

## COPPER HERITAGE

The Story of Revere Copper and Brass  
Incorporated

By  
Isaac F. Marcossou

*Author of Adventures in Interviewing,  
Turbulent Years, etc.*

Paul Revere is enshrined in American history as one of the outstanding patriots of the Revolutionary era. His famous Midnight Ride, immortalized in the Longfellow poem, however, was an incident in a many-sided career. Revere was not only the foremost silversmith of his or any other American time but, in a small mill at Canton, Massachusetts, in 1801, he founded the copper industry in this country. From that pioneer mill stemmed the great productive activity that has given us a metal supremacy.

Today the name, spirit and ideals of the master craftsman, Paul Revere, are perpetuated in Revere Copper and Brass Incorporated which entered upon its 154th year in 1955. It represents a merger, consummated in 1928, which united 25 per cent of the country's copper, brass and bronze

*(Continued on back flap)*

Copper  
Heritage

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MARCOSSON

DODD, MEAD

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Heritage

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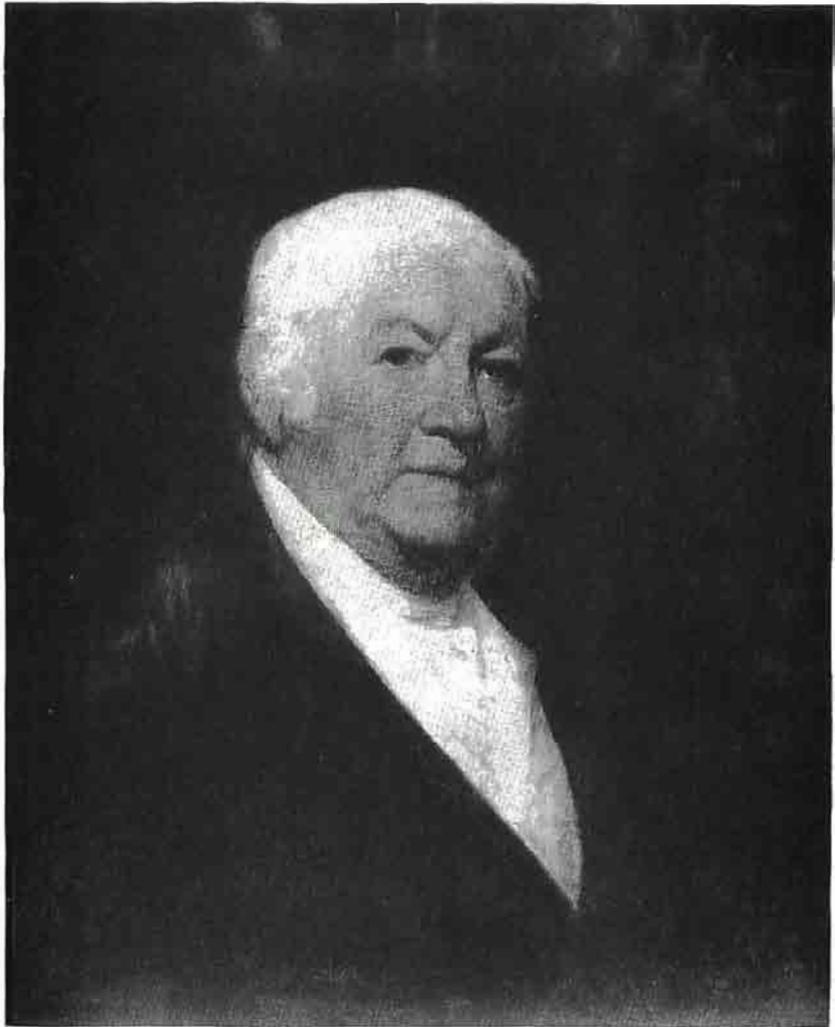
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COLONEL DEEDS—INDUSTRIAL BUILDER

METAL MAGIC

"MARSE HENRY"

INDUSTRIAL MAIN STREET



Paul Revere

# COPPER HERITAGE



*The Story of*  
REVERE COPPER AND BRASS  
*Incorporated*

ISAAC F. MARCOSSON

*Illustrated*

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NEW YORK

1955

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To  
*the memory of*  
PAUL REVERE  
*whose ideals endure in*  
*the company that bears his name*

## *Foreword*

**T**HE spirit of Paul Revere, builder, designer, artist and craftsman of early American silverware; pioneer in copper manufacture; and illustrious patriot who helped to forge American history, has been fervently captured in this story of Paul Revere and Revere Copper and Brass Incorporated.

The heritage of Paul Revere exemplified by his pride of workmanship, his industrial acumen in seeking new fields and his pioneer confidence as a builder endure through the author's pen down the years that have brought this early adventure in copper to the prestige and position Revere now enjoys. To our gratitude he has kept alive these things which are so truly American and which we, as members of the Revere team, have kept foremost in our planning.

This work will not only inspire present members of Revere but serve as a tribute to the past members of Revere and as a talisman to Revere men of the future.

J. M. KENNEDY

## *Acknowledgments*

FOR cooperation in the preparation of this book I am indebted to many. First are the past and present senior executives of Revere and the past and present Divisional Vice Presidents and their associates. The list also includes the Copper & Brass Research Association, the Aluminum Association and the advertising agency of St. Georges & Keyes, Inc. A particularly valuable service was rendered by Miss Mary Berthel whose expert typing of the manuscript was all that could be desired. I am especially indebted to Ralph Moran who wrote the booklet "Paul Revere Pioneer Industrialist" and did useful research for various Company publications.

Among the books, reports and periodicals read were the admirable "Paul Revere and The World He Lived In" by Esther Forbes; "The Story of Copper" by Watson Davis; "The Brass Industry" by William G. Lathrop; and "History of the Brass Industry" by C. F. Olson. I have drawn freely on my books, "Industrial Main Street—The Story of the Copper City" and "Metal Magic—The Story of the American Smelting and Refining Company." Other sources were the bulletins of the Aluminum Association, "Titanium for De-

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I.F.M.

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COPPER  
HERITAGE

*The Story of*  
REVERE COPPER AND BRASS  
INCORPORATED

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*Patriot and Industrialist*

INTO the tapestry of Revolutionary history are woven myriad figures of enduring interest. You envision the majestic face of Washington, the placid features of Benjamin Franklin, the alert visage of Thomas Jefferson, the serene countenance of Paul Revere and all the rest of the gallant company that strove, from Massachusetts to Virginia, to make a struggling young nation free.

In that galaxy of greatness the figure of Revere emerges with peculiar significance. His midnight ride, immortalized in the Longfellow poem, was an episode in a long and fruitful career that illumined craftsmanship and gave dignity and distinction to industrial output. He possessed, as has been well said, "the heart of a pioneer, the skill of a Cellini, and the zeal of a Crusader."

Revere was both industrial and political patriot. Due to his energy and foresight, the copper industry in this country came into being to serve the needs of war and peace. Just as he labored so mightily to help break the shackles forged by British oppression, so did he emancipate the fabrication of man's oldest and most useful metal from the thrall of oversea's dependence. Revere could not foresee, amid the manifold activities

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that engrossed him in those epoch-making times, that his honored name would give, in the years to come, title to a far-flung corporation dedicated to the high ideals of production and service that animated his industrial endeavor. A study of the man, his character and his methods, is therefore an essential prelude to the story of Revere Copper and Brass Incorporated.

The urge for freedom was instinct with Paul Revere. He sprang from forebears who abhorred tyranny. This abhorrence dictated the transplanting of one member of the family from the Old World into the New to start a strain that made history and enriched the American scene.

To find the root of the Revere family it is necessary, figuratively, to cross the Atlantic to the pleasant Midi domain near Bordeaux in France. This rich and productive area, with its vine clad hills and peaceful, verdant valleys, was the heart of what was termed the "Huguenot Country," which meant that it was a Protestant stronghold. For years since the revocation of the Edict of Nantes which had bestowed religious freedom, the Huguenots had been under a religious ban.

In Riaucaud, a picturesque village within easy riding distance from Bordeaux, lived Isaac and Serenne Riviori, sturdy, God-fearing peasants who owned vineyards which had been in the family possession for generations. As staunch Huguenots, they had felt the goad of intolerance but had somehow survived. At that time the great migration of Huguenots from France to foreign lands was in full swing. The emigres went to Holland, Switzerland and England. Not a few, however, sailed for America in search of the freedom to worship which was denied them in their native land.

The elder Rivioris realized that they were too old to join

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the migration so they sent their son Apollos. The thirteen-year-old lad went first to Guernsey, one of the Channel Islands, where his Uncle Simon, also an emigre, had settled. The family decided that Apollos should try his fortunes in America. Accordingly the boy was put aboard a ship and set forth on the long, storm-tossed voyage that ended at Boston. The year was 1713.

Before Apollos left home the family had decreed that he become a silversmith which happened to be a thriving occupation in Boston. So Apollos was apprenticed to John Coney, a leading craftsman, whose work was held in high regard. With his indenturing the boy entered upon what was akin to servitude to his master. Apprenticeship in those days, a survival of the medieval system, was long and hard.

Apollos showed great aptitude in his work. The very air of the Colony, with its liberty-loving people, stirred and exalted him. It was a happy change from the oppression that had driven him into exile. Apollos, however, was faced with one difficulty. The Bostonians could not pronounce his name. It followed that Riviori became Revere, and Apollos emerged as Paul. In this way was born the name that was to be emblazoned in American political and industrial annals.

When Paul was in his early twenties Coney died. The young man, still an apprentice, could have been "sold" under his indenture to another master. For £30, however, he could buy his freedom. How he raised the money is not known, but raise it he did. He was now on his own. At once he opened shop and soon prospered. Before he was thirty he married Deborah Hitchbourn. Twelve children, not an uncommon flock in those days, were born to them. The third child, a son, was

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baptized Paul Revere on January 1, 1735. He became the famous Paul. In the eighty-two years of his crowded life he was to add luster to the family name as patriot, craftsman and industrialist.

Following what was now a family tradition, the youthful Paul was destined to be a silversmith and was apprenticed to his father. His apprenticeship lasted until he was twenty-one. At twenty-two he was a master silversmith operating his own shop, with his younger brother Thomas as apprentice. In 1758 he married Sarah Orne who bore him eight children. Upon her death he married Rachel Walker and became the father of eight more children. Thus Paul Revere maintained the Boston tradition of abundant progeny.

By 1760 Revere had become the outstanding silversmith of his, or any other, American time. Every piece of Revere silver, each a gem of grace, workmanship and beauty, has become a collector's item, treasured in museums and private collections. Revere's silver, simple in design and substantial in weight, is characteristic of the life and fashion of his period in America. He produced tankards, platters, teapots, sugar bowls, creamers, spoons, cups, porringers and shoe and knee buckles. Many pieces were fashioned for churches. They include chalices, flagons and basins.

Revere's finest achievement in silver is the so-called Sons of Liberty Punch Bowl, which some consider America's most famous historical treasure outside the Declaration of Independence and the Constitution. It was dedicated to the memory of the members of the Massachusetts House of Representatives who voted their defiance of England in 1768. The bowl is now in the Boston Museum of Fine Arts. It was characteris-

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tic of Revere that he made a record of every piece of silver he made and of its disposition. In this way every product of his skilful hands can be easily traced.

Events that were to project Revere dramatically into widespread fame now began to shape. Some of his exploits, one in particular, are enshrined in legends and endure in song, poem and story.

By 1770 the spark that was to kindle the flame of armed revolt against England had been fanned into increasing life. England's regulations which were drastic restrictions soon evoked more than angry protests. Organized opposition flared. In Boston James Otis, John Hancock, Samuel and John Adams and Josiah Quincy thundered against what had become British oppression, while down in Virginia Patrick Henry gave the colonists the choice between liberty or death. The Sons of Liberty became a force for freedom; the Liberty Tree rose up in Boston. Then came the Tea Act. "Taxation without representation" was now the battle cry.

Revere became a ringleader in the seething drama of protest. Henceforth there was no patriotic activity that did not enlist his active support, whether afoot or horseback. Among other things he helped to organize the band of patriots who, disguised as Indians, pulled off the famous Boston Tea Party when 342 chests of tea, valued at £18,000, were dumped into the waters of the harbor.

The tea episode started Revere on the first of his many rides which made him the Patriot Express-Horseman of the Revolution. The initial ride was to advise the seaports adjacent to Boston to be on the lookout for additional shipments of tea from England.

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Before the outbreak of actual war Revere made many other trips on horseback as courier for various patriotic organizations. Many were between Boston, New York and Philadelphia. On one occasion he completed the round trip from Boston to Philadelphia in eleven days, a notable feat of endurance. It meant an average of sixty-three miles a day. Physical hardihood was one of the inheritances from his sturdy French peasant ancestors. Revere also carried to Philadelphia and New York the news of the Boston Port Bill which closed the port of Boston. On this trip he brought back the heartening news that Boston's sister cities would "stand by in the hour of distress." He was also the most important link between the Boston patriots and the Continental Congress assembled in Philadelphia.

The Boston Tea Party was the prelude to Concord, Lexington and "the shot heard round the world." Now came the ride on April 18, 1775, made famous in the Longfellow poem, known to every school boy and most of their elders as well. The oft-repeated tale merits a brief retelling.

The Committee of Safety, of which Revere was a member, learned that the British planned to march on Lexington and Concord and destroy powder and cannon which the patriots had collected. Revere volunteered to warn the people as to which route the Red Coats would take. Once more he leaped into the saddle and performed the task with his famous warning, "one if by land and two if by sea." With this ride Revere "galloped into history."

The horse ridden by Revere on the historic ride was named Brown Beauty and was borrowed from Deacon John Larkin.

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It was never returned to the owner. This undoubtedly resulted from the fact that Revere was picked up at the end of his ride by British pickets who seized the horse and turned it over to a sergeant whose mount had foundered.

Revere had little military experience. He held two commissions. One was as Lieutenant in the French and Indian War which netted neither action nor glory. During the Revolution he had the rank of Lieutenant Colonel and was, for a time, in command of Castle Island in Boston Harbor which the British had fortified.

In the midst of his arduous patriotic endeavor Revere was forced to meet and solve a pressing problem. His silver output, beautiful as it was, no longer had a market for it had become a luxury that Bostonians could not afford. Business depression had descended upon Massachusetts and elsewhere in the Colonies; times were hard.

Revere now turned to an activity that revealed his many-sided talents. He became a manufacturer of false teeth for which there was ample need. Men and women in their early twenties lost their front teeth due, as various authorities have pointed out, to excessive tea drinking and too much fruit and sweetmeats. It was typical of Revere that before he embarked upon the production of false teeth, he mastered all there was to know about the dentistry of the period. A set of false teeth for George Washington, who had half a dozen sets, is attributed to him.

Revere believed in advertising whatever product he happened to be turning out. His advertising, however, applied only to his wares for he was one of the most modest of men.

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Once he was prepared to turn out false teeth, he inserted the following advertisement in the Boston Gazette of September 19, 1768:

“WHEREAS many Persons are so unfortunate as to lose their Fore-Teeth by Accident, and otherways, to their great Detriment, not only in Looks, but speaking both in Public and Private:—This is to inform all such, that they may have them replaced with artificial ones, that looks as well as Natural, & Answers the End of Speaking to all Intents, by PAUL REVERE Goldsmith, near the Head of Dr. Clarke's Wharf, Boston.”

Meanwhile Revere had his first but slight contact with copper, the metal with which his name is so inseparably linked. The deft hands that had wrought such exquisite silver pieces could draw equally well. Although self-taught, he produced many copper plate engravings which came into wide demand. The plates included illustrations for books, magazines and book plates. Many of his engravings appeared in the Royal American Magazine. One of his best known engravings depicted the Boston Massacre.

Revere also engraved political cartoons for he was quick to realize the effectiveness of caricature to portray and intensify political feeling. He not only engraved the plates but made the press and printed the promissory notes of the State of Massachusetts Bay, as well as some of the earliest Bills of Credit authorized by the Continental Congress.

Revere rounded out his service to the Revolutionary cause with two activities. The American Army was in dire need of gunpowder. Once more an appeal went out to Revere

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as the man to meet the emergency, and he met it. He set up mills at Canton, destined to be the site of his historic pioneering in rolling copper, and at Andover. Being inland towns, they were immune from British attack.

Before starting the powder works Revere went to Philadelphia to look at the one efficient powder mill in the Colonies. The owner was not cooperative, permitting his visitor only to walk through the plant. Thus Revere had no time to study the machinery or talk to the workmen but his quick observation and retentive memory enabled him to set up the two mills in Massachusetts. For the first three years of the Revolution Revere furnished most of the gunpowder for the Massachusetts troops.

As the war progressed the need of cannon for the Continentals became as acute as the need for gunpowder. Again an appeal went to Revere and once more he was not found wanting. Soon he was casting cannon from iron and brass. This was his first operation in metal other than the silver he employed in his famous pieces and the small amount of copper for his plates.

The roster of Revere's activities before and during the Revolution provide an illuminating index to the man and his versatility. They disclose a fabric of achievement not surpassed by any of his contemporaries, certainly none outside the military domain. His varied experiences equipped him for his historic task once he turned to the rolling of copper. That, however, lay more than a decade ahead.

When peace sent the embattled Continentals back to normal pursuits, Revere resumed his work as a silversmith. His craftsmanship was unimpaired but, again, he found no market

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for his product. Nearly all of Boston's wealthy families, his onetime customers, were in exile. Business everywhere in the new-born republic was at low ebb. The struggle for the necessities of life precluded any luxury buying.

Revere now turned to a new occupation. In 1783 he opened a store on Essex Street. Among the products that passed over his counter were "hinges of brass," "sley bells," "truck bells" and other copper and brass products. He also sold fine cloth, wearing apparel, sand paper, blotting paper and pencils.

Mere merchandising, however, was a slow and irksome process for a man who possessed an active and creative mind. Furthermore, handling articles made by other hands went against the grain. His instinct was for production, the field in which he was to shine anew. He had the impulse to cast and to mold and now he set out to obey that impulse.

In 1788 Revere built a furnace on the tip of North Boston Harbor. It was surrounded by shipyards which, before long, were to provide an outlet for Revere products. At the start, they were spikes, bolts and other ship fittings.

After a few years Revere turned to still another occupation. He became a bell caster, a role which was to reveal him in a new light and bring a considerable degree of prosperity. Nothing, save his pioneering in copper rolling, so reflects his courage and determination as his entry into what for him was an absolutely new field.

To begin with, few church bells had been produced in America. With rare exceptions, which included the Liberty Bell, they were imported from England. As Esther Forbes points out in her admirable biography of Revere, "Nothing more musical than a cow bell had been cast in Boston." It

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meant that Revere had to equip himself for a task with which he was completely unfamiliar.

With characteristic thoroughness Revere launched his bell-casting operation. Some years previous, Colonel Aaron Hobart had set up a bell foundry at Abington, Massachusetts. As with dentistry, Revere was determined to master every detail of his new work. He visited Hobart and discovered that he was about to retire from business. Hobart's son, however, who had been associated with his father, was at a loose end. Revere hired him and also engaged another employee, a foundryman—a deserter from the British army—who had worked at a bell works in England before the war. With this staff of two men Revere began his bell casting in the foundry on North Boston Harbor.

Up to this time Revere had never cast any metal other than silver. Now he had to deal for the first time with copper in considerable quantity. He had previously experimented with alloys and heat-treating metallurgical processes. This experience was useful in the new enterprise which took full measure of his capacity.

Revere cast his first bell in 1792. It was not altogether a fit mate for the 397 Revere bells that followed but it was acceptable. Moreover, it was the first bell to be produced in Boston. The bell was sold to St. James's Church in Cambridge. The edifice had no bell tower and the bell was never hung. It rests today in the nave. Instead of putting a pious inscription on his first bell, as was the custom then, he inscribed these words on his initial product: "The first bell cast in Boston. 1792. P. Revere."

Many of the Revere bells hang in Boston and elsewhere in

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New England and still sound their sweet-toned call to worship. Perhaps the best known was cast for King's chapel. It weighed 2,437 pounds and continues in use. In Hancock, New Hampshire, a Revere bell is in constant use for summons to church, to town meetings and as a clock bell. Revere cast a bell for the famous frigate *Constitution* (Old Ironsides). It was shot away in the historic battle with the *Guerriere*. One of the Revere bells has this inscription:

"The living to the church I call  
And to the grave I summon all."

When Revere used copper in the casting of his bells, the "red metal," figuratively, entered his system. Henceforth it was to be a sort of lode star to guide him to his epoch-making achievement.

What actually started Revere on the road to the first American copper rolling mill was the birth of the American Navy in 1795. He was quick to realize that copper and copper alloys—then as today—were critical materials in what is called defense economy. Copper was needed for the bolts, spikes, dovetails and nails necessary to make a ship seaworthy. Copper was also needed to sheathe the wooden hulls of merchantmen and men-of-war alike as a protection against barnacles and the wear and tear of ocean traffic.

Revere's debut as purveyor to the Navy came when the iron bolts for the *Constitution*, then building near his foundry, were found to be defective due to rust. Revere asked if he could replace them with copper bolts and received the award for the work. Soon he was supplying copper sheathing for American vessels. He knew that the one vital durable metal

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to be employed for ship fittings was copper. "Copper for ships" became the slogan.

There was another motivating factor behind this slogan. The raw material; that is, the copper sheets for Revere's products, were all imported from England. Britain still had the monopoly on the refining and rolling of copper. An ample ore supply and cheap labor gave her what was then an unassailable supremacy.

Revere was determined to break that monopoly. Patriotic service, as well as economic need, dictated the resolve. It became an all-absorbing ambition that dwelt with him day and night. The time was now at hand when that ambition would be realized. Revere was on the eve of his great adventure.

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*An Industry Is Born*

WHEN the dawn of the Nineteenth Century broke, the United States, her ties to England severed, was a free political agent lifting her young head among the nations of the earth. In one vital respect, however, the new republic was not free. Native copper was lacking and copper was essential to her infant industry. As already pointed out, it was supplied by England and Wales, then practically the sole refiners and rollers of the much needed metal. It remained for Revere to redress the situation and give the United States an economic freedom. Before we embark on that history-making achievement it may be well to know something about the origin and development of copper, "the metal of destiny."

No metal, save perhaps gold, has so romantic and picturesque a background. It is bound up in history and legend down the ages, unfolding a narrative of compelling and dramatic interest.

Copper was the first metal used by the human race. Eight thousand years before the dawn of the Christian era it was known and employed by the Incas in Peru, the Egyptians, the Chinese, the races of Asia Minor and some European peoples, principally the Romans and Greeks. The first source of copper

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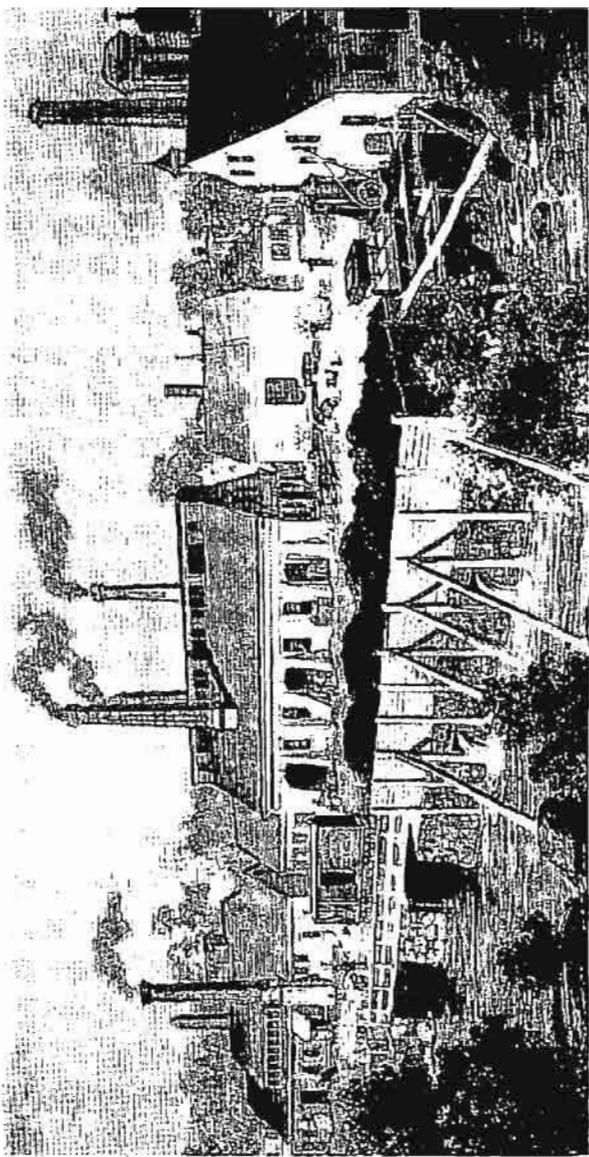
is generally attributed to the Island of Cyprus. Certain it is that in this area the metal received its initial name. The natives called it Cyprium metal. Subsequently the Romans termed it Cyprum. Later it became copper.

Copper recorded a significant era because copper, mixed with tin, produces bronze, the first metallic compound or alloy in use. Hence the Bronze Age. Copper eventually became the base of more recognized alloys than all other metals combined.

Copper was originally found in its native state. When this supply gave out, people were forced to dig for the ore. This launched the age of mining and man has been a miner ever since.

The next step was primitive smelting. Various legends tell the story of this pioneer operation. One is that in the Caucasus ignited oil seepage came in contact with an outcrop of ore and the metal was revealed. Another story relates that a primitive man dropped his flint knife into a camp fire. After he recovered it he saw a bright glow in the ashes. It was copper. Still a third legend is that metal reduction was discovered through the action of a forest fire which reduced metal from an outcrop. Whatever the crude beginnings, those accidental happenings were the outposts of the vast smelting and refining domain that today is one of the marvels of the machine age.

Because of its malleability, toughness, corrosive resistance, conductivity and capacity to alloy, copper became the indispensable metal emerging as "the handmaiden of electricity." Without it the Age of Electricity with its myriad contributions to the work, comfort and convenience of mankind, would never have reached its stupendous development. Such



Paul Revere's Copper Rolling Mill at Canton, Mass.



Edward H. R. Revere

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is the world's debt to copper.

Since Revere also worked in brass and because brass, like copper, enters so largely into the fabrication effort of Revere Copper and Brass Incorporated, it is important to get a brief view of the background of this metal. As was the case with copper, the production of brass prior to the Nineteenth Century was virtually a British monopoly. The modern method of making brass by the direct fusion of copper and zinc was invented in England in 1787.

There was no Paul Revere to initiate the brass industry in the United States. Its introduction came decades after that gallant pioneer had been gathered to his fathers. Until the beginning of the Nineteenth Century the center of our brass production was in the Naugatuck Valley of Connecticut, still a stronghold. The most important early influence on the industry in the Valley was the manufacture of culinary vessels from tin which was, in the beginning, a household activity started by William and Edward Pattison in 1746. From this humble launching developed a considerable business through peddlers who ranged from Quebec to Charleston, South Carolina, and even across the Mississippi.

It was not until 1837 that Chauncey Jerome, a Connecticut citizen, perfected a one-day brass clock which led to a demand for brass. Meanwhile, pewter and britannia ware came into manufacture by skilled workmen imported from England. The first nickel silver produced on this side of the Atlantic also was produced. These, and other kindred ventures, formed the background of the brass industry in the United States.

The decade between 1820 and 1830 saw the first experi-

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mental stage in the growth of the industry in Connecticut. All raw materials were imported. Scrap copper was employed. By 1830 manufacturers were making their first attempts to meet the English product in the open market. Two companies were established at Waterbury. One was Leavenworth, Hayden & Scovill; the other, Benedict & Burnham. The former concern started output with brass buttons then in great demand for military uniforms. Then it turned to rolling its own brass, the first to be rolled in the United States. A third pioneer was Israel Holmes whose resource and personality dominated the early history of the industry. Originally in the employ of the Scovill firm, he organized four brass companies including the Waterbury Brass Company, all prominent in the business. It was Holmes who smuggled skilled labor out of England and brought back better methods of production and the latest machinery.

During the period up to 1850 the market for brass made in this country expanded. The original distribution of the product sprang from the old tinware business for again peddlers brought the products of the Naugatuck Valley to the doors of purchasers. Selling agents then superseded the peddlers and the industry became organized as a business.

The most important factor for the localization of the brass industry in Waterbury was the residence there of the pioneers in the field. The contract system, early in use in the Valley, also went a long way toward fixing control there. Another reason why the brass industry flourished was the favorable protective tariff which enabled the industry to meet the competition of foreign products.

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The corporate set-up had a value all its own. The large profits were reinvested which accounted for the early increases in capitalization. All the pioneer brass concerns were closed corporations. As soon as new products, such as pins and clocks, were introduced new plants were set up for their independent manufacture. By 1850 profits lessened because of the competition between American companies. In the interim brass made in this country forged ahead of the British product.

One interesting fact marked the early stages of the brass industry. The American Brass Association, organized in 1853, formulated the earliest trade agreement in this country. It was signed by every brass mill in the Valley and was at first primarily concerned with prices. Three years later it sought to regulate production by a pool which saved more than one manufacturer from serious loss.

By 1884 the Naugatuck Valley was producing eighty-five per cent of the rolled brass and brassware in the United States. The Valley continued its supremacy in output until the turn of the century. Prior to that time brass mills had begun to spring up in various parts of the country. One of the first was Rome Brass & Copper Company. Another was Michigan Copper & Brass, while a third was Higgins Brass & Copper in Detroit—all destined to come within the orbit of Revere Copper and Brass Incorporated.

We can now return to the sequence of events which involved Paul Revere. All through the closing years of the Eighteenth Century, Revere worked at the process of rolling copper. A hint of what the future held is indicated in a letter he wrote in 1798 to Benjamin Stoddert, then Secretary of the

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Navy. The letter is historic because it may well be said that it forecast the start of the copper rolling industry in this country. This is what he wrote:

"I understand that you have advised the Committee for building the Frigate in Boston not to send abroad for anything they can get manufactured in this Country; those Sentiments have induced me to trouble you with this letter. I can manufacture old or new Copper, into bolts, Spikes, Staples, Nails, etc. or anything that is wanted in Shipbuilding. . . . I supplied the Constitution with Dove-tails, Staples, Nails, etc., etc. My greatest difficulty is to get old Copper. Could I get a sufficient supply of Copper, I would undertake to roll Sheet Copper for Sheathing Ships, etc. . . . You will permit me to offer my services to you in Manufacturing Brass Cannon, Bells, Copper Bolts, Spikes, etc."

It is obvious from this letter that Revere had already solved the problem of rolling copper sheets. The great revelation, however, was made in a letter to Congressman Harrison Otis written March 11, 1800 after he had replaced the bolts on the *Constitution*. The letter reads:

"After discoursing with a number of old Copper/smiths, they one and all agreed that they could not melt copper, and make it so maleable as to hammer it Hot. I further found, that it was a secret in Europe that lay in but very few Breasts. I determined, if possible, to gain the Secret. I have the satisfaction to say, that, after a great many tryals, I have . . . obtained my wishes."

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Revere, at long last, had found the secret upon which he founded an industry. The big task that now loomed ahead was to translate that secret into action. This meant a rolling mill, and a rolling mill entailed a considerable expenditure. In the rolling mill—center and backbone of the industry—the metal is prepared for the coppersmith to be employed for the manifold uses to which the sturdy metal is put.

Revere needed money so he turned to his best customer, which was the United States government. He appealed to the Secretary of the Navy for a loan. The appeal was frustrated, for a time at least, by a Colonel Humphries. The Colonel was acquainted with the difficulties that lay in the way of copper rolling and advised the Secretary that no man in America could make copper malleable.

It followed that Revere's letter of appeal accumulated dust in office files for months. Subsequently Humphries met Revere and discovered that there *was* a man in America who could match the British in working copper. It was a fateful meeting for Revere. Humphries now corrected the wrong impression that he had given the Secretary of the Navy. In consequence, Revere received the promise of a government contract for copper. The contract included a \$10,000 loan which was to be repaid in copper.

Like many another official promise concerning a government loan in those days, there was delay. The capstone was placed on Revere's dilemma when the promise of government support was withdrawn. Jefferson had become President; Stoddert was replaced as Secretary of the Navy by Robert Smith. When Revere renewed his plea for the promised contract which meant a loan, he got this reply from Smith:

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"I know of no law which authorizes this Department to lend money for the creation of copper works."

Revere, a patient man, was qualified to deal with people. His temperate reply, which follows, convinced the Secretary that he was in error:

"I was sensible . . . there was no law for the purpose . . . the fact was, I had contracted to manufacture Copper Bolts, Spikes, etc. sufficient for two seventy-four ships . . . when a place for a Rolling Mill offered . . . I knew that the Congress had appropriated a large sum of Money for building those ships; and that the United States was obliged to procure their Sheet Copper from Foreigners. I acquainted the Naval Agent here, that if the Government would advance me 10,000 dollars on my giving them sufficient security to deliver the Sheet Copper, or repay the Money, I would go on with the Rolling soon after. He acquainted me, that He had the assurance that the Money should be advanced to me. I bought the place, and am completing the works . . . I had no doubt but the present Administration would have fulfilled what the last had engaged. It is exceeding hard that an individual should suffer, when he is exerting himself for the good of the Government."

Another factor contributed to Smith's change of heart. Tripoli had declared war on America and our Navy went into action against the pirates who had operated against American vessels. It meant that the Navy needed copper. Revere was the

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man who could provide it.

As the century neared its end, Revere was engaged in assembling materials for his mill. He was putting every dollar he could scrape together into the project. Witness his own statement concerning it: "I have engaged me to build a mill for Rolling Copper into sheets which for me is a great undertaking and will require every farthing which I can rake or scrape."

The site of the mill was two adjoining pieces of land on the Neponset River in what later became the town of Canton, sixteen miles from Boston. An abandoned gunpowder mill had once stood on the location. The purchase was made early in 1801 from a firm of iron founders. The price was \$6,200, a considerable sum for those days. The property acquired included a dwelling house, trip-hammer shops, and what was called a "cole" house. Every building needed repairs. Several supplemental structures had to be erected.

Except for a few water wheels, there was no power back in that period but the muscle power of man and beast; no land transportation save by horse, or coach. There were no good roads. Revere had water power for his mill but a lawsuit was necessary before he could avail himself of it.

Revere could have obtained the rolls for his mill from American foundries. Always the perfectionist, he decided to get them from England where the most finished products were being turned out. With the delivery of the rolls he was ready to begin work. On October 24, 1801—a date that will endure in American industrial history—Revere rolled his first copper sheets. With these sheets Canton became the cradle of the copper industry in the United States.

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It is generally agreed that the year 1801 is as important to our industrial history as 1776 is to our political annals. The little mill at Canton helped to usher in what became the century of vast mechanical development, the so-called machine age, with its fabulous output. Far ahead lay the marvels of the telephone, the telegraph, the airplane, the submarine, the motor car, the radio, television, steam transport, electronics, endless electrical gadgets and finally, born of war, the atomic and hydrogen age.

When Revere started operations he had just nine and a half tons of copper. He hired fifty workmen, which for that time was something of a host. The workers received two dollars a day. When people expressed wonder at what was considered excessively high pay, Revere said: "I want my workers to be content."

Revere followed the rolling mill operation then in vogue in England. A pig of copper was heated to a glowing red, then beaten by a hammer and cut by wheel-driven shears into pieces of convenient length. These pieces were returned to the furnace and heated again. Each glowing piece was now thrust between a pair of rollers made of case-hardened steel. As one man thrust the piece between the rollers, another seized it with tongs as it passed through. A second man lifted it back over the upper roller to his partner who adjusted a screw that brought the rollers closer together. This was repeated until the copper was rolled to the thickness desired.

Revere had to improvise a rolling mill so that when he had melted down his metal, refined, poled, skimmed it and judged it to be just the right color and pitch, he could make it into plates, sheets and other forms by passing it between rollers.

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Revere used wood for fuel and could refine 1,800 pounds at one time.

There has been practically no basic change in the operation just described. The big difference, of course, is that modern labor-saving machinery, steam or electrically-driven, has done away with hand work. Copper cakes are used now instead of the pigs of Revere's day.

Revere's contract with the government, which still hung fire, was predicated upon the delivery within eighteen months of 20,000 pounds of what was termed "quality sheathing" for the Navy. If this were acceptable, the loan of \$10,000 would be forthcoming. His equity at Canton was pledged to the government as security for the loan. Revere reported to the authorities that he had rolled enough copper to repay the loan. Still there was no report from the Navy. It meant that Revere was on his own, so far as capital was concerned. He had already expended \$12,000 of his money on the mill. Employees had to be paid. Furthermore, it was necessary to buy copper for rolling and this was a cash transaction.

At this juncture Revere had what we would call a "break" which bolstered his finances. The new State House in Boston, designed by Bullfinch, needed 7,675 pounds of copper sheathing for its dome and also 789 pounds of copper nails to hold the sheathing fast. Revere got the contract. The State promptly paid the bill which amounted to \$4,232. Revere was now able to meet his payrolls. It is typical of the quality of the Revere output that the sheathing on the State House dome lasted for more than a century. Subsequently Revere furnished the copper for the dome of New York's City Hall.

The Federal Government still lagged in the matter of the

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loan to Revere, despite the fact that his copper sheets had been approved by the official inspectors. This letter from Revere to the Secretary of the Navy explains his plight:

"We beg leave to mention that it is more than two years since we have received one shilling from the Government tho we have been at work for them the whole time; that there is near \$15,000 due us, besides which, should you agree to take our 28 and 26 ounce copper that we mentioned in our last, we shall be able soon to finish the whole of our contract, when there will be due to us between \$24,000 and \$25,000. . . . We are now distressed for money. . . . You may be sensible that it requires Considerable Capital to carry on a Business the stock of which cannot be purchased but with Cash."

Navy orders continued to roll in but payment did not follow in their wake. Revere was distracted for money but he kept doggedly on. The *Constitution* came home from Tripoli and needed sheathing. Revere provided it. The ship's log for June 26, 1803, contained this entry:

"The carpenters gave nine cheers which were answered by the seamen and calkers because they had in fourteen days completed recoppering the ship with copper made in the States."

It is interesting to note, in this connection, that from the day when Revere began to copper the Navy, the original Revere organization and its descendants have done business with the Navy. Revere technicians have worked side by side with government experts on the many problems relating to the use of copper and copper alloys that have arisen as our fighting

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ships have grown in size and power.

One other fact is worthy of comment. When Revere started his copper mill he was sixty-five, in these days the age when men have retired from active business or think of retiring. Not so with Revere. His was the period when men stuck to their jobs until death or physical disability overtook them. Revere still had seventeen years allotted to him and he made the best possible use of them retaining his vigor almost to the last.

Revere's chief problem was to obtain a supply of old or stock copper sufficient to meet the increasing demands for his sheets, especially from the Navy. At that time the bulk of copper used both in England and America came from Turkey, Sweden, Russia and South America. There was no American copper save the comparatively small amount that came from Maryland. Revere then made what was considered an audacious proposal to the Navy. In substance it said: "Since your ships are constantly coming back from distant parts, why not let them carry copper as ballast on the journey home?" The Navy thought it was a good idea. The result was that when next time the *Constitution* returned from Turkish waters the hold of the gallant ship was filled with copper. There were no further difficulties about the Revere copper supply.

In 1804 Revere took into the business as partner his son, Joseph Warren, named after the heroic doctor who died at Bunker Hill, allocating to him a one-third interest which his father valued at \$16,200. The articles of partnership were quaint. Paul Revere was listed as "Gentleman" and Joseph as "Bell and Cannon Founder." Revere was still casting bells at the North Boston foundry. The firm became Paul Revere & Son.

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Joseph Warren Revere maintained the paternal tradition of high character and conscientious effort. Always eager for information and desiring the firm to have the benefit of the latest developments in the industry, Paul sent his son abroad on a fact-finding mission. He visited England, Wales, France and Scandinavia, all copper-working countries, returning in 1805 equipped to advance and expand the business. While abroad Joseph worked in copper mills to master technological processes at first hand. Joseph's trip marked the first essay into industrial research by an American concern.

Paul Revere was now the accredited head of the copper industry in this country. His output matched the best that Britain could produce and it was much in demand. An epoch in transportation had been launched by Robert Fulton with his first steamboat, the *Clermont*. Fulton turned to Revere for the heavy copper needed for his vessels. The exact dimensions for the plates were sent to Canton and fabricated there. Copper from Canton went into all of Fulton's ships from the *Car of Neptune* to *Fulton the First*, the first steam warship which was launched after Fulton's death.

Revere not only pioneered the copper industry in this country but his example inspired others to enter the field. The first was Levi Hollingsworth, a Baltimore merchant and member of a shipbuilding family, who started the Gunpowder Copper Works near his native city in 1804. The full story of Hollingsworth's operations will be told in the next chapter. Sufficient to say here, the corporate descendants of Hollingsworth's enterprise are today units in the Baltimore Division of Revere Copper and Brass Incorporated.

Revere was now to feel the sting of the proverbial ingrati-

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tude of republics. He had, at immense effort, risk and financial outlay, founded the copper rolling industry in America. In time of need he had provided the Navy with copper that made our fighting ships the most seaworthy in the world. As early as 1807 he became the victim, so to speak, of the new tariff. At that time much sheet copper was still imported from England. The British had easy access to ore and large quantities of old copper. Their experienced workers received a lower wage than the American workers. They could therefore undersell Revere and the other American producers.

Revere felt that the new tariff, or rather, as he termed it, the "muddled" interpretation of it, imposed a drastic hardship which should be removed. He stated his case in the following letter to Josiah Quincy:

"Now what do we pray for? Only; that the Laws made by Congress may have their natural and just force. The Act says, all copper manufactured, shall pay a duty of 17½ p. ct. But Copper in plates, pigs and Bars shall be free . . . to make raw materials in Copper free; to encourage the importing of it."

Revere further pointed out that sheathing was not a raw material but a manufactured product. He was taxed on raw material and forced to pay full tariff on old sheathing which, ripped from ships in foreign docks, was an important source of copper.

Revere and Hollingsworth were friends. The Baltimore industrialist frequently called on Revere for technical advice and got it. Since both suffered alike under what they termed the injustice of the new tariff, they joined forces and, in 1813,

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petitioned Congress for relief, which meant a more equitable interpretation of the regulations governing imports of copper sheets. Congress ignored the petition. Copper in sheets and bolts still came into the country without payment of duty. Eventually the now expanding American copper industry obtained the much-needed relief.

With the outbreak of the war of 1812 Revere was equipped to meet the emergency. By 1813 he was producing three tons of copper products a week. Most of it went to the Navy. The war amply demonstrated the fitness of American warships. The Revere-coppered ships, notably the doughty *Constitution* in her battle with the *Guerriere*, outfought the best ships of the British Navy and registered a heroism that became a proud tradition.

Revere's contribution to the war of 1812 was his last major effort. Time was closing in on him to take its ruthless toll. He was still erect and took a keen interest in his business. He knew he could leave it without impairment for it was in worthy hands. Joseph Warren Revere had the Revere integrity not only of character but in output as well. On May 10, 1818, and on a Sunday, Paul Revere died in his eighty-fourth year. His country was at peace and he was at peace. Now he ranked with the immortals of the American scene.

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*Paul Revere's Spirit Endures*

THE Revere business, like John Brown's body in the famous song, went "marching on." Following the founder's death, depression settled down once more on the United States. To diminished demand for copper was added increased competition from abroad. Foreign countries, England in particular, began to dump goods on the American shore with disastrous results for American enterprises. Mills shut down, business failures mounted; unemployment became widespread.

Small wonder that the now aroused American producers, Revere & Son among them, sought retaliatory measures. In consequence, the Tariff Act of 1816 was enacted. It aided many concerns but, as usual, it brought no relief to the copper industry. Foreign sheathing remained untaxed. This provision, combined with British dumping of metal, imposed a severe strain on Revere & Son. Joseph Warren Revere, however, like his father, was both executive and craftsman. He managed to keep the company afloat amid the disasters that still crowded thick and fast upon so many American businesses.

To the widespread depression was now added, so far as copper production was concerned, the advent of competition

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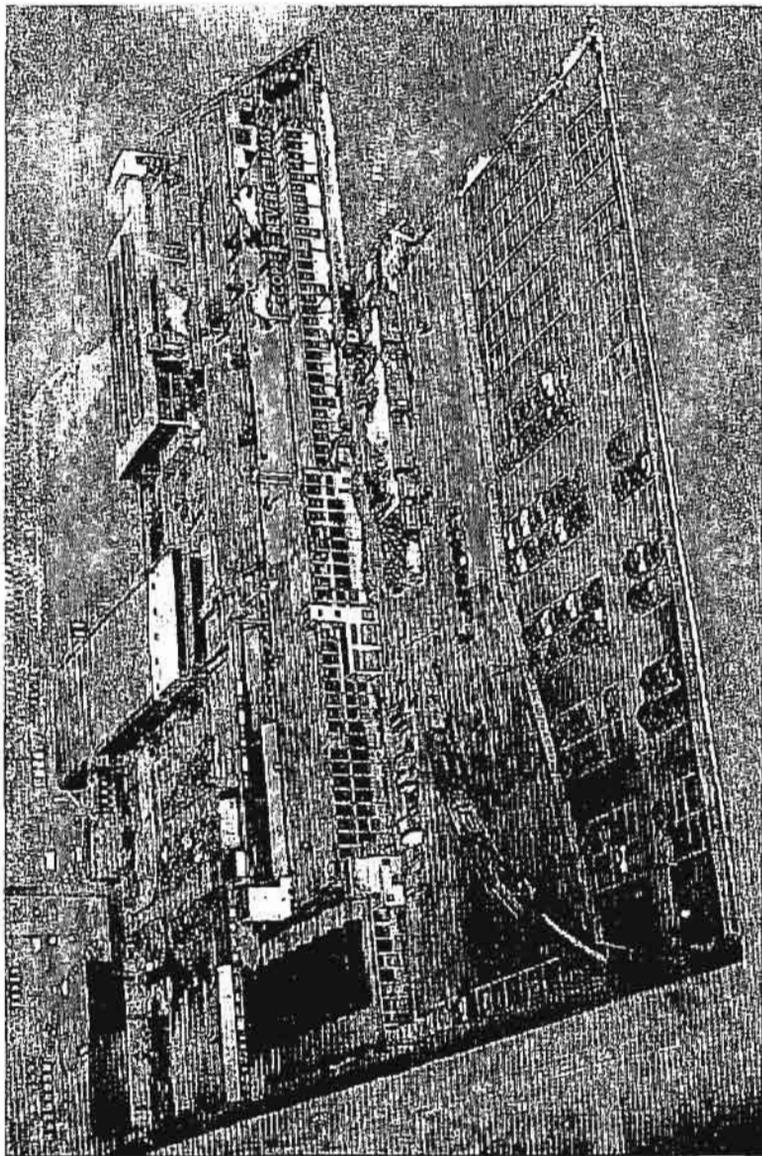
in the industry. Levi Hollingsworth down in Baltimore was the first competitor. Next came the Crocker Brothers in Taunton while a third arose in the Swift's at New Bedford. All these enterprises, each with a distinctive contribution to the industry, were destined to become a part of Revere Copper and Brass Incorporated.

Despite the growing competition Revere & Son remained supreme in their field. Although the Navy had invoked competitive bidding, Revere captured the bulk of the business because improved methods and quantity production at Canton constantly reduced the price of their products. Merchant shipping followed the lead of the Navy. Typical of Joseph Revere's astute management was a contract with the Navy for 257,750 pounds of copper augers for the Charlestown Navy Yard at thirty-six cents a pound. Revere was able, thanks to the lowered costs of production, to cut the price of copper for two Navy schooners by one half.

Up to 1828 the Revere concern had been an exclusive family affair. Now outsiders, that is, individuals not of Revere blood, entered the business. The new association was with James Davis & Son of Boston who operated a brass foundry where a composition casting for ships that Revere coppered was turned out. The elder Davis, a native of Barnstable, had learned the trade of brass founder in Boston. In 1828 the Revere and Davis businesses were combined with the title Revere Copper Company. Joseph Revere became President; James Davis, Sr., Treasurer, while Davis's son, James, Jr., was named Agent in Boston. Samuel Walker Lincoln took over the post of Agent at Canton. Lincoln's mother was a daughter of Paul Revere. This fusion of firms was the first of a series of copper and brass



Barton Haselton



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mergers that were to have their rich and final fruition in Revere Copper and Brass Incorporated. The Revere-Davis consolidation strengthened the pioneer business and enhanced its prestige.

Union with the Davis concern coincided with the beginning of a boom throughout the United States. Canals were being built, the outposts of what became the great nationwide network of railroads were laid down; the vast and hitherto undeveloped lands of the Middle West were being opened up. "Westward the Star of Empire" was pointing the way. Land speculation, made possible by paper money, became frenzied. Then came the bursting of the bubble. It followed Andrew Jackson's Specie Circular which ended payment for land with paper money. Panic ensued with a huge toll of bank failures and closed factories. Depression stalked the land.

Under Joseph Revere's wise and prudent leadership the Revere firm rode the storm successfully just as it had weathered previous depressions. While the recession was at its worst the firm delivered 150,000 pounds of copper to the Charlestown Navy Yard. It was typical of how the business carried on.

In 1844 Revere operations were broadened and strengthened with the establishment of the Point Shirley works for refining copper ore. It was the first American plant to employ the Continental process and marked an important step in the history of copper metallurgy in the United States. Point Shirley was a promontory in Boston Harbor five miles from the city. The area, which covered nearly six acres, was favorably situated since it faced the water on three sides. The wharf was capable of docking and unloading the largest ore-laden vessels from South America, Chile in particular, which had be-

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come an important source of ore. Once roasted at Point Shirley, the copper was taken to Canton for firing in the four furnaces there. The Point Shirley plant helped to keep Revere & Son in copper for twenty-eight years.

After nearly thirty years of successful operation the Point Shirley Works were "legislated" out of existence, as a result of the tariff placed on foreign ores in 1868. Deprived of foreign ore, the works operated for several years on the limited supply of domestic ore but were forced to shut down in 1872. This was before the vast ore deposits in Arizona, Utah, Montana, Michigan and elsewhere in the United States had been tapped to give us a metal supremacy.

The Civil War tested the resources of the Revere Copper Company and the firm rose to the emergency. The echoes of the bombardment of Fort Sumter had scarcely died away before the Army and Navy were piling up orders for ordnance and copper. Revere specialized in twelve pounders and under urgent stimulation from the Army was able to produce a gun a day. The Navy, too, was hungry for armament. Revere delivered fifty naval howitzers in what was then record time. Many of the guns of Farragut's fleet in the great attack on Mobile came from the Revere works. Revere also furnished many thousands of copper ingots for the Washington Navy Yard. These instances, a few among many, indicate the extent of Revere's contribution to the War between the States.

After sixty years of devoted service Joseph Warren Revere died in 1867 and was succeeded as President of the company by Frederick Walker Lincoln. Joseph, worthy son of an illustrious father, brought added distinction to an honored name. After Lincoln's death in 1869, James Davis, Jr., took over di-

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rection of the company.

Following the death of Davis, S. T. Snow became President. When he died in 1881 John Revere, grandson of Paul, took over as his successor. John Revere had served as Clerk of the Corporation, Acting Agent in Boston, Treasurer and head of the works at Canton. His health had never been robust and he died at the age of sixty-four, an unusual time for a Revere. Henry Winsor then became President.

During the period when Winsor served as President two other Reveres were active in the operations of the firm. They were William Bacon and Edward H. R., both sons of John Revere, representing the fourth generation in the family. William Bacon headed the works at Canton while Edward H. R., born October 12, 1867, became clerk in the Revere Boston store. The Revere firm occupied four Boston stores in succession. The one at 47 Kilby Street was destroyed in the great Boston fire.

During John Revere's incumbency as President, tremendous transformations marked the course of the copper industry. The first of the epoch-making changes related to shipping. Wooden vessels, which had required so much copper sheathing, were passing out of the picture. Iron and steel ships were taking their place on the ocean lanes of the world. New horizons, however, would compensate the copper industry for the loss.

The second momentous change was linked to electricity with what became its fabulous use of copper. Alexander Graham Bell had been able to transmit the sound of the human voice through a copper wire. The telephone was born. Thomas A. Edison had perfected the electric lighting system

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whose current also ran through copper wire. Always the most useful of metals, copper now became indispensable. "Copper, while losing one market, was gaining an empire."

Coming events, one in particular which was to make industrial history, were casting their shadows before. The Revere concern had already been involved in one merger. Another was now to be effected. In 1900 the Revere Copper Company was merged with the Taunton Copper Manufacturing Company and the New Bedford Copper Company. Out of this emerged the Taunton-New Bedford Copper Company. When the companies joined, destiny completed an inevitable link among the pioneers in the copper industry of New England.

We can now go into the detailed story of the two companies that joined the Revere Copper Company in the 1900 merger. Chronologically the Taunton concern came first. In the town of Norton in Massachusetts at the turn of the century lived the three Crocker brothers: Samuel L., George A., and William. The first scene of their operations in metal was Norton where they began rolling copper in a water-power plant, employing the process initiated by Paul Revere. Although competitors of Revere they were friends and customers. As early as 1803 Revere sold the Crockers gun metal, brass, copper and tin. The Crocker plant prospered to such an extent that it was moved to Taunton where, in 1826, the business was incorporated under the name of the Taunton Copper Manufacturing Company. The Crocker's were refiners as well as fabricators of copper. Their principal output then was copper sheathing for ships.

The Crockers became the outstanding citizens of Taunton. If a person came to the town he could not avoid some

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kind of commercial contact with them. They owned most of the real estate, controlled water power, textile mills, the iron foundry, and most phases of retail service. The people of Taunton farmed Crocker land, rolled Crocker metal, ate Crocker food, and wore Crocker calicos. The brothers maintained a more or less benevolent despotism until the specie panic of 1837 when the family holdings were reduced by the deflation of real estate values. The metal production, however, went on apace.

Soon after the incorporation of the company Samuel Crocker went to England to study the techniques of the British metal industry just as Joseph Warren Revere had gone in 1804. While there he learned of a new copper alloy invented by George Frederick Muntz in 1832. It was the so-called "Muntz Metal," made of copper and zinc and especially suited to ship bottom sheathing. Crocker brought the formula back to Taunton and the Taunton "Yellow Metal," as it was termed, went into serious competition with pure copper sheets. How formidable was the competition is evidenced by the fact that it sold for three cents a pound less than pure copper.

In 1848 the enterprising Crockers brought over William H. Muntz, son of the inventor, and installed him as plant superintendent. They also imported skilled British workers to produce the yellow metal. Thus began the Yellow Metal industry in New England. The Revere Copper Company was quick to realize the value of the Muntz Metal and built a large brick mill to roll it. In 1888 the entire Crocker works, greatly expanded, were consolidated in Taunton.

The Crocker brothers believed in diversified output. During the third decade of the century they began to manufac-

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ture printing rollers for the rapidly growing textile industry of New England. At the American Institute Fair in New York the Crocker's rollers won first honors among all competitors in the field, a distinction that Revere carries on to this day.

Taunton production also included stamping planchets for the large copper one cent pieces of that era. They were more successful in one sales venture than Paul Revere. Soon after the Revolution, Revere tried to sell the Government copper planchets or flat copper discs for the stamping of pennies. The copper penny of that time was several times larger than the Indian head or Lincoln penny of today. The Mint turned Revere down and continued purchasing the copper discs from Europe. In 1834, however, the Crocker's supplied the Mint with forty-six boxes and nine cases of planchets valued at \$2,800.

The growing business at Taunton led to a need of additional water power to turn the water-wheels of the mills which pressed the billets of copper and yellow metal into sheets. In 1836, the Crocker's protected their immediate production requirements and their future needs by securing valuable water rights on the Wading River just above their plant at Norton. The river was dammed and a feed canal built providing an increased head of water.

The year 1838 was the trough of a depression that carried many leading business firms of the country to disaster. Few of the survivors had enough profits to warrant a dividend to stockholders. That year the Taunton Copper Manufacturing Company declared a dividend of \$200 on its outstanding shares.

The early growth of railroading interested the Crocker

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brothers who recognized the superior qualities of copper over iron in the manufacturing of tubing for locomotive boilers. On October 27, 1838, they announced: "Having commenced the manufacture of Copper Tubing for Locomotives it is our intention to carry on this branch of business extensively in future." For twelve years this type of brazed pipe was manufactured at Taunton until the introduction of seamless pipe in 1850 put an abrupt end to this phase of operations.

Taunton's enterprise gained for the Crocker's a contract to furnish the copper roofing for the United States Post Office Building at Washington in 1841, and the invoice mailed on June 5th, called for the payment of \$4,811.82. Coincident was a new development in shipbuilding, one in which Taunton was to gain a place on the pages of maritime history. This distinction developed from the speed of the swift American clipper ships, built of the best oak, Southern pine and hackmatack and sheathed with Taunton Yellow Metal. These vessels were winning the envy and admiration of the world. Their speed cut days from the trip around the Horn and even weeks from the round trip to the East.

While Revere Copper and Taunton Copper were active competitors they were friendly and frequently cooperative rivals. When a source of foreign ores sent a shipment of copper pig, heavily influenced by unwanted iron, they joined hands to punish the culprit financially and dump the metal back in his lap. Revere and Taunton sold copper to each other as circumstances required. A high level of ethics and craftsmanship engendered a mutual confidence and respect. On the bottom of a bill, receipted September 25, 1839, by Revere for copper sold to Taunton, there is this note of cordial acknowledgment,

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"We are notified of our offer for supplying the Norfolk Navy Yard being accepted & hope you have secured the Charlestown Yard."

The military demands of the Civil War strained the facilities of all copper producing industries in the country. The Taunton Copper Manufacturing Company, impelled by the natural growth of the city and the need for a larger smelting plant, erected a smelter in Rhode Island. This smelter was operated until 1884, when the growth and specialization of the copper industry made it more advantageous to buy the pure copper in billets from the mining and producing companies and to confine Taunton's activities to wider manufacturing opportunities. Among the products of the period between the end of the Civil War and the beginning of the new century were copper nails, screws, bolts, sheathing and such fabricated items as copper kettles, range boilers, copper floats, closet pans, tank and cistern boilers.

A competitor of imposing proportions now arose to challenge both Revere and Taunton. The port of New Bedford was enjoying the zenith of the great day of whaling. The shipyards there worked day and night to repair the clippers, barkentines and schooners that carried the American flag throughout the Seven Seas. It followed that New Bedford had urgent need of a copper mill within easy distance of the docks and shipyards. The need was met by Jirah and William Swift who organized the New Bedford Copper Company in 1860 with a capital stock of \$150,000. The name of Swift in New Bedford was almost as influential as that of Crocker in Taunton.

The rolling mill, completed in 1862, was considered enormous for those days. It was 187 feet long and 81 feet wide. The

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fly wheel of the engine room was 30 feet in diameter and weighed over fifty tons. The plant went into production during the middle of the Civil War. It used Lake Superior copper, transported by water, for by this time American ore was coming into the market in increasing quantity. Among the early New Bedford products were copper and yellow sheathing metals, yellow metal bolts and nails, braziers, bolt copper and copper rollers for calico printers.

The discovery of oil in Pennsylvania in 1859 sounded the doom note of whaling. As happened with the advent of iron and steel ships when electricity expanded the use of copper, there was compensation for the loss. Up rose the textile industry with its need for copper rolls. Local craftsmen perfected the manufacture of these rolls until they ranked first in the American output. New Bedford has maintained its superior skill in the making of printing rolls down the years. More than ninety per cent of all fabrics produced in American mills are printed from New Bedford rolls.

The year 1900 was significant in the march of America. The country was a world power with responsibilities upon which the sun never set. Following the Spanish-American War, the Philippines and Puerto Rico were ours. No less significant was the evolution of industry. Hand-craft was giving way to the beginning of quantity production. The age of specialization was upon America, stimulated to an almost bewildering degree by the myriad inventions in electricity and by the advance in chemistry. New processes, new methods and new problems crowded upon each other; new markets beckoned for the added needs of a rising standard of living. "The anatomy of industry had steel bones and copper nerves."

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The problem of distribution became as important as the function of manufacture. The common needs of Revere, Taunton and New Bedford became an irresistible magnet. As already indicated, the inevitable happened with the merger of the three companies as the Taunton-New Bedford Copper Company operating two plants, one at Taunton and the other at New Bedford. After the merger the Canton plant, with its historic associations, ceased to exist. The first President of the combine was C. A. Cook.

Following the merger Edward H. R. Revere bade a temporary farewell to copper. He went into the brokerage business in Boston associating himself with the firm of W. O. Gay & Company. Being a Revere however, it was natural that he should again heed the call of copper. When Henry F. Bassett, President of the Taunton-New Bedford Copper Company died in 1920, Edward H. R. became chief executive officer of the company, holding that post until the merger of 1928, the year which brought Revere Copper and Brass Incorporated into being. He then became a director of Revere and has remained on the board ever since, a living link with a great name both in devoted service and high tradition.

To go back to 1900 and the decade following, the Taunton-New Bedford Copper Company immediately took a commanding place in its field as some of its contracts indicate. The concern provided metal for the machinery and tubing used in the construction of the Panama Canal, one of the world's great engineering achievements. When New York City tapped the Catskills for additional drinking water, Taunton-New Bedford supplied copper tubing and sheets for the Catskill Aqueduct which brings water more than a hundred miles through a

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tunnel passing under the Hudson River to Manhattan Island.

The Taunton-New Bedford plant also contributed to other notable American achievements on the sea as well as on land. In 1851 the schooner *America* won the Queen's Cup and brought it to the United States where it has remained ever since. Practically every American Cup defender—*Enterprise*, *Resolute*, *Vanite*, and *Rainbow* in particular—since that memorable race was equipped with Taunton-New Bedford copper and bronze.

That the New Bedford Division, the title the Taunton-New Bedford works assumed after the 1928 merger, has persevered in its craftsmanship for nautical work, was effectively demonstrated in World War II. A pre-World War II experiment in the use of cupro-nickel resulted in the building and testing of the *Revere*, a forty-five foot boat of welded construction with a light, tough metal hull of cupro-nickel only .08 of an inch thick. Launched in the fall of 1941, she was turned over to the United States Coast Guard a week after Pearl Harbor.

Powered by two 300-horsepower Scripps motors with a top speed of thirty-five knots, the *Revere* joined in the patrol duty off Jacksonville in 1942 and sailed out of Salem, Massachusetts during the following year. Her thin metal was tested under the most challenging conditions, even to the unexpected chore of serving as an ice-breaker for the less rugged wooden hulls of other Coast Guard vessels on the frigid Northern patrol from Martha's Vineyard to the Grand Banks.

The year 1955 finds the names of the *Constitution* and *Revere* again joined in the new luxury liner sailing under the house flag of the American Export Lines. In the *Constitution* and her sister ship, the *Independence*, Revere metals serve

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both a functional and decorative purpose from engine room to lounge.

The New Bedford Division made another contribution to an advance in nautical construction that fits into the atomic age and may well revolutionize the building of warships. It provided 50,000 pounds of cupro-nickel, which was made into condensers and other heat-transfer equipment, for the atomic-driven submarines, *Nautilus* and *Sea Wolf*, built by the Navy at New London. It was a commission demanding the highest perfection in product and met every requirement.

The New Bedford Division is a so-called Specialty Division in that its output includes products that the other Divisions find it difficult to produce. Metal for television tubes provide an example of this work. Another is copper and brass for costume jewelry. Providence, seat of the costume jewelry industry, is within easy distance from New Bedford.

Modernization, as elsewhere in the Revere empire, is the keynote of equipment. With it has been a large degree of pioneering in the use of the latest mechanical devices. New Bedford was the first division to install the large type of Ajax electric furnace. It permits the casting of large cakes of brass to be made into tube heads. Another first, so far as Revere Divisions are concerned, is the Electric Eye which tracks metal so that large coils can be wound up easily. A third is the Gantry Crane which lifts 20,000 pounds of metal into the furnace, takes it out and carries it to the rolls.

The equipment for the textile rollers, for which New Bedford has long held the premier place in the industry, likewise represents the last work in mechanical progress. The Division is the only concern making solid copper print rollers.

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At New Bedford are two devices almost uncanny in their operation and accuracy. One is the Reflectoscope, an instrument which works on supersonic principles and is used to analyze the inside of a piece of metal in order to detect internal flaws. The other is the Profilometer, a device which measures the height of a grinding mark in micro-inches on rolls so that a roll surface can be ground to the desired smoothness.

All the installations that have been described are only part of the equipment whether in the Plate Mill where non-ferrous plates for big condenser tube heads are turned out, in the Sheet Mill which produces sheathing and standard and architectural copper and brass, and the Strip Mill where the metal for costume jewelry is finished. This equipment, which has no superior anywhere, is typical of the mechanics that lie behind Revere output.

The Plate Mill merits special mention. It is the only one in the Revere organization and there is only one other in the copper and brass industry. When the original plate mill was built at Taunton it was the largest mill in the non-ferrous metal industry. At that time the roller was imported from England because it was felt that no one in America had the know-how to roll such plates. Taunton, however, later disproved this belief.

Duplicating its sister Divisions, New Bedford, as in World War I, became an "arsenal of democracy" during the second global conflict. The techniques used in civilian production, particularly the improved methods employed in the making of print rolls, were diverted for the production of war materials.

The New Bedford Division was the first Revere Division,

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as well as the first plant in southeastern Massachusetts, to win the coveted Navy "E" which was presented at ceremonies on Patriots' Day, April 19, 1942. During the three years of hectic output achievement that followed, four additional stars were awarded for excellence of quality and the maintenance of the production record.

The service records of the 772 New Bedford employees have established something of a record. Three out of every five workers have been on the Division payroll for ten years or longer. Ten years, however, is a small part of the span of the service of many others. John Johnson, for example, has been with the company for fifty-three years and is still on the job. Grafton A. Burt has rolled up forty-six years; Frank Lynch forty-five years; James E. Ryan and Edward A. Reilly forty-four years; and James J. Hoey, thirty-eight years. These records of service betoken a commendable loyalty. Retirement at New Bedford is optional. When an employee's age is well beyond sixty he is given work in accordance with his physical ability.

Heading the New Bedford Division is James B. Buckley who typifies the youthful vigor that characterizes so many Revere executives, for he is under forty. A member of the Class of 1938 at Yale Sheffield Scientific School, his first job was as a solderer for the Superior Metal Company of Brooklyn where he rose to be assistant General Manager. In 1942 he joined Revere at New Bedford, working at first on the hot rolls. Then came work in the Sheet, Plate, Strip Mills and in the Print Roll Department. In 1948 he became Assistant Works Manager, which was followed by his appointment in 1952 as Assistant to the General Manager. In the following year he succeeded Robert S. Stringer as General Manager and was

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made a Vice President.

In Stringer, Buckley had a worthy predecessor. A graduate Bachelor of Science at Colgate, he drew his first pay as a worker in the Wire Department of the National Conduit & Cable Company, subsequently going to the Standard Brass & Tube Company of New London. His association with Revere began in 1915 when he joined the Baltimore Tube Company as head of the casting department. He was successively Sales Manager and in charge of the Philadelphia office. When Revere acquired the Baltimore Tube Company he found his real niche. In 1936 he was made Vice President in charge of the Baltimore Division, retaining that post until 1944 when he took over the New Bedford Division, retiring in 1953.

Stringer's predecessor at New Bedford was Hughes Dallas, son of C. Donald Dallas, who, as President and Chairman of the Revere Board, contributed so vitally to the advance of the corporation. Hughes Dallas first went to New Bedford in 1937 and worked in one of the mills. He then went back to New York for a stretch of service. In 1940 he was made Vice President in charge of the New Bedford Division which post he held until 1944 when he was made Vice President in charge of manufacturing and transferred to the New York office. He retired in 1952.

George F. McGovern, Works Manager of the New Bedford Division, embodies the familiar Revere story of an office boy who rose to a responsible post. At fourteen he was running messages in the Sheet Mill at Taunton. At twenty-two he became foreman of the Sheet Mill and was later Superintendent of the Strip Mill when the department was moved to New Bedford. He then became General Superintendent of all

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manufacturing both at Taunton and New Bedford. He has been Works Manager for nineteen years, completing forty-five years of service with the company in 1955.

Charles G. Miller, Sales Manager of the New Bedford Division, joined the Stamping Department of the Rome Manufacturing Company in 1928. Two years later he became a salesman for the New Bedford Division, becoming head of the Sales Department in 1940. Rounding out the New Bedford staff is James Muldoon, Treasurer and Office Manager, who joined the Division at Taunton in charge of general accounting. He was moved to New Bedford in 1935 when the Division's headquarters were established in that city. He became Treasurer and Office Manager in 1932.

Rich in historical association because it is a link with Paul Revere's pioneer plant at Canton and alert to every phase of industrial advance, the New Bedford Division plays its full part in the production of Revere Copper and Brass Incorporated.

## II

For the beginning of the fourth enterprise which was eventually to become part of Revere Copper and Brass Incorporated we must turn back the pages of time for more than a century to Levi Hollingsworth whose pioneering in Maryland laid the foundation for Baltimore's importance as a copper capital. What few people realize is the fact that Maryland, back in the Eighteenth Century, was a producer of copper ore. The first mine was worked in 1742 when Dutch and Swedes prospected for ore and located iron and copper not only in Maryland but in parts of Pennsylvania, New Jersey and New

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York. A considerable part of the copper originally used by Paul Revere came from Maryland. The copper deposits in Maryland were mined intermittently until the middle of the Eighteen Fifties when the State's ore production ceased, due largely to the opening of the Lake Superior field.

Hollingsworth, a merchant and member of a prominent Cecil County family, was endowed with vision and enterprise. Baltimore, with the Chesapeake as a natural harbor, was fast developing into an important Atlantic port. American commerce then was mainly water-borne. The Chesapeake was alive with ships plying from Boston, Providence, Albany, Philadelphia and New York. British vessels made Baltimore a port of call on the way from London to the West Indies.

The Baltimore shipbuilders, like their colleagues in New Bedford, were in urgent need of bolts, rods, spikes and copper for deck sheaths and bottoms. Hollingsworth, emulating the Swift's at New Bedford, decided to fill that need. In 1804 he started a small mill and by 1810 was able to produce one hundred tons of metal a year. His faith in copper prompted him to go to England to study British methods of production. He spent the greater part of 1811 working with British craftsmen.

In 1814 Hollingsworth launched the Gunpowder Copper Works on Gunpowder River with machinery brought from England. With this plant he began Baltimore's copper industry and set up an ancestor of Revere Copper and Brass Incorporated. Hollingsworth spent \$100,000 on the works, an almost fabulous sum for those days. There were two sets of sheet rolls, two refining furnaces, and later a cupola furnace for treating the slag. Most of the ore came from Chile which meant a long and often hazardous trip around the Horn. The

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business of the Gunpowder Works expanded steadily. One of the concern's most important contracts was for the copper sheathing for the capitol at Washington which was burned by the British in 1814.

The operation of the Gunpowder plant, especially at the beginning, was somewhat bucolic. Most of the workers were farmers. When the metal business was slack, they tilled their acres. When a ship from the Orient or some other distant area came into port, Hollingsworth rang a bell and his workers came trooping in to roll copper and sheath the vessel. The job finished, they went back to their plows.

Hollingsworth operated the Gunpowder Works until his death in 1822 when the plant was taken over by Isaac McKim and others in his family in association with the Hollingsworth interests. In 1837 operations were conducted as Hollingsworth & Company.

Now began a series of reorganizations and absorptions that were to lead ultimately to Revere Copper and Brass Incorporated. In 1845 the Baltimore & Cuba Smelting & Refining Company was formed by Haslett McKim and David Keener to operate a copper plant at Locust Point on property now used as a freight terminal by the Baltimore & Ohio Railroad. The inclusion of the word "Cuba" in the title led to an amusing and expensive experience. The company was primarily established to use ore from a mine near Santiago de Cuba owned by one Bartholomew Trenard who was sent down to open up the property. When the plant near Baltimore was completed in 1846 and everything was set to work the Cuban ore, it was discovered that practically no ore existed. It became necessary to obtain ore from Chile but Chilean ore had to be hauled

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around the Horn. At this point Kenner, pessimistic about the future of the company, associated himself with the Baltimore Copper Smelting Company, a rival concern at Canton across the harbor from Locust Point.

The other officials of the Baltimore & Cuba Smelting & Refining Company did not share Keener's pessimism. As an adjunct to the original plant they built a rolling mill and a yellow metal mill. Losses piled up and in 1851 the decision was made to go out of business. The plant was sold and demolition began.

Now developed an event little short of astonishing. While the plant was being demolished a considerable amount of copper was found in the furnace bottoms, due to operation by unskilled labor. The slag, which had been thrown away as worthless, proved to be a small mine of copper. All this lucky find was carefully collected and shipped to England for sale. The proceeds realized were so large that the company decided to continue in business. More capital was raised, the sale of the plant was cancelled, and the works reconditioned. The company bought and enlarged the Baltimore Copper Smelting Company which had been set up by Keener. The business continued under the original name of the Baltimore & Cuba Smelting & Refining Company.

In 1866 the works at Locust Point were removed to Canton, the old property having been sold to the Baltimore & Ohio Railroad. The company reorganized as the Baltimore Copper Company. The Baltimore Copper Smelting Company was now absorbed and both companies operated thereafter as the Baltimore & Cuba Smelting & Refining Company. By this time the Baltimore & Cuba concern was practically owned by

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John W. Garrett, who had pioneered the Baltimore & Ohio Railroad, and Johns Hopkins, who endowed the hospital and university in Baltimore which bear his name. Meanwhile the City of Baltimore bought the site of the plant for an extension of its water supply.

Trouble then loomed for the company because of the uncertainty of the ore supply. The 1869 tariff on Chilean ore made its use almost prohibitive. Business had slumped and the company found itself in financial straits. In 1870 there seemed no alternative but to wind up its affairs. While liquidation was in process, ore began to arrive from Arizona and Montana. With an adequate ore supply assured, the concern was taken over by George A. Pope and George B. Cole who had acquired the Gunpowder Copper Works. The name of the company was changed to Pope, Cole & Company. Work was concentrated at Canton under their auspices. In 1883 Pope & Cole erected a modern rolling mill at Canton adjacent to their smelter. Out of this emerged the Baltimore Copper Rolling Company. When Pope & Cole failed through overextension the Baltimore Copper Rolling Company, which had prospered, took it over and the concern became the Baltimore Copper Smelting and Rolling Company in 1887. This was the last reorganization necessitated by financial difficulties.

Three years later a plant operated as the Baltimore Electric Refining Company was set up. With the Bessemerizing of copper matte, the company discontinued smelting and devoted itself to electrolytic refining. In 1900 the Baltimore Electric Refining Company and the Baltimore Copper Smelting & Refining Company were consolidated in what became the largest copper refining company in the world. Seven years later it was

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sold to the American Smelting and Refining Company. Rod and wire mills were built to give variety to the output and enhanced the prestige of Baltimore as a copper center.

Additional and important changes were now to enlarge the Baltimore copper picture. Prior to 1927 the Canton Rolling Mills which now comprise part of Revere, were owned by the Baltimore Copper Smelting & Rolling Company. In 1927 the American Smelting and Refining Company sold the rod and wire mill to the General Cable Corporation. The following year General Cable sold the rod, sheet and wire mill to Republic Brass Corporation whose corporate name was changed in 1929 to Revere Copper and Brass Incorporated. At the time of the transfer of the sheet, rod and wire mill from General Cable to the then Republic Brass the former company retained control of the rod and wire mill. What had been at one time the rod and wire mill was repurchased by Revere in 1945. This building now performs an important function in the operation of the Revere Canton rolling mills.

In 1935 Revere widened its scope of operations in Baltimore with the acquisition of the Baltimore Tube Company, which had originally been the Baltimore Tube Bending and Polishing Machine Company dating back to 1911. The Tube Company, which had a highly desirable plant on the 1300 block of Wicomico Street, gave Revere an important manufacturing activity, in addition to the rolling mill operations at Canton. The plant was the first to be erected south of the Mason and Dixon Line for drawing seamless copper and brass tubing and for the manufacture of condenser tubes. In 1936 all the administrative activities of what had become the Baltimore Division of Revere were consolidated and set up at 1301

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Wicomico Street.

Such was the long and somewhat complicated corporate trek from the Hollingsworth mill on Gunpowder River down the years to Revere's Baltimore Division. In the century and a half that have intervened, depression, ore shortage, a Civil War, two global wars, and the many other hazards of which industry is heir, have taken their toll. Yet, capable and courageous men, whose names are written large in Revere's history, persevered; science and invention simplified and enhanced production, and the entire nation has become a market.

Revere's Baltimore Division comprises two plants, one at Canton on the Patapso River, and the other, the onetime Baltimore Tube Works, on Wicomico Street. In the Canton mill copper is fabricated into sheets, roll and strip copper, coppersmith sheets, bus bars and anodes. In normal times these products are used principally in the construction industry for copper roofs, gutters, down spouts and are supplied to coppersmiths for making tanks for liquids and gases and other industrial equipment.

Copper and tube operations are at the Wicomico plant. Acquisition of Baltimore Tube added brass and copper tube and pipe as well as drawn copper bus bars and brass strip and plate to the list of products. As elsewhere in the Revere family, both Canton and Wicomico Street represent the last word in machine modernization.

We now reach a Baltimore Division product that has recorded a unique achievement for Revere both in war and peace. This product is aluminum, regarded by many as the metal of the future with tremendous possibilities for the entire copper and brass industry. Like so many innovations in

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Revere, this one stemmed originally from C. Donald Dallas. The way of it was this; it was Dallas' custom to go to England every year to study British advances in industrial techniques and production. Among other contacts he established a close relation with the Imperial Chemical Industries, the famous I.C.I. as it is termed for short. In 1937 while inspecting one of the I.C.I. plants, he saw aluminum production on a constantly increasing scale and, what appealed to his instinct as salesman, how many big customers of the company were turning from copper to aluminum products. On his return to New York he said to his principal associates, "We must go into aluminum production."

It was one thing to say that Revere should go into aluminum production and quite another to achieve it for the operation required a large outlay, expert experience and what amounted to a new mechanical set-up. The Dallas idea persisted however. Some spade work for both aluminum and magnesium developed at Baltimore when Robert S. Stringer was Vice President in charge.

It remained for World War II to give Revere the impact that projected the corporation into both aluminum and magnesium production, and to bestow upon the Baltimore Division the distinction of being the first big copper and brass concern to go into aluminum on a large scale. In 1942 the United States Government asked the Baltimore Division to operate Plancor 1302 for the production of aluminum tubing for aircraft and other wartime applications. Plancor was the name given to Government-owned war plants which numbered more than a thousand throughout the country. Revere operated five of these plants.

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A portion of the small tube mill was converted in 1942 for the production of small size aluminum tubes. With this output under way, the Baltimore Division's brass mill and copper bus bar department were discontinued. Additional tube producing equipment was installed in the building formerly devoted to the brass mill and copper bus bar activities. This was the beginning of Baltimore's light metal production that was to expand mightily in the next three years. In 1943 the production of magnesium was started at the Canton plants.

The advent of Irving T. Bennett in 1943 galvanized light metal production at Baltimore. A Revere veteran, he had demonstrated his exceptional ability in various capacities for he had been Sales Promotion Manager, General Manager of the Rome Radiator Division, Technical Advisor and Assistant Sales Manager of Rome Division. He now became Manager of what was known as the Magnesium-Aluminum Division of Revere.

Under Bennett's stimulation and the increased demand for products for war purposes, the Division moved fast to expand output. Plancor 1410 was now taken over. It was designed, constructed and operated to produce magnesium sheet and at the time of its full operation was the largest magnesium sheet mill in the world.

The next step was the construction of the Halethorpe extrusion plant known as Plancor 1778. This operation was for the alloying and extrusion of magnesium shapes, rods and bars; for the alloying and extrusion of aluminum tube blooms for the tube mill on Wicomico Street; for the alloying, extrusion and heat treating of aluminum shapes; and for the production of large magnesium forgings. The Halethorpe plant went into

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production in February 1944. The experience gained by Revere at this plant in alloying, casting and extruding aluminum shapes and tube blooms has since been capitalized to excellent advantage by the corporation's aluminum activity.

By 1943 the Magnesium-Aluminum Division had been created. In consequence Baltimore activities were conducted by the Baltimore Division and the Magnesium-Aluminum Division. When, in 1947, the production of magnesium sheet was discontinued due to the lack of a civilian outlet, the word "Magnesium" was dropped from the title of the Division. Following this change, the Baltimore Division and the Aluminum Division operated within the Revere organization in Baltimore.

Aluminum and magnesium were only two of Baltimore's essential wartime products. Plancor 209 was in operation to produce large quantities of cupro-nickel tubing for the United States Navy. Revere designed, constructed and operated this large mill, where production was started in August 1942. The output of this plant was of first importance not only to our Navy but to the British Admiralty as well, because many British ships, battered in conflict, were repaired in American navy yards.

There was still another Government-owned plant operated by the Baltimore Division. Plancor 903 was designed, constructed and operated to turn out cartridge brass cups and discs for ammunition. This Plancor was integrated within Revere's own facilities.

The Halethorpe plant was discontinued in 1946. Revere then consolidated within its own Wicomico works equipment for the production of aluminum extrusions, tube blooms and

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tubing. These operations were expanded in 1951 by the addition of a new building covering about 60,000 square feet. Meanwhile production of aluminum coiled sheet was started in the Canton plant. This move gave Revere a wide range of aluminum products in coiled sheet, extrusions, tubing and pipe.

Revere has continued to improve and expand the Baltimore activities. The expansion of the aluminum tubing and shapes field was highlighted by the completion of a 55,000 square feet addition to the aluminum mill. This addition allowed the Division to relocate inspection, packing and shipping operations. A 3,000 ton press with a self-contained hydraulic pressure system was installed to permit an increase in aluminum shape production and to widen the range of manufacturing. This press is served by its own billet heating units, a 100,000 pound stretcher and cut-off saws. To further strengthen Baltimore's position in the aluminum tubing field, Bull Blocks were installed for the drawing of long length aluminum tubing in coils.

This expansion program in tubing and shapes has resulted in the installation of additional homogenizing facilities. A 2,500 pound per hour and a 4,000 pound per hour furnace for aluminum extrusion ingots have been installed. They were needed to bring homogenizing capacity up to casting and extrusion capacity. Since this equipment allowed Baltimore to increase production of aluminum tubing and shapes, it was necessary to increase capacity to cast aluminum extrusion ingots. This was accomplished by the introduction of a 30,000 pound capacity reverberatory melting furnace of new design.

Additional expansion in aluminum has been carried out in

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the coiled sheet field. It was initiated by the acquisition of approximately 80,000 square feet of additional manufacturing space made available by Revere's taking over an area previously under lease to the American Can Company. Copper finishing operations were moved into this new area thus making available additional space for aluminum equipment where fabrication of copper was originally conducted. An electrically-heated annealing and stabilizing oven for aluminum coiled sheet to reduce staining hazards due to oxidation of the rolling oil under heat treating temperatures, was also installed. The breakdown rolling of aluminum coiled sheet from large aluminum rolling ingots required a furnace for batch homogenizing or continuous heating and this has also been put into operation.

All the equipment and technical detail just enumerated have a significance beyond the domain of immediate output. Revere realizes the immense importance of aluminum in its future relation to copper and brass, and particularly copper, and will be ready to meet the demands of the future, whatever the evolution in metal may bring about.

Expansion in the Baltimore Division has not been confined to aluminum alone. Copper tubing facilities have been increased by the installation of Bull Blocks which, like aluminum, permit production of long length copper tubing in a coil. To economize floor space, single draw benches for producing straight copper tubing have been converted into triple draws. A gravity roller conveyor system has facilitated the handling of copper sheet coils.

These improvements in copper and aluminum equipment and operation have not only increased Baltimore's production

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capacity but have also strengthened Revere's program of building a highly trained working force with the necessary modern equipment to produce a high quality product. Aluminum production has a particular value since it permits the recapture of markets lost in copper and also enables Revere to reach new markets and therefore new customers, thus broadening the base of production and selling.

A full circle was completed in 1953 when the use of the word "Aluminum" as a Division name was discontinued. Today all copper, brass and aluminum operations in Baltimore are conducted under the title of Baltimore Division. The Division has registered a remarkable record of accomplishment notably when it is realized that its aluminum operations did not begin until 1942 and that these operations make the Division the largest non-integrated fabricator of aluminum mill products in the United States.

Bennett's hand was at the helm during Baltimore's rise in aluminum production. As output rose, he also rose to increasingly responsible position. From 1944 to 1952 he was a Vice President of Revere and Executive Head of the Baltimore and Aluminum Divisions. In 1951 he was elected a Director of Revere and on October 15, 1952 was made General Manufacturing Manager. In 1953 he resigned from Revere to become Chairman of the Executive Committee and a Director of General Cable Corporation. He is now Chairman of the General Cable Board.

The story of the Baltimore Division would be incomplete without the inclusion of William H. Peirce, one of the foremost metallurgists of his time, who was Vice President, Director and a member of the Executive Committee of Revere from

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its incorporation in 1928 until his resignation in 1933. He was the co-inventor of the Peirce-Smith converter which revolutionized the process of converting copper. He joined the Baltimore Copper Smelting & Rolling Company in 1890, was made Manager in 1895, and later became President. Under his guidance the company became one of the leading copper fabricators of the country. The Baltimore Copper Smelting & Rolling Company was one of the six to be consolidated into Revere Copper and Brass Incorporated in 1928. Peirce died in 1944, rich in years and honors.

The tradition of high administrative ability, set by Stringer and Bennett, is maintained today in Alexander N. Aird, Vice President and head of the Baltimore Division. A graduate in mechanical engineering from Cornell University, he joined Revere's Baltimore predecessor, the Baltimore Copper Smelting & Rolling Company, after graduation. He was appointed Superintendent of the Mechanical Department of the Canton plant in 1931. From 1941 to 1943 he served as Chief Engineer of Revere's Michigan Division at Detroit, returning to Baltimore as Works Manager of the Halethorpe plant in 1944. Subsequently he became Works Manager of all the Revere Baltimore plants. In 1953 he was named Vice President and succeeded Bennett in charge of the Division.

A. Leo Howell, Works Manager, a Bachelor of Science from the University of Tennessee, worked as cooperative student for the Aluminum Company of America and the Tennessee Copper Company during his college training. He joined Revere in 1949 as Assistant Supervisor of Methods and was promoted to be Supervisor of Methods the same year. He became Works Manager in 1954.

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Like Aird, the Treasurer, Arthur M. Wainwright, was employed by the Baltimore Copper Smelting & Rolling Company before joining Revere where he was successively Chief Clerk, Assistant Sales Manager and Assistant Treasurer. He was named Treasurer in 1937. The Sales Manager, Jack F. Croasdale, first came to Revere as a student trainee. After serving as Revere's Pittsburgh District Manager he returned to Baltimore as Assistant Sales Manager and was promoted to Sales Manager in 1946. Wilbur A. Prentiss, Industrial Relations Manager, was Personnel Manager at Halethorpe in 1943 and later filled the same post in the Baltimore Division. He was named to his present position in 1953.

Summed up, the achievement at Baltimore has added luster to the name of the corporation of which it is part. In its aluminum production it embodies the potentialities to meet whatever threat this light metal holds for copper. It means, let me repeat, that Revere will be equipped for any eventuality that may change the face of the metal map.

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## *Copper and Brass Westward Ho*

WITH the exception of the forerunners of the Rome Divisions, all the Revere units so far detailed were located at or near the Atlantic Seaboard. All harked back in one way or another to Paul Revere's mill at Canton. The geography of operation was now to be extended to the Middle West with abundant reason and kindred success.

In the early decades of the Nineteenth Century Detroit, still regarded as "Out West," had already become a seat of considerable industrial activity. Copper and brass were in increasing demand largely because of their use in the production of stoves, which led in the community's factory output. Brass was used to brighten the stoves while copper made them durable. The expanding employment of these metals naturally induced alert business men to produce them in greater quantity. The need found the men.

It so happened that in Detroit lived two men with ample experience in brass production. One was Jeremiah Howe; the other, David M. Ireland. Howe had learned the brass business in the Coe Brass Company in Torrington, Connecticut, the State that had become the seat of the brass industry. He had settled in Detroit and got a job as shipping clerk with the De-

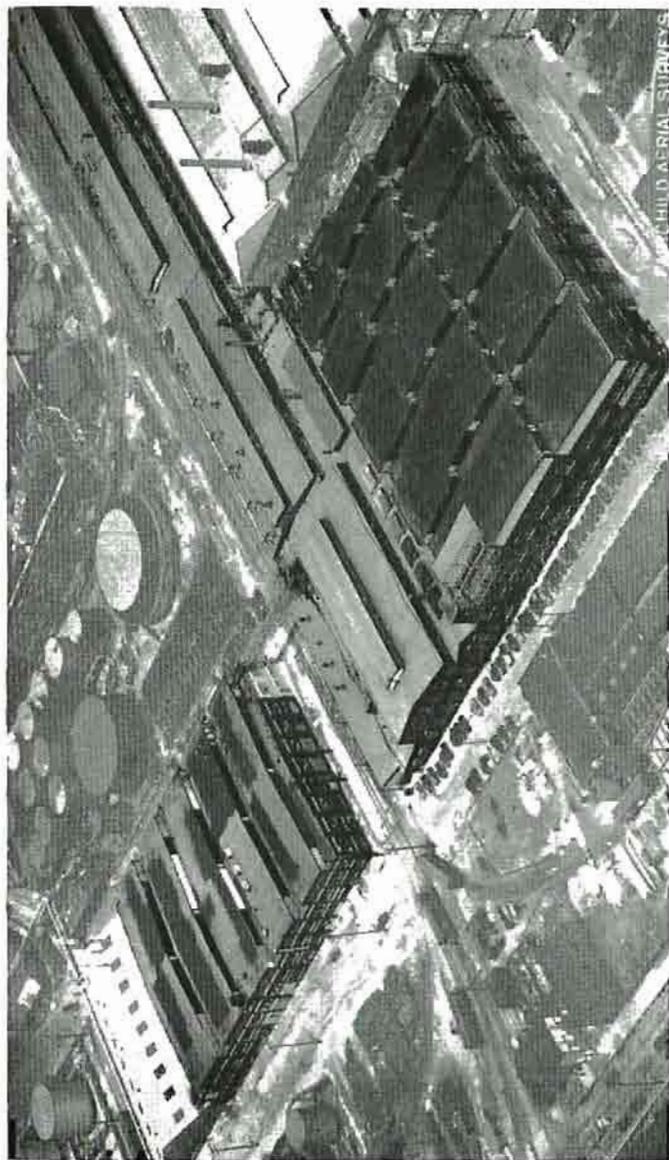
## *Copper Heritage*

troit Copper & Brass Rolling Mills where he rose to be Superintendent. Ireland had also been trained in brass. His school was in Waterbury, Connecticut where he had been Superintendent of the Matthews & Willard Manufacturing Company. When he came to Detroit he established the Ireland & Matthews Manufacturing Company, which made stove brass, copper and nickel plumbing parts.

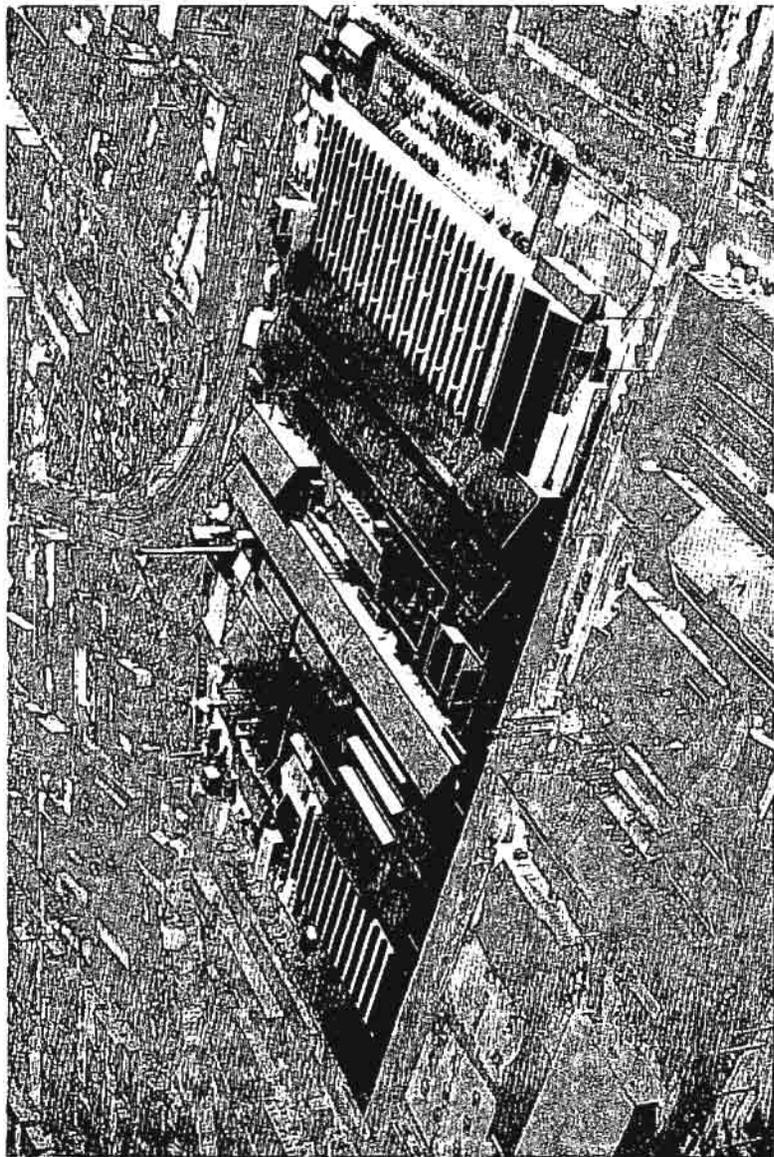
One of the Detroiters who sensed the need of larger copper and brass production in the city was George H. Barbour, Vice President and General Manager of the Michigan Stove Company, then the largest concern of its kind in the United States, which used brass in large quantities. Barbour, as chief organizer, together with Howe and Ireland, decided to form a company that would give Detroit the supply of copper and brass that it required. On January 22, 1906, they incorporated the Michigan Copper & Brass Company. At that time there was only one other copper and brass mill west of Buffalo. Supremacy in the working of these metals had long rested on the Atlantic Seaboard. The Michigan Copper & Brass Company was therefore a challenge to that supremacy.

The organizers recruited A. B. Seelig, William M. Rule and William Westerman, all veterans in brass who had been schooled in the Naugatuck Valley, the original brass stronghold. Seelig subsequently became General Manager. Barbour was the first President. Howe functioned as Superintendent. Ireland was Vice President, later President and a director. The initial investment was \$400,000.

The fourteen-acre mill site had a strategic setting between the Michigan Central tracks and siding on one side and the Detroit River on the other, thus giving the benefit of both



Baltimore Division Canton Plant



Baltimore Division Wiconico Street Plant

### *Copper and Brass Westward Ho*

rail and water transportation. The water transportation was important because all the copper mined in Michigan and shipped East by water passed the rear of the property. Ground was broken for a plant early in 1906. Core of the works was a cross-compound upright steam engine, a giant for its day. No similar plant in the country had finer equipment, which included electric monorails, pneumatic hoists, improved blocking machines for coiling metal as delivered from the rolls, latest type of furnaces and muffles, and automatic stokers for the boilers.

When Michigan Copper & Brass was organized, the automobile represented an infant industry with its product the butt of jokers who jeered at the pioneer drivers with the phrase, "Get a horse." Few dreamed in those days that the horseless carriage would revolutionize transport, put the world on rubber tires, and widen the horizon of man. The initiative for motor car development was in Detroit which, before two decades passed, was to become capital of a mighty industrial empire. The fortunes of Michigan Copper & Brass were to be linked with that development. As Detroit expanded under the impact of the almost fabulous automobile industry, so did Michigan Copper & Brass expand.

Everything was not altogether rosy in the early days of Michigan Copper & Brass. Once linked with automobile production, it shared that industry's weal and woe. A slump in car production in 1910 made an increase in capital necessary. For years the motor car used copper and brass lavishly, the latter in particular. Brass was employed around the radiator for lamps and other visible parts. As body designs became more graceful and eventually streamlined, copper and brass became

### *Copper Heritage*

less visible although they are still necessary. Today the quantity of copper and brass used in an automobile averages thirty-five pounds. This seems small compared with the weight of the metals used in the early days. The decrease in weight, however, is more than offset by the fantastic increase in car output which makes a tremendous tonnage of copper and brass necessary in the automotive industry.

By 1911 Michigan Copper & Brass had recovered from the setback due to the slump in automobile sales and was forging forward. Early appreciation of the commercial use of the motor car was evident when the company bought cars for its salesmen, a step regarded as almost sensational. Up to that time the automobile's principal use was for pleasure driving although the early breakdowns on the road were not entirely conducive to pleasure. Even then it had not been envisioned that the automobile would become indispensable for the farmer, the salesman, the industrial producer; in fact, for every phase of social, business and productive activity.

In the years prior to World War I, the copper and brass industry became more competitive than ever before. Barbour, still President of the Michigan Copper & Brass, felt that his first love, stoves, required his undivided attention. He therefore retired as head of the company. It was then that Ireland took over the Presidency, bringing to it his qualities as outstanding executive. He was to be President for thirteen years, years of great growth for the company. It is interesting to note in this connection that his successor as President of Michigan Copper & Brass was George H. Allen who was the first President of Revere Copper and Brass Incorporated when the merger was effected in 1928.

### *Copper and Brass Westward Ho*

Now for an interlude in the narrative of Michigan Copper & Brass, which was subsequently to have an important bearing on the Revere merger. In 1908 Harry A. Higgins was Master Mechanic with Michigan Copper & Brass. Like most of his principal associates in the concern, he had been reared in the Connecticut brass industry, first as draftsman and later as designer in Torrington and Ansonia. Of inventive mind, an expert craftsman and with boundless ambition, he was certain to make his presence felt in the industry. He achieved that objective for, in 1922, he established the firm of C. B. Higgins, Incorporated. The firm derived its name from that of Harry's brother who became President. Harry was Vice President. In 1924 the name of the concern was changed to the Higgins Brass & Manufacturing Company which became a good customer of Michigan Copper & Brass.

Harry Higgins was a meticulous worker always achieving the right gauge and temper of copper for a particular customer. It followed that his firm attracted a large following, especially for brass where close tolerance was necessary and for the fabrication of such critical items as carburetors and floats. Harry was mechanically resourceful. Among other things he devised a profitable method of putting in two pairs of rolls in the small space necessary to reroll metal and was able to roll the thin metal for which there was a great demand. The Higgins enterprise, though small in size and with only eighteen stockholders, was an excellent money-maker. Much of its output was used for thin metal strip employed by the automobile industry and in lockseam tubing. When the Revere merger was consummated, the Higgins business was joined with Michigan Copper & Brass to form the Michigan Division. Sub-

### *Copper Heritage*

sequently the Higgins plant was sold and the rolling equipment moved to the Michigan Division plant.

While the Higgins business was finding itself, considerable change marked the course of Michigan Copper & Brass. Its close link with the automobile industry was shown in the annual financial report for 1917, which revealed the names of Alfred P. Sloan, Jr., Walter P. Chrysler and Charles S. Mott as directors. Mott's inclusion on the board was fraught with great significance for the company, as will be presently revealed. Meanwhile Seelig, who was Ireland's chief lieutenant, became General Manager and wrote a record of high efficiency. So, too, with Charles W. Thomas and Charles S. Cook, both endowed with unusual capability, who rendered a fruitful service to the company.

Mott's connection with Michigan Copper & Brass was invaluable. As Executive Vice President of General Motors, he brought an organizing genius to the service of Michigan Copper & Brass. He was one of the pioneers in the automobile industry. His plant, the Weston-Mott Axle Company, originally located at Utica, New York, built the axles for the first Cadillac. Certain that the motor car had arrived in a big way, he moved the axle plant to Flint, Michigan so as to be near the capital of the industry. In 1907 General Motors bought out his business and annexed him to its executive staff.

It was due to the foresight of Ireland that Mott was brought actively into the affairs of Michigan Copper & Brass, thus fortifying the already profitable association with General Motors. From 1917 to 1927 Mott was a director of Michigan Copper & Brass. He had ample capital for investment and part of it went into the company.

### *Copper and Brass Westward Ho*

Coincident with Mott's financial support there began a large program of expansion designed to meet the swelling demands of the motor-car industry in and around Detroit. This enabled the company to deliver a huge output within a radius of fifty miles of the city, much of it going to Ford, General Motors and Chrysler. Since that time nearly ninety per cent of the product of Michigan Copper & Brass and later the Michigan Division has gone into the automotive field. The vast needs of the industry, growing well-nigh miraculously, meant a tremendous increase in the company output. The close calibration of product, an accuracy dictated by mass assembly and the interchangeability of the most delicate parts, produced a drastic revision in the brass industry. What had been an art was transformed into a science.

When Michigan Copper & Brass and Higgins Brass & Manufacturing Company became part of Revere Copper and Brass Incorporated, J. Aylmer Doucett, a Vice President in the new corporation, was named head of the Michigan Division. He had been Vice President and Sales Manager of Michigan Copper & Brass. In 1930 he went to Rome as first General Sales Manager for Revere. When Revere's offices were moved to New York he took over the post of Vice President in charge of Sales. In 1934 when the scope of the company's activities led to a revision of the sales organization, Doucett became Vice President in charge of Sales Relations. He served in that capacity and later as a director until March 1, 1954, when his retirement brought to a close a career marked by such great ability and high integrity as to earn him the confidence, liking and respect of the entire industry. His successor as Vice President in charge of the Michigan Division was Charles W.

### *Copper Heritage*

Thomas, a veteran of Michigan Copper & Brass. He remained head of the Division until 1946 when he retired and Harold N. Todt became his successor.

As was the case with the other Divisions in both World Wars, Michigan contributed its full share of output. One performance was typical of what was achieved in the second global conflict. It was highly important to conserve copper which became an almost precious metal. The idea of using silver as a substitute in bus bars originated with C. Donald Dallas. The silver, originally stored by the Government at West Point, New York, in the form of ingots, was shipped by motor freight to Perth Amboy, New Jersey. There at the plant of the American Metal Company, it was remelted into suitable size cakes and shipped in railroad cars to the Michigan Division.

Armed guards of the Treasury Department presided over the transportation of the metal and protected the vast quantities that awaited fabricating. At times there were more than six million pounds of silver waiting to be rolled. Imagine the amazement of Paul Revere had he wandered into one of his Revere plants in 1942 or 1943 and watched 400 solid carloads of silver rolling into the plant and being converted into silver bus bars, and then rolling out again as bus bars for electrical equipment in aluminum and magnesium plants, thus saving critical copper essential for ammunition. More than \$450,000,000 worth of silver, approximately 600,000,000 ounces, twelve times the normal peacetime consumption of silver in this country, was taken from Government storage at West Point, New York, thereby saving 40,000,000 pounds of copper for war purposes. Yet, through all the operation, not

### *Copper and Brass Westward Ho*

one ounce was lost or unaccounted for, a remarkable record of technical efficiency.

In addition to meeting the automotive and electrical industry phases of the armament program, the Michigan Division was engaged in work of a top-secret nature in connection with the Manhattan Engineer District Project on the atomic bomb. The fact that the Michigan Division was chosen for this task speaks amply for the confidence that a nation was placing in the fidelity and skill of the men of Michigan.

During this period the Michigan Division developed a short cut in brass production which saved thousands of man hours. The shortage of zinc led to another Division achievement. Brass scrap of a quality not suited for direct use was melted in a resistor furnace where it was resolved into its components. The zinc, separated from the copper, was poured off and put back into use. In this way the Michigan Division replenished its supply of metal in critical shortage. With the advent of peace the Division resumed its normal activities, fortified by the technological skills created under the pressure of war-time needs.

Modernization of the Michigan Division began in 1947 with the installation of a Bliss 16" and 33" x 30" Four-Hi Roll powered with a 1,000 H.P. synchronous motor. The layout and production plan required that the Roll be relocated, in line with the new Hot Mill and adjacent to the source of its flat metal supply which is directly from the milling machine. Eventually, when operations require the hot rolling of aluminum, this unit, approximately 300 feet from the Hot Mill, will be used as an auxiliary and will coil the flat strip straight from the Hot Mill. In anticipation of this operation, provi-

### *Copper Heritage*

sion was made for a recirculating oil system when the foundation was built. Consequently only minor changes will be required to fit this unit into an aluminum rolling program. This equipment is one of many evidences of preparedness in Revere to meet the inevitable and expanding demands of aluminum production.

The Draw, Straighten and Cut-to-Length unit represents the latest piece of equipment in the Rod Mill. It is of most modern design and delivers rod from coil stock, performing a size reduction, straightening and cut to length in one operation. The acquisition of this piece of equipment with its high speed gives capacity for profitable extrusion of larger billets, thereby producing larger coils which, in turn, means greater output with less effort.

Extensive changes in plant layout and acquisition of modern fabricating equipment have enabled the Division to have one of the most modern non-ferrous Rolling Mills in the country. During the past several years there has been steady effort toward the processing of wider and heavier bars weighing up to 3,000 pounds. The advantage of processing these bars focused attention on the personnel and handling problems involved, with the result that a program was inaugurated which required practically a new plant layout. Through this program approximately ninety per cent of all equipment in the Roll and Strip Mill was relocated and most of it disposed of. The disposed of equipment was replaced with modern units and handling facilities.

Wherever possible new techniques have been employed. The auxiliary process whereby metal is heated slowly and cooled slowly to reduced brittleness, has been continuously

### *Copper and Brass Westward Ho*

improved. To accomplish this the furnace was relocated so as to be directly connected with its source of supply. With the new installation the furnace is independent of other service units. Formerly crane service was required. Hot and laborious work was involved. All manual effort has been obviated by resorting to levers and push buttons.

In the Michigan Division an operation was developed that has simplified and increased output. It is the Straight Line Pickling Process. The first design set up in 1928 was made with the thought of running the strip through on the edge because at that time the scale on the surface was rather heavy. Considerably longer time was required to remove it than in the final design. In 1930 it was decided to go to the horizontal type machine because the strip would be guided and handled more easily than on edge.

Considerable improvement in annealing furnaces had also occurred with the result that metal could be pickled, brushed, repickled, brushed again and washed with cold and hot water at a considerably higher speed than originally anticipated. This prepared the metal for instant use at the rolls and eliminated the battery of pickle tubes, trays, wash-tubs and cold water rinse formerly a necessary part of the equipment at each stand of rolls.

Today two or three Continuous Straight Line Pickling Machines clean all strip in rolls as the metal comes from the Annealing Furnaces. A continuous supply of metal is thus available at the rolls at all times. The continuous pickling and non-oxidizing by bright annealing have materially changed the processing of strip, so that material is now being rolled in widths and speeds thought impossible a few years

### *Copper Heritage*

ago. The Pickling Machine was developed by Todt. In 1938 Revere took out patents on the process and for a slight fee per machine made this equipment available to the industry.

Through the intensive modernization program, and many more instances could be cited, greater flexibility and increased capacity have been attained with fewer pieces of equipment and less manual labor. Behind all the advance in method and machinery were two basic objectives. One was the task of planning and completing the regular monthly run of commercial work primarily for the automotive industry. The other was to maintain available potential capacity to satisfy predetermined commitments in the event of a national emergency, if it became necessary to provide the Ordnance Department with thirty, fifty and sixty caliber cartridge case caps.

One historical fact is worth noting. The Michigan Division was the only one in Revere or, for that matter, the only plant in the industry to operate a Reverberatory type furnace for reclaiming, by refining, secondary copper during the shortage of this metal. This furnace is rated as fifty-ton capacity. During the period of operation the Division purchased, refined and cast into copper cake approximately 2,000,000 pounds of copper per month. Altogether, it cast 60,000,000 pounds of copper cake during the periods of operation. To do this it was necessary to design molds, design and construct mold carriages, transfer ladles, transfer ladle carriages and quenching pits. Without this activity Revere's contribution to the demand for its products would have been impaired by the amount produced by the operation.

The original plot of ground occupied by the Michigan Division approximated 12.25 acres. By 1950 it was so com-

### *Copper and Brass Westward Ho*

pletely covered by buildings that further expansion of manufacturing facilities posed a problem. An area of 17.7 acres belonging to the Detroit Lumber Company and immediately adjacent to the Michigan site, was purchased in December 1950. This acquisition gave the Division nearly 30 acres of land on the Detroit River within three miles of downtown Detroit. It increased the river frontage by 635.59 feet, making the total frontage 1,075 feet. When the St. Lawrence Seaway project becomes a reality the importance of this piece of property is self-evident.

Vision and capacity mark the ranking staff at the Michigan Division. As Vice President in charge, Harold N. Todt, a native Detroiter, brought to his post a long experience in copper and brass. He worked his way through the University of Michigan, graduating in mechanical engineering. In 1924 he entered the employ of Michigan Copper & Brass as draftsman, rising to the position of Master Mechanic. With the creation of the Michigan Division he was promoted to Chief Engineer and was successively Works Manager and Executive Vice President.

Second in command at Michigan is Eugene P. Hawkins who also worked his way through college with the aid of a fellowship. His alma mater was Washington University in St. Louis where he received his degree as Bachelor of Science. He then took a post-graduate course in commerce and finance. Following service as General Manager of the subsidiary companies of the Callaway Mills, he joined Revere in 1950, spending his first six months at Rome. He was then transferred to Michigan as Assistant to the Vice President. In May 1952 he was made Assistant General Manager.

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Michigan's Works Manager, Earl G. Skavdahl, a native of Sioux City, Iowa took extension courses in Accounting and Industrial Engineering at La Salle Institute in Chicago. His first job at Revere was in 1929 as a Cost Accountant, afterward becoming head of the new Wage Incentive Department. His mechanical flair asserted itself so markedly that he was made Industrial Engineer in 1937. Seven years later he became General Industrial Engineer and was transferred to the General Offices in Rome. In 1946 he was raised to Works Manager in Detroit.

The Treasurer, C. Kenneth Striffler, is a graduate of Michigan Copper & Brass where he was in the Accounting, Cost and Payroll Departments. He was promoted to be Chief Accountant of the Division in 1934 and then served as Assistant Treasurer taking over his present position in 1951. William A. Everson, Sales Manager, started to work for Michigan Copper & Brass in 1927 as Sales Correspondent, moving upward to Assistant Sales Manager and then Sales Manager in 1947.

Linked in output to the great automotive industry, the Michigan Division, with its streamlined equipment representing the last word in progressive mechanical advance, is an industrial showplace, competently flying the flag of Revere.

## II

The second Middle West unit destined to play a large part in the development of Revere Copper and Brass Incorporated was what became the Dallas and Chicago Manufacturing Divisions in Chicago. With the entry of the Dallas Division there emerged a man who was not only to infuse vitality into the

### *Copper and Brass Westward Ho*

corporation and its far-flung activities but to exert a definite influence upon the course of the copper and brass industry as well. That man was C. Donald Dallas.

The dogged purpose that animated the Donald Dallas career sprang from his heritage. His father, Andrew C. Dallas, was a Canadian Scot; his mother was English. The son, who was to be a power in industry, was born in Hamilton, Ontario, October 24, 1881. Andrew Dallas started his commercial life with a \$3 a week job in a wholesale grocery concern. Subsequently he worked in a lumber yard. He was a good accountant and a competent salesman and rose to a responsible position. After losing his savings in a business venture, he decided to take his family to Chicago in 1891. Here he obtained a post as manager of the American Brass Company warehouse. This was the family's first connection with the metal that was to loom so large in the lives of both father and son.

Donald Dallas attended public school in Chicago and had one year in the Hyde Park High School. The urge to earn impelled him to leave school and find a job. His initial work was as a \$3 a week office boy in the insurance firm of Marsh, Ullmann & Company in La Salle Street. Later the firm became Marsh, McLennan & Company.

Now began the first chapter in a typical American self-made success story. Ambitious to advance himself Donald attended night school at the Y.M.C.A. On week-ends he cut grass, shovelled snow and sold insurance. Through these varied activities he was able to save enough money to attend Armour Scientific Academy where he took courses in chemistry, physics and machine shop technique. Many years later he received the degree of Doctor of Engineering from his alma mater for

### *Copper Heritage*

"distinguished engineering achievement."

Following his graduation from Armour in 1902 he got a position to take telephone orders at the American Brass warehouse where his father was employed. Donald found his work irksome. He was a bundle of energy and wanted to get out and sell so he took a job at \$10 a week as travelling salesman for American Brass. His territory was Detroit, Ohio and Indiana. On the road he displayed the keen qualities in selling that were to make him a master salesman. One day a secretary in the office of American Brass tipped him off that he was to be fired for some obscure reason. Donald "beat the gun" by resigning. This early procedure was characteristic of the man, once he set his compass in the big business world, for he developed an uncanny instinct to anticipate events. Although it is running ahead of the consecutive story, one incident will illustrate the Dallas foresight. A year before the German invasion of Poland, he felt that a World War was inevitable so he set to work to prepare for it. When conflict broke and the urgent need of copper and brass products arose, Revere had a running start on conversion to war work. All the blueprints were ready.

The year 1908 set up a mile-post in the career of Donald Dallas for, on January 8th of that year, father and son went into the metal business as A. C. Dallas & Son with offices in one room on the corner of Lake and Dearborn Streets in Chicago: The firm was incorporated for \$10,000—the actual capital was \$4,000—and started operation as selling agents for Michigan Copper & Brass, the French Manufacturing Company of Waterbury, Connecticut and the Baltimore Tube Company. Two of these firms were ultimately to come into

### *Copper and Brass Westward Ho*

the Revere fold.

The young firm was short on space but long on ability and ambition. Over the desk of A. C. Dallas hung the motto: "What is worth doing, is worth doing well." This injunction became a guiding star for the infant firm. It did everything well for business prospered under Donald's dynamic selling. The company moved to larger quarters at the corner of Randolph and La Salle Streets. In 1911 another move was made to 117 North Jefferson Street where space on the main floor and basement was secured. These quarters enabled the firm to lay in a stock of brass and copper sheet, rod and tube and start jobbing and warehousing on a modest scale.

Donald Dallas was endowed with an instinct for production. It followed that he was not content to remain a jobber and manufacturer's agent. A new type of tubing known as lockseam tubing was being developed. Donald was quick to realize its advantages so he invested in two lockseam tube machines. Now began the first manufacturing operation of the young firm in the basement of the Jefferson Street building. Its outlet was for radiators in the expanding automobile industry.

By 1914 business had increased to the point where more space was needed. Once again the firm moved, this time to 223-231 North Jefferson Street where two floors were occupied. By this time the stock list included sheet brass, soft sheet copper, cold rolled copper, seamless brass tubing, seamless copper tube, brass rod and wire and brazed brass tubing. The firm was exclusive mill representative in Chicago for the French Manufacturing Company, the McKinnon Chain Company of Buffalo, the Buffalo Copper & Brass Rolling Mill and

## *Copper Heritage*

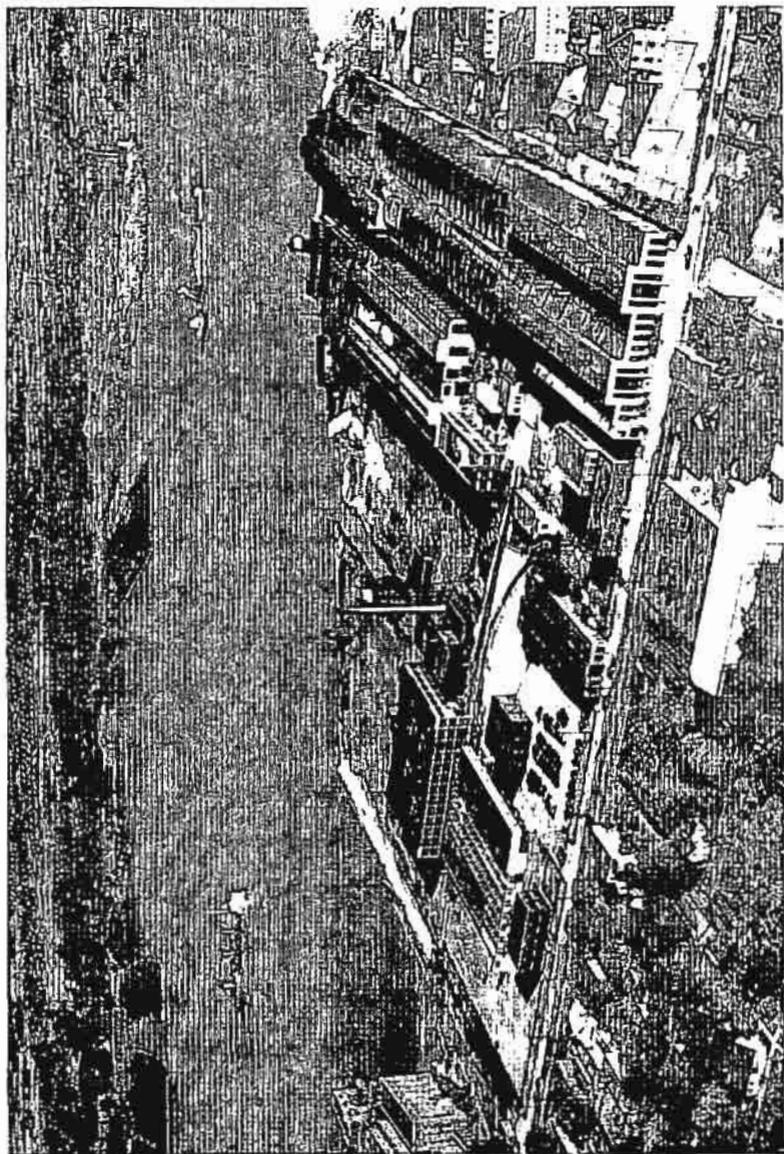
the Baltimore Tube Company.

Finding their sales efforts limited by current prices, Dallas & Son went into more expanded production. They started to roll metal in 1912. From rolling they went to finishing and then, working backward, added a casting shop. Soon they were making their own brass. Although without much technical training, Donald worked at the machines himself, building an experience that was to be invaluable later on.

With the onset of World War I the firm was in a position to do its share before, and during, our participation. One of its achievements was to roll eight-inch copper to two-thousandths of an inch for use in the Liberty engine, one of the notable American contributions to the war effort. The firm also supplied special and difficult sizes of lockseam copper tubing for the Liberty motor and rolled copper down to four-thousandths of an inch. This precise work became a specialty of Dallas & Son.

Both the title and the horizon of the firm were now to be widened. In August 1918 the company name was changed to the Dallas Brass & Copper Company with Donald as President and his father Chairman of the Board. Once more the need of more space rose up. The company could rent more spacious quarters or build. The latter alternative was adopted. In September 1919 land was purchased at the southeast corner of Institute Place and Orleans Street where a concrete, steel and brick structure with three stories and basement was erected. It provided 90,000 square feet of floor space.

In the basement of the new building a hot mill for the breaking down of cake copper was installed, making the company self-contained in the rolling of strip copper. Its rolling



Michigan Division



C. Donald Dallas

### *Copper and Brass Westward Ho*

activities were expanded and many customers were added for rolling mill products as well as for lockseam tubing. Most of the output was used by the automobile radiator industry.

Another development which was growing in importance was the specialty and eyelet department, in which was manufactured small eyelets and small drawn pieces made from brass, copper and steel. These items were used in large quantities by the makers of shoes, corsets and electrical equipment. Other products were towel bars, closet extension bars and coat hangers—made principally from the output of the company's lockseam tube mills.

From the start Donald Dallas believed in the ample use of printer's ink. He wrote, or inspired most of the advertising which was pungent and straight to the point. A typical advertisement read: "Don't be an ass. Buy Dallas Brass." Donald's forte was not confined to the written word. He became a master of equally effective speech. His pep talks galvanized the personnel and lifted their spirits when business slumped even when, as the head of the firm put it: "You could play baseball on any of the floors business was so bad." This was in 1921.

With the depression part of the past, Dallas Brass & Copper resumed its forward march. For the fourth time additional space was urgently needed. In the fall of 1924 a tract of twelve acres on the far west side of Chicago between the Chicago, Milwaukee & St. Paul Railroad tracks and Grand Avenue at the 6600 block was acquired. This was the first step toward the present-day twenty-five acre site on Natchez Avenue. A year after the land was secured a modern brass casting and sheet rolling mill was erected, housing four Ajax electric furnaces, four pairs of rolls, and annealing and finishing machinery.

### *Copper Heritage*

Dallas Brass & Copper was the first and only plant in the Chicago district to roll brass strip.

Building by building the Natchez plant expanded. The model office building at 2200 North Natchez Avenue was part of the construction program. Others were a new engineering building, machine shop, carpenter shop and an addition to the brass rolling mill. On the completion of these structures in 1930 the Orleans Street building was abandoned and all activity centered in the present plant. At the time of the Revere merger when Dallas Brass & Copper became the Dallas Division, the plant had 300,000 square feet and produced 2,500,000 pounds of copper monthly, mostly for the automotive industry and especially for the huge needs of Ford. The Dallas plant output rose to 36,000,000 pounds of copper and brass in 1929, an upward curve telling the story of the growth of the automotive industry which took 83.6 per cent of the Dallas output, the balance going in small percentages to electrical, construction, radio and refrigeration industries. Practically all the metal produced by Dallas was delivered within a radius of two hundred miles. Meanwhile capital had mounted. In the twenty-year period between 1908 and 1929 the original Dallas capital of \$4,000 had multiplied five hundred fold to \$2,000,000.

With the completion of the merger Dallas was made Vice President in charge of Manufacturing and Sales, the two activities for which he was so well equipped. Production was meat and drink to him and selling was instinct.

When Dallas became President of Revere in 1931 a dynamo that was to vitalize all the activities of the corporation was set in motion. The executive offices were moved to New York but

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the General Offices, Research and Legal Departments remained at Rome. At that time the Chairman of the Board and the President shared equal powers. F. H. Brownell was Chairman but he was not an industrialist, as such, his stronghold, and it was strong, being the law and finance. Dallas, therefore, became the active head of a mighty productive domain, the largest independent fabricator of copper and brass in the country.

The speed-up that had propelled Dallas Brass & Copper into an important place in the industry was now duplicated in all the Revere Divisions. Modernization of plant became the order of the day. Dallas said: "Men's heads are worth more than sheer brawn." Animated by this idea the scrapping of old mills began. The brass mill at Rome was the first of many buildings and equipment to be replaced by modern plants.

Dallas asserted: "I can't afford to pay men to lift hundred-pound brass slabs." This led to his pioneering in the use of conveying and other handling equipment in the industry. Revere workers were able to move eight hundred-pound brass slabs on roller tables. This operation was typical of what went on throughout the Divisions. It made for increased production and reduced accidents. The bronze Donald Dallas Safety Award, which originated with Dallas, is bestowed annually on the Division making the best safety record. At this writing the Baltimore Division holds the award for the fourth time.

With safety and modernization Dallas linked continuous production which was a fetish with him. "Output," he said, "should be like the continuous flow of a river." A corollary to this is another Dallas maxim: "Successful manufacturing

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consists of good housekeeping, making two blades of grass grow where one grew before."

Throughout his entire active career Dallas was never a desk-bound executive. He not only visited every Division each year but made an annual trip to Europe, studying industrial plants in England, Germany and sometimes Scandinavia, always returning with a batch of constructive innovations to be introduced first in Dallas Brass & Copper and later in Revere. He made the initial trip in 1922. At Dusseldorf Dallas found the Junker mold for casting brass and copper. He also brought back new machines for cutting brass rods to any length. The cutting, straightening and polishing are done in one operation. As previously pointed out, Dallas established a useful relationship with Imperial Chemical Industries where he got the inspiration to launch Revere production of aluminum. He also brought about an exchange arrangement with Imperial whereby executives of each corporation visited the other to study development of plant and product.

Being a born salesman himself, it was natural that selling should receive special attention from Dallas. At the root of his selling philosophy were the words: "Fill orders quickly." He supplemented this with a characteristic saying: "Customers don't want shipments tomorrow. They want them yesterday." It was his formula for bigger orders. One episode will show how he went after business with a degree of daring. When he became President the base brass item order was for ninety pounds which was not profitable and merely made for good will. He put the base order up to three hundred pounds. The industry stalled. "You will follow," he said, and it did.

In his early manufacturing day, Dallas's largest customers

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had been Ford, Chrysler and Westinghouse. In time they were practically lost to Revere. Dallas personally set himself to win back these valuable clients and under his stimulation they returned to the fold.

Employee relations and the joint responsibility of management and labor were problems that evoked constant Dallas attention. An instance of his interest developed in World War II when he initiated the Revere Award, a series of prizes totalling \$10,000 to be given to the best plans for speeding industrial defense submitted by men in the metal working industry no higher in rank than the grade of foreman. Dallas felt that the plan made available for defense the skill and ingenuity of trained men from whose ranks sprang Edison, Ford and Chrysler.

In his dealings with employees Dallas brought to bear a keen logic which was sometimes not unmingled with humor. How he settled a strike at the New Bedford plant indicates his ingenuity. The men wanted one-eighth of a cent an hour more than was agreed on at a conference between management and the union. It seemed a trifling matter for haggling but Dallas felt that he had a principle to uphold. He was spending the summer at Edgartown, Massachusetts when he received word of the strike and the workers' demand. Dallas wrote an advertisement for the New Bedford paper showing that the men would be obliged to work ninety-six years to make up the one-eighth of a cent in case they struck for ninety days. The day after the advertisement appeared the union called off the strike.

Throughout his active career Dallas preached the virtue of initiative and fathered the bonus system as an incentive for it.

### *Copper Heritage*

He summed it up with another typical saying: "How can you get there if you don't start?" This leads to his quality of courage. He was never averse to taking calculated risks and the end justified the means many times.

At the time of Dallas's accession to the presidency, Revere was the largest buyer of free copper in the world. He found, among other things, a top-heavy inventory of the metal which, combined with a serious financial burden, posed a serious problem of readjustment. The basic trouble with the copper end of the dilemma was that it had been bought at the wrong time. Dallas made a careful study of the situation and introduced strategic buying which stopped inventory losses and turned loss into profit.

Apropos of copper is Dallas's historic purchase of the metal, a transaction which once more revealed his courage. It was when the depression had reached its lowest ebb. The price of copper had also hit bottom. At that time Cornelius C. Felton, now a Vice President of Revere, was selling copper for Calumet & Hecla. He had met Dallas back in the Dallas Brass & Copper days and the men had become friends. At the moment Calumet & Hecla was not only in dire need of money but was loaded up with a big stock of copper. Felton went to see Dallas to try to dispose of part of his firm's huge surplus. The net result of that meeting was the purchase by Dallas of 14,000,000 pounds of copper at  $4\frac{7}{8}$  cents a pound, the lowest that the metal had ever reached.

In 1947 Dallas was named Chairman of the Revere Board. By a change in the by-laws this office became the senior executive post. Thus he stepped into ranking command which he retained until, by reason of ill health and under the terms of

### *Copper and Brass Westward Ho*

the Retirement Plan, he retired in 1951.

Such was the business career of Donald Dallas, a Titan of copper and brass, whose impress is still potent in the Chicago Division and no less felt throughout the Revere empire.

We can now resume the consecutive story of the Dallas Division. As in World War I, the Division met every requirement in World War II. Early in 1941 the Ordnance Department, later the Ordnance Division, had been revived in Plancor 91, designed by Revere engineers to produce 8,000,000 pounds of artillery ammunition and 7,000,000 pounds of small arms ammunition brass strip a month. The first shipment of small arms cups was made late in December 1941 after Pearl Harbor had already justified the foresight that made the ordnance plant not only possible but ready. By 1943 the plant had doubled its original capacity and was producing nearly 30,000,000 pounds of brass strip a month. Revere's war effort had its full recognition. On October 7, 1942 Rear Admiral H. A. Wiley presented Dallas with the Army-Navy "E" award for high achievement in the production of war equipment.

In 1929 the manufacturing activities were transferred to the present site, with greatly expanded facilities located in an area completely separated from the rolling mill. A year later the non-ferrous forging departments of the Chicago Forging & Manufacturing Company were purchased and added to the facilities of Dallas Brass & Copper Company. This department has been merged with the forging department of Rome Manufacturing Division.

For years the Dallas Division has been recognized as specialists in light gauge copper and brass strip and continues in

### *Copper Heritage*

this capacity. Its remaining copper and brass products are used in the communication, electrical, printing, household appliance, air conditioning, luggage and radio industries.

More than fifty per cent of the Division's total output is employed in automotive radiators and gaskets, unit heaters and convectors. A large portion of the product is sold to the Chicago Manufacturing Division, an offshoot of the Dallas Division. The Dallas Division also acts as selling agent for many products of the other Revere Divisions, disposing of approximately twenty per cent of the mill output of the sister units. Its sales area constitutes all or part of nineteen mid-western States.

A major modernization program, the largest attempted since the original mill was put in operation, was begun in 1954. One of the primary objectives is the rolling of heavier copper and brass bars into strip metal to meet the constantly increasing demands of customers for coils in greater length. Behind this objective is the larger and ever present desire for more efficient new machines to produce a better product at lower cost.

Competently heading the Dallas Division is Walter G. Seidlitz, a St. Louisan who, after service in the Navy in World War I, was employed by the Wagner Electric Company where he took the apprentice draftsman course. After taking night courses in engineering at Washington University, he worked for the Valley Electric Company and the Western Electric. He received his college degree at the Illinois Institute of Technology. In 1935 Seidlitz joined Revere as Technical Advisor of Dallas Division. With the outbreak of World War II he became Plant Manager of Plancor 91. Subsequently he was

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named General Manager and was elected a Vice President.

Ralph H. Buck is another office boy who has made good. After a month of indoctrination in the Chicago office of Dallas Brass & Copper he was assigned to their Cleveland office as an assistant to the District Manager, later succeeding to that post. In 1925 he was moved back to Chicago where he was appointed Sales Manager in 1931. His promotion to be Assistant General Manager of Dallas Division came in 1952.

The Dallas Division Works Manager, Harry A. Howell, also came up from the bottom for he began as helper; that is, a laborer, on the furnaces in the Annealing Department. Through successive promotions he became Plant Superintendent of the Ordnance Division. Upon being transferred back to the Dallas Division in 1945 he was appointed Works Manager.

Frank W. Brennan is a graduate of Rome Manufacturing Company where he rose to be Industrial Engineer. From this position he was transferred to Chicago to become Industrial Relations Manager for both Dallas Division and Chicago Manufacturing, the post he now holds. Still another office boy who has gone up to a responsible post is George H. Ehmann, who started in a humble post with A. C. Dallas & Son and advanced as the firm expanded. Today he is in charge of mill sales and special accounts of Dallas Division.

Edward Walworth, who started as a youth with Rome Manufacturing Division, was then assigned to Rome Division operations in Chicago and was absorbed by the Dallas Division at the time of the merger. He was assigned its large accounts and contributed to the success of Revere until his retirement on December 1, 1952.

### *Copper Heritage*

Herbert S. Ullmann, who started as an office boy with A. C. Dallas & Son, became sales manager of that company in the Twenties and in 1931, after the merger, was elected a Vice President of Revere in charge of the Dallas Division. He retired in 1945. During his tenure of office he contributed much to the growth of the Division and of the company.

Rollo E. Falk, as a boy, started as mill worker with Dallas Brass & Copper and was successively production manager, purchasing agent, Assistant Works Manager and Works Manager. He moved to the New York office in 1933 and became Vice President and General Manufacturing Manager of Revere. In 1938 he was elected a Director of the company and served until his retirement in 1944. Hard working and aggressive, he too helped broaden and strengthen the foundations of Revere.

The references to the Chicago Manufacturing Division made previously in this chapter lead to an important and logical organization change effected in 1946. As Dallas Division products increased in number and variety, it was found desirable to separate mill and manufacturing departments. The reason was obvious because their activities required different types of thinking and direction. Furthermore, the great success achieved by J. M. Kennedy in developing the Rome Manufacturing Division undoubtedly contributed to the decision. In consequence, the Chicago Manufacturing Division came into being. Supervisory help, sales, manufacturing and executive heads were taken over from the Dallas Division. Kennedy was appointed advisor to the new Division and to the Chairman of the Board on all matters pertaining to the new Division. The Chicago Manufacturing Division has richly justified its existence.

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Since Revere introduced the use of lockseam tube in automobile radiators, it follows that it has an important part in Chicago Manufacturing products. It is widely used to solve the heat transfer problems of automobile, bulldozer, tractor, truck, bus, power shovel, and power unit manufacturers. Lockseam is also extensively used by the casket industry for coffin handles. The Division has developed many standard patterns. The variety of the Division's output is indicated by the range from fish lures used by anglers to copper coffee pots. It includes parts for electrical appliances, plumbing and building hardware, television antennas and refrigerator equipment. While the Division naturally prefers to use metals produced by other Revere Divisions, it does a considerable amount of fabrication in stainless steel. From twelve to twenty-eight per cent of Chicago Manufacturing output is sold by the Dallas Division, easily the best customer of the Division.

By 1954 operations at Chicago Manufacturing Division had expanded to the point where additional space was required. The tube mill, which produces lockseam tube, rolled moldings and shapes, was removed to an acquired plant at Lockport, six miles from Joliet, in Illinois. It is twenty miles southwest from the two Divisions in Chicago. The new works turn out tubing copper-plated steel, brass-plated steel, copper and copper base alloys, aluminum, zinc and stainless steel. The plant is part of the Chicago Manufacturing Division and is known as the Joliet Plant.

The more you delve into the background of important Revere officials, the more you encounter the office boy tradition. Chicago Manufacturing provides still another instance in Ervin A. Arnesen, who started as a \$6 a week office boy with

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A. C. Dallas & Son where he soon graduated to the sales order desk and then went on to Assistant Sales Manager. Following this he functioned as Sales Manager of Chicago Manufacturing and was subsequently made Vice President in charge of the Division in 1949.

Paul LaVigne, Treasurer of both Dallas and Chicago Manufacturing Divisions, joined Revere in 1934 in the Accounting Department. Gilbert N. Boyd is Works Manager, having been with Revere for eighteen years. He is another graduate of Western Electric. Nicholas F. Lellinger, Sales Manager of welded and lockseam tube, and Kenneth J. Brundage, Sales Manager of eyelets, forgings and stampings are both Revere veterans.

In modernization, variety of output and general efficiency the two Chicago Divisions are worthy mates of their sister units throughout the Revere domain. Moreover, they are enriched by the heritage of the Donald Dallas leadership which endures.

*The Citadel at Rome*

VARIOUS American cities are pivots around which the tides of history swirled. Boston, with its tradition of Paul Revere and the first armed resistance to British rule; Philadelphia, scene of the Continental Congress and setting of the Declaration of Independence; and Lexington where the shot heard round the world was fired, are landmarks in the march of the Revolution. They are not alone, however, in big historic significance. Rome, New York contributed a kindling episode to the serial of American independence. At Fort Stanwix on the site where the city was founded and where the Stars and Stripes were first unfurled, the British received a check that was part of the prelude to eventual Continental victory.

Rome has written another phase of history as relevant to peace as its Revolutionary contribution was pertinent to war. It is recorded in blazing furnaces, giant smokestacks, vast machinery and a massive output that comprise a citadel of production. For Rome, the Canal Town that became the Copper City, is the home of Revere's largest units—the Rome Division and the Rome Manufacturing Company. Like the city itself, they are rich in tradition for they are lineal descend-

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ants of Rome Iron Works, the foundation on which Rome Brass & Copper was reared. Into the origin and development of Rome Brass & Copper, which was to take high place in Revere, were woven the lives and endeavors of indomitable men who left an impress upon the industry they served.

When the Civil War ended Rome was a town of 6,246 people. There were a few small factories but major industrial enterprise was lacking. An energizing force was needed to initiate it. It remained for Addison Day to provide it and become Rome's productive pioneer.

Day, a Roman by birth, was Superintendent of the Rome & Watertown Railroad. In 1863 he moved the shops from Watertown to Rome which was a great boon for the then canal town. At that time the railroads ran on iron rails which were imported from Wales. The rails were short-lived because they were beaten out of alignment by the incessant pounding of the trains that ran over them.

Day had vision, courage and energy. He said to himself, "Why not build a rolling mill to reroll the perishable iron rails?" A rolling mill, however, meant a considerable financial outlay and the Watertown road was unable to provide it. So Day started out to raise the capital. His first encouragement came from Edward Huntington. He also interested Dr. W. J. P. Kingsley, a leading medical practitioner in Rome. Others favorable to Day's project who joined in the enterprise in the making were Alfred Ethridge, Franklin Ethridge, Dr. E. B. Armstrong, G. N. Bissell, J. J. Parry, B. J. Beach, Dr. S. O. Scudder and David Utley.

With these men Day organized the Rome Iron Works in 1866. The original capital was \$100,000 which was later raised

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to \$300,000. Huntington became the first President with T. G. Nock as Superintendent. The formation of Rome Iron Works started Rome on her industrial march. A rolling mill was erected on Dominick Street adjacent to the New York Central tracks. Later rose a puddling mill for the direct handling of iron pigs. The immediate success of Rome Iron Works led to the establishment of the Merchant Mill which was not a competitor because it produced commercial iron. Rome's industrial expansion was under way.

In 1867 a lanky youth named Jonathan Haselton, just turned eighteen, got a job as office boy at the Rome Iron Works. When he started work, there entered upon the Roman scene the personality who was not only to expand and dominate the company but to become the community's foremost citizen and the prime factor in its industrial development. Such was the Haselton heritage for Rome.

Jonathan Haselton's father, Nathaniel, had arrived in Rome in 1848 to build the Rome & Watertown Railroad to Watertown. A year after Nathaniel came to Rome his family, that is, his wife and their two sons, George and Jonathan, joined him. Jonathan was one year old. Meanwhile Nathaniel had become one of the crack engineers of the Watertown road. When his two boys were in their early teens, their father used his influence with the road on which he worked to get them jobs, Jonathan as newsboy on a passenger train, and George as apprentice in the shops at Rome. Both boys made good in a big way. George, a mechanical genius, ultimately became mechanical head of the Vanderbilt railroad empire.

It is with Jonathan that this narrative is now concerned. With his ability and temperament he was not the type to

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remain a train butch boy long. To get into a larger field he got the job as office boy at Rome Iron Works. From that time on, his progress was onward and upward. He was successively clerk, bookkeeper, Secretary, Treasurer and finally President when Rome Iron Works became Rome Brass & Copper. Every post that he filled registered a mile-post in company expansion and likewise in the industrial growth of Rome.

Each succeeding year brought added prosperity to Rome Iron Works. The company weathered the catastrophe of Black Friday and continued to expand. Then a blow fell. A large part of the works was destroyed by fire. The courage of the directors never faltered. On the day of the fire they voted to rebuild and declared a ten per cent dividend.

A major blow now impended. It was the menace of the steel rail which was soon to make the old iron T-rail obsolete and, with it, the need of rerolling. Steel was coming into its own and coming fast. The beginning of 1878 saw the iron rail in the discard.

The ill wind, however, blew good. On July 18, 1878, an historic date in the advance of the company and of Rome as well, the trustees voted to extend the operations of the concern to include the smelting, refining, manufacturing and selling of copper, zinc, tin and other metals. Superintendent Nock was instructed to equip the puddling mill for the production of brass and German silver, an alloy in which copper is the principle ingredient. The puddling mill, which started operations in 1881, was the first to be established west of the Hudson River. Thus was laid the foundation of the copper industry in Rome, which was to emblazon the name of the community on the Mohawk as the Copper City.

### *The Citadel at Rome*

In turn Dr. W. J. P. Kingsley, Addison Day, Dr. S. O. Scudder and William Huntington served as President. A new difficulty now arose. The company was turning out copper for fabrication but it was difficult to find a use for it. Today the world is copper-conscious, employing it in an almost bewildering array of products. Such was not the case back in the Eighties. It was Jonathan Haselton, now raised to high authority, who found the way out. Combining productive and merchandizing talents, he capitalized them to the fullest extent. The era of the company's diversification began.

First of all, Haselton converted the old iron mill into a sheet copper rolling mill. He then organized the Wilson Bath Tub Company to make and sell copper bath tubs which had superseded the old tin tubs. Next he increased the variety of brass products. The inevitable result was that on October 8, 1891 the concern became the Rome Brass & Copper Company. As such it was destined to play an important part in national copper and brass fabrication as a unit of Revere Copper and Brass Incorporated.

Ever restless for expansion Haselton, with his associates, organized the Rome Manufacturing Company in March 1892 as an outlet for his copper production. Four years later he formed Rome Factory Building Company which built a plant for Rome Manufacturing on its present site on Railroad Street into which the company moved in 1896. Meanwhile, Rome Brass & Copper, having outgrown its plant on East Dominick and Bouck Streets, acquired the Brennan farm on the then eastern edge of Rome, the area where Revere's Rome Division now stands. This area was later to be known as Riverdale.

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When Haselton was in his early fifties; that is, in 1900, he turned to the production of copper tubing with the organization of the Rome Tube Company. A mill for the manufacture of seamless copper tubing was added. In the meantime Rome Manufacturing had increased its already diversified output by making ornaments for brass bedsteads then much in vogue.

Haselton was now not only the dominating force in the Rome copper and brass industry but the city's leading citizen as well. A close-up of the man reveals some of the qualities that made him commanding. He was so lean and lank that he was called "Skinny" by his associates but to the workers and, for that matter, to all Rome he was "J. S." Harsh of thought and action, he was a martinet who drove his employees hard but he drove no one in the organization harder than he drove himself. He ran a one-man show for he could hire and fire at will. Supreme authority was his. He pinched pennies but he could also be lavish as was the case when he gave an elaborate ball to celebrate the dedication of the new Rome Metal plant. The business was the very essence of Haselton's life—his pride and passion. Once when a payroll impended and funds were lacking to meet it, he mortgaged his newly acquired home for \$4,800 and the men were paid with a reserve left to meet the next emergency. Such was J. S. Haselton, well termed a "Roman of the Romans."

Oddly enough it was not until 1908 that Haselton became President of Rome Brass & Copper. For three decades he had been Secretary-Treasurer. He was much more than these posts indicated, however, he was the driving force of the business. It was peculiarly ironic that he was President for less than a

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year for he died June 14, 1908.

Haselton was succeeded in the presidency by Dr. Willey L. Kingsley, son of Dr. W. J. P. Kingsley. For the second time a father and son became executive head of the company. The other instance was when William R. Huntington succeeded his father.

When "J. S." became President, he was succeeded as Secretary-Treasurer by his son Barton who had been assistant to his father in these posts for two years. In 1907 Barton became Vice President as well as Treasurer. Three years afterward he took over the presidency from Willey Kingsley. He filled that post until Rome Brass & Copper became a unit of Revere Copper and Brass Incorporated in 1928 when he was named Chairman of the Board.

Barton capitalized one lesson out of his father's career. He and every other associate knew that "J. S." had actually worked himself to death. One of his first tasks was to build a team of men to assist him in the future operation of the company. The men who, with Barton, comprised the management team were J. J. Armstrong, William Palmer, F. J. DeBisschop, F. E. Richmond, John Henderson, H. J. Rowland, Gary March, N. S. Thomas, William Oliver, M. K. Williams, Charles F. Owens and H. D. Wolfe. Later on J. J. Russell, Louis G. Glesmann, Weston Jenkins, Leslie A. Wiggins and R. P. Winberg became members of the group.

Like his father, Barton Haselton left an impress on Rome but it was a different kind of impress. Where the father had been a dynamo of energy, dogged and hard-boiled, his son was cast in milder mold. He was kind but firm and resolute and he got things done in his own sympathetic but always effec-

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tive fashion. No citizen of Rome was more beloved. To the humblest he was "B. H."

Jonathan Haselton had risen the hard way; Barton's career was easier but it was reared on merit. Determined that his son should know every angle of the business, "J. S." put him to work in the brass mill where he advanced to be Superintendent. Transferred to the office, he displayed the same ability that he had shown in the mill. He remained the same unassuming individual, accessible to the most obscure worker in the plant. When he died in 1939 he was mourned by the entire community.

With Barton's advent to the stewardship of Rome Brass & Copper there began a new era of expansion. In 1900 the Slade Tube Company was formed to redraw tubes in smaller sizes. In the following year the Slade unit became the Rome Hollow Wire & Tube Company which was acquired by Rome Brass & Copper in 1924. The company operated until 1928 when it was dissolved and its assets taken over by Rome Brass & Copper. The year 1911 had witnessed the merging of Rome Tube with Rome Brass & Copper. Rome Metal and its bar copper mill also came into the Rome Brass & Copper fold.

Each succeeding year witnessed fresh expansion by Rome Brass & Copper. With its growth Rome grew. By 1925 nearly ten per cent of all the copper fabricated in the United States was turned out in Rome which had become the Copper City. In 1927 Rome Manufacturing was purchased by Rome Brass & Copper. Five years later the company gained its individual identity which it has maintained ever since.

When you analyze the careers of most of the men who rose to high position, first, in Rome Brass & Copper and later when

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it became part of Revere, you find that they followed the pattern of self-made success. It was notably true of J. S. Haselton and of J. M. Kennedy, now Chairman of the Board of Revere. Likewise was the story of J. J. Russell. He was born in Rome in 1886 and after attending public school got a job at Rome Brass & Copper. For two years he filled practically every job in the plant from sweeping out to rolling metal. Later he became a combination office boy and messenger for J. S. Haselton.

Russell did not long remain an office boy and messenger. When Barton Haselton became President of Rome Brass & Copper he was made Assistant Secretary. From that time on his rise was steady. A wizard with figures, his services became invaluable. Like Barton Haselton he was unassuming and, also like him, he got things done in particularly effective fashion. When the Revere merger was consummated Russell was named Treasurer, a post for which he was peculiarly fitted. Subsequently he moved on to the presidency. When Dallas retired as Chairman in 1951 Russell stepped into the vacated place to serve worthily until his lamented death in 1953. One interesting fact about Russell's career is that he was the one individual who held successively every elected office in the company. Another is that he spent his entire working life in the copper and brass industry and in the employ of one organization. Like Dallas, Russell was beloved by all his associates. His chief interest in life was the welfare of the company and he applied himself assiduously and with great achievement and credit to all of the positions he held in Revere. He can be credited with a major role in building Revere to its strong and powerful position.

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### II

In 1928, when the Revere merger came into being, Rome Brass & Copper was in process of moving from the old plant at East Dominick and Bouck Streets to the present site at Riverdale. The Rome Metal mill, now the bar copper mill, was the first building in what is now the Rome Division. Next came the tube mill. The original Rome Metal Company housed not only the bar copper department but also the bronze tube, small rod and brass wire departments. Subsequently small tube production was transferred to the structure erected for Rome Hollow Wire & Tube Company which, as you have seen, was acquired by Rome Brass & Copper in the early Twenties. The year 1928 saw further consolidation of Rome Brass & Copper facilities. The new copper mill was completed and became a member of what was now the Revere family.

You have seen chronologically how the units that became the Rome Division progressed from an iron rail rerolling mill back in the mid-Sixties to its present commanding position when it has become a mighty power house of production. The immediate task is to appraise its accomplishments as a pioneer in the introduction of advanced machines and methods which, together with its output, have made it a force in the industry. The story of Rome Manufacturing and its famous product, Revere Ware, will be told in the next chapter.

A conspicuous achievement, born of both courage and capital, was the introduction of the Four-High Tandem Mill which represented an outstanding pioneering phase of production in copper and brass. To understand what this innovation meant, it is necessary to know that while the making of heavy

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material had been highly mechanized by the end of World War I, the production of light plates and sheets had not been similarly effected. A thousandth of an inch variation in the thickness of a two or three-inch plate rarely causes trouble, while the same variation in a thin sheet may make all the difference between a useful and a useless product. Uniformity was one of the many technical problems that delayed the advent of the continuous strip mill. Until the arrival of the \$400 Ford car, which practically created the automobile industry, there was not sufficient demand for sheets to justify expensive equipment.

For some time prior to 1924 Barton Haselton and his associates in Rome Brass & Copper had been considering plans for a new sheet copper mill. The old mill, like all others in the industry, depended on the slow, expensive pack-rolling method for the manufacture of wide, thin sheet copper. The Four-High Tandem brought about a revolutionary change.

The old method had been to roll the cake copper hot down to a thickness of one-quarter of an inch. For the finishing of metal up to about sixteen inches wide, these quarter-inch slabs were slit or trimmed and then cold rolled in a continuous strip on Two-High mills. For metal wider than sixteen inches, the quarter-inch slabs were cut into pieces and rolled hot, first singly and then in packs, piling two or more pieces on top of each other as the thickness was reduced. The process was not only costly but the wide sheets were likely to be wavy and heavier in the center than on the edges. Furthermore, the method was extremely hard on the workers because of the intense heat from the furnaces and from the metal itself. The solution seemed to lie in some means which would allow roll-

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ing of the wide sheets in the same manner as metal was handled up to sixteen inches in width. No equipment of this kind was available.

Among the employees of Rome Brass & Copper was Colonel Weston Jenkins who had served with the famous Lost Battalion in World War I. To him was given the responsibility of developing the new mill. In 1924 Jenkins learned that on a drawing board in the drafting room of the United Engineering & Foundry Company of Pittsburgh was a blueprint of a Four-High Tandem Mill capable of rolling wide sheets in a single layer in the same way that normally narrow strips were rolled, thus enabling wide sheet metal to run in a continuous strip. It held the promise that the gauge from edge to center would be improved, that the surface would be satisfactory, and costs greatly reduced. The continuous strip idea is that the strip goes through each stand of rolls in succession, each one taking its reduction so that in one pass through the four mills as much is accomplished as would be accomplished in four passes through a single mill. The United people made no guarantee. To install the mill was a big and expensive gamble.

As soon as Jenkins heard of the blueprint he asked United to send experts to Rome. When he saw the specifications he maintained that the Four-High Tandem would provide the rigidity and power necessary for rolling wide sheets. Jenkins had a stout ally in William J. Palmer, then Superintendent of the rolling mill and now Executive Vice President of the Phelps Dodge Corporation. Barton Haselton backed them up and the mill was installed in 1924 at a cost of \$100,000. It went into operation in 1928. The new copper mill was de-

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signed and built around the Four-High Tandem and is still considered the world's largest copper rolling mill. It has established a pattern which has been accepted by the industry as standard for the economical and efficient production of quality brass and copper sheet and strip.

The Four-High Tandem Mill at Rome Brass & Copper was the first to be installed in the industry. Today all steel, aluminum, brass and copper mills are equipped with them. Rome led in an innovation that, industrially, was historic.

A series of notable innovations stemmed from the installation of the Four-High Tandem. The second improvement in method was in the shape of a cake larger than the two-hundred pound one used in the Two-High Mill. The American Metal Company was persuaded to produce six-hundred and eight-hundred pound end-poured cakes. The eight-hundred pound cakes required a reversing hot mill with conveyor and pickling equipment so that it could be hot rolled and pickled without any manual labor whatever. In the new equipment the work at this point became merely a matter of pushing buttons and tripping air levers.

In the development of the plant which housed the Four-High Tandem the Rome Division, as it was now designated, pioneered in the continuous annealing of sheet copper on a conveyor-type annealer, the sheets moving continuously through annealing furnaces, pickling operations and the dry-out line. The finishing of sheet copper in coils was a unique achievement. Handling heavy sheets of copper was always a problem due to its non-magnetic characteristics. Rome developed a pick-up and conveyance by pneumatic vacuum cups.

Rome Brass & Copper was the first mill to introduce success-

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fully dry-rolled brass, which is a high quality finish produced by a light reduction with highly polished rolls. Rome also led the way in the development of light gauge brass and copper for the production of automotive radiators which today represent the largest single market for brass rolling mill products.

Rome was also the first copper and brass mill to adopt electric annealing furnaces. Under the guidance of L. G. Glesmann electric furnaces were designed and installed, permitting close control of grain size and the development of a superior finish brass. This development represented the first accurate control of annealing achieved by the brass industry and the first major improvement in the brass industry in many years.

A substantial tonnage from the copper rolling mill at Rome goes into the building field for roofing sheets, flashing materials, parallel edge strip for the fabrication of copper leaders and downspouts. With the development of the mill, Rome engineered a continuous production line for this style of material which featured the highest quality of sheet that had yet been made available for the building trades. It also produced square-cornered strips and sheets of accurate dimensions, made possible by shearing both sides and edges simultaneously.

Notable pioneering has also been achieved in the Tube Mill where modernization has matched the mechanical progress made in the rolling mill. For one thing, extrusion processes came in for detailed study. After Barton Haselton and F. E. Richmond, then Superintendent of the company mills, made several trips of inspection in Europe, a German-made tube extruder of the latest type was purchased for \$250,000. When installed it was the most modern and largest

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tube extruder in the United States. Other tube extruders were put in, permitting the works to supply the United States Government with tubes of special alloys not heretofore produced in Rome. Just about this time hydraulic benches were replaced by electric chain draw benches.

In the late Twenties Leslie Wiggins, who became Vice President in charge of the Rome Division, surveyed the European use of copper tube for plumbing. As a result of that mission, Revere decided to pioneer in the marketing of copper water tube for general plumbing applications. The long flexible lengths of copper tube and the development of flanged and soldered pipe connections eliminated the necessity of cutting threads, and made possible substantial reductions in both the weight and the cost of plumbing tubes. It is interesting to note, in this connection, that the gauges selected for copper water tube were equivalent to the wall thickness of standard iron pipe sizes without the metal required for the cutting of threads. The development of this new, cheaper and more adaptable method of copper piping opened tremendous markets in the building field for the copper industry.

One of the high spots in the history of the Rome Division records a contribution to an historic event. Small tubes are used in oil lines for automotive and aircraft equipment and other industrial uses. The famous Spirit of St. Louis, piloted by Charles A. Lindbergh, when it winged its way across the Atlantic to establish a new flight record, contained copper tube manufactured at the Rome mill. If the quality of this Rome tube had not been equal to the demanded task, the pages of aviation history might read differently.

The advent of the electric refrigerator was a great boon

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for the small copper tube industry. With the cooperation of the principal manufacturers of electric refrigerators, Rome Brass & Copper developed a dehydrated and sealed copper refrigerator tube that for many years has occupied a preferred position from the standpoint of quality in the refrigerator industry. This department has grown over the years and kept pace with the refrigeration and air conditioning fields, making everything from the smallest sizes such as capillary tube to the larger, extremely light gauge tubes now standard in the refrigeration industry.

For a number of years copper refineries made no billets as small as 3" in diameter. In the early Twenties the first 3" billets were cast by refineries. These were electrolytic copper rather than phosphorized. Later on refineries undertook to supply phosphor-deoxidized tube billets. The Romans have always felt that they helped to set a pattern which was to become standard practice.

Until the late Twenties it had never been possible to pierce 70/30 brass tube on the Mannesman machine. This mixture was not considered a hot working mixture but rather a cold working mixture. About 1928 Rome Brass & Copper experts discovered that if a pure enough zinc could be purchased so that the lead content of the resulting mixture could be kept practically nil, the mixture would be pierceable. With the advent of electrolytic zinc first produced by the St. Joseph Lead Company, it became possible to obtain a uniform, high purity zinc. Rome maintains that it was the first to pierce 70/30 brass commercially. Rome also developed a scalping process for the pierced shell which removed the cast surface, producing a finish and quality superior to brazed tube. This

### *The Citadel at Rome*

advance led to the discontinuance of the Brazed Tube Department.

The Bar Copper Department has held its own in progressive methods. To illustrate, in the early Nineteen Forties L. G. Glesmann, the Assistant Works Manager, obtained a patent covering the principle of producing a wedge section to certain definite widths and thicknesses by confining the thick edge of the wedge and governing the width by the cross-section of the metal entering the bar. Following this development, the Bar Copper Department went through a period of complete renovation.

So, too, with brass rod. Originally the rod was produced by rolling and drawing. To meet the demand for high leaded rod which does not lend itself to hot rolling, extrusion presses were adopted. Following extrusion from cast billets, the extruded bars were finished by cold drawing operations. Just prior to World War II Revere, at the Rome Division, introduced into the United States the first Schumag automatic rod drawing equipment. Subsequently automatic drawing and cut-off equipment for the production of rod in long coils, was installed. Revere also initiated in this department the first high speed extrusion of brass welding rods.

Revere has invested approximately \$3,000,000 to improve tube facilities at its Rome Division. This includes block drawing of long coils at high speeds. In 1954 Rome Division installed a new 3,500 ton extrusion press which has greater capacity than any similar equipment being used in the production of copper and brass tube. The primary purpose of this, and all the other phases of the modernization program, is to improve the quality of the finished product and gain for

## *Copper Heritage*

the plant the benefits of ultra-modern production methods.

One feature of the Rome Division is well worth pointing out. On the theory that the workers in the Division should know the ultimate use of the parts they turn out, a so-called Customers' Display Booth was set up a few years ago. It is the visual answer to the question, "Where do our products go?" heard so frequently in all the departments. Brass and copper parts are displayed in decorated booths, together with the finished product in which they are used. It may be a musical instrument or a silver-plated spoon. In this way the plant workers derive a sense of satisfaction in the work of their hands and machines.

When men go to war, metal also goes to war. Every conflict down the centuries has been a war of metals whether with the rude spears of the long ago or the massive heavy-caliber guns of today. It followed that Rome was in a strong position to snap into the responsibility of meeting the nation's demands once we were embroiled.

Prior to our entry into the first global conflict Rome helped to supply some of the needs of the Allies. With the United States engaged, the mills became government arsenals. Rome produced a continuous stream of condenser tubes for warships, endless quantities of driving bands for armor-piercing shells, cartridge cups for small arms, and cartridges and cartridge discs for large artillery shells.

The plant modernization program, begun in the Thirties, found the Rome Division equipped to turn, once more, to war work. World War II was the sixth to employ Revere products. The bulk of output went into ammunition and component parts. There was scarcely an implement or instrument of

### *The Citadel at Rome*

war, however, that did not make use of Revere products. One of the many wartime tasks was to fabricate oil coolers for airplanes. With them the unprecedented was accomplished because the government specification called for the production of tubes with a wall thickness as thin as four one-thousandths of an inch. As was the case in World War I, the Rome Division produced driving bands for shells and brass discs and cups for cartridge cases and small arms ammunition.

During World War II the Rome Division met more than one emergency. Here is an instance. An order for oil coolers to outfit army tanks was so huge that it necessitated a twenty-fold increase in production. To achieve the goal, a shape-rolling machine was built by Revere engineers in six weeks and the enhanced output began to roll to the tank plants. Since this immense production had to be combined with the traditional accuracy of the Rome Division, the plants were put on a twenty-four hour shift, seven days a week, with respite only every second Sunday.

The Rome Division has developed a group of men of exceptional ability, most of them rising from minor jobs to the office of Vice President in charge of the Division. The first was Howard D. Wolfe who started as a clerk with Rome Brass & Copper, advancing by the way of Paymaster, Purchasing Agent, Superintendent of the sheet copper mill, General Superintendent of all Rome Brass & Copper mills, Treasurer, Assistant General Manager to the senior executive position in Rome. He died in 1945.

Second was Leslie A. Wiggins. He worked in all departments of the mills and offices and then went on to the Sales Department, later becoming Assistant Secretary and Sales Manager.

### *Copper Heritage*

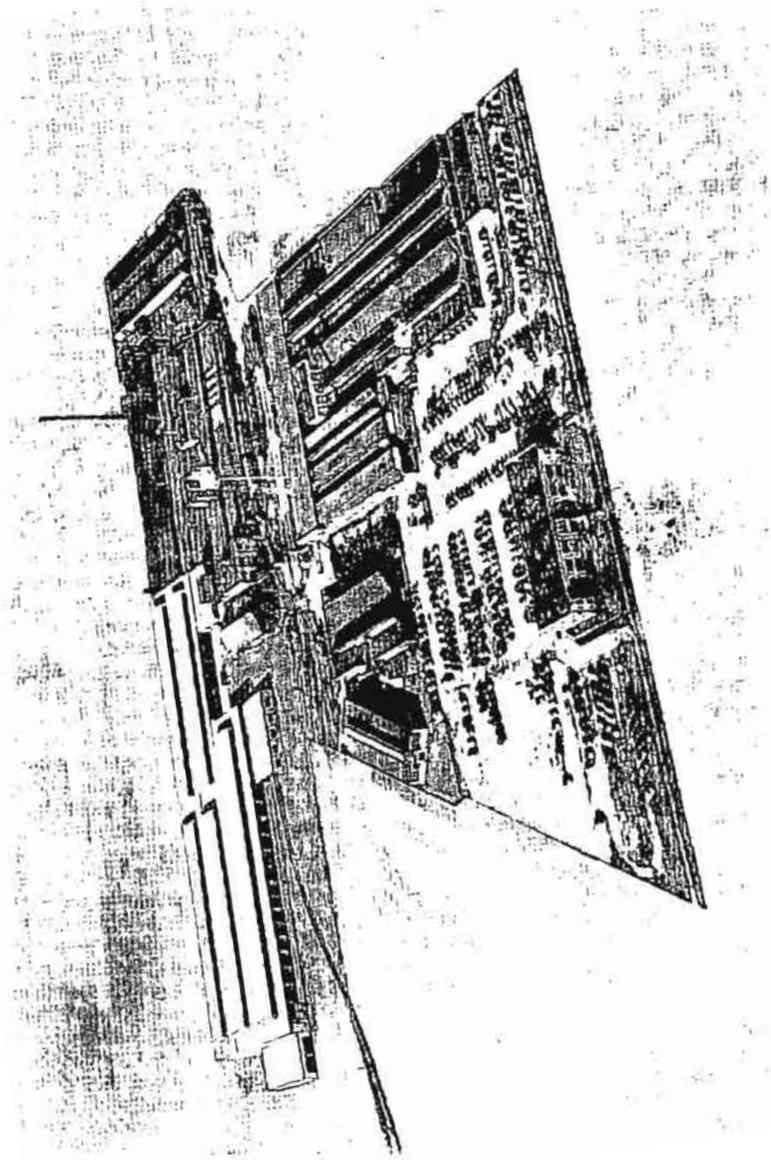
With the formation of Revere he was made Secretary and a Director, being subsequently placed in charge of the Rome Division as Vice President. He filled this position until his death in 1948.

A worthy colleague is Forrest E. Richmond, who went on the payroll of Rome Brass & Copper in 1908 as a section foreman in the Seamless Tube Department of the metal mill. Two years later he was Superintendent of the old tube mill. The year 1928 saw him Superintendent of all the company mills in Rome. In 1935 he became Works Manager and on the death of Wiggins assumed the Vice Presidency in charge of the Division. He retired in 1950.

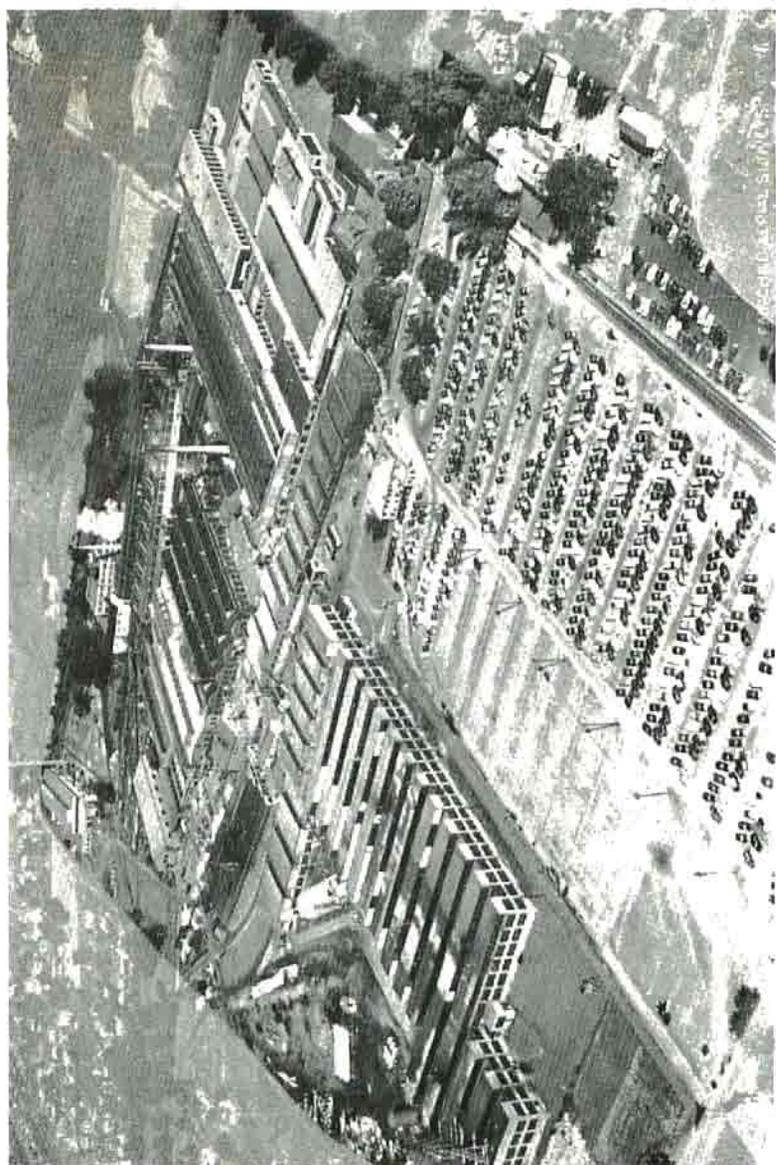
A fourth to move up the ladder is Louis G. Glesmann, who began his service at Rome Brass & Copper as a metallographer attached to the laboratory. Following the Revere merger he developed the Methods Department of the Division and became Supervisor of Methods. In 1938 he was made Assistant Works Manager. Ten years later he was promoted to Works Manager and was filling that post when he was named Vice President and General Manufacturing Manager in 1952 with headquarters in New York.

The Vice President in charge of the Rome Division today maintains the standard of his predecessors. He is Robert M. Lake who came to his present post in 1953. He entered Revere employ in 1929 as a student in various mill and office departments. Here he gained the varied experience that equipped him for the Sales Department. In 1940 he became Assistant Sales Manager and was Sales Manager when named to the Vice Presidency.

As Assistant to the Vice President, Kenneth M. Bow regis-



Dallas Division and Chicago Manufacturing Division



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ters another rise from minor job for he began with Rome Brass & Copper as office boy for J. S. Haselton. He has served in practically every department of the office, was made Treasurer and Office Manager in 1928 and took over the post he now holds in 1953.

The Division Works Manager, James A. Phillips, has risen from saw helper in Rome Brass & Copper through various mill positions to his present position. Edward F. Barnard, Sales Manager, started in the Sales Department of Rome Brass & Copper in 1925 and has been in the Sales Department ever since except for a stint as District Manager in Buffalo. L. A. Jacobus, Treasurer, is another instance of how a one-time clerk advanced. He installed the first modern cost system used by the company. His assistant is Charles R. Getty. Rounding out the ranking personnel in Rome Division is Norman MacLeod who has gone from Industrial Engineer of the Division to Industrial Relations Manager.

### III

Nothing, perhaps, so typifies the advance of modern industry as the development of research to improve products and likewise anticipate the needs of the future. Research has been well termed the keynote of production, plotting fresh paths for the industrialist to pursue. It has become an indispensable aid to progressive output.

Revere's research, operating at Rome as the Research and Development Department, occupies a distinguished place among kindred activities. It was established in September 1930 by Dr. R. A. Wilkins as director who continues in that capacity. Of the many functions it performs the one which gains

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the widest recognition is the technical and professional service to Revere's customers and to users of Revere products. Thus, while directed to new methods and processes, it is basically in support of sales. After superiority of product, the competently served client is a primary objective. To achieve this a so-called Technical Advisory Service, staffed by specialists, was early set up.

The work of the Research Department is varied and, in some instances, unique. Few laymen realize that metals, like human beings, get tired. A piece of tired metal can easily impair the work of an entire machine. Revere technicians use fatigue-testing machines to determine the useful life of metals under conditions of constant vibration. Another important function of the laboratory is the thorough examination of samples of metals obtained from prospects and customers in order to provide suggestions as to specifications and fabrication. Behind all this research and service is the objective of new markets and new products, the creation of basic metallurgical data of value to every-day operations, and the exploration and development of new processes and materials of potential future value.

The company's Research personnel in the fields of sheet metal construction, corrosion and heat transfer are widely recognized authorities. Their recommendations and publications have done much, not only to provide direct assistance to customers, but to establish broad and proper usage of the company's materials and to prevent the occurrence of inadequate performance arising from improper application or design.

In recent years very significant advances have been made in

### *The Citadel at Rome*

welding techniques. The Department's staff of welding experts has done outstanding work in adapting these new techniques to copper and to copper base alloys, in addition to aiding customers in the solution of design and manufacturing problems involving the use of welded constructions or assemblies. Substantial accomplishments have been made, and are being made, in the development of control methods based on spectroscopic analysis and other advanced laboratory techniques that have had the result not only of strengthening the company's control of quality but of effecting substantial economies in maintenance of such control. A program is maintained which involves the exploration of methods of producing and fabricating new metals and new materials and effecting improvements in equipment for the processing of such materials.

In addition to specialists in various fields of application and use, the Research Department is staffed by competent metallurgists, physicists, chemists and engineers. It is provided with specialized equipment which enables it not only to maintain the various activities mentioned but to collaborate closely with the company's General Manufacturing Department and the Divisional Methods Departments in the study of mill operations for the purpose of establishing economies, maintaining quality and improving operating procedures.

In addition to numerous ingenious and highly sensitive instruments and apparatus employed for manifold uses, the Research Department operates its own complete pilot plant which is a little marvel of mechanism. In a miniature copper mill, complete in every detail, small billets of new alloys are cast, rolled or shaped for testing, thereby determining the

### *Copper Heritage*

value of new mixtures and their particular qualities. Tests for metal to appraise elongation, hardness, expansion, flattening and compression are also made. As in all Revere products, ultimate perfection is the goal.

It has been Revere's maintained policy to establish and publish sound, explicit engineering and scientific data with respect to the application and performance of its products in their numerous and varied fields of use. Hence, one of the many services rendered by the Research Department is the publication of books and reports which have attained an authoritative place in industrial literature and are in wide and constant demand. The book entitled "Copper Sense and Copper" is typical of the output. A full-bodied publication, it contains basic principles for design, lists of mechanical properties, and specifications for durable, trouble-free installations. So valuable are its definite recommendations for the proper installation of sheet copper in new construction and for the repair and re-enforcement of old work, that the book has become a standard aid and guide for builders and architects.

Like the Rome Division, Revere's Research Department has met emergencies with the same resource that it applies to its day-by-day problems. An illuminating instance occurred in World War II. As already pointed out, perfect condenser tubes are vital to the uninterrupted operation of ships. These tubes are made of cupro-nickel which is composed of seventy per cent copper and thirty per cent nickel.

Soon after our entry into World War II the country was confronted with a great scarcity of nickel. An acute situation demanded swift and effective action. The Metal Research Department at Washington sent an S.O.S. to Dr. Wilkins,

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stating in substance: "We must have an adequate supply of nickel." It was up to Wilkins to make good and he did it in original and interesting fashion.

Wilkins knew that there was an abundant supply of nickel available in keys and also in plated ware. Keys seemed to offer the best and easiest source of supply. A hurry-up call for keys went out. What came to be known as the Great Key Collection got under way, stimulated by a nation-wide publicity campaign. Collection boxes, labelled "Keys for the War Effort," were planted in bars, hotel and motion picture theater lobbies, shops, railway stations; in fact, wherever people gathered. It was not long before carloads of keys began to roll into Rome. Every conceivable kind of key, from the huge ones given to signify the freedom of a city to small latch keys, came in.

It was one thing to mobilize the keys; it was quite another to separate the nickel from them. Once more Wilkins rose to the need. With one of his colleagues, Frank F. Poland, he had been engaged in developing a furnace, later known as the Wilkins-Poland Furnace to refine brass scrap. It was now adapted for the extraction of nickel from keys. Millions of pounds of the much-desired metal were recovered with the result that our fighting and other ships had an ample supply of condenser tubes that stood the strain.

The Wilkins-Poland Furnace is likely to play an important part in the development of titanium, the newest member of the metal family, for it is just six years old. A brief explanation of this infant metal and its possibilities is therefore in order.

Titanium, which is found with iron ore, has been called a natural aircraft material. Slightly more than half the weight of steel, it has high-strength ratio both at room and elevated

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temperature and heat and corrosion-resistance qualities as good or better than stainless steel. The Navy has constantly sought a metal that would stand up to the ravages of seawater corrosion in critical shipboard applications. The Army has been faced with demands for more mobile combat equipment adaptable to efficient land, sea or air transport consistent with a new global defense strategy, especially high-speed flight. Titanium appears to possess all these advantages. Hence, since the birth of this new metal, air frame and jet engine design engineers and metallurgists have closely watched titanium development and what may be the birth of a new industry.

The possibilities of titanium, aside from aircraft and other defense needs, are so impressive that a number of corporations, including Revere, are engaged in research on them with a view of possibly fabricating the material. The real advance in the art of making and using titanium will come through commercial and industrial applications. So far, incentive and requirements for improvement in the technology and uses of titanium have been focused on products required by the armed services.

In the light of these facts, the work of the Research Department at Rome in gearing the Wilkins-Poland Furnace to titanium is invested with a large degree of significance. The furnace has already been adapted to high-temperature melting; that is, to 3,600-3,700 degrees Fahrenheit for the melting and processing of metals under conditions of high vacuum. The implication of this operation is evident when you know that the melting point of titanium is about 3,600 degrees Fahrenheit. In molten condition it will react with practically any other substance whether solid or gaseous.

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Successful culmination of the work at Rome will permit the melting of pure titanium and pure titanium alloys and casting them so that the metal produced will be suitable for cold-working or cold-forming operations, and also so that it will be of a satisfactory quality for welding and casting large cakes which are desirable from a fabricating point of view. A further value of the improved Wilkins-Poland Furnace will be in the remelting of process scrap with substantial ensuing economies. Taking a look ahead, one can visualize a future application of the furnace for the processing of stainless steel and the elements that enter into its manufacture, and also a valuable application in the remelting of stainless steel scrap without alteration or destruction of its composition.

In Dr. Wilkins, the Research Department possesses a Chief who unites high scientific equipment with astute commercial sense, a rare combination. After his graduation from Massachusetts Institute of Technology he had charge of the chemical engineering section of the Lynite Laboratories of Aluminum Corporation of America. Subsequently he became Vice President of the Industrial Development Corporation and special lecturer at his alma mater with the rank of Assistant Professor.

The processes developed in the Research Department and the many innovations introduced elsewhere by Revere, together with trademarks, require adequate legal protection. This protection, together with other functions that come within its jurisdiction, are provided by the Legal Department with offices at Rome. At the head is Arthur S. Evans, General Counsel. He started practice more than forty years ago and occupies a high position at the bar. He was General Counsel for Rome Brass & Copper, Rome Manufacturing, Rome Hol-

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low Wire & Tube, and Rome Tube and had an important part in the creation of the consolidation out of which Revere emerged.

Having now seen the unfolding of its varied activities, it is small wonder, then, that the Rome Division merits the designation of citadel of industry. Its massive output enhances the prestige of Revere and contributes an impressive chapter to the progress of the copper and brass industry.

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*Jewels of the Kitchen*

A CELEBRATED English poet once wrote in a widely quoted poem that while people could live without poetry, music and art, "civilized man cannot live without cooks." Naturally the world with its component gourmets, gluttons and ordinary consumers of food, applauded. For many decades cooks were content with conventionally made tools of their trade. Modern cooks, however, demand utensils that evoke skill, interest and imagination, combined with utility and they found all these requirements in Revere Ware, those well-termed Jewels of the Kitchen, which have made the name they bear household words throughout the length and breadth of the land.

Revere Ware first emerged from Rome Manufacturing Company to gladden the heart of the housewife and give its producers an accolade for meritorious service. The story of Rome Manufacturing, therefore, will provide the necessary approach to the creation of its prize product.

Rome Manufacturing, it will be recalled, was organized in 1892 by J. S. Haselton as an outlet for his copper production. From that comparatively small acorn grew the stout oak which is today such an important unit of Revere. Although John G.

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Bissell was President and Walter B. Johnson, Manager and Secretary, the directing force was Haselton. Under his skilful guidance the company developed from modest beginning to a producer of national prominence. In shaping the company Haselton had expert advice and financial assistance from Bissell and Willey Kingsley, both directors of the concern. They were able and progressive men who realized the opportunities that lay in working with copper.

It is an interesting fact that the first items produced by Rome Manufacturing were tea kettles made of copper and nickel plated. In their modest way they were the forerunners of the famed Revere Ware which was to score such a spectacular success. Production of tea kettles was started June 21, 1892. By the end of the year 30,000 had been turned out. The product gained for the plant the title of "tea kettle works." With those first kettles Rome Manufacturing laid emphasis on quality, durability and salability and these essentials have been dominant ever since.

The success of the tea kettles led to expansion in production. In 1893 tea and coffee pots were added, while in the following year copper wash boilers joined the line. By this time the business had grown to such an extent that the original quarters at 136 South James Street were abandoned and the present plant on Railroad Street, or rather the beginnings of it, was occupied. It was one of the first buildings erected by the Rome Factory Building Company which had been organized by J. S. Haselton.

In 1900 Rome Manufacturing purchased part of its brass bedstead trimming business from Rome Brass & Copper. Four years later it bought the additional part of the bedstead trim-

### *Jewels of the Kitchen*

ming business so that by 1910 there were produced no less than fifty-six different kinds of husks for brass beds, twenty-five different forms of bottom mounts, eighty-four of rod ends, and a huge variety of spindles, vases, top and middle mounts, rail balls, ferrules and scrolls. The manufacture of specialty stampings and checks, chain and grommets followed the erection of a new building. Rome Manufacturing was growing and growing fast.

At this time, that is, the period preceding and during World War I, the brass bedstead was at the height of its popularity. No house was complete without one or more. With the close of the war, and even earlier, the housewife underwent a change in taste. She turned against the brass bedstead, once her pride and joy, and it went out of fashion. The change in taste posed a problem for Rome Manufacturing since a change in production became necessary. The painted iron bedstead now came into vogue and the company successfully met the demand for this type. Then the iron bedstead followed its brass predecessor into the discard. The company now began to make tubing with simple, butted joint or with brazed seams. This type of manufacture was followed until 1925 when a license to make electric welded steel tubing was secured from the Elyria Iron & Steel Company. From this license sprang an impressive phase of the business.

In 1912 Barton Haselton became Vice President of the company and Percy C. Thomas, who began as office boy, was named Assistant Secretary and Sales Manager. The policy of expansion and continuous introduction of new products was maintained under this management. In 1913 lock joint tubing and aluminum cooking utensils were produced. The produc-

### *Copper Heritage*

tion of the latter was later discontinued due to inability to get the raw material. Following World War I, Walter B. Johnson became Chairman of the Board; Percy C. Thomas, President; and Charles P. Drake, who had been Sales Manager, Secretary and Treasurer.

The success of the Electric Welded Steel Tube Department has been notable. At the start it was limited by the size of the steel tubing it could produce, starting out with some small electric welders. The scope of manufacturing was then enlarged to tubing from one-half inch in diameter to four- and five-eighth inches with wall thickness varying from .020" to .250".

Output has steadily expanded with the quality of the product widely recognized. The growth of this department has been a valuable asset in the history of the company. Its markets, then as now, are for automotive parts, bicycles, pneumatic and gravity-type conveyors, chrome steel furniture, a myriad of other uses and, in the last few years, dinette sets, the metal parts of which are chrome plated, vacuum cleaner handles, and transformer tubes. Wherever steel tube is used, welded steel tubing has a market.

Since 1926 Rome Manufacturing has been a leading producer of welded steel tubing and has kept abreast of all developments with the acquisition of new and modern tube mill equipment as it was perfected. Thomas C. Bright, who, like so many of his Revere co-workers, started as office boy, began in the Steel Tube Department in 1915 and was made Sales Manager in 1929. In 1949 he was appointed Manager of the Department, the post he now holds. Heading both the Welded Steel Tube and Forging Departments is Paul G. Ful-

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ler, who was named General Sales Manager in 1954.

The Forging Department has made a conspicuous contribution to the company's success. During World War I the process of hot-pressing brass was brought to this country from England for the making of ammunition components. Balanced weights, freedom from structural defects, great strength, good surface, and details to small tolerance were required in ammunition specifications. Forgings were the answer.

Following the hectic years of World War I, the men who had guided the company through the period of conflict visualized many peacetime applications and advantages in forgings. In 1920 Rome Manufacturing purchased the forging facilities of the New Jersey Brass Company of Garwood, New Jersey. This acquisition, which enabled the company to form copper and copper base alloys into shapes to customer specifications, made the company one of the pioneers in the industry and the third to engage in the process. H. W. Ditmeyer headed the company's first activities. He was succeeded by G. F. R. Wheat, another onetime office boy who went up. Wheat served for a time as Sales Manager. In 1949 he was made Manager and remains in this position.

The first customer of the Forging Department, Warren Webster of Camden, New Jersey, a former client of New Jersey Brass, is still a customer. Here is one of the many examples of how, once a customer of Revere, always a customer.

Some of the first accomplishments of the Forging Department were amusing. One will illustrate. A handle for steam valves for the Wrigley Building in Chicago was undertaken. It was a complicated design requiring new and untried technique. The complicated dies were completed with dispatch.

### *Copper Heritage*

The next day they were found in small pieces all over the tool room. Then and there it was realized that proper heat treating of forging dies would play an important part in the Department's activities.

In the early days of electric refrigeration, absolutely lead-proof valve bodies were vital. It meant that the first design of electric refrigeration worked or they didn't. Even life was in danger due to some poisonous refrigerants then used and today replaced by non-toxic ones. The demand was so urgent that the fastest passenger trains passing through Rome were stopped to pick up carloads of forged brass valve bodies for delivery at the customer's plant the next morning.

These early experiences, coupled with many other favorable ones, confirmed the vision of the founders. With unfaltering confidence the Forging Department has marched forward filling the needs of countless applications in both peace and war.

In the early years of World War II aluminum forging was introduced as a supplement to brass and copper facilities. Special furnaces were installed for the heat treatment necessary to harden aluminum and give it some of the lasting qualities of copper and brass. These facilities for aluminum were of vital importance for aircraft and ammunition components during World War II in which Revere was the third largest producer of aluminum forgings.

Long service has marked many of the Rome Manufacturing employees. Heading the list is Wesley C. Smith, Assistant Treasurer and Office Manager, with forty-six years to his credit. Next in seniority is Grant O. C. Elliot, Cashier, who has rounded out thirty-nine years. Myron W. Baker, Treas-

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urer, has been on the payroll thirty-one years; Stewart R. Eades, Chief Engineer, twenty-seven years. Others in long service are C. M. McCreery; Thomas P. Dunn, Works Manager; Gilbert G. Pike; Paul Fuller; Wheat and Bright; Thomas G. Whitaker; and Kenneth J. Byrnes, Purchasing Agent. Like Revere products, these men wear well.

The spectacular advance in copper fabrication, born of war effort and research, since World War I is attested by the fact that by 1927 nearly 10,000 products, each differing in size, shape and design, had been produced by Rome Manufacturing. In size, the company's output varied from a tiny button fastener weighing sixty-one ten-thousandths of an ounce to the building of a locomotive of 165 tons. In value, the cost of a single item has ranged from seven-tenths of a mill to \$48,000.

In 1927 Rome Manufacturing was purchased by Rome Brass & Copper, a transaction that greatly enhanced the prestige of the parent company. At this time Johnson and Thomas retired. The ownership continued until after the 1928 merger when it again regained its individual identity and became the Rome Manufacturing Division of Revere.

Today products of Rome Manufacturing are used in airplanes, railroad air brakes, and in power transformers. In every-day life the householder finds them in bathroom fixtures and in the fixtures that supply electricity, water, gas and automatic heat. The fire-fighting equipment in most Fire Departments throughout the country employs Revere forgings. Among the specialties produced by the Division are nickel silver forgings for dairy equipment. Special shapes made from brass and copper extruded rod and aluminum bar stock, are an important part of production.

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Huge and varied production is only part of the Rome Manufacturing picture. Along with this output must go special services and advice of technical advisers and salesmen. A highly trained group of men is charged with the responsibility of finding markets as well as ascertaining if products will meet the specific needs of customers. This follow-through of making certain that Revere's products are properly used and likewise do their job is essential to the corporation's reputation for quality.

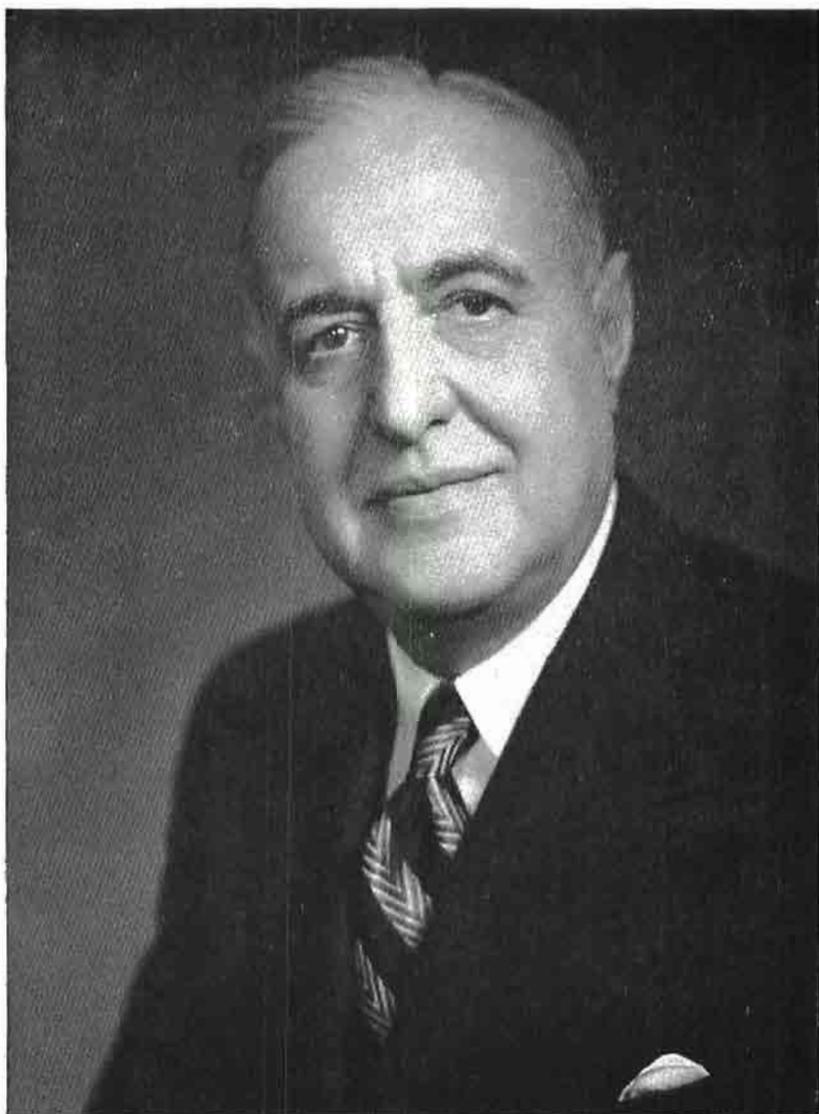
It may be well to recount here in detail the defense efforts of Rome Manufacturing and particularly its achievement in rocket production. With the crash of World War I the Division turned to the manufacture of brass discs and copper shell bands for the British Government. In 1917 control of Rome Locomotive and Machine Works was purchased and used mainly for the production of the shell bands for Britain. This output was later diverted to United States needs. Among the defense products turned out were 46,829,297 copper driving bands for large caliber projectiles.

The output for World War II was on a larger scale. Instruments for man's destruction had increased in variety and power. As a prime contractor, Rome Manufacturing produced 3,400,000 brass 40 MM cartridge cases; 4,400,000 smoke bombs; and 2,400,000 rockets of six different types. Rockets are a special type of ammunition, once so highly regarded as to warrant mention in our national anthem but out of favor for many years. Rome Manufacturing, working with the Army Ordnance engineers, led in the use of welded steel tubing in the manufacture of rockets. A great deal of the credit for the return to favor of the rocket is due to the increased accuracy



*Photo by Pach Bros.*

James J. Russell



*Photo by Harris & Ewing*

Roger W. Straus, Chairman Executive Division

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of the rounds produced from welded steel tubing. Rome Manufacturing also produced welded steel tubing and forgings of brass, copper and aluminum in large quantities for other contractors of the Army, Navy and Air Force.

The efforts of Rome Manufacturing were publicly acknowledged by representatives of the Chief of Ordnance and the Rochester Ordnance District when, on January 4, 1944, the Division received the Army-Navy "E" Award. Public recognition continued with the awarding of a second star on March 17, 1945. Following World War II, Rome Manufacturing participated in the design and development of specialized rocket types and made much of its know-how available to industry at large through the preparation and publishing of "Descriptions of Manufacture."

With the outbreak of the Korean crisis in 1950 it was logical that Rome Manufacturing should again be called upon by Army Ordnance to enter the defense effort for the production of rockets. Although specialized tools and equipment had long since been disposed of, the monumental job of accumulating machine tools, installing them, and building the thousands of special tools and gauges required, began once more.

A contract for several hundred thousand 4.5" rockets was preceded by two smaller contracts calling for experimental and development work. Rome Manufacturing engineers, again working with Ordnance experts, resolved design problems and initiated design changes to make a better yet less expensive product. A dramatic instance of this occurred with an important component of the rocket designed to be made as a steel casting. After contacting fifty-four producers of steel castings, it was found that few of them could make the part to the exact-

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ing specifications desired by Ordnance. Consequently Revere, in conjunction with four steel forging plants and Army Ordnance, developed a forged trap. This change made a better rocket and enabled Revere to meet production schedules on time. The improved part was made standard by Ordnance and later adopted by other producers of rockets. It has been estimated that this development alone saved the Government more than half a million dollars.

The contribution by Rome Manufacturing to the defense program was formally recognized by top level Ordnance personnel. On March 9, 1953, Brigadier General W. E. Laidlaw, Commanding Officer of the Ordnance Ammunition Center, visited the Division. Among other things, he said:

"It was noted during the visit that the production of the 4.5" Rocket, Metal Parts, T160E5, the administration of the contract, the performance of acceptance inspection, and the very evident cooperation between the personnel of the Rochester Ordnance District and Revere Copper and Brass Company are being conducted on a high level of effort and efficiency. The coordination and cooperation between your staff and that of the contractor are recognized as essential factors in the expeditious manner in which the many recent changes were incorporated into this program.

"The various divisions of the Rochester Ordnance District, the Revere Copper and Brass Company, and the individuals who participated in the different phases involved in this program are hereby commended."

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On September 17, 1953, Brigadier General J. B. Medaris, Chief of the Ammunition Branch, Office Chief of Ordnance, said:

"Every bit of information I have indicates that your performance on the 4.5" rockets has been especially outstanding. It indicates clearly both the ability and desire to cooperate of you and your executives and engineers, as well as demonstrating the interest of your production employees and their outstanding capability.

"You and all of your people have every right to be very proud of that job. Even measured against the fine performances we have learned to expect from your company, this rocket job was especially outstanding."

In every recent emergency copper and copper alloys have been in critical demand. Late in World War II the Army Ordnance Department, working with several concerns, attempted to develop a cartridge case from steel since enormous tonnages of brass were required for cartridge case production. Rome Manufacturing was then producing a 40 MM case from brass and participated in the research and development required by the change to steel. This work was interrupted by the end of the war in 1945 but when, in 1951, cartridge cases were required in quantity, Rome Manufacturing was selected to produce a 90 MM cartridge case in steel. All the engineering design and toolroom facilities of the Division were made available for this project but due to space requirements, the production line was laid out in the Clinton, Illinois, plant

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which had been started in 1950 to produce Revere Ware.

It was thought by Army Ordnance that the art of steel cartridge case manufacture had advanced sufficiently in the years 1945 to 1951 to permit the Clinton Division to plan a production line based on equipment, tools and processes then known to industry, and to start producing cases immediately when the line was complete. To hasten the completion, Revere engineers scoured the country's warehouses for used machinery to speed up the establishment of the line and found eight used heavy presses which had been in operation since 1945, together with limited induction heat-treating equipment.

The initial thinking of the Ordnance Departments had to be revised. When production was started it was found necessary to completely revise the tools and dies required, the heat-treating methods and other important operations. In this development work the engineering and toolroom facilities of Rome Manufacturing, working with the Clinton Division personnel, met each problem and solved it. The teamwork resulted in the Clinton Manufacturing Division being the first manufacturer in the United States to produce acceptable 90MM steel cases in quantity.

The production line is in a stand-by condition, ready for the next emergency. Meanwhile, Clinton has produced over 1,500,000 steel cartridge cases without a single ballistic failure. It was a notable achievement and one which will serve the country well in the conservation of brass, should another emergency arise.

Shortly after the production of the one millionth case on December 4, 1953, ceremonies were held at the Clinton Plant

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attended by Colonel B. P. Shirey of the Ordnance Ammunition Center; Colonel E. G. Miller, District Chief of the Rochester Ordnance District; representatives of the Chicago and Rochester Ordnance Districts; and representatives of Rome Manufacturing. At these ceremonies, Colonel Shirey said:

“Looking at this one millionth case, it is the manifestation of the coordination and cooperation and the close relationship that has existed for many years between industry and the Ordnance Corps. . . . The glory of the production you have achieved here could belong only to these men and women who operate the machines. You can be justly proud of the production accomplishments considering the nature of the equipment given you to set up this facility. . . . Production from this place has never suffered a ballistic failure. This illustrates very definitely that you are turning out a superior product.”

## II

During the busy years up to the early Thirties Rome Manufacturing had developed into a fit mate to Rome Brass & Copper in skill and production. A new and brilliantly illumined horizon was now to open. The time had arrived when, with a product and a man, it would make the housewives of the nation its eternal debtor. The product was Revere Ware; the man was James M. Kennedy.

As far back as 1908 Rome Manufacturing had produced some types of cooking utensils made of copper. These utensils were tin-lined but, as you have been told, the lining wore out,

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necessitating retinning. When aluminum utensils were introduced they captured a big share of the market. Rome Manufacturing sales up to 1931 depended largely on steel tubing, forgings, wash boilers and tea kettles.

Such was the situation when 1932 rolled around and Chester M. McCreery wrote the prologue, so to speak, for the drama of Revere Ware. McCreery had been a successful newspaper man in Toledo, Ohio, had quitted journalism and joined the Goodyear Rubber Company. Here he first displayed his flair for invention for, in collaboration with P. W. Lichfield, later Chairman of the Goodyear Board, and Ellis W. Templin, he invented the six-wheel vehicle which brought about a revolution in truck transportation. Armed with the patent for the truck, he organized the Six Wheel Company which was financed by Charles M. Schwab, the steel magnate. McCreery and Templin then retired from the Goodyear Company and marketed the first six-wheel vehicles produced for commercial use and for the United States Army. McCreery's facile use of words acquired in his newspaper days stood him in good stead for he became an ace salesman and such he has remained ever since.

McCreery then disposed of his interest in the Six Wheel Company and went on an extended trip to Europe. While abroad he observed that all kitchen utensils on the Continent and especially in France were fabricated from copper. It gave him the idea of introducing copper utensils in the United States. Rome Manufacturing, as you know, had made lined copper utensils but the lining was unsatisfactory. McCreery now had an inspiration. Why not chrome plate cooking utensils? He knew of the Rome Manufacturing experience with

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utensils. Here, then, was the ideal objective for the proposal of his plan so he went to Rome and discussed his idea with Dr. Wilkins. Wilkins referred him to Dallas, then President of Revere, and Barton Haselton, Chairman of the Board. They hired McCreery and sent him back to Rome. Once more McCreery's inventiveness asserted itself for he devised a tea kettle with a bird on it. The bird whistled when the kettle boiled. Hundreds of thousands of these kettles were sold.

A line of chrome-plated sauce pans was now produced. The lining failed to last because potatoes cooked with salt produced a solution that caused the chromium to wear off. The project was therefore abandoned. It seemed to Rome Manufacturing that the lined copper utensil, so far as their product was concerned, was doomed.

It was at this juncture that Kennedy first appeared on the utensil stage to play the big part in what became an historic development. With his entry upon the larger Revere scene he took the first major step on the road that was to lead him to the top. In view of his accomplishment, a profile of the man, his method, personality and varied equipment, is pertinent at this point.

Kennedy was born in Chicago, the son of Michael J. Kennedy, a native of Wigan, England, who emigrated to Chicago in 1868, two years before Mrs. O'Leary's famous cow kicked over the lamp that started the fire which devastated half the city.

After attending grade school James entered John Marshall High School where he excelled as an athlete, building up the powerful frame that was to fortify him for strenuous endeavor in the coming years. He was catcher on the baseball team, quarterback on the football team and captain of the High

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School golf team for two years. He shone particularly as a golfer, winning the Junior Championship in public parks. He was a member of the Interscholastic Championship basket ball team that established a record in Chicago sports.

While in High School Kennedy displayed the quality of leadership that was to manifest itself throughout his business career for he was made President of the Civic Industrial Club which participated in all municipal movements. One day a letter came from Mandel Brothers, who owned a big department store on State Street, stating that the firm wanted help in the store on Saturday afternoons. Kennedy applied and got the job at \$1.50 for the Saturday stint. His work was to pick up the coats tried on by women and replace them in the stock room.

Before long another letter came from Mandel Brothers, this time asking for a salesman in the necktie department. Kennedy applied and again got the job which paid more than the one in the women's coat section. When he came back for his second Saturday in neckties the manager reprimanded him for taking the second job when he already had one and sent him back to women's coats. Kennedy refused to stand for what he considered a demotion and walked across the street to the Boston Store which was a competitor of Mandel Brothers. He took with him the newspaper clippings that recounted his golf victories. The personnel manager, to whom he applied for the job, naturally took him up to the Golf Department to see if there was an opening there. It was a lucky break for Kennedy because there was a vacancy in the staff. He was put in the golf department and immediately made good. On his first Saturday he made \$10 on a straight commission basis.

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Later on he averaged \$16 and often went up to \$22. His success as salesman caused golf sales to lead the entire sporting goods department. When he went to collect his pay on Wednesday afternoons after school the manager would ask: "What sale do you suggest for next Saturday's sale?" At seventeen he had become not only something of a force in his department but an authority on golf as well. This was attested to by the fact that more than once Mr. Netcher, the proprietor of the Boston Store, sought his advice on the game and especially how to get rid of a slice.

James kept his job at the Boston Store until his graduation from High School. With our entry into World War I he enlisted in the Student's Army Training Corps of the United States Army. During his period of training he studied logistics, French, German, and military map reading. He also played football, basketball and golf. In 1918 he won the Cook County Amateur Golf Championship in Illinois.

Kennedy was now eighteen and ready for a full-sized go at business life, so he secured a position with the Quaker Oats Company as detail clerk. The urge to improve himself was strong and accordingly he took a night school course in accounting. The law now beckoned to him, not so much as a career but to give him an all-around equipment in business. In the late afternoons and on Saturdays he went to Kent Law School. After three years of legal study he was admitted to the bar of the State of Illinois. This was in 1924.

As happened later in Revere, Kennedy went steadily up the line at Quaker Oats. When he was twenty-two he became Traveling Auditor for the company. Up to that time no one under forty-five had held the post. Kennedy was less than half

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that age. His work took him to the many branch offices. He audited consigned stocks, accounts, bookkeeping systems and sometimes the mills. The entire United States and Canada were his territory. He was now an accredited member of what was known as the Quaker Oats Family.

One episode will reveal Kennedy's early ability. Quaker Oats had a feed mill at Richford, Vermont, the feed business being a by-product of oats. Part of his job was to check this mill twice a year. The firm needed a warehouse so Kennedy converted the mill into a warehouse. After it had served its useful purpose he reconverted the property to a feed mill which proved to be a prosperous move.

The time was now at hand when Kennedy was to make the business connection that would project him into the industry in which he was to become a power. One of the officials of Quaker Oats was Robert Laird who had taken an interest in Kennedy's career. He was acquainted with Donald Dallas, then President and Treasurer of Dallas Brass & Copper, an up-and-coming concern. At the moment Dallas was looking for a young man to handle costs and office management. Laird admired Dallas and had a desire to be of service to him. At the same time he did not want to lose Kennedy. He felt, however, that with a young firm like Dallas Brass & Copper he would have a bigger opportunity to advance himself than in Quaker Oats, so he said to Kennedy: "Go over and see Donald Dallas. He has a job open and I am sure you can fill it."

When Kennedy met Dallas he was instantly impressed with his virile personality. He felt that here was a man who would go far and he wanted to go along with him. At Quaker Oats Kennedy had dealt with a business that aggregated \$100,-

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000,000 a year. The Dallas concern then rolled up a total of only \$3,500,000 every twelve months. This difference in volume did not deter Kennedy. He sensed a big future for Dallas Brass & Copper and decided to link his fortunes with the firm. Dallas engaged him after their first meeting. Kennedy got the assurance from Laird, however, that if he were not satisfied at Dallas he could always come back to the Quaker Oats Family. That return was never to be made.

Kennedy was not long at Dallas Brass & Copper before he was head of all accounting. Soon he was in charge of the financial systems. Costs had been his first assignment. At that time Dallas Brass & Copper was turning out tubing, electric light fixtures, coiled copper and rerolled brass. After a year with the firm he made a report to Dallas suggesting that the electric light fixture department which was losing money be abandoned. Dallas adopted the suggestion with the result that the firm concentrated on profitable items.

In 1926 Kennedy was made a director and Assistant Treasurer of Dallas Brass & Copper. Until the Revere merger Dallas clung to the title of Treasurer. Meanwhile Dallas Brass & Copper was advancing steadily in prestige and output and Kennedy marched with it. He was fast developing into a forceful colleague of the dynamic Dallas. He was also getting an all-around grasp not only of copper and brass from metal purchase to fabrication but also in selling. He visited the important accounts, thus absorbing every detail of the business, qualifying himself for the senior role in Revere that eventually would be his.

Now began the series of innovations initiated and, in most cases, developed by Kennedy that were to disclose his resource

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and ingenuity. The first was at Dallas Brass & Copper and stemmed from the so-called time study. One of the problems confronted in the rolling mill was the difficulty in establishing time standards for the cakes as they went through the rollers. The difficulty was caused by the changing weight, shape and size of the cakes. Under the old system in vogue the time element was established by men who timed the operation with stop watches thus obtaining the time rate for rolling and intervals between passes. Since size, shape and weight were constantly changing, standards were continually changing. In addition, there were almost invariably constant disputes due to the disparity in the records set by the stop watches.

Kennedy had watched this operation with interest. He said to himself: "There must be some simpler and more accurate way of establishing the time record." He thereupon conceived the idea of recording the rolling time electrically. He called in outside engineers, laid his suggestion before them and they found it thoroughly practicable. The result was an electrical instrument which makes a perfect time recording and also eliminated the manual effort necessary in the old system. The electrical instrument is now in use in all Revere plants.

Came 1928, the year of the merger. Kennedy accompanied Dallas to New York and participated with him in all the major meetings that preceded the consolidation. Once the merger was consummated Dallas became Vice President in charge of manufacturing and sales. Kennedy assumed the post of Dallas Division Treasurer at Chicago. When Dallas succeeded Allen as President of Revere he transferred the executive offices to New York and moved there. The year 1931 saw Kennedy in-

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stalled in New York as aide to Dallas in special work with the title of Assistant to the President.

### III

Kennedy's big opportunity now came. Dallas, entrenched in power for the President of Revere then shared equal authority with the Chairman, was dissatisfied with the course of production events at Rome Manufacturing and particularly the difficulties that beset the line of utensils. He called Kennedy into his office and said: "Go up to Rome and produce something worthwhile." So Kennedy went up to Rome where he was to turn the gloom that enveloped the utensil project into the bright day of glowing success. He became General Manager of Rome Manufacturing.

Directly Kennedy reached Rome things began to happen. First of all, he moved the Rome Manufacturing Division Offices down to the manufacturing plant. The Manufacturing Company was set up as a separate Division and divorced from the mill, as it was realized that the products, the manufacture, the distribution and sales of the Manufacturing output were entirely different from those at the mill. Kennedy organized a team which was to function practically in toto for the next twenty years with McCreery as General Sales Manager, C. P. Drake, Ernest Spriggs, C. E. Gray, H. V. Leckie, M. S. Wyman, C. A. Mammosser, A. P. Knight, H. Lee and Enos Eades as the factory group; H. Gilbert and Les Faulds of the Treasury Department; G. F. R. Wheat in charge of forging sales; and T. C. Bright in charge of tubing sales. These men comprised the group that enthusiastically tackled the job of re-

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building the Rome Manufacturing Company as a Division of Revere Copper and Brass Incorporated.

Kennedy put the laboratory on a three-shift basis for a thorough testing of the chrome-plate lining. Under drastic tests it was discovered that the chrome plates of any quality would be affected by the action of vegetable acids. This meant that chrome-plated copper utensils would not stand up. Kennedy stopped the manufacture and sale of those items. He then created a Development Department to check and analyze all metals and combinations thereof in an effort to find a perfect cooking utensil. After almost endless tests, stainless steel proved to have the qualities needed. This steel was impervious to most of the food acids, was strong and durable and resisted pitting better than any other utensil metal tried out. A hard metal, it could stand up against pounding and misuse without denting or loss of shape. There was a hitch, however, because stainless steel lacked heat conductivity. The big problem was how to solve it.

Kennedy had an inspiration. He knew that copper was the best commercial metal to distribute heat, so he reasoned: "Why not marry copper and stainless steel? Deposit copper on the outside bottom of the utensil and you will have the happy combination."

Here, then, was the long-sought key to the riddle. Stainless steel was impervious to acids in food; copper would provide the means of even heat distribution. Kennedy was in Chicago when the idea of the marriage of stainless steel and copper struck him. On his return to Rome he began the task of converting his inspiration into a reality.

The problem of binding copper to stainless steel involved

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highly technical use of both chemistry and engineering. The electro-depositing of copper on the steel was found possible but to make such deposited copper adhere permanently to the stainless steel and to deposit a heavy layer in a short space of time and without flaws, involved techniques that had not been developed. The copper deposit on the bottom of a Revere stainless steel utensil had to be about one-and-a-half times as thick as the stainless steel material that comprised the receptacle, or body of the utensil. It was, therefore, a heavy deposit, made in a shorter period of time than ever before used commercially, as well as an adherent deposit that was discovered and developed by around-the-clock work in the Revere laboratories. Thus the indissoluble wedding of copper to stainless steel was brought about. It was a marriage that precluded divorce.

To achieve this end, every scientific resource of Revere was brought into play. Plating tanks and generators not hitherto in use were put to work and additional equipment obtained. Under the direction of Arthur P. Knight, Chief Chemist of Revere, and Harold Lee, with Dr. Wilkins as consultant, the testing began.

The first research objective was to find a process by which a copper deposit could be put on a stainless steel vessel. Hundreds of tests were run. Finally, in February, 1937, a process was developed that produced an absolutely adherent plate. High speed deposition of copper followed. The next and final step was the depositing of a smooth, heavy plate of copper thicker than the steel itself. The seemingly impossible had been achieved.

A small working model of a plating unit was set up by the

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engineering staff. It was run continuously for some months to show mechanical weaknesses or parts that would not stand heavy corrosion exposure. Everything worked out according to plan and process. Machinery for the production of Revere Ware was ordered early in 1938. The birth of the copper-clad stainless steel utensil was at hand.

It was necessary to create a fitting design for the new product. This task was entrusted to W. Archibald Welden, Revere's Director of Design. That he met the requirements is indicated in the grace and beauty of the utensils which achieve a perfect balance and a construction designed to eliminate rivets and dirt catchers.

With production it became apparent that these works of industrial art should not languish unseen in the kitchen cupboards and drawers. It was important that they be displayed as a treat to the eyes. Racks were devised on which to hang the utensils.

An adequate name was also essential. Since Paul Revere had founded the copper industry, it was altogether fitting that the utensils should bear his honored name. Thus it came about that, as Revere Ware, the copper-clad stainless steel utensil made its bow in the utilitarian world.

Revere Ware was first viewed by the public at the Housewares Show in Chicago. Nothing comparable to it had ever been displayed before. Housewives were enchanted with its beauty and utility. They saw a ware that lent itself to high polish and a mirror-like finish, was as easy to clean as glass, was resistant to food acids and alkalies. Furthermore, it was warp-proof, produced no hot spots, no burning of food and gave, in short, the greatest cooking efficiency.

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During World War II Revere Ware production was necessarily halted because the facilities of Rome Manufacturing were diverted to defense needs. When production was resumed with the advent of peace, the demands of housewives and consumers everywhere increased many fold with each succeeding month. Utensil production capacity at Rome Manufacturing was increased again and again, until every inch of available floor space was utilized. The plant was literally bursting at the seams. It was still impossible to keep up with the consumer demand.

Meanwhile, the great post-war migration westward began, with California, Oregon and Washington growing rapidly in population. Shipping costs to the west coast increased considerably. With a vision of still greater growth in that area, Dallas and Kennedy decided to extend utensil production by establishing a plant in California.

After an extensive survey of various manufacturing plants and available sites, the plant formerly owned by the Colonial Radio Corporation at Riverside, California, was selected by Kennedy as best suited for the purpose. It was an attractive concrete structure located in an eight-acre orange grove on the outskirts of Riverside in the heart of the citrus fruit belt. Riverside is served by the Union Pacific and Santa Fe Railroads, with freight connections to the nearby Southern Pacific Railroad in Colton. Many highways, north and south, east and west, traverse the city which is located just sixty miles from Los Angeles in the West Coast's fastest growing metropolitan area. Hence, rapid transfer of raw materials from the east and quick service to Revere Ware customers on the west coast were available. Water, power and gas supplies were ade-

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quate. Both the local Chamber of Commerce and the citizens of Riverside welcomed the establishment of a Revere Ware plant in the community.

A skeleton force of trained and experienced individuals was selected from the management group at Rome Manufacturing and transferred to Riverside for the purpose of installing machinery, hiring employees and local supervision, training them and putting the plant into operation. This group originally consisted of Edward T. Doyle, Works Manager; Edwin D. Howell, Assistant Works Manager; Robert F. Scott, Treasurer; Marshall L. Land, Industrial Relations Manager; A. W. Reinhardt, Plant Superintendent; and Walter P. Middlemiller, Superintendent of Maintenance. Assisting this group in the installation of power lines and machinery was M. S. Wyman, Superintendent of Maintenance of Rome Manufacturing.

The plant was occupied in February, 1948. The first equipment began to arrive in May of that year. By October some machinery was in operation and employees were being hired. The first shipment of utensils from the Riverside plant took place in December, 1948.

Additional equipment was brought into the plant in early 1949. By July the output of the plant had more than doubled. The original plant, which consisted of 50,000 square feet of manufacturing space, plus 8,000 square feet of office space, was almost doubled in 1949 by the construction of a warehouse to service west coast customers with products which the Riverside plant was not equipped to produce.

After the job of getting the plant in production was accomplished, Revere continued a policy of increasing efficiency,

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improving the plant's appearance and service to its customers. It included asphalt parking lots, a curb along Kansas Avenue fronting the plant, landscaping, air conditioning and many improvements to machinery and equipment. Riverside personnel pioneered the use of automatic equipment for buffing utensil bodies and were the first utensil Division to install water recirculation, thus conserving water and reducing costs.

Wherever possible, Revere selected local employees to become supervisors to augment the key employees transferred from Rome and also to permit employees to be transferred to other Divisions. This brought about the promotion of Ralph E. Johnson to general foreman of the 3:30 shift; John W. Carter, foreman of the Press Department; Daniel Stevens of the Buffing Department; and William P. Corridan, Assistant Foreman of the warehouse operations. All are Californians.

Another significant step was taken in June, 1954 when S. R. Knight was made West Coast District Sales Manager with headquarters in the Riverside plant. Prior to that time, sales representation for Revere Ware on the west coast had been handled by Osgood and Howell, a well-known west coast manufacturer's agent. Others of the Revere Ware sales organization transferred to the west coast with Knight were W. A. Fielding, Portland; D. R. Evans, San Francisco; J. M. Wilkins, Seattle; R. L. Williams, Los Angeles. These were augmented by three native Californians: D. N. Oldendorf, T. F. Short, P. J. Kelly, who became associated at the west coast sales organization. Other changes have taken place in the Riverside organization. McCreery became Vice President of Riverside Manufacturing Division in 1952; J. M. Kennedy, Jr., Assistant Works Manager replacing E. D. Howell; and E. D. Hayes,

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Industrial Relations Manager succeeding M. L. Land. In June, 1951, G. F. R. Wheat, Jr., became Assistant Works Manager replacing J. M. Kennedy, Jr., who was called back to the Rome Manufacturing Division on a defense project. In August, 1954 William Knutson succeeded Hayes when he returned to Rome Manufacturing Division as its Industrial Relations Manager.

Although in 1950 Rome Manufacturing was working twenty-four hours a day, seven days a week, and the then recently created Riverside Division was operating the same schedule, it was impossible to catch up with the demand of the consuming public for Revere Ware. Plant expansion again became necessary. A mid-west source of Revere Ware was now decided upon by Dallas and Kennedy. Market and site surveys throughout the mid-west were made in the same careful manner that had preceded the construction of the Riverside plant. Finally a plant in Clinton, Illinois, was selected by Kennedy. Again factors of water and power were ample, as was transportation. The city of Clinton is served by the Illinois Central Railroad with direct access to both Chicago and St. Louis, making outgoing shipments of Revere Ware economical and efficient. Smooth highways permit truck shipment in all directions. The city of Clinton is close to the center of population in the United States. The site of the plant, therefore, is strategic in every sense.

The factory building was built by the Clinton Community Association in 1946 for another concern through the selling of bonds to local residents in Clinton and DeWitt County. It was acquired by Revere in the spring of 1950. By June 1, the necessary remodeling of the plant was begun. A road had to be built to the plant and a parking lot constructed. Trans-

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formers to provide the type of power used by Revere were installed.

The plan used in starting Riverside had proved so successful that once again key employees, selected from the several Revere Divisions, were transferred to Clinton, later to be augmented by selected local employees. These key employees were E. D. Howell, Works Manager, who came from the Riverside Division; John Herold, Treasurer, from the Chicago Manufacturing Division; H. J. Schindler, Plant Superintendent; H. G. Roberts, Industrial Relations Manager; Donald A. Jackson, Tool Room Superintendent; Elmer E. Cornish, Maintenance Superintendent; and William M. Lowerre, all of whom came from the Rome Manufacturing Division. E. J. Keenan joined the Revere organization at Clinton as foreman of the Buffing Department. Again, M. S. Wyman, Superintendent of Maintenance at Rome Manufacturing, was in charge of the original equipment installation. The Clinton Division was in production even faster than the Riverside Manufacturing Division, producing their first utensil, a one-quart saucepan, in October, 1950. By December, 1950, regular shipments to customers were being made.

Shortly after production and when the original training of employees got under way, H. J. Schindler was made Assistant Works Manager and E. J. Keenan, Plant Superintendent. Two local Clinton residents, James R. Miller and James E. Isaac were made foremen. The plant had just barely started producing utensils when the Korean crisis occurred. The Clinton plant was selected for a substantial program of 90MM steel cartridge cases, as you have seen. In connection with this program, the floor area of the plant was virtually doubled, its

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power and water consumption increased many fold and a great many special presses, furnaces, induction-heat treating, machining and inspection equipment were installed.

Organization changes brought about by the defense effort were many. H. J. Schindler became Works Manager in November 1951, replacing E. D. Howell, who was transferred to Rome Manufacturing as Assistant General Manager of Revere's Rome Manufacturing, Riverside and Clinton plants, working directly with McCreery, now Vice President of the three Divisions. E. J. Keenan became Assistant Works Manager; James R. Miller, Plant Superintendent; J. C. Glover, Production Manager; and Harry Tilley, Chief Inspector.

Under Schindler's direction the working force grew by 400 additional employees to turn out steel cartridge cases needed for the Korean War. None of these new men had any experience in working with metal or in production and the record that they achieved is a great tribute to the management and to the teamwork, so much a part of the Revere spirit, which was so quickly engendered in the Clinton Division.

Government regulations concerning copper and stainless steel became such as to permit the joint operation of the Clinton plant on both cartridge cases and Revere Ware during 1952 and 1953. This plant, as well as Riverside, has served as a training ground for Revere personnel. In 1953 William Lowerre, Jr. was shifted to Rome Manufacturing to work on New Products Development; in 1954 John Herold, Treasurer, was transferred to Revere's General Office at Rome, New York, and was replaced as Treasurer at Clinton by J. F. Gregor, formerly of the Chicago Manufacturing Division.

The efficient use of every inch of floor space at Clinton is

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a constant source of amazement. It has seemed almost impossible to produce literally the millions of products which have been turned out under such condition. That this has been done, with high quality merchandise the mark of Clinton products, is a tribute to the Clinton Manufacturing Division and the residents of Clinton and surrounding areas who made it possible.

As of today, the Government has an ample supply of steel cartridge cases and no longer needs the output of the Clinton plant, which is being placed in a stand-by condition for future emergencies.

Three plants were now producing Revere Ware. It appeared that at long last the problem of keeping pace with demand was solved. A new difficulty arose with the scarcity of available raw materials. In 1951 and 1952 copper and stainless steel were both allocated by the Government with the additional handicap that the regulations under which domestic production could be produced and sold changed almost monthly. A great many of the larger items were dropped from the list entirely. What steel and copper could be obtained were diverted to the smaller utensils in order to satisfy the largest possible number of customers.

Rome Manufacturing adopted a Fair Share Distribution Program, allowing each customer a percentage of his previous year's purchase. This arrangement worked exceedingly well, proving to the trade the fairness in Revere distribution. In 1952 the extensive strike in the steel industry made the rationing program more difficult to carry out.

The period of 1953 and 1954 saw rapid plant improvement and a return to normal business. Virtually every item that had

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been absent from the line during the Korean crisis and some which had been absent from the line since World War II were brought back and accepted with great enthusiasm by customers.

Additional products were now added to the line. They included stainless steel mixing bowls and a three-piece mixing bowl set in plain stainless steel; handy pans and a handy pan set, also in plain stainless steel; a fourteen-cup coffee maker with new features such as filter bed and coffee extraction below the boiling point; a four-cup drip coffee maker; a six-cup egg poacher; and a solid copper chrome-plated tea kettle. Two attractive gift sets were also introduced. They were the Eleven Purpose Set and the Kitchen Jewel Chest. These sets, with their smart packaging and attractive appearance, received phenomenal acceptance by the public.

To keep pace with product development, plant improvements were made. Revere, in cooperation with city officials, widened and straightened Railroad Street, a step which not only improved parking facilities at the plant but also improved traffic conditions in the city of Rome. In 1954 an office building originally built by Rome Wire Company and later acquired by General Cable Corporation, was purchased for the Rome Manufacturing Division office building.

One virtue of Revere Ware is worth noting. Before its arrival the kitchen, even with the installation of many electrical gadgets that lighten work, was more often the most unattractive room in house or apartment. The racks of gleaming stainless steel copper-clad ware wrought a happy change. To harmonize with them the entire kitchen decor has been embellished with gayly painted cupboards, bright chintzes at

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the windows and red stools and tables.

The original Revere Ware line consisted of sauce pans, sauce pots, kettles, skillets and double boilers. They were the outposts of the institutional line, designed for mass feeding, put out in 1954 and first displayed at the National Restaurant Exposition held at the Navy pier in Chicago May 10 to 13 of that year. More than 30,000 people visited the show and most of them viewed the Revere Ware exhibit. The second public exhibition of the ware was in New York in November 1954 where registration was high and many orders taken.

The new line was produced by Rome Manufacturing Division and includes braziers, sauce pans, sauce pots, flared skillets, stock pots, mixing bowls, handy pans and coffee makers. It enables hotels, restaurants, schools, cafeterias, hospitals, bakeries and other institutions to enjoy the many benefits of copper-clad stainless steel ware in utensils of sufficient size to meet all needs. As with the first Revere Ware, the line is functionally beautiful and met with an enthusiastic reception, filling a long-felt want.

The institutional line was years in making. As a matter of fact, it appeared on the drawing boards soon after the introduction of the first Revere Ware in 1939. It was designed primarily by Archibald Welden who designed the first line.

One reason for the delay in the production of the institutional line was the heavy involvement of Rome Manufacturing Division in war work which occupied five years. The initial portion of post-war output was used to catch up with the demand for the household utensils. Another delaying action was the unavailability of 18-8 stainless steel for civilian products during the Korean war. This is the highest grade of stain-

### *Copper Heritage*

less steel. During the interval prior to the production of the institutional line, Revere engineers and the Research Department checked with hotel and restaurant managers on the practical uses and design features which could improve their preparation of food, as well as provide quick and economical serving. One important objective was how to extend the aesthetic and utilitarian features of the domestic line to the heavy-duty institutional line. The features were not only extended but enhanced.

One of the original design features of the institutional line is the unique flat, recessed, stainless steel cover or lid for sauce pans and sauce pots, which permits nesting or stacking of hot pans on top of the stove to keep food warm. Aside from this advantage, these covers with their wing-tip handles can be stored easily. They are durable and, like their forerunners, eliminate hot spots, make for uniform spread of heat, resist dents and corrosion and are easy to clean. A further advantage of the institutional line is that it has copper where it is always most effective—at the bottom of the utensil.

The introduction of ware made of stainless steel with copper bottoms not only represented a great advance in the evolution of kitchen utensils, but also marked a revolution in women's concept of familiar household aids. Likewise it called for new policies and new methods in advertising and selling. Revere has met these changed conditions with revised methods and processes.

For one thing, in order to handle the increase in Revere Ware output, sales territories have been reorganized and the field staff expanded by one hundred per cent. Young men, preferably with college education, developed in the Revere

### *Jewels of the Kitchen*

organization or secured from the outside, are brought in and given a complete course of cooking in the Home Economics kitchen. After a schooling in office and policy procedure they go forth fully prepared for field work. They have established permanent cooking demonstrations in many department stores.

Surmounting the tariff wall, Revere utensils are finding their way in large numbers into Canadian homes. Regular distribution, carried on through big jobbing houses and the larger department stores, is widespread throughout the Dominion. Revere utensils are on display in more than 50,000 retail stores in the United States and Canada. Alaska and Hawaii have come into the Revere Ware ken. Inquiries are received from practically all countries. In the kitchens of the King of Thailand hang rack after rack of shining Revere Ware. It means that the forward look is not local but global. Revere Ware is becoming a world citizen.

Bulwarking the selling force is Revere's cooperative advertising program, launched in November 1953. It was formulated to aid all retail outlets in developing and promoting their Revere Ware business. The specifications were drawn in accordance with existing legislative procedure to achieve fair and equal treatment for all classes of retailers. Revere's cooperative advertising program specifies that any newspaper with a fully paid circulation is an eligible medium. Revere pays fifty per cent of the cost of the original space of the advertisement only, based on the retailer's lowest local contract rate.

Revere was practically the first manufacturer to make such a program available to all retailers on an equal basis. As a

### *Copper Heritage*

result, up to 50,000 retailers are eligible if they sign the contract. In this connection, a retailer is not eligible to participate until he has executed the contract. All advertising that pre-dates the execution is not eligible for reimbursement. At this writing, Revere has approximately 6,000 signed contracts from retailers throughout the United States and Canada.

Revere looks to still greater growth of Revere Ware in the future. This confidence is based on the conviction that the past and the present are only a foundation of knowledge and experience on which to build. Many more kitchen products which can be made from copper-clad stainless steel and also from plain stainless steel will be added to the lines as designs are developed and tools made to produce them.

Field Marshal, so to speak, of Revere Ware production and distribution is McCreery, Vice President in charge of Rome Manufacturing, Clinton and Riverside Divisions. He was in at the birth of the copper-clad stainless steel ware and has been an animating force in fostering and expanding the product. He is re-enforced by an able group of key men who are H. J. McCormick, General Sales Manager of the entire utensil line; P. L. Wakefield, Sales Manager—Housewares; M. L. Land, Sales Manager—Institutional Ware; L. T. Stannard, Manager of New Products; W. A. Welden, Designer; Mildred G. Arnold, Director of Home Economics; C. P. Drake, Assistant Sales Manager—Fair Trade; E. D. Hayes, Industrial Relations Manager; W. A. Brown, Superintendent of Maintenance; H. J. Lee, Chief Chemist; A. H. Froschauer, Master Mechanic; Paul G. Fuller, General Sales Manager of Forging and Welded Steel Tube Departments; G. F. R. Wheat, Sr., Manager, Forging Department; T. C. Bright, Manager, Tub-

### *Jewels of the Kitchen*

ing Department; A. Matesky, Welding Engineer; and H. V. Seals, Superintendent of Stainless Steel and Rocket Departments.

The creation of Revere Ware, outstanding as was the achievement, was only one of the Kennedy accomplishments at Rome Manufacturing. His flair for mechanical transformations to the end of economy and simplified and profitable operation, has manifested itself in various directions.

Kennedy renovated the entire electric welding department into straight-line production. Next he got rid of all forging department equipment and put to use the Maxi-Press for copper and brass forging. It is now in common use in the industry. He renovated and conveyORIZED the tea kettle unit into straight-line production and brought in a completely automatic unit for nickel and chrome plating. To eliminate duplicate equipment he closed down the Forging Department in Chicago Manufacturing Division and concentrated all forging in Rome. The Rome Stamping Department was transferred to Chicago Manufacturing. This gave additional space for the utensil operation.

An outstanding Kennedy innovation was his pioneering in the bright nickel-plating solution which eliminates buffing after plating. Before he introduced the solution it cost twenty-five cents in labor alone to chrome-plate a tea kettle. With straight-line production it became possible to produce a complete tea kettle, from raw material to finished product, for ten cents. This operation not only increased sales of the now lower-priced kettles and gave additional employment to Rome workers but enabled Revere to get a big bulge on manufacturers of kettles. The Kennedy operation is now standard.

## *Copper Heritage*

Kennedy also focussed his talents on the selling end. When he went to Rome all forgings were sold by mill salesmen. He felt that this kind of selling required men skilled in the manufacture of the product, so he brought about a change that accomplished this end. This, however, was just one step in his reform of selling.

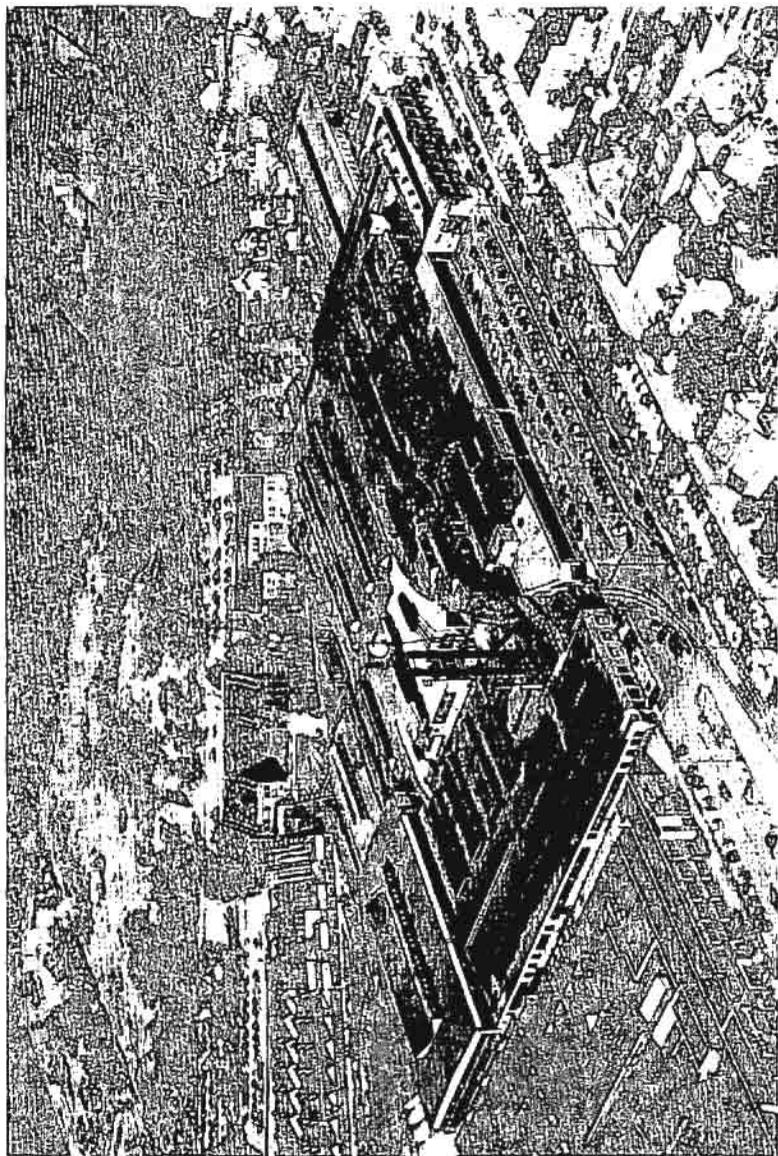
Tubing sales were made through so-called Franchise Distributors which was, in Kennedy's view, an unsatisfactory procedure. Products were shipped to these distributors who placed them with their own customers. This made it impossible for the company to know who the ultimate purchasers were. The distributors could cancel their agreements with Revere and the company would be left without a selling force. To overcome this hazard Kennedy caused men in the Revere organization to be trained to sell steel tubing direct to the customers. The remainder of the field, thus, belonged to Revere. To widen the direct selling operation, Kennedy turned over the Western Zone to Chicago Manufacturing Division and had their men trained to sell welded steel tubing and copper, brass and aluminum forgings.

Kennedy's compass is constantly set for new items of production and the improvement of old. To accomplish these objectives he set up a New Products and Development Department on the company organization chart. It functions in two sections, one covers new products for the mill Divisions under the Vice President in charge of research, who is Wilkins. The other is devoted to new products for the so-called Manufacturing Divisions and generates the power for ultimate production of new items for the consumer field. This is under the direction of McCreery.

### *Jewels of the Kitchen*

With the retirement of Dallas as Chairman of the Board in 1951 Russell moved up to the vacated place and Kennedy became President. Following the death of Russell in 1953 Kennedy came into the Board Chairmanship, thereby reaching the top rung of the Revere ladder.

No element of luck has entered in to the rise of Kennedy. Every advance in his career has been achieved through sheer ability. He combines aggression with caution; the creative with the intensely practical. His conquest of the baffling copper-clad stainless steel utensil was only one evidence of his many-sided resource. Big of build and vision, with a strong personality, he has an almost uncanny instinct for anticipating production needs and processes. Years ago an eminent French philosopher wrote: "To foresee is to rule." Kennedy is the embodiment of that maxim.



Rome Manufacturing Company Division



James M. Kennedy, Chairman of the Board

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## *The Revere Merger*

AS THE third decade of the Twentieth Century neared its end, all the Revere units heretofore enumerated, each with an impressive record of resource, output and expansion, were marching inevitably toward a common point of fusion. That point marked the birth of the merger which brought Revere Copper and Brass Incorporated into being in 1928. It was an event that registered an epoch in American production and likewise wrote a chapter in industrial history. The companies that united for the merger had played vital parts in metal expansion long before, during and following World War I. One of them linked the stirring days of the Revolution with these teeming times. They were now, in team play, to be geared to further development of the copper and brass industries.

The approach to the merger was typically American in concept and purpose. We had pioneered mass production, the corner stone of our industrial might, and made the assembly line synonymous with massive output. Big corporations, like nations, had learned through trial and error that expansion, and sometimes self-preservation, lay through coordinated effort. This coordinated effort became the keynote of vast in-

### *Copper Heritage*

dustrial progress. The United States Steel Corporation had blazed the way for successful union of related interests. Other mergers followed. The time was ripe for another important consolidation.

The Wall Street investment banking house of Kissel, Kinnicutt & Company had effected the combination that resulted in the General Cable Corporation. On completion of this consolidation Kissel, Kinnicutt turned to a similar consolidation of copper and brass rolling mills. They formed a tentative organization of four companies owning five different plants and approached Michigan Copper & Brass which was unwilling to join the combination. The owners of ninety-five per cent of the stock, however, were agreeable to the sale of their holdings. Kissel, Kinnicutt then approached the American Smelting and Refining Company which agreed to buy the stock of the Michigan company and turn it into the proposed consolidation provided the combine would buy the Baltimore Copper Rolling Mill from General Cable, which had acquired the mill from the Smelting Company. This was done. The way to consolidation was now clear. It went into effect in 1928 as the General Brass Company with the following units: Baltimore Copper Rolling Mill, Dallas Brass & Copper Company, Higgins Brass & Manufacturing Company, Michigan Copper & Brass Company, Rome Brass & Copper Company, and the Taunton-New Bedford Copper Company. Combining twenty-five per cent of the country's copper, brass and bronze rolling mill facilities, with mills valued at \$43,000,000, the merger became the second largest fabricator of copper and brass products in America, and the biggest fabricator not wholly owned by mining interests.

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Four days after the merger had been consummated the name of the corporation was changed to Republic Brass Corporation. On November 12, 1929, in order to honor the revered name of the founder of the copper industry in the United States, the name was changed again, this time to Revere Copper and Brass Incorporated. As such, it occupies a pre-eminent name in the roster of American metal fabricators.

The first Chairman of the Board was Barton Haselton who had won his spurs as executive with Rome Brass & Copper. George H. Allen, the first President, was reared in metal. His preparation for the post of executive head of the new consolidation was derived through more than thirty years' experience with the American Brass Company, the leading firm in the industry. He grew up in Torrington, Connecticut, the State that was the seat and stronghold of brass. His first job was with the Coe Brass Company which later became part of American Brass. His progress in the industry was swift for he was successively Vice President and Treasurer of the Chicago Brass Company of Kenosha, a subsidiary of American Brass, and subsequently in charge of the Buffalo branch of the parent company. In July 1927 Allen resigned from American Brass and moved to Detroit to become General Manager, and later President of Michigan Copper & Brass. When that concern became part of the Revere merger he went along and became President of the new corporation, serving for two years. After a year as Chairman of the Executive Committee he retired to his boyhood home at New Milford, Connecticut.

Associated with Haselton and Allen was an imposing array of technical, financial and management ability that reached

### *Copper Heritage*

every phase of the copper and brass industry. The Vice President, C. Donald Dallas, had demonstrated how a small business can grow to imposing proportions under the impetus of fresh ideas and forceful leadership. J. J. Russell, graduate of Rome Brass & Copper, was a wizard at figures and served as Treasurer. E. H. R. Revere, great grandson of the eminent Paul, was, and remains, a member of the Board, thus maintaining the Revere name and tradition in the business.

The reasons for the merger were obvious. Just as collective security spells world peace if vicious nationalism were curbed, so does collective effort in industry make for manifold advantages. It means and has meant for Revere pooling of raw materials, joint experiment and research, wider distribution of products, increased technical service for customers, exchange of technical information, adaptability of production to regional conditions and demands and the many other benefits that stem from integrated effort.

The part played by the American Smelting and Refining Company in the preliminary to the formation of Revere was the forerunner of an association that has meant much more than a financial connection. High executives of the Smelting Company, which has a large holding of Revere stock, have contributed vitally to the progress of the corporation. Following the death of Barton Haselton, Francis H. Brownell, brilliant New York lawyer with an uncanny flair for business and financial direction, who had been Chairman of the Smelting Company Board and head of its Finance Committee, became Chairman of the Revere Board, as already pointed out. He had previously been Chairman of the Revere Executive Committee and also Chairman of its Finance Committee. After his

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retirement as Board Chairman he again headed the Executive Committee for two years. Brownell died in 1953.

An invaluable link between Revere and the Smelting Company is embodied in Roger W. Straus, Chairman of the Smelting Company Board and its senior executive. The distinguished son of a distinguished father, Oscar S. Straus, he is one of the foremost industrialists of the country and also an outstanding leader in humanitarian movements. As Chairman of Revere's Executive Committee, his vision and wise counsel have helped to initiate and guide many important undertakings. On the Board of Directors of Revere are other capable Smelting Company Executives. They are Kenneth C. Brownell, President of the company; J. C. Emison, Chairman of the Finance Committee; Simon D. Strauss, Manager of the Sales Department; Edgar L. Newhouse, Jr., head of Federated Metals; Oscar S. Straus, Treasurer; and R. Worth Vaughan, head of the Legal Department.

Although the specific details of plants and production have been revealed elsewhere in this narrative, it may be well to summarize the high spots of Revere achievements here. In the twenty-seven years that have intervened since the merger came into being, the world has experienced its worst depression and its most devastating war. Revere met the first named with fiscal equanimity and the second with a noteworthy contribution both to the global conflict and the Korean struggle. More political, military and economic history has been written in the past two and a half decades than in previous centuries. In that period the atomic and hydrogen age dawned with its twin impact for destruction and the industrial needs of peace as well. Russia marched to a commanding position in inter-

## *Copper Heritage*

national affairs; China and part of Indo-China, with their teeming millions, became hostage to the red order. The United States enhanced her world leadership and became the almoner of the economically distressed free nations. Scarcely an area throughout the universe escaped the virus of unrest and uncertainty.

Revere progress, through leadership of the highest caliber, has contributed to the development of copper, brass and bronze technology and its expert application. The far-sighted planning of new mills and the modernization of the old ones, with the consolidation of production in the most strategic locations, have made for advances in every productive channel. Then, too, the careful planning for the welfare of management, employees and stockholders has been part of the many benefits inherent in the merger.

From the research and manufacturing point of view, copper remains "the first true love" of Revere. Copper, as has been well said, "is a friendly and cooperative element" and joins with many other alloys essential to the human race in the ever-broadening use of metals. In addition to the historic uses of copper and brass, Revere has added aluminum to its family of metals and has made its production an important phase of output, both for war and peace, with tremendous potentialities for the future.

The management of an intricate corporate structure such as Revere Copper and Brass requires expert controls on materials, their acquisition, warehousing and distribution. The proper stockpile of copper in its various stages of refining and processing is based on the experience of the mills and the correct anticipation of requirements. In 1938, Revere

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adopted the inventory system, now generally known as LIFO, which means "last in, first out." Revere handles a vast tonnage of metals, and this costing of inventory through the LIFO method has a stabilizing effect on the book costs of metals, and prevents disturbing and often meaningless fluctuations in earnings. There is a safety factor also in the LIFO method, especially in a rising market because the aggregate inventory cost is well below the current market.

The peacetime requirements of industry and the wartime needs of the military incite the curiosity of metallurgists. While technological advances are usually greater under the stress of war, Revere has made many of its best advances in the breathing space between war and the rumors of war. A typical Revere activity is the Revere Technical Advisory Service, the national development of a desire to help industry get the best use out of copper and copper base metals. Not a day passes in any Division of Revere but a technical question is asked on the use of copper. Some of these questions are elementary. Other problems involving climate, stress, appearance, chemical reaction or electrical conductivity, require the guidance of the expert who is personally informed and who has access to the information of others. Such problems are the daily dish of the staff of Revere's Research Department.

One of the notable achievements of the post-merger period was the financial rehabilitation of the corporation to which Dallas largely dedicated himself, once he became President. It merits detailed explanation.

The original funded debt of the corporation was \$10,000,000 par value First Mortgage 6 Per Cent Sinking Fund Gold Bonds, Series A, due July 1, 1948. The total authorization was

### *Copper Heritage*

issued. The sinking fund provision required payment to the trustee twice a year of \$125,000 in cash or bonds. These bonds were deemed to be the equivalent of cash payment to the extent of amounts equal to the aggregate cost of the bonds but in no event to exceed 107½ per cent of the principal amount of bonds delivered. The redemption call price was set at 107½ per cent of the principal amount. There was no reduction in sinking fund or call price as the bonds neared maturity. The 6 Per Cent Sinking Fund Gold Bonds were redeemed through sinking fund requirements as well as property releases so that at the end of 1935, there was still \$8,399,000 par value of these bonds outstanding. They were redeemed as of February 11, 1936. This redemption was accomplished by the issuance of \$9,200,000 First Mortgage 4¼ Per Cent Sinking Fund Bonds due July 1, 1956, with sinking fund provisions, payable semi-annually of (a) \$100,000, plus (b) 5 per cent but not in excess of \$100,000 of the consolidated net income of the corporation for the prior year. Cash or the principal amount of these bonds could be used in payment of the sinking fund requirement. The sinking fund operated after the issuance of the bonds and on December 20, 1940, the entire issue then outstanding of \$7,922,000 was redeemed. The money for the redemption of these 4¼ Per Cent Sinking Fund Bonds was obtained through the issuance of \$7,500,000 First Mortgage 3¼ Per Cent Sinking Fund Bonds due November 15, 1960, which had similar sinking fund provisions to the 4¼ per cent bonds. Reductions were made in the outstanding bonds through sinking fund and property release provisions. The balance of \$2,740,000 was redeemed as of November 15, 1948 at 102, plus accrued interest, out of current funds on hand.

### *The Revere Merger*

The authorized capital of Revere at inception consisted of 200,000 shares of 7 Per Cent Cumulative Preferred Stock at a par value of \$100 per share; 1,000,000 shares of Class "A" Stock without par value; and 3,000,000 shares of Common Stock without par value. The 7 Per Cent Cumulative Preferred Stock was accompanied on issue by detachable warrants entitling purchase of Class "A" Stock at \$75 per share, such privilege expiring in December 1933. The holders of Class A Stock were given the privilege of converting to Common Stock at the rate of two shares of Common Stock for each share of Class A Stock.

The original amount issued was 100,000 shares of 7 Per Cent Cumulative Preferred Stock; 250,000 shares of Class A Stock; and 507,841 shares of Common Stock for the purchase of all the assets and assumption of liabilities of the constituent companies. In 1929 an additional 1,400 shares were issued for the purchase of land. During 1929 4,074 shares of the 7 Per Cent Cumulative Preferred Stock were purchased for the treasury and an additional 750 shares were purchased in 1932. On November 12, 1936 stockholders approved an issue of  $5\frac{1}{4}$  Per Cent Cumulative Preferred Stock of 150,000 shares of a par value of \$100 each and providing further that on or before June 30, 1937, any shares of the 7 Per Cent Cumulative Preferred Stock outstanding might be converted into  $5\frac{1}{4}$  Per Cent Cumulative Preferred Stock at the rate of one and one-third shares of  $5\frac{1}{4}$  Per Cent Cumulative Preferred Stock for one share of 7 Per Cent Cumulative Preferred Stock with accumulated dividends thereon. Under this authorization 70,589 shares of 7 Per Cent Cumulative Preferred Stock were converted into 94,118 shares of  $5\frac{1}{4}$  Per Cent Cumulative Pre-

## *Copper Heritage*

ferred Stock.

During 1942 and 1943, 2,547 shares of 7 Per Cent Cumulative Preferred Stock were purchased and retired and on March 2, 1945, the balance of the shares outstanding—22,040—were called for redemption out of the general funds of the company.

As already indicated, there were 94,118 shares of 5¼ Per Cent Cumulative Preferred Stock issued in exchange for 70,589 shares of 7 Per Cent Cumulative Preferred Stock, plus accumulated dividends. During 1942 and through June, 1950, 8,857 shares of 5¼ Per Cent Cumulative Preferred Stock were purchased and retired and the balance of 85,261 shares were called for redemption—25,261 shares on June 30, 1950; 20,000 shares on October 31, 1950; and 40,000 shares on December 30, 1950, out of the general funds of the company.

In addition to the 250,000 shares of Class A Stock originally issued, 1,051 shares were issued through exercise of warrants. 36,835 shares of Class A Stock were exchanged for Common Stock on the basis of one share of Class A Stock for two shares of Common Stock.

At a special meeting of stockholders held December 3, 1941, the charter was amended to reclassify and change the Class A Stock with all rights represented thereby, including all accumulative dividends thereon, into three and one-half shares of new Common Stock without par value for each share of Class A Stock. The 214,216 shares of Class A Stock under this authorization then outstanding were exchanged for 749,756 shares of Common Stock. On December 15, 1948, 45,741 shares of the Common Stock held in the Treasury were retired, leaving a balance of 1,286,916 shares outstanding.

### *The Revere Merger*

Since the merger Revere has devoted more than \$40,000,000 from depreciation funds and earnings to plant and equipment. Four new plants—Los Angeles and Riverside in 1948, Clinton in 1950 and Joliet in 1954—have been put in operation. All this expansion brought the total number of Divisions to ten with 9,500 employees.

With the establishment of the Los Angeles plant Revere made its entry as producer in the far west. The new member of the Revere productive family was given the title of Pacific Coast Division. Revere, however, was no stranger in that part of the country. Long before the smoke began to curl from the smokestack of the Los Angeles works, Revere products had played an important part in the industrial development of the entire Pacific Coast area. In marketing its products, however, the company labored under the handicap of high freight rates from its plants thousands of miles away.

The demand for Revere wares, coupled with the tremendous expansion of the Pacific Coast area, dictated the decision to start operations at Riverside, California. World War II had accelerated the needs of the shipbuilding, aircraft and other industries. Furthermore, the mushrooming population created many small home communities with their household needs and also provided a reservoir of potential employees.

The initial step toward the establishment of the Los Angeles plant was the setting up of a Revere sales organization on the coast. Next came the task of selecting a site. It will be recalled that the Rome Division rose in a region rich in historic interest for there the bloody tides of Indian and Revolutionary battle rose and fell in a pregnant hour of the struggle for American independence. The Los Angeles plant site

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is also invested with interest more picturesque, however, than sanguinary.

The land on which the Pacific Coast Division stands was part of the original Royal Spanish grant consisting of many ranchos. These ranchos, like the many missions that dotted what is now California, were virtually autonomous communities swearing loyalty only to the Crown of Spain. The missions were the outgrowth of the widespread clerical colonization in the present United States. The exact site of the Pacific Coast Division was the legendary 300,000 acre rancho of San Antonio whose patentee was Antonia Lerio Lugo. The area where once the silver-spurred vaqueros rode amid droves of cattle and sheep and where soft-toned mission bells called the faithful to prayer, is now alive with the hum of machinery and the clatter of trucks and cars. The site is in the midst of the 300,000 acre region in the geographical center of Los Angeles acquired by the city for its Central Manufacturing District.

It is interesting to remark that Revere's first production effort in the west began exactly a century after the historic discovery of gold in California which put the region on the map and fortunes in the pockets of many of the pioneers who dug and delved there. A year previous to the gold find California was acquired by the United States.

Land for the Pacific Coast Division was purchased just before the end of 1946. On April 15, 1948 excavation began on the twelve-acre plot where the plant was reared. It was the first Revere Division to be built from the ground up. It was a happy coincidence that on April 19, 1949, the 174th anniversary of Paul Revere's famous ride and the Battle of Lexing-

### *The Revere Merger*

ton, the first metals fabricated by the new Revere Division were sent on their way to customers. Revere's production had become nation-wide.

The Pacific Coast Division's streamlined rod and tube mill is capable of turning out upwards of a million pounds of copper and brass rod and tube each month. The building is approximately 700 feet long by 130 feet wide. On the front end there is an additional bay 80 by 130 feet housing the casting shop.

The Division represents the last word in modern equipment. In the casting shop are four electric furnaces with a unique furnace level-charging arrangement that simplifies the handling of metal. Efficiently planned transportation takes the copper and brass billets directly to the charge end of the billet furnace serving the rod and tube extruder. Pickling equipment is next in line with pointing machines close by. For the next step in fabrication the draw benches are ranged across the mill from breakdown to finish. Only when annealing is required does the metal deviate from a straight flow. The keystone in the planning of the mill is the elimination of as much handling of the metal as possible. In 1953 expansion of the property provided for the addition of a facility for the production of aluminum tubing in addition to the original facilities for the output of brass and copper tubing and brass rod.

When the Pacific Coast Division was opened approximately 100 residents of Los Angeles were needed to operate the equipment under the direction of skilled and experienced supervisors who had been trained in other Revere Divisions. Today the personnel total 300. With very few exceptions at the top

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management level, all the present employees were hired locally, a practice observed by Revere in the opening of all its new plants.

Vice President in charge of the Pacific Coast Division is Wallace H. Hitchcock who is still another Revere example of rise from minor post. In 1918 he was hired at \$10 a week to fill the positions of stenographer, order clerk, quotation clerk and, between times, to help out as shipping porter in the Taunton-New Bedford sales office and warehouse in New York. Several promotions brought him into sales work. In 1939 he became a Technical Advisor and in succession was Assistant Manager of the General Export Department and director of Pacific Coast sales. With the formation of the Pacific Coast Division he was made General Manager and a Vice President in 1952.

The Works Manager of the Division, John Hughes, is a graduate of the Rome Division where he rose to General Foreman of the Tube Mill. In 1954 he was transferred to the Pacific Coast Division as General Superintendent and on January 1, 1955 took over his present post. Conrad M. Fick, Treasurer of the Division, and Jack C. Hurst, Sales Manager, both came from subordinate posts, the former from bookkeeper and the latter from salesman. The Industrial Manager, William M. Duffy, started as time study engineer in the New Bedford Division.

Following the death of Russell in 1953 important changes were made in the top Revere echelon. The most impressive was the shift of Kennedy from President to Chairman of the Board. Next in importance was the taking over of the office of President by Charles A. Macfie. His name is new, so far as

### *The Revere Merger*

this narrative is concerned, but it is far from new in high Revere service.

Macfie was born in England and came to America in 1912. Prior to leaving his native country he passed a competitive examination which resulted in an appointment to a post unusual for one so young. From his early teens he was up and coming. Arriving in New York he got a job as office boy with the U. T. Hungerford Brass & Copper Company, then the largest distributor of copper and brass in the United States. His ability immediately asserted itself for in 1921 he was appointed Manager of the Copper Products Sales Department. In that year he formed a sales partnership with Daniel J. Finucane, another Hungerford employee, under the name of Finucane & Macfie. Now came the first link with a unit that was to become a part of Revere for the firm was named sales agent for Rome Brass & Copper for the sale of copper products in the New York metropolitan area. At that time the building industry was enjoying its biggest boom, creating a tremendous demand for copper sheets and with it a new group of distributors many of them aided by Macfie's firm.

With the creation of the Revere merger Macfie became Assistant Manager of New York Sales and later Manager. Following this post he was made Assistant Sales Manager associated with the General Executive Office. Dallas had kept close watch on Macfie, appraised him at his real worth and, in 1934, appointed him General Sales Manager of the corporation. This position carried large responsibilities since all Revere sales were administered under policies set by the General Sales Department and the management. The year 1934 saw Macfie a Vice President, continuing as General Sales Manager.

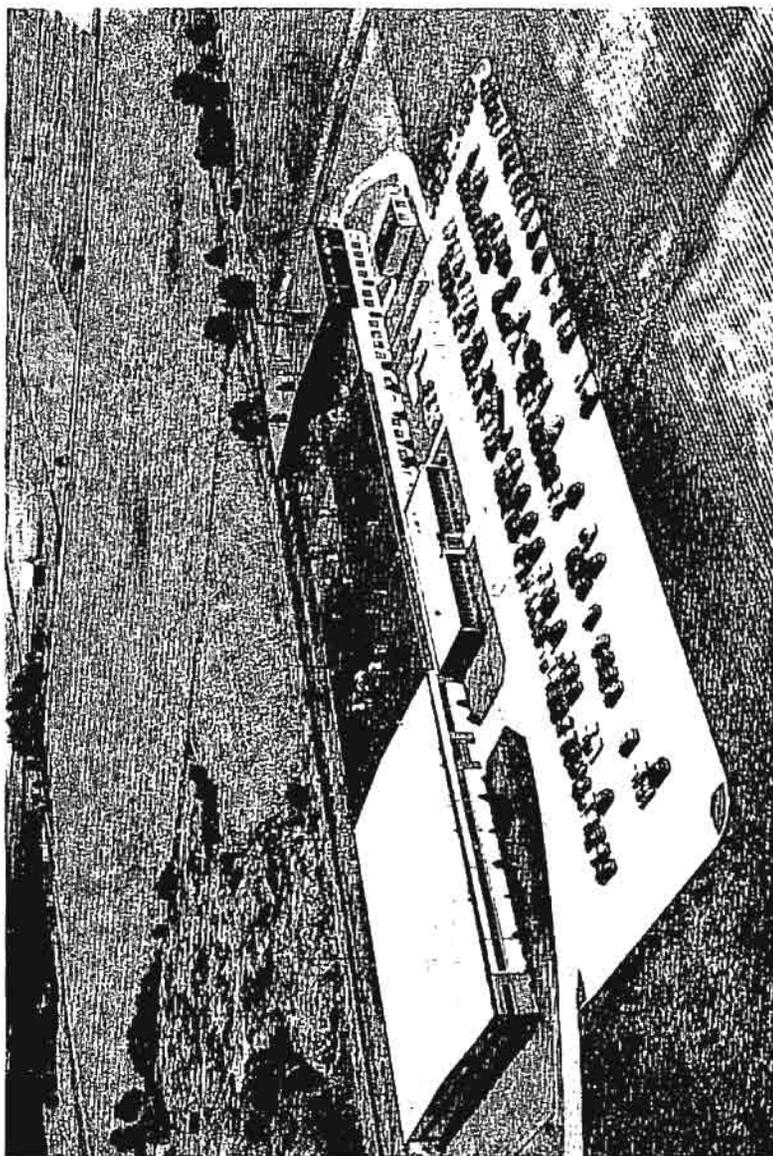
### *Copper Heritage*

The period between 1940 and 1946 necessitated various assignments for Macfie in view of the war effort. To properly administer the increasing foreign business and later on the Lend-Lease program, Macfie was named Vice President in charge of Export Sales. At the same time he assumed supervision of the New York Sales District. In 1943 he became Vice President in charge of Merchandise Sales which meant the sale of all Revere products to distributing outlets throughout the country. This post was in addition to the supervision of foreign and United States Government business. At the conclusion of the war, sales were again consolidated with Macfie taking over his original title—Vice President and General Sales Manager in charge of all rolling mill sales. In July 1951 he joined the Board of Directors. Two years later he was President.

Into the rise of Macfie have entered the qualities of high executive ability, instinct for merchandising animated by the projection of a persuasive personality. He is equipped with overall business insight and the ability to organize and direct an effective sales force equipped to meet any situation that may arise. He inspires confidence and is alive to the necessity of keeping the corporation's name at prestige peak.

Macfie is creative as well as executive. During his association with Finucane, the firm organized the Rival Strap Corporation to promote certain patents on roofing accessories developed by his partner and himself. The firm met with success and could have continued to expand. Following the Revere merger and Macfie's association with it, the assets were sold and the company liquidated.

Macfie has a close connection with an enterprise that ex-



Clinton Manufacturing Division



Albert E. McCormick



Raymond P. Winberg



*Photos by Jean Raeburn*

Louis G. Glesmann

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panded Revere interests to Latin America. In the latter part of 1944 Revere was approached by Luiz Campello, a young Brazilian, who suggested that the corporation enter into a co-operative enterprise with him and his associates to build a mill to roll copper, copper brass alloys and aluminum in Brazil. At the time the suggestion was made a small mill and utensil plant had been in operation for a year under Campello's direction but did a limited business.

The proposal for this joint venture appealed to Dallas and accordingly Macfie and L. G. Glesmann went to Brazil to look into possibilities. Based on their report to the management Revere agreed to subscribe to one-half of the capital of the new corporation to be known as *Industria Sul Americana de Metais, S.A.* The other half of the company was to be owned by Brazilians.

Plans were made for the erection of a new mill for which Revere supplied the major portion of the machinery, the engineering as well as sales experience. Dr. Campello, a citizen of Sao Paulo, was elected President of the company and E. D. Krumm, a member of Revere's General Manufacturing Department, was appointed to represent Revere on the Board of Directors of the new company. Dallas and Macfie, with Krumm, were elected to the Consultive Council, which is equivalent to the Executive Committee of an American company. Due to inflation rampant in 1945 and subsequent years, it was necessary to increase the capital both in 1945 and 1948. The lack of building materials delayed the completion of the project until 1947.

Business conditions in Brazil in 1948 were rather difficult as sufficient dollars were not available to cover all necessary

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imports. As a result, operations were maintained at a rather moderate level but each year since then has witnessed a gradual growth, with 1953 being the banner year to date. Both production and profits have been quite satisfactory even though business in Brazil is difficult to conduct due to the various Government regulations applicable to importations. Brazil must import primary copper and zinc as these metals are not produced in that country.

In 1952 plans were completed to add a rod and tube mill for the production of copper and brass alloy rods and tubes. A new building was erected in the latter part of 1953 and operations began in a small way in early 1954. At the same time an addition to the rolling mill was planned to provide for increased production to meet the growing demand. This went into operation in the latter part of 1954. Earnings have been plowed back into the company, enabling it to expand materially. The future holds every promise of being satisfactory. Much, however, depends upon financial conditions within Brazil but despite the many hazards, successful results are anticipated. One asset favorable to the future of the company is the phenomenal growth of Sao Paulo both in population and otherwise. Once largely dependent upon Brazil's one crop—coffee—for Santos, the coffee port is nearby, the community has become a live industrial center with skyscrapers comparable to a bustling American city.

Among the executive changes when Kennedy became Chairman was the shift of Raymond P. Winberg, who had been Vice President and executive head of Rome Division, to New York to take the title of Vice President and General Sales Manager to replace Macfie. As head of Revere's largest Division

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Winberg had maintained the tradition of high service established by his predecessors Leslie Wiggins, Howard D. Wolfe and Forrest E. Richmond. It was a big job and Winberg accomplished it in a big way. A graduate in chemistry from the University of Wisconsin, he brought to Revere an ample and successful experience both in production and merchandising—a rare combination, for he had served with American Brass and Mueller Brass. His first post with Revere was in the Sales Department, becoming in succession Assistant Sales Manager and Sales Manager. In 1950 he was elevated to a Vice Presidency and took over direction of the Rome Division. He became a director in 1953.

Coincident with the change affecting Winberg was the promotion of L. G. Glesmann to be Vice President, Director and General Manager of Manufacturing to succeed I. T. Bennett, who had resigned to become Chairman of General Cable Corporation. At the same time J. A. Doucett retired as Vice President and member of the Board of Directors. J. S. Fidler was named Secretary to replace Breck Aspinwall who retired. Apropos of all these changes, it is worthwhile to note that Donald Dallas, although in retirement, remains a member of the Board, a tribute to his invaluable services to the corporation.

Other able and experienced men are in the New York office. As Vice President, Director and Assistant to three Chairmen—Dallas, Russell and now Kennedy—Cornelius C. Felton is one of the Revere stalwarts, performing a manifold service. He knows copper literally from the ground up. Following his graduation from Harvard his first business connection was with Calumet & Hecla Consolidated Copper

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Company. While attending the fiftieth anniversary of the founding of the company in Calumet, Michigan, he became so intrigued with mining that he went to work underground serving successively as trammer, miner, timberman and eventually shift boss. Later he worked in the mills and copper refinery.

After service in World War I Felton became associated with the Calumet & Hecla sales department. In this capacity he met Donald Dallas and a close friendship developed. In 1935 he joined the Revere organization as Vice President to deal with special accounts and assignments, general administrative responsibilities and purchase of copper. In 1947 he was elected a director.

Felton has been conspicuous in two activities of significance to the copper industry. In 1943, as representative of Revere, he attended an orientation course in New York initiated by James Forrestal, then Under Secretary of the Navy, to study problems of the Naval Bureaus. It was attended by men from all the large American industries. At the conclusion of the course and at Forrestal's suggestion, Felton was largely instrumental in launching the Naval Industrial Association which, with the other orientation groups, included a membership of 650 individual industrial organizations, a cross-section of top American industry. Felton was the first President. The Association carried on after the armistice and was thus able to continue in peacetime the invaluable relationships which were established between industry and the military services during the war. Subsequently the name was changed to the National Security Industrial Association and is still going strong.

Of greater import to the copper industry has been Felton's

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activity in connection with the tariff on copper. An Act of Congress in 1932 imposed a tariff of four cents a pound on copper as part of the Recovery program. Just what this meant to the industry is comprehended when you are told that one-third of our copper is imported. Dallas, then President of Revere, put on his fighting clothes—as a matter of fact they were usually on—determined to remove the tariff handicap from the industry. He sent Felton to Washington as his representative to do battle, and battle he did. Largely due to his efforts the tariff was reduced to two cents a pound and then suspended. Except for one brief interval it has been suspended ever since. For this accomplishment Dallas and Felton received the plaudits of the industry.

Another Revere stalwart is Albert E. McCormick, Director, Treasurer and Assistant Secretary. His education, received in parochial and public schools in Boonton, New Jersey, his birthplace, was supplemented by evening study and correspondence courses with special attention to accounting. One of his early business connections was with the J. G. White Engineering Corporation which he left to enlist in the Navy in World War I where he performed a creditable service. On his discharge from the Navy he joined the accounting staff of Peat, Marwick Mitchell & Company where, among other assignments, he audited the accounts of Cities Service Company. He also supervised the audit of General Cable Corporation. With the formation of Revere he was assigned to handle the extensive accounting work connected with the operation. His efficiency attracted the favorable attention of the organizers of the merger with the result that he was invited to join the staff. His first post was as Assistant to the Treasurer. In 1939 he was

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made Assistant Treasurer and in 1947, Treasurer and Assistant Secretary. He was elected to the Board of Directors in 1954.

Others in the New York office are J. H. Feldmann, Sales Manager of Industrial Sales of copper and brass; S. H. Wilson, Sales Manager of Aluminum Sales; H. C. Wilson, Manager of Aluminum Sales Relations and also in charge of aluminum purchasing; D. J. Finucane, Sales Manager of New York District Sales; Paul B. Andrews, Manager of Merchandise Sales; W. P. Dion, Assistant Manager of Industrial Sales; Eugene Carlsen, Sales Manager of Merchandise Sales; E. S. Bunn, metallurgist whose work in aluminum development has contributed to Revere's success in that field; and last, but by far not the least, Norman A. Schuele, Advertising Director for twenty-five years and his assistant, D. F. Haggerty.

A study of the careers of Revere's senior officers, past and present, evokes a pertinent comment. With the exception of Barton Haselton who was born to the financial purple, every one rose from humble positions contributing heartening chapters to the saga of American self-made success. F. H. Brownell peddled Bibles and steam cookers in order to raise money to put him through college; Dallas, Russell and Macfie started as office boys, while Kennedy worked behind the counter of a department store to accumulate the tuition for a law course.

These men, again with the exception of Barton Haselton, were, or are, graduates of the school of rugged experience. They found the opportunity to advance and, by their own efforts, capitalized it. None has been wedded to a desk; all are steeped in the techniques and processes of the corporation they serve so well.

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THE success of Revere Copper and Brass Incorporated has amply demonstrated the great benefits derived from close coordination of related interests. This fusion of production, research and selling activities, however, is only one phase of cooperation that contributes to progress and profit. Another is the linking of management interest with labor interest to the larger end that all men and women on the payroll are partners in Revere. Such is the fundamental purpose of the Revere Industrial Relations set-up.

The basic industrial relations philosophy of Revere has developed from the combination of an honest belief in the dignity of the individual and a desire to practice good economics for the benefit of all. It implies that good management is more than a direction of things; it is primarily a direction of people, the recognition of the human element. Top management believes that each employee is an interested partner in Revere who has the right to explanation and information about company policies, plans, outlook, and finance; the right to courteous treatment and to retain individuality. Upon these convictions has been reared the General Industrial Relations Department, a model of its kind.

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The headquarters of the Industrial Relations Department are in Rome. It was a logical selection because more Revere employees are located in the Copper City than in any other single area. Direct and close contact with as many employees as possible is essential to good public relations efforts. Knowledge of both employee and community problems is invaluable.

At the head of Industrial Relations is John H. Eikenberg who is peculiarly fitted for this all-important direction. He is an outstanding example of "promotion from within," one of the cardinal principles in the Revere creed. Inflexible adherence to this principle made it possible for Dallas, Russell, Kennedy and Macfie to advance to high places. Eikenberg started as a clerk in the Cost and Accounting Department of the Baltimore Tube Company at the age of sixteen. Later he put on overalls and went to work in the mill where he rose to be Assistant Superintendent. Subsequently he became Industrial Engineer of the Baltimore Division. In 1941 he was assigned to Rome as General Industrial Engineer, taking over Revere Industrial Relations two years later. He was made a Vice President in 1945.

Associated with Eikenberg are an Assistant Industrial Relations Manager, a General Industrial Engineer, a Supervisor of Testing and Training, a Director of Employee Publications, an Art Director, an Auditor, and Supervisors of Safety Engineering and Compensation Insurance. All these positions are filled by men with from ten to thirty-five years of service with Revere in many capacities, including mill work and supervision.

This, then, is what might be termed the General Staff of

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Revere Industrial Relations. Its major function is to advise and participate in the formulation of policies that will be just and fair to employees without sacrificing the efficient operation so essential to company success and the continued ability to find jobs.

It is an axiom of good public relations that, in addition to the creation of policies that are just and fair, it is necessary that employees know the reasons for these policies and for the steps taken under them. In the belief that the company has a duty to keep employees thus informed, the Industrial Relations Department has developed an extensive publications department.

In war few things contribute so much to successful operation as highly organized and functioning communications. Armies must be informed not only of enemy movements but also the whereabouts of their own units. The system spans the era from couriers galloping on foam-flecked horses to motor cycle riders, wireless, airplanes, telephones and telegrams. What these agencies perform in war is achieved by Revere's array of publications. They are the lines of communication, so to speak, to the men and women in the mills.

The Revere publications, well written and copiously illustrated, cover every phase of information concerning activities that relate to the workers and the company. The Revere Patriot, the employees' magazine, is a bi-monthly magazine with a total circulation of 12,500. Employees' copies are mailed to their homes. The Publications Section of the Industrial Relations Department prepares sixteen pages of copy which is included in the edition published for all Divisions. Each Division furnishes copy for its own insert. It is the purpose of the

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general copy to inform employees on customer uses of Revere products, to promote better understanding of the American economy, to stimulate civic activity, to encourage understanding of functions of various departments in the company and to recognize outstanding achievements of Revere people. The Divisional inserts are intended to accord recognition to employees, to promote participation in the Suggestion Plan, the Safety Program and various employee activities.

Realizing that furnishing job information every other month was not adequate, "Revere Local News Reporters" were established in 1946. These "Reporters" are designed primarily to furnish an objective account of events at each Division which affect the employees' job. The "Reporters" are intended to include such items as a brief account of business conditions, changes in plant equipment, processes, customer complaints or compliments, national affairs which affect business, raw material supplies and some elements of labor relations. At times they are used to help promote safety, the Suggestion System, and other projects requiring an unusual sales effort. However, such use is not frequently advocated or encouraged because the company desires to keep the "Reporters" free from "preaching." This publication is normally a monthly one for each Division.

Years ago, Revere recognized a moral obligation to inform its employees on the financial position of the company. Knowing that financial strength and stability influenced their future security and progress, Industrial Relations believed they would be interested. A special publication, "Annual Report to Employees," was established for this purpose. The financial information in this publication is the same as that furnished

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in a separate report to stockholders. Some additional interpretive material is included, as is other information.

Recognizing the desirability of communication from the company's chief executive officer, a periodic pamphlet "Report to Employees from the Chairman of the Board" has been established. The Chairman attempts to explain management policies, interprets national affairs as applied to the business, and accords recognition for the joint achievements of management and employees. From time to time special occasions require prompt communication. Examples of such projects are included in a group of explanatory bulletins referring to payroll deductions, changes in federal tax status, disability insurance and income tax information. Contract negotiations and other management-union affairs occasionally require communications covering a situation peculiar to an individual Division. These are prepared as needed.

Federal labor legislation requires an impartial interpretation when it affects the employees in the plants. The pamphlet "Of the People, By the People, For the People" was part of Revere's effort to explain the purposes of the Taft-Hartley Act and its effect on employees, companies and the public. The folder "From the Consent of the Governed" represented an effort to encourage employees to express their honest opinion of the Act at a time when it was an extremely controversial political issue. The copy appearing in this folder also appeared in daily newspapers in the company's plant cities.

Another general type of communication is represented in material prepared primarily for new employees but also useful in reminding older employees. One of these is the booklet "Partners in Revere." This booklet tells something of the

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background of Revere, explains the company's organization, outlines the benefits accruing as a result of Revere employment, and states the rules and policies upon which continued employment depends. Another booklet of this type is "For Your Own Good and The Good of Us All." This booklet explains most of the safety hazards occurring in the business and points out safe practices to combat the hazards. The booklet is keyed to the Revere Safety Test which was originated by Revere. It was designed so that even those without much formal education could express their understanding of safety awareness. The booklet and the test are the basis for specialized safety training of employees by management supervision. These tests and booklets have been made available to other industries through Science Research Associates, a Chicago agency. This is one phase of Revere's overall testing program.

The booklets are placed in the folder which is given to new employees. At the time of the interview the applicant's name is written on the folder cover and the letter is signed by the appropriate member of the personnel staff. A pamphlet is included describing Revere's Benevolent Fund project. This project was developed to eliminate the many individual plant drives for local charities and the resultant irritations. It has been well received by employees and is operating effectively. To add interest to the Safety Contest between Divisions, which also ties in with the National Safety Council Annual Contest, monthly safety posters have been devised. They are furnished to all Divisions.

From time to time it becomes desirable to prepare special promotions on quality, waste, and prompt deliveries. One is labelled "Prompt, Dependable Quality." In this campaign

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large posters showing simply the letters "P.D.Q." were posted in the mill before the first shift reported for duty at midnight Sunday. In two days they were replaced with posters giving the legend "P.D.Q. Is Important to You." The local "News Reporter," mailed to employees' homes on Thursday night, was the first official explanation of "P.D.Q." The project appeared to be successful in stimulating consciousness of the competitive conditions facing the industry. As a follow-up, other posters were prepared. The poster "Will He or Won't He" is intended for posting in a mill which has received a customer complaint. The complaint is reproduced and attached in the center of the poster. The poster "Quality Products Made by Our Customer" is for general posting after a copy of a customer's advertising has been attached.

A comparatively recent innovation is the "Happy Birthday" Program. It emphasizes one of the basic purposes of communication which is to extend some measure of personal recognition to employees. Revere has designed a distinctive birthday card which is mailed to an employee's home, timed to arrive on his birthday. It is supplemented by a verbal greeting. One of the cards has a handsome colored etching of Paul Revere's famous ride and contains the message, "Many Happy Returns of the Day from all of us at Revere. Congratulations and may you have many more happy and joyous birthdays."

Another publication designed to facilitate the recruiting responsibility of the Industrial Relations function is "Why Revere." Prepared by the General Industrial Relations Department, this book is made available to the Personnel and Industrial Relations Departments at each Division. It is also sent to the Placement Bureaus of educational institutions in whose

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graduates the company is interested. The folder "Depend On a Rabbit's Foot if You Will" was designed with an accompanying poster in the same style to promote the sale of safety shoes in the interest of employee protection as well as economic savings in the purchase of footwear.

Among the most important of Revere's human relations projects is the Management Understanding Program. This program was designed to furnish management supervisors with the information and contacts in the plant which were needed to permit them to make better supervisors. The program itself consists largely in getting information to this group before it is transmitted to others and to furnish to them additional information which will help them to interpret policies, obligations and other communications. A part of the program is a series of meetings with other levels of management.

Four years ago Revere established an "Information Rack Service." Included in the material for these racks are pamphlets which contain more or less general information. The racks are placed in all the mills and are easily accessible to the workers.

In all its published communications Revere has avoided telling employees what decision they should make in any given situation. The company knows that the American worker has become the best productive unit in the world largely because he has the best plants, equipment and material with which to work. Fundamentally he is an individualist and inclined to do his own thinking provided he has the proper information on which to base his decisions. Revere's publications are intended to supplement information which the employee gains from other sources. It is hoped that by furnishing such information

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the realization that the best interests of the employee and his company are, for all practical purposes, the same, can be speeded. When this realization and understanding are achieved, the problems of industrial relations are greatly minimized.

The previous allusion to Management Understanding requires further elaboration. The larger conception of Management Understanding at Revere is that it is an attitude rather than a formal program. This brings about an automatic acceptance by every segment of management in all groups to become partners in policy formulation, technical applications and exchange of information.

What is termed Management Understanding at Revere discloses a heartening coordination between top management and employees. One of the gripes of foremen was that they did not know what top management was thinking about and what it was planning. Their urge was, "We want to know what is going on outside our little sphere of day-by-day work." To sterilize this grievance Industrial Relations set up a Management Understanding Program. Among other things, group meetings between Management, Supervisors and Foremen are held regularly. Top management policies are explained. The result is a better comprehension on the part of the lower management level of what the company has in mind and how it proposes to carry it out.

One of the first steps in carrying out the program of mutual understanding was the preparation of a pocket-size loose-leaf book entitled "Foreman's Guide." It contains a definition of supervision, a definition of labor legislation, and the names and explanations of the relevant laws, an analysis of labor

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legislation affecting Revere with emphasis on foremen's problems and on questions they are likely to be asked, a description of the functional departments of the company, and their responsibilities and their usefulness to foremen. Included is an explanation of the Revere job evaluation and wage incentive programs. Arrangements were also made for a continuing schedule of written and verbal communication in both directions.

A major step in carrying out the program of mutual understanding was to supplement verbal explanation with printed reference material. A distinctive letterhead form was designed exclusively for this purpose featuring the name "Supervision," an inference that management men should have a wider view of things than those they supervise. On these forms were printed such things as a definition of supervision, a definition of labor legislation, and the names and explanations of relevant laws, an analysis of labor legislation affecting Revere with emphasis on supervisor's problems and on questions they are likely to be asked, a description of the functional departments of the company, and their responsibilities and their usefulness to supervisors. Included is an explanation of Revere's job evaluation and wage incentive programs. A good quality three-ring binder, conspicuously labelled "Management Notes" was furnished each supervisor to hold these releases. This, of course, is a phase of the continuing arrangement for a schedule of written and verbal communications in both directions.

All communication is not by the written word. Verbal communication also plays its part. Through the Foreman's Understanding Program Revere executives keep all supervi-

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sors and, through them, the foremen informed on activities, so they in turn can keep union officials, as well as individual employees, in touch with what is going on. Personal contact is always encouraged. When, for example, a Plant Works Manager is about to purchase a new piece of equipment, he calls a meeting of supervisors and explains it to them. They then pass the information down the line.

The General Industrial Relations Department is responsible for the Suggestion System which has enabled many workers to profit financially by their ingenuity. In this highly competitive industry no means of improving methods and operation of equipment, as well as cost and waste reduction, can be overlooked. The Suggestion System encourages suggestions from employees relative to mechanical operation, safety, good housekeeping and office procedure. There is a Suggestion Secretary in each Division whose task is to carry out procedure, help to promote the program and analyze suggestions. In this analysis work he has the assistance of the executive, supervision and engineering groups. Special committees investigate each type of suggestion submitted. Suggestion Boxes are placed in the most easily accessible places in the mills and offices. Awards are based on suggestion value and range from five to one thousand dollars.

Many of the suggestions are refinements of present methods or equipment, which improve the production rate and the quality of safety in the operation. Among the suggestions that have received awards are an arrangement to provide synchronization of movement of sawblades on the flying saw through a different type of support, thus preventing blade breakage; a bracket for the rubber guards used at drawbench blocks

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which provides less guard changing-time and affords more protection against injury, and provision for an opening in the liner plate of a drawbench to enable the points to slide through into a chute which prevents entanglement in the chain sprocket which can cause considerable damage and lost time.

Every industry obviously realizes that it must have the right man or woman in the right place. Adaptability, temperament, and what is equally important, ambition to advance, enter into the consideration. There was a time when employees were just hired. It was too often a case of the round peg trying to get into a square hole. Through trial, error and travail workers eventually found their place, but valuable time and energy were dissipated. In the Revere industrial relations scheme all this is obviated by a comprehensive testing program for new employees designed to give them the job for which they are best fitted. In this way latent ability is discovered and the way opened for future advancement.

This worker appraisal is termed the Aptitude Test, which operates through selective and placement aids and includes specific tests for specific categories of employees. Into the test enter personality, qualification, interest, drive and the recognition of hazards in machines. They apply equally to men and women, whether destined for office or mill work. Applicants for jobs and those already in employ are subject to the tests.

Once a worker gets on the Revere payroll he comes under the eye of Industrial Engineering. This is the application and control of wage incentive. Here the employee's pay is measured by his skill, knowledge and his output at a given machine. The so-called Incentive Plan follows the policy devised to

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offer opportunity for increased earnings.

The onetime guesswork and unsupported opinion which often characterized differentials between the pay rate for different jobs have been eliminated through the establishment and use of the Revere Evaluation Plans. Under them factors such as responsibility, skill required, judgment involved, working conditions in the operation, hazards, help to determine the relationship of one job to another as far as work is concerned. The justice and equitability of these plans have attracted wide attention.

While "Safety Is Everybody's Business," everybody ordinarily does not heed the admonitions and precautions that prevent accidents with their attendant physical suffering, loss of earning power and, too often, death. Of vital importance to every employee and his family is the Revere Safety Test devised by the General Industrial Relations Department as a supplement to the company's extensive safety program. For development, validation and reliability, the cooperation of the Psychology Aid Service Center of Syracuse University was enlisted. Once the University's experience had been capitalized, the association was terminated.

The Safety Test endeavors to discover the safety awareness of employees and makes possible an effective program of safety instruction. It is a pictorial test which offers the examinee an opportunity to express his knowledge of safe and unsafe practices through his recognition of the situations pictorially presented. While the test is used to a minor degree as part of the employment procedure, its major use is in training. Safety Committees, safety meetings, safety equipment and safety engineers all play their part in achieving the big objective of

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making the men and women in the plants safety conscious; in short, to inculcate safe work habits.

The responsibility for safety precautions does not end with Revere mill workers. The safety of their children is also part of Management's concern. A color book is published by the Industrial Relations Department to entertain youngsters and at the same time invoke awareness of hazards to life and limb in their daily lives, especially at play. In this way the safety idea begins to develop at a time when the child is most receptive.

Revere works for the peace of mind of its employees just as it takes every precaution for their physical safety. The many government regulations on manpower, wages and in many other directions have created new problems. For the larger problems Revere has the advice of its General Counsel. In the lower level, employees also have the benefit of the best legal advice, thus eliminating penalties due to ignorance of what the law demands. Selective Service has also brought its problems both for men and their families. Here, again, proper interpretation of the law is important, not only in obeying it but in planning for resumption of employment without delay, once the period of service to country is completed.

Welfare today is part of the responsibility of management and is an integral part of good industrial relations. The man and woman at desk or machine requires healthful recreation and this is available at Revere plants in abundance. Barton Haselton was almost a generation ahead of his time in his interest not only in personnel problems but also in employee relations, with a strong accent on welfare. Shortly after World War I he initiated the housing and club facilities for Rome

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Brass & Copper at Riverdale. The club house, now used for offices by the Rome Division, had bowling alleys, a swimming pool, a gymnasium which could be used as a motion picture theater, pool and recreation rooms, dormitories and a restaurant.

Today welfare and recreation facilities are more or less autonomous with the employees, but they receive every possible support from management. All Divisions have Employees' Social and Athletic Associations. The activities are principally the sponsorship of bowling, golf and camera clubs, hunting and fishing contests, clambakes and picnics. Financing is made possible through employee memberships at one dollar a person, with generous company assistance.

Each Division has an Employees' Benevolent Fund which is responsible for employee contributions to the Community Chest, Red Cross, Polio Fund and other philanthropic agencies. It is financed by the workers from their pay checks and averages twenty-five cents a week for each individual. Because of Management's knowledge of community needs, the Works Manager or a representative of Industrial Relations is chairman of the committee.

In 1947 Revere inaugurated a Retirement Pension Plan with voluntary participation for eligible salaried employees on a contributory basis. It helps to provide economic security in the years when earnings decrease or stop altogether. Of main importance to ambitious applicants for jobs is the fact that the plan requires retirement at sixty-five, except for unusual situations, thus keeping open the opportunity for advancement. Following negotiations over some considerable period of time, the first pension plan for hourly employees, which is

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fully paid by the company, was inaugurated in February, 1953. A pension plan had been adopted by all Revere Divisions with the exception of one by the middle of 1954.

There remains one essential service performed by Industrial Relations. This is the recruiting of new employees, the plant and office executives of tomorrow. Every summer scouts go out to select technical personnel from among the graduates of Massachusetts Institute of Technology, Rensselaer, Cornell, Purdue, University of Illinois, Lehigh, Yale, University of Michigan and trade schools. The recruitment is not confined to technical institutions. Universities such as Yale, Harvard, Dartmouth, University of Pennsylvania and colleges in the areas where Revere plants are located are canvassed for prospects for office work.

Decentralization of Industrial Relations stems from Rome. Each Division has an Industrial Relations Manager. Under him is an Industrial Engineer and a Personnel Manager who is given responsibility for selection and placement of employees, safety, plant security and general personnel administration; that is, the Aptitude Test.

Any large industrial activity requires a vast amount of paper work which, in turn, demands an immense number of printed forms. Revere's Printing Department at Rome not only supplies these forms but practically all the literature that streams to offices and mills. Under the supervision of Warren L. Jones the plant operates at East Dominick and Bouck Streets.

Originally set up to furnish forms for a single Division of the company, the Printing Department has been expanded into a completely modern printing establishment, which, in addition to thousands of forms, now prints the employees'

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magazine, "The Revere Patriot," other company communications, and much of the color advertising used to promote the sales of Revere products.

The Revere Printing Department started with one small multigraph machine with hand-set type in a corner of the Rome Manufacturing Company and produced only the roughest form jobs for internal use. It has grown into a completely equipped offset shop employing twenty-five people. More than fifteen tons of printed matter are shipped every month. These fifteen tons represent more than three million pieces of printed forms and advertising matter.

This expansion has come as a natural result of the advantages found in the centralization of printing at one location. One advantage is the ability to control the standardization of forms, which makes it possible to use the same forms for similar functions at all the Divisions of Revere. In this connection, the Printing Department provides a quick source of supply for all Divisions so their work will not be hampered by inability to get working forms when needed.

The Printing Department has a direct benefit to the community of Rome. It provides an opportunity for the employment of Rome people and also avoids the necessity of going to suppliers outside the community. In so doing it makes a useful contribution to other local businesses.

The facilities of the Printing Department include a photo-engraving camera which transforms the printed matter and pictures into negatives. A completely equipped plate room uses these negatives to make metal plates from which the actual printing is done. Varying from the usual type of printing businesses, all work is done by the offset lithographic proc-

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ess which is rapid and economical.

Not all the partnership in Revere is vested in mill workers. For key employees a stock ownership scheme is in operation, formulated to create a proprietary interest in the company as well as to provide an incentive. By owning stock in the corporation the key employee will feel that if the concern's earnings increase, he will make more money. Thus his interest and effort are quickened. The stock option price is predicated on prevailing quotations on the day the option is granted regardless of any future rise in the price of the security. The employee must hold the stock for two years before exercising his option, which remains in effect for ten years or until normal retirement date, whichever is earlier.

## II

In a larger sense, one aspect of Revere industrial relations is not directly connected with the mill workers. It is the service rendered customers by the company and can best be designated as Customer Relations. This is a highly organized constructive operation that makes for good will and good business and is part of Revere's contribution to the efficiency of American industry.

There is a popular conception that it is the function of a mill or factory to fill orders, control costs and maintain quality. In the case of Revere it goes far beyond this. The mills serve creatively in close cooperation with Sales, the Technical Advisory Service and Research. This four-way organization is closely knit in the common interest in serving the customer.

The Technical Advisory Service is a body of capable engineers and technicians, located in all parts of the country,

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who collaborate with customers and prospects and in so doing provide liaison with Revere Research. Their work includes not only advice on the selection and specification of Revere metals for specific applications, but quite often involves the solution of manufacturing problems. The Technical Advisor, or "T.A.," as he is termed, has an extremely interesting job. One call may be upon a great shipyard, the next upon a jeweler, and the following one on a hardware manufacturer. Each T.A. tends to specialize to a certain extent along the natural lines laid down by his education and experience. Since the group is highly diversified, it is always possible to call into service the man or men most familiar with a given industry or problem.

Here are some instances of work done by the T.A.'s:

A shipyard was using electrolytic copper to make large-diameter pipes to carry cooling water to the condensers. The copper was purchased in sheets, formed into shapes of varying degrees of complexity, and brazed. The T.A. suggested that while electrolytic copper can be brazed, phosphor-deoxidized copper is far superior. He recommended that a trial be made of a few sheets. During a subsequent call on another matter the T.A. asked what the results had been. He was told that the phosphor-deoxidized copper was very much better; the ease of forming and brazing saved a great deal of time, more than making up for the extra cost of the alloy.

The manufacturer of a clothes dryer reported difficulty in drilling aluminum tube and aluminum extruded shapes, due to burrs around the holes. The drills used were found to be unsuitable for the purpose, so the T.A. obtained a high-spiral drill, ground it to the right rake and point angles in the Re-

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vere machine shop, and tried it on samples from the customer's order. Clean holes were produced with almost no burring. Elimination of a de-burring operation reduced manufacturing costs.

A large hardware manufacturer was buying and stocking too many types of materials, many of them differing only slightly. The T.A. Service collaborated with the engineering and production departments, and recommended simplified specifications for 225 items out of 360. Result: Purchase of larger quantities in the most economical sizes, with reduction of inventories, and lessening of clerical work. The first year showed a saving of about \$25,000.

Revere, like other companies, prefers to avoid rush orders, because they tend to upset orderly scheduling of production and shipment. However, the company is not bound by system and will do everything it can to help when a customer faces a genuine emergency. Sometimes, in spite of the best will in the world, conditions are encountered beyond control. A metal shortage is one example. When there is an overwhelming need for speed Revere can meet it.

One case can be cited. An important customer on the West Coast had spoiled two circular tube sheets while drilling them. This message was relayed by telephone to the New Bedford mill which produces these sheets. How soon could New Bedford replace them? They were for an important government project. So urgent was the need that the customer offered to charter a plane to fly them to California as soon as they were ready.

A quick check showed that Revere could make duplicate sheets much more quickly than usual. The specified alloy was

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in stock, partially processed, so that casting time was eliminated, as well as some of the rolling. It was rolled down to the required gauge, one and one-eighth inch thick, levelled and cut into two circles, each ninety-eight inches in diameter.

Meanwhile, the Traffic Department worked on the rather complicated problem of determining the fastest, most direct, yet least expensive way to get the circles to the Coast. Because of the weight and the time already saved, shipping by plane entailed a cost that did not seem justified. Traffic reported that the best solution was to ship by "direct car," which guaranteed no extra handling or trans-shipping en route. This was agreed to by the customer, and four days after he called the company, the circles were thus shipped. They arrived eleven days later, in time to meet the deadline.

Two days after the circles arrived Revere received a letter from the customer, in which he said:

"The promptness with which your company undertook the problem of supplying the two sheets to replace those we had spoiled has been appreciated by all of us. . . . It is most heartening to work with persons who have a real sense of responsibility and concern over their customers' emergency requirements. Your company's performance in this instance left nothing to be desired and we want you to know that it meant a great deal to all of us."

Some years ago it became evident to Revere that there was a real need to make more widely available modern information about methods of welding copper and its alloys. Many industrial companies preferred to use these metals because of such qualities as corrosion resistance, long life and workability, but

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were deterred by welding problems. In response to this need Revere established a Welding Section in its Research and Development Department to approach the subject from both a theoretical and practical standpoint. Detailed laboratory studies, reduced to practicality, have enabled the Welding Section to make valuable contributions to industry. It was felt that the market for Revere metals would be expanded considerably if customers could be shown how to make proper welds quickly and at minimum expense. This is precisely what has happened as these examples show:

A customer had a contract to make steel pressure vessels, which had to have a copper gasket surface on steel tube sheets. The original design called for machining a groove in the steel, inserting a copper bar, and welding it in place. Then another machining operation would be required to level the surface. Revere suggested that perhaps the first machining operation would be unnecessary if the copper gasket could be applied by welding. The laboratory made a few but important modifications in the inert-gas shielded-arc method, and by developing the correct procedures saved the customer both time and money.

Another customer was making oil coolers. The heads are threaded, and were being sealed by silver brazing. To remove the heads for cleaning, it was necessary to chip out the braze. Revere recommended welding as cheaper, equally satisfactory, and with the added advantage that the weld metal could be more quickly removed when the time came to clean the cooler. Revere was permitted to demonstrate the method, which proved entirely successful. The customer gratefully reported that he was saving between \$300 and \$400 on each oil cooler.

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In a third case, two men were flown to a customer's plant where they worked twenty hours a day over a week-end. By Monday afternoon they had the satisfaction of seeing the customer's operators turning out perfect welds, saving a substantial sum in penalties for delayed delivery.

The foresight in establishing the Welding Section has paid off in many instances. Two letters indicate customer appreciation.

The first follows:

"Your welding people were in our plant this past week and certainly went beyond what we expected in giving us technical advice. While I say went beyond expectations, what I'm getting at is that they certainly showed the proper spirit of cooperation to any company which is a potential customer or even a customer, as we are. They assisted us very greatly in a couple of problems that we had here at the plant, and I certainly felt it was well worth writing and telling you."

The second letter reads:

"Thank you for bringing your welding engineer to assist us in solving our problems.

"On his visit to our plant last month, he helped us to establish sound procedures and in so doing, eliminated several expensive errors we were unknowingly making. We are especially grateful to him for the energetic way in which he went about his work, in spite of physical difficulties encountered due to our plant being in full operation. We appreciate his patience in answering all questions with which he was

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bombarded by operators, supervisors and management alike.

"It was a real pleasure to have your welding specialist and a technical advisor with us, and we hope it will be possible for you to visit us again soon under less strenuous circumstances."

The normal procedure whereby the Welding Section is called into action is simple. Usually a Revere salesman uncovers a welding problem and calls in the Technical Advisory Service. Often a Technical Advisor can provide the needed know-how. If additional help is needed, he can get it from the Welding Section people.

Revere's Technical Advisory Service extends to many products. A manufacturer who planned to make a new electric coffee percolator came to Revere with a variety of problems. The first concerned the selection of a metal which would assure a quality product, yet be capable of economical fabrication in his plant. A Revere Technical Advisor consulted with the company's design engineers and recommended copper in a temper suitable for deep drawing. The suggestion was based on the fact that this metal is ideally suited because of its excellent forming characteristics, the fine finish obtainable and the ease with which it can be plated.

In order to give further assistance in the development of the new product, a thorough study was made of the customer's production equipment. It was pointed out that there were several possible methods of making the percolator body. Mutual analyses pointed out the best of these. This activity was especially appreciated, because the manufacturer had previously done little with copper, having worked chiefly with

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aluminum. Both metals, of course, can be put through the same equipment, but since they have different characteristics, switching from one to the other requires special consideration of such matters as tooling, annealing and finishing.

During the period of trial runs and initial production Revere continued to work closely with the customer. Today the percolator is used daily in the homes of a growing number of satisfied owners. The fact that the manufacture of this new product started so smoothly and quickly was due in large part to the desire of the customer to collaborate completely with the Technical Advisory Service and take full advantage of its experience and knowledge.

First Revere contact was with the Purchasing Department. This is standard procedure. Subsequently it was made possible for Revere to work with the design and tool engineers, methods engineers and production supervisors, in fact with practically everybody who had a position of responsibility in regard to the new product.

Many people think that copper is just copper, and brass is brass, whereas there are several types of copper and many kinds of copper alloys, all available in various forms, finishes and tempers. Choice of the correct metal, temper, shape and fabrication methods often makes a tremendous difference.

A communications-equipment manufacturer began development of a new relay. The original design called for a rectangular copper tube of a size that could not be made economically. The Revere Technical Advisory Service and Methods Department discussed this problem with the customer at considerable length. Design changes were made which satisfied everybody and made the relay commercially

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practical at no sacrifice in performance.

A lock maker was generating a lot of scrap in machining cylinder lock sleeves from bar. Revere suggested tube, but analysis showed only an even break on cost of material. Further study, however, revealed that tube would bring about substantial savings, due to longer tool life, less collet wear, less scrap to handle, and a smaller inventory of metal for the same output. The customer switched to tube to obtain these economies.

When a maker of electrical lugs and terminals found a pile of 40,000 rejected parts Revere was asked for advice, though the copper strip did not come from Revere. The Research Department worked all night and reported embrittlement of the metal caused the cracking, and in addition, brazing practices were incorrect. The proper metal and better brazing licked the problem.

Revere had the opportunity to study the fabrication methods employed by a customer and found they could be improved materially. Changing from silver soldering to welding and working out better jiggling methods cut fabricating costs by an amazing 90 per cent.

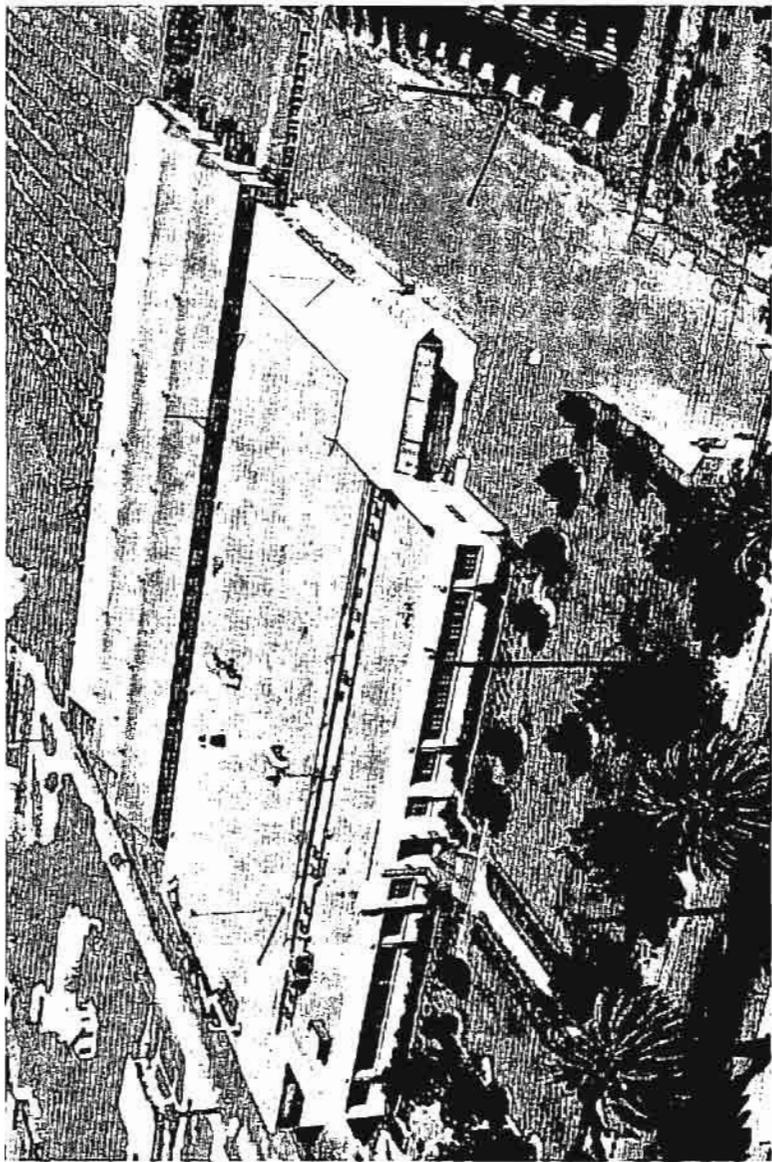
When a competitive metal would not work for a soap dish maker because it cracked at the bottom corners, Revere was called in. The Technical Advisory Service studied the dish, which is of the wall-recess type, and also the drawing process. Revere's 70-30 brass was recommended in a specified temper. This cured the difficulty at once.

Once in a while it is not the metal at all that causes difficulty. A large manufacturer of flashlight cases was troubled with staining of the brass. The Technical Advisory Service



*Photo by Jean Raeburn*

Charles A. Macfie, President



Riverside Manufacturing Division

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and the Methods Department could find nothing wrong with the metal, so asked the oil company engineers to collaborate. They changed the die lubricant, thus solving the problem.

The following case histories will round out the list of diversified products improved by Revere's collaboration with customers:

A manufacturer was producing rectangular brass cans in ten steps, all conventional, and encountered such difficulties as tearing and "orange peel." The Technical Advisory Service and the Revere Research Department made a complete study of the case and recommended certain changes in metal specifications. Result: Two anneals were dropped, production costs were cut, output rose and rejects were greatly reduced.

For many years a famous fire extinguisher had been made by riveting and soldering. When it was decided to modernize the processes by use of seam welding, the Revere Technical Advisory Service was called in for consultation, since it had been decided to switch from copper to the much stronger silicon bronze. Time, temperature and pressure requirements were worked out, and also the proper temper for the body sheet. Three of the Revere mills also collaborated. The new extinguisher is four and one-half pounds lighter, much better in appearance and design, and is produced with greater speed and economy.

Revere's Technical Advisory Service is not one-way traffic. So important are the Revere mills and the people who man them that frequently customers visit the plants to learn about operations. By the same token, mill personnel in turn go to customer plants. This interchange of information about mill methods on the one hand, and customer fabrication on the

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other, is extremely valuable. Adjustments on both sides make possible either better customer products or lowered cost, or both. In other words, the mills are just as important to Revere customers as Sales, Technical Advisory Service and Research which, in combination, give both mills and customers the help needed.

The case histories of Revere collaboration with customers that have been listed, and many more could be cited, do not lie inert in company office files. They are used in effectively written advertisements headed "Business in Motion" and addressed "To Our Colleagues in American Business," which appear in leading newspapers and trade journals. All have an element of human interest because they deal with people and their problems. They emphasize the fact that Revere's interest in a customer by no means ends with the receipt of an order from him. Company interest may well precede the order and is maintained through practical cooperation until the requirements of manufacture and use have been met to the maximum degree. This is Service with a capital "S" and service is Revere's creed and purpose.

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*"Forward Revere"*

THE past and present of Revere have been evaluated. The task now is to try to appraise the potentialities of the future under the stimulation of "Forward Revere."

First, however, a brief recapitulation. Paul Revere would blink his eyes could he behold the panorama of manifold production that has evolved from his modest mill at Canton. Revere Copper and Brass Incorporated enters upon its one hundred and fifty-fourth year with ten Divisions and twenty-nine divisional and district sales offices. Operations span the country with a ceaseless stream of output. The sun never sets on its products, for Revere Ware has become an international citizen and its name a household word. Ever apace with the march of metals, Revere is expanding its fabrication of aluminum with its great possibilities for usage. During the years since World War II a huge program of plant expansion, construction and remodelling has been carried out with many instances of pioneering in the introduction of advanced equipment. Revere's research has set a standard of investigation that has revolutionized processes and products. Revere metals have demonstrated their worth in six wars. They ride the ocean in every type of warship; they go into cartridges, shells, mortars,

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and rocket cases and play a great part in mobile equipment, such as tanks and jeeps as well as airplanes and Signal Corps equipment. In hundreds of mills in every state Revere products stand up against the test of time and wear. Revere's growth can be measured by items in its balance sheet. In 1953 the payroll of the company aggregated \$45,521,442 with sales of \$250,616,992. The army of employees numbers 9,631. Here then is an expansion worthy of the great name it bears.

After quality product and service to customers, no impetus to modern business is more vital than advertising and promotion. In this field Revere makes a striking contribution both with the printed word and with illustrations, particularly in color. The company has continued to expand its advertising program to more completely cover its many and diverse markets. Revere's advertising, which is directed in proportion to the importance of these markets, is carried on continuously and features strong selling copy.

In the industrial field the company uses case histories effectively. These show how given customers have been able to improve their products and reduce their costs through the help and assistance of Revere's Technical Advisors and Research Department whose advice has been invaluable in the selection of the right product and the correct method for its fabrication. In its advertising copy the company gives special attention to the important factors in the building, electrical, automotive, air conditioning, chemical and general industrial fields. Its consumer advertising on Revere Ware Copper-Clad Stainless Steel cooking utensils consists of pages and double spreads in full color in leading national consumer magazines in the women's service and home service fields and also in national

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and sectional farm publications. Through this medium the story of Revere Ware is consistently brought before millions of American consumers, who, as proof of this pre-selling, ask for the product by name in retail stores throughout the country. Consumer advertising has contributed greatly to Revere's success. The company also places Revere Ware advertising in trade papers and magazines directed to jobbers and distributors, as well as to retailers both large and small, thus keeping Revere Ware foremost in the minds of all the people who stock and sell it.

Revere advertising is continuous. It goes on month after month, year after year. This is because continuity is one of the essentials to advertising success. Advertising cannot be turned off and be expected to be immediately operative like an electric light when it is turned on again. There is a cumulative effect in advertising. Each advertisement benefits from the ones that have gone before. The more advertisements that have appeared, the more each succeeding one is worth. It is interesting to note that in an average year advertisements placed by Revere number 1,013 in 107 publications. Those placed by Revere and Revere customers advertising Revere products in newspapers total about 7,000 advertisements. In addition, the "Meet the Press" program has widely advertised Revere products, so that the combined total represents an audience of 450,000,000 readers of publications and newspapers and 104,000,000 television viewers, ample factual evidence of the great advertising coverage that Revere is consciously sending forth each year.

Adroit publicity supplements advertising and is an essential part of any program to increase public acquaintance with the

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company and its products. Since advertising appears in paid space, the advertiser is free to say what he chooses to say. Publicity, however, appears in reading columns and must necessarily be newsworthy to be printed. Revere releases, whether dealing with products and their applications, services, stories on how tough problems have been solved, impressive results of research, or personality stories about Revere men, gain wide circulation.

One of Revere's noteworthy essays into publicity is its well-known television program "Meet the Press," which has become a sounding board as well as a forum for distinguished public opinion. On October 8, 1950 the program was inaugurated with a message delivered by Donald Dallas, then Chairman of the Board. It marked the beginning of Revere's sponsorship of a half-hour program that has since made considerable news and has attracted increasing attention. For example, one week later, Governor Thomas E. Dewey of New York "met the press" on the Revere program and made his now-famous statement removing himself and backing General Eisenhower as Republican nominee for the Presidency in 1952.

Introducing the first Revere program, Dallas said,

"We believe the men and women who want to see 'Meet the Press' are the best possible prospects for the products we make. I am sure this audience includes manufacturers who use the copper, brass and aluminum alloys we fabricate and the distributors who sell them; it surely includes the merchants who handle the cars, the refrigerators and the thousand other products into which our metals go; it includes the consumers who also buy our Kitchen Jewels—Revere Ware. We also believe

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that free speech, a free press, and an informed nation are the foundation of all our freedoms. 'Meet the Press' permits prominent individuals to express their views while exposing them to the probing questions of the press in order to enable members of the television audience to form their own judgments. That is the sort of Americanism that Revere is proud to promote."

Along with the steady flow of advertising and publicity go the many booklets about Revere products and their uses, circulated among customers and salesmen. While essentially educational, they have a strong pull and have proved to be highly useful from a sales standpoint. The illustrated literature about Revere Ware, for example, makes an effective appeal to the housewife. While these Jewels of the Kitchen are practically self-selling because of their rare merit, the booklets have a value all their own.

It is not given to many concerns in this country to celebrate one hundred and fifty years of service, but such was the privilege of Revere in 1951. From Rome and Baltimore to Los Angeles festivities honored the pioneer mill on the Neponset River where Paul Revere wrote his name indelibly in the annals of American industry. Open house was kept in nearly all the plants which were visited by thousands of interested people who were impressed with the mechanical wonders they beheld.

One of the most unique of the sesquicentennial celebrations was held aboard the gallant old frigate *Constitution*, the famous "Ironsides" of battle renown, which had been coppered with Revere rolled metal in 1803 before her triumphs

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against the Barbary pirates and the British in the War of 1812. The ceremonies were held on the ship in Boston Naval Shipyard.

On this occasion Edward H. R. Revere, oldest male descendant of the great patriot, read a tribute to "Ironsides" and Paul Revere. The Certificate was entitled "A Joint Tribute to Paul Revere and the *U.S.F. Constitution*—An Indomitable American Patriot and 'Old Ironsides,' the Famous Fighting Ship He Helped Put on the Seas."

The text of the tribute read:

*"This Certificate* is in commemoration of the 150th Anniversary of an Epic Event in our history—the discovery in 1801 by Paul Revere of the secret of rolling copper, by which the renowned 'Midnight Rider,' Patriot and Metalworking Pioneer in his sixty-fifth year contributed mightily to American Naval Power, Industrial Strength and Free Enterprise.

"By solving the problem of rolling copper, *Paul Revere*

—Freed the United States, during potential war with England, from reliance on that country for imports of copper sheathing for warships and merchantmen.

—Enabled the Frigate *Constitution* and other American frigates to be completely coppered with sheets made in the United States.

—Played a major part in giving the *Constitution* that seaworthiness which helped her subdue the Barbary Pirates in 1803 and triumph gloriously over the Frigates *Guerriere*, *Java*, *Cyane* and *Levant* in the

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War of 1812.

—Began the American copper and brass industry which has been a bulwark of the nation in war and in peace.

—Founded a business under the Revere family name which has grown through the years into the nation's largest and oldest independent copper fabricator—Revere Copper and Brass Incorporated."

Another sesquicentennial ceremony of peculiar interest took place at Canton at the site of the copper mill where, in 1801, Paul Revere made industrial history. At this ceremony Edward H. R. Revere unveiled a plaque on the red brick building which was part of the original mill. The text on the plaque reads:

"Birthplace of the U. S. Copper Industry

"In this building in 1801 Paul Revere, famed Midnight Rider, Patriot and Silversmith, founded an industry as well as a business. Here he rolled copper successfully for the first time in America, thus beginning one of the most vital industries in the country. The business he established here under the Revere family name has grown into the nation's largest and oldest independent copper fabricator—Revere Copper and Brass Incorporated. This tablet, placed April 20, 1951 as part of the Sesquicentennial of the Company Paul Revere founded, is sponsored by the Canton Historical Society."

Among the speakers was Joseph P. Draper, President of the Canton Historical Society, who presided at the plaque-unveiling ceremony. Among other things he said:

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"Today, as the nation is undergoing a rigid re-examination of its foreign policy while strengthening its sinews to resist despotism and aggression, we need a renewal of the spirit which animated Paul Revere—the spirit of honest and unselfish service to our country and of true patriotism. We need to emulate Paul Revere if we would keep this country great and strong and free."

Another speaker was Charles A. Macfie, at that time Vice President and now President of Revere, who told of Paul Revere's efforts to give the United States a copper industry. He said, in part:

"The establishment of Paul Revere's mill was one of the major transition points ending the apprentice system and beginning that American Free Enterprise which has done so much to make this nation not only the arsenal but the bulwark of democracy. In the years since he established his little enterprise, the company which Paul Revere founded here has grown into the nation's oldest and largest independent copper fabricator. The principles of a fair deal to all, of the production of only the highest possible quality materials, and of unstinting service to the nation in every period of emergency—which motivated Paul Revere—live on in the Company he established so soundly."

The third feature of the Sesquicentennial celebration had a note of sentimental interest. It was the ringing of thirty-nine Paul Revere bells which, after a century and a half, are still in use in churches and town halls in five New England

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States. The bells are those remaining from the more than four hundred cast between 1792 and 1820 by Paul Revere and his son, Joseph Warren Revere. The ringing of the bells was uniquely patriotic since they were rung on Patriots Day, April 19, the day commemorating Paul Revere's historic ride.

Macfie's reference to Free Enterprise emphasizes a striking fact in the summation of Revere Copper and Brass Incorporated. The progress of the company is a kindling dramatization of what free enterprise accomplishes. In it is revealed another segment of the heritage bequeathed to his country by Paul Revere whose pioneering extended in many directions. That indomitable patriot early sensed and chafed under American dependence on England for copper. He determined to achieve emancipation from an economic bondage that stifled our infant production effort. First he mastered the secret that had enabled the English to create and maintain their monopoly. Then he resolutely set about to translate that secret into productive action with the first copper mill in the newborn republic. Freedom from political and other restraint, so far as business was concerned, enabled him to lay the corner stone of an industry and make his name synonymous with untrammelled enterprise.

Thus was planted the germ of a new economic freedom, aftermath of the political freedom won from Bunker Hill to Yorktown. Down the years free enterprise has encouraged individual and corporate initiative and rewarded success. It has made America industrially great. Free enterprise became the Bill of Rights of American business, providing the impetus, the incentive and the inspiration for the might, power

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and service of our industrial structure. Without it the assembly line and mass production, the hall marks of our productive supremacy, would have remained a frustrated dream.

Twenty-seven years have elapsed since the Revere merger came into being, years that have amply demonstrated the wisdom of the consolidation. They have been years that recorded increasing coordination, variety and enhanced quality of product, and enterprise in embarking on new fields of output, all making for a vital contribution to the copper, brass and aluminum industries. Just as the founding fathers of the republic envisioned a growing nation, knit by the common bond of freedom within the framework of a democracy, so did the framers of the Revere merger foresee a future of progressive corporate growth, linked to every scientific and mechanical advance that touched the industry.

This has come to pass. Expansion, acquisitions and research unite to spell progress and service. Always animated by enterprise, Revere has constantly put back a portion of its earnings and depreciation into modernization plans and new products. In 1954 all activities were increased. An organization chart was drawn up outlining specific duties with regard to acquisitions, research and development for the mills. Similar charts, creating new responsibilities were also prepared for the Manufacturing Divisions to cover forgings, steel tubing and cooking utensils.

Typical of Revere push and progress with its significance for the future, is the record of plans for expansion made in 1954. In that year \$2,000,000 was appropriated for the modernization of the Dallas Division to make the plant a low-cost producer of roll and strip copper and brass; \$1,500,000 was

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appropriated to bring into a straight line the latest equipment available for the copper tubing plant at Rome Division; appropriations of approximately \$1,000,000 to double the output of sheet aluminum at Baltimore; an appropriation of \$2,500,000 for the construction of an aluminum plant at the Dallas Division; purchase of a plant at Lockport, Illinois, to house the lock joint tube department; introduction of the institutional line of Revere Ware at Rome Manufacturing Division, which means sixty new products; the addition of eight new products to the domestic utensil line; manufacture of rolled moldings and automobile trim in the lock joint tube department; erection of a new building for the Research and Development Department for mill product development; reorganization of the entire staff and technical departments so that all projects for future development can be subject to daily consultation, just as obtains in mill production, new businesses and other activities necessary to keep the business current and on its toes.

So much for the inspiring plans for expansion made in 1954. For 1955, plans envisage a stainless steel rolling mill since the company uses a large amount of this metal; possible addition of a few lines of specialty items, such as cooking utensils, and a larger entry into the lock joint and welded steel tubing fields. Many other new products are either on the drawing boards or completed and ready for engineering specifications. In 1954 Revere made complete surveys and reports of the plastic tubing industry, an important possibility for production, and several other metal and kindred product companies. All these operations are continuing in high gear with sustained attention to keep Revere in the fore-

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front of varied and progressive manufacture. Nowhere is the maxim, "To Build Is to Progress," more in evidence than in Revere.

In the field of metals there rises today the gleaming bulk of aluminum. Although manufactured commercially for less than seven decades, it is now in universal use in a great variety of products from toys to skyscrapers. It has over 4,000 different uses in the house, on the farm, in the air, and in business and industry. Approximately one million people earn their living either directly or indirectly through the production of aluminum or the manufacture of aluminum products. Current research tends toward the development of other applications of this highly versatile, light-weight metal. One pound of aluminum is equal to three pounds of copper.

Aluminum is the most abundant metallic element, being found in almost all rocks, clays and soils. In these materials it usually occurs combined with silica as a silicate. The difficulty and cost of producing the metal from silicates are such, however, that today aluminum is commercially obtained only from an ore called bauxite in which the metal occurs chemically combined with oxygen and water—compounds which chemists call alumina hydrates. Bauxite gets its name from the village of Les Baux in France where it was first discovered.

In view of the potentialities of enlarged aluminum production by Revere, the story of the birth of the metal is relevant. It projects one of the most romantic chapters in the age-old history of metals. So difficult was it to isolate aluminum that it was not until the early part of the Nineteenth Century that scientists were able to produce small quantities.

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The metal became more precious than gold, costing as much as \$545 a pound. In 1825 Hans Christian Oersted of Denmark succeeded in producing aluminum by a chemical process but development was slow. Napoleon III became interested and commissioned Henri Sante-Claire Deville to find a cheaper way in the hope of being able to equip his armies with the new light-weight metal. Even by 1859 the price was about \$17 a pound, obviously still too high for extensive or commercial use.

It remained for two young men, working simultaneously and independently of each other, to unlock the secret that made aluminum available to the public. One was Charles Martin Hall who had just graduated from Oberlin College in Ohio; the other was Paul L. T. Heroult of France. Both had turned to electricity as the most efficient way to obtain aluminum and, in 1886, each man in the same month, discovered the electrolytic process which is the basis for the present day method of manufacture. The history of research has no parallel for this almost uncanny twin discovery of the aluminum process.

Hall and Heroult had found that the metal could be produced by passing an electric current through a solution of alumina (aluminum oxide) in molten cryolite. Neither was aware that the other was working on the problem at the time of their discovery. Both were experimenting in improvised laboratories—Hall in a woodshed at the rear of his parents' home in Oberlin, Ohio, and Heroult in a small tannery he had inherited from his father in Gentilly, near Paris.

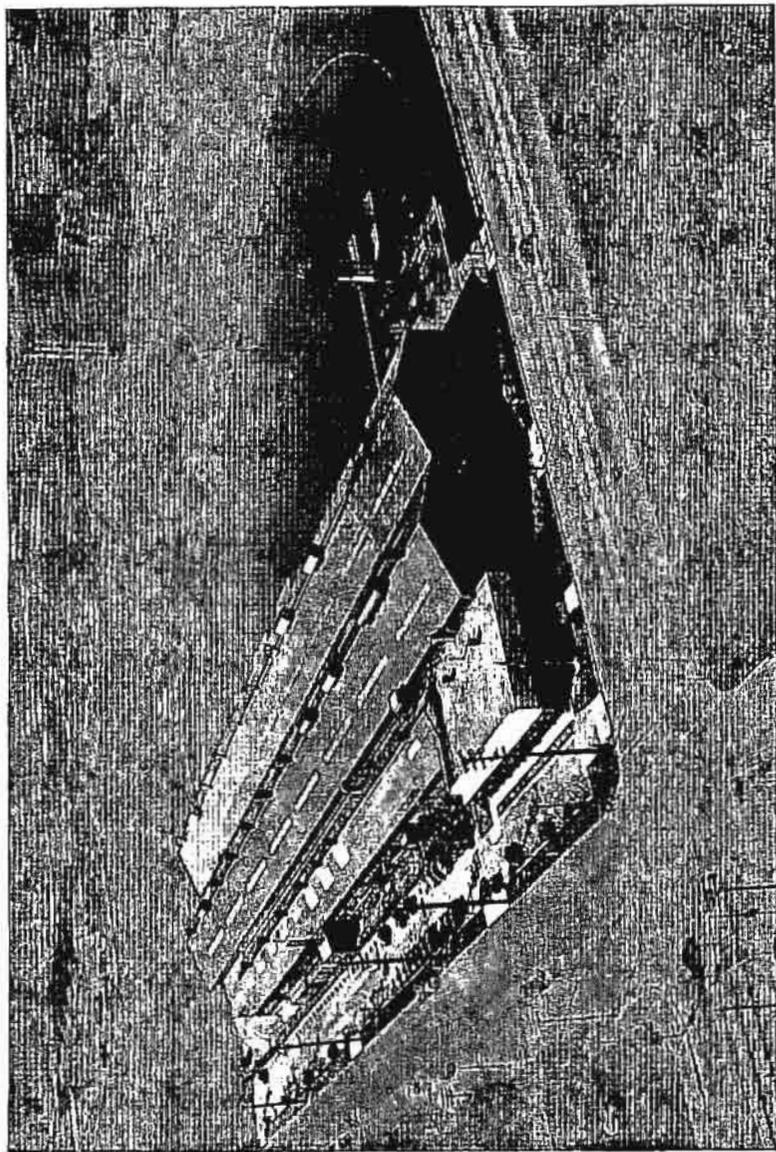
Both Hall and Heroult were men of moderate means and lacked the necessary funds to develop their electrolytic proc-

### *Copper Heritage*

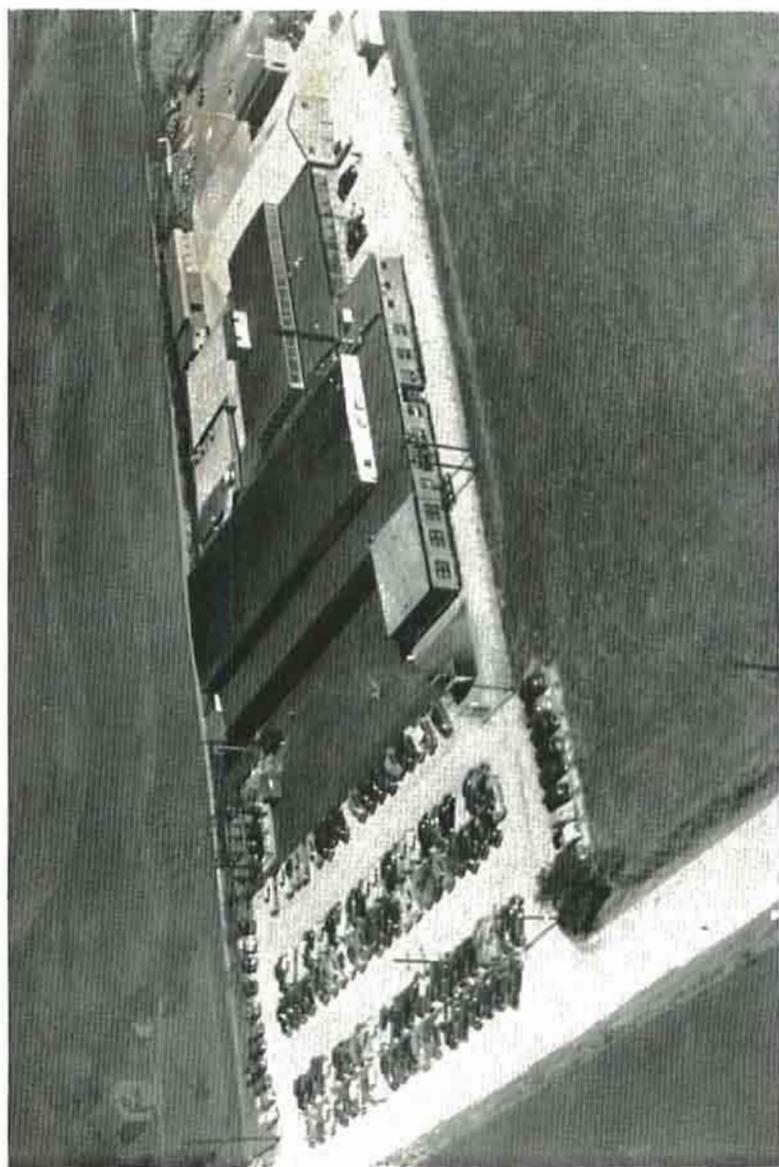
ess. Both struggled for more than two years before finding financial backing to put their discovery to commercial use. It seems almost incredible today in the light of our present knowledge of aluminum that a revolutionary new process for producing the metal cheaply would lay idle any time at all, but aluminum then was still relatively unknown and much development was necessary before it could be produced cheaply enough for wide-scale use.

Commercial production began in 1888. As demand grew, larger and larger plants were built and refinements were added which increased the efficiency of the process. Advances in the electrical field, paralleling the growth of the aluminum industry, greatly reduced the cost of electric energy. The result was a progressive lowering of the cost of the metal until in recent years it has sold for as low as 14 cents a pound in pig form.

Although copper and brass are far from static, aluminum offers the greatest growth opportunity of any present day metal. As a non-integrated fabricator, Revere recognized the potentialities of aluminum nearly three decades ago. The first production was at Rome Copper & Brass and later at Michigan Copper & Brass. Output on a considerable scale did not begin until 1943 at Baltimore under the impact of war needs for tubing, shapes and sheets when the Aluminum Division was set up to register a notable achievement in output which has been detailed in a previous chapter. Revere has progressively expanded its production until today it is the largest independent fabricator of wrought aluminum in the United States. In the years when supplies of primary aluminum were severely restricted, Revere wisely prepared for the



Pacific Coast Division



### *"Forward Revere"*

future by installing new and increased facilities.

Facilities for increased aluminum output are manifest in various sections of the Revere empire. The new plant at the Dallas Division at Chicago will produce coil and sheet. Chicago was selected as the site of the plant in order to take advantage of existing equipment and personnel engaged in copper and brass production, and because multiple use of facilities means decreased overhead, reduced costs and a more profitable overall operation.

The new equipment, which will double Baltimore aluminum production, includes a new Four-High cold rolling mill, the second to be installed by the company, and a new annealing furnace. With the new plant at Chicago and the increased output at Baltimore, the country will be divided into two major aluminum sales zones with Chicago handling all sales to areas west and southwest, and Baltimore handling the entire east out through Ohio.

Of further importance to the aluminum expansion program, Revere completed on December 15, 1954 negotiations for the acquisition of Standard Rolling Mills Incorporated, manufacturers of aluminum foil. This company has plants at Newport, Arkansas, Chicago, Illinois, and Brooklyn, New York. Its officers are J. H. Konigsberg, President; A. Petersen, Vice President; and L. F. Supple, Sales Manager.

The aluminum for the foil acquisition will be supplied by Revere's Dallas Division as soon as that Division's program is in being, which is expected to be July 1, 1955. In addition, many new products are planned for this foil acquisition, enlargement of its manufacturing facilities and an accelerated sales program. This conforms with Revere's program in the

### *Copper Heritage*

aluminum field by enlarging and bringing together a closer integration of aluminum operations through complete manufacture to the user.

That Revere is alert to every possibility in aluminum production is evident in the formation in 1954 of the Aluminum Development and Expansion Committee. A. N. Aird is chairman while his colleagues are Kennedy, Macfie, J. F. Croasdale, L. G. Glesmann and S. H. Wilson. The secretary is H. C. Wilson. The committee meets at the office of the Chairman of Revere in New York every sixty days, canvasses the aluminum situation, and makes suggestions both for output and selling. In every aspect Revere not only keeps pace with progress in aluminum but outpaces the pace.

Throughout the century and a half of its expansion, the spirit of Paul Revere, with its impact of high ideal of service, has animated the company in every phase of its many-sided advance. The courage of the founder of the copper industry in this country has been perpetuated and become an inspiration for those who have followed in his steps. Even the company's environment bears his impress since the reception room in the executive offices at 230 Park Avenue in New York is an exact replica of the living room in Paul Revere's house in Boston.

Rich in the tradition of the copper industry and its allied metals, the story of Revere Copper and Brass Incorporated unfolds a narrative of rich achievement. Down the years men of vision and resource have contributed to its progress, riding the storms of war and depression, metal shortage, and all the hazards to which business is subject. Paul Revere, craftsman in silver, turned to copper production and made his name

### *"Forward Revere"*

synonymous with it; a former newsboy like J. S. Haselton; a onetime department store clerk such as Kennedy; beginners as office boys like Dallas, Russell and Macfie, have stamped their impress in the making of a farflung concern. Revere progress through leadership of the highest caliber has been marked by specific development of the technologies of copper, brass and aluminum, as well as their alloys, and a know-how in fabrication that is unexcelled. The volume of business has grown in strides that match the far-sighted steps that have led to the planning and erection of new mills and the modernization of old; the consolidation of production in the most strategic locations, the development of research—all fortified and galvanized by expert selling and effective promotion. It means, in a word, that wherever you see an industrial smokestack you see an actual or potential customer of Revere.

Today, as never before, the domain of Revere, stretching as it does from coast to coast, is a beehive of diverse activity. The company faces the future with courage, optimism as well as prudence, conscious of its ability to maintain the high standards of quality products that have so long characterized its output. The men and management of Revere constitute a happy family, knit by pride, loyalty and long service. Before them stretches a vista of tremendous possibilities.

"Forward Revere" is the keynote of Tomorrow.

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Isaac F. Marcossion

Born in Louisville, Kentucky, where he served his journalistic apprenticeship on the *Louisville Times*, Isaac F. Marcossion was brought to New York by Walter Hines Page, later Ambassador to England, to be his associate editor on *The World's Work*. In 1907 he began his thirty-one years' association with *The Saturday Evening Post*, first as staff contributor and later as chief foreign correspondent. For more than two decades he roamed the globe, studying economic and political conditions and interviewing the great of the earth, winning the title of the "world's foremost interviewer." In 1945 Mr. Marcossion turned to the writing of industrial histories and has become outstanding in this field.