Synonymous.

It was Springer's afternoon off and he thought he would take the children for a little outing.

"My dear," he said, approaching his wife, "suppose we take the children to the zoo today?"

"Why, Will, you promised to take them to mother's."

"All right, if it's all the same to the children."

Good for Business.

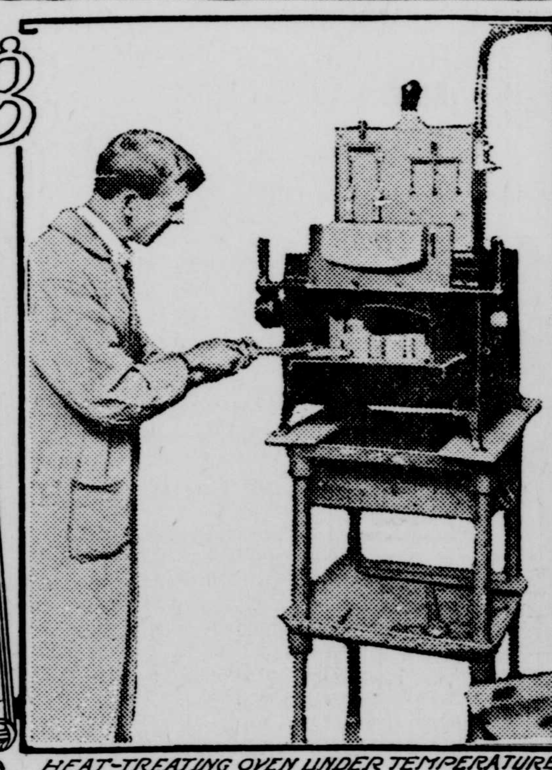
"Why is your landlady so smiling?"

"She heard the boarders were going on a hunger strike."

No gift is better worth giving than a beautiful thought.

Electrical Heating in Industry

ELECTRIC ARC FURNACE MAKING ABRASIVES



HEAT-TREATING OVEN UNDER TEMPERATURE OF 850° C

IT IS only within the past decade that engineers have come to the realization that heat generated by electricity has enormous possibilities of industrial development. Of course it has always been known that electricity passing through a wire created heat of varying degrees and intensity, but formerly this was considered more in the light of an unavoidable nuisance than otherwise.

As the electrical industry developed, however, and central stations of ever-increasing size were built, engineers began to look for means whereby stations could sell their electricity to the best advantage to themselves and the customers they served. This resulted in the rapid development of electric heating devices until today 500,000 K. W. or 670,000 horse power is used for industrial purposes alone. This figure represents some 7½ per cent of the electric energy used for all other industrial uses, for it has recently been estimated that about 9,000,000 horse power is used by electric motors in manufacturing.

The principal factor contributing to the increased use of electric heating appliances is the way in which they answer the modern demand for conservation—conservation not only in the saving of natural resources, but the saving of time, materials and the reduction of the uncertain "personal element" to a minimum, as well as the improvement of the product. Despite the fact that the conversion of fuel into electric heat is only reached after a long and complicated series of steps, whose ultimate efficiency is but 20 per cent, it has met requirements so well that in time it will undoubtedly replace the use of fuel heating to an enormous extent. At Niagara Falls, for example, fully 90 per cent of the energy now generated is used for industrial heating purposes. In fact, its development in recent years has gained such headway that it bids fair to surpass, in energy consumption, both the light and power branches of electrical service together.

With the enormous amount of undeveloped hydraulic power in the country, it is not easy to predict where the final stopping point will be, because it is by water power that electrical energy can be most efficiently developed as regards money input versus output. The limits to the use of electricity, produced hydraulically, can be grasped only when it is realized that there is one hundred and twelve million potential horse power on the continent of North America still undeveloped.

Most industrial heating of former days was obtained through three mediums—coal, oil or gas. Taking coal as an example in reaching the exceedingly high temperature necessary in some processes, 88 per cent of the B. T. U., or heat units, in a pound of coal are used up in merely raising the fuel and the excess air of the furnace to the required temperature, thus wasting the natural resources upon which we depend so much, and making the average industrial town anything but a healthful or pleasant place in which to live.

With electrical heat, temperatures that are impossible to fuel-generated heat are reached quickly, economically, and without any consequent defilement of the surrounding atmosphere. Along the same line of conservation, manufacturers are beginning to realize that the elimination of spoiled and unfit products, whether rendered so by inefficient and unreliable methods of heating, or by careless employees is just as much conservation as anything else. Also the elimination of unnecessary labor, and the establishment of cleaner, safer working conditions, tend toward the attainment of the rapid rate of production which is the paramount demand of the present industrial era.

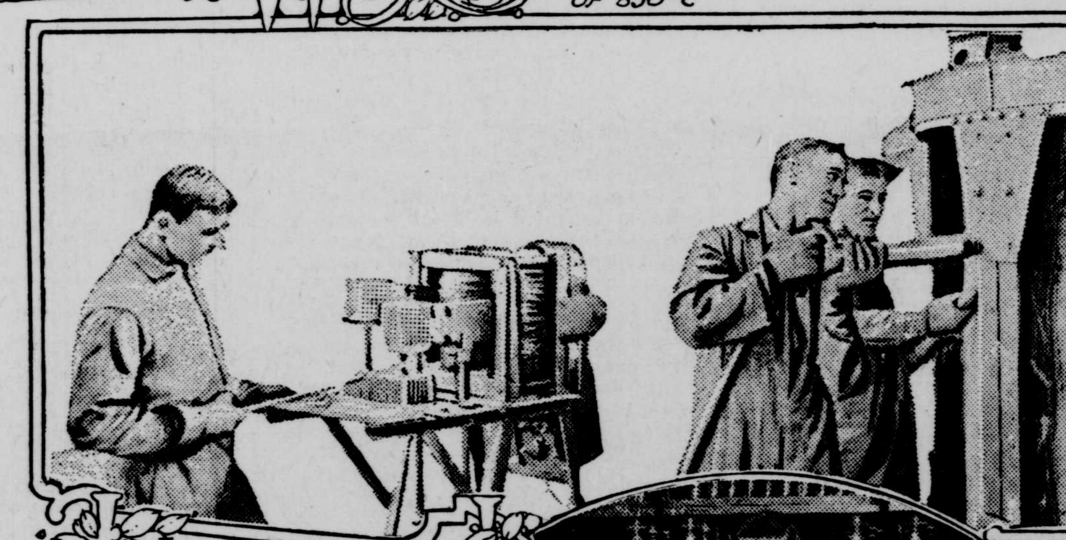
Thus the variety of processes to which electric heat is applicable has given rise to many devices for its use, ranging all the way from a metal-melting furnace, whose production is 18,000 pounds a day, through the oven field, to small metal melting pots with a capacity of 25 pounds of metal. In the domestic field 25,000 electric ranges and an uncounted number of small household appliances are in use. All furnaces, ovens, etc., claim economy and perfection of their finished products.

To take the brass furnace as a typical example of what can be done by the application of electric heat in overcoming the difficulties of specialized operation, in the fuel-heated brass furnace, one of the greatest drawbacks is the loss of zinc through volatilization and oxidation due to the high temperature of the applied heat, as well as the atmospheric conditions surrounding the bath.

In the electrically-heated brass furnace both these conditions are absolutely under the control of the operator. There are several types of brass furnaces in use today: the arc type, which has no automatic control but a low first cost; the induction which just fits a field where productions can be placed on a 24-hour basis; the carbon resister, best for temperatures not exceeding 1,000 C, and the muffled type, more expensive, but the only one that can be operated automatically.

This furnace can be operated at higher temperature than the carbon resister type, and at the same time can be regulated to operate at lower temperatures economically, but with the additional feature of automatic control.

The electric furnace, in actual use, has reached the temperature of 3,500 C. Recent experiments in a research laboratory have, however, developed



ELECTRIC RIVET HEATER

a furnace which gives a temperature of 4,500 C—enough to volatilize diamonds. A comparison of these temperatures with that of the sun, which is estimated at 5,000 C, gives a striking idea of what can be accomplished in handling refractory substances with electric heat.

There are other types of electric furnaces, which, although simple in construction, are capable of doing in one operation things which formerly took several heatings. In making shells, for example, for large caliber guns, it is necessary to expose different sections of the same shell to different degrees of heat. With an electric furnace this is done by simply combining heat units of varying resistance, according to the degree of heat desired, in the same furnace.

COMPOUND MELTING POT

The war was responsible for many new devices designed with a view to increasing production quickly. One of the things the government needed most was ships—lots of them, and in building ships an enormous amount of rivets have to be heated, and that quickly. The usual method or heating these rivets was in a forge, usually burning coke or oil as fuel, which was after a careful survey, found to be woefully inefficient. The attendance was large, requiring a blower man as well as a passer; large quantities of rivets were burned, welded together, or insufficiently heated in the forge, and when it had to be taken into the hold of the ship for use, the difficulties of operation were only exceeded by the vileness of the atmosphere resulting from the fumes of the forge.

The result was the electric rivet heater. Rivets are now heated by inserting them between two copper bars carrying a heavy current, supplied by a transformer. Since the iron of the rivets themselves is a material of high resistance, they are heated thoroughly and quickly. The bars are operated by a foot pedal, so that when the rivets are removed, or are being placed in position to be heated, the current ceases to flow. The whole apparatus is easily portable.

It was found that this simple machine heated the rivets throughout; that, inasmuch as the energy was used only when the rivets were actually being heated, there was no waste of heat; that there were no noxious fumes or spoiled and wasted rivets, and that the machine was nearly foolproof. The attendance was reduced to a minimum, and there was no necessity of supplying fuel, with the consequent trouble in disposing of the ashes when it was being operated in more or less inaccessible parts of a ship. It has a capacity of 800 ¼-inch rivets, 1 inch long per hour, which is enough under ordinary conditions for a gang of gun riveters.

The place where electric heat has found its greatest application, from the standpoint of number of installations at least, is in the electrically-heated oven, or air-drying and baking apparatus, as one prefers. It is surprising how many products that are necessities of our everyday life require an oven treatment somewhere in the course of their manufacture.

Electric ovens are used more in the automobile industry than in any other field. Here 100,000 KW are used in baking the japan on 3,000 automobile bodies every day. In a few years the automobile whose japanned parts are not baked in an electric oven will be a rarity. Other large users of electric ovens are foundries, for baking cores; telephone and typewriter manufacturers; manufacturers of iron and bed frames, and chemical manufacturers of various sorts.

Oven processes include baking, air tempering, drying and sherardizing. Of these four the first is the most used, the other two are quite common, and the last is a process for protecting exposed iron parts from corrosion.

In many of these processes, accurate regulation of heat, and automatic control are absolutely necessary, because many materials are irrevocably ruined by a slight change in the temperature of the oven. And here again manufacturers have found that the saving in material which was spoiled by the vagaries of the fuel-heated furnace has more than paid for the increased expense of installing and operating a bank of electric ovens.

Of these three classes of ovens, those installed for baking are the most numerous. The work they do varies: baking japan on various articles, baking enamels, cores and colored inks on lithographic plates. The japan baking oven has been developed from the experimental stage in the last four years. The process of baking japan in fuel-burning ovens, owing to the fact that volatile and explosive liquids, such as naphtha and kerosene, are used as solvents, has always been a somewhat hazardous operation. The gases given off are of a highly-explosive nature, and frequently these ovens have exploded with decidedly disastrous results. Another fault of this fuel oven was that in baking the lighter colors of a japan or enamels, soot from the gas sometimes would discolor the baking articles. Some of the ovens used in this work are of the conveyor type, so that loads can be loaded and unloaded while one is baking. The capacity of two of these ovens used in one plant is greater than that of six gas-heated ovens, formerly used to do the same work. It takes about three-quarters of an hour to complete a baking in one factory where these ovens are largely used, which more than doubles the number of loads finished per day, with a saving of 70 cents per load, which ran up into thousands of dollars when figured on a daily basis. The quality of work turned out is superior to that of the old type; it requires little or no attention, and the fire hazard is largely eliminated.

It is interesting to know that a new type of japan is being developed which consists of an emulsion of the asphalt base with water, thus removing the fire hazard, besides being much cleaner to handle. This process is called water japan.

Ovens are used for many other purposes; sterilizing dental instruments, baking effervescent salts and drying all sorts of products requiring well-regulated heat and a clean atmosphere in the oven itself. The fact that their temperatures can be so exactly regulated, the absence of a mass of fuel-carrying pipes, fumes, soot, and other by-products of burning gases, make the electric oven theoretically ideal for this purpose.

The fourth process mentioned, electric sherardizing, is a patented process for protecting exposed iron parts from corrosion due to exposure to the weather.

Besides ovens, furnaces, and other devices mentioned, there are a number of small "individual" electrically-heated pots, furnaces, etc., for use in the shop, garage, or even at home. In this class are compound melting pots, glue pots, metal melters, small furnaces and electric soldering irons.

Many of them are easily portable, in fact can be attached to almost any lighting or shop circuit. For work in a book bindery or pattern shop for instance, the electrically-heated pot keeps the glue continuously at just the right temperature for use, but never burns it; the same may be said of the compound melting pot and the lead or babbitt melter, which are ideal for work around a garage or in a factory. As for the soldering iron, anyone who has used the gas-heated type on top of a ladder or in some inaccessible place, need not be told the advantages of an iron that is always hot and still light and well balanced enough to be used with accuracy and comfort

In spite of its growth in the last few years, the application of electrical heating to industry is only in its infancy. The time will undoubtedly come when the effort to conserve our natural coal and gas resources will cause it to assume much larger proportions. There is generally no limit to its possibilities of development not only as applied to factories, but in offices and homes. Engineers say that the saving of floor space, cleaner and more healthful working conditions, to say nothing of the improved speed of production and superior quality of work done, all tend to make its universal adoption but a matter of time—and comparatively short time.

WHEN IS A LADDER SAFE?

There seems to be such a general lack of knowledge of the angle at which ladders should be placed to secure the maximum of safety for the men working on them that Safety News has prepared an interesting diagram showing the position of ladders of various lengths to insure safe use. The angle of 75 degrees has been found, through a series of experiments, to give the greatest degree of safety, and to secure this angle, all that is necessary is to place the foot of the ladder approximately one-quarter of the length of the ladder away from the vertical. This angle will prevent undue straining of the ladder, or slipping of the ladder feet when placed too flat, and at the same time will give the feet of the workmen sufficient room when they are working near the top of the ladder. Another point that should not be forgotten in connection with ladders is that portable ladders should be fitted with safety feet or points, in order that a sure grip on the floor or ground may be secured.—Scientific American.

Arizona's Buried Treasure.

What is believed to be the first clue to the reputed buried treasure of the padres of the Tumacacori mission, built by the Spanish Jesuits high up in the Tumacacori mountains, less than three hours' journey from Tucson, has been discovered by Frank Pinckley, custodian of the ruins. It is the gateway to the mission cemetery. From this gateway, it is said, the plans and maps left by the padres start to outline the way to the buried gold and silver. The Tumacacori mission was built near what are believed to be the ruins of one of the Seven Cities of Cibola. The center region is said to show evidences of rich mineral deposits, which, declare those who have inspected the mountains, doubtless led the padres to build their mission there.

Didn't Fill the Bill.

One day as Harold's father was hanging up a few pictures Harold begged him to let him hang one up. His father gave him a small one and walked into another room. When he returned he found Harold sitting in a chair puffing and mopping his forehead.

"What's the matter, son? Can't you get it up?"

"Naw. I guess I's too short at one end."

Fitting Punishment.

"They are railroading this man to prison." "That is all right; he is a train robber."

Every woman gets a lot of satisfaction out of her belief that other women envy her.

Shawls are of oriental origin.