THE AMERICAN GAS FURNACE COMPANY'S GAS PLANT AND FURNACES.

The use of gaseous fuel in metallurgical and technical operations is a distinguishing tendency of the technics of the present day. This has led to the extensive introduction of producer gas for the larger class of metallurgical operations, while natural gas, whose supplies are now fast failing, has in the past caused an extraordinary development of processes dependent on its use. We illustrate in the present issue the gas-producing plant and general apparatus of the American Gas Furnace Company, of Elizabeth, N. J., a system which has secured very remarkable results and which is every day witnessing a wider extension.

Fig. 5 shows the gas plant complete. The gas is a mixture of naphtha vapor and air. Underground at any convenient place is established a naphtha tank. Connected with the naphtha tank is a water tank at a higher level. When the water is admitted to the naphtha tank, it displaces the naphtha and forces it into the generating machine. Within the machine is a valve which regulates the height of the naphtha, shutting it off or admitting it, according to whether the level is raised or lowered. A similar valve maintains a constant water level in the tank, so that the naphtha is subjected to a double regulation.

This secures the supply of combustible. Air is blown into the apparatus from a blower, of which more will be said later, and which in the cut is seen to the left of the main apparatus. The blower maintains a pressure of over one pound per square inch. It is provided with a blow-off valve, so that if no air passes through the gas machine, it simply blows off into the room. The air is heated before it acts upon the naphtha. The gas thus produced goes through the pipes to any desired place. It will be seen that in the ordinary operation of the plant no gas holder whatever is required. The blower runs continually, and if all the gas is shut off at once, the air from the blower simply escapes.

In the plant, as shown, the blower is run by a gas engine which supplies the power required in the factory and solely for the purpose of starting the gas engine in the mornings, a small gas holder is provided. Once the engine has made a few revolutions, the gas holder may be considered out of use. The plant is a self-contained unit. The gas engine drives the blower and is operated by a small portion of the gas produced. As an extreme safeguard a trip valve is provided, which, when the gas falls below a definite pressure, shuts it off from the works.

One of the most interesting pieces of the gas-producing apparatus is the blower shown in Fig. 2. This is a four-vane rotary blower, working by a positive action. The vanes are held to their place by four segments of circles, one for each vane, which work in a circular groove on the side cover. To secure a tight fit, leather packing is used at the ends of the vanes. This outer circle of the casting is not a true circle, but is turned out to the arc of a circle for the working portion only, thus saving 75 per cent of the friction of the vanes. In all its details the blower is a result of long experimenting and its construction has even involved the installation of special tools, in order that all the work might be done satisfactorily. In Figs. 3 and 4 are shown some experiments performed with the blower in the writer's presence indicative of the high pressure that can be produced. A stream of water from a watering pot was poured into the blast and was instantly atomized into the finest spray and carried up like a cloud to the ceiling. A 10 inch file was placed in the outlet and was supported by the blast of air.

We may now see what operations are done by the gas thus made. In Fig. 1 is shown one of the oven furnaces, a type in which a square oblong space is heated evenly throughout. Furnaces of this class have a very extensive application for heating metal products. Cutters, dies, reamers, knife blades, saws and the like are placed on the slab within the furnace and are there brought to any degree of temperature required. The slab is of fire clay, and the peculiar whirling motion of the flame when it enters secures an even distribution of the heat. The flame is applied beneath the slab, the products of combustion rise around it. The amount of gas is regulated by a globe

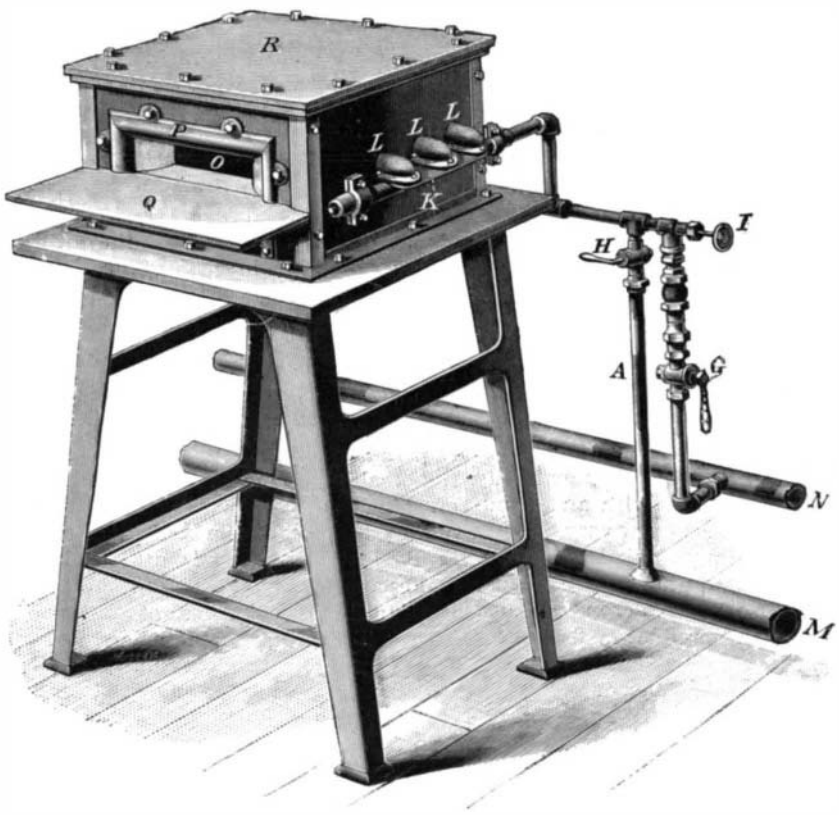


Fig. 10.—GAS FORGE.

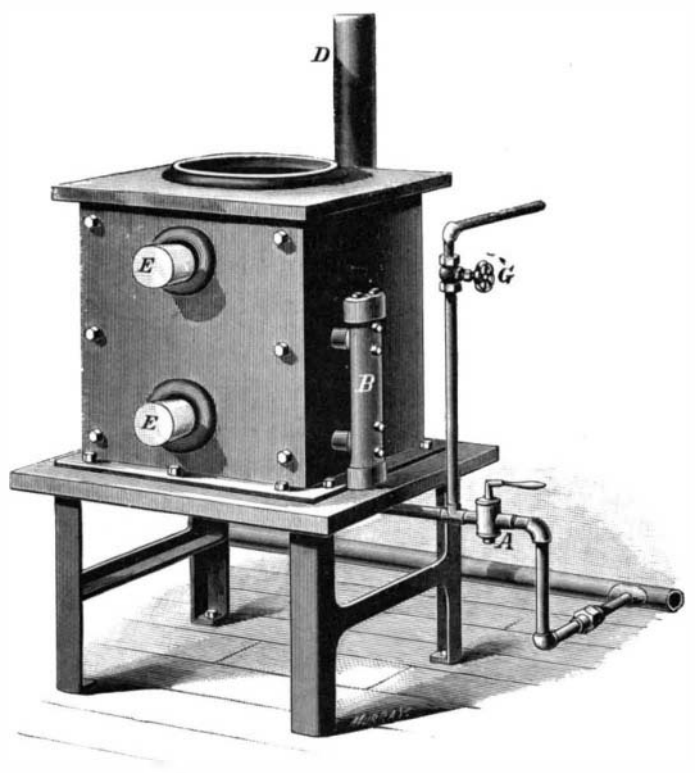


Fig. 11.—SOFT METAL FURNACE FOR LEAD HARDENING.

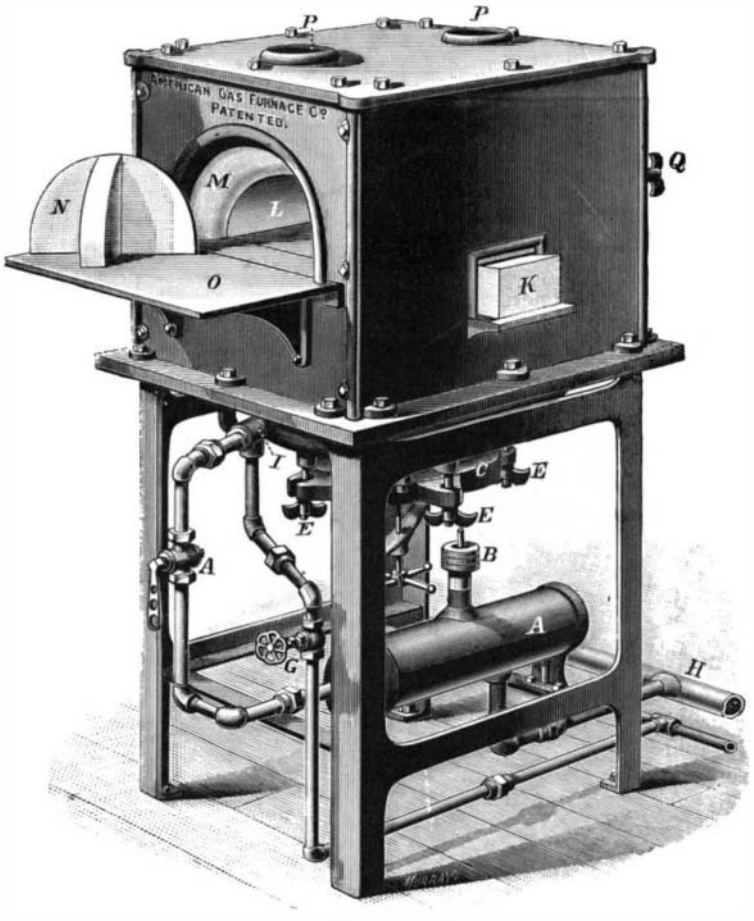


Fig. 12.—MUFFLE FURNACE.

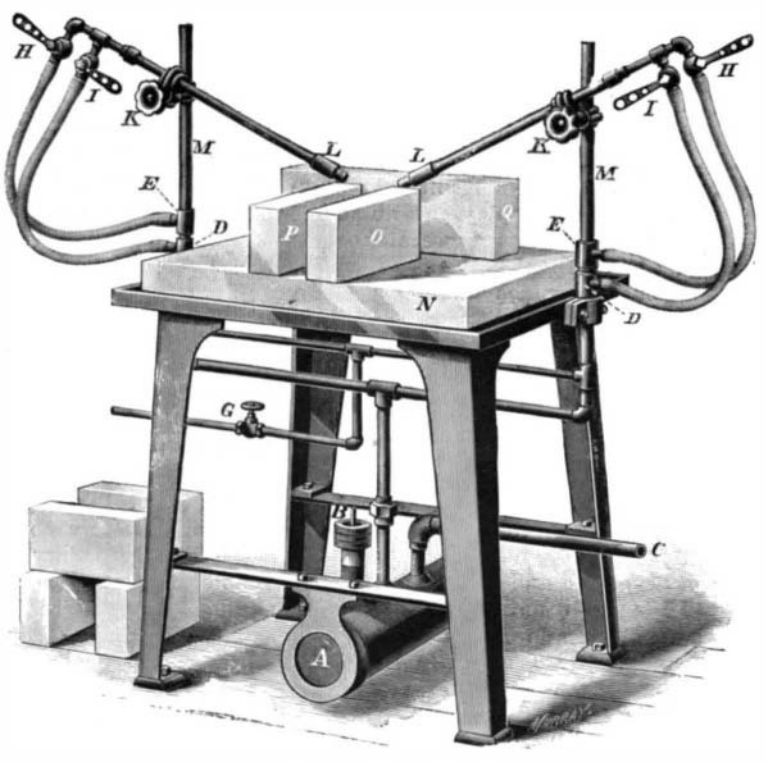


Fig. 13.—BRAZING TABLE.

THE AMERICAN GAS FURNACE COMPANY'S GAS PLANT AND FURNACES.

valve, and the articles rest upon the slab untouched by the flame. This does the work ordinarily executed in large and expensive muffles, and independent of the saving of the muffles, runs otherwise more economically than a muffle furnace.

Fig. 6 shows a large melting furnace. This is used for brass or bronze foundry work. The flame enters tangentially and with a slight downward inclination, and the products of combustion escape from the bottom of the furnace. There is no escape of gas or flame from the top, and when the metal is at its hottest, one can stand over the crucible and look down into it without inconvenience.

Fig. 7 shows one of the special furnaces to which the process lends itself so admirably. It is a modification of the oven furnace just described, and is designed for tempering mowing machine cutters. These are fed to the machine on an endless chain, their bases resting thereon, the cutters being supported in an approximately vertical position. The effect of this is to produce differential tempering, the edges being brought to the higher heat, so that as they fall into a tank of oil or water the cutting edge is made hard and the body is left soft. Fig. 8 is a soft metal furnace. In such furnaces as this Babbitt metal, solder or other of the more fusible alloys may be compounded, or it may be used for melting the more fusible metals for castings.

Fig. 9 shows another interesting apparatus, a furnace for bluing screws or other small articles, such as the parts of a bicycle chain. Within a gas furnace rotates a drum, provided with helical partitions. The screws are fed in at the back and as the drum rotates pass through the furnaces, each one in an absolutely definite time, and a constant stream pours out from the front of the furnace, all blued to the exact tint required. By varying the amount of gas used or by feeding the pieces more or less rapidly, any desired result may be obtained with certainty.

Fig. 10 shows a gas forge. This apparatus provides for the needs of a blacksmith or drop forger. For the latter especially it is designed. The piece of metal introduced at the opening, O, is rapidly brought to the desired temperature. Fig. 11 shows another special apparatus, a furnace for maintaining lead in a state of fusion to be used for hardening steel tools. In this furnace the hotter metal is kept in fusion at any desired temperature, so that uniform results in tempering can be secured by it. This furnace has vertical burners entering opposite to each other at top and bottom, so as to maintain all portions of the metal at an even temperature. Thus a long bar of steel plunged in the metal is heated evenly from top to bottom.

Fig. 12 shows a muffle furnace. This is a more familiar type and is used by assayers, enamelers, and in many classes of operations. It is lined with fire clay and the muffle bottom is protected by an extra slab so that it will not sag. It is found that a muffle with a gas fuel lasts much longer than in the ordinary coal furnace, which also applies to crucibles.

Fig. 13 shows the brazing table, where two blowpipes fitted on adjustable supports bring their flames to impinge on the object to be brazed. This was originally built for bicycle work, but its operations have been found to be so good that it has been adopted by the brazing trade in general. Although our illustrations represent the works at Elizabeth, N. J., the general offices are at 80 Nassau Street, New York.

Space is not permitted us to go into details of the American Gas Furnace Company's apparatus as fully as we might desire. It is enough to say that a very large variety of furnaces for every conceivable kind of work is furnished, and that by the use of their gaseous fuel a great direct economy is secured, as well as the indirect one due to a more perfect regulation of heat and to less wear and tear upon the furnace.

Every apparatus is evidently the result of painstaking care and thorough technical knowledge, and their aim appears to be to produce the best, irrespective of immediate profit. Their work has received flattering recognition from the Franklin Institute, and the fact that these furnaces have been recognized as most efficient for certain grades of work is evidenced by the fact that a number of these furnaces are exported annually to foreign countries.

In the factory at Elizabeth, and elsewhere, the gas is used to supply incandescent burners. It also is used in radiators to heat rooms. Thus the Elizabeth factory is lighted and partly heated by the gas as well as given its power.

GAS ENGINE TRICYCLE.

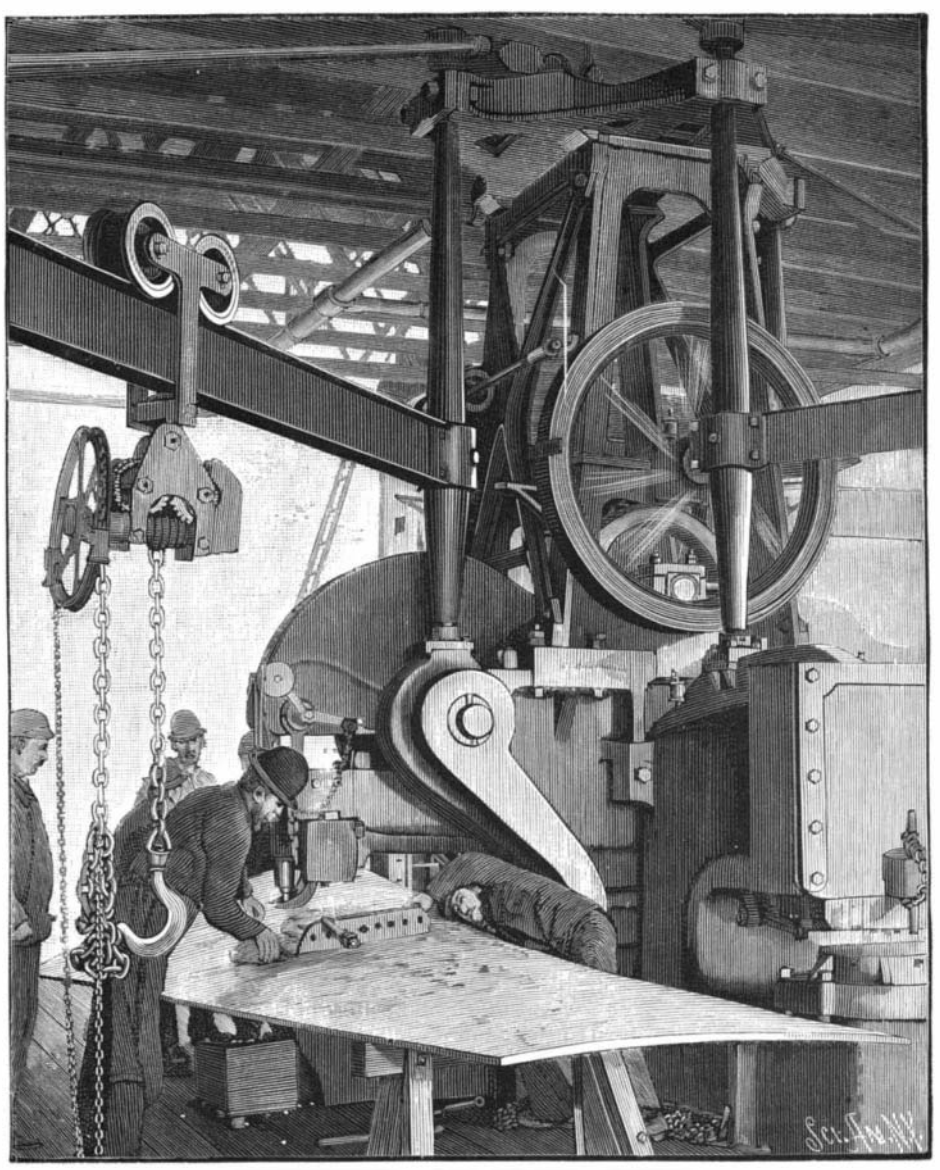
GAS ENGINE TRICYCLE.

Verily, the field of usefulness formerly held by the horse is narrowing daily. To steam, electricity, and the ubiquitous bicycle comes an ally in the form of explosive gas, so cunningly applied to the propulsion of vehicles as to threaten his utter rout. The accompanying illustration shows the latest improvement in adapting the gas engine to the running of wagons on ordinary roads.

This tricycle is propelled by a two horse power Golden Gate balanced gas engine. It has been tested on the streets of the city under varying conditions as to grade and roadway, and has proved in every instance satisfactory, being easy to control as regards starting, regulating speed, turning, stopping, etc.

The machine is calculated to carry three persons on the single broad seat, though operated by one, with surplus power sufficient to trail one or two buggies or a loaded wagon, according to the character of the road. It carries twelve hours' supply of gasoline, or two and one-half gallons, and can easily attain a speed of from ten to twelve miles per hour on favorable ground. Being geared in such a manner that the movement of a lever increases or decreases the speed enables the driver to climb grades of considerable pitch.

It is claimed to be perfectly safe and is simple in construction, the design of the inventor being to have as few pieces and parts as possible. The wheels and frame supporting the engine are strong and the entire machine is constructed in the most substantial manner, as if intended to withstand hard usage. It was built on an order from a gentleman in Santa Maria, Cal., by A. Schilling & Sons, 211-213 Main Street, manufacturers of the Golden Gate gas engine.—Min. and Sci. Press.



HYDRAULIC JAW PLATE PUNCH.

HYDRAULIC JAW PLATE PUNCH.

The accompanying illustration represents one of the powerful hydraulic jaw plate punches in use in the William Cramp & Sons Ship and Engine Building Yards in Philadelphia. The punch is one of many similar punches used in constructing the great war ships and merchant marine vessels for which the Cramps have gained a great reputation. This particular form of punch is used to cut the plates which are to form the hulls of the vessels to the desired shape. The punch is situated in the ship yard near the immense stays which hold the great vessels while in course of construction. The illustration has been made from an instantaneous photograph taken while the punch was in operation.

Before placing the plates in position for punching, the exact form of the plate desired is marked on the original plate by a wide chalk line. The plate is then carried to the punch by means of an ordinary traveling hand crane and pulleys, which are clearly shown in the illustration, and to aid in holding the plate in a horizontal position several ordinary wood trestles are generally employed. The steel punch consists of a knife with a very blunt edge which cuts or punches out disks of metal one inch in diameter. By punching the plate so that these disks overlap one another it is of course possible to cut the plate quickly and neatly to the desired pattern. The illustration shows the punch at work in cutting a plate of steel one inch thick. The friction produced by the punch