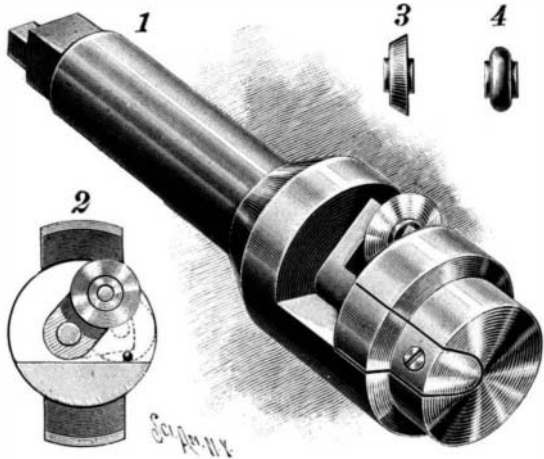


**A NOVEL BOILER-TUBE CUTTER AND EXPANDER.**

The device illustrated in the accompanying engraving is an apparatus for cutting or expanding boiler-flues, the cutting being performed before the removal of the old flue and the expanding being performed on the new flue to hold it in place.

Fig. 1 is a perspective view of the tool. Fig. 2 is a sectional view showing the eccentric mounting of the expander or cutter. Fig. 3 is a modified form of cutter. Fig. 4 is an edge view of the expander.

The tool consists of a shank and of a body portion. The shank, in the particular form illustrated, is provided with an eccentric passage extending into the body. This passage incloses a rod, the outer end of which projects from the shank and is squared to receive a wrench, and the inner end of which has an arm



HERVEY'S BOILER TUBE CUTTER AND EXPANDER.

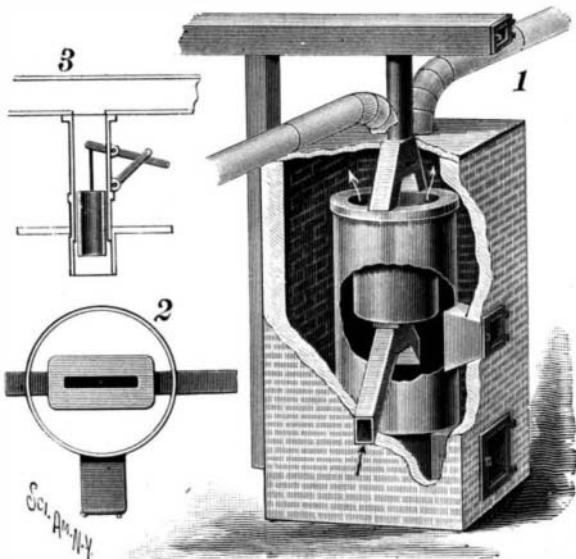
swinging eccentrically in a recess formed in the body. The free ends of this arm are designed to receive a double bevel cutter, or a single bevel cutter, of the form shown in Fig. 3, or an expander of the type illustrated in Fig. 4. In order to permit the insertion and removal of the rod carrying the cutter or expander, the body is formed with a groove which is closed by a removable piece.

In using the tool, the eccentrically-mounted arm is thrown from the position shown in full lines to that shown in dotted lines in Fig. 2, and the body is inserted in the flue. If the flue is to be cut, the eccentric arm is fitted with one of the cutters described; if it is to be expanded, then the arm is fitted with the expander. In order to hold the tool against the flue-sheet a suitable clamping-device is used. In bringing the tool into contact with its work the rod is first turned by means of a wrench, and thus the shank and body are turned to perform the work. The movement of the tool will cause the cutter or expander to engage or bind against the tube and perform its functions. It will be seen that the rotation of the body portion in the flue will force the eccentric arm to the left, as shown in Fig. 2, and that as this movement increases, the cutter enters the flue correspondingly further. The tool, therefore, automatically feeds the cutter or expander as fast as may be desired.

The inventor of the device described is Walter D. Hervey, Chenoa, Ill.

**AN IMPROVEMENT IN FURNACE CONSTRUCTION.**

The hot-air furnace which we illustrate herewith is so constructed that a large volume of heated air may be obtained from a comparatively small body of fuel,



AN IMPROVEMENT IN FURNACE CONSTRUCTION.

and that the draft may be shut off between the furnace and the chimney or the off-take flue, ample provision being made for the escape of the gases.

Fig. 1 is a perspective view of the furnace, parts being broken away to show the interior arrangement. Fig. 2 is a top plan view of the cold-air flue. Fig. 3 is

a vertical section through the off-take and through the valve controlling the draft.

Through the body of the furnace above the grate the cold-air flue is passed, the upper portion of which, as shown in Fig. 2, is slotted. A superheating well, open at the top, and communicating with the slot of the cold-air flue, is located in the upper part of the furnace-body. This well is provided with a flange which is fitted in the upper portion of the furnace, and which has ports connected with a bridge-pipe communicating with an off-take. In the section connecting the bridge-pipe with the off-take a tubular valve is loosely mounted, by means of which valve communication between the off-take and bridge-pipe may be cut off, a sufficient space being left between the valve and the surrounding section to permit the escape of the gases. The means by which the valve is seated consist, as shown in Fig. 3, of a link attached to the valve and pivoted to a lever, locked in adjusted position by a locking-bar.

The furnace is surrounded by a casing of such dimensions that a space is left between the sides of the furnace and the sides of the casing. At the bottom of the casing doors are hung, which ordinarily close openings serving to admit cold air in order to force the column of hot air contained in the upper portion of the casing into the pipes leading to the various rooms of the dwelling.

As the flames and products of combustion must pass around the upper portion of the flue before passing around the superheating well, the cold air admitted is, of necessity, very quickly heated, owing to the heated condition of this portion of the flue. The air thus heated passes into the well, where its temperature is still further raised, and finally enters the supply-pipes.

The inventor of the furnace is Mr. Alexander Heil, of Reading, Pa.

**Automobile Regulations in France.**

The following regulations for automobile carriages have been made in France. Every type of vehicle employed must offer complete conditions of security as to mechanism, steering gear and brakes. The construction of the carriages must be approved by the Service des Mines. This certificate must be obtained for each type of machine. The builder is then at liberty to manufacture an unlimited number of vehicles. Each vehicle must bear the maker's name, the type of machine and the number of vehicle in that type, as well as the name and address of the owner.

No one may drive the automobile who is not the holder of a certificate of capacity, delivered by the prefect of the department in which he resides and granted with the consent of the Service des Mines. The driver of an automobile must always have the regulator of the speed well in hand. In case of narrow or crowded thoroughfares, the speed must be reduced to a walking pace, and in no case must it exceed 18½ miles in the open country or 12½ miles an hour upon passing houses. Racing is allowed, provided authorization is obtained from the prefect and the mayors are warned. In racing, a speed of thirty kilometers, or 18½ miles, an hour may be exceeded in the open country, but in passing houses the maximum of twenty kilometers (12½ miles) must not be exceeded. The approach of the automobile must be signaled by means of a trumpet. Each automobile must be provided with two lamps, one white and the other green.

**A Pneumatic Artificial Limb.**

An English inventor has devised a very ingenious artificial leg and foot intended for use in cases of amputation below the knee joint. It is mainly composed of a hollow rubber chamber which is inflated in exactly the same way as is a bicycle tire. The skeleton of the foot is of wood and contains within it a rubber-faced joint which permits of movements like those which take place at the ankle. A pair of rubber pneumatic pads surround the end of the amputated limb, so that no undue pressure is exerted on the tissue.

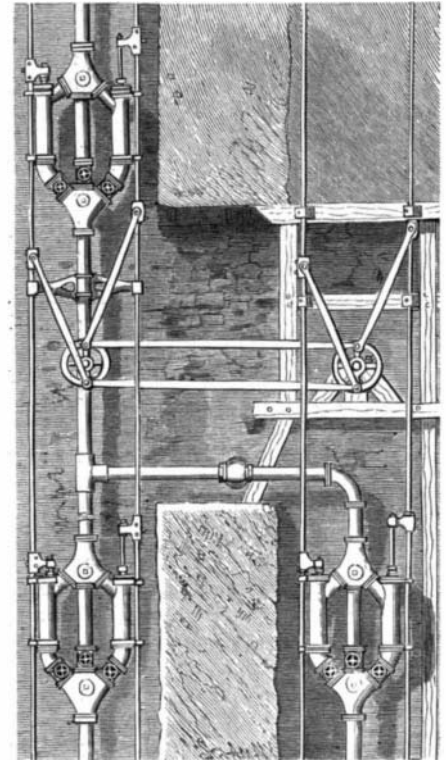
**A DEEP-MINE OR RELAY PUMP.**

By means of an improved relay pump, patented by George S. Herbolsheimer, 2343 Bryant Street, Denver, Col., it is possible to pump water out of a mine-shaft at one or more levels simultaneously, the parts of the pump being so arranged that any one of the individual pumps can be connected and disconnected whenever it may be so desired.

The apparatus comprises a series of pumps arranged in pairs at different elevations and connected by a common water-main. Each of the pumps comprises two cylinders having suction and discharge connection with the water-main. In order to render the water-main continuous, a by-pass is employed, which connects the suction and discharge chambers of the pump and which is provided with a cut-off valve. Within the pump-cylinders pistons are fitted, the rods of which are connected with two power-transmitting rods extending alongside of the pumps. The upper ends of the rods are connected with a suitable mechanism for

imparting alternate or opposite reciprocations to the rods, so that one piston will ascend while the other descends.

In order to transmit the motion of the rods operating the pumps in a shaft to the rods operating the



HERBOLSHEIMER'S DEEP-MINE OR RELAY PUMP.

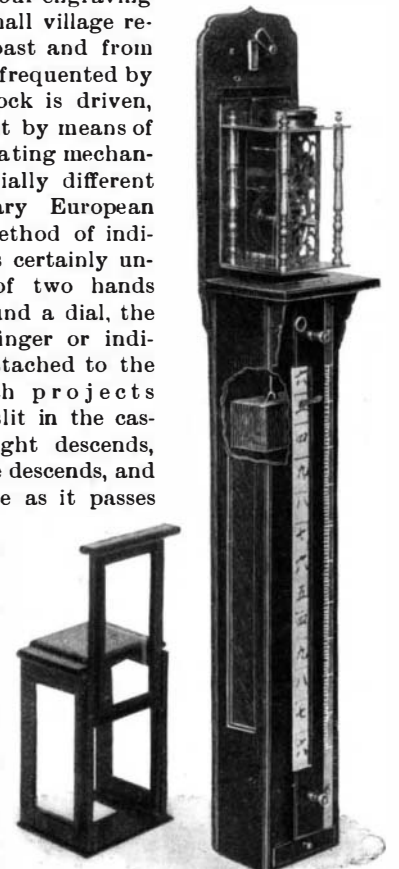
pumps in a sump, links are employed which extend through the level above the sump and join the rods of the two sets of pumps in question, and which are pivoted on crank-wheels connected by pitmen with the power-transmitting rods. The up-and-down motion of the power-transmitting rods of the shaft-pumps is transmitted by the pitmen and link-connected crank-wheels to the power-transmitting rods of the pumps located in the sump, in order to actuate the pistons.

When the cut-off valve in each by-pass is closed, and the cut-off valve in each suction chamber is opened, and when the power-transmitting rods are reciprocated, water is pumped from the mine-shaft, as well as from the level and its sump, to the outside of the mine. By opening the by-pass valve and closing the suction-valves of the proper pump, it is possible to cut out a level or main shaft, as desired, so that water is removed only from the main shaft or from the level.

**A QUIANT OLD JAPANESE CLOCK.**

Mr. and Mrs. Joseph Wintherbotham, of Chicago, in their travels in Japan, last year, came across the clock from which our engraving was made, in a small village remote from the coast and from the cities usually frequented by travelers. The clock is driven, not by springs, but by means of a weight. Its operating mechanism is not essentially different from the ordinary European clock; but the method of indicating the time is certainly unusual. Instead of two hands which travel around a dial, the clock employs a finger or indicator, which is attached to the weight and which projects through a long slit in the casing. As the weight descends, the finger likewise descends, and indicates the time as it passes

over a vertical scale on which the divisions of time are inscribed in Japanese characters. These divisions are subdivided by means of an auxiliary scale, over which the indicator also travels. Apart from this curious method of indicating the time of day, the clock is remarkable for its excellent workmanship. Its beautiful ebony case, its well-cut gear wheels, and its polished brass frame, coupled with its queer elongated form and unclock-like appearance, lend to it an interest which we hardly attach to our ordinary time-pieces. This curious old Japanese clock may be seen at the office of this paper.



A QUIANT OLD JAPANESE CLOCK.