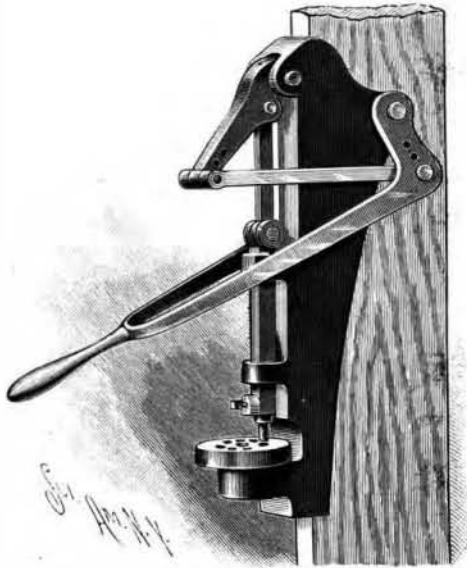


A HAND PUNCH FOR WORK ON COLD IRON.

This is a strong and simple machine in which levers are so arranged as to be operated by hand, practically without friction and with great power, for punching holes in metal. The improvement has been patented by Mr. Paul L. Johnson, of Bishop Hill, Ill. The frame is clamped to a suitable support and has at its



JOHNSON'S PUNCHING MACHINE.

lower end a lug which carries the die plate. The latter may, if desired, be held in place by a downwardly extending bolt and thumb nut. The vertically sliding punch bar is pivoted at its upper end to a drive bar, and the latter is pivoted at its upper end to a drive lever, the short arm of which is pivoted between lugs near the top of the frame, while its long arm, near the outer end, is connected by rods which straddle the frame with the elbow portion of a forked-handle lever, which also straddles the frame and the drive bar, the short arm of this lever being also fulcrumed to the frame. The handle lever and the drive lever each have a series of holes to receive the pivot pins of the connecting rods for the making of different adjustments, according to the length of stroke or the power required.

What is Carbon?

That carbon is a "metalloid"—which, if it means anything, means something resembling, but not identical with, a metal—we have long been assured, chiefly by French chemists suffering from an excess of system. Now, however, it has advanced a step further, and presumably forms a basic oxide. No other hypothesis appears tenable to account for the existence of two remarkable bodies named respectively "carbon silicate" and "carbon sulphate," the product of the reaction of ignorance and printer's ink found in a column serving for the fractional distillation of "scientific" residues, which appears weekly in an evening paper. Chemists will be disappointed to learn that the first named substance is nothing more mysterious than carborundum. They will, however, have ample room for admiration concerning the second, as it is said to be concerned in the production of "coal balls" found in coal measures, and by passage through the vegetable tissues of plants to produce "chemical changes resulting in the formation of carbonate of lime and iron pyrites." We are tempted to suggest that sulphate of iron may be meant, but then,

arguing from the carborundum case, carbon sulphate may after all be merely a pseudonym for carbon disulphide. The speculation is enticing, and we commend it to the *dilettanti*.—*Industries*.

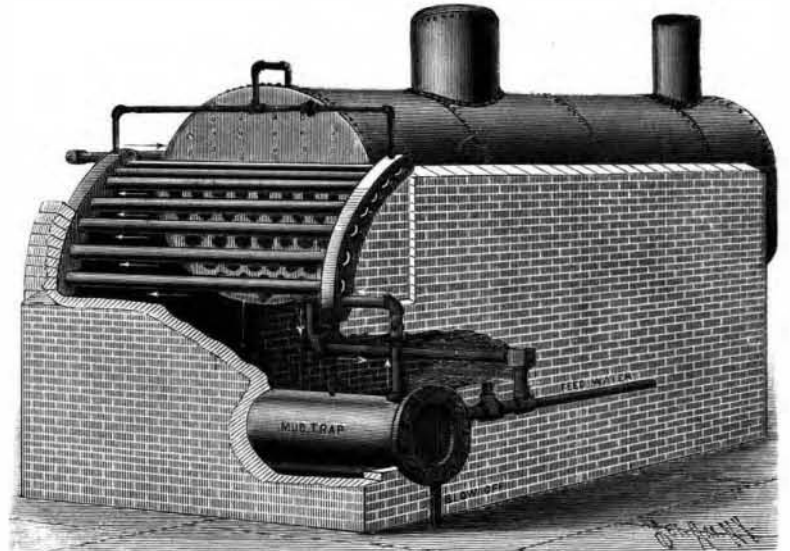
AN ARCH SUPPORT, WATER PURIFIER AND HEATER.

This improvement, adapted for use in connection with an ordinary boiler, affords a permanent arch over the combustion chamber at its back end, and is an auxiliary steam generator as well as feed water heater, while aiding in securing the best results in keeping the boiler practically clean, by blowing off and otherwise. It has been patented by Mr. George W. Collin, of Atlanta, Ga. The heater is formed with curved end columns and connecting pipes, the latter having in their ends hand holes with removable cover plates, the heater being supported by the furnace walls and forming a firm support for the arch, which may be built directly upon the end columns and tubes. In each of the connecting tubes is a strip of sheet copper with serrated edges, to take up lime, etc., from the water, and prevent the formation of scale, the mud drum also being supplied with a similar plate, and the plates being readily removable when necessary. At its upper end the heater is connected by suitable pipes with the steam space of the boiler, and one of its curved end columns is connected near its upper end with the boiler at or just below the lower water line. The feed pipe has a valved connection leading to the bottom of the boiler and another leading to the mud drum, while the latter is also connected by a valved pipe with one of the curved end columns of the heater, and has a valved escape or discharge pipe. When the boiler is filled and the fire started, the valve in the pipe connecting the mud drum with the heater is opened, and the heat and flame passing backward under the boiler, up against the pipes of the heater, causes a circulation of water from the upper connection of the heater into the boiler, and from the bottom of the boiler through the mud drum and again into the heater, making a constant current one way through the device. When

the boiler. To blow off water from the bottom of the boiler, the valves in the feed pipe and in the pipe connecting the mud drum with the heater are closed.

Marble-like Plaster.

Zinc in the form of cuttings or dust is placed in water, and after having been allowed to stand for some time boiled therewith, whereby it dissolves to

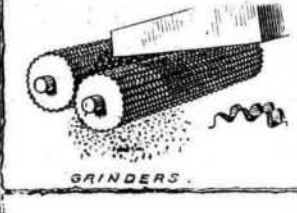
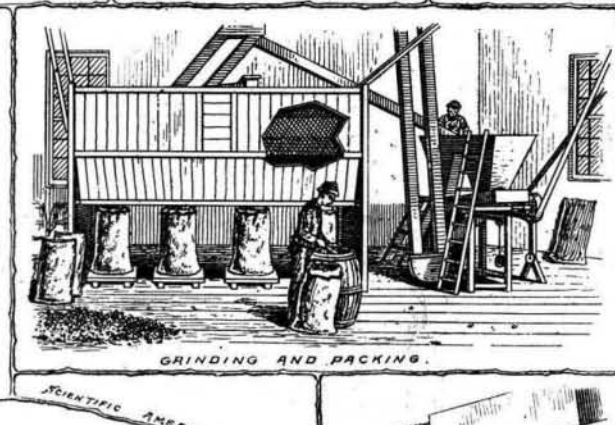
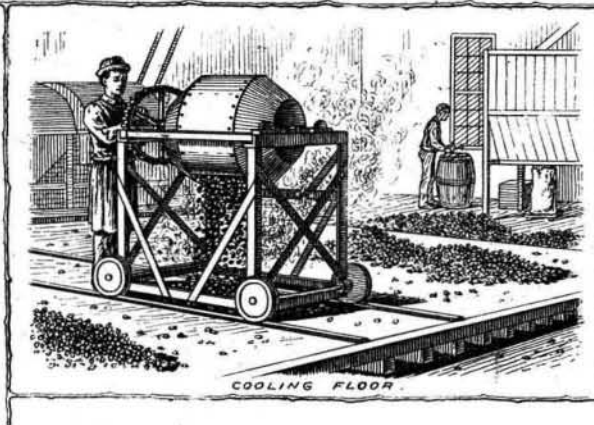
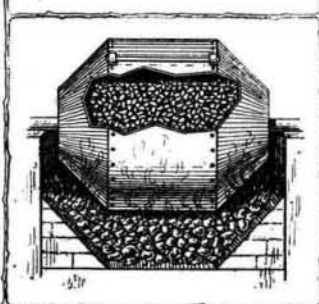
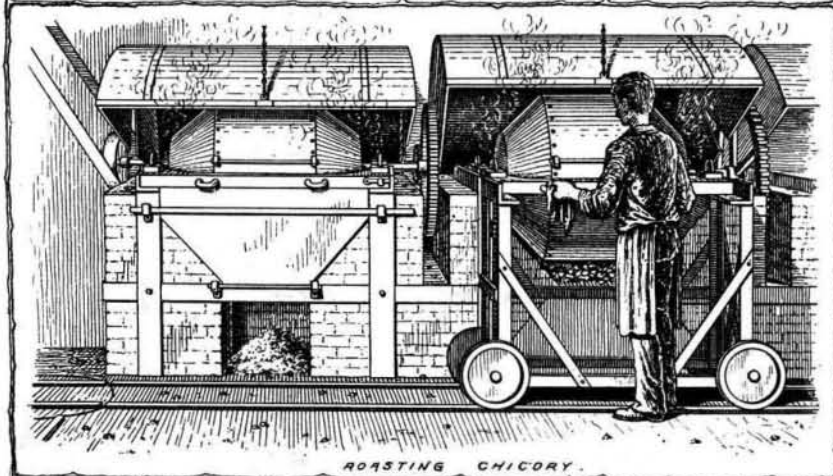
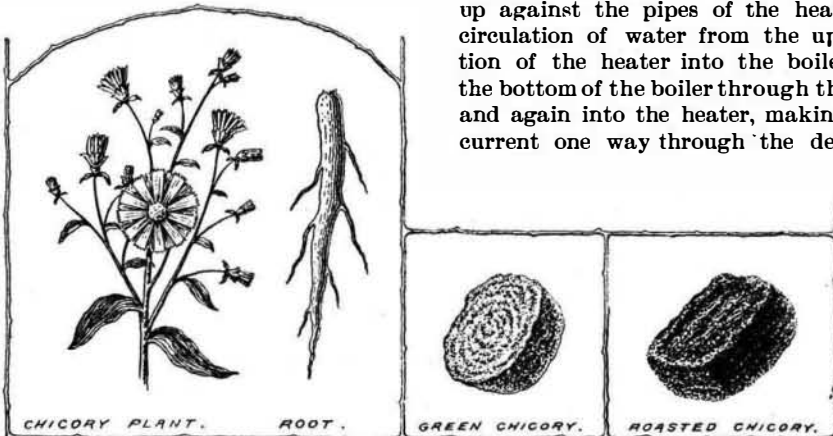


THE "C. B." BOILER ATTACHMENT.

the extent of about 32 milligrammes per liter. The solution is mixed with an equal quantity of a solution of an alkaline silicate, preferably silicate of potash at 3° B., and the mixture diluted with four times its weight of water. One part of gypsum is mixed with two parts of lime and made into a paste with the liquid already described, the product having, it is stated, a marble-like luster due to the employment of the mixture of silicates used.

MANUFACTURE OF CHICORY.

Chicory or succory plant is raised principally in England, Holland, Belgium, France, and Germany. A small quantity is raised in the United States, most of which is grown on a few hundred acres in California. The plant belongs to the same family as the dandelion. It has a long fleshy and milky tap root. The plant when under cultivation grows to the height of 5 to 6 feet. It grows very quickly in a low temperature, the plant making about 7 inches in about three weeks. In some countries it is grown as fodder and herbage for cattle. The plant blossoms in August and September and can be recognized by its bright blue flowers, which measure about 1½ inches across. The soils best adapted for its growth are deep, friable loams. The process of cultivation is about the same as that required for carrots, excepting that it is not sown earlier than the first week in May, lest it should run to seed. About four pounds of seed is the quantity required to sow per acre either broadcast or in rows, the latter being the best method, yielding roots of greater weight. The crop is ready for digging up in November. The analysis of chicory shows the following constituents: Water, 9.09; soluble salts, 4.20; soluble extractive substances, 41.29; soluble gummy resinous substances, 5.22; dextrine, 6.12; saccharine matter, 11.36; cellulose, 19.40; caramel, 2.10; carbon, 1.18; empyreumatic oils, 0.04. In some countries it is used as a substitute for coffee. Other substances have been tried for the same purpose and abandoned, not being agreeable or beneficial to some constitutions. When



THE MANUFACTURE OF CHICORY.

feeding water from the feed pipe, the water is first forced into the mud drum, to be taken up by the current through the heater, thus passing into the boiler at a high temperature, the steam which is formed passing into the steam space of

mixed with coffee it adds to it additional color, bitterness and body. For the preparation of chicory the older, stout, white roots are selected, and after washing they are sliced up into small pieces and kiln-dried. In this condition it is sold to the chicory roaster. The roasters are made of rolled steel about 3 feet in diameter, about 3 feet in length and tapering down to about 1 foot at the ends. They are drawn from the ovens, on a track