ciently satisfactory to induce proprietors to substitute them wholly for the old furnaces in even a single mill. The Danks patent is upon details; but the inventor is certainly entitled to much credit for skillfully proportioning them, and even more for his perseverance and tact in overcoming those difficulties that usually impede, for many years, the progress of the most meritorious inventions.

The ordinary process of puddling consists in melting cast iron upon the hearth of a reverberatory furnace and stirring it until the carbon has been burned out, and other impurities have passed into a slag; and malleable or wrought iron then remains. Many attempts have been made to substitute machine for manual labor in the process, but none have been hitherto successful, and, all over the civilized world, puddling is done by the same old process; and the severity of the labor, together with the intensity of the heat to which the workman is exposed, makes the life of the puddler a short one and the process comparatively expensive.

The Danks puddling furnace has an ordinary furnace grate, but, instead of the large chamber of the reverberatory furnace, a barrel shaped vessel receives the charge of pig metal, and through this the flame passes to the chimney. The metal once melted, the barrel is caused to revolve by steam power, and as the fluid metal flows around the interior, the carbon which it contains and the accompanying silicon are oxidized by contact with the passing oxygen in the furnace gases, and with that of the iron ore with which the barrel is lined. Gradually it loses its fluidity, becomes viscous and finally pongy, and is then malleable iron. One end of the barrel is movable, and that being removed, the great "ball" of spongy iron, weighing 600 to 700 pounds, several times the weight of an ordinary puddle ball, is taken out, carried, by tongs suspended from an overhead railroad, to the squeezers, where it is rolled and compressed into a billet of quite compact iron, and thence to the "muck train" of rolls in which it is given the shape of a long rough looking bar, which only requires additional rolling to convert it into such "merchant bar" as we see in the market. The process was a very interesting one to us, and the contrast between this and the ordinary method, so far as the comfort of the workman is concerned, was very marked and very gratifying. So satisfactorily have these furnaces done their work here that they have displaced all of the old furnaces in these works. English iron masters have considered the improvement so important and desirable that they some time since sent a commission to this country to determine the real value of this furnace.

The commission brought over many tons of the worst, as well as of some of the best, British irons and puddled them here. Their report is one that will interest and please every friend of American manufacturing industry. We saw very good iron which had been made from Yorkshire pig, and from even worse Welsh cast iron; and, during our visit, the furnaces were working with *stove scrap*, which is, probably, generally about as poorly adapted for the purpose as any iron that can be found; judging from the appearance of the bars produced, it made a good iron. Whether this particular furnace will ever become generally used is uncertain, and even a matter of little consequence to the world; but it is eminently desirable that, in some form, a machine may perform this very simple and yet essential detail in the process of iron making, and, at the same time, reduce its cost and relieve the workman from one of the severest tasks known in the arts.

THE CINCINNATI WATER AND GAS WORKS.

After visiting the water works, where we found five steam engines engaged in supplying the city with water, and where we were especially interested in the working of the largest—a great machine, 100 inches in diameter of cylinder and of 12 feet stroke of piston—we accepted the invitation of Mr. E. M. Breese, the engineer of the city gas works, and, under his guidance, examined that great establishment very minutely. Space will not, however, allow of a description of this or of other interesting establishments which may be found at Cincinnati. Some idea of the magnitude of the city itself is afforded by the facts, learned at the gas works, that they consume annually about 1,250,000 bushels of coal, making 700,000,000 of cubic feet of gas. Such a quantity of coal would warm, for the winter, the houses of about 6 000 New York mechanics, and the volume of gas made annually is perhaps four times as great as that of the 6,000 houses taken together.

R. H. T.

SLICING APPLES.

The wholesomeness of the apple as an article of food is not as widely known as it deserves to be. The fruit not only contains large quantities of nutritive matter, but has valuable antiseptic qualities which exercise the most beneficial effects on the system. In order to prepare apples so as to have them available for use at any time, a correspondent suggests the following method: A hole of about the size of an ordinary apple is cut in a block of wood. On the under side of the orifice, seven shoe knives are arranged, edges up in such a manner that the middle blade is the lowest, the pair on its either side on a higher plane, the next pair higher and so on—so that the edges form a curve. The knives are also inclined so that the edges are nearer together than the backs. A follower is fitted into the curve thus made, and is attached to the block of wood by a hinge on one of its sides; to the other, a handle is affixed. To make the plan clear, we should judge that the instrument as described by our correspondent, resembles a lemon squeezer, with knife blades substituted for the perforated cup in which the lemon is usually placed. The apple, being placed in the orifice, is pressed down by the follower upon the knife edges. It is thus cut into slices which fall through the openings between the blades. In this manner, we are informed, a bushel may be sliced in two or three minutes. The slices are then spread upon a grass plat and "hayed" in the sun—covering them or raking them together at night. When thoroughly dried they may be stored away, when they will keep without spoiling for any length of time.

RECIPES AND EXPERIMENTS.

The following recipes and experiments have not been practically tested by the editor of the SCIENTIFIC AMERICAN, but are published for the benefit of readers who may desire to try them. The editor would be glad to be informed of the results of such trials.

BLEACHING FEATHERS.—First clean from greasy matter, then place the feathers in a dilute solution of bichromate of potassa to which a small quantity of nitric acid has been added. The greenish deposit of chromic sesquioxide which ensues may be removed by weak sulphurous acid, when the feathers will be left perfectly white.

RENDERING CLOTH WATERPROOF.—Put half a pound of sugar of lead and a like quantity of powdered alum into a bucket of soft water. Stir until clear and pour off into another bucket—into which place the cloth or garment. Soak for twenty four hours and hang up to dry without wringing. This process is said to be very effective.

FILTER FOR CISTERN WATER.—Perforate the bottom of a wooden box with a number of small holes. Place inside a piece of flannel, cover with coarsely powdered charcoal, over this, coarse river sand, and on top of this, small pieces sandstone.

ZINC WASH FOR ROOMS.—Mix oxide of zinc with common size and apply it with a brush, like lime whitewash to the ceiling of a room. After this, apply a wash, in the same manner, of the chloride of zinc, which will combine with the oxide and form a smooth cement with a shining surface.

HARDENING WOOD FOR PULLEYS.—After a wooden pulley is turned and rubbed smooth, boil it for about eight minutes in olive oil, then allow it to dry, after which it will ultimately become almost as hard as copper.

TO CLEANSE WOODEN FLOORS.—The dirtiest of floors may be rendered beautifully clean by the following process: First scrub with sand, then rub with a lye of caustic soda, using a stiff brush, and rinse off with warm water. Just before the floor is dry, moisten with dilute hydrochloric acid and then with a thin paste of bleaching powder (hypochlorite of lime); let this remain over night and wash in the morning.

MUCILAGE.—Glue, water and three per cent of nitric acid adheres well to metallic surfaces.

PRESERVING STUFFED ANIMALS WITHOUT ARSENIC.—Rub the flesh side of the skin with a composition of 1 lb. tobacco ashes, ½ lb. alum, 2 lbs. dry slaked lime.

CLEANING OIL PAINT.—Whiting is better than soap. Use warm water and a piece of soft flannel. Afterwards wash clean and rub dry with chamois.

MAKING CITRIC ACID.—Treat fresh lemon juice with powdered chalk until all the acid is neutralized. Citrate of lime will be precipitated, which wash and then decompose by means of diluted sulphuric acid. A precipitate of sulphate of lime will then be formed while the citric acid dissolves. Filter, and the citric acid will deposit itself in crystals when the concentrated liquid cools.

VERMILION PAINT.—The tendency of paint made from vermilion (cinnabar or sulphide of mercury), when mixed with white lead, to turn black or brown in a short time may be obviated by mixing with the dry paint, before adding the oil, one eighth of its weight of flowers of sulphur.

CLEANING GLASS —The lenses of spectacles or spy glasses that have come scratched or dimmed by age may be cleaned with hydrofluoric acid diluted with four or five times its volume of water. The solution should be dropped on a wad of cotton, and thoroughly rubbed on the glass which should afterwards be well washed in clear water. Great care must be exercised in handling this acid, as it eats quickly into the flesh, often producing painful and obstinate sores.

PAINTING ZINC.—Oil paint may be made to adhere to sheet zinc by coating the latter with a composition of one part nitrate of copper, one part chloride of copper and one of sal ammoniac, dissolved in sixty-four parts of water; add to the solution one part hydrochloric acid. This should be left from twelve to twenty-four hours to dry. It acts also as a protection to the metal against atmospheric influences.

TO RENDER CORKS OR STOPPERS AIR TIGHT.—This can be accomplished by covering with a cement composed of red lead or finely powdered litharge mixed with undiluted glycerin.

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