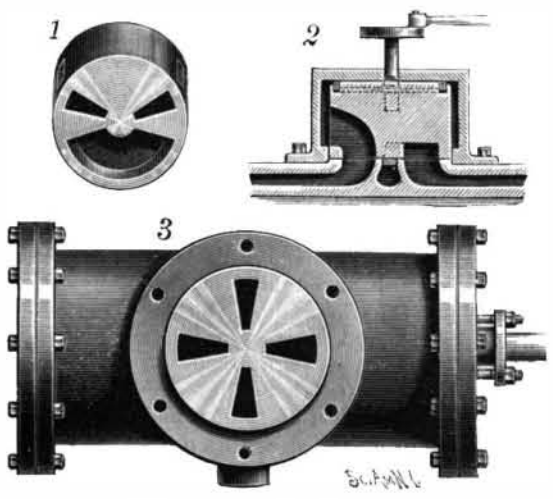
The City of Paris.

Iron concludes that, whatever may have been the immediate cause of the breakdown of the starboard engine of the City of Paris, considerable may be learned from the accident. In the first place, the transverse bulkheads have proved their ability to keep the vessel afloat, although both engine rooms were filled with water. Secondly, the longitudinal bulkhead between the port and starboard engine rooms was not strong enough to prevent an accident to one from rendering the other engine useless. This bulkhead should be strengthened, so that each engine room should be practically bomb-proof against the other. Finally, there should have been valves in the circulating pipes between the engine room and the hull, which could be shut from the upper deck in case of the breakage of these pipes in the engine room. This would perhaps have prevented the filling of the engine rooms with water. It is a great satisfaction to know that the accident was not attended with loss of life, and that the vessel did not go to the bottom even after it reached Queenstown harbor.

Fig. 1.—ETCHED IRON CASKET IN THE BAVARIAN NATIONAL MUSEUM IN MUNICH—THE END.

AN IMPROVED VALVE.

The illustration shows an oscillating valve, patented by Mr. John C. Wood and Caleb F. Houston, designed to permit the easy reversing of the engine and obviate the wearing of a hollow seat when set to cut off at short stroke. Fig. 1 represents the valve in perspective, Fig. 2 being a sectional side elevation of the improvement as applied, and Fig. 3 showing the cylinder. The engine cylinder has the usual inlet and outlet ports opposite each other, over which operates the circular valve, turning in the steam chest, and in the valve, at angles to each other, are ports adapted to connect alternately with the live steam ports, and extending through the rim of the valve, as shown in Fig. 1, so as to lead into a circular steam space in the steam chest. In the under side of the valve is an exhaust cavity adapted to alternately connect the inlet ports with one of the exhaust ports, according to the direction in which the engine is running. The valve has a central spindle carrying a slotted link pivotally connected



WOOD & HOUSTON'S VALVE.

with a rod connected with the engine-driving shaft, to impart an oscillating motion to the valve, the pivot of the rod on the link being adjustable for governing the cut-off. The motion of the valve can be reversed by connecting the rod to the other end of the link. In the top of the valve is an annular groove in which fit a number of split rings forming a packing.

For further information relative to this invention address Mr. Caleb F. Houston, Albuquerque, New Mexico.

ETCHING.

ETCHING METALS.

There are two ways of etching metals, which produce different effects. According to one method, the design is cut, while the ground remains bright. According to the other method, the ground is etched, while the design remains bright.

Lines may be formed on any of the base metals by coating the surface thinly with beeswax, scratching the design through the wax by means of a needle or any sharp instrument, finally applying to the surface a solution formed of 1 part of nitric acid, 1 part of sulphuric acid, and 8 parts of water.

Usually a rim of wax is placed around the surface to be etched, to confine the acid. After the surface has been sufficiently etched, the acid solution is poured off, the surface is washed with water, and dried, when the wax is removed by a cloth after the metal has been heated sufficiently to soften or melt the wax.

To produce an etched ground with a bright figure, this method is reversed, *i. e.*, the design is drawn with asphaltum varnish, and the ground is exposed to the action of the acid.

In Fig. 1 is represented the end of an etched iron casket of the sixteenth century, which is an example of this kind of work. After the etching is complete the work is washed as in the other case, and the asphaltum is dissolved off by means of a cloth wet with turpentine, leaving the design bright.

GLASS ETCHING.

Glass may be etched as readily as iron or steel. The method is about the same, the only difference being in the kind of acid employed.

The glass to be etched is completely coated with

Fig. 2.—ETCHED GLASS.

beeswax or paraffine, and the design is traced thereon by means of a needle or narrow scraper, which cuts through the wax, and exposes the surface of the glass. The next step in the process is to prepare the hydrofluoric acid for use. A gutta-percha or lead bottle is required for containing this acid. It may be bought in the concentrated form, or it may be purchased in a dilute state ready for use. The strong acid should be diluted with 8 or 10 parts of water. The article may be dipped in the acid, or the acid may be applied by means of a brush, as shown in Fig. 3.

The surface will be sufficiently etched in four or five minutes. After etching, the glass is washed in water and dried, when the wax coating is melted, and removed by means of a cloth. The design will appear as a dull or frosty surface.

The operator should be very careful to avoid inhaling the fumes of the acid, and also to avoid touching the skin with it, as it produces painful ulcers, which are long in healing.

It is obvious that beautiful designs may be made in this manner upon window screens, lamp shades, mirror borders, etc.

Laying Pipes under Water.

Mr. F. S. Pecke, a civil engineer at Watertown, N. Y., lately accomplished in a very simple, cheap, and expeditious way what is usually a difficult and expensive operation—the laying of a long line of pipe in deep water. He had occasion to lay nearly 1,000 feet of suction pipe at Rouse's Point. The water was needed for manufacturing purposes, and as it was found that water near the shore was more or less roily and impure, it was necessary to place the inlet a considerable distance out in the lake. He purchased for the purpose a steel pressure pipe of 8 in. diameter, manufactured by the Spiral Weld Tube Co., at East Orange, N. J., and used for couplings cast iron flanges, weighing, with bolts and gaskets, about 65 lb. to the pair. Plugging the end of the first length, he pushed it out on the surface of Lake Champlain, and connected the second length, pushing this out in turn, until the whole line was coupled. It then presented the unusual spectacle of a line of 8 in. pressure pipe nearly 1,000 ft. long, floating with a displacement of only 3½ in. of its

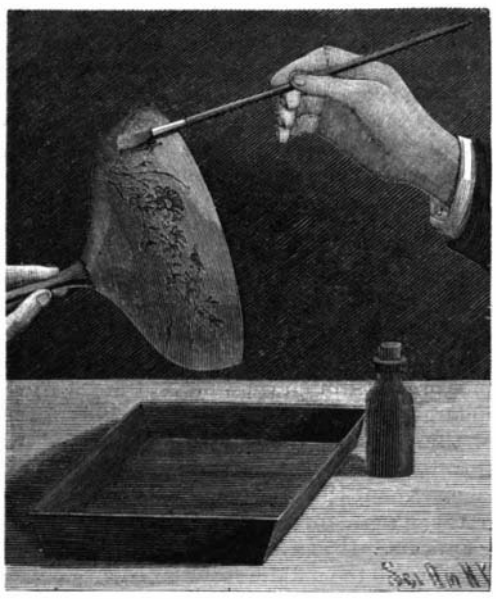


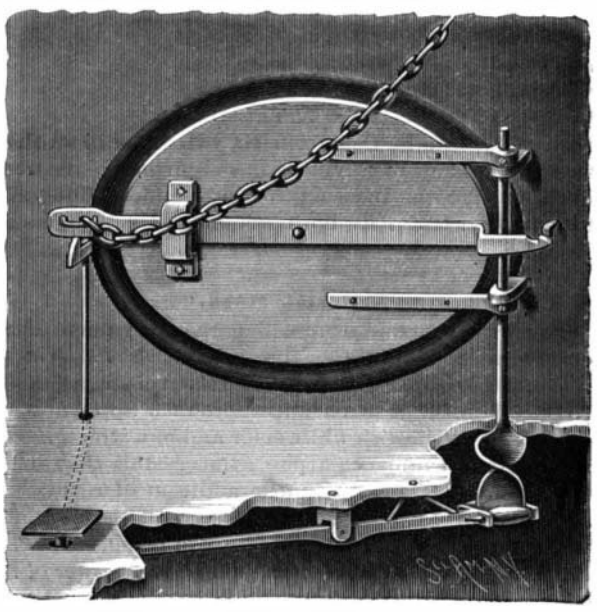
Fig. 3.—ETCHING GLASS.

diameter. When the requisite length had been connected the line was towed to position, the plug at the end removed, and the pipe sank easily in 16½ ft. of water without breaking a joint or receiving any injury. No buoys or floats were used in the operation, and no apparatus of any kind. The pipe is now in use as the suction of a steam pump, and gives perfect satisfaction. Work of this kind usually involves the use of expensive and troublesome flexible joints, and Mr. Pecke's neat and ingenious expedient is worthy of record and of imitation under like conditions.

It is obvious, says *Engineering News*, that this could hardly have been done with cast iron pipe, on account of its rigidity and liability to fracture.

AN IMPROVED FURNACE DOOR OPENER.

A device designed to facilitate the opening and closing of furnace doors, and especially adapted for application to the doors of locomotive furnaces without any alteration in the present ordinary forms of construction, is shown in the accompanying illustration, and has been patented by Mr. George F. Moors, of Owensborough, Ky. Beneath the floor in front of the furnace is pivoted a lever, one end of which terminates in a treadle extending above the floor, while the other end has horizontal aligning rollers adapted to engage the twisted lower end of a vertical shaft with which the rear end of the furnace door is rigidly connected, whereby pressure on the treadle end of the lever, moving the rollers up on the spiral of the shaft, will swing open the furnace door. When the pressure on the treadle is removed, a spring returns the lever to its normal position and thus closes the door. Another lever is also so pivoted that the pressing down of the



MOORS' FURNACE DOOR OPENER.

treadle gives vertical movement to a rod on the upper end of which is a shoulder normally resting in the bottom of the latch catch, whereby the latch bar is released simultaneously with the movement of the lever for opening the door. The latch bar extends all the way across the furnace door and has on its rear end a catch adapted to engage a similar catch projecting from the wall of the furnace at the rear end of the door, whereby the door may be held open when desired after the pressure has been removed from the treadle.