An Etching Ink for Glass.

For writing on glass with an ordinary steel pen, Dr. M. Muller prepares an ink containing fluorine. Equal parts of hydrofluoric acid, fluoride of ammonia, and dry precipitated barium sulphate are rubbed together in a porcelain mortar. When intimately mixed the mass is transferred to a dish made of platinum, lead, or gutta percha, and fuming hydrofluoric acid poured over it successively and rapidly stirred with a gutta percha rod, shaped like a pestle, until the impression left by the rod quickly vanishes. Glass written on with this ink is etched immediately, and the etched portions are so beautifully roughened that they are visible at a long distance. The ink only needs to act for fifteen minutes on the glass, and a longer action may be harmful, as the edges lose their sharpness.

In making good etching ink, the quality of the barium sulphate is of great consequence. It must be prepared by precipitating the solution of a barium salt (the chloride) with an excess of sulphuric acid, washing well by decantation, filtering, and drying at 248° Fahr. (120° C.). It is only in this manner that it can be obtained sufficiently fine and impalpable.

This ink cannot, of course, be kept in glass bottles, but only in gutta percha vessels closed with corks protected with wax or paraffine. Owing to its greater specific gravity, the barium compound used to thicken it naturally settles, hence it must be well shaken each time before using. It can be preserved in glass bottles that are protected within with a layer of wax or paraffine, which can be easily applied by warming the bottle over an alcohol or other smokeless flame, dropping in a piece of wax, and continually turning the bottle to bring the melted wax in contact with all sides. Even fuming hydrofluoric acid can be kept in such a bottle.

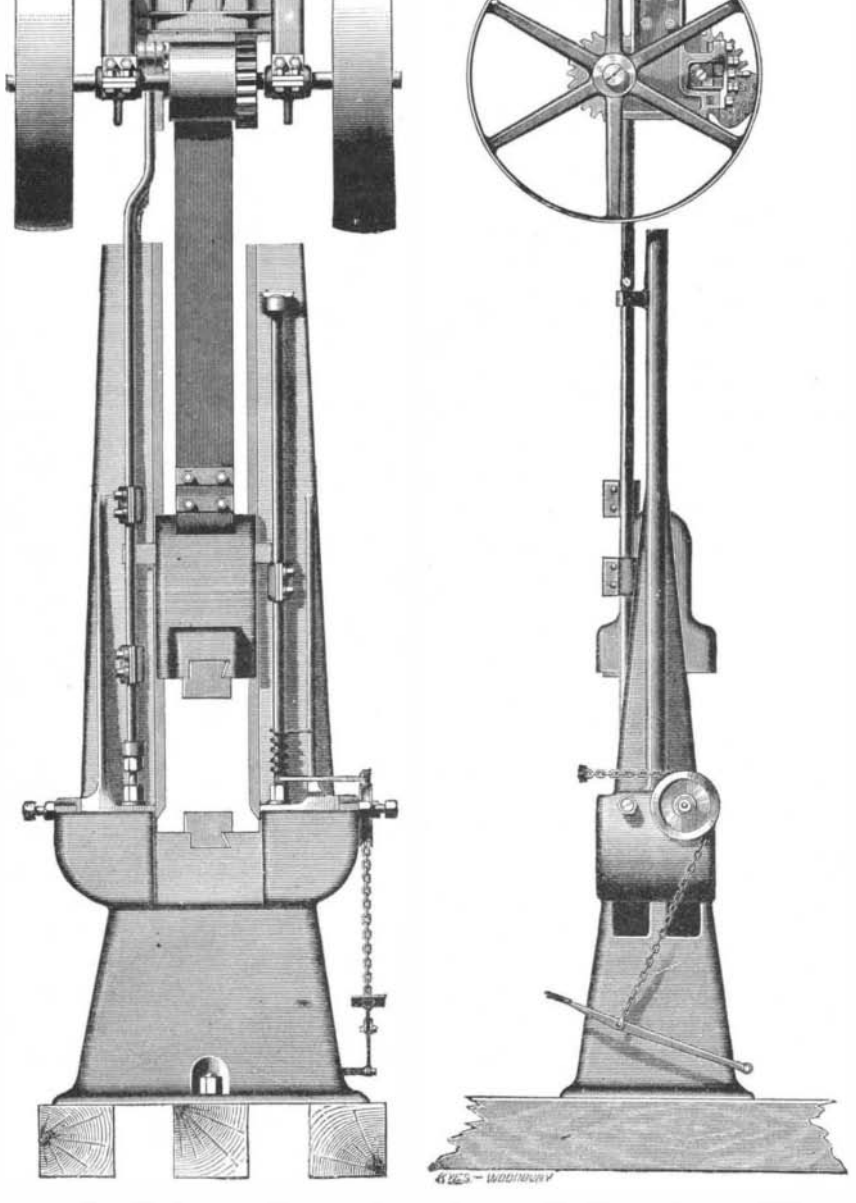
Concentrated hydrofluoric acid may cause serious inflammation and even ulcers, if left in contact with the skin for some time, so that care should be taken both in making and using the ink not to touch it to the fingers.

To make the etchings more distinct, and visible at a greater distance, it is frequently necessary with delicate lines, especially on graduated chemical ware, burettes, eudiometers, etc., to rub some red lead, soot, or clay over them. A small quantity adheres to the roughened surface, but it soon rubs off. The etchings made with this ink are so much rougher that if a strip of metal is rubbed over the lines some will adhere, and they acquire the color and luster of the metal. If a name is written on glass with this ink, and then the spot is rubbed with a thick brass wire, the name will appear in golden letters, and may be protected by a thin, colorless varnish. Lead may also be used, but for chemical apparatus, Dr. Muller employs platinum.
—*Neue Erfind. und Erfahrungen.*

THE REMINGTON DROP HAMMER.

The Remington drop hammer, the cut of which appears on this page, is of that class in which the hammer is raised by a stiff belt or board passing up between two friction rolls, and is so well known that we only describe the improvements.

These consist in the lifting arrangements being detached from the upright ways, and in such a manner that the lifter gets no jar from the hammer, as it does in other drops. The lifter is made of a peculiar style adapted to this class of machines, very strong in all its parts. The friction rolls running parallel with each other are keyed strongly on a three inch shaft, and run in fixed bearings. One of the shafts is turned on an eccentric, and on the end of this there is a shackle or adjustable lever, which is connected with a rod which runs down by the ways, and is connected with the base. On this rod are two clamps, which are easily adjustable, to vary the height of the hammer, in order to give a light or heavy blow. An automatic trip is connected with the catch bar in such a manner as to enable the operator to readily give any number of blows he may require, and at the same time have free use of his hands. The lifter can be used with any other drop. For further information address E. Remington & Sons, Ilion, N. Y.



REMINGTON DROP HAMMER WITH DETACHED LIFTER.

DURING the gales of the 26th and 27th of Jan., unprecedented wind pressures were experienced at the Forth Bridge works. Mr. Benjamin Baker reports that the strongest gusts gave a momentary pressure of 35¼ pounds per sq. ft. on a large board, 300 sq. ft. area, and no less than 65 pounds per sq. ft. on a small board, containing 1·5 sq ft.

IMPROVED STEAM ENGINE.

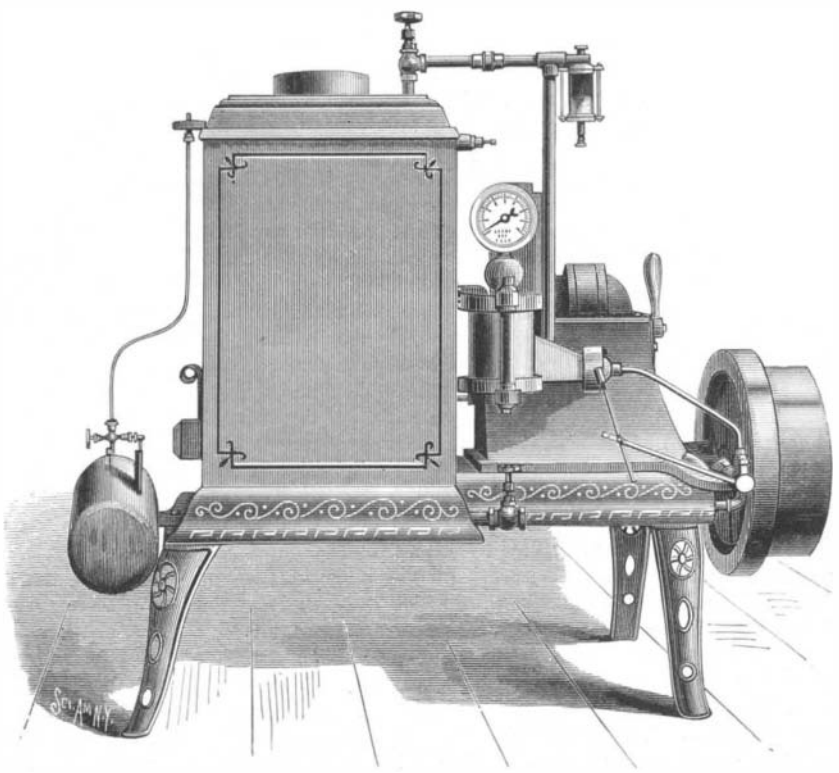
The annexed engraving shows a compact and light steam engine and boiler of simple construction, manufactured by Mr. A. H. Shipman, of Rochester, N. Y. The boiler is made from cast iron sections, having wrought iron tubes screwed into them, and bolted together. Radiation is prevented by double jackets of sheet iron having an air space between them. An intense blast of fire is formed by pressure of air or steam flowing through an atomizer which throws a fine spray of kerosene into a fire box in the boiler, the fire being so placed as to be completely surrounded by water. This plan insures the combustion of all the oil, does away with smoke stack, and utilizes the heating power of the fuel. A diaphragm controls the fire, so that an even pressure of any desired amount can be carried at all times. As the pressure in the boiler increases, the diaphragm closes, and the amount of steam admitted to the atomizer diminishes accordingly, thereby regulating the quantity of oil burned.

A lowering of the pressure produces a contrary effect, and the fire is increased. The tank of oil can be kept at any distance from the engine and brought to it by a pipe. An automatically regulated pump, with plunger connected direct to main shaft by an eccentric, keeps the boiler constantly supplied with the proper quantity of water. The engine is placed in close proximity to the boiler, so that loss resulting from the use of long connections is avoided.

The cylinder and its parts are inclosed in a steam tight box in which the steam exhausts. This keeps the cylinder hot, and insures the complete oiling of all the parts.

The engine has two cylinders, with steam chest between them, and two piston heads, one to each cylinder, connected with a small rod. The pistons are hollow, and as the movement is vertical there is no friction caused by their weight. The lower piston head is connected with the pitman, which is attached direct to the main shaft, no crosshead or slides being used. The valve is balanced. A governor acting direct upon the valve is applied to engines for stationary work.

The engine is especially designed for propelling small boats because of its small size, light weight, little attention required and the small amount of room needed for storing fuel; when it is to be used for this purpose it is made reversible. The engine shown in the cut is furnished with a balance and band wheel for stationary work.



SHIPMAN'S IMPROVED STEAM ENGINE.

Building up Milling Tools.

If a solid mill intended for dressing a width of six and sometimes eight inches is broken at any portion of its length, its usefulness will be impaired by so much as the break removes from the teeth their cutting surface. No remedy exists but annealing, turning down, recutting, and rehardening. Consequently, built up mills, are used for wide stretches, disks of three-quarters of an inch thickness, or less, being placed side by side on the same arbor and held by a set-up nut. If one of these breaks a tooth, it is a matter of slight consequence compared with the loss when a long mill breaks; the broken disk may be removed and a whole one substituted.

But these built up mills leave necessarily behind them narrow uncut ridges, showing where the disks met side by side, and thus making imperfect work. An ingenious device has remedied this defect and made the built up milling tool as perfect in the results of its work as the solid and expensive mill. The sides of the mill disks are cut into radial projections to the depth of the teeth, an alternate projection to an alternate depression—understood by recalling the old-fashioned shaft couplings cast with lugs on their engaging sides, so that they locked together. By this method of forming the mills any number may be placed on a spindle, or arbor, and interlocked, making a solid mill that will leave no circumferential tracks on its work.

This mill has another advantage. Inside the circumference of alternate projecting teeth is a turned and finished portion extending from the center hole out to the root of the teeth, forming the solid bearing of one disk against those next to it when they are assembled and set together with the common binding nut.

If two disks side by side make a cut exactly one and a half inches wide, which it is desirable to widen to one inch and nine-sixteenths, this may be done by introducing "skims" or washers of paper without impairing the face continuity of the built up mill.

How to Increase the Temperature of Furnaces.

There is one application of gas as a fuel which was discovered by Mr. Fletcher two years ago, but is not generally known. This is the addition of a very small quantity of coal gas or light petroleum vapors to the air supplied by a blower or chimney draught to furnaces burning coke or charcoal.

The instant and great rise in temperature in the furnace, and the great stability of the solid fuel used, are extraordinary.

This is in fact, a practical application of the well known flameless combustion, the only sign that the gas is being burnt being the great rise in temperature and a decreased consumption of solid fuel; indeed, solid fuel is not necessary.

To polish tarnished nickel, use chalk or rouge mixed with tallow.