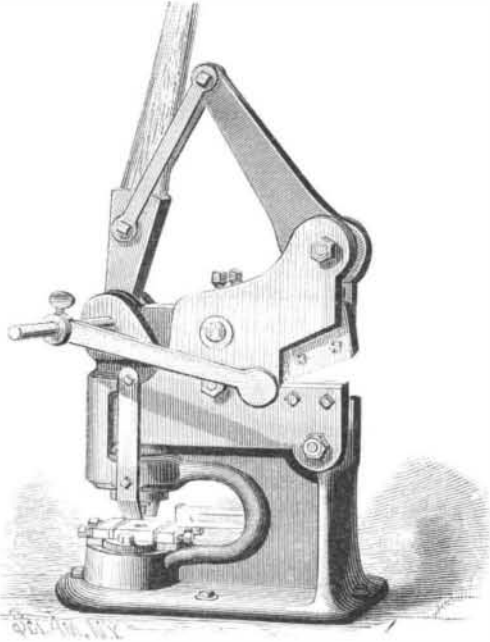


IMPROVED MECHANICAL MOVEMENT.

The engraving represents a novel arrangement of compound levers for operating combined shearing and punching or other similar devices, recently patented by Mr. Peter Broadbrooks, of Batavia, N. Y. On the strong vertical extension plate of the base is pivoted, near the end, a frame consisting of two plates; the working lever is pivoted at the opposite side and at about twice the height of the frame pivot. The two frame plates are placed on opposite sides of the upper edge of the vertical plate, above which is a lever formed of a wide plate, and pivoted to the frame plates about in the center of the machine; the



BROADBROOKS' IMPROVED MECHANICAL MOVEMENT.

other end of the plate lever is joined to the forward cam lever by a pair of links, by means of which the plate lever is raised by the cam lever. These links also control a friction roller fitted between the top of the plate lever and the cam lever. The plate lever has a slot in the end that is mounted on the fulcrum pivot, in which the end of the hand lever fits like a rule joint, to mount both levers on one pivot. The hand lever is connected to the free end of the cam lever by strap links, as plainly shown, in order to obtain a powerful effect on the plate lever, which, besides being forced down by the cam lever, is also depressed by the weight of the frame, which becomes a working arm for operating the sliding stock for the punch. The plate lever has a shear cutter attached to its end under the cam lever, and one of the frame plates is also provided with a cutter.

To make a simple and efficient round bar cutter there is inserted, in a hole through one of the frame plates, a cutter, and in a corresponding hole in the plate lever is placed a second cutter; these are arranged at such a distance above the central pivot as to permit them to pass each other by the movement of the lever. These cutters are made in the form of tubular dies, and are fitted in round holes in which they can be readily turned to shift the cutting points of the edges, thus enabling the dies to be used much longer without grinding than if they cut only at one place. A gauge bar

Fireproofing Process for Fabrics.

This process, due to Prof. Winckelmann, of Munich, consists in impregnating the materials with the following solution:

Protochloride of manganese.....	33 per cent.
Phosphoric acid.....	20 "
Boric acid or borax.....	10 "
Chloride of magnesium.....	12 "
Chloride of ammonium or sulphate of magnesia.....	25 "

The materials are immersed for six or eight hours in this solution at the temperature of ebullition. They quickly become impregnated with doublesalts, insoluble in water, and the incrustations that are formed effectually protect the materials treated against fire. When exposed to a quick fire, they carbonize, but produce no flame.—*Chronique Industrielle.*

IMPROVED MACHINE FOR TONGUING AND GROOVING BOARDS.

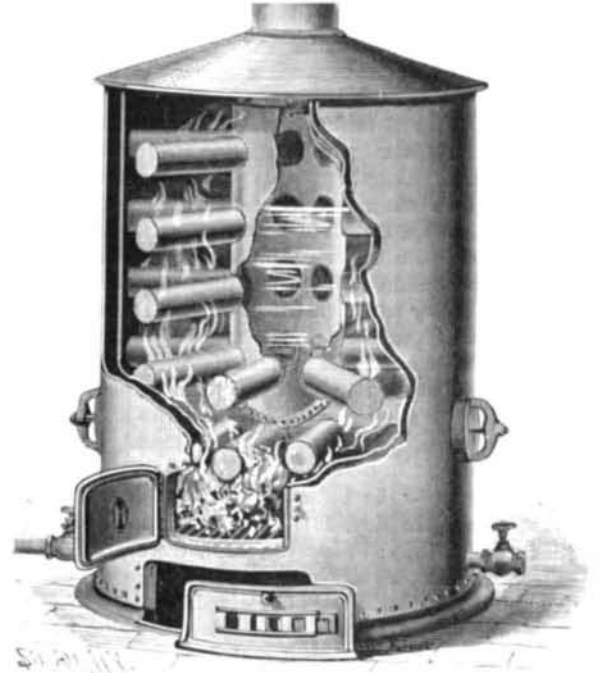
The accompanying engraving of the Tunis gang flooring machine illustrates a patented improvement for planing mills, when applied to the manufacture of flooring, ceiling, wainscoting, weather boarding, and other lumber to be tongued and grooved, when it is desired to work more than one piece at a single operation. The improvement consists of an attachment suitable for any four-sided planer, and may be readily distinguished in the illustration, at the right of and working with the planer. The board is fed in to the left, and after passing through the planer is separated into two, three, or more pieces of tongued and grooved flooring or ceiling, all at one operation, and without the use of a rip saw, which can be removed entirely from the mills. As will be seen, this improvement greatly increases the capacity of planing mills for all such work, but of greater consequence than this is the saving in lumber effected, for all the middle saw kerfs are saved, leaving but the outer edges to plane, and in separating the board there is no waste.

The machine will also, with equal facility, dress each strip into a different product, the lumber being made without feather edges, but with a beveled edge tongue that is more easily inserted, and is said to give great satisfaction to carpenters, who say the boards come up so well together as to make a floor thus laid look almost like one board. The saving is represented as follows: Taking a rough board 16 feet long and 12 inches wide, and by this machine three pieces of flooring can be cut therefrom, respectively $3\frac{1}{2}$, $3\frac{1}{2}$, and 4 inches wide on the face, which, rated according to certain trade rules, would measure 17 feet of dressed flooring, as against only about $15\frac{1}{2}$ feet to be obtained by the old process. As the mill is capable of making 30,000 feet of lumber daily, it will be seen that a saving of $1\frac{1}{2}$ feet on every 16 feet makes a large gain. A Baltimore lumber inspector testifies recently to having counted the working by the machine of 27,980 feet 44 yellow pine boards, in widths of $9\frac{1}{2}$ to $10\frac{1}{2}$ inches, standing by as it came through three pieces at a time, of 2 to $3\frac{1}{2}$ inch face, and making a net result of 30,181 feet, each piece being marked correctly in accordance with the general usage for marking.

Builders and owners of houses will do well to notice that users of this machine can furnish narrow strips for flooring cheaper than the wide ones, which contractors generally prefer, can be afforded under the old process. The narrow strips are not only handsomer, but of greater durability than wide ones, and show less shrinkage.

STEAM BOILER.

The illustration represents a boiler recently patented by Mr. S. P. Hedges of Greenport, N. Y., which may be used for house warming, agricultural purposes, pumping, etc., and which is safe and economical. An upright cylinder is provided with a number of projecting pipes, the outer ends of which are closed. The lower end of this cylinder is connected to a horizontal pipe, the ends of which extend out through the furnace wall. From the lower side of the end parts of this pipe extend tubes down at the opposite sides of the fire box, and provided with valve couplings

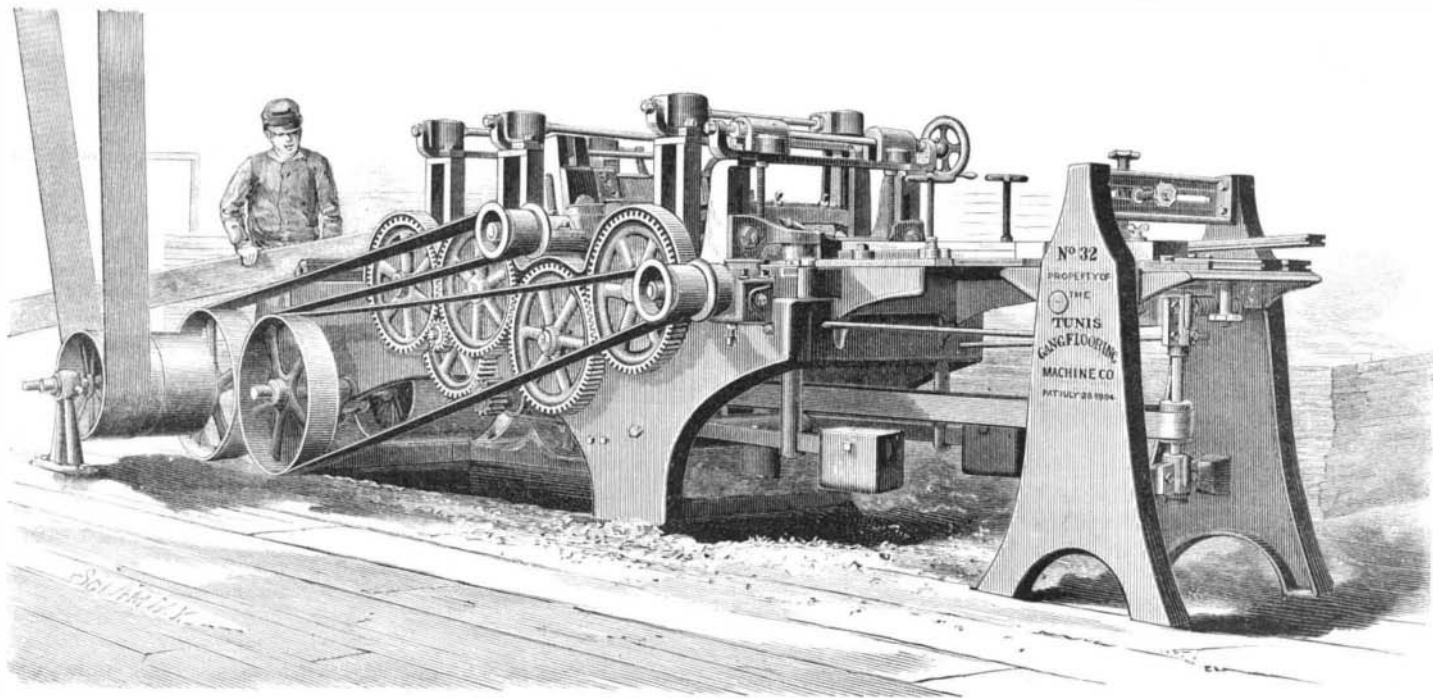


HEDGES STEAM BOILER.

with one of which the feed pipe is connected, while the other serves as a blow off for the removal of sediment. The casing can be made of two iron shells placed a little distance apart as shown in the engraving, or of brickwork, as may be most convenient.

Within the pipes projecting from the cylinder are placed smaller pipes of such a length as to project beyond the inner ends of the pipes in which they rest. These pipes are centered, and supported by pins projecting from their opposite sides and resting against the inner surfaces of the large pipes. The upper parts of the inner ends are cut away to form cups or spouts to receive the descending water through the middle part of the cylinder, and cause it to flow through the pipes to the inner ends of, and out through, the large pipes. The opposite sides of the horizontal pipe are furnished with projecting pipes having interior circulation pipes. Manholes are formed at the ends of the cylinders to give access to the interior for convenience in cleaning. The steam pipe is connected with the upper part of the vertical cylinder. With this construction the entire outer surface of the cylinders and pipes is exposed to the fire, and a thorough and continuous circulation of the water is established.

DURING the next year three comets of short period will return to perihelion. Encke's comet is due in March, pro-



TUNIS' IMPROVED MACHINE FOR TONGUING AND GROOVING BOARDS.

mounted on an extension of the pivot bolt may be set for the lengths to be cut off the rod. The construction of the punch is so clearly shown in the engraving as to need no detailed description.

M. C. BARTHELEMY (*Comptes Rendus*), having placed a number of hyacinths in glasses in a circle around the pipe of a stove, found that the roots took an almost horizontal direction toward the pipe, as a common center of attraction.

The company do not sell the machine, but collect pay therefor by royalty. They agree to put the attachment on a planing mill free of cost, and after it is run for a week will remove it if not satisfactory. If it is satisfactory, the charges thereafter to be 25 cents per 1,000 feet of lumber worked.

This invention was patented by Mr. H. C. Tunis, but the corporation of the Tunis Gang Flooring Machine Co., of No. 6 South Street, Baltimore, has purchased the rights for the United States and Canada.

bably in the first or second week, according to the elements of 1881. The next is Tempel's comet, 1867 II., in the case of which it is not possible to assign the time of perihelion passage without the calculation of the perturbations due to the attraction of Jupiter, near which planet the comet was situated during the last half of the year 1881; the least distance of the two bodies having been about 0.57 in October. The third comet referred to is Tuttle's, last observed in 1871, the perihelion passage probably in September or October.