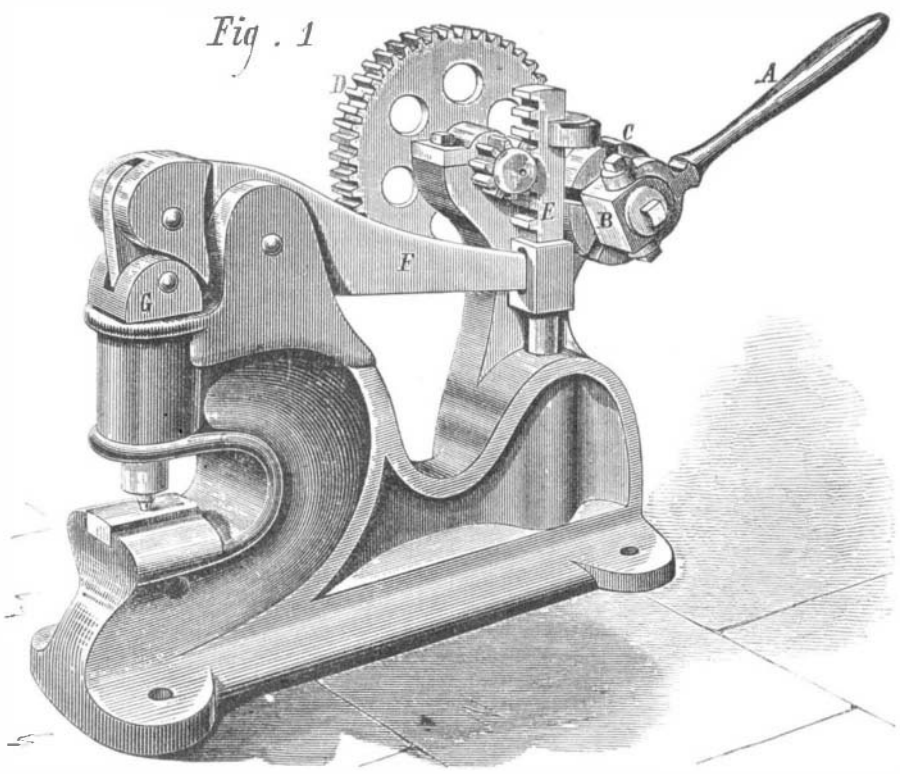
IMPROVED PUNCH AND SCREWDRIVER.

The invention which our engravings illustrate furnishes a method of applying power to two useful implements, so as to gain a strong purchase through the interposition of simple and effective mechanical contrivances.

Fig. 1 is a punch, such as may be used for piercing boiler plates or other metal. The construction is such that no long lever is required, and hence room is greatly economized; while the mechanism by which several movements of the short hand lever are transmitted to produce a very short motion of the punch, and to develop in the latter a strong power, is quite simple and readily understood. The hand lever, A, is provided with jaws which are pivoted to a block, B, which turns loosely and is secured by a nut on a horizontal shaft. Upon the latter is fastened a disk, C, the face of which is notched as shown. Upon the under side of the lever, A, and just at the throat of the jaw, is a projection which fits into any of the grooves on the disk, C. The shaft of the latter is journaled in the frame and carries on its other end a pinion. This is not shown in Fig. 1, but its position is such that its teeth engage with the gear wheel, D. This wheel is also journaled in the frame, and on the further end of its shaft carries a pinion, which, as clearly shown in the engraving, engages with the teeth of a vertical rack, E. The lower and plain portion of the latter enters a hole in the frame, so that by this means, together with a suitable guide grasping the rack above, the rack is kept perpendicular. Just below the toothed portion of the rack is a slotted enlargement of the same, through which passes loosely the diminished end of the punch lever, F. This is pivoted to the frame, and connects, in the simple manner depicted, with the punch bar, G.

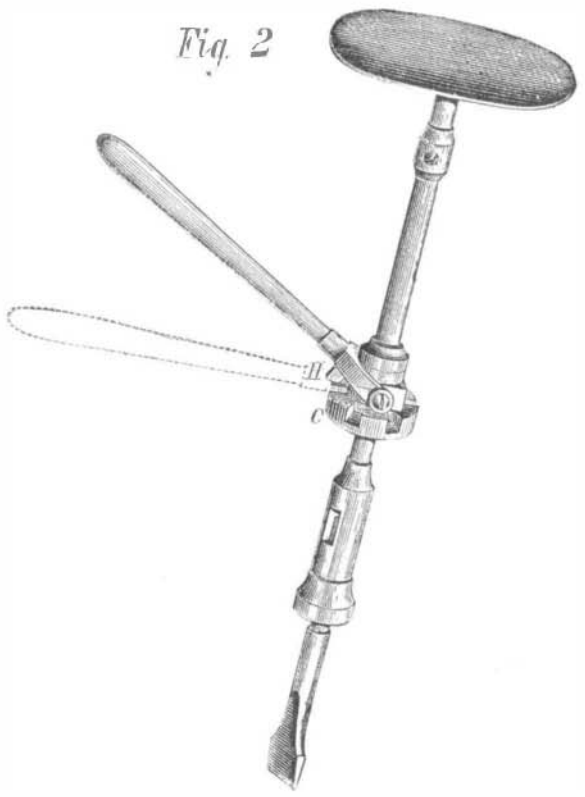
Fig. 1



LYONS' IMPROVED PUNCH AND SCREWDRIVER.

The operation consists in lifting the lever, A, and causing its projection to engage in the highest notch on the disk, C. The lever is then pressed down, turning the disk until the former strikes the floor. Then the projection is removed from the notch, the lever again raised, and a new hold taken, repeating the process, which, in fact, is precisely the same as that adopted in moving a heavy weight with a crowbar. The workman lifts the load as far as possible with the latter, then blocks it in position, and shifts his bar for a new purchase, and so on until the labor is accomplished. By means of a crank to be placed upon the shaft of the disk, D (not shown in our engraving), the punch, after descending, may be raised very quickly. This avoids the delay of engaging the lever projection in the successive notches of the

Fig. 2



disk, and of turning the arm in the opposite direction from before.

We need not enter into any details of the inter-relation of the wheel, pinions, and levers, to show that an immense power may thus be applied piecemeal toward forcing down the punch; nor is it perhaps necessary to add that this machine, as is the case with many others which have appeared in our columns, is an ingenious plan for utilizing hand power where other motors do not exist or where their application would be inconvenient.

Passing to our second illustration, we have another adaptation of the device, to a screwdriver. Further description of the mechanism is not needed; so that in that connection it remains but to say that the dotted lines indicate the position of the lever when its projection, H, is engaged with a notch in the disk, and that the block to which the jaws are attached necessarily works loose on the shaft. The invention, as shown, is a convenient substitute for the unhandy combination of screwdriver and tongs commonly employed. The leverage is straight and applied at the best advantage. The instrument may be employed for cutting tapsin corners, and it is constructed to hold screwdrivers of any proper form. It will, we think, prove of especial handiness in operating upon screws in positions difficult to reach by the ordinary tool.

For further particulars regarding sale of rights, in both inventions, etc., address Mr. Warren Lyon, Mamaroneck, Westchester county, N. Y. The tools will be manufactured by the Biddle Machine and Tool Company, of 164 West 27th street, New York city, at which establishment they will shortly be ready for examination.

The St. Gothard Tunnel.

In reply, no doubt, to rumors, circulated from French sources, that the St. Gothard tunnel was to be abandoned as a failure, its progress being so slow as not to promise its completion for twenty years, the Swiss Federal Government is now making public, after proper verification of their correctness, the monthly reports received by it of the state of the works. The report for March shows that the rate of advance of the boring for the month was as nearly as possible 500 feet linear, the proportion on the Swiss side being greater than that made from Airolo by nearly a third. The total length gained since the first trials were made sixteen months ago is an actual advance of seven eighths of a mile, of which very nearly 1,200 yards are cleared out to the complete section of the tunnel. The number of workmen now employed on an average daily is 1,380; but this appears to include the labor in extensive workshops outside each of the two openings. The boring from the Swiss end continues to be entirely through solid gneiss rock. The temperature is found remarkably equable within the tunnel, varying little during the month from 70°, while outside the average was 41°. At the southern end the mica schist, through which the boring has been carried, has ceased to contain quartz, and has become of a much softer and looser character as the work advances. The reports as to the leakage of springs into the tunnel are decisively contradicted in this report, according to which the quantity of water entering in March was perfectly insignificant. It is also announced that so far from the Belgian boring machines of Dubois and François having been given up as a failure, they are working on with the greatest success.—*Pall Mall Gazette.*

Painting Magic Lantern Slides.

The following are the methods employed by the artists whose profession is the painting of magic lantern slides:

1. Use transparent colors, like Prussian blue, gamboge, and carmine. These will give the three primary colors, and by their mixture the other tints. Apply with a brush, and a transparent drying varnish, like dammar varnish. Allow one coat to dry before applying a second. Considerable aid can be derived from stippling, the color being strengthened, where necessary, by applying it with the point of a fine brush. The colors must not be used too thin.

2. Flow the glass plate with albumen, after the manner of photographers, and paint with aniline colors. This process gives great softness and brilliancy to the pictures, but they are apt to fade.

3. Paint with water colors and then flow the entire surface with Canada balsam, covering the painted side with a glass plate.

4. Use water colors, but mix them with turpentine, instead of water, and work rapidly.

The Sphygmograph in Bright's Disease.

The investigations of Mr. Mahomed, of the fever hospital, Madras, tend to show that in the form of Bright's disease which follows scarlet fever, there is an early stage, the first indication of which is usually a pulse exhibiting high tension, though this may be preceded by dry skin and confined bowels. Next comes, as first in the order of changes in the kidney, a urine which contains no albumen recognizable by the ordinary tests, but some blood stuff, which yields the blue reaction with ozonic ether and tincture of guaiacum. If matters still go on, this is followed by the ordinary serum albumen, and when that is abundant no blue reaction can be obtained. Moreover, Mr. Mahomed says that he has only been able to get this blue reaction when the tension is arterial, not when it is purely venous.

Fuel in Furnaces.

M. Foucault, in a report to the Industrial Society at Rheims, combats the idea that the smokelessness of a fire can effect a notable saving in the amount of fuel burnt. He alleges also, on the other hand, that a considerable loss of economy is produced by smoke-consuming apparatus. He brings in support of his opinion the long series of observations made by the Industrial Society of Mulhouse, which have proved that, with the ordinary boiler furnaces, it is only necessary to consume from 125 to 150 cubic feet of air for each pound of coal, while for the most part furnaces pass twice that quantity. If the draft be reduced in quantity much smoke is evolved, but the products of combustion, circulating more slowly, part with their heat more readily to the boiler flues. It is further proved that the best means of reducing the loss of heat by the chimney is by the use of feed heaters in the flue, so as finally to reduce to 200° the products of combustion, which are often discharged as hot as 400°. Feed water heaters, well set, will produce an economy of from eleven to twenty per cent with a reduced draft.

The conclusion is that furnaces with large area and suitable feed heaters are the most economical in all respects. But in order to obtain the best results, much care is needed in stoking. A little at a time and often, should the coal be spread over the front of the fire, and the bright coal pushed back to the bridge. At the same time, the least possible quantity of cold air should be admitted.

IMPROVED HAMMER.

In drawing old or poorly made nails with the claw end of a hammer, it is a common annoyance for the heads of the former to be pulled off, causing considerable difficulty in extracting the remaining portion. Mr. Candidus Bilharz, of Pittsylvania Court House, Va., has recently devised an ingenious arrangement which, in connection with the ordinary hammer, is stated to obviate the trouble. The tool is represented in the annexed engraving, and the portion above referred to is shown in section in Fig. 2. At the base of the claws is an orifice, A, in which, by a pivot pin, an eccentric jaw, B, is attached. This jaw works in connection with the forward end of the orifice, and is pressed toward that end by a spring, C. Its face is notched or serrated to prevent slipping from the nail.

When the pull on the claw tears off the head, the end of the nail is made to enter the orifice, A, between the serrated side of the jaw and the body of the hammer, and, becoming thus tightly held, is drawn in the usual manner. The improvement will gripe and hold anything that can be introduced, and hence may be applied to other uses than simply extracting nails.

Fig. 1

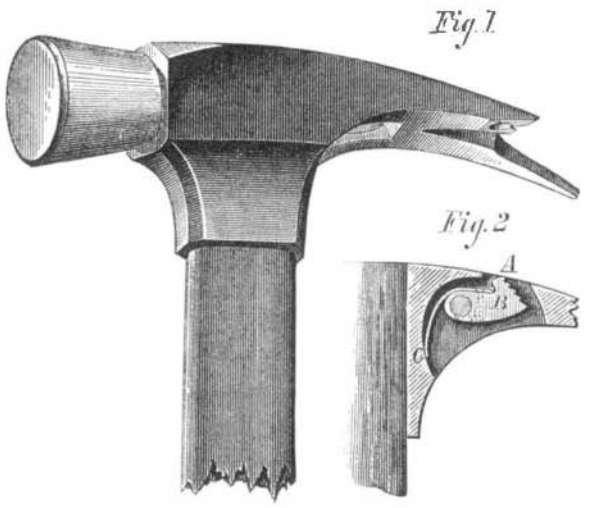


Fig. 2

The claw end of the hammer (Fig. 1), it will be noticed, is provided with one long and one short claw. At the extremity of the former is made a point in order to enable the operator to punch a hole in the wood in which the nail will stick without holding previous to driving. The short claw is suitably formed on its end for driving tacks.

This invention was patented through the Scientific American Patent Agency, April 21, 1874. Further particulars, as to sale of patent or rights to manufacture, may be obtained by addressing the inventor as above.

DYEING WITH MAHOGANY SAWDUST.—A Mr. C. Dreyfuss a correspondent of the *Farber Zeitung* residing in England, has patented mahogany sawdust as a ware for dyeing and printing browns on cotton. He mordants with tin, and uses a little lime and glue in the dye beck.