Sheet 1, 2 Sheets.

J. Jervis.

File-Cutting Machine.

No. 44,633. Patented Oct. 11, 1864.

Fig. 2.

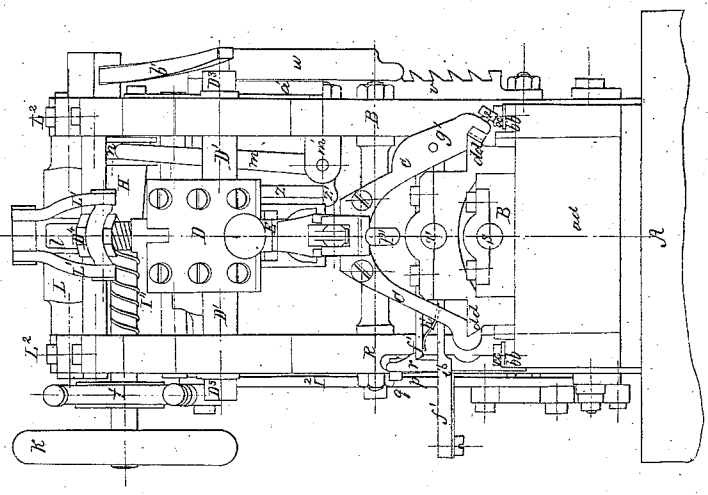


Fig. 1.

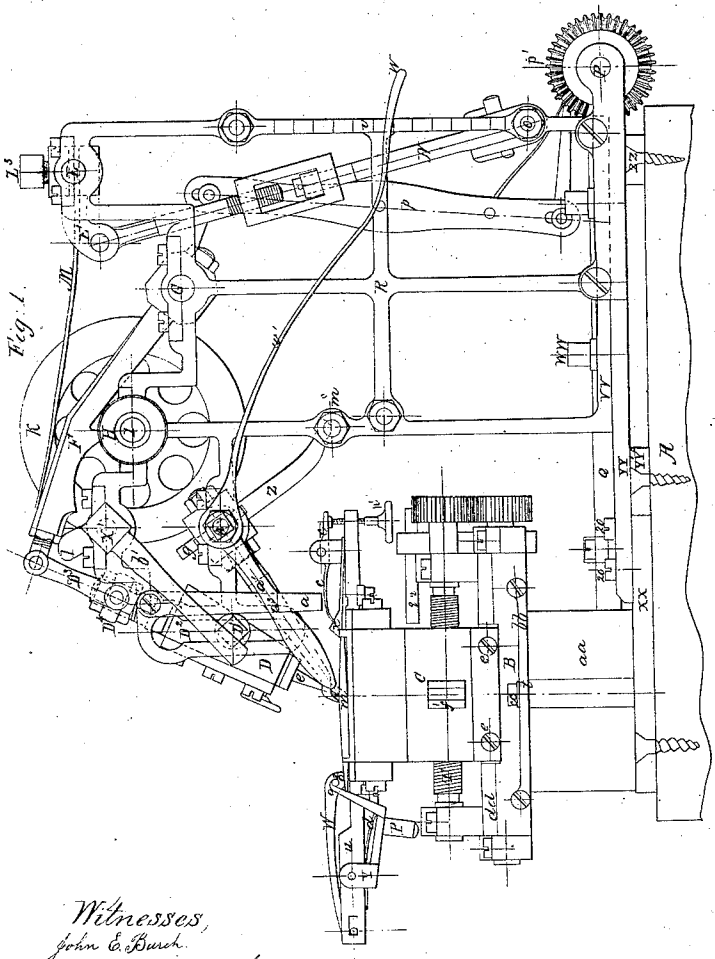
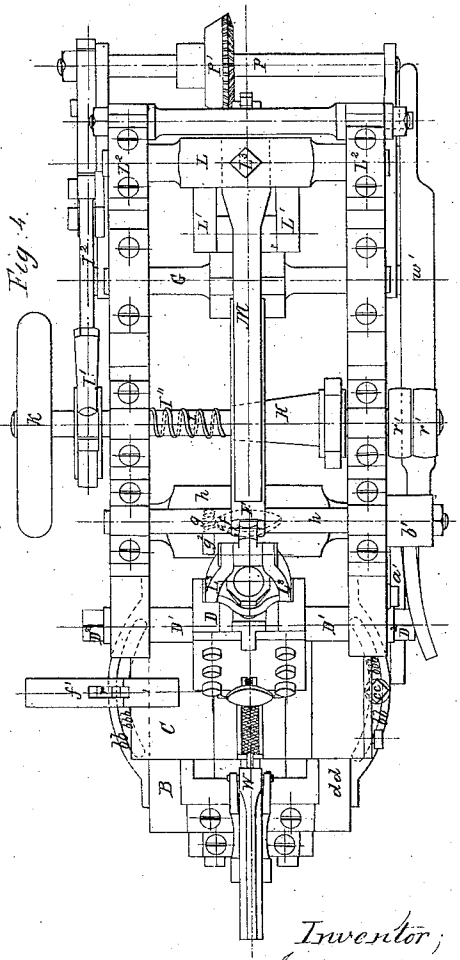


Fig. 4.



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Sheet 2, 2 Sheets.

File-Cutting Machine.

No. 44,633. Patented Oct. 11, 1864.

Fig: 3.

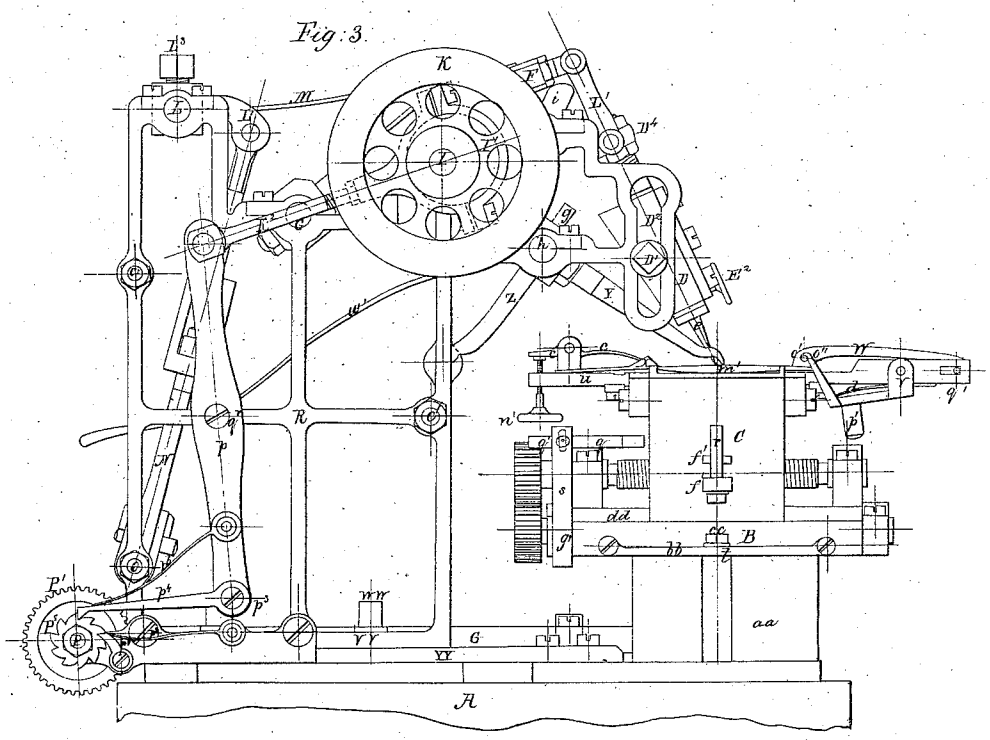
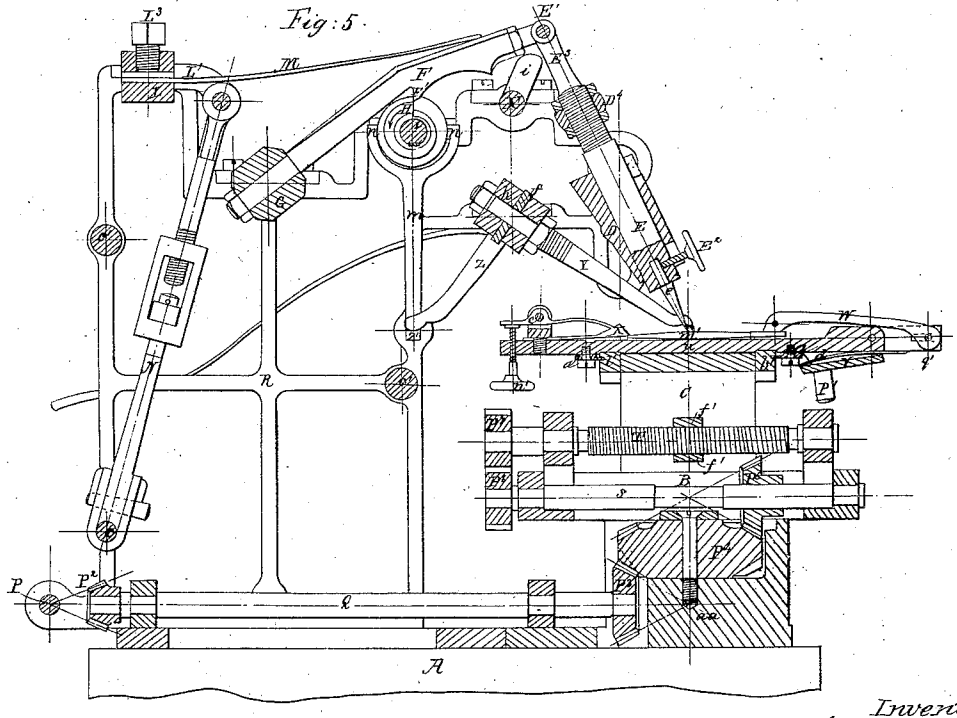


Fig: 5.



Witnesses;
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UNITED STATES PATENT OFFICE.

JAMES JERVIS, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN MACHINES FOR CUTTING FILES.

Specification forming part of Letters Patent No. **44,633**, dated October 11, 1864.

To all whom it may concern:

Be it known that I, JAMES JERVIS, of the city of Baltimore, in the State of Maryland, have invented a new and useful Improvement in Machines for Cutting Files; and I hereby declare that the following specification contains a full, clear, and exact description of the same and of the operation thereof.

There have been many attempts, more or less successful, to cut files by machinery. Where files are cut by hand, the skill of the workman regulates the force of the blow of the chisel according to the width of the surface, while the bed on which the file rests is easily adjusted, so as to afford a firm and equal resistance to the successive strokes of the hammer.

Files generally are either flat, round, half-round, or triangular, and have a taper both in their breadth and thickness. Whatever the width of the file the depth of each cut must be the same; and where files are cut by machinery the intelligence of the workman, which secures this uniformity where files are cut by hand, must be supplied by mechanical contrivances, and the great merit of my invention consists in the mode by which I make the form of the file itself regulate the force of the blow with unerring accuracy, while at the same time the solidity of the file for each successive stroke is secured. However complicated the machinery may be there are but two results to be produced by it. The first is the steadiness of the file when the cut is made, and the second the force of the blow upon it to make the cut.

I shall pursue the natural division in my description and describe, first, the anvil and its appurtenances; and, second, the machinery giving and regulating the cut.

In the accompanying drawings, Figures 1 and 3 are side views of the opposite sides of the machine. Fig. 2 is an end view looking toward the cutter. Fig. 4 is a plan, and Fig. 5 a section, of the machine.

The same letters indicate the same parts in all the figures.

The anvil.—The anvil consists of three principal parts, the base, the rest, the anvil proper.

The base *a a*, Figs. 1, 2, 3, and 5, is a cylinder of adequate strength hollowed and open on one side to admit the gearing through which motion is communicated to the anvil proper. This gearing is shown in Fig. 5.

The rest B, Figs. 1, 2, 3, 4, and 5, is a quadrangular frame revolving horizontally and concentrically on the base *a a*, which supports it, and is provided with two projecting disks, *b b*, Figs. 1, 2, 3, and 4, with slots *b b b*, Fig. 4, forming arcs of circles, which receive bolts *c c*, Figs. 1, 2, 3, and 4, attached to the base, and the tightening of which fixes the rest in any required position. These slots guide the rest in its horizontal revolution, and their length determines its extent. The rest carries two shafts, T and S, Figs. 2 and 5, upon the upper of which is an endless screw, which gives motion, as presently described, to the anvil proper.

The anvil proper, C, Figs. 1, 2, 3, 4, and 5, is of a saddle shape in section, as shown in Fig. 2, so as to admit under it the shafts T and S, and is connected with the rest at the slides *d d*, Figs. 1, 2, 3, and 4 on the sides thereof, after the manner of a dovetail, as shown at Fig. 2. Set screws *e e*, Figs. 1 and 2, furnish the means of adjusting the anvil proper on the slides of the rest.

As the file is being cut it is necessary that it should advance the width of the space between the teeth between each successive cut. This is effected through the endless screw above mentioned. Above and below this, and pivoted at *g'*, Fig. 2, on one side of the anvil proper, are two clasps, *f' f'*, Fig. 2, one above and one below, each having cut on it a corresponding portion of a female screw. These clasps are kept apart and free from contact with the male screw when not in use by the spring *h'*, Fig. 2, but capable of being clasped on the male screw by the catch *r*, Fig. 2, pivoted on the lower clasp at *i'*, Fig. 2. When the clasps are clasped on the male screw, they move as it turns, carrying the anvil proper with them until the catch *r*, Figs. 2 and 3, comes in contact with and is thrown back by the hook *q*, Fig. 3, attached by the set-screw *q'*, Fig. 3, to the arm *s*, which is fastened to the base at *s'*, Fig. 3. The clasps are then thrown apart by the spring *h'*, Fig. 2, and the motion of the anvil proper ceases.

Having thus described the anvil, I will now describe the manner in which the blank or shape which is to be made a file is fastened to it.

On the top and lengthwise of the anvil is a groove with a semicircular section, into which fits a bed-piece, *u*, Figs. 1, 3, and 5, projecting beyond the anvil proper, and confined in its place by pins *l' l'*, Fig. 5, fitting in circular grooves in the ends of the anvil proper, allowing the bed-piece a slight rotation at right angles to its length. On this bed-piece *u* rests the file *m*, Figs. 1, 3, 4, and 5, upon a thin sheet of lead, confined at each end by catches *w* and *x*, Figs. 1, 3, and 5, which are kept in place by springs *c* and *d*, Figs. 1, 3, and 5, the pressure of *c* being regulated by the set-screw *n'* upon the end of the bed-piece. The spring *d* operates upon a bent lever, V, Fig. 3, pivoted at one end of the bed-piece, as shown in Fig. 3, at one end of which lever is the hook *o'*, passing over the pin o^2 on the catch W, which catch, when relieved from the hook *o'* by pressing forward the knob *p'*, Figs. 1, 2, 3, and 5, may be slid back on the slot shown at *q'*, Figs. 1, 3, and 5, so as to permit the introduction of the tang of the file, when the catch W is pushed forward and the hook *o'*, being brought upon the pin o^2, the shape is confined on the bed-piece by the catches W and X. The pressure of the spring *c* should be so regulated by the set-screw *n'* that the shape should touch the bed-piece about the center of the former at *m'*.

Having thus shown how the shape is fixed upon the anvil, how it has a rotation vertically, and a lateral rotation, to regulate the angle of the teeth with the axis of the file, I will now describe how the cut is given, so that it shall be of the same depth whatever the breadth of the file at the time.

To support the chisel and appurtenances, I construct a frame, R R R, Figs. 1, 2, 3, and 5, as shown in the drawings, firmly attached to the foundation A, and connected with the base of the anvil, so as to form a compact whole. Across this frame a principal or main shaft, I, Figs. 1, 2, 3, 4, and 5, receives the moving power at the pulleys *r' r'*, Fig. 4, on one end, while the other end carries a balance-wheel, K, Figs. 1, 2, 3, and 4. On the balance-wheel side of the shaft I is an eccentric, I', Fig. 3, whose rod I^2 connects with a lever-beam, *p*, pivoted at p^2, whose opposite end, p^3, carries a pawl, p^4, which, pressed down by the spring p^6, catches upon a ratchet-wheel, p^5, which is attached to the shaft P, Figs. 1, 3, 4, and 5, which carries a beveled spur-wheel, P', which engages the pinion-wheel P^2 on the shaft Q, Fig. 5, whose opposite end carries a beveled wheel, P^3, Fig. 5, which engages the beveled wheel P^4 in the base of the anvil, which in its turn engages the beveled wheel P^5 on the shaft S, at whose extremity is the spur-wheel P^6, which engages the pinion-wheel P^7 on the shaft T, on which is the endless screw, which in this way receives its motion from the main or driving shaft of the machine, the space between the teeth being determined by the size of the teeth on the ratchet-wheel. To vary this space, the ratchet-wheel must be changed to insure accuracy in the action of the pawl p^4 on the ratchet-wheel P^5. I employ a check-pawl and spring, (shown at P^7 and p^8, Fig. 3.) The chisel shaft G, Figs. 1, 3, 4, and 5, is supported on the frame in suitable boxes and carries the chisel-beam F, at the other end of which the chisel-bar E, Fig. 5, is connected by the rods E^3 at E', Figs. 1, 2, 3, 4, and 5. The chisel itself, *e*, is inserted in the lower end of the chisel bar and retained by the set-screw E^2.

To steady the chisel and give direction, accuracy, and firmness to its cut, it passes through the guide-block D, Figs. 1, 2, 3, 4, and 5, which is supported by the arms D', Figs. 1, 2, 3, and 4, moving in the vertical slots D^2, Figs. 1 and 3, and permitting it to be raised or lowered, as required by the thickness of the shape. The arms are confined in their required position in the slots by suitable set-screws.

The blow of the chisel proceeds from the main spring M, Figs. 1, 3, 4, and 5, one end of which rests on the chisel-beam and the other is confined by the set-screw L^3, Figs. 1 and 5, on the shaft L, supported on the frame at L^2, Figs. 2 and 4.

To regulate the pressure of the spring on the chisel-beam, strong arms, L', Figs. 1, 2, 3, 4, and 5, project from the shaft L toward the anvil. These connect with the rod N, whose opposite end is attached to a shaft, O, Figs. 1 and 5. On the rod N is a swivel screw for lengthening or shortening it, so as to increase or diminish the pressure of the spring on the chisel-beam, as shown in the drawings.

To make the main spring effective to produce the cut, I use a tapering cam, H, Figs, 1, 2, 3, 4, and 5, sliding to and fro on the main shaft I, but which is kept in its normal position at one end of the shaft by the spring I', Fig. 4. The shape of this cam is shown in the drawings at H I, Fig. 5, where the projection *a* on the lower side of the chisel-beam is represented on the point of the cam at the instant when the latter, moving in the direction of the arrow, releases the beam, which is forced down suddenly by the main spring M causing the chisel to make its cut.

To throw the chisel out of gear, I use a cam, *l*, on a shaft, X', Figs. 1 and 5, to which shaft is a lever, *b'*, Figs. 1 and 2. Raising this arm the cam *l* is brought under the chisel-beam, and holds it up out of reach of the cam.

In cutting a file it is necessary to vary the angle at which the chisel strikes the shape according to the description of file wanted. I accomplish this by changing the angle of the block D in the slots D^2, tightening it in the required position by the set-screw D^3, Fig. 2. The lengthening or shortening of the chisel-bar consequent upon the change in the angle is effected by the screws D^4, Figs. 1, 2, 3, and 5, in a way well known to mechanics.

In adjusting the parts of the machine in proper relations to each other, the middle of the edge of the chisel ought to be on the cen-

ter of the base of the anvil to insure a proper firmness and resistance. If the chisel has this relation, and it is desired to make the chisel strike the shape at a more acute angle, and the position of the block D is changed accordingly, the effect will be to advance the edge of the chisel, when the middle of its edge will cease to be on the center of the base, and the machine will be ill-adjusted to that extent. To obviate this difficulty and to secure at all times a proper adjustment, it is necessary to cause the chisel-frame to advance toward or to recede from the anvil, which I accomplish in the following manner:

By referring to the drawings, Figs. 1 and 3, it will be observed that the lower member, *v v*, of the chisel-frame R is attached to the anvil frame through the bars Y Y, which are bolted to the anvil-frame by the bolts 20 20, and that the chisel-frame can accordingly be slid along the bar Y, to which it is secured by the bolts W W, which pass through oblong holes in V V. When, therefore, by increasing the angle of the chisel, it becomes necessary to move it back, that the middle of its edge may be on the center of the base of the anvil, the bolts *w w* are loosened and the chisel-frame pushed back the proper distance, the bolts are tightened, and the bevel-wheel P^2 is set back on its shaft, so as to engage properly with P′.

I now proceed to describe the manner by which I make the shape regulate the force of the cut, so that the cuts shall be of the same depth whatever the width of the file.

The regulator Y is an arm inserted in the shaft *h*, Figs. 1, 3, and 5, suitably strengthened to receive it, as shown at *h* and *f*, Fig. 5. One end of the regulator, which is bent there with an opening for the chisel to pass through, rests when the machine is in motion on the shape.

m z′, Fig. 2, is a bent lever pivoted at *m′*, the upper arm of which is connected with a concentric on the cam-shaft I, Fig. 5, as shown at *n n*, Fig. 5, while the lower arm, *z′*, is in contact with an arm, *z*, projecting at right angles from the shaft *h*, Figs. 1, 3, and 5.

If the regulator Y is raised in the direction of the dotted arc, Fig. 5, the arm *z′* is depressed, both Y and *z* being attached to the shaft *h*. *z′* being depressed, the other arm of the bent lever *z′ m* is moved in the direction of the dotted arc at *n*, Fig. 2, and the conical cam on the main shaft is carried in the same direction against the resistance of the spiral spring I′, Fig. 4. Now, the lip of the regulator Y, resting on the shape, as this last increases in thickness the lip is raised and the conical cam is moved along the main shaft, bringing a larger diameter under the chisel-beam, raising this higher in proportion, and so increasing the action of the main spring and the force of the blow of the chisel on the shape, and the thickness of the shape being always in proportion to its breadth, the broadest part of it receives the heaviest blow, which is the result aimed at. But the regulator has another important function. It secures a perfect resistance to every stroke of the chisel. As we have already seen, the bed-piece *u*, Fig. 5, on which the shape is placed to be cut, is flat in both directions while the face of the shape is rounding, as shown at *m′*, Fig. 5; and we have seen, too, that the surfaces of the bed-piece and shape are in contact at *m′*, Fig. 5, being kept so when the shape is first laid on the bed-piece by the springs already described. To keep the part of the shape about to receive the blow of the chisel in contact with the bed-piece, so as to secure a solid resistance to the blow, I use the spring *w*, Fig. 1, attached at one end to a prolongation beyond the frame of the shaft *h*, Fig. 1, and at the other end catching in the ratchet V, Fig. 2. Raising the spring *w* on the teeth of the ratchet the lip of the regulator is pressed on the shape and adds its force to the spring nearest the end at which the cut is being made to keep the shape at that point firmly pressed upon the anvil.

A lever attached to the projecting end of the regulator-shaft enables the workman to raise the regulator from the shape, the lever being held up by the catch *a*, pivoted at a^3, Fig. 1, where the lever is represented at *a′*.

It will be seen that the edge of the chisel and the edge of the regulator are to be kept parallel to each other; but as the chisel may not always be ground at right angles to its axis, but the edge of it may be ground at an angle, it becomes necessary to make an arrangement by which, notwithstanding, the necessary parallelism may be preserved between the edge of the chisel and the lip of the regulator. For this purpose the regulator has on it a wheel partially cogged, *f*, inserted in the shaft *h*, Fig. 5. These cogs engage with the teeth of an endless screw on the bolt *g′*, Fig. 1, the head of which, g^2, is square, to be worked by a wrench when necessary. By turning the endless screw the cogs on the wheel on the regulator cause the latter to revolve, and the edge of the regulator is made parallel with the chisel.

The process of working the machine here described is as follows: The workman, seated in front of it, takes a shape and places it under the catch X. Then letting fall the catch W on the tang end and putting the pin *o′* over the pin o^2, Fig. 1, and adjusting the rest on the base of the anvil, so as to give the proper angle (having regard to the axis of the file) to the cut, he loosens the clasps *f′ f′* and moves the anvil proper back on the slides, so as to bring the shape under the chisel where the teeth are to commence. The regulator and the chisel are now both let down upon the shape. The clasps *f′ f′* are brought together under the catch *r*, so as to clasp the endless screw, and the power is applied, when the different parts of the machine operate as already described, the pile continuing to be advanced until the catch *r*, being thrown off by coming in contact with the hook *q*, the endless screw is unclasped. The workman at

this time throws up the lever, which raises the chisel and regulator, the pile is taken out, and a fresh shape is put on the anvil proper.

What I claim as new, and desire to secure by Letters Patent in the above-described machine, is—

1. The combination of the regulator Y with the movable conical cam, whereby the thickness of the shape is made to regulate the force of the blow of the chisel.

2. The combination of the regulator aforesaid with the levers, through the action of which, as described in the specifications, the thickness of the shape is made to impart a lateral movement to the conical cam.

3. The arrangement of the devices whereby the shape is kept upon the anvil, as described, and the regulator is made to impart a longitudinal rocking motion to the shape as it is moved forward under the chisel, so as to secure a perfect resistance to the blow of the latter, notwithstanding the swell of the shape and the flatness of the anvil.

4. The combination of the saddle-shaped anvil proper, permitting the screw moving it to be placed beneath it, with the rest on which it slides, another clasp, *f f*, on the endless screw T.

5. The combination of the endless screw on bolt *g*, Fig. 4, and cog-wheel *f*, with the regulator, whereby the parallelism of the latter with the edge of the chisel may at all times be secured.

6. The combination of the chisel with the adjustable block D, arranged as described, whereby the tooth of the file may be cut sharper or blunter, as required.

7. The arrangement of the chisel-frame with the anvil-frame in the manner herein described, by which their distance from each other may be varied, as described.

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