(No Model.)

R. I. KNAPP.

METAL SHEARING MACHINE.

No. 304,829. Patented Sept. 9, 1884.

FIG. 1.

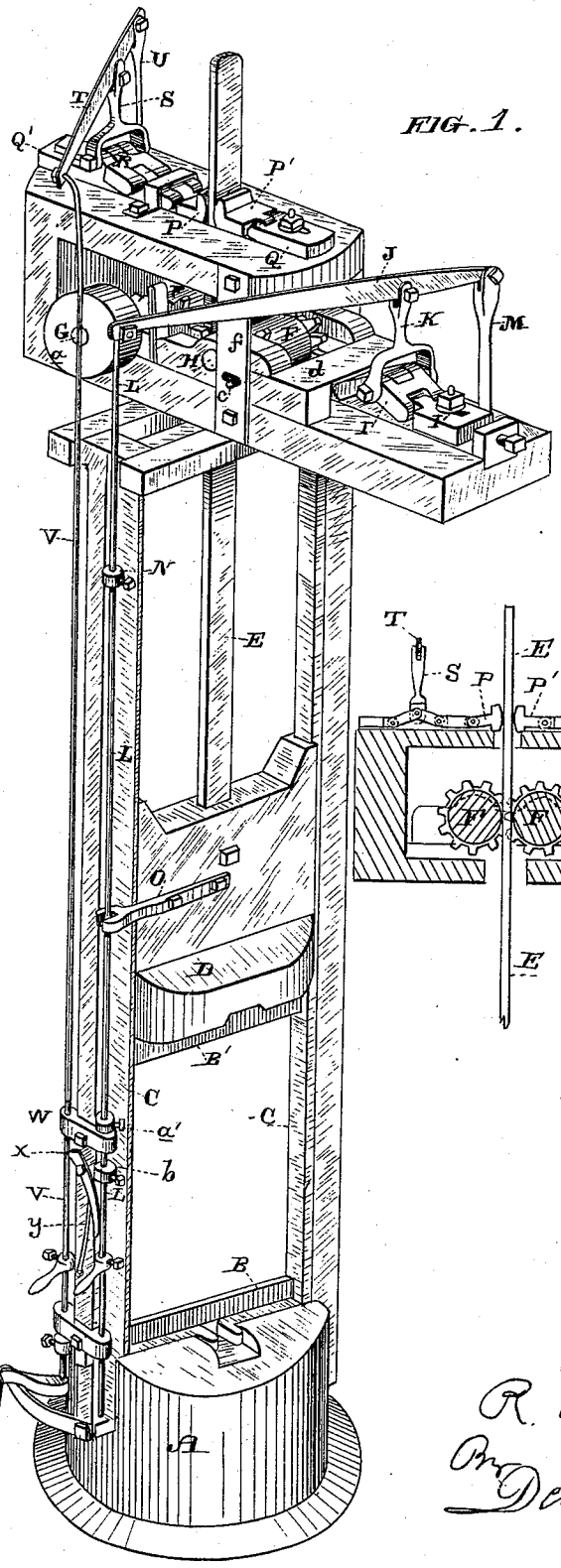
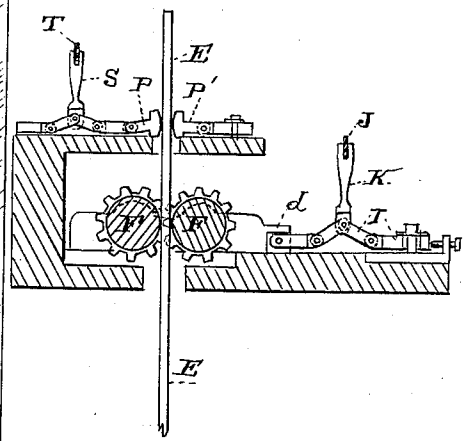


FIG. 2.



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UNITED STATES PATENT OFFICE.

ROBERT I. KNAPP, OF HALF MOON BAY, CALIFORNIA.

METAL-SHEARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 304,829, dated September 9, 1884.

Application filed February 12, 1884. (No model.)

To all whom it may concern:

Be it known that I, ROBERT I. KNAPP, of Half Moon Bay, county of San Mateo, and State of California, have invented an Improvement in Metal-Shearing Apparatus; and I hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an apparatus for cutting plates or bars of metal.

It consists in the combination of devices hereinafter described and claimed.

Figure 1 is a perspective view of my apparatus. Fig. 2 is a view of the upper mechanism.

The usual method of cutting steel or iron bars or plates is by means of power or hydraulic shears which operate with a slow motion and under great pressure. In my apparatus I employ the momentum of a falling or steam-driven weight carrying one of the shear-blades so that it passes the other, which is stationary, and upon which the plate to be cut may be held. In the present case I have shown the shears actuated by a weight.

A is a heavy metal base, having one of the shear-blades, B, fixed to it.

C C are guide-posts, which may be made of iron or of wood with iron or steel lining-plates which fit the grooves of the weight D accurately while the weight slides up or down. In the lower face of this weight is fixed the other blade, B′, of the cutting-shears. The two blades are so fixed in their respective supports that their cutting-edges will pass each other with a shearing action, one end of each being nearer together than the other end. In order to raise the weight and control its movements, it is provided with a stem, E, which is preferably flattened and extends up between rollers F, secured to shafts G H at the top of the guides. These shafts also have gear-wheels which mesh, so as to cause the rollers to act simultaneously. The driving-shaft G may be a main-line shaft, if the apparatus is to stand in a position beneath it, or, if not, it may be a counter-shaft and be driven by a belt from the line or power shaft to the pulley *a*, fixed to the shaft G. The shaft H is journaled in a support, *d*, which may be moved horizontally to or from the shaft G, and this motion causes the rollers F to clamp or release the stem E to raise or drop it. In order to move this support, it is fitted into horizontal guides, and has one arm of a knee or toggle joint, I, connected with it, while the other arm of the joint is fixed to an adjusting plate or block, I′. The center pintle of the toggle is connected with a lever, J, by a link, K, and the long arm of the lever has a rod, L, extending down alongside of one of the guides C to a point within easy reach of the operator, while the short arm has its fulcrum in the post M. When the rod L is pulled down, the toggle-levers are straightened, and the slide or support *d* carries the shaft H closer to the shaft G, until the rollers F press upon the stem E with sufficient force to raise the stem and with it the weight D. A collar, N, is fixed by a set-screw upon the rod L, and an arm, O, is fixed to the weight, so as to project out and clasp the rod and slide upon it with the movement of the weight. When the weight reaches the desired height, the arm O strikes the collar N, and lifting the rod L forces the knee-joint I of the levers up until the roller H is withdrawn from the stem E sufficiently to let the hammer drop.

If it is desired to hold the hammer when it has reached the highest point a hinged block, P, is attached to the frame upon the opposite side from the joint I, and above the rollers F. This block is so hinged that its front curved face rests against the side of the stem E, and when the stem is going up the hinge allows the block to be turned up by the friction of the upwardly-moving stem, which thus moves freely. When the rollers F are relieved from pressure upon the stem and it begins to drop, the block P falls against the stem and binds or holds it against a similar hinged block, P′, upon the opposite side of the stem. The block P′ is hinged to a plate, Q, which is fixed to the frame by bolts and nuts, and is slotted so as to be adjusted forward or back at will. The rear end of the block P is hinged to one part of the knee-joint R, while the other part of the joint is hinged to an adjusting-plate, Q′. The center plate of the knee-joint is connected by a link, S, with a lever, T, having its fulcrum at U, while its long arm is connected

with a rod, V, which extends down alongside the guide-post C, near the rod L, and is steadied by a guide, W. Just below this guide the rod V is notched, and a pawl, X, is fixed to the side of the frame, and acted upon by a light spring, *y*, so that its point engages the rack upon the rod, and thus holds the rod up when it has been lifted. This lifts the lever T and the center of the knee-joint R, so as to withdraw the clamping or holding block P from the stem, to allow it to move freely when it is desired to drop the shear-blade B′.

Z is a bent lever, having its angle fulcrumed in a support, so that one end of the lever stands just beneath the end of the rod V, and the other end depends to a point near the ground, so that the operator can touch it with his foot, and thus lift the rod and draw back the block P when he desires to drop the hammer.

a′ is a collar, which is fixed to the rod L at such a point that when the blade B′ has descended so as to cut the bar or plate the arm O upon the block D will strike this collar and force the rod L, lever J, and the center of the knee-joint I down until the rollers F are again pressed against the stem E with sufficient friction to instantly raise the movable shear-blade for another blow.

b is another collar, fixed to the rod L just below the guide W, and of such shape that when the rod L is forced down by the dropping of the shear-blade this collar will strike the end of the pawl X and release it from the rack on the rod V. The weight of the rod will then bring it down, and by its action upon the lever T and the toggle R will force the block P forward, so as to again be in contact with the stem E, and ready to clamp and hold it when it reaches the top of its stroke.

The slide *d* is prevented from lifting out of place vertically by pins *c* projecting from it through horizontal slots in the upright *f*, the slots allowing the necessary horizontal motion.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a metal cutting or shearing machine, a fixed base to which one blade of a shears is attached, vertical guides extending upward from said base, a weight fitted to move upon said guides, and having the other blade of the shears fixed to it, in combination with a stem extending upward from the weight, and a mechanism by which it can be raised and released, consisting of the rollers F, shafts G H, provided with gear-wheels, toggle-joints I and R, links K and S, levers J and T, and blocks P, substantially as herein described.

2. The vertically-moving shear-blade, with its stem, the compression or frictional lifting-rollers, toggle I, lever J, and rod L, in combination with the collar N, fixed to the rod, and the arm O, connected with the movable shear-blade or weight, substantially as herein described.

3. The clamping-block P, with its knee and operating levers, as shown, in combination with the rod V, notched or toothed, and the pawl X, substantially as herein described.

4. The vertically-moving shear-blade, compressing or lifting rollers, toggle, and actuating-levers in combination with the rod L, having the collar *a′* fixed to it, and the arm O, projecting from the moving shear-blade support, substantially as herein described.

5. The rod L, connected with the roller or lifting mechanism, and the toothed or notched rod V, with the holding-pawl X, in combination with the vertically-moving shear-blade, with its arm O, the collar *a′*, and the collar *b*, substantially as herein described.

In witness whereof I have hereunto set my hand.

R. I. KNAPP.

Witnesses:
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