4 Sheets--Sheet 1.

W. RICHTER.

Machines for Breaking Metal Bars.

No. 135,364. Patented Jan. 28, 1873.

Figure 1.

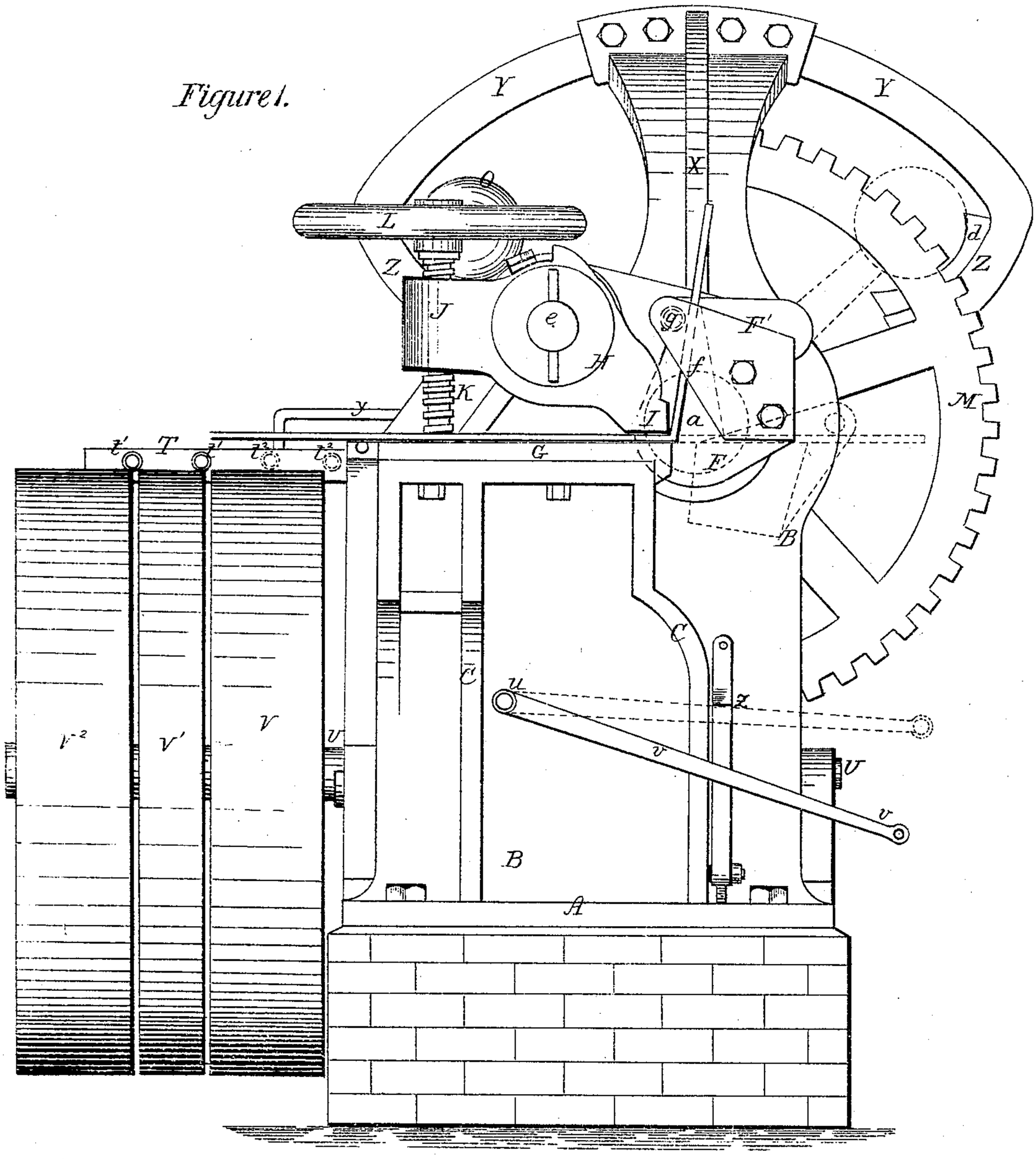

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Figure 2.

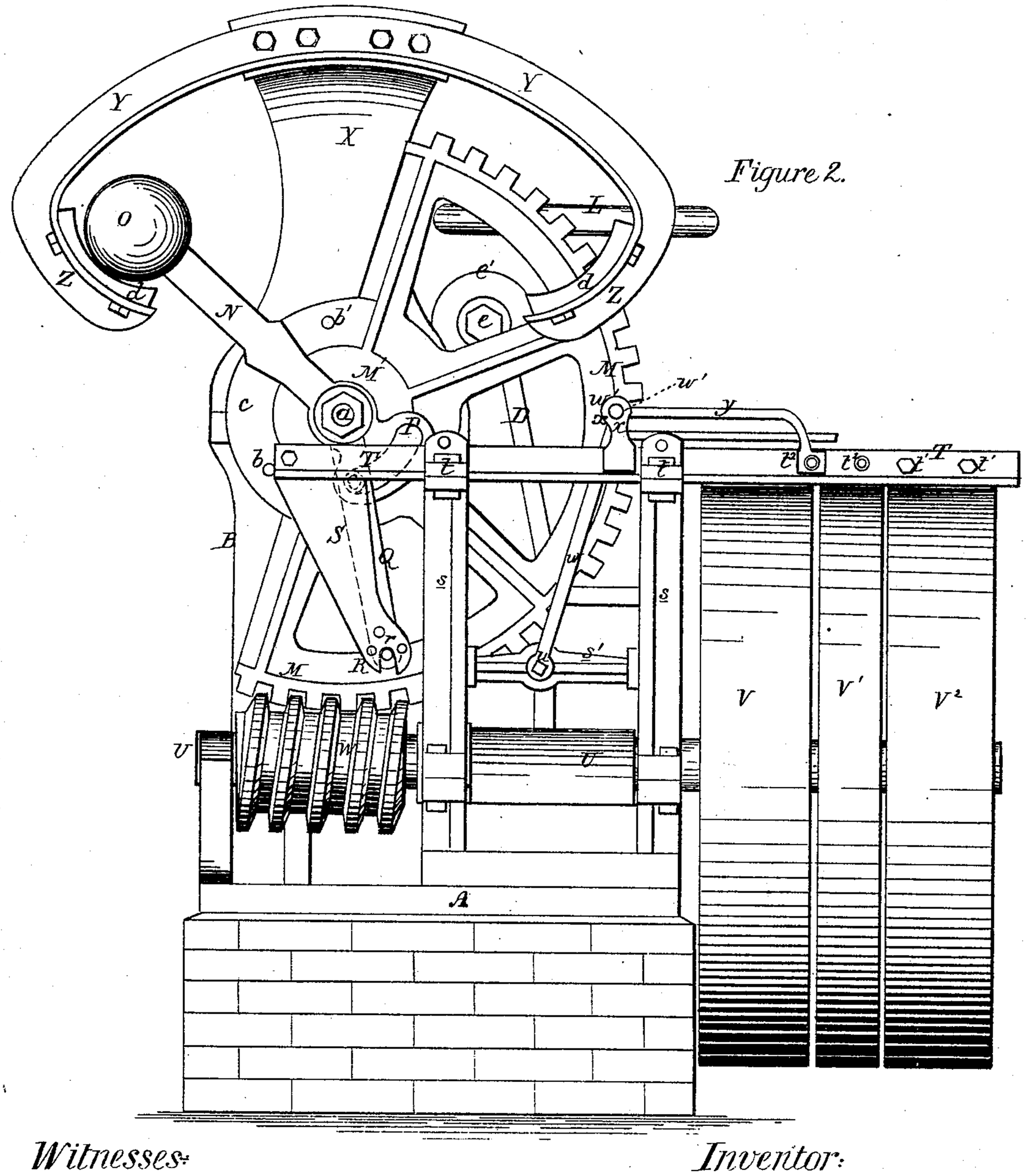

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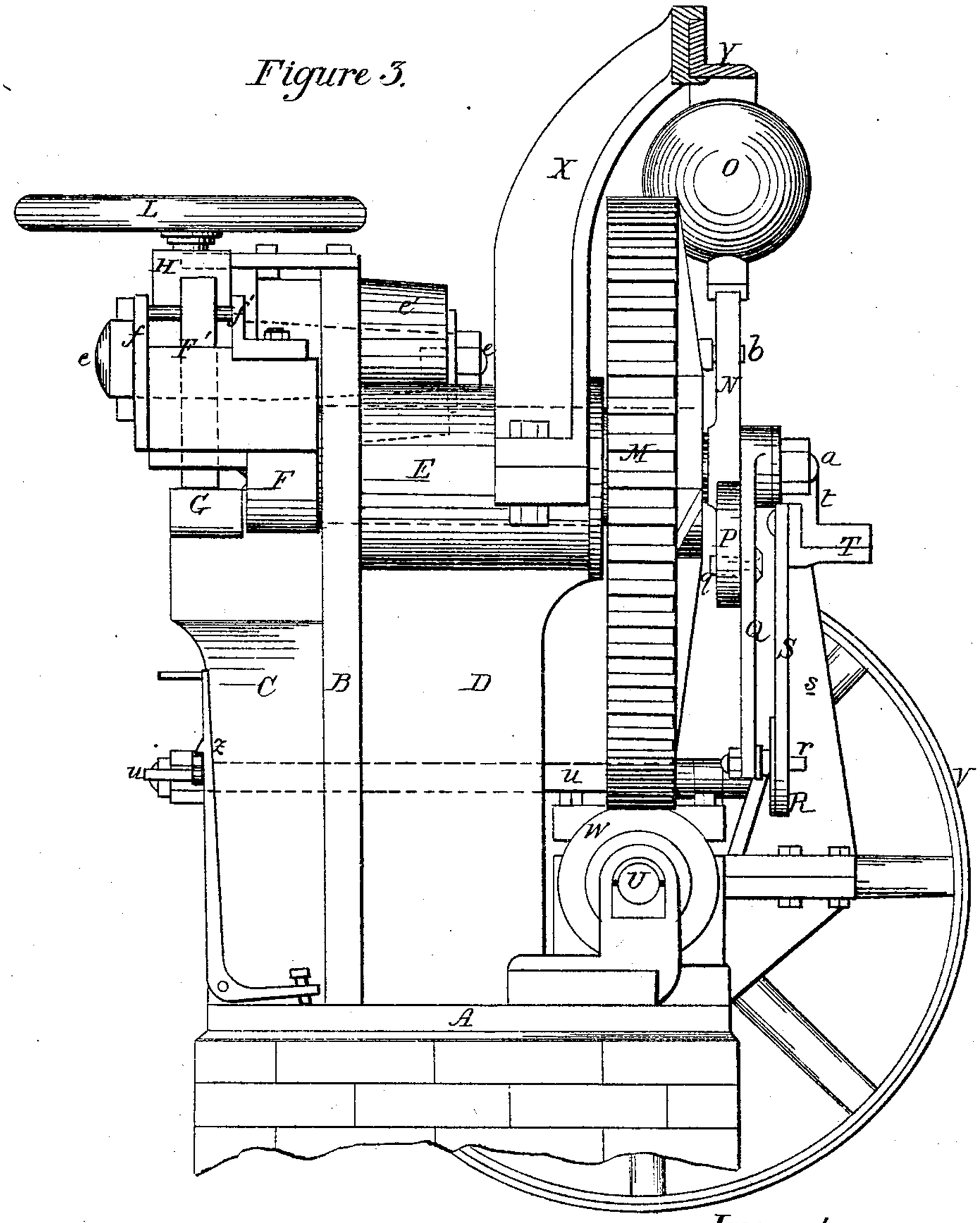
Figure 3.



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4 Sheets--Sheet 4.

W. RICHTER.

Machines for Breaking Metal Bars.

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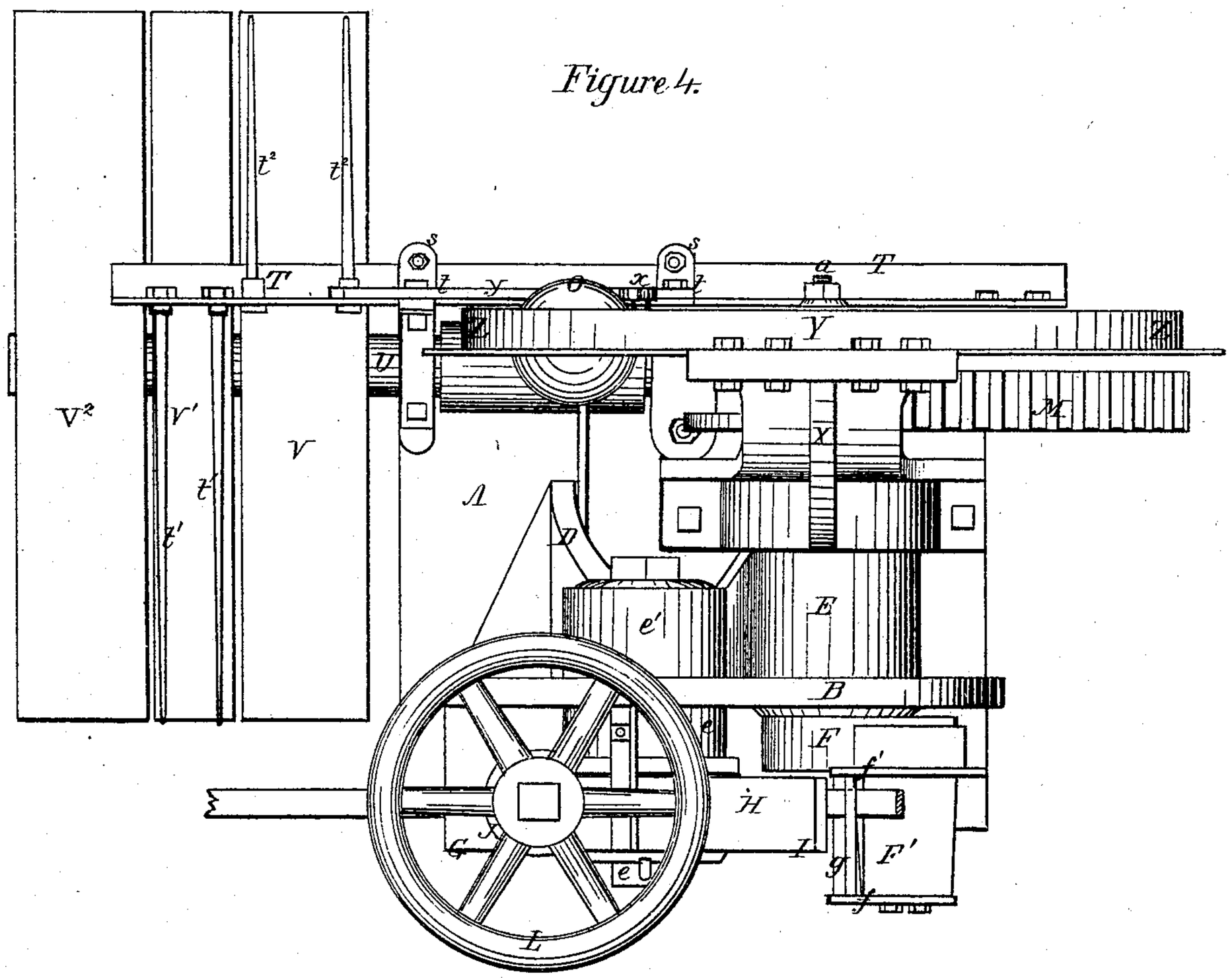
Figure 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM RICHTER, OF EINTRACHTSHUETTE, GERMANY.

IMPROVEMENT IN MACHINES FOR BREAKING METAL BARS.

Specification forming part of Letters Patent No. **135,364**, dated January 28, 1873.

To all whom it may concern:

Be it known that I, WILLIAM RICHTER, of Eintrachtshuette, in the Kingdom of Prussia and Empire of Germany, have invented a new and Improved Machine for Breaking Puddle Bar Iron, of which the following is a specification:

The object of my invention is to break mill-bars at any required lengths by breaking them at given points without in the least degree defacing or injuring either the main bar or the piece broken off; and my said invention consists of a crank jaw-block, the shaft of which has its bearings in suitable standards, which jaw-block holds that part of the bar which is to be broken off, and is turned by suitable mechanism at right angles to the main portion of the bar; and in a hinged block which holds the main portion of the bar at two points on a solid bed, and which can be set by means of a set-screw to hold iron bars of different thicknesses in such a manner that when the crank jaw-block is turned by means of its turning mechanism the portion of the bar to be broken off will be bent at right angles without puckering, and will break off sharp when the crank jaw-block is returned to its original position. My invention further consists in a peculiar belt-shifting device, by means of which the crank jaw-block is automatically returned to its horizontal position after bending the bar at right angles; and further, in an automatic device, for arresting the operation of the machine after every full operation—that is, after each complete up-and-down movement of the crank jaw-block; or, in other words, after every complete breaking of a bar—in order to allow a new bar to be put in, or the old main bar to be moved further for a second break, which stoppage continues until the operator releases the device for further operation.

In the accompanying drawing, Figure 1, sheet 1, represents a front elevation of my improved machine, showing the bar bent up. Fig. 2, sheet 2, represents a rear elevation of the same, the parts being in position when the jaw is down, as shown in dotted lines, Fig. 1. Fig. 3, sheet 3, represents a side elevation of the same, the parts being as in Fig. 1; and Fig. 4, sheet 4, represents a plan or top view of the same, the parts being in the same position.

Upon a suitable brick foundation rests a bed-plate, A, from which rises a main standard-plate, B. This plate is provided with front standards C and rear standards D, of suitable shape, at right angles to the plate B. A shaft, *a*, has its bearings in a sleeve, E, formed on one of the rear standards D, and extending rearwardly from plate B. This shaft *a* passes through the plate B, and carries on the front end a crank-arm, F, and block F′, provided with two projections, *f f′*, which have a short, stout bar, *g*, between their upper ends, which bar is situated a suitable distance from the acting surface of the block. This bar and the acting surface of the block F′ form together a kind of jaw to hold the end of the iron bar which is to be broken off; and as the block forms a crank on the shaft *a*, and has a crank movement on the same, I call the block F′ a crank jaw-block. The acting surface of this block F′, when level, is in line with a bed-plate, G, (see dotted lines, Fig. 1,) secured on the front standards C. Centrally above this bed-plate G, a shaft, *e*, is rigidly secured in a sleeve, *e′*, of the standard B, and passes forward through said standard B, on which shaft a block, H, is pivoted, which, toward the side of the block F′, is provided with a downwardly-projecting arm or nose, I, having a flat under surface parallel and even with that of the bed-plate G, and extending as far as the corresponding end of the latter, so as to form with the same the two lips of an opening and closing jaw, (see Fig. 1.) At its other end the block H carries a vertical screw-sleeve, J, through which a set-screw, K, provided with a handle, L, passes. By turning this screw by means of its hand-wheel L, the arm I of the block H may be raised from or depressed upon the bed-plate G to any requisite degree. The shaft *a* on its rear end in rear of the sleeve E, carries, first, a toothed segment, M, being one-half of a circle, and depending from the shaft; further, in rear of this segment a lever, N, being at its upper and longer arm provided with a weight, O, and at its lower shorter arm with a small, segmental, slotted piece, P, in the slot of which a pin, *q*, has free play, which pin extends forward from a lever, Q, (see Figs. 2 and 3.) This lever Q is pivoted on the shaft *a* just in the rear of the lever N, and is at its lower end provided with a pin, *r*, which extends rearwardly between the forks of the forked end R of a downwardly-extending arm, S, of

the belt-shifting slide T. The segment M is keyed on, and moves with the shaft *a*, but the levers N and Q are only loosely pivoted on the shaft. The belt-shifting slide T moves in slides *t* on standards *s* from the bed-plate A in such a manner that the slide is free to move from side to side without interfering with the operation of the levers N and Q. On the inner end the slide T carries the pendent arm S, while on its outer end are secured two sets of belt-guiding arms, t^1 and t^2, the outer arms t^1 extending toward the front and the inner arms t^2 toward the rear of the machine. The outer end of the slide T extends over three pulleys, V V^1 V^2, arranged side by side on a shaft, U, the pulleys V V^2 being wide loose pulleys, and the middle pulley V^1 being a narrow fast one. The arms t^1 t^2 of the slide are so arranged that when the slide is moved out to a certain distance the arms t^1 t^2 will hold both of the be ts used with the machine—one cross-belt and one straight belt—both run from the same upper pulley on the loose pulleys, one on each. Between the slide standards *s*, a little higher than the shaft U, is secured a cross-piece, *s'*, through which a shaft, *u*, passes, which, extending toward the front, passes through the standard B, and carries at its front end a hand-lever, *v*, while at its rear end it carries a vertical lever, *w*, the upper end of which latter extending upward above the slide T is provided with a pin, *w'*, which has free play in the sleeve *x* of an arm, *y*, attached to the slide T in such a manner that when the slide T moves from side to side a corresponding up-and-down movement is imparted to the lever *v* in front of plate B. A spring-catch, *z*, is so arranged with relation to the lever *v* that when the belt-arms t^1 and t^2 hold their belts, one on each loose pulley, so that the fast pulley is not operated, the lever *v* is arrested in its upward movement by said spring-catch, and the belts are thereby held on the loose pulleys and the weight O nearly upright until the catch is pressed back and the lever *v* released, which allows the weight to fall and the slide to move outwardly to its full extent, and brings the inner belt on the fast and the outer belt on the outer loose pulley. On the shaft U, which has its bearings in suitable standards rising from the rear part of bed-plate A, is formed a worm, W, centrally under shaft *a*, and gearing with the teeth of the segment M. On the hub M' of the segment is formed a smaller segmental piece, *c*, from which two pins, *b b'*, extend rearwardly, which pins, in coming into contact with the weighted lever N, carry the latter to one side or the other, whichever way the segment M is moved by the worm W. From the sleeve E rises a standard, X, which carries a curved piece, Y, with inwardly-bent ends Z, on which latter cushions *d* are secured. These cushions receive the weight O of the lever N whenever the latter is thrown to one side or the other by the pins *b b'* on the piece *c* of segment M.

The operation of my improved machine is as follows: We will suppose the machine to be in position as shown by dotted lines in Fig. 1 ready to receive a bar of iron at the commencement of the operation. The belt in the inner arms t^2 is a cross-belt, while the belt in the outer arms t^1 is a straight belt, and both belts are on loose pulleys, the lever *v* being held by the catch *z*, and preventing the full outward movement of the slide T by the weighted lever N. The operator unscrews the set-screw K by means of hand-wheel L, pushes the bar to be broken on the bed-plate G under the arm I and over the surface of block F' and under the bar *g* until the point at which the bar is to be broken is exactly at the end of the bed-plate G and held between it and the arm I. The set-screw K is now turned down until the screw not only holds the bar under it, but has also firmly pressed the arm I down upon the bar, which is thus held at two points. The operator now releases the lever *v* from the spring-catch *z*, which allows the slide T to move outwardly to the full extent by the weight of the lever N, and brings the cross-belt on the fast fulley V^1, and the straight belt on the loose pulley V^2. At this moment the lever N is in position, as shown in Fig. 2, its weight O resting on the cushion to the right of the machine, looking from the front, and the segment M held near one of its ends by the worm W. The cross-belt now turns the pulley V^1, shaft U, and worm W, the straight belt running on the loose pulley V^2. As the worm moves the segment M the shaft *a* is turned also, and with it the block F', and that end of the bar of iron which is to be broken off bends gradually at the point where it is held in the jaw between arm I and bed-plate G, being forced to remain straight itself by bearing against the surface of block F'. As the segment M turns the pin *b* comes into contact with lever N, and raising the weight O from its cushion carries the weighted lever with it, the slot in the lower end of this lever N moving around the pin *q* of the lever Q without operating the latter. When, however, the block F' has turned so far as to bring the end of the bar which is to be broken off at a right angle to the main bar, the pin *b* carries the lever N over the center, and the weight O of the latter forces the lever to fall quickly to the opposite side. At that moment, however, the pin *q* has reached the end of the slot in the lower end of the lever, and thus this latter, in its sudden movement to the opposite side, carries the lever Q with it. The lever Q in its turn suddenly draws the slide T inward by means of its pin *r* and the arm S of the slide. This inward movement of the slide carries the cross-belt on the loose pulley V^2, and the straight belt on the fast pulley V^1, thus reversing the rotation of the fast pulley, shaft, worm, and segment. By this reversion of the motion, the block F' on the shaft *a* is again turned back, and the piece of the bar brought again into a horizontal position, thereby breaking it off short and sharp at the point

where it was bent. The pin b' now carries the lever N with it, and at the moment when the block has regained its horizontal position, and the bar is broken, this pin b' carries the lever N back over the center. But its fall on the opposite side, when over the center, cannot now move the slide outwardly to the full extent, for the lever v, which during the first portion of the operation—that is to say, by means of the reversion of the motion and consequent inward movement of the slide T, and by reason of its connection with the latter through the shaft u, lever w, and arm y—has been moved downwardly, passing without hindrance the catch z, cannot move upward any further than the catch z, which now holds the lever, and through the lever the slide T; and as the slide, when thus held by the lever v and catch z, carries both belts on the loose pulleys, leaving the fast pulley free, it is evident that the machine must stop the moment the lever v is caught in its upward movement by the catch z; and thus the machine is automatically stopped every time after the forward and backward movement. A new bar may now be placed in position after removing the broken one, and by releasing the lever v from its catch z the machine may be started anew, as above described, by the action of the weighted lever N.

The advantages of this machine are apparent. With it a bar of iron may be broken off sharp at any desired point, without injuring or defacing either the main bar or the piece broken off.

Having thus described my invention, I claim—

1. In a machine for breaking bar-iron, the combination of a hinged breaking-block, F′, a bed-plate, G, and the pivoted adjustable block H with its arm I and screw K, these parts operating relatively to each other and to the iron bar essentially as described.

2. The combination of a hinged block, F′, a bed-plate, G, a clamp, I, with a cross-bar, g, or its equivalent, for holding and breaking off a bar of metal, as set forth.

3. In combination with the breaking-block F′, the worm W on shaft U, the segment M with its pins b b', weighted and slotted lever N, lever Q, slide T with its arms S t^1 t^2, the pulleys V V^1 V^2 with one cross and one straight belt, to give the reciprocating rotary motion to the block F′, and as an automatic shifting device, essentially as described.

4. In combination with the next above, the lever v, catch z, shaft u, lever w, pin w', and arm y of the slide T, as an automatic device for arresting the motion of the machine, essentially as described.

5. A machine for breaking bar-iron, the several parts of which are constructed, arranged, and operating essentially as herein described and shown.

The above specification of my improvement in machines for breaking bar-iron signed this 13th day of July, 1872.

WILLIAM RICHTER.

Witnesses:

ROBERT GOTTHEIL,

OTTO SCHADE.