# W. C. Hicks,

# Drop Hammer,

No. 37,445, Patented Jan. 20, 1863.

Fig. 1.

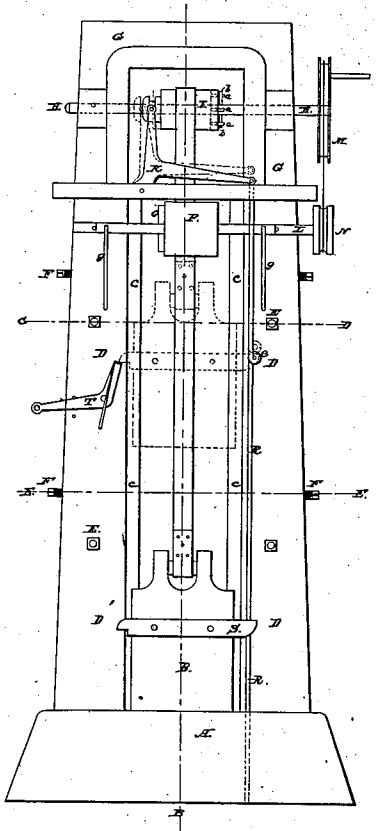


Fig. 2.

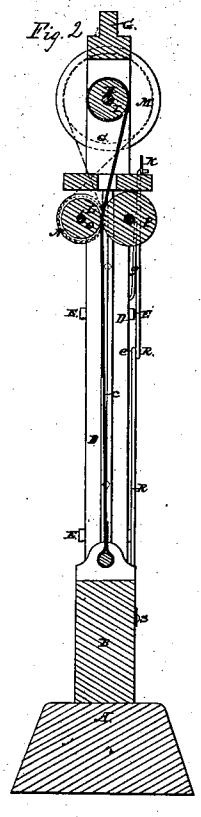


Fig. 3.

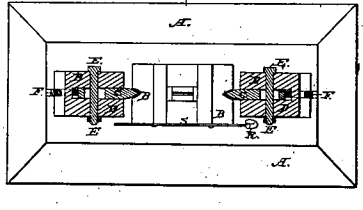
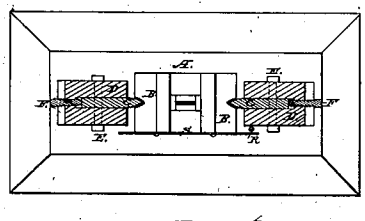


Fig. 4.



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# UNITED STATES PATENT OFFICE.

WILLIAM CLEVELAND HICKS, OF NEW YORK, N. Y.

## IMPROVEMENT IN DROP-PRESSES.

Specification forming part of Letters Patent No. **37,445**, dated January 20, 1863.

*To all whom it may concern:*

Be it known that I, WILLIAM CLEVELAND HICKS, of New York city, in the county and State of New York, have invented certain new and useful Improvements in Drop Presses; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of my improved apparatus, and Figs. 2, 3, and 4, sectional views of the same, according to lines A B, C D, and E F, respectively.

My invention relates to drop-presses or drops used in gun-shops, jewelry-shops, and other like establishments for working metals by forging, stamping, or embossing, and in which the hammer is elevated by means of a belt; and it consists in a method of taking up the belt to prevent the rebound of the hammer after striking the blow; also, in a method of unwinding the hammer-belt as soon as the hammer is raised to the requisite height from which it is allowed to drop.

The nature of my invention will be more fully understood from the following description of the construction, arrangement, and operation of my improved drop hammer or press, to wit:

The general arrangement of my drop is similar to those heretofore in use. The drop is composed, as usual, of a base, A, denominated the "anvil," and of a hammer, B, either or both of which have secured in suitable corresponding beds or sockets dies constituting the counterpart of the piece which is to be produced or formed by the action of the hammer on the anvil. The hammer in its up-and-down motion is guided by means of ways C, secured in upright posts D, which are let and held in the anvil by mortise-and-tenon joint. The ways, it will be seen, are independent and separate from the posts, the latter being grooved or slotted on their inner faces for the reception of ways, which are let into the grooves or slots and held therein by lateral pressure effected by means of bolts E, passing through both the posts and the ways. When these bolts are screwed up tight, the rigidity of the ways will not only prevent them from moving, but will effectually counteract the jars attending the operation of the drop. By this arrangement I am enabled also to adjust the ways so as to give them a perfect fit and insure accuracy in the operation of the hammer throughout its whole stroke, and I effect this by screws F in the posts and back of the ways. The posts are surmounted and laterally braced by a head-frame, G, in which is hung the winding-shaft H, carrying a loose drum, I, to which is attached one end of the belt, the other end of which is fast to the hammer. At one of its ends the drum is provided with studs *a*, which engage with a transverse pin, *b*, on the winding-shaft, when the drum, actuated by the clutch K, is thrown forward. The winding-shaft is connected with some prime mover by means of a belt passing over an outside pulley; or it may derive its motion from the main shaft of the establishment, so that when in operation it shall constantly run in but one direction. The winding-shaft is geared with another shaft, L, hung in bearings on the posts by cog-wheels or friction-wheels, or by means of a crossing band passing over pulleys M and N on each shaft, so that the two shafts shall run in contrary direction, the under shaft which I call the "unwinding-shaft," being so geared as to give it two or more revolutions to every one revolution of the winding-shaft. On the unwinding shaft there is a drum, O, the circumference of which reaches or nearly reaches the center of the drop. On the other side of the posts, and at the same elevation as the unwinding-shaft, there is an axle carrying a drum, P, which presses on the belt with an elastic pressure derived from the springs Q, bearing on the axle and holding it in open journal boxes or recesses, which may be wrought directly in the posts. The clutch which operates the drum by sliding it along and upon the winding-shaft from right to left, and vice versa, is actuated by a rod, R, connected therewith and descending to the anvil on the side of the right hand post. The rod in its turn is moved up by a dog, S, attached to the hammer, striking in its upward movement a collar or stud, *e*, on the rod. It is brought down again by a spring or by its own weight, just below the dog, when at the end of its stroke—*i. e.*, after having lifted the clutch-operating rod. There is a catch or trigger, T, pivoted to the left-hand post, whose

function it is to hold the hammer in suspension until released by the foot or hand of the operator.

Drops were heretofore made with anvil, winding-shaft, winding-drum, and clutch and trigger to hold up the hammer and rod which operates the clutch or shipper, and the hammer belt was wound up substantially as hereinbefore indicated, the operation being as follows: The hammer being wound up and held in suspension, the operator places the piece of metal to be shaped, stamped, or embossed on the die in the anvil. He then pulls the trigger with his foot or hand, the hammer falls, and the forging is formed. In such machines the dog on the right hand side of the hammer strikes, on descending, a cam on or bend in the rod and slides it off a step which held it up. It is thus allowed to drop by its gravity and to ship the clutch and drum and cause the belt to be wound up until the dog on the hammer again strikes the collar on the rod and again moves the rod up and the drum away from its connection with the shaft, whereby the winding up, and consequently the ascent of the hammer, is stopped. The trigger on the left post then takes the hammer and holds it ready for another blow. By this arrangement it will be seen that when the hammer commences to fall it must unwind the belt by its own weight, which checks the speed of the hammer, whereby the force of the blow is greatly reduced. Again, when the hammer reaches the cam on the clutch-rod, as above referred to, it necessarily strikes it a blow, and as the dog must be on either one or the other side it produces a tendency to bind the hammer in the ways, which checks the blow and cocks the hammer up so that the blow is not quite square. The blow also tends to break the dog and the rod. But the most serious objection consists in that when the dog, in striking the cam just before the hammer strikes the anvil, ships the rod and clutch the belt commences to wind up, without, however, preventing the hammer from bounding on the die or anvil once or twice. This often spoils the work, injures the dies, and causes great expense. Now, my improvements have partly for their object to remedy these defects, and I have accomplished it by the employment of unwinding-rollers, hereinbefore described, to operate in connection with the winding-drum in the manner as follows: Suppose the hammer to have reached the collar on the clutch-rod and has thrown the drum out of gear with the winding-shaft, the hammer rests then on the left-hand trigger. Now, on my improved drop the hammer-belt runs between two drums, one of which is driven in a direction opposite to that of the winding-shaft, and while the belt is winding up and the hammer rising the little belt which drives this unwinding-shaft slips and the drums all turn the same way; but the moment the clutch disengages the drum, and while the hammer still rests on the catch or trigger, the little cross-band takes effect and causes the unwinding-drums to unwind the hammer-belt and leave the hammer free to fall without hinderance from the belt. This draws the belt into the same position every time—that is, the unwinding-drums cause the belt to hang perpendicularly from the winding-drum, so that the same length is always left to be wound up by the machinery. Now, if the hammer be allowed to fall, the belt no longer hinders the descent and the blow is equal to the momentum of the weight multiplied with the velocity of the hammer, which (the ways being clean) is always precisely the same. Now, the speed at which the hammer is raised is very much less than that of the hammer falling, (practically about one-half,) and the use of the bound being about equal in speed to the speed at the extremity of the blow. I found that by elongating the hammer-belt (say four inches to a six-foot fall) the hammer bound may be taken up if the winding up be commenced simultaneously with the hammer commencing to fall.

In the accompanying drawings I have shown the apparatus arranged to operate in accordance with the principles of my invention. The clutch, it will be seen, connects the drum with the shaft the very moment the hammer commences to fall, so that the belt is being wound up while the hammer is falling. To effect this, it was important to remove all intervening obstacles—such as cams, bends, &c.—on the rod near the anvil, and to so arrange the clutch and rod as to allow the latter to hang from the end of the shipping-clutch all the time, except when the hammer is being raised and when the drum is thrown out of gear with the winding-shaft. In other words, the drum should remain connected with the winding-shaft, except when the hammer is at rest on the trigger. By this arrangement the winding up of the belt is started at the same time the hammer is released and allowed to drop, and when the blow is struck the quantity of belt fed out is just sufficient to allow of the blow being effected without loss of power, and the amount of belt taken up at the same time is such as that, if the rebound takes place, the belt fed out after the rebound shall be insufficient to allow it to strike a second blow on the anvil.

Having thus described my improvements in drop-presses and the manner in which the same are or may be carried into effect, I would observe that I do not confine myself to the precise construction and arrangement of parts as hereinbefore described, and shown in the accompanying drawings, it being obvious that the apparatus is susceptible of modifications without departure from the principles of my invention.

What I therefore claim as my invention is—

1. The method of unwinding the hammer-belt immediately upon its reaching the requisite elevation by the employment, in combination with the ordinary winding-drum, shipping-clutch, and appurtenances, of auxiliary friction rolls or drums, the whole being arranged to operate substantially in the manner and for the purposes set forth.

2. Preventing the hammer from rebounding by the means and in the manner hereinbefore described, or in any other manner substantially the same.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

WM. CLEVELAND HICKS.

Witnesses:
A. POLLAK,
WM. H. HARRISON.