

(No Model.)

J. H. ELWARD.

DROP HAMMER.

No. 305,165.

Patented Sept. 16, 1884.

Fig. 1.

Fig. 14.

Fig. 2.

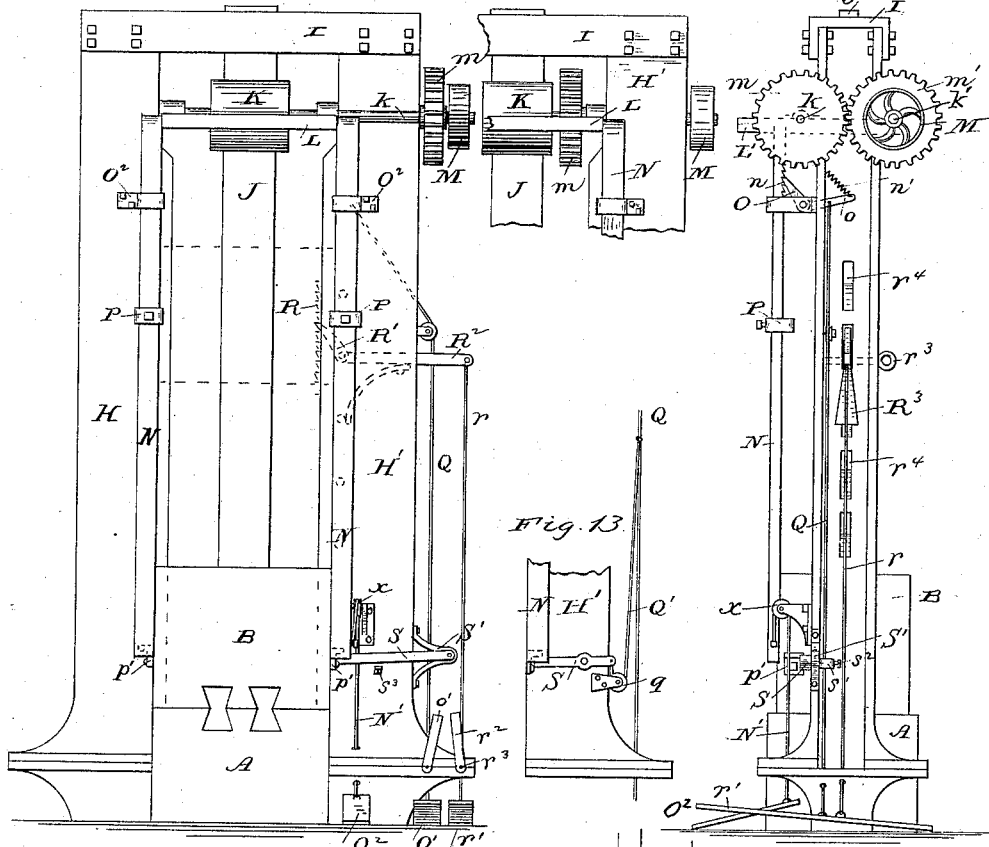


Fig. 10.

Fig. 11.

Fig. 12.

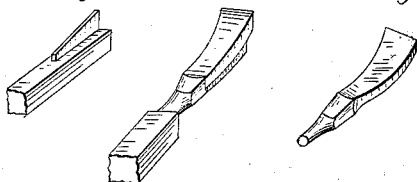


Fig. 7.

Fig. 8.

Fig. 9.

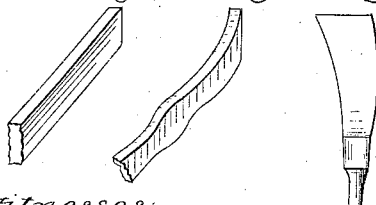


Fig. 3.

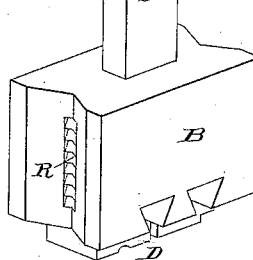


Fig. 4.

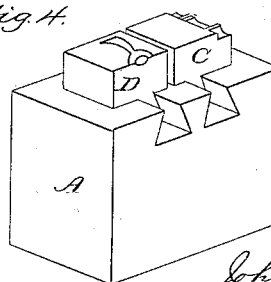


Fig. 5.

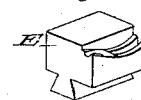
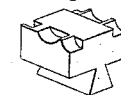


Fig. 6.



Witnesses:

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# UNITED STATES PATENT OFFICE.

JOHN H. ELWARD, OF STILLWATER, MINNESOTA, ASSIGNOR TO HIMSELF  
AND D. M. SABIN, OF SAME PLACE.

## DROP-HAMMER.

SPECIFICATION forming part of Letters Patent No. 305,165, dated September 16, 1884.

Application filed January 16, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN H. ELWARD, a citizen of the United States of America, residing at Stillwater, in the county of Washington and State of Minnesota, have invented certain new and useful Improvements in Drop-Hammers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 is a front elevation of a mechanism embodying my improvements. Fig. 2 is a side elevation of the same. Fig. 3 is a perspective view of the hammer detached. Fig. 4 is a perspective of the anvil. Figs. 5 and 6 are perspectives of detached dies. Figs. 7, 8, and 9 illustrate three stages in the manufacture of a tooth which is all iron. Figs. 10, 11, and 12 illustrate the corresponding stages in manufacturing a tooth partly of steel. Fig. 13 shows a modified form of roller-tripping devices. Fig. 14 shows the gearing of the rollers mounted inside of the frame.

Heretofore in machinery for the forging or swaging of thrasher-teeth it has been customary to employ dies, each constructed to have upon its face a portion for the rudimentary operation in forming the tooth and a portion for finishing the tooth, these two parts or dies being formed in one and the same piece of metal. One die having these two parts (to wit, the rudimentary part and the finishing part) is attached to an anvil, and the other die to the rising and falling hammer. In making the teeth with these devices a bar of suitable dimensions is, while hot, subjected to the action of the rudimentary dies on the two opposing blocks, and afterward to the action of the finishing-dies upon the same blocks. The rudimentary dies that are employed for this purpose are liable to much wear, and their efficiency is therefore impaired, and they become worthless much sooner than the finishing-dies, and therefore the whole block of metal in which the dies are formed is rendered useless entailing much unnecessary expense so far as concerns the finishing portion.

One object of my invention is to so construct and arrange the dies that while, on the one hand, they shall permit the forming of a tooth at one heating of the iron, they shall, on the other, obviate the necessity of removing the finishing part of the dies when it is necessary to remove the rudimentary portion. Again, different rudimentary dies are necessary in different kinds of work, while in all of said several kinds of work the same finishing-die is required, and the construction and arrangement in my case enable me to leave the finishing-dies in the anvil and in the hammer, and to remove the rudimentary dies of one shape or character and substitute others.

In the drawings, A represents the anvil, which, so far as the main portion thereof is concerned, may be of any preferred construction and be secured in place in any suitable manner.

B is the rising and falling hammer arranged to reciprocate above the anvil A. The operative faces of the anvil and the hammer are provided, not, as heretofore, with only one, but with two or more dovetailed grooves for receiving the tongues of the dies. In Fig. 4 I have shown two dies to be thus attached to the anvil, it being understood that corresponding dies are attached to the hammer shown in Fig. 3.

When it is desired to form a thrasher-tooth which shall be iron throughout, use is made of a die substantially similar to that shown at C for performing the rudimentary operation upon the metal of the form shown in Fig. 7. After the tooth has been thus acted upon, it is in the rudimentary state seen in Fig. 8, then (and before being heated again,) subjected to the action of the finishing-dies D D, the bar or rudimentary tooth being placed before this last action in planes transverse to those in which it was when acted upon by the rudimentary dies.

It is often desirable to make the teeth partially of iron and partially of steel, the steel being "laid" or welded upon the iron portion, the tooth, when finished, having the wearing portion made partially of steel—that is to say, that portion which is to be outside of the cylinder-bar, and to come in contact with the grain and straw.

In Fig. 10 is shown a bar of iron, having laid thereon, and partially attached thereto, the piece of steel intended to form the steel portion of the tooth. After being joined, as there shown, both the iron and the steel are sufficiently heated, and are then subjected to the action of different rudimentary dies (seen in Fig. 5) specially constructed for the purpose of imparting to the steel and iron the proper shape, and also to properly perform the first welding act. After this it will be found that the two pieces of metal are partially welded, as illustrated in Fig. 11, but to complete the welding and finish the shaping of the tooth it is subjected to the action of the dies at D D, these dies being the same for finishing teeth of this class as those which are made of iron alone. With these devices I have combined a peculiar elevating and dropping mechanism connected with the falling hammer.

H H' are two posts or uprights extending upward from the anvil-frame, and joined and braced at the top by a suitable cross piece or pieces, I. The hammer B is supported between them, and extends substantially from post to post.

J represents the bar, projecting upwardly from the hammer, and guided by the top piece, I, which is provided with a slot for that purpose. Behind the lifting-bar is a stationary roller adapted to press against one side of the bar, and in front there is a swinging roller, K, adapted to be pressed against, and to be withdrawn from the bar J. This roller K is attached to shaft *k*, which is mounted upon a swinging frame, L L', the arm L' being pivoted upon the shaft *k'* of the rear roller. As the roller K is allowed to drop downward, the bar J is pressed between the two rollers. The rollers are rotated in opposite directions by means of a belt-wheel, M, and spur-wheels *m* *m'*, attached, respectively, to the shafts of the rollers. Inasmuch as the frame L L' swings upon the shaft *k'* as a center, the spur-wheel *m* can be carried up or down without being disengaged from the wheel *m'*.

N N are bars pivoted to the frame L L, and their weight tends to draw said frame downward. One or both of them are provided with ratchet-teeth at or near the upper end, as at *n*. With these teeth a pawl, O, is adapted to engage, its engaging end being swung outward by means of a spring, *n'*.

P P are adjustable collars upon the bars N N. They carry projecting pins, with which engage lugs *p' p'* on the hammer B when the hammer is raised sufficiently high.

N' is a rope having one end attached to one of the bars N', and passing thence over a pulley, *x*, mounted in a bracket-arm attached to post H, and thence down to a treadle, O<sup>2</sup>, within convenient reach of the operator.

Q is a cord attached to the arm *o* of the pawl O, and running downward to a lever or foot-treadle, O'. One end or side of the hammer B is provided with ratchet-teeth, as shown at R. With these ratchet-teeth a pawl, R', piv-

oted in the post H, is arranged to engage. This pawl has a returning-spring, R<sup>3</sup>, and an arm, R<sup>2</sup>, extending outwardly, to which a cord, *r*, is attached. This cord runs down to another foot-treadle, *r'*.

The operation of the pawl above described is as follows: By pressing upon the foot-treadle O', the pawl O is released from bar N, whereupon the bars N draw the frame L L' downward and with it the roller K, until said roller presses the lifting-bar J against the roller behind, whereupon (both rollers being in motion) the lifting-bar is lifted, and with it the hammer B. While rising, the lugs or ears *p' p'* strike against the pins on the collars P P, or against the collars themselves, and elevate the bars N N and the frame L L' sufficiently to throw the roller K out of contact with the bar J. As soon as this disengagement occurs, the pawl O engages with the ratchet-teeth *n* again, holding the frame L L' in its upper position. At the same time the pawl R' engages with the teeth in the hammer-block, holding the hammer in its elevated position, although the bar J is no longer grasped by the roller. The metal to be operated upon is now placed in position upon the matrix, and the operator, by pressing downward upon the lever or foot-treadle *r'*, releases the pawl R', and the hammer then drops. The extent of the travel of the hammer may be regulated by means of the adjustable collars P P. When said collars are adjusted, there should be a corresponding adjustment of the pawl R', which may be effected by placing its pivot-rod *r<sup>3</sup>* in the proper aperture of the series, shown in dotted lines at *r<sup>4</sup>*. The hammer may be arranged to release the pawl O just as it (the hammer) is completing its fall, so that the rollers shall immediately after such fall engage with it instantly and begin to draw it upward again.

S, Figs. 1 and 2, represents a lever pivoted in an angle-frame, S', its free end being situated in the path of the ears or lugs *p'* on the hammer. It has a backwardly-projecting arm having an eye, *s'*, through which the cord Q passes. *s<sup>2</sup>* is a set-screw, by which the cord can be gripped tightly in the eye. When the hammer it near the lower end of its downward stroke, the lug *p'* strikes the end of lever S and pulls downward upon the cord Q, which releases the pawl O. Thereupon the roller K drops into engagement with the bar J, and instantly begins to elevate the hammer. By the eye *s'* and set-screw *s<sup>2</sup>* the tension of the cord may be properly adjusted for tripping the cord. If it is desired to throw this automatic tripper out of engagement with the hammer, so that the tripping can be caused only by the treadle O<sup>2</sup>, this can be done by loosening the set-screw *s<sup>2</sup>* and dropping the lever S until it rests upon the stop *s<sup>3</sup>*, where it is out of engagement with the hammer.

In Fig. 13 I have shown a slightly-modified form of tripper. In this case a supplemental cord, Q', extends from the cord Q under the pulley *g*, attached to the post H', and thence

up to a lever, S, which lies in the track of the hammer. Instead of employing the lugs  $p'$  to operate the lever S, an arm may be attached to the hammer for this special purpose, and with the arm may be combined a spring, these parts operating to drop the pawl without in any manner impeding the drop of the hammer.

It is many times desirable to modify the force of the blow imparted by the hammer, as the character or condition of the work shall indicate, and this can be accomplished by means of the treadle  $O^2$  and rope  $N'$ , it being readily understood that by means of these devices the operator can elevate the frame L L' sufficiently to throw the roller K out of contact with the bar J, and the pawl R' being withdrawn from the ratchet-teeth by the foot-treadle  $r'$ , the hammer will drop. Preferably the pawl R' should be held entirely out of engagement when this last-described mechanism is being used. It may be held out by the operator pressing downward upon pedal  $r'$ ; or a device may be combined with it for holding it permanently out of engagement with the ratchet-teeth.

$r^2$  is an arm, pivoted at  $r^3$  in such position that the free end of the arm may be employed to hold the treadle  $r'$  in a depressed position and withhold the pawl R' from contact with the ratchet-teeth R on the hammer. Thus it will be seen that during the upward movement of the hammer the lugs  $p' p'$  lift the bars N N', and release the roller K from contact with the lifting-bar J, and the hammer is allowed to drop, so that its rising and falling become automatic.  $o'$  is a similar locking-bar, pivoted at  $o^2$ , and adapted to hold down the treadle  $O'$ , and when this is done the operator can, by means of the treadle  $O^2$ , operate the hammer with a variable stroke, lifting it to such distance as he may desire, and then letting it drop.

I do not herein claim the construction of the anvil or hammer, separately considered, or the construction and arrangement of the dies, as I have made these the subject-matter of another application which I have filed.

What I claim is—

1. The combination of the rollers, the swinging frame which carries one of the rollers and vibrates about the axis of the other, the hammer-bar situated between said rollers, the hammer carried thereby, and a tripping device carried by the hammer, which engages with the swinging frame and raises it to disengage the roller and permit the hammer to fall, substantially as set forth.

2. The combination of the rollers, the swinging frame which carries one of the rollers and vibrates about the axis of the other, the hammer-bar between the rollers, the hammer carried by said bar, the downwardly-hanging bar N, secured to the front swinging end of the frame which carries the swinging roller, the tripper carried by the hammer, which engages with said bar N, and thereby throws up one

of the rollers about the axis of the other, and the stop which holds the bar N while the rollers are disengaged, substantially as set forth.

3. The combination, with the hammer B and its lifting-bar J, of the stationary roller, the swinging roller, the frame in which the swinging roller is mounted, the weight-bars N N', one of which is ratcheted, the pawl O, lugs  $p' p'$ , and the adjustable collars P P, substantially as set forth.

4. The combination of the rollers, the swinging frame in which one of the rollers is mounted, the hammer, mechanism operated by the hammer to move the swinging frame to disengage the rollers, the stop which holds the swinging frame when the rollers are disengaged, the rope  $N'$ , connected with the swinging frame, and treadle  $O^2$ , substantially as set forth.

5. The combination, with the hammer, its lifting-bar J; the stationary roller, the swinging roller, and the frame in which the swinging roller is mounted, of the rope  $N'$ , connected with the swinging frame, and the treadle  $O^2$ , whereby the operator may at any point in the elevation of the hammer move the swinging frame and the roller carried thereby to release the hammer-bar and permit the hammer to fall, substantially as set forth.

6. The combination, with the hammer B, the rollers which elevate it, and the devices which hold the rollers out of engagement, of the pawl R', the cord  $r$ , treadle  $r'$ , rope  $N'$ , connected with the swinging frame, and treadle  $O^2$ , substantially as set forth.

7. The combination, with the hammer, its lifting-bar, the rollers which elevate the hammer, of which rollers one is movable about the other and away from the lifting-bar, the frame in which the movable roller is mounted, and a stop which holds the movable roller away from the hammer-bar after it has been moved, of a tripping mechanism operated by the hammer to move the swinging roller, and a second tripping mechanism under control of the operator, the said tripping mechanisms being arranged relatively to each other, substantially as set forth, whereby the one brought into action by the operator can be operated prior to the one brought into action automatically, as set forth.

8. The combination of the hammer, the stationary roller, the swinging roller, the frame in which the swinging roller is mounted, the lifting-bar J, mechanism operated by the hammer to move the frame of the swinging roller to throw said roller out of contact with the bar J, and the automatic stop which engages with the hammer and supports it after the rollers have been thrown out of engagement with the lifting-bar, substantially as set forth.

9. The combination of the hammer, the stationary roller, the swinging roller, the frame in which the swinging roller is mounted, the lifting-bar J, mechanism operated by the hammer to move the frame of the swinging roller to throw said roller out of engagement with

the bar J, pawl R', a spring which forces the pawl R' into contact with ratchet-teeth on the hammer, and means for withdrawing said pawl from the ratchet-teeth, substantially as set forth.

10 10. The combination of the hammer, the stationary roller, the swinging roller, the frame in which the swinging roller is mounted, the lifting-bar, mechanism operated by the hammer to move the frame of the swinging roller to throw said roller out of engagement with the bar J, an automatic stop which holds

the swinging roller out of engagement with the bar, and an automatic stop which engages with the hammer and supports it after the rollers have been thrown out of engagement with bar J, substantially as set forth. 15

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. ELWARD.

Witnesses:

H. H. BLISS,

J. S. BARKER.