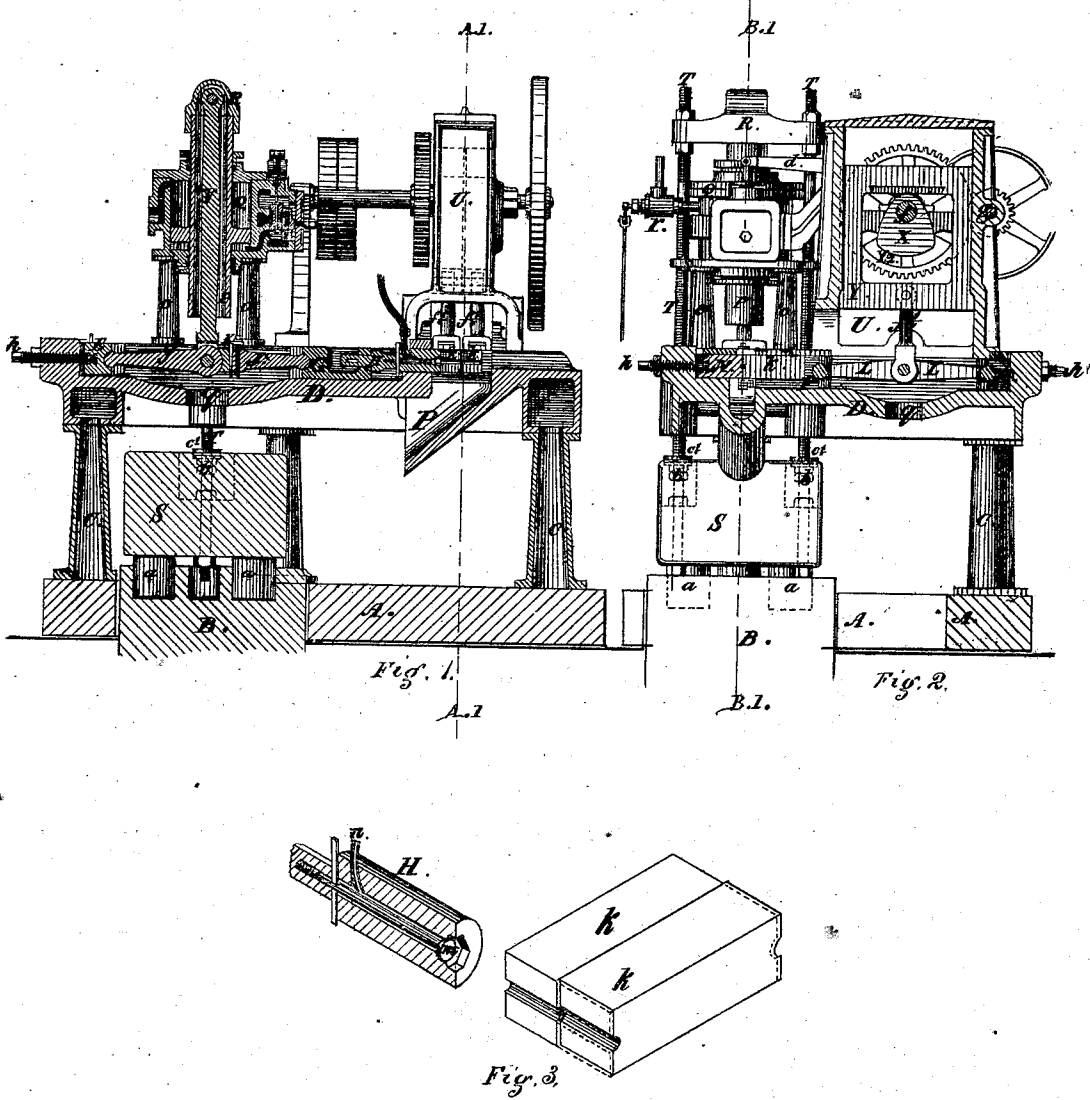


R. GRACEY.

Machines for Heading Bolts.

No. 158,485.

Patented Jan. 5, 1875.



Witnesses { *Saml. H. Gregory* Inventor *Robert D. Tracy*
 C. M. Cornell

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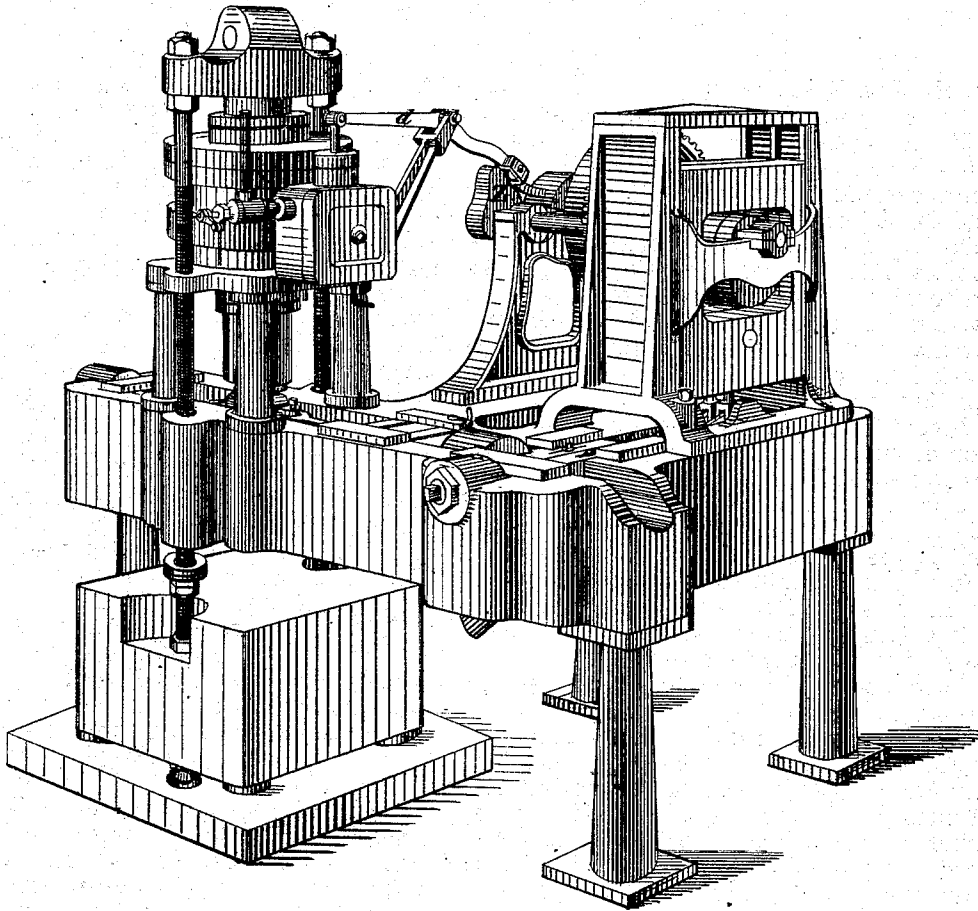


Fig. 4.

Witnesses { *Saml. H. Gregory* Inventor *Robert P. Gracey*
L. M. Conwell

UNITED STATES PATENT OFFICE.

ROBERT GRACEY, OF ALLIANCE, OHIO, ASSIGNOR OF TWO-THIRDS HIS RIGHT
TO CHAS. E. MARCHAND AND THOS. R. MORGAN, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR HEADING BOLTS.

Specification forming part of Letters Patent No. **158,485**, dated January 5, 1875; application filed
July 10, 1874.

To all whom it may concern:

Be it known that I, ROBERT GRACEY, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Machine for Heading Bolts and Rivets; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification—

Figure 1, Sheet 1, being a sectional elevation on line B' B' of Fig. 2, showing the arrangement of the principal parts. Fig. 2 is a transverse sectional elevation on line A' A' of Fig. 1. Fig. 3 is a perspective view of the gripping-dies which hold the bolt while being headed, and a longitudinal sectional elevation of the die in which bolts are headed; and Fig. 4 is a perspective view of the machine as it appears when ready for operation.

Corresponding letters refer to like parts in the several figures.

This invention, which is designed to be an improvement upon a machine for which Letters Patent were granted me on the 27th day of October, 1868, relates to that class of machines which are used for heading bolts, spikes, rivets, and other devices, which require to have heads formed upon them, said improvements consisting in certain novel combinations of the parts of which the machine is composed, as will be more fully explained hereinafter.

In constructing machines of this character I use a foundation, A, of metal, or other suitable material, it being of suitable dimensions to receive and support the other parts of the machine. Upon the plate A, or in a recess formed therein, there is placed a separate plate or piece of metal, which is provided with elastic cushions *a*, for the purpose of arresting the motion of the drop-weight, (soon to be described,) thus preventing the shock to the machinery which would otherwise occur, and for aiding in starting it on its upward movement, these cushions acting, in conjunction

with the steam in the cylinder, to remove the head-forming die from the bolt or other device as soon as it has been formed, and thus preventing injury to said die, which would be caused by leaving it too long in contact with the heated metal.

For the purpose of supporting the operating parts of the machine, columns or posts C C are secured in or cast upon the bed A, and are extended upward for a distance sufficient to enable them to support a frame, D, to which the other parts are secured. This frame has a recess formed in its central portion, in which the toggle-lever, which operates the heading-die, works, its outer end being dressed out to receive the sliding adjustable block E, against which the outer end of the toggle-lever presses. This block has a recess formed in its inner surface, which is adapted to receive the rounded end of the toggle-lever, and thus hold it in position, while it is allowed such movement as the motion imparted to its center requires. In order that the position of this block longitudinally may be adjusted according to the length of the head-forming die, and to the motion imparted thereto by the toggle-lever which moves it, a set-screw, *h*, is made to pass through the frame outside thereof, or through a cap placed thereon, by turning which the distance between the outer bearing-point of the toggle-lever J, which moves the head-forming die, and the inner surfaces of the gripping-dies can be regulated.

The toggle-levers J J', above alluded to, are connected at their centers by a pin, which passes through them, the end of one being bifurcated to receive the central portion of the other, a wedge, K, being placed in one of the levers, and made to bear against a block, which rests upon one end of the lever in such a manner that, by forcing the wedge downward, any lost motion which may result from the wear of the parts may be taken up, and thus any deviation in the point at which the heading-die will terminate its movement be prevented. The inner end of the lever J' rests in a recess formed in a projection upon the cross-head G, it being the same in form

as that in the block E, and for the same purpose.

The cross-head just alluded to moves on ways placed upon the frame D, and has inserted in its outer end the head-forming die H, which I prefer to make in the manner shown in Fig. 3 of Sheet 1 of the drawings, but which may be of any other suitable construction, it having a recess formed in its outer end of the size and form which it is desirable to give to the head of the bolt, spike, or other device. The lengths of the die H, the toggle-levers JJ', and of the cross-head G are to be such that the aggregate thereof shall, when the parts are in the position shown in Fig. 1, cause the outer end of the die H to touch, or very nearly touch, the inner surface of the gripping-dies K K. For giving motion to the toggle-levers JJ', and through them to the cross-head and to the heading-die H, there is placed directly over the joint in said levers a steam-cylinder, Q, which is furnished with a trunk-piston, the ends of which extend through the upper and lower heads of the cylinder, a connecting-rod, V, being attached to the upper end of said trunk, and extending downward to the joint of the levers with which it is connected, so that as steam is admitted to the under side of the piston it will be raised up, and the central portions of the levers will also be carried up, which will cause the die H to be withdrawn from the head of the bolt.

The method of forming the head upon the bolt or other device is, by placing in the gripping-dies, which will soon be described, a blank, and causing said dies to be successively brought in contact with it, which will hold it in position, when the piston having been raised, and the steam having been exhausted from below it, the toggle-levers will be brought down to the position shown in Fig. 1, by means of the drop-weight S, which is connected to a cross-head, R, attached to the upper end of the trunk by means of rods T T, the lower ends of which are provided with screws for attaching thereto the weight S, and, with nuts *b b*, working on said threaded portions of rods T T, by means of which the amount of lift given to the weight S can be regulated, as said rods and weight move with the piston, and in line with its rod.

To prevent the contact of the nuts *b b* with the under side of the frame D, and thus causing a jar or shock upon the machine, elastic washers *c'* are placed upon the upper sides of the nuts *b*, and thus a cushioning material is made available for that purpose. The arrangement of these parts is such that, by adjusting the position of the nuts *b b* upon the rods T T, the distance through which the weight will be raised will be controlled, and consequently the distance traveled by the central portions of the toggle-levers, which in turn will determine the distance that the end of the head-forming die H will recede from the gripping-dies, so that when the blank is placed in said dies, and its inner end placed in contact with

the head-forming die H, the amount of iron which is to be used in forming the head of the bolt or other device can always be determined, a greater amount of movement of the lever causing the head-forming die to recede farther from the gripping-dies, and a less amount causing it to recede a less distance.

In order that the admission of steam to the cylinder may be so regulated as to cause the head-forming die to recede immediately after the head has been formed, a valve is arranged in the steam-chest in such a manner that, when it is in its normal or most elevated position, it admits steam to the under side of the piston, and raises it and its attachments so as to permit of the introduction of the blank to the dies, it being held in that position until it is changed by the cam Z, operating on lever *z*, which acts to depress the valve, and thus allow the steam to exhaust from the cylinder, when the weight S will carry the parts connected with it down with such force as to cause a head to be formed upon the blank.

The valve-moving mechanism is operated by a shaft, *f*, having upon it a gear-wheel, which is driven by a smaller wheel placed upon the main shaft *g* of the machine, said shafts being supported in boxes formed in standards placed upon the frame D.

For giving motion to the gripping-dies, and for regulating the movements thereof, there is placed upon the top of frame D another frame, which is designated by the letter *u*, which forms the bearings for one end of the shafts *f* and *g*, their opposite ends being held in a bracket provided for that purpose.

Upon the shaft *g*, which is the main shaft, there is placed a tight and a loose pulley, they being for the purpose of receiving a belt from any prime mover, for communicating motion to the part of the mechanism which moves the gripping-dies, which is effected in the following manner: The belt just alluded to having put the shaft, upon the outer end of which there is placed a balance-wheel, in motion, it imparts motion to the shaft *f*, through the medium of the gear-wheels above alluded to, which causes the cams *x x* to operate upon the weights *y y*, which rise and fall within the frame *u*, they being guided in their movements therein by grooves formed in the surfaces of said frame. The cams which raise these weights are placed upon the shaft *f*, the movement of which is so regulated as to cause said cams to lift the weights immediately after the steam in the cylinder has withdrawn the head-forming die from the head of the bolt, by which arrangement the gripping dies are made to hold the bolt while the die is being withdrawn from its head. The weights *y y* consist of rectangular pieces of metal, having apertures formed in them for the passage of the shaft *f* and cams *x x*, and having attached to their under surfaces links or connecting-rods, by means of which they are attached to the central portions of toggle-levers L L, as shown in Fig. 2. These levers are constructed in the

same manner as the ones J J', above described, their outer ends being held in blocks E', which are fitted into a recess formed in frame D, and are adjustable by means of set-screws h', their opposite ends being attached to the inner ends of the movable slides F, which carry the gripping-dies, the fixed portion thereof consisting of a block or blocks of metal, N, fixed in a recess in frame D, and made adjustable by means of a set-screw. The line of movement of the gripping-dies is at a right angle to that of the heading-die, and the cams which move them are so arranged upon their shaft that in closing the dies upon the blank one of the movable portions is made to come in contact with said blank just in advance of or before the other, so that the first may gripe the hottest portion of the blank, and thus prevent any bending thereof by the other. The gripping action of these dies is caused by the weights y y acting upon the toggle-levers L L, the inner surface of the inner movable one and of the stationary one forming the surfaces against which the head is formed, the forming-die, while performing that function, being guided by a rest formed in the frame D and placed near the outer end of said die. As a consequence of the arrangement of the weights, cams, and toggle-levers, the possibility of breaking the parts is avoided, as the force which acts to gripe the blank is produced by a weight, and not by an increasing force provided by a cam or equivalent, and hence, if any piece of metal or other substance should by inadvertence get between the gripping-dies, there would not be force enough applied to cause a fracture of the parts, as there would be if the force were applied by any device which would give a constantly-increasing amount from the time the die commenced moving until the gripping action had been completed.

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

1. The combination, substantially as described and shown, of the devices for gripping the bolt-blank, comprehending the dies K K, toggle-links L, cams X, and weighted cam-yokes Y, the devices for heading the bolt, comprehending the header H, toggle-links J, and the weight S, and the steam-engine for elevating said toggle-links J and weight S.

2. The mode of combination of the drop-weight S, the toggle-links J, and the steam-engine, said toggle-links and weight being connected to the two extremities of the piston-rod of said engine, substantially as shown and described.

3. The combination, as described and shown, of the toggle-links L, cams X, and the weighted cam-yokes Y with the dies K K.

4. The combination, with the devices as specified in the first claim for gripping and heading the bolt-blank and the steam-engine, of cam Z and weighted lever d, for reciprocating the valve of said engine.

5. The combination of the weight S, rods T T, adjusting-nuts b b, cross-head R, piston-rod P, connecting-rod V, toggle-levers J J', and heading-die H, the parts being arranged substantially as described and shown, whereby the heading-die, which forms a stop for the blank when it is inserted, is made adjustable for the purpose of determining the amount of metal which shall constitute the head of the bolt or other device.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

ROBERT GRACEY.

Witnesses:

SAML. H. GREGORY,
C. M. CONNELL.