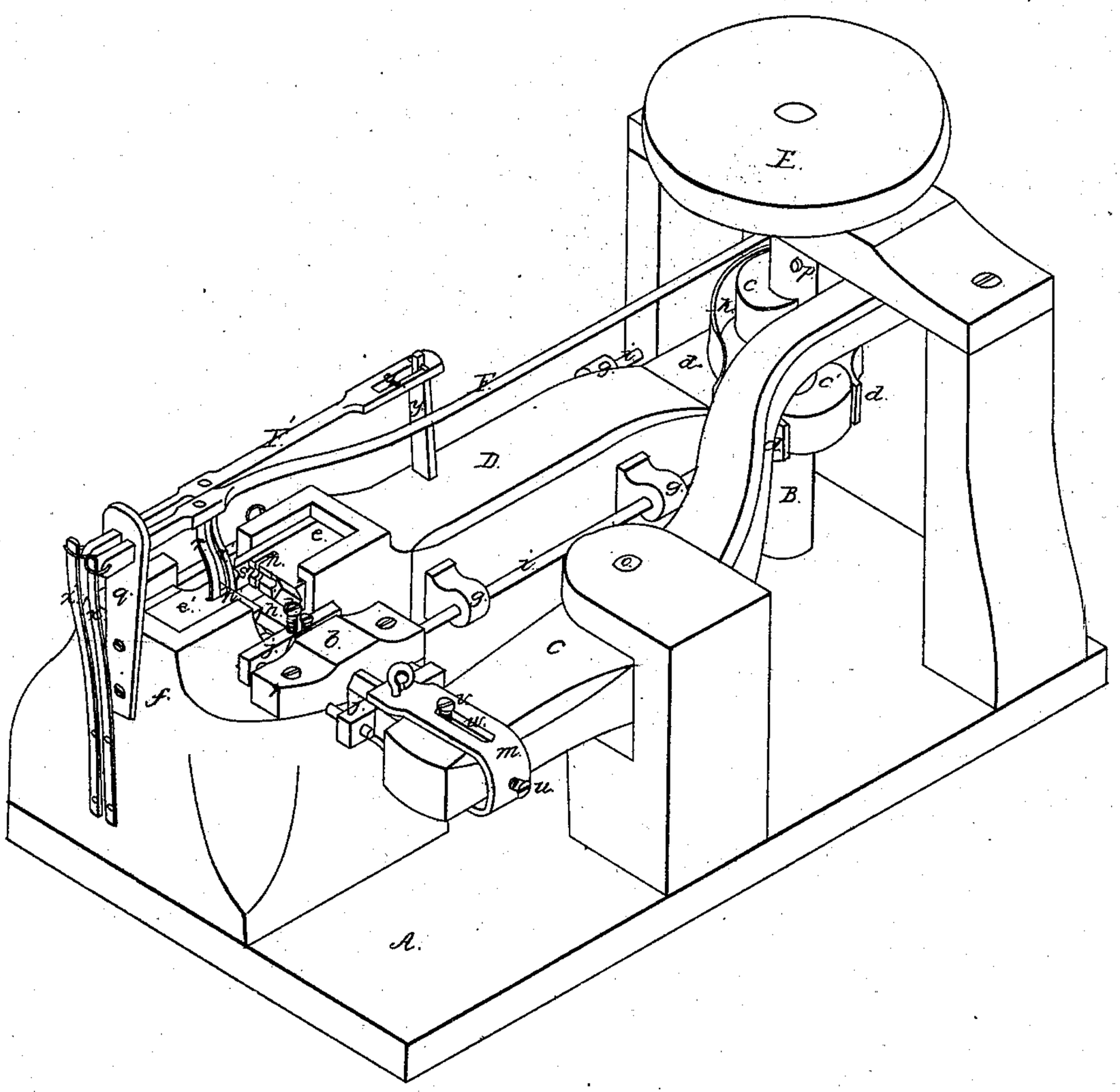
A. REESE.

RIVET AND BOLT MACHINE.

No. 32,381. Patented May 21, 1861.



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ABRAHAM REESE, OF PITTSBURG, PENNSYLVANIA.

BOLT AND RIVET MACHINE.

Specification of Letters Patent No. 32,381, dated May 21, 1861.

To all whom it may concern:

Be it known that I, ABRAHAM REESE, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Bolt and Rivet Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawing, forming part of this specification, which is a perspective representation of my improved machine.

In the manufacture of bolts and rivets by machinery it is a matter of the greatest importance that the head of the bolt or rivet should not only be well shaped, but that in forming the head the iron at the point where the head and shank unite should not be weakened, as is very apt to be the case in bolts made by compressing the iron in a matrix by a single stroke of the heading tool. As such machines are ordinarily constructed, the iron projecting beyond the gripping dies, which shape and hold the shank, is apt to be bent to one side by the forward stroke of the heading tool, which injures the neck of the bolt, and renders it weak at that point, where it is exposed in use to the greatest strain. To remedy this defect and at the same time to secure the formation of a well formed and symmetrical head, I so construct and arrange my heading tool and dies that the heading tool works entirely within the cavity of the dies in which the head of the bolt is shaped, not being withdrawn on the backward stroke of the heading lever. By this means a uniform stroke of the heading tool in the direct line of the shank of the bolt is secured, and the iron which is to form the head is not bent or twisted at the neck, but is so powerfully compressed between the dies and heading tool as to weld up any crack or imperfection in the iron at that point, and make a very strong and perfect bolt. Another difficulty in the operation of such machines is that when the dies part to deliver the finished bolt or rivet the compression of the iron in the head forces some iron into the body or shank and swells it a little, so that the bolt is apt to bind in one or other of the dies at the neck, and not to fall out at the proper time, which makes it necessary to loosen it by other means, and thus impedes the operation of the machine. This I remedy by means of fingers, either working through the dies or entering their face, which, when the dies open, force out the bolt, either by the retrocession of the dies from the fingers, or by a positive motion of the fingers effecting the desired result.

In bolt machines, where the head of the bolt is formed in a matrix by a heading tool having a positive motion and fixed length of stroke, it is difficult to regulate the length of iron to be inserted in the cavity of the dies for forming the head and to adjust the stroke of the lever to the size of head required to be made. This I effect by making the end of the heading tool, when at the extent of its backward stroke (and when still within the cavity of the dies) serve as a guide for the length of iron to be fed into the machine, and regulating the stroke of the heading tool to suit the required thickness of the head of the bolt, without varying the stroke of the heading lever, by means of a set screw, wedge or similar device in the heading lever, in combination with a yoke for connecting the heading tool to the lever.

My invention, then, consists in the means employed as just stated for obviating the three defects above mentioned in the practical operation of bolt and rivet machines.

To enable others skilled in the art to construct and use my improved machine, I will proceed to describe it in detail.

In the drawing A is the frame or bed plate to which are attached the several parts of my machine. At the rear end of the machine is an upright shaft B, working in suitable bearings on which are the cam *c* which operates the heading lever C, the fulcrum of which is at *o* and the cam *c′* which works in the yoke *d*, and operates the horizontal sliding die carriage D, which carries the moving die *e*. The corresponding die *e′* is stationary, being set in a strong upright *f* attached to the frame of the machine at its front end. The sliding die carriage has a horizontal reciprocating motion communicated by means of the cam *c′* which works between the cross heads *d′ d′* of the yoke *d*. From each side of the sliding die carriage D project two arms *g g* through which pass the horizontal guide rods *i i*, one on each side of the die carriage, the guide rods being firmly attached to the frame work of the machine. The arms *g g* slide along the guide rods *i i* and thus the die carriage is supported and kept in position during its backward and forward strokes. The cam

shaft B is caused to rotate on its axis by power applied to the pulley E.

The stationary die *e'* is set, as before stated, in the upright *f* attached to the frame of the machine. Its face is placed exactly opposite to the die *e'* in the sliding carriage D so that when the faces of these two dies *e e'* come together (as they do on the forward stroke of the die carriage) the cavity for the shank of the bolt, and the cavity for its head in each die, exactly correspond with the similar cavities in the other. These dies have each a cavity of the diameter and shape of the bolt to be made by them, so that they will shape the shank of the bolt, if the iron be not of the required shape already, and will grip the shank and hold it firmly while the head is being formed. The cavity in each die for the formation of the head is also of the required shape and diameter, but its depth is greater than the required thickness of the head, so as to allow the heading tool *h* to have a bearing in that cavity, when the dies are brought together, as the heading tool *h* is never withdrawn so far as to pass out of the head-cavity in the stationary die. The outer edge of these two dies are also in the same plane, so that when the dies come together, the projecting cutting edge of the knife or chisel *s* which is placed beside the die *e* in the sliding carriage D and projecting beyond the face of the die passes close to the outer edge of the stationary die *e'*, thus severing from the rod of iron fed between the dies into the machine, a piece of the right length to make the required bolt. If preferred, heading dies may be used, separate from the gripping dies, but placed beside them in the boxes, in the sliding die carriage D and frame *f*.

Various styles of dies are used to suit the different diameters of iron, length of bolts and shape and size of heads required. The shape of the heading tool *h* is such as to fit exactly in to the head cavity in the dies. The heading tool *h* has a horizontal reciprocating motion at right angles to the plane of motion of the sliding die carriage D communicated through the lever C by the cam *c* which works in a yoke *k* at the end of the long arm of the lever C. The heading tool is set by a screw *t* in a sliding frame *j*, which works in a bearing *l* in the upright *f* of the frame, by which it is kept in place and the direction of its stroke is preserved and regulated. The sliding frame *j* is attached to the heading lever C by a yoke *m* placed over the lever C near its shorter extremity and although the stroke of the heading levers is uniform in length, that of the heading tool is varied to suit the thickness of head to be given to the bolt by means of the set screws *u* and *v*. The set screw *u* passes through the yoke *m* and presses against the outer side of the lever C so that the farther the set screw *u* is screwed down, the sooner will the lever come in contact with it on its back stroke, and consequently the farther will it cause the heading tool *h* to recede in the dies, and vice versa. The length of the forward stroke of the heading tool, that is, the distance that it passes into the head cavity of the dies, is regulated by the set screw *v*, which is screwed into the lever C through a slot *w* in the side of the yoke, for the forward motion of the short arm of the lever C has no effect on the heading tool *h* until the screw *v* comes in contact with the yoke *m* at the end of the slot *w*. The length of the forward stroke of the heading tool *h* may be also regulated by setting it more or less deeply into its sliding frame *j*, adjusting it by means of the screw *t*. The length of the forward and backward strokes of the heading tool is very important, inasmuch as the thickness of the head of the bolt depends upon it, for if a thick head is to be made the heading tool must be drawn farther back in the dies, so as to allow more iron to be inserted into the head cavity of the dies, and the length of the forward stroke of the die must be correspondingly reduced, as otherwise the heading tool could not go in between the dies far enough to allow the cam *c* to pass around, and if the forward stroke of the heading tool were not long enough the iron of the head of the bolt, would not be sufficiently compressed to make a good bolt.

After each stroke of the machine, and when the dies open to discharge the bolt or rivet, it is often found necessary to remove it by some mechanical means, as the bolt is apt to remain in one of the dies, owing to the binding of the die around the neck of the bolt, caused by the forcible compression applied to form the head of the bolt in the heading dies, which enlarges the neck a little.

To insure the delivery of the bolt immediately on the opening of the dies, I employ the following simple contrivance: F, F' are two horizontal rods placed side by side, over and parallel with the dies *e e'* and die carriage D. One of these rods F extends from the front to the rear of the machine, where it is held in place by a bracket in such position as to lie against the shaft B a little above the lever cam *c*. The front end of both of the rods passes through a bracket *q* and the projecting extremity of each is connected by a link or otherwise with a leaf spring (*x* to the rod F and *x'* to the rod F.) The rod F' need not extend so far rearward as the rod F, being connected with the sliding die carriage D by a standard *y* rising from the die carriage and passing through a slot *z* in the extremity of the rod F'. From each of the rods F F' there pro-

jects downward fingers r r' which enter and fit accurately in slots in n n' in the working face of the dies e e'. When the dies are close together gripping the shank of the bolt or rivet, and the rods F F′ are drawn forward by their springs x x' the fingers r r' fill the slots n n' in the dies e e', or at least that part of the slots around the shank of the bolt, so as not to cause any impression of the slots n n' to be made on the iron. As soon as the bolt is formed, on each stroke of the machine, and as the dies open to discharge the nut, the sliding die e withdraws from the finger r' which remains stationary for a while, until the end of the standard y reaches the extremity of the slot z in the rod F, thus if the bolt has stuck fast in the die e, the bolt is removed by the finger r remaining fixed, while the die recedes, but before the end of the backward stroke of the sliding die carriage D, the standard y acts on the end of the rod F drawing it back a little, so as to remove it out of the way of the iron, which is fed in between the dies before the forward stroke of the die carriage D commences, the spring x' causing the rod F′ to resume its former position, as the die carriage advances.

If the bolt should have gotten fast in the stationary die e, it is forced out by the motion of the finger r attached to the rod F. On the rear end of the rod F where it presses against the shaft B there is a notch corresponding with a pin p on the shaft B. This pin is so placed on the shaft B that when the dies begin to open the pin engages the notch in the rod F and draws it and the finger r attached to it backward, causing the finger to pass out of its slot in the stationary die e', and of course remove the bolt. As soon as the pin p has passed the notch in the rod F, the spring x causes the finger r to return to its place in the die e'. The same result of discharging the bolt may be accomplished in other ways substantially the same, as by seating short rods in the dies e e' at right angles to the cavity for the shank of the dies, which rods may be pressed forward by spiral springs or otherwise, and which would recede into the dies when they come together with the iron for making the bolt between them.

Having thus described the construction of my machine, it remains briefly to explain its operation. The parts of the machine being in the position shown in the drawing, excepting that the finger r' is still drawn back by the standard y, the rod of iron which is to be made into bolts, being heated to a welding heat at its extremity, is inserted between the dies, by placing it in the cavity of the stationary die, and pressing it forward until its point comes in contact with the end of the heading tool h which, although at the end of its rearward stroke is within the head-cavity of the dies, and resting against the face of the stationary die e' (as seen in the drawing). Should a thicker head to the bolt be required, the set screw u must be screwed in, so as to cause the lever to draw the heading tool farther back, and the set screw v must be placed farther back so as to give a less forward stroke to the heading tool. The iron being thus fed into the machine, and the stroke of the heading tool adjusted to the thickness of head required, the moving die e comes forward, closes upon the iron in the cavity of the die e', holding it fast, so as to resist the pressure of the heading tool, which now advances and presses the iron in the head cavity of the dies, forming a head of the required shape and size, and compressing the iron so forcibly as to insure the perfect welding up of any imperfections in the iron, making the head and neck of the bolt very firm, strong and compact. The heading tool then withdraws slightly, just enough to relieve the pressure without leaving the head cavity of the dies, and the bolt is discharged by the fingers r r' in the manner before described; the whole operation of making a bolt or nut being performed by one revolution of the cam shaft B.

Having thus described my improvements in bolt and rivet machines, what I claim as my invention, and desire to secure by Letters Patent, is—

1. So constructing and arranging the heading tool, and dies of bolt and rivet machines, that the heading tool shall, during the entire operation of the machine, remain within the head cavity of the dies, substantially in the manner and for the purposes hereinbefore set forth.

2. The use of fingers or rods entering suitable recesses in the face of the dies, and so operated as to discharge the finished bolts or rivets from the dies, either by a positive or relative motion, substantially as described.

3. Attaching the heading tool to its lever, by means of a yoke or similar device, in combination with set screws or wedges, so as to regulate the thickness of the head of the bolt or rivet to be made by the machine, without changing the heading tool, or varying the stroke of the lever itself, in the manner substantially as described.

In testimony whereof, I, Abraham Reese, have hereunto set my hand.

ABRM. REESE.

Witnesses:

M. G. Cushing,

A. S. Nicholson.