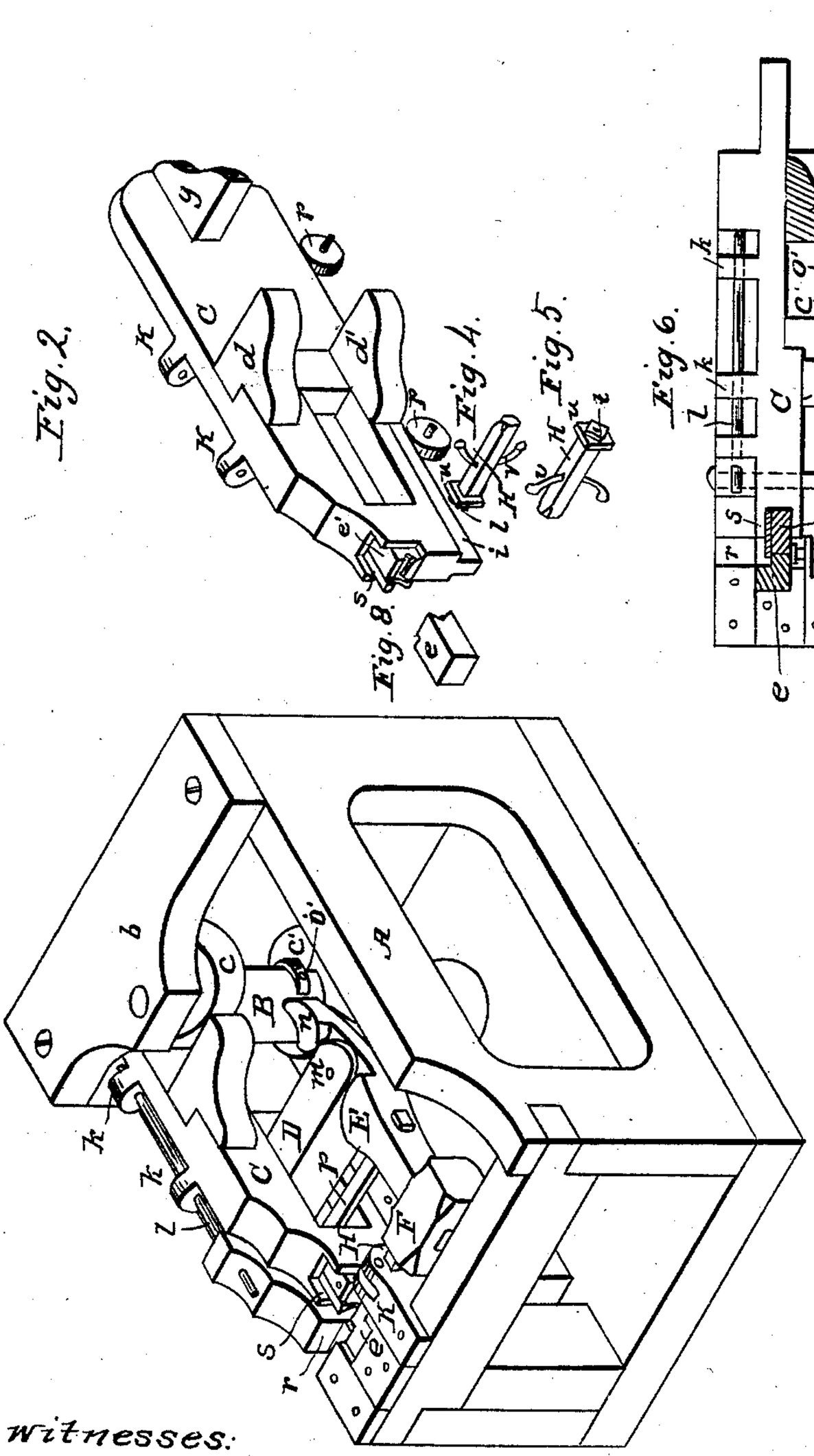
A. REESE.

Bolt and Rivet Machine.

No. 27,238. Patented Feb 21, 1860.



Witnesses:

Martin G. Cushing

Charles W. Hubbard.

Inventor:

A. Reese

UNITED STATES PATENT OFFICE.

ABRAHAM REESE, OF PITTSBURG, PENNSYLVANIA.

RIVET AND BOLT MACHINE.

Specification of Letters Patent No. 27,238, dated February 21, 1860.

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 Machines for Making Bolts and Rivets; 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, in which—

Figure 1, is a perspective representation of my improved machine. Fig. 2, is a perspective representation of the sliding die carriage, set upon rollers. Fig. 3, is a representation of the stationary die, detached from the machine. Fig. 4, represents the spring heading tool (which is concealed from view in Fig. 1,) in the position which it occupies in the machine. Fig. 5, is the spring heading tool reversed, so as to show its shape more clearly. Fig. 6, is a top view of the machine, showing the position and shape of the several cams, on the shaft B, and of the other parts of the machine.

In the several figures, like letters of reference are used to denote similar parts.

My improved machine belongs to that class of bolt and rivet machines, in which the rod of iron, of which the bolt or rivet is to be made, is gripped between dies, which shape the body of the bolt or rivet, or if the rod is already of the required shape, hold it firmly, while the head is formed not by pressure, but by the repeated strokes of a hammer.

The difficulty in making good bolts or rivets by machinery, is to make the head strong and solid, so that it will not be weak at the neck or point where the head connects with the body, for it is at this point, that bolts or rivets are exposed to the greatest strain, and therefore ought to be strongest.

Two modes of making bolts and rivets by machinery are chiefly in use. In one mode, the body of the bolt is held by dies, which grip it around the neck, while the head of the bolt or rivet is formed by means of a header working in dies of the requisite shape of the head. The iron to form the head projecting into the matrix formed by the heading dies, is pressed by a single stroke of the header with so much force as to spread it out sufficiently to fill the matrix in which it is compressed by the header. This makes a very prettily shaped head, but as it is not always possible to adjust the amount of iron, projecting from the gripping dies to form the head, to the capacity of the matrix formed by the heading dies and header, the length of whose stroke must necessarily be uniform, it frequently happens, that the head does not receive the necessary degree of compression, and the pressure of the header on the end of the iron rod, is apt to crack it, and make an imperfect head, which will be apt to give way at the neck, so that bolts and rivets thus formed are not nearly so strong as those the head of which is formed by being upset by the repeated strokes of a hammer. The other mode of making bolts and rivets, is to use a trip hammer operated by machinery, striking on the head of the bolt, while the sides and corners of the head are also struck by sliding dies or hammers. This mode requires complicated machinery, which is liable to get out of order and does not form the head so accurately, or give it as good a shape and finish as the method first described. My improved machine is designed to combine both these methods, securing the advantages of each, and at the same time, to simplify the construction of the machinery; which is very important, as many of the bolt and rivet machines, now in use, are very hard to keep in order, or to repair when they become deranged.

In order to enable others skilled in the art, to construct and use my improved bolt and rivet machine, I will proceed to describe its construction and operation.

In the drawing Fig. 1, A, is a strong rectangular frame of iron, which contains and supports the several parts of my machine. At one end (which for the sake of distinction, I shall call the rear end) is a strong upright shaft B, the lower journal of which, works in a bearing *a* and the upper journal in the horizontal crosspiece *b* of the frame A. This shaft revolves on its axis by power communicated by gearing from a steam engine or other prime motor, in any convenient way. At the top of the shaft B is a semicircular horizontal cam *c* and at a short distance below it, is another cam *c'* of similar size and shape, and similarly set on the shaft B. These cams work against the cross heads *d d'* which project horizontally from the inner side of the sliding die carriage C, the shape, construction and details of which, are shown in Fig. 2.

The cams *c c'* operating on the cross heads *d*, *d'* press the sliding die carriage C in a horizontal direction, with a rapid motion forward, so as to bring the dies *e e'* in contact with each other, and keep them together without diminution of pressure, during the greater part of the revolution of the shaft B. A small pointed cam *f* (see Fig. 6) projects from the shaft B, immediately under the upper cam *c* by which the back strokes of the sliding die carriage C is effected. This cam *f*, projects to the outer edge of the cam *c'*, and is designed to work against the cross head *g* projecting from the sliding die carriage C near its rear end. The horizontal plane of the cross head *g* is below that of the cross head because its cam *f*, is immediately under the cam *c* on the shaft B, and it (the cam *g*) is so situated on the shaft B as to withdraw the sliding carriage C as soon as the pressure of the cams *c c'* on the cross heads *d d'* ceases.

The sliding die carriage C is set horizontally in the frame A at one side of the machine, its lower edge resting on rollers *h h* (seen in Fig. 2, but concealed in Fig. 1) which rollers are set in the frame A. On the lower edge of the sliding die carriage C, is a tenon *i* (see Fig. 2.) which works in a longitudinal groove in the frame A, which thus keeps it in place. The upper edge of the carriage C, is kept in position by two arms *k k* which slide on a horizontal rod *l*, attached to the frame A (as seen in Fig. 1.)

A strong block D projects inward horizontally from one side of the frame A, near the end of which, is the pivot *m* on which vibrates the arm E of the trip hammer F. The hammer arm E is so pivoted to the block D that the length of the arm from *m* to the hammer F is greater than from *m* to the rear end or point *n* of the arm. Around the shaft B are a series of small cams *o o'* &c. (see Figs. 1 and 6) which are so placed, as to come in contact with the point *n* of the hammer arm E, and as they pass the point *n*, gradually depresses it, and when it passes the highest point of the cam, allows it to fall suddenly, thus causing a stroke of the hammer, which is repeated as often as the point *n* of the hammer arm passes a cam *o* & *o'* on the shaft, giving as many strokes of the hammer in one revolution of the shaft as there are cams *o* & *o'* on the shaft B. One of these cams *o'* is so situate, that its lowest point comes in contact with the point *n* of the hammer-arm E just at the moment when the cam *f* begins to press against the cross head *g* and the sliding carriage C begins to recede (as seen in Fig. 6); by this arrangement, the hammer F is raised from the heading tool H, so soon as the sliding carriage C begins to recede, thus permitting the iron rod of which the bolt or rivet is to be made, to be inserted far enough between and beyond the dies, to give sufficient iron, for the formation of the head of the bolt or rivet. The number of these cams may be varied at pleasure, so as to make the hammer strokes more or less frequent, according to the size of the machine, or the cams may be removed from the shaft, so that their number may be increased or diminished at pleasure. A spring *p* is attached to the frame A, and either pulls or presses the hammer arm E in such a manner, as to give a stroke to the hammer F in the direction of the dies *e e*, whenever the cams *o o'*, pass under the point *n* of the hammer arm. This spring may be a spiral or a leaf spring or a heavy piece of india rubber or any other kind of spring, which may be found most efficient or convenient, and may be attached to, or press against the hammer arm E on either side of the fulcrum *m*.

In a box at *q* on the front end of the frame A, and in exact range with the sliding die carriage *c*, is placed the stationary die *e*, having its face edges, in a line with the center of the hole *r* in the frame, through which the rod of iron to be made into a bolt or rivet, is inserted. The shape of this die is seen in Fig. 3, the contour of its face, being made to suit the shape of the body of the bolt or rivet, to be manufactured:—In order to suit the variety of diameter and shape of bolt or rivet required, whether cylindrical, square, straight or tapering, a variety of suitable dies is kept, which may be inserted in the machine, and used at pleasure. A similar die *e'*, is inserted in a suitable box or cavity in the front end of the sliding die carriage C—as seen in Fig. 2; the dies *e* and *e'*, when their faces are brought together by the forward stroke of the carriage, serving either to shape the body of the die (or only to hold it firmly in place during the heading operation, if the rod of iron is already of the proper shape.) In the cavity of the sliding die carriage C in which the moving die *e'* is placed, there is also inserted a steel chisel or knife *s*, which is placed on the outer side of the die *e'*, and projecting beyond its face, so that, when the dies *e e'* come in contact with each other, the projecting edge of the knife *s* passes close in front of the outer edge of the die *e'*, thus severing the rod, as it is fed into the machine, cutting off the bolt or rivet of the length required, which is regulated by the length of the face of the dies *e e'*. In case it is desired to make a bolt or rivet head at the end of a long bar of iron the knife *s*, is taken out, and the head is formed at the extremity of the rod, without severing it.

The cavity, at the inner end of the dies *e* and *e'* is enlarged so as to form a suitable matrix, when the dies are brought together, for forming the head of the required shape.

If preferred, heading dies may be used of

various size, separate from the gripping dies *e e'* and placed with them in their boxes, in the frame A, and sliding carriage C.

The heading tool H, by which the end of the head of the bolts is shaped by being compressed in the matrix in the dies formed for that purpose, is placed immediately in the line of the center of the space left when the dies come together, and in which the rod of iron is placed. The heading tool is supported in its place by the projecting guide block *k* through a hole in which the heading tool *h* vibrates as struck by the hammer. The shape of this heading tool is seen in Figs. 4 and 5. The head end (turned toward the eye in Fig. 5,) has a projection *t*, which is square, six sided, round, or other required shape of head, and which fits exactly into the cavity for the head at the end of the dies *e e'*. Below this projection, is a flange or collar *u*, which prevents the heading tool passing so far into the dies, as to injure their inner surface, in case the heading tool should be struck by the hammer before the iron rod is fed into the machine. Below their collar or flange *u* the heading tool is squared so as to work in the similarly shaped hole in the guide block *k*, and then cannot turn on its axes, which would prevent its head entering the dies accurately. There is a spring through the heading tool and attached to the guide block *k* which causes the retrocession of the heading tool H, whenever the hammer is raised after a stroke. The head F of the hammer is so situated as to strike fair on the end of the heading tool at every stroke.

Having thus described the construction of my improved machine, a few words will suffice to explain its operation.

When the sliding die carriage is withdrawn, the rod of iron to be made into bolts or rivets, being first heated to a welding heat, is inserted between the dies. The hammer being raised by the cam *a'* as before described, so as to allow the retrocession of the heading tool, the end of the bar is passed in, until it touches the head *t* of the heading tool H. The further revolution of the shaft B, quickly closes the dies *e e'* and grips the iron rod firmly, giving it the required shape of body, if it be not already of the shape of the cavity of the dies; a portion of iron rod projecting beyond the end of the dies sufficient to form the head of the bolt or rivet: A still further revolution of the shaft B causes the end of the heading tool to be struck forcibly by the hammer, and the head *t* of the tool H, pressing against the end of the heated rod, when the tool is struck by the hammer, upsets it, and drives it into the cavity or matrix in the dies: the hammer is immediately raised, and the heading tool H flies back from the dies, and another blow of the hammer follows, causing the end of the rod to be struck with a rebounding blow, almost exactly like that struck by hand with a hammer, only much more powerful. These blows are repeated as often as there are cams in the shaft, and then the sliding carriage is withdrawn, and the finished bolt or rivet drops out, and the machine being ready for repeated use, the iron rod is again fed in, with a like result.

It is manifest from the description, that the operation of my machine, compresses the iron forming the head of the bolt or rivet, in the matrix formed by the dies for the head, by the head of the heading tool, which fitting in between the dies, gives a smooth and finished appearance to the head, while at the same time, the action of the hammer on the heading tool, upsets the iron in the like manner, as if the iron were struck immediately by the hammer, and the result is that the iron in the head of the bolt or rivet, is firmly welded together, making a strong and solid head.

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

1. The use of a sliding die carriage, working upon rollers, in the manner hereinbefore described.

2. The combination of a heading tool, reacting by means of a spring, with a trip hammer so arranged as to give repeated strokes on the heading tool between each stroke of the gripping dies, and with dies forming a matrix for the head of the bolt or rivet; for the purpose of forging the heads of bolts and rivets into shape when inclosed in a die, by repeated blows of the hammer on the heading tool working in the cavity of the heading dies in the manner hereinbefore described.

In testimony whereof I have hereunto set my hand, this twenty-sixth day of November A. D. 1859.

ABRM. REESE.

In presence of—
MARTIN G. CUSHING,
AND. M. MASTER.