J. Gribben.

Die for Making Bolts.

No. 57,313. Patented Aug. 21, 1866.

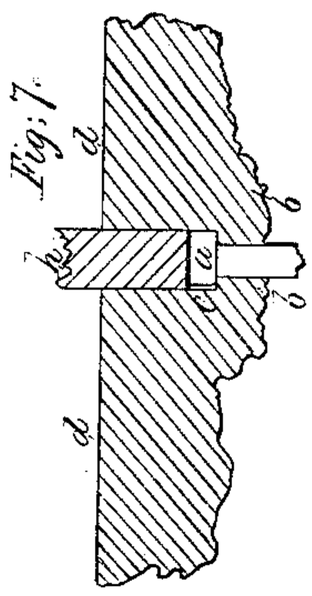
Fig. 7.


Fig. 5.

Fig. 6.

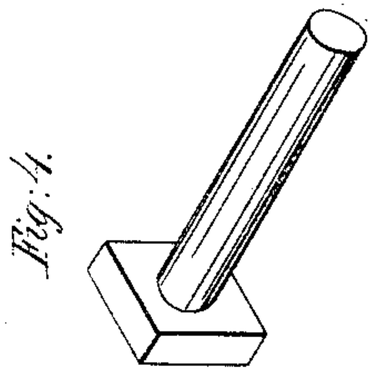
Fig. 4.

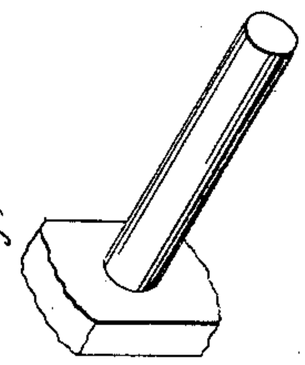
Fig. 3.

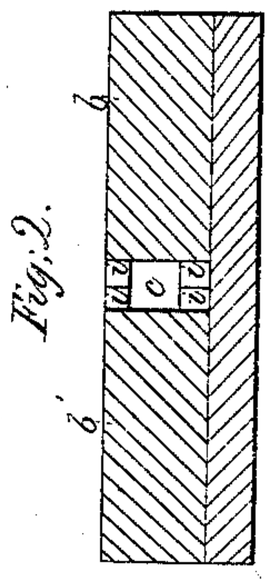
Fig. 2.

Fig. 1.

Witnesses.

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UNITED STATES PATENT OFFICE.

JOHN GRIBBEN, OF ALLEGHENY, PENNSYLVANIA.

IMPROVEMENT IN DIES FOR BOLT-HEADING MACHINES.

Specification forming part of Letters Patent No. **57,313**, dated August 21, 1866.

To all whom it may concern:

Be it known that I, JOHN GRIBBEN, of the city of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Manufacture of Square-Head Bolts; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective representation of my improved dies, and of the header for making square-head bolts, the dies being open, and the face of one of the dies being broken away so as to show the face of the opposite die. Fig. 2 is a cross-section through the dies, when closed, on the line *x x* of Fig. 1. Fig. 3 represents the shape of the head of a bolt after the first operation of the dies. Fig. 4 shows the shape of the head of the bolt when finished. Figs. 5, 6, and 7 represents the operation of dies of ordinary construction, and showing one of the evils which my invention is designed to overcome.

In the several figures like letters of reference denote similar parts of the machine.

In the manufacture of bolts the chief object to be attained is to make the bolt sufficiently strong at the neck, or the point where the shank joins the head. The chief strain on a bolt when in use is at this point, because, as the strain bears on the under side of the head, if the neck be weak the head will give way. As the head of bolts, when made by machinery, is formed by staving up the end of a piece of iron, which was previously of uniform diameter, within a cavity of suitable size and shape, the great danger is that by the consequent derangement of the fibers of the iron in the process of staving up, the continuity of fiber between the shank and head will be broken, and thus, although the external appearance of the bolt may be good, its weakest point will be just where the head and shank unite, the very point which ought to be the strongest. The cause of this defect is shown in Figs. 5, 6, and 7. In Fig. 5, *a* represents a piece of iron held between the griping-dies *b b*, and projecting into the cavity *c* of the heading-dies *d d*. The header *h* is about to descend on the iron and stave it up, so as to fill the cavity *c* and shape the head.

As the end of the iron from which a previously-made bolt has been severed by cutters is usually higher on one side than the other, the header pushes the iron first over to one side, as in Fig. 6, and as it descends farther, and the iron comes in contact with the side of the heading-die *d*, it is forced back again, the effect of which is that the iron forming the head is pushed sidewise, first in one direction and then in the other, while the shank or body of the die is held immovable by the griping-dies, and thus the fiber of the iron is broken between the shank and head. The head also is liable to be made larger on one side than on the other, as shown in Fig. 7. When this is the case the next operation of the heading-dies and header pushes the head over to its proper position on the shank, and a still further disruption of the fibers of the iron is the result.

In order to enable others skilled in the art to make and use my improved dies, I will now proceed to describe the nature and operation of my improvement.

In the drawings, Fig. 1, *b b′* are the two griping and heading dies, the die *b* being stationary, while the other die, *b′*, is moved by any suitable mechanical device back and forth, with its face parallel to the face of the stationary die *b*. The front portion of the dies have each a corresponding semi-cylindrical cavity, *e*, by which the rod of iron from which the bolt is to be formed is griped and held in place during the process of heading. Back of the griping-cavity in the dies, when their faces are brought together, is a square cavity, *c*, of the size (in cross-section) of the head of the bolt, into which cavity the header *h* fits. One-half of this square cavity *c* is in each of the dies *b* and *b′*.

The peculiar features of the construction of the dies *b b′* is that the projecting portion *i* of the die, which forms the top and bottom of the cavity, is cut away immediately back of the griping portion of the die, for a distance a little greater than the depth or thickness of the head of the bolt, as shown in Fig. 1, so as to allow the iron forming the head to spread up and down into the space *n* on two sides of the head, while it is confined by the walls of the dies to the proper size on the other two sides.

The operation of the machine as thus constructed is as follows: The rod of iron to be headed for a bolt is first heated and then

placed in the semi-cylindrical cavity *e* of the stationary die *b*, with a portion sufficient to form the head projecting toward the header *h*. The dies are then closed, the projecting faces *i i* of the dies coming together and forming the square cavity *c*, as shown in Fig. 2. The header is then advanced, while the iron rod is prevented from receding by the griping portion of the dies. As the iron is staved up by the advance of the header *h* it is sustained on all four sides by the walls of the square cavity *c*, and is thus prevented from spreading too much in any one direction, and is staved up evenly; but when the header is about to complete its stroke and compress the head into shape the staved-up portion of the iron is all contained in that part of the cavity *c* which is inclosed only on two sides, and consequently the iron has a chance to spread up and down in two directions while the other two sides are compressed. This forms the head of the shape shown in Fig. 3. If there is more iron on one side of the head than on the other, this surplus protrudes into the space above or below the perimeter of square cavity, and is not forcibly pushed to one side, as by the ordinary method of heading. The dies are then opened and the partly-formed bolt is turned quarter round, so as to present the bolt-head in the opposite direction to the sides of the square cavity *c*, and so that the two edges which were not restrained by the sides of the die at the end of the stroke of the header are now compressed and shaped, while the other two opposite edges are allowed to spread if necessary. This turning of the bolt and iteration of the stroke of the header and compression of the dies may be continued until by the repeated operation the head is well shaped without injury to the strength of the iron at the neck of the bolt.

In my drawings I have shown the griping and heading dies united; but, if preferred, they may be separated and made to work independently.

Another advantage of my improvement is that only two sides of the head of the bolt, at the end of the stroke of the heading-tool, are in contact with the sides of the die, the other two sides projecting into the space *n*, so that those two sides are not so much chilled as they would otherwise be, and are more readily shaped by the sides of the dies on the next operation.

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

The dies for making square-headed bolts, constructed substantially as hereinbefore described—that is to say, so that when brought together they will inclose a cavity in which to form the head, of which cavity two opposite sides are removed for a space in the direction of the length of the bolt equal to the thickness of the head, but otherwise inclosing all sides, both of the blank and of the upsetting-punch.

In testimony whereof I, the said JOHN GRIBBEN, have hereunto set my hand.

JOHN GRIBBEN.

Witnesses:
A. S. NICHOLSON,
ALLAN C. BAKEWELL.