

(No Model.)

2 Sheets—Sheet 1.

W. E. WARD.
BOLT BLANK MACHINE.

No. 341,970.

Patented May 18, 1886.

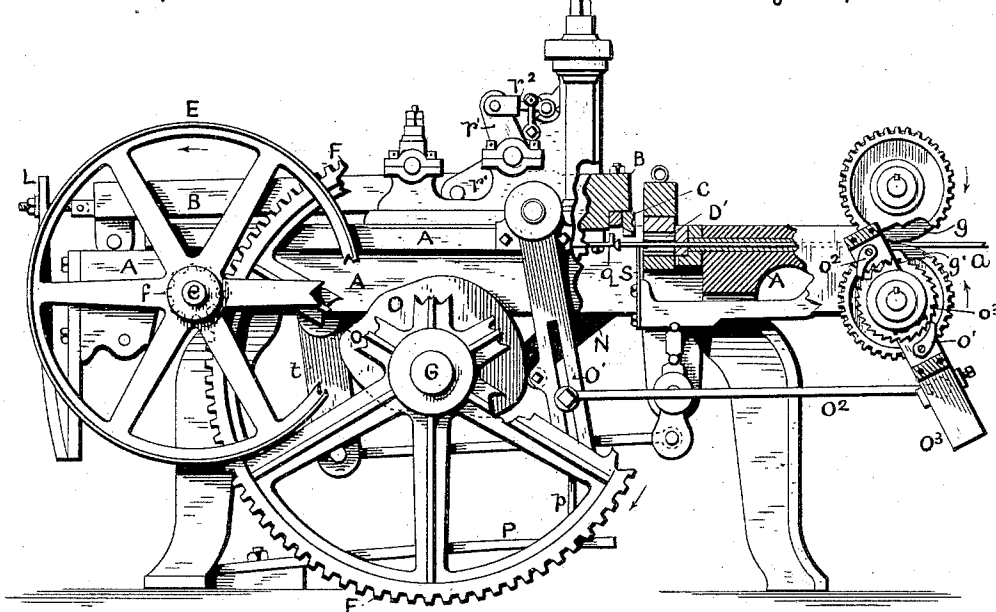


FIG. 1.

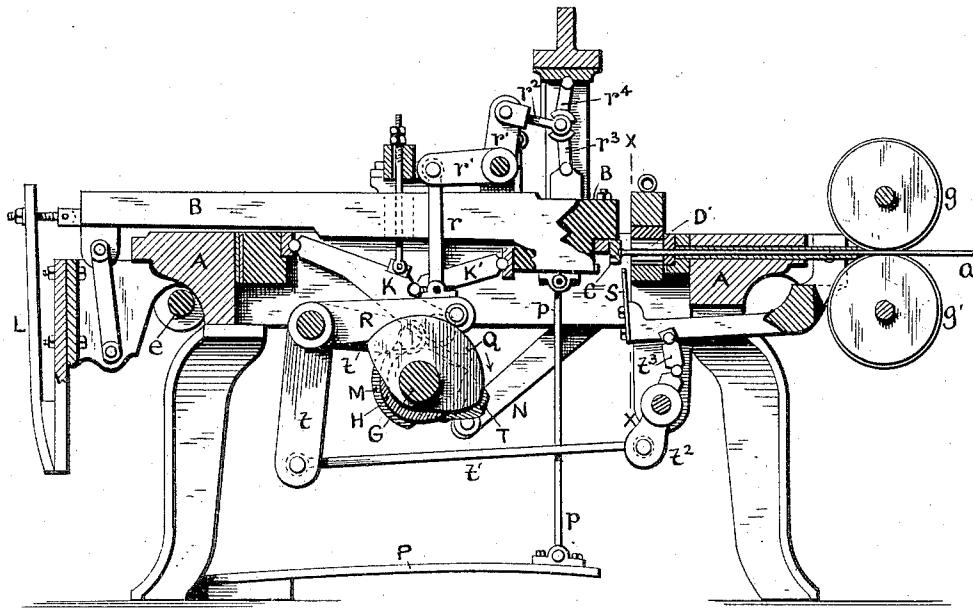


FIG. 2.

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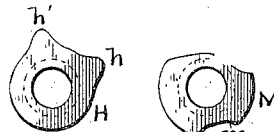


FIG. 3.



FIG. 4.

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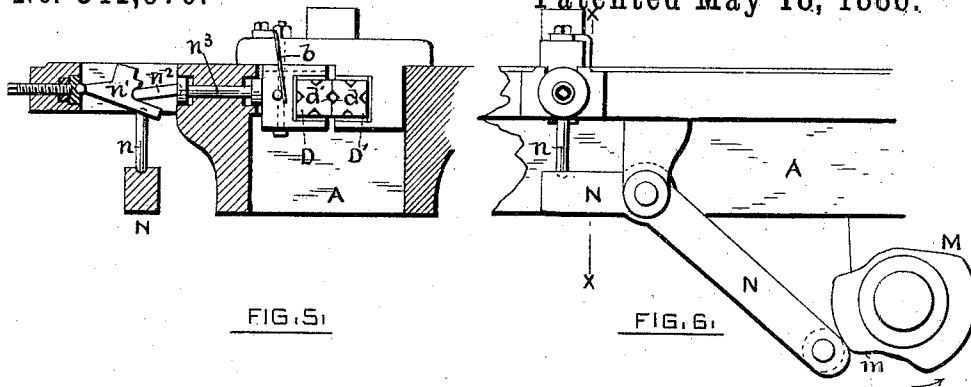


FIG. 5.

FIG. 6.

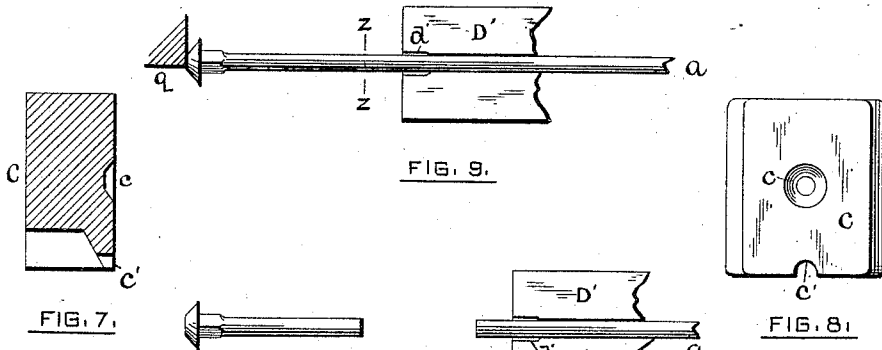


FIG. 7.

FIG. 9.

FIG. 8.

FIG. 10.

FIG. 11.

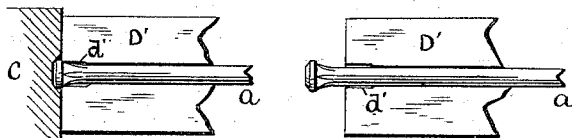


FIG. 12.

FIG. 13.

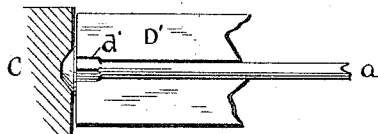


FIG. 14.

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UNITED STATES PATENT OFFICE.

WILLIAM E. WARD, OF PORT CHESTER, NEW YORK.

BOLT-BLANK MACHINE.

SPECIFICATION forming part of Letters Patent No. 341,970, dated May 13, 1886.

Application filed December 24, 1885. Serial No. 186,592. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. WARD, a citizen of the United States, residing at Port Chester, in the county of Westchester and State of New York, have invented a new and useful Improvement in Machines for Forming Bolt-Blanks from Cold Rods of Metal; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The feature of the present invention which distinguishes it from all former machines for heading-bolts with which I am acquainted is, that the rod from which the bolt-blanks are to be consecutively formed is fed forward a succession of times through the gripping-jaws, which hold and sustain the rod to enable the head to be formed by a succession of upsetting operations, each upsetting action of the heading-forming ram being consequent upon a fresh feeding of the rod. By my invention I am enabled to form heads of any desired size upon either square or round rod-stock for bolt-blanks, and in case round stock is used a square under the head of sufficient length for all ordinary requirements of a bolt can be obtained.

My invention can be applied to any ordinary single-acting bolt-heading machine known for many years in the art by simply reorganizing the same, so that the mechanism which feeds the rod through the gripping jaws or dies shall be arranged, first, to feed forward the rod beyond the anvil-faces of such jaws or dies a prescribed distance to enable the heading-ram when it advances to upset the portion of the rod so projecting. In this respect the action is analogous to that which is performed by ordinary bolt-heading machines; second, to arrange the feeding mechanism in timely relation to the retreating movement of the heading-ram, so that the rod will be fed forward through the gripping jaws or dies for a further distance, to enable the heading-ram when it next advances to perform a second upsetting operation thereon; and, third, if so desired, to arrange the machine so as to effect successive operations of rod-feeding and heading-upsetting until the completed head of any re-

quired size is formed, the distinguishing characteristic of my invention being the performance of a succession of feeding operations while the rod is contained between the same pair of gripping jaws or dies, and a succession of upsetting operations upon such intermittently-fed rod, whereby a full head of any size can be progressively formed from a rudiment to the completed whole.

In the accompanying drawings, Figure 1 represents in side view and partial section a machine for forming bolt-blanks in accordance with the invention. Fig. 2 shows a longitudinal section of the same. Figs. 3 and 4 represent, respectively, the cam for giving the horizontal forward movements to the ram and the cam for causing the gripping jaws or dies to hold the rod. Fig. 5 shows an end view of the gripping jaws or dies and the mechanism through which the movable jaw is advanced. Fig. 6 shows a side view of the cam and lever for operating the mechanism. Figs. 7 and 8 represent, respectively, a vertical section and a face view of the matrix or die for shaping the head of the blank. Fig. 9 shows a side view of one of the gripping-jaws and the headed rod fed forward against a gage or stop preparatory to severing the blank from the rod. Fig. 10 represents the blank. Fig. 11 shows the rod projecting beyond the face of one of the gripping-jaws after the blank has been severed and in readiness for the first upsetting operation. Fig. 12 shows the matrix or die acting upon the rod to form a rudimentary bolt-head thereon. Fig. 13 represents the rod having a rudimentary bolt-head fed forward preparatory to the second upsetting operation. Fig. 14 represents the matrix or die acting upon the rod to complete the bolt-head.

A represents the frame of the machine, in and upon which the various parts are mounted, the said frame being similar to those of ordinary bolt-heading machines.

B is the heading-ram, which is mounted to have the usual reciprocating movements in vertical and horizontal planes. It carries upon its forward end the usual die-block, C, provided with a matrix, c, Figs. 7 and 8, corresponding with the form of the finished bolt-head.

DD' are the gripping jaws or dies. Through these the rod *a*, out of which bolt-blanks are to be formed, is to be fed, such rod being gripped by the jaws while the upsetting operation is being performed, the grip being relaxed at the time the rod is being fed.

Power is applied to the machine through the pulley E, keyed to the transverse shaft *e*, mounted in suitable bearings on the frame.

Upon the shaft *e* is keyed a pinion, *f*, (shown in dotted lines at Fig. 1,) the teeth of which engage with the teeth of a gear-wheel, F, keyed to the transverse shaft G. Upon this latter shaft the various cams which control the movements of the heading-ram and the feeding mechanism are mounted.

g g', Figs. 1 and 2, are the feeding-rollers, which are made to act to feed forward the rod intermittingly in a well-understood way.

Assuming the rod *a* of bolt-stock to have been fed forward a prescribed distance, as indicated in Fig. 11, the heading-ram advances by the action of the tooth *h* of the cam H upon the arm K of the toggle K K'. The toggle is thereby straightened, and its rear end being immovable, because resting upon the frame A, as shown in Fig. 2, the ram is moved horizontally toward the gripping jaws or dies D D'. The effect is to upset the end of the rod, and the result is to produce a partially-formed head, as illustrated at Fig. 12. The continued revolution of the cam H allows the ram to be retracted by the spring L. Contemporaneously, or nearly so, with this backward movement of the ram the grip of the jaws D D' is relaxed by the influence of the spring *b*, Fig. 5, upon the jaw D, which spring is now allowed to act for the reason that the cam M, Figs. 2, 4, and 6, no longer operates through the lever N, pin *n*, toggle *n' n''*, and pin *n''*, Figs. 5 and 6, to hold the gripping-jaws shut. Thereupon the feed-rollers *g g'* are caused to advance the partially-headed rod against a stop (preferably the die C, which remains in alignment with the rod, as shown in Fig. 2) by the influence of the rise *o* on the cam O, Fig. 1, which acts upon a pivoted arm, O', connected by a rod, O², to an arm, O³, carrying pawls *o'* *o''*, which engage a ratchet-wheel, *o''*, secured to the shaft upon which the lower feed-roll, *g'*, is mounted. The rod, with its partially-formed head, will now project beyond the anvil-face of the gripping-jaws, as illustrated at Fig. 13. The gripping-jaws now close again by the continued rotation of the cam M through the influence upon the lever N of the rise *m* on said cam. The heading-ram now for the second time advances through the influence of the tooth *h'* of the cam H upon the toggle K K', and again upsets the rod, thereby completing the head of the bolt-blank, as illustrated at Fig. 14.

The above-described operations of feeding forward the rod, and of causing the ram to advance to further upset the head, may be repeated any desired number of times by increasing the capacities of the cams O, M, and

H, controlling, respectively, the feeding mechanism, the gripping-jaws, and the horizontal movements of the ram.

The completely-formed bolt-head having been made upon the end of the rod, the ram is retracted by the spring L, to clear the same from the rod. The ram-head is then elevated, in a very familiar way in this class of machines, by the influence of a spring, P, Figs. 1 and 2, which is connected with the ram by a rod, *p*, and acts, when permitted by the contour of the cam Q, in the usual manner. The ram-head having been elevated, the rod, with the fully-formed head thereon, is now fed forward, preferably against a stop, *q*, Figs. 1 and 9, for a distance equal to the full length of the bolt-blank, and for such distance, in addition, as will furnish the metal for the first operation of forming the head on the succeeding blank, as illustrated at Fig. 9, in which the length of the finished bolt is indicated by the dotted line Z Z. The ram-head is now made to descend by the influence of the cam Q, Fig. 2, which acts upon a lever, R, connected by a rod, *r*, to a bell-crank lever, *r'*. The lever *r'* is connected by a rod, *r''*, to the toggle-arms *r''* *r'''*, one of which bears upon the ram-head and the other upon the frame of the machine, as shown in Fig. 2. The descent of the ram-head causes a cutter, *c'*, Figs. 7 and 8, to act in conjunction with the movable rest S, Figs. 1 and 2, to cut off the blank from the rod, as illustrated at Fig. 10. This rest has been brought up in a well-known manner, to support the rod during the descent of the ram-head, by the cam T, acting through the bell-crank lever *t*, connecting-rod *t'*, and toggle-lever *t'' t'''*.

The operations before described are to be repeated in forming successive bolt-blanks.

If bolt-blanks made from round rods are to have a "square" under the head, the gripping jaws or dies D D' are provided, respectively, with the necessary die-recesses *d d'*, Figs. 5, 9, 11, 12, 13, and 14, well known in the art, so as to produce such square, as shown in Figs. 9, 10, and 14. It will be readily understood that by a succession of feeding operations and a succession of upsetting operations in the formation of the head the square under the same will be progressively formed, and will necessarily be more perfect in shape, and may be greater in length than when formed as heretofore practiced, which is a feature of importance.

It is apparent that in carrying out my invention it is not necessary that the rod should be fed forward to the same extent preliminary to each upsetting operation; but the extent to which the rod may be fed for the successive operations may be varied as experience in working different descriptions of metal may require for producing the best results. It will also be evident to constructors of this class of machinery that the specific devices and mechanical contrivances for accomplishing the operations hereinbefore described can be greatly

varied to produce the same result of progressively feeding forward a rod of stock for bolt-blanks, and subjecting such rod, after each feeding operation, to the action of a ram for
5 upsetting the metal, and thereby progressively forming the bolt-head thereon—as, for instance, instead of employing single cams or disks having more than one cam-face or salient projection, respectively, for producing the
10 horizontal movements of the ram, the movements of the gripping-jaws, and the feeding of the rod, separate cams may be used for causing each definite movement of these parts, and such cams may be located upon a single shaft,
15 or upon more than one shaft, as will be readily understood.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, substantially as herein-
20 before set forth, of mechanisms, substantially as described, for feeding forward at successive

times the rod from which blanks are to be made, for gripping at successive times the rod after it has been fed, and for upsetting at successive times the end of the rod to form the
25 head, such mechanisms being arranged as described, so that the said operations of feeding, gripping, and upsetting, respectively, shall follow each other in series, whereby a complete
30 head can be progressively formed on the end of the rod.

2. The method, substantially as described, of progressively forming a head upon bolt-blanks from cold rods of metal, which consists in a plurality of feedings, grippings, and up-
35 settings upon the rod before severing, following each other in series, as herein set forth.

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Witnesses:

JOSEPH H. MARSHALL,
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