

(No Model.)

2 Sheets—Sheet 1.

W. E. WARD.
BOLT BLANK MACHINE.

No. 341,971.

Patented May 18, 1886.

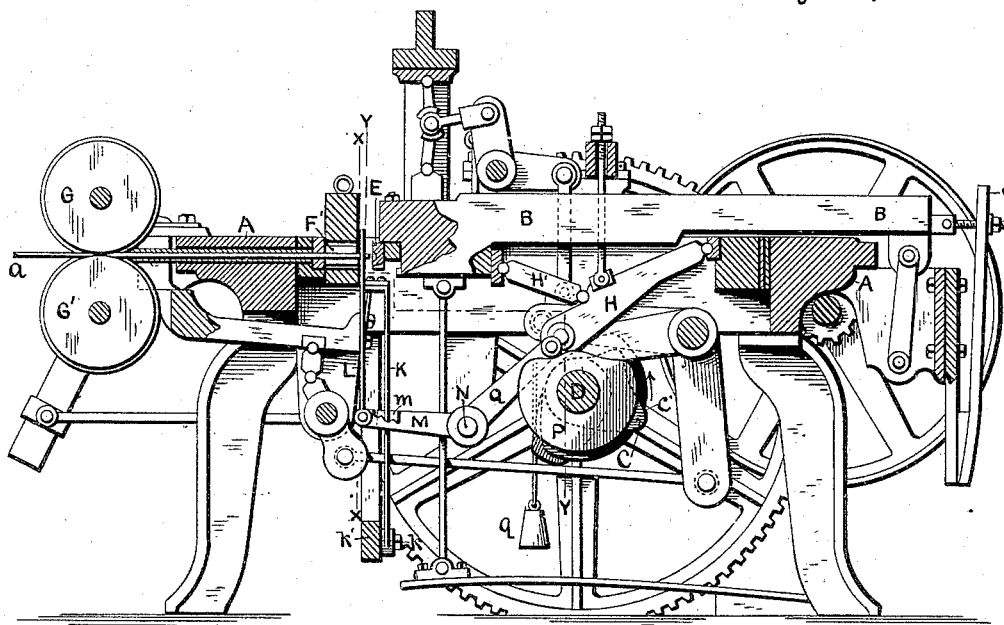


FIG. 1.

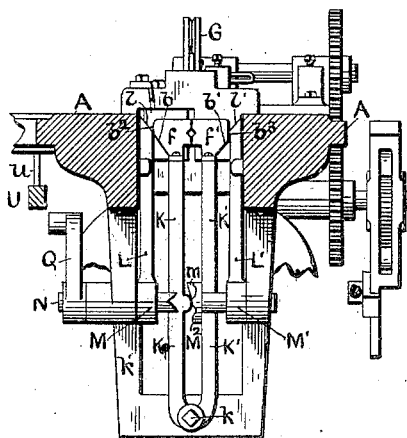


FIG. 3.

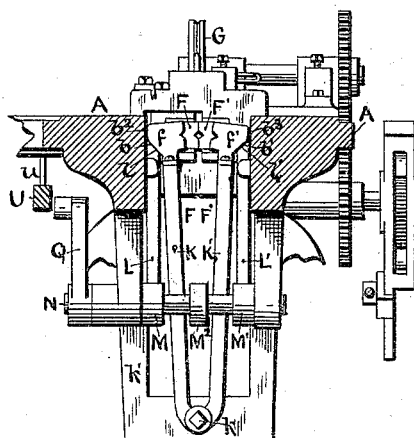


FIG. 4.

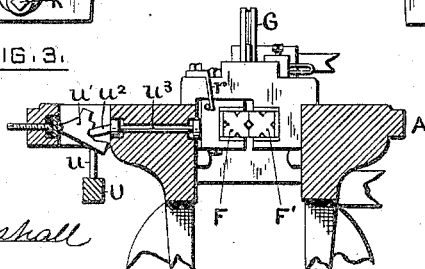


FIG. 2.

WITNESSES.

Joseph W. Marshall
Edwin Salisbury Jones

INVENTOR.

W. E. Ward

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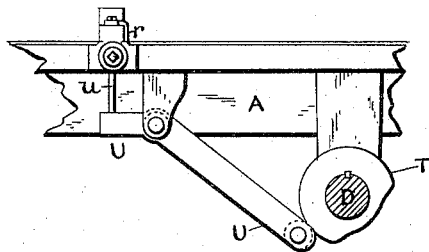


FIG. 5.

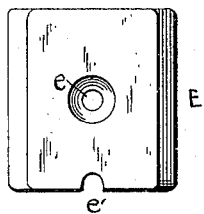


FIG. 7.

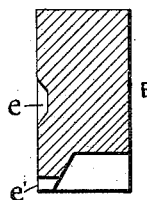


FIG. 8.

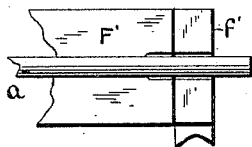


FIG. 10.

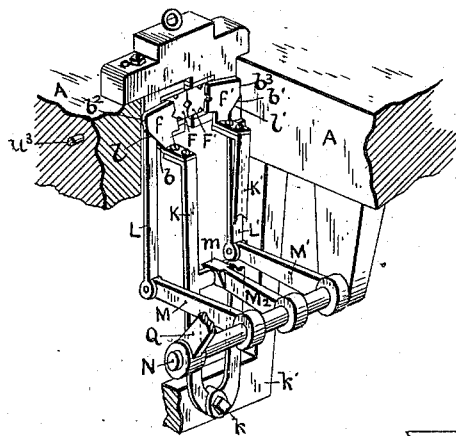


FIG. 6.



FIG. 13.

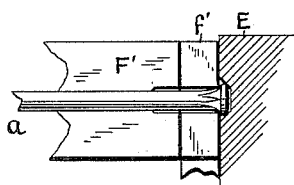


FIG. 11.

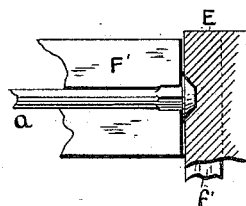


FIG. 12.

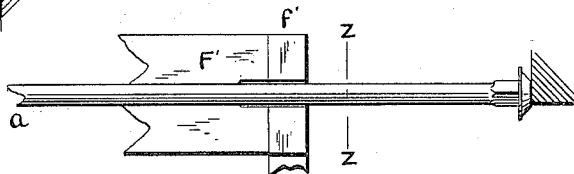


FIG. 9.

WITNESSES.

Joseph W. Marshall
Edmund Salisbury Jones

INVENTOR.

W. E. Ward

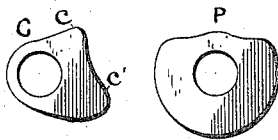


FIG. 14.

FIG. 15.

UNITED STATES PATENT OFFICE.

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

BOLT-BLANK MACHINE.

SPECIFICATION forming part of Letters Patent No. 341,971, dated May 18, 1886.

Application filed December 24, 1885. Serial No. 186,593. (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, county of Westchester and State of New York, have invented a new 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.

In another application for Letters Patent, for an improvement in machines for forming bolt-blanks from cold rods of metal, I have described a machine the novel characteristic of which is that the rod of bolt-stock is fed forward more than once during the formation of the bolt-head, and the heading-ram is made to advance more than once to upset the end of the rod, whereby, as a result of a succession of feeding, gripping, and upsetting operations, a complete head of large size relatively to the diameter of the rod-stock will be progressively formed on the end of the rod.

The present invention is to accomplish the same result in kind by a different combination of devices; and it consists in the employment of a heading-ram, to which more than one advancing movement is given, for upsetting the rod-stock, in combination with gripping jaws or dies for holding the rod during the operation of forming the bolt-head, which jaws or dies are made in sections, so that by the withdrawal of a die-section after an upsetting operation has been performed there will be an exposure of a portion of the length of the rod-stock corresponding with the thickness of such removed die-section, whereupon a second advance of the heading-ram will be able to further upset the end of the rod or complete the bolt-head.

In the accompanying drawings, Figure 1 represents in longitudinal vertical section a machine embodying the invention. Fig. 2 shows a transverse section of the same through line X X, Fig. 1. Figs. 3 and 4 represent transverse sections of the machine through the line Y Y, Fig. 1, showing, respectively, a removable section of the jaws or dies in open and closed positions. Fig. 5 represents in side elevation the cam and lever for closing the

main gripping jaws or dies. Fig. 6 shows in perspective the main gripping jaws or dies, the removable sections of the jaws or dies, and mechanism for closing and opening the latter. Figs. 7 and 8 represent, respectively, a face view and a vertical section of the die-block, which is secured to the ram-head, and is provided with a matrix for shaping the head of the bolt-blank. Fig. 9 represents a side view of one of the main gripping-dies and one of the removable die-sections, and the fully-headed rod fed forward against a stop or gage preparatory to severing the bolt-blank from the rod. Fig. 10 shows a side view of one of the main gripping-dies and one of the removable die-sections with the rod projecting beyond the front face of the latter in readiness for the first upsetting operation. Fig. 11 represents the rod in one of the main dies, and one of the removable die-sections with the rudimentary bolt-head formed on the end of the rod by the heading die. Fig. 12 represents the rod in one of the main dies, with the completed head formed on the end of the rod by the heading die. Fig. 13 shows the completed blank. Fig. 14 represents a side view of the cam for producing the forward movements of the heading-ram. Fig. 15 shows a side view of the cam for working the arms or levers which engage the removable die sections.

The machine shown in Fig. 1 of the drawings is mainly the ordinary bolt-heading machine modified by the addition of means and devices whereby the mode of operation which is the characteristic of my improvement can be accomplished.

A represents the frame of the machine, upon which the several parts are mounted.

B is the heading-ram, which obtains its forward movements for upsetting the end of the rod and forming the bolt-head from the cam C, Figs. 1 and 14. This cam is mounted upon a transverse shaft, D, and has two rises or salient faces, *c c'*, Fig. 14, the former of which produces the first forward movement of the ram, and the latter a second or subsequent forward movement thereof. The forward end of the ram is furnished with the usual die-block, E, Figs. 1, 7, and 8, which block is provided with a matrix, *e*, for giving shape to the head of the bolt-blank.

The main gripping jaws or dies, through which the rod *a* of bolt-stock passes, are indicated by the letters *F F'* in Figs. 1, 2, 4, and 6, and are of the usual character pertaining to machines of this class. In addition to these main jaws or dies, there are employed sectional or supplemental jaws or dies *f f'*, which are so arranged that when closed they will form an extension of the main dies *F F'*, but when opened or withdrawn, as shown at Figs. 4 and 6, will expose the ends or faces of the main dies, to resist the thrust of the heading-ram in performing a subsequent upsetting operation. If it be supposed now that a rod of bolt-stock be introduced into the gripping jaws or dies by the usual feed-rolls, *G G'*, Fig. 1, and that the end of such rod is projected beyond the front faces of the sectional jaws or dies *f f'*, as shown at Fig. 10, for a sufficient distance to furnish the desired amount of stock for the heading-ram to upset in the process of forming a bolt-head upon the end of the rod, the first operation of the machine will be to cause the heading-ram to advance, as in ordinary bolt-heading machines, and upset the projecting end of the rod upon the faces of the sectional jaws or dies *f f'* as an anvil. This movement of the ram is accomplished by the rise *c* of the cam *C*, Fig. 14, acting through the toggle-lever connections *H H'*, Fig. 1. This operation having been accomplished, a depressed portion of the revolving cam *C* will allow the spring *J*, Fig. 1, to draw the ram backward clear of the upset end of the rod.

The next operation of the machine is to cause the sections *f f'* of the gripping jaws or dies to be opened or withdrawn, in order to expose a further portion of the bolt-rod for enabling a second upsetting operation to be performed. This opening or withdrawal of the die-sections *f f'* is accomplished in this instance by the following-described means: The die-sections *f f'* are respectively attached to two vertical arms, *K K'*, Figs. 3, 4, and 6, which have a common fulcrum-pivot at *k*, on a standard, *k'*, upon the frame of the machine. It is obvious, therefore, that the die-sections *f f'* may be made to occupy relatively to the main dies *F F'* the positions respectively shown at Figs. 3 and 4. When in the position at Fig. 3, the sections *f f'* form an extension of the main jaws or dies *F F'*, and when in the position shown at Fig. 4 the faces of the main dies *F F'* are exposed. The rear edges of the die-sections *f f'* have inclined planes *b b'*, respectively, the remaining portions, *b² b³*, of such faces being straight or substantially parallel with their front edges. In combination with the die-sections *f f'* are vertical sliding rods *L L'*, working in guides of any preferred form. These rods are pivoted at their lower ends to the arms *M M'* of a rock-shaft, *N*, as plainly shown at Fig. 6. It is obvious that if a vibratory movement be given to the rock shaft *N* in one direction the said rods *L L'* will move downward and the die-sections *f f'* will be free to separate. The

separation is accomplished in this instance by means of a wedge-block, *m*, Fig. 6, which is forced between the arms *K K'* or projections thereon by the movement of the radius-arm *M²*, secured to the rock-shaft *N*, or the said arms may be made to separate by the influence of a spring or other convenient means. When the die-sections *f f'* are to be closed, movement is given to the rock-shaft *N* in the opposite direction, whereupon the wedge block *m* is withdrawn, and the guided rods *L L'* moving upward cause the inclined planes *l l'*, Figs. 3, 4, and 6, on their upper ends to act against the inclined planes *b b'* upon the die-sections *f f'* and force said die-sections to take the closed position shown at Fig. 3, and a continued upward movement of such rods *L L'* locks the said die-sections closed, as illustrated at Fig. 3.

The necessary movements are given to the rock-shaft *N* by the cam *P*, Figs. 1 and 15, acting upon the arm or lever *Q*, Figs. 1 and 6, keyed to said shaft. This cam may be grooved to the proper outline, so as to act positively to cause the die-sections *f f'* to both open and close; or if a face-cam be used, as indicated in the drawings to prevent confusion in the figure, a positive movement will be given to the rock-shaft *N* in one direction by said cam, and the movement in the opposite direction can be obtained in a well-understood way by means of a weight, *q*, Fig. 1, or a spring applied to the arm *Q*.

Recurring again to the operation of the machine, and understanding that the heading-ram has made one advancing movement, has upset the end of the bolt-rod, and has retreated for a sufficient distance to prevent embarrassing the opening of the die-sections *f f'*, the next operation performed by the machine will be to open or withdraw these die-sections by the means hereinbefore just described. The faces of the main jaws or dies *F F'* are now exposed, as shown at Figs. 4 and 6, and the bolt-rod stands projecting for a distance in advance of said faces equal to the thickness of the die-sections *f f'*, which have been removed, and upon the end of the bolt-rod there is a partially-formed head. The heading-ram is now made to advance again under the influence of the rise *c* on the cam *C*, Fig. 14, and the end of the bolt-rod is further upset against the faces of the main dies *F F'* as an anvil, as shown in Fig. 12. The bolt-head is thus completed.

It is to be understood that, if round bolt-stock is used, a well-known squared matrix is to exist in the jaws or dies for the formation of the "square" under the head of the bolt-blank.

While I have shown in the drawings only one removable die-section, *f f'*, it will be apparent to any constructor of this class of machinery that the capacity of the machine may be enlarged by supplying additional die-sections accompanied with proper mechanism of the same general character as herein described for giving the proper timely movements to such sections, and mechanism also of the same

general character as described for giving additional movements to the heading-ram to upset in succession each freshly-exposed length or portion of the bolt-rod. The principle of my invention would not be changed thereby, but its complexity would be increased. Practically it will be found that the machine as described is adequate to forming a head of sufficient size upon bolt-rods.

After the bolt-head has been fully formed, the heading-ram is made to retreat and rise in a perfectly well-understood way in this class of machines. The gripping jaws or dies FF' now relax their grip upon the bolt-rod by the influence of the spring *r*, Fig. 2, upon the die F, such spring being permitted to act for the reason that the cam T, Fig. 5, no longer operates through the lever U, pin *u*, toggle *u' u''*, and pin *u'''*, Fig. 2, to hold the said jaws or dies shut. The bolt-rod is then fed forward by the feeding-rolls G G', the requisite distance for the length of the bolt-blank, and with an additional length sufficient for the formation of the next head on the end thereof, as indicated at Fig. 9. The dies FF' are now made to grip the rod by the action of the cam T upon the lever U, which straightens the toggle *u' u''*, Fig. 2, and moves the die F toward its fellow F'. The heading-ram now descends in a way familiar to all acquainted with ordinary bolt-heading machines, and in descending a cutter, *e'*, Figs. 7 and 8, cuts off the bolt-blank on the line Z Z, Fig. 9.

I do not limit myself to the particular devices which I have shown for operating the die sections *f f'*, as it is apparent that other well-known mechanical devices for giving the necessary movements to such die-sections can

be substituted, the characteristic feature of my invention being the employment, in the combination hereinbefore explained, of gripping jaws or dies made in sections, and so arranged that one or more of such sections can be withdrawn from the main portion of said jaws or dies, and thereby expose fresh sections of rod-stock to be incorporated into the bolt-head by the action of the heading-ram.

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

1. The combination, substantially as hereinbefore set forth, of a heading-ram, and gripping jaws or dies made in aggregated sections, a portion of such sections less than the whole being removable in order commencing with the foremost section to expose successive sections of the bolt-rod stock to the action of following thrusts of the heading-ram.

2. The combination, substantially as hereinbefore set forth, of a heading-ram, mechanism, substantially as described, for giving an advancing movement to the ram for upsetting the end of bolt rod stock, rod gripping jaws or dies constructed in aggregated sections to grip the rod, mechanism, substantially as described, for withdrawing the foremost of said sections adjacent to the partially-formed head on the rod to expose a corresponding section of the bolt-rod stock, and mechanism, substantially as described, for giving a subsequent further advancing movement to the heading-ram for incorporating such exposed stock into the bolt-head thereon.

W. E. WARD.

Witnesses:

JOSEPH H. MARSHALL,
EDSON SALISBURY JONES.