(No Model.) 2 Sheets—Sheet 1.

J. MORGAN.

MACHINE FOR MAKING BOLTS AND RIVETS.

No. 261,022. Patented July 11, 1882.

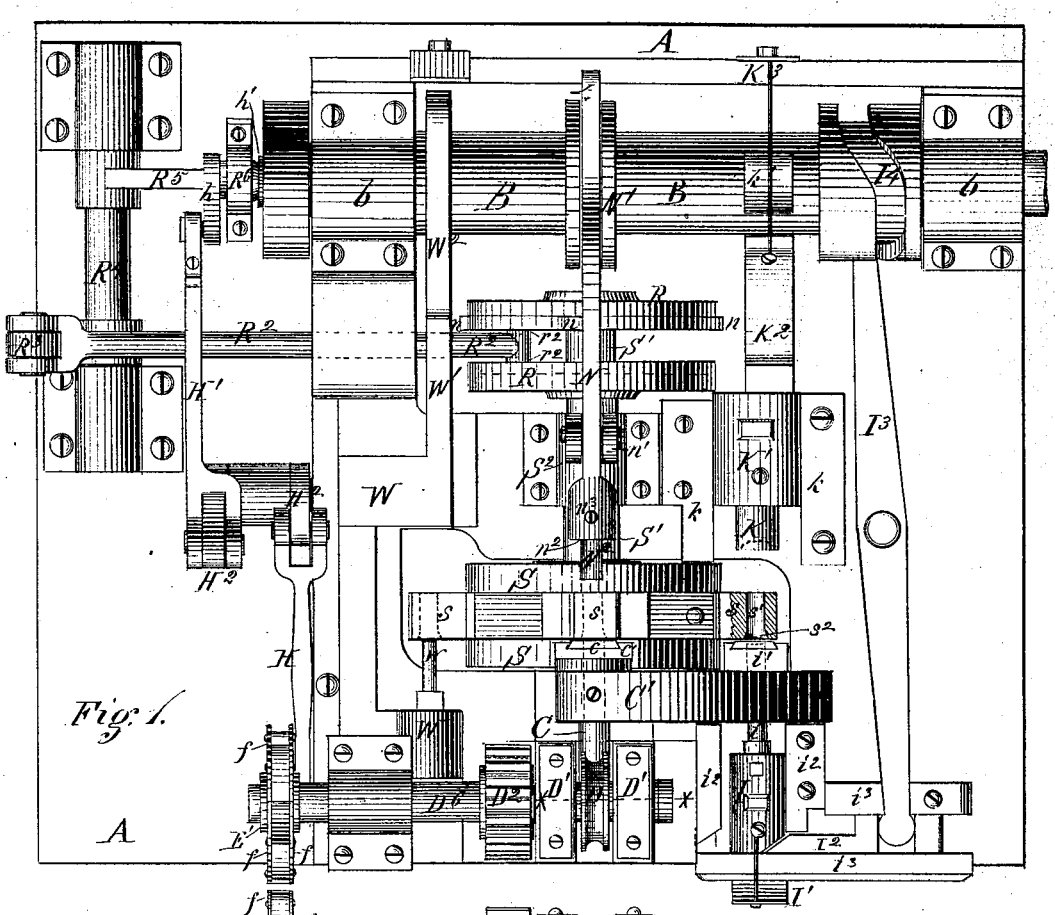

Fig. 1.

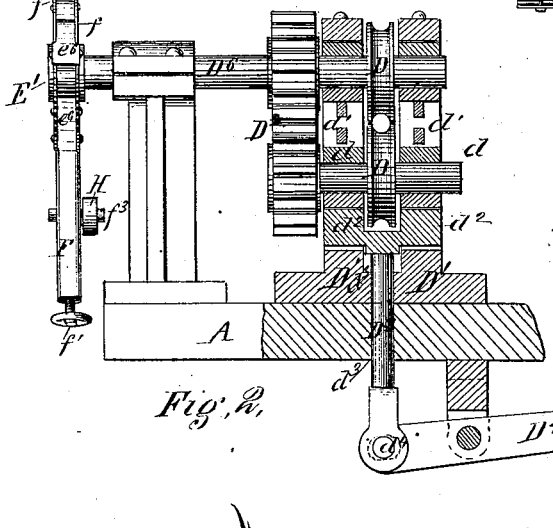

Fig. 2.

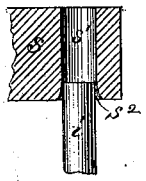

Fig. 3.

Witnesses.
C. L. Parker
R. H. Whittlesey

Inventor James Morgan
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(No Model.) 2 Sheets—Sheet 2.

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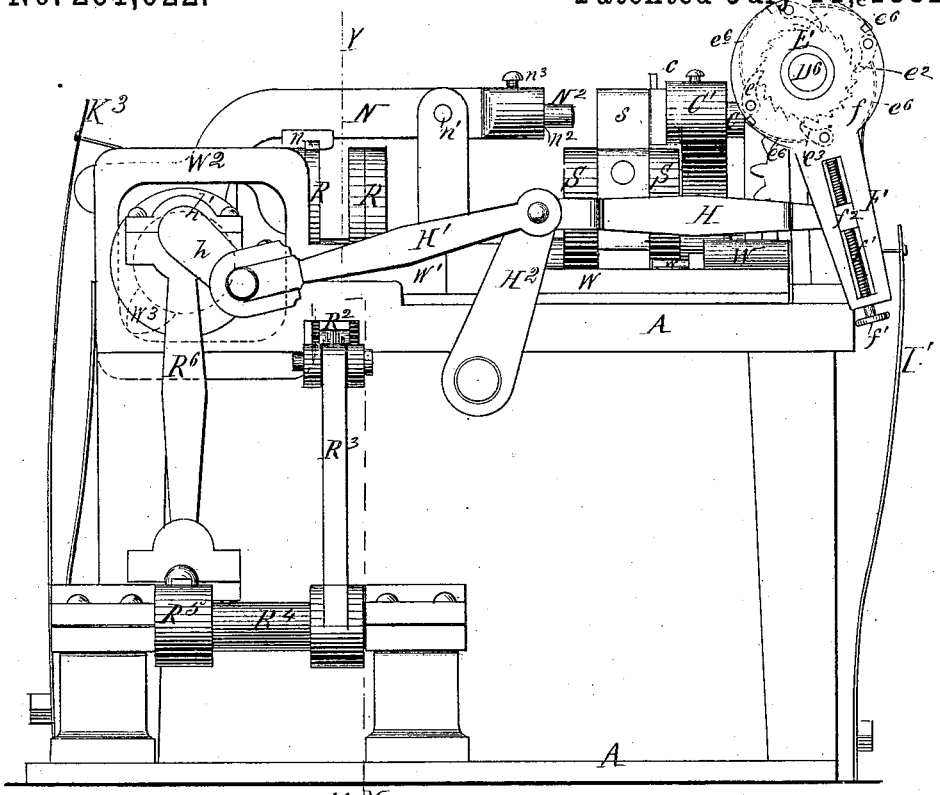

Fig. 4.

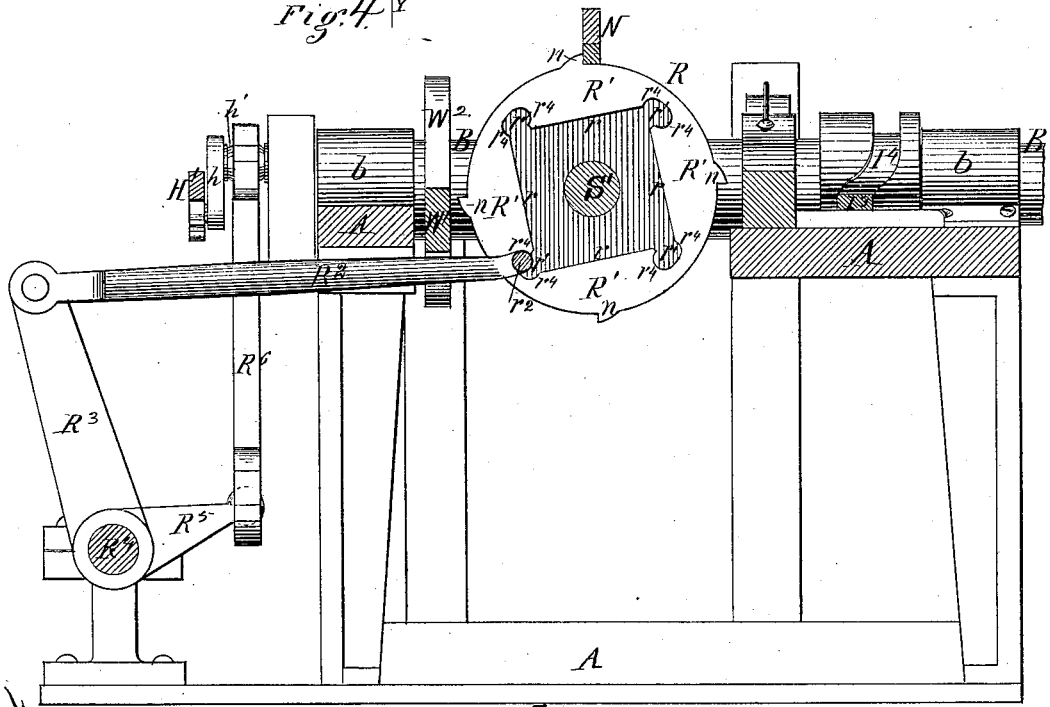

Fig. 5.

Witnesses.
C. L. Parker
R. N. Whittlesey

Inventor James Morgan
By Attorneys George H. Christy

UNITED STATES PATENT OFFICE.

JAMES MORGAN, OF PITTSBURG, PENNSYLVANIA.

MACHINE FOR MAKING BOLTS AND RIVETS.

SPECIFICATION forming part of Letters Patent No. 261,022, dated July 11, 1882.

Application filed August 4, 1881. (No model.)

To all whom it may concern:

Be it known that I, JAMES MORGAN, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Machines for Making Bolts and Rivets; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1, Sheet 1, is a top plan view of my improved bolt and rivet machine. Fig. 2 is a detached view in sectional elevation of the feeding mechanism, the section being taken vertically in the plane of the line *x x*, Fig. 1. Fig. 3 is a detached view to an enlarged scale of the die and anvil-plunger, the die being in section to show the form of its cavity. Fig. 4, Sheet 2, shows a side elevation of the machine; and Fig. 5 is a transverse sectional view taken in the plane of the line *y y*, Fig. 4.

My present invention relates to certain improvements in that class of bolt and rivet machines for which Letters Patent of the United States were granted to me October 26, 1880, No. 233,685; and it consists in certain improvements in the feeding, shearing, and heading mechanism, as hereinafter described and claimed.

On one end of a frame, A, of any suitable construction, is journaled in suitable bearings, *b*, a power-shaft, B. On the opposite end of the frame are mounted two grooved feed-rolls, D D, in uprights or housings D′. These rolls are geared by wheels D^2 to rotate in unison, and they are driven with intermittent motion by means presently to be described. The rod to be worked is fed between the rolls in the usual way.

Rods as usually prepared for bolts, rivets, &c., are not perfectly round, nor of uniform size, and if the rolls D are set or adjusted by means ordinarily employed for a rod of given size, they will not feed it properly through its whole length unless it is more uniform in size and shape than is usually the case.

It is important in this class of machines that the rolls should feed with uniformity and precision in all cases. In order to secure this under the conditions named, I mount the lower feed-roll in sliding journal-bearings *d*, which are supported within the opening *d′* in the housings by a cross-block, d^2. A rod, D^3, extends downward from block d^2 through suitable guide-holes, d^3, in the frame, and at its lower end it is pivoted at d^4 to one end of the pivoted lever D^4. A counter-weight, D^5, is secured on the other end of this lever, of sufficient heft to overbalance the lower roll and hold it against the rod with sufficient pressure to insure proper feed-motion on the rotation of the rolls. The journal-blocks *d* are made movable vertically in the housings by the usual or any desired form of fittings, and as variations in the form or size of the rod occur the under roll will move, and thereby reduce or enlarge the feed-passage, the roll being held to its work by the weight D^5. By varying the distance of this weight from the pivot or fulcrum of its lever the normal pressure of the rolls upon the rod may be adjusted as desired. Holes d^5 are provided in the lever for this purpose; but other suitable means may be used.

Intermittent rotary motion is given to the rolls substantially as described in the prior patent referred to; but I have introduced a new and improved means for adjusting the amount of feed-motion so as to vary the length of blanks as desired. This is done as follows: A ratchet-wheel, E, (shown in dotted lines, Fig. 4,) is secured on the extended end of the upper roll-shaft, D^6. This ratchet is inclosed by two side plates, *f f*, which are journaled loose on the shaft or on the hub E′ of the ratchet, and extending out from the shaft they are united in any convenient way, forming a hollow arm, F. In these plates *f f*, around the periphery of the ratchet E, are pivoted two or more pawls, as *e e′* e^2 e^3, &c., the free ends of which are held upon the ratchet-teeth by springs e^6. I have shown four of these pawls thus arranged. A greater or less number may be employed, however. They are made of different lengths; or, as securing the same result, they may be pivoted to the plates *f f* in such relationship that they shall bear upon the ratchet-teeth at different points or at different distances from the base of the teeth. As illustrated in Fig. 4, one pawl, *e*, rests in the seat or base of a tooth in position to communicate motion to wheel E, while the pawls *e′* e^2 and

c^3 rest on the inclined faces of their respective teeth at different distances from the base or point. If all the pawls rested upon the teeth at the same distance from the base, the distance of one tooth from another would represent the minimum of variation or adjustment that could be given to the feed, since a change in the stroke or movement of the pawls less than such distance would simply result in lost motion; but by using two or more pawls and arranging them to bear upon the teeth of the ratchet at different points, as shown, the feed-motion may be varied by smaller amounts. In the arrangement shown in the drawings the feed may be varied an amount equal to one-fourth the distance between ratchet-teeth, since a movement of arm F corresponding to such an amount or distance will insure engagement of one of the pawls with the ratchet-teeth.

Lengthwise within the arm F is journaled in any convenient way a rotary screw-rod, f'. A nut, f^2, works on this rod, and from the nut a wrist, f^3, is extended laterally in suitable position to make pivot-connection with bar H. By turning the screw-rod f' the nut and wrist may be moved along its length, thereby increasing or diminishing the acting distance of the wrist from the roll-shaft D^6. The bar H receives reciprocating motion from the driving-shaft B by crank h, reciprocating bar H', and the double rocking arm H^2. (See Fig. 1.) Instead of employing these rocking arms, however, a bent bar may be employed to couple the crank h and arm F directly; or the roll-shaft D^6 may be extended sufficiently to permit of the use of a straight coupling-bar between these points. By the means described the amount of feed may be varied to give all the various lengths of blanks required, and at the same time the ratchet-teeth and other parts are made of proper size to afford the requisite strength. As the rod is fed forward by the rolls it is passed through a tube, C, which is secured in a bracket, C', extending upward from the main frame. At the inner end of this tube a shear-plate or die, c, is inserted in a dovetail slit or groove, c', made across the end of the tube. This plate has through it a hole of suitable size to permit passage of the rod. By changing plates various sizes of rods may be worked, as desired.

A rotary die head or carrier, S, is also employed as heretofore, on the periphery of which are secured dies s, having die-cavities s' through the same, into which the bar is fed, and by which the blank is held while being upset or headed. These dies are given intermittent rotary motion, as presently described, whereby they are in succession brought and held in the line of feed, their cavities s' being successively in line with the feed-passage through tube C and plate c. While in such position the rod is fed forward through or into the die-cavity.

Heretofore the blank has been severed by a direct forward movement of the dies as they are carried forward in their rotary movement; but in such shearing operation there is a tendency to form a fin on that side of the rod toward which the die moves in shearing or at the point where the cut is finished, and such a fin often interferes with the proper entry of the rod into the succeeding die-cavity. I avoid this by first moving the die backward a little, thereby partially severing the blank on one side and then moving it forward in the direction of rotation, finishing the shearing operation from the other side of the rod. In this way the cut is made from opposite sides toward the center of the rod, and any projection of metal made by shearing will be at or near the center, within the rim or surface, and consequently it will not interfere with the proper entry of the rod in the next die-cavity. In practice, however, with such a cut the end or cut surface will be smooth and free from roughness or projecting fins, and the end of the rod will be but slightly, if at all, distorted. This double or backward and forward motion is given to the dies as follows:

The die-head S is mounted on the end of a shaft, S', which is journaled on the bed or frame by suitable box-bearings, S^2. On the opposite end of this shaft are secured two disks or wheels, R R, (see Figs. 1 and 5,) on the inner or adjacent faces of which are made raised rims R'. The inner edges of these rims are made polygonal in form, the number of sides r corresponding to the number of part rotations which it is desired to give the shaft and dies. At the angles formed by the several sides r are made hook-seats r', into which a hook or pin drops and finds bearing for moving the disks. These seats are sunken below the lines r or toward the circumference, forming shoulders r^4 on both sides, against which the hook bears for moving the disks in either direction.

The hook R^2 is made with pins r^2, extending laterally from opposite sides, adapted to bear upon the faces or edges r and rest in the seats r' in both disks. Reciprocating motion is given the hook, as presently described, the extent of each stroke being in excess of the length of edges r, or of the distance between hook-seats r'. In operation the hook moves on the lower edge or side, r, of the rims, and drops successively into the seats r' as it moves toward the right. (See Fig. 5.) In so doing it drops into the seat before it reaches the limit of its stroke, and on the continuation of such stroke it pushes against the remote side or shoulder r^4 and gives the disks a backward movement. The amount of such movement will be determined by the excess of the length of stroke of the hook over the distance between seats r' taken in the direction of the hook's motion. By varying the stroke of the hook, as presently described, the amount of backward movement of the dies may be adjusted so as to cut the desired distance into rods of different size. On the reverse movement of the hook the dies will be given their advance ro-

tary movement, as heretofore, toward the right, Fig. 1, thereby completing the shearing operation, as above described, carrying the die containing the severed blank into position for the heading operation and bringing the next or following die into feeding position.

Reciprocating motion may be given hook R^2 in any suitable way. The means shown are substantially the same as those shown in the prior patent referred to—that is, the outer end of the hook-shaft is coupled by pivot-connection to an arm, R^3, extending upward from a rock-shaft, R^4. From a horizontal arm, R^5, a pitman-bar, R^6, makes connection with the crank h' on the drive-shaft. By varying the acting length of either arm R^3 or R^5 the length of stroke of the hook may be varied at pleasure.

In order to assist in stopping the dies at the desired points with precision, stop teeth or lugs n are made on the periphery of one of the disks R, which are engaged at proper intervals by a pivoted bar, N, moved vertically by a cam, N', on the driving-shaft.

Instead of using a fixed feed-stop, as heretofore, to arrest the forward feed of the rod, I now extend the bar N forward of its pivot n', and in a suitable socket, n^2, in its end I secure a stop-block, N^2, by binding screw n^3 in such position and direction that it shall be in the line of feed when the bar N is in engagement with the lugs n. Then as the rear end of bar N is lifted by cam N' the stop N^2 will be moved downward out of contact with the end of the blank, leaving the blank and die more free to move backward and forward than would be the case if the stop N^2 were stationary and in contact with the end of the blank. This movement of the stop is of special advantage in connection with the double-shear motion above described, but may be used to advantage with a single direct movement of the dies.

Owing to the difficulty of stopping the dies with perfect precision in machinery of this kind, where more or less lost motion is always present, I provide for such slight irregularities as may occur by making the die-cavities s' slightly conical or bell-mouthed at the end adjacent to feed-tube C, as at s^2, so that the rod may enter the cavity readily, although the die-cavity and feed-tube may be slightly out of alignment. The desired result is secured with a comparatively small enlargement, s^2, which will not impair materially the shearing function of the die, although it may occasion a slight bending of the blank in shearing.

In order to straighten the blank and move it within the die-cavity past the enlargement s^2 preliminary to heading, I employ a plunger, i, which is carried by a sliding block, I, arranged to move on the bed or frame. This plunger passes through the block i' and by an advance movement pushes the blank endwise in the cavity past the enlargement s^2. The position of the die in this operation is illustrated at the right-hand side of Fig. 1, and the relationship of plunger and die when the blank is thus pushed along is illustrated in Fig. 3. The plunger is then held in this position and it thus forms an anvil or rest for the blank, while a header, K, advances and upsets a head on the protruding end of the blank. The plunger is then withdrawn in time for the next movement of the dies. In securing these movements the block I is guided by strips i^2, and motion is given to it by a spring, I', and sliding wedge I^2, the latter being held in place by guide-strips i^3. The wedge is moved forward and backward by a vibrating lever, I^3, actuated by a cam, I^4, on the driving-shaft. The wedge moves the plunger forward into the die-cavity and holds it there while the head is formed, and as the wedge moves back the spring I' withdraws the plunger.

The header K is of the usual form, adapted to give the desired shape of head. It is carried by a sliding head, K', which latter is guided by strips k. A stem or shaft, K^2, extends backward and receives forward movement from pressure thereon of cam k'. A spring, K^3, withdraws the header in the usual way.

On the left-hand side of the frame is arranged the discharge-plunger w, which is operated, substantially as heretofore, by sliding frame W, shaft W', yoke W^2, and cam W^3.

The mode of operation of the machine and the order of succession of its various steps will be readily understood. The feeding, heading, and discharging operations are performed simultaneously, or nearly so, while the dies are at rest, and the shearing is done during and by the movement of the dies.

I claim herein as my invention—

1. As a means for shearing blanks, the combination of feed-tube C, rotary moving dies s, and the means, substantially as described, for giving the dies a backward movement for partially severing the blank from one side and a forward movement to complete the severing of the blank from the other side, as set forth.

2. The combination of shear-tube C, dies s, rotary die-carrier S, shaft S', disks R, having hook-seats r' and connecting-ways r formed in their side faces, hook R^2, and means for imparting to the hook reciprocating motion with a length of stroke in excess of the distance between hook-seats in the line of stroke, substantially as and for the purposes set forth.

3. In a bolt and rivet machine, the combination of die-carrying shaft S', disks R, having in their adjacent side faces ways or edges r and hook-seats r' at the angles of the edges, such seats being formed with shoulders r^4 adjacent to the edges on either side, as described, and reciprocating hook R^2, having a length of stroke in excess of the distance between hook-seats, substantially as and for the purposes set forth.

4. As an improvement upon the combination composed of the feed and shear tube C, rotary moving die-head S, having dies s, piv-

oted bar N, rotary cam N′, and wheel R, having lugs *n n*, the addition to the end of bar N of the feed-stop N², in virtue of which combination said stop is lowered to permit the free movement of said head and dies and raised to bring it in line with the feed-tube, substantially as set forth.

5. The combination of header K, dies *s*, having cavities *s′ s²* therein, plunger *i*, spring I′, sliding wedge I², lever I³, and cam I⁴, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JAMES MORGAN.

Witnesses:
HARVEY THOMPSON,
CLAUDIUS L. PARKER.