2 Sheets—Sheet 1.

J. H. ALKER.

Bolt and Rivet Machine.

No. 224,264. **Patented Feb. 10, 1880.**

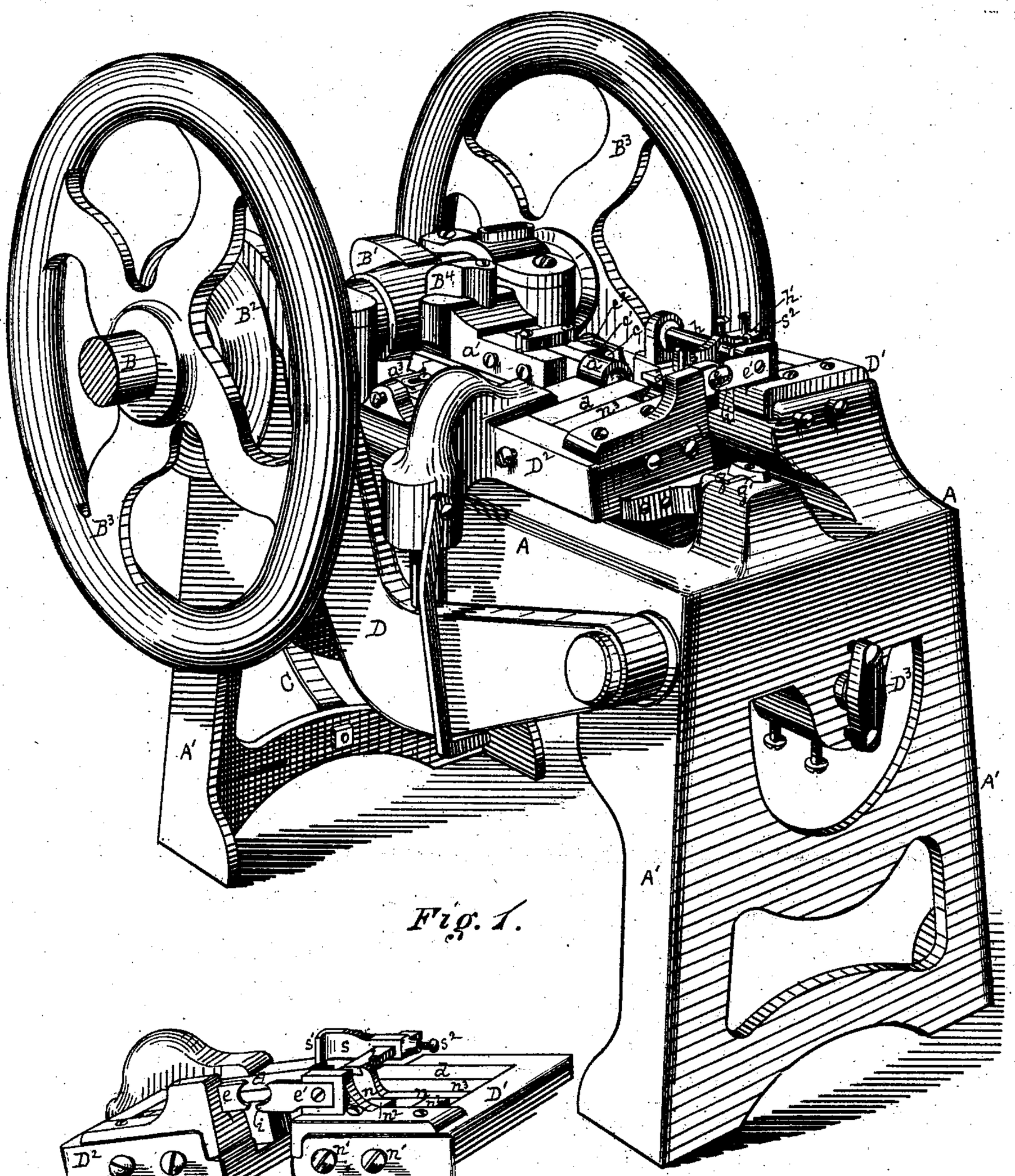

Fig. 1.

Fig. 2.

Witnesses
John W. Donaldson
R. H. Whittlesey

Inventor John H. Alker,
By Attorney George H. Christy

2 Sheets—Sheet 2.

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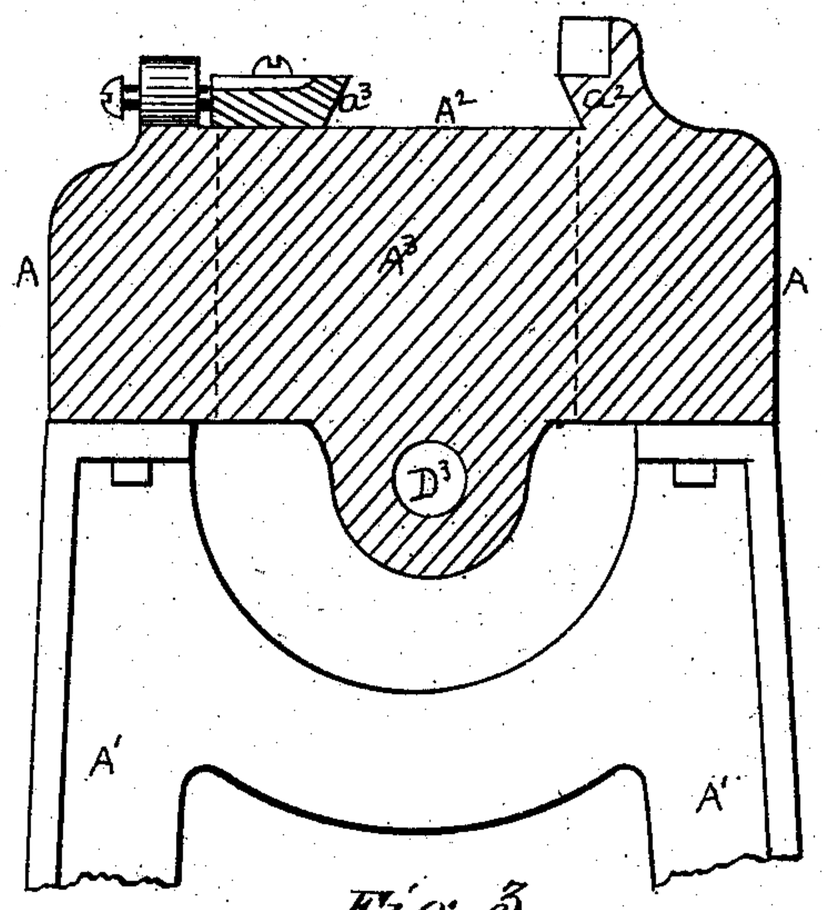

Fig. 3.

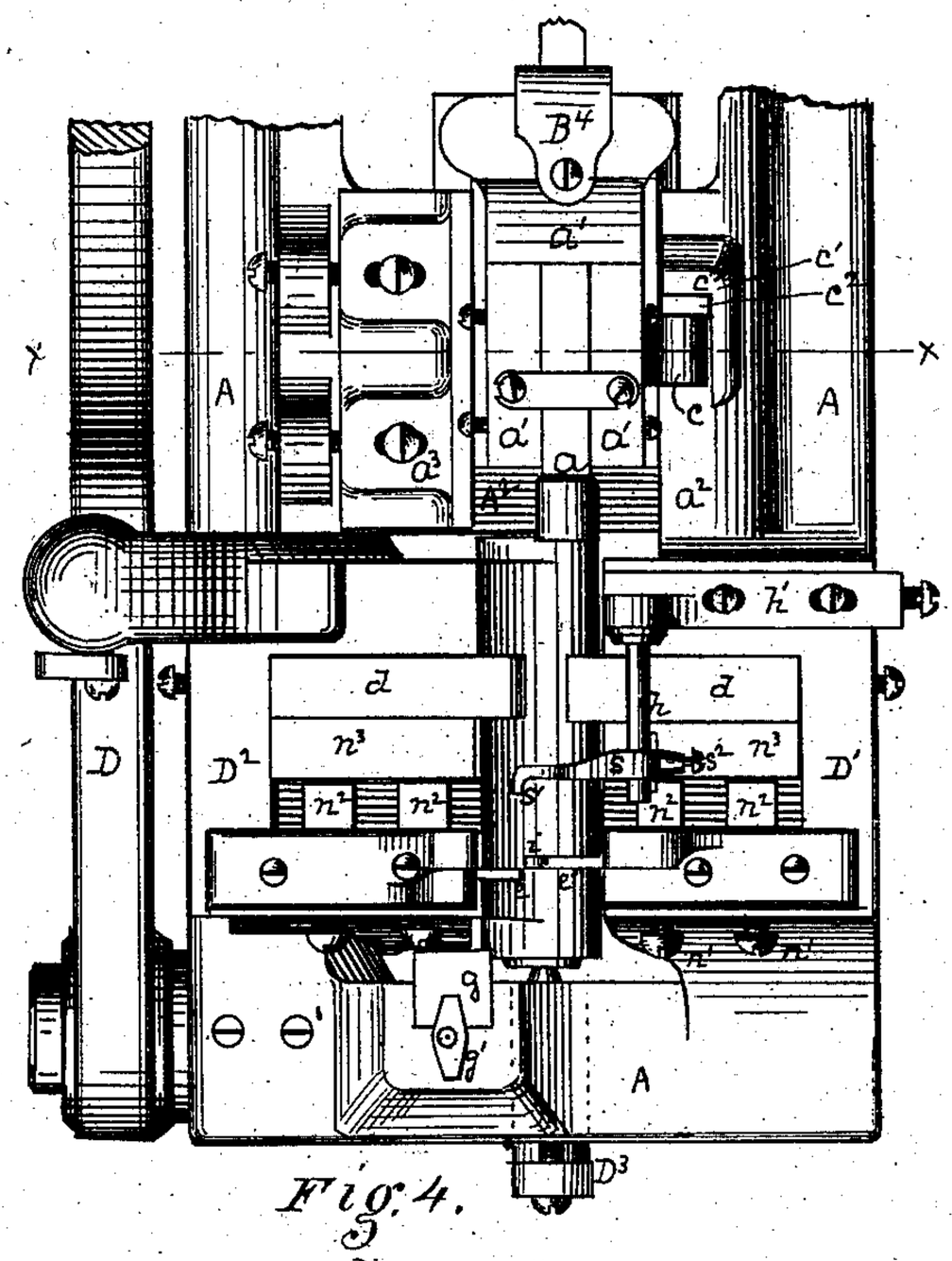

Fig. 4.

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Inventor John H. Alker,
By Attorney George H. Christy

UNITED STATES PATENT OFFICE.

JOHN H. ALKER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO JONES & LAUGHLINS, OF SAME PLACE.

BOLT AND RIVET MACHINE.

SPECIFICATION forming part of Letters Patent No. 224,264, dated February 10, 1880.

Application filed August 30, 1879.

To all whom it may concern:

Be it known that I, JOHN H. ALKER, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Bolt and Rivet Machines; 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 perspective view of my improved machine. Fig. 2 is a detached view, in perspective, of the griping, shearing, and gage devices. Fig. 3, Sheet 2, is a vertical cross-section through the frame in the line *x x* of Fig. 4; and Fig. 4 is a top or plan view of the forward or operating end of the machine.

My invention relates to certain improvements in machines for making bolts and rivets, whereby the machine in some parts is rendered stronger and more durable, and whereby in the other parts it is adapted to do better and more perfect work, and in other parts to be operated with greater facility, all substantially as hereinafter described and claimed.

The main frame or bed-piece A is made by casting in the usual way, and of suitable form and proportions, with reference to the other parts to be described, and the operation of the same in the proper manner. It may be cast solid with the legs A′, as in Fig. 1, or separate, as in Fig. 3. It is provided at or near one end with a main driving-shaft, B, on which are the cams or eccentrics B′ and B², one for giving the header *a* its forward motion, and the other for operating the lever D, which imparts motion to the movable griper and shear. The usual fly-wheels B³ may be added, and power is communicated in any suitable way. The header *a*, having a cavity of the shape of the bolt or rivet-head to be made, or other desired shape, is secured in the usual way in the header-box *a′*. The latter slides forward and back on a seat, A², planed on the middle cross-piece, A³, of the bed, Fig. 3, and between a fixed and an adjustable way or guide, a^2 a^3. It receives its forward motion from the cam B′, which engages at each revolution a shoe, B⁴, at the base of the header-box. The back stroke of the header is effected in the usual way by means of a stiff spring, the lower end of which is shown at C. The length of motion of the header *a* should be variable, in order that it may perform, when back, the function of a feeding-stop, so as thereby to fix at pleasure the amount of stock which goes into the head. Heretofore, for this purpose, a lug, *c*, has been made on the side of the heading-box, through which an adjustable screw was passed, so that being adjusted forward or back, and at the back stroke of the header, engaging a fixed stop on the guide a^2, it regulated the length of stroke of the header. This has been found to be highly objectionable, since the screw-threads soon strip or become worn. The lug *c* has then to be retapped and a larger screw inserted. In this way the lug *c* is used up before the header-box is worn out. As an improvement on this I make on the guide a^2 a stop, *c′*, of the form of two sides of a box, with room for the lug *c* to play therein, and shorten or lengthen the stroke of the head, by inserting in or removing from the base end of the box-shaped stop *c′* a liner or liners, c^2, of the desired thickness, to regulate the amount of stock to go into the head. As these parts thus made are not subject to any unusual wear, they will last as long as the rest of the machine without danger of getting out of repair.

The die-boxes D′ and D² differ in no material respect from those ordinarily employed, except as they are adapted to the devices yet to be described.

As shown, the box D′ is fixed and D² is movable, being operated from the center D³ by an oscillatory motion by means of its connections with the lever D, substantially as shown in Fig. 1.

In the structure of machines of this class it has heretofore been usual to insert the cutters or shears at the base of the griping-dies, or in the direct line of feed to the griping-dies and header, so that the bolt or rivet blank would be headed and cut off at the same stroke. This has been found objectionable, because in such case the griping-dies almost invariably make a fin at their line of parting on each side of the bolt or rivet shank, and in rivet-shanks,

particularly for boiler-making, a shank of practically a true cylindrical form is exceedingly desirable, if not absolutely essential, to good work; also, when the cutters and griping-dies operate simultaneously on the same blank at the same stroke the cutters must necessarily act a little in advance of the griping-dies, or, in other words, must commence, and in some cases complete, their cutting action by or before the griping-dies engage the blank, so as to hold it steadily and firmly in the line of feed. Hence, as the cutters cut past each other by a kind of shearing action, they are liable to deflect the forward end of the rod so as to make a cut more or less oblique, ragged, or irregular, which, in both rivets and bolts, is exceedingly objectionable. I am aware that both these objections can be and have been overcome by mounting the cutters in boxes or carriers separate from the griping-die boxes, and operating them by a motion taken from the main driving-shaft, separate from and independent of that of the griping-dies; but such construction increases the size and cost of the machine, adds about one-third to the number of working parts, and increases to the same extent the liability to loss by breakage, wear and tear, &c.

By the features of improvements now to be described I obviate the objections above named, and otherwise improve the structure, operation, and product.

The griping-dies *d d* differ in no material respect from those heretofore used. They and the cutters *e e'* are mounted in or on the same boxes D' D², so as to be operated by the same motion; but the cutters *e e'* are not in the line of feed to the griping-dies, but sufficiently above or below (preferably above) such line as not to interfere with the feed. The griping-dies may have any desired length of working or griping face, and are removable, as also is the header, so that the corresponding devices of other sizes may be inserted, as the work may require.

The operations of feeding, griping, and heading are performed in the usual way; but as the cutters do not act in the line of the feed to the griping-dies the blank is not cut off when the griping-dies and header are operating on the blank. Hence the operator can, after the rod is headed and released, give it a quarter-turn, more or less, take another stroke on it, so as to work in the fins, and repeat this step of the operation on the unsevered blank until it is made as true, perfect, and complete in shape as may be desired; but in this structure and operation of griping, heading, and working in the fins no novelty is claimed herein, except as elements in the combinations hereinafter specified, though, so far as I know, such operation has never been performed in the manufacture of rivets, though common with bolts.

The cutters *e e'*, arranged above or below the line of feed to the griping-dies, as already stated, are of the usual construction, except that the lower wing or lip, *i*, of the stationary cutter *e'* is projected forward or lengthened a little beyond the vertical radial line of the cavity of the cutter, and also beyond the end of the corresponding upper lip of the same cutter, or, in other words, the corresponding upper lip of the same cutter retains its usual or about its usual length. This extension *i* performs the function of a rest and guide in feeding the blank to the cutters, and at the same time the corresponding upper lip of the same cutter retains the usual, or about the usual, length, so that the feeding of the blank or rod to the cutters can be performed without any material increase in the length of its motion. If both lips were prolonged the movable cutter would have to open so much the farther in order to permit the headed blank or rod to be inserted, and it is exceedingly important in such machines to secure the desired operations with the least possible motion.

In order to determine or fix the length of blank to be severed, and also hold the blank while being severed in position at right angles to the direction of the stroke of the movable cutter, so as to secure a square or straight transverse cut, I employ a stop-gage, *s*, which I connect with the die-boxes in any convenient way, two such being shown. Figs. 1 and 4 show the preferable way. Here the gage *s* is adjustably secured to a stem, *h*, so as to be adjusted thereon toward or from the cutters, and thereby vary at pleasure the length of bolt or rivet blank to be cut off. A binding-screw, *s²*, affords one proper means of effecting the adjustment. The opposite end of the stem *h* is secured to a bracket, *h'*, which is secured to the fixed die-box D', and is adjustable thereon toward or from the line of feed to the cutters, so as to adapt the gage for use with different sizes of bolts or rivets. The means of effecting this adjustment are such as are well known in the art.

By thus mounting the gage *s* on the die-box itself, without any direct connection with or independently of the griping-dies, I provide for changing or readjusting the latter when required without necessarily removing the gage or changing its adjustment, and also for varying the element last named independently of the griping-dies.

In order now to prevent the tendency of the blank while being cut by a shearing stroke to be turned to one side from the direct line of feed, and so secure a square or straight transverse cut, I bend the end of the gage *s*, as shown at *s'*, or make a forwardly-projecting lip thereon, in such position that such lip will engage the bolt or rivet head on the side toward which it tends to bend under the action of the cutters. This lip or projection thus takes a lateral bearing on the bolt-head on the side opposite to that of the adjacent cutter, and the projection should be properly disposed with reference to this result—that is, on the extreme end of the stop-gage *s*, so as to take a bearing on the outside of the bolt or rivet head, or a little distance from the end, so as to

bear on the inner side of the head, accordingly as one cutter or the other may work inside or outside the opposite cutter.

The mode of using the gage and cutters will now be readily understood. As soon as the blank is headed and the fins are properly worked in, as already explained, the workman transfers the rod to the cutters, placing the rod on the extension *i*, and the head endwise against the gage *s* and laterally against the lip or projections *s'*. A square cut is thus given, and as the cutters open the bolt or rivet drops out.

The other mode shown of mounting the gage *s* is illustrated in Fig. 2, where corresponding parts are similarly lettered; but in this case the block *n*, to which the stem *h* is affixed, is inserted inside the die-box D' and in the die-cavity, and is clamped in position (after being properly adjusted) by the use of the binding-screws *n'* and nuts n^2, which, in the ordinary use of the machine, are employed, in connection with blocks or liners n^3, to clamp the fixed griping-die *d*. In this arrangement the renewal, changing, or readjustment of the griping-dies necessarily involves the loosening of the gage, which is not the case in the construction previously described; and it is one of the important advantages of the machine, with either mode of connecting the gage *s*, that one pair of griping-dies may be employed to make bolts or rivets of any ordinary length; or, in other words, no change of griping-dies is required in order to make various lengths of rivet or bolt and shanks so long as the diameters remain the same.

In order to hold the movable die-box well up in position as against the strain caused by the forward stroke of the header, a block, *g*, is usually inserted between such die-box and the frame of the machine. This block, as it wears away, is commonly set forward by the use of liners.

The tendency of the motion of the die-box is to loosen and raise the block *g* vertically out of its seat. In order to hold it securely in place as against this tendency to rise, I pivot in the proper position on top of the frame, and adjacent to the block *g*, an oblong stop, *g'*, so shaped that when turned to the position shown in Fig. 4 it will bear securely on top of the block *g* and keep it from rising, but when turned one-quarter round will leave the block *g* free to be removed and renewed or set forward by means of liners in the usual way.

Other parts of the machine not herein specifically described are of suitable construction, such as is well known in the art.

It should be noted, however, that by arranging the movable cutter so that it shall strike or cut across that face of the fixed cutter which is on the other side of or farthest away from the finished article which is to be severed or cut off I am enabled to leave the cut or sheared end of the finished article with a squarer cut than can be secured when, as has heretofore been done, the movable cutter moved across the face of the fixed cutter on the side of the latter adjacent to the article to be cut off. This useful feature results from the fact that the movable cutter while performing its proper shearing function tends to bend the article on the side of the fixed cutter on which it works laterally out of line, and thereby make a sloping cut with a ragged point on the end of the piece so thrown out of line. When this is done on the end of the rod, as in my machine, no harm is done, since such sloping cut and ragged point are worked into the head of the next bolt or rivet, but the blank is cut off without being thrown out of line to any material extent, so that it leaves the machine with a square-cut end or an end sheared off in a plane approximately at right angles to its length; but I am aware that this function is not new in machines of the class in which the cutters work in the same line of feed as the gripers; but a machine thus made does not permit the forging or shaping of the bolt or rivet body by two or more repeated strokes of the griping or side and heading dies, which feature is an important one in my machine, since by it I am enabled to secure, first, a well-finished head and shank, and, second, a square-cut end on the latter, and thereby save a considerable amount of hand-work in preparing the blanks for use.

I claim herein as my invention—

1. The combination of the lug *c* on the header-box, a two-sided box-stop, *c'*, on the main frame, and insertible and removable liner or liners c^2 as a means of regulating the length of the back stroke of the header, substantially as set forth.

2. The extension *i* on the under side of the fixed cutter *e'*, projecting beyond the vertical radius of the cavity of such cutter and beyond the upper lip of the same cutter, substantially as and for the purposes set forth.

3. In combination with a pair of cutters, a gage, *s*, having a lip or projection, *s'*, adapted to arrest the movements of the bolt or rivet head on the side toward which the bolt or rivet blank tends to turn in the operation of cutting, substantially as set forth.

In testimony whereof I have hereunto set my hand.

JOHN H. ALKER.

Witnesses:
R. H. WHITTLESEY,
GEORGE H. CHRISTY.