J. A. EDEN, Jr.

MACHINE FOR DRILLING STAY BOLTS AND SIMILAR WORK.

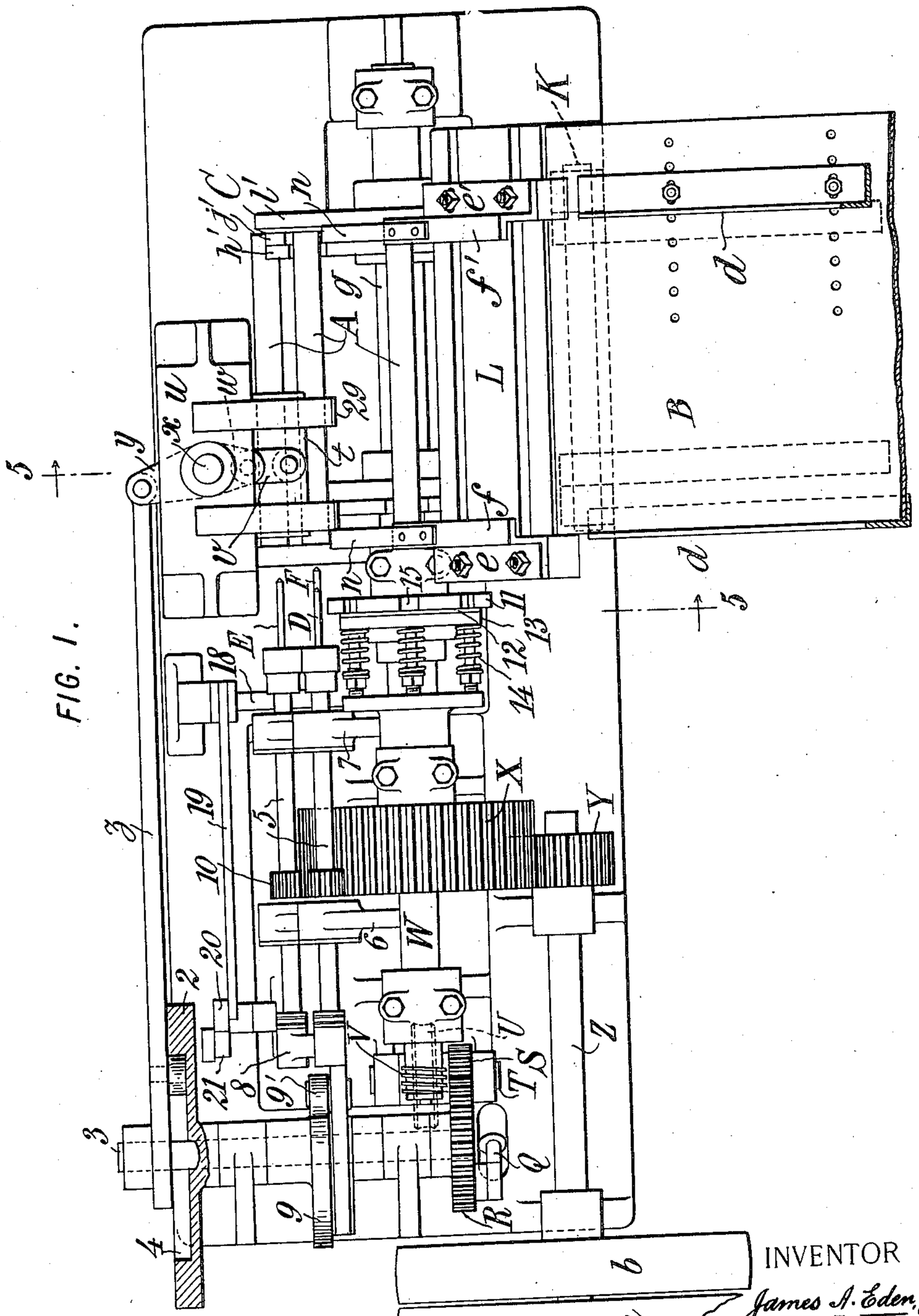
APPLICATION FILED MAR. 7, 1907.

Patented Apr. 6, 1909.

917,269.

4 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

Fred White

René Bruine

INVENTOR:

James A. Eden, Jr.

By Attorneys,

Arthur C. Fraser & Sons

J. A. EDEN, Jr.

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4 SHEETS—SHEET 2.

FIG. 2.

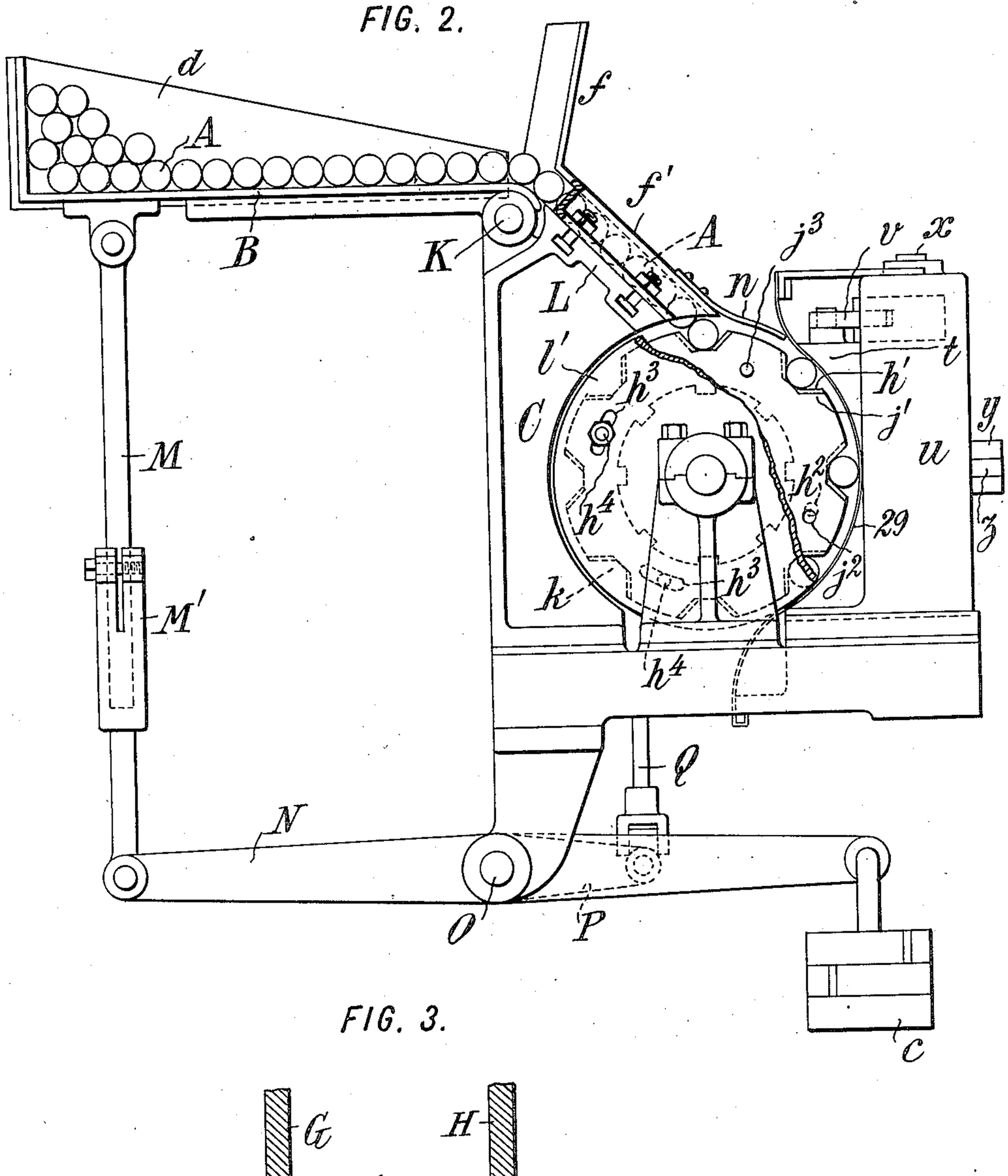

FIG. 3.

WITNESSES:

Fred White

René Bruine

INVENTOR:

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By Attorneys,

Arthur G. Fraser & Usina

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4 SHEETS—SHEET 3.

FIG. 4.

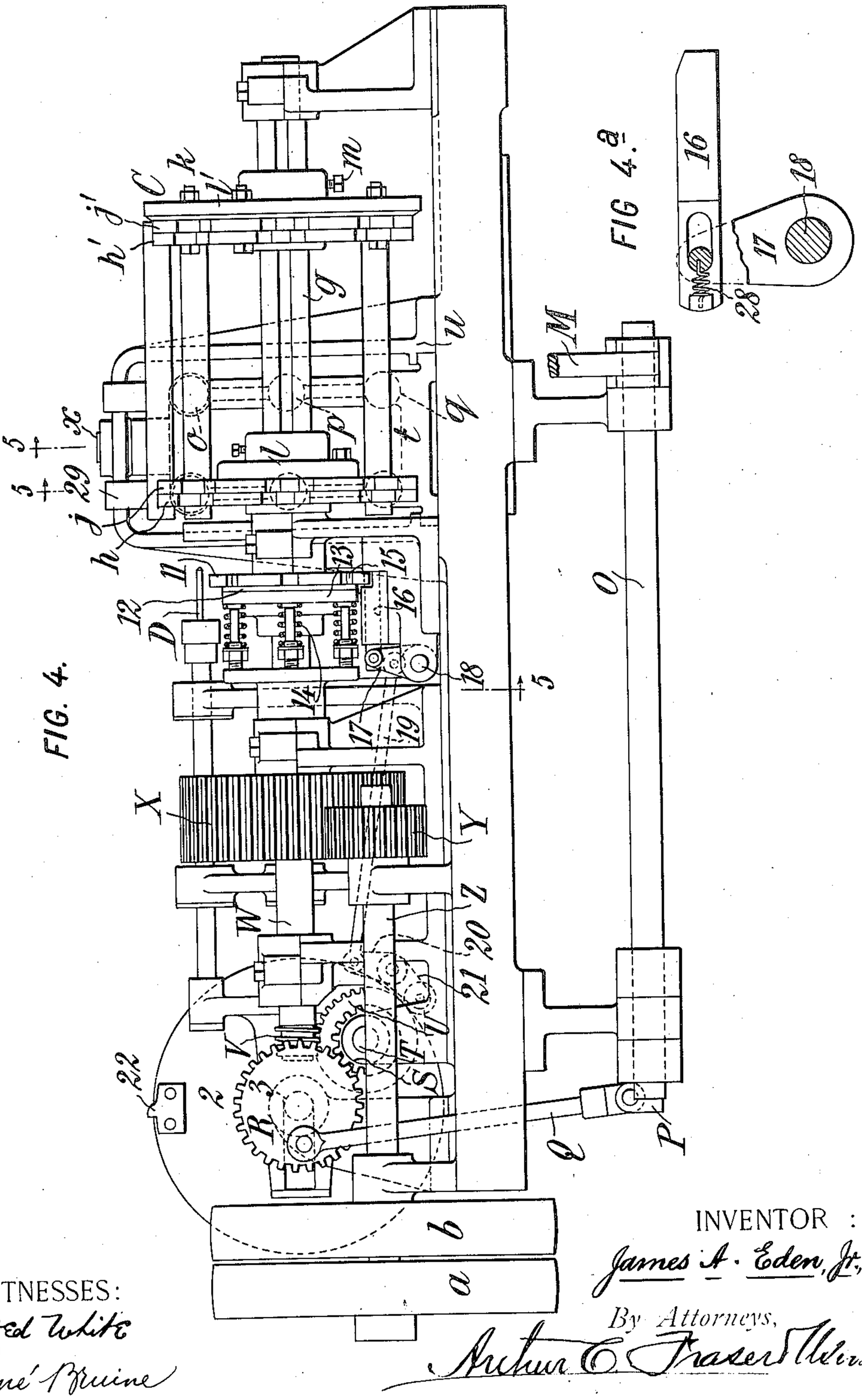

FIG 4.a

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René Bruine

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4 SHEETS—SHEET 4.

FIG. 5.

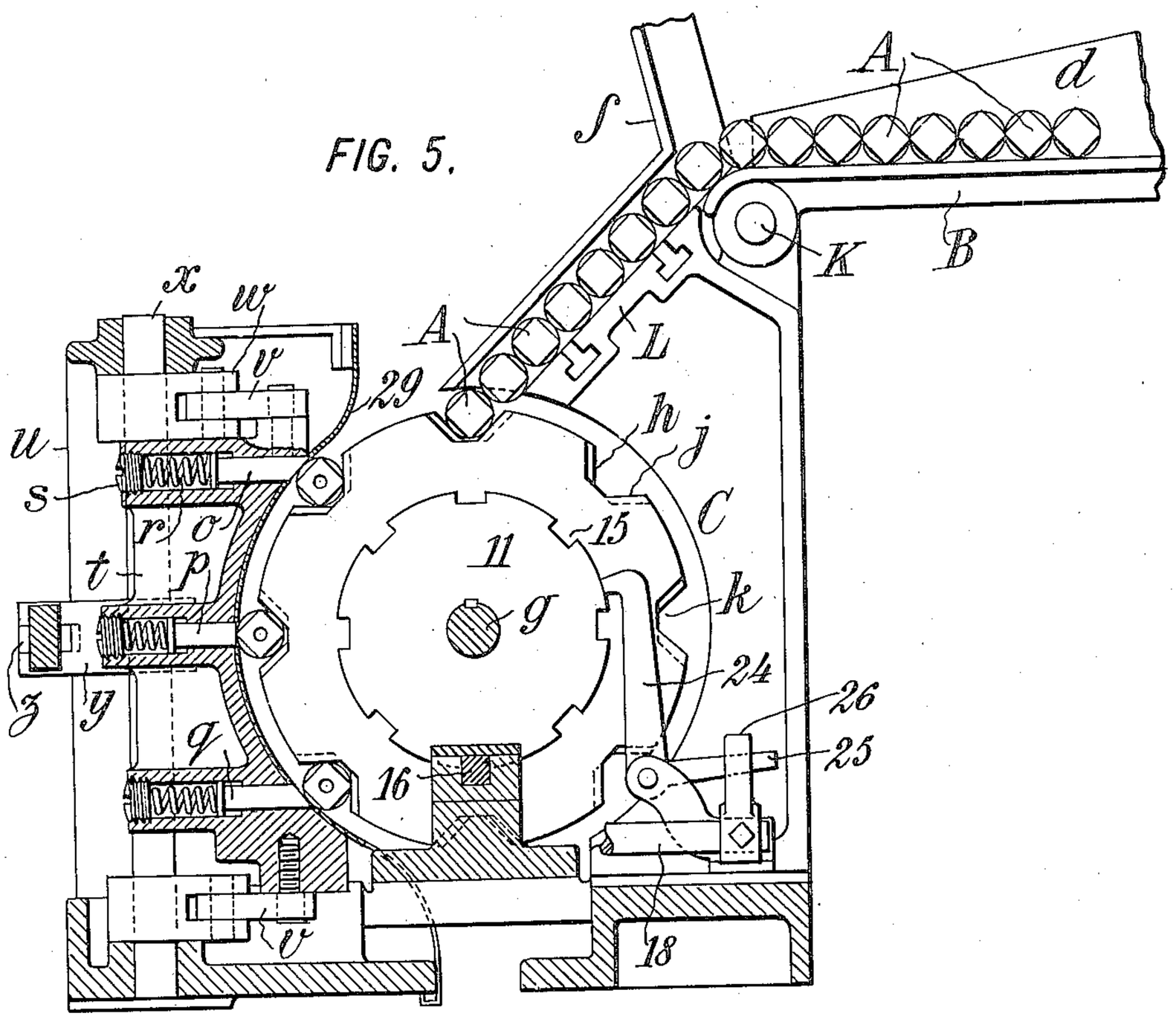
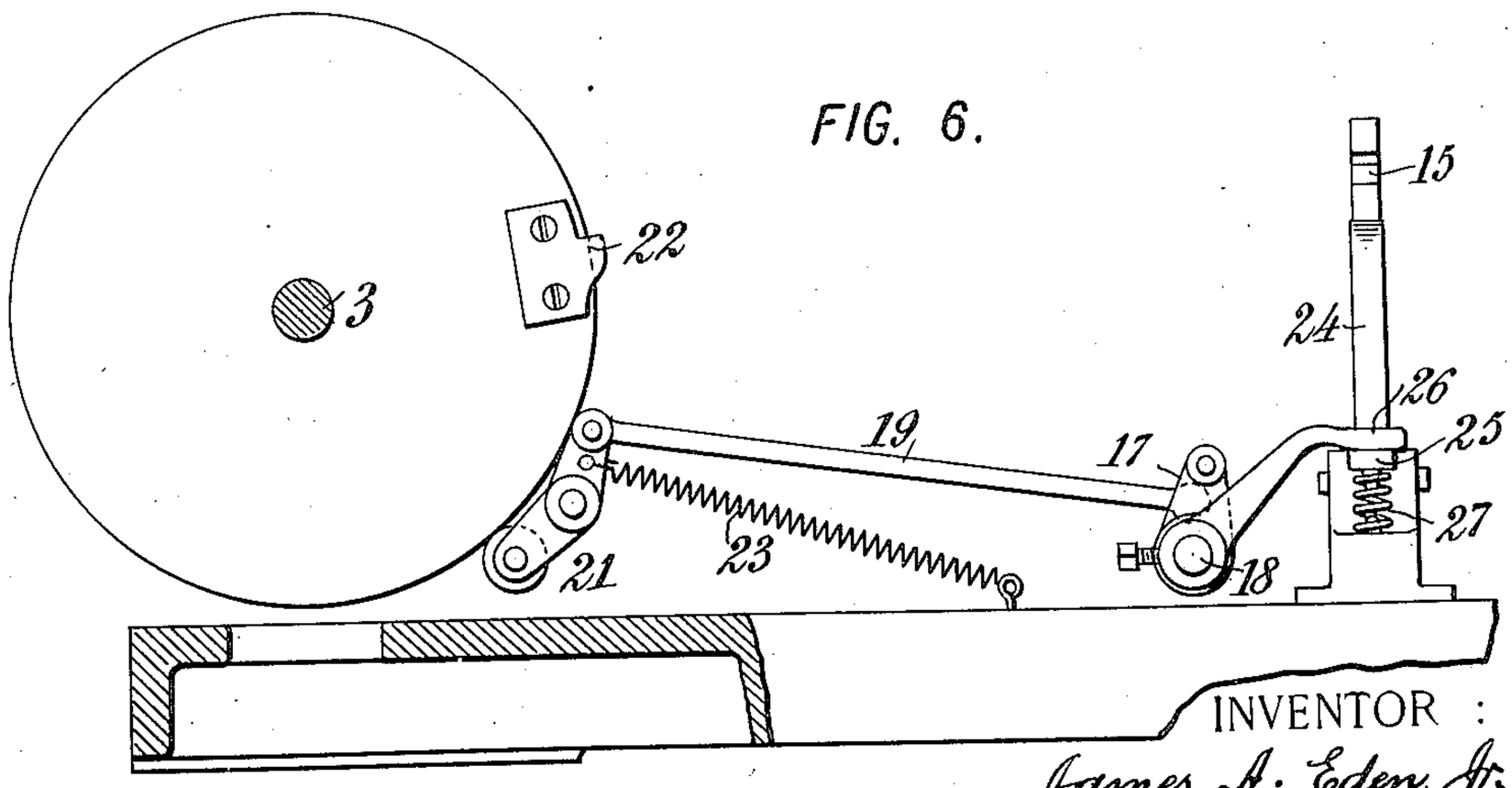


FIG. 6.



INVENTOR :

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Fred White

René Bruine

UNITED STATES PATENT OFFICE.

JAMES A. EDEN, JR., OF NEW YORK, N. Y., ASSIGNOR TO E. W. BLISS COMPANY, OF BROOKLYN, NEW YORK, A CORPORATION OF WEST VIRGINIA.

MACHINE FOR DRILLING STAY-BOLTS AND SIMILAR WORK.

No. 917,269. Specification of Letters Patent. Patented April 6, 1909.

Application filed March 7, 1907. Serial No. 361,074.

To all whom it may concern:

Be it known that I, JAMES A. EDEN, Jr., a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Machines for Drilling Stay-Bolts and Similar Work, of which the following is a specification.

Stay-bolts for boilers are ordinarily attached to the opposite plates of a boiler, and are drilled from the outer end inwardly a sufficient distance to permit the escape of water or steam when a bolt breaks between the two plates, and thus to indicate the fact of a break.

The present machine is designed to receive bolts, such, for example, as the square-headed center-punched bolts or blanks made in the machine described in my application for patent for machines for making stay-bolts or the like pending concurrently herewith; and to drill a sufficiently long hole in the outer ends of said bolts.

The complete machine includes a receptacle in which the bolts are made to assume parallel positions and to roll on to a carrier upon which they are clamped and carried in succession to points in line with one or more drills. The drills are advanced and withdrawn at the proper times, and the bolts are then carried to a position at which they are ejected from the carrier.

The machine operates with great rapidity and accuracy, the output being many times as great as that of apparatus previously used for such work.

Other points of advantage are referred to in detail hereinafter.

The accompanying drawings illustrate a machine embodying the invention.

Figure 1 is a plan of the complete machine. Fig. 2 is an end elevation of the same, partly broken away. Fig. 3 is a diagram of the finished product of the machine, showing the manner of use. Fig. 4 is a side elevation of the complete machine, omitting the feed tray. Fig. 4ª is a detail. Fig. 5 is a transverse section approximately on the line 5—5 of Figs. 1 and 4. Fig. 6 is a diagram of the escapement mechanism for the carrier.

Referring to the embodiment of the invention illustrated, the bolts A are arranged parallel to each other in a pile in a receptacle such as the tray B, from which they are fed to an intermittently rotating carrier, which I designate as a whole by the letter C. This carrier moves each bolt in succession to a plurality of drills, such, for example, as the three drills D, E and F. The first drill D enters say one-third of the desired distance, and is then withdrawn, after which the second drill extends the hole a third of the distance farther, after which the third drill enters to the final depth. This division of work not only saves the drills, but permits of working on a plurality of bolts at once, and discharging them at a rate approximately three times as great as if all the work had to be done by a single drill.

As shown in Fig. 3, the bolt A is designed to fasten together an inner boiler plate G and an outer one H, and is provided with a central hole J extending from the outer end to well within the space between the two plates.

The bolts may be carelessly stacked in the tray B, approximately parallel with each other. The feeding from this point is automatic, so that no skill is required to attend the machine. The tray is pivoted at K, and its outer end swings down about 15 degrees and up again slowly. The upward movement of the outer end of the tray rolls the bolts into a guide or trough L, keeping the latter filled. The downward movement of the outer end of the tray is below the level of the pivot and throws the bolts into the back of the tray, clearing the hinge and relieving the bolts in the trough L from the pressure. The drawings, Figs. 2 and 4, show the tray in the middle position of its oscillation. To permit the tray to swing well down, its rear end is made higher than the diameter of a single bolt, preferably of a height equal to several bolts on one another, as shown. This rolling of the bolts in the tray back and forth causes them to settle into parallel positions.

The tray B is connected by means of a link M with an operating arm N upon a shaft O. The link M includes a friction device M′ by which the lower end of the link is frictionally clamped to the upper end, the joint being arranged to yield in case of any obstruction and avoid breaking of the parts. As these machines are fed by cheap labor, the blanks are thrown in in all positions, and many things besides blanks are occasionally thrown in, the friction device is of great importance in connection with this oscillating tray. The shaft O has at its opposite end (Fig. 4) an arm P oscillated slowly by means of a link Q connected with a crank-pin upon a slow-speed gear R driven by means of a pinion S upon a shaft T which is rotated by means of a worm gear U and a worm V upon a longitudinal shaft W upon which is splined a large gear X rotated by means of a pinion Y upon the driving shaft Z of the machine, the latter being controlled from fixed and loose belt pulleys *a* and *b*.

The arm N is extended beyond the pivot O and provided with a counterweight *c* approximately balancing the weight of the tray B and its contents. The trough L is preferably fixed, and inclined sharply downward to the carrier C. The tray B has a fixed upwardly projecting side *d* serving as a stop to determine the endwise position of the bolts in the tray, and to insure that the bolts shall be properly positioned for the drills. In order to provide for bolts of greater or less length, the opposite side *d* of the tray is made adjustable, as by means of the slots and screws shown, or in any other suitable way. A similar arrangement of one fixed side *e* and one adjustable side *e′* is provided for the guide or trough L, and the latter is provided with overhanging flanges *f f′* or similar devices for holding the bolts down against their tendency to bunch up under the effect of their own weight.

The carrier C consists of a pair of heads mounted upon a shaft *g* and having peripheral sockets in which the ends of the bolts rest. Each head consists of a pair of plates, *h j*, *h′ j′*, respectively, which are angularly adjustable relatively to each other, as by means of a set of holes h^2 j^2 (Fig. 2) which are arranged vernierwise around the plates, so that by bringing one or the other set of holes in conjunction, and introducing a dowel j^3, they will be held in the desired position of adjustment relatively to each other. This adjustment causes the notches *k* in the plates to overlap in the manner indicated, so that the effective width of the notches may be varied in accordance with the diameter of the bolts to be carried.

It is to be noted that in order to preserve the center of the bolts always at the same point, it is necessary to shift not merely one of the plates but both of them simultaneously. They are therefore both mounted loosely on the shaft *g*, and are held in proper angular position thereon by means of one or more slots h^3 in the heads *l l′* respectively, through which pass bolts h^4 screwing at fixed points through one of the movable plates. The head *l* adjacent to the drills is preferably fixed on the shaft, while the opposite head *l′* carrying the plates *h′* and *j′* and projecting radially beyond them so as to form end stops or gages for the bolts, is adjustable longitudinally on the shaft *g* and fastened by means of a set-screw *m*. It is proposed to rotate the carrier C with rapid intermittent movements, and it is advisable to provide a guard such as a pair of springs *n* to prevent the bolts from being thrown out in passing from the receiving position at the top to the first boring position.

It is important to clamp the bolts firmly in position while they are being bored, to prevent any lateral strain upon the drills. For this purpose I provide a series of holding pins *o p q* with their ends shaped to angles approximately tangential to the carrier, and backed by strong springs *r* adjustable by means of screws *s* in sockets in a frame *t* which has a lateral reciprocating movement in a frame *u* rigidly mounted upon the base of the machine. The movement of the sliding frame *t* is obtained by a toggle mechanism. Links *v* at the upper and lower ends of the sliding frame are connected to inner arms *w* of a vertical shaft *x*, the shaft having a central arm *y* on its outer side which is connected by means of a link *z* to a roller running in a cam groove 4 of a disk 2 (Fig. 1) mounted on the slowly revolving shaft 3 and which cam groove gives the roller and the rod *z* the desired movements backward and forward.

The three drills are carried on the ends of spindles 5 which are provided with bearings in fixed standards 6 and 7, and the ends of which are mounted in a carriage 8 which is reciprocated by means of a cam 9 also on the shaft 3 and engaging a roller 9′ on an arm of the carriage. They are rotated by means of small pinions 10 arranged around the drum or wide gear X the center of which corresponds with the center of the carrier for the bolts, so that the drills are concentric with this carrier. The drum X is of sufficient width to be in engagement with the pinions 10 on the drill spindles 5 throughout their necessary reciprocation.

The drum X and the parts driven directly thereby are rotated continuously. A very simple mechanism is provided for transforming this continuous movement into a quick intermittent movement of the carrier C. The shaft *g* of the carrier is provided on its inner end with a locking disk 11 and a friction disk 12. A complementary friction disk 13 is mounted fixedly on the end of the shaft W of the drum X, and is pressed out-

ward by means of suitably guided springs 14, so as to form a friction clutch between the shaft W and the shaft *g*. There is a constant frictional engagement, and the shaft *g* receives a quick movement between its release and its locking by an escapement provided for the purpose.

The locking plate 11 is provided with locking notches 15 corresponding in interval with the feeding intervals and adapted to be engaged by a bolt 16 (Fig. 4) sliding in a suitably fixed guide, and attached to the end of the arm 17 upon a transverse shaft 18 which is connected by means of a link 19 with an arm 20 of a lever, the other arm 21 of which is provided with a roller lying in the path of a cam 22 upon the disk 2. When the cam or tappet 22 strikes the arm 21 the bolt 16 is withdrawn, and the shaft *g* allowed to turn, the tappet 22 being so short that the bolt 16 will be released and will be in position to jump into the next notch of the locking plate so as to hold the carrier in the next position. The locking bolt is normally pressed toward the locking plate 11 by means of a spring 23 (Fig. 6). Where, however, the movement of the carrier is very rapid, as compared with that of the disk 2, an additional stop may be provided for preventing the carrier from overrunning its intended interval before the locking bolt 16 can slip into place. Such a means is shown in Fig. 5, and comprises a locking pawl 24 having an outwardly projecting arm 25 upon which bears an arm 26 on the outer end of the shaft 18. A spring 27 presses upon the arm 25 and holds the pawl 24 against the notched plate 11. Now when the locking bolt 16 is withdrawn, the pawl 24 is immediately pressed yieldingly against the plate 11, and, as the latter rotates, the hooked end of the pawl drops into the next notch, the positions being such that this action takes place intermediate between two successive positions of the disk. When the stop 22 has passed, and the locking bolt 16 is released and ready for action, the pawl 24 is withdrawn. To permit the withdrawal of the pawl 24 while the locking bolt 16 is still held back, a spring 28 (Fig. 4[a]) may be introduced between the shaft 18 and the locking bolt 16.

The bolts are preferably held in the notches during their passage from one clamping pin to the next, by means of guides 29 concentrically arranged relatively to the carrier, and apertured for the passage of the clamping pins *o*, *p* and *q*, as shown in Fig. 4.

Though I have described with great particularity of detail a specific embodiment of my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiment disclosed.

Various modifications thereof in detail and in the arrangement and combination of the parts may be made by those skilled in the art without departure from the invention.

What I claim is:—

1. In a ma hine of the class described, a pivoted receptacle adapted to receive bolts and open at its discharge end so that bolts may roll out of said end, and having a flat bottom and a rear wall of greater height than the diameter of a bolt, and means for oscillating it about its pivot above and below a horizontal position whereby bolts laid on said bottom in various positions are caused to assume positions parallel to the pivot so as to roll out of the discharge end.

2. In a machine of the class described, the combination of a fixed downwardly inclined trough L for feeding bolts to a carrier, and a tray B having its open end pivoted adjacent to the upper end of the trough L and having a flat closed bottom upon which the bolts may be laid in various positions, and a rear wall of greater height than the diameter of a bolt, and means for oscillating said tray to cause the bolts to assume positions parallel to the pivot so as to roll into said trough.

3. In a machine of the class described, a movable carrier comprising two plates and having a notch for receiving a bolt and transferring it from one point to another, the opposite sides of said notch being formed by edges on the respective plates and both plates being adjustable so as to receive bolts of different diameters with their centers always in the same line.

4. In a machine of the class described, a movable carrier having two members each provided with a plurality of notches for receiving bolts and transferring them from one point to another, and one adjustable relatively to the other to cause the notches to overlap so as to reduce the effective width thereof and adapt them for bolts of different diameters.

5. In a machine of the class described, a carrier C having a pair of heads with peripheral sockets for receiving bolts, a shaft *g* on which said heads are mounted, each head comprising a pair of notched plates *h*, *j*, and *h'*, *j'*, respectively, the plates of each pair being angularly adjustable relatively to each other to vary the effective widths of the sockets, and each head being angularly adjustable on said shaft to maintain the centers of the bolts always in the same lines.

6. In a machine of the class described, a notched carrier comprising a shaft, pairs of notched plates arranged to receive a bolt, one pair for receiving each end of the bolt, the notched plates being angularly adjustable relatively to each other, and a plate angularly fixed on said shaft and adjustably attached to said notched plates for determining their angular position on the shaft.

7. In a machine of the class described, a notched carrier; a series of holding pins *o*, *p*

and *q*, a frame *t* having sockets carrying said pins, springs *r* in said sockets pressing said pins outwardly, and means for moving said frame toward or away from said carrier to cause said pins to engage or to release bolts in the notches of the carrier.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES A. EDEN, JR.

Witnesses:
DOMINGO A. USINA,
THEODORE T. SNELL.