(No Model.) 3 Sheets—Sheet 1.

A. WOOD.

BOLT THREADING MACHINE.

No. 405,236. Patented June 11, 1889.

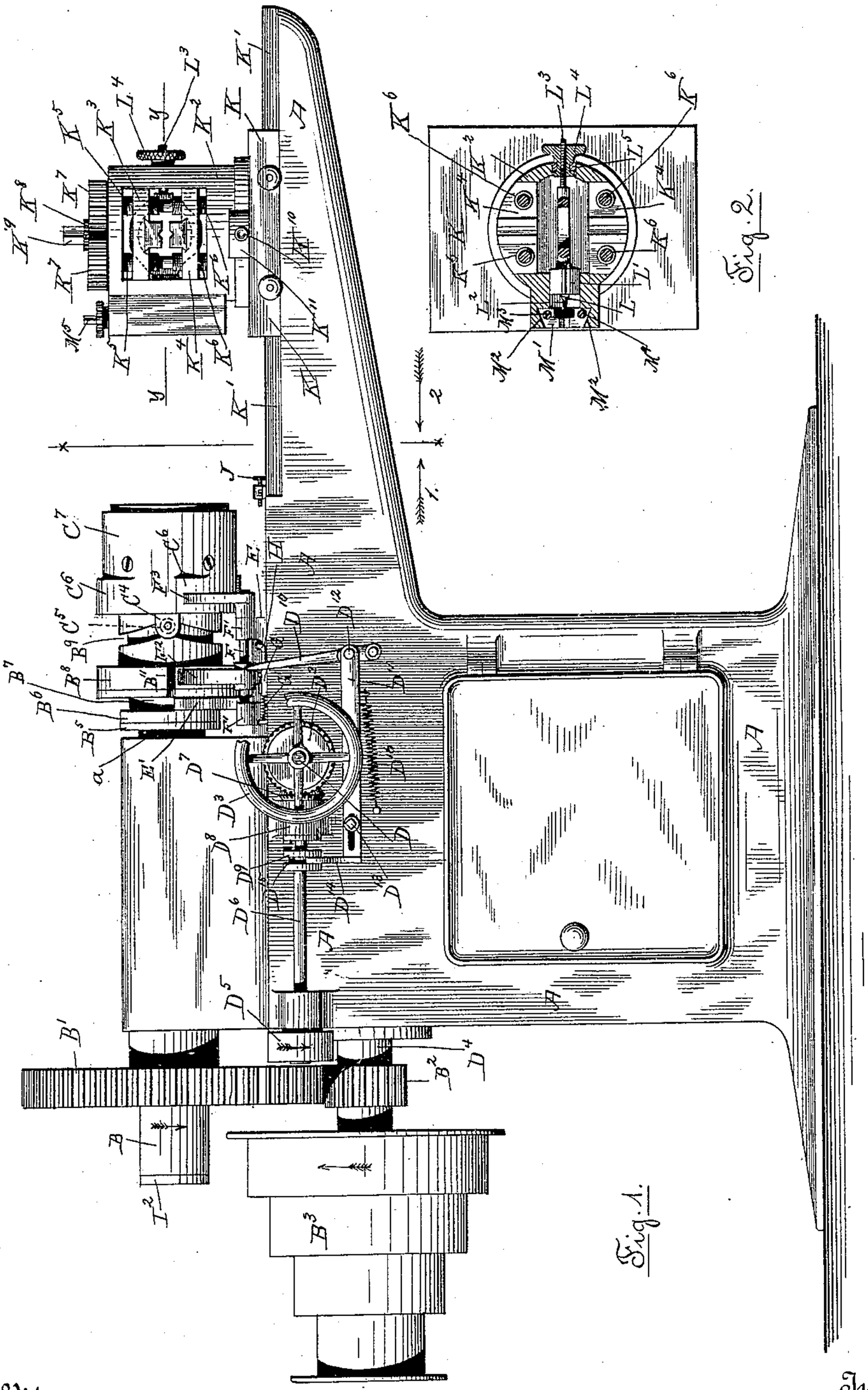


Fig. 2.

Fig. 1.

Witnesses
Chas. F. Schmelz.
H. M. Fowler

Inventor
Alvin Wood,

By his Attorney
Rufus B. Fowler.

(No Model.) 3 Sheets—Sheet 2.

A. WOOD.

BOLT THREADING MACHINE.

No. 405,236. Patented June 11, 1889.

Fig. 3.

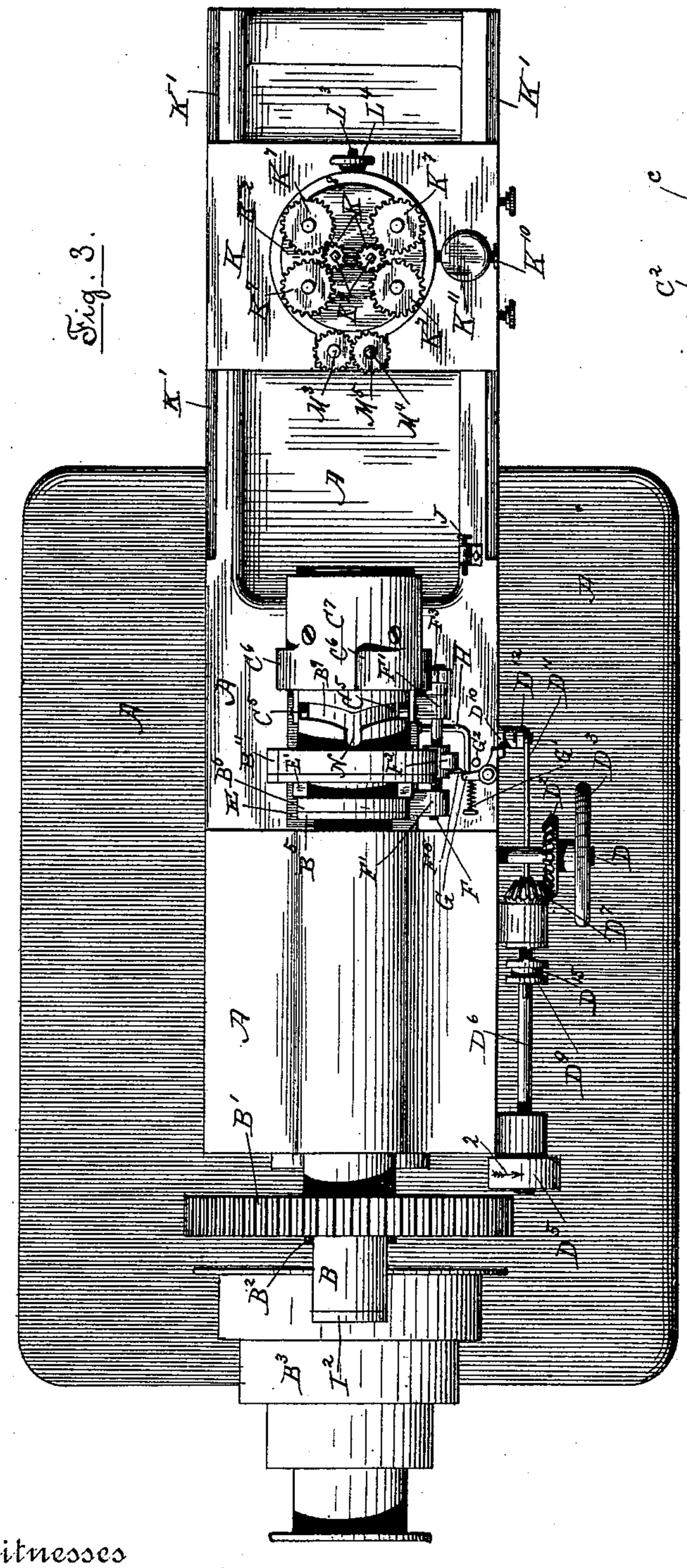


Fig. 5.

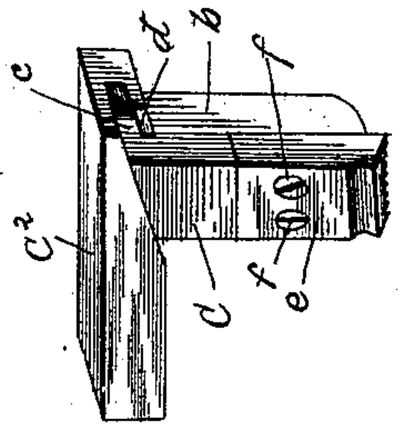
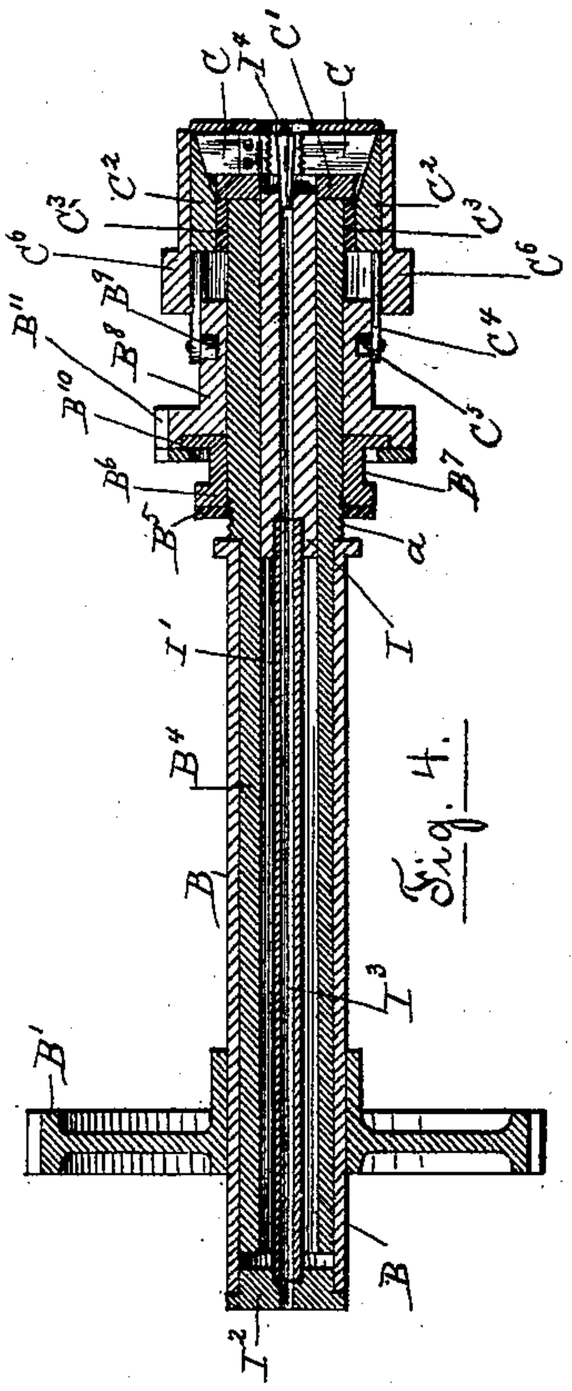


Fig. 4.



Witnesses
Chas. F. Schmelz.
H. M. Fowler

Inventor
Alvin Wood,

By his Attorney
Rufus B. Fowler

(No Model.) 3 Sheets—Sheet 3.

A. WOOD.

BOLT THREADING MACHINE.

No. 405,236. Patented June 11, 1889.

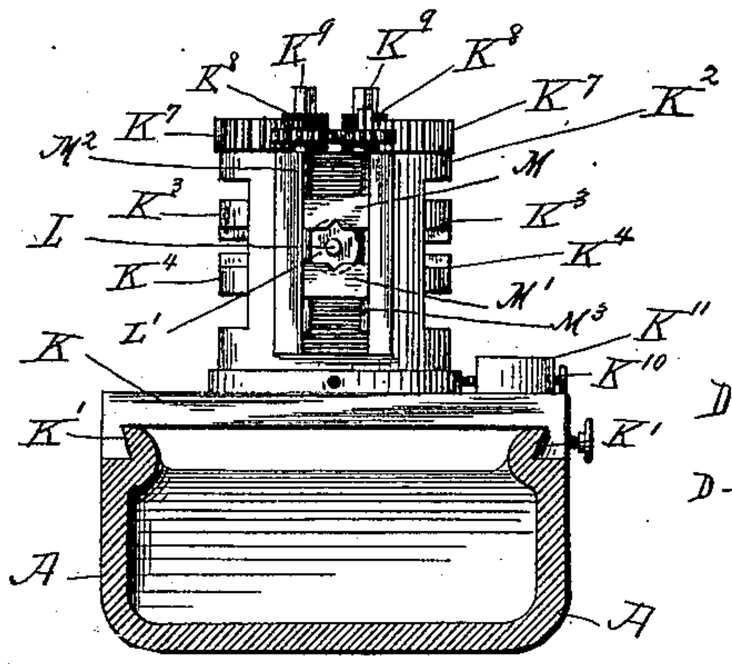


Fig. 6.

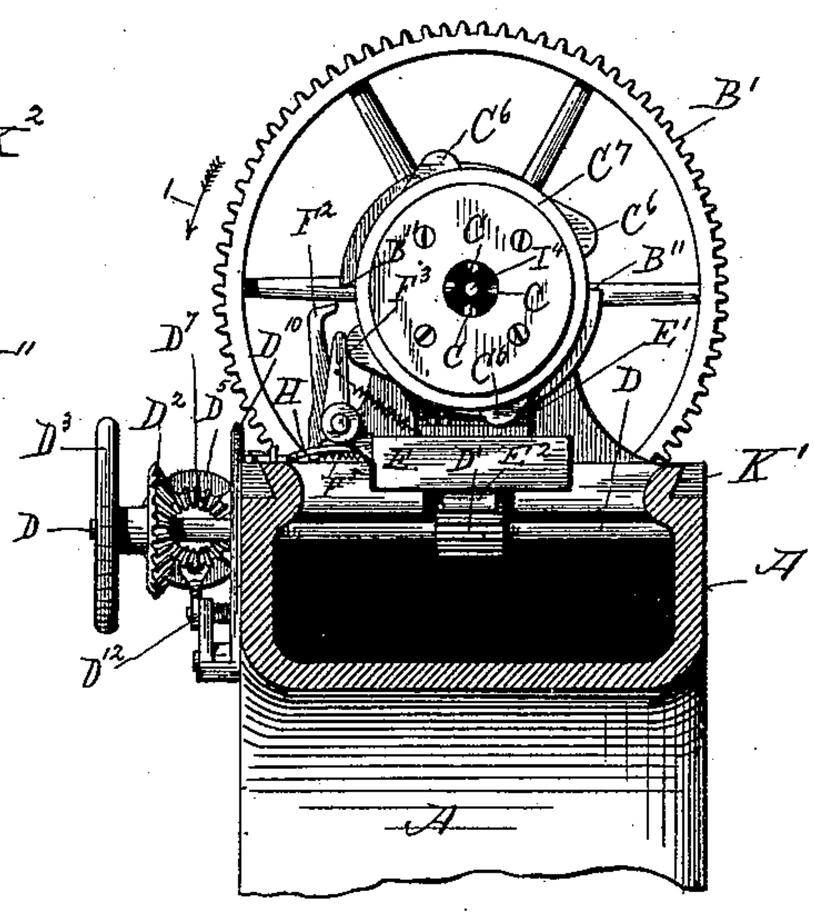
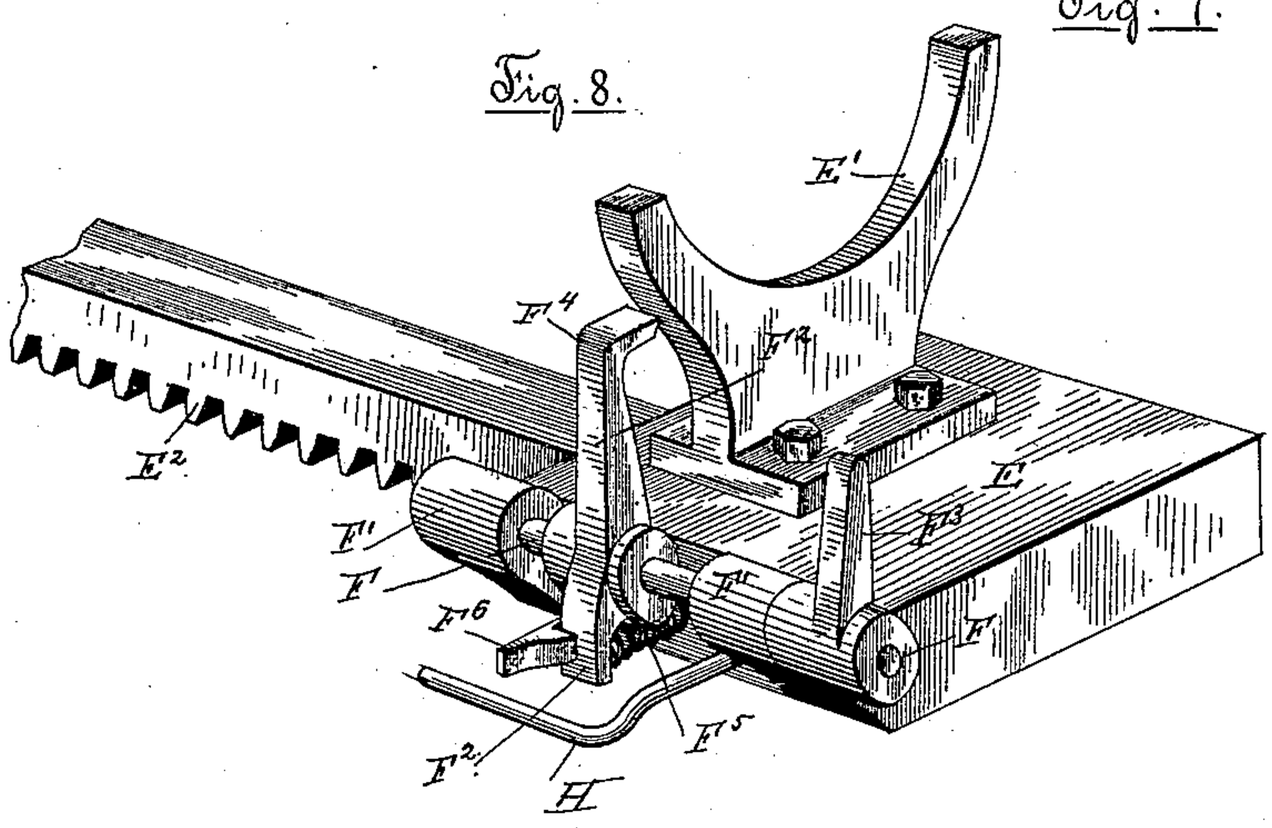


Fig. 7.

Fig. 8.



Witnesses
Chas. F. Schmelz.
H. M. Fowler.

Inventor
Aurin Wood

By his Attorney
Rufus B. Fowler.

UNITED STATES PATENT OFFICE.

AURIN WOOD, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CORNELIUS GRAY, OF SAME PLACE.

BOLT-THREADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 405,236, dated June 11, 1889.

Application filed January 21, 1888. Serial No. 261,540. (No model.)

To all whom it may concern:

Be it known that I, AURIN WOOD, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Bolt-Cutters, of which the following is a specification, reference being had to the accompanying drawings, illustrating a bolt-cutting machine embodying my invention, and in which—

Figure 1 represents a side view of the machine. Fig. 2 is a top view of the rotating tail-stock, partly in section, on line Y Y, Fig. 1. Fig. 3 is a plan view of the machine. Fig. 4 is a longitudinal sectional view of the revolving spindle, carrying the head in which the dies are held. Fig. 5 is a detached view of one of the cutting-dies. Fig. 6 is a transverse sectional view on line X X, Fig. 1, in the direction of arrow 1. Fig. 7 is a transverse sectional view on line X X, Fig. 1, in the direction of arrow 2; and Fig. 8 is a perspective view of the toothed sliding plate by which the head is operated, also showing the connected latching mechanism for opening and closing the dies.

Similar letters refer to similar parts in the several views.

My invention relates to a machine for cutting the screw-threads on bolts; and it consists in the construction and arrangement of the several parts, as hereinafter set forth, and specifically named in the annexed claims.

A A denote the supporting-stand upon which the operating parts of the machine are mounted. Journaled in bearings upon the stand A is a spindle B, driven through the gear-wheels B′ B² from the cone-pulley B³. Within the spindle B, which is a hollow sleeve, is placed another hollow spindle B⁴, capable of sliding within the hollow spindle B, and having a spline-connection with the spindle B, so its rotary motion is imparted to the spindle B⁴. A collar B⁵ is screwed upon the screw-threaded portion *a* of the spindle B⁴, having an attached sleeve B⁶, provided with flanges, which inclose a neck B⁷ to receive a forked carrier, by which a longitudinal sliding motion is given to the spindle B⁴ through connected operating mechanism, as hereinafter described.

B⁸ is a sleeve, having a cam-slot B⁹ and an annular chamber B¹⁰, which incloses a flange of the sleeve B⁶, preventing a longitudinal sliding motion of the sleeve B⁸ on the spindle B⁴, at the same time allowing it to rotate on the spindle.

The cutting-dies C C are held in radial ways in a block C′, attached to the end of the sliding spindle B⁴, and the dies are moved radially to open and close them by wedge-shaped pieces C² engaging the outer ends of the radially-sliding dies, as shown in Fig. 5. The wedge-shaped pieces are held in a block C³, having bars C⁴ carrying cam-rolls C⁵, which are held in the cam-slot B⁹ of the sleeve B⁸. A sliding motion is thus imparted to the sliding block C³ and wedge-shaped pieces C² by means of the rotation of the sleeve B⁸ around the sliding spindle B⁴.

The construction and operation of that part of my present machine relating to the method of opening and closing the dies, as above described, are substantially the same as that employed in the bolt-cutter forming the subject of Letters Patent No. 79,714, granted to me on the 7th day of July, 1868, to which reference may be had for a more full and detailed description.

D is a shaft placed transversely to the supporting-stand and at right angles to the spindle B, carrying a pinion D′, bevel-gear D², and hand-wheel D³. Power is applied to the transverse shaft D at will, or by the automatic action of the machine through the belt-pulleys D⁴ D⁵ and a belt-connection, shaft D⁶, journaled on the side of the stand A, bevel-gear D⁷, having its hub journaled in a bracket D⁸ on the side of the stand A, and a clutch-connection D⁹, the sliding half of the clutch having a spline-connection with the shaft D⁶, whereby the rotation of the shaft D⁶ is imparted to the bevel-gear D⁷. The sliding half of the clutch D⁹ is operated by a lever D¹⁰, pivoted on the side of the stand A, with a bar D¹¹, pivoted to the lever at D¹², and sliding on a stud D¹³ in the stand, the sliding bar D¹¹ having a forked arm D¹⁴, engaging an annular groove D¹⁵ on the sliding half of the clutch D⁹. A spring D¹⁶ serves to hold the bar D¹¹ to the left, disengaging the clutch D⁹.

A sliding plate E (shown in perspective

view in Fig. 8) is placed in ways in the supporting-stand A, directly beneath the revolving spindle B, having a forked spindle-carrier E′ attached to its upper side, and with teeth E^2 upon the under side forming a rack which is engaged by the pinion D′ on the transverse shaft D. The forked carrier enters the neck B^7 on the sleeve B^6, the spindle B^4 being thus caused to slide within the hollow spindle B by means of the rotation of the transverse shaft D, either by the hand-wheel D^3 or through the clutch-connection D^9. The sliding plate also carries mechanism by which the dies C C are opened or closed, consisting of a spindle F, journaled in lugs F′ on the plate E. To the spindle F, I attach the levers F^2 and F^3, with the lever F^2 placed opposite a series of ratchet-shaped teeth B^{11} on the sleeve B^8, and the lever F^3 opposite a series of wing-shaped projections C^6 on a sleeve C^7, inclosing and attached to the block C^8. The lever is bent at right angles at F^4, and a spring F^5 is placed between its lower end and the side of the sliding block or plate E, by which the lever F^2 is carried toward the ratchet-teeth B^{11}, unless held away by a spring-latch F^6, as shown in Fig. 8. Whenever the spring-latch F^6 is withdrawn, releasing the lever F^2, the tension of the spring F^5 will carry the upper end of the lever F^2 forward, so the bent end F^4 will engage one of the ratchet-shaped teeth B^{11} as the sleeve B^8 revolves in the direction of the arrow 1, Fig. 7, thereby dogging the sleeve B^8, while the continued rotation of the spindle B, carrying the die-holding block C′ and sleeve C^7, will move the cam-rolls C^5 along the cam-slot B^9, causing the sleeve C^7 and wedge-shaped blocks C^2 to be drawn to the left and moving the dies C C radially outward, in the same manner as is fully described in Patent No. 79,714, already referred to.

A bent latch G is pivoted upon the upper surface of the stand A, which bent latch is carried past the lever D^{10} as the lever is moved to the right by means of a spring G′, so applied to the latch as to carry it against the stop-pin G^2, bringing the latch against the lever D^{10} and retaining it against the tension of the spring D^{16}, holding the clutch D^9 in engagement, and causing the transverse shaft D to be driven by power from the pulley D^4 through the connecting mechanism already described, turning the shaft D^6 in the direction of the arrow 2, Fig. 3, and moving the spindle B^4 to the left, or into the hollow spindle B, until the bent rod H, extending from the side of the sliding plate E, is brought in contact with the latch G, compressing the spring G′ and withdrawing the latch from the lever D^{10}, and allowing the spring D^{16} to move the sliding bar D^{11} and throw the clutch D^9 out of engagement, thereby disconnecting the shaft D from the driving-power and checking the movement of the sliding spindle B^4.

Within the sliding spindle B^4 is a core I, fitting concentrically in the spindle B^4 and held from any longitudinal movement by a tube I′, connecting the concentric core I with a collar I^2 in the end of the spindle B, and through the core, tube, and collar is an opening I^3, through which a rod may be passed upon which a screw-thread is to be cut; or a center I^4, Fig. 4, may be inserted and held concentrically with the cutting-dies C C, for the purpose hereinafter set forth.

The cam-slot B^9 is a continuous slot around the sleeve B^8, and is so shaped that a quarter-revolution of the spindle B, when the sleeve B^8 is held from turning, will cause the dies C C to be opened or closed. The sleeve C^7 is provided with four equidistant wings C^6, so that whenever the lever F^2 is made to engage one of the ratchet-shaped teeth B^{11} on the sleeve B^8 one of the wings C^6 will throw the lever F^2 out of engagement within a quarter-revolution, the spring-latch F^6 retaining the lever F^2 and allowing the sleeve B^8 to continue to rotate with the spindle B and the cutting-dies to remain at rest either opened or closed, according to the position of the cam-slot D^9 relatively to the cam-rolls C^5. The lever F^2 is automatically thrown into engagement with the ratchet-teeth B^{11} at the end of the movement of the sliding spindle B^4 to the right by means of a screw J, adjustably attached to the frame of the machine, which is placed in the path of the spring-latch F^6, causing it to be disengaged from the lever F^2 and allowing the spring F^5 to carry the bent end F^4 into the path of the ratchet-teeth B^{11}, checking the rotation of the cam-slotted sleeve B^8 and opening the dies C C. The lever D^{10} is then brought to the right, engaging the clutch D^9 and causing the spindle B^4 to be moved to the left by power until it has reached the limit of its reverse movement, when the bent rod H is brought in contact with the bent latch G, releasing the lever D^{10} and permitting the spring D^{16} to disengage the clutch D^9.

Upon the supporting-stand A, I place a sliding plate K, capable of being moved along ways K′ and attached to the stand, so the distance between the sliding plate K and the sliding spindle B^4 may be varied, and upon the sliding plate K is mounted a turret K^2, capable of rotating about a vertical axis lying in the same plane as the axis of the spindle B^4. The turret K^2 forms a supporting-frame for two pairs of jaws K^3 K^4, actuated by two pairs of screws provided with a right and left hand screw-thread K^5 K^6 and a gear-wheel K^7, the gear-wheels of each pair of screws being in mesh with an actuating-pinion K^8, attached to a spindle journaled in the top of the turret and provided with a shank K^9, to which a crank or wrench is applied in order to rotate the screws and open or close the jaws K^3 K^4. Either pair of jaws may be brought opposite the end of the sliding spindle B^4 at will by rotating the turret K^2, which is held from turning in the desired position

by means of a spring-actuated bolt K^{10}, sliding in a stud K^{11}, projecting from the upper side of the sliding plate K. The two jaws K^3 K^4 are placed upon the right and left hand screws, so they will hold a rod or bolt coincident with the axis of the revolving spindle B^4. Whenever it is required to cut a screw-thread upon what are known as "finished bolts," or those which have been turned to a true cylindrical form, it is necessary to hold them upon centers, in order that the screw-thread may be formed concentrically with the axial line of the bolt. This is accomplished in my improved bolt-cutter by placing a center I^4 in the opening I^3, to hold the end of the bolt to receive the screw-thread, while the opposite end of the bolt is held upon the center L, held in a sliding block L', sliding in ways L^2 in the turret K^2.

The block L' has a screw-threaded bolt L^3 extending across the turret and having a hand-nut L^4 held from longitudinal movement by means of a groove or neck L^5 inclosed in the turret. The center L is thereby adjusted in a line coincident with the center I^4 and with the axis of the spindle B^4.

Above and below the center L are the jaws M M', having a sliding motion in ways M^2 and actuated by the right and left hand screws M^3 M^4, which are geared together at the top and operated by applying a crank or wrench to the squared section M^5, and bringing the jaws M M' upon the bolt-head, so as to hold the bolt from turning. Holes are placed in the base of the turret in proper position to receive the spring-bolt K^{10} and hold the turret in either of the positions, with one of the pairs of jaws K^3 K^4 in position to present a bolt held therein to the action of the cutting-dies or with the center L in position to receive the bolt, as described. The cam-slot B^9 is so formed that the throw of the slot or movement of the cam-rolls C^5 to the right is sufficient to close the dies and the movement to the left to open the dies; but at that part of the cam-slot at which the cam-rolls are carried to the extreme left, thereby opening the dies, I form the pockets N, one of which is shown in Fig. 3, in order to allow the sleeve C^7, attached block C^3, and wedge-shaped pieces C^2, carried therein, to be moved still farther to the left, thereby withdrawing the wedge-shaped pieces entirely from the dies, and permit the dies to be withdrawn.

The operation of cutting a screw-thread upon a bolt is as follows: The bolt is seized by one pair of the jaws K^3 K^4 and the turret turned to present the bolt to the cutting-dies, which are advanced upon the bolt by means of the hand-wheel D^3, when the movement of the cutting-dies will be continued by reason of their cutting action upon the bolt until the spring-latch F^6 is brought in contact with the screw J on the stand A, thereby releasing the lever F^2, which is carried forward by the action of the spring F^5 to engage one of the ratchet-shaped teeth B^{11}, dogging the sleeve B^8 and permitting the cam-rolls C^5 to move along in the cam-slot B^9 and draw the sleeve C^7 and wedge-shaped pieces C^2 toward the left, thereby moving the cutting-dies radially outward and releasing them from the bolt. As soon as this is accomplished, the motion of the lever F^2 is reversed by the action of one of the wing projections C^6 on the sleeve C^7, allowing the cam-slotted sleeve B^8 to again revolve with the spindle B^4 and checking the further withdrawal of the sleeve C^7. The lever D^{10} is then moved to the right, engaging the clutch D^9 and applying power to cause the reverse motion of the spindle B^4, as already described, the lever D^{10} being held in position to hold the clutch D^9 in engagement by the bent latch G until the spindle has reached the limit of its reverse movement, when the bent rod H is brought in contact with the latch G, releasing the lever D^{10} and allowing the spring D^{16} to disengage the clutch D^9. While the operation of cutting a screw-thread upon one bolt is being carried on, a second bolt is placed in the jaws K^3 K^4 upon the opposite side of the turret, and when the operation has been completed upon one bolt the turret is turned one-half a revolution and the second bolt presented to the action of the cutting-dies.

Whenever what are known as "finished" bolts are to be cut, the turret is rotated to bring the center L in line and in opposition to the spindle, and a center I^4 placed in the core I, as shown in Fig. 4, and the operation carried on of cutting the screw-thread, as already described with reference to unfinished or rough bolts.

The dies are constructed in two pieces, as shown in Fig. 5, in which *b* denotes a block having a radially-sliding motion, and being provided with a lip *c* at its outer end engaging a similar lip *d* in the wedge-shaped piece C^2. To the inner end of the block *b*, I attach the screw-thread-cutting plates *e* by means of the screws *f f*, thereby enabling the plates *e* to be replaced when worn without incurring the expense of entire new blocks *b*.

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

1. The combination, with a hollow revolving spindle and a die-carrying spindle held concentrically in said hollow spindle, of a rack having a sliding motion, and so connected with said die-carrying spindle as to impart a longitudinal sliding motion thereto, a shaft journaled transversely to said sliding rack, a pinion on said transverse shaft engaging said rack, a rotating driving-shaft and connections and clutching mechanism, substantially as described, whereby the transverse shaft and the rotating driving-shaft are connected and disconnected at will, as and for the purpose set forth.

2. The combination, with a hollow revolving spindle, a die-carrying spindle held concentrically within said hollow spindle, a transverse shaft carrying a pinion and a bevel-gear, and a sliding rack engaged by the pin-

ion on said transverse shaft, said rack being so connected with said die-carrying spindle as to impart a sliding motion thereto, of a bevel-gear journaled by its hub and engaging the bevel-gear on said transverse shaft, a shaft passing loosely through the journaled hub of said bevel-gear, and a clutching device by which said shaft is connected or disconnected with the hub of said bevel-gear, substantially as described.

3. The combination, with a sliding plate connected with the die-holding mechanism and provided with a toothed rack, and a transverse shaft having a pinion engaging said toothed rack, of a driving-shaft connected with said transverse shaft through a clutch-connection, a lever pivoted on the frame of the machine, a sliding bar carrying a forked arm and connected with said pivoted lever, and a retractile spring applied to said sliding bar to disengage said clutch-connection, substantially as described.

4. The combination, with a sliding rack connected with the die-holding mechanism, a transverse shaft carrying a pinion engaging said rack and connected with the driving-power through a clutch-connection, and a clutch-operating mechanism consisting of the lever D^{10}, bar D^{11}, forked arm D^{14}, and retractile spring D^{16}, of the bent latch G, arranged to engage said lever D^{10} and hold it against the tension of the retractile spring, spring G′, and bent rod H, attached to the sliding rack, whereby the sliding motion of the rack is limited in one direction by disengaging the clutch-connection of the transverse shaft, substantially as described.

5. The combination, with the radially-moving die-blocks C C, wedge-shaped actuating-blocks C^2, bars C^4, carrying cam-rolls C^5, and sleeve B^8, having a cam-slot B^9, of the pockets N, as and for the purpose set forth.

6. The combination, with the radially-moving die-blocks and connected operating mechanism, substantially as described, of the detachable screw-cutting plates *e*, attached to and inserted in the sides of said die-blocks, and attaching-screws *f*, substantially as described.

7. The combination of a hollow revolving spindle, a sliding spindle held concentrically in said hollow spindle and receiving rotary motion therefrom, and a hollow core held concentrically in said sliding spindle and so attached to said outer hollow revolving spindle as to be held from longitudinal movement, substantially as described.

8. The combination of hollow spindle B, sliding spindle B^4, hollow core I, collar I^2, attached to the spindle B, and connecting-tube I^3, as and for the purpose set forth.

9. The combination of screw-cutting dies inclosed within a sleeve C^7, having wing-shaped projections, sleeve B^8, having a cam-slot B^9 and provided with ratchet-shaped teeth B^{11}, said cam-slot actuating said sleeve C^7 to open and close the cutting-dies, substantially as described, spindle F, levers F^2 and F^3, spring F^5, and latch F^6, all arranged and operating as and for the purpose set forth.

10. The combination, with the die-holding mechanism having a longitudinal sliding movement, whereby the cutting-dies are fed to the work, and with mechanism for opening and closing said cutting-dies, substantially as described, of a spring by which said opening and closing mechanism is set in operation, a spring-latch for retaining the opening and closing mechanism, and a stop attached to the frame-work of the machine in the path of said retaining-latch, whereby said opening and closing mechanism is set in operation to open the dies, substantially as described.

11. The combination, with mechanism for rotating the screw-cutting dies and for imparting a longitudinal feeding motion to said dies, substantially as described, of the plate K, adjustably attached to the stand A, rotatable turret mounted on said plate and carrying the three sets of bolt-gripping jaws K^3, K^4, and M M′, and a sliding center L, substantially as described.

12. The combination, with mechanism for rotating the screw-cutting dies and for imparting a longitudinal feeding motion to said dies, substantially as described, of a rotatable turret carrying a center and devices for dogging the bolt and preventing its rotation, substantially as described.

13. The combination, with mechanism for rotating the screw-cutting dies and for imparting a longitudinal feeding motion to said dies, substantially as described, of a rotatable turret, a pair of jaws for gripping the bolt, and a center which is adjustable with reference to said cutting-dies, substantially as described.

14. The combination of plate K, rotatable turret K^2, jaws K^3 K^4, spindles having right and left hand screw-threads K^5 K^6, and gears K^7, and intermediate actuating-pinions K^8, substantially as described.

15. The combination, with screw-cutting dies and with the mechanism for rotating the same and imparting a longitudinal feeding motion to said dies, substantially as described, of the plate K, capable of being adjustably attached to the supporting-stand A, rotatable turret K^2, jaws K^3 K^4, spindles having right and left hand screw-threads K^5 K^6, gears K^7, intermediate actuating-pinions K^8, and a spring-actuated bolt K^{10}, by which said turret is held from rotation, substantially as described.

AURIN WOOD.

Witnesses:
RUFUS B. FOWLER,
CHAS. F. SCHMELZ.