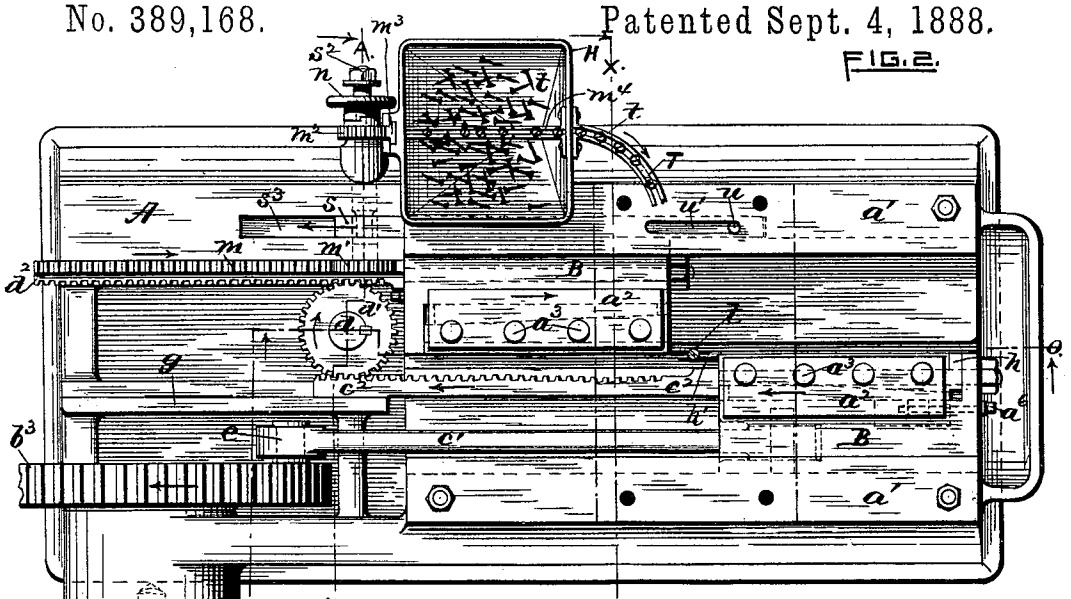
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C. D. ROGERS.

SCREW THREADING MACHINE.

No. 389,168. Patented Sept. 4, 1888.

FIG. 2.



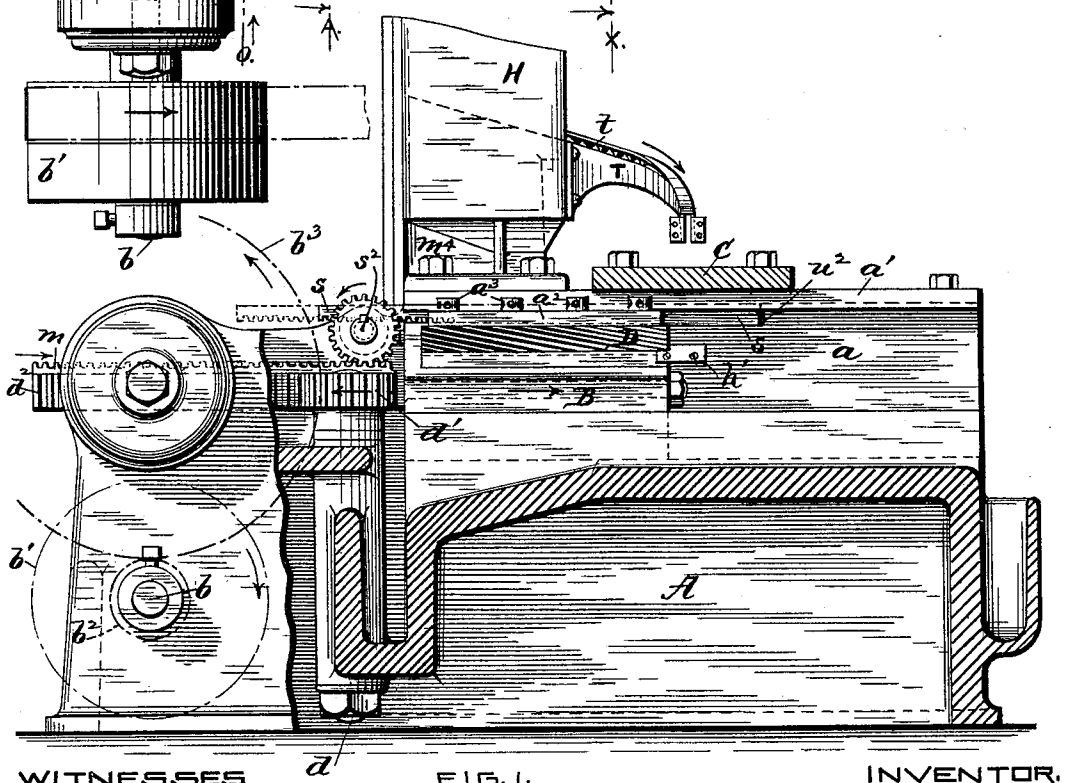


FIG. 1.

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(No Model.) 4 Sheets—Sheet 2.

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SCREW THREADING MACHINE.

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FIG. 4.

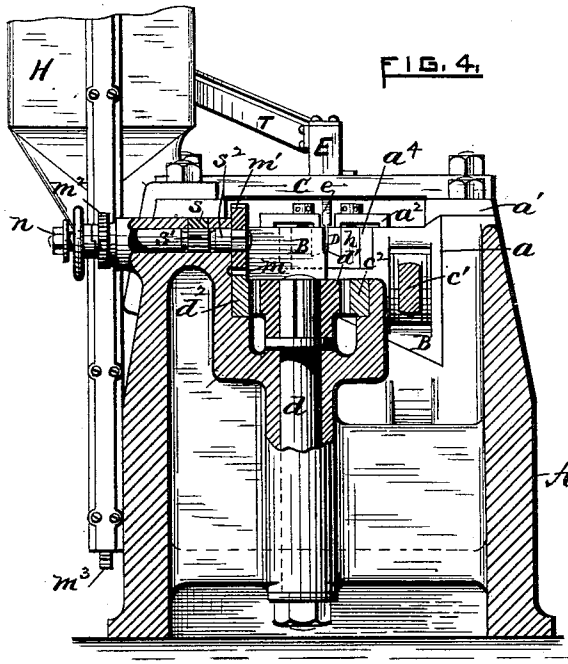
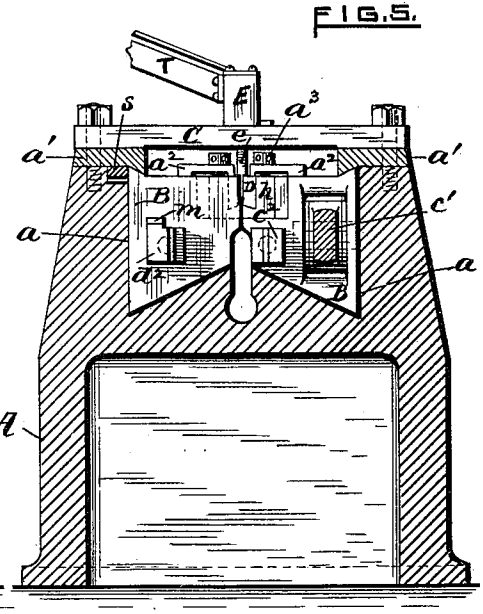


FIG. 5.



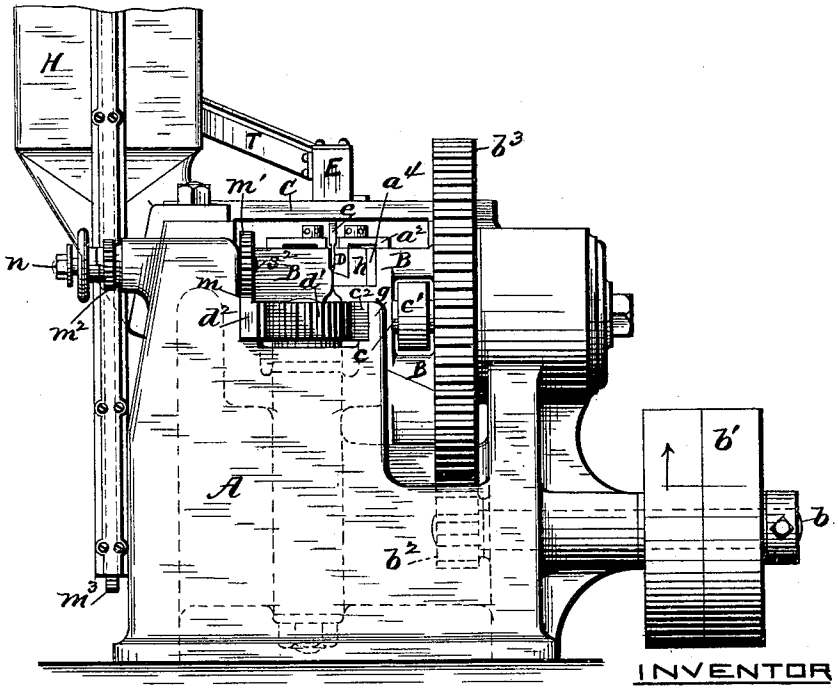


FIG. 3.

WITNESSES.

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SCREW THREADING MACHINE.

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FIG. 6.

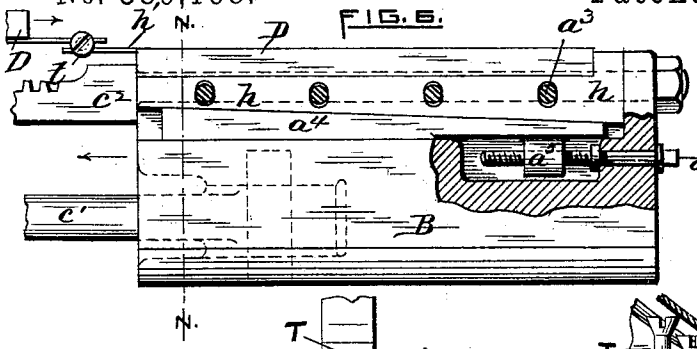


FIG. 7.

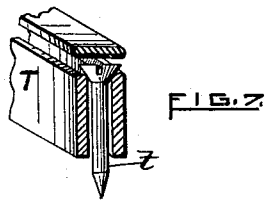


FIG. 8.

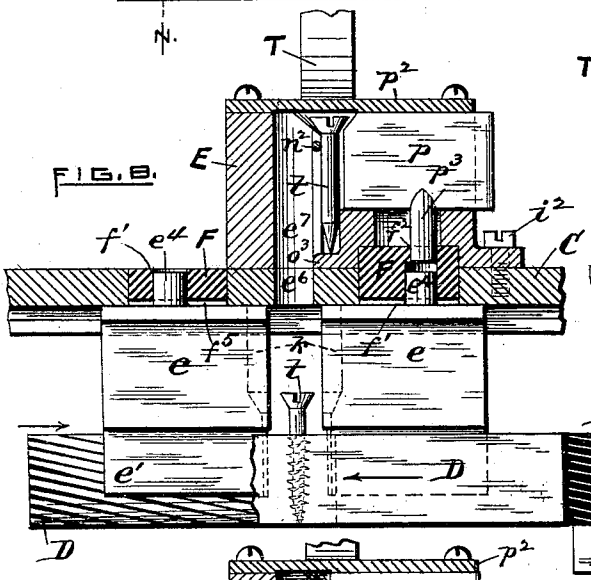


FIG. 9.

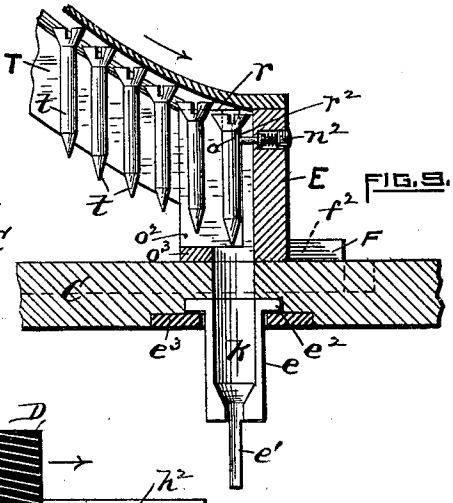


FIG. 10.

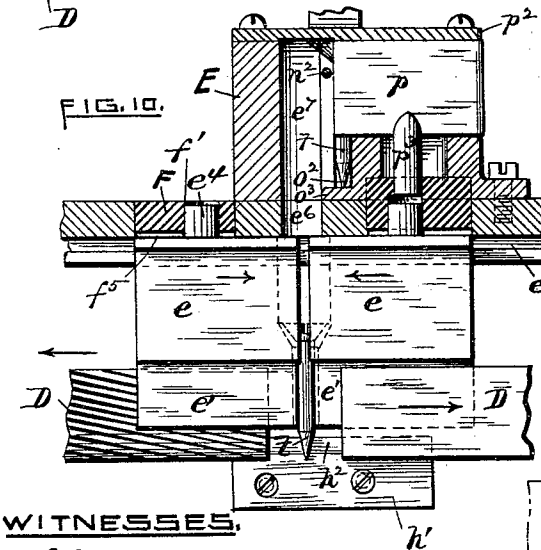


FIG. 11.

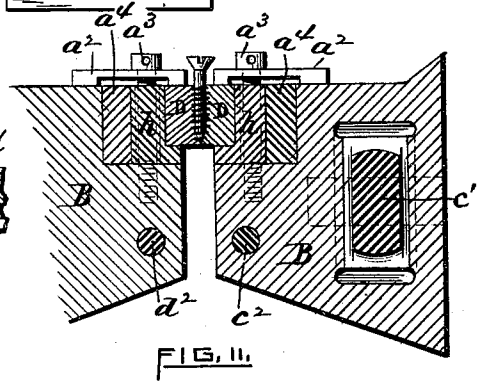
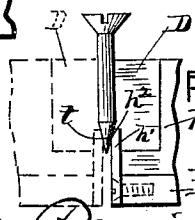


FIG. 11a.



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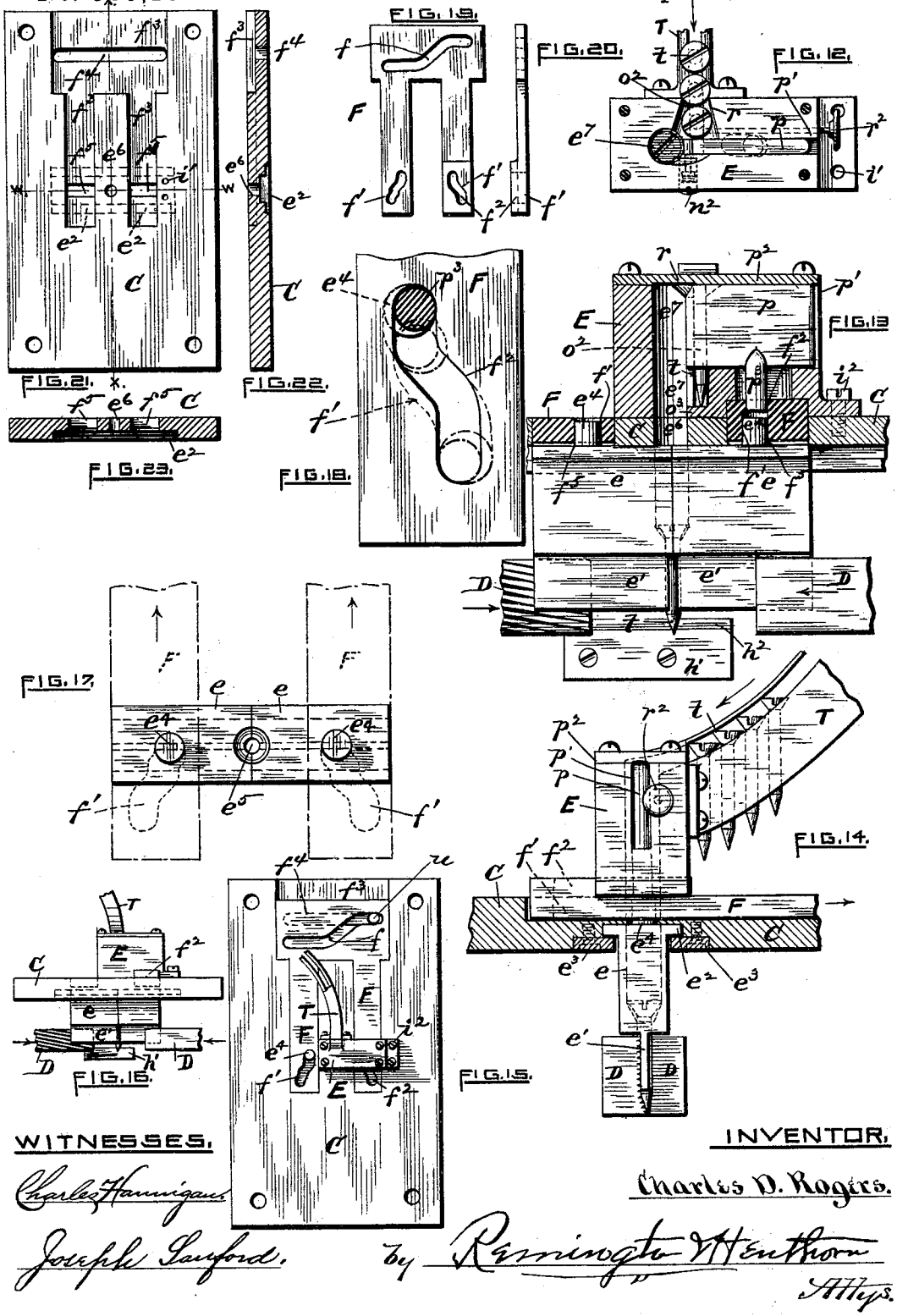
N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 4 Sheets—Sheet 4.

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SCREW THREADING MACHINE.

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UNITED STATES PATENT OFFICE.

CHARLES D. ROGERS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE AMERICAN SCREW COMPANY, OF SAME PLACE.

SCREW-THREADING MACHINE.

SPECIFICATION forming part of Letters Patent No. 389,168, dated September 4, 1888.

Application filed May 18, 1888. Serial No. 274,275. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. ROGERS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Screw-Threading Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The machine forming the subject of my present invention relates to the class which produce threads upon screws by the reciprocating action of grooved dies by and between which the screw-blanks are rolled, thereby compressing and forcing it laterally into the grooves of the dies.

My invention consists, essentially, in the novel manner of mounting and actuating the thread-forming dies, combined with automatically-operating feeding and blank-holding mechanisms.

The object of my improvement is to simplify the construction of screw-threading machines of the class referred to. To that end I employ a pair of oppositely-mounted and reversely-arranged grooved dies actuated by the main driving arrangement. The blanks while being acted upon are so held and guided between movable jaws that the proper relation of the several parts to the blanks is positively maintained.

An example of a machine arranged and adapted to automatically roll screw-threads upon blanks is shown and claimed in my United States Patent No. 370,353, of September 20, 1887.

In the annexed four sheets of drawings, Figure 1, Sheet 1, represents a side view of my improved screw-threading machine, a portion of said figure being shown in section or broken away to show some of the interior parts, the section being taken on the irregular line *o o* of Fig. 2. Fig. 2 is a plan view, a portion of the feeding mechanism, &c., being omitted. Fig. 3, Sheet 2, is a front end view of the machine. Fig. 4 is a vertical transverse sectional view taken on the irregular line A A of Fig. 2. Fig. 5 is a similar view taken on line *x x* of Fig. 2, the die and holder not being in section. Fig. 6, Sheet 3, is a plan view, enlarged, in partial horizontal section, showing the manner of mounting the die-carrier or cross-head. Fig. 7 is a cross-sectional view of the guide or run way which conducts the blanks from the hopper or reservoir to the receiver. Fig. 8 is a vertical sectional view taken through the center of the receiver, the same being located directly over the movable blank-holding jaws, which latter extend down into the space which separates the thread-forming dies. Fig. 9 is a transverse sectional view of the same, and showing a number of blanks lying in the runway preparatory to being dropped singly into the holding-jaws. Fig. 10 is a sectional view similar to that shown in Fig. 8, showing the holding-jaws nearly closed and having a blank therein in position to be acted upon by the dies on their return-stroke. Fig. 11 is a transverse sectional view of the two dies and the respective holders and cross-heads in which they are secured. Fig. 11ª shows the manner of supporting the blanks between the dies. Fig. 12, Sheet 4, is a plan view of the checking device by means of which the blanks are fed singly to the holding-jaws. Fig. 13 is a side view thereof in partial section, and also showing a blank held in position between the holding-jaws preparatory to being acted upon by the advancing threading-dies. Fig. 14 is an end view of the same, showing in addition the lower portion of the track communicating with the checking-head. Fig. 15 is a plan view, reduced, of the checking device and the cam-plates for actuating the holding-jaws. Fig. 16 is an end view of the same. Fig. 17 is a plan view of the holding-jaws in the closed position. Fig. 18 is an enlarged plan view of one of the cam-plates, the same being arranged to intermittingly actuate the checking-plate and the corresponding holding-jaw. Fig. 19 is a detached plan view (reduced) of the cam-plate, showing the arrangement of the several cams formed therein. Fig.

20 is a side view of the same. Fig. 21 is a detached plan view of the plate or cover fitted to receive the cam-plate shown in Fig. 19. Fig. 22 is a longitudinal sectional view of the same, taken on line $x\,x$; and Fig. 23 is a transverse sectional view taken on line $w\,w$.

A description of the several devices embodied in the present machine, together with their construction and operation, and including the joint operation, is as follows:

By referring now to the drawings, A will be found to designate the bed or main framing of the machine, the same being very strong and formed in one piece, the arrangement being such that the screw-blanks are held vertically while being acted upon by the two threading-dies, which are reversely arranged and mounted in die-holders or cross-heads working in opposite directions.

B B designate the two cross-heads, which are fitted to reciprocate in ways a, formed in the main frame, the length of these ways being somewhat greater than twice the length of the cross-head. In Fig. 2 the cross-heads are represented as being at the extreme of travel and preparatory to engaging a screw-blank. The upper parts of said ways are formed by gib-plates a', secured to the bed. By this arrangement the cross-heads are forced to travel in a true plane, the broad base and sides thereof insuring great rigidity or stiffness in action.

Each of the thread-forming dies D is mounted in an L-shaped seat, h, which in turn is adjustably secured to the cross-head by bolts a^3, a clamping-plate, a^2, resting upon the die and cross-head, being interposed between the said seat and bolts, as clearly shown in Fig. 11. In order to attain a nice adjustment of the dies in a lateral or transverse direction, a wedge-shaped piece, a^4, is placed at and forms a backing to the seat h, as shown in Fig. 6, &c. A nut, a^5, secured to the piece a^4, in conjunction with a screw, a^6, mounted in the cross-head, affords means for effecting such lateral adjustment, the bolts a^3 being first loosened for the purpose.

The mechanism for reciprocating the cross-heads is as follows: A driving-shaft, b, is mounted in the front lower portion of the frame A, the same having a small gear, b^2, secured thereto, which meshes into a large gear-wheel, b^3, also mounted in the frame. A pin, c, is secured to the gear-wheel thereby in connection with the rod or link c', jointed to the cross-head and pin, producing a crank motion, as usual. To the front cross-head, near its lower side, is secured a strong guided connection, c^2, having rack-teeth formed in its inner vertical face. This connection is well supported and guided at its forward end by the extension g, formed in the frame. A similar toothed connection, d^2, is secured to the rear cross-head and mounted in the same horizontal plane as the connection c^2. Intermediate of these racks c^2 d^2 is mounted a vertical shaft, d, having secured at its upper end a strong gear-wheel, d', arranged to intergear with both racks, as clearly shown in Figs. 2 and 4. By means of this device it is obvious that the two cross-heads will be reciprocated in opposite directions and at exactly the same relative speed—that is to say, the velocity ratio of the crank c is imparted to the cross-heads, so that both are always traveling and acting in complete unison.

I will next briefly describe a manner of picking up the blanks and delivering them to the track or runway T leading therefrom.

H indicates a stationary hopper containing loose screw-blanks. (See Fig. 9, &c.) Within the hopper is fitted a narrow double blade, m^4, which moves up and down through the mass of blanks. Its upper edge is formed at an angle, so that as the blade arrives at the end of its upward movement any blanks it may have picked up will readily slide therefrom onto the track T through an opening formed in the hopper and coinciding with the track. Motion is imparted to the blade or "pick-up" through the medium of a vertically-guided rack, m^3, secured thereto, which meshes into a small gear-wheel, m^2, loosely mounted on a horizontal shaft, s^2. This shaft has a gear-wheel, m', secured to its inner end, which intergears with rack-teeth m, formed on the upper face of the rack-connection d^2. Practically it is found desirable to be able at times to prevent the pick-up from delivering the blanks. Therefore the gear m^2 is loosely mounted, and is provided with lugs arranged to interlock with the clutch and nut n. The clutch is splined to the shaft, and is adapted to slide endwise, as common to locking devices of this character.

Referring to Figs. 1, 2, 4, and 5, it will be noticed that a rack-rod, s, is fitted into the upper part of the frame at the rear side. The front portion of said rod is provided with gear-teeth on its under side, which engage teeth s' cut into the shaft s^2. (See Fig. 4.) By this arrangement it is evident that a reduced reciprocating movement is imparted to the rod s in unison with the cross-head. An elongated opening, u', is formed in the center portion of the rear gib-plate, a', through which a pin, u, secured to the rear end of the rod s, projects. The object of this rod, &c., is to actuate the blank-checking and holding devices about to be described.

C indicates a plate or tie uniting the two sides of the frame and being firmly bolted thereto, its center being directly over the center of the space formed by the separation of the dies when in their extreme position, as shown by broken lines in Fig. 2. The upper surface of the plate C is cut away or recessed at f^3 to receive the cam-plate F. (See Figs. 21, 19, &c.) A slotted opening, f^4, is cut through the tie-plate to receive said pin u. Two slotted openings, f^5, are formed in the plate C along its transverse center, which communicate with a T-shaped groove, e^2, formed in the under side

of the plate. This groove is for the purpose of retaining the blank-holding jaws *e*. Gibs e^3, secured to the plate, prevent the jaws from dropping out, although permitting them to travel back and forth, as in opening and closing, when combined with the cam-plate F. The jaws are each provided with a short pin or projection, e^4, which passes through said openings f^5. The adjacent vertical faces or edges of the jaws are cut out in a semicircular form, *k*, Fig. 9, and are countersunk at the bottom, so as to freely receive the headed blanks *t*. The jaws are reduced in thickness at the lower portion, as at *e'*, so that they may easily enter the space formed by the lateral separation of the dies, (see Figs. 9, 10, &c.,) the edges being concave to more readily retain the blanks in position.

The plate F is provided with three cam-shaped slots, *f f' f'*, cut through it, the first-named slot being adapted to receive the pin *u* of the rack-rod *s*. The other two, which are shorter and are arranged right and left, (see Fig. 19, &c.,) are adapted to receive the pins e^4 of the jaws *e*. It is obvious now that by placing the plate F in the planed-out portion f^2 of the cap-plate C, and also mounting the jaws in position beneath the latter plate, a longitudinal movement of the pin *u*, extending through the straight slots *u'* f^4 and into the cam-slot *f*, will cause the plate F to move back and forth across the machine a distance corresponding to the throw of the cam. At the same time, by reason of the engagement of the pins e^4 with the cam-slots *f'*, the jaws will be made to open and close, the distance traveled being governed, of course, by the offset of the cam.

A portion of one of the arms of the cam-plate F extends above the general surface of the plate and is provided with an additional cam-slot, f^2. This cam-slot is substantially of the same length as the lower slot *f'*, as clearly shown by the full lines in Fig. 18.

E designates a box or frame in which the checking device is mounted, the same being secured to the center of the cap-plate C by screws i^2. A vertical opening, o^2, is formed in the rear wall of the box and coinciding with the mouth of the track T, (see Fig. 9, &c.,) the width of the opening being slightly in excess of the size of the shank of the screw-blank. The upper portion of the opening is made flaring, as at *r*, to freely receive the heads of the blanks. A vertical slot, *p'*, is formed longitudinally of the checking-box, the same intersecting the transverse opening o^2, just described.

p indicates a blade or plate fitted to reciprocate in the slot *p'*. Said plate is provided with a stem, p^3, on its lower side and engaging the cam slot f^2 of the cam-plate F, the latter in part being planed into the base of the checking-box, as clearly represented in Figs. 8, 10, 13, &c. By means of this construction it will be seen that by moving the cam-plate back and forth across the machine the cam-slot f^2 will force the blade *p* to reciprocate longitudinally of the machine. Now, when the blade stands in its extreme position toward the left of the box, the column of blanks are held in check by reason of the closing of the opening o^2 thereby; but by moving the blade in the reverse direction the opening o^2 will be uncovered and the pressure of the column of blanks will force them ahead, one of them sliding into the channel *p'* and in line with the blade *p*, as shown in Figs. 8 and 9. The point of the blank rests upon and is supported by a ledge, o^3. A spring-pin, n^2, mounted in the box E just in advance of the blank, serves to maintain the latter in position until the blade upon its return-stroke engages it and forces it past the yielding pin n^2 and from the support o^3. The blank then drops into the vertical circular opening e^7 down through a central hole, e^6, formed in the plate C, and into the holding-jaws *e*, which at the instant are separated slightly for the purpose, as shown in Fig. 10. A cover, p^2, is provided to close the top of the box E. The same also serves to prevent the blanks from rising, an extension thereof at the same time maintaining the blanks in position upon the runway T. A pin, r^2, mounted at the rear of the checking-blade, serves, when pushed forward, to temporarily keep the column of blanks from passing into the machine.

It will be seen, referring to Figs. 6, 11^a, 13, &c., that two thin strips, *h'*, of metal beveled at their upper edges, as at h^2, is arranged to receive the blank between them immediately upon its being forcibly ejected from the support o^3 by the action of the checking-plate. These metallic strips are secured to the cross-heads contiguous to the front end of the threading-dies, and serve to support the blank until the ribs of the dies have fairly commenced to act upon it. At the same time the blank is maintained in a vertical position by the jaws *e*, which inclose it.

The joint operation of the several devices embodied in my machine is substantially as follows: The machine is actuated by a belt leading from a suitably-mounted driving-pulley and connected with the mounted pulley *b'*, which, by means of the gears b^2 and b^3 and the connecting-rod *c'*, jointed to the large gear and front cross-head, B, imparts a reciprocating motion to the cross-head. The latter now in traveling, by reason of the connected rack c^2 and gear *d'*, gives a similar (but reversed) movement to the rear cross head through the medium of the gear *d'* and the intergearing rack d^2, secured to the rear cross-head, all as clearly shown in Fig. 2. Now, in order to thread the blank *t*, we will assume that it is retained in position by and between the jaws *e* (see Figs. 13 and 15) and resting upon the beveled edges of the strips *h'*, Fig. 11^a, and that the cross-heads are at the extreme or normal position shown in Figs. 1, 2, and 6. Next, by revolving the main gear in the arrow direction, the

front cross-head, with its die, will be forced ahead, which movement, through the medium of the racks and gear d', forces the rear cross-head, with its die, in the opposite direction, (the relation of the cap C and cam-plates to each other being as represented in Fig. 15.) This movement of the cross-head, &c., will cause the cam-plate F to slide rearwardly through the medium of the rod s and its mounted pin u, which works in the cam slot f, thereby, in conjunction with the two cam slots f' and pins e^4, separating the jaws e. At the same time the cam f^2, acting upon the checking-plate p, will be forced rearwardly to uncover the opening o^2, (see Fig. 8 and dotted-line position, Fig. 18,) the form and travel of the several cams, &c., being so arranged and timed that the holding-jaws begin to open immediately after the ribs of the thread-forming dies D have seized upon the blank. The continued travel of the dies impresses a screw-thread into the blank. An example of dies adapted for this purpose is shown and claimed in United States Patent No. 370,354, granted to me September 20, 1887. As the dies pass each other at the extreme of their travel corresponding to the forward dead center of the crank-pin c, the threaded blanks will drop from them into a space beneath. Upon the rearward stroke, and immediately preceding its termination, the next blank to be acted upon will be forced from the channel o^2 and past the spring or check-pin n^2 into the jaws e by the action of the cam f^2 and the checking-plate p. Fig. 10 represents a blank having been thus deposited between the jaws e before the dies have quite reached the end of the rearward stroke. At the commencement of the next forward stroke the blank will be retained by the closed jaws, and also supported by the strip h', as clearly shown in Fig. 13. The dies now in again traveling ahead seize the new blank between them and roll or impress a screw-thread upon it, as just described. It is of course understood that during the reciprocation of the cross head the blanks are automatically fed from the hopper and along the track T to the checking device by the vertically-traveling pick-up blade.

By means of my arrangement the method of actuating the threading-dies is greatly simplified, an important advantage resulting therefrom being that the movements of the dies are always coincident with each other.

It will be seen that provision is made whereby all the working parts of the machine are readily accessible and also adjustable.

I claim as my invention—

1. In a machine for forming screw-threads upon metal blanks, the combination of two mounted threading-dies arranged to reciprocate past each other and mechanism for effecting such movement, consisting of a toothed rod secured to each die or cross-head, a loosely-mounted gear-wheel meshing into both toothed rods, and a connecting-rod jointed to one of the cross-heads and to a suitably-mounted crank-pin, whereby the crank in revolving imparts a reciprocating motion to the dies in opposite directions, substantially as described.

2. In a machine of the class described, and in combination, a cross-head having a threading-die mounted therein, a rack, as c^2, secured thereto, a link jointed to the cross-head and connected with a suitably-actuated crank, a cross-head carrying a fellow threading-die and having a reversely-arranged rack, as d^2, connected therewith, and a loosely-mounted gear-wheel, as d', meshing into both racks, constructed and arranged substantially as described, and for the purpose specified.

3. The combination of two oppositely-mounted and reversely-arranged cross-heads, each having a toothed rod or rack secured thereto, an idler gear-wheel intergearing with both racks, and a crank-driven rod jointed to one of the cross-heads, whereby a continuous rotary motion is converted into a reciprocating movement to one cross-head, which latter imparts a like movement to the other cross-head, but in a reverse direction, substantially as set forth.

4. In a machine for forming screw-threads upon blanks, the combination, with two supporting threading-dies mounted to travel in opposite directions and a pick-up blade or finger mounted to pick up and guide the blanks to a runway, of a checking device having a pusher, as p, for forcing the blanks singly into slightly-separated recessed jaws beneath, and having means for closing the jaws prior to the engagement of the threading-dies with the blank, although when closed permitting a free axial movement of the blank, and means for separating the jaws in advance of the completion of the screw-thread, so that the threaded blank may readily drop from the dies after they have completed their work.

5. The combination of two parallel cross-heads carrying threading-dies reversely arranged and connected with each other by racks and a gear-wheel intermeshing therewith and actuated by one of the cross-heads, an intermittingly-operated pushing-plate arranged to uncover the lower end of the track to permit a blank to enter the feed-box and then to force it therefrom, and intermittingly-actuated jaws for receiving the blank and releasing it after being acted upon by the dies.

6. In a machine for screw-threading screw-blanks, the combination of oppositely-mounted and reversely-traveling dies having each a blank supporting strip, as h', at its front end, a stationary feed-box or checking device, as E, communicating with the track leading from the hopper, a pusher-plate, p, mounted to travel in the checking-box, jaws mounted below the checking-box for receiving and releasing the blanks, and a cam-plate, as F, connected so as to reciprocate across the machine and cause the pusher-plate and jaws to travel in unison, substantially as shown and described, and for the purpose hereinbefore set forth.

7. In a screw-threading machine, the combination, with the screw-threading die, a die-

holder, and a cross-head having said die and holder mounted therein, of an adjustably-mounted backing-piece or thrust-block interposed between the holder and cross-head, constructed and arranged so that a lateral adjustment of the die is effected, substantially as shown and set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

CHARLES D. ROGERS.

Witnesses:
CHARLES HANNIGAN,
GEO. H. REMINGTON.