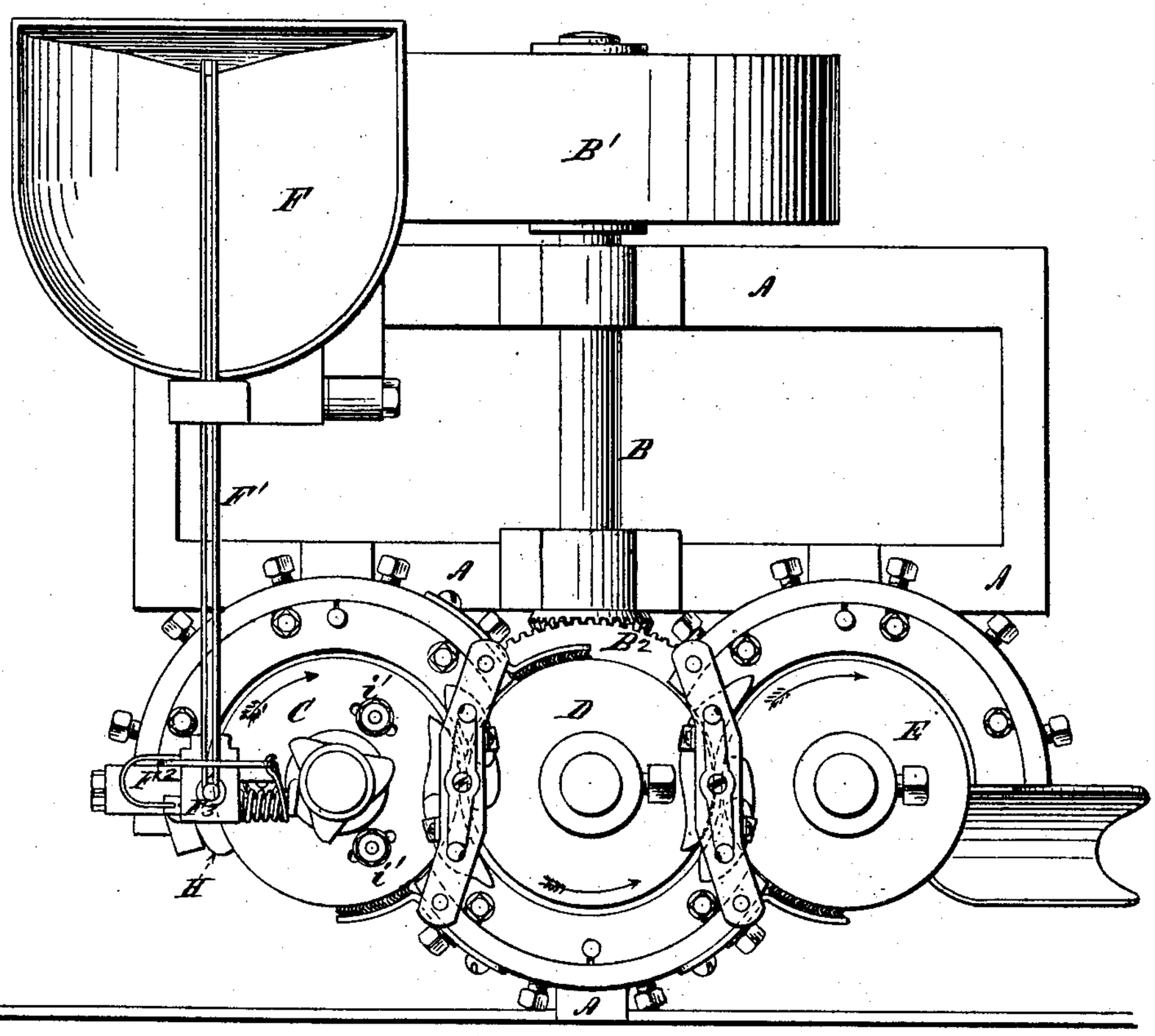
(No Model.) 4 Sheets—Sheet 1.

H. A. HARVEY.

MACHINERY FOR ROLLING SCREW THREADS.

No. 248,165. Patented Oct. 11, 1881.

Figure 1.



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(No Model.) 4 Sheets—Sheet 2.

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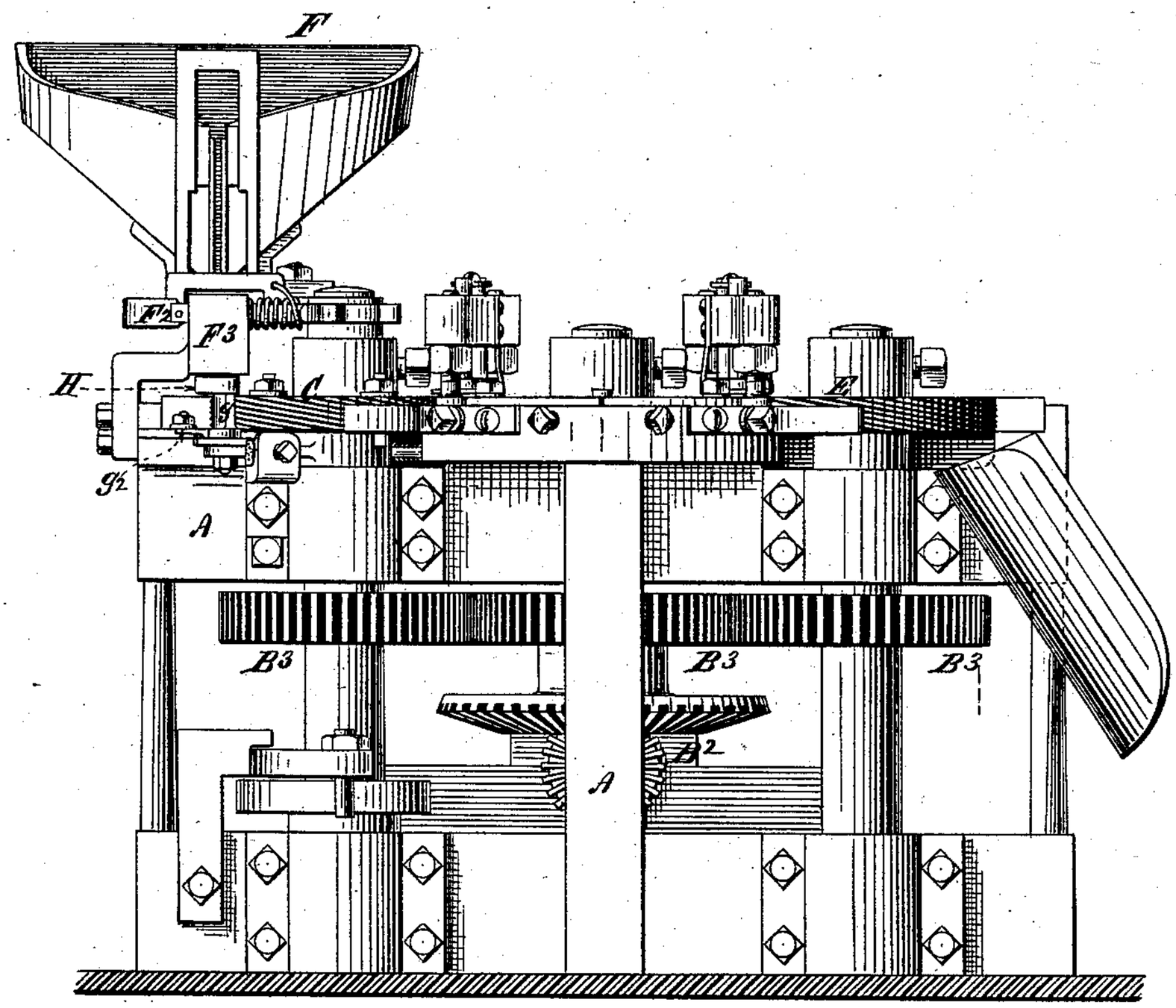
Figure 2.



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4 Sheets—Sheet 3.

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MACHINERY FOR ROLLING SCREW THREADS.

No. 248,165. Patented Oct. 11, 1881.

Figure 3.

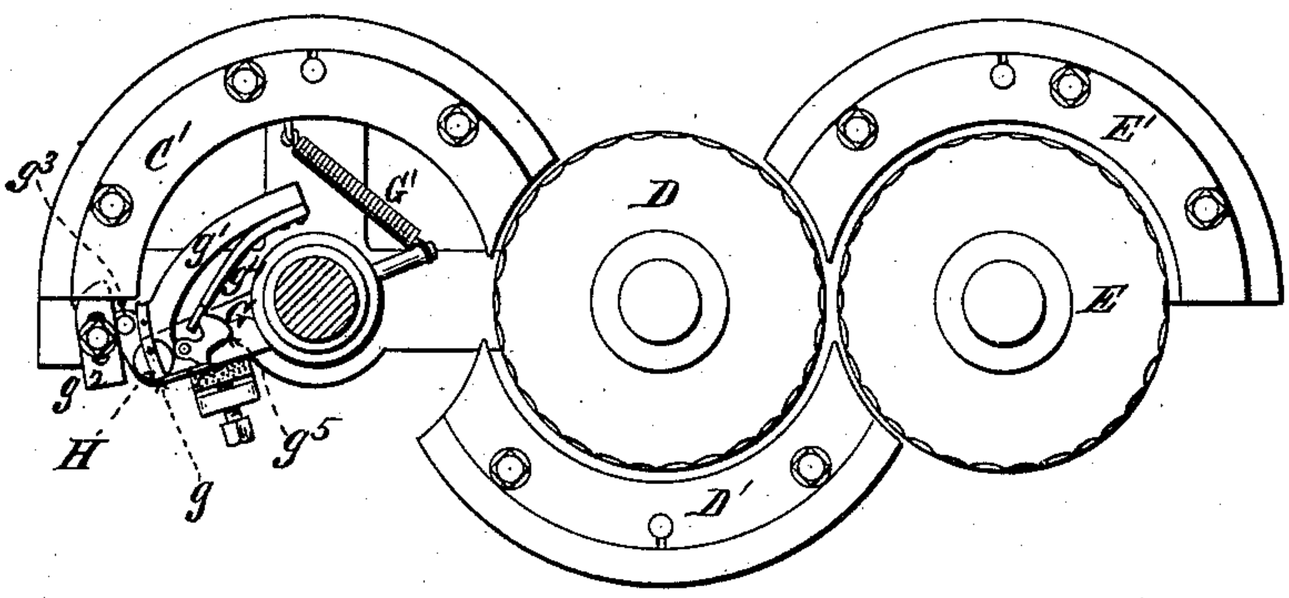


Figure 4.

Figure 5.

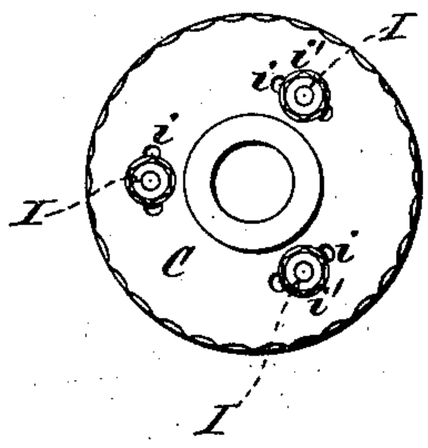
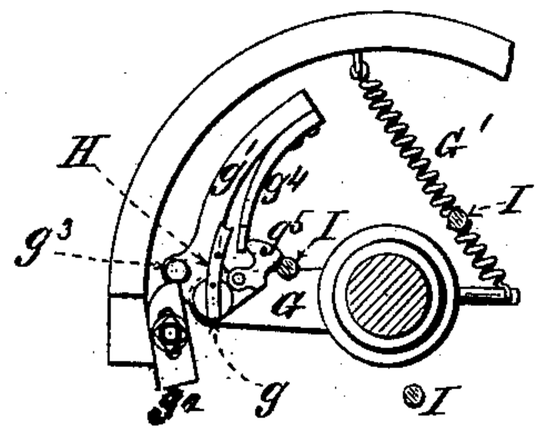


Figure 6.



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(No Model.) 4 Sheets—Sheet 4.

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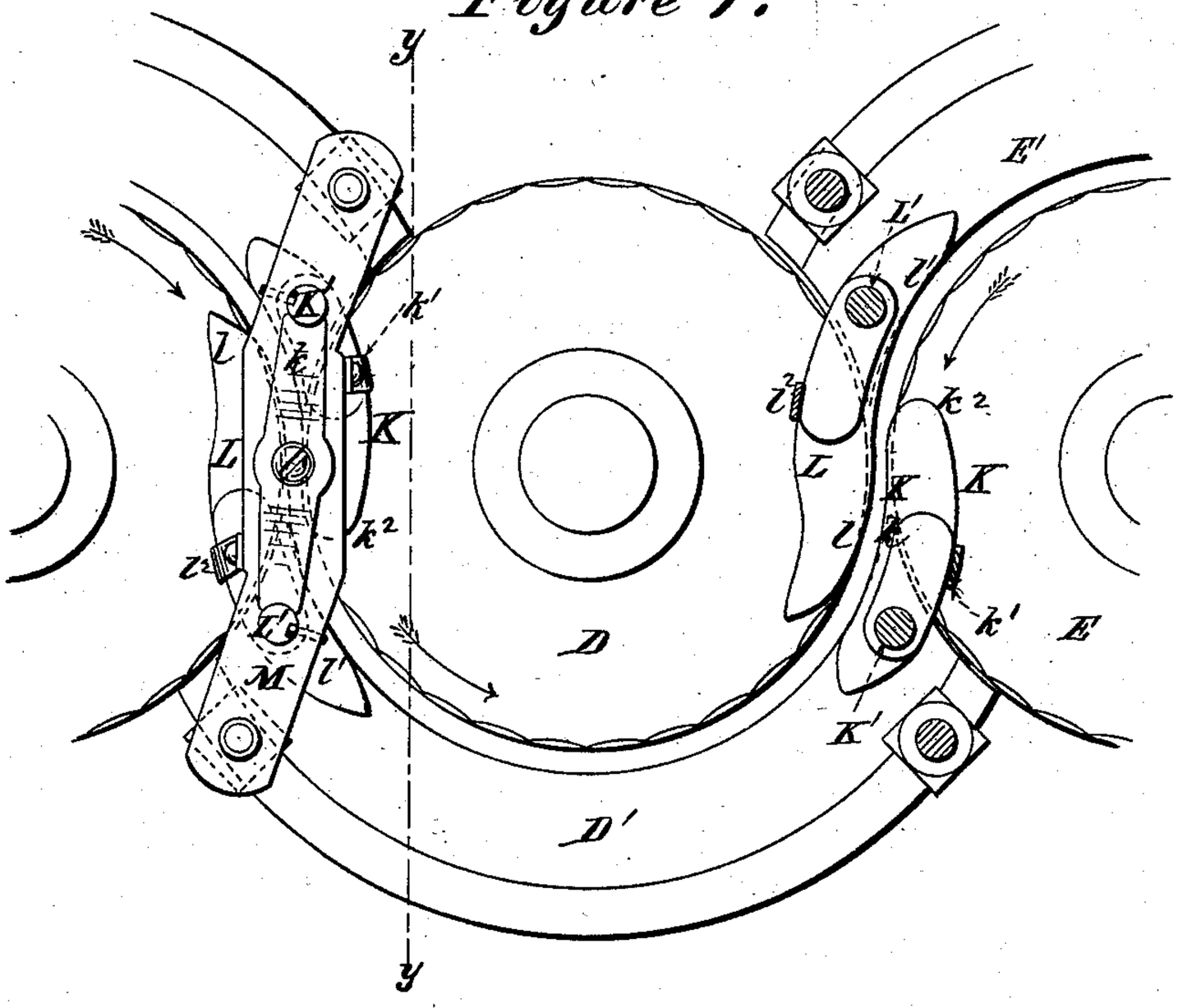
MACHINERY FOR ROLLING SCREW THREADS.

No. 248,165. Patented Oct. 11, 1881.

Figure 7.



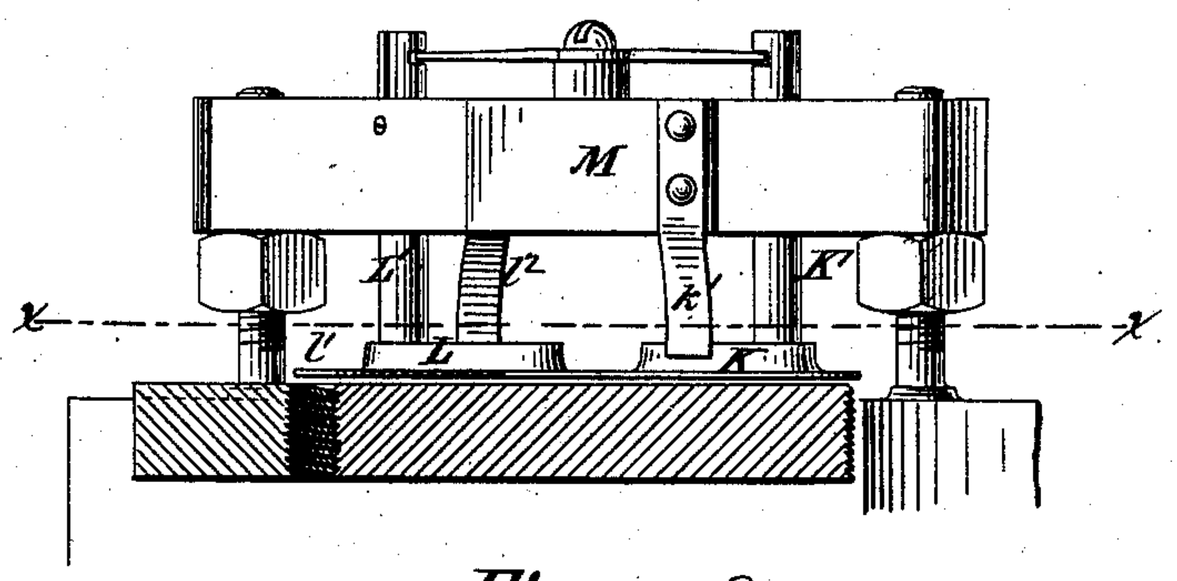


Figure 8.

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UNITED STATES PATENT OFFICE.

HAYWARD A. HARVEY, OF ORANGE, NEW JERSEY.

MACHINERY FOR ROLLING SCREW-THREADS.

SPECIFICATION forming part of Letters Patent No. 248,165, dated October 11, 1881.

Application filed April 7, 1881. (No model.)

To all whom it may concern:

Be it known that I, HAYWARD A. HARVEY, of Orange, New Jersey, have invented certain Improvements in Machinery for Rolling Screw-Threads, of which the following is a specification.

My improvements relate to that class of machines for rolling screw-threads in which the thread is formed upon the barrel of the screw or bolt by a series of progressive rolling operations respectively performed by pairs of dies, each pair consisting of a stationary die and a movable die, both dies having their working-faces suitably ribbed; and my invention consists, first, in the combination, with a pair of such dies, of an adjustable deliverer moving in a path parallel or concentric with the path of movement of the working-face of the moving die, for the purpose of insuring the seizing of the blank by the dies at the time when the ribs on the opposed faces of the two dies respectively occupy prescribed relative positions.

The second feature of my invention consists in devices for carrying or guiding the screw-blank by the head during its transfer from one pair of dies, from which it is delivered, to the next following pair of dies, by which it is received, and for holding the screw-blank against the face of the rotating receiving-die with an elastic pressure.

My improvements are embodied in the machine represented in the accompanying drawings, which in certain general aspects resembles the machine shown and described in Letters Patent of the United States No. 223,730, dated January 20, 1880, granted to me for an improvement in machines for rolling threads of screws or bolts.

The drawings are as follows:

Figure 1 is a top view of a machine containing three systems of rolling-dies. Fig. 2 is a front elevation of the same. Fig. 3 is a top view of the dies, with the exception of the first rotating die, which is removed for the purpose of exhibiting the mechanism for operating the pusher, which delivers the blanks to the first pair of dies. Fig. 4 is a top view of the spring-holding jaws with which the pusher is provided. Fig. 5 is a top view of the primary rotating die, showing three equidistant adjustable pins, which extend vertically through concentric slots in the die, and successively operate the pusher. Fig. 6 is a horizontal section, taken immediately beneath the primary rotating die, showing the manner in which the vertical pins operate the pusher. Fig. 7 is a top view, upon an enlarged scale, of portions of the dies, in which a top view is given of the transferring device for transferring the blanks from the first pair of dies to the second pair of dies, and a horizontal section is given of a similar transferring device for transferring blanks from the second pair of dies to the third pair of dies, such section being taken through the line *x x* on Fig. 8, which is an elevation of the transferring device, showing the second pair of dies in vertical section through the line *y y* on Fig. 7.

The machine represented in the drawings has a suitable frame, A, which supports a horizontal driving-shaft, B, driven by a belt on the pulley B′.

The cylindrical dies are respectively mounted upon the upper ends of parallel vertical shafts. The vertical shafts are geared together by suitable cog-wheels, B^3, and are rotated by power transmitted from the driving-shaft by means of the bevel-gearing B^2.

The arrows on Fig. 1 indicate the direction of rotation, respectively, of the primary rotating die C, the secondary rotating die D, and the finishing rotating die E.

The machine is provided with a well-known form of feeding mechanism, consisting of the hopper F, ways F′, and check F^2 for cutting off the lowermost blank from the row of blanks hanging by their heads in the ways, and dropping it through the tube F^3 into the cylindrical space between the jaws *h h′* of the pusher H. The pusher H is a curved metallic plate affixed to the vertical post *g*, inserted in the free end of the oscillating arm G, by which it is moved in the arc of a circle between the face of the rotating die C and the stationary curved die C′. A spring-arm, *g′*, is hung upon the lower part of the post *g* immediately above the arm G, and is hence adapted to oscillate in a plane parallel with the plane of oscillation of the arm G.

The position of the spring-arm *g′* relatively to the arm G, upon which it oscillates, is governed by the stationary tripping-cam g^2, the

face of which affords a bearing for the vertical pin g^3, inserted in the outer part of the arm g'. The pin g^3 is held against the face of the stationary tripping-cam g^2 by the force of the leaf-spring g^4, affixed to the arm g', bearing at its free end upon the nose of the trigger g^5 when the trigger g^5 is in engagement with either of the pins I. As the pins I are disengaged from the trigger g^5 the arm G is retracted by the spring G'. The upper edge of the pusher H projects slightly above the upper surfaces of the dies, and has affixed to it the stationary jaw h and the pivoted spring-jaw h'.

For clearness of illustration the pusher-jaws h and h' are omitted from Fig. 3 and are shown in Fig. 4.

As the primary die C rotates the projecting lower ends of the vertical pins I are successively swept against the trigger g^5, thus causing the arm G to swing upon its axis and push into the space between the rotating die C and the stationary die C' a blank which may have been deposited in the jaws h and h' of the pusher.

It will be seen that the vertical pins I are inserted through the concentric slots i in the rotating die C, and are therein held, respectively, by the clamping-nuts i'. The length of the concentric slots i is proportioned with reference to affording a sufficient range of lateral adjustment for the vertical pins I to enable them to be fixed at the exact points required, in order that they may commence to actuate the oscillating arm G at the instant when the ribs upon the face of the rotating die occupy, relatively to the ribs upon the face of the stationary die, the desired positions. Thus, if the machine is to be employed for rolling a single-threaded screw, the relative positions of the dies should be such that the apices of the ribs, intersected by a radial plane, shall occupy elevations midway between the elevations occupied by the apices of the ribs of the other die in the same radial plane.

As one die is stationary and the other is movable, it will of course be understood that these relations are constantly changing, and it is of the utmost importance that the blank should be seized by the dies at the instant when the ribs of the dies occupy the proper relative positions.

The machine may also be employed to roll a double thread—that is, to form two independent spiral threads upon the body of the blank—in which case the apices of the opposed ribs in the vertical plane wherein the screw is first seized should occupy the same elevations. If desired, therefore, sufficient range of adjustment may be given to the vertical pins I to enable the machine to roll either one or two threads upon the body of the blank.

The mechanism for transferring the partially-formed screw from one pair of dies to the next following pair of dies consists of the two spring-plates K and L, the curved edges of which respectively constitute portions of the concentric paths along which the partially-formed screw is rolled by the action of the rotating dies.

The spring-plate K is affixed to the vertical shaft K', having its bearings in the frame M, which extends diagonally across the space between the rotating dies. The spring-plate K has a small range of oscillation in a horizontal plane immediately above the surface of the die. The concave edge k of the spring-plate K is curved upon substantially the same radius as the stationary die, from which the partially-formed screw is delivered, which for the purposes of illustration I will call the "delivery-die." The concave edge k forms a continuation of the curved path afforded by the stationary delivery-die, along which the screw in process of formation is rolled progressively by the action of the rotating die. The spring-plate K is pressed toward the rotating delivery-die by the spring k'. The spring-plate K is rounded at its free end k^2, and extends to a point immediately beyond those parts of the two adjacent rotating dies which are nearest together.

The spring-plate L, affixed to the vertical shaft L', and having a limited range of oscillation in a horizontal plane immediately above the dies, is formed with a sinuous edge, the convex portion of which, l, is immediately opposite the concave edge k of the spring-plate K, while the concave portion l' is so curved as to constitute a portion of the curved path along which the partially-formed screw is rolled by the receiving rotating die, the remainder of that path being afforded by the receiving stationary die. The spring l^2 presses the free end of the plate L toward the plate K.

In operation the partially-formed screw, as it is rolled along the curved edge k of the spring-plate K, presses back the free end l of the spring-plate L, this result being secured by making the spring k^2 more powerful than the spring l^2. When, however, the blank has been rolled to the end of the spring-plate K the spring-plate L pushes the blank laterally against the face of the receiving rotating die, and the curved edge l' of the spring-plate L affords the exterior path along which the partially-finished screw is rolled to the entrance of the passage between the receiving rotating die and the receiving stationary die. This passage, however, will not permit the entrance of the partially-formed screw until the apices of the ribs upon the working-faces of the receiving stationary die and the receiving rotating die at the place where the screw is to enter occupy the proper relative elevations, so that they may respectively engage the parallel recesses presented upon the opposite sides of the screw which have resulted from the formation upon the blank of a spiral groove by the preceding pair of dies.

It will, of course, be understood that this transferring mechanism is adapted for employment between any two adjoining pairs of dies.

Another function performed by the spring-plates K and L is the suspension of the partially-formed screw by the head during its transfer from one pair of dies to the next following pair of dies. The partially-finished screw is prevented from dropping by the engagement of its barrel beneath the head with the edges of the spring-plates K and L respectively, and there is thereby insured the presentation of the partially-finished screw to the receiving-dies upon the proper level to enable the ridges on the face of the receiving-dies to engage that part only of the barrel upon which the thread is to be formed. This control of the vertical position of the screw-blank by its head is especially important in the manufacture of rolled screws having the threaded portions of their barrels of the same diameter as the unthreaded portions, in which case the portion of the barrel which is to be threaded is first reduced in diameter, as more fully described in my pending application for a patent for this method of manufacturing screws, filed April 4, 1881.

I claim as my invention—

1. In a machine for rolling the threads of screws, substantially such as described, the circularly-adjustable pins I, secured to the rotating die C, for actuating the oscillating arm G, which carries the pusher H, substantially as described.

2. The pusher H, provided with the jaws *h* *h'*, substantially as and for the purpose set forth.

3. In combination with adjacent pairs of dies, each pair consisting of a rotating cylindrical die and a stationary curved die, the transferring mechanism herein described, consisting of the spring-plates K and L, operating substantially as set forth.

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Witnesses:
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