(No Model.)

2 Sheets—Sheet 1.

W. T. McGINNIS.

SCREW SWAGING MACHINE.

No. 432,164. Patented July 15, 1890.

Fig. 1.

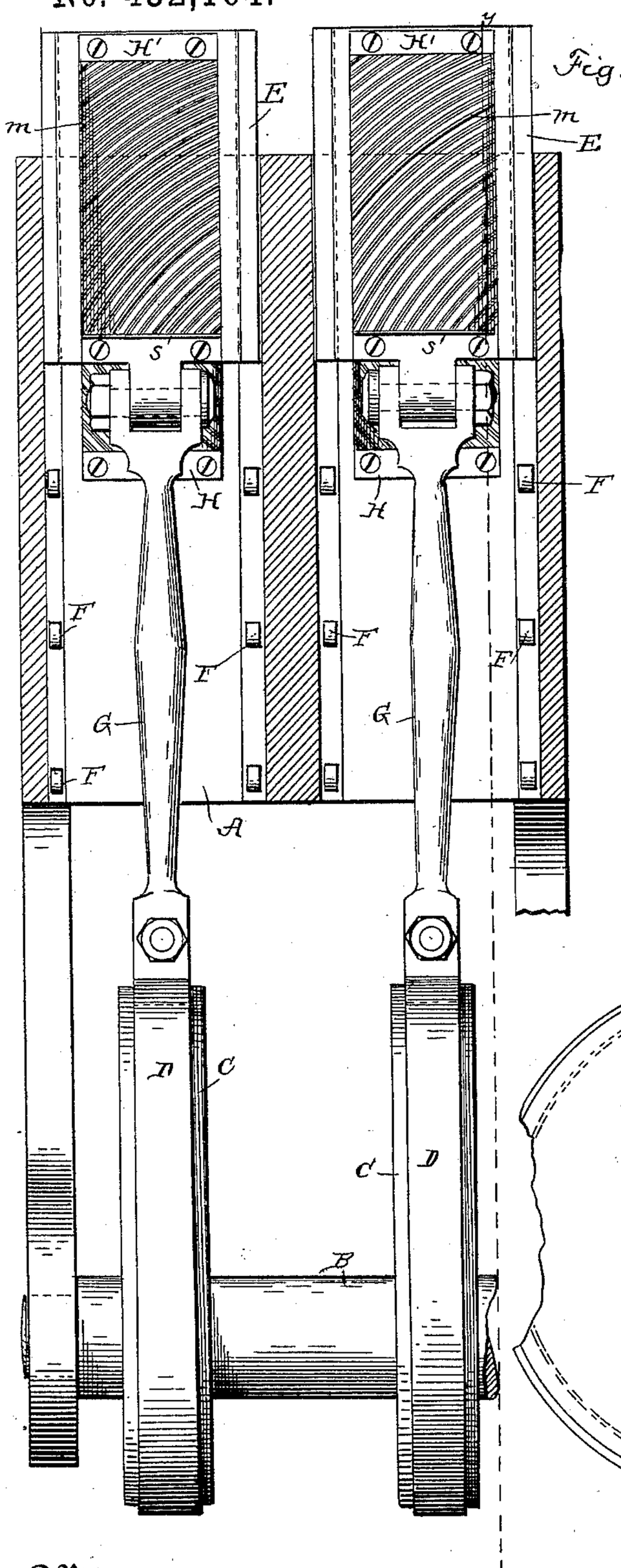
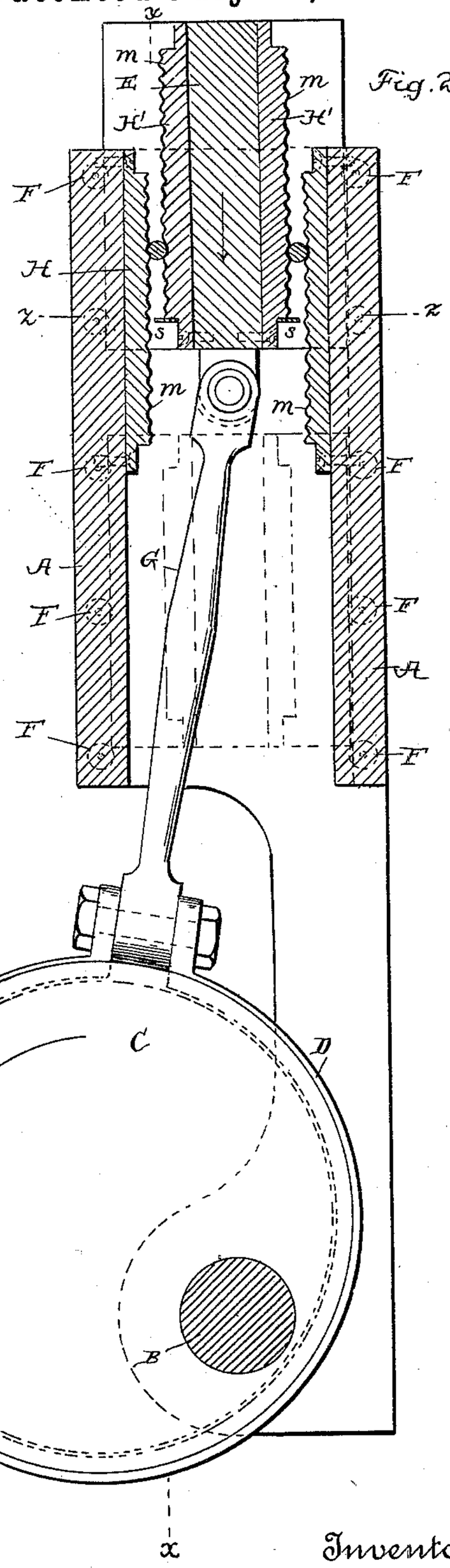


Fig. 2.



Witnesses:
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Attorney

(No Model.) 2 Sheets—Sheet 2.

W. T. McGINNIS.

SCREW SWAGING MACHINE.

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Fig. 3.

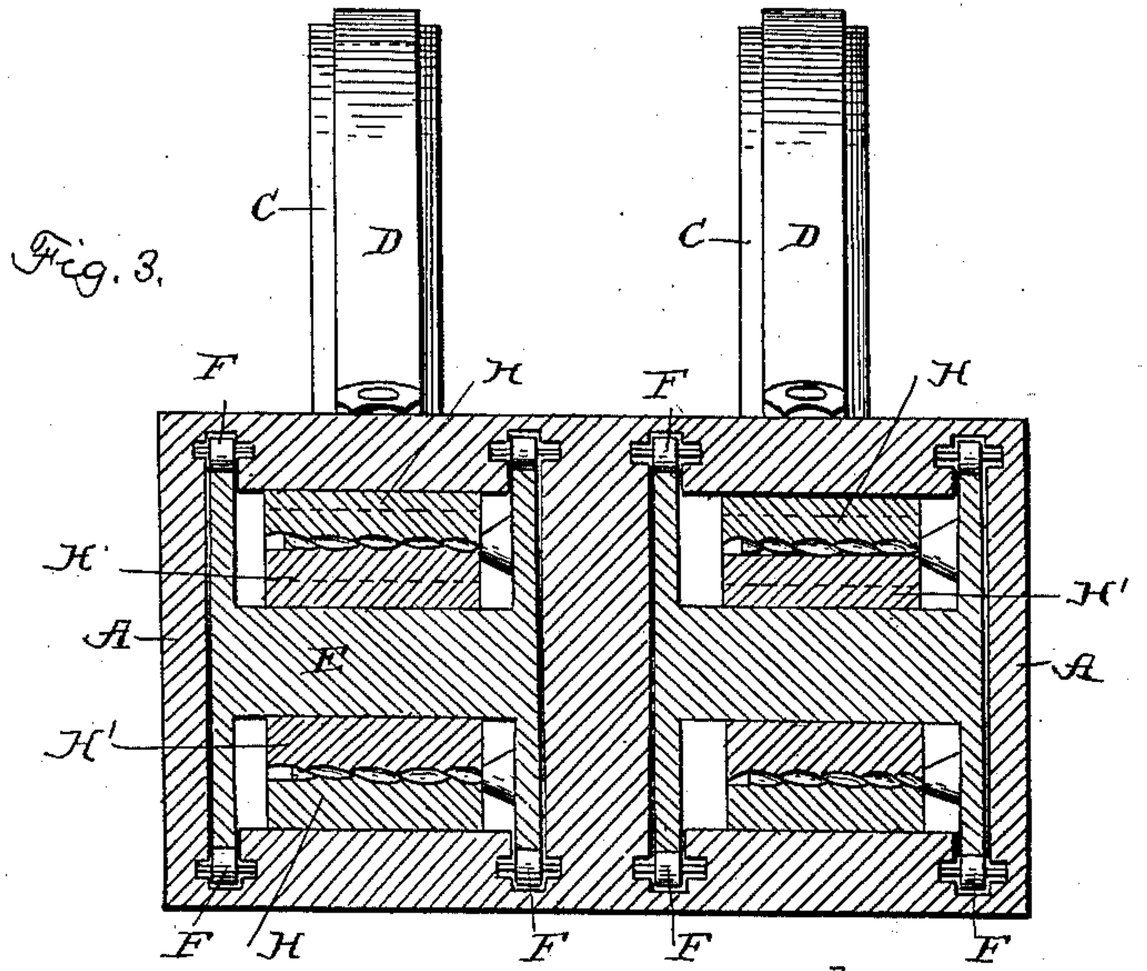


Fig. 4.

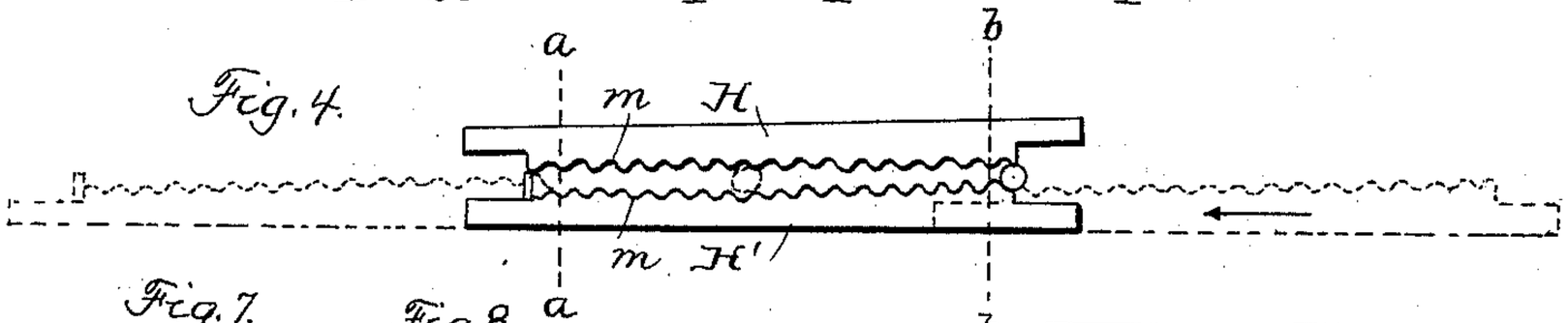


Fig. 7.

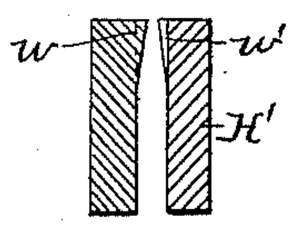


Fig. 8.

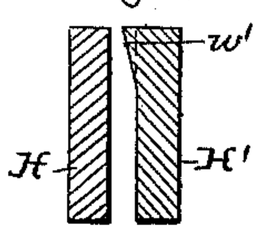


Fig. 9.

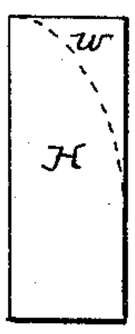


Fig. 10.

Fig. 5.

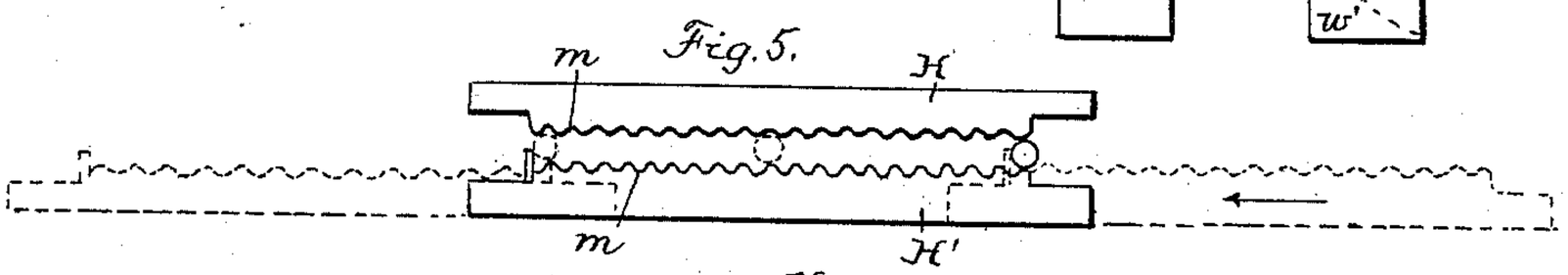
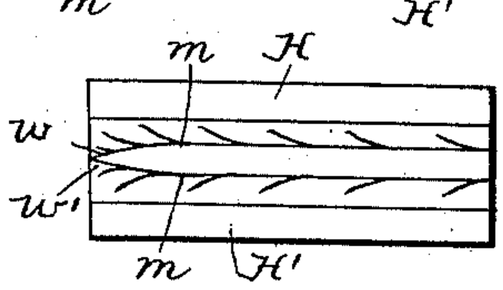


Fig. 6.



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

WILLIAM T. McGINNIS, OF NEW YORK, N. Y.

SCREW-SWAGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 432,164, dated July 15, 1890.

Application filed April 3, 1890. Serial No. 346,391. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM T. McGINNIS, of the city, county, and State of New York, have invented certain new and useful Improvements in Screw-Rolling Machines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention relates to machines for producing pointed screws by rolling cylindrical blanks between a stationary and a moving die.

The object of my invention is to produce a pointed screw from a cylindrical blank at one operation by passing the blank between a single pair of dies, one of which is stationary and the other made to reciprocate in a plane parallel to the first, and more especially to provide a machine adapted to the manufacture of my improved screw-nails patented September 29, 1885, No. 327,296.

In the accompanying drawings, Figure 1 is a vertical section in line *x x* of Fig. 2, illustrating my screw-rolling machine when constructed with four pairs of dies for operating simultaneously upon four blanks; Fig. 2, a similar section in line *y y* of Fig. 1; Fig. 3, a transverse section in line *z z* of Fig. 2; Fig. 4, a side view of one pair of the dies detached, illustrating the movement of the traveling die over its opposite fixed die; Fig. 5, a similar view of the dies from the opposite side; Fig. 6, an enlarged top view of one pair of the dies detached. Figs. 7 and 8 are cross-sections, respectively, in lines *a a* and *b b* of Fig. 4, illustrating the relative position of the raised or projecting corners in each die; and Figs. 9 and 10 are diagrammatic face views of the two opposed dies in a pair, illustrating the general form and extent of the projecting portions thereof.

A represents the frame of the machine; B, its main shaft; C C, eccentrics upon said shaft, and D D the eccentric-straps.

E E are blocks mounted to slide vertically in ways formed in the frame, and whose movements are relieved so far as possible from friction by means of friction-wheels F F, (see Fig. 3,) inserted in the ways so as to be opposed to the bearing-surfaces of the blocks. Each block is coupled by a connecting-rod G to one of the eccentrics, so that a reciprocating movement is imparted thereto by the rotation of the shaft B.

H H represent the stationary dies, and H′ H′ the reciprocating dies, of the machine.

The opposite faces of the blocks E E are recessed between their bearing-surfaces to a depth sufficient to embrace the thickness of a pair of dies, the inner faces of said recesses in each block being parallel to each other. The stationary dies H H are fixed to the frame to project within the recesses in the block with their faces parallel with the inner faces of said recesses, against which the traveling dies H′ H′ are secured, so that each stationary die H forms with the opposite die H′, carried by the reciprocating block E, an operating pair. The width of the dies exceeds somewhat the length of the screw-blank to be threaded between them, and the recess in the block is so much wider than the dies as to leave free space at either side for the head of the blank, as shown in Fig. 3.

The faces of both the stationary and reciprocating dies are formed with parallel cutting or forming ridges *m m* and intermediate grooves at an oblique angle thereon corresponding to the angle of inclination required in the threads of the screw and are uniformly curved from end to end, whereby a varying pitch is imparted to the threads of each of the screws formed between the dies. The degree of the curvature of the parallel ridges is determined by the extent to which it is desired that the pitch of the screw shall vary.

One corner *w′* (see Figs. 6 and 7) of the traveling die and the corresponding corner *w* at the opposite end of the stationary die (toward which the ridges incline) are each made so much thicker than the main portion of the die as to project out from the face thereof. The height of each of these projections at the extreme corner of the die-plate equals one-half the diameter of the screw-blank, and from this point it gradually slopes away toward the other end of the die for a distance nearly equal to its length (see Figs. 4, 7, and 8, and diagrams Figs. 9 and 10) as well as in the direction to produce the taper required in the point of the screw. (See Fig. 6.) Otherwise each die is of uniform thickness throughout,

so that as the opposite faces of the reciprocating block and stationary frame to which each pair are secured remain constantly parallel the dies in each pair remain parallel throughout the entire movement of the traveling die.

When the dies are mounted, the space between each pair is equal to the diameter of the body of the screw-blank less the depth of the threads. (See Fig. 6.)

A supporting-flange *s* is formed across the lower end of each traveling die H′ to extend out therefrom into close proximity to the opposite die. (See Fig. 2.)

The eccentrics C C are so proportioned as that in one revolution thereof the traveling die H′ in each pair shall be carried over the face of the opposed stationary die H and down below it, (see dotted lines in Fig. 2,) and thence up again to the first position. The dies admit of detachment from the sliding blocks, so that they may be readily replaced or recut and repaired, as required.

In the operation of my machine, when the sliding block E is at its highest point, bringing the flange *s* at the lower edge of the traveling die H′ flush with or slightly below the upper edge of the stationary die H, a screw-blank is dropped upon each flange *s* with its point toward the projecting corner *w′*. As the traveling die H′ is drawn downward, the blank is drawn in between the dies, and in its first rotation, as it is rolled forward between them by the movement of the traveling die, the ridges *m* upon the dies form the desired grooves upon the body of the screw and force the displaced metal outward thereon to form its threads. In the meantime the point is partially formed and threaded by the action of the projecting corner *w′*. As the screw continues its rotation between the dies, the projection *w* upon the stationary die H comes into play in connection with the projection *w′* on the moving die H′ to complete the point, while the remaining threads of the screw are made sharper and more complete by the continued impression of the ridges *m* thereon. A finished screw is thus completed from a blank between each pair of dies at each rotation of the main shaft B.

The blanks may be fed to the dies in any suitable manner, not necessary here to describe, and as they drop from the dies are caught by an apron and conveyed to a suitable receptacle.

I do not claim, broadly, dies for rolling spiral grooves upon a cylindrical surface, the one reciprocating over the other, as such devices for manufacturing screws are known to the art. Reciprocating grooved dies for swaging screw-blanks have also been made with an outward projection extending at its extreme height along nearly the entire length of one edge of each die and terminating near one end of the die with a sudden slope, as described in Letters Patent to Gardner, No. 15,512; but these dies are adapted only to produce a taper at the point of the screw and are so mounted as that the movable die approaches the fixed die in moving over it to impress a full thread upon the blank, and my invention differs therefrom in that, instead of having a projection extending along the major part of one edge of each die, one corner only of the die is made to project to an extreme height, and the projecting corners *w w′* of the two opposing dies are placed on the same side, but at opposite ends thereof, (see Figs. 7 and 8,) the face of each die being made to slope gradually from its projecting corner to the opposite ends of both the edges intersecting at said corner, as illustrated at *w w′* in the diagrams Figs. 9 and 10, without an abrupt change, as in the Gardner patent; also, in that the parallelism of the dies is maintained throughout their entire movement, whereby a screw is produced which tapers more or less gradually in diameter from head to point.

I am also aware that the patent to Harwood and Mickle, No. 72,490, describes reciprocating dies for threading screws having grooves cut on the faces thereof, which are brought opposite each other at an angle with the edge of the die equal to that of the pitch or angle of the threads required in the screw, the grooves being straight as well as parallel, excepting at the part of the die along the edge which forms the point of the screw, whereat the grooves are abruptly curved, so as to increase the pitch of the screw at its extreme point, the die at this point, however, being made so deep as not to reduce the diameter of the screw in that portion. My invention differs therefrom, however, in that the threading-grooves on each of my reciprocating dies are curved their entire length, as shown in Fig. 1, and are made to produce a screw not only varying in pitch, but also in diameter, from end to end and of a form which could not be produced by the inventions described in either of these last-mentioned patents.

I claim as my invention—

In a screw-rolling machine, the combination of a stationary die formed with parallel diagonal grooves upon its face, each curving uniformly from end to end, with an opposed counterpart similarly-grooved traveling die made to reciprocate over it in a parallel plane, substantially in the manner and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM T. McGINNIS.

Witnesses:

A. N. JESBERA,

E. M. WATSON.