(No Model.)

2 Sheets—Sheet 1.

H. A. HARVEY.

SCREW SWAGING MACHINE.

No. 329,737. Patented Nov. 3, 1885.

Fig. 1

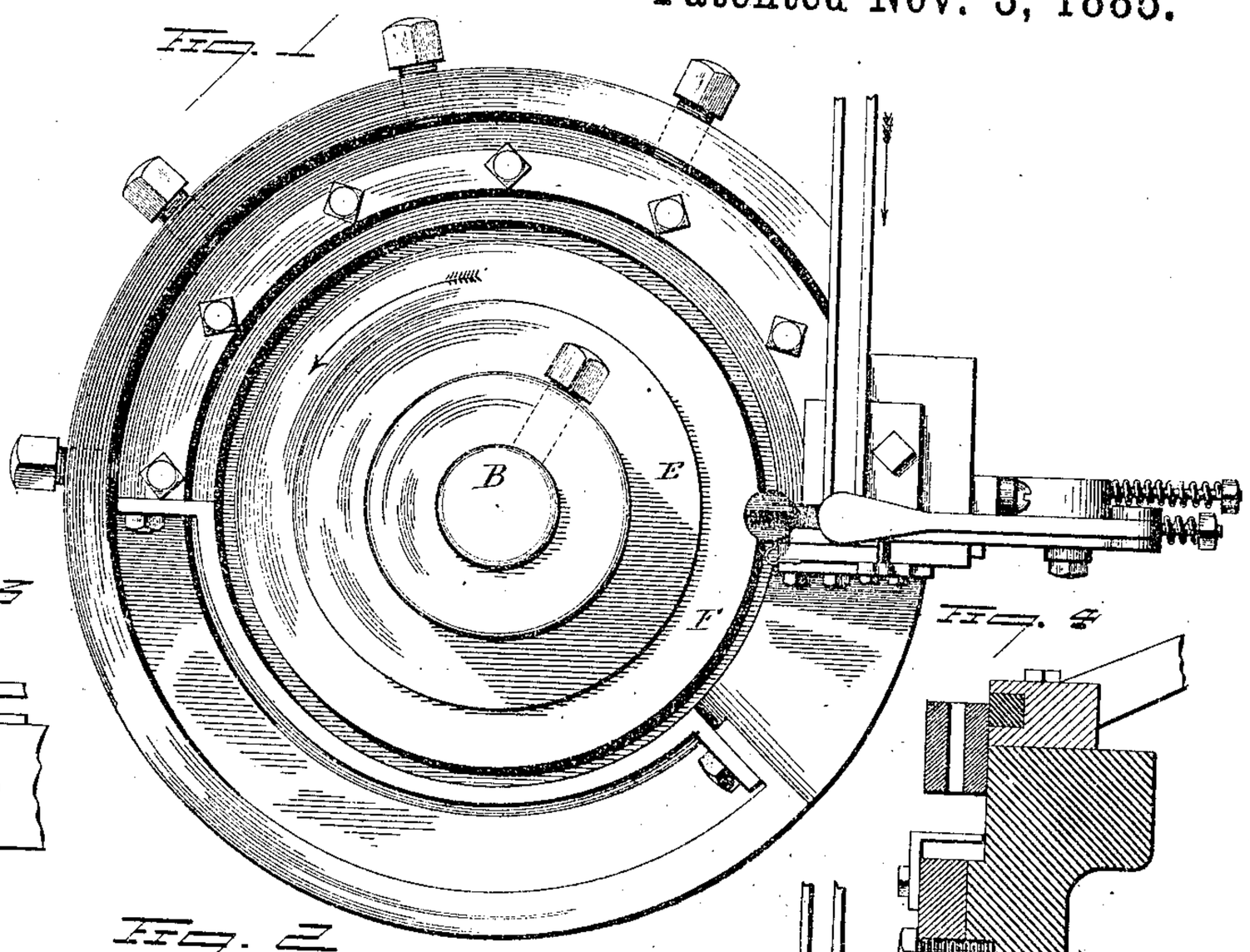


Fig. 2

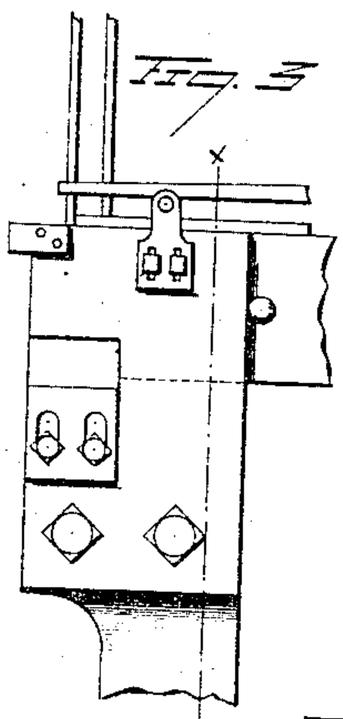
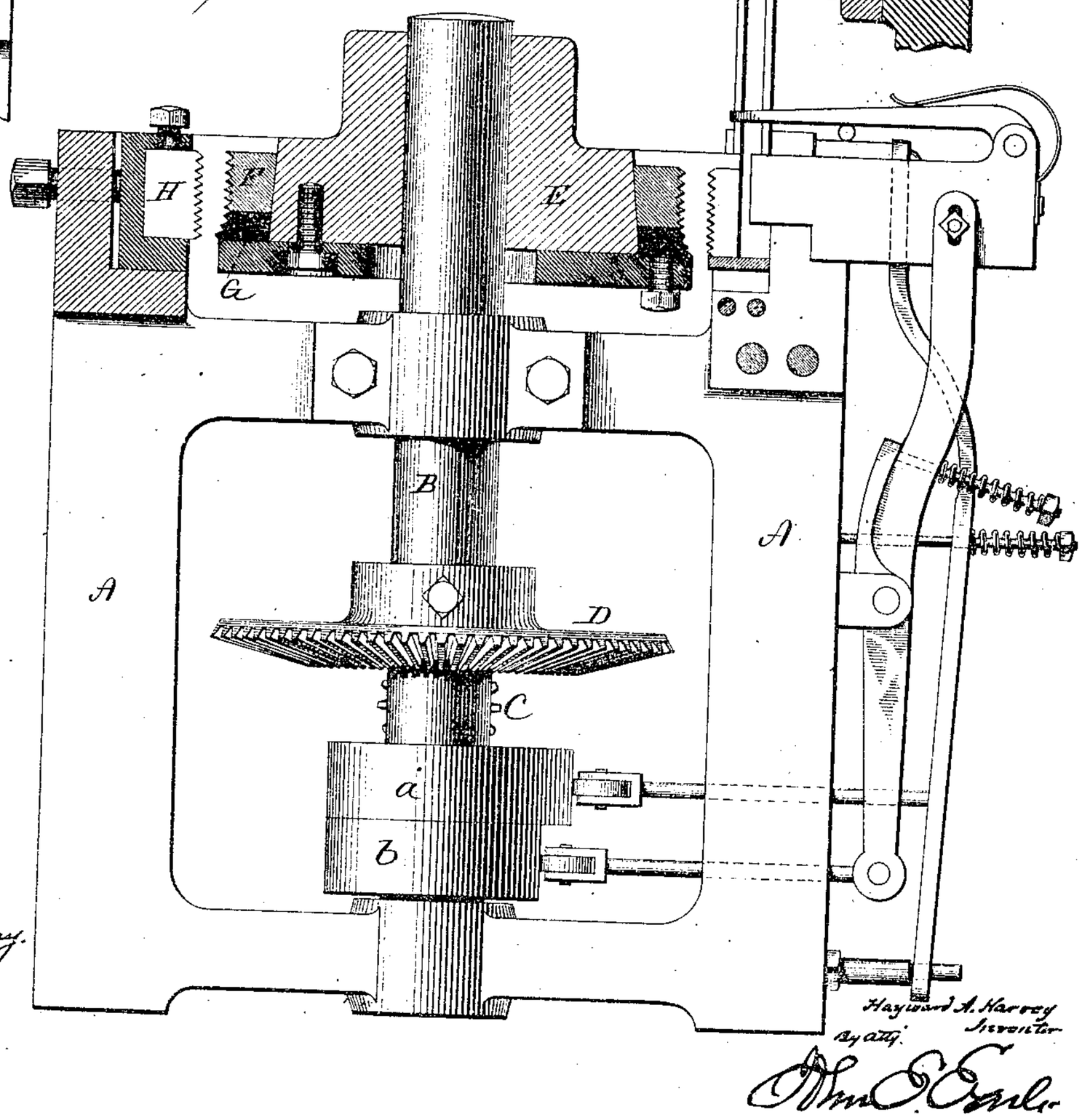


Fig. 3

Fig. 4



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(No Model.)

2 Sheets—Sheet 2.

H. A. HARVEY.

SCREW SWAGING MACHINE.

No. 329,737. Patented Nov. 3, 1885.

Fig. 5

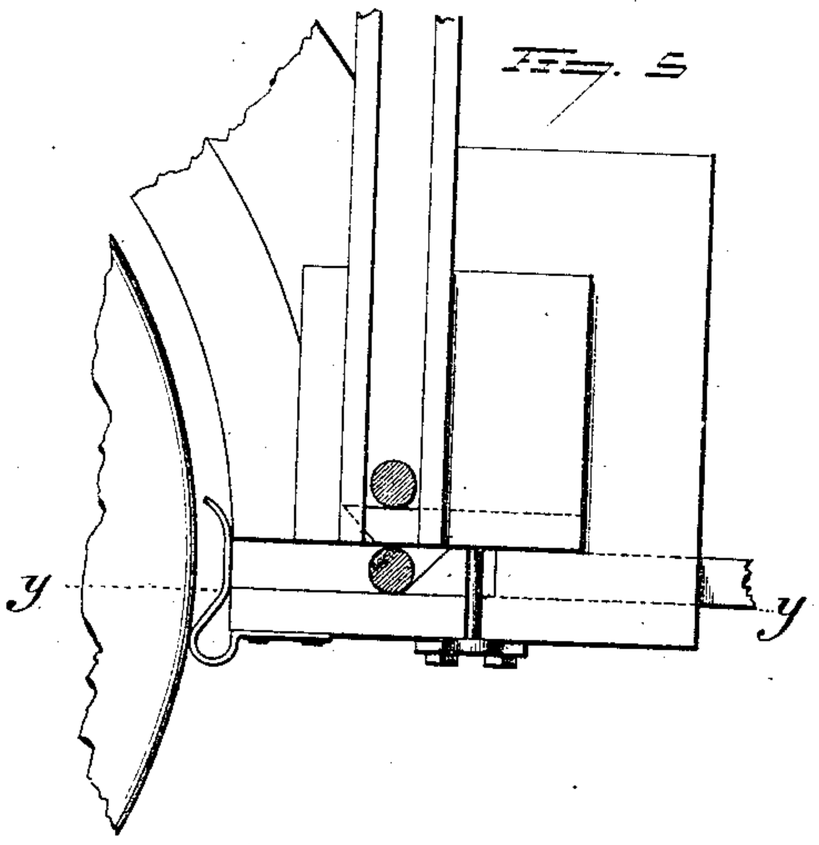


Fig. 6

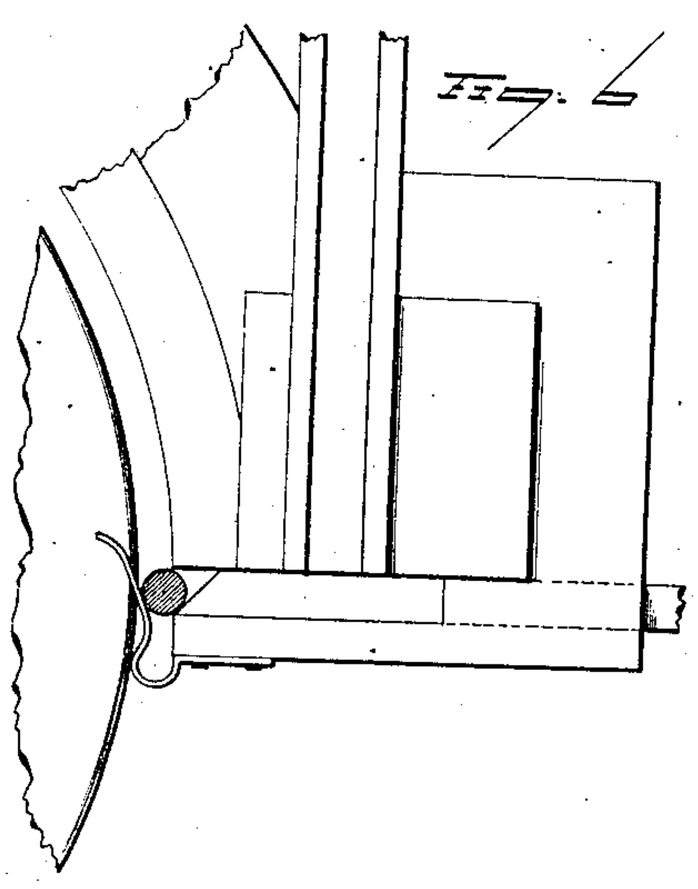


Fig. 7

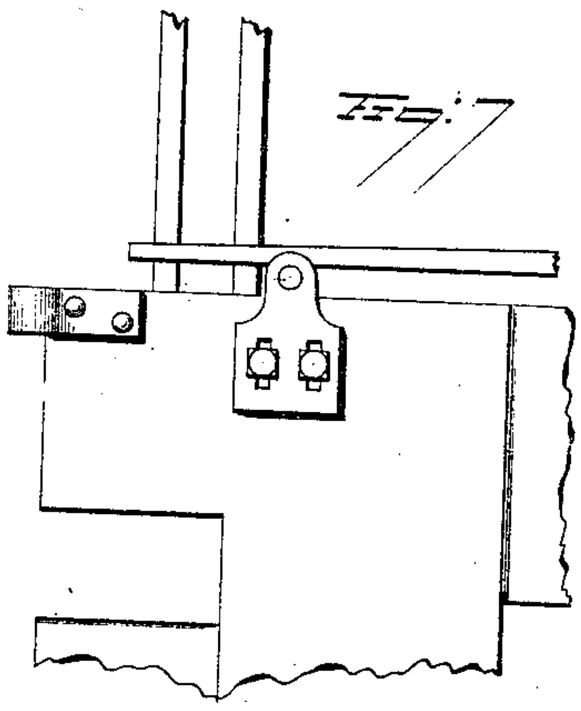


Fig. 8

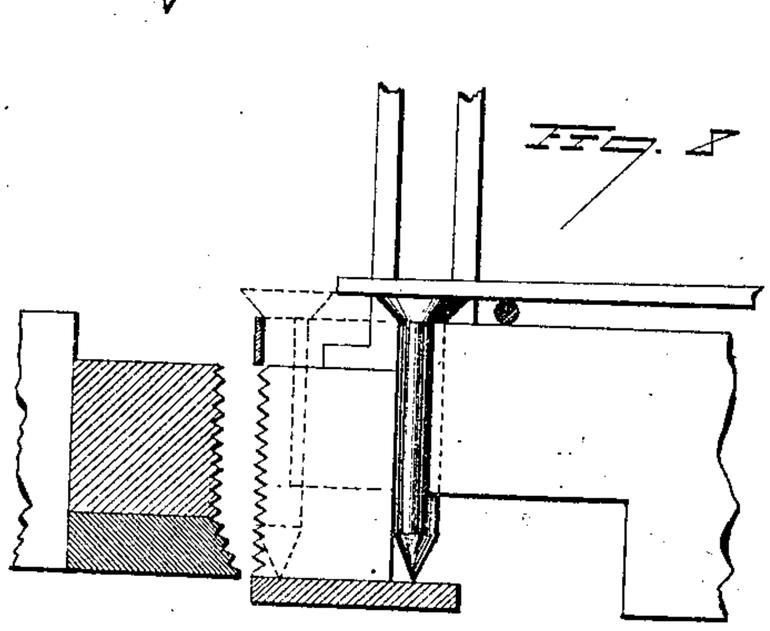
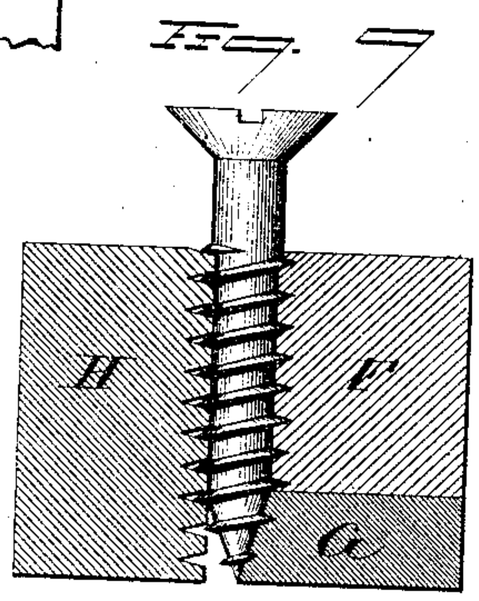


Fig. 9



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UNITED STATES PATENT OFFICE.

HAYWARD A. HARVEY, OF ORANGE, NEW JERSEY.

SCREW-SWAGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 329,737, dated November 3, 1885.

Application filed June 8, 1885. Serial No. 167,948. (No model.)

To all whom it may concern:

Be it known that I, HAYWARD A. HARVEY, of Orange, in the county of Essex and State of New Jersey, have invented a new Improvement in Machines for Rolling the Threads of Screws; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a top view of the machine complete; Fig. 2, a side elevation in partial section; Fig. 3, an elevation of the feeding mechanism, seen at the upper right hand in Fig. 2; Fig. 4, a vertical section through line *x x* of Fig. 3; Fig. 5, a top view, upon a larger scale, of the feed mechanism, showing the blank fed from the upper end of the ways, and standing in front of the delivery-slide; Fig. 6, a similar view showing the delivery-slide in the act of pushing a blank toward the rotating die; Fig. 7, an elevation, upon a larger scale, of the parts shown in Fig. 3; Fig. 8, a vertical section taken through line *y y* of Fig. 5; Fig. 9, a transverse section through the dies, showing a screw in place as finished, on an enlarged scale.

This invention relates to an improvement in that class of machines for threading screws in which the blank is caused to roll between dies presenting corresponding surfaces, the said surfaces having parallel ridges formed thereon at the proper angle of inclination with the plane of motion of the dies, and whereby the said ridges impress the surface of the blank rolled between them, and so as to form a corresponding spiral rib on the blank, and particularly to that class of machines for rolling threads which are constructed to continue the rib on the blank from the body down onto a tapered or conical point, and so as to form what are commonly called "gimlet-pointed screws."

Previous to my present invention the dies between which the blanks were rolled to form the spiral rib or thread thereon were constructed with their surfaces parallel to the extent of the cylindrical portion of the body of the screw to be formed, and at the termination of that portion of the surface the faces of the two dies converged to substantially a central point between the dies, the ridges on the dies being continued over the converging portions to form the gimlet-point, and so that the surfaces of both dies worked alike upon the pointed portion of the screw, each serving as a rest or resistance for the other. Such a machine is the subject of my application for patent, Serial No. 90,261.

While I have attained good results in the machine constructed as set forth in my said application, I have at times experienced difficulties, from the tendency of the blank to work longitudinally between the dies under the action of the gimlet-pointing portion, such movement of the blank tending to strip or destroy the thread on the cylindrical portion of the body.

The object of my present invention is principally to avoid this difficulty, as well as to materially simplify the machine; and the invention consists in constructing one of the dies with its face substantially parallel throughout with the axis of the blank to be threaded, the companion die having its surface substantially parallel to the said axis, and to the face of the first-mentioned die, to an extent equal to the length of the cylindrical portion of the blank to be threaded, thence inclined toward the said axis and face of the other die, the faces of the two dies being constructed with parallel ridges at the proper angle of inclination with the plane of motion of the dies, the ridges on the one die continued from its parallel surface onto the inclined portion, and whereby, as the blank is rolled between the said two dies, its surface will be impressed by the said ridges, and a corresponding spiral rib raised on the body of the blank, continued from the body down to the point by the inclined portion of the one die, and as more fully hereinafter described.

In illustrating my invention I show it in a machine having one revolving die, the periphery of which is constructed with inclined ridges, combined with a corresponding segment-shaped die, fixed with relation to the revolving die, and its adjacent surface having corresponding ridges, so that the blank will be rolled between the two, and with its axis parallel to the axis of the revolving die, and

in such revolution its surface will receive the impression of the ridges on the dies, so as to form a corresponding spiral rib on the body of the blank, this machine being substantially the same construction as that shown in Patent No. 306,132, granted to C. S. Clark and myself, October 7, 1884, and I find the peculiar formation of the ridges shown and described in that patent to be specially adapted to the formation of gimlet-pointed screws.

A represents the frame of the machine; B, the principal or driving shaft, to which power is best applied by means of a pinion, C, working into a corresponding gear, D, on the driving-shaft, but may be otherwise applied. E is the die stock or head, which is fixed to the shaft, and so as to present a surface concentric therewith. Upon this stock a ring-shaped die, F, is fixed, the depth of which corresponds to the cylindrical portion of the body of the screw to be threaded. This ring presents a periphery substantially parallel with the axis of the shaft. Immediately below the ring is a second ring, G, which at its junction with the ring F is of the same diameter as the ring F, but gradually increasing in diameter therefrom. The thickness of the ring G is substantially that of the length of the pointed portion of the screw, and its increasing diameter is equal to substantially one-half the diameter of the screw to be rolled.

The face or periphery of the rings F G is constructed with parallel ridges at the proper angle of inclination with the plane of motion of the rings, the rings being firmly secured to the head, and so as to revolve therewith, as here represented. The path of revolution is in a horizontal plane. Adjacent to the face of the revolving dies one or more segments, H, are arranged, the face of which is substantially parallel with the axis of revolution of the ring-shaped dies F G. The depth or width of the face of the segment-shaped dies is immaterial, only that it should be at least equal to the length of the cylindrical portion of the screw to be threaded. The segments H are constructed with inclined ridges corresponding to those on the revolving cylindrical die, and so that a blank introduced at the proper point—say at one end of the segment—will be rolled along the surface of the segment, between that surface and the surface of the revolving die, and the surface of the body of the blank will be impressed by the ridges, so as to form a spiral rib on the body of the blank, as indicated in Fig. 9, where the blank is shown as having the thread completely formed. The formation of the thread by the revolving dies is progressive from its commencement at one end of the segment until it is discharged fully formed at the opposite end.

In illustrating my invention I show feeding devices substantially the same as shown in the said Patent No. 306,132, which are designed to successively deliver blanks between the dies at the proper time, so that the blanks shall be successively taken by the revolving die and rolled along between the revolving and stationary dies and delivered from the machine.

The illustration of the feeding device does not require description in this application, as it constitutes no part of my present invention. Any of the feeding devices in numerous patents heretofore granted to me for this class of machines may be employed.

The blanks preparatory to being rolled are pointed, as indicated in Fig. 8, and, being properly delivered to the feeding device, are delivered successively to the dies, as seen in Figs. 5, 6, and 8. As the blank passes between the revolving and stationary dies the ridges on the face of the two dies firmly grasp and support the blank while being rolled. At the same time the single ridges on the inclined portion of the one die operate upon the pointed portion of the blank, so as to continue the rib on the blank from the cylindrical portion down onto the point, as seen in Fig. 9. As the pointed portion is not grasped between opposing surfaces, the tendency to raise the blank under the action or formation of the rib on the point is avoided. The parallel portion of the die firmly supports the blank against the action of the single inclined portion, and so that the point, whatever its inclination, will be concentric throughout.

Another great advantage of this improvement arises from the fact that one die having its surface parallel with the axis throughout may be made of a depth sufficient for the longest screw to be threaded, and thereby serve for all lengths of screws having that particular pitch of thread. In all screws having the same pitch of thread the point is the same; hence the same ring-shaped die G will serve for all lengths of screws, it only being necessary then to supply the cylindrical ring-shaped die F for the depths corresponding to the varying lengths of screws, so that by simply changing the cylindrical ring F and adjusting the pointing-ring G the same stationary segment-die and the same ring will serve for all lengths of screws of the same pitch. The two rings F G, however, may be made as one, if preferred, and the segment may be made of a depth only corresponding to the length of the cylindrical portion of the blank to be threaded; but by constructing the rings in two parts and the segment of maximum depth a very considerable saving in the construction of dies is made.

In thus far describing the invention I have done so showing the threading to be performed by one revolving die in conjunction with its segment; but the process of threading may be performed by the use of several such revolving dies with their corresponding segments—say as described in my Patent No. 223,730, of January 20, 1880. I therefore do not wish to be understood as limiting the invention to the formation of the thread in a single pair of dies.

I have represented the fixed or segment-

shaped die as having its surface parallel throughout with the axis of the blank to be rolled, and the revolving or moving die as having its surface parallel with the axis of the blank to be formed to the extent of the length of the cylindrical portion of the blank to be threaded, and the remainder of its face inclined corresponding to the point to be formed; but this arrangement may be reversed and the revolving die be cylindrically ridged and the segment have the pointing portion of its face inclined toward the moving die.

While I prefer to perform the rolling operation by means of a cylindrical die combined with a segment-shaped die, the face of one of which is substantially parallel throughout with the axis of the blank to be rolled, and the other parallel with the said axis to a depth equal to the length of the cylindrical portion of the body of the blank to be rolled, thence gradually inclined toward the opposite die to the depth of the pointed portion of the blank, the said inclination being substantially equal to one-half the diameter of the point, the dies may be straight, one or both receiving a reciprocating motion, as in well-known machines for rolling screws.

I claim—

1. In a machine for rolling threads on screws, the dies between which the blank is rolled having parallel ridges formed thereon at the proper angle of inclination with the plane of motion of the dies, the face of one of the dies parallel throughout with the axis of the blank to be rolled, the face of the corresponding die also substantially parallel with the said axis to an extent equal to the cylindrical portion of the blank to be threaded, thence inclined toward the opposite die, the depth of the said inclination being substantially equal to the length of the pointed portion of the blank, and the inclination substantially equal to one-half the diameter of the blank, substantially as described.

2. In a machine for rolling threads on screws, a rotating die and a stationary curved die, in which the working-faces for impressing the threads upon the body of the blank present parallel ridges at the proper angle of inclination with the plane of motion of the rotating die, the face of one die substantially parallel throughout with the axis of rotation, the face of the other die parallel with the axis of rotation to a depth substantially equal to the threaded portion of the screw to be produced, thence gradually inclined toward the opposite die, the depth of the inclined portion being substantially equal to the pointed portion of the screw to be produced, and the inclination substantially equal to one-half the diameter of the blank, substantially as described.

HAYWARD A. HARVEY.

Witnesses:
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FRED C. EARLE.