

935,315.

Patented Sept. 28, 1909.

5 SHEETS—SHEET 1.

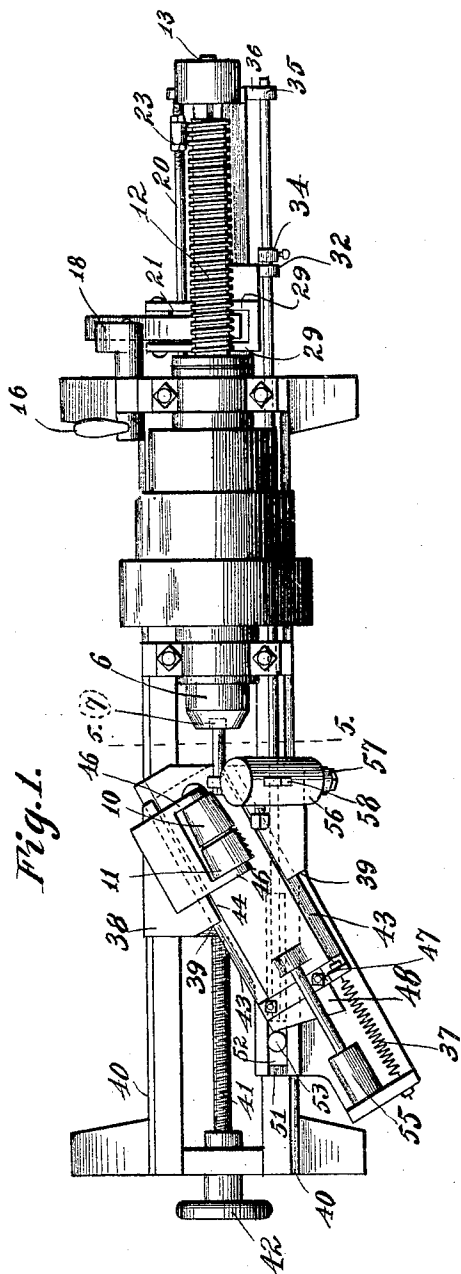


Fig. 1.

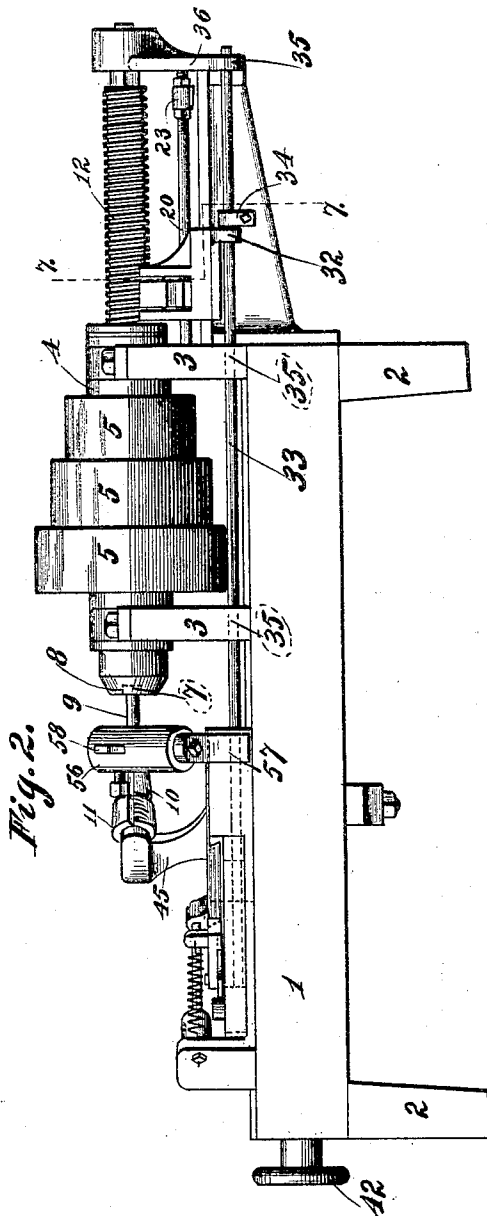


Fig. 2.

Attest:
Edward L. Dillon.
Gladys Wallow.

Inventor:
Edward J. Miller,
by
Hugh K. Wagner
His Att'y.

935,315.

Patented Sept. 28, 1909.

5 SHEETS—SHEET 2.

Fig. 3.

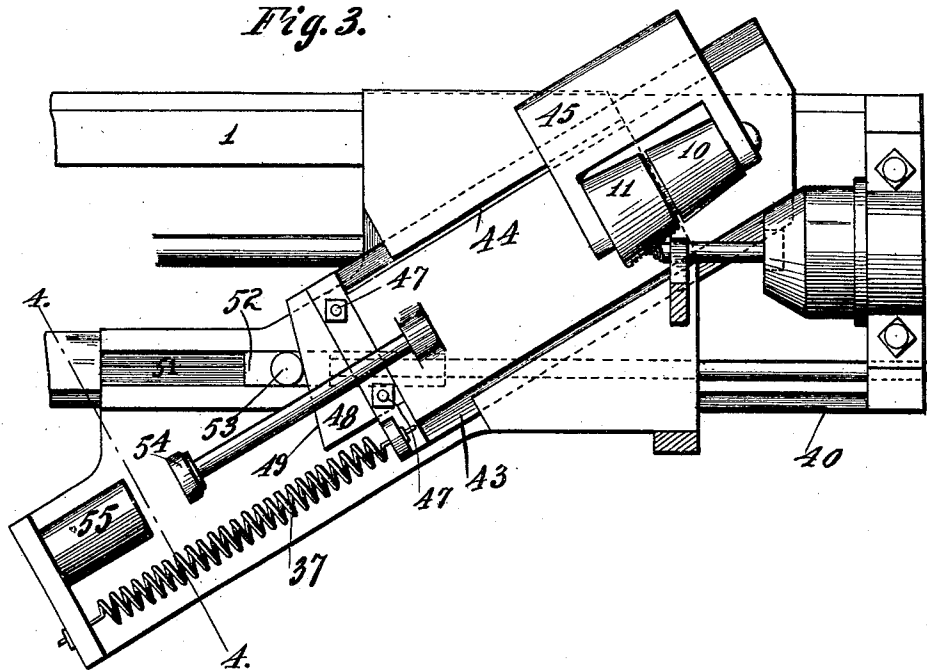
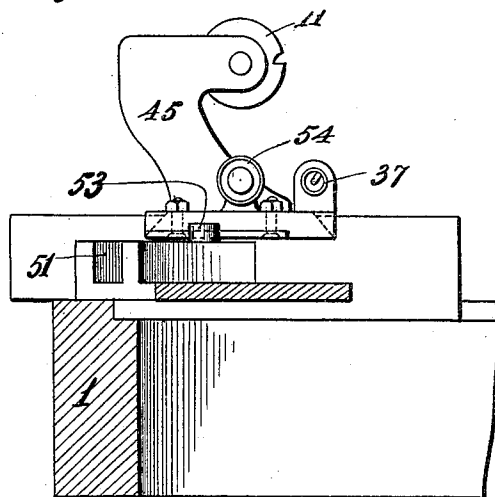


Fig. 4



Attest:

Edward L. Dillon
Gladys Walton.

Inventor:

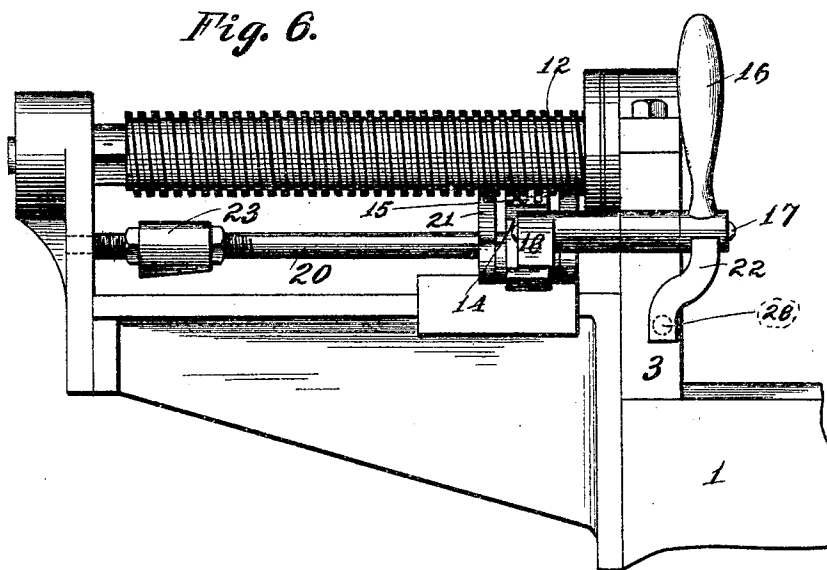
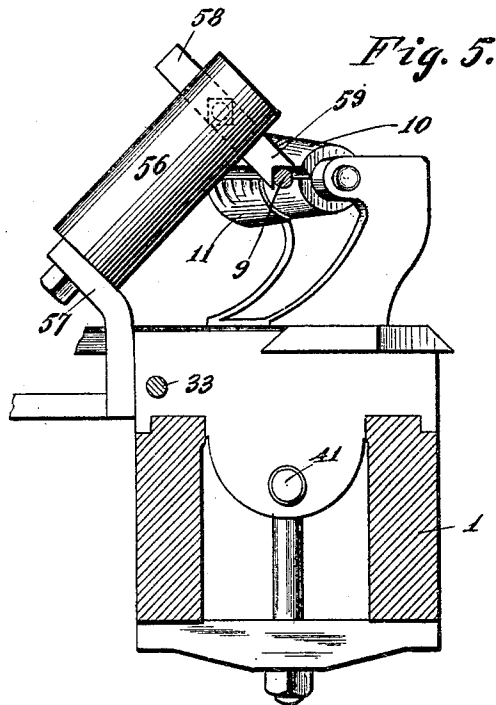
Edward J. Miller,
by
Hugh N. Wagner
His Att'y.

E. J. MILLER.
SCREW CUTTING MACHINE.
APPLICATION FILED OCT. 10, 1904.

935,315.

Patented Sept. 28, 1909.

6 SHEETS—SHEET 3.



Attest:
Edward L. Dillon
Gladys Walton.

Inventor:
Edward J. Miller,
by
Hugh K. Wagner,
His Att'y.

935,315.

Patented Sept. 28, 1909.

5 SHEETS—SHEET 4.

Fig. 7.

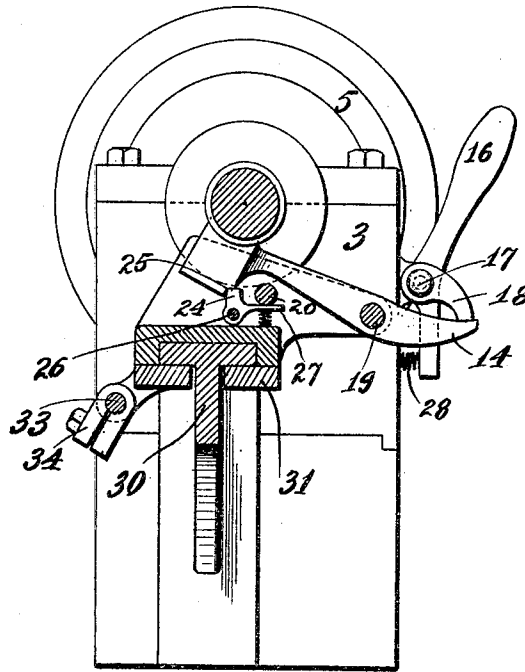


Fig. 8.

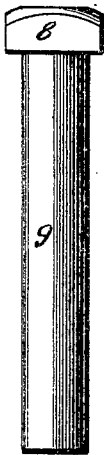


Fig. 9.



Fig. 10.

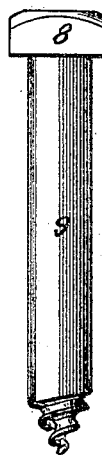
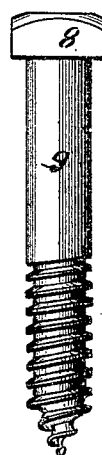


Fig. 11.



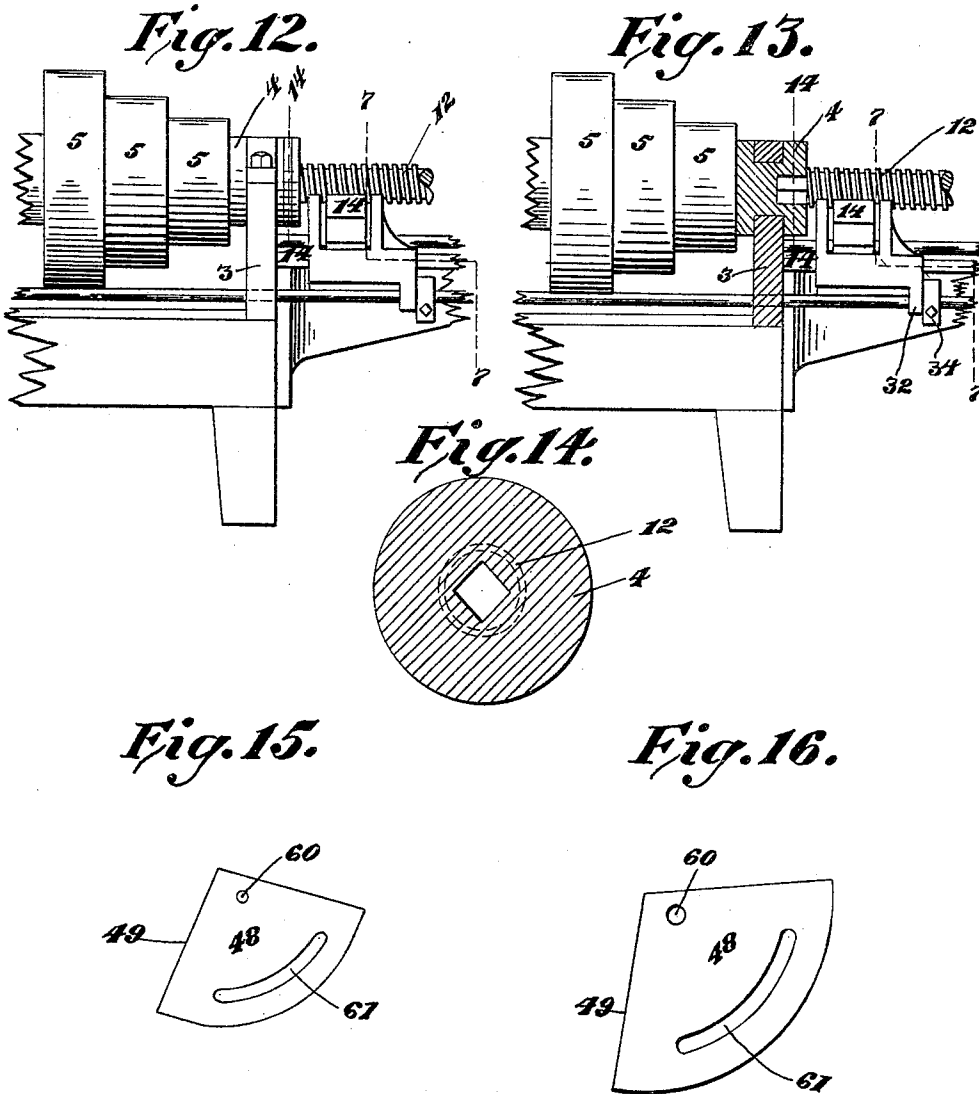
Attest:
 Edward L. Dillon
 Gladys Walton.

Inventor:
 Edward J. Miller,
 by Hugh K. Wagner,
 His Att'y.

935,315.

Patented Sept. 28, 1909.

6 SHEETS—SHEET 5.



Witnesses:
Elliott R. Goldsmith.
Chas. A. Becker.

Inventor:
Edward J. Miller,
By Hugh N. Wagner,
His Attorney.

UNITED STATES PATENT OFFICE.

EDWARD J. MILLER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO ST. LOUIS SCREW COMPANY,
OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI.

SCREW-CUTTING MACHINE.

935,315.

Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed October 10, 1904. Serial No. 227,778.

To all whom it may concern:

Be it known that I, EDWARD J. MILLER, a citizen of the United States, residing at the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Screw-Cutting Machines, of which the following is a specification.

This invention relates to screw-cutting machinery, and has for its object to accomplish the cone-pointing and gimlet-pointing of lag or coach screws or similar articles by one operation, and also to provide for the adjustment of the speed of the cutting operation, so as to alter the pitch of the screw-threads without the necessity of removing the lead-screw, and substituting therefor a lead-screw threaded with a different pitch.

Other items of invention will, also, be hereinafter described and afterward pointed out in the claims.

In the accompanying drawings forming part of this specification, in which like numbers of reference denote like parts wherever they occur, Figure 1 is a top plan view; Fig. 2 is a rear elevation; Fig. 3 is a top plan view, on an enlarged scale, of the sliding cutter-holder; Fig. 4 is a view, partly in section, on the line 4—4, Fig. 3; Fig. 5 is a cross sectional view on the line 5—5, Fig. 1; Fig. 6 is a front view of the lead-screw and lever for starting the machine into operation, with some of the connected parts; Fig. 7 is a cross sectional view on the line 7—7, Fig. 2, looking from the righthand end of the machine (Fig. 2). Fig. 8 shows the blank from which the screw is to be formed; Fig. 9 shows it cone-pointed; Fig. 10 shows same after it has been gimlet-pointed; Fig. 11 shows the completed article; Fig. 12 is a view, in elevation, showing the connection between the lead-screw and the spindle; Fig. 13 is a view of the same parts depicted in Fig. 12, some of said parts being shown in section; Fig. 14 is a detailed sectional view on the line 14—14, Fig. 12; and Figs. 15 and 16 are detailed views of the plate 48.

In making lag or coach screws, a blank, like that depicted in Fig. 8, which shows it just as it comes from the header, is first cone-pointed, as shown in Fig. 9. After that, the gimlet point is made, as shown in Fig. 10, after which it is passed through the threader to receive the screw-threads, as shown in Fig. 11. Sometimes the order of these op-

erations is different. For instance, the threads, shown in Fig. 11, are sometimes put on before the gimlet point, shown in the same figure and, also, in Fig. 10, but the preferable method is to form the gimlet point before threading, as thus the dies are given a starting lead, which is a great advantage, especially if the dies by use have become slightly dull.

My present machine can be so arranged as either to cone-point the blank, after which it may be gimlet-pointed on a different machine and threaded on still another, or it may be arranged so that with one handling and by a single operation the blank is both cone-pointed and gimlet-pointed. This is the preferable construction of my machine, and the one illustrated in the drawings, and which will be hereinafter described. Obviously, to cone-point and gimlet-point the screw by one operation and with only one handling is an important advantage in the way of economy. Moreover, the quantity of product that can be turned out is greatly increased, and the certainty with which the gimlet-pointing dies strike the cone point while the blank is held in the same position as when it received its cone point insures a superior quality of article.

The bed 1 of the machine is suitably arranged, as on standards 2. The bed 1 of the machine supports the pillow-blocks 3, in which the spindle 4 is journaled. Upon the spindle 4 are mounted the pulleys 5, which are of different sizes, in order to allow for different rates of speed of operation. The belts which engage said pulleys to rotate the spindle 4 are not shown in the drawings.

The spindle 4 has at one end a removable bushing 6, a plurality of said bushings being provided for the machine, and each bushing having therein a square opening 7 which receives and holds the square head 8 of the blank depicted in Fig. 8, and thereby holds the blank 9 against the cutters 10 and 11. Bushings like the bushing 6, having openings 7 of different sizes, to receive different sized heads 8, are provided, and they may, also, be different in form, so as to receive heads of different shapes, and may be fitted with chucks to hold material that can not otherwise be retained. At the opposite end, the spindle 4 is connected with the lead-screw 12, as shown in Figs. 13 and 14, said

lead-screw having a squared-off end which fits into a similarly-shaped recess in the spindle 4.

As the spindle 4 is rotated by the pulleys 5, and thus revolves the blank 9 to be cut against the cutters 10 and 11, the lead-screw 12 also revolves in its bearing 13. The lead-screw 12 is in line with the spindle 4, and at its lefthand end (Fig. 1) is fixed thereto, but journaled at its opposite end to revolve. The lever 14, by means of the teeth 15 thereon, engages the threads of the lead-screw 12, when said lever is in contact with said lead-screw, by means of the lever arm 16 pivoted at 17 and operating the finger 18 to depress the end of the lever 14, said lever 14 being pivoted on the rod 19 which passes through both sides of the forked frame 21 which carries the lever 14. The lever arm 16 is normally held vertical by the leaf spring 22. When the teeth 15 of the lever 14 engage the threads of the lead-screw 12, said threads tend to move the frame 21 along the rod 20 from the position indicated in Fig. 6. As the teeth 15 move in the grooves of the lead-screw 12, said frame 21 is steadily carried longitudinally on said rod 20 until the tripping nut 23 is reached. While so traveling on rod 20, the trigger 24, which engages the lever 14 in the notch 25 as soon as the teeth 15 of said lever are lifted into engagement with the lead-screw, holds the lever 14 in such position that the teeth 15 are maintained in contact with the lead-screw, said trigger 24 being pivotally mounted on pintle 26, which runs from one side of the yoke 21 to the other side, said trigger being thus located between the two branches of the yoke or frame 21. When the yoke or frame 21, carrying with it the lever 14, has traveled so far along on rod 20 that the arm 27 touches the tripping-nut 23, the trigger 24 is depressed from engagement with the notch 25, and the end of the lever 14, which contains said notch, falls, while the other end of said lever is returned to normal position by the expansion of the spring 28 and the pressure of spring 22.

The yoke or frame 21 consists of the two arms 29, which gradually increase in height from their point of connection with the rod 20 to their greatest height, as indicated in Figs. 2 and 7, where they are shown as extending higher than the lower portion of the lead-screw. The lower portion of the rear of said yoke or frame 21 incloses and slides upon the guide 30, and therewith forms the dovetail 31, said guide being in the form of a T iron. Projecting out from the rear of said yoke 21, is the collar 32, which encircles the rod 33, to which is clamped the adjustable split nut 34. The split nut 34, when placed in the desired position on the rod 33, is clamped to same and forms a stop thereon, against which the collar 32 abuts when the

yoke 21 is moving toward the tripping nut 23. The collar 32 thus forces the nut 34 in the same direction in which it is traveling, and in this manner carries with it the rod 33, which slides through bearings 35 in the pillow-blocks 3 and standard 36. The end of rod 33 projects through and outwardly from the standard 36 and may be moved longitudinally therethrough, so that most of that portion thereof beyond the nut 34 will protrude through the same when the yoke 21 has moved to a point where the tripper 23 will actuate the trigger 24 to release the lever 14, and thus terminate the forward longitudinal movement of the yoke 21. The instrumentality for the return of the yoke 21 to its initial position (shown in Figs 1, 2, and 6) is the retraction of the spring 37, the function and operation of which will hereinafter be more particularly described. At the other end of the machine, a block or saddle 38, having diagonal grooves 39 therein, is movably, but solidly, arranged upon the bed 1 of the machine, and is adapted to be moved longitudinally on the guides 40 for purposes of adjustment by the screw 41 operated by the handle 42. In the grooves 39 in the block 38, the dovetailed edges 43 of the sliding cutter carrier 44 slide. Formed integral with the sliding carrier 44, or at any rate solidly attached thereto, are the standards 45 which terminate at their top in the yoke 46 in which the cutters 10 and 11 are fixedly held at an angle to the blank 9, and at an angle substantially agreeing with the path of travel of the sliding carrier 44 through the grooves 39 in the block 38. The exact location of the block 38, relative to the spindle 4, will depend upon the length of the blank 9, and that is the reason for the provision of adjustment by means of the screw 41. The cutters 10 and 11 are set at such an angle as will produce the desired angle of the cone point and of the threads. The slide 44 has adjustably attached thereto, by means of the bolts and nuts 47, the plate 48, which has the beveled edge 49. Opposite the beveled edge 49, said plate 48 dovetails into a recess 50 in the end of the slide 44, being fastened therein by the bolts 47. By means of said bolts 47, the beveled plate 48 may be adjusted relative to the slide 44 so as to present either a greater or a less angle to the straight end of the slide 44, and, also, to the guides 40. Said plate 48 is constructed with a perforation 60 through which one bolt 47 is inserted, and an arcuate slot 61, through which the other bolt 47 passes. Said plate, accordingly, swings about the bolt passing through perforation 60 as a center, and, when said other bolt 47 is tightened, said plate is thereby clamped firmly in place, and its edge 49 can thus be set at any desired angle to the slide. The corner of said plate

48 opposite perforation 60 should be cut away, leaving two straight edges and an arcuate edge, as in Fig. 15, or, if desired, the part opposite perforation 60 may have a single arcuate edge, as in Fig. 16. In either case, the arcuate edges should be curved concentrically with the slot 61, so that, as the plate 48 is adjusted, it will not catch or bind in recess 50. It is however, permissible to provide a number of plates 48, each having an inclined edge of a different degree of angularity, thus permitting of the insertion of a plate capable of producing the desired thread pitch when the latter is to be changed.

In the bed 1, adjacent to the guide 48, is formed a groove 51 in which slides a block 52 attached to the end of the rod 33. When the rod 33 travels forward, under the impulse of the collar 32 pushing against the nut 34 when the frame 21 is carried forward by the rotation of the lead-screw 12, the block 52 slides forward in the groove 51 and carries with it the roller 53 which projects above the block 52, said roller 53 normally contacting with the inclined or beveled edge of the plate 48, as clearly shown in Figs. 1, 3, etc. As the block 52 moves forward in slot 51, the roller 53, which begins its travel across the edge of the plate 48 in the position shown in Fig. 1, moves across same, and is shown in Fig. 3 in a position in advance of that in Fig. 1, and about half way across the plate 48. The forward movement of the roller 53, borne by the block 52, propels the sliding cutter carrier 44 forward, the grooves holding the dovetails 43 of said sliding carrier 44 direct it obliquely across the bed of the machine, and thus at an angle to the blank 9 to be cut, and the fact that the plate 48 can be adjusted so that the roller 53 can ride at different angles to the main body of the sliding carrier 44, governs the speed at which the sliding carrier 44 travels past the blank 9, and thereby determines the pitch of the threads of the gimlet point cut thereon. The adjustability of the plate 48 makes it possible, also, to cut threads on the gimlet point different in pitch of thread from the pitch of the threads of the lead-screw 12. A plurality of cutters 10 and 11 is provided for the machine, in order that a suitable cutter may be inserted in the yoke 46 according to the nature of the work to be performed upon the blank. These cutters may be made either straight or cylindrical and, also, to conform to the shape of point that it is desired to make on the blank. If only a conical point is desired, one plain tool set at an angle corresponding to the depth of cut, and long enough so that when the righthand edge of the tool or cutter (Fig. 1) is set at the edge of the blank to begin the cut, the left hand edge of the cutter will pass the center of the blank. If the

cone point is long, it is preferable to have the tool-face or cutting edge of the cutter serrated, in order to break up the chips. If, in addition to the cone point, a gimlet point is wanted, it is necessary to have not only the plain cutter, just referred to, but also a tool formed with the necessary number and shape of teeth to form the point desired, as indicated by the cutter 11 in Figs. 1, 3, etc. If the blank has been previously cone-pointed in another machine, it is only necessary to use the last-named tool, limiting the travel of the slide 44 to the length of same, plus length of the point to be cut. When the cutters have traveled forward completely past the point of the blank 9, the blank now properly cone-pointed and gimlet-pointed drops by gravity to a chute or receptacle located underneath.

When the slide 44 has reached the farthest point of its forward movement, the frame 21 will have traveled forward on the rod 20 to such a point that the trigger 24 trips on the nut 23 and the forward motion of the frame 21, rod 33, roller 53, and slide 44 is thus stopped. Instantly the spring 37 pulls the slide 44 back, which causes the roller 53 to ride in the opposite direction on the plate 48, and the block 52 is pushed back in the slot 51, pulling with it the rod 33 and frame 21. The piston 54 enters the dashpot 55 under the impulse of the backward pull of the spring 37, and these parts act as a buffer to save shock and jar.

In order to hold the blank 9 against the cutters 10 and 11, a back-rest 56 is provided, same being fixed to the frame of the machine by the rigid support 57, but having mounted therein, so as to be adjustable slidingly there-through, the arm 58 having the jaws 59.

The operation of the machine is as follows. The head of the blank 9 is inserted into the bushing 7, and the other end of the blank is placed in the jaws 59. The lever-arm 16 is pulled forward; the finger 18 contacts with the lever 14 and depresses one end of it, while raising the teeth 15 on the other end thereof into contact with the lead-screw 12. The lead-screw 12 is rotating with the spindle 4 by power applied to the pulleys 5, and the rotation of the lead-screw 12 causes the teeth 15 to ride in the grooves of the lead-screw, thereby causing the frame 21 to move to the right in Figs. 1 and 2, and to the left in Fig. 6. This movement of the frame 21 continues until the arm 27 of the trigger 24 trips on the nut 23, which stops the forward movement of the frame 21, and with it the forward movement of the sliding cutter carrier 44 (to the right in Figs. 1, 2, and 3), said forward movement of the sliding cutter carrier 44 having been simultaneous with the movement of the frame 21, and caused by the contact of the sliding collar 32 with the adjustable, but fixed, split nut 34 mounted

on the rod 33, said rod 33 being thus caused to travel forward, pulling with it the block 52 and roller 53, and thus pushing the slide 44 forward. As soon as the trigger 24 is released from engagement with the lever 14, the forward movement just described ceases, and the spring 37 pulling on the slide 44 forces the block 52 backward in the groove 51, thereby returning the frame 21 to its initial position illustrated in Figs. 1, 2, and 6, by the instrumentality of the rod 33 and the contact of the fixed nut 34 on the sliding collar 32.

Having thus described my said invention, what I claim and desire to secure by Letters-Patent is:

1. In a machine of the type described, the combination of a spindle for rotating the blank, a slide moving at an angle thereto, a lead-screw in connection with said spindle, a rod advanced by said lead-screw, a roller borne by said rod, and an incline upon said slide upon which said roller acts.

2. In combination with a spindle for rotating the blank, a slide movable at an angle thereto, cutting means adjacent one end of said slide, a rod having a projection thereon, said rod being actuated lengthwise by the spindle for actuating the slide, and an adjustable incline on the opposite end of the slide for engagement with said rod projection.

3. In combination with means for holding the blank, a sliding element having a projection with separate means for actuating said element, a slide movable across the path of movement of said element, said slide having an inclined part disposed at an angle to the path of movement of said slide for engagement with said projection, and means connected to said slide whereby, when the same is restored to initial position, said element will be likewise restored by the action of said slide.

4. In a machine of the type described, the combination of rotatable means for loosely holding the blank, cutters movable at an incline with respect to said means, fixed auxiliary means forming a crotch in which said blank may rest, said means being adapted to hold said blank in contact with said cutters, said cutters engaging the blank on one side, and said auxiliary means engaging the blank on the opposite side, and means for actuating said cutters to become free of the blank to permit the blank to drop by gravity from said holding means after the operation of said cutters thereon.

5. In combination with means for rotating the blank, a longitudinally-movable rod having a projection adjacent one end, a slide adjacent to said rod and disposed angularly across the same, said slide having an inclined part engaged by said projection, said incline being at an angle to the path of movement of

said rod, and means actuated by said blank-rotating means for advancing the rod.

6. In combination with means for holding the blank, a longitudinally-movable element having a projection on one end, a slide having an adjustable inclined portion at its rear end for engagement with said projection, said element extending across said slide, and means actuated by said blank-holding means for operating said element.

7. In combination with means for holding the blank, means slidable in a longitudinal plane, a slide extending across said means and movable in a plane at an angle thereto and thereacross, an inclined part on the slide, a projection extending from said means to engage the edge of said inclined part, and means actuated by said blank-holding means adapted to operate said sliding means.

8. In combination with a spindle for rotating the blank, a lead-screw, a slide traveling at an angle across the axial line of the blank, an adjustable incline on said slide, adapted to govern the rate of forward travel thereof, and means intermediate said lead-screw and said incline and bearing upon said incline whereby travel of said slide is caused by said screw.

9. In combination with a spindle for rotating the blank, a slide embodying cutting means, an adjustable incline carried by the slide, and means arranged to travel parallel to the blank and transversely to the edge of said incline and engaging the same and adapted by travel of said means to cause travel of the slide at an angle to the path of movement of said actuating means.

10. In combination with a spindle for rotating the blank, means slidable parallel to said spindle, a slide adjacent said means and traveling at an angle to the path of movement of said means, said angle being determined by the angle of the cone-point desired to be formed on said blank, an incline on said slide disposed at an angle to the path of movement of said slidable means, and a projection extending from said slidable means to engage the edge of said incline.

11. In combination with means for rotating the blank, a longitudinally-movable rod actuated thereby, a slide adjacent to said rod and traveling thereacross at an angle to the path of movement of said rod, an incline upon said slide disposed at an angle to the path of movement of the rod, and means intermediate said rod and said incline.

12. In combination with a spindle for rotating the blank, a slide which travels across the axial line thereof at an angle determined by the angle of the cone point desired to be cut, cutters upon said slide which move across the blank at said angle, a swinging plate upon said slide controlling the rate of

its forward travel, thereby determining the pitch of the threads to be cut, and slide-actuating means engaging said plate.

13. In combination with a spindle for rotating the blank, a slide which travels across the axial line thereof at an angle corresponding to the angle of the cone-point to be cut, a slide-actuator, and an inclined member upon said slide, said inclined member being engaged by the slide-actuator and having a perforation near one edge and an arcuate slot near another edge, bolts being inserted through said perforation and said slot to hold said inclined member to said slide.

14. In combination with blank-rotating means, a lead-screw rotating therewith, a cutter-carriage, slidable cutter-carriage-actuating means, a lever having a toothed part to engage the lead-screw, means for causing said lever to slide in conjunction with said carriage-actuating means during the cutting operation and independently thereof during the return operation, and means for predeterminedly tripping said lever out of engagement with said lead-screw.

15. In combination with a spindle for rotating the blank, a slide which travels at an angle thereacross, a lead-screw operated by the spindle, a rod which operates the slide, a member having a toothed part to engage the lead-screw, and separate means for predeterminedly tripping said member out of engagement with said lead-screw.

16. In combination with a spindle for rotating the blank, a lead-screw operated by the spindle, a cutter-tool-carrying slide which travels diagonally to the blank, means for operating the slide, means connecting said slide-operating means to said lead-screw, means independent of said slide and of said slide-operating means for automatically and predeterminedly disengaging said connecting means from said lead-screw to cause said slide-operating means to cease operation, and means for thereafter automatically returning said slide and slide-operating means to starting position.

17. In combination with a spindle for rotating the blank, a cutter-carriage which travels diagonally to the axial line thereof, means upon said carriage disposed at an angle to the path of movement of the carriage-actuating means, said angle controlling the rate of forward travel of the carriage, and movable carriage-actuating means engaging said controlling-means.

18. In combination with a spindle for rotating the blank, a slide, means upon said slide disposed at an angle to the path of movement of the slide-actuating means, said angle controlling the rate of forward travel

of the slide, and movable slide-actuating means engaging said controlling means.

19. In combination with a spindle for rotating the blank, a slide, an adjustable incline upon said slide disposed at an angle to the path of movement of the slide-actuating means, said angle controlling the rate of forward travel of the slide, and movable slide-actuating means engaging said incline.

20. In combination with a spindle for rotating the blank, a cutter-carrying slide which travels diagonally to the axial line thereof, movable slide-actuating means, and an incline upon said slide disposed at an angle to the path of movement of the movable slide-actuating means, said angle controlling the rate of forward travel of the slide and the pitch of the threads to be cut, the slide-actuating devices bearing upon said incline.

21. In combination with a spindle for rotating the blank, a cutter-carriage which travels at an angle across the axial line thereof, a cutting tool and a threading tool fixed thereupon and carried forward in a straight line thereby, an adjustable plate upon said carriage regulating the rate of forward travel thereof, and slide-actuating means engaging said plate.

22. In combination with a spindle for rotating the blank, a slide which travels at an angle thereacross, cutters carried by said slide, said cutters and said slide being adapted to travel past the blank at an angle, said angle being determined by the desired angle of the cone point to be cut, and sliding means for actuating the slide.

23. In combination with a spindle for rotating the blank, a slide, a plurality of cutters carried thereby, slide-actuating means slidable parallel to the spindle, said slide traveling thereacross at an angle oblique to the path of movement of said slidable means, said angle being determined by the angle of the cone-point desired to be formed on said blank, and means intermediate said slide and said slide-actuating means.

24. In combination with a spindle for rotating the blank, a cutting tool and a threading tool and means to carry the cutting edges of said tools forward in a straight line and at an angle to the axis of the blank, said angle being determined by the angle of the cone-point desired to be cut.

In testimony whereof I have affixed my signature in presence of two witnesses this 8th day of October, 1904.

E. J. MILLER.

Witnesses:

M. E. LETCHER,
GLADYS WALTON.