No. 751,841. PATENTED FEB. 9, 1904.

G. A. ENSIGN.

THREAD CUTTING MACHINE.

APPLICATION FILED OCT. 29, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

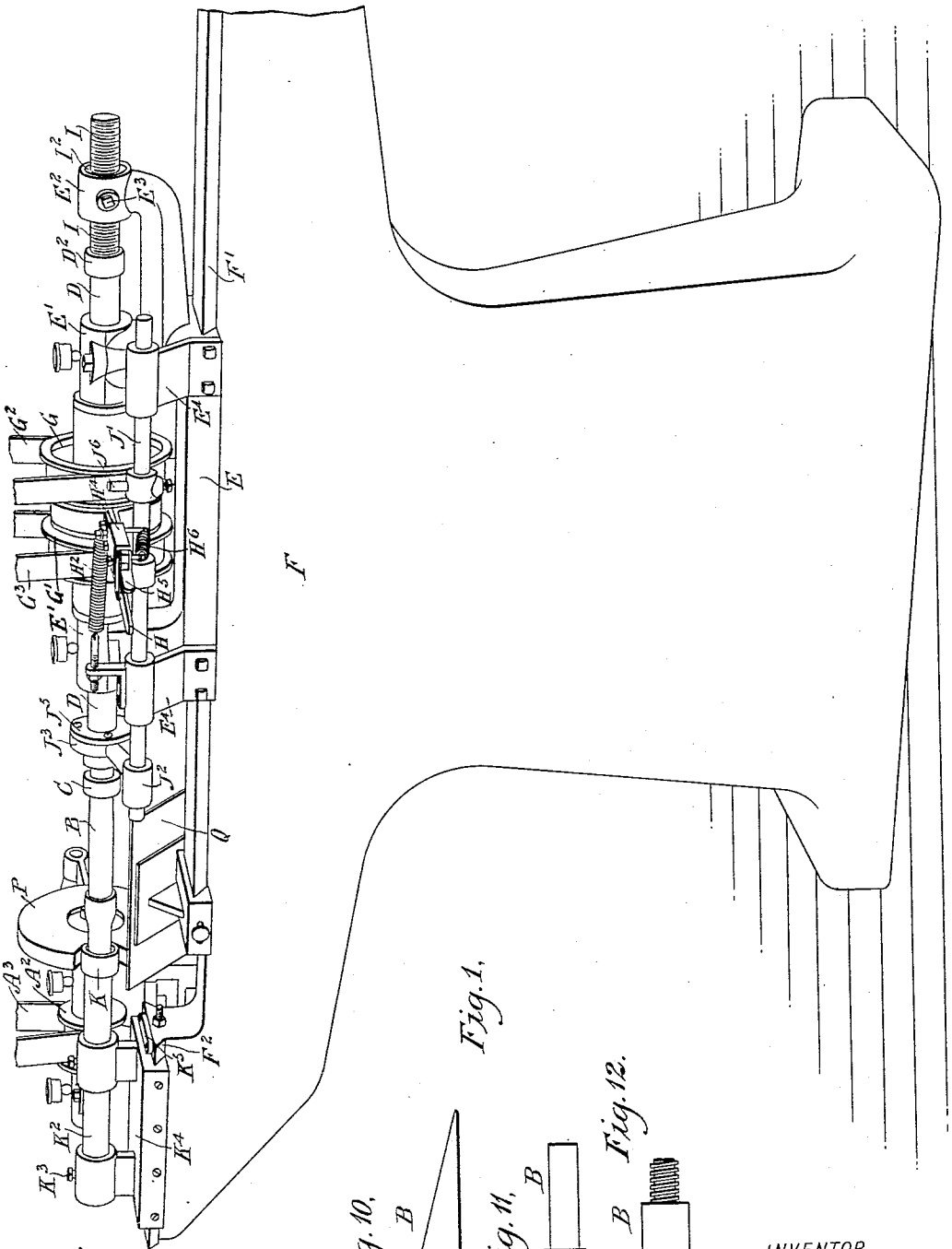

Fig. 1.

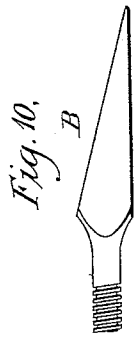

Fig. 10.

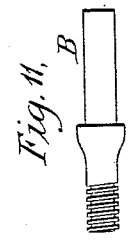

Fig. 11.

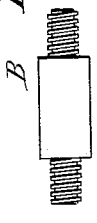

Fig. 12.

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INVENTOR

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ATTORNEYS

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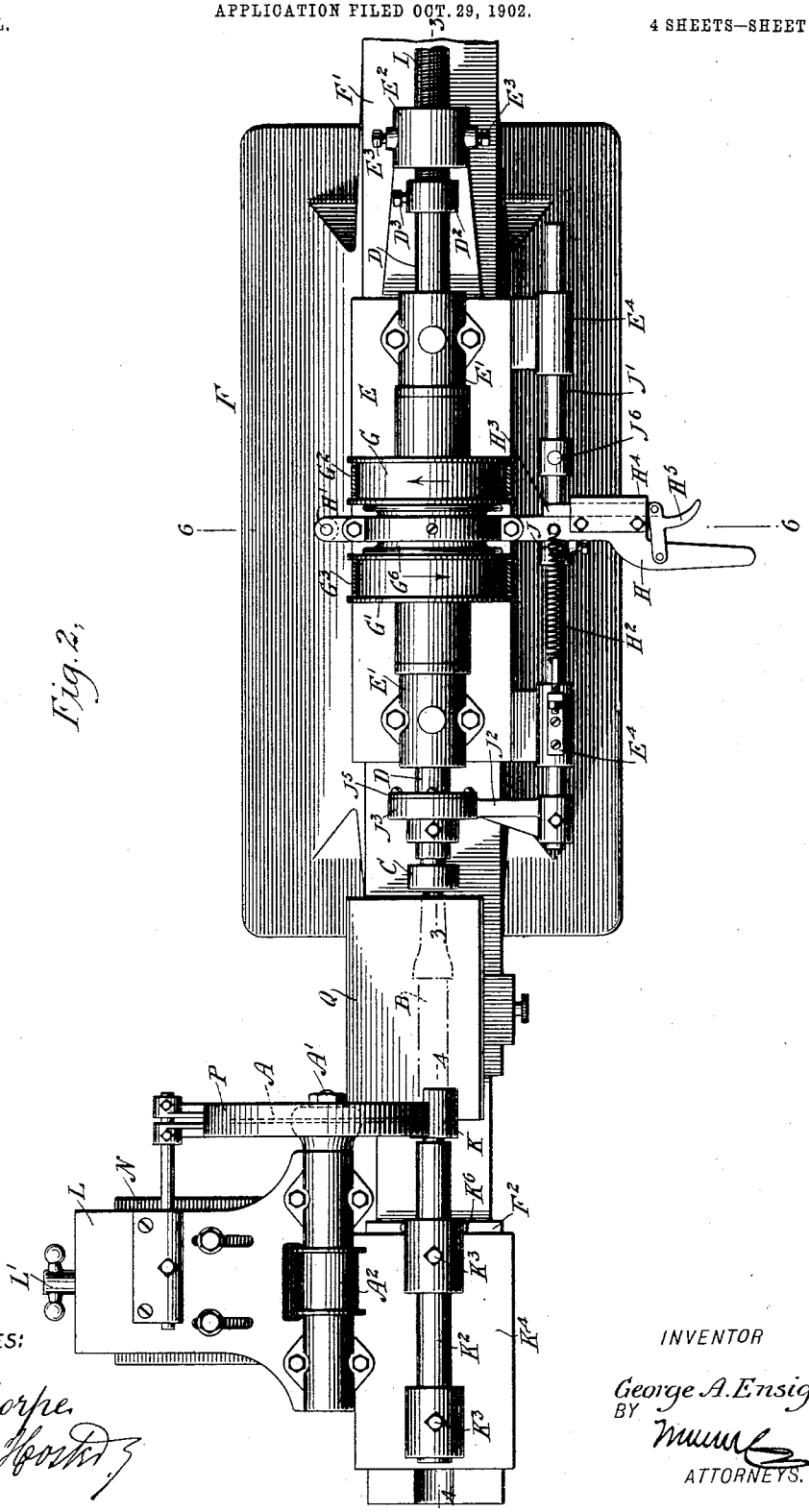
NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

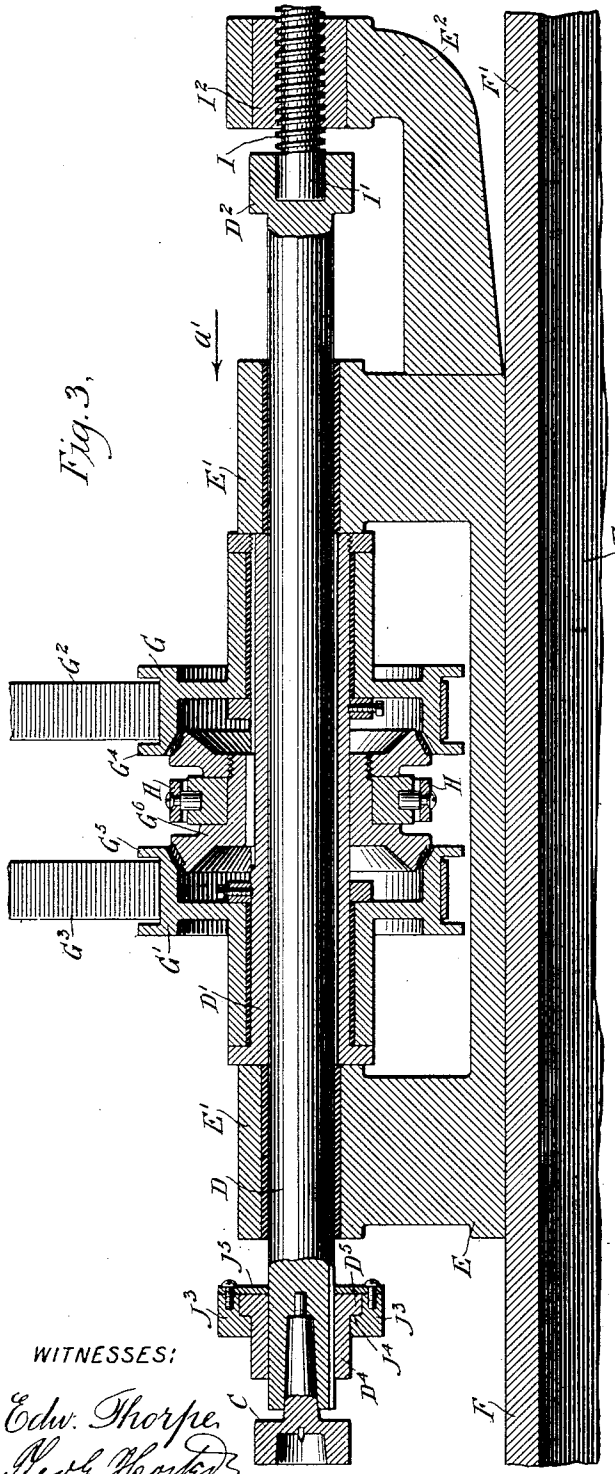


Fig. 5.

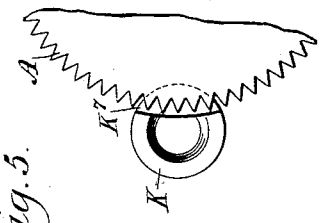
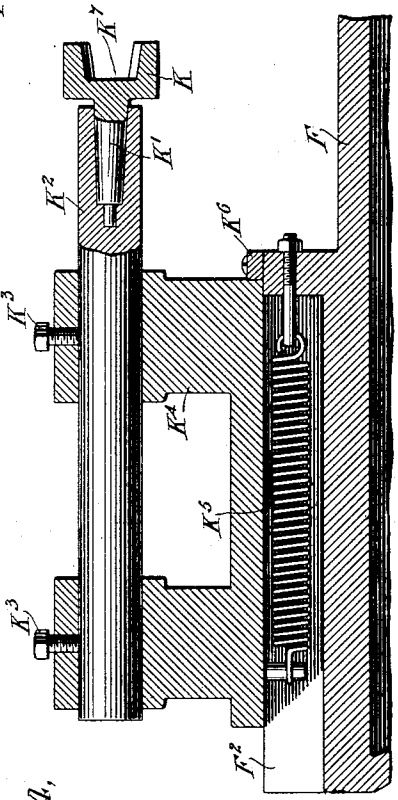


Fig. 4.



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NO MODEL. APPLICATION FILED OCT. 29, 1902.

4 SHEETS—SHEET 4.

Fig. 6,

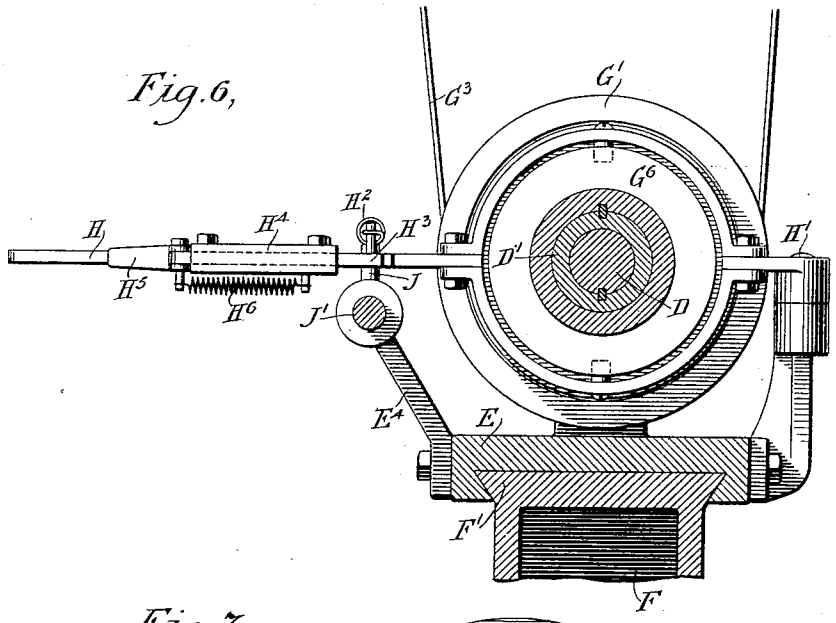


Fig. 7,

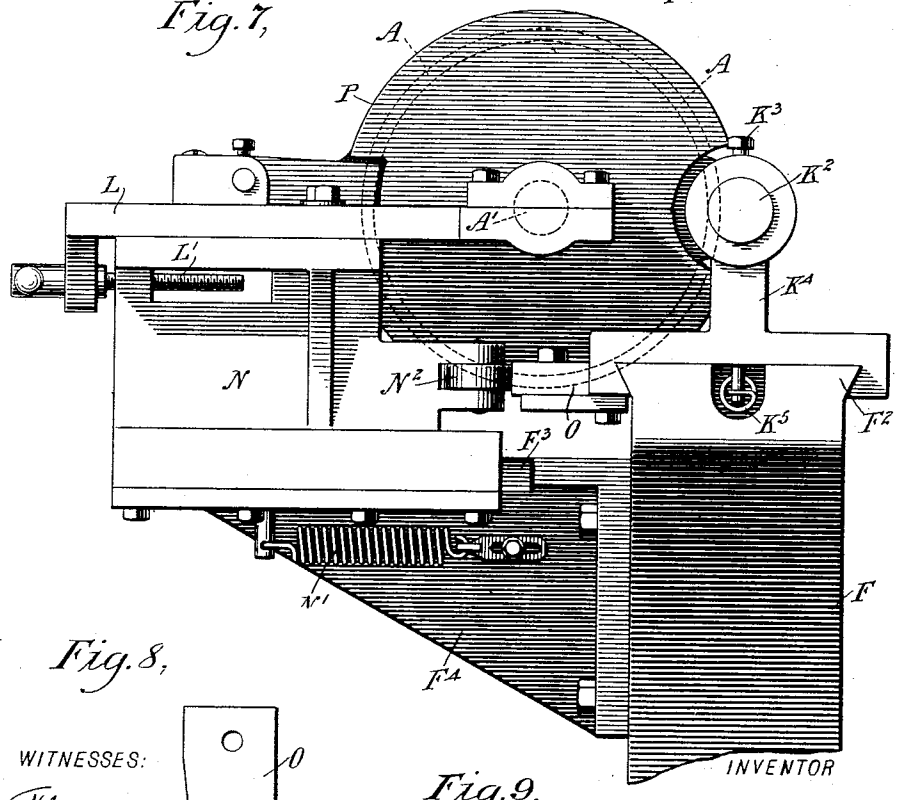


Fig. 8,

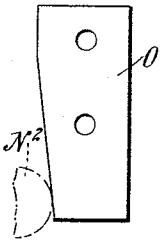
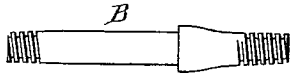


Fig. 9.



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No. 751,841. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

GEORGE A. ENSIGN, OF DEFIANCE, OHIO, ASSIGNOR TO DEFIANCE MACHINE WORKS, OF DEFIANCE, OHIO.

THREAD-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 751,841, dated February 9, 1904.

Application filed October 29, 1902. Serial No. 129,256. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. ENSIGN, a citizen of the United States, and a resident of Defiance, in the county of Defiance and State of Ohio, have invented new and useful Improvements in Thread-Cutting Machines, of which the following is a full, clear, and exact description.

The invention relates to woodworking machinery; and its object is to provide a new and improved thread-cutting machine more especially designed for cutting threads on wooden articles—such as insulator-pins, brackets, spools, bobbins, handles, barrels, &c.—and arranged to cut any desired number of threads per inch for a desired distance of the same or different diameters and irrespective of the shape of the work and to produce threads which are exceedingly smooth, clean, and true.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged longitudinal central section of the head-stock. Fig. 4 is a like view of the tail-stock. Fig. 5 is an end elevation of the tail-stock center and the circular cutting-saw. Fig. 6 is an enlarged transverse section of the improvement on the line 6 6 of Fig. 2. Fig. 7 is an enlarged end view of the improvement. Fig. 8 is a plan view of the pattern for tapering the work, and Figs. 9, 10, 11, and 12 are side elevations of wooden articles provided with threads.

The thread-cutting machine in its general construction consists of a revoluble cutter, preferably in the form of a circular saw A, extending at right angles to the axis of the work B and serving to cut the thread on one end of the work B, which latter is held at its other end in a chuck or other work-holder C, removably secured on a revoluble spindle D, having a lengthwise feed, according to the pitch to be given to the teeth to be cut on the work, the spindle being journaled in bearings E′, formed on the head-stock E, lengthwise adjustable on a guideway F′ of the bed F to permit of setting the head-stock according to the length of the work B under treatment.

A rotary forward-and-backward motion is given to the spindle D and the work B carried thereby by the following device: Two pulleys G G′ are connected by belts G^2 G^3 with pulleys on a counter-shaft, one of the belts being crossed, so that the pulley G is rotated in a forward direction, while the pulley G′ is revolved in a reverse direction. The inner opposite faces of the pulleys G G′ are formed with frictional clutch members G^4 G^5, adapted to be engaged by a double-clutch member G^6, shifted to the right or left by means of a shifting-fork H, fulcrumed at H′ on the rear end of the head-stock E, and the front end of the said shifting-fork H is under control of the operator to enable the latter to move the double-clutch member G^6 in engagement with either of the clutch members G^4 G^5. The double-clutch member G^6 is mounted to slide on and to rotate with a sleeve D′, turning with the spindle D, and allowing the latter to slide lengthwise in the said sleeve. When the double-clutch member G^6 is in engagement with the clutch member G^4 of the pulley G, then the rotary movement of this pulley G is transmitted by the double-clutch member G^6 and sleeve D′ to the spindle D, rotating the work-holder and the work B in a forward direction. When the double-clutch member G^6 is moved in frictional engagement with the clutch member G^5, of the pulley G′, then the motion of the parts above referred to is reversed—that is, the work B is rotated in a backward direction.

In order to feed the spindle D lengthwise, the rear end of the said spindle is provided with a head D^2, in which is removably secured the shank I′ of a screw-rod I, screwing in a nut I^2, removably secured in a bracket E^2, projecting from the head-stock E, the said nut I^2 being secured in place by set-screws

E^3, and a set-screw D^3 serves to fasten the shank I′ in position in the head D^2. Now when the spindle D is rotated in a forward direction, as above explained, then the screw-rod I in turning with the spindle screws in the nut I^2, and consequently feeds the spindle D forward in the direction of the arrow *a′*. When the motion of the spindle D is reversed, as previously explained, then the screw-rod I screws backward in the nut I^2, and consequently the spindle is moved lengthwise in the inverse direction of the arrow *a′*. The screw-rod I used at the time is selected according to the number of threads per inch to be formed on the work—that is, if the threads on the work are required to be six threads to the inch then a screw-rod I is selected having a like number of threads to the inch.

The double-clutch member G^6 is normally held in an intermediate position—that is, out of engagement with either clutch member G^4 G^5 (see Fig. 3)—and for this purpose the shifting-fork is held against a stop J by a spring H^2, the said stop being adjustably secured on a longitudinally-extending rod J′, mounted to slide in bearings E^4, carried by the headstock E. The forward end of the rod J′ is provided with a transverse arm J^2, formed with a ring J^3, fitting a collar D^4, keyed or otherwise secured to the spindle D, the collar being free to turn in the ring and the latter being held against longitudinal movement on the collar by abutting shoulders J^4 D^5 and by a ring-plate J^5, secured to the ring J^3 and engaging one face of the collar, as plainly indicated in Fig. 3. By this arrangement the rod J′ moves lengthwise with the spindle D. On the rod J′ is adjustably secured a second stop J^6, adapted to engage a bar H^3, slidable in a bearing H^4, secured to the shifting-fork H, the said bar extending transversely on that side of the shifting-fork opposite the one engaged by the other stop J. The bar H^3 is connected with a finger-piece H^5 under control of the operator and pivoted on the shifting-fork H, (see Fig. 2,) the said finger-piece H^5 being pressed on by a spring H^6 to hold the bar H^3 in the path of the stop J^6. Now when the several parts are in the positions shown in Figs. 2 and 3 and the operator moves the shifting-fork H from the left to the right against the tension of the spring H^2 then the spindle D is rotated and is fed forward in the direction of the arrow *a′*, and the spindle in its forward movement carries along the arm J^2 and rod J′, so that the stop J^6 finally comes in contact with the bar H^3, and thus moves the shifting-fork H from the right to the left to move the double-clutch member G^6 out of engagement with the clutch member G^4. When this takes place, the spindle D comes to a standstill, and the saw A has cut the thread the desired length on the work B. The operator now swings the shifting-fork H farther to the left, so that the double-clutch member G^6 engages the clutch member G^5, and the spindle D is now rotated in a reverse direction and at the same time fed in the inverse direction of the arrow *a′* to run the saw A back in the groove previously cut on the end of the work. When the saw reaches the starting-point, then the stop J moves in engagement with the shifting-fork H, so that the latter is swung into its normal position, and consequently the spindle D and the work again come to a standstill.

When it is desired to cut threads on both ends of the work and one thread longer than the other, it is necessary for the operator to press the finger-piece H^5 while cutting the thread on one end of the work. Now it will be seen that when the finger-piece H^5 is pressed the bar H^3 is drawn out of the path of the stop J^6, and consequently the latter will engage and move the shifting-fork H at a later period—that is, the spindle D is fed forward the distance between the stop J^6 and the said shifting-fork H, while in the other case the spindle D is only fed forward the distance between the stop J^6 and the bar H^3. Thus the short thread at one end of the work is cut the distance between the stop J^6 and the bar H^3 and the long thread at the other end of the work is cut the distance between the stop J^6 and the shifting-fork H—that is, one thread is longer than the other by the width of the bar H^3. The end of the work cut at the time by the saw A is held in a cup K, having a tapering shank K′, removably secured in a tail-center K^2, fastened by set-screws K^3 in the tail-stock K^4, mounted to slide longitudinally on a guideway F^2, formed on the right-hand end of the bed F. A spring K^5 presses the tail-stock K^4 to hold the latter normally against the stop K^6, secured on the right-hand end of the guideway F^2, as plainly shown in Fig. 4. The cup K has a portion of its side cut out, as at K^7, to permit the entrance of the saw A to the inside of the cup K and to the end of the work to start the thread at the end face of the work. Now when the work B is inserted in the work-holder C and the cup K and spindle D are fed forward, as previously explained, then the work B pushes the cup K, tail-center K^2, and tail-stock K^4 from the right to the left against the tension of the spring K^5 and away from the stop K^6. When the spindle D is on the return movement, then the tail-stock K^4 is moved in the same direction by the action of its spring K^5, and when the spindle D comes to a standstill the tail-stock K^4 again abuts on the stop K^6.

The circular saw A is secured on an arbor A′, carrying a pulley A^2, connected by a belt A^3 with a pulley on a counter-shaft, so that a continuous rotary motion is given to the said circular saw A. The arbor A′ is journaled in suitable bearings attached to or formed on a slide L, held transversely adjustable on a carriage N by a screw-rod L′, (see Figs. 2 and 7,) and the said carriage N is mounted to slide

transversely on a guideway F^3, formed on a bracket F^4, bolted to the rear side of the bed F, as plainly indicated in Fig. 7. The carriage N is pressed on by a spring N′, and on the said carriage is journaled a friction-roller N^2, traveling on the face of a pattern O, bolted or otherwise secured to the tail-stock K^4, the said pattern being shaped according to the shape of the end of the work under treatment—that is, the pattern has a straight face for cylindrical work and a tapering face for tapering work to allow of cutting threads both on cylindrical and tapering ends of the work. The spring N′ serves to hold the friction-roller N^2 in engagement with the face of the pattern O, and when a pattern O with a beveled or tapering face is used (see Fig. 8) and the tail-stock K^4 is shifted on its guideway F^2, as previously explained, then the face of the pattern O moves the friction-roller N^2, and with it the carriage N, in a transverse direction, so as to move the saw A farther from or nearer to the work, according to the taper at the end of the work. By having the slide L adjustable on the carriage N it is evident that the saw-arbor A′ can be shifted nearer to or farther from the work to cause the saw A to cut the threads to the desired depth. The saw A is protected by a suitable hood P, supported from the slide L, and on the guideway F′ is held adjustably a chip-deflector Q to protect the workman from the flying chips.

The operation is as follows: After the operator has inserted the work B in the work-holder C and cup K, as previously explained, he then moves the shifting-fork H to the right to cause the spindle D to revolve and to feed forward, so that the circular saw A cuts the thread on the end of the work B the desired length—that is, until the stop J^6 moves in engagement with the bar H^3—and thereby causes movement of the shifting-fork to an intermediate position, as previously explained. The operator now swings the shifting-fork H farther to the left to rotate the spindle D in a reverse direction and to feed the spindle D backward, so that the saw A runs empty in the groove previously cut on the end of the work. When the spindle D comes to a standstill by the action of said stop J moving the shifting-fork to an intermediate position, then the operator removes the work B and places a new piece of work in position, and the above-described operation is then repeated. When it is desired to cut threads on both ends of the work, then the work is simply reversed in the chuck after the first thread is cut to cut the thread on the other end. When one thread is to be longer than the other, as indicated in Fig. 9, then the bar H^3 is withdrawn from that end of the work which is to be provided with the longest thread. For tapering work use is made of the pattern O, having a tapering face, as previously explained, so that the carriage N is shifted transversely to move the saw correspondingly, and thereby causes the saw to cut a thread of the proper uniform height on the tapering end of the work. The saw-teeth have parallel sides; but as the saw stands at right angles to the work and the latter is simultaneously rotated and moved lengthwise it is evident that the sides of the thread are cut beveled—that is, the thread cut on the work is wider at the bottom than at the top.

It is understood that by the arrangement described the work is accurately threaded on either or both ends and on cylindrical or conical ends and without requiring the employment of skilled labor.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A thread-cutting machine, comprising a revoluble work-holder, means for feeding the work-holder longitudinally according to the threads per inch to be cut on the work, a circular cutter for cutting the threads on the work, means for imparting a forward and backward revolving motion to the work-holder, and a spring-pressed stock mounted to slide longitudinally and having a center engaged by the end of the work to be threaded, the said center being formed with a receiving-cup having a portion of its side cut out for the entrance of the said cutter, as set forth.

2. A thread-cutting machine having a tail-center mounted in a sliding tail-stock and provided with a cup to receive one end of the work, and having a cut-out portion in its side to receive a cutting-tool, said cut-out portion leading out through the end of the cup, as and for the purpose set forth.

3. A thread-cutting machine, having a revoluble spindle for carrying one end of the work, means for feeding the spindle lengthwise in a forward and backward direction, means for revolving the spindle forward and backward, and means for varying the length of the forward-and-backward feed of the spindle, and consisting of a stop movable lengthwise with the spindle and a shifting-lever for the said means to rotate the spindle, the shifting-lever having a movable bar adapted to be moved in or out of the path of said stop, as set forth.

4. A thread-cutting machine, having a revoluble spindle for carrying the work, means for feeding the spindle lengthwise, forward or backward, a sleeve for the spindle to slide in and to turn with, pulleys rotated in opposite directions and mounted to turn loosely on the sleeve, each pulley being provided with a clutch member, a double-clutch member slidable on and turning with the said sleeve, a shifting-lever for the said double-clutch member, to throw said member in or out of engagement with the clutch member on either pulley, a spring for holding the

shifting-fork in an intermediate position, and stops moving lengthwise with the spindle for engagement with and shifting of the shifting-fork as set forth.

5. A thread-cutting machine, having a revoluble spindle for carrying the work, means for feeding the spindle lengthwise, forward or backward, a sleeve for the spindle to slide in and to turn with, pulleys rotated in opposite directions and mounted to turn loosely on the sleeve, each pulley being provided with a clutch member, a double-clutch member slidable on and turning with the said sleeve, a shifting-lever for the said double-clutch member to throw said member in or out of engagement with the clutch member on either pulley, a spring for holding the shifting-fork in an intermediate position, and stops moving lengthwise with the spindle for engagement with and shifting of the shifting-fork, and a bar slidable on the shifting-fork for engagement by one of the stops, as set forth.

6. In a thread-cutting mechanism, the combination of a spindle, mechanism for revolving the spindle in either direction, a spring-pressed shifting-lever for said mechanism, means for moving the spindle backward and forward according to the direction it is revolved, a sliding rod connected with the spindle to move therewith and provided with spaced stops for engaging opposite sides of the shifting-lever, and means carried by the shifting-lever whereby its movement in one direction may be increased or decreased, as set forth.

7. A thread-cutting machine, comprising a work-holder, means for revolving it in either direction, means for feeding the work-holder forward or backward according to the direction it is revolved, a slidable and spring-pressed tail-center adapted to be engaged by the outer end of the work, a pattern carried by the tail-center, a transversely-sliding carriage engaging the pattern, a transversely-adjustable slide mounted in the carriage, and a saw mounted in the slide, as set forth.

8. A thread-cutting machine, comprising a work-holder, means for revolving the work-holder in either direction, means for automatically controlling the direction of movement of the work-holder, means for feeding the work-holder forward or backward according to the direction in which the holder is revolved, a slidable and spring-pressed tail-center carrying a pattern, a transversely-sliding carriage adapted to engage the pattern carried by the tail-center, a slide adjustably mounted on the carriage, and a saw mounted in the slide, as set forth.

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

GEORGE A. ENSIGN.

Witnesses:
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JOS. BAUER.