2 Sheets--Sheet 1.

L. GODDU.

Machine for Screw-Threading Wire.

No. 167,760. Patented Sept. 14, 1875

Fig. 1.

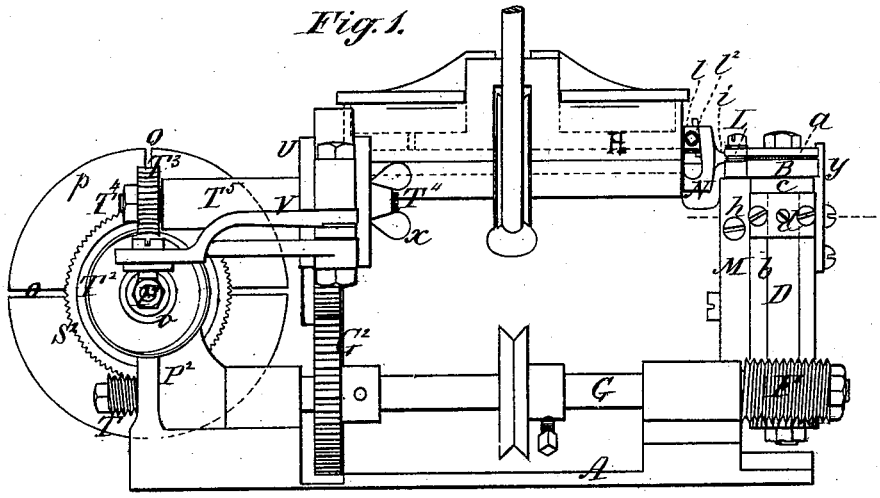


Fig. 2.

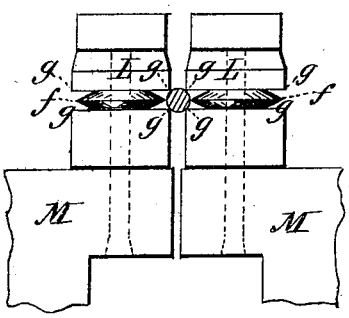
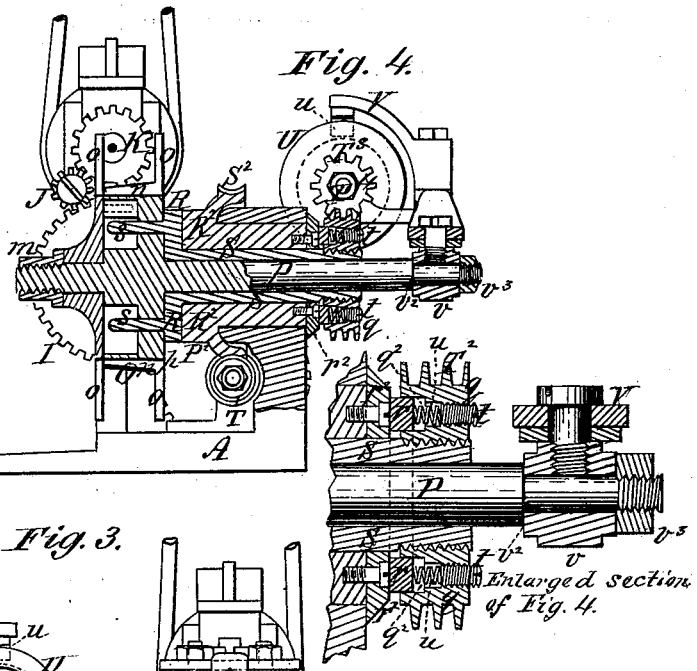


Fig. 4.



Enlarged section of Fig. 4.

Section at y. y. Fig. 3.

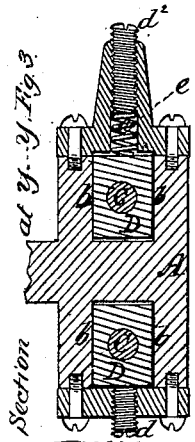
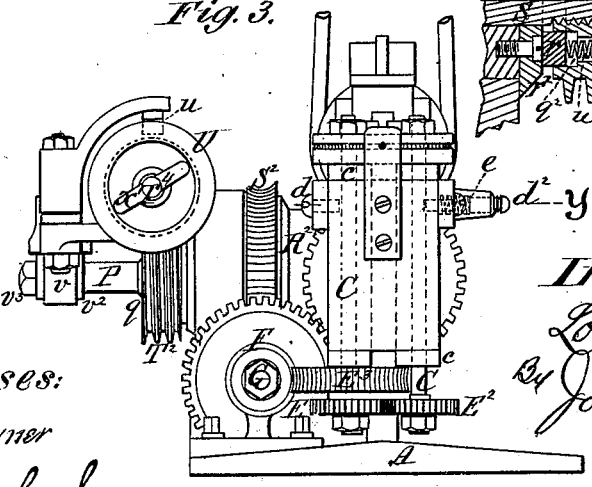


Fig. 3.



Witnesses:

J. West Wagner

Geo. C. Rutherford

Inventor:

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by Johnson & Johnson

his Attys

2 Sheets--Sheet 2.

L. GODDU.

Machine for Screw-Threading Wire.

No. 167,760. Patented Sept. 14, 1875.

Fig. 2.

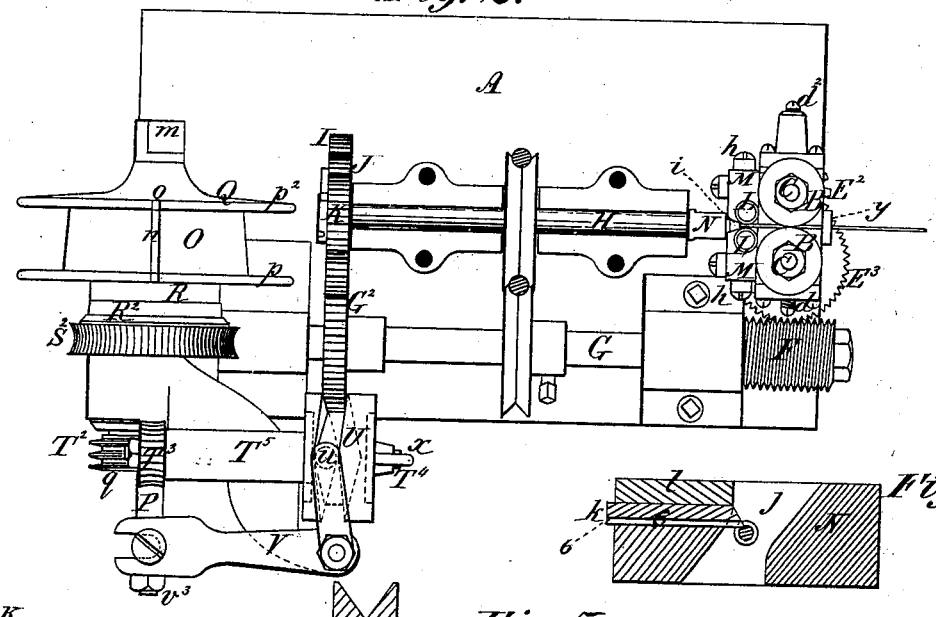


Fig. 6.

Fig. 5.

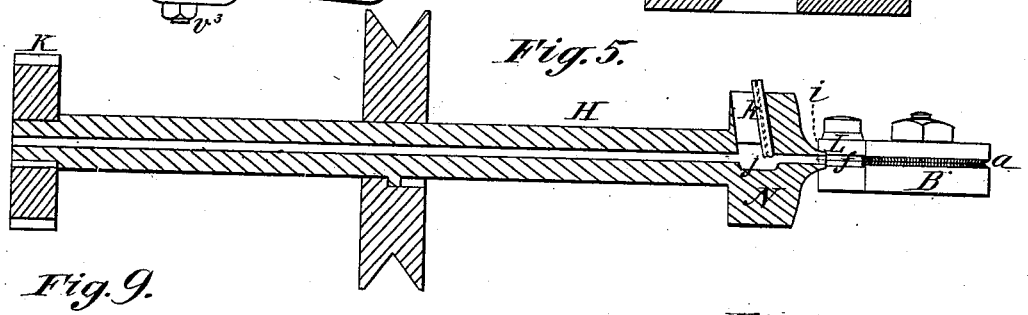


Fig. 9.

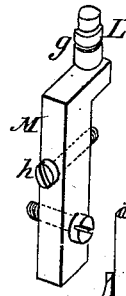


Fig. 11.

Fig. 8.

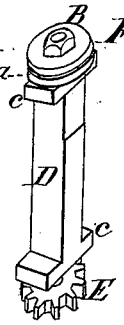


Fig. 13.

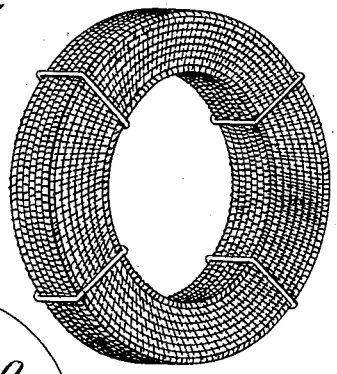


Fig. 7.

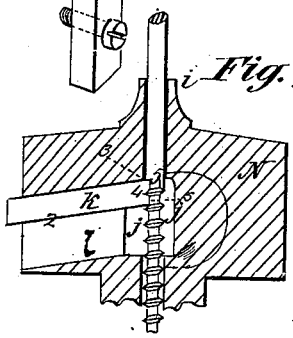
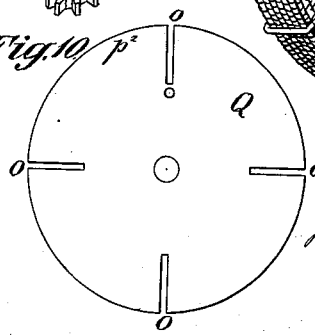


Fig. 10.



Witnesses:
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H. A. Rutherford

Inventor:
Louis Goddu,
By Johnson & Johnson
his Attorneys.

UNITED STATES PATENT OFFICE.

LOUIS GODDU, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN CABLE SCREW WIRE COMPANY, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR SCREW-THREADING WIRE.

Specification forming part of Letters Patent No. **167,760**, dated September 14, 1875; application filed August 27, 1875.

CASE A.

To all whom it may concern:

Be it known that I, LOUIS GODDU, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Manufacturing Screw-Threaded Wire for Boots and Shoes; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention is designed for manufacturing screw-threaded wire in long lengths, having a thread of slight pitch and considerable depth, as patented to Albert Van Wagenen April 6, 1875, No. 161,842, for use in machinery for uniting the soles and uppers of boots and shoes, and in which such wire is designed to draw itself into the leather when turned.

This new article of wire is produced by my machine in indefinite lengths, of any number of threads to the inch, and any depth of thread required for use in different kinds of work, and in compact coils of regular layers, so that each coil is produced from the machine in complete condition for transportation and use in machines adapted therefor.

The machine for this work consists, primarily, of a feeding, straightening, and griping device for the wire; a thread producing and finishing device; a revolving receiving and sustaining device for the threaded wire, whereby it is supported and delivered in a true line from the threader; and a coil receiving and laying device, of peculiar construction and function, in which the increasing size of the coil is compensated for to effect a uniform tension upon the wire, in relation to the threader, by means of a friction device.

A distinctive feature of the coiler consists in the means and manner of giving it a combined rotary and axial movement, whereby layer upon layer in regular planes is deposited to produce the compact coil.

The operating elements of the machine are arranged to receive the wire at one end, and deliver it in coils at the other end, and in which all the parts operate in unison from a single driving-shaft.

The feeding, straightening, and griping device for the wire, and the receiving and sustaining device are on the same plane, and the threader is carried at the end of the revolving sustaining device, and in close proximity to the griping device, for preventing all vibration and twisting of the wire while under the action of the revolving threader. This thread-cutting device is of both peculiar construction and function—in this, that the acting face of the cutter forms the thread by one corner, receives it in a recess, and occupies the space on each side of the thread, while the inner part of the cutter-edge serves the purpose of finishing the thread as it is formed and passes under the cutter, whereby the peculiar threaded wire referred to is produced.

In the accompanying drawings, Figure 1 represents a side elevation of my wire-threading machine; Fig. 2, a horizontal section, taken through the axis of the wire feeding, griping, and sustaining devices, showing the coiler device for reciprocating it in elevation; Fig. 3, a front elevation; Fig. 4, an axial section of the coiling device; Fig. 5, an enlarged section of the cutter-head, the wire receiving and sustaining hollow shaft, and the wire feeding and griping devices; Fig. 6, a cross-section of the cutter-head, showing the relation of the cutter to the wire to be threaded, on an enlarged scale; Fig. 7, a horizontal section of the same; Fig. 8, a detached view of one of the feed-rolls and its case; Fig. 9, a detached view of one of the griping-rolls and its support; Fig. 10, a face view of the coiler-disk; Fig. 11, a bottom view of the cutter; Fig. 12, a view of the griping and straightening rolls; and Fig. 13, a view of a coil of screw-threaded wire as tied and ready for the market.

The several parts of the machine are mounted in proper relation to each other upon an inverted T-shaped bed-plate, A, which has an H-shaped vertical extension at its front end to carry the feeding and griping devices. The feeding devices consist of two horizontal feed-

rolls, B, having milled grooves *a* to seize and move the wire forward. They are mounted upon two vertical shafts, C, which are supported by long bearings D, which fit into the opposite grooves or spaces *b* in the vertical front extension of the bed-plate, and are held in place by end shoulders *c*, so as to allow the feed-rolls to be adjusted nearer to or farther from each other to seize wire of varying thicknesses, such an adjustment being made by set-screws *d*, bearing upon the long boxes D of the feed-rolls, one of such set-screws, d^2, having its bearing upon an incased spiral spring, *e*, in order that one of the rolls shall have a slight yielding adjustment to allow such roll to recede slightly, and form a cushioned or elastic grasp. These rolls are revolved at equal speed by gears E E^2, intermatching at the lower ends of their shafts, and whose movement is made positive by a worm-gear, E^3, on the roll-shaft C, which has the fixed adjustment, and which is operated by a worm, F, on a shaft, G, running parallel with and geared to the cutter-shaft H, at the rear end thereof, by means of a gear-wheel, G^2. This connection is made by intermediate wheels I J and a gear, K, on the cutter-shaft, graded to the proper speed required to give a definite number of threads to the inch upon the wire. Instead of the gear-connections I J K, the feed-rolls may be driven by belt from the cutter-shaft to the worm-gear shaft.

Immediately in rear of the feed-rolls B, and between them and the cutter-head, the two griping-rolls L are arranged, the function of which is to receive the wire and grip it to prevent it turning or twisting under the action of the cutter. This is effected by providing these rolls with horizontal pins or knife-edges *f*, Fig. 12, formed within grooves *g*, round the surface of said rolls. This allows the wire, while being firmly grasped, to be moved forward in direct line from the feed-rolls; and as these grasping-blades are moved by the movement of the wire they therefore offer no friction as the wire passes between them, but simply have a line bearing centrally on opposite sides of the wire, the effect of which is to take out all slight bends or curves which may remain in the wire after passing the feed-rolls. These secondary rolls effect distinct and highly important advantages in folding and conducting the wire to the cutter-head. The revolving griping-edges *f* of the rolls are of slightly less diameter than the rolls, so that the wire is practically held at three points of bearing by each roll, viz: the edges *g g* of the grooves, which strike and bear upon the wire, and the edge of the fin or blade *f*, which occupies a central position in the grooves, enter slightly the wire, and these several bearing-points co-operate to receive and effectually prevent any turning or twisting of the wire, while these points of contact in the opposite rolls act as so many pressing-planes to make the wire perfectly straight before it enters the nose, as shown clearly in Fig. 12. These secondary rolls are very much smaller than the feed-rolls B, so as to seize the wire as soon after leaving the feed-rolls as possible. They are mounted upon arms M, pivoted to the frame-head, and are made adjustable by set-screws *h* passing through the said arm M into the frame. The wire passes from these griping-rolls immediately into a nose, *i*, projecting from the head of the cutter, and which nose *i* occupies a position almost in contact with the surfaces of the griping-rolls L, and in direct line with the feed of the wire, which enters the nose *i* through an orifice just sufficient to receive it, and to form a bearing or support to the wire just at the point of being threaded, so that the wire is fed solidly and firmly to the cutter, and can have no vibration whatever, and thereby insures a thread of uniform depth, and absolutely perfect throughout the length of the wire, which could not be done if there was the least spring or vibration of the wire. The cutter-head N is carried at the front end of the driving-shaft H, which is hollow, and through which the wire passes to the coiler. This shaft is mounted in long bearings on the frame, and which bearings are provided with lubricating-cups. The cutter-head N has a slot *j*, Fig. 6, formed therein, into which the nose-orifice opens, and the cutter *k* is inserted into a groove, 2, Fig. 7, in position to present its acting-edge to the wire the instant the latter leaves the nose-bearing, and in such position as to strike the surface of the wire midway between a line drawn horizontally and vertically through its center, (see Fig. 6,) so as to have the cutter *k* act with the best effect, and at the point where the wire leaves the nose-bearing, and consequently can have no vibration under the action of the cutter. The cutter *k* lies oblique to the wire, and its acting-edge is parallel thereto, so that the thread is cut, mainly, by the chaser-point 3, Figs. 7 and 11, while the remaining part of the knife-edge serves to support the thread, and act as a finisher therefor. For this purpose the cutter-face has a groove, 4, the counterpart of the cross-section of the thread, and there is on each side of this groove a finishing-edge, 5, so that while the cutter-groove 4 receives the formed thread and finishes its sides the body of the wire is also dressed by the parts 5, which form the double chaser, and which traverse the spaces between the threads. The knife is formed from a rectangular piece of steel of any suitable length, and has a surface-groove, 6, of a length equal to that of the cutter, and corresponding with the face-groove 4. The end of the cutter forms the chasing-point, and it is beveled obliquely back from such point, so I preserve the cutting-edge and its groove 4 by simply grinding the cutter until the cutter is used up.

It is evident that two separate chasers could be used—one to follow the other—but great inconvenience would follow this plan, for the reason that there would be two cutting-edges,

and necessarily much difficulty in maintaining the proper cutting-angle, their distance apart, and the extent of the cutting-edge.

A simple chaser might be used, but would necessarily produce a very imperfect thread as compared with my new integral chaser and finisher. The cutter is embedded in a slideway or recess, 2, at a proper angle in relation to the wire, so that as the cutter is worn away it can be set up to the wire, and always at the same angle. It is secured in its slideway 2 by a cap-plate, *l*, resting upon the body of the cutter, and clamped to the cutter-head N by a screw, l^2. The wire, after passing from the the action of the cutter, passes through the slot *j*, which is just wide enough to clear the chippings, when it again enters a solid bearing formed by the revolving hollow driving-shaft H, which prevents the threaded wire vibrating in its passage to the coiler. This coiler consists of a spool, O, mounted upon a shaft, P, secured in a suitable bearing in a standard, B^2, rising from the bed-plate, and said shaft P is at right angles to the line in which the threaded wire is carried to the spool. A detachable disk, Q, forms one side of the spool O, the shaft P of which projects far enough to allow said disk Q to be removed and replaced thereon and fastened by a screw-nut, *m*, on the end of the shaft. The surface of the spool is provided with a series of slots, *n*, parallel with its axis, and these slots are matched by slots *o* in the sides or flanges *p* p^2 of the spool, so that binding-wires can be introduced or slipped under the coil, bent over it, and tied tightly, before the coil is removed from the spooler. To allow the coil to be removed, the hub O is made slightly tapering toward the removable disk or flange p^2, so that the coil may be easily slipped off. Were it not for this construction it would be impossible to remove the coil without injuring the threads. The shaft P, upon which this spool O is mounted, has, in connection with its rotary motion, an axial motion, the object of which is to cause the spooler to have a lateral reciprocating movement equal to the width of the coil, whereby layer after layer is coiled successively in regular tiers. An automatic friction device is combined with the spooler, and consists of a disk, R, carried by a sleeve, S, through which the spooler-shaft P passes, and is secured in place by a nut, *q*, screwed upon the end of the sleeve. This nut *q* has an annular recess, q^2, on its inner face, to receive a friction-ring, *r*, which bears against a collar, r^2, screwed into the sleeve-bearing, while the face of inner friction-disk R has a constant bearing against the face of a hub, R^2, or extension of a gear-wheel, S^2, which is mounted loosely upon the sleeve S of said friction-disk R, and is turned by means of a worm-gear, T, upon the end of the counter-shaft G, which drives the feed-rolls. The spooler is connected with the friction-disk R by means of two or more pins, *s*, Fig. 4, passing through the inner spool-disk *p*, whereby the spooler is free to have an axial movement, while its rotary motion is governed by the friction device, the primary object of which is to give the spooler a self-adjusting tension upon the wire, which must always be the same whatever may be the diameter of the coil; otherwise any undue tension at any point in the revolution of the spool would crush the threads and damage them. It must be observed, however, that the spool must have a variable speed, for, at the commencement of a coil, the diameter is smaller, consequently it takes less length of wire to reach round it, and the spool must necessarily have its maximum speed, but this speed must diminish with each successive tier until the spool is full. The degree of friction required is adjusted by means of set-screws *t* in the screw-nut *q*, and which bear upon the ring *r* in the recess q^2 in said nut, and against a steel facing or collar, r^2, fixed in the frame; and the effect of the adjustment by these screws *t* is to bring the sleeve friction-disk R against the face or hub R^2 of the revolving griving-gear S^2, and the screw-nut ring *r* against the steel facing r^2, with more or less pressure, as may be desired. This pressure, however, is made yielding, by spiral springs *u* in the screw-nut *q*, which bear upon the nut-ring *r*, and receive the action of the adjusting-screws *t*, so that in effect the friction is always sufficient to cause the spooler to turn to coil the wire, and at the same time allow the spooler to slip with the friction-disk R whenever the speed of the spooler is reduced by the increasing diameter of the coil.

The screw-nut *q* of the sleeve S has a worm, T^2, cut upon its circumference, into which a gear, T^3, upon a short horizontal shaft, T^4, meshes. This short shaft T^4 passes through a bearing, T^5, in the frame, and carries at its opposite end a grooved cam, U, into which fits a roller, *u*, on the end of a bell-crank lever, V, pivoted upon an arm of the frame, and is connected by its other end by a fork to a sleeve-coupling, *v*, by a screw-bolt passing through the fork of said bell-crank lever. The sleeve-coupling *v* is secured on the outer end of the spool-shaft P between a collar, v^2, thereon and a nut, v^3, on its outer end, so that the vibration of the bell-crank lever V, by the cam U, gives to the spooler O its axial movement. This movement is produced by the cam U, which has a throw equal to the width of the coil, so that each complete revolution of the cam moves the spooler forward and back within the same limits. This cam U slips on its shaft T^4 against a shoulder, and is fastened by a thumb-screw, *x*, against said shoulder, so that the shaft T^4 will turn the cam with a positive movement. Sometimes, however, in finishing a coil of wire, the end of the coil is reached before the whole axial movement of the spooler is completed. It will be seen that in commencing the next coil it is necessary to secure the end of the wire in one of the slots *o* of the outer disk. Therefore, in order to commence to wind right, the spooler

must be carried to its extreme inward axial movement, so as to bring the outer disk Q in direct line with the wire from the revolving driving-shaft. Without some provision whereby to effect this adjustment of the spooler the machine would have to be run without any wire until the spooler was in the proper position to commence the coil. To avoid this, however, I simply unclamp the cam U from its shaft T^4, and turn it by hand, which operates the bell-crank lever V, and brings the spooler in its proper position, when I tighten the thumb-screw *x*, and the machine is ready for winding. The machine having been set in motion, the wire is fed from an ordinary roll, and is passed therefrom through a fixed guide, *y*, in front of the feed-rolls B, and entering the same is seized and fed through the griping-rolls L into the nose *i* of the revolving cutter-head N, in which the cutter is fixed, and which revolves with the shaft H round the wire, and threads it, the wire being held during such operation by the griping and feed rolls.

After passing the cutter the wire enters and passes through the driving-shaft H to the spooler O, upon which it is coiled, as before described.

All that is necessary to have one machine cut threads of different number to the inch is to alter the driving-gears to produce the right speed of the feed-rolls, and the size of the thread can be altered by changing the cutter accordingly.

I claim—

1. In a machine for cutting screw-threaded wire in indefinite lengths for use in the manufacture of boots and shoes, the combination, with the feed-rolls and a revolving cutter, of intermediate griping and straightening devices, co-operating to hold the wire and prevent it from turning or twisting while under the action of the cutter.

2. The combination, with the griping and straightening devices whereby the wire is held from turning or twisting, of a hollow nose, *i*, projecting from the cutter-head N in line centrally with the feed of the wire, and lying close to and between the griping devices, to form thereby a continuation of the holding and straightening device, and present the wire firmly for the action of the revolving cutter.

3. The griping and holding devices for the wire, consisting of rolls provided with circumferential grooves *g* and fins or blades *f*, relatively arranged to form a series of holding and pressing points or edges, between and in contact with which the wire is received from the feed-rolls.

4. The combination, with the griping-rolls, constructed substantially as herein described, of the pivoted arms M, whereby said griping devices may be adjusted as may be required to give a proper pressure upon the wire.

5. The combination, with the revolving cutter-head N and the hollow receiving-nose *i* thereof for the wire, of the cutter *k* in the slotted head, arranged to form the thread at the point where the wire leaves the nose *i* and enters the slot *j*, substantially as and for the purpose described.

6. The cutter *k*, constructed as described and shown.

7. The combination, with the feed-rolls B B, the griping device, and the revolving cutter-head, of the hollow driving-shaft H, in line with the feeding and griping devices, and forming a continuous support therefrom for the threaded wire to the spooler.

8. The feeding-rolls B, in combination with their long-shouldered boxes D, adapted to fit in the recesses *b* in the frame, and the adjusting-screws *d*, substantially as and for the purpose described.

9. The combination, with the feeding-rolls B and their shaft-carrying boxes D, of the gear-wheels E E^2 E^3 and the worm F of the counter-shaft G, whereby a definite feed of the wire is obtained.

10. The combination, with the train of gearing G^2 I J K, connecting the revolving cutter-shaft H with the counter-shaft G, of the worm F and cog-gearing E E^2 E^3 of the feed-rolls, whereby the latter are driven directly from the hollow driving-shaft.

11. The combination, with the revolving screw-cutter *k* and its hollow receiving and sustaining shaft H for the wire, of a spooler, O, having a movement at right angles to the line of the threaded wire, and adapted to receive said wire as it is delivered from the revolving cutter-shaft.

12. The combination, with the screw-cutting, wire-feeding, and delivering devices, of a spooler for the wire, having a removable end disk, Q, substantially as and for the purpose herein set forth.

13. The combination, with the screw-cutting, wire-feeding, and delivering devices, of a spooler constructed with a removable end disk, Q, and a slightly-tapering hub, O, substantially as and for the purpose herein set forth.

14. The spooler O, provided with the grooves *n* and *o* in its body and flanges, substantially as and for the purpose set forth.

15. The combination, in a spooler for receiving and coiling screw-threaded wire from a hollow cutter-shaft, of a friction device, operating automatically to regulate the speed of the spooler according to the varying diameter of the coil, substantially as herein described.

16. The combination, with the spooler and the friction-disk R, of the pins *s s*, whereby the spooler is united to the friction-disk, but is free to have an axial movement with its carrying-shaft.

17. The combination, with the spooler and the friction-disk R, of the hubbed gear-wheel S^2, the sleeve S, and worm T on the counter-shaft G, whereby the spooler receives its maximum speed, yet is independent of the positive action of the gear by reason of the friction device.

18. The combination, with the spooler and

the friction-disk R, of the friction-ring *r*, the screw-nut *q*, within which it is seated, and the adjusting-screws *t*, whereby the friction may be increased or diminished at the opposite surfaces, as described.

19. The combination, with the spooler, the hubbed driving-gear S^2 and the support for the friction-sleeve S, of a friction device having a yielding or cushioned pressure upon the friction-disk R, and ring *r*, substantially as and herein set forth.

20. The combination, with the spooler and its axially-movable shaft P, of the bell-crank device V, its operating-cam U, gear-wheel T^3, and the sleeved worm-gear T^2, whereby the spooler is moved back and forth, substantially as herein described.

21. The combination, with the screw-cutting, wire-feeding, and delivering devices, and a spooler having a compound rotary and an axial movement, of a cam, U, constructed to give said spooler and its shaft a movement equal to the width of the coil, substantially as herein set forth.

22. The combination, with the cam-driving shaft P and the spooler, of a cam, U, made fast to its shaft T^4, and unclamped therefrom by the means and for the purpose herein set forth.

In testimony that I claim the foregoing I have affixed my signature in presence of two witnesses.

LOUIS GODDU.

Witnesses:
F. O. TOBEY,
J. W. NUTTER.