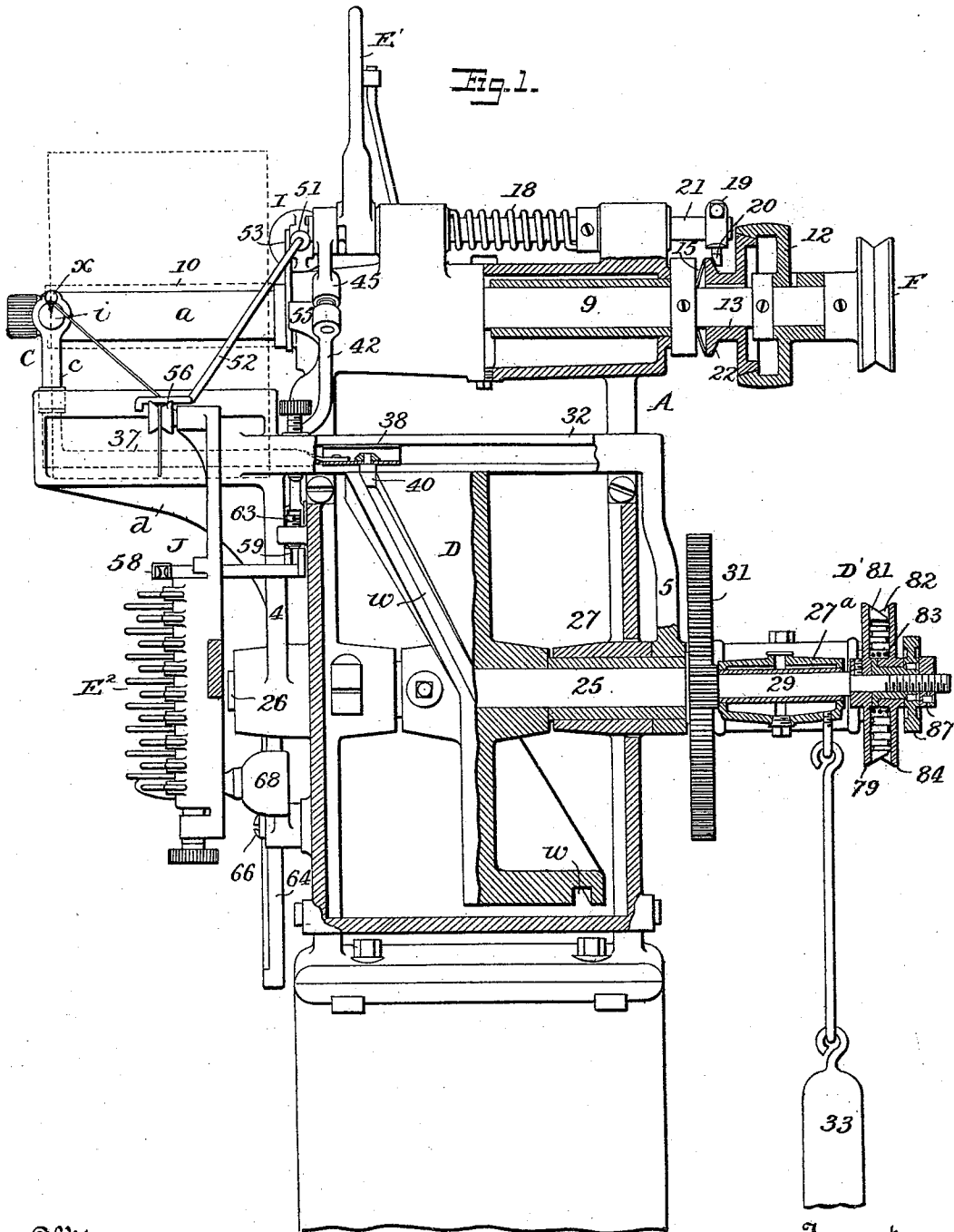


3 Sheets—Sheet 1.

No. 536,672.

Patented Apr. 2, 1895.



Witnesses

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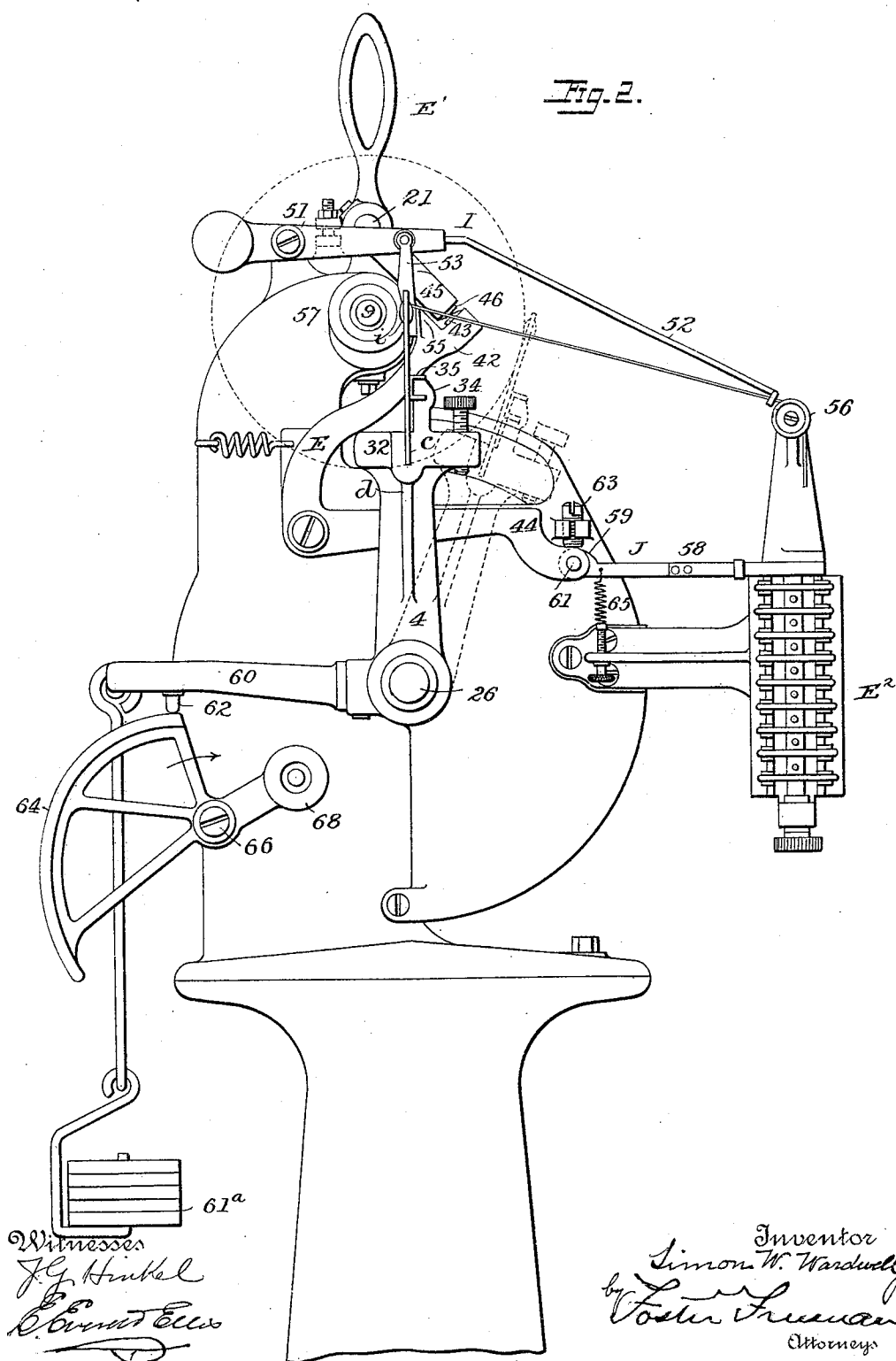
(No Model.)

3 Sheets—Sheet 2.

S. W. WARDWELL, Jr.
COP WINDING MACHINE.

No. 536,672.

Patented Apr. 2, 1895.



(No Model.)

3 Sheets—Sheet 3.

S. W. WARDWELL, Jr.
COP WINDING MACHINE.

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Fig. 3.

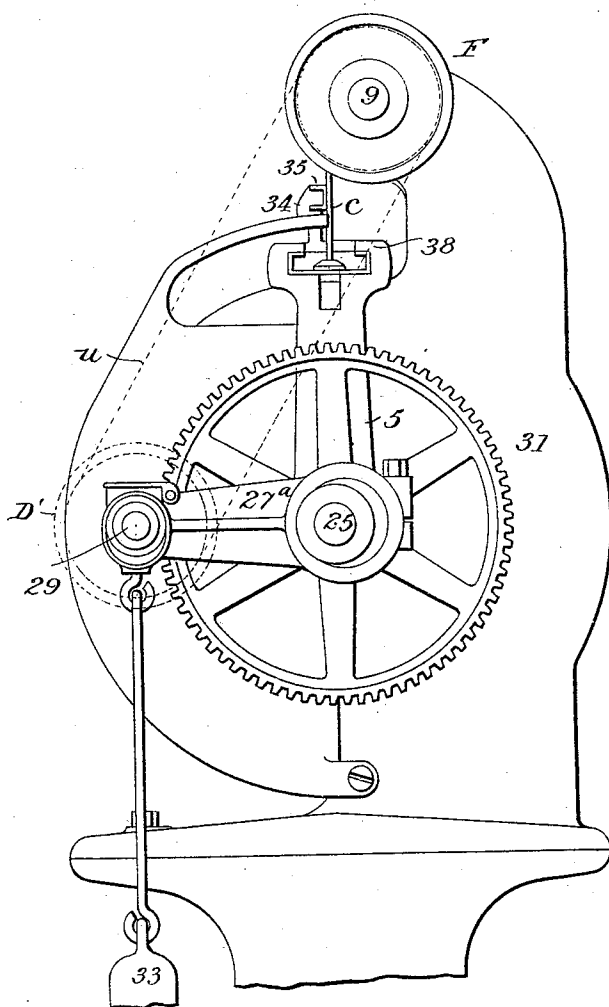
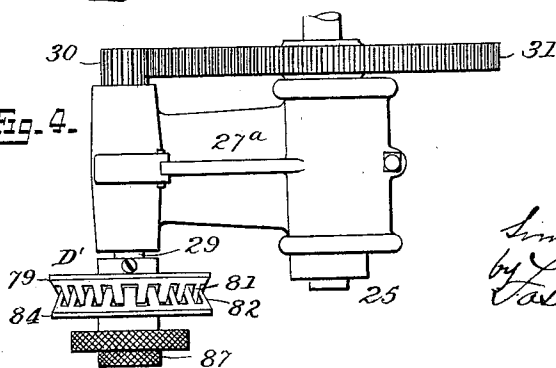


Fig. 4.



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UNITED STATES PATENT OFFICE.

SIMON W. WARDWELL, JR., OF BOSTON, MASSACHUSETTS.

COP-WINDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 536,672, dated April 2, 1895.

Application filed June 8, 1894. Serial No. 513,953. (No model.)

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, Jr., a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Cop-Winding Machines, of which the following is a specification.

My invention relates to that class of winding machines which are employed for building up cops of the character illustrated in my United States Letters Patent No. 486,745, and my invention consists in constructing the parts of the machine so as to secure greater delicacy of adjustment and operation and to generally improve the character and efficiency of the machine as fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation in part longitudinal section of a winding machine with my improvements; Fig. 2, an end view looking at the left hand end of the machine, Fig. 1; Fig. 3, an end view of the opposite end of the machine; Fig. 4, a plan view of a detached part of the machine.

The frame A is suitably constructed to support the operating parts including a spindle *a* and means for rotating it, a thread guide C, having an eye *x*, and means for reciprocating the said guide and appliances for varying the relative action of the guide and spindle so that at the end of each reciprocation the guide will occupy a different position as regards the holder or cop; that is, it will be opposite a point on the periphery of the cop back of or in advance of the point to which the guide was opposite at the previous reciprocation.

As shown, the spindle *a* is the end of the driving shaft 9 but any other suitable form of support for a holder (solid or tubular) may be used. As shown, the spindle projects from the side frame to receive a tubular holder 10.

The shaft 9 for rotating the holder is driven by a driving pulley 12 receiving a driving belt, turning loosely on the shaft 9, and having an inner beveled face to engage the outer beveled face of a clutch pulley 13 turning with but sliding on the shaft 9, the pulley 13 being pressed into engagement by a spring 15 and carried out of engagement by the down-

ward pressure of a beveled projection 20 upon an arm 19 extending from a rock shaft 21, when the said projection 20 is brought against the beveled face of a collar 22 on the pulley. A spring 18 tends to turn the shaft to throw downward the arm 19 and carry the pulleys out of engagement. A suitable detent is employed for maintaining the shaft 21 in position to keep the projection 20 out of contact with the collar 22. Thus the shaft 21 carries at one end an arm 45 with a cross shoulder 46 that engages a cross shoulder 43 upon the arm 42 of a lever E, thereby preventing the rocking of the shaft 21 under the action of the spring 18 so long as the shoulders 43, 46 are engaged. A handle E' secured to the shaft 21 serves as a means of turning it by hand.

As the guide in this class of machines must be reciprocated very rapidly, it has been found that unless the guide is very light in weight, the momentum from the rapid movement will tend to carry it out of position and interfere with that nice and regular operation which is necessary in order that the thread as it is brought to each end of the cop may be laid across one of the preceding threads with a sharp bend, and carried back at one side of said preceding thread. I therefore support the guide on a carrier frame *d*, the guide being of very thin light metal and sliding upon the frame which is of heavier material and which is pivoted or otherwise supported so that it can be carried outward as the cop increases in size, it being necessary to the formation of a cop of the character desired to maintain that portion of the guide which has the guiding eye in close contact with the cop throughout the entire series of operations of building up the cop. Thus the guide in which is the guide opening *x* consists of a thin blade of metal with an opening receiving a porcelain or other vitreous stud *z* in which is a notch coinciding with the guide opening *x*, while the frame *d* consists of an arm 4 swinging on a stud 26 at one side of the main frame, and an arm 5 swinging upon a hollow stud or sleeve 27 at the opposite side, and a cross bar 32 with a horizontal rib 34 receiving a guiding bracket secured to the guide C.

A connecting plate or rod 37 connects the lower end of the blade *c* with a slide 38, sliding in guides of the cross bar 32 and having a

stud 40 extending into the groove *w* of a cam wheel D, secured to a shaft 25 extending through the hollow bearing or sleeve 27, so that the rotation of the shaft 25 and its cam reciprocates the guide during the rotation of the spindle and holder. As the spindle and its holder must be turned generally two or more times to each reciprocation of the guide, the shaft 9 is rotated more rapidly than the shaft 25, and this is effected through the medium of suitable and intermediate gears.

As shown, a grooved pulley F upon the shaft 9 carries a belt passing to a grooved pulley D' upon a shaft 29, carried by an arm or frame 27^a swinging upon the projecting end of the shaft 25, which shaft extends into an opening arranged eccentrically on the hub of the frame, a weight 33 depressing the outer end of the said frame so as to maintain the belt *u* taut to prevent any possible slipping.

A pinion 30 on the shaft 29 gears with a toothed wheel 31 on the shaft 25, and it will be seen that by the use of interchangeable gears 30, 31 of different diameters, the spindle *a* may be caused to revolve any desired number of revolutions to each reciprocation of the guide, and an increase in the number of windings between the ends of the cop does not change the speed at which the thread is wound. As before stated, however, the spindle *a* must revolve not only a sufficient number of times to effect the desired number of winds at each rotation of the guide, but it must also have either a slightly less, or slightly greater, movement so that a point on the cop which at the end of one reciprocation of the guide is opposite the eye of the latter, shall at the end of the next reciprocation be a distance beyond or back of the eye of the guide equal to the distance between two adjacent bends following each other at the periphery of the cop. In the construction shown, I secure this result by making one of the pulleys F, D', of the belt gear an expansion pulley. As shown, the pulley D' is the expansion pulley, consisting of a disk 79 secured to the shaft 29 and having at one side beveled teeth 81, and a similar disk 84 having beveled teeth 82 interlocking with the teeth 81 with means for carrying the disks to and from each other so as to increase or decrease the diameter of the channel in which the belt lies. A spring 83 tends to separate the disks, while they may be brought together against the action of the spring, by means of a nut 87 turning upon the threaded end of the shaft.

By adjusting the disks to increase or decrease the working diameter of the pulley D', it is not only possible to secure the added or decreased movement necessary to cause the thread of one coil to be laid over that of the other, but it is also possible to secure that nice adjustment necessary to this end under variations of operations resulting from differences in the characters of the threads, and from different conditions of the same thread from variations in the atmospheric conditions.

In many instances, it is not practicable to procure cop holders or tubes that are of regular shape as they are frequently flattened at one or more parts or thicker at one end than at the other, and it has been found that when the guide is pressed against such irregular holders in building up the cop, it will move in and out with the projections and recesses are brought opposite to it and the cop will be started of an irregular shape which may have a tendency to magnify as the size of the cop increases. It has been found that this can be corrected by pressing the guide toward the cop and by permitting it to move freely outward as the size of the cop increases, and also when any projection of an irregular character is brought beneath it, but by preventing the guide from moving inward after being thus forced out by a projection, and that after the first two or three layers of thread are wound, the cop will assume a regular cylindrical form. Any suitable means may be combined with the guide for thus permitting it to move outward but preventing it from moving toward the cop after it has been moved outward to any extent; but as shown in Fig. 2, an arm 60 extends from the guide carrying frame *d*, and is provided with a stud 62 bearing upon the periphery or eccentric face of an eccentric cam 64 which is pivoted to a stud 66 and has a counter-weight 68 tending to turn the cam in the direction of the arrow so that when the frame *d* is swung outward to any extent, the cam 64 will be turned to maintain its bearing with the stud 62, thereby preventing the frame from swinging inward again. The arm 60 is suitably weighted by a weight 61^a hung thereto. As the frame *d* swings on the same axis as that of the cam, the relative positions of the cam and stud 40 are not materially altered when the frame swings back.

The thread passes from the tension device E² over a guide pulley 56 to the eye of the guide C, and to arrest the motion of the machine if the thread should break, a stop actuating device I of suitable construction is used. As shown the said stop actuating device consists of a lever 51 having a long arm 52 extending outward and bearing upon the thread adjacent to the guide roll 56. To the lever 51 is hung a wedge 53 with an inclined face bearing at one side upon a stud 57 on the frame, and at the other upon a lug 55 on the arm 42 of the lever E. If the thread breaks the long arm of the stop lever swings downward and the wedge forces away the arm 42 of the lever E to carry the shoulders 43, 46 out of contact when the shaft 21 will be turned by the spring 18, and the clutch device will be unlocked, stopping the machine. It is desirable in many instances to prevent knotted threads from being wound onto the cop, and a knot-catcher J is therefore provided to operate in connection with the stop device to arrest the motion of the machine whenever a knot approaches the guide. The knot-catcher may be of any suitable character, as shown. It consists of

a lever 58, pivoted to a pin 61 at the end of the arm 44 of the lever E and having at the opposite end a fork or notch through which the thread passes toward the pulley 56. At the pivoted end of the lever 58 is a cam 59, which bears against a bearing, as a set screw 63 extending through a stud on the frame of the machine, and an adjustable spring 65 tends to hold the lever 58 against any suitable bearing. When a knot upon the thread is brought against the lower edge of the lever 58, the latter is lifted, and the cam 59 bearing on the screw 63 depresses the end of the arm 44 of the lever E, rocking the latter and carrying the shoulder 43 away from the shoulder 46 so that the stop motion is put into operation to arrest the movements of the machine.

Without limiting myself to the precise construction and arrangement of parts shown, I claim as my invention—

1. The combination with the holder of a cop winding machine, of a reciprocating guide, a frame supporting said guide and supported to swing with the guide from the holder as the cop increases in size and means for positively reciprocating the guide upon the frame and means for positively driving the holder, substantially as described.

2. The combination of the rotating spindle, a frame supported to swing to and from the axis of the spindle, and a thread guide supported upon said swinging frame, and means for reciprocating said guide upon said frame, substantially as set forth.

3. The combination in a cop winding machine of a rotating spindle, a frame supported to swing from the axis of the spindle, a thread guide consisting of a plate provided with an eye and means for moving the guide upon the frame parallel to the axis of the spindle, and means for swinging the frame to maintain the guide in contact with the cop as the latter is wound, substantially as set forth.

4. The combination of the rotating spindle, a frame supported to swing to and from the axis of the spindle, a guide carried by the frame, and a rotating cam for operating said guide to reciprocate it upon said frame with its axis coinciding with the axis of the frame, substantially as set forth.

5. The combination with a swinging frame carrying the reciprocating guide, means for swinging the frame to maintain the guide in contact with the cop being wound, an eccentric cam bearing upon the frame, and means for turning the cam to limit the forward movement of the frame, during the winding of the cop, substantially as set forth.

6. The combination with the shaft for driving the cop-holder, the reciprocating guide supported to move in constant contact with the cop, and the shaft 29 for operating the reciprocating guide, of pulleys upon said shafts, one of said pulleys being an expansion pulley, means for setting the parts of the expansion pulley fixedly in different positions, and a belt passing around said pulleys, substantially as set forth.

7. The combination of the cop driving shaft and the pulley thereon, the guide, and devices including a shaft 29 for operating said guide, and a movable frame or bracket carrying said shaft 29, a pulley upon said shaft, and a belt passing around the pulleys on the cop driving shaft and on the shaft 29, one of the said pulleys being an expansion pulley, for the purpose set forth.

8. The combination with the cop driving shaft, and its pulley, of a shaft 29 carrying a pulley, a belt passing around both pulleys, a swinging arm or frame carrying the shaft 29, a guide, and cam for reciprocating the latter, and gears between the cam shaft and shaft 29, and means for securing an increment of movement of the cop shaft in respect to the guide, substantially as set forth.

9. The combination with the reciprocating guide, its operating cam and shaft, of a shaft 29, a movable supporting frame for the shaft 29, removable gears between the cam shaft and shaft 29, a cop driving shaft, and means for driving the shaft 29 from the cop driving shaft, substantially as set forth.

10. The combination of the frame of the machine having a bearing, a cop driving shaft, driving wheel and clutch device, a shaft 21 and devices connected therewith for operating the clutch device, a spring adapted to turn the shaft 21 in one direction, arms 42, 45 having contacting shoulders for holding the clutch operating devices out of action, a projection on the arm 42, an arm arranged to bear upon the thread to be supported thereby, and a wedge 53 carried by said arm, and extending between the bearing on the frame and the projection on the arm 42, substantially as set forth.

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

SIMON W. WARDWELL, JR.

Witnesses:

PHILIP E. BRADY,
CARL CHRISTENSEN.