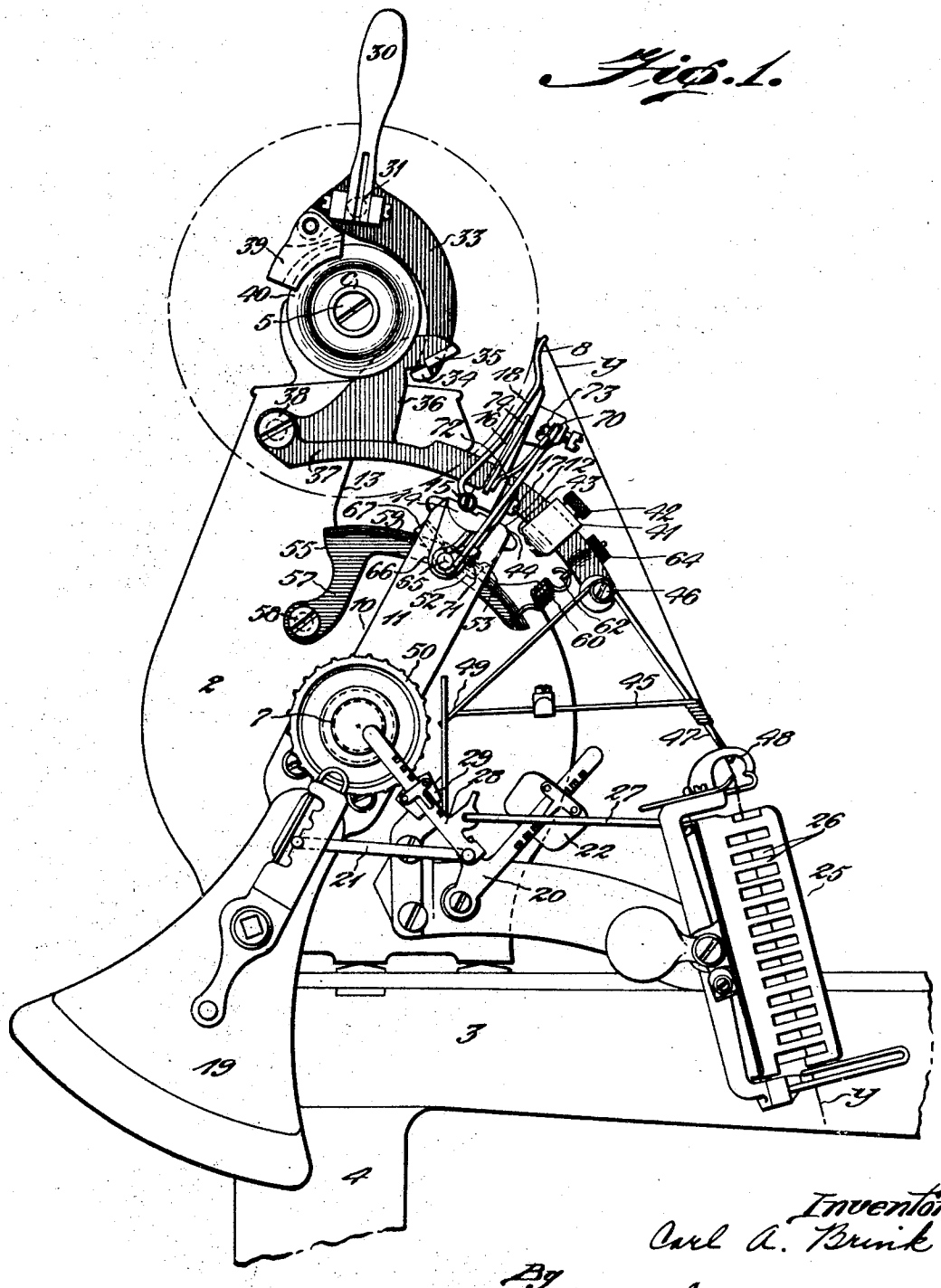
April 7, 1931. C. A. BRINK 1,799,153

WINDING MACHINE

Filed Jan. 4, 1928 2 Sheets-Sheet 1

Fig. 1.



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Filed Jan. 4, 1928 2 Sheets-Sheet 2

Fig. 2.

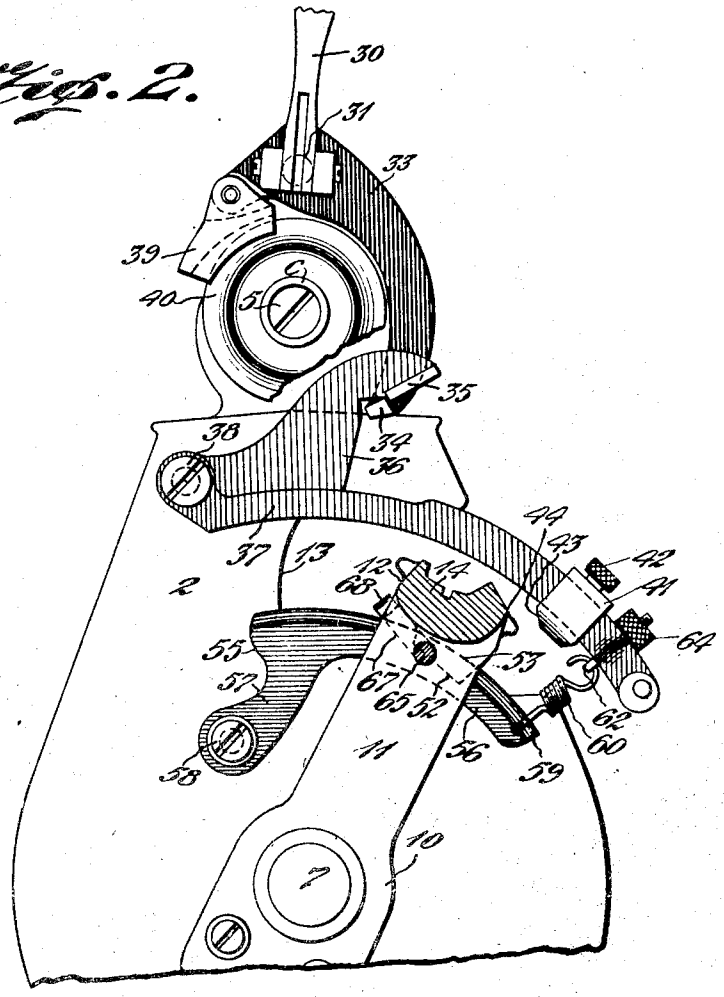


Fig. 3.

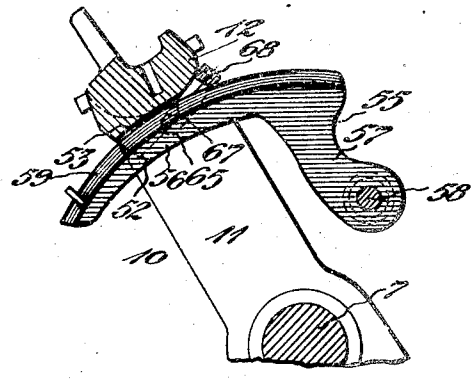
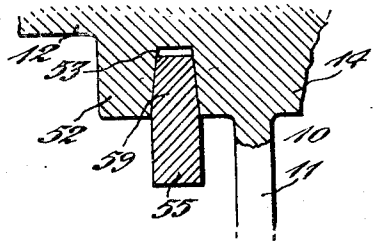


Fig. 4.



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UNITED STATES PATENT OFFICE

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WINDING MACHINE

Application filed January 4, 1928. Serial No. 244,527.

This invention relates to improvements in winding machines for winding cops, cones or packages of yarn, thread and other strand material. The present improvement is directed particularly to winding machines of that type wherein the cop, cone or package is wound on a rotating spindle with the yarn or other strand traversed longitudinally thereof by a thread-guide which bears against the surface of the winding to direct the strand thereto and which recedes from the winding-spindle as the winding increases in diameter.

A principal object of the present invention is to provide a machine of the type specified having improved means for controlling the separation of the thread-guide and winding-spindle during the winding operation.

A particular object of the invention is to provide an improved dogging-device for this purpose which permits outward movement of the thread-guide with respect to the winding-spindle and holds the guide from moving toward the spindle to restrain it from jumping or vibrating during the winding operation.

Another object of the invention is to provide a dogging-device which is simple in construction, proof against derangement or getting out of order and more efficient in action than similar devices now in use.

Further objects of the improvement are set forth in the following specification which describes a preferred embodiment of the invention as illustrated by the accompanying drawings. In the drawings:

Fig. 1 is a front elevation of a conventional type of winding machine showing the present invention as applied to use therewith;

Fig. 2 is an enlarged view of a portion of the machine showing it with certain of the parts removed to illustrate the present improved dogging-device;

Fig. 3 is an enlarged view showing a portion of the traverse-frame of the machine and illustrating the dogging-device in cooperative relation therewith; and

Fig. 4 is a further enlarged detail view showing a portion of the traverse-frame in section to illustrate the wedging engagement of the dogging-device therewith.

The machine illustrated in the present drawings is of a well known type comprising the essential elements of a rotating winding-spindle, a reciprocating thread-guide for traversing the strand material longitudinally of the spindle, and a swinging traverse-frame which carries the thread-guide to adapt it to bear against the winding and to recede from the spindle as the cop, cone or package is built up thereon. In the drawings, 2 designates the main frame of the winding-head or unit and 3 the bed or table on which a plurality of the units may be mounted and supported from the floor by means of suitable legs 4. The winding-spindle 5 is rotatively journalled in bearings at the top of the frame 2 and driven from a belt-pulley or other suitable power-operated driving-means not herein shown. The winding-spindle 5 may be of usual form for receiving a cylindrical paper cop-tube *c* on which the package is to be wound, or it may carry a cone-holder for supporting a conical cop-tube.

A cam-shaft 7 is journalled in lower bearings in the frame 2 extending parallel with the winding-spindle 5 and connected to be driven therewith by suitable means such as pulleys and gearing not herein shown. The cam-shaft 7 carries a helical cam of usual type, not herein shown, which is connected to reciprocate the thread-guide 8 to be later described.

The thread-guide 8 is carried on a swinging traverse-frame 10 which is supported from suitable arms 11 pivoted on the cam-shaft 7. Only the forward arm 11 of the traverse-frame 10 is shown in the present drawings, it being understood that a horizontal cross-bar 12 extends rearwardly from this arm through an opening 13 in the frame 2 to a second arm of the same form. Overhanging the front of the frame 10 and forming an extension of the cross-bar 12 is a horizontal portion or rest 14 which is slotted to form a bearing for the reciprocable traverse-bar 15. The traverse-bar 15 is thus mounted to slide in guideways extending parallel with the axis of the winding-spindle 5, being held therein beneath the lower edge of a traverse-frame back 16. The traverse-frame back 16 is usually made as a separate part and se-

cured to the overhanging portion 14 of the traverse-frame 10 by means of screws 17. The upper portion of the traverse-frame back 16 has a relatively flat face 18 which forms a rest or bearing for the upper end of the thread-guide 8. The thread-guide 8 as herein shown comprises a sheet-metal arm having its lower end attached to the traverse-bar 15 and formed with a curved head at its upper end provided with a slot or groove through which the strand *y* of yarn, thread or other material feeds.

The traverse-frame 10 is counterbalanced by a depending weighted arm 19 which normally tends to swing the upper part of the frame towards the winding-spindle to hold the thread-guide 8 pressed against the surface of the winding. As herein shown, the traverse-frame 10 is also influenced to hold the thread-guide against the winding by the action of a differential-pressure device of well known construction. The differential-pressure device comprises a pivoted arm or lever 20 connected to be swung from the traverse-frame 10 through the intermediary of a link 21. The lever 20 carries an adjustable weight 22 which exerts a pressure to resist the movement of the traverse-frame 10 and the force of the weight is gradually diminished as the frame is swung outwardly with the thread-guide during the building of the cop or package on the winding-spindle.

Tension is applied to the strand *y* of yarn or other material as it feeds from its source of supply to the thread-guide 8, and for this purpose the usual grid or finger tension-device shown at 25 may be employed. Such a form of tension-device comprises two opposite plates or grids 26, one fixed and the other hinged to swing with respect thereto, and as herein shown the swinging grid is pressed toward the fixed grid through the medium of a link 27 connecting it to a pivoted lever 28. The lever 28 carries an adjustable weight 29 and is pivoted to the pressure-lever 20. The tension-lever 28 is thus caused to act in a manner similar to that of the pressure-lever 20 to gradually diminish the pressure on the swinging tension plate 26 so that the tension on the strand is relieved as the thread-guide 8 recedes from the winding-spindle with the growth of the winding. This relief of tension on the strand and pressure of the thread-guide against the winding is designed for a purpose as next explained. As the cop or package increases in diameter the lineal speed of the strand is increased so that the applied tension would become too great unless controlled as by the means described. Furthermore, it is of advantage to decrease the pressure of the thread-guide against the winding as the cop increases in diameter to avoid the tendency of the ends of the cop or package to bulge.

The operation of the winding-machine is controlled by a starting-lever or handle 30 mounted on a rockable rod 31 held in bearings at the top of the frame 2. The rearward end of the rod 31 carries means, not herein shown, for operating a clutch-device or other instrumentalities which control the application of power to start or arrest the rotation of the spindle 5 and the parts connected to be driven therewith. The starting-handle 30 is normally rocked into the position illustrated in Fig. 1 of the drawings to start the operation of the machine and is held in this relation by detent-means as next described. Extending downwardly from the handle 30 is a curved arm 33 provided with a detent-shoulder or lock 34 at its lower end. The lock 34 is adapted to engage with an opposite shoulder or latch 35 carried on the upwardly projecting arm 36 of a quadrant-like lever 37. The lever or quadrant 37 is pivoted on a screw 38 screwed into the side of the frame 2 with its curved portion extending outwardly therefrom in concentric relation with respect to the axis of the cam-shaft 7. The latch 35 is normally held engaged with the lock 34 by the weight of the lever or quadrant 37 and by raising the outer end of the quadrant the latch may be disengaged to release the lock 34 whereby the starting-lever is permitted to rock under the action of a spring or other suitable means, not herein shown, whereby to effect the disconnection of the driving-means previously referred to. The starting-handle 30 carries a brake-shoe 39 which, when the handle is rocked as last explained, engages with a tapered brake disk 40 on the spindle 5 to bring the latter to a quick stop.

The release of the detent-means to arrest the operation of the machine may be effected automatically by instrumentalities as next described. Adjustable along the quadrant 37 is a stop-member 41 which may be set in position to make contact with the traverse-frame 10 after the thread-guide has moved outwardly from the winding-spindle 5 to a predetermined extent. The stop 41 is secured in its adjusted position by means of a set-screw 42 and its lower edge is beveled off at 43 whereby when the rounded edge 44 of the cross-bar 12 on the traverse-frame 10 engages therewith it will act to lift the lever or quadrant 37 to release the detents in the manner as before explained. Through this arrangement the adjustable stop 41 is operated to release the detents to arrest the operation of the winding machine at a point when the package has reached the desired diameter, the stopping-means thus acting automatically to determine the size of the package and to facilitate the winding of any number of packages of uniform size or diameter.

The winding mechanism may also be operated automatically upon the breakage or exhaustion of the yarn or other material feeding to the machine. The release of the

detents to arrest the operation of the machine for this purpose is effected through the action of a pivoted stop-lever or drop-wire 45 which is normally held suspended from the feeding strand *y*. As herein illustrated the stop-lever 45 consists of a triangular bar or wire having its upper end pivoted on a screw 46 fastened in the end of the quadrant 37. The lever 45 has an arm 47 reaching downwardly toward the tension-device 25 and provided at its end with a cross-bar or finger 48 which normally rests across the strand *y* as it leads from the tension-device to the thread-guide 8. Another leg 49 of the stop-lever 45 reaches back toward the cam-shaft 7 with its end adapted to engage with the toothed periphery of a stop-wheel 50 which rotates with the cam-shaft. When the finger 48 on the lever 45 is released by the breakage or running out of the strand *y* the leg 49 of the lever 45 will be carried back against the rim of the wheel 50 under the action of gravity and, through its engagement with the teeth on the wheel, will be forced upwardly to lift the quadrant 37 to release the detent lock in the manner and for the purpose as previously explained.

It has been explained that the traverse-frame 10 comprises a cross-bar 12 extending longitudinally between its two arms 11, and on the rearward side of the forward arm the bar is formed with a thickened portion or lug 52, see Figs. 2, 3 and 4, through which is milled a tapered slot or groove 53. The present improved dogging-device operates on the traverse-frame through the means of this slot 53 and in its preferred form comprises a sickle-shaped lever or dog 55. The dog proper is constituted by an arcuate strip or quadrant 56 supported by the arm 57 which is pivoted on a screw 58 screwed into the side of the frame 2. The upper curved edge 59 of the dog 55 is normally held substantially concentric with the axis of the cam-shaft 7 on which the traverse-frame 10 pivots and both sides of this edge are beveled off as shown in Fig. 4 to adapt it to wedge snugly within the tapered slot 53 in the lug 52 on the under side of the cross-bar of the traverse-frame 10. The dog 55 is caused to make a wedging engagement with the slot 53 in the traverse-frame 10 under the action of a spring 60, see Figs. 1 and 2. One end of the spring 60 is hooked through the outer free end of the dog 55 and its opposite end engaged through an eye 62 projecting through the end of the quadrant 37 and fastened in place by a thumb-nut 64.

To release the dog 55 from its wedging action on the traverse-frame 10 manually-operated means are provided as next described. A rod 65 extends through a bearing in a lug 66 depending from the overhanging portion 14 of the traverse-frame 10 and projects through a second bearing in the forward arm 11 of the frame. At its rearward end the rod 65 is bent into a crank-arm 67, see Figs. 2 and 3, with its right-angled end 68 projecting across the upper edge of the dog 55. On the forward end of the rod 65 is a sheet-metal lever 70 clamped to the rod by means of a screw 71, see Fig. 1. A leaf-spring 72, fastened to the top of the lever 70 by a screw 73, extends downwardly to bear against a flat fin 74 projecting from the end of the traverse-frame back 16. The lever 70 may be operated by pressing it toward the fin 74, for instance by pinching these two parts together, whereby to rock the rod 65 to cause its crank-arm 67 to swing the dog 55 on its pivot to release its frictional grip in the groove 53 of the traverse-frame 10. The method of operation of the dogging-device during the operation of the winding machine is as follows:

The machine is prepared for winding by placing a cop-tube *c* on the winding-spindle or mandrel 5 and leading the strand *y* of yarn or other material up through the tension-device 25, thence through the groove in the thread-guide 8 and attaching its end to the spindle. The thread-guide 8 is placed in operative position bearing against the surface of the cop-tube *c* by pressing the dog-lever 70 to release the dog 55 from its grip on the traverse-frame 10 and swinging the frame back. After the thread-guide has been placed in contact with the surface of the cop-tube the dog-lever 70 is released and the spring 60 will cause the beveled edge 59 of the dog to be carried into wedging engagement with the sides of the slot 53 in the traverse-frame 10.

The winding operation is started by rocking the handle or stopping-lever 30 into the position shown in Fig. 1 to engage its lock 34 with the latch 35 on the quadrant or lever 37, it being understood that normally the lock 34 rests on the lower flat side of the latch 35 so that when it is swung downwardly it will slide therealong to engage with the shoulder at the end of the latch. With the starting-lever 30 locked in this position the clutch or other power-controlling instrumentalities will be maintained operative to cause the machine to be driven from the belt-pulley or other transmission means on the spindle 5. The winding-spindle 5 is therefore rotated continuously and the cam-shaft 7 driven therewith to cause the machine to function to wind the material onto the spindle while the thread-guide 8 is being reciprocated from the traverse-bar 15. The strand *y* of yarn or other material is thus caused to be traversed longitudinally of the winding-spindle as it is directed thereto by the thread-guide 8 and laid on the cop-tube in a series of helical turns. As the layers of yarn or other material build up on the cop-tube *c* the thread-guide 8 is forced outwardly away from the

winding-spindle 5 with the traverse-frame 10 swinging on the axis of the cam-shaft 7.

As the traverse-frame 10 moves outwardly from the winding-spindle it meets no resistance from the frictional action of the dog 55 since the outer end of the dog is held resiliently by the spring 60. Any tendency to move the traverse-frame 10 back in the opposite direction, however, is resisted by the frictional wedging action of the dog 55 due to its inner end being held positively on its pivot 58. The outward movement of the traverse-frame 10 is thus controlled to prevent its retrogressive action so that the thread-guide will have a smooth, uniform receding motion without any tendency to jump and vibrate due to irregularities on the surface of the winding. That is to say, when the thread-guide is once forced outwardly, for instance, by a high point on the surface of the winding caused by the coils or other inequalities it is restrained from moving back again so that jumping and vibration are prevented. As the thread-guide moves outwardly from the winding-spindle with the growth of the package the differential-pressure mechanism operates in the manner as before explained to gradually diminish the resistance to this movement, and concurrently therewith the tension on the strand is relieved for the purpose as previously explained. When the cop or package reaches the desired diameter the traverse-frame 10 engages the stop-member 41 to lift the quadrant 37 to release the detents and the starting-lever 30 is then caused to act to throw the clutch or other device to arrest the operation of the whole machine. Likewise, when the strand breaks or its supply becomes exhausted the stop-lever 45 is released to cause it to be engaged by the stop-wheel 50 to raise the quadrant 37 and release the detents to effect the stopping of the machine.

It will be observed that in the present improved construction of the winding machine the dogging-lever acts directly on the traverse-frame 10 without the use of any intermediary elements. This renders the action of the dog positive and more efficient for the purpose explained and further prevents it from reacting on the other parts of the machine, for example the stopping-devices. Heretofore it has been a common practice to employ a dog carried by the traverse-frame and arranged to act against the curved detent-lever or quadrant 37 which controls the stopping of the machine. With this previous form of construction it has been the experience that the pressure of the dog under the vibration of the machine or from its sticking or binding on the quadrant would sometimes cause unwarranted release of the detents and thus prematurely arrest the operation of the machine. With the present improvement such accidental stopping of the machine is prevented and the dog rendered more efficient in action and less liable to derangement or getting out of order. Moreover, in the present construction the dogging-mechanism is reduced to the utmost simplicity and rendered more economical to manufacture and assemble on the machine without expert fitting or adjustment.

As another feature of the improvement, it will be observed that when the detent-member or quadrant 37 is lifted by the action of the wheel 50 on the stop-lever 45 to effect the stopping of the winding operation, it will have no effect to release the dog 55. That is to say, it will tend to press the dog 55 into firmer engagement with the tapered slot or groove 53 in the traverse-frame 10 so that the latter is still held fixedly to maintain the guide in proper relation with the surface of the winding. In previous constructions, the dog is released when the detent-mechanism acts to effect the stopping of the winding operation and this allows the traverse-frame to move and in some cases causes the guide to jump away from the surface of the winding. When this occurs the operator must replace the guide in contact with the winding before starting the machine and the need for such manual adjustment of the parts is eliminated with the present improved construction of the dogging means.

While the present improvement is herein shown and described in its preferred form it is to be understood that various modifications may be made in the structure and arrangement of the parts of the device and in the mechanism of the machine on which it is used without departing from the spirit or scope of the invention.

Therefore, without limitation in this respect, I claim:

1. In a winding machine, the combination of a winding-spindle and a thread-guide adapted to be traversed one in relation to the other, a movable member for supporting one of said elements to adapt it to recede from the other element as the winding is built up on the spindle, said member provided with opposite converging faces, a dog having corresponding opposite converging faces engaging frictionally with the converging faces of said member to restrain it from movement in one direction, and manually-operable means for releasing the dog from engagement with said member.

2. In a winding machine, the combination of a rotatable winding-spindle, a reciprocable thread-guide, a movable frame for supporting one of said elements to adapt it to recede from the other element during the growth in the winding, said frame provided with opposite converging faces, a dog having corresponding converging faces adapted to frictionally engage with the converging faces of the frame to resist its movement in

one direction while permitting it to move in the opposite direction, and means for maintaining said dog in frictional engagement with the frame.

3. In a winding machine, the combination of a rotatable winding-spindle, a reciprocable thread-guide, a movable frame for supporting one of said elements to adapt it to recede from the other element during the growth in the winding, said frame provided with opposite converging faces, a dog having corresponding opposite converging faces adapted to frictionally wedge against the converging faces of the frame to resist its movement in one direction, resilient means for maintaining said dog in frictional engagement with the frame, and manually-operable means for releasing the dog from engagement with the frame.

4. In a winding machine, the combination of a rotatable winding-spindle, a reciprocable thread-guide, a movable frame for supporting one of said elements to adapt it to recede from the other element during the growth in the winding, said frame provided with opposite converging faces, a dog having corresponding opposite converging faces adapted to engage the converging faces of the frame to resist its movement in one direction, a crank-arm adapted to be rocked to disengage the dog from the frame, and manually-operable means for rocking the crank-arm.

5. In a winding machine, the combination of a rotatable winding-spindle, a reciprocable thread-guide, a swinging traverse-frame for supporting one of said elements to adapt it to recede from the other element during the growth in the winding, said frame formed with opposite converging faces, an arcuate dog arranged substantially concentric with the axis on which the frame swings and provided with a tapered portion engaging the converging faces on the frame, and means for holding the dog in frictional engagement with the frame to resist the movement of the latter in one direction.

6. In a winding machine, the combination of a rotatable winding-spindle, a reciprocable thread-guide, a swinging traverse-frame for supporting the thread-guide to adapt it to recede from the winding-spindle during the growth in the winding, said frame formed with a tapered groove, an arcuate dog mounted on a fixed pivot and having a tapered portion adapted to engage the tapered groove in the frame, and resilient means for operating said dog to cause it to frictionally engage with the groove in the frame to resist the movement of the latter whereby to prevent the thread-guide from moving toward the winding-spindle.

7. In a winding machine, the combination of a rotatable winding spindle and a reciprocable thread-guide, a swinging frame for supporting the thread-guide to adapt it to recede from the winding-spindle as the winding is built up thereon, a quadrant arranged substantially concentric with the axis on which the frame swings having wedge-shaped means for frictionally engaging the frame to resist the movement of the thread-guide toward the winding spindle, yieldable means for holding the quadrant in engagement with the frame, and manually-operable means on the frame for releasing the quadrant from engagement therewith to allow the thread-guide to be moved toward the winding-spindle.

8. In a winding machine, the combination of a rotatable winding-spindle, a reciprocable thread-guide, a traverse-frame for supporting said thread-guide to adapt it to recede from the winding-spindle, said frame formed with a tapered groove, a dog having a tapered portion adapted to engage the tapered groove in the frame, resilient means for maintaining said dog in frictional engagement with the groove in the frame, and manually-operable means for releasing the dog from engagement with the frame.

9. In a winding machine, the combination of a frame, a winding-spindle rotatably journaled in said frame, a traverse-frame hinged on the first frame to adapt it to move toward and away from the winding-spindle, a reciprocable thread-guide carried by said traverse-frame, a dog pivoted on the first frame and having an arcuate face engageable with the traverse-frame, means for maintaining said dog in frictional engagement with the traverse-frame to resist the movement of the latter toward the winding-spindle, and manually-operable means on the traverse-frame for releasing the dog from engagement therewith to allow the thread-guide to be moved toward the winding-spindle.

10. In a winding machine, the combination of a main frame, a winding-spindle rotatable in bearings in said frame, a reciprocable thread-guide, a movable traverse-frame for supporting the thread-guide to adapt it to recede from the winding-spindle with the growth in the winding, a dog pivoted on the main frame to adapt it to frictionally engage the traverse frame to resist its movement toward the winding-spindle, a crank-arm pivoted on the traverse frame to adapt it to operate the dog to release it from engagement with the traverse-frame, and a manually-operable lever for rocking the crank-arm.

In testimony whereof I hereunto affix my signature.

CARL A. BRINK.