Jan. 8, 1935. A. L. ROSENMUND 1,987,079

WIRE SPOOLING MACHINE

Filed Feb. 21, 1931 6 Sheets-Sheet 1

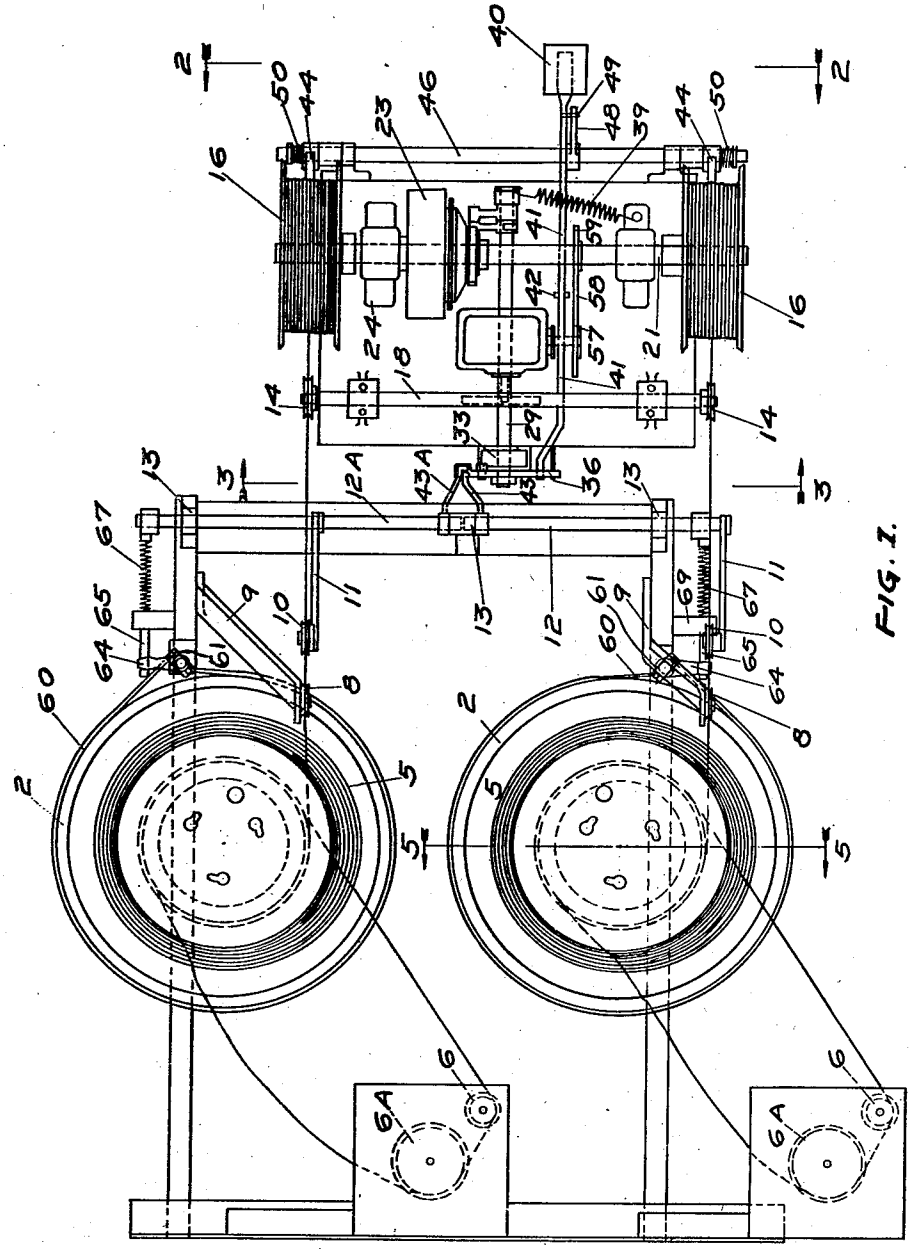


FIG. 1.

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WIRE SPOOLING MACHINE

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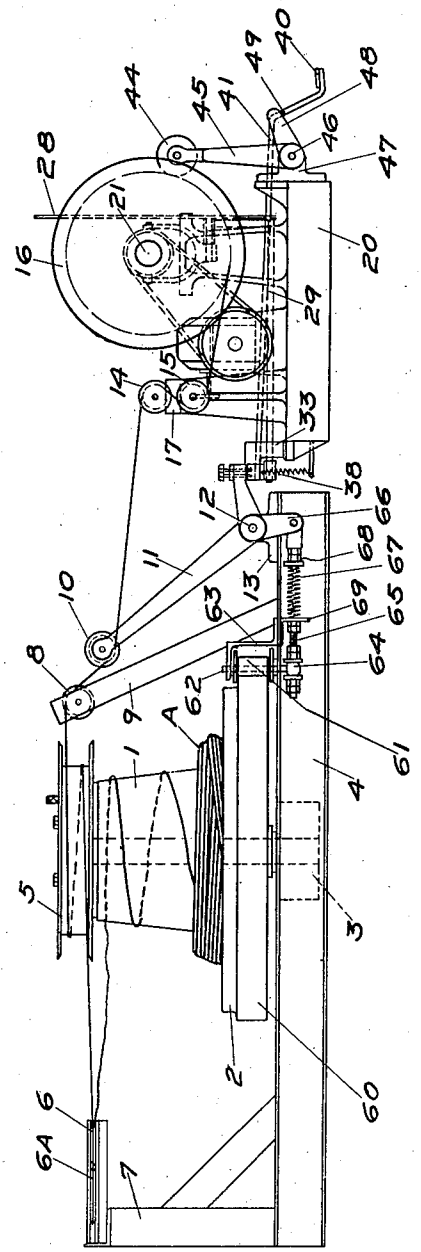


FIG. 2.

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WIRE SPOOLING MACHINE

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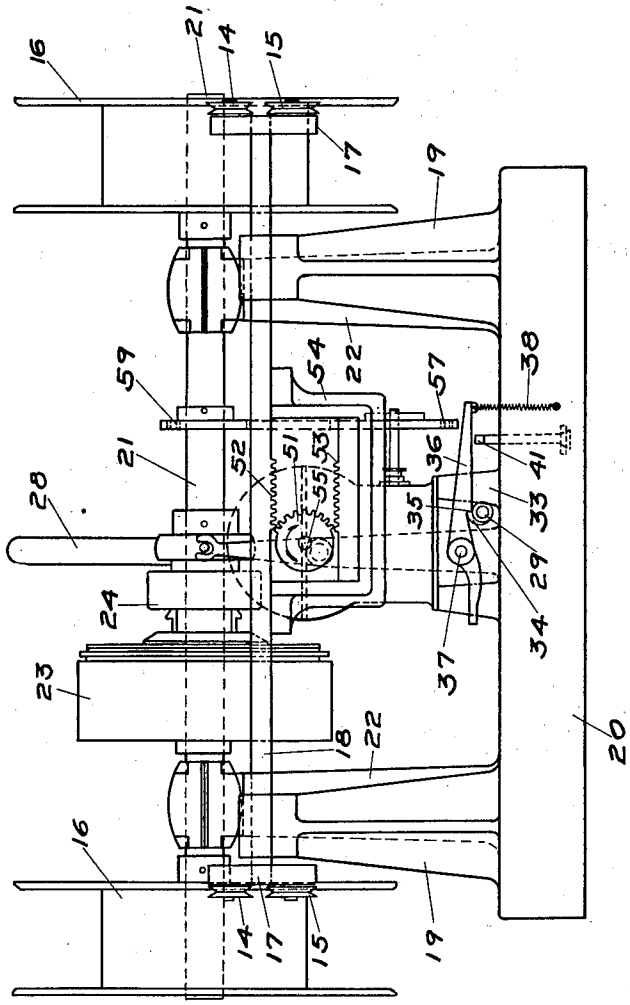


FIG. 3.

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WIRE SPOOLING MACHINE

Filed Feb. 21, 1931 6 Sheets-Sheet 4

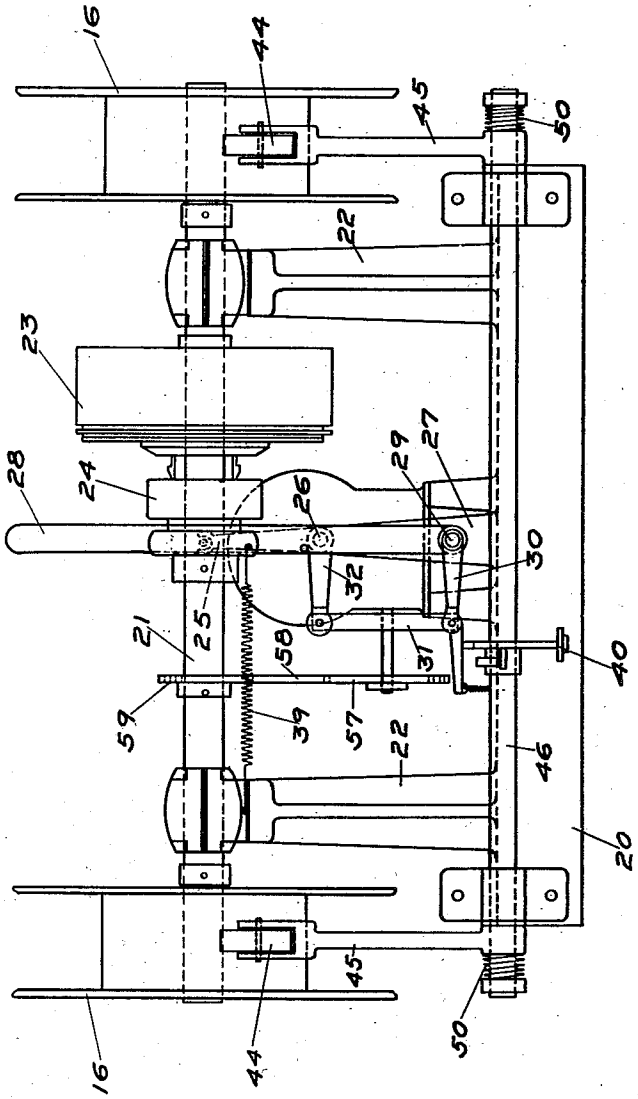


FIG. 4

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WIRE SPOOLING MACHINE

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FIG. 10.

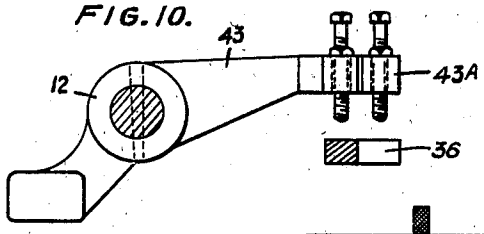
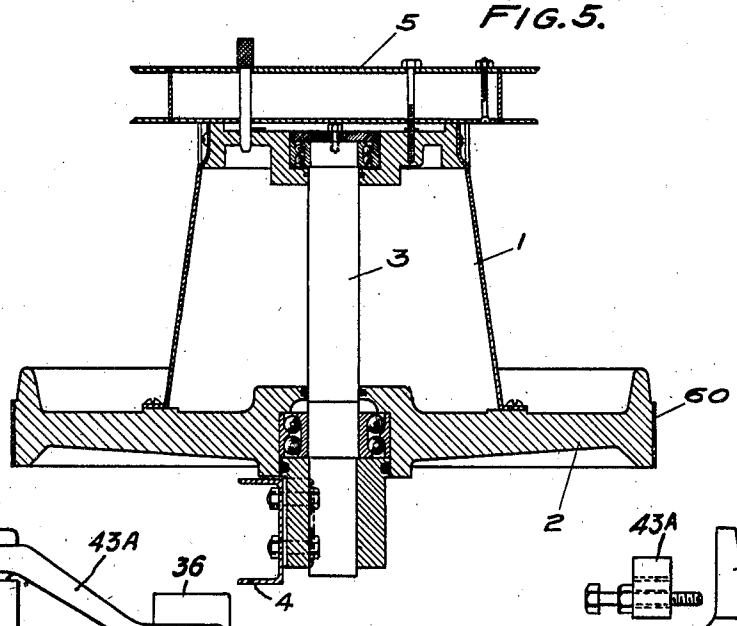


FIG. 5.



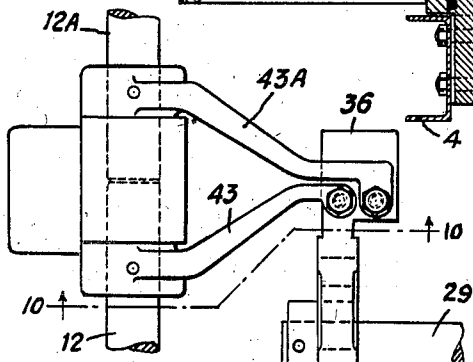


FIG. 8.

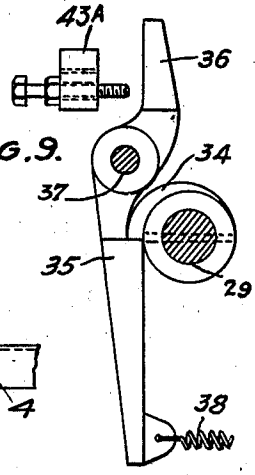


FIG. 9.

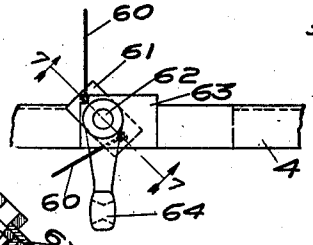


FIG. 6

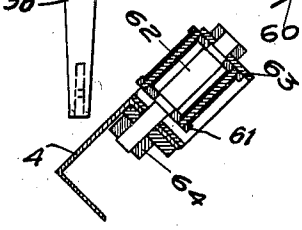


FIG. 7.

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WIRE SPOOLING MACHINE

Filed Feb. 21, 1931 6 Sheets-Sheet 6

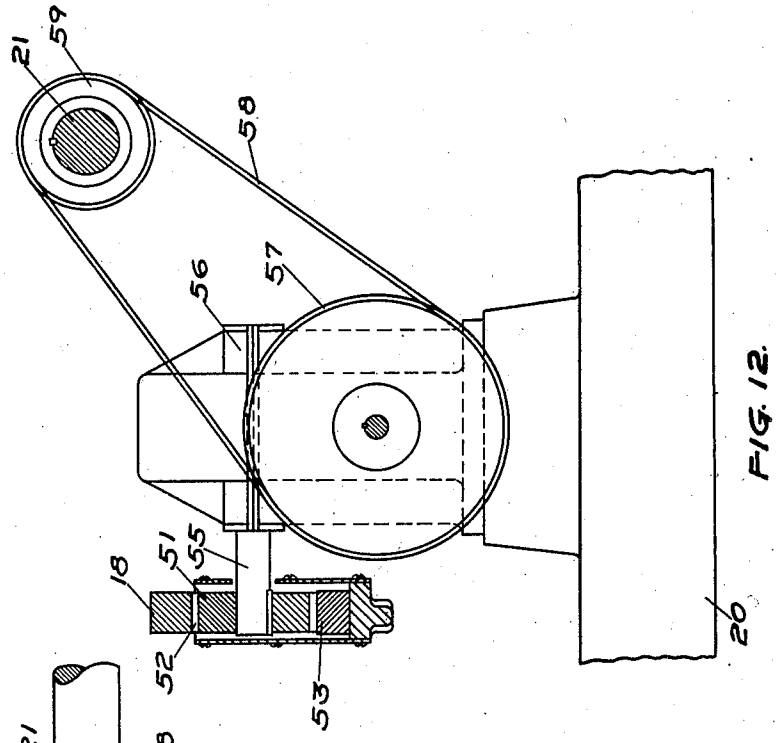


FIG. 12.

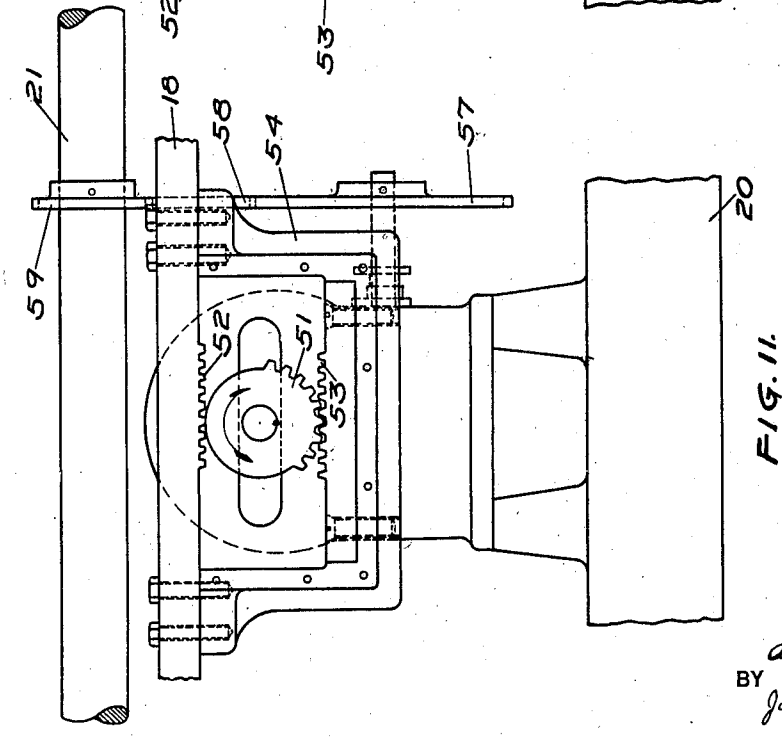


FIG. 11.

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UNITED STATES PATENT OFFICE

1,987,079

WIRE SPOOLING MACHINE

Alfred L. Rosenmund, Rockaway Borough, N. J., assignor to Stapling Machines Co., a corporation of Delaware

Application February 21, 1931, Serial No. 517,390

7 Claims. (Cl. 242—25)

This invention relates to wire spooling machines.

It is an object of the invention to provide an efficient and dependable machine for coiling wire on a reel or spool.

It is a further object to provide a machine adapted automatically to uncoil a rough coil of wire, straighten or smooth the wire, and coil it evenly on a reel or spool from which it may be readily drawn for use.

In many types of stapling machines, such, for example, as wirebound box blank machines, the wires from which staples are formed, and the binding wires which are stapled to the box blanks or sections, are carried on reels and are drawn therefrom continuously during the running of the machine. In the operation of such machines any interruption in the feed of the wire interrupts the operation of the machine. It is therefore desirable that the wire be fed to the stapling mechanism without interruption, and free from bends or kinks which might interfere with the formation of staples or the laying of the binding wire. Because the wire for use with such machines is received from the wire manufacturer in loose coils which have been roughly handled in transit, it is necessary to uncoil the rough coil of wire, straighten out or smooth kinks or bends in the wire, and re-coil the wire on a reel or spool which is designed to be used in the box making machine.

Heretofore the rough coil of wire as received from the wire manufacturer has been mounted on a rotating cone and the outer end of the wire secured to the hub of a reel on which it is to be rewound. The reel is then rotated to transfer the wire from the cone to the reel. Such a procedure has many objections. The pulling of the wire from the cone frequently tightens the wire on the cone and tangles it, or causes the cone to rotate too fast and thereby cause overtravel and tangles in the wire. Constant attention of an operator is required to prevent trouble.

The present invention is intended to eliminate the objectionable features of prior practices by providing a machine which will operate automatically to control or govern the tension of the wire, the speed of rotation of the loose coil, and which will remove kinks and bends in the wire, and coil it evenly and with proper tension on the reel.

One illustrative embodiment of the invention is shown in the accompanying drawings, in which:—

Figure 1 is a top plan view of a machine embodying the invention.

Fig. 2 is a side elevation of the machine.

Fig. 3 is an enlarged sectional elevation taken on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged end elevation seen from the right in Fig. 1.

Fig. 5 is an enlarged sectional elevation taken on the line 5—5 of Fig. 1.

Fig. 6 is an enlarged plan view of a detail of the brake-control mechanism.

Fig. 7 is a sectional elevation taken on the line 7—7 of Fig. 6.

Fig. 8 is an enlarged plan view of the clutch release.

Fig. 9 is a partial elevation of the same, showing the arrangement of the clutch trip mechanism.

Fig. 10 is a sectional elevation taken on the line 10—10 of Fig. 8.

Fig. 11 is an enlarged view of a portion of the mechanism shown in Fig. 3; certain parts being omitted for clearness of illustration.

Fig. 12 is an end elevation of the same; partly in section.

The machine selected for illustration is a double or tandem machine capable of handling two coils of wire simultaneously. It will be understood that a single coil machine may be provided without departing from the invention.

Referring to Fig. 2, the loose coil of wire designated A is placed over a receiving member 1, preferably frusto-conical in shape (two such members being provided for two coils of wire, as shown in Fig. 1), and rests on a wheel-like base member 2. Members 1 and 2 are mounted to rotate on a shaft 3 supported on a frame casting 4. Detachably secured to the top of member 1 is a driving drum 5 which may be removed to permit placing the loose coil of wire over the member 1, and then replaced and secured to the member 1 to rotate therewith.

One end of the loose coil of wire is passed over guide rollers 6 and 6A carried by a bracket 7 supported by frame casting 4, and then is passed one or more times around driving drum 5. A similar arrangement is provided for the second coil. From drum 5 the wire passes over a roller 8 carried by a fixed arm 9 secured to casting 4, thence under a roller 10 carried by an arm 11 fixed on a shaft 12 which is adapted to oscillate in bearings 13 bolted to frame casting 4. Similar rollers are provided for the second coil, and a shaft 12A similar to shaft 12. From roller 10 the wire passes over a roller 14, thence under a roller 15 located directly beneath roller 14, and thence to a winding reel 16, to the hub of which the wire is secured. As shown in Fig. 1, a reel 16 and a set of

rollers as just described are provided for each wire to be uncoiled and reeled.

As shown in Fig. 3, each set of rollers 14 and 15 is carried by a plate 17 fixed to the end of a transverse shaft 18 slidably mounted in brackets 19 supported by a frame casting 20. Shaft 18 is reciprocated longitudinally to cause the rollers 14 and 15 to travel back and forth across the face of winding reel 16 to guide and distribute the wire evenly on the reel 16. Winding reels 16 are detachably mounted respectively on the opposite ends of a drive shaft 21 journaled in support castings 22. Drive shaft 21 is driven by a pulley 23 through a clutch 24.

As shown in Fig. 4, clutch 24 is operated by a fork 25 fast on a rock shaft 26 journaled in a support 27. Shaft 26 is rocked by a hand lever 28 fast on a rock shaft 29, through the action of link arms 30, 31 and 32. Rock shaft 29 is journaled at one end in support 27 and at the other end in a support 33 (see Fig. 1).

Referring to Fig. 3, the end of shaft 29 is provided with a stop cam 34, which is engaged and held by a tooth 35 formed on the under side of a trip arm 36 pivoted to a stud shaft 37 carried by support 33. Tooth 35 is normally held in locking engagement with stop cam 34 through the action of a spring 38 secured at one end to trip arm 36 and at the other end to casting 20. Thus, when lever 28 is moved to the left in Fig. 3 to clutch shaft 21 to pulley 23, tooth 35 will engage stop cam 34 on shaft 29 and hold the clutch 24 in clutching position until arm 36 is raised to release stop cam 34, whereupon (see Fig. 4) a spring 39 will move clutch 24 out of clutching engagement.

Trip arm 36 may be raised to release tooth 35 from engagement with stop cam 34 in any one of three different ways. Referring to Fig. 1, arm 36 may be raised by pressing downward on a foot pedal 40 carried at one end of an arm 41 pivoted on a support 42, and the other end of which is located directly beneath trip arm 36.

Referring to Fig. 1, arm 36 may be raised by a trip member 43 fast on rock shaft 12 or by a trip member 43A fast on rock shaft 12A. In the normal operation of the machine, trip members 43 and 43A are positioned above trip arm 36, and are only lowered into operating contact with arm 36 when something happens to prevent the uncoiling of the rough coil of wire from member 1 and driving drum 5. In other words, the trip members 43 and 43A serve as safety devices to stop the operation of the machine in the event that the feed of the wire is stopped at any time due to kinks or tangles, or other causes. For example, (referring to Fig. 2), when the wire is being freely fed the roller 10 and arm 11 are in the position shown in Fig. 2, with the wire passing under the roller 10. If the feed of the wire should be stopped for any reason, the wire passing under the roller 10 would be tensioned, thereby raising the roller 10 and arm 11, which movement would rock shaft 12 and lower the trip 43 or the trip 43A, as the case may be, into contact with one end of arm 36, thereby raising the opposite end of arm 36 and releasing hook 35 from its engagement with cam stop 34. Such a safety stop mechanism automatically stops the operation of the machine prior to breakage of any of the parts in the event that the feed of the wire is stopped for any reason.

Provision is also made to raise arm 36 and stop the operation of the machine when a sufficient amount of wire has been coiled on the reels 16. As shown in Fig. 2, such mechanism consists of a roller 44 carried by an arm 45 fast on a rock shaft 46 supported in bearings 47 secured to casting 20. Shaft 46 carries an arm 48 which is adapted to engage a pin 49 carried by arm 41 to lower arm 41 and thereby raise arm 36 to release the clutch. Arm 45 and roller 44 are spring-pressed toward the reel 16 by means of springs 50, shown in Fig. 1. As the wire is coiled on the reels 16, the increasing diameter of the coil presses the roller 44 and arm 45 away from the coil, and such movement rocks shaft 46 and lowers arm 48 toward pin 49. When arm 48 engages pin 49 and presses it downward the other end of arm 41 is raised against arm 36 to release tooth 35 from stop cam 34 and stop the machine.

Referring to Fig. 3, shaft 18 is reciprocated longitudinally to carry rollers 14 and 15 back and forth across the faces of reels 16 by a mutilated pinion 51 which cooperates with a rack 52 on the under side of shaft 18 and a rack 53 supported by a U-shaped bracket 54 secured to the under side of shaft 18, the arrangement being such that upon rotation of pinion 51 its teeth first engage rack 52 and move shaft 18 to the right and then engage rack 53 and move shaft 18 to the left, such movements being repeated during the operation of the machine. Referring to Fig. 12, pinion 51 is rotated on a shaft 55 connected to a reduction gear located in a box 56, which reduction gear is operated through a gear 57, a chain 58, and a sprocket 59 on shaft 21.

To prevent the rough coil of wire A from uncoiling faster than it is being coiled on the reel 16, an automatic braking mechanism is provided to retard rotation of member 1 and driving drum 5. As shown in Fig. 2, such mechanism consists of a brake band 60 surrounding the wheel-like member 2. The ends of the brake band 60 are attached to opposite edges of a cam plate 61 carried by a pin 62 journaled to oscillate in a bracket support 63 bolted to frame casting 4. Secured to the lower end of pin 62 is a laterally extending arm 64, the end of which is pivotally connected to a rod 65 which connects with an arm 66 fast on rock shaft 12. A spring 67 is interposed between a nut 68 threaded on rod 65 and an abutment 69 carried by frame casting 4 and through which abutment, rod 65 passes. The arrangement is such that the spring 67 normally functions to tighten brake band 60 about wheel member 2 to retard rotation of wheel member 2, coil-carrying member 1, and driving drum 5. When, however, rotation of driving drum 5 is retarded by brake band 60, the wire between driving drum 5 and the reels 16 tightens and raises roller 10 and arm 11, thereby rocking shaft 12 and moving arm 66 and rod 65 to turn cam plate 61 and release the brake band 60, thereby permitting driving drum 5 and member 1 to rotate and permit the wire to uncoil from member 1. As soon, however, as the wire becomes slack under the roller 10, spring 67 will again function to tighten brake band 60 about wheel member 2 and retard rotation of the driving drum 5 and coil of wire A. When rotation of drum 5 is retarded, the wire slips thereabout and takes up any slack wire which may have accumulated between the coil A and the drum 5. Thus it will be seen that the uncoiling of the rough coil A is retarded or increased automatically to prevent overrun and tangling of the wire between the coil and the driving drum.

It should be noted that the coil of wire A is rotated through the driving drum 5, and that

this arrangement takes the pull off the coil and prevents jamming and tangling of the wire.

It should also be noted that the location of rollers 14 and 15, one above the other, and in close proximity to each other, tensions the wire over the rollers and removes any bends or kinks in the wire, so that the wire as wound on the reels 16 is free of kinks and bends.

In operation, the drum 5 is removed from the member 1, and a rough coil of wire A is placed over the member 1 and rests on member 2. The loose end of the coil A is passed around rollers 6 and 6A, thence around driving drum 5, over roller 8, under roller 10, over rollers 14 and 15, and thence to the hub of a reel 16 to which the end of the wire is secured. Lever 28 is then moved to clutch pulley 23 to the drive shaft 21 to start the machine. Upon rotation of shaft 21, reels 16 are rotated to coil the wire on the reel. Rotation of a reel 16 causes rotation of driving drum 5, which in turn rotates members 1 and 2 and coil A to draw the wire from coil A. As brake band 60 is normally held in braking position about the member 2 through the action of spring 67, the wire will at first slip about driving drum 5 until all of the slack wire between the coil A and the driving drum 5 has been taken up, whereupon, the wire between driving drum 5 and the reel 16 will tighten and raise roller 10 and arm 11, thus releasing the brake band 60 and permitting rotation of drum 5, members 1 and 2, and coil A. If and when the wire between coil A and driving drum 5 becomes slack, the wire will slip about driving drum 5 and permit roller 10 and arm 11 to move downward under the action of spring 67, thus tightening brake band 60 about member 2 and arresting further rotation of the coil until such slack is taken up in the manner hereinbefore explained. Thus, during the normal operation of the machine, rotation of coil A is automatically controlled to prevent overrun and tangling of the wire. The braking action of the brake band 60 may be regulated by turning nut 68 to adjust the tension in brake spring 67.

If during the operation of the machine the wire becomes caught for any reason so that it cannot feed, the roller 10 and arm 11 will be raised far enough to cause trip member 43 to engage trip arm 36 to disconnect the clutch 24 and stop the machine. When a sufficient amount of wire has been coiled on a reel 16, the machine will be automatically stopped through the action of arm 48 contacting with pin 49 on arm 41, the roller 44 contacting with the coiled wire on the reel 16 causing movement of arm 48 into contact with pin 49 when a full coil of wire has been wound on the reel. The machine may be stopped at any time by the operator by stepping on foot pedal 40.

During the operation of the machine the rollers 14 and 15 are moved back and forth across the face of a reel 16 to guide the winding of the wire thereon. While the description of the operation of the machine has been confined almost entirely to the operation of one coil and one reel, it will be understood that the operation of the other coil and reel is similar to the one described, the tandem parts of the machine being duplicates of each other.

The machine of this invention may be used to coil wire for various purposes and is not to be limited to the coiling of wire for use in a wire-bound box blank machine of the character hereinbefore referred to. Among other advantages the machine operates with practically no attention from the operator as it automatically adjusts itself to conditions as they arise.

I claim:

1. A wire spooling machine comprising, in combination, a plurality of rotatable holders each adapted to receive a coil of wire; a drum secured to each holder to rotate therewith; a roller located a distance from each holder and drum about which the wire from the coil may pass and then be wrapped one or more times about the drum; a plurality of reels to each of which the end of a wire may be secured and about which the wire may be coiled; means to distribute evenly the convolutions of the wire on the reels; means to rotate the reels, whereby the wire will rotate the drum and, through the drum, the holder; braking means for retarding rotation of the holder; means controlled by the tension on the wire to control the operation of the braking means; means controlled by the tension on the wire to stop the machine; and means to stop the machine when a predetermined amount of wire has been coiled on a reel.

2. A wire spooling machine comprising, in combination, a rotatable holder to receive a coil of wire; a drum secured to the holder to rotate therewith; a roller located a distance from the holder and drum about which the wire from the coil may pass and then be wrapped one or more times about the drum; a reel to which the end of the wire may be secured and about which the wire may be coiled upon rotation of the reel; means to distribute evenly the convolutions of the wire on the reel during rotation thereof; means to rotate the reel whereby the wire will rotate the drum and, through the drum, the holder; braking means for retarding rotation of the holder; means controlled by the tension on the wire to control the operation of the braking means; means controlled by the tension on the wire to stop the machine; and means to stop the machine when a predetermined amount of wire has been coiled on the reel.

3. A wire spooling machine comprising, in combination, a rotatable holder to receive a coil of wire; a drum secured to the holder to rotate therewith and about which the wire may be wrapped one or more times; a reel to which the end of the wire may be secured and about which the wire may be coiled; means to rotate the reel whereby the wire will rotate the drum and, through the drum, the holder; braking means for retarding rotation of the holder; means controlled by the tension on the wire to control the operation of the braking means; means controlled by the tension on the wire to stop the machine; and means to stop the machine when a predetermined amount of wire has been coiled on the reel.

4. A wire spooling machine comprising, in combination, a rotatable holder to receive a coil of wire; a drum secured to the holder to rotate therewith and about which the wire may be wrapped one or more times; a reel to which the end of the wire may be secured and about which the wire may be coiled; means to rotate the reel whereby the wire will rotate the drum and, through the drum, the holder; braking means for retarding rotation of the holder; means controlled by the tension on the wire to control the operation of the braking means; and means controlled by the tension on the wire to stop the machine.

5. A wire spooling machine comprising, in combination, a rotatable holder to receive a coil of wire; a drum secured to the holder to rotate there-

with and about which the wire may be wrapped one or more times; a reel to which the end of the wire may be secured and about which the wire may be coiled; means to rotate the reel whereby the wire will rotate the drum and, through the drum, the holder; braking means for retarding rotation of the holder; and means controlled by the tension on the wire to control the operation of the braking means.

6. The combination of a coil of wire, and means to uncoil the wire and recoil it on a reel; said means comprising a rotatable holder for the coil, a driving drum secured to the holder to rotate therewith and about which the wire is wrapped at least once, a rotatable reel to which the end of the wire is attached and about which the wire will coil upon rotation of the reel, means to rotate the reel whereby rotation of the reel will rotate the drum and, through the drum, the holder, to uncoil the wire on the holder and coil it on a reel, and means controlled by the tension on the wire to control the speed of rotation of the holder.

7. The combination of a coil of wire, and means to uncoil the wire and recoil it on a reel; said means comprising a rotatable holder for the coil, a driving drum secured to the holder to rotate therewith and about which the wire is wrapped at least once, a rotatable reel to which the end of the wire is attached and about which the wire will coil upon rotation of the reel, means to rotate the reel whereby rotation of the reel will rotate the drum and, through the drum, the holder to uncoil the wire on the holder and coil it on a reel, and means to control the speed of rotation of the holder in accordance with the tension on the wire between the reel and the drum.

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