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CONTINUOUS WINDING MECHANISM

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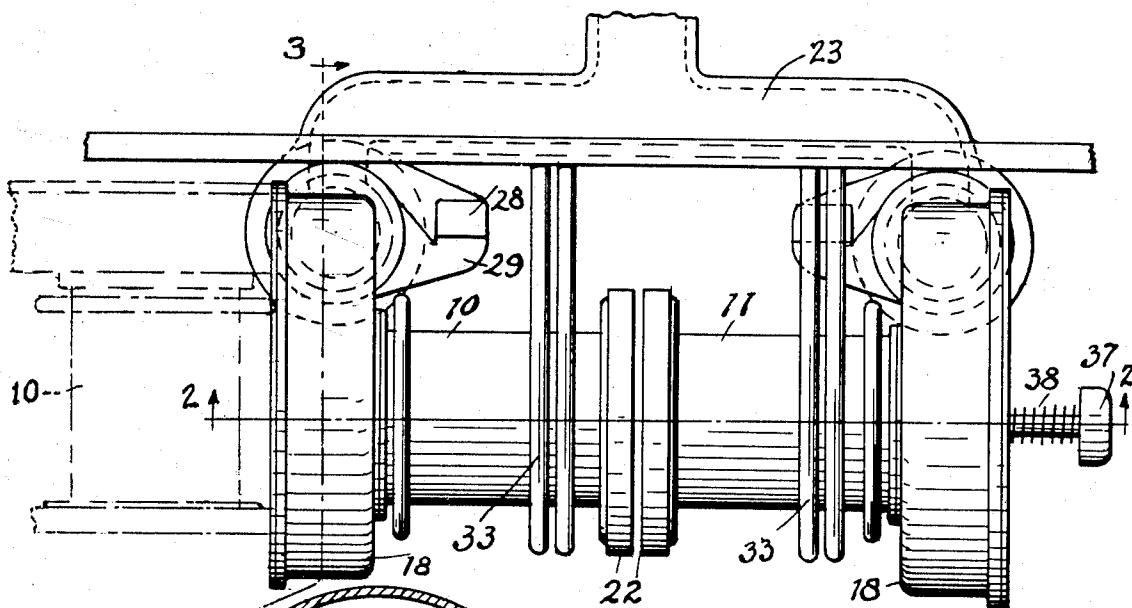


Fig. 1.

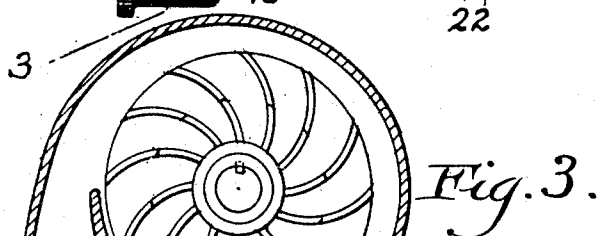


Fig. 3.

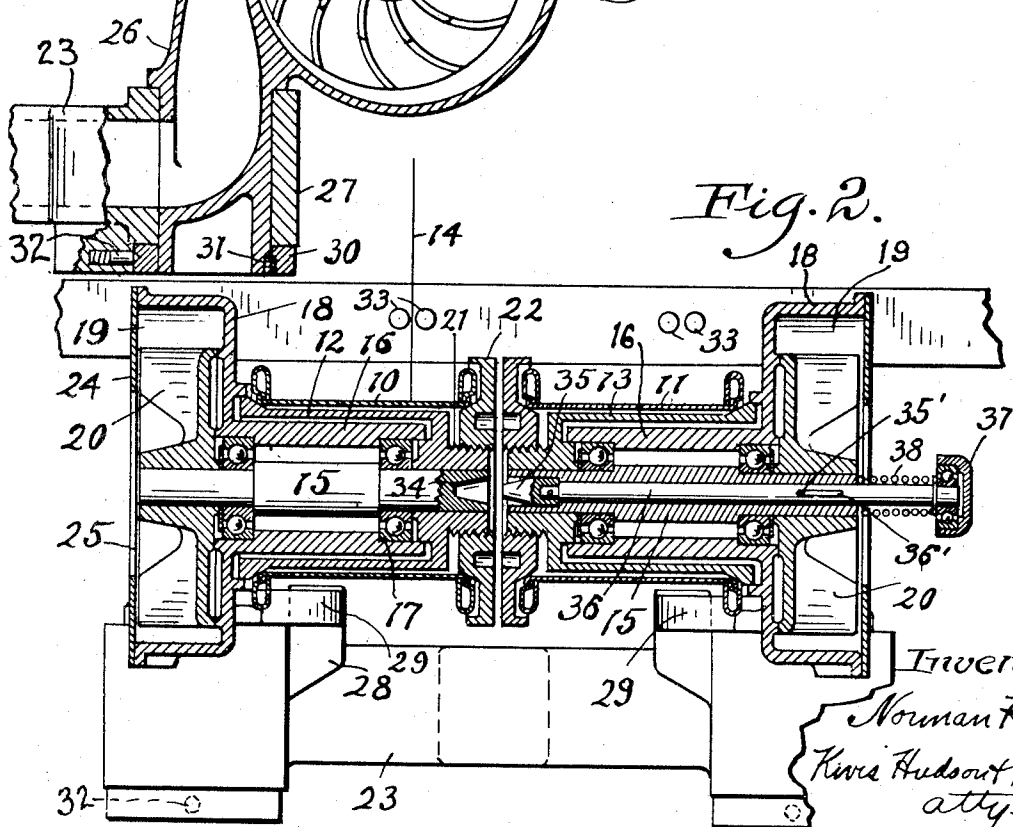


Fig. 2.

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UNITED STATES PATENT OFFICE

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CONTINUOUS WINDING MECHANISM

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15 Claims. (Cl. 242—25)

This invention relates to apparatus for winding strand or strip material and, more particularly to a novel form of continuous winding mechanism in which the spools, or the like, upon which the material is being wound, can be discharged when filled, without stopping or interfering with, the operation of the apparatus through which the material to be wound is passing.

In winding mechanisms which have heretofore been available for use with wire drawing, annealing or tinning apparatus, it has been necessary to stop the winding operation in order that filled spools might be removed and empty ones substituted. Interrupting the continuous movement of the strand for this purpose is undesirable because it frequently results in breakage of the material when the winding operation is to be resumed. In the case of a wire drawing machine, particularly one for drawing fine wire, considerable skill is required on the part of the operator to stop the machine, change spools, and start the same again without breakage of the strand. In the case of annealing, tinning or similar apparatus, stopping the strand for the purpose of changing spools frequently results in the strand being burned and otherwise damaged, or in breakage of the strand when the winding operation is resumed. By my invention, I avoid these difficulties and the consequent loss of production, by providing for the removal of a filled spool while the winding operation may be continued on another spool without interruption.

It is also an object of my invention to provide mechanism of the kind mentioned, embodying a plurality of winding means, which have adjacent winding positions so that the material being wound can be transferred from one to the other, and which are adapted to be moved individually from such winding position to a position for discharging wound material.

Another object of my invention is to provide a winding mechanism in which the supply of power to the driving means thereof is controlled by movement of the winding means from a winding position toward a position for discharging wound material.

Another object of my invention is to provide a winding mechanism of the kind mentioned, in which the winding means is pivotally supported for swinging movement from a winding position to a position for discharging wound material, and in which the driving means is controlled by a device actuated by the swinging movement of the winding means.

Still another object of my invention is to pro-

vide a winding mechanism of the kind mentioned, in which the winding means is pivotally supported for swinging movement from a winding position to a position for discharging wound material, and in which a fluid motor for driving the winding means is controlled by a valve in the pivotal support.

A further object of my invention is to provide a winding mechanism of the kind mentioned, having a plurality of adjacent winding means adapted to be individually driven, and means for synchronizing said winding means as to speed of rotation.

The invention may be further briefly summarized as consisting in certain novel combinations and arrangements of parts hereinafter described and particularly set out in the appended claims.

In the accompanying sheet of drawing,

Fig. 1 is a top plan view of a winding mechanism embodying my invention;

Fig. 2 is a sectional elevation thereof taken on line 2—2 of Fig. 1; and

Fig. 3 is a sectional elevation taken on line 3—3 of Fig. 1.

In the drawing to which detailed reference will presently be made, I have shown a preferred form of my continuous winding mechanism as a means of illustrating my invention, but before proceeding with a detailed description thereof it will be understood, of course, that the invention may be embodied in various other mechanisms or devices of this kind.

According to my invention, my winding mechanism, as illustrated in Figs. 1 and 2, is provided with a pair of spools 10 and 11, which are carried respectively by the substantially axially aligned arbors 12 and 13, with their ends in adjacent or contiguous relation so that a strand of material, such as the strand 14, can be transferred from one spool to the other when a spool becomes full, without stopping the winding operation. The arbors 12 and 13, as will be presently explained in detail, are so arranged that they, with their spools thereon, may be individually moved from a winding position illustrated in full lines in Figs. 1 and 2, to a position for discharging the filled spools, such as the dotted line position indicated in Fig. 1 for the spool 10.

It will be noted that the supporting and driving means for the arbors 12 and 13 are of similar construction, but that the parts are oppositely arranged so as to permit the spools to assume the substantially aligned winding position mentioned above, in which the spool ends are closely adjacent to each other. The arbors are secured

to adjacent ends of the shafts 15, as clearly shown in Fig. 2, and telescopically surround the supporting sleeves 16 in which the shafts 15 are rotatably supported by the anti-friction bearings 17. The sleeves 16 are integral with and extend laterally from the casings 18 of the motors 19 which drive the arbors. Any suitable form of motor may be used for driving the arbors, but I prefer to use fluid motors or turbines for this purpose, such as those illustrated, having rotors 20 secured to the ends of the shafts 15 opposite the arbor connections. The spools may be removably retained upon their arbors by providing the latter with the threaded portions 21 to which the nuts 22 may be applied.

For driving the motors to thereby rotate the arbors and spools, I provide a fluid supply manifold 23 having connection with a suitable source of fluid, and from which motive fluid may be supplied to the casings of the motors. The motor casings, as shown in Fig. 3, are preferably of volute form each having a removable cover plate 24 with an exhaust opening 25 therethrough, and a fluid inlet portion 26 which is journaled in an enlarged end portion 27 of the manifold, so as to provide a pivotal support for the motor casing and arbor, and also a valve for controlling the flow of motive fluid into the motor casing.

For limiting the swinging movement of the arbors about the pivotal supports, so that when in the winding position shown in Fig. 1, the spools will be in substantial axial alignment, I provide stops or abutments 28 which may be formed integral with the manifold. These stops are disposed in the path of movement of, and adapted to be engaged by, the arms 29 which project laterally from the motor casings. The engagement of the arms 29 with the abutments 28 limits the swinging movement of the arbors and causes the spools to be correctly positioned for the winding operation. For preventing separation of the parts forming the pivotal connection between the motor casings and the manifold, I provide clamping rings or collars 30 which are secured to the casing portions 26 by means of the set screws 31. To releasably retain the arbors in the winding position, or in the position for discharging the wound material, I provide spring pressed plungers or pawls 32 in the portions 27 of the manifold for engagement in recesses in the clamping rings 30, which recesses are located to correspond with the winding and discharge positions of the arbors.

It will be seen from the arrangement thus far described that the arbors can be swung individually about their pivots without interference with each other, so that a filled spool can be removed and an empty one substituted while the winding operation is being continued on the spool mounted on the other arbor. It will also be seen that when an arbor is swung from the winding position to the discharge position, the cooperating casing and manifold parts which form the control valve for the motive fluid, are moved relative to each other, causing the valve to be closed and the supply of motive fluid to the motor cut off. Thus whenever an arbor is swung thereto is cut off and the spool ceases to rotate.

For laying the strand during the winding operation, any of the well-known forms of distributing mechanisms may be used, and in my continuous winding machine I provide one of these mechanisms for each spool. During the winding operation the strand is first delivered to

one spool, such as the spool 10, and when this spool becomes filled, the strand is removed from between the fingers of the distributing device 33 and is quickly deflected or transferred to the spool 11 and inserted between the fingers of the distributing device for that spool. The filled spool 10 is then swung to the discharge position, indicated in dotted lines in Fig. 1, and upon coming to rest is removed from the arbor and replaced by an empty spool. The arbor 12 with the empty spool thereon is allowed to remain in the discharge position with the motor stopped until the spool 11 has nearly been filled. The arbor 12 is then swung to the winding position whereupon the motor receives motive fluid and begins to rotate the empty spool.

I have found that in order to properly transfer or deflect the moving strand from a filled spool to an adjacent empty spool, it is desirable to have the spools synchronized as to speed, and for this purpose I provide cooperating clutch elements which connect the arbors for rotation together during this transfer operation. These clutch elements, as shown in Fig. 2 of the drawings, may consist of a recess 34 of truncated conical form provided in the end of one of the shafts 15, and a similarly shaped friction member 35 disposed in a recess in the end of the other shaft 15. The friction member 35 is pinned or otherwise secured to the end of an actuating shaft 36, which is suitably connected for rotation with the shaft 15 through which it extends, as by means of a pin 35'. An elongated slot 36' provided in the shaft 36 permits the latter to be moved axially within the shaft 15 to cause engagement and disengagement of the friction elements. At the outer end of this shaft or, in other words, at the end thereof opposite the friction member 35, I provide a rotatable handle or grip 37 by means of which the actuating shaft may be moved inwardly and the friction element 35 pressed into the recess 34. A spring 38 surrounding the actuating shaft adjacent the handle 37, normally holds this shaft in the outward position illustrated in full lines in Fig. 2, with the friction member 35 out of engagement with the recess 34. When the operator is ready to transfer the strand from the filled spool to the empty spool, he moves the shaft 36 inwardly against the action of the spring 38 to press the friction member 35 into the recess 34. With the arbors thus connected by the cooperating clutch elements, the individual driving motors are brought to synchronous speed whereupon the operator transfers the strand to the empty spool. After a few turns have been wound upon the empty spool the operator releases the handle 37, and while the winding operation is continued on the new spool, the filled spool is swung to the discharge position and replaced, as explained above.

It will now be readily seen that I have provided an extremely simple form of continuous winding mechanism which will permit wire drawing, tinning, annealing or similar operations to be performed as continuous operations with less danger of breakage or injury to the strand, and without interruptions heretofore necessary in removing and replacing filled spools. It will also be seen that in my mechanism the movement of the spools to the discharge position causes the supply of rotative power to be interrupted, so as to automatically provide for the stopping and starting of the spool motors at the proper time. Additionally, it will be seen that I have provided a simple and efficient means for quickly and

easily bringing the spools to synchronous speed when the strand is to be transferred from the filled spool to the empty spool.

While I have illustrated and described the mechanism of my invention in a detailed manner, it should be understood, however, that I do not intend to limit myself to the precise arrangements of parts and details of construction illustrated and described, but regard my invention as including such changes and modifications as do not involve a departure from the spirit of the invention and the scope of the appended claims.

Having thus described my invention, I claim:

1. In apparatus for the character described the combination of rotatable winding means, a motor for driving said winding means, means supporting said winding means whereby the latter may be moved from a winding position to a position for discharging wound material, and means for supplying power to the motor including a control device adapted to be actuated by the movement of the winding means.

2. In apparatus of the character described the combination of rotatable winding means, a fluid motor for driving said winding means, means supporting said winding means for movement from a winding position to a position for discharging wound material, and means for supplying motive fluid to said motor including valve means adapted to be actuated by the movement of said winding means.

3. In apparatus of the character described the combination of rotatable winding means, a fluid motor for driving said winding means, means pivotally supporting said winding means for swinging movement from a winding position to a position for discharging wound material, and valve means in said pivotal supporting means for controlling the supply of motive fluid to said motor.

4. In apparatus of the character described the combination of a plurality of adjacent rotatable winding means, an individual driving motor for each winding means, means supporting said winding means whereby the same may be moved independently of each other from a winding position to a position for discharging wound material, and means for supplying power to said motors including control devices adapted to be actuated by the movement of the respective winding means.

5. In apparatus of the character described the combination of a plurality of rotatable winding means, an individual fluid motor for driving each winding means, means supporting said winding means whereby the same may be moved independently of each other from a winding position to a position for discharging wound material, and means for supplying motive fluid to said motors including valve means adapted to be actuated by the movement of the respective winding means.

6. In apparatus of the character described the combination of a plurality of axially aligned rotatable winding means, an individual fluid motor for driving each winding means, means pivotally supporting said winding means whereby the same may be swung independently of each other from a winding position to a position for discharging wound material, and valves in the pivotal supporting means for controlling the supply of motive fluid to the respective motors.

7. In a continuous winding device the combination of a plurality of winding means rotatably supported adjacent each other, individual fluid actuated driving means for each winding means, and means for releasably connecting said wind-

ing means with each other for synchronizing said winding means with each other as to speed of rotation to permit transfer of a strand being wound from one winding means to the other.

8. In a continuous winding device the combination of a rotatable winding means, a second rotatable winding means to which a strand being wound may be transferred when the first winding means becomes full, means supporting said winding means whereby the same may be moved individually from a winding position in which they are in adjacent relation to a position for discharging wound material, and means for synchronizing said winding means as to speed of rotation to permit the transfer of said strand from one winding means to the other.

9. In apparatus of the character described the combination of a plurality of adjacent rotatable winding means, an individual driving motor for each winding means, means supporting said winding means whereby the same may be moved independently of each other from a winding position to a position for discharging wound material, and means for synchronizing said winding means as to speed of rotation while in the winding position.

10. In apparatus of the character described the combination of a plurality of axially aligned rotatable winding means, an individual driving motor for each winding means, means supporting said winding means whereby the same may be moved independently of each other from a winding position to a position for discharging wound material, and axially movable means for connecting said winding means for rotation together in the winding position.

11. In apparatus of the character described the combination of a plurality of axially aligned rotatable winding means, an individual driving motor for each winding means, means supporting said winding means whereby the same may be moved independently of each other from a winding position to a position for discharging wound material, and cooperable clutch elements on the respective winding means for connecting the latter for rotation together.

12. In a continuous winding device, the combination of a pair of winding arbors in adjacent substantially axially aligned relation with each other whereby material being wound may be shifted from one arbor to the other, individual driving motors for rotating said arbors, pivotal supporting means whereby each arbor and its driving motor may be swung as a unit independently of the other unit to thereby shift the arbor from a winding position to a position for discharging wound material, and means for controlling each driving motor independently of the other.

13. In apparatus of the character described, the combination of a pair of winding arbors in substantially axial alignment with each other and with ends thereof in adjacent relation, individual pivotal supports for said arbors adjacent their remote ends whereby the arbors may be individually swung from the aligned position to separate said adjacent ends, power supply means including mechanism for driving said arbors, and a control individual to each arbor and adapted to be actuated by swinging movement of such arbor for controlling the power supply mechanism for the arbor.

14. In a winding device the combination of spaced supporting means, a pair of winding units each comprising a driving motor having a shaft

- and a winding arbor connected with said shaft, and means for pivotally mounting one of said winding units on each supporting means, said supports being spaced and arranged so that said
- 5 arbors when in the winding position are in substantial axial alignment with ends thereof in adjacent relation and are adapted to be individually swung out of such aligned relation for the discharge of wound material.
- 10 15. In a winding device the combination of a pair of spaced supports, a housing pivoted on each support, a projection on each housing extending
- toward the other housing, a drive shaft journaled in each projection, and a hollow winding arbor telescoping over each projection and connected with the drive shaft therein, said
- 80 supports being spaced and arranged so that said arbors when in the winding position are in substantial axial alignment with ends thereof in adjacent relation and are adapted to be individually swung out of such aligned relation for the discharge of wound material.
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