Oct. 21, 1952 H. BÖCHER 2,614,766

WIRE REELING APPARATUS

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2 SHEETS—SHEET 1

Fig. 1

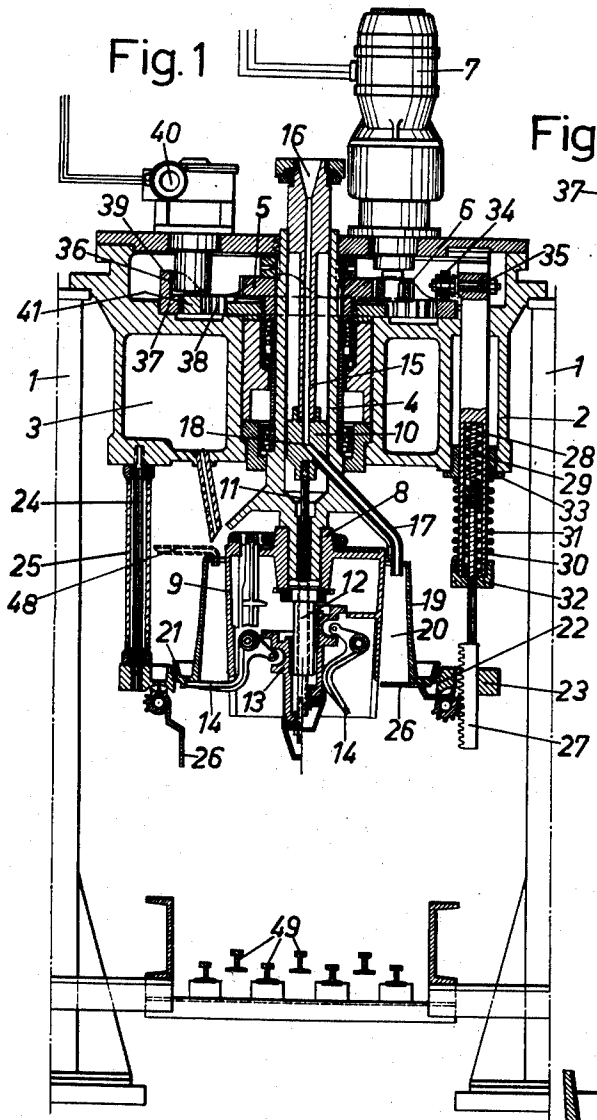
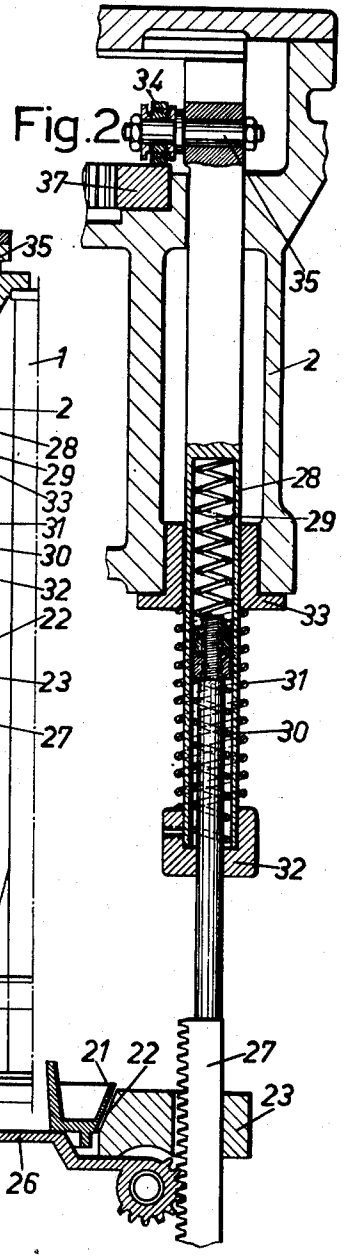


Fig. 2



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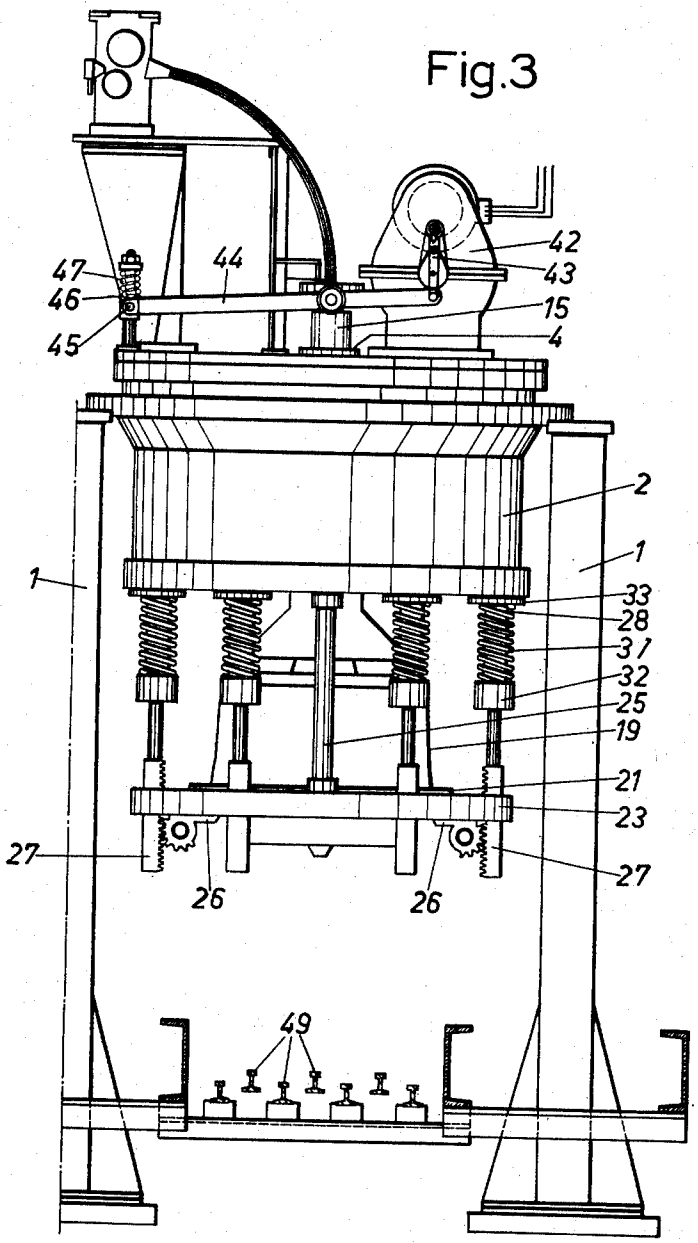
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WIRE REELING APPARATUS

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2 SHEETS—SHEET 2

Fig.3



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WIRE REELING APPARATUS

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9 Claims. (Cl. 242—84)

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The present invention relates to a wire reeling apparatus.

More particularly the invention relates to a wire winding reel selectively operable for high or low speed winding.

In the reeling of wire, there are presently known many systems for effecting such operation, each of which has its own particular advantages and which are also accompanied by certain disadvantages. The different systems operate with different winding velocities, thus while a system with a low wire winding velocity possesses the advantage that the wire is not twisted, low winding speed is a drawback.

Other systems having higher wire winding velocity are operable to increase the speed of operation but are peculiarly limited to wires of circular section since there is a possibility of twisting a wire about its axis when winding at high speed.

Accordingly and as previously indicated, the present invention has for an object to provide a structural unit embodying components selectively operable for either high or low speed winding.

More particularly the invention has for an object to provide a compact structure, including an inner reel and an outer reel drum coaxial therewith disposed on a vertical axis with pivoted wire coil supporting arms operably associated respectively internally and externally of the elements for movement into supporting position beneath the space between the reel and drum and selectively operable depending upon whether high or low winding speeds are utilized.

A further and more specific object is to provide a compact wire reeling machine capable of operating in accordance with either of the well-known Garret or Edenborn reeling systems.

The invention will now be described with reference to the accompanying drawings, in which:

Figure 1 illustrates an embodiment of the invention partly in section and partly in elevation;

Figure 2 is an enlarged detail of a portion of Figure 1 partly in section and partly in elevation; and

Figure 3 is an elevational view of the embodiment illustrated in Figure 1 viewed from a different side thereof and partly illustrating the drive for reciprocating the central feed tube.

In connection with the present invention the structure is particularly applicable to the Garret and Edenborn reeling systems.

In the Garret system the reeling apparatus includes the rotatable reel with the wire to be wound supplied from the side and wound on the

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external surface of the rotatable reel, movable supporting arms are utilized to support the coil of wire while it is being wound. In this system a low wire velocity of between 3 to 10 meters is obtainable.

In the Edenborn system there is again provided a reel mounted on a vertical axis between which is fixed a feed tube having an upper part that is coaxial with the reel and a lower part at an angle thereto of about 45° and terminating at the periphery of the reel. The feed tube is rotated with the wire fed therethrough and by means of rotation of the feed tube about a vertical axis a coil of wire is built up on arms that support the same positioned at the bottom of the reel. In this construction winding velocities up to 25 meters are obtainable so that the capacity of this reel is substantially greater than a reel operating under the Garret system.

The present invention particularly is applicable to these two reeling systems and by its structure permits selective high or low speed operation.

Referring to the drawing, a frame work 1 of sectional steel supports a cast iron reel housing 2 provided with an internal annular water tank 3. The housing is centrally apertured and supports a tubular shaft 4 which is set into rotation by a main motor 7 which drives a pinion 6 meshing with a gear 5 splined to the shaft. At the lower end of the tubular shaft a sleeve 8 is fastened which serves as a releasable coupling and which supports a frusto-conical reel 9.

An intermediate piece 10 is arranged for longitudinal displacement on the tubular shaft and has screwed into its lower end a control rod 11. This rod acts on a sleeve 13 which can be displaced on the lower end 12 of the tubular shaft. A plurality of supporting bell-crank arms 14 are carried by the drum. On the left-hand side of the shaft end 12, these supporting arms are shown in operative position under the action of the sleeve 13 whilst on the right hand side the inner arms 14 are shown to be rotated so as to lie within the periphery of the reel drum. An Edenborn feed tube 15 having a funnel-shaped mouth 16 is inserted in the upper end of the intermediate piece 10. An Edenborn guide tube 17 is inserted in the intermediate piece at an angle of 45°. A curved passage 18 formed in the intermediate piece effects a connection between the tubes 15 and 17. An outer drum 19 surrounding the reel 9 forms a cage 20 for the reception of the wire coil.

The outer drum is formed with an external conical seat 21 which engages with a correspond-

ingly shaped braking surface 22 provided on an outer ring 23 in the withdrawn position of the inner arms 14. This outer ring is rigidly connected to the housing 2 through tie rods 24 and tubular distance pieces 25 and carries one-arm outer supporting arms 26 of the Edenborn type. The outer arms 26 are actuated by racks 27 slidably mounted in the ring 23. As shown on the right-hand side of the drawing the outer arms 26 are swung in position below the storage space 20, whilst on the left-hand side the outer arms 26 are shown to be swung out of the way when the arms 14 are in use.

The racks 27 are provided on the ends of rods which are guided for longitudinal telescopic displacement within tubular lower portions 28 of spring housings within which are also mounted internally springs 29 and 30. These springs cooperate with head means provided on the end of the rack rods to resiliently hold these rods and the racks in a mid position while leaving the rods and racks free for slight displacements in either direction. A strong compression spring 31 which is held between the cap closure 32 for the spring housings and the bushing 33 mounted in the bores in the housing 2 that receive the spring housings insures that the racks 27 and the spring housings, including the tubular portion 28, always occupies their lowermost position. There are six racks in the present embodiment, some of which are not shown. As particularly illustrated in Figure 2, the upper portions of the spring housings are solid rods that journal rollers 34 mounted on bolts 35 secured transversely of the axis of these rods. These rollers ride on cam surfaces having high points as at 39 and which surfaces are formed on an annulus 37 which is provided with internal teeth 38. This annulus is driven by a motor 40 which drives a pinion 41 meshing with the teeth 38. Thus upon rotation of the annulus the cam surfaces simultaneously elevate the spring housings in the racks connected thereto. Figure 3 illustrates the invention in the elevation with particular reference to the drive for the second reeling arrangement. A third motor 42 having a worm drive is here provided which through a slider crank mechanism 43 moves the feeding tube 15 or reel shaft respectively and thereby the inner arms 14. The motion is effected through a one-arm lever 44 the pivot 45 of which is mounted on a slidably arranged sleeve 46 subjected to the action of the spring 47. A removable auxiliary feed tube for Garret type operation as illustrated at 48 and beneath the storage space 20 and supported by the framework 1 is a cooling grid 49 of known construction.

The mode of operation of the apparatus above described is as follows:

When the apparatus is to work on the Garret system, the removable auxiliary Garret type feed tube 48 is placed in position, the arms 26 are moved out of the way as shown on the left-hand side of Figure 1, by actuating racks 27, and the guide tube 17 is removed. The arms 14 are moved upwardly to take up their positions below the storage space 20, this being effected by lowering the intermediate piece 10 through the feed tube 16 and the slider crank mechanism 43. At this time the reel 9 is coupled through coupling 8 to the hollow shaft 4 and is maintained in rotation. By actuating the crank 43 and the members 10, 11, 13, 14 and 16 associated therewith the arms 14 are withdrawn and the complete coil of wire is ejected, following which the inner arms 14 are moved back into position below the storage space. The coil of wire is dropped on to a cooling grid 49 of known construction which is directly supported by the framework 1 and another coil is formed.

If the apparatus is to operate on the Edenborn system, the Garret feed tube 48 is removed and the operating means for the inner arms 14 are displaced upwardly so that these arms are tilted away from below the storage space. In this position the Edenborn guide tube 17 can be mounted on the intermediate piece 10 and fixes the latter in position. At the same time the racks 27 are moved into their lowermost position so that the storage space 20 is closed and the reel drum is uncoupled and remains stationary. After a coil of wire has been completed by rotation of the hollow shaft 4 under the action of the motor 7, by setting into motion the motor 40, the outer arms 26 are successively retracted from and returned to their position below the storage space. The coil of wire again drops on to the cooling grid 49.

It will be understood that the apparatus described may be subjected to numerous modifications and additions without exceeding the scope of the invention. The uncoupling of the reel 9 may, for instance, be effected automatically by driving upwardly the intermediate piece 10. For a rapid discharge of the coil of wire it is immaterial whether the reel 9 is driven or not and when the reel is again coupled to the driving shaft its speed of rotation will not have appreciatively decreased.

The braking of the reel may be effected simultaneously with the moving into position of the outer arms 26 either by the ends abutting against the edge of the drum or by means of a special brake for the drum.

The outer drum 19, which is lifted by the inner arms 14 may be driven thereby whilst inversely on moving the inner arms 14 into position the outer drum is lowered and with its brake surface comes into contact with the outer ring and is thus brought to rest. It is moreover possible to proceed in a different or, for instance in the reverse way.

I claim:

1. A wire winding reel for selective low or high speed winding comprising a frame, a vertical hollow shaft, a motor for driving said hollow shaft, a reel suspended at the lower end of said shaft, a releasable coupling between said hollow shaft and said reel to transmit rotation of said shaft to said drum, an outer drum surrounding and adapted to rotate with said reel and providing a storage space between the reel and drum for the reception of the wire coil, a set of inner radial supporting arms pivoted within said reel and adapted to selectively be swung outwardly into position to form the lower limit of said storage space, motor driven means including a second motor for pivoting said arms, a set of outer radial supporting arms pivotally mounted externally of said outer drum and adapted to selectively be swung inwardly to form the lower limit of said storage space when the inner supporting arms are withdrawn, additional motor driven means including a third motor for pivoting said second set of arms, a wire feed tube axially displaceable within and rotatable with said hollow shaft, and a removable inclined guide tube in communication with said feed tube and adapted to be rotated with said hollow shaft for placing the wire in the storage space with the said coupling released and the reel fixed and the outer

supporting arms in operative position, and a removable auxiliary wire feed tube for leading the wire to the storage space when the inclined guide tube is removed, the coupling engaged, the reel rotating with the hollow shaft and the inner supporting arms are in position below the storage space.

2. A machine as specified in claim 1 comprising an intermediate piece attached to said wire feed tube and adapted for vertical displacement therewith within the hollow shaft, an extension on the lower end of said shaft, a vertically movable sleeve on said extension for pivoting said inner supporting arms and a control rod attached to said intermediate piece and adapted to effect the operation of said inner supporting arms through the medium of said vertically movable sleeve.

3. A machine as specified in claim 2 and the intermediate piece having an internal curved passage communicating with the wire feed tube and the inclined guide tube.

4. A machine as specified in claim 1 comprising a fixed ring secured to the frame and supporting the outer supporting arms, and said additional motor driven means including a plurality of cam-operated racks, vertically movable in said fixed ring for operation of said outer supporting arms.

5. A machine as specified in claim 4 wherein the upper surface of an annulus having internal teeth comprises the cam for operating the racks, a driven pinion meshing with said teeth and a plurality of rollers attached to said racks and supported by the upper surface of said annulus.

6. A machine as specified in claim 5 wherein the said rollers are attached to the racks through spring-pressed telescopic tubes.

7. A machine as specified in claim 1 comprising an intermediate piece attached to said wire feed tube and adapted for vertical displacement therewith within the hollow shaft, an extension on the lower end of said shaft, a vertically movable sleeve on said extension for pivoting said inner supporting arms, a control rod attached to said intermediate piece and adapted to effect the operation of said inner supporting arms through the medium of said vertically movable sleeve and means providing a slider crank motion driven by said second motor and operably connected with said wire feed tube for intermittently effecting the vertical displacement of said control rod and the rotation of said inner supporting arms.

8. A machine as specified in claim 1 comprising an annular water chamber arranged co-axially with the hollow shaft.

9. A machine as specified in claim 1 comprising a cooling bed below the reel for the reception of the completed coil of wire.

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