May 12, 1959 O. HAUGWITZ 2,886,258

COILING APPARATUS

Filed April 27, 1956 2 Sheets-Sheet 1

FIG.2

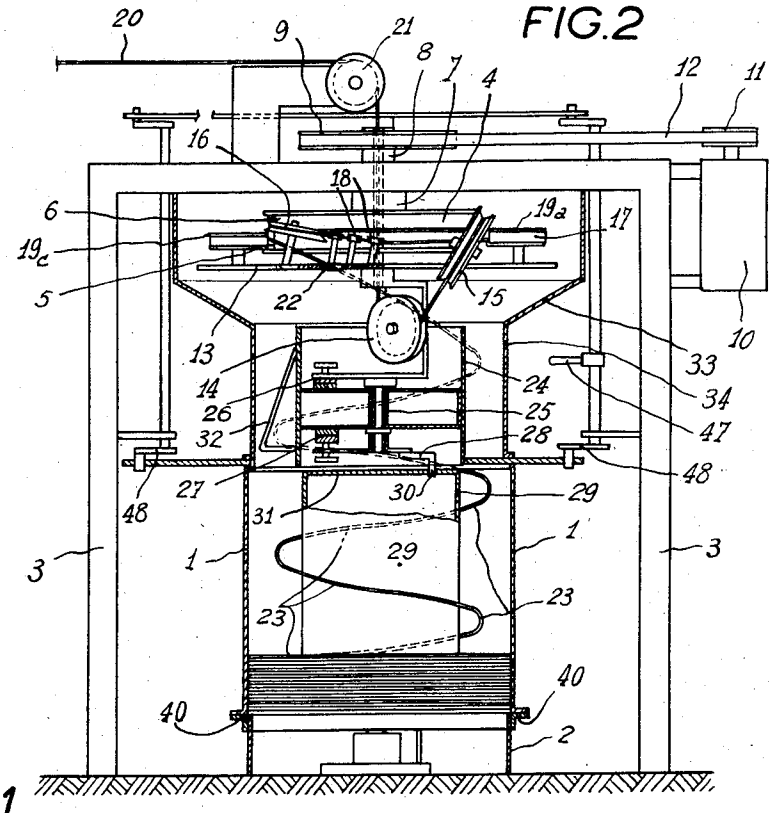
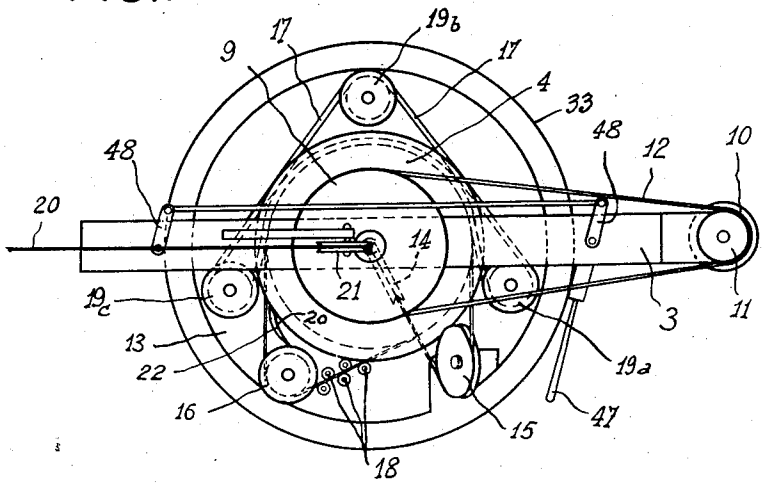


FIG.1



May 12, 1959 O. HAUGWITZ 2,886,258

COILING APPARATUS

Filed April 27, 1956 2 Sheets-Sheet 2

FIG.3

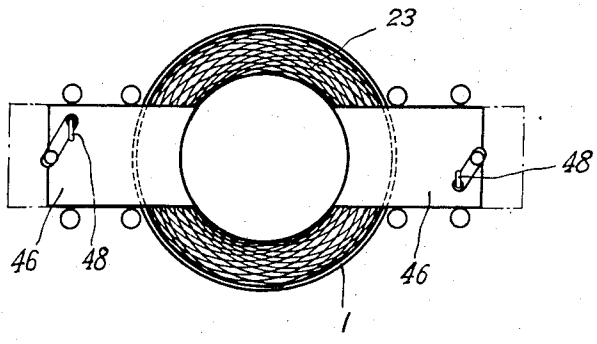
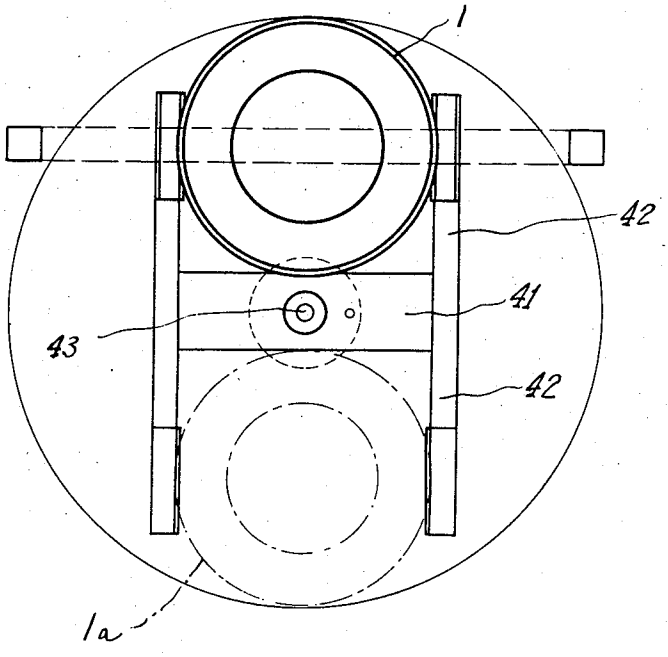


FIG.4



United States Patent Office 2,886,258 Patented May 12, 1959

2,886,258

COILING APPARATUS

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Application April 27, 1956, Serial No. 581,033

Claims priority, application France May 12, 1955

4 Claims. (Cl. 242—82)

In the manufacture of bare or insulated wire, it is always required to draw the wire through production machines and thereafter to wind it up for handling and storage purposes. Heretofore the wire was wound on drums and it was therefore required to provide both a draft or pulling unit, usually in the form of a conical winch, and a take-up unit consisting of a winder driven from the machine itself through an adjustable friction means or from a slip-drive motor which would be capable of matching the velocity to that of the winch so as to maintain a predetermined tension on the wire, since the angular speed of the winder has to decrease relatively to that of the winch as the drum is gradually filled. A guide device of adjustable pitch and displacement in accordance with the gauge of the wire and the width of the drum, driven by the drum, guides the wire and ensures a regular winding process. To remove the wire from the drums during the subsequent manufacturing stages a discharge frame is necessary. All this equipment including the drums is comparatively expensive, space consuming and involves considerable maintenance.

Another known method of winding wire, which possesses some advantages over that described above, consists in drawing the wire with a winch and then inserting it into a container in the form of a cylindrical barrel rotated about its axis and in which is disposed a cylinder of smaller diameter than that of the outer cylinder wall. The wire fills the space between the two cylinders.

The drawback with this last process lies in the fact that the barrel in which the wire is stored must be rotated, which circumstance obviously precludes continuous operation since in order to change a barrel once a barrel has been filled the rotation has to be arrested to remove the filled barrel and substitute an empty barrel therefor.

The present invention provides a remedy to this drawback and relates to apparatus of the kind including a barrel and winding winch, the invention essentially residing in the fact that the take-up barrel and the winch drum are stationary and a distributor unit for feeding and guiding the wire (or the like) is rotatably mounted over said barrel.

More especially an apparatus according to the invention comprises a stationary take-up barrel and the rotary feeder is disposed coaxially above such barrel, the rotary feeder including on the one hand a winch drum fixedly arranged relatively to the barrel, and on the other hand a table rotatably mounted on a hollow shaft coaxial with the barrel and the winch drum, said table carrying guide pulleys for guiding the wire, cable or the like about the winch drum prior to depositing it in the barrel.

In the case of a flexible wire or cable the number of guide pulleys may be limited; in the more general case of wire and cables which may show a certain amount of stiffness, the invention provides means for bringing the wire or cable to a pre-wound condition so that the turns will form and settle readily and regularly in the barrel.

For this purpose the above mentioned rotary table

supports a set of angled guide pulleys guiding the wire or cable about a first stage of the winch drum, and a set of horizontal guide pulleys which act to stretch an auxiliary belt around the winch drum, which belt serves to press the cable into a second stage of the winch drum prior to being deposited in horizontal coils within the barrel.

To ensure with yet greater reliability a regular distribution of the turns of cable in the bottom of the barrel, additional means are provided essentially consisting of a cylinder coaxial with the assembly and driven slowly in rotation, the cylinder supporting exteriorly thereof an excentered element which is adapted progressively to displace the turns all around the space between the two cylinders.

In a commercial aspect the apparatus is contained in a casing secured to a fixed gentry beneath which the barrels to be filled are consecutively introduced.

Since the barrels are stationary during filling they can be readily replaced after each filling operation so that continuous operation may easily be obtained as will be more fully disclosed hereinafter.

The invention will now be described with reference to the ensuing description and the accompanying drawings wherein:

Fig. 1 is an overhead view of the apparatus;

Fig. 2 is a side view, with the barrel and casing of the feeder shown in axial section;

Fig. 3 and Fig. 4 illustrate the system whereby the filled barrels may be interchanged in operation.

On the drawing a conventional take-up barrel or cylinder has been shown at **1**, placed on a base **2** more fully described hereinafter.

The feeder unit carried by a gantry **3** comprises a fixed winch drum **4** having two vertically spaced grooves i.e. a lower groove **5** and an upper groove **6**. The winch drum is rigidly connected with the gantry **3** by a part **7**. Extending through the assembly is a hollow shaft **8** driven in rotation through pulleys **9** and **11** and belt **12** from a motor **10**.

The feeder unit moreover includes a turntable **13** driven by shaft **8**, and drive pulleys which may be grouped in two sets.

In a first set the drive pulleys are mounted in angled condition on shafts journalled in supports rigid with the turntable **13**. These pulleys comprise: the pulley **14** located under turntable **13** tangentially to the axis thereof, the pulley **15** mounted above turntable **13** and having a common tangent with the upper groove **6** of the winch drum, and the pulley **16** mounted above turntable **13** and also having a common tangent with the upper winch groove **6**.

In the second set the pulleys are horizontal and regularly spaced above turntable **13** so as to tension an auxiliary belt **17** trained around a semi-circumference of the lower groove **5** of winch **4**.

In the case of a substantially stiff cable there is desirably associated with one of these pulleys a cable-rectifying system consisting of a set of small pulleys **18** arranged to guide the cable over a predetermined path.

The second set of pulleys in the illustrated instance consists of the pulleys **19***a*, **19***b*, **19***c*.

The device operates in the following way:

The cable **20** after having passed over the idler pulley **21** moves vertically downwards through shaft **8** and over a path as follows: drive pulley **14**, drive pulley **15**, semi-circumference of upper winch groove **5** guided by belt **17** stretched by pulleys **19***a*, **19***b*, **19***c*. Finally, the cable, pre-shaped into coils, passes through the slot or aperture **22** of turntable **13** and forms into the coils **23** which flow into the bottom of barrel or cylinder **1**.

As previously stated, in order to provide a smoother

distribution between the turns 23 in the bottom of the barrel or cylinder 1, there is provided a revolving eccenter system consisting in the illustrated instance of the cylinder 24 mounted on a shaft 25 and driven through a friction clutch 26, an adjustable brake 27 being provided. This brake is mounted on a lever 28 which engages with the inner cylinder 29 through a pin 30 projecting into a slot in the cover 31 of barrel 29.

The cylinder 24 carries an eccentric element 32 which, as a result of the slow rotation of cylinder 24, acts progressively to separate the turns around the full circumference of barrel 1. It is seen from Fig. 3 that this will result in a distribution of the turns 23 in a honeycomb pattern.

The whole feeder unit is enclosed in a casing 33 the base of which is formed as a cylinder 34 slightly less in diameter than that of the barrel 1 so that the turns will not be liable to catch but will drop freely into the barrel.

One great advantage of the device described consists in the possibility of working continuously for filling and emptying the barrels, a type of operation that was not practicable with the methods and devices known heretofore. The continuous annealing of copper wire, continuous vulcanization of rubber insulated wire, and the roving of plastic insulated wire all require operation without shut-down or slow-down periods, if it is desired to avoid the considerable waste occurring after each such period. The replacement of the barrels should therefore be effected in operation and the two ends of wire have to be accessible so as to make it possible to effect the soldered connection with the next length during time that one barrel is being emptied at the input of the machine using the wire.

There is illustrated in Figs. 3 and 4 one advantageous arrangement for the replacement of barrels on operation.

The barrels are provided with bases 2 (Fig. 2) which allow their being handled with a hoisting jack.

The base moreover carries two outwardly directed angle irons 40. The barrels may if desired be formed with sets of apertures (not shown) in their side walls for inspecting at any time the amount of cable that has been wound on or off.

As illustrated in Fig. 4, a pivotal frame 41 is mounted beneath the draft system and carries a pair of fork members 42 adapted to be rotated about the shaft 43 and to receive a pair of barrels 1 and 1*a* between the arms thereof. One barrel say 1 is at any time positioned in vertical axial alignment with the system described above so as to be in a position to receive the cable or wire, while the other barrel 1*a* is then positioned in front of the system. The assembly including arm 41 and forks 42 is adapted to be rotated 180° about the shaft 43 so as to change the particular barrel in receiving position. Means may be provided for latching the assembly in each of its operative positions so as to prevent inadvertent displacement of a barrel during loading thereof.

Moreover, in order to permit a continuous feed of the cable even during the periods in which the assembly is being rotated for replacing one barrel by the other, it is necessary to provide means whereby the cable may be collected during the time it is not being received into a barrel.

For this purpose the cylinder 34 serves as a storage means. This cylinder as is clearly shown in Fig. 3 is provided with a pair of plates 46 movably fitted to it and adapted to be operate by means of lever systems 47—48 for sealing the bottom end of the cylinder 34, the plates being selectively insertable inwardly as far as

the inner cylinder 24. In Fig. 2 the right-hand plate 46 is shown thus inserted.

When the barrel has been filled, the storage cylinder is closed by means of the lever 47 so that the turns of cable will provisionally coil up in the space defined between the walls 24 and 34. The barrel in receiving position is changed, the wire is cut off and the end of the wire hanging from the coiled mass accumulated is made fast to the side of the empty barrel, so as to make it readily accessible for the welder. The mass of coils previously stored is then cast loose by operating the lever 47.

During the time that each barrel is being filled there is ample time to replace the previously filled barrel on the pair of forks 42, with a similar empty barrel.

What is claimed is:

1. In apparatus for taking up an elongated flexible element, a stationary vertical hollow cylinder, stationary drum means supported coaxially with and spaced above said cylinder and adapted to receive said element around the periphery thereof, and means including an aperture rotatable between said drum and cylinder about the common axis thereof and arranged for having said element fed through said aperture for coiling into said cylinder on rotation of said apertured means.

2. In apparatus for taking up an elongated flexible element, a stationary vertical hollow cylinder, stationary drum means supported coaxially with and spaced above said cylinder and adapted to receive said element around the periphery thereof, an apertured member rotatable between said drum and cylinder about the common axis thereof and arranged for having said element fed through the aperture therein, pulley means carried by said member and adapted for guiding engagement with said element, and means for rotating said member.

3. In apparatus for coiling a flexible element, a stationary vertical hollow cylinder, a stationary drum supported coaxially with and spaced above the cylinder and adapted to receive said element around the periphery thereof, an apertured member rotatable between the drum and cylinder about the common axis thereof and arranged for having said element fed from the drum through the aperture in said member for coiled insertion into the cylinder, pulley means carried by said member and adapted for engagement by the element to guide the element towards said drum, flexible means carried by said member and engaging said drum periphery to apply said element thereabout, and means for rotating said member.

4. In apparatus for coiling a flexible element, a stationary vertical hollow cylinder, a stationary drum supported coaxially with and spaced above the cylinder and adapted to receive said element about the periphery thereof, an apertured member rotatable between the drum and cylinder about the common axis thereof and arranged for having said element fed from said drum through the aperture in said member for coiled insertion into the cylinder, first pulley means carried by said member and adapted for engagement by the element to guide the element towards said drum, further pulley means carried by said member, and a flexible means trained about said further pulley means and engaging said drum periphery for applying said element thereagainst.

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