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G. RASMUSSEN

APPARATUS FOR AXIALLY FEEDING AND ROTATING CYLINDRICAL ARTICLES

2,753,040

Filed July 10, 1952

2 Sheets-Sheet 1

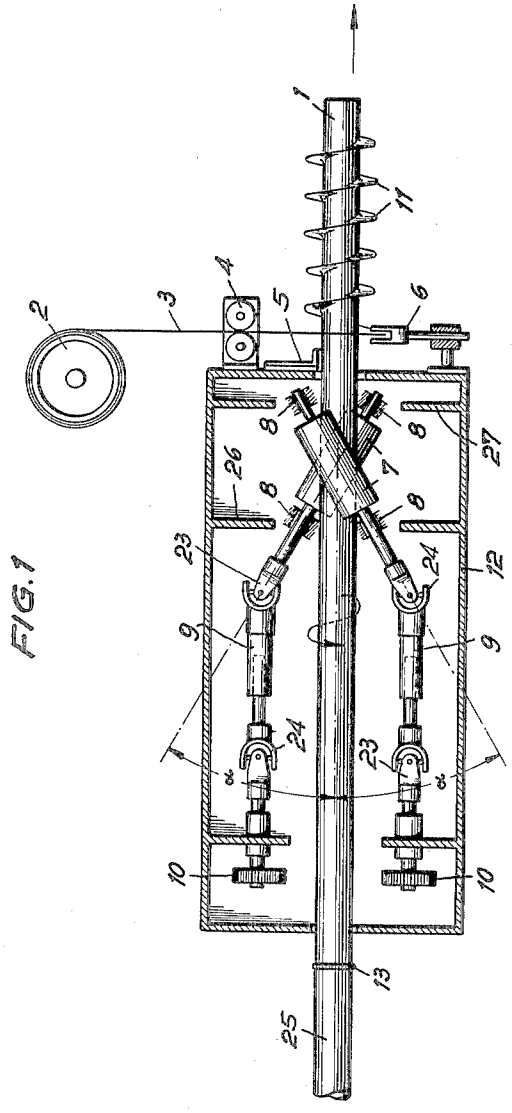


FIG. 1

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2 Sheets-Sheet 2

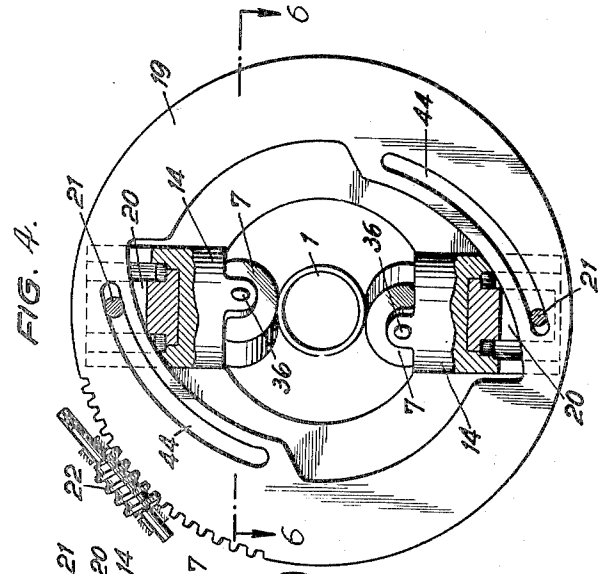


FIG. 4.

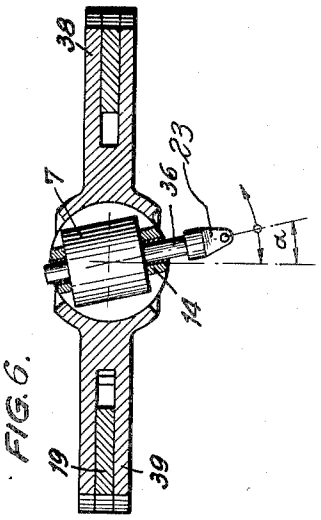


FIG. 6.

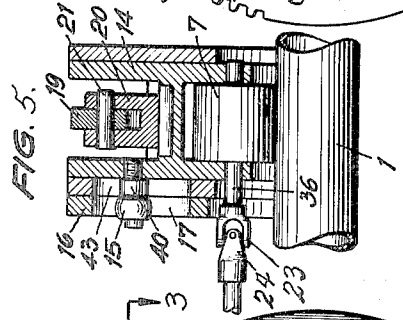


FIG. 5.

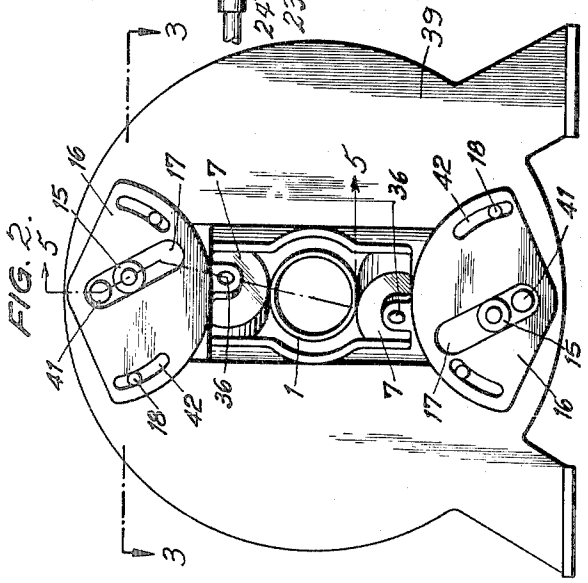


FIG. 2.

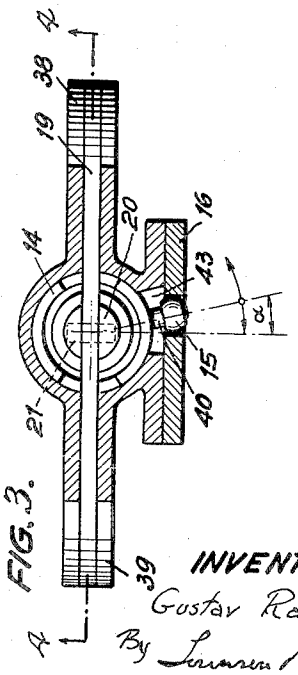


FIG. 3.

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APPARATUS FOR AXIALLY FEEDING AND ROTATING CYLINDRICAL ARTICLES

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Application July 10, 1952, Serial No. 298,153

Claims priority, application Germany July 13, 1951

2 Claims. (Cl. 203—75)

This invention relates to apparatus for axially feeding and rotating cylindrical articles, and has utility in many processes such as the manufacture of gilled tubes used for instance, in heat exchange apparatus and for refrigerator installations.

Such tubes are manufactured by applying strip material in helical windings to a smooth tube. Upon carrying out the winding process a plurality of difficulties are encountered. The tube to be wound is subject to severe stresses by the tension of the strip material to be tightly wound thereon. By progressive displacement of the point of winding from the point of support of the tube, there in set up a continually increasing distortion of the tube which gives rise to undesirable spring reactions and non-uniform winding of the strip on the tube. For this reason, more particularly in tubes of small diameter, the lengths which can be manufactured are extremely limited, since these are not suited to take the necessary distortion stresses.

It is an important object of this invention to provide improved means by which the driving drums employed to rotate the tube to which the helical fin is to be applied are capable of being adjusted to different angular inclinations and by which the drums are adjustable to accommodate different diameter tubes.

It is a further object of this invention to provide improved apparatus for axially feeding and rotating cylindrical articles, including driven rollers capable of being readily adjusted to accommodate cylindrical articles of different diameters; and still another object is to provide such an apparatus in which the rollers are readily adjustable to vary the rate of feeding and rotating of the cylindrical articles.

These, and other objects and advantages will be more fully explained with reference to the accompanying drawing showing for the purpose of illustration two preferred embodiments of the apparatus according to the invention, it being understood that the following description is not designed as a definition of the limits of the invention.

In the drawings:

Fig. 1 is a diagrammatic plan partly in section of an arrangement according to the invention.

Fig. 2 is an elevation taken in the direction of the tube axis of a detailed arrangement according to the invention.

Fig. 3 is a section along thel ines 3—3 of Fig. 2.

Fig. 4 is a section along the line 4—4 of Fig. 3.

Fig. 5 is a section along the line 5—5 of Fig. 2.

Fig. 6 is a section along the line 6—6 of Fig. 4.

According to Fig. 1 the strip material 3 to be wound on the tube 1 runs from a supply roll 2 through the guiding and shaping device 4 and the guide 6. In order to support the tube there is provided a further guide 5. These guiding devices are already known, but in contrast to the known tube winding arrangement they are arranged to be stationary, but may however be adjusted to suit the different widths and thicknesses of strip material.

The tube on which the strip is to be wound proceeds through a machine frame or stand 12, wherein by means of two pairs of bearings 8, a pair of driving drums or rollers 7 are arranged oblique to the axis of the tube 1 and are arranged to be rotated in a manner to be further described below. One driving drum is arranged above the tube 1 and is in driving contact therewith at a place which, theoretically, is a point. In a similar manner the second drum 7 is arranged below the tube and again is arranged with its surface in driving contact with the periphery of the tube 1. The oblique position of the drums 7 can be imagined to be produced in that each drum is arranged parallel to the tube 1 and that the peripheral surfaces are in contact along a line and that thereafter the drums 7 are deviated through an angle.

The two drums 7 are arranged to be driven through a common gearing 10, rotated in any suitable manner, for example by an electric motor and through respective pairs of universal joints 23, 24 and half-shafts 9 which are extensible but non-rotatable with respect to each other.

At 13 is shown how one end of the tube 1 may be joined to a further tube end 25, for example by welding.

In the event of a further tube end being welded on—as is shown at 13—the welded joint is made smooth in the continuing working process by the passage thereof through the rollers 7 so that the weld may be directly wound with the strip material without the necessity for any manual preparation. Another advantage accrues for the same reason, in that the driving drums, by their action, strip the tube of rust to a great extent before the strip material is wound thereon.

As shown in Figs. 2 to 6, the housing or frame for taking the bearings of the driving drums or driven rollers 7, and through which the tubes or other cylindrical articles pass, consists of two halves 38, 39 between which is disposed a ring 19 rotatable about the axis of the tube 1. Each drum 7 is carried with its shaft 36 rotatable on the inner side of one of a plurality of pistons 14 which are axially slidably displaceable in, and axially rotatable relative to, the half housings 38, 39 comprising the frame, in such a manner that each piston axis extends radially with respect to the axis of tube 1, and each drum or roller axis is perpendicular to the axis of its associated piston.

The piston 14 carries a pressure block 20 arranged therein so as to be coaxially rotatable but not axially displaceable with respect thereto. This block is provided with a transverse pin 21, which penetrates a slot 44, which runs in the ring 19 eccentrically with respect to the axis of the tube 1. A plurality of these slots are symmetrically disposed about and extend through ring 19, there being one slot adjacent each piston 14. Each pin 21 is disposed in its adjacent slot 44. By means of a self-locking worm 22, the adjusting ring 19 can be rotated with respect to the axis of the tube 1. The representation of locking worm 22 and its associated rack portion on ring 19 has been omitted from Figures 2 and 3 to avoid a confusing mass of lines. By a rotation of this adjusting ring, the transverse pin 21 is moved along the slot 44, and since the piston 14 is fast with the pressure block 20 in the two-part housing 38, 39, angular rotary movement of the adjusting ring 19 effects a sliding movement of the piston 14 with its pressure block 20 along an axis which is radial to the axis of the tube 1. Angular rotation of the adjusting ring 19 will therefore adjust the driving drums 7 to the varying diameters of the tubes which are to be wound.

Each piston 14 is provided with a transverse second pin at whose end is arranged a ball or roller 15 with a spherical running surface. This spherical head or roller 15 engages in a second slot 17 provided in a sector plate 16. One plate 16 is provided adjacent each piston 14, and each plate 16 is mounted for rotation on the frame about an axis 41 provided in the half 39 of the bearing housing.

The axis 41 lies remote from the rotation axis of the tube 1. Adjustment screws 18 which penetrate slots 42 in the sector plate 16 are provided for adjustment of the latter. A suitable cavity 43 is also provided in the half 39 of the housing so that second pin 40 can project therethrough.

By rotating the sector plates 16 about their axes 41 (by means not shown), after the adjusting screws 18 have been slackened, the pistons 14 will be rotated and thus the angle of the driving drums will be varied. In this way, the rate of feeding and rotating the cylindrical articles will be adjusted.

As will be readily understood from the foregoing description, in a preferred embodiment of the invention, a device, or a group of similar devices, effects both the rotary and the translatory motion of the tube. This idea is carried into effect in a simple manner according to the invention in that the rotary and translatory motion of the tube is effected by means of a rotatably arranged drum or roller having its peripheral surface in engaging contact with the tube and whose axis lies oblique to the tube axis.

Furthermore, from the above description it follows that in general it is advisable to provide a group of similar and similarly arranged driving drums whose contact points with the tube lie in a radial plane with respect to the axis of rotation of the tube. In this manner there is obtained at the same time a simple means of centering the tube during the rotary and translatory drive. In most cases it is also advisable to have a positive drive for all of the drums arranged in such manner. It is however also possible, for example, to provide a positive drive for only one drum and to allow the other drums to run idle therewith and thereby to act only as a guide for the tube. When a plurality of drums are provided the oblique angles at which they are arranged to the tube axis have preferably the same value with relation to a common radial plane of the tube.

As will be further apparent, in accordance with preferred embodiment as explained above the interval between the driving drums and the tube axis is adjustable. In this manner the arrangement according to the invention can be suited to tubes of various diameters in a simple manner.

What I claim is:

1. Apparatus for axially feeding and rotating a cylindrical article comprising in combination a frame through which said cylindrical article passes, a plurality of pistons mounted for axial sliding movement in said frame radially of said cylindrical article, a driven roller mounted on the inner side of each said piston for rotation about an axis perpendicular to the axis of its associated said piston, said pistons also being mounted for axial rotation relative to said frame, a ring mounted on said frame coaxially of said cylindrical article, said ring having a plurality of symmetrically disposed eccentric slots therethrough, there being one slot adjacent each piston, a block mounted on each said piston, each said block being rotatable relative to and coaxially of its associated piston but fixed against relative displacement axially of said piston, a pin mounted on each said block and disposed in its adjacent slot, means for rotating said rings to displace said pistons axially toward or from said cylindrical article, and means for driving said rollers for axially feeding and rotating said article.

2. The invention of claim 1, and a plate adjacent each piston mounted on said frame for rotation in a plane parallel to the plane of said ring and each plate having therein a second slot, a second pin mounted on each said piston and disposed in said second slot, whereby rotation of said plates rotates said pistons for adjusting the rate of feeding and rotating said cylindrical article.

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