

[54] **CENTERLESS WINDING OF A ROLL OF FOIL**

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[58] Field of Search**242/56 A, 56 R, 64, 65, 66, 242/55.05; 53/118**

[56] **References Cited**

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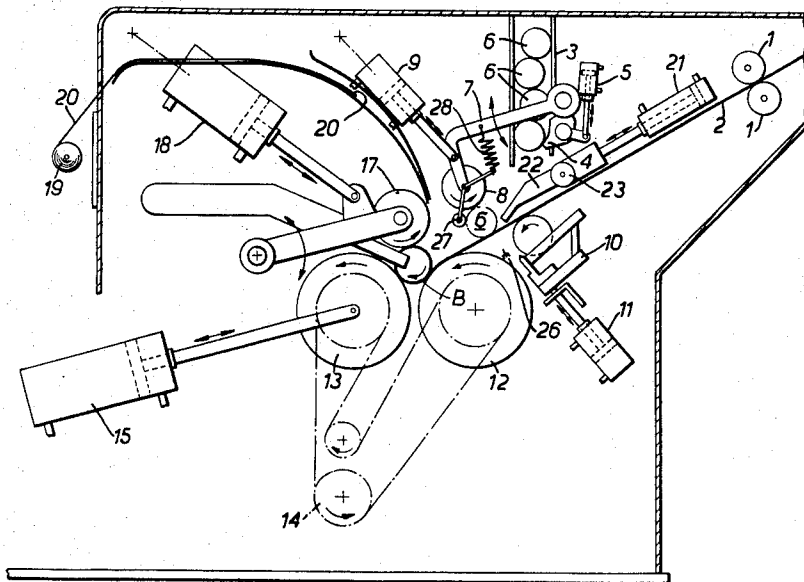
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[57] **ABSTRACT**

Apparatus for the centerless winding of a roll of foil comprises a pressure roller which urges a core and the foil against a rotating contact roller to cause preliminary winding of the foil on the core. The partially wound core is then transferred to a final winding position for completion of the winding followed by wrapping.

2 Claims, 3 Drawing Figures



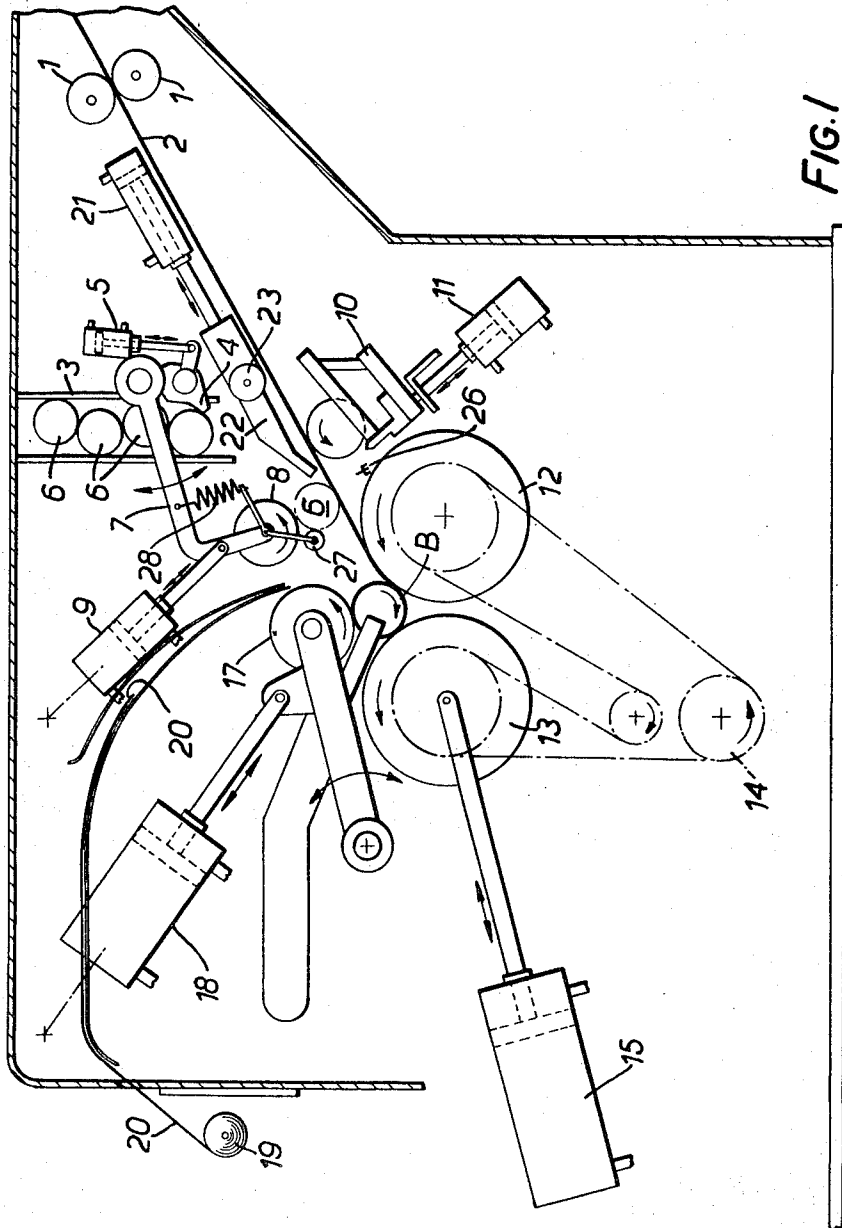


FIG. 1

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CENTERLESS WINDING OF A ROLL OF FOIL**FIELD OF THE INVENTION**

The invention relates to the centerless winding of a length of foil onto a core.

SUMMARY OF THE INVENTION

According to the present invention, there is provided apparatus for the centerless winding of a length of foil onto a core, said apparatus comprising a core magazine, a contact pressure device for pressing the foil against a core discharged from said magazine, a first rotating-contact roller, a pressure roller urging the core and foil against said contact roller to cause rotation of said core and preliminary winding of the foil on the core, means defining a final winding position, means for transferring the partially wound core to said final winding position, and cutter means actuatable to cut the foil when a predetermined length has been wound onto the core at said final winding position.

Preferably, the pressure device is pneumatically operated and holds the foil, which can comprise several layers, against the core, thereby ensuring that none of the layers is displaced, so that perfect winding is assured.

In the final winding position, the roll of material should preferably lie between the first contact roller and a second contact roller, to which latter a drive can be applied and which can be moved towards and away from the first contact roller.

Additionally, a pressure roll is provided, in constant contact with the roll of material being finally wound, preferably this pressure roll being controlled by a pressure piston and cylinder in such a way that the pressure applied is reduced as the diameter of the roll of material increases. Moreover, in conjunction with the movement of the pressure roll, the second contact roller is withdrawn so that the play of force is constant. The core magazine preferably has a gate, which releases a core shortly before completion of the winding of the roll of material. This gate is preferably pneumatically operated.

According to another preferred feature of the invention, a roll of wrapping paper is provided, from which wrapping paper carrying an adhesive strip is unwound and introduced into the gap between the fully wound roll and the contact roller.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings, in which:

FIGS. 1 and 2 are fragmentary elevations, partially in section, of apparatus in accordance with the invention in two working positions; and

FIG. 3 is a section taken on the line III—III in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings, the apparatus comprises a pair of draw-in rolls 1, through which is fed a foil strip 2. The foil strip can comprise, for example, a flattened tube folded longitudinally.

At 3 is a magazine for tubular cores, discharge of which is controlled by a gate 4. The gate 4, in the em-

bodiment shown, is operated by a double-acting piston and cylinder 5 supplied with fluid under pressure

The magazine 3 houses individual cores 6, which can be made of cardboard.

Mounted on a pivotal arm 7 is a pressure roll 8, the pressure applied by which is determined by a double-acting piston and cylinder 9 supplied with fluid under pressure.

A contact pressure device 10 is also provided, which, by means of a piston and cylinder 11, supplied with fluid under pressure, can be moved to a position, in which it presses the foil 2 firmly against a core 6, discharged from the magazine 3 for initial winding of the roll.

Two contact rollers 12, 13, against which the roll of material 16 bears when in a final winding position are driven from a roller 14 by means of an endless belt or chain. The contact roller 13 can be moved towards and away from the associated contact roller 12, this movement being imparted by a double-acting piston and cylinder 15, supplied with fluid under pressure.

A pressure roll 17 makes continuous contact with the roll of material 16, under the control of a double-acting piston and cylinder 18, supplied with fluid under pressure, the contact pressure being reduced as the roll 16 increases in diameter.

A roll of wrapping paper 19 is also provided, from which wrapping paper 20, coated with adhesive, is unwound and introduced into the gap between the fully wound roll 16 and the contact roller 12. In this way, the fully wound roll 16 is covered with wrapping paper 20, which projects by a given amount beyond the ends of the roll 16. The projecting portions are then tucked in so as to produce a finished roll 16 completely enclosed.

The letter A indicates the initial winding position, where the preliminary winding is formed, while the final winding position is lettered B. The roll is transferred from position A to position B by a mechanism (FIG. 3) operated by a double-acting piston and cylinder 21 supplied with fluid under pressure. This mechanism comprises two arms 22, pivoted on a spindle 23. Plug members 24, which engage in the ends of the core 6, are mounted on the arms 22 and are movable axially by means of double-acting pneumatically operated pistons and cylinders 25.

A cutter 26, which lies — considered in relation to the direction of travel of the foil 2 — beyond the contact pressure device 10 is operable to cut the foil 2 once the desired number of turns has been wound on to the core 6.

A retaining roller 27 biased by a spring 28, serves to prevent the core 6 from moving from the initial winding position A until the pressure roll 8 has been lowered.

The mode of operation of the apparatus is as follows:

For greater simplicity, it is best to start from the position shown in FIG. 2. When a metering device mounted on the draw-in rolls 1 (but omitted from the drawing in the interest of clarity) indicates that the previous roll has been almost fully wound, the gate 4 on the core magazine 3 releases a core 6, which drops on to the moving foil 2 and is held by the retaining roller 27.

The pressure roll 8 thereupon thrusts the core 6 transversely against the foil 2, so that the core 6 comes to rest in the space between the contact roller 12 and a backing roller 29 via in the initial winding position A.

When the core 6 bears against the contact roller 12, the plug members 24 are moved axially into the ends of the core 6, which is free to rotate. The torque required to rotate the core 6 and thus wind the foil is provided by frictional contact with the contact roller 12. Initially, the pressure roll 8 remains in the position shown and, when the previous roll has been fully wound, the drive to the roller 12 is terminated.

Next, the contact pressure device 10 is operated, the foil 2 thus being pressed firmly against the core 6 in several places. Directly after this application of contact pressure, the cutter 26 is operated and makes a dividing cut in the foil 2, the contact pressure device 10 then returning to its initial position.

While this contact pressure is being applied and the cutter operated, a predetermined length of wrapping paper 20 is unwound by hand from the wrapping-paper roll 19. The paper 20, the leading edge of which carries a strip of adhesive, is then introduced into the gap between the fully wound roll 16 and the contact roller 12. The roller 14 is then driven to rotate the two contact rollers 12 and 13 and thus, under the action of friction, the fully wound roll 16, the paper 20 being thereby wrapped round the fully wound roll 16, and projecting slightly beyond the ends of the roll. These projecting portions are then pressed into the ends of the roll 16.

During wrapping of the previously wound roll, foil 2 is wound on to the core 6. Only the initial winding of the foil 2 takes place, of course, when the core 6 is located in the initial winding position A.

Meanwhile, the contact roller 13 is moved away from the contact roller 12 by actuation by the double acting piston and cylinder 15. When the gap between the two rollers 12 and 13 becomes sufficiently large, the fully wound roll 16, wrapped round with paper 20, is discharged downwardly under the action of gravity.

The contact roller 13 is then returned to its initial position and the core 6 is transferred from position A to position B by the mechanism 21 to 25 (FIG. 1), the core 6 always remaining in contact with the contact roller 12. The mechanism 21 to 25 is thereupon returned to its starting position (FIG. 2).

As the diameter of the roll increases in position B, the contact roller 13 is continuously withdrawn and thus makes allowance for the ever-growing diameter of the roll. In addition, the pressure applied by the pressure roll 17 on the roll of material is reduced as the diameter of the latter increases. Constant winding pressure is thus ensured. As soon as a predetermined length of foil 2 has been wound on, a control pulse to unlock the gate is given and the above cycle is repeated.

The apparatus described is effective to wind a length

of foil onto the core at a relatively high speed, without the use of a winding spindle, and the capital cost of the apparatus is relatively low.

What is claimed is:

1. Apparatus for the centerless winding of a length of foil into a core, said apparatus comprising a core magazine, a contact-pressure device for pressing the foil against a core discharged from said magazine, a first rotating contact roller, a pressure roller urging the core and foil against said contact roller to cause rotation of said core and preliminary winding of the foil on the core, means defining a final winding position, means for transferring the partially wound core to said final winding position, cutter means actuable to cut the foil when a predetermined length has been wound onto the core at said final winding position, a pressure roller in continuous contact with the roll wound at said final winding position, and means actuating said pressure roller at said final winding position, the pressure applied being reduced as the diameter of the roll being wound increases.
2. Apparatus for the centerless winding of a length of foil onto a core, said apparatus comprising, a magazine holding a plurality of cores, means defining an initial winding position for a first core discharged from said magazine, said means comprising, a first driven roller, and first roller means, means defining a final winding position for said first core partially wound at said initial winding position, said means comprising, said driven roller, and second roller means, means for transferring the partially wound first core from said initial winding position to said final winding position, a contact-pressure device for pressing the foil against a second core at said initial winding position while winding of the first core is completed at said final winding position, cutter means actuable to cut the foil when a predetermined length has been wound onto said first core, and means operable to urge the second core at said initial winding position against said first driven roller after actuation of said cutter means to cause partial winding of said second core.

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