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2,520,826

MEANS FOR PREVENTING DEFORMATION OF TUBULAR CORES

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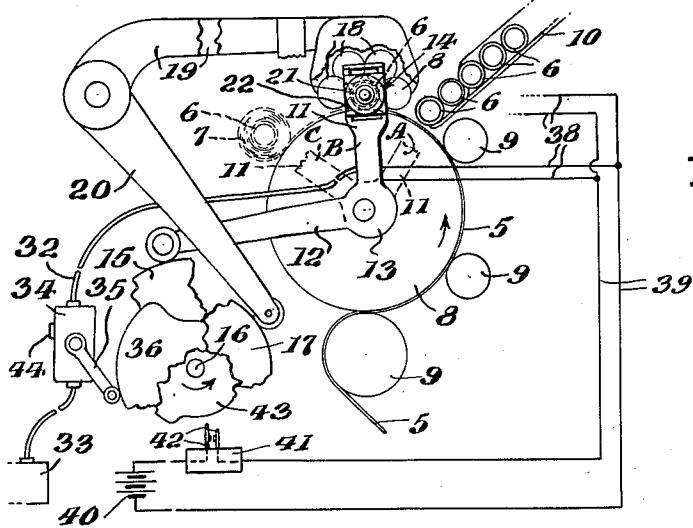


Fig. 1.

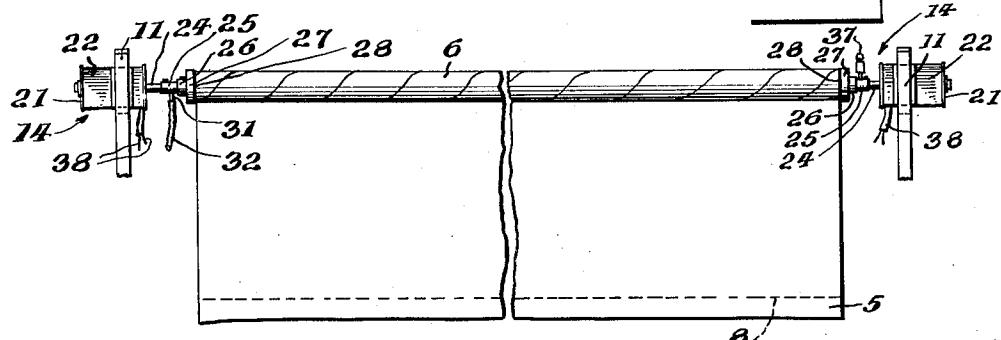


Fig. 2.

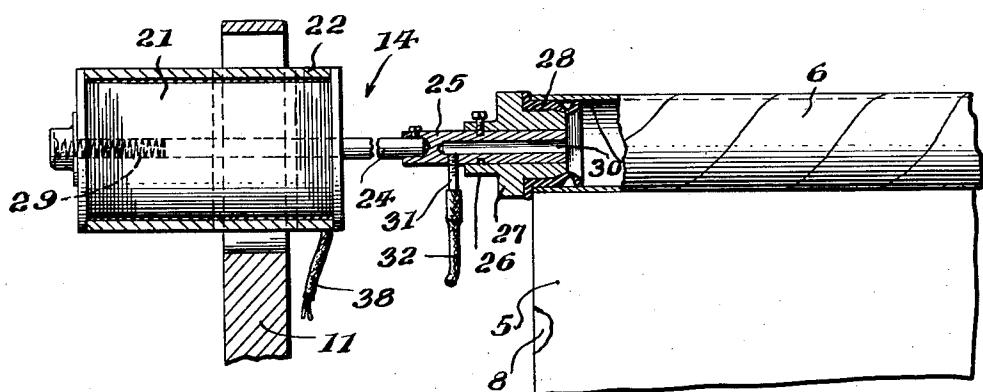


Fig. 3.

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MEANS FOR PREVENTING DEFORMATION
OF TUBULAR CORES

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4 Claims. (Cl. 242—65)

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My invention relates to a pressure control and more particularly to means for controlling pressure applied to cores or the like in web winding machines.

In the winding of web material, for instance, paper, for the fabrication of relatively small or converting rolls from a parent or supply roll, tubular cores are employed on which the web is spirally wound to form converting rolls and which cores are usually constructed of relatively heavy paper or cardboard. Because of the pressure to which the cores are subjected during winding of the web thereon, it has been the practice to provide the cores with winder shafts to preclude collapsing of the cores. Obviously, supplying the cores with winder shafts presents many difficulties and disadvantages, for instance, the loss of time due to stopping the machine to permit inserting and withdrawing of the shafts into and out of the cores previous to and subsequent to the winding operations in the use of semi-automatic winders, or the employment of relatively complicated mechanism for inserting and withdrawing the shafts during the operation of automatic winders. Another approach to the solution of the problem has been to gradually move the cores being wound away from the feeding drum as disclosed in U. S. Patents Nos. 2,385,691 and 2,385,692, issued to W. S. Corbin et al. on September 25, 1945. However this latter solution necessitates the employment of cores constructed of relatively thick material to withstand the pressures applied thereto by the caging rollers with the result that the cost of production is materially increased.

My invention overcomes the foregoing difficulties and disadvantages, it being one of the objects thereof to provide means capable of being applied to both automatic and semi-automatic machines for counteracting the pressure applied to the cores during winding to preclude their collapse and without the employment of winder shafts or similar insertable means.

Another object of my invention is to provide means of the foregoing described character effective for applying fluid pressure to the core to preclude collapse thereof.

A further object of my invention is to provide a method of applying fluid to a core in a manner to preclude its collapse by externally applied pressure.

An important object of my invention is to provide a pressure control of the foregoing described character which is simple in construction, durable in use, efficient in operation, economical

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in maintenance, and which lends itself to high productivity with respect to the forming of minor rolls from a supply roll.

With the above and other objects in view, as will hereinafter appear, my invention consists in the combination and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Referring to the drawings wherein like reference characters designate like parts throughout the several views:

Figure 1 is a fragmentary diagrammatic end elevation of a winding machine having my invention applied thereto.

Figure 2 is a side elevation of my invention as applied to a core.

Figure 3 is a detail sectional view of one of the structures disclosed in Figure 2.

In teaching my invention and with reference to the drawings, I employ a winding machine of the automatic type for winding a web 5, for instance, paper, from a supply or parent roll, about tubular cores 6 successively to form minor or converting rolls, one of the latter being disclosed at 7. As diagrammatically illustrated in Figure 1, the machine comprises a rotary feed drum 8 on which is disposed the web 5 for winding about the cores, pressure or guide rollers 9 being employed to maintain the web on the drum for rotation therewith.

A chute 10 serves to feed the empty cores towards the drum 8, to a core loading position adjacent the drum and from which position the cores are successively conveyed to initial web winding and final web winding positions respectively through the medium of a carrier. The carrier comprises a pair of core carrying arms 11 eccentrically mounted with respect to the axis of the drum, each arm being disposed adjacent an end face of the drum and having its inner end connected to a cam arm 12 by means of a hub 13. The outer end of each of the arms 11 is provided with core gripping means 14 coacting with each other for conveying the cores from the core loading position to the other positions as hereinafter more fully described. The outer end of the cam arm is provided with a roller for tracking engagement with a cam 15 mounted on a cam shaft 16 operating in synchronism with the drum. The cam shaft 16 has also fixed thereto, for movement therewith, a cam 17 for raising and lowering the caging rollers 18 which

embrace the core to initiate or institute winding of the web thereabout when the core is disposed in initial web winding position, the rollers 18 being carried by a pair of arms 19 pivoted to one side of the machine and which arms 19 are in turn each fixed to a cam arm 20 operated by the cam 17.

Each of the core gripping means comprises a solenoid 21 secured within a frame 22 slidably mounted in a slot 23 formed in the upper end of the respective arm 11, the spring pressed plunger 24 of the solenoid having its outer end secured within the inner end of a shaft 25 on which is rotatably mounted a sleeve 26 provided with a collar 27, the outer end of the sleeve and the adjacent radial face of the collar having secured thereto a compressible gasket 28 for effecting a seal with the end of a core when disposed therein under the tension of the plunger spring 29 of the solenoid. The shaft 25 is formed with a longitudinal bore 30 opening through its outer end face and which bore communicates with the interior of the core for supplying the latter with fluid pressure as hereinafter made apparent. The bore 30 of one shaft 25, at one end of the core, communicates with a fitting 31 threaded into the shaft and which fitting is connected, by means of flexible tubing 32, to a source of pressure 33, for instance, compressed air. The tube 32 has interposed therein a control valve 34 operated by means of a valve arm 35 actuated by a cam 36 fixed to the cam shaft 16. The bore of the other shaft 25, at the opposite end of the core, communicates with a safety or outlet valve 37 for exhausting pressure from the core above a predetermined value to preclude rupturing of the core. Each of the solenoids is connected, by wiring 38, to the wires 39 of an input circuit leading from a source of electrical energy 40, a switch 41 being interposed in the circuit and operated into closed and open positions by engagement and disengagement of switch blades 42 controlled by a cam 43 carried by the cam shaft 16.

In operation, the cores are successively conveyed from the chute 10 to the core loading, initial web winding and final web winding positions by the arms 11 as illustrated in dotted, full and dotted line positions A, B and C of the arms, respectively. When the arms 11 are operated to position A, the caging rollers 18 being raised above the drum by the action of the cam 17, the cam 43 operates to open the switch 41 whereupon the solenoids are deenergized and the shafts 25, together with the gaskets, are disposed within the ends of the lowermost core of the chute 10. As the drum and cam shaft continue to rotate, the cam arm 12 moves the arm 11 into initial web winding position B whereupon the caging rollers 18 are lowered about the core thus positioned by the cam 17. As the rollers 18 engage the core, the cam 36 functions to open the valve 34 whereupon fluid pressure is introduced into the core to counteract the pressure of the caging rollers to preclude collapse of the core. In this position, an appreciable length of the web is wound about the core whereupon the caging rollers are raised above the roll thus being formed and the arms advance the roll to the final web winding position C. As the rollers 18 are raised by the cam 17 to permit advance of the roll towards the position C, the valve 34 is operated by the cam 36 and shuts off the pressure from the source 33, and exhausts pressure from the core through an exhaust port 44 in the valve. When the arms are advanced to the position C,

the solenoids are energized by engagement of the switch blades 42 through the medium of the cam 43 thus permitting the arms 11 to be returned to the core loading position A for repeating the foregoing cycle of operation.

Without further elaboration the foregoing will so fully explain the invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and subcombinations.

It is obvious that the invention is not confined to the herein described use therefor as it may be utilized for any purpose to which it is adaptable. It is therefore to be understood that the invention is not limited to the specific construction as illustrated and described as the same is only illustrative of the principles of operation, which are capable of extended application in various forms and the invention comprehends all construction within the scope of the appended claims.

25 What I claim is:

1. In combination, apparatus for winding a web about a tubular core of a construction susceptible to deformation by pressure of a value within a known range when externally applied to the core incident to the winding of the web thereabout and including web feeding means and retaining mechanism for retaining the core in winding position relative to said feeding means, and core positioning means for disposing said core in said winding position and including fluid pressure supply means for sealing said core and supplying the latter with fluid pressure of an effective value within said range to preclude deformation of said core by said first mentioned pressure.

2. In combination, apparatus for winding a web about a tubular core of a construction susceptible to deformation by pressure of a value within a known range when externally applied to the core incident to the winding of the web thereabout and including web feeding means and retaining mechanism for retaining the core in winding position relative to said feeding means, core positioning means for disposing said core in said winding position and including fluid pressure supply means for sealing said core and supplying the latter with fluid pressure of a value to preclude deformation of said core by said first mentioned pressure, and fluid pressure control means effective for limiting the value of said fluid pressure to said range.

3. In combination, apparatus for winding a web about a tubular core of a construction susceptible to deformation by pressure of a value within a known range when externally applied to the core incident to the winding of the web thereabout and including web feeding means and retaining mechanism for retaining the core in winding position relative to said feeding means, core positioning means for disposing said core in said winding position and including fluid pressure supply means engageable with the ends of said core and effective for sealing said ends and supplying the core with fluid pressure of an effective value within said range to preclude deformation of said core by said first mentioned pressure, and electrical means connected to said supply means and operable for rendering the latter effective and ineffective.

4. In combination, apparatus for winding a web

about a tubular core of a construction susceptible to deformation by pressure of a value within a known range when externally applied to the core incident to the winding of the web thereabout and including a web feeding drum and mechanism for retaining the core in winding position on said drum, a pair of arms operable for disposing said core on said drum in said winding position, said arms equipped with core engaging devices for gripping the ends of the core and with means for operating said devices into and out of engagement with said ends, said devices functioning to seal said ends when in engagement therewith and with one of said devices being provided with means for introducing fluid pressure of an effective value and within said range into said core to

5 preclude deformation of said core by said first mentioned pressure.

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REFERENCES CITED

The following references are of record in the file of this patent:

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	2,289,519	Randall -----	July 14, 1942
15	2,385,691	Corbin et al. -----	Sept. 25, 1945
	2,385,692	Corbin et al. -----	Sept. 25, 1945