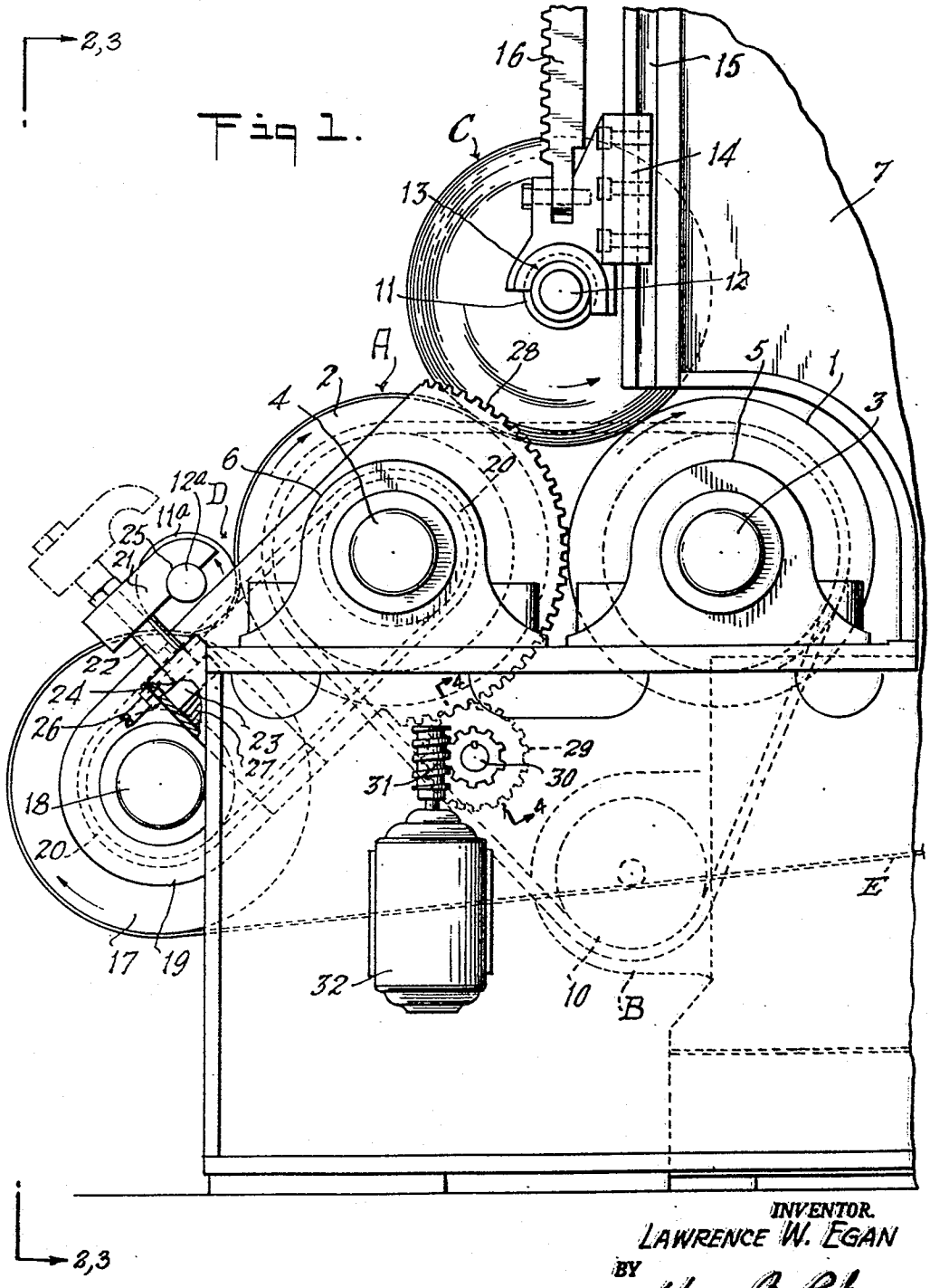
Nov. 12, 1957 L. W. EGAN 2,812,910

DOUBLE DRUM WINDING MACHINE AND FLYING WINDING ROLL CHANGER

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Fig 1.



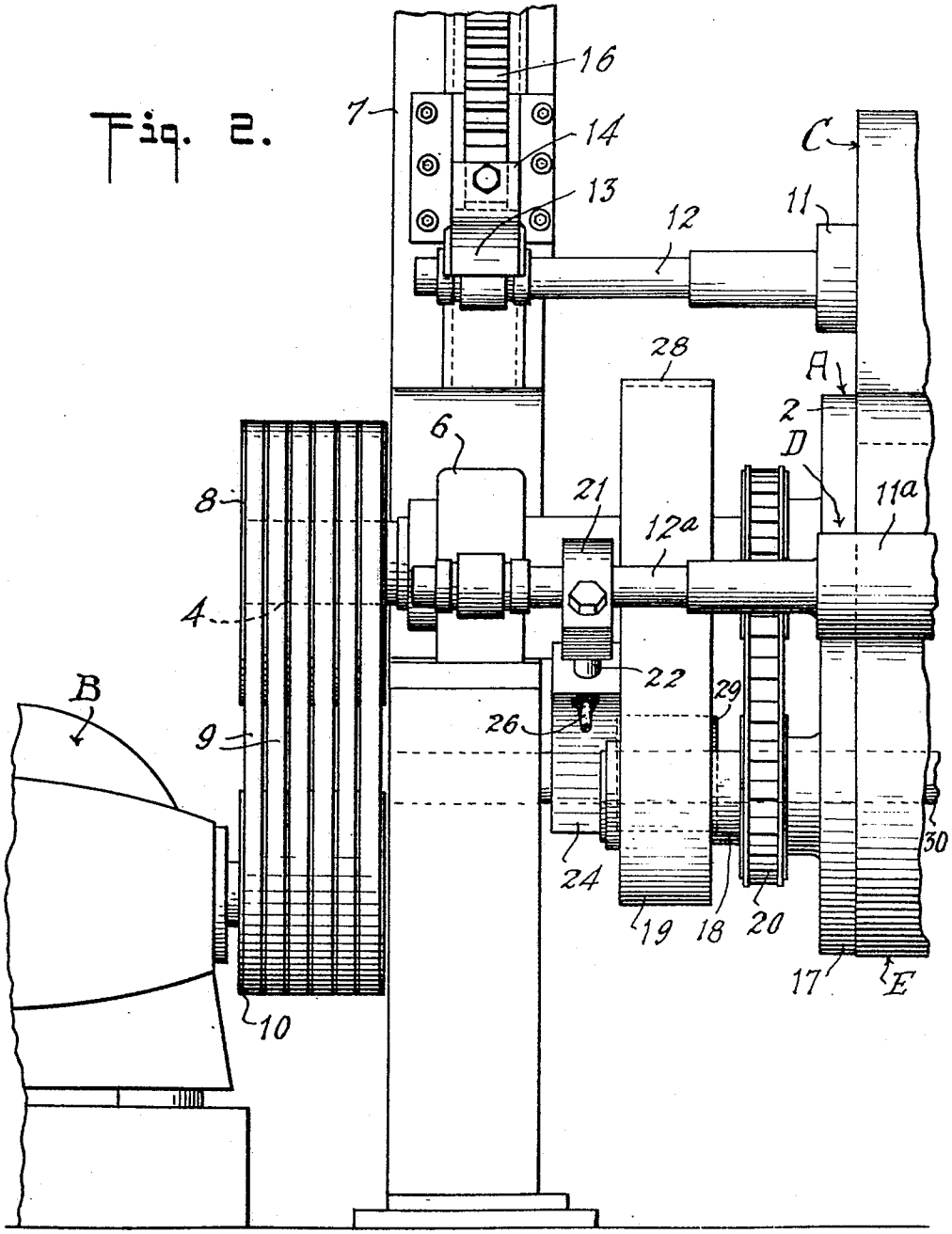

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Fig. 2.




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Fig. 3.

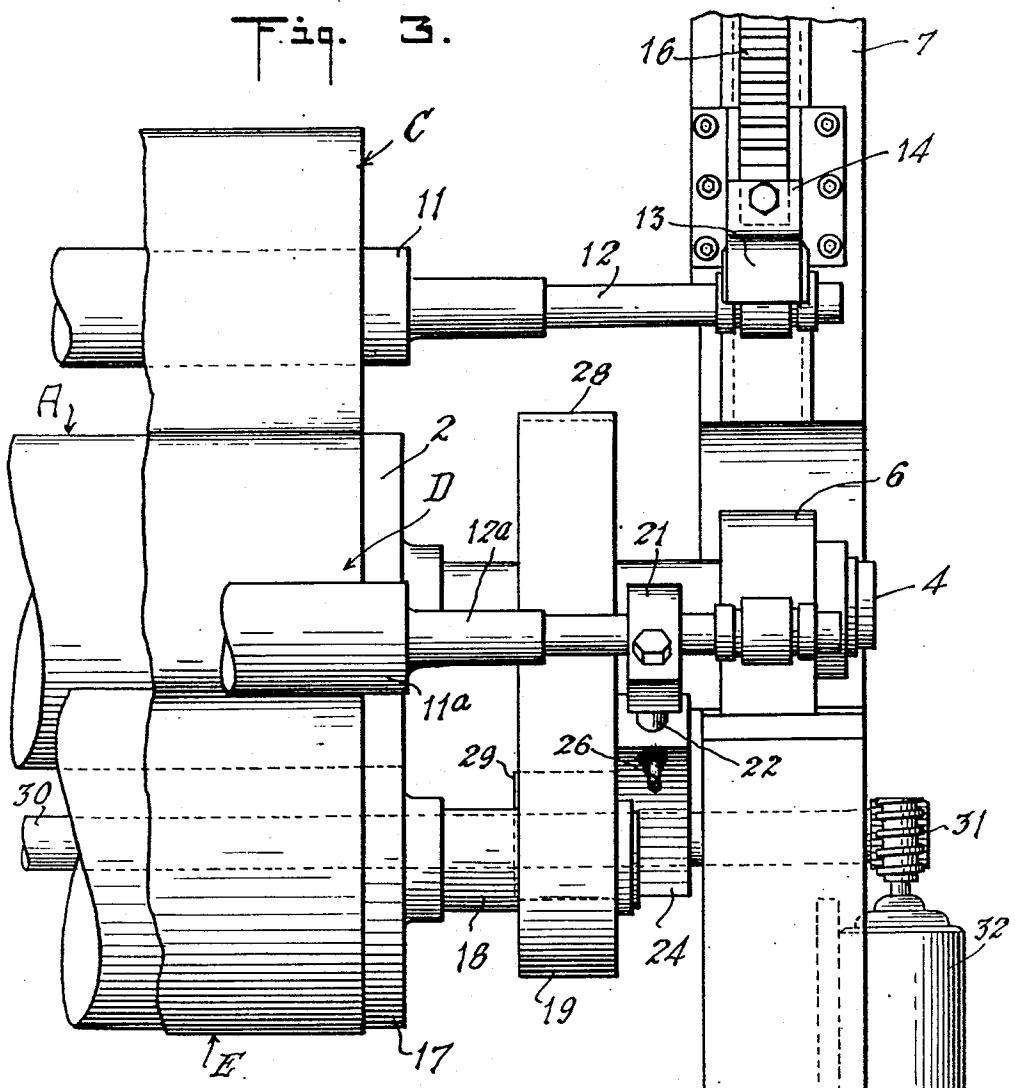
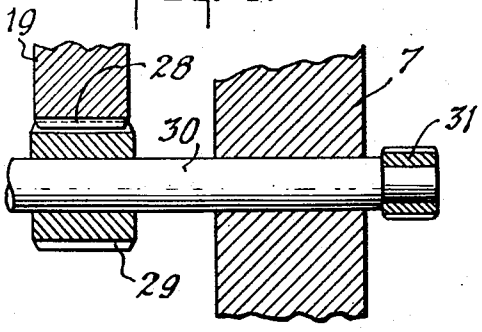



Fig. 4.




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Fig. 5.

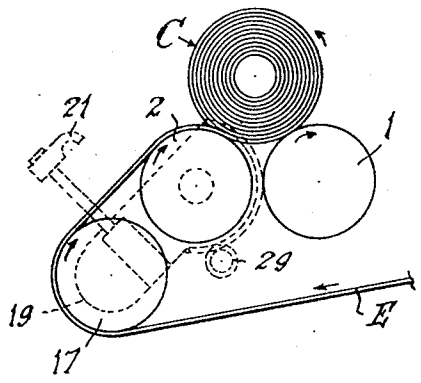



Fig. 6.

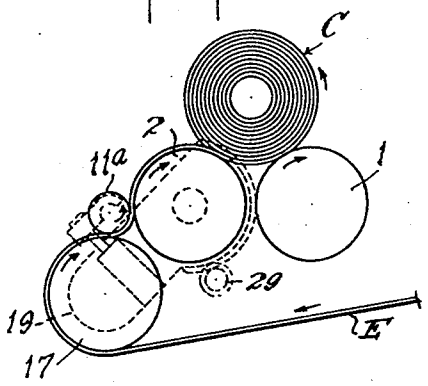



Fig. 7.

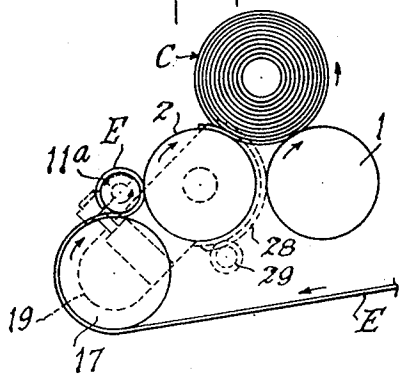



Fig. 8.

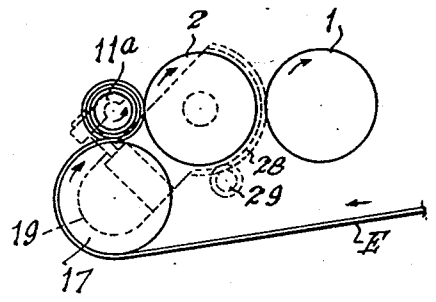
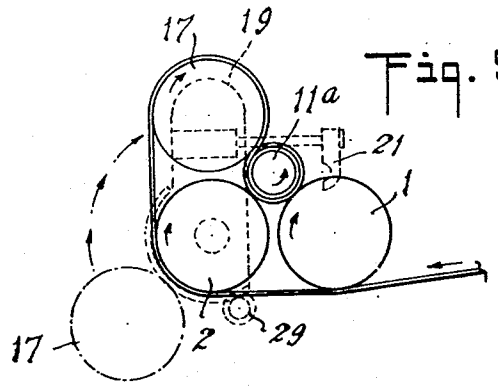



Fig. 9.




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2,812,910

# DOUBLE DRUM WINDING MACHINE AND FLYING WINDING ROLL CHANGER

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Application September 7, 1955, Serial No. 532,856

5 Claims. (Cl. 242—66)

This invention relates to a double drum machine for winding webs of paper fabrics and long pieces of other flexible materials into rolls; and more particularly the invention contemplates a machine for winding such materials substantially uninterruptedly and at full machine speed on a succession of winding shafts or cores as the material comes from a source of supply.

The invention is especially directed to the cutting of the web of material transversely after a roll has been completed, and the immediate attachment or splicing of the free or leading end portion of the web onto another winding core without slowing down or stopping the machine to change rolls or winding cores. Center drive winders have means for automatically splicing the webs at high machine speeds, and a web can be separated from a completed roll and attached to another core on a single drum surface winder without slowing down or stopping of the machine, and while there are machines for making web splices on a double drum winder without greatly reducing the machine speed or completely stopping the machine, they do not ensure tightly wound or "hard rolls." A double drum winding machine has the advantage over the other types of winding machines of producing a more tightly wound roll, but the use of double drum winders has been limited by the difficulty encountered in changing winding cores and starting new winding rolls.

Therefore, a prime object of the invention is to provide a double drum winder having novel and improved means for attaching webs to new winding cores and starting new winding rolls while the machine is running at full winding speed, so that a tightly wound roll as well as a higher production or winding rate can be attained and at the same time control of a coating or other operation on the web can be maintained so as to avoid the loss of many feet of the web on each side of the break in the web due to imperfect coating or other treatment of the web that occurs when a winding machine is slowed down or stopped for splicing operations or for changing rolls.

Another object of the invention is to provide a double drum winding machine having the usual main cradle comprising two driving drums for the winding roll, a second or auxiliary cradle in which a new core is held and rotated while the web is slit from a completed roll in the main cradle and tight winding of the leading end portion of the web is started on said new core, and means for moving or transferring the new and partially wound core from the auxiliary cradle into the main cradle after removal of the completed roll while maintaining tight winding of the web on the new core during the transfer and in the main cradle.

Other objects of the invention are to provide in such a machine, a novel construction and combination of a second or auxiliary cradle for a new winding core, including one of the driving or winder drums of the main cradle and a third driving or winder drum, means for holding the core in the cradle with yielding frictional resistance to the rotation of the new core so as to insure



a tightly wound roll without "telescoping," and means for moving the new partially wound core from the auxiliary cradle into the main cradle; and to obtain other advantages and results that will be brought out by the following description in conjunction with the accompanying drawings in which:

Figure 1 is a fragmentary side elevational view of a double drum winding machine including a splicer constructed in accordance with the invention, viewing the main cradle and auxiliary cradle from one end thereof;

Figure 2 is a fragmentary front elevational view of one end of the machine as illustrated in Figure 1;

Figure 3 is a similar view of the other end of the machine;

Figure 4 is a fragmentary longitudinal vertical sectional view approximately on the plane of the line 4—4 of Figure 1;

Figure 5 is a schematic end elevational view of the main and auxiliary cradles during the winding of a roll and before the insertion of a new winding core;

Figure 6 is a similar view showing the new winding core in position in the auxiliary cradle;

Figure 7 is a similar view showing the splicing of the web onto the new winding core;

Figure 8 shows the completed roll removed from the main cradle and the new winding core partially wound; and

Figure 9 shows the transfer of the new winding core from the auxiliary cradle to the main cradle.

Specifically describing the illustrated embodiment of the invention, the reference character A generally designates the main cradle of the machine which comprises two driving or winder drums 1 and 2 that are carried by the respective shafts 3 and 4 that are in turn journaled in bearings 5 and 6 in vertical frame sections 7. These drums are revolved in the same direction as indicated by the arrows by suitable means such as belt pulleys 8, each on one of the shafts 3 and 4 and driven by belts 9 from a belt pulley 10 on the output shaft of an electric motor and speed reducer combination B. The two drums are spaced apart so that they will support between them a roll C of a web E wound on a winding core 11, in such a manner that the roll will be rotated in the direction indicated by the arrow in Figure 1 by frictional contact of the periphery of the roll with the peripheries of the drums 1 and 2. The core is mounted on a winding shaft which is engaged by half bearings 13 carried by guide blocks 14 that are slidably mounted in guideways 15 in the frame pieces 7. The guide blocks 14 have connected thereto rack bars which are engaged by known mechanism, such as pinions rotated by a chain and pulley apparatus and adjustably held against rotation by a friction brake (not shown), for raising and lowering the half bearings and for normally yieldingly frictionally resisting upward movement of the winding shaft 12 as the diameter of the wound roll C increases during the winding operation.

In the operation of the machine, after the winding of the roll C has been completed, the roll is removed from the cradle A by a crane or other suitable hoisting mechanism, and in accordance with the invention, before the roll is removed, the web or other material being wound is slit transversely and the free or leading end of the web is immediately spliced onto a new winding core 11*a* for starting a new roll, all without slowing down or stopping the operation of the machine. As shown, a second or auxiliary cradle D is provided and comprises the winder drum 2 and a third winder drum 17 that normally is so related to the drum 2 as to support or "cradle" the new winding core 11*a* during the operation of splicing the web onto the new winding core. The third winder drum 17 is carried by a shaft 18 whose ends are journaled in

brackets 19 which are in turn rotatably mounted on the shaft 4 between the ends of the winder drum 2 and the corresponding frame pieces 7. The third winder drum 17 is driven in the same direction as the winder drum 2 by a chain and sprocket connection 20 between the shafts 4 and 18, and is spaced from the winder drum 2 such a distance that the new winding core 11*a* will be supported upon and rotated by the peripheries of the winder drums 2 and 17.

During the operation of the machine, the web E to be wound is directed from any suitable source of supply around the third winder drum 17 and thence upwardly over the winder drum 2 and onto the roll C in the main cradle. When it is desired to start a new roll on the new winding core 11*a*, said new winding core is pressed against the web between the winder drums 2 and 17 so that the new winding core will be rotated by frictional engagement with the web. The new winding core is held in this position by any suitable means such as clamping arms 21 rigidly mounted on the respective piston rods 22 connected to pistons 23 in cylinders 24 that are mounted on the sides of the brackets 19. Each clamping arm 21 has a semi-cylindrical recess 25 to receive and overlie one end of the winding shaft 12*a* on which the new core 11*a* is carried, and the clamping arm is pulled against said shaft by fluid pressure admitted into and released from the cylinders 24 through suitable valve controlled flexible tubes 26. The clamp arms may be actuated by springs 27 beneath the pistons 23 to release the winding shaft 12*a* from the clamps. Obviously the supply and release of the fluid pressure to and from both of the cylinders 24 can be effected at the same time by a common manually operated valve (not shown) or by an automatic valve mechanism.

After the new winding core has been mounted in the auxiliary cradle as shown in Figure 1, the web is severed transversely along the periphery of the winder drum 2 by any suitable means such as a knife or an air jet known in the art, and immediately thereafter the free or leading end of the web is pressed against the periphery of the new winding core until the end of the web is caught in the nip of the third winder drum 17 and the core as shown in Figure 7. Then, the completely wound roll C is lifted from the main cradle A by suitable means such as a crane connected to the ends of the winding shaft 12, after which the new winding core with the winding of the web started thereon is moved from the auxiliary cradle into the main cradle as shown in Figure 9. During this movement of the auxiliary winder drum 17 about the main winder drum 2, from the start of the new roll as shown in Figure 8 and throughout the transfer of the new roll to the main winder cradle as shown in Figure 9, the new roll is constantly in contact with two winder rolls, either the rolls 17 and 2 or the rolls 2 and 1 thereby ensuring a tightly wound or "hard roll." For accomplishing this result, the brackets 19 are shown as having motion-transmitting or driving parts such as gear segments 28 coaxial with the winder drum 2 with which mesh the respective pinions 29 that are fast connected to a shaft 30 journaled in the frame pieces 7 and having a suitable driving connection 31 with a motor 32. Rotation of the shaft 30 by the motor 32 in one direction will cause the brackets 19 to be swung from the positions shown in Figures 1–3 inclusive and 8 upwardly into the position shown in Figure 9 so as to set the partially wound new winding core in the main cradle A. The air pressure in the cylinder 24 is then released to permit the clamp arms 21 to be actuated by the springs 27 away from the new winding shaft 12*a* so as to leave the partially wound new winding core free in the main cradle, whereupon the winding of the new roll continues until it is completed. The motor 32 is then energized to rotate the brackets 19 into their initial position shown in Figures 1 to 3 inclusive and Figure 5, thereby completing the cycle and making ready the auxiliary cradle to receive the next new winding core.

It is desirable that the driving connection 31 and the motor 32 afford a resilient drive to compensate for the momentary opposing forces exerted on the new roll by the main winder drum 1 and the auxiliary winder drum 3 as the new roll increases in diameter and before release of the new winding shaft 12*a* from the brackets 19. Thus the motor 32 may be a reversible air motor and the gearing 31 may be of a speed reducing nature.

It is also desirable that the air pressure in the cylinders 24 be such as to exert sufficient friction on the new winding shaft 12*a* to ensure tight winding of the web on the new core and thereby prevent subsequent "telescoping," that is, squeezing of the inner portion of the wound roll endwise outwardly when the winding tension is increased after the roll has been partially built up.

While the invention has been shown as embodying certain structural details, it will be understood by those skilled in the art that the construction of the winder and roll changer may be widely modified and changed within the scope of the invention and the appended claims.

What I claim is:

1. A double drum winding machine and flying winding roll changer, comprising a main cradle on which the winding into a roll of material supplied to the machine is completed and said material is severed, an auxiliary cradle on which the leading end portion of the severed material is wound to start a new roll, and means for shifting said new roll from said auxiliary cradle onto said main cradle upon removal of the completed roll from said main cradle, said main cradle comprising two main driving winder drums rotatable in the same direction to support and rotate a roll, and said auxiliary cradle including one of said two main winder drums and a third auxiliary winder drum to support a winding core for said new roll, movable mounting means in which said third auxiliary winder drum is journaled, said movable mounting means providing in one position thereof for the reception and rotation of said winding core between said third auxiliary winder drum and said one main winder drum with the material being wound passing under and upwardly partially around said third auxiliary winder drum beneath said winding core and onto the roll on said main cradle so that said material may be severed transversely along the periphery of said one main winder drum and the leading end portion of the severed material may be pressed against and wound upon said winding core to start a new roll, and means for moving said mounting means and said third auxiliary winder drum into a second position with the new roll constantly in contact with both said third auxiliary winder drum and said one main winder drum to set onto said main cradle said new roll having the end portion of said material wound thereon to complete the winding of said new roll.

2. A double drum winding machine and flying winding roll changer as defined in claim 1, wherein said mounting means is movable coaxially with said one of the two main winder drums and the last-named means includes a motion-transmitting part on said mounting means coaxial with said one of the two main winder drums, a motor and a driving connection between said motor and said motion-transmitting part.

3. A double drum winding machine and flying winding roll changer as defined in claim 1, wherein said mounting means provides in one position for the reciprocation and rotation of said winding core mounted on a shaft and is movable coaxially with said one of the two main winder drums, and said mounting means includes a releasable clamp to engage said shaft to normally hold the winding core in position between said third auxiliary winder drum and said one main winder drum and to release said new roll onto the main cradle when the mounting means is in said second position.

4. A double drum winding machine and flying winding

roll changer as defined in claim 1, wherein said mounting means provides in one position for the reciprocation and rotation of said winding core mounted on a shaft and is movable coaxially with said one of the two main winder drums, and said mounting means includes a releasable clamp to engage said shaft to normally hold the winding core in position between said third auxiliary winder drum and said one main winder drum and to release said new roll onto the main cradle when the mounting means is in said second position, and wherein said releasable clamp is constructed to exert yielding frictional pressure on said shaft both to hold the winding core in position and in yielding contact with the third auxiliary winder drum and said one main winder drum for causing tight winding of the material on the winding core.

5. A double drum winding machine and flying winding roll changer as defined in claim 1, wherein said mounting means provides in one position for the reciprocation and rotation of said winding core mounted on a shaft and is movable coaxially with said one of the two main winder drums, said mounting means includes a releasable clamp to engage said shaft to normally hold the winding core in position between said third auxiliary winder drum and said one main winder drum and to release said new roll onto the main cradle when the mounting means is in said second position, and the last-named means includes a resilient power drive for swinging said mounting means into said second position with new roll in contact with the two main winder drums to compensate for the momentary opposing forces exerted by said one main winder drum and said auxiliary winder on the new roll before the release of the new roll from said mounting means.



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