Nov. 28, 1961 J. D. BROWN 3,010,671

COMPRESSED AIR DIFFERENTIAL WIND MANDREL

Filed Nov. 30, 1955 3 Sheets-Sheet 1

Fig. 1.

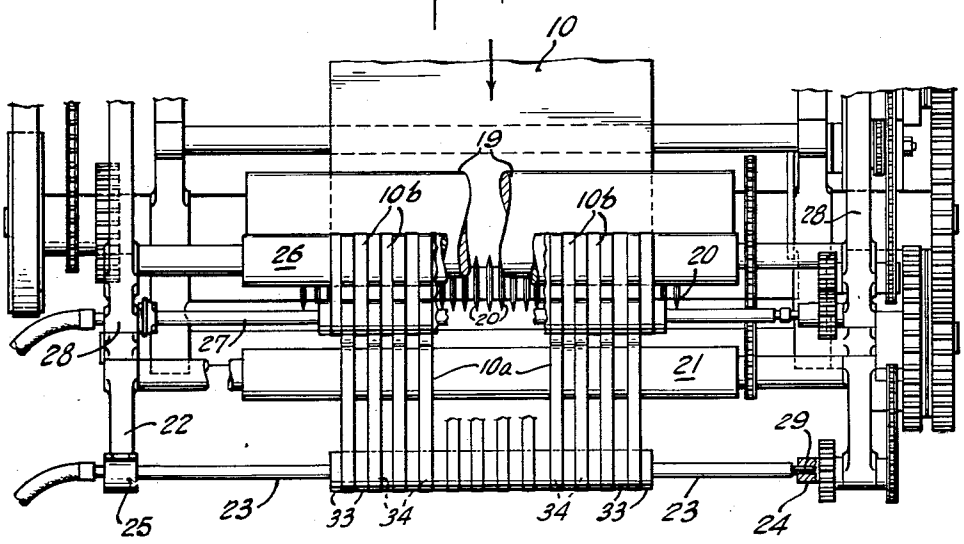
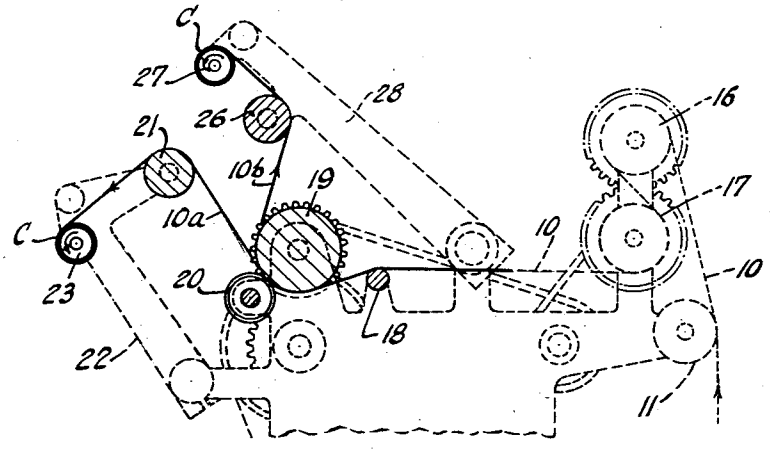


Fig. 2.



INVENTOR
JAMES D. BROWN.

BY
Arved S. Worfolk
ATTORNEY

Nov. 28, 1961 J. D. BROWN 3,010,671

COMPRESSED AIR DIFFERENTIAL WIND MANDREL

Filed Nov. 30, 1955 3 Sheets-Sheet 2

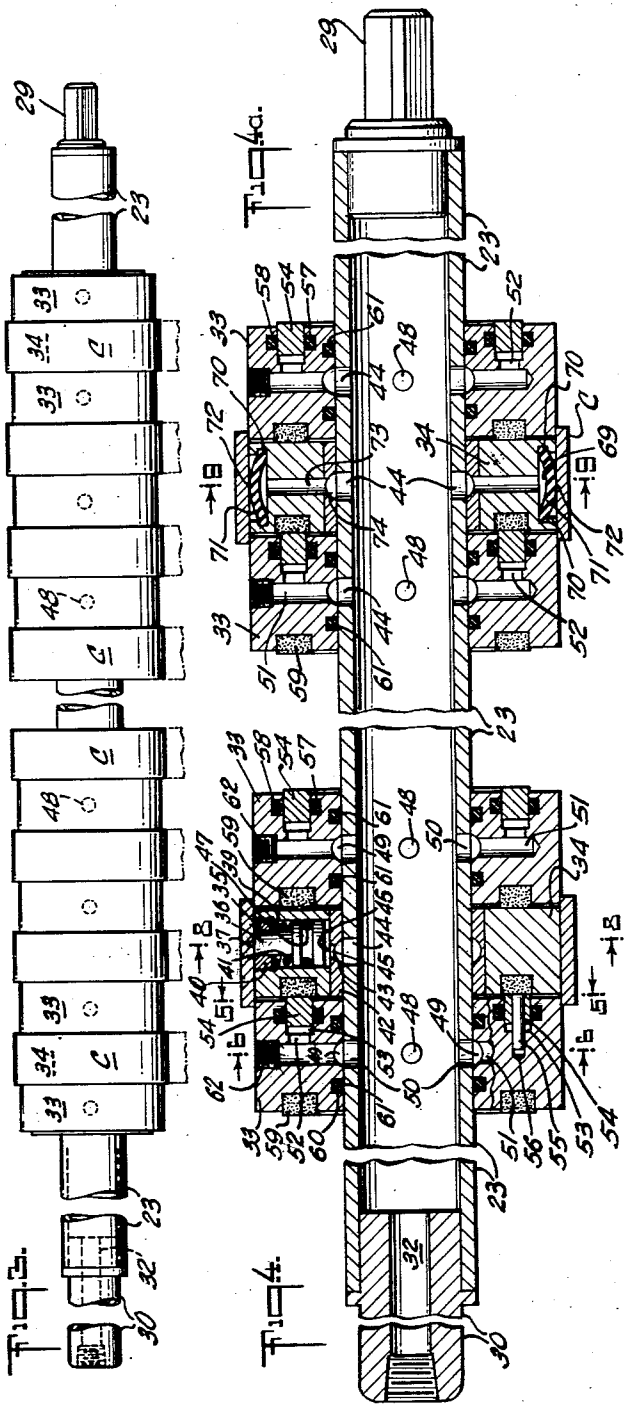


FIG. 3.

FIG. 4.

FIG. 4a.

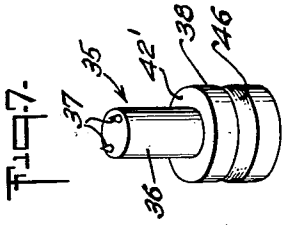


FIG. 7.

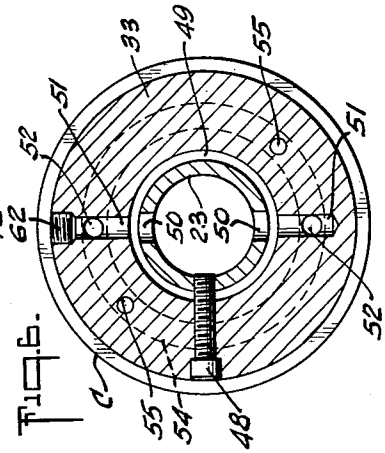


FIG. 6.

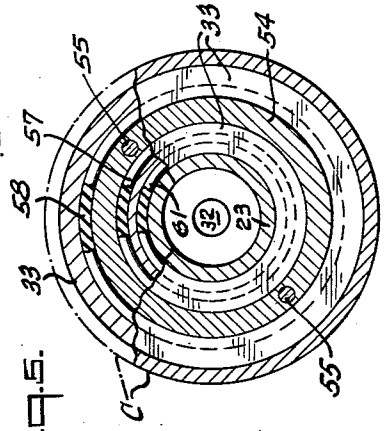


FIG. 5.

INVENTOR
JAMES D. BROWN.
BY
Arnold S. Wolfolk
ATTORNEY

Nov. 28, 1961 J. D. BROWN 3,010,671

COMPRESSED AIR DIFFERENTIAL WIND MANDREL

Filed Nov. 30, 1955 3 Sheets-Sheet 3

Fig. 8.

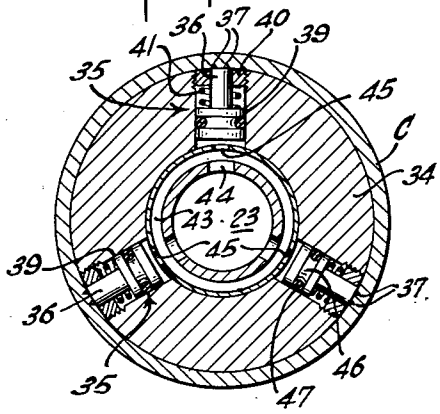


Fig. 9.

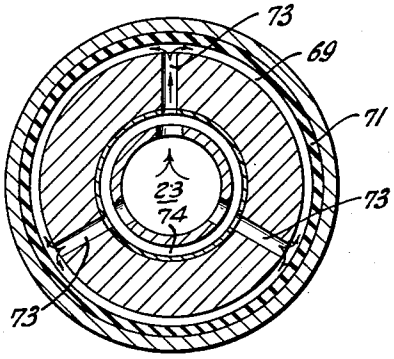


Fig. 10.

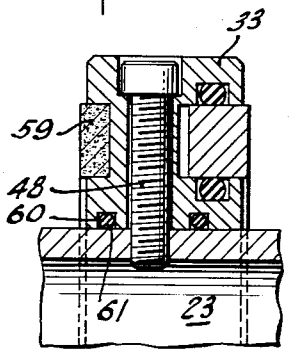


Fig. 11.

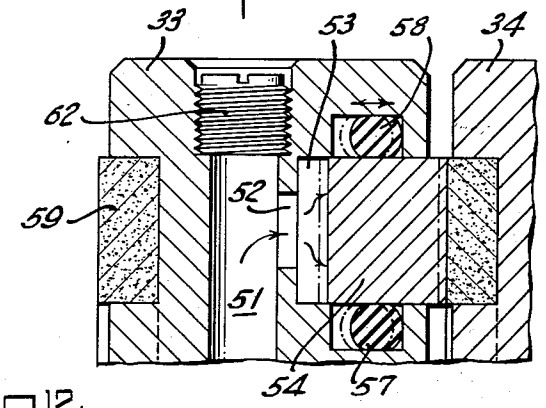
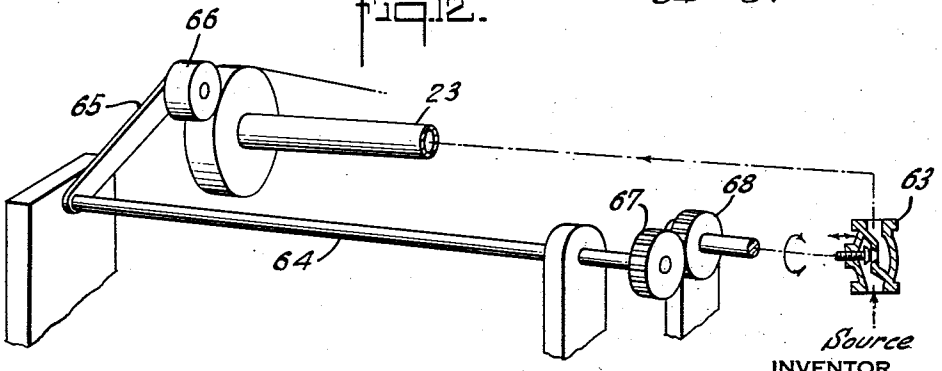


Fig. 12.



INVENTOR
JAMES D. BROWN

BY
Arnold S. Wayfolk
ATTORNEY

United States Patent Office

3,010,671

Patented Nov. 28, 1961

3,010,671

COMPRESSED AIR DIFFERENTIAL WIND MANDREL

James Donald Brown, Rahway, N.J., assignor, by mesne assignments, to Johnson & Johnson, New Brunswick, N.J., a corporation of New Jersey

Filed Nov. 30, 1955, Ser. No. 550,066
9 Claims. (Cl. 242—56.9)

This invention relates to apparatus for controlling winding tension in rolls of strip material, particularly in rolls that are simultaneously wound up from strips thereof slit from a master roll.

Products, such as surgical tape, masking tape, cellophane tape, and the like, are manufactured in the form of large master or bundle rolls which are slit into strips of desired width and wound in appropriate length on individual cores. It is customary to arrange the individual cores for a number of rolls on a common mandrel which is rotated to wind the strips on the cores as they are slit from the bundle roll. The mandrel is positively driven at a speed which, if the tension of wind in the bundle roll were substantially uniform over its entire width, would render the individual rolls quite satisfactory. But tension in a bundle roll is not uniform over its entire width. For example, in a bundle roll of paper made by a wet process, the sheet at the edges is frequently looser than at the center so that a roll of tape slit from the edge portion of such a roll is actually appreciably longer than a roll slit from the center portion thereof. In a bundle roll of cloth, on the other hand, the sheet at the selvaged edges is somewhat shorter than at the center of the roll so that the reverse situation holds true. Somewhat similar situations exist in films of regenerated cellulose or cellulose acetate, for example, whose gauge cannot possibly be controlled precisely across a wide sheet. In such cases, if the mandrel is set to rotate at a speed to produce rolls of average tension, rolls cut from thin portions of the sheet will appear loose and sloppy, whereas, rolls cut from thick portions of the sheet may be wound so tightly as to cause the cores to collapse or the rolls to become misshaped and telescoped.

The effects just mentioned are magnified when the webs are coated with an adhesive as in the manufacture of pressure-sensitive adhesive tape. It is difficult to apply an absolutely uniform film or coating across the entire width of the sheet even when the coating machinery is precisely adjusted. Such difficulties are magnified when the equipment is worn, out of adjustment, or carelessly operated. Variations in thickness over the width of a web being slit, even if slight, may nevertheless cause considerable variation in tension as among a group of rolls wound up therefrom after slitting as such rolls increase in size. To state it differently, variations in roll tension among a group of rolls slitted and wound up from the same bundle roll and resulting from variations in thickness over the width of such bundle roll are increased as the convolutions are increased in the wound up rolls of slitted tape.

In accordance with the present invention, the wind-up tension in a series of rolls of slitted tape is maintained at substantially the same value by applying the same torque to effect the winding of each of such rolls. It is true that despite use of the same winding torque, differences in diameter of the respective rolls at any instant resulting from variations in the thickness of the web being wound may produce some variation in wind-up tension, but such variation in tension as between the rolls will have no significant effect.

Also in accordance with the present invention, the driving torque on the respective rolls may be controlled during the wind-up operation in a manner to maintain tension throughout the length of such rolls substantially constant.

In the preferred embodiment of the invention, the cores on which the respective rolls of tape are wound are driven through individual clutch devices comprising each a member adapted to accommodate a core on which the tape is to be wound and arranged for rotation freely upon a mandrel and a second clutch member arranged adjacent the first and which is fixed on the mandrel.

A drive between the respective clutch members is effected by means of air pressure, preferably by causing an annular ring arranged concentrically with the axis of the mandrel and recessed into the face of the fixed member to move a limited distance in an axial direction under the action of pressure frictionally to engage the opposed face of the adjacent clutch member arranged for free rotation upon the mandrel. Throughout the winding operation, continuous slippage is permitted between the driving member of the clutch which is fixed on the mandrel and the driven member thereof which is rotatable on the mandrel. This relative movement between the clutch members throughout the winding operation enables a constant driving torque to be established more accurately than if on occasions there were no slippage during the drive since such an arrangement eliminates a variable, which otherwise might be introduced due to the difference between stationary and sliding friction. In other words, since the drive between the two clutch members is through surfaces that frictionally engage one another, driving torque transmitted through frictional engagement of the parts can be more accurately regulated if the friction involved is always sliding friction.

It will be understood, of course, that provision must be made for holding the cores against movement relative to the respective clutch members on which they are mounted, during each wind-up operation, and for releasing the cores to permit removal thereof from such clutch members after one wind-up operation and replacement thereof by similar cores for the next wind-up operation. While manual means could be used for locking and releasing the cores with respect to their clutch members, it is preferred, in accordance with the invention, to effect such locking and releasing operations automatically under the control of devices operated pneumatically by the air pressure within the mandrel.

A better understanding of the invention may be had from the following description read in conjunction with the accompanying drawings wherein:

FIG. 1 is a top plan view of a portion of a tape-winding machine illustrating the manner in which a mandrel equipped with the present improvements is associated therewith;

FIG. 2 is a phantom side elevation of a tape-winding machine illustrating the manner in which the tape is threaded through the machine to the cutters and thence to the mandrels equipped with the present improvements;

FIG. 3 is a plan view of a mandrel which has been removed from a machine to facilitate loading thereof with cores and which is equipped with a full complement of clutch members through which the respective cores are rotated to facilitate a tape-winding operation;

FIG. 4 is a central longitudinal section through a portion of a mandrel illustrating in detail two fixed clutch members and one form of intermediate clutch member rotatable with respect to the mandrel and located at one end thereof;

FIG. 4*a* is a view similar to FIG. 4 but showing the clutch members mounted at the opposite end of the mandrel, the intermediate clutch member illustrated being of an alternate form;

FIG. 5 is a transverse vertical sectional view on line 5—5 of FIG. 4;

FIG. 6 is a transverse vertical sectional view on line 6—6 of FIG. 4;

FIG. 7 is a perspective view of a core-gripping element associated with the form of clutch member used in FIG. 4;

FIG. 8 is a transverse vertical sectional view on line 8—8 of FIG. 4;

FIG. 9 is a transverse vertical sectional view on line 9—9 of FIG. 4*a*;

FIG. 10 is a vertical longitudinal sectional view through a portion of a clutch member fixed with respect to the mandrel and at a plane showing the manner in which the clutch member is fixed to the mandrel;

FIG. 11 is a longitudinal vertical section through a portion of a clutch member fixed with respect to the mandrel at a plane showing how air is supplied under pressure to the annular ring causing it frictionally to engage an adjacent clutch member rotatably mounted on the mandrel; and

FIG. 12 is a view showing diagrammatically a mechanism for increasing the pressure in the mandrel with increase in radius of a roll of tape being wound thereon.

In the embodiment of the invention illustrated, a web **10** is pulled upwardly off a bundle roll (not shown) past a guide roll **11** and thence over and around the upper of a pair of vertically-spaced horizontally-disposed S rolls **16** and **17** (FIG. 2). Both the rolls **16** and **17**, which are arranged one directly above the other, are positively driven and since the adhesive side of the web is in contact with the upper roll for about three quarters of its periphery, the tension exerted on the adhesive web is sufficient to pull it with facility off the bundle roll. After leaving the surface of the upper roll **16**, the web passes through the space between it and the lower roll **17**, toward the rear of the latter, and then around the lower roll which it leaves traveling in a forward direction toward the front of the machine.

From the roll **17** the web passes over a guide roll **18** and then under a platen roll **19** where the sheet is slit longitudinally into a plurality of tapes of narrow width **10***a* and **10***b* by a gang of circular knives **20** spaced along the platen roll with which the knives are in edgewise engagement (FIGS. 1 and 2). After the slitting operation, every other strip of tape **10***a* passes over a guide roll **21** supported at its opposite ends for rotation in bearings presented at the upper ends of a pair of arms **22** which are mounted one at each side of the machine frame at the front. From the guide roll **21** the tapes **10***a* travel to one or another of the series of cores C which are spaced along a mandrel **23** detachably mounted at one end on a short stub shaft **24** which is journalled for rotation in a bearing presented by the arm **22** at the right. The mandrel **23** at its other end is mounted in a split bearing device **25** permitting its rotation as well as ready removal from the machine. A guide roll **26** and a core supporting mandrel **27** provide a similar disposition for the intermediate strips of tape **10***b*. The guide roll **26** and mandrel **27** are mounted in the same fashion as the guide roll **21** and mandrel **23** in a pair of arms **28**. The arms **28** are likewise arranged one at each side of the machine frame.

The S rolls **16** and **17** adjacent the rear of the machine, the platen roll **19**, and two guide rolls **21** and **26**, and the two mandrels **23** and **27** on which the tape cores C are mounted, are all driven by mechanism standard on the particular type of slitting machine illustrated. Since it forms no part of the instant invention it need not be described here in detail except to say that contrary to the usual manner of operation it rotates the mandrels at a speed which even during the initial wind of tape upon the cores is higher than that necessary to wind up the tape at the speed it is delivered from the slitting knives.

Each mandrel **23** or **27** as the case may be, consists of a long hollow shaft closed at one end by a bushing **29** squared off externally for accommodation in a complementary-shaped socket driven in well-known manner and which positively rotates the mandrel during a normal machine cycle of operation. At its opposite end, the mandrel is also equipped with a bushing **30** suitably rounded off for rotation in a bearing preferably a split bearing, with which the machine is equipped at the left. Bushing **30** is provided with a longitudinally-disposed centrally-located passageway **32** communicating at one end with the hollow interior of the mandrel and at its other end through suitable connections, some of which are not shown, with a source of air pressure.

Each mandrel is equipped with a series of pairs of clutch members, **33**, **34**. The first member **33** of each pair, starting with the pair at the left end of the mandrel (FIG. 3) is fixed with respect to the mandrel whereas the other member **34** which is designed to accommodate the core on which the tape is to be wound is movable with respect to the mandrel freely in a rotational direction as well as for a limited distance in a longitudinal or axial direction. The movable member **34** of each pair is buttressed in its operation by the fixed clutch member **33** of the pair immediately to the right thereof, the last member **34** at the right end of the mandrel having a special fixed buttressing element whose construction need only be that necessary to serve as a buttress. Its construction for this purpose will be apparent as the description of the invention proceeds.

In the embodiment of the invention illustrated in FIG. 4, each core accommodating clutch member **34** is cylindrical in shape with an outer diameter substantially the same as the internal diameter of the cores C on which the tape is to be wound, a central diameter substantially the same as the external diameter of the mandrel **23** on which it is rotatably mounted, and two flat lateral faces located in parallel planes disposed at right angles to the axis of the mandrel. To prevent a core from turning with respect to the clutch member **34** during a tape wind-up operation, such member may be equipped with prong devices **35** adapted for movement outwardly to bite into the core preparatory to the tape-winding operation and then inwardly for disengagement from the core preparatory to the removal of a completed roll of tape therefrom. As shown in FIG. 8, there are three such prong devices **35** (although a greater or lesser number could be used) preferably disposed equidistantly along the circumferential periphery of the clutch member **34**. Each prong device includes a radially-disposed reduced stem portion **36** at the outer end of which a pair of prongs **37** is presented and an enlarged cylindrical inner portion **38** integral with the stem portion and which is arranged for limited sliding movement in a radial direction in a radially-disposed hole **39** drilled in the clutch member and whose diameter is such as just to accommodate such sliding movement. A bushing **40** threaded into each of the radially-disposed recesses at its outer end so as to be below the cylindrical surface of the clutch member is provided with a centrally-disposed hole to accommodate the reduced stem portion **36** of the prong device and guide it in its inward and outward movement. A compression spring **41** encircles the reduced stem portion and reacts between the inner surface of the bushing and an opposed shoulder **42'** presented by the enlarged cylindrical portion **38** where the stem meets the latter. The spring **41**, in the normal position of the parts, locates the prong device at the base of the hole **39** in a position where prongs **37** are below the outer surface of the member **34** and consequently incapable of interfering with the placement of cores thereon. Except as hereinafter stated, the recesses **39** which accommodate the prong devices **35** are closed off at the bottom by a cylindrical sleeve **42** preferably made of a suitable bearing metal and whose inner surface rides on the outer surface of the mandrel **23** as the clutch member **34** rotates. Approximately at a position midway between the lateral faces of the clutch member **34**, the

inner surface of the sleeve **42**, i.e., the surface adjacent the mandrel, presents an annular groove **43** extending all around the mandrel and so disposed that as the clutch member rotates, said groove always will have communication with the hollow interior of the mandrel through a hole **44** in the wall thereof and which registers with said annular groove. A hole **45** is drilled radially through the sleeve at the base of the annular groove at various positions corresponding to the location of the prong devices so that there will be established at all times communication between the annular groove and the recesses which accommodate the prong device beneath the enlarged cylindrical portions **38** thereof.

According to this arrangement, when air pressure is established inside the mandrel **23**, as is done when the mandrels with cores on the movable clutch members **34** thereof have been inserted in the machine preparatory to a tape-winding operation, the prong devices are forced outwardly against the reaction of their respective springs **41** to press the prongs **37** into the internal faces of the cores so as effectively to prevent the cores from rotating relatively to the clutch member **34** during a tape winding operation. Correspondingly, after the completion of a tape winding operation and in preparation for the removal of the mandrel from the machine, the air pressure within the mandrel is reduced and when this occurs the springs **41** force their respective prong devices inwardly to their normal positions thereby withdrawing the prongs from engagement with the cores so that the completed rolls of tape can be removed from the mandrel without difficulty. At this point, it should be noted that an annular groove **46** encircles the enlarged cylindrical portion **38** of each of the prong devices to accommodate a gasket **47** which by cooperating with the cylindrical wall of the recess in which the prong device slides prevents escape of air so that the appropriate pressure for operation of the device is maintained.

As previously stated, the core holding members **34** are designed for rotation with respect to the mandrel **23** on which they are mounted with as little friction as possible and it is for this reason that use of anti-friction bearings is preferred, although any other means of reducing friction and accomplishing an equivalent function will suffice. The exact mounting of the clutch members **34** with respect to the mandrel is such also that they each have a limited movement longitudinally of the mandrel as permitted by the clutch members **33** between which it is located and for this purpose also its mounting on the mandrel allows a degree of facewise adjustment sufficient to permit it to rest flush against the adjacent face of the clutch member **33** in contact with it on the right.

As previously stated, the clutch driving members **33** adjacent one to each of the driven members **34** have a fixed mounting on the mandrel **23**. These clutch driving members are circular in shape with outside diameter no larger than that of the core holding clutch members **34** so as not to interfere with loading of the cores on the members **34**. Each driving clutch member is formed with a radially-drilled hole tapped to accommodate a screw **48** which, when threaded up with its head below the outer cylindrical surface of the clutch member, is likewise threaded at its inner end into a registering hole in the mandrel **23** so that both clutch member and mandrel are constrained to rotate as a unit (FIGS. 6 and 10). When the clutch member **33** is appropriately connected with the mandrel in the manner described, an annular groove **49** formed in its internal surface which engages the mandrel and which encircles the mandrel, registers with one or more holes **50** drilled in the wall of the mandrel thus to establish communication between the annular groove and the interior of the mandrel. A pair of radially-disposed passageways **51**, closed at their outer ends, connect at their inner ends with the annular groove **49** and connect also through a pair of short horizontal passageways **52** with the base of an annular groove **53** formed in that lateral face of the fixed clutch member **33**, which is adjacent its associated movable clutch member **34** (FIGS. 4 and 11). The annular groove **53** is concentric with the axis of the mandrel. An annular ring **54** substantially square in cross-section seats in the annular groove **53** which is deep enough to permit movement of the ring for a limited distance in a direction facewise of the clutch members. Rotational movement of the ring, relative to its clutch member is prevented, however, by a pair of pins **55** diametrically disposed and which extend in a longitudinal direction through the ring and into a pair of correspondingly-disposed holes **56** drilled in the base of the annular groove **53**. The inner and outer concentric walls of the annular groove are recessed one radially inwardly and the other radially outwardly to accommodate rubber gaskets **57** and **58** of circular cross-section and which are installed under compression so as to make the connection air tight. According to the arrangement just described, air pressure built up within the mandrel **23** is communicated to the underside of the annular ring **54** thereby to move it to the right into engagement with the adjacent face of the movable clutch member **34** with a force dependent upon the degree of air pressure established. By maintaining this pressure constant while the mandrel is rotated, a constant torque is established which causes the movable clutch member **34** to turn with the fixed element and wind the tape up on the core. Furthermore, since the pressure established in each of the fixed clutch elements **33** is the same by virtue of the similarity of their mountings upon the mandrel, the torque acting upon all of the movable clutch members **34** is the same. The result is that the winding tension in all of the rolls of tape being wound upon the mandrel will for all practical purposes be the same.

The area of contact of the adjacent surfaces of the fixed and movable clutch members and the character of their surfaces are made such that a driving engagement will be established between the parts upon the introduction of air pressure into the annular chamber **53**. Preferably, this driving connection is such as to permit the mandrel to rotate at a speed in excess of the speed at which the movable clutch members are driven so that their drive is always through sliding friction. When the clutches are operated in this fashion, the driving torque acting upon the movable clutch members will be far steadier than if there were relative movement between the clutch members during some phases of the drive and an absence of relative movement during the other phases of the drive.

The force exerted by the fixed clutch member **33** on the relatively-movable clutch member **34** requires, of course, that axial movement of the movable clutch member be limited in an axial direction away from the fixed clutch member which drives it. This is accomplished by making the fixed clutch member on the opposite side of the movable member serve as a buttress to prevent such movement. In this connection, it may be noted that the buttressing member in the face thereof adjacent the movable member on the left may be equipped with a ring **59** of friction material raised slightly above such face so that in effect the movable member is driven through a double clutch. Alternatively the friction between the movable clutch member and the buttressing member may be reduced to a minimum, as by making the ring **59** of some anti-friction material or indeed using a thrust bearing between the movable and the buttressing members.

Escape of air from the central annular recess **49** of the fixed clutch members **33** along the external surface of the mandrel may be prevented by providing a pair of annular grooves **60** in those inner surfaces of such members which are adjacent the mandrel, one of each pair of grooves being spaced on each side of the recess **49** and locating a gasket **61** under compression in each of said grooves (FIG. 10). It should also be noted that a convenient way of plugging up the ends of the radially-disposed passageways **51** through which communication is established from

the mandrel to the floating ring **54** is to drill both of such holes from one point on the cylindrical surface of the member radially through both sections of the member, but terminating short of the outer surface of the diametrically-opposed point. The end of the hole at the initial point of drilling may then be tapped and a threaded plug **62** inserted (FIGS. 6 and 11).

It is normal procedure in winding up tape to employ constant torque with the result that wind-up tension in the tape decreases from the core outwardly in proportion to the increase in radius of the tape roll. In some instances, however, it may be desirable to wind the rolls of tape with constant tension. With the present improvements, this can be accomplished by increasing the pressure in the mandrel in proportion to the increase in radius of the rolls. In other words, any increase in mandrel pressure which increases the wind-up torque exerted on the relatively-movable clutch member **34** in proportion to increase in radius of the roll will result in a roll of tape wound under constant tension.

One example of a mechanism for accomplishing this is illustrated in FIG. 12. The hollow mandrel **23** on which the cores are mounted is connected with a source of air pressure through a globe valve **63** which can be opened and closed to increase or decrease the air pressure in the mandrel as desired. A rock shaft **64** rotatably mounted near its ends in a fixed part of the machine and parallel with the mandrel may be arranged for rotation by an arm **65** fixed to the shaft and which has a roller **66** at its outer end adapted to engage the periphery of a roll of tape on the mandrel. As the roll of tape increases in size, the shaft **64** is rocked in a counter-clockwise direction, looking at the parts from the right, causing intermeshing gears **67**, **68**, fixed one on the shaft and the other on the valve stem to open the valve. Opening the valve increases the pressure in the mandrel with a consequent increase in the torque exerted on each of the movable clutch members **34**.

As shown in FIG. 11, when the pressure in the system is increased to move the annular ring **54** toward the right, there is a tendency to rotate the sealing ring gaskets **57**, **58**. This sets up a torque in the gasket rings which upon decrease of the pressure in the systems, will restore ring **54** to its normal position.

In FIGS. 4*a* and 9, there is illustrated another embodiment of the invention which differs from that heretofore described only in the mechanism utilized by the relatively-movable clutch member to anchor the core against rotation with respect to the clutch member on which it is mounted. As shown in FIG. 4*a*, the outer cylindrical surface of the clutch member **34** is formed with a relatively-wide but shallow peripheral channel **69** whose lateral sides at the base are provided with opposed grooves **70**. A continuous band **71** of resilient material rests in the channel **69** with its opposite edges in the grooves **70**. The width of the band **71** is somewhat greater than the distance between the bases of the opposed grooves **70** and while this condition causes the band to camber upwardly to form a convex crown **72**, the edges of the band, nevertheless, are retained in the grooves by overlying shoulders which in part define such grooves.

Normally, when there is an absence of pressure in the mandrel **23**, the crown **72** of the camber will stand below the outer peripheral face of the clutch member **34** so as not to interfere with the placing of the cores thereon. However, after the cores have been placed on the mandrel and as air pressure is built up therein preparatory to the inaguration of a tape-winding operation, air pressure likewise is built up beneath the band forcing the latter outwardly at the crown of the camber so as tightly to engage the inner peripheral wall of the core and by friction to hold it tightly against relative rotation with respect to the clutch member. Air pressure is built up beneath the band through a plurality of ducts **73** which connect the region **69** beneath the band with an annular duct **74**, which is identical with and serves the same purpose as the duct **43** in the embodiment previously described. Three such communicating ducts **73** are shown but obviously a greater or a lesser number could be used if desired. Release of air pressure in the mandrel at the conclusion of the tape-winding operation permits collapse of the band **71** at the crown **72** of the camber sufficient to release the associated core for ready removal of the completed roll of tape. In all other respects, operation of this embodiment of the invention is the same as that previously described.

The invention has been described in connection with a limited number of modifications, but many other modifications are included within its spirit. It should be limited, therefore, only by the scope of the appended claims.

What is claimed is:

1. In apparatus for winding a plurality of strips of material on a corresponding plurality of cores, the combination which includes a hollow mandrel adapted to be connected to a source of pneumatic pressure, a plurality of core supporting devices concentrically mounted for independent rotation on the mandrel and adapted each to support a core on which a different one of the respective strips is wound, and an individual driving mechanism for driving each of said concentrically arranged core supporting devices on said mandrel and fixed against relative rotation thereabout and relative longitudinal movement therealong, said driving mechanisms comprising each a clutch engaging device and said core supporting devices comprising each a core gripping means, said clutch engaging devices and said core gripping means being operable upon establishment of pneumatic pressure in the mandrel simultaneously to connect the driving mechanisms with the core supporting devices and to engage the core supporting devices with cores supported thereon, and said clutch engaging devices and said core gripping means being operable upon disestablishment of pneumatic pressure in the mandrel simultaneously to disconnect the driving mechanism from the core supporting devices and to disengage the core supporting devices from the cores supported thereon.

2. In apparatus for winding strip material on a core, the combination which includes a hollow mandrel adapted to be connected to a source of pneumatic pressure, a core supporting member mounted thereon for free rotational movement thereabout, core gripping means in the peripheral surface of the core supporting member movable when subjected to the influence of pneumatic pressure into core gripping engagement to anchor a core mounted thereon against relative rotation and out of core gripping engagement to release said core when the influence of pneumatic pressure is removed, driving mechanism for the core supporting member fixed on the mandrel against relative rotation thereabout and relative translation therealong, and an annular ring concentrically disposed about the axis of the mandrel in a recess in the fixed driving mechanism movable axially when subjected to the influence of pneumatic pressure into clutching engagement with the core supporting member to establish a driving connection therewith and out of clutching engagement with the core supporting member when the influence of pneumatic pressure is removed to disestablish said driving connection, and air passageways connecting said core gripping means and said recess respectively with the hollow mandrel.

3. In apparatus for winding strip material on a core, the combination which includes a hollow mandrel adapted to be connected to a source of pneumatic pressure, a core supporting member mounted thereon for free rotational movement thereabout, core gripping means in the peripheral surface of the core supporting member movable when subjected to the influence of pneumatic pressure into core gripping engagement to anchor a core mounted thereon against relative rotation and out

of core gripping engagement to release said core when the influence of pneumatic pressure is removed, driving mechanism for the core supporting member fixed on the mandrel against relative rotation thereabout and relative translation therealong, and an annular ring concentrically disposed about the axis of the mandrel in a recess in the fixed driving mechanism movable axially when subjected to the influence of pneumatic pressure into clutching engagement with the core supporting member to establish a driving connection therewith and out of clutching engagement with the core supporting member when the influence of pneumatic pressure is removed to disestablish said driving connection, and air passageways connecting said core gripping means and said recess respectively with the hollow mandrel, and means reacting between the annular ring and the wall of the recess in which it is mounted to facilitate disengagement of the driving mechanism from the core supporting member.

4. In apparatus for winding strip material on a core, the combination which includes a hollow mandrel adapted to be connected to a source of pneumatic pressure, a core supporting member mounted thereon for free rotational movement thereabout, core gripping means in the peripheral surface of the core supporting member movable when subjected to the influence of pneumatic pressure into core gripping engagement to anchor a core mounted thereon against relative rotation and out of core gripping engagement to release said core when the influence of pneumatic pressure is removed, driving mechanism for the core supporting member fixed on the mandrel against relative rotation thereabout and relative translation therealong, and an annular ring concentrically disposed about the axis of the mandrel in a recess in the fixed driving mechanism movable axially when subjected to the influence of pneumatic pressure into clutching engagement with the core supporting member to establish a driving connection therewith and out of clutching engagement with the core supporting member when the influence of pneumatic pressure is removed to disestablish said driving connection, and air passageways connecting said core gripping means and said recess respectively with the hollow mandrel, and means including a gasket of circular cross section reacting between the annular ring and the wall of the recess in which it is mounted to facilitate disengagement of the driving mechanism from the core supporting member.

5. In apparatus for winding strip material on a core, the combination which comprises a hollow mandrel adapted to be connected to a source of pneumatic pressure, a core supporting member mounted thereon for free rotational movement thereabout, core gripping means associated with the core supporting member comprising a resilient band anchored along its edges and which, midway between its edges, is inflatable outwardly upon application of pneumatic pressure on its inner side into gripping engagement with a core supported on the core supporting member and deflatable out of gripping engagement with such core upon disestablishment of pneumatic pressure on said inner side, driving mechanism for the core supporting member fixed on the mandrel against relative rotation thereabout and relative translation therealong, an annular ring concentrically disposed about the axis of the mandrel in a recess in the fixed driving mechanism movable axially when subjected to the influence of pneumatic pressure into clutching engagement with the core supporting member to establish a driving connection therewith and out of clutching engagement with the core supporting member when the influence of pneumatic pressure is removed to disestablish said driving connection, and independent air connections between the inner side of the resilient band and the hollow mandrel and between said recess and the hollow mandrel.

6. Apparatus for winding strip material on a core which comprises a hollow mandrel adapted to be connected to a source of pneumatic pressure, a core supporting member mounted on the mandrel for free rotational movement with respect to the mandrel, means associated with the core supporting member for holding a core mounted thereon against rotation with respect thereto and movable when subjected to the influence of pneumatic pressure into core gripping engagement and out of core gripping engagement when the influence of pneumatic pressure thereon is removed, driving mechanism for the core supporting member comprising a member fixed on the mandrel and a second member movable when subjected to the influence of pneumatic pressure into clutching engagement with the core supporting member and out of clutching engagement therewith when the influence of pneumatic pressure thereon is removed to establish and disestablish a driving connection between the member fixed on the mandrel and the core supporting member, and connections between the movable clutch member and the hollow mandrel and between the hollow mandrel and the core gripping means through which pneumatic pressure may be established.

7. In apparatus for winding strip material on a core, the combination which includes a hollow mandrel adapted to be connected to a source of pneumatic pressure, a core supporting member mounted thereon for free rotational movement thereabout, core gripping means in the peripheral surface of the core supporting member movable when subjected to the influence of pneumatic pressure into core gripping engagement to anchor a core mounted thereon against relative rotation and out of core gripping engagement to release said core when the influence of pneumatic pressure is removed, driving mechanism for the core supporting member fixed on the mandrel against relative rotation thereabout and relative translation therealong, an annular ring concentrically disposed about the axis of the mandrel in a recess in the fixed driving mechanism and being movable axially, when subjected to the influence of pneumatic pressure established in the recess, into clutching engagement with the core supporting member to establish a driving connection therewith and out of clutching engagement with the core supporting member when the influence of pneumatic pressure is removed to disestablish said driving connection, and connections between the recess in which the annular ring is mounted and the hollow mandrel and between the hollow mandrel and said core gripping means through which pneumatic pressure may be established.

8. Apparatus according to claim 2 wherein the core gripping means is movable outwardly in an axial direction upon the establishment of pneumatic pressure in the mandrel and against the reaction of resilient means serving to urge the core gripping means inwardly.

9. Apparatus according to claim 2 wherein the core gripping means includes an element with prongs slideable outwardly to engage the prongs in the core, and a spring reacting on said element with the prongs to move it inwardly upon disestablishment of pneumatic pressure in the mandrel.

References Cited in the file of this patent

UNITED STATES PATENTS

1,053,918	Meyer	Feb. 18, 1913
2,215,069	Meisel	Sept. 17, 1940
2,321,146	Jones	June 8, 1943
2,465,810	MacDonald et al.	Mar. 29, 1949
2,537,492	Tidland	Jan. 9, 1951
2,684,210	Conti	July 20, 1954
2,855,161	Ganz et al.	Oct. 7, 1958

FOREIGN PATENTS

11,998	Great Britain	June 2, 1908
225,247	Germany	Sept. 5, 1910
743,337	Germany	Dec. 23, 1943
1,083,008	France	June 23, 1954