Sept. 15, 1959 C. L. WELLINGTON 2,904,276

APPARATUS FOR RELOADING A WINDING MACHINE ARBOR

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FIG. 1.

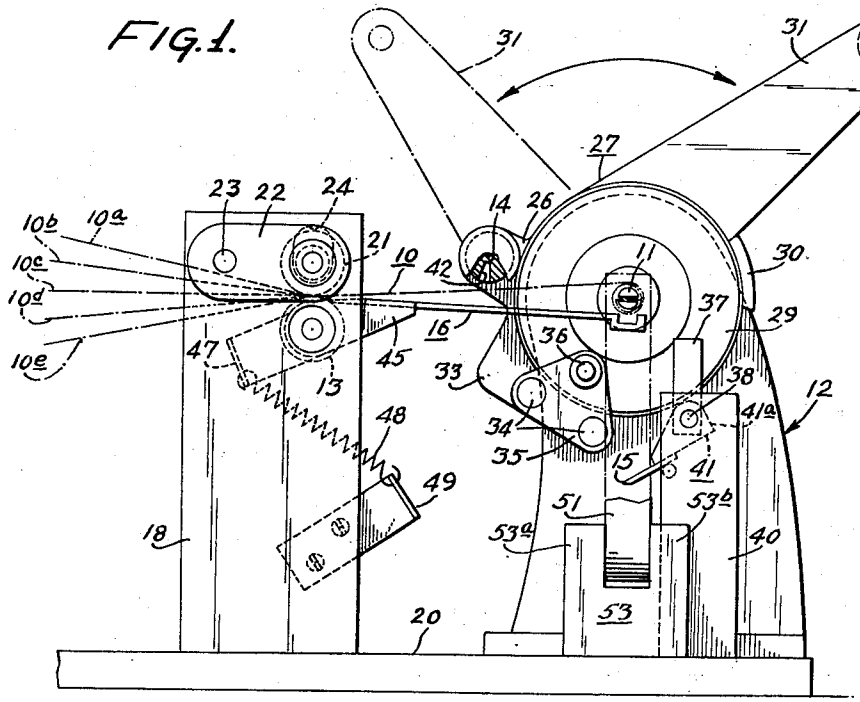
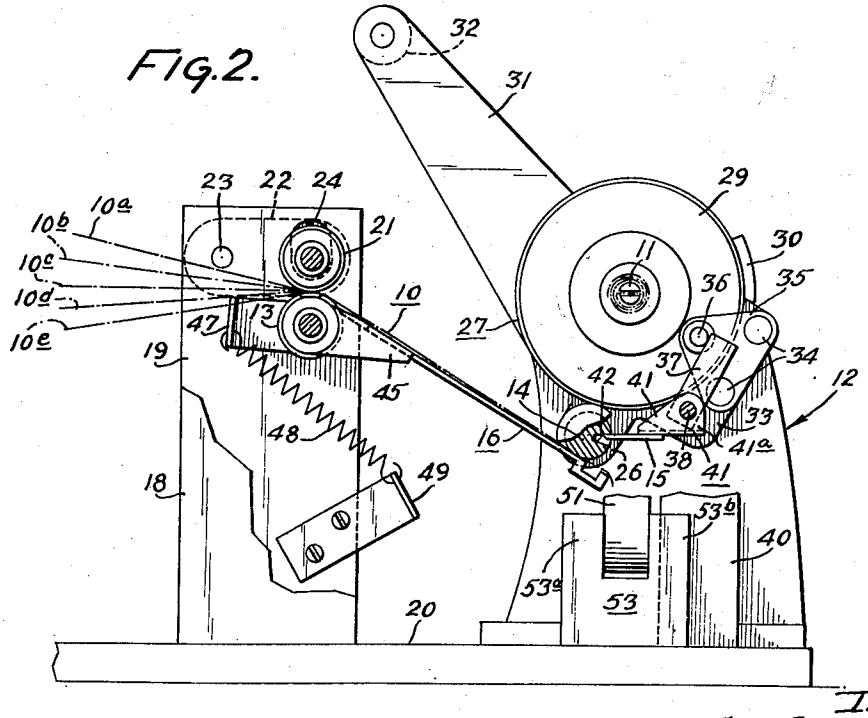


FIG. 2.



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FIG. 3.

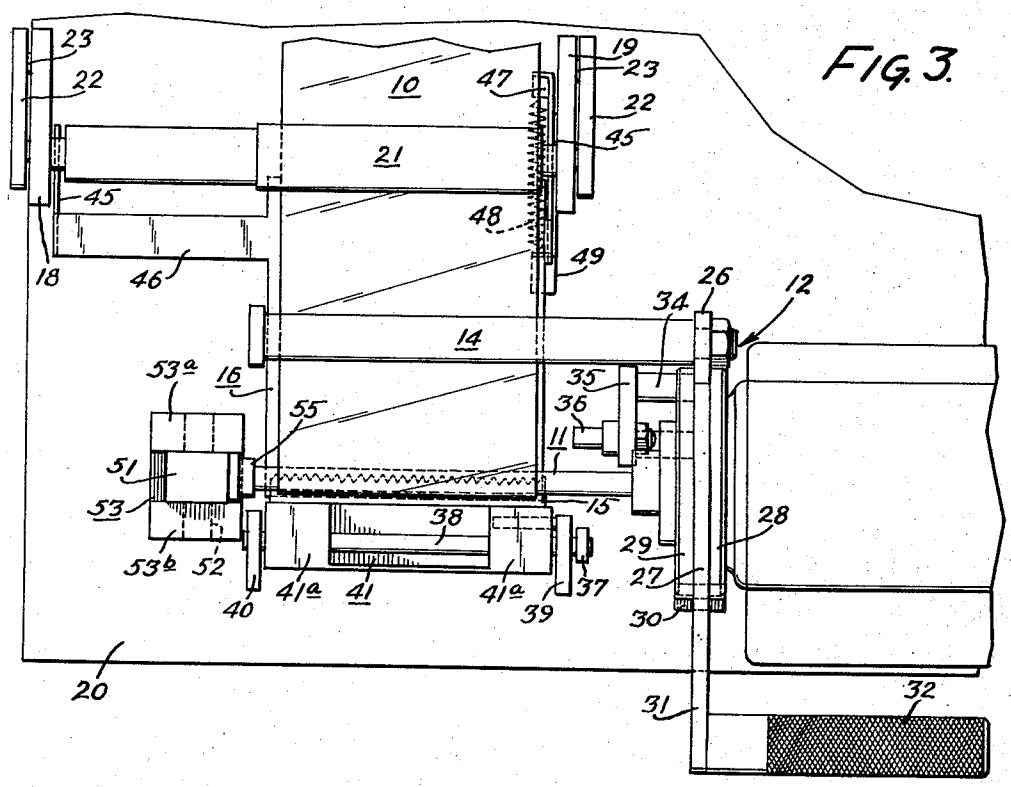
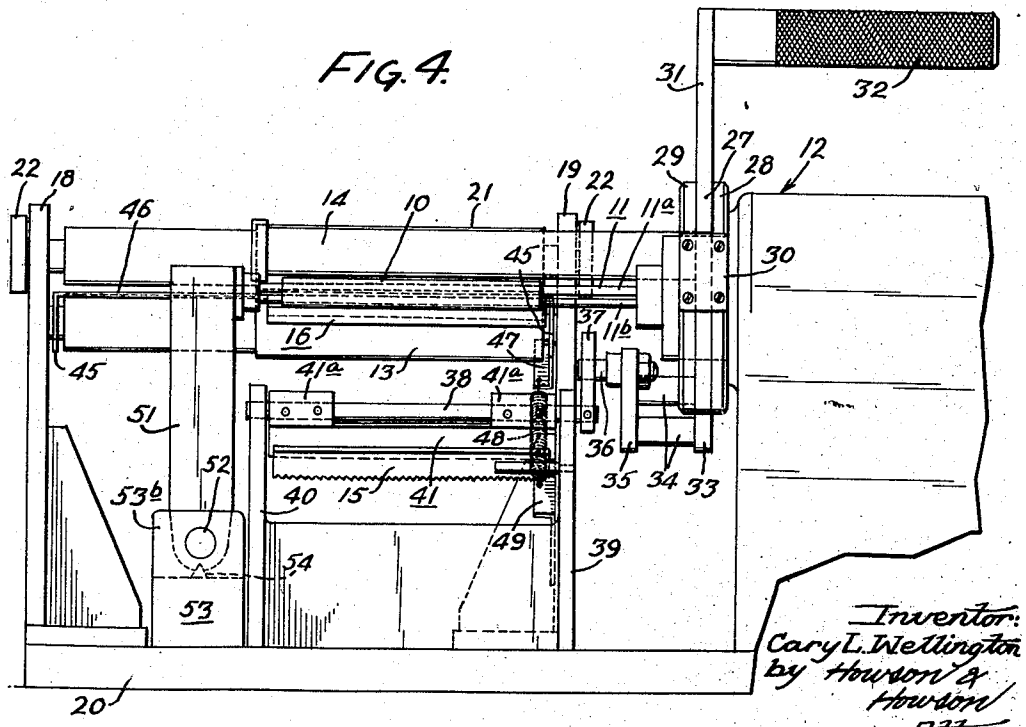


FIG. 4.



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FIG. 5.

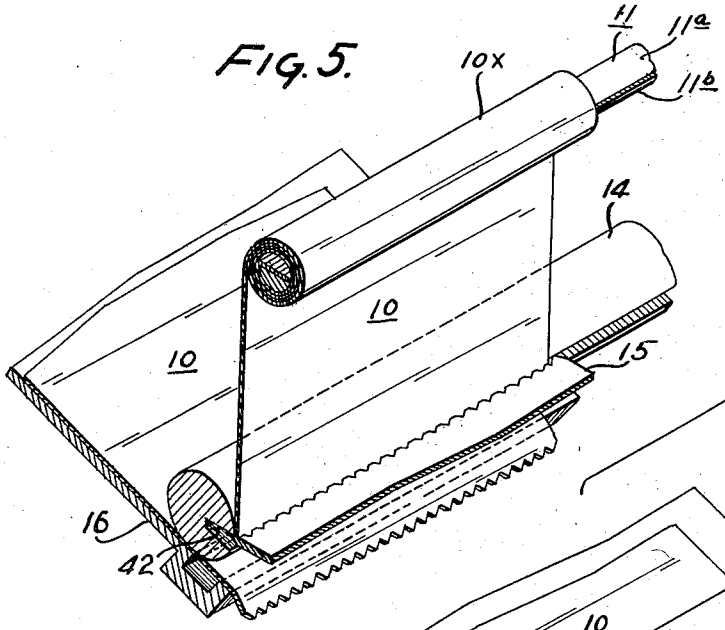


FIG. 6.

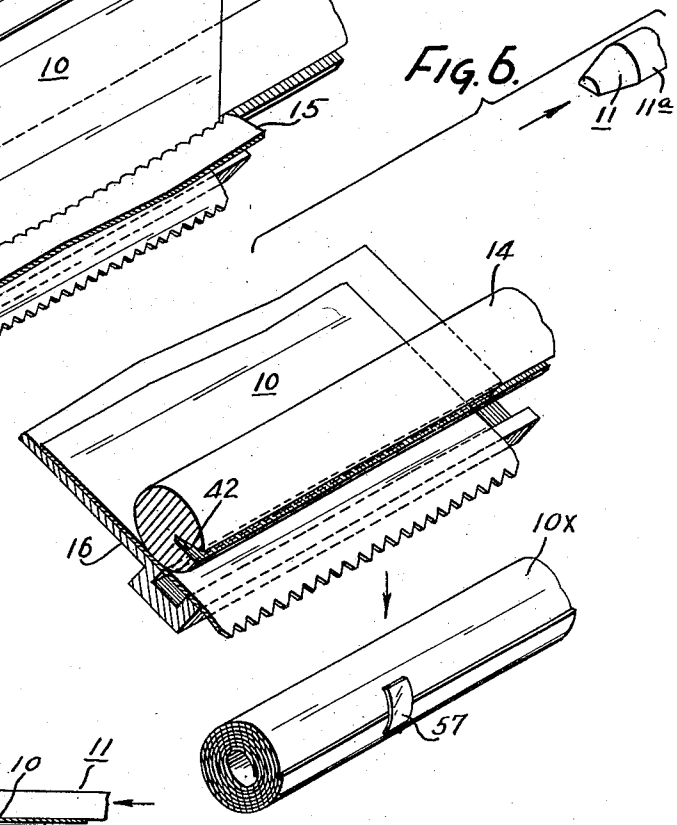


FIG. 7.

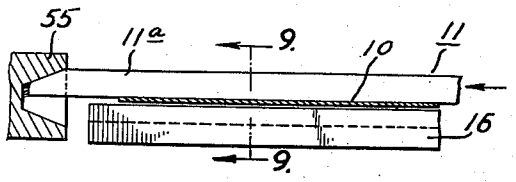


FIG. 8.

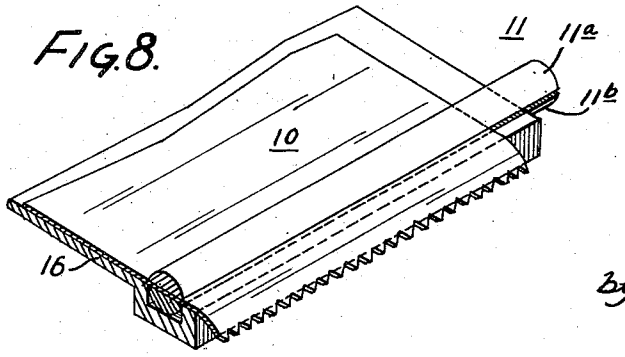
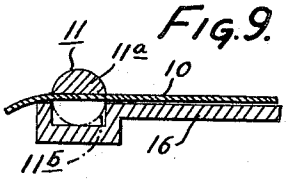


FIG. 9.



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APPARATUS FOR RELOADING A WINDING MACHINE ARBOR

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Application March 29, 1956, Serial No. 574,861

8 Claims. (Cl. 242—56.1)

This invention relates to apparatus for the reloading of the arbor of a winding machine in which tape or other continuous material is fed to the arbor to be wound into packages. This application is a continuation-in-part of application Serial No. 533,541, filed September 12, 1955, now abandoned.

Numerous machines have been devised for winding tape into cylindrical packages using a rotating arbor to which the tape is affixed and onto which the tape is wound. Using such devices a single tape or a plurality of tapes may be drawn from supplies along tape paths to the arbor by the pull of the arbor. Where a plurality of tapes are employed, it is common to collect them, between a pair of rollers, for example, into a sandwich so that they follow substantially a single tape path to the arbor in order to assure a smooth, neat package. As described in my copending application, Serial No. 503,923, filed April 26, 1955, now Patent No. 2,851,226, I have devised a method for making completely automatically stripping and removal of a package from the arbor of a machine of the type described. However, using my invention, which leaves the arbor in a convenient position for reloading, or any other machine or method known to the art, to make each new tape package, it is necessary to reload the arbor by hand after the previously wound package has been severed from the continuous tape.

The present invention eliminates the need to use hands in reloading the arbor. Using the method and apparatus of the present invention, it is possible to sever the tape, complete a package and reload the arbor in order to start the second package without laying hands on the tape, the reloading being done more quickly and accurately than it could be done by hand.

In accordance with the method of the present invention, an extra length of tape is drawn from its supply and stored between some point proximate to the arbor and the arbor. The proximate point may be the rollers for gathering a plurality of tapes into a single tape path or any other point at which the structure supports the tape. After the extra length has been stored, the tape is cut at such a point that the distance between the arbor and the cut is smaller than the stored extra length of tape. Thereafter, the severed wound package is removed from the arbor, preferably by the automatic means described in my copending application mentioned above. Finally, the cut end of the tape is fed to the arbor and attached thereto.

As a practical matter, in order to practice the present invention, simple apparatus may be added to an existing winding machine probably necessitating the rearranging of the position of any existing cutter so that it will be positioned close to the arbor immediately adjacent to the modified tape path. Other than the cutter, the apparatus consists primarily of a device for pulling the tape in order to draw an extra length of tape from the source, the extra length being greater than the distance between the cutter and the arbor. In addition, a feeder must be

employed to carry the cut end of the tape to the arbor. In most practical apparatus, the pulling device will be a storage bar which deflects the tape from its normal tape path between the arbor and another fixed support point along the length of the tape path in order to store the extra length of tape.

The device of the present invention may be made automatically or manually operated and, in either event, except for the drive device, the structure will be essentially the same. The apparatus of the present invention has the advantage that it is simple and requires but a few easily constructed parts which may also be easily assembled onto existing winding machines. Moreover, the principle of operation is so simple that no special skill is required of the operator. The mechanism is completely dependable and will continue to work accurately time after time, yet it does not require close tolerances and clearances, a factor which adds further to the ease of its construction and assembly.

For a better understanding of the present invention, a manually-operated apparatus embodying the invention will be described in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevational view partially broken away showing the essential elements of the winding machine and the apparatus of the present invention;

Fig. 2 is a view similar to Fig. 1 showing the storage and cutting position of the apparatus of the present invention;

Fig. 3 is a plan view from above of the apparatus of the present invention in the position of Fig. 1;

Fig. 4 is a front elevational view of the apparatus of the present invention in the position of Fig. 1;

Fig. 5 is a perspective sectional view showing effective elements of the present invention in the course of cutting to complete a package;

Fig. 6 is a view similar to Fig. 5 showing the stripping action of the arbor;

Fig. 7 illustrates part of the apparatus of the present invention in reloading position and illustrates the first step of the reloading operation;

Fig. 8 illustrates in a perspective view the second step of the reloading operation; and

Fig. 9 is a side sectional view showing the mechanism of reloading the arbor.

Referring now to Figs. 1, 3 and 4, it will be observed that this embodiment of the apparatus of the present invention is designed to wind a sandwich **10** of tapes **10***a*, **10***b*, **10***c*, **10***d*, **10***e* which extends along a tape path to an arbor **11** into a cylindrical package **10***x*. The arbor **11** is part of a winding machine generally designated **12** and rotates to form package **10***x* and draw the various tapes from their supplies. The arbor illustrated is an axially split arbor having upper and lower portions **11***a* and **11***b*, respectively, which are designed to be separately withdrawn axially from the winding position, as described in my copending application, Serial No. 503,923, filed April 26, 1955.

As the cylindrical package is wound, the tapes are drawn from their tape sources (not shown) over a surface bounding and defining one end of a storage region, which is bounded at its other end by the arbor. The surface **13** is an idler roller which is part of a device to compress the plurality of tapes into sandwich **10** following a single tape path. A storage bar **14** which is adapted to be moved between the surface **13** and the arbor **11** so as to deflect the tape sandwich **10** from its normal path and hence draw from the supplies and store in the region between the surface **13** and the arbor **11** an extra length of tape. The cutter **15** is arranged to cut the tape sandwich while assuming its modified path after storage has been completed at a distance from the arbor which is

smaller than the length of the extra amount of stored tape. After the tape has been cut, the package **10***x* on the arbor may be completed and stripped from the arbor and the severed end of the tape will thereafter be fed by a feeder **16** to the arbor **11**, as will hereafter be described.

In the apparatus illustrated, the idler roller **13** is supported between a pair of upright support brackets **18** and **19** which, in turn, are supported on base **20**, which in this particular embodiment is also the base of the winding machine **12**. Above the idler roller **13** is another idler roller **21** having its axis parallel to that of roller **13** and arranged to make tangential surface contact with roller **13**. Roller **21** is journaled in short lever members **22** which, in turn, are journaled for rotation about dowel posts **23** mounted respectively in brackets **18** and **19**. To avoid interference with the tape, the short levers **22** are mounted outside of the support brackets **18** and **19** so that, in order to permit the idler roller **21** to be journaled in these levers, large holes **24** are provided in both brackets. Spring means (not shown) are advantageously provided to urge the idler **21** into tangential contact with the idler **13** in order to compress the tapes passing therebetween into the sandwich **10** following substantially a single tape path between roller **13** and arbor **11**.

An annular plate-like member **27** having a peripheral flange **26** is mounted on a cylindrical shoulder on the winding machine **12** to rotate about the axis of rotation of the arbor. Member **27** is supported between similar plate-like members **28** and **29** which are fixed to each other and to the winding machine. Plate **28** is fixed by bolting it to the winding machine and plate **29**, by fixing it, in turn, to plate **28** using a typing member **30**, which also acts as a stop, as will hereafter appear. The peripheral flange **26** supports storage bar **14** in a position generally perpendicular to the member **27** and parallel to the arbor. Also projecting from the periphery of the generally circular member **27** is an actuating lever **31** to the end of which is attached a handle **32** whose axis is parallel to the axis of rotation of the arbor.

On still another peripheral projection **33** of member **27** is mounted a pair of pins **34** which, in turn, support a small plate **35** which mounts a stud member **36**. The pins **34** are sturdy and provide a junction between plates **33** and **35** which is solid and essentially unyielding. Plate **35** is arranged so that stud **36** will project parallel to the axis of rotation of the arbor, its radius from the arbor being smaller than the radius of member **29**. Stud **36** is arranged so that in rotation of plate **27** it will be brought to bear against a lever **37** journaled to rotate about pin **38** fixed in an upright bracket **39** which is supported on base **20**. Pin **38** extends through bracket **39** to a second upright bracket **40** which parallels bracket **39** and is also fixed to the base **20**. A cutter supporting member **41** is journaled to the rod **38** to rotate about it by a pair of ears **41***a* on the knife supporting member **41** to the bottom of which is attached serrated cutter knife **15** by any appropriate means. The storage bar **14** is provided with a V-shaped groove **42**, one edge of which provides a cutting edge for the cutter knife **15**. The cutter knife **15** is so located that when the storage bar **14** is in its storage position the cutter will be moved into it.

The feeder element **16** is advantageously a plate-like member which is arranged tangentially to the idler roller **13** and made to extend the length of the ordinary tape path, i.e. to beneath the winding arbor. Reference to Fig. 3 will indicate the general shape of feeder **16** which is provided with a pair of flanges **45** arranged generally perpendicular to its plane to support feeder **16** on the axle of idler **13** and permit its rotation about the same axis as idler **13**. An extension arm **46** is necessary to join the main body of the feeder plate **16** to the flange **45** adjacent support member **18**. The flange **45** at the side adjacent support **19** is provided with an extension **47** beyond the point of support at the idler roller and extending between this extension **47** and tab **49** on bracket **19** is a spring **48**, to urge the feeder upward against the arbor.

The arbor itself, as described in my previously mentioned application, is able to be axially withdrawn from the winding position. Support member **51** is provided to hold the arbor in its proper position while winding and is connected between the tines **53***a* and **53***b* of bifurcated member **53** by pin **52**. A wedge member **54** (as seen in Fig. 4) is used to limit the amount of relative rotation between members **53** and **51** about pin **52**. An insert **55** in the top of support member **51** is provided with a conical inlet in order to direct the parts of the arbor together as they move into member **55**. Member **55** is advantageously composed of some material providing a good bearing surface.

It will be observed that in Figs. 5–9, the schematic drawings show only one layer of tape instead of a sandwich. Although this has been done for clarity here it also serves to illustrate that the principle of winding and the application of the present invention is the same whether a single tape or a sandwich of a plurality of tapes is employed.

The nature of the winding operation will be understood by reference to my aforementioned application. In the course of the winding operation, the tapes are drawn between idlers **13** and **21** and thence together along a normal tape path to the winding arbor **11** which winds the tapes into a cylindrical package. When the size of the package is large enough, the handle **32** is pressed, rotating lever arm **31** from the position shown in Fig. 1 to the position shown in Fig. 2. This movement causes the storage bar **14** to move downward and depress out of its normal tape path the tape **10** so that, as shown in Fig. 2, an extra quantity of tape is drawn from the tape source and stored between the idler **13** and the arbor **11**. The extra quantity is the difference in length between the idler **13** and the arbor when the tape is deflected by the storage bar and when it assumes its normal path. In the course of rotation, the stud **36** revolves into contact with lever **37** which causes knife **15** to be revolved about pin **38** and into the position shown in Fig. 2. At the bottom of its stroke, the storage bar **14** will move against the cutter **15** so that the tape is cut between the serrated edge of the cutter **15** and the edge of the V-shaped groove **41**. A detailed view of the cutting of the tape is illustrated in Fig. 5. In order to prevent damage to the cutting edge of the knife, member **30** acts as a stop against which peripheral flange **33** abuts at the extreme position shown in Fig. 2 and against which lever **31** abuts in the extreme position shown in Fig. 1.

After the tape is severed, the tape package is completed by winding, and a piece of adhesive tape **57** is automatically or manually applied to the completed package to hold it together. Thereafter, the arbor part **11***b* is withdrawn to strip the tape package from the arbor and leave it loose on the arbor member **11***a*. Then arbor member **11***a* is withdrawn, as shown in Fig. 6, permitting the tape package **10***x* to drop into a box or other storage device. Handle **31** is rotated back into the position shown in Fig. 1, in the course of which as the storage bar **14** rises, the feeder **16** may also rise into position against the arbor. Also as the lever **31** is moved back into position of Fig. 1, the cutter shifts into position of Fig. 1 and the package **10***a* is able to drop between feeder **16** and cutter **15** into its collection box. The feeder is urged upward into the arbor by the spring **48** and by the time it has reached this position, the arbor member **11***a* is back in place and the tape **10** may be held against it by the feeder, as shown in Fig. 7. It will be noted that the end of the feeder beneath the arbor is thicker than the rest of the feeder and that a groove is milled therein. This groove is intended to accommodate part **11***b* of the arbor and when the condition shown in Fig. 7 is achieved, the part **11***b* of the arbor may then be slid through the groove beneath the tape **10**, as shown

in Fig. 8, in order to grasp the severed end of tape 10. As arbor member 11*b* reaches bearing member 55, it will be forced against arbor member 11*a* so that the tape 10 is snugly held between the two pieces. Thereafter, the winding may proceed as through the arbor had been loaded by hand. The presence of the feeder beneath the arbor will not be detrimental and it will be depressed against the action of its spring pressure 48 as the size of the tape package increases, as illustrated in Fig. 1.

The machine illustrated is intended to be used for flat tapes and is mainly used for the purpose of winding condensers employing at least two insulator and two conductor flat tapes into a condenser.

Although the continuous tape in this particular embodiment of the invention has been illustrated as a flat strip, it is possible in other applications to employ tapes of all sorts of dimensions including dimensions having circular cross sections, such as string, wire, etc. Where materials having circular square or like cross sections are employed, it may be desirable to wind in a slightly different way, for example, by feeding the material to be wound laterally, as well as lengthwise, in which case a traverse mechanism of some sort can be employed. The addition of necessary equipment to permit winding of various types of tape or other continuous material is a matter of choice or skill and will be obvious to those skilled in the art. It should be observed, however, that the term "tape" herein is intended to include broadly all sorts of continuous materials.

Other modifications in the product to be wound and other modifications in the machine and method of the present invention will occur to those skilled in the art and all such modifications within the scope of the claims are intended to be within the scope and spirit of the present invention.

I claim:

1. A machine for winding spiral packages of tape drawn from a tape supply comprising, a winding arbor having a fixed supporting bearing permitting rotation of the arbor, a fixed tape supporting member spaced laterally a substantially fixed distance from the arbor and providing a normal tape path extending directly between the supporting member and the arbor, tape deflecting storage means supported relative to the arbor and adapted to move between the supporting member and the arbor into contact with the tape therebetween to deflect said tape from its normal tape path into a cut-off position, and cut-off means so arranged that the tape is moved against the cut-off means in cut-off position to cut the tape at such a point that the length of tape withdrawn from the supply is sufficiently long for direct attachment to the arbor without drawing more tape from the supply.

2. The winding machine of claim 1 in which the storage means is a storage bar generally parallel to the arbor and mounted for oscillatory movement only about the axis of rotation of the arbor.

3. The winding machine of claim 1 in which a feeder adapted to carry the cut end of the tape to the arbor is positioned below the tape path to receive the severed tape after cutting as it falls by gravity and lift it to the arbor.

4. The winding machine of claim 3 in which the feeder is a member rotatable about an axis spaced from and parallel to the arbor and spring urged into the arbor.

5. The winding machine of claim 4 in which the supporting member is rotatable and supports the feeder, the feeder has a tape supporting surface which lies below the arbor and the deflecting storage means is a storage bar which is adapted to move against the feeder in order to deflect it against its spring urging away from the arbor and which is oscillatory in its movement between rest and tape cutting positions.

6. The winding machine of claim 1 in which the cut-off means includes a cutter knife rotatable into a cutting position beneath the arbor, and in which the storage means includes a storage bar which serves as an anvil for the cutter knife.

7. The winding machine of claim 6 in which the cutter knife is supported on a crank having a support about which the crank is rotatable fixed relative to the winding position of the arbor and means on the storage bar support structure adapted to contact the crank and move the knife in position against the storage bar.

8. The winding machine of claim 7 in which the storage bar support also carries a handle revolvable about the axis of rotation of the arbor by which the storage bar is moved to deflect the feeder and against the cutter knife.

References Cited in the file of this patent

UNITED STATES PATENTS

2,199,603	Ackley	May 7, 1940
2,247,750	Dohnal	July 1, 1941
2,272,940	Gerard	Feb. 10, 1942
2,361,264	Christman	Oct. 24, 1944
2,740,592	Larsen	Apr. 3, 1956

FOREIGN PATENTS

1,040,088	France	May 20, 1953