Jan. 6, 1970 TETSUO SASAKI 3,488,013

APPARATUS FOR ROLLING TAPES

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FIG. 1

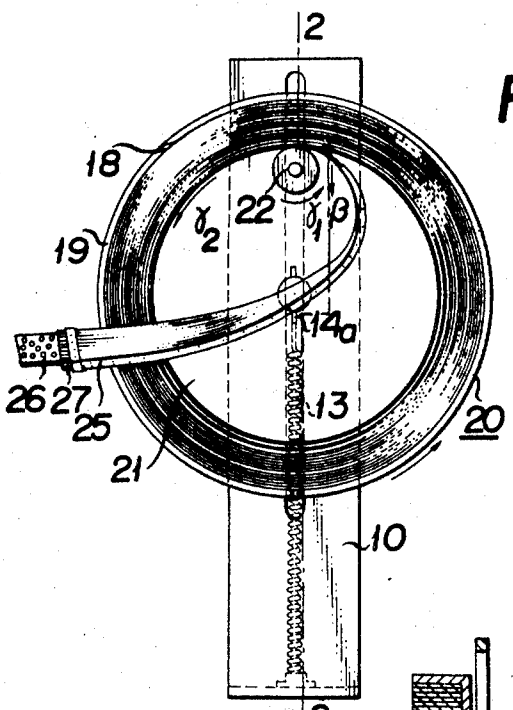
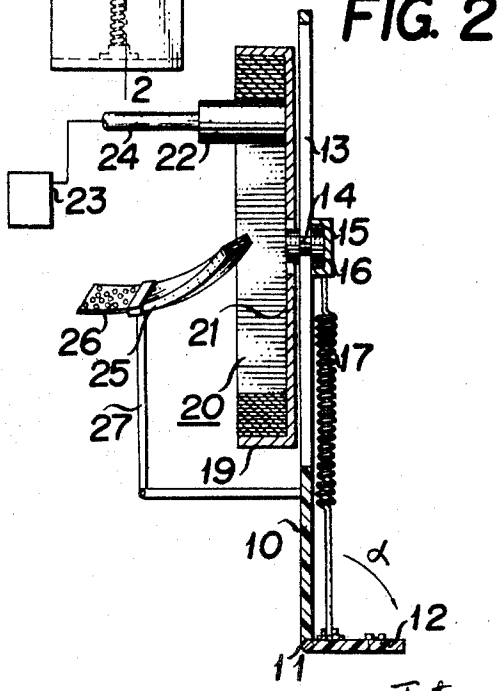


FIG. 2



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FIG. 3

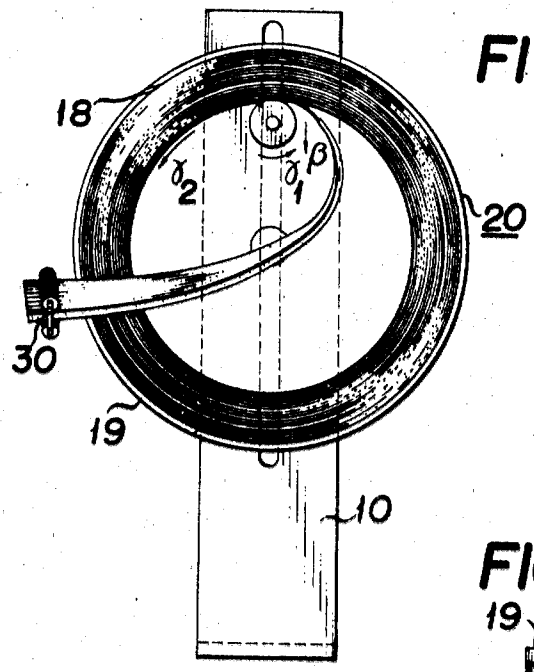
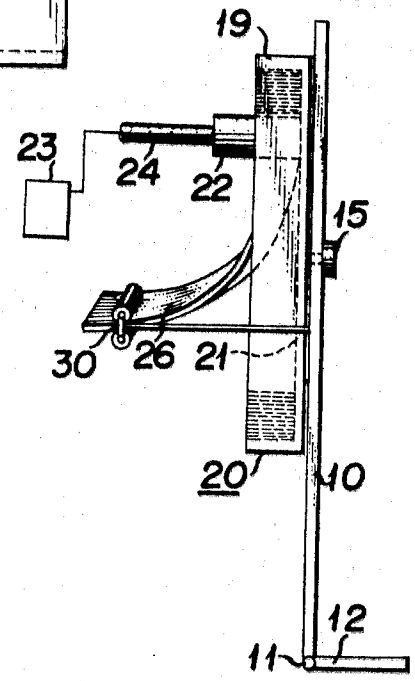


FIG. 4



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FIG. 5

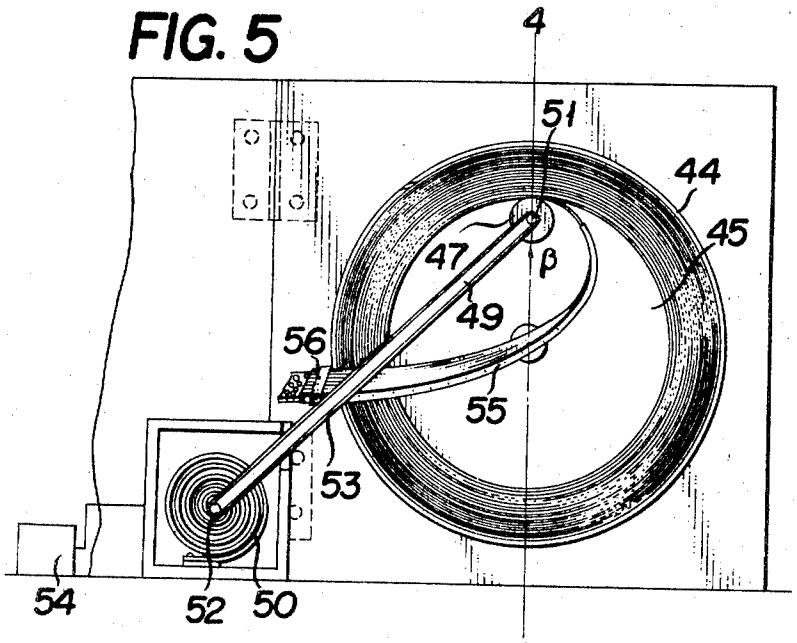
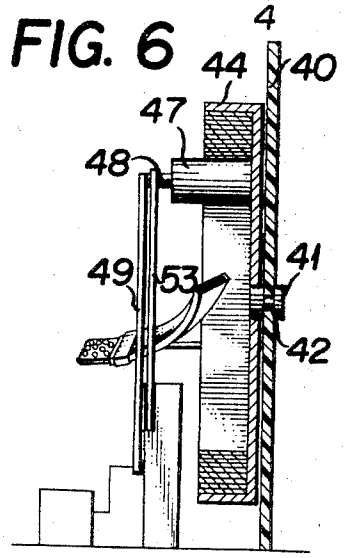


FIG. 6



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FIG. 7

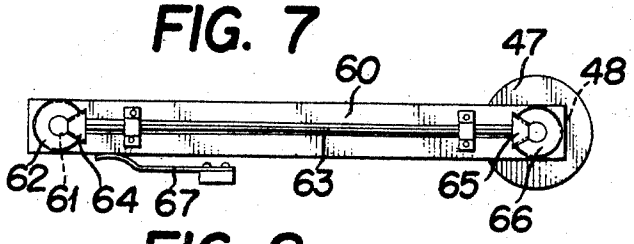


FIG. 8

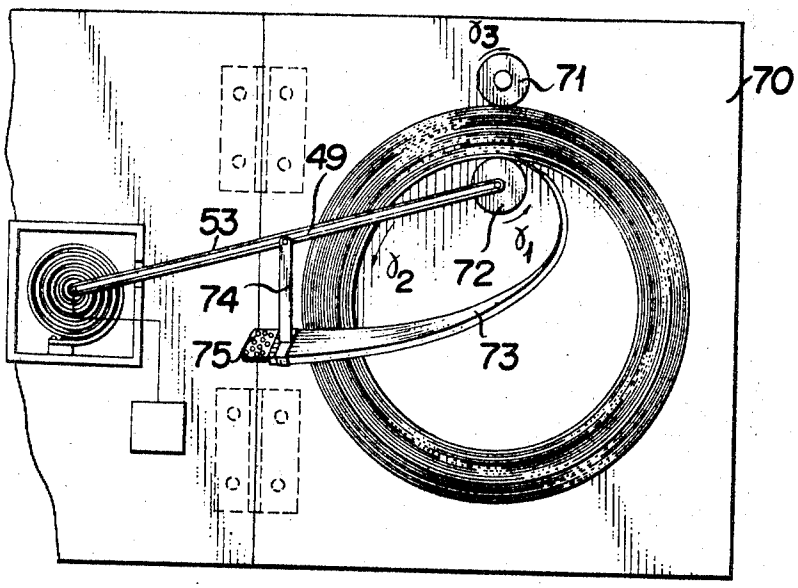
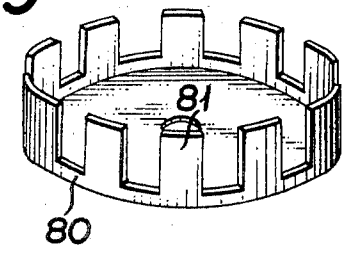


FIG. 9



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3,488,013

APPARATUS FOR ROLLING TAPES

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Claims priority, application Japan, Aug. 31, 1966, 57,211/66
Int. Cl. B65h *17/48*
U.S. Cl. 242—55.21 5 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus for rolling tapes which comprises a rotatable tape container consisting of a wall to support outer tape windings and a plate on which said supporting wall is set upright, a pinch roller accessibly facing the inner surface of said supporting wall and having an axis parallel to that of said tape container, a means to transmit a rotating force to either said tape container or pinch roller so as to cause tight rotation therebetween. The tape is fed through the space between the circumferential surface of said pinch roller and the inner surface of said supporting wall. A guide means is provided to conduct a tape to where it comes in contact with said pinch roller.

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for reeling magnetic or perforated or other types of tape, more particularly for taking up tapes progressively from the outside toward the inside of the windings.

In general, where the aforementioned types of tape are taken up on a reel for use as the regenerated tape of a tape recorder or a projector film, the starting end of the tape is fitted to the taking up axle provided in the central part of the reel and wound progressively from the inside toward the outside of the windings. In this case, the commonly used taking up device for tapes comprises a spool-type reel and a drive mechanism to rotate it.

This device has the drawbacks that since the starting end of the tape is first taken up on the inside of the windings and the finishing end is placed on the outside thereof, said tape is gradually used from the last part thereof if it is reused. Consequently before the tape is put to use again, it is necessary to rewind it on a separate reel so that its starting end is positioned on the outermost side of the windings. Hence there are difficulties in the continuous repeated use of the tape and also extra time and work have to be expended in rewinding it.

SUMMARY OF THE INVENTION

The tape rolling apparatus of the present invention comprises a tape container having a circumferential wall, a pinch roller in contact with the inner surface of said wall with a tape intervening between them and a guide means to conduct the tape through the space between said wall and roller, thereby making it possible to take up the tape from the outside toward the inside of the windings along said circumferential wall. Therefore the present invention has eliminated the troublesome rewinding of a tape in practical use as required with the commonly used tape reeling apparatus which took it up progressively from the inside toward the outside of the windings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevation of one embodiment of the tape rolling apparatus according to the present invention;

FIG. 2 is a sectional view taken along line 2—2 of FIG. 1;

FIG. 3 is an elevation of one modification of the embodiment of the present invention illustrated in FIGS. 1 and 2;

FIG. 4 is a side view of the apparatus shown in FIG. 3;

FIG. 5 is a front elevation of another embodiment of the tape rolling apparatus according to the present invention;

FIG. 6 is a sectional view taken along line 4—4 of FIG. 5;

FIG. 7 is an elevation showing one modification of the main part of the embodiment shown in FIGS. 5 and 6;

FIG. 8 is an elevation of still another embodiment of the present invention; and

FIG. 9 is a perspective of one modification of the tape container used in the tape rolling apparatus according to the present invention.

One embodiment of the present invention will now be described with reference to FIGS. 1 and 2. A support plate **10** is fitted at the bottom end to a fixing plate **12** by means of a pivotal axle **11** in a manner freely to rotate in the direction indicated by an arrow α. Provided in the lengthwise direction of said support plate **10** is a slit of slide way **13** in which a slidable main shaft **14** is placed. Fitted to the rear end of said main shaft **14** is a circular stop means **15** so as to prevent said main shaft **14** from falling off in the forward direction. Attached around said stop means **15** is a cylindrical ball bearing device **16**. Stretched between said ball bearing device **16** and said fixing plate **12** is a coil spring **17**, which pulls main shaft **14** downward at all times. On the other hand, fitted at the fore end of said main shaft **14** having an engaging projection **14***a* is a cylindrical tape container **20** open at the top and made, for example, of acrylic resin by fixing the central part of the bottom plate **21** thereof to said main shaft **14**, said container having a circumferential wall **19** carrying a slit **18** to take hold of the starting end of a tape. Thus said tape container **20** rotates with said main shaft **14** and is always pulled downward by said spring **17**. A pinch roller **22** is inserted from the open side of said tape container **20** into that part which faces the inner surface of the circumferential wall **19** of said tape container **20**. The bottom face of said pinch roller **22** is placed in the proximity to the aforesaid bottom **21** of said tape container **20**. Said pinch roller **22** is connected through a rotary shaft **24** to a means of a drive mechanism **23** such as a motor. Further, a sheath-shaped guide **25** is extended upward from the neighborhood of the part where said pinch roller **22** faces said circumferential wall **19** to the upper opening of said tape container **20** in a semi-circularly twisted form, serving to conduct tape **26** from outer port through the space between said pinch roller **22** and circumferential wall **19**. Said guide **25** can be transferred to the prescribed position by support arm **27**.

Further, where it is desired to move tape container **20** in the direction of an arrow β, it will be sufficient only to set support plate **10** upright as illustrated in FIGS. 3 and 4. In this case, the force required to work in the direction β will be supplied by the self weight of said tape container **20**.

Also where a relatively thick and elastic tape such as an ordinary projector film is used, a sheath-shaped guide will not be required, and instead, as shown in FIGS. 3 and 4, installation of only a pair of guide rollers **30** or the like will be sufficient to conduct tape through the space between pinch roller **22** and the circumferential wall **19** of tape container **20**.

Description will now be given of the functional operation of the tape rolling apparatus under the present invention. First, tape **26** to be taken up is held between said circumferential wall **19** of tape container **20** and pinch roller **22** by being conducted through guide **25**, and the

starting end of said tape **26** is fixed into the slit **18** on said circumferential wall **19**. At this time, tape container **20** is pulled in the direction of an arrow β due to the tension of a coil spring **17** and presses tape **26** between it and pinch roller **22**. Next when pinch roller **22** is made to rotate in the direction of an arrow γ_1 by drive mechanism **23**, tape container **20** concurrently rotates along with tape **26** in the direction of an arrow γ_2, allowing said tape **26** to be taken up progressively from the outside toward the inside of the windings in said tape container **20**.

Since the starting end of tape **26** thus taken up is located at the outermost side of the resultant windings and the finishing end lies in the inmost part thereof, the use of such tape for practical purposes can be made with great ease without rewinding, namely, simply by drawing it out from the outside of the windings in a usual manner.

Another embodiment of the present invention will now be described with reference to FIGS. 5 and 6. Located in the substantially central part of horizontally rotatable support plate **40** is main shaft **42**, one end of which is supported by a stop means **41**. Fitted at the other end of said main shaft **42** is a tape container **45** open at the top and formed, for example, from an aluminum plate by fixing the central part of the bottom plate thereof to said shaft **42**, said container having a circumferential wall **44** carrying a slit to take hold of the starting end of a tape. A pinch roller **47** is inserted from the open side of said tape container **45** into that part which faces the inner surface of the circumferential wall **44** of said tape container **45**. The bottom face of said pinch roller **47** is placed in the proximity to the aforesaid bottom plate **46** of said tape container **45**. Fitted to said pinch roller **47** is one end of rotary shaft **48**, and mounted on the other end of said rotary shaft **48** is one end of rotatable arm **49**. The other end of said rotatable arm is fitted to the center of a spiral spring **50** so as to pull said pinch roller **47** in the direction of β at all times. There is also stretched an endless belt **53** between a pulley **51** placed on said rotary shaft **48** and another pulley **52** provided in a protruding manner on the side of spiral spring **50** of rotary arm **49**. Said pinch roller **47** is driven through the belt **53** by a drive mechanism **54** connected to said pulley **52**. Further, sheath-shaped guide **55** of the same type as in the preceding embodiment is fitted in a manner to rotate with rotatable arm **49** by means of a support arm **56**. In this embodiment the force to take hold of the tape is supplied by pinch roller **47** which works upward through rotary arm **49**.

One modification of the means to drive pinch roller **47** of the aforesaid embodiment will now be described with reference to FIG. 7. Mounted on one end of plate member **60** is a bevel gear **62** which is connected to a drive mechanism (not shown) through rotary shaft **61**. Meshed with said bevel gear **62** is another bevel gear **64**, which is rotatably secured to one end of intermediate shaft **63** which is also rotatably located on plate member **60** in the lengthwise direction thereof. Rotatably secured to the other end of said intermediate shaft **63** is bevel gear **65**, which meshes with another bevel gear **66** which is fitted to one end of rotary shaft **48** secured to pinch roller **47**.

Due to the elimination of an endless belt as a means to drive said pinch roller **47**, the aforesaid modification has the advantage that it has a simple construction as a whole.

The means to rotate the arm of said pinch roller **47** may consist of the spiral spring referred to in the aforementioned embodiment, a plate spring **67** shown in FIG. 7 or any other devices.

A further embodiment of the present invention will now be described with reference to FIG. 8. A pinch roller **71** having the circumferential surface made of hard rubber is placed in the upper part of the approximately central part of horizontally rotatable support plate **70**. Fitted below this pinch roller **71** is another pinch roller **72**. The latter roller is contacted by rotatable arm **49** and driven by endless rubber belt **53** in the same manner as in the aforementioned embodiment of FIGS. 5 and 6. The clearance between said upper pinch roller **71** and said lower pinch roller **72** is adjustable according as the wound tape increases in thickness. The contact between these two rollers through the intervening tape and their respective rotation may, of course, be carried out by the means shown in FIG. 7 or by connecting upper pinch roller **71** to a drive mechanism (not shown) or by pressing said roller downward by a separate device.

A sheath-shaped guide **73** of the same type as in the aforementioned embodiments is connected to said rotatable arm **49** by means of support arm **74** so as to move along with said rotatable arm **49**. The outlet of said guide **73** is located near the upper part of said lower pinch roller **72** so as to conduct a tape constantly through the space between both pinch rollers **71** and **72**. While this guide **73** may be fitted to said support plate **70**, the abovementioned method of attaching said guide has the advantage that the feeding of a tape is performed smoothly and that the amount of the tape to be taken up can be increased without being restricted by the position of said guide.

The functional operation of the modification illustrated in FIG. 8 will now be described. First, tape **75** is conducted through sheath-shaped guide **73** to the space between pinch rollers **71** and **72**. Tape **75** is further drawn out to form a circular ring. The starting end of the tape is fixed by an adhesive to that point of the succeeding length of the tape at which a complete circle is defined by said starting end of the tape while it is being drawn out. This ring constitutes the outermost side of the windings formed from tape **75** taken up. Next in the same manner as in the foregoing embodiments, lower pinch roller is allowed to rotate in the direction of γ_1 and tape **75** pressed between upper ond lower pinch rollers **71** and **72** is made to rotate in the direction of γ_2 so as to be taken up progressively. If, in this case, upper pinch roller **71** is allowed to rotate in the direction of γ_3 it will facilitate the rotation of tape **75**.

The apparatus illustrated in FIG. 8 eliminates a tape container, so that a tape can be taken up to any desired diameter of the resultant windings. This embodiment also has the effect of saving the time required in removing the finished windings from a tape container.

Furthermore, the present invention permits a wound tape to be used as enclosed in a tape container or after removal therefrom. In the former case, it will be sufficent only to engage the tape container having an engaging slit with a main shaft having an engaging project as illustrated, for example, in FIG. 1. In the latter case, the rotation of a support plate will easily release the windings from the tape container, though it is engaged with the rotary shaft. The tape container used in the aforesaid cases may consist of one which has a circumferential wall formed around the circular bottom plate as shown in each of the related embodiments or one which has a circumferential wall formed, as illustrated in FIG. 9, from a plurality of wall segments **81** arranged at proper spaces on the circumference of a circular bottom plate **80**.

What is claimed is:

1. An apparatus for rolling a tape comprising in combination,

(a) a cylindrical tape container with an inner circular wall and a cylindrical side wall, said container being at least partially open at the opposite circular end, said inner wall and side wall defining a tape storage zone wherein tape can be wound up against said inner wall;

(b) a rotating shaft, said container being mounted on said shaft to rotate generally in the vertical plane;

(c) supporting means to hold said container, base

means, means pivotally attaching said supporting means to said base means to allow said container to at least partially pivot about a horizontal axis so that said rotating shaft is disposed at an angle to the horizontal;

(d) a driven rotatable pinch roller in said container parallel to said shaft and resilient means to urge said side wall toward said pinch roller so that tape taken up in said container is sandwiched and pressed between said side wall and pinch roller;

(e) driving means to rotate said pinch roller;

(f) guide means attached to said supporting means at least partially spiral to spirally guide tape between said pinch roller and said side wall.

2. The apparatus according to claim wherein said side wall has a slit to take hold of the starting end of the tape.

3. The apparatus according to claim **1** wherein said side wall has a plurality of openings through which the fingers can be inserted to take up the wound tape.

4. The apparatus according to claim **1** wherein said urging means consists of a coil spring whose ends are connected to said tape container and said base means.

5. The apparatus according to claim **1** wherein said guide means consists of a twisted sheath-shaped guide having a tape inlet near said opposite circular end and a tape outlet within said container in the vicinity of said pinch roller.

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