Sept 10, 1957 E. W. BOLLMEIER 2,805,764

TAPE DISPENSING AND APPLYING DEVICE

Filed June 18, 1954

FIG. 1a

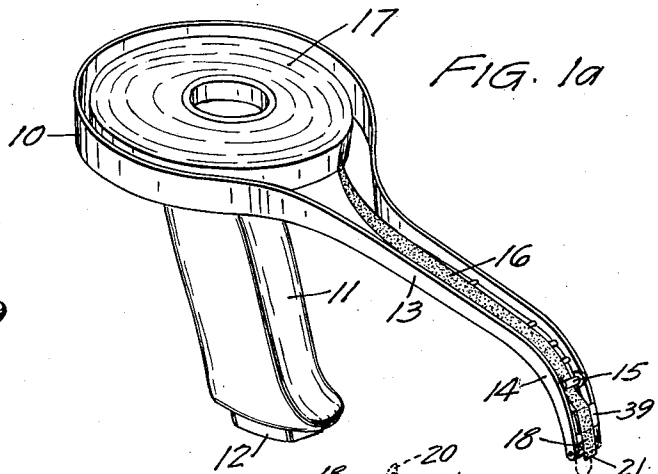


FIG. 1

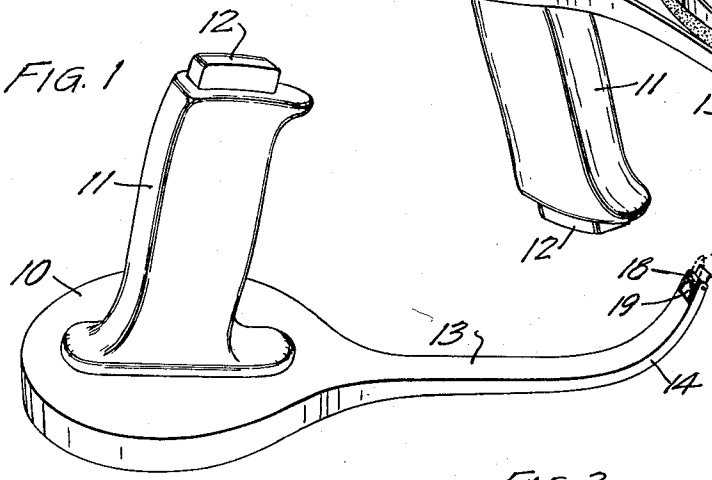


FIG. 2

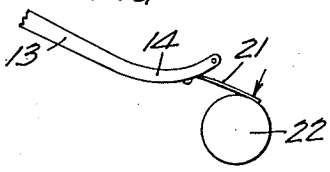


FIG. 3

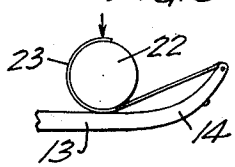


FIG. 4

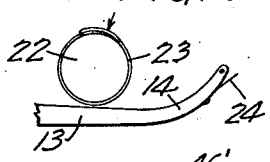


FIG. 5

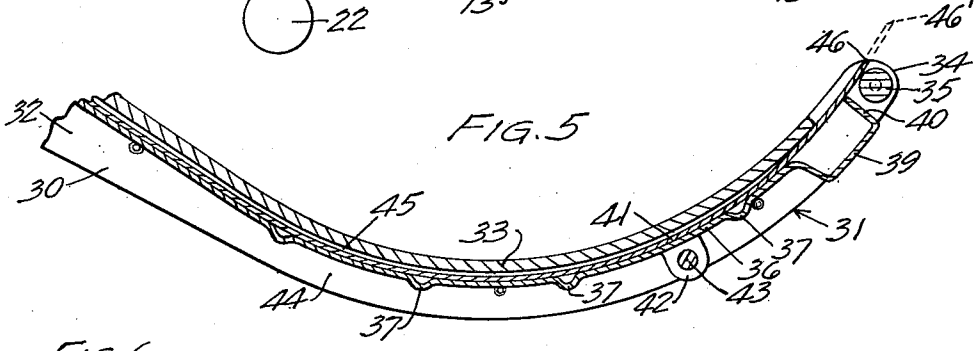


FIG. 6

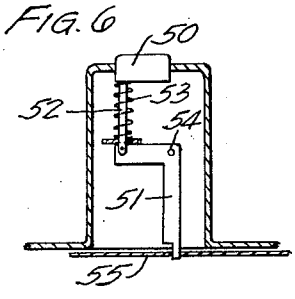
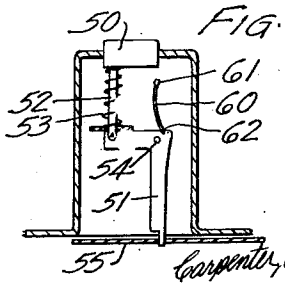


FIG. 7



INVENTOR
EMIL WAYNE BOLLMEIER
Carpenter, Abbott, Coulter & Kinney
ATTORNEYS

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TAPE DISPENSING AND APPLYING DEVICE

Emil Wayne Bollmeier, Mendota Township, Dakota County, Minn., assignor to Minnesota Mining & Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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5 Claims. (Cl. 164—47)

This invention relates to devices for dispensing and applying pressure-sensitive adhesive tape, and has particular application to devices for the placing of single wraps of pressure-sensitive adhesive tape as tying, supporting or identifying media around wiring harnesses or bundles of wires where the same are installed in difficultly accessible locations, as in the wiring of electrical systems in airplanes.

My novel tape applying device is particularly applicable in the taping of electrical wiring harness and the like after the wiring has been installed and in restricted space areas. The tape segment is attached to the wires and detached from the supply roll without any substantial movement of the dispenser. The dispenser is small, compact and easily portable. Positive means for severing the tape are provided, capable of operation on tape products from which segments cannot ordinarily be removed by tearing against a serrated edge as in many dispensers of prior art. Thus the device has been found to be particularly effective in the assembly and repairing of aircraft, in wrapping wires and cables with single turns of tough, plastic pressure-sensitive electrical insulating tape.

A typical dispenser made in accordance with the principles of this invention comprises an elongate supporting means along which may be extended an unsevered length of pressure-sensitive adhesive tape withdrawn from an attached tape supply source, a tape guiding means affixed at the working end of the supporting means and facing the non-adhesive surface of the length of tape, a tape retainer means positioned closely adjacent the tape-supporting surface on the supporting means and at a distance from the guiding means and functioning to temporarily support the pressure-sensitive adhesive surface of the length of tape, and a tape severing means movable with respect to the elongate supporting means by manual actuation from a point removed from the retaining and guiding means for severing the tape when the latter is under tension around the guiding means between the guiding means and the article being taped. When a section of tape is applied to an article and severed from the tape source, the end portion of tape positioned between the retaining means and the guiding means becomes an end tab which is then in position to be conveniently adhesively engaged to another article.

In the accompanying drawings, the principles of my invention are illustrated in terms of a number of specific but non-limiting embodiments.

Figure 1 is a perspective view showing my improved tape dispenser in upright position;

Figure 1*a* is a perspective view showing the dispenser in an inverted position with the bottom sides uncovered;

Figures 2, 3 and 4 are fragmental side elevations showing the steps in using the device for taping a wiring harness;

Figure 5 is a fragmental sectional side elevation of my tape applying device showing, in detail, a preferred modification of the snout member and its component parts; and

Figures 6 and 7 are schematic representations of two of the types of actuating means which may be utilized in my tape dispenser.

Referring to Figures 1 and 1*a*, the dispenser shown has a case **10** having means therein for rotatably mounting a supply roll of tape. A pistol grip handle **11** extends vertically from case member **10** to which it is affixed and has positioned therein at the non-affixed end an actuating button **12**. An elongate snout **13** extends radially from the case and is shaped such that the snout has an arcuate portion **14** at the outward end thereof extending upwardly, as shown in Figure 1. A transverse tape retaining roller **15** is mounted across the arcuate portion and facing the adhesive face of the end portion **16** of pressure-sensitive adhesive tape, the latter being withdrawn from tape supply roll **17** rotatably positioned and removably retained by the mounting means in case **10**. The adhesive face of the tape faces exteriorly of the arcuate portion **14** and bears against and is supported by retaining roller **15** at least directly prior to and subsequent to the time of application of tape. A transverse tape guide roller **18** is positioned at the outward end of the snout **13** and bears against the non-adhesive side of the tape when the latter is pulled around the roller during the taping of an article, as will be hereinafter described. An advanceable thrust member extends along the snout **13** and terminates at the outward end in a tape severing cutter **19**, shown in the normal retracted position. The thrust member is mechanically connected with the actuating button **12**. When sufficient external force is applied to the actuating button, the thrust member and knife **19** are advanced beyond guide roller **18** to the advanced position **20** indicated in Figures 1 and 1*a* by broken lines. If the tape is in a tautly extended position around guide roller **18** when actuating button **12** is depressed, the advancing cutter will sever the tape. The new end tab of tape, being no longer under tension, returns to an equilibrium position, and in the event the tape had not already adhesively engaged the retaining roller **15** during the withdrawal and severing thereof, it now adhesively engages the retaining roll. The end portion of tape is supported along the snout **13** between supply roll **17** and retaining roller **15** leaving a free end tab **21** extending cantileverly of retaining roller **15** and in position to be easily engaged to the next object to be taped.

Referring to Figures 2, 3 and 4, snout member **13** is brought into a position such that the exterior side of arcuate portion **14** of snout **13** faces adjacent the wiring harness **22**. The end tab **21** of tape supported by the retaining roller is manually adhesively engaged with the harness **22** as shown by the arrow in Figure 2. In the event the electrical wires have a non-adherent coating to which the pressure-sensitive adhesive will not readily adhere, the end tab **21** may be manually held in position with one hand while my tape applying device is conveniently maneuvered and operated entirely with the other hand.

The device is then maneuvered so that snout **13** is pulled away and around the wiring harness **22** into a position such that the harness **22** is between the end of the snout member and the handle, as indicated in Figure 3, and faces the interior of arcuate portion **14** of the snout **13**. The tape is thereby withdrawn along snout **13** from the supply roll and is in a tautly extended position with the non-adhesive face thereof bearing against the guide roller. The retaining roller, during adhesive engagement with the tape, rotates as the tape is being withdrawn allowing easy withdrawal thereof. The handle (not shown) is then moved toward the wiring harness **22** thus pushing the guide roller mounted on the end of snout member **13** away from the harness thereby withdrawing a slight excess length of tape with which the wrap **23** will be com-

pleted, the tape remaining in a tautly extended position and under tension between the harness 22 and the guide roller (Figure 3).

The actuating button in the handle member (not shown) is then depressed, advancing the thrust member and the cutter thereby severing the tape adjacent the tip and between the tip and the harness, and providing a new end tab 24. The wrap 23 is then completed by manually bringing up the slight excess of tape into adhesive engagement with the wire and the back face of the other end of the wrap at the overlap. The new end tab 24 is held in position for subsequent application through adhesive contact with the retaining roller, as shown in Figure 4.

By having an elongate relatively narrow snout extending from the case which supports the tape supply roller and having means for actively severing the tape without having to tear it across a draw bar or serrated member, my tape dispenser may be effectively utilized in places which are not easily acecssible, and with strong, tough and tear-resistant tape products. The device may be operated with only one hand allowing the operator to "feel" his way in a "tight" place. The elongate snout member need not be limited to extending radially from the tape supply roll, but rather may extend tangentially or in any other manner whereby the tape may be led along the snout without engaging adhesively the sides thereof to the extent of being fouled.

I find that my device having a snout with an arcuate portion at the outward end may be effectively utilized whether the object to be taped or the bundle to be wrapped has a large or relatively small diameter, since the upwardly curved portion allows the necessary excess length of tape for overlap to be withdrawn from the device without necessitating the movement of the snout excessively far beyond the object. When the bundles to be taped, however, have a relatively small diameter a device with a relatively straight snout is adequate.

Referring now to Figure 5, the elongate snout member 13 has as the external case member a first shallow constant-width channel member 30 having an inverted shallow U-shaped cross-section and forming a part of the elongate snout member 13 of Figure 1. The width of the channel is preferably slightly greater than the width of tape to be utilized therein. The channel 30 terminates in an arcuate portion 31 and the side elements 32 of the channel 30 extend slightly beyond the end of the base 33 of the channel to form a pair of mutually opposing parallel tips 34. A transverse tape guide roller 35 is mounted between tips 34. A second shallow constant-width constant-depth channel member 36 having a shallow U-shaped cross-section is fitted within first channel 30 with the edges of second channel member 36 abutting the base 33 of first channel 30.

The second channel member 36 extends at least along the arcuate portion 31, has a series of transverse protrusions 37 facing exteriorly of the arcuate portion 31, and a larger flattened terminal portion providing a tape applying section and reaching just short of the guide roller 35. This applying section has a flat portion 39 lying outside the space bounded by the tips 34, as shown in the figure. The back or non-adhesive side of the tape passes over this flat portion as the tape is withdrawn from the dispenser. The flat portion 39 terminates in an end section 40 which lies mainly between the parallel tips 34 and abuts against thrust member 41, hereinafter described. Extending from the arcuate portion of the second channel 36 toward the outside of the arc, and somewhat short of the flat portion 39, are a pair of mutually opposing parallel ears 42 with a transverse tape retaining roller 43 mounted therebetween.

First channel member 30 and second channel member 36 combine to form a pair of passages; the first being an outer open tape passage 44 and the second an inner enclosed passage 45. The channel member 36 is removably retained in the desired position with respect to the channel 30, e. g. by a series of spot dimples in first channel 30. A flexible advanceable thrust member 41 extends through inner passage 45 and terminates in a tape severing cutter shown in normal position 46 and in advanced tape severing position 46'. In normal position the end section 40 abuts against thrust member 41 with sufficient force to prevent the latter from continuously bearing against guide roller 35.

When used to apply tape to an object which is receptive to pressure-sensitive adhesive tape, the dispenser is manipulated such that the length of tape contiguous with flat section 39 is that which first bears against and adhesively engages the object, the flat section serving as a firm base for pressing the tape into position. When so brought to bear, the end section 40 of second channel member 36 abutting thrust member 41 prevents the flat section 39 from being depressed too far within first channel 30.

An end portion of tape (now shown in Figure 5) extends along tape passage 44 with the non-adhesive side bearing against transverse protrusions 37 which serve to hold the tape away from the flat base of the second channel 36 and thereby to decrease drag on the tape. The tape passes and adhesively engages the retaining roller 43 which bears against the adhesive face of the tape. When in operating position with the tape adhered to the object and in tautly extended position between such object and the dispenser, the non-adhesive face of the tape within the tip of the dispenser bears against flat portion 39 and tape guide roller 35.

Generally I prefer to removably fasten a cover along the open side of snout 13 to protect the surface of the tape from contact with foreign substances.

Although the applicator device as hereinabove described represents a preferred embodiment of my invention, other equivalent combinations of elements may be used. For example the supporting member may be flat rather than channeled, having the retaining roller, guiding means, thrust member and cutter supported thereon by separate encircling rings or between attached ears. The guide means need not be a roller but may be any rigid support allowing the tape to pass there-around without undue friction. The applying section and guiding means may be combined into one guiding and applying unit.

The severing means may be actuated in a number of ways. However, the means by which the severing means may be advanced can broadly be divided into two classes: the first being where the severing means is actuated directly by externally applied force, that is where the mechanical parts serve only to connect the actuating button and the severing means, and secondly, where an externally applied force is aided or replaced by the sudden release of internally stored energy. Figure 6 schematically illustrates the former while Figure 7 illustrates the latter. Referring to Figure 6 an actuator button 50 is directly connected to a bell crank 51 by means of an actuator bar 52 rigidly affixed to button 50 and pivotally fastened to bell crank 51. Return spring 53 retains actuator bar 52 and button 50 in normal undepressed position as illustrated in the figure, unless overcome by external force. Bell crank 51 is pivoted about axis 54 and the lower arm of bell crank 51 is movably engaged with advanceable thrust member 55 which terminates in severing means, shown in Figure 5 as knife 46. When a sufficient external force is applied to actuator button 50 to depress it against return spring 53 the actuator bar 52 is depressed and bell crank 51 pivots about axis 54 thus advancing the lower arm of bell crank 51 and with it thrust member 55. Upon release of the external force return spring 53 decompresses thereby returning actuator bar 52 to the normal position which in turn pivots bell crank 51 about axis 54 in the direction opposite that of the advancing direction and returns thrust member 55 to the normal position.

Referring now to Figure 7, the mechanism is identical

with that represented by Figure 6 except for the addition of impulse leaf spring **60** rigidly connected to frame support at one end **61** and movably compressibly connected to bell crank **51** at the other end **62**. Connections **61** and **62** are spaced close enough together so that leaf spring **60** is under constant compression. Connection **62** is so positioned that when actuator button **50** is in normal position, a constant moment is created opposite to the advancing direction. However, when bell crank **51** is pivoted in the advancing direction, the spring **60** is further compressed until connection point **62** is moved up to and beyond a line connecting axis **54** and rigid connection **61**, thus reversing the moment created by leaf spring **60**. As the moment caused by leaf spring **60** is reversed the energy of the spring is released in the advancing direction to further rotate the bell crank thereby sharply driving the thrust member forward to the position shown by broken lines. Upon release of the external force on button **50** the return spring overcomes the opposite moment of the leaf spring to return the mechanism to the normal position.

The actuator button can equally well be positioned at a point other than on the handle. For example, an actuator button or trigger may be located on the snout adjacent the connection between the snout and case. The mechanism can alternatively be arranged so that the externally applied force merely "triggers" a completely internally exerted advancing force. Further such an advancing spring can be positioned near the terminal end of the snout with a mechanical connection to the actuator means. Regardless of how the device is mechanically assembled, the actuating means is located at such a position that it may be manipulated by the hand holding the device while the actual severing takes place at the terminal end of the snout.

What is claimed is as follows:

1. A compact hand manipulatable tape dispenser adapted for the efficient application of single wraps of pressure-sensitive adhesive tape around wire-bundles in inconveniently accessible locations, comprising: a horizontally disposed magazine adapted to receive a supply roll of pressure-sensitive adhesive tape; means for centrally rotatably mounting the supply roll within said magazine; an elongate snout extending horizontally outwardly from said magazine and including a tape guiding member at the end thereof, and having a passage through which a length of tape is to be withdrawn from said supply roll and led around said guiding member, a transverse tape retaining roller positioned in said passage closely adjacent but spaced from said guiding member, and an advanceable thrust member extending along said snout and terminating in a severing means; an upwardly extending inverted pistol-grip type handle affixed centrally of said magazine; mechanism within said handle for advancing and withdrawing said thrust member; and a depressible spring-returned thumb-piece positioned in the upper end of said handle for actuating said mechanism.

2. The device of claim 1 wherein said mechanism consists of direct mechanical linkage between the thrust member and the thumb-piece.

3. The device of claim 1 wherein said mechanism includes means for releasable internal storage of energy.

4. A hand manipulatable tape dispenser adapted for the efficient application of single wraps of plastic pressure-sensitive adhesive tape around wire-bundles in inconveniently accessible locations, comprising: a frame including means for rotatably mounting a supply roll of tape, handle means positioned adjacent said mounting means and a snout member, said snout member comprising a narrow elongate arm extending outwardly from said mounting means and terminating in an arcuate portion and providing a tape guiding member at the end thereof, a partition within said arm extending at least substantially over the entire arcuate length thereof and defining arcuately outer and inner passages therein, said outer passage serving as a tape passage through which a length of pressure-sensitive adhesive tape is to be withdrawn from the supply roll with the non-adhesive surface in contact with and supported by the surface of said partition facing into said outer passage, a tape retaining roller transversely mounted in said arcuate portion of said outer passage at a point spaced from said guiding member for supporting the tape by temporary adherence thereto, a flexible thrust member extending along the entire length of said snout through said inner passage and terminating in a severing means, said severing means being advanceable beyond said guiding means, means for advancing said thrust member, and means accessible to said handle for the manual actuation of said advancement while said frame is maintained in stationary position, said outer passage being open at least along the end thereof toward said guiding member providing unhindered access to an end tab of the withdrawn length of tape cantileverly extending from said retaining roller.

5. In a tape dispenser and applicator adapted for the efficient application of single wraps of pressure-sensitive adhesive tape around wire-bundles in inconveniently accessible locations, a snout member comprising: a narrow elongate arm terminating in an arcuate portion and providing a tape guiding member at the end thereof, a partition within said arm extending at least substantially over the entire arcuate length thereof and defining arcuately outer and inner passages therein, said outer passage serving as a tape passage through which a length of pressure-sensitive tape is to be withdrawn from a source of supply with the non-adhesive side in contact with and supported by the surface of said partition facing into said outer passage, a tape retaining roller transversely mounted in said arcuate portion of said outer passage at a point spaced from said guiding member for supporting the tape by temporary adherence thereto, and a flexible thrust member extending along the entire length of said snout through said inner passage and terminating in a severing means, said severing means being advanceable beyond said guiding member in response to an actuating impulse applied to said thrust member, said outer passage being open along at least the end thereof toward said guiding member providing unhindered access to an end tab of the withdrawn length of tape cantileverly extending from said retaining roller.

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