Aug. 4, 1964 A. P. KRUEGER 3,143,019

TAPE DISPENSER

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Fig. 1.

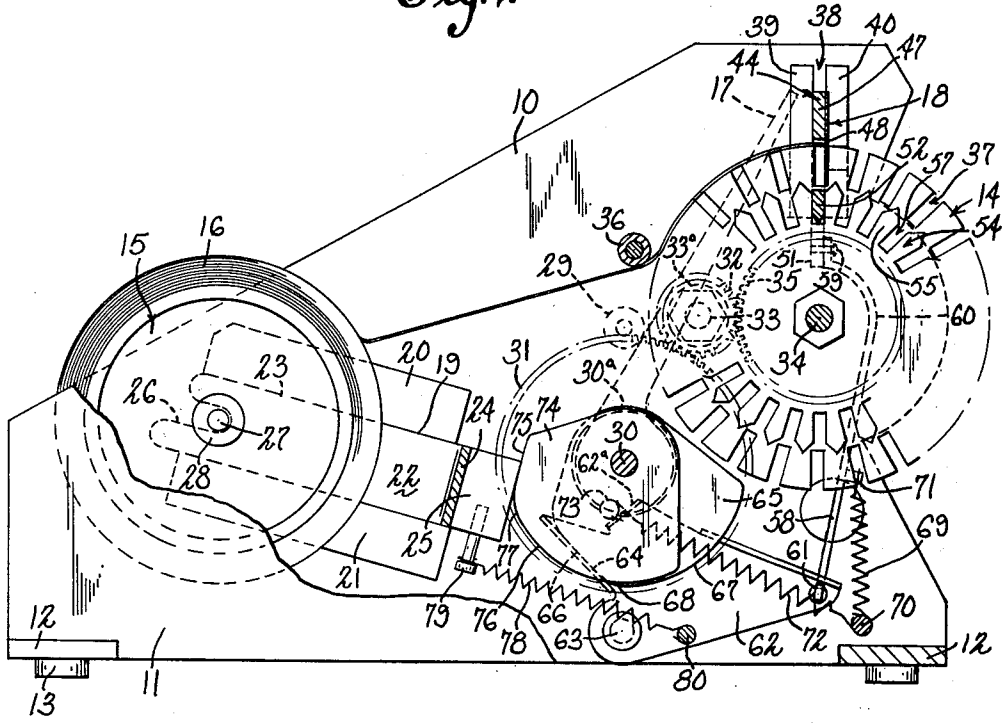
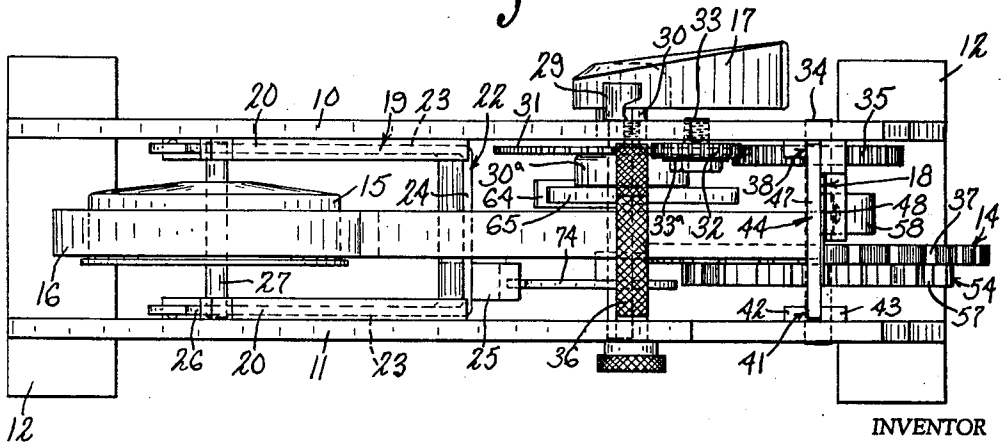


Fig. 2.



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TAPE DISPENSER

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Fig. 3.

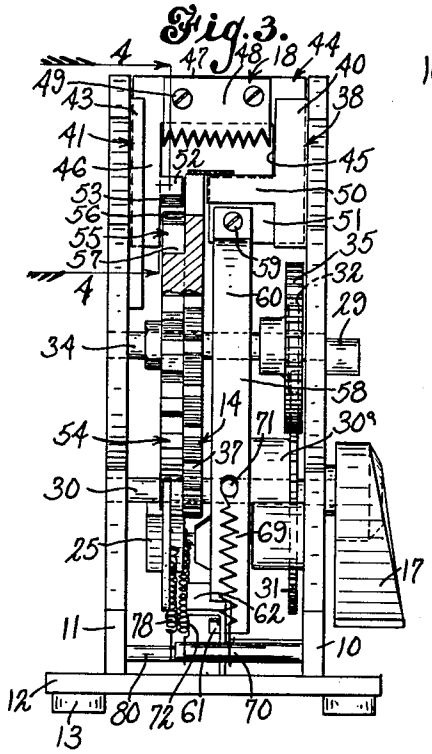


Fig. 4.

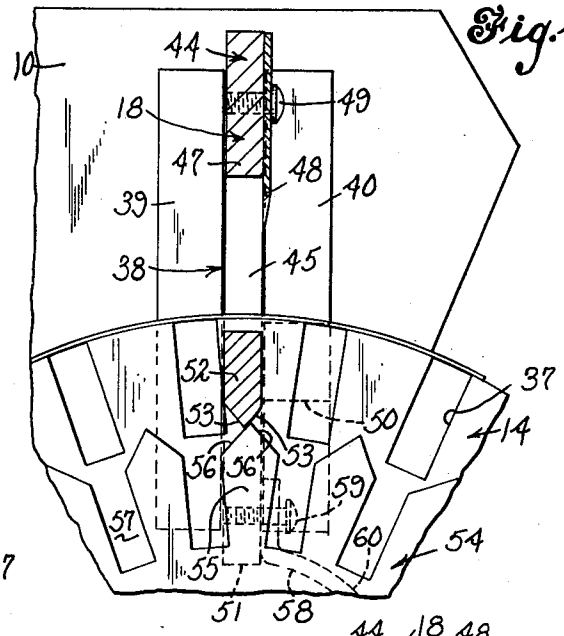
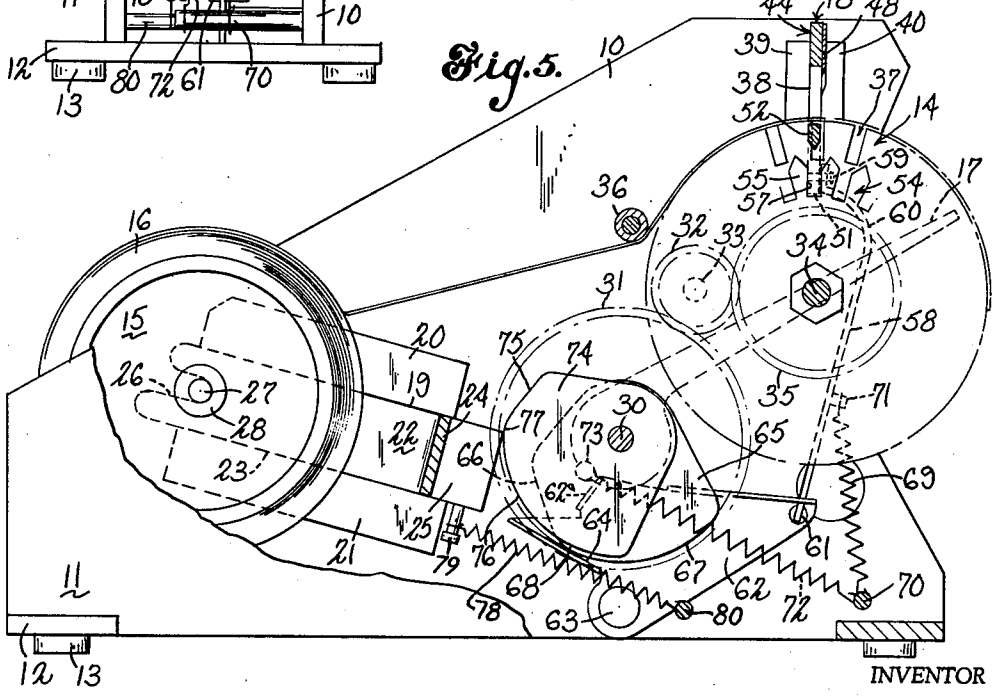


Fig. 5.



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TAPE DISPENSER

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Fig. 6.

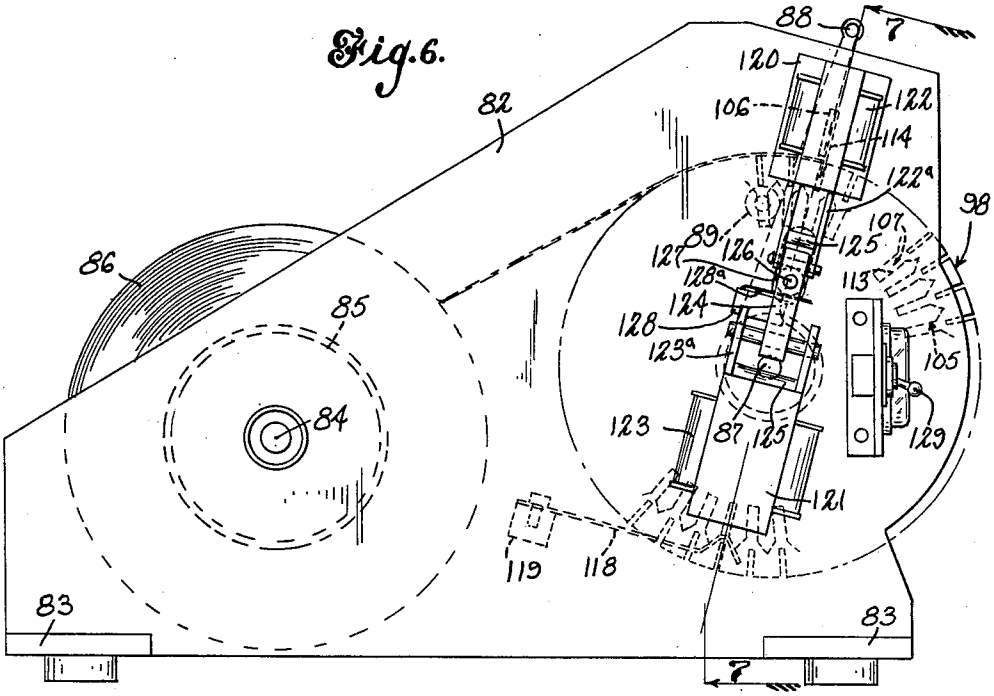


Fig. 7.

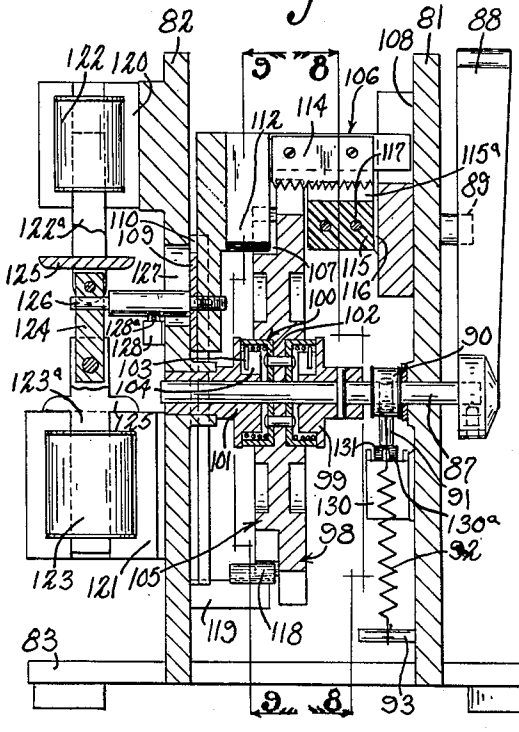


Fig. 11.

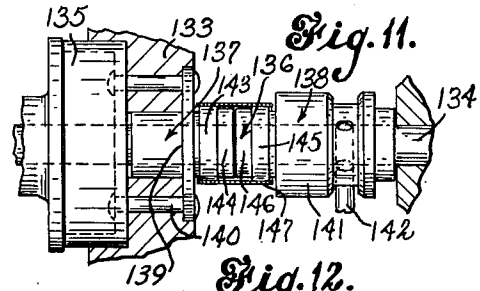
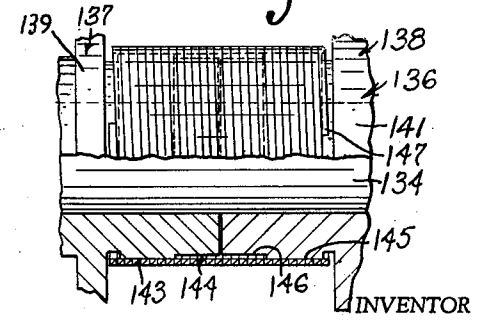


Fig. 12.



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TAPE DISPENSER

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Fig. 8.

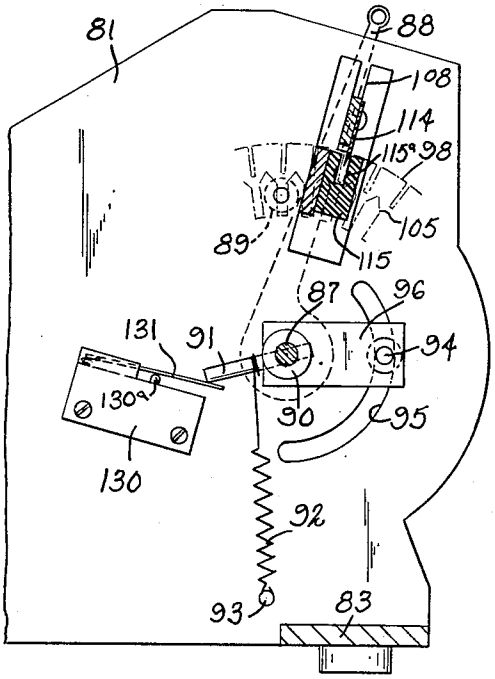


Fig. 9.

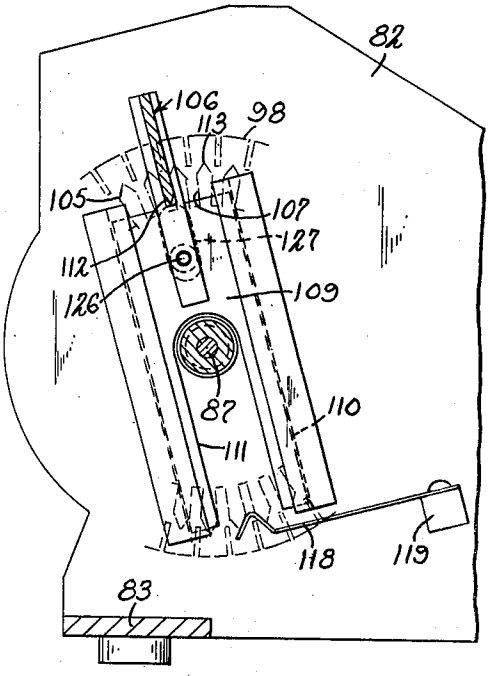
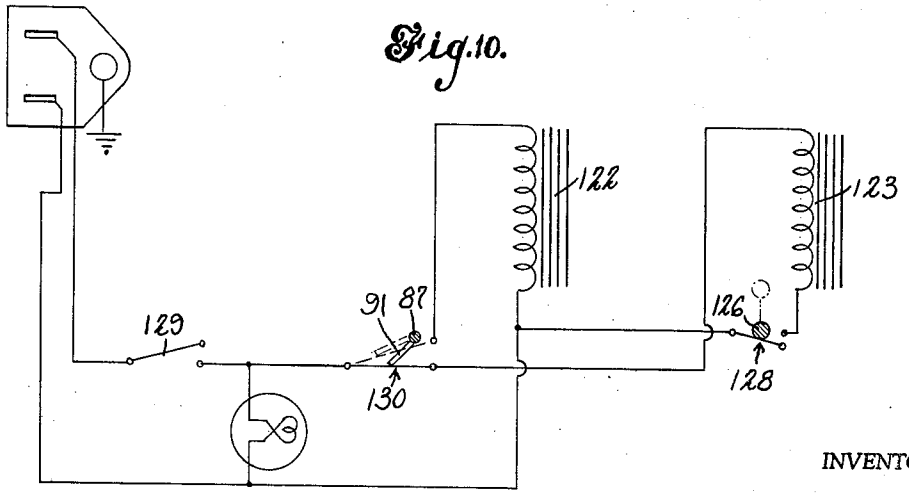


Fig. 10.



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United States Patent Office 3,143,019 Patented Aug. 4, 1964

3,143,019

TAPE DISPENSER

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Filed Feb. 27, 1961, Ser. No. 91,820
13 Claims. (Cl. 83—224)

This invention relates to tape dispensers and relates more particularly to a dispenser for pressure-sensitive tape or tape which is tacky on one or both sides thereof.

One object of the invention is to provide a tape dispenser having an improved tape-feeding roll to which the tape adheres and from which tape may be readily stripped by manual operation.

Another object is to provide in such a dispenser improved means for severing lengths of tape served from the dispenser.

Still another object is to provide in such a tape dispenser tape-severing means cooperating with the feed roll to sever tape in a novel and improved manner.

A further object is to provide in such a dispenser means to move the feed roll for a limited distance in either rotary direction to align one of a plurality of tape-severing stations on the feed roll with the cutitng blade of the tape-severing means.

Another object of the invention is to provide in a tape dispenser, such as characterized above, self-operating means for effecting slack in the tape between the supply roll and the feed roll to facilitate relative alignment of the cutitng blade with one of the tape-severing stations on the feed roll.

Further objects will be apparent from the following detailed description of one form of the tape dispenser:

In the drawings:

FIG. 1 is a side elevational view, partially broken away illustrating a tape dispenser embodying the invention;

FIG. 2 is a top plan view of the dispenser;

FIG. 3 is an elevational view, partially in section, showing the front end of the dispenser;

FIG. 4 is an enlarged sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a view similar to FIG. 1 showing certain parts of the dispenser in different positions;

FIG. 6 is a side elevational veiw of a modified form of the dispenser;

FIG. 7 is a sectional view taken on line 7—7 of FIG. 6;

FIG. 8 is a sectional view taken on line 8—8 of FIG. 7;

FIG. 9 is a sectional view taken on line 9—9 of FIG. 7;

FIG. 10 is a diagrammatic view illustrating the electrical circuitry of the modified form;

FIG. 11 is a fragmentary elevational view, partially in section, illustrating a modified form of a clutch mechanism which may be employed in the tape dispenser; and

FIG. 12 is a fragmentary elevational view, partially in section and on a larger scale, further illustrating the clutch mechanism of FIG. 11.

In the form shown in FIGS. 1 through 5 of the drawings, the upstanding side walls of the dispenser are indicated at 10 and 11, the walls being interconnected by lower plate-like parts 12 at the respective front and rear end portions of the dispenser and provided with downwardly projecting pads 13 on which the dispenser may rest on a support, such as a table or the like. Intermediate the side walls and supported therefrom is a tap-feeding roll, indicated generally at 14, and a tape supply spool, indicated generally at 15, supporting a tape roll 16. Tape from the roll 16, which is trained over a peripheral portion of the feed roll 14, is advanced in the instant form by rotation of the last-mentioned roll through manual operation of an operating lever 17, as will appear more

fully hereinafter. The dispenser is provided with movable tape-severing means, indicated generally at 18, which is moved to a tape-clearing and inoperative position by movement of the lever 17 in one direction, and which is spring biased in the other direction, all as will appear more fully hereinafter.

As shown in FIG. 1, a slideway 19 is formed on the inner face of the upstanding side wall 10 of the dispenser, the slideway extending generally rearwardly of the dispenser and being inclined somewhat upwardly. The slideway 19 on the side wall 10 is arranged in opposing relationship to a similar slideway formed on the inner face of the side wall 11. Each slideway may be formed by spaced-apart plate-like parts 20 and 21 of elongated form fixed to the respective side walls. The spool 15 is supported for sliding movement generally forwardly and rearwardly on a slide, indicated generally at 22, extending between and mounted in the aforementioned slideways.

The slide 22 in the illustrated form is of U shape and has the arms 23 thereof, which are of plate-like form, received in the respective slideways 19. Near one of the slideways 19 the portion 24 of the slide 22, which interconnects the arms 23, is provided with a forwardly projecting cam lug 25, shown to advantage in FIGS. 1 and 2. The distal ends of the arms 23 are notched, as at 26, to receive the respective ends of a spindle 27 supporting the spool 15, the spool having a hub 28 through which the spindle extends. The spool may be locked axially on the spindle 27 in any conventional manner so that the spool may be properly positioned with reference to the tape-feeding roll 14.

As shown in FIG. 2, the tape spool 15 may be of greater width than the tape roll 16. The spool 15 is axially positioned on the spindle 27 with reference to the axial position of the feed roll 14 so that a substantial portion of the tape overlaps one side of the feed roll, as shown in the last-mentioned view. Thus, when the tape is fed out of the dispenser by the action of the feed roll, it may be readily grasped by the user at the last-mentioned side of the roll 14 for removal from the roll after it has been severed in a manner which will appear hereinafter.

The operating lever 17 normally rests against the outwardly projecting stop 29 on the side wall 10 of the dispenser, and one end of the lever 17 is fast to a shaft 30 which extends from the lever at the right side of the dispenser, as viewed from the front, through the side wall 10 and into the side wall 11, the shaft 30 being journalled in the aforementioned side walls. Intermediate the side walls 10 and 11 and near the former a gear 31 is provided on the shaft 30, the gear meshing with a pinion 32 supported from a stub shaft 33 mounted in the side wall 10 of the dispenser. The gear 31 is not fast on the shaft 30, but is connected to the latter through a conventional one-way clutch 30^a which, on rotation of the shaft 30 in a clockwise direction as viewed in FIG. 1, drives the gear 31 in the same direction, but which permits the shaft 30 to be rotated in the other direction without driving the gear 31. The clutch 30^a, which forms a lost-motion driving connection between the shaft 30 and the gear 31, may be constructed in accordance with the disclosure of U.S. Patent No. 2,866,502, for example. Forwardly and in a plane above the shaft 30, a shaft 34 extends between the side walls 10 and 11 and is journaled therein, the shaft carrying in fixed relation thereto a gear 35 meshing with the pinion 32. It will be understood from the foregoing that when the lever 17 is swung forwardly from the broken-line position of FIG. 1, the gear 31, meshing with the pinion 32 which meshes with gear 35, is driven in a direction to rotate the shaft 34 in a clockwise direction as viewed in FIG. 1. The shaft 34 supports and is angularly rigid

with the feed roll 14. Hence, when the operating lever is swung clockwise from its normal or rest position, shown in FIG. 1, the feed roll 14, to which the end portion of the tape extending from the tape roll 16 adheres, is rotated in a direction to advance the tape, stripping the tape from the roll 16. The tape may be fed forwardly by the feed roll through movement of the lever 17 from the rest position to any position intermediate the rest position and a forward abutment for the lever, such as the usual adjustable stop, not shown. As shown, the feed roll may be of relatively large diameter, and the gearing, which drives the last-mentioned roll, may be such that the feed roll is rotated through approximately 90 degrees or more by movement of the operating lever 17 from the rest position to the aforementioned forward abutment. As indicated in the drawings, the feed roll projects forwardly of leading edge portions of the side walls of the dispenser. A spring washer 33a on the stub shaft 33 bears against the pinion 32 and tends to prevent reverse rotation of the gearing and the feed roll to any undesirable extent.

In this illustrated form, a tape-guiding roll 36 is provided extending between the side walls 10 and 11 and journaled therein. This roll, which may be knurled, may be positioned with reference to the feed roll 14 so that tape passing under the roll 36 from the tape roll 16 is deflected toward the feed roll 14 to adhere to a substantial peripheral portion of the last-mentioned roll prior to passing over the axis of the last-mentioned roll as the tape is fed forwardly. The resulting substantial area of tape adhering to the feed roll 14 effects greater pull of the feed roll on the tape and facilitates the stripping action of the feed roll, that is, the stripping of the tape from the supply roll 16. As shown in FIGS. 1 and 3, the peripheral surface of the feed roll may be roughened. The tape-guiding roll 36 is removably mounted in the side walls 10 and 11.

The feed roll 14, at rather closely spaced intervals around the circumference thereof, is provided with means defining substantially radially extending slots, indicated at 37, constituting tape-severing stations on the feed roll. These slots extend inwardly from the periphery of the roll 14 and may terminate approximately one-half inch from the periphery of the roll, for example. In the illustrated form, each slot has substantially parallel side walls and a substantially flat end wall, but this formation of the slots is not critical, as will be manifest hereinafter. As previously indicated, the tape-severing means 18 of the dispenser may cooperate with any one of the tape-severing stations 37 on the feed roll 14.

As shown in FIG. 1, a slideway 38 is provided on the inner face of the side wall 10, the slideway being constituted by vertically arranged laterally spaced-apart plate-like parts 39 and 40 of elongated form fixed to the side wall 10. In opposing relation to the slideway 38 there is provided on the inner face of the side wall 11 a slideway 41 constituted by plate-like parts 42 and 43 of similar construction to the previously mentioned parts 39 and 40 and arranged in a similar manner. The tape severing means 18 comprises a blade element, indicated generally at 44, which is substantially of inverted U shape, having arms 45 and 46 slidably received in the slideways 38 and 41, respectively. These arms are interconnected by a portion 47 of the blade element, and the blade element straddles the feed roll 14, as shown in FIG. 3. The horizontally extending portion 47 of the blade element carries a depending cutting blade or knife 48 secured thereto as by screws 49, the cutting blade having a serrated cutting edge in this illustrated form and being secured to the forward face of the portion 47, as shown in FIGS. 3 and 4. As shown in FIG. 3, the cutting blade or knife 48 has the cutting edge thereof extending substantially between the arms 45 and 46, the cutting edge being considerably longer than the width of the feed roll 15, so that it may sever tapes which are wider than the tape shown in the drawings by way of illustration.

Substantially midway between the ends of the plate-like part 40 there is provided a lug 50 extending inwardly from the part 40 and closely approaching the feed roll 14, as best shown in FIG. 3. The lug 50 may be formed integrally with the part 40 and, as shown in FIGS. 3 and 4, is substantially flush with the highest point on the periphery of the feed roll 14, the arrangement being such that the tape adhering to the feed roll 14 travels over the lug 50 in overlapping and closely spaced relation thereto. As will appear more fully hereinafter, this lug facilitates the support of the tape during the cutting operation, and is located closely adjacent to the cutting point. In the illustrated form, the lug 50 is disposed forwardly and closely adjacent the vertical path of the cutting blade or knife 48.

The arm 45 of the blade element is provided with an inwardly extending integrally formed lug 51 which, in this illustrated form, closely approaches one side of the feed roll 14. This lug is disposed at the distal portion of the arm 45. As best shown in FIG. 3, the arm 46 of the blade element is provided with an inwardly extending integrally formed lug 52, intermediate the ends of the arm 46, which, in this illustrated form, closely approaches the other side of the feed roll 14. The lug 52 constitutes a cam on the blade element 44, and is provided with downwardly converging cam surfaces 53 for cooperation with a rotary cam element, indicated generally at 54, fast to the shaft 34.

The cam element 54, which is of wheel-like shape, may be integrally formed with the feed roll 14. As shown in FIGS. 3 and 4, the cam wheel 54 is of smaller diameter than the feed roll 14. The wheel 54 is provided with substantially radially projecting cam lugs 55 arranged circumferentially on the wheel 54 at relatively close intervals, each cam lug 55 being located circumferentially between two adjacent tape-severing stations 37. The distal end portion of each lug 55 is provided with outwardly converging cam surfaces 56. As best shown in FIG. 4, the cam surfaces 56 meet in a knife-like point, as do the cam surfaces 53 of the cam lug 52. Inwardly of the outer points of the cam lugs 55, each lug 55 defines between it and the next lug 55 a slot 57 extending substantially radially inwardly, having in the present instance parallel side walls and terminating in a substantially flat bottom. The slots 57 are of approximately the same depth as the slots 37 in the feed roll 14, as shown in FIG. 4. As will appear more fully hereinafter, the cam 52 on the blade element 44 may cooperate with any two of the lugs 55 which are neighbors, the cam 52 being dimensioned to slide rather closely into the slot 57 formed by the opposing side walls of these lugs 55.

To operate the blade element 44, an actuating arm 58 is provided, the arm being substantially vertically arranged and having the upper end thereof loosely connected to the lug 51 of the plate element, as by fastener 59, to permit limited vertical swinging movement of the arm 58. As shown in FIG. 5, the arm is bent outwardly, as at 60, to provide ample clearance with the shaft 34. The lower end of the arm 58 has a pivotal connection, as at 61, to a vertically arranged cam follower 62 which is swingable in a vertical plane on a pivot 63 mounted in the side wall 10 of the dispenser. As shown in FIG. 5 the pivot 63 is located rearwardly of the pivotal connection 61 between the arm 58 and the cam follower 62, and rearwardly of the pivot 63 the follower 62 is provided with a substantially flat cam surface 64 cooperating with a rotary cam 65 fast on the shaft 30 for rotation therewith.

The cam 65 has edgewise engagement with the cam surface 64 of the cam follower and, as shown in FIG. 1, the cam 65 has an edge portion 66 which is substantially flat and merges with a cam edge portion 67 formed substantially on a radius of the shaft 30. A camming shoulder or nose 68 is formed at the junction of the edge por-

tions 66 and 67 and, as shown in the lastmentioned view, the edge portion 66 is normally engaged with the cam surface 64 of the cam follower. A coil spring 69 has one end thereof fixed to a pin 70 extending through the side walls 10 and 11 of the dispenser, and the other end of the spring is connected to the actuating arm 58, as at 71, the arrangement being such that the spring 69 constantly urges the actuating arm 58 of the blade element 44 downwardly. A similar spring 72 has one end thereof connected to the pin 70 and the other end thereof connected to an eccentrically arranged pin 73 fixed on the rotary cam 65. The spring 72 urges the rotary cam 65 in a counterclockwise direction as viewed in FIG. 1, the spring 72, acting through the cam 65, serving to normally maintain the shaft 30 in the angular position shown in FIG. 1 in which the operating lever 17 occupies the position shown in this view. When the cam 65 is in this position the forward end of the cam follower 62 is depressed and through the actuating arm 58 maintains the tape-severing means 18 in the position shown in FIG. 1. In this position of the tape-severing means 18, the tape path is blocked by the cutting blade or knife 48, the vertically slidable blade element 44 occupying the lowest position thereof.

Axially spaced from the rotary cam 65 in a direction toward the side wall 11 of the dispenser there is provided a rotary plate-like cam 74 fast to the shaft 30 for cooperation with the spool-carrying slide 22. The cam 74 has edgewise engagement with the lug 25 formed on the last-mentioned slide, the cam 74 having a substantially straight edge portion 75 merging into an edge portion 76 formed substantially on a radius on the shaft 30. These edge portions at their junction form a camming shoulder or nose 77, as shown in FIG. 5.

As shown in the last-mentioned view, a coil spring 78 is provided to urge the spool-carrying slide 22 forwardly and against the cam 74, the spring 78 having one end thereof connected to the cam lug 25 by means of a pin 79 and having the other end thereof connected to a pin 80 mounted in the side wall 11 and extending inwardly therefrom. The normal or rest position of the slide 22 is shown in FIG. 1. As shown here the cam lug 25 is in engagement with the cam surface 75 of the rotary cam 74 and the spool-carrying slide 22 is in its foremost position.

The operation of the tape dispenser will be manifest from the foregoing disclosure. When the operating lever 17 is swung forwardly from its rest position, shown in FIG. 1, upward movement of the tape-severing means 18 is initiated before the start of the tape-feeding operation due to the lost-motion driving connection between the shaft 30 and the gear 31 provided by the clutch 30a. As rotary movement of the shaft 30 is initiated by operation of the lever 17 in a forward direction, the cam 65 is rotated with the shaft to bring the camming shoulder or nose 68 into engagement with the cam surface 64 of the cam follower 62, thereby swinging the follower in a counterclockwise direction, as viewed in FIG. 1.

This movement raises the arm 58 pivotally interconnecting the follower 62 with the blade element 44, and this movement of the arm slidably raises the blade element 44 to clear the tape path before tape-feeding movement of the roll 14 is initiated. During this movement of the blade element 44 the tape-severing knife or blade 48 is withdrawn from one of the slots 37 in the feed roll 14 into which it previously extended. Also during this movement of the blade element 44 and the cam lug 52 thereon is withdrawn from the corresponding slot 57 in the rotary cam 54 angularly rigid with the feed roll 14. When the blade element 44 is raised to the position shown in FIG. 5 in the aforementioned manner, the feed roll 14 and the rotary cam 54 are freed for rotation together upon rotation of the aforementioned gearing through continued forward movement of the operating lever 17.

However, prior to driving movement of the gear 31 driven from the shaft 30 through the clutch 30a movement of the shaft 30 fast with the rotary cam 74 initiates movement of the latter in a clockwise direction, as viewed in FIG. 1, to bring the camming shoulder or nose 77 of the last-named cam into engagement with the cam lug 25 on the spool-carrying slide 22 to cam the spool-carrying slide rearwardly against the pressure of the spring 78. This movement, of course, carries the tape supply spool 15 and the tape roll 16 rearwardly.

Upon continued rotation of the operating lever in a clockwise direction as viewed in FIG. 1, the edge portion 76 of the last-mentioned cam is brought into engagement with the cam lug 25 on the spool-carrying slide to maintain the slide in its rearmost position during the remainder of the clockwise rotation of the operating lever 17. At the same time the continued rotation of the cam 65 fast on the shaft 30 effects engagement of the edge portion 67 of the cam 65 with the cam surface 64 on the follower 62 to maintain the rear end portion thereof in depressed condition, thereby maintaining the blade element 44 in the raised position (FIG. 5) through the arm 58 during the remainder of the clockwise movement of the operating lever 17.

It will be understood from the foregoing that continued movement of the operating lever in the last-mentioned direction effects driving movement of the gear 31 which meshes and drives the pinion 32 which in turn meshes and drives the gear 35 angularly rigid with the feed roll 14 on the shaft 34. This driving movement of the aforementioned gearing drives the feed roll in a clockwise direction as viewed in FIG. 1, thereby stripping tape from the tape roll 16 and feeding tape forwardly on the last-mentioned roll to which it adheres. When the desired length of tape has been fed by the feed roll 14, the operating lever is released and permitted to return to its normal or rest position, shown in FIG. 1, under influence of the spring 72 acting through the rotary cam 65 on the shaft 30. The spring 72 effects counterclockwise movement of the cam 65 and shaft 30 as viewed in FIG. 1, and during this movement of the shaft the cam 74 angularly rigid therewith is rotated in a counterclockwise direction as viewed in FIG. 1, bringing the edge portion 75 thereof into engagement with the lug 25 on the spool-carrying slide 22 while permitting the slide to move forwardly under the influence of the spring 78. This movement of the spool-carrying slide effects a degree of slack in the tape extending between the tape roll 16 and the feed roll 14.

During the last-mentioned rotary movement of the shaft 30, the cam 65 rigid therewith is rotated in a counterclockwise direction as viewed in FIG. 1, bringing the edge portion 66 thereof into engagement with the cam surface 64 of the follower 62, while permitting the rear end of the follower 62 to be raised under the influence of the spring 69. The last-named spring effects downward movement of the forward end of the follower 62 through the actuating arm 58. This spring draws the arm 58 downwardly and in so doing draws the blade element 44 downwardly toward the high point on the periphery of the feed roll 14. During the last-mentioned movement of the cam 65 the pin 73 carried thereby may engage a flange 62a of the follower 62, forcing the forward end of the follower downwardly by a camming action and thereby supplementing the action of the spring 69 in drawing the blade element 44 downwardly.

In this form, which is illustrated only by way of example and not by limitation, the tape which is to be severed extends (FIGS. 3 and 4) over the upper portion of the interrupted circumference of the tape roll 14, the tape extending over the outer ends of certain radially extending slots 37 forming tape-severing stations. As indicated in FIG. 4, the tape extends across tape-severing stations at either side of the plane of operation of the movable blade element 44. As indicated in FIG. 3, the tape may

be considerably broader than the thickness of the tape feed roll 14 and may extend a distance beyond one side face of the last-mentioned roll for easy grasping by the user after the tape has been severed. Also as indicated in the last-mentioned view, the tape extends over the lug 50 in fixed relation to the side wall 10 of the dispenser and providing a support for the tape closely adjacent the point at which it is to be cut.

The aforementioned slack in the tape effected by the forward movement of the spool-carrying slide 22 facilitates limited rotary movement of the feed roll 14 in either direction to index the knife 48 with one of the tape-severing stations formed in the feed roll. As the blade element 44 carrying the knife 48 descends under the influence of the spring-biased arm 58 during counterclockwise movement of the operating lever 17 as viewed in FIG. 1, the cam lug 52 formed on the blade element 44, unless the knife 48 is properly indexed with reference to one of the tape-severing stations, has its knife-like point engage one of the inclined surfaces 56 of one cam lug 55 in a manner similar to that shown in FIG. 4. As shown in the last-mentioned view, one of the inclined surfaces 53 of the cam lug 52 is engaged with one surface 56. After engagement of the cam lug 52 with one of the cam lugs 55 on the rotary cam 54, continued downward movement of the blade element under the influence of the spring 69 effects rotary movement of the cam 54, the direction of rotary movement of the cam 54 being dependent upon which cam surface 56 of the lug 55 the cam lug 52 happens to strike. As shown in FIG. 4, the cam lug 52 has engaged one cam lug 55 to rotate the cam 54 in a clockwise direction. Rotation of the cam 54 by the lug 52 continues until the lug 52 enters the slot 57 formed by the last-mentioned lug 55 and its neighbor. When this occurs the tape-severing knife 48 is properly indexed with the corresponding tape-severing station on the feed roll 14, which roll, of course, rotates with the rotary cam 54.

Continued downward movement of the blade element 44 effects severing of the tape on the tape roll by the knife 48 as the latter moves toward its final position, shown in FIG. 1. In this position the knife 48 extends within one of the slots 37, and it will be noted that, as shown in this view, the knife passes into the slot close to one side wall of the slot. Hence support of the tape on the periphery of the feed roll during the severing of the tape is facilitated. After the severing operation has been completed and the operating lever has returned to its rest position, the severed length of tape may be easily stripped from the feed roll 14 by grasping the protruding portion thereof and lifting it off the feed roll. As previously indicated, the extent to which the tape protrudes from one side face of the feed roll is dependent on the width of the tape and the axial position of the tape roll 16 on the supply spool 15, the tape roll being axially adjustable on the spool 15.

The modified form illustrated in FIGS. 6 through 10 is generally similar to the form previously described. Generally speaking, the two forms differ in that in the modified form the tape roll has a stationary axis instead of a movable one, the feed roll is not gear driven, and the tape-severing means is electrically operated. In the form shown in FIGS. 6 through 10 the upstanding side walls of the pressure-sensitive tape dispenser are indicated generally at 81 and 82 and correspond generally to the above-described side walls 10 and 11. The side walls of the modified form of the dispenser are rigidly interconnected by footed plate-like parts 83 similar to the parts 12 previously described. At the rear portion thereof a removable shaft 84 extends between and is supported by the side walls 81 and 82, and this shaft supports a tape supply spool 85 which in turn supports a tape roll 86. Forwardly of the tape roll 86 a shaft 87 extends between the aforementioned side walls and is journaled therein. One end of the shaft 87 extends without the side wall 81, and an operating lever 88 similar to the operating lever 17 previously described has one end thereof fixed to the last-mentioned end of the shaft 87.

When the operating lever is in its rest position, it abuts a lug 89 extending outwardly from the side wall 81. Intermediate the side walls there is provided a collar 90 made fast on the shaft 87 by a pin 91 extending therethrough, the pin extending beyond the collar, as shown in FIG. 8. A coil spring 92 has one end thereof fixed to the pin 91 and the other end thereof secured to a pin 93 extending inwardly from the wall 81. The spring 92, acting through the collar 90, biases the shaft 87 in a direction to urge the operating lever 88 in a counterclockwise direction, as viewed in FIG. 8. When the tape dispenser is at rest, the operating lever is held against the stop 89 by the spring 92. A stop 94 is provided to limit the distance of clockwise rotation of the operating lever as viewed in FIG. 8, the stop 94 providing an abutment for the lever and being of the adjustable type. As shown in FIG. 8, the stop is mounted in an arcuate slot 95, formed on a radius of the shaft 87, for adjustment therein, all in accordance with conventional and well-known practice. The stop 94 may have a part thereof overlying marginal portions of the slot 95. The stop 94 may extend into the slot 95 and have a threaded part, not shown, threaded into a clamping plate 96 to be clamped against the inner face of the wall 81 when the stop is in the desired position and fully threaded into the plate 96, the clamping plate 96 being pivoted on the shaft 87.

A feed roll 98 is supported from the shaft 87 intermediate the side walls. A clutch, indicated generally at 99, which may be constructed in accordance with United States Patent No. 2,866,502, forms a lost-motion, one-way driving connection between the shaft 87 and the feed roll 98 to effect feeding movement of the roll 98 upon rotation of the shaft 87 in a clockwise direction as viewed in FIG. 8. A clutch, indicated generally at 100, and of the same type as the clutch 99 forms a connection between the side wall 82 and the feed roll 98 to limit reverse rotation of the feed roll. The clutch 100 has an element 101 embracing the shaft 87 in fixed relation to the side wall 82 and mounted therein, and has an element 102 fixed to the feed roll 98. The element 102 is constituted by a cup opening toward the side wall 82 and housing a coil spring 103 which, as manufactured, has an external diameter slightly greater than the internal diameter of the cup into which it is forced. One end of the spring 103 has a lost-motion connection, as at 104, with the clutch element 101. The other end of the spring 103 is free, and the arrangement is such that reverse rotation of the feed roll is limited by the tendency of the spring 103 to unwind and bind against the cup 102, all as is well known in the art.

The feed roll 98 has an integrally formed rotary cam member 105 corresponding to the rotary cam 54 previously described to cooperate with a blade element 106 corresponding to the previously described blade element 44. The feed roll is formed similarly to the above-described feed roll 14 and is provided with tape-severing stations formed by slots 107 in the periphery of the roll, the slots 107 being somewhat narrower than the slots 37 in the roll 14. It will be understood from the foregoing that the blade element 106 is extensible into any one of the slots 107, for severing a length of tape adhering to the periphery of the roll which, of course, is interrupted by the slots 107.

As viewed in FIG. 7, the blade element 106 which cooperates with the feed roll is generally of inverted L shape, having the distal end portion of the horizontally extending leg thereof received in a slideway 108 formed on the inner face of the side wall 81, as indicated in FIG. 8. It may be noted here that this slideway, unlike the corresponding slideway 38 in the form of FIGS. 1 through 5, is somewhat inclined to the vertical. The other leg of the L-shaped blade element 106 is provided with a

plate part 109 received in a slideway 110 formed on the inner face of the side wall 82. The plate part 109 rigid with the last-mentioned leg is recessed at 111 to provide clearance for the structure mounting the shaft 87 in the side wall 82 on downward sliding movement of the blade element. The blade element 106 is provided (FIG. 7) with a knife-like cam lug 112 corresponding to the cam lug 52 previously described. The cam lug 112 cooperates with similar cam lugs 113 formed at close intervals on the circumference of the rotary cam 105 and corresponding to the previously described lugs 55 of the form of FIGS. 1 through 5. The horizontally extending leg of the L-shaped blade element 106 carries the severing blade or knife 114 in depending relation thereto, as shown in FIG. 7.

As shown in the last-mentioned view and also in FIG. 8, a tape support 115 corresponding to the previously described lug 50 extends inwardly from the slideway 108. The tape support 115 may be formed conveniently of a plastic or other suitable material characterized by low adhesion to adhesive materials and is supported from a bracket 116 (FIG. 8), fixed to one margin of the slideway 108, through fasteners 117. As shown in the last-mentioned view, the upper surface of the tape support 115 is substantially in alignment with a point on the periphery of the feed roll, and the tape support 115 is recessed, as at 115a, to receive a portion of the knife 114 during each tape-severing operation. It will be manifest from the foregoing that during the tape-severing operation the tape is supported in the area of the knife 114 partially by the feed roll 98 and partially by the support 115.

To facilitate the indexing of the tape-severing stations 107 with the knife 114 there is provided (FIG. 9), in addition to the cam means 112 and 113 previously described, an elongated spring detent 118 having one end supported from a lug 119 extending inwardly from the side wall 82. The distal end portion of the detent 118 is of inverted V shape to extend partially between any two of the knife-like lugs 113 and thereby urge the rotary cam member 105 and the feed roll fixed thereto in either rotary direction to align the knife 114 with one of the tape-severing stations 107. The detent 118 continually bears frictionally against the rotary cam 105 provided with the cam lugs 113 and is pressed out of the way of these cam lugs by the pressure of the cam lugs thereagainst as the rotary cam 105 is driven with the feed roll 98 to feed tape in a forward direction upon driving movement of th eshaft 87 in a counterclockwise direction as viewed in FIG. 9.

As previously indicated, the blade element 106 is operated electrically. As shown in FIG. 7, the side wall 82 is provided with an upper outwardly extending bracket portion 120 and a lower outwardly extending bracket portion 121, these portions being vertically spaced and in alignment with one another. The upper bracket portion 120 supports a solenoid 122 and the lower bracket portion 121 supports a solenoid 123. The solenoid 122 is provided with a conventional plunger-type core member 122a while the solenoid 123 is provided with a similar plunger 123a. The aforementioned solenoids are arranged in opposing relation to one another and their plungers are interconnected as at 124. Abutments 125 are provided on the respective plungers to coact with the respective bracket portions of the side wall 82 to limit movement of the plungers. In this form illustrated in the drawings only by way of example and not by limitation, the solenoid 122, when energized, is operative to raise the blade element 106 from its tape-blocking position shown in FIG. 7, while the solenoid 123, when energized, is operative to effect downward movement of the blade element 106 to sever a length of tape. The solenoids 122 and 123 are connected with the blade element 106 through a stub shaft 126 carried by the aforementioned means 124 interconnecting the solenoid plungers 122a and 123a. The stubshaft 126 extends through a clearance opening 127 formed in the side wall 82, and the shaft 126, which may extend through the plate part 109 of the blade element, may be secured to the depending leg of the blade element 106 by being threaded therein. A switch, having an outwardly biased operating member 128a of the plunger type, 128 is mounted on the side wall 82 for cooperation with the shaft 126 in a manner which will appear fully hereinafter. A main switch 129 is also mounted on the side wall 82 to extend outwardly therefrom, this switch being a two-position switch of the manually operated type. A switch 130 is mounted on the inner face of the side wall 81 as indicated in FIG. 8, the switch having an outwardly biased operating member 130a of the plunger type which is normally depressed by a leaf spring 131 having one end thereof mounted on the switch 130 and having the other end thereof engageable by the pin 91 carried by the shaft 87. The spring 131 is biased away from the operating member 130a, and in the normal rest position of the operating lever 88 shown in FIG. 8 is engaged by the pin 91 to maintain the operating member 130a in the depressed position.

The operation of the tape dispenser shown in FIGS. 6 through 10 will be apparent from the foregoing disclosure. With the shaft 84 removed from one of the side walls 81 and 82, the tape roll 86 may be mounted on the supply spool 85 prior to reassembly of the shaft 84 with the aforementioned side wall. The end of the tape is trained over the upper peripheral portion of the feed roll 98, as shown in FIG. 6, the tape projecting from the right-hand face of the roll 98 as viewed in FIG. 7. When it is desired to serve a length of tape, the main switch is closed and thereafter the operating lever 88 is swung forwardly from its rest position, shown in FIG. 6, to initiate driving movement of the roll 98 through the shaft 87 and the clutch 99. The lost-motion driving connection of the clutch 99 between the shaft 87 and the feed roll 98 permits limited rotation of the shaft 87 in a driving direction without movement of the feed roll 98. This movement of the shaft 87 is sufficient to move the pin 91 carried thereby a distance to permit the leaf spring 131 to release the spring-biased operating member 130a of the switch 130 and thereby close the switch, establishing a circuit (see FIG. 10) including the solenoid 122. When this solenoid is energized the blade element 106 is raised to clear the tape path through upward sliding movement of the shaft 126 in fixed relation to the plunger 122a of the last-named solenoid.

Continued forward movement of the operating lever 88 effects forward feeding movement of the tape by the roll 98 to which the tape adheres, the last-named roll being driven through the clutch mechanism 99 interposed between the shaft 87 and the feed roll 98. This driving movement of the feed roll, of course, also effects rotation of the rotary cam 105 in fixed relation thereto. It should be noted here that prior to feeding movement of the feed roll 98 the switch 128, which is normally open, is closed. The spring-biased operating member 128a of the last-mentioned switch is normally maintained in depressed position by the vertically slidable shaft 126. As this shaft is raised with the blade element 106 to clear the tape path, the switch-operating member 128a under the influence of its spring is permitted to follow the movement of the shaft 126 a distance to close the switch 128.

When the desired length of tape has been fed forwardly by the feed roll 106, the operating lever is released and is thereafter returned to its rest position under the influence of the spring 92. The clutch 100 between the side wall 82 and the feed roll 98 limits reverse movement of the feed roll but permits sufficient reverse rotation of the feed roll to properly index the blade element 106 with one of the tape-severing stations 107 on the feed roll. At the end of the return movement of the operating lever 88 to its rest position, the switch 130 is again operated by re-engagement of the pin 91 with the leaf spring 131 to again depress the spring-biased switch-operating member 130a. When this occurs, the circuit which includes

the solenoid 122 is opened while the switch establishes a circuit which includes the solenoid 123 and the switch 128 which is then in closed condition as previously described. When the solenoid 123 is energized its plunger 123a is operated to draw the blade element 106 downwardly through the vertically slidable shaft 126. During this downward movement the lug 112 formed on the blade element 106 cooperates with the rotary cam 105 to properly index the knife 114 with one of the tape-severing stations 107, and this indexing, as previously indicated, is facilitated by the cooperation of the detent 118 with the cam 105. As the blade element 106 is moved downwardly by the solenoid 123, the knife 114 severs the tape and thereafter the shaft 126 re-engages the spring-biased operating member 128a of the switch 128 to depress the last-named operating member and thereby open the switch 128, breaking the circuit in which the solenoid 123 is included. It will be manifest from the foregoing that due to the arrangement of the switches 128 and 130, the solenoids 122 and 123 are de-energized when the main switch 129 is closed and the tape-severing mechanism is at rest. After a length of tape has been severed in the aforementioned manner, the severed length, which protrudes laterally from the feed roll, may be grasped by the user and stripped from the roll.

In FIGS. 11 and 12 there is shown a modified form of clutch mechanism which, while not limited thereto, may be conveniently employed in a tape-dispensing mechanism similar to that shown in FIGS. 6 through 10. I make no claim to the particular clutch mechanism but only illustrate and describe it as a typical mechanism which may be employed in a tape dispenser embodying the invention. In FIG. 11 the feed roll, indicated at 133, similar to the feed roll 98 is shown on a shaft 134 which may be suitably journaled. A clutch mechanism 135, which may be identical to the previously described clutch mechanism 100, is interposed between the feed roll 133 and one side wall, not shown, of the dispenser to limit rotation of the feed roll in a direction opposite the feeding direction. A clutch mechanism indicated generally at 136 is interposed between the shaft 134 and the feed roll 133 to effect rotation of the feed roll in a feeding direction during rotation of the shaft 134 in the corresponding direction.

The clutch mechanism 136 comprises two spool members 137 and 138 embracing the shaft 134 and arranged in end-to-end relationship. The spool member 137 has a flange 139 secured to the feed roll 133 as by fasteners 140. The spool member 138 has as an integrally formed portion thereof a collar 141 corresponding to the previously described collar 90 and pinned to the shaft by a pin 142 corresponding to the previously described switch-actuating pin 91. As indicated in FIG. 12, the opposing ends of the spool members 137 and 138 approach each other closely. The spool member 137 has a circumferential surface portion 143 which is of greater diameter than the adjoining circumferential surface portion 144. In the illustrated form the surface 143 is provided by a raised portion of the spool member 137, that is, it is not formed merely by reducing the adjoining surface portion which forms the surface 144. In other words, the surface portion 143 is formed by a land on the spool member 137 in the illustrated form. The surface portion 144 extends between this land and the end of the spool member 137 which is in opposing relation to the spool member 138. The areas of the surfaces 143 and 144 are approximately equal in the illustrated form.

The spool member 138 is similarly constructed in the areas corresponding to the areas 143 and 144 previously described. The member 138 is provided with a land which effects a raised surface 145, and between this land and the end of the spool member 138 opposing the spool member 137 the member 138 is provided with a surface 146 which, like the surface 145, is a circumferential surface but of smaller circumferential dimension. A coil spring 147 embraces portions of both of the spool members 137 and 138, the spring having its ends free of restraint. The end portions of the spring 147 overlie the respective raised surfaces 143 and 145 and the spring 147 is so constructed that it must be expanded somewhat from its manufactured size to be assembled with the aforementioned spool members. When the spring 147 is at rest, the portion of the spring extending between the lands providing the raised surfaces 143 and 145 is of substantially the same diameter as the end portions of the spring which portions frictionally grasp the surfaces 143 and 145, and the aforementioned intermediate portion of the spring is out of contact with the surfaces 145 and 146 which are of smaller circumference.

When the shaft 141 is rotated in a direction to rotate the feed roll 133 in a feeding direction, corresponding movement of the spool 138 fast on the shaft tends to wind up the coil spring 147. The right end portion of the spring 147 as viewed in FIG. 12, may have little tendency to wind up during the last-mentioned rotary movement of the shaft 141 due to the manner in which this end portion of the spring is firmly supported from within by the land which forms the surface 145 against which the spring bears tightly. However, due to the gap between turns of the spring and the surface 146 of the spool 138 these turns may wind up to some extent without frictionally engaging the spool 138. It will be understood that the spring tends to be wound up from the last-mentioned end. As the last-mentioned turns of the spring 147 are wound up, they in turn tend to wind up coils overlying the surface 144 of the spool 137 and outwardly spaced therefrom. The last-named coils may be wound up to some extent without frictionally binding against the spool 137 prior to any winding tendency of those coils which frictionally overlie and grip the surface 143 provided by the land on the spool 137. It will be understood from the foregoing that due to the drag on the spool member 137 effected by the tape extending from the roll 86 and adhering to the feed roll 133 secured to the member 137, the spring 147 imparts a lost-motion one-way driving connection between the spool members, in other words, the intermediate turns of the spring 147 may be wound up to some extent before driving movement of the spool 137 and the feed roll 133 is initiated. This permits in the instant form movement of the shaft-carried pin 142 corresponding to the switch-operating pin 91 previously described prior to feeding movement of the roll 133.

It will be further understood that when the shaft 141 is rotated in the opposite direction, there is a tendency of the spring to expand, that is, unwind, and owing to this tendency no driving connection is effected from the spool 138 to the spool 137. It will be noted that in the form of the clutch mechanism illustrated by way of example in the drawings the metal strand from which the spring 147 is formed has a rectangular cross section as opposed to a round one. This cross-sectional form of the strand tends to prevent a turn of the spring from entering the space between the opposing ends of the spool members and becoming lodged therein. Of course, a spring formed of a strand of round cross section may be employed in the clutch mechanism if desired.

From the foregoing disclosure it will be manifest that there is provided a tape dispenser having an improved tape-feeding roll to which the tape adheres and from which tape may be readily stripped by a manual operation. It will also be manifest that there is provided in the dispenser improved means for severing lengths of tape served from the dispenser. The tape-severing means also cooperates with the feed roll in a novel and improved manner, and there is provided simple and yet very effective means for indexing the severing means with tape-severing stations on the feed roll. It will also be apparent that the dispenser includes novel and efficient cam means for effecting movements of various movable parts in the dispenser.

While several forms of the tape dispenser have been illustrated in the drawings and described above, it will be apparent to those versed in the art that the dispenser may take other forms and is susceptible of various changes in details without departing from the principles of the invention and the scope of the appended claims.

What I claim is:

1. A tape dispenser comprising a frame, a supply roll of pressure-sensitive tape mounted therein, said tape being tacky on at least one surface thereof, a rotatably mounted feed roll carried by the frame and to the periphery of which a tacky side of the tape adheres to be drawn from the supply roll when the feed roll is rotated in a tape-feeding direction, means for rotating the feed roll in the last-named direction, the feed roll having a multiplicity of radially directed interruptions in its peripheral surface over a plurality of which interruptions the tape extends as it is advanced, a tape-severing blade supported for radial movement between a retracted position spaced radially outwardly from the periphery of said feed roll to a tape severing position within a registering one of said interruptions, means for moving said blade between said retracted and severing positions, and roll-indexing means adjacent said feed roll and said blade for locking said feed roll against accidental rotation thereof when said blade is in the tape-severing position and for insuring registration of one of said roll-surface interruptions with the blade during movement of the blade from retracted toward tape severing position irrespective of the position to which said feed roll has been moved by said feed roll rotating means.

2. The tape dispenser according to claim 1 wherein the means for moving the blade is electrically operated and is controlled by said means for rotating the feed roll.

3. The tape dispenser according to claim 1 wherein the means for rotating the feed roll comprises a feed-roll-driving shaft operated by manipulation of a lever, said shaft being connected to the feed roll through a one-way, lost-motion clutch mechanism, and said means for moving said blade being electrically operated and controlled by movement of said shaft.

4. The tape dispenser according to claim 2 wherein said means for moving said blade comprises a first solenoid for moving said blade toward retracted position and a second solenoid for moving said blade toward tape severing position.

5. The tape dispenser according to claim 1 wherein there is means for slackening the portion of the tape extending between the supply and feed rolls following tape feeding movement of said feed roll and prior to the indexing of the feed roll, to facilitate the indexing.

6. The tape dispenser according to claim 1 wherein the supply roll is mounted for movement toward and away from the feed roll between first and second positions respectively, and means is provided to effect disposition of the supply roll in said second position during tape feeding movement of said feed roll and to move said supply roll to said first position following such feed roll movement and prior to the indexing of the feed roll, to create slack in the portion of the tape extending between the rolls and thereby facilitate the indexing operation.

7. A tape dispenser comprising a frame, a supply roll of pressure-sensitive tape mounted therein, said tape being tacky on at least one surface thereof, a rotatably mounted feed roll carried by the frame and to the periphery of which said tacky side of the tape adheres to be drawn from the supply roll when the feed roll is rotated in a tape-feeding direction, means for rotating the feed roll in the last-named direction, the feed roll having a multiplicity of radially directed interruptions in its peripheral surface over a plurality of which interruptions the tape extends as it is advanced, a tape-severing blade slidably supported, the blade being radially slidable into any registering one of said interruptions in the peripheral surface of the feed roll to sever a length of tape on the last-named roll, means adjacent said feed roll and said blade to index the feed roll with reference to the blade prior to the severing operation and subsequent to the feeding operation to effect registration of one of said roll-surface interruptions with the blade, and means to move the blade to clear the tape path during the feeding operation and move the blade to sever the tape and extend the blade into the registering peripheral-surface interruption of the feed roll in tape-blocking position subsequent to the feeding operation, the last-named means being electrically operated and movement of the blade to the tape-path-clearing position being controlled by said means for rotating the feed roll in a feeding direction.

8. A tape dispenser comprising a frame, a supply roll of pressure-sensitive tape mounted therein, said tape being tacky on at least one surface thereof, a rotatably mounted feed roll carried by the frame and to the periphery of which a tacky side of the tape adheres to be drawn from the supply roll when the feed roll is rotated in a tape-feeding direction, means for rotating the feed roll in the tape-feeding direction, the feed roll having a multiplicity of radially-directed interruptions on its peripheral surface over a plurality of which interruptions the tape extends as it is advanced, a tape-severing blade supported for radial movement between a retracted position spaced radially outwardly from the periphery of said feed roll to a tape-severing position within a registering one of said interruptions, means associated with said means for rotating the feed roll for moving said blade between said retracted and severing positions, and roll indexing means adjacent said feed roll and cooperating with said tape-severing blade for preventing accidental rotation of said feed roll when said blade is in the tape-severing position and for insuring registration of one of said roll surface interruptions with the blade during the movement of the blade from the retracted toward the tape-severing position irrespective of the position to which said feed roll has been moved by said feed roll rotating means.

9. A tape dispenser as defined in claim 8, wherein the means to move the blade to and from said positions thereof is operated electrically, and the movement of the blade to the ready position thereof is controlled by the means for rotating the feed roll in the feeding direction.

10. A tape dispenser as defined in claim 8, wherein means is provided to slacken the tape extending between the rolls prior to the indexing of the feed roll, to facilitate the indexing.

11. A tape dispenser as defined in claim 8, wherein one of said rolls has its axis movably mounted for movement of the roll generally toward and away from the other, and means is provided to first move said movable roll away from the other and then toward it prior to the indexing of the feed roll, to create slack in the tape extending between the rolls and thereby facilitate the indexing operation.

12. A tape dispenser as defined in claim 11, in which the axially movable roll is the tape supply roll and wherein the supply roll is carried by a slide mounted in the frame for movement generally toward and away from the other roll, and the means for moving the supply roll in the last-named direction is operatively interposed between said slide and said means for rotating the feed roll.

13. A tape dispenser comprising a frame, a supply roll of pressure-sensitive tape mounted therein, said tape being tacky on at least one surface thereof, a rotatably mounted feed roll carried by the frame and to the periphery of which said tacky side of the tape adheres to be drawn from the supply roll when the feed roll is rotated in a tape-feeding direction, the feed roll having a multiplicity of circumferentially, relatively closely spaced, and radially directed tape-severing stations thereon over which stations the tape extends as it is advanced, a tape-severing blade slidably supported in the frame for radial movement relative to said feed roll, the blade being slidable to sever tape at any one of said tape-severing stations and thereby sever a length of tape on the feed roll, the blade having a position in which it clears the tape path and a tape-

blocking position to which it moves to sever the tape, means to rotate the feed roll in a feeding direction, means associated with the feed roll to index the feed roll with reference to the blade prior to the severing operation and subsequent to the feeding operation to effect registration of one of said tape-severing stations with the blade, said means for rotating the feed roll in a feeding direction comprising a lost-motion driving connection between a rotary shaft supported in the frame and the feed roll, a first solenoid operatively connected to the blade to move the latter to the tape-path-clearing position thereof, a second solenoid operatively connected to the blade to move the latter to the tape-path-blocking position thereof, means operative from the means to rotate the feed roll in a feeding direction to energize the first solenoid prior to feeding movement of the last-named roll to move the blade out of the tape-path-blocking position thereof, means operative upon movement of the blade to

the tape-path-clearing position thereof and upon termination of the tape-feeding operation to de-energize the first solenoid and energize the second solenoid to effect severing movement of the blade, and means operative upon the last-named movement of the blade for de-energizing the second solenoid after the tape has been severed.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,143,019 August 4, 1964

Alfred P. Krueger

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, lines 25 and 31, for "cutitng", each occurrence, read -- cutting --; column 5, line 67, strike out "and".

Signed and sealed this 8th day of December 1964.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents