

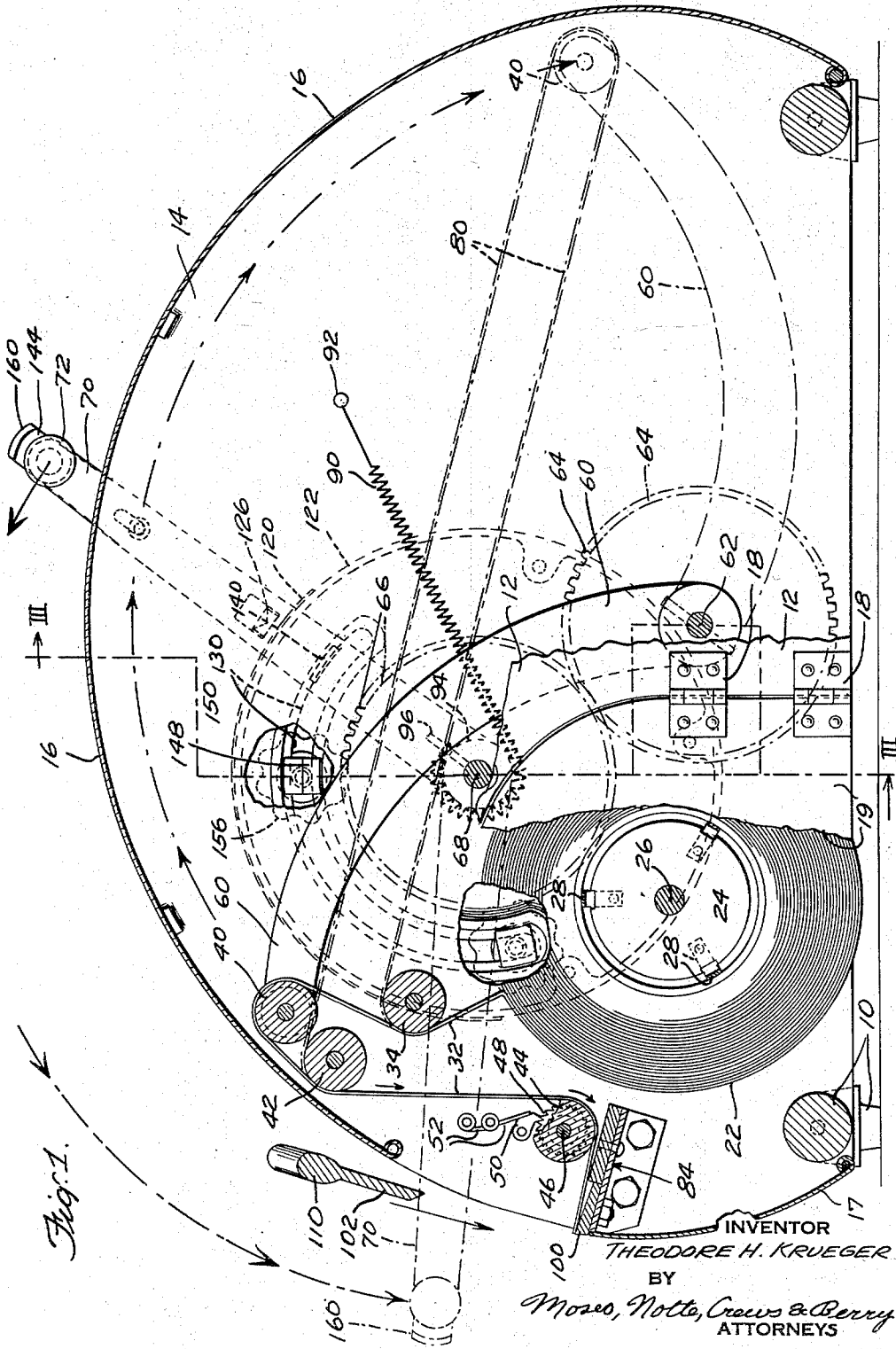
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T. H. KRUEGER
TAPE SERVING MACHINE

2,536,066

Filed Jan. 23, 1945

3 Sheets-Sheet 1



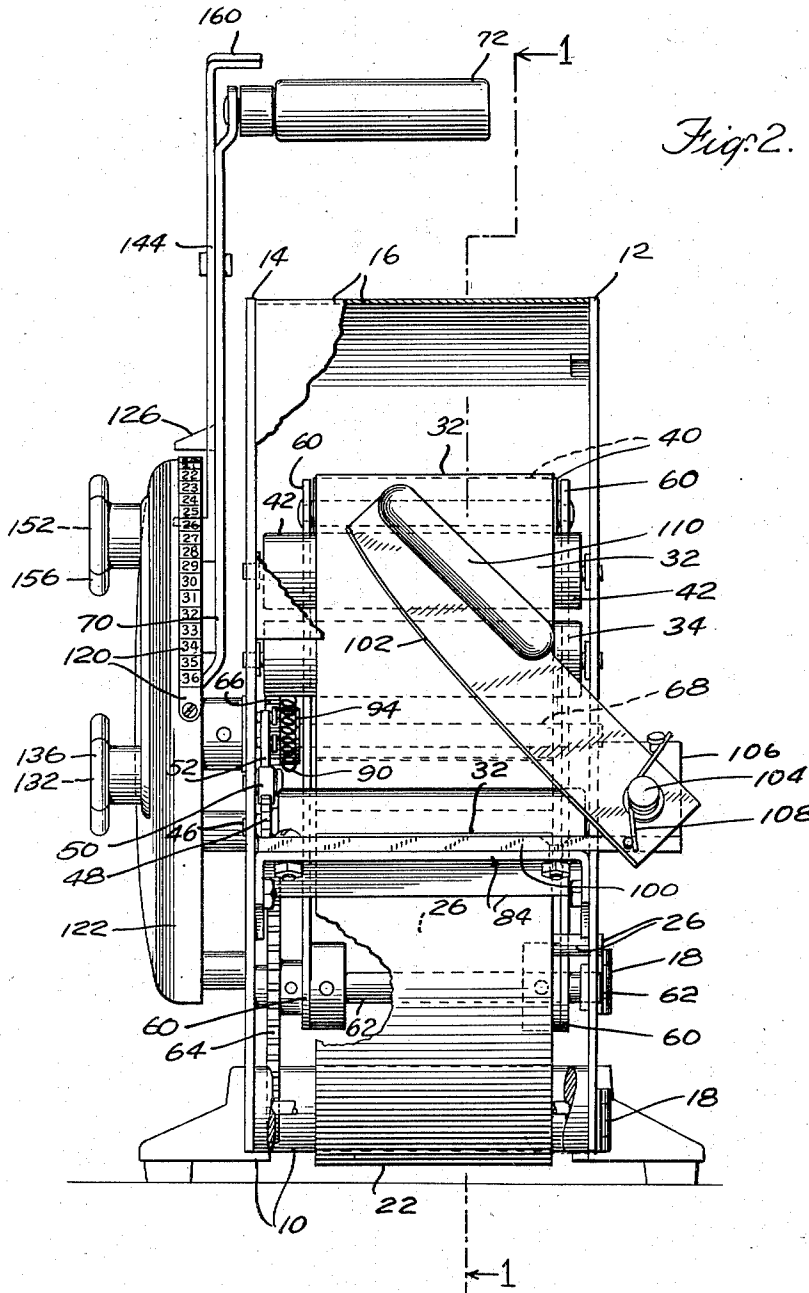
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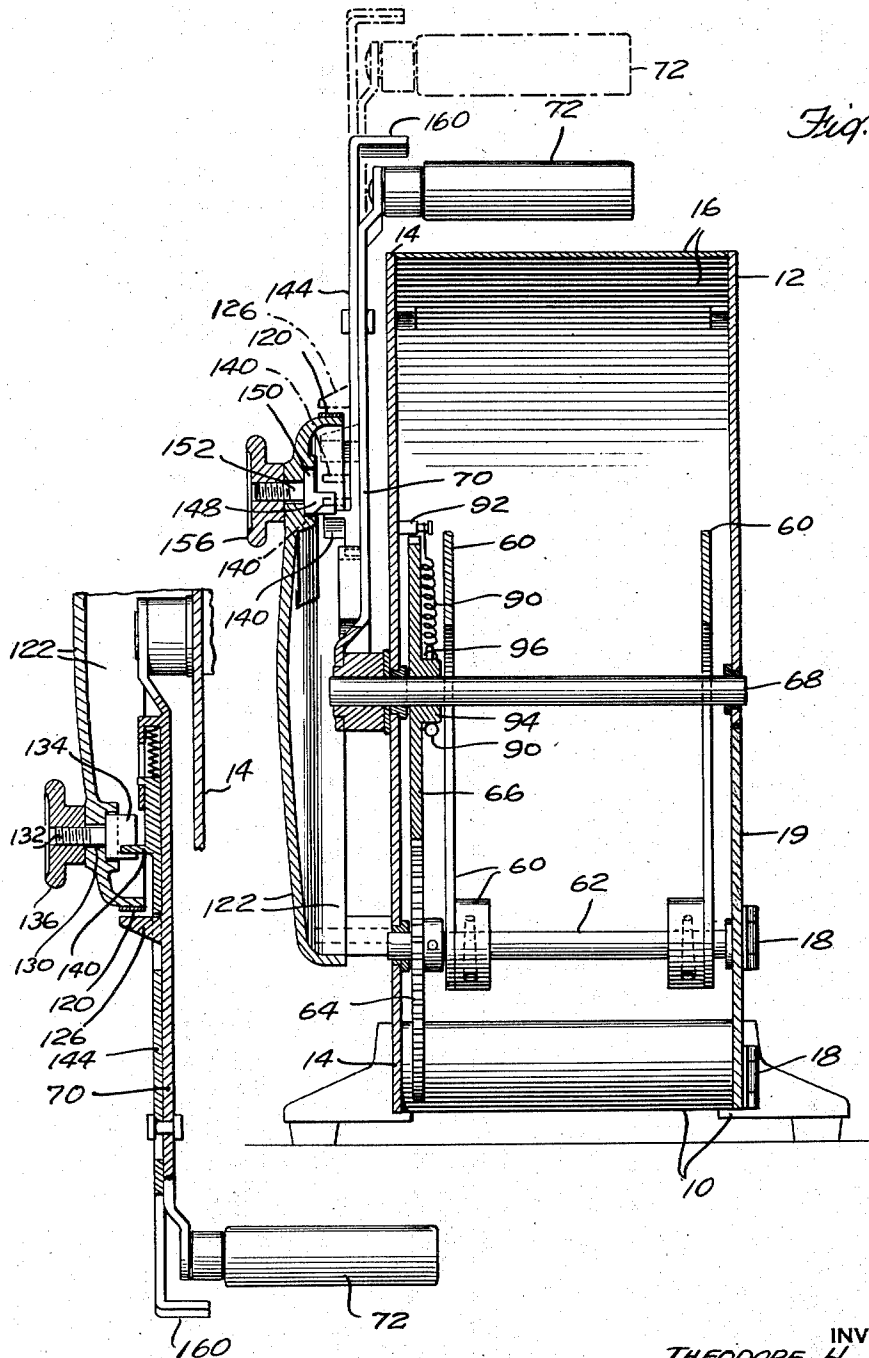
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UNITED STATES PATENT OFFICE

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TAPE SERVING MACHINE

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1

This invention relates to machines for serving adhesive tape and is particularly adapted for the serving of pressure sensitive or normally tacky adhesive tape.

Machines have heretofore been devised for serving comparatively short lengths of light or narrow pressure sensitive adhesive tape but for certain purposes it is desired to serve long lengths of pressure sensitive tape and particularly long lengths of comparatively wide and heavy tape. Such long lengths of tape are used for many purposes, such as sealing large packing cartons.

Much of this tape is used by the Army and Navy for the sealing of food shipments for overseas service. The handling of such large and wide pieces of tape presents many problems not met with in the handling of small short pieces of tape and existing machines are unadapted for the purpose.

It is an object of the present invention to provide a compact and efficient machine for serving measured lengths of adhesive tape and particularly comparatively long lengths of pressure sensitive adhesive tape.

It is another object of the invention to provide a machine of this character in which a crank or hand or foot operated member or power mechanism is used to draw the tape from the roll of tape and measure the desired length to be used, the measured length of tape being then pulled from the machine by hand and cut off. By using a part of the mechanism to do the actual pulling of the tape from the roll of tape, an operation which requires considerable force in the case of comparatively wide rolls of pressure sensitive tape, the unwinding and withdrawing of the tape from the roll is done by the machine and the tape may thereafter be pulled out of the machine by slight pressure of the hand. Furthermore, by using the mechanical parts of the machine to pull the tape from the roll these mechanical parts may also be used to effectively measure the length of tape pulled off the roll and prepare it for manual removal. In this way accurately measured lengths are served and wastage of the tape is avoided. This is important when using wide and heavy pressure sensitive tape as such tapes are frequently laminated from one or more layers and sometimes even have cloth backing and are comparatively expensive so that wastage becomes a substantial factor of cost.

Another object of the invention is to provide adjustable stopping means for assisting in the delivery of preselected lengths of tape, these stopping means being preferably arranged so that one

2

or more different predetermined lengths of tape may be dispensed as desired.

Another object of the invention is to provide visual means for measuring the length of tape to be served.

In accordance with the present invention the tape serving machine is preferably provided with mechanism for drawing a length of the adhesive tape, preferably in the form of a loop, from the roll of tape, which length or loop is held in a more or less taut condition within the machine prior to being manually withdrawn when it is to be used. The power of the machine may thus be used to overcome the resistance caused by the tight winding of the adhesive tape on the tape roll and the only force necessary to apply when withdrawing the tape from the machine is that required to withdraw the loop previously formed in the machine. Furthermore by withdrawing the tape from the roll in loop form approximately twice the length of tape may be pulled from the roll and formed into the loop as the distance which it is necessary for the loop forming means to move. Thus long lengths of tape may be withdrawn and served from a comparatively compact machine. If the tape were merely drawn out in a straight line from the roll obviously the overall dimensions of the machine would be much greater. The machine can also be operated in such a way as to provide a timed withdrawal of the tape from the closely wound roll. It is ordinarily not practicable to jerk or pull the tape very quickly from the roll because of its close adhesion to the underlying layers thereof. As the machine does this part of the withdrawing it is easier to control the rate at which the unwinding is carried out. The tape having been formed into the loop within the machine may thereafter be drawn out by hand as rapidly as desired because there is no particular resistance to be overcome.

In the machine illustrated the loop is formed by a movable feed roller engaging an intermediate portion of the tape between the supply roll of tape which acts as an anchor at one end of the loop and an anchoring means at the delivery end of the loop, such anchoring means preferably being in the form of a ratchet roller to which the end of the tape is adhered. Such roller will permit the tape in the loop to be withdrawn freely from the machine but will prevent the end of the tape from being pulled back into the machine. Such ratchet roller thereby forms an anchor for the free end of the tape. By moving the feed roller against the tape, which is thus anchored at both ends, tension is put on the tape and as

the ratchet roller cannot turn backward, this anchorage for the free end of the tape will not yield and the pull on the tape results in drawing the tape from the supply roll. Thus the loop is enlarged until the desired length of tape is withdrawn from the supply roll. There are thus three elements involved in the forming of the loop, namely the anchoring ratchet roll or other anchoring means at the free end of the tape, the supply roll to which the tape adheres and from which it must be pulled, and the intermediate feed or loop forming roll. In the embodiment of the invention illustrated in this case the loop is formed by moving the feed roll but obviously the tape might be withdrawn from the supply roll by moving either the anchoring ratchet roll, the feed roll, or the tape supply roll, or by moving any two or three of these elements relatively to one another. The important consideration is to provide means in the machine for forcibly withdrawing the tape from the supply roll and holding it suspended in such manner that it may be manually withdrawn from the machine with a light pull when required.

In the accompanying drawings, in which I have illustrated one preferred embodiment of my invention,

Figure 1 is a longitudinal vertical section of the machine taken on the line I—I of Fig. 2, with certain portions in side elevation.

Figure 2 is a front view of the machine with parts of the cover plate broken away so as to show the internal construction;

Figure 3 is a transverse vertical section of the machine taken on the line III—III of Fig. 1; and

Figure 4 is a fragmentary view in horizontal section with the operating handle in its forward position.

Referring to the drawings in detail, the machine has a frame which is shown as comprising a base 10 carrying side walls 12 and 14. The space between the side walls may be conveniently enclosed by one or more cover plates 16 and 17. The side wall 12 is preferably provided with hinges 18 for a door 19 which can be opened to permit the insertion of a roll of adhesive tape 22 which may be supported in any suitable manner, as by means of a tape core 24 mounted on a spindle 26 supported in bearings on the side walls. The tape core 24 may conveniently be formed as a wooden roller having grooves therein in which are fitted bowed flat springs 23 over which the roll of tape is forced. In the construction shown the roll of tape is wound adhesive side in and the tape is led from the roll as a strip 32 passing first over the guide roller 34. As the tape is wound adhesive side in, in the example shown, it will be seen that the adhesive side of the tape passes over the guide roller 34. In order to prevent the tape from adhering too firmly to such guide roller the surface of the latter may be treated by being sanded or in any other suitable manner which will prevent too close adherence. The tape passes from the guide roller 34 over a feed roller or pulling roller 40, then over a guide roller 42 and finally under an anchoring roller or ratchet roller 44. In the construction shown the non-adhesive side of the tape passes over the rollers 40 and 42 while the adhesive side of the tape is in contact with the ratchet roller 44. The ratchet roller 44 rotates about the axis of a spindle 46 and is provided at one end with a ratchet wheel 48 which is engaged by a pawl 50 pressed in contact with the ratchet wheel by a spring 52. This arrangement permits

the roller 44 to rotate in a clockwise direction (Fig. 1) thereby permitting the tape to be freely pulled out of the machine. The ratchet roller, however, will not rotate in the other direction so that the tape is firmly held against being pulled in the opposite direction owing to the adhesion of the tape to the roller.

In the form of the invention shown tape is withdrawn from the supply roll by movement of the feed or puller roll 40. The latter is mounted between the arms of feed yoke 60 the other ends of the arms being fixed to a shaft 62 journaled in the side walls 12 and 14 and having keyed thereon a gear 64. The gear 64 meshes with a gear 66 keyed to a shaft 68 the outer end of which is fixed to a crank 70 having an operating handle 72. Movement of the operating crank in a counterclockwise direction (Fig. 1) will result in swinging the arms of the yoke 60 in a clockwise direction from the position shown in full lines in Fig. 1 to the position shown in dotted lines in said figure (or to some intermediate position depending upon the length of strip to be fed). Obviously any suitable means for moving the puller roll may be substituted for the particular mechanism illustrated. The pulling force can be applied by means of a hand crank, as shown, or by power or otherwise as desired, and the various parts may be connected by gearing of any appropriate form. Movement of the yoke 60 in a clockwise direction as described, results in the formation of a taut loop of tape. As the tape is anchored to the ratchet roll 44 it must be drawn from the supply roll 22. Furthermore as the tape is withdrawn into a doubled loop, as indicated at 80, it will be seen that approximately twice the length of tape will be withdrawn as the length of the distance moved by the puller roll 40. This admits of a compact construction of the machine.

The leading end of the tape in front of the ratchet roller 44 rests adhesive side up on a support or table 84. In this position it may be readily grasped by the operator, particularly as the adhesive side is exposed, so that it may be picked up by merely touching the fingers to the adhesive side. When the operator desires to use the tape he takes hold of this end resting on the table and pulls out the tape which is contained in the machine in the loop 80. The pulling out of this tape involves no great effort as it merely means the drawing of the tape over the guide rollers and the moving of the puller roller 40 and yoke and gear and crank, all of which parts move freely. It is not necessary to overcome the resistance to the stripping of the tape from the supply roll because this has already been done by the operation of the crank. The manual withdrawal of the tape from the loop in this manner returns the crank and associated parts to initial position ready for the next operation. Figure 1 shows the parts in such position in full lines, and shows the crank and yoke in dotted lines in the position at the end of the loop forming stroke at which time the tape is in condition for the operator to draw it manually from the machine.

As the crank is moved by the hand of the operator in counterclockwise direction (Fig. 1), on its active stroke while it acts to form the loop and withdraw the tape from the tape supply roll and as it is returned to its initial position, by the act of manually withdrawing the tape from the machine, it is unnecessary to provide spring means for moving it in either direction. However it is desirable to provide a relatively

5

light or holding spring which tends to urge the crank in a counterclockwise direction and thus prevent it from being accidentally pushed in the opposite direction before the tape is manually withdrawn from the machine. The crank is thus urged in a direction in which it will maintain the tape loop taut thereby preventing the sides of the loop from sagging with possible contact between the sides of the loop or between portions of the loop and some part of the mechanism. This is important because of the tacky nature of the tape which immediately adheres to anything it touches. In the construction shown a comparatively weak spring 90 is provided which is anchored at one end to a fixed support 92 and at the other end is wound part way around a spool 94 on the crank shaft 68, this end being anchored to a pin 96 fixed in such spool. This spring should not be strong enough to move the crank or actuate the yoke 60, against the resistance necessary to unwind the tape from the roll, so that the spring will not feed the tape. Any other suitable means for preventing accidental displacement of the crank may be utilized. In the construction of the machine illustrated, the weight of the crank and its handle substantially balances the weight of the yoke 60 and roller 40, and as these parts move in opposite directions they substantially balance each other in all positions.

Suitable means for severing the tape are preferably provided. If the machine is used for dispensing a heavy strong tape such as heavy paper backed or cloth backed tape it is desirable to provide a positive shear cutter means. If the machine is used for dispensing light tape, such as cellophane tape, a simple serrated cutter or tear off blade may be used. In the construction shown a shear cutter is illustrated this comprising a ledger blade 100 fixed to the plate 84 and with which cooperates a pivoted shear blade 102 one end of which is pivoted on a post 104 fixed in a pivot block 106. A spring 108 is preferably provided to hold the shear blade in retracted position and the shear blade is provided with a pad or handle 110 by which it may be manually actuated. The shear blade is located far enough in front of the ratchet roller 44 to leave an end of the tape long enough to be readily grasped. Obviously, if desired, an automatic shear blade might be employed, arranged to be actuated in accordance with the movements of the operating crank. Such constructions are well known and need not therefore be described in detail. The use of a pivoted shear blade engaging the upper tacky surface of the tape has the advantage that after the tape has been sheared the rear end of the cut off portion tends to adhere lightly to the cutting edge of the shear blade so that as the blade goes up it lifts up this end of the tape and prevents it from dropping to the bench or floor. Instead it will remain momentarily affixed to the blade until the operator is ready to take hold of it when transferring the cut off strip of tape to the carton or other article to be sealed.

Suitable means are preferably provided for measuring the amount of tape withdrawn from the tape supply roll, and therefore for measuring the length of the piece of tape which the operator can withdraw from the machine for application to the carton. In the construction shown a visible indicating scale for making such measurements is provided and adjustable stops are also provided. The visual scale consists of a

6

calibrated scale plate or strip 120 which is mounted on a measuring drum 122 attached to the side of the machine. The measuring drum is mounted concentrically of the crankshaft 68 and the crank 70 has a pointer 126 which moves over the scale and enables the operator to read at once the length of tape measured out for any particular position of the crank. If the operator wants to withdraw a piece of tape say 30 inches long, he draws the handle forward until the pointer 126 is opposite the numeral "30" on the scale 120. This position of the crank corresponds with the given position of the feed yoke in which a loop has been formed of such length as to permit a 30 inch piece of tape to be pulled out of the machine and cut off.

In some cases it is desirable to provide an adjustable stop or stops which may be used for limiting the movement of the crank where one or more predetermined lengths of tape are to be fed repeatedly. For example, the measuring drum 122 is shown as provided with an arc-shaped slot 130 in which slides a bolt 132 having a head 134 and adapted to be clamped in desired position in the slot by means of a clamping nut 136. The head 134 constitutes a stop adapted to be engaged by a projection 140 carried on a length selector slide 144 mounted to have a limited longitudinal sliding movement on the crank. The stop 134 is of sufficient size to be engaged by the projection 140 irrespective of the particular adjustment of the selector slide so that the movement of the crank is always limited by the position of this stop which may be termed the final feed stop. Where it is desired to feed alternately or at intervals one or more shorter lengths of tape than the length for which the stop 134 is set, an optional feed stop is provided which comprises a lug 148 forming part of the head 150 of a bolt 152 mounted in the slot 130 and adapted to be adjustably clamped therein by the nut 156. When the length selector slide 144 is moved outwardly then the projection 140 will clear the optional feed stop 148 and permit a length of tape to be measured determined by the setting of the final feed stop 134. When the length selector slide is pushed inwardly, however, which may be done by the thumb of the operator's hand holding the crank handle 72 being engaged with a finger piece 160 on the end of the length selector slide, then the projection 140 will contact with the optional feed stop 148 and thereby limit the movement of the crank so as to measure out a shorter length of tape. In this way the operator may measure either one of two lengths of tape as often as desired without changing the positions of either of the feed stops.

While I have illustrated and described in detail certain preferred forms of my invention, it is to be understood that changes may be made therein and the invention embodied in other structures. I do not, therefore, desire to limit myself to the specific constructions illustrated, but intend to cover my invention broadly in whatever form its principle may be embodied.

I claim:

1. In a pull out machine for dispensing pressure sensitive adhesive tape, means for holding a supply roll of tape, means for anchoring the free end of the tape by adhesion of the same to an anchoring surface, means for unwinding tape from the supply roll while the free end is anchored in stationary position, and means for supporting the tape unwound from the roll in such manner that it may be manually withdrawn from the

7

machine without unwinding additional tape, and means for restoring the unwinding means to initial position by withdrawal of the piece of tape previously unwound.

2. In a machine for dispensing adhesive tape, means for holding a supply roll of tape, a pair of guide rollers over which the tape passes, a feed roller engaging the tape between said guide rollers, a pivoted arm carrying said feed roller, means for anchoring the tape beyond said feed roller, and means for moving said feed roller away from said guide rollers so as to draw a loop of tape from the tape supply.

3. In a machine for dispensing pressure sensitive adhesive tape, a frame, means thereon for supporting a roll of adhesive tape, a feed roller over which the tape is passed after it leaves the supply roll, means for supporting and moving said feed roller in the direction to withdraw tape from the supply roll, an anchor roller over which the tape passes after it leaves the feed roll, said anchor roller being arranged to engage the adhesive side of the tape and anchor the tape by such adhesive engagement and being freely rotatable in a direction to permit withdrawal of the tape from the machine, means to prevent backward rotation of said anchor roller, and means for severing the tape after it has passed the anchor roller and at a point spaced from said roller so as to leave a free end of the tape to be grasped, said end projecting from the anchor roller to which it is attached by adhesion at a distance from such end.

4. In a machine for dispensing pressure sensitive adhesive tape, a frame, means thereon for supporting a roll of adhesive tape, a feed roller over which the tape is passed after it leaves the supply roll, means for supporting and moving said feed roller in the direction to withdraw tape from the supply roll, an anchor roller over which the tape passes after it leaves the feed roll, said anchor roller being arranged to engage the adhesive side of the tape and anchor the tape by such adhesive engagement and being freely rotatable in a direction to permit withdrawal of the tape from the machine, means to prevent backward rotation of said anchor roller, and a table engaging the non-adhesive side of the tape for supporting the end of the tape after it leaves the anchor roller, said feed roller being returnable to initial position by withdrawal of the previously fed piece of tape.

5. In a machine for dispensing pressure sensitive adhesive tape, a frame, means thereon for supporting a roll of adhesive tape, a feed roller over which the tape is passed after it leaves the supply roll, means for supporting and moving said feed roller in the direction to withdraw tape from the supply roll, an anchor roller over which the tape passes after it leaves the feed roller, said anchor roller being arranged to engage the adhesive side of the tape and anchor the tape by such adhesive engagement and being freely rotatable in a direction to permit withdrawal of the tape from the machine, means to prevent backward rotation of said anchor roller, a table engaging the non-adhesive side of the tape for supporting the end of the tape after it leaves the anchor roller, and severing means carried by said table for severing the tape at a point spaced from said anchor roller so as to leave the free end of the tape supported on said table.

6. In a machine for dispensing pressure sensitive adhesive tape, a frame, means thereon for supporting a roll of adhesive tape, a feed roller

8

over which the tape is passed after it leaves the supply roll, means for supporting and moving said feed roller in the direction to withdraw tape from the supply roll, an anchor roller over which the tape passes after it leaves the feed roller, said anchor roller being arranged to engage the adhesive side of the tape and anchor the tape by such adhesive engagement and being freely rotatable in a direction to permit withdrawal of the tape from the machine, means to prevent backward rotation of said anchor roller, and means for severing the tape after it has passed the anchor roller and at a point spaced from said roller so as to leave a free end of the tape to be grasped, said severing means comprising a fixed blade and a blade pivoted to move downwardly to sever the tape and upwardly to an inoperative position, the tape being arranged to pass over the fixed blade adhesive side up.

7. In a machine for delivering pressure sensitive adhesive tape, a frame, means on the frame for supporting a roll of adhesive tape, a feed roller over which the tape passes after it leaves said roll, an anchor roller over which the tape passes with the adhesive side of the tape in contact therewith, the tape being anchored to said roller by said adhesive contact said anchor roller being movable freely in a direction to permit withdrawal of the tape, means for preventing backward rotation of said anchor roller, a movable support for said feed roller, manual means for moving said feed roller support, and a visual scale cooperating with said manual means to permit movement of the same through measured distances.

8. In a machine for delivering adhesive tape, a frame, means on the frame for supporting a roll of adhesive tape, a feed roller over which the tape passes after it leaves said roll, an anchor roller over which the tape passes with the adhesive side of the tape in contact therewith, said anchor roller being movable freely in a direction to permit withdrawal of the tape, means for preventing backward rotation of said anchor roller, a movable support for said feed roller, manual means for moving said movable support, and an adjustable stop means for limiting the movement of said manual means.

9. In a machine for delivering adhesive tape, a frame, means on the frame for supporting a roll of adhesive tape, a feed roller over which the tape passes after it leaves said roll, an anchor roller over which the tape passes with the adhesive side of the tape in contact therewith, said anchor roller being movable freely in a direction to permit withdrawal of the tape, means for preventing backward rotation of said anchor roller, a movable support for said feed roller, manual means for moving said movable support, a plurality of adjustable stops, and means associated with said manual means and under the control of the operator for selectively engaging said stops so as to selectively limit the extent of movement of the manual means.

10. In a machine for dispensing adhesive tape, a frame, means therein for supporting a roll of adhesive tape, a shaft mounted in said frame, a yoke mounted on said shaft, a feed roller mounted on said yoke, a crankshaft mounted in said frame, an operating crank mounted on said crankshaft, gearing connecting said shafts, a guide roller mounted in said frame over which said tape passes from the supply roll of tape to said feed roller, a second guide roller mounted in said frame over which the tape passes

after it leaves said feed roller, and an anchor roller mounted in said frame over which the tape passes after it leaves said second guide roller, said anchor roller being arranged to engage the adhesive side of the tape but being free to rotate in a direction to permit tape to be withdrawn from the machine, and means for preventing the backward rotation of said anchor roller.

11. The method of dispensing measured lengths of pressure sensitive adhesive tape from a roll of adhesive tape which consists in anchoring in fixed position the free end of tape withdrawn from the roll, withdrawing further tape from the roll by applying sufficient force to an area of the tape between the anchored end and the roll to strip the tape from the roll in the form of a measured loop of tape between the roll and the anchored free end thereof, and then pulling out the previously anchored free end of the tape and the tape in the previously formed loop without unwinding any more tape from the supply roll, and then severing such withdrawn tape.

12. The method of dispensing lengths of pressure sensitive adhesive tape from a roll of adhesive tape which consists in anchoring the free end of tape withdrawn from the roll, applying force to the tape between the anchored position and the roll sufficient to strip further tape from the roll while maintaining the free end thereof anchored, then pulling out the previously anchored free end of the tape and the tape previously withdrawn from the supply roll without unwinding any more tape from the supply roll, and then severing the withdrawn tape.

13. The method of dispensing lengths of pressure sensitive adhesive tape from a supply roll of adhesive tape of such character that force is required to strip the tape from the roll, which consists in anchoring the tape at a distance from the roll by causing the tape to adhere by its own adhesiveness to an adhesion roller capable of rotation only in a direction permitting withdrawal of tape, stripping tape from the supply roll without changing the adhesive engagement between the part of the tape adhered to the adhesion roller and such roller so as to increase the length of tape between the adhesion roller and the supply roll, and finally withdrawing the tape to be dispensed by pulling the same over the adhesion roller without breaking the adhesive contact between the tape and the adhesion roller.

14. The method of dispensing measured lengths of pressure sensitive adhesive tape from a supply roll of adhesive tape of such character that force is required to strip the tape from the roll, which consists in anchoring the tape at a point spaced from the roll by causing the tape to adhere by its own adhesiveness to an adhesion roller capable of rotation only in a direction permitting withdrawal of tape from the roll, stripping tape from the roll without breaking the adhesive engagement between the tape adhered to the adhesion roller and such roller so as to increase

the length of the piece of tape between the adhesion roller and the supply roll by a measured amount, and finally withdrawing such measured amount of tape by pulling the same over the adhesion roller without separating the adhesive contact between the tape and the adhesion roller and without stripping additional tape from the supply roll.

15. The method of dispensing lengths of pressure sensitive adhesive tape from a supply roll of adhesive tape of such character that force is required to strip the tape from the roll, which consists in anchoring the tape at a distance from the roll by causing the tape to adhere by its own adhesiveness to an adhesion member in such manner that the force necessary to break the adhesion between the tape and said member is greater than the force required to strip the tape from the supply roll, lengthening the tape path between the adhesion member and the supply roll so as to strip tape from the supply roll, shortening the tape path between the adhesion member and the supply roll so as to provide a length of tape stripped from the roll ready for dispensing, and finally withdrawing from the adhesion member and dispensing the tape previously stripped from the supply roll.

16. In a pull out dispenser for dispensing pressure sensitive adhesive tape from a supply roll of tape of such character that force is required to strip the tape from the roll, means for holding a supply roll of tape, means for anchoring the free end of the tape comprising an idler anchor roller to which the end of the tape is anchored by its own adhesion, said anchor roller being freely rotatable in a direction to permit withdrawal of the tape, such withdrawal, through adhesive contact of the tape with the roller, constituting the only means provided in the dispenser for rotating such roller, means to prevent backward rotation of said anchor roller, means for applying sufficient force to the tape to strip the tape from the roll and to unwind a measured length therefrom, while the free end is anchored in stationary position, and means for supporting the tape unwound from the roll in such manner that it may be manually withdrawn from the machine without unwinding additional tape from the supply roll, whereby the tape may be withdrawn without application of the force required to strip the tape from the roll.

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