April 23, 1968 K. PETRŮ 3,379,598

CUTTING MECHANISM FOR MACHINES WHICH WRAP A PRISMATIC BOX INTO A CELLOPHANE COVER

Filed June 10, 1964 4 Sheets-Sheet 1

Fig. 1.

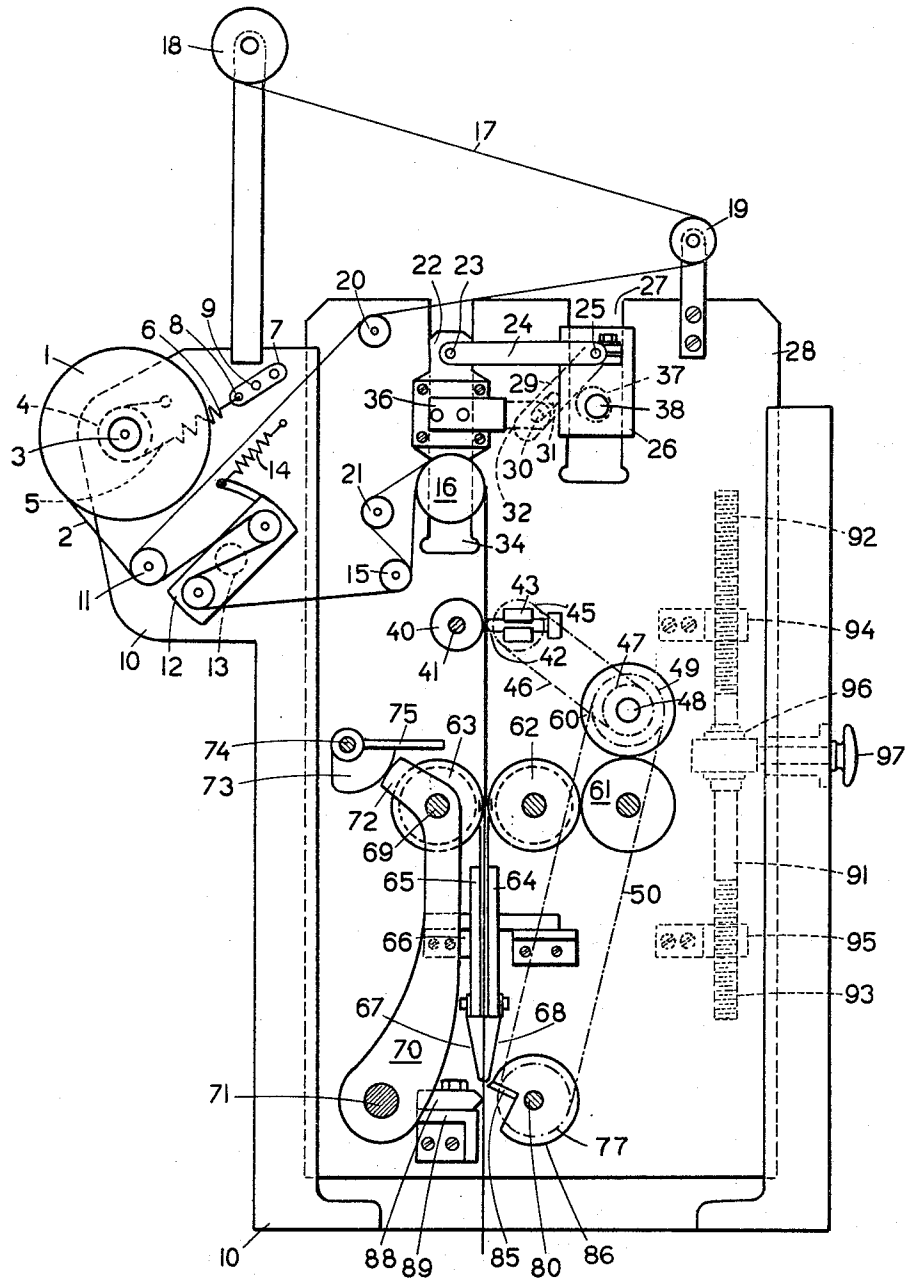

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Fig. 2.

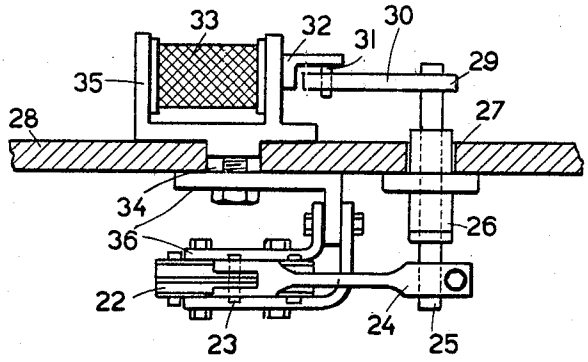
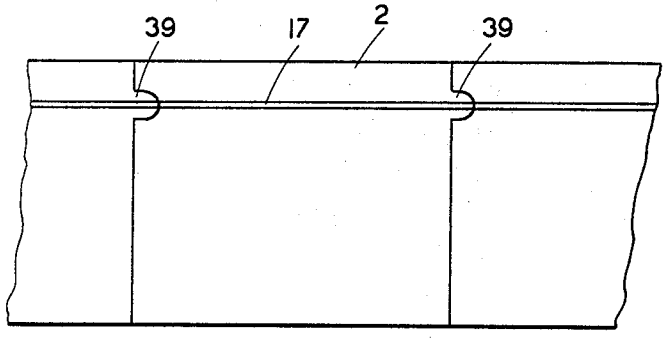


Fig. 3.



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CUTTING MECHANISM FOR MACHINES WHICH WRAP A PRISMATIC BOX INTO A CELLOPHANE COVER

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Fig. 4.

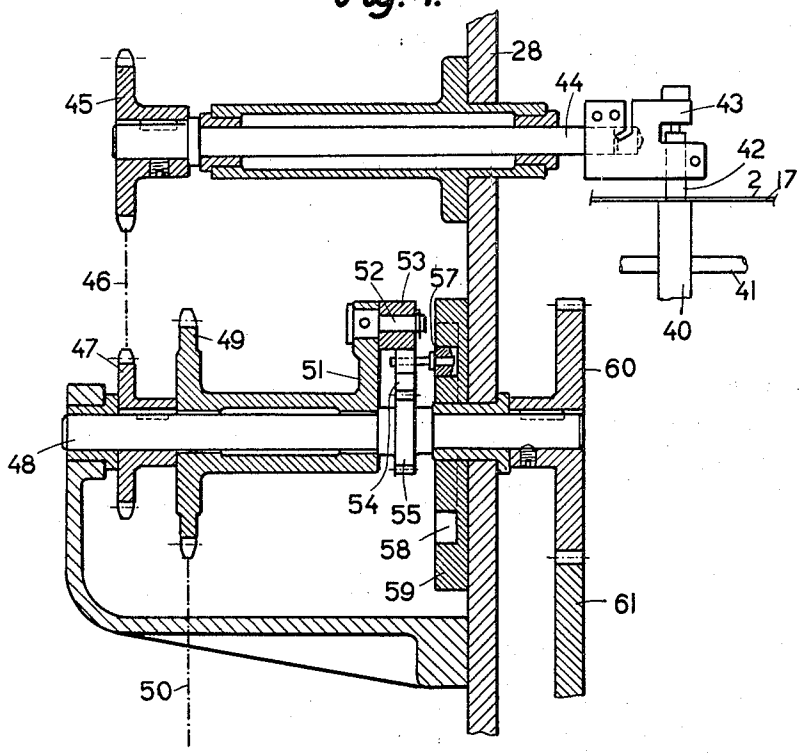
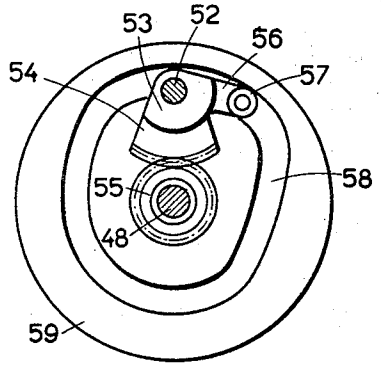


Fig. 5.



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CUTTING MECHANISM FOR MACHINES WHICH WRAP A PRISMATIC BOX INTO A CELLOPHANE COVER

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Fig. 6.

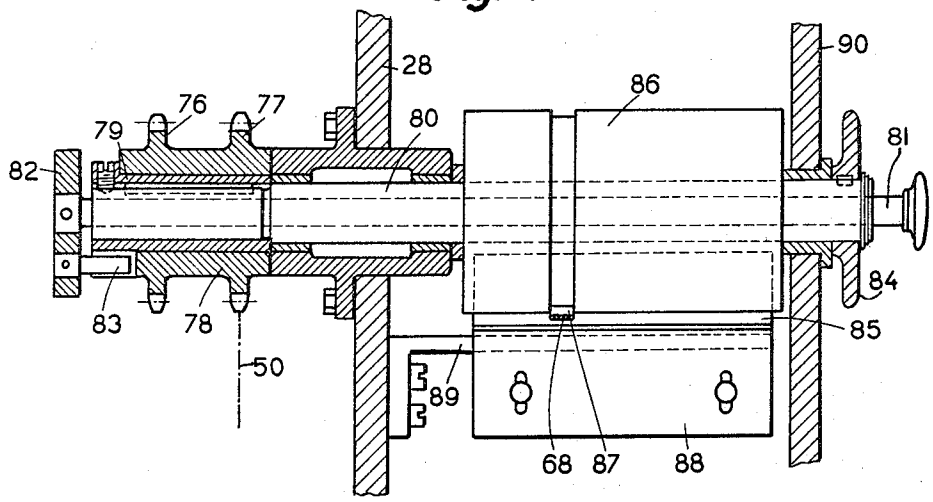
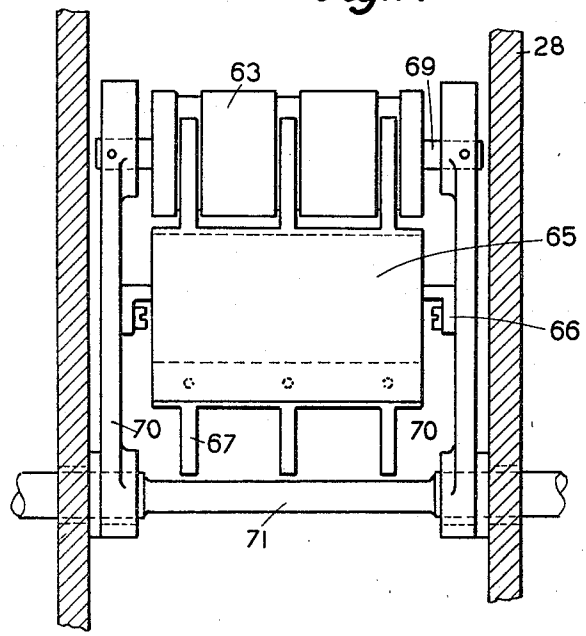


Fig. 7.



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Patented Apr. 23, 1968

3,379,598

CUTTING MECHANISM FOR MACHINES WHICH WRAP A PRISMATIC BOX INTO A CELLOPHANE COVER

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4 Claims. (Cl. 156—510)

The invention relates to a cutting mechanism for wrapping boxes of prismatic shape into a cellophane cover.

Prismatic boxes, more particularly proper or cardboard cigarette boxes, are usually wrapped in an outer cellophane coating or cover. The cellophane blank, provided in advance with a ripping tape, is placed in an upright position in the path of the moving box filled with cigarettes. In a further working cycle the cellophane blank is wrapped around this box and its free laps are joined together by thermal treatment or by paste or a similar material. The cellophane is wound-off from bobbins together with the ripping tape and they are placed on each other before the wrapping operation and they are also joined together after having been folded around the box either by thermal treatment or by paste or a similar material. The cellophane blank with the ripping tape is cut from bobbins so that the ripping tape ends in a sort of projection or tip which can be readily caught between the fingers. By pulling the projection of the ripping tape which sticks to the cellophane wrapper, the upper portion thereof is separated and the extraction opening of the cigarette box is uncovered.

In existing cutting devices serving the above mentioned purpose the cellophane blank with the respective piece of ripping tape is cut off from bands which are uniformly wound-off from the respective supply bobbins so that both pieces move uninterruptedly into the cutting-off position. All other component-parts and operations of the entire machine are adapted to such a regular, uniform and continuous movement. This method of moving both tapes is convenient from the kinematic point of view, but it allows only machines with smaller capacities to be used. This is due to the fact that if the cellophane is joined together with the ripping tape by purely thermal treatment, a solvent must be used to join the tape with the cellophane and this solvent pollutes the machine and this reduces its efficiency. Besides this, uniform movement of the cellophane is not convenient if the movement of the packages which are to be wrapped in cellophane is a periodic one at least in the first part. A further disadvantage of known devices is the complexity of the various cellophane guides and holding devices after the cellophane has been cut-off from the bobbin to prevent its twisting or curling and shifting under effect of the air swirl caused by the rotating knife, this twisting and shifting preventing the two ends of the ripping tape from meeting together after completion of the wrapping action.

It is a general object of this invention to eliminate the above mentioned drawbacks of the known state of art.

Stated briefly but more specifically, the cutting mechanism cuts off the respective pieces from cellophane and ripping tape bands when the two bands are at rest, or moving at a reduced speed, instead of moving uninterruptedly and uniformly as in existing devices of this type, and that they are cut off after the cellophane has been partly wrapped around the box, particularly around the narrower, usually longitudinal front edge of the box. The interrupted movement of the wound-off cellophane and ripping tape bands by the supply mechanism is equalized on the one hand by a band-brake on the cellophane

bobbin created by a band placed around the rotary bobbin hub, the said band being tensioned in accordance with the pulling force of a spring by means of an adjustable holder with a stationary pin mounted in the machine frame, and on the other hand by a twin-roller swinging out in one direction under effect of the pull of the wound-off cellophane, and in the opposite direction under effect of the pull of a spring.

There are two kinds of cutting-out and cutting-off devices for cutting-off the cellophane and ripping tape bands.

One device is designed to create a horseshoe projection or tip on the cellophane. This device consists of a rotary knife and a counter-knife provided by a freely rotatable roller; the second device is designed for longitudinal cutting-off of the respective piece.

This second device consists of a uniformly rotating knife and a stationary knife. The rotary knife is provided on its periphery and on its cutting edge with a groove into which extends a guiding bar and through which passes the ripping tape which has already been cut earlier to the required length. The said guiding bar forms together with the guiding counter-bar equalization surfaces to prevent curling of the cellophane.

The device for welding or fusing the ripping tape to the cellophane piece is designed in such a manner that the terminal fusing body is suspended by means of a roller carried on a pivoted lever above a roller rotating freely and periodically, and advancing the cellophane and the ripping tape. This roller and the thermal welding body are adjustable with respect to the cutting-off position.

The invention will be best understood from the following specification to be read in conjunction with the accompanying drawings, in which:

FIG. 1 illustrates schematically the entire cutting mechanism in a side elevation;

FIG. 2 is a more detailed view of the welding mechanism;

FIG. 3 illustrates cutting-out the projection from the cellophane piece;

FIG. 4 illustrates the cutting-out mechanism of the projection of FIG. 3;

FIG. 5 illustrates an example of the device employed for obtaining the slowed-down movement of the entire device;

FIG. 6 represents the driving and cutting-off mechanism; and

FIG. 7 represents the plan view of the second part of the cellophane drive device.

It can be seen from FIG. 1 that the cutting device in accordance with the invention comprises the following five partial mechanisms; a cellophane and ripping tape supply mechanism; a mechanism for welding or fusing together the ripping tape with the cellophane; a mechanism for cutting out the projection from the cellophane; a driving mechanism; and a mechanism for cutting-off the required pieces of cellophane and ripping tape.

It can be seen from FIG. 1 that the cellophane and ripping tape supply device with the equalizing mechanism of the interrupted movement of the wound-off bands comprises a bobbin **1** for the cellophane **2**; this bobbin is carried on the rotary hub **3** carrying the brake disk **4** around which is guided the brake-band **5** tensioned by a spring **6**. The force of the spring is adjusted by a holder **7** provided with openings **8** serving for placing the holder **7** on a stationary pin **9** in accordance with the required pulling force of the spring **6**. The pin **9** is mounted on the machine construction frame **10**.

The cellophane is guided from the bobbin **1** over a roller **11** upon a twin-roller **12** swinging out about the center **13** in one direction under effect of the winding-off cellophane band **2**, and in the opposite return direction under effect

of the pull of the spring 14. The cellophane band 2 is then further guided over the roller 15 to the connection roller 16 and to the welding mechanism. The ripping tape 17 is wound-off simultaneously from the bobbin 18 and it is guided over pull rollers 19 and 20 to the pull roller 11 where it meets the cellophane band 2 with which it moves together over the twin-roller 12 and the roller 15. The ripping tape is then again separated from the cellophane band 2 by means of a known device and guided upon the pull roller 21 from whence it is guided upon the roller 16 where it meets again the cellophane band. On the roller 16 the ripping tape 17 is fused together with the cellophane 2 by means of a welding or fusing device.

The welding device can be understood from FIGS. 1 and 2, it comprises a main thermal body 22 suspended above the roller 16 on a pin 23 carried on the strap 24, rotatable on shaft 25 mounted in the holder 26 inserted into the opening 27 in the carrying plate 28 which is shiftably mounted in the machine construction frame 10.

It can be seen from FIG. 2 that the shaft 25 of the lever 24 is carried in the holder 26 and that it is provided on the second end, that is on the second side of the carrying plate 28 with a lever 29 which is provided on its end with a groove 30 into which extends a pin 31 of the core 32 of an electromagnet 33.

As can be seen from FIGS. 1 and 2 this electromagnet 33 is mounted in the opening 34 of the carrying plate 28 and its frame 35 is mounted together with the frame 36 of the thermal body 22 in such a manner that the lever 24 is connected by the pin 23 with this thermal body 22. If the electromagnet 33 is not excited, the core 32 is lifted so that the thermal body 22 is removed from the roller 16, and the welding or fusing device is not in action. The thermal body 22 can be put out of action manually by adjustment of the eccentric 38, see FIG. 1, mounted on the rotary shaft 38 held in the holder 26 (not illustrated in FIG. 2) underneath the shaft 25.

The mechanism for cutting out the horse-shoe shaped projection or tip 39 from the cellophane piece 2 and the ripping tape 17, as shown in FIG. 3, may be understood with reference to FIG. 4. It comprises a roller 40 freely rotatably on pin 41, and a rotating knife 42 mounted in a knife heard 43 on a shaft 44 so that its position can be changed to allow the cellophane projection or tip to be produced in accordance with the arbitrarily selected position of the ripping tape over the entire length of the cellophane. The shaft 44 carries on the second side of the plate 28 a wheel 45 with a drive chain 46 cooperating with a sprocket 47 keyed-on on the shaft 48. On the same shaft is mounted a freely rotatable sprocket 49 driven by the chain 50 from the main drive. The sprocket 47 is provided with a driver 51 which carries a two-armed lever 53 rotatable on a pin 52.

The parts 51–53 form part of a means, shown in FIGS. 4 and 5, to periodically slow down the continuous movement of the cellophane band and ripping tape. It can be seen from FIG. 5 that the two-armed lever 53 has one toothed segment arm 54 engaging with the pinion 55, and its second arm 56 is provided with a roller 57 guided in a groove 58 of the cam 59 which is attached to the plate 28. A toothed wheel 60 is keyed-on the shaft 48 on the other side of the plate 28. This toothed wheel 60 is in engagement with the pulling wheel 61 driving the pair of pulling wheels of the pulling mechanism. The wheel 63 is driven from the wheel 62. The cellophane with the ripping tape passes between the wheels 62 and 63.

The device according to FIG. 5 has been illustrated and described by way of a known example; the drive may also be slowed-down by other suitable means, such as a spider mechanism, a globoidal cam and the like.

The cellophane drive mechanism with the ripping tape comprises, as shown in FIG. 1, the already mentioned pair of pulling wheels 62 and 63, and a pair of guide bars 64 and 65 of which the bar 64 is stationarily mounted in plate 28, and the second bar 65 is tiltably mounted in the cross-member 66. The tiltable mounting of the bar 65 facilitates insertion of the cellophane between the guide bars. The guide bars 64 and 65 are extended by approaching guides 67 and 68 to prevent curling of the cellophane in the cutting-off mechanism.

The pulling wheel 62 is turnable on the plate 28 and the pulling wheel 63 is pivoted on the shaft 69 gripped between a pair of holder arms 70 tiltable on a common pin 71. The tilting is carried out so that the head 72 of one of the holder arms 70 rests against the segment 73 which is rotatable about the pin 74 and it is provided with a manual control handle 75. The cross-member 66 is carried on a holder arm 70, and the tilting guide bar 65 is therefore tilted at the same time as the holder arm 70.

The arrangement of the holder arms 70 can be seen from FIG. 7 which is a plan view of a part of the pulling mechanism. The cutting mechanism for cutting off the cellophane piece with the ripping tape which is the last device of the cutting mechanism is driven from the main shaft of the machine, as obvious from FIG. 1. But it drives also by means of the chain 50 the mechanism for cutting-out the cellophane and ripping tape projection and thus also the remaining cutting device. The cutting mechanism acts when the continuous movement of the cellophane band and ripping tape is periodically slowed down by the means described above in connection with FIGS. 4 and 5.

It is obvious from FIG. 6 that the main drive shaft of the machine drives the wheel 76 which rotates the wheel 77 because they are on a common hub 78. The cutting device for the horseshoe tip of the ripping tape is driven by chain 50 from the wheel 76. The hub 78 is placed on a sleeve 79 which is keyed-on on the hollow shaft 80. Through this hollow shaft 80 passes a pin 81 provided with a holder 82 on its end on the side of the wheels 76, 77. The holder 82 carriers a stationary pin 83 which extends on the one hand into a recess in the sleeve 79, and on the other hand into a recess in the hub 78. On the opposite end of the hollow shaft 80 is mounted a manual wheel 84 which rotates the hollow shaft 80 when positioning the rotating knife 85 which is mounted in the holder of the knife 86 mounted on the hollow shaft 80. The knife 85 and the holder 86 are provided with a groove 87 into which extends a guide 68, at the place where the horseshoe shaped tip 30 is already cut. The counter-knife 88 is a stationary one and it is attached to the bracket 89. The cellophane piece is cut between the cutting edge of this stationary knife 88 and the cutting edge of the rotating knife 85. The hollow shaft 80 with the complete cutting mechanism is attached on the plate 28, and on the other end it is supported by the holder 90.

FIG. 1 shows also that this cutting mechanism is provided with the already mentioned bars 67, 68 which guide the cellophane 2 to the cutting position to prevent its curling before reaching the cutting position. Beyond the cutting position, the cellophane 2 is also guided between the extended guide bars 68 and the wall of the bracket 89. The guide bar 67 is flat, and the guide bar 68 is a strap which extends into the groove of the knife 87, 88.

It can be seen from FIG. 1 that the fundamental plate 28 can be moved with regard to the machine frame 10 by means of a guide rod 91 both ends of which are provided with threads 92, 93 by means of which the rod 90 is screwed into the guide nuts 94, 95 attached on the base plate 28. In the centre of the rod 90 is provided a gear drive with a screw 96 which is provided with a manual wheel 97. The rotary movement of the manual wheel 97 is transformed in the transmission 95 into an advance motion of the rod 91 which moves the fundamental plate 28 with respect to the frame 10.

The advantages of the above described mechanism reside in the fact that the known methods of stopping or slowing down the drive are here used to prevent the movement of the cellophone with regard to the box after having been cut-off, and creating the conditions for accurate overlapping of the ends of the ripping tape on both

ends of the cellophane piece. The ripping tape is fused together with the cellophane on a freely rotatable roller by a thermal welding or fusing body, and this is attended with the advantage that the rotating roller becomes cooled so that the cellophane is not affected by heat. The fact that the position of the roller on which the ripping tape is fused together with the cellophane may be adjusted in accordance with the invention with respect to the cutting-off position of the cellophane blank is used for a more intensive fusing of the ripping tape on the edges of the blank, that is the thermal fusing body may be adjusted for most intensive fusing of the ripping tape at the place which, in consequence of slowing-down or stopping of the cellophane, has been delayed on the freely and periodically rotating roller below the thermal fusing body for a longer period than would be the case if the movement were uniform as with previously employed methods and devices.

The cellophane blank and the piece of ripping tape is cut-off below the strip of pulling rollers by a double cut, namely; the horseshoe tip is cut-out from the cellophane, and the cellophane is cut longitudinally by the rotating cutting edge. This longitudinal cut is interrupted at the place of the projection of the ripping tape. Through the place of this interruption passes a guide bar which guides the cellophane blank during the time of cutting and prevents deflection of the cellophane from the required perpendicular path under effect of the air swirl produced at higher speeds of the rotating knife head, or to prevent curling of the cellophone due to its previously being wound on the bobbin.

Equalization of the interrupted movement of the wound-off cellophane band and of the ripping tape imparted to the cellophane and to the ripping tape by the pulling rollers prevents this unwanted movement from being imparted to the bobbins and creates a supply loop which is again reduced by the faster movement of the cellophane between the pulling rollers.

To facilitate insertion of the cellophane band with the ripping tape between the pulling rollers, one of the rollers can be tilted by means of a tiltable pair of grooved arms and while in action, this tiltable roller is pressed into contact with the other roller.

What I claim is:

1. In a cutting mechanism for machines which wrap a prismatic box into a cellophane cover, cutting off cellophane blanks and ripping tape pieces to be connected or fused together with the cellophane piece forming the cellophane cover, the cellophane and ripping tape pieces being wound-off from a cellophane supply bobbin and a tape supply bobbin to the required length and shape, the said cutting mechanism comprising:

means for providing a continuous movement of the cellophane band and ripping tape,

means to periodically slow down the continuous movement of the cellophane band and ripping tape through the cutting mechanism, at the moment when the cutting-off should take place,

a band placed around a rotary hub of the cellophane supply bobbin forming a band-brake,

a spring for tensioning the said band,

an adjustable spring holder for controlling the tensioning force of the said spring,

a stationary pin for mounting said spring holder in the machine frame, and

a twin-roller swinging out in one direction under the effect of the pull of the wound-off cellophane and a spring means pulling said twin-roller in the opposite direction for maintaining the cellophane under tension while it is continuously moved, said twin-roller and spring means acting on the cellophane and responding only to the periodic slow down

in the continuous movement thereof without influencing the means for continuously moving and for periodically slowing down the movement of the cellophane.

2. Cutting mechanism as claimed in claim **1** comprising:

a mechanism for cutting out a projection from the cellophane,

said projection cutting out mechanism formed by a rotating knife and by a counter-member consisting of a freely rotatable roller,

a mechanism for longitudinally cutting-off the blanks,

said latter mechanism comprising a uniformly rotating knife and a stationary knife,

the said rotating knife of the latter mechanism provided on its circumference and on its cutting edge with a groove through which passes the said ripping tape,

a guide bar extending into the said groove and forming together with a counter guide bar equalizing surfaces for preventing cellophane curling and twisting.

3. Cutting mechanism as claimed in claim **2**, comprising:

a fusing mechanism for firmly connecting the said ripping tape with the cellophane piece,

the said fusing mechanism comprising a roller carried by a rotatable lever, said roller being freely and periodically rotatable,

a thermal fusing body suspended above the said roller,

the said roller feeding the cellophane together with the ripping tape,

the said roller and the said thermal fusing body being adjustable with respect to the cutting position of the blank.

4. In a machine for periodically cutting through a celophane band and a ripping tape longitudinally joined theerto, a mechanism for cutting out a projection from the cellophane band, said projection cutting out mechanism being formed by a rotating knife and by a counter member consisting of a freely rotatable roller, a mechanism for longiutdinally cutting off blanks from the cellophane band, said latter mechanism comprising a uniformly rotating knife and a stationary knife, the said rotating knife of the latter mechanism being provided at its circumference and at its cutting edge with a groove through which the ripping tape passes, a guide bar extending into said groove and a counter guide bar coacting with said guide bar for providing equalizing surfaces for preventing cellophane curling and twisting.

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