June 3, 1969 K. BURBIDGE 3,447,718

TAPE DISPENSERS

Filed Sept. 20, 1966 Sheet 1 of 2

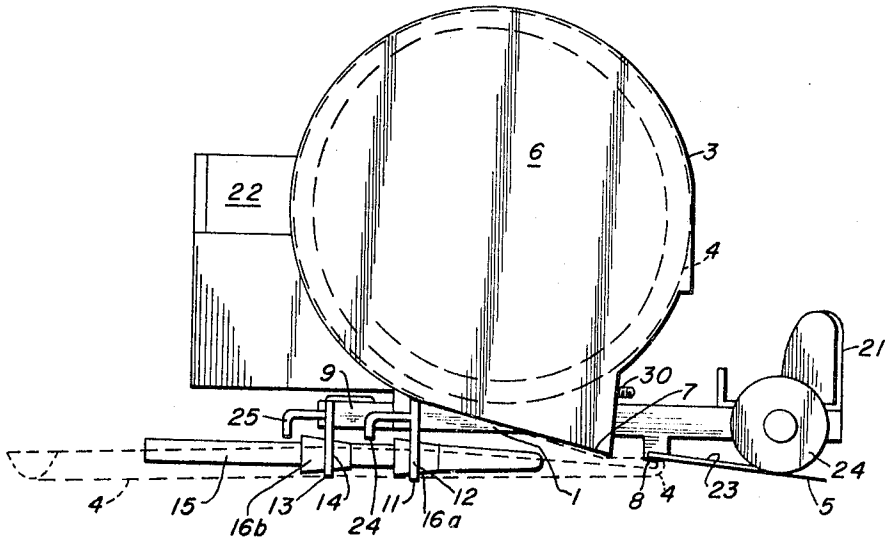

Fig. 1.

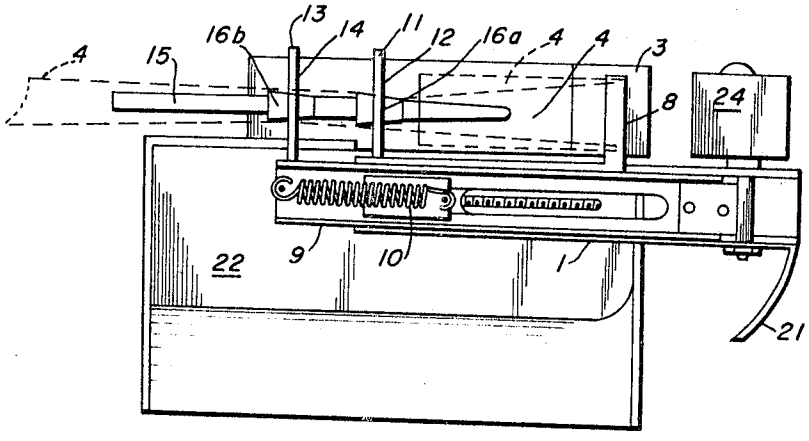

Fig. 2.

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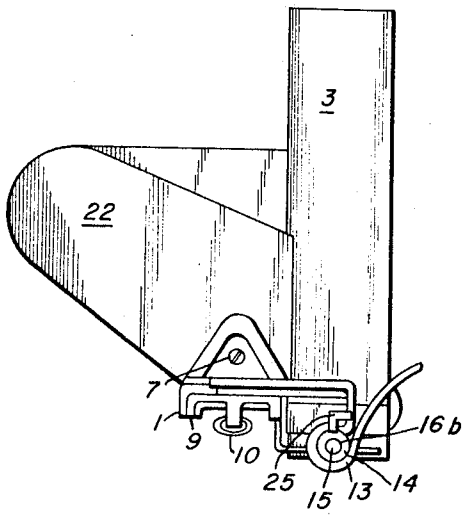

Fig. 3

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TAPE DISPENSERS

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Int. Cl. B65h 5/28, 17/44
U.S. Cl. 221—73 11 Claims

ABSTRACT OF THE DISCLOSURE

A dispenser having strips of flexible sheet material for dispensing articles. A frame has a magazine for the sheet material and an actuating member is slidably mounted on the frame. A releasable drawing clamp for gripping and drawing the sheet material from the magazine is provided and a releasable checking clamp for gripping and checking the sheet material. The clamps each comprise a collar and cooperating means loosely retained within the collar. The collar of the drawing clamp cooperates with the actuating member. Stop means depend from each collar towards the associated cooperating means to oppose withdrawal of the cooperating means from its associated collar. Means effecting the gripping action of said drawing clamp upon actuation of said actuating member upon the strip of flexible sheet material between the collar and cooperating means of said drawing clamp move the cooperating means into gripping position with its associated collar to grip the strip of flexible sheet material. Means are provided for releasing the action of the gripping means upon return of the actuating member causing the strip of flexible sheet material to drag the cooperating means from its gripping position. Means effect the checking action of said checking clamp by said drag between the cooperation means and associated collar of the checking clamp on the cooperating means when said sheet material is moved therebetween by said drag when said cooperating means is dislodged in said drawing clamp. Means are provided for deforming said strip of sheet material adjacent said clamps to resist buckling and crumpling. Adjusting means are provided for said actuating member and slots are provided in the collars for edgewise insertion of the sheet material. A peeling blade is located in front of the frame together with an applicator roller.

The present invention relates to dispensers for tape-conveyed articles such as labels, for example preferably self-adhering labels which can be removed readily from the tape on which they are conveyed for adherence to other articles. With such arrangements the controlled feeding of the tape conveying the articles must be effected and various accessories and adaptions may be made to the dispenser for various requirements, such as a magazine or the like for a reel of tape, guide rollers or plates, or the like, a peeling blade or the like, in order that varying or specific processes may be carried out such as label dispensing or delivery at a given point. The main problem to be overcome by the dispenser of the present invention is the prevention of crumpling, looping or feed back of the tape. The tape is fed through the machine by a repetitive sequence of movements upon actuation of the dispenser, whereby the tape is held or clamped to a moving component, the component moved in one direction and halted, the tape held or retained to a stationary guiding component and released from the moving component, the moving component being returned to its first position to a new position on the

tape and the cycle can then be repeated. At some stage in this cycle of operation the free end of the tape is being impelled through an open clamp, or a relative movement between the tape and clamp is taking place. In this case of non-rigid tapes, this could result in crumpling, looping or feed back of the tape and the desired forward movement of the tape would not be effected or obtained since the moving component would fail to change correctly its position on the tape. Consequently an essential object of the invention is to ensure satisfactory feed of the tape and another object is to ensure that the tape is lightly held or supported along its longitudinal edges or is given a more rigid shape, or both, during its feed through the dispenser to avoid detrimental crumpling or looping of the tape.

Accordingly the present invention provides a dispenser for tape-conveyed articles, such as labels for example, comprising a peeling blade around which the tape of tape-conveyed articles is arranged to be bent, such that the conveyed articles are peeled and spill from the tape as the tape passes over the edge of the blade, first and second gripping means through which and between which the tape is arranged to be threaded, whereby actuation of the dispenser causes the first gripping means to close and grip the tape and draw the tape therewith in one direction over and from the blade and the second gripping means remains open and allows the tape to pass therethrough in said one direction a subsequently said second gripping means closes to grip the tape and the first clamping means opens and moves over the tape in the opposite direction to take up a new position on the tape without crumpling or damaging the tape.

Detrimental crumpling or looping of the tape between the gripping means is prevented in one way by providing complementary holding surfaces on the gripping means, which provide adequate rigidity over the length of the tape between the gripping means, and the tape can be impelled through the gripping means and the gripping means passed over the tape without fouling the tape. The complementary or opposing holding surfaces of the gripping means may be suitably shaped such that the tape passing therethrough is shaped in a complementary fashion. For example the tape may be given a curved, or corrugated cross-section or given a channel cross-section. Any cross-sectional shape may be given to the tape by the gripping means provided it gives the tape sufficient rigidity to be impelled through and between the gripping means upon actuation of the dispenser. Alternatively, the gripping means may be so arranged as to hold the edges only of the tape and in this way give sufficient ridigity to the tape. In one arrangement of the invention it is envisaged that the gripping means be formed with circular holding surfaces by two plugs having circular tapered outer surfaces and located on a central aligning rod the plugs each being positioned in a clamp formed in this arrangement by a collar, the apertures in the collars being likewise circular, a gripping effect being provided between the tapered plugs and the collars whereby the tape passing through the collars is curved in cross-section and given rigidity as it is passed therethrough.

Various modifications of this arrangement are envisaged where the collars are replaced by alternative forms of means, such as clips, gates or the like means, which are so shaped as to co-operate with suitable means, such as tapered plugs on a rod or on the actual tapered surface of a rod provided within said alternative means whereby gripping and release of the tape can be effected as desired and the suitable rigid formation given to the tape.

Furthermore one of the plugs may be formed integral with or fixed to the central aligning rod or the two plugs

may be movable along the rod or the tapered end of the central aligning rod may replace one of the plugs.

An alternative form of collar is evisaged suitable for facilitating "threading-up" of the tape, in wihch a slot or gap or gate is provided through the walls of the collars enabling the tape to be passed edgewise through the slot, gap or gate and around the plug. Thus gap or slot may be provided with a spring-closed or weight-closed gate. Alternatively a gate may be provided closed in position by a clip. This gap or gate may be of any desired width and it is envisaged that if of extreme width it could extend around half or more of the collar and plug.

Other means are envisaged for providing adequat rigidity to the tape, whereby the tape is fed between suitable forming or holding surfaces which may be provided on the moving or stationary components or both of the dispensers and may form all or part of the profile of these components. A simple example is a rod within a tube whereby the tape is provided with a circular cross-section as it passes between the outer surface of the rod and the inner surface of the tube. Another arrangement envisaged would be the provision of one component in two parts, or alternatively two pairs of holding or retaining surfaces along the edges of the tape. Such parts would have the function of pairs of jaws the tape being held flat in cross-section. Such an arrangement would permit the holding of forming surfaces to be curved in length. With the provision of suitable extensions or arms or the like, the two components may be pivoted together at the centre of curvature, the moveable component being a swinging member, thus enabling rigidity to be provided in the cross-section of the tape, which provision could have special usefulness in certain applications.

The clamp or clamps on the respective components may be self-releasing, the clamp on the stationary component may however be lightly holding and non-releasing. The self-releasing clamp or clamps may take the form of a pivoting jaw or jaws, closing to the respective component with the tape therebetween. Alternatively it may be in the form of a collar or collars or an insert or inserts suitably tapered to draw and to close onto or into a suitably conforming taper or tapers on the respective component, with the tape therebetween, the friction or contact and relative movement of one or the other of the opposing component of the clamp against the tape or other parts of the dispenser being sufficient to cause the releasing and closing action. Alternatively the clamp or clamps may take the form of a lever pivoting to the respective component causing the jaw to close against this component, with the tape between and may be return-sprung and stopped to ensure a return to the open or closed position after operating pressure has been removed, depending upon the particular phase of the operating cycle in which it is intended to operate.

In certain arrangements the return spring operating the moving component may be anchored to this lever to serve the dual purpose.

The clamp on the moving component may be positioned so that the closing movement on the lever may be arranged to coincide with the forward or the operating movement of the moving component, in order that pressure to operate both the moving component and the clamp may be applied at one point.

The opposing components of the jaw may have shape-forming surfaces. These surfaces may be designed to have a crimping effect on the tape, or a penetrating effect.

The dispenser may be designed so that the length of the stroke may be regulated and set by means of moveable stops, and the settings capable of fine adjustment by means of set screws, or the like.

The moving component may be of a hollow or concave section, and may house the return spring within. This component may be comprised of separate lengths, one length detachable from within the stationary component in order to facilitate easy insertion of tapes. The return

spring may be positioned or within either component in such a way as to contribute to the shaping of the tape.

The dispenser may be designed to provide for the reversal of the opening and closing action of the clamp, or clamps, and the tape after it has passed over a separating blade to be fed in a reverse direction through the machine. This enables the movement of withdrawal to coincide with the speed and direction of a label leaving the tape, and permits the direct transfer of a label from the tape, on to an article interposed between the operator and an operating surface or extension on the moving component.

The stationary component may be comprised of two or more sections. This may permit these sections to be separate or split apart for easy insertion of tape. The function of this component may be essential one of guidance. It may be constructed as the result of the assembly of other parts of the dispenser, such as the base and magazine.

All leading-in edges may be bevelled back or splayed to ensure easy insertion of tapes and smooth running.

The shape-forming part of either component may be formed by a separate component. This component part may be detachable. A portion or portions of the stationary component may be left open or cut-away in order that the anchorage for the opposing jaw on the moving component may be carried round the tape, and for the clearance of arms or other projections attached to the moving component.

In order that the invention may be more readily understood, a preferred embodiment thereof is described below in conjunction with the accompanying drawing in which:

FIG. 1 shows a side view of the dispenser of the present invention;

FIG. 2 shows an underneath view of the dispenser of FIG. 1;

FIG. 3 shows an end elevational view of the dispenser of FIGS. 1–2.

FIGS. 1, 2 and 3, show one embodiment of the dispensing machine constituted by a frame **1** on which a magazine **3** is mounted in which the tape **4** (shown in dotted lines) of tape-conveyed articles **5** is wound conveniently in a roll **6**, whereby the tape is led out from the magazine **3** and tension on the end of the tape **4** will unwind the roll **6** of tape **4** to provide continuous feed of the tape **4** from the magazine **3**.

The tape **4** passing from the magazine **3** is fed beneath a guide surface **7** in the form of a slightly curved surface. The guide surface could conveniently be formed by part of the magazine or a separate guide member. The tape passes to a peeling blade **8** over which the tape **4** is fed. The guide surface **7** may suitably be replaced by a flat plate underneath which the tapers fed to the blade **8**. Alternatively the tape may be fed directly to the blade without guide means or may be fed over a guide roll or other suitable guiding surface to approach the blade **8** flat. The blade **8** is suitably provided suspended from the frame **1** having a free end facilitating easy threading-up of the tape thereover.

The tape then alters direction immediately after passing over the blade **8**.

A slidable member or plunger **9** is provided slidably mounted on the frame **1** and further attached thereto by a return spring **10**.

A fixed collar **11** is provided attached to or extending from the frame **1** having an aperture **12** therein. A further collar **13** is provided extending from the plunger **9**, having an aperture **14** therein, the apertures **12, 14** being in alignment one with another adjacent frame **1**.

After passing over and around the blade **8**, the tape **4** is fed through the apertures **12, 14** in the two collars, **11, 13**, and thereafter it is free to move away from the dispenser where it can be torn off when the length becomes unmanageable and unwieldy, or alternatively rewound if desired.

The collars **11, 13** are suitably formed as shown in this

arrangement by a wire or member adaptable to being profiled to encircle the plugs to grip the tape 4 therebetween and have stops 24, 25, attached thereto or integral therewith. Such a collar may be moulded or worked into this shape in any suitable material. The configuration shown assists greatly in edgewise threading of the tape into the collars. If it is desired to have end-threading of the tape into the machine the leading edges of the collars may be bevelled or splayed back for the purpose of deflecting the end of the tape during initial threading-up of the machine, through and into the collars. Furthermore with this end-threading arrangement the stops for retaining the plugs may be movable pawls which when disengaged permit the greater withdrawal of the plugs from within the collars providing greater clearance all round for threading of the tape.

An aligning rod 15 of circular cross-section extends within the apertures 12, 14 of the collars 11, 13 and the plugs 16A, 16B are provided encircling rod 15 and positioned one in each collar 11, 13. The inner surface of the plug is of such cross-section as to allow free movement of the plug on the rod 15 sufficient to cause the plug 16B to move relative to the rod 15 or vice versa when either is prevented from movement itself. The outer surfaces of the plugs 16A, 16B are tapered. The fixed collar 11 engages the plug 16A which is fixed on the rod in this arrangement. Alternatively it may be formed as part of the rod.

Movement of both plugs 16A, 16B within the collars 11, 13 is possible but limited toward the stops 24, 25 in that an abutting surface is provided on each plug engageable with the stops 24, 25 in this particular arrangement the larger end face of each plug forms the abutting surfaces. With a plug formed as part of the surface of the rod a suitable recess in the rod need be provided to engage the stops. Thus ensures limited movement of the plugs 16A, 16B relative to the collars 11, 13, sufficient to release the grip on the tape.

Movement of the plugs in the other direction away from the stops 24, 25 is limited by contact of the major diameters of the plugs in their respective collars 11, 13.

The slidable member or plunger 9 is arranged to slide to and fro within the frame 1. The movement in one direction may be effected manually by the person using the dispenser and movement in the other direction is effected upon release of the sliding member 9 under action of the return spring 10. A convenient lever, lug or handle member 21 is provided for actuation of the sliding member 9. A further handle or gripping member 22 is likewise provided attached to the frame 1 in order to facilitate the pulling of the slidable member 9 and holding of the dispenser whereby the thumb may movably engage the handle 21 and the rest of the hand grip the handle 22 in a very convenient manner.

As mentioned above the tape 4 with the tape-conveyed articles 5 adhered thereto passes from the magazine 3 beneath the guide surface 7 and over the peeling blade 8 and through the aperture 12 in the collar 11 which is fixed to the frame 1 and through the aperture 14 in the collar 13 attached to plunger 9, the tape being warped round the plugs 16A, 16B within the collars and around the rod between the collars 11, 13.

The tape 4 is substantially flat in cross-section between the magazine 3 and blade 8 and until it is warped into a rigid shape between the collars and plugs.

To proceed to dispense the tape-conveyed articles 5, which for convenience we will call "labels" hereinafter, the sliding member 9 is moved in one direction against the return spring 10 by actuation of the handle 20 extending therefrom. This causes the movable collar 13 to move in said one direction to contact the major diameter of the plug 16B drawing the plug 16B therewith and at the same time gripping the tape 4 between the tapered surface of the plug 16B and the collar 13.

The movable collar 13 draws the plug 16B over the rod 15 until the movement of the slidable member 9 stops. The length of the stroke or movement of the plunger 9 in said one direction is limited by a set screw 30 the end of which is arranged to contact a portion of the plunger after a predetermined movement of the plunger 9. The set screw may be adjusted to vary the stroke according to the length of labels to be dispensed.

The tape 4 is pulled in said one direction with the collar 13 and plug 16B, thus withdrawing a supply of tape 4 from the magazine 3 and drawing the tape 4 over the peeling blade 8. At the same time, the fixed plug 16A except for its warping effect has a neutral effect on the tape, in other words the tape 4 is not gripped and is free to pass through the fixed collar 11.

The labels 5 are of the type temporarily adhered to the tape 4 by means of contact adhesive, the surface of the tape 4 being such as to prevent permanent adhesion between itself and the labels 5, whereby the labels 5 may be removed without difficulty. It is merely necessary to lift the edge of the label 5 and peel the label 5 from the tape 4. In the embodiment shown the tension on the tape 4 provided by the gripping movement of the movable collar 13 tears back the tape 4 from beneath the forward edge of the label 5 as the label 5 approaches of the peeling blade 8, whereby the label 5 continues in its line of movement and leaves the tape.

At this stage the leading end of the subsequent label 5 on the tape 4 is approaching the peeling blade 8. Upon release of the plunger 9 the return spring 10 draws the plunger 9 back into its initial position, thus allowing the movable collar 13 to slide back toward the leading end of the rod 15 thus releasing its gripping effect on the plug 16B and thus on the tape 4, and to slide over the tape to take up a new position thereon.

At the same time the fixed collar 11 closes onto the plug and grips the tape in response to any feed-back movement of the tape.

The stroke of the plunger in said one direction causes the movable collar 13 to move along the tape in a direction away from the peeling blade and as a consequence of this movement and drag exerted on the plug 16B caused by the friction between the tape and plug 16B, the plug 16B is impelled into the aperture of the clamp 16B thus providing a gripping or binding action on the tape therebetween and drawing the tape along in said one direction. The fixed collar 11 as mentioned above has a neutral effect on the tape being impelled therethrough apart from the warping effect providing rigidity as a consequence of drag exerted on the plug by the tape which tends to draw the plug therewith in said one direction to provide increased clearance between the tapered surface of the plug and the collar. On the return stroke of the plunger 9 there may be a slight amount of reverse movement given to the tape as a consequence of the grip between collar 13 and plug 16B not having been sufficiently released. However as a consequence of this slight reverse movement and its accompanying drag, now in a reverse direction on the plug 16A of the fixed collar 11 attached to the frame 1 this plug 16A is drawn into and tightens up and grips the tape within the collar 11. Having done so and as a consequence of the return movement of the collar 13 attached to the punger 9, the drag on the plug 16B of collar 13 as a consequence of its friction with the tape 4 is drawn or impelled out of the collar 13 and its grip on the tape 4 is released, in this condition it can freely complete the remainder of its return movement to a new position on tape 4.

A guide plate 23 is provided extending from the guide surface 7 above the blade and to a roller 24 which is suitably provided with a resilient surface such as rubber, foamed rubber etc., the roller being rotatably mounted on the frame 1. Upon dispensing of a label 5, the label 5 passes beneath said guide plate 23 and into contact with the roller with its sticky surface away from the roller, whereby the label 5 can be applied to the surface

of an article and the roller provide application pressure for adherence of the lable to the article. The position of the roller relative to the peeling blade 8 could be adjustable if desired to accommodate labels of different lengths.

It will be appreciated that various modifications of the arrangements described above are envisaged within the scope of the invention as set forth in the appended claims. For example various forms of gripping members may replace those specifically described above furthermore the guiding means and feed-in of the tape to the peeling blade may be varied to accommodate various uses of the dispenser and to feed the labels to various types and shapes of articles to which they are to adhere. Guide means may be provided for guiding the feed of the labels themselves after their separation from the tape to their point of application.

It may be desirable to arrange the pre-peeling of the labels at the blade and subsequent replacement onto the tape fairly lightly. Thereafter they may be fed on the tape to the point of application by guide means and can thus be applied to articles independently of the stroke of the dispenser.

Furthermore the blade may be provided to the rear or front of the frame or midway therebetween depending upon the application or use of the dispenser and convenience of dispensing.

The actuation of the plunger may be manually or treadle operated.

The feeding of the tape may likewise be down over the blade or up over the blade according to the application of the dispenser desired.

I claim:

1. A drawing device for strips of flexible sheet material, comprising in combination: a frame; an actuating member slidably mounted relative to said frame; a releasable drawing clamp for gripping and drawing said sheet material which is threaded therethrough and a releasable checking clamp for gripping and checking said sheet material which is threaded therethrough, said clamps each comprising a collar and a plug element encircled by and loosely retained within said collar; the collar of the drawing clamp being engaged with said actuating member and the collar of the checking clamp being fixed relative to the frame; a stop means depending from one end of each collar towards one end of the associated plug element to oppose complete withdrawal movement of the plug element from one end of its associated collar; gripping action of the drawing clamp being effected upon actuation of the actuating member in one direction which causes the strip of flexible sheet material extending between the plug element and encircling collar of the drawing clamp to drag said plug element into a gripping position with its associated collar to grip the strip of flexible sheet material; release action of the drwaing clamp being effected upon return of the actuating member causing the strip of flexible sheet material to drag the plug element from its gripping position and urge it against the associated stop means; checking action of said checking clamp being effected by virtue of the drag of the strip of flexible sheet material extending between the plug element and associated collar of the checking clamp on the plug element when the tape is moved therebetween by the drag action of the plug element being dislodged in the drawing clamp and releasing action of the checking clamp being effected by virtue of the drag produced on the plug element of the checking clamp by the tape being drawn through the drawing clamp; and means deforming the strip of sheet material within and adjacent the clamps into a longitudinally rigid shape to resist buckling and crumpling when being moved through the clamps comprising an engaging surface on the plug element of each clamp bearing on one side of the strip of flexible sheet material, and marrying in a male and female configuration with an opposed engaging surface on the inside of the associated collar which opposed engaging surface is engageable with the other side of the strip of flexible material.

2. A dispenser having strips of flexible sheet material for dispensing articles, comprising in combination a frame, a magazine for said sheet material mounted on said frame, an actuating member slidably mounted relative to said frame; a releasable drawing clamp for gripping and drawing said sheet material from said magazine, a releasable checking clamp for gripping and checking said sheet material, said clamps each comprising a collar and cooperating means loosely retained within said collar; the collar of said drawing clamp cooperating with said actuating member, stop means depending from each collar towards the associated cooperating means to oppose withdrawal of said cooperating means from its associated collar, means effecting the gripping action of said drawing clamp upon actuation of said actuating member upon the strip of flexible sheet material between the collar and cooperating means of said drawing clamp moving said cooperating means into gripping position with its associated collar to grip said strip of flexible sheet material, means releasing the action of said gripping means upon return of said actuating member causing said strip of flexible sheet material to drag said cooperating means from its gripping position, means effecting the checking action of said checking clamp by said drag between said cooperating means and associated collar of said checking clamp on said cooperating means when said sheet material is moved therebetween by said drag when said cooperating means is dislodged in said drawing clamp and means deforming said strip of sheet material adjacent said clamps to resist buckling and crumpling.

3. A dispenser as set forth in claim **2** wherein said cooperating means comprises a rod upon which said cooperating means are axially aligned and one of said cooperating means being fixed to said rod.

4. A dispenser as set forth in claim **2** wherein said cooperating means comprises pivotally mounted elements.

5. A dispenser as set forth in claim **2** wherein said collars are provided with slots to facilitate the edgewise threading of said sheet material into said clamps.

6. A dispenser as set forth in claim **2** wherein spring means are provided for returning said actuating member after each actuation.

7. A dispenser as set forth in claim **2** wherein said stop means are adjustable.

8. A dispenser as set forth in claim **2** wherein said means deforming said strip of sheet material comprises means for deforming said strip into arc shape.

9. A dispenser as set forth in claim **2** wherein the travel of said actuating member is adjustable.

10. A dispenser as set forth in claim **2** wherein a peeling blade is mounted upon said frame around which said sheet material is bent so as to remove articles on said sheet material therefrom.

11. A dispenser as set forth in claim **10** wherein an adjustable applicator roller is mounted upon said frame in front of said blade for applying said articles.

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WALTER SOBIN, *Primary Examiner.*

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