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(54) **A device for the separation of bags or finished items, pre-cut and formed by a thermal or high frequency welding process, from one or more continuous strips of heat-sealable plastic film.**

(57) The device falls within the art field of equipment for processing heat-sealable plastic film in strip format, typically in the manufacture of bags, and serves to bring about separation of the pre-cut and bonded bags (13) from one or more continuous strips (2) of material by tearing along their pre-cut outline; the separating action is automatic, with the bags detaching and passing onto a runout conveyor (12) and the offcut (15) directed away toward a disposal point by pinch rollers (14).

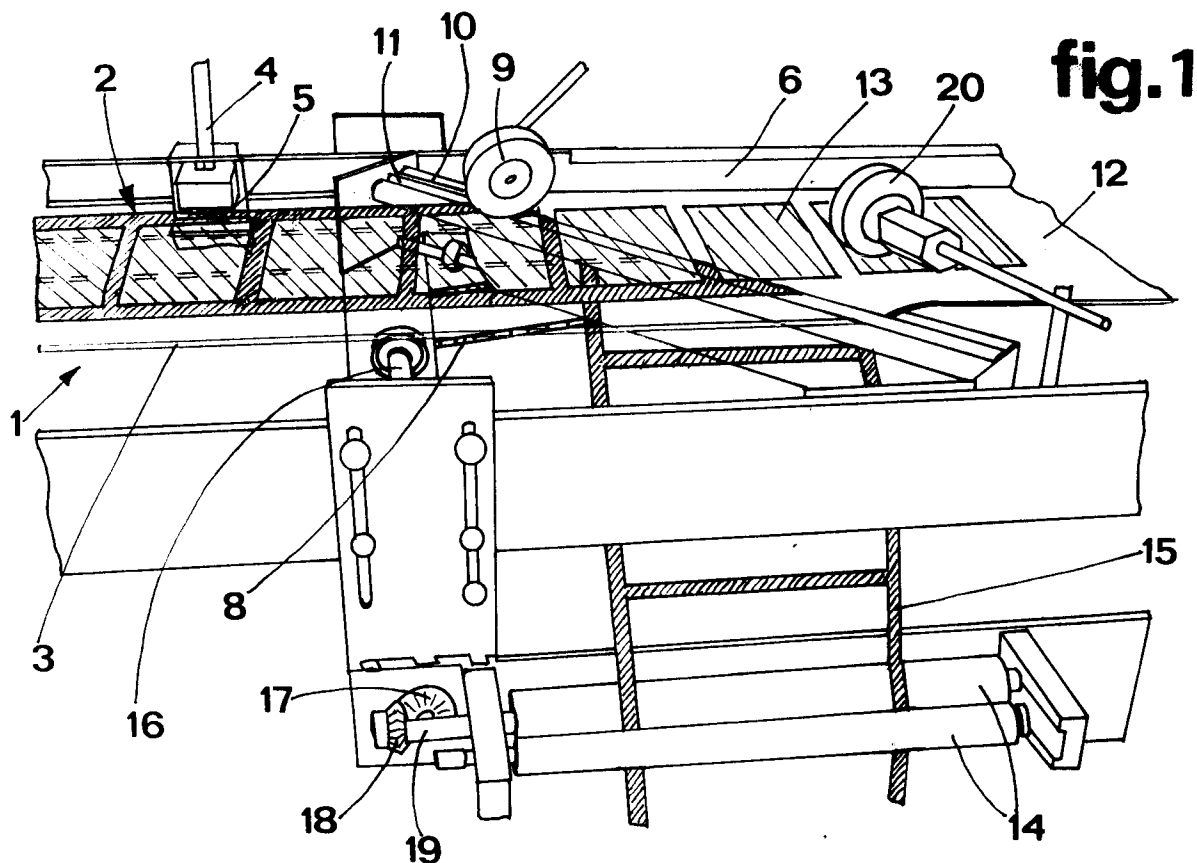


fig.1

The present invention relates to a device for the separation of bags or finished items generally, pre-cut and formed by a thermal or high frequency welding process, from one or more continuous strips of heat-sealable plastic film.

In continuous processes for the manufacture of bags or comparable items utilizing heat-sealable plastic material, the question arises ultimately of how best to separate the single bags or items from the remainder of the continuous strip material as both advance along a conveyor.

The finished bags or items are pre-cut, generally around their entire peripheral outline, and the conventional method of separation is simply for an operator to apply pressure to the pre-cut outline (a weakened area along which the plastic material can be torn easily and precisely) and detach the bag or item forcibly by hand.

The prior art also embraces automatic systems for bringing about the separation in question, using intricate gripper mechanisms by means of which to lay hold on the edge of the bags advancing along the conveyor and detach them forcibly from the remainder of the continuous strips of film. Manual methods of separation betray a number of drawbacks connected with high costs and low hourly output rates.

The automatic system mentioned is markedly complex in construction, and lengthy set-up and adjustment procedures are involved when adapting the grippers to the size and shape of different end-products. The object of the present invention is to overcome the drawbacks mentioned above, and in particular to enable the separation of pre-cut bags or comparable items from continuous plastic film material using an automatic device that is simple in construction and easily adjusted, and thus affords a saving in capital outlay and a reduction in the set-up time required for a given end-product.

A further object of the invention is to provide a device able substantially to match the output rate of a supply machine, in particular thermal or high frequency welding equipment, and capable therefore of being integrated into an existing line without occasioning any fall in productivity.

The stated objects are fully realized in a device according to the present invention by means of which to separate bags or other finished items, pre-cut and formed by a thermal or high frequency welding process, from one or more continuous strips of heat-sealable plastic film; such a device is characterized in that it comprises means by which one or more such continuous strips, advancing along a table, are restrained momentarily at a peripheral corner area of each finished item in such a way as to bring about a partial separation of the item from the strip or strips along a pre-cut outline; in that the finished items are separated completely from the strips and transferred to a conveyor belt for collection at a runout from the

device, and the offcuts of strip material simultaneously collected, by means consisting in rollers designed to divert the path of the advancing strips through 90° within the same plane as that occupied by the roller axes; in that the axes of the rollers and the axis of the path followed by the strips describe an angle of 45° encompassing the means of restraint by which partial separation of the finished items is brought about, and in that it comprises means by which to distance the offcuts following separation.

The invention will now be described in detail, by way of example, with the aid of the accompanying sheet of drawings, in which:

- fig 1 illustrates the device in perspective;
- fig 2 is a further perspective illustrating means by which the bags are separated from the continuous film of material.

With reference to the drawings, 1 denotes a table consisting in a plurality of wires 3 upon and along which to support and feed at least one continuous strip of heat-sealable material denoted 2. Such material is utilized in the production of bags or other comparable finished items fashioned by thermal or high frequency welding executed along pre-cut guide lines coinciding with the peripheral outline of the item.

In the description of a preferred embodiment that follows by way of example, reference is made to the continuous production of bags.

4 denotes a pneumatic cylinder, associated rigidly with the fixed frame 6 of the device by way of a bracket 7 and disposed perpendicular to the table, of which the rod 5 impinges repeatedly on the strip of material 2 beneath at a point coinciding with a peripheral corner area of each successive bag 13, in such a way as to effect a partial separation of the bag from the strip along a pre-cut line that coincides with its own peripheral outline.

The cylinder 4 and the relative rod 5 constitute means by which to restrain the continuous strip of material momentarily as it passes along the table 1 and thus bring about a partial separation of each finished bag 13.

Thereafter, the strip is fed through a gap between two rollers 11 and 10 disposed substantially at 45° to the path followed by the strip along the table. More exactly, the rollers are positioned in such a manner that the pneumatic cylinder 4, or whatever means of restraint, will be encompassed within the 45° angle described by the axes of the rollers and the axis of the path followed by the strip.

The first roller 11 encountered revolves freely, whereas the second roller 10 is live, power driven by means not shown in the drawings, and serves to transmit motion to a looped conveyor belt 12 along which the bags run out.

9 denotes a pressure wheel mounted to a relative bracket 21 and adjustable thereon for position, by means of which to press the material 2 directly against

the rollers 11 and 10 at a point coinciding with the outermost edge of the strip on the side nearest the pneumatic cylinder 4, and thus favour a complete separation of the finished bags 13.

The rollers 11 and 10 serve to divert the path of the strip or strips through 90° in a plane parallel to the table 1 and indeed substantially coinciding therewith, given that the intervening distance is equal to no more than the diameter of the rollers. Each bag 13 separated from the strip 2 passes under a second pressure wheel 20 and along the conveyor belt 12 to the runout.

The film material from which the finished bags are separated, now reduced to one or more offcuts 15, passes from between the two rollers 11 and 10 and is drawn clear by a pair of pinch rollers 14, one of which power driven.

The pinch rollers 14, thus constituting means by which to distance the offcuts 15 from the device, are disposed with axes parallel to the direction followed by the strip 2 along the table 1. 18 denotes a bevel gear keyed to the shaft 19 of one of the pinch rollers 14 and in mesh with a further bevel gear 17 keyed to a drive shaft 16 disposed perpendicular to the roller shaft 19; the resulting bevel gear pair 17 and 18, arranged with axes at right angles, thus constitutes a mechanical coupling between the drive shaft 16 and the pinch rollers 14.

8 denotes a chain looped around a sprocket (not illustrated) keyed to one end of the drive shaft 16 and set in motion by means not illustrated in the drawings. The means in question will be one and the same as those by which rotation is transmitted via the live angled roller 10 to the conveyor belt 12. The angled rollers 11 and 10, pressure wheels 9 and 20 and pinch rollers 14 thus constitute means by which the finished bags are separated completely from the continuous strips of film material 2 and directed onto a conveyor belt for collection at the runout of the device, and by which waste or offcut film 15 is distanced from the device for disposal. In the event of a change in the size or shape of bag to be separated from the continuous strip, it suffices to adjust the position of the pneumatic cylinder 4 and the first pressure wheel 9 on their respective brackets 7 and 21, in such a way as will adapt the device to the new dimensions.

Claims

1) A device by means of which to separate bags or other finished items (13), pre-cut and formed by a thermal or high frequency welding process, from one or more continuous strips of heat-sealable plastic film (2), characterized

– in that it comprises means by which one or more continuous strips advancing along a table (1) are restrained momentarily at a peripheral corner

area of each finished item (13) in such a way as to bring about a partial separation of the item from the film or films along a pre-cut outline;

– in that the finished items (13) are separated completely from the strips (2) and transferred to a conveyor belt (12) for collection at a runout from the device, and the offcuts (15) of strip material collected simultaneously, by means consisting in rollers (10, 11) designed to divert the path of the advancing strips through 90° within the same plane as that occupied by the roller axes;

– in that the axes of the rollers (10, 11) and the axis of the path followed by the strips describe an angle of 45° encompassing the means of restraint by which partial separation of the finished items is brought about; and

– in that it comprises means by which to distance the offcuts following separation.

2) A device as in claim 1, wherein momentary restraint is applied to continuous strip material advancing along a table (1) in order to bring about a partial separation of finished items, by means consisting in a pneumatic cylinder (4) of which the rod (5) extends perpendicular to the table (1) in such a way as to impinge on the strip material from above at a point coinciding with one peripheral corner area of each successive finished item (13) and thus bring about partial separation of the item from the continuous film material along the pre-cut outline.

3) A device as in preceding claims, wherein means by which finished items are separated completely from the strip material comprise:

– a first roller (11) disposed substantially at 45° in relation to the path followed by the strip material along the table (1), and a second power driven roller (10) disposed parallel with the first and driving the runout conveyor belt (12), between which the continuously advancing strip material is directed;

– a first wheel (9) by which pressure is applied to the strip material along the outermost edge nearest the restraint means (4) in such a way as to favour the passage of the material between the two angled rollers (11, 10) and bring about a complete and automatic separation along the 45° axis, whereupon finished items (13) are directed onto the runout conveyor belt (12) and under a second pressure wheel (20), and offcuts (15) are directed toward the distancing means.

4) A device as in claim 1, wherein means by which to distance the offcuts (15) from the device comprise a pair of rollers (14), one of which power driven, braced in rotation with one another and disposed with axes parallel to the path followed by the strip material along the table (1), between which the offcut material is pinched and directed toward a disposal location.

5) A device as in preceding claims, comprising drive means by which power is transmitted both to the

conveyor belt (12), by way of the corresponding angled roller (10), and to the pinch rollers (14) by way of a mechanical driveline consisting in a chain (8), a drive shaft (16) set in rotation by a sprocket in mesh with the chain, and a bevel gear pair of which one member (17) is keyed to the drive shaft (16) and the remaining member (18) keyed to a shaft (19) disposed at right angles to the drive shaft (16) and supporting one of the rollers (14).

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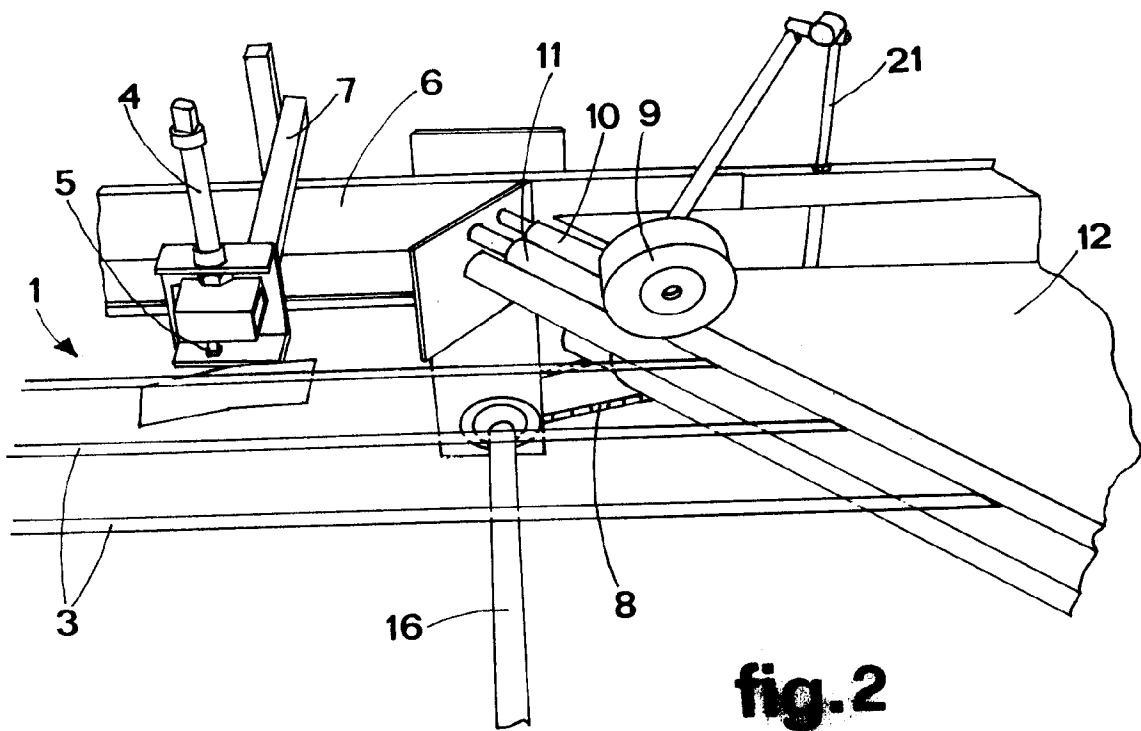
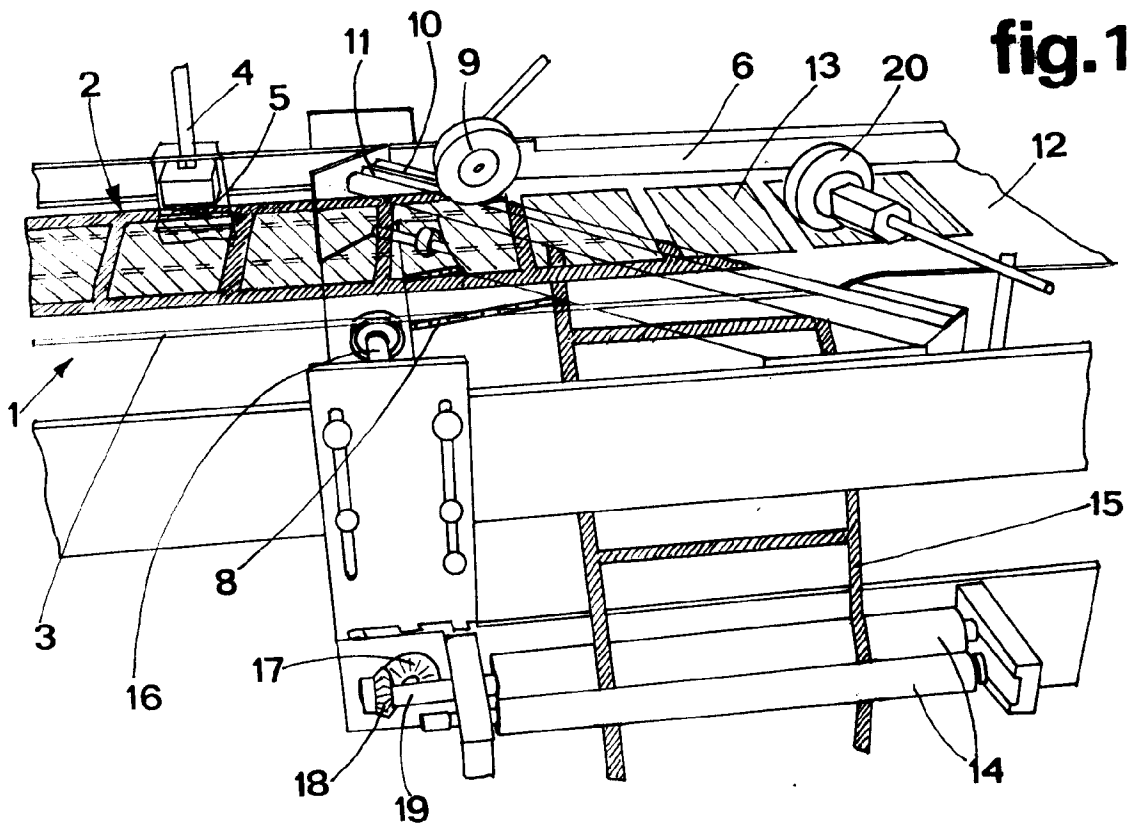
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European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 91 83 0065

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 5)
A	US-A-4 346 855 (BIGGAR) * Column 5, line 39 - column 6, line 36; claim 1; figures 1,2,5 *	1,3	B 26 D 7/18
A	US-A-4 096 981 (MARTORANO) * Column 1, lines 22-31; column 2, lines 12-32; column 3, lines 30-56; column 6, line 49 - column 7, line 20; claim 1; figures 3-5 *	1	
A	US-A-2 789 640 (BELDEN) * Column 3, lines 33-55; figures 1,2 *	2	
A	US-A-3 679 116 (HAMLIN) * Column 3, lines 29-36; column 3, line 69 - column 4, line 2; figure 1 *	4	
A	US-A-4 467 948 (DESLAURIERS) * Abstract; claim 1 *	5	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 5)
			B 26 D B 26 F B 29 C B 31 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02-10-1991	Examiner PETERSSON B.U.M.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

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