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(54) Form, fill and seal apparatus

(57) Apparatus (1) for forming bags from a web (B) of synthetic film, filling them with a product and sealing them, comprising forming means (8, 33) for transforming a fed flat web of heat sealable material into a tubular form with overlapping margins, first heat sealing means (14) for forming a longitudinal sealing seam in the formed tube at the overlapping margins by heat sealing and second heat sealing means (15) for forming transverse sealing in the formed tube by heat sealing, as well as means (16, 19) for supplying a strip (S) of the same material up to and parallel to the tubularly formed web at a location upstream from the second heat sealing means which form the transverse sealing seam and downstream from the location where the film web is transformed to a tube.

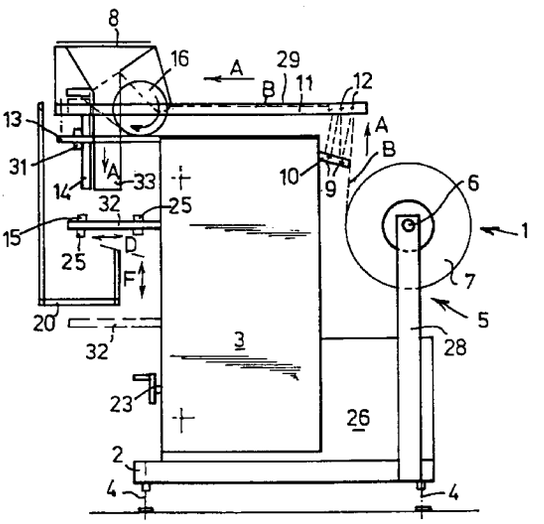

FIG. 1

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Description

The apparatus relates to a form, fill and seal apparatus, in particular to an apparatus for forming bags from a web of heat sealable material, filling them with a product and consequently sealing the bags by heat sealing.

Apparatuses of this kind are very well known. A rolled up web of, for example, polyethylene or polypropylene film is rolled off from a roll and guided over a forming shoulder with a forming tube, around which the film is wrapped to form a tube moving in the course of the further process downward over and from the forming tube. The forming shoulder is open at the top and and forms there the beginning of a filling sleeve for products which are to be put into the bags which extends vertically through the forming tube. After the film web has been formed into a tube a continous longitudinal seam is formed at the location of the margins of the web which overlap each other, by means of a heat sealing rod placed against that. Two double transversely disposed heat sealing rods are located on either side of the downwardly extending tube beneath the heat sealing rod, which are periodically moved towards each other in order to clamp the tube film between themselves and then to be activated to form a seal, after which a certain quantity of the product to be packed is dispensed, which will fall downward through the forming shoulder and the forming tube. At the same time the tube is pulled down over the rise of one bag by the heat sealing rods which still clamp the film tube. Then the double heat sealing rods are moved away from the film tube again, are moved to the top over the rise of a bag and are consequently brought into heat sealing engagement with the film tube so as to form at the same time the upper transverse seal of the bag just filled and the lower transverse seal of the bag following behind, which is still to be formed. At the same time a cutting means arranged between the double heat sealing rods is then activated, so that a bag, divided and sealed off by a longitudinal seam, an upper transverse seam and a lower transverse seam, and filled with the product is obtained.

If the bags are formed from a film web having a closed surface, the film web can be printed with all kinds of information about the product to be packed into the future bags before it is delivered for use in the form, fill and seal apparatus. Printing the film web is done by a supply company. For each separate product the company using the form, fill and seal apparatus will have to have a separate roll of film web with the appropriate print for that product in stock.

In some cases, even in the case of bulbs, the product to be packed will have to be allowed to remain in contact with the surroundings when it is contained in the bag. For this purpose the bags are made of a film web material which is provided with holes, wherein the holes can be placed quite close to one another. As the film web is provided with holes the surface thereof is less suitable for printing information onto; a large part of the illustrations and the letters can be lost. In cases like this self-adhesive stickers are sometimes placed on the formed bags in a separate operation. This is, however, laborious and moreover results in a sometimes considerable number of the holes being closed off. Besides, the bag is then made up of several materials, this being disadvantageous for the possible retrieval for reuse of material from the future waste.

Another way of providing information on the bags made of film web which is provided with holes consists of omitting the holes from a part of the film web so that there a strip is provided which is suitable to be printed on. The result is that two parts containing a different quantity of material can be distinguished in the film web, that is the part without holes and the part with holes. This difference in thickness gives rise to difficulties when rolling up the film web.

An object of the invention is to provide a form, fill and seal machines which is an improvement on the circumstances described above.

To this end, the invention provides an apparatus for forming bags from synthetic film, for filling and sealing them, comprising forming means for transforming a fed flat web of heat sealable material into a tubular form with overlapping margins, first heat sealing means for forming a longitudinal sealing seam in the formed tube at the overlapping margins by heat sealing and second heat sealing means for forming transverse sealing seams in the formed tube by heat sealing, as well as means for supplying a strip of the same material up to and parallel to the tubularly formed web at the location upstream from the second heat sealing means which form the transverse sealing seam and downstream from the location where the film web is transformed to a tube.

The fed strip of heat sealable material can serve here as an information carrier so that the film web itself does not have to be printed on beforehand. In this way far less material in roll form need be kept in stock. Only the rolls with the strip will each be related to a certain product and these rolls with strips will take up less space and contain less material than the rolls of film web.

The strip, which is of the same material as the heat sealable film web material, will simultaneously be sealed at the location of the second heat sealing means which form the transverse sealing seams.

In the apparatus of the invention, if the film web is provided with holes no part of the surface of the film web need be realized as being closed, but instead a film web with a regular hole pattern can be used. In spite of this, a sufficient information carrying area is provided by the strip. By the strip feeding during the bag forming process no special operations are required. The only thing that has to be taken care of is that the roll of the strip is replaced in time and that the strip is introduced into the apparatus in the correct way. Not only the film tube and with that the film web are moved through the apparatus by the activated second heat sealing means, which form the transverse seams, but also a length of strip from the

roll of the strip material is unrolled.

Preferably the supply means for the strip are adapted to supply the strip at a location aligned with and upstream from the first heat sealing means up to and parallel to the tubularly formed web. Thus the strip is sealed together with the overlapping margins by the first heat sealing means, that is over the whole length of the future bag.

Preferably the form means are adapted for transforming the film web into a film tube advancing in a downward direction.

It is observed that a form, fill and seal apparatus is known from the Dutch patent application 66.05669, with which a web, made up of two layers of material, for example cellofane and polethylene, and with which the one surface cannot then be sealed to the other surface, is transformed into a tube with the longitudinal edges against each other, that is, without overlapping, which tube is longitudinally sealed with the help of a sealing strip of polythene sealed on to the outer tube surface made of, for example, polyethylene.

It is further observed that a form, fill and seal machine as well as a method for forming, filling and sealing bags from a web of heat sealable material are known from US patent specification 4,894,975, whereby a web of thermoplastic film such as polyethylene is fed over a forming shoulder and brought about a filling tube to a tubular form. Here the margins are not made to overlap with each other but are held, extending radially, at a distance from one another. In the space between both margins a radial rib or fin extends from the filling or forming tube, which serves as a guider for a closing strip, which is likewise fed from above parallel to the direction of movement of the formed tube. By means of sealing rods this closing strip is sealed on the one hand to the margin and on the other hand to the other margin. The closing strip is provided with intermating profiles, which form a resealable upper opening of the finished bag during use. There is no question of an overlap being formed by the two margins of the tubularly formed web of heat sealable material. As a result there is also no longitudinal seal seam at the location of the overlap. Moreover, the additional strip is not sealed to the outside of the tube but to the inner surface thereof, i.e. on the surfaces of the margins facing each other. As a result the strip extends substantially in a radial direction.

The invention will now be described on the basis of an examplary embodiment of the apparatus of the invention shown in the drawing in which:

fig. 1 shows a side view of a first exemplary embodiment of the apparatus of the invention;
fig. 2 shows an top view of the apparatus of fig. 1;
fig. 3 shows an end view of the apparatus of fig. 1; and
fig. 4 shows a detailed perspective view of the way in which the strip is fed.

The form, fill and seal machine 1 in figures 1, 2, and 3 comprises a frame 2 which can be placed on a fixed base by means of adjustable legs 4. An electric driving unit 26, a housing 27, a control cabinet 3 and a roll holder 5 are placed on the frame 2.

The roll holder comprises a post 28, on the upper end of which a transverse shaft is rotatably attached. This transverse shaft 6 is free at its other end, so that a roll 7 of synthetic monofilm, for example PE can easily be put thereon. The film can be provided with holes on its entire surface.

On the righthand side (figure 1) of the housing 27 outriggers 10 are hingedly and resiliently attached on either side thereof, between which compensation rolls 9 are arranged. On its upper surface the housing 27 forms a guiding table 29 over which a film web B, originating from the roll 7, can be supported and guided. On either side of the guiding surface 29 there are guiding rails 11 which are provided with follower rolls 12 at their upstream ends, which are supported in the guiding rails 11 with their ends, the follower rails being situated above the compensation rolls 9.

At the downstream end of the guiding table 29 a combined forming shoulder/filling funnel 8 is placed, whereby the feed funnel merges into a forming tube 33 at its lower end. The combined forming shoulder/filling funnel is supported on projecting ends of the guiding rails 11 and on outrigger 13, attached to the housing 27.

On the lefthand side of the rearmost guiding rail 11, as seen in figure 1, a roll 16 of printed strip material 5 made of PP is rotatably put onto a shaft 17. At some distance from there, also on the rail 11, a first angle iron is attached, consisting of a vertical attachment plate, which is welded to the rail 11, and a horizontal strip feed-through plate 19, provided with a strip feed-through slot 19' situated at 45° in relation to a vertical longitudinal plane of the apparatus.

In a transverse direction at a distance from the plates 18, 19 a second angle iron 20 is arranged, supported by a transverse rod 30, which itself is carried by the rail 11. The angle iron 20 comprises a horizontal strip feed-through plate 21 which is provided with a strip feed-through slot 20' arranged at 45° in relation to the previously mentioned longitudinal plane and a strip feed-through plate 22 rising vertically from the plate 21, provided with a horizontal strip feed-through slot 22'. The plate 22 is located at a minor distance in front of the surface of the forming tube 33, where the overlapping margins of the film web which has been transformed into a tube will be situated during operation of the apparatus.

At the other outer end of the outrigger 13 a transverse rod 31 is mounted to move back and forth in the E directions. A heated longitudinal seam forming rod 14 is perpendicularly arranged on this cross rod 31 which together with the cross rod 31 can be moved to the surface of the forming tube 33 and away from it again. The rod 14 is of a length minimally equal to the height of the bag and is covered with a layer of teflon.

The arrangement is such that the strip feed-through

plate 22 is placed immediately above the upper end of the longitudinal seam forming rod 14.

Beneath the forming tube 33 an outrigger 32 is mounted to the housing 27 to move back and forth in the F directions. Two transversely placed support rods 25 are mounted on the outrigger 32 which are movable towards and away from each other in the D directions. On their surfaces facing each other the transverse rods 25 carry heated transverse seam forming double rods 15. A cutting means (not shown) is located between each of the double rods 15. These rods too are provided with a teflon covering.

The space in which the sealing seam forming rods are arranged and where they move is screened off by means of a movable, transparent panel 20.

All movable parts of the apparatus 1 can be operated pneumatically.

The operation of the apparatus as shown in the figures 1, 2 and 3 is as follows. A roll of film web 7 is put on the shaft 6 of a roll holder 5. The film web B is manually rolled off over a certain length and guided about the compensation rolls 9 and the follower rolls 12, as can be seen in figur 1, and then laid over the guiding table 29, laid about the forming shoulder 8 and guided about the forming tube 12 so that the film web acquires a tubular form, all this until the then tubular film web extends up to below the working area of the transverse seam forming rods 15. A delivery apparatus for products to be packed in bags, which is adjusted for delivering suitable doses is placed above the forming shoulder/filling funnel. The apparatus 1 is then put into working order by allowing it to operate for a while without being fed with products. In addition, the transverse seam forming rods 15 are operated so as to clamp the tube film B in between themselves and to pull it downward over a distance equal to the height of the bag to be formed. Because the transverse seam forming rods 15 tightly clamp the film web, during this stroke period the film web B is pulled and will be rolled off and will move along in the direction of arrow A.

In the meantime the strip 5 has also been prepared by rolling it off over a length of the roll 16 in direction G (figure 4), bringing it up to the strip feed-through slot 19,' inserting it through there from below to above, bringing it subsequently in direction H up to below the plate 21, and inserting the strip S from below to above through the feed-through slot 22' up to the forming tube 12 (figure 4) and finally leading it directly downward in direction I up to the operating area of the transverse seam forming rods 15. When the rods 15 therefore clamp the film tube B and pull it along in their descending movement not only the roll 7 of the film web B is rolled off, but also the roll 16 of the strip S.

When the transverse seam forming rods 15 arrive at the lower end of a vertical stroke the stroke period ends and the rods 15 are moved away from each other so that the film tube is no longer clamped. The film web B and the strip S will then come to a standstill. In the period which elapses until the transverse seam forming rods have returned to their highest position and are operated once more to clamp the film tube B between themselves and to lead it downward, which period is called here the intervening period, the transverse rod 31 is moved towards the forming tube 12 in the E direction until the longitudinal seam forming rod 14 presses the film tube B against the forming tube 33. The film web B is led in such a way about the forming shoulder and the forming tube 33, that in the area of contact with the longitudinal seam forming rod 14 an overlap area is located, where the longitudinal margins of the film web B are placed over each other. The strip S is located between the rod 14 and the overlap area so that at the same time the strip S is welded by the rod 14 onto the overlap area and the overlap area is sealed by the heat sealing.

When the adjustment of the apparatus is as planned the product delivery apparatus too - not shown - is brought into action. A start is made with the stroke period in which the transverse seam forming rods 15 are moved towards each other to clamp the film tube B. At the same time the heating elements in the transverse seam forming rods 15 are operated so that a double transverse sealing seam is formed by heat sealing. The strip S is sealed as well. Whilst the outrigger 32 is being moved downward in the direction F, and with it the transverse seam forming rods, the strip S and the film tube B, a command is given by suitable means to the delivery apparatus to release a measured quantity of products, this measured quantity falling into the filling funnel 8 and through the forming tube 12 into the film tube B, until this quantity of products is restrained at the lower end of the film tube B which is closed by the transverse seam forming rods.

Because the transverse seam forming rods 15 are each made up of two heated rods placed above one another, an upper seam of the lowest, previous bag and a bottom seam of the subsequent bag are formed simultaneously. Between these double heated rods a knife (not shown) is arranged, which is operated when the transverse seam forming rods 15 have arrived at the end of the descending stroke. At the end of every stroke a filled, cut off bag will therefore be delivered.

During operation of the machine the vertical stroke can be continuously adjusted by a hand wheel 23.

The compensation- and follower rolls 9 and 12 ensure that the film web B remains under tension.

Whilst moving the rods 15 back up the rod 14 is pressed against the stationary strip 5 until the strip S and the local overlap area of the film tube B are clamped against the forming tube 33. The the longitudinal seam is sealed and the rod 14 is subsequently moved back. At the same time the transverse seam forming rods 15 are moved towards each other in the direction D in order to allow another stroke period to start.

In this way film bags filled with a measured out quantity of product are delivered by the apparatus 1 on the lefthand side thereof, the bags being sealed by

means of a bottom seam, a top seam and a longitudinal seam, wherein also a strip extending over the length of the bag is sealed onto the longitudinal seam, on which the information relating to the product is printed.

Claims

1. Apparatus for forming bags from a web of synthetic film, filling them with a product and sealing them, comprising forming means for transforming a fed flat web of heat sealable material into a tubular form with overlapping margins, first heat sealing means for forming a longitudinal sealing seam in the formed tube at the overlapping margins by heat sealing and second heat sealing means for forming transverse sealing seams in the formed tube by heat sealing, as well as means for supplying a strip of the same material up to and parallel to the tubularly formed web at a location upstream from the second heat sealing means which form the transverse sealing seam and downstream from the location where the film web is transformed to a tube.

2. Apparatus according to claim 1, in which the supply means for the strip are adapted to supply the strip at a location aligned with and upstream from the first heat sealing means up to and parallel to the tubularly formed web.

3. Apparatus according to claim 1 or 2, in which the forming means are adapted for transforming the film web into a film tube advancing in a downward direction.

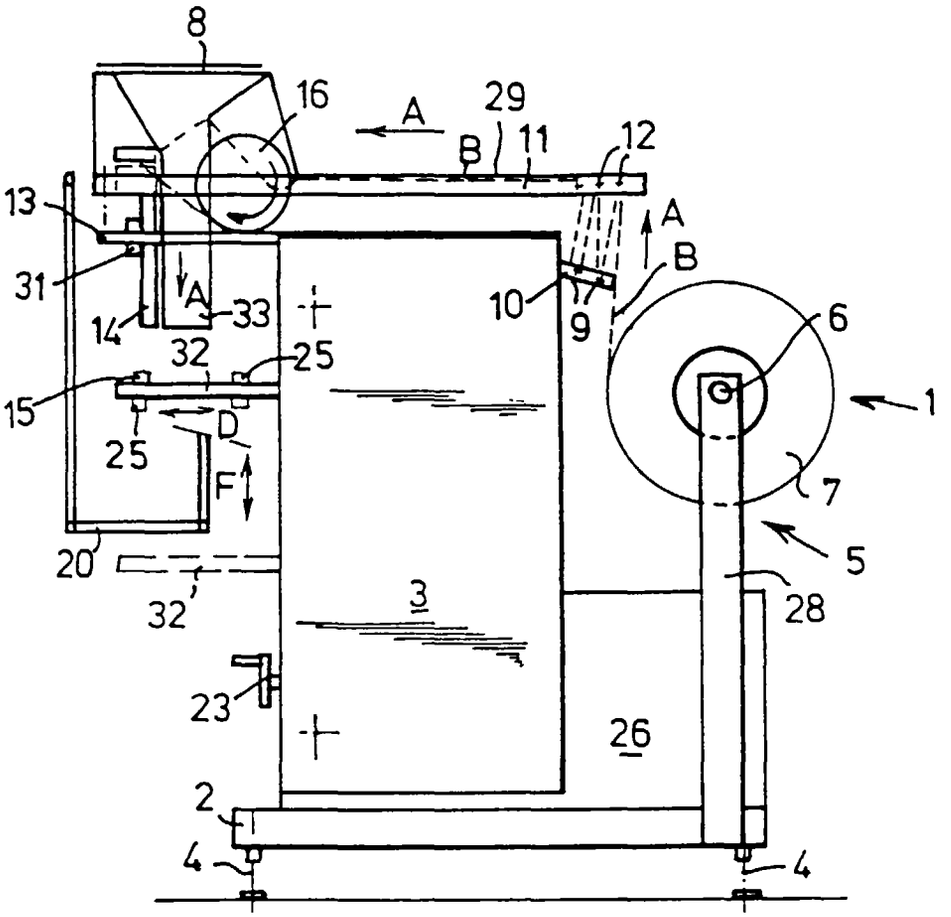
8
16
A
29
B
11
12
13
A
B
31
A
33
10
9
6
14
32
25
1
15
25
D
F
7
20
5
32'
3
28
23
26
2
4
4

FIG. 1

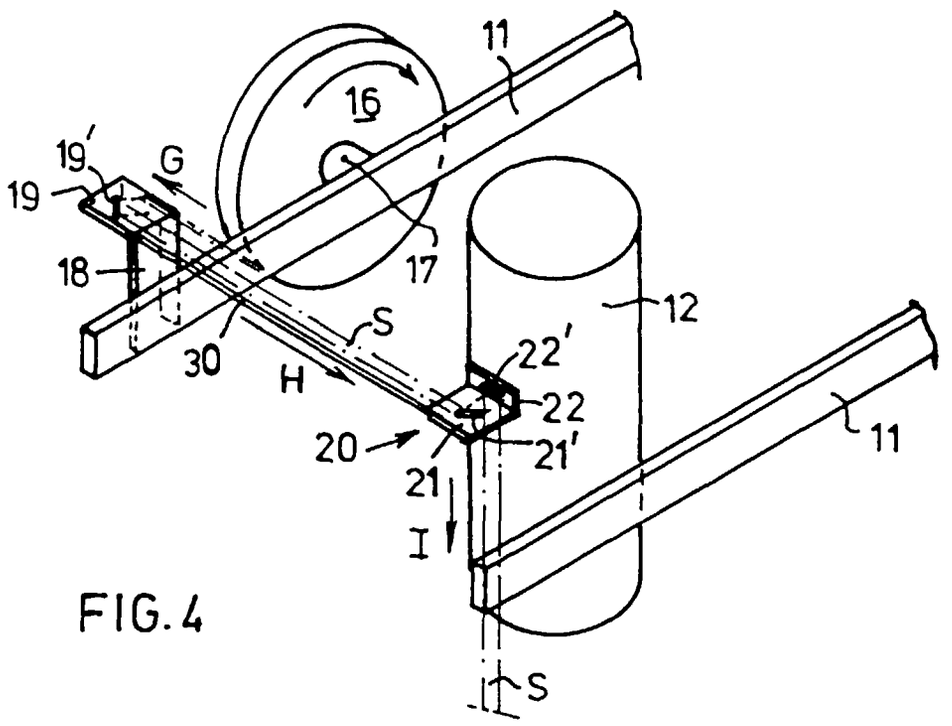
11
16
19'
G
19
18
17
12
S
30
H
22'
22
20
21'
21
11
I
S

FIG. 4

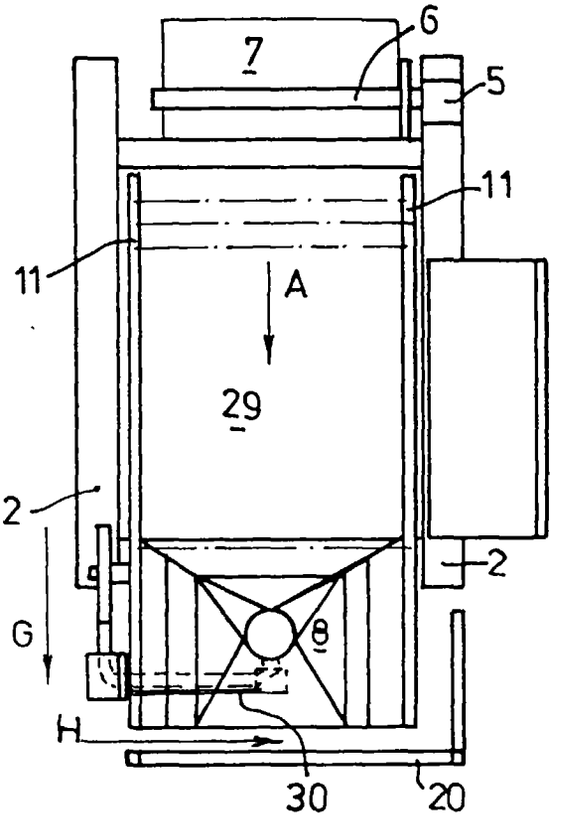
7
6
5
11
11
A
29
2
2
G
8
H
30
20

FIG.2

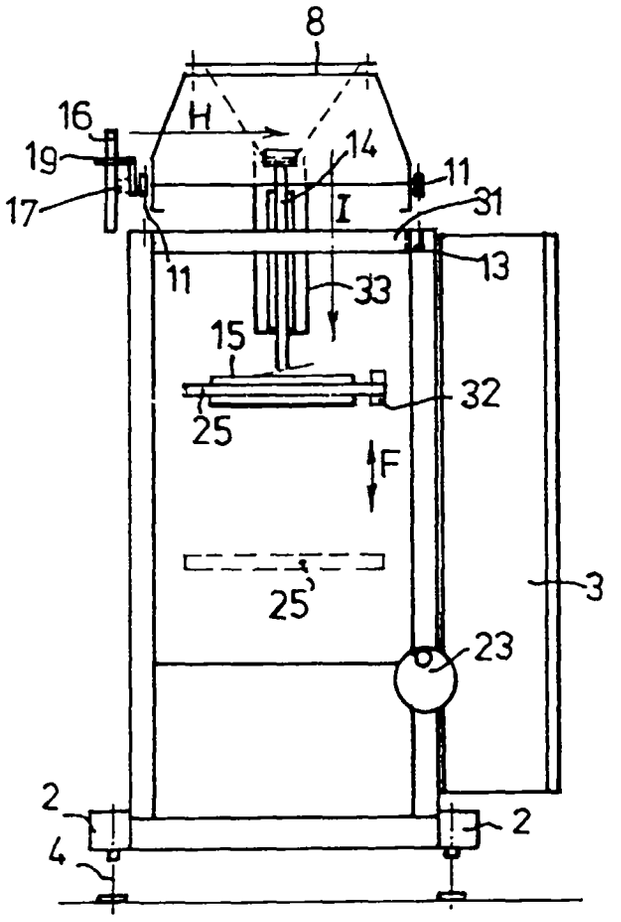
8
16
H
19
14
11
17
I
31
11
13
33
15
32
25
F
25
3
23
2
2
4

FIG.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 20 0373

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.6)
D,X	US 4 894 975 A (S. AUSNIT) * column 3, line 24 - column 4, line 26; figures * ---	1-3	B65B9/20 B65B61/20 B65B61/18
A	US 5 046 300 A (R. CUSTER) * column 4, line 37 - column 6, line 22; figures * -----	1-3	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 April 1997	Jagusiak, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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