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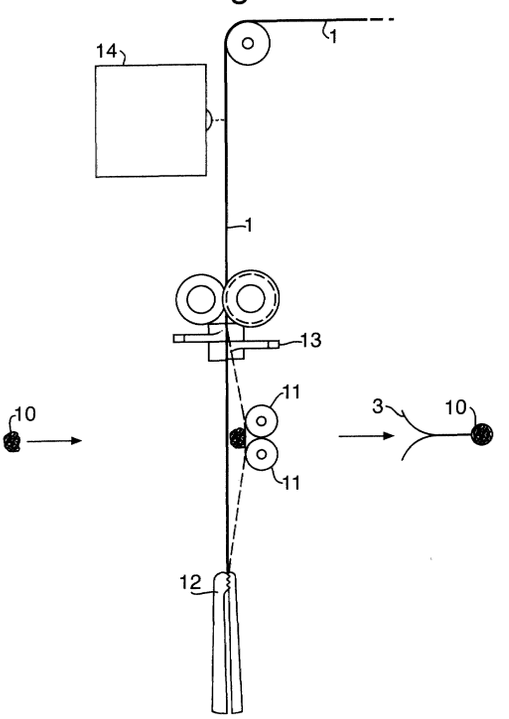
(54) Bag tying machine

(57) The sealing of plastic bags filled with a particular product, for example bread, is commonly achieved by folding a lenght of adhesive tape (1) around the gathered neck (10) of the bag. The adhesive tape (1) is folded such that the ends of the tape stick to each other to form a closed loop. A bag tying machine for sealing bags in this way includes a roll of adhesive tape (1) having spaced portions (3) which are non-adhesive, wherein the tape is wholly coated with adhesive and the non-adhesive portions are portions which have been treated to neutralise the adhesive ; a detector (14) for detecting the boundary between the adhesive and non-adhesive portions of the adhesive tape (1) ; and, cutting means (13) for cutting the adhesive tape (1) into individual ties wherein the cutting means (13) cut the tape (1) at positions according to boundary position data received from the detector (14).

Fig.2.



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Description

[0001] The sealing of plastic bags filled with a particular product, for example bread, is commonly achieved by folding a length of pressure sensitive adhesive tape around the gathered together neck of the bag. The adhesive tape is folded such that the ends of the tape stick to each other to form a closed loop around the neck of the bag.

[0002] A problem with this form of sealing arises when a consumer wishes to open the bag. The tape is stuck tightly to the bag and tightly to itself along its entire length. This makes it difficult for the consumer to undo the seal and get to the product. This often leads to consumers ripping the bag open. With bags containing multiple products such as slices of bread it is desirable to be able to reseal the bag after some of the product has been removed. In this case it is particularly important to be able to open the bag without ripping it and to be able to remove the adhesive tape intact so that it is reusable.

[0003] One way to achieve a resealable tie is to provide paper tabs covering the adhesive at the end portions of each tie. Typically the adhesive tape is provided from a roll of tape and is cut into predetermined lengths for each tie just prior the to application of the tie to the neck of a bag. The tape is unwound from the roll and paper tabs are applied to the tape at predetermined intervals. Typically the paper is also unwound from a roll and cut into tabs on contacting the adhesive tape. The tape with paper tabs attached is then cut through the supplied paper tabs so that each end of each length of tape to form each tie includes a paper tab. A bag tying machine of this type is disclosed in GB-A-1381871. This type of bag tie has proved extremely successful but requires complex and reliable machinery capable of handling sticky pressure sensitive adhesive tape to prepare and apply the bag ties.

[0004] Another method that has been proposed for creating adhesive tape with non-adhesive ends is to fold the ends of the tape back on itself. This has to be done after the lengths of tape have been cut. Again this would require complex and precise machinery capable of handling sticky pressure sensitive tape. So far such a system has not been successfully implemented in practice.

[0005] It is also known in the field of carton sealing to provide lengths of pressure sensitive adhesive tape which hold the flaps of a carton closed and which are treated to make portions of the adhesive tape non-adhesive to provide tabs to enable the tape easily to be gripped and removed. These non-adhesive areas may be formed by covering the adhesive by paper or plastics tabs or by inactivating the pressure sensitive adhesive by coating it with ink. Such techniques are described in CA-A-2055402. Again in the field of carton sealing it is known to use gummed paper tape bearing a printed message and to provide a machine which provides precut lengths of gummed paper tape, cut in positions between adjacent printed messages. To achieve this the tape includes registrations marks which are detected using an optical detector which then triggers a cutting mechanism. This arrangement is shown in US-A-3559519.

[0006] According to this invention a bag tying machine includes:

a roll of adhesive tape having spaced portions which are non-adhesive, wherein the tape is wholly coated with adhesive and the non-adhesive portions are portions which have been treated to neutralise the adhesive;
a detector for detecting the boundary between the adhesive and non-adhesive portions of the adhesive tape; and,
cutting means for cutting the adhesive tape into individual ties wherein the cutting means cut the tape at positions according to boundary position data received from the detector.

[0007] The present invention provides a bag tying machine which produces adhesive tape ties with non-adhesive end portions which does not require complex machinery to form the tie close to the sealing means. It is also less costly than other currently available methods.

[0008] Preferably the cutting means cuts the tape in the centre of the non-adhesive portions of the tape. Preferably the detector is an optical detector capable of detecting differences in reflection from the adhesive and non-adhesive portions. The detector may detect differences in colour.

[0009] An example of a bag tying machine in accordance with the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows the adhesive tape being inked at intervals;
Figure 2 shows a schematic cross-sectional view of a bag tying machine;
Figures 3(a)-3(f) show the sequence of operation of the bag tying machine;
Figure 4 shows a length of inked adhesive tape prior to being cut into ties;
Figure 5 shows the neck of the bag sealed with a tie.

[0010] As shown in Figure 1, a wide roll of adhesive tape 1 is unwound and the tape passes under a flexo printer 2 which prints a band of coloured ink 3 across the entire width of the tape. The bands of coloured ink are all of equal width, approximately 25mm. The interval between successive bands of ink is approximately 65mm. The coloured ink is of a different colour to the adhesive side of the tape and where the ink is applied it neutralises the adhesive on the tape i.e. the adhesive on the tape is made non-adhesive by the application of the ink onto it. Suitable inks include Flexo vinyl masking (yellow/red/green/blue) CON 043 available from Inktech of Crawford Street, Rochdale, OL16 5NU, UK. Once the

ink has been printed on the tape, the tape can be cut into strips of the required width and pancake or spool wound.

[0011] In a typical bag tying machine the adhesive tape is applied to the neck of a filled bag with movement of the gathered together neck of the bag through a bag tying machine. A typical bag tying machine is shown in GB-A-1381871 and only the differences from such a conventional machine are shown in Figure 2 and described subsequently. The neck of the bag 10 contacts the adhesive side of a length of adhesive tape 1 arranged perpendicular to the direction of motion of the neck of the bag. The neck continues on its path pulling the tape with it and passes through a pair of rollers 11. The action of the rollers folds the length of adhesive tape around the neck of the bag and onto itself to form a seal. The sealed bag then moves on out of the tying machine.

[0012] The apparatus for cutting the tape into the desired lengths is shown in Figure 3. Figure 3a shows a pair of gripper arms 12 in an open position at a point in the tying cycle just after a seal has been formed around one bag, cut by a pair of cutting blades 13, released by the gripper arms and moved out of the tying machine. The gripper arms 12 are moved up and down and opened and closed by pneumatic piston and cylinder assemblies as described in GB-A-1381671. The gripper arms 12 have a pneumatic brake system which consists of a slide bar 15, which moves up and down with the gripper arms 12, and brake pads 16 which are anchored in a fixed position on the tying machine. The brake pads 16 are shown in a released position as the gripper arms 12 are about to move up and grip the free end of the tape 1 in the next step.

[0013] Figure 3b shows the gripper arms 12 at their uppermost point, where the gripper arms 12 close so gripping the free end of the tape 1. The tape 1 is then pulled as the gripper arms 12 move down, as shown in Figure 3c, until a detector 14 detects the leading edge 18 of a printed band of tape. A proximity switch 17 detects the tail 19 of the brake slide bar 15, and when both detections are made, as shown in Figure 3d, the brake pads 16 are applied to brake the movement of the brake bar 15 and hence halt the movement of the gripper arms 12.

[0014] The detector 14 is an optical detector which sends a beam through an optic fibre to the tape and detects the reflected light re-entering the optic fibre. From a change in the reflected light the boundary between inked and non-inked sections of the tape can be ascertained. A suitable detector is manufactured by Keyence Corporation of Milton Keynes, UK and designated their CZ-41.

[0015] As the gripper arms 12 are halted the neck of the next bag is pushed into the path of the tape 1 and 6mm more tape is allowed to be pulled from the reel. This situation is shown in Figure 3e. A signal is then sent to the pair of cutting blades 13. Upon receipt of the signal the cutting blades 13 move to cut the tape 1 to form the next tie. The tape is cut just prior to the entry of the neck of the bag 10 into the nip between the rollers 11 where the cut length of tape is formed into a tie around the neck of the bag. This position is shown in Figure 3f. The relative positioning of the blades 13 and the detector 14 is such that the blades cut the tape at the midpoint of the preceding inked band of the tape 3 than that, the position of which has just been detected. The position of the detector 14 relative to the cutting blades 13 is arranged to compensate for the extra 6mm of tape.

[0016] Figure 4 shows a length of inked adhesive tape 1 prior to it being cut into lengths. The length of each inked band 3 is 25mm. The inked bands are eventually cut in the middle, leaving inked, non-adhesive tabs 3 of 12.5mm in length. Crucially this is sufficient length for a consumer to grip with finger and thumb in order to peel apart the seal. The interval between inked bands must be of sufficient length to encompass the neck of the gathered bag to be sealed, in this example it is 65mm. This means that the total length of one tape seal is 90mm. For some applications the total length of each seal is 110 mm.

[0017] Figure 5 shows the neck of a bag with an adhesive tape seal applied. The inked tabs 3 are free and form gripping portions.

Claims

1. A bag tying machine including

a roll of adhesive tape having spaced portions which are non-adhesive, wherein the tape is wholly coated with adhesive and the non-adhesive portions are portions which have been treated to neutralise the adhesive;
a detector for detecting the boundary between the adhesive and non-adhesive portions of the adhesive tape; and,
cutting means for cutting the adhesive tape into individual ties wherein the cutting means cut the tape at positions according to boundary position data received from the detector.

2. A bag tying machine according to claim 1, in which the machine also includes:-

means to pull the adhesive tape across the path of a gathered together neck of a filled bag; and,
means to apply the cut individual adhesive tape ties around the gathered together neck of a filled bag and to itself to form a completed tie.

3. A bag tying machine according to claim 1 or claim 2, in which the cutting means cuts the adhesive tape in the middle of a non-adhesive portion so that each tie has a non-adhesive portion at each end of it.

4. A bag tying machine according to any one of the preceding claims, in which the detector is an optical detector capable of detecting differences in reflection from the adhesive and non-adhesive portions of the tape.

5. A bag tying machine according to claim 4, in which the detector detects differences in colour between the light reflected from the adhesive and non-adhesive portions of the tape.

6. A bag tying machine according to any one of the preceding claims, in which the machine includes a brake which is actuated to stop movement of the tape before it is cut to form a tie.

7. A bag tying machine according to claim 6 when dependent upon claim 2 or any other claim dependent upon claim 2, in which the brake, when actuated, stops the movement of the means to pull the tape across the path of a gathered together bag.

8. A bag tying machine according to any one of the preceding claims, in which the non-adhesive portions of the tape are parts of the tape on which ink or paint has been applied to its adhesive side.

9. A bag tying machine according to any one of the preceding claims, in which the tape is spool wound.

10. A bag tying machine according to any one of the preceding claims, in which the tape is pancake wound.

Fig.1.

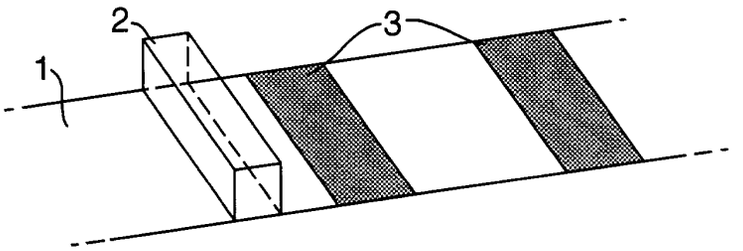


Fig.2.

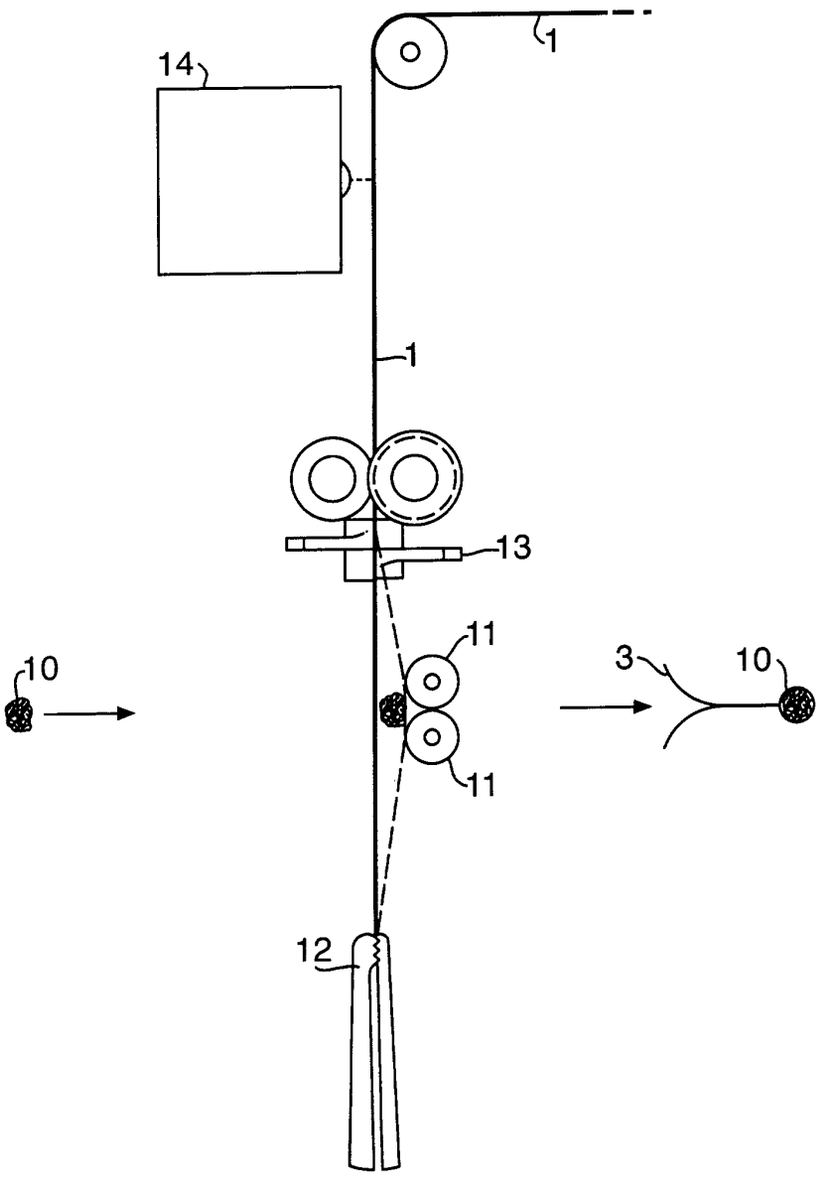


Fig.3(c).

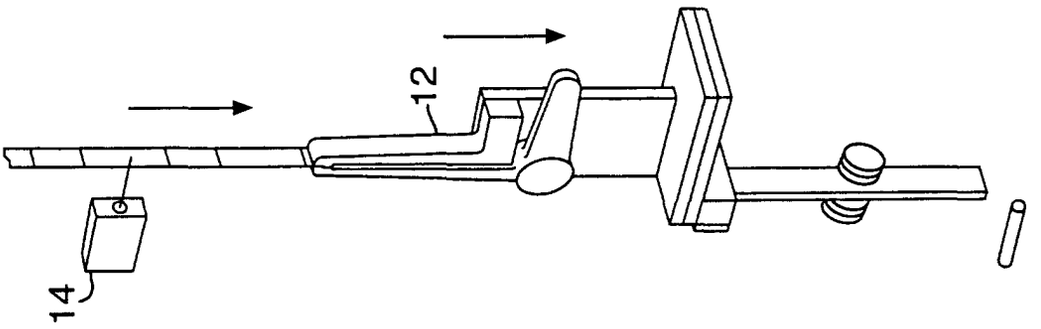


Fig.3(b).

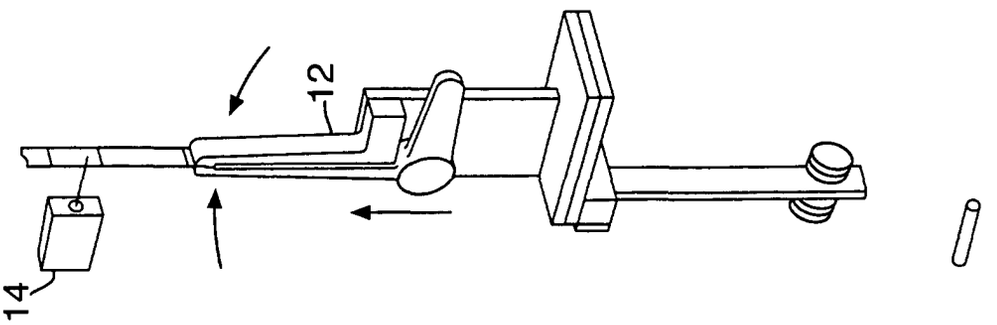


Fig.3(a).

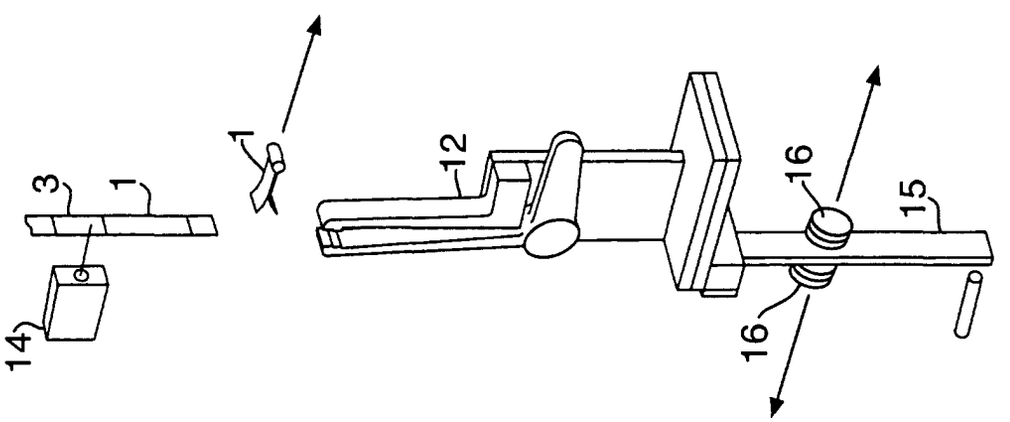


Fig.3(f).

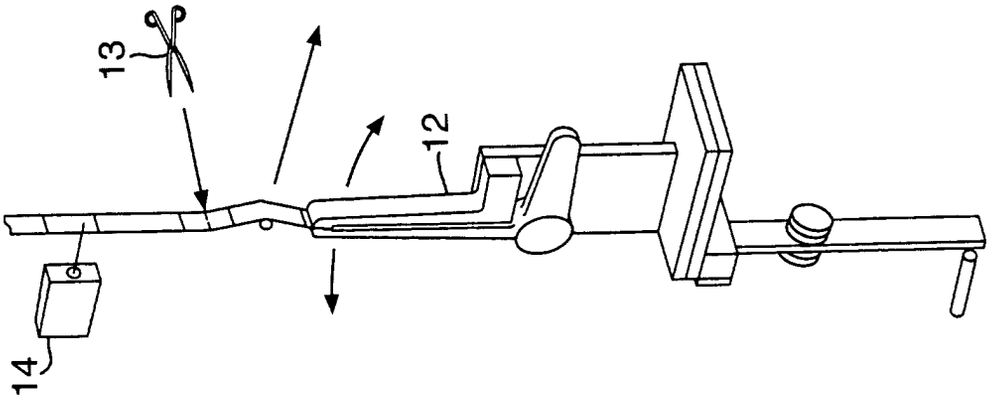


Fig.3(e).

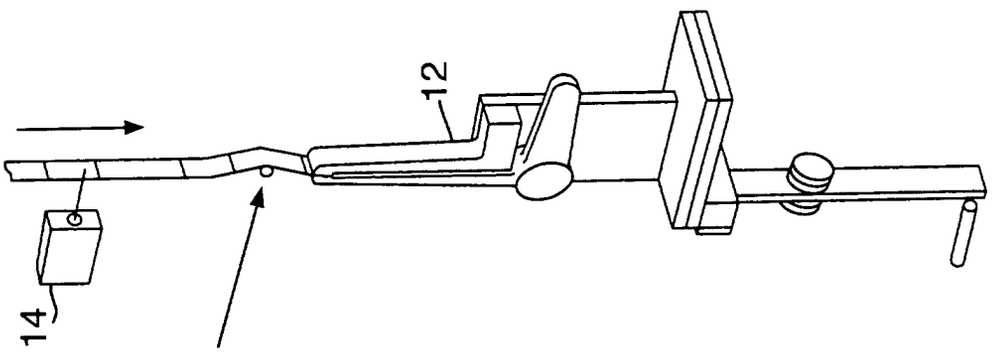


Fig.3(d).

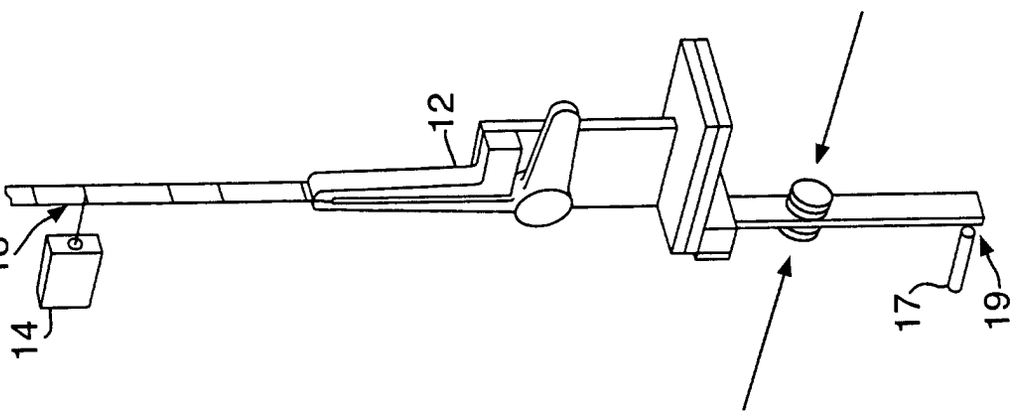


Fig.4.

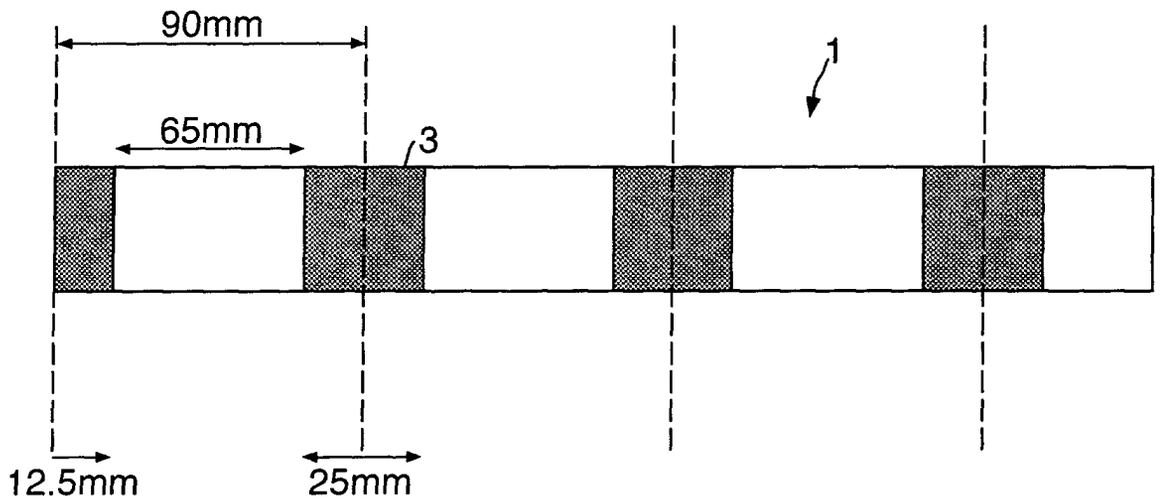
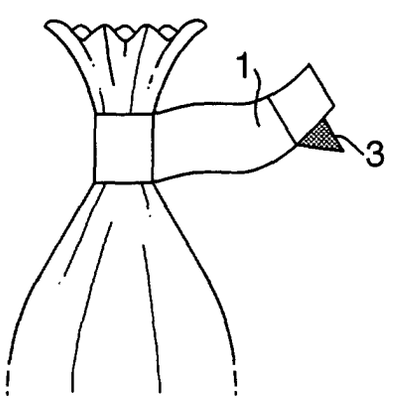


Fig.5.



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Application Number
EP 01 30 6312

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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65B
C09J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 November 2001	Jagusiak, A

CATEGORY OF CITED DOCUMENTS

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