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(54) **Labelling machine**

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Description

[0001] The present invention relates to a labelling machine for printing and applying self-adhesive labels, starting from adhesive tape reels and in particular usable for identification systems, to boxes, small parcels, packages, containers in general, pallets.

[0002] More specifically the present invention relates to labelling machines applying labels in real time and capable to operate also with packages coming from different lines, the labels having also different sizes and content.

[0003] Machines applying prepunched labels are known from the prior art. The labels are formed by an adhesivized substratum (paper, plastic film, etc.) applied on an anti-adhesive support, usually siliconized, constituting the label carrier and release. In the application step the label is printed, removed from the support and applied. The drawback of said systems is that the support, carrier of the labels, is completely discarded and must be disposed as special waste.

[0004] USP 4, 784, 714 discloses a thermal printer and label applicator comprising a transport system 12 for moving linerless thermosensitive paper 14 from a roll 16 to a printing station 18. A cutting station 20 is provided to separate the linerless thermosensitive paper into individual labels. A vacuum system 28 transports the separated individual labels 30 from the cutting station 20 to an adhesive activation station 32, and thereafter to a label ejection station. The transport system 12 include a guide roll 80 and a pair of drive rollers 82, 84, that pull the linerless paper 14 from the roll 16 around the guide roller 80 and thereafter into the printing station 18, formed of a printing head 90 in an operative relationship with a guide roller 92. When the thermosensitive paper 14 ends, a conventional light emitting diode-type detector 86, placed between the driving rollers 82, 84 and the guide roller 80, stops the thermal printer and label applicator 10. The portion of the linerless thermosensitive paper between the drive rollers 82, 84 and the thermal print head 90 is then removed and replaced with additional linerless thermosensitive paper.

[0005] The object of the present invention is to provide a machine for printing and applying labels on boxes, etc. having the following advantages in comparison with the printing and labelling machines of the prior art:

- absence of processing waste;
- application in real time of the last printed label (the label coming out from the printing group) from adhesivized reels;
- possibility to change the sizes and the text of the various labels while the machine is working, and with the possibility to print the whole label surface;
- utilization of the machine also on packages coming from different lines.

[0006] It has been surprisingly and unexpectedly found by the Applicant a machine able to print and apply labels on containers, etc., solving the above technical problem.

[0007] The object of the present invention is accomplished by a machine for printing and applying the labels on containers according to claim 1.

[0008] The cutting systems can have variable sizes; generally their size is preferably lower than 60 mm, measured along the tape, still more preferably 40 mm. From the working point of view of the applying machine, it is preferable to use cutting systems having the lowest possible size for example 15-40 mm.

Fig. 1 shows an embodiment of a labelling machine according to the present invention.
Fig. 2 shows a side view of the cutting system.
Fig. 3 represents a detailed view of the printing group and cutting system.
Fig. 4 represents a comparative labelling machine with which comparative tests as defined by the examples 3 and 4 are performed.
Fig. 5 represents an embodiment of a labelling machine according to the invention provided with a conveyor belt to advance the tape towards the printing group and to pass the tape between the driving roll and the printing head.
Fig. 6 represents a detailed view of the conveyor belt from Fig. 5.

[0009] In Fig. 1 the unwinding roll (8) is preferably driven by an engine. The applying pad (6) is preferably driven by an electropneumatic device (7). In Fig. 3 the driving roll (3a) is preferably driven by a motor cyclically inverting the roll rotation direction.

[0010] With reference to Fig. 2, the cutting blade (2a) is preferably driven by a linear pneumatic cylinder (2c); the counterblade (2b) is mounted on a plate fixed or oscillating, preferably fixed; the contact between the counterblade (2b) and the blade (2a) is assured by a system (2d) acting on the counterblade (2b) or on the blade (2a); preferably the device (2d) assuring the contact between (2a) and (2b) acts on the mobile blade (2a). The system (2d) can be a spring or a pneumatic cylinder or a pusher.

[0011] The cutting blade (2a) can have flat or slightly curved vertical section, the bend having a radius generally from 500 mm to 6,000 mm preferably from 1,500 mm to 4,000 mm. A flat blade is preferred.

[0012] Preferably both sides of the blade (2a) and counterblade (2b) are covered with solid anti-adhesives. The anti-adhesive treatment of the blade and counterblade surfaces avoids that the adhesive tape adheres on said surfaces. The anti-adhesive treatment can, for example, be carried out by using materials based on (fluoro) silicones and/or fluoropolymers to obtain anti-adhesive solid coatings. One can mention, for example, coatings with the commercial name of Plasma Coating® PC 918F, PC 936, PC 915, PC 915S, PC 934, PC 934S, PC 932, PC 918-C, PC 434, PC 432, 40601/4001F.

[0013] The driving roll (3a), as said, is made of anti-

adherent material, i.e. the adhesive tape (5) does not adhere to the driving roll (3a). The driving roll (3a) is, for example, made by silicone resins, for example silicone rubbers.

[0014] As said, the engine acting on the driving roll (3a) cyclically inverts the rotation direction. Alternatively, the progress/inversion movement of the engine can for example be programmed by modifying the printing group firmware.

[0015] In the printing group, when the tape is moved backward from the driving roll (3a), the distance covered preferably corresponds to a space from 1 mm to L mm, wherein L is the distance, reported in Fig. 3, between the cutting blade and the printing head. The distance L depends on the cutting system volume (size); generally it is comprised between 15 and 60 mm. The back movement of the tape depends on the printing requirements. For example, when the print zone starts at a distance of 2 mm from the upper edge of the label, the moving back space is L - 2. With upper edge of the label it is meant the label side coming out first from the printing head.

[0016] The Applicant has indeed surprisingly and unexpectedly found that, with the labelling machine of the present invention it is possible to print the adhesivized tape even near the upper edge of the label.

[0017] The support film of the adhesive tape forming the labels has a thickness from about 30 micron to about 80 micron, preferably from 50 micron to 60 micron.

[0018] The adhesive amount spread on the support film, calculated on the dry product, ranges from 10 to 30 g/m^2, preferably from 15 to 22 g/m^2.

[0019] The labels have various sizes depending on the requirements. Generally the label width depends on the tape used. Generally the tape width is up to 180 mm, usually from 10 mm to 180 mm, preferably from 30 mm to 150 mm; the length is variable, for example up to 250 mm, generally from 20 mm to 200 mm, preferably from 30 mm to 180 mm.

[0020] The preferred tape for the labelling system is in plastic material with the internal side adhesivized.

[0021] The tape is preferably formed of bioriented polypropylene, polyester, polyethylene, polyvinylchloride, or also laminates, or plastic coupled articles in general.

[0022] The used adhesive is available on the market and is selected among those allowing a permanent adhesion. In particular the adhesive is preferably a water acrylic adhesive, in aqueous emulsion form, based on a C_3-C_5 ester of the acrylic acid, for example butyl acrylate, or a "hot melt" adhesive formed of thermoplastic rubbers and hydrocarbon resins in general.

[0023] Using a preprinted adhesive tape reel, it is possible to determine the label size through an optical reading system ((photocell 4) in Fig. 1) which determines the cutting position.

[0024] As already said, the printing group (3), see Fig. 3, is carried out by a driving roll of anti-adherent material (3a) on which the adhesive tape to be printed (5) arrives. The tape (5) passes between the driving roll (3a) and the head (3b)

[0025] Another system to pass the tape (5) between the driving roll (3a) and the head (3b) is to advance the tape (5) towards the printing group (3) in contact with a conveyor belt (3c), see Fig. 5, said conveyor belt coming into contact with the adhesive side of the tape (5) through a roll (3e) downhill of the unwinding system of the reel (1), by passing with the tape between the driving roll (3a) and the head (3b), and being then engaged by the bar (3d), placed before the cutting group (2), around which it turns detaching itself from the tape; the conveyor belt is then engaged by the roll (3e) and brought again into contact with the tape (5) advancing towards the printing group (3).

[0026] Also in this embodiment the contact between the printing head (3b) with the adhesive tape to be printed (5) and the conveyor belt (3c) is carried out through a driving roll (3a). In this case it is not necessary that the driving roll (3a) is of anti-adherent material. The material of the driving roll (3a) can, for example, be selected among those commonly used for the roll manufacture. In this case the conveyor belt (3c) must be of anti-adherent material, or the conveyor belt surface, coming into contact with the tape adhesive side, is coated with anti-adherent material.

[0027] For the embodiment with the conveyor belt, see Fig. 5, in particular Fig. 6.

[0028] In the printing group (3), as said, the driving roll (3a) drives the tape (5) in the first embodiment of Fig. 1 and Fig. 3, or drives both the tape (5) and the conveyor belt (3c) in the embodiment of Fig. 5 and Fig. 6.

[0029] The conveyor belt (3c), as said, is carried out in anti-adherent material; the adhesive tape (5) does not adhere to the belt (3c). The belt (3c) is formed, for example, by a composite formed, for example, by an external layer of silicone resins, for example silicone rubbers, spread on a flexible material support, for example a natural or synthetic fiber cloth.

[0030] The conveyor belt has a width not smaller than that of the label (tape (5)), generally the width is about 180 mm. The belt length is determined by the distance between the roll axes (3a) and (3e), generally the distance is in the range 30 mm-500 mm, preferably 200-300 mm.

[0031] The bar (3d) is preferably formed of a wear-lasting material of the conveyor belt (3c) passage. Generally the bar is of metal, special steels, for example tempered steels, etc. Generally the bar (3d) length is shorter than length L.

[0032] The working process of the labelling machine according to the present invention is the following. Tape (5), see Fig. 1, is unwound from the reel (1) by the unwinding system comprising an unwinding roll (8) and a tape tensioning device (9), proceeds into the printing group (3) for the label print. Successively, see Fig. 2, the tape (5) enters the cutting system (2) moving in a direction perpendicular to the cutting blade (2a) ; the blade (2a) cuts the tape maintaining an inclination, preferably con-

stant, the contact point between the blade (2a) and counterblade (2b) during the cut moves transversally in a continuous way through the tape section (5) . After the cut the printed label is immediately applied on the container by the applying pad (6) (Fig. 1).

[0033] With reference to Fig. 3, after the label application, the adhesive tape (5) is moved backward by the driving roll (3a), to allow to the printing head (3b) to start printing near the upper edge of the label being formed. At this point the tape (5) proceeds again into the cutting system (2), a new label is cut and the cycle starts again.

[0034] The backward tape movement under the printing head, after the label application, represents a remarkable advantage of the labelling machine of the present invention in comparison with the prior art as the available surface of the label is substantially completely used.

[0035] It has been found by the Applicant that, with the present invention, adhesive deposits on the cutting blade and on the counterblade are not formed, thus allowing a high label application speed, avoiding machine stops for the adhesive removal.

[0036] Furthermore, during the machine working, the application of lubricating oils, which could stain the label and the container is not required. The use of lubricating oils is rather critical, especially for food packages, since they represent a critical contamination source for the rules and procedures HATCH (Hazard Analysis Critical Control Points). According to these rules the oil must not come into contact, directly or indirectly, with the food or their packages. Furthermore oil traces on the adhesive part of the label reduce the adhesion on the package.

[0037] The label printing is preferably carried out by the thermal transfer process.

[0038] The label text is previously programmed by the user, for example' with a software inside a PC. Generally the text written on the label contains for example the following information: identification code of the product, of the customer, supplier, producer, etc. and can be personalized as desired.

[0039] By the use of the management program, it is possible to memorize labels having different features as regards both the format and the text (logo, firm data, production codes, expiry dates, etc.). In connection with the production requirements the labels are recalled from the memory, made and applied on the product on the packaging line.

[0040] By using the present invention it is possible to change on the packaging line the sizes and the label text from one package to another, even more times or even in a continuous way, if required; without interrupting the production cycle.

[0041] It is indeed possible, by application of software available on the market, to identify on the packaging line the package to which the corresponding label, for sizes and contents, is to be applied. It is thus possible to use only one labelling station downhill of more packaging lines.

[0042] As a matter of fact the tape substitution with a tape of different sizes, bringing the new label to be printed, is not required provided that the label sizes are compatible with the tape strip, i.e. they have the same tape width. When labels, having a width larger or smaller than that of the used tape (5), are desidered, it is necessary to use a tape (5) having the desired width.

[0043] The printing/labelling machine of the present invention allows to obtain labels having a variable length in function of the content or the text of the labels. This represents a remarkable advantage with respect to the systems of the prior art, wherein labels having a fixed format are used. In these known systems when the label length is to be changed, it is necessary to change the label reel with the desired format. Furthermore another advantage of the present invention machine is that the siliconized support of the punched labels, the label punching step and the consequent waste are avoided.

[0044] The present invention machine is advantageous in comparison with the machine of the comparative Example 3 since with the latter it is not possible to apply in real time the last printed label.

[0045] The cut number (cycles) of the machine according to the present invention depends on the label length. For labels having a format for example of 80 x 60 mm the cut number is of the order of 10-50 strokes/minute at most. From the industrial point of view the labelling machine of the present invention assures a very high productivity.

[0046] The label application can be carried out with various systems. For example, in Fig. 1 it is reported a piston system (7) to apply the labels on the upper part of the container.

[0047] The working process of the labelling machine according to the present invention, when the printing group uses the conveyor belt (3c) is the following. Tape (5), see Fig. 5, is unwound from the reel (1) by means of the unwinding system comprising an unwinding roll (8) and a tape tensioning device (9), successively, see Fig. 6, the tape comes into contact with the belt (3c) in correspondence of the roll (3e) downhill of the reel unwinding system ; it proceeds into the printing group (3) for the label overprint; the tape is then separated from the belt in a point comprised between the printing head (3b) and the cutting system (2), i.e. at the end of the bar (3d). For the cutting.system see the above described Fig. 2. As said, after the cut, the printed label is immediately applied on the container through an applying pad (6).

With reference to Fig. 6, after applying the label, the adhesive tape (5) with the belt (3c) is moved backward by the driving roll (3a), to allow the printing head (3b) to start printing near the upper edge of the label being formed; the tape (5) enters again the cutting system (2), a new label is cut and the cycle continues.

[0048] A further advantage of the present machine is that it is not necessary to have available tapes with prepunched labels having a different format (length) according to the production requirements.

[0049] For comparison with the labelling machine of

the present invention, the Applicant has carried out a comparative labelling machine as represented in Fig. 4. In particular:

- (1) represents the unwinding of the adhesive tape from which the labels are formed;
- (3) the printing group;
- (2) the cutting system.

[0050] After the label printing step (printing group 3), the printing pitch determines the size of the label itself through an optical reading system (photocell (4) of Fig. 4) determining the cutting position.

[0051] The printing method used is the thermal transfer method.

[0052] In the applying machine the distance between the printing unit (3) and the cutting unit (2) is 240 mm. In Fig. 4, between the photocell (4) and the cutting unit (2), the tape driving roll (3a) is represented.

[0053] The comparative Examples 3 and 4, wherein the comparative labelling machine of Fig. 4 is used, show a lower performance of the comparative labelling machine in comparison with the labelling machine according to the invention of Fig. 1 (see the Examples 1 and 2).

[0054] The following Examples illustrate the invention.

EXAMPLE 1

[0055] At the outlet of a fine Beretti line mod. MS30 carton wrapping machine, a machine for printing and applying labels according to the present invention has been inserted (Fig. 1).

[0056] The machine is connected to a computer with a management program allowing to print on the formats the requested information. The boxes which have been labelled had 380 X 250 X 300 mm sizes. The applied labels had 120 X 80 mm sizes and have been formed by directly cutting the tape of a 50 μm polypropylene reel adhesivized with acrylic adhesive Primal® PS 83d (Rohm & Haas), weight 20-22 g/m^2, having a width of 120 mm and a length of 800 m.

[0057] On the label the following product information was printed by a thermal transfer printer: product type, number of pieces contained in the box, lot number, bar code, progressive package number, date, exact hour of the label application. The information was distributed on the whole label surface, up to a distance of 2 mm from the upper edge.

[0058] The last label printed by the machine was applied in a real time on the first container moving to the labelling station.

[0059] The line working was continuous on a daily workshift of 8 hours. The line production speed was 18-20 boxes/minute. During the test no inconveniences on the machine occurred and to each package a label was applied bearing the above information. The printed and applied labels resulted equal to the model prepared on the computer.

[0060] The labelling process with the labelling machine according to the present invention does not show any inconvenience from the industrial point of view, even though one or more packages are removed from the line uphill of the labelling machine for the most various reasons, for example due to unsuitable packaging. Even in this case it is possible to maintain the progressive number of the box packaging.

EXAMPLE .2

[0061] The labelling machine of the Example 1 is placed on a collecting conveying tape on which three packaging lines of three different products join, made up in packages having the following sizes:

- product A: 200 mm x 150 mm x 70 mm;
- product B: 200 mm x 150 mm x 90 mm;
- product C: 200 mm x 150 mm x 110 mm.

[0062] The labels were applied in a real time on one of the two sides of the box having a lower perimeter.

[0063] The labels had a different content and respectively the following sizes:

- product A: 120 mm x 60 mm;
- product B: 120 mm x 80 mm;
- product C: 120 mm x 100 mm.

[0064] The used reel was of the same type as that used in the Example 1.

[0065] By means of a detector placed at the outlet of each of the three lines, it is detected the transit and the origin line of the box on which the label is to be applied.

[0066] The detector sends a signal to the printer which, on the basis of the collection of the label formats available in the own database residing on personal computer, prints and applies in real time on the box in transit under the labelling station a label bearing the information concerning the product identified by the origin line, along with the date and the transit time.

[0067] The line working was continuous on a daily workshift of 8 hours. The line production speed was 18-20 boxes/minute. During the test no inconveniences on the machine occurred and to each package a label was applied bearing the above information.

[0068] During the whole processing cycle 9,100 boxes were labelled and it was not necessary to change the adhesive tape reel.

[0069] This is an advantage, since, using for example a reel of prepunched labels on siliconized paper, the reel diameter being equal, a remarkable lower number of applied labels would have been obtained.

[0070] The labelling process with the labelling machine according to the present invention does not show any inconvenience from the industrial point of view, even though one or more packages are removed from one or more lines uphill of the labelling machine for the most

various reasons, for example due to unsuitable packaging. Even in this case it is possible to maintain the progressive number of the box packaging.

[0071] This Example shows that it is possible to apply labels having different sizes even containing different information on the different packages coming from the three lines.

EXAMPLE 3 (comparative)

[0072] Print and application of labels from adhesive tape using a labelling machine having a fixed distance between the printing group and the cutting group (see Fig. 4).

[0073] This comparative labelling machine has been carried out by the Applicant for comparative purposes with the labelling machine according to the invention and is characterized by a fixed distance between the printing group and the cutting group for a better management of the electropneumatic apparatus.

[0074] The comparative labelling machine is placed at the outlet of a fine Beretti line mod. MS30 carton wrapping machine.

[0075] The fixed distance in the machine used in this Example between the cutting group and the print head is 240 mm and it determines the label size.

[0076] The comparative labelling machine is connected to a computer with a management program which allows to print on the formats the requested information. As in the Example 1, the boxes which have been labelled had 380 x 250 x 300 mm sizes. The applied labels had 120 x 80 mm sizes.

[0077] The labels have been formed by directly cutting the tape of a reel of the same type as that used in the Example 1.

[0078] On the label the following information was printed by a thermal transfer printer: product type, number of pieces contained in the box, lot number, bar code, date.

[0079] The comparative labelling machine does not allow to apply in real time the label, since between the applying pad and the printer there is an adhesive tape segment corresponding to the space taken up by three labels.

[0080] Therefore on the labels it was not possible to print the progressive package number and the transit time of the package under the comparative labelling station. Indeed, even considering the phase displacement due to the three labels still in the machine, during the labelling process one or more packages could be removed from the line uphill of the labelling machine for the most various reasons, for example due to unsuitable packaging. In this case, from the industrial point of view, it is extremely complicated to succeed in maintaining the progressive box packaging number.

[0081] Furthermore this comparative labelling machine of the Example 3 cannot be used to label packages of products coming from different packaging lines, for example as described in Example 2. Indeed in the comparative labelling machine three labels are ready to be applied already printed with determinate information.

[0082] The line working was continuous on a daily workshift of 8 hours. The line production speed was 18-20 boxes/minute.

[0083] It has been found that, by passing to a different production lot, three labels of the previous lot remained in the machine, which had to be removed since no longer suitable for the batch to be started. Therefore, with the comparative labelling machine of the comparative Example 3, at the end of each batch there are some waste which must be disposed before starting the successive production. This represents a further drawback in comparison with the labelling machine of the present invention as shown in the Examples 1 and 2.

EXAMPLE 4 (comparative)

[0084] Example 2 was repeated but by using the comparative labelling machine of the Example 3 (Fig. 4).

[0085] The labelling resulted unsuitable, since labels with information not corresponding to the package content were applied. This inconvenience occurred when the packages reaching the labelling station came from different lines.

Claims

1. A labelling for printing and applying machine labels on containers, comprising:

- an adhesive tape reel (1) from which the labels are formed;
- a reel unwinding system comprising at least an unwinding roll (8) and a tape tensioning device (9);
- optional photocell (4);

tape (5) adhesivized on the internal side of the reel;

- printing group (3), comprising a printing system wherein the contact between the print head (3b) and the adhesive tape to be printed (5) is carried out by a driving roll of anti-adherent material (3a), which cyclically inverts its rotation direction;
- cutting system (2) comprising:

  - a cutting blade (2a) which moves perpendicularly to the direction of the tape to be cut, from which the labels are obtained; the cutting blade (2a) has an inclined cutting edge having an angle between 2° and 45°, preferably between 2° and 30° with respect to the tape (5) to be cut;
  - a counterblade (2b) ; the blade and counterblade cutting surfaces are covered with solid anti-adhesives;

- applying pad (6);

the cutting system (2) being adjacent to the printing group (3).

2. A machine according to claim 1, wherein the cutting system size, measured along the tape, is smaller than 60 mm, preferably 40 mm, still more preferably 15-40 mm.

3. A machine according to claims 1-2, wherein the unwinding roll (8) is driven by an engine; the applying pad (6) is driven by an electropneumatic device (7); the driving roll (3a) is driven by a motor cyclically inverting the roll rotation direction.

4. A machine according to claims 1-3, wherein the cutting blade (2a) is driven by a linear pneumatic cylinder (2c); the counterblade (2b) is mounted on a fixed or oscillating plate, preferably fixed; the contact between the counterblade (2b) and the blade (2a) is assured by a system (2d) acting on the counterblade (2b) or on the blade (2a); preferably the system (2d) acts on the blade (2a).

5. A machine according to claims 1-4, wherein the cutting blade (2a), in vertical section, is flat or has a bending having a radius from 500 mm to 6,000 mm, preferably a flat blade is used.

6. A machine according to claims 1-5, wherein both sides of the blade (2a) and counterblade (2b) are covered with solid anti-adhesives.

7. A machine according to claims 1-6, wherein the distance L between the cutting blade (2a) and the print head (3b) ranges from 15 to 60 mm.

8. A machine according to claims 1-7, wherein the support film of the adhesive tape forming the labels has a ' thickness from about 30 micron to about 80 micron, preferably from 50 micron to 60 micron.

9. A machine according to claims 1-8, wherein the tape width is up to 180 mm, preferably from 10 mm to 180 mm, still more preferably from 30 mm to 150 mm.

10. A machine according to claims 1-9, wherein the tape is formed of bioriented polypropylene, polyester, polyethylene, polyvinylchloride, or also laminates, or plastic coupled articles in general.

11. A machine according to claims 1-10, wherein the tape (5) moves towards the printing group (3) in contact with a conveyor belt (3c), said conveyor belt coming into contact with the adhesive side of the tape (5) through a roll (3e) downhill of the unwinding system of the reel (1), passing with the tape between the driving roll (3a) and the head (3b), and being then engaged by the bar (3d), placed before the cutting group (2), around which it turns detaching itself from the tape; said conveyor belt being then engaged by the roll (3e) and brought again into contact with the tape (5) advancing towards the printing group (3).

12. A machine according to claim 11, wherein the conveyor belt (3c) is of anti-adherent material, or the belt surface coming into contact with the adhesive side of the tape (5) is covered with anti-adherent material.

13. A machine according to claims 11-12, wherein the conveyor belt (3c) is a composite formed by an external layer of silicone resins on a flexible material support, preferably a natural or synthetic fiber cloth.

14. A machine according to claims 11-13, wherein the conveyor belt (3c) has a width not lower than that of the tape (5), preferably it is about 180 mm.

15. A machine according to claims 11-14, wherein the distance between the roll axes (3a) and (3e) is in the range 30 -500 mm, preferably 200-300 mm.

16. A process for printing and applying the labels which uses the labelling machine of claims 1-10, wherein:

- the tape (5) is unwound from the reel (1) by the unwinding system comprising an unwinding roll (8) and a tape tensioning device (9), enters the printing group (3) for the label overprint;
- the tape (5) enters the cutting system (2) moving in a direction perpendicular to the cutting blade (2a); the blade (2a) cuts the tape maintaining a preferably constant inclination; the contact point between the blade (2a) and counterblade (2b) during the cut moves transversally in a continuous way through the tape section (5);
- the printed label after the cut is immediately applied on the container by an applying pad (6);
- after the label application, the adhesive tape (5) is moved backward by the driving roll (3a), and the printing head (3b) starts printing near the upper edge of the label being formed;
- the tape (5) proceeds again into the cutting system (2) to form the next label.

17. A process according to claim 16, wherein the label print is carried out by a thermal transfer process.

18. A process according to claims 16-17, wherein the moving back space is L - 2 if the printing zone begins at a distance of 2 mm from the upper edge of the label.

19. A process according to claims 16-18, wherein the label text is previously programmed by the user, pref-

erably with a software inside a computer.

20. A process according to claim 19, wherein the text written on the label contains the following information: idenotification codes of the product, of the customer, suppier, producer, optionally personalized.

21. A process according to claims 19-20, wherein in a management program labels having different features as regards both the format and the text, are memorized.

22. A process according to claims 16-21, wherein the sizes and the label text of the packaging line packages can be varied from one package to another, even more times or in a continuous way, without interrupting the production cycle.

23. A process according to claim 22, wherein only one labelling machine according to one of claims 1-15 placed downhill of more packaging lines is used.

24. A process according to claims 16-23, wherein the labels have a variable length in function of the content or the text of the labels.

25. A process according to claims 16-24, to print and apply the labels which uses the labelling machine of claims 11-15, wherein:

- the tape (5) is unwound from the reel (1) by means of the unwinding system comprising an unwinding roll (8) and a tape tensioning device (9) and successively, the tape comes into contact with the conveyor belt (3c) in correspondence of the roll (3e) downhill of the reel unwinding system ; it proceeds into the printing group (3) for the label overprint, the tape is then separated from the conveyor belt in a point comprised between the printing head (3b) and the cutting system (2), at the end of the bar (3d);
- the printed label after the cutting is immediately applied on the container through an applying pad (6);
- after the label application, the adhesive tape (5) with the conveyor belt (3c) is moved backward by the driving roll (3a), to allow the print head (3b) to start printing near the upper edge of the label being formed; at this point the tape (5) enters again the cutting system (2), a new label is cut and the cycle continues.

Patentansprüche

1. Eine Etikettiermaschine zum Drucken und Anbringen von Etiketten auf Behältern, enthaltend:

- eine Klebebandrolle (1), von der die Etiketten gebildet werden;
- ein Rollenabwickelsystem, enthaltend mindestens eine Abwickelwalze (8) und eine Bandspannvorrichtung (9);
- optionale Photozelle (4);
- ein auf der Innenseite der Rolle mit Kleber versehenes Band (5);
- Druckgruppe (3), enthaltend ein Drucksystem, worin der Kontakt zwischen dem Druckkopf (3b) und dem zu bedruckenden Klebeband (5) durch eine Antriebswalze aus nichthaftendem Material (3a) vorgenommen wird, die zyklisch ihre Drehrichtung umkehrt;
- Schneidesystem (2), enthaltend:

  - eine Schneideklinge (2a), die sich senkrecht zur Richtung des zu schneidenden Bandes, von dem die Etiketten erhalten werden, bewegt; die Schneideklinge (2a) hat eine schräge Schneidkante, die einen Winkel zwischen 2° und 45° aufweist, vorzugsweise zwischen 2° und 30° bezüglich des zu schneidenden Bandes (5);
  - eine Gegenklinge (2b); die Klingen- und Gegenklingen-Schneidflächen sind mit festem Antihaftmaterial beschichtet;

- Anbringungskörper (6);

wobei das Schneidesystem (2) an die Druckgruppe (3) angrenzt.

2. Maschine nach Anspruch 1, worin die Schneidsystemgröße, entlang dem Band gemessen, kleiner als 60 mm ist, vorzugsweise 40 mm, noch bevorzugter 15-40 mm.

3. Maschine nach den Ansprüchen 1 - 2, worin die Abwickelwalze (8) von einem Motor angetrieben wird; der Anbringungskörper (6) von einer elektropneumatischen Vorrichtung (7) angetrieben wird; die Antriebswalze (3a) von einem Motor angetrieben wird, der die Walzendrehrichtung zyklisch umkehrt.

4. Maschine nach den Ansprüchen 1 - 3, worin die Schneidklinge (2a) von einem linearen pneumatischen Zylinder (2c) angetrieben wird; die Gegenklinge (2b) auf einer festen oder schwingenden Platte, vorzugsweise einer festen Platte, montiert ist; der Kontakt zwischen der Gegenklinge (2b) und der Klinge (2a) durch ein System (2d) garantiert ist, das auf die Gegenklinge (2b) oder auf die Klinge (2a) einwirkt; vorzugsweise wirkt das System (2d) auf die Klinge (2a) ein.

5. Maschine nach den Ansprüchen 1 - 4, worin die Schneidklinge (2a) im Vertikalschnitt flach ist oder

eine Krümmung mit einem Radius von 500 mm bis 6.000 mm aufweist, vorzugsweise wird eine Flachklinge verwendet.

6. Maschine nach den Ansprüchen 1 - 5, worin beide Seiten der Klinge (2a) und der Gegenklinge (2b) mit festen Antihaftmaterialien beschichtet sind.

7. Maschine nach den Ansprüchen 1 - 6, worin der Abstand L zwischen der Schneidklinge (2a) und dem Druckkopf (3b) zwischen 15 und 60 mm liegt.

8. Maschine nach den Ansprüchen 1 - 7, worin der Trägerfilm des die Etiketten bildenden Klebebandes eine Dicke von etwa 30 Mikron bis zu etwa 80 Mikron, vorzugsweise von 50 Mikron bis zu 60 Mikron, aufweist.

9. Maschine nach den Ansprüchen 1 - 8, worin die Bandbreite bis zu 180 mm beträgt, vorzugsweise von 10 mm bis 180 mm, noch bevorzugter von 30 mm bis 150 mm.

10. Maschine nach den Ansprüchen 1 - 9, worin das Band aus biaxial orientiertem Polypropylen, Polyester, Polyethylen, Polyvinylchlorid oder auch Laminaten oder allgemein aus Kunststoffverbund-Artikeln gebildet ist.

11. Maschine nach den Ansprüchen 1 - 10, worin sich das Band (5) in Kontakt mit einem Transportriemen (3c) zur Druckgruppe (3) bewegt, wobei besagter Transportriemen mit der Klebeseite des Bandes (5) von einer Walze (3e) hinter dem Abwickelsystem der Rolle (1) in Kontakt kommt, wobei er mit dem Band zwischen der Antriebswalze (3a) und dem Kopf (3b) durchläuft, und dann durch die Leiste (3d) gelöst wird, die vor der Schneidegruppe (2) angeordnet ist, um die er sich dreht wobei er sich vom Band löst; besagter Transportriemen dann von der Walze (3e) aufgenommen und erneut mit dem Band (5) in Kontakt gebracht wird, das zur Druckgruppe (3) vorrückt.

12. Maschine nach Anspruch 11, worin der Transportriemen (3c) aus nichthaftendem Material besteht, oder die Riemenoberfläche, die mit der Klebeseite des Bandes (5) in Kontakt kommt, mit einem nichthaftenden Material beschichtet ist.

13. Maschine nach den Ansprüchen 11 - 12, worin der Transportriemen (3c) ein Verbundwerkstoff ist, der aus einer Außenschicht aus Silikonharzen auf einem flexiblen Trägermaterial, vorzugsweise einem natürlichen oder synthetischen Gewebe, gebildet ist.

14. Maschine nach den Ansprüchen 11 - 13, worin der Transportriemen (3c) eine Breite hat, die nicht geringer ist als die des Bandes (5), vorzugsweise beträgt sie etwa 180 mm.

15. Maschine nach den Ansprüchen 11 - 14, worin der Abstand zwischen den Walzenachsen (3a) und (3e) zwischen 30-500 mm liegt, vorzugsweise 200-300 mm.

16. Ein Verfahren zum Drucken und Anbringen der Etiketten, das die Etikettiermaschine der Ansprüche 1-10 verwendet, worin:

- das Band (5) durch das Abwickelsystem von der Rolle (1) abgewickelt wird, das eine Abwikkelwalze (8) und eine Bandspannvorrichtung (9) enthält, es in die Druckgruppe (3) zum Etikettenüberdruck eintritt;
- das Band (5) in das Schneidesystem (2) eintritt, wobei es sich in einer Richtung senkrecht zur Schneidklinge (2a) bewegt; die Klinge (2a) das Band unter Beibehaltung einer vorzugsweise konstanten Neigung schneidet; sich der Kontaktpunkt zwischen der Klinge (2a) und der Gegenklinge (2b) während des Schnitts kontinuierlich quer durch den Schnitt des Bandes (5) bewegt;
- das bedruckte Etikett nach dem Schnitt durch einen Anbringungskörper (6) sofort auf dem Behälter angebracht wird;
- nach der Etikettenanbringung das Klebeband (5) von der Antriebswalze (3a) rückwärts bewegt wird und der Druckkopf (3b) das Drucken nahe der oberen Kante des zu bildenden Etiketts beginnt;
- das Band (5) wieder in das Schneidesystem (2) vorrückt, um das nächste Etikett zu bilden.

17. Verfahren nach Anspruch 16, worin der Etikettendruck durch einen thermischen Transferprozess durchgeführt wird.

18. Verfahren nach den Ansprüchen 16-17, worin der Rückbewegungsraum L - 2 beträgt, wenn die Druckzone in einem Abstand von 2 mm von der oberen Kante des Etiketts beginnt.

19. Verfahren nach den Ansprüchen 16-18, worin der Etikettentext zuvor vom Benutzer programmiert wird, vorzugsweise mit einer Software in einem Computer.

20. Verfahren nach Anspruch 19, worin der auf dem Etikett geschriebene Text die folgende Information enthält: Kenncodes des Produktes, des Kunden, Lieferanten, Herstellers, wahlweise personalisiert.

21. Verfahren nach den Ansprüchen 19-20, worin in einem Management-Programm die Etiketten, die verschiedene Merkmale haben, was sowohl das Format

als auch den Text betrifft, gespeichert werden.

22. Verfahren nach den Ansprüchen 16-21, worin die Größen und der Etikettentext der Packungen der Verpackungslinie von einer Packung zur anderen variiert werden kann, sogar mehrere Male oder in kontinuierlicher Form, ohne den Produktionszyklus zu unterbrechen.

23. Ein Verfahren nach Anspruch 22, worin nur eine Etikettiermaschine nach einem der Ansprüche 1-10, die hinter mehreren Verpackungslinien angeordnet ist, verwendet wird.

24. Ein Verfahren nach den Ansprüchen 16-23, worin die Etiketten in Abhängigkeit vom Inhalt oder dem Text der Etiketten eine veränderliche Länge haben.

25. Ein Verfahren nach den Ansprüchen 16-24 zum Drucken und Anbringen der Etiketten, das die Etikettiermaschine der Ansprüche 11-15 verwendet, worin:

- das Band (5) von der Rolle (1) durch ein Abwickelsystem abgewickelt wird, das eine Abwikkelwalze (8) und eine Bandspannvorrichtung (9) enthält, und daraufhin das Band in Übereinstimmung mit der Walze (3e) hinter dem Rollenabwickelsystem in Kontakt mit dem Transportriemen (3c) gelangt; es in die Druckgruppe (3) zur Etikettenüberdruckung vorrückt, das Band dann am Ende der Leiste (3d) an einem Punkt vom Transportriemen getrennt wird, der zwischen dem Druckkopf (3b) und dem Schneidesystem (2) enthalten ist;
- das bedruckte Etikett nach dem Schneiden unmittelbar über einen Anbringungskörper (6) auf dem Behälter angebracht wird;
- nach der Etikettenanbringung das Klebeband (5) mit dem Transportriemen (3c) durch die Antriebswalze (3a) zurückbewegt wird, um dem Druckkopf (3b) zu gestatten, nahe der oberen Kante des zu bildenden Etiketts das Drucken zu beginnen; an diesem Punkt das Band (5) erneut in das Schneidesystem (2) eintritt, ein neues Etikett geschnitten wird und der Zyklus weitergeht.

Revendications

1. Machine d'étiquetage, destinée à imprimer et à appliquer des étiquettes sur des récipients, comprenant :

- une bobine de bande adhésive (1) depuis laquelle les étiquettes sont formées ;
- un système de déroulement de bobine comprenant au moins un rouleau déroulant (8) et un dispositif tenseur de bande (9) ;
- une photocellule facultative (4) ;
- une bande (5) collée sur le côté interne de la bobine ;
- un groupe d'impression (3), comprenant un système d'impression dans lequel le contact entre la tête d'impression (3b) et la bande adhésive à imprimer (5) est effectué par un rouleau d'entraînement en matériau anti-adhérent (3a), qui change de direction de rotation de manière cyclique ;
- le système de coupe (2) comprenant :
- une lame de coupe (2a) qui se déplace perpendiculairement à la direction de la bande à couper, dans laquelle les étiquettes sont obtenues ; la lame de coupe (2a) a un tranchant incliné selon un angle compris entre 2° et 45 °, de préférence entre 2° et 30° par rapport à la bande (5) à couper ;
- une contrelame (2b) ; les surfaces de coupe de la lame et de la contrelame sont couvertes d'anti-adhésifs solides ;
- un tampon applicateur (6) ;

le système coupe (2) étant adjacent au groupe d'impression (3).

2. Machine selon la revendication 1, dans laquelle la taille du système de coupe, mesurée le long de la bande, est inférieure à 60 mm, de préférence 40 mm, de façon encore plus préférée entre 15- 40 mm.

3. Machine selon les revendications 1-2, dans laquelle le rouleau déroulant (8) est entraîné par un moteur ; le tampon applicateur (6) est entraîné par un dispositif électropneumatique (7) ; le rouleau d'entraînement (3a) est entraîné par un moteur inversant de manière cyclique la direction de rotation du rouleau.

4. Machine selon les revendications 1-3, dans laquelle la lame de coupe (2a) est entraînée par un cylindre pneumatique linéaire (2c) ; la contrelame (2b) est montée sur une plaque fixe ou oscillante, fixe de préférence ; le contact entre la contrelame (2b) et la lame (2a) est assuré par un système (2d) agissant sur la contrelame (2b) ou sur la lame (2a) ; de préférence, le système (2d) agit sur la lame (2a).

5. Machine selon les revendications 1-4, dans laquelle la lame de coupe (2a), dans sa section verticale, est plate ou a une courbure d'un rayon de 500 mm à 6 000 mm, une lame plate étant de préférence utilisée.

6. Machine selon les revendications 1-5, dans laquelle les deux faces de la lame (2a) et de la contrelame (2b) sont couvertes d'anti-adhésifs solides.

7. Machine selon les revendications 1-6, dans laquelle

la distance L entre la lame de coupe (2a) et la tête d'impression (3b) s'étend de 15 à 60 mm.

8. Machine selon les revendications 1-7, dans laquelle le film de support de la bande adhésive formant les étiquettes a une épaisseur d'environ 30 microns à environ 80 microns, de préférence de 50 microns à 60 microns.

9. Machine selon les revendications 1-8, dans laquelle la largeur de bande est au maximum de 180 mm, de préférence de 10 mm à 180 mm, de façon encore plus préférée de 30 mm à 150 mm.

10. Machine selon les revendications 1-9, dans laquelle la bande est formée de polypropylène biorienté, de polyester, de polyéthylène, de polychlorure de vinyle, ou également de laminés, ou d'articles généralement couplés à du plastique.

11. Machine selon les revendications 1-10, dans laquelle la bande (5) se déplace vers le groupe d'impression (3) en contact avec un tapis roulant (3c), ledit tapis roulant venant en contact avec le côté adhésif de la bande (5) d'un rouleau (3e) au-dessous du niveau du système de déroulement de la bobine (1), passant avec la bande entre le rouleau d'entraînement (3a) et la tête (3b), et étant alors désaccouplé par la barre (3d), placée avant le groupe de coupe (2), autour de laquelle il tourne en se détachant de la bande ; ledit tapis roulant étant ensuite accouplé avec le rouleau (3e) puis de nouveau amené en contact avec la bande (5) avançant vers le groupe d'impression (3).

12. Machine selon la revendication 11, dans laquelle le tapis roulant (3c) est en matériau anti-adhérent, ou la surface de courroie venant en contact avec le côté adhésif de la bande (5) est couverte de matériau anti-adhérent.

13. Machine selon les revendications 11-12, dans laquelle le tapis roulant (3c) est un matériau composite formé d'une couche externe de résines de silicone sur un support matériel flexible, de préférence un tissu de fibres naturelles ou synthétiques.

14. Machine selon les revendications 11-13, dans laquelle le tapis roulant (3c) a une largeur non inférieure à celle de la bande (5), de préférence d'environ 180 mm.

15. Machine selon les revendications 11-14, dans laquelle la distance entre les axes de rouleau (3a) et (3e) est dans la plage de 30-500 mm, de préférence de 200-300 mm.

16. Processus d'impression et d'application des étiquettes utilisant la machine d'étiquetage selon les revendications 1-10, dans lequel :

- la bande (5) est déroulée de la bobine (1) par le système de déroulement comprenant un rouleau déroulant (8) et un dispositif tenseur de bande (9) et entre dans le groupe d'impression (3) pour l'impression de l'étiquette ;
- la bande (5) entre dans le système de coupe (2) en se déplaçant dans une direction perpendiculaire à la lame de coupe (2a) ; la lame (2a) coupe la bande selon une inclinaison de préférence constante ; le point de contact entre la lame (2a) et la contrelame (2b) pendant le coupe se déplace transversalement de façon continue à travers la section de bande (5) ;
- l'étiquette imprimée, une fois coupée, est immédiatement appliquée sur le récipient par un tampon applicateur (6) ;
- après l'application de l'étiquette, la bande adhésive (5) est ramenée en arrière par le rouleau d'entraînement (3a) et la tête d'impression (3b) démarre l'impression près du bord supérieur de l'étiquette en cours de formation ;
- la bande (5) entre à nouveau dans le système de coupe (2) pour former l'étiquette suivante.

17. Processus selon la revendication 16, dans lequel l'impression de l'étiquette est effectuée par un processus de transfert thermique.

18. Processus selon les revendications 16-17, dans lequel l'espace de déplacement vers l'arrière est L-2 si la zone d'impression démarre à une distance de 2 mm du bord supérieur de l'étiquette.

19. Processus selon les revendications 16-18, dans lequel le texte de l'étiquette est d'abord programmé par l'utilisateur, de préférence avec un logiciel informatique.

20. Processus selon la revendication 19, dans lequel le texte écrit sur l'étiquette contient les informations suivantes : codes d'identification du produit, du client, du fournisseur, du producteur, personnalisés facultativement.

21. Processus selon les revendications 19-20, dans lequel dans un programme de gestion, des étiquettes ayant des caractéristiques différentes aussi bien en termes de format que de texte sont mémorisées.

22. Processus selon les revendications 16-21, dans lequel les formats et le texte des étiquettes de cartons, sur une ligne d'emballage, peuvent être modifiés d'un carton à un autre, voire plusieurs fois de suite ou de façon continue, sans interrompre le cycle de production.

23. Processus selon la revendication 22, dans lequel seule une machine d'étiquetage selon l'une des revendications 1-10, placée au-dessous du niveau de plusieurs lignes d'emballage, est utilisée.

24. Processus selon les revendications 16-23, dans lequel les étiquettes ont une longueur variable dépendant du contenu ou du texte des étiquettes.

25. Processus selon les revendications 16-24, destiné à imprimer et appliquer les étiquettes, utilisant la machine d'étiquetage des revendications 11-15, dans lequel :

- la bande (5) est déroulée de la bobine (1) au moyen du système de déroulement comprenant un rouleau déroulant (8) et un dispositif tenseur de bande (9) et, à la suite, la bande entre en contact avec le tapis roulant (3c) en correspondance avec le rouleau (3e) au-dessous du niveau du système de déroulement de la bobine ; elle passe dans le groupe d'impression (3) pour l'impression d'une étiquette, puis la bande est séparée du tapis roulant à un point compris entre la tête d'impression (3b) et le système de coupe (2), à l'extrémité de la barre (3d) ;
- l'étiquette imprimée après la coupe est immédiatement appliquée sur le récipient au moyen d'un tampon applicateur (6) ;
- après l'application de l'étiquette, la bande adhésive (5), avec le tapis roulant (3c), est déplacée vers l'arrière par le rouleau d'entraînement (3a), pour permettre à la tête d'impression (3b) de démarrer l'impression près du bord supérieur de l'étiquette en cours de formation ; à ce stade, la bande (5) entre de nouveau dans le système de coupe (2), une nouvelle étiquette est découpée, et le cycle se poursuit.

Fig. 1

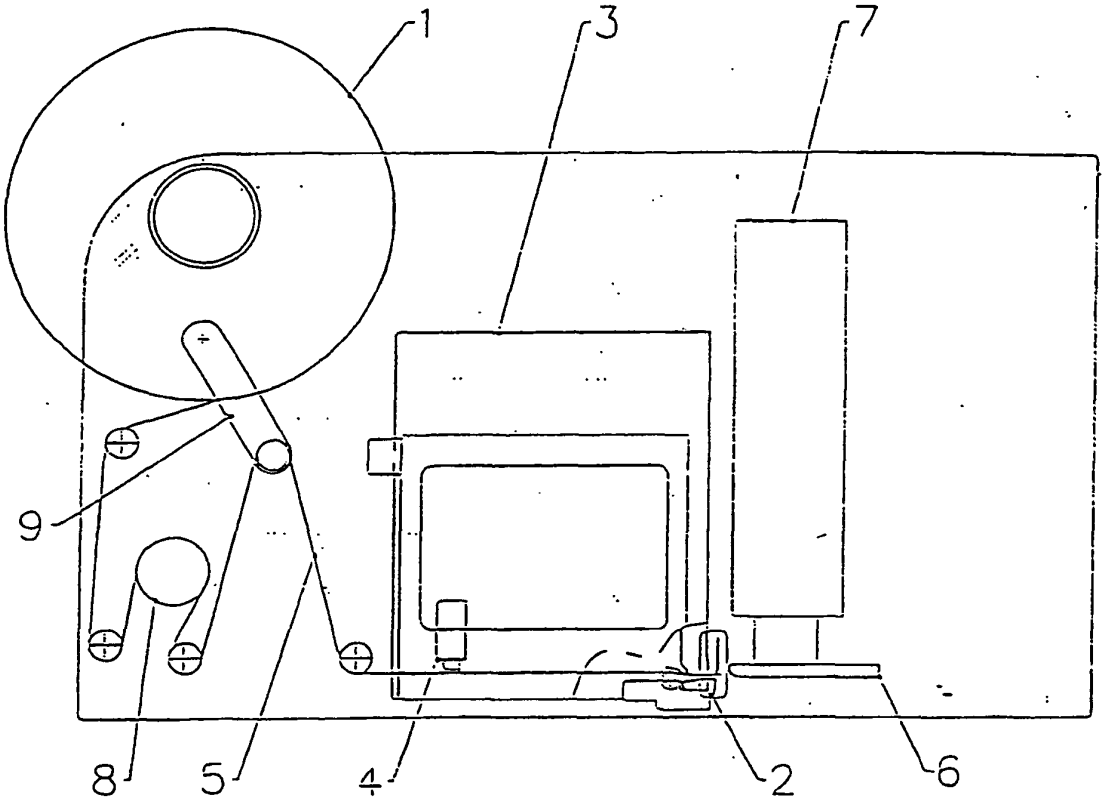

Fig. 2

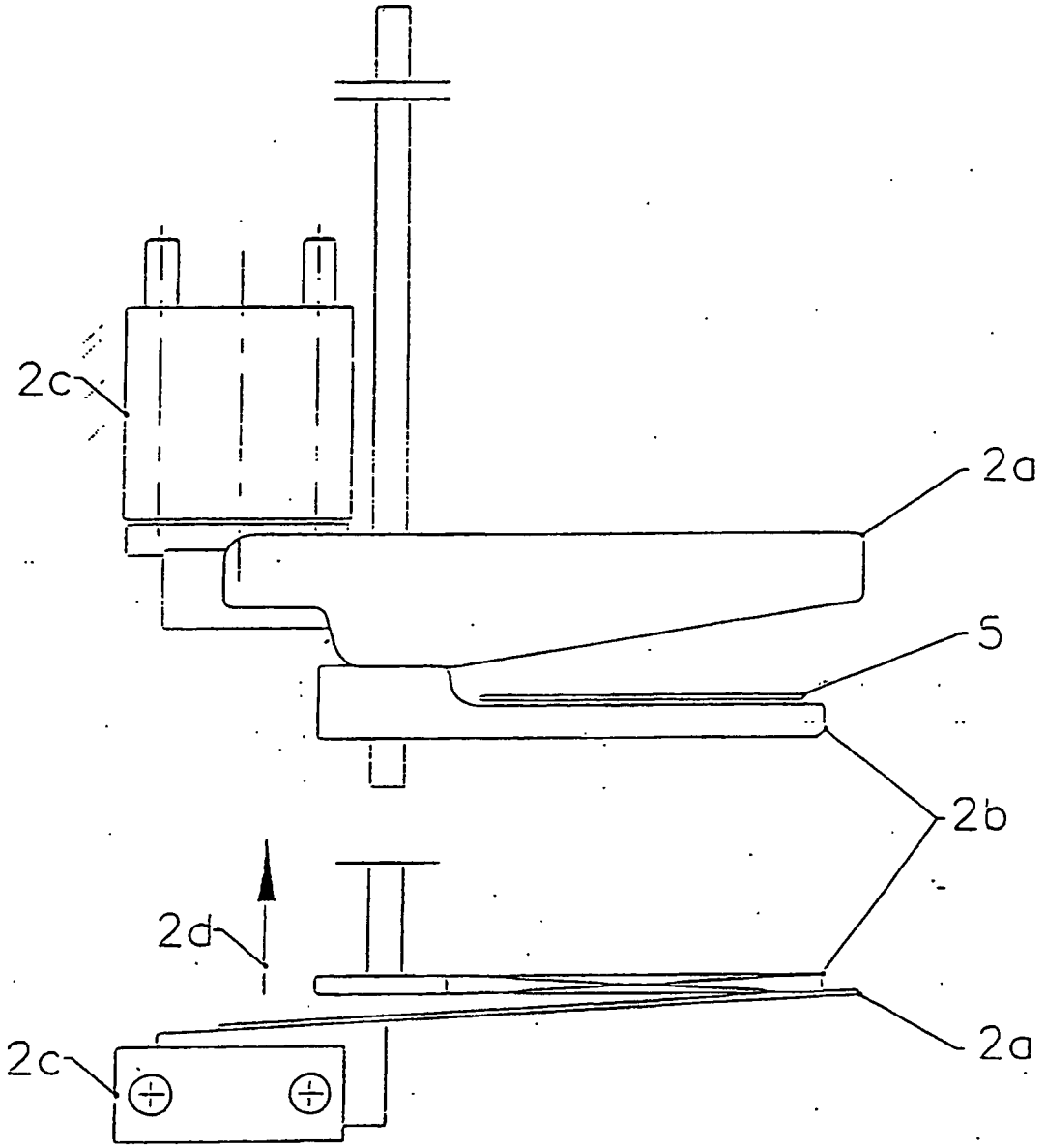

Fig. 3

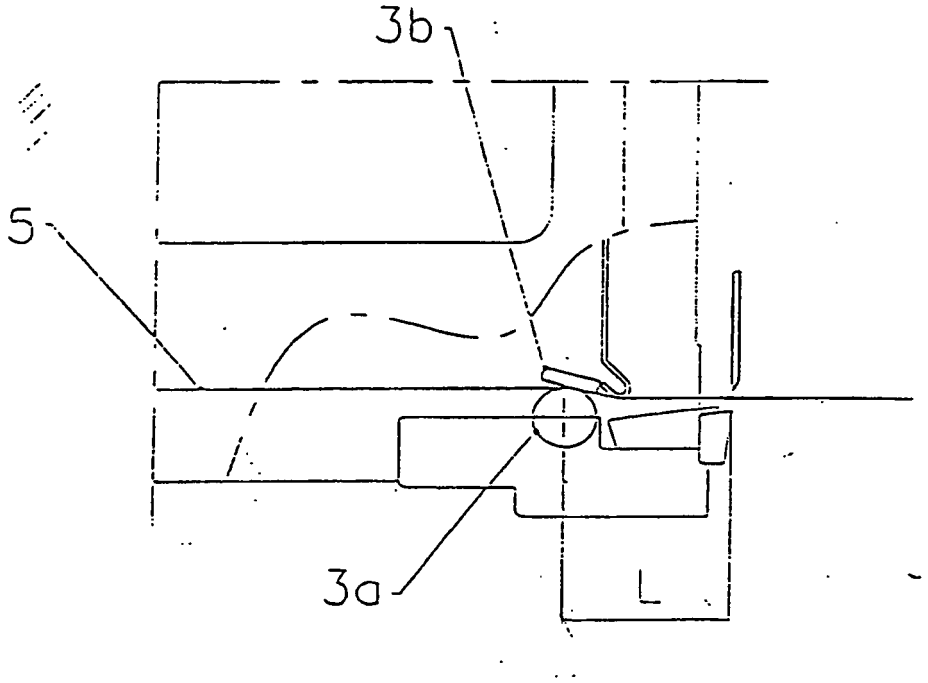

Fig. 4

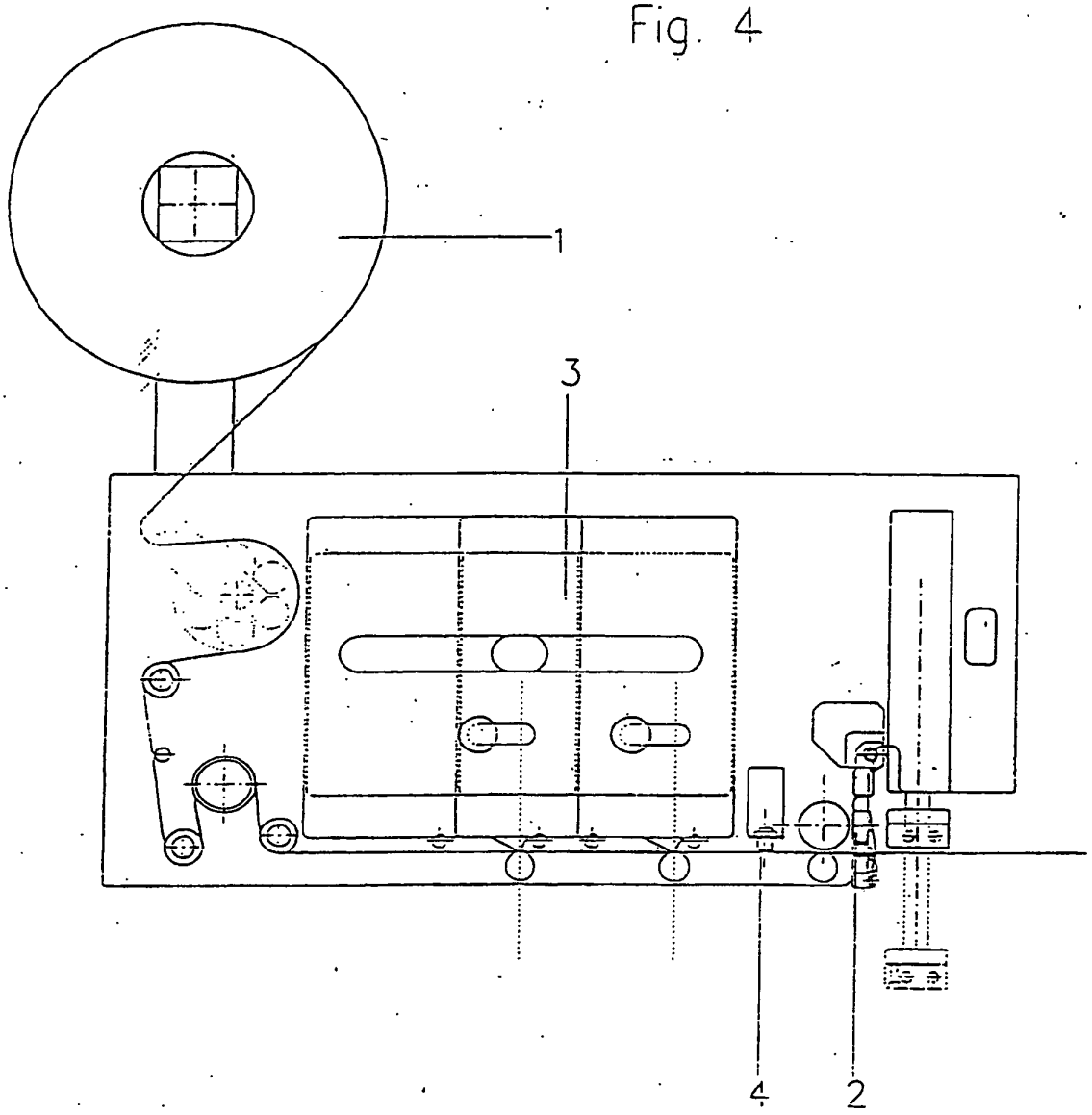

Fig. 5

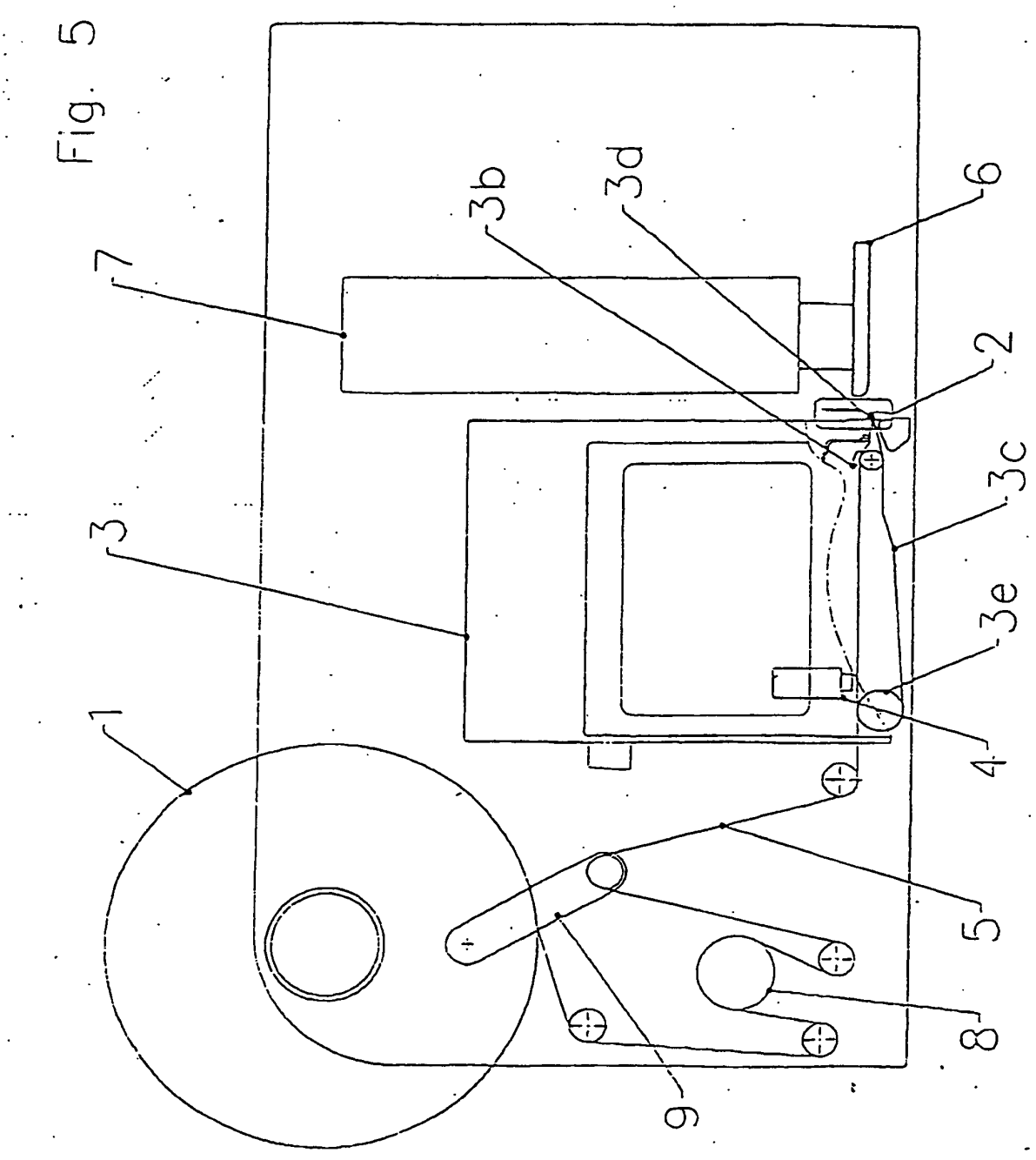

Fig. 6