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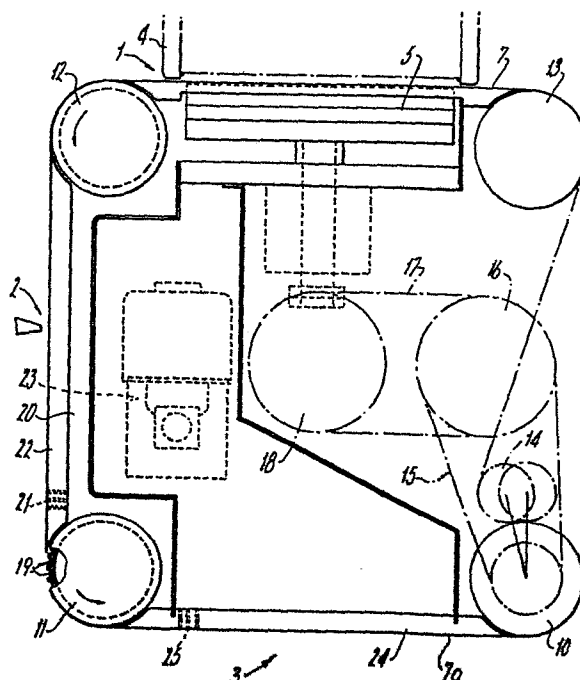
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(54) Labelling apparatus and method.

(57) The invention provides labelling apparatus and a method of applying labels to articles. The labelling apparatus comprises an adhesive applying station (2) and a label applying station (3), means (7) for successively transporting plain paper labels from a supply thereof first to the adhesive applying station (2) and then to the label applying station (3), means at said adhesive applying station for applying adhesive to a surface of each label, means for successively transporting articles to be labelled to said label applying station, and means at said label applying station for applying the labels with adhesive thereon to said articles.

Fig.1.



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LABELLING APPARATUS AND METHOD

This invention relates to a labelling apparatus and method.

Most labelling systems in general use at the present time utilise pre-gummed labels, i.e., labels
05 which have previously been coated with an adhesive. Such pre-gummed labels are very expensive compared to plain paper labels, i.e., labels which have not been pre-coated with adhesive.

The present invention has as its object to
10 provide a labelling apparatus and method which utilises relatively cheap plain paper labels.

The present invention provides labelling apparatus comprising an adhesive applying station and a label applying station, means for successively
15 transporting plain paper labels from a supply thereof first to the adhesive applying station and then to the label applying station, means at said adhesive applying station for applying adhesive to a surface of each label, means for successively transporting
20 articles to be labelled to said label applying station, and means at said label applying station for applying the labels with adhesive thereon to said articles.

The present invention also provides a method of
25 applying labels to articles comprising successively transporting plain paper labels from a supply thereof first to an adhesive applying station and then to a label applying station, applying adhesive to a surface of each label at said adhesive applying
30 station, successively transporting articles to be labelled to said label applying station, and applying the labels with adhesive thereon to the articles at said label applying station.

The plain paper labels may be supplied to said
35 transport means from a magazine containing a stack of

individual plain paper labels and may be transferred to said transport means by vacuum, feed roller means or the like. Alternatively the plain paper labels may be in a continuous roll and suitable cutting means provided for cutting individual labels from the roll.

Said transport means may comprise any suitable conveyor or like means, e.g., may comprise a conveyor, roller or the like having apertures therein and means for applying vacuum through said apertures to maintain the labels in contact with the surface of the transport means. Thus, for example, the transport means may comprise a conveyor in the form of closely spaced parallel endless belts and said vacuum applying means may be provided on the opposite side of the conveyor to the label transporting surface thereof and may be adapted to apply the vacuum through the spaces between the parallel belts.

The means for applying adhesive to a surface of each label may be of any suitable kind and may comprise, for example, one or more spray nozzles for spraying adhesive onto a surface of each label or one or more jet printing nozzles.

Where the adhesive is applied using one or more jet printing nozzles then these may be of the drop-on-demand or continuous drop kind. Where the jet printing means is of the drop-on-demand kind then it may comprise a plurality of jet printing nozzles each of which is adapted to direct single individual droplets of adhesive onto said surface of a label and control means for selectively and individually controlling said nozzles so that droplets of adhesive can be directed onto said surface of a label in a required predetermined pattern. If the jet printing means is of the continuous kind then the means may comprise one or more nozzles each adapted to produce a continuous single stream of droplets of adhesive

and electrostatic or other suitable means for directing the individual droplets of adhesive to selected positions on a said surface of a label or to a drain or gutter.

05 According to a preferred embodiment of the present invention the adhesive applying means comprises means for directing a continuous stream of drops of a said liquid in a direction to traverse and not impinge on a surface to which the liquid is to be
10 applied, means for effecting relative movement between a said stream of drops and a said surface in a direction perpendicular to the direction of travel of the stream of drops, means for selectively electrically charging the drops of liquid in said
15 stream, and means for establishing a steady electric field about the path of travel of said stream of drops for deflecting the electrically charged drops onto said surface.

 The means for applying the labels with adhesive
20 thereon to said articles may be of any suitable kind and may comprise, for example, a plurality of air jets for blowing the labels onto the articles, a wrap-around belt, suitable reciprocating means, or the like.

25 The invention will be more particularly described with reference to the accompanying drawings, in which:-

 Figure 1 is a diagrammatic side elevation of one embodiment of labelling apparatus according to
30 the present invention,

 Figure 2 is a diagrammatic front elevation of the apparatus shown in Figure 1,

 Figure 3 is a diagrammatic side elevation of another embodiment of labelling apparatus according
35 to the present invention,

 Figure 4 is a fragmentary enlarged detail view of a modification of the apparatus shown in Figure 3,

Figure 5 is a side elevation of another embodiment of labelling apparatus according to the present invention, and

05 Figure 6 is a diagrammatic representation of one form of adhesive applying means suitable for use with labelling apparatus of the present invention.

Referring to Figures 1 and 2 of the drawings it will be seen that the apparatus illustrated therein comprises a plain paper label supply station 1, an
10 adhesive applying station 2 and a label applying station 3.

At the label applying station 1 there is provided a label magazine 4 adapted to contain a stack of plain paper labels and a vacuum label
15 extractor 5 which is connected to a source of vacuum and which is intermittently controllable by a cut-off valve 6 to exert vacuum pressure on the lowermost label in the magazine 4 and draw this from the magazine onto an endless conveyor 7. As will be seen
20 more clearly from Figure 2 the endless conveyor 7 comprises a plurality of parallel endless belts 8 having spaces 9 therebetween, the extractor nozzles 5a of the label extractor 5 being aligned with the spaces 9 between the endless belts 8. The endless
25 belts 8 extend around a driven roller 10, idler rollers 11, 12 and 13 and a tensioning roller 14.

The driven roller 10 is driven by a drive belt 15 which extends round a clutch and brake mechanism 16 which in turn is driven through a drive belt 17 by a
30 motor 18. The idler rollers 11 and 12 are hollow and have apertures 19 in the peripheral wall thereof which are aligned with the spaces 9 between the endless belts 8. The interiors of the idler rollers 11 and 12 are connected to a source of vacuum so that
35 vacuum will be exerted through the apertures 19 to maintain the labels in contact with the endless

belts 8 as these pass round the rollers 11 and 12.

From the label supply station 1 the labels are carried on the conveyor 7 around the idler roller 12 to the adhesive applying station 2, the labels being
05 maintained in contact with the conveyor 7 by establishing an area of low pressure 20 beneath the conveyor 7 which exerts vacuum pressure on the labels through apertures 21 provided in a platen 22 over which the conveyor 7 passes, the apertures 21 being
10 aligned with the spaces 9 between the belts 8 of the conveyor 7. The adhesive applying means may be of any suitable kind, e.g., may be of any of the kinds hereinbefore described.

From the adhesive applying station 2 the labels
15 are transported on the conveyor 7 around the idler roller 11 to the label applying station 3. At the label applying station 3 the conveyor 7 travels over a platen 24 which, like the platen 22, has apertures 25 therein which are aligned with the spaces 9
20 between the belts 8. Some of the apertures 25 are connected to a source of vacuum for maintaining the labels in contact with the conveyor 7 whilst others of the apertures 25 are connected to the source of air under pressure 23 for transferring the labels
25 from the conveyor 7 onto articles to be labelled. Although not shown in the drawings the articles to be labelled are transported on a suitable conveyor which extends parallel to the reach 7a of the conveyor 7 at the label applying station.

30 The label applying apparatus illustrated in Figures 1 and 2 may be adapted for either continuous or intermittent operation. Where it is adapted for continuous operation then the labels will travel continuously from the label supply station 1 to the
35 label applying station 3 and will have adhesive continuously supplied thereto at the adhesive

applying station 2. Where the apparatus is designed for intermittent operation then the labels will be transported from the label supplying station 1 to the adhesive applying station 2 where their travel will
05 be interrupted whilst the adhesive is applied thereto. The travel of the labels can be interrupted either by stopping the conveyor 7 or by providing suitable stops which can be extended through the spaces 9 between the belts 8 at the adhesive applying
10 station 2 so that the leading edge of each label will engage the stops so that the label skids on the conveyor 7 whilst the adhesive is applied thereto and the stops then retracted to allow the label to continue its travel.

15 The labelling apparatus illustrated in Figures 3 and 4 is for applying labels to bottles, cans or other cylindrical articles. As will be seen the apparatus comprises a label magazine 26, a feed roller 27 or other suitable feed mechanism for feeding the
20 labels one at a time to an adhesive applying station 28, a conveyor 29 for transporting bottles or other similar articles 30 to a label applying station 31, and a wrap-around belt 32 for wrapping the labels with adhesive thereon around the articles 30. The
25 adhesive applying station 28 comprises a vacuum box or like means 33 having an apertured wall on which the labels are held by vacuum pressure whilst adhesive is applied thereto by a spray nozzle 34 or other suitable adhesive applying means.

30 The labelling machine illustrated in Figure 5 is for use with labels which are printed on and cut from a web and comprises a support 35 on which is mounted a supply reel 36 of printed web, a coder 37, label cutting means 38, a web matrix take-up reel 40,
35 adhesive applying means 41 and label applying means 42.

Where the labels printed on the web 43 are to

have a code marking applied thereto by the coder 37, which coder may be of any suitable form and may comprise, for example, suitable ink jet printing means, then the web 43 is taken off the supply web 36, over a tension roller 44, around a guide roller 45, through suitable coder registration means 46, past coder 37 so that code markings can be applied to the labels and on to suitable cutter registration means 47. Where code marking of the labels is not required then the web 43 is taken from the supply reel 36 around a tension roller 48 and then direct to the cutter registration means 47. From the cutter registration means 47 the label web passes by way of driven feed rollers 49 to the cutting means 38. The cutting means 38 comprises opposed die cutting rollers which are adapted to completely sever the labels from the web matrix 43a but leave them retained in the web matrix. From the cutting means 39 the web passes between guide plates 50 to a vacuumised label transport 51 on which the labels are retained by suction or vacuum whilst the web matrix 43a from which the labels are removed continues on and is re-wound on matrix take-up reel 40. The vacuumised label transport 51 comprises spaced hollow perforate rollers 52, one of which is driven, and spaced guide rollers 52a around which a series of spaced parallel belts 53 extend and means for maintaining the pressure within the rollers 52 and on the underside of the reach 54 of the belts 53 below atmospheric so that the labels will be retained on the rollers 52 and belts 53 by vacuum pressure exerted through the perforations in the rollers 52 and the spaces between the belts 53. The label transport 51 transports the labels from the adhesive applying means 41 to the label applying means 42.

The adhesive applying means 41 may be of any suitable kind and may, for example, be of any of the

kinds herein described. Where the adhesive applying means is capable of applying adhesive to moving labels then the label transport 51 may operate continuously. Otherwise the label transport may be
05 operated intermittently. Where desired or necessary suitable label sensing means 55 may be provided downstream of the adhesive applying means 41 for providing a control signal indicative of the presence of a label and so enabling the label applying means
10 42 to be suitably controlled.

Where both the coder 37 and the adhesive applying means 41 are of the jet printing kind, and possibly in other cases also, the control functions required to control the operation thereof will be the
15 same or similar and accordingly a common control means, e.g., a common microprocessor based control circuit, may be provided for controlling the operation thereof.

The label applying means 42 comprises a
20 perforate grid 56 onto which the labels are transferred from the label transport 51 and which forms one wall of an air box 57 the interior of which is maintained by a fan 58 at a pressure below atmospheric so that the labels will be retained on
25 the grid 56 by vacuum pressure. Mounted in the air box 57 is a manifold 59 which is connected to a source of air under pressure (not shown) by way of a suitable control valve (not shown). Connected to the manifold 59 are a series of tubes (not shown) the
30 other ends of which communicate with apertures in the grid 56 through which air under pressure can be applied to the labels to overcome the vacuum holding the labels on the grid and transfer the labels onto articles to be labelled which are transported past
35 the grid 56 on suitable conveyor means (not shown).

Said control valve controlling the supply of air under pressure to the manifold 59 may be actuated

by suitable control means so as to ensure that the labels are correctly applied to the articles to be labelled. Such control means may comprise a pair of photocells or other suitable detectors which are
05 arranged a predetermined distance apart at locations upstream of the grid 56 and which are adapted to detect articles to be labelled moving towards the grid 56, means for measuring the time it takes an article, e.g., the leading edge of the article to
10 travel the predetermined distance between the two detectors, means for computing the speed of travel of the article from said time measurement, and means for actuating said control valve after a suitable computed time delay so that a label will be correctly
15 applied to the article.

Whilst the apparatus of Figure 5 has been described in relation to labels which are die-cut from a web matrix and are retained in the web matrix until they are transferred to the label transport 51,
20 the apparatus is with only slight modification also suitable for use with square cut or butt cut labels, i.e., labels which extend the full width of the web 43 and which are formed by simply transversely cutting the web. For such butt cut labels the
25 die-cutting rollers 38 are replaced by a suitable cutting knife, guillotine, or the like and, since there will no longer be a web matrix to carry the labels onto the label transport 51, a pair of feed rollers or the like are interposed between the
30 cutting means and the label transport 51 for feeding the labels from the cutting means to the label transport.

Referring now to Figure 6 it will be seen that the adhesive applying means illustrated therein
35 comprises a nozzle 61 having an inlet 62 whereby it can be connected to a source of adhesive under pressure (not shown) and piezo electric stimulating means 63, e.g., in the form of a bimorph or a

unimorph. The nozzle 61 is adapted to produce a single stream 63 of adhesive which under the stimulation of the stimulating means 63 breaks up into uniformly spaced and uniformly sized drops 65 which are directed towards a drain or gutter 66 along a path which traverses and is perpendicular to the path of travel of a label web 67 extending between a feed roller 68 and a take up roller 69. The means further comprises a charge electrode or electrodes 70 for selectively variably charging the drops 65 and a pair of opposed deflector plates 71 which are arranged on either side of the path of travel of the drops 65 and which are suitably connected into an electric circuit (not shown) for applying either a positive or negative charge thereto so that a steady electric field will be established therebetween. The path of travel of the web 67 is between the lower deflector plate 71 and the path of travel of the stream of drops 65.

When the means of Figure 6 is in use the uncharged drops 65 will pass in a straight line between the deflector plates 71 to the drain or gutter 66 whilst the charged drops 65 will be deflected onto the surface of the label web 67 at a selected position across the width thereof depending upon the strength of the charge applied to each individual drop as indicated at 65a and 65b. By selectively varying the charge applied to the selected drops 65 and coordinating this with the speed of travel of the label web 67 the selected drops 65 can be deposited at any required selected position on the web 67.

CLAIMS:

1. Labelling apparatus comprising an adhesive applying station and a label applying station, means for successively transporting plain paper labels from a supply thereof first to the adhesive applying
05 station and then to the label applying station, means at said adhesive applying station for applying adhesive to a surface of each label, means for successively transporting articles to be labelled to said label applying station, and means at said label
10 applying station for applying the labels with adhesive thereon to said articles.

2. Labelling apparatus according to claim 1, wherein said transport means comprises vacuum transport means.

15 3. Labelling apparatus according to claim 2, wherein said vacuum transport means comprises a transport surface having apertures therein and means for applying vacuum through said apertures to maintain the labels in contact with the transport
20 surface.

4. Labelling apparatus according to claim 2, wherein the vacuum transport means comprises a conveyor having a plurality of closely spaced parallel endless belts which provide said transport
25 surface and said vacuum applying means is provided on the opposite side of the conveyor to the transport surface and is adapted to apply vacuum through the spaces between the parallel belts.

5. Labelling apparatus according to claim 2, 3
30 or 4, wherein said vacuum transport means comprises at least one hollow roller having apertures in the peripheral surface thereof and means for applying vacuum from within the interior of said hollow roller to maintain the labels in contact with the outer
35 surface of the roller.

6. Labelling apparatus according to any one of the preceding claims, comprising a magazine for containing a stack of individual plain paper labels and transfer means for transferring the labels from
05 said magazine to said transport means.

7. Labelling apparatus according to any one of claims 1 to 5, wherein the label supply comprises a roll of paper web and cutting means is provided for cutting individual labels from the paper web.

10 8. Labelling apparatus according to any one of the preceding claims, wherein said adhesive applying means comprises at least one spray nozzle for spraying adhesive onto a surface of each label.

9. Labelling apparatus according to any one of
15 claims 1 to 7, wherein said adhesive applying means comprises jet printing means.

10. Labelling apparatus according to claim 9, wherein said jet printing means comprises a plurality of jet printing nozzles each of which is adapted to
20 direct single individual droplets of adhesive onto said surface of a label and control means for selectively and individually controlling said nozzles so that droplets of adhesive can be directed onto said surface of a label in a required predetermined
25 pattern.

11. Labelling apparatus according to claim 9, wherein said jet printing means comprises at least one nozzle adapted to produce a continuous single stream of droplets of adhesive and means for
30 directing the individual droplets of adhesive either to selected positions on a said surface of a label or to a drain or gutter.

12. Labelling apparatus according to claim 11, wherein means is provided for selectively variably
35 electrically charging the droplets of adhesive and wherein deflecting means is provided for establishing an electrical field about the path of travel of the

stream of droplets for deflecting the electrically charged droplets of adhesive to selected positions on said surface of a label.

13. Labelling apparatus according to claim 12,
05 wherein said at least one nozzle is arranged to direct said stream of droplets along a path which traverses and is perpendicular to the path of travel of the labels and wherein said deflecting means is adapted to deflect the selectively variably
10 electrically charged droplets out of their path of travel and onto said surface of a label.

14. Labelling apparatus according to claim 13,
wherein said deflecting means comprises opposed deflector plates for establishing a steady electric
15 field about the path of travel of said stream of droplets and wherein the path of travel of the labels is between one of said deflector plates and the path of travel of the stream of droplets of adhesive.

15. Labelling apparatus according to any one of
20 the preceding claims, wherein said label applying means comprises a plurality of air jets for blowing the labels with adhesive thereon onto the articles.

16. Labelling apparatus according to any one of
claims 1 to 14, wherein said label applying means
25 comprises a wrap-around belt.

17. A method of applying labels to articles comprising successively transporting plain paper labels from a supply thereof first to an adhesive applying station and then to a label applying
30 station, applying adhesive to a surface of each label at said adhesive applying station, successively transporting articles to be labelled to said label applying station, and applying the labels with adhesive thereon to the articles at said label
35 applying station.

Fig.1.

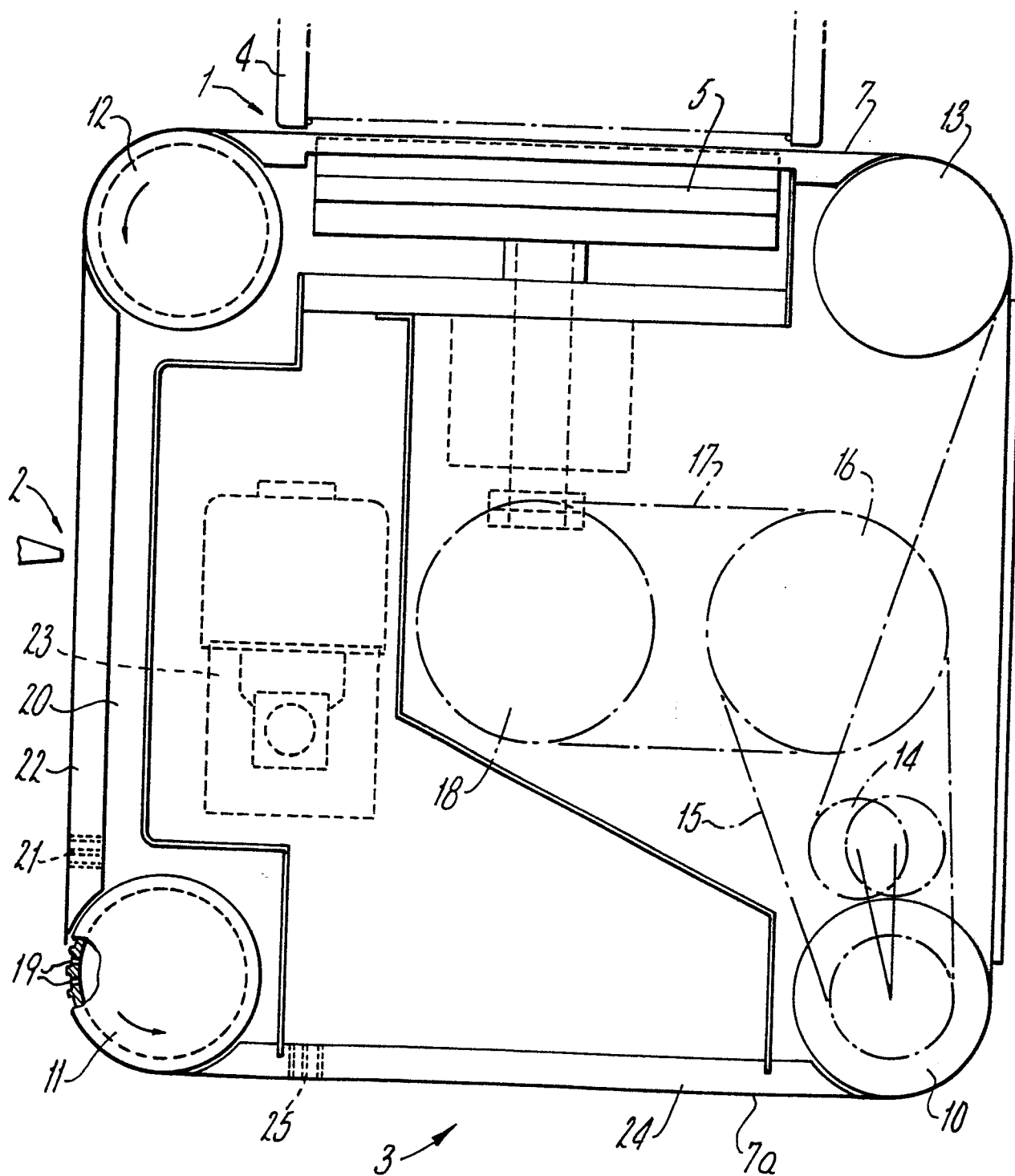
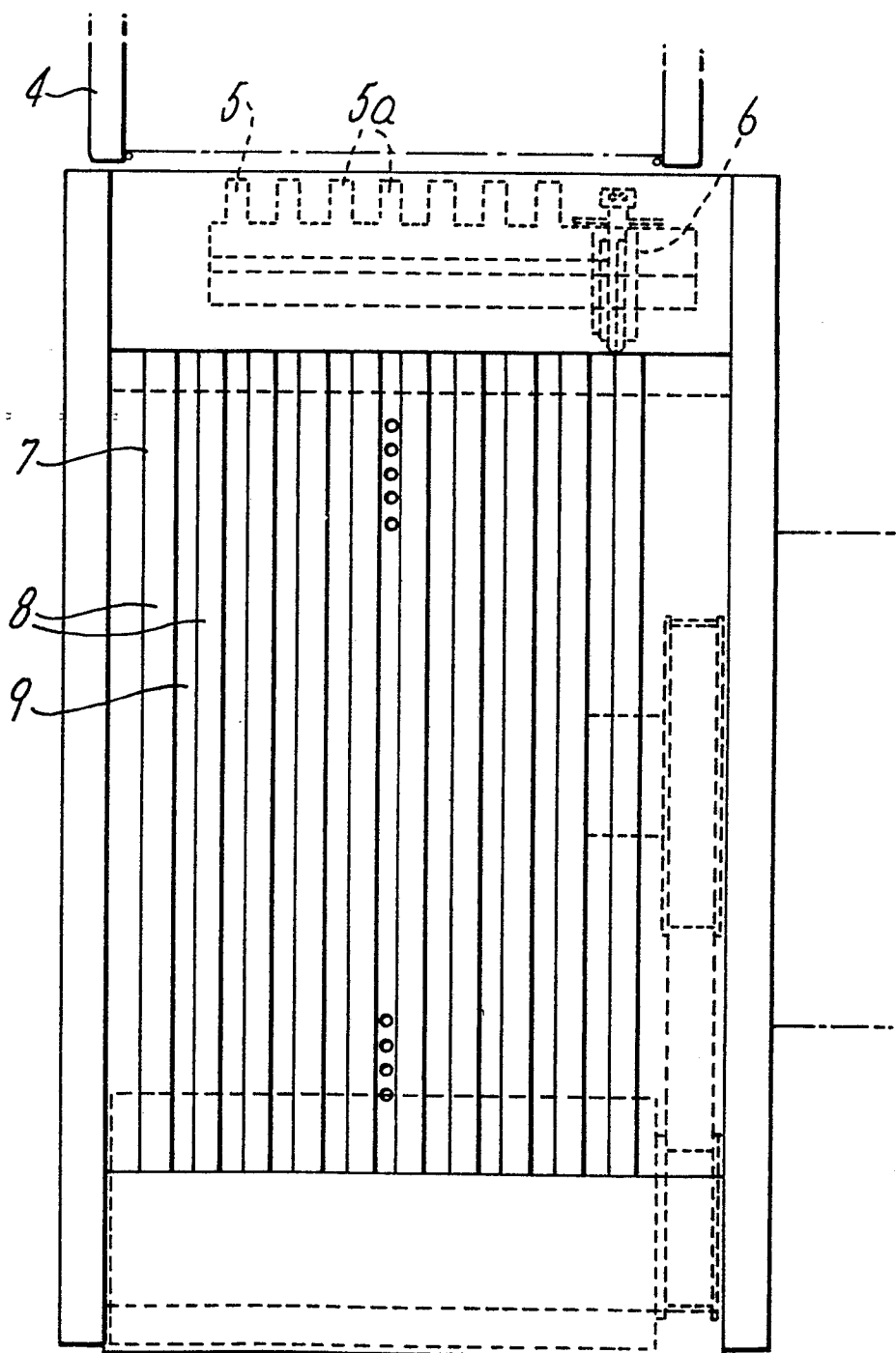
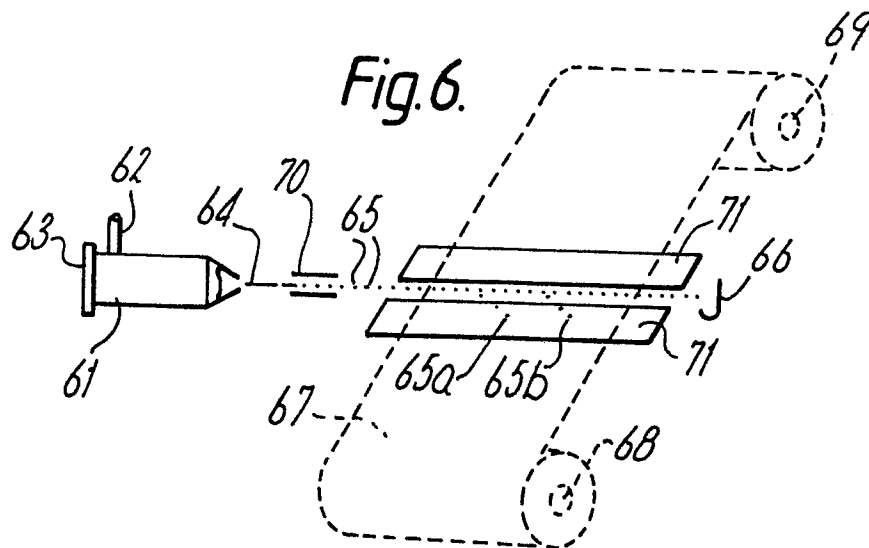
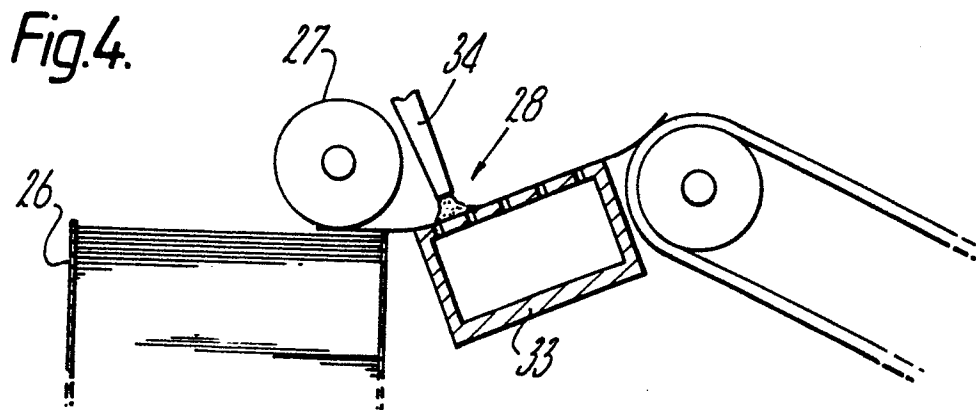
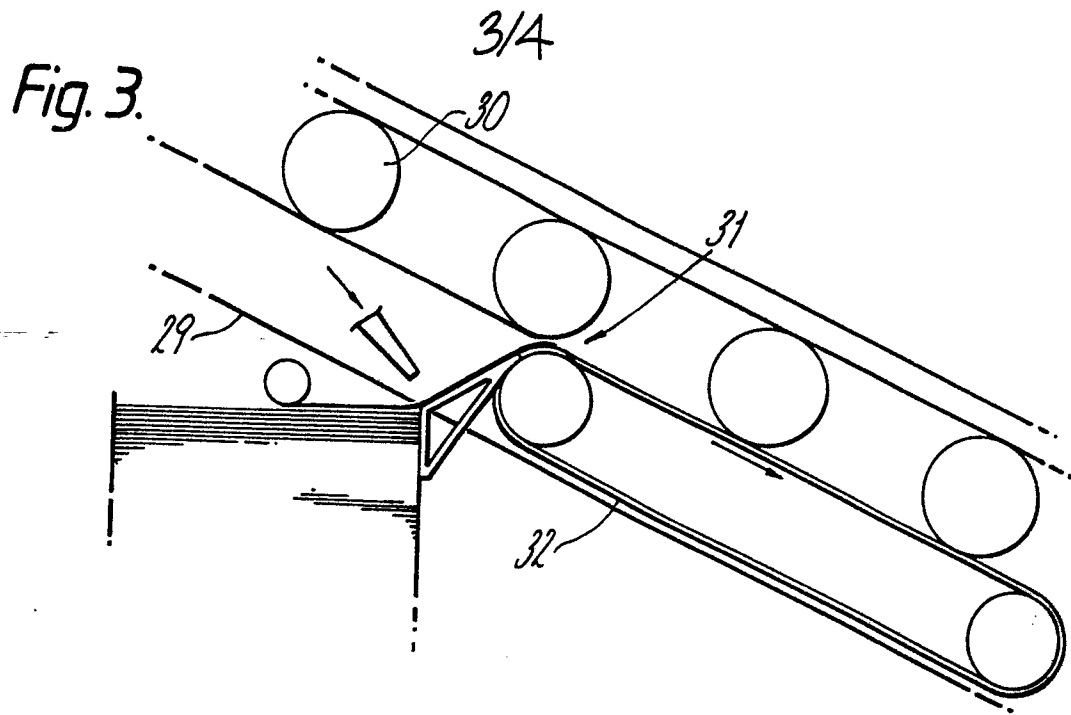


Fig. 2.





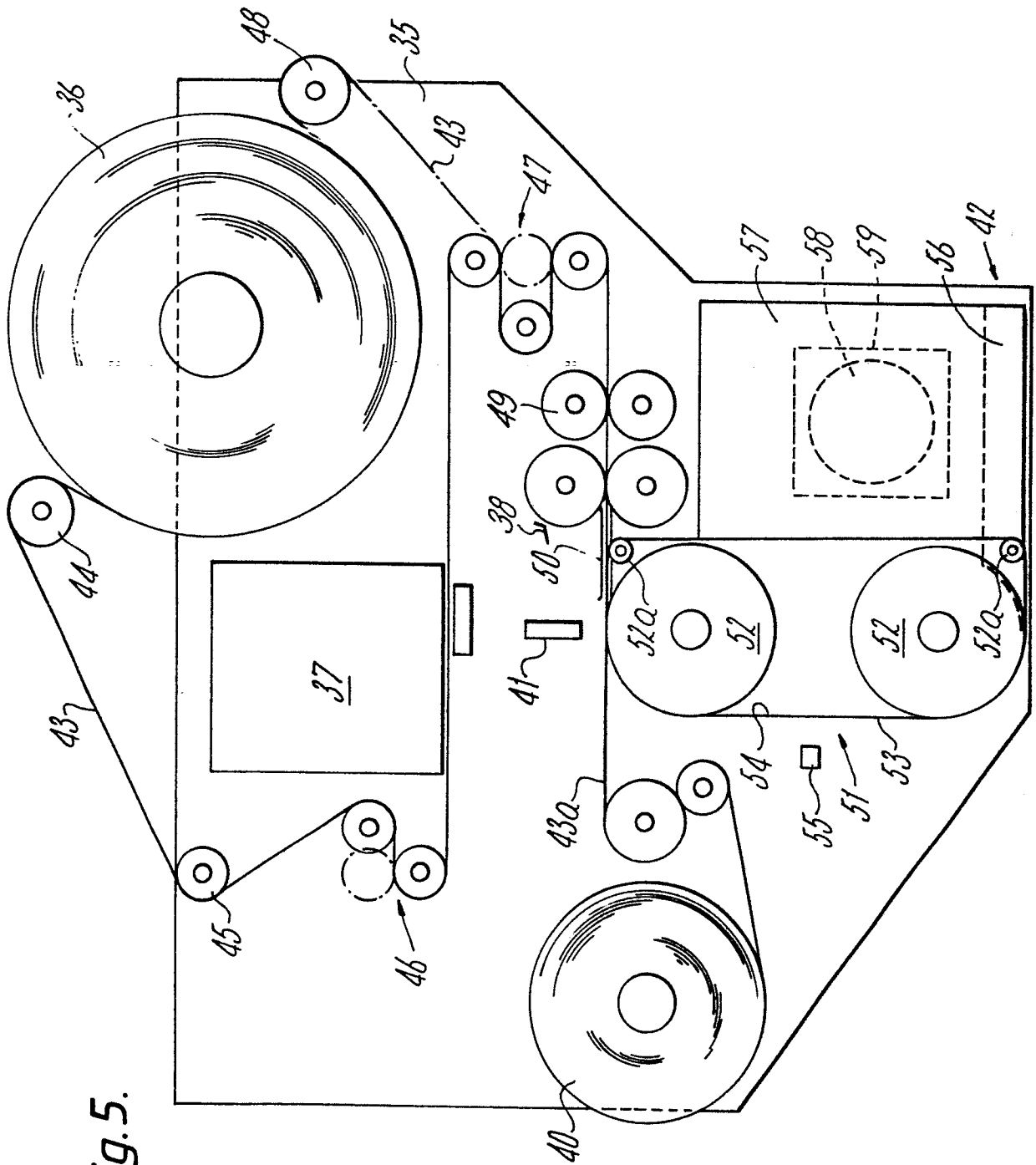


Fig. 5.