(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 011 967**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **79302590.9**

(22) Date of filing: **15.11.79**

(51) Int. Cl.³: **B 65 C 9/42**
B 65 C 9/18

(30) Priority: **28.11.78 GB 4628578**

(43) Date of publication of application:
11.06.80 Bulletin 80/12

(84) Designated Contracting States:
AT BE CH DE FR IT LU NL SE

(71) Applicant: **HARLAND MACHINE SYSTEMS LIMITED**
Agecroft Trading Estate Langley Road
Salford, M6 6JQ(GB)

(72) Inventor: **Aldous, Barry**
13 Watling Street
Bury Lancashire(GB)

(74) Representative: **Funge, Harry et al,**
SYDNEY E. M'CAW & CO Saxone House 52-56 Market Street
Manchester M1 1PP(GB)

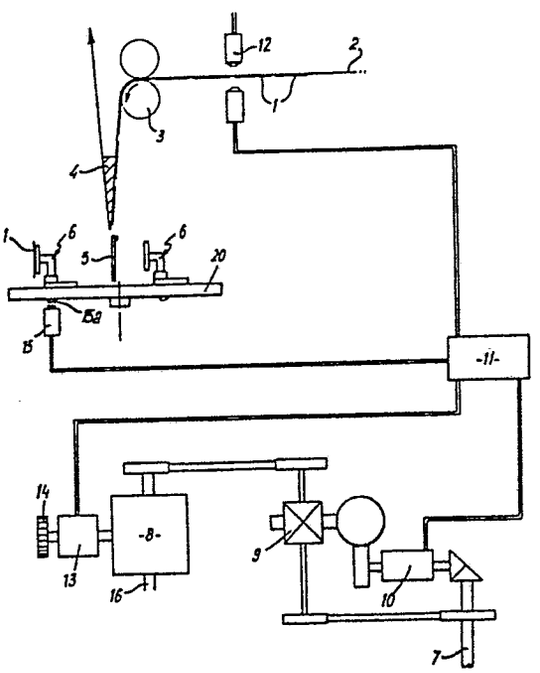
(54) **Labelling machines.**

(57) A labelling machine strips labels (1) from an continuously advancing backing tape (2) and then applies the stripped labels to objects continuously advancing on a conveyor. The labels are transferred from the backing tape to the objects with the aid of a transfer mechanism (20). The transfer mechanism (20) has a continuously movable transfer member (6) which picks up the labels at one position and applies such labels to the objects at the second position, and the movement of the transfer member at a pick-up position may be at a rate and/or in a direction which differs from the rate and/or direction of the advancement of the backing tape.

EP 0 011 967 A1

./...

Croydon Printing Company Ltd



Фиг.1

LABELLING MACHINES

This invention relates to a machine for automatically applying labels to objects whilst such objects are advancing on a conveyor.

With a known labelling machine, pressure sensitive adhesive backed labels are stripped from a backing tape, by passing the tape around an edge of a plate-shaped dispensing member, and the objects to be labelled are advanced past such edge so as to receive the labels directly therefrom.

With this arrangement, in order to achieve rapid yet accurate labelling it will be appreciated that it is desirable for the direction and rate of feed of a label to be matched with the direction and rate of advancement of an object as the label is applied to the object; and this can only be achieved in the case where the objects are advanced in continuous manner at constant speed, by effecting intermittent feed of the labels, unless of course the label spacing on the backing tape is arranged to coincide with the spacing of the objects which is not practical in all cases.

Such intermittent feed is normally achieved using a clutch and brake mechanism coupled to feed rollers for the label-carrying tape, or with a solenoid mechanism

controlling engagement of a nip roller with a tape feed roller, under the control of devices which sense the positions of individual objects and labels.

These known intermittent feed arrangements are however disadvantageous in that it is difficult to ensure reliable, trouble-free operation and careful control of the positioning of the labels on the objects whilst effecting the requisite continual acceleration and deceleration of the label-carrying tape.

An object of the present invention is to provide a labelling machine with which labels carried on a backing tape can be stripped therefrom and applied to objects advancing in continuous manner on a conveyor without requiring intermittent feed of such tape.

According to the invention therefore there is provided a labelling machine of the kind with which in use labels are stripped from an advancing backing tape and automatically applied to objects advancing on a conveyor, characterised in that said machine has a transfer mechanism which has at least one transfer member movable between a pick-up position at which it is operable to pick up a stripped label, and a release position at which it is operable to release such picked-up label for application to an advancing said object.

With this arrangement, in so far as the rate and/or direction of movement of the transfer member need not be matched to the rate and/or direction of advancement of the backing tape it will be appreciated that the operation of the transfer mechanism can be so arranged as to ensure that stripped labels are presented to the advancing

objects in a manner suited to rapid, accurate labelling even in the case where the rate and/or direction of advancement of the label-carrying backing tape is not so suited. Thus there is no need to effect intermittent feed of the backing tape and such tape may be advanced in continuous manner at a constant or substantially constant speed. Reliability and accuracy of the labelling operation can therefore be much improved.

Preferably also the movement of the or each transfer member is effected continuously and at a constant or substantially constant speed and the rate and direction of such movement match the rate and direction of advancement of the objects at said release position. This may be achieved by rotatably driving the transfer mechanism so that the or each transfer member moves through a circular path through said pick-up and release positions.

In order to achieve smooth pick-up at said pick-up position despite different rates and/or directions of movement of the transfer member, and the backing tape, the arrangement may be such that each stripped label passes to a holding device at which its movement is arrested until the transfer member reaches same, and/or the transfer member may move relative to the label during pick-up at such a speed and/or in such a direction as to ensure that smooth pick-up can be achieved. In a particularly preferred embodiment, stripped labels pass to a holding device and the transfer member moves into pick-up relationship therewith in a direction transversely to the direction of backing tape advancement. Conveniently, the transfer member may move horizontally and the backing tape may move either vertically or horizontally towards the pick-up position.

With regard to the stripping of labels from the backing tape, this may be effected in conventional manner by passing the tape around an edge of a plate-shaped member.

Where a holding device is provided as mentioned above, this may be a suction device. The or each said transfer member may also constitute a suction device. Application of reduced pressure to such suction devices may be controlled on a cyclical basis to enable labels to be held and released as and when appropriate. It will be appreciated that the present invention does not necessitate the use of control devices incorporating sensors responsive to the position of the objects and labels because intermittent label feed is not required. However, such control devices may be utilised if desired and such use thereof may well be advantageous.

With regard to the advancement of the objects this may be effected in any suitable manner although preferably the objects are advanced on a rotary turntable through said second position.

The invention may find application in the context of the application of pre-printed pressure sensitive adhesive backed labels to bottles for pharmaceutical products, and in this case the labelling machine may incorporate or be used in conjunction with appropriate auxiliary devices, for example, for pre-printing the labels, for checking the labels, for filling the bottles, and so on. It is however to be understood that the invention is not intended to be restricted to this field of application.

The invention will now be described further by way of example only and with reference to the accompanying drawings in which:-

Fig. 1 is a diagrammatic representation of parts of one form of a labelling machine according to the invention;

Fig. 2 is a diagrammatic sectional view of the transfer mechanism of the machine to a larger scale;

Fig. 3 is a diagrammatic perspective view of part of the transfer mechanism also to a larger scale;

Fig. 4 is a diagrammatic plan view of the labelling machine.

The machine is for use in applying labels 1 to objects, which labels 1 are of pressure sensitive adhesive backed form and are supplied on a backing tape 2. The tape 2 is fed, by passage of same through driven nip rollers 3, from a supply reel to a take-up reel (not shown). Between such reels the tape 1 passes around a lowermost horizontal edge of a vertical downwardly tapered plate-shaped dispensing member 4 so that the labels 1, which are spaced at regular intervals on the tape 2, are stripped from the tape 2 and applied one at a time to a holding device 5 from which they are picked up by moving fingers 6 of a transfer mechanism as described in more detail hereinafter.

The nip rollers 3 are drivably connected to an output shaft 16 of a variable speed gear box 8 which is connected to a main drive shaft 7 via a differential 9 operated by a clutch 10 controlled by a control device 11. The speed of the gear box 8 can be adjusted with a

manual control 14 or by a stepping motor 13 which is also controlled by the device 11. The drive shaft 7 may be connected to a motor which drives only the shaft 7, or, alternatively, the shaft 7 may be connected to the drive for the transfer mechanism described hereinafter.

By pre-adjustment of the speed of the gear box 8, the rate of advancement of the backing tape 2 is pre-selected in accordance with the desired rate of feed of individual stripped labels 1 to the holding device 5, as determined by the rate of movement of the aforesaid transfer fingers 6. This pre-adjustment of the gear box 8 is used to accommodate different label sizes.

The control device 11 is connected to an optical label sensor 12 which monitors the rate of passage of the leading edges of the labels 1 on the backing tape 2 and compares this with a signal derived from a sensor 15 which is representative of the rate of movement of the transfer fingers 6. The sensor 15 may be a magnetic or electromagnetic proximity switch device which operates whenever elements 15a (e.g. magnetic or magnetised material) move into close proximity with same. In the event that the rate of advancement of the labels 1 is slightly too slow or fast, as determined in relation to the rate of movement of the transfer fingers 6, automatic adjustment of the drive to the feed rollers 3 is appropriately modified by the variable speed gear box 8 (with the stepping motor 13) and/or the clutch 10, under the control of the device 11. The clutch input speed is limited to approximately 2% of the differential speed (assuming that the label length is no greater than 150mm and the spacing between labels is 3mm) so that excessive

increase in speed of label feed cannot be effected by the differential to the extent that a label is fed on top of a previously dispensed label held by the holding device 5. Adjustment of the gear box 8 can also be effected manually as desired with the control 14.

The transfer mechanism, as shown in greater detail in Fig. 2, comprises a disc-shaped structure 20 which can be rotatably driven on a shaft 21 about a vertical axis by means of a drive connected to the shaft 21. Such drive is effected in continuous manner at constant speed.

Above the disc 20 there are four equally circumferentially spaced transfer fingers 6 each of which comprises an upstanding support 22 which is rotatable about its axis relative to the disc 20 and terminates in a pad 23 having an aperture 24 therein. The fingers 6 are connected to a mechanism 25 with epicyclic characteristics having a central fixed gear 26 whereby the pads 23 maintain a fixed directional orientation during rotation of the disc 20 due to rotation of the supports 22 relative to the disc 20.

The apertures 24 are connected via internal ways 27 in the supports 22, the disc 20 and the shaft 21, and a swivel joint 28 to a source of pressurised air (not shown), and venturi devices 29 are provided to produce a suction effect at the apertures 24 in the pads 23 when connected to such source of pressurised air.

The aforesaid holding device 5, as shown in greater detail in Fig. 3 comprises a pair of vertically extending horizontally spaced suction bars 30 which are fixedly

supported in spaced disposition above the disc 20 and are connected to an air line. When actuated, a stripped label 1 is held between such members against the front (i.e. leading) sides thereof by suction.

The transfer mechanism is positioned such that the fingers 6 pass between the suction members 30 from behind, with the pads 23 facing towards any label 1 held thereto, as the disc 20 rotates.

It will therefore be seen that a label can be smoothly picked up by each finger 6 if suction is applied to such finger 6 and the label releases from the holding device 5 as the finger 6 approaches the label 1.

Such control of suction at the pads 23 is effected by a valve plate built into the base of each support 22 and co-operable with a corresponding formation in the disc 20. As the support 22 rotates relative to the disc 20 air is admitted to and cut off from the venturi 29 as the portions of the airway 27 in the support 22 and in the disc 20 move into and out of communication with each other on a cyclical basis as determined by the conformation of the aforesaid valve plate.

In order to ensure release of the label from the holding device 5, suction may be disconnected from the device as the finger 6 picks up the label and this may be effected by a cam switch or any other suitable device operated in synchronism with the rotation of the disc 20. Alternatively, suction may be applied continuously to the holding device 5, a pressure reduction valve being utilised to ensure that the suction is sufficiently weak to enable labels to be readily picked up by the fingers.

The pads 23 are detachable and different interchangeable pads of different sizes and shapes may be provided for accommodation of different sizes and shapes of labels.

When a label 1 is picked up by one finger 6, such label 1 is advanced to a label applying position 31 (Fig. 4) and a further label 1 is fed to the holding device 5 ready to be picked up by the next finger 6. It will be noted that the fingers 6 move perpendicularly to the direction of feed of labels to the holding device 5.

As shown in Fig. 4, the labelling position 31 is at the periphery of a turntable 32 of an object conveying system.

With such system objects 33 on a conveyor belt 34 are fed at predetermined intervals, as determined by a screw 35, into compartments of a rotary transfer device 36 which transfers the objects onto the turntable 32. The objects 33 are held in position on the turntable (by means not shown) as they are successively moved through the labelling position 31 at which labels are applied to the objects from successive fingers 6. The conveyor belt 34, the transfer device 36, the screw 35 and the turntable 32 are driven continuously at constant speed throughout.

Label application is effected as suction is disconnected from the fingers 6, and a roller or the like may be utilised to press the label in position on the article. The fingers 6, or at least the pads 23 thereof may be spring-loaded so as to be capable of slight rearward resilient deflection.

Synchronisation of the arrival of the fingers with the

arrival of the objects at the labelling position is effected by virtue of interconnection of the drives for the turntable 32 and the transfer mechanism. Adjustment of the relative positioning of the fingers 6 and objects 33 at the labelling position 31 can be effected by means of a phase adjuster 37 (Fig. 2) applied to the drive for the transfer mechanism.

At the labelling position 31, the pertaining object 33 and finger 6 are moving at the same nominal tangential speed and in the same direction.

The vertical location of the labels 1 relative to the objects 33 is determined by the vertical positioning of the labelling system which may be independently adjustable.

After labels have been applied to the objects 33, further labels may be applied with further labelling systems 38 after rotation of the objects if necessary. The labelled objects leave the turntable 32 and are transferred via a further rotary transfer device 39 back to the conveyor 34.

With the arrangement described above it will be appreciated that labels can be rapidly and accurately applied to the objects whilst the label carrying tape is driven in a continuous manner, whereby reliable, trouble-free operation with careful control of label positioning can be ensured.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which are described by way of example

only.

Thus, for example, additionally or alternatively to the use of suction in the holding device 5, it is possible to provide vertical guides in the form of channels along which opposite side edges of the labels can slide. With this arrangement in the case where suction is not used, the labels may be held in position in the guides, before pick-up by the fingers 6, by slight adhesion of the labels to the guides and/or due to the curvature of the labels within the straight channels and/or by stops provided at bottom ends of the channels which limit the drop of the labels. Such guides may be of a size and shape to suit the requirements of a particular type of label, and different substitute guides may be used for other types of labels.

Also, if desired, instead of advancing the backing tape vertically downwardly towards the upstanding transfer fingers 6, it is possible to use an arrangement in which the backing tape is advanced horizontally (and transversely) to such fingers, or even an arrangement in which the backing tape is advanced vertically upwardly towards depending transfer fingers.

Claims:

1. A labelling machine of the kind with which in use labels are stripped from an advancing backing tape and automatically applied to objects advancing on a conveyor, characterised in that said machine has a transfer mechanism which has at least one transfer member (6) movable between a pick-up position at which it is operable to pick up a stripped label (1) and a release position at which it is operable to release such picked-up label for application to an advancing said object (33).

2. A machine according to claim 1, characterised in that the or each transfer member (6) is arranged to move through said pick-up position at a rate and/or in a direction which differs from the rate and/or direction of advancement of the backing tape (2) towards said position.

3. A machine according to claim 2, characterised in that the or each transfer member (6) is arranged to move through said pick-up position transversely to the direction of advancement of the backing tape (2).

4. A machine according to any one of claims 1 to 3, characterised in that the or each transfer member (6) is arranged to move horizontally through said pick-up position.

5. A machine according to any one of claims 1 to 4, characterised in that the or each transfer member (6) is arranged to move in

a circular path which passes through said pick-up and release positions.

6. A machine according to any one of claims 1 to 5, characterised in that the backing tape (2) is arranged to advance continuously.

7. A machine according to any one of claims 1 to 6, characterised in that the or each transfer member (6) is arranged to move continuously.

8. A machine according to any one of claims 1 to 7, characterised in that a holding device (5) is provided for holding stripped labels (1) at the said pick-up position, the or each said transfer member (6) being arranged to pick up labels held by such device.

9. A machine according to claim 8, characterised in that the holding device (5) comprises a suction device.

10. A machine according to claim 8 or 9, characterised in that the holding device (5) has edge guides to hold edges of the labels.

11. A machine according to any one of claims 1 to 10, characterised in that the or each transfer member (6) comprises a suction pad (23).

12. A machine according to claim 11,

characterised in that
the suction pad (23) is at the end of an upstanding support (22) mounted on a rotatable platform (20).

13. A machine according to any one of claims 1 to 12, characterised in that
monitoring means (12, 15) is provided for monitoring delivery of labels to and pick-up of labels from the said pick-up position, and an automatic adjustment mechanism (11) is arranged to be controlled by the monitoring means for adjusting a drive transmission (8, 10) of the labelling machine to maintain a predetermined relationship between the rates of said label delivery and pick-up.

14. A machine according to any one of claims 1 to 13, characterised in that
the or each transfer member (6) is arranged to move continuously at the said delivery position with a rate and direction of movement which are matched with the rate and direction of movement of continuously advancing said objects (33).

15. A machine according to claim 14, characterised in that
a turntable (32) is provided for advancing the objects through said delivery position.

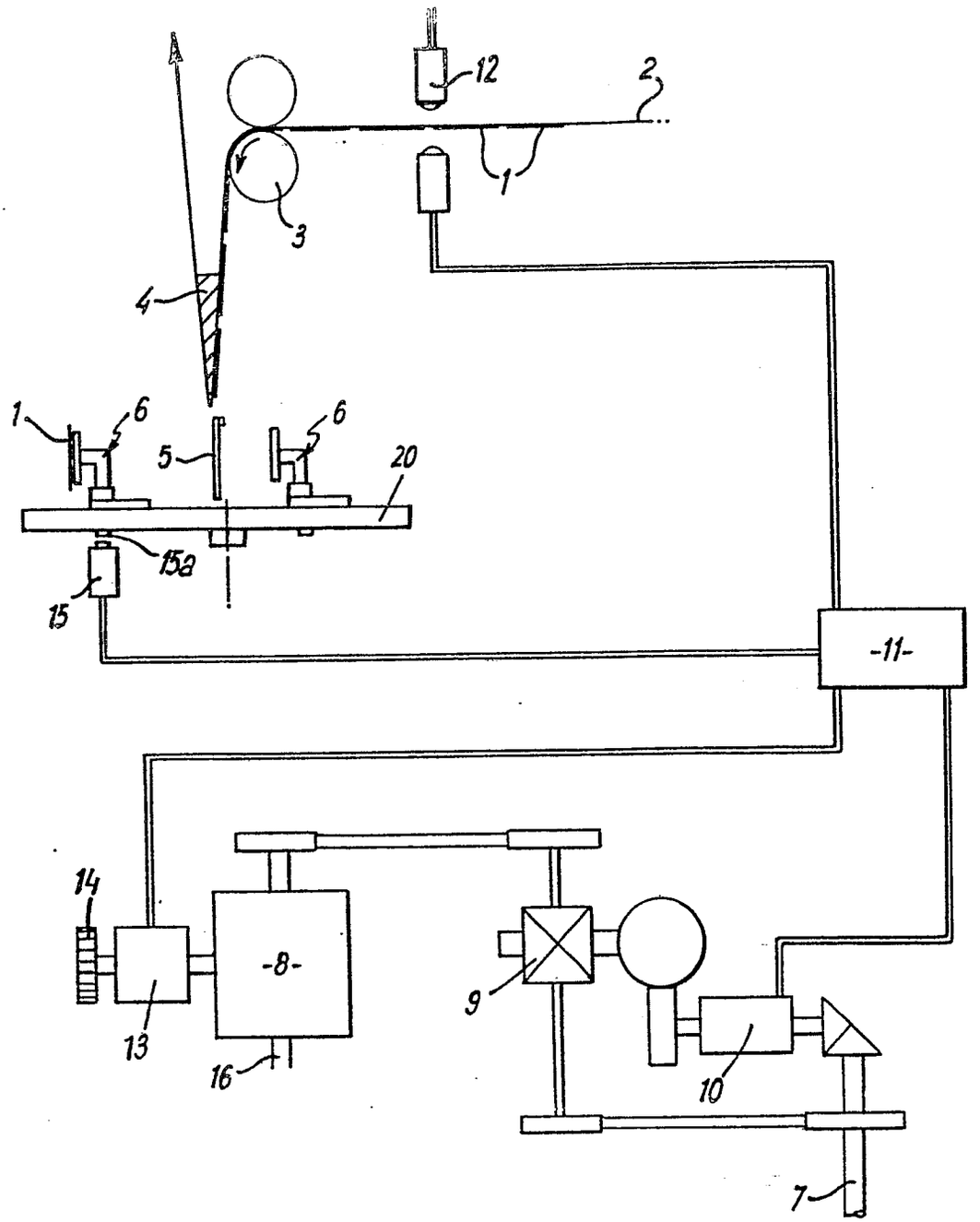


FIG.1

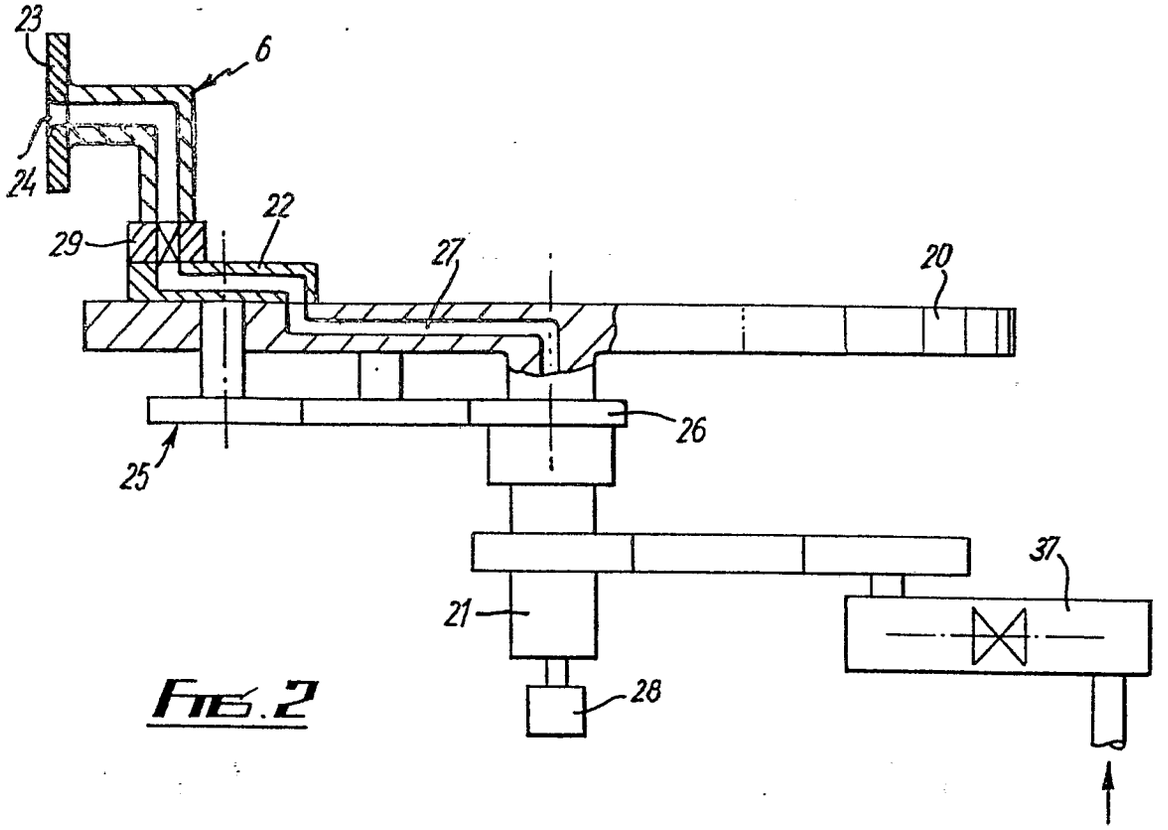


FIG.2

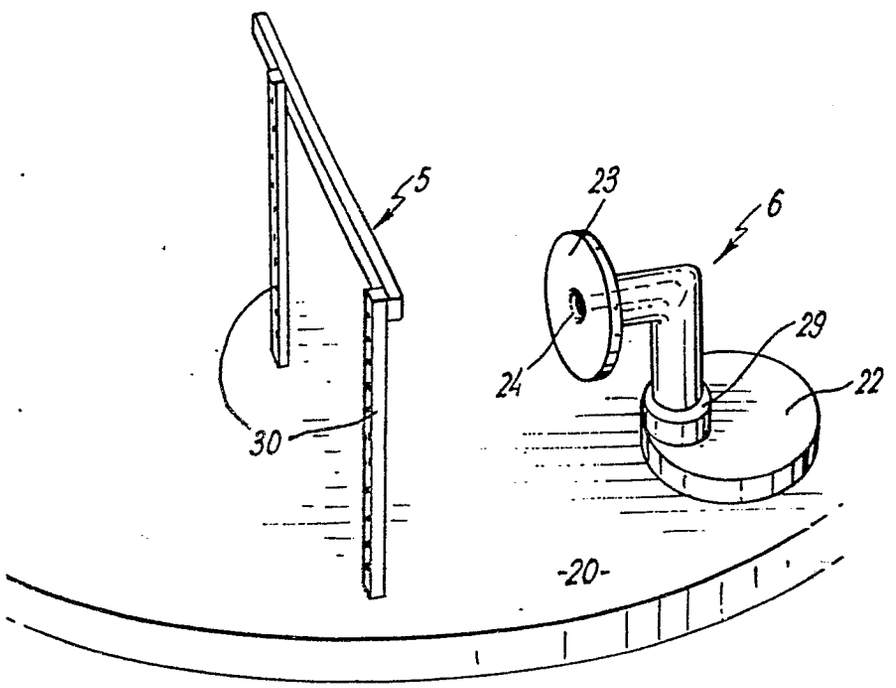


FIG.3

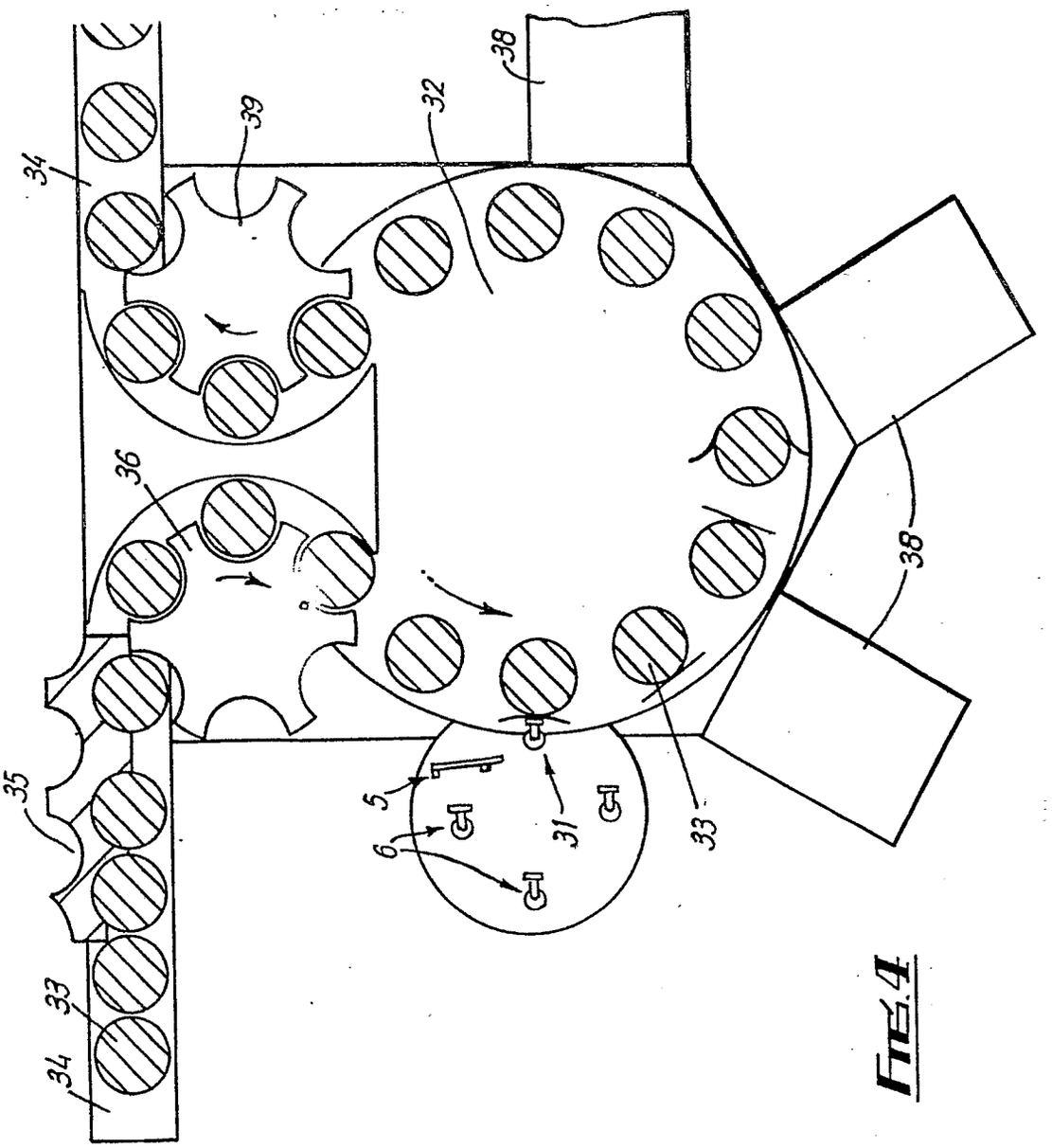


FIG.4

European Patent Office

EUROPEAN SEARCH REPORT

0011967
Application number

EP 79 20 0790

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	FR - A - 2 169 637 (N.J.M. INC.) * Page 5, line 13 - page 9, line 24; figures 1-5 * --	1-5,8-13
	FR - A - 2 383 080 (SUNKIST) * Page 15, line 10 - page 16, line 11; figures 2,17 * --	13,14
	DE - A - 2 160 297 (KRONSEDER) * Page 7, line 1 - page 9, line 4; page 10, line 22 - page 11, line 23; figures 1,5 * ----	6,13, 14

CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)

B 65 C 9/42
9/18

TECHNICAL FIELDS SEARCHED (Int.Cl. ³)

B 65 C

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	05-03-1980	VROMMAN

EPO Form 1503.1 08.78