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(54) Automatic cutting machine for cutting into pieces a continuously advanced strand, particularly a strand of soap and the like.

(57) The object of the invention is an automatic cutting machine for cutting into pieces (P) a continuously advanced strand (B), particularly a strand of soap or of any like material, characterized in that it comprises a conveyor belt (1) arranged substantially horizontally, which is meant for carrying the continuous strand (B), the piece in the course of being cut, and the already cut pieces (P), and which is driven at a higher speed than the speed at which the strand (B) is advanced, a guillotine-type cutting unit (9) being operatively associated with the said belt (1), and being adapted for cutting the pieces (P) directly on the belt (1) itself, by using as opposing means the active stretch (101) of the belt, which is properly supported by an underlying stationary table (6) for the sliding thereof.

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Automatic cutting machine for cutting into pieces a continuously advanced strand, particularly a strand of soap and the like.

The present invention concerns an automatic cutting machine for cutting into pieces a continuously advanced strand consisting, for example, of an extruded semisolid material, particularly soap, and any material with an analogous consistence.

A cutting machine provided with such operative features is shown and described in one former Patent Application in the name of the same Patentee; in the said machine, the cutting member is of the guillotine type and is fitted on a frame carrying the relative counterblade and the means for reciprocating the blade. In order to permit the continuous forward movement of the strand being cut, provisions are made for the said frame to be movable over a certain length in the direction in which the said strand is advanced. In the said Patent Application there are also described suitable means for guiding the strand and for measuring its forward movement, from which exact pulses result for controlling the means for operating the guillo tine-type blade.

While certainly presenting valuable technical and operative features, the said cutting machine is however not provided with means for supporting the piece in the course of being cut, in correspondence of that section along which the blade is moved substantially parallel to the strand; this renders the machine unsuitable for cutting pieces shorter than a certain length. Besides this, the said cutting machine comprises, for guiding and supporting the already cut pieces, only a train of idle rollers on which these pieces are pushed forward the one by the other, thus arriving in a congregated, and sometimes stuck together condition at the outlet of the machine, so that problems arise for their successive processing.

The present invention wants to obviate to the said inconveniences and, to this end, it proposes a cutting machine of the above disclosed type, which comprises a conveyor belt that is meant for carrying the continuous strand, the piece in the course of being cut, and the already cut piece, and that is driven at a higher speed than the speed at which the strand is advanced, a cutting unit of the guillotine type being operatively associated with the said belt, and being adapted for cutting the pieces directly on the belt itself, the active stretch of the belt being supported by a stationary table on which it slidingly bears.

The said features allow the machine according to the invention to cut pieces of any predetermined length, and to deliver them to its outlet in a suitably spaced apart relation.

Preferably, the cutting unit of the cutting machine according to the present invention simply comprises a blade fastened to a supporting fork that is connected with reciprocatingly driving means which generally consist of a double-acting pneumatic cylinder fitted on the fixed structure of the machine, the said supporting fork being hingedly connected in such a manner that the blade is allowed to perform a motion of translation substantially parallel to the direction of the strand forward movement, so that during a cutting step the blade can follow the strand being continuously moved forward, while once the cutting has been completed, it will be returned into its starting position. The extremely light construction of the cutting unit allows this unit to operate at a very high speed, which is greatly beneficial for the productivity of the machine.

According to a further feature of the invention, the means for operating the blade are controlled by a pulse generator unit that directly detects from the strand the degree of its forward movement. Thanks to the said measuring and controlling unit, the cutting machine according to the invention is capable to cut from a strand pieces of a predetermined length, with practically negligible errors.

These and other features of the invention and the advantages arising therefrom will clearly appear in the following detailed description of one preferred emodiment thereof, made by way of a nonlimiting example, and by referring to the annexed sheets of drawings, in which:

Figure 1 is a side elevational view with parts in section, diagrammatically showing the cutting machine according to the invention.

Figure 2 is a front view of the said machine, sectioned on line II-II of Figure 1.

Figure 3 is a side elevational view showing the unit for controlling the cutting means.

Figure 4 finally is a corresponding top view of the said control unit, shown with parts in section.

In the drawings, and preferring particularly to Figures 1 and 2, there is shown a cutting machine according to the invention, which is adapted for cutting pieces P of a predetermined length from an extruded strand B being continuously moved forward, which preferably is a strand of soap of any like semisolid material.

The said cutting machine comprises a horizontal conveyor belt 1 which is led around two rollers 2 and 3 fitted between two opposite longitudinal sidewalls 4 carried by a box-shaped base frame 5 of the machine.

The active stretch 101 of belt 1, i.e., the upper stretch thereof, that is meant for carrying both the strand B being fed thereon and the already cut pieces P, is in turn supported throughout its length by an underlying stationary table 6 made from a material with a low coefficient of sliding friction, such as, for example, from a suitable phenolic resin, on which the said stretch of the belt can easily slide.

The roller 2 of the conveyor belt 1 is driven through a suitable chain drive 7 by a geared motor 8 housed in the box-shaped base frame 5, which causes the belt to be advanced in the direction of arrow F at a higher speed than the speed at which the strand B is fed thereon, in the concordant direction. This brings about a continuous sliding of the belt 1 relatively to the extruded strand B, chiefly in order to space apart the cut pieces P to be delivered from the machine.

Operatively associated with the belt 1 is a cutting unit 9 of the guillotine type, which is capable of cutting the strand B into pieces P directly on the belt itself, by using as opposing means the stretch 101 of the belt, that is properly supported by the table 6 for the sliding thereof.

The said cutting unit 9 comprises a blade-carrying fork 109 arranged in a substantially vertical position astride of the belt 1, near its idle roller 3; at its upper end, above the belt 1, the said fork carries a cutting blade 209, and at its lower end it is swingably pivoted at 110 to the extremity of the piston rod of a double-acting pneumatic cylinder 10 which alternately moves the blade from a position in which it is quite removed from the stretch 101 of belt 1, into a position in which it grazes the said stretch of the belt. The pneumatic cylinder 10 is secured onto a plate 11 which is so mounted as to be adjustable along vertical guides 111 which are integral of the base frame 5, whereby it is possible to fix a priori the maximum distance of the blade 109 from the stretch 101 of belt 1, in correlation with the thickness of the strand B to be cut.

The height adjustment of plate 11 and thus of blade 209, can be manually performed by using a simple mechanical device 12. Preferably, the said device 12 comprises a threaded vertical stem 112 which is rotatably carried by the fixed structure of the machine, and is engaged in a respective threaded bushing 212 integral with the plate 11. The said threaded stem 112 is rotated through a pair of bevel gears driven by menas of a handle 412.

When in the waiting step, the blade-carrying fork 109 is in a quite vertical position, as shown by solid lines in Figure 1. During the cutting step, in order to not interrupt the continuous forward movement of the strand, the said blade-carrying fork is driven forward, as shown by dash-and-dot lines still in Figure 1, and is pivoted about the pivot 110, so that it causes the blade to describe an arc of a circle of a relatively great radius. Then, in order to prevent the blade from cutting, at the end of its cutting stroke, into the active stretch 101 of belt 1, provisions are made for the table 6 supporting the said stretch 101 of the belt, to be inclined downward by a small angle, which is sufficient for counterbalancing the slight sinking of the blade.

Of course, a fixed limit stop member 13 is operatively associated with the cylinder 10, while the fork 109 has its lower end provided with a small flange 119, that is meant for hitting against an abutment member 129, whereby the fork will be returned, on completion of a cutting cycle, into waiting position.

Through a solenoid valve 14, the pneumatic cylinder 10 is fed from a reservoir and plenum chamber 15, into which pressure air is admitted. The presence of the reservoir guarantees a delivery of air at a constant pressure from the cylinder 10.

It is important to notice that the connection between the reservoir 15 and the cylinder 10 is accomplished by means of short connectors and only one pipe length 16, preferably of polythene.

The solenoid valve 14 of the pneumatic cylinder 10 is actuated by a control device 17, shown particularly in Figures 3 and 4, which is adapted for detecting the forward movement of the strand B.

The said control device comprises a supporting arm 18 shaped like an overturned "L", which at its lower end is made integral of plate 11, and at its upper end carries two spaced apart, idle rollers 19 and 20, that are meant or bearing on the extruded strand B, so as to keep it against the underlying belt 1. On the shaft 120 of roller 20 there is freely swingably mounted a lever 21 that carries the real and proper detection and control unit. The said unit comprises a rolle 22 that is arranged intermediately of the other two rollers 19 and 20, and is meant for bearing on the strand B in a freely rockable manner, the said roller 22 being connected with a pulse generator 23 which in turn is connected to a

totalizator 24, whereby the said totalizator transmits control signals to the solenoid valve 14, in correlation with the degree of forward movement of the strand B.

The adjustment of the said control unit permits to obtain pieces P of any desired length.

The return of the cutting unit 9 into waiting position is controlled by a microswitch 117 that is operatively associated with the fork 109.

At the inlet side of the machine there are provided two suitably spaced apart inlet rollers 25 with their axes arranged vertically, which are adapted for laterally guiding the extruded strand B.

The cutting machine according to the invention furthermore comprises a transparent cover 26 to which a microswitch is connected, that stops the machine any time the cover is raised.

From the foregoing, it is evident that the cutting machine according to the invention affords, as compared with the known similar cutting machines, a great number of advantages, among which:

-the possibility of cutting from a strand pieces of any desired, even very short length, the said pieces being supported and guided along their entire path of movement through the machine, particularly in the cutting zone;

-the very quick cutting sequence as allowed by the cutting unit being very light and simple;

-the possibility of spacing apart the cut pieces;

-the considerably simple construction of the whole machine.

Claims

1. An automatic cutting machine for cutting into pices (P) a continuously advanced strand (B) consisting, for example, of an extruded semisolid material, particularly soap and any material with an analogous consistence, characterized in that it comprises a conveyor belt (1) arranged substantially horizontally, which is meant for carrying the continuous strand (B), the piece in the course of being cut, and the already cut pieces (P), and is driven at a higher speed than the speed at which the strand (B) is advanced, a guillotine-type cutting unit (9) being operatively associated with the said belt (1), and being adapted for cutting the pieces - (P) directly on the belt (1) itself, by using as opposing means the active stretch (101) of the belt (1), which is properly supported by an underlying stationary table (6) for the sliding thereof.

2. The cutting machine according to Claim 1, wherein the cutting unit (9) comprises a blade - (209) fastened to a supporting fork (109) connected with reciprocatingly driving means (10) fitted onto the fixed structure (5) of the machine, the said fork (109) being hingedly connected in such a manner that the blade (209) is allowed to perform a motion of translation substantially parallel to the direction of the strand forward movement.

3. The cutting machine according to Claims 1 and 2, wherein the means (10) for operating the cutting unit (9) are controlled by a pulse generator unit - (17), which is adapted for detecting the degree the strand forward movement directly from the strand - (B) itself.

4. The cutting machine according to Claims 1 to 3, wherein the means for operating the cutting unit - (9) comprise double-acting pneumatic cylinder - (10) having the blade-carrying fork (109) fulcrumed about its piston rod, the said cylinder (10) being meant for alternately moving the blade (209) from a position quite removed from the active stretch - (101) of the conveyor belt, into a position in which it grazes the said stretch (101) of the belt (1).

5. The cutting machine according to Claim 4, wherein the pneumatic cylinder (10) is fitted onto the fixed structure (5) of the machine in an adjustable manner, whereby it is possible to vary the maximum distance of the blade (209) from the active stretch (101) of the conveyor belt (1), in correlation with the thickness of the strand (B) to be cut.

6. The cutting machine according to the preceding Claims, wherein the table (6) on which the active stretch (101) of the conveyor belt (1) slides, is inclined downwardly by a small angle starting from the cutting zone in the forward direction, as referred to the forward mevement of the strand (B).

7. The cutting machine according to Claim 4, wherein the pneumatic cylinder (10) is operatively associated with a fixed limit stop member (13).

8. The cutting machine according to the preceding Claims, wherein the blade-carrying fork (109) comprises means (119, 129) that are adapted for automatically returning same, at the end of each cutting cycle, into starting position.

9. The cutting machine according to Claims 4 to 8, wherein through a solenoid valve (14) the pneumatic cylinder (10) is fed from a reservoir and

plenum chamber (15) into which pressure air is admitted.

10. The cutting machine according to the preceding Claims, wherein the pulse generator unit (17) for controlling the cutting unit-operating means - (10) consists of a roller (22) which is meant fro bearing on the strand (B) in a freely rockable manner, and is connected with a real and proper pulse generator (23), which in turn is connected to a totalizator (24), whereby the said totalizator can transmit control signals to the said cutting unit-operating means (10), in correlation with the degree of forward movement of the strand (B).

11. The cutting machine according to Claims 10 and 11, wherein the freely rockable pulse generator unit (17) and associated idle rollers (19, 20) for the guide of the strand (B) are carried by an arm (18) which is secured in an adjustable manner to the fixed structure (5) of the machine.

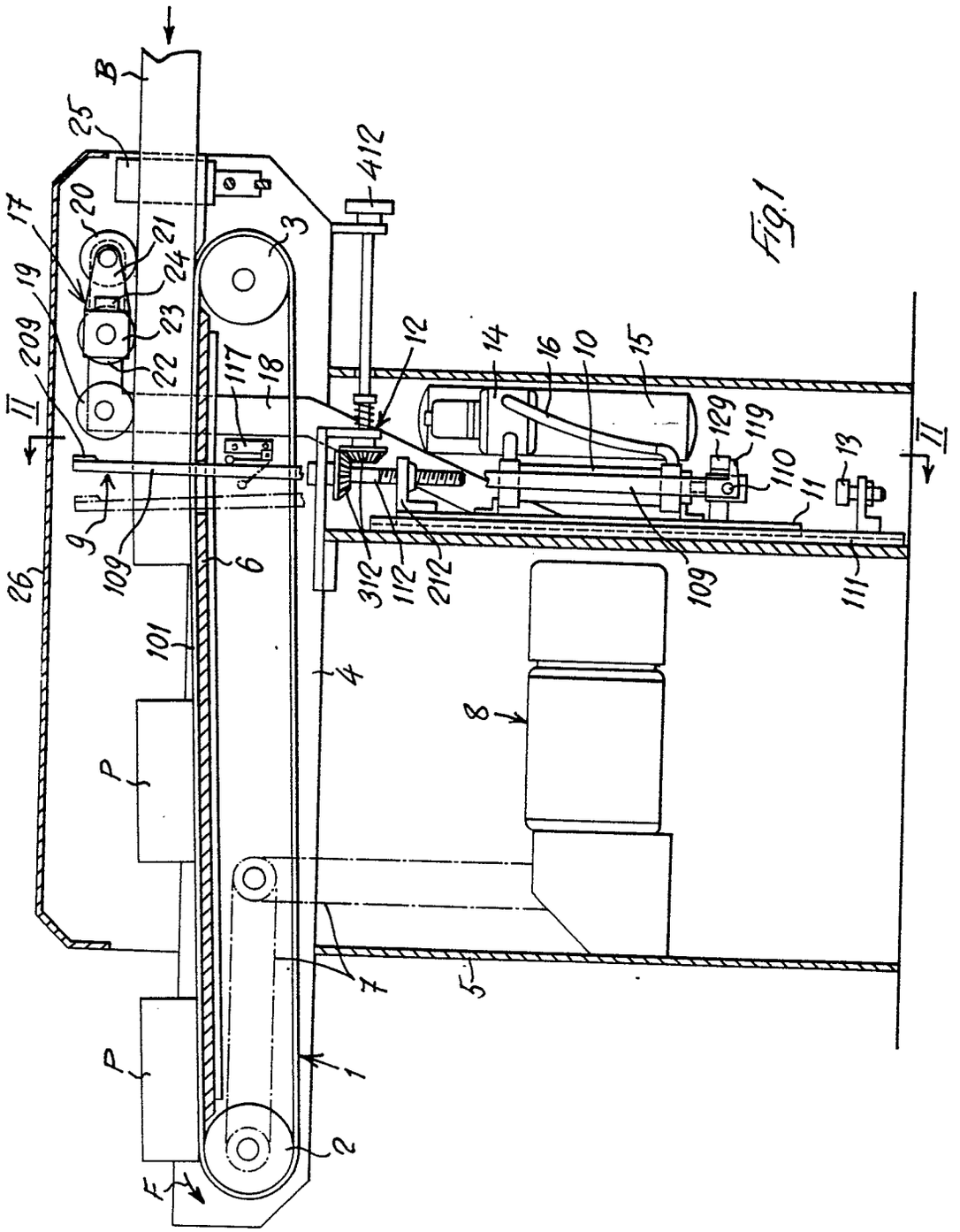
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Fig.1

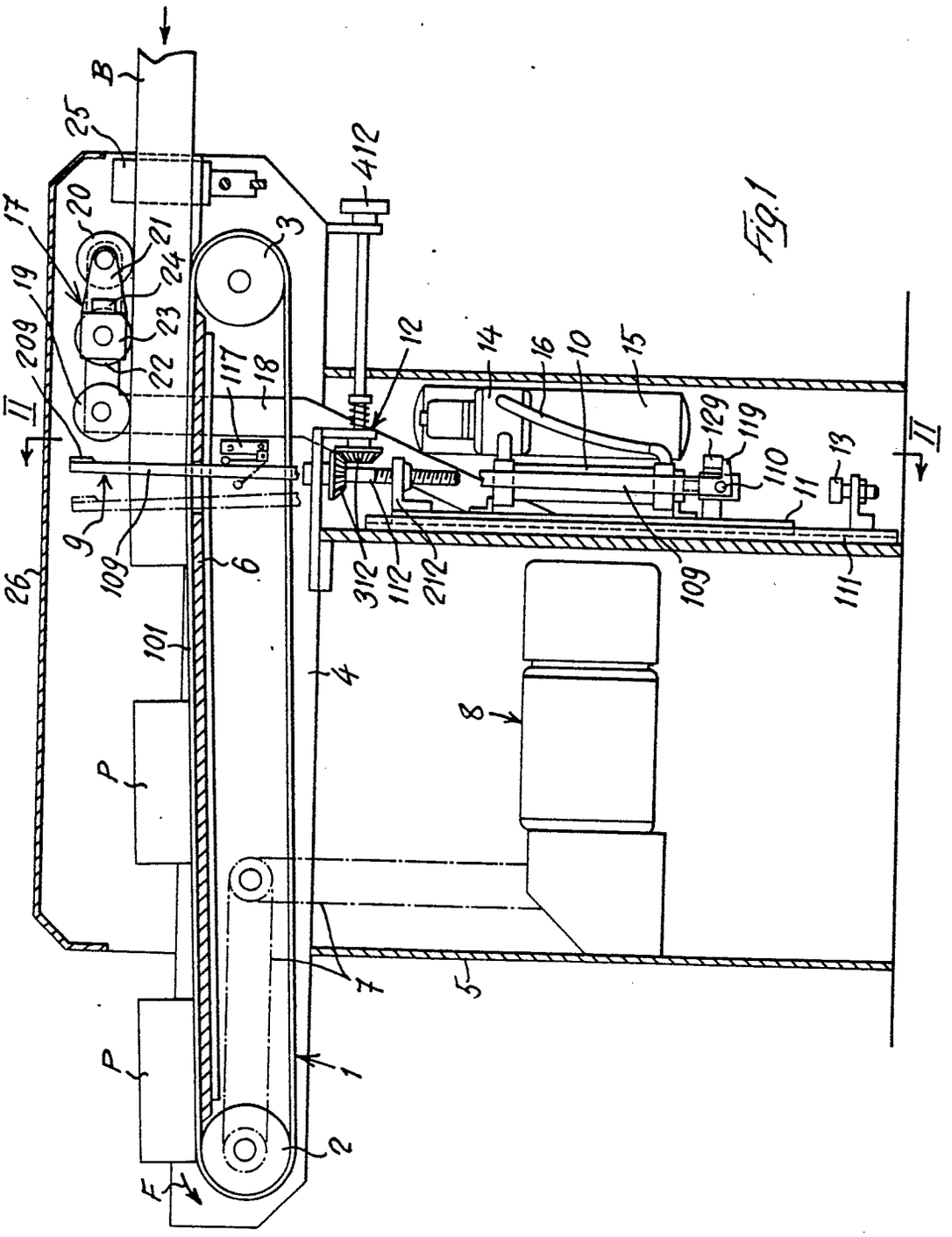
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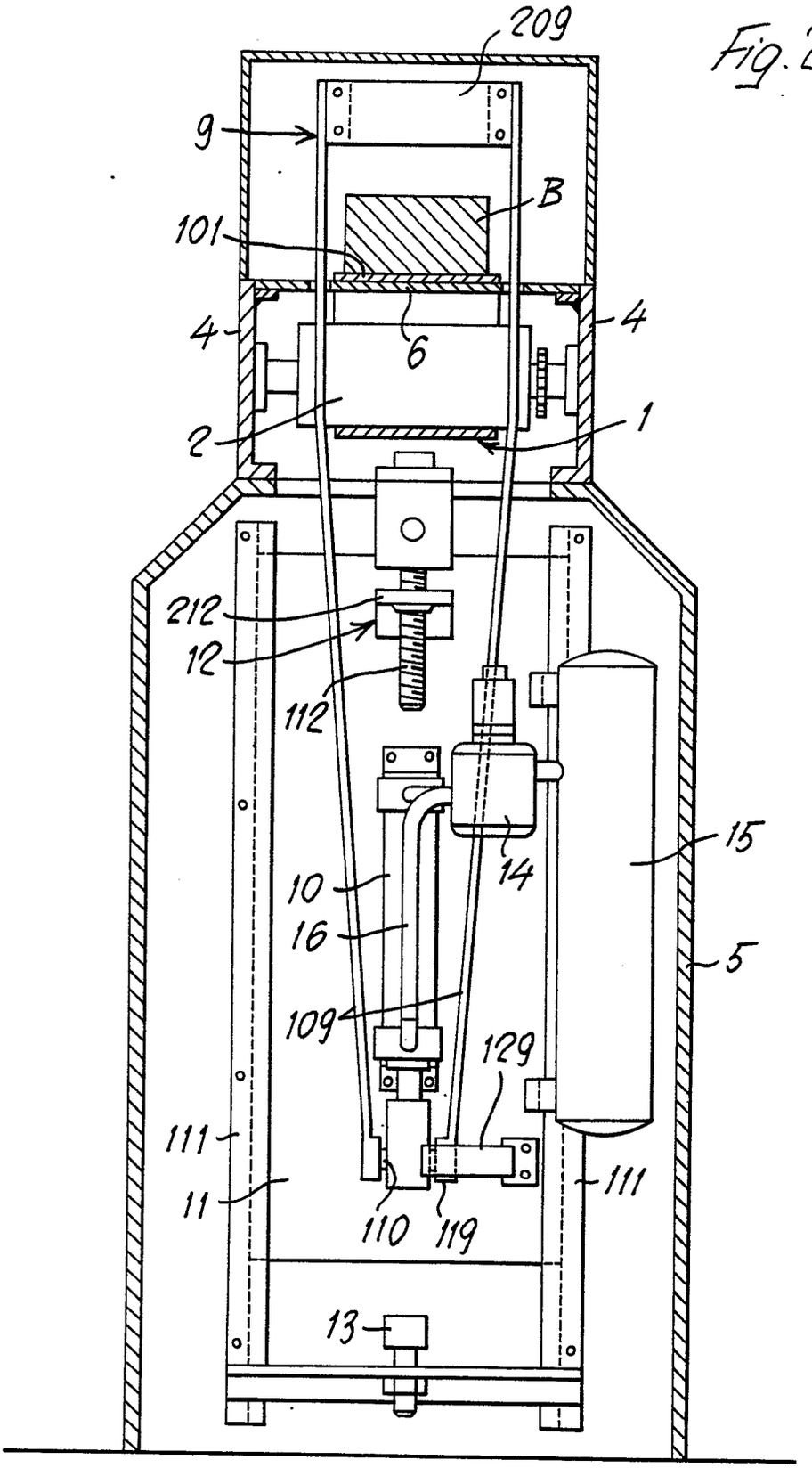
Fig.1

Fig. 2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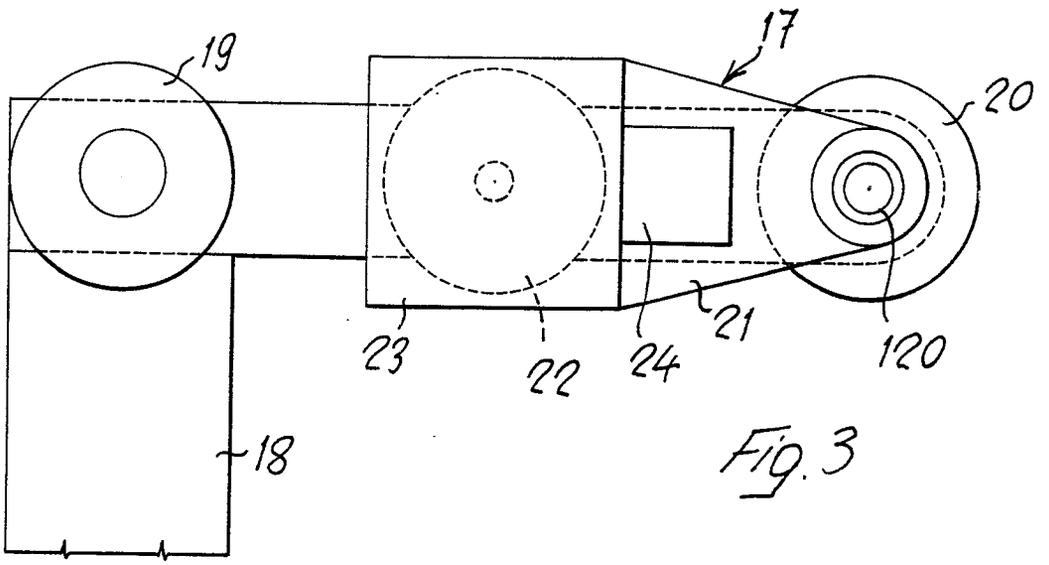

Fig. 3

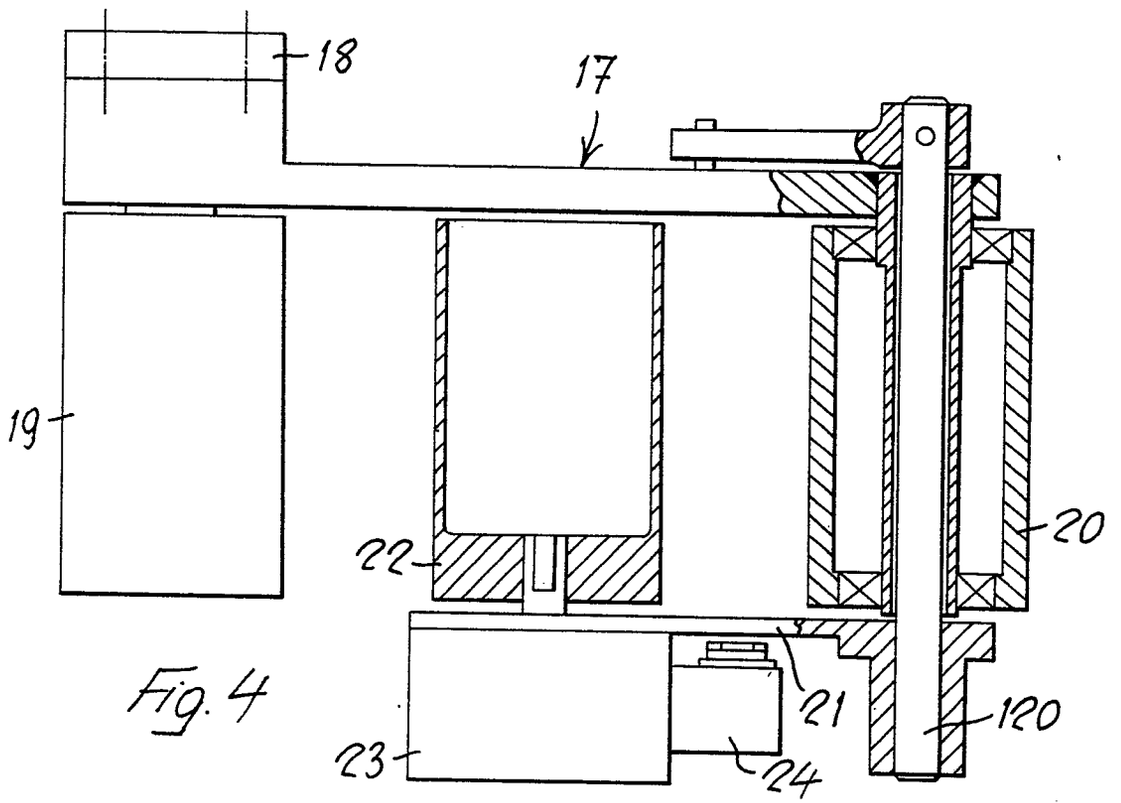

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 10 4565

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-3 269 243 (DENKER) * Whole document *	1	B 26 D 7/06 // G 11 D 13/22
A	US-A-4 442 741 (WHITTINGHAM)		
A	GB-A- 663 955 (SHARP)		
A	GB-A- 566 756 (WILLIAMS)		
A	DE-A-3 151 017 (ANTPÖHLER GmbH)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 26 D
A 21 C
C 11 D
A 23 G
B 28 B
B 29 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24-07-1986	BERGHMANS H.F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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