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(54) **Automatic molding press adapted for making molded pieces from an extruded continuous strand of soap and the like materials.**

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DE-C- 107 824
DE-C- 226 753
DE-C- 367 550
FR-A- 363 226
FR-A- 398 181
FR-A- 1 220 937
GB-A- 213 532
US-A- 1 981 804
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EP 0 211 192 B1

Description

The invention relates to an automatic molding press which is adapted for molding finished pieces from an extruded continuous strand of plastic material such as a solid soap, a paraffin wax, and the like, with means for conveying the extruded strand along a horizontal path, in correspondence of which molding means are arranged, which are adapted for acting in a horizontal direction upon the strand, transversely thereto, and comprise a box-shaped matrix arranged on one side of the strand and provided with a movable molding bottom, and a mold which is arranged on the opposite side of the strand and is moved with a reciprocating motion for being cyclically engaged in the matrix.

An automatic molding press of this kind is known from the document FR-A 1 220 937. In this known molding press, on a drum rotating about a horizontal shaft arranged transversely to the soap strand, there is provided a plurality of molding pairs consisting each of a mold and a corresponding matrix, and which are angularly spaced apart from each other in such a manner that by the rotation of the drum, these molding pairs are brought the one after the other in correspondence of the soap strand, where the mold is temporaneously driven into the matrix. The drum is rotatably driven by a motor, through a gear drive, and the mold and the movable bottom of the matrix are driven, that is, are axially displaced, by means of stationary cams, and possibly by means of return springs. The means for conveying the extruded strand along the horizontal path are not fully described and shown in this document FR-A 1 220 937.

From the document US-A 2 280 373 a machine is known for cutting soap, in which a strand is conveyed along a horizontal path by means of a pair of opposed friction rollers. From the document DE-C 226 753 a hidraulic molding press is known for molding finished pieces from an extruded continuous strand, in which the strand is fed from above by gravity in an inclined direction, between a mold and a corresponding matrix, so that no means are provided for conveying the strand along a horizontal path, while the mold is operated by a hydraulic cylinder. Finally, from the document DE-C 107 824 a machine is known for making tablets by compressing a powdered material between a punch and a matrix having a movable bottom. The punch and the matrix bottom are operated by means of swingable levers by a common cam.

The object of the invention is to improve a molding press of the type as described at the beginning, and known from the document FR-A 1 220 937, so that a simple construction, as well as a high productivity and a reliable operation, are attained.

This problem is solved by the invention with the combination of the features a) – b) according to the characterizing part of Claim 1.

Further advantageous embodiments of the molding press are characterized in the sub-Claims.

One embodiment of the molding press according to the invention will be described hereinafter, by referring to the accompanying drawings, in which:

Figure 1 shows in perspective view a molding press according to the invention, which is adapted for molding finished pieces from an extruded continuous strand of solid soap and like materials.

Figure 2 shows in a different scale a vertical section through the said molding press, taken transversely to the direction of the strand forward movement.

Figure 3 is another vertical section through the molding press, taken on line III–III of figure 2.

Figure 4 finally shows a constructional detail of the means for causing the strand to be advanced stepwise.

In figures 1 to 3, numeral 1 denotes as a whole the fixed supporting structure of an automatic molding press according to the invention, which is for molding finished pieces P directly from a strand B of soap and any similar products, continuously extruded from an extruder (not shown) of a known type.

At the side turned toward the extruder, the said structure 1 carries means for entraining the strand B, which preferably comprise a pair of horizontal parallel ribbons 2 facingly arranged at a short distance from each other, with the strand B being engaged therebetween.

Generally, in order to avoid any undesired slippage, each one of the said ribbons 2 consists of an inwardly toothed belt stretched between two guide sprockets 102, of which one is a motor-driven sprocket.

By the said ribbons the strand B is advanced stepwise, in such a manner that its end portion will be brought exactly in correspondence with molding means provided at the sides thereof, which are adapted for cutting and molding the pieces P.

Preferably, the said molding means comprise a mold 3 which is imparted a reciprocating motion, and cooperates with an oppositely arranged, box-shaped stationary matrix 4.

The mold 3 is carried by a slide 5 slidably mounted between rollers 6 and connected to a rockable driving arm 7, which by means of a connecting rod 8 is connected to a disk crank 9, which through reduction gearings 11, 12 is driven in rotation by the motor 10.

In order to enable the slide 5 to slide rectilinearly, the rockable arm 7 is fulcrumed at 107 about a compensating lever 13, which is in turn pivoted at 113 to the supporting structure of the molding press.

The box-shaped matrix 4, which is also called box, comprises an elastically movable molding bottom 104. More particularly, the bottom 104 is fitted to one end of a slidable stem 204 which is co-axially engaged by a cylindrical spiral thrust spring 304 that when in rest condition, positions the said bottom in correspondence of the opening of matrix 4. The said spring 304 bears against two spring-supporting elements 404 and 504, of which the first is screwed to the free end of stem 204 and is designed for abutting, under the bias of spring 304, against a fixed abutment block 604, while the second is applied to the end of a bolt 704 screwed in a fixed support 804. Such an assembly of these com-

ponents permits both to alter the position of the molding bottom 104 at the opening of matrix 4, and to adjust the thrust load of spring 304.

In the molding step, the mold 3 is moved forward against the opposite matrix 4, so that a portion of strand B located therebetween is inserted into the matrix, and a commensurate backward movement of the bottom 104 under the thrust of the piece molded, is caused to occur. Therefore, owing to the concurrent action of the matrix and the mold, every single piece is cut and is simultaneously molded by the mold, in cooperation with the opposed bottom 104.

Nextly, the mold 3 is drawn away from the matrix 4, and owing to the thrust of spring 304, the bottom 104 of the matrix can expel therefrom the finished piece P, which is taken up by an underlying horizontal ribbon 14 with its active upper stretch running either continuously or stepwise in the same direction as the strand B.

The separation from the matrix 4 of the already expelled piece P is assured by a pushing member 15 which in rest position is located just over the opening of matrix 4. The said pushing member 15 is carried by two lateral arms 115 which are pivotally connected at 215, and one of them is a square-shaped arm. At its opposite end, the square-shaped arm 115 comprises a washer element 315 which is engaged between two antagonistic means consisting of a cylindrical spiral compression spring 415 and a rod 16 fitted on pivot 17 so as to be rockable thereabout. The rocking movement of rod 16 is controlled by a cam 18 keyed onto the same shaft 19 for the rotation of the already mentioned disk crank 9, the cam 18 being into engagement with a roller 116 carried by the rod 16. It is obvious that the alternate prevalence of the spring 415 and of the rod 16 over their relative antagonistic means will respectively bring about the activation and the de-activation of the pushing member 15.

Of course, the operative sequence of the pushing member 15 and the molding means 3, 4, 104 results from the angular displacement between the cam 18 and the crank disk 9 on the common shaft 19 for their rotation.

As shown in figure 4, the sprockets 102 driving the facingly arranged ribbons 2 for moving forward the strand B carry on the shafts 202 for their rotation respective freewheel devices 302 which are engaged in counter-rotation by a chain length 20 which is alternately pulled in one direction by a driving lever 21 (see figure 2) and in the opposite direction by a return spring 22. The said driving lever 21 that causes the active travel of chain 20, i.e., the travel by which the freewheels 302 come to be coupled with the respective shafts 202 for the rotation of the driving rollers 102, is fulcrumed at 121 and is swung by a lever 23 connecting it to a second crank disk 24 which is also keyed onto the shaft 19. The said lever 23 is pivotally connected to a rod 25 which is fulcrumed at 125. The position of the fulcrum 125 of rod 25 is adjustable by means of the threaded stem 26, in order to render it possible to alter the arc over which the lever 21 swings, and thus the extent of the forward step of strand B.

Also in this case, the proper operative sequence of the means for moving forward the strand B and of the means for molding it, derives from the relative angular displacement of cranks 24 and 9.

In the molding press according to the invention some safety devices are provided.

One of these devices prevents the mold 3 and the movable bottom of matrix 4 from mutually coming into contact, thus damaging each other, in the instance in which, for any reason, the relative section of strand B is not present therebetween. The said device, which in itself is very simple, consists of a lever 27 which is fulcrumed at 17, and through a trace 28 is connected to a lever 7. Under normal operative conditions, the said lever 27 rocks idly, but when the said anomalous conditions occur, this lever pushes the spring-supporting element 404 so as to draw the bottom 104 away from the mold 3 in the course of being engaged with the matrix 4.

Another safety device provides for the possibility of an elastic sliding movement of the compensating lever 13, in the instance in which in correspondence of the molding means the thickness of the strand B comes to be increased owing to any accidental cause (such as, for example, owing to a finished piece sticking to one side of the strand end). In order to permit the said sliding movement, the lever 13 is movably engaged in a bushing 213 pivotally connected at 113, and cooperates with a return spring 313.

The adoption of molding means located at the sides of the strand being moved forward solves every problem of unloading the finished pieces P, which can be easily fed to underlying unloading means, such as the already mentioned ribbon 14. This ribbon is preferably driven at a higher speed than the strand, whereby a spacing between the finished pieces is obtained.

Of course, between the molding press and the strand-extruding means adjusting means are provided, which conform the production rate of the molding press to the speed at which the extruded strand is advanced. The said adjustment means are described and shown in a former Patent Application of the same Patentee, relating to a similar molding press, and for this reason they are not discussed here in detail.

Moreover, in order to make the stepwise forward movement of strand B possible, it is provided for the same to take upstream of ribbons 2 a sinuous configuration, which is necessary for giving rise to an off-hand reserve.

From the foregoing, it is apparent that the molding press according to the invention affords very many technical and functional advantages, among which/

- an easy unloading of the finished pieces and of the waste material, if any,
- a simple construction and a high productivity,
- a reliable operation.

Claims

1. An automatic molding press which is adapted for molding finished pieces (P) from an extruded continuous strand (B) of plastic material such as a solid soap, a paraffin wax, and the like, with means

for conveying the extruded strand (B) along a horizontal path, in correspondence of which molding means (3, 4) are arranged, which are adapted for acting in a horizontal direction upon the strand (B) transversely thereto and comprise a box-shaped matrix (4) arranged on one side of the strand (B) and provided with a movable molding bottom (104), and a mold (3) which is arranged on the opposite side of the strand (B) and is moved with a reciprocating motion for being cyclically engaged in the matrix (4), characterized by the combination of the following features:

a) the mold (3) is carried by a slide (5) connected to a rockable driving arm (7) which by means of a connecting rod (8) is connected to a first crank disk (9) keyed onto a shaft (19) which is driven in rotation through reduction gearings (11, 12) by a motor (10);

b) the means for conveying the extruded strand (B) comprise a pair of opposed parallel horizontal belts (2) arranged at a short distance from each other, with the strand (B) engaged therebetween, each belt (2) being toothed on its side opposite to the strand (B) and being stretched between two guide sprockets (102), one of which is a driving sprocket;

c) the driving sprockets (102) carry on the shafts (202) for their rotation freewheel devices (302) which are engaged in counter-rotation by a chain (20) alternately pulled in one direction by a driving lever (21) and in the opposite direction by a return spring (22);

d) the driving lever (21) is fulcrumed at an intermediate region (121) and, through an adjustable intermediate leverage (23), is swung by a second crank disk (24) that is keyed onto the same shaft (19) of the said first crank disk (9).

2. The molding press according to Claim 1, characterized in that the rockable driving arm (7) of the mold carrying slide (5) is fulcrumed by its free end about a compensating lever (13) which is pivoted to the supporting structure (1) of the molding press.

3. The molding press according to Claim 1, characterized by a pushing member (15) located over the opening of the matrix (4) and adapted for assuring the separation of every single piece (P) formed by the matrix (4), whereas the operation of the pushing member (15) is derived, through an intermediate leverage (115, 16), from a cam (18) that is keyed onto the same shaft (19) of the said first crank disk (9).

4. The molding press according to any one of the preceding Claims, characterized in that a lever device (27, 28) is provided for preventing the mold (3) and the movable bottom (104) of the matrix (4) from fortuitously contacting each other.

5. The molding press according to any one of the preceding Claims, characterized by means adapted for forming, immediately upstream of the pair of parallel horizontal belts (2) for moving forward the strand (B), a sinuous strand length for giving rise to a certain off-hand reserve.

Patentansprüche

1. Automatische Formpresse zur Formung von Fertigteilen (P) aus einem extrudierten fortlaufenden Strang (B) aus plastischen Stoffen, wie feste Seife, Paraffinwachs u. dgl. mittels einer Einrichtung zum Transport des extrudierten Stranges (B) längs einer horizontalen Bahn, in deren Verlauf eine Einrichtung zur Formgebung (3, 4) angeordnet ist, die in horizontaler Richtung quer auf den Strang (B) einzuwirken vermag und eine auf einer Seite des Strangs (B) angeordnete und mit einem beweglichen Formboden (104) versehene Matrize (4) aufweist sowie mit einem auf der gegenüberliegenden Seite des Strangs (B) angeordneten Preßwerkzeug (3) versehen ist, das für einen zyklischen Eingriff in das Formteil (4) gegenläufig bewegbar ist, dadurch gekennzeichnet, daß

a) das Preßwerkzeug (3) an einem Schieber (5) angebracht ist, der an einem Schwenkarm (7) angelenkt ist, der durch eine Verbindungsstange (8) mit einer auf einer Welle (19) befestigten ersten Kurbelscheibe (9) verbunden ist, die über ein Reduziergetriebe (11, 12) von einem Motor (10) in Drehung versetzt wird;

b) die Einrichtung zum Transport des extrudierten Strangs (B) aus einem Paar einander gegenüberliegender, paralleler horizontaler Gurte (2) besteht, die mit geringem Abstand zueinander angeordnet sind und gegen den dazwischen befindlichen Strang (B) anliegen, wobei jeder Gurt (2) auf der dem Strang abgewandten Seite gezahnt und zwischen zwei Führungsrollen (102) gespannt ist, von denen die eine eine Antriebsrolle ist;

c) die Führungsrollen (102) zur Drehung auf den Wellen (202) Freilaufeinrichtungen (302) aufweisen, die von einer Kette (20) in entgegengesetzten Drehrichtungen beaufschlagt werden, welche wechselweise von einem Antriebshebel (21) in die eine Richtung und von einer Rückholfeder (22) in die andere Richtung gezogen wird;

d) der Antriebshebel (21) an einer mittleren Stelle (121) angelenkt ist und über einen verstellbaren Zwischenhebel (23) von einer zweiten Kurbelscheibe (24) verschwenkt wird, die auf der gleichen Welle (19) befestigt ist, wie die vorgenannte erste Kurbelscheibe (9).

2. Formpresse nach Anspruch 1, dadurch gekennzeichnet, daß der Schwenkarm (7) des das Preßwerkzeug aufnehmenden Schiebers (5) an seinem freien Ende an einem Ausgleichshebel (13) angelenkt ist, der an der Trägerkonstruktion (1) der Formpresse schwenkbar gelagert ist.

3. Formpresse nach Anspruch 1, dadurch gekennzeichnet, daß über der Öffnung der Matrize (4) ein Stoßelement (15) angeordnet ist, das die Abtrennung eines jeden einzelnen, von der Matrize (4) geformten Fertigteils (P) sicherstellt, während die Betätigung des Stoßelements (15) über einen Zwischenhebel (115, 16) durch eine Kurvenscheibe (18) erfolgt, die auf der gleichen Welle (19) befestigt ist, wie die vorgenannte erste Kurbelscheibe (9).

4. Formpresse nach einem der vorstehenden Ansprüche, gekennzeichnet durch ein Hebelsystem (27, 28), welches eine zufällige Berührung zwischen dem Preßwerkzeug (3) und dem beweglichen Formboden (104) verhindert.

5. Formpresse nach einem der vorstehenden An-

sprüche, dadurch gekennzeichnet, daß in Fließrichtung unmittelbar vor dem dem Transport des Strangs (B) dienenden Paar paralleler horizontaler Gurte (2) eine Einrichtung zur Bildung eines sich schlängelnden Strangabschnittes vorgesehen ist, der eine bestimmte, sofort zur Verfügung stehende Reserve bildet.

Revendications

1. Presse à mouler automatique apte au moulage de pièces finies (P) à partir d'un boudin extrudé continu (B) d'une matière plastique telle que savon solide, cire de paraffine et similaire, comportant des moyens de transfert du boudin extrudé (B) le long d'un trajet horizontal, des moyens de moulage (3, 4) correspondants étants prévus, pouvant agir dans le sens horizontal au-dessus du boudin (B) et transversalement à celui-ci et qui comprennent une matrice en forme de caisson (4) disposée sur un côté du boudin (B) et munie d'un fond de moulage mobile (104) ainsi qu'un moule (3) disposé sur le côté opposé du boudin (B) et mû selon un mouvement alternatif pour sa pénétration cyclique dans la matrice (4), caractérisée par la combinaison des caractéristiques suivantes:

a) le moule (3) est porté par une glissière (5) montée sur un bras d'entraînement oscillant (7) qui, au moyen d'une bielle (8), est relié à un premier disque-manivelle (9) claveté sur un arbre (19) qui est entraîné en rotation par un moteur (10), par l'intermédiaire de pignons de réduction (11, 12).

b) les moyens de transfert du boudin extrudé (B) comportent une paire de courroies horizontales parallèles opposées (2), disposées en vis-à-vis à faible distance l'une de l'autre, le boudin (B) étant engagé entre elles, chacune des courroies (2) étant crantée sur sa face opposée au boudin (B) et tendue entre deux roues dentées de guidage (102) dont l'une est une roue menante.

c) les roues menantes (102) sont munies, sur leur arbre de rotation respectif (202), de dispositifs de roue libre (302) qui sont sollicités en rotation en sens inverse par une chaîne (20), tirée alternativement, dans un sens, par un levier de commande (21) et, dans le sens opposé, par un ressort de rappel (22).

d) le levier de commande (21) est articulé dans une zone intermédiaire (121) et, grâce à une tringlerie intermédiaire réglable (23), oscille sous l'effet d'un deuxième disque-manivelle (24) claveté sur le même arbre (19) dudit premier disque-manivelle (9).

2. Presse à mouler selon la revendication 1, caractérisée par le fait que l'arbre de commande oscillant (7) de la glissière portant le moule (3) est articulé par son extrémité libre sur un levier compensateur (13) qui est monté pivotant sur la structure porteuse de la presse à mouler.

3. Presse à mouler selon la revendication 1, caractérisée par un poussoir (15) placé au-dessus de l'orifice de la matrice (4) et agencé pour assurer la séparation de chacune des pièces (P) formées par la matrice (4), cependant que le mouvement du poussoir (15) est assuré par une tringlerie intermédiaire (115, 16), à partir d'une came (18) qui est clavetée sur le même arbre (19) dudit premier disque-manivelle (9).

4. Presse à mouler selon l'une quelconque des revendications précédentes, caractérisée par le fait qu'il est prévu un dispositif à levier (27, 28) pour empêcher le moule (3) et le fond mobile (104) de la matrice (4) d'entrer fortuitement en contact l'un avec l'autre.

5. Presse à mouler selon l'une quelconque des revendications précédentes, caractérisée par des moyens agencés pour former, immédiatement en amont de la paire de courroies parallèles horizontales (2) d'avancée du boudin (B), une longueur de boudin sinueuse pour constituer une certaine réserve immédiate.

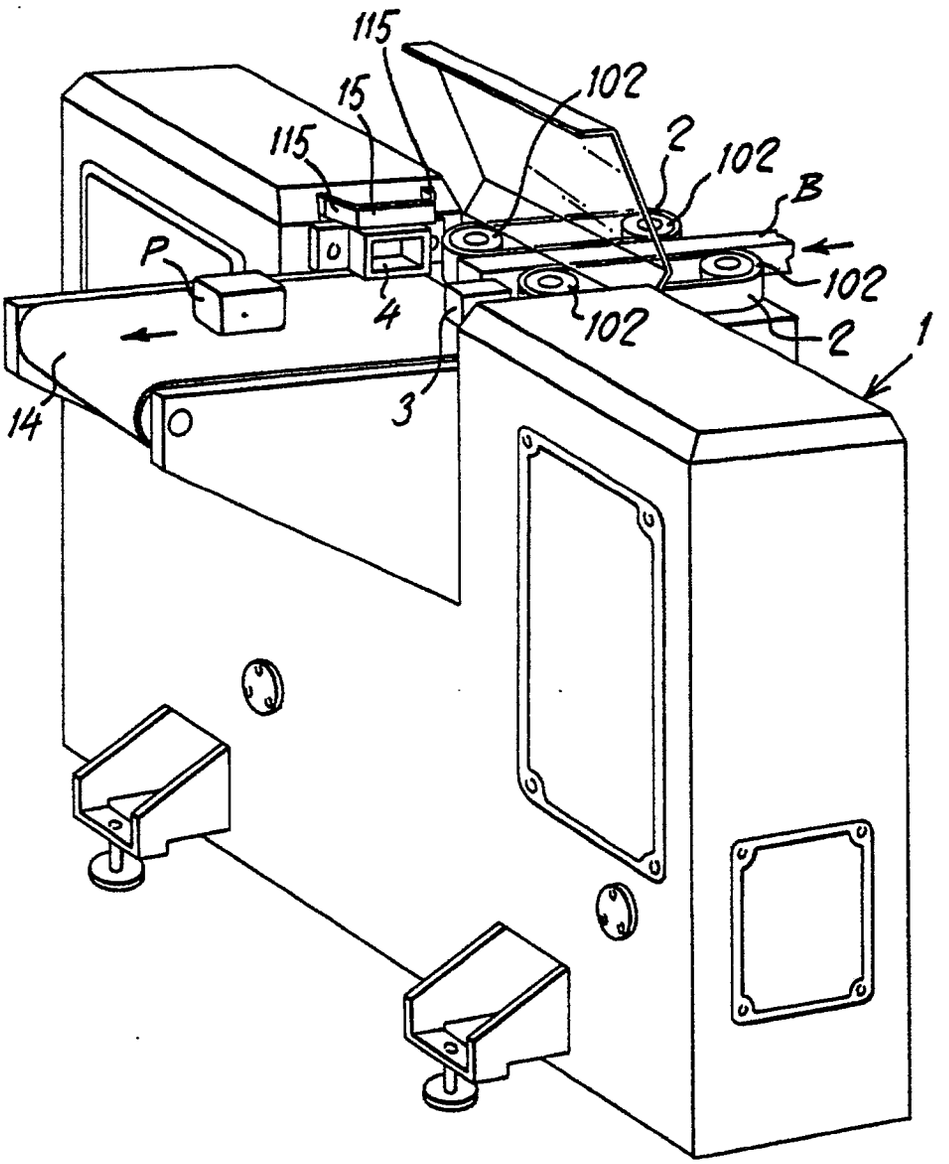
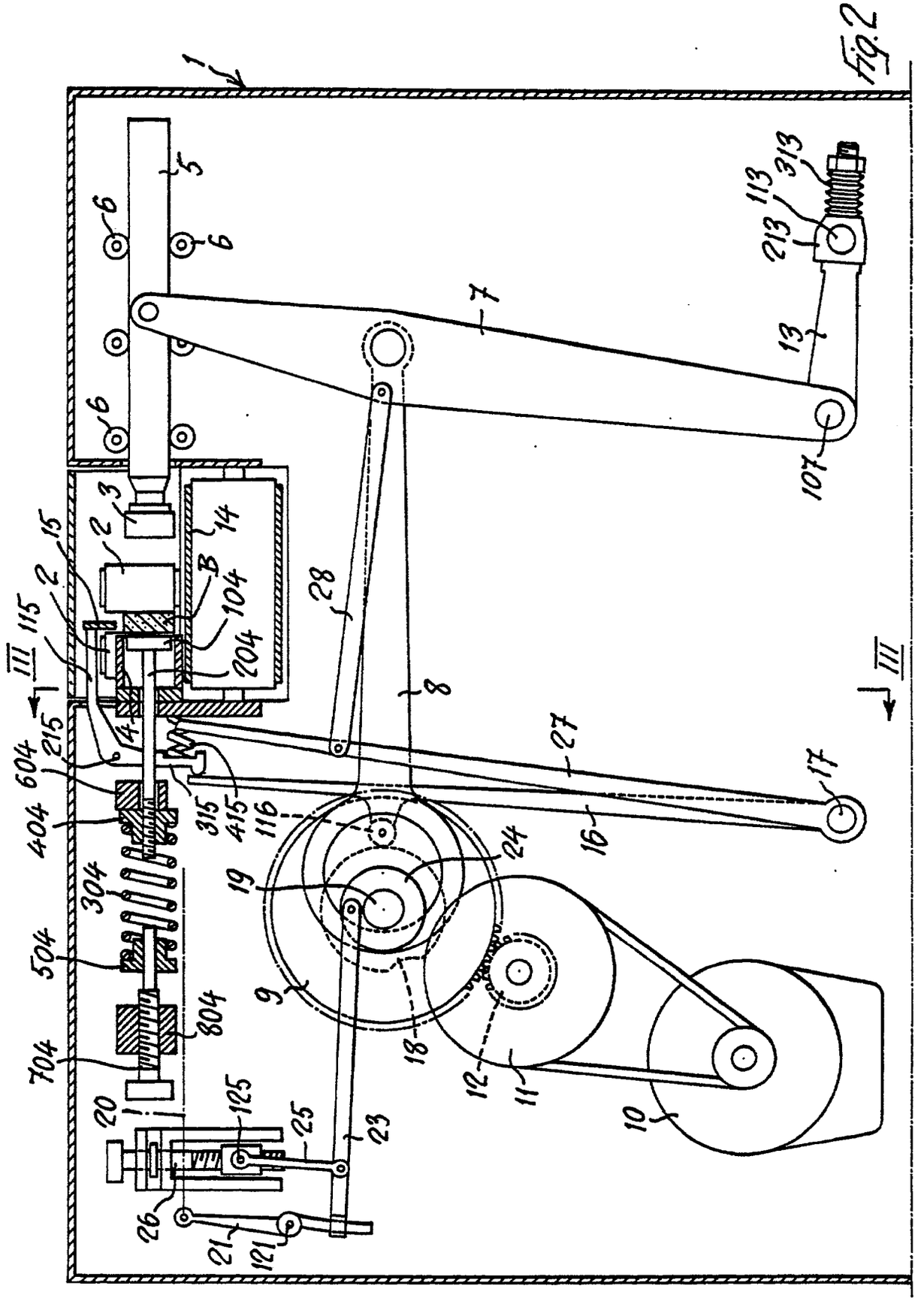


Fig. 1


1
5
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14
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17
18
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23
24
25
26
27
28
2
3
4
B
104
107
113
115
116
121
125
204
213
215
304
313
315
404
415
504
604
704
804
III
III

Fig.2

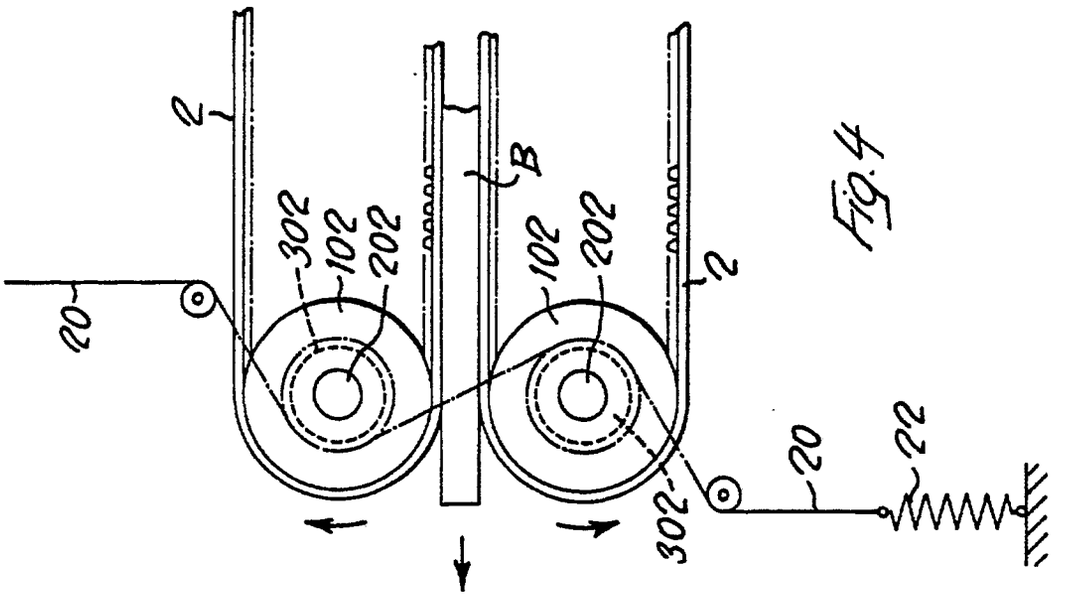
2
B
302
102
202
102
202
2
20
20
22
302

Fig.4

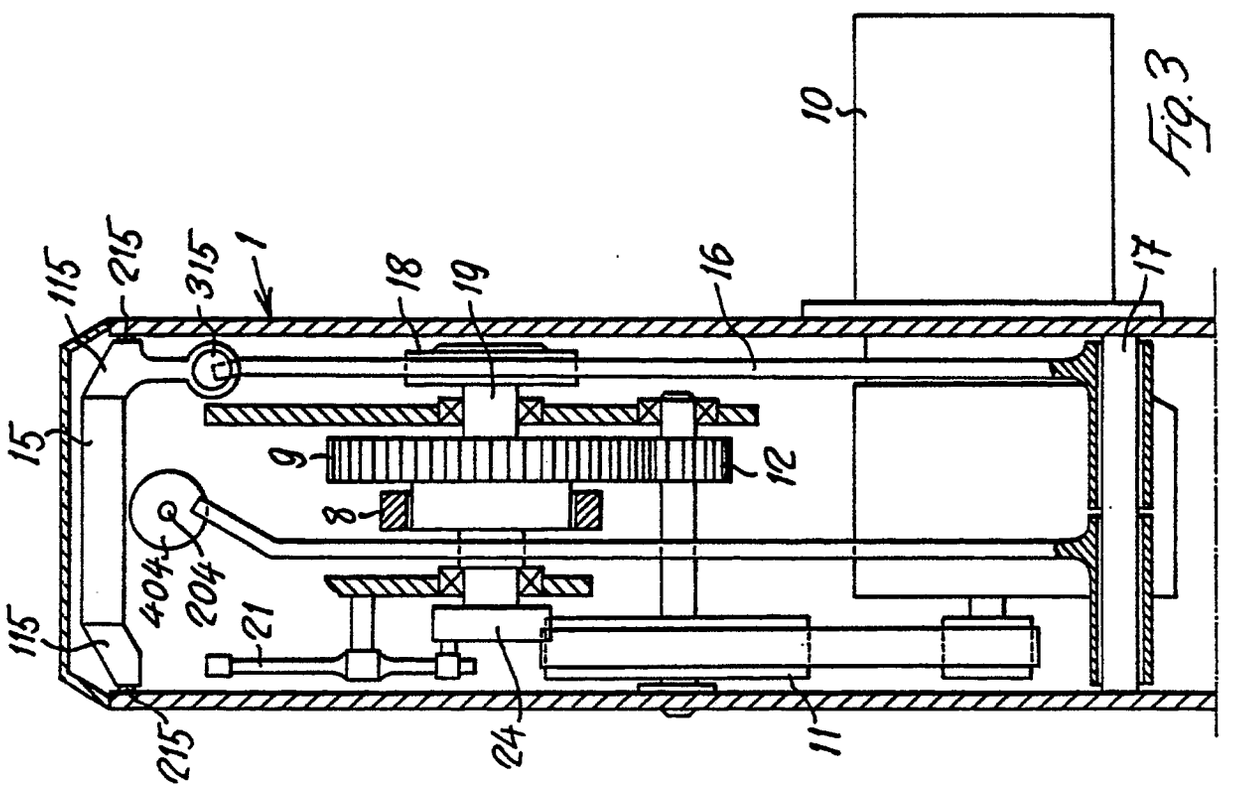
10
115
215
315
1
18
19
16
17
15
9
12
8
404
204
21
115
215
24
11

Fig.3