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(54) **Device for centering and applying sealing capsules on bottles**

Vorrichtung zum Zentrieren und Anbringen von Siegelkapseln auf Flaschen

Dispositif de centrage et d'application de capsules de scellage sur des bouteilles

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EP-A- 0 052 045 **DE-A- 4 035 998**
FR-A- 2 376 030

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EP 0 635 452 B1

Description

The present invention relates to a device for centering and applying sealing capsules on bottles of wine, liquors and beverages in general, according to the preamble of claim 1.

As is known, sealing capsules are fitted on the neck of bottles after bottling, said capsules concealing the cap and forming a seal that guarantees the contents of the bottle.

Typically, these capsules are made of a heat-shrinking polymeric material or of aluminum and alloys thereof, and are applied to the bottle by making them adhere tightly to the neck of said bottles. In the case of capsules made of polymeric material, the heat-shrinking properties of the material are used to make the capsules adhere to the bottles by heating. In the case of metal capsules, the capsule is made to adhere to the neck of the bottle by forming longitudinal folds on the capsule and by pressing or flattening said folds onto the neck of said bottle.

Since said capsules generally bear lettering and/or symbols and the like, in the latter case it is necessary to form the folds in the free spaces between one lettering or symbol and the next, so as to avoid concealing them. The bottle, on whose neck the capsule is placed, is thus pre-orientated with respect to a colored marking, known as "spot", which is pre-printed on said capsule, and is then sent to the stations for forming and flattening the folds.

In conventional capsule applicators, the capsules are currently orientated and applied by means of a device which is provided with a carousel disk with a plurality of rotating and motorized pans for supporting the bottles and with a series of heads for forming and flattening the folds, which are suspended above said bottles. During the rotary motion of the carousel disk, each bottle, provided with the capsule to be applied, passes in the viewing field of an optical reader, typically a photoelectric cell, and the corresponding pan supporting the bottle is rotated until the reader reads the spot pre-printed on the capsule and stops the pan, consequently orientating the bottle to send it to the subsequent stations for forming and flattening the folds.

Also known from EP-A-0052045 is a machine in accordance with the preamble of claim 1 for automatically capping and labelling bottles having a magazine for loading the caps, an endless conveyor chain for guiding the bottles, an Archimedean screw for controlling speed, and an endless conveyor chain for removing the bottles. The machine also has an inlet cross and an outlet cross, a carousel bearing a support and, above the support, capping heads inside which a nozzle connected to a source of vacuum, is mounted to move vertically, coaxially to the capping heads, a labelling device, a counter-labelling device and rollers for smoothing the labels. An indexing apparatus is disposed between the inlet and outlet crosses and is constituted by a platform mounted to rotate on a fixed pin and supporting five

groups of indexing members. Each indexing member has a cap support, a clutch-brake assembly, and a photoelectric cell. The platform is rotated above a fixed column by the motor which also rotates the carousel and the labelling apparatus. The clutch-brake has a pin bearing a gear which meshes with a large gear fast with the fixed column. On the pin are mounted two electromagnets due to which a toothed ring may be driven in rotation or braked and stopped. One electromagnet ensures drive of the gear and is controlled by an inductive pick-up which detects the presence of a cap on the support, while the other electromagnet ensures braking of the gear, and is controlled by the photocell. At the base of the support there is provided a toothed ring which meshes with the ring of the clutch-brake assembly.

These conventional devices for orientating and applying capsules have several drawbacks, including mainly a limited speed of the operating cycle, considerable structural complexity due to the presence of individual motors for actuating the supporting pans, and poor reliability in centering due to the limited reading time available to the optical reader and due to the inertia of the bottle, which prevents the immediate halting of the pan and the consequent correct alignment of said bottle with respect to the axis of said reader.

A principal aim of the present invention is essentially to eliminate these and other drawbacks, and within the scope of this general aim the invention has the important object of providing a device for centering and applying metal sealing capsules as specified which has a substantially simplified structure, allows high production cycle speeds, is extremely reliable in terms of capsule centering, and has reduced manufacturing and running costs.

According to the present invention, with this aim, these and other objects in view, there is provided a device for centering and applying sealing capsules which has the characteristics specified in the appended claims.

Substantially, the device according to the invention comprises a carousel disk which is rotated at a constant speed and has a plurality of pans which are mutually spaced with a preset angular pitch, which can rotate freely, and which support corresponding bottles to be processed. Processing heads, respectively for orientating the capsules, for forming the folds, and for flattening said folds, are suspended above the carousel disk with the same angular spacing as the pans. The processing heads rest on a support which performs reciprocating angular advancement and return translatory motions, with strokes that are equal in extent to the spacing pitch of the pans, and vertical descending and ascending movements to move said heads from a standby position to an active position and vice versa. The heads, in the lowered active position, during the advancement stroke of the support, perform their working cycle by moving at the same angular speed as the carousel disk and rise at the end of said stroke to perform the reverse angular

return stroke.

The orientation head or heads are powered, and each one has a rotating presser disk which, in active position, rotates the underlying bottle engaged there-with. Respective optical readers cooperate with the ori-
 5 entation head or heads, follow each bottle along the entire angular stroke of the advancement of the carousel disk, and control the rotation of the presser disk of the head, stopping it when the reference mark of the capsule aligns itself with the respective optical reader.

Further characteristics, purposes and advantages of the device according to the invention will become apparent from the following detailed description thereof and with reference to the accompanying drawings, given by way of non-limitative example, wherein:

figure 1 is a schematic elevation view of the device according to a preferred embodiment of the invention;

figure 1a is an enlarged-scale view of a detail of figure 1;

figure 2 is a top plan view of figure 1;

figure 3 is an enlarged-scale schematic sectional view, taken along the plane III-III of figure 1.

In figure 1, the reference numeral 10 generally designates the device for centering and applying capsules on bottles B which arrive from preceding bottling stations and are individually provided with said capsule C fitted loosely on their necks.

The device 10 substantially comprises a carousel disk 11 rotated at constant speed by a first hollow vertical shaft 11a which is in turn driven by a gearmotor arranged in the footing (not shown) of the capsule applicator. The carousel disk 11 has multiple pans 12 mutually spaced with a preset angular pitch "p". Each pan is freely rotatably mounted, with the interposition of bearings 13, on a corresponding support 13a which is rigidly coupled to the carousel disk 11 and is slightly braked by a braking ring with a friction coupling. A second solid vertical shaft 14 is arranged coaxially to the hollow shaft 11a and is rotated in alternating directions to perform an advancement stroke and a return stroke, each of which has an angular extent that is equal to, or a multiple of, the spacing pitch "p" of the pans 12.

The shaft 14 is also subjected to axial movements in order to perform corresponding ascending and descending strokes at the end of the advancement stroke and of the return stroke respectively. A cam device, which is per se known and is not shown, drives the shaft 14 angularly and axially. A threaded portion 14a of the shaft 14 carries a movable support 15 so that it can be adjusted vertically by means of a hand lever device 15a; at least one set of three processing heads 16-17-18 is suspended from, and retained by, said movable support 15, and said heads perform angular advancement and return translatory motions and vertical ascending and descending movements which correspond to the angular and axial movements of the shaft

14; the vertical axis of the heads intersects the circular path of the centers of the pans 12.

The processing heads are also mutually spaced with an angular pitch "p" equal to the spacing pitch of the pans 12 and perform, in succession and respectively, the operations for orientating the capsules, forming the folds, and flattening the folds. Preferably, the heads 16, 17 and 18 are arranged in pairs to act simultaneously on two bottles at a time. Accordingly, the support 15 is provided with three pairs of processing heads which are identical two by two and are meant respectively for orientation, fold forming, and fold flattening, and the support 15 performs an advancement translatory motion having an angular extent "P" that is twice the pitch "p" of the spacing of the pans 12.

Each one of the processing heads 16 for orientating the capsules is provided with a presser disk 19 which is preferably fitted with elastomeric material and is supported at the end of a grooved shaft 20 subjected to the action of a weight 21. The shaft 20 can slide axially in, but is torsionally coupled to, a driving bush 22 (figure 1a) which is freely rotatably contained in a support 23 with bearings and has a pulley 24 which is actuated, by means of a transmission belt 25, by a step motor 26. The pulley 24 and the belt 25 are preferably of the toothed type.

The processing heads 17-18 respectively for forming and flattening the folds are of the known pneumatic-dome type which comprise a dome-shaped support 27 accommodating an elastomeric sleeve 28 which is subjected to the action of a compressed fluid and has, depending on the operation performed by the related processing head 17 or 18, an internal surface which is profiled so as to form or respectively flatten the folds on the capsule C.

The processing heads 17 and 18 also have a respective presser 190 which however is not motorized and is only subjected to the action of a weight 210.

Processing heads such as 17 and 18 for forming and flattening the folds are described in the prior Italian patent No. 1,160,564 and in the prior Italian Utility Model patent No. 197,131 in the name of the same Applicant.

Respective movable optical readers 29-30 cooperate with the processing heads 16 and perform advancement and return strokes rigidly with the disk 15 of the processing heads, following each bottle along the entire angular advancement pitch. Each one of the readers 29-30 is constituted by a photoelectric cell which controls the rotation of the motor 26 driving the presser disk 19 of the respective head 16 and which stops said motor when a reference mark T, pre-printed on the capsule C, aligns itself with the respective optical reader. The slight braking action applied to the pans 12 as mentioned above allows to stop the rotation of the bottle B in correct alignment with the optical reader.

As clearly shown in figure 3, each reader 29-30 is rigidly coupled, in an adjustable manner, to the end of a respective radial supporting arm 31-32. The other end

of the arms is rigidly coupled to a beam 33 which is in turn rigidly coupled, by means of a bolt 34, to a vertical retention rod 35. The rod 35 is rigidly coupled to a collar 36 which is freely rotatably fitted on the hollow shaft 11a. The collar 36 has a radial wing 36a provided with a hole 37 in which a rod 38 passes, said rod actuating the collar 36 rotatably and slideably.

As clearly shown in figure 1, the upper end of the actuation rod 38 is rigidly coupled to a horizontally swinging arm 39 which is rigidly coupled to the shaft 14 and therefore performs the same angular movements as said shaft, rigidly coupling the optical readers 29-30 to the support 15 in the advancement and return strokes; the vertical movements of the shaft 14 are irrelevant due to the through coupling of the traction rod 38 to the collar 36.

Naturally, without altering the concept of the invention, the details of execution and the embodiments may be altered extensively with respect to what has been described and illustrated by way of non-limitative example without thereby abandoning the scope of the invention defined by the appended claims, wherein the reference numerals are given only for the sake of clearer understanding.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Device (10) for centering and applying sealing capsules (C) on bottles (B) of wine and beverages in general, comprising a carousel disk (11) which is rotatable at constant speed and has multiple pans (12) for supporting the bottles to be processed, said pans being mutually spaced about the periphery of the disk with a preset angular pitch (p), at least one set of processing heads (17-18) being supported by a support (15) which performs vertical movements and reciprocating advancement and return angular translatory motions with strokes whose extent is equal to, or a multiple of, the spacing pitch of the pans, two of said heads being respectively for forming the folds on the capsules and for flattening the folds, characterized in that said supporting pans are freely rotatable, in that the or each set of processing heads includes a third processing head (16) for orientating the capsules prior to the forming and flattening the folds and in that drive means are (19-26) associated with the orientation head or heads to rotate each bottle, together with its capsule arranged on the pan (12) once that the orientation head has been applied on the bottle, said drive means consisting of an electric motor for each orientation head, and optical reader means (29-30)

which move rigidly with the head support (15), said reader means being suitable to stop the motor of the respective orientation heads (16) when a reference mark (T) printed on the capsule is aligned with them.

2. Device according to claim 1, characterized in that it comprises a set of three pairs of processing heads (16,17,18) which are identical two by two, and in that each pair of heads performs, in succession, the respective operating steps for orientating the capsules, forming the folds, and flattening said folds on two bottles at the same time; the head support (15) performing advancement and return translatory motions the angular extent (P) whereof is twice the pitch (p) of the spacing of the pans (12).
3. Device according claim 1, characterized in that the processing heads (16,17,18) are mutually spaced with an angular pitch (p) which is equal to the angular spacing pitch of the pans (12).
4. Device according to the claim 2 or 3, characterized in that the orientating processing heads have a presser disk (19) supported at the end of a grooved shaft (20) which is subjected to the action of a weight (21) and is rotated by an actuation bush (22) which is driven by a step motor (26) by means of a transmission belt (25); said shaft (20) being axially slideably with respect to the actuation bush (22).
5. Device according to claim 1 or 2, characterized in that the support (15) of the processing heads (16,17,18) can move vertically to transfer the heads from a raised return position to a lowered position for active translatory motion and vice versa.
6. Device according to claim 1, characterized in that the carousel disk (11) is driven by a hollow shaft (11a) which contains, so that it can slide and rotate freely, a solid shaft (14) for supporting and moving the movable support (15) of the processing heads (16,17,18).
7. Device according to claim 1, characterized in that the optical reader means (29,30) are constituted by photocells which are adjustably supported by respective radial supporting arms (31,32) which move rigidly with the support (15) of the processing heads (16,17,18), performing corresponding advancement and return strokes.
8. Device according to claim 7, characterized in that the arms (31,32) for supporting the optical reader means (29,30) are rigidly coupled to a collar (36) which is freely rotatably fitted on the shaft (11a) for moving the carousel disk (11), and in that said collar (36) is moved angularly, by means of an actuation rod (38) passing through a wing of said collar,

by a horizontally swinging arm (39) which is torsionally rigidly coupled to the shaft (14) which supports and moves the support (15) of the processing heads (16,17,18).

9. Device according to claim 1 or 2, characterized in that the processing heads (17,18) for forming and flattening the folds of the capsules are of the pneumatic type and comprise a dome-shaped support (27) accommodating an elastomeric sleeve (28) which is subjected to the action of a pressurized fluid.

Patentansprüche

1. Vorrichtung (10) zum Zentrieren und Anbringen von Siegelkapseln (C) auf Wein oder allgemein Getränke enthaltenden Flaschen (B), mit einer Karussellscheibe (11), die mit konstanter Geschwindigkeit drehbar ist und eine Vielzahl von Platten (12) zum Tragen der zu bearbeitenden Flaschen hat, wobei die Platten mit einem vorbestimmten Teilungswinkel (p) entlang des Randes der Scheibe voneinander beabstandet sind, mit mindestens einer Gruppe von Bearbeitungsköpfen (17-18), die an einem Träger (15) angeordnet sind, welcher vertikale Bewegungen und translatorische Vor- und Zurück-Schwenkbewegungen ausführt, wobei der Schwenkweg gleich dem Winkelabstand der Platten oder ein Vielfaches davon ist, und wobei zwei der Köpfe für das Bilden von Falzen an den Kapseln bzw. für das Flachdrücken der Falze vorgesehen sind, dadurch **gekennzeichnet**, daß die Trägerplatten frei drehbar sind, daß die bzw. eine jede Gruppe von Bearbeitungsköpfen einen dritten Bearbeitungskopf (16) zum Ausrichten der Kapseln vor dem Bilden und Flachdrücken der Falze hat, und daß Antriebsmittel (19-26) mit dem Ausrichtkopf bzw. den Ausrichtköpfen verbunden sind, um die jeweilige, auf der Platte (12) angeordnete Flasche mit ihrer Kapsel zu drehen, nachdem der Ausrichtkopf auf die Flasche aufgesetzt wurde, wobei die Antriebsmittel einen Elektromotor für jeden Ausrichtkopf umfassen, und daß eine optische Leseeinrichtung (29-30) vorgesehen ist, die sich starr mit dem Bearbeitungskopf-Träger (15) bewegt, wobei die Leseeinrichtung dazu ausgebildet ist, den Motor der jeweiligen Ausrichtköpfe (16) anzuhalten, wenn eine auf die Kapsel aufgedruckte Bezugsmarkierung (T) sich in Ausrichtung mit ihr befindet.
2. Vorrichtung nach Anspruch 1, dadurch **gekennzeichnet**, daß sie eine Gruppe von drei Bearbeitungskopfpaaren (16, 17, 18) hat, wobei jeweils zwei Köpfe identisch sind, und daß jedes Kopfpaar nacheinander die jeweiligen Arbeitsschritte zum Ausrichten der Kapseln, zum Bilden der Falze und zum Flachdrücken der Falze gleichzeitig an zwei

Flaschen ausführt, wobei der Bearbeitungskopf-Träger (15) translatorische Vor- und Zurückbewegungen ausführt, deren winkelmäßige Ausdehnung (P) zweimal so groß ist wie der Teilungswinkel (p), mit dem die Platten (12) beabstandet sind.

3. Vorrichtung nach Anspruch 1, dadurch **gekennzeichnet**, daß die Bearbeitungsköpfe (16, 17, 18) mit einem Teilungswinkel (p) voneinander beabstandet sind, der gleich dem Teilungswinkel ist, mit dem die Platten (12) voneinander beabstandet sind.
4. Vorrichtung nach Anspruch 2 oder 3, dadurch **gekennzeichnet**, daß die Ausrichtungs-Bearbeitungsköpfe eine Andruckscheibe (19) haben, die am Ende einer Nutenwelle (20) angeordnet ist, auf die ein Gewicht (21) einwirkt und die mittels einer Betätigungsbuchse (22), die von einem Schrittmotor (26) über einen Transmissionsriemen (25) angetrieben wird, drehbar ist, wobei die Welle (20) in axialer Richtung relativ zur Betätigungsbuchse (22) gleitend verschiebbar ist.
5. Vorrichtung nach Anspruch 1 oder 2, dadurch **gekennzeichnet**, daß der Träger (15) für die Bearbeitungsköpfe (16, 17, 18) vertikal bewegbar ist, um die Köpfe aus einer angehobenen Rückstellposition in eine abgesenkte Position für eine aktive translatorische Bewegung und wieder zurück zu verstellen.
6. Vorrichtung nach Anspruch 1, dadurch **gekennzeichnet**, daß die Karussellscheibe (11) von einer Hohlwelle (11a) angetrieben ist, in der eine massive Welle (14) frei gleitend und drehbar aufgenommen ist, die den beweglichen Träger (15) für die Bearbeitungsköpfe (16, 17, 18) trägt und bewegt.
7. Vorrichtung nach Anspruch 1, dadurch **gekennzeichnet**, daß die optische Leseeinrichtung (29, 30) Fotozellen enthält, die jeweils verstellbar an radialen Trägerarmen (31, 32) gelagert sind, die sich starr mit dem Träger (15) für die Bearbeitungsköpfe (16, 17, 18) bewegen und dabei entsprechende Vor- und Zurückbewegungen ausführen.
8. Vorrichtung nach Anspruch 7, dadurch **gekennzeichnet**, daß die Arme (31, 32), an denen die optische Leseeinrichtung (29, 30) angeordnet ist, starr mit einem Reif (36) verbunden sind, der frei drehbar an der Welle (11a) zum Bewegen der Karussellscheibe (11) gelagert ist, und daß der Reif (36) mittels einer Betätigungsstange (38), die sich durch einen Fortsatz am Reif erstreckt, von einem horizontalen Schwenkarm (39) gedreht wird, der drehfest mit der Welle (14) verbunden ist, die den Träger (15) für die Bearbeitungsköpfe (16, 17, 18) trägt und bewegt.

9. Vorrichtung nach Anspruch 1 oder 2, dadurch **gekennzeichnet**, daß die Bearbeitungsköpfe (17, 18) zum Bilden und Flachdrücken der Falze der Kapseln vom druckluftbetätigten Typ sind und einen kuppelförmigen Träger (27) haben, in dem eine Elastomerhülle (28) aufgenommen ist, auf die ein Druckfluid einwirkt.

Revendications

1. Dispositif (10) de centrage et d'application de capsules de scellement (C) sur des bouteilles (B) de vin et de boissons en général, comportant un disque carrousel (11) pouvant tourner à vitesse constante et possédant des cuvettes multiples (12) pour supporter les bouteilles à traiter, lesdites cuvettes étant mutuellement espacées autour de la périphérie du disque selon un pas angulaire prédéterminé (p), au moins un ensemble de têtes de traitement (17-18) étant supportées par un support (15) qui accomplit des mouvements verticaux et des mouvements de translation en va-et-vient d'avance angulaire et de retour avec des courses dont la valeur est égale ou est un multiple du pas d'espacement des cuvettes, deux desdites têtes ayant respectivement pour but la formation des plis sur les capsules et l'aplatissement des plis, caractérisé en ce que lesdites cuvettes de support peuvent tourner librement, en ce que le ou chaque ensemble de têtes de traitement comprend une troisième tête de traitement (16) pour orienter les capsules avant la formation et l'aplatissement des plis et en ce que des moyens d'entraînement (19-26) sont associés à la ou aux têtes d'orientation pour faire tourner chaque bouteille, conjointement avec sa capsule, disposée sur la cuvette (12) après que la tête d'orientation a été appliquée sur la bouteille, lesdits moyens d'entraînement étant constitués par un moteur électrique pour chaque tête d'orientation, et par des moyens de lecture optique (29-30) qui se déplacent solidairement avec le support de tête (15), lesdits moyens de lecture étant appropriés pour arrêter le moteur des têtes d'orientation respectives (16) lorsqu'un repère de référence (T) imprimé sur la capsule est aligné avec eux.
2. Dispositif selon la revendication 1, caractérisé en ce qu'il comporte un ensemble de trois paires de têtes de traitement (16, 17, 18) qui sont identiques deux par deux, et en ce que chaque paire de têtes accomplit, en succession, les étapes respectives d'orientation des capsules, de formation des plis, et d'aplatissement desdits plis sur deux bouteilles à la fois; le support de tête (15) accomplissant les mouvements de translation d'avance et de retour dont l'étendue annulaire (P) est le double du pas (p) d'espacement des cuvettes (12).
3. Dispositif selon la revendication 1, caractérisé en

ce que les têtes de traitement (16, 17, 18) sont mutuellement espacées d'un pas angulaire (p) qui est égal au pas d'espacement angulaire des cuvettes (12).

4. Dispositif selon la revendication 2 ou 3, caractérisé en ce que les têtes de traitement d'orientation possèdent un disque presseur (19) supporté à l'extrémité d'un arbre cannelé (20) qui est soumis à l'action d'un poids (21) et est entraîné en rotation par un manchon d'actionnement (22) qui est entraîné par un moteur pas à pas (26) au moyen d'une courroie de transmission (25); ledit arbre (20) pouvant coulisser axialement par rapport au manchon d'actionnement (22).
5. Dispositif selon la revendication 1 ou 2, caractérisé en ce que le support (15) des têtes de traitement (16, 17, 18) peut se déplacer verticalement pour transférer les têtes depuis une position de retour élevée dans une position abaissée pour un mouvement de translation actif et vice-versa.
6. Dispositif selon la revendication 1, caractérisé en ce que le disque carrousel (11) est entraîné par un arbre creux (11a) qui contient, de manière à pouvoir glisser et à tourner librement, un arbre plein (14) pour supporter et déplacer le support mobile (15) des têtes de traitement (16, 17, 18).
7. Dispositif selon la revendication 1, caractérisé en ce que les moyens de lecture optique (29, 30) sont constitués par des cellules photoélectriques qui sont supportées de façon réglable par des bras supports radiaux respectifs (31, 32) qui se déplacent solidairement avec le support (15) des têtes de traitement (16, 17, 18), accomplissant des courses d'avance et de retour correspondantes.
8. Dispositif selon la revendication 7, caractérisé en ce que les bras (31, 32) pour supporter des moyens de lecture optique (29, 30) sont couplés de façon rigide à un collier (36) monté à rotation libre sur l'arbre (11a) pour déplacer le disque carrousel (11), et en ce que ledit collier (36) est déplacé angulairement, au moyen d'une tige d'actionnement (38) passant à travers une aile dudit collier, par un bras oscillant horizontalement (39) qui est couplé de façon rigide en torsion à l'arbre (14) qui supporte et déplace le support (15) des têtes de traitement (16, 17, 18).
9. Dispositif selon la revendication 1 ou 2, caractérisé en ce que les têtes de traitement (17, 18) pour former et aplatir les plis des capsules sont du type pneumatique et comportent un support (27) en forme de dôme recevant un manchon (28) en élastomère qui est soumis à l'action d'un fluide pressurisé.

FIG. 1

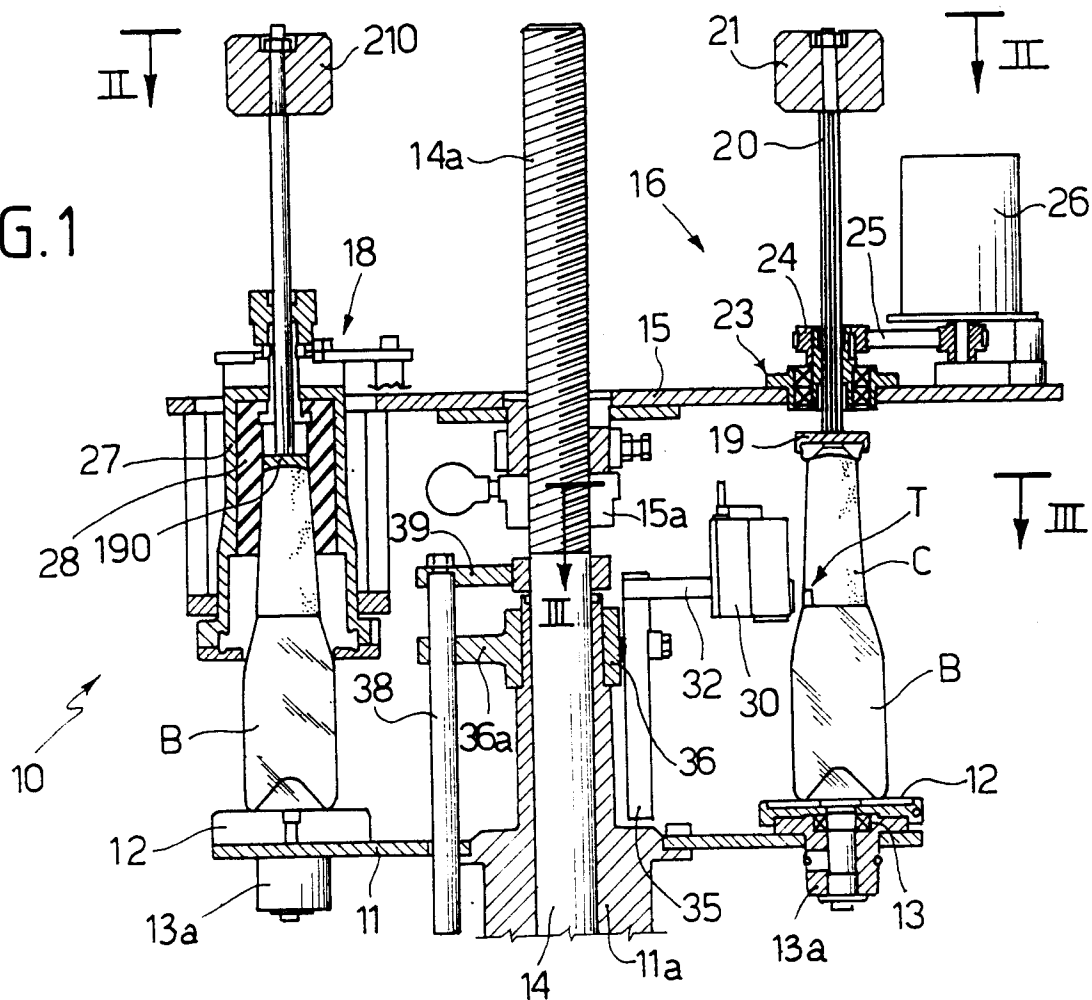
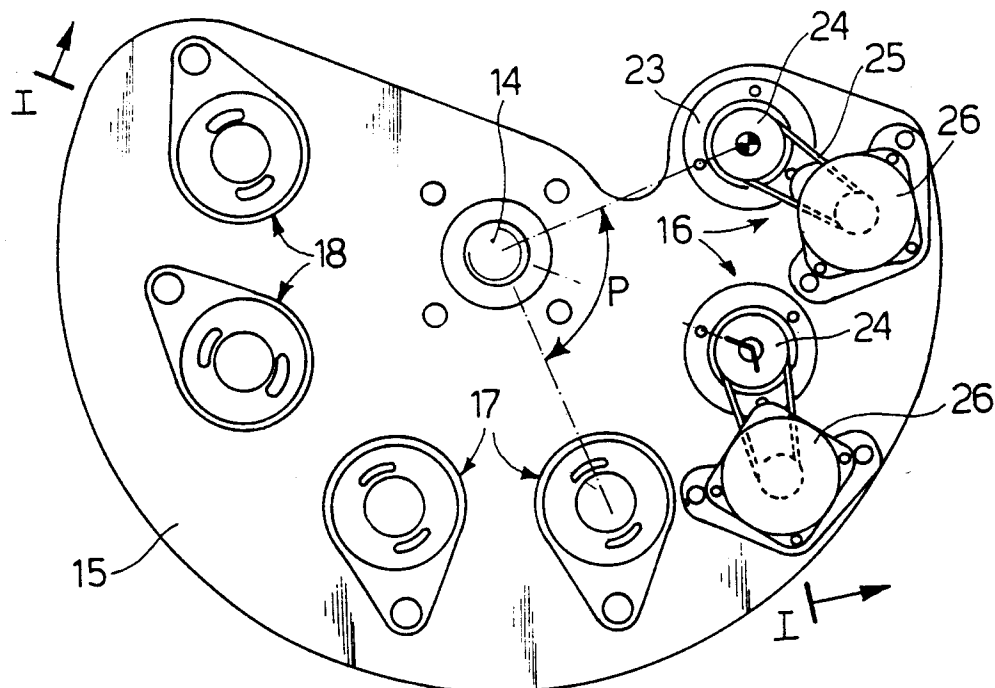


FIG. 2



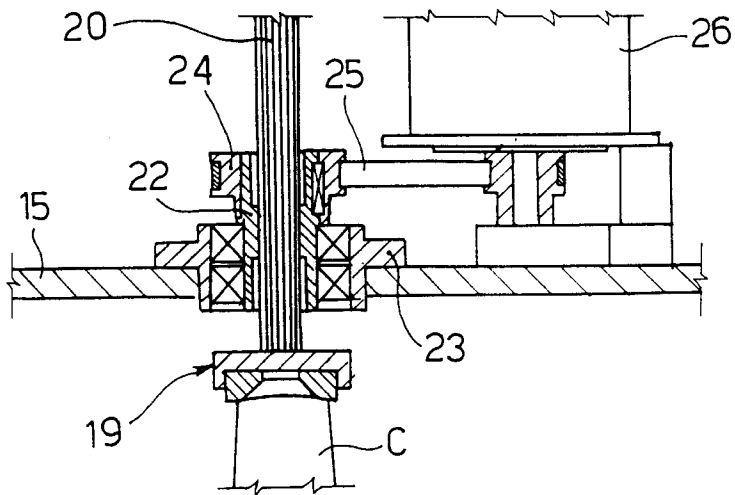


FIG. 1a

FIG. 3.

