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(54) A rolling head for tightening sealing capsules of a yielding material around the necks of bottles of wine, liqueur, and the like

(57) The rolling head (20) is installable on a rolling machine in which the bottle is movably supported in a vertical direction with respect to the head between a resting position non interfering with the head, and operative positions interfering with the head. A housing is (64) pivotally supported about a vertical axis under control of motor means (74). A plurality of arms (68) are hinged to the housing (64) about respective tangential axes, and each of them pivotally supports a roller (72) about an axis lying at right angles to the hinging axis of the arm. Each arm can swing between a working position in which the roller (72) is near the axis of rotation of the housing (64), and a non-working position in which the roller is spaced from the axis of rotation of the housing (64). The arms (68) are biased to said working position by remote-controlled driving means (60, 176, 280) for controlling the pressure applied by the respective rollers (72) on the neck of a bottle arranged coaxial to the axis of rotation of the housing (64).

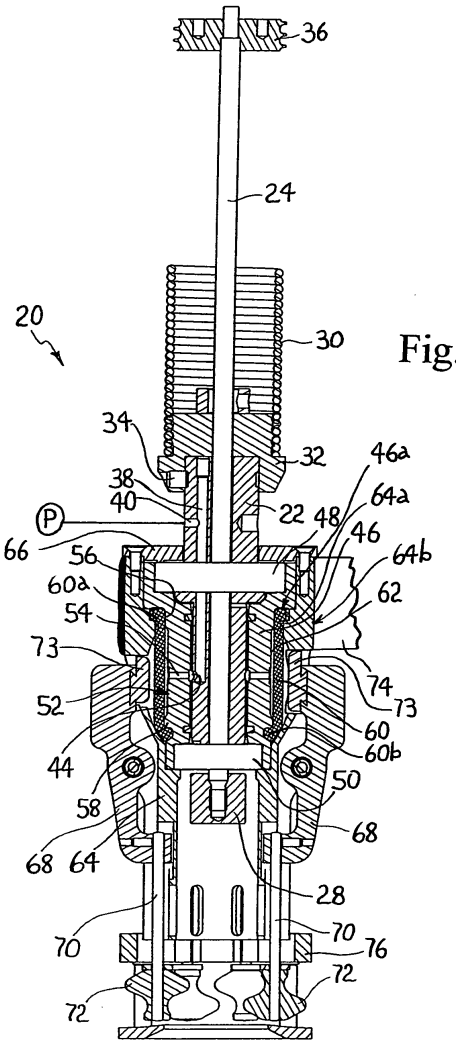

Fig. 3

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Description

[0001] The present invention relates to a rolling head for tightening sealing capsules of a yielding material around the necks of bottles of wine, champagne-type wine, liqueur, and the like.

[0002] In the wine-bottling field it is known to seal the mouth of the bottle by a plug consisting of an agglomerate of cork, or of a synthetic material, which is pushed into the neck of the bottle by a corking machine. The mouth is then sealed by fitting a capsule of a synthetic material, typically a thin metal sheet, on the neck.

[0003] The capsule initially has a cylindrical shape surrounding the neck with a loose fit, and then is pressed to substantially adhere to the neck of the bottle by a rolling machine, which generally comprises a carousel supporting a plurality of stations, which follow one another in receiving the bottles in a vertical position from a feeder and are provided with respective rolling heads. The bottles are received in respective seats that are vertically movable under control of cam-based mechanisms.

[0004] Each rolling head generally comprises a housing which rotates about a vertical axis and has a plurality of arms hinged to its periphery. Each arm bears a roller that is elastically biased against the neck of the bottle by a spring, or by an elastic band engaged between the arm and the housing.

[0005] While the head rotates, the bottle is lifted by the cam-based mechanisms and the rollers elastically engage the capsule surrunding the neck with a rolling friction action from the upper end of the capsule, near the mouth, to its lower end. Thereafter, the bottle is dropped and the rollers rotatably engage the capsule in the opposite direction.

[0006] The above-mentioned rolling head has drawbacks deriving from the circumstance that the elastic force applied by the springs, and consequently the pressure applied by the rollers to the bottle neck, is not controllable while the head rotates. This circumstance, e.g., complicates the setting of the head, which must be carried out with the machine at rest, by adjusting the preload of the springs with a cut-and-try approach. This setting method does not allow the effects of the adjustments to be appreciated in real time, and also requires the machine to be started and stopped repeatedly.

[0007] In addition, as well known to the person skilled in the art, the action of the rollers during the downstroke may damage the material of the capsule, which was already stressed during the upstroke along a helical path from the top to the bottom, and now is stressed in the opposite direction. This circumstance may cause stretching, or even tearing, of the material.

[0008] It would also be desirable to change the pressure applied by the rollers during the rolling cycle on a bottle. In fact, while the profile of the capsule before the rolling process is substantially cylindrical, the bottle neck generally has a profile tapering upwards and terminating with an enlaged mouth. Therefore, a stronger rolling action would be desired in the areas where the gap between the capsule and the neck is larger, while a softer rolling action would be desired in the areas where the gap between the capsule and the neck is narrower, e.g., at the enlarged mouth, to prevent the material of the capsule from damaging.

[0009] Therefore, it is a main object of the present invention to provide a rolling head which allows the pressure applied by the rollers to be controlled in real time during the rolling process, in order to make it easier and faster to set the head and to optimize the action of the rollers during the rolling cycle.

[0010] The above objects and other advantages, which will better appear from the following description, are achieved by the rolling head having the features recited in claim 1, while the other claims state other advantageous, thought secondary features of the invention.

[0011] The invention will be now described in more detail with reference to a few preferred, non-exclusive embodiments shown by way of non-limiting example in the attached drawings, wherein:

Fig. 1 is a diagrammatical view in side elevation of a general rolling carousel;

Fig. 2 is a view in side elevation of a rolling head according to the invention;

Fig. 3 is a view in axial section of the rolling head of Fig. 1 along line III-III;

Figs. 4 to 6 are views similar to Fig. 3 in a smaller scale, which illustrate three successive operative steps of the rolling head;

Fig. 7 is a view in axial section of a rolling head in a first alternative embodiment of the invention;

Fig. 8 is a view in axial section of a rolling head in a second alternative embodiment of the invention.

[0012] Fig. 1 diagrammatically shows a motorized rolling carousel 10 which receives bottles 12 from a feeder 14. Each bottle 12 is provided with a cylindrical capsule 16 which surrounds the bottle neck with a loose fit and is made of a yielding material, typically a thin metal sheet. Carousel 10 supports a plurality of rolling stations spaced at equal angles on its periphery. Each station comprises a bottle-holding seat 18 and a rolling head 20 supported above it. Bottle-holding seat 18 is vertically movable from a resting position non interfering with the head to operative positions interfering with the head, under control of cam-based mechanisms of a conventional type (not shown).

[0013] With particular reference to Figs. 2, 3, rolling head 20 comprises a vertical-axis hollow shaft 22 in which a rod 24 having a stopper 28 screwed to its lower end is slidable. Rod 24 is normally drawn downwards by an ex-

tension spring 30 that is anchored to a bottom 32, which is coaxially attached to the upper end of hollow shaft 22 by a pin 34 and has a helical groove engaged by the lower end of the spring, and to a plate 36, which is coaxially attached to the upper end of rod 24 and also has a helical groove engaged by the upper end of spring 30. However, for better clarity, spring 30 is shown in the Figures as closed in a resting position and disconnected from plate 36. Hollow shaft 22 has a longitudinal channel 38 with an inlet mouth 40 connected to pressurized air feeding means P (which are only diagrammatically shown in Fig. 3). Longitudinal channel 38 leads to a circumferential groove 44 spaced from inlet mouth 40, below the latter.

[0014] Hollow shaft 22 pivotally supports a sleeve 46 on bearings 48, 50. Sleeve 46 has a narrow cylindircal portion 52 in fluid communication with circumferential groove 44 via radial passages 54. Cylindrical portion 52 axially extends between a shoulder 56 and a ridge 58, and is surrounded by a substantially cylindrical membrane 60 made of an elastic, synthetic material. The membrane is fitted on sleeve 46 and elastically and sealingly engages both shoulder 56 with one of its ends having an edge 60a projecting inwards, and ridge 58 with its opposite end having a recess 60b that axially engages ridge 58. Therefore, a pneumatic annular chamber 62 in fluid communication with longitudinal channel 38 is defined between cylindrical portion 52 and membrane 60.

[0015] A hollow housing 64 closed by an upper cover 66 integrally surrounds sleeve 46. Hollow housing 64 has an inner, annular abutment 64a which clamps edge 60a of membrane 60 against an outer, annular abutment 46a of sleeve 46. Hollow housing 64 supports a plurality of roller-bearing arms 68 that are hinged to its periphery about respective tangential axes passing through an intermediate point of the arm. Each arm 68 terminates at its lower end with a bar 70 which projects in the direction of the arm and pivotally supports a roller 72 at its lower end. The roller is shaped as an amphora and is arranged with its axis lying at right angles to the hinging axis of the arm. Arm 68 has an abutment 73 at its upper end facing membrane 60. In the example, there are six arms with respective bars and rollers, and the rollers are alternately arranged in upside-down positions, with their larger sections lying on two planes which are mutually spaced in a vertical direction. Each arm 68 can swing between a working position, in which the respective roller 72 engages the neck of a bottle coaxially arranged below the head, and a non-working position in which the roller is radially spaced from the neck of the bottle. The hinging point advantageously lies on the side of the arm facing away from the rollers with respect to the center of gravity of the roller-bearing arm, so that the arms, while the head rotates, are biased to their resting position by the centrifugal force.

[0016] Hollow housing 64 and sleeve 46 are driven to rotate about hollow shaft 22 by a motorized belt 74 (only a portion of which is shown in the Figures) which operatively engages a driving surface 64b of hollow housing 64.

[0017] Hollow housing 64 supports a cage 76 at its lower end. The cage surrounds rollers 72 and is open at its lower end for axially receiving the bottle neck.

[0018] In the operation, the stations of carousel 10 follow one another in receiving bottles from feeder 14. Each bottle is received in a respective seat 18 coaxial to head 20, which is continuously driven to rotate by belt 74.

[0019] With particular reference to Figs. 4 to 6, where only two roller-bearing arms 68 are shown for better clarity, the head is initially lifted at its position non interfeing with the bottle, as shown in Fig. 4. Once received the bottle, pneumatic chamber 62 is pressurized, so that membrane 60 is inflated in such a way as to engage the upper ends of arms 68, which consequently rotate to their working position. While the bottle is progressively lifted, the rollers radially engage the capsule fitted on the bottle neck by rolling friction action, thereby describing a helical path around the capsule, from its upper end near the mouth to its lower end (Fig. 5). While the bottle is lifted, stopper 28 engages the bottle mouth, thereby preventing the bottle from rotating by effect of the rotation of the head. Then, the pneumatic chamber is exhausted so that arms 68 are made free, and the bottle is dropped (Fig. 6). While the bottle is dropped, the arms are biased to their non-working position, in which the rollers are spaced from the bottle neck, by the centrifugal force.

[0020] Fig. 7 shows an alternative embodiment of the invention, in which the components similar to the previous embodiment are referred to with the same reference number augmented with 100, while no description will be given for the identical parts.

[0021] In particular, the embodiment of Fig. 7 differs from the previous embodiment in that the arms are not driven by an elastic membrane but by a plurality of pistons 178 which are sealingly slidable within respective radial seats 180 which are formed in sleeve 146 and are open to circumferential groove 144. Each piston engages the end of a respective arm 168. Accordingly, pistons 178 in their seats 180 provide a plurality of pneumatic cylinders operatable to push the arms to their working position.

[0022] Fig. 8 shows a further alternative embodiment of the invention, in which the components similar to the previous embodiment are referred to with the same reference number augmented with 200, while no further description will be given for the identical parts.

[0023] In particular, in the embodiment of Fig. 8 the arms are not driven by pneumatic means but by a plurality of electromagnetic actuators 282 of a conventional type, which are radally supported within sleeve 246 and are conventionally connected to a driving electric circuit E, which is only diagrammatically shown in the Figure. Therefore, in this embodiment, hollow shaft 222 does not have longitudinal passages for feeding pressurized air, as in the previous embodiments.

[0024] With all the above embodiments, the arms bearing the rollers at their lower ends are biased to their working position by pneumatic/electromagnetic remote-con-

trolled driving means. This circumstance allows the pressure applied by the rollers during the rolling process to be accurately controlled. In particular, the rolling action on the bottle is only performed during the ascent, while the roller-bearing arms are free during the descent. This enhances the machining accuracy while the machining time is equal, or even reduced, because the bottle can be lifted slowly to perform a soft rolling action in one direction, thereby obtaining an enhanced finishing, and then, when the rollers have been disengaged from the bottle neck, the bottle can be dropped very quickly to compensate the longer time for the upstroke.

[0025] In addition, it is evident that the rolling head according to the invention makes the setting easier and faster, because the pressure applied by the rollers can be adjusted while the head rotates, so that the effects of the adjustments can be appreciated in real time.

[0026] Furthermore, the pressure applied by the rollers can also be changed during the rolling cycle. For example, by delaying the operation of the roller-holding arms, the enlarged mouth will only be engaged by the three rollers lying on the higher plan, thereby providing a softer rolling action which does not damages the material of the capsule.

[0027] A few preferred embodiments of the invention have been described herein, but of course many changes may be made by a person skilled in the art within the scope of the claims. For example, in the first two embodiments other fluidodynamic driving means could be used, e.g. driving means supplied with a liquid such as oil rather than with air. Of course, the rolling head could also be installed on a rolling machine in which the head is vertically movable, while the position of the bottle-holding seats is stationary.

Claims

1. A rolling head (20) for tightening a cylindrical capsule of a yielding material (16) on a bottle neck (12), said head being installable on a rolling machine in which the bottle is movably supported in a vertical direction with respect to the head between a resting position non interfering with the head and operative positions interfering with the head, comprising

   - a housing (64) that is pivotally supported about a vertical axis under control of motor means (74),
   - a plurality of arms (68) hinged to the housing (64) about respective tangential axes, each of which arms pivotally supports a roller (72) about an axis lying at right angles to the hinging axis of the arm, each arm swinging between a working position in which the roller (72) is closer to the axis of rotation of the housing (64), and a non-working position in which the roller is spaced from the axis of rotation of the housing (64),

   characterized in that said arms (68) are biased to said working position by remote-controlled driving means (60, 176, 280) for controlling the pressure applied by the respective rollers (72) on the neck of a bottle arranged coaxial to the axis of rotation of the housing (64).

2. The rolling head of claim 1, **characterized in that** said driving means comprise biasing means (60, 176, 280) arranged to engage respective operative surfaces of the arms in a radial direction, thereby causing the arms to rotate to their respective working positions.

3. The rolling head of claim 2, **characterized in that** said biasing means (60, 176) are driven hydrodinamically.

4. The rolling head of claim 3, **characterized in that** said biasing means comprise a sealed chamber (62) which is operatively connected to pressurized fluid feeding means (P) and is externally delimited by an elastic membrane (60) facing said operative surfaces and elastically yielding in a radial direction to engage said operative surfaces.

5. The rolling head of claim 4, **characterized in that** said elastic membrane (60) is fitted on a sleeve (46) integral with housing (64), which is pivotally supported on a vertical shaft (22) having channels (38) connected to pressurized fluid feeding means (P), and has passages (54) in fluid communication with said channels (38) and leading to said sealed chamber (62).

6. The rolling head of claim 3, **characterized in that** said biasing means comprise a plurality of radial, hydraulic cylinders (178, 180) operatively connected to pressurized fluid feeding means (P), each of which is arranged in front of the operative surface of a respective arm (168).

7. The rolling head of claim 6, **characterized in that** said hydraulic cylinders (178, 180) are supported on a sleeve (146) integral with the housing (64), which is pivotally supported on a vertical shaft having channels connected to pressurized fluid feeding means, and has passages which are in fluid communicaton with said channels (38) and lead to said pneumatic cylinders.

8. The rolling head of claim 2, **characterized in that** said biasing means comprise a plurality of radial, electromagnetic actuators (282) which are operatively connected to an electric circuit (E) and are each arranged in front of the operative surface of a respective arm (268).

9. The rolling head of any of claims 1 to 8, **characterized in that** the hinging point of each of said arms (68) lies on the side of the arm facing away from the rollers with respect to the center of gravity of the arm with roller, so that the arms, while the head rotates, are biased to their resting position by the centrifugal force.

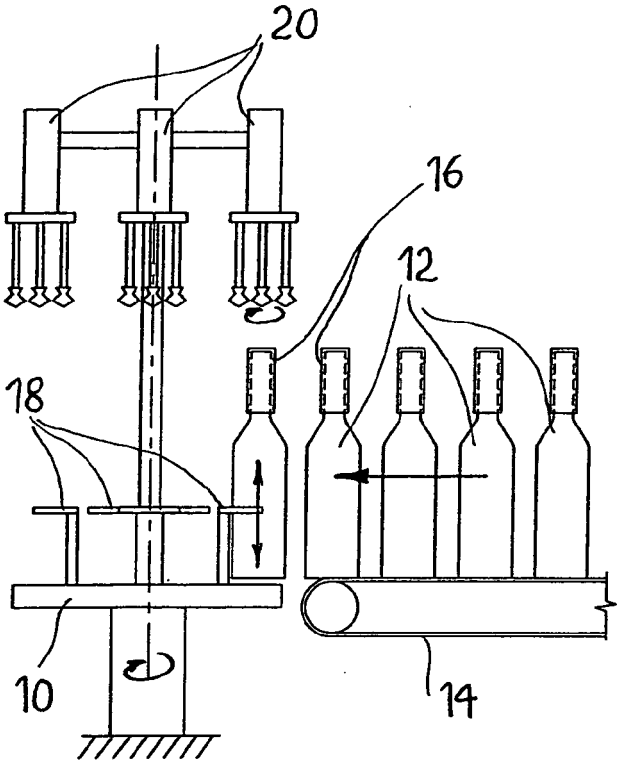

Fig. 1

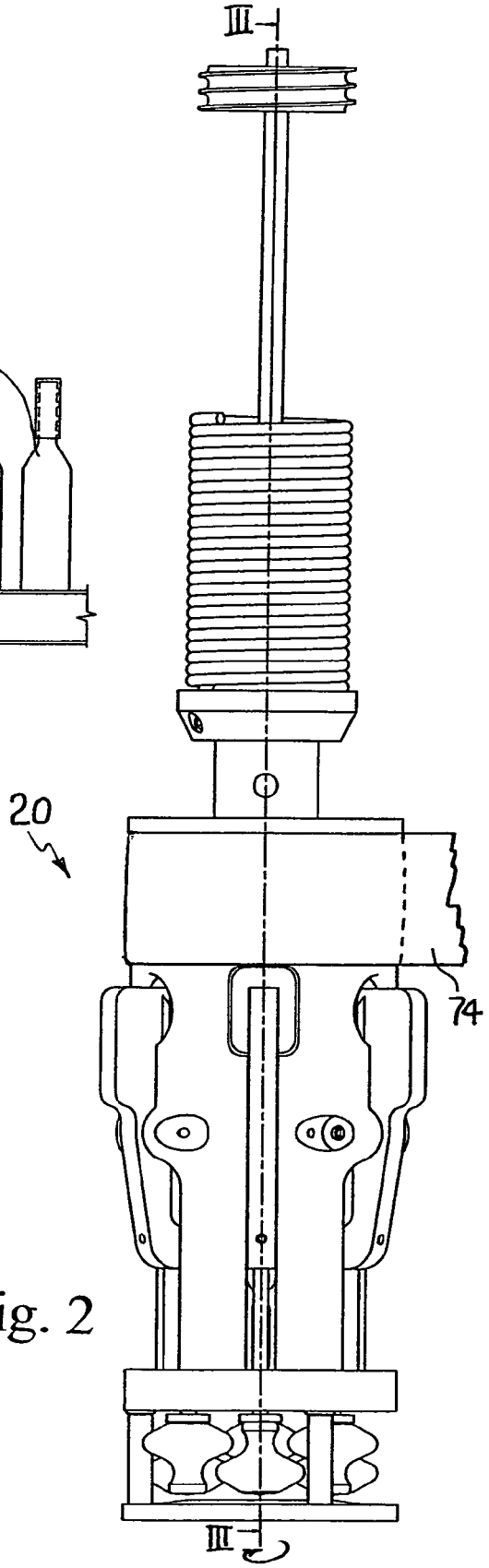

Fig. 2

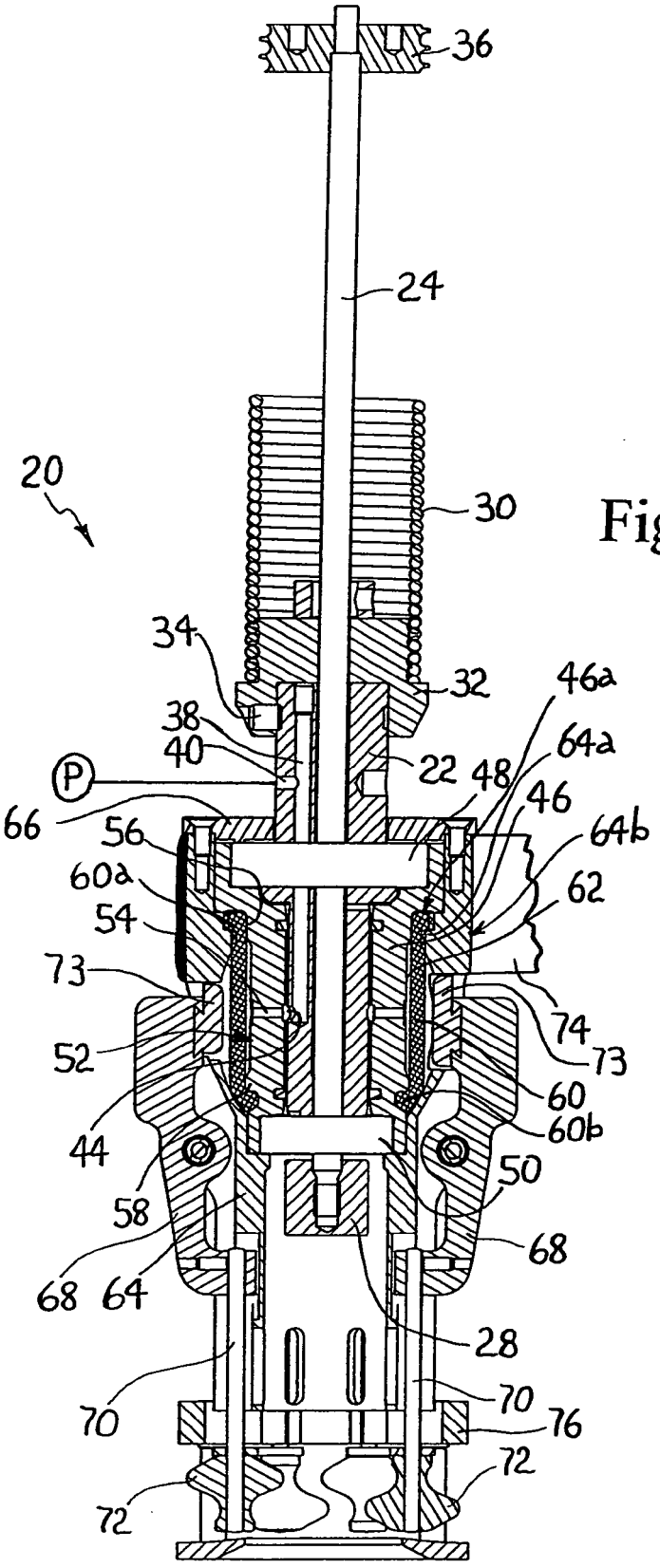
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Fig. 3

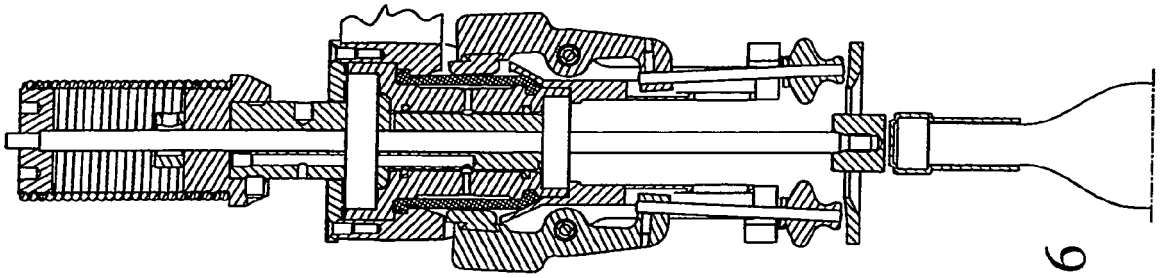


Fig. 6

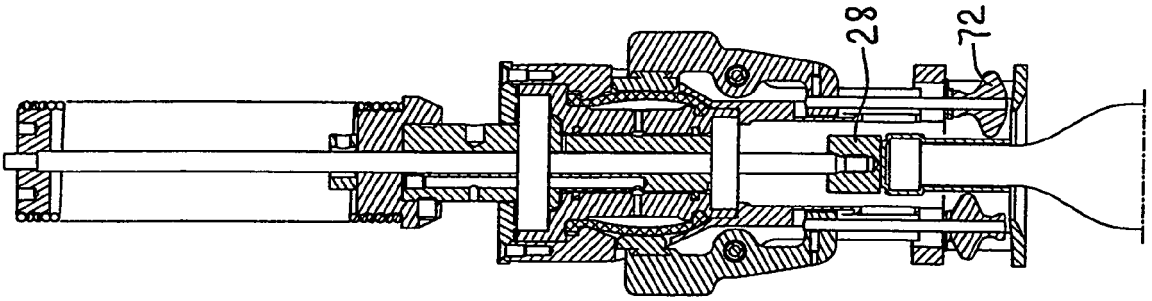


Fig. 5

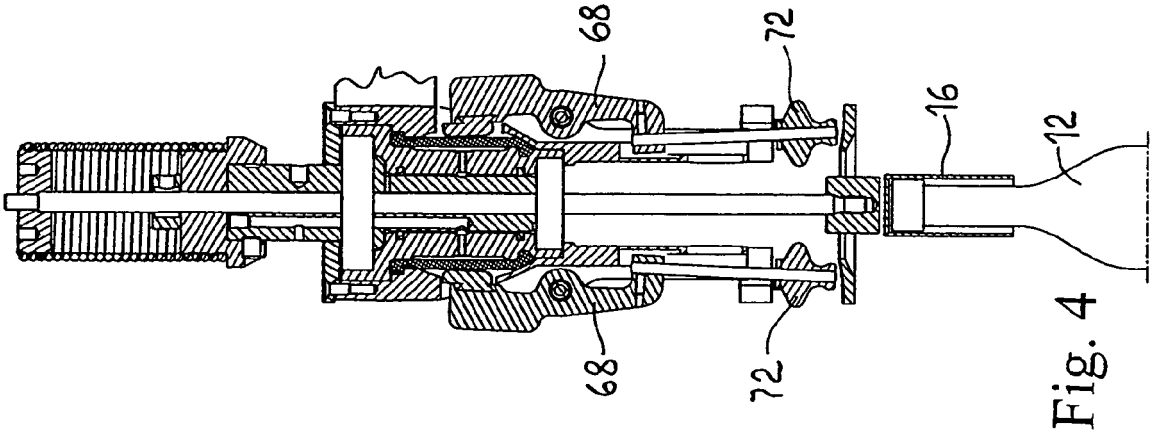


Fig. 4

Fig. 7

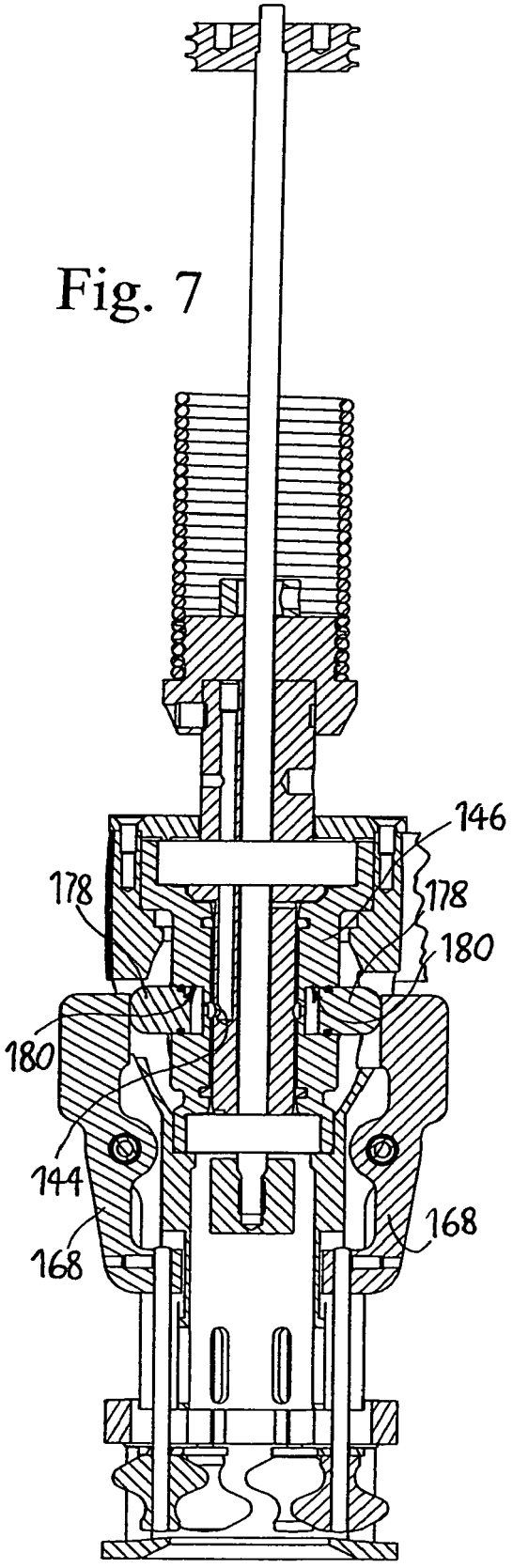
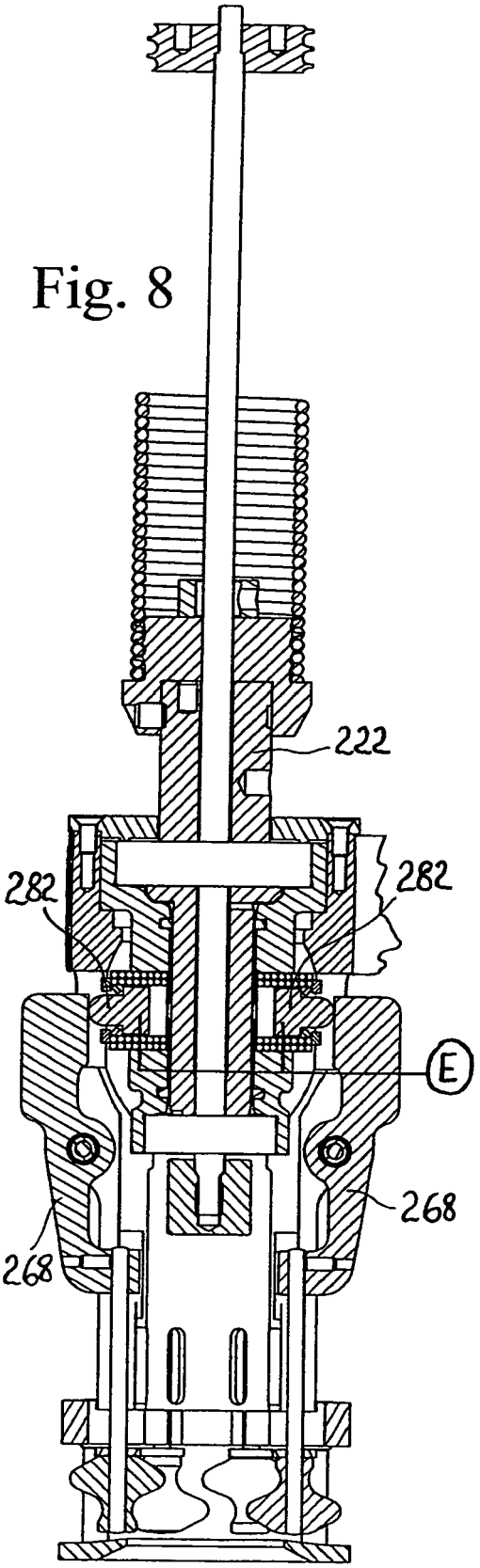


Fig. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5766

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	FR 843 460 A (BETTS & BLANCHARD ETS) 4 July 1939 (1939-07-04) * page 2, lines 64-102; figures *	1	INV. B67B5/03
A	EP 1 103 514 A (GRUPPO BERTOLASO S P A [IT]) 30 May 2001 (2001-05-30) * paragraphs [0021] - [0031]; figures *	1	
A	US 3 039 250 A (ALEXANDER PANCRAZI) 19 June 1962 (1962-06-19) * column 3, lines 14-67; figures *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			B67B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	2 March 2009	Müller, Claus

CATEGORY OF CITED DOCUMENTS

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02-03-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 843460 A	04-07-1939	NONE	
EP 1103514 A	30-05-2001	AT 250553 T	15-10-2003
		DE 60005461 D1	30-10-2003
		DE 60005461 T2	24-06-2004
		IT MI992443 A1	23-05-2001
US 3039250 A	19-06-1962	NONE	

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