



Publication number: **0 421 543 A1**

EUROPEAN PATENT APPLICATION

Application number: **90202620.2**

Int. Cl.⁵: **B65B 7/28**

Date of filing: **02.10.90**

Priority: **03.10.89 JP 116877/89 U**

Date of publication of application:
10.04.91 Bulletin 91/15

Designated Contracting States:
CH DE DK FR GB LI NL SE

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Apparatus for capping containers.

An apparatus for capping containers comprises a primary suction member (31) for attracting the central portion of a cap (L) at the lowermost position within a cap stacker (11), and a secondary suction member (34) for attracting a peripheral portion of the cap. Although both the suction members are stretchable, the secondary suction member is contractable more greatly than the primary suction member when attracting the cap. Both the suction members attract the cap in the lowermost position

within the stacker at the same time to withdraw the cap from the stacker, whereupon the secondary suction member contracts more greatly than the primary suction member to create a clearance between the attracted cap and another cap adjacent thereto immediately thereabove, permitting air to flow in between the two caps through the clearance to prevent occurrence of a negative pressure.

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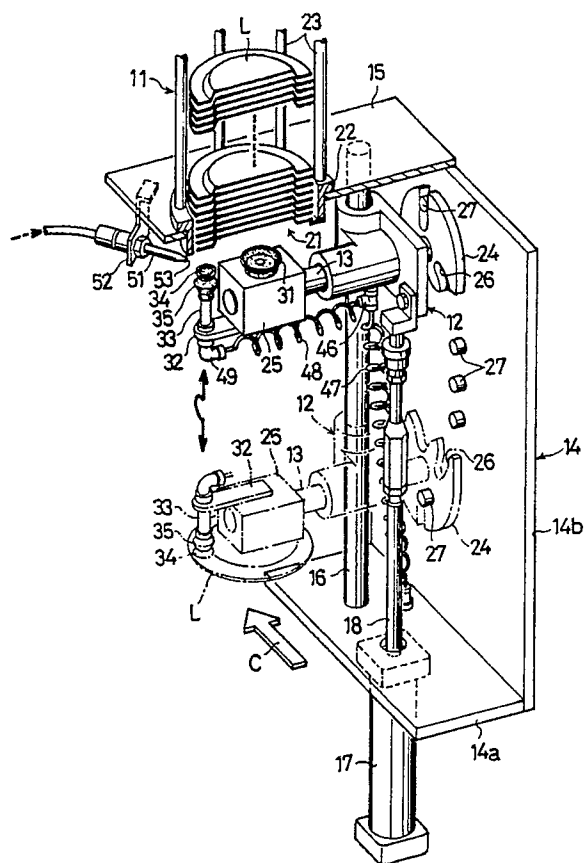


FIG. 1

APPARATUS FOR CAPPING CONTAINERS

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for capping containers.

Conventional apparatus of the type mentioned comprise a cap stacker disposed above a path of transport of containers and having a delivery opening facing downward, a horizontal rotary shaft attached to a lift member so as to be movable upward and downward between the path and the cap stacker, and a suction member attached as directed outward to the horizontal rotary shaft so as to attract the central portion of a cap at the lowermost position within the cap stacker when the lift member is at the upper limit position of its upward-downward stroke. When the lift member is at the upper limit position of its stroke, the suction member attracts thereto the central portion of the cap in the lowermost position within the cap stacker, whereupon the lift member descends, and the rotary shaft rotates through 180 degrees during the descent, whereby the cap is withdrawn from the cap stacker and fitted over a container transported to a position therebelow.

The cap stacker contains a multiplicity of caps as stacked up, and it is likely that the adjacent caps are in fitting contact with each other. When such caps are to be withdrawn one by one from the lowermost position, a negative pressure is likely to occur between the cap in the lowermost position and another cap adjacent to this cap immediately thereabove, permitting at least the two caps to be withdrawn as fitted together. To preclude this, the edge portion of the stacker defining the cap delivery opening is conventionally provided with a separating claw having a tip partly projecting into the delivery opening for scratching a peripheral portion of the cap to be withdrawn to separate off the cap.

The conventional apparatus encounters no problem if the attraction between the caps fitting together is relatively small but fails to reliably separate the cap from another if the attraction is relatively great.

SUMMARY OF THE INVENTION

The main object of the present invention is to provide an apparatus for capping containers which is adapted to reliably separate caps fitting together regardless of the magnitude of attraction between the caps.

The present invention provides an apparatus

for capping containers which comprises a cap stacker disposed above a path of transport of containers and having a delivery opening facing downward, a horizontal rotary shaft attached to a lift member so as to be movable upward and downward between the path and the cap stacker, a primary suction member outwardly stretchable and attached as directed outward to the horizontal rotary shaft so as to attract the central portion of a cap at the lowermost position within the cap stacker when the lift member is at the upper limit position of its upward-downward stroke, and a secondary suction member outwardly stretchable and attached as directed outward to the horizontal rotary shaft so as to attract a peripheral portion of the cap, the secondary suction member being inwardly contractable by an amount larger than the primary suction member when attracting the cap.

With the container capping apparatus of the present invention, the central portion of a cap in the lowermost position within the cap stacker is attracted by the primary suction member, with a peripheral portion of the cap attracted by the secondary suction member, whereupon the secondary suction member inwardly contracts more greatly than the primary suction member, whereby the peripheral portion of the cap in the lowermost position is pulled down. This produces a clearance between the peripheral portion of the cap attracted to the secondary suction member and the peripheral portion of another cap immediately above the cap, permitting air to flow in between the two caps through the clearance to preclude occurrence of a negative pressure therebetween.

Accordingly, the apparatus of the present invention reliably separates the caps fitting together even if the attraction therebetween is great.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view partly broken away and showing an apparatus embodying the invention;

FIG. 2 is a view in vertical section of the apparatus; and

FIGS. 3 (a), (b) and (c) are views for illustrating a capping operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the present invention will be

described next with reference to the drawings.

The illustrated container capping apparatus comprises a cap stacker 11 disposed above a path of transport of containers (in the direction of arrow C), and a horizontal rotary shaft 13 attached to a lift member 12 so as to be movable upward and downward between the path and the cap stacker 11.

An L-shaped frame 14 is disposed at one side of the transport path and has a horizontal support plate 15 attached to the upper end of the frame 14 in a cantilever fashion and projecting above the path. The horizontal plate 14a of the frame 14 and the support plate 15 are interconnected by a vertical guide rail 16 for guiding the lift member 12. A vertical hydraulic cylinder 17 is attached as directed upward to the horizontal plate 14a and has a piston rod 18 coextensive with the guide rail 16.

The cap stacker 11 comprises a vertical hollow cylindrical frame 22 attached to and extending through the support plate 15 and a downwardly facing delivery opening 21, and a plurality of guide rods 23 provided upright on the upper end of the frame 22. The stacker 11 contains a multiplicity of shallow dishlike caps L as stacked up and turned upside down. The upper end of the piston rod 18 is connected to the lift member 12. The horizontal rotary shaft 13 extends through the lift member 12 across the direction of transport of containers perpendicular thereto and is rotatably supported by the lift member 12. The shaft 13 has a disk 24 attached to one end thereof and a cubic vacuum head 25 attached to the other end thereof. Although not described in detail, a plurality of cutouts 26 are formed in the outer peripheral edge of the disk 24. The vertical plate 14b of the frame 14 is provided with a plurality of rollers 27 arranged along the path of upward and downward movement of the disk 24. With the upward or downward movement of the lift member 12, the disk 24 moves upward or downward, with the cutout portions 26 coming into engagement with the rollers 27 successively, whereby the horizontal rotary shaft 13 is reversibly rotated through 180 degrees in either direction.

FIG. 2 shows the lift member 12 immediately before reaching the upper limit of its upward and downward stroke. In this state, a primary vacuum cup 31 is attached as directed upward to the upper side of the vacuum head 25. On the other hand, a bracket 32 in the form of a cantilevered horizontal plate is attached to the bottom side of the vacuum head 25. A vertical pipe 33 connected upright to the outer end of the bracket 32 has a secondary vacuum cup 34 attached as directed upward to the upper end of the pipe 33. The primary vacuum cup 31 and the secondary vacuum cup 34 are arranged side by side and spaced apart by a predetermined

distance. The primary vacuum cup 31 is opposed from below to the central portion of the cap L at the lowermost position within the cap stacker 11, and the secondary vacuum cup 34 is opposed from below to an outer peripheral portion of the same cap L. The central portion of the cap L within the stacker 11 is at a higher level than the peripheral portion thereof. In corresponding relation with this, the attracting face of the primary vacuum cup 31 is at a higher level than that of the secondary vacuum cup 34. Each of the primary and secondary vacuum cups 31 and 34 is made of rubber or like elastic material. The secondary vacuum cup 34 is provided at its base portion with a bellows portion 35. The secondary vacuum cup 34 is inwardly contractable more greatly than the primary vacuum cup 31 by the contraction of the bellows portion 35 when attracting the cap.

The horizontal rotary shaft 13 is concentrically formed with an air channel 41 along its axis and has two communication ports 42, 43 formed in its peripheral wall defining the channel 41. The vacuum head 25 is formed with a passageway 44 for holding the port 42 in communication with the primary vacuum cup 31. An annular groove 45 communicating with the other port 43 is formed in the inner peripheral surface of the lift member 12 defining the shaft bore. A primary air supply pipe 47 is connected by a union 46 to the lift member 12 in communication with the annular groove 45. A secondary air supply pipe 48 branching from the union 46 is connected to the lower end of the vertical pipe 33 by another union 49.

An air jet nozzle 51 is suspended by a bracket 52 from the outer end of the support plate 15. The air jet nozzle 51 has an orifice 53 which is positioned close to the secondary vacuum cup 34 at a slightly lower level than the attracting face thereof.

The cap supply operation of the apparatus will be described next with reference to FIGS. 3 (a) to (c).

When the lift member 12 moves up to the upper limit of its upward-downward stroke, the primary vacuum cup 31 comes into contact with the lower surface of central portion of the cap L in the lowermost position within the stacker 11, with the secondary vacuum cup 34 coming into contact with the lower surface of a peripheral portion of the same cap L (FIG. 3 (a)). Subsequently, the two vacuum cups 31, 34 are brought into operation for suction, whereupon the central portion of the cap L is attracted to the primary vacuum cup 31 and the peripheral portion of the same cap L to the secondary vacuum cup 34. With the suction operation, the bellows portion 35 of the secondary vacuum cup 34 contracts, so that the peripheral portion of the cap L is pulled downward as attracted to the secondary vacuum cup 34. This creates a clear-

ance between the cap L and the peripheral portion of another cap L immediately thereabove. Simultaneously with this, air is forced out from the air jet nozzle 51 into a space between the two caps L through the clearance (FIG. 3 (b)). The lift member 12 then descends, whereby the cap L is lowered as held attracted to the two vacuum cups 31, 34 and withdrawn from the stacker 11 (FIG. 3 (c)). Through the capping operation which will not be described in detail but is generally well known, the horizontal rotary shaft 13 is rotated through 180 degrees while the lift member 12 subsequently descends to the lower limit of its stroke, whereby the two vacuum cups 31, 34 are directed downward to position the cap L face up. The cap is released from the suction and fitted over a container.

Claims

1. An apparatus for capping containers comprising:
 - a cap stacker disposed above a path of transport of containers and having a delivery opening facing downward,
 - a horizontal rotary shaft attached to a lift member so as to be movable upward and downward between the path and the cap stacker,
 - a primary suction member outwardly stretchable and attached as directed outward to the horizontal rotary shaft so as to attract the central portion of a cap at the lowermost position within the cap stacker when the lift member is at the upper limit position of its upward-downward stroke, and
 - a secondary suction member outwardly stretchable and attached as directed outward to the horizontal rotary shaft so as to attract a peripheral portion of the cap, the secondary suction member being inwardly contractable by an amount larger than the primary suction member when attracting the cap.
2. An apparatus as defined in claim 1 wherein each of the primary suction member and the secondary suction member comprises a vacuum cup made of elastic material.
3. An apparatus as defined in claim 2 wherein the secondary suction member is provided at its base portion with a bellows portion made of elastic material.
4. An apparatus as defined in claim 1 wherein an air jet nozzle is so disposed that the orifice thereof is positionable as opposed to a space between the cap attracted to the secondary suction member and another cap immediately above the cap.

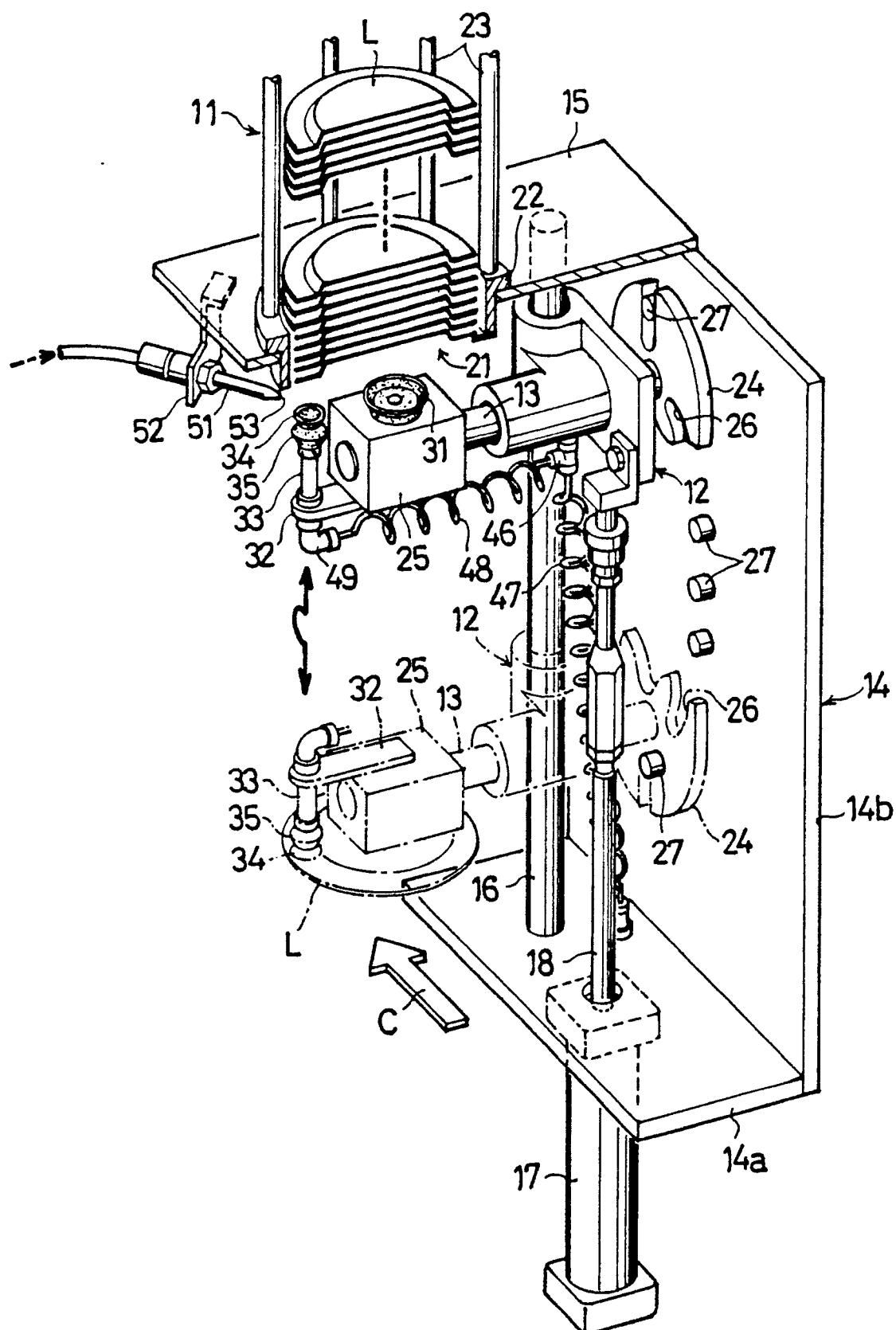
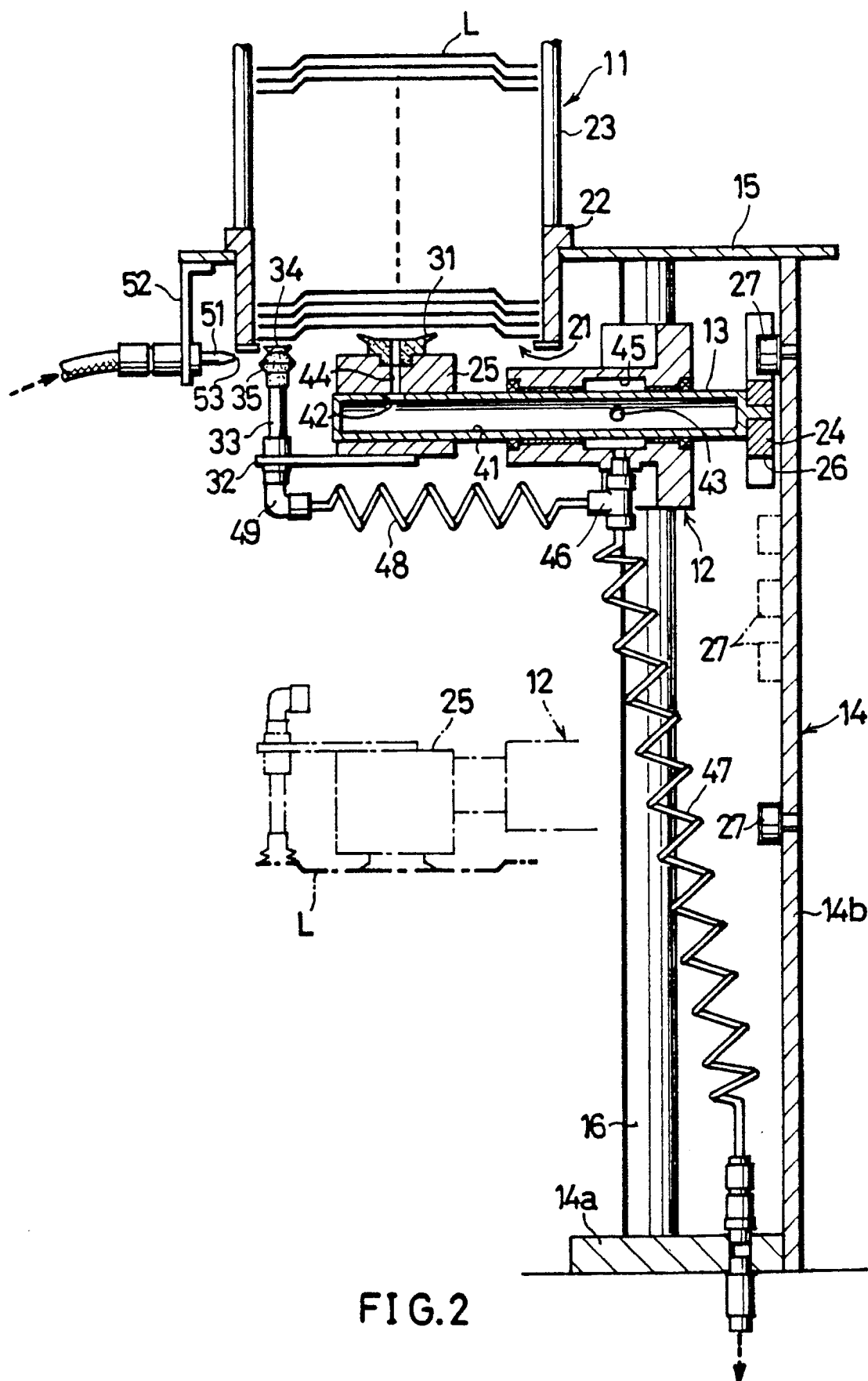


FIG. 1



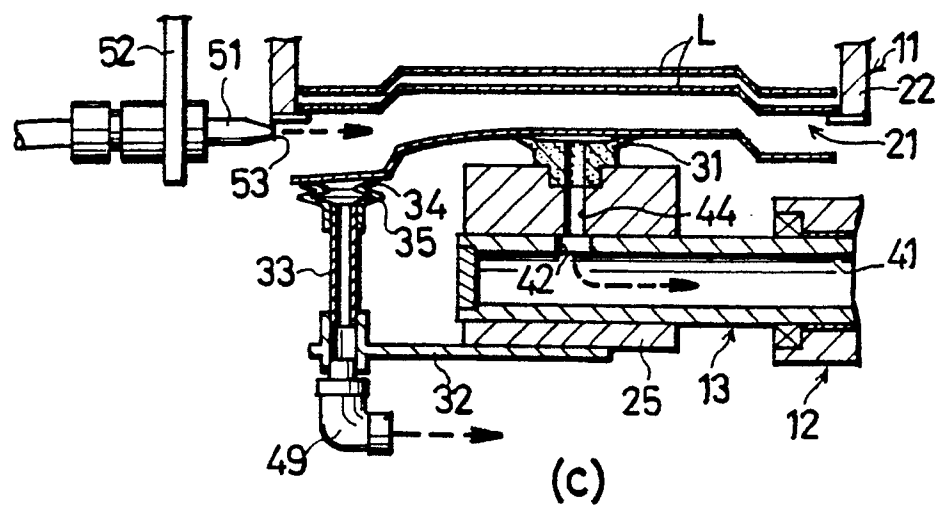
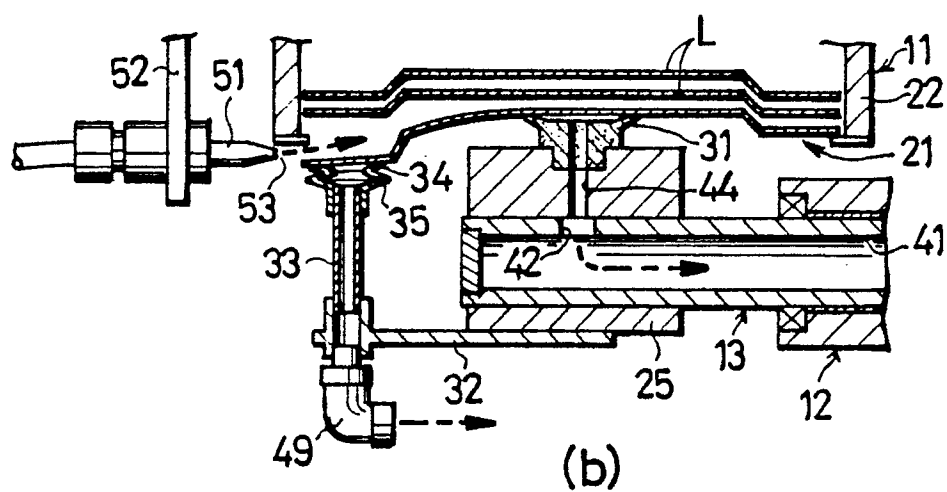
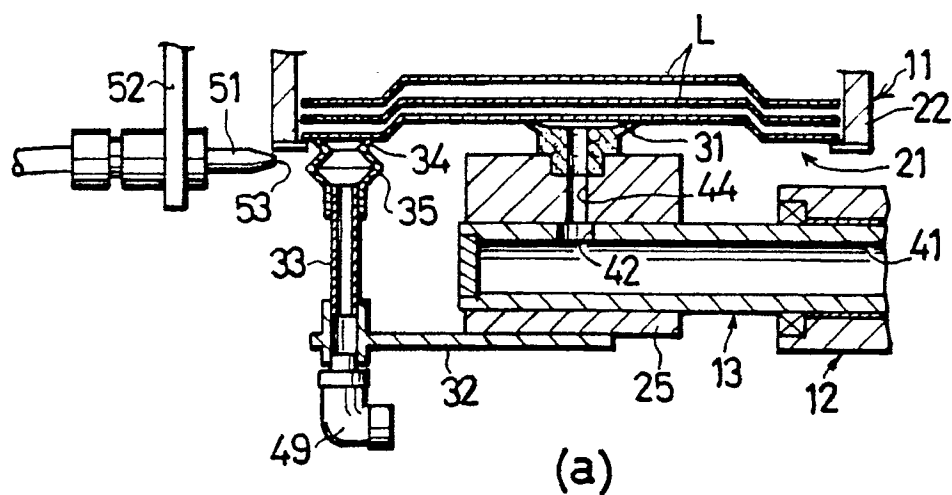


FIG. 3



European
Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 2620

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.5)
A	EP-A-0 238 421 (MLB) * Page 3, line 29 - page 6, line 16; fig. * - - -	1,2	B 65 B 7/28
A	WO-A-8 002 271 (LYKES PASCO) * Page 10, line 22 - page 11, line 34; figures 9-12 * - - -	1,2	
A	EP-A-0 274 296 (E. REMY) * Column 3, line 25 - column 4, line 54; fig. * - - -	1,2	
A	US-A-4 848 060 (CONTINENTAL CAN) - - - - -		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 65 B B 67 B
The present search report has been drawn up for all claims			
Place of search		Date of completion of search	Examiner
The Hague		17 December 90	JAGUSIAK A.H.G.
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons ----- &: member of the same patent family, corresponding document			