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54 Packaging machine for feeding a product, particularly a liquid product, into containers, for example cartons, within an aseptic chamber, feeding and dosing device for it, cleaning device for the aseptic chamber and methods for it.

57 An aseptic packaging machine 1 includes a chain conveyor conveying cartons along a path P in an aseptic chamber 6 including an advance leg and a return leg each extending along the machine 1. Ultra-violet germicidal lamps 8 extend over at least a major portion of the advance leg. Aseptic liquid is fed into the cartons C by a filling device 9 comprised of, in turn, an expansion chamber, a non-return inlet valve, a reciprocating bellows and a non-return outlet valve. After filling, the cartons are top-heated and sealed by a top heating device 10 and a top-sealing device 11. The only non-aseptic matter deliberately introduced into the chamber 6 is the cartons C. The chamber 6 is cleaned internally by cleaning fluid from spray nozzles. The carton entry to and exit from the chamber 6 have aseptic air curtains.



Fig. 1

**TITLE MODIFIED**  
see front page

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Improvements in or relating to packaging.

This invention relates to packaging, particularly aseptic packaging of aseptic products, for example long-life milk, in cartons.

5 According to the first aspect of the present invention, there is provided an aseptic packaging method, comprising introducing containers into an aseptic chamber of an aseptic packaging machine of elongate form; conveying said containers along a path in said chamber; sterilizing the interiors of said containers  
10 to render said interiors aseptic, feeding an aseptic product into said containers and sealingly closing said containers, all while said containers are on said path ; characterised in that said path includes both an advance leg and a return leg each extending  
15 along the machine and in that said sterilizing occurs over at least a major portion of the length of said advance leg.

According to a second aspect of the present invention, there is provided an aseptic  
20 packaging machine of elongate form, comprising an aseptic chamber; introducing means arranged to introduce containers into said chamber; conveying means arranged to convey said containers along a path in said chamber; sterilizing means arranged to render aseptic the  
25 interiors of said containers while said containers are on said path; feeding means arranged to feed an aseptic product into said containers while said containers are on said path downstream of said sterilizing means;

and sealing means arranged sealingly to close said containers while said containers are on said path downstream of said feeding means; characterised in that said path includes both an advance leg and a return leg each extending along the machine and that said sterilizing means extends over a section of said path forming at least a major portion of the length of said advance leg.

According to the third aspect of the present invention, there is provided packaging apparatus including feeding means arranged to feed a fluid product into containers, said feeding means comprising ducting, a reciprocatory pump communicating with said ducting for pumping the product, an outlet valve in said ducting arranged to open to allow the product to flow from the pump during the pressure stroke thereof, and an inlet valve in said ducting arranged to open to allow the product to flow to the pump during the suction stroke thereof, characterised in that the reciprocatory pump is a bellows.

According to the fourth aspect of the present invention, there is provided apparatus comprising a dosaging device arranged to deliver a liquid product in predetermined individual doses, a pumping device arranged to deliver continuously said product under pressure, and an expansion chamber by way of which said pumping device communicates with said dosaging device and whereof the volume varies in dependence on the difference between the rates of flow of said product thereinto and therefrom, characterised in that said expansion chamber has a flexible wall part whereby said volume varies as aforesaid.

According to the fifth aspect of the present invention, there is provided an aseptic packaging method, comprising introducing into an aseptic chamber pre-formed, open-topped cartons; sterilizing the interiors of the cartons to render said interiors aseptic while the cartons are in the chamber; feeding an aseptic product into the cartons while the cartons are in the chamber; top-sealing the cartons while the cartons are in the chamber; and removing the aseptic product-containing cartons from the

chamber, characterised in that the only non-aseptic matter deliberately introduced into the chamber is the pre-formed, open-topped cartons.

5 According to a sixth aspect of the present invention, there is provided aseptic packaging apparatus, comprising an aseptic chamber; introducing and removing means arranged to introduce pre-formed, open-topped cartons into said chamber and to remove aseptic product-containing cartons therefrom; sterilizing means arranged to render aseptic the interiors of the open-topped  
10 cartons while the cartons are in the chamber; feeding means arranged to feed an aseptic product into the open-topped cartons while the cartons are in the chamber; and top-sealing means arranged to seal the tops of the  
15 cartons while the cartons are in the chamber characterised in that the apparatus is such that, in use of the apparatus, the only non-aseptic matter deliberately introduced into the chamber is the pre-formed, open-topped cartons.

20 According to a seventh aspect of the present invention, there is provided a method of cleaning the internal surface of an aseptic chamber of an aseptic packaging machine, comprising supplying cleaning fluid into said chamber from dispensing means which communicates with the interior of said chamber characterised in that  
25 said dispensing means forms part of said machine.

30 According to an eighth aspect of the present invention, there is provided an aseptic packaging machine, comprising an aseptic chamber, characterised in that said machine includes dispensing means communicating with the interior of said chamber and arranged to supply cleaning fluid into said chamber for cleaning the internal surface of said chamber.

35 According to a ninth aspect of the present invention, there is provided an aseptic packaging machine, including an aseptic chamber having an opening in a wall thereof, characterised in that means is arranged to produce an aseptic air curtain across said opening.

According to a tenth aspect of the present invention, there is provided a method of filling a con-

5 tainer with a liquid product, wherein the container is maintained in a tilted condition in which an internal face thereof is inclined to the vertical and directly below an outlet from which the liquid product flows down onto said internal face, characterised in that said method is automatic.

10 According to an eleventh aspect of the present invention, there is provided apparatus for filling a container with a liquid product, comprising a downwardly directed outlet for the product, and means arranged to maintain the container in a tilted condition in which an internal face thereof is inclined to the vertical and directly below said outlet, characterised in that said apparatus is automatically controlled.

15 In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

20 Figure 1 shows a diagrammatic top plan view of an aseptic packaging machine,

Figure 2 shows a diagrammatic side elevation of the machine,

25 Figure 3 shows a diagrammatic end elevation of the machine in the direction of the arrow III in Figure 2,

Figure 4 shows a sectional plan view of the left-hand end of the machine in Figure 1,

30 Figure 5 shows a sectional end elevation of a top pre-breaking device of the machine,

Figure 6 shows a side elevation of part of a dosaging filling device of the machine,

Figure 7 shows a partly sectional end elevation of that part of the filling device,

35 Figure 8 shows a sectional side elevation of an expansion device of the filling device,

Figure 9 shows a sectional end elevation of

the expansion device, and

Figure 10 shows diagrammatically a modified manner of filling a carton by means of the filling device.

5 Referring to the drawings, the machine 1 for carrying out aseptic packaging includes at one end of the machine a conventional device 2 for pre-forming (including bottom-sealing) gable-topped cartons. The open-topped, pre-formed cartons are taken to the other end  
10 of the machine through a closed channel 3 by means of a chain system. The channel 3 is bounded by covers 4 individually liftable about hinges to give access to the channel interior. At this front end of the machine, the open-topped cartons are advanced stepwise and in  
15 a vertically upright condition by means of conveying chains 5 along a hairpin-shaped path P of which an advance leg extends along the machine towards the device 2 and a return leg extends along the machine 1 back towards its front end. The cartons exit from  
20 the channel 3 directly into an aseptic chamber 6 which totally encloses the chains 5 and which is provided with access covers 6''. The chains 5, which are arranged coextensively one above another, have projecting therefrom outwardly of the path P long  
25 lugs 5' which extend beyond guide strips extending along the path P, the cartons being received among and advanced along the path P by the long lugs 5' and being supported at one side by the chains 5 and at the other side by the guide strips. The chains 5  
30 carry the cartons first of all to a top pre-breaking device 7, where the open top of each carton is pre-broken. Then the cartons are passed beneath high-intensity ultra-violet germicidal lamps 8 which extend over a section of the hairpin-shaped path P which forms at  
35 least a major portion, in the present case in fact a major portion, of the length of the advance leg of the path P. In the region of the beginning of this section

of the path P, there is arranged some means for introducing into the interior of the carton a fine spray of hydrogen peroxide ( $H_2O_2$ ). This means comprises a nozzle arrangement 7' incorporated in the pre-breaker 7 and serving to spray particularly the inside of the carton with  $H_2O_2$ . The combined effect on the interiors of the cartons of the ultraviolet radiation and the hydrogen peroxide has a synergistic sterilizing action which is highly germicidal. Where the degree of sterilisation required is not very great, it is possible to omit use of hydrogen peroxide. At the downstream end of this path section, the chains 5 carry the cartons round through  $180^\circ$  to start the return leg of the path P. On this leg, the cartons first arrive at a filling device 9 where the cartons are filled with an aseptic product, for example long-life milk, the cartons then proceeding to a top heating device 10 where thermoplastics surfaces of the top of each carton are heated to a tacky condition, and the cartons are then advanced to a top sealing device 11 where the gable tops are sealed. The cartons leave the aseptic chamber 6 at an exit hole 6'' therefrom at the front end of the machine. Throughout the operation of the machine, aseptic air is fed from a main sterile air filter to aseptic air inlets 13 and 13' of the chamber 6, in which chamber the aseptic air flows from the inlet 13 relatively smoothly to the front end of the chamber 6, where the aseptic air leaves via an aseptic air outlet 14. Not only does the aseptic air act as a scavenging gas removing microbes and hydrogen peroxide from the chamber 6, particularly tending to prevent the microbes and the hydrogen peroxide from being carried up to the filling device 9, but the aseptic air also maintains the interior of the chamber 6 at a pressure slightly above atmospheric and thus discourages the entry of ambient air into the chamber.

Referring particularly to Figures 4 and 5, the top pre-breaker 7 is in two sections 71 and 72 which

are carried by a common horizontal support 73 itself carried by two horizontal arms 74 fixed to a vertically reciprocating plunger 75. The section 71 comprises two substantially triangular flaps 76 turnable about respective substantially horizontal parallel pivots 77 by respective oscillatory cranks 78. Between each two advances of the stepwise-advanced cartons, the pre-breaking device 7 is lowered onto the two cartons beneath it, and performs its pre-breaking and simultaneously the  $H_2O_2$  is sprayed into the carton immediately beyond the section 72 by the nozzle device 7'.

The filling device 9 is particularly designed to prevent microbes obtaining access to the aseptic liquid product being supplied to the chamber 6. Referring to Figures 6 to 9, the filling device includes a mounting frame 20 which mounts four stainless steel reciprocatory bellows 21 having bottom walls which are reciprocatorily driven by respective reciprocatory plungers 22 and having top flanges fixed to respective lower limbs of T-unions 23. Respective upper limbs of the unions 23 contain respective spring-loaded, non-return, inlet valves which open to allow downward flow through the limbs. Intermediate limbs of the respective unions 23 are connected to respective arcuate pipes 24 which curve downwardly and which at their lower ends are connected to respective outlet nozzles 25 which contain respective spring-loaded, non-return, outlet valves. The chains 5 advance the cartons stepwise directly below the line of nozzles 25 and a selected number of the bellows 21 are operated each to deliver a predetermined dosage of long-life milk to the vertically upright cartons, the number of bellows 21 operated being dependent upon the nominal capacity of the cartons. Thus, with each bellows 21 being pre-set to deliver a halfpint at each reciprocation, all four bellows 21 are operated for cartons which can each hold one quart. On each bellows 21 performing a pressure stroke, because the inlet valve in its union 23 is held closed by its spring and by the

milk pressure, the inlet valve is automatically opened against the action of its spring so that the bellows 21 can draw in milk from an expansion device 26 shown in Figures 8 and 9. The device 26 is connected to the upper limbs of all of the T-unions 23 by way of its outlet 27. A pump (not shown) continuously pumps long-life milk into the device 26 through its inlet 28. The interior of the device 26 is divided into an expansion chamber 29 and a constant-pressure chamber 30 by an annular bellows 31 and a rigid, movable, end closure wall 32 thereof. The chamber 30 is set at a substantially constant pressure owing to the provision of a pressure-regulated air supply to the chamber 30 via a port 33 in a removable end wall 34 of the device 26. There extends through the wall 34 in a fluid-tight manner a rod 35 which is fixed at one end to the plate 32. The rod 35 carries abutment flanges 36 which limit the degree of movement of the wall 32 relative to the wall 34. The rod 35 also carries a pointer 37 which moves over a scale 38 to indicate the position of the wall 32 in the device 26. In use of the machine, when the instantaneous rate of delivery of the pump to the inlet 28 exceeds the rate of drawing of the milk into the bellows 21 via the outlet 27, the wall 32 is moved by the pressure of the milk to the right in Figure 9 against the action of the air pressure in the chamber 30, so that the expansion device 26 acts temporarily as a reservoir until the rate of drawing of the milk into the bellows 21 exceeds the rate of delivery by the pump, in which case the plate 32 moves to the left in Figure 9 under the action of the air pressure in the chamber 30. It will thus be appreciated that, at least between the pump (not shown) and the outlet valves in the nozzles 25, the filling system is always absolutely full of long-life milk, so that there are no voids or air spaces, which would possibly allow microbes to obtain access to the milk. Another advantage of the present filling

system is that all of the internal surface area of the system which in use is in contact with the long-life milk can itself easily be sterilised by simply passing a very hot liquid, chemical cleaning fluid or steam through the filling system, so that all of that internal surface area comes into contact with the very hot liquid, the fluid, or the steam.

Referring to Figure 10, a carton C is shown being filled from one of the nozzles 25. It will be noted that, in this modified manner of filling, the carton C is in a position inclined to the vertical, so that the milk flowing from the nozzle 25 falls down onto an internal face of the carton C which face is inclined to the vertical and is directly below the nozzle 25. Compared to a conventional arrangement in which a nozzle pours milk down into a carton arranged in a substantially exactly upright position directly below the nozzle and thus the milk leaving the nozzle virtually always pours directly onto a body of milk in the carton, the arrangement shown in Figure 10 has the advantage of minimising the production of foam on the top of the milk. In the present case, the cartons C move along the path P in upright positions, except in the region of the filling device 9, where they are in a tilted condition. It will be appreciated that movement of the carton from its upright condition to its tilted condition and then back to its upright condition can be produced in various ways, particularly by suitable design of the chains 5 and/or the guide strips for the cartons.

The machine 1 also includes automatically controlled means for cleaning the internal surface of the aseptic chamber 6, this means consisting of spray nozzles 41 distributed centrally along the length of the chamber. These nozzles serve to supply a cleaning fluid, e.g. a hot detergent solution or steam, to the interior of the chamber 6 in such a manner that the whole of the interior of the chamber 6 receives the

cleaning fluid, which can then be drained off through a drain (not shown).

5 The machine 1, particularly the aseptic chamber 6 and the associated machine parts, such as the items 5 to 11, are so designed that the only non-aseptic matter deliberately introduced into the chamber 6 is the preformed cartons C.

10 The entry 3' where the empty cartons enter the aseptic chamber 6 and the exit 6'' where the filled cartons leave the aseptic chamber can be sealed off outside the chamber 6 by respective air curtains of aseptic air at higher pressure. Thus the lower-pressure aseptic air inside the chamber 6 is prevented from escaping. These air curtains are established by slotted  
15 tubes 81 and 82 seen in Figures 4 and 3, respectively. The aseptic air for the curtains is taken from a separate sterile air filter giving higher pressure than the main sterile air filter for the chamber 6 itself.

CLAIMS:

1. An aseptic packaging method, comprising introducing containers (C) into an aseptic chamber (6) of an aseptic packaging machine (1) of elongate form; conveying said containers (C) along a path (P) in said chamber (6); sterilizing the interiors of said containers (C) to render said interiors aseptic, feeding an aseptic product into said containers (C) and sealingly closing said containers (C), all while said containers (C) are on said path (P); characterised in that said path (P) includes both an advance leg and a return leg each extending along the machine (1) and in that said sterilizing occurs over at least a major portion of the length of said advance leg.
2. A method according to claim 1, wherein said sterilizing comprises irradiating said interiors with ultra-violet radiation, and characterised in that said sterilizing includes spraying said interiors with hydrogen peroxide.
3. A method according to claim 2, characterised in that said spraying is performed in the region of the beginning of said advance leg.
4. A method according to claim 3, wherein said containers (C) are cartons (C), characterised in that said spraying is performed at a top pre-breaking station (7) on said path (P).
5. An aseptic packaging machine of elongate form, comprising an aseptic chamber (6); introducing means (3) arranged to introduce containers (C) into said chamber (6); conveying means (5) arranged to convey said containers (C) along a path (P) in said chamber (6); sterilizing means (7',8) arranged to render aseptic the interiors of said containers (C) while said containers (C) are on said path (P); feeding means (9) arranged to feed an aseptic product into said containers (C) while said containers (C) are on said path (P) downstream of said sterilizing means (7',8); and sealing means (11) arranged sealingly to close said containers (C) while said containers (C) are on said path (P) downstream of said feeding means (9); characterised in that said path (P) includes both an advance leg and

a return leg each extending along the machine (1) and that said sterilizing means (7',8) extends over a section of said path (8) forming at least a major portion of the length of said advance leg.

6. A machine according to claim 5, wherein said sterilizing means (7',8) comprises ultra-violet radiating means (8), characterised in that said sterilizing means (7',8) includes spraying nozzle means (7') for spraying said interiors with hydrogen peroxide.

7. A machine according to claim 6, characterised in that said spraying nozzle means (7') is situated in the region of the beginning of said advance leg.

8. A machine according to claim 7, and further comprising a top pre-breaking means (7) situated in said region for pre-breaking top closures of said containers (C), characterised in that said spraying nozzle means (7') is carried by the top pre-breaking means (7).

9. Packaging apparatus including feeding means (9) arranged to feed a fluid product into containers (C), said feeding means (9) comprising ducting (23-25), a reciprocatory pump (21) communicating with said ducting (23-25) for pumping the product, an outlet valve in said ducting (23-25) arranged to open to allow the product to flow from the pump (21) during the pressure stroke thereof, and an inlet valve in said ducting (23-25) arranged to open to allow the product to flow to the pump (21) during the suction stroke thereof, characterised in that the reciprocatory pump (21) is a bellows (21).

10. Apparatus according to claim 9, and further comprising a pumping device arranged to deliver continuously said product under pressure, and an expansion chamber (29) by way of which said pumping device communicates with said inlet valve and the volume of which varies in dependence on the difference between the rates of flow of said product thereinto and therefrom, characterised in that said expansion chamber (29) has a flexible wall part (31) whereby said volume varies as

said flexible wall part (31) and supply means (33) arranged to supply a pressure fluid to said constant-pressure chamber (30) to maintain a substantially constant pressure therein.

18. Apparatus according to claim 15, 16, or 17, characterised in that indicating means (37) is connected to said flexible wall part (31) and arranged to indicate the position thereof.

19. Apparatus according to claim 15, 16, 17, or 18, characterised in that said flexible wall part (31) comprises an annular bellows (31) sealingly connecting a movable wall part (32) to a fixed wall part of said expansion chamber (29).

20. An aseptic packaging method, comprising introducing into an aseptic chamber (6) pre-formed, open-topped cartons (C); sterilizing the interiors of the cartons (C) to render said interiors aseptic while the cartons (C) are in the chamber (6); feeding an aseptic product into the cartons (C) while the cartons (C) are in the chamber (6); top-sealing the cartons (C) while the cartons (C) are in the chamber (6); and removing the aseptic product-containing cartons (C) from the chamber (6); characterised in that the only non-aseptic matter deliberately introduced into the chamber (6) is the pre-formed, open-topped cartons (C).

21. A method according to claim 20, characterised in that a stream of aseptic air is passed through said chamber (6) during said sterilizing, said feeding, and said top-sealing.

22. A method according to claim 20 or 21, characterised in that aseptic air curtain means are formed across carton entry and exit means (3', 6") of said chamber (6).

23. Aseptic packaging apparatus, comprising an aseptic chamber (6); introducing and removing means (3, 3', 6") arranged to introduce pre-formed, open-

aforesaid.

11. Apparatus according to claim 10, characterised in that force-applying means (30,33) is arranged to apply to said flexible wall part (31) a force which is of a substantially constant value.

12. Apparatus according to claim 11, characterised in that said force-applying means (30, 33) comprises a constant-pressure chamber (30) and supply means (33) arranged to supply a pressure fluid to said constant-pressure chamber (30) to maintain a substantially constant pressure therein.

13. Apparatus according to claim 10, 11 or 12, characterised in that indicating means (37) is connected to said flexible wall part (31) and arranged to indicate the position thereof.

14. Apparatus according to claim 10, 11, 12 or 13, characterised in that said flexible wall part (31) is an annular bellows (31) sealingly connecting a movable wall part (32) to a fixed wall part of said expansion chamber (29).

15. Apparatus comprising a dosaging device (21-25) arranged to deliver a liquid product in predetermined individual doses, a pumping device arranged to deliver continuously said product under pressure, and an expansion chamber (29) by way of which said pumping device communicates with said dosaging device (21-25) and whereof the volume varies in dependence on the difference between the rates of flow of said product thereinto and therefrom, characterised in that said expansion chamber (29) has a flexible wall part (31) whereby said volume varies as aforesaid.

16. Apparatus according to claim 15, characterised in that pressure-applying means (30, 33) is arranged to apply to said flexible wall part (31) a pressure which is of a substantially constant value.

17. - Apparatus according to claim 16, characterised in that said pressure-applying means (30, 33) comprises a constant-pressure chamber (30) bounded by

topped cartons (C) into said chamber (6) and to remove aseptic product-containing cartons (C) therefrom; sterilizing means (7', 8) arranged to render aseptic the interiors of the open-topped cartons (C) while the cartons (C) are in the chamber (6); feeding means (9) arranged to feed an aseptic product into the open-topped cartons (C) while the cartons (C) are in the chamber (6); and top-sealing means (11) arranged to seal the tops of the cartons (C) while the cartons (C) are in the chamber (6), characterised in that the apparatus (1) is such that, in use of the apparatus (1), the only non-aseptic matter deliberately introduced into the chamber (6) is the pre-formed, open-topped cartons (C).

24. Apparatus according to claim 23, characterised in that means (13, 13') is arranged to pass a stream of aseptic air through said chamber (6) in the direction from said feeding means (9) towards a carton entry (3') of said chamber (6).

25. Apparatus according to claim 23 or 24, characterised in that means (81, 82) is arranged to produce aseptic air curtain means across carton entry and exit means (3', 6") of said chamber (6).

26. A method of cleaning the internal surface of an aseptic chamber of an aseptic packaging machine, comprising supplying cleaning fluid into said chamber (6) from dispensing means (41) which communicates with the interior of said chamber (6), characterised in that said dispensing means (41) forms part of said machine (1).

27. A method according to claim 26, characterised in that said supplying is automatically controlled.

28. An aseptic packaging machine, comprising an aseptic chamber (6), characterised in that said machine (1) includes dispensing means (41) communicating with the interior of said chamber (6) and arranged to supply cleaning fluid into said chamber (6) for cleaning the internal surface of said chamber (6).

29. An aseptic packaging machine, including an aseptic chamber (6) having an opening (3', 6") in a wall thereof, characterised in that means (81, 82) is arranged to produce an aseptic air curtain across said opening (3', 6").

30. A method of filling a container with a liquid product, wherein the container is maintained in a tilted condition in which an internal face thereof is inclined to the vertical and directly below an outlet from which the liquid product flows down onto said internal face, characterised in that said method is automatic.

31. Apparatus for filling a container with a liquid product, comprising a downwardly directed outlet for the product, and means arranged to maintain the container in a tilted condition in which an internal face thereof is inclined to the vertical and directly below said outlet, characterised in that said apparatus is automatically controlled.

32. Apparatus as claimed in claim 31, characterised in that it is part of a packaging machine (1).

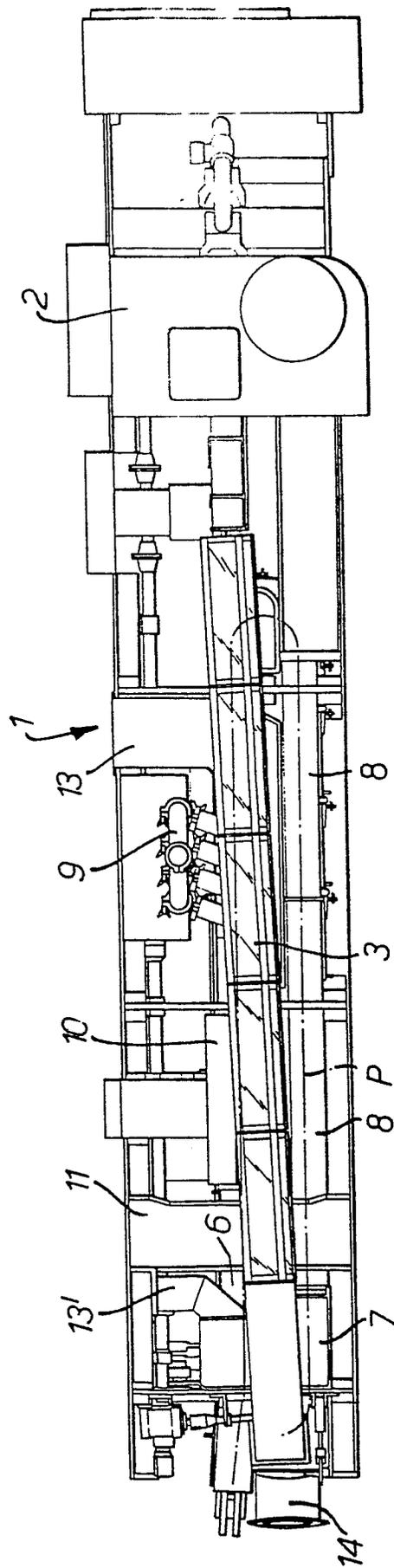


FIG. 1.



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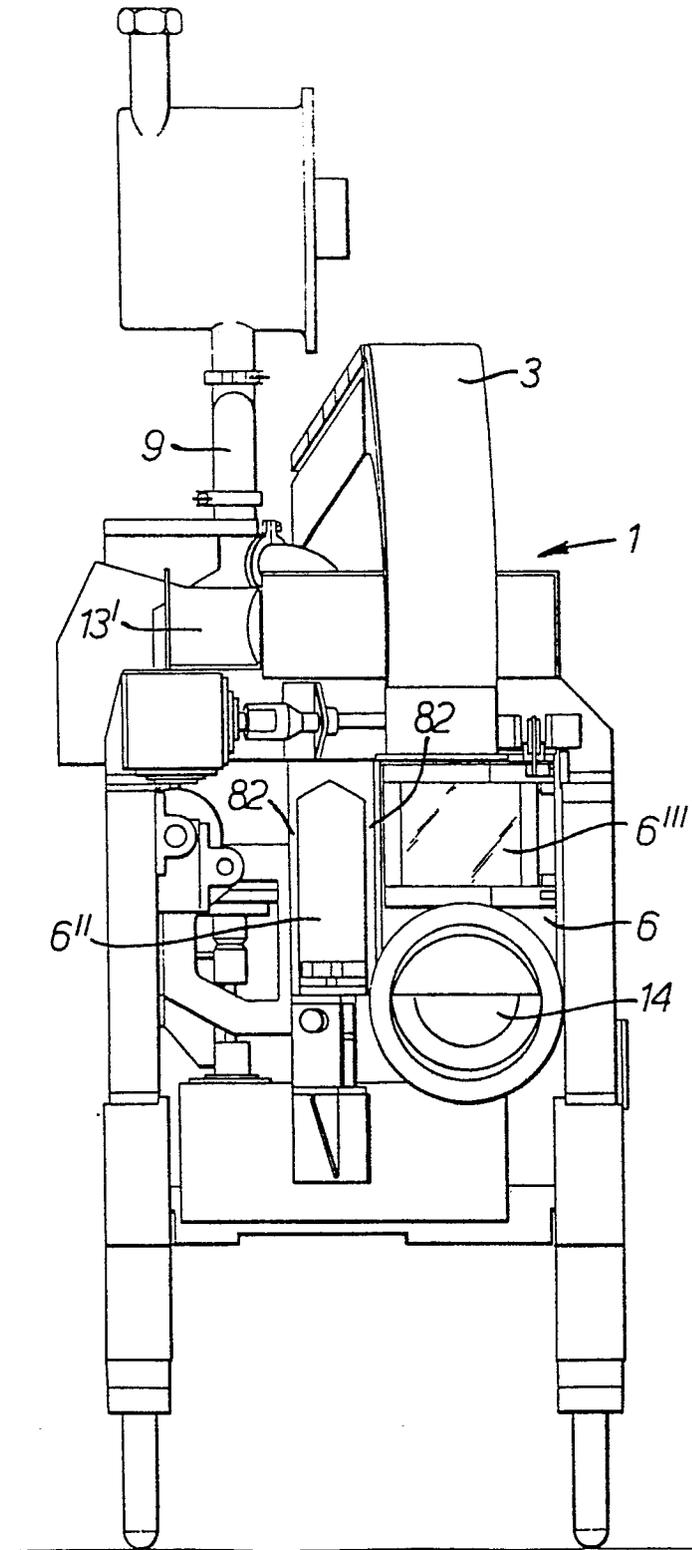


FIG. 3.

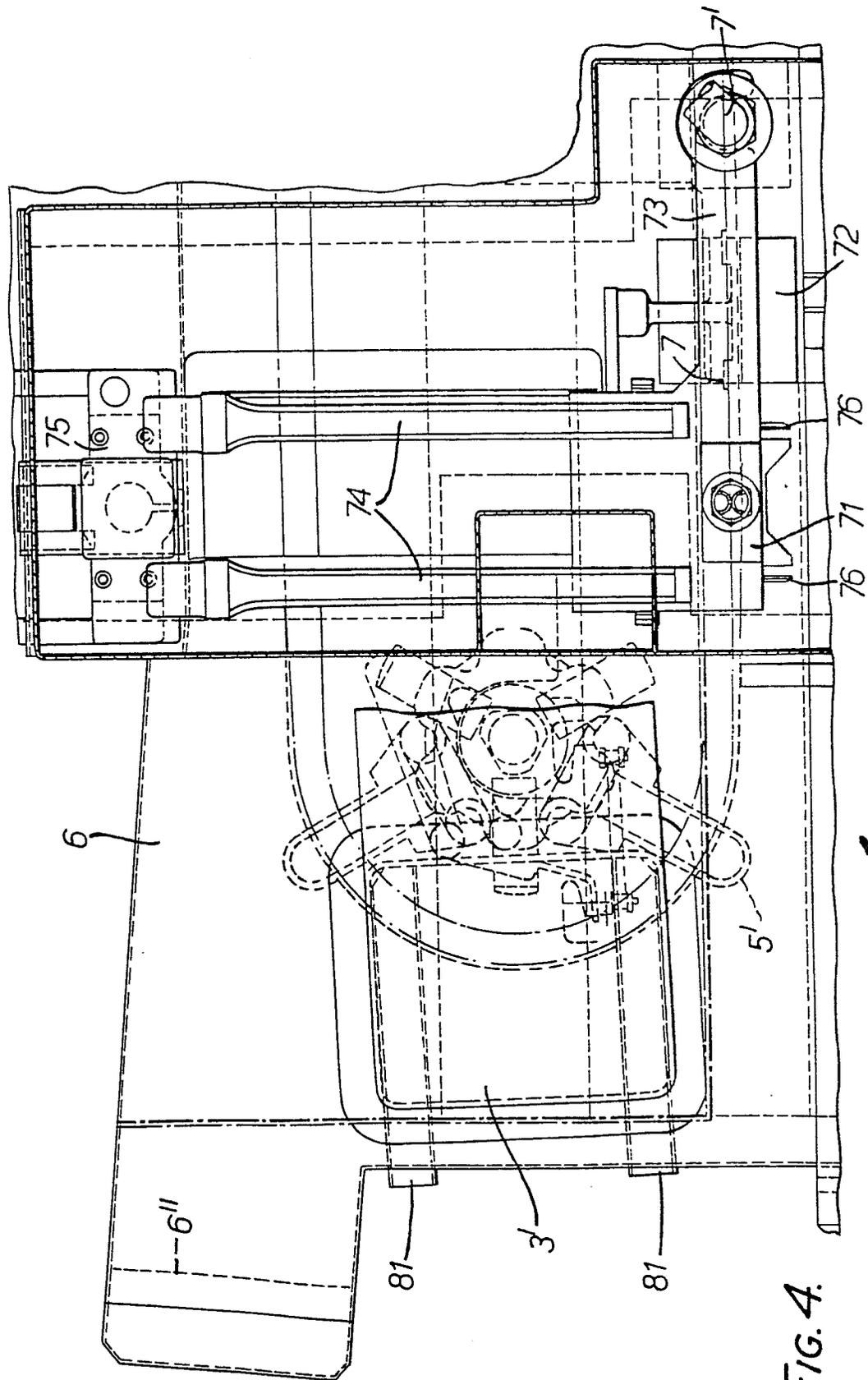


FIG. 4.

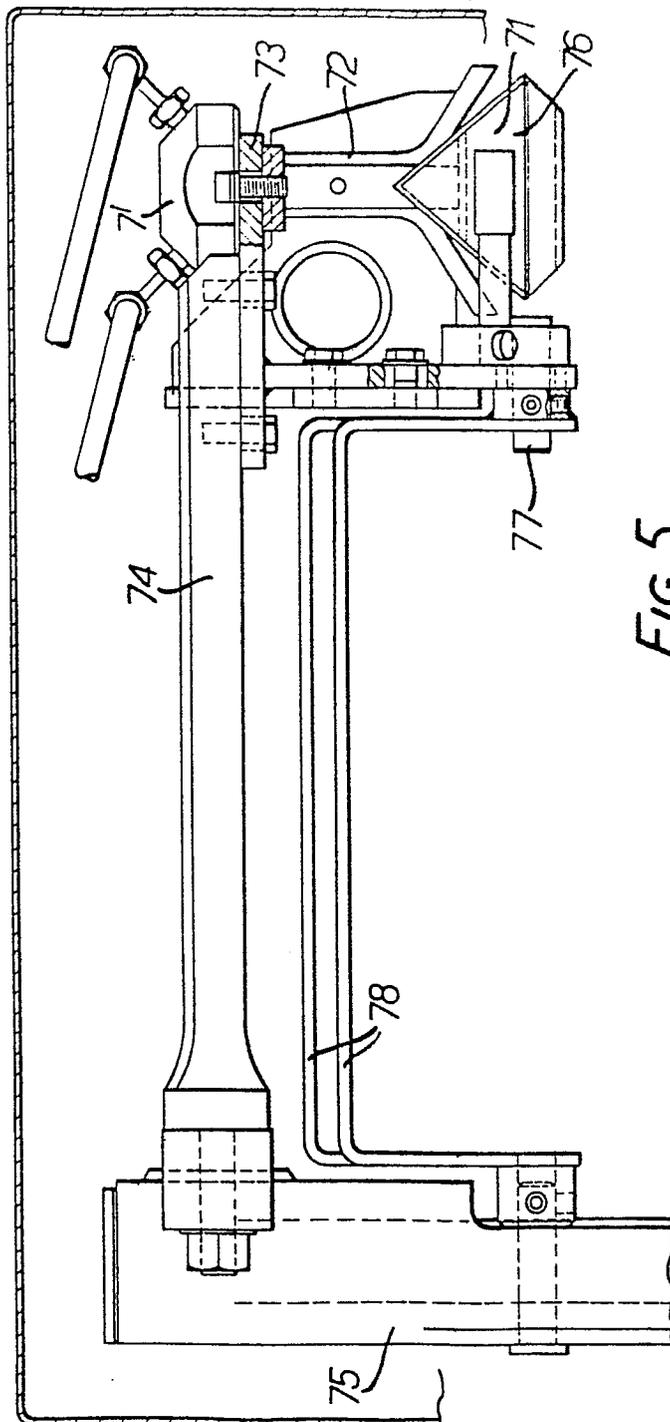


FIG. 5.

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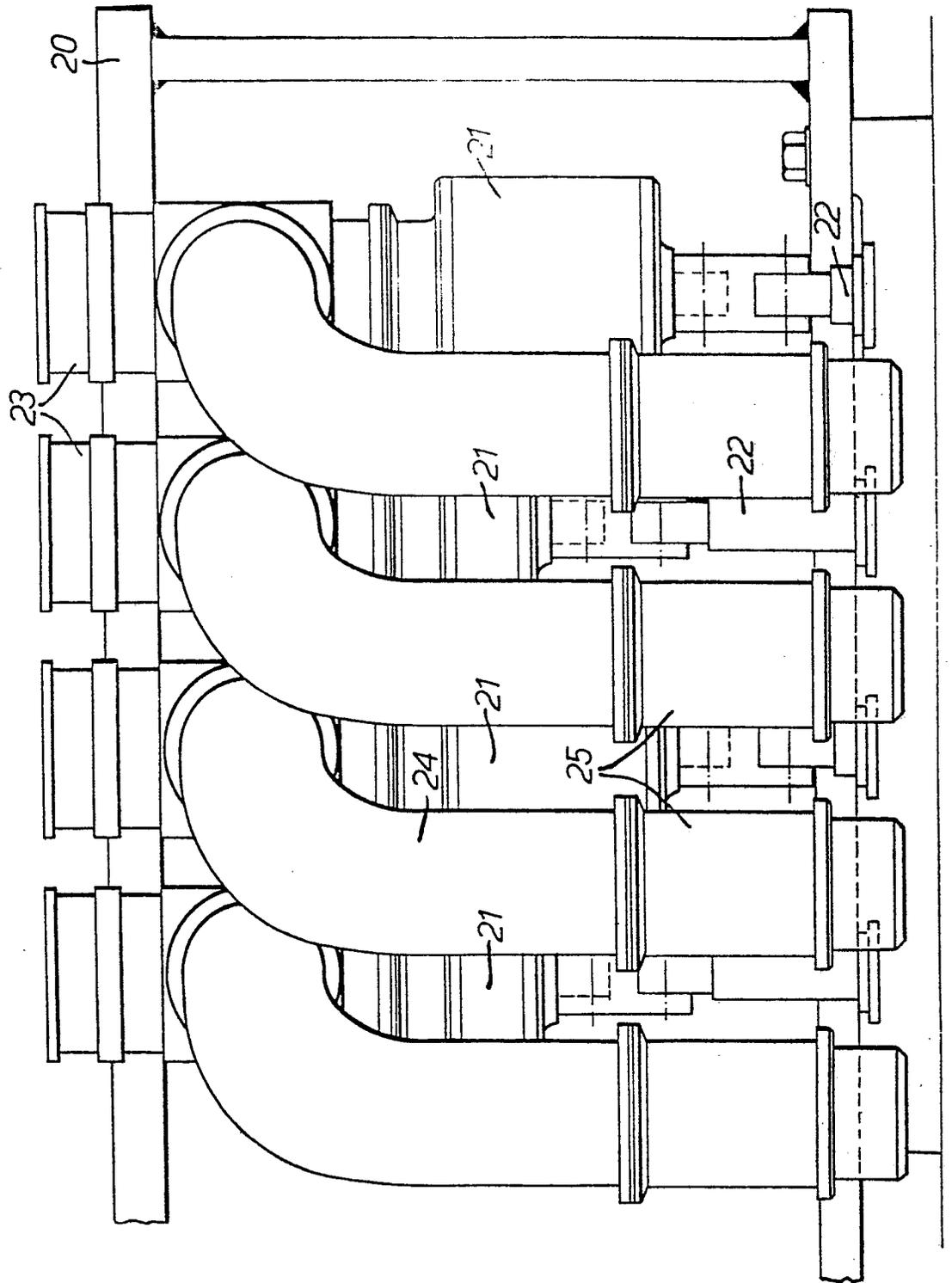


FIG. 6.

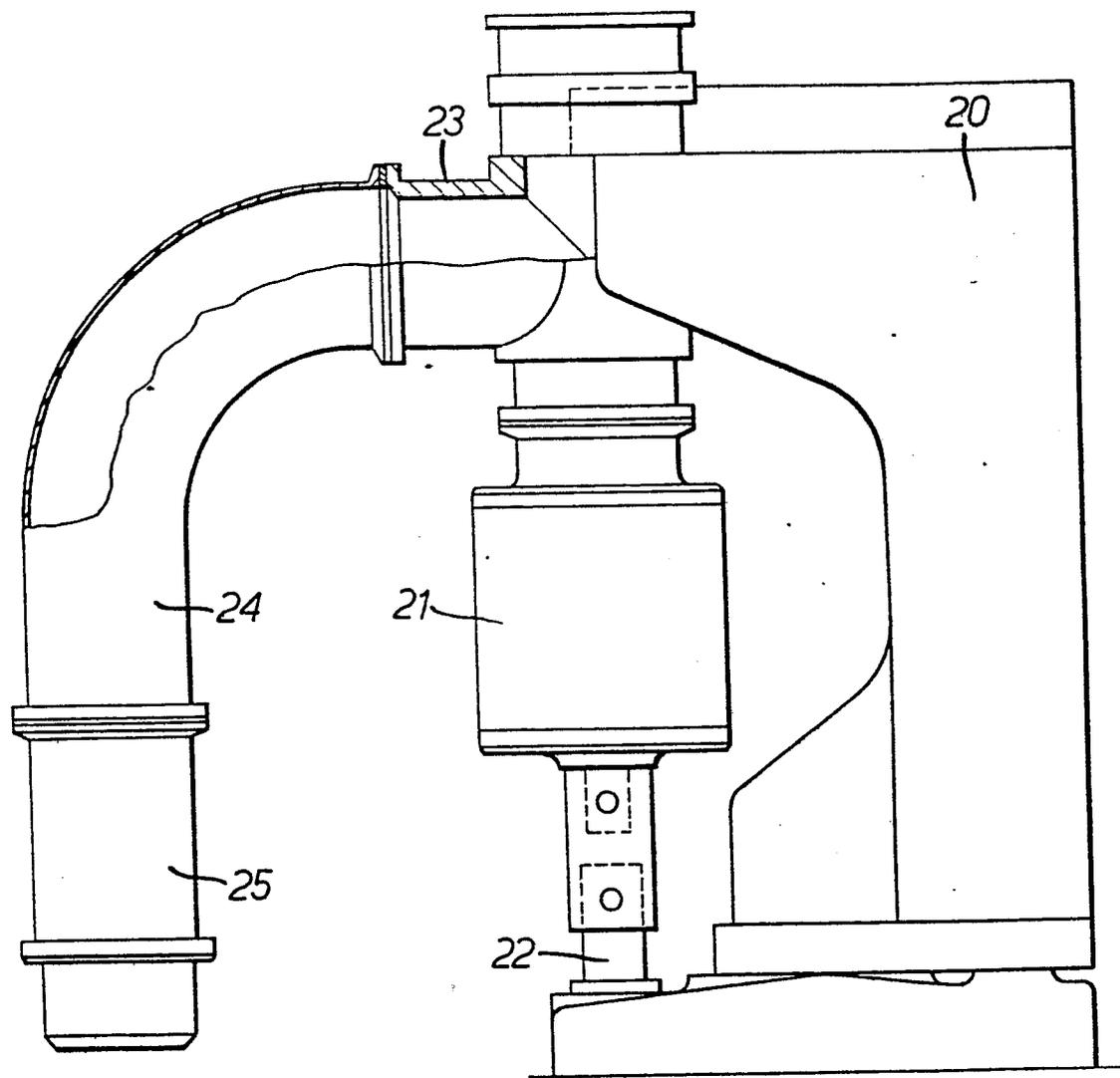
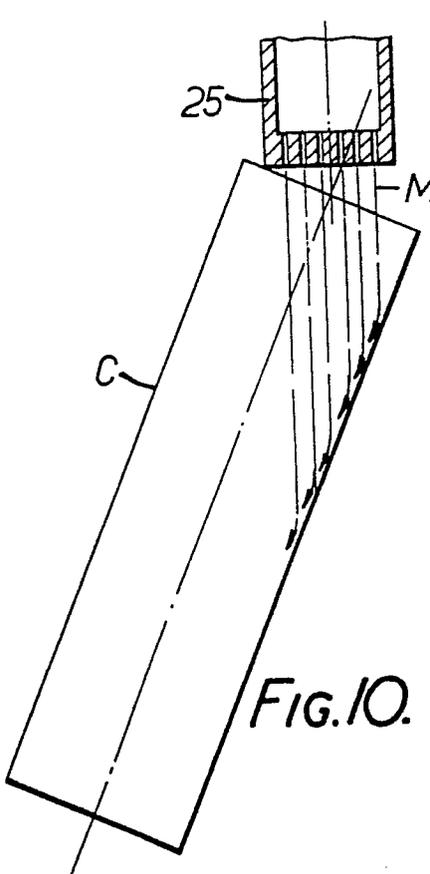
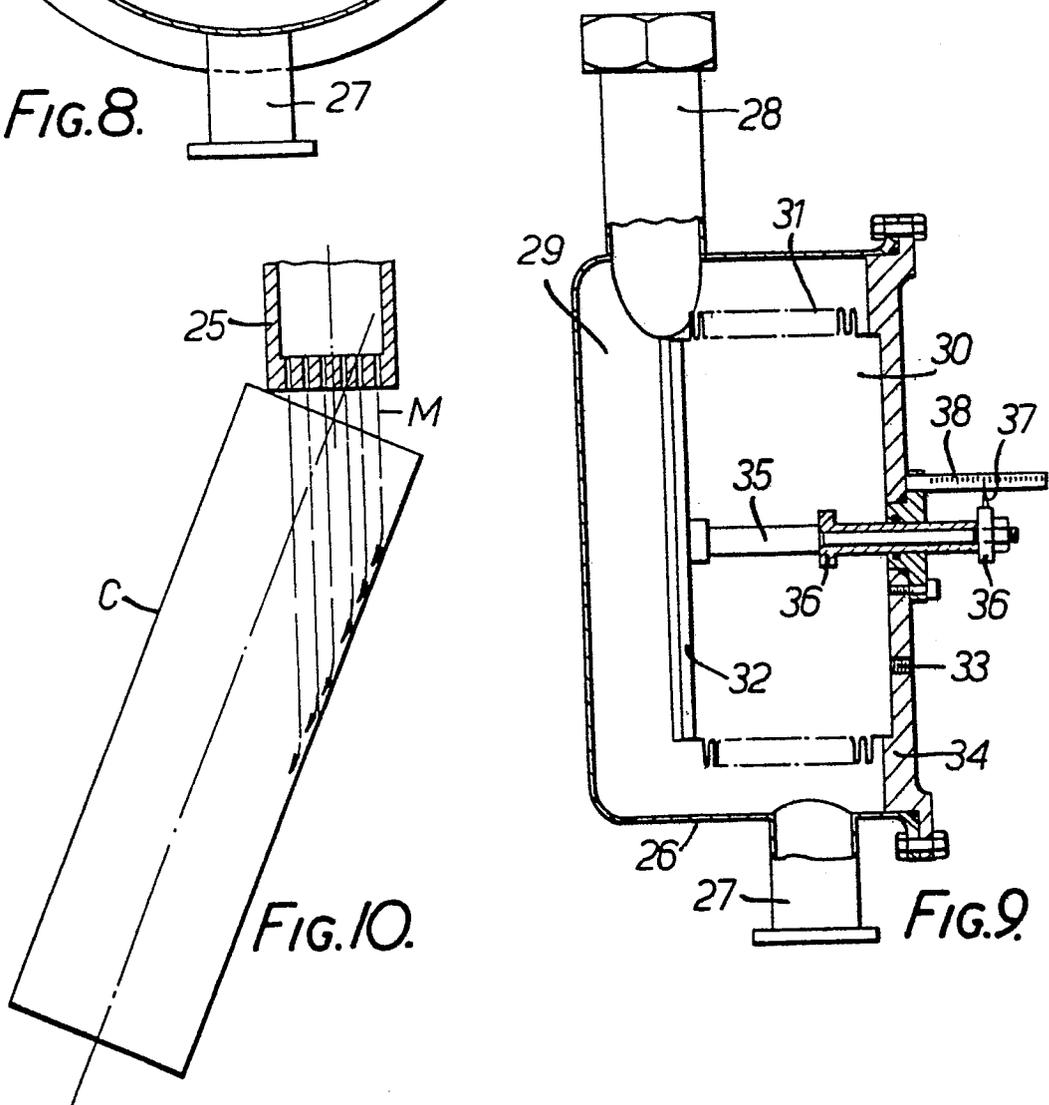
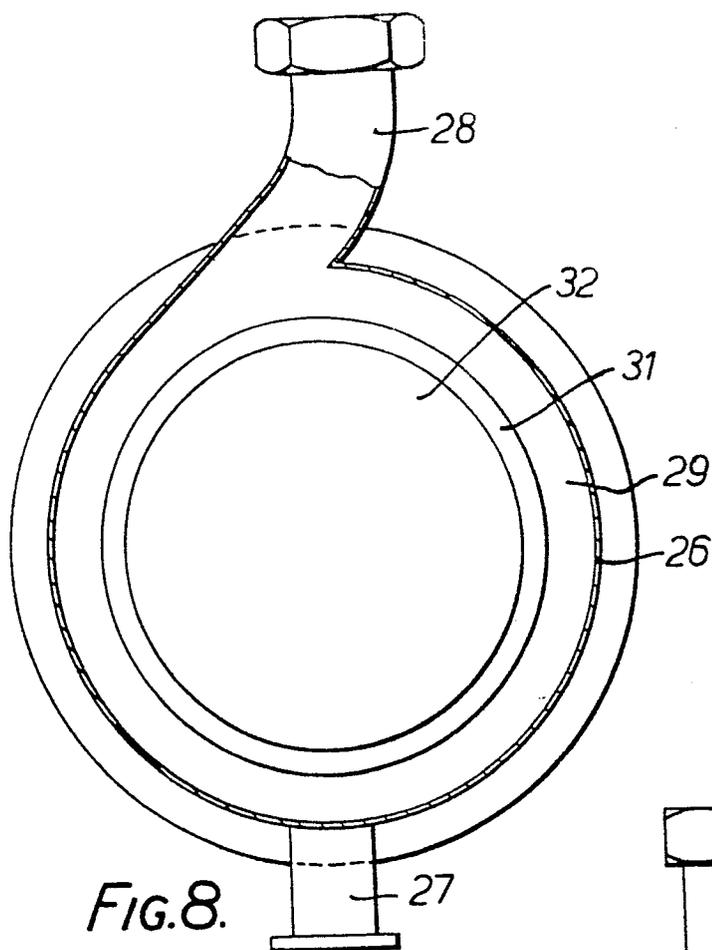


FIG. 7.

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European Patent  
Office

EUROPEAN SEARCH REPORT

0013132  
Application number

EP 79302970.3

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<p><u>DE - A - 2 214 080 (HAMBA-MASCHINENFABRIK H.A. MÜLLER)</u></p> <p>+ Page 16. lines 17-19; page 17, lines 1-4 +</p> <p>--</p> <p><u>GB - A - 1 335 007 (SCHWEIZERISCHE INDUSTRIEGESELLSCHAFT)</u></p> <p>+ Totality +</p> <p>--</p> <p><u>US - A - 4 014 158 (AB ZIRISTOR)</u></p> <p>+ Column 2, lines 48-53 +</p> <p>----</p>	<p>1,5, 26,28</p> <p>9</p> <p>29</p>	<p>B 65 B 55/04</p> <p>B 65 B 3/12</p> <p>B 65 B 3/22</p>
			<p>TECHNICAL FIELDS SEARCHED (Int. Cl. 3)</p>
			<p>B 65 B 3/00</p> <p>B 65 B 31/00</p> <p>B 65 B 55/00</p> <p>B 65 B 37/00</p>
			<p>CATEGORY OF CITED DOCUMENTS</p> <p>X: particularly relevant</p> <p>A: technological background</p> <p>O: non-written disclosure</p> <p>P: intermediate document</p> <p>T: theory or principle underlying the invention</p> <p>E: conflicting application</p> <p>D: document cited in the application</p> <p>L: citation for other reasons</p>
			<p>&amp;: member of the same patent family, corresponding document</p>
<input checked="" type="checkbox"/>	The present search report has been drawn up for all claims		
Place of search	Date of completion of the search	Examiner	
VIENNA	19-03-1980	PIPPAN	

