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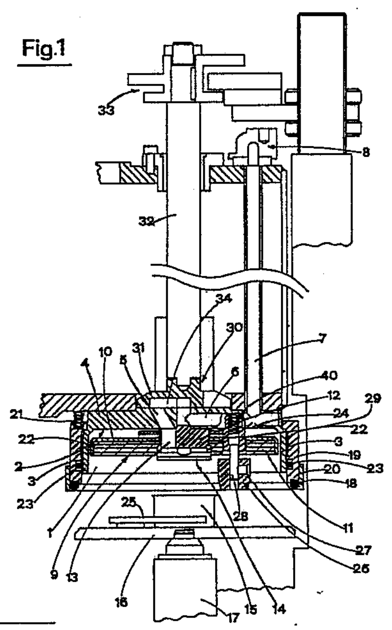
(54) **A process for the vacuumized brimfilling of cans fashioned from aluminium alloy, tinned metal strip or other easily buckled material, and a device for the implementation of such a process.**

(57) The process and the device relate to the art field of brim-filling cans in a vacuum, with a liquid such as oil, in order to preserve perishable foodstuffs. The can (15) is positioned in a sealed chamber (1) with its inside totally isolated so that different negative pressure levels can be created at once in the can and in the chamber; the vacuum generated in the chamber, which is of a lesser degree than that maintained in the can, prevents the material of the can itself from buckling under pressure and ensures aseptic filling conditions.

Fig.1



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Description

The invention relates to a process for vacuumized brim-filling of cans fashioned from aluminium alloy, tinned metal strip or other easily buckled material, and to a device for its implementation.

In the manufacture of canned foods, cans into which a product has already been packed, e.g. tuna fish, sardines etc., are filled to capacity with oil, to the end of preserving the perishable foodstuff. To avoid oxidation of the foodstuff, the operation whereby oil is introduced must be brought about in a vacuum.

Systems currently in use are capable of effecting this final brim-filling operation only with cans fashioned from sheet metal, inasmuch the equipment is designed to create a vacuum internally of the single cans, and these will only be prevented from collapsing inwards if the metal used is of a given thickness.

Cans have now become available in aluminium, tinned metal, and other materials that tend to buckle with relative ease; cans such as these cannot be vacuum-filled using the conventional systems referred to above, as they will not withstand the pressure of an internal vacuum without undergoing distortion, or becoming otherwise damaged.

The current method of filling cans, for instance, of the rectangular type adopted for sardines, mackerel fillets and similar products, consists in pouring oil into the can to the point of brimming over, so that air in the can is displaced naturally. Not only is this type of process lengthy and costly to carry into effect, it does not guarantee total expulsion of air from the can; consequently, the foodstuff may become oxidated. Moreover, oil spilling over from the cans must be cleaned and filtered before it is suitable for further use.

Accordingly, the object of the invention is to set forth a process for vacuumized brim-filling of cans in aluminium alloy, and similar materials, that will ensure total removal of air from inside the can. A further object of the invention is to obtain a marked reduction in the time required for packaging foodstuffs in cans fashioned from aluminium alloy, tinned metal strip or other easily buckled material, thereby cutting manufacturing costs.

The stated objects and others besides are realized, according to the invention disclosed, with a process for vacuumized brim-filling of aluminium alloy cans, and a device for the implemention of such a process, as characterized in the appended claims.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

fig 1 is a front elevation, seen partly in section, of the filling device disclosed;

fig 2 is a schematized front elevation of part of the device, viewed during implementation of a step of the process disclosed;

fig 3 shows the configuration of the device during implementation of the step of the process following that of fig 2;

fig 4 shows the configuration of the device during implementation of the step of the process following that of fig 3;

fig 5 shows the configuration of the device during implementation of the step of the process following that of fig 4.

With reference to fig 1, the device consists in a chamber 1 encompassed substantially by a hollow element 2 with an open bottom. The hollow element 2 exhibits two vertical side walls 3, and a horizontal body 4 affording a substantially vertical passage 5, and a substantially horizontal passage 6 connected by way of a duct 7 with conventional equipment 8 for generating negative pressure.

9 denotes a cover, positioned inside the chamber 1, consisting substantially in a plate 10 the underside of which is faced with a layer of synthetic flexible material 11 designed to produce a sealing action. A central opening is created in the cover 9 to the end of accommodating a cylindrical block 12, through which a passage 13 is formed, and a central presser shoe 14 the surface area of which substantially matches that of the open top of a single can 15. The can 15 rests on a flat surface 16 afforded by a pedestal which is supported on means that produce raising and lowering movement, such as a cam type mechanism, or a fluid power cylinder 17 (as shown). The dimensions of the pedestal 16 are such that its peripheral edge registers precisely with a seal 18 wedged between an outer mantle 19 and a retaining collar 20; accordingly, when the pedestal 16 locates against the seal 18, the chamber 1 will be rendered completely fluid-tight.

The outer mantle 19 is slidable in relation to the side walls 3 of the hollow element 2, and is biased downward by the action of a spring 21.

22 and 23 denote further seals located between the outer mantle 19 and the walls of the hollow element. The horizontal passage 6 and the duct 7 connect with the chamber 1 by way of an orifice 24. 25 denotes a centralizer serving to align the can 15 correctly on the pedestal 16, whilst 26 denotes a centralizer for alignment of the can in relation to the cylindrical block 12, hence in relation to the presser shoe 14.

The centralizer denoted 26 consists substantially in a tapered plunger 27 keyed to a shaft 28 that is slidable internally of a sleeve 29 made fast to the horizontal body 4 of the hollow element and loaded against a spring 40 accommodated by the sleeve 29. 30 denotes a valve assembly consisting in a circular plate 31, keyed to a shaft 32 which is carried by an overhead mechanism 33 of conventional embodiment. The circular plate 31 comprises two channels, and more exactly, a horizontal channel 34 that connects the vertical passages 5 and 13 with the horizontal passage 6, and a vertical channel 35 (see fig 4) that connects the vertical passages 5 and 13 with a tank (not illustrated) containing oil, or whatever liquid is used for filling purposes.

Conventional means are used to rotate the shaft

32 and the circular plate 31 at prescribed intervals so as to bring the channels 34 and 35 alternately into alignment with the passages 5 and 13, and to block the passages altogether, as will now be explained. The steps of the vacuumized brim-filling process according to the invention correspond substantially to the single configurations of the device shown in figs 2, 3 4 and 5, and will now be described. A first step of the process consists in positioning the can 15 internally of a sealed chamber 1, in such a way that the inside of the can remains isolated. Such a chamber 1 is created whenever the cylinder 17 extends and urges the pedestal 16 upward against the seal 18 which, in its turn, is biased downward by the spring 21.

This upward movement also brings the top edge of the can 15 up against the layer of flexible synthetic facing material 11 in such a way that the open top of the can is sealed off, and the inside isolated from the surrounding chamber.

Gentle pressure is now exerted on the contents of the can by the presser shoe 14, and the second step of the process can be implemented (fig 2), namely, creation of a vacuum not only within the can, but internally of the chamber 1 surrounding the can as well, thereby avoiding any possible danger of an inward collapse on the part of the can. This second step is effected by rotating the shaft 32 to the point where the horizontal channel 34 in the valve plate is positioned so as to connect the vertical passage 5, hence the inside of the can, with the negative pressure duct 7.

The following step, illustrated in fig 3, is that of maintaining the vacuum within the can at a maximum level, while reducing the level of the vacuum in the surrounding chamber.

The purpose of this third step is to verify total expulsion of air from within the can, ensuring at the same time that no loss of shape occurs in the can itself; accordingly, the shaft 32 is rotated to the point where the valve plate 31 isolates the two vertical passages 5 and 13 from the duct 7, whereas the chamber 1 remains connected to the equipment 8 and is now evacuated to a lesser degree.

Adjustment of the negative pressure level in the chamber 1 is brought about by conventional means, which are not illustrated.

The next step is that of filling the can to the brim with oil, as illustrated in fig 4; this is effected by rotating the shaft 32 to the point where the vertical channel 35 in the valve plate is brought into alignment with the supply line from the tank containing the oil.

The final step is illustrated in fig 5, and consists in effecting a temporary seal of the filled can and venting the chamber to atmosphere, so as to enable removal of the can and ultimate fitment of its lid; this is achieved by rotating the shaft 32 to the point where the valve plate connects the vertical passages 5 and 13 to the horizontal passage 6, and allowing the negative pressure duct 7 to draw air from the atmosphere.

The process and the device thus described will be seen to permit of vacuum-filling cans fashioned in aluminium alloy, or similar material with a tendency to buckle, by virtue of the fact that a vacuum is created not only inside the can, but also around it, and to a degree sufficient to avoid inward collapse of the can while ensuring efficiency of the filling operation.

The description is by no means limitative. A device as disclosed might be adapted to handle cans of any given shape, round, square or rectangular, without prejudice to the substance of the claims below.

Claims

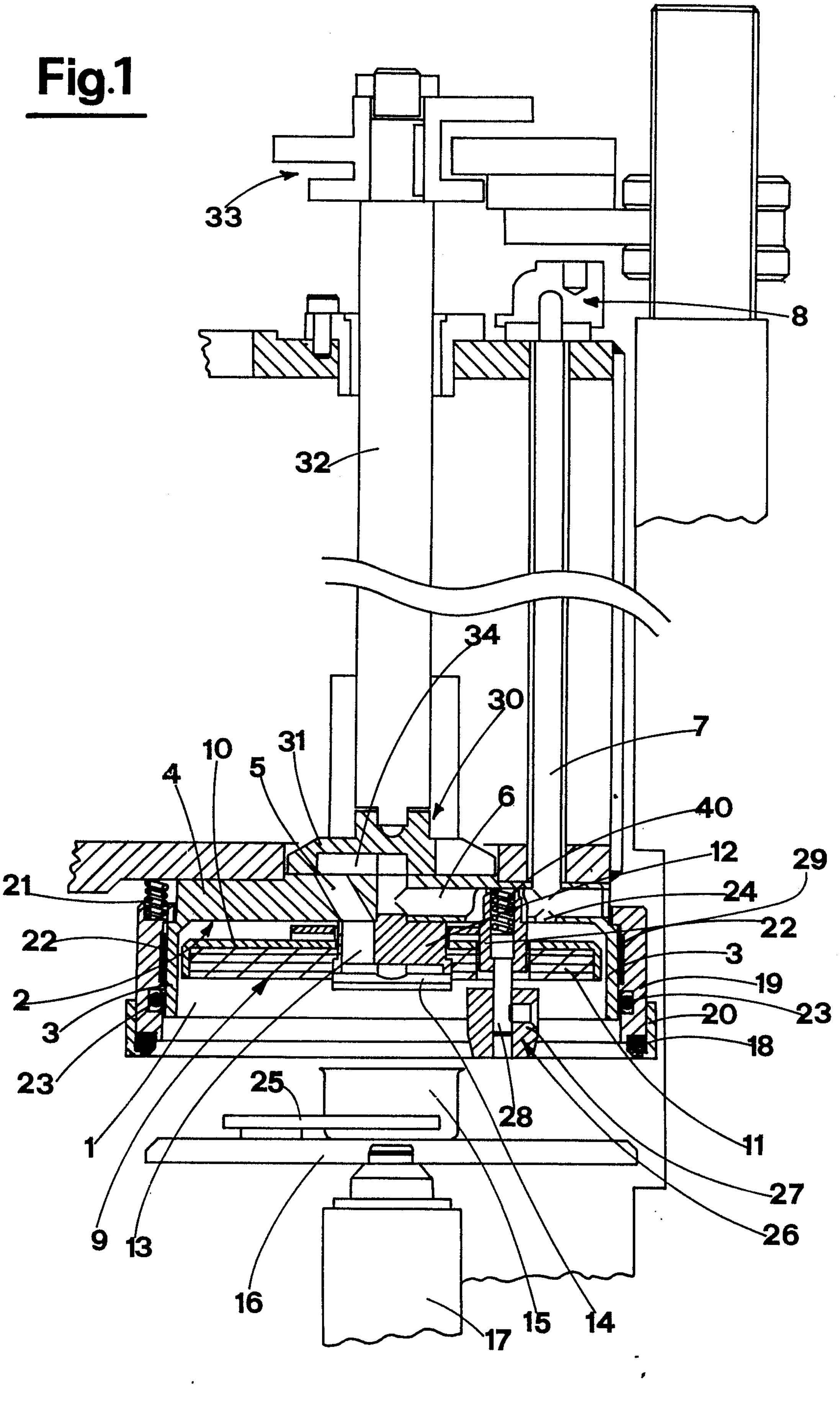
1 A process for the vacuumized brim-filling of cans fashioned from aluminium alloy, tinned metal strip or other easily buckled material, characterized in that it comprises the steps of:
-positioning cans in a sealed chamber in such a way that the inside of the can remains isolated from the surrounding chamber;
-creating a vacuum internally both of the can and of the surrounding chamber;
-lowering the negative pressure level of the vacuum within the chamber;
-filling the can to the brim with a liquid;
-effecting a temporary seal of the filled can and venting the chamber to the atmosphere.

2 A device for the vacuumized brim-filling of cans fashioned from aluminium alloy, tinned metal strip or other easily buckled material, characterized in that it comprises:
-a sealed chamber (1) designed to accommodate at least one can and connected by way of a duct (7) with means for generating negative pressure;
-a cover (9), positioned internally of the sealed chamber and designed to create a fluid-tight seal with the open top of the can;
-passages (5, 13) created respectively in one wall of the sealed chamber and in the cover;
-a rotary valve (30) serving to connect the passages (5, 13) at prescribed intervals with the negative pressure duct (7) on the one hand, and with a supply of the canning liquid on the other; and
-means (8) for generating negative pressure, which connect permanently with the chamber and are capable of varying the level of negative pressure therein.

3 A device as in claim 2, wherein the sealed chamber (1) is embodied substantially as a hollow element the open bottom of which is enclosed in fluid-tight manner by a flat surface (16) that also provides a pedestal for support of the can during the filling operation.

4 A device as in claim 2, wherein the rotary valve (30) comprises a circular valve plate (31) rotatable about a vertical axis and provided with a first channel (34) that connects the inside of the can with negative pressure, and a second channel (35) that connects the inside of the can with a supply of the canning liquid.

Fig.1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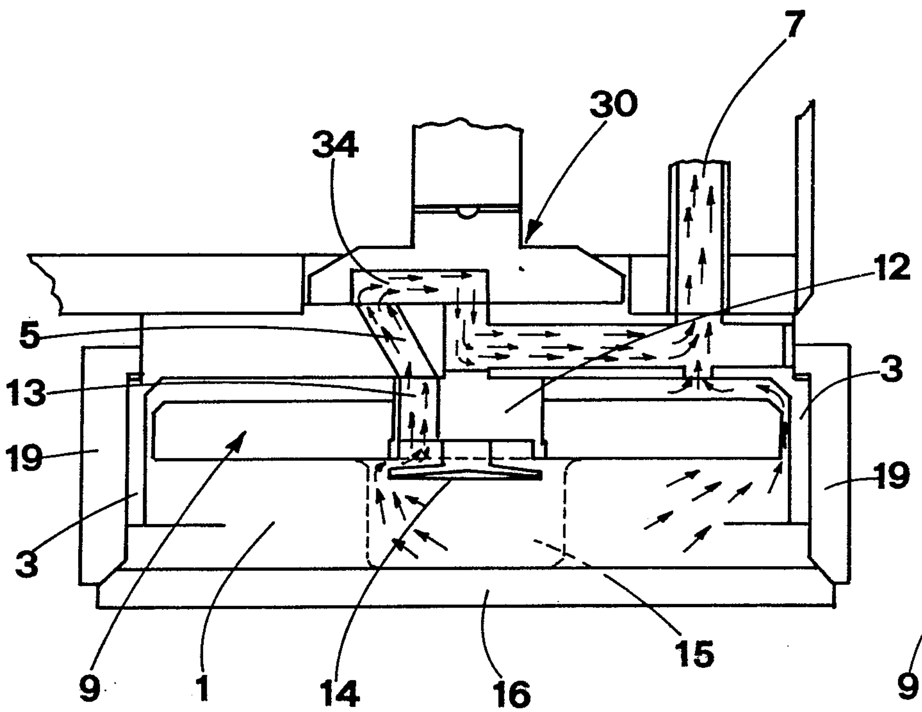

Fig. 2

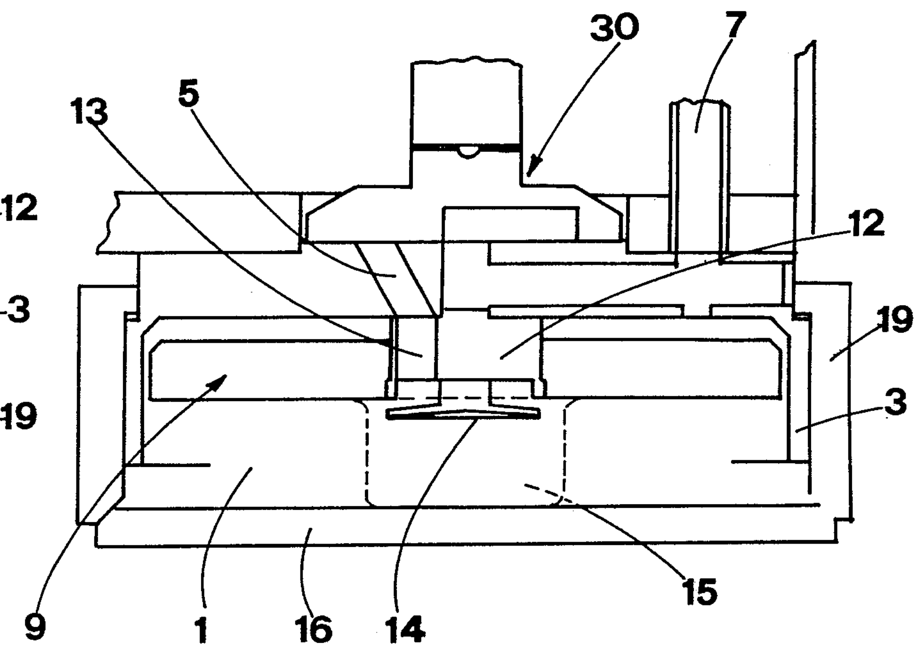

Fig. 3

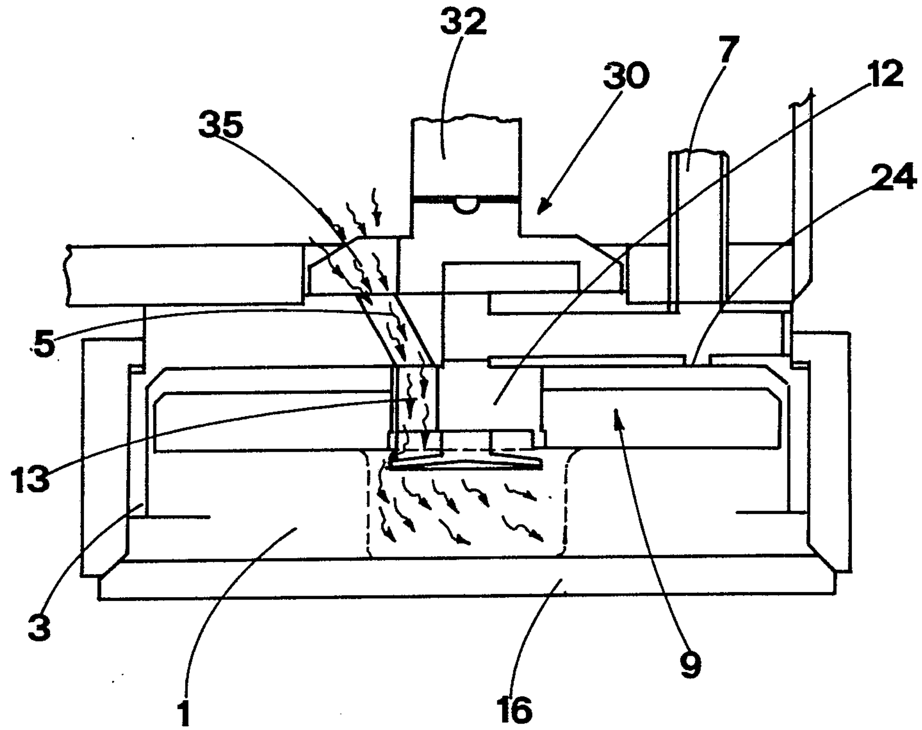

Fig. 4

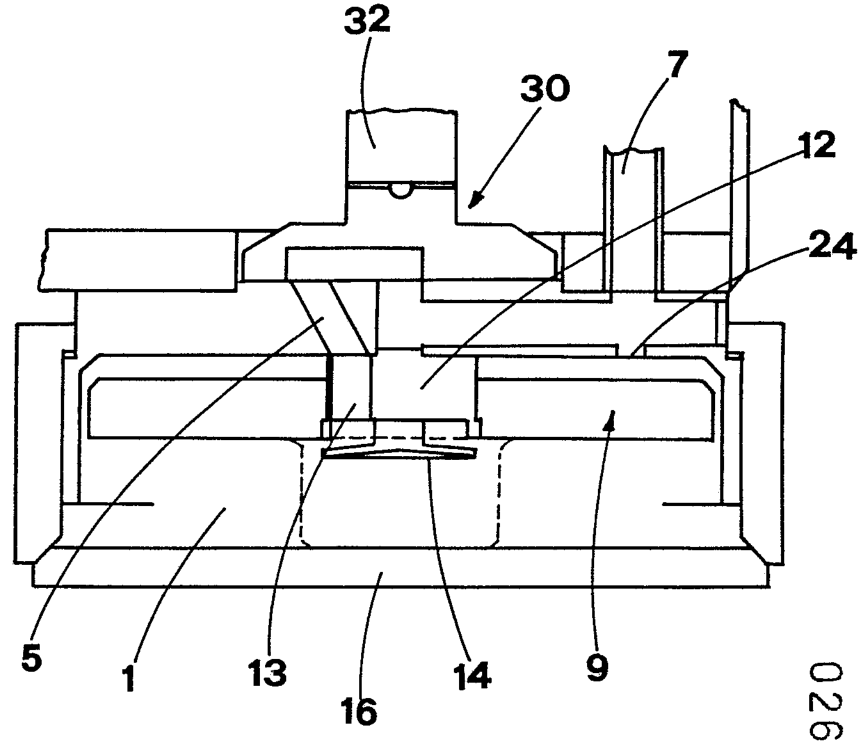

Fig. 5