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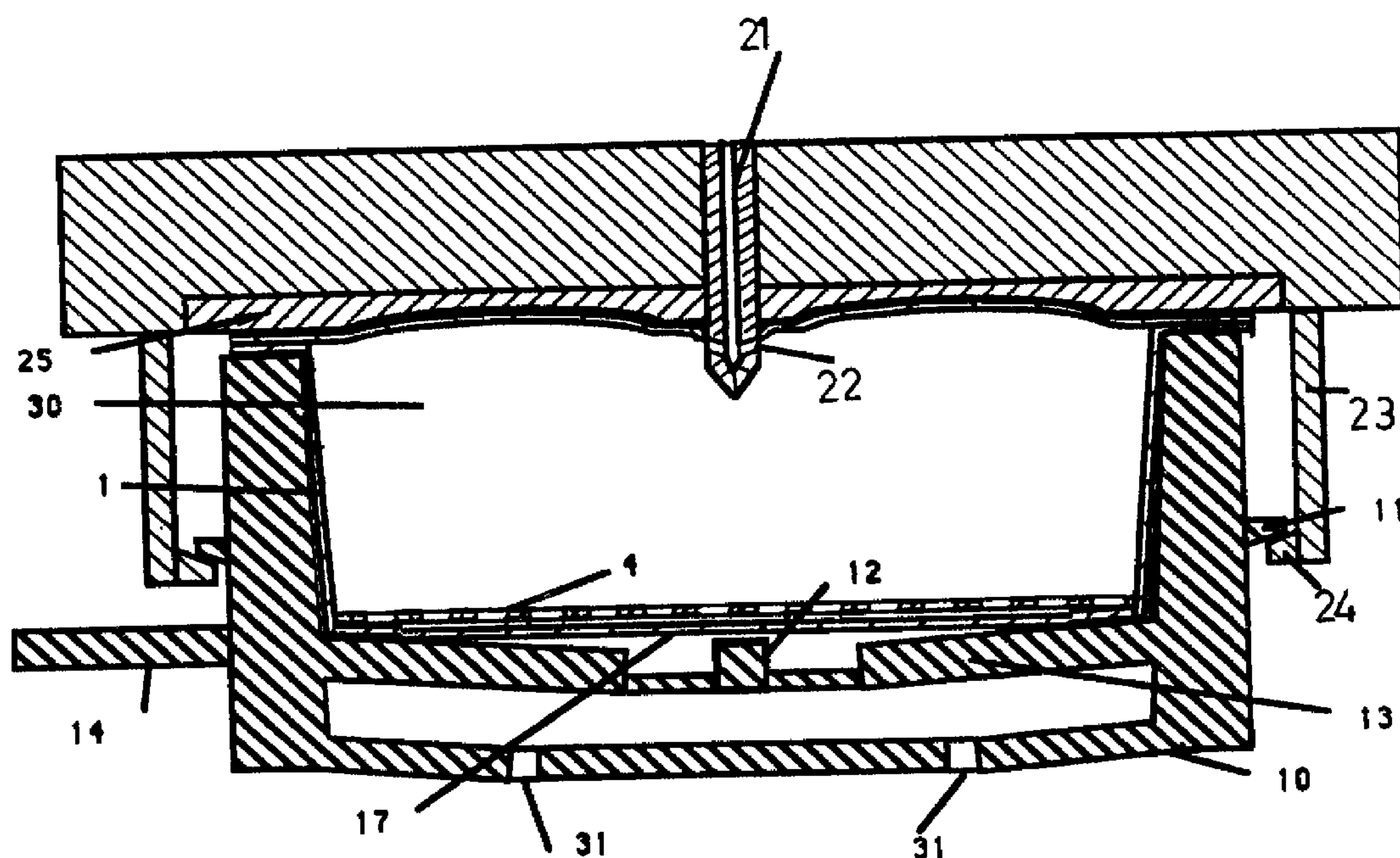
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(54) **DISPOSITIF SERVANT A L'EXTRACTION DE CARTOUCHES**

(54) **A DEVICE FOR THE EXTRACTION OF CARTRIDGES**



(57) The invention relates to a device (2) for the extraction of cartridges designed for the preparation of a beverage in a cartridge holder for coffee machines, comprising a tightening ring (8) with tightening ramps (9) for the cartridge holder, an injector (7) coaxial with the tightening ring and, around the periphery of the injector, a circular surface (16) perpendicular to the injector and designed to ensure imperviousness on the upper face of said cartridge during its extraction.



Abstract

A device for the extraction of cartridges

5 The invention relates to a device (2) for the extraction
of cartridges designed for the preparation of a beverage
in a cartridge holder for coffee machines, comprising a
tightening ring (8) with tightening ramps (9) for the
10 cartridge holder, an injector (7) coaxial with the
tightening ring and, around the periphery of the in-
jector, a circular surface (16) perpendicular to the in-
jector and designed to ensure imperviousness on the up-
per face of said cartridge during its extraction.

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Fig. 1

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A device for the extraction of cartridges

5 This invention relates to a device for the extraction of cartridges designed for the preparation of a beverage in a cartridge holder for coffee machines.

10 EP 242 556 relates to a device for the extraction of cartridges comprising a hollow cylindrical body with an inner shape substantially corresponding to the outer shape of the cartridge to be extracted, the body comprising an injector at its upper end following the axis of the cylinder and, on its outer part, a spring holding a ring for the release of the cartridge after extraction. Although a device of this type enables a coffee of
15 good quality to be obtained, it can only be used with one type and one shape of cartridge perfectly adaptable to the inner shape of the hollow cylinder.

20 The extraction device according to the invention can be used much more universally, i.e. for the extraction of capsules of different shapes and sizes, is relatively simple in design and enables cartridges to be dependably extracted with good reproducibility.

25 The present invention relates to a device for the extraction of cartridges designed for the preparation of a beverage in a cartridge holder for coffee machines, comprising a tightening ring with tightening ramps for the cartridge holder, an injector coaxial with the tightening ring and, around the periphery of the injector, a
30 circular surface perpendicular to the injector and designed to ensure imperviousness on the upper face of said cartridge during its extraction.

35 The circular surface may be completely flat, above all if the cartridge to be extracted has a flat upper face.. It may also have a circular bore concentric with the injector, particularly in cases where the capsule to be

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5 extracted has a curved upper face. At all event, the surface is always flat in the zone where the imperviousness of the capsule is established, i.e. in the zone close to the periphery of the capsules. The imperviousness is totally guaranteed by this circular surface.

10 The injector consists of an injection needle which performs the dual function of perforating the upper face of the cartridge and injecting water. The injector comprises between one and ten and preferably between four and eight holes uniformly distributed around the periphery of the injector and optionally at two levels. The axis of the holes of the injector forms an angle of 0 to 25° with the horizontal. By horizontal is meant the plane formed by the flat circular surface.

15 By angle is meant the angle formed above the plane of the horizontal. By virtue of the geometry of the holes of the needle, the water is thus directed towards the top of the capsule so that is uniformly distributed over the entire surface of the capsule after deflection at the top of the capsule (or cartridge).

20 The orientation of the holes of the injection needle is favourable because it permits the use of capsules having variable sizes and height-to-diameter ratios, more particularly with small values (from 1 to 0.12), and relatively lightly compacted layers of coffee.

25 This is because, by being directed slightly upwards, the water injected through the few holes of the needle is deflected in the upper zone of the capsule and is returned towards the layer of coffee in far more dispersed form. Thus, the water comes into contact with the layer of coffee after partial dispersion and no longer in the form of a few localized jets.

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5 This phenomenon is important during the first few seconds of the extraction process when the layer of coffee is not stabilized. In addition, this dispersion is favourable if it is desired to obtain a dispersion and reduction of the kinetic energy of the water injected so that the layer of coffee is not excessively compacted, thus avoiding any risk of the layer of coffee choking under excessive pressure. By being lightly compacted, the layer of coffee moves from its place in the capsule which is then taken by the water.

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15 During the remainder of the extraction process, the jets of water are then released more or less into this volume of water and, in no case, are the jets directed directly onto the coffee.

20 The holes of the injector are between 0.2 and 1.5 mm in diameter. They must be long enough to allow the water to arrive under a pressure of as high as 20 bar, but must not be too large in order to avoid any risk of reflux of the coffee grounds on completion of extraction.

25 To be sure of good penetration of the water into the cartridge during the extraction process, the holes of the injector are situated at a distance of 3 to 8 mm from the circular surface.

30 The distance between the bottom of the injector and the lower edge of the tightening ramp is at least equal to the thickness of the tightening ramp, for example at least 5 mm and as much as 25 mm, depending on the configurations of the cartridge holders and the capsules. The object is to ensure both minimal and the cleanest possible tearing of the upper face of the cartridge to be extracted to avoid soiling of the extraction device with coffee grounds during release of the capsule after extraction.

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5 The cartridge is held in the extraction device by means
of a cartridge holder of which the internal geometry is
variable according to the size of the capsules used. It
comprises two diametrically opposite retaining lugs de-
signed to cooperate with the tightening ramps of the
tightening ring. The opening of the tightening ramps
should be the smallest possible in relation to the width
of the retaining lugs of the cartridge holder to promote
better centring of the capsule before it is perforated
10 by the water injector. After the cartridge holder has
been secured in the tightening ring, the imperviousness
of the extraction device is established by compression
of the outer ring of the capsules against the flat cir-
cular surface of the device according to the invention.
15 This circular surface is made of a material which en-
sures high impermeability, i.e. either a flexible mate-
rial, such as natural or synthetic rubber, or a rigid
material, such as Inox coated with PTFE (Teflon) or
filled PTFE.

20 The use of several types or sizes of capsules from one
and the same extraction device is made possible by using
cartridge holders of which the inner part is specific to
the capsule while the outer part, common to all types,
25 is compatible with the tightening ring.

In particular, it is possible to use the capsules accor-
ding to applicants' European Patent Application filed on
the same date as the present application under the title
30 "A sealed cartridge for the preparation of a beverage
and a process and device for its production" (EP
90114404.8).

35 It is also possible to use the extraction device accord-
ing to applicants' European Patent Application filed on
the same dated as the present application under the ti-
tle "A process and a device for the extraction of sealed
cartridges" (EP 90114401.4).

It is also possible to extract open cartridges, for example those object of the EP Patent Application No. 90114405.5.

After extraction, the capsules are easily released by loosening the cartridge holder and releasing the capsule simply by inverting the capsule holder.

Embodiments of the invention are described in detail in the following with reference to the accompanying drawings, wherein:

Figure 1 is a section through the device embodying the invention.

Figure 2 is a section through a second embodiment of the device according to the invention.

Figure 3 is a view from beneath of the device shown in Fig. 1.

Figure 4 is a section through the complete cartridge extraction system using the device shown in Fig. 2.

The extraction device (2) embodying the invention comprises a water injector (7) having water outlet holes (15) forming an angle α with the horizontal. In Fig. 1, this angle is 20° . The extraction device additionally comprises a tightening ring (8) with tightening ramps (9) and, around the periphery of the injector (7), a flat circular surface (16) of rubber to establish impermeousness during extraction of the sealed cartridge.

Fig. 1 also shows the distance between the bottom of the injector and the lower edge of the tightening ramp of the tightening ring. In the case of this configuration, $h = 10 \text{ mm}$.

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5 Figs. 2 and 3 show another embodiment of the device according to the invention. This device (20) comprises a water injector (21) having water outlet holes (22). In addition, the device comprises a tightening ring (23) with tightening ramps (24) and a circular surface (25) around the periphery of the injector (21). This surface is divided into three zones, namely: two flat parts, one at the centre (26) and the other at the periphery (28), and a circular bore (27) provided for the extraction of capsules having a curved upper surface. The outer zone (28) must be flat to ensure imperviousness during extraction. The flat zone (26) is necessary because, during piercing of the capsule when the upper membrane deforms downwards, the zone (26) compensates this deformation to avoid the reflux of coffee grounds during release of the capsule after extraction.

10 The complete extraction system (Fig. 4) additionally comprises a cartridge holder (10) with two retaining lugs (11) designed to cooperate with the ramps (24). The cartridge holder comprises a recess for the cartridge (1) and, beneath this recess, a fixed central finger (12) and radial fins (13) which support the lower wall (17) and the filter (4) of the cartridge to be extracted. The handle (14) provides for easy handling of the cartridge holder.

25 The cartridge (1) containing the coffee (30) is introduced into the cartridge holder (10) and engaged in the tightening ring (23), the water injector (21) piercing the upper face of the cartridge (1).

30 The water arrives through the orifices (22) of the water injector (21) and wets the entire layer of coffee (30). Under the effect of the water pressure, the lower face (17) of the cartridge deforms and is applied against the central finger (12). The face tears on reaching its yield stress. The filter (4) also deforms, but is of

such a thickness that it does not tear. The actual extraction process can then begin. The coffee issues through the orifices (31) of the cartridge holder (10).

5 The surface (25) of rubber guarantees high imperviousness during the extraction process while the orifices (22) directed towards the top of the capsule ensure thorough wetting of the layer of coffee.

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CLAIMS

1. In a device for extraction of a material contained in a cartridge for preparation of a beverage having a housing member which has a base, having an injector member which extends longitudinally about a longitudinal axis from the housing member base for piercing a cartridge and which has outlets displaced at a position away from the base and disposed for directing water from the injector member into a cartridge for extraction of a material in a cartridge and having a seal member which has a first seal surface and a second seal surface which opposes the first seal surface and wherein the seal member is positioned at the base of the housing member so that the first and second seal surfaces extend in a direction perpendicular to the longitudinal axis of the injector member and so that the first seal surface is positioned adjacent the base and wherein the seal member has a centrally disposed bore therethrough from the first surface to the second surface to provide an opening for sealably surrounding a periphery of the injector member, wherein the improvements comprise:

the seal member second surface having a first centrally disposed flat surface portion, a second flat surface portion and a third surface portion, wherein the bore is centrally disposed in the first portion and wherein the third portion extends between and connects the first and second portions and is concave with respect to the first and second portions and forms a cavity between the first and second portions;

the injector member having outlets disposed for directing water ejected from the injector member at an angle of from 90° to 65° with reference to the longitudinal axis; and

a cartridge holder and a tightening ring wherein the cartridge holder has a base and has a wall having inner and outer surfaces which extends transversely from the base to a wall edge disposed between the inner and outer surfaces and displaced from the base and has lugs which extend transversely from the outer surface, and

the tightening ring extends from the housing member and has a surface which extends from the housing member transversely with respect to the first and second surface portions and from a position about the seal member second surface portion and has ramps which extend transversely from the tightening ring surface for engaging the cartridge holder lugs for supporting the cartridge holder, and

wherein the seal member second surface portion has a size sufficient so that upon engagement of the ramps and lugs for supporting the cartridge holder, the cartridge holder wall edge is aligned with and adjacent to the seal member second surface portion for effecting compression of a cartridge against the second surface portion.

2. A device according to claim 1 wherein the seal member second surface portion extends to a seal member peripheral edge which is circular in shape.
3. A device according to claim 1 wherein the injector member outlets are positioned at a distance of from 3 mm to 8 mm from the first surface portion.
4. A device according to claim 1 wherein the injector member has between one and ten outlets.
5. A device according to claim 1 wherein the injector member outlets have a size of from 0.2 mm to 1.5 mm in diameter.
6. A device according to claim 1 wherein the seal member is comprised of a rubber material.
7. A device according to claim 1 wherein the seal member is comprised of steel coated with PTFE.
8. In a device for extraction of a material contained in a cartridge for preparation of a beverage having a housing member which has a base, having an injector member which extends longitudinally about a longitudinal axis from the housing member base for piercing a cartridge and which has

outlets displaced at a position away from the base and disposed for directing water from the injector member into a cartridge for extraction of a material in a cartridge and having a seal member which has a first seal surface and a second seal surface which opposes the first seal surface and wherein the seal member is positioned at the base of the housing member so that the first and second seal surfaces extend in a direction perpendicular to the longitudinal axis of the injector member and so that the first seal surface is positioned adjacent the base and wherein the seal member has a centrally disposed bore therethrough from the first surface to the second surface to provide an opening for sealably surrounding a periphery of the injector member, where the improvements comprise:

the seal member second surface consisting of a first centrally disposed flat surface portion, a second flat surface portion and a third surface portion, wherein the bore is centrally disposed in the first portion, wherein the second portion extends to a seal member peripheral edge and wherein the third portion extends between and connects the first and second portions and is concave with respect to the first and second portions and forms a cavity between the first and second portions; and

the injector member having outlets disposed for directing water ejected from the injector member at an angle of from 90° to 65° with reference to the longitudinal axis of the injector member.

9. A device according to claim 8 wherein the seal member peripheral edge is circular in shape.

10. A device according to claim 8 wherein the injector member outlets are positioned at a distance of from 3 mm to 8 mm from the first surface portion.

11. A device according to claim 8 wherein the injector member has between one and ten outlets.

12. A device according to claim 8 wherein the injector member

outlets have a size of from 0.2 mm to 1.5 mm in diameter.

13. A device according to claim 8 wherein the seal member is comprised of a rubber material.

14. A device according to claim 8 wherein the seal member is comprised of steel coated with PTFE.

PL. 1/3

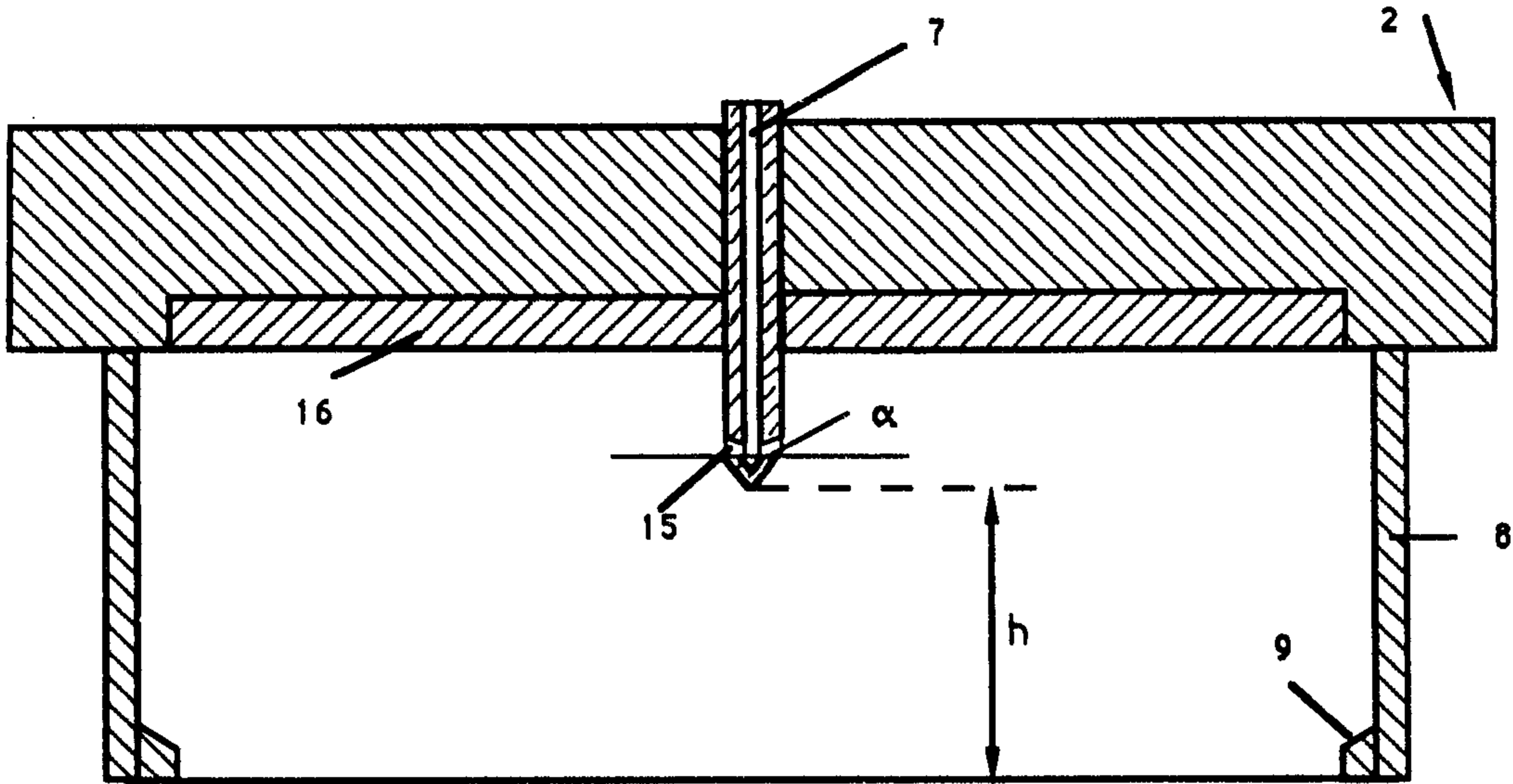


FIGURE 1

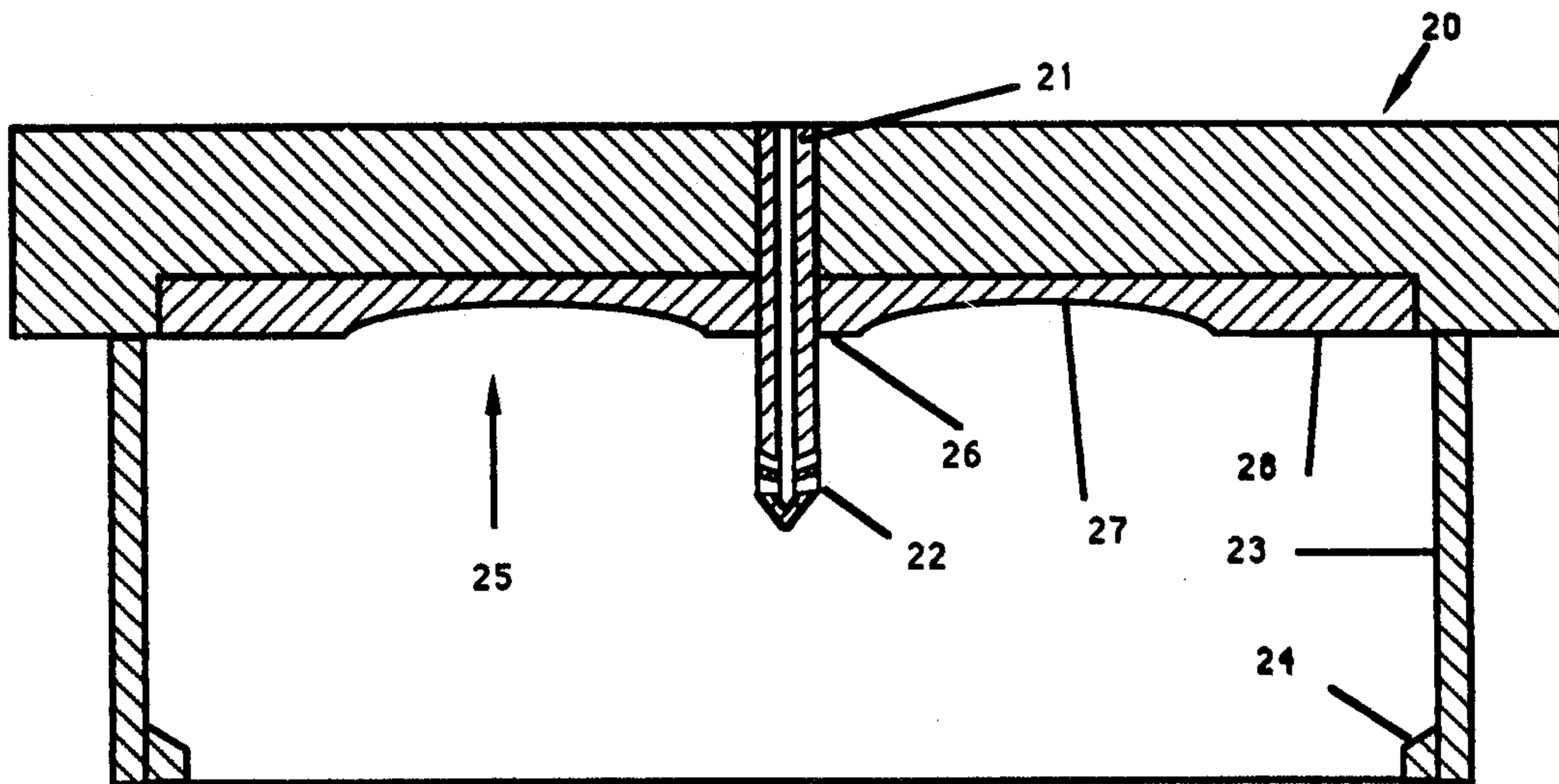


FIGURE 2

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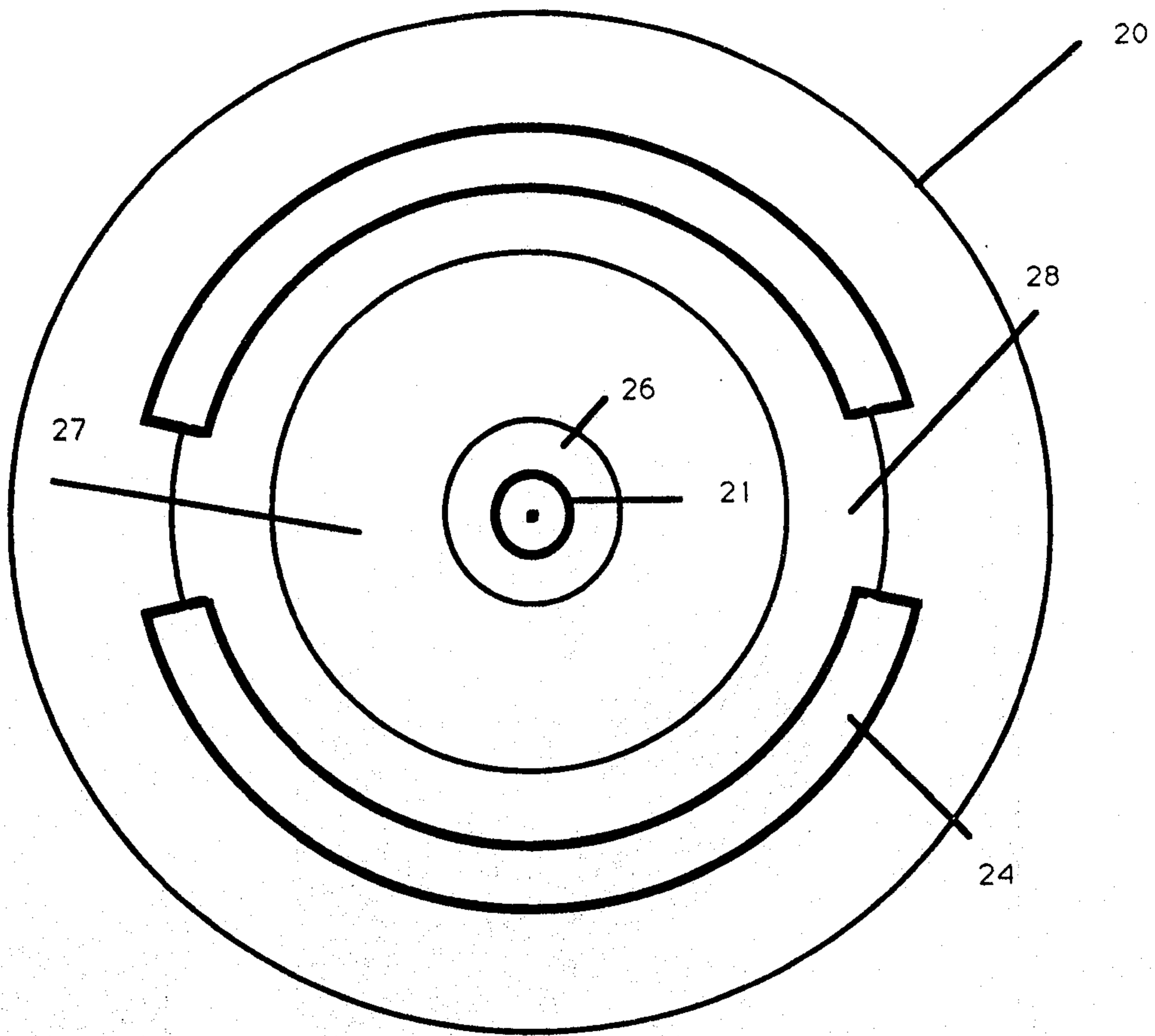


FIGURE 3

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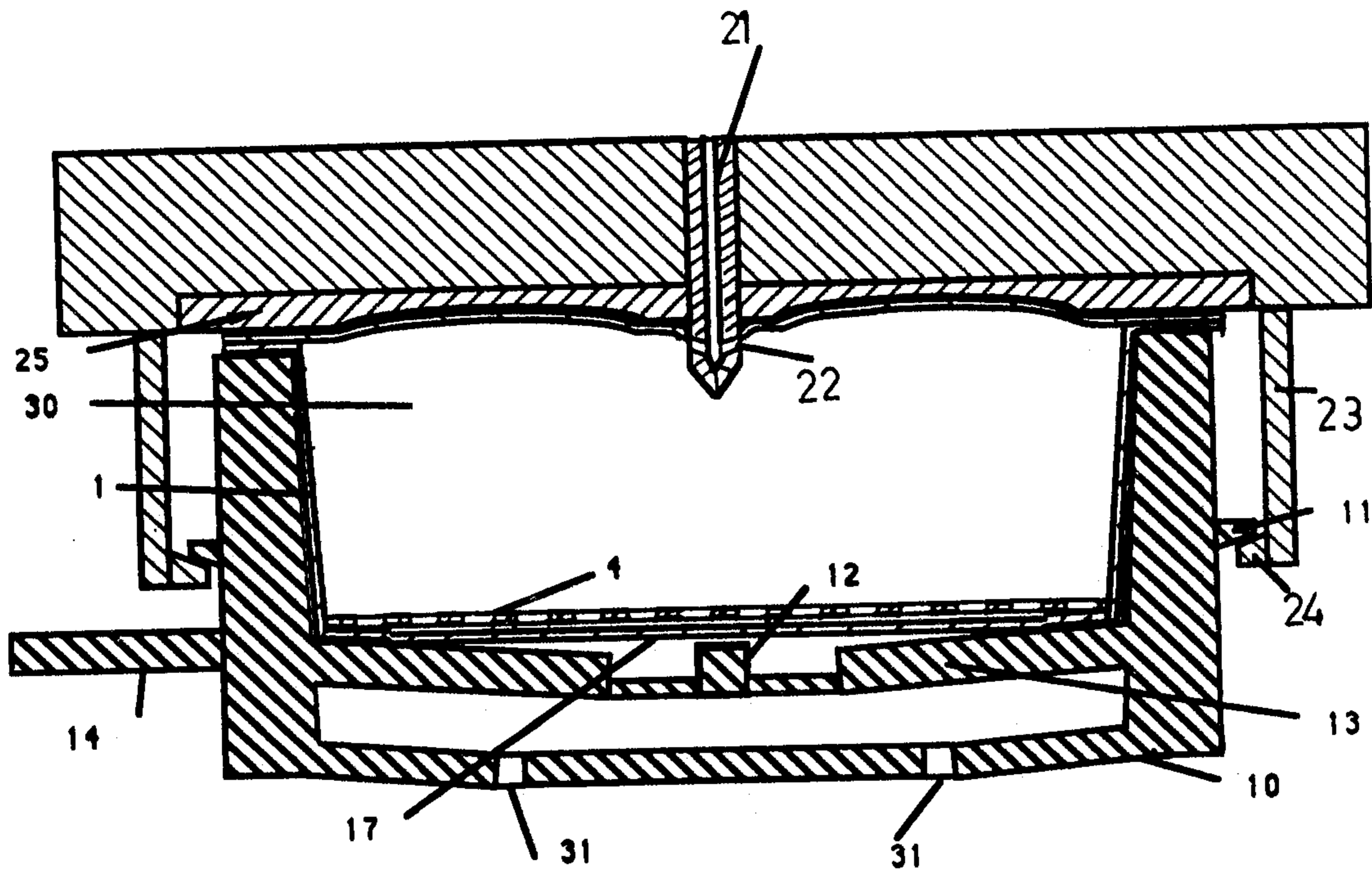


FIGURE 4

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