

653324

COMMONWEALTH of AUSTRALIA
Patents Act 1952

APPLICATION FOR A STANDARD PATENT

I/We

Studio Tecnico Sviluppo E Ricerche S.T.S.R. s.r.l.

of

Via dell'Artigianato 3, Lacchiarella, Milano, Italy

hereby apply for the grant of a Standard Patent for an invention entitled:

A fixed plate for a hydraulic valve, provided with means for ejecting chips

which is described in the accompanying complete specification.

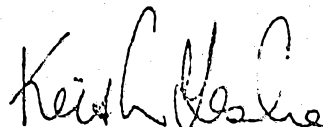
Details of basic application(s):-

<u>Number</u>	<u>Convention Country</u>	<u>Date</u>
67103-A/90	Italy	13 February 1990

The address for service is care of DAVIES & COLLISON, Patent Attorneys, of 1 Little Collins Street, Melbourne, in the State of Victoria, Commonwealth of Australia.

DATED this EIGHTH day of FEBRUARY 1991

To: THE COMMISSIONER OF PATENTS


.....
a member of the firm of
DAVIES & COLLISON for
and on behalf of the
applicant(s)

Davies & Collison, Melbourne

024 000000

PATENTS ACT 1952

Insert title of invention.

Insert full name(s) and address(es) of declarant(s) being the applicant(s) or person(s) authorized to sign on behalf of an applicant company.

In support of the Application made for a patent for an invention
entitled: "A fixed plate for a hydraulic valve, provided
with means for ejecting chips"

I Luciano Pianezzola of
We

STUDIO TECNICO SVILUPPO E RICERCHE S.T.S.R. s.r.l.
of Via dell'Artigianato 3, Lacchiarella (Milano), Italy

Cross out whichever of paragraphs 1(a) or 1(b) does not apply

1(a) relates to application made
by individual(s)

1(b) relates to application made
by company; insert name of
applicant company.

do solemnly and sincerely declare as follows :—

1. (a) KKKK NNS APPKEA KXXXXX FOR NNS PAKEN
WXX XX

ör (b) I am authorized by

Studio Tecnico Sviluppo E Ricerche S.T.S.R. s.r.l.

the applicant..... for the patent to make this declaration on ^{its}~~their~~ behalf.

[illegible]

or (b)

Francesco KNAPP

of Via Brigata Pavia 10, Pavia, Italy

is the actual inventor..... of the invention and the facts upon which the applicant.....
~~are~~
~~is~~
~~are~~ entitled to make the application are as follows :-

assignment dated 22nd October, 1990, whereby the actual inventor assigned the invention to the said applicant.

Cross out paragraphs 3 and 4 for non-convention applications.

- For convention applications, insert basic country(s) followed by date(s) and basic applicant(s).

3. The basic application..... as defined by Section 141 of the Act ^{was} made ~~XXXX~~
in Italy..... on the 13th February, 1990.....
by the same Applicant i.e. / Studio Tecnico Sviluppo E
in Ricerche S.T.S.R. S.r.l.
on the
by
on the
by

4. The basic application..... referred to in paragraph 3 of this Declaration ^{was} ~~is~~ the first application..... made in a Convention country in respect of the invention the subject of the application.

Insert place and date of signature.

Signature of declarant(s) (no attestation required)

Note: Initial all alterations.

Declared at Milano this 16th day of January 1991
STUDIO TECNICO SVILUPPO E RICERCHE S.T.S.R. s.r.l.

(Luciano Pianezzola, General Director)

DAVIES & COLLISON, MELBOURNE and CANBERRA.



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A FIXED PLATE FOR A CERAMIC DISC VALVE HAVING CHIP CLEARANCE RECESSES
- International Patent Classification(s)
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- (21) Application No. : 70896/91 (22) Application Date : 08.02.91
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67103 /90 13.02.90 IT ITALY
- (43) Publication Date : 15.08.91
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- (71) Applicant(s) **RICERCHÉ**
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- (56) Prior Art Documents
FR 2524105
US 4186773
- (57) Claim



1. A fixed plate of hard material for a hydraulic valve, of the type which has a passage opening asymmetrically located with respect to the plate center and is susceptible to chip formation when in co-operative operation with respect to an adjacent plate of similar hard material, characterized by the fact that it has, on its lapped working face, a surface portion, opposite the passage opening with respect to the plate center, which is situated at the same level as the surface portion surrounding the passage opening, and has another surface portion, not adjacent said passage opening, which is recessed, this recessed surface portion being open towards the plate periphery and providing a region from which any chips formed during valve operation may be ejected away from the plate.

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PATENTS ACT 1952

COMPLETE SPECIFICATION

NAME & ADDRESS
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COMPLETE SPECIFICATION FOR THE INVENTION ENTITLED:

A fixed plate for a hydraulic valve, provided with means for ejecting chips

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

The subject of this invention is a fixed plate of hard material for
5 a hydraulic valve, of the type, mainly used in the socalled screw type
faucets, which has a passage opening asymmetrically located with respect
to the plate center.

A fixed plate of the type to which this invention refers is used by
forming a pair with a similar movable plate, and this pair of plates is
10 mounted in the valve between an inlet connection and an outlet connec-
tion. Each plate is limited, on a working face, by a lapped plane sur-
face, and the lapped surfaces of both plates are put at mutual contact
and are suitable for effecting a hydraulic sealing. The movable plate
is so mounted that it may be turned with respect to the fixed plate by
15 means of a control member, whereby, when both plates have their passage
openings in mutual register, the valve allows passage of a maximum flow,
when the passage openings of the two plates are in diametrically opposi-
te positions the flow is shut out, and in the intermediate positions the
passage of a partial flow is allowed. The control field of such valve
20 is of about 180°.

These pairs of plates give rise to a particular problem. Because
the passage opening is located in an asymmetrical position, the force
applied by the water pressure to the plates is asymmetrical too, and it
causes strain concentrations. The hard materials forming the plates are
25 generally rather brittle, and therefore the mutual displacement of the
plates under these strain concentrations causes ^{minute} ~~very little~~ splinter-
ings, ^{from} ~~so~~ which ensue the formation of ^{small} ~~little~~ chips of hard material.
These chips are confined between the lapped plane surfaces of the two
plates forming the pair, from which they have been detached, and cannot
easily escape because these surfaces extend on the entire area of the



plates, with the only exception of the passage openings. With the lapse of time such chips give rise to grooves in the lapped surfaces, and thus jeopardize the perfect behaviour of the valve.

On the contrary, the described disadvantage does not appear in some plates
5 which are similar to those now considered but have two diametrically opposite passage openings. In this case, the forces applied by the water pressure are always symmetric; such symmetric forces do not give rise to strain concentrations, and therefore no splinterings take place and no hard material chip is formed. But the plates showing such a symmetrical disposition of the passage openings have a control
10 field of 90° only, which is too limited for allowing an easy and accurate control of the valve.

In view of the above, the object of this invention is to improve a fixed plate for a valve, of the type having a passage opening asymmetrically located with respect to the plate center, in such a way as to prevent any damage of the hydraulically
15 sealing lapped surface, deriving from the hard material chips originated by the splinterings of both the surfaces of the fixed plate itself and the movable plate cooperating therewith, and this by allowing the ejection of such chips.

This object is attained, according to the invention, by the fact that a plate of the considered type has, on its lapped working face, a surface portion, opposite the
20 passage opening with respect to the plate center, which is situated at the same level as the surface portion surrounding the passage opening, and has another surface portion, not adjacent said passage opening, which is recessed, this recessed surface portion being open towards the plate periphery and providing a region from which any chips formed during valve operation may be ejected away from the plate.

25 The described arrangement does not impair the valve sealing, because all the surface portion of the lapped working face of the fixed plate, which surrounds the passage opening, remains at a uniform level and is suitable for correctly cooperating with the lapped working face of the movable plate forming a pair with the fixed plate. Moreover, the portion of the working face of the fixed plate, which is a part
30 of the



1 surface opposite the passage opening with respect to the plate center,
and is located at the same level as the surface portion surrounding the
passage opening, ensures a correct rest of the movable plate cooperating
with the fixed plate, and prevents any inclination of the movable plate
5 with respect to the fixed plate, under the action of the asymmetrical
strains which are present. But the presence of a recessed portion of
the working face of the fixed plate causes a quick ejection, from the
lapped surfaces of the mutually cooperating plates, of the chips situat-
ed between said lapped surfaces, as a consequence of the relative dis-
10 placement of the plates at the time of each valve control. Then, said
chips can no more enter between the lapped plate surfaces, nor they can
accumulate, because the recessed surface portion is open towards the
plate periphery, and therefore the chips are taken away by the water
flow passing through the valve.

15 Preferably, said recessed portion of the working plate face is li-
mited, with respect to the not recessed portion, by rims which, at least
in part, are not concentric with respect to the geometrical center of
the plate. Thanks to this arrangement, a brushing action is effected on
the lapped surface of the movable plate by the rim of the not recessed
20 surface portion of the fixed plate, at the time of each displacement of
the movable plate. This brushing action aims to positively remove the
chips which lie on the lapped surface of the movable plate, by causing
them to fall into the recessed portion, from which they are then taken
away by the water flow.

25 This brushing action attains the maximum effectiveness when at
least a part of the rims which separate the recessed portion of the pla-
te from the not recessed portion thereof is directed substantially ra-
dial with respect to the geometrical center of the plate.

30 These and other features and advantages of the subject of this in-
vention will appear more clearly from the following description of some
embodiments of the invention, given as non limitative examples and dia-
grammatically shown in the annexed drawings, wherein:

1 Figure 1 shows, in a front view of the working face, a known movable plate of the kind intended to cooperate with a fixed plate of the type considered by the invention;

 Figure 2 shows, in a front view of the working face, a fixed plate
5 of the type to which this invention may be applied, but in its conventional form, not improved by the invention;

 Figures 3 to 5 show, in a manner similar to Figure 2, three different embodiments according to which this invention may be applied to a fixed plate;

10 Figure 6 shows a cross section, taken along line VI-VI, of the fixed plate shown by Figure 5; and

 Figure 7 shows the axial section of a so-called screw type faucet, in which the plates according to Figures 1 to 5 may be used.

 With reference at first to Figure 7, a so-called screw faucet, of
15 the kind taken into consideration for the application of this invention, comprises a faucet body A intended to be screwed by means of a threading B into a manifold (not shown) of a valving group, and to seal therein by means of a packing C. The bottom portion of faucet body A is intended to communicate, through a packing D, with an inlet opening for the water
20 flow to be controlled, which enters along arrow F1 and then flows into the manifold through side openings of the faucet body A, along arrows F2. A hard material fixed plate E, having a passage opening F, is housed within body A over packing D so as not being allowed to rotate. A movable plate G, having a passage opening H as well, is superimposed to
25 the fixed plate E and rotatably contacts the same. In the position shown, the passage openings F and H of the two plates E and G do not register, and therefore a closure condition is obtained. Within body A there is mounted, sealing by means of packings J, a shaft K, which has at its outer end a teeth coupling L for a control handle (not shown).
30 At its inner end shaft K has a control head M which, by means of a key N, engages the movable plate G and imparts to the same any rotation displacements which may have been imparted by means of the control handle

1 to the shaft K. The hard material plates E and G form the members for the flow control, and form the pair of plates, to the fixed one of which the present invention may be applied.

Figures 1 and 2 show the usual conformation of both plates, respectively the one movable and the other fixed, which are intended to form a pair of plates for a hydraulic valve of the considered kind. The movable plate according to Figure 1 has on its working face a lapped surface 1, which extends on a little more than a half of the plate and forms a peripheral border 2 around a passage opening 3 which, on its turn, extends on a little less than a half of the plate. On its turn, a usual fixed plate according to Figure 2 has on its working face a lapped surface 4, which extends on a little more than a half of the plate and forms a peripheral border 5 around a passage opening 6 which, on its turn, extends on a little less than a half of the plate. Some projections 7 may be foreseen in order to establish the position of the fixed plate with respect to a supporting member, not shown. In the usual conformations now described, the surfaces 1 and 2 of the movable plate, and the surfaces 4 and 5 of the fixed plate, lie in their entire extension on a single plane. In the application of the invention, no change has to be effected on the movable plate 1-3, which remains unmodified and is suitable for operating both with the fixed plates improved by the invention, and with the usual fixed plates.

In the embodiment of the invention according to Figure 3, the fixed plate still has a passage opening 6 surrounded by a peripheral border 5, and in case may have positioning projections 7, but the surface 4, which was lying on a single plane in the known plate according to Figure 2, is now subdivided into a portion comprising the parts 10, 12 and 14, which still lies on the same plane as the surface of the peripheral border 5 surrounding the passage opening 6, and a portion 16 which, on the contrary, is somewhat recessed, and opens towards the periphery of the plate through passages 17.

The not recessed portion 10 completes, with the unmodified peri-

1 pheral border 5, the perimeter of the passage opening 6, and therefore
it allows the fixed plate to correctly cooperate with the movable plate
1-3 from the hydraulic point of view. The not recessed portions 12 and
14, on their turn, offer to the cooperating movable plate a rest, and
5 therefore they allow the fixed plate to correctly cooperate with the movable plate 1-3 even from the mechanical point of view. On the other hand, the recessed portion 16 defines a region wherein there is no contact between the fixed plate and the movable plate, whereby the hard material chips which may have been formed cause no disadvantage when they
10 locate in this region. Besides, such chips cannot remain for a long time or accumulate in region 16, because this latter is open towards the periphery of the plate through passages 17, and therefore the chips are taken away by the water flow which, in the operation of the valve, establishes in part through these passages too. Finally it is to be noted
15 that, during the displacements of the movable plate for the valve control, the rims 13 and 15, which limit the parts 12 and 14 of the not recessed surface portion, brush the lapped surface of the movable plate, thus pushing away the chips lying thereon. A similar brushing action is also effected by the rims 11 of part 10 of the not recessed surface portion.
20

In the embodiment of the invention according to Figure 4, the fixed plate still has a passage opening 6 surrounded by a peripheral border 5, and possibly positioning projections 7, but the surface 4, which was lying on a single plane in the known plate according to Figure 2, is now subdivided into a portion comprising the parts 10 and 24, which still
25 lies on the same plane as the surface of the peripheral border 5 surrounding the passage opening 6, and a portion 26 which, on the contrary, is somewhat recessed, is formed in this case by a groove, and opens towards the periphery of the plate through its end portions 27.

30 The not recessed portion 10 completes, with the unmodified peripheral border 5, the perimeter of the passage opening 6, and therefore it allows the fixed plate to correctly cooperate with the movable plate

1 1-3 from the hydraulic point of view. The not recessed portion 24, on
its turn, offers to the cooperating movable plate a rest, and therefore
it allows the fixed plate to correctly cooperate with the movable plate
1-3 even from the mechanical point of view. Finally, the groove 26
5 defines the region wherein the chips which leave the lapped surfaces of
the plates may fall, and wherefrom they are then taken away by the water
flow through the end portions 27 of groove 26. In this case the rims 11
of the not recessed surface portion 10, and the rims 25 of the not re-
cessed surface portion 24, effect the brushing action on the lapped sur-
10 face of the movable plate.

Finally, in the embodiment of the invention according to Figures 5
and 6, the fixed plate still has a passage opening 6 surrounded by a pe-
ripheral border 5, and possibly positioning projections 7, but the sur-
face 4, which was lying on a single plane in the known plate according
15 to Figure 2, is now subdivided into a portion comprising the parts 10
and 34, which still lies on the same plane as the surface of the pe-
ripheral border 5 surrounding the passage opening 6, and a portion 36
which, on the contrary, is somewhat recessed, extends in this case on
about a half of the plate, and widely opens towards the periphery of the
20 plate through its regions 37.

The not recessed portion 10 completes, with the unmodified peri-
pheral border 5, the perimeter of the passage opening 6, and therefore
it allows the fixed plate to correctly cooperate with the movable plate
1-3 from the hydraulic point of view. The not recessed portion 34, on
its turn, offers to the cooperating movable plate a rest, and therefore
25 it allows the fixed plate to correctly cooperate with the movable plate
1-3 even from the mechanical point of view. The position of portion 34,
diametrically opposite the passage opening 6, makes this rest action
particularly effective although part 34 has a reduced extension. Final-
30 ly, the recessed portion 36 defines the region wherein the chips which
leave the lapped surfaces of the plates may fall, and wherefrom they are
then taken away by the water flow through the peripheral regions 37. In

1 this case the rims 11 of the not recessed surface portion 10, but above
all the rims 35 of the not recessed surface portion 34, effect the
brushing action on the lapped surface of the movable plate.

5 The nearly radial position of the rims 35 gives them a particular
effectiveness in this action. In the present embodiment, the great ex-
tension of the recessed portion 36 and its ample opening towards the
outside in regions 37 at the periphery of the plate make the action of
ejecting the chips particularly effective. Another reason for the spe-
cial effectiveness of the embodiment according to Figures 5 and 6 resi-
10 des in that the part 34 of the not recessed portion has a reduced exten-
sion in the circumferential direction, and therefore the chips deriving
from splinterings arrive quickly to the rims 35 and fall into the reces-
sed part 36, whereby they are ejected before having damaged on a notice-
able length the working surfaces of the plates.

15 As it may be understood from the above, this invention may be
embodied in very different embodiments of manufacture, all suitable for
attaining the pre-established object. Therefore the designer disposes
of a wide choice of possible embodiments, which in all cases allow to
apply the invention in the more convenient way. Of course, also other
20 embodiments are possible in addition to those shown, and different
modifications, as well as any replacement by technically equivalent
means, may be introduced.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A fixed plate of hard material for a hydraulic valve, of the type which has a passage opening asymmetrically located with respect to the plate center and is susceptible to chip formation when in co-operative operation with respect to an adjacent plate of similar hard material, characterized by the fact that it has, on its lapped working face, a surface portion, opposite the passage opening with respect to the plate center, which is situated at the same level as the surface portion surrounding the passage opening, and has another surface portion, not adjacent said passage opening, which is recessed, this recessed surface portion being open towards the plate periphery and providing a region from which any chips formed during valve operation may be ejected away from the plate.

2. A fixed plate for a valve, as set forth in Claim 1, characterized by the fact that said recessed portion of the working plate face is limited, with respect to the not recessed portion, by rims which, at least in part, are not concentric with respect to the geometrical center of the plate, and effect a brushing action.

3. A fixed plate for a valve, as set forth in Claim 1, characterized by the fact that the recessed surface portion of the plate is separated from the not recessed surface portion by rims which are directed generally radially with respect to the geometrical center of the plate.

4. A fixed plate for a valve, as set forth in Claim 1, characterized by the fact that the not recessed portion of the plate comprises a substantially diametrical portion and interrupted portions extending along the peripheral border of the plate.

5. A fixed plate for a valve, as set forth in Claim 1, characterized by the fact that the recessed portion of the plate has the shape of a groove which is nearly diametrical with respect to the plate.

6. A fixed plate for a valve, as set forth in claim 1, characterized by the fact that the not recessed portion of the plate comprises a substantially diametrical part and a part which is diametrically opposite the passage opening and is limited sidewise by rims which are substantially radial with respect to the geometrical center of the plate.

7. A fixed plate for a valve as set forth in Claim 1, characterized by the



fact that the not recessed portion of the plate has a very limited circumferential extension.

8. A fixed plate for a valve substantially as hereinbefore described with reference to the drawings.

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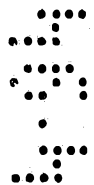
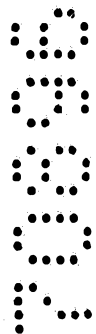
Dated this 5th day of April, 1994

STUDIO TECNICO SVILUPPO E RICERCHE S.T.S.R. s.r.l.

by its Patent Attorneys

Davies Collison Cave

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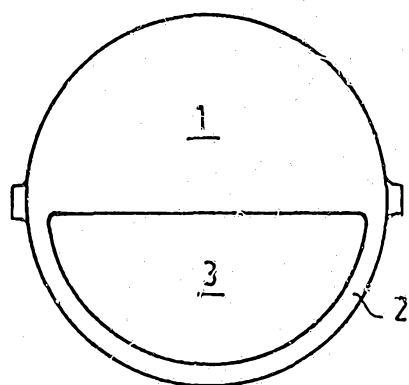


FIG. 1

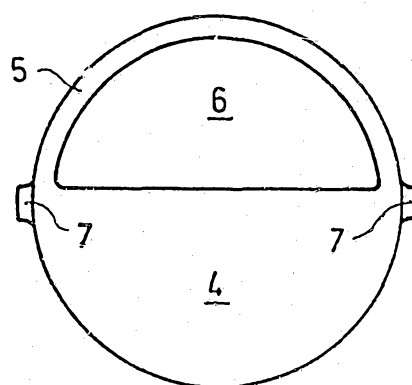


FIG. 2

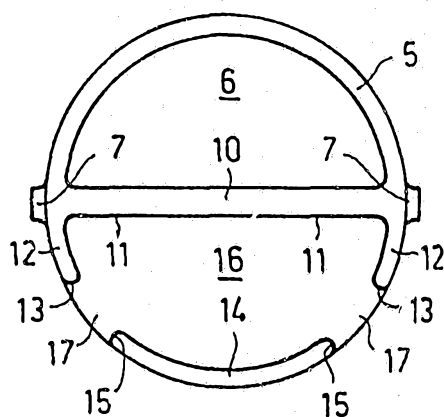


FIG. 3

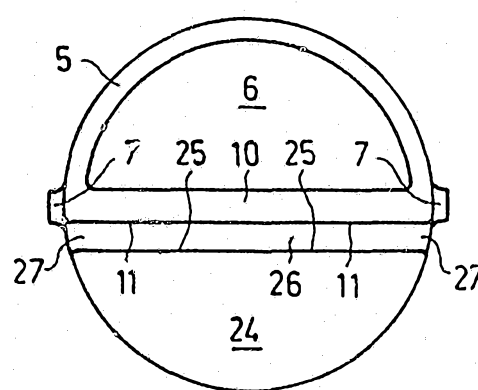


FIG. 4

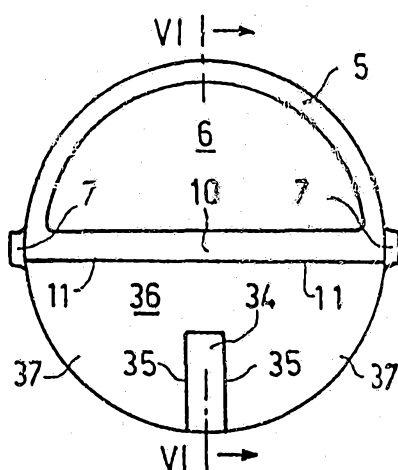


FIG. 5

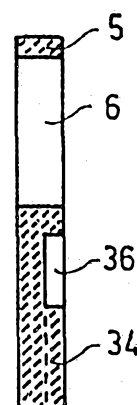


FIG. 6

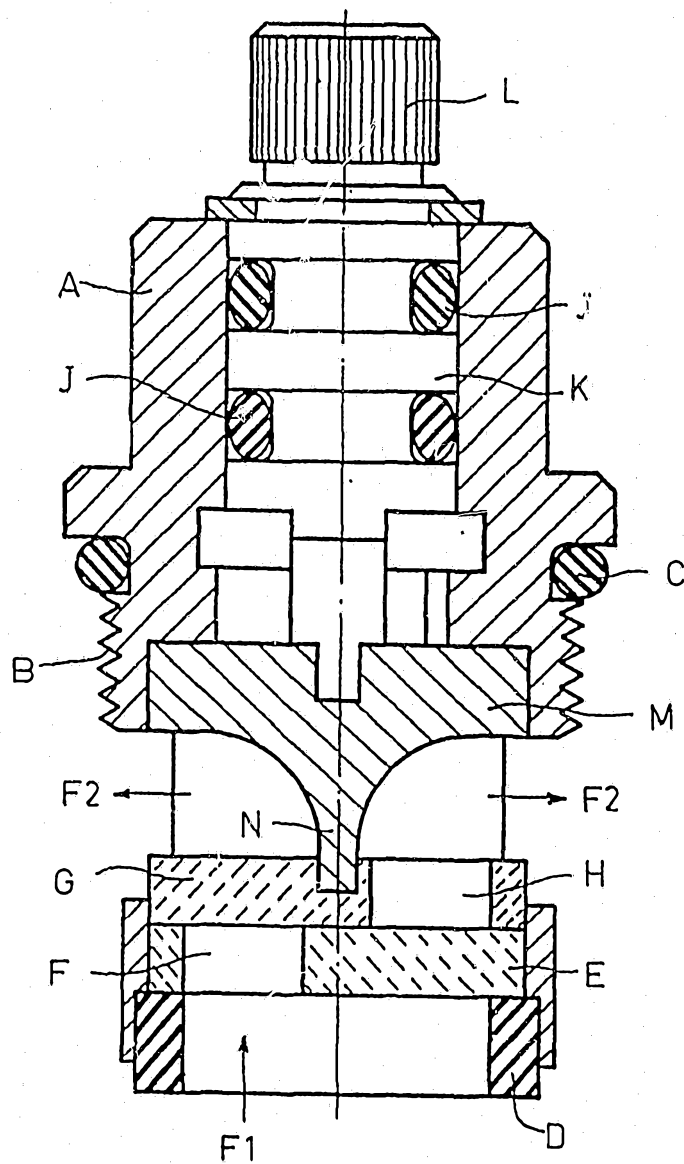


FIG. 7