



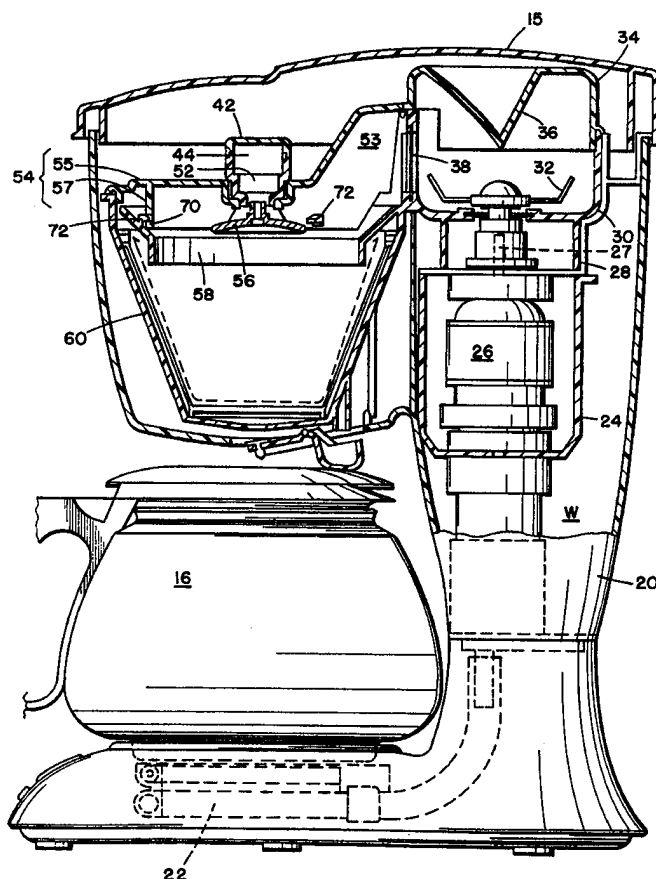
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: COFFEE GRINDER AND MAKER

## (57) Abstract

A coffee maker includes a water reservoir (20), a heater (22) coupled to the water reservoir, a conduit coupled to the heater, a coffee filter holder (60), a condensate chamber (64) for channeling steam condensate to the water reservoir, and a fluid distributor (42) operatively connected between the conduit, filter holder and condensate chamber. The fluid distributor channels hot water from the conduit to the filter holder and collects and condenses steam produced from the filter holder and conduit, thus preventing escape of steam into the interior of the coffee maker.



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**COFFEE GRINDER & MAKER**FIELD OF THE INVENTION

The present invention relates to a coffee grinder  
5 and maker which collects and condenses steam resulting  
from a brew action and provides safety features to  
prevent the escape of steam and hot water.

BACKGROUND OF THE INVENTION

10 Many arrangements of coffee makers with and  
without integral coffee grinders are commercially  
available on the market. Such coffee makers utilize  
hot water to make coffee and as a consequence, generate  
quantities of steam. In particular, during a brew  
15 cycle, hot water is channeled into a filter unit  
holding a filter which, in turn, holds coffee. Steam  
is generated in the filter unit and often rises up and  
out of the coffee maker's casing. This escaping steam  
may result in physical injury, i.e., burns, to the  
20 user. Further, the escaping steam condenses on and  
around the coffee maker creating cleaning problems.

Another problem associated with a conventional  
coffee maker is the fact that, as a water reservoir is  
refilled with water and a heater is still active or  
25 hot, the water is heated by the heater and is suddenly  
discharged from the coffee maker. More specifically,  
in some circumstances, the heater remains active or hot  
after the brew cycle (i.e., the heater remains  
activated to keep coffee in a carafe warm or has not  
30 cooled down from a recent brew action). As water is  
poured into the water reservoir, the heater immediately  
heats the water and generates hot water and steam both  
of which are automatically channeled through the coffee  
maker. That is to say, the heater causes a brew action  
35 to start as the water reservoir is refilled. The  
resultant hot water and steam are suddenly discharged

from the coffee maker and may result in injury to the user.

Accordingly, it is a fundamental object of the present invention to provide a coffee maker which  
5 collects and condenses steam generated during a brew cycle, thereby preventing steam from escaping the coffee maker.

It is a further object of the invention is to provide a coffee maker which has a safety valve for  
10 preventing the discharge of hot water and steam.

An additional object of the invention is to provide a coffee maker which has safety interlocks for preventing the discharge of hot water and steam.

#### 15 SUMMARY OF THE INVENTION

A coffee maker incorporating the invention includes a water reservoir; a heater coupled to the water reservoir; a conduit coupled to the heater; a coffee filter holder; a condensate chamber for  
20 channeling steam condensate to the water reservoir, and a fluid distributor operatively connected between the conduit, filter holder and condensate chamber. The fluid distributor channels hot water from the conduit to the filter holder and collects and condenses steam  
25 produced from both the filter holder and the conduit.

The present invention provides a solution to the problem of steam accumulation during a brew action. The coffee maker includes a unique fluid distributor which is operatively connected between a filter holder,  
30 condensate chamber and hot water conduit. The fluid distributor serves two purposes. First, it distributes hot water from the conduit into the filter holder for the brew cycle.

More importantly, the fluid distributor prevents  
35 the steam generated during a brew action from escaping into the coffee maker's casing. During a brew action,

steam is generated in the filter holder as hot water is  
channeled into the filter holder. The steam rises from  
the filter holder and into the fluid distributor. The  
fluid distributor collects and condenses the steam from  
5 the filter holder as well as any steam generated from  
the hot water conduit. The steam condensate is then  
either channeled back to the filter holder or to the  
water reservoir, via the condensate chamber.

The present invention further provides safety  
10 measures to protect the user from injuries that may  
result from contact with steam and hot water associated  
with the use of a coffee maker. The hot water conduit  
contains a safety valve that prevents the discharge of  
hot water and steam if the fluid distributor is not  
15 properly engaged. The safety valve is spring-loaded  
and is normally closed to prevent the discharge of hot  
water. Only when the fluid distributor is coupled to  
the conduit, does a protrusion mate with the safety  
valve, actuate the valve to an open position and allow  
20 hot water to flow into the fluid distributor.

In addition, safety interlocks are utilized to  
prevent the operation of the invention if the fluid  
distributor is not properly engaged between the filter  
holder, conduit and condensate chamber and if the  
25 grinder cover is not in place. As mentioned above, the  
fluid distributor distributes steam and hot water  
between different components. If not properly engaged  
before a brew cycle, hot water and steam may be  
discharged during the brew cycle. A safety interlock  
30 is employed to remedy this problem. The safety  
interlock includes a plunger and a normally open switch  
and mates with an actuator that extends from the fluid  
distributor. When the fluid distributor is properly  
engaged, the actuator contacts the respective plunger,  
35 thereby closing the respective switch and allowing the

operation of the present invention. The grinder cover activates a similar interlock as described above.

Other and further objects, advantages and features of the present invention will be understood by  
5 reference to the following specification in conjunction with the annexed drawings, wherein like parts have been given like numbers.

#### BRIEF DESCRIPTION OF THE DRAWING

10 Fig. 1 is a perspective view of a preferred coffee maker and grinder incorporating the invention.

Fig. 2 is a side cross-sectional view of Fig. 1.

Fig. 3 is a top view of the components in Fig. 1.

Fig. 4 is an exploded schematic top view of  
15 components in Fig. 3.

Fig. 5 is a top view of the components in Fig. 4

Fig. 6 and 8 are cross-sectional views of a preferred safety interlock of the present invention.

Fig. 7 is a cross-sectional view of a preferred  
20 safety valve of the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

An assembled coffee maker and grinder 10, according to a preferred embodiment of the invention,  
25 is shown in Figure 1. Coffee maker and grinder 10 comprises a casing 12 which includes a filter/grinder housing 14, a carafe receiving location 13 for a carafe 16 or other container, a lid 15 and a control panel 18 with various controls.

30 Referring to Figure 2 in conjunction with Figure 4, a water reservoir 20, holding water W, is a cavity formed by the interior walls of the casing 12. A conduit (not shown), connected between water reservoir 20 and a heater 22, allows water W to flow from water  
35 reservoir 20 into heater 22. A conduit 40 (Figure 4) having a spring-loaded safety valve 41 is connected to

the outlet of heater 20. When heater 22 is activated, water W from water reservoir 20 is heated in heater 22 and is channeled up through conduit 40 to safety valve 41.

5        Safety valve 41 is located at the outlet of conduit 40 and is normally closed to prevent the discharge of hot water and steam from conduit 40. A fluid distributor includes a downwardly extending conduit connector 48. Conduit connector 48 has a  
10    central post (not shown) seated concentrically within an outer thin tube-shaped finger which is designed to mate with and actuate safety valve 41. When engaged (Figure 7), conduit connector 48 activates safety valve 41 and allows hot water to flow therethrough into fluid  
15    distributor 42.

      Figures 3 and 4 respectively illustrate a top and an exploded view of fluid distributor 42 which comprises a flow chamber 44 and a coupled filter cover 54. Flow chamber 44 is a molded plastic hollow  
20    chamber. Flow chamber 44 (Figure 4) has a filter cover connector 52, a condensate chamber connector 50 and conduit connector 48, which are respectively designed to connect operatively into filter cover 54, a condensate chamber 64 and as previously mentioned,  
25    conduit 40. Flow chamber 44 serves two primary functions. First, flow chamber 44 receives hot water from conduit 40 via conduit connector 48 and channels it to a filter holder 60, via filter cover connector 52. Second, flow chamber 44 collects and condenses  
30    steam produced from within filter holder 60 and conduit 40.

      A barrier 46 is located inside flow chamber 44 and forms a fluid flow path between filter cover connector 52 and conduit connector 48. Barrier 46 extends only  
35    part of the way to the top of flow chamber 44 and thus leaves an opening for the passage of steam between

filter cover connector 52 and condensate chamber connector 50. As is apparent from Figure 4, barrier 46 forms a passage way which allows hot water from conduit 40 to flow into filter holder 60, but prevents hot  
5 water from conduit 40 from entering condensate chamber 64 via condensate chamber connector 50. The opening above the top edge of barrier 46 and the top interior surface of flow chamber 44 enables gaseous flow, in particular steam flow, between filter holder 60 and  
10 conduit 40 and condensate chamber 64.

As shown in Figures 2 and 4, filter cover 54 includes a circular filter lid 55 with a hole positioned in its center, an extending concentric flange 57 and an extending channel 53. Filter  
15 connector 52 (Figure 4), a tube-shaped finger protrusion from flow chamber 44, is permanently connected into the filter lid hole. Filter cover 54 further includes a convex-shaped hanging water deflector 56 (Figure 2) which is connected to the  
20 underside of filter lid 55. Hanging water deflector 56 is positioned under the filter lid hole with its convex side facing the filter lid hole.

Filter cover 52 is designed to fit onto a filter holder 60 and to mate with a ground coffee feed path 38  
25 to form a seal which prevents the escape of hot water and steam from filter holder 60. Feed path 38 is a square-shaped extension from a grinder chamber 30. The function of feed path 38 and grinder chamber 30 will be discussed in more detail further below.

30 Filter lid 55 vertically engages the top of filter holder 60 and simultaneously, engages filter chute 58, via channel 53. As a result, when filter cover 52 is engaged onto filter holder 60 and feed path 38 (Figure 2), hot water is allowed to flow from flow chamber 44,  
35 through filter connector 52 and into filter holder 60. The hot water entering filter holder 60 is deflected by



hanging water deflector 56 and dispersed evenly throughout filter holder 60.

As hot water flows into filter holder 60 (Figure 2), steam is generated inside filter holder 60 and is initially trapped between filter holder 60 and filter cover 54. The steam naturally rises up towards filter lid 60, through filter connector 52 and into flow chamber 44. At the same time, steam from conduit 40 also rises up into flow chamber 44 (Figure 4). As a result, steam accumulates throughout flow chamber 44 and condenses into water, on both sides of barrier 46. The condensate is then either channeled into filter holder 60 through filter cover connector 52 (with the flowing hot water from conduit 40) or into condensate chamber 64 through condensate chamber connector 50.

Referring to Figures 4 and 5, condensate chamber 64 is located inside water reservoir 20 and has a top opening located on its top and an open bottom (not shown) which opens out into water reservoir 20. Condensate chamber connector 50 (Figure 4) is a mushroom cap-shaped extension from flow chamber 44 and is designed to mate with the top opening of condensate chamber 64. When so engaged, steam condensate is thus allowed to flow from flow chamber 44, into condensate chamber 64 and out to water reservoir 20.

The location and design of condensate chamber 64 further prevents the escape of steam entering from flow chamber 44. Condensate chamber 64 extends down the length of water reservoir 20 (not shown), such that any steam entering condensate chamber 64 through condensate chamber connector 50 is trapped therein. The trapped steam either condenses into steam condensate which flows into water reservoir 20 or naturally rises back into flow chamber 44.

It is preferred that coffee grinder and maker include safety interlocks 66 and 68 which prevent a

user from being injured by escaping steam and hot water. The safety interlocks are illustrated in Figures 4, 5, 6 and 8 herein. Safety interlocks 66 and 68 prevent the operation of coffee grinder and maker 10, unless fluid distributor 42 is properly engaged between conduit 40, filter holder 60 and condensate chamber 64. Safety interlocks 66 and 68 both include corresponding plungers 72 and 78 and respective normally open switches 74 and 80. Male tubular fingers 70 and 76 extend from flow chamber 44 and are designed to mate with corresponding safety interlocks 66 and 68. When engaged, fingers 70 and 76 respectively actuate plungers 72 and 78 which close corresponding switches 74 and 80 and therefore, allow the operation of coffee grinder and maker 10.

As shown in Figures 2 and 4, coffee grinder and maker 10 incorporates an integral coffee bean grinder 25 located inside casing 12. Coffee bean grinder 25 includes a motor 26, a grinder base 24, grinder chamber 30, a grinder blade 32 and a grinder lid 34. Motor 26 is located inside grinder base 24 and has a motor shaft 27 which engages grinder blade 32. Grinder base 24 is provided with a lip 28 extending upwards to form a reservoir. It permits a stable and properly aligned engagement between grinder chamber 30 and grinder base 24 and between motor shaft 27 and grinder blade 32.

Referring to Figures 2 and 3, grinder lid 34 is a circular lid with an extending circular flange engages and covers grinder chamber 30. When grinder lid 34 is in and motor 26 is activated, shaft 27 rotates grinder blade 32. The spinning motion of grinder blade 32 grinds coffee beans, placed in grinder holder 60, and at the same time, deflects the grounded coffee upwards towards a v-shaped deflector 36 which protrudes from the top interior surface of grinder lid 34.

As is best seen in Figure 2, v-shaped deflector 36 is positioned to deflect ground coffee out through feed path 38 and into filter holder 60 via channel 53. Feed path 38 has a plurality of holes that only allow coffee grounds, and not chunks, to pass therethrough. Grinder chamber 30 is permanently connected to the top-side edge of filter holder 60 such that feed path 38 is positioned above filter holder 60. This arrangement allows deflected ground coffee passing through filter chute to fall into filter holder 60.

Coffee maker 10 preferably includes a funnel-shaped filter stabilizer 58 (Figure 4) which both guides filter lid 54 onto filter holder 60 and prevents a filter paper placed in filter holder 60 from collapsing and blocking feed path 38. Filter stabilizer 58 is designed to loosely engage filter cover 54 via coupling between hooks 72 and slots 70. Filter cover 54 has a concentric flange 57 with slots 70 which mates with male hooks 72 (extend from the top rim of filter stabilizer 58). When engaged, filter stabilizer 58 hangs loosely from filter lid 55. When filter lid 55 and filter stabilizer 58 are then initially secured onto filter holder 60 holding a filter paper, the hanging filter stabilizer 58 adjusts in such a manner that the bottom rim pins the filter paper against the interior surface of filter holder 60. As a result, the filter paper is prevented from collapsing. When filter lid 55 is finally secured onto filter holder 60, the pinning rim of filter stabilizer 58 drags the top portion of the filter paper downwards and prevents the filter paper from blocking feed path 38.

In summary, the present invention comprises a coffee grinder and maker which has means for channeling hot water to a filter unit and for preventing the escape of steam resulting from a brew action. A valve

prevents the discharge of hot water should water be added to the coffee maker while the heater is still hot. An interlock means prevents the operation of the coffee grinder and maker, unless the water channeling  
5 and grinder cover are in place.

The invention having thus described with particular reference to the preferred forms thereof, it will be obvious that various changes and modifications may be made therein without departing from the spirit  
10 and scope of the invention as defined in the appended claims.

CLAIMS

1. A coffee maker comprising:
- 5 (a) a water reservoir;
- (b) a heater connected to said water reservoir  
for providing a hot water source;
- 10 (c) a conduit operatively connected to said hot  
water source;
- (d) a filter holder for holding a coffee filter  
and a quantity of coffee;
- 15 (e) a condensate chamber for channeling steam  
condensate to said water reservoir; and
- (f) fluid distribution means operatively  
20 connected between said conduit, said filter  
holder and said condensate chamber for:
- (i) channeling hot water from said conduit  
to said filter holder,
- 25 (ii) collecting and condensing steam produced  
during a brew action from at least said  
filter holder, and
- 30 (iii) channeling steam condensate to said  
condensate chamber.
2. The coffee maker recited in claim 1, wherein said  
fluid distribution means comprises a flow chamber and a  
35 filter cover for coupling said filter holder to said

flow chamber and for channeling steam resulting from the brew action thereinto.

3. The coffee maker recited in claim 2, wherein said  
5 flow chamber comprises:

a molded, plastic, hollow chamber having fittings for mating with said conduit, said cover means and said condensate chamber; and said molded, plastic,  
10 hollow chamber includes:

- (i) a first passage between said conduit and said cover means,
- 15 (ii) a second passage between said cover means and said condensate chamber, and
- (iii) a barrier between said first passage and said second passage for preventing liquid flow  
20 between said first passage and second passage and for enabling gaseous flow between said first passage and said second passage.

4. The coffee maker recited in claim 3, wherein said  
25 flow chamber further condenses steam into steam condensate, i.e., water.

5. The coffee maker recited in claim 1, wherein said condensate chamber comprises a receptacle operatively  
30 connected between said fluid distribution means and said water reservoir for directing steam condensate into said water reservoir.

6. The coffee maker recited in claim 5, wherein said  
35 condensate chamber is located inside said water reservoir and wherein a bottom end of said receptacle

opens out into said water reservoir, thereby allowing steam condensate to return to said water reservoir.

7. The coffee maker recited in claim 1, further comprising valve means positioned in said conduit, having a normally closed condition for preventing the ejection of hot water therefrom when in the closed condition.

8. The coffee maker recited in claim 7, wherein said valve means comprises a spring-loaded valve means openable when contacted by a protrusion from said fluid distribution means, thereby actuating said valve means to an open position.

9. The coffee maker recited in claim 1, further comprising a filter paper stabilizer for preventing a filter paper placed into said filter holder from collapsing during a brew action.

10. The coffee maker as recited in claim 9, further comprising:

(i) means for grinding coffee beans into coffee grounds;

(ii) means for dispensing coffee grounds into said filter holder; and

(iii) said filter stabilizer further preventing the filter paper from obstructing said means for dispensing coffee grounds into said filter holder.

11. The coffee maker recited in claim 9, wherein said filter paper stabilizer comprises a funnel shaped

filter ring operatively connected to said cover means for pinning said filter paper against an interior surface of said receptacle when said cover means is engaged onto said filter holder.

5

12. The coffee maker recited in claim 11, wherein said hour-glass shaped filter ring has a ridged bottom rim for improved pinning of said filter paper against the interior surface of said filter holder.

10

13. The coffee maker recited in claim 11, wherein coffee filter stabilizer when engaged to said cover means hangs in a self-adjusting position.

15

14. The coffee maker recited in claim 1, further comprising safety interlock means for preventing an operation of said coffee maker when said fluid distribution means is not properly engaged between said conduit, said filter holder and said condensate chamber.

20

15. The coffee maker recited in claim 14, wherein said safety interlock means comprises a switch means having a normally opened condition, wherein said switch means is closed only if said fluid distribution means is properly engaged between said conduit, said filter holder and said condensate chamber.

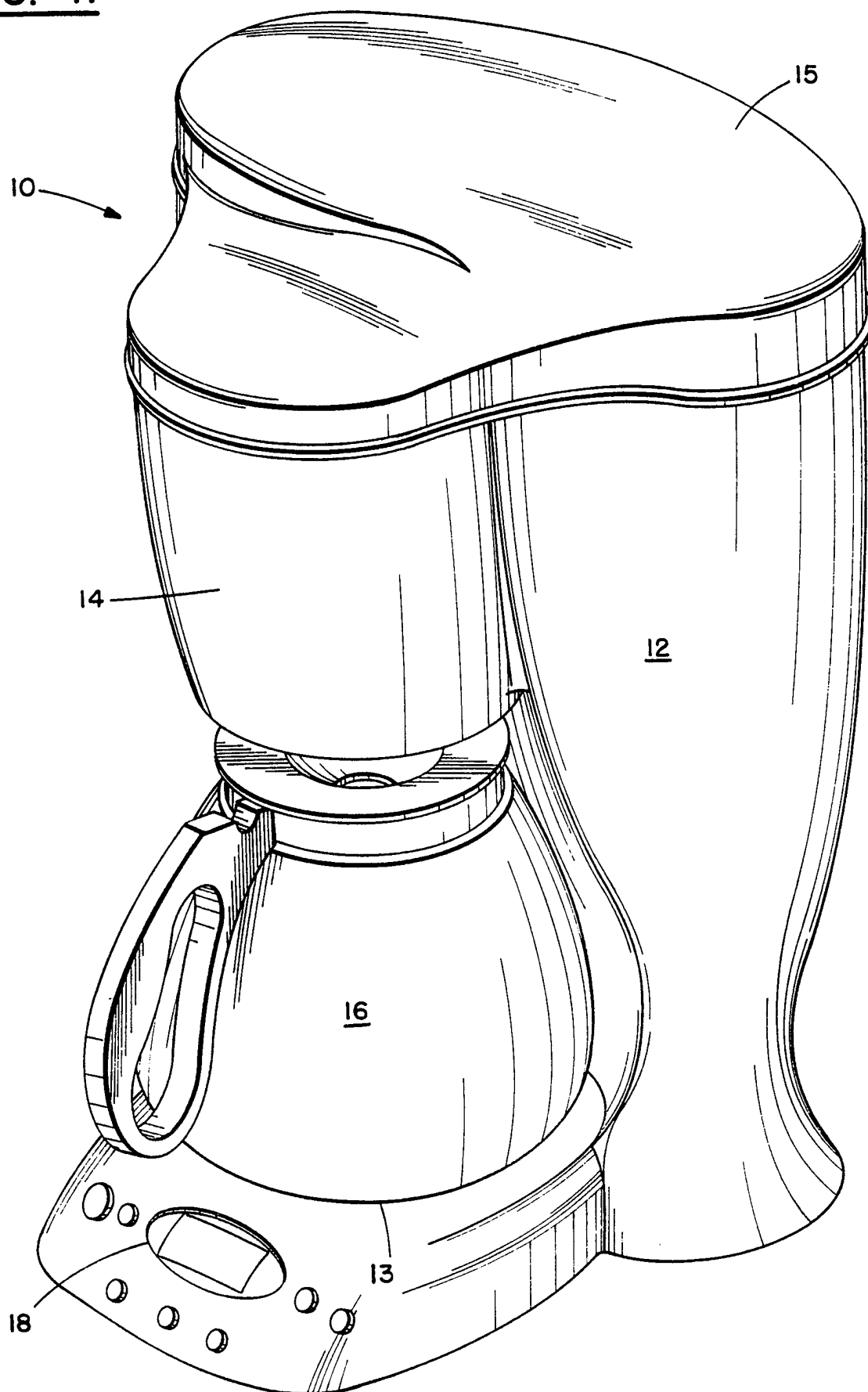
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16. The coffee maker in claim 15, wherein said switch means further comprises a spring-loaded plunger for closing said switch means when said plunger is contacted by a protrusion from said fluid distribution means.

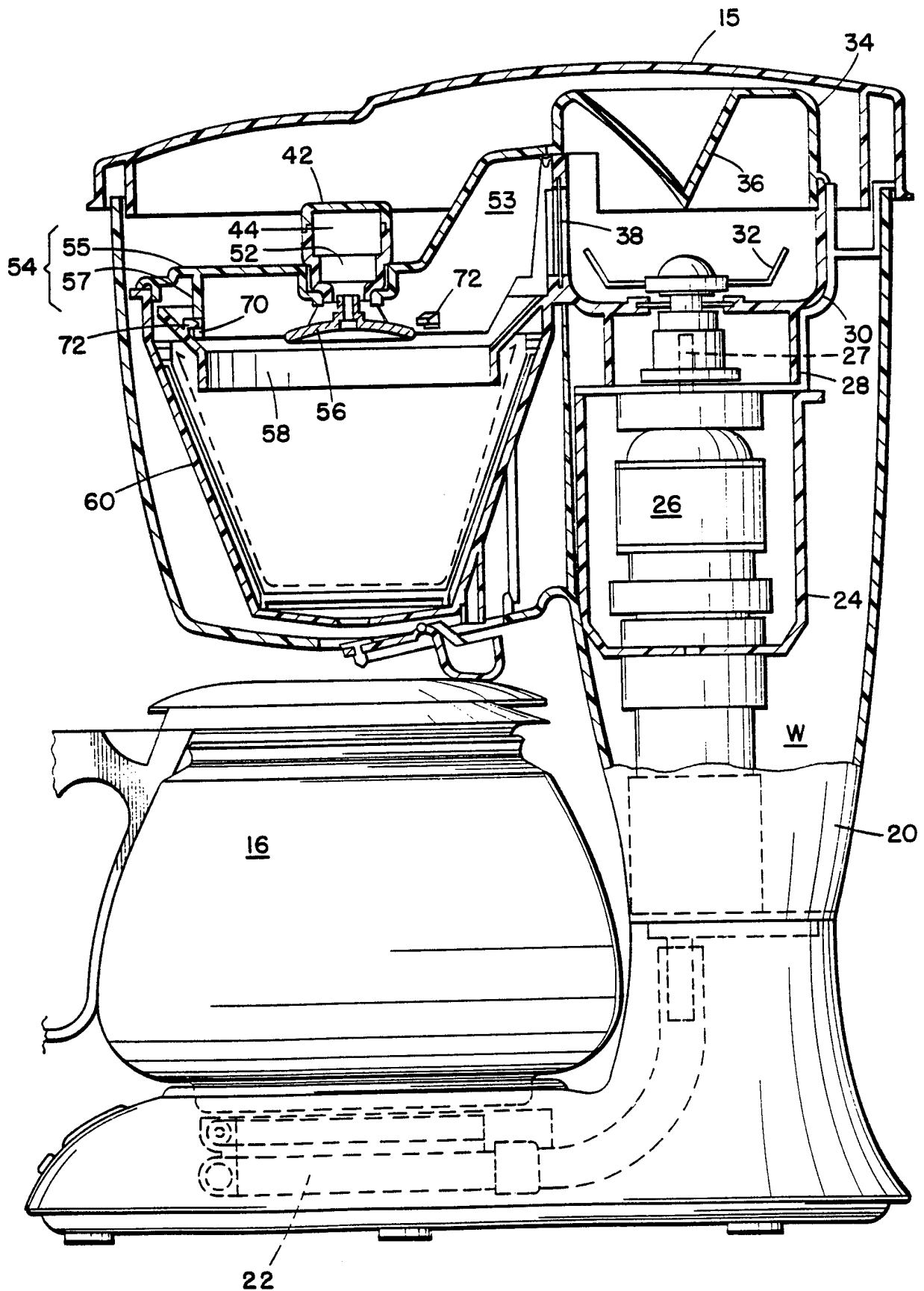
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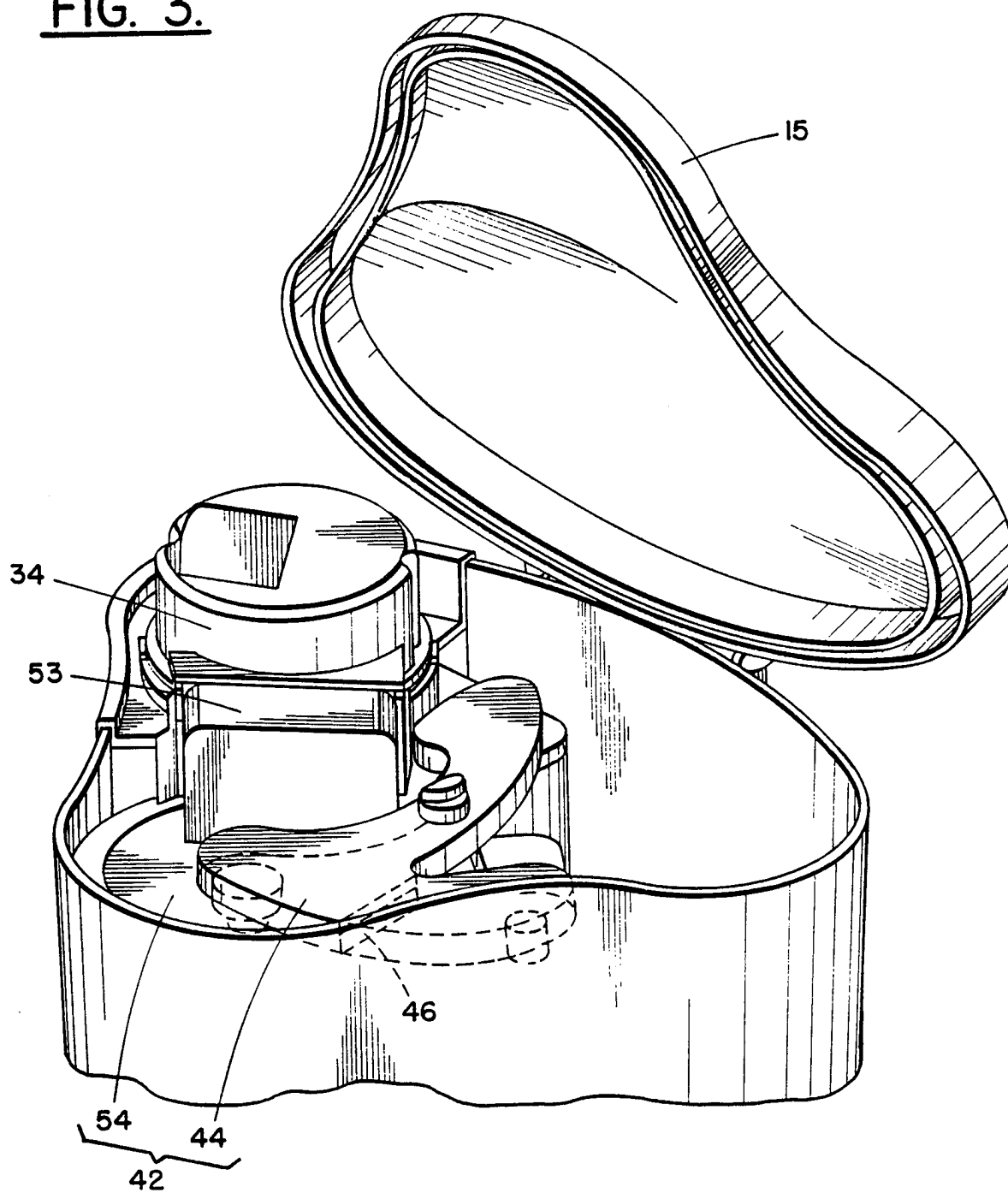
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FIG. 1.

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FIG. 2.

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FIG. 3.

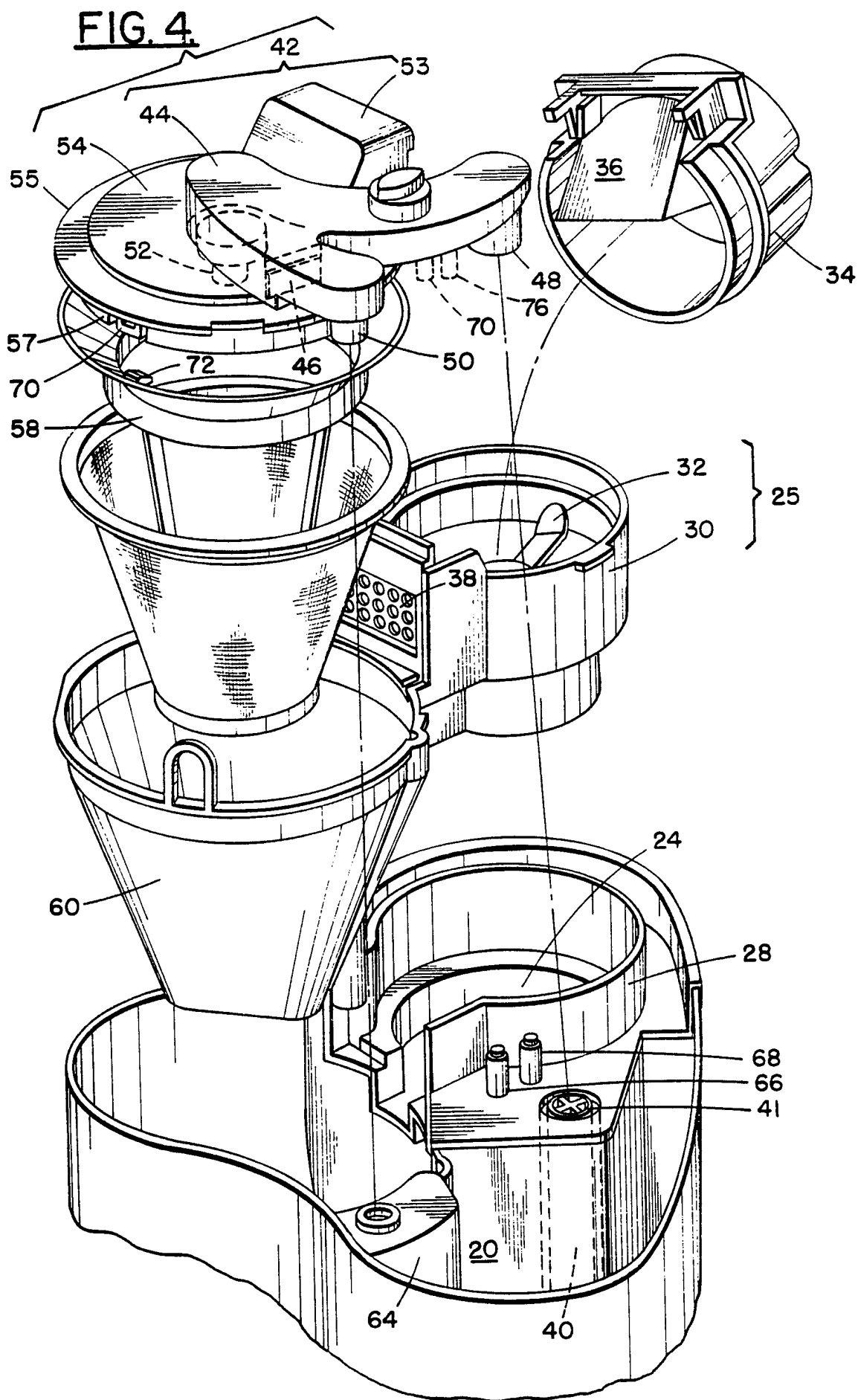


FIG. 5.

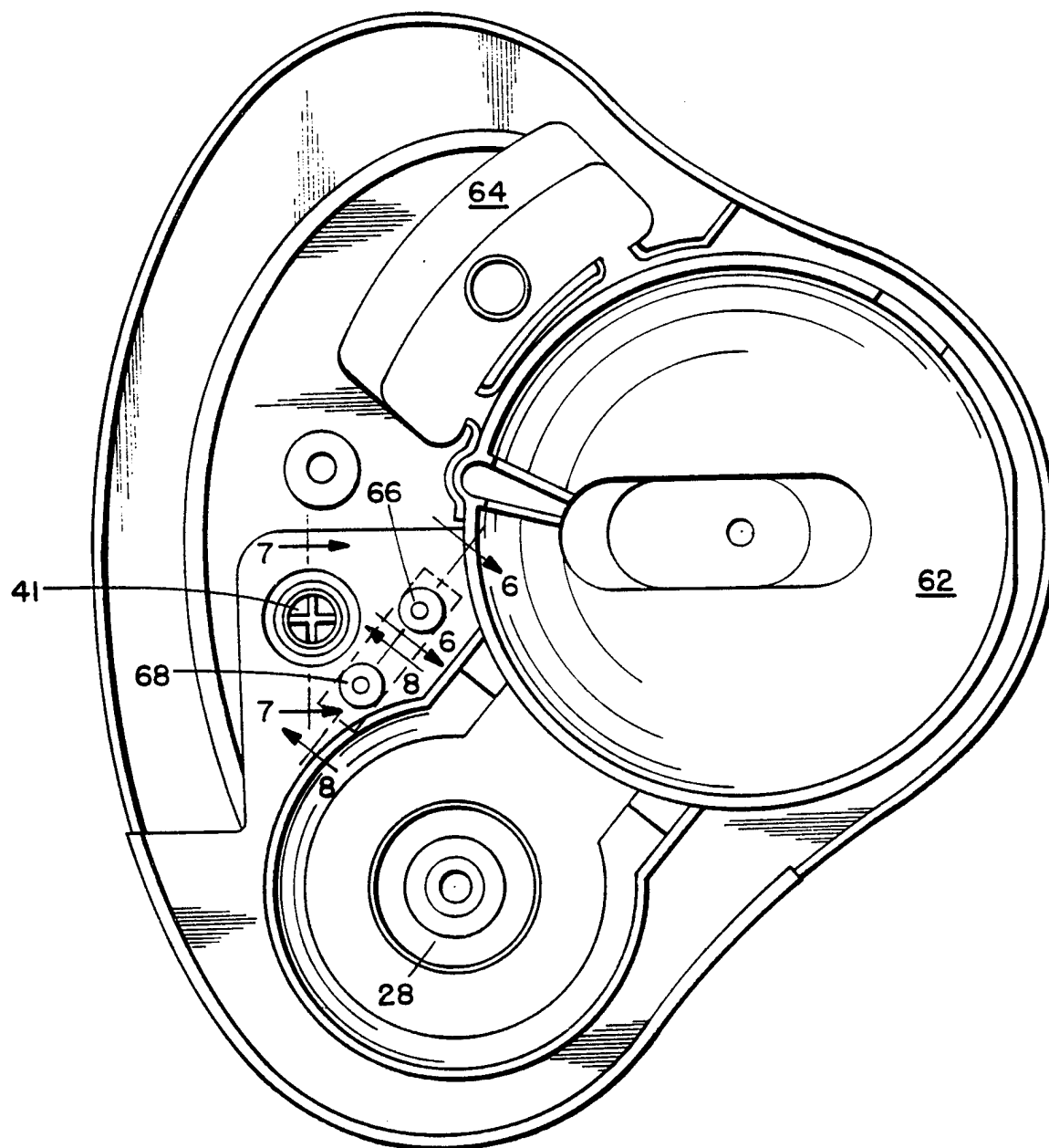


FIG. 6.

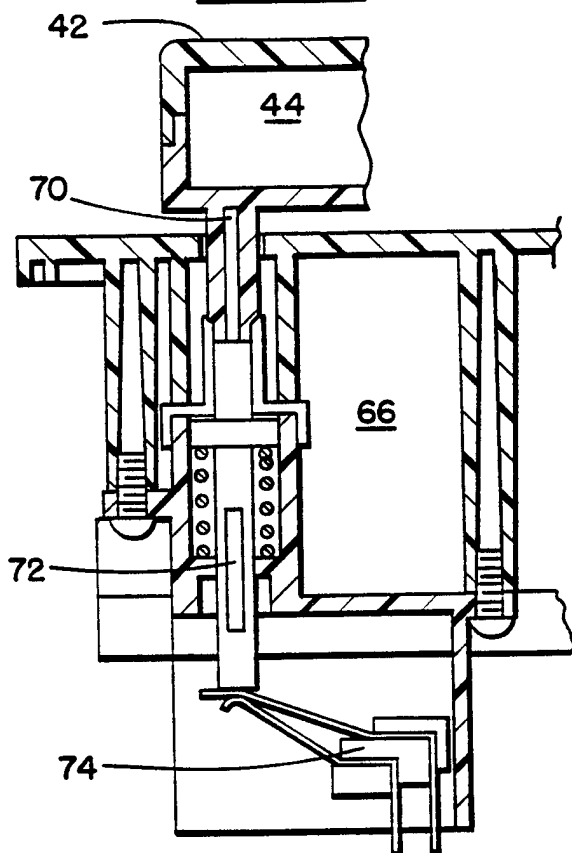


FIG. 7.

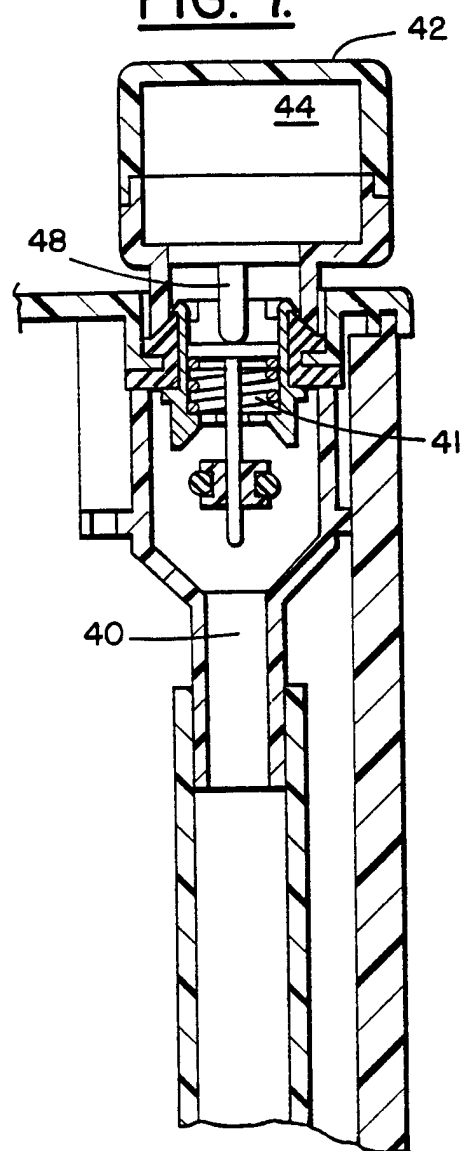
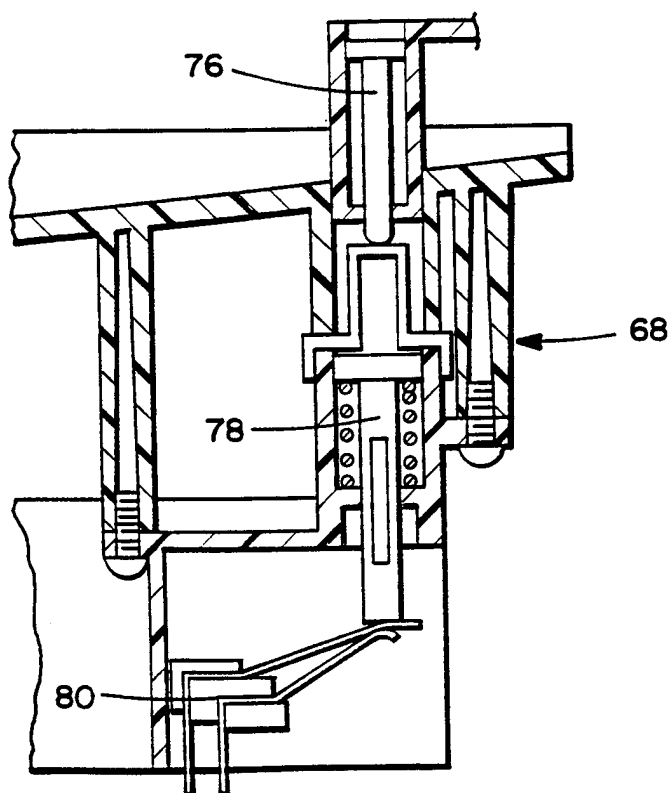


FIG. 8.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/05539

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A47J 31/30, 31/00

US CL :99/307, 293

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 99/307, 293, 287, 300, 304, 308; 426/433

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONEElectronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
NONE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,251,541 A (ANSON et al) 12 October 1993, see entire document.	1, 5, 9, 11-13
A	US 4,998,463 A (PRECHT et al) 12 March 1991.	1-16
A	US 5,267,506 A (CAI) 07 December 1993.	1-16



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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