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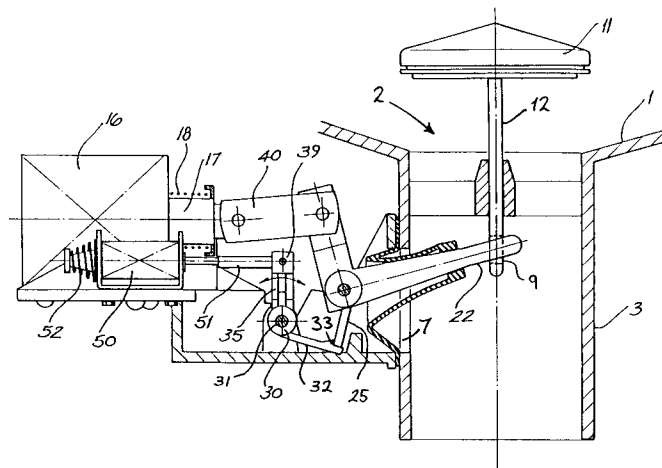
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London WC2A 1HN(GB)(54) **Dump valve assembly.**

(57) A dump valve assembly has a valve (11) connected to a stem (12) and locatable in a drain outlet (2) to open and close same. The stem (12) is arranged for reciprocable movement along a longitudinal axis of the outlet (2), and is interconnected with one end (22) of a substantially L-shaped lever (20) extending through a sealed opening (7) in the outlet (2). The lever (20) is pivoted adjacent its corner, and has its other end connected to a first solenoid (16). A first arm (35) of a substantially L-shaped latch piece (30) is connected to a second solenoid (50), and is pivoted adjacent its corner and has a second

arm (32) including a ramp (33) adapted for engagement and disengagement with a foot (25) extending from the lever (20) adjacent its pivot. The ramp (33) is adapted to engage the foot (25) upon actuation of the assembly (10) through enabling of the first solenoid (16) to open the outlet (2) by movement of the valve (11). The engagement prevents the inadvertent closure of the outlet (2) by a force acting on the valve (11). The ramp (33) is disengaged from the foot (25) upon enabling of the second solenoid (50) and a consequent rotation of the latch piece (30) caused thereby.

**FIG. 3****EP 0 487 215 A2**

The present invention relates to a dump valve assembly that prevents inadvertent closure of the dump valve.

Dump valves are conventionally used in sinks and basins instead of a plug. The dump valve generally includes a manually operated lever assembly that permits opening and closing of the valve. As the valve opens upwardly into the sink, the weight of water overlying the valve tends to depress it to close the discharge outlet. Thus, dump valve assemblies have either had to be manually held open (normally closed) or include a manually releasable latch mechanism.

It is an object of the present invention to provide a dump valve assembly that prevents inadvertent closure of the dump valve.

In accordance with the present invention, a dump valve assembly comprises a dump valve connected to a stem and locatable in a drain outlet to open and close same, said stem being arranged for reciprocable movement along a longitudinal axis of said outlet, characterised in that said stem is operatively associated with one end of a substantially L-shaped lever extending through a sealed opening in said outlet, said lever being pivoted adjacent its corner, the other end of said lever being connected to a first actuator, a first arm of a substantially L-shaped latch piece being connected to a second actuator, said latch piece being pivoted adjacent its corner and having a second arm including a ramp adapted for engagement and disengagement with a foot extending from said lever adjacent its pivot, said ramp being adapted to engage said foot upon actuation of said assembly through enabling of said first actuator to open said outlet by movement of said valve, said engagement preventing the inadvertent closure of said outlet by a force acting on said valve, said ramp being disengaged from said foot upon enabling of said second actuator and a consequent rotation of said latch piece caused thereby.

Preferably, the first and second actuators are solenoids.

A preferred embodiment of the present invention will now be described with reference to the drawings in which:

Fig. 1 is a perspective view of the dump valve assembly;

Fig. 2 is a schematic left side view of the assembly of Fig. 1;

Fig. 3 is a schematic right side view of the assembly of Fig. 1;

Fig. 4 shows (A) a top plan view, (B) a left side elevation view, and (C) a rear end elevation view of the lever used in the assembly of Fig. 1;

Fig. 5 shows (A) a top plan view, (B) a left side elevation view, and (C) a front end elevation view of the latch piece used in the assembly of

Fig. 1; and

Fig. 6 shows (A) a top plan view, (B) a side elevation view, and (C) a front end elevation view of the connector used in the assembly of Fig. 1.

A dump valve assembly 10 is shown in Fig. 2 as latched in the open configuration. The assembly 10 is adapted to open and close the drain outlet 2 of a sink 1. The outlet 2 supplies a discharge pipe 3 into which liquid (not illustrated) flows from the sink 1 under gravity.

The assembly 10 includes a dump valve 11 that is configured to open and close the outlet 2 by movement along the longitudinal axis 6 of the discharge pipe 3. The longitudinal movement of the dump valve 11 is guided by a sleeve 5 formed in a spider grill 4 arranged in the outlet 2. A valve stem 12 passes through the sleeve 5 and pivotally interconnects the dump valve 11 with a substantially L-shaped lever 20. A long arm 22 of the lever 20 is retained in an eye 9 located at the lower end of the valve stem 12. Alternatively, the stem 12 and the long arm can be connected by any other form of pivotable join, such as a hinge (not illustrated).

The lever 20 passes through the discharge pipe 3 at an opening 7 which is sealed by a rubber boot 13, part of which is sandwiched between the pipe 3 and a mounting flange 15 of a chassis or support block 14. The support block 14 provides a foundation for a first remotely operable solenoid 16 that provides for actuation of the assembly 10 by means of a reciprocable armature 17 interconnected with the lever 20 by a connector 40. A spring 18 is provided about the armature 17 to maintain the armature 17 extended when the solenoid 16 is not energised.

As seen in Fig. 2, and shown in more detail in Fig. 4, the L-shaped lever 20 has a pivot 21 at its corner and its short arm 23 extends therefrom to terminate in a pin receiving hole 24. The hole 24 provides for pivotal connection of the lever 20 to the connector 40. As best seen in Fig. 6, the connector 40 includes a body 41 with bifurcated ends 45, 46. The bifurcated end 45 is provided with aligned holes 43 to permit pivotal connection with the hole 24 of the lever 20. The bifurcated end 46 is provided with aligned holes 44 to permit pivotal connection in a similar manner with the armature 17.

The interconnection provided by the connector 40 and the lever 20, between the armature 17 and the valve stem 12, provides for the raising of the valve 11 to open the outlet 2. More particularly, on energisation of the solenoid 16, the armature 17 and thus the short arm 23 of the lever 20 are pulled back, to the position of Fig. 2, thus pivoting the lever 20 clockwise about the pivot 21 to elevate the lever arm 22 and open the valve 11.

Also provided in the assembly 10 is an interlock mechanism formed by a latch piece 30 that interacts with the lever 20 and is releasable by a second remotely operable solenoid 50.

As seen in Fig. 3, and shown in more detail in Fig. 5, the latch piece 30 is substantially L-shaped and includes a pivot 31 formed at its corner. Extending from the pivot 31 is a latch arm 32 that includes a ramp 33 having a stop face 34. Also connected to the pivot 31 and extending in directions both perpendicular to, and transverse to, the arm 32 is a cruxiform-shaped inclined connecting arm 35, of which flanges 36, 37 and 48 have been particularly referenced. The connecting arm 35 extends to a distal end connection 39 to which an armature 51 of the solenoid 50 is connected. A spring 52 is provided so as to maintain the armature 51 retracted when not energised.

Also, with reference to Figs. 2, 3 and 4, extending from the pivot 21 of the lever 20 is a foot 25 that is adapted for interengagement with the ramp 33 and stop face 34 of the latch piece 30.

The interlock operation of the latch piece 30 can now be described with reference to Fig. 3.

To attain the open valve position of Fig. 3, the solenoid 16 is energised and the armature 17 is retracted. Also, the solenoid 50 is not energised and is therefore, due to the operation of the spring 52, fully retracted, which imparts a counter-clockwise rotation to the latch piece 30 about pivot 31. As such, the latch arm 32 is lifted from within a recess 19 (seen in Fig. 2) in the support block 14, to engage the foot 25 of the lever 20. This engagement takes the form of abutment against the stop face 34 such that any downward force upon the valve 11, which would act to rotate the lever 20 in 3 clockwise direction (as seen in Fig. 3) about pivot 31, is prevented. As such, the latch piece 30 prevents the closing of the outlet 2 by a downward force on the valve 11. Once the valve 11 is open, and latched, energisation of the solenoid 16 is ceased.

Still referring to Fig. 3, in order to close the valve 11, the solenoid 50 is energised to extend the armature 51 so as to impart a clockwise rotation about pivot 31 to the latch piece 30. The latch arm 32 thereby drops into the recess 19 thereby permitting a clockwise movement of the foot 25 away from the pipe 3, which is assisted by the extending of the armature 17 under the force applied by the spring 18. The lever 20 thereby lowers the valve 11 to close the outlet 2.

In order to open the valve 11, the armature 17 is retracted which results in a counter-clockwise rotation (Fig. 3) of the lever 20. As the solenoid 50 is not energised, the spring 52 imparts a corresponding rotation upon the latch piece 30. The foot 25 engages the ramp 33 and slides thereover

into the stop position illustrated in Figs. 1, 2 and 3.

When energised for actuation, each of the solenoids 16 and 50 is energised momentarily sufficient to achieve latching, on opening, and closure. Once opened, the interlock maintains the valve 11 raised irrespective of the energisation of solenoid 16. When closed, gravity and the pressure of overlying water maintain closure.

In the illustrated embodiment, the angle 26 (Fig. 4C) between the foot 25 and the lever arm 22 is preferably 60°. Also, preferably the angles 50 and 51 as seen in Fig. 5 are each 15°.

The lever 20, latch piece 30 and connector 40 are preferably manufactured of resilient plastics material, however mild steel can also be used.

The solenoids 16 and 50 can be replaced by other forms of actuators.

Also, through relocation of the solenoids 16 and/or 50, the latch piece 30 can be simplified to omit the inclination of the connecting arm 35. For example, if the solenoid 30 was located underneath the solenoid 16, the armatures 17 and 51 can be longitudinally aligned one above the other without unwanted collision between the lever 20 and the latch piece 30.

The dump valve assembly 10 disclosed herein has specifically been designed to form part of an automatic dishwasher locatable in a kitchen sink. However, the present invention is not limited to use in sinks and basins. Other applications such as swimming pool outlets or outlets for storage vats are equally applicable.

Claims

1. A dump valve assembly (10) comprising a dump valve (11) connected to a stem (12) and locatable in a drain outlet (2) to open and close same, said stem (12) being arranged for reciprocable movement along a longitudinal axis (6) of said outlet (2), characterised in that said stem (12) is operatively associated (9) with one end (22) of a substantially L-shaped lever (20) extending through a sealed (13) opening (7) in said outlet (2), said lever (20) being pivoted (21) adjacent its corner, the other end (23) of said lever (20) being connected to a first actuator (16), a first arm (35) of a substantially L-shaped latch piece (30) being connected to a second actuator (50), said latch piece (30) being pivoted (31) adjacent its corner and having a second arm (32) including a ramp (33) adapted for engagement and disengagement with a foot (25) extending from said lever (20) adjacent its pivot (21), said ramp (33) being adapted to engage said foot (25) upon actuation of said assembly (10) through enabling of said first actuator (16) to open said outlet (2) by

movement of said valve (11), said engagement preventing the inadvertent closure of said outlet (2) by a force acting on said valve (11), said ramp (33) being disengaged from said foot (25) upon enabling of said second actuator (50) and a consequent rotation of said latch piece (30) caused thereby. 5

2. A dump valve assembly as claimed in claim 1, characterised in that said first actuator (16) comprises a (first) solenoid (16) having a (first) armature (17) pivotally connected to said lever (20). 10
3. A dump valve assembly as claimed in claim 2, characterised in that said first solenoid (16) includes a spring (18) adapted to extend said first armature (17) when said first solenoid (16) is unenergised. 15
20
4. A dump valve assembly as claimed in claim 3, characterised in that a connector (40) is interposed between and is pivotally (43,44) connected to both of said first armature (17) and said lever (20). 25
5. A dump valve assembly as claimed in any one of the preceding claims, characterised in that said second actuator (50) comprises a (second) solenoid (50) having a (second) armature (51) pivotally (39) connected to said latch piece (30). 30
6. A dump valve assembly as claimed in any one of the preceding claims, characterised in that said stem (12) includes an eye hole (9) at a lower end thereof into which said one end (22) of said lever (20) is inserted to create said operative association. 35
40
7. A dump valve assembly as claimed in any one of the preceding claims, characterised in that said sealed opening is provided by a boot (13) surrounding an arm (22) of said lever (20) associated with said one end thereof and sandwiched between a chassis (14) of said assembly and said opening (7). 45
8. A dump valve assembly as claimed in any one of the preceding claims, characterised in that said actuators (16,50) are remotely actuatable. 50
9. A liquid holding vessel including a dump valve assembly (10) as claimed in any one of the preceding claims. 55

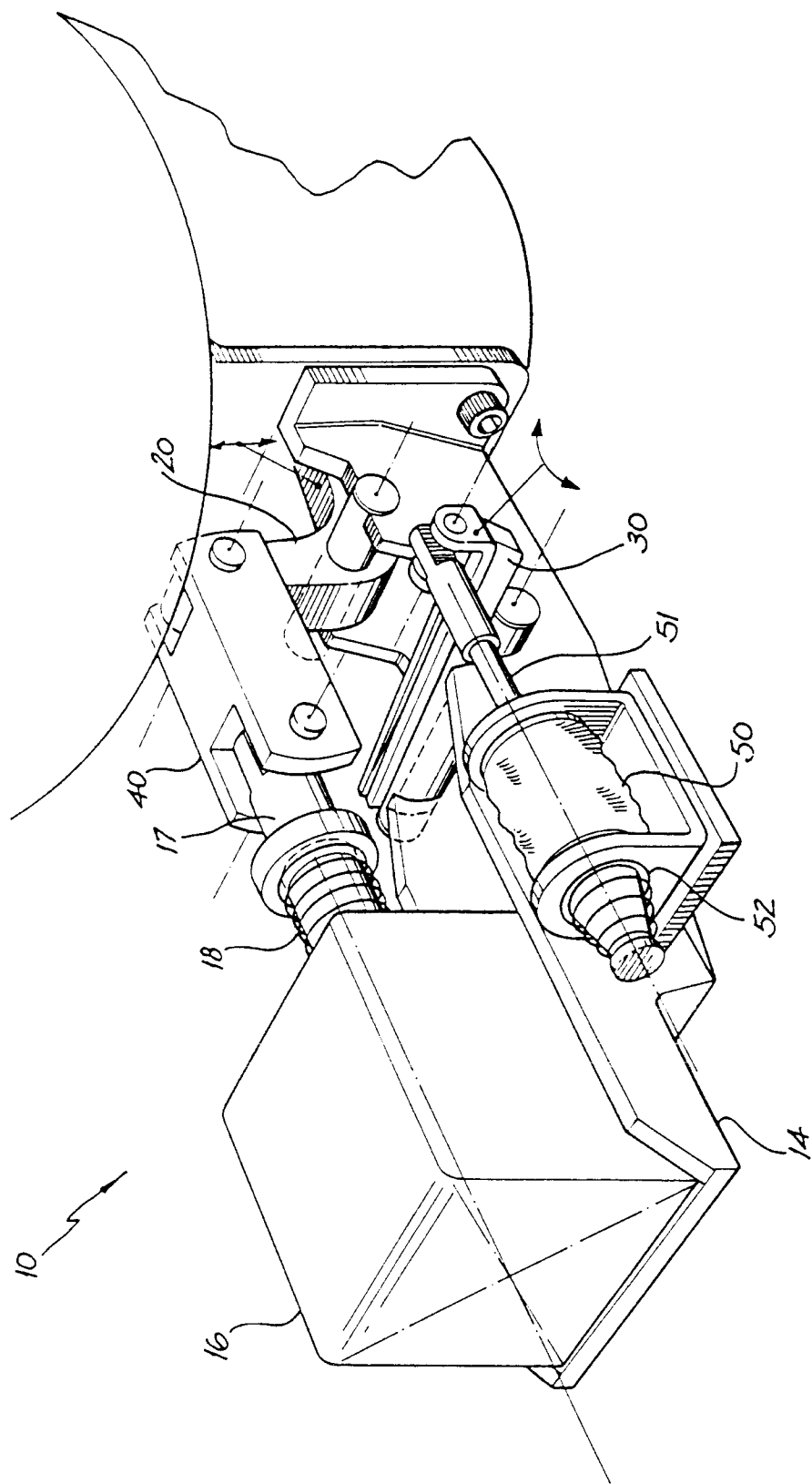


FIG. 1

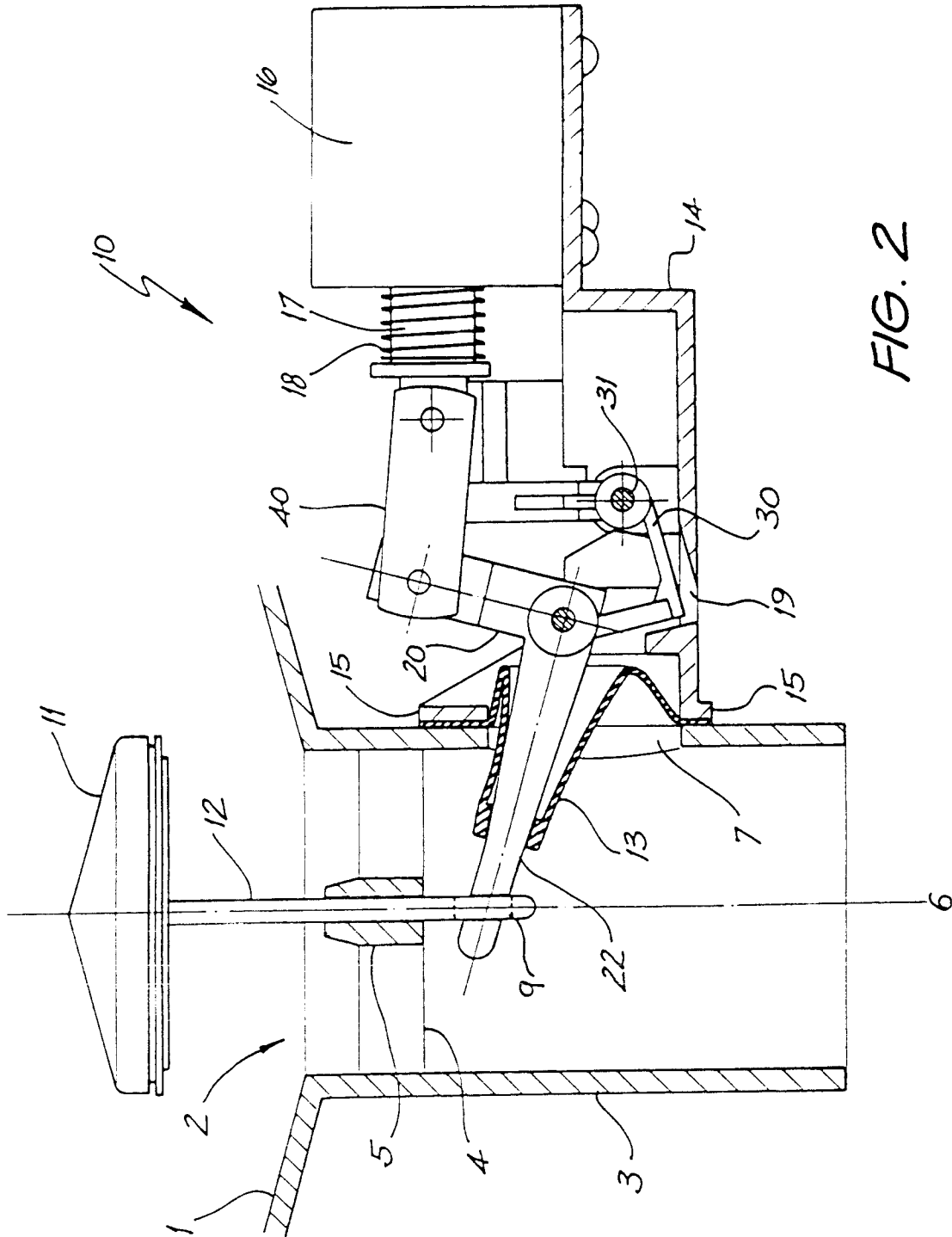


FIG. 2

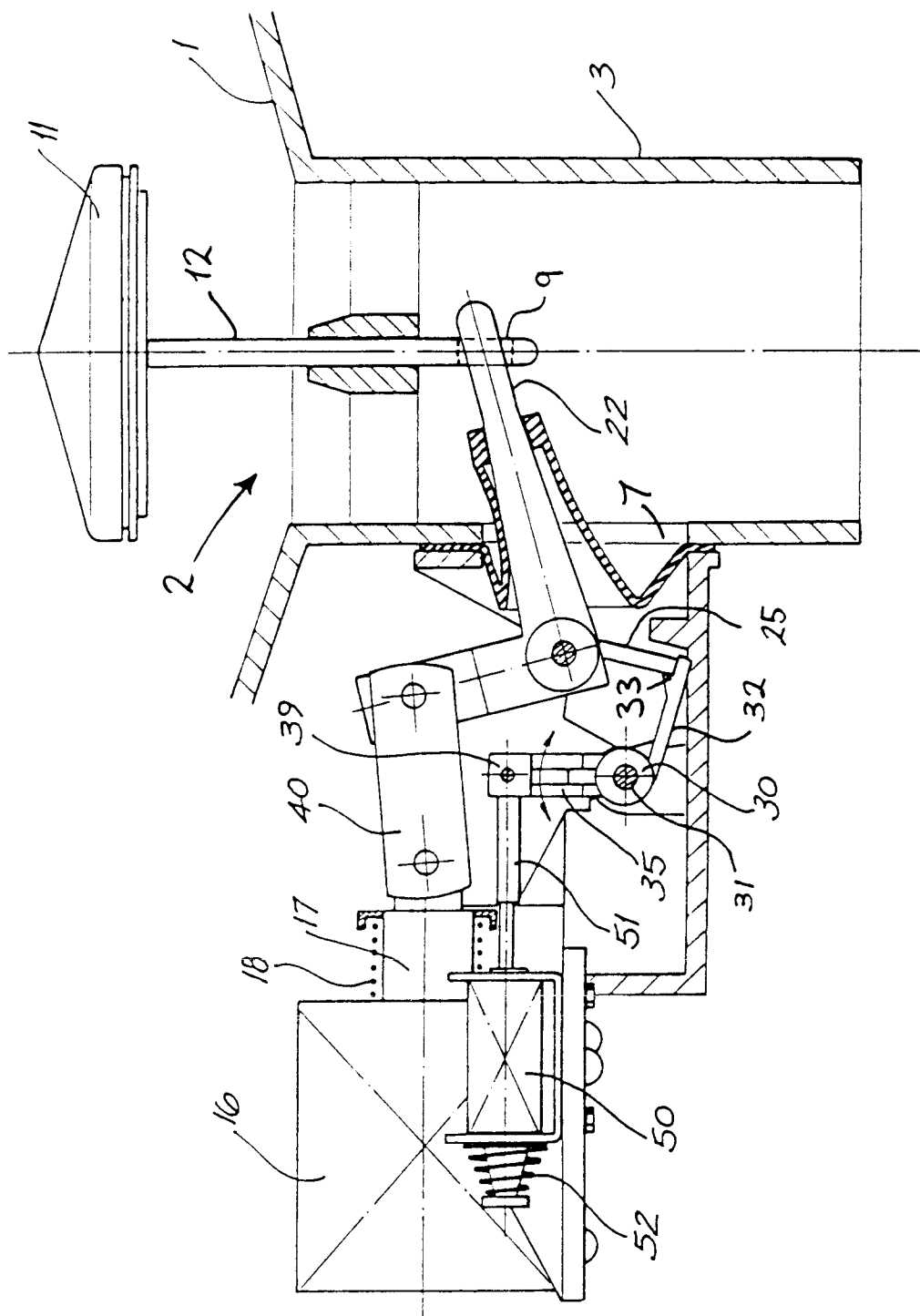
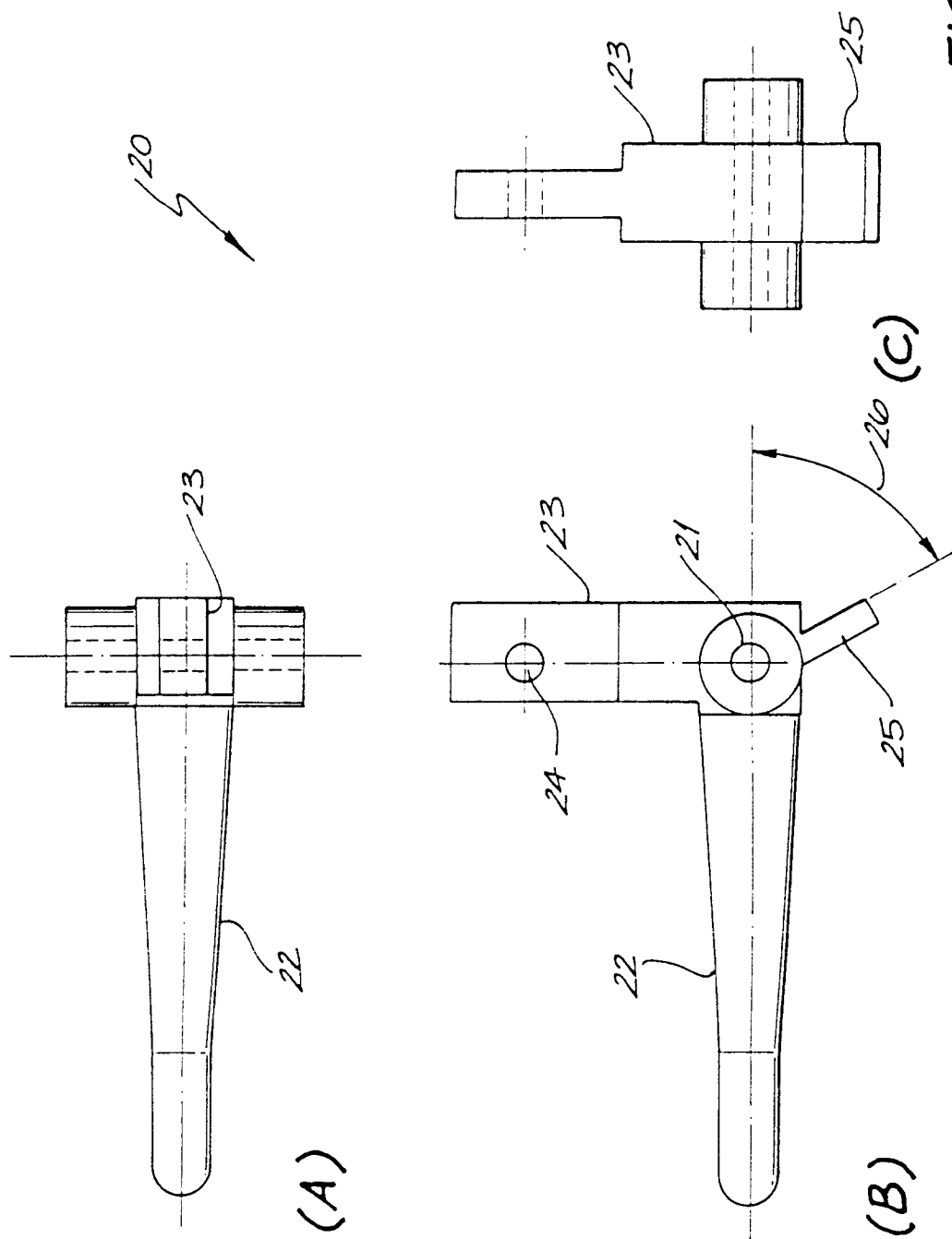


FIG. 3



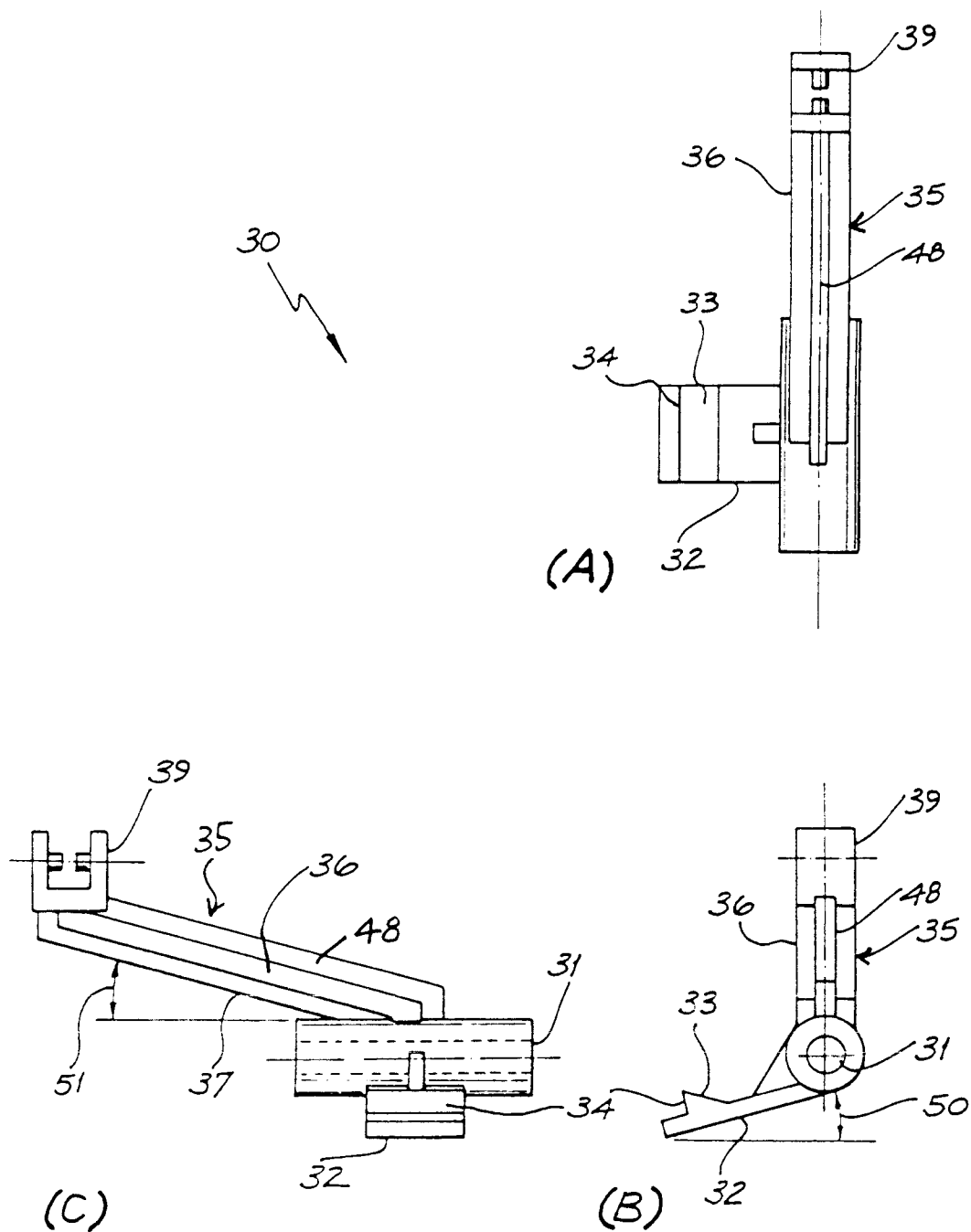


FIG. 5

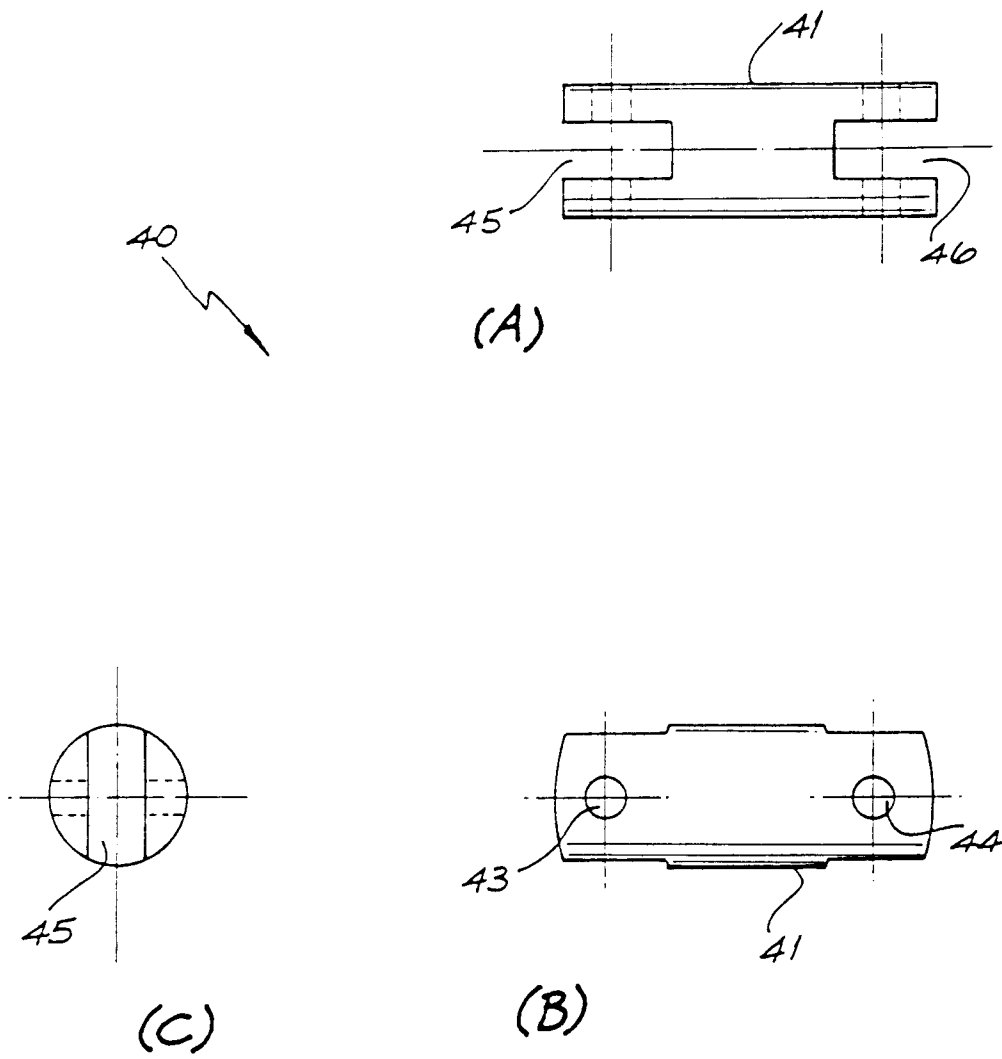


FIG. 6