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(54) **MANUALLY-ACTUATED HYDRAULIC SHUTOFF VALVE**

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(57) **ABSTRACT**

(76) **Inventor: Donald L. Mensch, (US)**

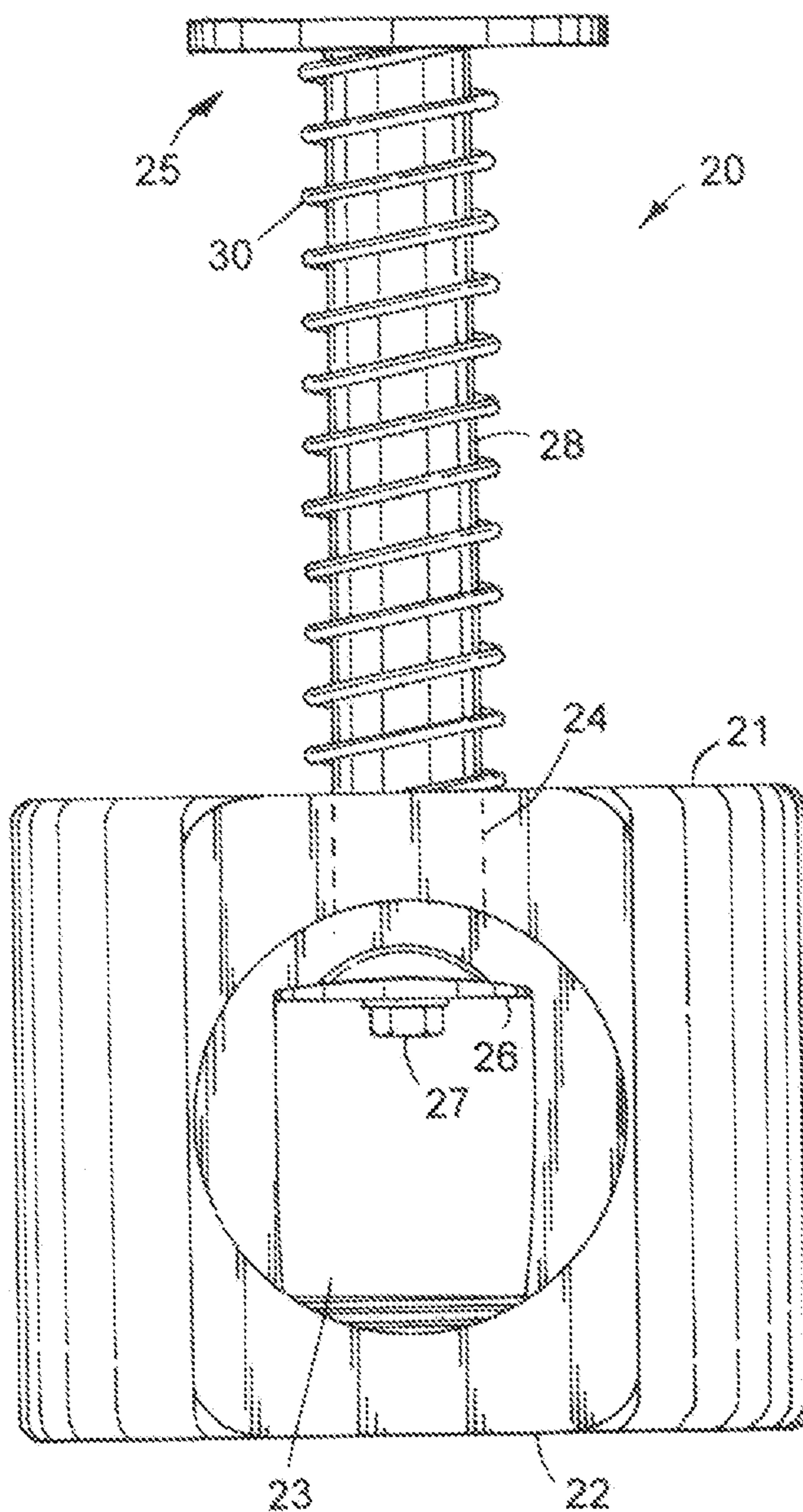
A shutoff valve includes a valve housing with inlet and outlet openings and a hole drilled in alignment with the inlet (or outlet) opening. A pusher is slidably positioned in the hole for extension toward the inlet opening, the pusher including a shutoff member inside the hollow housing adapted to close off the inlet opening when extended to an inlet-closed position, and to open the inlet opening when retracted to an inlet-opened position. The pusher includes a handle for manually pressing the pusher and shutoff member toward the inlet opening. A spring biases the pusher toward the inlet-opened position. By this arrangement, the pusher is manually closed but cannot accidentally be left in the inlet-closed position due to being biased toward the inlet-opened position.

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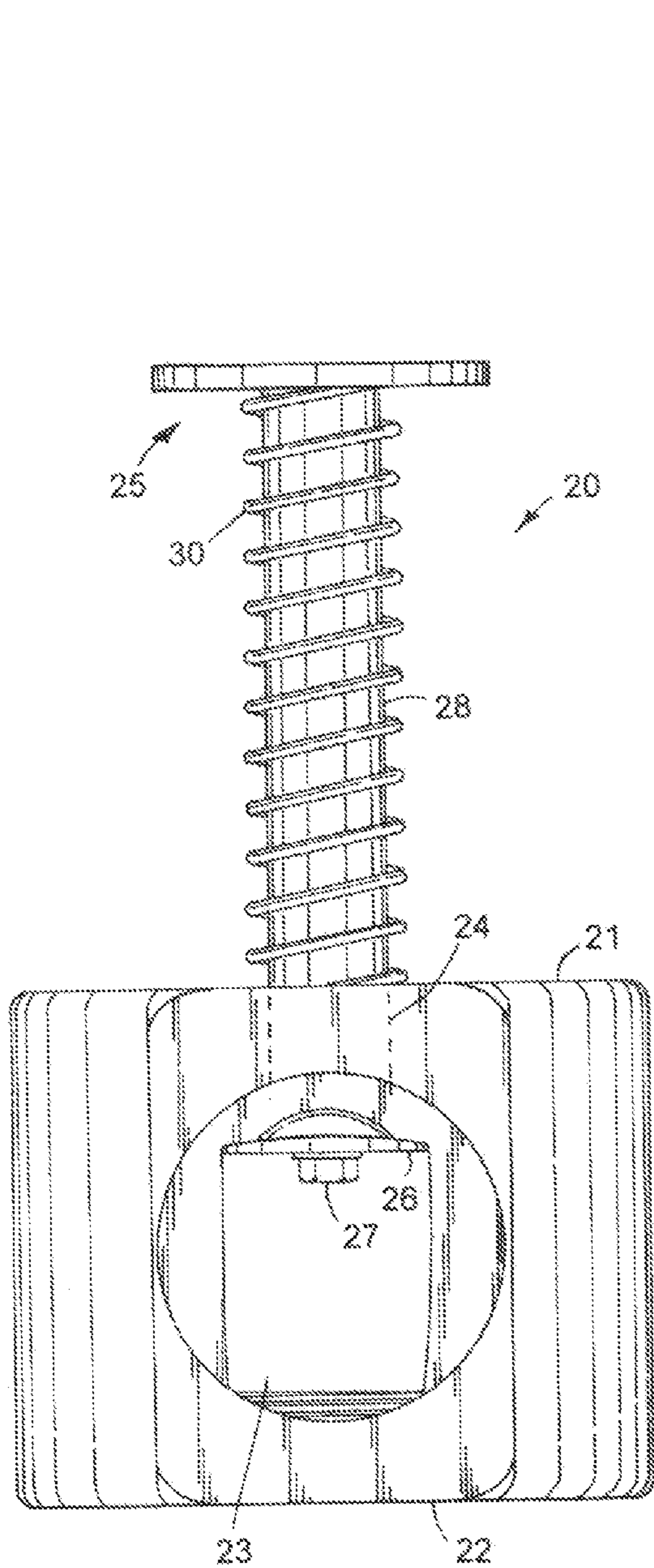


FIG. 1

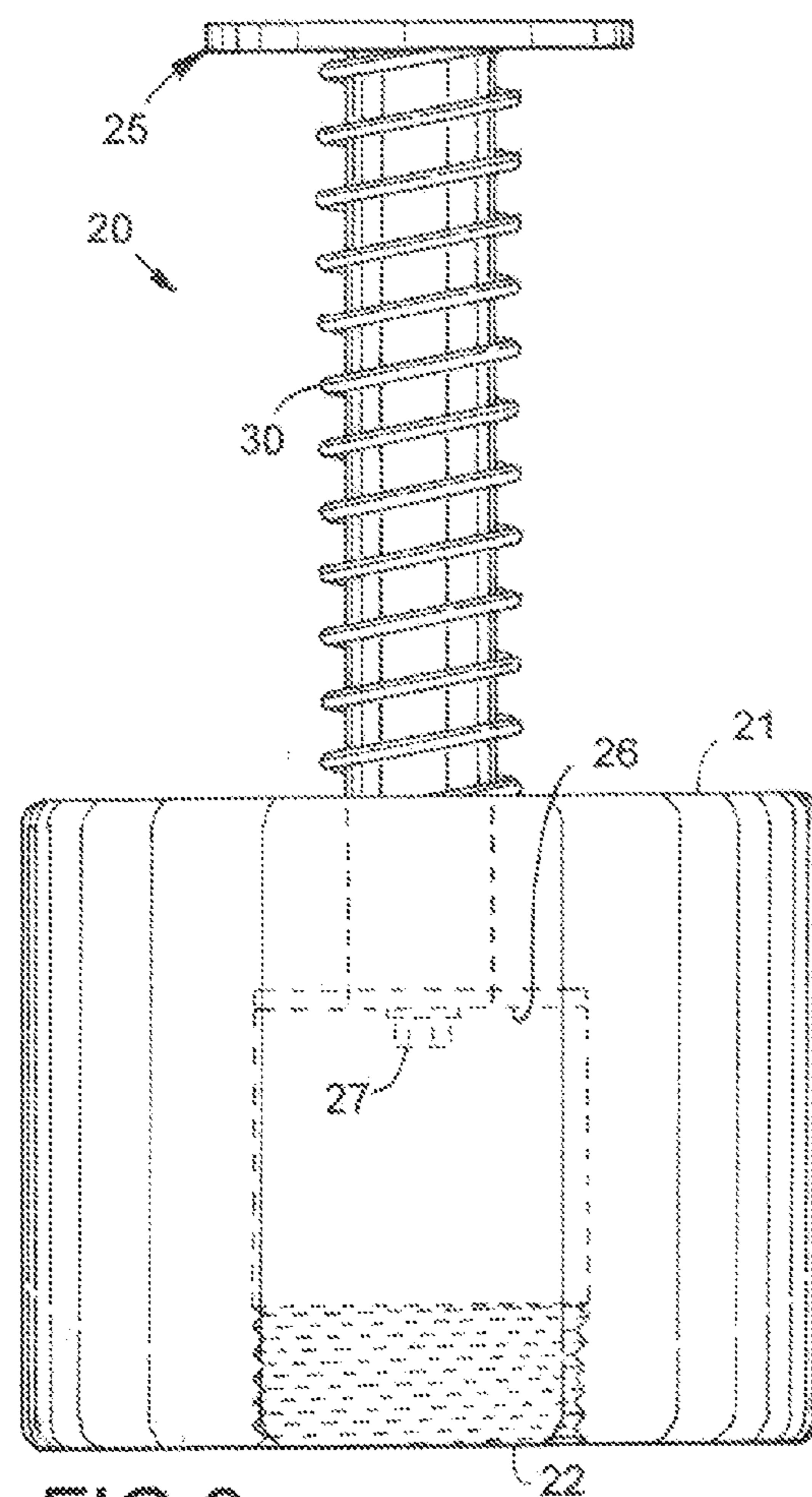


FIG. 2

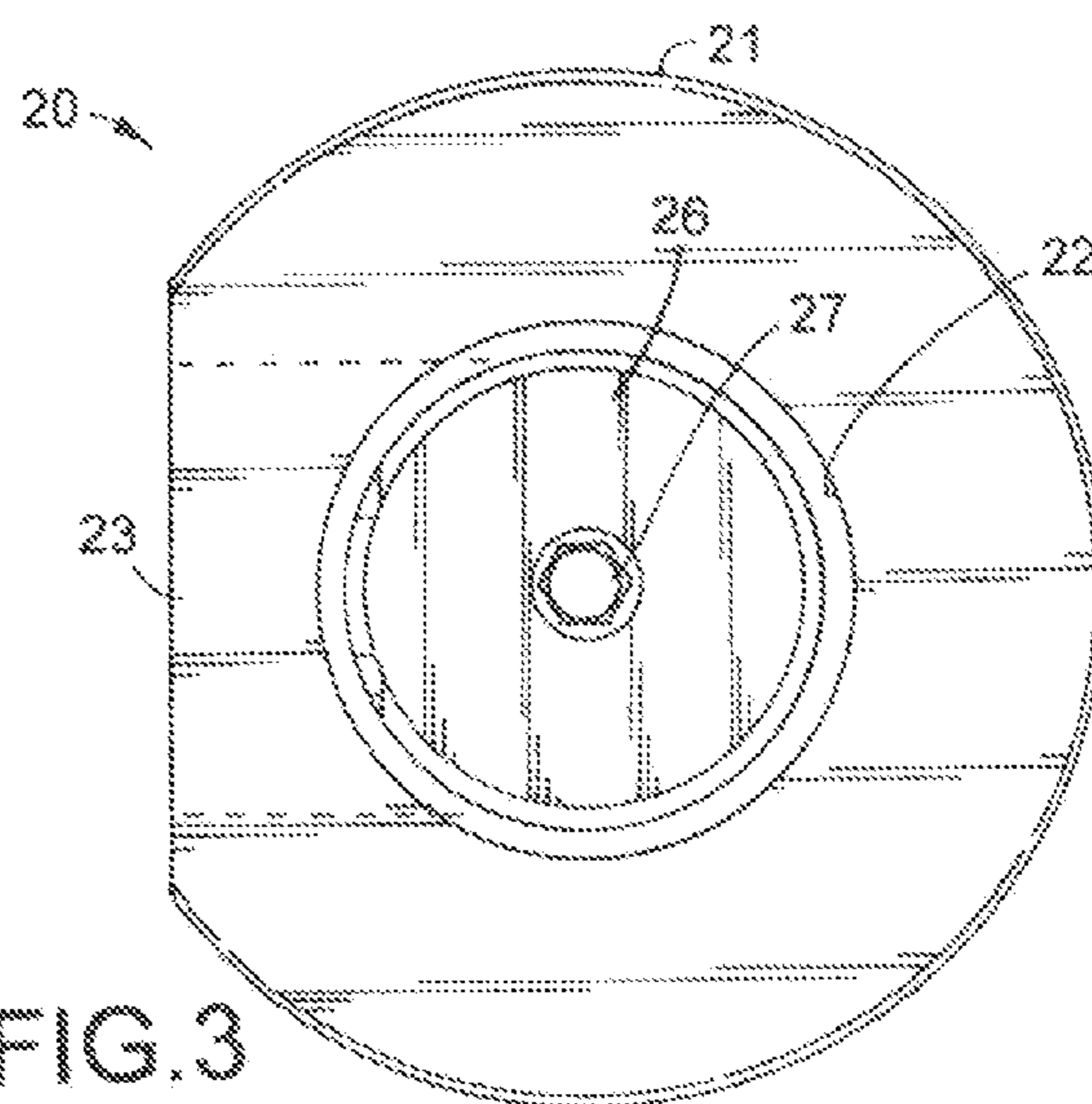


FIG. 3

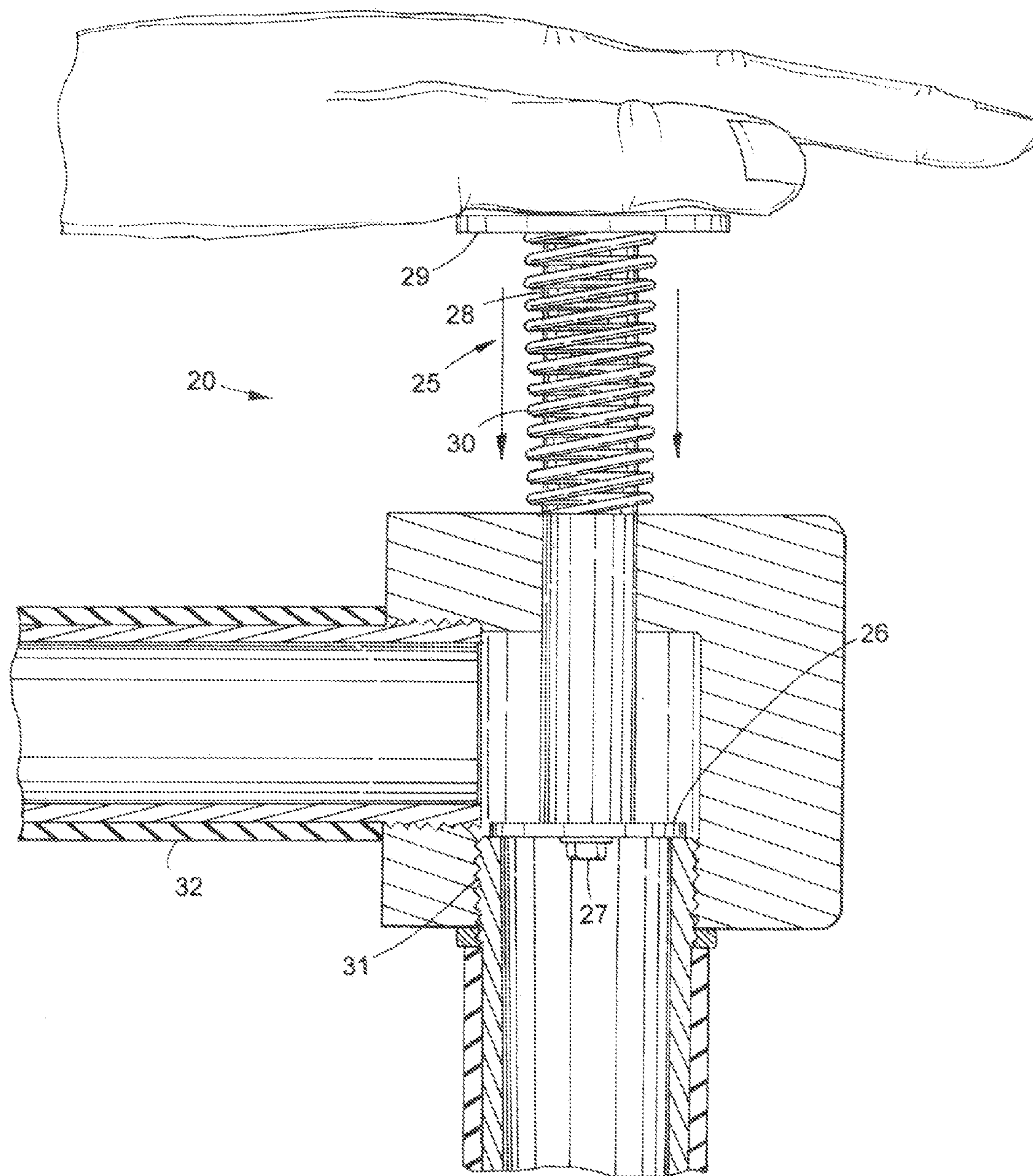


FIG.4

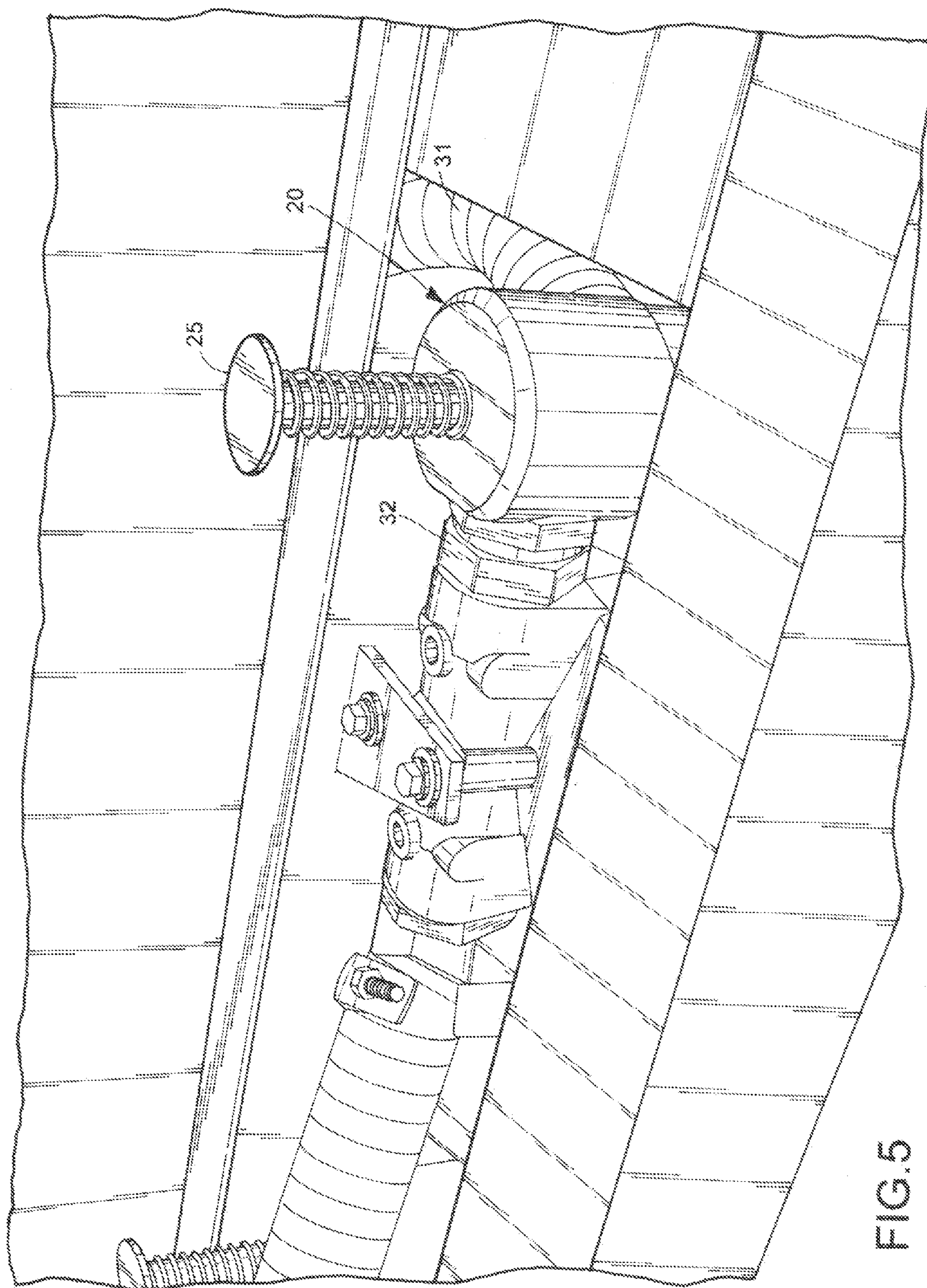


FIG. 5

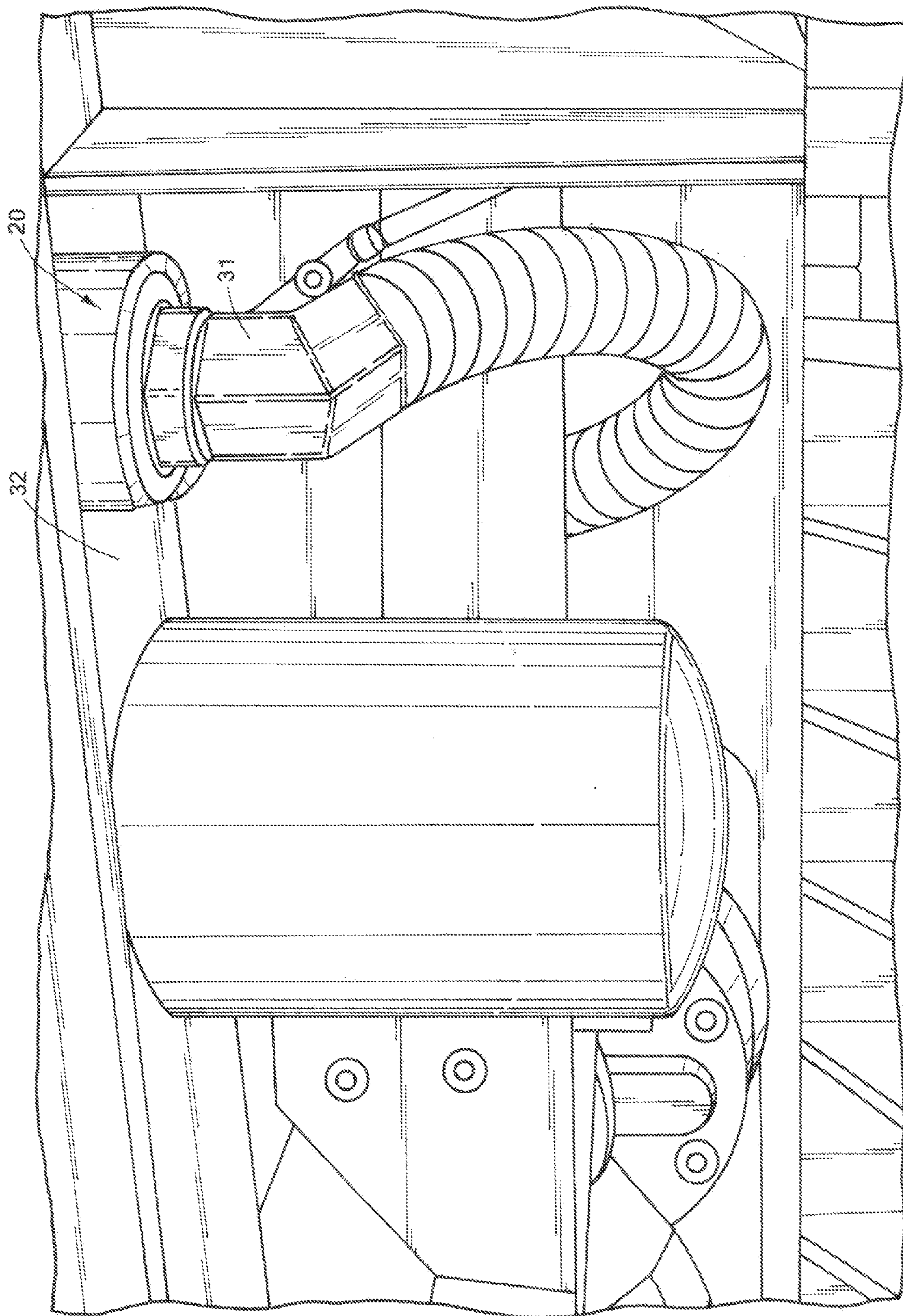


FIG. 6

MANUALLY-ACTUATED HYDRAULIC SHUTOFF VALVE

BACKGROUND

[0001] The present invention relates to a manually-actuated shutoff valve that is spring-biased toward an oil-flow-permitting open position.

[0002] Many oil and hydraulic systems include a shutoff valve to shut off oil so that it doesn't leak while an oil filter or hose is changed. However, sometimes an operator forgets to re-open the valve, such that the system is starved of oil when restated. This can cause equipment damage, depending on how quickly the operator realizes what happened, and depending on how sensitive the equipment is to operating when oil-starved.

[0003] At least one equipment supplier has tried to solve this problem by attaching sensors and electrical circuitry to prevent starting the equipment unless the shutoff valve is opened. However, this circuitry is expensive, and itself can fail. Further, redundant systems can be expensive, and can lead to complexities in the equipment, making it difficult to keep the equipment running. Also, they add considerably to cost of the equipment, and cost of manuals for the equipment, not to mention confusion when trying to figure out why the equipment won't start.

SUMMARY OF THE PRESENT INVENTION

[0004] In one aspect of the present invention, a shutoff valve includes a valve housing having inlet and outlet openings and a hole drilled in alignment with one of the openings. A pusher is slidably positioned in the hole for extension toward the one opening, the pusher including a shutoff member inside the hollow housing adapted to close off the one opening when extended to a closed position, and to open the one opening when retracted to an opened position. The pusher includes a handle for manually pressing the pusher and shutoff member toward the one opening, and includes a spring for biasing the pusher toward the opened position. By this arrangement, the pusher can be manually closed but cannot accidentally be left in the closed position due to being biased toward the opened position.

[0005] In another aspect of the present invention, a shutoff valve includes a valve housing having inlet and outlet openings and a passageway therebetween, and including a hole drilled in the housing to the passageway. The valve further includes a pusher slidably engaging the hole for extension toward the passageway. The pusher includes a shutoff member inside the hollow housing shaped to close off the passageway and a spring-bias return to bias the shutoff member away from the passageway. The pusher characteristically is made of hard material and does not include a resilient member for sealing the passageway. By this arrangement, the pusher can be manually closed but cannot accidentally be left in the closed position due to being biased toward the opened position. Further, the valve is made to have a relatively non-complex, efficient, and low-cost design

[0006] In another aspect of the present invention, a method includes steps of providing a valve housing including inlet and outlet openings and a hole drilled in alignment with one of the openings, and also providing a pusher slidably positioned in the hole for extension toward the one opening, the pusher including a shutoff member inside the hollow housing adapted to close off the one opening when extended to a

closed position, and to open the one opening when retracted to an opened position. The method further includes manually pressing the pusher and shutoff member toward the one opening against a spring bias on the pusher to close oil flow through the one opening, and releasing the pusher so that the spring biases the pusher toward the opened position. By this method, the pusher can be manually closed but cannot accidentally be left in the closed position due to being biased toward the opened position.

[0007] These and other aspects, objects, and features of the present invention will be understood and appreciated by those skilled in the art upon studying the following specification, claims, and appended drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0008] FIGS. 1-3 are orthogonal views of a shutoff valve embodying the present invention.

[0009] FIG. 4 is a side/elevational view like FIG. 2 but showing the pusher being manually depressed to shut off oil flow.

[0010] FIGS. 5-6 are top and bottom perspective views of the present valve in a hydraulic circuit that includes an oil reservoir and a hydrostat drive.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0011] The present manually-operated hydraulic shutoff valve 20 (FIGS. 1-3) includes a rectangular hollow metal housing 21 having orthogonally-drilled threaded inlet and outlet openings 22 and 23. A hole 24 is drilled in alignment with the inlet opening 22 (or alternatively, in alignment with the outlet opening 23), and a pusher 25 is positioned in the hole 24 for extension toward the opening 22. The pusher 25 includes a shutoff member (illustrated as a metal washer 26) inside the hollow housing, and a retainer screw 27 attaching the washer 26 to an end of the pusher rod 28. A flat button 29 is on the exterior end of the rod 28 serves as an enlarged surface for a palm-push handle, and a spring 30 biases the rod 28 away from a valve-closed position. In the closed position, the washer 26 essentially blocks oil flow through the inlet hole 24. The spring 30 biases the washer 26 toward a retracted valve-open position where it allows hydraulic fluid flow. Notably, the spring 30 provides sufficient force such that it requires effort to close the valve (i.e. so that it is unlikely that the valve will be accidentally closed), and so that the spring reliably causes the valve to open upon release of the pusher 25.

[0012] As shown in FIG. 4, when the pusher 25 is manually depressed (i.e. in the valve-closed position), the washer 26 abuts an end of the inlet hose's connector/fitting 31, thus stopping hydraulic fluid from flowing to the outlet hose 32. By this arrangement, flow of hydraulic fluid can be stopped manually while an oil filter is changed or even when hoses are changed, without losing hydraulic fluid. Also, it is not possible to "forget" to return the shutoff valve to its open position since it automatically moves to the open position via its spring bias upon release.

[0013] The illustrated shutoff valve 20 (FIGS. 5-6) is positioned between an oil reservoir and a hydrostat drive unit (or oil pump unit), in a position relatively close to an oil filter. This allows a single worker to depress the valve 20 with one hand and also replace the filter with their other hand.

[0014] It is contemplated that the present shutoff member (washer **26**) can include a rubber or resilient member to seal the inlet opening tightly. However, my testing shows that the present valve **20** works sufficiently well to prevent loss of oil even without any such rubber or resilient member or seal. For example, in one of my self-propelled vacuum machines, the present valve **20** allows a filter to be changed with less than a cup of fluid being lost. Also, a single repairman can accomplish both holding the valve closed and also replacing the oil filter as long as the repairman is efficient and as long as the valve is positioned close to the filter.

[0015] It is contemplated that the present valve can be used in other applications, such as in any system where a fluid must be stopped in order to change a filter or other component without considerable loss of fluid.

[0016] A related method includes steps of providing a valve housing including inlet and outlet openings and a hole drilled in alignment with the inlet (or outlet) opening; and providing a pusher slidably positioned in the hole for extension toward the inlet opening, the pusher including a shutoff member inside the hollow housing adapted to close off the inlet opening when extended to a inlet-closed position, and to open the inlet opening when retracted to an inlet-opened position. The method further includes manually pressing the pusher and shutoff member toward the inlet opening against a spring bias on the pusher to close oil flow through the inlet opening; and later releasing the pusher so that the spring biases the pusher toward the inlet-opened position. By this arrangement, the pusher can be manually closed but cannot accidentally be left in the inlet-closed position due to being biased toward the inlet-opened position.

[0017] It is to be understood that variations and modifications can be made on the aforementioned structure without departing from the concepts of the present invention, and further it is to be understood that such concepts are intended to be covered by the following claims unless these claims by their language expressly state otherwise.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A shutoff valve comprising:
 - a valve housing including inlet and outlet openings and a hole drilled in alignment with one of the openings; and
 - a pusher slidably positioned in the hole for extension toward the one opening, the pusher including a shutoff member inside the hollow housing adapted to close off the one opening when extended to a closed position, and to open the one opening when retracted to an opened position, the pusher including a handle for manually pressing the pusher and shutoff member toward the one opening, and including a spring for biasing the pusher toward the opened position; whereby the pusher is manually closed but cannot accidentally be left in the closed position due to being biased toward the opened position.
2. The valve defined in claim 1, wherein the pusher includes a rod, and including a retainer screw attaching the washer to an end of the rod.
3. The valve defined in claim 2, wherein the washer is metal.

4. The valve defined in claim 3, wherein the washer is configured and adapted to abut an end of a hose fitting engaging the housing to close the one opening and thus prevent oil flow through the housing.

5. The valve defined in claim 4, wherein the washer does not include a resilient seal member.

6. The valve defined in claim 1, wherein the pusher includes a rod slidably engaging the housing, and wherein the handle includes a flat button on an exterior end of the rod.

7. The valve defined in claim 1, wherein the pusher includes a rod slidably engaging the housing, and a spring that biases the rod away from a closed position.

8. A hydraulic system including an oil reservoir, a hydrostat drive, an oil filter, and lines operably connecting same, and further including the valve defined in claim 1 that is operably connected to one of the lines between the reservoir and the drive.

9. The valve defined in claim 8, wherein the valve is in one of the lines adjacent the filter.

10. A shutoff valve comprising:

- a valve housing including inlet and outlet openings and a passageway therebetween, and including a hole drilled in the housing to the passageway; and

- a pusher slidably engaging the hole for extension toward the passageway, the pusher including a shutoff member inside the hollow housing shaped to close off the passageway and a spring-bias return to bias the shutoff member away from the passageway, the pusher characteristically being made of hard material and not including a resilient member for sealing the passageway; whereby the pusher is manually closed but cannot accidentally be left in the closed position due to being biased toward the opened position.

11. The shutoff valve defined in claim 10, wherein the shutoff member is made entirely of metal.

12. The shutoff valve defined in claim 10, wherein the shutoff member and housing do not include a resilient seal.

13. A method comprising steps of:

- providing a valve housing including inlet and outlet openings and a hole drilled in alignment with one of the openings;

- providing a pusher slidably positioned in the hole for extension toward the one opening, the pusher including a shutoff member inside the hollow housing adapted to close off the one opening when extended to a closed position, and to open the one opening when retracted to an opened position;

- manually pressing the pusher and shutoff member toward the one opening against a spring bias on the pusher to close oil flow through the one opening; and

- releasing the pusher so that the spring biases the pusher toward the opened position; whereby the pusher is manually closed but cannot accidentally be left in the closed position due to being biased toward the opened position.

14. The method defined in claim 13, wherein the step of manually pressing the pusher to close oil flow includes metal on metal contact between the shutoff member and the housing, and does not include sealing the one opening with a resilient member.

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