

G. HILGER.
VALVE.

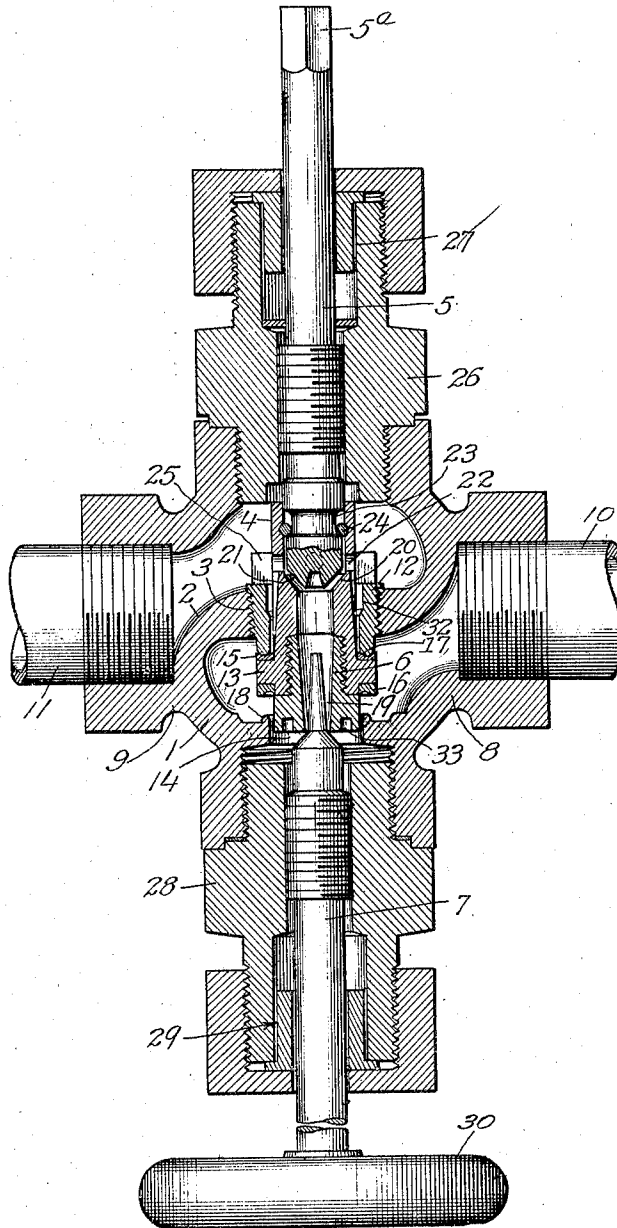
APPLICATION FILED MAR. 4, 1918.

1,315,020.

Patented Sept. 2, 1919.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Robert F. Weir
Arthur W. Carlson

Inventor
George Hilger
By Miller Chindahl Parker
Attys.

G. HILGER.
VALVE.

APPLICATION FILED MAR. 4, 1918.

1,315,020.

Patented Sept. 2, 1919.

2 SHEETS—SHEET 2.

Fig. 2.

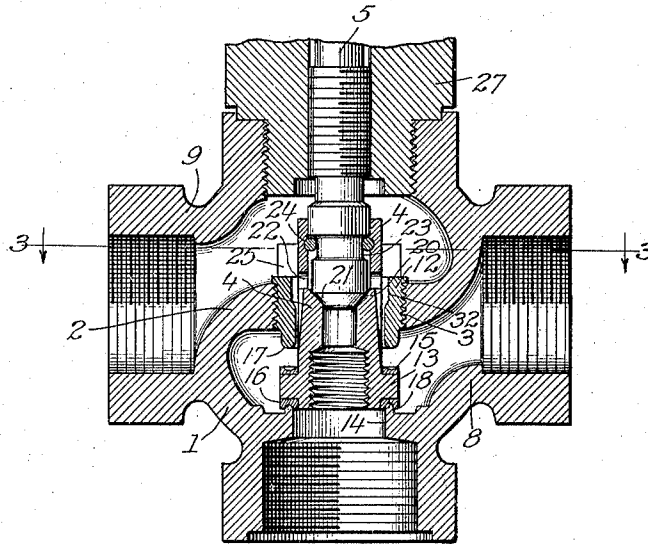


Fig. 3.

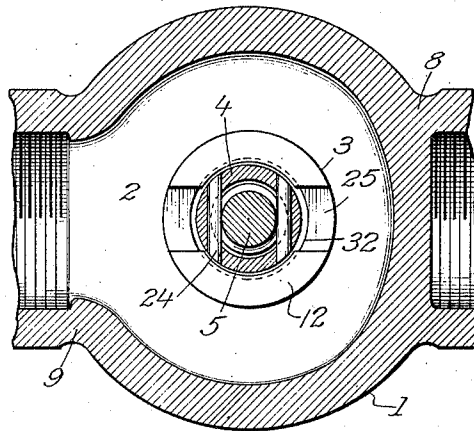
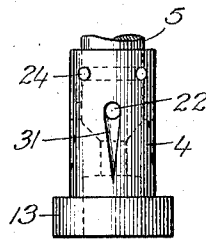


Fig. 4.



Witnesses:
Robert H. Weir
Arthur W. Carlson

Inventor
George Hilger

By Melvin Chindahl Parker
Attys:

UNITED STATES PATENT OFFICE.

GEORGE HILGER, OF CHICAGO, ILLINOIS.

VALVE.

1,315,020.

Specification of Letters Patent.

Patented Sept. 2, 1919.

Application filed March 4, 1918. Serial No. 220,137.

To all whom it may concern:

Be it known that I, GEORGE HILGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Valves, of which the following is a specification.

The invention relates to valves for use in systems wherein it is very desirable, if not necessary, that the flow of fluid through the valve be uninterrupted after the system has been set in operation; and the object of the invention is to provide a valve in which the parts which are apt to become worn may be removed for repair or replacement without interrupting the flow through the valve.

In refrigeration systems where valves are employed to regulate the flow of liquid ammonia for expansion into gaseous form, it is particularly desirable that the operation of the system be uninterrupted even when repairs are being made, and I have herein illustrated my invention as applied to an expansion valve of a refrigeration system. It will be understood, however, that I do not intend to be limited to such use, nor to the particular construction and arrangement set forth, in the interpretation of the appended claims, except as may be necessitated by the state of the prior art.

In the drawings, Figure 1 is a central vertical sectional view through an expansion valve embodying the features of my invention and showing the normal position of the parts when the system is in operation. Fig. 2 is a fragmental vertical sectional view of the valve showing the valve member and the seat member removed but with the parts in position to form a passageway through the valve. Fig. 3 is a sectional view on line 3-3 of Fig. 2. Fig. 4 is a fragmental detail view of a tubular member forming between its periphery and the casing a passageway in the valve when the parts are in the position shown in Fig. 2.

The valve comprises a casing 1 having a partition 2 with an opening 3 therein; a tubular member 4 mounted on the end of the screw stem 5 and having a removable seat member 6; and a valve member 7 arranged to cooperate with said seat member. The parts are so proportioned and arranged that in one position a passageway is formed which extends through the tubular member 4 and which is arranged to be controlled by

the valve and seat members, while in another position of the parts a passageway is formed around the tubular member independently of the valve and seat members which may thus be removed for repair.

The casing 1 may be provided with the usual laterally extending necks 8 and 9, into which the inlet and outlet pipes 10 and 11, respectively, are threaded, while the partition 2 extends substantially diagonally through the casing and has the central opening 3 therein through which the passageway through the casing is formed. A bushing 12 is threaded in said opening 3 to form a port therein, and its lower end extends downwardly into the lower portion of the casing.

The tubular member 4 is entered loosely through the bushing 12 and said member is provided near its lower end with a peripheral flange or collar 13. The upper surface of said collar, in one position of the member, is arranged to abut against the lower end of the bushing 12, and the lower surface of said collar, in the other position of the member, is arranged to abut against the upper edge of an opening or port 14, in the lower side of the casing, in which the valve and seat members operate. Preferably the upper and lower surfaces of said collar 13 are formed by grooved rings 15 and 16 of soft metal, while the lower end of the bushing 12 is rounded as at 17 to receive the grooved ring 15, and an annular rim 18 is formed around the edge of the port 14 to receive the grooved ring 16.

The tubular member 4 is arranged to be operated into position upon either of the seats 17 and 18, by means of the screw stem 5 mounted in the upper side of the casing. In the normal position of the parts the member 4 is in the position shown in Fig. 1 with its collar 13 seated upon the lower end of the bushing 12 and in this position the fluid is permitted to pass through the port 14, around the lower end of the valve seat member 6, which is mounted on the lower end of the member 4, and thence into a central opening 19 in said seat member which is alined with the opening in the tubular member.

Within the upper end of said tubular member is formed a conical seat 20 and the lower end of the screw stem 5 extends into said member 4 and is tapered as at 21 and

arranged to cooperate with the seat 20 to control the flow of fluid through ports 22 provided in said tubular member immediately above the conical seat. In order that the stem may thus cooperate with the seat 20 it has a sliding connection with the member 4. To this end the stem is provided with a reduced portion or groove 23 of substantial width and a pair of transverse pins 24 mounted in the upper end of the tubular member and arranged to operate in said groove 23 longitudinally of the stem 5. By this construction it will be apparent that by operating the screw stem 5 the tubular member 4 may be held in raised position with its ring 15 abutting against the seat 17 of the bushing, or in lowered position with its ring 16 abutting against the seat 18 at the edge of the opening 14 in the lower side of the casing. Preferably the upper end of the bushing 12 which extends a short distance above the partition 2 is provided with a pair of aligned notches or slots 25 communicating with the ports 22 in the tubular member 4. A free flow of fluid from said ports is thus permitted. The screw stem 5 may be mounted in a head 26 threaded into the upper side of the casing and provided with the usual packing box 27, and the upper end of said stem may be squared as at 5^a to receive a wrench for operating the stem.

The valve seat member 6 is in the form of a cap screw having its shank threaded into the lower end of the tubular member 4 and its head abutting against the lower end of said member 4. The central opening 19 of said seat member is tapered upwardly and outwardly and the lower edge of said opening forms a seat for the conical upper end or needle of the valve member 7. The head portion of said seat member is arranged to extend downwardly into the port 14 in the casing and is made slightly smaller in diameter than the opening so as to form a restricted passage for the fluid.

The valve member 7 has a screw stem mounted in a head 28 threaded into the lower wall of the casing 1 and having the usual packing box 29; and on the lower end of said stem may be provided a hand wheel 30 by means of which the stem may be operated to regulate the position of the needle with reference to its seat upon the member 6.

As hereinbefore stated, the normal arrangement of the parts is shown in Fig. 1, wherein the valve member 7 may be manipulated to control the flow of fluid through the valve. In this position of parts the passageway for the fluid is around the lower end of the seat member 6 through the opening 19 therein, the tubular member 4 and out through the ports 22 in the upper end of said tubular member, the lower end 21 of the stem 5 being spaced from its seat 20

in the tubular member to an extent equal to the width of the groove 23.

When it is desired to remove the seat member 6 and the valve member 7 for any reason, as for the purpose of repair, this may be accomplished without discontinuing the flow of fluid through the valve. To this end the stem 5 is screwed down into engagement with its seat 20 to close the upper end of the tubular member and also to hold the collar of the tubular member 4 in engagement with the seat 18 around the opening 14. Any escape of fluid from the casing through the port 14 is thus prevented and the removal of the valve and seat members is permitted. When the tubular member is in this position (Fig. 2), the passageway through the valve is formed between the periphery of the member 4 and the inner surface of the bushing 12.

As shown in Fig. 4, one or more grooves 31 may be provided in the outer periphery of the tubular member adapted to increase the area of said passageway and thus facilitate the flow of fluid through the casing, and if desired the bushing 12 may also be grooved as at 32 for the same purpose. It will be evident, however, that the employment of such grooves is not essential for the reason that the annular passageway formed between the tubular stem and bushing 12 may be made of the proper diameter to permit the fluid to pass at a sufficiently rapid rate of speed.

For convenience in removing and assembling the seat member, its lower end may be provided with openings 33 adapted to receive a spanner wrench, the tubular member being, for this purpose, prevented from turning by reason of its frictional engagement with the seat 18 on the casing.

While I have herein described the valve with reference to the vertical position illustrated in the drawings, I have done so merely for convenience, it being evident that the valve is operative in any position in which it is desired to be used.

I claim as my invention:

1. A valve comprising, in combination, a casing having a partition with a port therein and having a port in its wall aligned with said port in the partition, a valve member mounted in the wall of said casing and extending through said port therein, a tubular member extending through said port in the partition, a screw stem mounted in the wall of the casing and having its inner end slidably connected to said tubular member and arranged to be operated to cause said tubular member to close either the port in the partition or the port in the casing and said stem serving to cooperate with the tubular member to permit or prevent the flow of fluid therethrough according to whether the member closes the port in the partition or the port in the casing, and a seat member

arranged to cooperate with said valve member to control the flow of fluid through the tubular member, said seat member being mounted on the tubular member so as to be removable therefrom when desired.

2. A valve comprising, in combination, a casing having a partition with a port therein and having a port in its wall alined with said port in the partition, a valve member mounted in the wall of said casing and extending through said port therein, a tubular member extending through said port in the partition and having a conical seat in its upper portion and outlet ports adjacent said seat, a screw stem mounted in the wall of the casing and having its inner end tapered and slidably connected to said tubular member whereby by the operation of said stem the tubular member may be either held in position to close the port in the partition and to permit the flow of fluid through the tubular member, or may be held in position to prevent a flow of fluid through the tubular member and said ports and to permit a flow of fluid around the member, and a seat member carried by said tubular member, said valve and seat members being adapted to be removed when the flow of fluid through the tubular member is prevented.

3. A valve comprising, in combination, a casing having a partition with an opening therein and a port in its wall, a bushing in said opening in the partition alined with the opening in the wall, a valve member mounted in the wall of said casing and extending through said port therein, a tubular member extending through said bushing in the partition and having a collar arranged to seat either upon one end of the bushing or upon the edge of the port in the casing, a screw stem mounted in the wall of the casing and operatively connected with said tubular member whereby by the operation of said stem said collar may be held in position to close the opening in the partition and to permit the flow of fluid through the tubular member, or in position to prevent a flow of fluid through the tubular member and to permit a flow of fluid around the member, and a seat member carried by said tubular member, said valve and seat members being adapted to be removed when the flow of fluid through the tubular member is prevented.

4. A valve comprising, in combination, a casing having a partition with a port therein and a port in its wall, a valve member mounted in the wall of said casing and extending through said port therein, a tubular member extending through said port in the partition, means operatively associated with said tubular member whereby said member may be either held in position to close the port in the partition and to permit a flow of fluid through the member, or may be held in position to prevent a flow of fluid there-

through and to permit of a flow of fluid around the member, said valve and seat members being adapted to be removed when the flow of fluid through the tubular member is prevented.

5. A valve comprising, in combination, a casing having a partition with a port therein and a port in its wall, a valve member mounted in the wall of said casing and extending through said port therein, a screw stem mounted in the wall of the casing, and means operatively associated with said stem for operation thereby to close the port in the partition and to permit of a flow of fluid through said port in the casing, or vice versa, and a seat member for said valve member, said valve and seat members being adapted to be removed when the port in the casing is closed.

6. A valve comprising, in combination, a casing having a transverse partition with a port therein and a port in its wall, a valve member and a seat member, and means adapted to form one passageway through said casing arranged to be controlled by said valve and seat members or to form another passageway through the casing independently of said members, said means including a screw stem mounted in the wall of the casing and having an annular groove of substantial width in its lower end, a tubular member having a pin operating in said groove longitudinally of the stem and having a peripheral collar, said pin-and-groove connection between the stem and tubular member being arranged to permit the stem to operate said member into position to either close the port in the partition or the port in the casing.

7. A valve comprising, in combination, a casing having an inlet and an outlet, a valve member and a seat member, and means adapted to form with said inlet and outlet one passageway through said casing arranged to be controlled by said valve and seat members, or to form with said inlet and outlet another passageway through the casing independently of said members, said means including a tubular member movably mounted in the casing and adapted to cooperate therewith to form said passageways.

8. A valve comprising, in combination, a casing having an inlet and an outlet, a valve member and a seat member, and means adapted to form with said inlet and outlet one passageway through said casing arranged to be controlled by said valve and seat members or to form with said inlet and outlet another passageway through the casing independently of said members, said means including a tubular member, and a screw stem having a sliding connection therewith.

9. A valve comprising, in combination, a casing having a port in its wall, a valve

- member and a seat member, and means adapted to form one passageway through said casing arranged to be controlled by said valve and seat members or to form another
- 5 passageway through the casing independently of said members, said means including a tubular member into which said seat member is threaded and arranged to be removed through said port in the casing.
- 10 10. A valve comprising, in combination, a casing having means forming two independent passageways, said means including a member movable into position to close either of said passageways, and valve mechanism operatively associated with said member to control the flow of fluid through one of said passageways.
- 15 11. A valve comprising, in combination, a casing having two ports, a member movable into position to close either of said ports, and a valve member entered through one of said ports and arranged to control the flow of fluid when the first-mentioned member closes the other one of said ports.
- 20 12. A valve comprising, in combination, a casing having two alined ports, a member movable into position to close either of said ports, a valve seat member removably carried by said movable member, and a valve member arranged to coact with said seat member.
- 30 13. A valve comprising, in combination, a casing having an inlet and an outlet and two alined ports, and a closure member movable into position to effectively close either of said ports, and operative by its own movement when closing either port to establish communication between said inlet and said outlet through the other port.
- 40 14. A valve comprising, in combination, a casing having two ports, an inlet and an outlet, and a tubular member movable into position to effectively close either of said ports and arranged to form a fluid passageway between said inlet and said outlet when closing either port, one of said passageways being formed around and the other through said tubular member.
- 45 15. A valve comprising, in combination, a casing having two alined ports, a tubular member movable into position to close either of said ports and arranged to form a fluid passageway when closing either port, and means for moving said member and preventing the passage of fluid therethrough when closing one of said ports.
- 50 16. A valve comprising, in combination, a casing having two ports, a tubular member movable into position to close either of said ports and arranged to form a fluid passageway when closing either port, and means for moving said tubular member and also controlling the passage of fluid therethrough.
- 60 17. A valve comprising, in combination, a casing having two ports, a member movable in one of said ports into position to close either of them, a seat member carried by said movable member, and a valve member arranged to coact with said seat member, said valve and seat members being removable
- 70 when said movable member closes one of said ports.
18. A valve comprising, in combination, a casing having two ports alined with each other, a member movable into position to close either of said ports and having a valve seat, a valve member arranged to coact with said seat and having an operating screw stem mounted in one side of the casing, and means for moving said movable member including a screw stem mounted in the other side of the casing.
- 80 19. A valve having, in combination, a casing having an inlet and an outlet and a port, a member movable into position to either close or open said port, said member serving when said port is open to form a fluid passageway between it and the port communicating with said inlet and outlet and being adapted to permit a flow of fluid therethrough from the inlet to the outlet when closing the port.
- 90 20. A valve having, in combination, a casing having a port, a member movable into position to either close or open said port, said member serving when said port is open to form a fluid passageway between it and the port and when said port is closed thereby to form a passageway therethrough, and valve mechanism for controlling the rate of flow of fluid through the second mentioned passageway.
- 100 21. A valve having, in combination, a casing, means forming two passageways, means for closing either of said passageways, and valve mechanism for controlling the flow of fluid through one of the said passageways including a valve member and a seat member therefor adapted to be removed when one of the passageways is closed.
- 110 22. A valve having, in combination, a casing having a port, a head removably mounted in the side of the casing in axial alignment with said port, a movable member adapted to close said port, a seat member carried by said movable member, and a needle valve mounted in said head and arranged to coact with said seat member to regulate the rate of flow through the casing.
- 115 23. A valve having, in combination, a casing having two ports, a member having a passageway therethrough and movable into position to close either of said ports, and an operating stem mounted in the casing and having a sliding connection with said member, said stem being adapted in one position to close the passageway in said member.
- 125 24. A valve having, in combination, a casing having two ports, a member movable into position to close either of said ports and
- 130

having a valve seat, an operating stem mounted in the casing and having a sliding connection with said member, and a valve member mounted in the casing and arranged
5 to coact with said valve seat.

25. In combination with a casing having a through passage, controlling means for said passage adapted to form two separate passageways one of which is closed while
10 the other is open, and a valve mechanism arranged to control the rate of flow through one of said passageways, said casing having an opening therein through which said valve mechanism may be removed when the pas-
15 sageway controlled thereby is closed and said opening being closed when the other passageway is open.

26. A valve having, in combination, a casing having a port and an opening, a bushing
20 in said opening having a slot near one end, a tubular member movable in said bushing into position to close either one end thereof or said port and having a port near its oppo-
25 site end communicating with said slot in the bushing, and means for closing the port in

the tubular member when said member closes the port in the casing.

27. A valve having, in combination, a casing having two ports, a tubular member movable into position to close either of said
30 ports, means for stopping the flow of fluid through said tubular member when it closes one of said ports, and means for controlling the flow of fluid through said tubular member when it closes the other one of said ports. 35

28. A valve having, in combination, a casing having an inlet and an outlet opening and a port in its wall and having a partition between said openings with a port therein, a
40 tubular member movable into position to close either of said ports, the interior thereof being arranged to communicate with said inlet and outlet when closing the port in the partition, and means for stopping the flow of
45 fluid through said tubular member when it closes the port in the casing wall.

In testimony whereof I have hereunto set my hand.

GEORGE HILGER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."