July 24, 1923.

1,462,857

N. H. HILLER

VALVE BLOCK FOR COMPRESSORS OR PUMPS

Filed Dec. 8, 1921

2 Sheets-Sheet 1

Fig. 1.

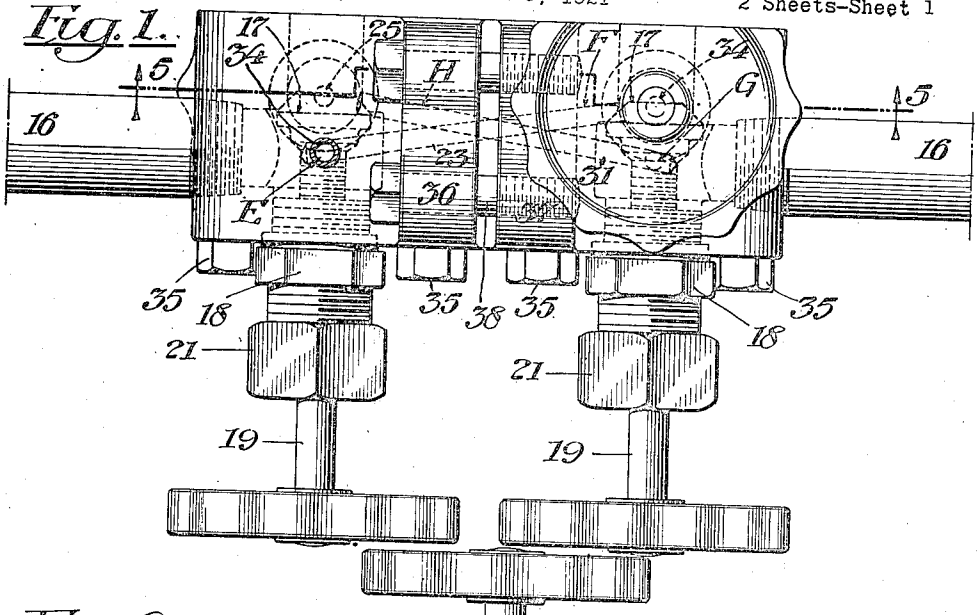


Fig. 2.

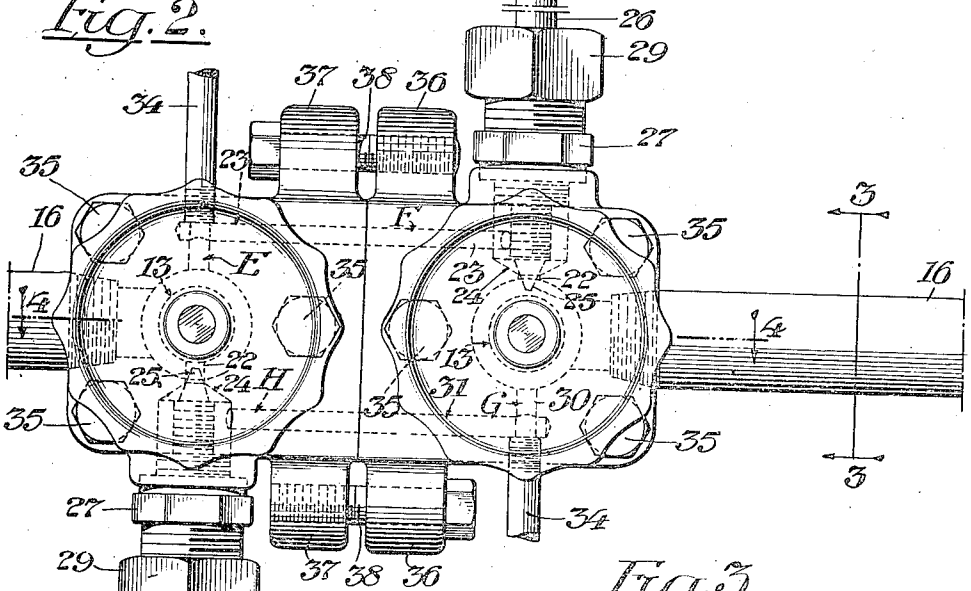
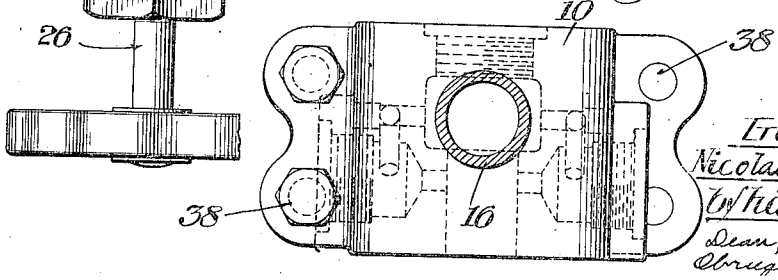


Fig. 3.



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Fig. 4.

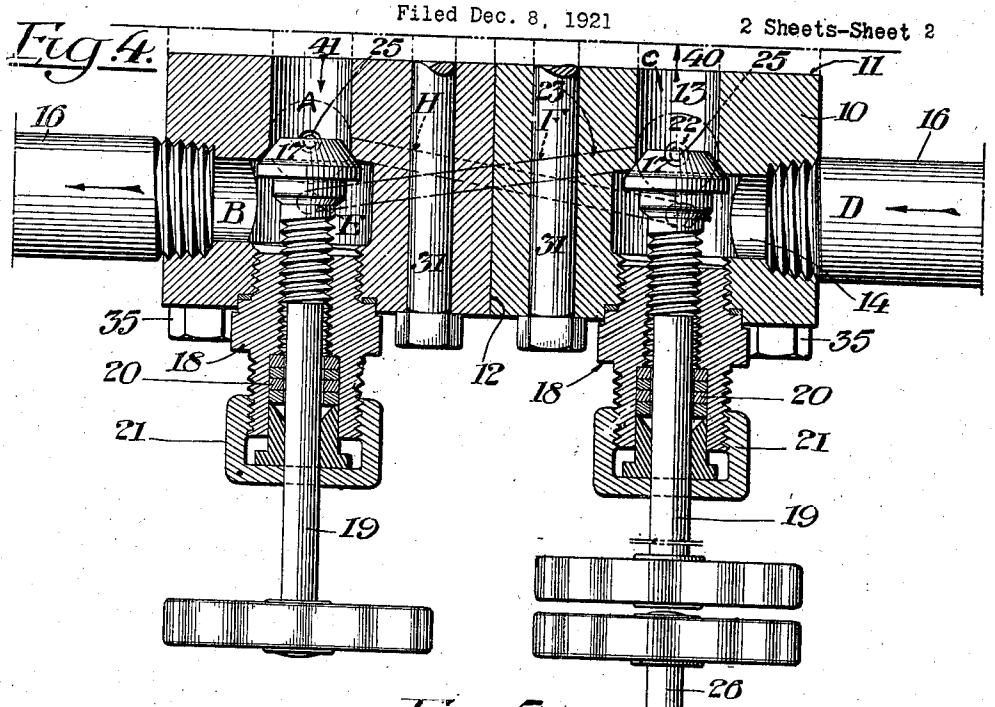
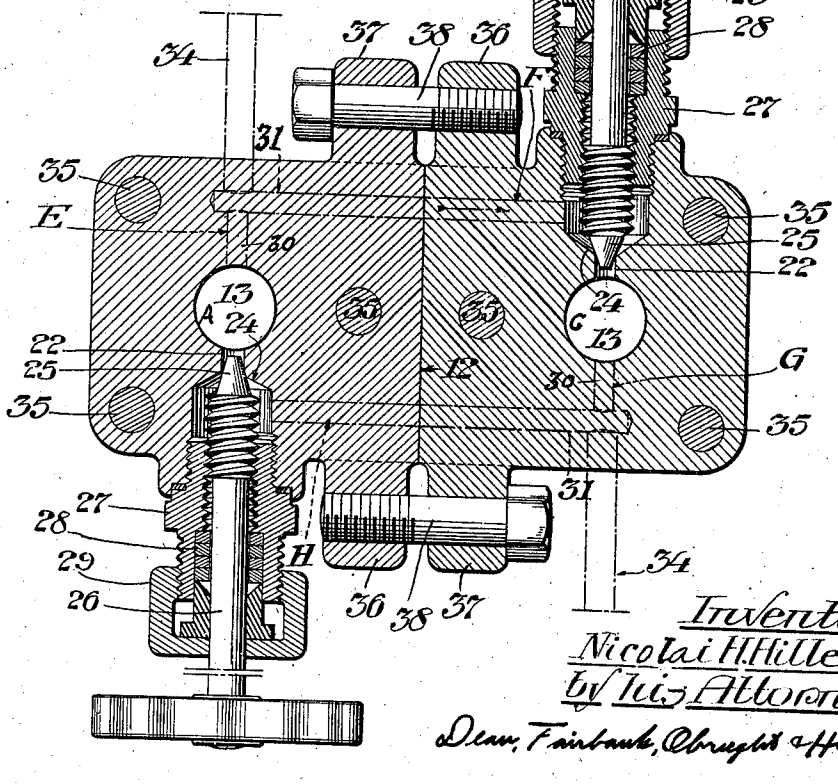


Fig. 5.



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UNITED STATES PATENT OFFICE.

NICOLAI H. HILLER, OF CARBONDALE, PENNSYLVANIA.

VALVE BLOCK FOR COMPRESSORS OR PUMPS.

Application filed December 8, 1921. Serial No. 520,831.

To all whom it may concern:

Be it known that I, NICOLAI H. HILLER, a citizen of the United States, and resident of Carbondale, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Valve Blocks for Compressors or Pumps, of which the following is a specification.

In the use of pumps and compressors it is sometimes desirable to cause the compressor or pump to draw from what is normally the receiving conduit or chamber and deliver to what is normally the supply conduit or chamber. For instance in the operation of a refrigerating plant, it is sometimes desirable or necessary to empty the condenser of ammonia and temporarily store the ammonia in the expansion coils or in other receivers during a repair or replacement of the condenser.

For simplicity of expression I will hereinafter use only the term "pump" but it is understood that this term is to be used in its broadest significance to include mechanisms for receiving and discharging fluids whether such fluids be liquids or gases, and whether or not the discharge be under pressure.

The main object of my invention is to provide a simple form of valve block which may be directly attached to the head of the pump and provided with passages and valves whereby the direction of flow of the fluid in the supply and discharge conduits may be reversed without stopping or altering in any way the operation of the pump.

A further object is to simplify the design and reduce the cost of manufacture by making the complete valve block of two identic sections or members adapted to be directly secured together and to be secured to the pump head in registry with the inlet and outlet ports of the latter. Thus each unit block may be simple in construction and inexpensive to manufacture, and only one kind of unit block need be carried in stock, and only one set of patterns, jigs, dies, etc., need be employed. In assembling, two of the unit blocks may be connected together in mutually reversed positions. This is a very material advantage over the use of a large single complicated block with all of the valves and passages therein, or a construction in which separate and oppositely formed right and left sections are necessary.

My invention in its preferred form includes a valve block adapted to be secured to the pump head and in either of two positions, whereby its main passage may register with either the inlet or outlet port of the pump. The valve block has a contact face adapted to engage with the contact face of an identic valve block in reverse position, and each block has branch passages leading from its main passage and upon opposite sides of its main valve, to this contact face. The passages are so located that they register at said contact face to form cross-overs or by-passes from the pump sides of the two main valves to the outer sides thereof. These by-passes are controlled by suitable valves, one in each valve block, whereby when the main valves are closed and the by-pass valves are opened, the pump will draw through one by-pass from what is normally the delivery conduit of the pump and will deliver through the other by-pass to what is normally the supply conduit of the pump.

In the accompanying drawings I have illustrated one embodiment of my invention. In these drawings:—

Fig. 1 is a side elevation,

Fig. 2 is a face view,

Fig. 3 is an end view taken substantially one the line 3—3 of Fig. 2 and with the valves, glands, etc., removed,

Fig. 4 is a section on the line 4—4 of Fig. 2, and

Fig. 5 is a section on the line 5—5 of Fig. 1.

In Figs. 4 and 5, the passages which are beyond the plane of the section are shown in dotted lines and the passages which are in front of the plane of the section are shown in dot and dash lines.

In the form illustrated each valve block or unit includes a body portion 10 preferably of cast metal and having a face 11 adapted to be secured to the head of a pump and a second face 12 adapted to be secured to a similar face of another valve block. The block has a main passage therethrough which includes sections 13—14 separated by a valve seat 15. The passage 13 leads to the face 11 whereby it may communicate with a port of the pump and the passage 14 terminates in the side of the block opposite to the face 12 and is adapted for the connection thereto of one of the main conduits 16 of the pump. For controlling this main passage 13—14 there is provided a valve 17 adapted

to coact with the seat 15. Any suitable means may be employed for operating this valve and packing the valve stem thereof. As shown, a valve bonnet 18 is threaded into the block in alignment with the passage 13, and has a central threaded passage for receiving and supporting the valve stem 19. The valve bonnet carries a suitable gland 20 and gland nut 21 for packing the valve stem.

In addition to the main passage there are provided a pair of branch passages leading to the face 12 of the block, and from opposite sides of the valve seat 15. One of these passages includes sections 22 and 23 separated by a valve seat 24. The passage 22 leads from the passage 13, while the passage 23 leads from the face 12. For controlling the flow through these passages 22 and 23 there is provided any suitable form of valve. This is shown as a needle valve 25 carried by a valve stem 26, the latter being mounted in a valve bonnet 27 and packed by a gland 28 and gland nut 29. It will be noted that this valve controlled passage 22—23 leads from the main passage on the pump side of the main valve 17. The other branch passage in the valve block includes intersecting sections 30 and 31, the former leading from the passage 14 which is at the outside of the valve 17 and the latter leading from the face 12. The ends of the passages 23 and 31 are so positioned in the face 12, that when another valve block of identic construction is secured to it in reversed position, as shown in Fig. 2, the passage 23 of each block will register with the passage 31 of the other. The passages 23 and 31 may be drilled directly from the face 12, so that comparatively short drills are needed, particularly as compared with the drills which would be necessary if the two blocks were made integral. The passage sections 30 may be drilled in from the side of the block and the outer end may be closed by a plug or a pressure gauge or the coupling 34 thereof, may be connected thereto.

Any suitable means may be employed for securing the valve block to the pump cylinder head. As shown, there are provided three holds for screw bolts 35. Any suitable means may be employed for rigidly securing two valve blocks together in mutually reversed positions, and with the faces 12 in contact. As shown, each block has a pair of lugs 36—37 upon opposite sides thereof and adjacent to the face 12. The lug 36 is threaded and the lug 37 has a smooth bore, so that when the two blocks are brought together in reverse position, screw bolts 38 may be employed. It will be noted that the threaded lug 36 is on the same side of the casting with the bonnet 27, so that in inserting the bolts 38 and tightening them, the valve bonnet does not interfere with the action of the wrench or other tool. The gauges do not need to be connected until after the two valve blocks have been connected and secured in place.

It will be noted that the two main valves have their stems projecting parallel from the outer sides of the two valve blocks and it is these valves which are employed for controlling the main passages. The by-pass valves 25 are normally closed, and it will be noted particularly from Fig. 5 that the valve stem of one extends in one direction and the other in the other direction, and that they lie adjacent to and parallel with the pump cylinder head.

In operation it may be assumed that the blocks are connected to a pump cylinder head with the main passage of the right hand block in registry with the pump inlet port 40 and the main passage of the left hand block in registry with the pump outlet port 41. With the valves 17 open and the valves 25 closed, the normal flow of fluid will be in the direction indicated by the arrows in Fig. 4, and only through the main passages. When it is desired to cause the pump to draw from what is ordinarily the discharge or receiving conduit 16 shown at the left of Fig. 4, and deliver to what is ordinarily the supply conduit 16 shown at the right of Fig. 4, the two valves 17 are closed and the two valves 25 are opened. The pump will then draw from the conduit 16 of the left hand valve block and thence through passage B, the by-pass E—F and passage C. The discharge from the pump outlet port 41 will be through the passage A, by-pass H—G and passage D. This action may be maintained until the desired quantity of fluid is transferred or until the desired pressure or vacuum is produced.

The two valve blocks being identical may be made with a single set of patterns, jigs, etc., all of the drilled passages are comparatively short, and all of the parts may be assembled prior to securing the valve blocks to the pump cylinder head. The supply and delivery conduit 16 may be connected to the valve blocks in the same way that they are ordinarily connected to the cylinder head.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A valve block adapted to be secured to a pump cylinder port and having a main passage therethrough for registry with said port, a valve within said block for controlling said passage, and a pair of branch passages leading from said main passage at opposite sides of said valve, and a second valve in said block for controlling one of said branch passages.

2. A valve block adapted for use in connection with a pump and having a main passage therethrough for registry with a

port of said pump, a valve within said block for controlling said passage and a pair of branch passages leading from said main passage at opposite sides of said valve and terminating in one face of said block, and adapted to register with corresponding branch passages in a similar block to form by-passes.

3. A valve block adapted for use in connection with a pump and having a main passage therethrough for registry with a port of said pump, a valve within said block for controlling said passage and a pair of branch passages leading from said main passage at opposite sides of said valve and terminating in one face of said block, and adapted to register with corresponding branch passages in a similar block to form by-passes, and means for controlling said by-passes.

4. A valve block adapted for use in connection with a pump and having a main passage therethrough for registry with a port of said pump, a valve within said block for controlling said passage, and a pair of branch passages leading from said main passage at opposite sides of said valve and terminating in one face of said block, and adapted to register with corresponding branch passages in a similar block to form by-passes, and separate valves for said by-passes.

5. A valve block adapted for use in connection with a pump and having a main passage therethrough for registry with a port of said pump, a valve within said block for controlling said passage and a pair of branch passages leading from said main passage at opposite sides of said valve and terminating in one face of said block, and adapted to register with corresponding branch passages in a similar block, the branch passage from the delivery side of said valve registering with the branch passage from the delivery side of the valve of the other block and the branch passage from the supply side of said valve registering with the branch passage from the supply side of the valve of the other block.

6. A valve block adapted for use in connection with a pump and having a main passage therethrough for registry with a port of said pump, a valve within said block for controlling said passage and a pair of branch passages leading from said main passage at opposite sides of said valve and terminating in one face of said block, and adapted to register with corresponding branch passages in a similar block, the branch passage from the delivery side of said valve registering with the branch passage from the delivery side of the valve of the other block, and the branch passage from the supply side of said valve registering with the branch passage from the supply side of the valve of the other block to form by-passes between said main passages, and separate valves controlling said by-passes.

7. A valve block having a surface adapted to be secured to a pump cylinder head, and having a main passage therethrough terminating in said surface for registering with a pump port, a valve within said valve block for controlling said main passage, said block having a surface at right angles to said first mentioned surface and adapted to engage with a corresponding surface of a similar valve block, separate passages leading from said second mentioned surface to said main passage upon opposite sides of said valve, and a valve in one of said second mentioned passages.

8. A double cross-over apparatus for pumps, including a pair of similar valve blocks adapted to be secured to the pump cylinder head and each having a main passage therethrough, one for registry with the inlet port and the other with the outlet port of the pump, separate valves for controlling said passages and a pair of by-passes in said blocks each leading from the pump side of its corresponding valve to the other side of the other valve, and separate valves for controlling said by-passes.

9. A double cross-over apparatus for pumps, including a pair of similar valve blocks adapted to be secured to the pump cylinder head and each having a main passage therethrough, one for registry with the inlet port and the other with the outlet port of the pump, separate valves for controlling said passages and a pair of by-passes in said blocks each leading from the pump side of its corresponding valve to the other side of the other valve, and separate valves for controlling said by-passes, the valve for one by-pass being in one valve block and that for the other by-pass in the other block.

10. A double cross-over device for pumps, including a pair of identic and interchangeable valve blocks, each having a main passage therethrough, one for the normal main supply to the pump and other for the normal main discharge therefrom, valves in said blocks for controlling said passages, and a pair of by-passes each formed partly in each block, and each extending from the pump side of its corresponding valve to the opposite side of the other valve, and means for normally preventing the flow of fluid through said by-passes.

Signed at Carbondale, in the county of Lackawanna and State of Pennsylvania this 1st day of December A. D. 1921.

NICOLAI H. HILLER.