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VALVE MECHANISM

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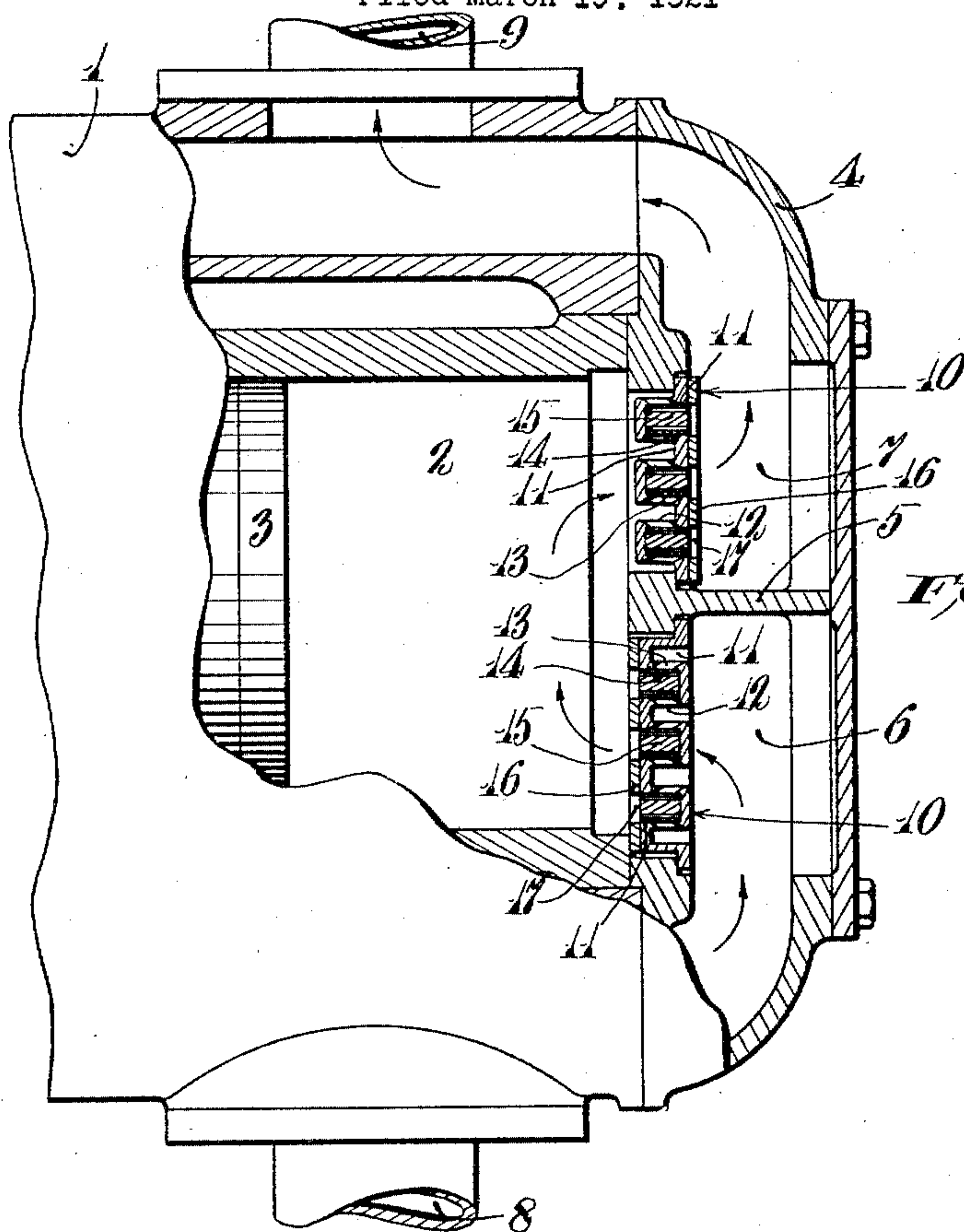


Fig. 1.

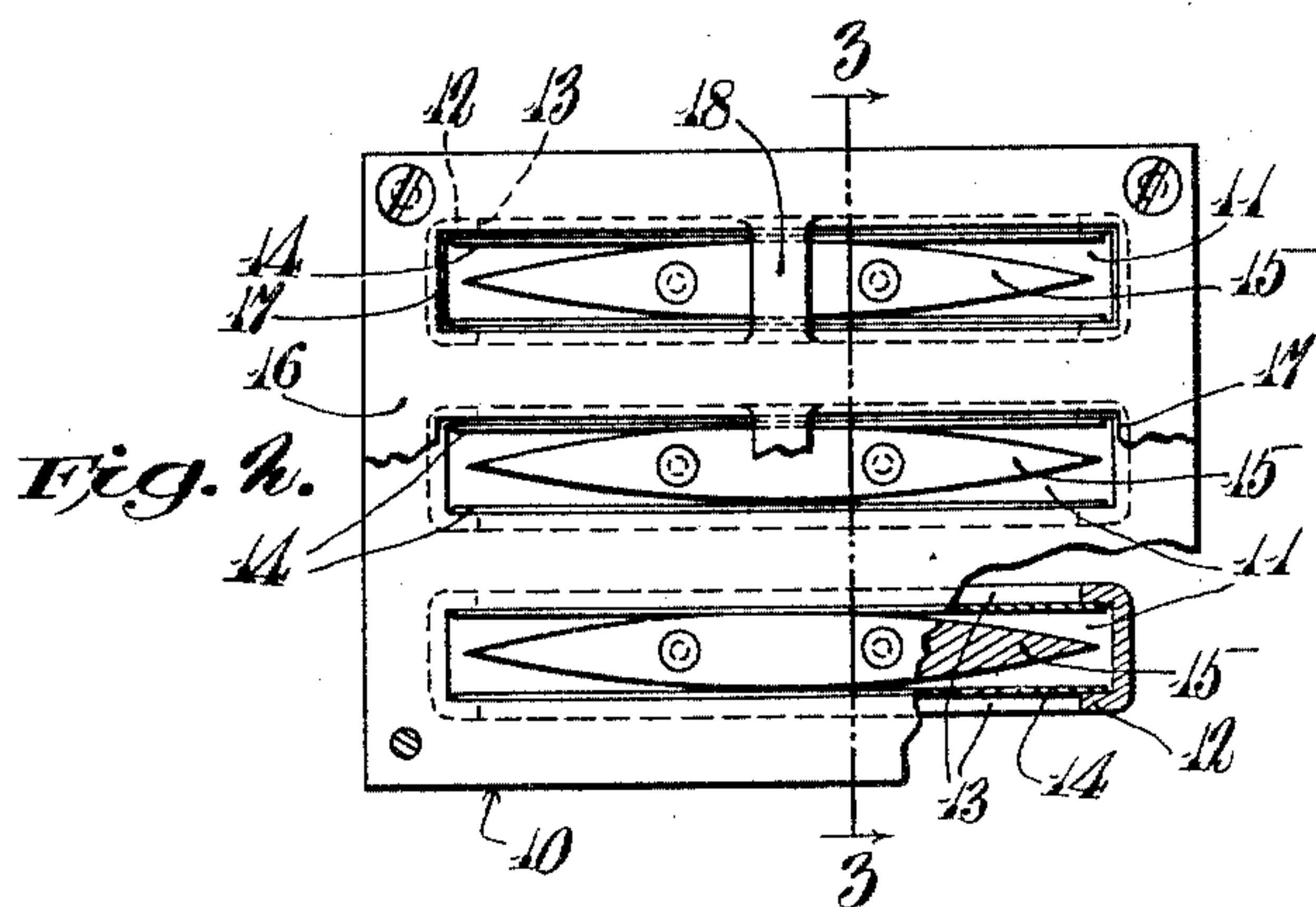


Fig. 2.

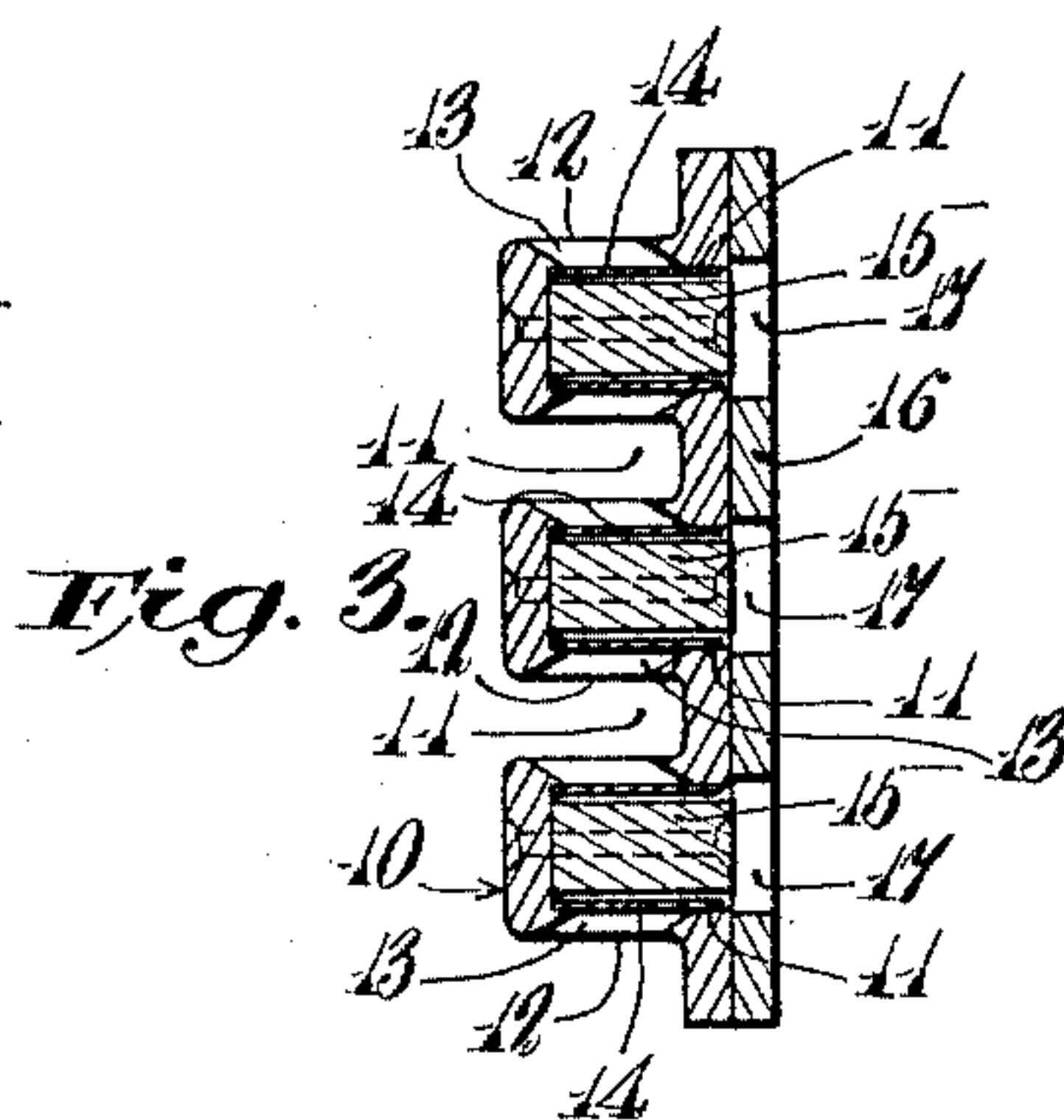


Fig. 3.

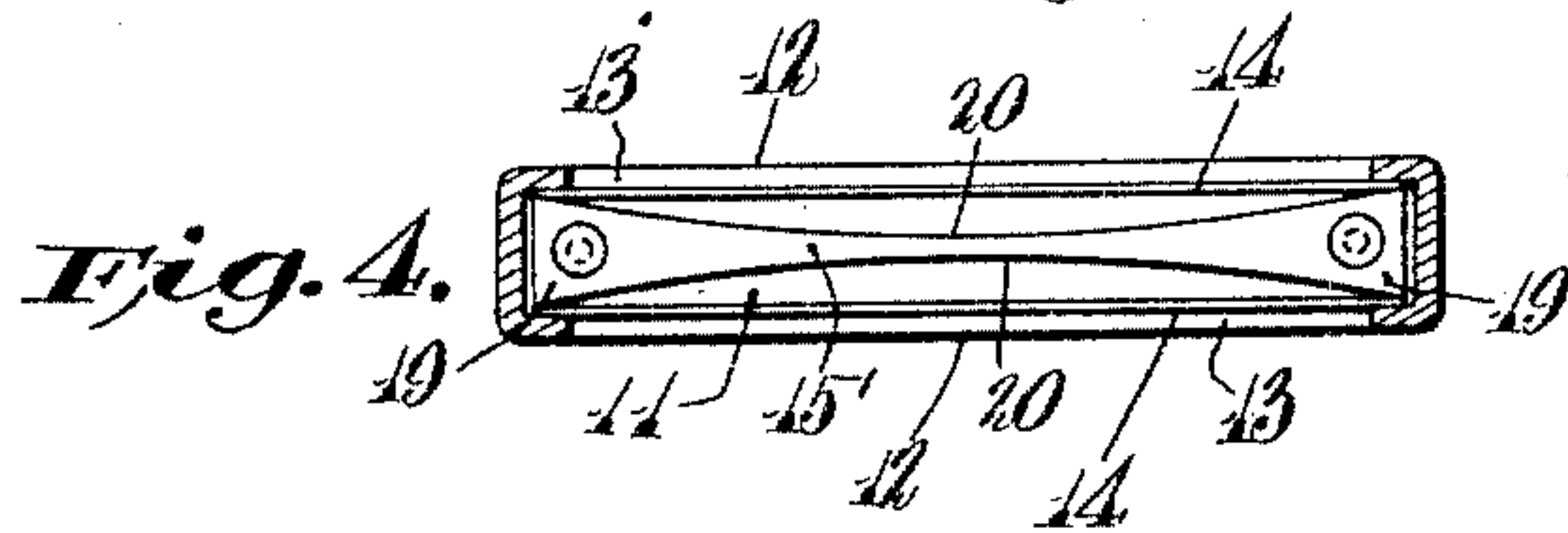


Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## VALVE MECHANISM.

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My invention relates to valve mechanisms, and more particularly to valve mechanisms for pumps or compressors.

An object of my invention is to provide an improved valve mechanism for use in pumps and more particularly for use in pumps of the type used for the compression of gaseous fluids. Another object of my invention is to provide an improved and very simple type of valve mechanism for pumps of the type specified in which springs may be omitted and in which a large port area may be secured with relatively small over-all valve area.

In the accompanying drawings I have shown for purposes of illustration two forms which my invention may assume in practice.

In these drawings,—

Fig. 1 is a view partially in elevation and partially in central longitudinal section through one end of the compressor cylinder.

Fig. 2 is a view partially in elevation with parts broken away, and partially in section, of a valve cage constructed in accordance with my invention.

Fig. 3 is a transverse section on the line 3—3 of Fig. 2.

Fig. 4 is a view in section corresponding to the lower right hand corner of Fig. 2, and showing another illustrative form which my invention may assume in practice.

In illustrating my invention I have shown it embodied in a pump of the air compressor type comprising a cylinder 1 having a bore 2 in which a piston 3 is reciprocable in a well-known manner. The cylinder 1 is closed at its rear end by a head member 4 divided into two compartments by a partition 5, the compartments being numbered 6 and 7 and being, respectively, inlet and discharge compartments. The inlet compartment communicates with an intake pipe or line 8 and the discharge compartment with a discharge pipe 9. Within each of the compartments is arranged a valve constructed in accordance with an illustrative form of my invention.

Describing first the discharge valve mechanism, it will be noted to comprise a cage member 10 formed upon its opposite sides with parallel grooves 11, these grooves 11 being so arranged that the grooves on one side lie between those on the other and being

connected through their intervening walls 12 by ports 13, which ports are closed when the compressor is idle by narrow thin sheet metal plate valves 14, the side walls of the grooves against which the valves 14 abut being ground to permit smooth seating. Within the grooves 11 on the side toward the cylinder head of the cage member 10 are secured backing members 15, these members being very slightly shorter than the length of the valves 14 and of a width at their central portions sufficiently less than the width between the walls 12 of the slots to permit the valve to lie freely but snugly between their sides and the walls 12. The members 15 are tapered from the center toward each end in such manner as to provide increasing clearance at the ends thereof whereby the valves may, under the action of fluid pressure, be pressed from their seats adjacent the ends and be rolled back around the sides of the member 15. For the purpose of preventing the valves 14 from falling out of place, I provide a cover plate 16 having openings 17 therethrough coinciding with the grooves 11 in the cage member 10, the openings being traversed at their central portions by web members 18 which serve to retain the valves in position.

With respect to the inlet valves, the primary distinction will be found in the fact that the grooves containing the valve members 14 are arranged on the side of the cage toward the cylinder bore and that the cover plate 16 is applied on that side of the cage instead of upon the opposite side.

It will be obvious that the precise form of backing members for the valves shown does not need to be employed and that instead of tapering these members from the center towards the ends it is possible to make them of maximum thickness at the ends and taper them toward the center whereby the central portion of the valve opens a maximum amount. This construction is illustrated in Fig. 4 in which a backing member 15' is shown of a width just less than the width of the groove 11 at its ends 19 but at its center of a relatively much smaller thickness as indicated at 20.

While I have in this application specifically described several forms which my invention may assume in practice, it will be



understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:—

1. An air compressor valve mechanism comprising valve seats disposed in parallel planes, separate valves cooperating with said seats and each having portions approaching the other on opening, and rigid means disposed between said valves to guide the same during opening movement, said rigid means preventing converging surfaces one facing each of said valves and having its portions extending in opposite directions from the longitudinal center towards the two ends thereof substantially symmetrical with respect to each other.

2. An air compressor valve mechanism comprising valve seats disposed in parallel planes, separate valves cooperating with said seats and each having portions approaching the other on opening, and rigid means disposed between said valves to guide the same during opening movement, said rigid means presenting converging surfaces one facing each of said valves and having its portions extending in opposite directions from the longitudinal center towards the two ends thereof substantially symmetrical and further having its portions at opposite sides of the plane parallel to the planes of the valve seats and midway between the latter substantially symmetrical.

3. An air compressor valve mechanism comprising valve seats disposed in parallel planes, separate valves cooperating with said seats and each having portions approaching the other on opening, and rigid means disposed between said valves to guide the same during opening movement, said rigid means also constituting flow directing means and presenting converging surfaces one facing each of said valves and having its portions extending in opposite directions from the longitudinal center towards the two ends thereof substantially symmetrical with respect to each other.

4. An air compressor valve comprising valve seats disposed in parallel planes, separate parallel valves having oppositely extending free end portions cooperating with said seats and approaching each other on opening movement, and a rigid member disposed between said seats and having curved converging surfaces into contact with which said free end portions of said valves progressively move upon opening movement thereof, said surfaces likewise constituting flow directing surfaces.

5. An air compressor valve comprising seats disposed in parallel planes, separate parallel valves having oppositely extending

free end portions cooperating with said seats and approaching each other on opening movement, and rigid means presenting curved converging surfaces disposed between said valves of a width adjacent its central portion to maintain said valves in contiguity to said seats, said means tapering toward its two ends whereby said free end portions of said valves may move away from their seats a greater distance than other portions thereof.

6. An air compressor valve mechanism comprising a cage provided with a plurality of parallel flow slots each having ports opening laterally thereinto through its opposite sides, valve seats surrounding said ports and disposed in parallel planes, separate valves cooperating with said seats each having portions approaching the other on opening, and rigid means disposed between said valves to guide the same during opening movement, said rigid means presenting converging surfaces one facing each of said valves and having its portions at opposite sides of the longitudinal center thereof substantially symmetrical.

7. An air compressor valve mechanism comprising a cage provided with a plurality of parallel flow slots each having ports opening laterally thereinto through its opposite sides, valve seats surrounding said ports and disposed in parallel planes, separate valves cooperating with said seats each having portions approaching the other on opening, and rigid means disposed between said valves to guide the same during opening movement, said rigid means presenting converging surfaces one facing each of said valves, and having its portions extending in opposite directions from the longitudinal center towards the two ends thereof substantially symmetrical and further having its portions at opposite sides of the plane parallel to the planes of the valve seats and midway between the latter substantially symmetrical.

8. An air compressor valve mechanism comprising a cage provided with a plurality of parallel flow slots each having ports opening laterally thereinto through its opposite sides, valve seats surrounding said ports and disposed in parallel planes, separate valves cooperating with said seats each having portions approaching the other on opening, and rigid means disposed between said valves to guide the same during opening movement, said rigid means also constituting flow directing means and presenting converging surfaces one facing each of said valves and having its portions at opposite sides of the longitudinal center thereof substantially symmetrical.

9. An air compressor valve mechanism comprising a cage provided with a plurality of parallel flow slots rectangular in longi-



5 tudinal and transverse cross section each  
having ports opening laterally thereinto  
through its opposite sides, valve seats sur-  
rounding said ports and disposed in paral-  
5 lel planes, separate valves cooperating with  
said seats each having portions approaching  
the other on opening, and rigid means dis-  
posed between said valves to locate and  
guide the same during opening movement,  
0 said rigid means presenting converging sur-  
faces one facing each of said valves and  
having its portions at opposite sides of the  
longitudinal center thereof substantially  
symmetrical.

5 10. An air compressor valve comprising a  
cage having parallel slots formed therein,  
valve seats formed at opposite sides of said  
slots and mutually parallel but perpendicu-  
lar to the surface of said cage traversed by  
0 said slots, valves cooperating with said  
seats, and rigid means disposed in said slots  
having a valve positioning portion midway  
of its length and tapering valve guiding  
portions formed thereon at each end there-  
5 of.

11. An air compressor valve comprising  
valve seats disposed in parallel planes,  
flexible valves cooperating with said seats  
having a central portion and end portions,  
0 said valves disposed in parallel planes when  
in seated position, and a member located be-  
tween the planes of said valves adapted  
rigidly to position said central portions and  
to guide said end portions inwardly along

their entire length during opening move- 35  
ments thereof.

12. An air compressor valve mechanism  
comprising valve seats disposed in parallel  
planes, separate valves cooperating with  
said seats and each having free end portions 40  
approaching the other on opening, and rigid  
means disposed between said valves to guide  
the same during opening movement, said  
rigid means having a valve positioning  
means intermediate its ends and presenting 45  
converging surfaces one facing each of said  
valves and having its portions extending in  
opposite directions from the longitudinal  
center towards the two ends thereof sub-  
stantially symmetrical with respect to each 50  
other.

13. An air compressor valve mechanism  
comprising valve seats disposed in parallel  
planes, separate valves cooperating with  
said seats and each having free end por- 55  
tions approaching the other on opening, and  
rigid means disposed between said valves to  
guide the same during opening movement,  
said rigid means having a central valve po-  
sitioning portion and presenting converging 60  
surfaces one facing each of said valves and  
having its portions extending in opposite  
directions from the longitudinal center  
towards the two ends thereof substantially  
symmetrical with respect to each other. 65

In testimony whereof I affix my signature

FRED D. HOLDSWORTH.