(No Model.)

2 Sheets—Sheet 1.

A. F. HALL.

PUMP.

No. 531,528. Patented Dec. 25, 1894.

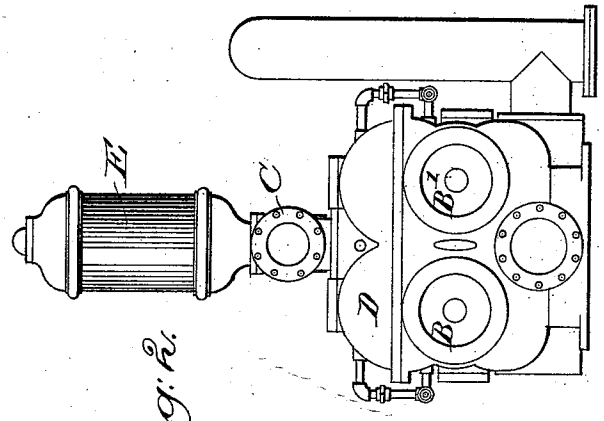

Fig. 2.

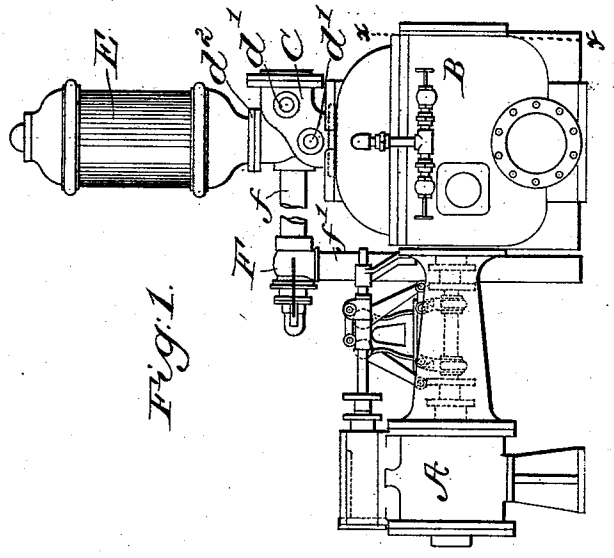

Fig. 1.

Witnesses.
Fred S. Gruenbaf.
Oscar F. Hill

Inventor
Albert F. Hall.
by Crosby & Gregory
Attys.

(No Model.) 2 Sheets—Sheet 2.

A. F. HALL.

PUMP.

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Fig. 3.

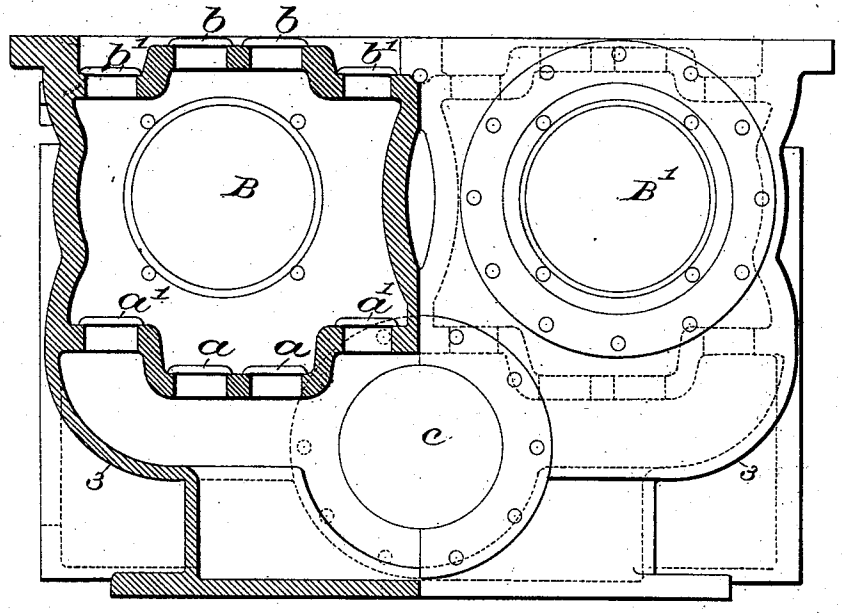


Fig. 4.

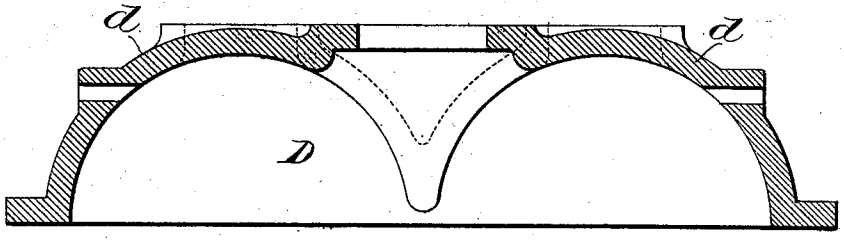
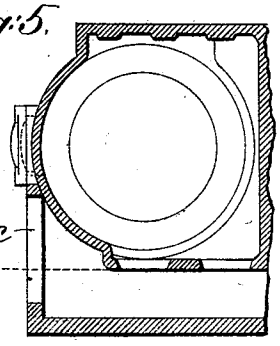


Fig. 5.



Witnesses.
Fred. L. Gunther.
Oscar F. Hill

Inventor:
Albert F. Hall.
by Crosby & Gregory
Attys.

UNITED STATES PATENT OFFICE.

ALBERT F. HALL, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE GEO. F. BLAKE MANUFACTURING COMPANY, OF NEW JERSEY.

PUMP.

SPECIFICATION forming part of Letters Patent No. 531,528, dated December 25, 1894.

Application filed August 26, 1891. Serial No. 403,781. (No model.)

To all whom it may concern:

Be it known that I, ALBERT F. HALL, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Pumps, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to improve the construction of steam pumps, whereby great compactness, together with additional strength may be secured without affecting the efficiency of the pump.

Prior to my invention, it has been customary to arrange the several inlet or suction valves of a pump cylinder in a common plane upon the under side of the cylinder, the suction valves being made vertically movable, this being the arrangement best adapted for convenient and economical construction and repairs, but when the valves are so arranged in a common plane, it is necessary for the best results that the inlet or suction opening should lie entirely below the plane of the suction valves. This is easily accomplished when the suction opening enters vertically from beneath the cylinder, but when a lateral suction opening or pipe is employed entering the side of the pump, such opening when of considerable size necessitates placing the valve seat at such a distance from the bed of the pump as shall bring it above the lateral suction opening, making the pump set higher than desirable. In seeking to make pumps of this class more compact, it has been customary to drop the valve seat below the top of the suction opening, the valve seat still being in a single plane, but by dropping the valve seat and valves below the top of the suction opening, great inconvenience is experienced by air becoming trapped in the upper portion of the suction chamber or that portion lying above the plane of the valve seat, thus reducing the area of the suction opening and capacity of the pump.

In accordance with this invention, the valve seat is constructed to present a series of steps, one above the other, one or more valves being arranged on each step, the highest step with the valves thereon, lying next the outside of the pump, the outside or highest valve or valves being above the lateral suction opening, while the lowest valve or valves may lie at a considerable distance below the top of the suction opening, so that while the desired compactness is secured by dropping the plunger of the pump, which may be done between the highest steps of the valve seat upon either side, still inconvenience from air becoming trapped in the suction chamber is entirely avoided.

The invention therefore consists in the combination with a pump cylinder, a suction chamber and a lateral suction opening therefor, of a valve seat consisting of a series of steps, and vertically movable valves arranged on said steps, the said suction opening being arranged below the uppermost of said valves and steps, whereby pocketing of air in the suction chamber is prevented, substantially as will be described.

Figure 1, represents in side elevation a pump embodying this invention; Fig. 2, a right hand end elevation of the same; Fig. 3, a half section and end elevation taken on the dotted line X—X, Fig. 1; Fig. 4, a cross section of the corrugated or undulatory cover or wall, and Fig. 5, a sectional detail showing former arrangement of valves and inlet or suction openings.

Referring to the drawings, the pump may be of any suitable or desired construction, the pump herein represented consisting of the steam cylinders A, only one of which is shown in Fig. 1, having their pistons connected with suitable plungers arranged to move within the pump cylinders or chambers B, B′, see Fig. 3, all of which may be of usual or desired construction, and need not be herein further described in detail.

In accordance with this invention, the several inlet or outlet valves of the pump, instead of being arranged in a single plane, are arranged substantially as represented in Fig. 3, wherein the valves are arranged upon various planes or levels, so that their location may more nearly approximate the contour of the plunger or cylinder of the pump.

Referring to Fig. 5 which represents the common practice in pump construction at the

present time, the valves are located in the same plane, which for the sake of compactness is somewhat below the top of the lateral inlet or suction opening *c*, so that any air entering with the water, would be pocketed in the suction chamber above the dotted line indicated in the said figure, it being impossible to draw it out through the valves for the reason that the valves are on a lower level than the top of the suction chamber; but in the improved construction, as represented in Fig. 3, the valves are arranged upon different planes or steps, the valves located at *a*, *a*, and *b*, *b*, being at a greater distance from the horizontal center line of the pump plunger than the valves arranged at *a'*, *a'*, and *b'*, *b'*, the valves *a'*, *a'*, being arranged in a plane above the lateral inlet or suction openings *c*, and, it will be observed that by this construction the entrances to the valve openings lie in different planes also, and the entrances to the valves *a'*, *a'*, lie in the same plane with the top of the suction chamber and above the suction opening or inlet, and the entrances to the valves *a*, *a*, extend into the suction chamber and below the top of the suction opening or inlet, so that it is impossible for any air or gas to become pocketed in the suction chamber, as in the construction represented in Fig. 5.

Instead of providing a plain, flat casting or cover for the upper wall of the pump casting, the said cover D is made with its edges or contacting faces $d^{\times}$ straight or plain, but with a body portion having corrugations or undulations *d*, which extend sufficiently toward the pump casting or cylinder to leave a single or continuous space between the cover and cylinder, and hence it is necessary to provide the cover with a single outlet or delivery opening only, as represented. The number and shape of the corrugations *d*, however may be varied to meet various requirements.

With a cover constructed as shown and described, greater strength and compactness is secured, the corrugations taking the place of the usual ribs.

When pumps are employed for fire purposes, it is customary to provide the outlet or delivery opening of the pump with a turret provided with a series of independent outlets to which a number of lines of hose may be attached.

In my efforts to reduce the cost of construction of pumps of this class, I have devised an arrangement as represented, wherein a single casting C, bolted or otherwise secured to the cover D of the pump, is provided with several lateral opositely arranged outlets *d'*, suitably fitted to receive fire hose, and an opening at d^2, o communicate with the usual air chamber E. Thus the required number of openings to which the hose may be attached, are secured in a single casting with that supporting the air chamber, and providing a very compact construction, and less expensive than the common turret arrangement.

The casting C at its rear side is tapped to receive the pipe *f*, connected with the relief valve F, which latter discharges through a pipe *f'*, extended down between the axes of the pump cylinders and preferably in the rear of the pump cylinders, so that both the relief valve and its discharge pipe are wholly contained within the limits of the pump, and are therefore out of the way.

By constructing the valve seat as herein shown like a series of steps, the highest steps being arranged at the sides, said valve seat in form approximates the circular cross section of the pump plunger, making it possible to bring the valve seat nearer the plunger than would otherwise be possible, to thus secure compactness, and it is only necessary that the suction opening should lie below the highest valves in order to avoid the pocketing of air in the suction chamber, so that the lowest valves may be considerably below the top of the suction opening if desired, this construction of valve seat permitting the greatest possible compactness of design when it is necessary to use a lateral suction opening. Again, by constructing the valve seat like a series of steps, it is possible to have all the valves vertically movable, so that the valve seats may be easily ground and fitted from the top in the same manner that the valve seats are ground and fitted now where all the valves lie in a common plane.

I claim—

1. In a pump, the pump cylinder or chamber in which the plunger moves, the valve seat consisting of a series of adjacent horizontal steps arranged on levels of different altitude, the entrances to the valve openings within the suction chamber being arranged on levels of different altitude, the vertically movable valves seated upon said steps, the suction chamber, and a lateral inlet or suction opening therefor, located below the uppermost step and with its top above the lowermost step, substantially as described.

2. In a pump, the pump cylinder or chamber in which the plunger moves, the valve seat consisting of a series of adjacent horizontal steps arranged on levels of different altitude, the entrances to the valve openings within the suction chamber being arranged on levels of different altitude, vertically movable valves seated upon said steps, the suction chamber, and a lateral inlet or suction opening in said suction chamber, located below the uppermost step, the entrance to the uppermost valve opening being arranged in substantially the same plane with the top of the suction chamber, substantially as and for the purpose set forth.

3. In a pump, the pump cylinder or chamber in which the plunger moves, inlet and outlet valve seats consisting of sets or series of adjacent horizontal steps, the steps of each

series being arranged on levels of different altitude, the entrances to the inlet valve openings within the suction chamber also being arranged on levels of different altitude, vertically movable valves seated upon said steps, the suction chamber, and a lateral inlet or suction opening therein located below the uppermost step of said inlet valve seat, the entrance to the valve opening of the uppermost of said inlet valve steps being arranged in substantially the same plane with the top of the suction chamber, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALBERT F. HALL.

Witnesses:

FREDERICK L. EMERY,

EMMA J. BENNETT.