W. HALLOWELL.

VALVE.

APPLICATION FILED NOV. 24, 1909.

966,909.

Patented Aug. 9, 1910.

2 SHEETS—SHEET 1.

FIG. 2.

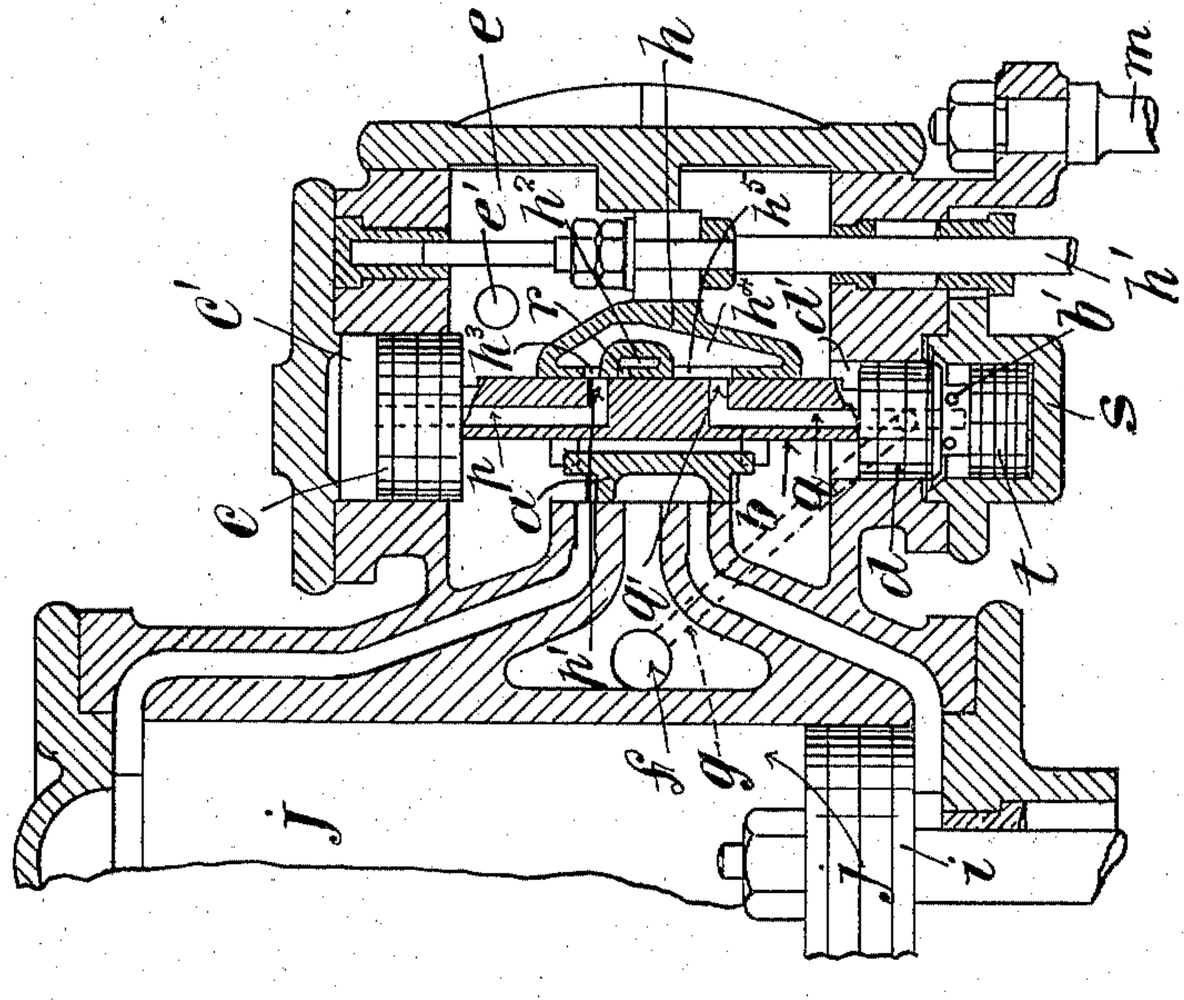
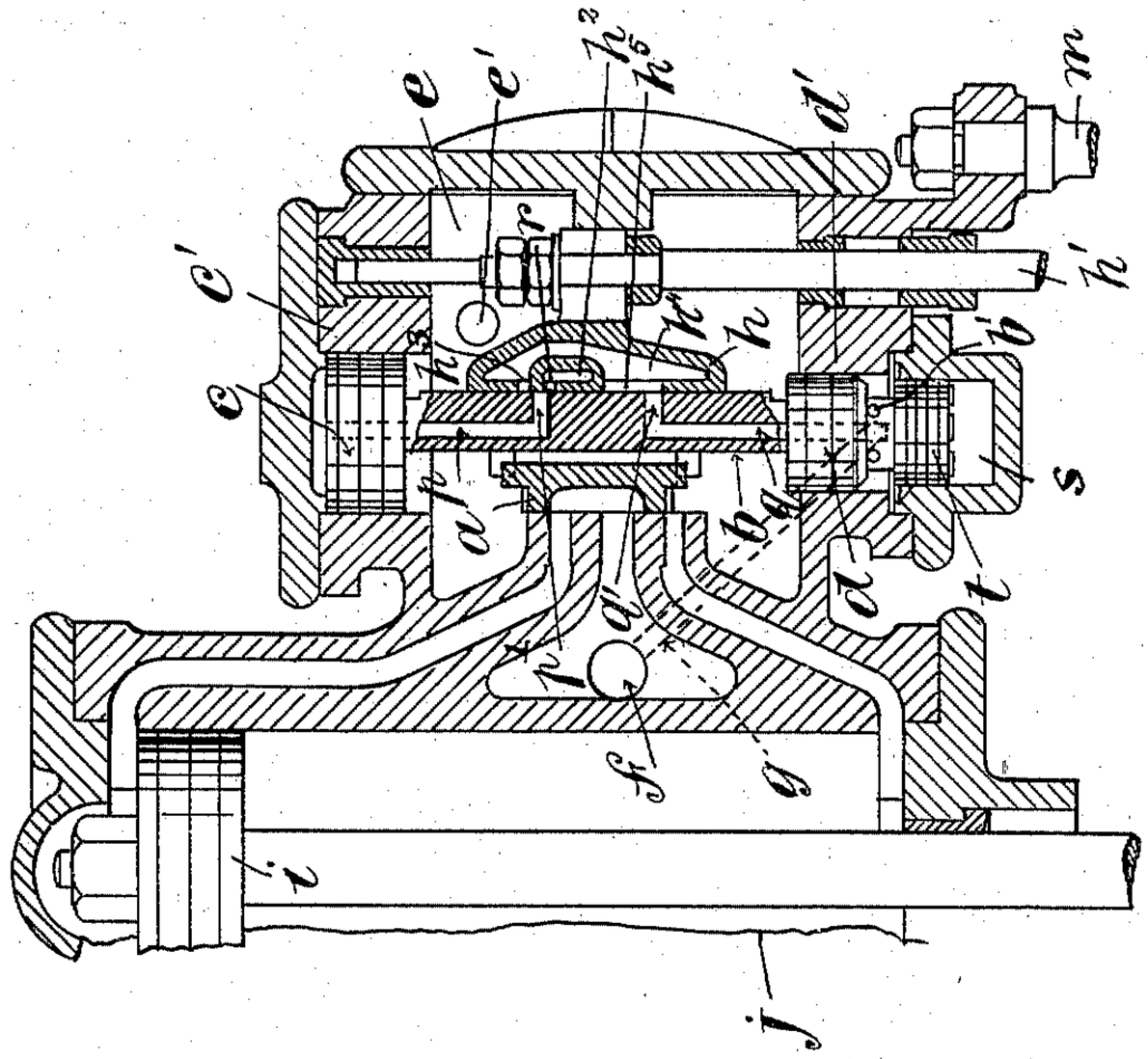


FIG. 1.



WITNESSES

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2 SHEETS—SHEET 2.

FIG. 5.

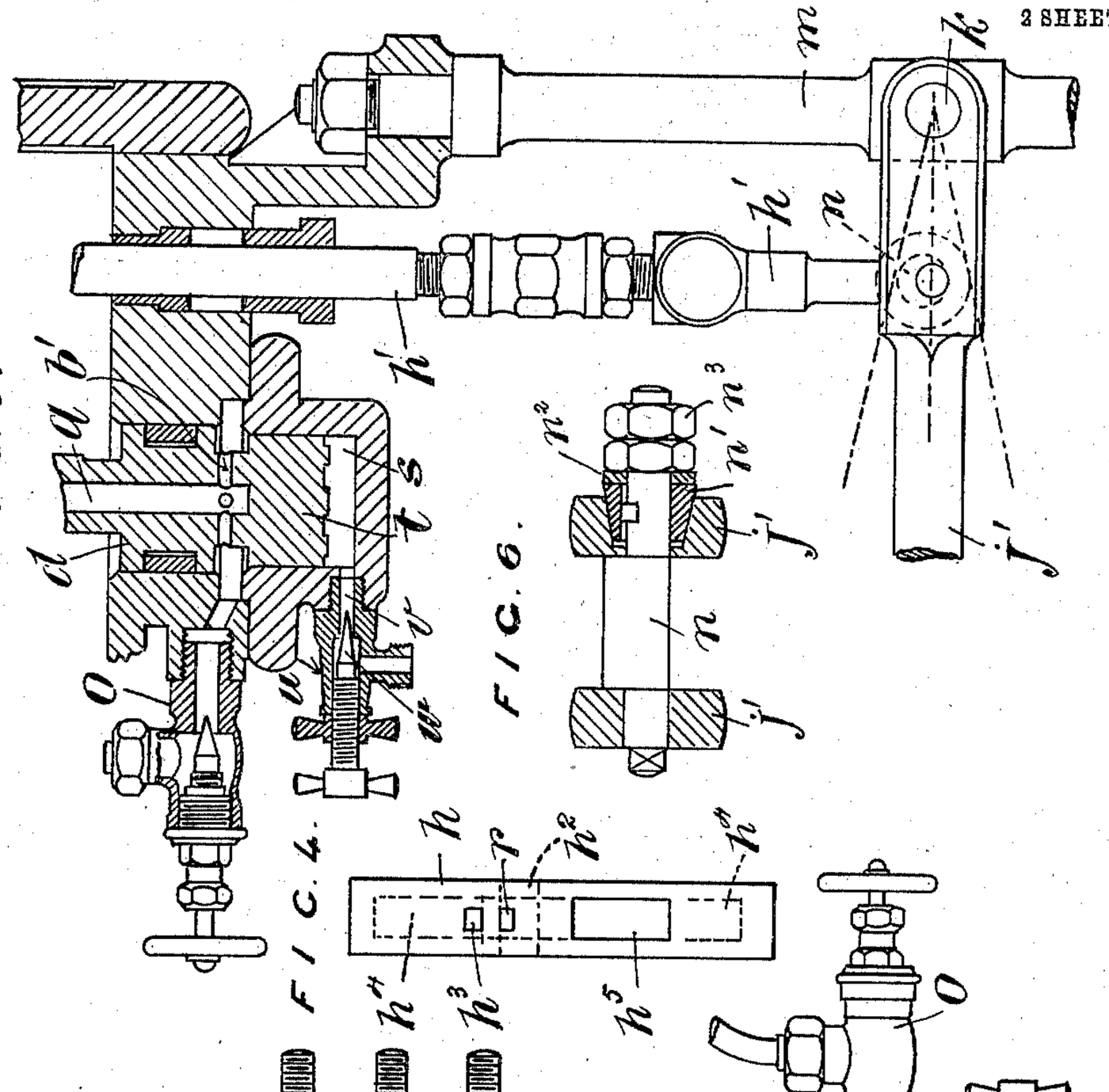

FIG. 6.

FIG. 4.

FIG. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM HALLOWELL, OF MANCHESTER, ENGLAND, ASSIGNOR OF ONE-HALF TO HENRY STOREY AND WILLIAM EDWARD STOREY, OF MANCHESTER, ENGLAND.

VALVE.

966,909. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed November 24, 1909. Serial No. 529,704.

To all whom it may concern:

Be it known that I, WILLIAM HALLOWELL, a subject of the King of Great Britain and Ireland, residing at 12 St. Johns road, Old Trafford, Manchester, in the county of Lancaster, England, draftsman, have invented new and useful Improvements in Valves, of which the following is a specification.

The invention has reference to the valve gear of steam pumps and is illustrated in the accompanying drawings in which:—

Figure 1 shows a sectional elevation of the valve gear. Fig. 2 is a similar view but with the distribution valve in a different position. Fig. 3 is a side view on a larger scale with certain parts removed. Fig. 4 is a separate view of a detail part, and Figs. 5 and 6 are also detail parts on a larger scale and shown in section.

In the invention the main distribution valve *a* is attached to and receives motion from a bored spindle *b*, which I call a controller, on each end of which is mounted a piston, the pistons being of different diameters the larger being lettered *c* and the smaller *d*. The pistons *c d* are slidable in suitable cylinders *c' d'* at opposite ends of a steam chest *e* to which steam is admitted through the port *e'*, and the inner faces of the pistons *c d* are directly acted upon by steam pressure within the chest, the outer face of the smaller piston *d* being in communication with the exhaust *f* by a port or passage *g*.

An auxiliary slide valve *h* is slidable steam tight upon the back of the controller *b* and is actuated in the same direction as the piston *i* of the main cylinder *j* through levers *j'* attached to the cross head of the pump. The levers *j'* are formed each with a flat end mounted loosely on a fixed pin *k* carried by a rod *m* (see Fig. 5). The valve rod *h'* of the valve *h* is mounted loosely on an eccentric stud *n* carried by the flat ends of the levers *j'* the stud being jambed and prevented from rotating by a cone *n'* washer n^2 and nuts n^3, (see Fig. 6.) By rotating the eccentric stud *n* the proper adjustment of the auxiliary valve *h* to effect the length of stroke of the main piston *i* is obtained. The travel of the auxiliary valve *h* is greater than that of the main distribution valve *a*. The auxiliary valve *h*, the contact face of which is shown in Fig. 4, is made with a steam port h^2 passing right through the valve from one side to the other so that live steam from the steam chest *e* has constant access to the port h^2 which has an outlet *r*, the auxiliary valve being also provided with an adjacent port h^3 leading to a chamber h^4 in the valve *h* through which steam can exhaust from the back of the larger piston *c* and can be conducted through the controller *b* to the back of the smaller piston *d*, through a throttle valve *o* to exhaust *f* through the port *g*. The controller *b* is partially bored through from each end with ports *p q* being blocked up in the center the inner end of each passage *p q* in the controller *b* having a port *p' q'* leading to the auxiliary valve *h*.

When the piston *i* of the main cylinder *j* is at one extreme end of its stroke as shown in Fig. 2, and the distribution valve *a* is in such a position that the main piston is open to steam at the back and to exhaust at the front, the auxiliary slide valve *h* has been moved by the piston *i* to just open the back of the larger of the differential pistons *c* to exhaust, the steam exhausting through the ports *p p'* in the controller *b*, and port h^3 to the interior exhaust chamber h^4 of the auxiliary valve *h*, and from thence through the ports h^5 and *q'* to the passage *q* in the controller and to the exhaust pipe *f*, through passage *b'*, the throttle valve *o* and port or passage *g*. The balance of the larger of the differential pistons being thus disturbed the steam pressure in the chest *e* acting on the superior area of the piston *c* moves the controller *b* and main distribution valve *a* in the contrary direction which places the front of the main piston *i* to steam and the back thereof to exhaust. In effecting this, as the main piston *i* and auxiliary valve *h* are moving in the same direction, the auxiliary valve *h* and the controller *b* have moved in opposite directions, thus effecting a rapid opening of the ports to exhaust and a prompt closing thereof. When the auxiliary valve *h* moves in a return direction with the piston *i* of the main cylinder, the exhaust port h^3 in the valve *h* is again momentarily brought in communication with the port *p'* in the controller leading to the back of the larger piston *c* thus insuring the effective exhausting of the steam and the completion

of the stroke of the controller. The further movement of the auxiliary valve h on or about the completion of the return movement of the main piston as shown in Fig. 1, brings the steam port r h^2 of the auxiliary valve in communication with the ports p' p of the controller b to conduct live steam to the back of the larger differential piston c which being thus put into balance the controller is again actuated due to the steam pressure in the chest e acting on the smaller piston d to reverse the main distribution valve a for the next stroke and the cycle of operations is repeated. The controller b on commencing to move by the action of live steam on the back of the larger differential piston c, by the contrary directional movement of the auxiliary valve h as described, effects a rapid opening and closing of the steam port p' r and completes part of its stroke by expansion of the steam admitted behind the piston c. And when the auxiliary valve h is moved again by the piston i of the main cylinder, before placing the back of the larger differential piston c again to exhaust, there is a momentary opening of the steam port r to again admit a puff of steam along the ports p' p to the back of the larger differential piston c to insure that the controller will make its full stroke. Thus by these secondary openings of the back of the larger differential piston c alternately to exhaust and to steam as described the full reciprocatory movement of the controller b is insured.

My invention also relates to the improved cushioning of the differential pistons c and d. The controller b is brought to rest in one direction by cushioning the exhaust on the back of the larger of the differential pistons c by closing the port p leading into the auxiliary slide valve h before the end of the stroke is reached. In the other direction the controller b is cushioned by an air dash pot s arranged beyond the exhaust port g of the smaller controller cylinder. A piston t is slidable in the dash-pot s and the dash pot is fitted with an adjustable snifting valve u, (Fig. 5) air being admitted and discharged through a passage v governed by a needle valve w which can also be regulated to throttle the outlet and inlet of air. The cushioning in this direction is also assisted by the cutting off of the steam acting on the back of the larger of the differential pistons c the steam working expansively for the remainder of the stroke. The careful adjustment of the throttle valve o and the snifting valve w will secure complete cushioning of the controller and the silent running of the pump.

I declare that what I claim is.

1. In valve gear for steam pumps, a controller formed with steam and exhaust passages, pistons of differential area carried by such controller the inner faces of which are exposed to steam pressure, a distribution valve connected to the controller, an auxiliary valve slidable on the controller and actuated by and having the same directional movement as the main piston of the steam pump, with means for admitting steam to and exhausting it from the back of the larger of the differential pistons to actuate the controller and distribution valve, and means for repeating the admission of steam to the back of the larger of the differential pistons and for placing the same under exhaust to insure the controller making its full reciprocatory stroke substantially as described.

2. In valve gear for steam pumps the combination of a controller with steam and exhaust passages, a distribution valve connected to such controller, pistons of differential diameter carried by the controller the inner faces of which are exposed to steam pressure, cylinders in which such pistons slide, an auxiliary valve slidable on the controller, steam and exhaust ports formed in such valve, the main piston of the steam pump, means for connecting the auxiliary valve with the cross head of such main piston for insuring the same directional movement of the auxiliary valve with the main piston, means to admit steam to and exhaust it from the back of the larger of the differential pistons and means for repeating such admission of steam to the back of the larger of the differential pistons and for placing the same under exhaust to insure the controller making its full reciprocatory stroke substantially as described.

3. In valve gear for steam pumps the combination of a steam chest, a controller with steam and exhaust passages, a distribution valve connected to such controller, pistons of differential diameter carried by the controller, the inner faces of which are exposed to steam pressure, cylinders formed in the steam chest in which such pistons slide, an auxiliary valve slidable on the controller, steam and exhaust ports formed in such valve, the main piston of the steam pump, means for adjustably connecting the auxiliary valve with the cross head of such main piston for insuring the same directional movement of the auxiliary valve with the main piston, means to admit steam to and exhaust it from the back of the larger of the differential pistons and means for repeating such admission of steam to the back of the larger of the differential pistons and for placing the same under exhaust to insure the controller making its full stroke, and means for cushioning the differential pistons substantially as described.

4. In combination in valve gear a controller formed with steam and exhaust passages, pistons of differential diameter car-

ried by such controller, means for providing a steam cushion for one of said pistons and an air dash pot provided with an adjustable valve communicating with the atmosphere for assisting in cushioning the other of said pistons, substantially as described.

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

WILLIAM HALLOWELL.

Witnesses:
JOSHUA ENTWISLE,
NORMAN KIERNAN.