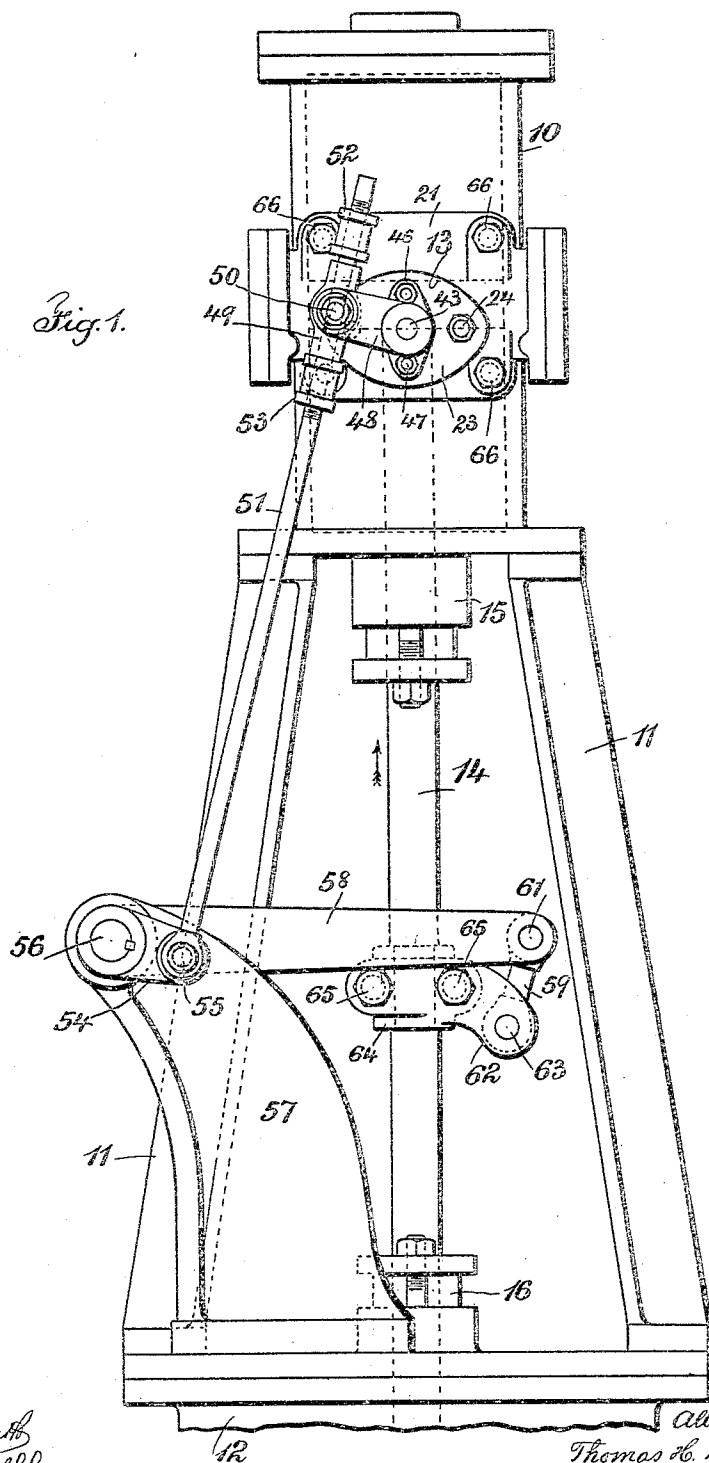


A. F. HALL, DEC'D.
T. H. HALL, ADMINISTRATOR.
STEAM ENGINE.
APPLICATION FILED MAR. 17, 1908.

930,282.

Patented Aug. 3, 1909.

2 SHEETS—SHEET 1.



Witnesses
Charles Smith
A. J. Terrell

Inventor
Albert F. Hall
deceased.
Thomas H. Hall
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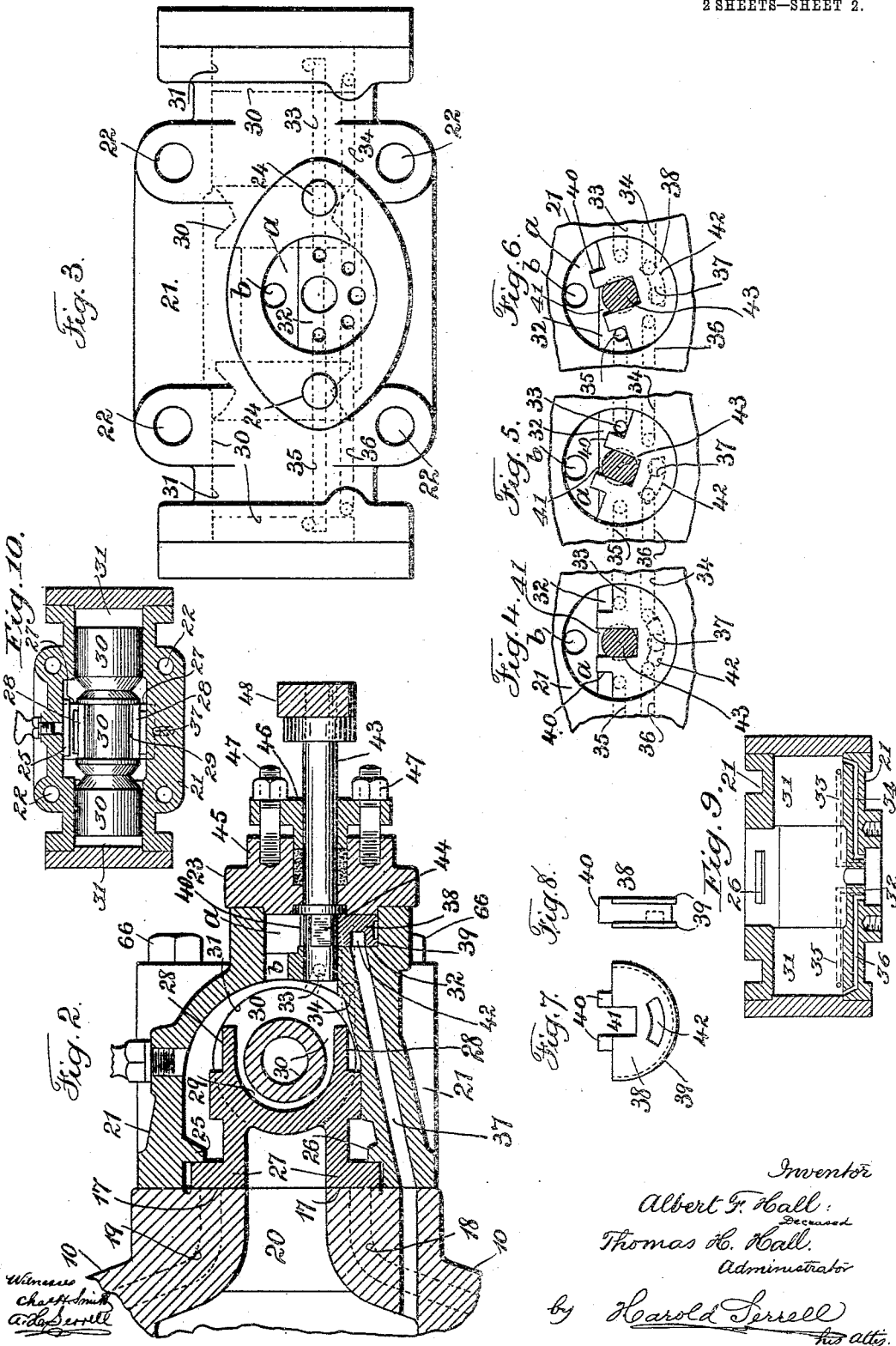
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Thomas H. Hall, ^{Dec'd.}
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By Harold Terrell ^{his atty.}

UNITED STATES PATENT OFFICE.

THOMAS H. HALL, OF BOSTON, MASSACHUSETTS, ADMINISTRATOR OF ALBERT FRANCIS HALL, DECEASED, ASSIGNOR OF ONE-HALF TO FREDERICK M. WHEELER, OF MONTCLAIR, NEW JERSEY.

STEAM-ENGINE.

No. 930,282.

Specification of Letters Patent.

Patented Aug. 3, 1909.

Application filed March 17, 1903. Serial No. 421,672.

To all whom it may concern:

Be it known that I, THOMAS H. HALL, a citizen of the United States of America, residing at Boston, in the county of Suffolk and State of Massachusetts, sole administrator of the estate of ALBERT FRANCIS HALL, deceased, late of Boston, in the county of Suffolk and State of Massachusetts, have an Improvement in Steam-Engines, invented by the said ALBERT FRANCIS HALL, deceased, of which the following is a specification.

This invention relates to that class of engines particularly applicable for actuating fluid pumps and the like, and in which the main slide valve is operated by an auxiliary piston and in which there is also an auxiliary valve for controlling the movements of the said auxiliary piston; the auxiliary piston being connected with the said slide valve in such a manner that this slide valve can be moved by and simultaneously with the movement of the auxiliary piston which is reciprocating.

In carrying out this invention there is provided an auxiliary piston co-acting with and moving the main slide valve. The auxiliary piston preferably has a reciprocating longitudinal movement in the steam chest and in this steam chest there are arranged as is customary suitable steam and exhaust ports opening into the steam chest at the respective ends of the stroke of the said auxiliary piston and also opening at a valve seat provided in the said steam chest for an auxiliary rocker valve actuated by a valve stem to partially rotate over the said valve seat to cover and uncover the steam and exhaust ports so as to actuate the said auxiliary piston and the main slide valve moved thereby; the said valve stem being rocked or actuated by means of a valve rod and suitable links and connection made with the main piston rod of the engine, as will be hereinafter more particularly described.

In the drawings, Figure 1 is an elevation of so much of the steam engine as relates to the present invention. Fig. 2 is a central transverse section through the steam chest and the parts associated therewith. Fig. 3 is an elevation of the steam chest with the cap thereof removed. Figs. 4, 5 and 6 are

plan views of the auxiliary valve and valve seat showing the auxiliary valve in its central and extreme positions respectively. Fig. 7 is an elevation of the reverse side of the auxiliary valve. Fig. 8 is an end elevation of the same, Fig. 9 is a central horizontal section through the steam chest with the auxiliary piston and steam valve removed, and Fig. 10 is a central vertical section through the steam chest at right angles to that shown in Fig. 2; Figs. 9 and 10 being on a reduced scale.

Referring particularly to the drawings, 10 designates a steam cylinder mounted as shown on suitable supports 11 or otherwise and carried by the adjacent end of the cylinder 12 of the fluid pump or other mechanism. The steam cylinder 10 is provided as is customary, with a piston 13 and a piston rod 14 connecting the piston 13 with the piston of the cylinder 12 and passing through the stuffing boxes 15 and 16 in the ends of the steam cylinder 10 and pump cylinder 12 respectively. In a suitable position the steam cylinder 10 is provided with a seat 17 for a slide valve, and a steam chest, and the steam cylinder as is also customary, is provided with suitable steam ports 18 and 19 leading to the respective ends thereof and also with exhaust ports of usual character connecting with the port 20.

21 designates a steam chest which is secured on the seat 17 by means of suitable bolts 22 passing through the holes 22 in the said chest or otherwise, and the steam chest is fitted with a cap 23 secured thereon by the bolts and nuts 24. Interiorly the steam chest 21 is provided with guides 25 26 to direct the movement of the main slide valve 27 which is actuated across the face of the valve seat 17; the said main slide valve being so constructed that the steam is admitted to and exhausted from the opposite ends of the said steam cylinder 10. The outer side of the main slide valve 27 is preferably provided with parallel lugs 28 and an intervening recess 29 in and between which an auxiliary piston 30 is received and the steam chest 21 is provided with cylindrical apertures 31 in which this auxiliary piston 30 is moved. The steam chest is also provided with an auxiliary valve seat 32 in which there are

inlet and exhaust ports 33 34 respectively, leading to the end of one of the said cylindrical apertures 31 in the steam chest. There are also inlet and exhaust ports 35 36 respectively, leading to the outer extremity of the other cylindrical aperture 31 in which the auxiliary piston is moved.

It will be noted by reference to Fig. 3, that the exhaust ports 34 and 36 terminate at points somewhat short of the ends of the cylindrical apertures in order to provide for a cushioning effect of the auxiliary piston as is customary in the steam engine art.

This invention relates particularly to an auxiliary rocker valve indicated at 38. This rocker valve is substantially semi-circular in plan and is provided with peripheral flanges 39 in order that the valve may be balanced and also with lugs 40 and an intermediate recess 41 to receive a valve stem by which the valve is given a rocking movement and this valve is also provided with an exhaust recess 42.

In the steam chest 21 and between the auxiliary valve seat 32 and cap 23, there is an auxiliary steam chamber *a* connecting with the main steam chamber of the steam chest by a passageway *b* and the hereinbefore described auxiliary valve is adapted to be actuated against the said auxiliary valve seat within the auxiliary steam chamber *a* by means of a valve stem 43 which in suitable oppositely disposed positions is provided with flattened surfaces 44 adapted to be received in the recess 41 of the said auxiliary valve; the said valve stem 43 being suitably journaled at one end in the steam chest and passing through a stuffing box 45 in the cap 23 which as is usual, is provided with a suitable gland 46 and bolts 47 or otherwise, and this valve stem 43 is actuated and given a partially revoluble movement to actuate the auxiliary rocker valve 38 as hereinafter described. It being apparent that for instance after the piston 13 is at its lowest position, the auxiliary valve 38 must be rocked or turned to the position shown in Fig. 6 in order that the steam may be admitted through the port 35 to actuate the auxiliary piston from the left to the right position thereby similarly moving the main slide valve to open the admission port 18 in order that the piston 13 may be forced upwardly. In this position, as will be understood, the exhaust port 34 is open to the opposite end of the auxiliary piston which by means of the recess 42 and the exhaust passage 37 through the steam chest, is connected with the main exhaust 20, and under these conditions, the exhaust port from the upper end of the cylinder 10 will be open to the exhaust 20. As also will be obvious the reverse conditions must maintain at the beginning of the down stroke of the piston 13 and the

auxiliary rocker valve will assume approximately the position shown in Fig. 5.

Connected to the outer or free end of the valve stem 43 is a crank 48 and at its free end this crank 48 is pivotally connected to the sleeve 49 by means of the pin 50 or otherwise, and the sleeve 49 is mounted to slide on a valve rod 51 which at the ends of the said sleeve 49 is provided with tappets 52 53 by means of which the movement of the said rod within the said sleeve and hence the movement of the said sleeve may be limited and adjusted. The end of the valve rod 51 opposite that on which the sleeve 49 is mounted is pivotally secured to a crank 54 by means of a pin 55 or otherwise and the crank 54 is secured to a rock shaft 56 mounted in a suitable bearing carried by an arm 57 supported upon and connected to the cylinder 12 of the fluid pump or other apparatus. The crank 58 is also connected to the rock shaft 56 and also pivotally connected to a link 59 by means of a pin 61 or otherwise, and the link 59 is also pivotally connected to an arm 62 by means of a pin 63 or otherwise and the arm 62 is integral with or secured to a sleeve 64 secured in position on the main piston rod 14 by means of the bolt 65 or otherwise, and it will be apparent that through this mechanism the necessary rocking movement is imparted to the auxiliary rocker-valve from the main piston rod 14 to actuate the valve mechanism hereinbefore described to operate the engine.

I claim for this invention:

1. In an engine of the class described and in combination with a steam chest, an auxiliary piston and a main slide valve, an auxiliary rocker valve approximately semi-circular in plan, peripheral flanges on the rocker valve, a seat for the rocker valve in the auxiliary steam chest and means for actuating the auxiliary rocker valve to cover and uncover suitable steam and exhaust ports to control the movement of the auxiliary piston and the main slide valve.

2. In an engine of the class described and in combination with a steam chest, an auxiliary piston and a main slide valve, an auxiliary rocker valve semi-circular in plan and having spaced apart lugs and an intervening recess, a valve seat for the auxiliary rocker valve, a valve stem adapted to fit within the recess between the said lugs, and means for actuating the said valve stem to rock the said valve.

3. In an engine of the class described and in combination with a steam chest, an auxiliary piston and a main slide valve, an auxiliary rocker valve approximately semi-circular in plan, peripheral flanges on the circular edges of the valve, spaced apart lugs and an intervening recess on and in the

straight edge of the said valve, a valve stem adapted to be received within the said recess and means for actuating the said valve stem to rock the valve.

- 5 4. In an engine of the class described, a valve chamber through which steam passes to the chamber of the main valve, an auxiliary rocker valve in said chamber, flat and approximately semi-circular in plan, hav-
10 ing peripheral flanges, spaced apart lugs

and a recess, and means for actuating the same.

Signed by me this fifth day of March 1908.

THOMAS H. HALL,
Administrator of the estate of Albert F. Hall,
deceased.

Witnesses:

GEO. C. BURGESS.

WM. FRANKLIN HALL.