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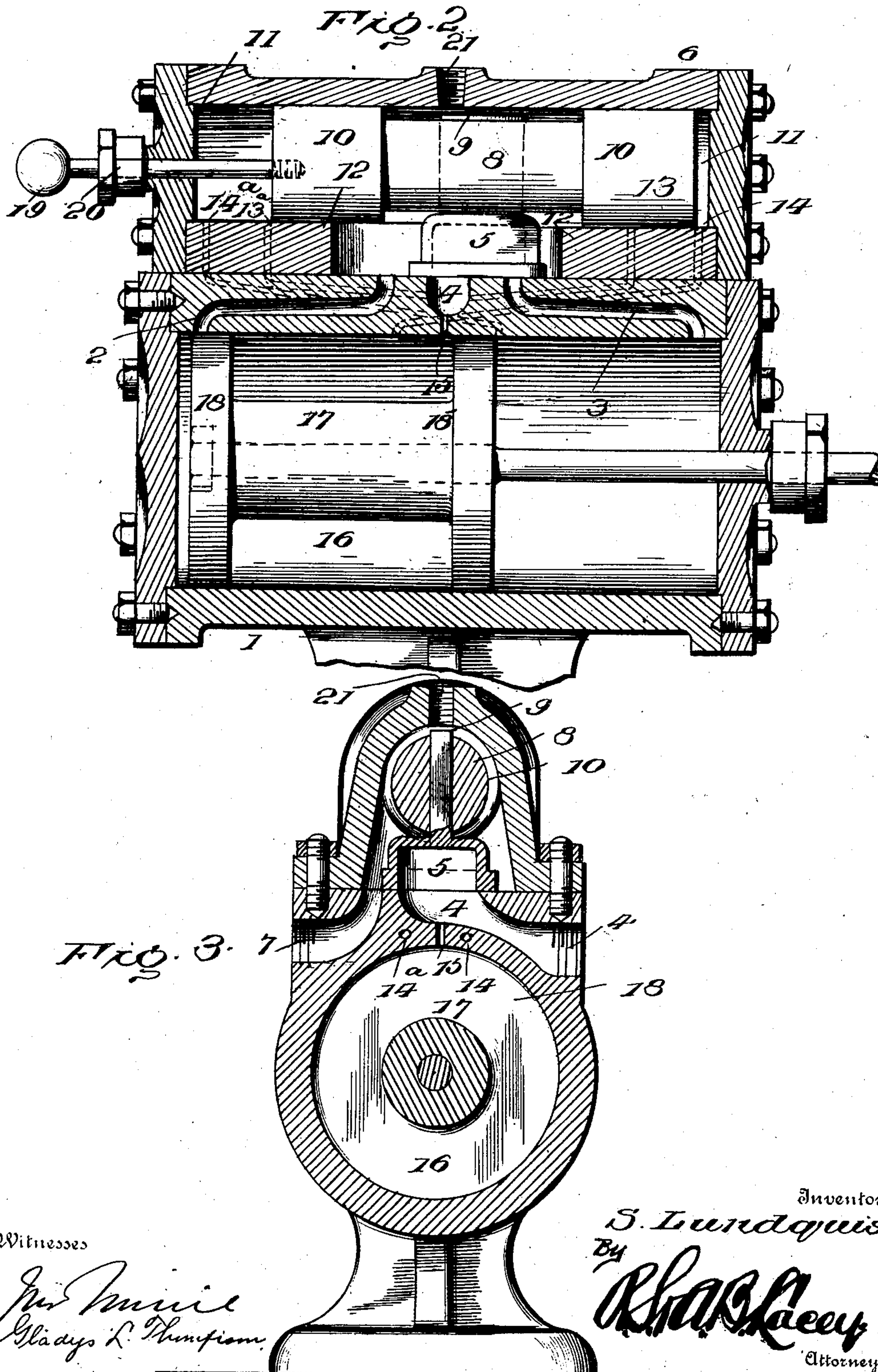
S. LUNDQUIST.

STEAM ACTUATED VALVE FOR ENGINES.

APPLICATION FILED APR. 8, 1903.

NO MODEL.

2 SHEETS--SHEET 2.



UNITED STATES PATENT OFFICE.

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STEAM-ACTUATED VALVE FOR ENGINES.

SPECIFICATION forming part of Letters Patent No. 733,985, dated July 21, 1903.

Application filed April 8, 1903. Serial No. 151,674. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL LUNDQUIST, a citizen of the United States, residing at Dubois, in the county of Clearfield and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Actuated Valves for Engines, of which the following is a specification.

The primary purpose of this invention is to simplify the construction of direct-acting steam-engines and to reduce the number of working parts and wholly dispense with cams, tappets, and analogous mechanisms for operating the valve for controlling the admission of live steam to the engine and the exhaust of the spent steam therefrom.

In accordance with this invention the piston of the engine and the slide-valve are so related in conjunction with steam ports and ducts that the action of one is governed by the movement of the other when the throttle is open and the engine running.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and drawings hereto attached.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal section of an engine embodying the invention, showing the piston at one end of the cylinder and the piston-valve at the opposite end of the steam-chest. Fig. 2 is a view similar to Fig. 1, showing the piston and valve in reverse position. Fig. 3 is a transverse section about on the line *x x* of Fig. 1.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The engine may be of any pattern or make so long as it is of the direct-acting type. The cylinder 1 is provided with ports 2 and 3, which are in communication at their outer ends with the terminal portions of the cylinder and at their inner ends with steam-chest.

The exhaust-port is indicated at 4 and communicates at its inner end with the steam-chest and is adapted to be connected at its outer end with the pipe (not shown) for conveying the exhaust-steam to a suitable point of discharge. The ports 2, 3, and 4 are of ordinary construction and arrangement and operate in the well-known manner, with the slide-valve 5 for controlling the steam or like motive medium in its supply to and escape from the cylinder. The steam-chest 6 is located at one side of the engine-cylinder and is provided with the live-steam port 7 for connection with the boiler or other source of supply for the motive medium. Within the steam-chest are located slide-valve 5 and piston-valve 8, the two being connected for synchronous action, valve 5 being provided with stem 9, snugly fitted into an opening of piston-valve 8. The central portion of the piston-valve is reduced, the terminal portions forming heads 10, which are fitted snugly into reduced end portions 11 of the steam-chest, said reduced portions 11 constituting, in effect, barrels for the piston-head 10 to operate in. The lower portion of the steam-chest or other part adjacent to cylinder 1 is thickened to form seats 12, and between these seats operates slide-valve 5. Ducts or passages 13 and 14 and 13^a and 14^a connect the respective barrels 11 with the exhaust-port 4 and the center portion of cylinder 1 for a purpose presently to be explained. The ducts 13 and 13^a establish communication between the respective barrels 11 and exhaust-port 4, and the ducts 14 afford communication between said barrels and cylinder 1 and cross near their inner ends, whereby duct 14 is in communication with the left-hand end portion of cylinder 1 and duct 14^a is in communication with the right-hand end of cylinder 1, this being essential, as will appear more fully hereinafter. An opening or duct 15 connects the central portion of cylinder 1 with exhaust-port 4.

The piston 16 is somewhat longer than one-half the length of cylinder 1, and in order that it may be of a minimum weight consistent with strength its central portion is reduced, as shown at 17, the end portions constituting heads 18, which have a steam-tight

fit in the cylinder, so as to preclude waste of steam. The piston may be of any substantial construction, and the parts 17 and 18 may be of integral formation or separately formed and fitted together and to the piston-rod.

To admit of operation of the piston-valve by hand, a stem 19 is connected thereto and passes through stuffing-box 20 at one end of steam-chest 6. The parts being assembled substantially as herein disclosed and the throttle being opened and piston 16 having been driven to the right-hand end of the cylinder, as indicated in Fig. 1, and the piston-valve being at the left-hand end of the steam-chest, the steam from the steam-chest enters the right-hand end of cylinder 1 through port 3 and drives the piston to the left, and as it approaches the limit of its movement to the left port 14^a is uncovered and live steam passing therein enters the left-hand end of the steam-chest and forces piston-valve to the right, carrying slide-valve 5 and closing port 3 and opening port 2, thereby permitting the live steam to enter port 2 and drive the piston to the right until port 14 is uncovered, when the live steam will enter the right-hand end of the steam-chest and drive piston-valve 8 to the left. The steam finding its way into the barrels 11 will pass to the exhaust-port 4 through ducts 13 and 13^a, as will be readily understood.

The opening 21 at the top of the chest 6 is for connection therewith of an oil-cup (not shown) for lubricating the valves.

Having thus described the invention, what is claimed as new is—

1. In a direct-acting engine, the combination of the cylinder and chest provided with admission and exhaust ports and with pairs of ducts 13, 14 and 13^a, 14^a, the outer ends of the ducts communicating with the respective end portions of the chest at different points in its length, the inner ends of ducts 13 and

13^a connecting direct with the said exhaust-port, and the inner ends of ports 14 and 14^a connecting with the middle portion of the cylinder upon opposite sides of a medial line, a piston arranged to reciprocate in the cylinder, a piston-valve mounted to reciprocate in said chest and control the said pairs of ducts, and a slide-valve for controlling the exhaust and admission ports and connected with the piston-valve for synchronous movement therewith, the piston and piston-valve being arranged with reference to the said ducts and ports to operate in the manner substantially as set forth.

2. In combination, an engine-cylinder provided with exhaust and live ports and having its central portion in communication with the exhaust-port by means of an opening or duct, a piston arranged to work within said cylinder and of a length exceeding one-half the length of said cylinder and having its intermediate portion reduced, a chest having its terminal portions reduced to form barrels, ducts connecting said barrels with the exhaust-port, other ducts connecting said barrels with the central portion of the cylinder upon opposite sides of a medial line and crossing near their inner ends, a slide-valve for controlling the exhaust and live ports and arranged to work in the chest between the reduced end portions thereof, and a piston-valve having its end portions snugly fitted in said barrels and having its intermediate portion connected with said slide-valve for synchronous movement therewith, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL LUNDQUIST. [L. S.]

Witnesses:

JET KEARNS,
W. C. PERRY.