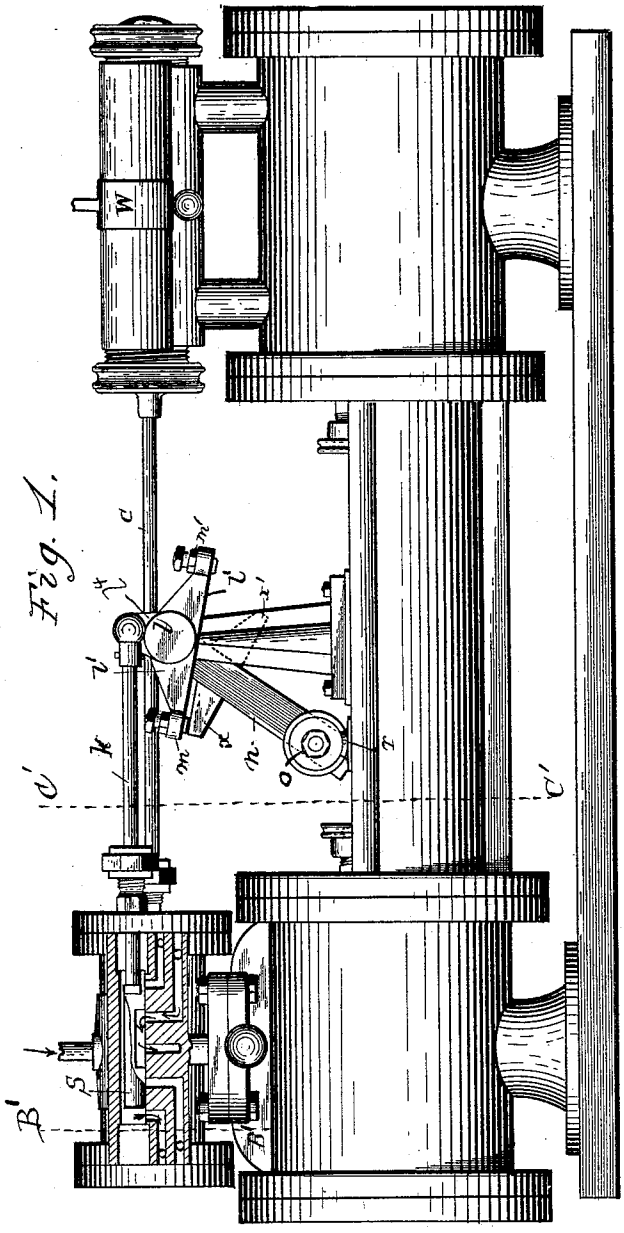
(No Model.) 4 Sheets—Sheet 1.

E. SMEDLEY.

STEAM ACTUATED AIR PUMP.

No. 482,814. Patented Sept. 20, 1892.



Witnesses;
Jon'a B. Gilby
G. M. Copenhaver

Inventor.
Edwin Smedley
By his Attorneys.
John J. Halsted & Son

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E. SMEDLEY.

STEAM ACTUATED AIR PUMP.

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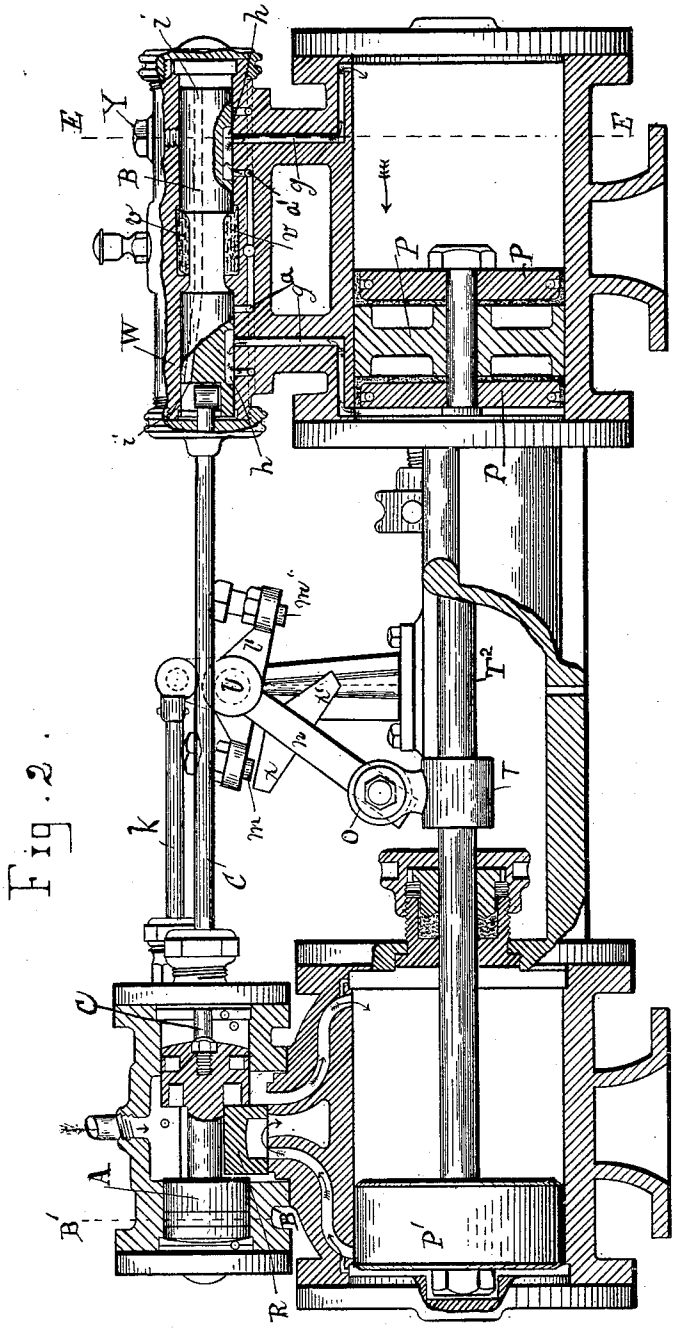

Fig. 2.

WITNESSES
Claude Kesler
Henry V. Calver.

INVENTOR
Edwin Smedley
By his ATTORNEYS
John J. Halsted & Son.

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E. SMEDLEY.

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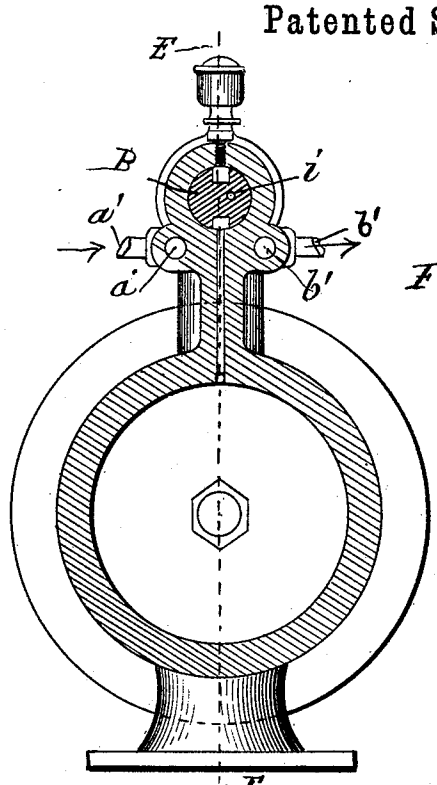

Fig. 3.

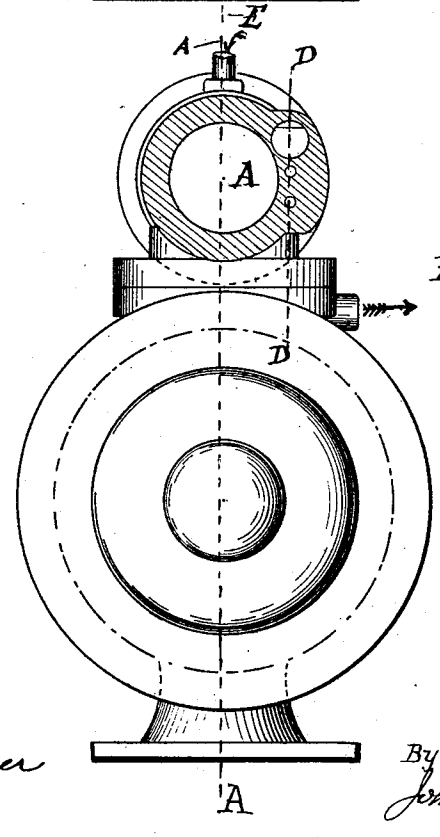

Fig. 4.

Witnesses;
Jona. B. Tilley.
G. M. Copenhaver

Inventor;
Edwin Smedley
By his Attorneys;
John J. Halsted & Son

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(No Model.) 4 Sheets—Sheet 4.

E. SMEDLEY.

STEAM ACTUATED AIR PUMP.

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Fig. 5.

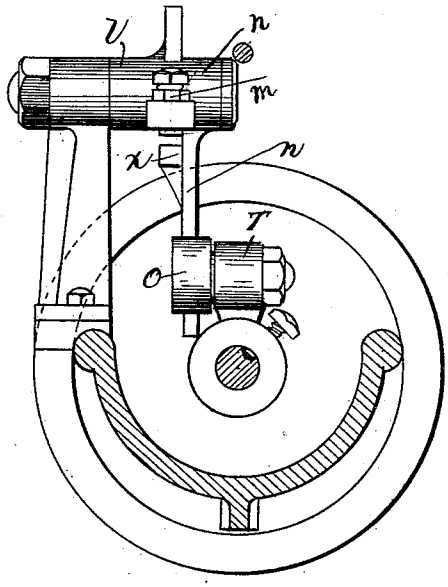


Fig. 6.

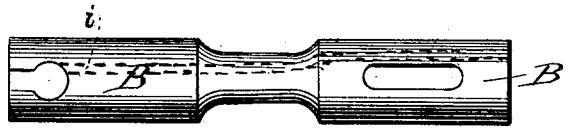
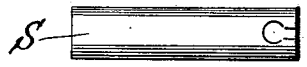


Fig. 7.



Witnesses;
J. B. Crilley,
G. M. Copenhaver.

Edwin Smedley
Inventor.

By his Attorneys,
John J. Halsted & Son

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UNITED STATES PATENT OFFICE.

EDWIN SMEDLEY, OF DUBUQUE, IOWA.

STEAM-ACTUATED AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 482,814, dated September 20, 1892.

Application filed September 26, 1890. Serial No. 366,279. (No model.)

To all whom it may concern:

Be it known that I, EDWIN SMEDLEY, of Dubuque, in the county of Dubuque and State of Iowa, have invented certain new and useful Improvements in Steam-Actuated Air-Pumps; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to a piston air-valve; and it consists in a special construction of the same and of its auxiliary devices. An air-valve as heretofore made is forced to its seat by air-pressure, which is produced by the return movement of the air-piston, and before the valves are seated a quantity of air "slips" past them and a loss of pressure or vacuum is the result.

My invention does away entirely with the "slippage" or loss because of the valve moving before the piston moves, as will presently be described, thus cutting off all outlet before the movement of the air-piston begins.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is an elevation of the steam-piston cylinder and air-piston cylinder and their respective valve-cases, the auxiliary steam-valve being shown in section; Fig. 2, a view of the same, the cylinders being in central vertical longitudinal section; Fig. 3, a transverse section in the line E E of Fig. 2; Fig. 4, an end view, partly in section, through the line B′ B′ of Fig. 1; Fig. 5, a cross-section through the line C′ C′ of Fig. 1; Fig. 6, a top view of the actuated air-valve detached, and Fig. 7 a top view of the auxiliary valve S.

A is a steam-actuated piston-valve, substantially such as is described in my patent, No. 304,465, dated September 2, 1884.

B is a piston air-valve driven by valve A.

C is a rod connecting the valves A and B, as shown.

a a are ports connecting with the inlet-ports *a′ a′*.

b b are ports connecting with the outlet-ports *b′ b′*.

g g are ports connecting with each end of the air-cylinder.

h h are cavities in valve B, opening and closing the ports *a* and *b* alternately with the ports *g g*.

S is an auxiliary steam-valve similar to that in my above-named patent.

l is a rocker-shaft carrying a rocker *l′*.

l^4 is an arm on shaft *l* and connecting it with rod *k*. *k* is a rod connecting valve S with this arm l^4.

m m′ are adjusting-screws on the rocker *l′*.

n is a lever with tappets *x x′*, which operate upon the adjusting-screws *m m′* and fitted to slide loosely through head O, which is an oscillating head fitted loosely into a cross-head T.

P is the air-piston.

P′ is the steam-piston.

R is the slide-valve, (steam.)

T is a cross-head fastened to piston-rod T^2.

V is an oil-room in cage W.

W is the air-valve cage.

i is a hole drilled through the valve B to allow air and oil to go from end to end and allow free movement of the valve.

Y is a set-screw to prevent the valve B from turning out of position.

From the above description it will now be seen that when the cross-head T has arrived at the end of the stroke or when the tappet *x* has touched the screw *m* it will move the auxiliary steam-valve S, so as to open a port and admit steam to the steam piston-valve A, causing it to shoot to the opposite end of the chest, carrying with it the main steam-valve R, and at the same time carrying the piston air-valve B to the opposite end of its cage. It will be seen that the air-valve B moves before the main pistons P′ and P move, and for the reason that these main pistons P′ P could not move in the opposite direction from which they were previously moving till after the main valve R shall have moved, and the parts R, A, and B move simultaneously and the pistons P′ and P immediately thereafter. Thus the air-valve B will have cut off all outlet before the action of the air could come from a reversal of the air-piston P. The change of position of the piston air-valve B changes the positions of the cavities *h h* of this valve, and changes the admission and discharge from

port *a* to *g*, and on the opposite end from port *g* to *a*.

It is desirable that as little residue as possible be left in the air-cylinder. Therefore the air-piston P should travel as closely as possible to the cylinder-heads. It will be seen that by adjusting the screws *m m'* up or down any desired extent of movement of piston may be had.

I claim—

1. The piston air-valve B, having cavities *h h* therein serving to open and close the ports *a a'* and *b b'*, and having an oil-hole through it to allow the free movement of the valve and to permit the air and oil to flow from one end of the valve to the other as the valve moves from end to end.

2. In combination with the valve-cage W, the piston air-valve provided with the exterior oil room or recess V for caging the oil, and with the interior passage *i*, as and for the purposes set forth.

3. In combination with the air-cylinder and piston and the described piston air-valve B, a main steam-valve directly connected to said air-valve, and an auxiliary steam-valve and actuating devices intermediate the air-piston and the auxiliary steam-valve, whereby the air valve is adapted to be thrown by the main steam-valve prior to the movement of the air-piston.

4. In combination with the air-piston P and with the piston air-valve B, constructed and operated as described and having the passage *i* through it, the rocker arm or rod *l*, its adjusting-screws *m m'*, the lever *n*, having tappets *x x*, cross-head T, through which said lever slides, and air piston-rod T^2, carrying said cross-head, and connections intermediate the said rocker *l* and the piston air-valve B.

5. In combination with the air-piston P and with the piston air-valve B, constructed and operated as described and having the passage *i* through it, the rocker arm or rod *l*, its adjusting-screws *m m'*, the lever *n'*, having tappets *x x*, cross-head T, through which said lever slides, air-piston T^2, carrying said cross-head, arm l^4, connecting-rod *k*, auxiliary steam-valve S, main steam-valve A, and connecting-rod C.

EDWIN SMEDLEY.

Witnesses:
W. S. WRIGHT,
E. T. PRINDLE.