(No Model.)

H. C. REAGAN.

SLIDE VALVE.

No. 401,209. Patented Apr. 9, 1889.

FIG. 1

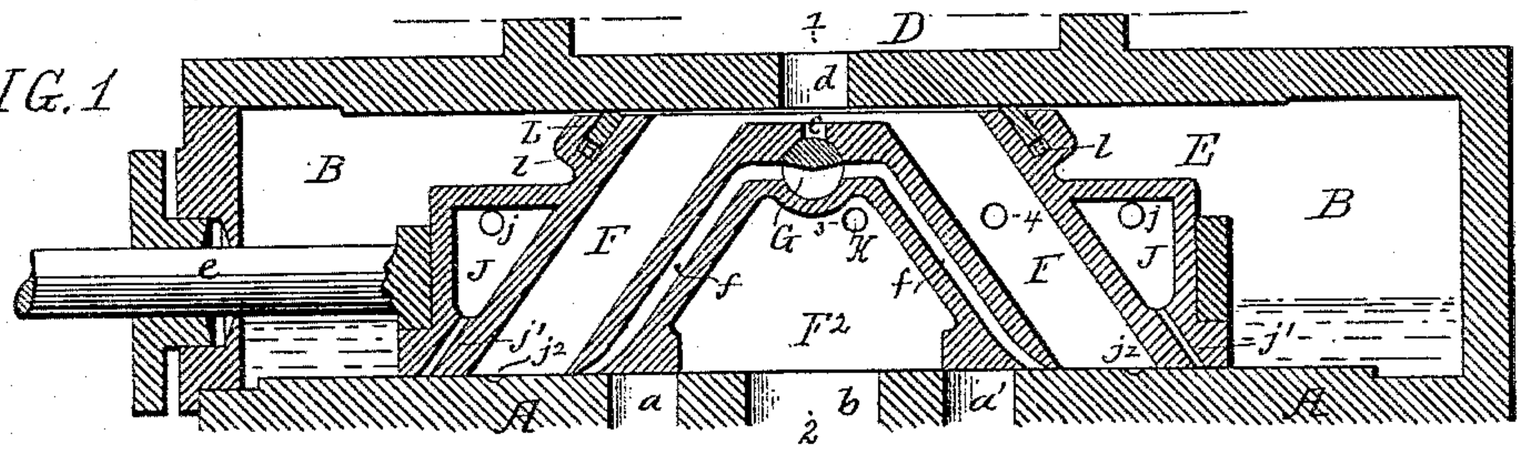


FIG. 2.

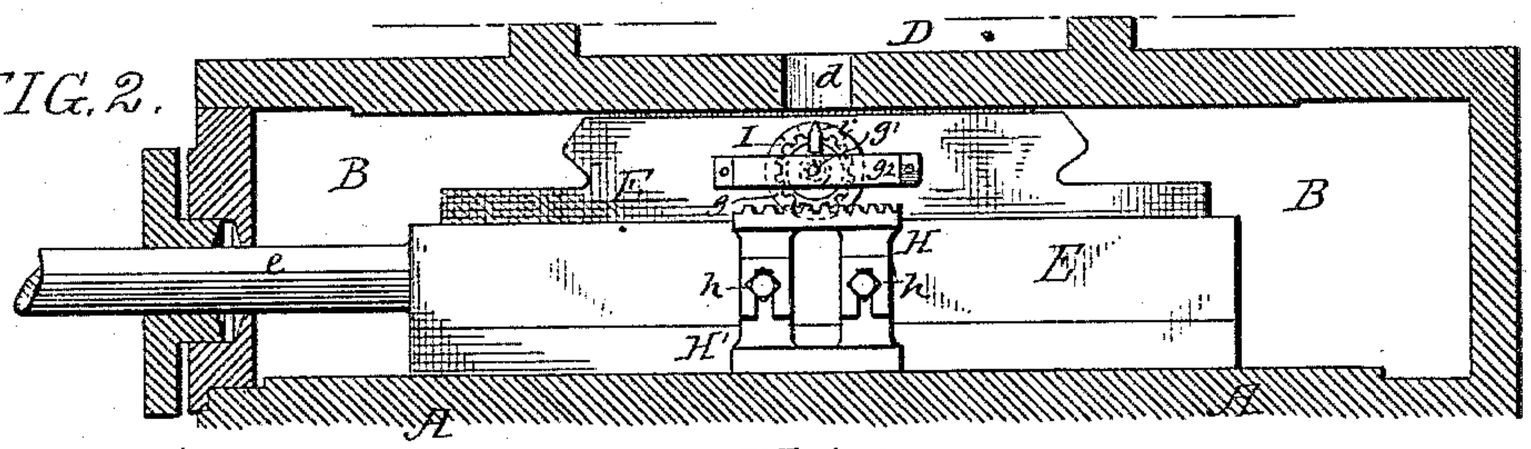


FIG. 3.

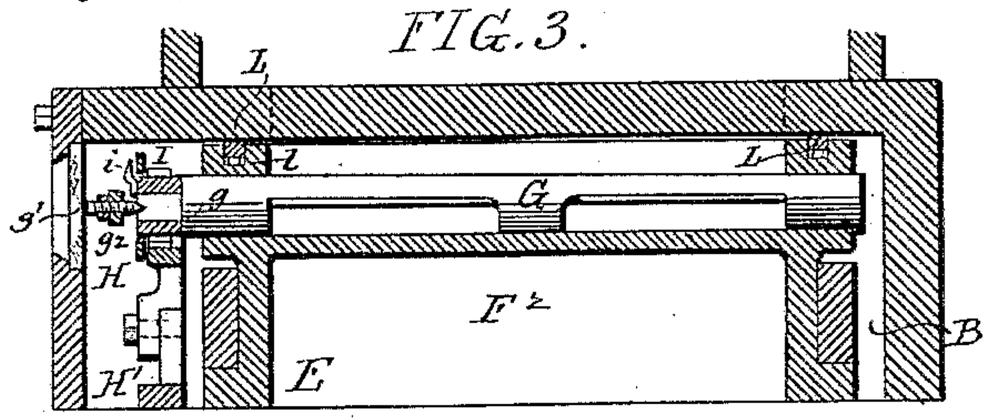


FIG. 5.

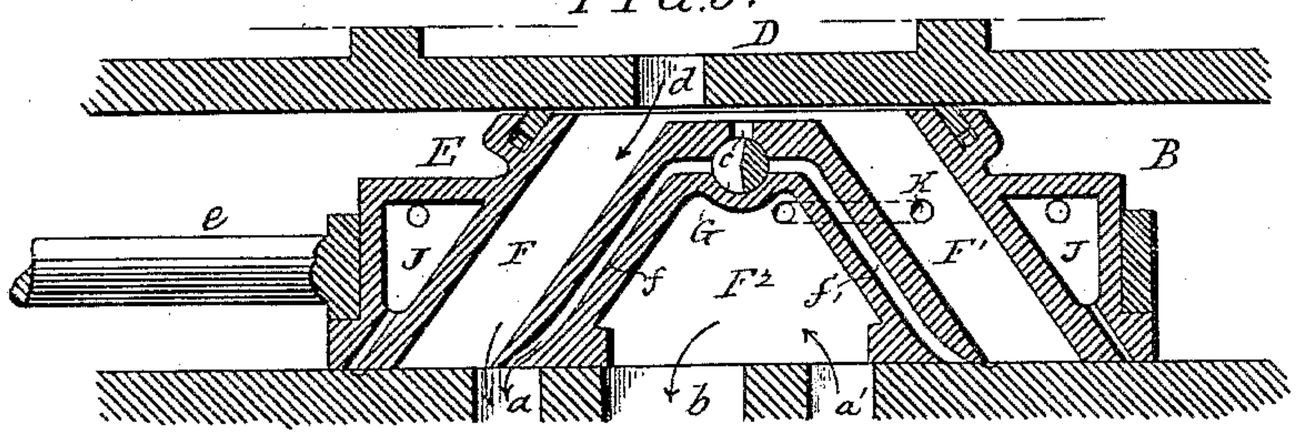


FIG. 6.

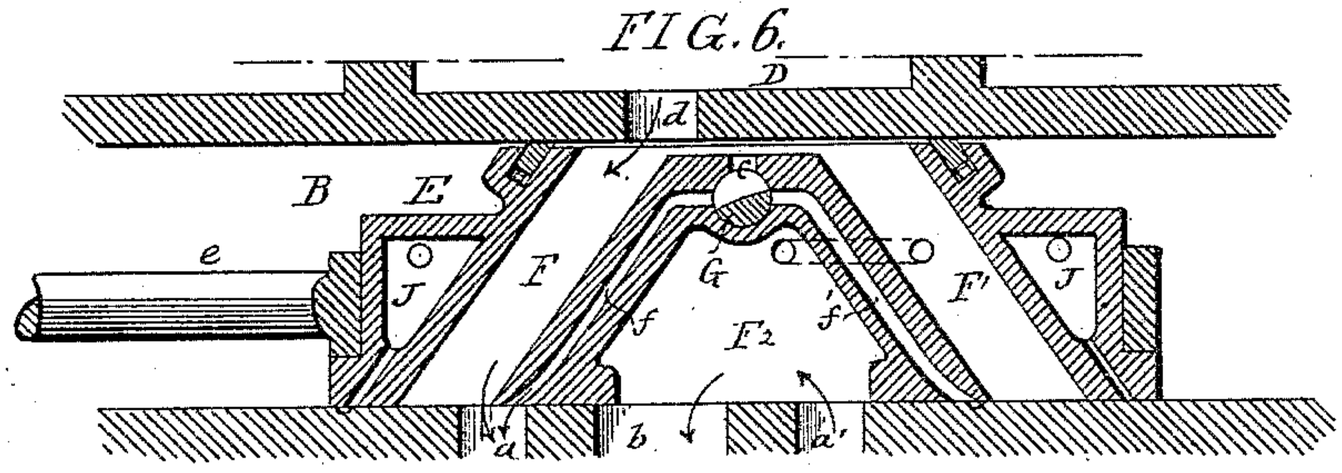
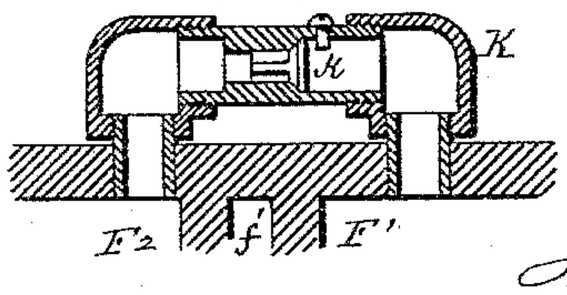


FIG. 4.



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UNITED STATES PATENT OFFICE.

HARRY C. REAGAN, OF PHILADELPHIA, PENNSYLVANIA.

SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 401,209, dated April 9, 1889.

Application filed January 26, 1889. Serial No. 297,685. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. REAGAN, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Slide-Valves for Steam-Engines, of which the following is a specification.

The object of my invention is to construct a slide-valve that will be balanced, and that with a very short stroke a large steam-opening is obtained; and a further object is to thoroughly lubricate the valve-seat and supply oil to the steam-cylinder, as fully described hereinafter.

In the accompanying drawings, Figure 1 is a longitudinal section of the valve and its seat. Fig. 2 is a side view of the valve. Fig. 3 is a transverse section on the line 1 2, Fig. 1. Fig. 4 is a section on the line 3 4, Fig. 1; and Figs. 5 and 6 are diagrams showing the valve in different positions.

A is the steam-cylinder, having the usual steam-ports, *a a'*, and exhaust-port *b*, which pass up into the valve-chest B. Above the valve-chest is the steam-chest D, having an opening, *d*, into the valve-chest. Sliding in the valve-chest B is a valve, E, of the form shown in Fig. 1. This valve is attached to a valve-rod, *e*, in any suitable manner. In the present instance a yoke on the rod passes around the valve. The valve-rod passes through a stuffing-box, which is sufficiently tight to prevent the leakage of oil, as the valve-chest is not a steam-chest, but merely a space for the valve to slide in, and is used for the storage of oil or other lubricant to lubricate the valve or the piston of the steam-cylinder, or both. The valve E has two steam-ports, F F', and two supplemental steam-ports, *f f'*. The steam-ports *f f'* unite in a single opening, *c*, in the upper portion of the slide-valve, and the inlets to the passages *f f'* are governed by a valve, G, which in Fig. 1 is shown cut off from both passages *f f'*. This valve G is moved automatically on the reciprocation of the main valve by a rack, H, which meshes with a pinion, I, on the shaft *g* of the valve G. (See Fig. 2.) This rack is adjustable vertically on a standard, H', secured to the cylinder and to said standard by nuts *h h*. The valve G is a taper valve, and is held in place by a set-screw, *g'*, in a bearing, g^2, the set-screw resting against the end of the valve. A pointer, *i*, is also secured to the valve G or its pinion *g*, this pointer acting, in connection with the dial-plate I on the valve E, to indicate the amount of movement of the valve and the exact position of the valve in respect to the ports. The casing is cut away at this point to enable the engineer to see the indicator.

A glass or sliding plate may be used to cover the opening, if necessary.

The valve E is practically a balanced valve, as steam enters the opening *d* and passes through the passages F F' into the respective ports, no pressure being on the outside of the valve. The ports are so formed as to leave an exhaust-space, F^2, in the valve, forming a valve of the D pattern.

On each end of the valve are reservoirs J, which are filled with oil through the opening *j*, and the oil flows from these reservoirs through the passage *j'*, thus lubricating the valve-seat, and at the same time when the passages *j* pass over the small recesses or grooves j^2 in the valve-seat a certain amount of oil is deposited in the grooves, so that on the return-stroke of the valve the steam in the passages F or F' atomizes the oil and allows it to pass through into the cylinder, and thus lubricate portions of the cylinder otherwise inaccessible.

K is a pipe connecting the exhaust-chamber F^2 and the passage F' and the valve. This passage has a check-valve, *k*, which prevents any live steam passing from the passage *f'* to the exhaust-chamber F^2; but in case the pressure of the exhaust is greater than that of the inlet, which is often the case when the steam is cut off from the cylinder, the check-valve opens and equalizes the pressure in both the passage and the exhaust-chamber. It will be understood that this pipe K may connect with the chamber F, if desired. At the upper portion of the valve is a packing-bar, L, kept in position by a spring, *l*, which prevents the escape of steam into the valve-chest from the interior of the valve. The valve-chest itself may be an oil-reservoir, as shown in Fig. 1. In this case the chambers J J may connect with this chest, or they may be dispensed with

altogether, according to circumstances. By this means a thorough lubrication of all the parts is insured.

The operation of the machine is as follows: In Fig. 1 the valve is in the mid-position between the two ports *a a'*, covering them entirely, so that no steam can enter either. The passages *f f'* are cut off entirely from the passage *c* by the valve G. On the movement of the valve in the direction of the arrow, Fig. 1, steam will commence to exhaust from the port *a'* into the exhaust-port *b* through the exhaust-chamber F^2. The small passage *f* will then be uncovered to the inlet-port *a;* but steam cannot enter this port until the valve G is turned. When the valve is in the position shown in Fig. 5, the passage F is uncovered to the same extent as the passage *f*. The valve is turned to this position, so that with a very short stroke double the area of the passage *f* is secured and a corresponding opening of the exhaust through the port *a'*. On the continued movement of the valve the passage F is uncovered to a further extent, and the oil-opening *j'* passes over the groove j^2 in the face of the valve-seat, so that oil can accumulate in this groove. On the return movement of the valve the passage F exposes the groove, and consequently the oil in said groove will be atomized, and the oil will pass into the cylinder with the steam and thoroughly lubricate all the parts. When the valve reaches a point on its return movement in the same position as shown in Fig. 5, steam will be cut off from the passage F by the valve G, and will be entirely cut off at the same time that the valve cuts off communication through the passage F and the port *a*, and when the valve passes over the center the same operation takes place with the port *a* as the exhaust and the port *a'* as the steam-inlet.

I claim as my invention—

1. The combination, in a slide-valve, of the main steam-inlet passages and supplemental inlet-passages, and the exhaust-chamber, with a valve for controlling said supplementary inlet-passages, substantially as described.

2. The combination, in a slide-valve, of the passages F F', supplemental passages *f f'*, and a passage, *c*, with a valve, G, having on its stem a pinion meshing with a stationary rack, so that on the reciprocation of the main valve said valve G will be oscillated to open one or other of the ports *f f'* to the steam, substantially as and for the purpose set forth.

3. The combination, in a steam-valve, of the exhaust-chamber f^2 and a steam-passage with a pipe connecting said exhaust and steam passages, and a check-valve in said pipe to allow for the escape of steam from the exhaust to the steam-passage, but check any escape of steam from the steam-passage into the exhaust, substantially as set forth.

4. The combination of the slide-valve and its steam-passages with the valve-seat having grooves so situated as to be uncovered by one or other of the steam-passages, whereby the lubricant in said grooves will be atomized, as and for the purpose set forth.

5. The combination, in a slide-valve, of the reservoirs J J, outlets *j j'*, and grooves J' J', substantially as described.

6. The combination, in a slide-valve, of the valve G, having an indicator-hand, *i*, with a dial on the said slide-valve, 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.

HARRY C. REAGAN.

Witnesses:

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H. P. MCMICHAEL.