E. ROBINSON.

Balance Side-Valve.

No. 219,597. Patented Sept. 16, 1879.

Fig. 1.

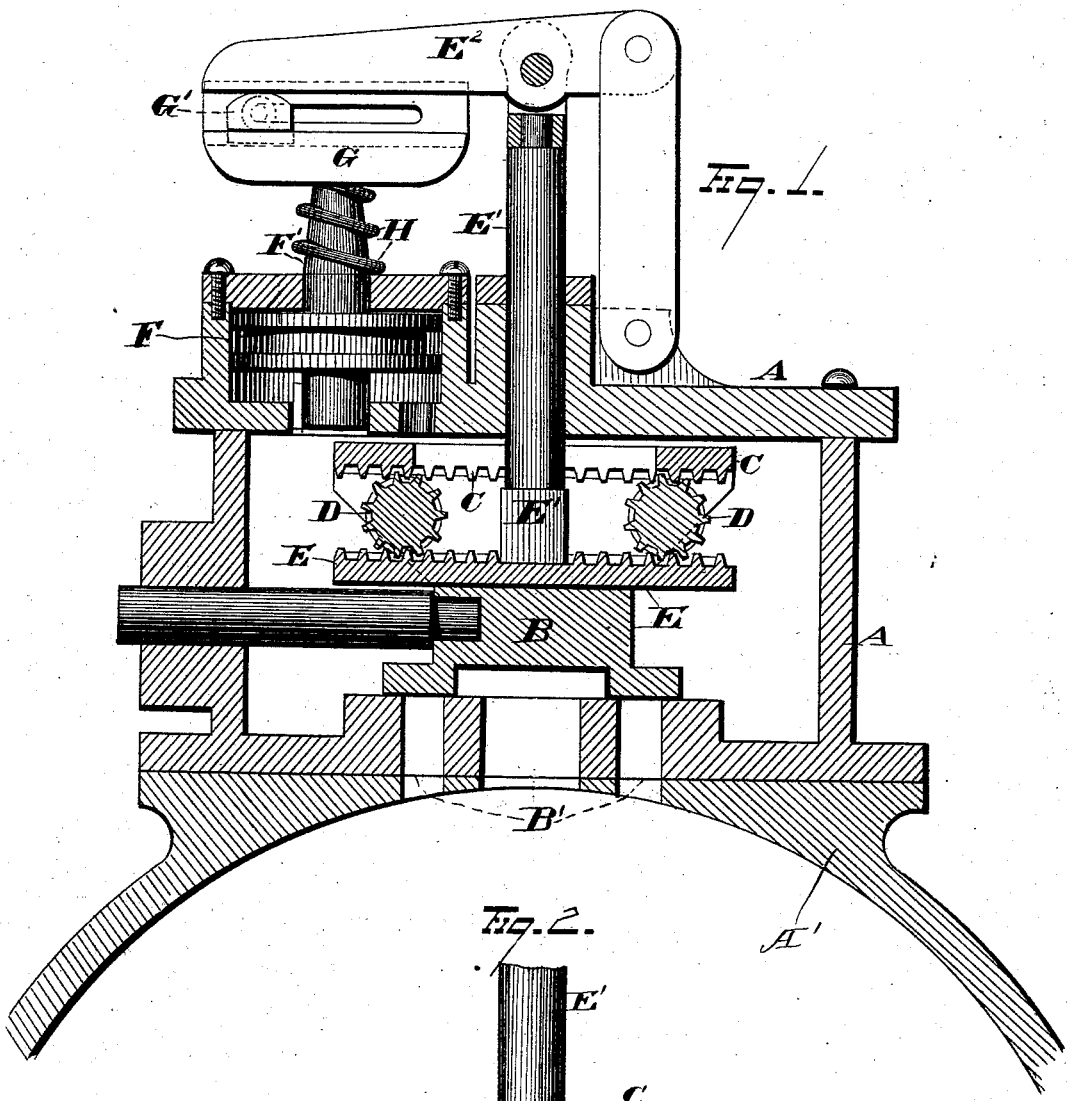
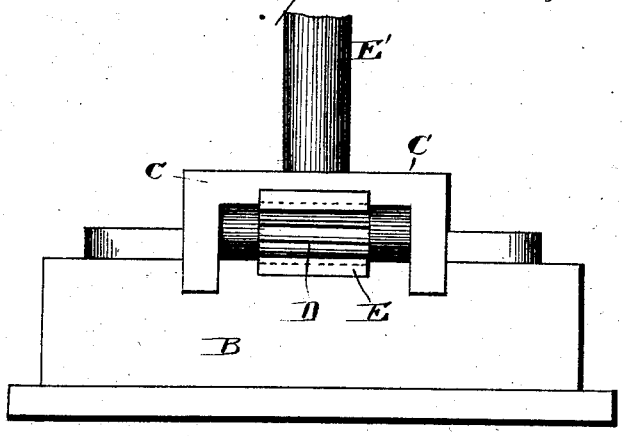


Fig. 2.



WITNESSES

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INVENTOR

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ATTORNEYS

UNITED STATES PATENT OFFICE.

EDGAR ROBINSON, OF DENNISON, OHIO.

IMPROVEMENT IN BALANCED SLIDE-VALVES.

Specification forming part of Letters Patent No. **219,597**, dated September 16, 1879; application filed August 14, 1879.

To all whom it may concern:

Be it known that I, EDGAR ROBINSON, of Dennison, in the county of Tuscarawas and State of Ohio, have invented certain new and useful Improvements in Balance Slide-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to steam slide-valves; and it consists in the several details of construction and combinations of parts, as will hereinafter be described, and pointed out in the claims.

In the drawings, Figure 1 is a longitudinal section of a device constructed according to my invention. Fig. 2 is an end elevation of the valve.

A is the body or casing of any steam-chest, located in any suitable manner in connection with its cylinder A′. B is a slide-valve, of any construction, moving over its ports B′ in any suitable manner.

I do not in any degree limit myself to any precise construction or arrangement of steam-chest and slide-valve and ports, as my invention is adapted to be used on valves of an indefinite variety.

Attached firmly in any manner to the valve B is a metallic surface, C, which may or may not be in the form of a rack, as will hereinafter more fully appear. The surface C is adapted to act as a bearing for two or more anti-friction rollers, D, which are adapted to move in the space between the surface C and a stationary surface, E, which also may or may not be in the form of a rack, as before specified.

The anti-friction rolls D are placed between the moving surface C and stationary surface E, for the manifest purpose of facilitating the movement of the former between the latter.

The anti-friction rolls, if desired, may be cogged or toothed, as shown in the drawings, and adapted to engage with the rack formed upon the surfaces C E.

When thus constructed the rolls D may be more readily secured in proper position and relation with each other and adjacent parts than if made smooth and operating against smooth surfaces C E. Either form, however, will be comprehended in my invention, and might be adopted at pleasure. I prefer, however, for general use that the surfaces C E should be provided with racks, and the rollers D provided with cogs to engage therewith; and in this construction the rollers proper are situated at each end beyond the cog portion, and the size of the smooth or roller portion is made to correspond exactly to the pitch-line of the cogs of the rollers D. Thus will the smooth or cylindrical ends of the rollers D engage with correspondingly smooth faces on the surfaces C E, and the said smooth faces of the surfaces C E should also exactly correspond with the pitch-line of their respective racks.

Thus it will be seen that the rack and cog-roller arrangement only serves to keep the anti-friction rollers proper in their desired position and relation with adjacent parts, while the actual bearing and anti-friction function is performed between the smooth ends of the rollers D and the corresponding smooth faces C E, above and beneath them.

The stationary surface E is supported by a stem, E^1, which passes up through a slotted opening made through the moving surface C and through the case A when it is attached to its lever E^2, as shown in the drawings, or in any other suitable manner.

It will now be seen that if the stem E^1 is drawn up it will operate to lift the valve B from its seat, or at least relieve the pressure of said valve upon its seat, while at the same time the valve is allowed a free movement through the agency of the surfaces C E and anti-friction rollers just specified. It is desirable, however, that the lifting of the valve B should be governed in some manner, and to accomplish this I employ an auxiliary cylinder and piston, F, which has a steam-connection with the interior of the steam-chest wherein the valve B operates.

Attached to the piston-stem F′ of the cylinder F is a cross-bar, G, or its equivalent, having a movable and adjustable block, G′, which serves as a bearing to the lever E^2, to which lever, as already mentioned, is connected the stem E^1.

As the bearing G′ is moved toward or from the fulcrum of the lever E^2, to that degree will

the lifting power of the auxiliary piston F be affected.

The point of adjustment should be such that the lifting force of the piston will be sufficient almost to lift the valve B from its seat against the pressure of steam upon it within the chest; and this lifting power of the auxiliary piston F may be adjusted at pleasure by the moving rest G′.

The mechanical construction and arrangement of levers and block G′, as shown in the drawings, may be varied without any departure from my invention, which consists, broadly, in any device employing the auxiliary cylinder and piston F and any adjustable connection between said cylinder and the valve B, whereby the pressure of steam from within the steam-chest, acting through said auxiliary cylinder, will be sufficient to lift the valve B against the pressure of steam above it.

When adapted for use on locomotives, I prefer that the adjusting apparatus which regulates the leverage between the said auxiliary piston F and the valve B should be susceptible of manipulation and control from the engineer's cab by means of any suitable rod-connection therewith. By this means the slide-valve B of the locomotive will at all times and under any circumstance be under the ready control of the engineer.

The principal advantages attained through my invention are, first, a practical avoidance of wearing friction between the sliding valve and its seat, consequently a greater ease and facility of movement and a greater saving of strain and wear upon the valve-rod and all joints and parts connected with it, which will enable all these parts to be made of much lighter material, with a corresponding economy of weight and expense; and, second, owing to the great diminution of friction and strain, the power of the engine is to that degree enabled to be more directly applied in motive force. As an example of this fact, I have found, by practical experiment with my device in use upon locomotives, that with the same expenditure of steam and fuel I am enabled to pull at least two cars more than could be done with the same engine without my device.

H is a spiral spring, or its equivalent, which acts to exert an upward push upon the stem F′. In the case of a locomotive on a down grade, if the steam is shut off while the locomotive is still in motion the entire weight of the valve would rest upon its seat and the motion between them would result in injurious grinding and wearing of parts. By means, however, of the spring H at such a time as this the valve B is not permitted to rest injuriously upon its seat. This spring, if desired, may be made adjustable, so that any desired lifting force may be exerted through it.

What I claim is—

1. The combination, with a slide-valve and lifting-stem indirectly connected therewith, of a piston receiving steam from the valve-chest, and adjustable leverage connections located outside the valve-chest and arranged to connect the outer ends of the piston-rod and lifting-stem, substantially as set forth.

2. In combination with a slide-valve and lifting-stem indirectly connected therewith, a piston adjustably connected with the lifting-stem by means of the movable rest G′, substantially as set forth.

3. The combination, with a slide-valve and lifting-stem indirectly connected therewith, of a piston connected with the lifting-stem, and a spring, H, surrounding the piston-rod, substantially as set forth.

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

EDGAR ROBINSON.

Witnesses:

JNO. CROWELL, Jr.,

WILLARD FRACKER.