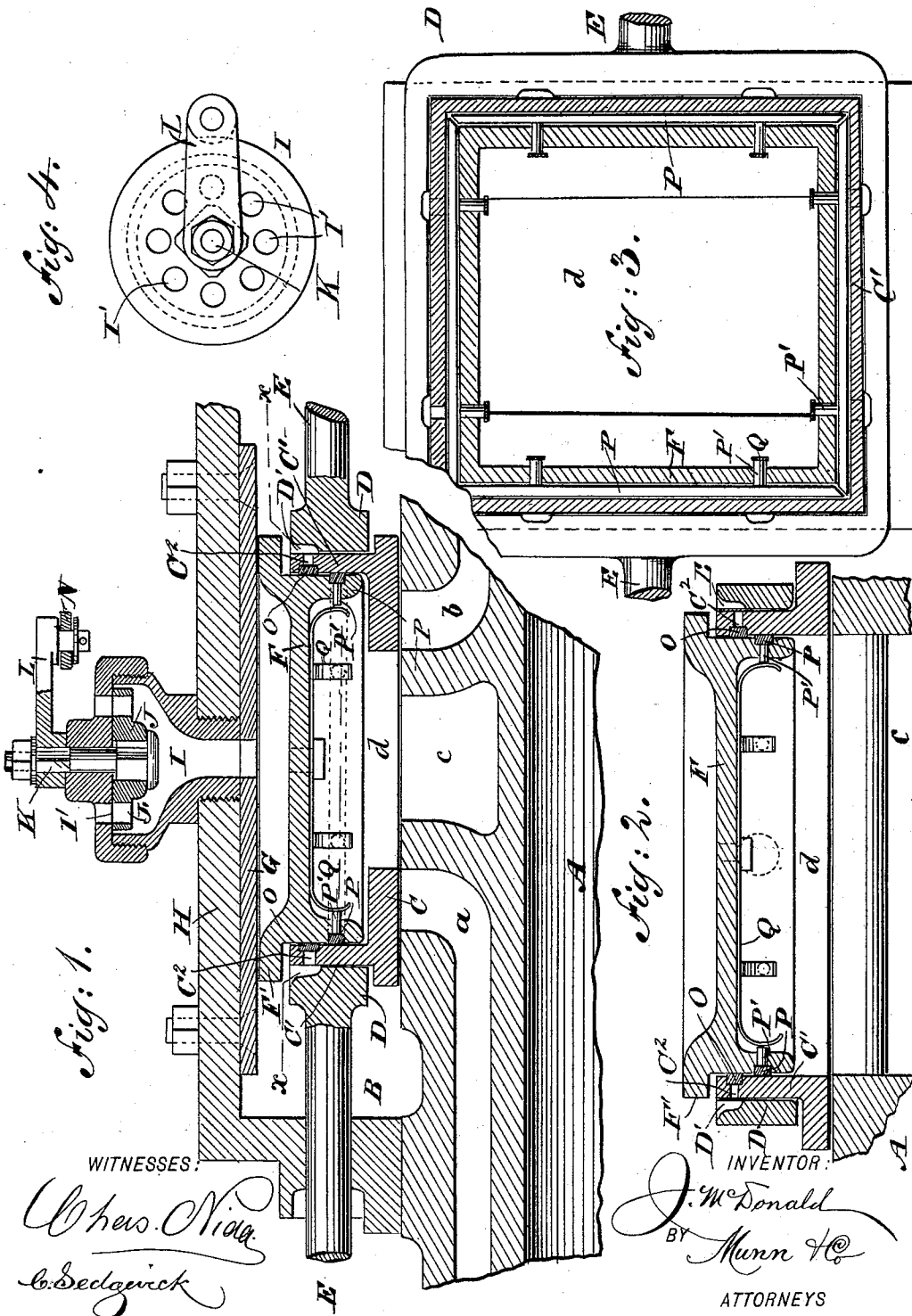


(No Model.)

J. McDONALD.
BALANCED SLIDE VALVE.

No. 477,307.

Patented June 21, 1892.



UNITED STATES PATENT OFFICE.

JOHN McDONALD, OF TOKIO, JAPAN.

BALANCED SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 477,307, dated June 21, 1892.

Application filed May 2, 1891. Serial No. 391,337. (No model.)

To all whom it may concern:

Be it known that I, JOHN McDONALD, a subject of the Queen of Great Britain, residing at Tokio, Japan, have invented a new and useful Improvement in Balanced Slide-Valves, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved balanced slide-valve, which is simple and durable in construction, very effective in operation, and not liable to get out of order.

The invention consists of a slide-valve formed with an open top and a crown-plate or cover fitted to slide in the said slide-valve and adapted to be pressed by back-pressure of the cylinder in contact with the face-plate held on the steam-chest cover.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement as applied. Fig. 2 is a transverse section of part of the same. Fig. 3 is a sectional plan view of part of the improvement on the line *x x* of Fig. 1, and Fig. 4 is a plan view of the air-valve.

The cylinder A, on which the improvement is applied, is provided with the usual inlet-ports *a* and *b* and the exhaust-port *c*, opening into the steam-chest B, in which is fitted to slide a slide-valve C, engaged by a yoke D, carrying the valve-stems E, actuated in the usual manner to impart a reciprocating motion to the said slide-valve. The latter is provided with the usual opening *d*, adapted to alternately connect the ports *a* and *b* with the exhaust-port *c*.

The slide-valve C is open on the top and is formed with sides C', on which is fitted to slide vertically a crown-plate or cover F, formed at its upper end with a flange F'; adapted to be seated against the under side of a face-plate G, secured by suitable means to the underside of the cover H of the steam-chest B.

In the middle of the cover H and base-plate G is arranged a valve I, which opens into the

steam-chest over the space covered by the crown-plate or cover F of the slide-valve C. The valve I is provided on its top with openings I', adapted to register with openings J', formed in a disk J, held on a stud K, mounted to turn in the top of the valve I, and carrying on its outer end an arm L, connected with a lever or link N, under the control of the operator, so that the openings I' and J' may be brought to register with each other or be disconnected, as desired, and for the purpose hereinafter more fully described.

On the inner surface of the side walls C' of the slide-valve C are fitted packing-strips O, pressed against the outer surface of the crown-plate F by live steam in the steam-chest B, the said live steam passing through a recess D' in the yoke D into openings C², formed in the said side walls and leading to the said packing-strips. Similar packing-strips P are held in the outer surface of the crown-plate F, and are pressed in contact with the inner surface of the side walls C' by means of springs Q, attached to the under side of the crown-plate and pressing on pins P', connected with the said packing-strips P. The springs Q, as well as the back-pressure from the cylinder, hold the packing-strips P in firm contact with the side walls, so that no leakage of live steam from the steam-chest B is possible to the interior of the slide-valve C.

The operation is as follows: When the engine is started and the valve I is in the position shown in Fig. 1, then the crown-plate F is exposed to atmospheric pressure, and consequently assumes a lowermost position—that is, the top surface of its flange F' is disconnected from the underside of the face-plate G. Now when the live steam enters the steam-chest B, part of this live steam can escape over the flange F' and out of the valve I to the open air. The engine is actuated in the usual manner by the live steam entering the ports *a* and *b* alternately, the exhaust taking place in the usual manner through the ports *b c* and *a c*, respectively. Soon after the engine is started the unbalanced pressure in the chest, acting on the lower side of the projecting flange of the crown-plate or cover F of the slide-valve C, forces the said crown-plate upward until its flange F' rests against the under side of the face-plate G. The valve

is thus counterbalanced without aid of springs. It will be seen that as soon as the crown-plate F slides upward the live steam cannot escape farther through the valve I, and hence the operator can see at a glance that the valve now operates completely balanced. As soon as the live steam is shut off from the steam-chest B in stopping the engine, the crown-plate F drops to its former position, so that the steam-chest, by the valve I, is opened to the atmosphere, and all vacuum in the cylinder is thereby destroyed.

It will be seen that this slide-valve is not liable to get out of order, as its working does not depend on springs. It will further be seen that the operator can readily see at any time whether the valve is working balanced or unbalanced, according to the escaping or non-escaping steam from the valve I.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the yoke having grooves D', of the balanced valve having a vertically-sliding cover, a packing-groove provided with packing O, and apertures leading through the sides of the valve to said packing and registering at their outer ends with the yoke-grooves D' to admit steam to the packing, substantially as set forth.

2. In a balanced slide-valve, the combination, with a steam-chest provided with an air-valve, of a slide-valve fitted to slide in the said steam-chest and provided with a sliding crown-plate or cover adapted to be seated on the face-plate of the said steam-chest, substantially as shown and described.

3. In a balanced slide-valve, the combination, with an open-top valve, of a crown-plate or cover for the valve, fitted to slide vertically in the said valve, packing-strips held in the outer surface of the crown-plate or cover, pins engaging the packing-strips, and springs secured to the under side of the cover and engaging said pins, substantially as herein shown and described.

4. In a balanced slide-valve, the combination, with a steam-chest provided with an air-valve, of the open-top slide-valve C in the steam-chest, and the crown-plate F, fitted to slide in the valve and provided with the flange F', adapted to be seated on the face-plate of the steam-chest, substantially as described.

The above specification of my invention signed by me this 30th day of March, 1891.

JOHN McDONALD.

Witnesses:

W. N. WHITNEY,
EDWIN DUN.