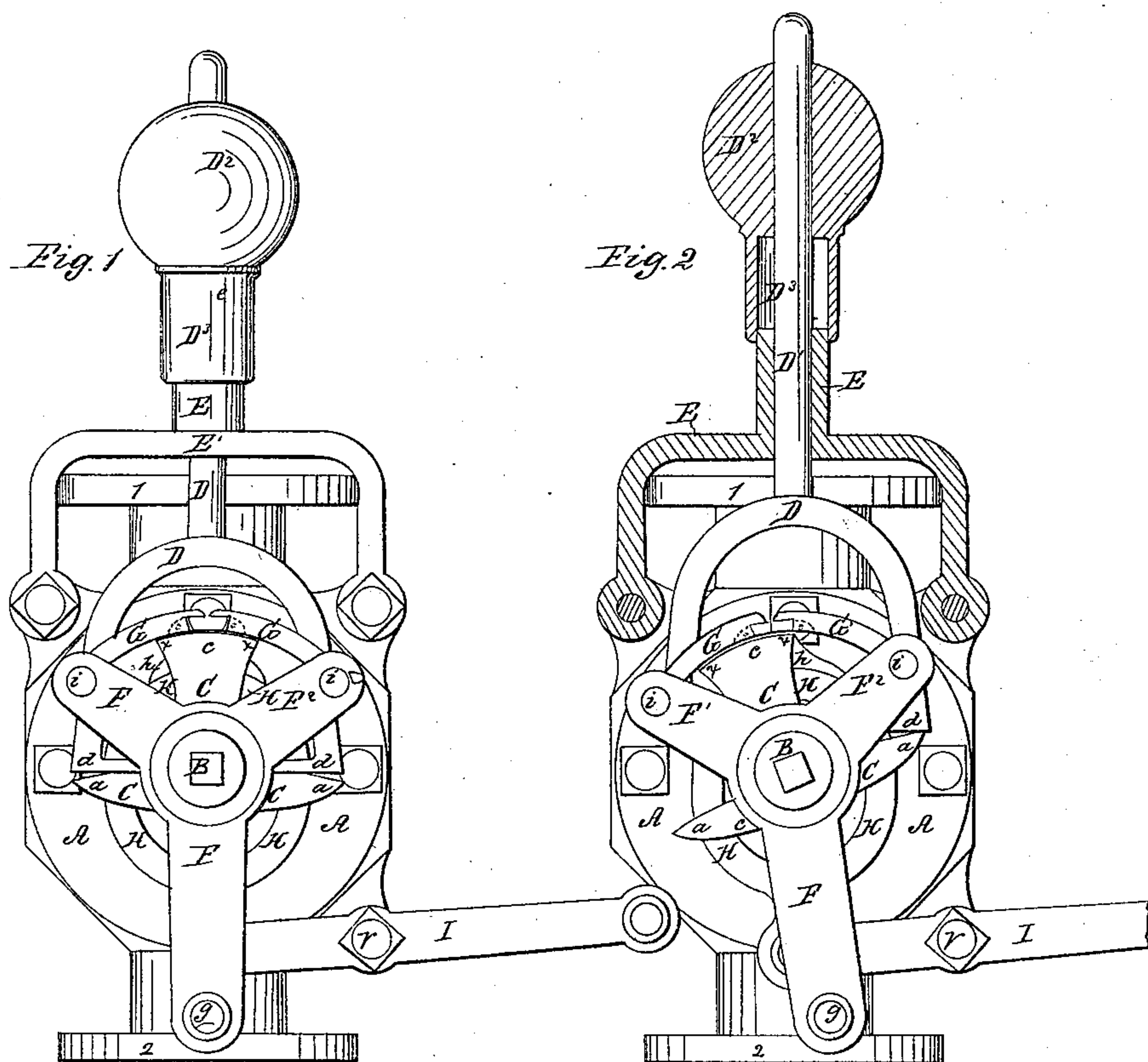


R. Stewart, 2 Sheets-Sheet 1.

Steam-Engine Valve-Gear.

N^o 52,221.

Patented Jan. 23, 1866.



Witnesses;
V. C. Clayton
John Mulvany

Inventor;
Robert Stewart
by his atty.
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2 Sheets-Sheet 2.

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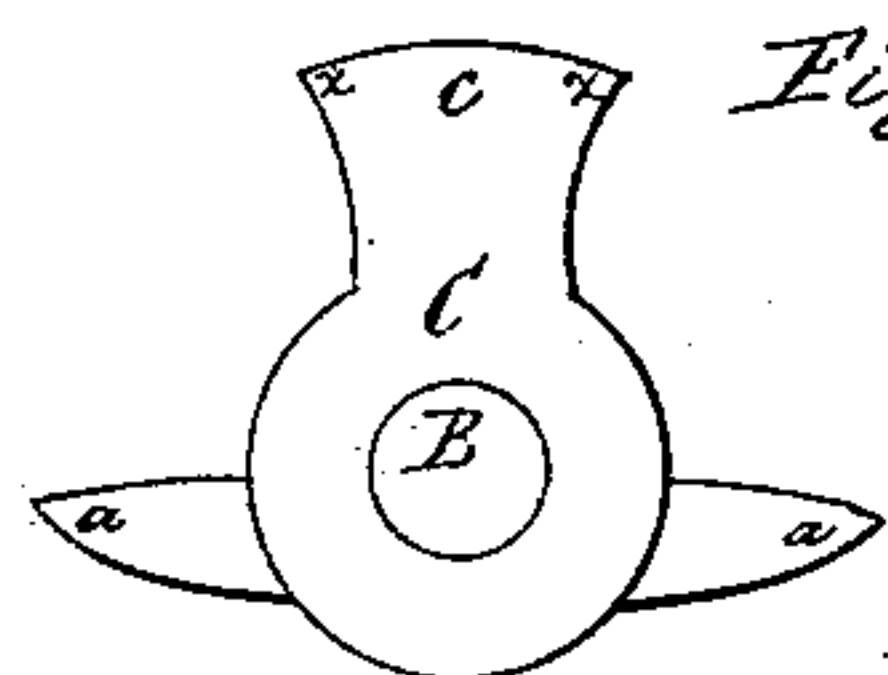


Fig. 3

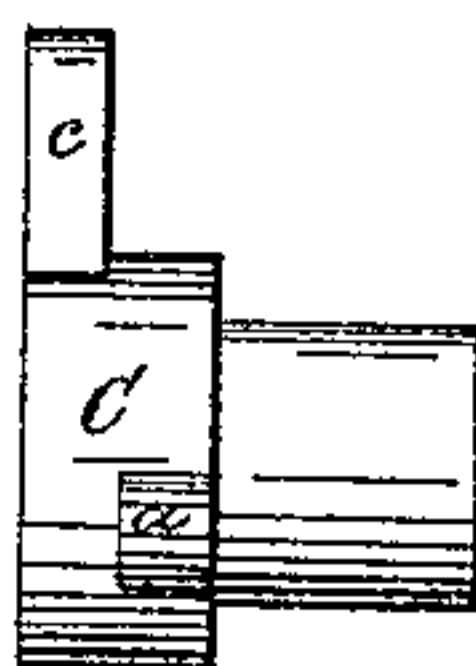


Fig. 4

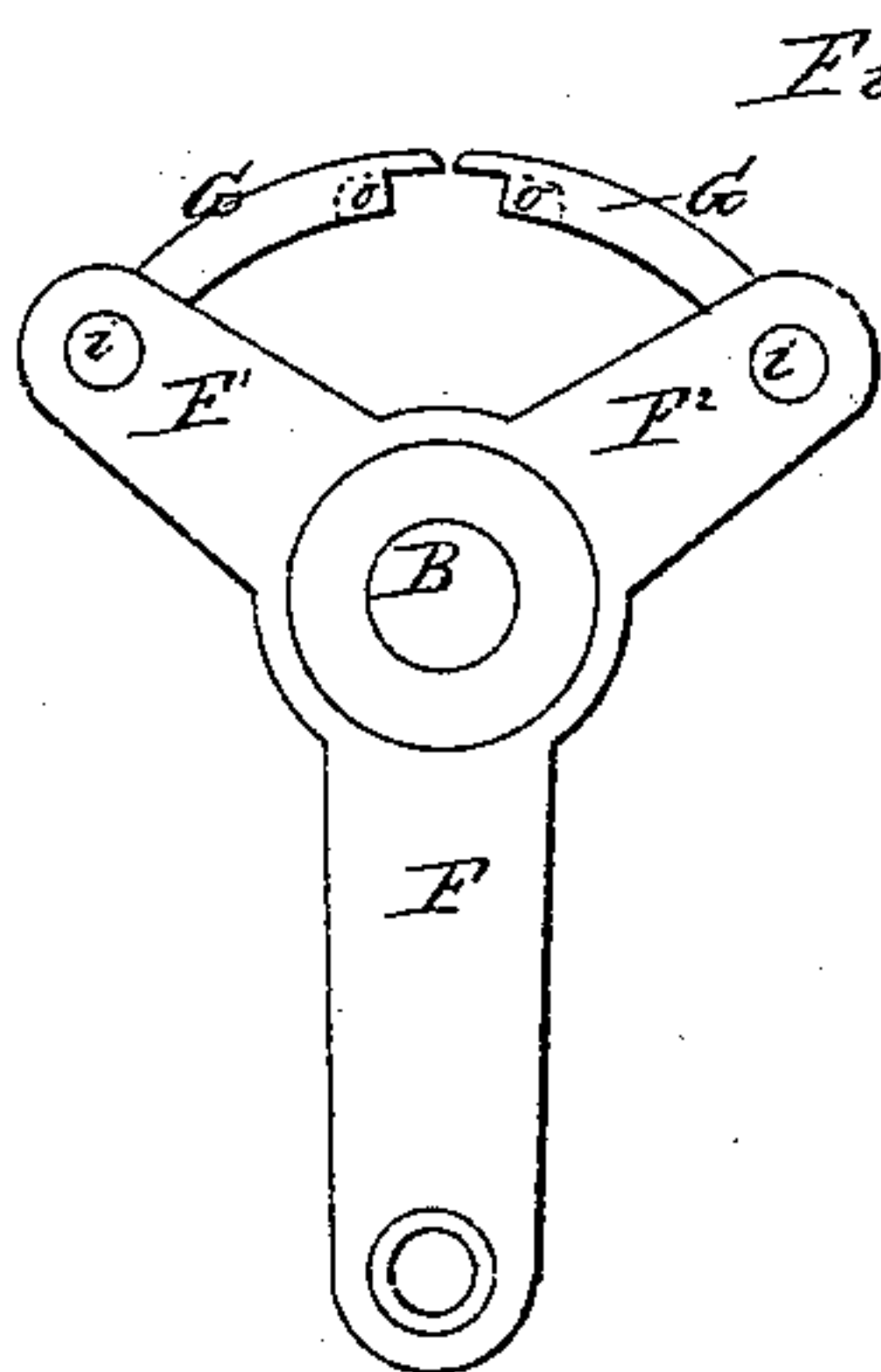
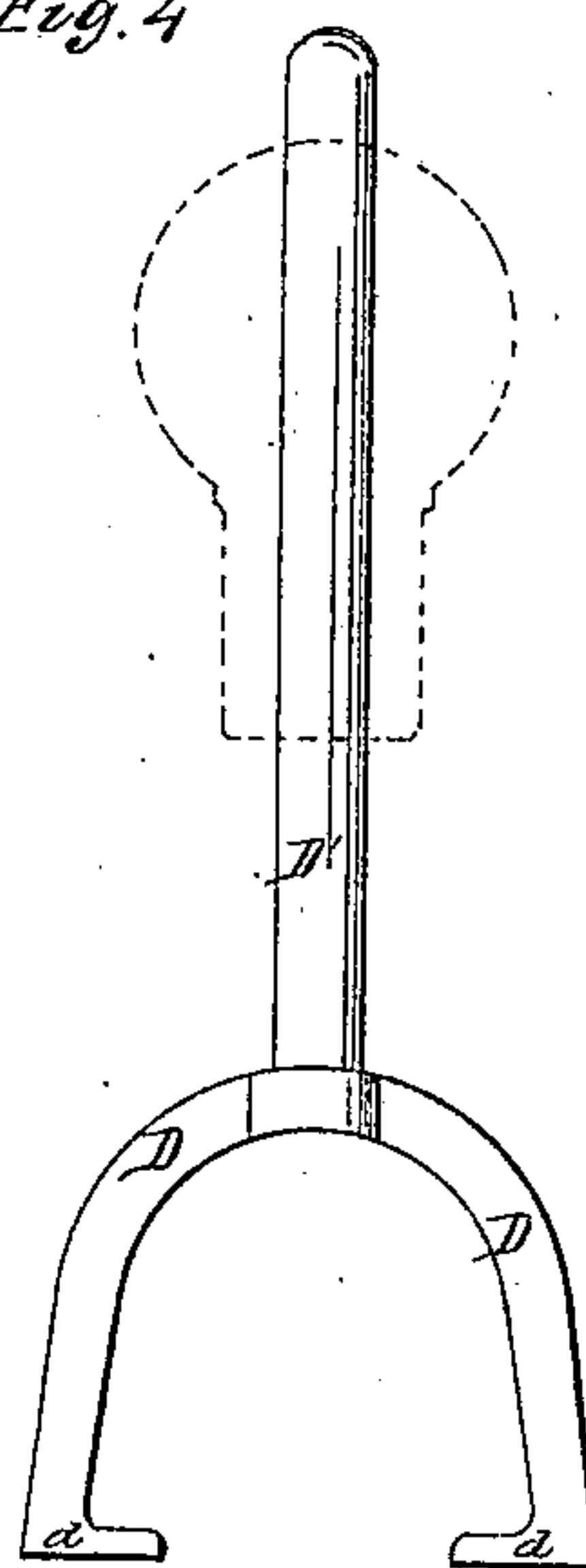
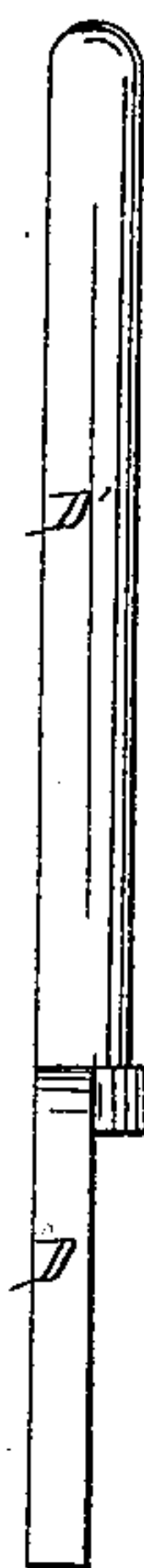


Fig. 5

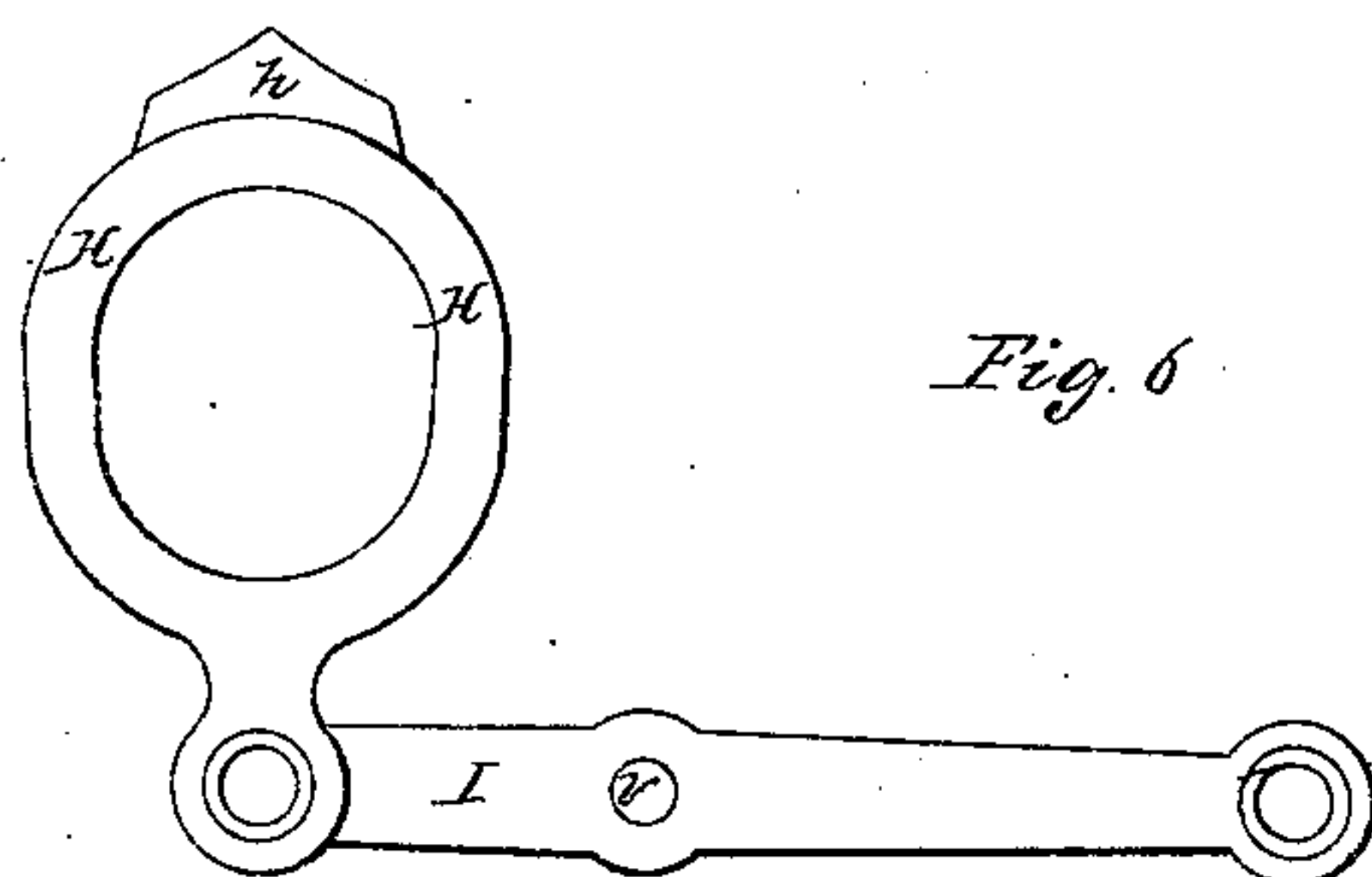
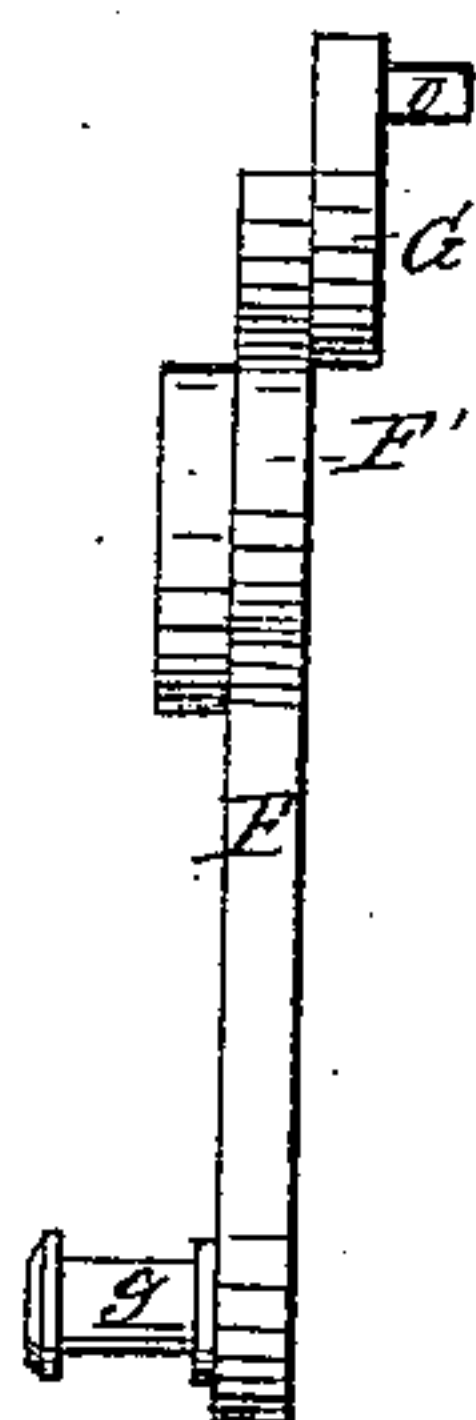
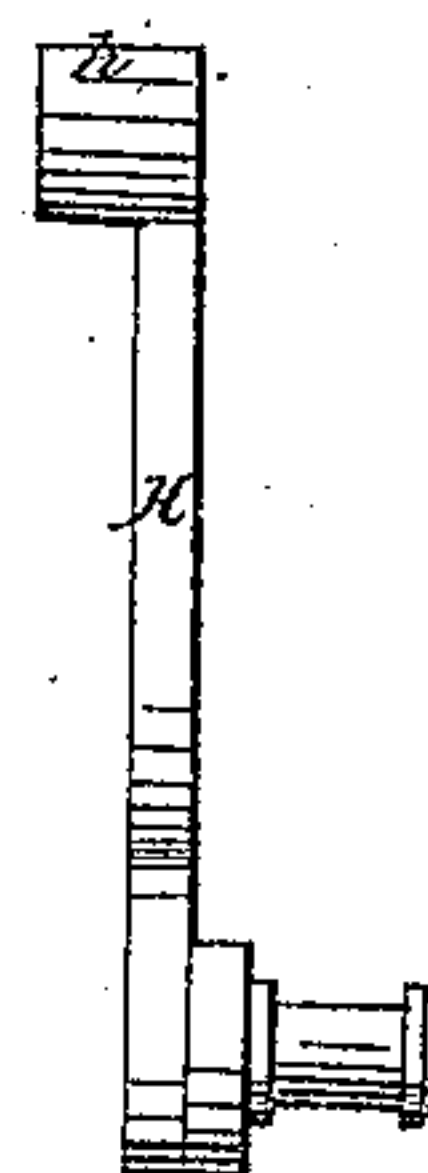


Fig. 6



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UNITED STATES PATENT OFFICE.

ROBERT STEWART, OF ELMIRA, NEW YORK.

IMPROVEMENT IN CUT-OFF VALVES.

Specification forming part of Letters Patent No. 52,221, dated January 23, 1866.

To all whom it may concern:

Be it known that I, ROBERT STEWART, of Elmira, Chemung county, in the State of New York, have invented a certain new and useful Machine for Operating the Cut-Off Valves of Steam-Engines; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference thereon marked.

In the drawings, Figure 1 is a side elevation, showing the valve-crank in a vertical position, as it stands when the valve-ports are closed. Fig. 2 is also a side elevation, but showing the parts as they stand when the ports are wide open and the steam cut off at full stroke. Fig. 3 shows the valve-crank. Fig. 4 is the weighted yoke which bears down upon the arms of the valve-crank so as to close the ports. Fig. 5 shows the operating-crank, to which the eccentric of the engine is attached and oscillates upon the valve-stem. Fig. 6 shows the yoke for regulating the bite of the pawls, and is operated by the governor.

To enable those skilled in the art to make and use my invention, I will describe its construction and operation.

My invention consists in constructing the machine hereinafter described for the purpose of operating a cut-off valve for steam-engines. This object I attain by means of an arrangement simpler, cheaper, and more effective than any heretofore known.

A represents the valve, the induction being at 1 and the eduction at 2. I make no claim to the construction of the valve, but prefer to use a balanced valve similar in construction to the valve patented to me heretofore.

B is the valve-stem.

C is the valve-crank, which is provided with lateral arms *a a*. This crank C is keyed to the valve-stem, and it is provided with a short vertical arm, *c*, extending upward, the upper surface of the end of this arm being described by a radius having its center at the center of the valve-stem. The outer corners, *x x*, of this arm should be faced with steel where they meet the friction of the pawls.

D is a weighted yoke, having arms *d d* at its lower end to rest upon the curved arms *a a* of the crank C and make it return to its vertical position when relieved from the bite of the

pawls. The stem D' of this yoke D passes upward through a socket, E, in the curved support E', which is affixed to the valve-chest.

D² is a heavy ball keyed to the upper end of the stem D', and is provided with a cylindrical extension having an air-chamber, D³, in it. The socket E acts as a stationary piston, the chamber D³ falling and rising around it. There is a small opening, *e*, from the chamber outward for the escape of the air, which is extended to act as a spring to prevent jarring by the sudden fall of the arms *d d* upon the arms *a a*.

F is the three-armed operating-crank, which is made to oscillate upon and around the valve-stem by means of the eccentric, which is attached to the button-stud *g* at its lower end. The upper end of the crank F branches out with two arms, F' and F², to the ends of which are pivoted, at *i*, the pawls G and G'.

G and G' are two pawls, respectively pivoted at *i* to the crank-arms F' and F². These pawls are formed in conformity with the arc whose radius is at the center of the crank-axis, so that the under side of both pawls corresponds to and slides over the upper end of the arm *c* of the valve-crank C.

o o o are studs near the toe of the pawls and projecting backward a sufficient distance to rest upon the operating-yoke.

H is the operating-yoke, which moves upon and embraces the journal-box of the valve-stem. At its lower end it is pivoted to the lever I, which is pivoted at V. The outer end of lever I is connected to the governor. The upper part of the yoke H is formed into an A or double-inclined plane, *h*, upon which the studs *o* of the pawls rest, the rise and fall of the plane *h* correspondingly raising or lowering the pawls.

In operating my invention the valve is properly attached to the engine, and the steam is admitted at full pressure from the boiler. In a state of rest the weighted yoke D presses down upon the arms *a* of the valve-crank C, so as to keep it vertical and close the valve-ports. As soon as the steam is let into the valve I oscillate the valve-crank C by hand a few times, so as to open the valve-ports and let steam enough into the cylinder to start the machinery and operate the governor. The action of the governor, through lever I, is to raise

or lower the operating-yoke H and its plane *h*. When the governor is lifted the yoke is depressed, and when the governor is depressed the yoke is lifted. As the yoke rises or falls, so rise or fall the pawls G G', whose studs *o* rest upon the top of the yoke; and the rise and fall of the pawls determine the degree of bite which they have upon the corners *x* of the valve-crank C. The engine being at work and its eccentric upon the return-stroke, as shown in Fig. 2, it will be seen that the pawl G' is made to push against the corner *x* of the valve-crank C so as to open the valve-ports. As the crank C is pushed by the pawl the stud *o* of the pawl gradually rises up upon the curved plane *h*, so that at the instant the steam is to be cut off the pawl shall be raised above and escape from the corner of the crank, which will then be instantly forced into the vertical position, closing the ports by the weighted yoke D, which presses upon the crank-arms *a*. At the instant that the pawl and crank-corner become disengaged the crank moves back to become vertical and close the ports, while the pawl goes in the opposite direction, sliding upon top of the crank, so as to allow the eccentric to complete the stroke. This being done, it will be found upon the forward stroke that the pawl G is, in turn, ready to instantly act in like manner upon the other corner, *x*, of the crank. In like manner the two pawls G and G' alternately push against the opposite corners of the valve-crank, pushing it more or less to the right or left, and correspondingly cutting off with more or less steam, in proportion to the degree of bite of the pawls against the crank-corners.

When the governor is at its highest elevation the yoke will be depressed, and the pawls will have their greatest hold upon the corners, and the crank will be pushed the greatest distance, and more steam will be admitted, and the steam will be cut off almost at full stroke. Just the reverse of these incidents will occur

when the governor is at its lowest position, and the steam will be cut off almost as soon as it enters the cylinder.

It will readily be seen that my invention is simpler, cheaper, and more effective in its construction and operation than any device heretofore known for this purpose.

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

1. The valve-crank C, provided with corners *x* and arms *a*, substantially as described, when used in combination with the pawls G G', or their equivalent, and the weighted yoke D *d*, or its equivalent, substantially as and for the purposes specified.

2. The weighted yoke *d* D D' D², constructed and operating substantially as described, and in combination with the arms *a*, socket E, and air-chamber D³, substantially as specified.

3. The operating-crank F F' F², constructed and operating substantially as specified, in combination with pawls G G' and valve-crank C, for the purposes specified.

4. The pawls G G', constructed and operating substantially as described, in combination with the regulating-yoke H *h*, valve-crank C, and operating-crank F F' F², substantially as and for the purposes specified.

5. The regulating-yoke H *h*, constructed and operating substantially as specified, in combination with the pawls G *o* G' *o*, substantially as and for the purposes specified.

6. The combined construction and arrangement of the weighted yoke D and valve-crank C for the purpose of closing the ports, substantially as described.

7. The arrangement of all the parts above described.

ROBERT STEWART.

Witnesses:

JNO. H. McCUTCHEN,
JO C. CLAYTON.