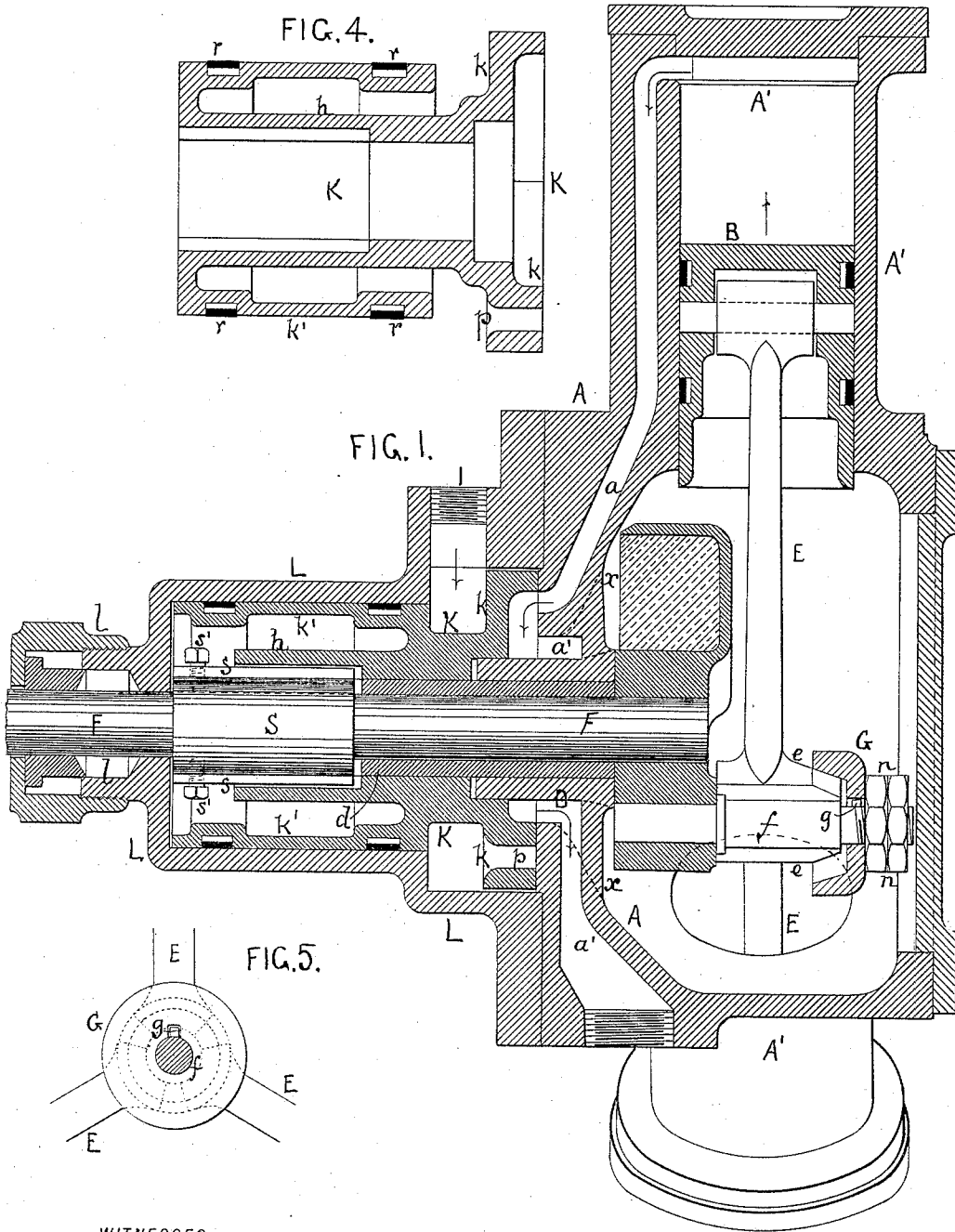


C. C. ABBE.  
MULTIPLE CYLINDER ENGINE.

No. 444,901.

Patented Jan. 20, 1891.



WITNESSES:

*George Baumann*  
*John Revell*

INVENTOR

*Charles C. Abbe*  
BY  
*Howson and Howson*  
his ATTORNEYS

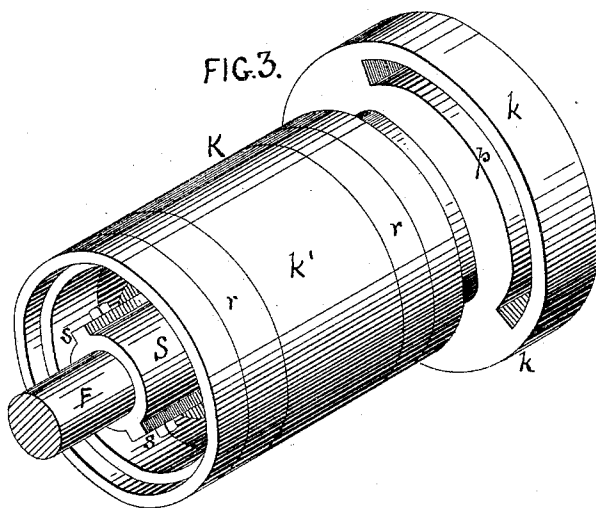
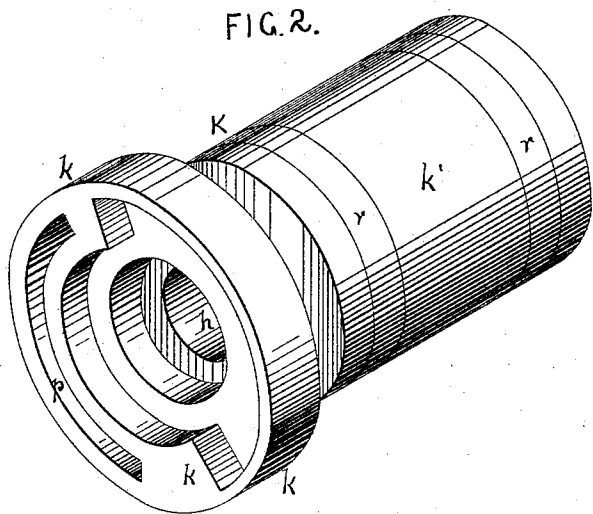
(No Model.)

2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

CHARLES C. ABBE, OF BROOKLYN, ASSIGNOR TO THE ABBE STEAM ENGINE COMPANY, OF NEW YORK, N. Y.

## MULTIPLE-CYLINDER ENGINE.

SPECIFICATION forming part of Letters Patent No. 444,901, dated January 20, 1891.

Application filed July 9, 1890. Serial No. 358,195. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES C. ABBE, a citizen of the United States, and a resident of Brooklyn, Kings county, New York, have invented certain Improvements in Multiple-Cylinder Engines, of which the following is a specification.

My invention relates more particularly to that class of multiple-cylinder engines or motors in which the several piston-rods are connected to a crank and in which the valve is a rotary valve connected to or operated by or from the crank-shaft.

My invention consists, mainly, in improvements in the construction of the valve and in its combination with other parts, designed with a view to simplicity and economy of construction and efficiency of operation.

My present invention is more particularly an improvement upon the multiple-cylinder engine for which I have obtained Letters Patent of the United States of America, No. 396,451, dated January 22, 1889.

In the accompanying drawings, Figure 1 is a vertical section of a multiple-cylinder engine or motor constructed in accordance with my invention. Figs. 2 and 3 are perspective views of the valve, looking at it from opposite ends. Fig. 4 is a sectional view of a modified form of valve; and Fig. 5 is a sectional view of a part on the line 1 2, Fig. 1.

The engine illustrated in Fig. 1 is of the three-cylinder type, and is intended more particularly for use as a steam-engine, although it may be adapted to be operated by other motive fluid; or by applying power to the crank-shaft it may be used as a meter, pump, or blower without material alteration in its principles of construction. My improvements may also be adapted to engines or other motors with more or fewer cylinders than three, but the latter is a convenient number for practical use.

In Fig. 1, A is the casing of the engine, with cylinders A', in which are the single-acting pistons B, connected by rods E to the crank-pin f of the shaft F. This crank-shaft turns in a bushing d, fixed in and practically forming a part of the central bearing or hub D of the casing. K is the rotary valve, which is arranged about the crank-shaft and controls

the supply of steam to and exhaust from the several cylinders through the usual steam-passages a and exhaust-passage a'. In the present instance I have shown the exhaust-passage a' as leading directly outside of the casing; but the steam may be exhausted, if desired, into the central chamber in a manner similar to that described in my above-mentioned patent, No. 396,451, and as indicated by dotted lines x in Fig. 1.

The principal feature of my present invention consists in the construction of the valve, which, as shown in the drawings, is a rotary disk-valve k, with a counterbalancing-piston k', formed in one piece with or secured to the disk portion, and the whole is inclosed by a detachable bonnet L, in which the rotary piston has a peripheral bearing. The steam is admitted through the inlet I into an annular space between the disk portion of the valve and its counterbalancing-piston, and as the latter has its bearing in the bonnet, but with a smaller diameter than the disk, the valve is a balanced valve. The surface area of the back of the disk portion of the valve (allowing for the steam-port p) is just a little larger than the opposing area of the counterbalancing-piston, and the valve is accordingly just held to its seat under all ordinary conditions. The counterbalancing-piston of the valve is made a little shorter than its internal bearing in the bonnet, so that if by any accident there should be an excess of back-pressure in any of the cylinders the valve can under such excessive pressure move back from its seat sufficiently to relieve it. The valve, in addition to having the peripheral bearing of its piston in the bonnet, turns upon the exterior of the central bearing or hub D of the crank-shaft, either upon that part of the bearing which is in this case shown in the form of an extended bushing or upon the cast portion of the bearing, or upon both, as in the particular instance illustrated in Fig. 1. It will thus be seen that the valve is supported independently of the crank-shaft, and more particularly by the extended bearing which the piston finds in the casing, so that the shaft is thus relieved from the duty of carrying the valve and has only a driving connection with it.

The power-transmitting end of the shaft *F* passes out through a stuffing-box *l* in the end of the bonnet *L* and carries an adjustable sleeve *S*, which extends within the interior of the valve and has one or more keys or feathers *s*, adapted to enter freely a corresponding key seat or seats within the hub *h* of the valve, so that when this sleeve has been secured in proper position by the set-screws *s'* to the crank-shaft it can impart the necessary rotary motion to the valve. The counterbalancing-piston of the valve may be provided with one or more packing-rings *r* in its periphery, and it may be cast in the form illustrated in Fig. 1, open at the back; or, as shown in Fig. 4, open at the end next the disk portion of the valve.

As a convenient method of connecting the feet *e* of the connecting-rods *E* to the crank-pin, I prefer to bevel the outer faces of these feet, as shown in Figs. 1 and 5, and fit over these tapered ends a retaining-ring *G*, which has an internal cone and is preferably prevented from turning by a pin *g* on the crank-pin entering a notch in the ring. This retaining-ring *G* is held in place and set up by means of nuts *n*, screwed onto the outer threaded end of the crank-pin *f*.

I claim as my invention—

1. A multiple-cylinder engine having a crank-shaft, with a rotary disk-valve around the crank-shaft, and a counterbalancing-piston which is formed in one with or secured to the disk portion and which is adapted to an extended bearing in the casing to support the valve independently of the shaft, with which it has only a driving connection, all substantially as set forth.

2. A multiple-cylinder engine having a casing and a crank-shaft turning in a bearing, with a rotary counterbalanced disk-valve about the crank-shaft and turning on the bearing for the crank-shaft and also in a peripheral bearing in the casing.

3. The combination of the crank-shaft of a multiple-cylinder engine with a counterbalanced disk-valve about the crank-shaft and having within its hub an internal longitudinal key seat or seats, and a sleeve on the shaft entering into the hub, with a key or keys adapted to the said seat or seats.

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

CHARLES C. ABBE.

Witnesses:

EDITH J. GRISWOLD,  
HUBERT HOWSON.