No. 614,139. Patented Nov. 15, 1898.

B. W. SMITH.

ROTARY VALVE.

(Application filed Dec. 29, 1897.)

(No Model.)

Fig. 1.

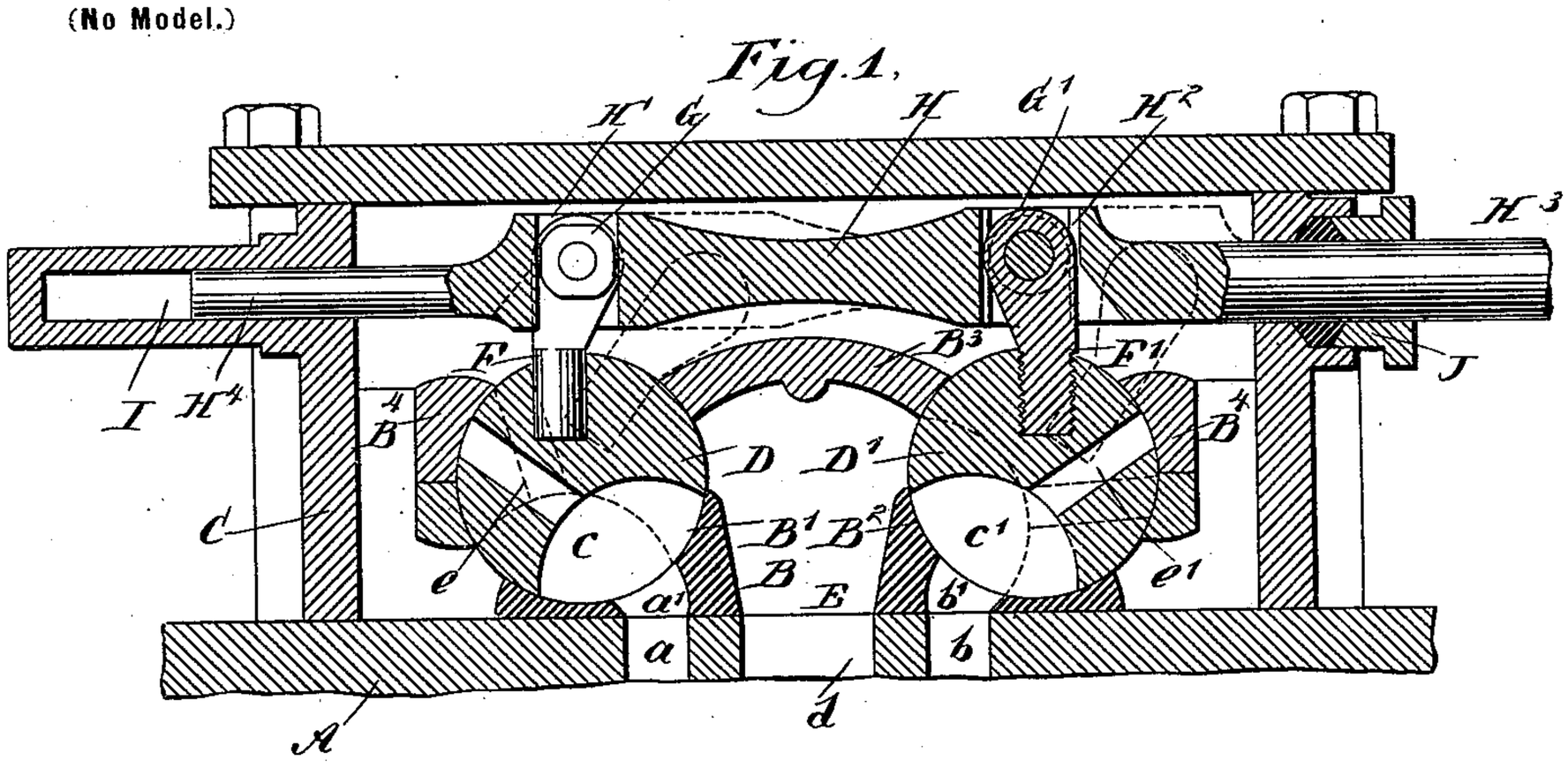


Fig. 2.

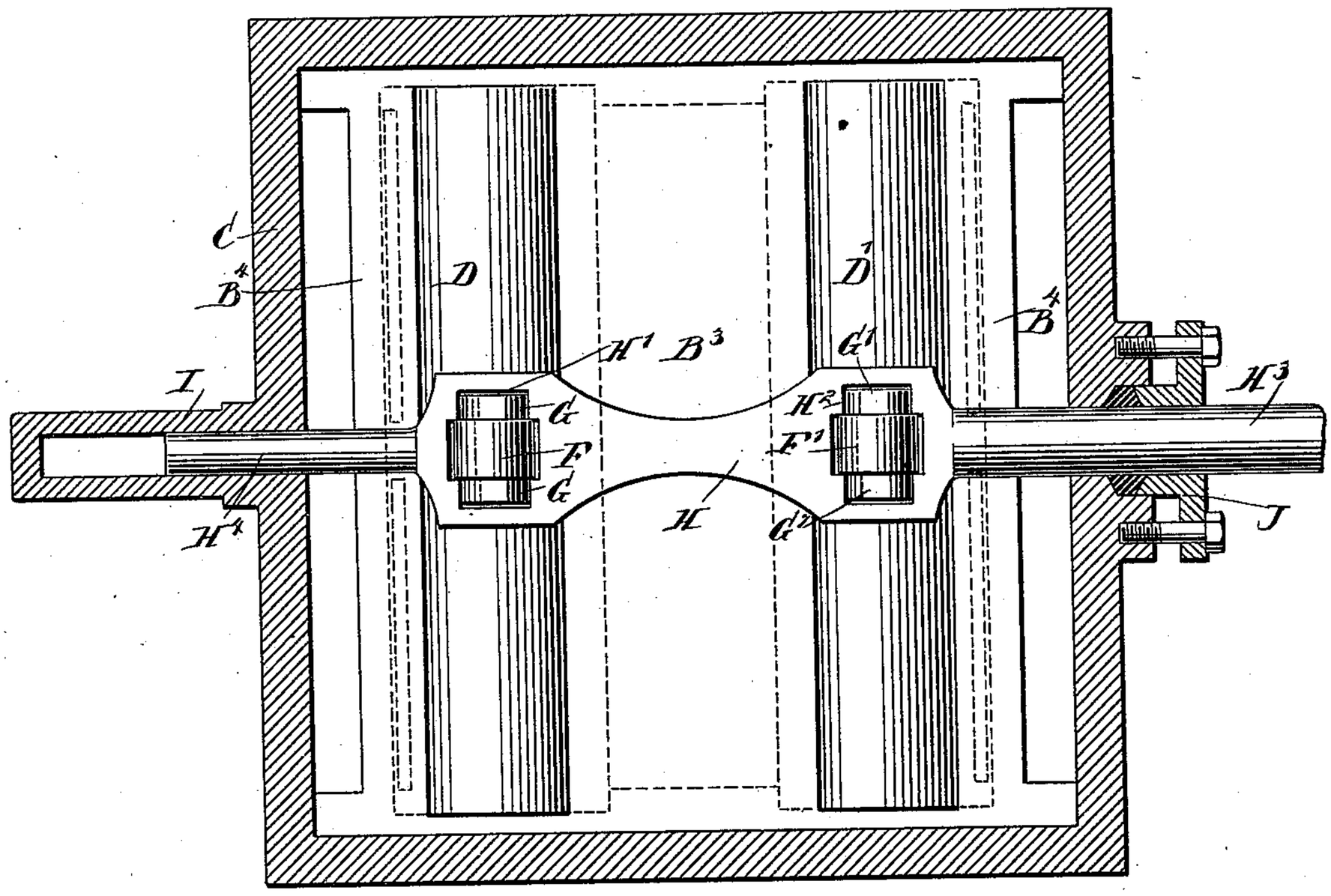
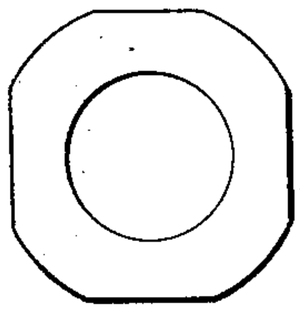


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

BRAINERD WASHINGTON SMITH, OF DELPHOS, OHIO, ASSIGNOR TO HIMSELF, AND JOHNSON B. FLANDERS, OF VAN WERT, OHIO.

ROTARY VALVE.

SPECIFICATION forming part of Letters Patent No. 614,139, dated November 15, 1898.

Application filed December 29, 1897. Serial No. 664,292. (No model.)

To all whom it may concern:

Be it known that I, BRAINERD WASHINGTON SMITH, of Delphos, in the county of Allen and State of Ohio, have invented a new and Improved Rotary Valve, of which the following is a full, clear, and exact description.

The invention relates to rotary valves such as shown and described in the Letters Patent of the United States No. 535,737, granted to me on March 12, 1895.

The object of the invention is to provide a new and improved rotary valve arranged to reduce the friction of the working parts to a minimum and to admit a large amount of steam to the same travel of the valve, to increase the power of the engine without the use of more steam by admitting a large amount of steam earlier to the cylinder.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter 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 characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of the improvement. Fig. 2 is a partly-sectional plan view of the same, and Fig. 3 is an enlarged side elevation of one of the friction-blocks.

The cylinder A is provided with the usual cylinder-ports *a* and *b*, registering with ports *a'* *b'*, respectively, formed in the valve-body B, held in a steam-chest C, connected in the usual manner with a steam-supply. The ports *a'* and *b'* open into segmental valve-seats B' B^2, formed in the valve-body B, and on the said seats are mounted to turn the cylindrical valves D D', respectively, formed with cavities *c c'*, adapted to connect the interior of the steam-chest with the cylinder-ports and the latter with a steam-exhaust chamber E, formed within the valve-body B and leading to an exhaust-port *d*, connected with the atmospheric air.

From the top of the valves D D' extend in an upward direction arms or lugs F F', on which are journaled friction-blocks G G', respectively, mounted to travel in vertically-disposed guideways H' H^2, respectively, formed in a connection H, extending between the valves within the steam-chest, and preferably rigidly connected with a valve-stem H^3, receiving the usual reciprocating motion by the valve-gear of the engine. The rear end H^4 of the connection H is fitted to slide in a suitable guideway I, formed or secured on the steam-chest C, and the valve-stem H^3 is fitted to slide in the usual stuffing-box J likewise carried by the steam-chest. Now it is evident that when a reciprocating motion is given to the valve-stem H^3 and the connection H then the friction-rollers are carried along by the guideways, so as to impart a swinging motion to the valves D D' to rock the same on their seats B' B^2 to bring the cavities *c c'* into position for admitting steam to the cylinder and for exhausting the steam, as previously explained.

By the arrangement described the stem H^3 and its connection H have a free sliding movement independent of the rocking movement of the valves, which receive their motion from the guideways in the connection H, it being understood that the friction-blocks G G' travel up and down in the guideways upon the forward-and-backward motion of the connection without undue friction.

The chamber E, previously mentioned, has its top B^3 formed by a part of the cap of the valve-body B, the said cap extending at B^4 on the outer sides of the peripheral surfaces of the valves D D', so as to close for a time the auxiliary ports *e e'*, formed in the valves D D', respectively, and opening at their inner ends at the cavities *c c'*. The ports *e e'* are so arranged relative to the cap portions B^4 that when the cavities *c c'* connect the cylinder-ports with the exhaust-chamber E then the said auxiliary ports *e e'* remain closed; but when the cavities commence to open into the steam-chest for connecting the latter with the cylinder-ports to admit steam then the auxiliary ports *e e'* will also open into the steam-chest to allow an additional amount of steam to pass from the steam-chest to the cavities. Thus a very large amount of steam is permitted to pass into the cylinder without increasing the travel of the valves, and consequently considerably more power is given to the engine by this increased volume of

steam entering the cylinder and acting on the piston as soon as the valve begins to open.

It is to be expressly understood that the auxiliary ports *e e'* remain closed during the time exhaust takes place, but open with the cavities to the steam-chest to admit live steam to the cylinder.

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

1. A valve mechanism, provided with a segmental valve-seat, a valve mounted to turn on the said seat, and formed with a cavity for connecting the cylindrical ports with the valve-chest and the exhaust, to admit and exhaust the steam to and from the said cylinder-ports, the valve being formed with an auxiliary port opening into the said cavity and arranged to open into the steam-chest at the time the cavity opens into the same, and to be cut off or closed during the time the cavity opens to the exhaust, substantially as shown and described.

2. The combination with a cylinder and valve-chest, the former having an exhaust-port and two ingress-ports, of two valve-seats mounted in the valve-chest and having ports respectively registering with the ingress-ports of the cylinder, a valve-body having a top extending over the exhaust-port to form an exhaust-chamber, and the top of the valve-body having an extension at each side, such extensions being juxtaposed to the valve-seats of the ingress-ports, two rotary valves respectively mounted on the valve-seats and respectively bearing against said extensions of the top of the valve-body, each valve having a cavity and such cavities being in continual communication with the respective ingress-ports, and being capable of communicating either with the exhaust-chamber or with the interior of the valve-chest, each valve also having an auxiliary port communicating with the cavity in the valve, such auxiliary ports being closed by the extensions of the valve-body, and being opened to the interior of the valve-chest as the cavities in the valves are opened to the interior of the valve-chest, and means for simultaneously rolling the valves.

3. The combination with a cylinder and valve-chest, the cylinder having an exhaust and an ingress port, of means in the valve-chest and forming an exhaust-chamber inclosing the exhaust-port of the cylinder, a valve-seat having a port registering with the ingress-port aforesaid and located in the valve-chest, and a rotary valve mounted on the valve-seat and having a cavity in continual communication with the port thereof, the cavity being capable of communication either with the exhaust-chamber or with the interior of the valve-chest, and the valve also having an auxiliary port in communication with the cavity, such auxiliary port being closed when the cavity is in communication with the exhaust-chamber, and being in communication with the interior of the valve-chest when the cavity is in communication with the interior of the valve-chest.

4. The combination with a cylinder and valve-chest, the former having an exhaust-port and an ingress-port, of a valve-seat mounted in the valve-chest and having a port in communication with the ingress-port of the cylinder, a valve-body situate in the valve-chest and having a top forming an exhaust-chamber, and also having an extension situated in proximity with the valve-seat, and a rotary valve mounted on the valve-seat and engaging with said extension of the top of the valve-body, the valve having a cavity in continual communication with the ingress-port of the cylinder, and the cavity being capable of communication either with the exhaust-chamber or with the valve-chest, and the valve also having an auxiliary port in communication with the cavity and closed by said extension when the cavity is in communication with the exhaust-chamber, the auxiliary port being opened to the interior of the valve-chest when the cavity is opened to the interior of the valve-chest.

5. The combination with a valve-chest, of two rotary valves mounted therein, an arm fixed to each valve, a friction-block carried by each arm, and a valve-stem reciprocal in the valve-chest and provided with transversely-disposed guideways wherein are fitted the respective friction-blocks.

6. In a valve-gear, the combination of a valve-chest having a seat therein, and a rotary valve mounted on said seat and having a cavity therein and also having an auxiliary port run through the valve and in communication with the cavity.

7. In a valve-gear, the combination with a cylinder and valve-chest, the former having an exhaust-port and an ingress-port, of a rotary valve mounted in the valve-chest and having a cavity, and also having an auxiliary port in communication with the cavity, and means for imparting movement to the valve.

BRAINERD WASHINGTON SMITH.

Witnesses:
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C. L. SAUTTER.