

No. 742,142.

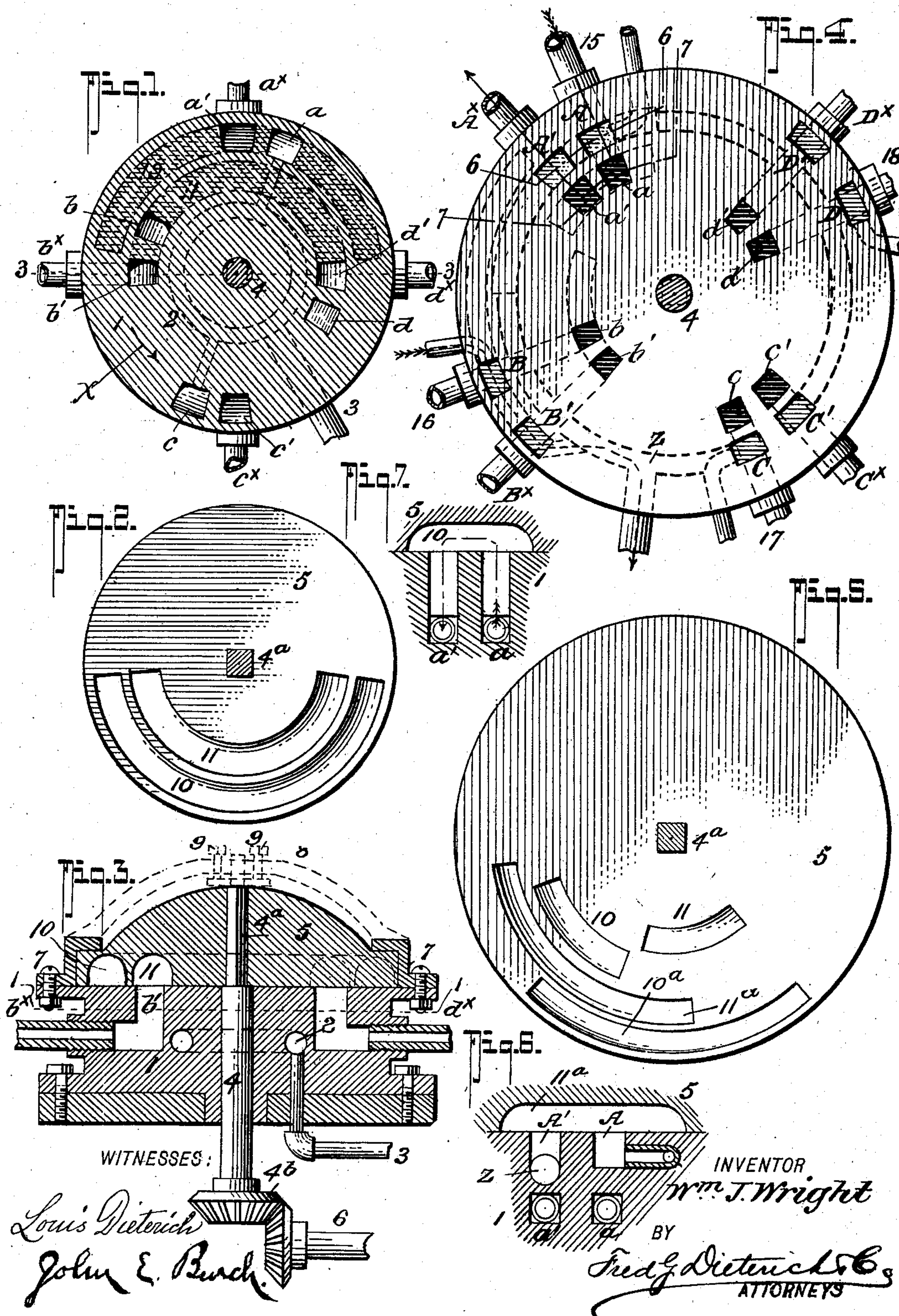
PATENTED OCT. 20, 1903.

W. J. WRIGHT.  
VALVE MECHANISM FOR GAS ENGINES.

APPLICATION FILED JULY 23, 1900,

NO MODEL.

2 SHEETS—SHEET 1.





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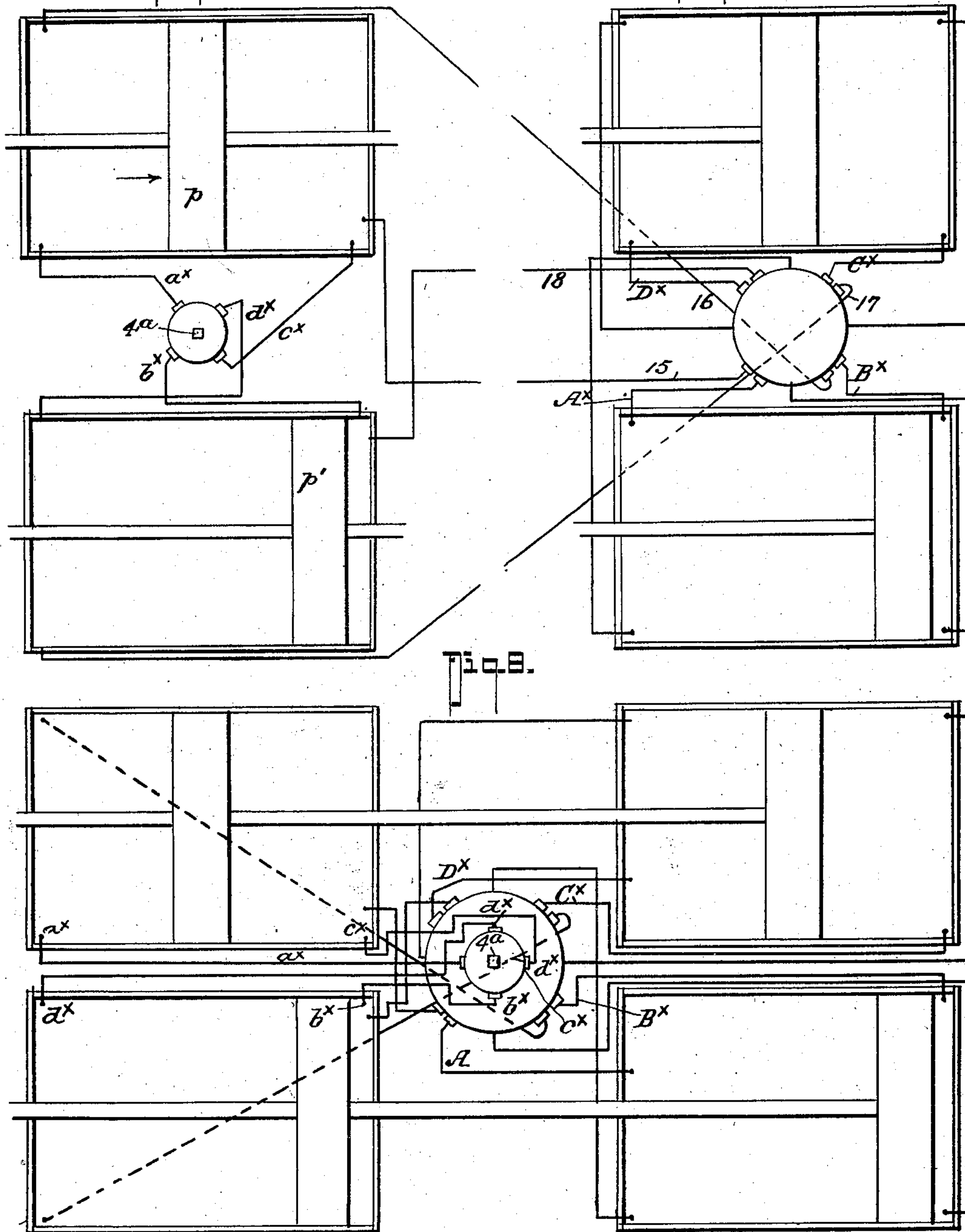
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NO MODEL. Fig. 1<sup>a</sup>

Fig. 4<sup>a</sup> SHEETS—SHEET 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## VALVE MECHANISM FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 742,142, dated October 20, 1903.

Application filed July 23, 1900. Serial No. 24,539. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM J. WRIGHT, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented an Improvement in Valve Mechanism for Gas-Engines, of which the following is a specification.

This invention is in the nature of an improved valve mechanism for gas-engines; and it is more particularly adapted for use in the type of explosive-engine described and claimed in my copending application filed on even date with this application, Serial No. 24,540, and the said invention seeks to provide a very simple, inexpensive, and effectively-operating valve mechanism capable of governing or controlling the feed of the working agent to the working cylinder and the escape of the exploded mixture in such manner as to avoid the necessity of providing cams, trip devices, eccentrics, &c., such as are usually employed in the common type of explosive-engines, it also having for its purpose to provide a very compact arrangement of valve mechanism which when properly set will not readily get out of order and in which the several parts are so arranged as to effect a positive, safe, quick, and effective operation and by which a regular action of feeding and exhausting can be maintained irrespective of the explosion thrusts of the operating-pistons.

My invention in its complete make-up also comprehends a novel construction of valve mechanism capable of being adapted for use with other types of engines, steam or air, without requiring essential changes of the parts constituting the mechanism hereinafter specified.

The invention in its more subordinate features consists in certain details of construction and peculiar combination of parts, all of which will hereinafter be fully described, and pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a horizontal section of the simplest form of my improved valve mechanism, taken on the line 1 1 of Fig. 3. Fig. 1<sup>a</sup> illustrates diagrammatically the manner in which

my valve mechanism shown in Figs. 1, 2, and 3 is applied for use on a two-cylinder pumping means for gas-engines. Fig. 2 is an inverted plan view of the rotary valve which forms a part of the complete valve mechanism. Fig. 3 is a vertical section of the valve mechanism, taken practically on the line 3 3 of Fig. 1. Fig. 4 is a plan view of the bottom or base part of a modified construction of my improved valve mechanism, the same being especially applied for regulating the feed and exhausts of a double-cylinder gas-engine taking a working charge at both ends of the piston. Fig. 4<sup>a</sup> is a diagram illustrating the manner of use of the said modified form of valve mechanism. Fig. 5 is an inverted plan view of the valve for the mechanism shown in Fig. 4. Fig. 6 is a section on the line 6 6 of Fig. 4. Fig. 7 is a similar view on the line 7 7 of Fig. 4; and Fig. 8 is a diagrammatic view illustrating a further modification of my invention, the pump-governing valve mechanism and the working-cylinder valve mechanism being combined, the two rotating valve members being mounted upon a single rotating stem or shaft.

In the form illustrated in Figs. 1, 2, and 3 my type of valve mechanism comprises a base 1, suitably mounted and having an annular feed-channel 2, into which a feed-pipe 3 discharges and which when the mechanism is used in the manner shown in Fig. 1<sup>a</sup>, hereinafter referred to, the charge is a mixed air and gas or other explosive agent. Arranged quadrantly the base has a series of feed-ports *a*, *b*, *c*, and *d*, all of which communicate with the feed-channel 2, and adjacent each of said ports and in the same annular plane is an escape-port, said ports being designated by *a'*, *b'*, *c'*, and *d'* and discharging into offtakes *a*<sup>x</sup>, *b*<sup>x</sup>, *c*<sup>x</sup>, and *d*<sup>x</sup>.

4 designates a shaft rotatably held on the base 1 and extended vertically therethrough, the upper end of which projects above the base and terminates in a non-circular spindle 4<sup>a</sup>. Any suitable means may be employed for rotating the shaft 4 to effect a proper predetermined rotation of valve 5, presently described, as particular use for which the said mechanism may be applied necessitates.



When used for regulating the inflow to a pair of pumping-cylinders, as in Fig. 1<sup>a</sup>, the shaft 4 has a miter-gear 4<sup>b</sup>, driven by a shaft 6, in turn rotated by direct or indirect connection 5 with the crank-shaft of the engine.

The valve 5 has a flat seat to engage the seat of the base 1, and to hold the valve true on its base a flange-guide 7 is provided, and to regulate the pressure of the valve 5 on the base a bridge-piece (see dotted lines 8 of Fig. 3) is provided, having clamp-screws 9 to bear down on the valve 5. The seat or under face of the valve has a pair of concentrically-arranged feed-chambers 10 and 11, that extend 15 nearly half-way around the seat, the inner channel 11 being so disposed as to travel in the plane of the ports *b b'* and *d d'*, while the outer channel travels over the remaining ports. When arranged as described, it will 20 be manifest that by reason of the correlation of the several sets of ports and the feed-channels 10 and 11 in the valve that in rotating, assuming the valve to be traveling in the direction indicated by the arrow X, when the 25 ports *a a'* are in full open communication at the center of the feed-channel 10 the channel 11 will just be beginning to bring in the port *b'* with port *b*, it being also obvious that on the other half of its movement the valve 5 30 will act correspondingly on the other two sets of ports, which during the operation just described remain closed.

The arrangement of the valve mechanism shown in Figs. 1, 2, and 3 I have found very 35 effective for regulating the inflow of the working agent to a pair of pump-cylinders arranged to take in a charge at one end of the cylinders as the pistons drive out a prior charge at the other end and as a prior col- 40 lected charge is driven alternately into the opposite ends of the pump-cylinders.

When applied as indicated in Fig. 1<sup>a</sup>, the operation of the valve mechanism is as follows: Piston *p*, traveling in the direction indicated by the arrow, draws in a flow of 45 working agent back of it under full head through the pipe *a<sup>x</sup>*, which is now in communication with the feed-channel through ports *a a'*, and at the same time the pipe *b<sup>x</sup>* 50 is just beginning to receive a flow through ports *b b'* and discharging in back of piston *p'*. The two air-pistons are driven in the direction indicated by any suitable means, and the valve 5 continues in its rotary movement, 55 brings the channel 10 into communication with ports *c c'*, which allows piston *p*, which now begins its movement in the opposite direction, to draw in the fluid back of it, and when said piston reaches the center of its 60 stroke in the direction stated the ports *d d'* will open to pipe *d<sup>x</sup>*.

The modified form of my invention (shown in detail in Figs. 4 to 6 and diagrammatically in an operative position in Fig. 4<sup>a</sup>) has the 65 ports *a a'*, *b b'*, *c c'*, and *d d'* arranged the same as in Fig. 1, except that the ports *a*, *b*, *c*, and *d* each communicate with an inde-

pendent feed-pipe 15, 16, 17, and 18, which when they form a part of the improved gas-engine shown in my copending application 70 before referred to join with the escape-outlets of the pump-cylinders. In this modified form the offtake-pipes (indicated by *A<sup>x</sup> B<sup>x</sup> C<sup>x</sup> D<sup>x</sup>*) may join with the inlets of a pair of working cylinders, as shown in Fig. 4<sup>a</sup>, and 75 said form of mechanism also includes supplemental ports, one set for each set of the feed-ports before described, said supplemental ports being indicated, respectively, by *A A'*, *B B'*, *C C'*, and *D D'*, and all of the ports *A*, 80 *B*, *C*, and *D* communicate with a single exhaust *Z*, while the ports *A'*, *B'*, *C'*, and *D'* join with the several exhausts in the two working cylinders.

It will be noticed by reference to Fig. 4<sup>a</sup> 85 that by means of a valve mechanism constructed as described the continuous rotation of the rotary-valve member will serve to progressively exhaust the ends of the working cylinders and open up communication be- 90 tween the said cylinders and the different feed-pipes that lead the charge into the several feed-pipes *a*, *b*, *c*, and *d*.

Fig. 8 illustrates a further modification of my improvement. In this form of my inven- 95 tion the two valve mechanisms (shown in Figs. 1<sup>a</sup> and 4<sup>a</sup>) are combined as one—that is, the two rotary-valve members are held in like vertical planes on a single drive-shaft—and while I have not illustrated the same it 100 is manifest my valve may be further modified and a single rotary-valve member used in place of the two heretofore described, with the feed-channels therein and the feed-ports 105 in the base disposed coöperatively in such manner so as to provide for the proper predetermined feeding of the working agent to the pump-cylinders and to govern the feeding and exhausting for the working cylinders.

While I have illustrated the preferred use 110 for which my improved valve mechanism is adapted, I deem it proper to here say that with slight modifications coming under the scope of the appended claims the said mechanism may be readily adapted to act as a sub- 115 stitute for the valve mechanisms shown in my copending application for improvements in a gas-engine, Serial No. 23,709, filed July 16, 1900.

In the modified construction shown in Fig. 120 4 the valve 5 is provided with supplemental feed-channels 10<sup>a</sup> 11<sup>a</sup>, having a predetermined correlation with the channels 10 11, said channels 10 11 in this latter form being much 125 shorter than those in the valve shown in Fig. 2 to provide for a quick-feed action and also to permit the exhaust-channels 11<sup>a</sup> 10<sup>a</sup> to open up communication through the exhaust-ports in the valve-base in advance of the opening of the inlet-ports. 130

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

1. A valve mechanism, comprising a sta-



tionary body having a plurality of sets of ports, each set having an inlet and an outlet, said sets being arranged to be successively brought into an operative condition, and a rotary-valve member having feedways adjacent each other and extending in the arcs of circles through a distance slightly less than one hundred and eighty degrees, and arranged to bring one set of said ports into condition for the passage of a maximum flow there-  
 10 through, as the two ports of the next set in advance are being put into communication with each other, as specified.

2. A valve mechanism having a series of ports arranged in sets, each set including an inlet and an outlet, the several sets being arranged to be brought successively into an open condition adjacent each other and extending in the arcs of circles through a distance of slightly less than one hundred and eighty degrees, and a rotary valve member having feed-channels adapted to bring into an open position two succeeding sets of ports, while the remaining sets remain closed, and  
 25 to begin to open up the next succeeding ones of the remaining sets as the first of the two sets of ports are being closed, as set forth.

3. A valve mechanism for the purpose described, comprising a base member having a series of ports arranged in four sets, each set having an inlet and an outlet, the inlet communicating with a feed, the outlets with distributing-pipes or offtakes, said sets being disposed annularly; of the rotary valve  
 35 having its face movable over the aforesaid ports, said face having feed-channels adapted to engage with two adjacent sets of the ports at the same time, and while connecting with the forward one of the two sets of ports to maintain a full open way in the other set of  
 40 ports it engages, as set forth.

4. A valve mechanism for the purposes de-

scribed, comprising a base having four sets of ports, two diametrically opposite ones being disposed outside of the other two diametrically opposite ones, each set of ports including an inlet and an outlet, a valve member held to rotate on the stationary member, said valve member having concentrically-disposed feed-channels, the inner one traveling  
 45 over the inner set of ports, the outer channel adapted to travel over the outer set of ports, substantially as shown and described, whereby one set of ports will always be opened in advance of the other set of ports, for the purposes described.

5. A valve mechanism comprising a stationary body having a plurality of sets of ports one half of said sets being arranged in one series and diametrically opposite each other  
 60 the other half of said sets being arranged in a second series and diametrically opposite each other, the sets of ports of the first series being arranged in the arc of one circle the sets of ports of the other series being arranged  
 65 in the arc of the second circle, each set of ports having an inlet and outlet, said sets being arranged to be successively brought into operative condition, a rotary-valve member having feedways adjacent each other and extending in the arc of circles and of slightly  
 70 less length than one hundred and eighty degrees, said valve member and its feedways being so arranged as to bring one set of ports in one series into condition for the passage  
 75 of a maximum flow therethrough as the ports of the next set in advance of the second series are being brought into communication with each other, substantially as shown and described.

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Witnesses:

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