No. 671,739. Patented Apr. 9, 1901.

H. T. VADERS.

MOTOR.

(No Model.) (Application filed Sept. 25, 1900.)

2 Sheets—Sheet 1.

Fig. 1.

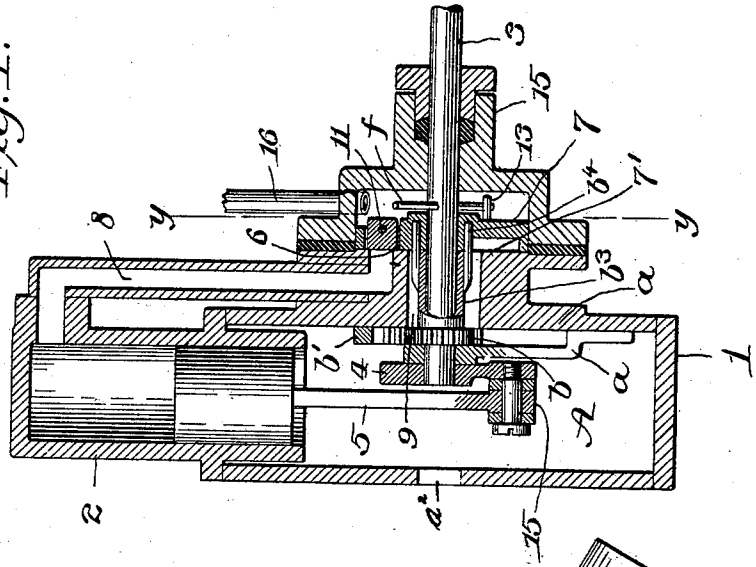
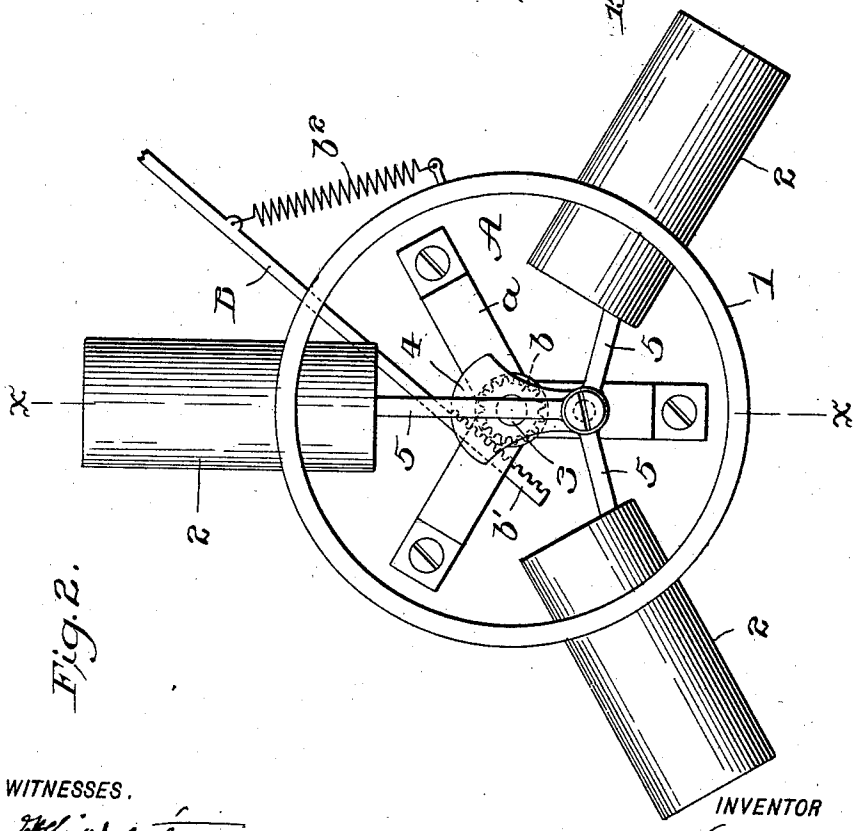


Fig. 2.



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Fig. 3.

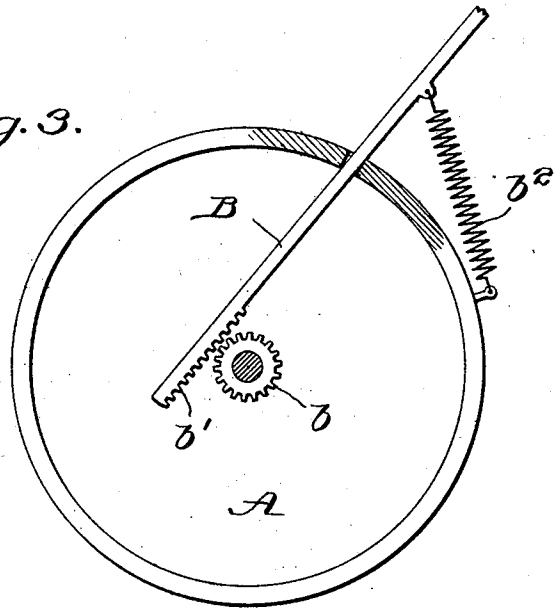


Fig. 4.

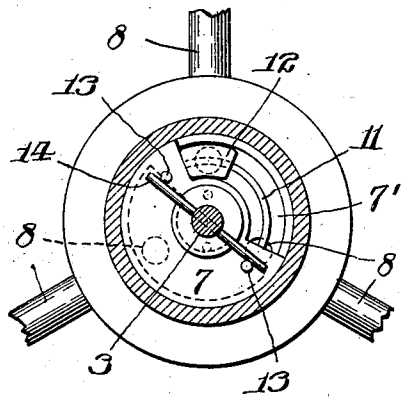


Fig. 5.

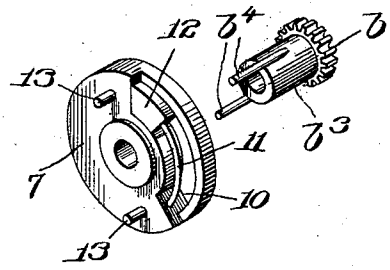
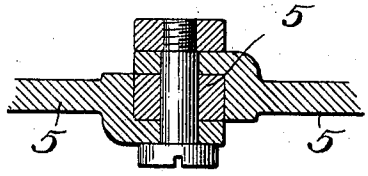


Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY T. VADERS, OF PHILADELPHIA, PENNSYLVANIA.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 671,739, dated April 9, 1901.

Application filed September 25, 1900. Serial No. 31,057. (No model.)

To all whom it may concern:

Be it known that I, HENRY T. VADERS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Motors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in motors, and has particular reference to that class of motors which are adapted to be operated by steam, compressed air, or any other well-known propelling medium and is designed as an improvement on a patent granted to me March 27, 1900, No. 646,197, for improvements in motors.

The invention consists in the combination and novel arrangement of the several parts of the device, as hereinafter described, illustrated in the drawings, and more particularly pointed out in the claims hereunto appended.

Referring to the drawings, Figure 1 is a sectional view of the motor, taken on line $x\,x$, Fig. 2. Fig. 2 is a view of the device, showing the relative positions of the cylinders to the exhaust-chamber and to each other and the manner of connecting the pistons of said cylinders to the main shaft of the motor and the position and connections of the reversing-lever. Fig. 3 is a detail view showing the position of the reversing-lever when the motor is running normally ahead. Fig. 4 is a vertical transverse section through the valve-chest, taken on line $y\,y$, Fig. 1, showing the valve mechanism. Fig. 5 shows details of the valve, reversing cut-off plug, and mechanism for reversing said valve; and Fig. 6 is a detail sectional view showing the manner of attaching the piston-rods of the several cylinders to the main driving-shaft.

Referring to the drawings, the numeral 1 indicates the motor; 2, the several cylinders, having their forward ends mounted and projecting a short distance through the casing or wall of and into the main exhaust-chamber A, which exhaust-chamber is preferably circular in cross-section.

3 indicates the main shaft of the motor, being suitably mounted therein and having one end thereof projecting into the interior of the exhaust-chamber A, through the wall a' thereof, said end being mounted in and centered by a bracket a. This shaft has secured on its end inside of the exhaust-chamber A a crank-arm or plate 4, to one end of which is pivoted the free ends of the piston-rods of the several cylinders 2 by placing them one upon the other and passing therethrough a securing-bolt, as shown in Fig. 6.

Loosely mounted on the main shaft, within the exhaust-chamber A, between the wall a' thereof and the bracket a, is a suitable pinion b, provided with a sleeve b^3, having suitable pins or projections b^4, adapted to enter corresponding openings in the main valve 7 of the motor, whereby the pinion and valve will be rigidly connected, for a purpose hereinafter stated.

The numeral 6 indicates the main valve-seat, which is provided with the ports 8 8 8, leading to the several cylinders, as shown, and the exhaust-port 9, surrounding the shaft 3, leading through suitable passages in the wall a' down into the exhaust-chamber A. The valve 7 is a circular revoluble sliding valve, provided with an open passage 10, adapted to open to the valve-chest ports 8 in the valve-seat. This valve is also provided with a covered passage 7′, adapted to connect one or more of the ports 8 with the exhaust-port 9 of the valve-seat, as is evident. In this open passage 10 is provided a suitable guide 11, as shown, upon which is slidably mounted a movable cut-off plug 12, adapted to be shifted to the opposite side of the opening 10 after the valve 7 has been turned halfway around for the purpose of reversing the engine. The object of this plug 12 is to form a movable cut-off that will be operative whether the engine is moving forward or backward, and it is fitted loosely upon the guide 11 and over the valve-seat, so that some steam will escape through the crevices, and when the engine is started in the opposite direction aid in forcing said valve to the proper position on the opposite side of the

opening 10. After getting into this position the force of the revolving valve and friction will retain the plug in the proper position.

On the outer side of the valve 7 and projecting into the valve-chest are two oppositely-disposed pins or lugs 13 13, adapted to be engaged by a bar or pin 14, secured to or passing through the main shaft 3, as shown, for a purpose hereinafter stated. The numeral 15 indicates a suitable cap for said valve-chest, through which extends the main shaft 3 and which is provided with a suitable inlet-pipe 16, adapted to be connected to the source of supply of any suitable propelling medium.

B is a reversing-lever having one end thereof projecting through the casing and into the interior of the exhaust-chamber A and provided with a rack b', adapted to engage with the pinion b on the main shaft.

b^2 is a spring having one end thereof secured to the lever outside the casing and the opposite end secured to said casing or the support thereof for the purpose of holding said rack and lever out of engagement with said pinion until it is desired to reverse the direction of the motor.

The operation of the device is as follows: Steam, air, or other propelling medium enters from any suitable source of supply through the inlet-pipe 16 to the valve-chest and passing through the open passage in the valve and one of the ports 8 in the seat thereof to one of the cylinders 2 and drives the piston-head thereof inwardly, and by reason of the connection of its piston-rod to the crank-arm or plate 4, to which the piston-rods of the other cylinders are also connected, forces the piston-heads of the remaining cylinders back, thereby expelling the expended propelling medium from said cylinders out through the ports 8 8, covered passage $7'$, and exhaust-port 9 out into the exhaust-chamber A of the motor, whence it is taken to the atmosphere through the opening a^2. This starts the shaft 3 to revolve and by means of the pin 14, secured therein in the valve-chest, and the pins or stops 13 13 on the valve, which are engaged thereby, will cause the said valve to revolve with said shaft, thus presenting another port 8 in the valve-seat to receive and carry to its cylinder the propelling medium, when the same operation takes place as described for the first cylinder. When it is desired to reverse the motor, the lever B is raised, which causes the rack b' on the end thereof within the exhaust-chamber A to engage the pinion b, which is loosely mounted on the shaft 3 and connects with the valve 7. This upward movement of the lever B will turn the valve 7 half-way around and cause the steam to enter a port 8 that would otherwise be exhausting. As a consequence the movement of the engine would be reversed and the cut-off plug 12 would be immediately forced to the opposite side of the opening 10 in the valve 7 and perform its steam-cut-off function in the same manner as if the engine were moving in the forward direction. The ends of two of the piston-rods 5 being upset and the middle piston-rod made straight, as shown in Fig. 6, the thrust of the engine is always carried upon the middle part of the pin that fastens the ends of the piston-rods to the crank-shaft.

Having thus described my invention, what I claim is—

1. A motor having a plurality of cylinders projecting into the main exhaust-chamber and provided with pistons connected with a common driving-shaft in said main exhaust-chamber, a valve-chest common to all the cylinders, a valve therein, means for causing said shaft and valve to rotate in unison, mechanism and a sleeve located in the exhaust-chamber and connected with said valve for receiving its motion, and means for operating said sleeve and mechanism, as set forth.

2. A motor having a plurality of cylinders provided with pistons connected with a common shaft located in the main exhaust-chamber, a valve-chest, a flat revoluble sliding valve therein for controlling the feed and exhaust of said cylinders, means for causing said shaft and valve to rotate in unison, a sleeve connected with said valve and extending into the exhaust-chamber, and suitable mechanism connected with the extended end of said sleeve for reversing the valve, as set forth.

3. In a motor of the character described, the combination of a steam-valve loosely mounted on the driving-shaft and adapted to be moved in unison therewith, with a sleeve also loosely mounted on the driving-shaft and rigidly connected to said steam-valve and extending into the main exhaust-chamber, and mechanism connected with said sleeve and located in the main exhaust-chamber, and means for operating said mechanism, whereby said valve may be shifted during the operation of the motor to reverse the same, as set forth.

4. A motor having a plurality of cylinders provided with pistons connected with a common shaft located in the exhaust-chamber, a valve-chest, a flat revoluble sliding valve therein for controlling the feed and exhaust of said cylinders, a sleeve connected with said valve, mechanism connected with said sleeve located in the exhaust-chamber and connected with said valve, and means, substantially as described, for controlling said sleeve and pinion to cause a reversal of said valve to reverse the operation of the motor, as set forth.

5. A motor having a plurality of cylinders, pistons connected with a common shaft, a valve-chest, a valve therein for controlling the feed and exhaust of said cylinders, a sleeve and pinion loosely mounted on said shaft and located in the exhaust-chamber and connect-

ed with said valve, a lever projecting through the casing of said exhaust-chamber and provided with a rack adapted to engage said pinion, whereby the valve may be reversed to reverse the motor, as set forth.

6. A motor having a plurality of cylinders, pistons connected with a common shaft, valve-chest, valve therein for controlling the feed and exhaust of said cylinders, a sleeve and pinion loosely mounted on said shaft and located in the exhaust-chamber, pins or projections on said sleeve adapted to enter corresponding openings in said valve to connect said valve and pinion, a lever projecting through the casing of said exhaust-chamber provided with a rack adapted to engage with said pinion, whereby the valve may be reversed to reverse the motor, as set forth.

7. A motor having a plurality of cylinders, pistons connected with a common shaft, valve-chest, valve therein for controlling the feed and exhaust of said cylinders, a sleeve and pinion loosely mounted on said shaft and located in the exhaust-chamber, pins or projections on said sleeve adapted to enter corresponding openings in said valve to connect said valve and pinion, a lever projecting through the casing of said exhaust-chamber provided with a rack adapted to engage with said pinion, and means for holding said rack out of engagement with the pinion, as set forth.

8. A motor having a plurality of cylinders projecting into the main exhaust-chamber and provided with pistons connected with a common driving-shaft, a valve-chest common to all of said cylinders, a valve located therein and loosely mounted on said driving-shaft, said valve being provided on its upper side with two oppositely-disposed pins or projections, an arm or pin secured in said driving-shaft and adapted to engage said pins or projections in such manner that the valve may be revolved in one direction, or given a reverse movement to the extent of a half-revolution in the opposite direction, and means located in the main exhaust-chamber for reversing said valve, as set forth.

9. In a motor having a plurality of cylinders, a valve-chest provided with inlet and exhaust means, the combination of a flat revoluble sliding valve loosely mounted on the main driving-shaft and having an open passage therein, with a cut-off plug located in said open passage and adapted to be shifted when the direction of the valve is reversed to cover a port and prevent the entrance of live steam to a cylinder, as set forth.

10. In a motor having a plurality of cylinders, the combination with a valve-chest provided with suitable supply and exhaust means, and ports connecting said steam-chest with the cylinders, of a valve located therein for controlling the feed and exhaust of said cylinders, said valve being provided with two passages, one open to permit the passage of the motive fluid to the several cylinders, and the other closed for connecting said cylinders to the main exhaust of the motor, a cut-off plug slidably mounted in said open passage, oppositely-disposed pins on the upper side of said valve, a pin secured in the shaft adapted to engage said pins to revolve said valve with the shaft, a sleeve loosely mounted on said shaft and located within the exhaust-chamber and connected with said valve, a lever projecting through the casing of said exhaust-chamber and provided with a rack adapted to engage said pinion to cause the valve to reverse said motor, and means for holding said rack out of engagement with said pinion, as set forth.

11. In a rotary motor, a revoluble sliding valve provided with inlet and exhaust ports and having on the upper side of said valve two pins or projections located exactly opposite to each other, in combination with a driving-shaft passing through the center of said valve and having therein a pin adapted to come in contact with the projections on the valve so that the motion of the shaft will impart motion to the valve, and mechanism connected with said valve by means of which it may be given half a revolution independent of the driving-shaft, substantially as shown and for the purpose described.

12. In a motor, the combination of a flat revoluble sliding valve provided with inlet and outlet ports, a driving-shaft extending through the said valve, a sleeve loosely mounted on the driving-shaft, connections between said sleeve and the revolving valve, that cause them to move in unison, and means for operating said sleeve to reverse the valve, substantially as shown.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY T. VADERS.

Witnesses:
THOS. D. MOWLDS,
SAML. H. KIRKPATRICK.