

No. 651,157.

Patented June 5, 1900.

C. F. BERGMANN.
FLUID PRESSURE MOTOR.

(Application filed Feb. 20, 1899.)

(No Model.)

3 Sheets—Sheet 1.

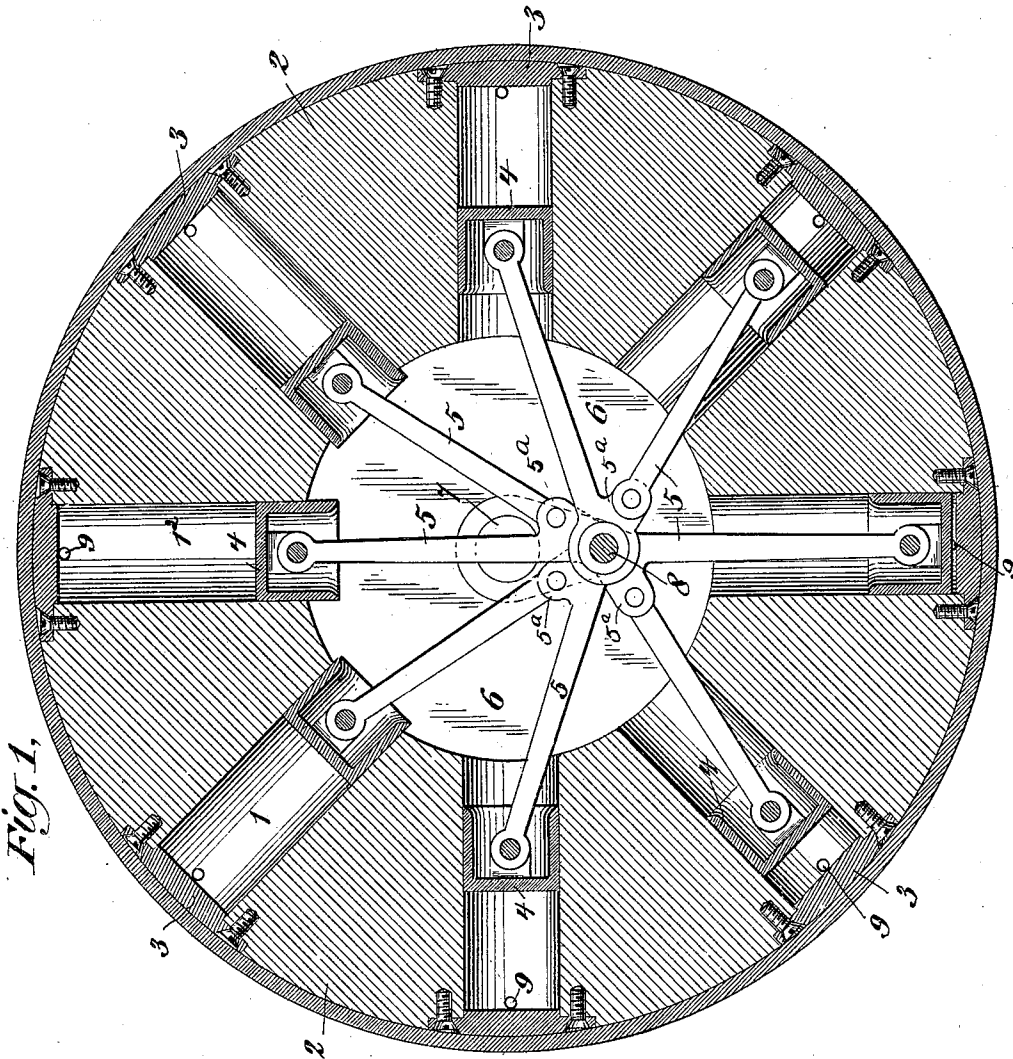


Fig. 1.

WITNESSES:

A. H. Meyer

Friedrich

INVENTOR

Carl F. Bergmann

BY

Jefford & Price
ATTORNEYS

No. 651,157.

Patented June 5, 1900.

C. F. BERGMANN.
FLUID PRESSURE MOTOR.

(Application filed Feb. 20, 1899.)

(No Model.)

3 Sheets—Sheet 2.

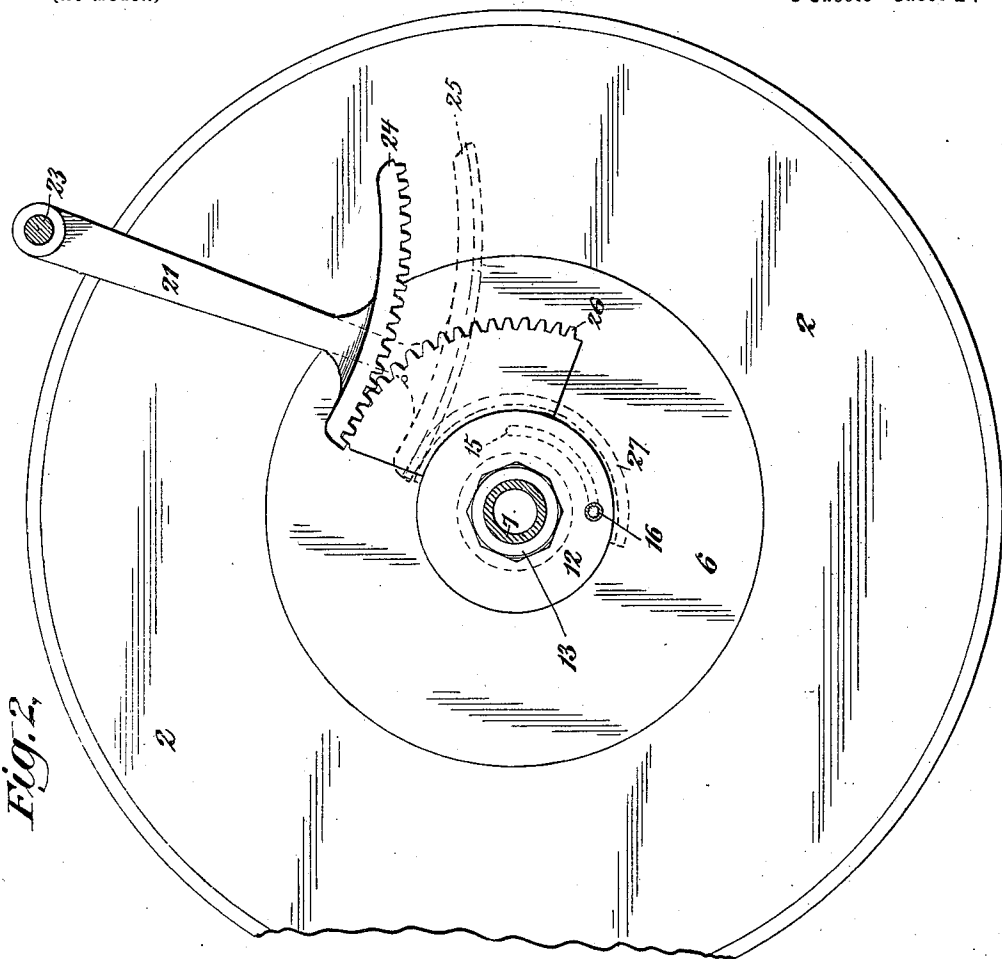
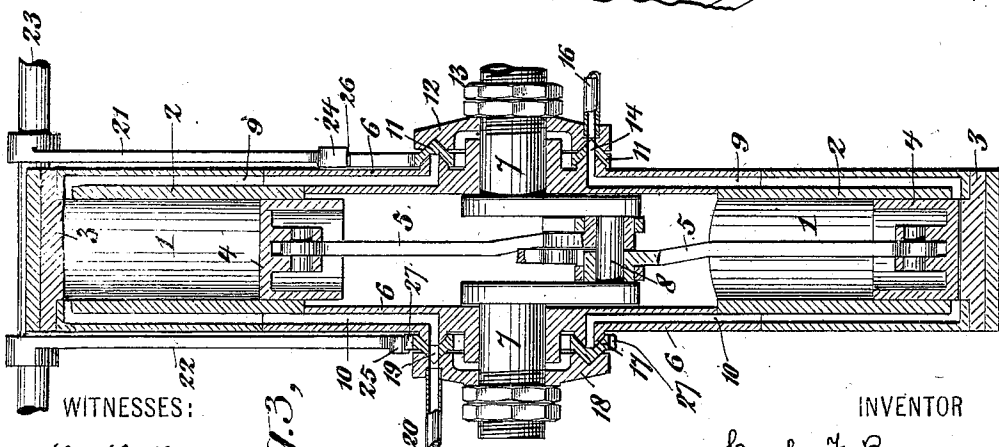


Fig. 2,



WITNESSES:

C. N. Maynard

Fred Kemper

Fig. 3,

INVENTOR

Carl F. Bergmann

BY *Gifford & Price*
ATTORNEYS

No. 651,157.

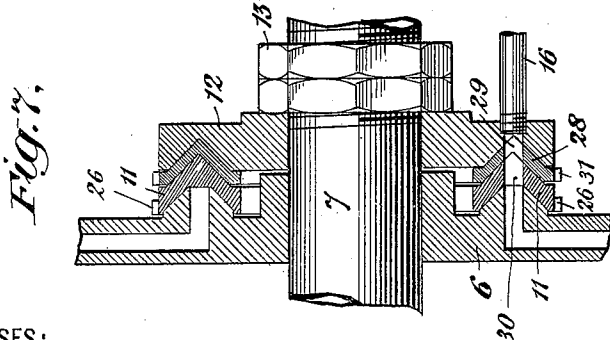
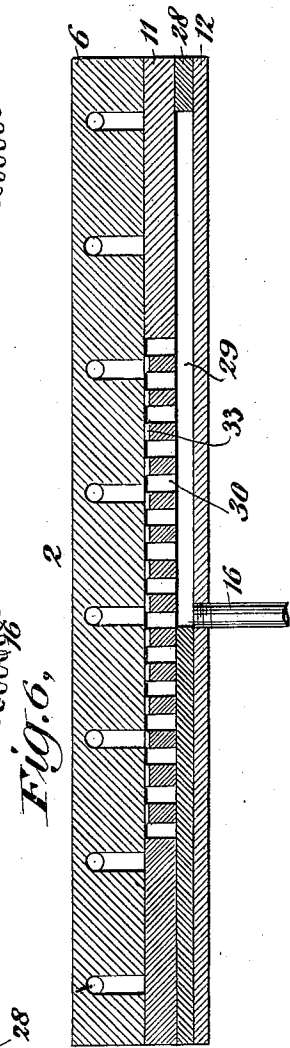
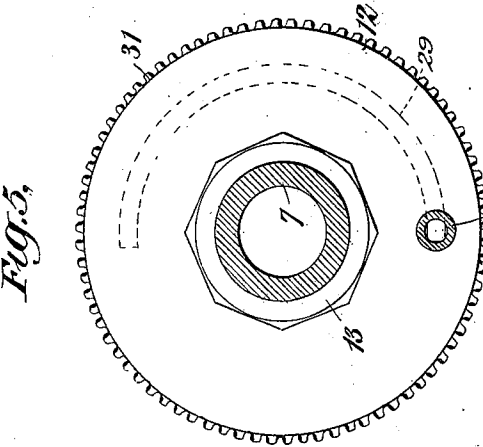
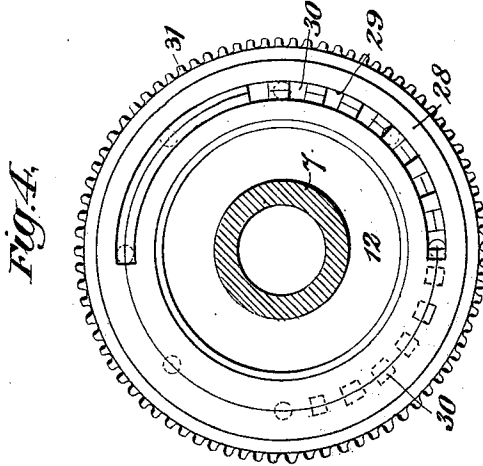
Patented June 5, 1900.

C. F. BERGMANN.
FLUID PRESSURE MOTOR.

(Application filed Feb. 20, 1899.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

R. A. Maynard
Fred Stimpfer

INVENTOR

Carl F. Bergmann

BY

Jeffrey & Pyle
 ATTORNEYS

UNITED STATES PATENT OFFICE.

CARL F. BERGMANN, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF TO FRANK M. FOYE, OF SAME PLACE.

FLUID-PRESSURE MOTOR.

SPECIFICATION forming part of Letters Patent No. 651,157, dated June 5, 1900.

Application filed February 20, 1899. Serial No. 706,103. (No model.)

To all whom it may concern:

Be it known that I, CARL F. BERGMANN, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Fluid-Pressure Motors, of which the following is a specification.

This invention is an improvement in fluid-pressure motors, and relates especially to motors used for propelling motor-vehicles and operated by steam, air, or other expansive fluid; and the improvement consists in the constructions and combinations recited in the claims herein.

The accompanying drawings show an engine embodying my invention in one of the forms at present preferred by me; but it will be understood that various modifications and changes may be adopted without departing from the spirit of my invention and without exceeding the scope of the concluding claims.

In the accompanying drawings, Figure 1 is a sectional side elevation of the motor; Fig. 2, a side elevation of the motor; Fig. 3, a vertical sectional elevation through the centers of the cylinders; Figs. 4, 5, 6, and 7, views of a modified construction of the delivery-valve.

The following is a description of the embodiment of my invention illustrated in the drawings.

In the construction shown in Figs. 1, 2, and 3, which illustrate the application of my improvement to a revolving motor for propelling vehicles, there are a series of cylinders 1, arranged radially about a common center and carried by a casting 2, forming the outer portion of the motor. Within these cylinders, which are closed by the headings 3 at their outer ends, are the pistons or disks 4, to which are attached the rods or links 5. For convenience of construction the central portion of the motor is formed by the plates 6, removably secured to the casting 2, so they can be detached, if desired, by which the motor is mounted on the axle or stationary shaft 7. The outer ends of the rods 5 are attached directly to the trunk-pistons 4, while the inner ends are secured by suitable connections to a fixed pin 8 on one side of the central shaft 7 in such manner as to turn thereon. As will

be seen from Fig. 4, this pin 8 in this construction resembles the crank-pin of the ordinary motor, only each alternate rod 5 is journaled directly upon the pin 8, while the other rods are pivoted directly upon lugs or arms 5^a, extending from one side of those rods which are journaled upon the pin 8, being thus indirectly connected with the crank-pin. This enables bearings of reasonable width to be used without making the crank-pin of excessive length. As the pistons 4 are attached by the rods or links 5 to the stationary pin 8 the pistons are held at substantially a uniform distance from this central pin, and this pin being at one side of the central shaft 7, on which the motor revolves, it follows that the cylinders will slide back and forth upon the pistons and the motor will be thereby revolved on its shaft. Connected with the cylinders are induction and exhaust ports 9 and 10, through which the motive agent employed passes into and out of the cylinders, the same being controlled by the delivery-valve 11. As will be seen from Fig. 3, this valve consists of a ring or annular plate 11, situated on the outside of the motor around the central shaft 7 and held in place by a circular plate 12, secured to the shaft by the nuts 13. This valve is made in the form of a ring which is in cross-section of a V shape, the seating-surfaces of the hub 2 and plate 12 being correspondingly shaped. This serves to retain the valve and its cover-plate in proper position and facilitates readjustment to compensate for wear. Where the cut-off valve 28 is used, as in Fig. 8, it is made of the same shape. Extending through the valve is a hole 14, communicating on the inside of the valve with a circular groove 15. The position of the hole 14 and groove 15 corresponds with the end of the induction-port 9. Outside of the valve and in line with the hole 14 is the end of the conduit 16, through which the steam or other motive agent passes to the motor.

In the operation of the motor the valve 11 is held stationary, and as the motor revolves the end of the induction-port 9 is brought into communication with the groove 15 on the inside of the valve, when the steam at once passes into the port 9 until the end of the

latter has revolved beyond the groove. On the other side of the motor and similarly constructed is the exhaust-valve 17, by which the passage of the steam from the cylinder through the exhaust-port is controlled. The operation of this valve is the same as that of the delivery-valve, and the steam passing out through the exhaust-port as the end of the latter in the revolution of the motor comes into communication with the groove on the inside of the valve and passing through the hole 19 in the valve escapes by the pipe 20. In this valve, however, the groove on the inside of the valve is semicircular, in order that the steam may commence to escape the instant the piston has completed its stroke and continue to escape during the half-revolution of the motor while the piston is sliding back in the cylinder.

To change the direction in which the motor revolves, and consequently the direction in which the vehicle proceeds, whether forward or back, the valves 11 and 17 are revolved on the shaft 7, so as to communicate with cylinders on one or the other side of the motor, depending on the direction it is desired to have the vehicle go. This shifting of the valves is effected by the levers 21 and 22, secured to the shaft 23, although they may be separately mounted and independently operated. On the inner ends of these levers are curved racks 24 and 25, which engage with cogs 26 and 27 on the respective valves. As the shaft 23 is turned by any suitable mechanism the levers 21 and 22, engaging with the valves, are moved so as to reverse them in the position desired.

As stated above, the steam continues to pass through the delivery-valve into the induction-port so long as the end of the port is in communication with the groove 15 on the face of the valve. The length of the groove therefore determines the amount of steam entering the cylinder at a single stroke of the piston or, in other words, determines the cut-off. To vary the stroke of the piston by the driver, as is sometimes very desirable when greater or less power is required in the motor, as well as to cut off the passage of all steam through the valve, I employ the construction of delivery-valve shown in Figs. 4, 5, 6, and 7. In this form of valve a second disk 28 is interposed between the plate 12 and the disk 11. In this disk is a semicircular opening 29, and in the disk 11 are a series of ports or openings 30 extending half-way around the disk. The disk 28 is rotated by any suitable mechanism, under the control of the driver, engaging the cogs 31 on its edge. In the operation of the valve the disk 11 remains stationary, and as the disk 28 is rotated its opening 29 is brought into line with a greater or less number of the holes 30, and hence a greater or less amount of steam is permitted to pass through the valve. If the entire extent of the opening 29 is brought in line with the holes 30, steam will enter the cylin-

der up to the full stroke of the piston, while if the solid portion of the disk 28 is brought under the holes the passage of all steam is shut off. With this valve, therefore, the amount of steam admitted to the cylinders, and consequently the cut-off of the stroke, may be regulated at pleasure by the driver, and all steam may be shut off, if desired.

The operation of the motor is as follows: The delivery and exhaust valves are first adjusted to turn the motor and propel the vehicle in the direction desired. When the adjustable valve shown in Figs. 4 and 5 is employed, the valve-disk 28 is then rotated to uncover some of the openings in the valve and permit the steam to pass into the induction-port and into the top of the cylinder whose piston is located at its head. As the piston is held fixed and immovable from the pin 8, the force of the steam acting on this stationary piston will force the head of the cylinder away from the piston and cause the motor to which the cylinder is connected to revolve on its bearings. The steam will continue to force the cylinder-head away from the piston until the cylinder is in the position shown at 1² at the end of its stroke, with the piston at the bottom of the cylinder. As the cylinder reaches this position the exhaust-port comes into communication with the opening in the exhaust-valve, and the steam escapes, allowing the cylinders to revolve freely until the piston is again at the head of the cylinder. Of course steam is admitted into each cylinder in turn as its induction-port is brought into communication with the opening in the delivery-valve, and the motor is thus made to revolve until the motive agent is shut off.

While I have described my invention applied to a motor adapted for automobiles, it will of course be understood that motors or engines involving my invention may be applied to any other uses to which they are adapted. For example, a stationary engine of this general design may be used and the power generated transmitted by a belt applied directly to the revolving shell.

What I claim is—

1. An engine having plural cylinders arranged radially of and to revolve about a common axis, a crank, pistons in said cylinders connected with said crank, admission and exhaust valves rotatively mounted about said axis, connections from the valves to the cylinders, and means for turning the valves to reverse the engine, adapted to turn the exhaust-valve in excess of the admission-valve, substantially as described.

2. An engine having a rotating power mechanism, admission and exhaust valves mounted to turn about the engine-shaft to reverse the engine, said valves having each a toothed segment thereon, the one upon the admission-valve being upon a greater radius than that upon the exhaust-valve, a shaft, and toothed segments mounted upon said shaft and en-

