

No. 651,158.

Patented June 5, 1900.

C. F. BERGMANN.
FLUID PRESSURE MOTOR.

(Application filed Aug. 19, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2.

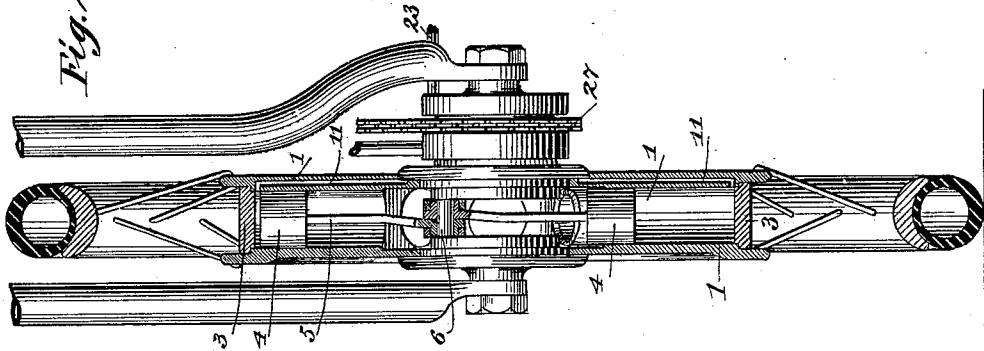
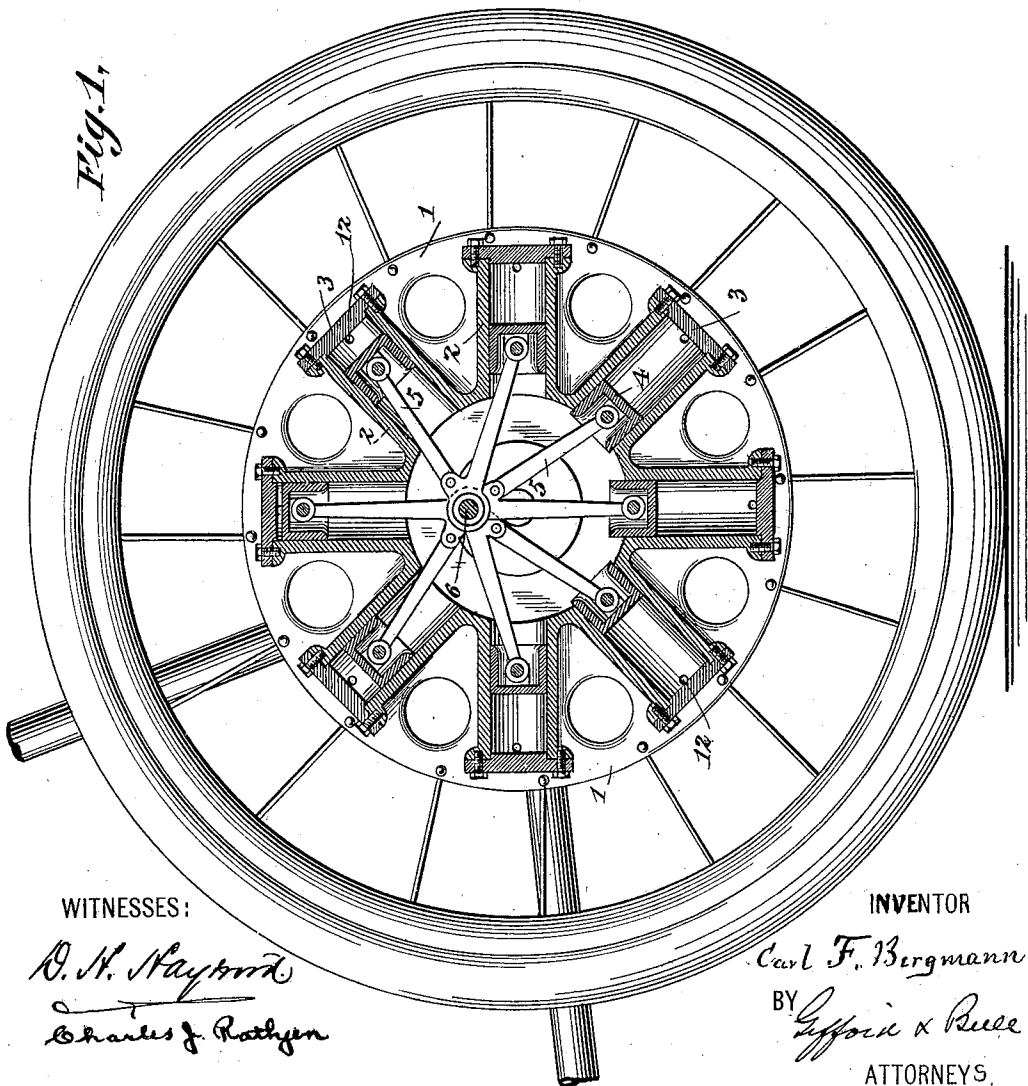


Fig. 1.



WITNESSES:

R. H. Haywood
Charles J. Rathjen

INVENTOR

Carl F. Bergmann
BY *Gifford & Buel*
ATTORNEYS.

No. 651,158.

Patented June 5, 1900.

C. F. BERGMANN.
FLUID PRESSURE MOTOR.

(Application filed Aug. 19, 1899.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 5,

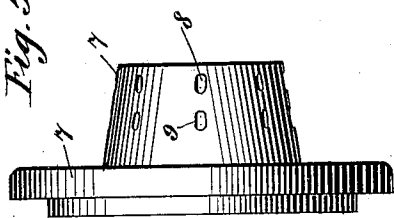


Fig. 7,

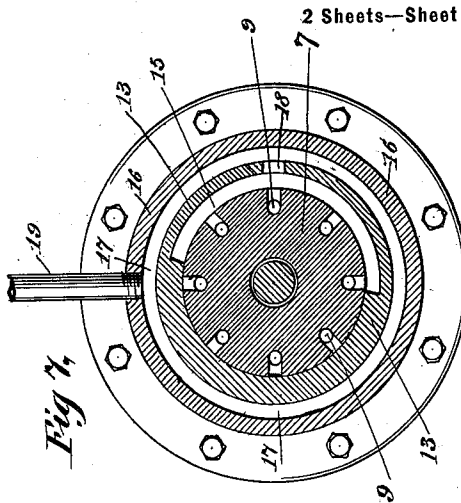


Fig. 4,

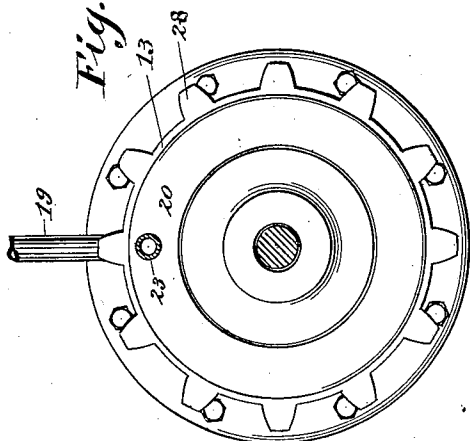


Fig. 6,

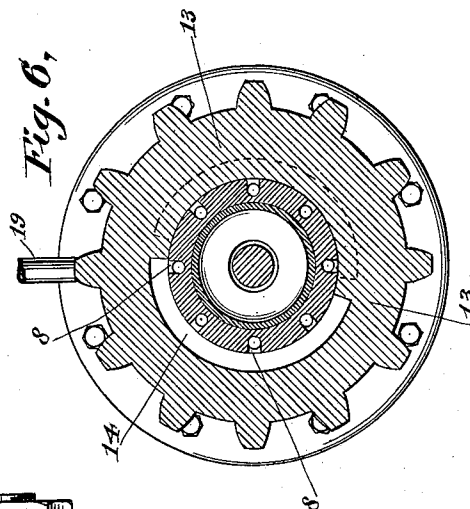
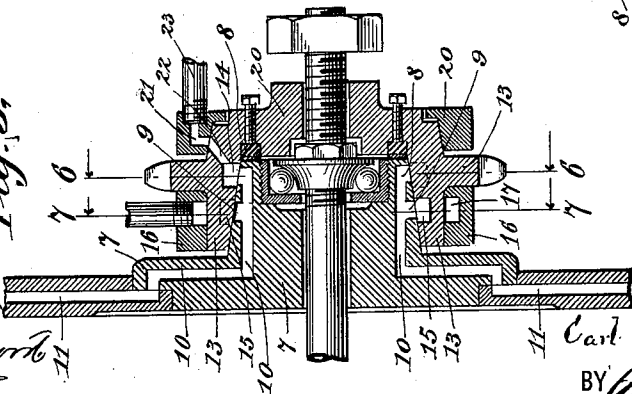


Fig. 3,



WITNESSES:

N. H. Maybrook
Charles J. Rathjen

INVENTOR

Carl F. Bergmann
BY *Lyford & Bull*
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. 651,158, dated June 5, 1900.

Application filed August 19, 1899. Serial No. 727,809. (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 employed for propelling motor-vehicles and operated by steam, air, or other expansive gas; and the improvement consists in the constructions and combinations recited in the claims herein.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of the motor, partly in section, in position in the center of the motor-wheel. Fig. 2 is a vertical sectional elevation of Fig. 1 through the centers of the cylinders. Fig. 3 is a sectional side elevation of the mechanism by which the motive power is introduced into and exhausted from the cylinders. Fig. 4 is a plan view of Fig. 3. Fig. 5 is a detail. Fig. 6 is a sectional plan view of Fig. 3 through the line 6 6. Fig. 7 is a sectional plan view of Fig. 3 through the line 7 7.

The drawings show an engine embodying my invention in the forms at present preferred by me as applied to the wheel of a bicycle or other vehicle; 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 construction shown, 1 is a circular casting or disk mounted on the axle of the vehicle, so as to revolve thereon, to the outer edge of which are attached the spokes of the wheel.

2 represents cylinders arranged radially within the disk, having their outer ends closed by the headings 3 and open at their inner ends. These cylinders are preferably bored out from the material of the disk, but may be constructed in any other suitable manner. In the cylinders are pistons 4, to which are attached piston-rods 5. The outer ends of these piston-rods are secured by suitable connections to a stationary pin 6, situated eccen-

trically with respect to the axis of the motor or on one side of the latter and corresponding to the crank-pin of the ordinary motor. The pistons are thus held substantially stationary with respect to the axle; but as this pin is situated eccentrically of the axle the effect of the motive agent in the cylinder is to cause the latter to reciprocate with respect to the piston or the cylinder-head to slide away from and toward the piston, and thus to cause the cylinders to revolve about the axle. The motive agent is introduced into and exhausted from the cylinders by the mechanism shown in Figs. 3 to 7, containing the intake and exhaust ports and channels. On one side of the motor, attached to the center of the disk, is a cone-shaped hub 7, which revolves with the disk around the axle.

Around the side or face of the cone, arranged in pairs, one in front of the other, are two rows of ports or openings 8 and 9, the former or outer row of which forms the intake or inlet ports through which the motive agent enters the cylinders and the other or inner row 9 the outlet-ports through which the cylinders exhaust. Each pair of ports or openings 8 and 9, constituting the intake-port and the exhaust-port in line with and back of it, open into a channel or duct 10, formed in the side and base of the cone and so arranged as to connect and communicate with a channel 11 in the side wall of the cylinder, Fig. 3, which opens into the cylinder, at the outer end of the latter, through the opening 12 near the cylinder-head. The cone-hub 7 revolves in a movable ring 13, held in place on the axle, the inner surface of which is shaped to conform to the side of the cone, and in this inner surface are formed semicircular grooves 14 and 15, corresponding in position, when the cone is in the ring, respectively with the rows of ports 8 and 9 on the cone. As will be seen from Figs. 6 and 7, these semicircular grooves 14 and 15 are on opposite sides of the center of the ring, and thus communicate with the intake-ports and, respectively, with the exhaust-ports on opposite sides of the cone. Hence, as the groove 14 communicates with half of the row of the intake-ports 8 on one side of the cone, the groove 15 back of it will communicate with half of the row of the ex-

haust-ports 9 on the other side of the cone. The grooves 14 and 15 on the surface of the ring 13 thus determine which of the channels 10 and 11, and hence which of the cylinders 5 connecting with the latter, communicate with the intake-ports and which with the exhaust-ports, and therefore which cylinders are receiving the motive agent and which are exhausting the latter. As the grooves 14 and 10 15 are on opposite sides of the center of the ring, and therefore of the motor, it follows that the cylinders on one side of the motor are in communication with the intake-ports, and are thus receiving the motive agent, and 15 the cylinders on the other side are in communication with the outlet-ports, and are thus exhausting. The ring 13 is capable of a half-revolution around the cone 7, whereby the grooves 14 and 15 are brought into communi- 20 cation with the intake and exhaust ports, respectively, on the opposite side of the cone, and the channels 10 and 11 and cylinders connecting with the latter, which before communicated with the intake-ports and received the 25 motive agent, are now brought into connection with the exhaust-ports, while the channels and cylinders which communicated with the exhaust-groove 15 and exhaust-ports are now connected with the groove 14 and with 30 the intake-ports and receive the motive agent, thus reversing the revolution of the motor and causing the vehicle to move in the opposite direction. Around the inner part of the movable ring 13, next to the disk, is a fixed ring 35 16, having a circular groove 17 on its inner surface, corresponding in position with the groove 15 in the ring 13 and communicating with the latter groove through the opening 18. Leading from the groove 17 is a pipe 19, 40 through which the exhaust from the cylinders passes from the motor. At the outer edge of the ring 13 is another fixed ring 20, having a channel 21, communicating with a channel 22 in the ring 13, opening into the groove 14. 45 An inlet-pipe 23 is connected with the ring 20 and opens into the channel 21.

The operation of the mechanism is as follows: Supposing the several parts are in the position shown in Fig. 3, the motive agent 50 employed passes through the inlet-pipe 23 and thence through the channels 21 and 22 into the groove 14 in the ring 13 and from thence enters the several intake-ports 8, communicating with it, and passing along the 55 channels 10 in the cone leading from these ports enters the channels 11 in the several cylinders and by means of the latter passes into the outer end of the cylinders on the one side of the motor. At the same time the ex- 60 haust from the cylinders on the opposite side of the motor passes through the channels 11, connected with such cylinders, and through the channels 10 on the opposite side of the cone and enters the groove 15 in the ring 13. 65 From thence the exhaust passes, by means of the opening 18, into the circular groove 17 in the ring 16 and escapes through the outlet-

pipe 19. As the motive agent is thus entering the cylinder on one side of the motor through the intake-ports on one side of the 70 cone it is passing out of the cylinders on the other side of the motor through the exhaust-ports on the opposite side of the cone. The cylinders thus receive the motive agent and exhaust the same on one side of the motor 75 and by means of a single mechanism and through a single channel or port in the cylinder.

By reference to Fig. 1 it will be seen that when the motive agent enters those cylinders 80 in which the piston is at or near the cylinder-head, as the piston is connected by the piston-rod with the stationary pin 6, and therefore cannot move, the force of the motive agent tends to slide the cylinder-head away 85 from the piston, thereby causing the motor to which the cylinder is attached to revolve on the axle on which it is mounted. As the motor revolves the cylinders are successively brought into communication with the intake- 90 ports in the cone and receive the motive agent and afterward with the outlet-ports and exhaust the same. To reverse the direction of the motor, the ring 13 is revolved on the cone half-way around by means of the sprocket- 95 chain 27, which engages with the teeth 28 on the rim of the ring or by any other suitable mechanism whereby the intake-ports are brought into communication with the cylinders on the other side of the motor, and the 100 latter is caused to revolve in the opposite direction.

What I claim is—

1. An engine, having the motive parts mounted to turn about the shaft, and a cen- 105 tral hub having ports therein and turning with the motive parts in combination with a normally-stationary sleeve or tubular valve mounted upon the hub and having two grooves formed in its inner periphery and extending 110 partially about the same, said grooves being located on opposite sides of the sleeve and at different points in its length, means for giving said sleeve or valve a partial rotation, and supply and exhaust rings surrounding 115 said valve-sleeve and communicating each with its respective groove in the valve-ring, substantially as described.

2. An engine having the motive parts mounted to turn about the shaft and a cen- 120 tral hub having ports therein and turning with the motive parts, in combination with a normally-stationary sleeve, or tubular valve mounted upon the hub and having two grooves formed in its inner periphery and extending 125 partially about the same, said grooves being located on opposite sides of the sleeve and at different points in its length, a toothed flange on the sleeve forming a sprocket-wheel whereby it may be given a partial rotation by dis- 130 tant rotated means, and supply and exhaust rings surrounding said valve-sleeve and communicating each with its respective groove in the valve-ring, substantially as described.

3. In a fluid-pressure motor revolving on an axis, and provided with a series of cylinders having a reciprocating motion with reference to their pistons, in combination with the motor, a cone, 7, attached to the motor, having intake and outlet ports communicating with a channel connecting with a port on the cylinder, and a reversible ring, 13, provided with the semicircular grooves, 14 and 15, communicating with the intake and outlet ports in the cone, and means whereby the groove, 15, communicates with the exhaust from the motor, substantially as described.

4. In a fluid-pressure motor revolving on an axis and provided with a series of cylinders having a reciprocating motion with reference to their pistons; in combination with the motor, a cone 7, attached to the motor, having intake and outlet ports, communicating with a channel, 10, connecting with a port in the cylinder; a reversible ring, 13, provided with the semicircular grooves, 14 and 15, communicating with the intake and outlet ports in the cone; a ring, 16, surrounding the ring, 13, and having a circular groove, 17, communicating with the groove 15, in the ring 13, and an outlet for the exhaust from the cylinder, substantially as described.

5. In a fluid-pressure motor for vehicles, in combination, a disk situated in the center of the vehicle-wheel; a series of cylinders drilled radially therein, having a reciprocating motion with respect to their pistons; pistons held stationary within the cylinders; piston-rods connected with such pistons and with a pin placed eccentrically with respect to the

axle of the wheel; cone 7, attached to the motor, having intake-ports, 8, and outlet-ports, 9, communicating with the channel, 10, connecting with a port in the cylinder; the reversible ring, 13, provided with the semicircular grooves, 14 and 15, communicating with the intake and outlet ports, 8 and 9, and the ring, 16, surrounding the ring, 13, and having the circular groove, 17, communicating with the groove, 15, in the ring, 13, substantially as described.

6. In a fluid-pressure motor for vehicles, in combination, a disk situated in the center of the vehicle-wheel, a series of cylinders drilled radially therein, having a reciprocating motion with respect to their pistons; pistons held stationary within the cylinders; piston-rods connected with such pistons and with a pin placed eccentrically with respect to the axle of the wheel; cone 7, attached to the motor, having the intake-ports, 8, communicating with the channel, 10, connected with a port opening into the inner end of the cylinder, and outlet-ports, 9, communicating with the channel, 24, connected with a port opening into the outer end of the cylinder; reversible ring, 13, having the grooves 14, 14' and 15, 15', and passage-way, 26, connecting grooves 14' and 15', and the ring, 16, having the groove, 17, communicating with the groove, 15, in the ring, 13, substantially as described.

CARL F. BERGMANN.

Witnesses:

CHARLES J. RATHJEN,
FRED S. KEMPER.