

No. 709,877.

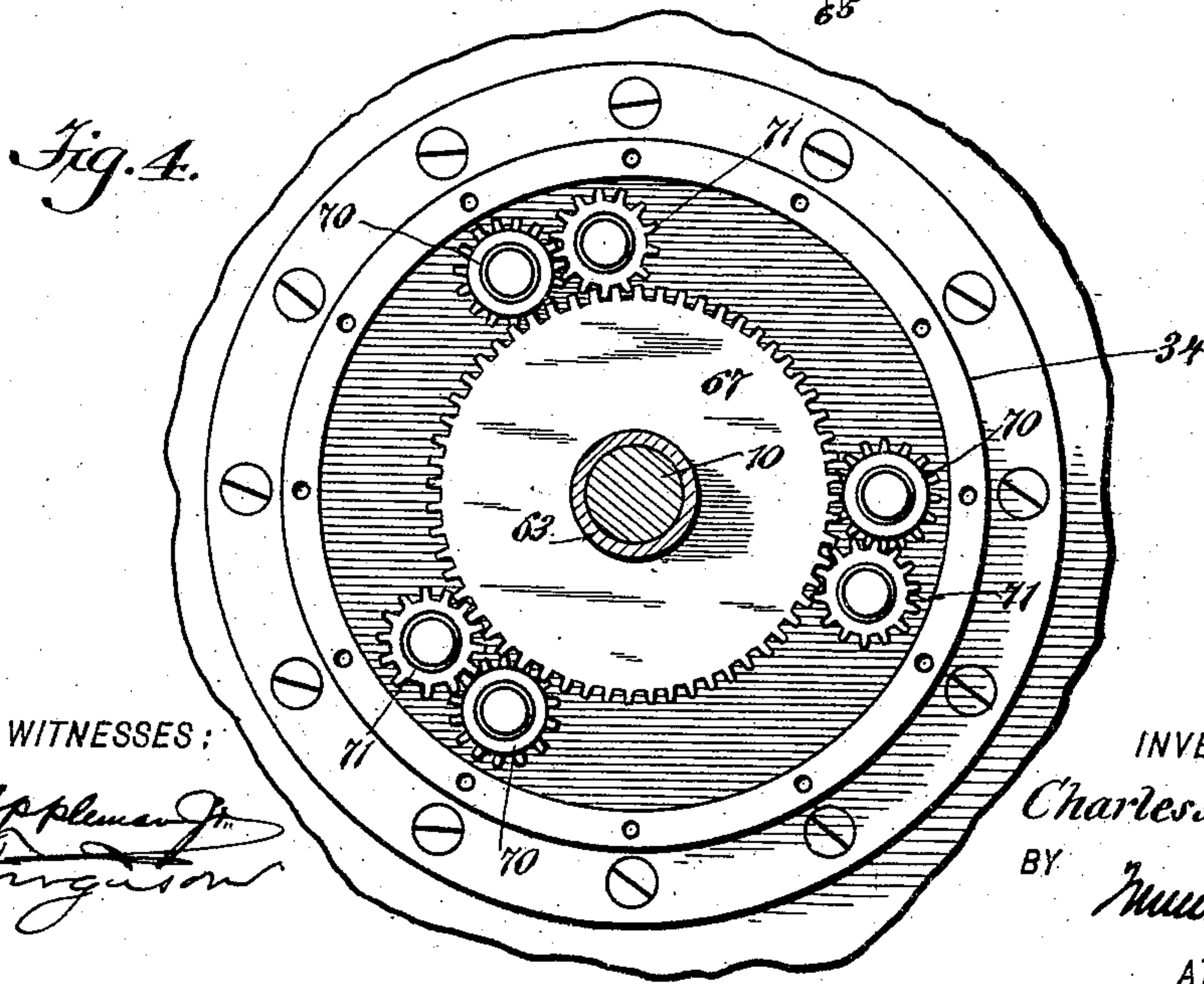
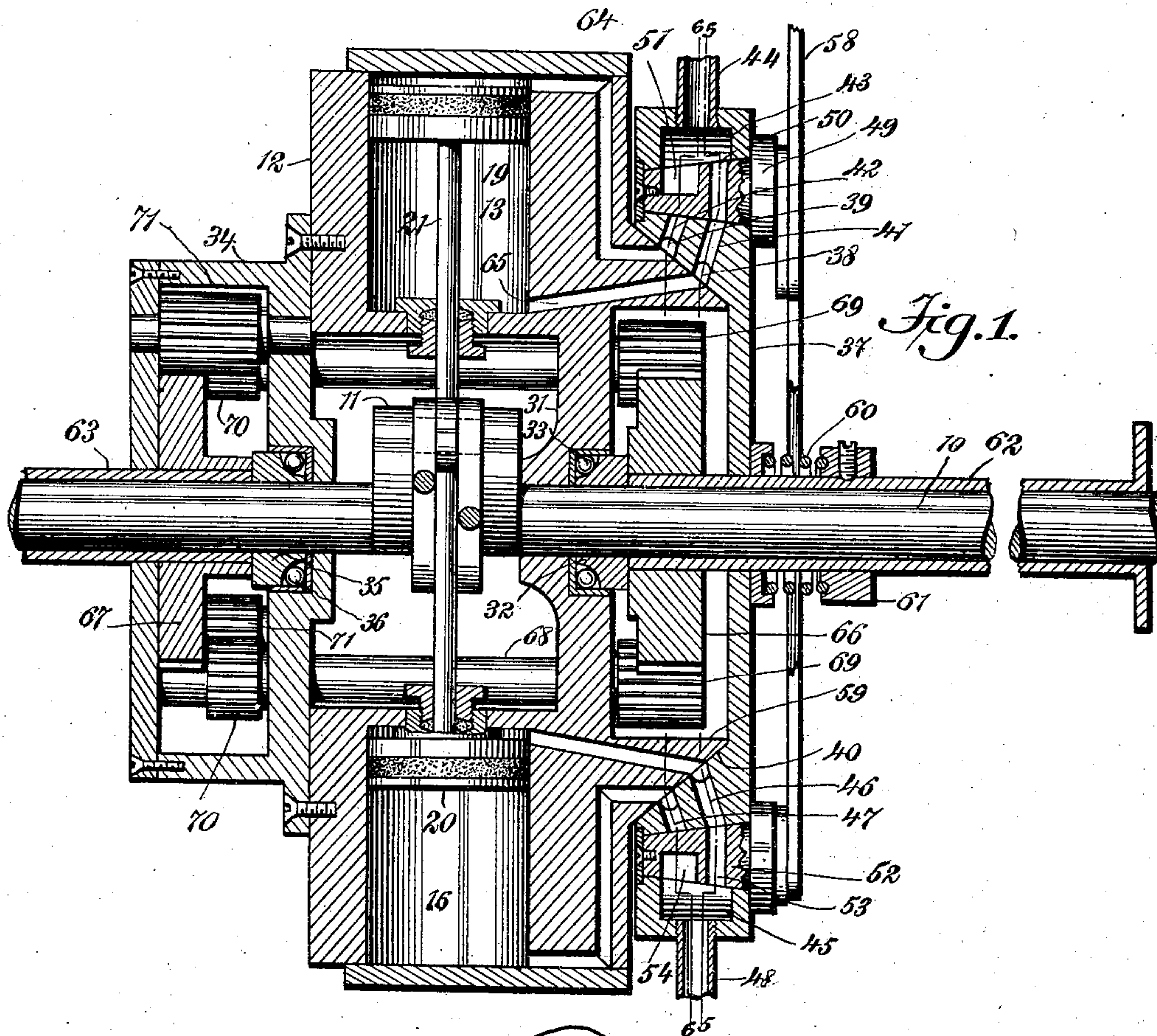
Patented Sept. 30, 1902.

C. J. CULLEN.
MOTOR.

(Application filed Nov. 14, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:

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3 Sheets—Sheet 2.

Fig. 2.

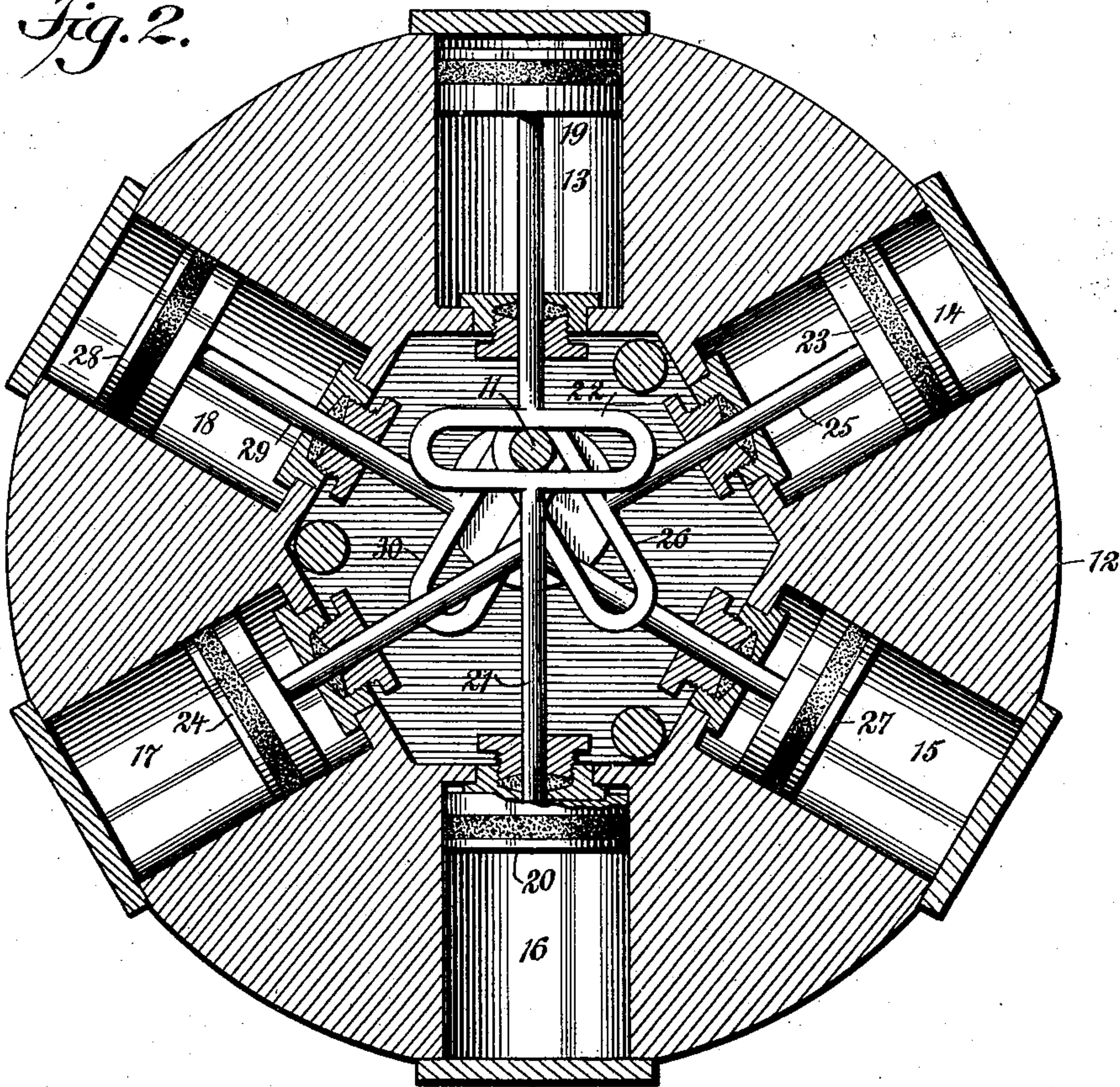
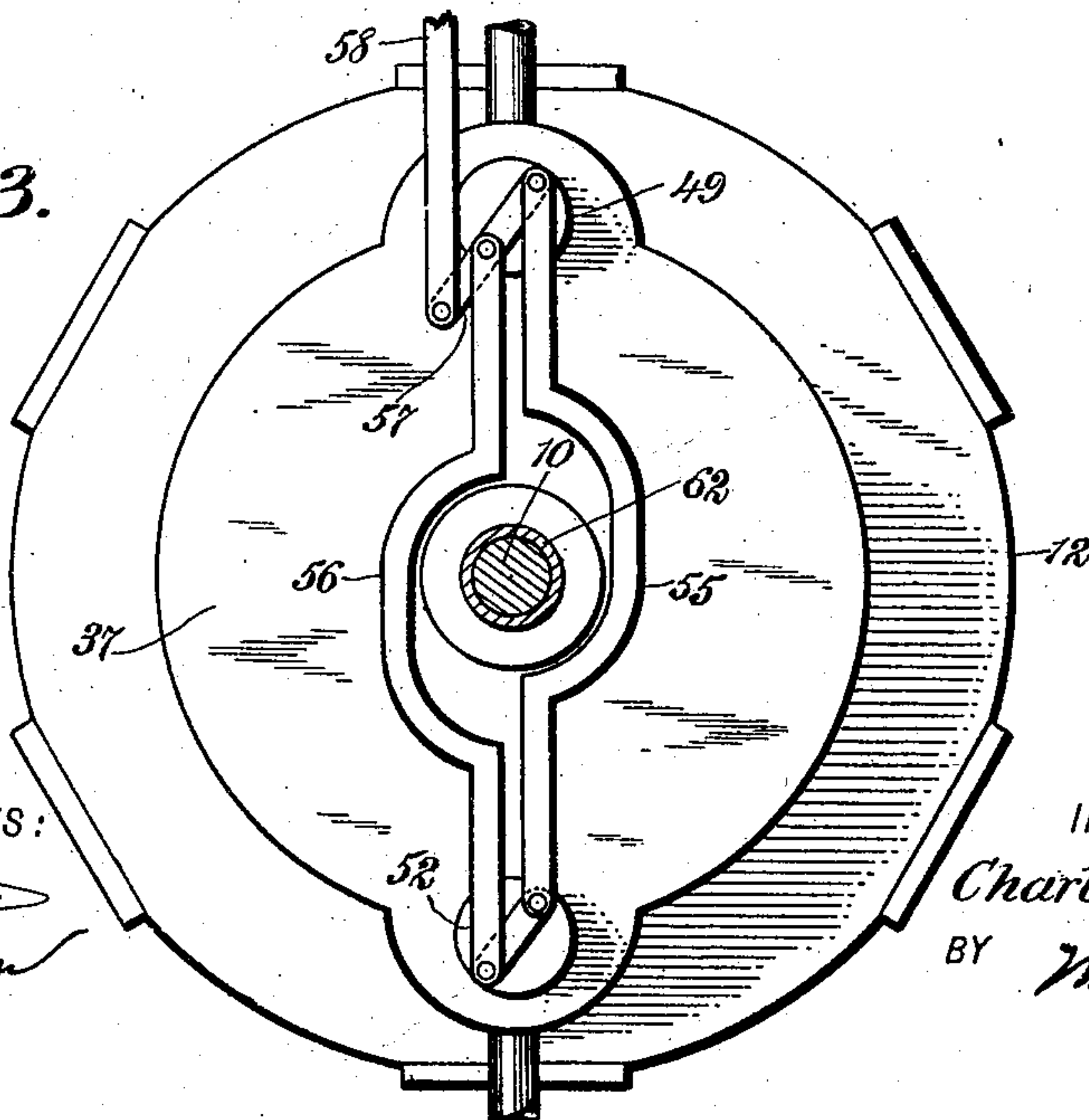


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES J. CULLEN, OF JERSEY CITY, NEW JERSEY.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 709,877, dated September 30, 1902.

Application filed November 14, 1901. Serial No. 82,330. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. CULLEN, a citizen of the United States, and a resident of Jersey City, in the county of Hudson and State of New Jersey, have invented a new and Improved Motor, of which the following is a full, clear, and exact description.

This invention relates to improvements in motors particularly adapted for use in connection with automobiles; and the object is to provide a motor of simple construction mounted to rotate with the driving-axle and having a plurality of cylinders, the pistons in diametrically opposite cylinders being so connected with a stationary crank-shaft that there will practically be no dead-centers upon the rotation of the motor; and a further object is to employ in connection with the motor a simple form of compensating gear to compensate for the difference in travel of two traction-wheels while turning corners or running on curves.

I will describe a motor embodying my invention, and then point out the novel features in the appended 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 elevation of a motor embodying my invention. Fig. 2 is a section thereof at right angles to Fig. 1. Fig. 3 is an end view showing a valve-shifting mechanism. Fig. 4 is the opposite end view with the end plate removed to clearly show a compensating gear employed. Fig. 5 is a section on the line 5 5 of Fig. 1, and Fig. 6 is a section on the line 6 6 of Fig. 1.

Referring to the drawings, 10 designates a fixed shaft having a crank portion 11. Mounted to rotate on this shaft 10 is the circular body portion 12 of the motor, in which are formed a series of cylinders, (indicated at 13, 14, 15, 16, 17, and 18.) In the opposite cylinders 13 and 16 are the pistons 19 and 20, connected by a piston-rod 21 with a transverse loop or yoke portion 22, through which the wrist-pin of the crank passes. The pistons 23 and 24, operating in the cylinders 14 and 17, are connected by a rod 25, having a yoke 26, through which the wrist-pin passes, while the pistons 27 28 in the cylinders 15 and 18 are connected by a rod 29, having a central

yoke portion 30, through which the said wrist-pin passes. It will be seen that as the pairs of pistons are arranged at an angle, one pair relatively to the other, the piston-rods and connections with the wrist-pin will also be on a corresponding angle and the several yokes 22, 26, and 30 will engage at different points on the wrist-pin, so that the pressure of one will counterbalance that of another, and thus overcome dead-centers.

At one side the body portion 12 is provided with a web 31, between which and a block 32 on the shaft 10 ball-bearings 33 are arranged, and on the opposite side a boxing 34 is attached to said body, and between the inner wall of this boxing and a block 35, attached to said shaft 10, are ball-bearings 36. The web 31 and the inner wall of the boxing 34 form the opposite walls of a chamber, in which the crank portion 11 of the shaft 10 is located, and therefore no dirt or dust can reach the bearings between the crank and the yokes.

Arranged at one side of the body 12 and held from movement by any suitable means is a port-plate 37, in which port-channels 38 and 39 are located, these channels extending entirely around the inwardly-extended portion 40 of the plate and communicating, respectively, at the upper portions with ports 41 and 42, which communicate with a steam-chamber 43, into which steam or other actuating medium is passed from a pipe 44, and at the lower portions these channels or grooves 38 and 39 communicate with an exhaust-chamber 45 through ports 46 and 47, and from this exhaust-chamber 45 an exhaust-pipe 48 leads. The ports 41 and 42 are controlled by a plug-valve 49, having ports 50 and 51, and the ports 46 and 47 are controlled by a plug-valve 52, having ports 53 and 54, the ports in each plug-valve being arranged at an angle one relatively to the other.

The plug-valves are simultaneously moved to turn on or off the motive agent by means of rods 55 and 56, which connect with the outer ends of the two valves at opposite sides of their centers, as is clearly shown in Fig. 3, and from a crank-arm 57 on the upper valve an operating-rod 58 extends upward to a position to be easily operated by a person in the vehicle.

The plate 37 is held yieldingly yet tightly

against the inclined offset 59 of the body 12 by means of a spring 60, surrounding the shaft 10 and engaging at one end against said plate 37 and at the other end against a collar 5 61 on a tubular driving-shaft 62, surrounding said shaft 10. Also mounted to rotate on the shaft 10 at the opposite side of the motor from the shaft 62 is a tubular shaft 63. These tubular shafts 62 and 63 are designed to be 10 connected with the opposite traction-wheels of the vehicle, and they constitute, in effect, a single driving shaft or axle.

From the outer end of each cylinder a port 64 leads and is designed to communicate with 15 the channel 39, while from the opposite or inner end of each cylinder a port 65 leads to communicate with the channel 38.

Arranged in the space between the plate 37 and the adjacent side of the body 12 is a 20 gear-wheel 66, which is rigidly attached to the shaft-section 62, while arranged in the boxing 34 is a similar gear-wheel 67, rigidly attached to the shaft-section 63. A series of compensating gear-shafts 68 extend through 25 the wall 31 and through the inner wall of the boxing 34, these walls forming bearings for the several shafts. On one end of each shaft 68 is a pinion 69, meshing with the gear-wheel 66, while at the opposite end of each shaft 68 30 within the boxing 34 is a pinion 70, meshing with a pinion 71, the said pinion 71 also engaging with the gear-wheel 67.

In operation when the valves are turned to the position indicated in Figs. 5 and 6 the 35 steam enters through the port 41, and thence into the right-hand side of the port 38. (Indicated in Fig. 5.) The active steam will now operate against the inner surfaces of the pistons in the first three cylinders 13, 14, and 40 15, and active steam will also enter through the port 42 and through the left-hand port 39 in Fig. 6 to the outer sides of the pistons in the opposite cylinders, while exhaust will take place from the inner sides of the pistons 45 in the cylinders 13, 14, and 15 through the port 38 at its left-hand side, as indicated in Fig. 5, and out through the port 53 in the exhaust-valve. The opposite cylinders will exhaust upon reaching the port 39 at the right 50 of Fig. 6.

When the vehicle is traveling in a straight or practically straight line, the motor and the driving-shaft will be locked through the medium of the compensating gearing to the 55 gear-wheels 66 and 67, and motion will be imparted to the shaft comprising the sections 62 and 63. Upon a curve, however, and in which event the wheel at the outer side of the curve travels a greater distance and faster 60 than the wheel at the inner side of the curve, the compensating gear will come into play by the pinions 69 moving in one direction upon the gear-wheel 66 and causing the pinions 71 to impart a slight motion to the gear-wheel 67 65 in a reverse direction to that of the gear-wheel 66.

While I have shown the several cylinders

arranged in a practically solid body or ring, it is obvious that the several cylinders may be separated one from another and suitably 70 supported in their proper relations. The heavy body, however, acts somewhat as a balance-wheel.

Having thus described my invention, I claim as new and desire to secure by Letters 75 Patent—

1. A motor comprising a fixed crank-shaft, a plurality of cylinders mounted to rotate around the crank-shaft, pistons in the cylinders having connection with the crank of the 80 crank-shaft, a two-section driving-shaft, and compensating-gear connections between the driving-shaft sections and the cylinders, substantially as specified.

2. A motor, comprising a fixed crank-shaft, 85 a cylinder-body mounted to rotate around the crank-shaft and having a plurality of cylinders arranged one cylinder opposite another, pistons arranged in the cylinders, rod connections between opposite pistons, yoke mem- 90 bers arranged in said rods and engaging with the crank, a shaft movable around the crank-shaft, and fixed gear connections between the movable shaft and the motor-body, substantially as specified. 95

3. A motor, comprising a fixed crank-shaft, a cylinder-body mounted to rotate around said crank-shaft and having a plurality of cylinders arranged one cylinder opposite another, 100 pistons for operating in the cylinders, rod connections between opposite pistons, yokes in said rod connections for engaging with the crank, a driving-shaft comprising tubular sections surrounding the crank-shaft, and driving connections between the motor-body 105 and said tubular shaft-sections, substantially as specified.

4. A motor, comprising a fixed crank-shaft, a motor-body mounted to rotate relatively to the crank-shaft, the said body having a plu- 110 rality of cylinders, pistons operating in the cylinders, rod connections between opposite pistons, yoke members in said rod connections for engaging with the crank, tubular driving-shaft members mounted to rotate on 115 the crank-shaft, gear-wheels on said tubular shaft members, shafts carried by the body, pinions on said shafts for engaging with the gear-wheel on one of the tubular shaft members, pinions on the opposite ends of said 120 shafts, and pinion connections between said last-named pinions and the gear-wheel on the other of said tubular shaft members, substantially as specified.

5. A motor, comprising a fixed crank-shaft, 125 a motor-body mounted to rotate on said shaft and having a series of cylinders, the cylinders being arranged in pairs, one cylinder opposite another, pistons for operating in the cylinders, opposite pistons being connected 130 and having connection with the crank of the crank-shaft, ports leading into the outer and inner ends of the cylinders, a fixed port-plate having channels with which the respective

inner and outer ports communicate, means for directing a motive agent into said channels and a driving-shaft having gear connection with the motor-body, substantially as specified.

6. A motor, comprising a fixed crank-shaft, a motor-body mounted to rotate on the shaft and having a series of cylinders, the said cylinders being arranged in pairs one cylinder opposite another, pistons operating in the cylinders, opposite pistons being connected and having connection with the crank of the crank-shaft, a driving-shaft gear connections between the driving-shaft and the motor-body, a fixed port-plate having two channels for communicating with ports leading to the inner and outer ends of the cylinders, a valve for controlling the inlet of steam to said channels, a valve for controlling the exhaust of steam from said channels, and means for simultaneously operating said valves, substantially as specified.

7. A motor, comprising a fixed crank-shaft, a motor-body mounted to rotate on the shaft

and having a series of cylinders, the said cylinders being arranged in pairs one cylinder opposite another, pistons operating in the cylinders, opposite pistons being connected and having connection with the crank of the crank-shaft, a driving-shaft, gear connections between the driving-shaft and the motor-body, a fixed port-plate having two channels for communicating with ports leading to the inner and outer ends of the cylinders, a valve for controlling the inlet of steam through said channels, a valve for controlling the exhaust of steam from said channels, means for simultaneously operating said valves, and means for holding the port-plate yieldingly against the body of the motor, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES J. CULLEN.

Witnesses:

CLINTON I. VAN DYNE,
THOMAS HOWIE.