P. W. KANE.

ENGINE.

APPLICATION FILED APR. 8, 1907.

976,808.

Patented Nov. 22, 1910.

4 SHEETS—SHEET 1.

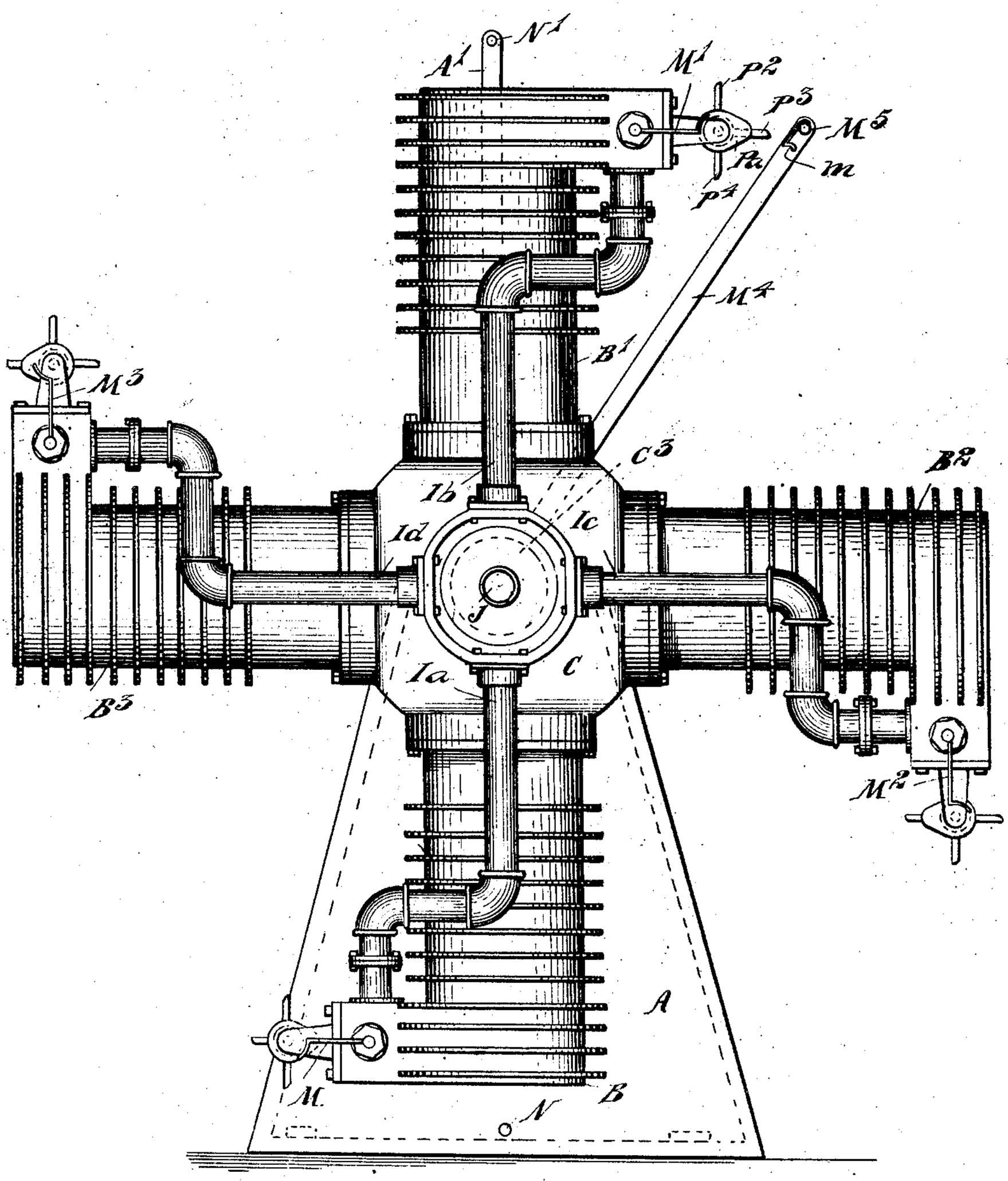

Fig. 1

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4 SHEETS—SHEET 2.

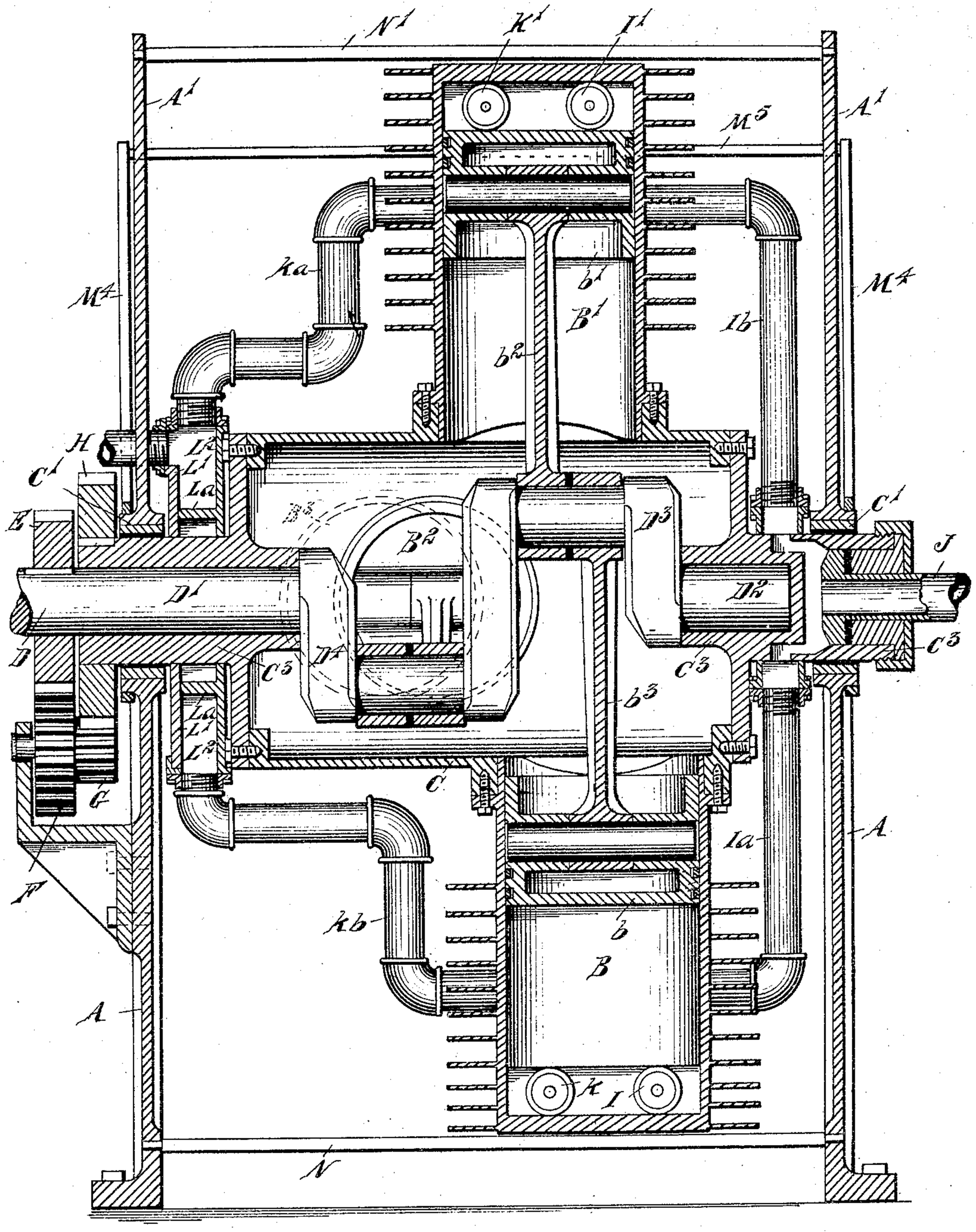

Fig. 2.

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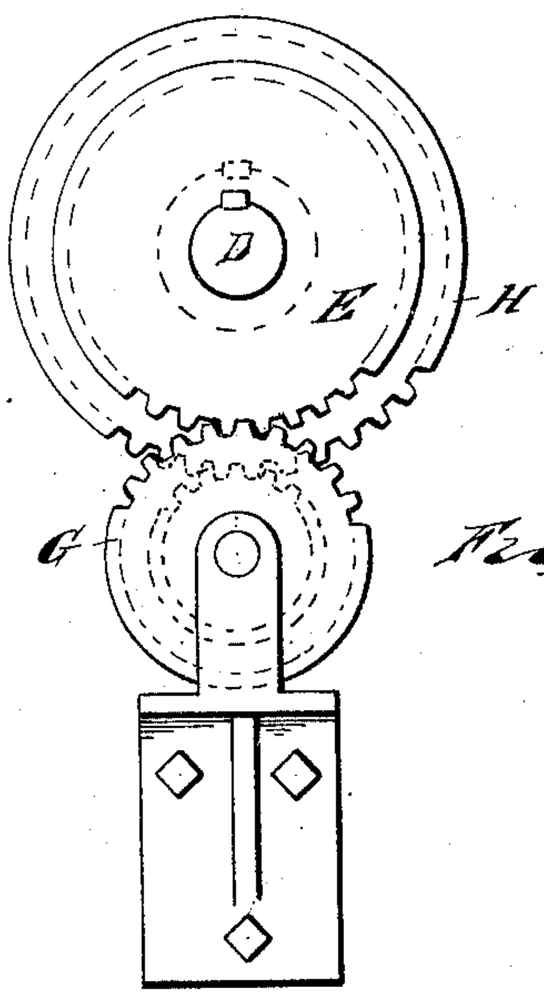


Fig. 3

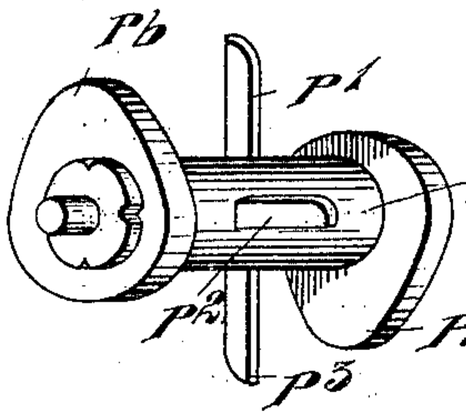


Fig. 6

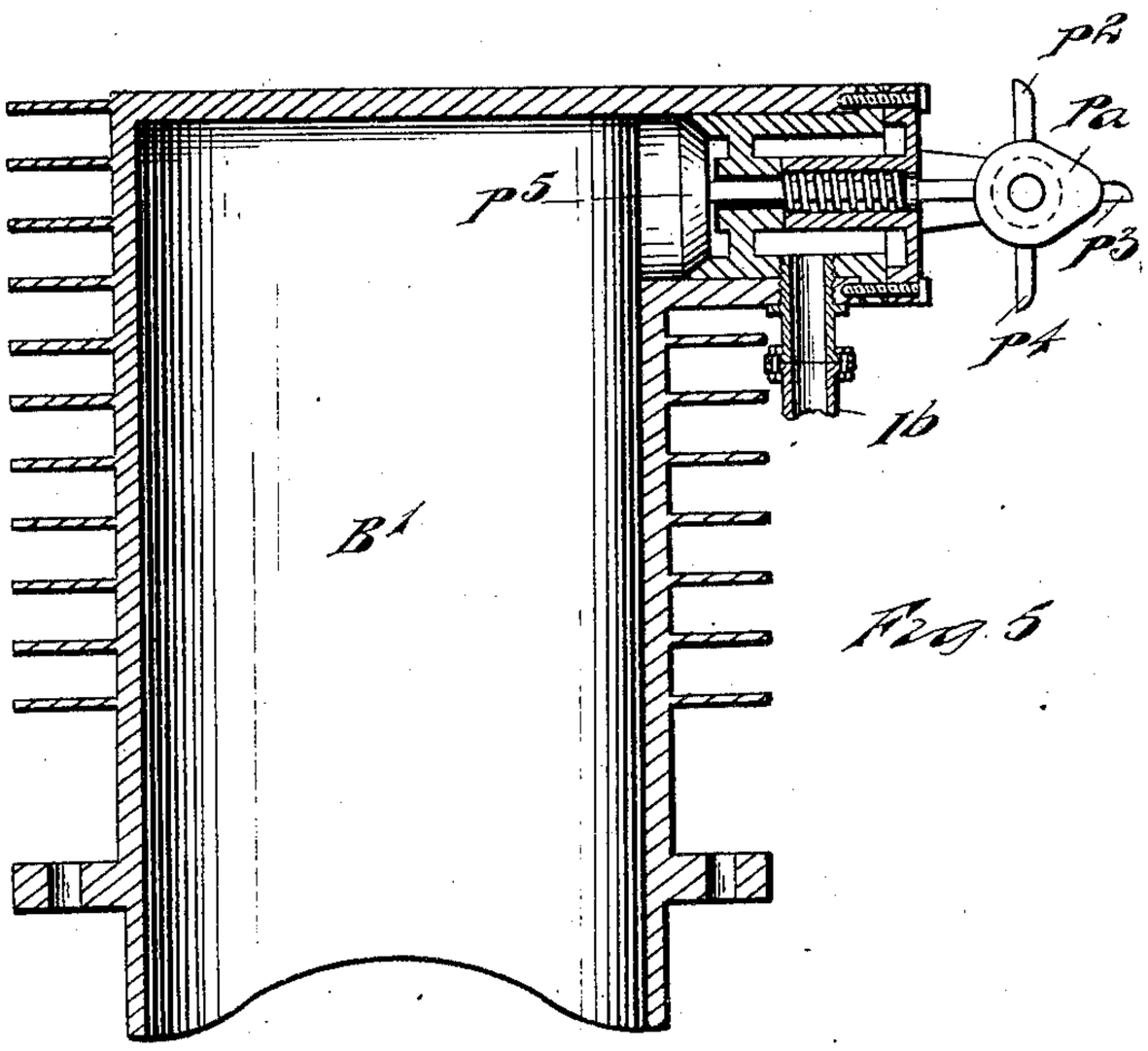
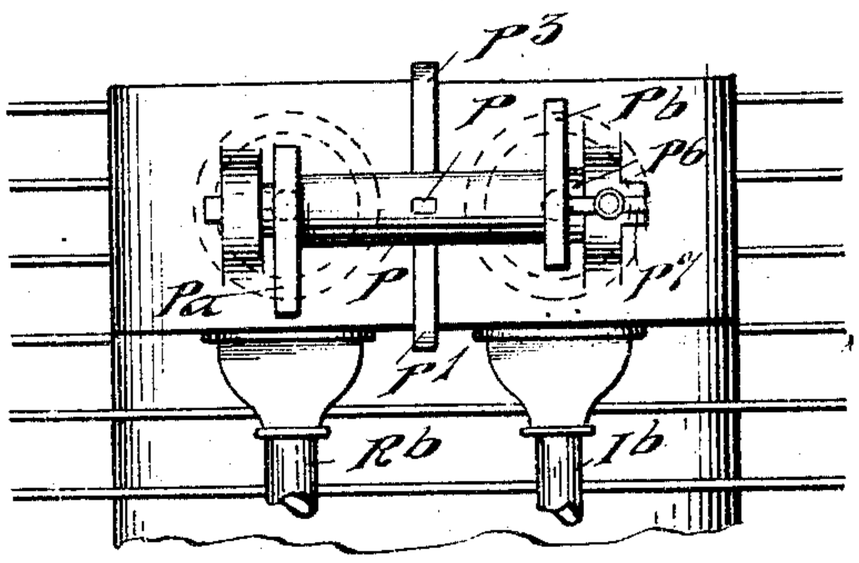


Fig. 5

Fig. 4



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4 SHEETS—SHEET 4.

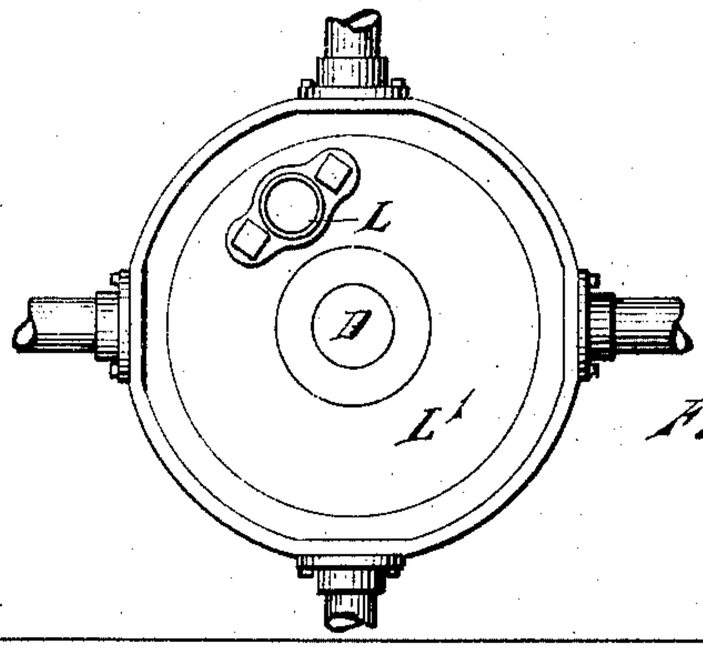

Fig. 10.

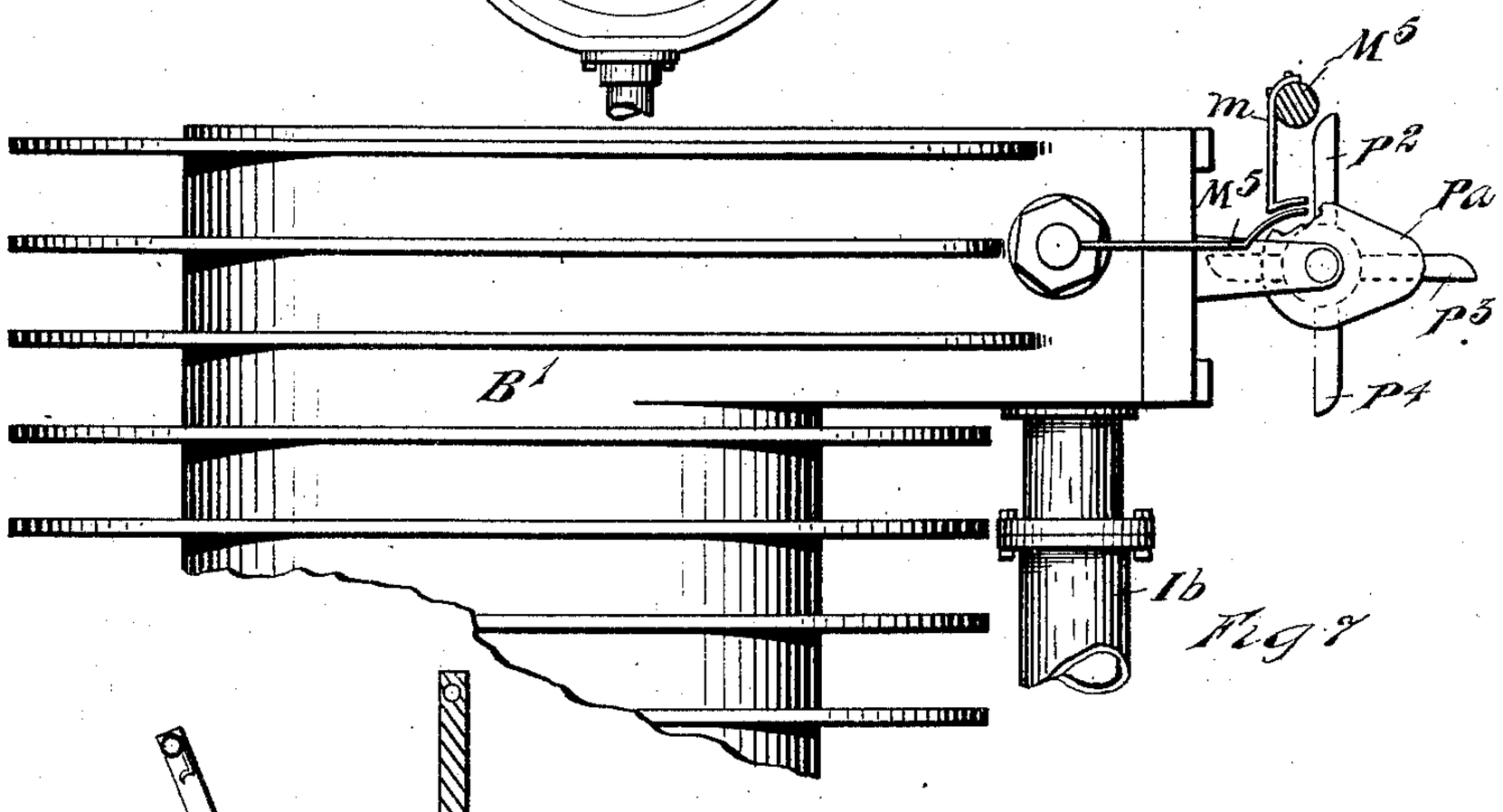

Fig 7

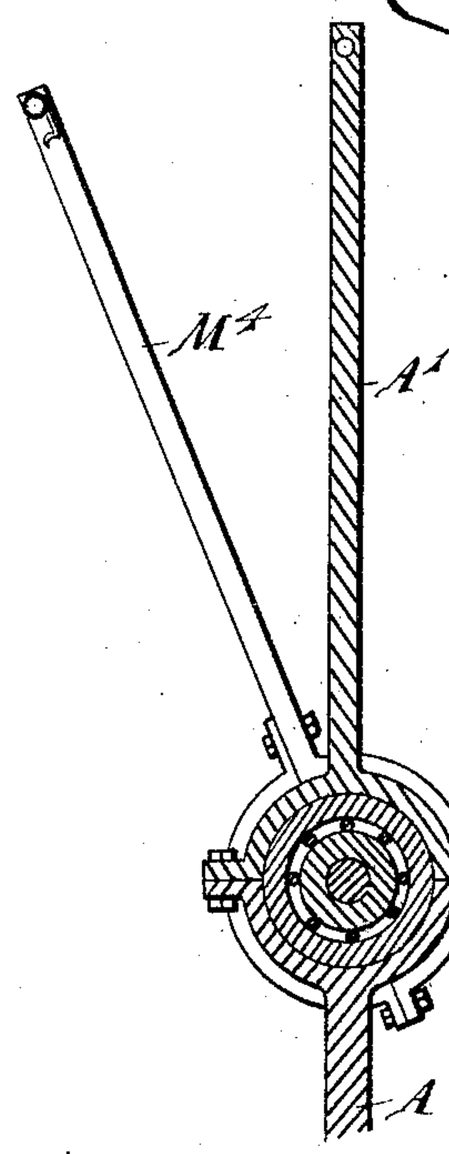

Fig 9

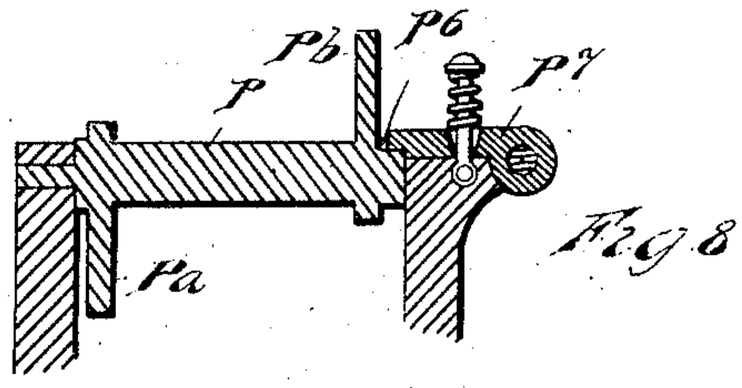

Fig 8

WITNESSES

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UNITED STATES PATENT OFFICE.

PETER W. KANE, OF DETROIT, MICHIGAN.

ENGINE.

976,808. Specification of Letters Patent. Patented Nov. 22, 1910.

Application filed April 8, 1907. Serial No. 366,943.

To all whom it may concern:

Be it known that I, PETER W. KANE, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Engines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to internal combustion engines, and consists in the improvements hereinafter described and shown in the accompanying drawings, in which:—

Figure 1, is an elevation, looking at the one end of the main shaft, the supporting standard which is toward the observer being removed. Fig. 2, is a vertical central section in a plane at right angles to the plane of the picture of Fig. 1. Fig. 3, is a detail view, showing the train of gearing connecting the shaft and rotary casing. Fig. 4, is a detail elevation, showing the valve operating mechanism. Fig. 5, is a detail, showing one end of a cylinder and illustrating the valve operating mechanism and its relation to the valve. Fig. 6, is a perspective view of the valve operating mechanism. Fig. 7, is an enlarged detail of one end of one of the cylinders, showing a method of making electrical contact. Fig. 8, is a detail view in section, illustrating the mechanism for holding the valve operating mechanism in an adjusted position. Fig. 9, is a detail sectional view, illustrating the mechanism for altering the angular position at which electrical contact is made. Fig. 10, is a detail view, illustrating a portion of the exhaust apparatus.

In the drawings an internal combustion engine employing the four cycle method of operation is shown.

A, A, are standards upon which the engine is supported.

B, B^2, B^1, B^3, are four radially disposed cylinders secured to a casing C. The casing C is provided with trunnions C^3, which rest in bearings C^1 on the standards A, A.

D is the main shaft resting in bearings D^1, D^2, in the trunnion C^3 of the casing C.

D^3 and D^4 are two adjacent cranks forming part of the shaft D. A pair of pistons b, b^1, are connected by connecting rods b^2, b^3, to a crank D^3. The connections to the crank D^4 are entirely similar to that of those to D^3, so that they need not be specifically described.

E is a gear wheel upon the shaft D.

H is a gear wheel upon the trunnion C^3 of the casing C.

F and G are intermediate gear wheels joining the gear wheels E and H, so that the casing C shall turn in the same direction as the shaft D, and have half the angular velocity of said shaft.

I, I^1 are intake valves. The charge is supplied to said valves and to the corresponding valves of the cylinders B^3 and B^2 through the pipe J, and the radially extending pipes I^a, I^c, I^b, and I^d. The pipe J is stationary, and opens into a chamber in a trunnion C^3 of the casing C, with which chamber the radial pipes just referred to connect. The end of the pipe J may be surrounded by a stuffing box.

K, K^1, are exhaust valves; the cylinders B^2, and B^3 are provided with similar exhaust valves. The exhaust from the four cylinders is conveyed through radial pipes, two of which, K^a, and K^b, are shown in Fig. 2, similar to the induction pipes above described. The exhaust pipes open into a chamber surrounding a trunnion C^3 at the opposite side of the engine to that at which the pipe J is located. The chamber into which the exhaust is discharged, is made up of a plate L^2 connected with the casing C of the engine, a stationary plate L^1, and a baffle ring L^a, which acts as a shield to protect the bearing.

L is a pipe conveying the exhaust from the chamber to which it has been delivered by the radial exhaust pipes.

M, M^2, M^1, M^3, are contact pieces shown as extending from the sparking plugs in the cylinder.

M^4, M^4, are radius rods between the outer ends of which passes a horizontal rod M^5 carefully insulated from said radial rods. The contact pieces M, M^2, M^1, M^3, are located in different planes, and therefore each will require a special corresponding contact piece *m*. The radius rods M^4 may be adjusted to different radial positions.

A^1, A^1, are rods extending upward from the standards A, A.

N is a rod extending horizontally between the standards A, A, near the lower ends of said standards.

N^1 is a rod extending horizontally between the upper ends of the standards A^1, A^1.

There is a shaft P resting in bearings adjacent to each pair of valves I, K, on each cylinder. From each shaft P extend arms P^1, P^2, P^3, P^4, and toward the ends of each of said shafts is a cam P^a and a cam P^b, the former of said cams adapted to operate the inlet valve, and the latter the exhaust valve. The arms P^1, P^2, P^3, and P^4 form lugs which strike against a rod N or N^1, thus turning a shaft P through one quadrant at each contact.

P^6 (Figs. 6 and 8) are notches located one quadrant apart at one end of each of the shafts P, and in the periphery thereof.

P^7 is a latch adapted to engage in a notch P^6 to hold the shaft P at a definite angular position. Each time that one of the radial rods from a shaft P strikes against a rod N or N^1, the shaft is moved through one quadrant. When a cam P^a or P^b is turned to the proper position, it raises the inlet or exhaust valve from its seat, and when it passes said position, said valve is returned again to its seat by its proper spring in the usual way. While I have shown the radius rod M^4 and the connections *m*, M^5, and the spring connections extending from the sparking plugs, as one way of making the electrical connections of the secondary at different points, still other ways may be devised, and in any case, the time of sparking will probably be adjusted by the primary connection if the jump spark system is used, and the method of making this connection will be well understood by those cognizant with the art, and will need no explanation. It will be observed that there is but one deadpoint to each pair of cylinders for each revolution of the main shaft D.

What I claim is:—

1. In an engine, the combination of a crank case provided with a trunnion resting in a bearing, a main shaft resting in a bearing in said trunnion, one or more cylinders upon said crank case, a stationary and a movable wall surrounding said trunnion and inclosing a chamber, a pipe extending from the port or ports of said cylinder or cylinders to said chamber, and an outlet passage in the stationary part of the walls surrounding said chamber.

2. In an engine, the combination of a crank case provided with a trunnion resting in a bearing, a main shaft resting in a bearing in said trunnion, one or more cylinders upon said crank case, a stationary and movable wall surrounding said trunnion and inclosing a chamber, a pipe extending from the port or ports of said cylinder or cylinders to said chamber, an outlet passage in the stationary part of the walls surrounding said chamber, and a shield L^a for keeping the exhaust gases from the bearing.

3. In an engine, the combination of a revoluble cylinder, a valve in said cylinder, a rotary part pivoted on said cylinder adapted to actuate said valve, a lug connected with said rotary part adapted to contact a stationary part to turn said rotary part, and a stationary part adapted to be contacted by said lug.

4. In an engine, the combination of a revoluble cylinder, a valve in said cylinder, a rotary part pivoted on said cylinder adapted to actuate said valve, a lug connected with said rotary part adapted to contact a stationary part to turn said rotary part, a stationary part adapted to be contacted by said lug, a cam on said rotary part and means for holding said cam at its various adjusted positions.

5. In an engine, the combination of a revoluble cylinder, a valve in said cylinder, a rotary part pivoted on said cylinder, adapted to actuate said valve, a lug connected with said rotary part adapted to contact a stationary part to turn said rotary part, a stationary part adapted to be contacted by said lug, notches on said rotary part, and a stationary pawl adapted to engage said notches, for the purpose described.

In testimony whereof, I sign this specification in the presence of two witnesses.

PETER W. KANE.

Witnesses:

ALICE TOWNSEND,

ELLIOTT J. STODDARD.