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DISTRIBUTION SYSTEM FOR EXPLOSION OR INTERNAL COMBUSTION ENGINES

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Fig. 1.

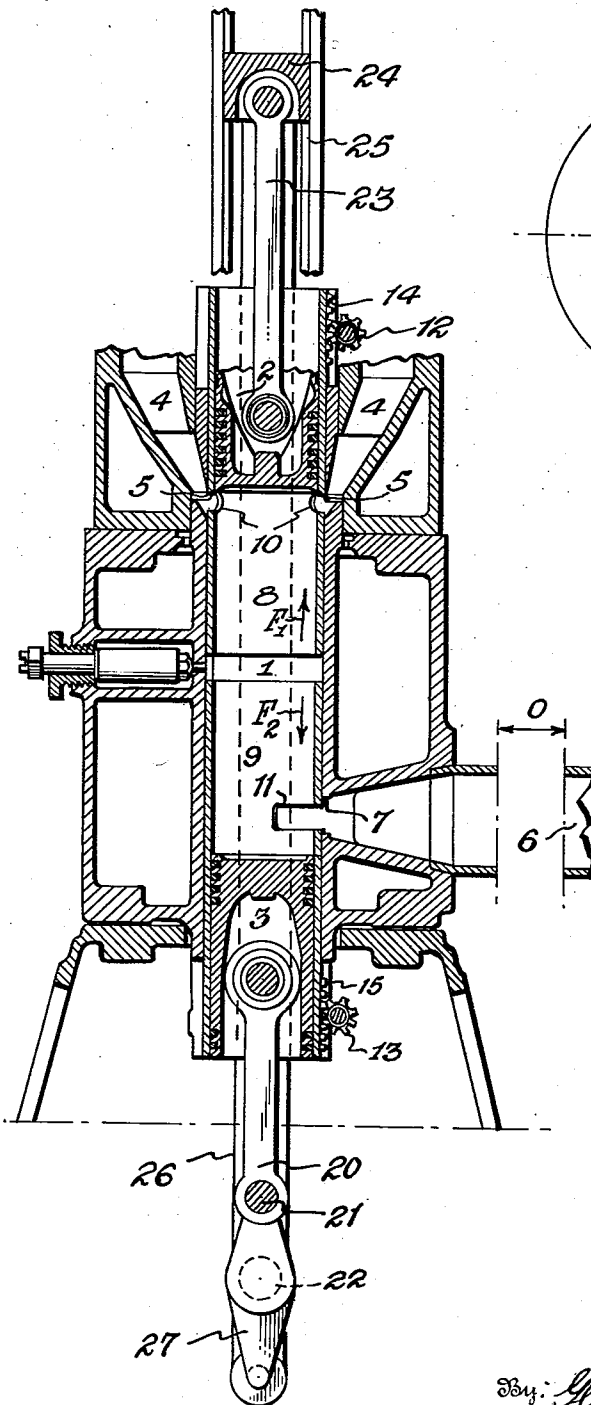
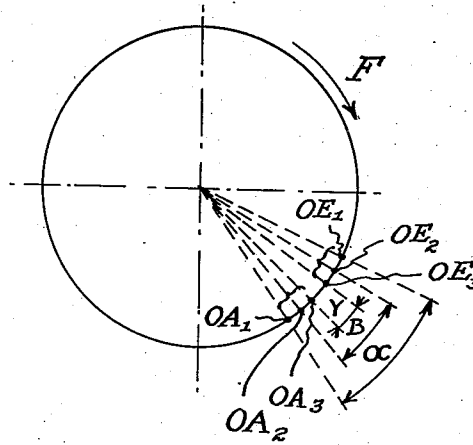


Fig. 2.



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DISTRIBUTION SYSTEM FOR EXPLOSION OR
INTERNAL COMBUSTION ENGINES

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In France August 1, 1933

1 Claim. (Cl. 60—32)

The present invention relates to two stroke cycle internal combustion engines wherein the vacuum or high depression left in the cylinder by the discharge of the burnt gases substantially as a mass in an interval of time shorter than that required for the burnt gases to expand down to the ambient atmospheric pressure by adiabatic flow is utilized for introducing the fresh charge through an inlet which is opened while the exhaust port is open and when the said issuance of the burnt gases is in full progress and causes a suction effect to be exerted in the cylinder, all as set forth in the applicant's Patent No. 2,102,559, granted December 14, 1937.

The object of the invention is to provide an improvement in the operation of such engines whereby the output may be maintained over a wide range of speeds.

In the accompanying drawing, by way of example:

Figure 1 is a diagrammatic view of an engine according to the invention.

Figure 2 is a diagram showing the action of the device for controlling the distribution.

It will be assumed, for instance, that an engine, in the cylinder (or in each cylinder) 1 of which slide two diametrically opposed pistons 2, 3, is under consideration. The piston 3 is connected by a rod 20 with the crank arm 21 of a crank shaft 22. The other piston 2 is connected by a rod 23 with a cross head 24 slidably mounted in guides 25. The cross head 24 is connected by a rod 26 with a crank arm 27 carried by the crank shaft 22 and arranged in opposed relation to the crank arm 21.

Admission takes place through two conduits 4 opening in the wall of the cylinder 1 through ports 5, and exhaust is effected through a conduit 6 opening in the wall of the cylinder 1 through a port 7. Both ports 5 and 7 are respectively uncovered by the pistons 2 and 3, when the latter approach their "bottom" dead centre, that is to say the position opposed to that corresponding to maximum compression.

This engine operates in the following manner.

At the end of the firing stroke, the piston 3 uncovers the port 7, and, the body of burnt gases resiliently rebounds between the cylinder wall and the gaseous atmosphere existing in the conduit 6, whereupon, under the influence of the repeated shocks to which it has been subjected, this gaseous atmosphere is in its turn set in motion, and the burnt gases leave the cylinder as a mass forming with the gaseous atmosphere, in the conduit 6, a column which escapes at a high speed and

produces in the cylinder a shock similar to a negative water hammer, that is to say a suction effect.

It is at this moment that the piston 2 uncovers the ports 5, so that the cylinder is automatically and completely filled up, and, when the gas column, checked on the down side by the atmosphere it encounters, tends to return into the cylinder, its re-entry into the latter is opposed by the charge of fresh air (or of carburetted mixture) which has just been admitted therein.

According to the invention, the above condition is maintained at varying engine speeds by the provision of an adjusting device whereby the lapse of time between the opening of the exhaust and that of the inlet can be varied.

In the example under consideration, this adjustment is obtained by means of sliding sleeves 8, 9, interposed between the cylinder 1 and the pistons 2 and 3, respectively, and provided with ports 10, 11 opposite the ports 5, 7.

The arrangement and the respective levels of the various ports are such that by causing the sleeves 8, 9 to slide in the cylinder, the distribution is modified; by moving the sleeve 8 in the direction of F_1 , the opening of the inlet is retarded, and, by moving the sleeve 9 in the direction of F_2 , the opening of the exhaust is retarded, the reverse effects being obtained if the sleeves 8 and 9 are moved in the opposite directions to those indicated.

These displacements are controlled by pinions 12, 13 respectively meshing with racks 14, 15, longitudinally arranged on the outer walls of the sleeves 8, 9.

Figure 2 is a circular diagram showing various positions of the distribution system; F designates the direction of rotation of the engine; the points OE1, OE2, OE3 designate different positions of exhaust opening, and the points OA1, OA2, OA3, different positions of inlet opening.

When the positions of the sleeves 8, 9 are such that the exhaust opens at OE1, and the admission at OA1, the angular retardation of the admission relatively to the exhaust has a relatively great value α . This arrangement corresponds to a high speed of rotation of the engine, since, notwithstanding this high angular value, this retardation must have, in terms of time, a value which is always relatively small in order that the charging shall be effected before the tail end of the column of exhaust gases has had the time to return into the cylinder.

If the sleeve 9 is moved in the direction of the arrow F_2 , the opening of the exhaust port is re-

tarded, the exhaust then takes place at a point such as OE2, and, if the sleeve 8 is moved in a direction opposed to that of the arrow F1, the opening of the inlet is advanced, the admission then occurring at a point such as OA2.

5 For this new arrangement, the angular retardation of the opening of the inlet relatively to that of the exhaust is now only β and this, from what has been stated, corresponds to a lower speed of the engine.

10 Finally, the arrangement EO3—OA3 of Figure 2 diagrammatically illustrates a still smaller angular retardation β corresponding to a still lower speed of the engine.

15 It is of course to be understood that the engines to which the present invention is applied may comprise any of the expedients described in Patent No. 2,102,559 above referred to.

I claim:

20 A two stroke cycle internal combustion engine

having a cylinder, exhaust and inlet orifices in the cylinder, an exhaust conduit on the exhaust orifice, means for so controlling the exhaust orifice during the firing stroke as to ensure the issuance of the burnt gases as a mass, whereby the said mass moves outward and thereafter returns from a point which may be within the said conduit, the said conduit providing a permanent free passage for the burnt gases to the limit of outward travel of said gases, means for so controlling the inlet orifice as to ensure that it will be opened while the exhaust orifice is still open and when the said issuance of the burnt gases is in full progress and produces a suction effect in the cylinder, and means for varying the angular retardation of admission relative to exhaust, whereby the desired timing of inlet opening may be established for varying engine speeds.

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