March 30, 1943. G. LOISELLE 2,315,214

ENGINE

Filed March 16, 1940

Fig. 1.

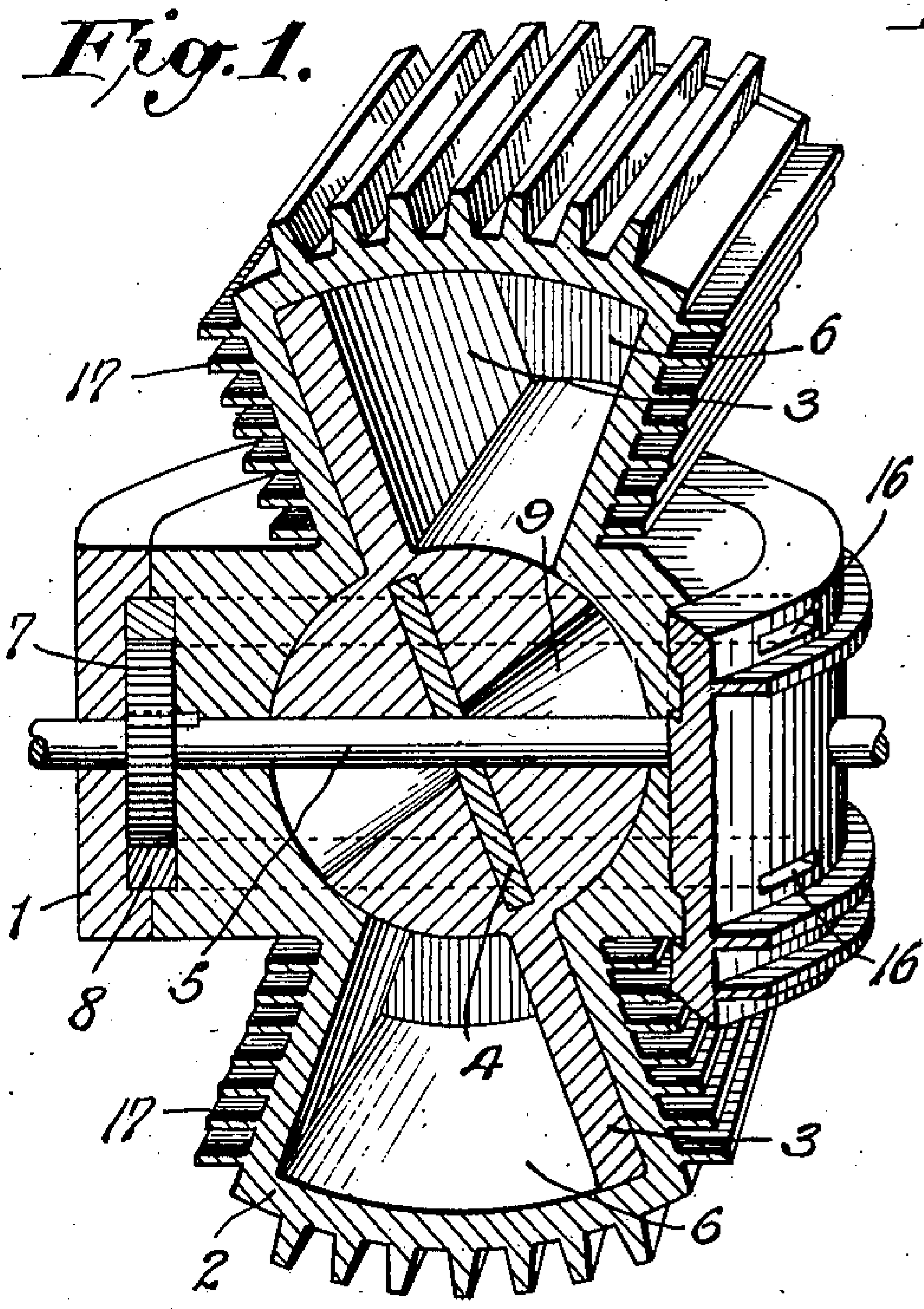


Fig. 2.

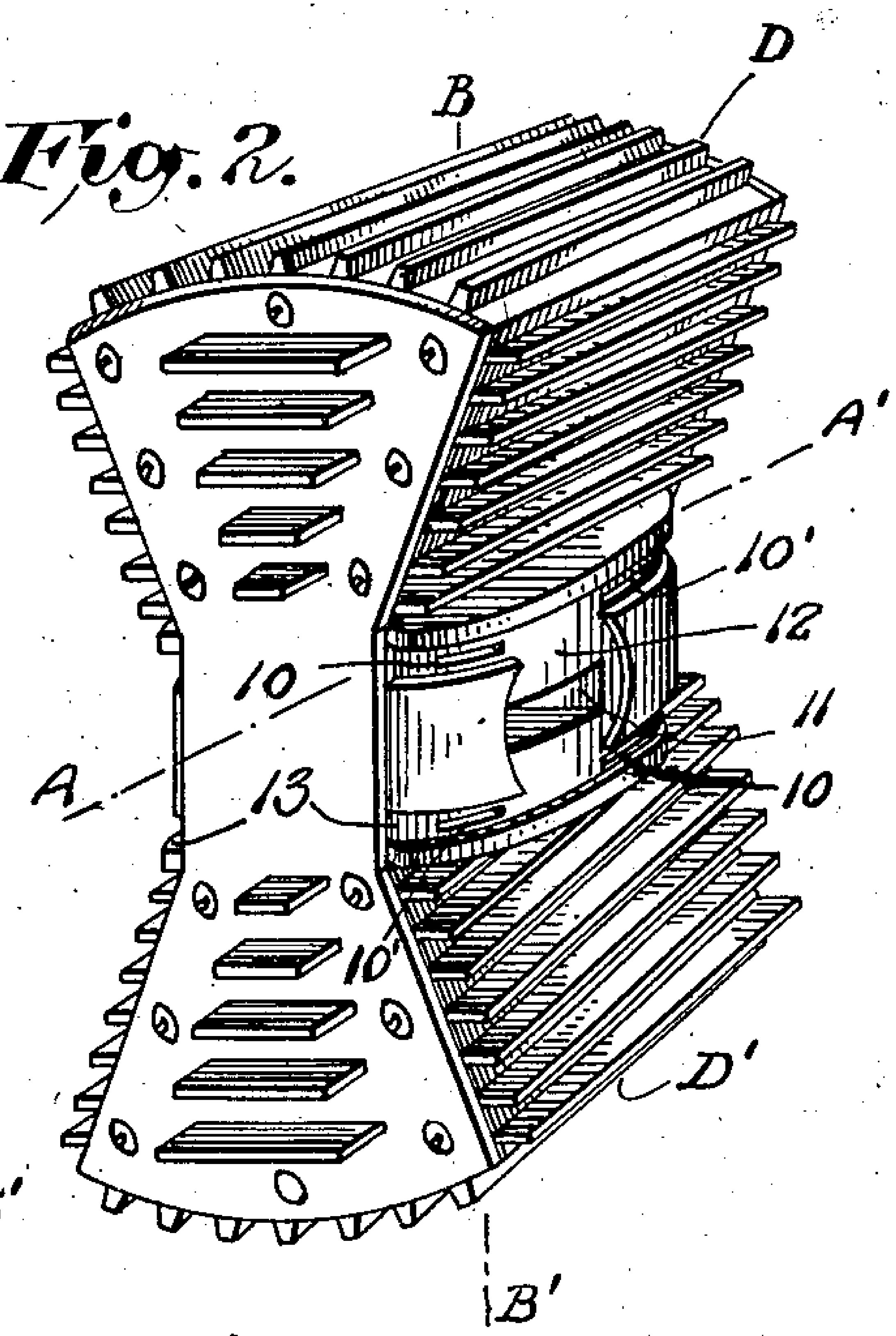


Fig. 3.

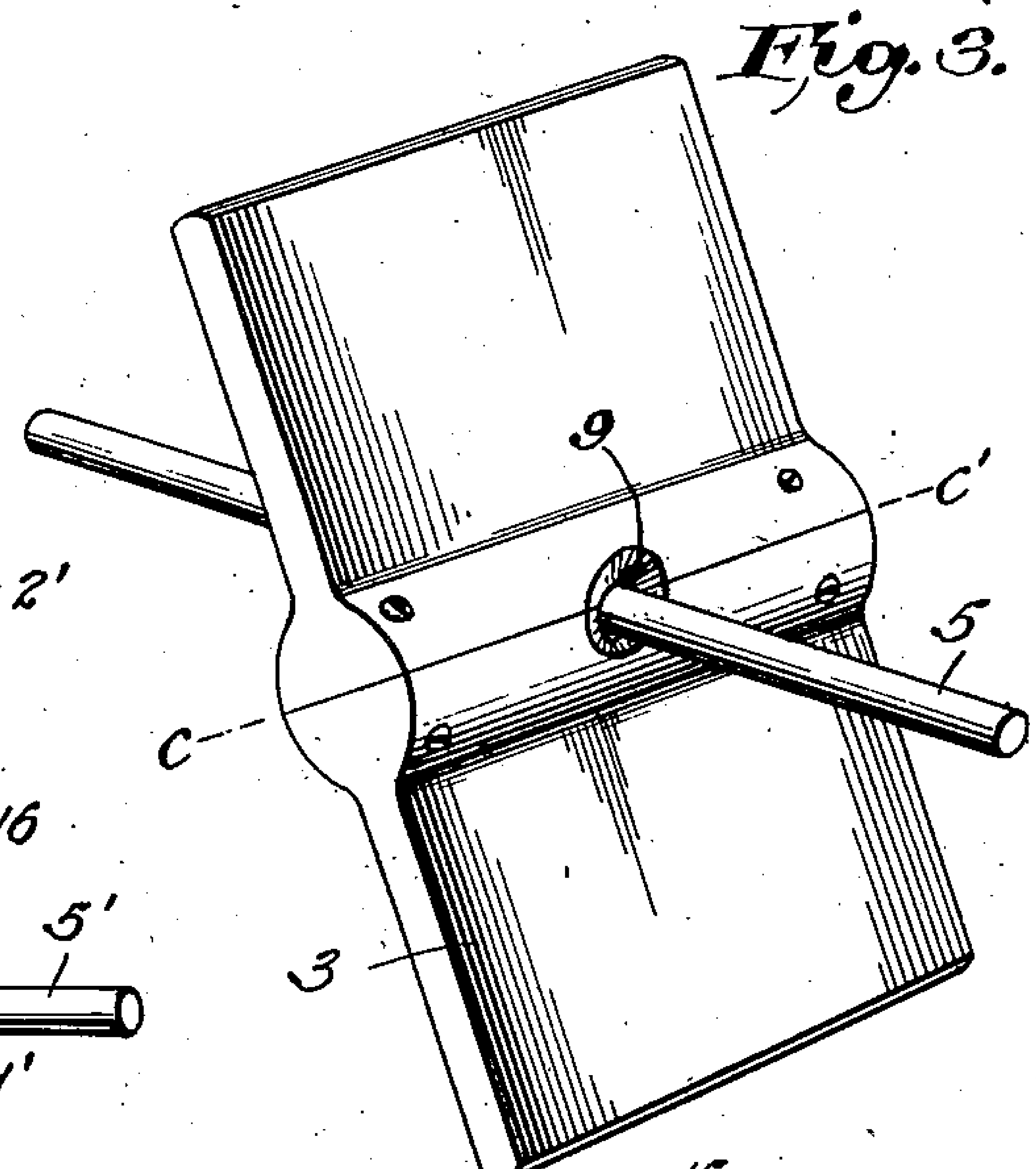
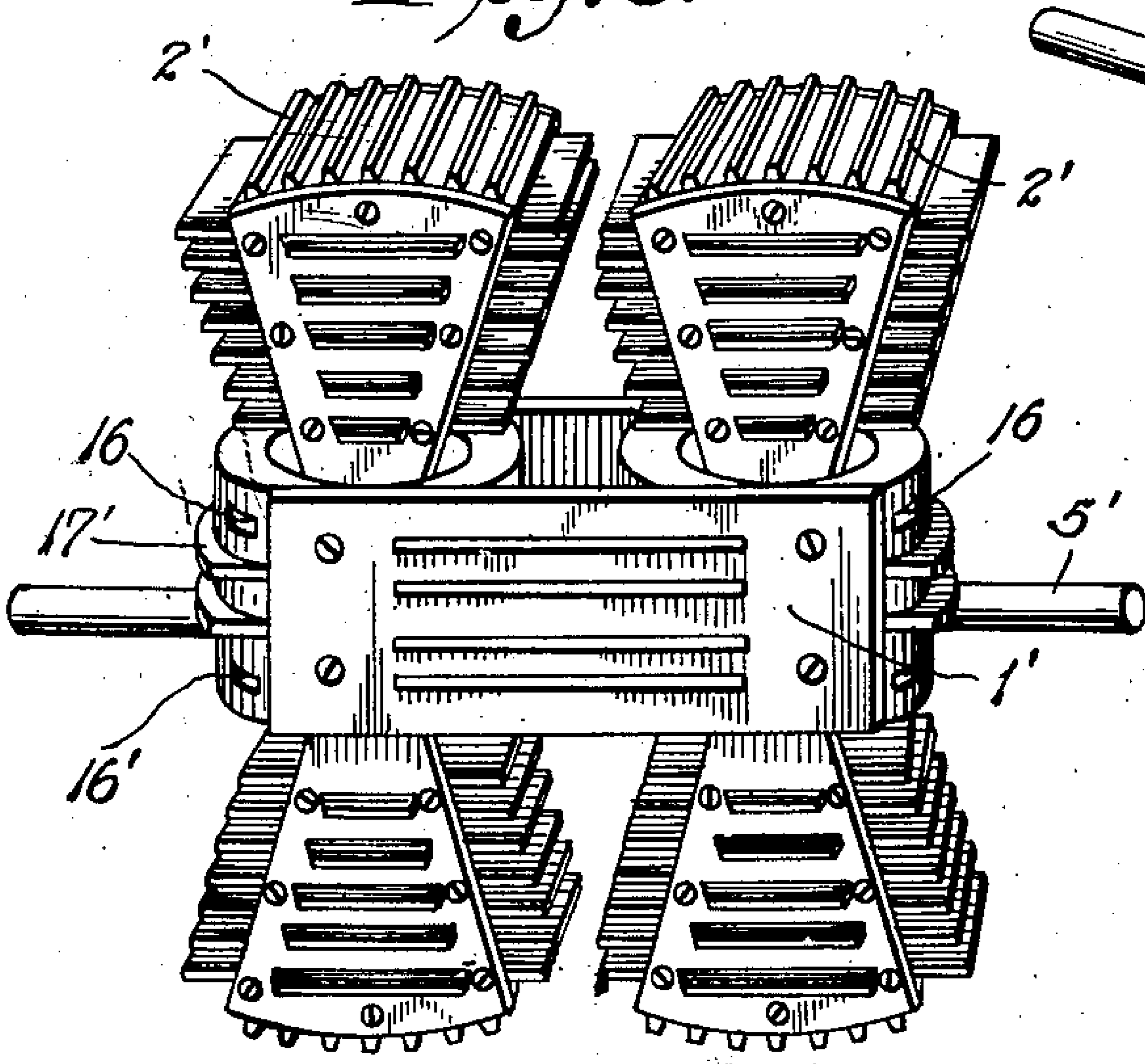


Fig. 5.



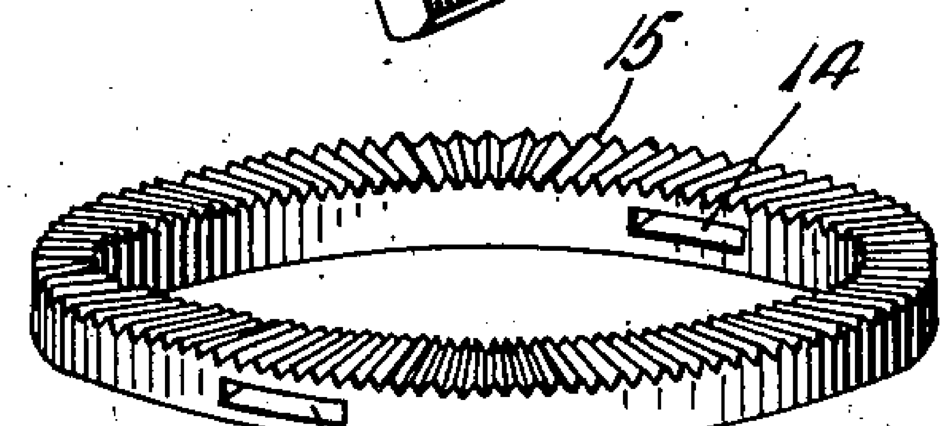


Fig. 4.

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2,315,214

ENGINE

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Application March 16, 1940, Serial No. 324,438

7 Claims. (Cl. 121—63)

This invention relates to an improved engine which may be applied to the class of internal combustion engines and also steam engines, and outside the class of prime movers it is adapted for the construction of pumps and fluid meters.

An object of this invention is to provide an engine in which the number of parts is reduced to a minimum, thereby decreasing the chances of accidental stalling and lowering the cost of production inherent to complicated assemblages.

Another object of this invention is to provide an engine of large power-capacity for its volume, the bulk and frontal area being reduced to a minimum for a given horse-power value.

Another object of this invention is to provide an engine which, while remaining particular and distinctive in its essentials, lends itself to a certain flexibility of form and construction, thereby greatly facilitating its adaptation to the various functions it can fulfill and lightening considerably the problem of its production.

Another object of this invention is to provide a simple and efficient valve mechanism which can be cooled easily, thus ensuring proper operation of the engine when it is used as a heat engine, steam or internal combustion.

The invention is illustrated in the accompanying drawing in which Fig. 1 is a section of an engine embodying my invention. Fig. 2 is an external view of a possible casing to suit my invention. Fig. 3 is the oscillating member mounted on the rotating element and shaft to be put inside the casing. Fig. 4 is a ring-valve. Fig. 5 is an external view of several units mounted on same shaft.

This invention is designed to employ the required number of units to develop the required horsepower, each unit comprising a fixed support, a casing oscillating on said support, an oscillating member inside the casing and forming with the inside walls of that casing variable-volume chambers, a rotating element mounted at angle on a shaft and by its revolution causing the casing and the member to oscillate, or reciprocally oscillation of these latter, produced by expansion of fluids in the chambers, causing said element to revolve with said shaft, and ports for the admission and exhaust of fluids. It is obvious that when several units are used together, the supports and shafts are bound together respectively so as to become but one support and one shaft.

Referring to Figure 1: the support is the ring 1, in which is located the symmetrical oscillating casing 2; an oscillating member 3 divides the casing into four fluid-tight chambers 6; number 4 indicates a rotating element bearing on member 3 and fixedly mounted at angle on shaft 5; mounted on the shaft is a gear 7 engaging valves 8; number 9 represents suitably sized holes permitting the oscillation of member 3; numbers 16 and 16′ are respectively intake and exhaust ports and number 17 indicates fins for cooling.

Figure 2 shows a suitable form of casing where 10 are ports for intake and 10′ for exhaust; 11 is a suitable aperture for the shaft, taking account of the oscillating of the casing; 12 is a recess for valve gear 7 (Fig. 1) and 13 recesses for ring valves 8 (Fig. 1). Line BB′ is the symmetrical axis of oscillation of the casing, while line AA′ is the geometrical axis of revolution of the surface D of the casing and of its corresponding surface D′.

In Figure 3, line CC′ is the axis of oscillation of the member 3 (Fig. 1 also); this line CC′ to lie on line AA′ (Fig. 2) when member is in place; 9 is a convenient recess permitting oscillation of member; number 5 is the shaft.

Figure 4 shows ports 14 in a ring-valve as well as teeth 15 to be engaged by valve gear 7 (Fig. 1).

In Fig. 5, number 1′ represents the stationary ring structures; the casings are designated by 2′; 5′ is the shaft common to both units; 16 and 16′ are respectively intake and exhaust ports and number 17′ indicates fins for cooling.

The operation of this engine goes as follows: when rotating element 4 is rotated by shaft 5, it causes member 3 to follow its angle, thus producing a rotating oscillation of that member around axis CC′ (Fig. 3) or AA′ (Fig. 2); at the same time, member 3 has to take an oscillating motion in a plane perpendicular to aforesaid oscillation; this second oscillation must in accordance be followed by the casing 2, which, by so doing, oscillates around its symmetrical axis BB′ (Fig. 2) perpendicular to its geometrical axis of revolution AA′.

A full rotation of the shaft thus produces a full period oscillation of the casing relatively to shaft and a full period oscillation of member 3 inside the casing relatively to the casing itself. It is obvious that the reciprocal will be true if the engine is to be used as prime mover.

It is also obvious that these oscillations cause the four chambers inside casing to vary in volume and that, suitable ports being provided, the device can be used as an engine. An explanation of the valve action will clarify the operation of the engine. Let port 10, in the upper recess on casing 2, Fig. 2, be the intake port, 10′ the exhaust port, port 16 in the upper portion of ring support 1, Fig. 1, be the corresponding intake and let there be an exhaust port 16' in said ring corresponding to said exhaust in casing. Suppose an observer on the right side of Fig. 1 (i. e. near Fig. 2) to rotate shaft 5, Fig. 1, from 0 to 90 degrees clockwise; casing would start rotating counterclockwise for an observer looking from above, while member 3, Fig. 1, would itself rotate clockwise, thus reducing the size of upper chamber 6, Fig. 1, and increasing chamber on the other side of said member. It is evident that, if gear 7, Fig. 1, is engaged to teeth in the upper ring valve, to which lower corresponding is indicated by number 8 on Fig. 1, said upper ring valve will also rotate, the direction of its rotation being function of the location (right end or left end of shaft) of gear 7, Fig. 1, and angular speed of its rotation being function of the angular speed of shaft and of the size of same gear. Consequently, it is seen that communication from chamber 6, Fig. 1, with the outside, either for intake or exhaust, is function of the relative positions of casing, ring valve and support, that these positions are themselves function of the angular displacement of the shaft, of the location and size of valve gear 7, Fig. 1, that said communication with the outside is also function of the size and number of ports 14 in the ring valve. And since the ring valve is a full circle it is also evident that same conditions of operation, in phase or not, could be duplicated for chambers on both sides of member 3, Fig. 1.

I want to point out that this engine can be embodied with various valve systems, various forms of supports and of casings according to the various functions it can fulfill. I also want to point out that my engine is particularly suited for air cooling: it would be particularly easy to locate suitable fins 17 on the oscillating bodies exceeding the casing for the cooling of its chamber walls, as well as on the support for the cooling of the valves.

I am aware that prior to my invention engines have been invented using the incline element principle, but I state that a very particular point of my invention is in the simultaneous and relative movements of both its casing and inside member.

Therefore, I claim:

1. An engine comprising a fixed support, a casing rotatably oscillating on said support, a member mounted to rotatably oscillate inside said casing and forming with the inside walls of said casing variable-volume chambers, a rotating element mounted at an inclined angle on a shaft, said rotating element bearing on said member and causing, by its rotation with said shaft, oscillation of both said member and said casing, said casing having suitable ports for the inlet and exhaust of fluid from the chambers, and reciprocally oscillation of both said member and said casing causing rotation of said element with said shaft.

2. An engine comprising a fixed support, a symmetrical casing mounted on said support so as to be free to oscillate around an axis, a symmetrical member mounted to oscillate around an axis inside said casing and forming with the inside walls of said casing variable-volume chambers, a symmetrical rotating element mounted at an angle on a shaft, said angle being an inclined angle relative to the axis of said shaft, said element lying in the same plane as that of said member and causing by its rotation oscillation of both said member and said casing, said casing being provided with suitable ports for the inlet and exhaust of fluids from the chambers, and, reciprocally, oscillation of both said member and said casing causing rotation of said element.

3. An engine comprising a fixed support, a casing of the form of a hollow solid of revolution mounted on said support so as to be free to oscillate around an axis, a symmetrical member mounted to oscillate inside said casing, around the geometrical axis of revolution of the casing, and forming, with the inside surface of said casing and suitably disposed walls inside it four variable-volume chambers, a symmetrical rotating element mounted at an inclined angle on a shaft and having its center of rotation at the intersection of the axis of oscillation of said casing with the axis of oscillation of said member, rotation of said element causing oscillation of both said member and said casing, said casing being provided with suitable ports for the inlet and exhaust of fluids from chambers, and reciprocally, oscillation of both said member and said casing causing rotation of said element.

4. An engine comprising a fixed support, a casing of the form of a symmetrical portion of a hollow solid of revolution mounted on said support so as to be free to oscillate around an axis of symmetry perpendicular to its geometrical axis of revolution, a symmetrical member mounted to oscillate inside said casing around the geometrical axis of revolution of said casing and forming with the inside surface of said portion of a hollow solid of revolution and walls limiting this latter four variable-volume chambers, a symmetrical rotating element fixedly mounted at an inclined angle on a shaft and having its center of rotation at the intersection of the axis of oscillation of said casing with the axis of oscillation of said member, rotation of said element causing oscillation of both said member and said casing, said casing being provided with suitable ports for the inlet and exhaust of fluids from the chambers, and reciprocally, oscillation of both said member and said casing causing rotation of said element with said shaft.

5. An engine comprising a fixed annular support, a casing of the form of a symmetrical portion of a hollow solid of revolution mounted on said support so that its geometrical axis of revolution is free to oscillate in the same plane as that of the annular support and around an axis of symmetry perpendicular to this plane, a symmetrical member mounted to oscillate inside said casing around the geometrical axis of revolution of said casing and forming with the inside structure of said casing and walls limiting said portion of said casing of revolution four variable-volume chambers, said walls being so disposed as to be almost parallel to the closest surfaces of said member when this latter is at its maximum angle inside the casing, that is to say when chambers are at a minimum, a symmetrical rotating element fixedly mounted at an inclined angle on a shaft and having its center of rotation at the intersection of the axis of oscillation of said casing with the axis of oscillation of said member, rotation of said element causing oscillation of both said member and said casing, this latter being provided with inlet and exhaust ports, and reciprocally oscillation of said member and said casing causing rotation of said element with said shaft.

6. An engine comprising an annular support, a casing of the form of a symmetrical portion

of a hollow solid of revolution, said symmetrical portion being limited, outside said support, by planes parallel to the geometrical axis of revolution of said hollow solid of revolution and, inside said support, by a cylindrical surface fitting smoothly in said support and permitting said casing to oscillate around a symmetrical axis perpendicular to its geometrical axis of revolution, which geometrical axis of revolution is to move in the same plane as that of the support, a symmetrical member mounted to oscillate inside said casing on the geometrical axis of revolution of the casing and forming with the inside walls of the casing four fluid-tight variable-volume chambers, said walls of the casing being formed by the portion of the hollow solid of revolution and by planes limiting said hollow solid, a symmetrical rotating element mounted in a suitable space provided inside said member so that its center of revolution lies at the intersection of the axis of oscillation of said casing with the axis of oscillation of said member, said element being rigidly mounted at an angle on a shaft, the line of said shaft being along a symmetrical diameter on said support and rotation of said element and shaft causing oscillation of both said casing and said member, said casing being provided with inlet and exhaust ports, and reciprocally oscillation of said member and said casing causing rotation of said element with said shaft.

7. An engine comprising annular support, a casing limited outside said support by symmetrical portions of a hollow solid of revolution and planes limiting these portions, said planes being parallel to the geometrical axis of revolution of said hollow solid of revolution, said casing also limited, inside said support, by a cylindrical surface fitting smoothly in said support and permitting said casing to oscillate around a symmetrical axis perpendicular to its geometrical axis of revolution, which geometrical axis of revolution is to move in the same plane as that of the support, recesses provided around said casing so that annular rings can be symmetrically inserted between said support and said casing, on each side of shaft center line, said rings to be moved by a gear mounted on a shaft, in a convenient recess between said support and said casing, so as to engage both rings and make them rotate in opposite directions, said support and said casing being provided with ports and said rings being provided with ports to match at proper time with said ports provided in said support and said casing for the intake and exhaust of fluids, a symmetrical member mounted to oscillate inside said casing on the geometrical axis of revolution of the casing and forming with the inside walls of the casing four fluid-tight variable-volume chambers, a symmetrical rotating element mounted in a suitable space provided inside said member so that its center of revolution lies at the intersection of the axis of oscillation of said casing with the axis of oscillation of said member, said element being rigidly mounted at an angle on a shaft, the line of said shaft lying along a symmetrical diameter of said support, and rotation of said element and shaft causing oscillation of both said member and said casing and reciprocally oscillation of said member and said casing producing rotation of said element with said shaft.

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