

N° 20,219



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Date of Application, 30th Aug., 1910

Complete Specification Left, 24th Mar., 1911—Accepted, 24th Aug., 1911

PROVISIONAL SPECIFICATION.

Improved Internal Combustion Motor.

I, FREDERICK LAMPLOUGH, of Albany Works, Cumberland Park, Willesden Junction, in the County of Middlesex, Managing Director, do hereby declare the nature of this invention to be as follows:—

5 The object of the present invention is to construct an improved internal combustion motor.

The invention consists of a novel combination and arrangement of parts whereby great simplicity and efficiency of operation are obtained.

10 For this purpose I employ a pair of parallel firing cylinders open at both ends and each fitted with a pair of pistons which alternately approach towards and recede from each other. These pistons, by connecting rods, are connected to means for oscillating inclined discs one at each end of the engine shaft and thereby give rotary motion to said shaft.

The following is the arrangement I prefer to use for this purpose:—

15 I employ a ring or gymbal at each end of the shaft provided with trunnions around which it can oscillate. On a line at right angles to one passing through the trunnions the ring or gymbal is provided with ball bearings to receive the trunnions of a cup shaped ring fitted with a flat race ring.

20 An inclined disc suitably balanced is mounted on the shaft and is keyed thereon with capability of being slidden for adjustment. This disc is fitted with a second flat ball race ring which passes into said cup shaped ring and bears against balls placed in a cage between the two flat race rings, which latter are formed with slightly sunk paths for the balls.

25 The inclined disc is formed with a boss fitting the shaft and with a split socket to receive an adjusting sleeve screwing onto a screw threaded part of the shaft. When the parts are adjusted the lugs of the split socket are drawn towards each other by a screw which fits within a groove around the adjusting sleeve thereby locking such parts together. The inclined disc and adjusting sleeve are locked on the shaft by a locking ring having projections fitting recesses in the end of the adjusting sleeve in combination with a nut and a nut locking washer. This
30 driving mechanism forms the subject of another application for Letters Patent of even date.

As the pistons fly out each way the inlet ports near one end of each cylinder are uncovered; the charge enters and drives out the exhaust through the exhaust openings near the other end.

35 The firing cylinders are enclosed in a casing which receives air or gaseous mixture from the discharge opening of a pump of the following construction:—

40 The driving shaft of the pump is eccentric to the cylinder, and segmental pistons are employed located between the inner surface of the cylinder and of an eccentric tube which latter is kept in position concentric with the cylinder by said segmental pistons.

On the driving shaft are keyed driving plates which are formed with a number of circular openings corresponding in number with that of the segmental pistons. In each opening is fitted a driving disc having an eccentric pin entering one end of a piston.

45 The driving plates and driving discs are retained in contact with the ends

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of the cylinder, pistons and central tube, by means of a collar on the driving shaft bearing against one driving plate and a nut and lock nut screwing onto a screw threaded end of the driving shaft and acting directly against the other driving plate.

The driving plates are located in spaces at each end of the cylinder casing, 5 which spaces are concentric with the driving shaft.

Each driving plate has preferably a boss forming a sleeve fitting the driving shaft, on which sleeve is fitted the inner race ring of a ball bearing, the outer race ring being carried by part of the casing.

The exterior surface of the segmental pistons fitting against the interior of 10 the cylinder is recessed at the front and back leaving a central narrow part slightly wider than the inlet and outlet ports.

The exterior surface of the pistons is also recessed at each end to accommodate 15 a pair of retaining rings to counteract the friction caused by the outward thrust of the pistons due to centrifugal action.

Dated this 30th day of August, 1910.

HARRIS & MILLS,
Agents.

COMPLETE SPECIFICATION.

Improved Internal Combustion Motor.

I, FREDERICK LAMPLOUGH, of Albany Works, Cumberland Park, Willesden Junction, in the County of Middlesex, Managing Director, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of the present invention is to construct an improved internal 25 combustion motor.

The invention consists of a novel combination and arrangement of parts whereby great simplicity and efficiency of operation are obtained.

I will describe the invention by the aid of the accompanying drawings, in 30 which:—

Fig. 1 is a longitudinal vertical section and Fig. 2 is a longitudinal horizontal section of parts of a motor constructed according to my invention.

Fig. 3 is a cross section drawn on the line 3—3 of Fig. 1.

Fig. 4 is an end view.

Fig. 5 is a cross section of parts drawn on the line 5—5 of Fig. 1. 35

Fig. 6 is an end elevation of one of the bearings.

Figs. 7, 8, 9, are views of a locking ring or washer, and

Figs. 10 and 11 are views of a lock nut.

According to my invention I employ a pair of fixed parallel firing cylinders B, open at both ends and each fitted with a pair of pistons C, (only one of which 40 latter is shown in each cylinder), which pistons alternately approach towards and recede from each other. These pistons, by connecting rods D, are connected to means for oscillating inclined discs, one towards each end of the engine shaft, and thereby give rotary motion to said shaft.

The above described parts, separately speaking, form no part of my present 45 invention.

The following is the arrangement I prefer to use in combination with the above described parts for communicating motion from the connecting rods D to the inclined discs *d*.

I employ, at each end of the shaft A, a ring or gymbal *a*, provided with 50 trunnions *a*¹, on which it can oscillate in fixed bearings *b*.

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On a diameter at right angles to one passing through the trunnions a^1 , the ring or gymbal a is provided with ball bearings a^2 , to receive the trunnions a^1 of a cup shaped ring c fitted on its disc shaped part with a flat race ring c^2 .

5 The inclined discs d are suitably balanced and keyed on the shaft A with capability of sliding longitudinally thereon for adjustment. These discs d are each fitted on one side with a second flat ball race ring d^1 , which is in a plane parallel with the flat race ring c^2 , which race ring d^1 passes into the cup-shaped ring c and bears against balls e placed in a cage between the two parallel flat race rings c^2 , d^1 , which latter are formed with slightly sunk paths
10 for the balls e .

The inclined discs d are each formed with a boss d^* fitting the shaft A and with a split socket d^2 to receive an adjusting sleeve f screwing onto a screw-threaded part of the shaft A. When the inclined disc d is properly adjusted
15 towards the balls e , the lugs d^3 of the split socket d^2 are drawn towards each other by a bolt g , which fits within a groove f^1 formed around the adjusting sleeve f , thereby locking such parts together.

The inclined disc d and its adjusting sleeve f are locked on the shaft A by a locking ring h having two projections h^1 shown in Fig. 2, fitting two of a
20 number of rectangular grooves f^2 formed in the end of the adjusting sleeve f and internal radial projections (not shown) fitting keyways in the shaft A. The locking ring h is used in combination with a lock nut i and a nut locking washer j , preferably such as those described in Specification No. 27,870 of the year 1908 and shown separately at Figs. 7 to 11. The lock nut i has recesses i^1
25 on its outer face, and the nut locking washer j has integral therewith a tongue j^1 which enters a groove on the shaft A, in which groove it is retained by the lock nut i , and such tongue is finally bent over into one of the recesses i^1 in the lock nut i .

The above described mechanism for causing the reciprocating motion of the pistons C to give rotary motion to the shaft A, forms the subject of another
30 Application for Letters Patent No. 20,220 of even date herewith.

As the pistons C fly out each way, the inlet ports B^1 near one end of each cylinder B, are uncovered; the charge enters the cylinders and drives out the exhaust through the exhaust openings B^2 near the other end.

35 The firing cylinders B have a casing, which forms a chamber k to receive air or gaseous mixture from the discharge opening l^2 of a pump of the following construction.

The driving shaft A of the pump, which is the engine shaft, is eccentric to the pump cylinder l , and segmental pistons m are employed located between
40 the inner surface of the cylinder l and of a tube n , which latter is kept in position concentric with the cylinder l by said segmental pistons m as shown and described in Specification No. 14,828 of 1910.

l is the inlet to the pump cylinder l ; l^2 is the outlet from said cylinder into the chamber k .

45 On the driving or engine shaft A are keyed driving plates o with capability of sliding longitudinally thereon for adjustment. These plates o are formed with a number of circular holes or openings o^1 corresponding in number with that of the segmental pistons m . In each opening o^1 is fitted a driving disc p having an eccentric pin p^1 entering one end of a piston m .

50 The driving plates o and driving discs p are retained in contact with the ends of the pump cylinder l , pistons m and central tube n , by means of a collar A^1 on the driving shaft A bearing against the boss of one driving plate o , and a nut q and lock nut r screwing onto a screw threaded end of the shaft A and acting directly against the other driving plate o . These driving plates o are located at each end of the pump cylinder l and are eccentric thereto.

55 Each driving plate o has preferably a boss o^2 forming a sleeve fitting the shaft A, on which sleeve is fitted the inner race ring s of a ball bearing, the outer race ring s^1 being carried by part of the fixed casing.

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The exterior surface of the segmental pistons *m* fitting against the interior of the cylinder *l* is recessed at the front and back, leaving a central narrow part slightly wider than the outlet port.

The exterior surface of the pistons *m*, as has already been proposed, is also recessed at each end to accommodate a pair of retaining rings to counteract the friction which would otherwise be caused by the pistons due to centrifugal action.

The pump above described is almost identical with that shown and described in my Specification No. 14,828 of the year 1910; therefore, separately considered, it forms no part of the present invention.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an internal combustion motor, the combination of a pair of fixed parallel firing cylinders open at both ends and each fitted with a pair of pistons which alternately approach and recede from each other, connecting rods from such pistons giving motion to means for oscillating inclined discs keyed one near each end of the engine shaft and consequently rotating said shaft, and a rotary charging pump mounted around and driven by the engine shaft.

2. An internal combustion motor as above claimed, characterized by each inclined disc being fitted on one side with a flat race ring, a cup-shaped ring having its plane parallel with the inclined disc and fitted with a flat race ring, bearing balls between such parallel flat race rings, trunnions on the cup-shaped ring mounted in bearings in an oscillating ring or gymbal, trunnions on the oscillating ring or gymbal at right angles to those on the cup-shaped ring, fixed bearings in which the gymbal trunnions are mounted, and means for adjusting the inclined disc in relation to the bearing balls and cup-shaped ring and for locking the same on the engine shaft.

3. An internal combustion motor as claimed in Claims 1 and 2, characterized by the rotary charging pump having the driving or engine shaft eccentric to the pump cylinder, a tube, segmental pistons located between the cylinder and tube and retaining the latter in position, driving plates keyed on the engine shaft at each end of the pump cylinder, circular holes in such driving plates, a driving disc in each of said holes, eccentric pins in said discs entering holes in the ends of the segmental pistons, and means for adjusting the driving plates against the ends of the cylinder, segmental pistons and central tube.

4. The improved internal combustion motor constructed substantially as herein described and as represented in the accompanying drawings.

Dated this 24th day of March, 1911.

HARRIS & MILLS,
Agents.

[This Drawing is a reproduction of the Original on a reduced scale.]

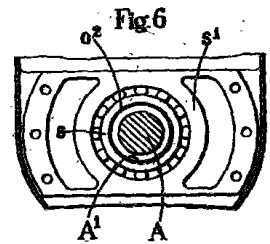
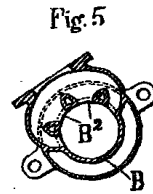
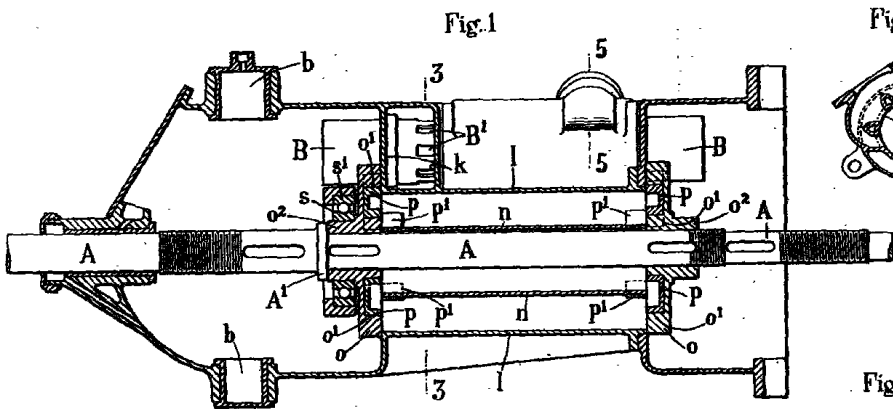


Fig. 8

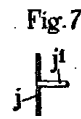
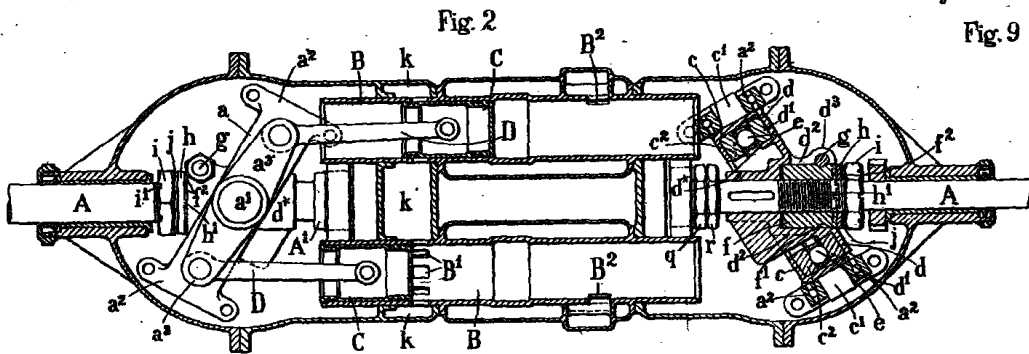


Fig. 9



Fig. 10

Fig. 11



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Fig. 1

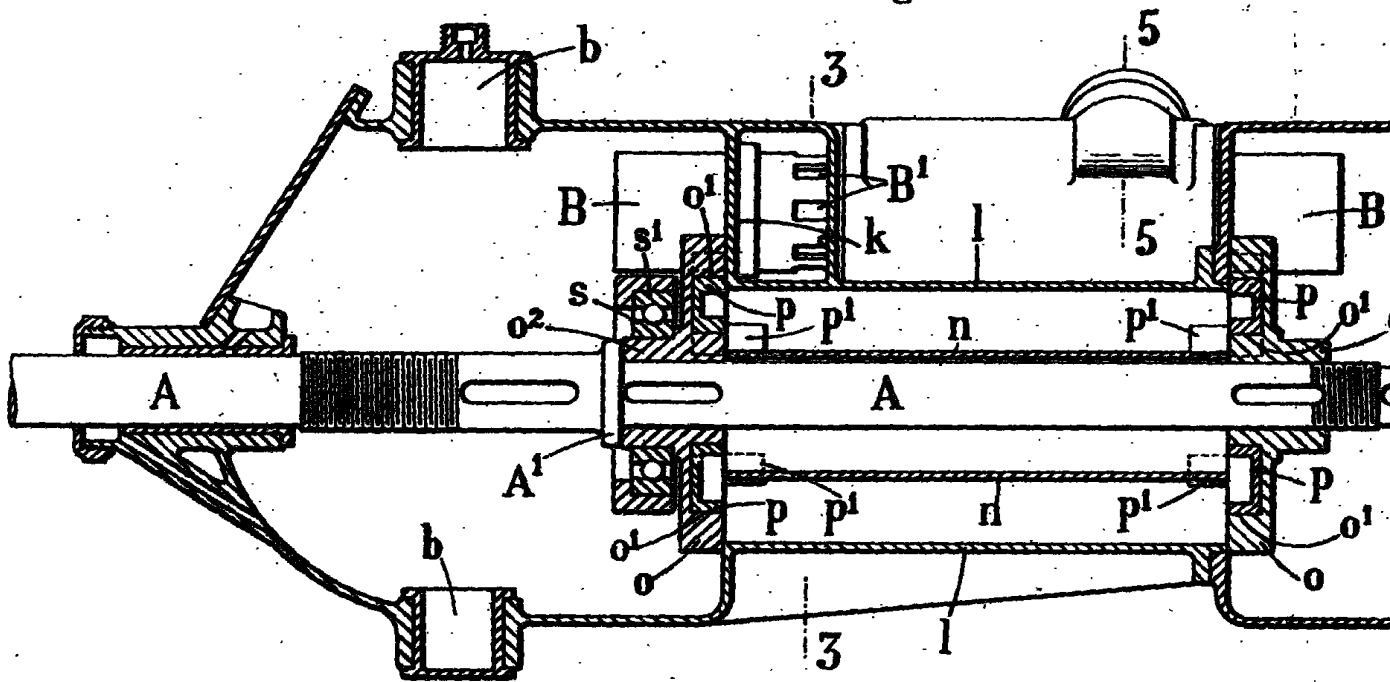
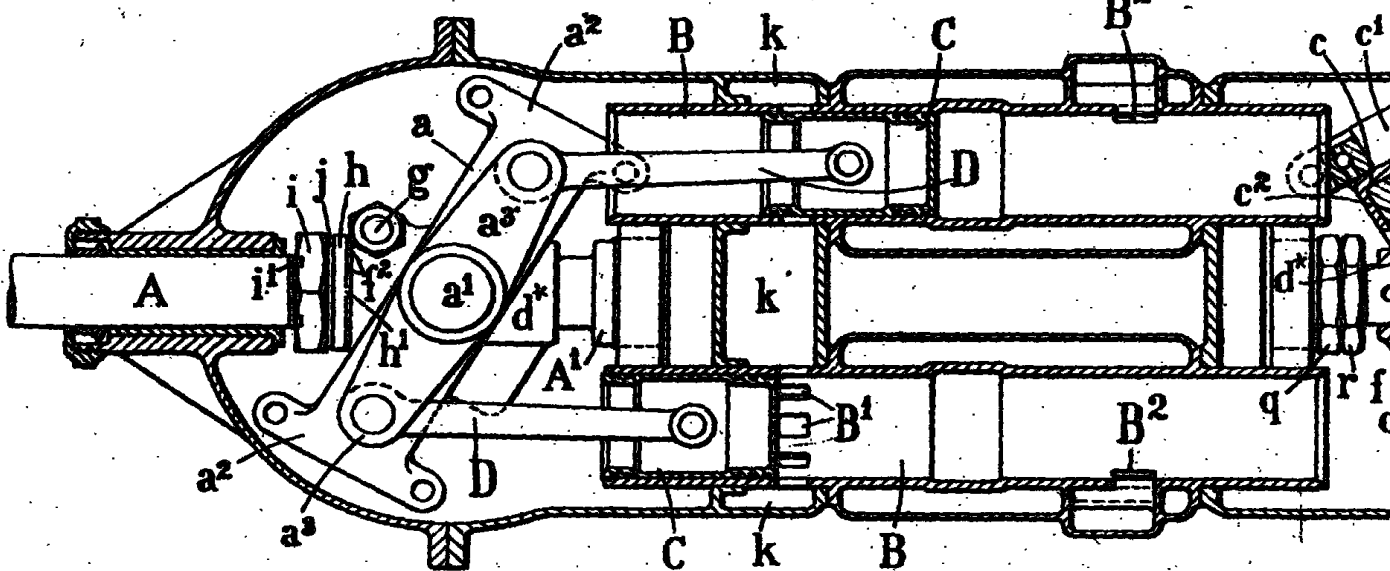


Fig. 2



This drawing is a reproduction of the original on a reduced scale.

Fig. 5

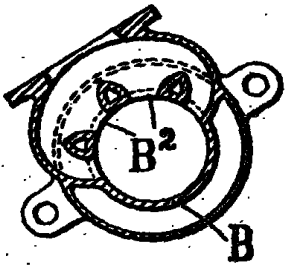


Fig. 6

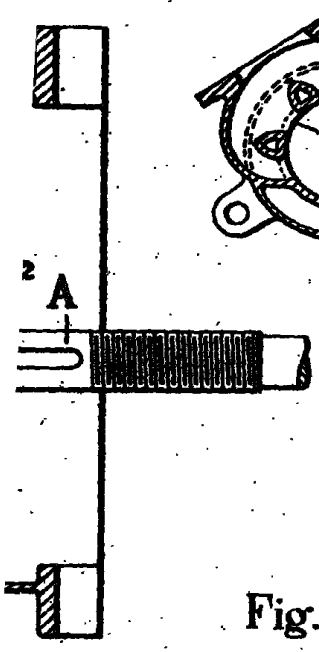
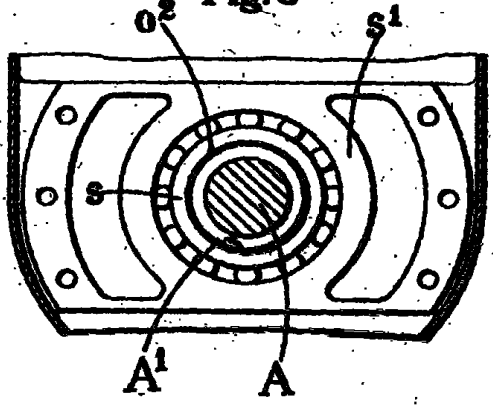


Fig. 8

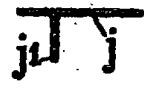


Fig. 7



Fig. 10

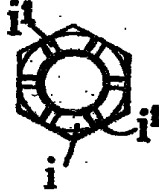
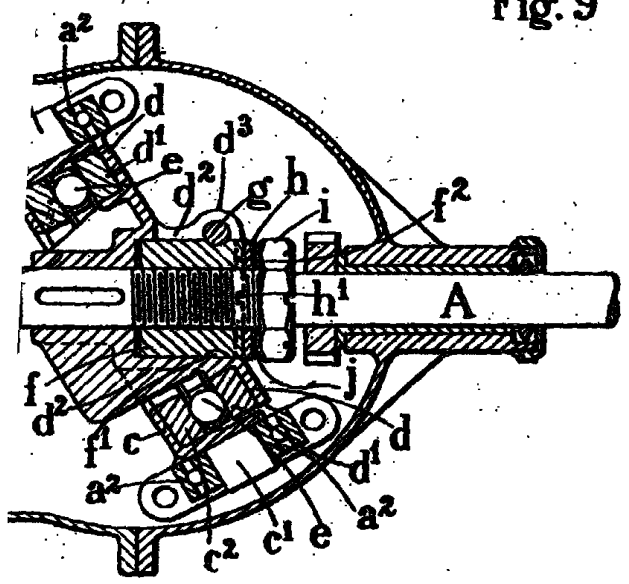


Fig. 11

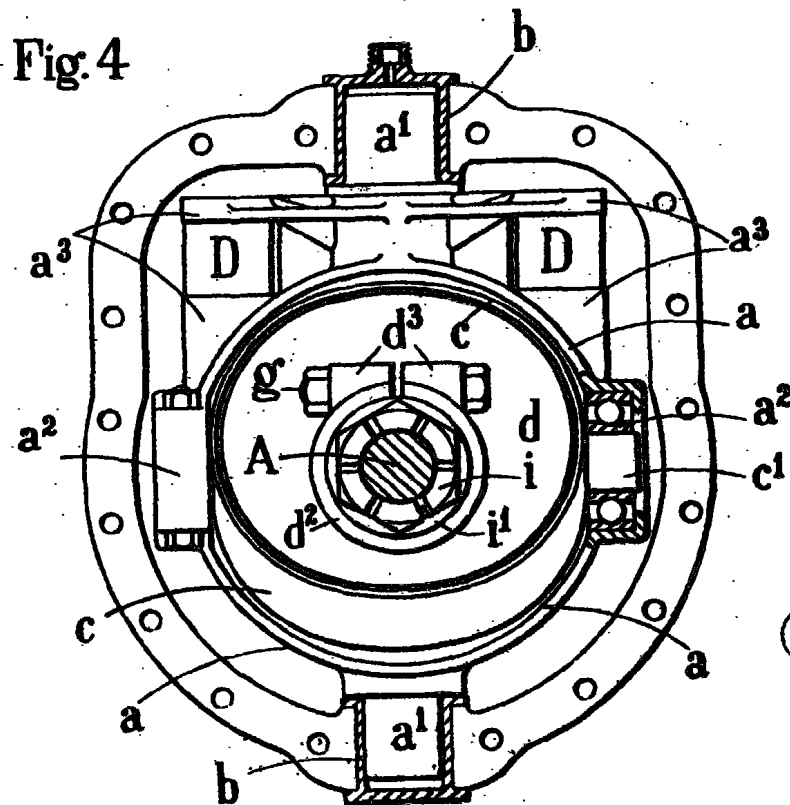
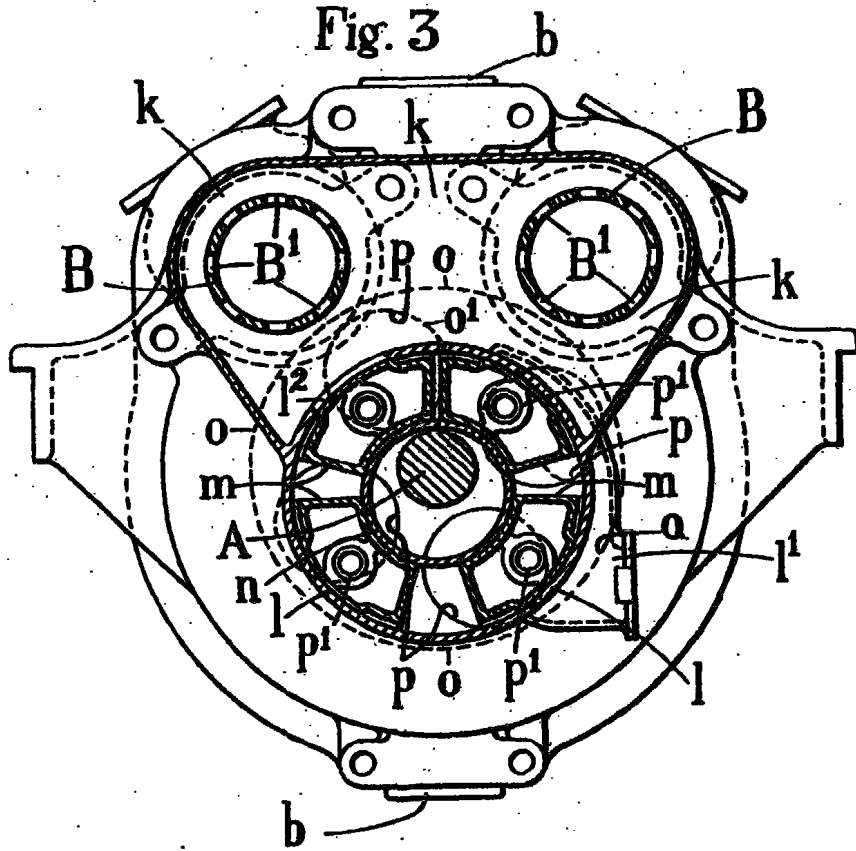


Fig. 9



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