Nov. 8, 1932. V. C. MATTSON 1,886,492

INTERNAL COMBUSTION ENGINE

Filed April 20, 1931 3 Sheets-Sheet 1

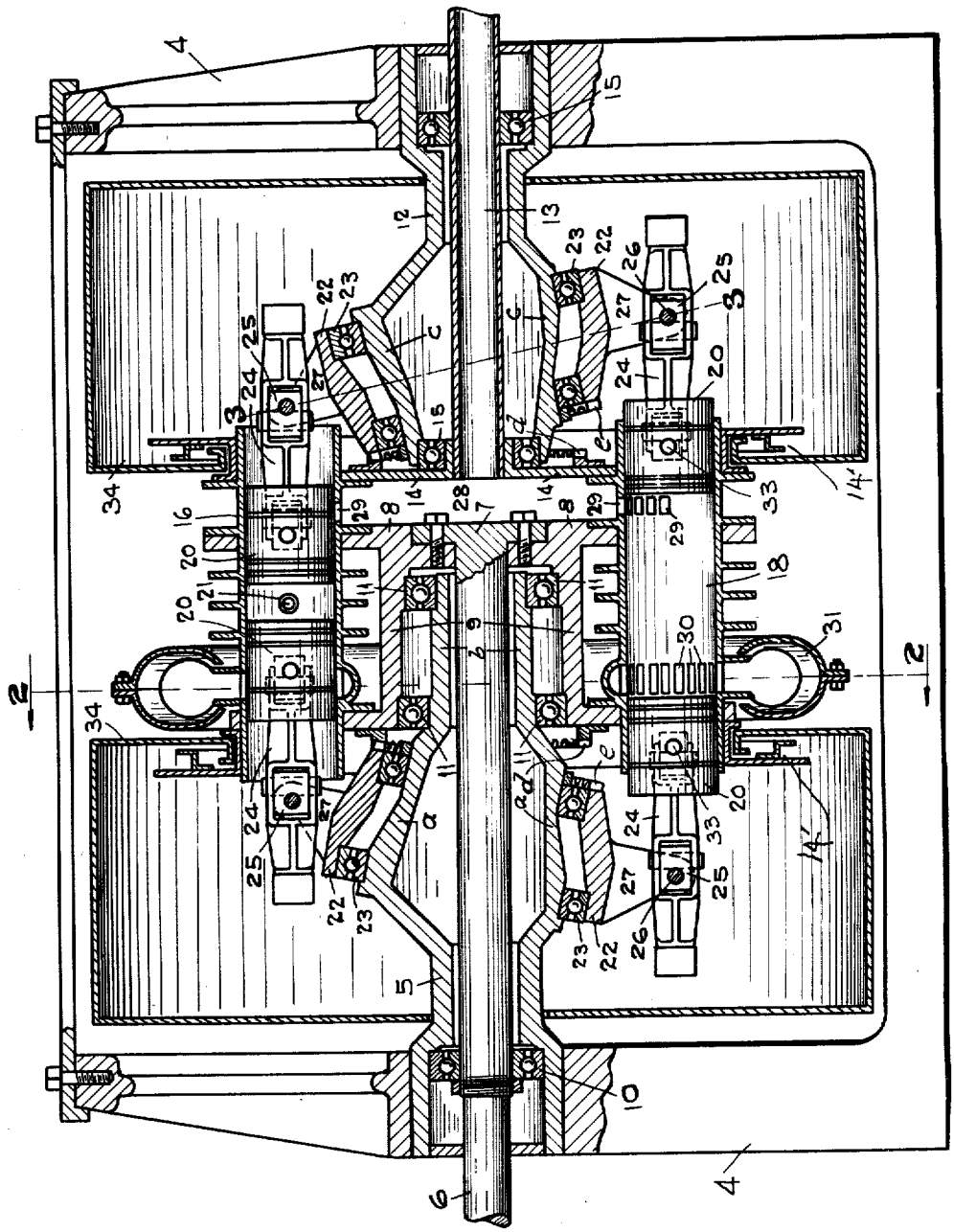


Fig. 1.

Inventor

V. C. Mattson

By Hiram A. Sturges Attorney

Nov. 8, 1932. V. C. MATTSON 1,886,492

INTERNAL COMBUSTION ENGINE

Filed April 20, 1931 3 Sheets-Sheet 2

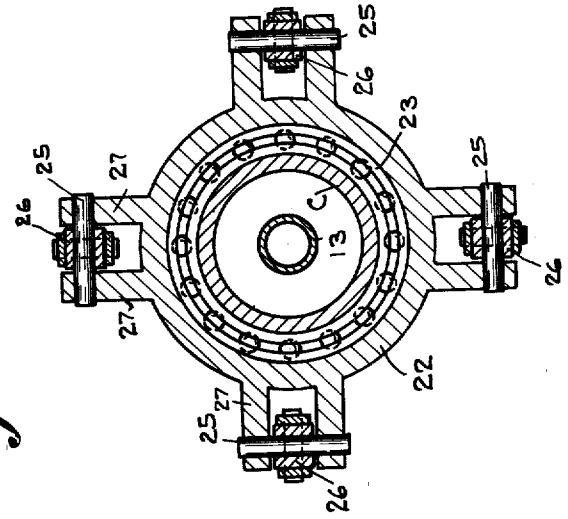


Fig. 3.

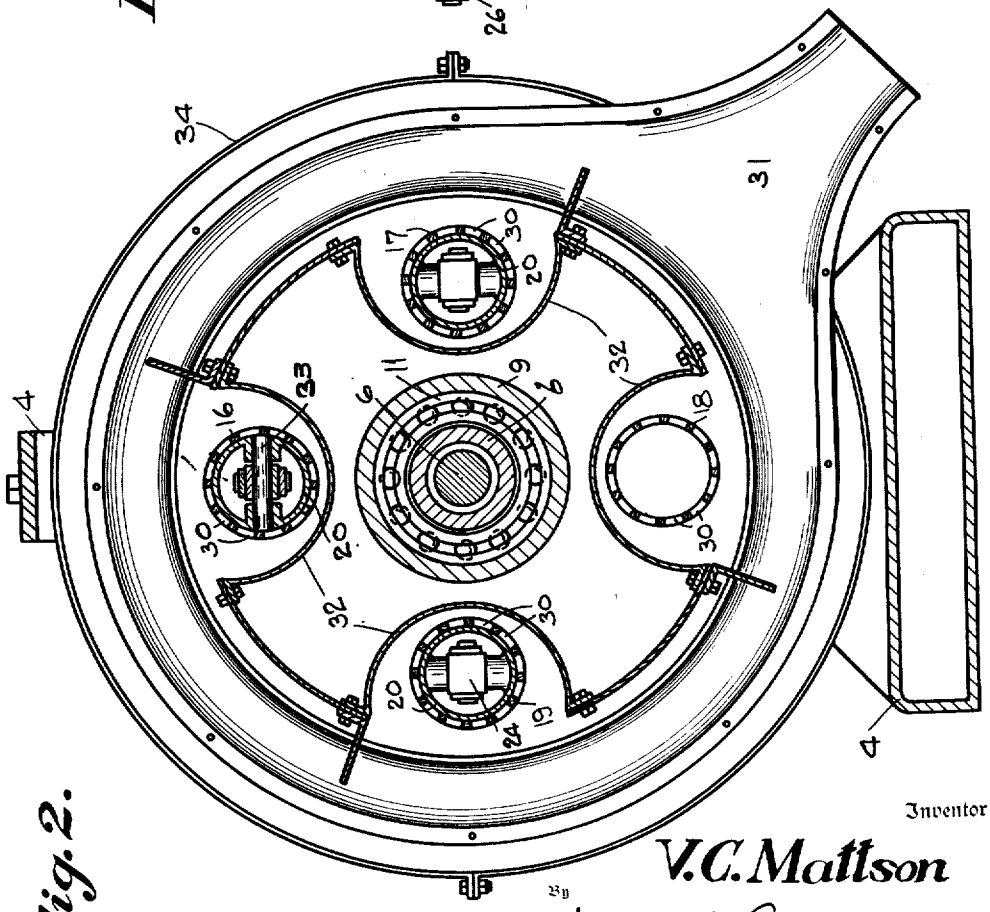


Fig. 2.

Inventor

V. C. Mattson

By Hiram A. Sturges Attorney

Nov. 8, 1932. V. C. MATTSON 1,886,492

INTERNAL COMBUSTION ENGINE

Filed April 20, 1931 3 Sheets-Sheet 3

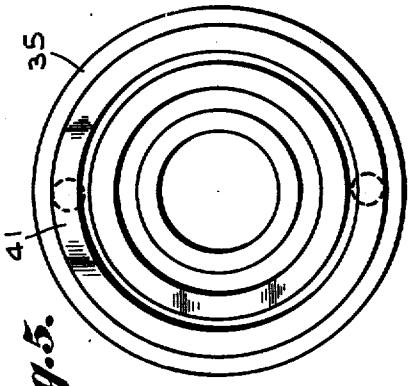


Fig.5.

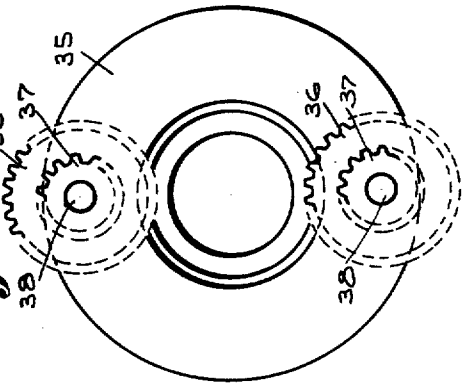


Fig.6.

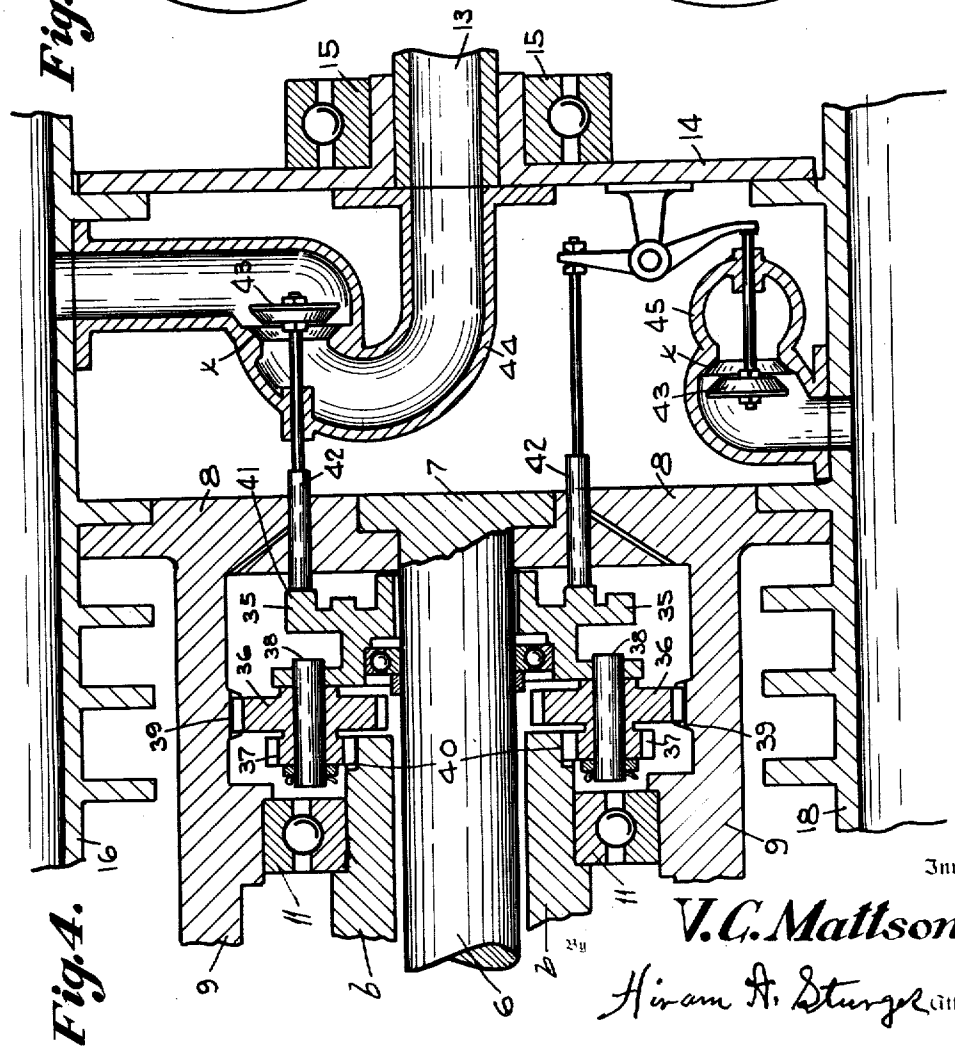


Fig.4.

Inventor

V.C.Mattson

By

Hiram A. Sturges Attorney

Patented Nov. 8, 1932

1,886,492

UNITED STATES PATENT OFFICE

VICTOR C. MATTSON, OF LOOMIS, NEBRASKA

INTERNAL COMBUSTION ENGINE

Application filed April 20, 1931. Serial No. 531,284.

This invention relates to internal combustion engines, and has for its object, broadly, to improve the construction shown in U. S. Letters Patent No. 1,673,632 for rotary engines issued June 12, 1928 to Victor C. Mattson.

One of the specific objects in view is to provide horizontal movements for the pistons of the cylinders.

Another object is to provide such an arrangement of the parts which move circularly about a common center that the weight of these parts will be distributed in a manner more uniform than ordinary.

It is an object of the invention to provide such an arrangement for the bearings of the parts which move circularly about a common center that a lesser degree of friction will be developed than ordinary.

With the foregoing objects in view and others to be mentioned the invention presents a new and useful construction, combination and arrangement of parts as described herein and claimed, and as illustrated in the accompanying drawings, it being understood that changes may be made in form, size, proportion of parts and minor details, said changes being within the scope of the invention as claimed.

In the drawings, Fig. 1 is a view in longitudinal section through an internal combustion engine embodying the invention.

Fig. 2 is a transverse section of the same on line 2—2 of Fig. 1, and Fig. 3 is a transverse section through a part of the engine on line 3—3 of Fig. 1.

Figs. 4, 5 and 6 illustrate a modified form of the invention. Fig. 4 is an enlarged detail showing a control for poppet valves. Fig. 5 is a side view of a cam. Fig. 6 shows the reverse side of the cam.

Referring now to the drawings for a more particular description, numeral 4 indicates a frame which may have any suitable form for supporting the stationary and movable parts of the engine.

Numeral 5 indicates a bearing-sleeve which is rigidly mounted at its outer end on the frame, said sleeve having an irregular cone-shaped part *a* and a rectilinear part *b*.

Numeral 6 indicates a shaft which is mounted in the sleeve 5, its inner end being provided with a head 7, and at 8 is indicated a circular frame which is carried by the shaft, said frame including a circular ledge 9 which is disposed parallel with the rectilinear part *b* of the sleeve and parallel with the shaft 6.

The bearings for the shaft 6 preferably consist of rollers in a raceway or guide 10 in the outer end of the sleeve 5, together with rollers in guides 11 which are disposed between the circular ledge 9 and the rectilinear part *b* of the sleeve 5, and when the shaft rotates, the frame 8 and parts mounted on the frame will revolve about said shaft.

At 12 is indicated a second sleeve which extends inwardly of the frame approximately in line with the sleeve 5. It is rigidly mounted on said frame and it has a part *c* of irregular cone-shape.

Numeral 13 indicates an intake pipe for gas under pressure, said pipe being disposed in line with the shaft 6 and provided at its inner end with a partition 14. The bearings for the pipe 13 preferably consist of rollers disposed in circular guides 15, and as described, the fuel-pipe 13 and partition and parts carried by said partition may rotate without undue friction.

In the present instance four cylinders are used, these being numbered 16, 17, 18 and 19. They are suitably mounted upon and carried by the frame 8 and partition 14.

Each cylinder is disposed parallel with the shaft 6 and fuel-pipe 13. They are open at their ends, and each cylinder is provided with a pair of opposed pistons 20 and a spark plug 21.

Numerals 22 indicate a pair of bearing-rings, one being journalled on the cone-shaped part *a* of the sleeve 5 and the other being journalled on cone-shaped part *c* of the sleeve 12, roller balls preferably being used to prevent undue friction and mounted in guides or raceways 23.

It will be noted that the walls *a* and *c* of the respective sleeves 5 and 12 are inclined inwardly toward each other, and this feature is important and is depended upon for operation in causing rotation of the shaft.

Also it will be noted that the walls or surfaces of said parts *a* and *c* differ in their inclinations, and also the transverse curvatures are not uniform, and it will be seen that these features are important and are depended upon for operation.

Each guide 23, of course, consists of two grooved strips, and since these strips are secured to the convex surfaces of the sleeves and concave surfaces of the bearing-rings 22 they will be disposed closely adjacent to each other, the balls being disposed in the grooves, and the bearing-rings will not develop appreciable friction during their movements around the sleeves 5 and 12.

Each piston rod 24 is pivotally mounted near its outer end upon a coupling-member 25 as indicated at 26, this mounting being in the ends of a pair of flanges 27 provided for each bearing-ring 22.

The fuel intake pipe 13 is in communication with a gas chamber 28, the intake port 29 of each cylinder being in communication with said chamber. The discharge ports for the cylinders are disposed somewhat remote from the intake ports as indicated at 30 and are in communication with the exhaust pipe 31, each cylinder being provided with a hood 32 in communication with the exhaust pipe so that all burned gases will move out from the engine.

The inner end of each piston rod is mounted in a piston as indicated at 33 to permit rocking movements thereof while the piston is reciprocated, and the mounting of the outer ends of the piston rods on the coupling-members 25 also permit rocking movements of the piston rods.

As thus described the wall 14 carried by the intake-pipe 13, together with the frame 8, provide the compartment or chamber 28 for gas, and it will be understood that gas will enter the cylinders in succession, and the gas will be compressed and ignited in succession.

It will be understood that the force directed outwardly of the ends of the cylinders by the pistons will be sustained by the bearing-rings 22, and since the guides 23 will remain in register with each other and also since the surface *a* and *c* are inclined inwardly toward each other the bearing-rings 22 will move transversely of the engine on the roller-balls of guides 23, the carrier-frame 8 together with all parts thereon having a movement in common around the shaft, the result being that said shaft 6 will be rotated.

Since the partition or disc 14 and carrier-frame 8 are each provided with a ring-gear *d* in engagement with the gears *e* which are provided for the inner ends of the bearing-rings 22, the latter will rotate at the same degree of speed as shaft 6.

The aggregate force thus directed to cause the revolving movement of the frame 8 will be sufficient to cause the shaft 6 to rotate with sufficient force and speed for all required purposes, some of the advantages being that undue friction and vibration will be avoided.

Numerals 34 indicate a pair of cylindrical stationary casings which partly enclose the movable parts of the engine and they are adapted to contain a sufficient quantity of oil for lubricating all movable parts of the engine. Numerals 14′ indicate oil deflectors which are provided for said casings.

Figs. 4, 5 and 6 illustrate a modified form of the invention, the parts being the same as already described except that they are arranged for a four cycle engine.

In this modified form, a cam 35 is used and is suitably journalled on the shaft 6, and is rotated by means of double gear wheels 36 and 37 mounted on stub-shafts 38, the latter having bearings in parts of the cam 35 as best shown in Fig. 4.

Since the teeth of the gear wheels 36 are in mesh with the teeth 39 of the circular ledge 22 of the carrier frame 8, said wheels 36 and 37 will be rotated, the teeth of the gear wheels 37 being in engagement with the teeth 40 of the rectilinear part *b* of the sleeve 5.

The rotation of the cam 35 will cause operation of the poppet valves 43. This cam is provided with a projection 41 (Fig. 5), and at each rotation the projection will engage plunger-bars 42 for moving the poppet valves from their seats *x*.

In the drawings, Fig. 4 discloses only two of the poppet valves, one being disposed in a gas supply-pipe 44 and the other disposed in an exhaust pipe 45, but it will be understood that each cylinder 16 and 18 shown (four cylinders being used) is supplied with a gas intake pipe 44, and an exhaust pipe 45.

It will be understood that the present invention is adapted to be used for gas engines generally and does not depend upon the number of cycles. The broad features of the invention include the bearing rings 22, the inclination and transverse curvatures of the surfaces *a* of the cone-shaped parts of the sleeves 5, the guides 23 and operation of the pistons 20 for revolving the carrier-frame to cause rotation of the shaft 6, and therefore it is believed that the invention includes the modifications shown in Figs. 4, 5 and 6 of the drawings.

I claim as my invention,—

1. A gas engine comprising a frame, a sleeve rigid with and extending inwardly of the frame and having a rectilinear part and a cone-shaped part, a carrier-frame having a cylindrical ledge journalled on the rectilinear part of the sleeve, a shaft journalled in the sleeve and having a head-piece secured to the carrier-frame, a second sleeve rigid with and extending into the frame and having a cone-shaped part, a pair of bearing-rings each provided with coupling-members and journalled on a cone-shaped part of a sleeve, an intake

pipe journalled in the second sleeve and having a partition disposed adjacent to the carrier-frame to provide a gas chamber in communication with said intake pipe, an exhaust pipe, a plurality of cylinders on the carrier-frame, each having a port communicating with the gas chamber, and a port communicating with the exhaust pipe, pistons arranged in pairs within the cylinders each piston having a rod engaging a coupling-member, and a plurality of spark-plugs each mounted in a cylinder between a pair of pistons for igniting gas to cause actuation of the coupling members and bearing-rings to cause actuation of the carrier-frame and said shaft.

2. A gas engine comprising a frame, a sleeve stationary with the frame and having a cone-shaped part, a carrier-frame having a cylindrical ledge journalled on the sleeve, a shaft journalled in the sleeve and secured to the carrier-frame, a second sleeve stationary with the frame and having a cone-shaped part, a pair of bearing-rings each provided with coupling-members and journalled on a cone-shaped part of a sleeve, an intake-pipe extending inwardly of the second sleeve and having a partition disposed adjacent to the carrier-frame to provide a gas chamber in communication with said intake-pipe, an exhaust pipe stationary with the carrier-frame, a plurality of cylinders movable with the carrier-frame each cylinder having a port in communication with the gas chamber and a port in communication with the exhaust pipe, pistons arranged in pairs in the cylinders, each piston having a rod extending outwardly of the end of a cylinder for a pivotal mounting on a coupling-member, spark plugs in the cylinders between the pistons thereof for igniting gas to cause actuation of the bearing-rings, the carrier-frame and said shaft.

3. A gas engine comprising a frame, a pair of sleeves extending toward each other within and secured to the frame, each sleeve having a cone-shaped part provided with endless guides, a pair of bearing-rings each having endless guides for engaging the guides of the cone-shaped parts of the sleeves and provided with coupling-members, a shaft journalled in one of said sleeves, a carrier-frame rigid with the shaft and journalled on a sleeve, an exhaust pipe, cylinders on the carrier-frame each having a port for receiving gas and a port communicating with the exhaust pipe, pistons in the cylinders having rods mounted on said coupling-members, and spark plugs in the cylinders for igniting gas therein to cause the guides of the bearing-rings to move on the guides of said sleeves for actuating the carrier-frame and shaft.

4. A gas engine comprising a stationary sleeve, a shaft journalled in the sleeve, a carrier-frame rigid with the shaft and journalled on the sleeve and provided with a ring-gear, a second stationary sleeve, an intake pipe journalled in the second sleeve, a partition of disc-form rigid with the intake pipe and provided with a ring-gear, a bearing-ring journalled on the first named sleeve and having a ring gear engaging the ring gear of the carrier-frame, a second bearing-ring journalled on the second sleeve, cylinders outwardly of the bearing-rings, pistons arranged in pairs, each piston of a pair being pivotally connected with a bearing-ring and adapted to be moved outwardly of a cylinder to cause coincident revolving movements of the bearing-rings and carrier-frame around the sleeves for rotating the shaft.

In testimony whereof, I affix my signature.

VICTOR C. MATTSON.