June 21, 1938. E. E. HAMMERS 2,121,660

INTERNAL COMBUSTION MOTOR

Filed March 20, 1935 4 Sheets-Sheet 1

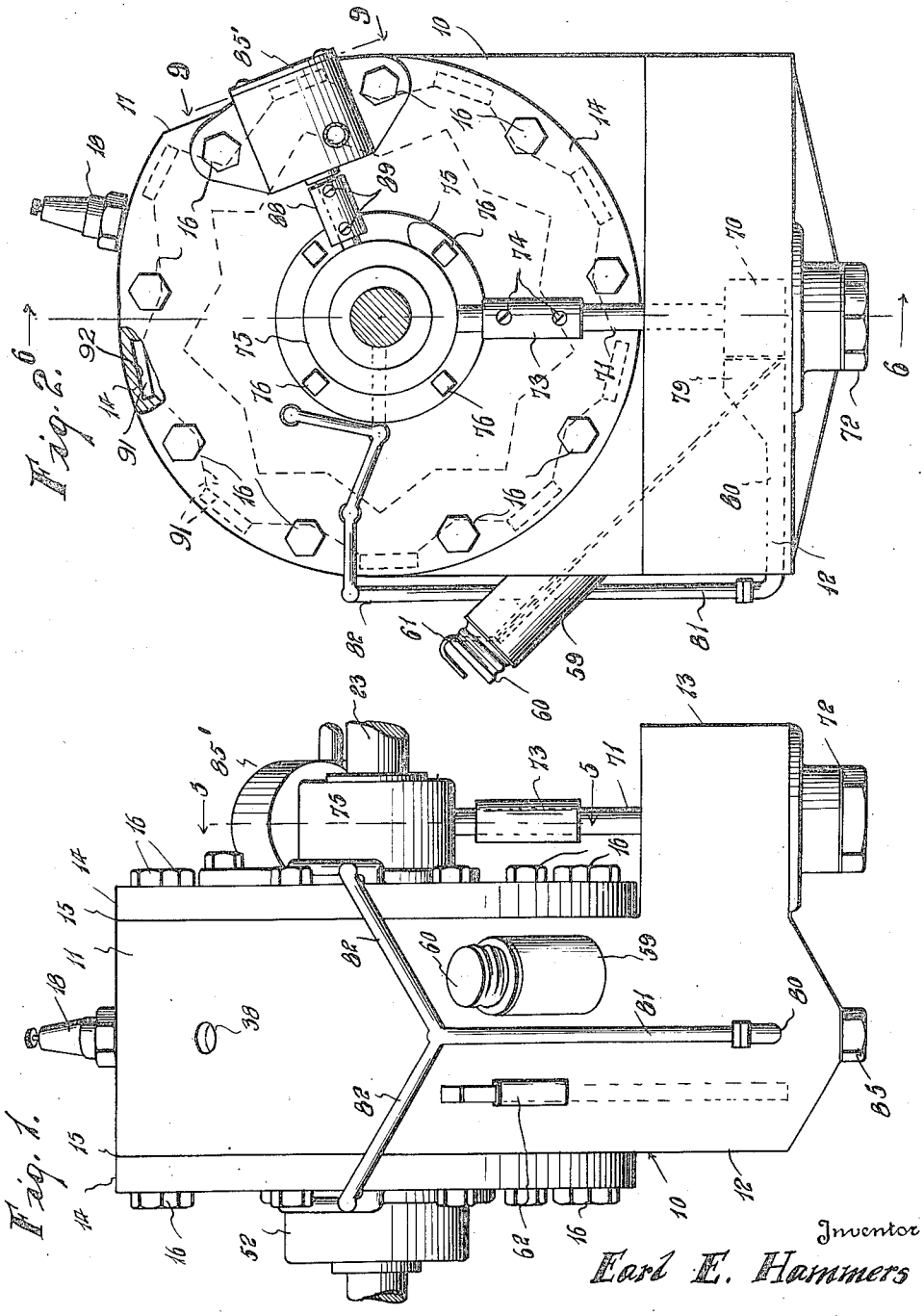


Fig. 2.

Fig. 1.

Inventor
Earl E. Hammers

By L. F. Randolph Jr.
Attorney

June 21, 1938. E. E. HAMMERS 2,121,660

INTERNAL COMBUSTION MOTOR

Filed March 20, 1935 4 Sheets-Sheet 2

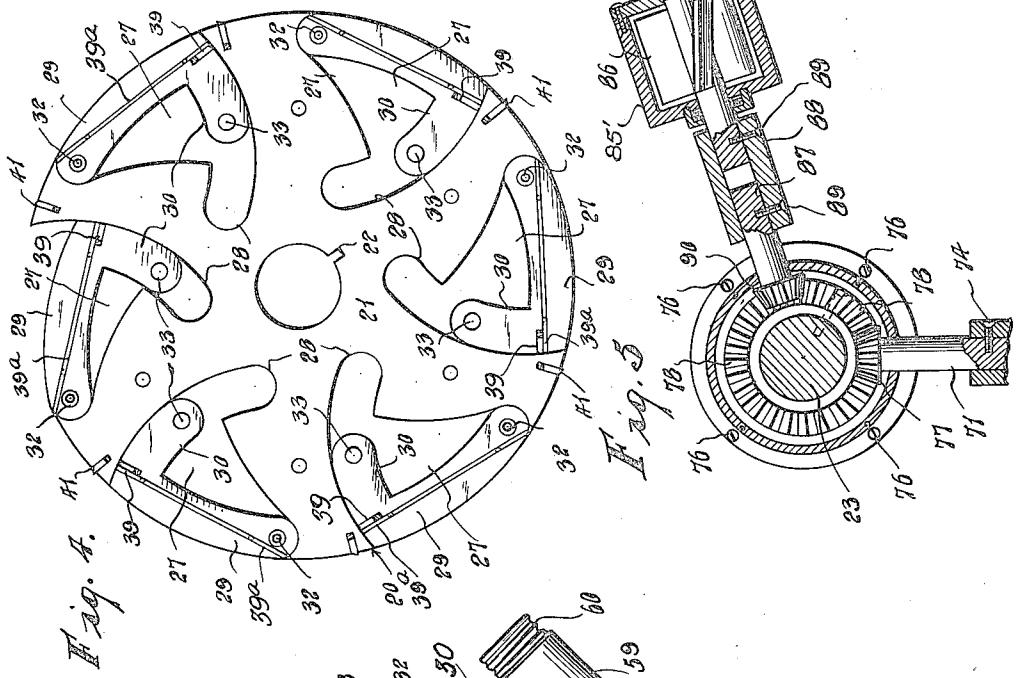


Fig. 4.

Fig. 5

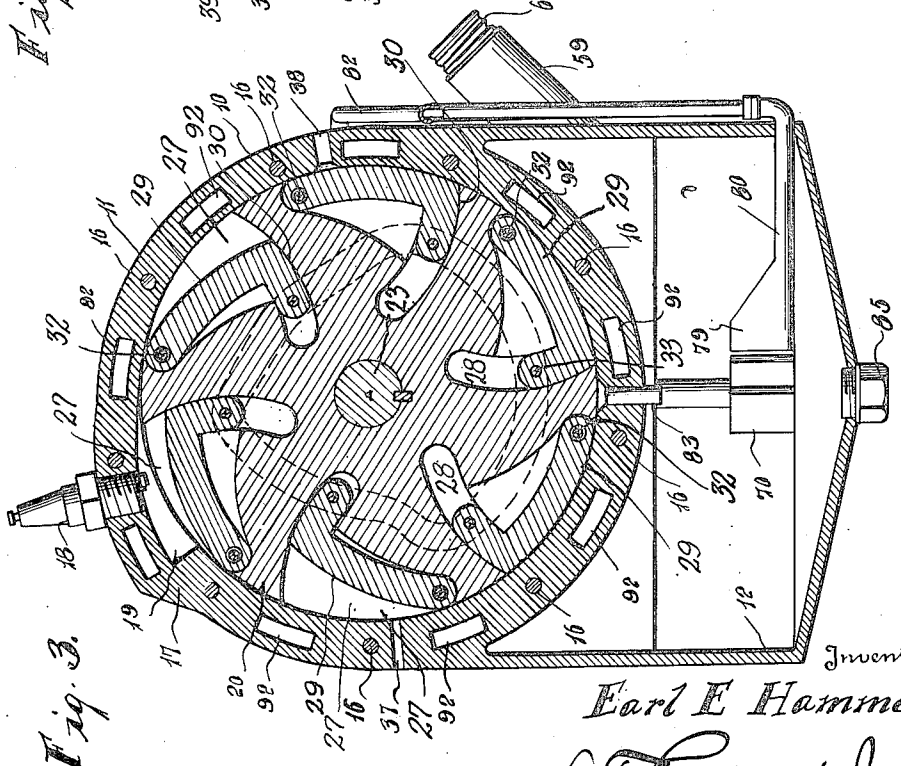


Fig. 3.

Inventor
Earl E Hammers
By L. F. Randolph Jr.
Attorney

June 21, 1938. E. E. HAMMERS 2,121,660

INTERNAL COMBUSTION MOTOR

Filed March 20, 1935 4 Sheets-Sheet 3

Fig. 6.

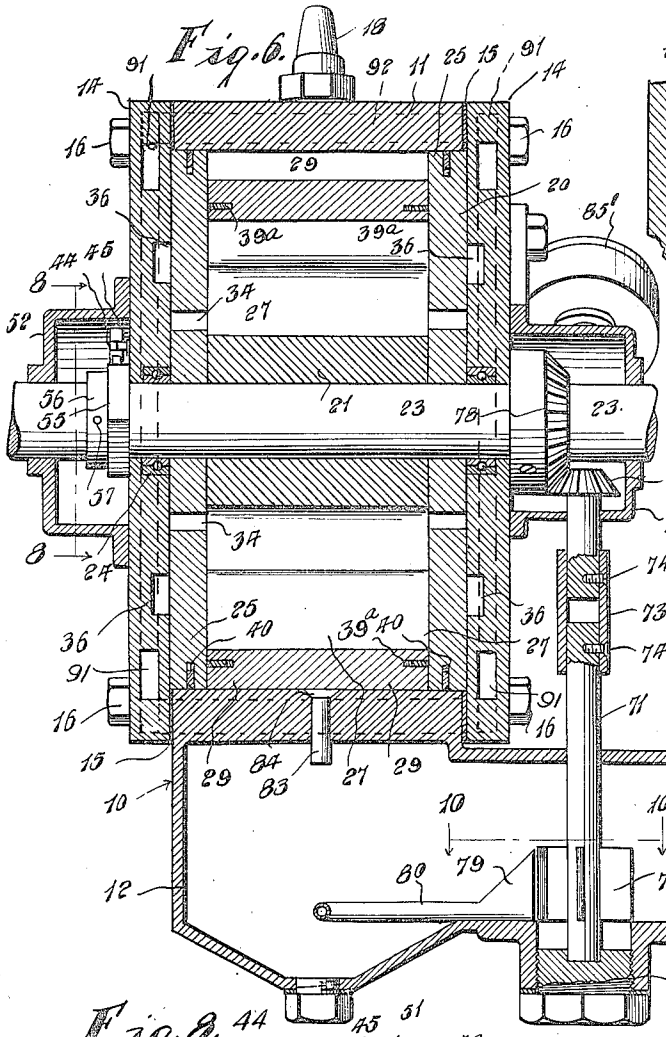


Fig. 7.

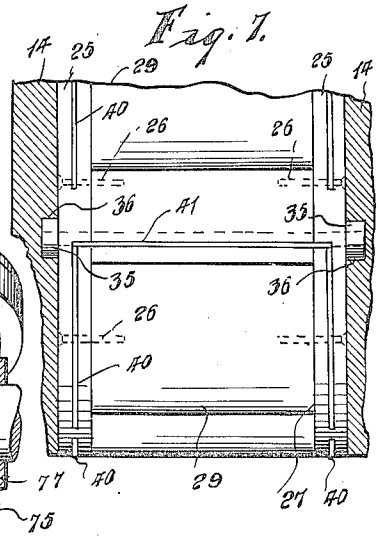


Fig. 9.

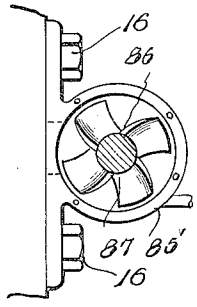


Fig. 8.

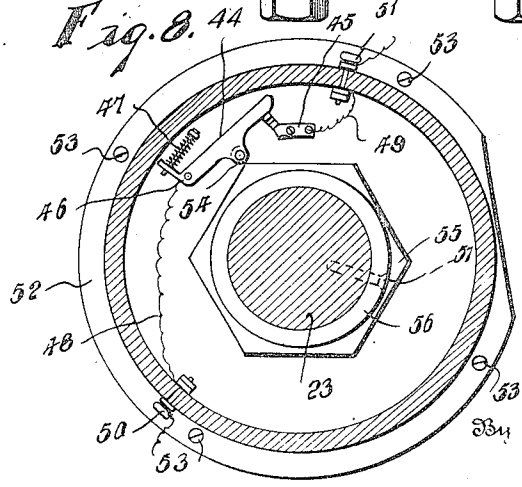
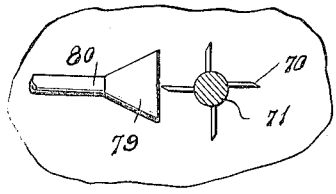


Fig. 10.



Inventor

Earl E. Hammers

By L. F. Kaumbrecht Jr.

Attorney

June 21, 1938. E. E. HAMMERS 2,121,660

INTERNAL COMBUSTION MOTOR

Filed March 20, 1935 4 Sheets-Sheet 4

Fig. 13.

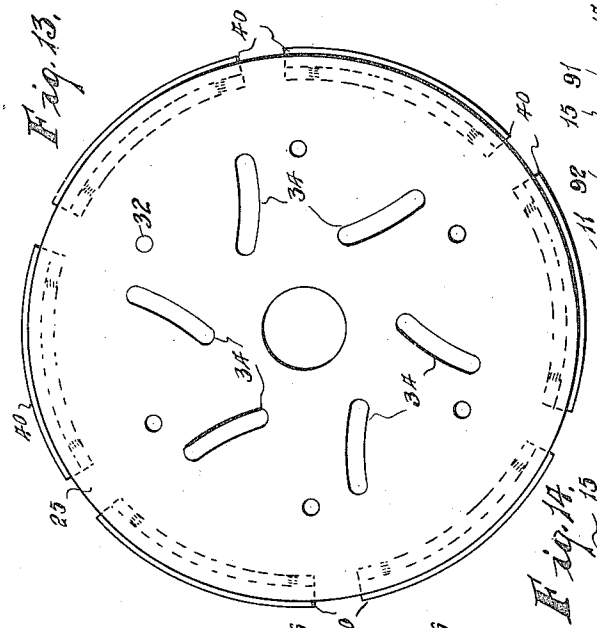


Fig. 14.

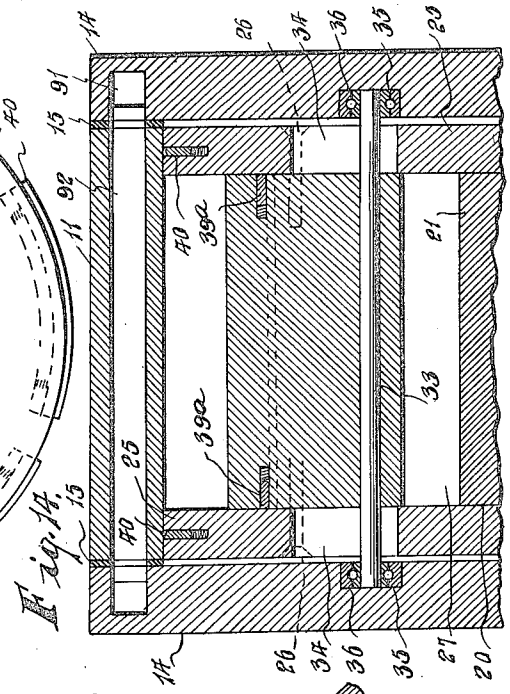


Fig. 12.

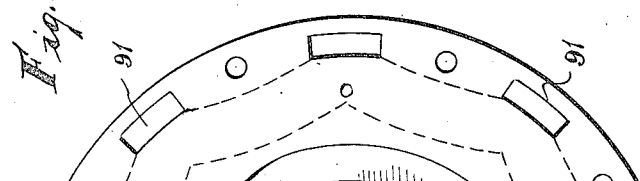


Fig. 15.

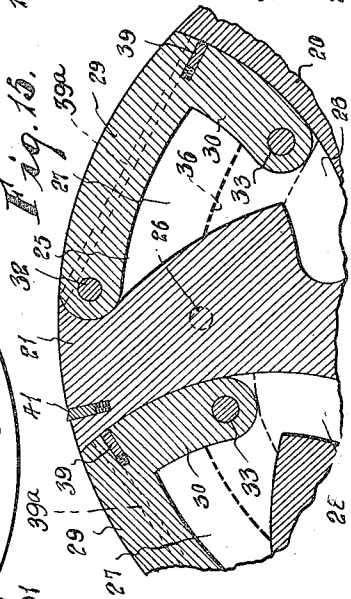


Fig. 11.

Inventor

Earl E. Hammers

By L. F. Randolph Jr.

Attorney

Patented June 21, 1938 2,121,660

UNITED STATES PATENT OFFICE

2,121,660

INTERNAL COMBUSTION MOTOR

Earl E. Hammers, St. Joseph, Mo., assignor of one-half to Christian M. Jespersen, Kansas City, Mo.

Application March 20, 1935, Serial No. 12,099

1 Claim. (Cl. 123—17)

This invention relates to an improved internal combustion motor and it aims generally to provide a simplified construction having a minimum of working parts; a construction wherein greater fuel efficiency is attained by directing the explosive force in the direction of the rotation of the drive shaft, a construction wherein greater oil economy is effected due to less strenuous usage and the employment of a single moving part in the oil chamber, namely the oil pump, and a motor which may be manufactured less expensively and which will produce more power per pound of weight of the motor.

The more specific objects and advantages will in part be pointed out hereinafter and otherwise become apparent from a consideration of the description following taken in connection with accompanying drawings.

In said drawings:—

Figure 1 is a side elevation of the improved motor;

Figure 2 is a rear elevation thereof;

Figure 3 is a vertical sectional view through the motor taken transversely of the axis of rotation;

Figure 4 is an elevation of the rotor, having the side disks thereof removed;

Figure 5 is a detail section taken on the line 5—5 of Figure 1;

Figure 6 is a vertical sectional view taken on the line 6—6 of Figure 2;

Figure 7 is a detail sectional view illustrating the mounting of the pistons;

Figure 8 is a sectional view taken on the line 8—8 of Figure 6;

Figure 9 is a sectional view taken on the line 9—9 of Figure 2;

Figure 10 is a sectional view taken on the line 10—10 of Figure 6;

Figure 11 is a side elevation of the inner surface of one of the stator side plates;

Figure 12 is an end elevation of one of the rotor disks;

Figure 13 is a side elevation of one of the rotor disks;

Figure 14 is an enlarged detail section taken on the line 14—14 of Figure 3; and

Figure 15 is an enlarged detail section taken across the rotor.

Referring specifically to the drawings, wherein like reference characters designate like or similar parts and one embodiment of the invention is shown by way of example, 10 generally designates a stator comprising a cylinder 11 and an oil reservoir or case 12 having an extension 13 extending beyond one side of the engine.

Bolted or otherwise fastened against opposite sides of the cylinder 11 are side plates 14, similar in construction, gaskets 15 preferably being interposed between them. The securing bolts for said plate and cylinder are shown at 16. Said cylinder is enlarged or offset as at 17, which accommodates a spark plug 18 having its electrodes arranged to fire within a firing chamber 19 formed in said enlargement 17, in combination with a rotor disposed within the cylinder 11 and generally designated 20.

Said rotor comprises a core 21 suitably keyed as at 22 to a drive shaft 23 suitably journaled, preferably in ball bearing devices 24 housed in the stator end walls 14. The rotor also has side disks 25 through which the shaft 23 passes and which are detachably secured to the rotor in any suitable manner as by means of screws 26.

The core 21 of said rotor, is peripherally cut away, equidistantly, to provide spaces 27 having inward extensions 28. Operable in said spaces 27 and 28 are swinging vanes or pistons 29 having extensions 30, movable in the extensions 28. Said pistons 29 are pivotally mounted by means of bolts or other fastenings as at 32 connected to the side disks 25 of the rotor.

Rods 33 pass through the extensions 30 of the swinging pistons 29, and they also pass through arcuate slots 34 provided in the side disks 25. Said rods 33 extend beyond the outer sides of disks 25 and have mounted on their terminals ball bearing rollers 35, rollers 35 traveling in endless cam grooves 36 provided in the inner surfaces of the side walls or plates 14 of the stator, and disposed about the shaft 23. The shape of the cams 36 is such as to impart the necessary movement, through the rollers 35 and rods 33, to the pistons or vanes 29 to move them inwardly towards the axis of shaft 23 for intake of the combustible mixture, from any suitable source, through an intake opening 37 in the cylinder 11, and then compress it for firing in the combustion chamber 19, and thereafter cause exhaust or expulsion of the spent gases through an exhaust port 38 in the cylinder 11, to any desired location. More specifically, as the pistons pass intake port 37 they are moving inwardly so that the fuel mixture is sucked in, following which the piston moves outwardly to compress such charge before the piston moves opposite the combustion chamber 19. When the piston in question is opposite such combustion chamber, the compressed fuel is fired and ex-

pands, driving the piston inwardly. When the said piston registers with the exhaust port 38, the same is moved outwardly to completely expel the spent gases through the exhaust port.

It will be understood that the explosions of the fuel occur against the pistons 29, in succession, with the piston traveling clockwise as viewed in Figure 3.

Various gaskets or equivalent devices are employed to avoid loss of compression. These gaskets are shown on the bearing surfaces of the pistons 29 as indicated at 39, in the free end of, and at 39a on the side of, said pistons. Circumferentially of the disks 25 as at 40, also transversely of said core 21 at 41 and transversely of the cylinder 11 as at 42, are shown other gaskets. It will be noted that the devices 41 are located peripherally of the core 21 and that the devices 42 are located in the inner annular surface of cylinder 11.

The firing of the spark plug 18 is suitably timed and under control of the shaft 23. The circuit through such spark plug 18 is made through the making and breaking of contacts 44 and 45, the former being pivoted as at 46 to one of the side plates 14, and spring pressed as at 47 toward closed engagement with the contact 45. Contact 45 on the other hand is fixed to the same plate 14. The necessary conductors in the circuit to the contacts 44 and 45 are shown at 48 and 49, leading from terminals 50 and 51, secured to a housing 52 screwed or otherwise fastened as at 53 to the last mentioned side plate 14. Such electrical parts are insulated where necessary and in a high tension circuit. Contact 44 has a roller 54 thereon engageable by cam surfaces or projections 55 of a collar 56, fastened as at 57 to the shaft 23. The projections 55 are symmetrical for even firing, the high portions thereof disengaging the contacts 44 and 45 and the lower portion permitting engagement thereof for closing the ignition circuit through the spark plug 18.

Lubricant is supplied to the reservoir or case 12 through an inclined filling tube 59 normally closed by a screw plug 60. The depth of the lubricant within the reservoir 12 may be observed through the removal of a gage rod 61 slidably engaged in a tubular extension 62 on the stator. The lubricant is supplied under pressure to the various working parts of the engine to which end, an impeller pump 70 is located within the reservoir 12, being carried by a vertical shaft 71 mounted from below by a suitable supporting and stuffing box structure 72, detachably screw-threaded to the bottom of the reservoir. Shaft 71 extends through and above the extension 13 and is in sections detachably coupled together as by a sleeve 73 and screws 74, the upper section extending through a housing 75, detachably screwed at 76 to one of the side plates 14. Shaft 71 is driven by a bevel gear 77 thereon enmeshed with a bevel gear 78 keyed to the drive shaft 23. Impeller pump 70 forces lubricant into the enlarged end 79 of a conduit 80 extending exteriorly of the reservoir and with which communicates a distributing pipe 81 and branches 82, conveying the lubricant to any desired parts of the engine, the lubricant within the engine, returning to the reservoir through a drain pipe 83 in the bottom of the cylinder 11 and which has an enlarged entrance 84. Reservoir 12 may be drained upon removing a screw plug 85 in the base thereof.

The engine is preferably water-cooled and to this end, a suitable water pump structure is provided at 85', bolted as by means of several of the bolts 16, to the engine. Such pump has an impeller 86 and sectional shaft 87 whose sections are connected by a sleeve 88 and screws 89. The shaft extends through the housing 75 and within the same has a bevel pinion 90 thereon enmeshed with the bevel gear 78, so as to be driven from the drive shaft 23. Such pump 85' is in circuitous communication with a radiator, (not shown), with communicating water passages 91 in the side plates 14, and with passages 92 in the cylinder 11, see Figures 1 and 11.

Various changes may be resorted to provided they fall within the spirit and scope of the invention.

What is claimed is:—

A device of the class described having a substantially round cylinder comprising a ring and closure plates overlapping the edges of the ring and secured against opposite sides thereof, said ring having an enlargement providing a firing chamber, firing means associated with said chamber, a rotor, disks fastened on opposite sides of the rotor, said rotor and disks being of the same diameter as the interior of the ring and being collectively of the same width as the ring, a drive shaft carrying said rotor, pistons on said rotor having arcuate walls on the same arc as the rotor and adapted, when in their outermost position, to register with the periphery of the rotor, said rotor having spaces in which said pistons are mounted, means pivotally connecting each of said pistons to said disks, said pistons each having inward extensions at one end, a rod passing through each of said extensions between its pivot and the axis of the rotor, said closure plates having cam grooves into which the ends of the rods extend to move the pistons to effect intake, compression, firing and expansion of fuel and to effect exhaust, said ring having intake and exhaust ports to coact with the pistons and spaces, and said disks having arcuate slots therethrough through which said rods pass.

EARL E. HAMMERS.