Jan. 21, 1941. W. W. EVERTS 2,229,240

INTERNAL COMBUSTION ENGINE

Filed July 13, 1938

Fig. 1.

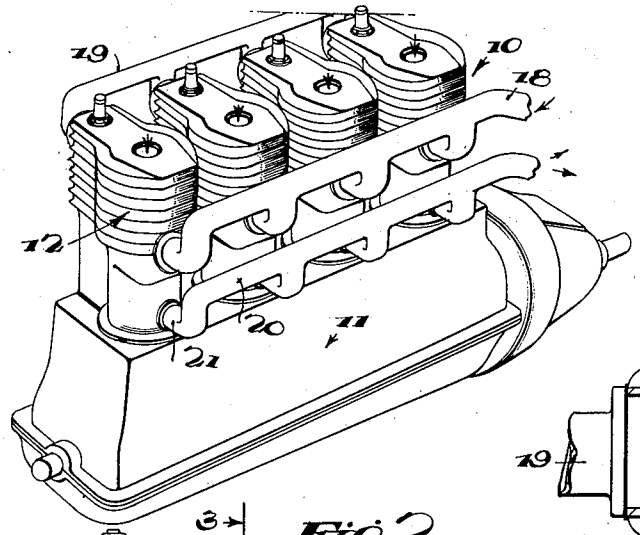


Fig. 4.

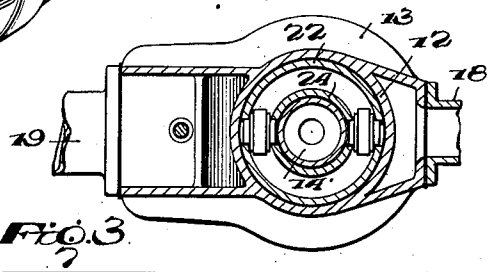


Fig. 2.

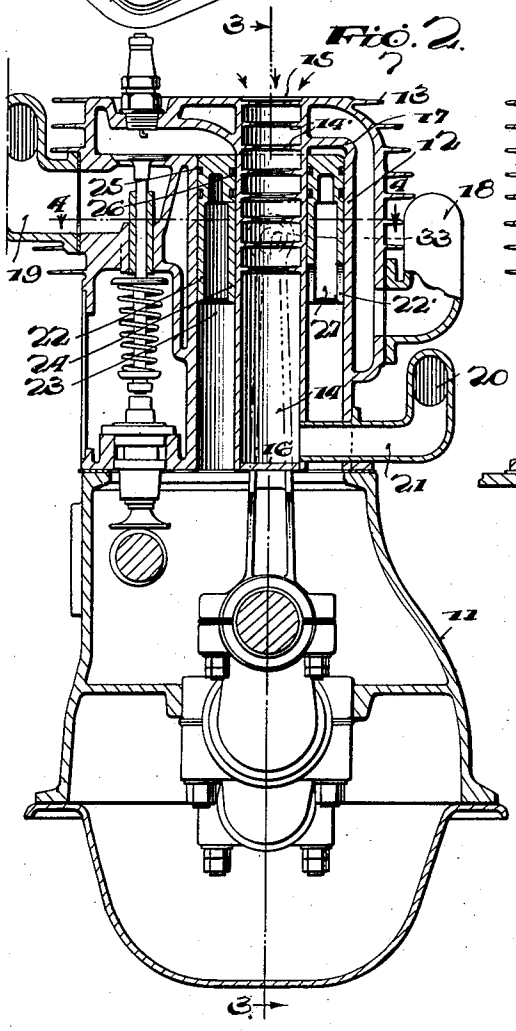
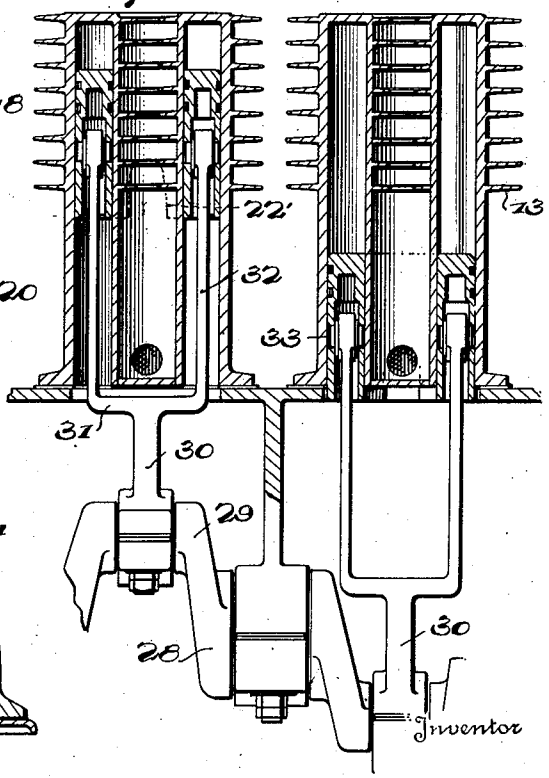


Fig. 3.



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2,229,240

INTERNAL COMBUSTION ENGINE

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Application July 13, 1938, Serial No. 219,059

3 Claims. (Cl. 123—176)

My invention relates to improvements in internal combustion engines.

An important object of the invention is to improve the piston and cylinder construction, rendering it possible to use a piston of increased diameter, without liability of developing a hot spot in the center of the piston, which would cause improper ignition.

A further object of the invention is to provide means for air cooling the piston and cylinder construction.

A further object of the invention is to provide an internal combustion engine of the above mentioned character, which is relatively simple in construction.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawing forming a part of this application and in which like numerals are employed to designate like parts throughout the same:

Figure 1 is a perspective view of an internal combustion engine embodying my invention,

Figure 2 is a central vertical transverse section through one piston and cylinder construction,

Figure 3 is a longitudinal vertical section taken on line 3—3 of Figure 2, and,

Figure 4 is a horizontal section taken on line 4—4 of Figure 2.

In the drawing, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates an internal combustion engine as a whole. This engine comprises a crank case 11 upon which are rigidly mounted cylinders 12, four being shown for the purpose of illustration. The engine shown for the purpose of illustration is an air cooled engine, adapted for use upon aeroplanes. It is to be understood that the invention is in no sense restricted to its embodiment within an air cooled engine, as it may be applied to a water cooled engine for use upon aeroplanes, automobiles, or the like. The invention is also shown as of the four-cycle type, but may be two-cycle type, if desired.

Each cylinder 12 is shown as vertically arranged and is equipped with exterior radiating fins 13. The cylinder 12 surrounds an inner cylinder or tube 14, arranged in spaced concentric relation therein, and having no communication with the interior of the upper end of the cylinder 12. The upper end of the inner cylinder or tube 14 is open, as shown at 15, and in free communication with the atmosphere, while its lower end is preferably closed as shown at 16, so that it has no direct communication with the crank case. The inner cylinder or tube 14 is preferably provided with annular radiating fins 14'. The explosive charge is supplied to the upper end of the cylinder 12, which is covered by the head 17, through the usual intake manifold 18, while the numeral 19 designates the usual exhaust manifold.

The usual valves are employed for controlling the intake and exhaust of the fuel and burnt gases to and from the upper end of the cylinder 12, which are timed and operated in accordance with the well known practice in operating four-cycle internal combustion engines. The charge is ignited by the ordinary spark plug.

Arranged exteriorly of the cylinders 12 and near their lower ends is a suction air exhaust manifold 20, the branches 21 of which lead into the side of the inner cylinders or tubes 14, adjacent to their lower ends, as clearly shown in Figure 2. When the engine is traveling forwardly through the air, as applied to an aeroplane or the like, the rapidly traveling current of air passing rearwardly about the trailing end of the air exhaust manifold 20, creates a suction therein, and this suction causes a circulation of air downwardly through the upper open ends of the inner cylinders 14 and outwardly from the lower ends therof, through the branches 21.

Coacting with the cylinder construction including the outer and inner spaced concentric cylinders 12 and 14, is an annular piston 22, slidably mounted within the annular passage 23, and engaging the cylinder 12 and having an opening 24 to slidably receive the inner cylinder 14. The piston 22 has a slot 22' to receive the branch 21, as shown. The piston has outer and inner compression rings 25 and 26, as shown. The piston is provided with an annular space or passage 27, open at the bottom.

Operating within crank case 11 and journaled in suitable bearings, is a crank shaft 28, having cranks 29, to which are pivotally connected connecting rods 30, corresponding in number and arrangement to the pistons 22. Each connecting rod is provided at its upper end with a yoke 31, comprising a pair of sides or connecting rod sections 32. The yoke straddles the inner cylinder 14 and the connecting rod sections 32 are disposed upon opposite sides thereof, and the upper ends of the connecting rod sections 32 enter the annular space 27 of the piston and are pivotally

connected therewith by wrist pins 33 or the like.

In operation, the piston 22 reciprocates in the space 23 between the cylinders 12 and 14. The air traveling downwardly through the inner cylinder 14 maintains the inner portion of the piston head properly cool. This enables the piston to be made in diameters considerably greater than the diameters of the ordinary piston. It is well known that if the ordinary piston is made larger than around six and one-half inches, that it will tend to heat at the center, producing a hot spot, causing improper or premature ignition. By the provision of the air exhaust manifold connected with the lower ends of the inner cylinders 14, the rapidly traveling currents of air about the trailing outlet end of the exhaust air manifold will produce the desired suction, for maintaining proper circulation of air through the inner cylinders 14. The connecting rods with the yokes or forked ends afford simple and reliable connections between the crank shaft and the pistons, without interfering with the discharge of the air from the lower ends of the inner cylinders.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. An internal combustion engine comprising an outer cylinder, an inner cylinder extending longitudinally within the outer cylinder in spaced concentric relation, the inner cylinder having its outer intake end open to the atmosphere, an annular piston mounted within the space between the inner and outer cylinders, a crank shaft, a connecting rod between the piston and crank shaft, and an air exhaust pipe arranged exteriorly of the inner cylinder and communicating with the inner outlet end of the inner cylinder.

2. An internal combustion engine comprising outer cylinders, inner cylinders within the outer cylinders and having air intake openings at their outer ends and also having outlet openings near their inner ends, pistons operating within the outer cylinders, a crank shaft, means connecting the pistons and crank shaft, and means leading into the outlet openings of the inner cylinders for withdrawing a cooling fluid from the inner cylinders, the air traveling in one direction only through the cylinders.

3. An internal combustion engine comprising an outer cylinder having an outer wall, said outer wall having an opening in direct communication with the atmosphere, an inner cylinder extending longitudinally within the outer cylinder for affording an annular passage between the same, said inner cylinder having one end in free communication with the opening, an air outlet device leading directly from the inner cylinder, an annular piston mounted to reciprocate within the space between the inner and outer cylinders, a crank shaft, and a connecting rod between the piston and crank shaft.

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