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COOLING SYSTEM FOR THE PISTONS OF INTERNAL COMBUSTION ENGINES.

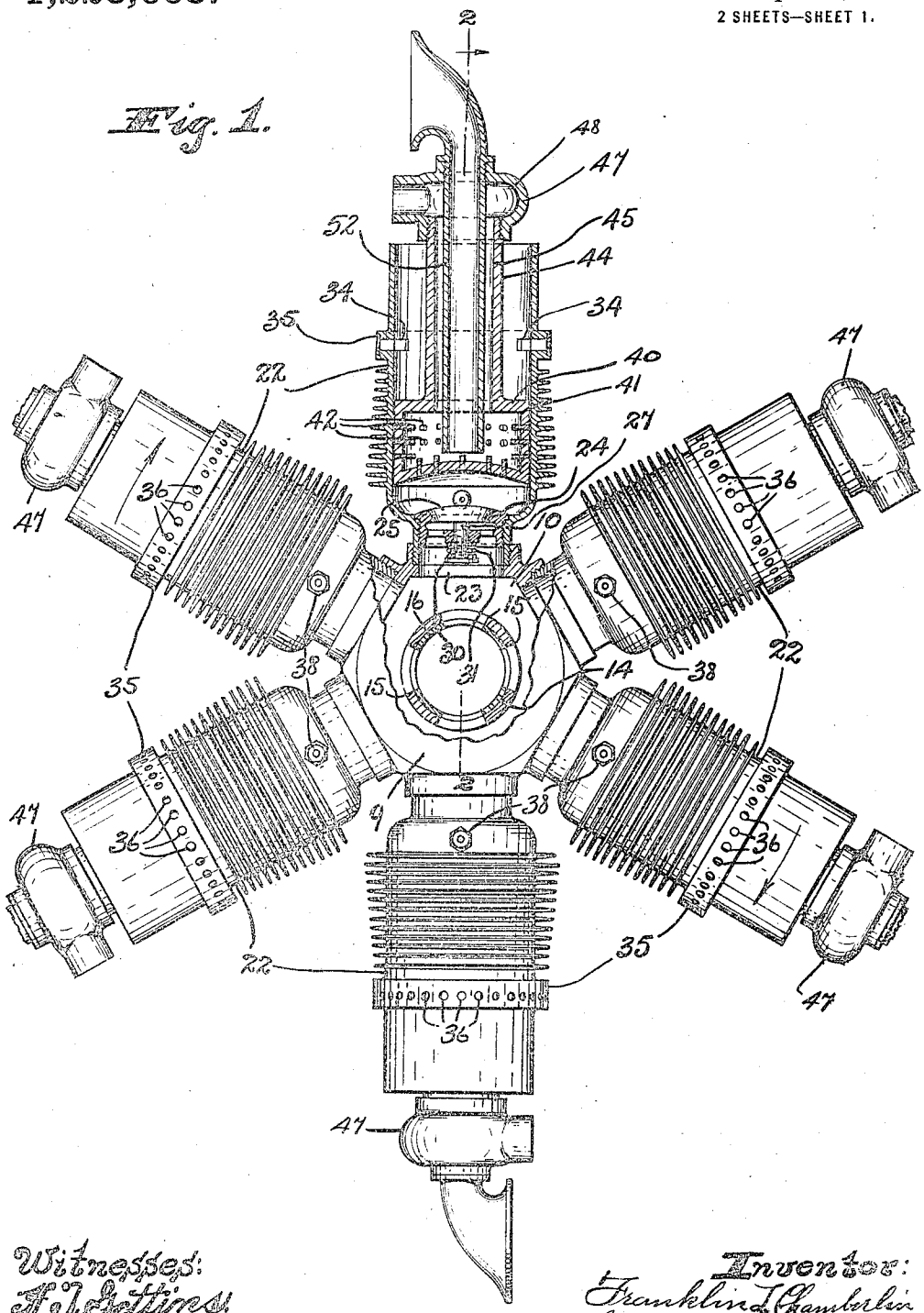
APPLICATION FILED MAY 1, 1914.

1,223,668.

Patented Apr. 24, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



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Inventor:
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2 SHEETS—SHEET 2.

Fig. 2.

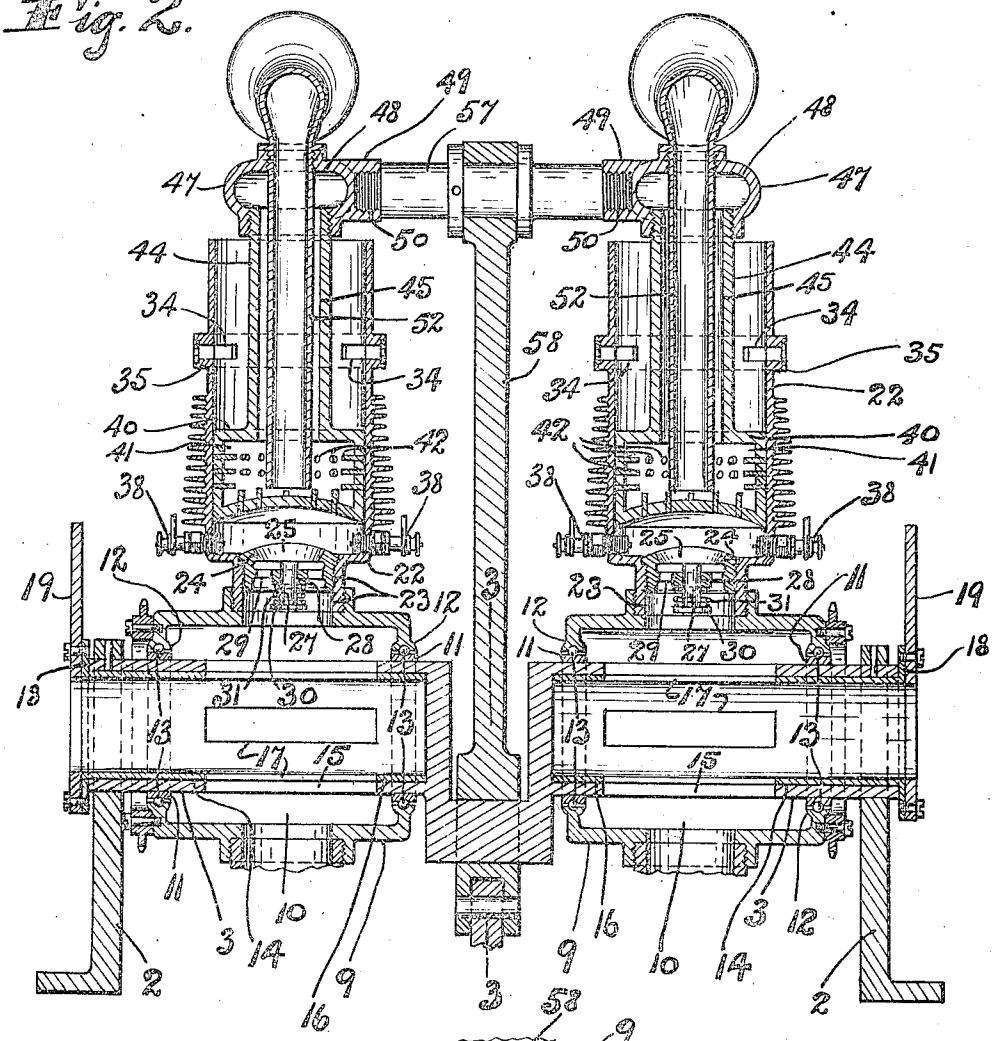
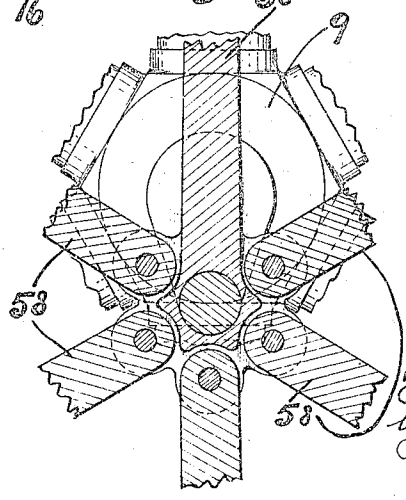


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANKLIN L. CHAMBERLIN, OF CLEVELAND, OHIO; E. W. MOORE ADMINISTRATOR OF SAID FRANKLIN L. CHAMBERLIN, DECEASED.

COOLING SYSTEM FOR THE PISTONS OF INTERNAL-COMBUSTION ENGINES.

1,223,668. Specification of Letters Patent. Patented Apr. 24, 1917.

Application filed May 1, 1914. Serial No. 835,609.

To all whom it may concern:

Be it known that I, FRANKLIN L. CHAMBERLIN, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Cooling Systems for the Pistons of Internal-Combustion Engines; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to new and useful improvements in explosive gas engines, and particularly to that type of engine where a plurality of cylinders are mounted on and rotate around the crank shaft while the crank shaft remains stationary.

The object of the invention is to provide in an engine of this character means for independently cooling each piston which will be very effective in operation, simple in construction, and absolutely automatic in operation.

With this object in view, my invention consists in providing a hollow piston and piston-rod in each cylinder and providing means for forcing air into the hollow piston and out the piston-rod when the engine is in operation.

My invention also consists in the features of construction and combination of parts hereinafter described in the specification, pointed out in the claims and illustrated in the accompanying drawings.

In the accompanying drawings is shown a type of engine comprising two sets or series of cylinders, one set being mounted at each side of the crank portion or crank pin of the crank shaft and each piston in one series is connected directly with a piston in the other series so that each piston in one series moves synchronously with a piston in the other series. The pistons in all the cylinders are identical in construction and when the engine is in operation all the cylinders rotate about the crank shaft and the pistons move about in a circle, the center of which is the crank pin.

Again referring to the drawings, Figure 1 is a view in elevation of an engine embodying my invention with part broken away and with one of the cylinders shown in central section. Fig. 2 is a section on line 2—2, Fig. 1. Fig. 3 is a section on line 3—3, Fig. 2.

Again referring to the drawings, 2 represents a pair of suitable standards and on these standards is mounted a crank shaft 3 which is rigidly secured to the standards so that it is not capable of rotation. On the crank shaft 3 at each side of the crank pin is mounted a chambered hub 9, the chamber being indicated by 10. On each end of the crank shaft are arranged ball races 11 and each hub is provided with corresponding ball races 12 and in the said races are arranged ball bearings 13. Each end of the said crank shaft 3 is made hollow so as to provide a chamber 14 and in the walls of said chamber 14 are formed openings 15 which communicate with the chamber 10 in the hub. A cylindrical valve 16 is arranged within the chamber 15 and the said valve is provided with openings 17 which can be caused to register with the openings 15 when the said valve is turned, the object of the valve being to provide means for controlling the flow of air from the chamber 14 into the chamber 10. The said valve 16 is preferably provided with a flange 18, to which is secured an operating lever 19. On each hub 9 is mounted a series of engine cylinders 22 which extend out radially from the said hub and the said cylinders are spaced the same distance apart around the hub. Each of the engine cylinders is of the type in common use for a two cycle engine and the lower end of each cylinder communicates directly with the chamber 10 in the hub on which it is mounted through a passageway 23. In the passageway 23 is arranged a removable valve seat 24 and a valve 25 is arranged to rest on the said valve seat. The said valve 25 is provided with a valve stem 27 which extends down through an opening 28 formed in a spider 29 carried by said valve seat 24. On the lower end of said valve stem is secured a head 30 and between the head 30 and the said spider 29 is arranged a coil spring 31 which resiliently holds the said valve 25 on the valve seat 24 but permits the valve to open inwardly on the up-stroke of the piston in the cylinder. In the side of each cylinder, near the upper end thereof, are formed openings or exhaust ports 34 and on the exterior of the cylinder over said ports 34 is arranged an annular housing 35, the vertical wall of which is perforated as at 36 to the permit the exhaust gas to escape. The object of this housing is to prevent the

lubricating oil in the cylinder from being forced out and sprayed over the outside of the engine and also to muffle the sound of the exhaust. In the bottom of the cylinder are mounted the usual spark plugs 38.

Within the cylinder is arranged a hollow piston 40 having a chamber 41 and the walls of the chamber are provided with heat radiating lugs 42. The said piston is provided with a piston rod 44 which has a longitudinal passageway 45 arranged to communicate at its lower end with the chamber 41 in the piston. On the upper end of the piston rod is arranged a hollow head 47 having a chamber 48 which communicates with the passageway 45 in said piston rod. On the side of said head 47 is formed an exterior lug 49 which is provided with a screw-threaded socket 50.

A pipe 52 extends down through the head 47 and through the piston rod 44 and into the chamber 41 of the piston 40, and the diameter of the pipe is such that a space is left between said pipe 52 and the surrounding wall of the piston rod. The upper end of the pipe 52 extends beyond the head 47 and is curved or bent so that the mouth thereof is in a plane approximately parallel with the axis of the crank shaft and the walls of the pipe at the mouth flare outwardly in the form of a cowl.

The piston rod in each cylinder on the crank shaft at one side of the crank pin is connected with the piston rod in the corresponding cylinder on the crank shaft at the other side of the crank pin by means of a bar 57, and each bar 57 is connected to the crank pin by a link 58 one end of which is journaled on the bar 57 and the other end is pivotally connected with the crank pin.

The operation of my engine is as follows:—

When the cylinders are revolved through the operation of the engine the air in the path of the pipes 52 will be forced down through said pipes and driven into the chambers in the pistons and will then be forced up between the outer walls of the pipe 52 and the inner walls of the piston rods and will then enter the chambers in the heads on the ends of said piston rods and escape through the outlet openings in said heads. As the air thus circulates through the piston rods and the pistons it will take up the heat from the pistons and thereby keep the pistons from overheating.

What I claim is:—

1. In a cooling system for the pistons of internal combustion engines, the combination of a cylinder mounted so as to be free to rotate, a piston arranged in said cylinder, a piston rod connecting said piston, said piston and piston rod having a continuous passageway therein which extends from the outer end of the piston rod into the piston and up again to the outer end of the piston rod, one end of said passageway being arranged to face in the direction of rotation of said cylinder and the other end of said passageway being arranged to face in a different direction and means for producing a reciprocating motion between the cylinder and the piston.

2. In a cooling system for the pistons of internal combustion engines of the character indicated, the combination of a stationary crank-shaft, an engine cylinder mounted on and adapted to rotate around said shaft at one side of the crank pin, a hollow piston arranged in said cylinder, a tubular piston rod connected with said piston, an operative connection between the piston rod and the crank pin and a pipe extending down through the piston rod, the outer end of said pipe extending beyond the outer end of the piston rod and having the mouth thereof facing in the direction of rotation of said cylinder.

3. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, an engine cylinder mounted on and adapted to rotate around said crank shaft at one side of the crank pin, a hollow piston arranged in said cylinder, a tubular piston rod connected with the piston, a link operatively connecting said piston rod with the crank pin of the crank shaft, a pipe extending down through the tubular piston rod and projecting beyond the outer end of the piston rod and provided with a flaring mouth which faces in the direction of rotation of the cylinder.

4. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, an engine cylinder mounted on and adapted to rotate around said crank shaft at one side of the crank pin, a piston arranged in said cylinder, a piston rod connected with said piston, the said piston and piston rod having a continuous passageway therein which extends from the outer end of the piston rod into the piston and up again to the outer end of the piston rod, one end of said passageway being arranged to face in the direction of rotation of said cylinder, the other end of the passageway being arranged to face in the direction opposite to the direction of rotation of said cylinder.

5. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, an engine cylinder mounted on and adapted to rotate around said crank shaft at one side of the crank pin, a hollow piston arranged in said cylinder, a piston rod connected with said piston, said piston rod having a passageway extending therethrough and communicating with the chamber in said piston, a cham-

bered head mounted on the upper end of said piston rod, a pipe extending down through said chambered head and into the chamber in the piston, said pipe extending beyond the said head and having a mouth arranged to face in the direction of rotation of the cylinder and said head being provided with an outlet opening facing in the direction opposite to the direction of rotation of said cylinder and an operative connection between the piston rod and the crank shaft.

6. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, an engine cylinder mounted on and adapted to rotate around said crank shaft at one side of the crank pin, a hollow piston arranged in said cylinder, the inner surface of said piston being provided with a plurality of lugs, a piston rod connected with said piston, said piston rod having a passageway extending therethrough and communicating with the chamber in said piston, a chambered head mounted on the upper end of said piston rod, a pipe extending down through said chambered head and into the chamber in the piston, said pipe extending beyond the said head and having a mouth arranged to face in the direction of rotation of the cylinder and said head being provided with an outlet opening facing in the direction opposite to the direction of rotation of said cylinder and an operative connection between the piston rod and the crank shaft.

7. In a cooling system for the pistons of internal combustion engines of the character described, the combination of a stationary crank shaft, a cylinder mounted on and adapted to rotate around said crank shaft, a piston, a tubular piston rod connected to said piston, said piston having a chamber in open communication with the passageway in said piston rod, a pipe arranged within the piston rod and spaced from the walls thereof, the upper end of said pipe extending beyond the piston rod and having its mouth facing in the direction of the rotation of said cylinder, a hollow head arranged on the outer end of the piston rod and forming a support for the said pipe, said head being provided with an outlet opening which faces in the direction opposite to the direction of rotation of said cylinder, and an operative connection between the piston rod and said crank shaft.

8. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, a plurality of cylinders mounted on and adapted to rotate around said crank shaft, a chambered piston arranged in said cylinder, a piston rod connected with said piston, said piston rod being provided with two passageways which extend longitudinally of the piston rod, one of said passageways being arranged to conduct air to the chamber of the piston and having its air-receiving end arranged at the outer end of the piston rod and there communicating with the external atmosphere and flaring in the direction in which the cylinder revolves during the operation of the engine, and the other of said passageways being adapted to conduct air from said chamber and having its mouth or outlet facing in the direction opposite to the direction of rotation of said cylinder and an operative connection between the piston rod and said crank shaft.

9. In a cooling system for the pistons of internal combustion engines of the character described, the combination of a stationary crank shaft, a cylinder mounted on and adapted to rotate around said crank shaft at one side of the crank pin, a chambered piston arranged in said cylinder, a piston rod connected to said piston, said piston rod being provided with two passageways, one of which passageways is arranged within the other passageway and is adapted to conduct air to the chamber of the piston and has its air-receiving end arranged at the outer end of the piston rod and there communicating with the external atmosphere and having the mouth facing in the direction in which the cylinder revolves during the operation of the engine, and the other passageway being adapted to conduct air from said chamber and having its mouth facing in the direction opposite to the direction of rotation of said cylinder and an operative connection between the piston rod and the crank pin.

10. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, a plurality of engine cylinders mounted on and adapted to rotate around said shaft at one side of the crank pin, a hollow piston arranged in each cylinder, a hollow piston rod connected with said piston, means operatively connecting the piston rod with the crank pin and a pipe extending down through the piston rod, the outer end of said pipe extending beyond the outer end of the piston rod and having its mouth facing in the direction of rotation of said cylinder.

11. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, a plurality of cylinders mounted on and adapted to rotate around said crank shaft at one side of the crank pin, a hollow piston arranged in each cylinder, a tubular piston rod connected with each piston, a chambered head secured on the upper end of each piston rod, and a pipe secured in said head and extending down through the piston rod and having its outer end projecting beyond the outer end of the piston rod, the mouth of said pipe being arranged to face in the di-

rection of rotation of said engine, and the said head being provided with an outlet opening facing in the opposite direction from said mouth of said pipe.

12. In a cooling system for the pistons of internal combustion engines, the combination of a stationary crank shaft, a plurality of cylinders mounted on and adapted to rotate around said crank shaft at each side of the crank pin, a hollow piston arranged in each cylinder, a tubular piston rod connected with each piston, a chambered head secured on the upper end of each piston rod, a pipe secured in each head and extending down through the piston rod and having its outer end projecting beyond the outer end of the piston rod, the mouth of the said pipe being arranged to face in the direction of rotation of the said engine and said head being provided with an outlet opening facing in the opposite direction from the mouth of said pipe, a rod connecting the piston rod of each cylinder on one side of the crank pin with the piston rod of each cylinder on the other side of the crank pin and links operatively connecting said rods with said crank shaft, for the purpose set forth.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

FRANKLIN L. CHAMBERLIN.

Witnesses:
B. C. BROWN,
V. C. LYNCH.