

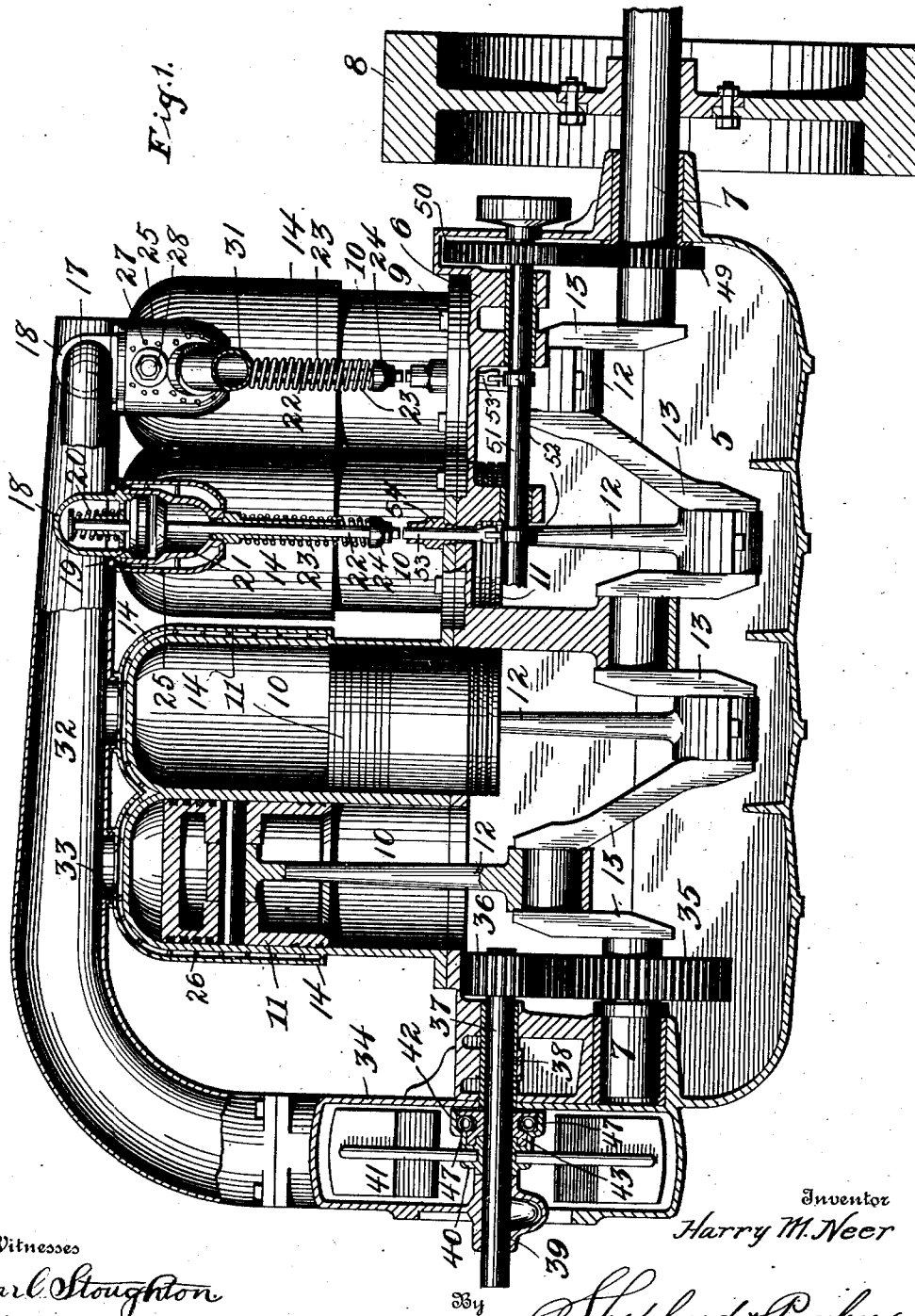
No. 868,689.

PATENTED OCT. 22, 1907.

H. M. NEER.
EXPLOSIVE ENGINE.

APPLICATION FILED NOV. 7, 1906.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 2.

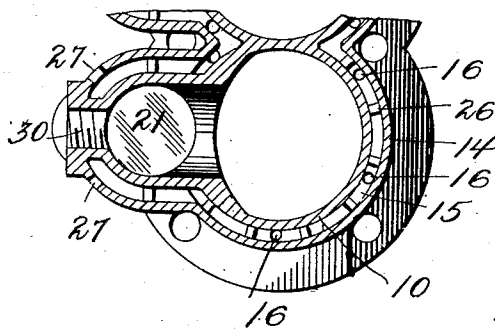
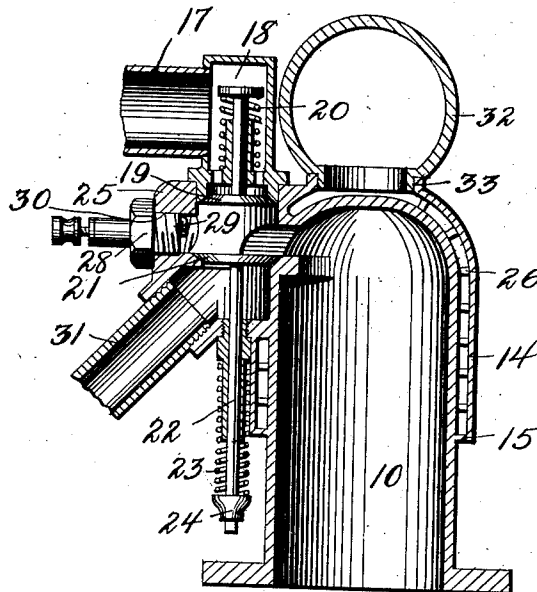


Fig. 3.

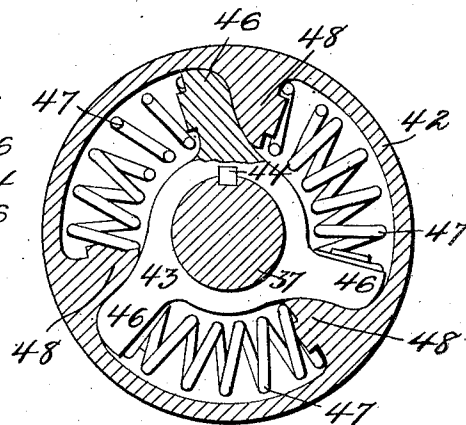


Fig. 4.

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UNITED STATES PATENT OFFICE.

HARRY M. NEER, OF COLUMBUS, OHIO, ASSIGNOR TO THE NEER AIR COOLED ENGINE COMPANY, OF PLAIN CITY, OHIO, A CORPORATION OF OHIO.

EXPLOSIVE-ENGINE.

No. 868,689.

Specification of Letters Patent.

Patented Oct. 22, 1907.

Application filed November 7, 1906. Serial No. 342,334.

To all whom it may concern:

Be it known that I, HARRY M. NEER, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Explosive-Engines, of which the following is a specification..

My invention relates to an explosive engine and has for its object the provision of an engine provided with improved means for cooling the valves and cylinders thereof.

A further object of the invention is the provision of an improved yielding connection between a fan which supplies air for cooling the valves and cylinders and the members which impart movement to said fan.

Further objects and advantages of the invention will be set forth in the detailed description which now follows:

In the accompanying drawings: Figure 1 is a view partly in side elevation and partly in section of an engine constructed in accordance with the invention, Fig. 2 is a transverse vertical section of one of the cylinders, Fig. 3 is a horizontal section through the upper portion of one of said cylinders, and, Fig. 4 is a view partly in section and partly in elevation of a yielding connection between the fan or blower and the shaft upon which said fan is mounted.

Like numerals designate corresponding parts in all of the figures of the drawings.

Referring to the drawings, the numeral 5 designates the crank casing of the engine and the numeral 6 designates the frame of the engine. Mounted upon the main shaft 7 is a balance wheel 8. Bolts 9 secure the cylinders 10 to the engine frame. Pistons 11 are slidably disposed in the cylinders 10 and are connected by connecting rods 12 with the cranks 13 of the engine in the usual and well known manner. Air jackets 14 partially inclose the cylinders. In contra-distinction to air jackets of this nature which have been heretofore used, these air jackets are closed at their bottoms with the exception of small openings 16. The intake pipes 17 leading from the carbureters, not shown, conduct vaporized air to the interior of chambers 18. Communication between these chambers 18 and the interiors of the cylinders 10, is normally cut off by check valves 19 which are closed under the tension of the springs 20. The exhaust valves 21 are mounted upon stems 22. Springs 23 normally tend to close these exhaust valves, said springs bearing against collars 24 carried by the stems 22. These inlet and exhaust valves 19 and 21 and the parts connected thereto are arranged in offset portions 25 carried by the cylinders 10 and cast integral therewith, the air jackets 14 extending about these offset portions, as well as about the cylinders. The air jacket is supported by a plurality of pins or studs 26 which are cast with the cylin-

der and with the jacket. Openings 27 formed through the walls of the air jacket, adjacent the offset portions 25, establish communication between the air jackets and the atmosphere. A spark plug 28 having the usual sparking point 29 is screwed into the offset portion 25 as at 30. Exhaust pipes 31 lead from these offset portions as is clearly illustrated in Fig. 2.

A conduit 32 which communicates as at 33 with each of the air jackets, leads from a fan casing 34, this fan casing being cast in one piece with the crank casing as is best illustrated in Fig. 1. A gear wheel 35 which is mounted upon the main shaft 7 at the left hand end of the engine as illustrated in Fig. 1, meshes with a pinion 36, said pinion 36 being fast upon a fan shaft 37. This shaft is journaled in a bushing 38 carried by the engine casing and in the fan casing as at 39. Loosely mounted upon the shaft 37 is the hub 40 of a fan 41. This hub is provided with a cup-like member 42 which is adapted to inclose a spider 43 which is keyed upon the shaft 37 as at 44 (see Fig. 4). This spider comprises a hub portion and radially extending arms 46. Coiled springs 47 bearing between the arms 46 and lugs 48 carried by the cup 42 form a yielding connection between the spider and the cup, by virtue of which construction when the engine starts suddenly as engines of this character usually do, the danger of breaking the fan is greatly diminished. A gear wheel 49 which is fast upon the shaft 7, meshes with a second gear wheel 50 which is fast upon a shaft 51. This shaft carries cams 52 which are adapted to impart vertical reciprocatory motion to plungers 53, said plungers being slidably disposed in bearings 54 carried by the engine frame.

The operation of this engine is as follows: Upon the down stroke of the pistons 11, carbureted air is drawn through the intake valve 19 into the cylinder. Upon the up-stroke of the pistons, this charge is compressed in the upper portion of the cylinder and in the space between the intake and exhaust valves. When the piston reaches the upper end of its stroke, the spark occurs in the usual and well known manner and the charge is exploded, this drives the piston down and since the gear 49 is but half the size of the gear 50, the exhaust valves will be opened against the tension of the springs 23, during the next up-stroke of the pistons permitting the burned gases to be ejected through the exhaust pipes 31. This action is the usual action of a four-cycle engine and requires no further description. It is in the improved cooling means and in the improved connection between the fan and the shaft upon which it is mounted, that this invention particularly resides. By having the lower portion of the air jacket closed, with the exception of the openings 15, but a limited portion of the current of air produced by the fan is permitted to pass from the bottom of the air

jacket. The major portion of the air passes through the openings 27. When the air enters through the conduit 32, it circulates about the cylinders and about the extensions 25 and afterwards passes through the openings 16 and 27. By leading the air from the upper portion of the extensions 25 through the openings 27, the heat is drawn from the point where the explosion takes place and where the greatest heat is experienced. In other air cooled devices of this nature, the air has been expelled from the bottom of the air jackets. The lower portions of the cylinders are comparatively cool and it is the upper portion of the cylinders and the intake and exhaust valves that are subjected to the greatest heat. It is for that reason that the openings 27 have been provided to lead the blast from the fan from the upper portion of the offsets 25 and from the upper portion of the cylinder, by virtue of which construction a more efficient cooling is had than would otherwise be the case. It has been found that the sudden starting of a fan of this character is likely to injure the same and it is therefore desirable that some means be provided for relieving the jar incident to the sudden starting of the engine. To accomplish this I have provided the yielding members shown in Fig. 4. The spider is entirely inclosed in the cup 42, by virtue of which construction it is impossible for the springs 47 to fall out of position or to become lost. The parts are more readily accessible than if the yielding connections were located inside the crank casing proper, and the provision of the large gear wheel 35 meshing with the pinion 36 upon the fan shaft, greatly accelerates the speed of the shaft and the fan. The studs or pins 26 of which there are a large number, increase the radiating surface of the cylinders.

From the foregoing description, it will be seen that simple and efficient means are herein provided for accomplishing the objects of the invention, but while the elements shown and described are well adapted to serve the purposes for which they are intended, it is to be understood that the invention is not limited to the precise construction set forth, but includes within its purview such changes as may be made within the scope of the appended claims.

What I claim, is,

1. The combination with an explosive engine, of a fan shaft, connections between said engine and said fan shaft,

a fan mounted upon the fan shaft, and a yielding connection between said fan and the shaft upon which it is mounted.

2. A fan shaft, a fan mounted upon said shaft and having a cup-like hub, a member having radial arms fast upon said shaft and lying within said cup-like hub, and springs forming a yielding connection between said radial arms and the cup-like hub.

3. The combination with an explosive engine, of a fan shaft, connections between said engine and said fan shaft, a fan mounted upon said shaft and having a cup-like hub, a member having radial arms which is fast upon the fan shaft and which lies within said cup-like hub, members carried by the cup-like hub which lies between said radial arms, and springs disposed between said members and said radial arms to thereby form a yielding connection between the hub of the fan and the shaft upon which said fan is mounted.

4. In a hydrocarbon engine, the combination with a cylinder, of a jacket which partially incloses said cylinder, an air conduit which communicates with said jacket at the top of the cylinder, said air jacket being closed with the exception of a few small openings at the bottom thereof, and a valve casing also surrounded by said air jacket, said air jacket having a number of openings formed in the wall thereof adjacent said valve casing.

5. In a gas engine, the combination with a plurality of cylinders, and air jackets partially inclosing each of said cylinders, a fan, a conduit leading from said fan and extending along the tops of all of said cylinders, said conduits being in communication with each of the air jackets at the top thereof, valve casings also inclosed by said air jackets, said air jackets having a number of openings formed in the walls thereof adjacent said valve casings, and said air jackets, being closed at their bottoms with the exception of a few small openings to thereby cause the major portion of the air from the conduit to pass out around the valve casings.

6. In a gas engine, the combination with a plurality of cylinders, of air jackets partially inclosing each of said cylinders, a fan, a conduit leading from said fan and extending along the tops of all of said cylinders, said conduits being in communication with each of the air jackets at the top thereof, valve casings also inclosed by said air jackets, said air jackets having a number of openings formed in the walls thereof adjacent said valve casings, said air jackets being closed at their bottoms with the exception of a few small openings to thereby cause the major portion of the air from the conduit to pass around the valve casings, and a plurality of pins which extend between the cylinder and the air jacket.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY M. NEER.

Witnesses:

FRANK G. CAMPBELL,
A. L. PHELPS.