No. 810,643. PATENTED JAN. 23, 1906.

S. HAM.

COOLING MEANS FOR EXPLOSIVE ENGINE CYLINDERS.

APPLICATION FILED MAY 8, 1905.

Fig 1

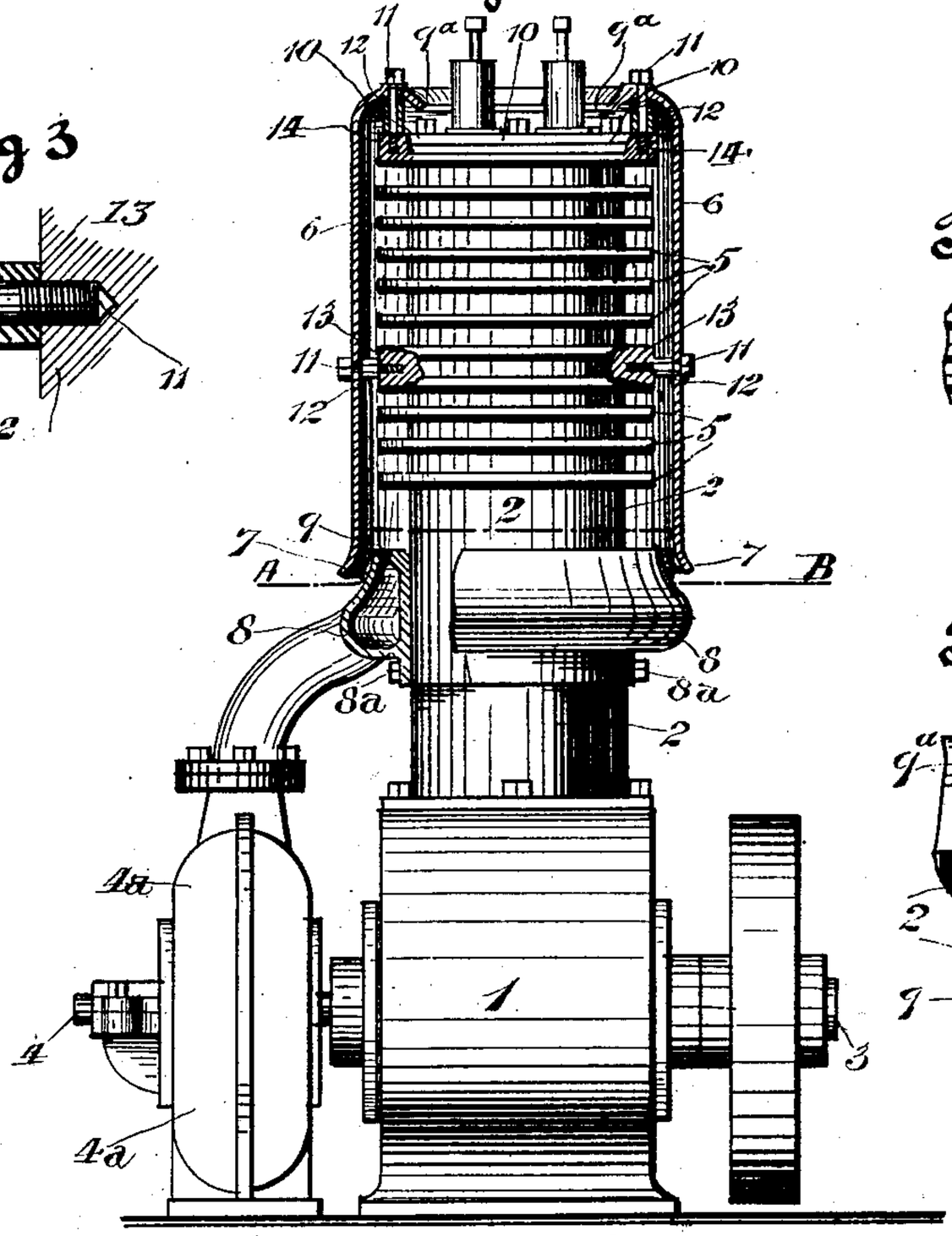


Fig 3

Fig 4

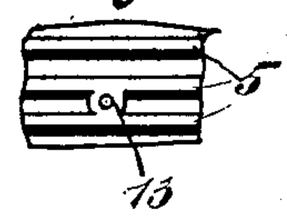


Fig 5

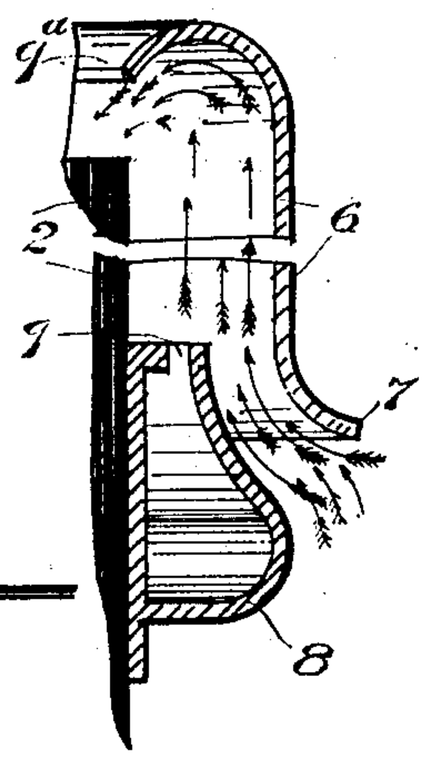
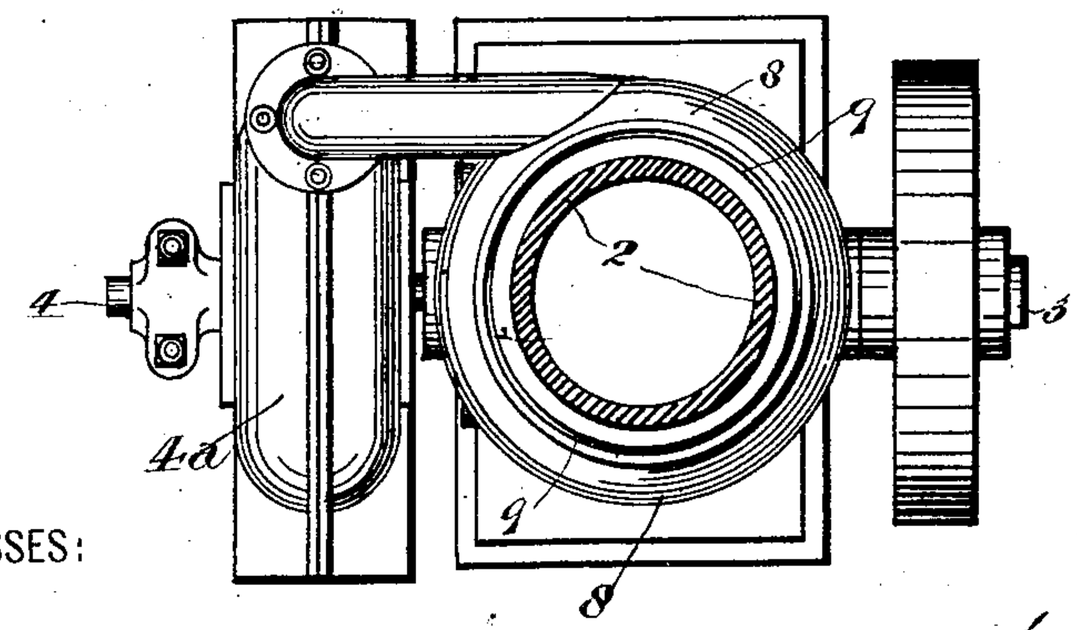


Fig 2



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COOLING MEANS FOR EXPLOSIVE-ENGINE CYLINDERS.

No. 810,643. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed May 8, 1905. Serial No. 259,368.

To all whom it may concern:

Be it known that I, SIMEON HAM, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Cooling Means for Explosive-Engine Cylinders, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a means for cooling the cylinders of gas or explosive engines; and it consists in means hereinafter described, and particularly pointed out in the claim.

The object of this invention is to provide a means whereby a continuous jet or column of cooling-air will be continuously forced at a high velocity along the space between the air-jacket and the exterior heated surface of the cylinder of the explosive-engine and in passing will be caused to impinge in a measure or degree against the cooling-ribs situated around the exterior of that portion of the cylinder subjected to heat to prevent an undue heating of said cylinder; also to construct said air jet or column producing means of an annular form to surround the cylinder and situate said means at the open-bottom or bell-mouth end of the air-jacket of the cylinder, so that the action of the column of air flowing from the annular jet-tube will blow into the open-bottom flared or bell-mouthed end of said jacket to operate as a siphon, and thereby create a strong vacuum to draw the exterior cold air into the space between the air-jacket and the cylinder and to rapidly force it upwardly in such space; to construct said air-jacket at its top open end with an annular deflecting-curve, so that the escaping air will be deflected downwardly to impinge against the top end or cover of the cylinder to rapidly cool the same. I attain these objects by the means illustrated in the accompanying drawings, in which similar numerals of reference designate like parts throughout the several views.

Figure 1 is a partly-broken sectional elevation of a gas-engine, showing my invention of an air-cooling means applied thereto. Fig. 2 is a sectional plan view of the same. Fig. 3 is an enlarged detail sectional view of one of the air-casing-securing bolts, showing the manner of securing the air casing or jacket to the cylinder. Fig. 4 is a broken portion of the cylinder, showing one of the tapped bosses into which the air casing or jacket securing bolts are screwed to secure said casing or jacket, and Fig. 5 is an enlarged detail broken sectional elevation of a portion of the bottom and the top portions of the air casing or jacket and the annular jet-tube.

The engine-base or crank-casing 1 supports the cylinder 2 of the engine, and the crank-shaft 3 of the engine is reduced and prolonged at one end to be connected directly to the blower-shaft 4. The blower-shaft 4, being thus driven directly by the engine-shaft, is subjected to the same fluctuations and variations in velocity as the former. This is a matter of importance in the working of an explosive-engine, particularly automobile-motors, which are necessarily required to be run at speeds varying materially in velocity, for when the engine is driven at a high velocity a corresponding increase of the capacity of the blower 4^a is the result, a matter of importance in connection with this invention, and is self-evident.

The cylinder 2 is provided with a series of cooling-ribs 5, which ribs encircle the cylinder and are arranged at suitable intervals apart along the cylinder, and the same are provided for the purpose of dissipating the heat from the body of the cylinder 2. The cooling-ribs 5 extend over that portion of the cylinder the interior surface of which is exposed to the heat of the explosives used therein, and the same are preferably turned or machined to remove the outer skin, due to molding, and expose the clean metal to the cooling action of the air.

The casing or jacket 6 is cylindrical and completely encircles the cylinder 2, has its top and bottom ends open, and is of a length sufficient to permit its bottom flaring open end to be situated slightly below the last cooling-rib 5 of said cylinder. The bottom open portion 7 of the jacket 6 is flared outwardly or bell-mouthed for the purpose hereinafter set forth.

An annular tube 8 is provided at its upper side with an annular jet-opening 9, which is preferably made continuous, so that when air escapes through said jet-opening will form a hollow cylindrical column to encircle the entire cylinder 2. The tube 8 is preferably inclined inwardly or reduced at its exterior top side toward the annular jet top opening, which reduction is of a curved form

corresponding with that of the curvature of the bell-mouth or flare 7 of the bottom open end of the casing 6, and the said tube 8 is situated relatively to the bottom open end of said casing or jacket so that the flow of the column of air from the jet-opening of said tube will be best adapted to create a vacuum within the space between the cylinder 2 and the casing 6, thereby promoting rapid and continuous flow of the exterior air between the reduced top portion of the annular tube 8 and the bell-mouthed open bottom portion 7 of the jacket 6, and this inflowing air shall have imparted to it a velocity equal almost to the velocity of the air-jet escaping from the tube 8, by which the air is impelled upwardly in the space between said jacket and said cylinder 2 toward the top deflecting end of siad jacket. The air-jet tube 8 is secured in position on said cylinder by securing-bolts 8^a.

The deflecting end of the jacket is constructed with an inwardly and downwardly inclined curved deflecting-lip 9^a, which is the best adapted to impart a centrally-inclined downward force to the upwardly-impelled air to cause the air to impinge against the upper surface of the cylinder-head 10 to cool the same.

The jacket 6 is secured to the main cylinder 2 by means of suitable bolts 11 and maintained in position relative thereto by means of the distance-sleeves 12. (See particularly Figs. 1 and 3.)

It will be particularly noted that when the engine is required to be driven at a high velocity the velocity of the blower 4^d will be correspondingly high and the capacity of the blower will be greater and cause a greater volume of air to pass through the space between the cylinder 2 and its jacket 6 to carry off the heat from said cylinder, and when said engine is required to be driven at a lesser velocity the speed of the blower will be correspondingly reduced and the capacity of the blower will be proportionately reduced and less power will be required to operate it, and the volume of air supplied to cool the cylinder will necessarily be less, and less will be required for the purpose of cooling the cylinder, and thus the volume of air is regulated directly by the engine itself to suit the different conditions under which it is required to work.

Certain parts around the cylinder between the ribs 5 are filled in to form a boss 13, which is drilled and tapped to receive the casing-securing bolt 11. Similar bosses 14 are formed on the head or top end of the cylinder and drilled and tapped for the same purpose.

Having thus fully described this my invention, what I claim as new and useful, and desire to cover by Letters Patent of the United States therefor, is—

In a gas or explosive engine, the combination with the cylinder thereof and a series of integral-turned air-cooling ribs surrounding said cylinder, of a jacket or casing surrounding said cooling-ribs of said cylinder and having its top and bottom ends open, said jacket having an outwardly-flaring base-lip, an inwardly and downwardly curved deflecting-lip situated at the top of said jacket or casing whereby the column of outgoing air is deflected against the end cover of the cylinder, an annular air-jet tube, having a continuous annular slit or air-outlet jet-opening, situated beneath the bottom open end of said casing in relative position thereto so that the air under pressure escaping from said annular slit is directly applied to cool the cylinder, a pressure-blower connected directly to the crank-shaft of said engine and suitable means for connecting said blower to said annular jet-tube.

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

SIMEON HAM.

Witnesses:
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FLORENCE GIMBEL.