No. 754,728. PATENTED MAR. 15, 1904.

J. WHITE.

COOLING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED JAN. 22, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

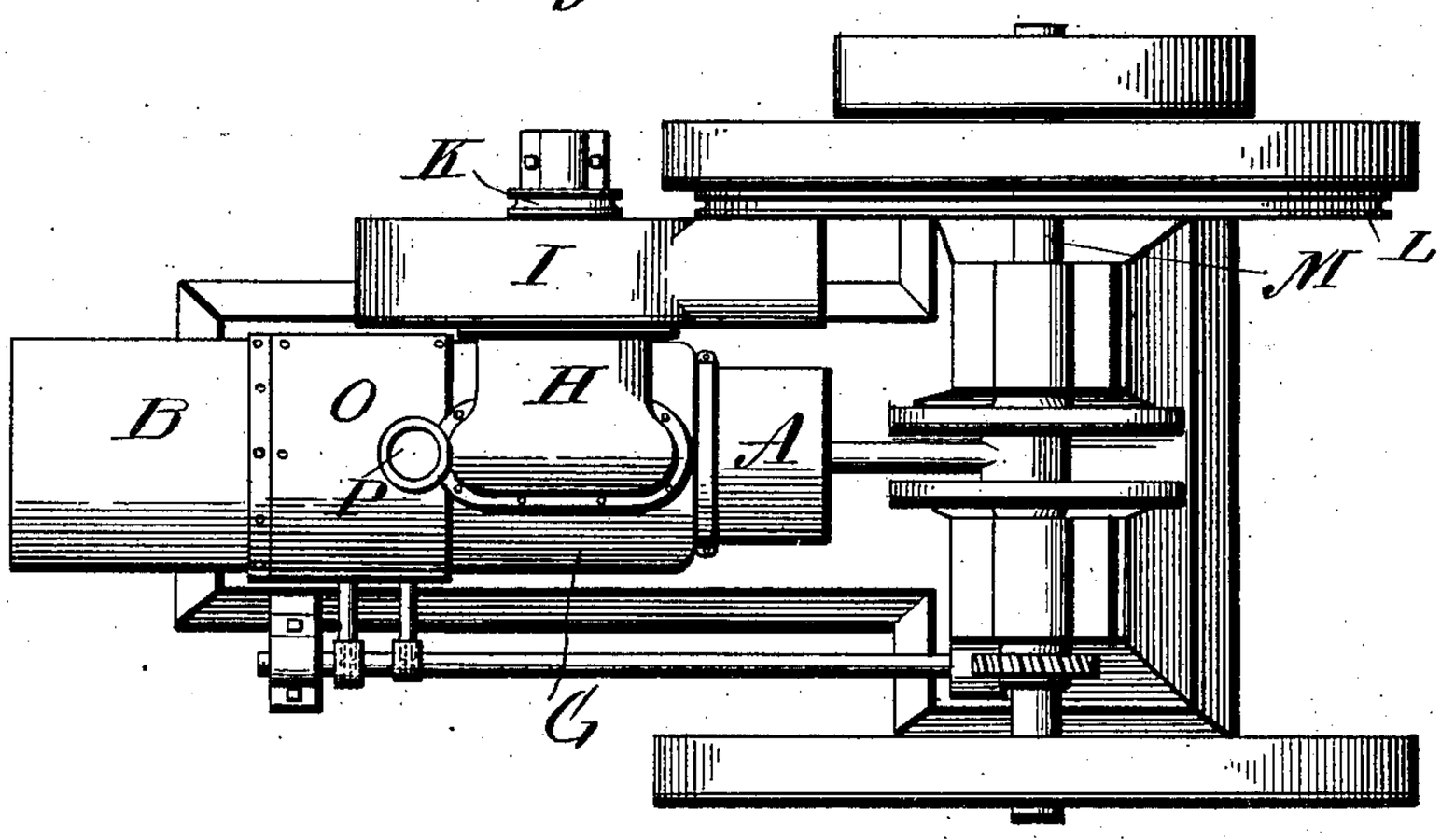
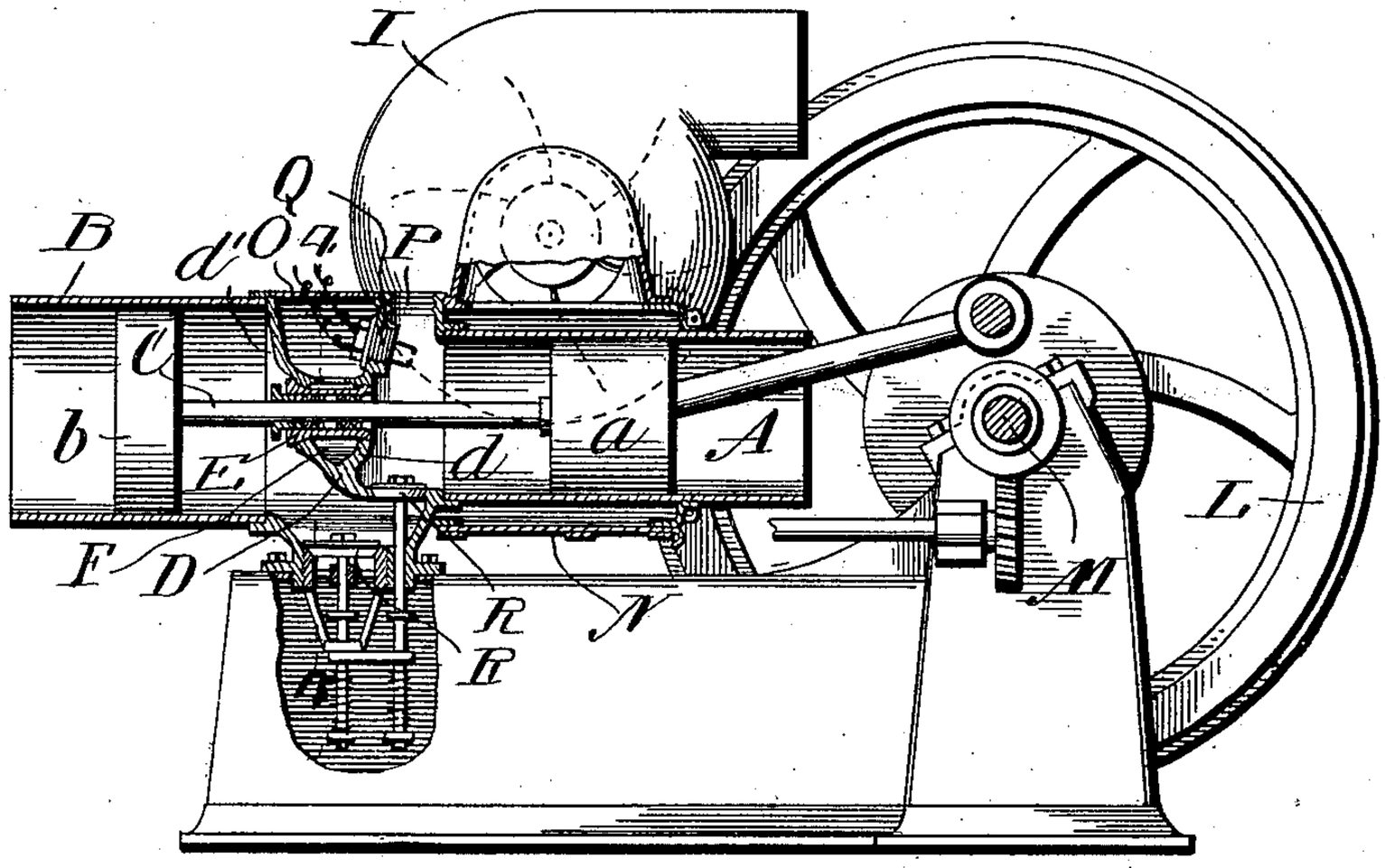


Fig. 2.



WITNESSES:
Wm. F. Doyle
Geo. B. Pitts.

INVENTOR
James White
BY
J. S. Barker
Attorney

No. 754,728. PATENTED MAR. 15, 1904.

J. WHITE.

COOLING DEVICE FOR EXPLOSIVE ENGINES.

APPLICATION FILED JAN. 22, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

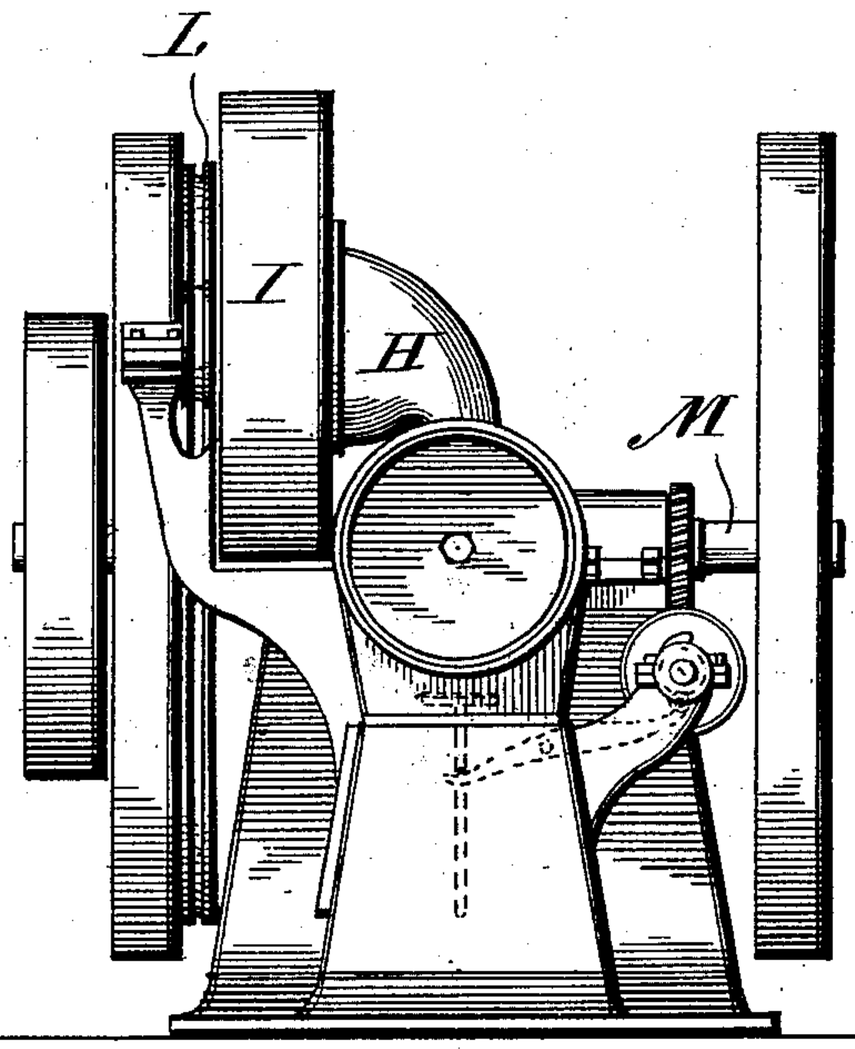


Fig. 5.

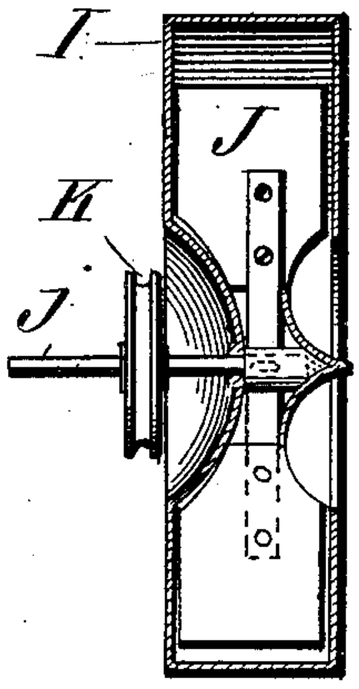
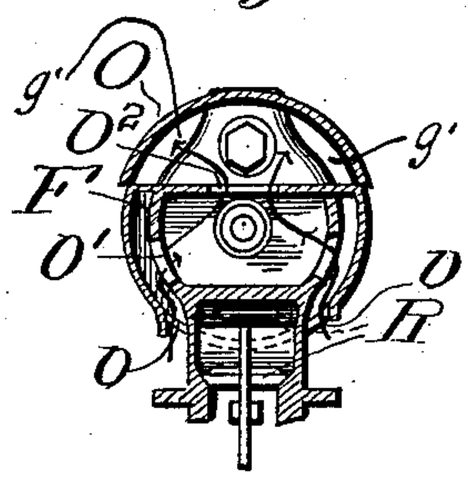


Fig. 4.



WITNESSES:

Wm. F. Doyle

Geo. B. Pitts.

INVENTOR

James White

BY J. S. Barker

Attorney

No. 754,728. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

JAMES WHITE, OF CLEVELAND, OHIO.

COOLING DEVICE FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 754,728, dated March 15, 1904.

Application filed January 22, 1903. Serial No. 140,139. (No model.)

To all whom it may concern:

Be it known that I, JAMES WHITE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Cooling Devices for Explosive-Engines, of which the following is a specification.

My invention relates to gas or gasolene engines which are actuated by the explosion and expansion of the gas, and it is particularly applicable to that type known as "four-cycle" engines. It is well known by users of this type of engine that the use of water for cooling (this being the almost universal medium for cooling gas-engines) has many objections besides the cost incident to water connections required and the liability of freezing in cold weather. Thus the practical range of temperature at which water may be employed for this purpose is quite limited. It cannot be used above 212° Fahrenheit, as that is the boiling-point of water, and it is not practicable to use it at much above 150° Fahrenheit, because its cooling efficiency is at that temperature not sufficiently great, while it is difficult to keep the water at a lower temperature.

My invention has for its object to provide improved means for cooling the various parts of an explosive-engine and to dispense with the use of water for this purpose. For this purpose I employ air, which is caused to circulate about the cylinder of the explosion-chamber and about such other parts of the engine as it is desired to keep cool by means of a powerful suction-fan and casing connections between the various parts of the engine and the fan.

In the accompanying drawings, Figure 1 is a top plan view of a compound explosive-gas engine embodying my improvements. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is an end view. Fig. 4 is a vertical sectional view taken on the line 4 4 of Fig. 2, and Fig. 5 is a detail vertical sectional view of the fan.

My invention may be applied to any gas-engine; but I have represented it in connection with an engine embodying other features of my invention, which, however, are not herein claimed, forming the subject-matter of another application filed of even date herewith.

Referring to the drawings, A indicates the high-pressure explosion-cylinder of the gas-engine, and B the low-pressure cylinder thereof. In these cylinders are mounted, respectively, the pistons *a* and *b*, these being arranged tandem and connected by the piston-rod C. The two cylinders are arranged axially in line with each other and are connected by a head-piece, (designated generally by D.) This head-piece is constructed to form the end wall *d* of the cylinder A and the end wall *d'* of the cylinder B. In this end wall is mounted the stuffing-box or packing E for the piston-rod C. The two walls *d d'* of the head-piece D are separated from each other, forming an open space F surrounding the packing-box. The inner portion of the explosion-cylinder A is surrounded by a casing or jacket G. This in turn is connected by an air-duct H with the eye of the fan-casing I. The fan J, which is represented in detail in Fig. 5, is a suction-fan of large power and is mounted upon a shaft *j*, upon which is mounted the pulley K, arranged to be connected by a belt with a grooved wheel L on the crank-shaft M of the engine.

N represents a damper or slide arranged to control an opening through the casing G by opening or closing the slide, by which the amount of air passing through the fan can be regulated. The open space between the heads *d d'* of the cylinder and surrounding the stuffing-box of the piston-rod is inclosed by a suitable casing O. (See particularly Fig. 4.) This space connects with the space inclosed by the casing G on both sides thereof, as represented at *g' g'*, and there are suitable openings *o o' o²* to permit a free circulation of air from the outside around and about the piston-rod packing and then into the chamber inclosed by the casing G and thence to the fan, the course of the air being indicated by the arrows in Fig. 4.

P designates the opening through the head-piece D and into the explosion-chamber,

through which the charges of gases to be exploded are taken. Q designates in a general way the sparking device, and R R the valves. These latter parts—the valves, the sparking device, and inlet connection—may be of any usual or approved construction and need not be described in detail.

By employing a fan such as shown and connecting it to be driven at a high rate of speed I produce a powerful suction within the space inclosed by the casing G, and by opening the damper N to a greater or less extent I can accurately regulate the amount of air that is allowed to circulate about the explosion-cylinder. It will be readily understood that more air will be required to cool the cylinder in hot weather than when the weather is cold, and I thereby construct the fan of a size and capacity to operate efficiently under all circumstances.

By the arrangement which I have shown I have found that the explosion-cylinder may be kept at the proper temperature at a very small expenditure of power, and the temperature at which it is kept can be regulated with great nicety. I am also enabled to keep down the temperature of the stuffing-box for the piston-rod, which is a very desirable feature of the invention.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an engine, the combination of a cylinder, a piston working therein, a piston-rod extending through the head of the cylinder, a stuffing-box or packing for the piston-rod, an inclosed air-space about the stuffing-box or packing, and means for causing air to circulate through the said air-space to keep the stuffing-box or packing cool, substantially as set forth.

2. In an explosive-engine, the combination of an explosion-cylinder, a piston-rod extending through the head of the same, a stuffing-box or packing for the piston-rod, an air-space about the said stuffing-box, and means for causing an air circulation about the said stuffing-box to cool the same, substantially as set forth.

3. In an explosive-engine, the combination of an explosion-cylinder, a casing G surrounding the same, means for causing circulation of air through the said casing, a piston-rod extending through the head of the cylinder, a stuffing-box or packing for the piston-rod, and an air-space about the said stuffing-box also connected with the said means for causing a circulation of air, substantially as set forth.

4. In an explosive-gas engine, the combination of an explosion-cylinder, a casing surrounding the same, means for causing a circulation of air through the casing, a piston-rod extending through the head of the cylinder, a stuffing-box or packing for the piston-rod, and a casing inclosing an air-space about the said stuffing-box or packing, the said casing being connected with the casing surrounding the explosion-cylinder, whereby air is caused to circulate about both the stuffing-box and explosion-cylinder to keep them cool, substantially as set forth.

JAMES WHITE.

Witnesses:
J. S. BARKER,
GEO. R. LINKINS.