No. 798,247. PATENTED AUG. 29, 1905.

G. WOLKE.

AIR COOLING DEVICE FOR ENGINES.

APPLICATION FILED JAN. 28, 1904.

2 SHEETS—SHEET 1.

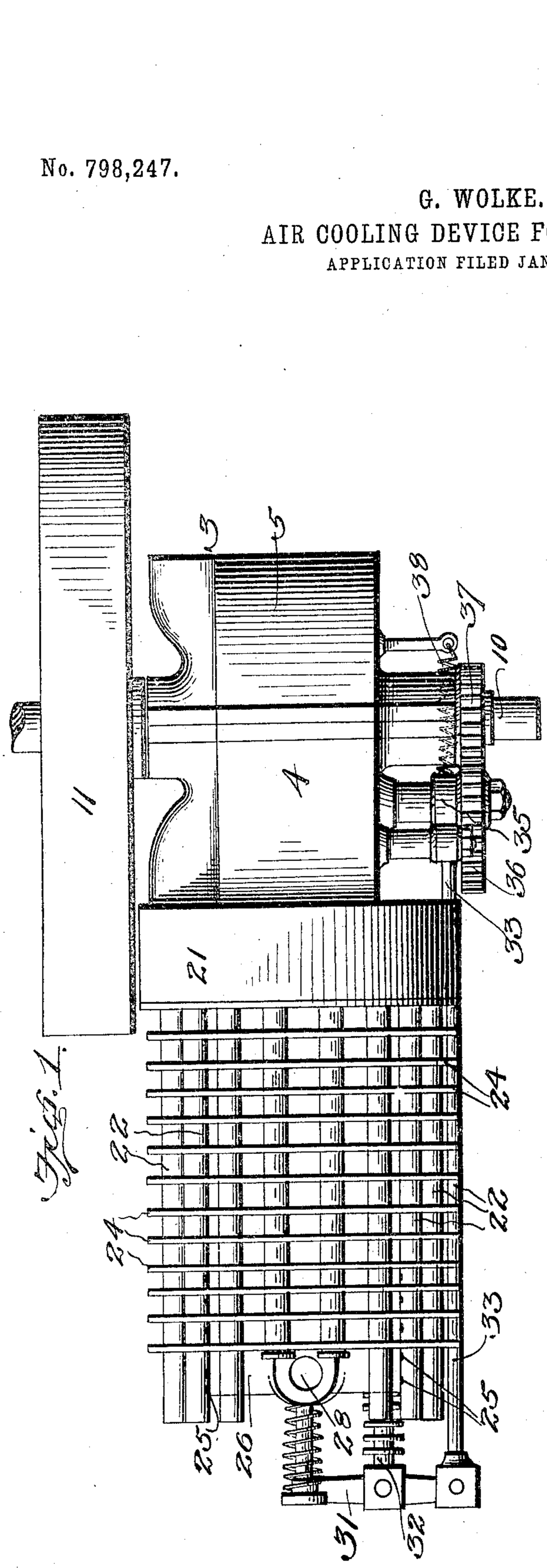

Fig. 1.

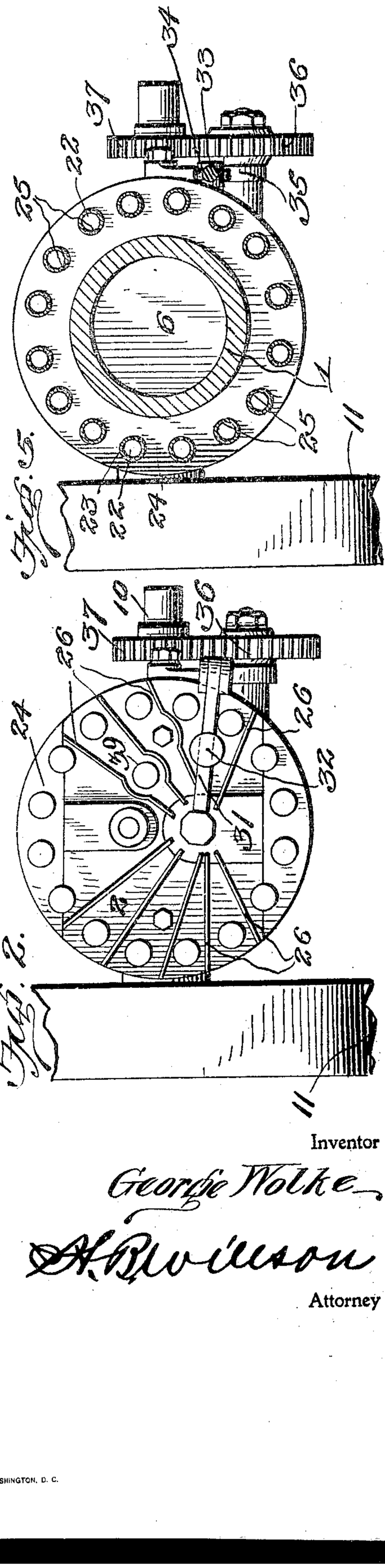

Fig. 5.

Fig. 2.

Witnesses

C. E. Hunt

J. Allison

Inventor

George Wolke

By H. B. Wilson

Attorney

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Fig. 3.

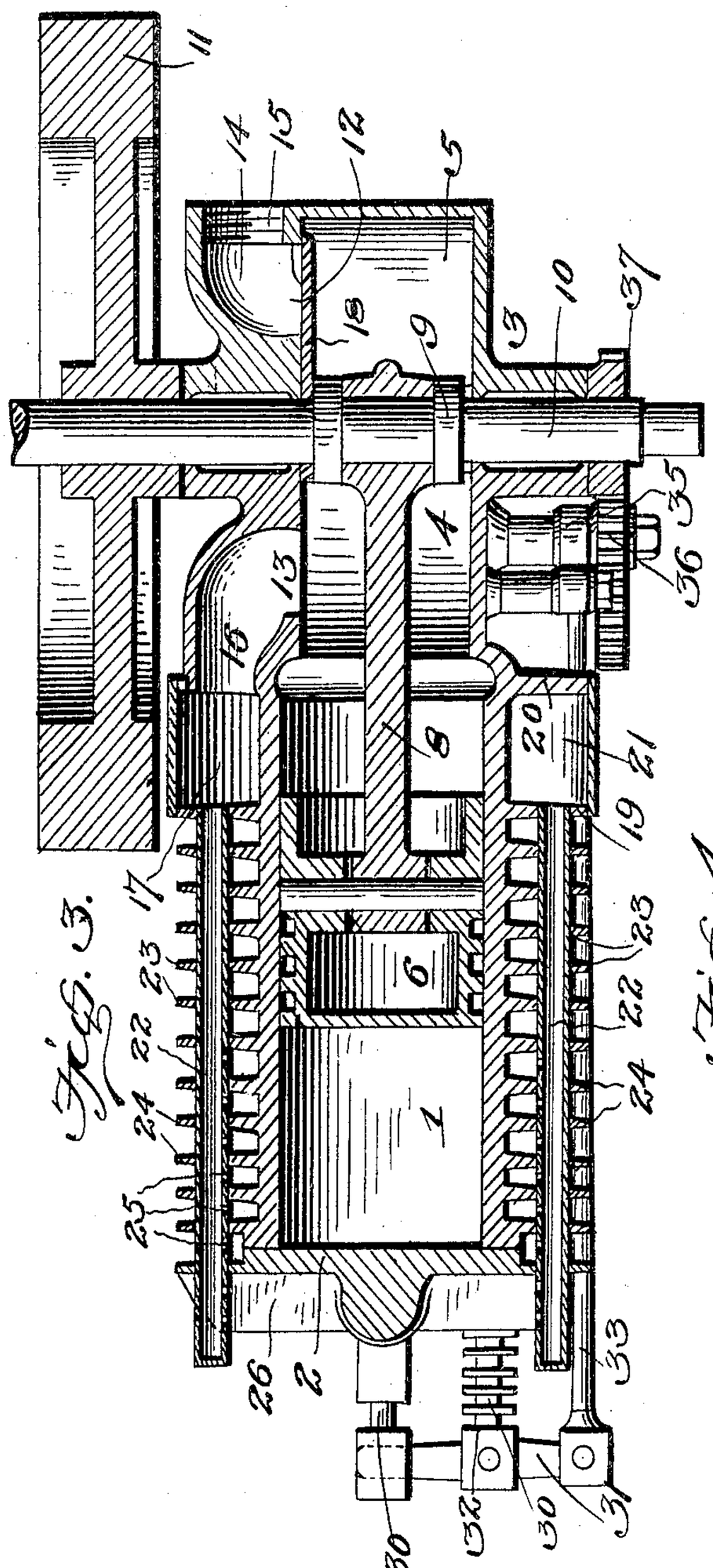
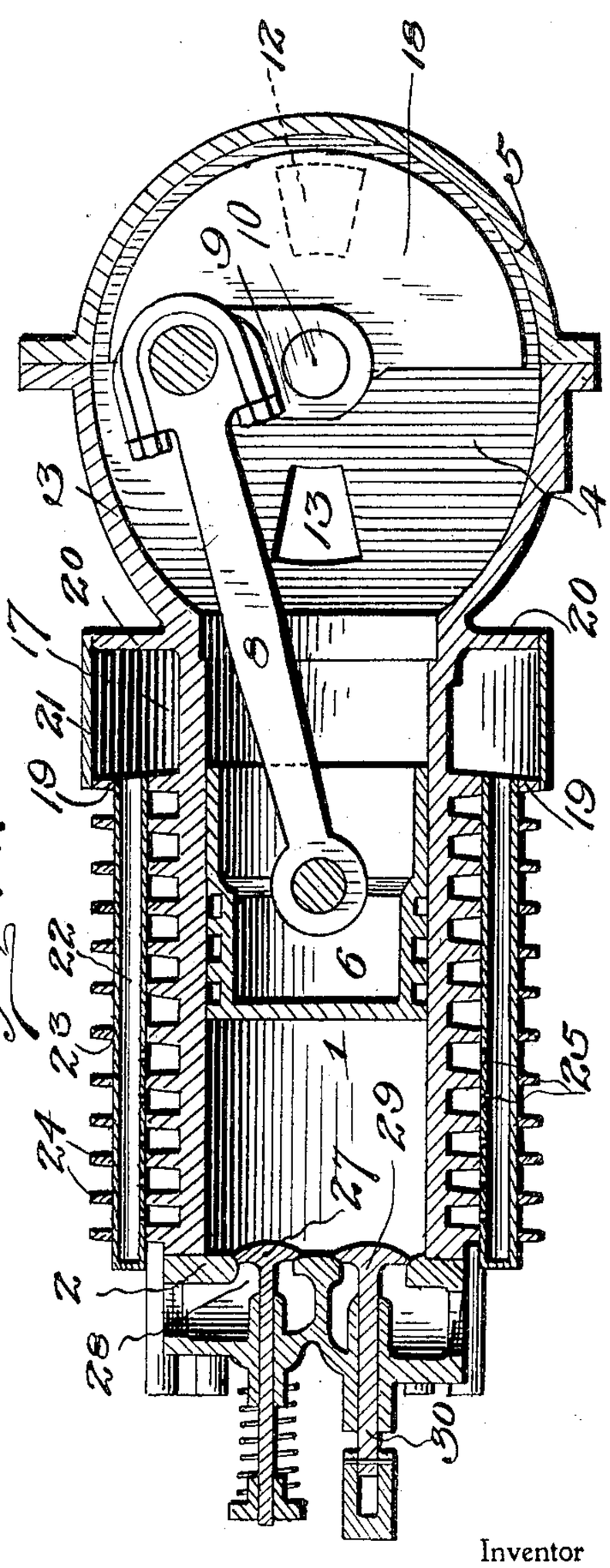


Fig. 4.



Witnesses

C. B. Hunt.

J. Ellison

Inventor

George Wolke

By H. B. Willson

Attorney

UNITED STATES PATENT OFFICE.

GEORGE WOLKE, OF JACKSONVILLE, ILLINOIS, ASSIGNOR OF ONE-HALF TO EDWARD P. KIRBY AND WILLIAM K. McLAUGHLIN, OF JACKSONVILLE, ILLINOIS.

AIR-COOLING DEVICE FOR ENGINES.

No. 798,247. Specification of Letters Patent. Patented Aug. 29, 1905.

Application filed January 28, 1904. Serial No. 191,045.

To all whom it may concern:

Be it known that I, GEORGE WOLKE, a citizen of the United States, residing at Jacksonville, in the county of Morgan and State of Illinois, have invented certain new and useful Improvements in Air-Cooling Devices for Engines; and I do 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 appertains to make and use the same.

My invention relates to improvements in air-cooling devices for engines, particularly gasolene-engines and other internal-combustion motors.

One of the objects of my invention is to provide a simple, durable, and highly-efficient device of this character in which the crank-chamber and the rear end of the piston of the engine will be utilized as an air-pump for the purpose of forcing cooling currents of air against the cylinder or other heated parts of the engine.

Another object of my invention is to provide a simple, durable, and comparatively inexpensive valve mechanism for the crank-chamber of the engine, whereby it may be used as an air-pump for the purpose specified.

Another object of my invention is to provide an improved means for distributing the cooling currents of air over the engine-cylinder in a simple and effective manner to secure the best results.

With these and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a top plan view of a gasolene engine or motor constructed in accordance with my invention. Fig. 2 is an end elevation of the same. Fig. 3 is a horizontal sectional view. Fig. 4 is a vertical longitudinal sectional view. Fig. 5 is a vertical transverse sectional view through the cylinder.

Referring to the drawings by numeral, 1 denotes an engine-cylinder having its outer end closed by a head 2 and its inner end in open communication with a closed crank chamber or casing 3, which is formed by two half-sections 4 and 5, the section 4 of the casing being cast integral with the cylinder 1 at its inner end, as shown, and the section 5 being bolted or otherwise secured to the section 4. The piston 6, which reciprocates in the cylinder 1, is connected by a rod 8 to a crank 9 upon a shaft 10, which is mounted in suitable bearings in the sections 4 and 5 of the casing 3 and has upon one of its outer ends the usual fly-wheel 11.

The closed crank chamber or casing 3 has formed in one of its side walls air inlet and outlet ports or openings 12 and 13, which are disposed on opposite sides of the crank-shaft and preferably in line with the center of the engine-cylinder. The intake-port 12 communicates with a passage 14, formed in the section 5 of casing 3 and having its outer end open to the atmosphere, as shown. If desired, a pipe leading from any suitable source of cold-air supply may be tapped into the outer screw-threaded end 15 of said passage. The outlet-port 13 communicates with a passage 16, formed in the section 4 of the casing 3 and communicating with an annular air-distributing chamber 17, which surrounds the inner end of the cylinder 1 adjacent to the section 4 of the crank-casing 3. The said inlet and outlet ports 12 and 13 are controlled by a rotary valve 18 in the form of a semicircular disk of wood fiber or any other suitable material, which is secured to the crank-shaft 10, as shown. Said valve is adapted to rotate close to the side wall of the casing 3, in which said ports 12 and 13 are formed, and is so disposed that one of said openings will be closed while the other is open, said openings being preferably segmental in shape, as shown, so that one will open at the same speed that the other closes.

It will be seen that the provision of the ports or openings 12 and 13 and the rotary valve 18 in the closed crank-chamber 3 will cause the latter to coact with the rear end of the piston 6 and serve as an air-pump. Upon the outward movement of the piston 6, or the stroke toward the combustion end of the cylinder, the valve 18 will close the port 13 and open port 12 to suck or draw air into the chamber 3 through said port 12, and upon the return of the piston toward the crank-chamber, or its instroke, the valve 18 will open the port 13 and close the port 12, so that the air drawn into the crank-chamber 3 will be forced from the same through said port 13 into the distributing-chamber 17.

The said distributing-chamber 17 is formed by two annular radially-projecting flanges 19 and 20, having their outer edges connected by a ring or band 21, which forms a jacket to inclose the space between them. The air entering said distributing-chamber through the passage 16 passes from the same through a series of longitudinally-disposed distributing-tubes 22, arranged parallel at suitable intervals or spaces around the outside of the cylinder. The said tubes extend through alining openings 23, bored or otherwise formed in a series of parallel radially-projecting annular flanges 24, which are preferably cast integral with the cylinder upon its outside and designed to radiate the heat generated within the cylinder. The said tubes 22, which have their outer ends closed and their inner open ends in communication with the distributing-chamber 17, are formed with discharge-openings 25, located between the said flanges 24 and disposed opposite the outside of the cylinder 1, so that the cool air discharged from them will be directed against the cylinder. Said openings 25 are preferably provided only adjacent to the outer or combustion end of the cylinder, as shown, so that the cool air will be directed to the hottest part, where it is most needed. Some of the distributing-tubes 22 extend beyond the outer end of the cylinder and have some of their discharge-openings 25 opening between heat-radiating flanges 26, provided upon the outer side of the head 2 of the cylinder. Said heat-radiating flanges or webs 26 project at right angles from the head 2 and are arranged radially, as shown.

In the cylinder-head 2 is provided a spring-seated intake-valve 27 of ordinary construction, through which a charge of explosive mixture is drawn by the piston, the said valve affording communication between the engine-cylinder and a passage 28, formed in the cylinder-head and adapted to be connected up with a carbureter or the like. In the said cylinder-head 2 is also provided an exhaust or discharge valve 29, through which the gases in the cylinder escape after the explosion. Said valve may be operated in any suitable manner. As shown, its stem 30 is formed with an opening through which one end of a rocker arm or lever 31 projects. Said lever 31 is pivoted intermediate its ends to a post 32, projecting from the cylinder-head 2, and has its opposite end pivoted to the outer end of a longitudinally-disposed rod 33, mounted in a suitable guide or hanger and having its inner end provided with a friction-roller 34, which rides upon a cam 35, secured upon one face of a gear 36, which is journaled on a suitable shaft projecting from the casing 3 and is in mesh with a pinion 37, secured upon the crank-shaft 10. The gear 36 is twice the size of the pinion 37, so that the valve will be opened but once during two revolutions of the crank-shaft. Said valve is seated and the roller 34 is held in engagement with the cam 35 by a coil-spring 38, which has its ends connected, respectively, to the said rod 33 and to a pin projecting from the side of the casing 3. A sparking device of any desired form or construction (not shown) is placed in an opening 39, formed in the cylinder-head 2, and a suitable contact device, which is under the control of the operator, is preferably provided upon the said gear and pinion.

The operation and advantages of my invention will be readily understood from the foregoing description, taken in connection with the accompanying drawings. It will be seen that upon each outstroke of the piston cool air will be drawn into the crank-chamber through the port 12, and upon its instroke the air thus drawn in will be expelled through the port 13 and passage 16 from said crank-chamber into the distributing-chamber 17 and from the latter into the distributing-tubes 22, which discharge it against the heated sides and end of the engine-cylinder. The valve 18 will effectively control the inlet and outlet of air to and from the crank-chamber and will run smoothly and noiselessly, offering no resistance to the air passing through the open port. The air expelled from the openings 25 in the distributing-tubes 22 is directed to the points where the most benefit is derived from it— that is, to the combustion end of the cylinder and to the exhaust-valve in the cylinder-head.

While I have shown and described the preferred embodiment of my invention, I wish it understood that I do not limit myself to the form of engine nor to the construction and arrangement of parts herein shown and described. For instance, instead of employing the rotary valve 18 I may use two check-valves to accomplish the same result.

Various other changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

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

1. An internal-combustion motor having a crank-chamber, a cylinder having heat-radiating flanges or webs and communicating with said crank-chamber, air-distributing tubes supported by the flanges and having discharge-openings for projecting cooling streams or jets of air between the flanges to the heated parts of the motor, a piston in said cylinder, and valve mechanism coacting with said piston to pump a cooling medium through said air-distributing tubes, substantially as described.

2. An internal-combustion motor having a crank-chamber, a cylinder communicating with said crank-chamber, flanges surrounding the cylinder, air-distributing tubes extending through the flanges and having discharge-openings for projecting cooling jets or cur-

rents of air longitudinally along and against the heated portions of said cylinder, a piston in said cylinder, and valve mechanism coacting with said piston to pump air into said distributing-tubes, substantially as described.

3. An internal-combustion motor having a crank-chamber, a cylinder communicating with said crank-chamber, flanges surrounding said cylinder distributing-tubes passing through said flanges and provided with jet-orifices for directing cooling jets or currents of air longitudinally along and against the heated parts of the motor, a piston in said cylinder, and valve mechanism coacting with said piston and crank-chamber to pump air into said distributing-tubes, substantially as described.

4. An internal-combustion motor having a crank-chamber, a cylinder provided with exterior flanges and communicating with said crank-chamber, an air-distributing chamber surrounding the cylinder at its inner end, discharge-tubes supported by said flanges and leading from said distributing-chamber longitudinally of the cylinder, and provided with jet-orifices to direct cooling currents of air against the heated parts of the motor, a piston in said cylinder, and valve mechanism coacting with said piston and crank-chamber to pump air into said distributing-chamber, substantially as described.

5. An internal-combustion motor having a closed crank-chamber, a cylinder in communication with said crank-chamber, an annular air-distributing chamber surrounding one end of said cylinder, a plurality of longitudinally-extending air-discharge tubes projecting from said distributing-chamber and arranged around said cylinder to direct cooling currents of air against the heated parts of the latter, a piston in said cylinder, and valve mechanism coacting with said piston and crank-chamber to pump air into said distributing-chamber, substantially as described.

6. An internal-combustion motor having a closed crank-chamber, a cylinder in communication with said crank-chamber, heat-radiating flanges or webs upon said cylinder, air-discharge tubes projecting through said flanges or webs and adapted to discharge cooling currents of air between the same and against the cylinder, an air-distributing chamber in communication with said discharge-tubes and said crank-chamber, a piston in said cylinder, and valve mechanism coacting with said piston and crank-chamber to pump air into said distributing-chamber, substantially as described.

7. In an internal-combustion motor, the combination of a cylinder having heat-radiating flanges, air-discharge tubes projecting through said flanges, and means for forcing air through said tubes, substantially as described.

8. In an internal-combustion motor, the combination of a cylinder having annular radially-projecting heat-radiating flanges, longitudinally-disposed air-discharge tubes projecting through said flanges, and means for forcing air through said tubes, substantially as described.

9. In an internal-combustion motor, the combination of a cylinder, an annular air-distributing chamber surrounding said cylinder at one end, air-discharge tubes projecting from said chamber and arranged around said cylinder, said tubes being provided with jet-apertures to project streams of air against the cylinder, and means for forcing air into said air-distributing chamber, substantially as described.

10. In an internal-combustion motor, the combination of a cylinder having heat-radiating flanges upon its sides and head, and air-discharge tubes extending through said flanges upon its sides and adapted to discharge air between the same and said flanges upon its head, substantially as described.

11. In an internal-combustion motor, the combination of a cylinder, a piston in said cylinder, flanges surrounding the cylinder, perforated air-distributing tubes passing through the flanges a closed crank-chamber in communication with said cylinder and provided with inlet and discharge openings, a crank-shaft in said crank-chamber operated by said piston, and a semicircular disk secured to said crank-shaft and adapted to alternately open and close said openings in said crank-chamber, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE WOLKE.

Witnesses:
JAMES K. C. PIERSON,
JOHN E. DAY.