G. WOLKE.

COOLING DEVICE FOR ENGINES.

APPLICATION FILED FEB. 24, 1909.

981,733.

Patented Jan. 17, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

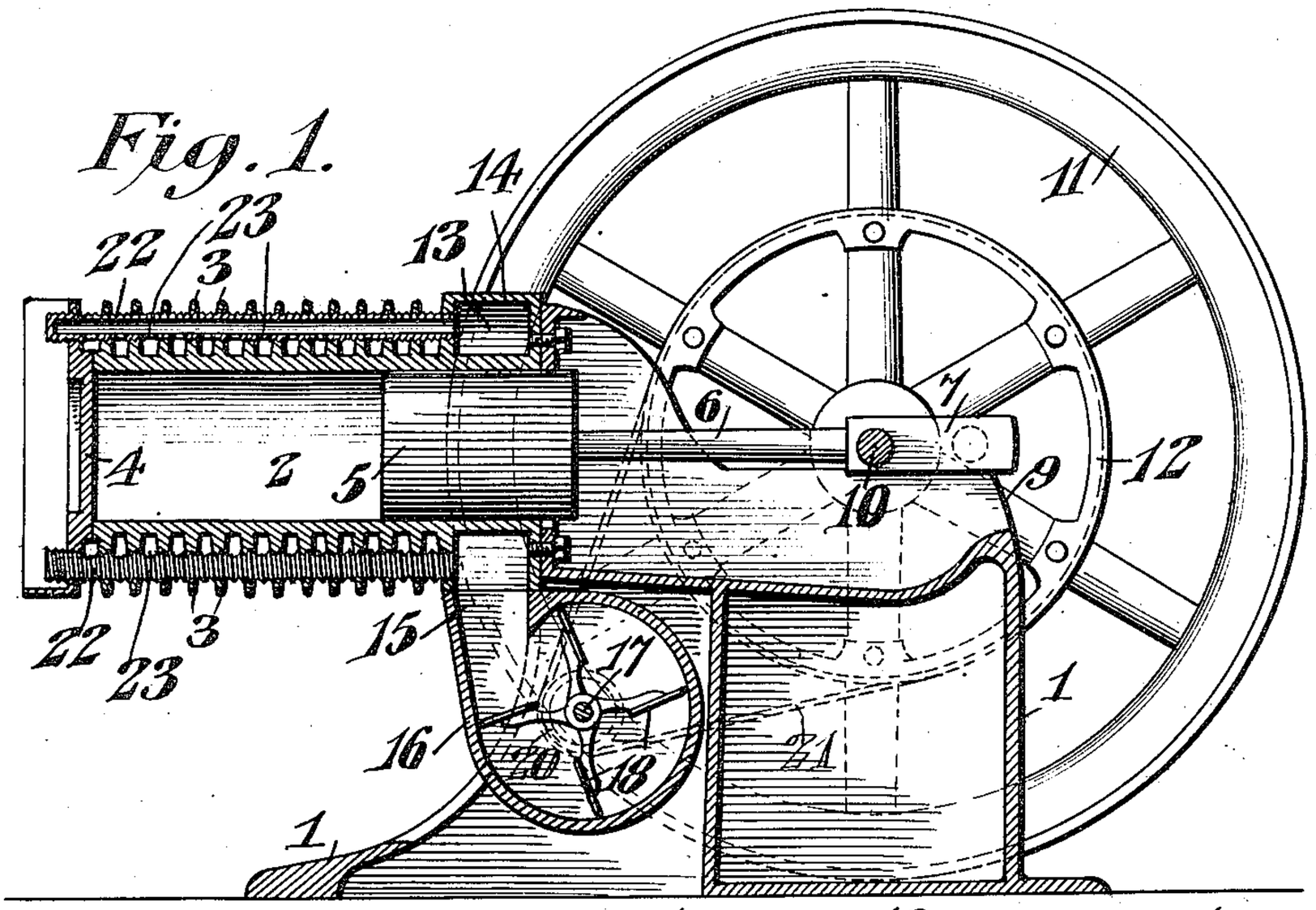


Fig. 2.

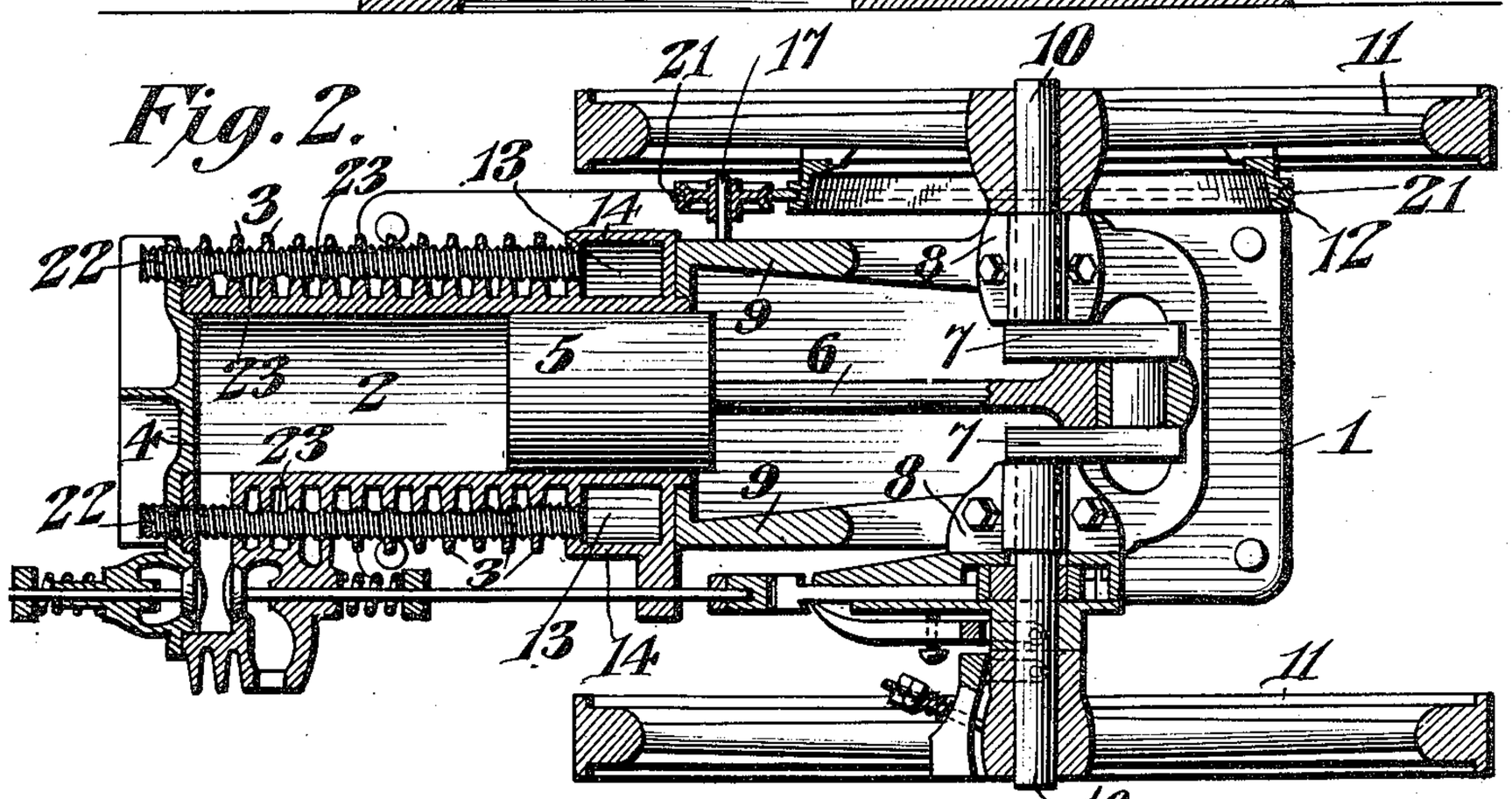
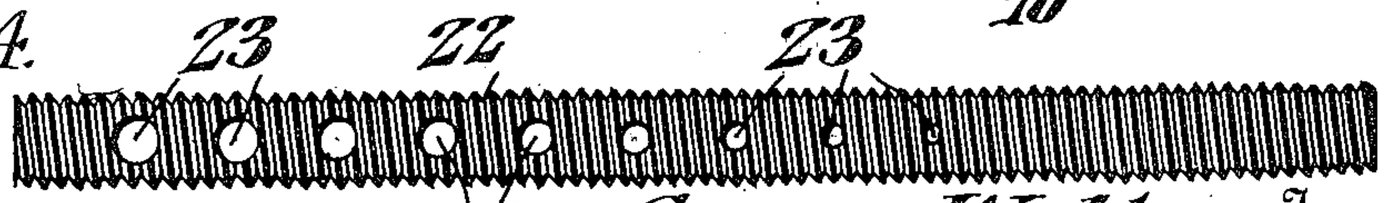


Fig. 4.



Witnesses

Jas. K. McCathran

Frederick B. Wright

Inventor

George Wolke

By E. G. Siggers

Attorney

G. WOLKE.

COOLING DEVICE FOR ENGINES.

APPLICATION FILED FEB. 24, 1909.

981,733.

Patented Jan. 17, 1911.

2 SHEETS—SHEET 2.

Fig. 3.

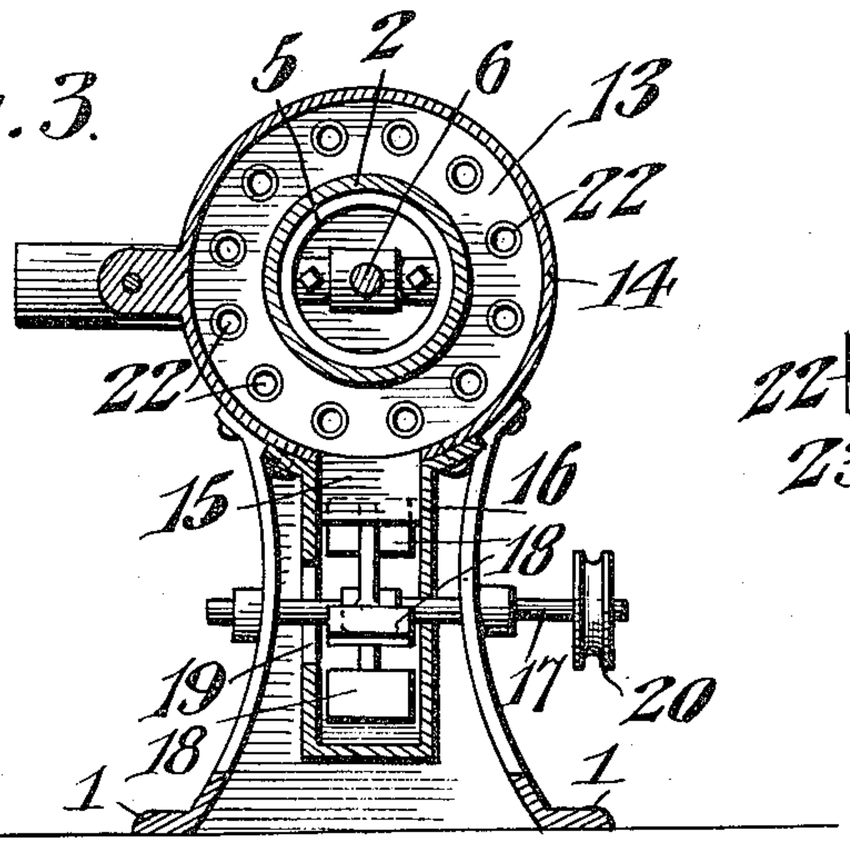


Fig. 5.

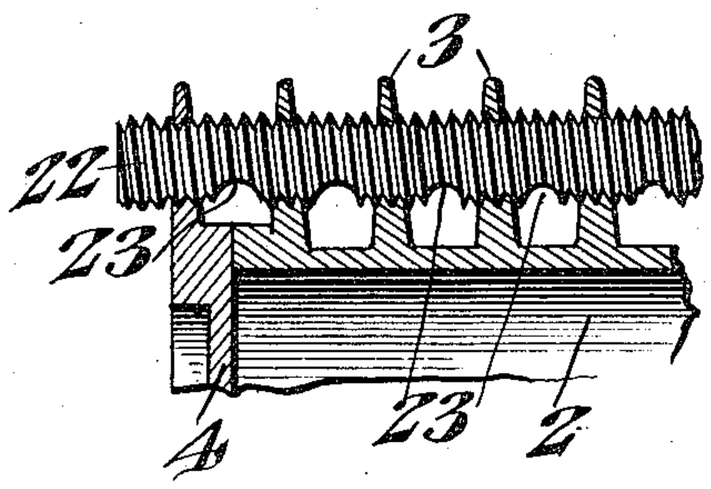


Fig. 6.

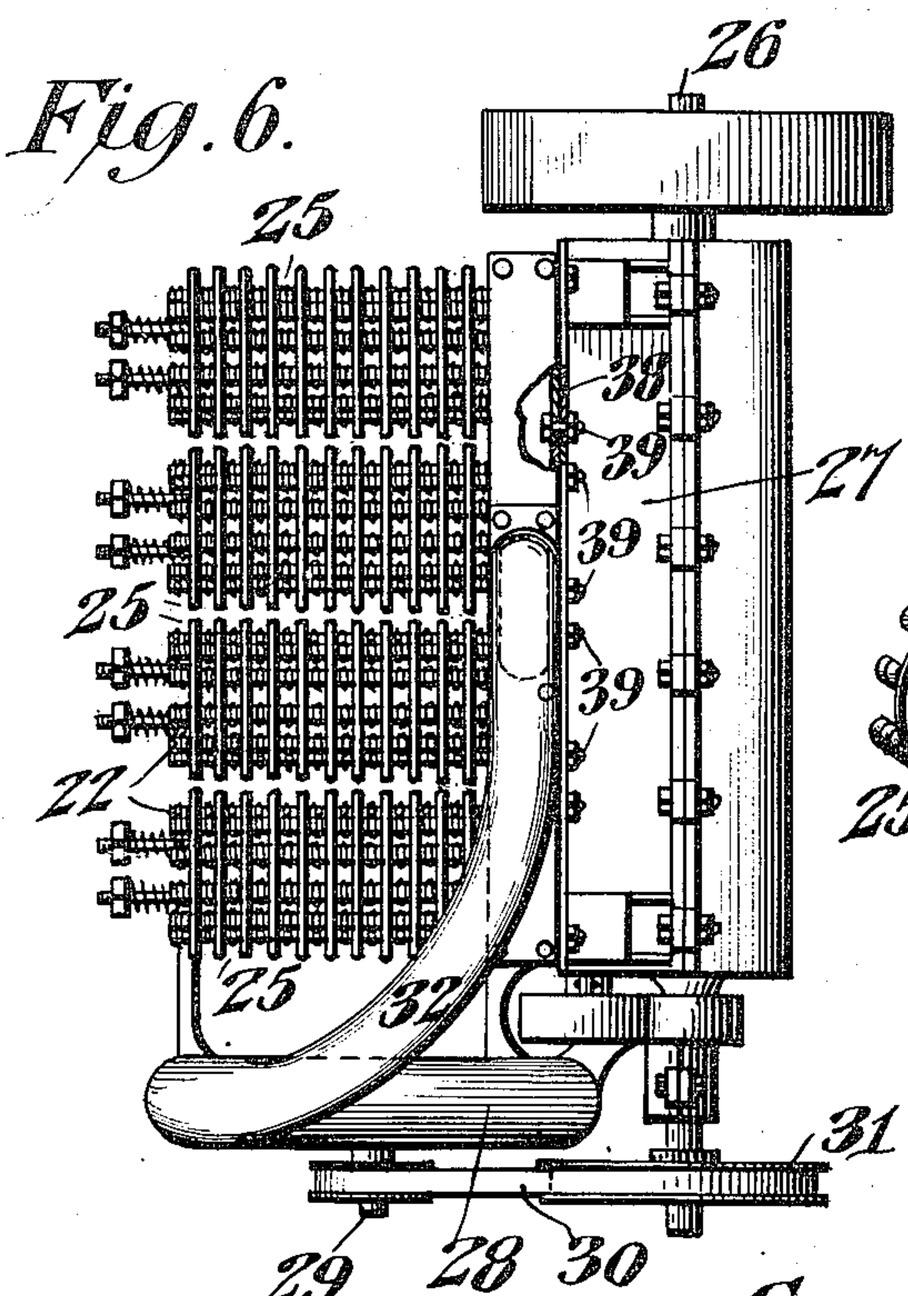
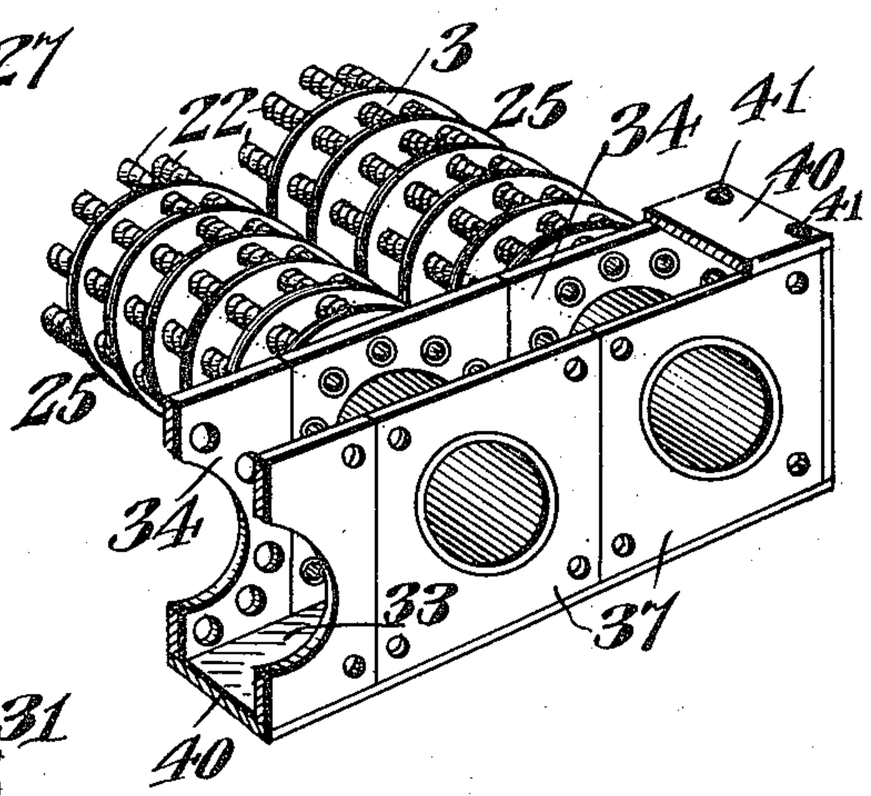


Fig. 7.



George Wolke, Inventor

Witnesses

Jas. K. McCathran

Judson B Wright

By E. G. Siggers

Attorney

UNITED STATES PATENT OFFICE.

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

COOLING DEVICE FOR ENGINES.

981,733. Specification of Letters Patent. Patented Jan. 17, 1911.

Application filed February 24, 1909. Serial No. 479,696.

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 a new and useful Cooling Device for Engines, of which the following is a specification.

My invention relates to improvements in cooling devices for the cylinders of explosive engines, and more particularly to a construction of the character set forth in Letters-Patent No. 798,247, granted to me August 29, 1905, and No. 879,428, patented February 18, 1908. In both of these patents a construction was shown wherein the cylinder was provided around its circumference with a series of cold air pipes, these pipes being formed with orifices opening toward the cylinder and the pipes being connected to a source of cold air. Thus in the operation of my construction cold air was driven into these pipes and forced from the orifice against the exterior walls of the cylinder.

The object of the present invention is to render the construction described by my previous patents more effective in operation, that is, more effective to cool the cylinder. In the first patented construction air or cooling medium was drawn into the crank chamber and then forced into the distributing pipes for discharge against the cylinder, and in the second construction the cold air was injected or drawn into the discharge tubes or pipes by streams or jets of partially heated air. I find that while this construction is in many cases efficient for the purpose, that the air is likely to be too much heated by being drawn into the crank chamber or forced into the discharge pipes by heated air and hence in this present invention I provide a blower or equivalent air-forcing apparatus driven by the engine which is entirely separate and apart from the crank chamber, this blower being connected to a distributing chamber which surrounds the open end of the cylinder and from which the cooling tubes above referred to extend. Thus, it will be seen that cold air will be drawn into the blower and will be forced out therefrom directly into the discharge pipes. In addition to the fact that the cold air is not warmed before issuing to the discharge pipes, the construction provides for a very compact arrangement of the blower mechanism and allows me to use an open crank chamber, thus permitting the crank and those portions of the mechanism connected therewith or opening thereon to be cooled by the exterior air.

My invention also includes improvements in the means whereby the discharge tubes are attached to the cylinder, and the air chamber for these tubes formed, and in addition includes an improvement in the construction of the discharge tubes whereby a large amount of heat-radiating surface is provided and also whereby the tubes may be readily inserted and securely held in position in the radiating flanges or ribs upon the exterior of the cylinder.

In the drawings, Figure 1 is a longitudinal section of an engine and cylinder, the fly-wheel, however, being shown in elevation; Fig. 2 is a plan view of Fig. 1, the cylinder being shown in section; Fig. 3 is a vertical section through the rear end of the cylinder and the blower casing; Fig. 4 is an elevation of one of the discharge tubes showing the inside face thereof; Fig. 5 is a fragmentary section of one of the outer ends of the cylinder with one of the tubes in place, the tube being in elevation; Fig. 6 is a plan view of a multi-cylinder engine, showing how my blower may be applied thereto; Fig. 7 is a fragmentary detail of two of these cylinders, the air chamber being broken away.

In the drawings 1 denotes a base of any suitable construction and supporting at its forward end the usual cylinder 2, formed with a series of circumferential outstanding ribs or flanges 3. The forward end of the cylinder is closed by the usual head 4, and in the cylinder moves the usual piston 5, of any suitable construction, connected by a pitman 6 to the crank 7 supported in bearings 8 on the upwardly projecting side walls 9 of the base. The crank shaft 10 has on it the usual fly-wheel 11 and a band or pulley wheel 12, which rotates with the shaft or fly-wheel and may be made in any desired manner.

The rear end of the cylinder is formed with a chamber 13, this chamber being conveniently made by omitting one of the ribs 3 and connecting the two rearmost ribs remaining by a cover plate 14, which extends around the cylinder but opens at its bottom into a duct 15 leading to a blower casing 16, which in the form of the engine shown in

Fig. 1 is located between the two side pieces of the base 1, and in line with the axis of the cylinder and engine. Passing through the blower casing is the shaft 17 mounted in suitable bearings in the sides 1 of the base, and carrying fan blades 18. These blades may be made in any desired form which will best conduce to forcing air into the chamber 13. An opening 19 admits air to the blower casing. The end of the shaft carries the belt pulley 20, which is connected by a band 21 to the band wheel 12. Extending from the chamber 13 and surrounding the cylinder is a series of air discharge tubes 22. The forward ends of these tubes are blocked or closed, but the rear ends pass through the outer wall of the chamber 13 and open into the chamber. These tubes are provided on their inside faces with a series of openings 23, which extend from the outer end of the cylinder rearwardly nearly to the inner end thereof, these openings gradually diminishing in size. The reason for the diminishing size of the openings is that the forward end of the cylinder is of course the hottest and thereby requires a greater amount of cold air to be discharged thereon. The heat of the cylinder gradually diminishes as it nears the rearward end thereof, and, hence, the holes proportionately diminish, and, indeed, do not extend to the entire length of the cylinder. While I may attach these tubes to the flanges 3 in any desired manner, as by simply inserting them through openings in the flanges, I preferably form the tubes with exterior ribs which preferably also take the form of screw threads as shown in detail in Fig. 4. These screw threads are relatively deep and constitute secondary heat-radiating ribs between the main ribs on the cylinder to coöperate therewith to very greatly increase the radiating surface of the tubes, thus assisting the flanges 3 to carry off heat from the cylinder, keep the tubes cool and thus prevent the heating of the air carried thereby. The screw threaded tubes also permit the tubes to be inserted more readily and held in position more rigidly than if the tubes were simply inserted through openings in the flanges or ribs 3.

While it is no part of my invention, I have shown this cylinder 2 as provided with the usual inlet and exhaust valves common to engines of this class, the inlet valve being shown as an ordinary suction valve, while the exhaust valve is opened by the usual cam mechanism carried upon the shaft 10. As this construction forms no part of my invention, is of any usual or desired character, and is well known, no further description thereof is necessary.

In Figs. 6 and 7 I show my invention as applied to a multi-cylinder engine of any ordinary construction. 25 denotes the cylinders, each of the form shown in Fig. 1, and each provided with the ribs 3, and with the usual inlet and exhaust mechanism. 26 denotes the crank shaft, corresponding to the shaft 10 in Figs. 1 and 2, and carrying, of course, the usual series of cranks connecting with the pistons of the cylinders 25. These cranks are contained within the sectional crank case 27. This crank case and the mechanism for driving the shaft 26 from the engines being well known, do not require any further description. 28 denotes a blower case of any desired character, having a blower shaft 29 connected by a belt 30 with a belt pulley 31 mounted on the shaft 26. The blower case is connected by a duct 32 with a chamber 33. This chamber corresponds to the chamber 13 in Figs. 1 and 2, and may, like the chamber 13, be conveniently formed by providing a transversely extending plate or series of plates 34, which extend across all of the cylinders 25, and through which the ends of all the cylinders project. The tubes 36 extend through these plates 34, and open into the interior of the chamber 33. The outer end of the chamber 33 is formed by a plate or series of plates 37, having central openings receiving the inner ends of the cylinders 25, and provided with bolts whereby they may be attached to the end plate 38 of the crank case 27, these bolts being designated 39, shown in Fig. 6. A plate or plates 40 inclose the space between the plates 37 and 34, these plates 40 being bolted to the plates 37 and 34 by stud bolts passing through openings 41.

Of course, it will be understood that I do not wish to limit myself to the particular construction shown, as other equally good ways of connecting the plates 37, 34 and 40 to each other and to the crank casing 27 may be used.

The operation of my invention in both its forms will be evident.

Air will be drawn in by the blower and will be forced into the chambers 13, or 33, and thence forced out through the discharge pipes 22 or 36, and discharged through the openings 23 against the sides of the cylinder or cylinders between the flanges, thus keeping the cylinder perfectly cool at all times and providing for a positive supply of cold air thereto, and also providing for a greatly extended radiating surface whereby the heat from the cylinders may be radiated to the exterior atmosphere.

The construction I have shown in Fig. 7 for a multi-cylinder engine is of particular advantage inasmuch as it permits me to combine any number of cylinders, each cylinder having the square or rectangular flanges 34 and 37, these flanges on each cylinder thus being capable of abutting against the like flanges on the next adjacent cylinder

to thereby form an air chamber common to all the cylinders, this casing being, of course, inclosed by the plate or plates 40. I do not of course, wish to limit myself to this manner of making the air chamber for a multi-cylinder engine, but I believe it to be preferable for the reason above stated.

It will be obvious, also, that many changes may be made in the exact details of construction without in any manner departing from the principle of my invention.

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

1. In an engine, the combination of a base, a cylinder supported by and projecting from the base and provided with a plurality of annular heat-radiating ribs having alined openings therethrough, a tube externally threaded throughout its length inserted through and secured in said alined openings and provided between the ribs with ports discharging against the cylinder, said ports being of gradually decreasing diameter toward the outer end of the cylinder, a blower mounted on the base adjacent the cylinder and communicating with said tube, and a driving shaft mounted on the base and driven from the cylinder and connected with the blower.

2. In an engine, the combination of a plurality of cylinders, an air chamber having opposed walls provided with openings into which the inner ends of the cylinders are fitted, a crank chamber, means for securing the crank chamber to one of the walls of the air chamber, the opposite wall of the air chamber having apertures extending around each cylinder, a plurality of air tubes mounted on each cylinder with their outer ends closed and their inner ends disposed in the apertures in the wall of the air chamber, said tubes having openings for discharging air against the outer surface of the cylinders, a blower, and means connecting the blower to the air chamber, said air chamber forming a connecting means between the cylinders and the crank casing.

3. In an engine, a series of parallel cylinders, each provided with a series of outwardly projecting radiating ribs, the inner end of each cylinder being formed with two parallel opposed rectangular flanges spaced apart from each other, the rectangular flanges of each cylinder being adapted to be alined and engaged with the rectangular flanges of the next adjacent cylinder, a cover plate closing the space between said flanges and with them inclosing an air chamber, a blower, a connection between the blower and said air chamber, and a series of air discharge tubes on each cylinder closed at one end, passing through the series of radiating ribs and into said air chamber, said tubes being each provided with perforations opening toward the adjacent cylinder.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

GEORGE WOLKE.

Witnesses:
J. N. C. PIERSON,
CYRUS C. CORNFELDT.