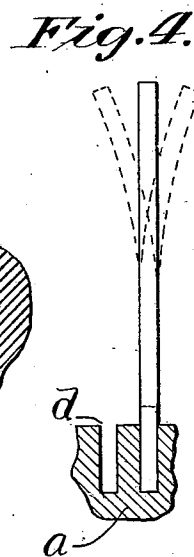
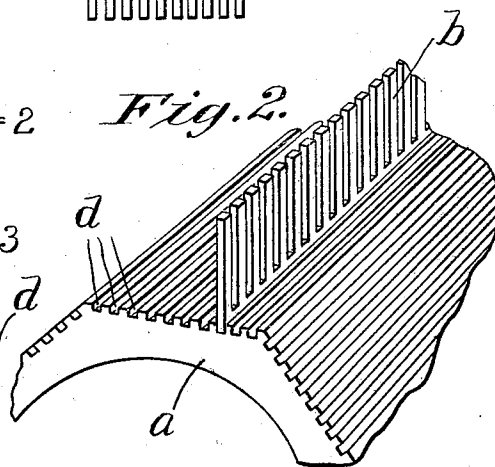
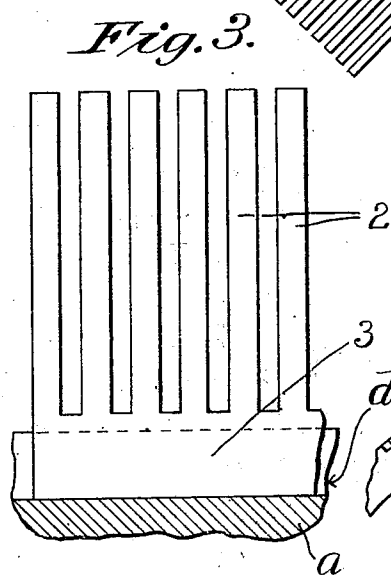
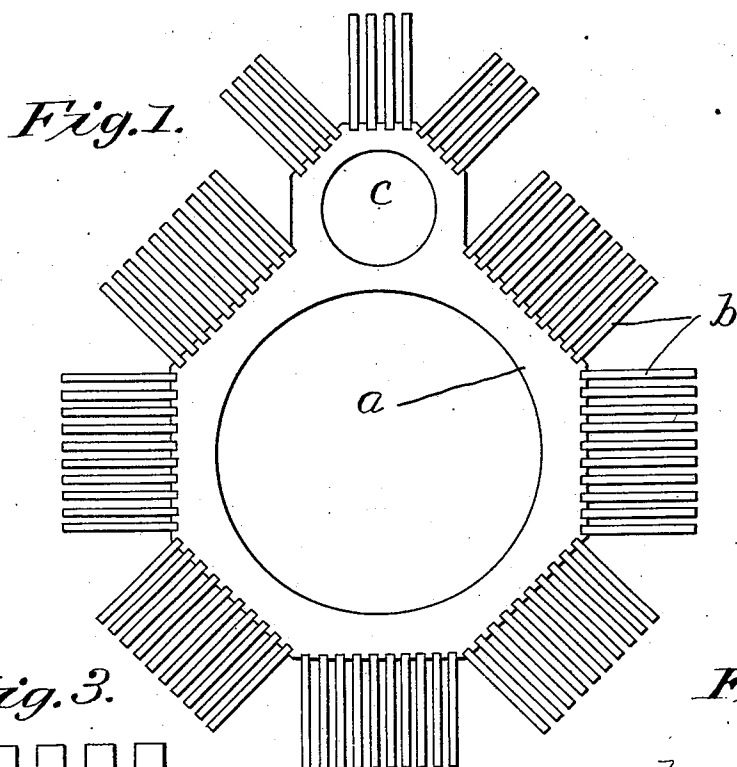


No. 728,724.

PATENTED MAY 19, 1903.

J. H. JONES.
INTERNAL COMBUSTION ENGINE.
APPLICATION FILED OCT. 16, 1902.

NO MODEL.



Witnesses:
J. D. Garfield
M. G. Crozier

Inventor:
James H. Jones.
by *Chapman & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

JAMES H. JONES, OF SPRINGFIELD, MASSACHUSETTS.

INTERNAL-COMBUSTION ENGINE.

SPECIFICATION forming part of Letters Patent No. 728,724, dated May 19, 1903.

Application filed October 16, 1902. Serial No. 127,496. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. JONES, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Internal-Combustion Engines, of which the following is a specification.

The invention relates to the construction of internal-combustion engines, and particularly to that type of engines of this class which are known as "air-cooled" in contradistinction to those engines provided with a water circulation about the cylinder for the purpose of dissipating the heat generated in the operation thereof.

Various constructions have been resorted to to provide for the air-cooling of internal-combustion engines, the first disclosure in this art consisting of pins or ribs cast integral with the cylinder; but in practice it has been found impossible to provide a sufficient area of exposed surface by this method to accomplish the desired result, and this method was found inoperative except for very small motors. The next disclosure in the art and constituting an advance over the cast pin and rib consists in inserting corrugated pins made of some suitable metal in holes drilled, generally radially, in the outer surface of the cylinder. This method provides the required radiating-surface and permits the elimination of the water-jacket on motors of relatively large size. This last-named method, however, is relatively expensive, as each hole must be drilled separately and the pins separately fitted thereinto.

The object of this invention is to provide a cylinder for an engine of this class with a sufficient area of radiating-surface and to accomplish this result at a much reduced cost of manufacture and at the same time to provide means whereby the heat may be more rapidly dissipated from a given radiating area.

Having these ends in view my invention consists in providing the cylinder with a series of parallel longitudinal grooves milled in the surface thereof, into each of which grooves there is forced a strip of metal of relatively high heat conductivity shaped like a comb, the teeth of which extend radially from the

surface of the cylinder and the back edge of which fits tightly in the grooves.

In the drawings forming part of this application, Figure 1 is an end view of a cylinder having the heat-radiating members secured thereto. Fig. 2 is a perspective view of a portion of said cylinder, showing the grooves therein for the reception of the radiating devices and showing a portion of one of the latter in position on the cylinder. Fig. 3 is a side view of a portion of one of these combs in position in the cylinder, a small portion of the latter being shown in section; and Fig. 4 is an end elevation of the comb shown in Fig. 3.

Referring now to the drawings, *a* indicates the cylinder, and *b* the heat-radiating strips, applied thereto. In the drawings the cylinder *a* and the valve-chamber *c* are shown as having a polygonal surface, and while this is not an essential feature it is the preferred manner of casting the cylinder, because of the great advantage in point of economy thereby attained, because of the increased rapidity with which the grooves *d*, running longitudinally of the cylinder, may be milled, for by thus providing flat surfaces on the cylinder all of the grooves on each of the faces of the latter may be milled at once by a gang-mill, which may be run from one end of the cylinder to the other, thus effecting a very great saving in time in cutting these grooves. If desired, however, the cylinder may be cast, as such cylinders usually are, with a smooth cylindrical surface and the grooves *d* be cut therein one or two at a time, if desired. The cylinder having been suitably grooved, a strip of suitable metal is then punched out to make the comb-like pieces, (shown in Fig. 3,) these combs as a whole being indicated by *b* in Figs. 1 and 2. In Fig. 3 the comb is shown of substantially natural size, and preferably the teeth of the comb, which are indicated in this figure specifically by the numeral 2, are made somewhat wider than they are thick, as shown by comparison with the edge of the comb in Fig. 4. These teeth are all united along one end thereof by a rib or back, (specifically indicated in this figure by the numeral 3,) the thickness of which back is so proportioned relative to the grooves *d* in the cylinder that it

may be driven or forced into said groove to fit very tightly therein, whereby an intimate contact between the smooth bright surface of the groove and said rib may be established to the end that the heat may pass readily into said rib and by means of the teeth 2 become dissipated. If desired, all of the radiating strips or combs *b* for each of the several flat faces of the cylinder may be introduced at the same time into their respective grooves *d* by providing a fixture in which said combs may be held in such relation one to another that when this holder is applied to the cylinder all of the backs of these combs will simultaneously enter the grooves formed to receive them, and these combs may be so inserted by pressure or by blows on said holder, as desired. The fact that the teeth of the combs *b* are all united in each one of these combs by the rib or back, which enters the grooves *d* in the cylinder, aids very greatly in dissipating the heat from the cylinder, inasmuch as the heat will travel from pin to pin much more rapidly through this back than through the body of the cylinder, said back and pins being made of some metal having a greater heat conductivity than cast-iron, of which the cylinder is made. Therefore as the highest temperature is at one end of the cylinder it will by means of the backs of the ribs be communicated much more rapidly to a greater number of pins by reason of the integral construction of the combs than it would through the medium of the wall of the cylinder. This point is highly important when the great speed at which these engines run is considered and the consequent resulting high temperatures to which the cylinders are subjected. Where these engines are used on motor-vehicles, a strong current of air is created through these pins by the movement of the vehicle, their effectiveness being somewhat enhanced by bending one tooth to the right and the next tooth to the left, as shown in dotted lines in Fig. 4, whereby they will come more directly into

contact with the air than if located in alignment, as shown in the other figures of the drawings.

The combs *b* may of course be applied, if desired, to the closed end of the cylinder. (Not shown herein.)

It is obvious that if the grooves in which the combs are inserted were made to run around the cylinder instead of lengthwise thereof this change would come within the scope of the invention, and while in some types of engines such a change might be feasible the preferred construction is that described herein.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A cylinder for internal-combustion engines having grooves in its outer surface parallel with each other and with the axis of the cylinder, and comb-shaped strips of metal secured by their backs in said grooves.

2. A cylinder for internal-combustion engines having a series of grooves in the outer surface thereof, combined with metal strips fitted closely into said grooves, and teeth on said strips located at right angles to said cylinder-surface.

3. A cylinder for internal-combustion engines, the outer surface of which consists of contiguous planes, parallel with the axis of the cylinder, there being in each of said planes a series of parallel grooves, combined with comb-shaped strips of metal secured by their backs in said grooves.

4. The combination of a cylinder for internal-combustion engines having a series of grooves in the outer surface thereof, and comb-shaped strips of metal whose backs entirely fill the grooves and which are permanently secured in intimate contact with the wall of the grooves throughout.

JAMES H. JONES.

Witnesses:

WM. H. CHAPIN,
K. I. CLEMONS.