No. 737,083. PATENTED AUG. 25, 1903.

F. W. DARNSTAEDT.

HEAT RADIATOR FOR INTERNAL COMBUSTION MOTORS, &c.

APPLICATION FILED DEC. 12, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

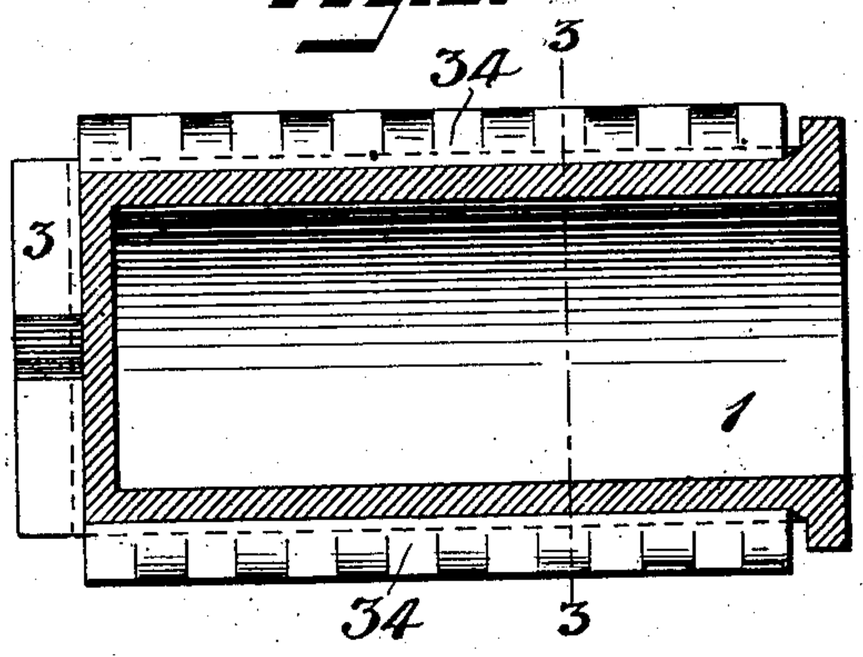


Fig. 2.

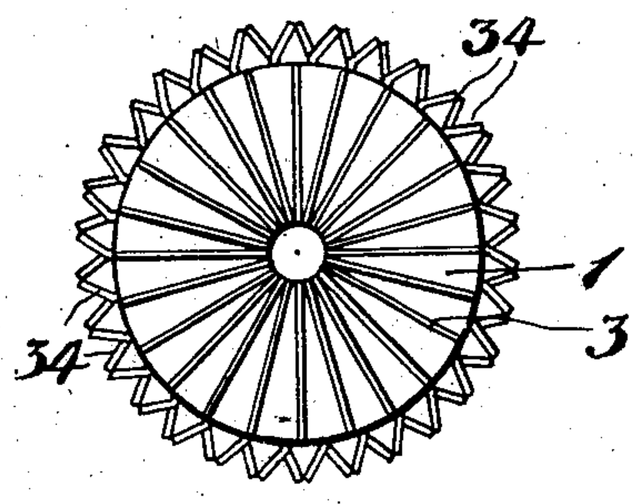


Fig. 3.

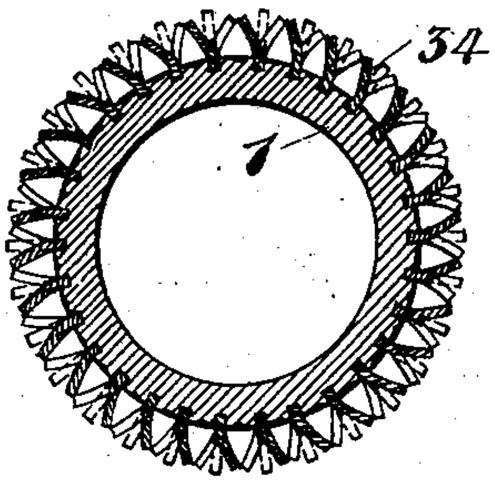
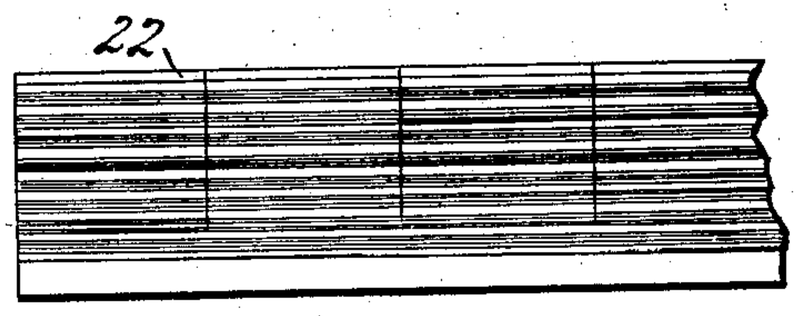


Fig. 4.



Witnesses
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[illegible]

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HEAT RADIATOR FOR INTERNAL COMBUSTION MOTORS, &c.

APPLICATION FILED DEC. 12, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

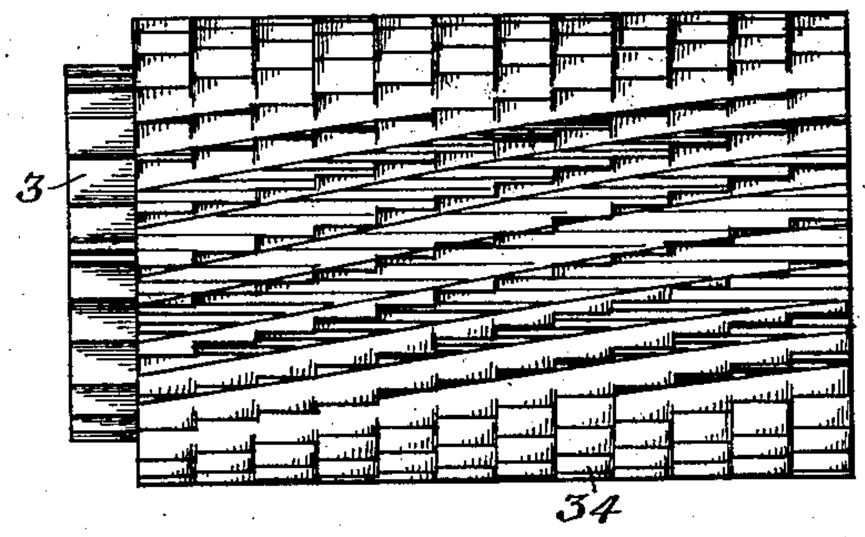
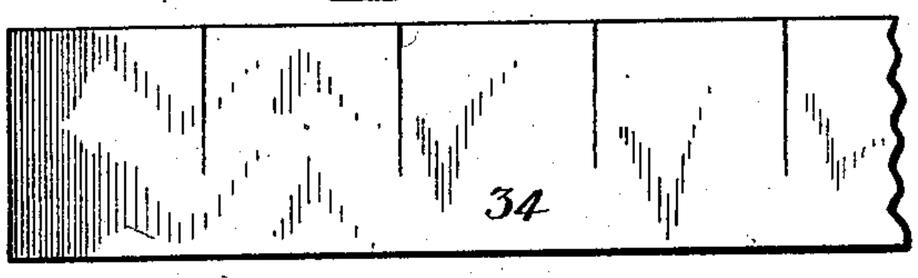


Fig. 6.



WITNESSES:

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No. 737,083. Patented August 25, 1903.

UNITED STATES PATENT OFFICE.

FREDERICK W. DARNSTAEDT, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR OF TWO-THIRDS TO HOWARD S. HART, OF NEW BRITAIN, CONNECTICUT.

HEAT-RADIATOR FOR INTERNAL-COMBUSTION MOTORS, &c.

SPECIFICATION forming part of Letters Patent No. 737,083, dated August 25, 1903.

Application filed December 12, 1902. Serial No. 134,881. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. DARNSTAEDT, a citizen of the United States, residing at New Britain, in the county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Heat-Radiators for Internal-Combustion Motors and other Devices, of which the following is a full, clear, and exact description.

This invention relates to heat-radiators for internal-combustion motors and other devices.

The object of this invention is to provide simple and effective means to effect the rapid radiation of heat in devices exposed to high temperature. The invention has, therefore, great utility in connection with internal-combustion motors and may be applied to the cylinder or cylinders thereof to keep the temperature of the same down to such a degree as to facilitate and maintain proper lubrication. At the present time the commonest method of preventing the overheating of cylinders used in internal-combustion motors is to provide a water-jacket for the same wherein a circulation of water or other cooling liquid is maintained. In low-powered motors radiating-flanges cast integrally with the cylinder are sometimes provided, and this method is termed "air-cooling."

My invention relates to that class of devices which are air-cooled, and particularly to new and improved features of construction hereinafter described, which accomplish the desired end to such an effective degree as to render it possible to include in the class of air-cooled motors heavier-powered engines than have hitherto been cooled in this manner, at the same time more effectively cooling the lighter-powered engines. Because this invention has particular utility as applied to cylinders for internal-combustion motors the drawings and description will set forth the invention as applied in that art.

In the drawings, Figure 1 is a longitudinal section of an engine-cylinder, conventionally shown, embodying one form of my improvement. Fig. 2 is an end elevation of Fig. 1. Fig. 3 is a cross-section on the line 3 3 of Fig. 1. Fig. 4 is a relatively enlarged side elevation of a portion of a radiator blade or fin of a modified form. Fig. 5 is a side elevation of a cylinder fitted with my invention in modified form. Fig. 6 is a relatively enlarged side elevation of a portion of a radiator blade or fin shown in Fig. 1.

1 is a cylinder.

34 34 are blades or radiator-fins formed of wrought or sheet metal and secured to the sides of the cylinder—for example, by inserting them tightly into grooves formed in the outer surface thereof. These fins preferably extend longitudinally of said cylinder; but this is not absolutely essential.

3 represents radiator blades or fins, which may be secured to the end or head of the cylinder. In the drawings I have not attempted to show the radiator-blades 34 3 arranged as closely as they may be in practice. In the preferred form the blades are swelled or enlarged along that edge which makes contact with the cylinder, and the slots in which they are placed may be originally formed of sufficient width to admit of the insertion of the swelled edge of the blades. When the blades are introduced, the metal of the cylinder adjacent to the slot or slots may be expanded by indenting, so as to press the metal of the cylinder into tight contact with the side of the adjacent radiator strip or fins above the thickened portion, thus in a simple and effective manner firmly uniting said radiator strips or blades with the cylinder. This is of course merely a preferred form of effecting secure engagement between the sheet-metal radiator-blades and the cylinder.

One important advantage of forming the radiator blades or fins 3 34 of wrought or sheet metal is that such metal possesses a higher coefficient of conductivity than cast metal, and hence the heat is more rapidly radiated therefrom than would be possible by the use of cast metal. Another advantage resides in the fact that the radiator-fins may be made of very much thinner stock than could be employed were cast metal used. This results in the possibility of providing many more radiator-fins upon a cylinder of a given size than

could be provided by casting the same integrally therewith. As a direct result of the possibility of using a great number of radiator-fins it is manifest that the radiating-surface possible to obtain by this construction is vastly in excess of the radiating-surface possible to obtain by any other method and vastly in excess of the radiating-surface obtained by casting flanges integrally with the cylinder. Another advantage resides in the fact that wrought-metal radiator-fins are most tenacious and will withstand hard usage, whereas cast metal is brittle and is easily broken. Another advantage due to the use of wrought or sheet metal radiator fins or blades resides in the fact that offset deflector-tongues may be stamped out of the said blades, which construction will, in fact, result in a more rapid radiation than were the said blades unbroken or smooth. The formation of these tongues may be effected without sacrifice of radiating-surface. In fact, a gain in radiating-surface is made to the extent of the thickness of the edge of the metal of each tongue, as particularly shown in Figs. 2 and 3. By forming the blades or fins of wrought metal instead of cast metal the same may be readily knurled or corrugated, as shown in Fig. 4, in which 22 represents a radiator-blade having a knurled surface. It is preferable that the fins should each be formed in a continuous strip; but of course it is not essential.

In Fig. 5 I have shown another modification, in which the fins 34 are affixed to the cylinder in spirally-arranged grooves extending partially around said cylinder. The effect of bending the fins 34, so as to fit them to the spiral, causes the incisions to open up, as graphically shown, thus providing a larger radiating-surface than were the strips unbroken. In Fig. 5 the fins 3 at the end of the cylinder are similar to the radiator-fins 3 in Fig. 1. I have spoken of a current of air. While it is not essential to my invention that a current of air should be caused to traverse the radiator-fins, it is well known that these engines are commonly employed on automobiles or launches and in other places where air-currents are common. Artificial currents of air may be generated by fans, if desired.

By this invention it is possible to use in the formation of the radiator fins or blades those metals which have a high coefficient of conductivity—such as, for example, aluminium, which in addition to its heat-conducting properties is very light and tenacious, and is hence of great advantage as applied to motors for automobiles.

What I claim is—

1. A cylinder for internal-combustion engines having grooves in its outer surface arranged side by side and longitudinally of the cylinder, and tongued strips of metal secured by their backs in said grooves, the space between said tongues being formed by bending them laterally to said strip.

2. The combination of a cylinder for internal-combustion engines having a series of grooves in the outer surface thereof and tongued strips of metal whose backs are located in and fitting tightly within said grooves and are permanently secured therein by intimate contact with the wall of the grooves throughout, the tongues on said strips being formed by shearing or cutting the metal without removing any substantial portion thereof and by bending them laterally to the strip, so that their ends stand apart.

3. A cylinder for internal-combustion engines having grooves in its outer surface arranged longitudinally of the cylinder and side by side, a radiating device combined therewith and comprising a tongued strip of metal, the tongues being formed by shearing or cutting into the outer edge of said strip without removing any substantial portion of the metal and offsetting adjacent tongues out of the plane of the bottom portion or back of said strip, said back being located in and fitting tightly within the grooves and permanently secured thereto.

4. A cylinder for internal-combustion engines having a series of grooves in its outer surface and tongued strips of metal whose backs are arranged in said groove and are permanently secured in intimate contact with the wall thereof, the tongues of said strip being formed by shearing or cutting into the outer edge of said strips without removing any substantial portion of the metal thereof, the space between adjacent tongues being formed by offsetting or bending the adjacent tongues out of the same plane.

5. A cylinder for internal-combustion engines having a series of grooves in its outer surface and tongued strips of metal whose backs are arranged in said groove and are permanently secured in intimate contact with the wall thereof, the tongues of said strip being formed by shearing or cutting into the outer edge of said strips without removing any substantial portion of the metal thereof the space between said tongues being formed by offsetting or bending the adjacent tongues out of the same plane, the sides of said tongues being corrugated or grooved.

FREDERICK W. DARNSTAEDT.

Witnesses:
HOWARD S. HART,
NORMAN P. COOLEY.