No. 719,326. PATENTED JAN. 27, 1903.

H. GROSS.

COOLING MEANS FOR EXPLOSIVE ENGINES.

APPLICATION FILED NOV. 14, 1902.

NO MODEL.

Fig. 1.

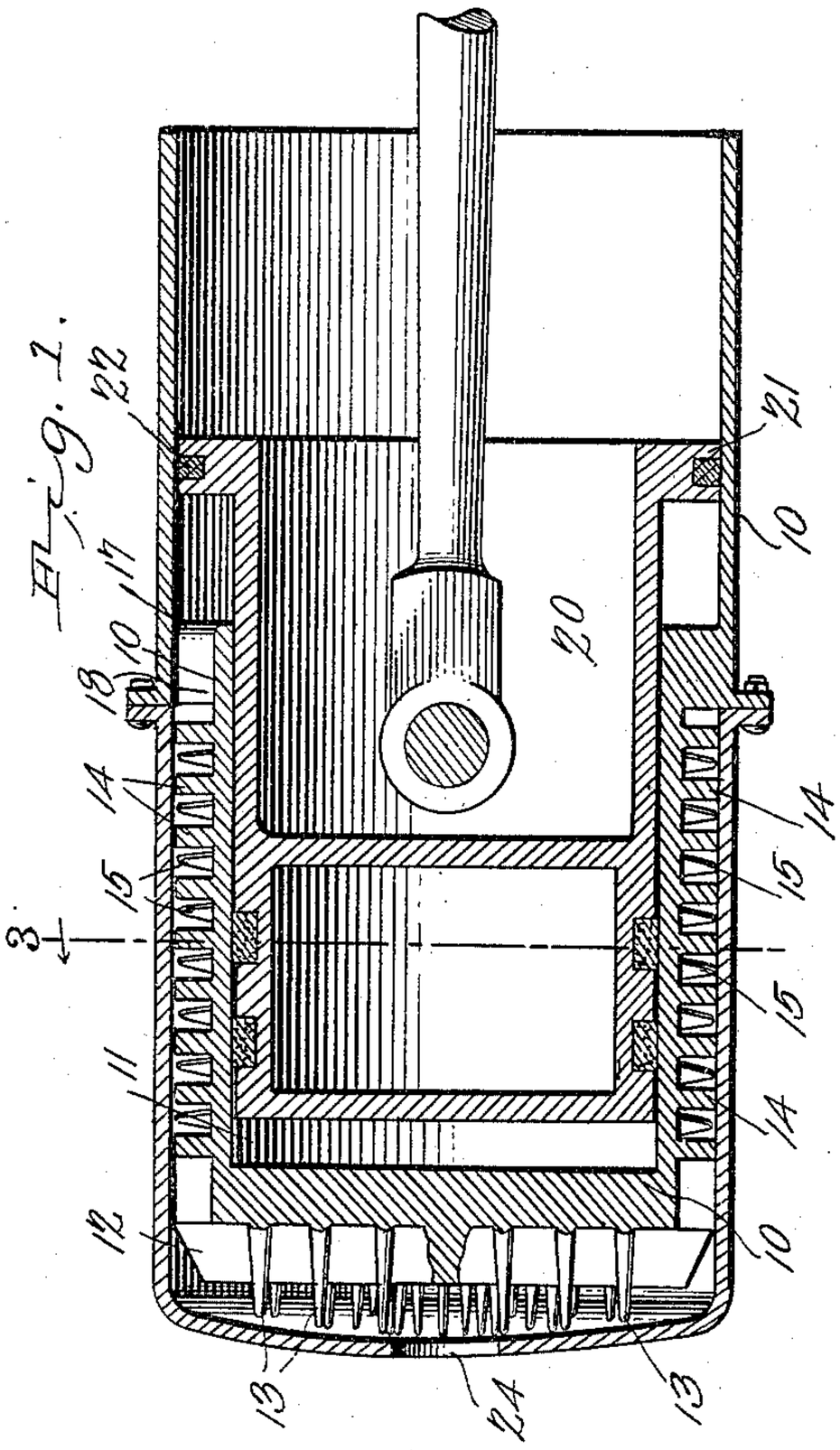


Fig. 2.

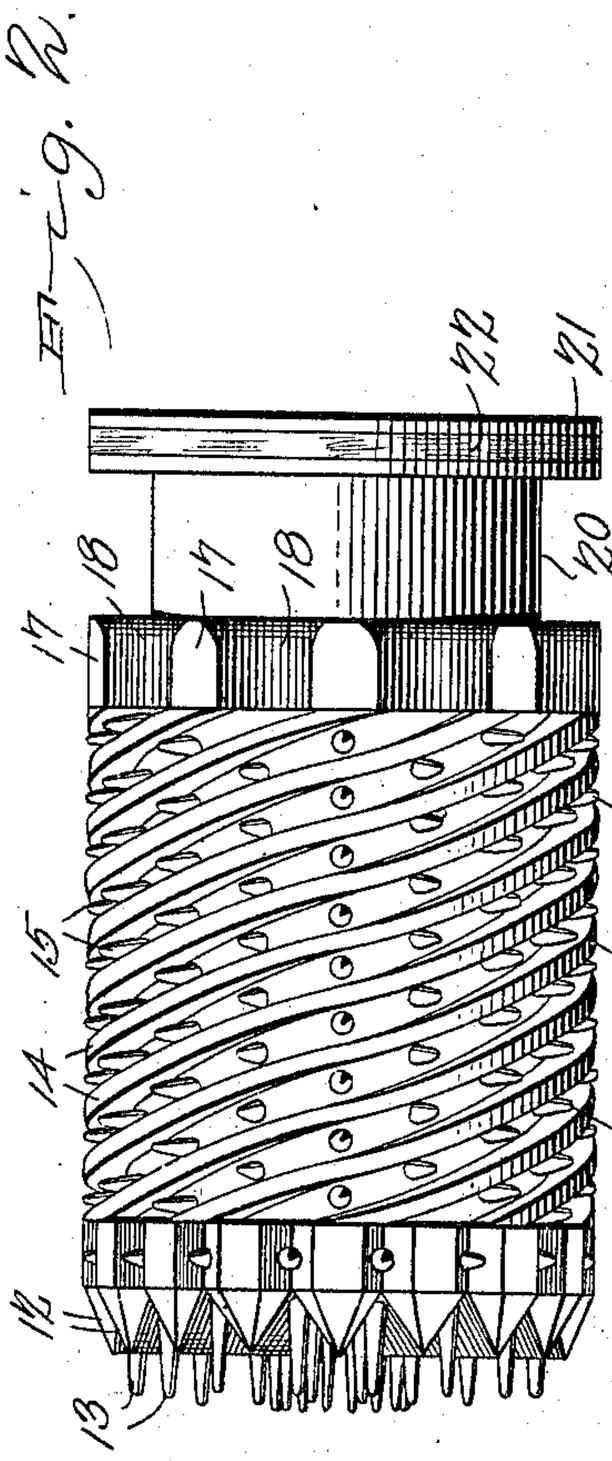


Fig. 3.

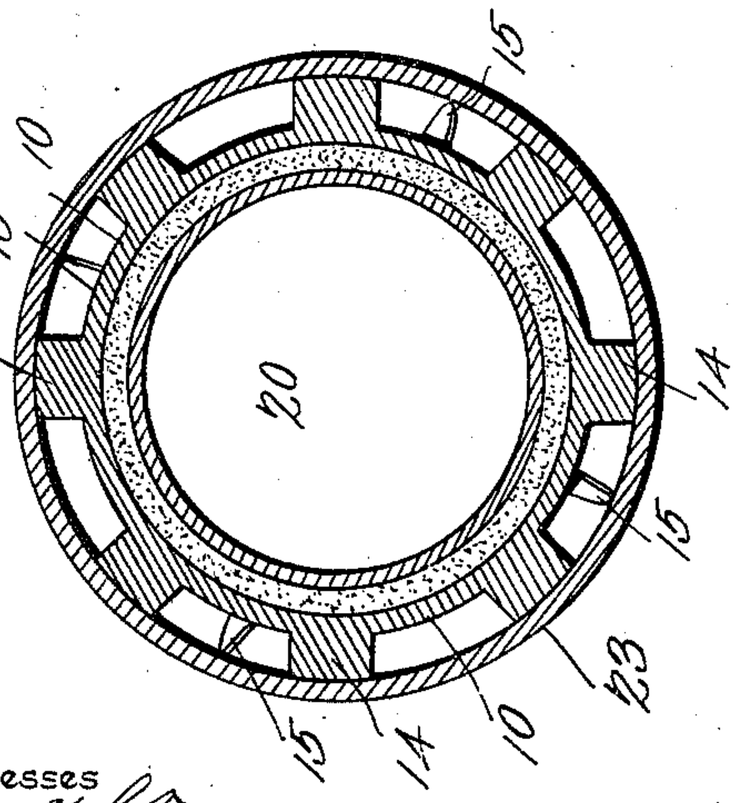
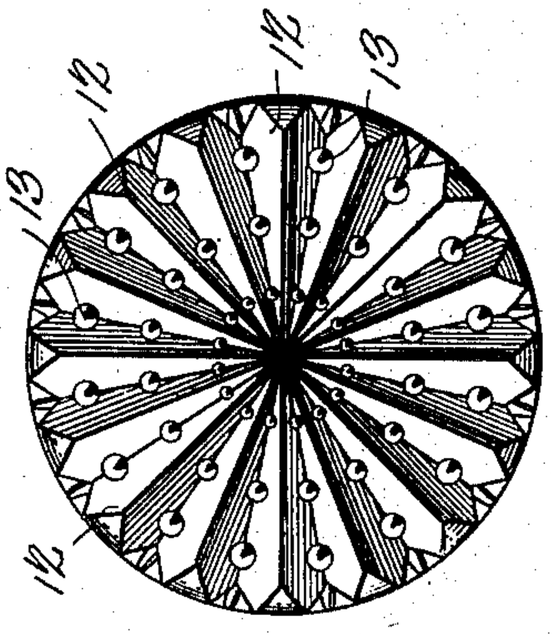


Fig. 4.



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UNITED STATES PATENT OFFICE.

HERMAN GROSS, OF LAFAYETTE, INDIANA.

COOLING MEANS FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 719,326, dated January 27, 1903.

Application filed November 14, 1902. Serial No. 131,411. (No model.)

To all whom it may concern:

Be it known that I, HERMAN GROSS, a citizen of the United States, residing at Lafayette, in the county of Tippecanoe and State of Indiana, have invented a new and useful Cooling Means for Explosive-Engines, of which the following is a specification.

This invention relates to certain improvements in explosive-engines, and more particularly to improved means for cooling the cylinder.

The principal object of the invention is to provide an improved cylinder construction whereby currents of air are established over or between radially-arranged heat-conducting surfaces at each stroke of the piston.

A still further object is to provide in connection with the ribbed cylinder an auxiliary piston and cylinder for the purpose of forcing air-currents between the ribs.

With these and other objects in view the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of the cylinder of an explosive-engine constructed in accordance with my invention. Fig. 2 is a side elevation of the same with the cylinder-jacket removed. Fig. 3 is a transverse sectional elevation of the cylinder on the line 3 3 of Fig. 1. Fig. 4 is an elevation of the cylinder-head.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

In the drawings, 10 indicates the cylinder of a gas-engine, the gas entrance and escape ports and igniting devices being omitted for the sake of clearness. The cylinder is of much greater length than usual and is provided with a counterbored portion 11, of somewhat larger diameter than the cylinder proper. The head of the cylinder, as shown in Fig. 4, is provided with a large number of radially-disposed tapering ribs 12, the grooves between the ribs extending from the flattened face of the head to the periphery thereof, the ribs extending in radial lines beyond the periphery of said head. In the spaces between the ribs are pins 13 of any desired number, the pins being preferably formed integral with the head in order to provide a more extensive heat-radiating surface.

On the periphery of the cylinder proper are a number of helically-arranged ribs 14. The ends of the ribs terminate in alinement with the ribs 12, so that the spaces between both sets of ribs will be continuous and form an uninterrupted passage for the cooling medium.

In the spaces between the helical ribs are arranged a plurality of pins 15, also forming heat-radiating surfaces for contact with the currents of air. At the inner end of the main cylinder is an annular flange 17, having a plurality of notches or openings 18 equal in number to the number of spaces between the helical ribs and forming continuations of the air-passages formed by such spaces.

The piston 20 is of the trunk type, and at its inner end, or that end nearest the crank-shaft, is a peripheral flange 21, forming an auxiliary piston fitting within the auxiliary cylinder 11 and provided with a suitable packing-ring 22 to prevent leakage.

The device as thus constructed forms an auxiliary annular cylinder 11, of which the inner wall is formed by the periphery of the piston 20.

Over the main portion of the cylinder is placed a tightly-fitting jacket 23, which also extends over the head of the cylinder and is provided at a point opposite the center of the head with an air-inlet opening 24.

In the operation of the device the outstroke of the piston under the impulse of the explosive charge creates a partial vacuum within the annular cylinder 11 and induces the flow of a current or currents of air through the opening 24 and the spaces between the ribs of the head and the spiral ribs of the cylinder, the air passing through the notches or spaces 18 into said cylinder 11. On the back stroke of the piston the air is forced from the cylinder 11 in the reverse direction and escapes finally through the opening 24. The

numerous ribs and projecting pins form extensive heat-radiating surfaces for contact with the currents of air, and the cylinder is thus kept at a proper temperature without the necessity of employing the usual water-jackets and the annoyance incident to the accumulation of lime or other substances on the surface of the ribs.

Having thus described the invention, what is claimed is—

1. The combination with the cylinder and piston of an explosive-engine, of an auxiliary cylinder of larger diameter than the main cylinder, an annular flange carried by the piston and fitting within said auxiliary cylinder, a plurality of ribs arranged on the surface of the cylinder, a jacket surrounding the ribs to form a plurality of air-passages, and radial ribs disposed on the head of the cylinder, there being an opening in the jacket for the passage of air, substantially as specified.

2. The combination with the cylinder and piston of a gas-engine, of an auxiliary cylinder of a diameter greater than that of the main cylinder, an annular flange carried by the piston and fitting within the auxiliary cylinder, a plurality of ribs arranged on the cylinder, ribs disposed on the cylinder and abutting against the ribs of the head, and a jacket surrounding all of the ribs to form a plurality of air-passages, there being an opening in said jacket for the passage of air.

3. Means for cooling the cylinder of a gas-engine, comprising a plurality of ribs on the outer surface of the cylinder, means for inducing the flow of currents of air through the spaces between the ribs, and a plurality of pins carried by the cylinder and projecting into the spaces.

4. The combination of the cylinder having helical grooves and ribs on its outer surface, a cylinder-head having radiating ribs against which the ends of the helical ribs abut, a jacket in contact with all of the ribs and forming closed air-passages between the same, heat-radiating pins projecting into the air-passages, and means for inducing the flow of currents of air through said passages.

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

HERMAN GROSS.

Witnesses:
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BEN SHICK.