No. 789,382. PATENTED MAY 9, 1905.

H. RICHTER.

COOLING MECHANISM FOR EXPLOSION ENGINES.

APPLICATION FILED NOV. 24, 1903.

2 SHEETS—SHEET 1.

Fig. I.

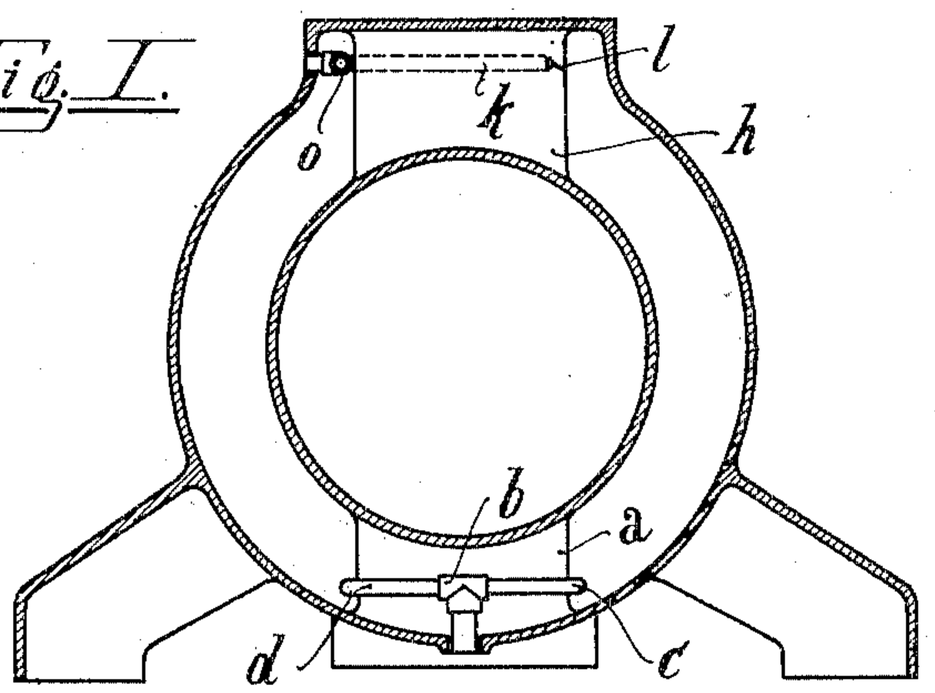


Fig. II.

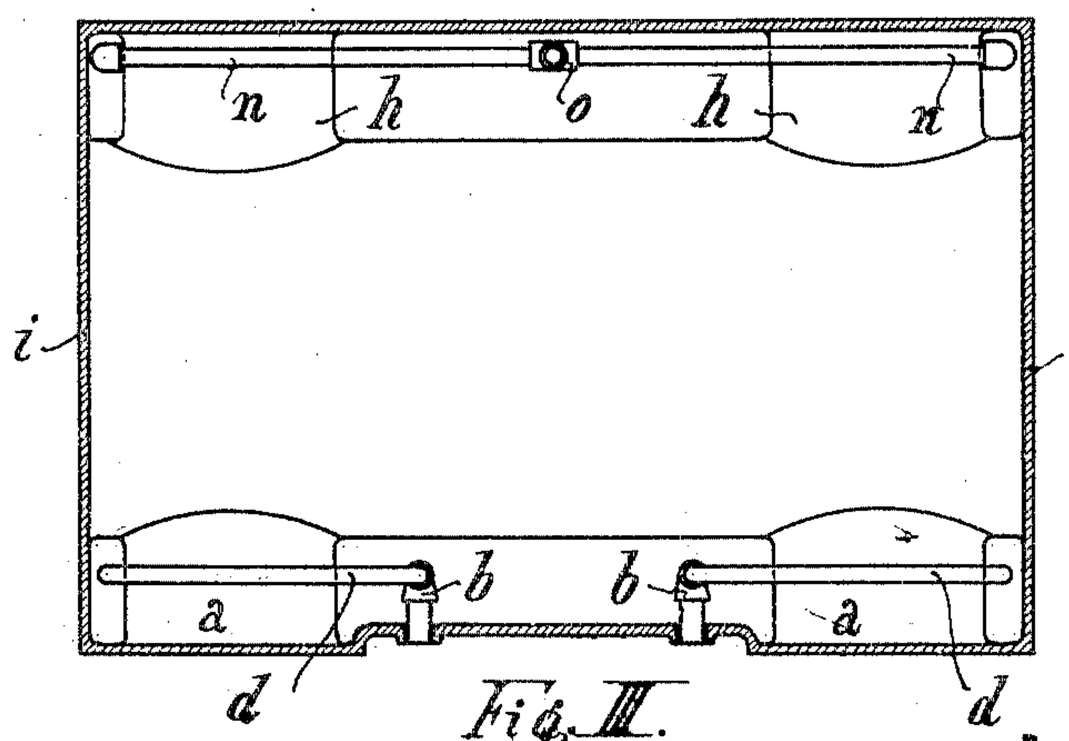


Fig. III.

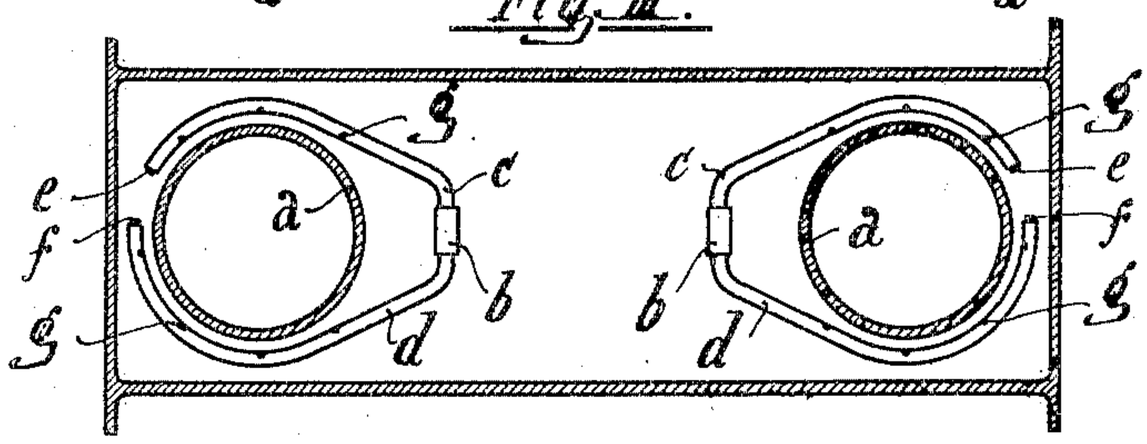
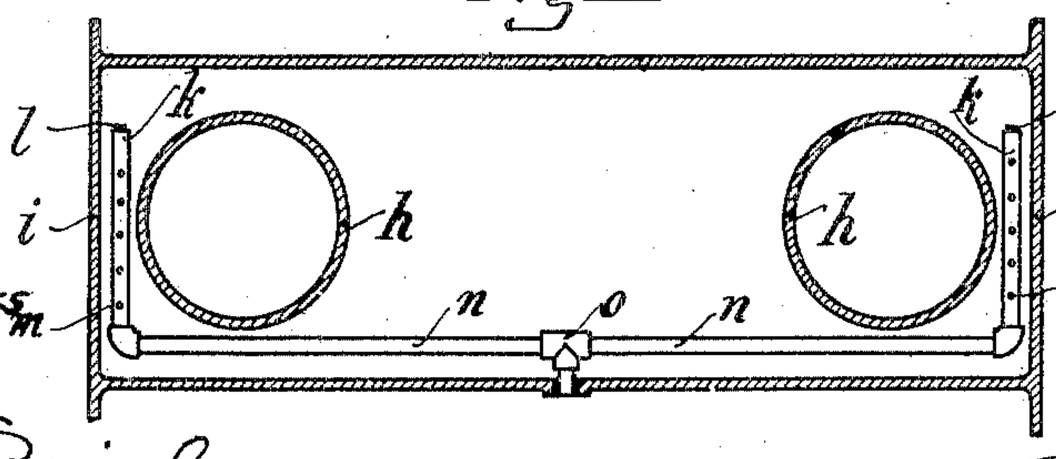


Fig. IV.



WITNESSES

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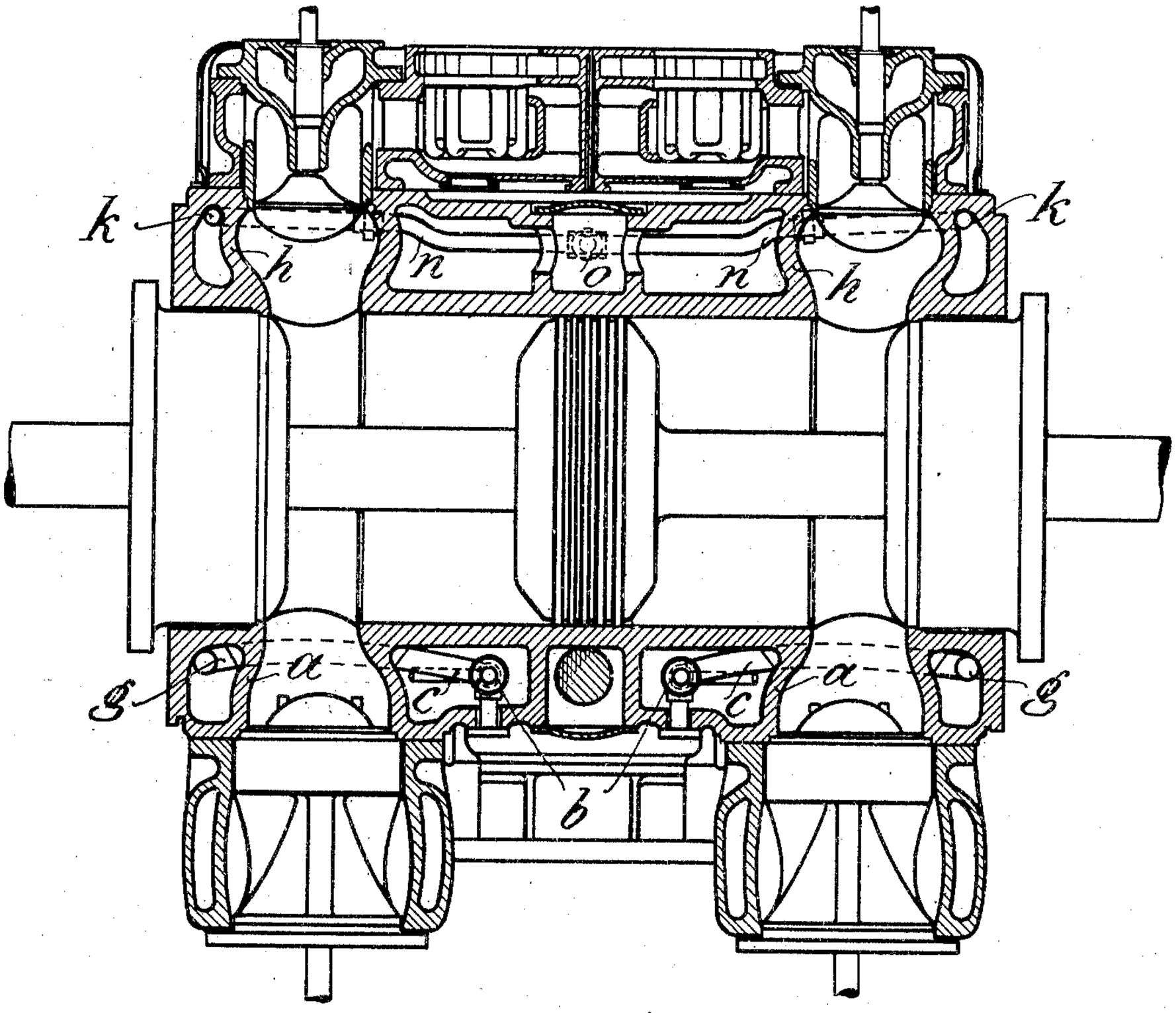
2 SHEETS—SHEET 2.

Fig V.



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No. 789,382. Patented May 9, 1905.

UNITED STATES PATENT OFFICE.

HANS RICHTER, OF NUREMBERG, GERMANY, ASSIGNOR TO THE FIRM OF VEREINIGTE MASCHINENFABRIK AUGSBURG UND MASCHINENBAU-GESELLSCHAFT NÜRNBERG A. G., OF NUREMBERG, GERMANY.

COOLING MECHANISM FOR EXPLOSION-ENGINES.

SPECIFICATION forming part of Letters Patent No. 789,382, dated May 9, 1905.

Application filed November 24, 1903. Serial No. 182,536.

To all whom it may concern:

Be it known that I, HANS RICHTER, engineer, a subject of the Emperor of Germany, residing in Nuremberg, in the Empire of Germany, (whose full postal address is 15 Gleisbühlstrasse, aforesaid,) have invented certain new and useful Improvements in Cooling Mechanism for Explosion-Engines, of which the following is a specification.

The principal difficulties which are found in the construction of large gas-engines are in connection with making a durable cylinder. This problem has not hitherto been solved in an entirely satisfactory manner, cylinders frequently cracking more particularly in proximity to the valve-boxes, where in consequence of slower circulation of the water, air, or steam bubbles may form.

Now this invention has for its object to remove such defects by causing, by means of a peculiar arrangement of the pipes conveying the cooling-water to and away from these parts, a specially vigorous circulation of water at the places likely to be injured. This may be done by means of the arrangement hereinafter described, and shown in the accompanying drawings, where it is employed in connection with a double-acting gas-engine with valve-boxes cast thereon.

Figure 1 is a cross-section; Fig. 2, a vertical section, and Figs. 3 and 4 different constructions embodying the same principles. Fig. 5 is a sectional view of a cylinder and its piston with my invention applied thereto.

The admission of water takes place, as may be seen from Fig. 1, Fig. 2, lower part, and Fig. 3, from beneath upward between the lower valve-boxes *a* at the points *b* through bent pipes *c* and *d*, which are carried so far round the respective valve-boxes *a* that the closed free ends *e* and *f* of the bent pipes *c* and *d*, respectively, face one another at a small distance apart. Such a pipe is provided with lateral openings *g*, directed toward the axis of the valve-boxes *a*.

The arrangement adopted for carrying off the water is shown in Fig. 1, Fig. 2, at the top, and Fig. 4.

Discharge-pipes *k*, which are closed at their rear ends *l* and provided with a series of discharge-apertures *m*, are arranged in the narrow spaces between each upper valve-box *h* and the annular walls *i*, serving for shutting off or inclosing the cooling-chamber. On the front end of each pipe *k* a pipe *n* is connected, directed uniformly with the longitudinal axis of the cylinder. The two pipes *n* are connected in the center of the cylinder and attached at *o* to the outer pipe for discharging the cooling-water.

The cooling-water, which enters at *b*, flows through the bent pipes *c* and *d* on the valve-boxes *a*, is here distributed over the entire cooling-chamber, and rises to the summit of the same, at the same time absorbing heat.

Before running away the stream of cooling-water divides before finally escaping at *o* to the outside through the upper apertures of the discharge-pipes *k* and the connecting-pipes *n*.

In consequence of the arrangement adopted a rapid water circulation takes place especially in the narrow chambers or spaces in proximity to the valve-boxes, so that neither air nor steam bubbles can form.

Of course the cooling-water may be conveyed to or carried off from other parts in a precisely similar manner, where a checking or retardation of the circulation of the cooling-water or the formation of air or steam bubbles is to be feared.

I declare that what I claim is—

An arrangement for cooling explosion-engines consisting of the cooling-casing for the cylinder, inlet-pipes therein surrounding one set of valve-boxes and having openings for discharging the water thereagainst, and the outlet-pipes for the cooling-casing having openings in the portions which are adjacent the other set of valve-boxes.

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

HANS RICHTER.

Witnesses:

MARTIN OFFENBACHER,

HERMANN DÖHLEMANN.