

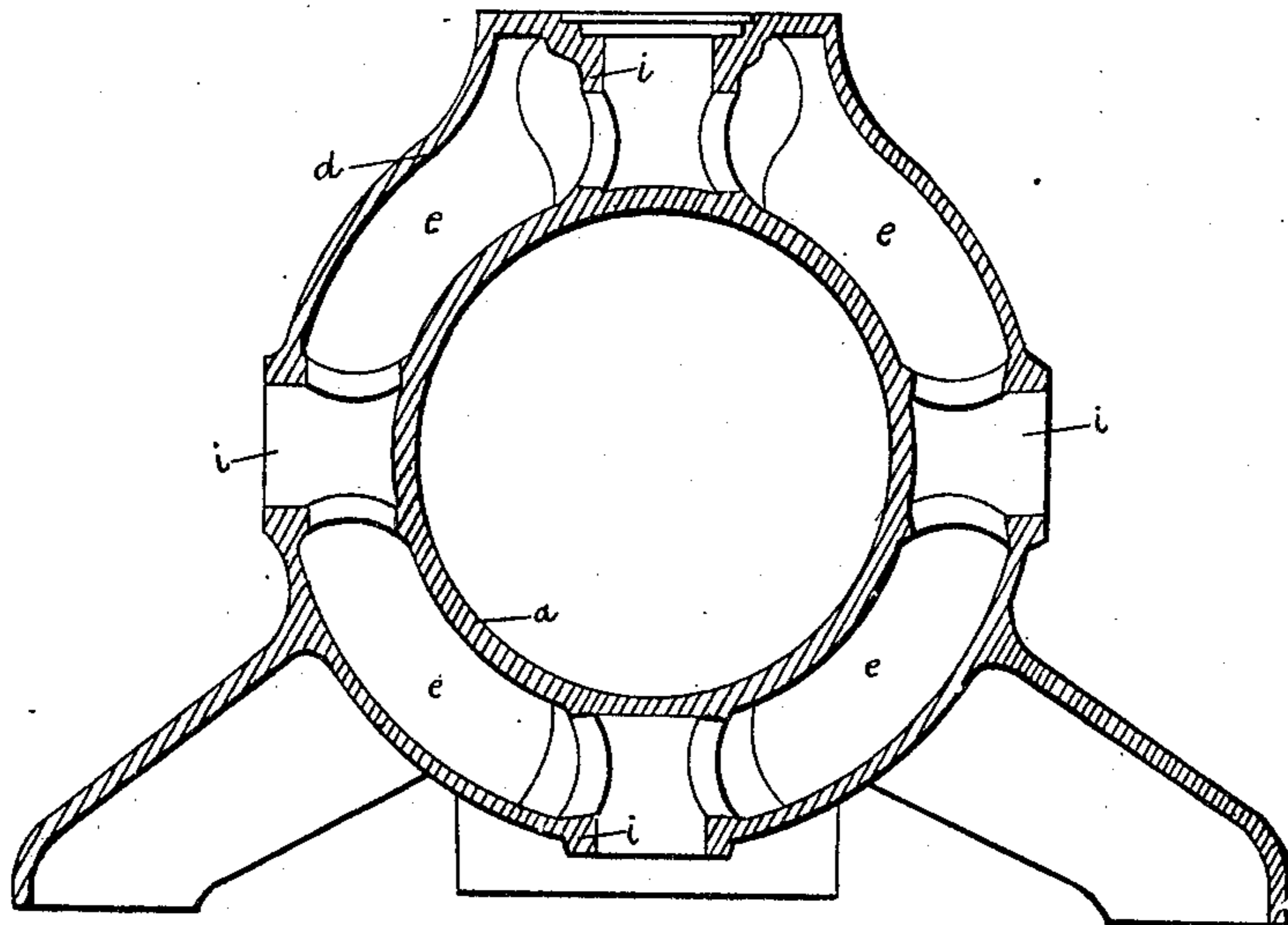
No. 872,306.

PATENTED NOV. 26, 1907.

H. RICHTER.
CYLINDER FOR GAS ENGINES.
APPLICATION FILED JULY 9, 1903.

2 SHEETS—SHEET 1.

FIG. 1.



ATTEST:

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Eud L. Tolson.

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By

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ATTY'S.

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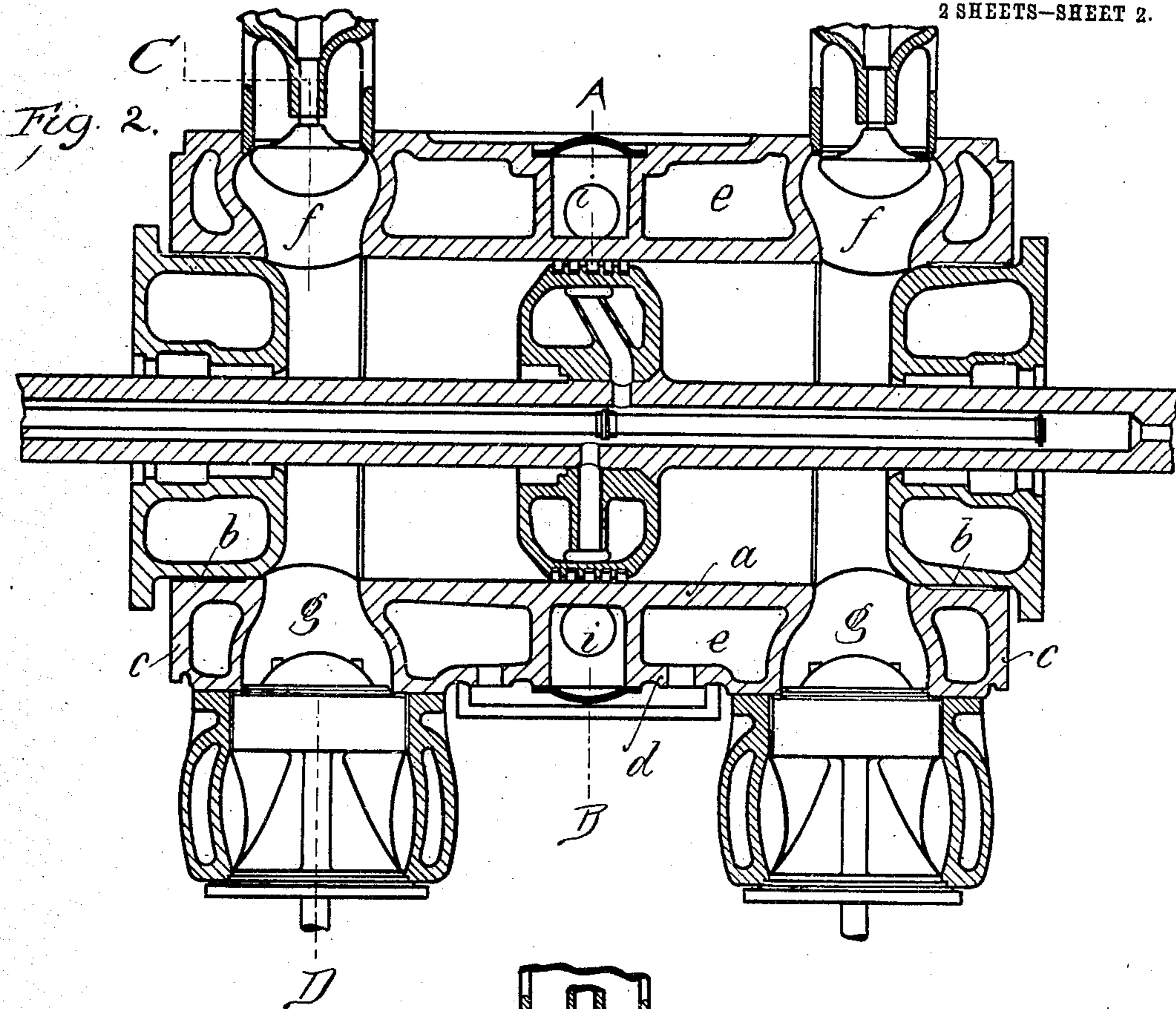
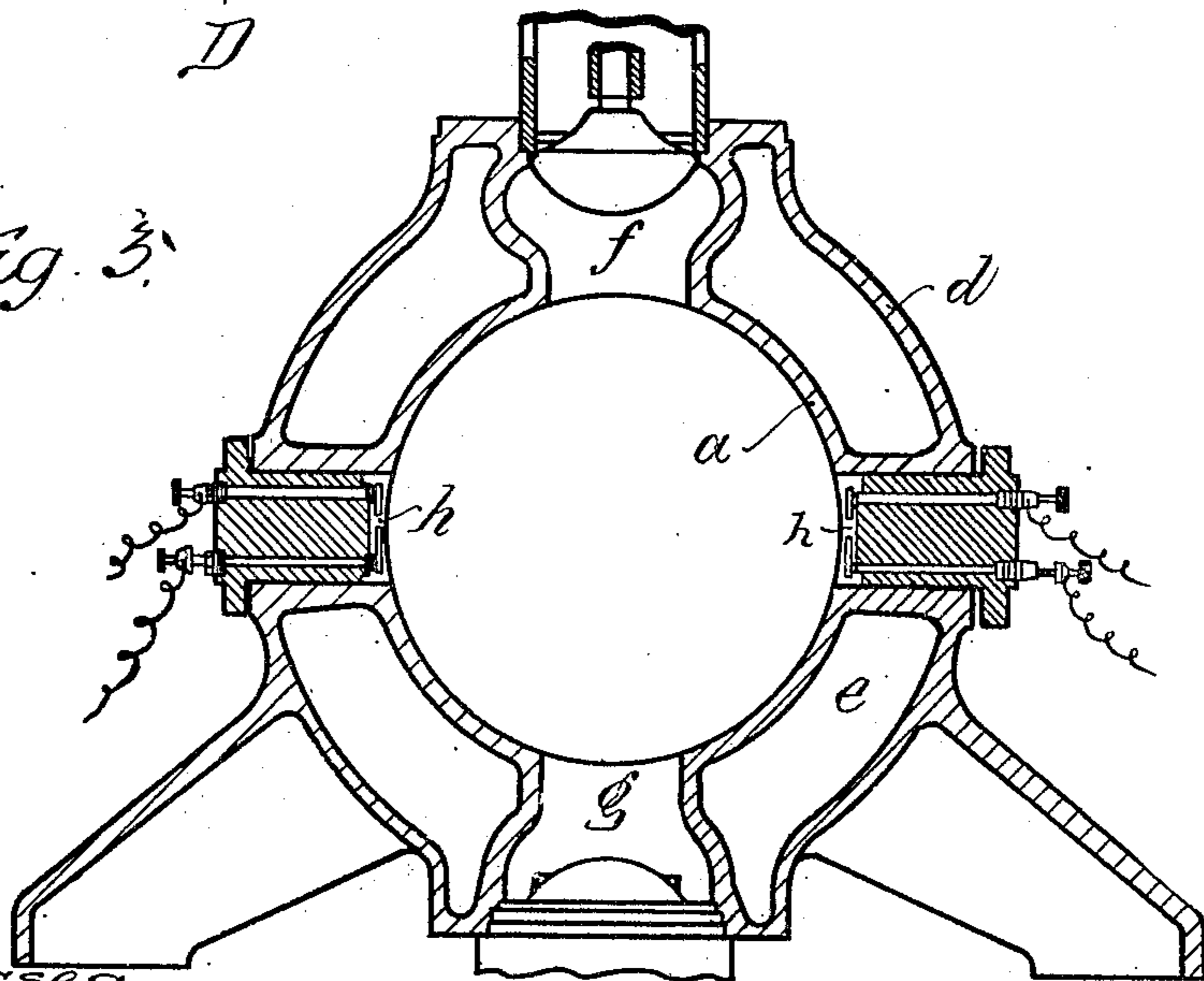


Fig. 3.



Witnesses
Am. Kuehn
John A. Kuehn

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UNITED STATES PATENT OFFICE.

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

CYLINDER FOR GAS-ENGINES.

No. 872,306.

Specification of Letters Patent.

Patented Nov. 26, 1907.

Application filed July 9, 1903. Serial No. 164,864.

To all whom it may concern:

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

10 The cylinders of gas engines have hitherto been made slightly longer in an axial direction than the piston slide surface, and the valves, the igniting devices, and any other necessary parts were usually arranged on the cylinder covers (cylinder head). Consequently this head or cover has been very complicated in construction and particularly so when not only the space behind the piston but also the space in front of the same

20 was closed, that is to say a double action, was produced, as in such cases tight washered guides (stuffing boxes) had to be provided for the piston rods in the cylinder covers. In addition in such double acting gas engines

25 there was a further serious drawback, namely that with the removal of the cylinder cover the gas and air pipes and the igniting device, valve mechanism and other parts on one end of the cylinder had to be removed

30 if it was desired to have access to the piston or to draw the same out. These drawbacks may be removed by the said valves and the like parts being arranged not on the cylinder covers but on the cylinder itself, which is

35 suitably prolonged to the rear and to the front. As the cylinder must also contain cooling chambers and pipe connections for the supply and withdrawal of the cooling water, in other words must be complicated

40 in construction, it can only be cast in a single piece if care be taken that during its manufacture or its working no casting strains are induced owing to unequal heating and unequal expansions at different places of its

45 walls can arise.

By the present invention the hitherto unallowed for requirements as regards solidity introduced for these reasons, are avoided by a peculiar form of the cylinder which is

50 almost symmetrical as regards three main planes at right angles to one another, in which the material of the cylinder is very uniformly distributed and only a single con-

nected cooling chamber of very great capacity is provided, the water contents of which maintain the heating of the cylinder which takes place when at work within narrow limits and at all parts of its walls, approximately uniform.

In the accompanying drawings: Figure 1 is a vertical cross section along line A-B of Fig. 2. Fig. 2 is a longitudinal section and Fig. 3 is a vertical cross section along line C-D of Fig. 2.

The inner wall of the cylinder consists of a piece *a* which either itself forms the piston slide surface or is provided in the ordinary manner with a bush and two extension pieces *b* which are connected with the outer wall *d* of the cylinder by means of plate shaped ring pieces *c* arranged on the cylinder ends. The combined cooling chamber *e* which is inclosed between the outer cylinder walls *d* and the inner cylinder walls *b a b* and also the end pieces *c* is in the parts *b* traversed above by two pipe connections or casings *f* arranged on the front and rear ends of the cylinder and beneath by pipe connections or casings *g* arranged in a similar manner which casings serve for admitting the valves for discharging the gaseous mixture and for this reason must be made of considerable size.

Two casings adapted to contain ignition plugs are provided at the level of the axis of the cylinder to right and left of the same, which casings traverse the cooling chamber *e* horizontally and the centers of which lie on the same cross sectional lines C-D as the axes of the nozzles *f* and *g*.

In order to obtain approximately the same size for all the casings *f g h* the outer cylinder wall is arranged everywhere at the same distance from the inner wall *a* which in the case of the pipe connections *f* and *g* follows as a natural result for constructive reasons. Now in order further to obtain the same distribution of the masses in the center of the cylinder as at the ends, four orifices *i* standing at 90° to one another are provided in the middle of the cylinder which approximately correspond in size to the connections *f g* and *h*. In these casings *i* the core pieces may be placed when the cylinder is being cast and in the finished motor they serve as pipe connections for supplying and discharging the water used for cooling the cylinder, and as hand

holes for cleaning the cooling chamber and the like.

It will be recognized that the cylinder here-
inbefore described is essentially symmetric-
5 ally arranged as regards three planes vertical
to one another and everywhere shows ap-
proximately a similar distribution of the
masses. By the arrangement of the very
large cooling chamber a thoroughly uniform
10 cooling of all the parts of the cylinder when
at work is also obtained and the greatest pos-
sible accessibility of the inner parts of the
cooling chamber afforded.

Having now particularly described and as-
15 certained the nature of the said invention
and in what manner the same is to be per-
formed, I declare that what I claim is:—

1. A cylinder comprising inner and outer
walls spaced apart and having transverse
20 portions connecting their ends together,
transverse walls connecting the inner and
outer walls together and forming casings, a
pair of said casings being at each end of the

cylinder, and transverse walls forming a pair
of casings *h* located between the casings of 25
each pair and two pairs of casings *i* located
between the pairs of casings and having com-
munication with the space between the inner
and outer walls.

2. In a cylinder with a cast-on cooling 30
jacket and cast-in casings, a number of said
casings serving as casings for the ignition
boxes and others as pipe connections for the
cooling water, said casings lying around and
along the cylinder between the latter and the 35
cooling jacket and all the casings having ap-
proximately the same measurements and
being arranged radially of the cylinder and
equidistant from each other.

In witness whereof I have hereunto set my 40
hand in presence of two witnesses.

HANS RICHTER

Witnesses:

MARTIN OFFENBACHER,
OSCAR BOCK.