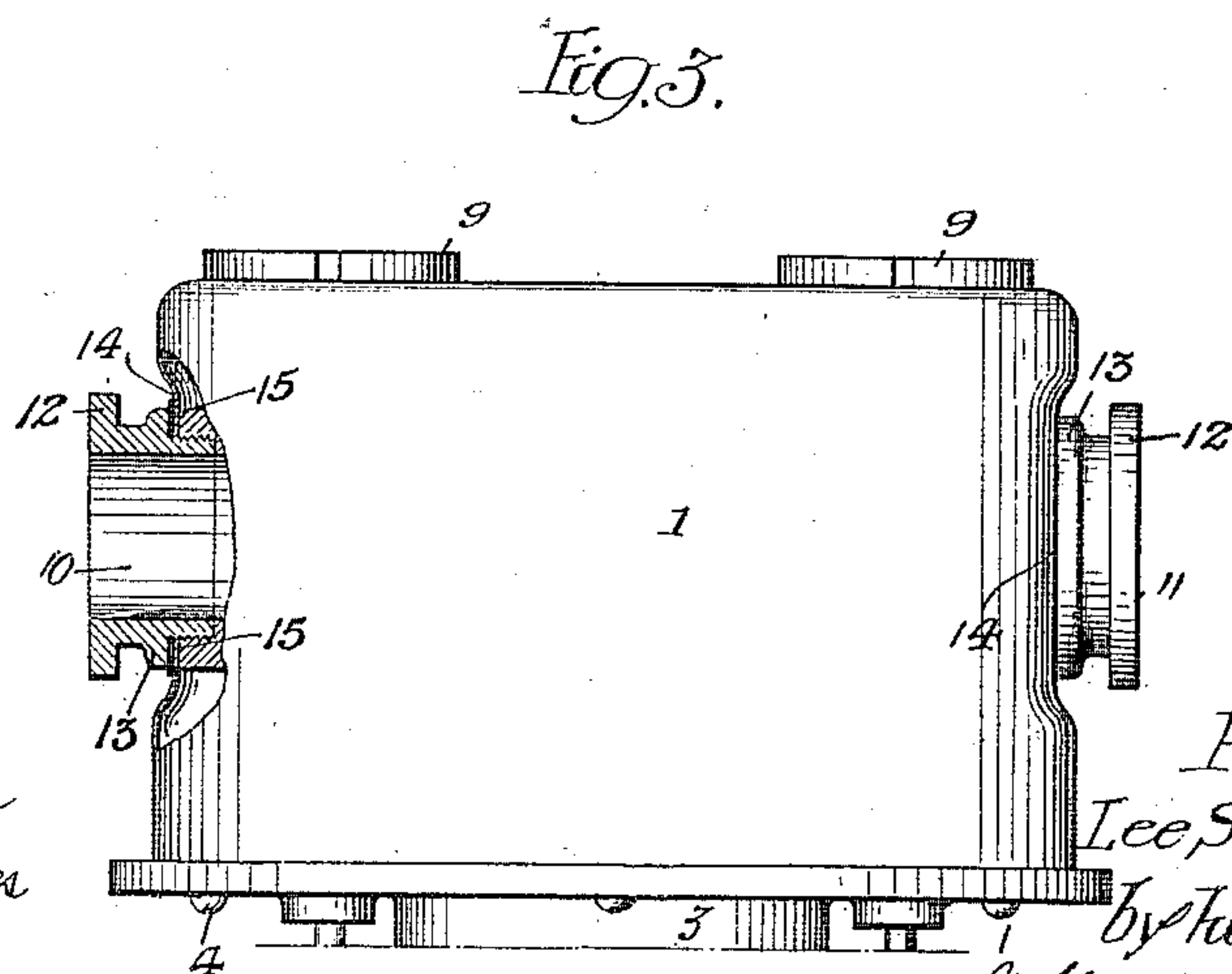
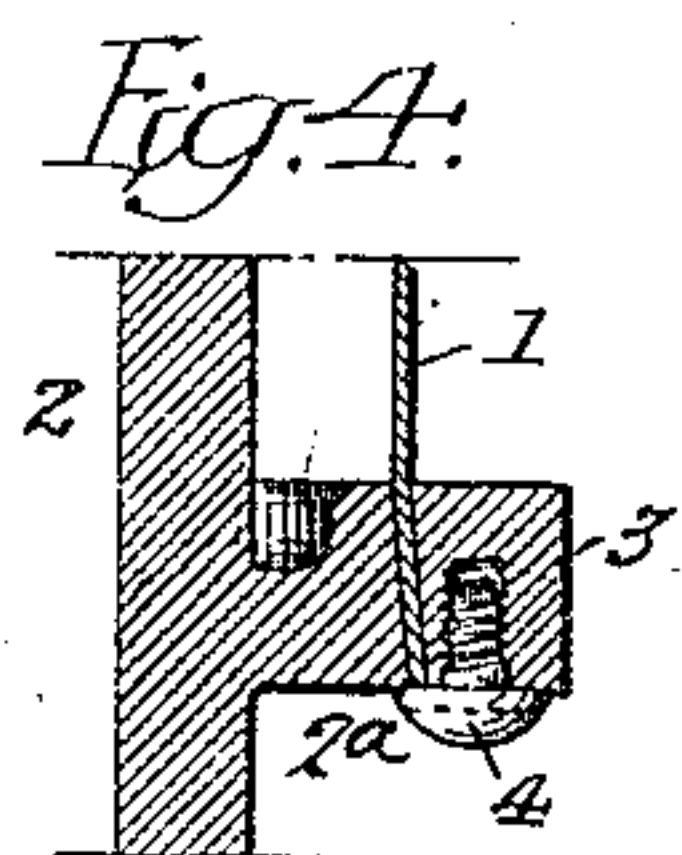
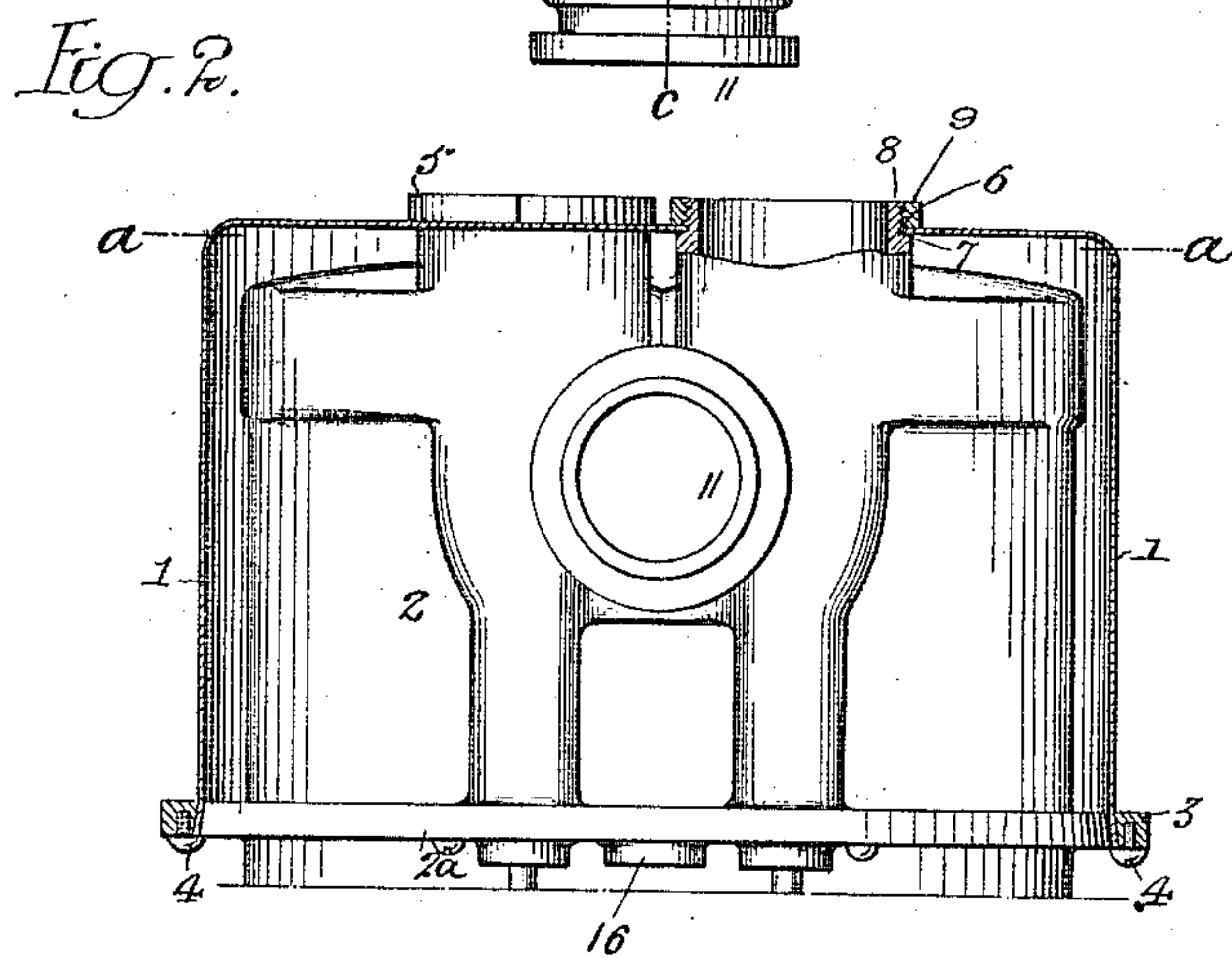
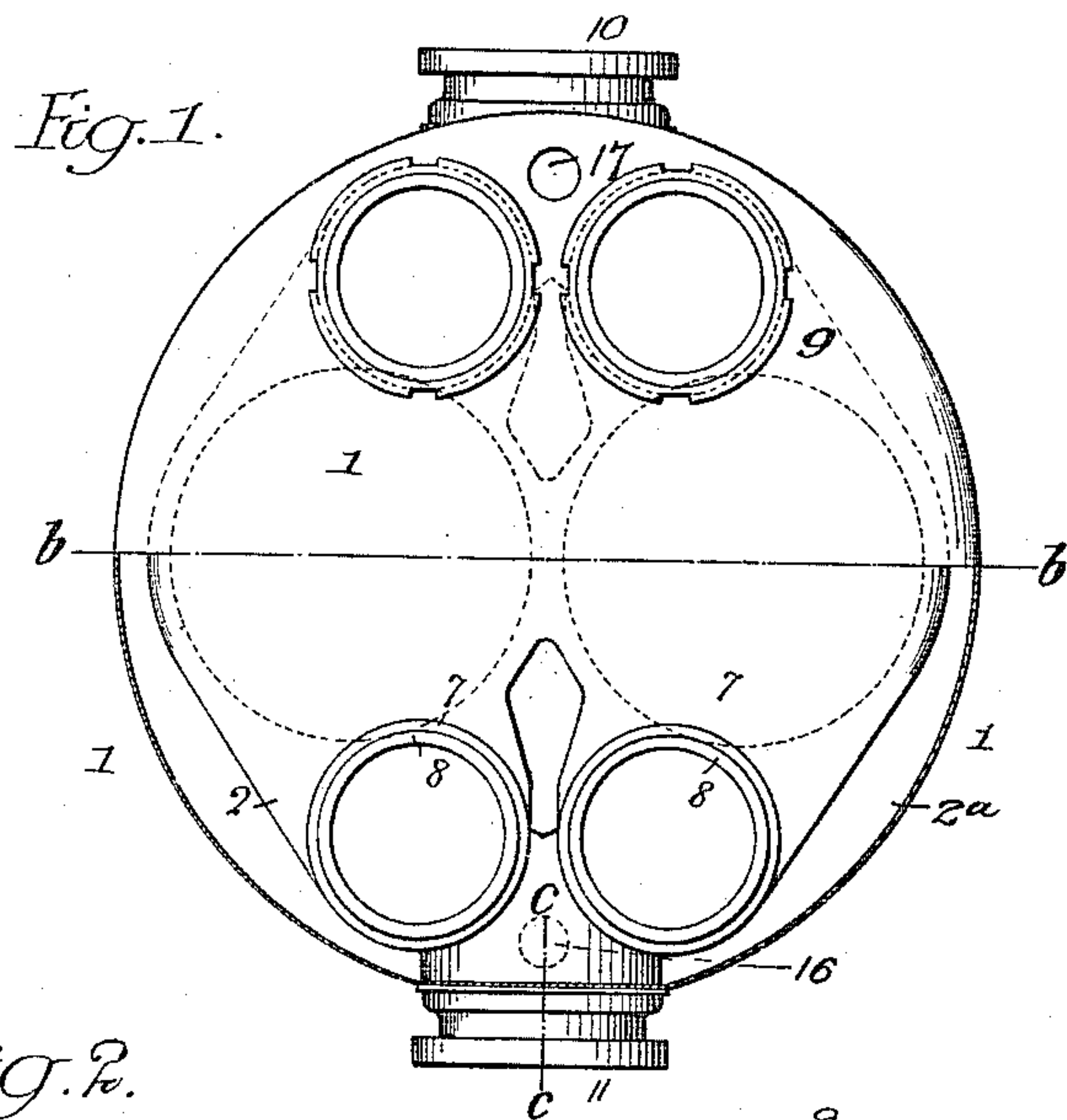


L. S. CHADWICK.
WATER JACKET FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED MAY 6, 1905.

995,324.

Patented June 13, 1911.



Witnesses:
Walter F. Pullinger
Wills A. Burrows

Inventor:
Lee S. Chadwick.
By his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

LEE S. CHADWICK, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO FAIRMOUNT
ENGINEERING WORKS, OF PHILADELPHIA, PENNSYLVANIA.

WATER-JACKET FOR INTERNAL-COMBUSTION ENGINES.

995,324.

Specification of Letters Patent. Patented June 13, 1911.

Application filed May 6, 1905. Serial No. 259,121.

To all whom it may concern:

Be it known that I, LEE S. CHADWICK, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Water-Jackets for Internal-Combustion Engines, of which the following is a specification.

My invention relates to the cooling means for internal combustion engines, and consists of a jacket or casing designed to cover the inlet and exhaust end of the same, and to provide means for circulating a cooling fluid for the engine; such casing being so attached as to provide water-tight joints to insure that no fluid may leak into the engine cylinder.

My invention is clearly shown in the accompanying drawing, in which—

Figure 1, is a plan view, partly in section on the line *a—^a* Fig. 2, of sufficient of an internal combustion engine to illustrate the manner of applying the casing forming the subject of my invention; Fig. 2, is a sectional view of the casing, taken on the line *b—^b*, Fig. 1; Fig. 3, is an elevation at right angles to Fig. 2, partly in section on the line *c—^c*, Fig. 1; and Fig. 4, is a sectional view illustrating a detail of my invention.

In casting those cylinders of internal combustion engines which are provided with chambered walls serving as water jackets, much difficulty is experienced in securing perfect castings. In practice almost twenty per cent. of the castings made are rendered useless by reason of pitting, or the presence of spongy parts that extend from the combustion chamber or outer surface of the wall of the cylinder to the chamber disposed within such wall; such conditions in both instances causing leakage and consequent rejection. I propose to obviate this difficulty by providing a casing or jacket for the cylinder which is made wholly independent thereof, preferably by spinning a sheet of metal into desired form. In casting a cylinder for use with such a jacket there is no necessity for providing chambers for the circulation of water, and as there is only a single wall to provide for, such cylinder can usually be cast without serious difficulty. In fact, practice has shown that less than two per cent. of bad castings are produced.

In the accompanying drawing, 1 represents the jacket which is preferably spun

from copper, although for use in marine work it may be desirable to use other metal, since copper would be unduly affected by salt water. This jacket or casing is a one-piece, cup-shaped, seamless metal structure cylindrical in contour.

The cylinder casting 2 is provided with an annular flanged portion 2^a, which is outwardly flared and upon this flanged portion the jacket or casing 1 inclosing said cylinder casting rests, being flared sufficiently at its open end to fit thereon. To retain the casing in place, I provide a locking ring 3 which has an inner surface disposed at the same angle as the flared surface of the flanged portion, and when fitted in place it will confine the parts in such manner as to provide a water-tight joint. To retain this ring in the position for locking the jacket in place, I tap a series of screws 4 into the same from the under side, and the heads of these screws are large enough to extend under the flanged portion of the cylinder, as shown in Fig. 4. The cylinder casting in this particular instance is duplex in form; each explosion chamber being provided with an inlet port or passage 2^b and an exhaust port or passage 2^c; said ports or passages communicating with the bore or explosion chamber of the cylinder and receiving the necessary valves. Both of these ports or passages must be accessible from the end of the cylinder through the jacket or casing, and for this purpose gland connections are provided. The casing 1 is cut at 5 and 6, for the purpose of fitting around these connections, and the body of the casing adjacent to said openings lies against a shoulder 7 from which a threaded projection 8 extends to receive gland nuts 9. In the sides of the cylinder structure the main inlet and exhaust passages or manifolds 10 and 11 are disposed, and a similar arrangement for securing the jacket or casing in place is provided here, except that the projections in which the passages are formed are internally threaded and receive collars or sleeves 12 having annular shoulders 13 which abut the wall of the casing. If preferred, this form of connection may be employed instead of the threaded projections 8. To insure proper connection, the wall of the casing is flattened slightly at 14 and such flattened portion extends for a sufficient distance around the aperture to support the gasket 15 held

by the collars 12 and insure a water-tight joint at all joints.

The several ports 2^a and 2^b communicate with the bores or explosion chambers of the cylinders and receive the inlet and exhaust valves to which access may be had through said ports. It will be understood, of course, that these ports are closed by suitable means when the engine is in use. Such feature, however, forms no part of my invention.

The water or other cooling medium enters the chamber formed between the cylinder casting and the jacket 1, at the point 16, adjacent to the exhaust port 11, in order that the coolest fluid will strike the hottest portion of the engine first. This water discharges from the casing at the top of the same at the point 17 just above the inlet port. The cooling fluid has full opportunity of entering the entire space between the jacket and the wall or shell of the cylinders and a marked improvement in the circulation is effected.

As may be noted from the drawing, there is no opening or connection through which the circulation water can enter the combustion chambers of the cylinders. At each connection the threaded portion surrounding the port or passage communicating with the interior of the cylinder extends some distance away from the wall of the jacket or casing, and all possible leakage from the casing outwardly is avoided by having gaskets or other suitable packing for each gland nut.

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. The combination with the cylinder casting of an internal combustion engine having a pair of cylinder bores disposed side by side, and a circular flange forming part of said casting and disposed at one end of the same, of a one-piece, cup-shaped, seamless, metal casing cylindrical in contour and inclosing said cylinder casting and fitting the marginal wall of said flange, and means for securing the open end of said casing to said flange.

2. The combination with the cylinder casting of an internal combustion engine having a pair of cylinder bores disposed side by side, and a circular flange forming part of said casting and disposed at one end of the same, of a one-piece, cup-shaped, seamless, metal casing cylindrical in contour and inclosing said cylinder casting and fitting the marginal wall of said flange, a locking ring for clamping the edge of the open end of said casing against said flange, and means for securing said locking ring in operative position against said flange.

3. The combination with the cylinder casting of an internal combustion engine having a pair of cylinder bores disposed side by

side, and a circular flange forming part of said casting and disposed at one end of the same, of a one-piece, cup-shaped, seamless, metal casing cylindrical in contour and inclosing said cylinder casting and fitting the marginal wall of said flange, a locking ring arranged to clamp the edge of the open end of said casing against said flange, and threaded members engaging correspondingly threaded recesses in the under side of said locking ring and having heads for engagement with the flange, said threaded members serving to draw said locking ring against the lower part of the casing and the latter to the flange.

4. The combination with the cylinder casting of an internal combustion engine having a pair of cylinder bores disposed side by side, and a circular flange forming part of said casting and disposed at one end of the same, of a one-piece, cup-shaped, seamless, metal casing cylindrical in contour and inclosing said cylinder casting and fitting the marginal wall of said flange, a beveled locking ring arranged to clamp the edge of the open end of said casing against said flange, and threaded members engaging correspondingly threaded recesses in the under side of the locking ring, said threaded members having heads for engagement with said flange.

5. In an internal combustion engine, the combination of a single casting having a pair of cylinder bores set side by side and a plurality of ports adjacent one end of said casting communicating with said bores, outwardly extending annular sleeve-like projections integral with said cylinder casting and surrounding said ports, a flange integral with said casting and circular in outline, said flange surrounding the casting some distance from the ported end of the same, a one-piece, cup-shaped, seamless, sheet metal shell or casing fitting over said cylinder casting and having openings for the passage of said outwardly extending projections, the latter being reduced to form shoulders, sleeve nuts carried by said projections for clamping the sheet metal shell against the shoulders formed by reducing said projections, such connections being wholly exterior of the through passages in said projections, and means for securing the lower edge of the shell or casing to the flange of said cylinder casting.

6. In an internal combustion engine, the combination of a single casting having a pair of cylinder bores set side by side and a plurality of ports adjacent one end of said casting communicating with said bores, outwardly extending annular sleeve-like projections integral with said cylinder casting and surrounding said ports, a flange integral with said casting and circular in outline, said flange surrounding the casting

some distance from the ported end of the same, a one-piece, cup-shaped, seamless, sheet metal shell or casing fitting over said cylinder casting and having openings for
5 the passage of said outwardly extending projections, the latter being reduced to form shoulders, sleeve nuts carried by said projections for clamping the sheet metal shell against the shoulders formed by reducing
10 said projections, such connections being wholly exterior of the through passages in said projections, a locking ring arranged to

clamp the lower edge of the shell or casing against said flange, and means for securing said locking ring to the cylinder casting to
15 hold the sheet metal jacket in place.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

LEE S. CHADWICK.

Witnesses:

MURRAY C. BOYER,
JOS. H. KLEIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
