

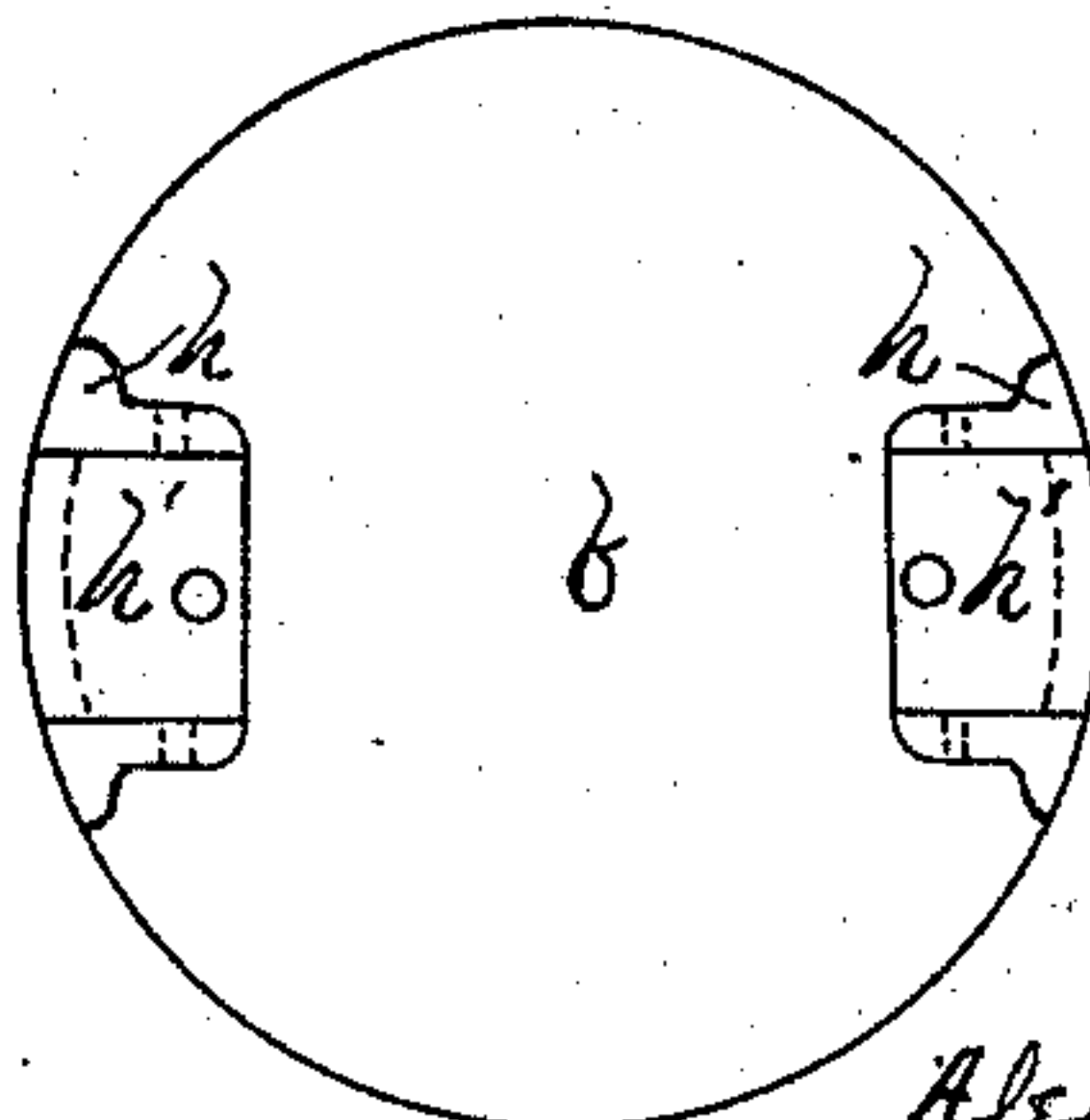
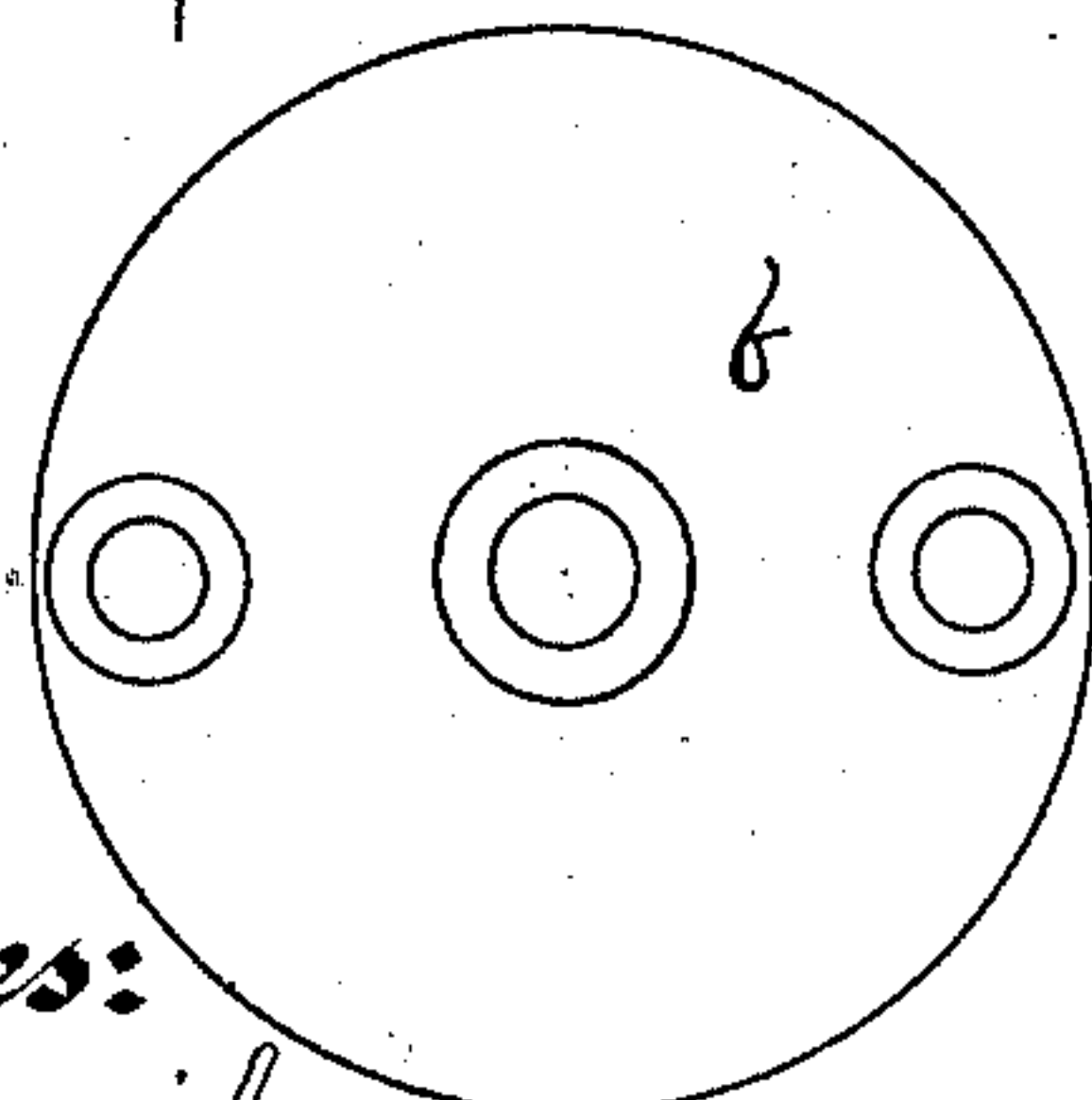
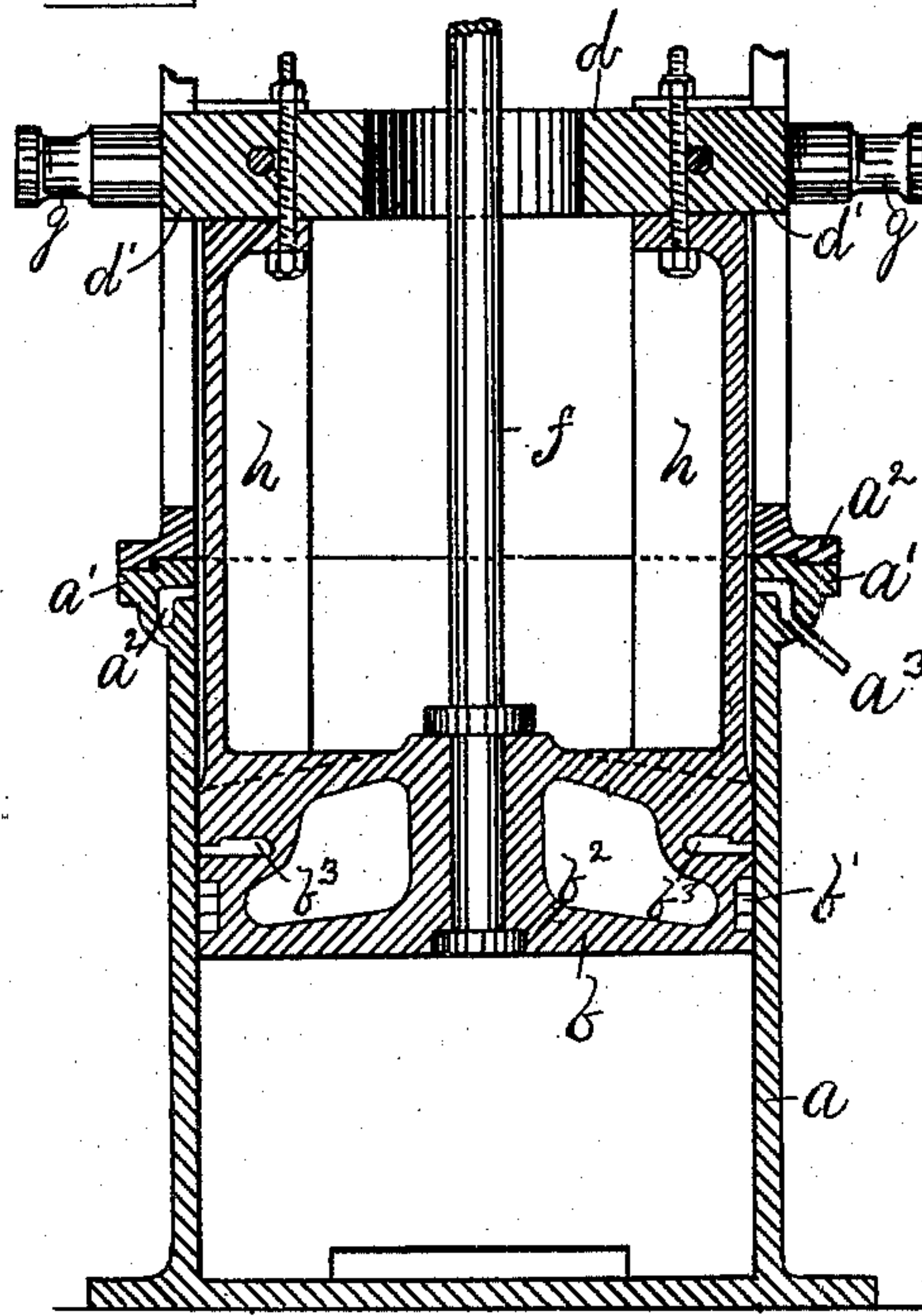
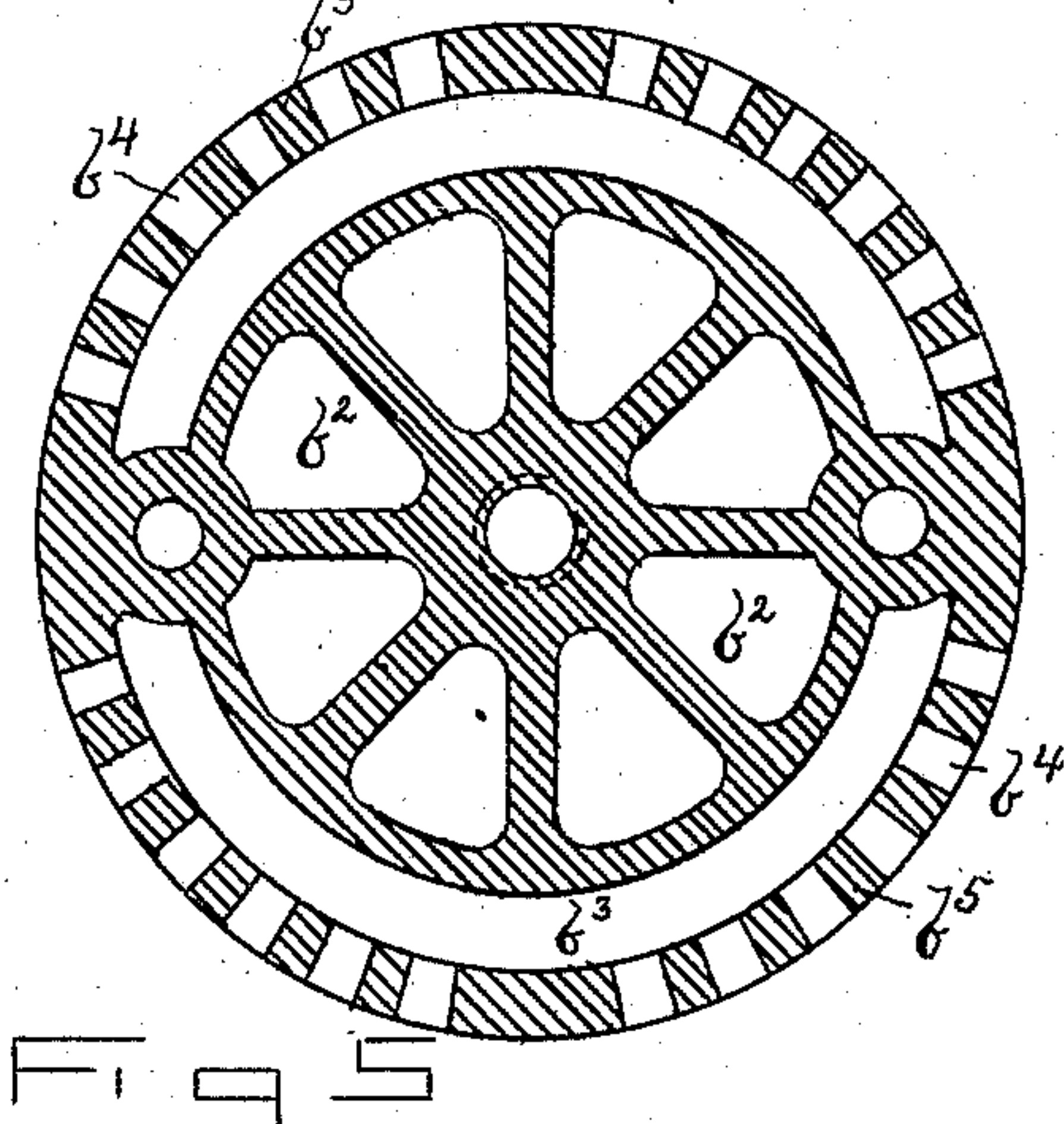
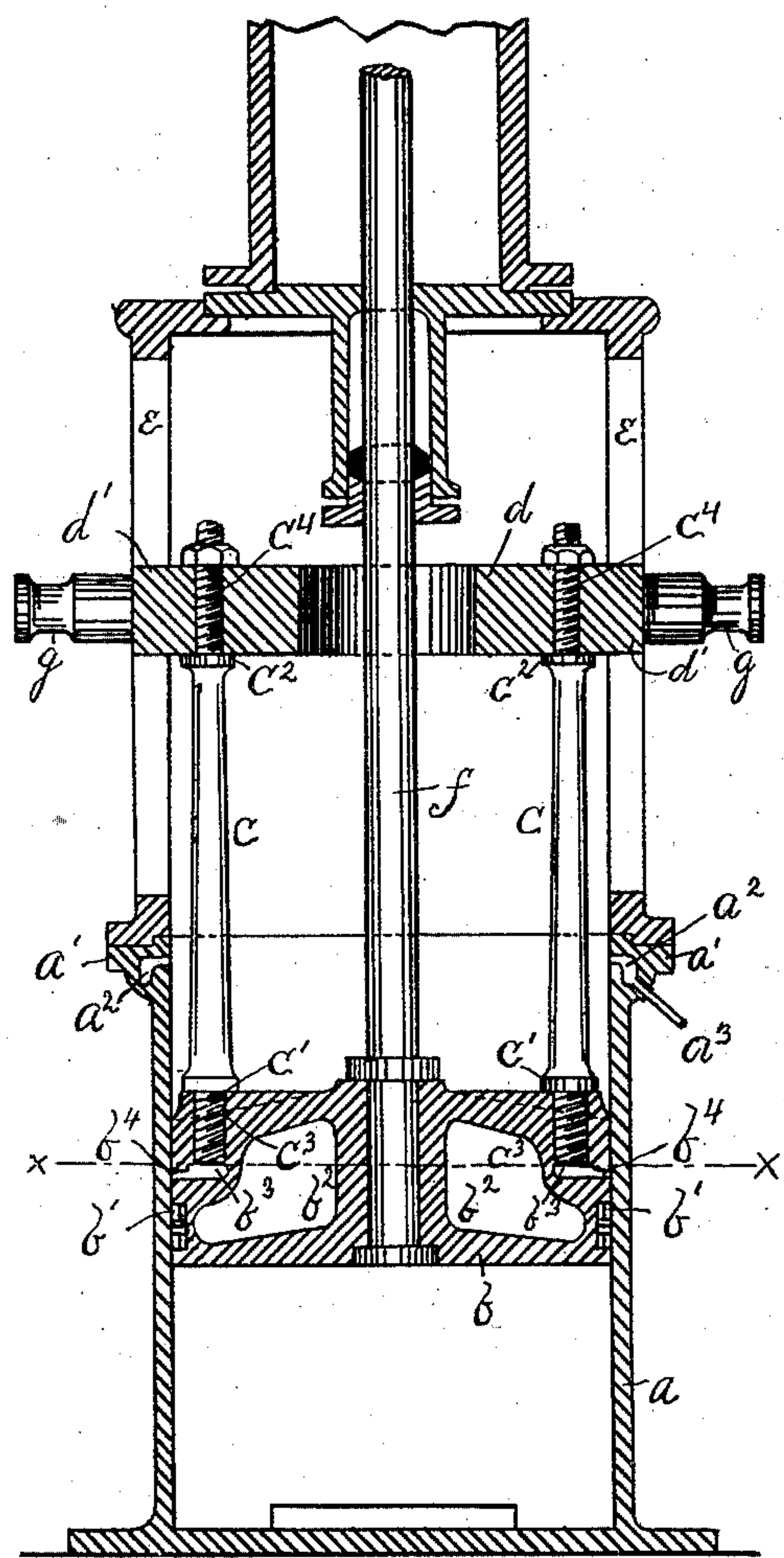
(No Model.)

A. T. BALLANTINE.

COMPRESSOR FOR ICE MAKING APPARATUS.

No. 313,045.

Patented Mar. 3, 1885.



Witnesses:

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UNITED STATES PATENT OFFICE.

ALEXANDER T. BALLANTINE, OF GENEVA, OHIO, ASSIGNOR TO ELLA B. BALLANTINE, OF SAME PLACE.

COMPRESSOR FOR ICE-MAKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 313,045, dated March 3, 1885.

Application filed June 2, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER T. BALLANTINE, a citizen of the United States, residing at Geneva, in the county of Ashtabula and State of Ohio, have invented certain new and useful Improvements in Cylinders and Pistons in Compressors for Ice-Making Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates particularly to certain improvements in a compressor for ice-making apparatus for which Letters Patent No. 229,940 were granted to me on the 13th of July, 1880, which improvements will be fully hereinafter described and claimed.

In the drawings, Figure 1 represents in vertical central section portions of a gas-compressor embodying my improvements. Fig. 2 represents a detached top plan view of my improved piston. Fig. 3 represents in vertical central section a modified form of piston. Fig. 4 is a detached top plan view of piston shown in Fig. 3, and Fig. 5 is an enlarged horizontal section taken in line *xx* of the piston.

The compressor shown in my patent hereinbefore named consists, essentially, of a steam-cylinder having but a single head, a piston and follower working in such cylinder, the follower having secured thereto at its sides the guide-blocks, to which are pivoted the pitman-rods, operated by a cranked shaft, and the upper end of the piston-rod is provided with an auxiliary piston working in a gas-cylinder provided with inlet and outlet valves.

In the accompanying drawings I have only shown those parts of the compressor which contain my improvements, referring to which, *a* is the steam-cylinder, open at its upper end, and *b* is the piston working therein. This cylinder and piston and the connections with the shaft embody my improvements, which I will now proceed to describe. The upper end of the cylinder *a* has the enlarged flange *a'*. Within this flange is located the annular chamber *a*²,

opening into the interior of the cylinder *a*, and *a*³ are discharge-openings, one or more, leading from the annular chamber *a*² to any convenient point outside of cylinder *a*. The piston *b* is provided with the usual packing-rings, *b'*, and is cast with the series of hollow chambers *b*² to diminish its weight.

*b*³ is an annular chamber within the piston, preferably centrally located, and close to the outer circumference of the piston. A series of openings, *b*⁴, separated by strengthening-walls *b*⁵, lead from the annular chamber *b*³ into the interior of the cylinder.

The object of the improved construction just described is to carry off the condensed steam, which may be forced between the piston and the walls of the cylinder in the operation of the compressor. As the water is forced up by the incoming steam it collects in the annular chamber *b*³ in the piston *b*, and as this chamber *b*³ in the upward stroke of the piston reaches a point opposite the annular chamber *a*² in the upper wall of cylinder *a* the collected water passes from the chamber *b*³ into chamber *a*², from whence it is discharged through openings *a*³, and in this manner all of the condensed steam which is forced up between the piston and cylinder is collected and discharged into any suitable receptacle away from the compressor, thereby keeping the base of the same free from the condensed steam, which would otherwise overflow the upper and open end of the steam-cylinder.

In the compressor shown in my patent hereinbefore named the steam-piston is provided with an integral cylindrical follower, to the sides of which the guide-blocks connected with the shaft are secured. This construction I have found in practice to be faulty, owing to the uncertainty of obtaining a homogeneous casting of the piston and follower, which is absolutely necessary to obtain an equal expansion or contraction of the follower, to insure an equal strain upon the two opposite guide-blocks.

My improved construction to obviate the above-mentioned difficulty is arranged as follows:

Referring to Fig. 1, *c c* are two wrought-iron rods having the shoulders *c'* *c'* and *c*² *c*² and screw-threaded ends *c*³ *c*³ and *c*⁴ *c*⁴. The lower

screw-threaded ends, $c^3 c^3$, are secured to the piston-head b , and the upper screw-threaded ends, $c^4 c^4$, to an annular cross-head, d , having side projections, $d' d'$, working in the guide-ways e , the piston-rod f passing up and down through the center of the cross-head d . Extending from the side projections, $d' d'$, are the short journals $g g$, to which the pitmen are attached which connect with the shaft of the compressor. By means of the adjustable wrought-iron rods $c c$ and cross-head d , as just described, an equal strain can readily be preserved upon the journals $g g$, which insures an even and accurate working of the piston, and prevents any breaking or fracture of parts consequent upon unequal strain due to irregular expansion.

In Fig. 3 I have shown a modification of the construction just described, in which the connecting-rods $h h$ are cast with the piston b , their upper ends being provided with sockets $h' h'$, in which is secured the cross-head d . This modified construction provides equally well against the breaking or fracture of parts, which is so liable to occur in the form of compressor shown in my patent hereinbefore named.

I claim—

1. In a compressor for ice-making apparatus, the combination, with the cylinder having a single head, and provided with an annular chamber in its upper or open end, such chamber opening into the interior of the cylinder, and having an exterior outlet or outlets, of the

piston provided with an annular chamber opening into the cylinder, by means of which the condensed steam is removed from the cylinder and prevented from overflowing its open end, substantially as shown and described.

2. In a compressor for ice-making apparatus, a piston adjustably secured by rods to a separate annular cross-head working in ways in the frame, such cross-head carrying the journals, which are connected by pitmen to the working-shaft, substantially as shown and described.

3. In a compressor for ice-making apparatus, the combination, with the cylinder a , having a single head, and provided with the annular chamber a^2 in its upper or open end, and the exterior outlet, a^3 , of the piston b , provided with the annular chamber b^3 , having openings b^4 , substantially as and for the purpose stated.

4. In a compressor for ice-making apparatus, the combination, with the piston b , of the cross-head d , such cross-head being adjustably connected with the piston by the screw-threaded rods $c c$, the cross-head having the journals $g g$, substantially as shown and described.

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

ALEXANDER T. BALLANTINE.

Witnesses:

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OTTO HODDICK.