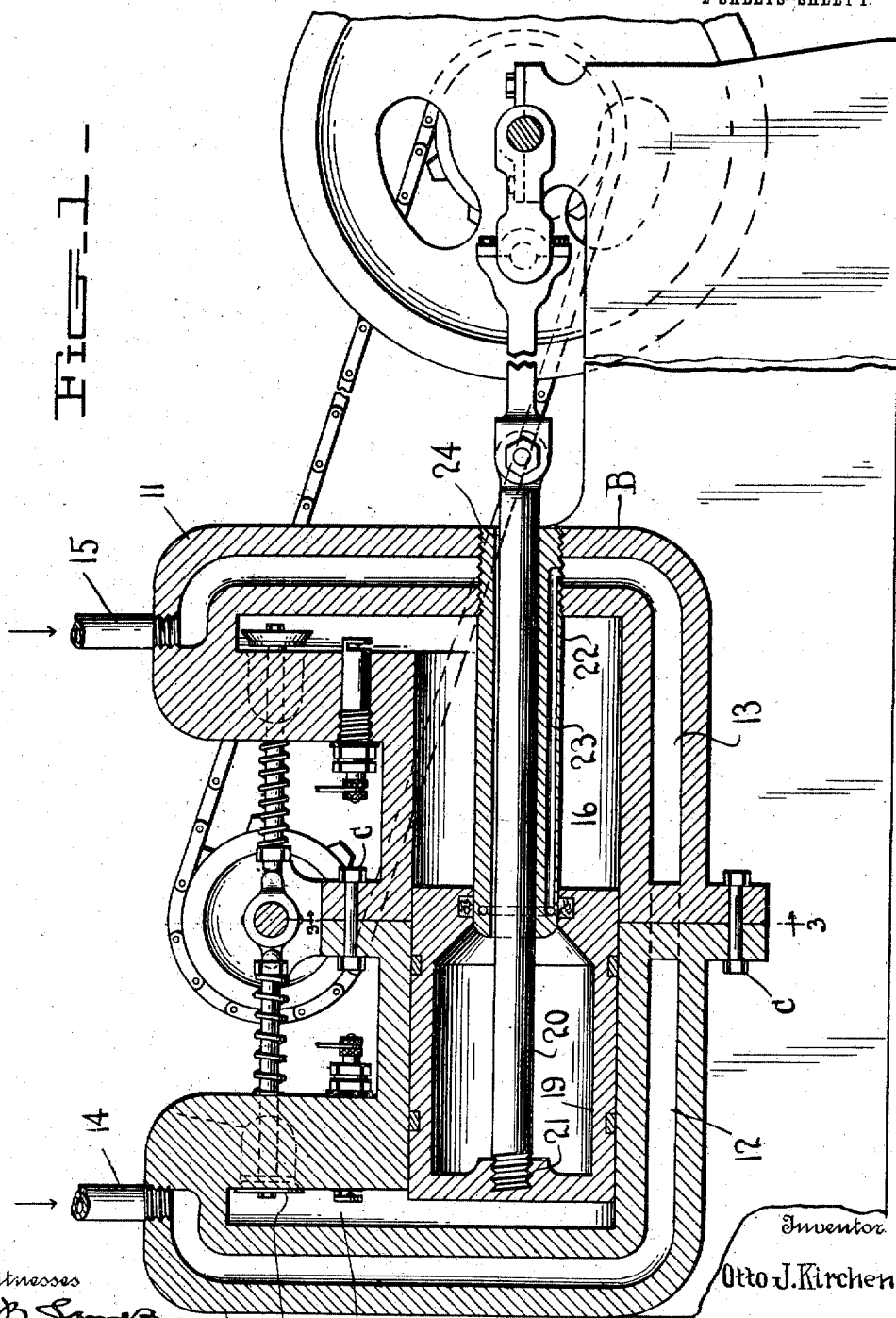


980,423.

O. J. KIRCHEN.
GAS ENGINE.
APPLICATION FILED MAR. 7, 1910.

Patented Jan. 3, 1911.

2 SHEETS-SHEET 1.



Witnesses
L. B. Jones
Henry P. Wright

Inventor
Otto J. Kirchen

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O. J. KIRCHEN.

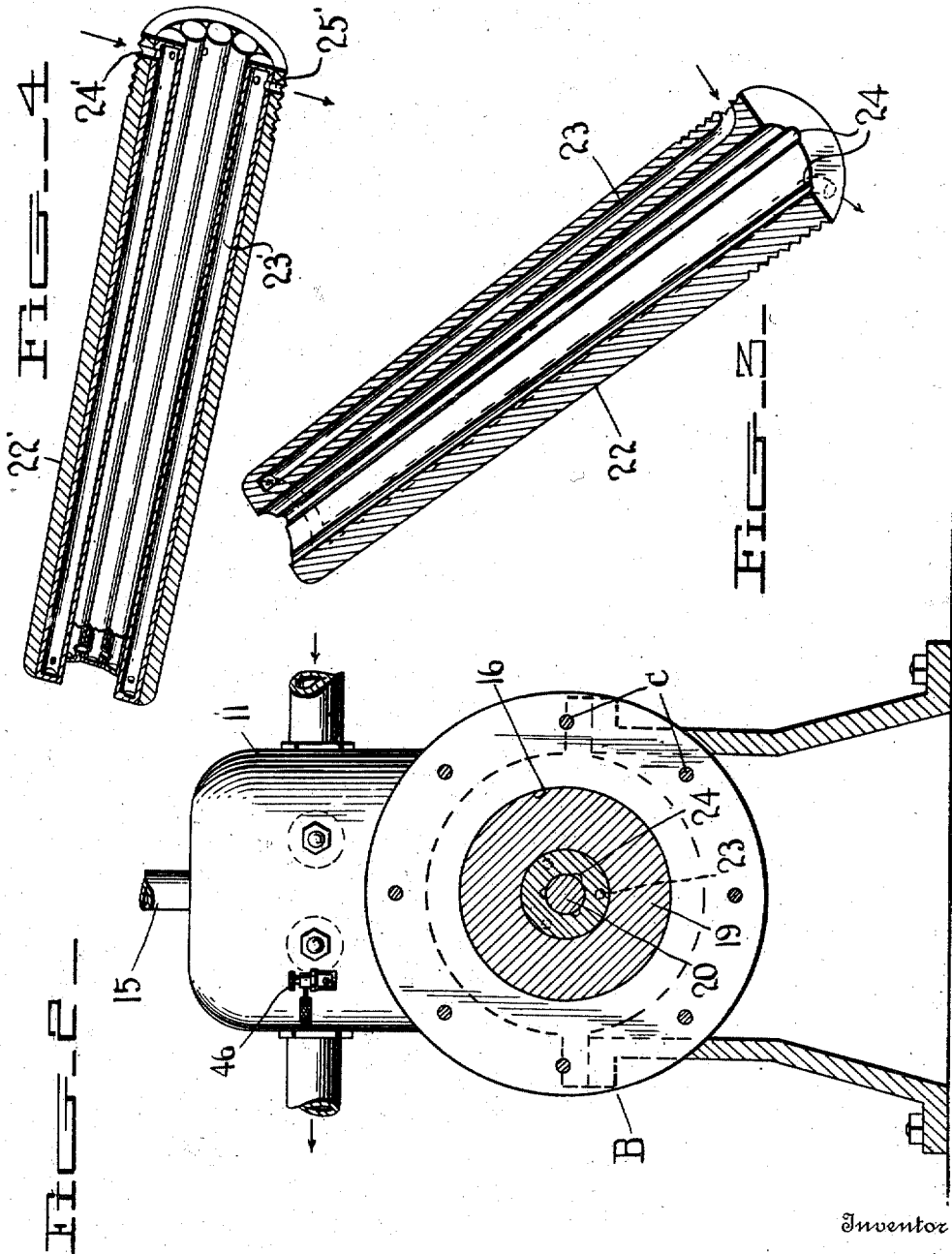
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L. B. James
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UNITED STATES PATENT OFFICE.

OTTO J. KIRCHEN, OF HANCOCK, MICHIGAN.

GAS-ENGINE.

980,423.

Specification of Letters Patent.

Patented Jan. 3, 1911.

Application filed March 7, 1910. Serial No. 547,799.

To all whom it may concern:

Be it known that I, OTTO J. KIRCHEN, a citizen of the United States, residing at Hancock, in the county of Houghton, State of Michigan, have invented certain new and useful Improvements in Gas-Engines; 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.

This invention relates to gas engines and particularly that type in which an explosion of fuel takes place at substantially the termination of each stroke of the piston; said explosions occurring at opposite ends of the cylinder and in opposite ends of the piston head successively.

The object of the invention is the construction of a gas engine of the type specified which embodies new and improved construction for effecting the cooling of the parts thereof during operation, and simplicity of design generally.

With the above and other objects in view the invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully described and set forth in the claim.

In describing the invention in detail reference will be had to the accompanying drawings in which like characters of reference denote corresponding parts in the several views, and in which,

Figure 1 is a vertical longitudinal section of a gas engine constructed in accordance with the invention; Fig. 2, a section on the line 3—3 of Fig. 1 looking to the rear; Fig. 3, a detail view showing the construction of the jacket which surrounds the piston rod for effecting the cooling of same during operation; and, Fig. 4, a detail view showing a modified form of the jacket which surrounds the piston rod for effecting the cooling of same during operation.

Referring to the drawings, the engine is shown as comprising a pair of heads A and B which are bolted together as at C, and provided at their outer terminals with the enlarged portions 10 and 11 respectively which project upwardly from the main portions of said head. Both of the heads A and B are provided with water jackets 12 and 13 respectively when the heads are in assembled position to form one continuous jacket, the outlet to which is shown at 14 and the inlet

at 15. When said heads A and B are bolted together the interiors thereof form a continuous cylindrical chamber 16 having upwardly extending terminals 17 and 18. Mounted for travel in the cylindrical chamber 16 is a piston head 19 formed of a hollow casing open at one end, through which opening projects a piston rod 20, one end of which is secured to the closed end of the piston as at 21. Mounted in the end wall of the head B, and projecting inwardly of said head and surrounding the piston rod 20, is a sleeve 22 of such diameter as to fit snugly in the opening in the end of the piston head 19 and at the same time permit a free movement of said piston head thereon. The wall of the sleeve 22 is provided with a series of longitudinal cavities or ducts 23 each having one end in communication with the water jacket of the engine and their other ends in communication with each other, whereby a circulation of water is maintained within said sleeve during the operation of the engine to effect a cooling of the piston rod 20 and the piston head 19 as the former moves within said sleeve and the latter without. The cooling of the parts just named is further enhanced by providing the face of the bore of the sleeve 22 with a series of grooves 24 which extend longitudinally of said sleeve throughout its entire extent; said grooves serving to permit the passage of air therethrough into the interior of the piston head 19.

In the modified form of cooling jacket shown in Fig. 4 a sleeve 22' surrounds the piston rod 20 and a plurality of tubes 23' are secured to the inner wall of the sleeve 22' and are disposed between said sleeve and piston rod. The tubes 23' have their ends closed and constitute a bearing for the piston rod 20. All of the tubes 23' are interconnected at each end so that water entering one of said tubes through the opening 24' in the sleeve 22' from the water jacket will be enabled to fill all of the tubes and discharge through the opening 25' into said water jacket. By this construction boring of the sleeve 22' is obviated and suitable passages for the circulation of air around the piston rod produced by reason of the cylindrical surface of said tubes 23'.

From the foregoing construction it will be apparent that during the operation of the engine in the usual and well-known manner, both the piston head 19 and the

piston rod 20 will be efficiently cooled by the passage of water through the channels in the sleeve 22 and the oscillation of air in the grooves 24.

5 What is claimed is:—

10 In a gas engine, the combination of a casing provided with a water jacket, a tubular member disposed longitudinally of said casing, said member having a series of ducts therein in communication with each other and with the water jacket; and further having a plurality of air passages extending

longitudinally of the member and opening through both ends thereof, a piston head provided with a central chamber to clear 15 said member, and a piston rod attached to the piston head and extending through the member.

In testimony whereof, I affix my signature, in presence of two witnesses.

OTTO J. KIRCHEN.

Witnesses:

CHAS. G. FISHER,
CHRIST. ZIEGLER.