

No. 858,707.

PATENTED JULY 2, 1907.

L. S. & E. B. CUSHMAN.
GAS ENGINE.
APPLICATION FILED JUNE 11, 1906.

Fig. 1.

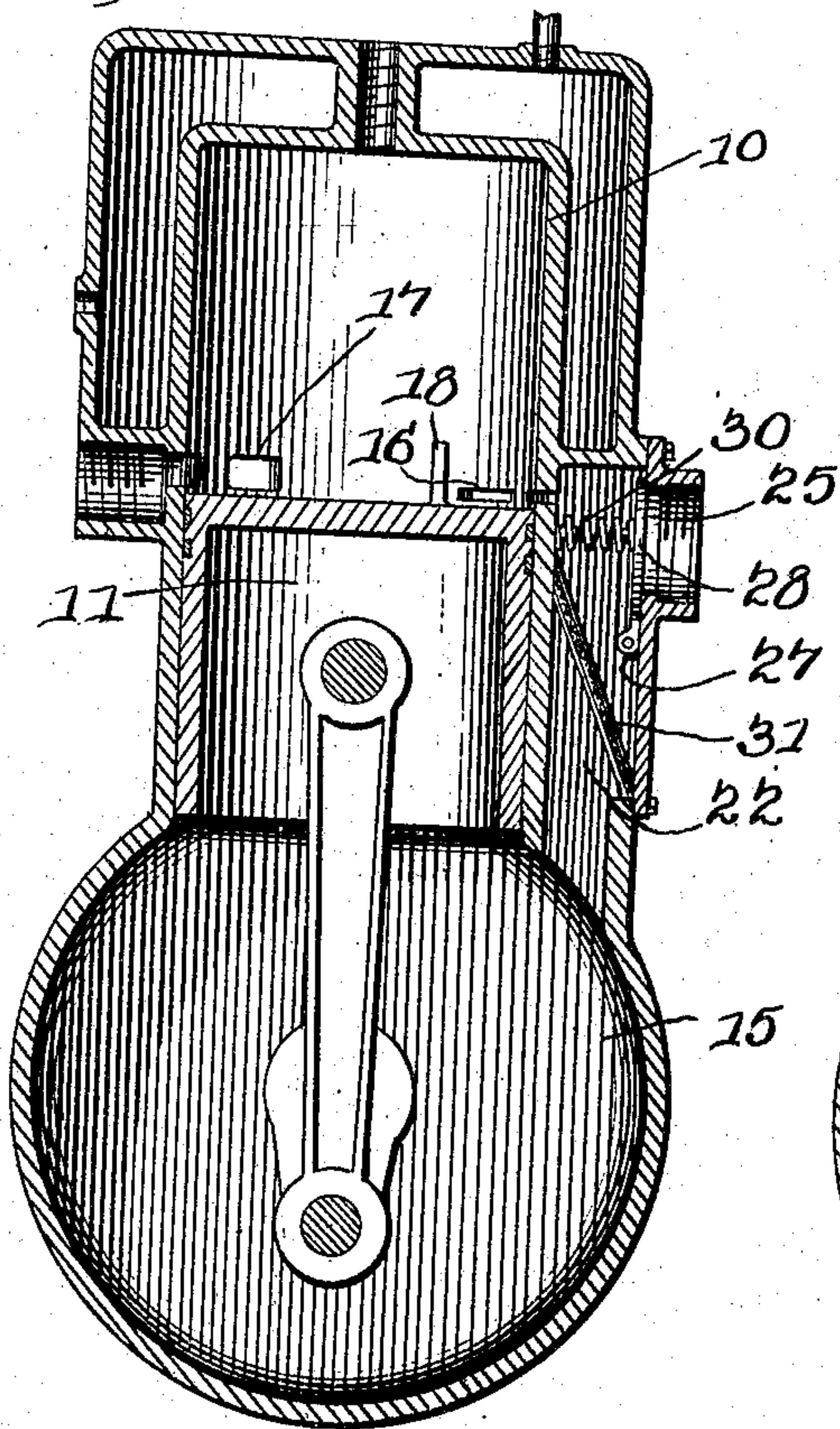


Fig. 2.

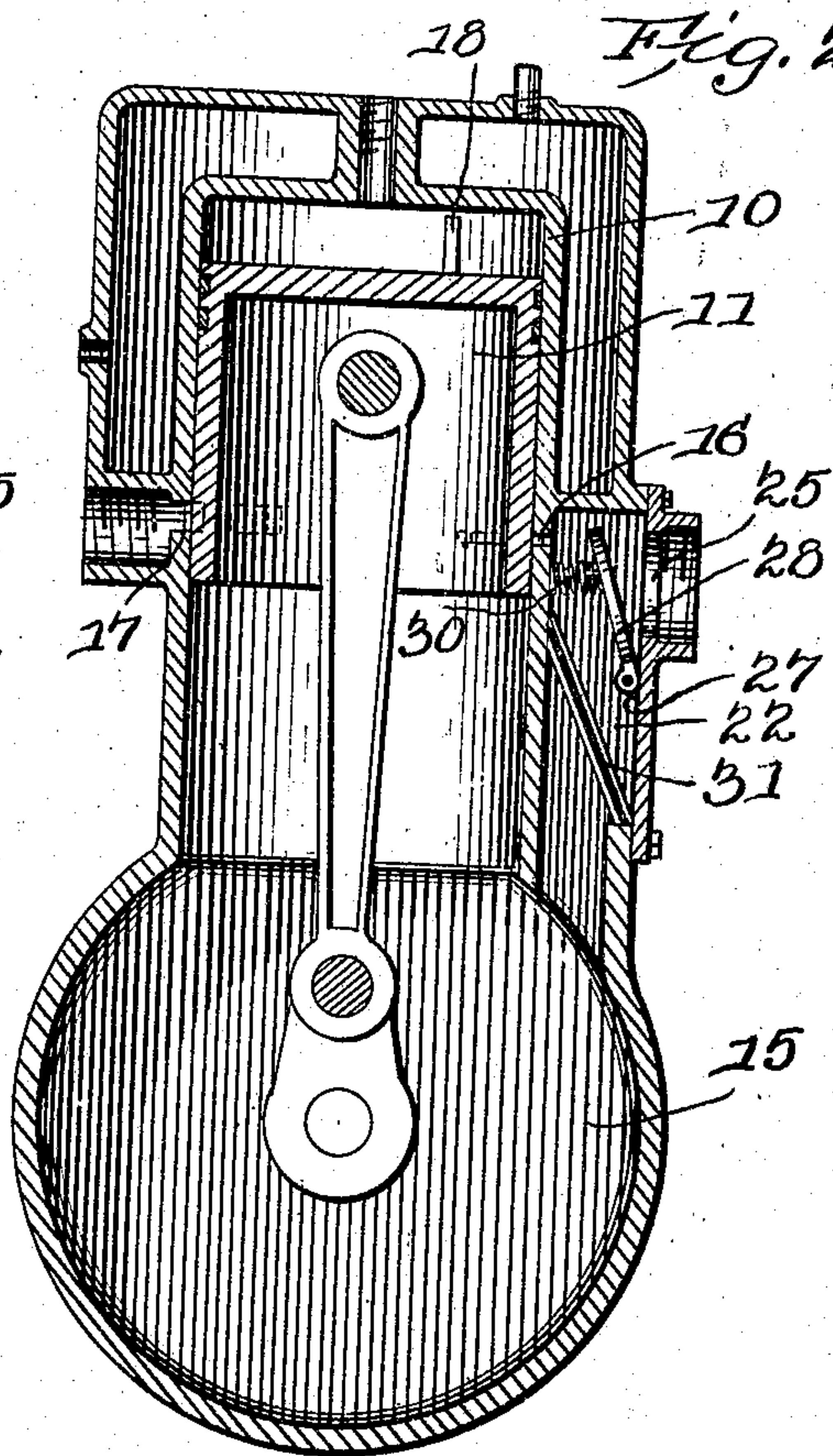


Fig. 3.

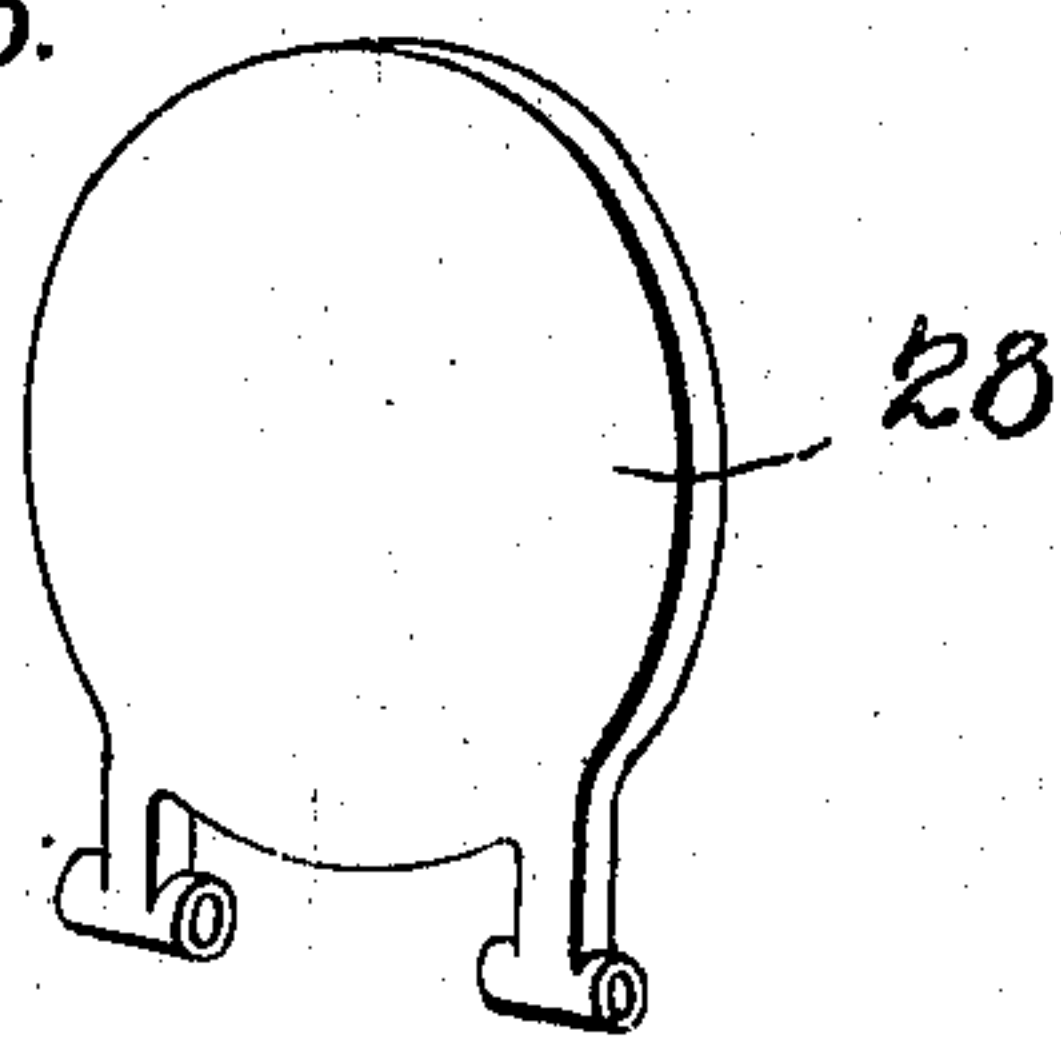


Fig. 4.

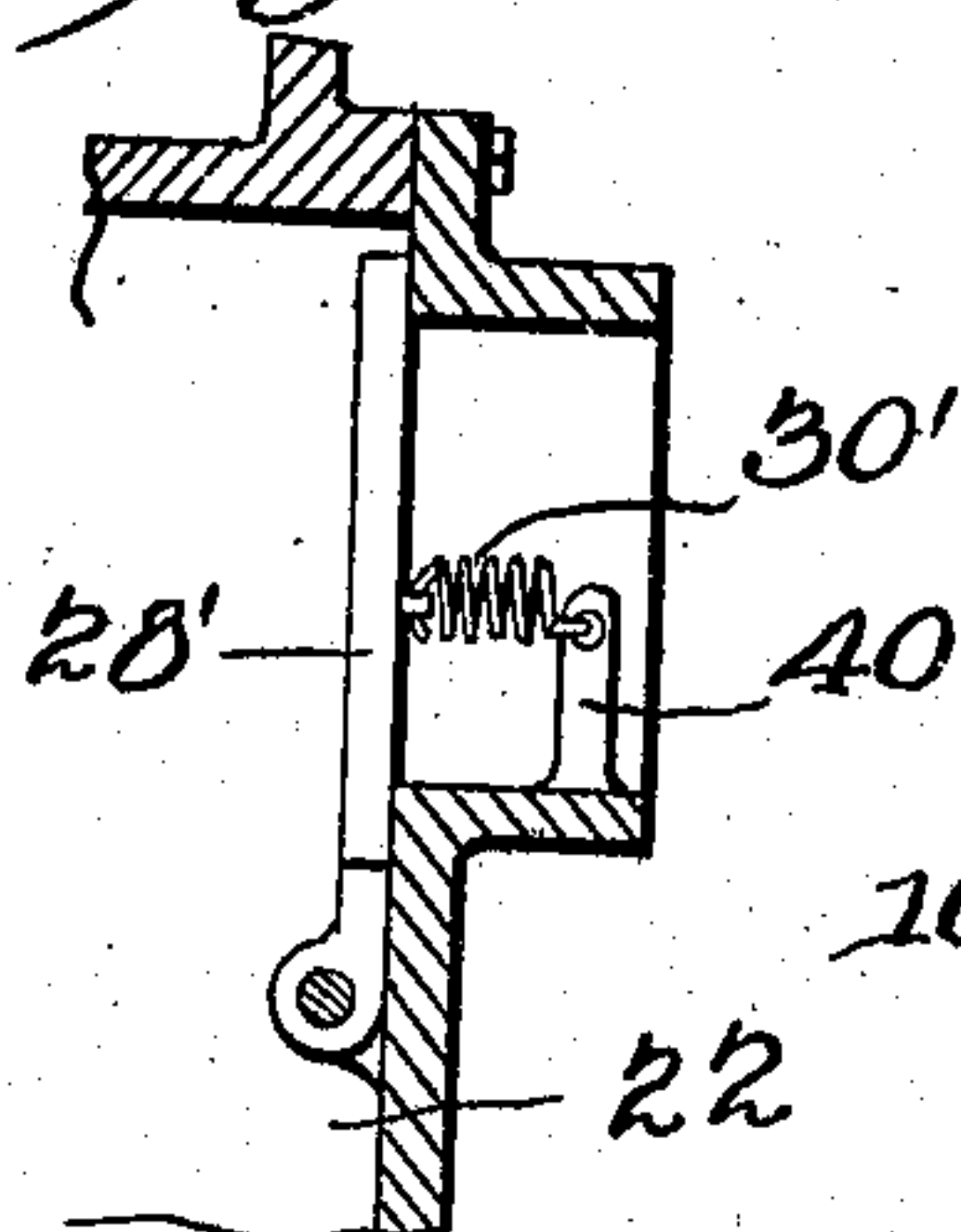
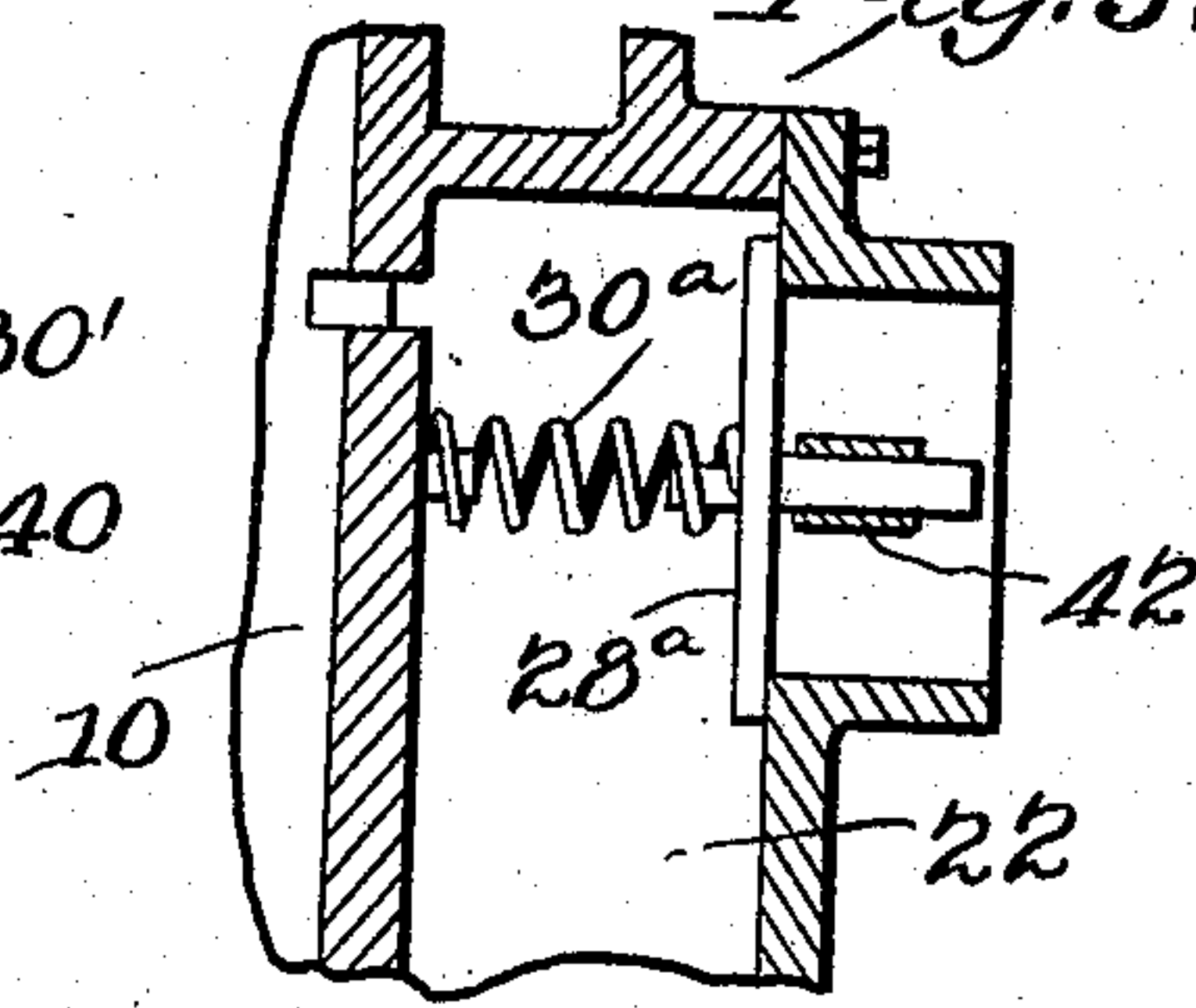


Fig. 5.



WITNESSES:

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UNITED STATES PATENT OFFICE.

LESLIE S. CUSHMAN AND EVERETT B. CUSHMAN, OF LINCOLN, NEBRASKA.

GAS-ENGINE.

No. 858,707.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed June 11, 1906. Serial No. 321,260.

To all whom it may concern:

Be it known that we, LESLIE S. CUSHMAN and EVERETT B. CUSHMAN, citizens of the United States, residing at Lincoln, in the county of Lancaster and State of Nebraska, have invented a new and useful Gas-Engine, of which the following is a specification.

This invention relates to internal combustion engines, and particularly to engines of the three port two cycle type, wherein all of the ports are under the direct control of the piston.

One of the principal objects of the invention is to provide an engine which may be readily started, and in which a preliminary charge or charges of an explosive compound rich in carbon or other liquid may be forced into the cylinder during the first stroke or strokes without danger of the accumulation of any liquid from the charge within the crank casing.

A further object of the invention is to provide the inlet port from the carbureter or other source of supply with a valve which will readily open to admit the charge when a partial vacuum is created within the crank casing or compression chamber, and which will close in order to cut off any direct communication between the carbureter and the cylinder while the inlet port of the latter is opened.

A further object of the invention is to provide a screen or foraminous support which will retain any liquid, gasoline or other material, and prevent the passage of the same to the crank casing.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of a three port two cycle engine constructed in accordance with the invention, the piston being shown at the completion of the working stroke. Fig. 2 is a similar view showing the piston at the completion of the out or compression stroke. Fig. 3 is a detail perspective view of the valve detached. Figs. 4 and 5 are detail views, illustrating modifications of the valve.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The cylinder 10 of the engine is arranged to contain a trunk piston 11 that is connected to a main crank shaft, the latter being disposed within a suitable crank casing 15 of the type ordinarily employed in two cycle engines. The cylinder is provided with a feed port 16

and an exhaust port 17, arranged diametrically opposite each other, and the piston has a deflector 18 of the usual type in order to direct the entering charge toward the upper or outer end of the cylinder.

At one side of the cylinder is a passage 22, the upper end of which communicates with the inlet port 16, and the lower end opens directly into the crank case. The outer wall of the passage 22 is formed of a plate that is bolted or otherwise secured in position, and it may be readily removed when necessary. This plate carries ears or lugs 27 to which a light disk valve 28 is pivoted, the valve being preferably formed of a thin sheet of aluminium or other light metal to permit quick movement to open or closed positions, and said valve is acted upon by a spring 30 that tends to retain it in the closed position, shown in Fig. 1. In the lower portion of the passage or port 22 is a screen 31 that preferably is arranged diagonally across the passage, and through which the explosive charge is passed once when moving down into the crank casing, and again when moving from the crank casing back to the inlet port.

During the ordinary operation of the engine, the partial vacuum created in the crank casing during the out stroke of the piston will result in opening the valve 28, so that an explosive charge may flow through the port 25 and down through the passage 22 into the crank casing. During the working stroke of the piston, this charge will be compressed, and at the end of the working stroke the charge will flow through the port 16 into the upper end of the cylinder, while the products of combustion will pass out through the port 17. As the valve 28 is effectively closed from the beginning of the working stroke of the piston until after the next compression stroke begins, it becomes impossible for any of the products of combustion to pass outward through the carbureter connecting port.

When starting the engine with the cylinder cold, it is usual to employ an excess quantity of gasoline or other liquid for the first few charges, but under ordinary circumstances this liquid, or a portion of it will remain in purely liquid form and will flow down through the passage 22 into the crank casing. In the present instance any liquid which remains uncombined, will be caught by the screen 31 and will be retained on the screen until at the completion of the working stroke of the piston, the compressed charge flows outward through the passage 22, and in again passing through the screen, will come into contact with the liquid and will carry the same up to and through the feed port 16 into the cylinder.

Fig. 4 illustrates a slight modification of the invention, wherein the valve 28' is connected by a spring 30' to a stud 40 within the carbureter connection, a tension spring being substituted for the compression spring shown in Figs. 1 and 2.

Fig. 5 illustrates a further modification in which a

plain disk valve 28^a is provided with a stem 41 adapted to a suitable guide 42 at the center of the port 25, said valve being normally held closed by a spring 30^a.

The construction of the engine is much simplified by placing the carbureter connection directly in the transfer port or passage, and is of especial value in securing easy starting of the engine and the forcing of whole charges into the cylinder as soon as the work is commenced.

10 We claim:—

In a three port two cycle engine, a transfer port, or passage extending between the crank case and the cylinder inlet port, a feed port communicating with said transfer port, a suction opened valve, a light spring tending to

force said valve to closed position and cut off the flow 15 from the feed port into the transfer port, and a screen extending across the transfer port at a point below the feed port and cylinder inlet port, whereby any liquid gasoline entering with the fresh charge being drawn to the crank casing will be caught by the screen and held until 20 the return flow of the charge through the transfer port in the direction of the cylinder inlet port.

In testimony that we claim the foregoing as our own, we have hereto affixed our signatures in the presence of two witnesses.

LESLIE S. CUSHMAN.
EVERETT B. CUSHMAN.

Witnesses:

A. O. TAYLOR,
L. W. CUSHMAN.