

No. 788,496.

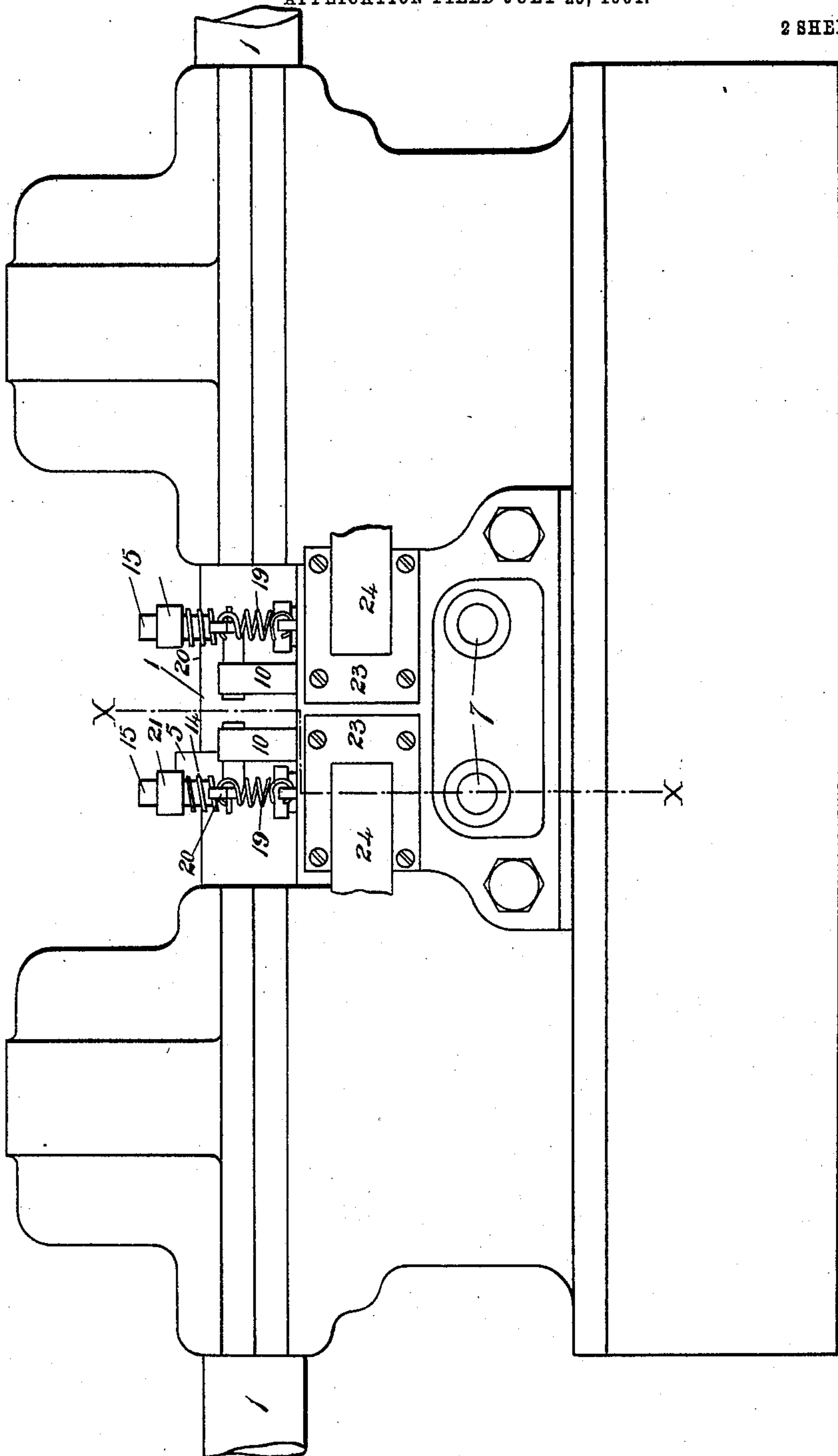
PATENTED APR. 25, 1905.

J. W. SEAL.

OPERATING DEVICE FOR INLET AND IGNITION VALVES OF INTERNAL  
COMBUSTION ENGINES.

APPLICATION FILED JULY 25, 1904.

2 SHEETS—SHEET 1.



Witnesses  
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Albert Yeater

Inspector  
John William Seal  
per Hubert Seftin Jones  
Attorney

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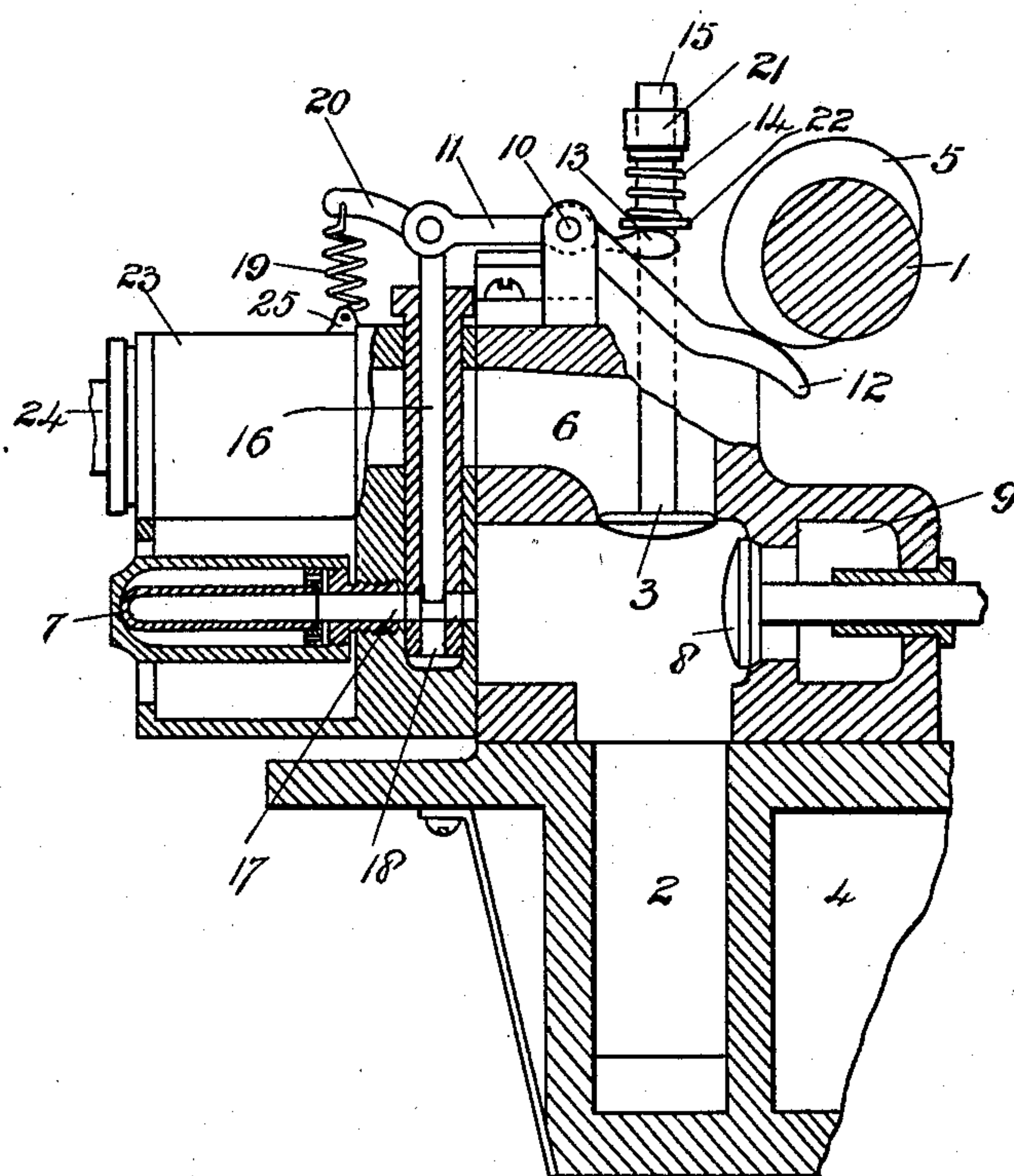
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*Fig. 2.*

Witnesses

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# UNITED STATES PATENT OFFICE.

JOHN W. SEAL, OF HAMMERSMITH, LONDON, ENGLAND, ASSIGNOR OF TWO-THIRDS TO JOHN BERNARD LANGFORD, OF CHISWICK, ENGLAND.

OPERATING DEVICE FOR INLET AND IGNITION VALVES OF INTERNAL-COMBUSTION ENGINES.

SPECIFICATION forming part of Letters Patent No. 788,496, dated April 25, 1905.

Original application filed October 23, 1903, Serial No. 178,298. Divided and this application filed July 25, 1904. Serial No. 218,057.

*To all whom it may concern:*

Be it known that I, JOHN WILLIAM SEAL, a subject of the King of Great Britain, residing at Oil Mill Lane, Hammersmith, in the county of London, England, have invented new and useful Improved Operating Devices for Inlet and Ignition Valves of Internal-Combustion Engines, of which the following is a specification.

10 This invention relates to internal-combustion engines; and it has for its object improvements in the means for admitting the mixed gases to the working space.

15 In the accompanying drawings the invention is shown as applied to a two-cylinder engine of the type wherein the crank-shaft is above the cylinders, Figure 1 being a front elevation of such an engine with this invention applied thereto, while Fig. 2 is a partial vertical section of the engine, taken through the inlet-valve mechanism, the igniter, and the exhaust-valve on the line X X of Fig. 1.

20 The crank-shaft 1 runs above the cylinders 4 and carries, as is usual, a cam 5 for operating each ignition-valve.

25 2 is a cylinder-port with which communicates the inlet-valve 3, controlling the admission of the mixture from the passage 6, which communicates with the vaporizer 23. The mixture reaches the vaporizer through pipes 24 from a mixing-valve or any suitable source. (Not shown.) The igniter 7 also communicates with the port 2, and opposite the same is an exhaust-valve 8, leading to an exhaust-port 9 and operated in any desired manner from the shaft 1.

35 The same cam serves for controlling both the inlet and the ignition valves, but, as it will be seen hereinafter, the operation of the inlet-valve is to a large extent automatic.

40 Upon the support 10 is pivoted a three-armed lever the arm 12 of which is shaped to be engaged by the cam 5, while the arm or tailpiece 13 is forked to pass around the spindle 15 of valve 3, and to the forwardly-projecting arm 11 is connected the rod 16, arranged to slide longitudinally in a sleeve 18, and which rod moves across the passage 17, leading to the igniter 7, so as to regulate the admission of gases to said igniter. The end

of the rod 16 may be made slightly smaller in diameter than the upper portion of said rod in order that a small leakage of gas into the igniter may take place before the passage is properly opened by the raising of rod, thus allowing time for the charge to enter and become ignited in the bulb in the case of high-speed engines. The arm 11 is extended to 20 and is pulled downward by a tension-spring 19, held by a lug 25 on the top of the case 23. On the stem 15 of the inlet-valve is arranged a compression-spring 14, working against a collar 21 and pressing upon the forked arm or tailpiece 13 by means of a washer 22. The spring 19 is sufficiently strong to overcome the pressure of spring 14 and to hold the valve 3 closed under normal circumstances. It may be mentioned that the sleeve 18 passes in the construction shown through the inlet-passage 6, the said passage dividing around the sleeve and sufficient space being left so that the wall of the sleeve does not obstruct the flow of gases through the passage. The parts of course might be differently arranged.

75 The operation of the above-described device is as follows: The parts are shown in the drawings in the position which they occupy at the beginning of the explosion-stroke. Compression has taken place and the cam 5 is just causing the opening of the passage 17, leading to the igniter 7. Simultaneously as the forked tailpiece 13 falls the pressure of spring 14 is being relaxed, but owing to the compression of gases in the cylinder and to the subsequent explosion the valve 3 remains pressed upon its seating. During the ensuing exhaust-stroke the passage 17 is closed and the spring 14 is again compressed, so that the valve 3 remains upon its seating. During the suction-stroke the forked tailpiece 13 again falls, thus relieving the spring-pressure on the valve 3 and allowing the combustible mixture to enter freely from the passage 6. The ignition-passage 17 is also open, but owing to the fact that the ignition-tube contains a certain amount of exhaust-gases the incoming mixture does not find its way into said tube during this period. During the compression-stroke the ignition device and valve 3 are both closed and the explosion or work-



ing stroke then follows as before. With this arrangement it will be seen that during the suction-stroke the incoming gases have a minimum of work to do in opening the valve 3, in which respect the engine resembles one having mechanically-operating valves; but at the same time the inlet-valve is always free to close, should the pressure in the cylinder rise suddenly through any cause, such as the premature ignition of the incoming charge.

It will be obvious that the working parts described may be replaced by their mechanical equivalents without departing from the scope of this invention. For instance, the valves may have any suitable shape or form and any equivalent devices may replace the cams for operating the inlet and ignition-valves.

What I claim is—

1. In an internal-combustion engine the combination with the cylinder, crank-shaft, means for supplying the combustible mixture and means for exhausting the waste products of combustion, of an igniter, a valve therefor, an inlet-valve for the combustible mixture, a spring adapted to press said valve upon its seating, means adapted to open and close the valve of the igniter and to simultaneously relieve or enforce the spring-pressure on the inlet-valve, and a single device adapted to be moved by the crank-shaft to operate the valve opening and closing means aforesaid.

2. In an internal-combustion engine the combination with the cylinder, crank-shaft, means for supplying the combustible mixture and means for exhausting the waste products

of combustion, of an igniter, a valve therefor, an inlet-valve for the combustible mixture, a spring adapted to press said valve upon its seating, a cam upon the crank-shaft, a three-armed lever connected by one arm to the valve of the igniter, by another arm adapted to enforce or relieve the spring-pressure on the inlet-valve, and by the third to be operated by the cam aforesaid, and means for maintaining the third arm in engagement with the cam-surface.

3. In an internal-combustion engine the combination with the cylinder, crank-shaft, means for supplying the combustible mixture and means for exhausting the waste products of combustion, of an igniter, a valve therefor, an inlet-valve for the combustible mixture, a spring adapted to press said valve upon its seating, a cam upon the crank-shaft, a three-armed lever connected by one arm to the valve of the igniter, by another arm adapted to enforce or relieve the spring-pressure on the inlet-valve, and by the third to be operated by the cam aforesaid, and a second spring adapted to overcome the pressure of the spring of the inlet-valve and to cause said valve to be held on its seating when the lever is not moved by the cam in such manner as to relieve the pressure of said valve-spring.

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

J. W. SEAL.

Witnesses:

G. ALTROP,

C. H. RICHARDS.