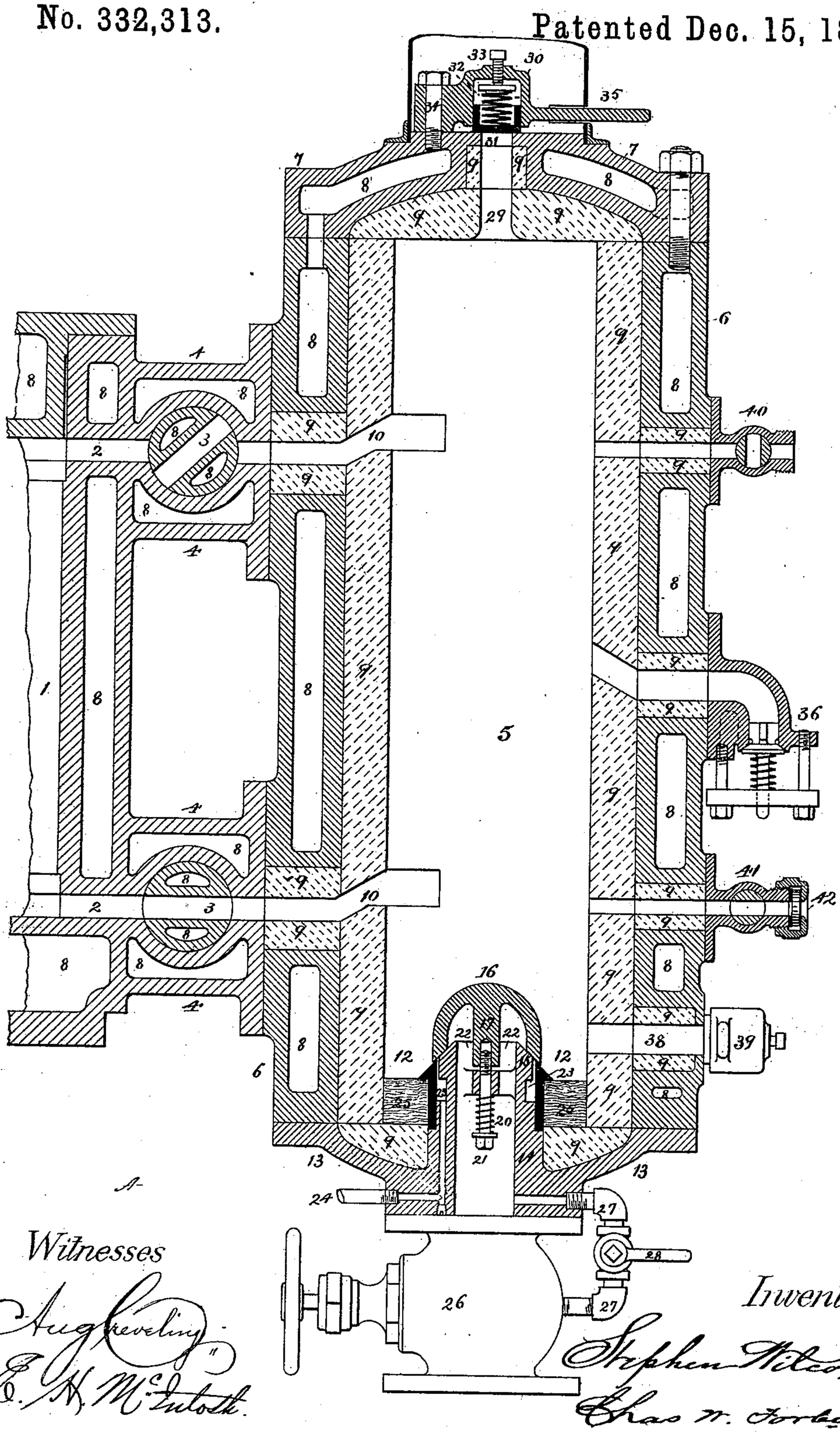
(No Model.)

S. WILCOX.

GAS ENGINE.

No. 332,313. Patented Dec. 15, 1885.



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GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 332,313, dated December 15, 1885.

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To all whom it may concern:

Be it known that I, STEPHEN WILCOX, a citizen of the United States, residing at the city of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Gas-Engines, of which the following is a specification.

In engines of this class, in which the combustible gases are usually fired in the working-cylinder, more or less difficulty has been met with in practice in maintaining an igniting-flame, particularly in devices designed to ignite each successive charge, and the principal object of my present invention is to overcome this difficulty.

The invention consists in a separate combustion chamber or furnace connected to and communicating with the working-cylinder valve-chests, and to certain details in the construction and adaptation of said combustion-chamber, wherein the gases are introduced, mixed, and fired preparatory to admission to said working-cylinder.

In order that others may understand and practice my invention, I will proceed to describe it in connection with the accompanying drawing, in which the figure represents a central longitudinal section of a part of a working-cylinder and valve-chests and a connected combustion chamber or furnace.

In the drawing a portion of the working-cylinder is shown at 1, together with its induction-ports 2 2, valves 3 3, and valve-chests 4 4. The valves 3 3 (shown for example) are constructed in cylindrical form, with passages made directly through them, and are oscillated by any well-known mechanism to cause said passages to register with and close the ports leading from the furnace and to the working-cylinder at any desired predetermined time during the stroke of the piston.

5 represents the combustion chamber or furnace in which the gases are mixed and fired preparatory to admission to the working-cylinder 1. This furnace is preferably made of a shell of cast metal, in cylindrical form, with removable heads or bonnets, and of a capacity equal to the requirements of its intended service. Its shell 6 and head 7 are provided with water-chambers 8 throughout, forming a water-jacket, and its entire interior surface and openings exposed to the action of the heated gases lined with fire-brick or other refractory material, as indicated at 9. These expedients for counteracting the effect of high temperature are individually well known, and the circulation of water through chambers arranged throughout all working parts of this class of engines, as intended in this case, is equally well understood. The furnace 5 is arranged adjacent to the working-cylinder 1, and in the present instance attached directly to the valve-chests 4 4, as shown, this arrangement having certain advantages, including a convenient location of the eduction-passages 10 10 and separation of the furnace and working-cylinder, whereby the valve-chests are made accessible, so that the valve may be removed without opening the furnace and the chest water-jacketed, besides presenting uniformity in design, and is therefore a preferred construction.

12 represents the burner, to which the air and inflammable fluid is conveyed from the source of supply. It is connected with and forms a part of the head or bonnet 13, whereby it may be readily placed or removed by detaching its pipe-connections and removing the bonnet. The burner consists in a hollow head, 14, projecting into the combustion-chamber, and cast in a single piece with the bonnet 13, as shown. It may, however, be made in a separate piece. The end or top of this head 14 is beveled, as shown at 15, and covered by a hollow spherical cap, 16, resting on and fitted to said beveled portion, and held in place by a central depending boss, 17, and connected spindle 18, that passes through a lug, 19, projecting from the head 14. The spindle 18 is connected with the boss 17 by a screw-thread, and passes loosely through the lug 19, and carries a spiral spring, 20, placed between said lug and the spindle-head 21, whereby the tension of the spring is made adjustable and capable of holding the cap 16 in place under various degrees of air-pressure. This cap or valve 16 not only covers the central air-passage, 22, but its beveled rim also covers the annular passage 23, through which the inflammable fluid enters from the pipe 24, leading from its source of supply.

25 represents an absorbent that may be composed of any porous substance that surrounds the head 14 and receives the saturated air,

and from this absorbent the flame is derived. A stop-valve, 26, is placed beneath the central air-passage and regulates the admission of the air from its reservoir or source of supply, an auxiliary air-pipe, 27, being provided to allow a small quantity of air to enter the burner, sufficient to maintain a flame when the engine is stopped and the stop-valve 26 closed, a plug-cock, 28, being provided to shut off the passage of air through the auxiliary pipe 27. The main stop-valve 26 may also be used, in place of the auxiliary pipe 27, for admitting air to maintain combustion in the furnace when the engine is still by partially opening the same.

29 is a relief or escape passage that is closed by a swinging gate, 30. This gate is provided with a recess that contains a valve, 31, covering the passage 29. This valve is made in cup shape and held on its seat by the inclosed spiral spring 32, which is compressed to more or less tension by the set-screw 33. The gate 30 is pivoted at 34 and operated at the will of the attendant by means of the handle 35, that is projected through a slot in the surrounding escape-pipe. The object of this gate 30 is to facilitate the ignition of the burner at starting, to exhaust the furnace when desired, or to vent the same in maintaining slow combustion when the engine is at rest, the valve 31 operating to insure a gas-tight joint. A safety-valve, 36, is also provided, and preferably arranged in the reversed position shown, in order to protect it, so far as possible, from the action of the hot gases. It will be observed that the escape-passage leading to this safety-valve from the combustion-chamber is made at an angle to the direction of escape through the refractory lining, the same expedient being also applied to the eduction-passages leading to the induction-valves of the working-cylinder, the object of this construction being to check a return of the gases to the combustion-chamber after once entering these passages, wherein a sensible cooling effect may be produced from the incidental exposure of these connections to the water-jackets or external air. This valve is of the ordinary type in construction and operation and adjusted to any desired point to relieve the furnace from an excess of pressure in the usual way.

38 is the igniting-port, through which a lighted torch is passed for igniting the burner 12, a suitable cap or cover (shown at 39) being provided.

40 and 41 represent openings through which the attendant can inspect the interior of the furnace and eduction-ports. These openings are located opposite the eduction-ports in direct line of sight, and are furnished with transparent sight-caps, as shown at 42, and interposed cocks to open and close the same.

Having now referred to such details of an apparatus embodying my invention that will enable others to construct the same, I will briefly describe the operation of such details and subsequently point out the novel characteristics in the claims. Air under compression is admitted to the central chamber, 22, and regulated by the stop-valve 26, and the inflammable fluid or oil supply enters the adjacent passage and chamber 23 through the pipe 24, that is connected with a pump or other charging device. The initial air-pressure lifts the cap 16 and the air is directed downward under the rim of said cap and across its beveled seat 15 to the absorbent 25. In lifting the cap 16 the annular passage leading from the oil-supply is uncovered, which allows the inflammable fluid to escape simultaneously with the air, and by which it is carried to the absorbent 25, where it is vaporized and made available upon ignition as the impelling agent, the torch being applied to the burner through the firing-port 38. When the engine is at rest, the flame may be maintained with a slow combustion by the admission of a small quantity of air through the auxiliary air-pipe 27 or stop-valve 26, the gate 30 being opened a sufficient amount to regulate the same. Small engines may be immediately set in motion upon lighting the fire, but large engines require means for maintaining the fire until it is convenient to start the same. Therefore I place the igniting-port at the bottom and the escape-outlet at the top of the furnace. When the valves covering these openings are open and a small supply of oil delivered by means of a hand-pump or otherwise, the fire may be started and maintained by the natural draft through said openings, so as to gradually heat up the furnace, this being conducive to the durability of the refractory lining and keeping the furnace in condition for instant service. In small engines the lighting-port may also serve as the escape-outlet when air is admitted to sustain slow combustion.

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

1. A gas-engine containing a working-cylinder, a combustion-chamber separated therefrom, and an intermediate induction-valve chest to which said parts are connected, whereby the valve is independently located so that it may be removed without disturbing the adjacent parts, and also water-jacketed for its special protection.

2. In a separate combustion-chamber of a gas-engine, the combination of the main or the auxiliary air-supply with an auxiliary gate, whereby combustion is maintained while the engine is still.

3. A burner for gas-engines, consisting of a head having a central air-passage, an annular oil-passage, a cap covering said passages, and an external absorbent, said cap being capable of automatic action by the pressure of the air.

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