(No Model.)

W. BURGER.

DISCHARGE VALVE FOR GAS ENGINES.

No. 570,376. Patented Oct. 27, 1896.

Fig: 1.

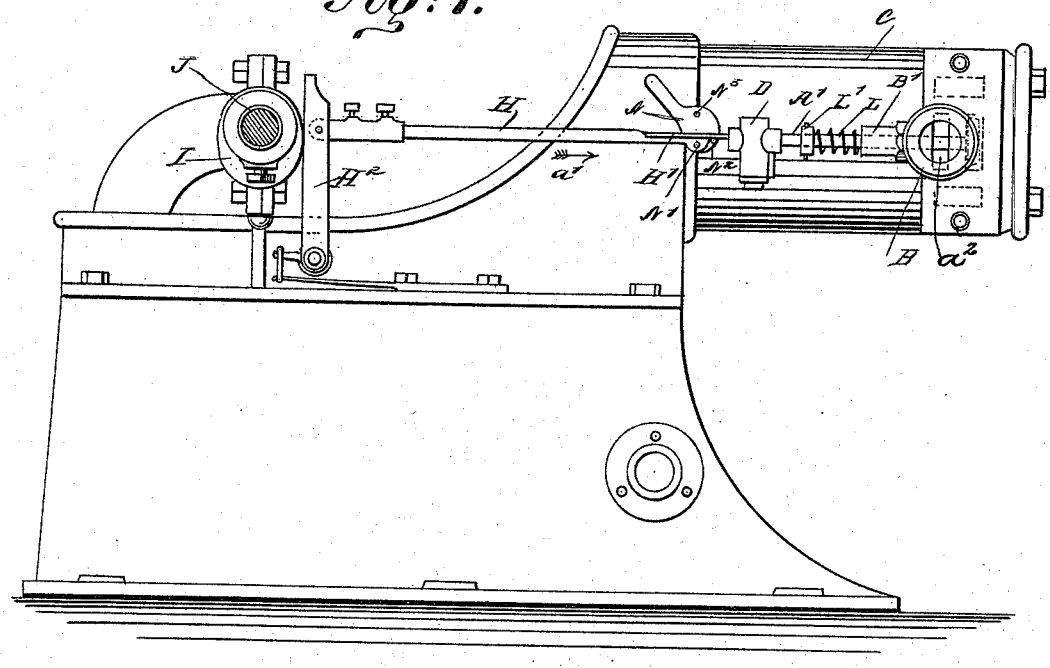


Fig: 2.

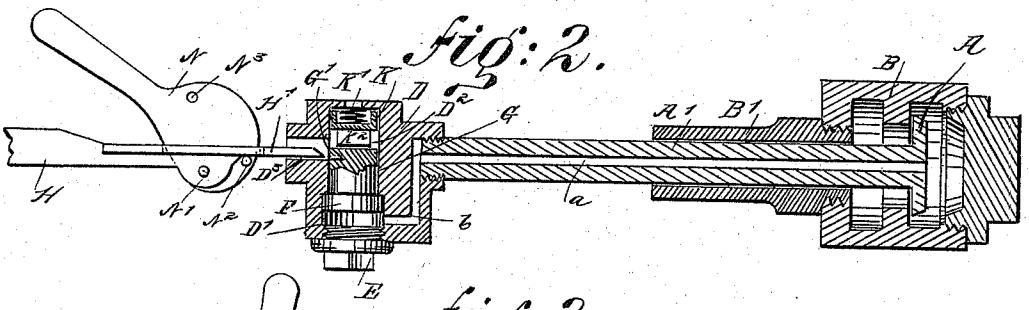


Fig: 3.

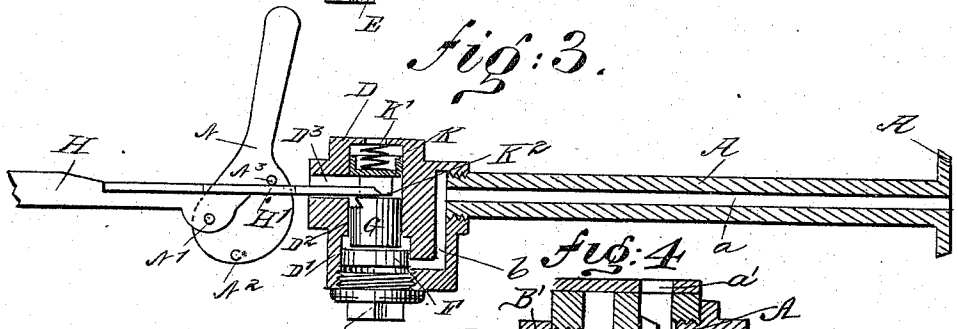
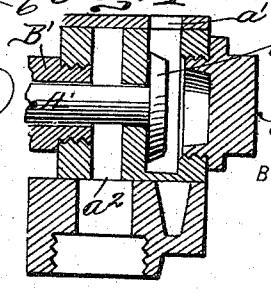


Fig: 4



WITNESSES:

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DISCHARGE-VALVE FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 570,376, dated October 27, 1896.

Application filed September 10, 1895. Serial No. 562,065. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM BURGER, of Delphos, in the county of Allen and State of Ohio, have invented a new and Improved Discharge-Valve for Gas-Engines, of which the following is a full, clear, and exact description.

The invention relates to engines using explosive mixtures as the motive agent; and its object is to provide a new and improved discharge or exhaust valve which is simple and durable in construction and arranged to control the outlet from the cylinder in such a manner that the latter may be repeatedly charged with the explosive mixture before igniting the same and in case of failure of ignition to retain the charge within the cylinder until proper ignition takes place.

The invention consists, primarily, of a movable part actuated by the engine, a discharge-valve having a stem channeled for the passage of pressure from the working cylinders, and means actuated by the pressure so as to be interposed between the stem and movable part to operate a discharge-valve.

The invention also consists of certain parts and details and combinations of the same, as will be fully described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement as applied. Fig. 2 is an enlarged sectional side elevation of the improvement detached. Fig. 3 is a similar view of the same with parts in a different position, and Fig. 4 is a section of the valve-casing at right angles to that shown in Fig. 3.

The exhaust or discharge valve A is normally seated on its seat in the exhaust-port B, connecting with a port a', leading from the cylinder C of the engine, and the valve-casing is provided with a port a^2, leading to the atmosphere, as will be readily understood by reference to the drawings. The valve A is provided with a valve-stem A', passing through the usual stuffing-box B', connecting at its outer end with a casing D, the said valve-stem being provided with a longitudinally-extending channel a, opening into a port b, formed in the casing D, and leading to a chamber D', formed in the bottom of the casing D, and closed by a plug E. In this chamber D' is fitted to slide a piston F, adapted to move a block G vertically in a chamber D^2, formed in the casing D, as is plainly shown in Figs. 2 and 3.

In the upper end of the block G is arranged a notch G', adapted to be engaged by the outer end of a pawl H', fixed to a rod H, pivotally connected with a spring-pressed lever H^2 in engagement with the peripheral surface of an eccentric I, secured on the main driving-shaft J of the engine. The free end of the pawl H' passes into an opening D^3, leading to the chamber D^2 in the casing D, so that the said pawl is adapted to engage the said notch G' at the time the block G is in an uppermost position, the said block being moved to this position by a pressure of gas or other mixture from the cylinder C, passing through the channel a and port b into the chamber D', to press the piston F upward and lift the block G into its uppermost position. Normally, however, the block G and piston F are in a lowermost position, so that the pawl H' in moving forward and backward by the action of the eccentric I passes loosely over the top of the block G without imparting a sliding motion to the valve-stem A' and the valve A. (See Fig. 3.)

A cap K, held in the upper end of the chamber D^2, is pressed on by a spring K' and is provided with feet K^2, engaging the top of the block G, so as to force the latter downward into its lowermost position whenever there is no pressure against the under side of the piston F. The pawl H' is adapted to pass between the feet K^2 at the time the block G is in a lowermost position. The valve A is held normally to its seat by the action of a spring L, coiled on the stem A' and resting with one end on the stuffing-box B', as is plainly shown in Fig. 1.

In order to open the discharge-valve A at every revolution of the shaft J when starting the engine, I provide a cam-lever N, fulcrumed at N' to the rod H and provided with two stop-pins N^2 and N^3. When the cam-lever is thrown down, as shown in Fig. 3, then it en-

gages the casing D on the inward movement of the rod H in the direction of the arrow *a'* to push the casing D, stem A', and valve A in the same direction to unseat the valve A and open the cylinder at the exhaust-port B to the outer air at every revolution of the shaft J, whereby no compression takes place within the cylinder C, and consequently the piston and cylinder simply act as a pump for pumping the explosive mixture into the cylinder. After the fly-wheels are set in motion the lever N is thrown backward into the position shown in Fig. 2 and the engine will now compress its charge of the explosive mixture in the usual manner. If this mixture is not ignited at the time the piston is on the inward stroke, then the charge will be expanded and compressed over and over again until proper ignition takes place. When the ignition does take place, then the pressure within the cylinder passes through part of the exhaust-port B to the channel *a* and into the port *b*, from which it passes to the chamber D' and acts on the under side of the piston F to raise the latter and the block G into an uppermost position. The rod H, by its pawl H', engages the notch G' whenever the rod H is moved forward in the direction of the arrow *a'* at the time the piston is on the return stroke, so that the valve A is opened, and the exhaust takes place from the cylinder during the return stroke of the piston by way of the exhaust-port B.

It is understood that the valve A is again seated at the time the piston moves into an outermost position by the action of the spring L and the return stroke of the rod H. Now it is evident that when no explosion takes place there is no pressure in the cylinder in the beginning of the return stroke of the piston. Consequently the block G remains in a lowermost position and the pawl H' passes over the top of the block without engaging the same, and consequently without shifting the casing D, stem A', and valve A in the direction of the arrow *a'* to move the valve A off its seat. The latter thus remains closed and additional mixture is drawn into the cylinder on the next stroke, and if proper ignition then takes place, then the exhaust-valve is again opened on the outward stroke of the piston, as previously described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A gas-engine comprising a movable part actuated by the engine, a discharge-valve having a stem channeled for the passage of pressure from within the working cylinder, and means actuated by said pressure so as to be interposed between the stem and the movable part to operate the discharge-valve, substantially as specified.

2. A gas-engine, comprising a spring-pressed exhaust-valve having a longitudinally-channeled stem, a casing held on the said stem and provided with a port, a piston in the said casing, and adapted to be acted on by pressure passing through the said channel and port from the cylinder, and a block carried by the said piston, and adapted to be engaged by the actuating mechanism for the valve-stem, substantially as shown and described.

3. A gas-engine, comprising a spring-pressed exhaust-valve having a longitudinally-channeled stem, a casing held on the said stem and provided with a port, a piston in the said casing, and adapted to be acted on by pressure passing through the said channel and port from the cylinder, a block carried by the said piston, and adapted to be engaged by the actuating mechanism for the valve-stem, and a pawl mounted to slide, and adapted to engage the said block when the latter is in an uppermost position, substantially as shown and described.

4. A gas-engine, comprising a spring-pressed exhaust-valve having a longitudinally-channeled stem, a casing held on the said stem and provided with a port, a piston in the said casing, and adapted to be acted on by pressure passing through the said channel and port from the cylinder, a block carried by the said piston, and adapted to be engaged by the actuating mechanism for the valve-stem, a pawl mounted to slide, and adapted to engage the said block when the latter is in an uppermost position, and a spring-pressed cap for holding the said block and piston normally in a lowermost position, substantially as shown and described.

5. A gas-engine, comprising a spring-pressed exhaust-valve having a longitudinally-channeled stem, a casing held on the said stem and provided with a port, a piston in the said casing, and adapted to be acted on by pressure passing through the said channel and port from the cylinder, a block carried by the said piston, and adapted to be engaged by the actuating mechanism for the valve-stem, a pawl mounted to slide and adapted to engage the said block when the latter is in an uppermost position, and a cam-lever for engaging the said casing and moving with the said pawl, substantially as shown and described.

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Witnesses:
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