No. 681,441. Patented Aug. 27, 1901.

W. L. CORSON.

EXHAUST MECHANISM FOR EXPLOSIVE ENGINES.

(Application filed Oct. 8, 1900.)

(No Model.)

Fig. 1.

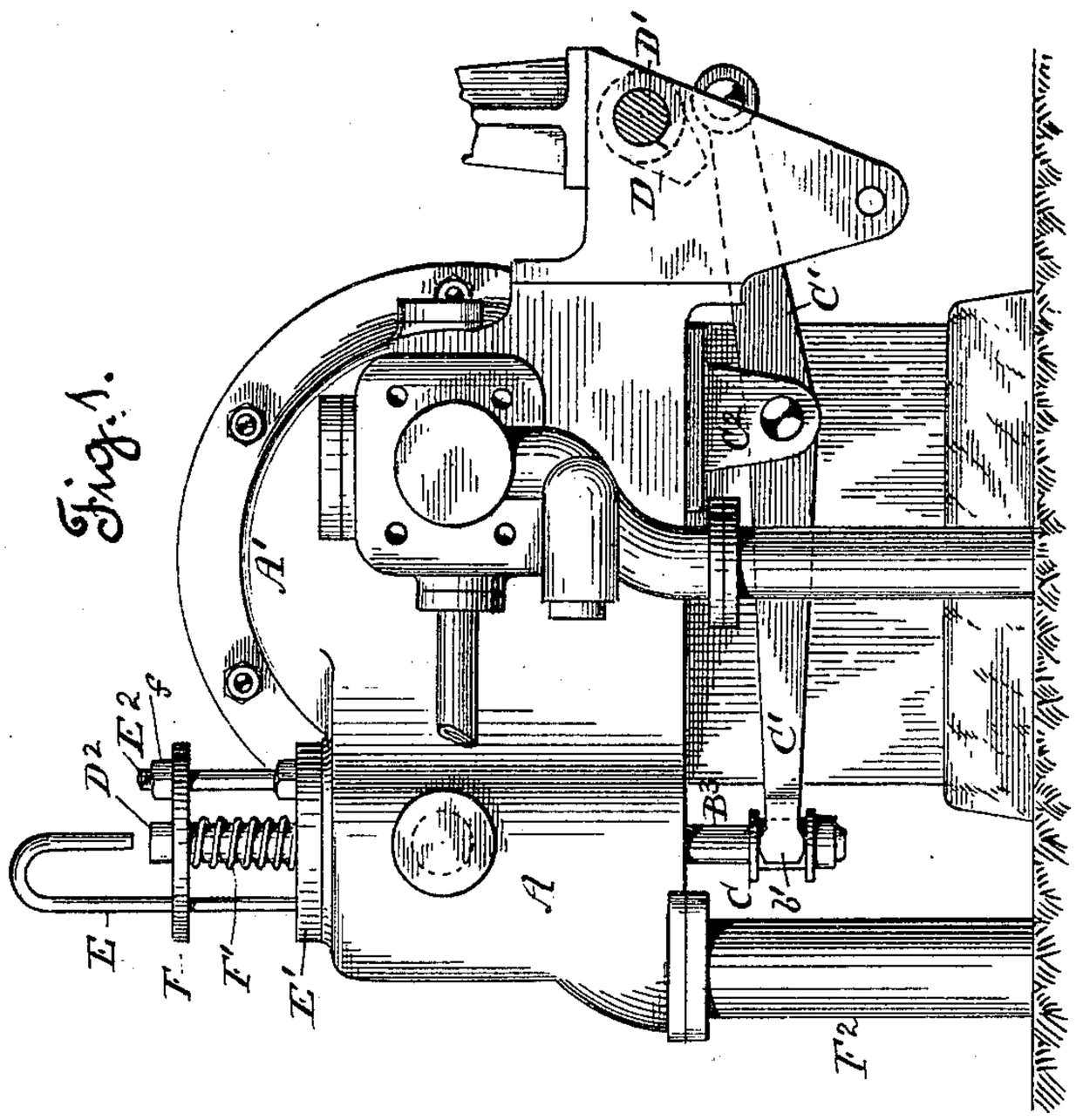


Fig. 3.

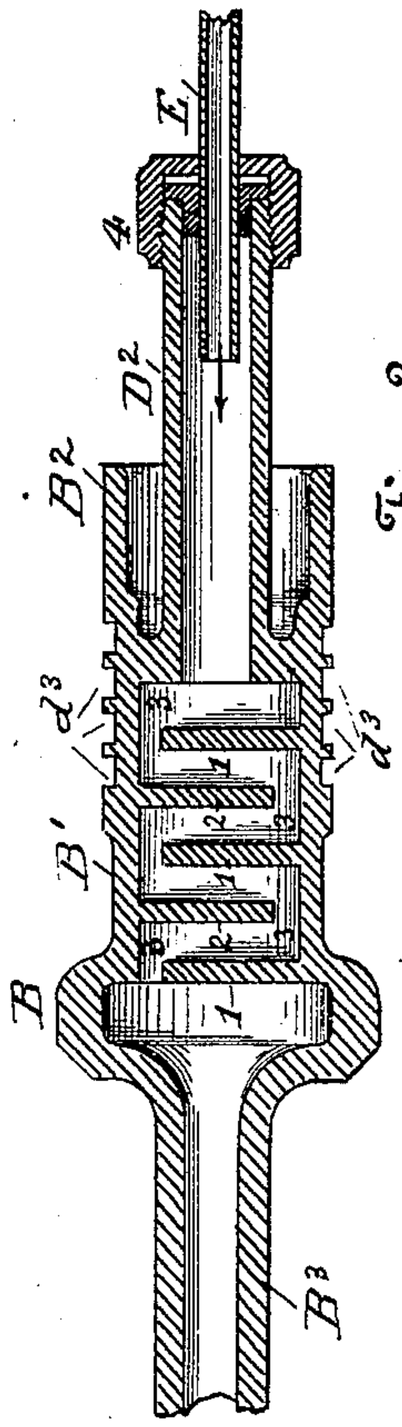
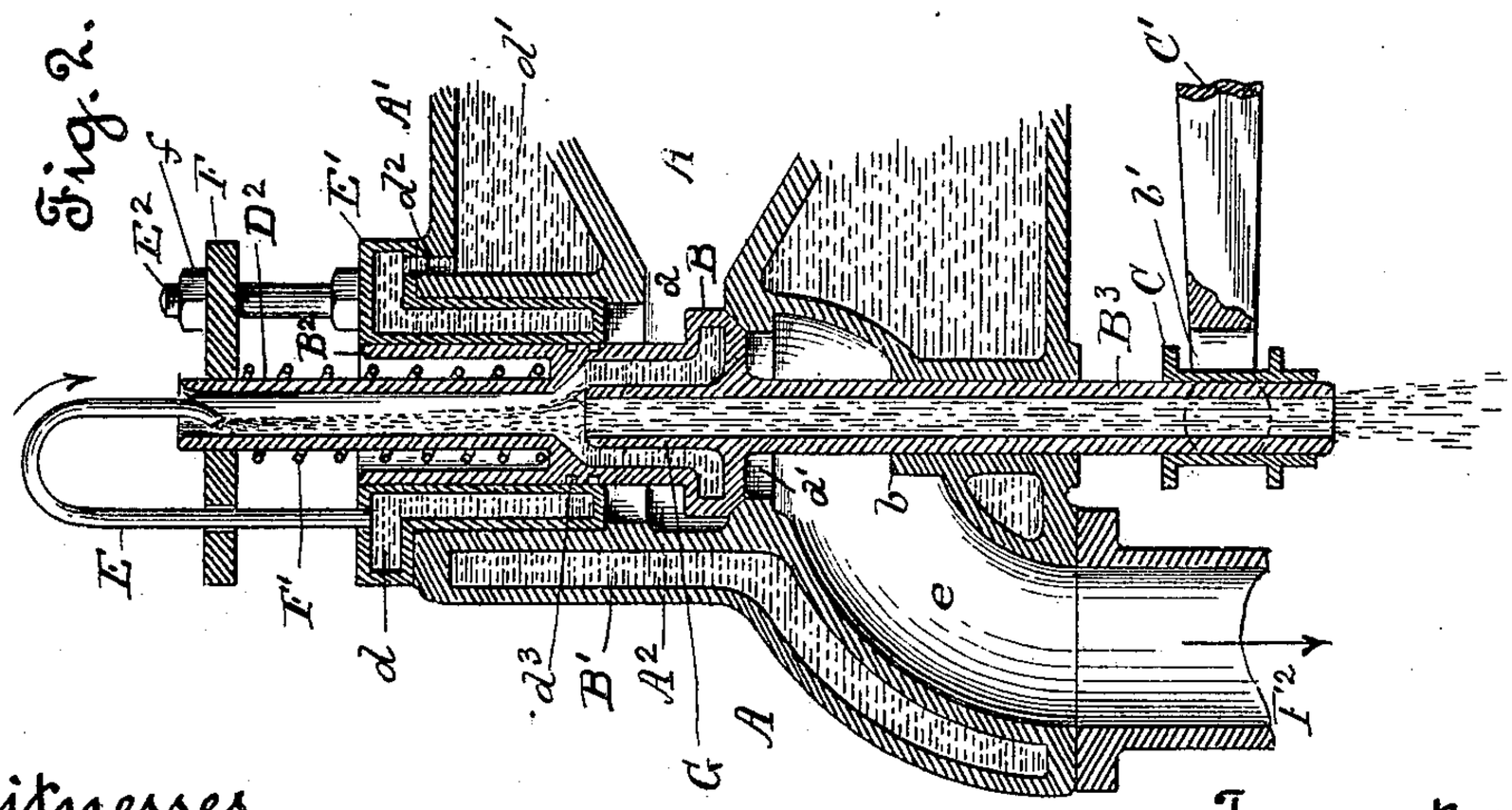


Fig. 2.



Witnesses.

H. Hollmann

Walter F. Vane.

Inventor.

William L. Corson

by N. A. Acker

his atty.

UNITED STATES PATENT OFFICE.

WILLIAM LINDSAY CORSON, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO THE UNION GAS ENGINE CO., OF SAME PLACE.

EXHAUST MECHANISM FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 681,441, dated August 27, 1901.

Application filed October 8, 1900. Serial No. 32,327. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LINDSAY CORSON, a subject of the Queen of Great Britain, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Exhaust Mechanism for Explosive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the same.

The invention relates more particularly to the means for controlling the exhaust of the spent or utilized gases or vapors from the combustion or explosive chamber of internal-combustion engines; and the objects of the invention are to reduce the power required to lift or unseat the exhaust-valve in order to permit of the escape of the exhaust; to reduce the pressure on the valve-seat during the explosive stroke of the engine; to provide means for maintaining the valve at a low temperature during the working of the engine, whereby liability as to preignition of the explosive charge is obviated, and in providing for the easy removal of the valve with but little delay to the working of the engine. These objects are attained by the arrangement of parts and details of construction, as will be hereinafter fully set forth in the drawings and described and pointed out in the specification.

The exhaust mechanism forming the subject-matter of the present invention is applicable to either the horizontal or the vertical style of internal-combustion engines, the only change required to adapt the mechanism to either style of engine being one of detail.

In order to comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a front view in elevation of the engine, illustrating the means for actuating the exhaust-valve. Fig. 2 is a vertical sectional view of the exhaust mechanism and exhaust-chamber, and Fig. 3 is a modification of the exhaust-valve.

In the drawings, the letter A is used to indicate the combustion-chamber of the engine-cylinder A′, and A^2 the exhaust-chamber. Communication is established between the combustion-chamber A and exhaust-chamber A^2 by the passage-way *a*. Within the exhaust-chamber works the valve B, which closes the outlet-port *a*′. This valve is formed with a hollow body portion B′, which terminates in an upwardly-extending circular wall B^2. Said valve is provided with a hollow stem B^3, which works through a guide-opening *b* in the wall of the exhaust-chamber. To the lower end of this valve-stem is fitted the collar C, which rests upon the bifurcated end *b*′ of the fulcrumed lever C′. Said lever is fulcrumed to bracket C^2, depending from the engine-frame, and its inner end is actuated by the cam D, attached to the drive-shaft D′ of the engine.

The hollow valve is provided with a tubular pipe extension D^2, which projects above the exhaust-chamber. Into this tubular pipe extension enters one end of a water-supply pipe E, the opposite end of which communicates with the water-space *d* of the water-jacketed collar or sleeve E′, which sleeve or collar is secured to the engine by means of the bolts or studs E^2. The water-space of the sleeve or collar E′ communicates with the water-space *d*′ of the water-jacketed cylinder A′ by means of the passage-way d^2. Inasmuch as the valve B is of greater diameter than its body portion B′, it is required that the sleeve or collar E′ be provided in order that the upper open end portion of the exhaust-chamber may be closed, so as to prevent the escape of the gases or vapor to the atmosphere. In order that a tight joint may be made between the sleeve or collar E′ and the body portion B′ of the valve, the said body portion is provided with rings d^3 or any suitable packing.

The form of valve herein illustrated may be said to constitute a trunk-valve, its body portion having an area sufficient to counterbalance or partially counterbalance the pressure on the valve B.

The studs or bolts E^2 not only serve to hold the water-jacketed sleeve or collar E′ in proper position, but also the plate F, loosely fitted over the tubular extension D^2. This plate keeps in compression the spring F′, which in the present case surrounds the tubular extension and bears upon the body portion B′ of the valve. By means of this spring the valve is normally held downward, and the

tension thereof is sufficient to force the valve down upon its seat after discharge of the spent or utilized charge. The exhaust from the engine escapes through the valve-opening a' into the exhaust-passage e, to which connects the exhaust-pipe F^2.

The water delivered from the water-jacketed sleeve E' through pipe E into the tubular extension D^2 flows through the hollow valve and maintains it cool at all times, thus preventing undue heating of the valve by the heated exhaust and providing against liability of preignition. From the hollow valve the cooling medium escapes through the hollow stem B^3. While I have illustrated and described a flow of water as the cooling medium for the valve, I do not wish to be understood as confining myself thereto, for I am well aware that any suitable form of cooling medium may be employed for the purpose of maintaining the valve at a low temperature during the working of the engine.

Preferably within the hollow valve is arranged an overflow-pipe G, which overflow-pipe may be said to constitute an upward extension of the hollow stem B^3. By means of this overflow the water or cooling medium is confined within the hollow valve until a given level has been reached, after which it will overflow into pipe G and escape from within the valve. The valve may to all intent and purpose be said to be water-jacketed.

Any desired means may be employed for retaining the water within the hollow valve, although I prefer the form described and illustrated, owing to its simplicity.

While the tubular extension D^2, valve and body B B', hollow valve-stem B^3, and overflow G are shown as one casting, it is obvious that the said tubular extension, hollow stem, and overflow may be formed separately and secured in place by screw-threaded fittings.

The valve and its body may be treated as one integral structure, and it will be observed that the valve extends through the exhaust-chamber and that the product of combustion surrounds the valve instead of bearing directly thereupon. By this means the pressure of the exhaust is distributed and the valve substantially balanced, hence requiring but a small amount of power to raise or lift the valve in order to unseat the same to uncover the exhaust-port.

The valve is raised or unseated during the operation of the engine by the cam D, secured upon the drive-shaft, engaging the free end of the fulcrumed lever. As the cam is carried around by the drive-shaft it throws the free end of the fulcrumed lever C' downward, raising its inner end. As this end of the lever is moved upward it carries the valve B therewith through the medium of the stem B^3 in order to unseat the valve and permit exhaust of the spent or utilized products of combustion.

In Fig. 3 I have illustrated a modification of the valve. In this case as the valve is designed to work in a horizontal instead of a vertical position the overflow-pipe G is omitted, and in lieu thereof a series of baffle-plates 1 2 are employed. These plates alternate, so as to give a staggered passage-way 3 for the water or cooling medium. These baffle-plates confine the water or cooling medium until a given level has been reached, depending upon the height thereof, after which the same will run off through the hollow stem.

In Fig. 3 the tubular extension D^2 is illustrated as connected to the end of supply-pipe E by means of a stuffing-box 4. This form of connection permits of the tubular extension sliding in and out on the supply-pipe during the reciprocating movement of the valve B.

The plate F is held in place by the nuts f, which screw onto the studs or bolts E^2. By tightening or loosening the nuts f the tension of the spring F' upon the valve may be increased or decreased.

In order to remove the valve, it is only required to release the water-jacketed sleeve or collar E' and lift same from within the exhaust-chamber, after which the valve B upon removal of collar C may be lifted or removed.

The valve may be said to be a reciprocating one, its lift or throw being controlled by the adjustment of the collar C. The position of the collar imparts an increased or decreased lift to the valve.

I do not wish to be understood as confining myself to the arrangements of parts described, as changes may be made without departing from the spirit of the invention. For instance, I am well aware that the cooling medium may enter the valve through the stem B^3 and escape by means of the tubular extension D^2.

Having thus described the invention, what I claim as new, and desire to secure protection in by Letters Patent, is—

1. The combination with a hollow valve, of a hollow stem extending therefrom, a tubular extension secured to the valve, and of means for causing the free passage of a cooling medium through the tubular extension to the interior of the valve, the hollow stem communicating with the interior of the valve and serving as an outlet for the cooling medium, said stem and tubular extension constituting a passage open to the atmosphere.

2. The combination with a hollow valve, of a hollow open-ended stem extending therefrom and open to the atmosphere, of a tubular extension secured to the valve, means for supplying a cooling medium through the tubular extension to the valve, and of means located within the valve for retarding the outflow of the cooling medium into the hollow stem until a given level has been reached.

3. The combination with the valve-chamber of an explosive-engine, of the valve arranged therein, said valve being provided with a body portion of less diameter than the

valve, a hollow sleeve or collar surrounding said valve-body and removably secured within the valve-chamber, means for supplying a cooling medium thereto, a stem extending from the valve, a spring for holding the valve to its seat, devices operated by the movement of the engine for raising or unseating the valve, and of means for maintaining the valve cool during the working of the engine.

4. The combination with the valve-chamber, of an explosive-engine, of the hollow valve arranged therein, said valve being provided with a body portion of less diameter than the valve, a water-jacketed sleeve or collar surrounding said body portion and secured within the valve-chamber, a hollow stem extending from the valve, a spring for holding the valve to its seat, devices actuated by the engine in order to raise or unseat the valve, and of means forming connection between the water-jacketed sleeve and the valve whereby water is supplied to said valve in order to maintain same cool during the working of the engine.

5. The combination with a valve-chamber, of a hollow valve, an open-ended tubular extension on said valve, an opposite open-ended tubular shank constituting with the tubular extension a passage through the valve open to the atmosphere, and means for supplying a cooling medium to said passage, substantially as described.

6. The combination with a valve-chamber, of a hollow valve provided with a through-passage open at opposite ends to the atmosphere, and means for supplying a cooling medium to said passage, substantially as described.

7. The combination with a valve-chamber, of a hollow valve therein, an open-ended tubular extension on one side of said valve, an opposite open-ended tubular stem on the opposite side of the valve and constituting with the tubular extension an open-ended passage through the valve, an overflow-pipe G in said valve in line with said passage, and means for causing a cooling medium to pass through said passage, substantially as described.

8. The combination with a water-jacketed valve-chamber, of a valve therein, a hollow sleeve surrounding said valve and communicating with said water-jacket, a tubular extension projecting from one side of said valve, a tubular stem projecting from the other side of said valve, and constituting together with said tubular extension a through-passage for the valve open to the atmosphere, a pipe connecting with said hollow sleeve and adapted to discharge the cooling water from said sleeve into said through-passage, and means connected with said stem for operating said valve, substantially as described.

In witness whereof I have hereunto set my hand.

WILLIAM LINDSAY CORSON.

Witnesses:
W. J. CASEY,
JNO. F. DALY.