No. 723,160. PATENTED MAR. 17, 1903.

J. E. JONES.

MECHANISM FOR AUTOMATICALLY OPERATING EXHAUST VALVES ON EXPLOSIVE ENGINES.

APPLICATION FILED JAN. 21, 1902.

NO MODEL.

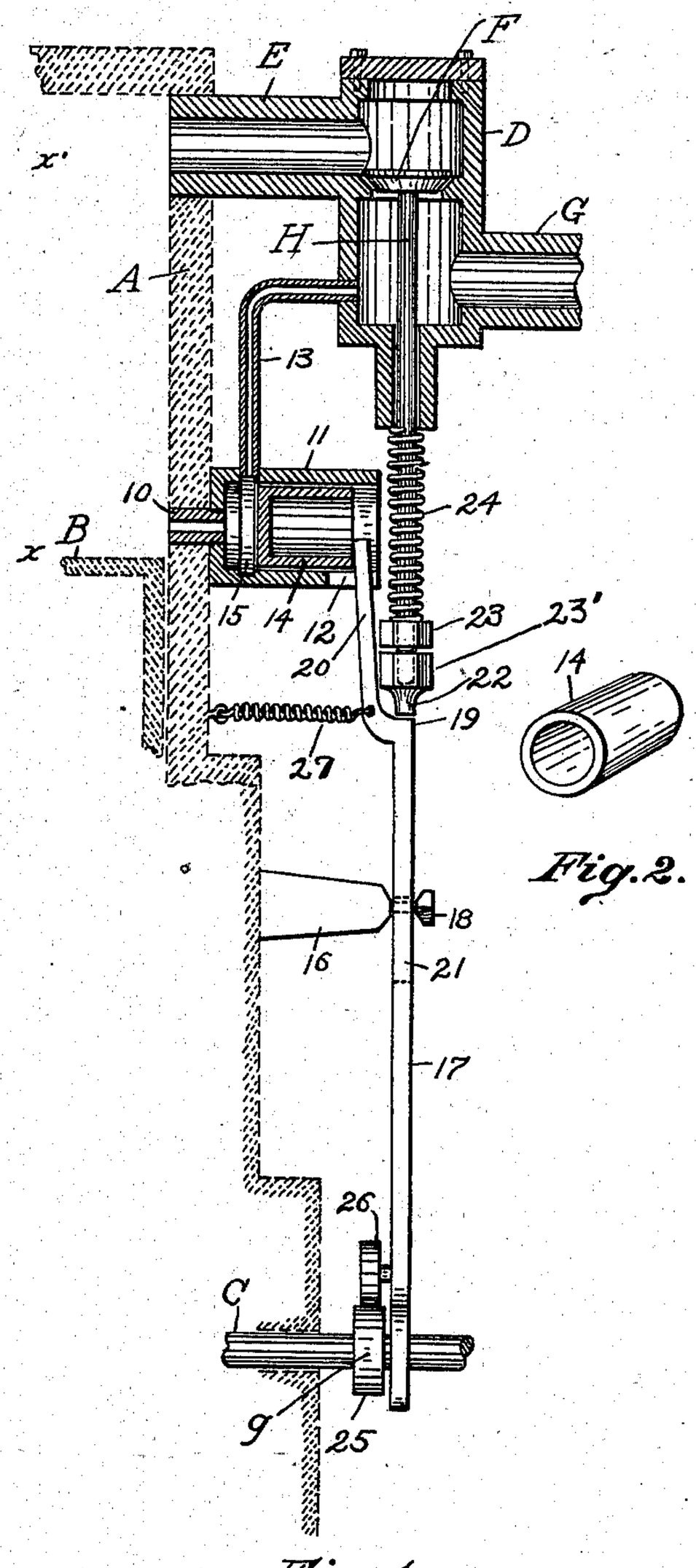

Fig. 1.

Fig. 2.

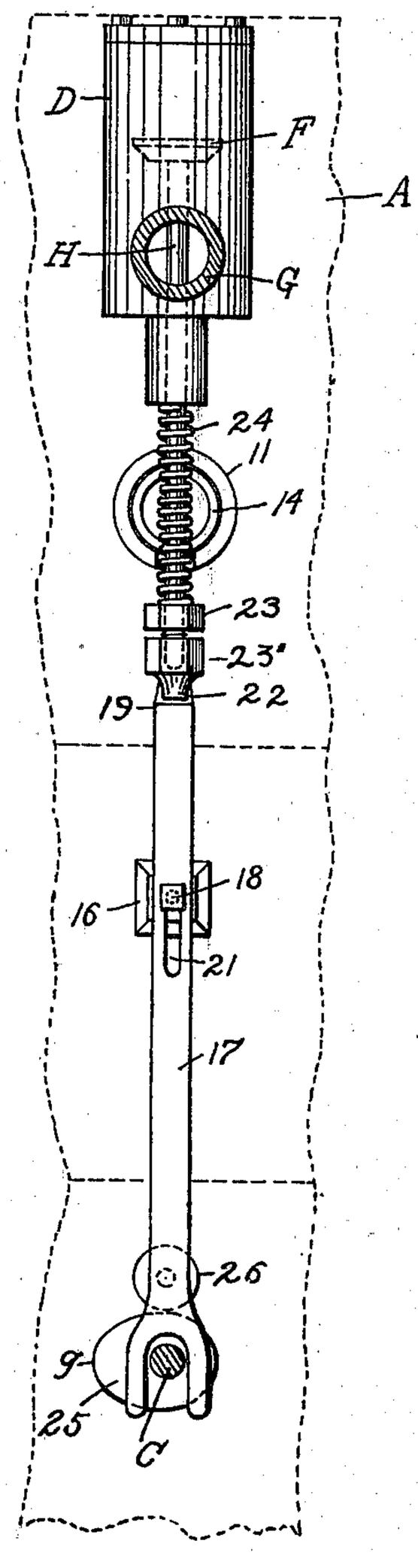

Fig. 3.

Witnesses:
S. C. Duvall.
R. E. Randle

Inventor:
JAMES E. JONES;
by his attorney,
Robert W. Randle.

UNITED STATES PATENT OFFICE.

JAMES E. JONES, OF RICHMOND, INDIANA.

MECHANISM FOR AUTOMATICALLY OPERATING EXHAUST-VALVES ON EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 723,160, dated March 17, 1903.

Application filed January 21, 1902. Serial No. 90,689. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. JONES, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented and produced new and useful Improvements in Mechanism for Automatically Operating Exhaust-Valves on Explosive-Engines, of which the following is a specification; and I do declare the following to be a full, clear, and exact description of my invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to an improved mechanism for automatically operating the exhaust-valve on explosive-engines to allow the discharge of the pressure in the engine-cylinder at the proper time.

The object of my invention, broadly speaking, is the provision of an improved mechanism for automatically operating the exhaust-valve on gas, vapor, or other explosive engines, which will be simple in its construction, easy of operation, compact in its several parts, positive in its action, and in which the friction and consequent wear on the several parts thereof will be reduced to a minimum.

Other objects and advantages will appear from the following description and the drawings and from the claims terminating this specification.

I attain the objects sought by means of the mechanism and arrangement of the several parts illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of the several parts of my invention. Fig. 2 is a detail perspective view of the auxiliary piston. Fig. 3 is a front outside elevation of the several parts of my invention.

Similar letters and figures of reference denote and refer to similar parts throughout the several views.

A denotes the cylinder or explosion-chamber of an ordinary explosion-engine, and B represents the piston of same, which travels in A approximately from x' to x.

C represents the crank-shaft, which is revolved by the pitman, connected to the piston B in any well-known manner.

D represents an exhaust-chamber which lies parallel with the cylinder A and a slight distance therefrom and is connected thereto by a nipple E, which provides a passage-way from the interior of A to the interior of D near the top of each, substantially as shown in the drawings.

The interior of the chamber D is divided into two compartments by a bevel lip extending around the interior thereof, which lip forms a seat for the correspondingly-beveled valve F. Near the lower end of the chamber D is an exhaust-pipe G, extending out therefrom. Through the wall of the cylinder A I provide a small opening, which should be located below E and slightly above the upper extremity of the piston B when the piston B has reached its lowest point in the cylinder A. This opening is provided with a nipple 10, which projects slightly out from the cylinder A.

11 represents an auxiliary cylinder, open at one end, the other end being closed, except a small threaded opening in the center thereof to receive the nipple 10. The nipple 10 and the cylinder 11 may be made in one piece of material, if desired, and be integral parts of each other. In the lower outer edge of 11 I provide an open slot 12, and in the upper part of 11, near the inner end, I provide an opening which leads into the pipe 13. The pipe 13 provides a small opening connecting the interior of 11 to the interior of the lower part of the exhaust-chamber D.

14 represents an auxiliary cylinder, one end being closed to form a solid head adapted to oscillate laterally in the interior of 11, its head being adapted to seat against the inner surface of the head of 11 or to assume the position shown in Fig. 1.

15 represents a channel cut around the inner surface of the cylinder 11 and intersects and connects with the opening leading to the pipe 13, substantially as shown.

16 represents a hanger secured to some stationary part of the engine for guiding and holding in place the arm 17. The end of 16 is provided with a lateral threaded hole to receive a machine-screw 18, by which 17 is held

in place. The outer end or point of 16 should be slightly rounded or beveled, as shown. The lower end of the arm 17 is forked and straddles the shaft C and then extends upward, where it forms a shoulder 19, thence to the left and upward, forming the finger 20, which operates in the slot 12 of the cylinder 11.

21 represents a slot in the arm 17, through which passes the screw 18 into the hanger 16. The slot 21 and the screw 18 allow the arm 17 to have an up-and-down endwise motion and also allows the ends of the finger 20 to have an opposite lateral movement, the screw 18 acting as a pivot.

H represents a stem extending down from the center of the valve F, to which it is secured, to the point 22, which point 22 is adapted to contact with the shoulder 19. The valve F controls the exhaust from E into G and is held resiliently in its seat by the spring 24, as shown.

23 represents a nut by which the pressure of the valve F on its seat can be changed, if desired, and 23′ is a nut similar to 23 and is adapted to be contacted therewith.

25 represents a cam secured on the shaft C, and 26 represents an idle wheel journaled on a short axle secured to and extending out from the arm 17 above the forks of 17, as shown. The wheel 26 is adapted to travel on the periphery of the cam 25 when 25 and 26 are in alinement, as shown in Fig. 1.

27 represents a coil-spring attached to the wall of the cylinder A and to the finger 20. The object of this spring is to keep the finger 20 in contact with the piston 14, and thus keep the closed head of 14 pressed firmly over the outer end of the opening in the nipple 10 and at the same time keep the wheel 26 out of contact with the cam 25.

It is now apparent that if the piston B be at x' and an explosion occurs in the cylinder A the piston B is forced down in the cylinder A, the valve F preventing the exhaust of gases until the piston B has reached almost the lowest point of its stroke, at which time the opening in 10 will be exposed to the action of the pressure in the cylinder. The pressure passing through 10 will press the piston 14 outward to the point shown in Fig. 1, carrying with it the finger 20, which will cause the lower end of arm 17 to move to the left, carrying the wheel 26 above and in alinement with the cam 25, which is the position shown in the drawings. The shaft C is revolving continuously, carrying the cam 25, and as the major part g of the cam travels to the left, Fig. 3, it will carry upward the wheel 26, and consequently the arm 17 will be moved upward. As the arm 17 is pressed upward the shoulder 19 contacts with the point 22, which carries upward the stem H and which in turn lifts the valve F and allows the pressure to escape from the cylinder A through E into the chamber D and then out through the vent G. Should the piston B on its movement upward catch and retain any pressure in the auxiliary cylinder 11, it will be allowed to escape into the exhaust through the pipe 13, thus allowing the piston 14 to again return to its normal position in the cylinder 11 by the action of the spring 27.

From the above it will be apparent that my mechanism will remain inactive and that the valve F will be closed at all times except when the pressure in the cylinder A should be released, when it will be thrown into action automatically by the action of the pressure in the cylinder A and the pressure will be released from A at the proper time by the action of the cam 25.

My invention is perfectly adapted to accomplish the results for which it is intended, and it is evident that changes in and modifications of the specific construction herein shown and described may be made and that analogous parts may be used to accomplish the same results without departing from the spirit of my invention or sacrificing any of its many advantages, and the specific construction of the details of my mechanism, in which novel features are embodied, may be variously changed without altering the essential principles which are claimed as new.

The terms "upward," "downward," "front," "rear," "up-and-down," and other similar terms are used for convenience of description, and it is not intended by their use to limit the arrangement of the several parts to the relative positions indicated; but they may be variously changed and modified to suit the various requirements of different types of engines on which my invention may be used.

I wish it to be distinctly understood that I do not dedicate any part of my invention to the public and that I wish adequate and just protection for every feature of my invention and the various parts herein shown and described that are new and useful and which involve invention.

Having now fully shown and described my invention and the best mode for its construction to me known at this time, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In an automatic mechanism for operating the exhaust-valve on explosive-engines, of the auxiliary cylinder 11 attached to and communicating with the cylinder of an engine, a piston adapted to slide in the auxiliary cylinder operated in one direction by the pressure in the main cylinder and in the opposite direction by a spring 27, the cylinder 11 provided with a slot 12 extending in from the open end thereof, and a channel extending around the inner surface of 11 and communicating with the pipe 13 reaching therefrom to the exhaust-chamber, all substantially as shown and described and for the purposes specified.

2. In a device of the class described the combination of the cylinder 11 and piston 14, of an arm 17, forked at its lower end and

straddling the crank-shaft C, provided with a shoulder 19 then extending upward forming a finger 20, of the piston 14 held in contact therewith by the spring 27, of the exhaust-valve F with a stem H extending downward therefrom to the shoulder 19, and means whereby said arm is operated, all substantially as shown and described.

3. In an exhaust-valve-operating device, the combination with the exhaust-valve F, located in the exhaust-chamber D, of the auxiliary cylinder 11 and piston 14, of the stem H extending downward from the valve F, its lower point 22 adapted to contact with the shoulder 19, of the coil-spring 24 encircling the stem H, and the nuts 23 and 23′ for adjusting and securing the tension of the spring 24, the exhaust-valve F with a downwardly-projecting stem H, and the shoulder 19 adapted to lift endwise the stem H and with it the valve H, all substantially as shown and described.

4. An automatic exhaust-valve-operating device consisting of an auxiliary cylinder, and piston therein, attached to the side of the explosion-chamber of an engine, an arm operated up and down by a cam on the crank-shaft for opening and closing the exhaust-valve and means for automatically engaging the cam and the arm by means of the action of the auxiliary piston operating against the finger 20 extending upward from the shoulder 19, of the arm 17, to the slot 12, all substantially as shown and described.

5. In combination with an explosive-engine, a crank-shaft and an exhaust-chamber D opening into the cylinder A and a vent leading therefrom and a valve located in said exhaust-chamber, of an auxiliary cylinder 11 attached to and with an opening 10 leading into the cylinder A, a piston 14 adapted to slide in the cylinder 11, a channel cut around the inner surface of the cylinder 11 with an exhaust-pipe 13 leading therefrom, of the hanger 16 secured to the side of the cylinder A, an arm 17 carrying the idle wheel 26 and provided near its center with the slot 21 by which it is pivotally and slidably mounted to 16 by the screw 18, a shoulder at the upper end of arm 17 and a finger 20 extending upward from said shoulder and contacting with the piston 14, a stem H adapted to rest on the shoulder 19 which shaft is attached to the center of the valve F, a spring 24 for keeping the point 22 of the stem H in contact with the shoulder 19 and a pair of lock-nuts for securing the spring 24 at the desired tension, all substantially as shown and described and for the purposes set forth.

6. An engine provided with an automatic exhaust-valve-operating device consisting of an auxiliary cylinder attached to the cylinder of the engine, a piston operating in the auxiliary cylinder, a finger contacting with the outer end of said piston, an arm extending up from the crank-shaft of the engine of which said finger is a part, an idle wheel pivoted near the lower end of said arm adapted to contact with a cam attached to the crank-shaft, all substantially as shown and described and for the purposes specified.

In witness whereof I have hereunto signed my name to this specification, in the presence of two subscribing witnesses, at Richmond, Indiana, this the 15th day of January, 1902.

JAMES E. JONES.

Witnesses:
ANNA B. JONES,
R. E. RANDLE.