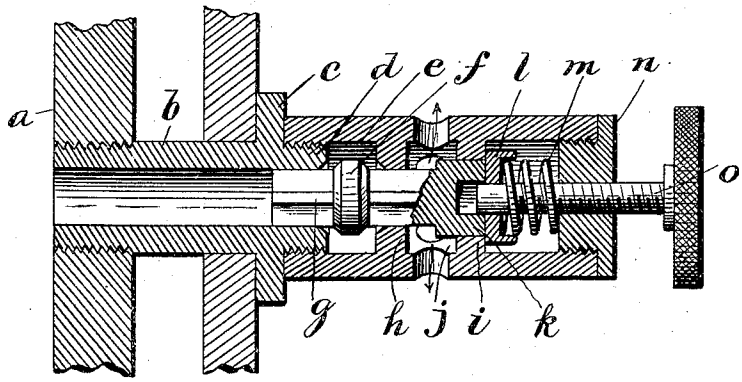
No. 790,764. PATENTED MAY 23, 1905.

H. A. TOBEY.

STARTING VALVE FOR EXPLOSIVE ENGINES.

APPLICATION FILED OCT. 14, 1902.



Witnesses

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UNITED STATES PATENT OFFICE.

HENRY A. TOBEY, OF TOLEDO, OHIO.

STARTING-VALVE FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 790,764, dated May 23, 1905.

Application filed October 14, 1902. Serial No. 127,314.

To all whom it may concern:

Be it known that I, HENRY A. TOBEY, a citizen of the United States, and a resident of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Starting-Valves for Explosive-Engines, of which I do hereby declare the following to be a specification.

My invention relates to starting-valves for explosive-engines, and has for its object to provide a valve of simple and efficient construction by which the engine can be started without moving the same against the resistance of either the gas or of the valve mechanism and having means for locking the valve closed when it is desired to put it out of operation.

To this end the invention consists of the device hereinafter described and claimed.

The invention is illustrated in the accompanying drawing, in which the figure shown is a central section of the valve.

Referring to the drawing, *a* is the wall of a gas-engine cylinder, in which the valve is fitted. A tube or pipe *b* is secured in the wall of the cylinder above the highest point the piston will reach on its upward stroke. The tube is provided at its outer end with a flange *c*, which serves to receive a wrench for screwing the tube into place and also for making a tight joint with the wall of water-jacket. The tube also has a projecting threaded nipple *d*, on which the body or casing *e* of the relief-valve is secured by screw-threads and has a valve-seat at its outer end for the inner valve-face of a double valve *f*, provided with winged guides *g*, which slide in the nipple *d* and in an apertured flange *h*. The flange *h* is provided on its inner side with a valve-seat for the outer face of the valve. Between the flange *h* and a similar flange *i* a chamber *j* is formed, from which outlet-ports for the valve *f* lead into the open air.

On the outer end of valve-guides *g* is a cupped head *k*, which rests in the opening in flange *i* and is in contact with an apertured dished disk *l*, bearing against flange *i* and adapted to seat a compression-spring *m*, located between said disk and a cap *n*, screwed into the outer end of valve-body *e*. A screw *o* passes through said cap and its smooth end passes through disk *l* and into cup *k*.

The operation of the valve is as follows: When the engine is at rest and is to be started, the screw *o* is screwed out away from the cup *k*, so as to allow the valve free play. The valve *f* is free to slide between its inner seat against the nipple and its midway-open position shown in the drawing without resistance by or pressure of the spring *m*. The spring *m* is of such tension as to return the valve to its open position, as shown in the drawing, and owing to the stop formed by flange *i* to disk *l* without forcing it back against its inner valve-seat and to normally hold it in open position against the pressure of escaping gases during compression, but adapted to yield under the force of an explosion of the gases. In starting the engine when the fly-wheel is turned, bringing the piston downward and drawing in gases, the valve *f* will be drawn against its inner seat; but when the piston starts upward and gas in the cylinder begins to be compressed the valve *f* will be lifted to the position shown in the drawing by the pressure on its inner end, allowing the gases in the cylinder to escape by it and through the ports, as indicated by arrows. Thus the piston will be brought to its upper stroke without the resistance of compression, which, without any relief, makes an engine difficult to start, and it will also be moved without resistance of the valve-spring. As soon as the crank of the engine has passed over its upper center the remaining gases in the clearance-space of the piston will be exploded suddenly, thus increasing the pressure, which will drive the cup *k* on the guides of valve *f* against disk *l*, overcoming the resistance of compression-spring *m*, which will bring the outer face of the double valve in contact with the valve-seat in flange *h*, thus making a tight valve and preventing escape. When the pressure in the cylinder has been relieved by the gas being exhausted, the valve *f* will be returned by the spring to its midway-open position, and when the piston starts down again the valve will return to its inner seat and prevent the drawing in of air. When the piston again

comes upward, the gas will be released, as before described. When the engine gets under way, the screw *o* is screwed down against the valve-cup and the valve put out of service.

It is obvious that various changes in the details of my invention may be made without departing from the scope thereof.

Having thus described my invention, what I claim is—

1. In combination with a gas-engine cylinder, a single, double-faced relief-valve for said cylinder having two cylinder-closing positions and a midway, open position and having a free, unresisted movement between one closing position and the open position, and yielding means to prevent the movement of the valve from the open position to the other closing position against the pressure of gas and air forced out by the starting of the engine, said means being adapted to yield to a predetermined explosive force in the cylinder, substantially as described.

2. In combination with a gas-engine cylinder, a casing communicating therewith, a double-seated valve-chamber in said casing, a double-faced sliding relief and check valve in said valve-chamber, a spring in said casing against which said valve is adapted to bear, said casing having a closed chamber for the spring and also having a chamber open to the atmosphere between said valve-chamber and spring-chamber, substantially as described.

3. In combination with a gas-engine cylinder, a sliding valve, means to permit the valve to open to relieve compression on starting and to close upon a predetermined pressure thereon, and a locking-screw adapted to be screwed against said valve to lock the same out of operation, said screw independent of the sliding movement of said valve, substantially as described.

4. In combination with an explosive-engine cylinder, a starting-valve mechanism consisting of a double valve, resistance and return mechanism for said valve, said valve having a limited movement independent of said resistance and return mechanism, substantially as described.

5. In combination with an explosive-engine cylinder, a single double-faced starting-valve, a return-spring, said valve movable to open and close the cylinder on one side by the compression and intake of gas or air in the cylinder and to close and open the cylinder on the other side of the valve by the force of the explosions and said return-spring, and having a limited movement independent of said spring, substantially as described.

6. In a starting-valve mechanism, in combination with the valve-casing, a double-faced valve having a limited free movement, a sliding member carrying said valve, guides on said member which slide in the casing, a head on one end of said sliding member and a spring bearing against said head, substantially as described.

7. In a starting-relief mechanism the combination with a double valve, of a double-seated valve-chamber, a spring for bearing against said valve, and means for locking said valve closed, said valve having a limited free movement independent of said spring, substantially as described.

8. In combination with a valve, a sliding rod carrying said valve, a cup at the end of the said rod, a screw having its inner end unthreaded and adapted to extend into said cup, and a spring surrounding said screw, substantially as described.

9. In a starting-valve mechanism, a sliding valve, a head at one end of said valve, a spring, a spring seating member with which said valve-head is adapted to contact, and a stop to limit the pressure of said spring and seating member against the valve-head, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HENRY A. TOBEY.

Witnesses:

NELSON H. YOUNG,

GEO. R. LOVE.