

(No Model.)

G. F. ROUNDS.  
COMPOUND ENGINE.

No. 455,670.

Patented July 7, 1891.

FIG. 1.

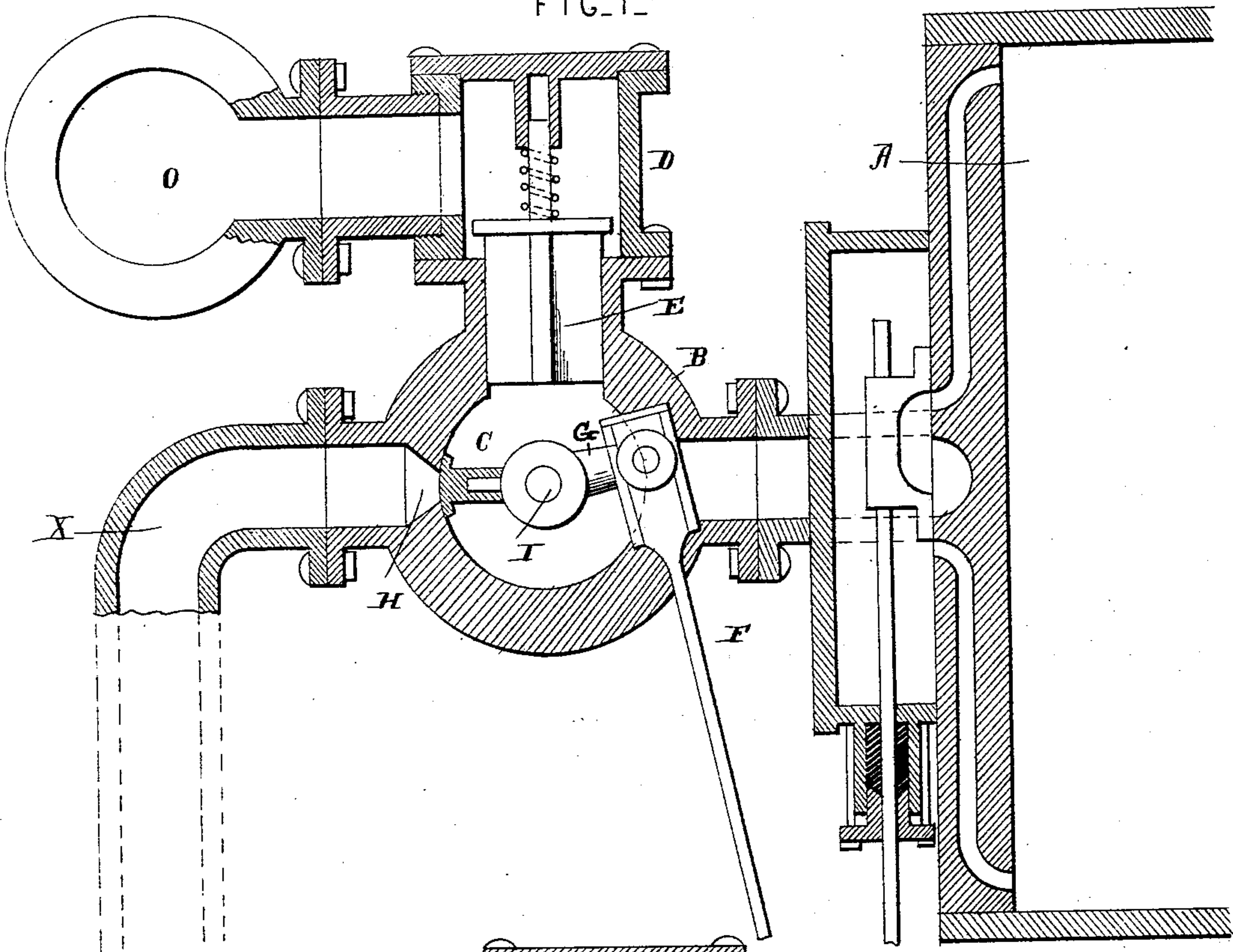
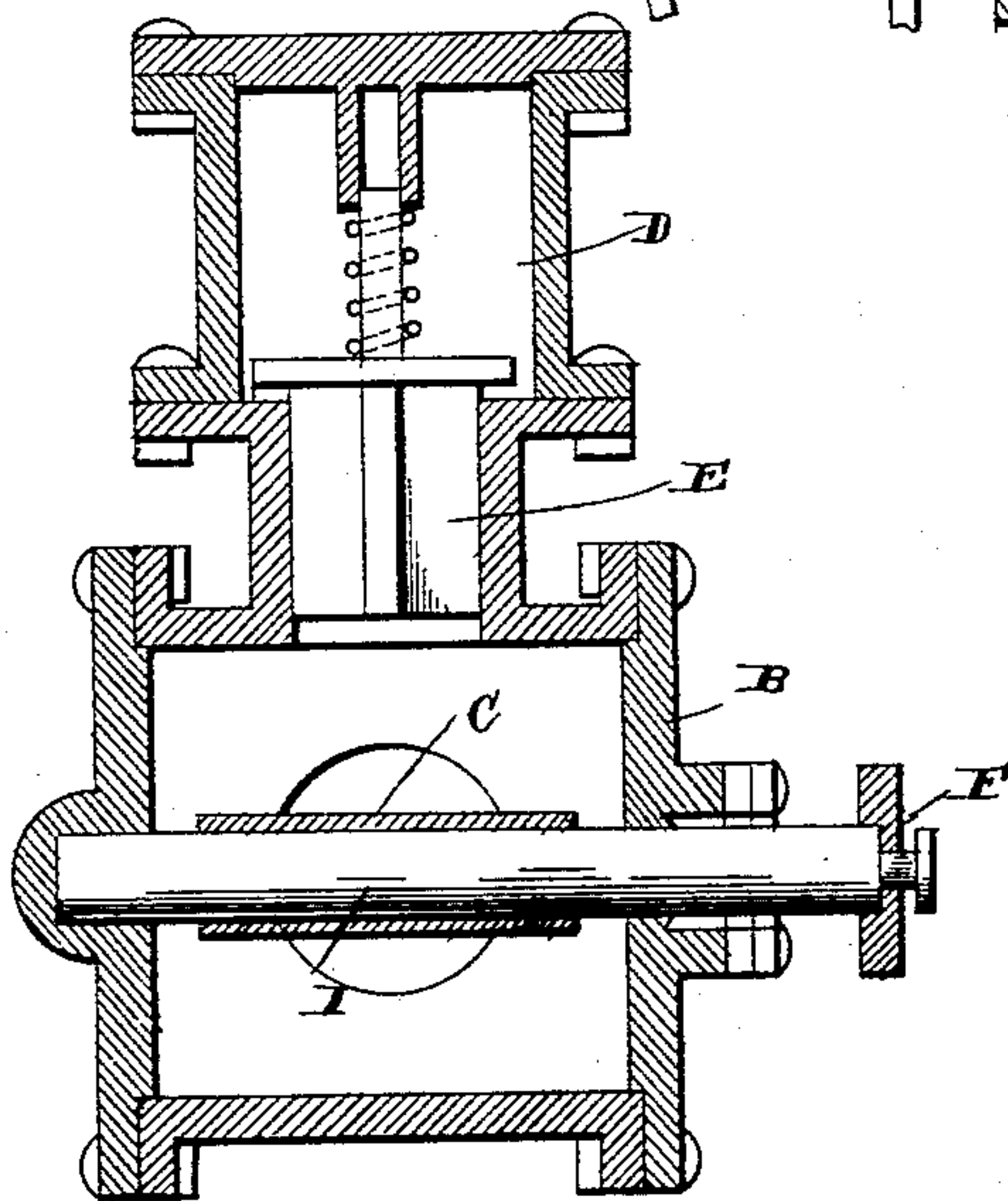


FIG. 2.



WITNESSES.

*Geo. Frech.*

*Roland A. Fitzgerald.*

INVENTOR.

*Geo. F. Rounds.*

*per*  
*Lehmann & Patterson,*  
*attys.*



# UNITED STATES PATENT OFFICE.

GEORGE F. ROUNDS, OF BENTON HARBOR, MICHIGAN.

## COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 455,670, dated July 7, 1891.

Application filed April 15, 1891. Serial No. 389,007. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE F. ROUNDS, of Benton Harbor, in the county of Berrien and State of Michigan, have invented certain new and useful Improvements in Compound Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in compound engines; and it consists in a casting, which is attached to the exhaust-port of the high-pressure cylinder, and an oscillating relief-valve that is placed therein, and which controls the escape of the exhaust-steam, and is operated by the eccentric on the main shaft through an eccentric-rod combined with a check-valve and a receiver for the exhaust-steam, as will be more fully described hereinafter.

The object of my invention is to relieve the high-pressure cylinder of a compound engine of back-pressure by using a receiver.

Figure 1 is a vertical section of an apparatus which embodies my invention. Fig. 2 is a vertical section taken through the apparatus at right angles to Fig. 1.

A represents the high-pressure cylinder, and attached to its exhaust-port is the cylindrical casting B, to one side of which is secured the pipe X, which conveys the steam to the condenser. Passing through one end of this casting B is the shaft I, which has its inner end journaled in a suitable bearing in the end of the casting B, and which shaft has secured to its outer end an arm or crank G, to which the eccentric-rod F is fastened. This rod F is operated by an eccentric on the main shaft and serves to impart to the shaft I an oscillating movement.

Projecting from a sleeve, which is secured loose on the shaft I inside of the casting, is the relief-valve C, which controls the port H. To the valve C is given a back-and-forth or oscillating movement through the eccentric-rod F, so as to alternately open and close the port H at regular predetermined

intervals. Through the casting B is also made an opening, in which the spring-actuated check-valve E is placed, and connected to the casting B, by a suitable casting D, is the receiver O for the exhaust-steam. At the time of the exhaust of the cylinder A the relief-valve C closes the port H, and then the exhaust-steam passes from the casting B past the check-valve E to the receiver O. As soon as the pressure in the receiver is nearly equal to that in the cylinder A, the check-valve E closes either from its own weight or the action of the spring, and then the relief-valve C is opened by the action of the eccentric through the rod F and the relieved steam passes through the pipe X to the condenser. The time between the exhaust and the relief is controlled by the lap of the relief-valve C.

My invention is applicable especially to compound engines having a high and a low pressure cylinder. The low-pressure cylinder, as usual, is preferably about twice the size of the high-pressure cylinder A and has its steam-chest connected in any suitable manner to the receiver O.

In operation the high-pressure cylinder A exhausts into the receiver O, and as soon as the pressure in the receiver is equal to the pressure in the exhaust side of the high-pressure cylinder the check-valve E closes and the relief-valve C opens, which prevents any back-pressure from the receiver O to the high-pressure cylinder. The steam from the casting B passes into the pipe X, and from thence to the condenser, thus making the high-pressure cylinder a low-pressure cylinder for a portion of its exhaust, which, as will readily be understood, greatly increases the efficiency of the said cylinder.

By means of the construction here shown the high-pressure cylinder of the compound engine is relieved of back-pressure, and the action of the engine is greatly improved in every way.

The parts which constitute my invention are few and simple and are not liable to get out of repair while in operation.

Having thus described my invention, I claim—

1. The cylinder and the receiver, combined

with a casting having ports formed therein for the escape of the exhaust-steam, a check-valve, a relief-valve, and a mechanism for operating the relief-valve, substantially as shown and described.

2. The cylinder A, the casting B, connected to the exhaust-port and provided with openings or ports for the escape of steam, a relief-valve and shaft to which the valve is connected, and the eccentric-rod for oscillating the valve, combined with a check-valve and a receiver, substantially as set forth.

3. In a compound engine, a high-pressure cylinder, combined with a low-pressure cylinder by means of the exhaust of the former and a check and relief valve between the two, substantially as described.

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

GEORGE F. ROUNDS.

Witnesses:

M. V. BUCHANAN,  
A. H. FLANEGAN.