

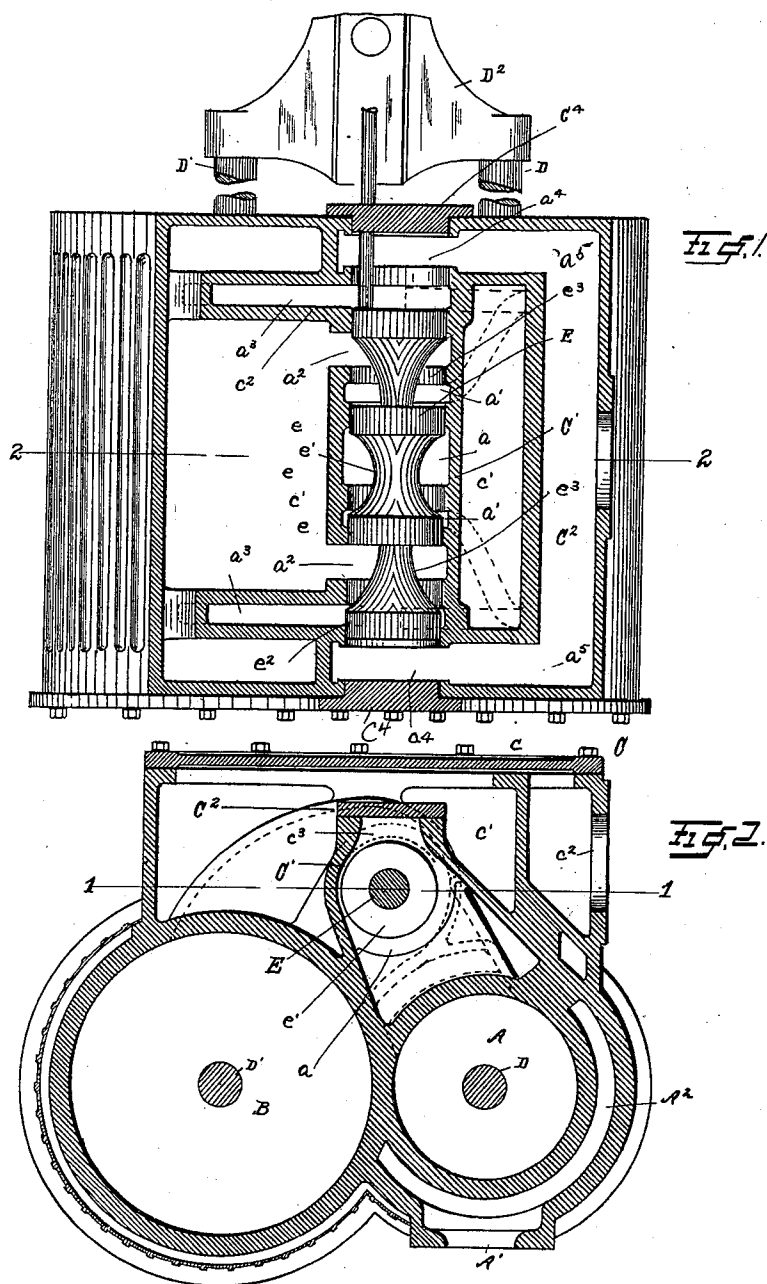
No. 658,201.

F. H. & F. O. BALL.
STEAM ENGINE.

Patented Sept. 18, 1900.

(Application filed Jan. 30, 1900.)

(No Model.)



WITNESSES

Albert Hopkins
Harry Williams

INVENTORS

Frank H. Ball
and
Frederick O. Ball

BY *H. C. Lind*
ATTORNEY

UNITED STATES PATENT OFFICE.

FRANK H. BALL AND FREDERICK O. BALL, OF PLAINFIELD, NEW JERSEY.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 658,201, dated September 18, 1900.

Application filed January 30, 1900. Serial No. 3,352. (No model.)

To all whom it may concern:

Be it known that we, FRANK H. BALL and FREDERICK O. BALL, citizens of the United States, residing at Plainfield, in the county of Somerset and State of New Jersey, have invented certain new and useful Improvements in Steam-Engines; and we 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 appertains to make and use the same.

This invention relates to steam-engines; and it consists in certain improvements in the construction thereof, as will be hereinafter fully described, and pointed out in the claims.

More particularly our invention relates to compound engines, and it is especially adapted to compound engines the cylinders of which are set side by side and which operate upon a common cross-head. This style of compound engine we have termed a "duplex compound engine."

The invention is illustrated in the accompanying drawings as follows:

Figure 1 shows a section on the line 1 1 in Fig. 2. Fig. 2 shows a section on the line 2 2 in Fig. 1.

A marks the high-pressure cylinder; B, the low-pressure cylinder; C, the steam-chest, and C' the valve-chest.

The cylinders A and B are arranged side by side in cross compound relation.

The valve E is of cylindrical shape, and the valve-chest is also cylindrical.

The pistons D D', having the usual piston mechanism, are attached to the common cross-head D².

Steam enters at A', moves around the high-pressure cylinder and the passage A², and enters the valve-chest through a port a. The central or high-pressure part of the valve E comprises the walls ee, which form the chamber e'. Leading from the valve-chest are the ports a' a', which extend to the ends of the high-pressure cylinder. The valve-chest, except at the ports, forms a steam fit with the walls e. The walls e are so arranged relatively to the ports a a' that the chamber e' is in constant communication with the port a and is brought alternately into com-

munication with the ports a' as the valve is reciprocated. The walls e are also so arranged relatively to the ports a' a' as to uncover the ports a' at the side out of communication with the chamber e' at each traverse of the valve. The outer ends or low-pressure portion of the valve comprise the walls e² e², which are of the size of the valve-chest, and the intermediate smaller portions, which extend to the walls e. This forms the chamber e³ between the walls e and e². These chambers are in constant communication with the ports a², which ports lead into the steam-chest. These chambers e³ are alternately brought into communication with the ports a', so that they form means of communication between the ports a' and the steam-chest through the port a². These chambers e³ are also alternately brought into communication with the ports a³, so that a means of communication between the steam-chest and low-pressure cylinder is effected through the port a², chamber e³, and port a³. The outer ends of the valve-chest communicate with the final exhaust-ports a⁴, and the ends of the valve pass alternately over the ports a³, thus connecting the low-pressure cylinder through the ports a³ with the exhaust. The ports a⁴ communicate through a passage a⁵ with the exhaust portion of the steam-chest c².

In operation steam enters by the port a, passes through the chamber e', port a' to the high-pressure cylinder. At the same time the opposite port a' is exhausting through the chamber e³ and port a² into the steam portion c' of the steam-chest. Steam passes from the steam-chest through the port a², chamber e³, and port a³ to the low-pressure cylinder at the same end as that to which steam is being delivered to the high-pressure cylinder. Steam exhausts from the low-pressure cylinder through the port a³ by the end of the valve-chest, port a⁴, passage a⁵, and exhaust-chamber c².

The valve-chest preferably has the openings c³ opposite each port, through which access may be had to the valve-chamber, and these openings are closed by a valve-chest cover C³. The steam-chest is provided with a cover c, which incloses both the steam-

chambers c' and the exhaust-chamber c^2 . The ends of the valve-chest are provided with the covers c^4 .

What we claim as new is—

5 1. In a compound engine, the combination of the high and low pressure cylinders arranged in cross compound relation; double-acting piston mechanism therefor; a common cross-head for said piston mechanism; a cylindrically-shaped valve for controlling the
10 flow of steam to and from said high and low pressure cylinders; and a passage exterior to the valve for conveying steam from the end of the high-pressure cylinder exhausting, to
15 the opposite end of the low-pressure cylinder, said passage being also controlled by said valve.

2. In a compound engine, the combination of the high and low pressure cylinders arranged in cross compound relation; double-
20 acting piston mechanism therefor; a common cross-head for said piston mechanism; a receiver between the high and low pressure cyl-

inders; a single piston-valve for controlling the flow of steam to and from the high and
25 low pressure cylinders and to and from said receiver.

3. In a compound engine, the combination of the high and low pressure cylinders; piston mechanism therefor; a common cross-
30 head for said piston mechanism; a cylindrically-shaped valve-chest having the ports, a , leading to the steam inlet or port, ports a' , a' , leading to the high-pressure cylinder, ports, a^2 , a^2 , leading to the steam chest or receiver
35 and ports, a^3 , a^3 , leading to the low-pressure cylinder; the valve, E , having the walls, e and e^2 thereon, forming the chambers, e' and e^3 , in the relation to said ports, as described.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK H. BALL.

FREDERICK O. BALL.

Witnesses:

HOWARD I. BRAMPTON,
ROBT. T. BRAMPTON.