

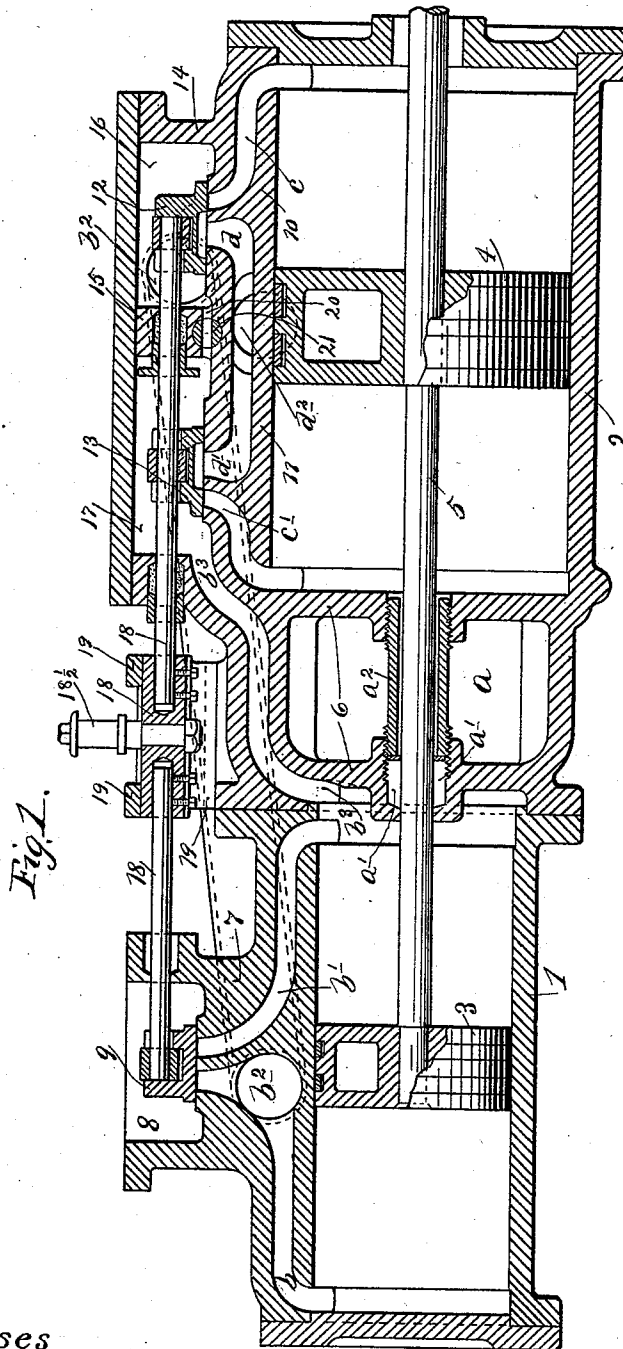
(No Model.)

2 Sheets—Sheet 1.

J. PEEBLES.
COMPOUND ENGINE.

No. 531,272.

Patented Dec. 18, 1894.



Witnesses

C. H. Hill,

Frank Merchant.

Inventors

John Peebles
By Jas. F. Williamson
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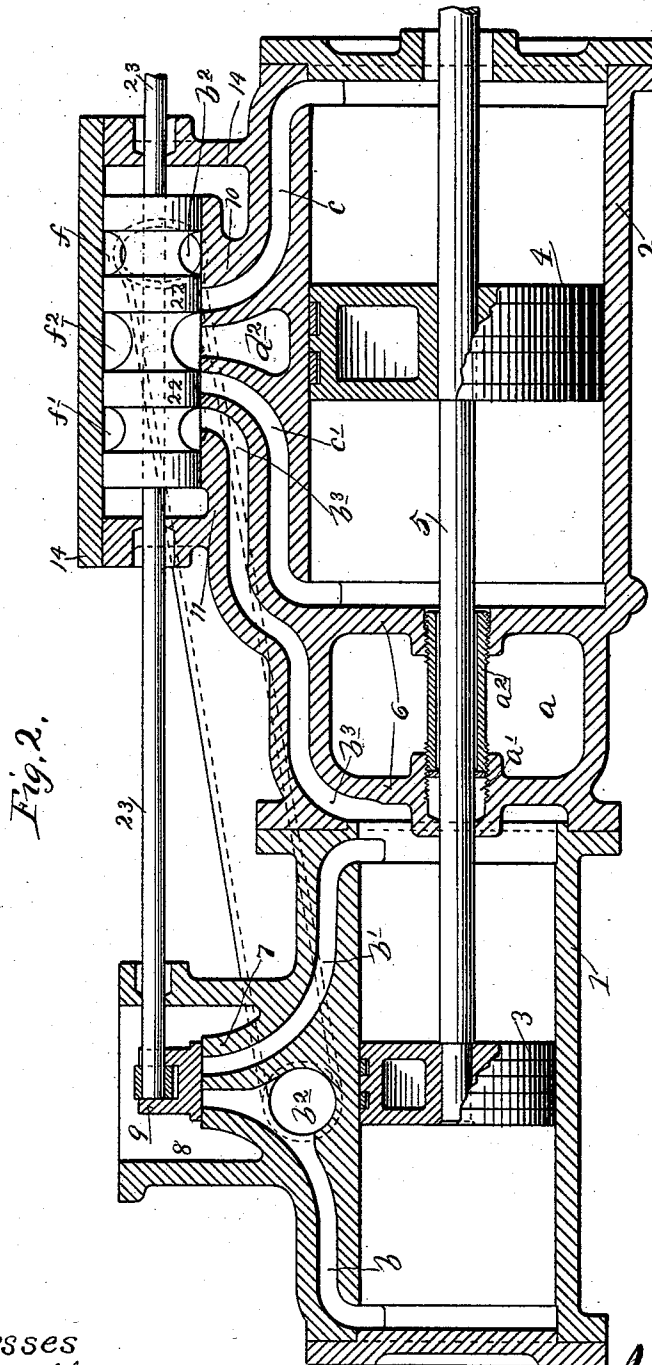
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UNITED STATES PATENT OFFICE.

JOHN PEEBLES, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE WOOLF VALVE GEAR COMPANY, OF SAME PLACE.

COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 531,272, dated December 18, 1894.

Application filed June 18, 1894. Serial No. 514,854. (No model.)

To all whom it may concern:

Be it known that I, JOHN PEEBLES, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, 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 appertains to make and use the same.

My invention relates to compound engines; and consists in the novel features of construction, hereinafter fully described and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like letters and figures refer to like parts throughout.

Figure 1 is a vertical longitudinal central section through the preferred form of my improved engine; and Fig. 2 is a similar view of a modification.

The cylinder castings 1 and 2, are preferably set tandem, as shown, and are fitted with suitable pistons 3 and 4, on the common rod 5. The cylinder casting 2 has cast integral therewith, as shown, a coupling-head 6, which serves to connect the two cylinders and form the inner end walls of the same. This coupling head 6, is open to the atmosphere, as shown at *a*, for affording access to the piston rod packings, where passing through the walls of said head. For effecting this packing, a single stuffing-box *a'* is located in one wall of the head, which stuffing-box is held in position by a single packing sleeve *a''*, which is screw-threaded at its ends and in engagement with the seats for the same in the walls of said head, with one of the said sleeves bearing against the gland of the said single stuffing box. By this construction, steam tight joints are afforded for the piston rod 5, where passing through said coupling-head, with the use of a single stuffing box; and is, in this effect, a simplification and an improvement over devices hitherto used for the purpose.

The high pressure cylinder 1, is provided with a valve-seat 7, having a pair of high pressure admission ports *b b'*. On the said

seat 7 and in the valve-chest 8, is located a high pressure admission valve 9.

The low pressure cylinder 2, has a double valve-seat 10 and 11, each member of which has a low pressure admission and a final exhaust port; which several ports, in the said double seat 10 and 11, are distinguished by the letters *c c' d* and *d'* respectively. As shown, the final exhaust ports *d d'* merge before tapping the final exit or outlet passage *d''*. On the said double seat 10 and 11, is located a double distributing valve, the members of which are indicated at 12 and 13. The said double valve 12 and 13 is located in a chest 14, which is divided by a partition 15 into two compartments or separated chests 16 and 17 of unequal size.

The high pressure valve 9 and the double or pair of low pressure valves 12 and 13, are all connected to the common sectional valve rod 18, which as shown, works in a suitable guide 19, located between the high and low pressure valve-chest. The section of the valve-rod, which works in the guide, is shown as provided with pin 18 $\frac{1}{2}$ to which the valve operating mechanism (not shown) is attached.

The outer end of the high pressure cylinder is connected by a pipe or passage *b''*, with the outer end low pressure valve-chest 16; and the inner end of the high pressure cylinder is connected by a passage *b'''* with the inner end low pressure valve chest 17. As shown, the pipe *b''* taps the outer end of the high pressure cylinder 1 through the outer end high pressure port *b*, but might of course, be directly connected to the outer end of said cylinder instead; and the passage *b'''* is shown as formed in the coupling head 6, which is a convenient and the preferred construction, but might, of course, be supplied by a pipe or passage otherwise formed.

Having regard to the action, it must be obvious from the construction described, that the high pressure fluid can only reach the high pressure cylinder through the ports *b* and *b'*, under the control of the admission valve 9; and that the fluid, after having been used in the high pressure cylinders, will reach the low pressure cylinders entirely independent of the high pressure valve 9. The low

pressure valve-chests 16 and 17, are always in communication, respectively, the former with the outer, and the latter with the inner end of the high pressure cylinder through the respective passages b^2 and b^3 , above noted. Hence, it must be obvious, that the said chests 16 and 17, with the respective passages b^2 and b^3 leading thereto, constitute parts of the high pressure clearance; and as the passage or pipe b^2 to the chest 16, is relatively long, as compared with the passage b^3 to the chest 17, compensation must be afforded to give equality of clearance; which compensation is afforded, as shown, by making the chest or compartment 17 larger than the chest or compartment 16. In this way, equal volumes of fluid are rendered available on the opposite sides of the high pressure piston 3.

The distribution of the fluid in the low pressure cylinders, through the ports c c' , d d' , under the control of the valves 12 and 13, is obvious.

In a passage 20, extending through the partition 15, which divides the low pressure valve-chests 16 and 17, I place a hand-operative valve 21, for converting the compounds into simple acting engines, at will, or vice versa, by simply throwing said valves 21 into position to open or close said passage 20.

In the modification shown in Fig. 2, the general construction is similar and the action is identical with that shown in Fig. 1; but instead of the pair of slide-valves 12 and 13, a cylindrical piston-valve 22 is employed; which piston-valve has the three annular cavities f f' f^2 , cut out from the exterior of its solid body, and the valve-chest 14 is of corresponding different shape, for fitting the said valve. The valve-seat also has only one final exhaust passage d^2 . The pipe b^2 from the outer end of the high pressure cylinder, taps the chest 14, at a point to communicate with the valve cavity f ; and the passage b^3 from the inner end of the high pressure cylinder, taps the said chest through the seat, at a point to communicate with the valve cavity f' . The valve cavity f^2 co-operates with the final exhaust cavity d^2 . The raised or full sized parts of the valve 22 act as partitions to properly separate the fluid. It is, of course obvious, that the valve-cavities f f' of the piston valve 22, serve the same functions as the separate valve chests or compartments 16 and 17 in the preferred construction, shown in Fig. 1; and besides, the said cavities serve their special function of controlling the ports to the low pressure cylinders. This modification has been shown, simply to illustrate the fact, that the piston-valve might be substituted for the double valve, for controlling the distribution to the low pressure cylinders.

Having regard to the advantages of this construction of compound engines, it is obvious that as separate valves are employed, for controlling the admission to the high pressure cylinder and for controlling the distribution to the low pressure cylinders, the

said valves may be arranged for the most advantageous distribution, to produce effective compounds of the non-receiver or Woolf type. As incidental to the construction, it may be noted that, inasmuch, as the high pressure valve 9 controls only the admission, it requires and has no exhaust cavity, and hence can be made comparatively short; and, inasmuch, as one of the said ports b b' in the seat 7 will always contain high pressure steam and the other low pressure steam, the valve 9 will be, to a large extent, balanced. This principle of construction for compound engines, is well adapted for the utilization of existing simple engine cylinders, in matching the same up and converting over simple engines into compounds.

It will, of course, be understood, that the coupling-head 6, might be constructed as a separate casting; and that the same principle, in respect to the relation of the valves, could be made to apply, if the cylinders were arranged parallel and along side of each other, instead of being arranged tandem, as shown.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a double compound engine, the combination with the high pressure cylinder, having a pair of admission ports, of an admission valve controlling said ports, a low pressure cylinder having a pair of low pressure valve-seats, a pair of passages connecting the ends of the high pressure cylinder, one with each end of said valve-seat, and a pair of valves on said low pressure seat controlling the admission to and exhaust from said low pressure cylinder, substantially as described.

2. In a tandem double compound engine, having their pistons on a common rod, the combination with the high pressure cylinder having a pair of admission ports, of an admission valve controlling said high pressure ports, a low pressure cylinder provided with a valve-seat having a pair of low pressure admission and exhaust ports, a pair of passages, one connecting each end of the high pressure cylinder with one end of said low pressure valve-seat, independent of said admission valve, a pair of low pressure valves on said low pressure valve-seat, and a common rod connected to all of said valves, substantially as described.

3. In a tandem double compound engine, the combination with the high pressure cylinder having a valve-seat provided with a pair of admission ports, of an admission valve on said port, a low pressure cylinder provided with a pair of valve seats each having a low pressure admission and an exhaust port, low pressure valves on said seats, and a pair of valve chests, one over each of said seats provided with passages connecting the same, one with each of the opposite ends of said high pressure cylinder, independent of said high pressure admission valve, substantially as described.

4. In a tandem compound engine, the combination with the high pressure cylinder having the valve-seat provided with a pair of admission ports, of the admission valve on said seat, the low pressure cylinder having the pair of valve-seats each with a low pressure admission and exhaust port, a pair of valves on said seat, a valve-chest over said seats divided into two unequal compartments, the outer and smaller of which is connected with the outer end of said high pressure cylinder and the inner and larger of which is connected with the inner end of said high pressure cylinder, substantially as and for the purpose set forth.

5. In a double compound engine, the combination with the high pressure cylinder, having the valve-seat provided with a pair of ad-

mission ports, of the admission valve on said seat, the low pressure cylinder having the pair of valve-seats each with a low pressure admission and exhaust port, a pair of valves on said seat, a pair of chests over said seats connected one to each end of the high pressure cylinder, independent of said high pressure admission valve, and a starting valve in the dividing partition between said chests, for converting the compounds into simple acting engines, substantially as described.

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

JOHN PEEBLES.

Witnesses:

E. F. ELMORE,
JAS. F. WILLIAMSON.