

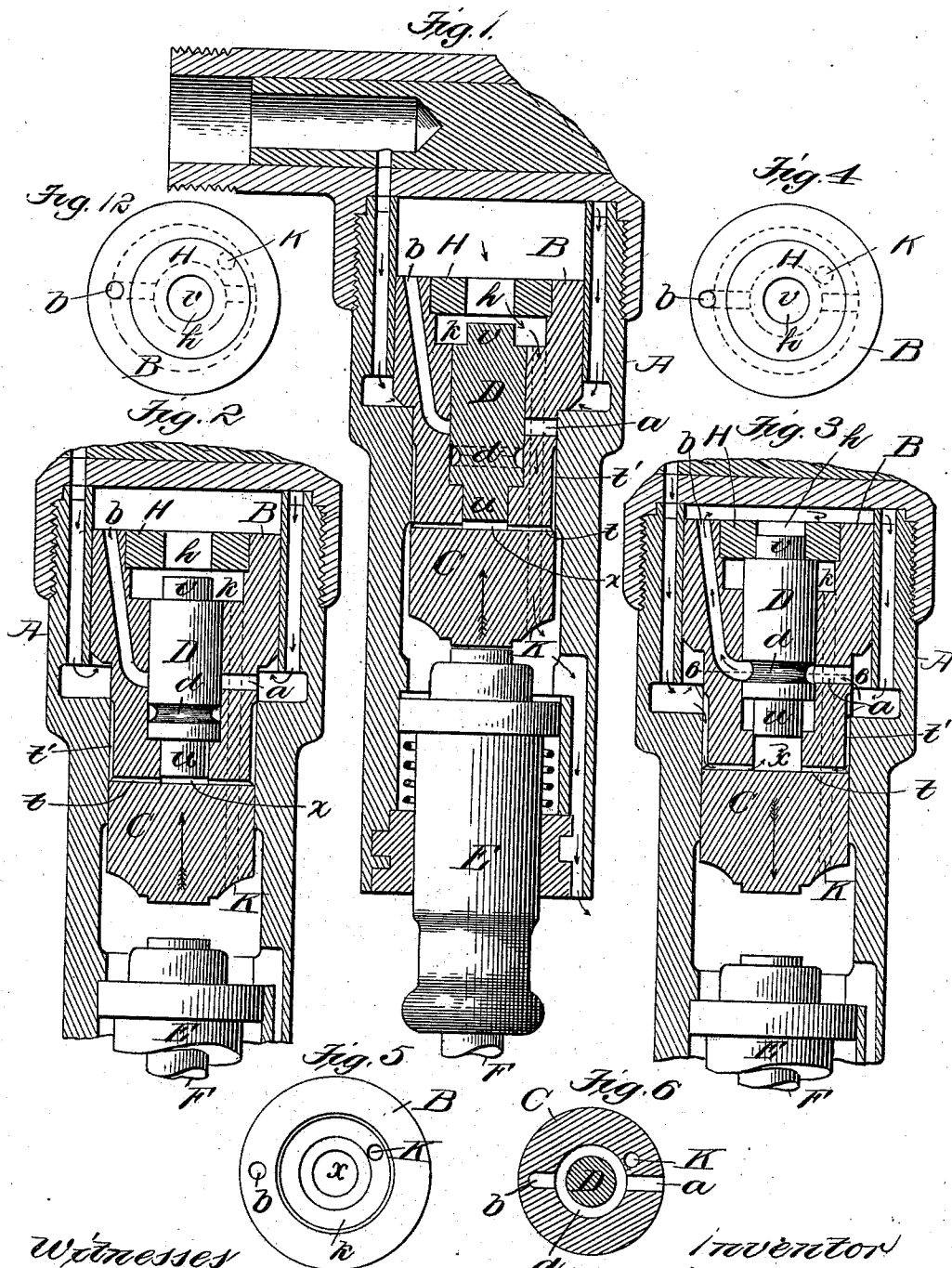
(No Model.)

P. CHOUTEAU.
ENGINE.

2 Sheets—Sheet 1.

No. 519,147.

Patented May 1, 1894.



Witnesses
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Hugh K. Wagner.

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(No Model.)

P. CHOUTEAU.
ENGINE.

2 Sheets—Sheet 2.

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Fig. 7

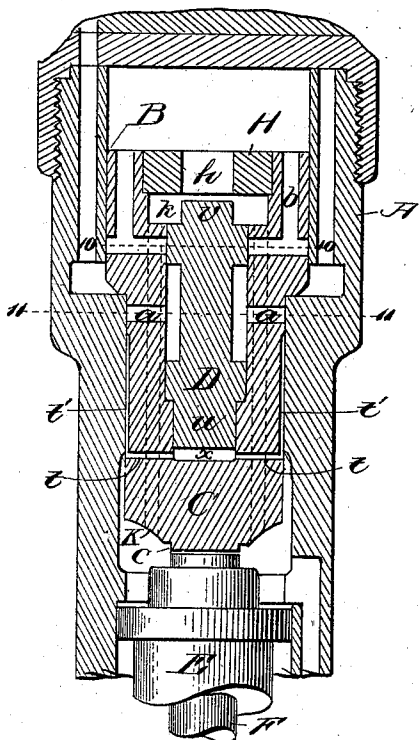


Fig. 8

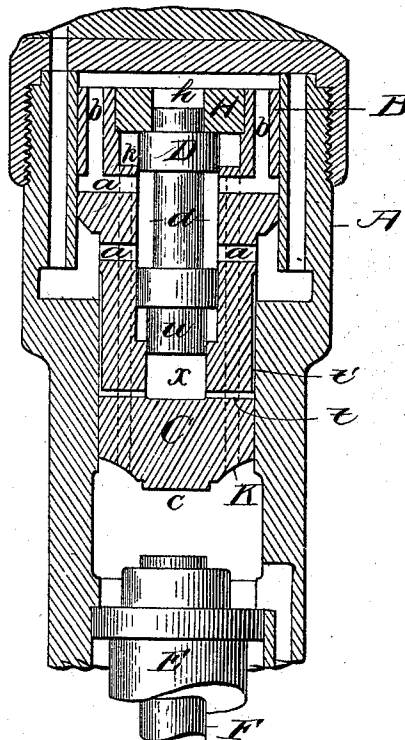


Fig. 9

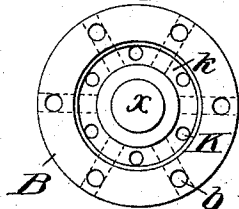


Fig. 10

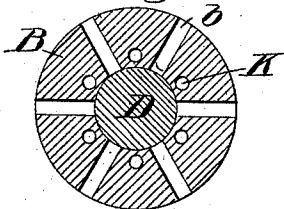
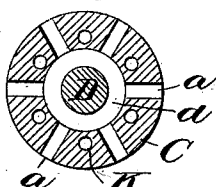


Fig. 11



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UNITED STATES PATENT OFFICE.

PIERRE CHOUTEAU, OF ST. LOUIS, MISSOURI.

ENGINE.

SPECIFICATION forming part of Letters Patent No. 519,147, dated May 1, 1894.

Application filed December 30, 1893. Serial No. 495,164. (No model.)

To all whom it may concern:

Be it known that I, PIERRE CHOUTEAU, a citizen of the United States, residing in the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, wherein like letters of reference refer to like parts wherever they occur, and in which—

Figure 1 is a longitudinal vertical section through my improved engine. Fig. 2 is a similar view illustrating the piston in a different position. Fig. 3 is a similar view illustrating a further change in the position of the piston, and a change in the position of the distributing valve. Fig. 4 is a top plan view of the piston head with the stop collar in position. Fig. 5 is a similar view with the stop collar and distributing valve removed. Fig. 6 is a cross sectional view taken through the piston on line 6—6 Fig. 3. Fig. 7 is a longitudinal vertical sectional view of the engine, illustrating a modified form of distributing valve and piston ports. Fig. 8 is a similar view of the modification, illustrating the piston and distributing valve in a changed position. Fig. 9 is a top plan view of the piston head shown in the modification, the stop collar and distributing valve being removed. Fig. 10 is a cross sectional view through the piston head taken on line 10—10 Fig. 7. Fig. 11 is a cross sectional view taken through the piston on line 11—11 Fig. 7, and Fig. 12 is a modification of the form of valve shown in Figs. 1, 2 and 3, showing the same eccentrically arranged.

This invention relates to that class of direct acting steam or pneumatic engines, in which the piston is reciprocated in the cylinder by the alternate admission of the motive fluid above and below the same, said fluid being controlled by a distributing valve carried by the piston, which distributing valve is itself actuated by the motive fluid in such manner as to be thrown in either of its extreme positions to effect the admission of the motive fluid above the piston and cut off the exhaust, or vice versa.

The principles of operation in this engine are substantially the same as those described in United States Letters Patent No. 434,976, of August 26, 1890, and many of the parts are similarly constructed as those shown in the patent above referred to.

In the drawings, A indicates the cylinder; B the piston, chambered for the reception of the distributing valve and provided with suitable ports which co-operate with said valve; C the piston rod; D the distributing valve; E the tool holder mounted in the end of the cylinder with which the hammer-head *c* of the piston rod C is adapted to co-operate, and F the shank of a tool; such parts being substantially the same as those shown in the Patent No. 434,976, save in the following particulars which I will now describe.

In the former patent above referred to, the distributing valve was made hollow, and small openings were provided at its lower end which were adapted to align with similar openings in the piston for admitting the motive fluid from the live fluid chamber to the top of the cylinder, where the area, being much greater than that presented by the underneath side of the piston head, the piston would descend, the motive fluid being admitted to the cylinder space thereabove through the hollow distributing valve. In this form of distributing valve, I have found in practical experience that there are disadvantages present, a salient one being weakness due to the perforations around its bottom, and in the operation of the valve, it has been known to break by its forceful impact against the piston.

The valve in my present construction, is operated to admit the motive fluid to the top of the piston and cut off the exhaust, in the same way as the valve shown in the Patent No. 434,976, that is, the piston rod is formed with a longitudinal groove or capping *t'*, as it is sometimes called, which opens into the live fluid chamber when the piston is going up, and the motive fluid entering this capping, passes through a port *t* which leads to a well *x* into which is received a stem *u* of the distributing valve. As the valve in its lowest position permits the exhaust port K to be open, the space above the piston is at

atmospheric pressure, and the pressure of the live fluid being introduced below the valve, the valve is thrown up, which when done, cuts out the exhaust port K by closing the opening *h* in the stop collar H, to the exhaust chamber *k*.

The construction of my present form of valve is different from that shown in the before mentioned patent, in the following particulars:—The body of the valve is made solid, from the ends of which project stems *v* and *u*, the former co-operating with the seat afforded by the collar H and with the opening *h* to the exhaust ports, to close the entrance to said ports from the space above the cylinder, when the valve is thrown up, and the latter projecting down into the well *x* where it is acted upon by the live fluid, when the piston is in certain of its positions, to throw the valve. The body portion of the valve is formed with an annulus or reduced portion *d*, which as shown in Figs. 1 or 6, registers with port *a* leading from the piston chamber to the live fluid chamber when the piston is in certain of its positions and the valve is thrown up, and with port *b* leading from the chamber in the piston to the space above the piston head, thus permitting the passage of the live fluid from the live fluid chamber to the space above the piston.

In Figs. 7 to 11 a modified form of valve and ports is shown, which are controlled and operated in the same way as those just described, save in this particular, that the reduced portion or annulus in the valve registers with the ports *a* at all times and the enlarged portion or head of the valve closes the ports *b* when the valve is down, and passes above said ports connecting them, through the annulus *d* with the ports *a* when the valve is thrown up. The ports *a* and *b* in this instance are not oppositely disposed, as in the former case, but are arranged at the top and bottom of the piston chamber. It will be noted that in both of these constructions, the valve D is solid and will stand greater strain than the one shown in Patent No. 434,976, and is in form, what is termed a spool valve, having all the advantages of this single spool form, and lacking the disadvantages of the hollow perforated form of valve used in the other construction shown in the patent. It is simple in construction, and can be introduced in existing forms of engines with but little change in the construction thereof, such as boring the ports *b*, and in operation it will be as effective as the old form.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a direct acting engine, the combination with a chambered piston, of a solid valve operating in said chamber and formed with a reduced portion which co-operates with ports in the piston to make and break the communication with the live fluid chamber and the

space above the piston, stems at the ends of said valve, one of which controls the exhaust, and said exhaust throwing the valve when the piston is in one of its positions, to open the exhaust, and the other stem being operated upon to close the exhaust, when the piston is in another of its positions, and open communication between the live fluid chamber and the space above the piston, substantially as described.

2. In a direct acting engine, the combination with a chambered piston, of a spool valve located and operating in said chamber for controlling the admission and exhaust of the motive fluid to and from the space above the piston, a stem on the lower end of the valve which is operated upon to throw the valve, close the exhaust from the space above the piston and open communication between the live fluid chamber and the space above the piston, said valve being thrown by the pressure in the space above the piston, when the piston is on its down stroke, to open the exhaust for the fluid above the piston, and close communication between the live fluid chamber and the space above the piston, substantially as described.

3. In a direct acting engine, the combination with a chambered piston, of a distributing valve operating in said chamber, said valve comprising a solid body portion formed with an annulus or reduced portion and two stems projecting from each end of said body portion, said lower stem operating in a well which has lead thereinto inlet ports which connect the well with the live fluid chamber to throw the valve in certain positions of the piston, and said upper stem co-operating with a seat on the piston to open or close the exhaust, and suitable ports formed in the piston which open into the live fluid chamber and to the top of the piston, with which the annulus or reduced portion in the valve co-operates to connect or close when the valve is in certain of its positions, substantially as described.

4. In a direct acting engine, the combination with the piston formed with a chamber and a well which opens into said chamber, suitable ports which connect the well with the live fluid chamber when the piston is in certain of its positions, a port leading from the chamber to the side of the piston where it communicates with the live fluid chamber when the piston is near the extreme of its up-stroke, another port which leads from the chamber to the space above the piston, an exhaust chamber formed in the upper end of the piston and an exhaust port leading from said chamber, of a stop collar provided with a central opening forming a seat, which collar partially closes the exhaust chamber, and a solid spool valve, formed with two stems at its ends, one of which extends into the well to operate the valve and the other co-operating with the stop collar to close the exhaust, and an annulus or reduced portion in the

spool which makes and breaks communication between the port which leads into the piston chamber from the live fluid chamber, and the port which leads from the piston
5 chamber to the top of the piston, when the valve is in certain of its positions, substantially as described.

In testimony whereof I hereunto affix my signature, in presence of two witnesses, this 9th day of December, 1893.

PIERRE CHOUTEAU.

Witnesses:

F. R. CORNWALL,
HUGH K. WAGNER.