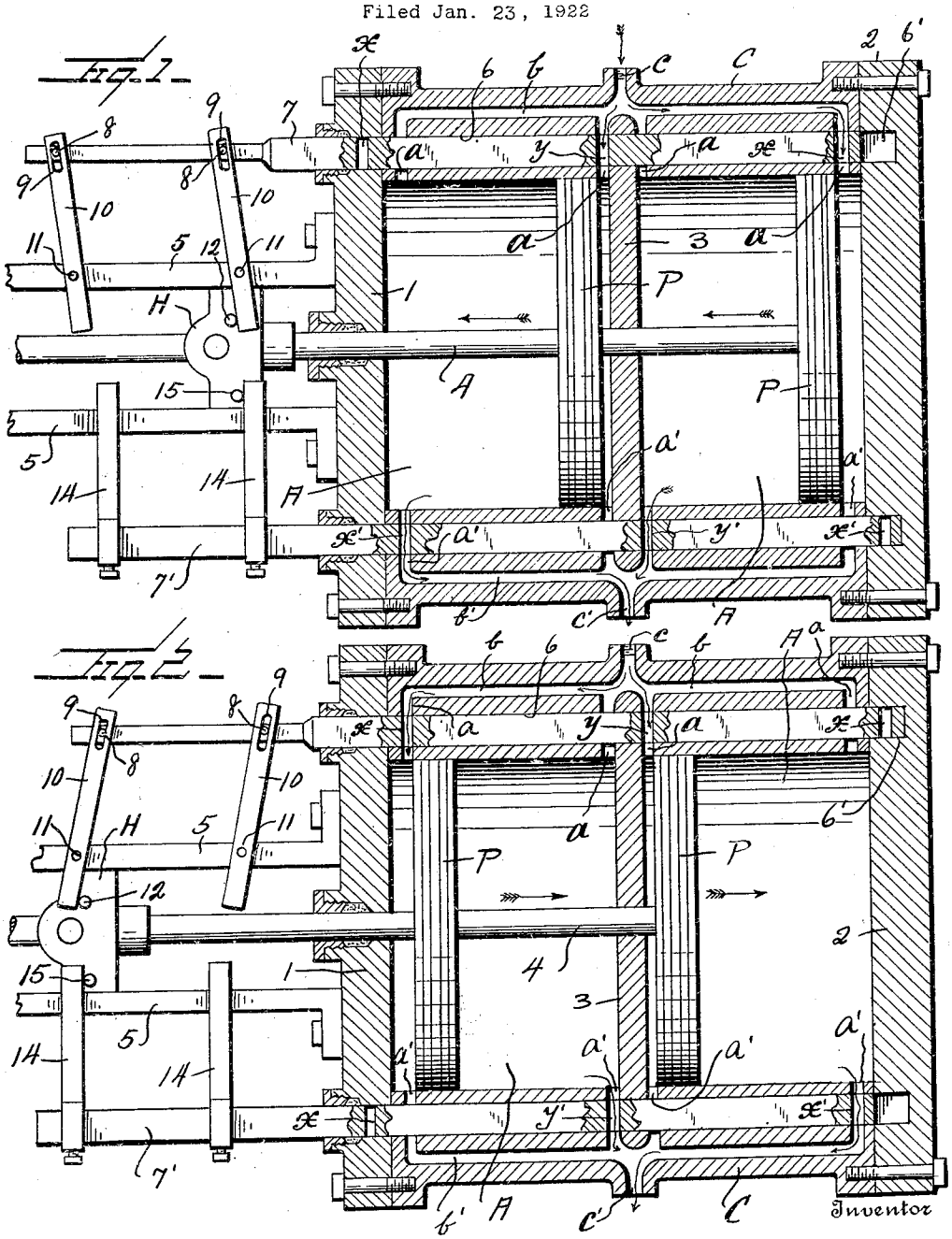
Nov. 25, 1924. 1,516,894

W. E. STEVENSON

MOTOR

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Patented Nov. 25, 1924. 1,516,894

# UNITED STATES PATENT OFFICE.

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## MOTOR.

Application filed January 23, 1922. Serial No. 531,227.

*To all whom it may concern:*

Be it known that I, WILLIAM E. STEVENSON, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Motors, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to certain improvements in motors and has relation more particularly to a device of this general character of a multiple chamber type, and it is an object of the invention to provide a device of this general character having novel and improved means whereby the admission of the expansive fluid or medium is effectively controlled.

Another object of the invention is to provide a novel and improved device of this general character comprising a plurality of chambers in each of which a piston has rectilinear movement, said pistons being connected for unitary reciprocation, together with means operated from the pistons for controlling the admission of the expansive fluid or medium within the chambers.

An additional object of the invention is to provide a novel and improved device of this general character whereby the admission of fluid within a chamber or cylinder and the exit of the fluid therefrom is under control of an improved type of slide valve operating within said cylinder wall.

The invention consists in the details of construction and in the combination and arrangement of the several parts of my improved motor whereby certain important advantages are attained and the device rendered simpler, less expensive and otherwise more convenient and advantageous for use, as will be hereinafter more fully set forth.

The novel features of my invention will hereinafter be definitely claimed.

In order that my invention may be the better understood, I will now proceed to describe the same with reference to the accompanying drawings, wherein:

Figure 1 is a view partly in section and partly in elevation illustrating a mechanism constructed in accordance with an embodiment of my invention; and

Figure 2 is a view similar to Figure 1 with the movable parts in a second position.

As disclosed in the accompanying drawings, C denotes a cylinder of desired dimensions and which has its opposite ends closed by the heads or plates 1 and 2. The bore of the cylinder substantially midway thereof is intersected by a partition 3 whereby the bore of said cylinder is divided into two power chambers A.

Working in each of the chambers A is a piston P, both of said pistons being secured to the rod 4 whereby the pistons P have rectilinear movement in unison within the chambers A. The portion of the rod 4 between the pistons P is slidably disposed through the partition 3 and the inner end portion of the rod 4 is slidably disposed through the head or plate 1. Exteriorly of the cylinder C, the rod 4 is operatively engaged with a cross head H which may be of any ordinary or preferred construction supported for reciprocation between the guide members 5.

In communication with the opposite end portions of each of the chambers A are the induction ports *a* each of which is in communication with a passageway or conduit *b* disposed lengthwise of the cylinder and having its central portion in communication with an inlet port *c* adapted for communication with a suitable source of fluid under pressure, such as compressed air. Substantially diametrically opposed to the induction ports *a* are the eduction ports *a'* leading from the passageway or conduit *b'* and which passageway or conduit has its central portion in communication with the outlet port *c'*.

Disposed lengthwise through the wall of the cylinder C parallel to the piston rod and between the steam conduit *b* and power chamber and intersecting the ports *a* is an opening 6, said opening 6 being continued through the head or plate 1 and also continued by a recess 6' formed in the head or plate 2. Disposed within the opening 6 and having endwise movement therein is an elongated member or slide valve 7. This elongated member or valve 7 is provided at its opposite end portions with the ports *x* which are adapted alternately to register with the end induction ports *a*.

The central portion of the member or valve 7 is provided with the port *y* which, upon movement of the member or valve 7 in one direction, registers with the inner port *a* of the outer one of the chambers A and, upon movement of the member or valve 7 in the opposite direction, registers

with the outer port $a$ of the second or inner chamber as shown in Figure 1. The recess 6′ is provided to facilitate the requisite reciprocation of the member or valve 7.

Associated with the eduction ports $a'$ is the elongated member or valve 7′ slidably disposed through the head or plate 1 and the wall of the cylinder C in the same manner as hereinbefore set forth with respect to the member or valve 7. The member or valve 7′ is provided with the ports $x'$ adapted to alternately register with the outer ports $a'$ and in proper sequence with respect to the ports $x$ of the member or valve 7. The member or valve 7′ is also provided with the intermediate or central port $y'$ which, upon proper reciprocation of the member or valve 7′, is alternately brought into register with the inner ports $a'$.

The member or valve 7 extends outwardly of the head or plate 1 and at longitudinally spaced points thereon, said extended portion is provided with the outstanding pins 8. These pins 8 extend within the slots 9 provided with the rock levers 10. The levers 10 are supported, as at 11, for swinging or rocking movement by one of the guide members 5. The levers 10 are in parallelism and have their inner end portions disposed in the path of travel of an upstanding pin 12 carried by the cross head H.

As the pistons P move in the direction indicated by the arrow in Figure 2, the pin 12 contacts with the outer lever 10 just before the pistons reach the end of their stroke so that the slight continued movement of the pistons results in the member or valve 7 being shifted inwardly, as indicated in Figure 2, whereupon the requisite ports $a$ are opened to effect the opposite stroke of the pistons. At the same time the member or valve 7′ is moved endwise to assure the opening and closing of the desired ports $a'$.

The extended portion of the member or valve 7′ is provided with inwardly disposed arms 14 spaced apart as desired in a direction lengthwise of the member or valve 7′. The arms 14 intersect the path of travel of the upstanding pin 15 also carried by the head H. The recurrent movement of the head H through the instrumentality of the pin 15 engaging the arms 14 results in the reverse movements of the member or valve 7′ in the desired timed sequence in connection with the reverse movements or reciprocations of the member or valve 7.

From the foregoing description it is thought to be obvious that a motor constructed in accordance with my invention is particularly well adapted for use by reason of the convenience and facility with which it may be assembled and operated, and it will also be obvious that my invention is susceptible of some change and modification without departing from the principles and spirit thereof and for this reason I do not wish to be understood as limiting myself to the precise arrangement and formation of the several parts herein shown in carrying out my invention in practice except as hereinafter claimed.

I claim:

1. In combination, a cylinder divided into two expansion chambers, a piston in each of said chambers, a rod common to both of the pistons and extending exteriorly of the cylinder, said rod causing the pistons to move in unison and in the same direction, said cylinder being provided with longitudinal conduits and inlet and outlet ports connecting said conduits with the opposite end portions of each of the chambers and longitudinal recesses in the cylinder wall between said conduits and the expansion chambers, members slidably disposed in said recesses and moving in a path intersecting the inlet and outlet ports, said members having ports for registry with the inlet and outlet ports, the ports of the sliding members registering with the inlet and outlet ports at opposite ends of the chamber when the members are moved in one direction and with the inlet and outlet ports in the reverse end portions of the chambers when the members are moved in the opposite direction, and means for imparting movement to the sliding members.

2. In combination, a cylinder, a partition dividing the cylinder into two chambers, pistons working in the chambers, a piston rod connecting said pistons, said cylinder having ports in communication with the inner and outer ends of each of the chambers, said cylinder being also provided with two longitudinal conduits with which the ports communicate, one of said conduits being adapted for communication with a source of fluid under pressure, the other for communication with an exhaust opening, members slidably disposed through the walls of the cylinder and intersecting the inlet and outlet ports thereof, said members having ports for alternate registry with the ports in communication with the end portions of the chambers, and means coacting with the cross head, a cross head with which the piston rod is operatively engaged, and the sliding members for imparting reciprocation to the sliding members when the pistons are at substantially the ends of their strokes.

In testimony whereof I hereunto affix my signature.

WILLIAM E. STEVENSON.