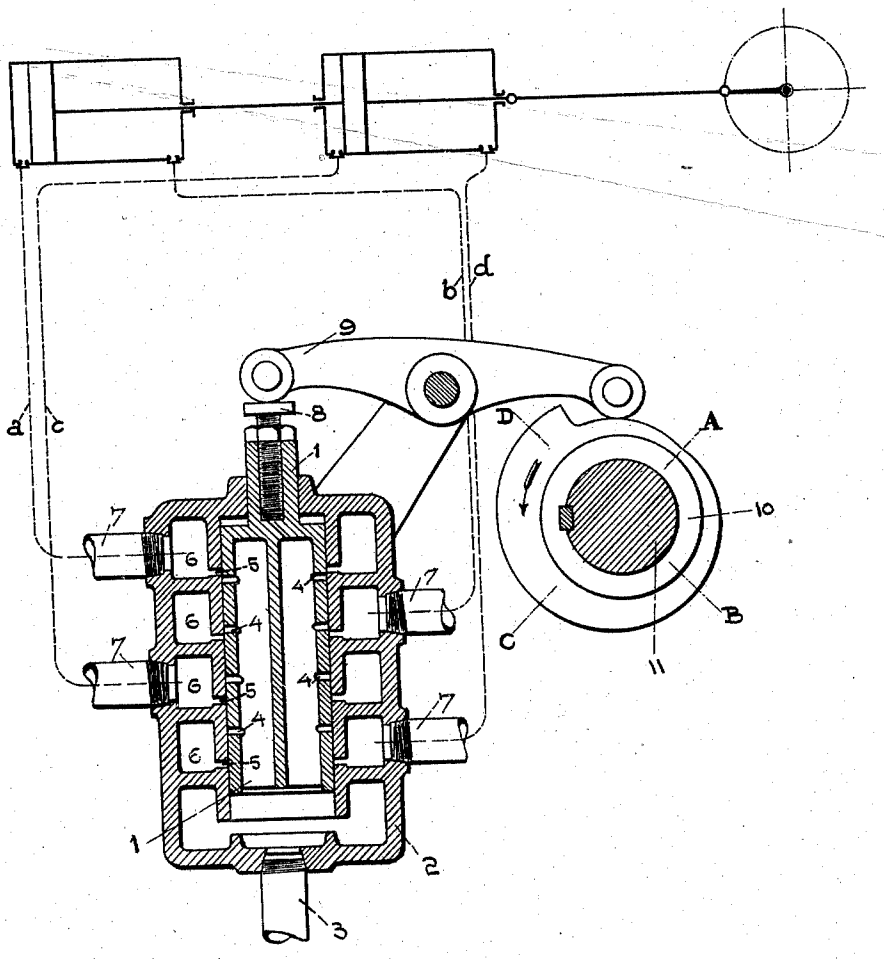
C. G. SPRADO.

VALVE.

APPLICATION FILED DEC. 28, 1905.

966,867. Patented Aug. 9, 1910.



WITNESSES:

P. Joseleuitsch

Geo. E. Kirk

INVENTOR

Carl G. Sprado

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CARL G. SPRADO, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO ALLIS-CHALMERS COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF NEW JERSEY.

VALVE.

966,867. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed December 28, 1905. Serial No. 293,582.

To all whom it may concern:

Be it known that I, CARL G. SPRADO, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Valves, of which the following is a specification.

This invention relates to controlling the flow of a fluid through a plurality of passages in a predetermined sequence.

This invention has utility when used to control the flow of fluid to a prime motor, as a reciprocating engine.

This invention is designed to provide a simple and inexpensive valve arrangement for controlling the flow of a fluid under pressure, as compressed air, for example, to the cylinders of a double cylinder, fluid engine for starting the same, and the ported member is so constructed and has its ports so arranged with respect to the ports which are provided in the valve casing 2, that the reciprocation of said ported member opens communication between the source of supply of the compressed air and each end of the two cylinders of the engine in one sequence for comparatively extended periods of time, to be followed by a reverse sequence for comparatively short periods of time, making these reverse communications negligible in practical operation.

The object desired, and which object has been secured by the apparatus shown by the drawings accompanying this specification, is to provide a simple and inexpensive form of apparatus which will, in effect, admit the fluid under pressure to a plurality of ports, as for example, the four ports shown, in substantially circular series, this result being attained by the use of a reciprocable member instead of a rotatable member.

It should be observed that the several ends of the cylinders are not placed in communication with the source of supply of the compressed air in true circular series, as such an operation is manifestly impossible with a reciprocable element, but the apparatus described by this specification and shown by the drawings is found to be practicable under the conditions of use for which it was designed.

The drawing shows an embodiment of the device. The reciprocable ported member 1 is guided in the fixed box or casing 2, into which member 2 leads the pipe 3. The piston valve or member 1 has a plurality of series of ports 4 which may be successively brought into registry with ports 5 in the guide member 2. These positions of registry are different for each series of ports and only one series of the member 1 is in registry with ports of the member 2 at the same time. In the member 1 is a plurality of passages 6 into which the ports 5 open. Each of these passages 6 has an outlet pipe 7. The member 1 has the bolt 8 in one end thereof so that its position of registry may be adjusted. The head of this bolt 8 is engaged by the rocker 9 which is positively actuated by the cam 10 mounted on the shaft 11.

The operation of the apparatus is as follows: The shaft 11 being rotated by the engine in the direction indicated by the arrow, the cam 10 secured thereto will be rotated, and with the ported valve member in the position as shown by the drawings, when the depressed part A on the cam is engaged by the rocker 9, the air under pressure will force the ported valve member up (as shown by the drawings) so that the uppermost ports 4 of said member will register with the uppermost ports in the casing, whereby the compressed air will pass to the left hand end of the left hand cylinder. As the cam 10 continues to rotate, the ported valve member will be depressed to the position as shown by the drawings, thereby cutting off the supply of compressed air to the end of the cylinder just mentioned, but on a further rotation of the cam 10 the second series of ports from the top in the ported valve member will be brought down into registry with the second series of ports in the casing and the air under pressure will be admitted to the right hand end of the left hand cylinder. On a further rotation of the cam 10, the ported valve member will be forced farther down, bringing said ports out of register and bringing the third series of ports in the ported valve member into register with the third series of ports in the casing, thereby admitting the air under pressure to the left hand end of the right hand cylinder. On a further rotation of the cam 10, the ported valve member will be forced down, bringing said ports out of register and bringing the lowermost series of ports in the ported valve member into register with the lowermost series of ports in the casing, there-

by permitting air under pressure to pass to the right hand end of the right hand cylinder. The four positions of the cam at which the ports of the ported valve member register with the ports of the casing are indicated by the letters A, B, C, and D, respectively, these portions of the cam being contacted by the rocker arm 9 respectively for the different positions of the register of the ports just described. On a further rotation of the cam 10, the rocker 9 will pass from the elevated portion of the cam to the depressed portion thereof, this movement being performed very rapidly by reason of the pressure of the air against the valve member 1 within the casing, and while each series of the three lower series of ports in the casing will be momentarily in register with their co-acting ports in the ported valve member, the time during which they are in register is so extremely limited that no harm results therefrom.

It is to be understood that the cylinders composing the engine which is shown diagrammatically by the drawings are provided with the customary exhaust valves (not shown) which are in common use with this type of engines whereby the air which has been admitted to the cylinders is permitted to escape therefrom at the proper times in the cycle of the engine.

Movement of the cam 10 from position D to position A to again successively register the ports, permits sudden movement of member 1 to a point of registry. By this construction uniformity is secured in bringing each port into registering position.

What is claimed and it is desired to secure by Letters Patent is:

1. The combination of a casing provided with a plurality of ports, of a reciprocable valve member provided with a like number of ports located within said casing and subjected to the pressure of a fluid within said casing whereby it is adapted to be moved in one direction, means for positively moving said valve member in the opposite direction, each of the ports of said valve member being adapted to register with a port in the casing during a reciprocation of said valve member, each of said ports in said valve member, however, registering with a port in the valve casing at a different period of the cycle than any of the others, said valve member being adapted to be moved from an initial position through a plurality of reciprocations in order to complete its cycle.

2. The combination, a double acting tandem fluid engine, a valve casing, conduits connecting the casing with the respective cylinder ends of the engine, and a valve controlling the flow of fluid to the cylinder ends so as to successively and singly open the conduits for such flow.

3. The combination, a double acting tandem fluid engine, a valve casing, conduits connecting the casing with the respective cylinder ends of the engine, a valve controlling the flow of fluid to the four cylinder ends, and cam means for operating said valve to control the flow to the cylinder ends successively and in cycles with a quick return from the end of one cycle to the beginning of the next cycle.

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

CARL G. SPRADO.

Witnesses:
JOHN DAY, Jr.,
GEO. E. KIRK.