C. W. DAKE.

VALVE.

APPLICATION FILED JUNE 21, 1915.

1,183,541.

Patented May 16, 1916.

Fig. 1

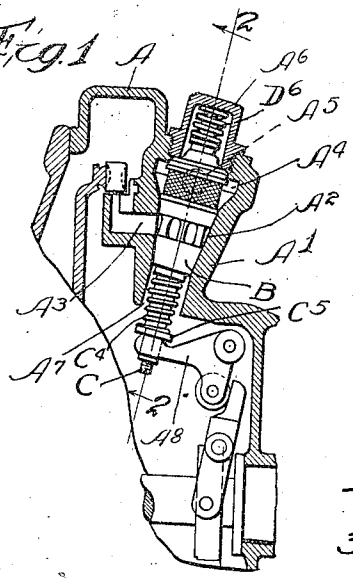
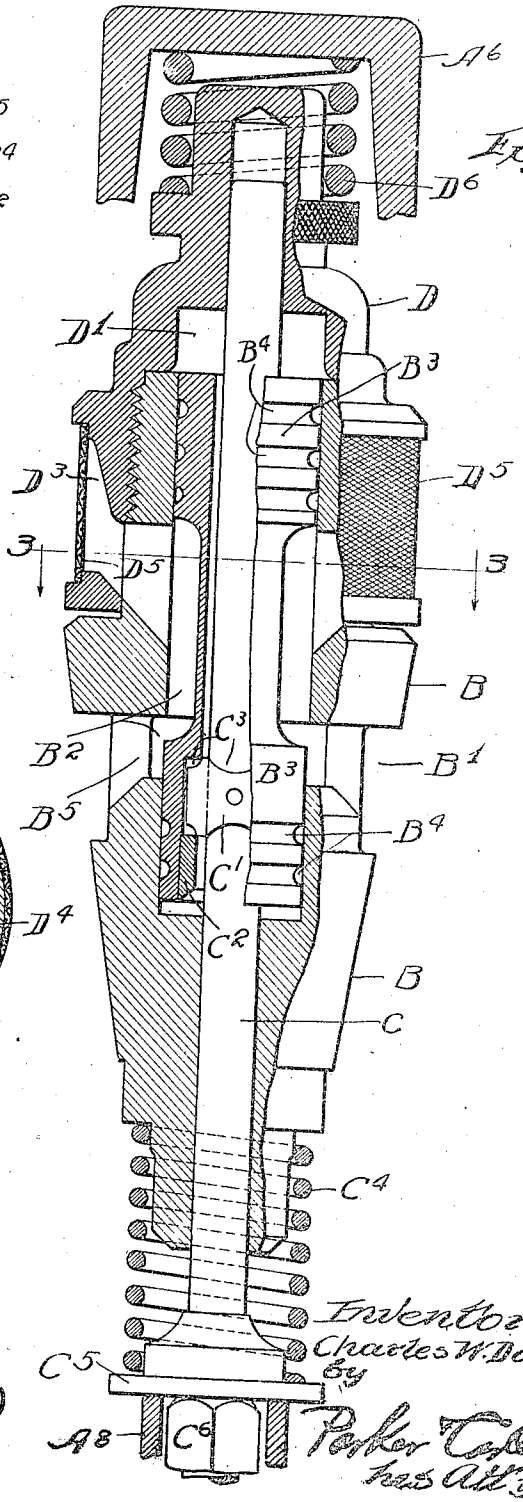


Fig. 2.



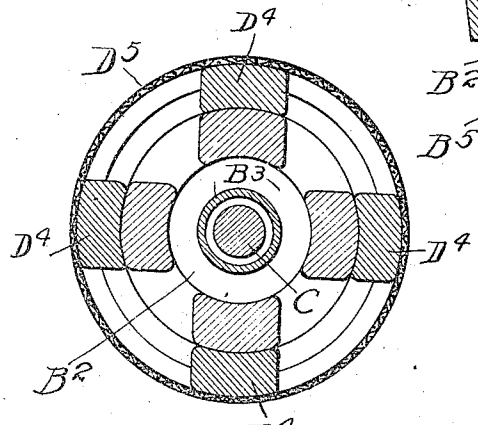


Fig. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

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VALVE.

1,183,541. Specification of Letters Patent. Patented May 16, 1916.

Application filed June 21, 1915. Serial No. 35,190.

To all whom it may concern:

Be it known that I, CHARLES W. DAKE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Valves, of which the following is a specification.

My invention relates to improvements in valves for turbine engines and the like and has for one object to provide a new and improved form of valve assembly which may be conveniently withdrawn as a unit from its operative position and which may then be subsequently dismounted or assembled for repair and adjustment with a minimum of difficulty.

Another object is to provide a piston control valve which will be substantially balanced in operation.

Another object is to provide a piston control valve which is easily produced and assembled and which is not subject to rapid gearation.

Other objects of my invention will appear from time to time in the specification.

My invention is illustrated more or less diagrammatically in the accompanying drawings, wherein—

Figure 1 is a detail section through a part of the motor generator set showing my device in operation; Fig. 2 is a section on the line 2—2 of Fig. 2 on an enlarged scale with parts in elevation and parts broken away; Fig. 3 is a section on the line 3—3 of Fig. 2. Like parts are indicated by like letters throughout the several figures.

A is a motor housing. In it is a valve assembly pocket A^1. This valve assembly pocket A^1 has a conical wall as indicated. In this conical wall is an annular steam passage A^2 and discharging from one side of it is a feed steam supply passage A^3. This pocket opens up at the top into an enlarged chamber A^4 to which is fed a steam supply through a passage A^5. This chamber is closed by a screw-threaded cap A^6. The pocket terminates at the bottom in an opening A^7 containing a governor control arm A^8 adapted to be actuated by any suitable mechanism not here shown in response to the usual governor or other speed control mechanism.

When the valve and valve socket assembly is withdrawn from the pocket and chamber adapted to contain it there is a free passage for steam from the supply pipe through the pocket and chamber through the discharge pipe to the engine and it is the function of the guide valve and valve pocket assembly to control this passage.

B is a conical valve socket body adapted to seat upon the conical wall of the valve pocket. This body is annularly grooved at at B^1 in register with the passage A^3. The central portion of this body contains a cylindrical chamber B^2 terminating at a point slightly below the annular groove B^1. This chamber forms a seat for a dumb bell piston valve B^3. These two ends are provided with the usual type of steam or water grooves B^4. The passages B^5 extending inwardly from the groove B^1 to the chamber B^2 are controlled by the lower portion of the valve which in the position shown is open to permit passage of the steam from the cylindrical chamber outwardly through the wall of the socket member.

C is a valve stem. It passes through the valve cylinder and is loosely anchored thereon by a collar C^1. This collar is held within a pocket inside the lower end of the valve by a sleeve C^2. This collar is smaller in diameter than the pocket in which it is contained and is held by the sleeve C^2 tight enough so that it and the valve stem may move sidewise within the valve. This collar is serrated as at C^3 to permit free passage of the steam along the length of the valve stem through the valve. The lower portion of the socket furnishes a substantially steam-tight bearing for the valve stem C. The spring C^4 tends yieldingly to draw the valve down to its wide open position being compressed between the lower end of the socket and the collar C^5 on the stem the position of which may be adjusted by means of the nut C^6.

It will be observed that the upper end of the socket is reduced and screw-threaded and this screw-threaded portion is engaged by a cap D which at its upper end has a bearing closed at the top to guide and support the upper end of the valve stem C. This cap is apertured as at D^1 to permit upward movement of the piston valve thereinto.

D^3 is an annular channel about the periphery of the cap divided into sections by a series of spacing members D^4, thus forming passages to communicate with passages D^5 through the wall of the reduced portion of the socket thus furnishing a connection

between the outside pocket A^4 and the inside of the socket.

D^5 is a screen surrounding the cap to prevent the passage of foreign material through the valve assembly.

D^6 is a spring resting upon the cap D and compressed between it and the cap A^6. It is a left-hand spring. The cap A^6 is screw-threaded with a right-hand thread and the cap D has a right-hand thread so that when the cap A^6 is screwed down it slides freely along or against the stiff spring B^6 but when it is screwed up the spring tends to clamp to a slight degree and thus may under some circumstances be rotated in the reverse direction. This would result in a slight rotation of the inner cap on the socket, thus when the outer cap is withdrawn and the socket taken out, the cap may be easily disassembled by hand and the parts adjusted or set up in any suitable manner. The length of the cylinder valve and the length of the cylinder chamber in the pocket is the same so that the operator can always tell by feeling whether or not the valve is in proper position. If the valve projects up above the end of the socket when the cap is removed, he knows even in the dark that something is wrong.

It will be evident that while I have shown in my drawings an operative device, still many changes might be made both in size, shape and arrangement of parts without departing from the spirit of my invention, and I wish, therefore, that my drawings be regarded as in a sense diagrammatic.

The serrations as indicated are of such depth that even when the collar is snugly held in position inside the valve piston, there is still room for the passage of the steam through these serrations past the shoulder between which the sleeve is held.

The whole valve assembly is as shown contained within a pocket or socket in the rotor housing. The large holding and closing cap is after the valve assembly is placed in position, screwed down and holds the valve assembly yieldingly but snugly in position by compressing the helical spring. The spring is twisted one way, the thread another, so that with the parts in the position shown, when a heavy wrench is applied to screw the cap down into position, the spring being spiraled in a direction opposite to the rotation of the cap, will slide freely between it and the cap or top of the valve assembly, and there will be no tendency for the spring to clamp between the two caps and turn the inner one in response to the rotation of the outer one, thus the installation of the valve's assembly will not tend to lock the parts together any more closely than they were first locked by the operator. When the big cap is unscrewed, there will be a tendency possibly to unscrew the inner cap. This does no harm.

The use and operation of my invention are as follows:—With the steam turned off at the boiler and the parts removed, the operator would place the already assembled valve socket and assembly in position in the pocket destined to contain them. He will then put the spring in position on top of the cap at the top of the socket and screw down the outer cap tight, thus making a steam-tight joint. The steam can then be turned on and with the valve in the lower position will pass through and drive the engine. As the engine speeds up and the governor comes into action the piston will raise gradually cutting off at its lower end the supply of steam until under some circumstances the piston might be moved clear up to completely close the steam passage. There is, of course, a certain amount of leakage of steam both up and down along the valve. This is resisted to a certain extent by the condensation grooves. This steam may pass around into the cylindrical chamber either above or below the valve and once there will pass up or down along the inside of the valve along the valve stem. It cannot get out at the top because the bearing there is closed. It may escape at the bottom along the long valve stem bearing though since this is a snug fit and well oiled not much steam will leak through here. The steam, of course, can get up to the upper end of the valve stem and exert a downward pressure on that end. The pressures are balanced on either end of the valve itself and also between the two enlarged ends so that the valve is balanced all except the cross sectional area of the valve stem and this is not balanced but is so small as to be easily compensated for in the governor by the adjustment of the governor spring.

The valve assembly may be taken down by unscrewing the nut at the lower end of the valve stem, unscrewing the cap at the upper end of the socket and lifting out the valve driving out the sleeve from the lower end of the valve, withdrawing the valve stem and collar and then driving the collar off the stem. The parts are all preferably made driving fit so that they may be assembled or disassembled on the road.

I claim:

1. The combination with a hollow piston valve of a valve stem passing therethrough and projecting from either end thereof, said stem being smaller in diameter than the inside of the valve and being loosely held in position therein.

2. The combination with a hollow piston valve of a valve stem loosely mounted therein, a pocket within the valve, a collar on the stem located within said pocket and the sleeve holding said collar in said pocket.

3. The combination with a hollow piston valve of a valve stem loosely mounted there-

in, a pocket within the valve, a collar on the stem located within said pocket and the sleeve holding said collar in said pocket, said stem being held by said sleeve and collar against longitudinal motion with respect to the valve, but free to move laterally with respect thereto.

4. The combination with a hollow piston valve of a valve stem passing therethrough and projecting from either end thereof, said stem being smaller in diameter than the inside of the valve and being loosely held in position therein, said collar being serrated at either end to permit passage of steam through the valve along the valve stem.

5. The combination with a hollow piston valve of a valve stem loosely mounted therein, a pocket within the valve, a collar on the stem located within said pocket and the sleeve holding said collar in said pocket, said collar being serrated at either end to permit passage of steam through the valve along the valve stem.

6. The combination with a hollow piston valve of a valve stem loosely mounted therein, a pocket within the valve, a collar on the stem located within said pocket and the sleeve holding said collar in said pocket, said stem being held by said sleeve and collar against longitudinal motion with respect to the valve, but free to move laterally with respect thereto, said collar being serrated at either end to permit passage of steam through the valve along the valve stem.

7. The combination with a cylindrical valve seat of intake and discharge ports communicating therewith and arranged along the axis thereof, a piston valve having enlarged ends in slidable engagement with said valve seat and reduced at its center, said ends being located normally one on either side of said ports and means for reciprocating the piston valve to control said ports.

8. The combination with a piston valve and housing of a removable valve socket in the housing having a cylindrical valve seat therein containing the piston valve, said socket and seat being open at one end, a removable cap closing the open end of the valve seat and mounted on the socket.

9. The combination with a piston valve and housing of a removable valve socket in the housing having a cylindrical valve seat therein containing the piston valve, said socket and seat being open at one end, a removable cap closing the open end of the valve seat and mounted on the socket, a valve stem free to move laterally with respect to the piston valve and projecting therethrough.

10. The combination with a piston valve of a valve socket having a cylindrical valve seat therein containing the piston valve, said socket and seat being open at one end, a removable cap closing the open end of the valve seat and mounted on the socket, a valve stem free to move laterally with respect to the piston valve and projecting therethrough, a bearing in the socket and in the cap for said stem.

11. The combination with a valve socket of a housing, a pocket therein in which the socket is contained, a cap screw-threaded on the end of the socket, a valve contained within the socket and held in position by the cap, a screw-threaded cap to close the open end of the pocket, and a spring interposed between said caps.

12. The combination with a valve socket of a housing, a pocket therein in which the socket is contained, a cap screw-threaded on the end of the socket, a valve contained within the socket and held in position by the cap, a screw-threaded cap to close the open end of the pocket, and a spring interposed between said caps, both of said caps having right-hand screw threads, the spring itself being a left-hand spiral spring.

13. The combination with a hollow piston valve having a reduced central portion of a cylindrical valve seat therefor, said seat being open at one end, a removable cap closing said open end, a valve stem loosely mounted in the valve, and a loose guiding bearing at the end of the cap, a loose guiding bearing below the valve seat for the stem, and a free passageway through the valve along said stem from one end of the valve to the other, intake and exhaust passages communicating with said valve seat adapted to be controlled by the valve.

In testimony whereof, I affix my signature in the presence of two witnesses this 18th day of June, 1915.

CHARLES W. DAKE.

Witnesses:
BESSIE S. RICE,
MINNIE M. LINDENAU.