E. DE H. CALDWELL.

THROTTLE VALVE.

APPLICATION FILED SEPT. 9, 1907.

952,508.

Patented Mar. 22, 1910.

Fig. 1.

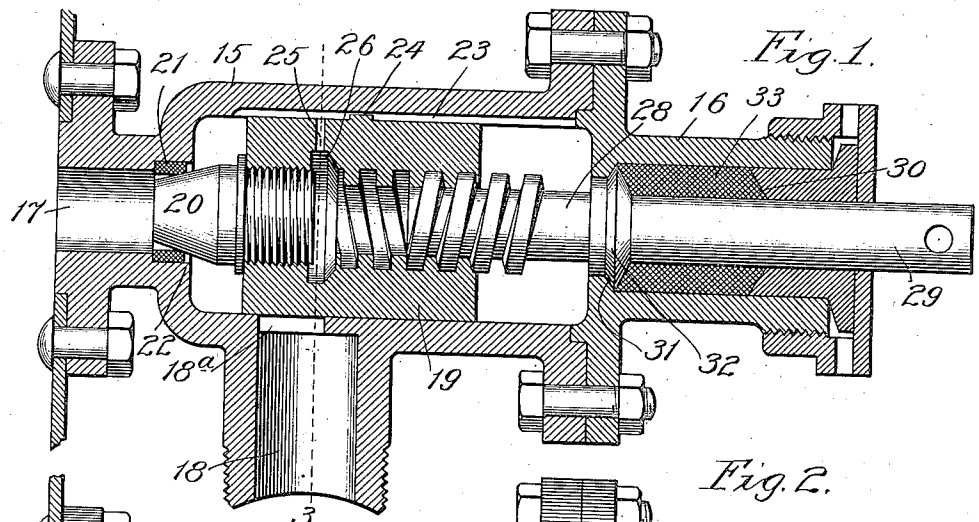


Fig. 2.

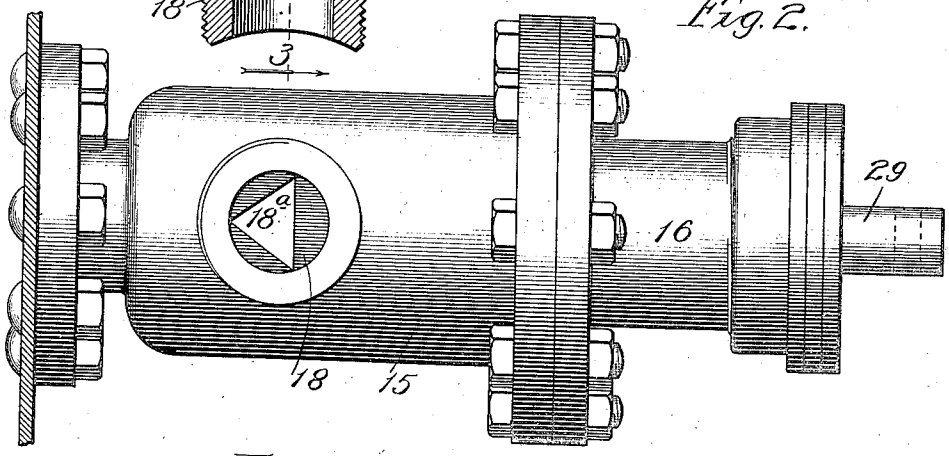
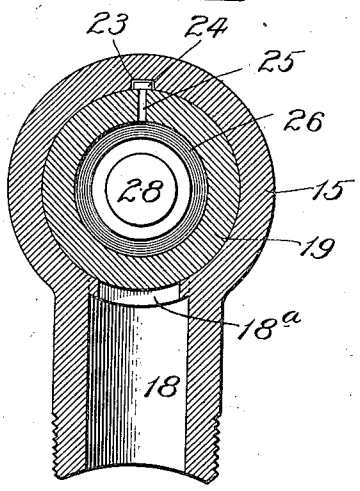


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWIN DE H. CALDWELL, OF ST. CHARLES, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WEBB JAY MOTOR COMPANY, A CORPORATION OF MAINE.

THROTTLE-VALVE.

952,508. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed September 9, 1907. Serial No. 391,955.

To all whom it may concern:

Be it known that I, EDWIN DE H. CALDWELL, a citizen of the United States, residing at St. Charles, in the county of Kane and State of Illinois, have invented certain new and useful Improvements in Throttle-Valves, of which the following is a specification.

My invention relates to throttle valves for elastic fluid motors, one feature being a double closure by which greater accuracy of adjustment may be obtained.

Another feature of my invention comprises means for balancing the pressure on the movable member of the valve.

Another feature of the invention lies in a removable valve seat.

These and various other objects of my invention will be apparent in the following specification and claims.

Referring to the drawings—Figure 1 represents a longitudinal section of my improved throttle valve; Fig. 2 is a side elevation thereof; and Fig. 3 is a section on the line 3-3 of Fig. 1 looking in the direction of the arrow.

The cylindrical valve casing 15 is closed at one end by a removable head 16 and at the opposite end has an opening 17 which forms a part of the pressure fluid conduit. Another opening from the cylindrical chamber is afforded by the nipple 18. This connects by a V-shaped opening 18^a, which has its point or apex directed to the left as is clearly shown in Fig. 2. Within the said chamber is a reciprocating member 19 with a puppet valve member 20 rigidly attached thereto. The ring 21 is fitted into the countersink 22 in the opening 17 and constitutes a seat for the valve member 20.

A longitudinal groove or slot 23 is cut in the side wall of the chamber 15 and the projection or tongue 24 from the reciprocating member 19 extends into said slot. A branch passage 25 is cut through the reciprocating member 19 from the said slot 23 to the chamber 26. The reciprocating member 19 has a screw-threaded socket, as shown, and the chamber 26, just referred to, is at the bottom of the socket. An operating stem 29 extends through the outside into the cylindrical chamber and terminates in a screw-threaded portion 28, which coacts with the socket in the reciprocating member 19. The stem 29 is surrounded by a packing gland 30 and carries an opposed shoulder 32 which rests upon the cylinder head opening 31. Packing 33 is interposed between the gland 30 and the shoulder 32.

The drawings illustrate the throttle valve in closed position. When it is desired to open it the stem 29 is rotated by any convenient means and thus the reciprocating member 19 is drawn to the right. The puppet valve member 20 thus recedes from its valve seat 21 and opens the passage 17. After this the apex of the V-shaped opening 27 is uncovered, this permitting a very restricted flow of pressure fluid. Further movement of the reciprocating member 19 by means of the operating stem 29 will increase the uncovered area at 18^a to any extent desired. It will be seen that a very fine adjustment of opening may be secured by means of the sliding member 19 coacting with the V-shaped opening 18^a, but that an absolutely tight closure is obtained between the members 20 and 21.

To prevent the reciprocating member 19 from rotating, the tongue and slot structure 24 and 23 is provided, and to secure a perfect balancing of the elastic fluid pressure on the reciprocating member 19, the branch passage 25 is provided. It will be noted that the tongue 24 fits loosely in the slot 23 and thus the right-hand end of the cylindrical chamber 15, as well as the cavity 26 are subjected to the same pressure as that in the left-hand end of the cylindrical chamber 15, and the reciprocating member 19 is balanced.

The valve seat 21 has an internal diameter slightly less than that of the conduit 17 so that it presents a projecting shoulder by which it may readily be removed, by being driven into the chamber 15. Moreover, the axial thickness of the ring seat 21 is less than the depth of the countersink in which it is fitted so that a shoulder 22 stands over the ring, and may be beaded down upon it to hold it in place.

By forcing the gland 30 down upon the packing 33, the shoulder 32 is held tightly down on the seat 31 and thus the valve stem is packed and at the same time held definitely against a reciprocatory movement.

I find that the V-shaped opening 18ª should preferably be an equilateral triangle, for this gives the best relation between the position of the valve and the speed of the motor controlled thereby.

In the following claims I employ the term puppet valve in a broad sense to include a taper or pin valve, and to distinguish from a valve which slides or rotates.

I claim:

1. A throttle valve comprising a cylindrical chamber, an end opening and a side opening therefor, and a reciprocatory member within the chamber adapted to seat from within on the end opening and to slide over the side opening.

2. A throttle valve comprising a cylindrical chamber, an end opening and a V-shaped side opening therefor, and a reciprocating member within the chamber adapted to seat from within on the end opening and to slide over the side opening.

3. A throttle valve comprising a cylindrical chamber, an end opening therefor, a reciprocating member within the chamber adapted to seat from within on the end opening, a longitudinal slot in the cylinder wall, and a projection from the reciprocating member into the slot.

4. A throttle valve comprising a cylindrical chamber, an end opening therefor, a reciprocating member within the chamber adapted to seat on the end opening, and passages from the end of the chamber adjacent to said end opening to the other end, whereby said other end is subjected over its entire area to the same pressure as that adjacent to said end opening.

5. A throttle valve comprising a cylindrical chamber, an end opening therefor, a reciprocating member within the chamber adapted to seat on the end opening, a stem extending into the end of the chamber opposite said end opening and engaging the reciprocating member, and a passage to conduct pressure fluid from the region of the end opening to act between the reciprocating member and the stem.

6. A throttle valve comprising a cylindrical chamber, an end opening therefor, a reciprocating member within the chamber adapted to seat on the end opening, an internally screw-threaded socket in the opposite end of the reciprocating member, a coacting externally screw-threaded stem projecting into the socket, and a passage from the socket to the region adjacent the said end opening.

7. A throttle valve comprising a cylindrical chamber, an end opening therefor, a reciprocating member within the chamber adapted to seat on the end opening, a longitudinal slot in the cylinder wall, a socket in the opposite end of the reciprocating member, and a passage through the reciprocating member from the slot to the socket.

8. In a throttle valve of the puppet type, a valve chamber, a countersunk conduit leading therefrom, and a ring valve seat in the countersink having its axial thickness less than the depth of the countersink.

9. In a throttle valve of the puppet type, a valve chamber, a countersunk conduit leading therefrom, a ring valve seat in the countersink having its internal diameter less than the normal diameter of the conduit, and having its axial thickness less than the depth of the countersink.

10. In a throttle valve, a cylindrical chamber, a reciprocating member therein, a rotatable stem extending through the cylinder head and operatively connected to the reciprocating member, a shoulder on said stem seated against the cylinder head, packing about the stem beyond the shoulder, and means extending from the cylinder to press the packing and the shoulder against the cylinder head.

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Witnesses:

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