Nov. 7, 1933. G. KUWADA 1,933,740

MECHANISM FOR OPENING AND CLOSING VALVES

Filed Dec. 2, 1932

Fig. 1,

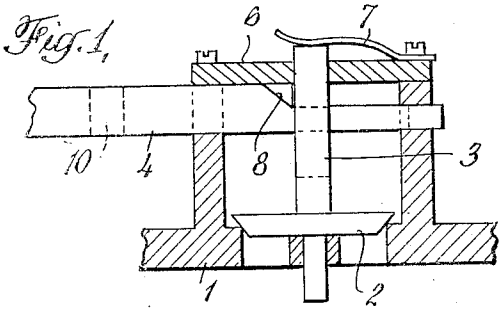


Fig. 4,

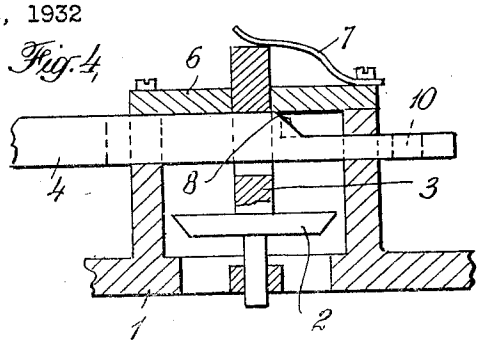


Fig. 2

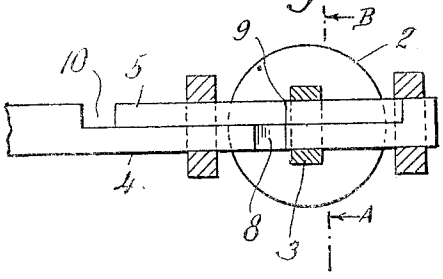


Fig. 5,

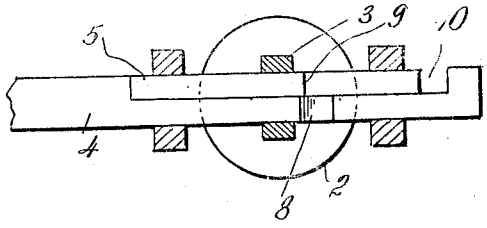


Fig. 6

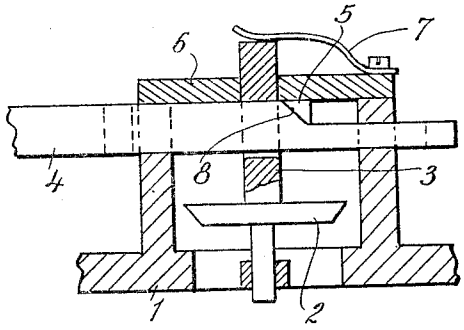


Fig. 3,

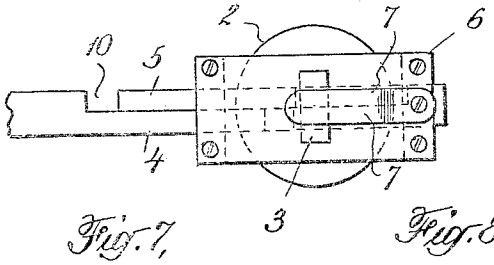


Fig. 7,

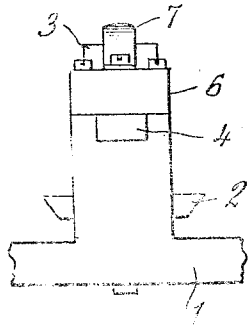


Fig. 8,

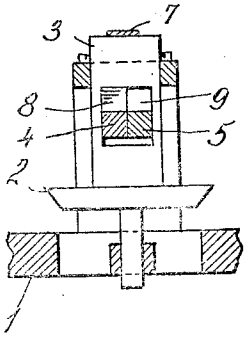


Fig. 9.

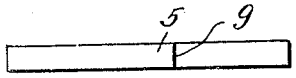


Fig. 10

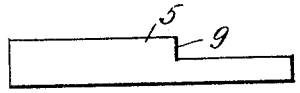
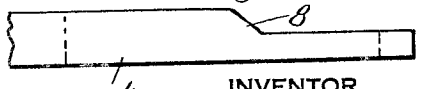


Fig. 11,



Fig. 12.



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MECHANISM FOR OPENING AND CLOSING VALVES

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Application December 2, 1932, Serial No. 645,335, and in Japan June 27, 1932

2 Claims. (Cl. 251—39)

My invention relates to a mechanism for opening and closing of a throttle valve, in such a way that while opening may be done gradually, closing may be performed either instantaneously or in a period much more rapidly than while opening.

In the accompanying drawing.

Figs. 1, 4 and 6 are vertical sections of the valve mechanism.

Figs. 2 and 5 are horizontal sections of the valve mechanism.

Fig. 3 is a plan of the valve mechanism.

Fig. 7 is a side elevation of the valve mechanism.

Fig. 8 is a vertical section on the line A—B of Fig. 2.

Figs. 9 and 11 are plans of the keys for moving the valve.

Figs. 10 and 12 are side elevations of the keys for moving the valve.

Referring to the drawing,

1 is the valve seat, 2 is the valve, 3 is the valve stem by means of which the valve is lifted off its seat, 4 is the key or bar for lifting the valve stem, 5 is the key or bar for letting the valve down to its seat, 6 are the brackets for guiding the keys 4 and 5, 7 is the spring for pressing the valve stem down to seat the valve, 8 is the sloping wall on the key 4 for the purpose of gradually lifting the valve, 9 is the wall on the key 5 for rapidly letting the valve down to its seat, 10 is a space provided for the longitudinal play of the key 5.

In all above figures the members marked are the same for the identical parts of the mechanism.

The working of this mechanism is as follows, when either by hand manipulation or by mechanical means operating with the machinery, of which the valve may be a part, the key 4 as shown in Figs. 1 and 2 is shifted longitudinally and the sloping wall 8 comes into contact with the wall of the aperture in the valve stem 3 through which the key passes, this sloping wall lifts the valve gradually as the key 4 proceeds until the valve stem is lifted up and the valve opened as shown in Figs. 4 and 5. In Fig. 5, there is shown how the key 4 in advancing had pushed the key 5 and the clearance 10 appears at the forward end of the key 4.

On the return stroke of the key 4 it leaves behind the key 5 as much as is allowed by the clearance 10 and the relative positions of the keys 4 and 5 appear as shown in Fig. 6. While the key 4 proceeds backwards the valve stem rides yet on the key 5 till the wall 9 allows the stem to drop under the action of the spring 7 thereby closing the valve 2 on its seat 1.

And at the end of the return stroke the keys 4 and 5 assume their former positions as shown in Figs. 1 and 2. Now the sloping wall 8 of the key 4 may be made to any desired degree according to the speed at which the valve is to be opened.

Likewise the wall 9 of the key 5 may be made either an abrupt drop in one step or by two steps, by the latter of which the seating of the valve may be brought about more quietly if so desired.

As described above and illustrated by the accompanying drawing my invention is of most useful application.

Having thus described my invention what I claim is:

1. In a valve device to open gradually and to close instantaneously, a mechanism consisting of a valve seat surrounding an opening, brackets at the sides thereof, a valve and valve stem, and two sliding members, one of which is travellable and provided with a notch-cut forming a sloping wall at one end of the notch graded in the direction of travel of the said member and the other being provided with a notch-cut forming at one end of the notch a wall at right angles to the direction of travel of the said member, the first named member being provided with a notch cut in its side and intermediate its ends to contain in said notch, the second named member, the length of the notch being longer than said second named member by such amount as to allow a clearance for the latter member in the notch in the side of said first named member, said sliding members passing through an aperture in said valve stem and supported by said brackets in such a manner that, as the members are caused to move forward, the sloping wall on the first named member acts to lift the valve stem, and consequently lift the valve gradually off its seat.

2. In a valve to open gradually and close instantaneously, a mechanism comprising a valve seat surrounding an opening and brackets at the sides of said seat, a valve and valve stem, two sliding bars one of which is provided with a notch forming a sloping wall at one end of the notch graded in the direction of travel of the said bar, and the other bar being provided with a notch forming at one end of the notch a wall at right angles to the direction of travel of said bar, the first named bar being provided with a notch cut in its side and intermediate its ends to contain in said notch, the second named bar, the length

of the notch being longer than said second named bar by such amount as to allow a clearance for the latter bar in the notch in the side of said first named bar, said sliding bars passing through an aperture in said valve stem and supported by said brackets in such a manner that, as the bars are caused to move forward, the sloping wall on the first named bar acts to lift the valve stem, and consequently lift the valve gradually off its seat, while the sliding bar with the wall formed at right angles to the direction of travel lags behind by so much as the clearance so provided allows and brings about no action on the movement of the valve, also that as the bars are caused to move back the sliding bar with the wall formed at right angles to the direction of travel again lags behind as on forward movement of the bars but in the opposite direction, so that the load of the valve is relieved from the bar with the sloping wall and becomes borne by the sliding bar with the wall formed at right angle to the direction of travel, and so soon as the edge of the said wall passes out of the aperture of the valve stem it allows the valve stem to return to its former position and the valve to become seated on the valve seat.

GOMPEI KUWADA.