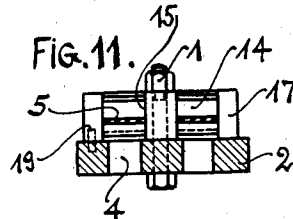
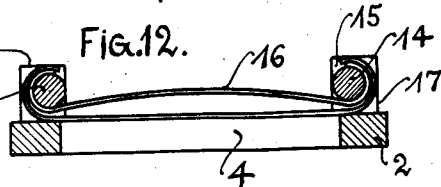
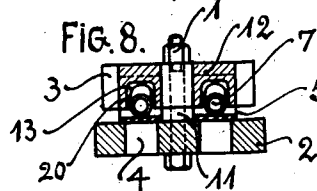
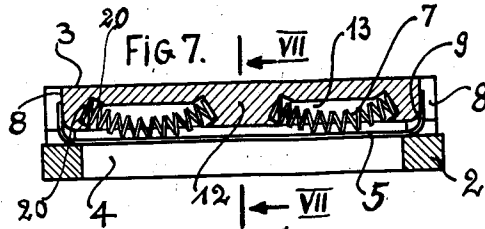
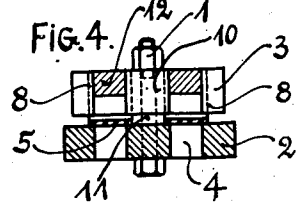
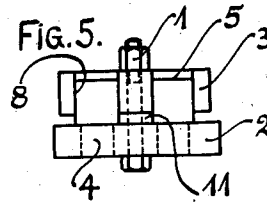
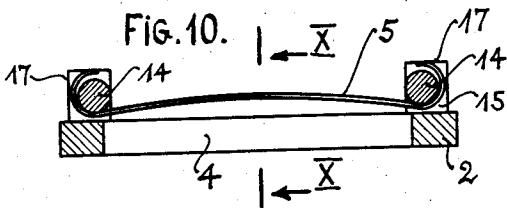
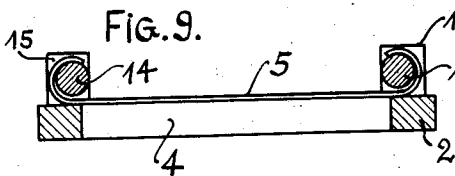
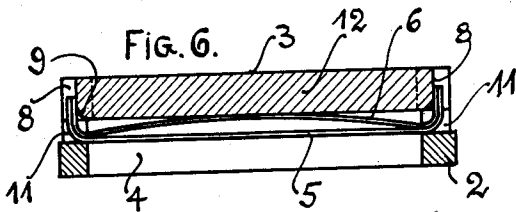
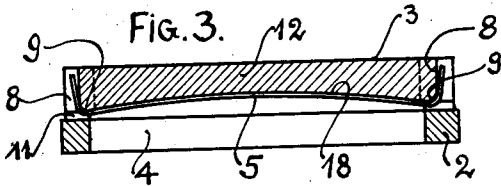
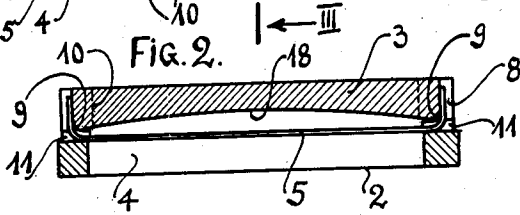
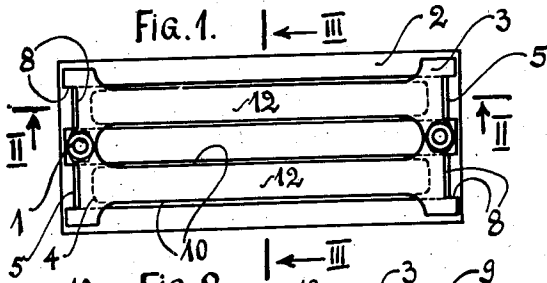


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AUTOMATIC PLATE VALVE

Filed Dec. 8, 1919



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AUTOMATIC PLATE VALVE.

Application filed December 8, 1919. Serial No. 343,379.

My invention relates to automatic plate valves, in which the valve plate consists of a simple strip-shaped plate or ribbon of constant section and shaped ends which lie extended on the valve seat, is weakened neither by holes nor slots, and is opened by the flowing medium and closed by its own elasticity or by means of a spring or springs pressing on the plate.

10 In ordinary plate valves of this type the strip-shaped plate is either attached at one end and the other end is movable longitudinally to enable the plate to bend upward, or the valve strip is unattached and the
15 strip bends upward unrestrained, the valve strip being guided in slots and recesses formed in the valve seat and the cap or arrester. In such valves, when moving, one end of the valve plate or both bear down
20 on the valve seat supporting themselves on a thin line or on an edge. In some cases the strip-shaped plate is lifted bodily and squarely from the seat either with or without bending and guided together with a
25 superposed flat section bow spring in a flow hole drilled in the arrester at the end of the plate.

These and similar methods of bending and guiding the strip-shaped valve plate have
30 the drawback that no substantially dimensioned surfaces are provided at the places of contact of the moving valve strip and the seat or the cap. The contact between the valve strip and the seat, the cap or the guide
35 is merely on a thin line or on an edge and in some cases there may be wear by friction and scraping especially if accelerated by the effect of grit and dirt accumulating in the guiding recesses and slots.

40 The object of my invention is to provide a plate valve to which the above described defects are not attached and which can be of two forms so as to act in two ways. First, by being, on opening, partways lifted
45 off its seat, then bent upward on a uniform bending line by the flowing medium so as not to bear its ends on the valve seat for support; on closing, by being straightened up on release of the bending pressure and
50 being finally seated by the vibratory swinging motion resulting at the end of the straightening movement of the valve strip. Second, by being lifted bodily and equally by the flowing medium throughout its entire
55 length and closed by means of either

a flat section bow spring or any adaptable spring.

For this purpose I mount the valve plate on the valve seat so that, by its upturned ends, it is suspended, and sidewise and
60 lengthwise guided in open rectangular stalls formed in the cap or arrester, or in a conveniently shaped holder attached to the seat, and so that it moves snugly within the desired limits, being supported on large bearing
65 surfaces at all sides; the upturned ends of the valve plates may be resilient or rigid.

Further purposes of my invention will appear in the specification and are specifically pointed out in the accompanying claims.
70 Referring to the drawings, in which like parts are similarly designated:—

Figure 1 is a plan view of an assembled valve; Figure 2 is a section of Figure 1 on the line II—II showing the closed position
75 of a single strip valve and the arched cap section; Figure 3 is a section of Figure 1 on the line II—II showing the open position of a single strip valve and the arched cap section; Figure 4 is a section of Figure 1
80 on the line III—III; Figure 5 is an end view of Figure 1; Figure 6 shows a longitudinal section through a valve with a superposed bow spring and straight cap section; Figure 7 shows a longitudinal section
85 through another form of single strip valve with backing springs imbedded in the straight cap section; Figure 8 shows a transverse section of Figure 7 on the line VII—VII; Figure 9 is a longitudinal section of a modified
90 single strip valve in closed position with endwise pivotal holders and without cap; Figure 10 shows the same valve as in Figure 9 but in flexed, open position; Figure
95 11 is a transverse section of Figure 10 on the line X—X; Figure 12 is a modified form of the valve shown in Figures 9, 10 and 11 and shows an elastic, arched bolster in place of the cap and the valve strip in closed position.
100

In Figures 1, 2, 3, 4 and 5 I have shown ribbon valves 5 housed between the seat 2 and the arched cap section 3. The ends of the valve plates 5 are bent upward at an angle of about 90 degrees with an ample
105 bending radius at the corners. The upturned ends of the valve strip are guided longitudinally, transversely and vertically in open stalls 8 formed in the cap section and which have their corners 9 rounded so as
110

to correspond with the curvature of the ends of the valve strips 5. Guided in the manner shown, the valve plates 5 are kept in proper working position over the flow slots 4 located in the seat 2, opening and closing between the flow passages 10 formed in the cap 3 in parallel but staggered arrangement to the port slots 4. It will be observed that the cap 3 is kept at a certain distance from the seat 2 by means of distance rings 11 so that the valve strip 5 is lifted parallel off its seat until it strikes against the rounded corners 9 and then only bends uniformly into the bow 18 of the arched wall section 12. The position shown in Figure 3 shows that, when open, the valve strip 5 does not touch the seat but is held up by the fluid pressure and clings to the curvature 18 of the cap 3, its upturned ends oscillating slightly, with the bending of the plate 5, being embraced and guided within the walls of the open stall 8. When closing the valve plate returns first to the straight flat position and by force of its inertia swings toward the seat with its center part and closes finally with a gliding motion starting from the center and seating without return action known as "chattering". As thus housed between the cap and the seat, the valve plate is so guided that there is no edge or thin line contact of the valve plate with the seat such as would cause scraping. There is no recess or corner to accumulate any matter liable to cause obstruction and the gas flows both in an upward and sideways direction away from the flow slots 4, unhindered by side walls or recesses.

In Figure 6 I have shown a valve strip 5 with upturned ends and an interposed flat section bow spring 6 having its ends turned upward in the same manner as the valve strip 5 but so dimensioned that the spring 6 is located within the upturned ends of the valve plate 5, the curvatures of the stall corners 9 and of the ends of the bow spring 6 and the plate 5 being amply dimensioned and fitting into each other with enough play between them so that no strain results from the elongation of the spring 6 when in the straight flat position. The cap 3 is kept at the desired distance from the seat 2 by distance rings 11 and held together with bolts in the same manner as shown in Figures 1 to 5. The valve plate 5 and its seating spring 6 are both guided in three directions by means of the upturned ends fitting into the open stalls 8 of the cap 3. There is no contact on an edge or a thin line. Obviously the upturned ends of the plate 5 and the spring 6 keep the member on which they are formed from tilting at all times, thus making the valve plate independent of the flat bow spring to keep it from tilting. In the case of the Figure 6 the valve plates 5 may be so thin as to bend when opening and

the spring 6 may be so dimensioned as to bend only enough so as to keep the ends of the plate 5 away from the seat when in open position or the principal bending may be done by the spring.

The valve shown in Figures 7 and 8 comprises the use of backing springs 7 which are imbedded in trenchlike grooves 13 with adjacent recesses 20 located in the wall section 12 of the cap 3. These springs are of the same type and are here used for the same purpose as I have shown and claimed in my Patent No. 1,343,534. The valve strip 5 is guided with its upturned ends in the open stalls 8. In opening the valve 5 is lifted squarely and equally along its entire length off its seat 2 over the flow slot 4, gliding on substantial surfaces. During the opening movement the helical springs 7 retreat into the trenchlike grooves 13. Kinking and tilting is effectually prevented by the sidewise guidance of the upturned ends in the open stalls 8 and as there is no contact on a scraping edge or on a thin line the guiding effectively prevents catching of the plates, making the valve especially valuable for high speed operation above 200 revolutions per minute.

In the foregoing Figures 6, 7 and 8, both the seat section 2 and the cap section 3 have their passage slots 4 and 10 respectively terminating in plane surfaces which are kept at a certain distance from each other by the rings 11 to afford an adequate lift to the valve plates 5. There are no guiding recesses, chambers or drilled flow passages on any of the parts of the valves under this invention. All parts are or may be simple castings easily manufactured by the simplest machining processes and affording the most ready and easy passage for the flowing medium all around the valve plate in upward and sideward direction. Furthermore it is observed that in all valves shown in Figures 1 to 8 the assembling is facilitated to a large degree as the valve strips 5 are readily placed into the open stalls 8 of the cap 3 then the seat 2 is easily located in the right position on top and the whole, the rings 11 being interposed, clamped together with the bolts 1. This facility in assembling is especially desirable when adjustments are made outside of the producing workshop and where no special assembling tools or fixtures are procurable.

The valve shown in Figures 9, 10 and 11 has its ends turned upward and bent to an approximate circular shape fitting around pivots or arbors 14 located near the ends of the flow slots 4 of the seat 2. The pivots 14 are conveniently formed by turning them into a rectangular guard 17 made of steel or other appropriate material of somewhat larger side dimension than the diameter of the pivot so that by turning the pivot from

the full material, side surfaces 15 are formed which serve to guide the ends of the plates 5 as in open stalls in the same manner as shown in the preceding figures. The distance of the lowest point of the pivot from the seat is so dimensioned as to allow freedom of action and afford a certain initial lift to the valve plate 5. When open the valve plate is unrestricted by a cap, merely being held by the ends fitting around the pivots 14. In shaping the ends of the valve plate to fit the pivots a double curvature is given them to allow for a small initial lift which keeps the valve, when open, from contact with the seat. When closed the upper part of the pivot 14 contacts with the valve plate, when open, the lower part of 14 contacts with the valve plate, the ends of which are tightly pressed against the pivot by the fluid pressure. In all positions the valve strip 5 is sidewise and lengthwise guided by the side surfaces 15 and by the pivots 14.

In Figure 12 I show a valve strip 5 that is mounted in a similar manner as the one in Figures 9 and 10 but with an elastic bolster or keeper 16 interposed between the valve strip 5 and the pivots 14. The bolster 16 is shaped like a bow and its ends cling snugly around the pivots 14. It is made of a resilient but stronger material than the valve plate so as to yield only slightly when the open valve strip 5 presses against it. The ends of the valve plate 5 are shaped around the outer diameter of the ends of the bolster 16, a double curvature being given to the ends to afford them freedom of action in lifting the valve strip initially to keep it from contact with the seat when moving.

Also in the valves shown in Figures 9, 10, 11 and 12 assembling is very simple as the shaped ends of the plates 5 are readily placed around the arbors 14 which are then bolted to the seat 2 by means of bolts 1 and kept in position by dowels 19.

In all cases illustrated in the figures it is observed that in plate or ribbon valves according to this invention the egress of the fluid is greatly facilitated and proceeds to all sides of the valve plate with practically equal velocity there being no recesses, side walls or enclosed chambers forcing an abrupt stop or change of direction of the fluid. The absence of side walls and the fact that the fluid can escape to all sides in upward and sideward direction effectually prevents wire-drawing and its undesirable reaction on the valve plate.

The arrangement of the elastic valve plates and springs obviously may vary from the types shown in the different figures. The valve plate may bend on a uniform bending line or be lifted equally and parallel off its seat within the broader features of the invention. Seating springs of the type shown, or additional or different springs, may be

used, but it is desirable that in all cases the plates are guided by their shaped ends and that there is no contact on an edge or a thin line between the valve plates and the seat, and it will be understood that various changes, substitutions and modifications may be made in size and arrangement of the parts without departing from the invention as specified in the following claims.

I claim:

1. A plate or ribbon valve, comprising a seating section and a cap section, said sections being secured together with an open space between their opposite faces, flow slots formed in each of said sections, strip-shaped valve plates having upturned ends and being adapted to close the flow slots in said seating section, said valve plates being free to lift bodily, and longitudinal and transverse guiding faces guiding the said valve plates by embracing their upturned ends and keeping the said valve plates from edge contact with the seat section.
2. A plate or ribbon valve comprising a ported seating section, a cap section secured to said seating section, a valve plate having its ends turned away from the seating section and moving in an open space terminating in open rectangular slots at the ends of the cap section at a distance from the seating section to allow the valve plate to freely bend in the center with its ends out of contact with the valve seat.
3. A plate or ribbon valve comprising a ported seating section, a cap section secured to said seating section with an open space between them, a valve plate having its ends turned away from the said seating section and moving in an open space terminating in open rectangular slots at the ends of the cap section shaped to guide the said valve plate over its port and allow the ends of the valve plate to oscillate when the valve plate bends.
4. A plate or ribbon valve comprising a seating section and a cap section spaced apart, a port in said seating section, a strip-shaped spring pressed valve plate disposed between said sections closing said port having its ends turned away from said seating section and embraced by open rectangular guide slots formed at the ends of said cap section.
5. A plate or ribbon valve comprising a seating section and a cap section spaced apart, a port in said seating section, a strip-shaped valve plate and superposed flat section bow spring both having their ends in contact and turned away from said seating section and embraced by open rectangular guide slots formed at the ends of said cap section.
6. The combination with a valve seat having one or more ports, of a thin elastic plate

for each port free to lift and bend uniformly to open and close the port and having its ends bent away from the valve seat to avoid an edge in contact with the seat, and an
5 abutment for the valve having curved surfaces coacting with curved portions joining the valve and its bent ends in the bending movement of the valve.

7. The combination with a valve seat having one or more ports, of a thin elastic plate
10 for each port free to lift and bend uniformly to open and close the port and having its

ends bent away from the valve seat to avoid an edge in contact with the seat, and an
15 abutment for the valve having curved surfaces coacting with curved portions joining the valve and its bent ends in the bending movement of the valve, said abutment being separated from the seat to allow the latter to lift bodily for bending with its ends out
20 of contact with the seat.

In testimony whereof I have hereunto set my hand.

JOHANN HEINRICH HERMANN VOSS.