Nov. 15, 1949 G. E. FRANCK 2,488,283

PLUG COCK

Filed Oct. 5, 1946

Fig. 1.

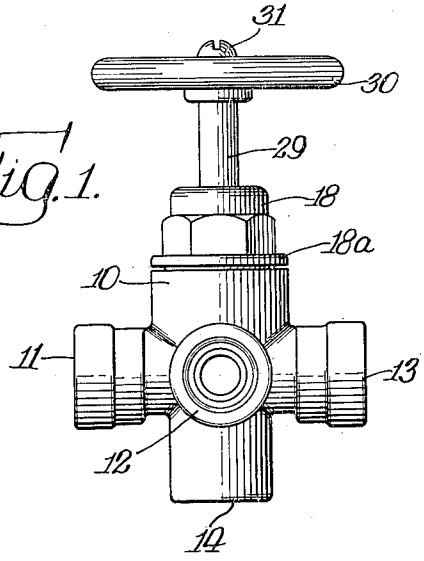



Fig. 3.

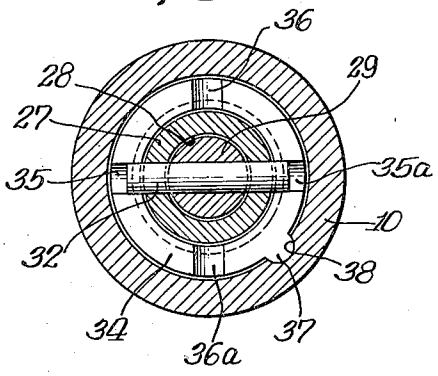



Fig. 2.

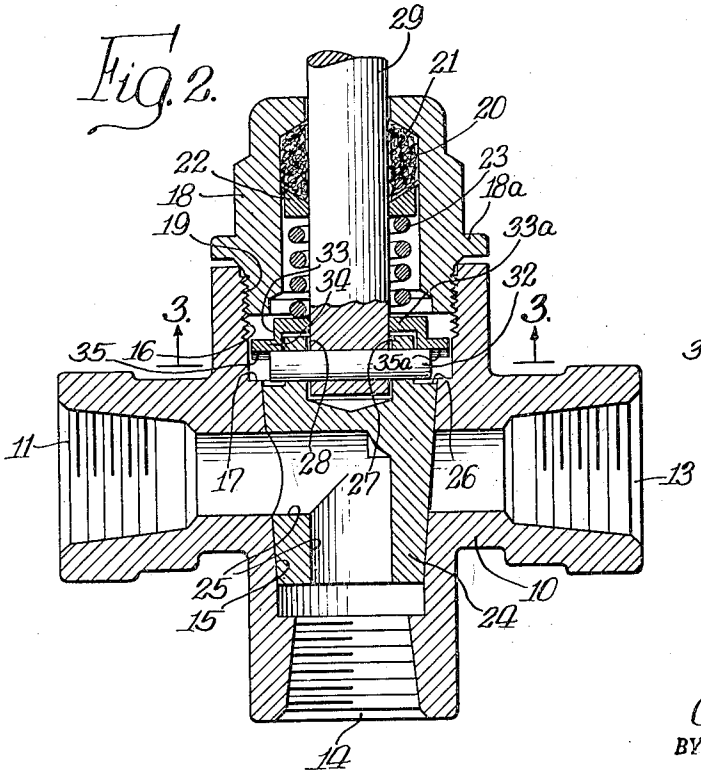
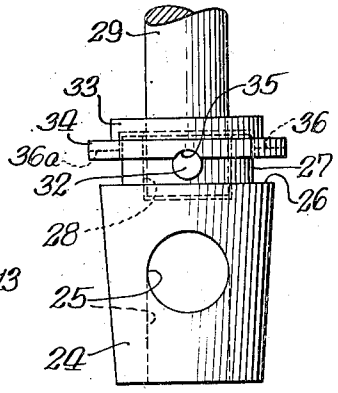



Fig. 4.




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## PLUG COCK

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3 Claims. (Cl. 251—112)

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My invention relates to manually controlled fluid valves, and more particularly to valves commonly designated as plug cocks.

Among the objects of my invention is to provide a new and improved plug cock which is simple and inexpensive, which has all of the working parts concealed within the body of the cock, and which is adapted to selectively connect any one of a plurality of inlet passages with an outlet passage.

Another object is to incorporate into the cock means for indicating when the plug is positioned to connect some one of said inlet passages with the outlet passage, all parts of which are contained within the body, and some of which at the same time comprise a part of the floating connection between the stem and the plug thereby serving a dual purpose and materially reducing the cost.

Another object of my invention is to provide means giving an audible and also a "feel" indication when the plug is in a proper position, this means also tending to cam the plug to proper registry in the event the plug is left somewhat out of registry.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in the claims and illustrated in the accompanying drawings, in which:

Figure 1 is an elevation of a plug cock constructed in accordance with my invention.

Figure 2 is an enlarged diametrical section through the plug cock shown in Figure 1.

Figure 3 is an enlarged transverse section through the plug cock, taken on the line 3—3 of Figure 2.

Figure 4 is a view of the plug and associated parts, looking from the left of Figure 2.

Plug cocks in the past have been widely known and used as a simple and inexpensive means of providing a shut-off device in a fluid line. Their chief function has been in fluid lines where the pressure is relatively low. As a result of their widespread use the field has been highly competitive and has been subject to constant attempts to simplify and reduce the cost of items of this kind to the lowest possible figure, sometimes at the sacrifice of efficiency. Because of the fact that the plug and the stem are customarily fixed together in one piece for the sake of cheapness, considerable trouble has been experienced in

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service due to the fact that a slight misalignment of the stem dislodges the plug from its fit.

It is also necessary in shut-off cocks and valves of this type to provide an indication of the position of the valve, and the means for providing such indication should be easily installed and positive in action. This invention is directed to the purpose of attaining these desirable features, and a portion of the means of obtaining such features are combined so that they serve a double purpose, permitting the device to retain the benefits of both, while keeping the number of individual parts to a minimum.

My invention is particularly directed to a plug cock having a common outlet passage and a plurality of inlet passages, such for example as may be used in a tractor or any other machine which starts on one fuel, as gasoline, and is subsequently switched over to another fuel, as kerosene. In such event it is desirable to selectively connect one of a plurality of inlet passages with a common outlet passage, and it may also be desirable to provide a shut-off position for said plug cock. My improved plug cock provides means for selectively positioning the valve so that communication is obtained between one of a plurality of inlet passages and a common outlet passage, or so that the valve may be completely shut off if desired. Such positioning means give a positive indication of the position of the valve and are simple in construction, a portion of such means being also utilized in securing a floating connection between the valve element and the stem.

Referring now to the drawings a plug cock constructed in accordance with my invention is shown in Figure 1. Said plug cock comprises a body portion 10 having a plurality of inlet passages 11, 12 and 13 and a common outlet passage 14. The inlet passages are each spaced ninety degrees apart around the valve body, and if desired another inlet passage may be provided on the opposite side of the body from the passage 12, or if desired such inlet passage may be omitted in which event such portion of the valve body will act as a shut off to close the valve when it is turned to that position. Of course, it is understood that one or more of the passages 11, 12 or 13 may be capped or plugged to provide additional shut off positions, if desired.

Within the body there is provided a tapered chamber 15 opening into the inlet passages 11, 12 and 13 and the outlet passage 14. Adjacent the large end of this chamber is a threaded enlargement or recess 16 which provides a step

or shoulder 17 between itself and the tapered chamber.

A bonnet 18 is provided with an annular flange 18a below which is a threaded end 19 adapted to be positioned within and engage the threads of the enlargement 16. If desired a gasket (not shown) may be provided between the annular flange 18a of the bonnet and the top of the valve body to insure a fluid-tight seal.

Within the bonnet is a relatively large pocket 20 within which a mass of packing 21 is disposed, a packing ring 22 and a spring 23 holding such packing in place.

Within the tapered chamber 15 there is a valve plug 24, said plug having the same taper as the taper of the chamber, and the plug is fitted snugly within the wall of the chamber and in the course of manufacture is lapped to make a fluid-tight fit. A passage 25 extends axially through the plug from the small end or bottom thereof to a point approximately midway in the plug, where said passage turns at right angles and progresses radially through the plug, terminating in an opening in the wall of the plug, said opening being adapted to register with one of the inlet passages 11, 12 or 13 when the plug is seated in the chamber 15. At its large end the plug is provided with a shoulder 26 and an axially extending flange 27 spaced radially inwardly relative to the adjacent outer periphery of the plug. This flange provides a central pocket 28 which is designed to receive one end of the valve stem 29 with a relatively loose sloppy fit. The stem is provided with a handle 30 secured thereto by means of a screw 31, said handle enabling the valve stem to be turned in either direction.

That portion of the stem within the pocket 28 is further provided with a lateral passage, and the flange 27 is likewise provided with oppositely disposed lateral passages in such position that they can be aligned with the lateral passage in the stem. A pin 32 extends through the lateral passage of the stem and outwardly through the passages in the flange, thereby securing the stem to the plug with a loose floating fit, but at the same time permitting the plug to be rotated by means of the stem and preventing the withdrawal of the stem from the plug. As shown in Figures 2 and 3 the pin 32 extends out beyond the flange 27 on opposite sides thereof.

Loosely mounted upon the stem is a washer 33 having a raised center portion 33a and an annular flange 34, thus providing a well or recess of slightly larger diameter than the flange 27 so that the flange 27 extends into the recess while the flange 34 rides on the extending end portions of the pin 32, the spring 23 acting to press the washer down upon the pin. Two pairs of oppositely disposed notches 35, 35a, 36 and 36a are formed in the underneath valve side of the annular flange 34. These notches are spaced ninety degrees from each other around said annular flange, and are each of a size adapted to receive the ends of the pin 32, which ends project beyond the flange 27. The annular flange 34 is also provided with a lug 37, and the valve body is provided with a niche or detent 38 designed to receive said lug and so positioned that when the washer is within the recess in the valve body and the ends of the pin 32 engage one of the pairs of notches 35 or 36, the opening to the passage 25 will register with one of the inlet openings 11, 12 and 13 or with the portion of the valve body 10 opposite the inlet opening 12. The spring 23 rests against the raised portion 33 of the washer and acts to urge said washer downwardly as shown in Figure 2. Thus it will be seen that such washer is axially movable, but is not rotatable with the valve stem, being non-rotatably fixed by means of the lug 37 and the niche 38.

As the valve stem 29 is turned, the annular flange 34 of the washer will ride upon the projecting portion of the pin 32, and when the pin 32 approaches one of the oppositely disposed pairs of notches, said pin will be yieldably engaged by said notch. As heretofore explained, the parts are so arranged that when this happens one of the inlet passages 11, 12 or 13, or the shut-off portion opposite the inlet passage 12 is in registry with the lateral opening of the passage 25 through the plug 24. Consequently when the pin 32 is engaged by one of the pairs of notches the valve is positioned in one of a plurality of on positions, or is shut off. This construction provides an audible indication of the positioning of the valve, as the spring 23 causes the notches to engage the pin with a distinct clicking sound which may be clearly heard. Furthermore there is a "feel" or contact indication when said valve is positioned, as the spring 23 combines with the notches to frictionally though yieldably hold the projecting ends of the pins within the notches.

A further feature of my improved plug cock is that the notches provide a camming action, for as the pin rides along the annular flange 34 and approaches one of the pairs of notches its proper engagement with said notches is aided by the action of the spring and the sloping sides of the notches. Proper registry of the valve openings is thereby insured.

The pin 32, therefore, serves to hold the valve stem 29 in place and also aids in positioning the valve, and the spring 23 serves to hold the packing 21 in place and also acts to exert pressure on the valve positioning washer, thereby causing an audible indication when the valve is properly positioned, causing a "feel" or contact indication when the valve is in position, and assisting in the camming action in properly positioning the valve.

While the invention is susceptible of various modifications and alternative constructions, it is shown in the drawing and hereinabove described in a preferred embodiment. It is not intended, however, that the invention is to be limited thereby to the specific construction disclosed. On the contrary, it is intended to cover all modifications and alternative constructions, falling within the spirit and scope of the invention as defined by the appended claims.

I claim as my invention:

1. A plug cock comprising a body portion having a tapered chamber with a recess at one end thereof and having a plurality of inlet passages and an outlet passage communicating with the chamber, a bonnet attached to the body closing the recess, a tapered valve element seated in said chamber, said valve element having a passage therethrough adapted selectively to connect said inlet passages with said outlet passage, a stem extending from the chamber through the bonnet, said valve element having an annular axially extending flange forming a central pocket at one end adapted loosely to receive one end of the stem and diametrically opposed radial passages through said flange, said stem having a corresponding diametrical passage, a pin projecting through said passages for loosely securing the stem to the valve element, said pin being rotatable with said stem and having both ends extending

radially outwardly of said flange, a valve positioning means surrounding the stem including a flat washer portion fixed against rotation within said recess but axially movable and bearing on said pin and a cupped portion bearing on said washer portion but clearing said axially extending flange, said washer portion having a plurality of recesses adapted yieldably to engage said pin, and a compression spring surrounding said stem and bearing at its inner end on the cupped portion of said valve positioning means to maintain the washer portion thereof bearing yieldably on said pin and through said pin urging said valve element into the chamber.

2. A plug cock comprising a body portion having a tapered chamber with a recess at one end thereof and having a plurality of inlet passages and an outlet passage communicating with the chamber, a bonnet attached to the body closing the recess, a tapered valve element seated in said chamber, said valve element having a passage therethrough adapted selectively to connect said inlet passages with said outlet passage, a stem extending from the chamber through the bonnet, said valve element having an annular axially extending flange forming a central pocket at one end adapted loosely to receive one end of the stem and diametrically opposed radial passages through said flange, said stem having a corresponding diametrical passage, a pin projecting through said passages for loosely securing the stem to the valve element, said pin being rotatable with said stem and having both ends extending radially outwardly of said flange, a valve positioning member surrounding said stem having a flange portion bearing on said pin and a cupped portion adapted to clear said axially extending flange, said flange portion having a plurality of recesses adapted yieldably to engage said pin, cooperating means on said flange portion and said body portion retaining said washer against rotation while permitting axial movement thereof, and spring means urging said valve positioning member inwardly to maintain the flange portion thereof bearing yieldably on said pin and through said pin urging said valve element into the chamber.



3. A plug cock comprising a body portion having a tapered chamber with a recess at one end thereof and having a plurality of inlet passages and an outlet passage communicating with the chamber, a bonnet attached to the body closing the recess, a tapered valve element seated in said chamber, said valve element having a passage therethrough adapted selectively to connect said inlet passages with said outlet passage, a stem extending from the chamber through the bonnet, said valve element having a central pocket at the valve stem end adapted loosely to receive one end of the stem and diametrically opposed radial passages leading from the pocket, said stem having a corresponding diametrical passage, a pin engaging said passages for loosely securing the stem to the valve element and being rotatable with said stem, a valve positioning means surrounding the stem including a washer-like element fixed against rotation within said recess, said washer-like element having a plurality of rotation limiting means adapted to be engaged by said pin as said valve is rotated, and spring means urging said washer-like element inwardly toward said valve element and through said pin urging said valve element into the chamber.

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