

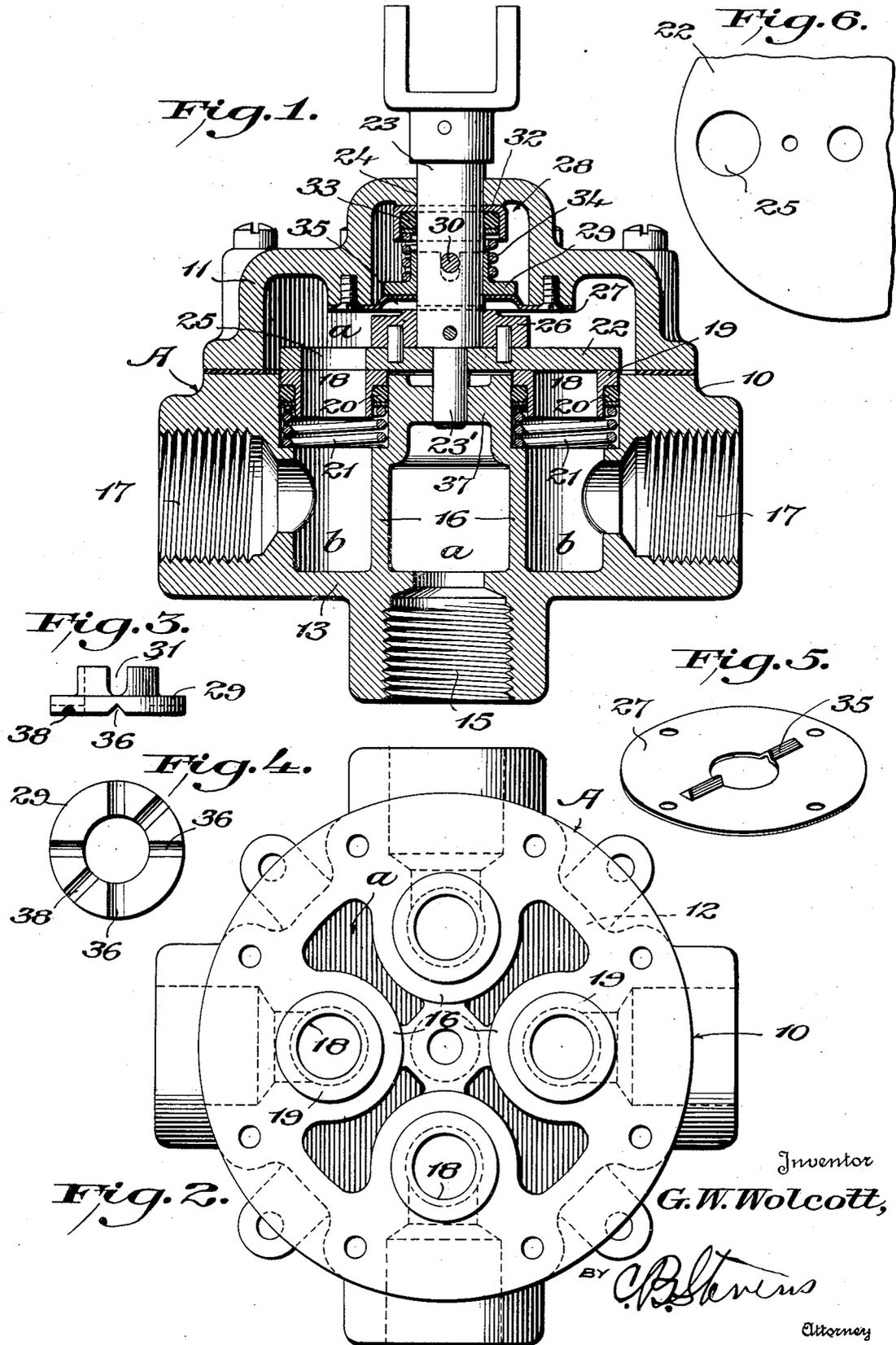
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PLURAL-WAY COCK

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PLURAL-WAY COCK

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1 Claim. (Cl. 251-84)

This invention relates to plural-way cocks, and has particular reference to improvements in plural-way cocks of the type in which a valve of the rotary disk type is employed to control flow of fluid through the cock between the inlet and the outlet openings thereof.

According to the invention, a cock casing including a body and a cover is divided into a main chamber and a plurality of auxiliary chambers which are separate from each other and from said main chamber; each of said chambers has an inlet or outlet opening individual thereto; a valve of the rotary disk type is disposed in the main chamber and is rotatable to establish communication between said main chamber and any one of said auxiliary chambers, and a stem is operatively connected to said valve and extends therefrom through an opening in the cover to the exterior of the casing for rotating said valve.

One special and important object of the invention is to provide, in association with each of the auxiliary chambers, a floating valve seat element which, under the influence of an associated spring, is maintained in tight sealing engagement with the valve disk.

Another special and important object of the invention is to provide, in association with each valve seat element, novel sealing means to prevent any flow of fluid between the related auxiliary chamber and the main chamber except through the rotary disk valve.

Another special and important object of the invention is to provide novel indexing means to assist in obtaining proper adjustments of the rotary disk valve and to releasably maintain said valve in proper adjusted positions.

Another special and important object of the invention is to provide novel means to seal the opening in the cover, through which the valve stem extends, against escape therethrough of fluid from the casing.

Another special and important object of the invention is to provide a cock of the type mentioned which is of simple, compact design, cheap and easy to produce, and thoroughly reliable and efficient in use.

With the foregoing and other objects in view, which will become more fully apparent as the nature of the invention is better understood, the same consists in a plural-way cock embodying the novel features of construction, combination and arrangement of parts as will be hereinafter more fully described, illustrated in the accompanying drawing and defined in the appended claim.

In the accompanying drawing, wherein like characters of reference denote corresponding parts in the different views:

Figure 1 is a central, longitudinal section through a plural-way cock constructed in accordance with one practical embodiment of the invention;

Figure 2 is an end view of the cock with the cover thereof removed;

Figure 3 is a side elevation of the indexing collar of the cock;

Figure 4 is an end elevation of the indexing collar.

Figure 5 is a perspective view of the indexing plate, and

Figure 6 is an end elevation of a portion of the disc valve.

Referring to the drawing in detail, A designates the casing of the present cock which preferably is composed of a body 10 and a removable cover 11 as shown.

The body 10 is closed at its sides, as indicated at 12, and at one end, as indicated at 13, and is open at its other end where it normally is closed by the cover 11, the latter being removably fastened to said body in any suitable manner, as, for example, by means of screws 14 and cooperating with said body, to define a main chamber designated as *a*. In the body 10 and in constant communication with said main chamber *a* is an opening 15 formed to have connected therewith a fluid delivery or supply pipe.

Projecting into the body 10 from the side wall 12 thereof is a plurality of bosses 16 which preferably are coextensive, or approximately coextensive, in length with said body and in each of which is a bore or auxiliary chamber *b* having in constant communication therewith a related opening 17, in said body 10 formed to have connected therewith a related fluid supply or delivery pipe.

The bores or auxiliary chambers *b* open through the ends of the bosses 16 which are nearer the open end of the body 10 and in the outer end portion of each of said bores or auxiliary chambers is loosely fitted, for longitudinal and tilting movements, a tubular valve seat element 18 which is provided, at or adjacent to its outer end, with an outwardly extending annular flange 19.

Surrounding each valve seat element 18 inwardly of its flange 19 and engaging the inner face of said flange as well as the adjacent portion of the side wall of the related bore or auxiliary chamber *b* is a resilient sealing ring 20 of

synthetic rubber or other suitable resilient material which constantly is urged outwardly against said flanges 19 by a coil spring 21. Accordingly, if the valve seat elements 18 are held against outward movement relative to the bores or auxiliary chambers b, the springs 21 serve to compress the sealing rings 20 against the flanges 19 and thereby to effect lateral deformation of said rings inwardly against said valve seat elements and outwardly against the side walls of said bores or auxiliary chambers with the result that effective seals are provided preventing any flow of fluid around the outsides of said valve seat elements between said auxiliary chambers and the main chamber a. At the same time, said seals permit the valve seat elements to move longitudinally and to tilt or, in other words, to float, in the outer end portion of the bore or auxiliary chambers b as aforesaid.

In the chamber a is a valve in the form of a rotary disk 22 which overlies all of the valve seat elements 18 and which is coupled to a stem 23 for rotation by the latter, said stem extending through an opening 24 in the cover 11 to the exterior of the casing A where it is accessible for manual manipulation and where it may be provided with a handle or any other suitable means for effecting its rotation.

The valve seat elements 18 are disposed equal distances radially from a prolongation of the axis of the valve stem 23 and preferably, though not necessarily, are spaced equal angular distances apart. In any event, the valve disk 22 is provided with a single opening 25 which, by rotation of said disk, may be aligned with any one of said valve seat elements to establish communication between any one of the bores or auxiliary chambers b and the main chamber a, and which may be disaligned from all of said valve seat elements to deny communication between any of said bores or auxiliary chambers and said main chamber. Accordingly, the valve 22 provides for establishing communication between any one of the pipes (not shown) connected with the openings 17 and the pipe (not shown) connected with the opening 15, or for denying communication between all of said pipes.

The valve disk 22 is suitably held against outward movement and thereby serves to hold the valve seat elements 18 against outward movement, under the influence of the springs 21, thus insuring compression of the sealing rings 20 by the springs 21. Moreover, the inner face of said valve disk is ground or otherwise smoothly finished and the outer end faces of the valve seat elements 18 also are ground or otherwise smoothly finished and engage flatly against the inner face of the said valve disk under the influence of the springs 21 and due to the floating mounting of said valve seat elements in the outer ends of the bores or auxiliary chambers b, and valve seat elements, seal fluid-tightly against the inner face of said valve disk.

While any suitable means may be provided to hold the valve disk 22 against outward movement, a preferred means for this purpose comprises a suitable abutment on the valve stem 23 engaged by said valve disk and, in turn, engaged with the cover 11 or with a suitable abutment carried by the latter. In this connection and as illustrated in the present instance, a block 26 is pinned to the valve stem 23 and engages a cover-carried abutment in the form of an indexing plate 27 fastened to the cover, whereby both said block and said valve stem are held

against outward movement, and the valve disk 22 engages either side block, or a shoulder on the valve stem, or both said block and a shoulder on the valve stem, whereby said valve disk is held against outward movement. Alternatively, the block 26 may be formed as an integral part of the valve disk 22. Preferably, however, said block and said valve disk are separate from each other and are pinned together to facilitate manufacture and assembly and disassembly of the cock and to provide for rotation of the valve disk by said valve stem.

In the cover 11 in surrounding relationship to the valve stem 23 is a recess 28 across the inner end of which the indexing plate 27 extends and in which is disposed an indexing collar 29 which is suitably mounted on said valve stem 23 for longitudinal movement relative thereto and for rotation therewith as, for example, through the instrumentality of a pin 30 extending through said valve stem and engaged in slots 31 in said collar.

Also mounted on the valve stem 23 and disposed in the recess 28, against the wall of the cover 11 at the outer end of said recess, is an inwardly opening cup member 32 in which is disposed, in surrounding relationship to said valve stem, a resilient sealing ring 33 of synthetic rubber or the like, while between said sealing ring and the indexing collar 29 is interposed an expansion coil spring 34 which tends constantly to urge said sealing ring and said cup member outwardly and said indexing collar inwardly.

A ground or otherwise tight joint is provided between the cup member 32 and the cover wall at the outer end of the recess 28 and the spring 34 maintains the sealing ring 33 compressed in said cup member in tight sealing engagement with the latter and the valve stem 23, thus sealing the opening in the cover wall through which the valve stem 23 extends against escape of fluid therethrough from the chamber a.

Projecting outwardly from the indexing plate 27 is a rib 35, while formed in the inner end of the indexing collar 29 is a plurality of recesses 36 to selectively accommodate said rib and thus releasably hold the valve stem 23 and the valve disk 22 against rotation. In this connection it is pointed out there is a recess 36 in the indexing collar 29 for each of the valve seat elements 18 and that said recesses have the same angular spaced apart relationship as said valve seat elements; also, that the rib 35 is disposed so that when any given recess 36 is aligned therewith, the valve disk 22 is in a position of rotation such that the opening 25 therein is aligned with the related valve seat element 18. When the valve seat element 22 is rotated from a position in which the rib 35 is engaged in any given recess 36, the indexing collar 29 is rotated therewith and is forced outwardly by said rib 35 against the force of the spring 34 to ride over said rib until the latter and the next recess 36 become aligned, whereupon the spring 34 snaps the collar inwardly. Thus, the operator of the cock may "feel" when the valve disk is in a position with the opening 25 thereof aligned with one of the valve seat elements 18; and by the angular position of the stem 23 as indicated by the handle thereon or by any other suitable means, is apprised of the particular valve seat element with which the opening 25 is aligned. Accordingly, any one of the openings 17 may readily be placed in communication through the related bore or

auxiliary chamber *b* and the main chamber *a* with the opening 15.

The openings 15 and 17 may be either inlet or outlet openings. Preferably, however, the opening 15 is an outlet opening connected, for example, to an aircraft engine and the openings 17 are inlet openings connected for example, with separate fuel tanks. Thus, one use of the cock may be to establish communication between the engine and the different fuel tanks as the latter successively become depleted of fuel.

To assist in holding the valve stem 23 and, consequently, the valve disk 22 against any side-wise or tilting movement, the inner end portion 23' of said valve may be journaled in a web 37 connecting the bosses 16.

In addition to the recesses 36 the indexing collar 29 is provided with another recess 38 to accommodate the rib 35 when the valve disk 22 is in a position with its opening 25 disalined from all of the valve seat elements 18, thus to releasably hold said valve disk in a position denying communication between all of the openings 15 and 17. In this connection, the indexing plate 27 may be provided, if desired, with a pair of diametrically opposed ribs 35 and the indexing collar 26 may be provided with pairs of diametrically opposite recesses 36 and 38 to accommodate said pairs of ribs 35.

From the foregoing description considered in connection with the accompanying drawing, it is believed that the construction and operation of the improved cock will be clearly understood and its advantages appreciated. It is desired to point out, however, that while only a single, specific structural embodiment of the invention has been illustrated and described, the same is read-

ily capable of embodiment in specifically different mechanical structures within its spirit and scope as defined in the appended claim.

I claim:

- 5 A plural way cock including, a casing having a plurality of laterally and longitudinally extending spaced inlets equidistantly disposed therearound and having an outlet centrally disposed with respect to and spaced from said inlets and arranged for fluid communication with the latter, a plurality of sliding and tilting valve seats one each disposed within one each of said inlets adjacent the inner end of the latter, each of said valve seats being formed so as to provide a reduced tubular body portion having an inner free end and an outer end provided with a relatively thin annular flange extending at right angles thereto, the external diameter of said flange being less than the internal diameter 10 of the wall defining the inlet in which the same is received so that said valve seat will slide and tilt therein, a packing disposed about the reduced tubular portion of the valve seat and engaging said flange and the adjacent wall of the inlet so as to prevent the flow of fluid therepast, means within the inlet for engaging the packing and for normally biasing the same and the valve seat beyond the inner end of said inlet, and a valve member movably engaged with the flanged 25 ends of each of said valve seats for holding the latter within their respective inlets, said valve member having a single opening affording selective communication between said outlet and any one of said inlets, whereby to establish fluid 30 communication therebetween.

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