June 7, 1955 R. H. BLACKFORD ET AL 2,710,023

CHECK-UNIT OR VALVE

Filed Aug. 22, 1951

FIG. 1

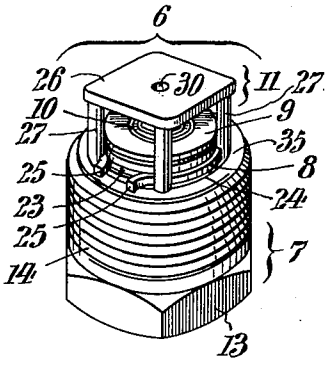


FIG. 3

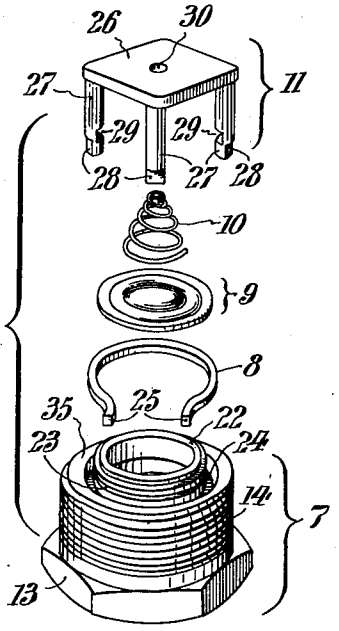


FIG. 2

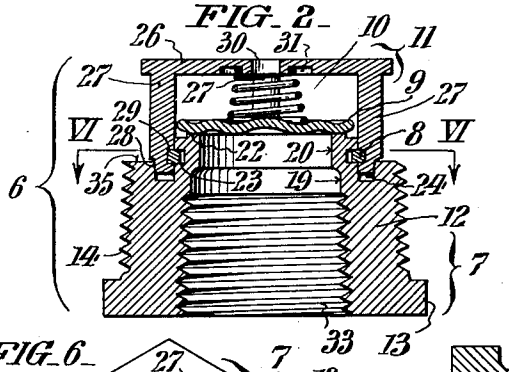


FIG. 6

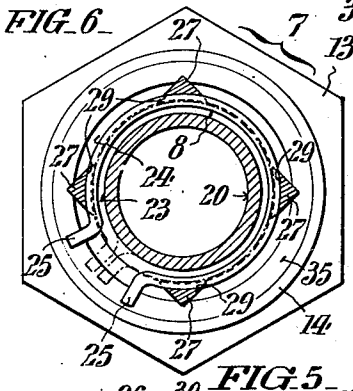


FIG. 4

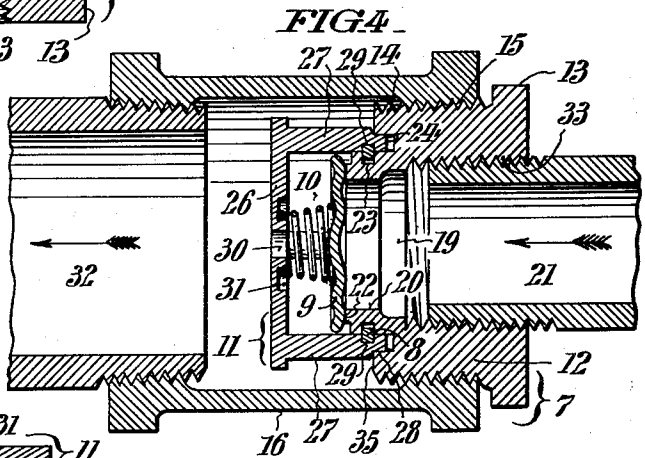
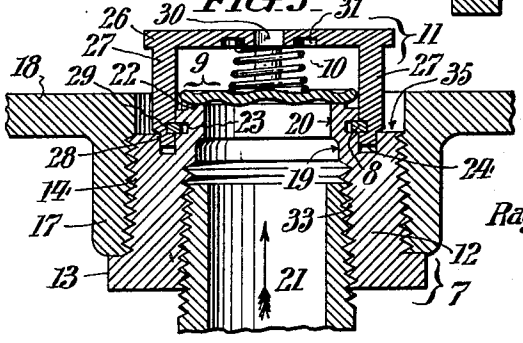


FIG. 5



INVENTORS:
Raymond H. Blackford, Karl von Koheritz
& Bernard L. Schwaller
BY Paul & Paul
ATTORNEYS.

United States Patent Office 2,710,023
Patented June 7, 1955

2,710,023

CHECK-UNIT OR VALVE

Raymond H. Blackford, Flushing, and Karl von Kokeritz, Staten Island, N. Y., and Bernard L. Schwaller, Wayne, Pa., assignors to Durabla Manufacturing Company, New York, N. Y., a corporation of New York

Application August 22, 1951, Serial No. 243,044

3 Claims. (Cl. 137—543.19)

Our invention has general reference to check-valves and check-units, or analogous devices, serviceable to control the flow of pressure fluids while it relates, more particularly, to the type we preferably term "basic check-units," that are designed for individual or multiple installation. Such species of check-unit is disclosed in the copending application of Raymond H. Blackford filed Nov. 25, 1949, Serial No. 129,329 which has matured into Patent No. 2,649,277.

The primary object of our present invention is to provide an improved check-unit of the above indicated species including refinements whereby the scope of its usage is considerably enhanced, and which is fundamentally characterized by an interlocking feature whereby the unit is rendered practically fool proof.

Another object is the provision of an improved check-unit including a novel type of interlocking ring effective to positively maintain the check-unit components in co-active assembly without any possibility of the guard becoming positionally disturbed under different operating conditions; as well as taking axial stresses without developing any tendency to displace said interlocking ring.

A further object of our invention is to provide a check-unit which can be applied to any standard pipe fitting, or otherwise located individually or in multiple, and thereby function as a check valve.

Other objects, with ancillary advantages, will hereinafter be specifically referred to or become apparent from the following detailed description and accompanying sheet of illustrative drawings, while the features of novelty are more particularly defined in the claims.

In the drawings:

Fig. 1 is a perspective view of a typical embodiment of our novel check-unit.

Fig. 2 is a central vertical section of the same but drawn to a larger scale for clearer illustration of important details.

Fig. 3 is an exploded perspective view of the several components involved in the device, of Figs. 1 and 2, and depicted as in spaced axial alignment for the purpose of clarity.

Fig. 4 is a longitudinal section showing our improved check-unit as included in a standard pipe fitting or coupling.

Fig. 5 is a somewhat similar sectional view showing the check-unit as adapted to the valve deck of a compressor; and,

Fig. 6 is a cross-section taken on the plane designated by the angled arrows VI—VI in Fig. 2.

In describing the forms of our invention typified by the drawings, specific terms will be employed for the sake of clarity, but it is to be understood the scope of said invention is not thereby limited; each such term being intended to embrace all reasonable equivalents which perform the same function for an analogous purpose; while, in all the views, corresponding parts are designated by like reference characters.

Referring more particularly to the drawings and specifically to Figs. 1, 2 and 3, it is to be observed that our novel or improved check-unit, is comprehensively designated 6 and basically comprises five components, see Fig. 3; namely, a reducer-bushing 7; a special, and preferably rectangular-section, retainer snap-ring 8; a valve member or disk 9; a volute spring 10; and a special guard-and-guide 11.

The reducer-bushing 7 is conveniently, although not essentially, a substantial tubulate element 12 with a polygonal-shaped head 13 at its outer end, whereas the exterior surface is provided with a pipe thread 14 for sealing engagement in the complementally-threaded bore end 15 of a standard pipe fitting or coupling 16, Fig. 4; or into the socket portion 17 of any other suitable body, such as a tank, or valve chamber wall 18, Fig. 5, for example only, and as readily understood by those acquainted with the related arts. The threaded bore 33 of the reducer-bushing 7 is inwardly-inclined or tapered, as shown, and includes axially aligned plain bore reductions 19, 20, the latter or smaller 20 of which is diametrically slightly larger than that of the inlet or service line 21.

The smaller end of the reducer-bushing 7 is appropriately formed to define an annular-seat 22, an adjoining surrounding channel or groove 23, and a rectangularly related boring or annular-recess 24, for purposes hereinafter fully explained. At this juncture it is to be particularly noted that the surrounding groove 23 is directly concentric with respect to the longitudinal axis of the reducer-bushing 7 and that the inner side face of said groove 23 is co-planar with respect to the spacially concentric annular-seat 22 of the bushing 7, for a purpose hereinafter again referred to.

The split retainer-ring 8 is preferably, although not essentially, made of square-section metal capable of snap expansion and forced contraction, while it is provided with terminal ends or projections 25 for grippage by a suitable implement to effect such contraction and permit the expansion thereof when said grippage is released; as readily appreciated from Fig. 6.

The valve element or disk 9, is preferably of the known corrugate species; while the special valve guard and guide 11, includes a preferably square head 26 with dependent corner legs 27. These corner legs 27, it is to be observed are of a desirable cross-section to afford guided lift for the valve disk 9, and are also of a longitudinal extent to firmly seat, by aid of outer shouldered reductions 28, in the reducer-bushing annular-recess 24. It is likewise to be observed that the inner lower portions of the legs 27 are provided with rectangular notches 29 for co-planar circumferentially-spaced registration with the reducer-bushing surrounding groove 23; also that, normally, the retainer-ring 8, when the check-unit 6 is in assembly, positively interlocks the reducer-bushing 7 and the combination guide and guard 11 rigidly together. In other words, the retainer-ring 8 functions to take axial thrusts without involving any relative movement between the parts 7 and 11; whereas the annular-recess 24 in the reducer-bushing 7 effectively prevents the guard-legs 27 from any tendency to spread. The guard head 26 may be provided with a comparatively small axial orifice 30, and an annular groove 31 to centralize the smaller end of the volute-spring 10, when fully compressed by the valve disk 9; whereas the wider end of the spring 10 seats within the trough intermediate adjoining corrugations of said valve disk 9 for maintenance of the spring 10 properly centralized and restrained against lateral displacement during operation. Incidentally it is noteworthy that the central orifice 30 induces a better and more even flow of the pressure fluid passing through the check-unit 6 than hitherto attainable with kindred devices.

In assembling our novel check-unit the retainer ring 8 is placed concentric over the annular seat end 22 of the

reducer-bushing 7 and onto the finished annular end 35 of the tubular body 12, whereupon the ends 25 of said ring are gripped by a pair of pliers—not shown—for instance, and drawn together until the ring 8 is forcibly contracted into the annular seat adjoining groove 23 and so restrained. The legs 27 of the guard 11 are next moved over the inwardly compressed ring 8 into the annular recess 24, whereupon the pliers are released when said ring expansively snaps into rigid engagement in the leg notches 29. Resultant to the just stated action of the ring 8, it will be clearly apparent that the reducer-bushing 7 and the composite guide-and-guard 11 are rigidly interlocked and positively secured against relative movement.

Referring now to Fig. 4, it will be readily understood that by application of a standard pipe-coupling 16 to the reducer-bushing 7, our novel unit 6 is quickly adapted for service as a complete check-valve, without disturbing any of the related parts, for interposition between ordinary line piping 21, 32. Furthermore the unit 6, is equally well applicable to conventional L's of diverse angularity; side outlets; beds; drain-elbows; T's and standard elbows, without disturbing any of its constituent parts.

From the foregoing it is felt the merits and advantages of our improved check-unit or valve will be clearly apparent, also that the said unit or valve will positively remain unaffected by widely varied operative location without sacrifice of any of its operational characteristic. It has been proven by actual tests that the improved check-unit or valve of this invention evidenced the lowest pressure-drop characteristics, of any type tested, both at full capacity as well as throughout the operating range.

Having thus described our invention, we claim:

1. In a check valve including an enclosure in which is mounted a valve seat having a recess therein and a valve disc coacting with said valve seat to open and close said valve, said valve seat surrounding a valve opening, the combination comprising a valve guard in the form of a head member spaced from said seat extending transversely of the valve openings, a plurality of elongated legs attached to said head member and extending substantially perpendicular to said head member toward said seat member, said legs surrounding and guiding said valve disc, said legs having ends extending into said valve seat recess, said ends being shaped to fit tightly into said recess whereby said valve seat limits the movement of said leg ends outwardly, the inner faces of said legs having depressions

that are spaced substantially equally from said head member, each of said depressions being near the free end of its leg with capacity to move into said valve seat recess along with the end of said leg, said valve seat having a peripheral groove facing said depressions, and a split locking ring shaped to fit into said valve seat groove, said split locking ring extending substantially around the periphery of said valve seat and having capacity to contract into said groove to permit the insertion of said leg ends into said valve seat recess, and said split locking ring being self-expanding from said valve seat groove into the leg depressions to lock the legs firmly in position with respect to the valve seat.

2. The check valve defined in claim 1 wherein said depressions and said split locking ring are of substantially the same cross-sectional size and shape, and wherein means are provided in the depression for limiting the penetration of the locking ring into said depression, whereby after expansion of the locking ring a part of the locking ring is engaged within said valve seat groove and another part of said locking ring is engaged in said depression thereby locking said legs with respect to said valve seat.

3. The check valve defined in claim 1 wherein stop means are provided on the legs which coact with the valve seat to limit the penetration of said legs into said recess to a position wherein the depressions in said legs are in registry with said groove in said valve seat.

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