

P. G. PRANOLD.
GRADUATE CONTROL VALVE.
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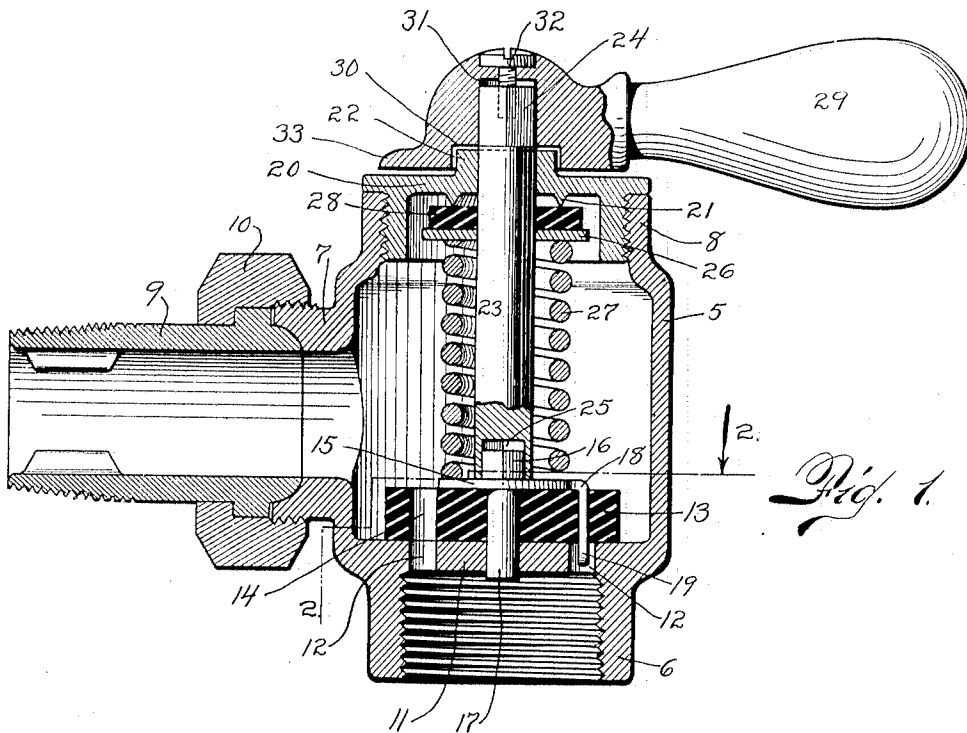


Fig. 1.

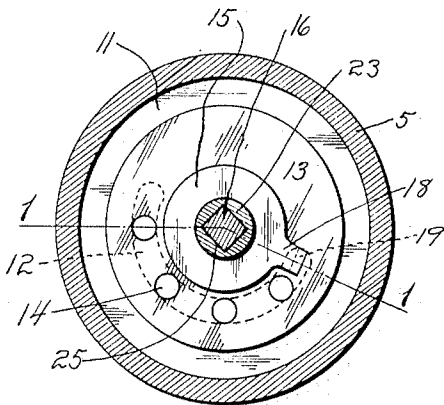


Fig. 2.

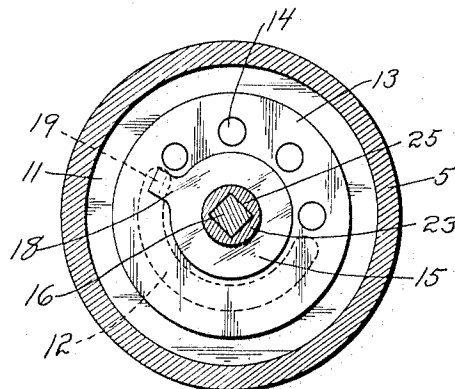


Fig. 3.

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UNITED STATES PATENT OFFICE.

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GRADUATE-CONTROL VALVE.

1,315,741.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, PETER G. PRANOLD, a citizen of the United States, residing at the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Graduate-Control Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to regulating valves for fluid line systems, and more particularly embodies a novel valve structural arrangement, of the graduate control type, especially adapted for ready attachment, as an assembled unit, to the inlet of a steam radiator, or for analogous uses.

Such fixtures have heretofore been in use, with a varied degree of success, but they have developed serious objections, in addition to their high cost of manufacture, primarily owing to the specific construction and functioning of certain reciprocating and co-acting separable parts generally, the multiple employment of which not only renders assembly more tedious and uncertain but also is a cause of inefficiency, after limited usage, from wear, leakage and otherwise. In fact, absolute inoperativeness frequently occurs from either a binding or a loosening or other derangement of elements.

Furthermore, these fixtures are not ordinarily cared for by an experienced steam-fitter, and where even minor repairs become necessary for worn elements, such as the replacement of composition washers, a more or less inexperienced janitor, or other house attendant, will invariably do more harm than good, by losing or misplacing a part in attempted re-assembling. For such an unreasonable cause alone, the very merits of these valves have been actually so prejudiced, in some instances, as to be absolutely discarded as inadequate and ineffectual—an obviously fatal drawback in commercial developments.

The primary object of my invention, therefore, is to overcome these disadvantageous features by providing an improved construction and combination of elements, substantially housed against tampering with, simple in assembly and unimpeded functioning, and positive and durable in action, while at the same time being comparatively inexpensive to manufacture and install, and which

will also insure maximum efficiency with a minimum number of independently operating parts.

Other objects and advantages will be so clearly apparent, as incidental to the following description, that it would be only undesirable surplusage to further refer to them initially.

With these prefacing general statements, the invention resides in the novel combination and arrangement of parts as hereinafter disclosed and more succinctly set forth in the appended claims, for a more complete conception whereof reference will now be had to the accompanying drawings, illustrating a practical and preferred embodiment of the improvements, in which drawings:—

Figure 1 is a longitudinal sectional view through my improved valve structure, in full open position, the section being taken substantially along the line 1—1 of Fig. 2, with the lower end of the operating stem and the inner end of the regulator handle broken away; Fig. 2 is a cross-sectional view on the line 2—2 of Fig. 1; and Fig. 3 is an analogous view, but with the parts in their full closed position.

5 designates the valve casing proper, providing the inlet nipple 6, the outlet nipple 7, and the upper nipple 8 for the top closure, all of which are suitably threaded as conditions may require. 9 and 10 simply designate any suitable coupling fittings for connection with the inlet to the radiator, and all of these features are self-evident.

The lower end of the casing is formed with a transverse division wall or a flat-surfaced valve seat 11, having a central bearing aperture and a circularly disposed slot therethrough, the latter functioning as an elongated curved inlet opening, under controlled communication with the valve chamber.

13 designates a disk valve, of suitable composite substance and thickness, which is formed with a central bearing aperture and a series of circularly disposed ports 14, the latter coöperating with the slot 12, the length of said series being such that any number or all of the ports 14 may be brought into registration with said slot at one time, or reversely may be entirely closed against communication therewith as desired.

Also, this disk valve element is so novelly mounted and rotated, under a firm yielding

pressure, as to be maintained accurately centered and held down on its seat flatwise, thus insuring positive and efficient action at all times, while compensating fully for all normal wear.

This accurate centering and positive rotation is attained by the employment of a lower metallic bearing disk 15, of a shorter radius than that of the curved series of ports 14, the said bearing disk being directly supported upon said composite disk valve. Its upper face provides a centrally projecting lug 16, preferably squared or hexagonal in cross-section, while a cylindrical pintle or stub-shaft 17 likewise depends from its lower face, which pintle is adapted to extend through the central bearing apertures of both the valve and its seat. The bearing disk 15 is also provided with a peripheral nib or ear 18 having a downwardly projecting arm or member 19, disposed in circular alinement with the ports 14, and which is anchored to the valve disk by passing through a snugly receiving aperture therein. The arm 19 is of sufficient length to extend substantially into the curved slot 12 of the valve seat, in which it rides and serves as a limiting stop at the end of the full opening and closing movements of the valve.

In addition to this limiting stop feature, the simplified combination and mounting as a whole not only guards against any sticking or binding of moving parts, of frequent occurrence heretofore with graduate control valves, as the rotation of the disk valve is absolutely free and unimpeded, but it also insures an easier and more positive actuation of the valve element, the power being applied thereto with a leverage force toward its periphery, or with a crank-like action, and the rotation thereof is not dependent at all upon any central rigid connections, which latter are liable to and do become loose and inoperative from straining wear, and hence are extremely inefficient and objectionable in constant use.

The casing 5 is provided with a detachable top, shown as comprising a cylindrical cap, flanged and threaded into the upper opening, the top wall 20 of which is formed with a central bearing aperture, encompassed by an internal knife-edged annular seat 21 and an external boss 22, squared or hexagonal in cross-section for the application of a spanner or other wrenching tool.

The aperture of this cap member journals the upper cylindrical portion of the valve stem 23, the projecting head being squared, as at 24, and the lower end of which is formed with a keying socket 25 for detachably receiving the lug 16 in secured rotary relation, but permitting of its limited vertical play.

The valve stem 23 carries an upper bearing disk 26, integrally or otherwise fixed

thereto, and a fairly strong coil spring 27 encompasses said stem under tension engagement with the bearing disks 15 and 26, while a composition washer 28 freely encircles the stem at a position between the upper bearing disk 26 and the annular knife-edge seat 21.

29 designates the operating handle detachably connected to the valve stem in any suitable way, conveniently illustrated by the dome-shaped head formed to provide a bottom recess 30, freely encompassing the boss 22, the socket 31 for receiving the head 24 of the valve stem, a restricted bore for the fastening screw 32, and an integrally joined finger or pointer 33, which coöperates with the usual indicator surface (not shown) for designating the "off" and "on" and intermediate positions of the valve.

The simplicity of assembly is fairly apparent. The metal bearing disk 15 is first snugly seated upon the top of the composition disk valve proper, with the pintle 17 and arm 19 of the former extending through and beyond their complementally fitting apertures in the latter. This provides in effect a unitary valvular element, of a novelly combined structure, which may be readily inserted bodily into the casing, with the pintle 17 projecting down through the central bearing aperture of the valve seat 11 and with the arm 19 positioned within the curved slot 12 thereof, for functioning as before described.

The valve stem and its fixed disk 26 provide a second substantially unitary structure with the composite washer 28 seated in position thereon.

It will be obvious, therefore, that there are really no loose small parts liable to become lost or misplaced in assembling, which latter may be facily accomplished with the spring inserted in position and the cap screwed home, after which the operating handle may be attached to the stem.

As shown in Fig. 3, the disk valve 13 is in its full closed position, all of the ports 14 being covered by the non-apertured portion of the seat 11, and further rotation to the left being prevented by the arm 19 abutting the left end of the slot 12. It follows that in swinging the operating handle to the right, into the full open position shown in Figs. 1 and 2, each of the four ports 14 (from left to right Fig. 3) will have been brought successively into registration with the slot 12, until the arm 19 strikes the right end of the slot, thus preventing further movement into overlapped partially closed position. Also, it is obvious that a swing of the handle less than its full stroke will provide for the graduate control or admission of steam to the casing, and hence to the radiator.

During these operations, it may be em-

phasized that the compressed spring 27 is not torsionally strained, traveling bodily with the stem, and it not only holds the disk valve flatly down on its seat, for obvious reasons, but it also holds the composite washer 28 firmly up against the annular knife-edge seat 21, thus establishing a leak-proof seal at the upper end of the casing, where leakage so frequently occurs, and all of this is satisfactorily accomplished without the employment of any packing, glands, nuts or other minor accessories whatsoever. This equalizing pressure is permitted by the separable connection between the socketed end 25 of the valve stem and the lug 16 of the valve element, and compensates fully for the wear on both the composite washer 28 and the composite disk valve 13, prolonging their effective life almost indefinitely. Other advantageous features have already been set forth with reference to the manner of positively rotating the disk valve and maintaining it accurately centered by the employment of the bearing disk 15 and its several fixed parts, but it may be further said that, in addition to the centering pintle 17, the true axis of the disk valve has an upper bearing also, by virtue of the valve stem 23 being journaled in the apertured boss 22 of the capping top.

While I have thus made a full and complete disclosure of a practical embodiment of my improvements, it may later be found expedient to make minor changes without departing from the underlying principles of the invention, and it will be understood, therefore, that I do not limit myself necessarily to the exact details as illustrated and described, excepting as they may come within the purview of the ensuing claims, when fairly interpreted in the light of the specification and understood equivalents.

What I do claim, as patentably novel, is:—

1. In graduate control valve structures, the combination with a casing embodying a fluid inlet, a fluid outlet and an interposed valve seating division wall, formed with an elongated curved slot; of a positively centered composite disk valve having a curved series of ports, functioning as set forth; a bearing disk mounted on said composite valve and having a stop arm embedded therein at a position radially distant from its axis of rotation; a rotatably oscillating stem for said bearing disk, disposed in line with said axis of rotation; and wear compensating means for snugly holding said composite valve flatwise against its seat, substantially as described.

2. In graduate control valve structures, the combination with a casing embodying a fluid inlet, a fluid outlet and an interposed valve seating division wall, formed with an elongated curved slot; of a positively cen-

tered composite disk valve having a curved series of ports, functioning as set forth; a bearing disk mounted on said composite valve and having an arm snugly extending therethrough at a position in circular alinement with said ports, the projecting end of said arm being adapted to ride in said inlet slot and additionally serve as a limiting stop; a rotatably oscillating stem for said bearing disk, disposed in line with the axis of rotation of said valve; and wear compensating means for snugly holding said composite valve flatwise against its seat, substantially as described.

3. In graduate control valve structures, the combination with a casing embodying a fluid inlet, a fluid outlet and an interposed valve seating division wall, formed with a central bearing aperture and an elongated curved inlet slot; of a composite disk valve having a curved series of ports, functioning as set forth; a bearing disk having a pintle adapted to be projected centrally through said valve for journaling in said bearing aperture, and also having a depending arm embedded in said valve at a substantially offset position from said pintle; a rotatably oscillating stem for said bearing disk, disposed in axial alinement with said pintle; and wear compensating means for snugly holding said valve flatwise against its seat, substantially as described.

4. In graduate control valve structures, the combination with a casing embodying a fluid inlet, a fluid outlet and an interposed valve seating wall, formed with a central bearing aperture and an elongated curved inlet slot; of a composite disk valve having a co-acting series of ports; a bearing disk provided with an upwardly disposed coupling element, an alining downwardly disposed pintle adapted to be projected centrally through said valve for journaling in said bearing aperture, and an offset depending arm for embedded anchorage with said valve body; a rotatably oscillating stem, mounted in axial alinement with said pintle and provided at its lower end with a coupling element, for making a lug and socket connection with said disk coupling element; and wear compensating means for snugly holding said valve flatwise against its seat, substantially as described.

5. In graduate control valve structures, the combination with a casing embodying a fluid inlet, a fluid outlet and an interposed valve seating wall, formed with a central bearing aperture and an elongated curved inlet slot; of a composite disk valve having a co-acting curved series of ports; a bearing disk provided with an upwardly disposed coupling lug, an alining downwardly disposed journaling pintle, adapted to be projected centrally through and beyond said valve, and an offset depending arm for

snugly extending through and beyond said valve body at a position in circular alignment with said ports, the several elements of said bearing disk functioning as set forth; a rotatably oscillating stem, provided at its lower end with a coupling socket for receiving said coupling lug; means for actuating said stem; and wear compensating means for snugly holding said valve flatwise against its seat, substantially as described. 10

In testimony whereof I affix my signature.

PETER G. PRANOLD.