C. A. DUNHAM.

STEAM TRAP.

APPLICATION FILED MAY 9, 1910.

986,967. **Patented Mar. 14, 1911.**

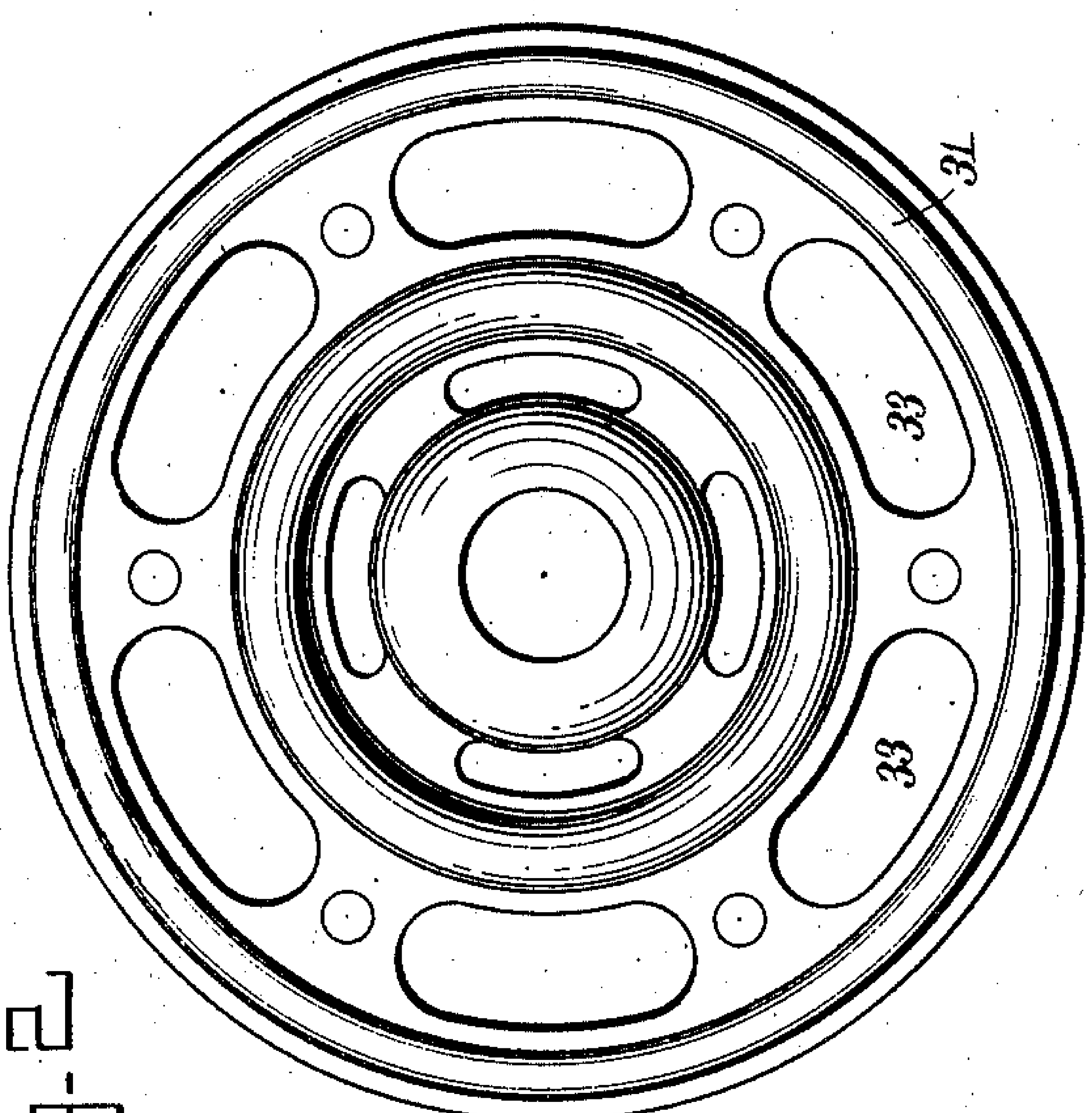

Fig. 2

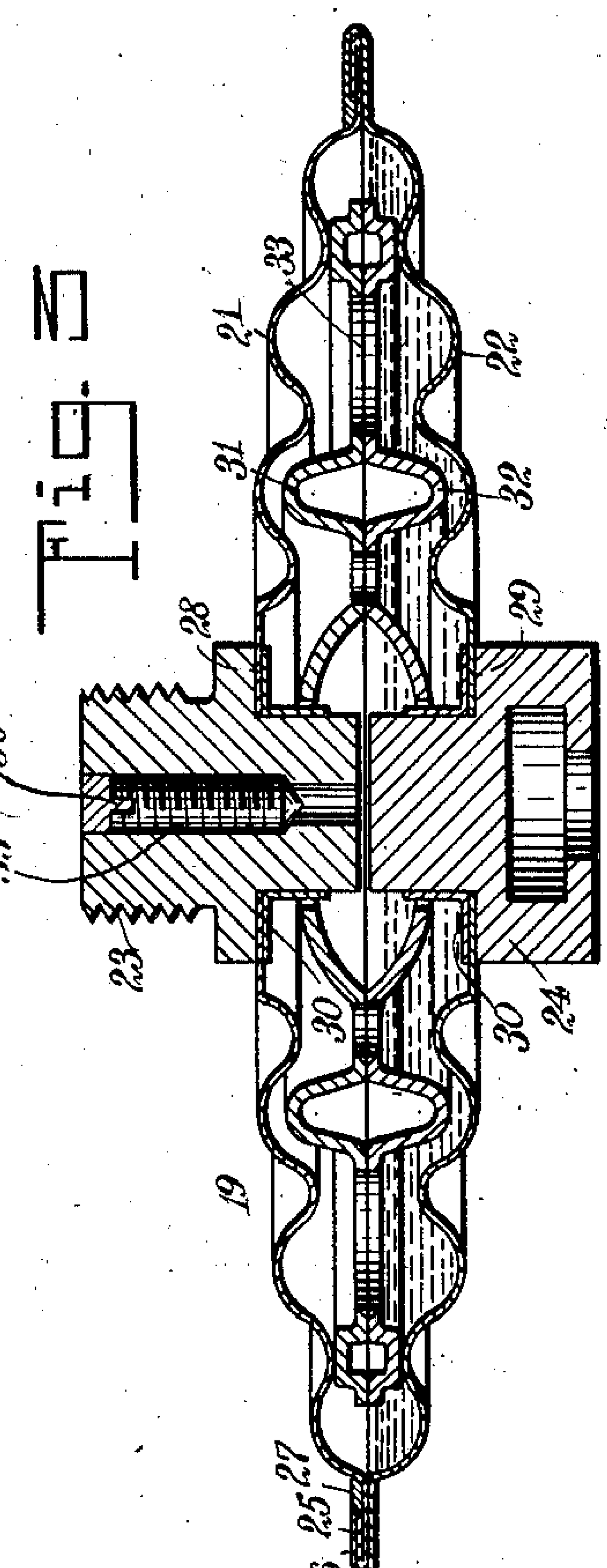

Fig. 3

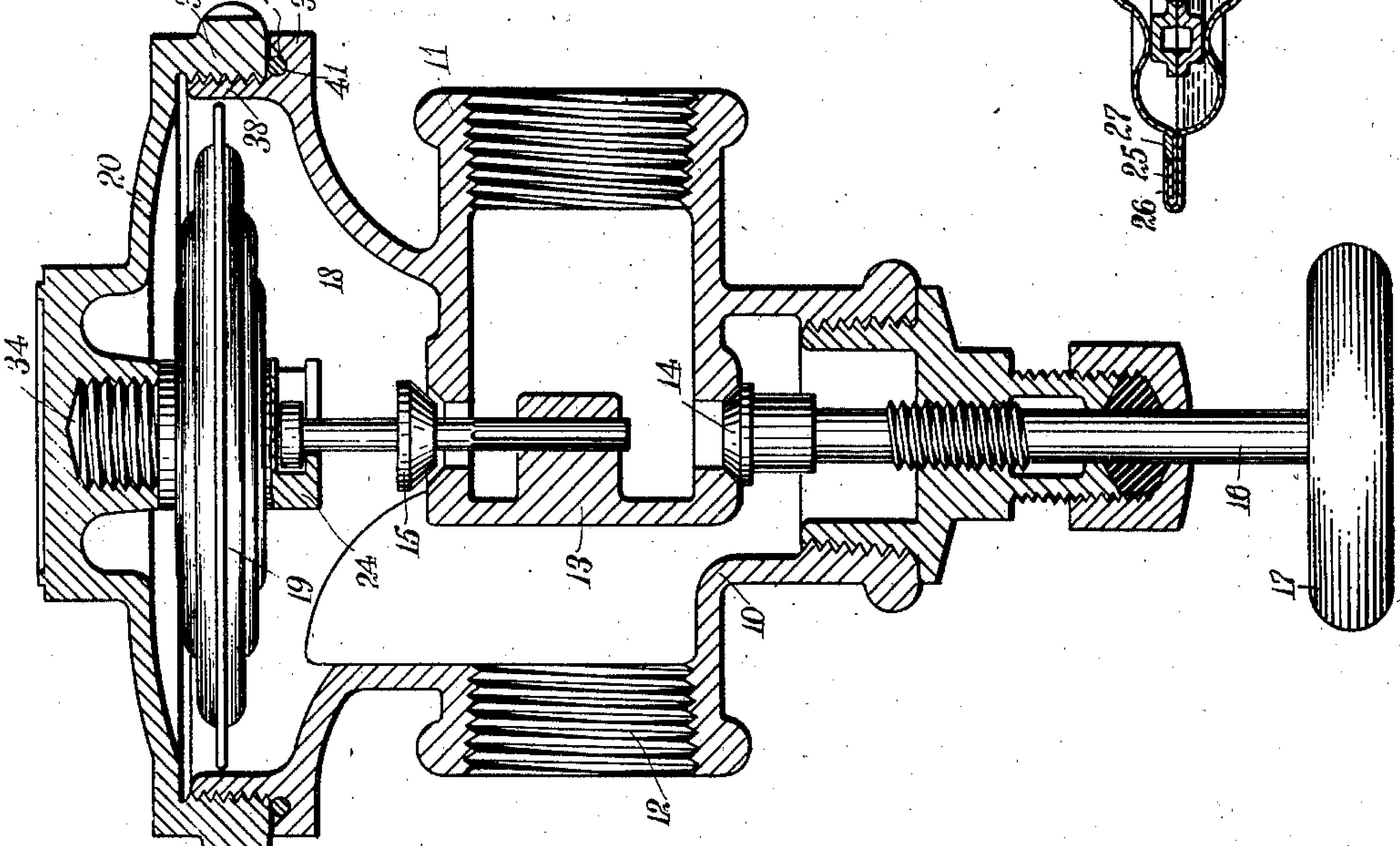

Fig. 1

WITNESSES:

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STEAM-TRAP.

986,967. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed May 9, 1910. Serial No. 560,151.

To all whom it may concern:

Be it known that I, CLAYTON AUBRA DUNHAM, a citizen of the United States, and a resident of Marshalltown, in the county of Marshall and State of Iowa, have invented a new and Improved Steam-Trap, of which the following is a full, clear, and exact description.

This invention relates to certain improvements in thermostatic steam traps, and more particularly to the construction of the thermostatic device, the means for supporting the same, and the means for preventing leakage from the casing around the device.

The invention consists in the features of construction and combination of parts hereinafter described and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a longitudinal section through a steam trap constructed in accordance with my invention; Fig. 2 is a plan view of the brace employed within the thermostatic disk, and Fig. 3 is a central longitudinal section through the disk.

In the accompanying drawings, I have illustrated my invention as applied to a type of steam trap illustrated in my prior Patent No. 753,557, granted March 1, 1904, but I wish it distinctly understood that all features of my present invention are equally applicable to various other forms of steam traps, and to drain valves, air valves, and other thermostatic regulators in which a thermostatic disk is employed.

In the specific form of steam trap illustrated, I employ a casing 10 having an inlet nipple 11 and an outlet nipple 12. Within the casing is a bridge 13 having two oppositely-disposed valve seats controlled by two valves 14 and 15. The valve 14 is connected to a valve stem 16, extending through a suitable stuffing box to the exterior of the casing, and having a handle 17 whereby the valve may be manually operated. The casing, upon the side thereof opposite to the manually-operated valve, has an enlargement constituting a chamber 18, to receive a thermostatic disk 19. This disk is disposed in a plane substantially at right angles to the general direction of movement of the valve 15, and has one side detachably connected to said valve and the opposite side supported from a cap 20, constituting a closure for the chamber 18.

The general arrangement of parts so far described, constitutes no portion of my present invention.

My improvements relate particularly to the thermostatic disk which is formed of two annular sheets 21 and 22 of thin metal secured together at their outer edges and having their center portions spaced apart. Each sheet is provided with concentric corrugations to facilitate the expansion and contraction of the disk, and one sheet, 21, is secured to a plug 23, which latter is attached to the cap 20, and the other sheet, 22, is secured to a plug 24, which has a groove extending a portion of the distance across the under side thereof to receive the head on the stem of the valve 15. To this extent the disk is similar to that disclosed in my prior Patent No. 865,171, granted September 3, 1907.

One important feature of my improved disk is the means employed for securing together the outer edges of the two metal sheets 21 and 22. In the forming of these annular sheets, each is provided with a marginal flange extending substantially at right angles to the general plane of the sheet. The flange 25 of the sheet 21 is of slightly smaller diameter than the flange 26 of the sheet 22, and in assembling the two sheets, the flange 25 is placed within the outer flange 26. The two flanges are then bent over simultaneously on to the outer surface of the adjacent portion of the sheet 21, so as to form a peripheral edge or seam of four thicknesses of metal. Solder is sweated into the seam both from the inside and from the outside, and the space between the free edges of the turned-down flanges 25 and 26 and the first corrugation of the sheet 21 is filled with solder 27.

The two plugs 23 and 24 have inwardly-extending portions which may engage with each other to limit the collapsing of the disk, and the two plugs have annular flanges 28 and 29 opposite to each other and encircling the smaller inwardly-extending portions of the plugs. The two sheets forming the side walls of the disk have center openings through which extend the plugs, so that the portion of each disk encircling the center opening engages with the shoulder of the corresponding plug. To secure the edge of the sheet metal to the shoulder, I provide a collar or thimble 30, preferably formed of stamped sheet brass and having a cylindrical portion adapted to closely fit the inner extension of the plug, and having an inwardly-extending flange portion for engagement with the inner surface of the sheet metal disk wall. After the plug is extended through the opening in the sheet to bring the surface of the sheet into engagement with the shoulder, the collar or thimble 30 is moved into position, so as to engage with both the plug and the sheet metal and is there soldered in place, the solder being sweated into all portions of the joint. In order that any of the volatile liquid within the disk may escape, it is necessary that it travel not only the full width of the shoulder, but it must also travel along the full length of the thimble or the full length of the flange of the latter. By means of this thimble, I render the joint doubly secure against leakage, and, at the same time, more effectively resist the strains to which the joint is subjected during the expansion or contraction of the disk.

Within the disk I provide my improved brace for resisting the complete collapsing of the disk. This brace is formed of two annular plates 31 and 32, formed of sheet metal and secured together by rivets or in any other suitable manner. The two plates are corrugated, the corrugations of one plate being opposite to the corrugations of the other plate, and the portions of both plates between concentric corrugations are provided with a series of apertures 33, to facilitate the free movement of the volatile liquid through the brace. The two plates are provided with apertures through which the plugs 23 and 24 extend, and the edges of the plates adjacent these apertures are spaced apart so as to guide the brace during the relative movements of the disk walls. Preferably, the corrugations of the two brace plates adjacent their peripheries, are opposite to inwardly-extending corrugations on the disk walls, so as to partly limit the contraction of the marginal portions of the disk, and thus prevent undue movement of the disk walls adjacent the peripheral seam. This prevents undue strain on the seam, which would otherwise tend to open the latter.

The plug 23 serves not only as a stem for supporting the thermostatic disk from the cap, but it also has a filling opening therethrough. The cap has a threaded socket 34 in the center of the inner side, but this socket does not extend through the wall of the cap or in any way communicate with the exterior of the casing. The plug has a threaded opening 35 extending therethrough, and within this opening is a plug or closure 36, which terminates at its inner end in a valve seating against a shoulder in the opening through the plug 23. The outer end of the closure 36 should terminate slightly below the outer end of the plug 23 and may have solder over the plug to prevent any possible loss of fluid. After filling the disk with the desired amount of volatile liquid, the closure 36 is screwed into place and the plug 23 is then screwed up into the socket in the cap 20. I thus render the disk doubly sure against leakage, as any of the volatile liquid to escape must pass the valve constituting the inner end of the closure 36, thence along the full length of said closure to the outer end of the plug 23, and then back the full length of the plug 23 and across the shoulder on the latter, which forms a stop for the inward movement of the plug.

For rendering the casing 10 substantially proof against leakage, I provide the cap 20 with an annular flange 37, which screws down over a threaded flange 38 on the casing and into engagement with a flange 39 on said casing. The flange 39 constitutes a stop, and its surface which engages with the flange 37 of the collar, is provided with an annular groove 40 into which may be placed a ring gasket 41. The flange 37 engages with this gasket before the movement of the cap is limited by the stop 39, and the gasket is therefore compressed and positively prevents the passage of air, steam or liquid through the joint.

As previously stated, the various features of my present invention may be used in connection with other devices than the particular steam trap illustrated, and certain features of the invention may be embodied in a construction without embodying all of the features.

Various changes may be made in the construction of the parts without departing from the spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. A thermostatic controller having a chambered expansion disk with interiorly-projecting plugs at opposite sides thereof, said plugs being juxtaposed to limit the contracting action of the disk, and an annular corrugated plate encircling said plugs and constituting a brace.

2. A thermostatic controller having a chambered expansion disk with interiorly-projecting plugs at opposite sides thereof, said plugs being juxtaposed to limit the contracting action of the disk and a brace within said disk and presenting a plurality of concentric annular supporting portions intermediate said plugs and the periphery of the disk.

3. An expansion disk for thermostatic controllers having sheet metal walls, and a

brace between said walls and presenting a plurality of annular concentric supporting portions.

4. A circular expansion disk for thermostatic controllers having opposite sheet metal walls, and a brace having an annular portion between said walls for spacing the latter apart intermediate the periphery and the center thereof.

5. A thermostatic controller having a chambered expansion disk with interiorly-projecting plugs at opposite sides thereof, said plugs being juxtaposed to limit the contracting action of the disk, and a brace within said disk and encircling said plugs and formed of two annular plates.

6. A thermostatic controller having a chambered expansion disk with interiorly-projecting plugs at opposite sides thereof, said plugs being juxtaposed to limit the contracting action of the disk, and an annular brace within said disk and encircling said plugs, said brace being provided with a series of concentric corrugations.

7. An expansion disk for thermostatic controllers having sheet metal walls, and a brace between said walls and including two annular metal plates.

8. An expansion disk for thermostatic controllers having sheet metal walls, and a brace between said walls and including two annular metal plates, each having a series of concentric corrugations.

9. An expansion disk for thermostatic controllers having oppositely-disposed corrugated sheet metal walls secured together at their outer edges, and an annular brace between said walls and having opposed concentric corrugations, the peripheral corrugations of said brace being disposed between the peripheral inwardly-projecting corrugations of said sheet metal walls, to limit the bending action of the latter at their outer edges.

10. An expansion disk for thermostatic controllers having oppositely-disposed corrugated sheet metal walls secured together at their outer edges, and an annular brace between said walls adjacent the periphery thereof and adapted to engage with inwardly-directed corrugations adjacent the periphery of said sheet metal walls, to limit the relative movement of the metal walls at the peripheral seam.

11. An expansion disk for thermostatic controllers, having opposite sheet metal walls, plugs projecting inwardly through said walls and having their inner ends juxtaposed to limit the contracting action of the disk, each of said plugs having a shoulder for engagement with the outer surface of its corresponding sheet metal wall, and a thimble encircling said inner projection of each plug and having a cylindrical portion in engagement with the plug, and an annular flange in engagement with the inner surface of the corresponding sheet metal wall.

12. An expansion disk for thermostatic controllers, having opposite sheet metal walls, plugs projecting inwardly through said walls and having their inner ends juxtaposed to limit the contracting action of the disk, each of said plugs having a shoulder for engagement with the outer surface of its corresponding sheet metal wall, and a thimble encircling said inner projection of each plug and having a cylindrical portion in engagement with the plug, and an annular flange in engagement with the inner surface of the corresponding sheet metal wall, said thimble being secured to both the plug and the wall by solder sweated between the adjacent surfaces.

13. An expansion disk for thermostatic controllers, said disk having sheet metal walls, each provided with an annular peripheral flange, the flange of one of the walls fitting within the flange of the other of said walls, and both of said flanges being folded over to lie parallel with the adjacent portions of said walls, to form a lapped seam of four thicknesses.

14. An expansion disk for thermostatic controllers, said disk having sheet metal walls, each provided with an annular peripheral flange, the flange of one of the walls fitting within the flange of the other of said walls, and both of said flanges being folded over to lie parallel with the adjacent portions of said walls, to form a lapped seam of four thicknesses, said seam being soldered interiorly by sweating.

15. An expansion disk for thermostatic controllers, said disk having sheet metal walls, each provided with an annular peripheral flange, the flange of one of the walls fitting within the flange of the other of said walls, and both of said flanges being folded over to lie parallel with the adjacent portions of said walls, to form a lapped seam of four thicknesses, and solder intermediate the adjacent edges of said flanges and an adjacent portion of one of said walls.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLAYTON AUBRA DUNHAM.

Witnesses:

J. W. Hook,

S. Ormerod.