

E. J. DEEGAN.
REGULATOR.
APPLICATION FILED FEB. 26, 1913.

Patented June 17, 1913.

2 SHEETS-SHEET 1.

1,064,714.

Fig. 1

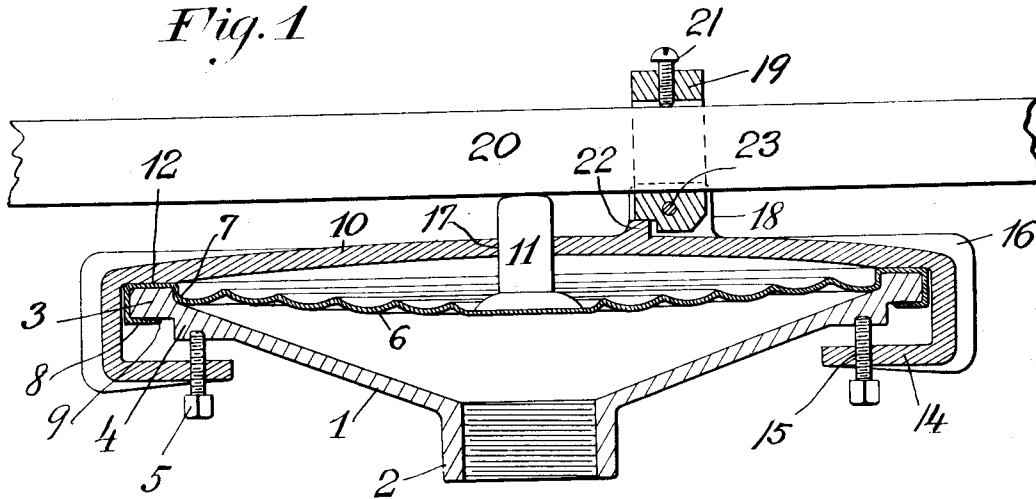
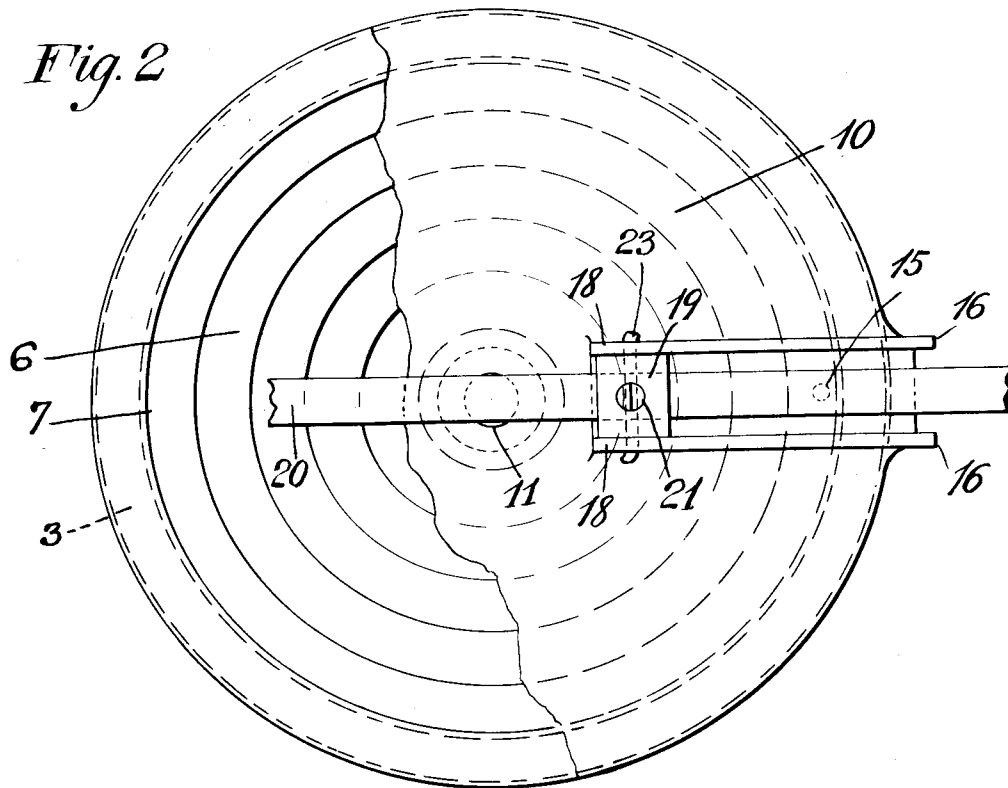


Fig. 2



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1,064,714.

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2 SHEETS—SHEET 2.

Fig. 3

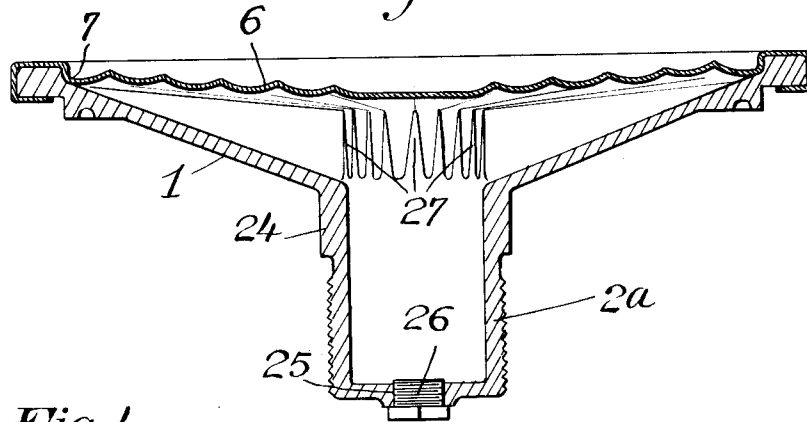


Fig. 4

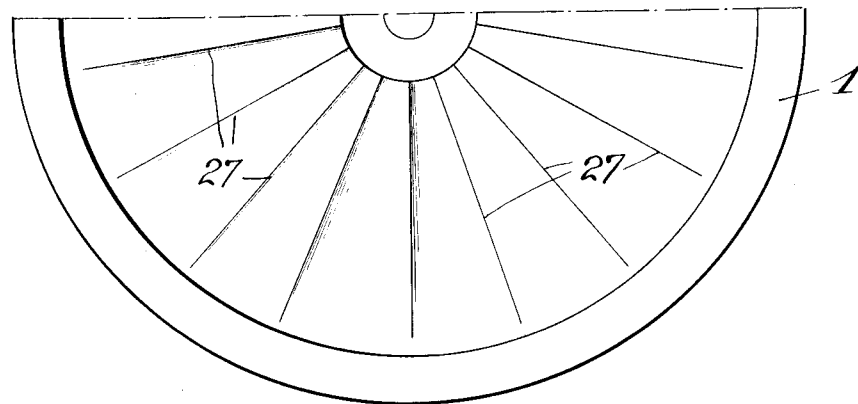


Fig. 5

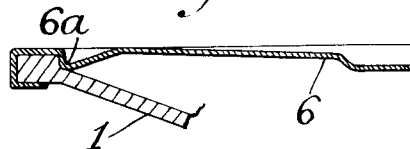


Fig. 6

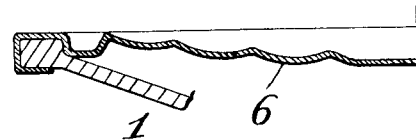
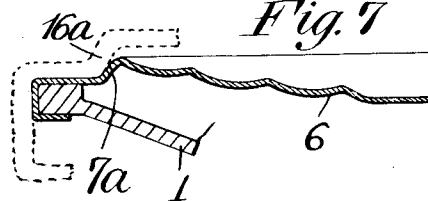


Fig. 7



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UNITED STATES PATENT OFFICE.

EDWARD J. DEEGAN, OF NEW YORK, N. Y.

REGULATOR.

1,064,714.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed February 26, 1913. Serial No. 750,715.

To all whom it may concern:

Be it known that I, EDWARD J. DEEGAN, a citizen of the United States of America, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Regulators, of which the following is a specification.

My invention relates to regulators intended to be actuated by pressure or temperature, and it consists in the peculiar arrangement of the parts which constitute the regulator.

Figure 1, is a vertical sectional view of a regulator embodying my invention. Fig. 2 is an upper plan view of the device, a part of the cover having been broken away to more clearly exhibit the diaphragm which I employ. Fig. 3 is a vertical sectional view of such a regulator with a modified form of base. Fig. 4 is an upper face plan view of the base shown in Fig. 3. Figs. 5, 6, 7, are detail views, in section, of modified forms of the diaphragm.

Regulators have been made of expansible tubes having a number of convolutions, but the difficulty has been that they are so expensive as to prohibit their use in the majority of instances.

To meet the demand for an accurate and sensitive regulator, I have devised the one which I am about to describe.

One great difficulty in the making of an economical regulator has been the making of a tight and durable joint between the diaphragm and the case. I have solved this problem by forming the base with a smooth surface, preferably flat at the edge then bringing the diaphragm tightly down upon this edge, spinning it or otherwise molding it so as to fit around the edge of the base and to fit under that edge and then soldering the extreme edge of the diaphragm to the under face of the outer rim of the base. In addition I prefer to have a cover with a circular edge and to clamp the outer part of the diaphragm tightly between it and the base, though that is not absolutely essential when the other steps are carefully taken. When I simply soldered the diaphragm to the upper face of the base I found that the repeated vibration of the diaphragm was likely to split the joint and render the device useless.

Another feature of my new regulator is the formation of a substantial shoulder or

angle in proximity to the inner periphery of that part of the base to which the edge of the diaphragm is to be secured. That shoulder will be noticed at 7 in the drawings. Its advantage is that it insures the flexing of the diaphragm at that point instead of extending the flexure over that part of the diaphragm which I desire to have kept closely against the base. When the diaphragm begins to rise, it at first presses this shoulder against the base rim and thus holds it even-tighter against it than it was before and when the center of the diaphragm, having passed the horizontal, moves farther upward, the bend at the shoulder forms a convenient hinge which tends to keep the movement at the center, direct and uniform and thus effect more perfectly the regulation desired than it would if the flexing occurred unevenly and the lifting post were tilted or unevenly moved.

Another feature of my regulator, is the formation of stops for limiting the movement of the diaphragm, particularly the downward movement. If no stop be provided, the center of the diaphragm is liable to move downward so far that, in section, it would exhibit quite an angle and when this is the case it requires considerable force to initiate an upward movement, the result being that the regulator then lacks that sensitiveness, which is one of its most desirable qualities.

In the drawings, 1 indicates the base of a regulator for steam. It consists of a circular casting, dished so as to create a space for the steam, provided with a central downwardly projecting boss or hub 2 which is threaded for connection with the service pipe. At the outer edge I prefer to form a rim, 3, rectangular in cross section, with its upper surface slightly above the dish line, and on the under face I usually form projections 4 adapted to receive the ends of the clamping screws 5. Over this base I place a preferably corrugated, diaphragm 6, having a shoulder 7 closely adjacent to the inner face of rim 3. The diaphragm extends over and about said rim 3, spun or otherwise molded to make a close fit, and projects under it, as shown at 8, the edge being preferably secured with solder 9. Over the diaphragm I have arranged a cover 10, circular in outline, though not limited to that form, perforated at the cen-

ter for the passage of the lifting post 11, preferably molded or planed at the edge 12, to fit down upon that part of the diaphragm resting upon rim 3, and also preferably provided with clamping fingers 14 which project from the edge of the cover, downwardly and inwardly, so that the apertures 15 therein may conveniently register with the projections 4, upon the base. These fingers are preferably strengthened by fins or ribs 16. Upon the upper face of the diaphragm, at the center, I seat a lifting post 11, having preferably an enlarged base to keep it upright and a shaft long enough to at all times project upward through the central aperture 17, in the cover. Upon the cover, in pillow blocks 18, I mount a tiltable chair 19, preferably apertured to receive a regulating lever 20, arranged to register with the apex of lifting post 11, and provided with a set screw 21 to hold the chair and lever in proper operative relation. By rabbeting the lower face of the chair and providing a stop 22, projecting from cover 10, I can readily limit the orbit or swing of the chair.

The operation of this device is as follows: When there is no steam on, or the pressure is below a predetermined limit, the diaphragm will remain at its lowest point, and the post and its superposed lever 19 will have corresponding positions. As soon as the pressure of the steam, entering the apertured hub 2, rises above the predetermined point, the diaphragm will begin to rise and carry up with it the lifting post 11, which in turn will press upon the lever 20 and swing it upward on its pivot, formed by the pin 23 of the tilting chair 19. This movement of lever 20 may be utilized to close drafts or turn off steam or otherwise regulate whatever mechanism may be connected with it. When the pressure decreases, a reverse movement will take place, with a reversal of the action of the respective parts and their connections. When the device is to be used as a regulator for vapor heaters or articles of that class, I prefer to construct the base with a somewhat longer hub, as shown, at 2^a, in Fig. 3, threaded as shown, so as to be screwed into a boiler or tube charged with the heating fluid and to provide a nut like projection 24 to accommodate a wrench. In such instances I usually charge the regulator, with a volatile fluid, passed in through aperture 25 and then seal that aperture by a plug 26, or in some other suitable way.

Increased heat above the predetermined degree will cause the volatile fluid to expand and raise the pressure so as to operate the device as already described, and a decrease of temperature toward the predetermined degree will cause the reverse action.

In Fig. 3, I have shown the base cast in a form which of itself constitutes the stop to the undue deflection of the diaphragm. As there shown it is formed with radial ribs 27 projecting upward to lines at the limit of the desired downward deflection of the diaphragm, and for convenience of manufacture such ribs 27 do not extend inwardly beyond the line of the interior of hub 2^a. Their purpose and operation are so manifest, that no detailed description is thought necessary, but I do not limit myself to this exact form or arrangement of stop, anyone suitable for limiting the downward movement of the diaphragm would embody my idea in its broadest sense.

While I prefer the form of shoulder 7 which I have shown in Fig. 1, I also find that some of the advantages of that shoulder may be secured in other forms of diaphragm, such for instance as the one indicated at 6^a in Fig. 5, or one with a shoulder formed by a downward and then an upward bend, as shown in Fig. 6, or one where the shoulder is formed by a bend upward from the level of the part lying immediately above the edge 12. When I use this 7^a form of shoulder, then I prefer to modify the form of the cover so that it may conform to the shape and arrangement of shoulder 7^a as shown at 16^a in Fig. 7.

What I claim and desire to secure by Letters Patent is:—

1. In a regulating device, the combination of a hollow base, provided with a rim, a diaphragm extending over the said base and having its edge brought down upon said rim and carried down about and under said rim and soldered fast on a line lying under the rim and within its outer edge together with a cover, and means for transmitting the diaphragm motion, substantially as set forth.

2. In a regulating device, the combination of a hollow base provided with a rim, a diaphragm extending over the said base, secured to said rim and provided with a hinge shoulder extending from the diaphragm on a line closely adjacent to said rim, together with a cover, and means for transmitting the diaphragm motion, substantially as set forth.

3. In a regulating device, the combination of a hollow base, provided with a rim, a diaphragm extending over the said base, and having its edge brought down upon said rim and carried down about and under said rim and soldered fast on a line lying under the rim and within its outer edge, together with a cover provided with a rim seated tightly over that part of the diaphragm above the rim of the base, and means for transmitting the diaphragm motion, all substantially as set forth.

4. In a regulating device, the combina-

tion of a hollow base, provided with a rim,
a diaphragm extending over the said base
and having its edge brought down upon
said rim and carried down about and under
5 said rim and soldered fast on a line lying
under the rim and within its outer edge, to-
gether with a cover, provided with an ap-
erture at the center and clamping fingers
extending around the rim of the base and the
10 edge of the diaphragm and fastening de-
vices connected with said fingers, substan-
tially as set forth.

5. In a regulating device, the combina-
tion of a hollow base, provided with a rim,
15 a diaphragm extending over the said base
and having its edge brought down upon said
rim and carried down about and under said
rim and soldered fast on a line lying under

the rim and within its outer edge, together
with a circular cover, provided with a rim 20
adapted to be pressed down upon that part
of the diaphragm overlying the rim of the
base, said cover being provided with an ap-
erture at the center and clamping fingers,
extending around the rim of the base and 25
the edge of the diaphragm, and fastening
devices connected with said fingers, sub-
stantially as set forth.

In testimony whereof, I have signed my
name to this specification in the presence of 30
two subscribing witnesses, this 17th day of
February 1913.

EDWARD J. DEEGAN.

Witnesses:

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MARGARET GAVIN.