June 2, 1925. 1,540,035

A. ROESCH

AUTOMATIC REGULATOR

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Fig. 2.

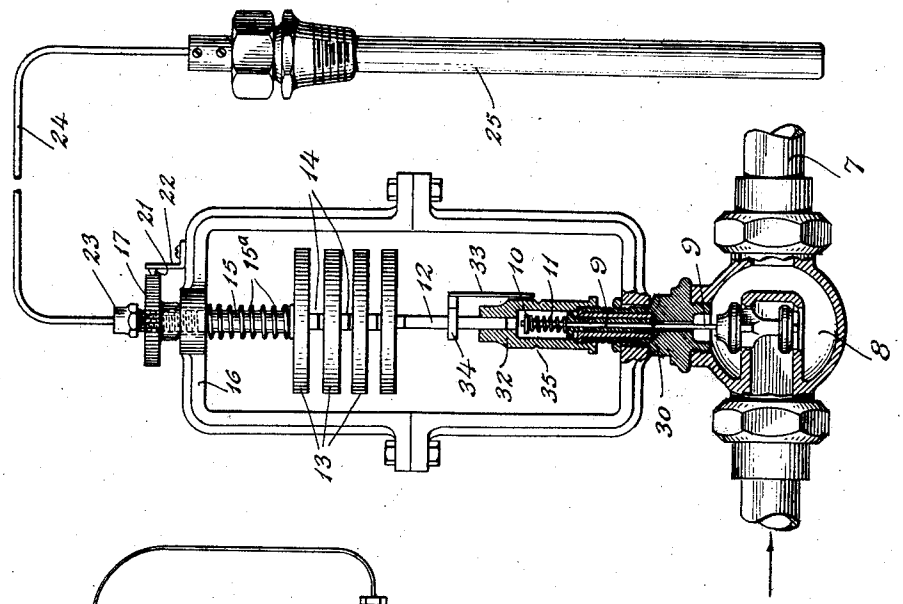
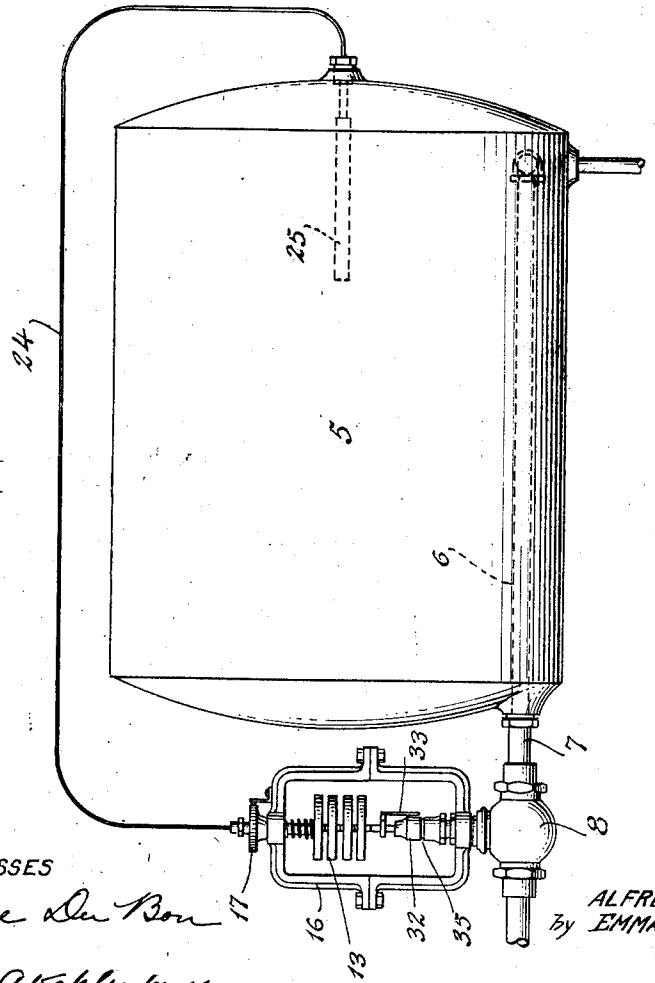


Fig. 1



WITNESSES

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Fig. 3.

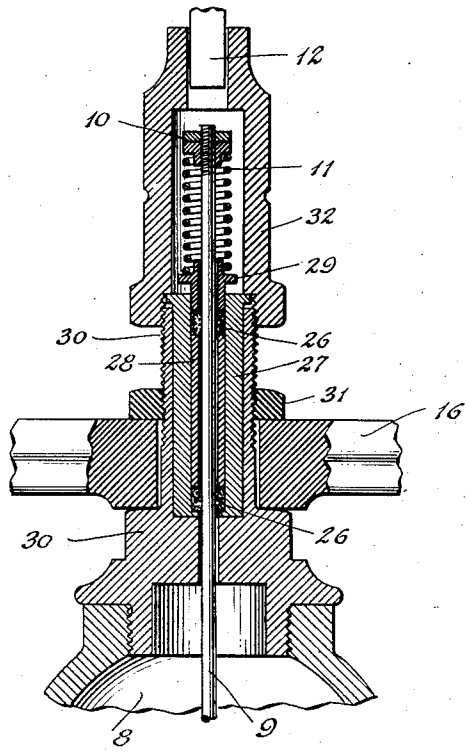
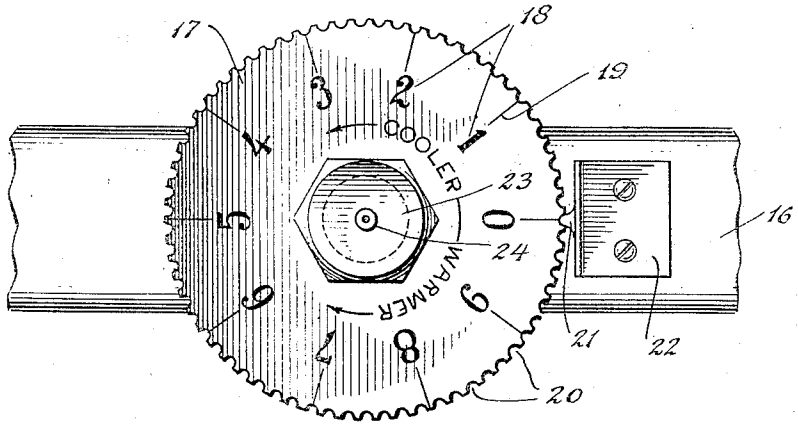


Fig. 4.



WITNESSES

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Patented June 2, 1925. 1,540,035

UNITED STATES PATENT OFFICE.

ALFRED ROESCH, DECEASED, LATE OF BROOKLYN, NEW YORK, BY EMMA ROESCH, ADMINISTRATRIX, OF BROOKLYN, NEW YORK, ASSIGNOR TO CHARLES J. TAGLIABUE MANUFACTURING CO., OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

AUTOMATIC REGULATOR.

Application filed August 9, 1921. Serial No. 491,048.

To all whom it may concern:

Be it known that ALFRED ROESCH, deceased, late a citizen of the United States, and resident of the borough of Brooklyn, county of Kings, city and State of New York, has invented certain new and useful Improvements in Automatic Regulators, of which the following is a specification.

The invention relates to regulators whereby temperatures or pressures are automatically regulated in accordance with predetermined desires or plans. Heretofore regulators of the type in question which, generally speaking, include a valve-operating diaphragm having no inherent elasticity of its own, have depended for their adjustment to various temperatures or pressures and for collapsing the diaphragms and for resisting the internal pressures within the diaphragms upon the use of springs, weights or fluids under pressure. The object of this invention is to provide an efficient and simple construction in which the elements recited above are eliminated and replaced by inherently elastic devices connected directly with the valve whereby the flow of the temperature-producing or pressure mediums is controlled. The invention will be fully described hereinafter and the features of novelty will be pointed out in the appended claims.

In the accompanying drawings, which show an example of the invention and of its application without defining the limits of the invention itself or of its field of usefulness, Figure 1 is an elevation showing the regulator operatively combined with a hot water heater; Fig. 2 is an enlarged detail elevation partly in section; Fig. 3 is a sectional elevation on a still larger scale illustrating a novel stuffing-box arrangement forming part of the invention, and Fig. 4 is a plan view on an enlarged scale illustrating the adjusting arrangements of the improved regulator.

In the illustrated example 5 represents a tank containing water and provided interiorly with a heating coil 6 which is in connection with a pipe 7 leading to a source of steam or other heating medium and controlled by a valve 8 of any suitable type. The valve 8 is carried by a vertically movable stem 9, having its upper end screw-threaded for the accommodation of an adjusting nut 10 which constitutes an adjustable abutment for one end of a spring 11 which serves, when free to do so, as will appear more fully hereinafter, to actuate the stem 9 upwardly and thereby keep valve 8 open, the upward travel of stem 9, in such case, being limited in the customary manner by the usual form of "disc holder." The stem 9 is further arranged to be operated in a downward direction by a rod 12 operatively connected with a capsular spring 13 which latter is preferably connected with a plurality of capsular springs 13 which are connected with each other by means of tubes 14. The upper one of said plurality of capsular springs 13 may be attached to a hollow stud 15 which passes through a suitable opening in the upper portion of a bracket or support 16 and which stud 15 is threaded at its upper end for the accommodation of an adjusting disc 17. The latter, as shown in Fig. 4, is preferably provided on its upper face with suitable graduation marks 18 and designations 19 to facilitate the setting of the regulator; said disc 17 is further preferably provided upon its circumferential periphery with notches or the like 20 adapted to co-operate with a pawl 21 whereby unintentional shifting of the adjusting disc 17 from jarring or vibration is prevented. The pawl 21 is carried by a spring 22 and is yieldingly maintained thereby in engagement with the notches 20; the spring 22 in turn is mounted upon the bracket 16. A spring 15^a which surrounds the stud 15 below the bracket 16 and with one end engages the same and with its other end engages the upper capsular spring 13 keeps the series of capsular springs 13 and the rod 12 pushed downward as far as permitted by the adjusting disc 17, the downward movement of which is arrested by the bracket 16 and into which disc 17 the stud 15 is threaded by a right hand screw-thread; thus, when viewed from the top, if the adjusting disc 17 is turned to the right or clockwise, the stud 15 is drawn upward against the resistance of the spring 15^a, thereby raising the capsular springs 13 and the rod 12 and vice versa. A nut 23 acts as a stop to prevent the adjusting disc 17 from being entirely unscrewed from the stud 15. The diaphragms of the capsular springs 13 are constructed of spring-tempered material so that each capsular spring possesses an in-

herent elasticity tending to return it to its normal condition or, in other words, to collapse it. As stated, the lower terminal capsular spring 13 is connected with the rod 12 while the other terminal capsular spring 13 is connected in the present instance with the capillary tubing 24 leading to the sensitive member or bulb 25 which contains a suitable volatile fluid in the usual way. When the regulator is used as indicated in the illustrated example, the sensitive member 25 is located interiorly of the tank 5 so as to extend into the water therein which is to be heated and regulated. The sensitive member 25 is always located so as to be susceptible to and directly influenced by the temperature at the point where regulation is desired and in the case of pressure regulation is replaced by a suitable device or element located in such case so as to be within the zone of the pressure which is to be regulated.

In describing the operation of the regulator the illustrated example of its use will be utilized as a basis, it being understood that this is done simply for the purpose of description and without intent to define the limits of the invention.

To begin with the adjusting disc 17 is rotated in the proper direction to move the rod 12 upward and in a direction away from the stem 9, thus permitting the spring 11 to actuate valve stem 9 upwardly and thereby move the valve 8 to its wide open position after which the heating medium is turned on, for instance, by opening a suitable control valve located anywhere between the valve 8 and the source of said heating medium, which latter enters the heating coil 6 and thus heats the water in the tank 5. When the water has reached the desired temperature the adjusting disc 17 is rotated in the reverse direction to move the rod 12 downwardly and against the stem 9 which, as the actuation of the disc 17 is continued, is correspondingly shifted to close the valve 8 far enough to admit the amount of heating medium necessary to maintain the water at this temperature to the coil 6; should the temperature of the water now rise above or fall below the predetermined point it will be regulated by the action of the capsular springs 13 upon the valve 8. That is to say, when the temperature of the water rises beyond the desired point the temperature of the volatile fluid in the bulb 25 also rises whereby said fluid is expanded and thus creates a higher pressure in the bulb 25 and tubing 24 which causes the capsular springs 13 to expand. This expansion of said springs is communicated to the rod 12 and thereby to the valve stem 9 and causes an axial movement of the latter in a direction to move the valve 8 toward its seat. In this way the supply of heating medium to the coil 6 is correspondingly reduced with the result that the temperature of the water gradually falls back to the degree desired, the capsular springs 13 meanwhile contracting as the pressure of the volatile fluid is reduced and carrying the rod 12 along whereby the spring 11 is permitted to return the valve 8 to the open position initially occupied thereby.

When the temperature of the water drops below the desired degree, the temperature of the volatile fluid in the bulb 25 is correspondingly reduced, thus causing a decrease of pressure in the capsular springs 13 which consequently contract or collapse, because of the inherent elasticity of the diaphragms thereof. The result of this collapse of said springs 13 is an axial movement of the rod 12 in a direction away from valve stem 9, thereby allowing spring 11 in turn to cause an axial movement of the valve stem 9 in a direction to open the valve 8 beyond its normal open position whereby the supply of heating medium to the coil 6 is increased and the temperature of the water is raised back to its intended point.

From the above it will be clear that the valve 8 is set to admit sufficient heating medium to the coil 6 to produce the temperature in the water which is desired and that said valve 8 is automatically closed or opened beyond this set point by the action of the capsular springs 13 if said temperture rises or falls beyond the desired point and is always returned to its set position after each rise or fall. In this way the temperature of the water in the tank 5 is regulated in the desired manner and is maintained at an approximately constant point in accordance with the predetermined plan.

The battery of capsular springs 13 provides the necessary range of movement to operate the valve 8 within its limits of adjustment and may be increased or diminished in number to meet the requirements of each case.

To secure the most efficient operation in a device of this kind it is essential that the friction of the moving parts be reduced to a minimum and the present construction accordingly includes a novel method of packing the valve stem 9 whereby it is enabled to move freely between two or more valve packings and thus avoids the friction resulting ordinarily from a bearing contact between metal parts. A preferred arrangement is shown in detail in Fig. 3 which also shows how friction is further reduced by the use of a smaller valve stem (made possible by widely spaced bearing surfaces) and how said stem is protected from damage. In the illustrated example 26 indicates two valve stem packings of suitable material, between which the stem 9 slides, said packings being located in the gland 27 and the lower

packing 26 being secured in place therein by a follower 28, while the upper packing 26 is maintained in position by a follower 29. An extension 30 of the valve-bonnet surrounds the gland 27, a lock-nut 31 serving to operatively connect said bonnet with the bracket 16; the gland 27 in turn is secured within extension 30 by means of a sleeve 32 which is in screw-threaded engagement with extension 30, said sleeve 32 also serving to protect from outside damage that portion of the valve-stem 9 which projects beyond the gland 27. The proper compression of the packings 26 is maintained by the spring 11 which has its one end in engagement with the follower 29 and which, in addition to lifting valve-stem 9, also serves the purpose of always keeping said packings 26 under the required pressure, thus at all times preventing leakage of the steam past the packings without undue pressure of the packings against the valve-stem.

Another novel feature of the present invention comprises an indicator 33 mounted upon the rod 12 by means of a collar 34 and which consequently travels up and down with the movement of the rod 12 and therefore also with the movement of valve-stem 9, thus indicating the extent to which valve 8 is closed; the condition of the valve is indicated by the tip of said pointer 33 which registers with a suitable mark 35 on the sleeve 32 when the valve is fully closed or if valve 8 is only partly closed by the distance between said tip of the pointer 33 and the mark 35.

It will be obvious that a cooling medium may be passed through the pipe 7 and coil 6 instead of a heating medium if the conditions incident to the desired operation require that this be done.

The regulator may be used with equal efficiency as a pressure regulator by connecting the tube 24 with the source of the pressure which is to be regulated. It is therefore to be distinctly understood that the terminology used in the claims is intended to cover pressure regulation as well as temperature regulation.

Various changes in the form shown and described may be made within the scope of the claims without departing from the spirit of the invention.

I claim:

1. An automatic regulator comprising a valve controlling the flow of an element, adjusting mechanism operated independently of said valve for adjusting the same to variable set positions to regulate the flow of said element in accordance with a predetermined regulation to be maintained, an expansible and contractible device included in said adjusting mechanism and having an inherent elasticity, said device responding to variations in said element and actuating said adjusting mechanism accordingly whereby the valve is automatically shifted from any given set position in accordance to increase or decrease the flow of the latter to correct deviations from said predetermined regulation, and means independent of said adjusting mechanism for indicating the position of said valve.

2. An automatic regulator comprising a valve controlling the flow of an element, a plurality of capsular springs connected with each other independently of said valve and arranged to control said valve, and an adjusting device whereby said capsular springs are bodily moved as a unit relatively to said valve to predetermine a set position of the latter to regulate the flow of said element in accordance with a predetermined regulation to be maintained, said capsular springs responding to variations in said element whereby the valve is automatically moved from a given set position in accordance to increase or diminish the flow of the latter to correct deviations from said predetermined regulation.

3. An automatic regulator comprising a valve controlling the flow of a heating element, a plurality of capsular springs communicating with each other, a device extending from one terminal spring toward said valve in independent relation thereto, an adjusting device whereby said capsular springs are bodily moved as a unit relatively to said valve to predetermine a set position of the latter to regulate the flow of said element in accordance with a predetermined regulation to be maintained, a capillary tube connected with the other terminal capsular spring and a heat sensitive member connected with said tube, said capsular springs being responsive to said heat sensitive member whereby said valve is automatically moved from given set position in accordance to increase or diminish the flow of said element to correct deviations from said predetermined regulation.

4. An automatic regulator comprising a valve casing, a valve therein for controlling the flow of an element, a valve-stem on which said valve is mounted, a support fixed upon said valve casing, a rod slidably mounted upon said support in axial registry with and independent of said valve-stem, a plurality of capsular springs connected with each other and carrying said rod, an adjusting device for bodily moving said capsular springs as a unit relatively to said stem to predetermine a set position of said valve in accordance with a predetermined regulation to be maintained, and means for indicating the adjustment of said device, said capsular springs being arranged to automatically actuate said rod and said stem whereby said valve is automatically shifted from a given set position in accordance to increase or di-

minish the flow of said element to correct deviations from said predetermined regulation.

5. An automatic regulator comprising a valve casing, a supporting bracket mounted upon said casing, a stuffing-box, a valve in said casing for controlling the flow of an element, a valve stem carrying said valve and projecting through said stuffing-box, an abutment adjustably mounted upon said valve-stem, a spring engaging said abutment and tending to move said valve to an open position, a sleeve secured upon said stuffing-box and enclosing the projecting end of said stem, a rod extending into said sleeve and adapted to engage said stem, a plurality of capsular springs connected with each other and with said rod, a hollow stud carrying said capsular springs and slidably mounted on said bracket, an adjusting disc mounted upon said stud and co-operating with said bracket to bodily move said capsular springs and rod as a unit whereby said valve is adjusted to a set position in accordance with a predetermined regulation to be maintained, a spring whereby said capsular springs are maintained in an adjusted position, a capillary tube connected with said stud and a sensitive member connected with said tubing and controlling said capsular springs and whereby the latter are actuated to automatically move said valve from its set position to increase or diminish the flow of said element to correct deviations from said predetermined regulation.

6. An automatic regulator comprising a valve controlling the flow of an element, a plurality of capsular springs connected with each other independently of said valve and arranged to control said valve, an adjusting device whereby said capsular springs are bodily moved as a unit relatively to said valve to predetermine a set position of the latter to regulate the flow of said element in accordance with a predetermined regulation to be maintained, said capsular springs responding to variations in said element whereby the valve is automatically moved from a given set position in accordance to increase or diminish the flow of the latter to correct deviations from said predetermined regulation and means independent of said adjusting device for indicating the position of said valve.

7. In an automatic regulator, the combination of a valve, adjusting means for predetermining varying set positions of said valve, the latter and said adjusting means having no positive connection with each other and being capable of independent movement and means for automatically moving said valve from its set position.

8. In an automatic regulator, the combination of a valve casing, a tubular extension thereon, a valve, a valve stem carrying said valve and projecting into said extension, a spring within said extension cooperating with said stem to move said valve in one direction, a rod independently slidable in said extension and adapted to engage said stem and to move toward and away from the same and thermo-sensitive means for operating said rod to automatically actuate said valve in the opposite direction.

9. In an automatic regulator, the combination of a valve; a valve stem carrying the same, a plurality of packings for said stem, tubular members engaging said packings, a projection on said stem, a spring engaging said projection and one of said tubular members whereby said valve is actuated in one direction and said packings are compressed and thermo-sensitive means for operating said valve in the opposite direction.

EMMA ROESCH,
Administratrix of Alfred Roesch, deceased.