A. THEOBALD.

TEMPERATURE REGULATING APPARATUS.

APPLICATION FILED JULY 17, 1911.

1,051,525.

Patented Jan. 28, 1913.

2 SHEETS—SHEET 1.

Fig. 1.

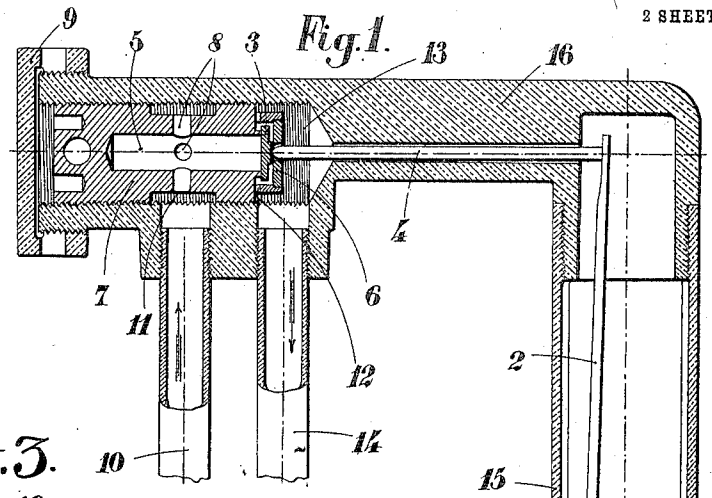


Fig. 3.

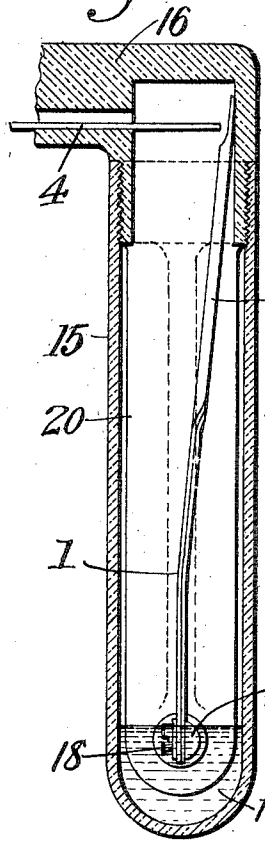
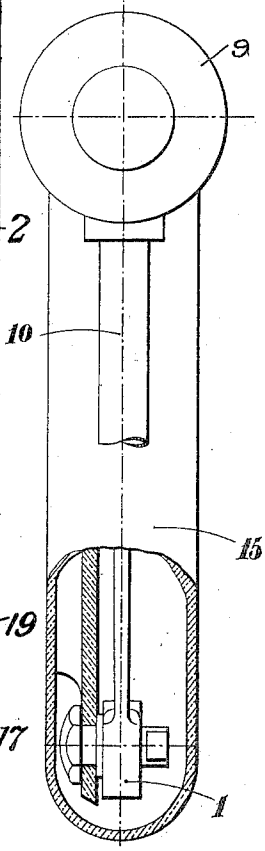
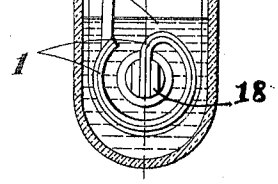


Fig. 2.





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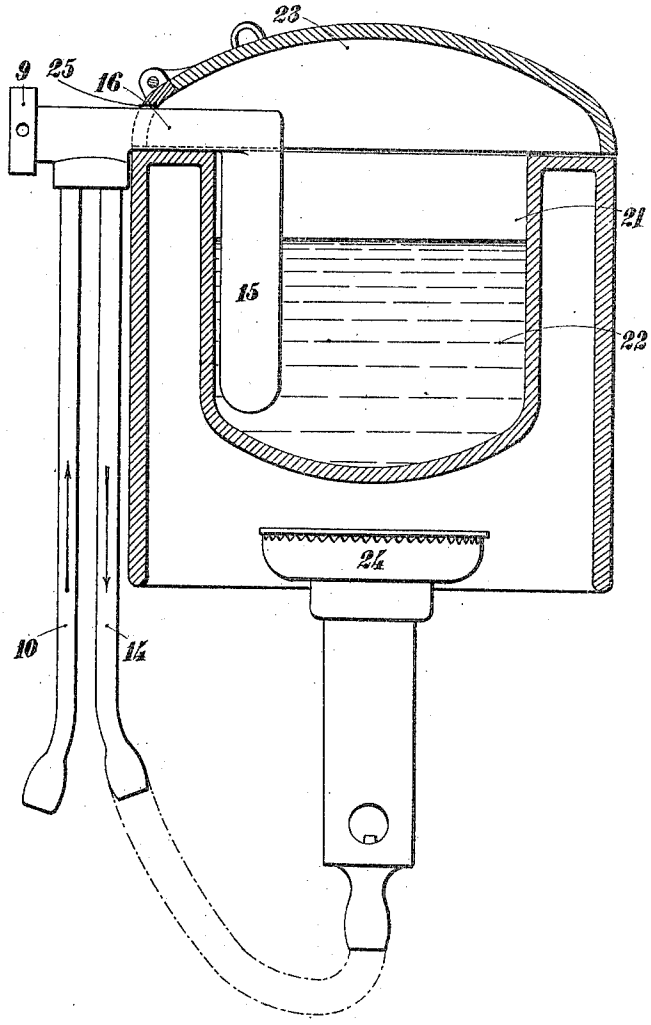
2 SHEETS—SHEET 2.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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TEMPERATURE-REGULATING APPARATUS.

1,051,525. Specification of Letters Patent. Patented Jan. 28, 1913.

Application filed July 17, 1911. Serial No. 638,919.

To all whom it may concern:

Be it known that I, ALBERT THEOBALD, citizen of the French Republic, residing at Paris, Department of the Seine, in France, have invented certain new and useful Improvements in or Relating to Temperature-Regulating Apparatus, of which the following is a specification.

This invention relates to thermostatic valves, designed to keep constant a supply of heat, by automatic operation.

The main object of the invention is to provide such a device of improved type and all of whose working parts shall be thoroughly protected from injury.

Various other objects will appear however as the specification proceeds.

The invention is especially applicable in cases where high temperatures are encountered, so it will be found very valuable when used in connection with composing machines where great heat is necessary to melt the type metal used.

Broadly the invention consists in providing a valve of novel construction, operated by an expansible member, and embedding this member in a solidified mass of low fusion point.

The invention is embodied in the accompanying drawings but it will be understood that various modifications can take place without departing from the spirit or scope of the invention.

In the accompanying drawings, Figure 1 is a longitudinal section of a device according to this invention, Fig. 2 a side elevation, partly in section, and Fig. 3 a modified construction. Fig. 4 is a side elevation partly in section of the thermostatic device used in conjunction with the metal pot of a composing machine.

The apparatus shown in Figs. 1 and 2, comprises a casing 15 which is screwed on the body 16 of the gas valve and dips into the pot, the temperature of which it is desired to regulate. The casing contains at 17 a quantity of easily fusible metal into which dips a spiral 1 made of two iron and copper strips arranged back to back, the copper being on the inside. The spiral is secured at one end and provided at the opposite end with a very light arm 2 which by means of a rod 4 acts on the mechanism regulating the admission of gas. The body of the valve carries two pipes 10 and 14 screwed into the part 16, the former pipe being connected to the inlet pipe for the gas, and the second to the heating burner. These two conduits open into a chamber 13 having a screw-threaded interior and made in the part 16. Within the said chamber is screwed a cylindrical plug 7 comprising a passage 5 extending throughout a portion of its length and connected by radial openings 8 to a circular groove 11 arranged at the outer portion of the plug 7. At the end of the conduit 5 is arranged a valve 3 in contact with a rod 4 which passes freely through the body 16, and the end of which is connected to the rod 2. A washer 6 perforated at the center to allow the rod 4 to pass, maintains the valve 3 in position but leaves it a certain amount of play. The cylindrical plug 7 has openings 12 which enable gas to pass into the portion of the chamber 13 communicating with the pipe 14.

To the end of the body 16 is secured a cover 9 which insures an air tight closing.

The operation of the device is as follows: The apparatus is first of all adjusted for a given temperature (for instance of 290° in the case of the application to a type casting machine). This adjustment is effected by screwing the plug 7 into the chamber 13 to a greater or less extent. The cover 9 having been firmly screwed on, and the apparatus put in place in the pot, the burner with the large flame is lighted so as to bring about the melting of the lead contained in the said pot. The temperature gradually rising the metal at 17 will be melted also. As the strip with the greater coefficient of expansion, that is to say, the copper strip is on the inside, the spiral 1 will open under the influence of heat. It will act by means of the rods 2 and 4 on the valve 3 which will close the opening of the conduit 5 proportionately to the height of the temperature, and thus will regulate the supply of gas. The latter entering through the conduit 10, groove 11 and conduit 5, reaches the pipe 14 which feeds the burner. If the apparatus has been properly adjusted, the valve 3 will be applied to its seat at the moment when the temperature is equal to 290°. The burner has then merely a weak blue flame maintained by the gas passing through a recess made in the valve 3. As soon as the temperature drops, the spiral closes, the pressure of the gas pushes back the valve, and the flame resumes its intensity until the temperature again reaches 290°, when the valve

is again closed. In that way, the temperature can be maintained practically constant.

In the construction shown in Fig. 3, the sensitive element is constituted by a band formed of two different metals (for instance copper and iron). This band is slightly curved or flat, and the metal with the greater coefficient of expansion (copper) is arranged at the side opposite to the distributer. This strip is secured by means of a screw 19 to a boss 18 supported by a plate 20 secured to the body 16 of the valve. Being almost straight, it is easier to manufacture than the double metal spiral of the apparatus shown in Figs. 1 and 2. To the band 1 is attached an arm 2 which at its upper end is adapted to engage a horizontal rod 4. The latter is preferably hollow and made of light material such as glass, so as to move under the action of a slight effort exercised in the direction of its axis at its free end. At its opposite end it acts on a valve similar to that previously described and used for controlling the admission of the gas.

The operation is entirely similar to that hereinbefore described. When the temperature rises, the double metal band 1 is heated both by the bath 17 and by the radiation of the casing 15. The copper strip arranged at the right hand side of the band 1, expands more than the iron strip arranged at the left hand side, and has the tendency to bring the arm 2 nearer to the vertical position. The rod 4 thus being pushed to the left, acts on the valve and reduces the admission of gas, which lowers the temperature to its normal amount.

Fig. 4 shows the thermostatic regulating device used in conjunction with a metal pot 21 of a composing machine. The casing 15 of the thermostatic device dips into the molten metal 22 contained in the pot 21. The cover 23 is provided with an opening or groove 25 to permit the passage therethrough of the body portion 16 of the regulating device. The burner 24 situated beneath the metal pot is supplied by gas through the passages 10 and 14, as heretofore described.

The apparatus described has the advantage of being very strong. All the parts of the mechanism are in fact inclosed in an air tight casing, and no accidental deterioration can take place. The adjustable portion being accessible only after the plug has been removed, the apparatus is thus protected from clumsy manipulation or other harm. At the same time, as the transmission gear does not comprise any joints, the friction is absolutely negligible, and the apparatus extremely sensitive, which enables the temperature to be maintained constant within half a degree. Finally, each time that the metal cools the spiral is imprisoned in a metal block. In that way, deformation of the said strip is avoided, and the regulation permanently insured.

I claim:

1. In a thermostatic valve, a valve portion, incoming and outgoing gas passages in said portion, an adjustable valve seat interposed in said passages, a valve to cooperate with said seat, means to operate said valve comprising a casing adapted to withstand high temperatures, an expansible member in said casing, an easily fusible metal surrounding said expansible member, and connections whereby the expansion and contraction of said member can operate said valve.

2. In a gas controlling mechanism, a casing, a valve carried by a portion of said casing, an expansible member carried in a second portion of said casing, an easily fusible metal surrounding said member adapted to be heated through the casing, and connections whereby the expansion and contraction of said expansible member can operate said valve.

3. The combination with a valve, of an operating mechanism therefor comprising a casing, an expansible member in said casing, an easily fusible material surrounding said member, said material adapted when fused to render the expansible member operative and when in an unfused state to protect the said expansible member, and connections between the valve and expansible member whereby the valve is operated by the expansion and contraction of said expansible member.

4. The combination with a valve, of operating means therefor comprising a casing, a support in said casing, an expansible member mounted on said support, an easily fusible metal surrounding said member adapted when unfused to protect the expansible member and when fused to render said member operable, and connections between said member and the valve whereby the valve is operated by the expansion and contraction of said expansible member.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALBERT THEOBALD.

Witnesses:
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Emile Klot.