

No. 770,345.

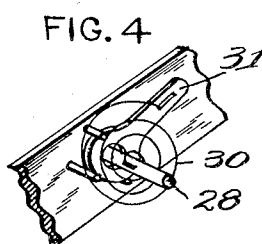
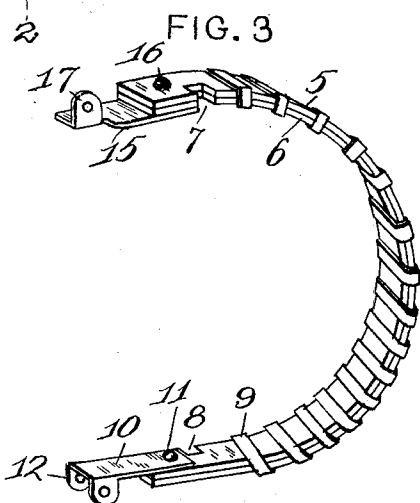
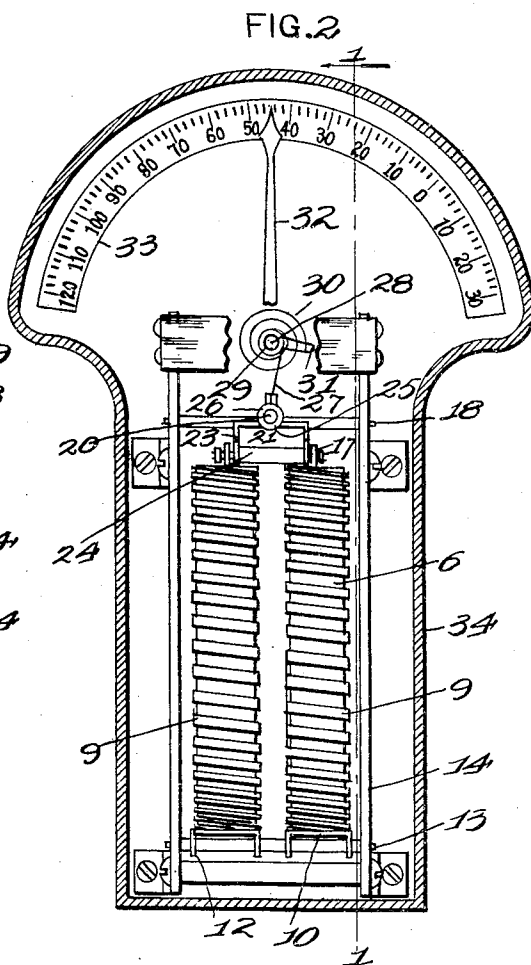
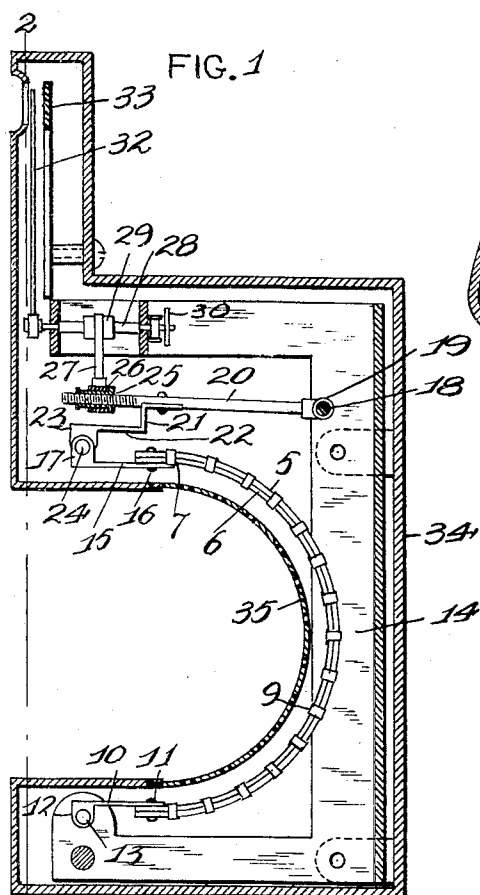
PATENTED SEPT. 20, 1904.

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THERMOMETER.

APPLICATION FILED JAN. 21, 1904.

NO MODEL.



ATTEST.
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UNITED STATES PATENT OFFICE.

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THERMOMETER.

SPECIFICATION forming part of Letters Patent No. 770,345, dated September 20, 1904.

Application filed January 21, 1904. Serial No. 189,984. (No model.)

To all whom it may concern:

Be it known that we, THEODORE H. WURMB and ROBERT BAUMANN, citizens of the United States, residing at St. Louis, State of Missouri, have invented certain new and useful Improvements in Thermometers, of which the following is a specification containing a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

Our invention relates to improvements in thermometers; and it consists in the novel construction, combination, and arrangement of parts hereinafter shown, described, and claimed.

The object of our invention is to produce a thermometer for indicating and recording any degree of natural high or low temperature, and which shall be as reliable as mercury in vacuum, but more sensitive, and consequently of quicker action.

After many historical experiments with zinc and iron bars, with platinum combined with different metals, and with flat spirals of brass and steel, and also with spiral mercury-tubes and many more devices of our own design we succeeded in controlling the action of zinc, which is by far the most sensitive of the cheaper metals.

In the drawings, Figure 1 is a vertical central section showing the thermostat in side elevation and taken on the line 1 1 of Fig. 2 and looking in the direction indicated by the arrow. Fig. 2 shows the casing in section and the thermostat in front elevation as seen looking on the line 2 2 of Fig. 1. Fig. 3 is a perspective of the thermostatic spring. Fig. 4 is an enlarged detail of the means of operating the indicator.

Referring to the drawings in detail, a flat tempered strip of steel 5 is curved into a half-circle and a strip of rolled sheet-zinc 6 of the same shape is held flat against the concave side of the strip 5, the ends of said strips being secured rigidly together and there being a notch 7 formed through the strips 5 and 6 at their upper ends and a similar notch 8 at their lower ends, the notch 8 being in the op-

posite edges of the strips from the notch 7. A narrow strip 9 of rolled zinc has one end secured to the strips 5 and 6 by bending into the notch 7, and said strip is wound spirally around the strips 5 and 6, and its other end is secured by bending into the notch 8, thus completing the thermostatic spring. The lower end of the thermostatic spring is secured to the hinge-plate 10 by a rivet or bolt 11, inserted through the hinge-plate and through the ends of the strips 5 and 6, and perforated ears 12 extend downwardly from the plate 10. In Fig. 2 we have shown two thermostatic springs mounted side by side, and the pivot-pin 13 is inserted through the ears 12, the ends of said pin being supported by the frame 14. A second hinge-plate 15 is secured to the upper end of the thermostatic spring by a rivet 16, inserted through the plate and through the ends of the strips 5 and 6, and a perforated ear 17 extends upwardly from the plate 15. The shaft 18 is mounted in the frame 14 and supports the collar 19, and a rod 20 extends forwardly from said collar. A bracket 21 is secured near the forward end of the rod 20 and extends downwardly and forwardly. The hinge member 22 is formed integral with the bracket 21, and the ears 23 extend downwardly from the forward end of the hinge member 22 and are secured to the ears 17 by the shaft 24. The adjusting-collar 25 is screw-seated upon the forward end of the rod 20 in front of the bracket 21. A sleeve 26 is mounted loosely upon the collar 25, and a flexible band 27 is attached to this sleeve. The indicator-shaft 28 is mounted in the frame 14 above the forward end of the rod 20 and carries a winding-drum 29, upon which the upper end of the band 27 is wound. At the rear end of the shaft 28 a spiral hair-spring 30 forms an adjustable yielding connection between the adjusting-arm 31 and said shaft 28. An indicator 32 is fixed upon the forward end of the shaft 28 and swings in front of the graduated dial-plate 33.

The frame 14 and the dial-plate are inclosed in a suitable casing 34, the front wall of said casing being recessed and the perforated plate

35 inserted, said plate being curved and fitting closely within the concave side of the thermostatic spring, so that atmosphere passing through the perforations in the plate will strike directly against the springs.

The operation depends upon the different effects produced upon the strips 5, 6, and 9 by changes in temperature. It is a well-known fact that rolled zinc is the most sensitive of cheap metals. The thickness of the steel strip 5 and of the zinc strip 6 must be in such proportions that the expansive force of the zinc will overcome the tension of the steel when the temperature raises, and so that when the temperature falls the tension of the steel will tend to bend the zinc back to its normal position. This action is reinforced by the spiral strip 9, said spiral strip being considerably longer than the other strips, and the ends of the spiral strip being rigidly secured to the strips 5 and 6. Supposing that the radius of the semicircular thermostatic spring is an inch and a half and that it is subjected to a change of temperature of 110°, raising from zero to 110° Fahrenheit will carry the shaft 24 upwardly a distance of about three-sixteenths of an inch, thus allowing the hair-spring 30 to move the indicator-shaft and carry the pointer from zero to "110."

We have found by experiments that spirals of steel and zinc or brass united by soldering the edges or winding wire or using clamps or staples not only act much slower than the half-circular spring, but continuously lose the contracting tendency; but winding a flat strip of steel and zinc with a narrow strip of zinc gives correct results and is entirely different in construction. Such a thermometer is capable of indicating and recording the momentary changes of temperature, such as are caused by a sudden gust of wind, or if the instrument is placed with its face to the sun it

will be affected by the different densities of the passing clouds.

We claim—

1. A thermostat composed of flat tempered steel curved and lined with sheet-zinc and united by a narrow strip of zinc wound spirally around both the steel and sheet-zinc, the ends of said strip being secured to the ends of the curved spring of steel and zinc.

2. A thermostat composed of flat tempered steel and sheet-zinc curved as described and united by bolting the ends together and also by winding a narrow strip of zinc spirally around both, and flanged extension-pieces at both ends of the compound spring.

3. A thermostatic spring, comprising a strip of tempered steel, a similar strip of rolled zinc, said strips being curved with the zinc upon the inside, and a third strip of zinc wound spirally around the first two strips, the ends of the three strips being secured rigidly together.

4. A thermostat comprising a strip of tempered steel, a similar strip of rolled zinc, said strips being curved with the zinc upon the inside, and a third strip of zinc wound spirally around the first two strips, the ends of the three strips being secured rigidly together, an extension-piece at one end of said strips, a hinge connecting said extension-piece to a support, an extension-piece at the other end of said strips, and an indicator mechanism connected to the last-mentioned extension-piece, substantially as specified.

In testimony whereof we have signed our names to this specification in presence of two subscribing witnesses.

THEODORE H. WURMB.
ROBERT BAUMANN.

Witnesses:

EDWARD E. LONGAN,
ALFRED A. EICKS.