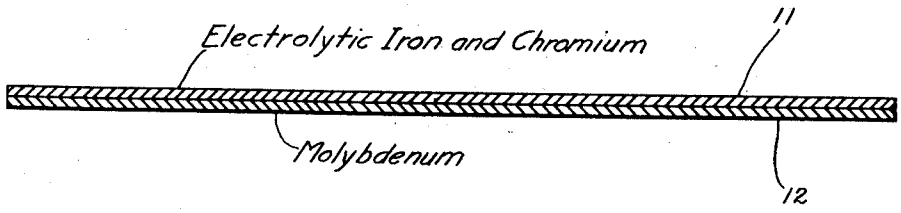
Feb. 28, 1928. 1,660,911

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THERMOSTATIC MATERIAL

Filed March 12, 1925



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Patented Feb. 28, 1928.

1,660,911

UNITED STATES PATENT OFFICE.

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THERMOSTATIC MATERIAL.

Application filed March 12, 1925. Serial No. 14,971.

My invention relates to temperature controlled devices and particularly to thermostats and thermostatic materials.

The object of my invention is to provide a bimetallic thermostat that shall be easily manufactured, that shall retain the characteristics of the individual metals after manufacture and that shall be effective over a relatively large temperature range.

In practicing my invention, I provide a heat-responsive device comprising metallic elements, one of which is an alloy of electrolytic iron and chromium, and the other of which is molybdenum.

The single figure of the drawing illustrates, in section, a bimetallic thermostat embodying my invention.

It has heretofore been suggested to use as one of the metal members of a bimetallic thermostat, an iron-carbon-chromium alloy in which the chromium comprises approximately 13% to 15% of the total metallic content and the carbon from 0.1% to 1% thereof. I have found that it is relatively difficult to effect an intimate bonding of this alloy with a cooperating metal element owing to the development of cold brittleness on the part of the iron-carbon-chromium alloy as a result of the heating operations necessary to braze this alloy to a cooperating metal element.

I have found that an iron-chromium-alloy made up of electrolytic iron and pure chromium or low carbon chromium and a small quantity of manganese is ductile even after heating to effect the brazing thereof to a cooperating metallic element and that therefore it may be cold rolled as is required in order to reduce the thickness of the bimetallic sheet to a suitably small value.

The range of composition of such an iron chromium alloy is about as follows:

	Per cent.
Chromium	15 –30
Manganese	.1– 1
Carbon less than	.05

and the balance iron or steel and minor impurities. The temperature expansivity of such an iron-chromium alloy between the imits of substantially 0° C. and 700° C. is approximately 12×10^{-6} units per unit length per degree centigrade.

The hereinbefore described metal element may be employed in connection with an irreversible nickel-steel alloy, of which an alloy containing approximately 26% nickel is typical.

However, I have found that molybdenum may be employed as the co-operating metal element as it has a temperature expansivity of substantially 5.4×10^{-6} units per unit length per degree centigrade over substantially the same temperature range as hereinbefore stated for the iron-chrominum alloy.

I have found that the two metal elements may be heated, heat treated and rolled as is required in the manufacture of the ordinary bimetallic thermostatic members without either or both of the metallic elements developing cold brittleness, both remaining ductile after the necessary heating. This characteristic of the electrolytic iron and chromium alloy to retain its ductility is of great value where it is desired to employ a bimetallic thermostat over a relatively wide range of temperature, such as in included between the limits of 0° C. and substantially 700° C.

In the drawing, the numeral 11 indicates one metal element of a bimetallic thermostat that is composed of electrolytic iron and pure chromium and the numeral 12 indicates the cooperating metal element thereof that consists of molybdenum. Any suitable or desired method of effecting a close and intimate union between the two metal elements over their entire abutting faces may be employed in a manner well known in the art.

Since various modifications and changes may be made without departing from the spirit and scope of the invention, I desire that only such limitations shall be placed thereon as are imposed by the prior art.

I claim as my invention:

1. A heat-responsive device comprising two metallic elements, one of said elements being an alloy of electrolytic iron and chromium haivng a relatively high temperature coefficient of expansion and the other of said elements being a metal having a relatively low temperature coefficient of expansion.

2. A heat-responsive device comprising a

plurality of metallic elements, one of said elements being an alloy of electrolytic iron and chromium with a greater percentage of iron than of chromium, the other of said elements being molybdenum.

3. A heat-responsive device comprising a plurality of metallic elements, one of said elements being molybdenum, and the other of said elements being an alloy of electrolytic iron and chrominum.

In testimony whereof, I have hereunto subscribed my name this 9th day of March, 1925.

PORTER H. BRACE.