Mar. 5, 1929. C. S. GORDON 1,703,880

THERMOSCOPE

Filed Dec. 30, 1924

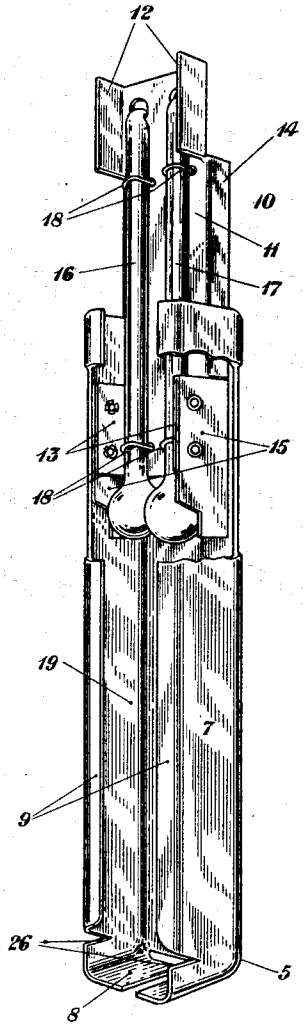


Fig. 1

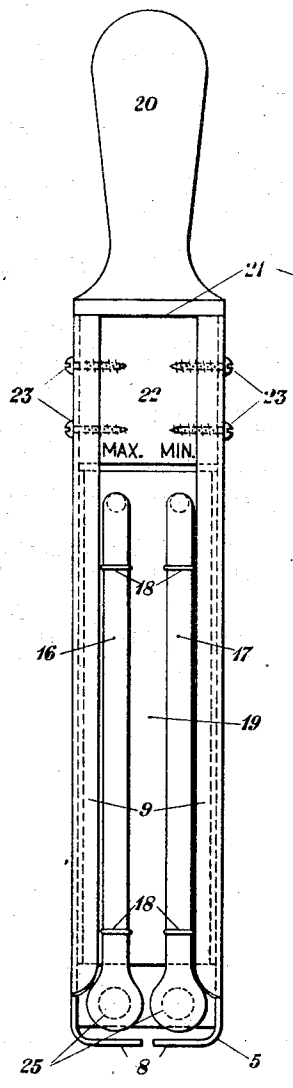


Fig. 2

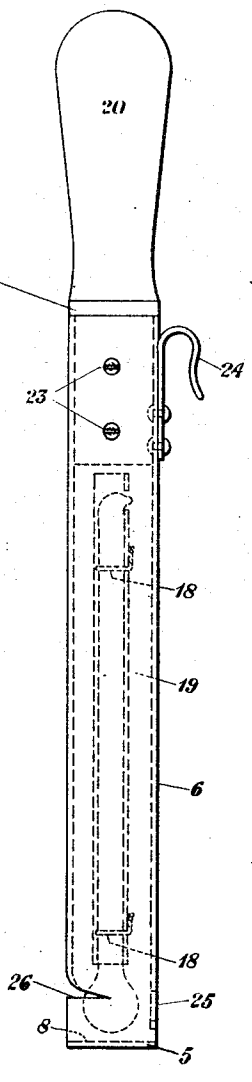


Fig. 3

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UNITED STATES PATENT OFFICE.

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THERMOSCOPE.

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This invention relates to thermoscopic instruments for indicating temperature ranges in melted substances, and more particularly in substances such as paraffin or the like.

An object of the invention consists in the provision of a thermoscope having contained elements which will function at predetermined ranges to indicate when the desired temperature range is reached in heating substances.

Another object consists in providing an instrument of this character of such ruggedness as to render it practically free from breakage.

Other and further objects will be apparent from the following description, when considered in connection with the accompanying drawing, in which one embodiment of the invention is illustrated.

Referring to the drawing, in which like characters of reference designate like parts throughout, Figure 1 is a perspective view of the improved device, Fig. 2 is a front elevation thereof, and Fig. 3 is a side view of Fig. 2.

The metal parts of this arrangement are preferably composed of rust-proof and non-corrosive materials, and, in the drawing, the numeral 5 represents a hollow, rectangular casing which may be nickel-plated. The casing 5 is provided with a flat back portion 6 having two flat side portions 7 and a bottom portion 8 which extend forwardly therefrom. The corners of the casing 5 are preferably rounded, and the front portions 9 are turned a short distance inwardly toward each other from the side 7 so that there is a comparatively wide space provided in the front of the casing to provide a sight-opening between the adjacent edges of the portions 9.

A carrier 10 is slidably positioned within the hollow casing 5 in such manner that it may be easily inserted in or withdrawn from said casing through the open upper end thereof. The carrier is provided with a flat portion 11, from the upper part of which two integral lugs 12, and from the lower part of which two corresponding lugs 13, extend forwardly. The edges 14 on each side of the portion 11, lying between the upper lugs 12 and lower lugs 13, are turned backwardly so that the depth presented by the forwardly extending lugs and backwardly extending portions provide sides for the carrier 12 of such dimensions to just permit the slidable engagement of said carrier with the channel portions formed between the front portions 9 and the interior back wall of the casing 5. In the drawing, two plates 15 are indicated as affixed respectively to the sides of the lower lugs 13. These plates extend downwardly from said lugs and are provided for the purpose of forming a bumper to limit the descent of the carrier 10 into the casing.

A pair of parallel glass tubes 16 and 17 are longitudinally mounted on the face of the carrier 10 in any suitable manner, for instance, as illustrated by means of wires 18 which encircle the tubes near their upper and lower extremities. The ends of these wires extend through openings in the carrier into the chamber 19, provided between the back of said carrier and the interior back wall of the casing 5. The ends of each pair of wires are then twisted so as to firmly retain the tubes in position. The upper parts of the tubes may be extended to form tips (as more clearly indicated in Fig. 3) which extend through holes in the carrier and serve to more rigidly position the tubes on said carrier. The sight-opening in the face of the casing between the longitudinal edges of the portions 9 is such as to permit a full view of the mounted tubes so that the action of their contents may be readily observed. The lower parts of the tubes have the usual enlarged globular portions which contain the ingredients which respond to temperature changes, and, in order that these may be more clearly visualized, openings 25 are provided through the rear wall of the casing directly behind the globular portions. The casing may have slots provided at either side of the globular portions to permit the entrance of light to facilitate the observation of their contents. The casing affords protection to the tubes by providing a partial enclosure therefor so that they are not subjected to outside contact and thus breakage thereof is negligible.

A handle, which may be composed of hard wood, is provided for the improved arrangement, and this is shown as having a surface 20 so formed as to be readily grasped by the hand. A central portion 21 is formed in the handle of such dimensions as to fit over the top edges of the casing and extending

downwardly therefrom is a rectangular portion 22, which fits within the casing and is secured thereto by screws 23, which may be introduced through the sides 7 of the casing. The portion 22 extends within the casing a sufficient distance to engage the top of the carrier 10, and serves to prevent longitudinal movement thereof. A hook 24 may be affixed to the back of the casing for the purpose of attaching the thermoscope to the side of the vessel in which is contained the substance to be tested.

If it is desired for any purpose to remove the carrier from the casing, the wooden handle is detached therefrom so that the carrier may be readily slipped out through the open top of the casing.

The chemical compounds used in the glass tubes are selected so that melting points will occur at predetermined temperatures and these elements may consist of organic or inorganic salts, or alloys. These ingredients may be mixed in different proportions to obtain desired melting points in the respective tubes. For example, if it is desired that the contents of the tubes shall respond respectively to temperatures of 375° Fahrenheit and 390° F. thallium nitrate and silver nitrate may be used. Thus, to obtain in one tube a melting point at 375° F., the salts are mixed in approximately the following proportions: 85% silver nitrate, and 15% thallium nitrate. To obtain in the other tube a melting point of 390° F., the salts are mixed in approximately the following proportions: 90% silver nitrate and 10% thallium nitrate.

Thus, the desired temperatures of the melted substance, for instance, paraffin, are indicated by the salt crystals changing into a clear liquid when melted. On cooling, the salts return to the crystalline form and the performance may be repeated without any change in the melting points.

It will be understood that sufficient substance is contained within the tubes to make it readily visible in both unmelted and melted conditions. The substances in the tubes in their normal, cool state present an opaque appearance, which changes into a clear liquid state when subjected to the proper temperature. The contents of tube 16 will change from an opaque state to a clear liquid state when subjected to a temperature of 390° F. and the contents of tube 17 will change from an opaque state to a clear liquid state when subjected to a temperature of 375° F. The provision of the improved structure with the tubes mounted therein, as above described, furnishes a very convenient form of thermoscope for determining the temperature of heated compounds, such as paraffin or the like. The casing forms a covering which protects the tubes from breakage and the sight opening permits the state of the substances in the tubes to be readily observed. Although other containers for the chemical compounds may be used, it has been found convenient to employ tubes of the character indicated for this purpose. These tubes afford good visibility, may be mounted in the casing in a convenient manner, and may be readily removed and expeditiously replaced in the field if necessary. Thus, when the tubes of the thermoscope are immersed in the melted compound or paraffin to be tested, their contained substances will respond in a characteristic manner when the compound or paraffin reaches the desired temperature. When the compound or paraffin reaches 375° F., the minimum temperature is indicated by the normally opaque substance in tube 17 becoming clear, and when the temperature reaches 390° F., the maximum temperature is indicated by the substance in the tube 16 becoming clear. Therefore, the temperature of the compound or paraffin may be readily determined by removing the thermoscope from the compound or paraffin if necessary, and noting the condition of the substance in tubes 16 and 17 through the sight opening in the casing. When the heated compound or paraffin reaches the desired temperature range, as previously indicated, it is in proper condition to be applied to insulated electric conductors.

From the foregoing, it is thought that the construction, operation and many advantages of the herein-described and delineated invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion and minor details of construction, as well as changes in the proportional parts of the ingredients may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention, as defined in the appended claims.

What is claimed is:

1. A thermoscope comprising a casing, a carrier mounted therein, a handle forming a cap for said casing and extending therein to prevent longitudinal movement of said carrier, a pair of tubes mounted on said carrier having contained chemical compound elements of like ingredients, but of different proportions, respectively, the elements being apportioned in said tubes to respond to predetermined temperature ranges to respectively indicate the maximum and minimum heat conditions in melted substances.

2. A thermoscope comprising a casing, a carrier mounted therein, parallel tubes mounted on said carrier, each tube having silver nitrate and thallium nitrate of different proportions contained therein to respond respectively to predetermined ranges in temperature of melted substances, the ingredients in one of said tubes being fusible

at a temperature of approximately 375 degrees Fahrenheit to indicate the minimum heat condition in the melted substance, and the ingredients in the other tube being fusible at a temperature of 390 degrees Fahrenheit to indicate the maximum heat conditions in melted substances.

3. A thermoscope comprising a casing, a carrier mounted therein, parallel tubes mounted on said carrier, each tube having ingredients therein to respond respectively to predetermined ranges in temperature of melted substances, the ingredients in one tube comprising silver nitrate of approximately 85% and thallium nitrate of approximately 15%, and the ingredients in the second tube comprising silver nitrate of approximately 90% and thallium nitrate of approximately 10%, the ingredients in said first tube being fusible at a temperature of approximately 375 degrees Fahrenheit to indicate a minimum heat condition in the melted substance, and the ingredients in the second tube being fusible at a temperature of approximately 390 degrees Fahrenheit to indicate a maximum heat condition in the melted substance.

4. A thermoscope comprising an elongated casing of substantially rectangular shape having flanges extending longitudinally of its front side to provide a sight-opening between the edges of said flanges, said casing having a substantially closed bottom portion and an open top portion, a carrier mounted in the casing, said carrier comprising a flat portion having extensions forwardly and rearwardly thereof to respectively engage the flange portions and rear portions of said casing to permit a slidable engagement of the carrier into position in the casing, parallel tubes mounted on the carrier in a position to be visualized through the sight-opening, and a handle affixed to the upper portion of the casing and extending therein to prevent the longitudinal movement of said carrier.

In testimony whereof, I have signed my name to this specification this 26th day of December, 1924.

CHESTER S. GORDON.