May 27, 1941. R. E. OLSON 2,243,355

THERMOSENSITIVE INSTRUMENT

Filed May 17, 1939

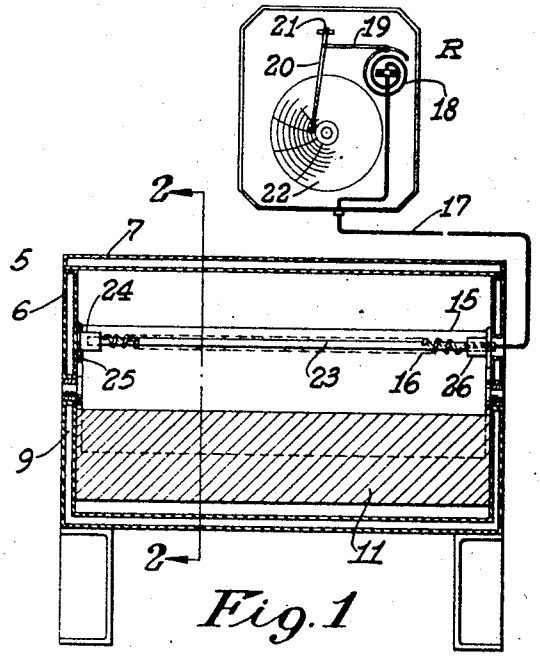


Fig. 1

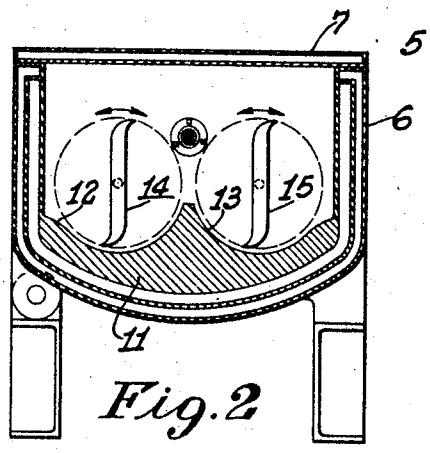


Fig. 2

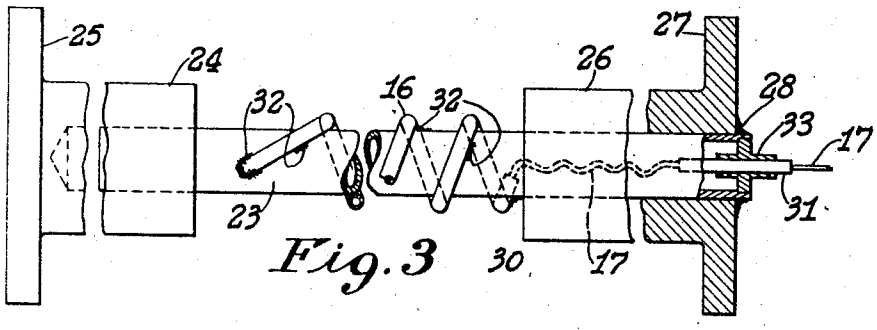
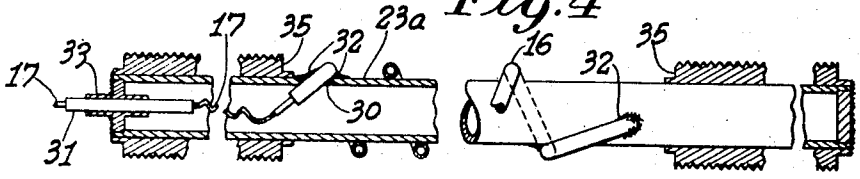


Fig. 3

Fig. 4



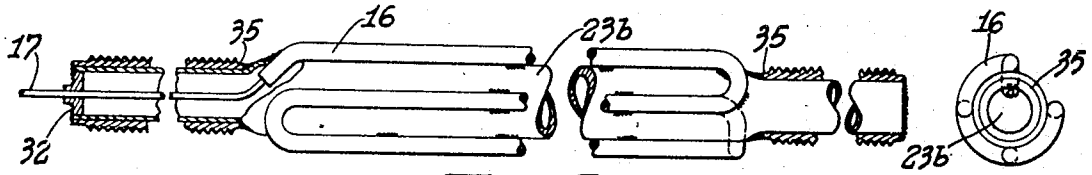


Fig. 5

Fig. 6

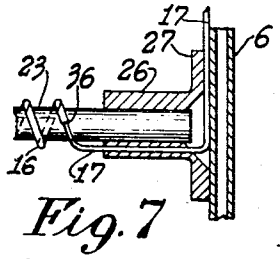


Fig. 7

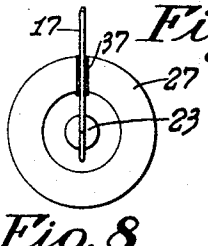


Fig. 8

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THERMOSENSITIVE INSTRUMENT

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4 Claims. (Cl. 297—3)

This invention relates to thermosensitive instruments.

In the manufacture of various products, particularly rayon, it is necessary to shred and mix the raw materials preferably at a predetermined temperature. Since the mentioned raw materials, which include cellulose, are relatively poor heat conductors, it is difficult to obtain an accurate determination of the average temperature thereof. Furthermore, the bulb and other sensing unit of a temperature indicating or regulating instrument used for this purpose, must be exposed to the material which is subjected to severe forces during the shredding operation.

In Patent No. 2,123,019 granted to Olson and Tate on July 5, 1938, there is disclosed a thermosensitive instrument including a bulb or unit for sensing the temperature of the material being treated in a shredder. This bulb although it is effective in service, is expensive to manufacture.

The present invention has for its purpose an improvement in the temperature unit disclosed in the mentioned patent whereby there is provided a unit of simpler and less expensive construction but of equal or superior durability with respect to that of the patented arrangement.

The features of the invention will appear from the detailed description and claims when taken with the drawing in which Fig. 1 is a vertical longitudinal section taken through a shredder, together with a temperature indicating instrument, the bulb of which extends lengthwise in the receptacle; Fig. 2 is a vertical section taken substantially on the line 2—2 of Fig. 1; Fig. 3 is an enlarged view partially in section of the tubular support for the bulb portion of the tube system secured thereto and also shows the means for attaching the support to the opposing walls of a receptacle; Fig. 4 is a fragmentary view partially in section illustrating a modified arrangement for mounting the tubular support and its bulb in the walls of a receptacle; Fig. 5 is a fragmentary view partially in section of a modified arrangement of the bulb portion mounted on the tubular support; Fig. 6 is an end view of Fig. 5; and Figs. 7 and 8 are respectively a fragmentary side view and an end view of a further modified arrangement.

In the drawing, 5 generally designates a shredder including an open-topped receptacle 6 having a removable cover 7. The outer wall of the receptacle and cover are provided, in accordance with the usual practice, with suitable heat-lagging material (not shown), while the walls of the receptacle are hollow as indicated at 9, to contain a circulating, cooling medium introduced from a circulating system (not shown), which medium is controlled either manually or automatically by means (not shown) to prevent any deviation in temperature which is indicated by the thermosensitive instrument R. The instrument herein illustrated is represented as being a temperature indicator, but it will be understood that it can be a combined indicator and controller, in which case the regulating portion thereof will control the flow of the circulating cooling medium.

Within the receptacle 6 there is provided a metal saddle 11 having two toothed surfaces 12 and 13 with which the blades 14 and 15 of the cutters respectively cooperate. In accordance with the usual practice, these blades are arranged to rotate alternately by means (not shown), first in one direction and then after a predetermined interval in the reverse direction as indicated by the arrows.

The mentioned instrument R includes a metallic bulb 16 connected through a capillary tube 17 to a Bourdon spring 18 constituting a tube system which is filled with a thermosensitive medium (not shown). It will be understood that the free end of the Bourdon spring is connected by a link 19 to a pen arm 20 pivoted at 21 on the instrument frame. The lower end of the pen arm carries a stylus in operative relation to a graduated chart 22 which is arranged to be rotated by a suitable clock mechanism (not shown).

In order that the bulb 16 may be immersed in the cellulose or the like within the shredder and yet be supported in a manner to withstand the severe stresses to which it is subjected, the bulb is arranged to embrace a support 23, such as by being helically wound thereon and welded thereto as indicated at 32. This support is preferably tubular and is of a length to extend between and be mounted on two opposing walls of the shredder. As shown in Figs. 1 and 3, the left end of the support 23 is received in the recess of a socket 24 which is provided with a flange 25 adapted to be screwed or otherwise attached to a wall of the shredder. The other end of the support 23 is received in the collar 26 having a flange 27 for attachment to the opposite wall of the shredder. This last-mentioned end of the tubular support 23 is preferably welded to the collar 26 as indicated at 28. Thus the right-hand end of the support is rigidly fastened to the wall of the shredder, while the other end of the support is free to move in the socket 24 thereby permitting the expansion and contraction of this support in

response to variations in temperature to which it is exposed during use. The right hand end of the bulb portion 16 (Fig. 3) extends into the interior of the tubular support through an opening 30 therein. The junction of the capillary tube 17 with the bulb portion is preferably located within the support, the capillary tube emerging through a sleeve 31 received in a cap 33 which closes the right hand end of the support.

While the dimensions of the bulb may vary within rather wide limits, the wall thickness thereof should be such as to resist collapsing under the severe pressures to which it is subjected and yet the mass of metal in the bulb should be as small as possible, to permit prompt thermal response of the thermosensitive medium in the bulb. To this end a bulb having an external diameter of .250 inch and an internal diameter of .110 inch has been found satisfactory. The length of the bulb should be such that volume of the thermosensitive medium therein will develop a pressure sufficient to actuate the instrument on relatively small changes in temperature. The helical arrangement of the bulb on the support, provides an exceedingly durable construction and further insures a large area of bulb exposure to the material being shredded.

The modified bulb unit shown in Fig. 4 differs from that shown in Figs. 1, 2, and 3 in that each end of the tubular support 23a has welded thereto a threaded sleeve 35. These sleeves are adapted to be received in alined openings in opposing walls of the shredder where clamping nuts engaging the outside walls of the shredder and the threaded collars, lock the tubular support in position. It will be understood that the mounting of the bulb portion 16 is the same as that previously described.

The modified form of the invention shown in Fig. 5 differs from that shown in the foregoing figures in that the bulb portion 16 of the tube system instead of being helically wound around the tubular support 23b, is arranged in zig-zag relation, that is, folded back and forth upon itself along the principal axis of the tubular support. While two arrangements have been disclosed for applying the bulb portion of the tube system to the tubular or other support, it will be understood that various other bulb arrangements can be provided within the scope of the present invention.

The modified form of the invention illustrated in Figs. 7 and 8 is similar to that illustrated in Figs. 1, 2 and 3. However, in this instance the bulb 16 is joined to the capillary tube 17 at 36 outside of the support 23. From this junction the capillary tube extends through the bore in the collar 26. The flange 27 on this collar is provided with a recess 37 to receive the capillary tube. Thus the capillary tube 17 can extend upward along the inner wall of the receptacle 6, being suitably attached thereto.

I claim:

1. In a temperature responsive instrument including a bulb portion, a pressure responsive element and a capillary tube communicating with said bulb portion and said element, a hollow rigid support adapted to have its ends respectively secured to the opposing walls of a receptacle with which the instrument is to be used, said support having an opening near one end thereof, said bulb portion being of a smaller diameter than that of the support and embracing the exterior of said support throughout substantially its entire length, means rigidly securing said bulb portion to the exterior surface of said support, said bulb portion having a part extending through said opening into the interior of said support, said capillary tube extending into one end of the support and communicating with said bulb within said support.

2. In a temperature responsive element including a bulb portion, a pressure responsive element and a capillary tube communicating with said bulb portion and said element, a rigid cylindrical support adapted to have its ends respectively secured to the opposing walls of a receptacle with which the instrument is to be used, said bulb portion being of smaller diameter than said support and means rigidly securing said bulb portion in helical relation on the exterior of said support throughout substantially the entire length thereof.

3. In a temperature responsive instrument including a bulb portion, a pressure responsive element and a capillary tube communicating with said bulb portion and said element, a rigid cylindrical support adapted to have its ends respectively secured to the opposing walls of a receptacle with which the instrument is to be used, said bulb portion being folded back and forth on itself in parallel relation to the principal axis of said support and means rigidly securing said bulb portion to said support.

4. In a temperature responsive instrument including a bulb portion, a pressure responsive element and a capillary tube communicating with said bulb portion and said element, a rigid support adapted to have its ends respectively secured to the opposing walls of a receptacle with which the instrument is to be used, said support having an opening therethrough near one end thereof, said bulb portion being of a smaller diameter than that of the support and embracing the exterior of said support throughout substantially its entire length, means rigidly securing said bulb portion to said support, said capillary tube having a part extending through said opening into the interior of said support and thence through one end of the support for connection with said pressure responsive element.

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