Dec. 29, 1942. B. R. SHAW 2,306,760

ASSEMBLING JIG

Filed Nov. 28, 1941

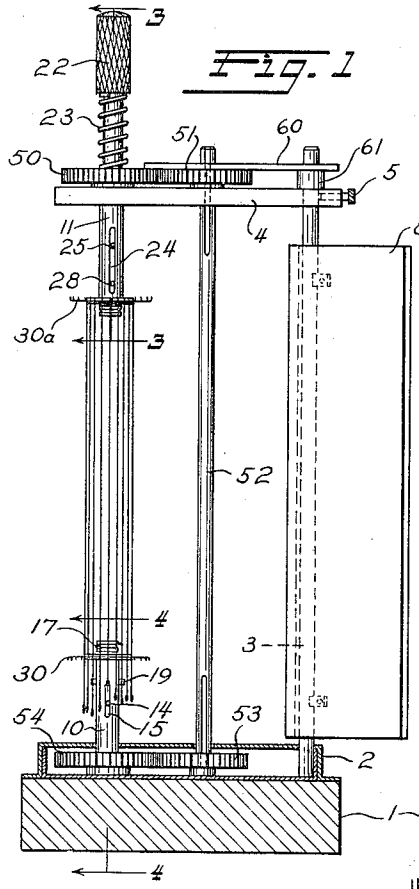


Fig. 1

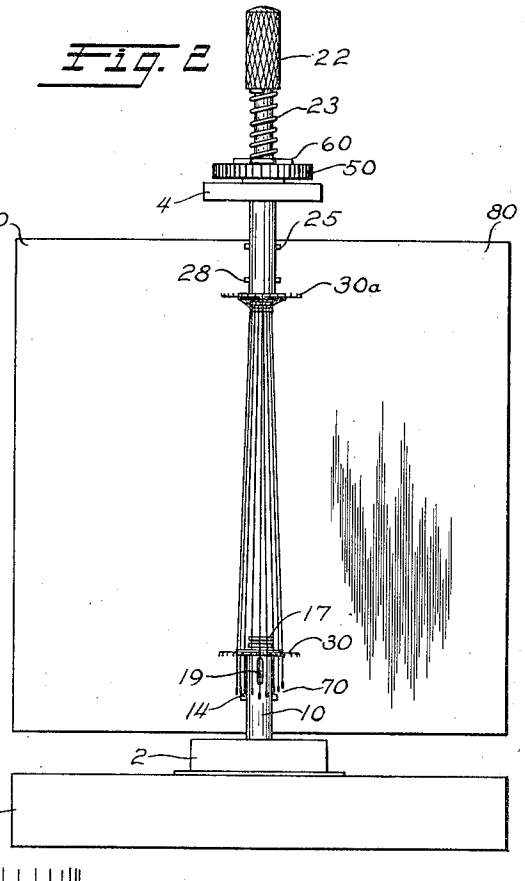


Fig. 2

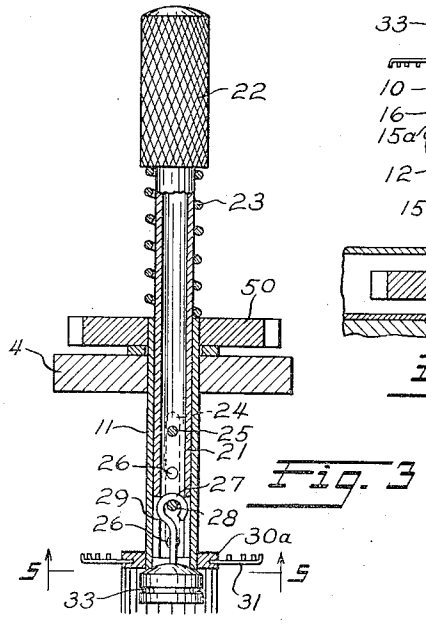


Fig. 3

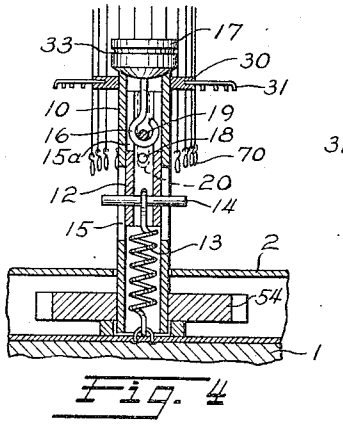


Fig. 4

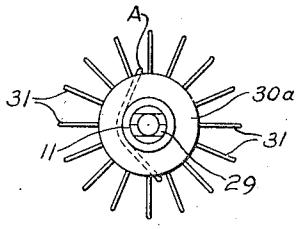


Fig. 5

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ASSEMBLY JIG

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14 Claims. (Cl. 29—84)

This invention is intended to provide a jig or fixture for facilitating the assembly or manufacture of devices comprising a number of strands of hair or similar material arranged in a predetermined manner and attached at their ends to spaced supports. The humidity-responsive elements of radiometeorographs, which comprise spaced button-like supports, about which in spaced relation are attached the ends of elongated hair elements, are typical of such devices, and the difficulties arising during the assembling of such elements are well-known. By means of the present invention the assembling of these elements is greatly facilitated and speeded.

It is the principal object of the present invention to provide a jig or frame upon which supporting members may be positioned and which will also include means for facilitating the proper spacing of hair, or other material, about such supporting devices while the hair, or other material, is being held under equal tension.

Other objects and features of novelty of the invention will be apparent from the following description and the annexed drawings, it being expressly understood, however, that such description and drawing are only illustrative of the invention and that the invention is not limited thereby or otherwise than by the appended claims.

Referring to the drawing in which the same reference numerals refer to corresponding parts,

Fig. 1 is a side view of a jig or frame embodying my invention and on which the hairs are hanging loosely;

Fig. 2 is a front view of the jig showing the hairs fastened to the top button;

Fig. 3 is a view, partly in section, taken along the line 3—3 of Fig. 1;

Fig. 4 is a sectional view, taken along the line 4—4 of Fig. 1, and

Fig. 5 is a sectional view, taken along the line 5—5 of Fig. 3.

In manufacturing devices of the type referred to above, such as the humidity element disclosed in my co-pending application Serial No. 403,044, filed June 18, 1941, strands of hair are spaced around the periphery of two spaced, parallel, drum-like buttons. In order to insure the best operation of such a device it is necessary to space the hairs at equal intervals about the peripheries of the drum-like devices and it is also necessary to place all of the hairs under the same tension. Heretofore these difficult and delicate operations have only been performed by hand without the aid of any jig or fixture.

As shown by the attached drawing, the invention provides a support for the various parts of the jig, comprising a base-block 1 on which is mounted a low metal box 2. A plate 4, lying substantially over the box 2, but separated therefrom a distance greater than the length of humidity element, is mounted on a rod 3, the lower end of which passes through box 2 and is supported at the rear of the box 2. The upper end of rod 3 protrudes through plate 4 for a short distance.

Means are provided by the present invention for supporting the two buttons, to which the ends of the hairs are attached, in properly spaced relation to each other, the buttons being placed one above the other. Such means comprise a lower tubular member 10, which is supported by and extends upwardly from block 1 and box 2, and an upper tubular member 11 which is supported by and extends downwardly from the plate 4. The two tubular members 10 and 11 are in axial vertical alignment with each other, the upper end of the lower member 10 being spaced below the lower end of the upper member 11 by a distance approximately equal to the overall length of the finished humidity device. Within the tube 10, as shown in Fig. 4, there is slidably mounted a second tube 12 which is constantly urged toward the lower end of the tube 10 by a spring 13, one end of which is attached to the base of box 2 and the other end of which is attached to the tube 12 by a pin 14 which extends diametrically of the tube and the ends of which protrude through elongated openings 15 in the wall of outer tube 10. The upper end of inner tube 12 is provided with two oppositely-disposed V-shaped apertures 15a which are adapted to permit the head 16 of a hook, which is attached to the lower button 17, to be positioned within the inner tube. A series of aligned apertures 18 is also provided in the inner tube adjacent the lower or narrowed end of the V-shaped apertures, and are adapted to receive a pin 19 which may extend through the hook 16 in order to hold the same within the inner tube. These apertures 18 are normally covered by the wall of outer tube 10 but are uncovered when the inner tube is raised against the force of spring 13, by elongated apertures 20 in the outer tube. It will be seen that if a button 17 is placed on the upper end of tube 10, with its hook extending downwardly into tube 10, the inner tube may be raised by means of the ends of pin 14 and against the force of spring 13 until the apertures 18 in the inner tube are aligned with the head 16 of the hook and are uncovered by the elongated apertures 20 in the outer tube. The pin 19 may then be passed through apertures 20 and 18 and

through the hook, thus attaching the hook and button to the inner tube. The spring 13 then urges the button 17 downwardly into engagement with the upper end of tube 10, holding it firmly thereon. The button may be released from tube 10 by pushing pin 19 out of the openings 18 in the inner tube, thus releasing the hook from attachment to the tube.

Similar means are also provided for holding the upper button against the lower end of tube 11, which is journaled in plate 4 near its front end and which extends above and below the plate. Slidably mounted within tube 11, as shown in Fig. 3, is a tube 21, the lower end of which does not extend to the lower end of tube 11 but the upper end of which extends some distance above the upper end thereof and is provided with a handle member 22. A spring 23 surrounds the upper end of tube 21, the upper end thereof abutting the lower end of the handle and the lower end thereof engaging the upper surface of a gear 50 which is disposed above the plate 4 and is attached to the upper end of outer tube 11. The spring 23 is slightly compressed so that tube 21 will be constantly urged upwardly. In the wall of tube 11, below plate 4, there is provided a pair of diametrically opposed elongated slots 24. A pin 25 is attached to tube 21 and extends through slots 24, the purpose of which will be described hereinafter. A series of diametrically opposed holes 26, which register with the elongated openings 24, and are spaced one above the other, is provided in inner tube 21. Tube 21 is also provided at its lower end with V-shaped cuts 29 similar to those provided in the tube 13. In order to position the upper button firmly against the lower end of tube 11, the inner tube 21 must be depressed by operation of handle 22 until one pair of the series of holes 26 is simultaneously registered with slot 24 and hook 27 which is attached to the upper button. A pin 28 is inserted through slot 24 and the aligned holes 26 and the hook after which the handle 22 is released, the button being then held against the lower end of the tube 21 by means of the spring 23, and may be released only by removing the pin 28 from engagement with the hook and the aligned apertures 26.

Means are also provided by the invention for properly spacing the strands of hair around the two buttons. Such means comprise the rings 30, 30a which are attached, respectively, to the adjacent ends of the tubes 10 and 11. Equally spaced about the peripheral edge of each ring are a number of radially extending arms or spacers 31, the outer extremities of the arms attached to the lower ring 30 being bent downwardly and those of the arms attached to the upper ring being bent upwardly. The rings are provided with the same number of arms and the arms are vertically aligned. Each pair of adjacent arms on a ring is painted the same color, which is different from that of the adjacent pair, the same color scheme being carried out on both rings and the arrangement being such that a pair of arms of a certain color on the upper ring lies directly over a pair of arms of the same color on the lower ring. The color scheme is also arranged so that opposite arms on each ring are the same color. This arrangement is the same for both the upper and lower rings. If desired, any other marking means such as numbering, etc., may be used.

Means are provided for rotating the entire assembly of buttons and arms in order to permit the operator to work always at the front of the jig. Such means comprise a gear arrangement comprising a gear 50 which is attached to the upper end of tube 11 of the upper assembly and is therefore disposed just above the plate 4. This gear 50 meshes with a second gear 51 which is keyed on the upper end of a rod 52, which is rotatably journaled in the plate 4 and block 1, the gear 51 being above plate 4. A plate 60, which is supported by a washer 61 attached to rod 3, overlies the gears 50, 51 and prevents any displacement thereof. The lower end of rod 52 carries a gear 53 which meshes with a gear 54 which is attached to the lower end of tube 10. In order to properly rotate the assembly of buttons and arms, the gears must all be identical although, if desired, gears 50 and 54 need not be identical with gears 51 and 53. As stated hereinbefore, the tube 11 is provided with a pair of longitudinal slots 24 through which a pin 25 passes, which is attached to inner tube 21, and by means of which the tubes 11 and 21 are connected to be rotated together. As the tube 11 rotates, the gears 50 and 51 together with rod 52 and gears 53 and 54 will rotate, thereby rotating tube 10 in the same direction and to the same extent as tube 11.

Means are also provided for assisting the operator of the jig to easily see the small strands of hair, such means comprising a light-colored back board 80 which is attached to rod 3 by any suitable means. The back board preferably forms a vertical di-hedral angle, in order to reduce the glare caused by reflected light, as shown in the drawing, and may be formed of any desired shape.

Means are also provided to vary the height of plate 4 in order to vary the length of the humidity responsive element. Such means comprise a set screw 5 which is adapted to be screwed into an opening in the end of plate 4 adjacent rod 3, the end of the screw engaging the rod. By this arrangement, if it is desired to raise or lower the plate 4 it is only necessary to loosen screw 5, adjust the height of plate 4 and then tighten the screw.

In the manufacture of the humidity element using the jig according to this invention, a strand of hair, or other suitable material, A is so positioned that approximately one-half of it extends from the lower to the upper ring between the arms of one of the correspondingly marked, vertically aligned pairs of arms or spacers. The middle portion of the strand is then wound around tube 11 until it is adjacent a pair of arms marked similarly to the just mentioned pairs, as shown in Fig. 5. The end of the strand is then placed between this pair of arms and extended downwardly between the pair of similarly marked arms of the lower ring which are vertically aligned with said upper pair. This operation is continued until the strands are between all of the pairs of arms on the upper and lower rings. In order to facilitate the placing of the strands between the arms, the two tubes 10, 11 may be rotated as provided hereinbefore. Equal weights 70 are attached to the ends of the strands to provide equal and proper tension at all times. It should be noted that the diameter of the rings 30, 30a is larger than the diameter of the buttons so that the strands of hair may be spaced away from the buttons while the humidity element is being manufactured.

In order to attach the strands to the buttons a piece of thread or other material is caused

to surround the hairs adjacent each button and is then wound around the periphery of the adjacent button, drawing the hairs to the button. After the thread, or other suitable material, is fastened, an adhesive is applied over the thread and allowed to harden. In Fig. 2 the strands have been attached to the upper button but not to the lower button. Each button is provided with a circumferential channel 33 in which the thread is wound in order to provide a more positive attachment. After the strands have been attached, those lying between the button and the adjacent arms are cut and any surplus attached to the top of the button is trimmed in order to make a neat-appearing apparatus. When this has been done the pin holding hook 16 in place is removed. Button 17 can then be removed from the tube. The pin holding the hook 27 is then withdrawn and the humidity-responsive element is completed and may be removed.

While I have illustrated and described one embodiment of my invention, additional embodiments or improvements may occur to those skilled in the art, all of which may be practiced without departing in any way from the spirit or scope of the invention, for the limits of which reference must be had to the appended claims.

I claim:

1. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising two axially aligned members having spaced adjacent ends, means for attaching one of the supporting members of such devices to that end of each member which is adjacent the other member, and a plurality of radially-extending arms attached to each member and being spaced thereabout in the relation in which the strands are to be spaced about the supporting devices therefor.

2. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising a frame having spaced upper and lower supports, two axially aligned members mounted respectively on said upper and lower supports and having spaced, adjacent ends, means for removably attaching one of the supporting members of such devices to that end of each member which is adjacent the other member and a plurality of radially-extending arms attached to each axially aligned member and being spaced thereabout in the relation in which the strands are to be spaced about the supporting devices therefor.

3. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising a frame having spaced upper and lower supports, two axially aligned members extending respectively from said supports and having spaced, adjacent ends, means for attaching one of the supporting members of such devices to that end of each member which is adjacent the other member, a ring attached to each member at the end thereof adjacent the other member, and a plurality of radially-extending arms attached to each ring and being spaced thereabout in the relation in which the strands are to be spaced about the supporting devices therefor.

4. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising a frame having spaced upper and lower supports, two axially aligned members extending from said supports and having spaced adjacent ends, means for attaching one of the supporting members of such devices to that end of each member which is adjacent the other member, and a plurality of radially-extending arms attached to each member and being spaced thereabout in the relation in which the strands are to be spaced about the supporting devices therefor, the arms attached to one member being arranged in differently marked pairs of adjacent arms and those attached to the other member being vertically aligned therewith and correspondingly marked.

5. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising a frame having spaced upper and lower supports, two axially aligned members extending from said supports and having spaced adjacent ends, means for attaching one of the supporting members of such devices to that end of each axially aligned member which is adjacent the other member, and a plurality of radially-extending arms attached to each such member and being spaced thereabout in the relation in which the strands are to be spaced about the supporting device therefor, oppositely-directed arms of each member being similarly marked in correspondence with the arms of the other member vertically aligned therewith.

6. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising a frame having spaced upper and lower supports, two axially aligned members extending from said supports and having spaced, adjacent ends, means for attaching one of the supporting members of such devices to that end of each member which is adjacent the other member, and a plurality of radially-extending arms attached to each member and being spaced thereabout in the relation in which the strands are to be spaced about the supporting devices therefor, the arms attached to one member being vertically aligned with those attached to the other member.

7. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising two axially aligned members having adjacent ends, means for connecting one of the supporting members of such devices to the end of each axially aligned member which is adjacent such other member, and means for rotating the two axially aligned members in the same direction and to the same extent.

8. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising two axially aligned tubes having spaced, adjacent ends, means for attaching one of the supporting members of such devices to the end of each of said tubes which is adjacent the other tube, said means comprising a second tube slidably mounted

within each of said first-mentioned tubes, a spring normally urging each inner tube in a direction away from the end of the outer tube which is adjacent the other tube, means for attaching one of the supporting members of such device to the end of each inner tube which is adjacent the other tube, and means for moving the inner tube longitudinally of the outer tube against the force of said spring.

9. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising two axially aligned tubes having spaced, adjacent ends, means for attaching one of the supporting members of such devices to the end of each of said tubes which is adjacent the other tube, said means comprising a second tube slidably mounted within each of said first-mentioned tubes, a spring normally urging each inner tube in a direction away from the end of the outer tube which is adjacent the other tube, and means for attaching one of the supporting members of such device to the end of each inner tube which is adjacent the other tube.

10. An apparatus for use in the manufacture of devices comprising spaced supporting members and a plurality of strands having their ends connected to the supports and spaced about the peripheries thereof, comprising two axially aligned tubes having spaced, adjacent ends, means for attaching one of the supporting members of such devices to the end of each of said tubes which is adjacent the other tube, said means comprising a second tube slidably mounted within each of said first-mentioned tubes, means normally urging each inner tube in a direction away from the end of the outer tube which is adjacent the other tube, means for attaching one of the supporting members of such device to the end of each inner tube which is adjacent the other tube, and means for moving the inner tube longitudinally of the outer tube against the force of said spring.

11. An apparatus according to claim 8, in which the means for attaching the supporting device to each inner tube comprises a series of aligned openings spaced along the length of the inner tube, and a pin extending through aligned openings of said series and through a hook attached to such supporting device.

12. An apparatus according to claim 8, in which the means for attaching the supporting device to each inner tube comprises a series of aligned openings spaced along the length of the inner tube, elongated openings in the outer tube adapted to uncover all or a part of such series of openings in the inner tube, and a pin extending through aligned openings of said series through the elongated openings in the outer tube and through a hook attached to such supporting device.

13. An apparatus according to claim 8, in which the spring is positioned within the inner tube.

14. An apparatus according to claim 8, in which the spring surrounds a portion of the inner tube.

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