

June 25, 1963

E. C. DE FREYNE
THERMOMETER MANUFACTURE

3,095,191

Filed Oct. 17, 1960

2 Sheets-Sheet 1

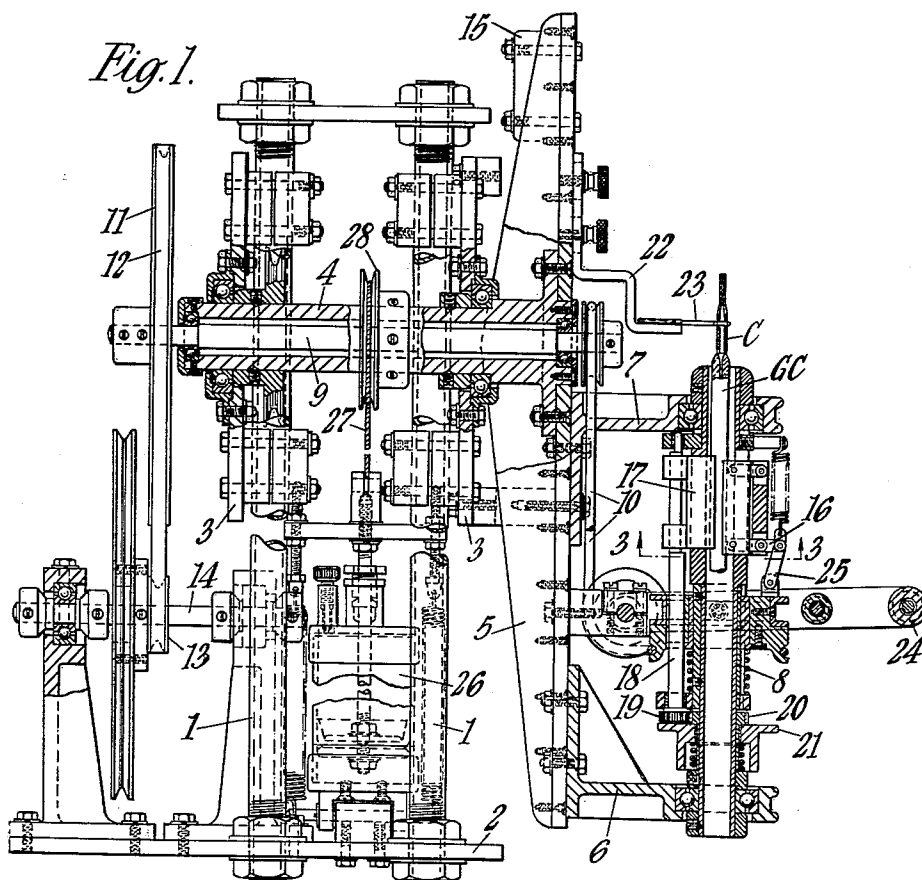
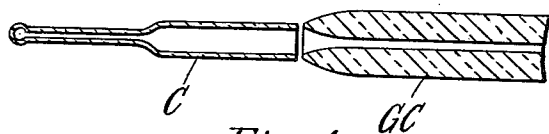


Fig. 4.

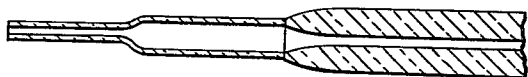


Fig. 5.

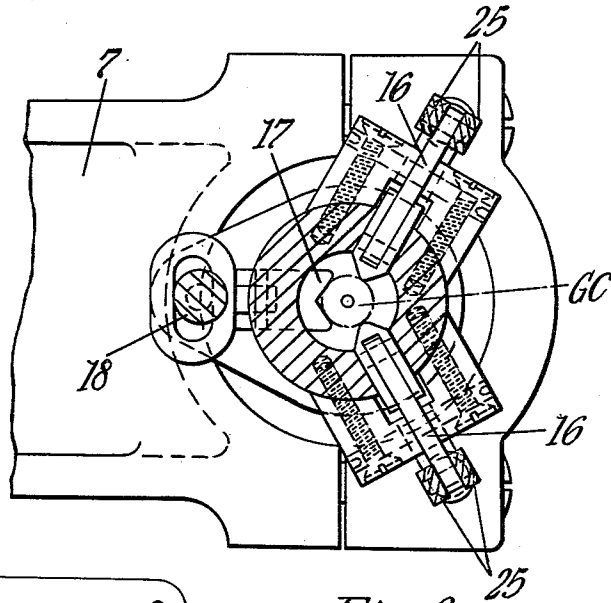
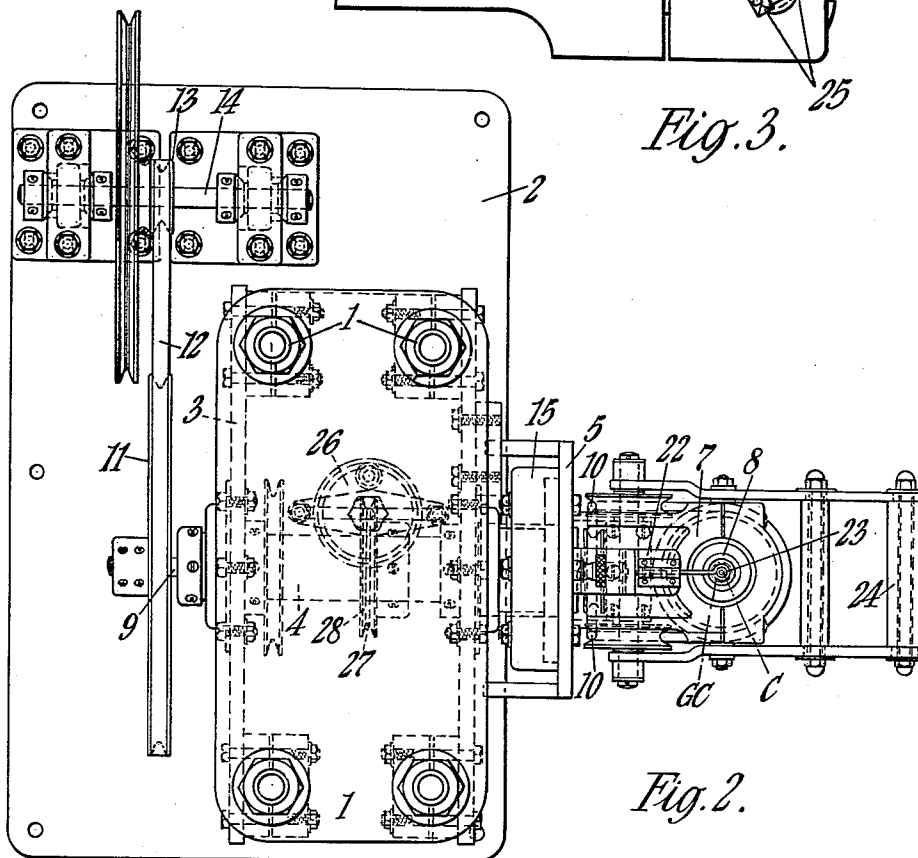
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1

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THERMOMETER MANUFACTURE

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4 Claims. (Cl. 269—43)

This invention relates to the manufacture of thermometers and more especially the operation of joining the thermometer bulb portion to the thermometer stem. The stem is first formed at the end to be a funnel shape. Usually this is done by hand but it may be done in an apparatus described in our co-pending application No. 63,160.

Taking the funnel-ended stem the operator usually welds on to this a length of relatively thin walled tubing to form the bulb. This operation calls for a high degree of skill and the correct assessment of the bulb diameter in particular takes many years to master.

The present application describes a form of apparatus for carrying out the operation in such a way as to eliminate the need for this considerable degree of skill.

The invention consists of an apparatus for joining the bulb to the stem of a thermometer, comprising means for clamping the stem in a vertical position with its funnel end uppermost, means for guiding the open end of the bulb to rest over the funnel end of the stem, heating means for joining the contiguous ends of the bulb and stem by fusion, and means for reversing the position of the bulb and stem to stretch out the fused glass and align the bulb and stem.

Preferably, means are also provided to rotate the bulb and stem while heat is being applied.

Preferably the stem is held in a three jaw chuck two of the jaws being spring loaded and retractable and the other being adjustable for centralizing the stem.

The adjustable jaw may be operated by a pair of rotatable vertical cam shaft.

The bulb is intended to be applied in the form of a glass cylinder with an elongated spill closing it at one end.

The glass cylinder, when first applied to the open ended chamber of the cane, is sealed at its upper end. This helps to prevent the thin walls of the cylinder collapsing at local spots when the torch is applied, since the air expands under the heat and whilst partially expelling some air down the stem of the thermometer, will effectively build up sufficient pressure to prevent the walls from collapsing inwards. In fact one frequently finds a swelling in the glass. On reversal this pressure is released by breaking off the small spill on the end of the cylinder glass and at the same time some slight assistance is given to the gravitational pull on this cylinder by hand and straightening up the bulb in relation to the stem.

The invention will be further described with reference to the accompanying drawings, for example only.

FIGURE 1 is a side elevation of the apparatus in partial section.

FIGURE 2 is a plan view.

FIGURE 3 is a section on the line 3—3 of FIGURE 1.

FIGURE 4 shows the chambered thermometer stem and the bulb cylinder prior to joining.

FIGURE 5 shows them joined.

It will be seen that a tubular structure 1 is mounted on a baseplate 2. Supported between the top of the vertical tubes are two plates 3 which in turn support a horizontal hollow spindle 4 mounted on journal bearings. Attached to the front end of this spindle is a framework 5 on which are mounted brackets 6, 7. Supported by

2

these brackets is a vertical hollow spindle 8. This spindle which with its appendages constitutes the chuck mechanism for holding the glass cane GC which will form the thermometer stem, is rotated from spindle 9 through hollow spindle 4 with the aid of V belts 10. Spindle 9 is in turn driven from pulley 11 by a belt 12 extending from pulley 13 on a drive shaft 14. A geared motor drive (not shown) controlled through a variable speed foot control drives shaft 14. It will be appreciated from the layout that not only can the glass cane chuck mechanism spindle be caused to rotate at variable speeds around its axis but at the same time the whole frame on which it is mounted can be reversed in its position through 180°. The frame 5 is counterweighted at 15 to reduce the forces necessary to bring about the reversal.

Since the glass cane chuck assembly mechanism is to accommodate large variations of cane diameter, and at the same time varying shapes, in the 3-jaw chuck (FIGURE 3) only two jaws 16 are caused to open or shut to effect the gripping of the glass cane. The third jaw 17, which is independent of the other two, is actuated by a vertical cam shaft 18 which causes the jaw to move in or out when the cam shaft is rotated. This rotation is brought about through a pair of gears 19, 20 at the lower end of the spindle 8 operated by rotatable handwheel 21 mounted thereon.

The whole assembly has the operating feature of being able to insert any size cane into the chuck and, when the chuck spindle is caused to rotate, if it is seen that the cane is eccentric in its rotation, all that is necessary to do is for a handwheel 21 to be arrested in its rotation for a short interval of time. This causes the gear train to operate through a "Sun and Planet" principle and the cam shaft to rotate moving the fixed jaw in or out. One or two slight adjustments of the hand will quickly centralise the glass cane, since as the cam shaft operated jaw 17 moves out so the other two spring-loaded jaws 16 follow in or vice versa.

Also mounted on the frame 5 is a bracket 22 which supports a wire loop 23 for holding the cylinder C which is to form the bulb.

The spindle 8 is straddled by a hand lever assembly 24 which serves to open the chuck over link 25.

The reversal of spindle 4 is carried out by means of an air actuated power cylinder 26 over a cable 27 which passes over pulley 28 mounted on the spindle 4.

A torch is used to effect the seal between the cane and the cylinder and held in the hand. Arm rests (not shown) are provided to steady the operator's hand. The chuck mechanism is opened or shut with a vertical movement of the hand lever assembly that straddles the spindle mechanism. The cycle of movement that constitutes the operation of joining the bulb glass C to the stem glass GC is as follows:

The selected cane GC with the chamber uppermost is put into the cane chuck spindle mechanism by pressing the chuck actuated handle 24 downwards, thus opening the two jaws 16. When located in the correct position the handle 24 is released and the two jaws 16 grip the cane forcing it up against the cam shaft actuated jaw 11. The spindle is then caused to rotate through the medium of a variable speed foot control, and it may be noticed that the cam is eccentric in its rotation. Whilst the spindle is still rotating the adjustment to concentricity is brought about, as explained above.

The machine is then stopped and a piece of selected cylinder glass C is sat upon the open end of the glass cane and supported by the light wire bracket loop 23. The flame is then applied at one little spot at the join causing the glass to fuse together at that point. The spindle is then rotated slowly and the torch held in a

3

steady position. The glass of the stem and the cylinder then begin to fuse throughout the length of the join. This is kept up until complete fusion is effected when the flame is taken off and the frame reversed through the medium of a foot control and the power cylinder 26. The small spill on the end of the cylinder glass is broken off and the cylinder straightened up and slightly pulled down to bring it in line with the bore of the cane glass while further heat is applied from the torch. The torch is put away and as soon as the glass has "frozen" the frame is allowed to go back to its position of rest. The chuck is opened and the thermometer permitted to fall out through the hollow spindle where it is caught by hand and put into a safe place for cooling.

Various modifications may be made within the scope of the invention. Thus for making clinical thermometers which do not vary extensively in length and diameter a simpler form of machine is possible.

I claim:

1. Apparatus for the manufacture of thermometers comprising a supporting base, a framework mounted on the base for rotation about a horizontal axis between two positions spaced 180° apart, clamping means mounted

4

on the framework for rotation about an axis which is vertical in each of the two spaced positions and having a clamp to hold a thermometer stem with its longitudinal axis in alignment with said vertical axis and means mounted on the framework for holding a thermometer bulb in contact and alignment with the clamped thermometer stem while permitting vertical movement.

2. Apparatus as claimed in claim 1 comprising a driving link for the clamping means extending from the base to the framework.

3. Apparatus as claimed in claim 1 comprising means for adjusting the alignment of the clamp for various sizes of thermometer stem.

4. Apparatus as claimed in claim 1 comprising means mounted on the framework for releasing the clamp.

References Cited in the file of this patent

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