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(54) **Minute hand shaft for clocks**

(57) In a device for clocks having a minute hand 22 secured to a hand shaft 10 by a retaining nut 26, the hand having a non circular hole 24 to engage a corresponding shape 16 at the front end of the shaft, which has a shoulder 20 for limiting axial movement of the hand, the foremost section 14 of the front end of the shaft 10 is unthreaded and smaller than the inside diameter of the retaining nut 26, and a conical section 16 is provided for the formation thereon of a thread which is cut by the retaining nut 26 when fitted onto the shaft 10 to hold the hand 22 against the shoulder 20. The shaft is described as an injection moulded plastics part, and the arrangement can be compatible with German Industrial Standard (DIN) 8270.

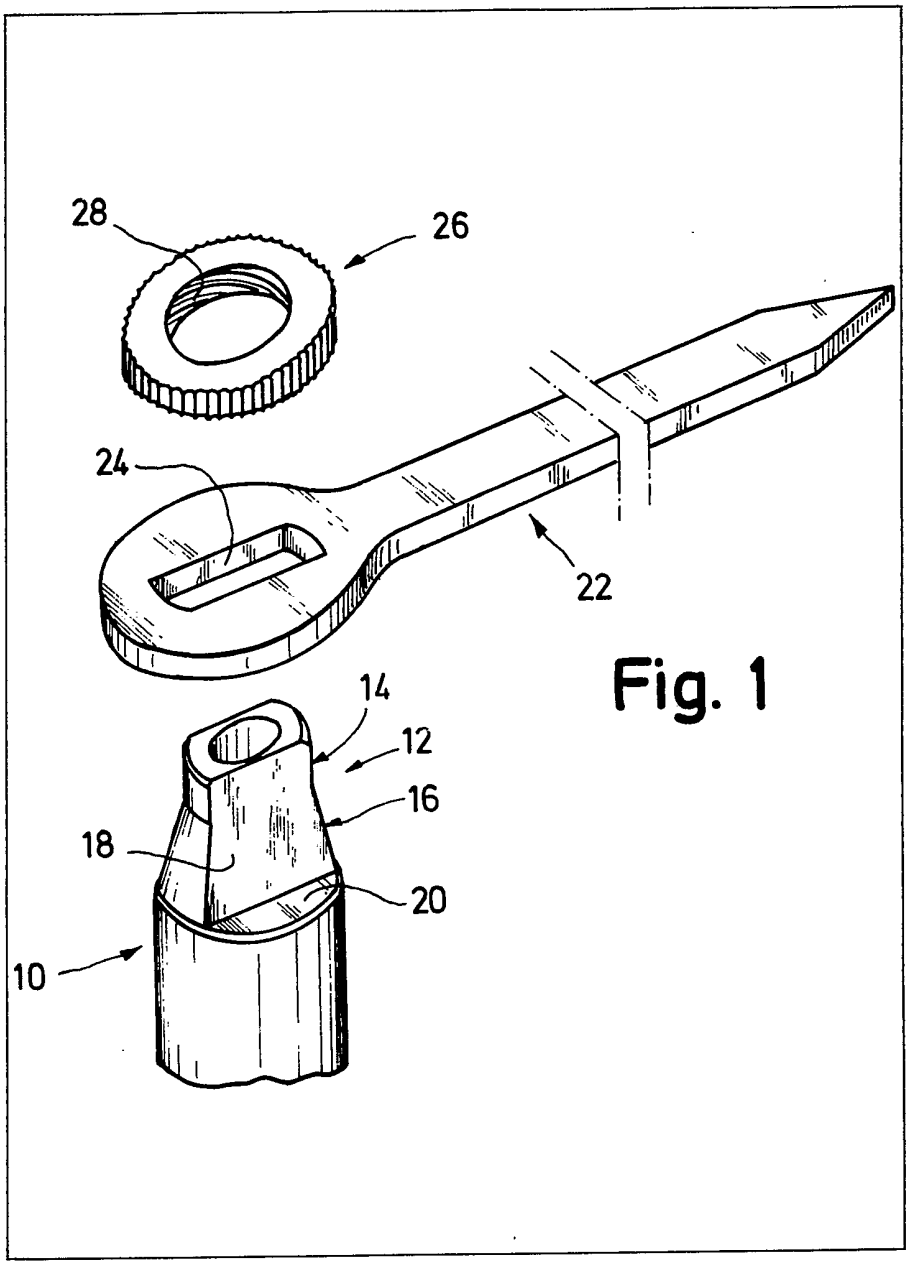

Fig. 1

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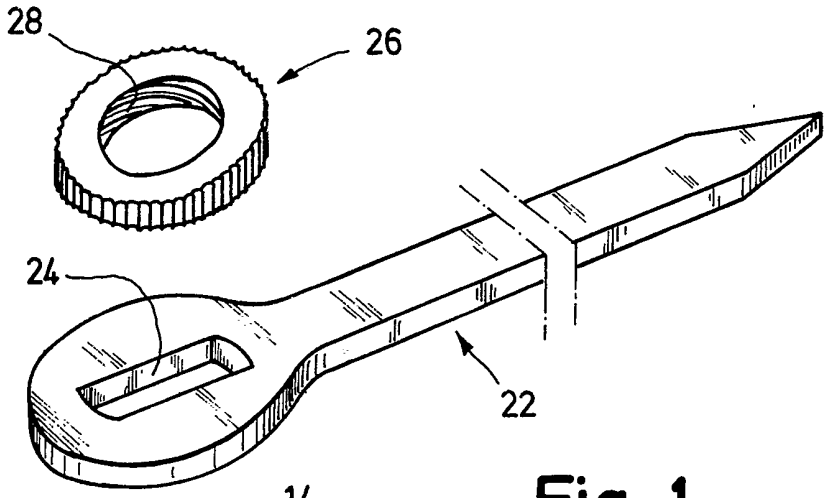


Fig. 1

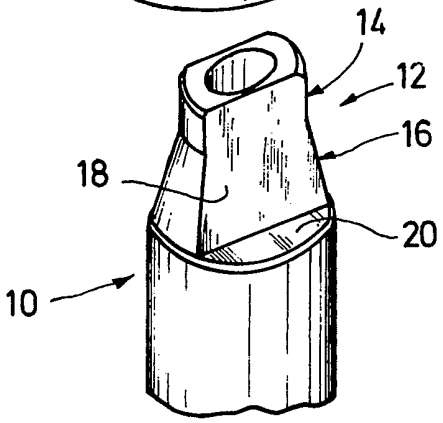


Fig. 2

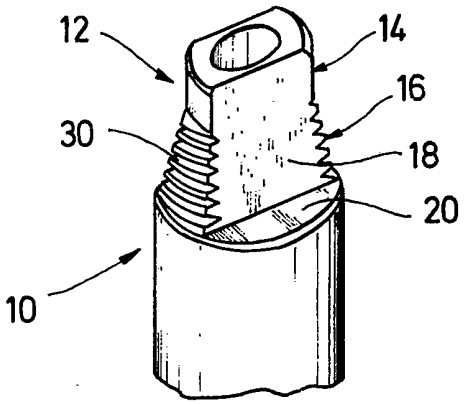
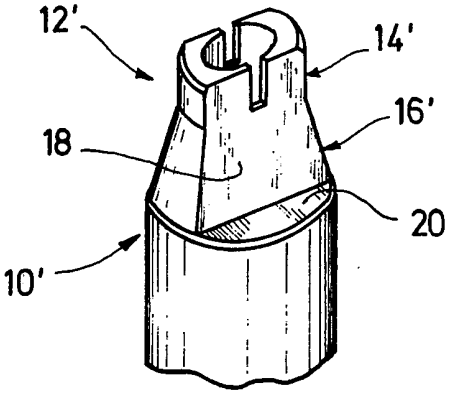


Fig. 3



SPECIFICATION

Minute hand shaft for clocks

The invention relates to a device for clocks consisting of a minute hand, a minute hand shaft and a retaining nut, in which the minute hand is slidable onto the front end of the minute hand shaft and has a hole in a form deviating from the circular and this front end of the shaft has, for retention of the minute hand, a threaded shaft portion comprising at least one area approximately parallel to the shaft axis for rotationally securing the minute hand and is limited in axial direction by a shoulder forming a stop for the minute hand.

In the case of known clocks the tubular minute hand shaft is made of metal; the entire front end of the shaft is constructed as far as the shoulder as a threaded shaft portion with two surfaces parallel to each other and to the shaft axis and the hole in the minute hand has the form of an oblong hole adapted to the cross section of the threaded shaft portion. During production of the minute hand shaft a thread is cut in the usual way into the front end of the shaft between the two surfaces. When mounting the minute hand this is usually slipped onto the threaded shaft portion thus produced until it abuts on the shoulders terminating the two faces towards the back whereupon the retaining nut is screwed on and tightened. In view of the fact that the hands were required to be interchangeable the shape and size of the front ends of the hand shafts as well as the shape of the holes in the hands were standardized by German Industrial Standard (DIN) 8270.

Apart from the known minute hand shafts mentioned, which are very expensive not only due to the material used (mostly brass) but also their manufacture, other designs are known, with which a portion of the minute hand shaft is formed from injection moulded plastics but the front portion of the minute hand shaft bearing the minute hand is still made of metal and is pressed into the tubular, rear plastic shaft portion so that production costs for this embodiment are also relatively high.

The object underlying the invention was therefore to lower the cost of manufacture of the minute hand shaft and minute hand for clocks and in such a way that, if necessary, the German Industrial Standard 8270 may also be met.

According to the invention there is provided a device for clocks consisting of a minute hand, a minute hand shaft and a retaining nut, in which the minute hand is slidable onto the front end of the minute hand shaft and has a hole in a form deviating from the circular and this front end of the shaft has, for retention of the minute hand, a threaded shaft portion comprising at least one area approximately parallel to the shaft axis for rotationally securing the minute hand and is limited in axial direction by a shoulder forming a stop for the minute hand, the foremost section of said front end of the shaft being unthreaded and at least approximately cylindrical and its diameter is at least approximately the same as the inside diameter of the retaining nut, the outside diameter of the thread of the threaded shaft portion adjoining the foremost, cylindrical section being overall larger than the inside diameter of the retaining nut, and the thread of the minute hand shaft having the form of a thread cut by the retaining nut.

This construction enables the entire minute hand shaft to be manufactured as a plastics injection-molded part in such a way that it is completely unthreaded and has a shaft portion, which is conical apart from at least the one face, adjoining the foremost, cylindrical section, a thread then being cut into this conical shaft portion with the aid of the retaining nut. With this construction it is also possible for the retaining nut to be perpendicular to the shaft axis when placed ready to cut the thread: The use of a cylindrical front end enables it to be dimensioned such that the foremost, cylindrical section of the front end of the shaft and the retaining nut together may form a light force fit or may fit together with a very slight clearance so that the retaining nut is hereby aligned. It is also beneficial to this alignment for the minute hand shaft to form stops at the point where the foremost, cylindrical section of the front end of the shaft adjoins the conical shaft portion; the retaining nut may then rest against these stops when cutting of the thread commences.

As the minute hand shaft may be produced without a thread, relatively simple forms may be used for the injection molding and the machine cycle time for such injection molding may also be reduced.

The fact that the thread is cut into the conical shaft portion with the aid of the retaining nut results in a minute hand shaft, with which the depth of the thread profile increases from the front end of the threaded shaft portion towards the back.

The face of the threaded shaft portion parallel to the axis may have cross-sectional form differing from a circular arc concentric to the shaft axis as long as it fulfills the purpose, together with the hole of the minute hand slipped onto the shaft, of rotationally securing this hand to the shaft. The face, is however, preferably level. It could also be placed at a distance from the shaft axis which is greater than half the largest thread diameter of the threaded shaft portion. In accordance with German Industrial Standard 8270 it is, however, recommended that this distance be selected less than half the largest diameter of the foremost, cylindrical section of the front end of the shaft.

In a preferred embodiment the shoulder forming a stop for the hand limits the face parallel to the axis in axial direction; however, this need not necessarily be the case. Finally, in a preferred embodiment the largest diameter of the foremost, cylindrical section of the front end of the shaft corresponds at least approximately to the inside diameter of the retaining nut.

The reduction in cost brought about by the constructional arrangement is considerable, in particular with a view to the fact that nowadays the sales price of clocks and watches has to be calculated very exactly and that even clocks are now mass-produced articles.

The invention will now be described by way of example with reference to the accompanying drawings in which;

Figure 1 is a perspective illustration of the front portion of a plastics minute hand shaft constructed accordance with the invention before the threadhas been cut, a minute hand and a retaining nut before assembly;

Figure 2 shows the minute hand shaft of Figure 1 after the minute hand has been mounted for the first time, that is after the thread has been cut, but not illustrating the nut and minute hand, and

Figure 3 shows a modified embodiment of the minute hand shaft constructed in accordance with the invention.

Figure 1 shows a minute hand shaft 10 of the usual tubular construction comprising a front end consisting of a foremost, cylindrical section 14 and a shaft portion 16 conically constructed between two faces 18. The faces 18 each end at the shoulder 20, below which the minute hand shaft 10 has the form of a circular cylinder.

A minute hand 22 illustrated in Figure 1 is provided with an oblong hole 24, the width of which is the same as or at the most slightly larger than the vertical distance between the two faces 18 of the minute hand shaft 10.

Finally, a retaining nut 26 is provided which is made from metal and has a thread 28 suitable for cutting a thread into the conical shaft portion 16.

In order to align the retaining nut 26 perpendicularly to the shaft axis when it is intended to cut a thread into the conical shaft portion 16 of the minute hand shaft, the largest diameter of the cylindrical section 14 of the minute hand shaft corresponds to the inside diameter of the retaining nut 26 so that when the retaining nut is slipped onto the cylindrical section 14 these two parts fit together, according to the embodiment in Figure 1 with a very slight clearance. According to the embodiment of the minute hand shaft 10' in Figure 3 it fits with a light force fit, the cylindrical section 14' being provided with longitudinal slots 14a' for assisting in this purpose.

The retaining nut 26, is, however, aligned not only by the cylindrical section 14 or 14' but also by the stop at the point where the cylindrical section adjoins the conical shaft portion 16 or 16'.

An additional feature is that the length of the oblong hole 24 in the minute hand corresponds to the outside diameter of the thread of the retaining nut 26 or is slightly larger than this outside diameter. The same applies for the largest diameter of the conical shaft portion 16 or 16' of the minute hand shaft 10 or 10'. Due to this construction the minute hand 22 may, when assembled for the first time, be slipped onto the minute hand shaft 10 until it abuts on the shoulders 20 whereupon the retaining nut 26 preferably designed as a straight-knurled nut is slipped onto the cylindrical section 14 or 14' as far as the stop formed by the front end of the conical shaft portion 16 or 16' and thereby positioned perpendicularly to the shaft axis whereupon the cutting of the thread into the conical shaft portion 16 or 16' may begin. Figure 2 shows the thread produced this way and designated 30.

CLAIMS

1. A device for clocks consisting of a minute hand, a minute hand shaft and a retaining nut, in which the minute hand is slidable onto the front end of the minute hand shaft and has a hole in a form deviating from the circular and this front end of the shaft has, for retention of the minute hand, a threaded shaft portion comprising at least one area approximately parallel to the shaft axis for rotationally securing the minute hand and is limited in axial direction by a shoulder forming a stop for the minute hand, the foremost section of said front end of the shaft being unthreaded and at least approximately cylindrical and its diameter is at least approximately the same as the inside diameter of the retaining nut, the outside diameter of the thread of the threaded shaft portion adjoining the foremost, cylindrical section being overall larger than the inside diameter of the retaining nut, and the thread of the minute hand shaft having the form of a thread cut by the retaining nut.

2. A device according to claim 1, wherein the depth of the thread profile on the minute hand shaft increases from the front end of the threaded shaft portion towards the back.

3. A device according to clam 1 or 2, in which the minute hand shaft is a plastics injection-molded part.

4. A device according to any one of claims 1 to 3, wherein the retaining nut is of metal.

5. A device according to any one of claims 1 to 4, in which the hole in the minute hand has the form of an oblong hole, and the foremost section of the front end has two faces parallel to each other and to the shaft axis, the width of the oblong hole in the minute hand being equal to the distance between the two faces, and the length of the oblong hole being at least equal to the outside diameter of the thread of the retaining nut.

6. A device according to any one of claims 1 to 5, in which the foremost, cylindrical section of the front end and the retaining nut form a light force fit or fit together with a very slight clearance.

7. A device according to claim 6, wherein the foremost cylindrical section of the front end is slotted to form the force fit.

8. A method of producing a device for clocks and constructed according to claim 1, wherein the minute hand shaft is injection molded such that it is completely unthreaded and a shaft portion, which is conical apart from at least said one area, adjoins the foremost, cylindrical section of the front end and a thread is then cut into the conical shaft portion with the aid of the retaining nut.

9. A device for clocks substantially as hereinbefore described with reference to an as shown in Figures 1 and 2 of the accompanying drawings.

10. A device for clocks substantially as hereinbefore described with reference to and as shown in Figure 3 of the accompanying drawings.

11. A method of producing a device for clocks substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

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