

[54] **BATTERY POWERED TIMEPIECES**
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1,874,967	8/1932	Greenleaf.....	58/52 R X
2,063,976	12/1936	Bateholts	58/23 R X
3,496,718	2/1970	Jepson et al.	58/140 R
3,710,566	1/1973	Masluyama.....	58/2 X
3,712,044	1/1973	Wolber et al.....	58/23
3,780,524	12/1973	Boyles.....	58/23 D

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 [58] Field of Search..... 58/2, 23 R, 52, 104, 140 R

[56] References Cited

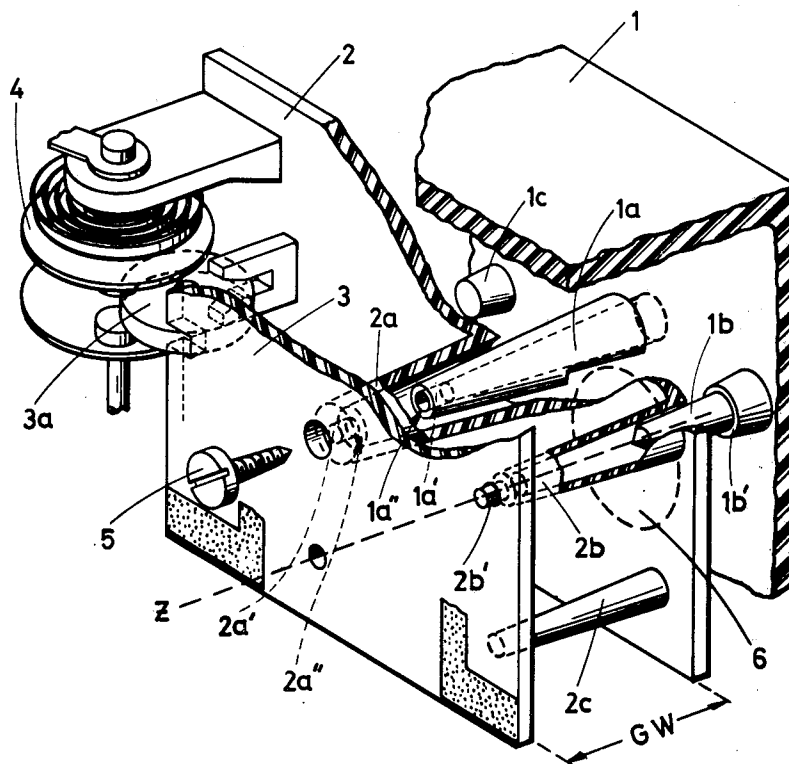
UNITED STATES PATENTS

1,492,264 4/1924 Porter 58/52 R

[57] ABSTRACT

In a battery powered clock movement, there is an improved connector means including a single fastner means as the sole means for securing the plate means and the housing cap means together.

12 Claims, 4 Drawing Figures



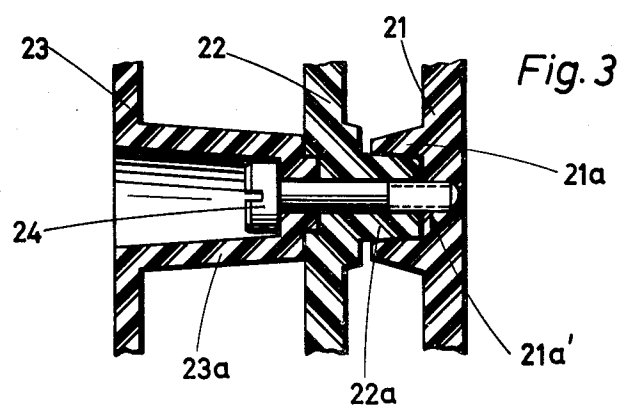
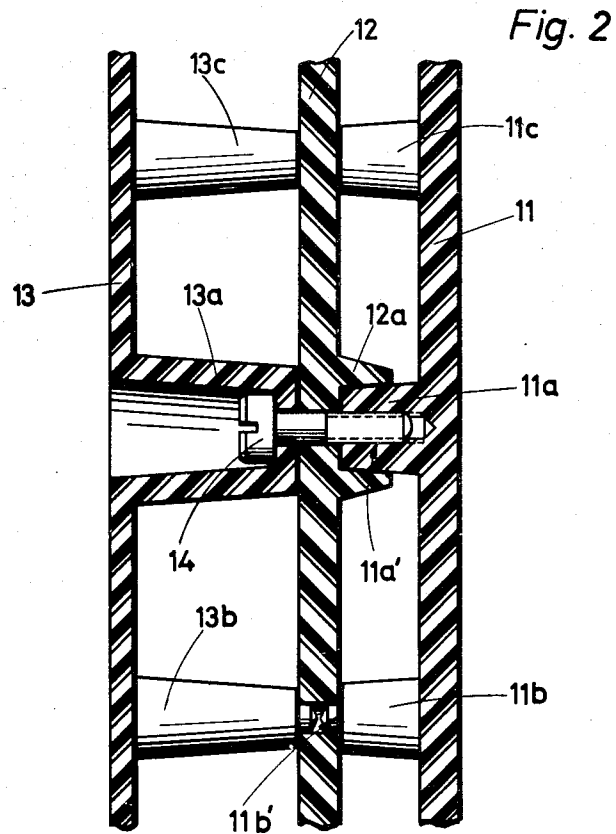
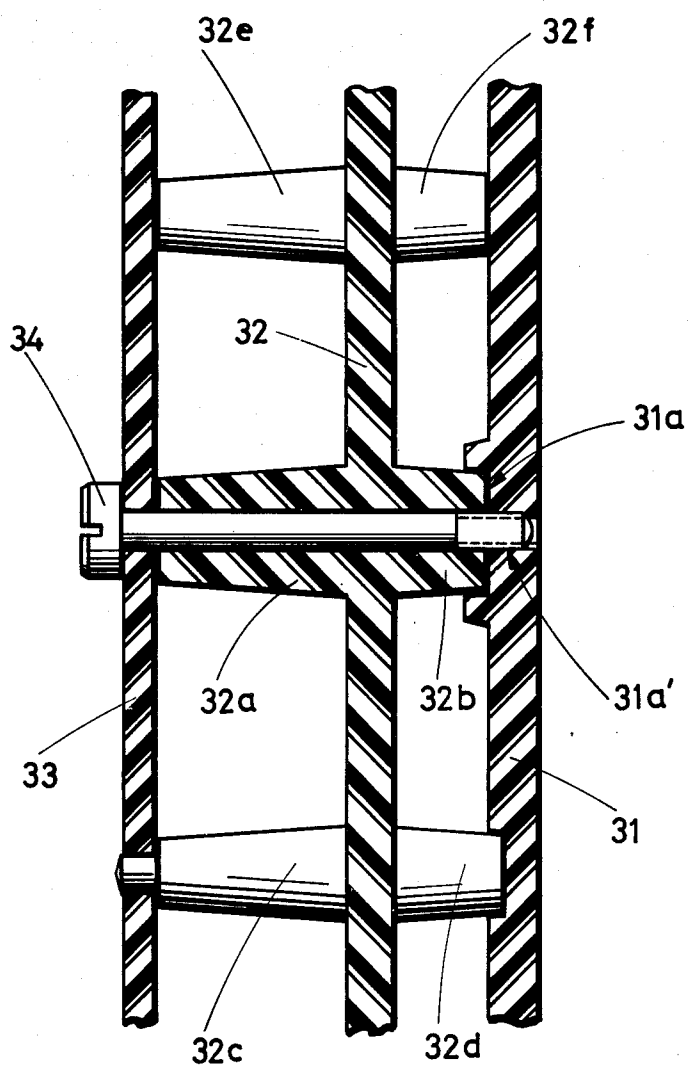


Fig. 4



BATTERY POWERED TIMEPIECES**BACKGROUND AND OBJECTS OF THE INVENTION**

The invention relates to a pillar arrangement for the attachment and distancing of plates for timepieces. The pillar arrangement is preferably utilized with a battery run watch having a housing cap consisting preferably of plastic. The plates are of the type that are spaced in the direction of the axis of a hand of the watch.

Known pillar arrangements for attaching such watch plates on a part of the watch housing consist of at least three pillars that are located between the plates in a manner holding the parts of the gear mechanism together. Additional pillars are disposed between the watch mechanism and the housing part and they keep the space for the mechanism of the hand at a distance. The attachment of the plates to one another as well as of the entire plate mechanism with regard to a housing cap made of plastic can be accomplished in various ways in accordance with the status of the prior art.

In this connection, there are battery watches, the plates of which are attached from the direction of one side among one another and to the housing. Therefore, for the attachment of the plates to each other and for the attachment of plates to the housing, two separate attachment operations are required. This in itself makes the course of the assembly cumbersome and expensive and has proven itself to be completely uneconomical according to present day concepts in the case of watches of the subject type. Moreover, a multiplicity of attaching elements, such as screws or nuts are required and must be mounted.

According to another known apparatus, a pillar arrangement has been known, which is disposed coaxially on both sides of a plastic plate. The pillars serve on one hand to space apart the plastic plate and the base plate to provide room for the actuating mechanism for the hands. On the other hand, the pillars tend to space apart the plastic plate and an additional plate to provide room for the gear mechanism. The additional plate is attached to the pillars by three screws, the base plate is only engaged with the pillars. For the actual attachment of the base plate, special resilient flaps have been provided on the plastic plate which hook up with the base plate. In the case of a watch mechanism constructed according to this utility patent, essentially the same disadvantages impeding the course of the assembly occur during fabrication as noted previously. At the same time, the attachment of the plastic plate to the base plate by way of the resilient flaps is not highly safe with regard to impacts as may occur during transportation.

Such a pillar arrangement with the same previously described disadvantages has also been known from another known apparatus. Contrary to the previously mentioned utility patent, however, here the base plate as well as the additional plate are attached only with screws which are located in a particularly uneconomical manner on the front and rear side of the watch mechanism.

The present invention begins with the realization that the forces emanating from the gear mechanism of an oscillator-driven watch mechanism are determined only by the weights of the pointers or hands and by the friction of the parts of the gear mechanism. Therefore,

in accordance with such a teaching, a frame for watch plates no longer needs to be of the same type as in the case of traditional watches.

It is an object of the present invention to obviate or alleviate these problems.

It is another object of the invention to simplify the attachment of the plates to achieve the greatest possible reduction in assemblage costs.

It is still a further object of the invention to provide an arrangement whereby only a single fastener is required to intercouple the plates of the timepiece.

BRIEF SUMMARY OF THE PREFERRED EMBODIMENTS OF THE INVENTION

According to the invention, this will be solved through the fact, that the pillar arrangement consists of only one coaxial combination of attaching pillars, of which at least a part contains a bore oriented parallel to the axis of the hands, opposite to which there is a coaxial bore of the housing cap or which is penetrated by a bolt attached in the housing cap.

That is, a timepiece has front and rear mounting plates and a housing cap. A primary pillar assembly is provided and includes a pair of coaxial, hollow primary pillars, one of the primary pillars being operably disposed between the front plate and the housing cap, and the other of the primary pillars being operably disposed between the front plate and the rear plate. A single fastener is provided for securing the primary pillar assembly together. The fastener is disposed along the coaxial axes of the primary pillars to secure the rear plate, front plate, and housing cap together. Also provided is an auxiliary pillar assembly comprising a pair of coaxial auxiliary pillars. One of the auxiliary pillars is operably connected between the front plate and the housing cap to prevent relative movement therebetween in a direction transverse to the axis of the one auxiliary pillar, and the other of the auxiliary pillars being operably connected between the front plate and rear plate to prevent relative movement therebetween in a direction transverse to the axis of the one auxiliary pillar.

In the case of a preferred embodiment according to the invention given by way of example, the attachment-pillar combination consists of a pillar formed on the housing cap. This pillar engages with a corresponding recess of the front plate defined by a hollow pillar formed coaxially on the other side of the front plate. This arrangement determines the width of the framing.

In the case of another embodiment according to the invention, the attachment-pillar combination consists of a first pillar formed on the rear plate and a pillar formed on the housing cap, so that the front plate lies between these pillars. Alternatively, the front pillar could be formed on the front plate. A fastener is provided whereby the attachment-pillar combination is interlocked and determines the width of the frame in the case of both variations.

At the same time, the pillar of the housing cap or the pillar of the front plate can engage each time with fixing recesses of the front plate or of the housing cap.

A further attachment-pillar combination according to the invention is formed on both sides of the front plate, with the pillar on the side of the pointer mechanism engaging a groove of the housing cap.

According to another advantageous development of the invention, the interlocking parts of each example of the invention can be made in a twistproof manner.

The invention permits the safe attachment with a single attaching means, such as a screw, a nut or clamping disc, of the entire frame of the gear mechanism within itself and on the housing cap.

Thus, an exceedingly inexpensive and yet qualitatively completely sufficient attachment of the plates was created for the above-mentioned watches.

The invention is explained in more detail on the basis of a few preferred embodiments depicted in drawings in which like numerals designate like elements and in which:

FIG. 1 shows an exploded, fragmentary perspective view, with parts broken away, of a pillar arrangement according to the invention according to a first embodiment given by way of example;

FIG. 2 is a fragmentary cross-sectional view of a second embodiment by way of example according to the invention;

FIG. 3 is a fragmentary cross-sectional view of a third embodiment by way of example according to the invention;

FIG. 4 is a fragmentary cross-sectional view of a fourth embodiment by way of example according to the invention; and

FIG. 5 is a view similar to FIG. 1 of a further embodiment by way of example according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 illustrates a part of a timepiece, preferably a watch which is of the battery-powered type. The numeral 1 designates a section of a plastic housing cap customary in the case of battery timepieces. As will be further described, a front plate 2 and a rear plate 3 are provided, as is customary. The housing cap 1 includes a projecting pipelike pillar 1a. This pillar 1a defines part of the attachment-pillar combination to be discussed.

On the front plate 2, and defining a further part of the attachment-pillar combination, a pipelike pillar 2a is likewise formed in projecting fashion, the inside of which is hollow and dimensioned in accordance with the pillar 1a to receive the latter. The pillars 1a and 2a are shaped as truncated cones, with the smaller diameter being located at the outer tips thereof.

The rear plate 3 in this example is developed as a conductor plate. Of the numerous electronic constructional elements interconnected to this rear plate, only the coil 3a is shown which, in this case, cooperates for example with a balance wheel 4. The overall hand actuating mechanism is conventional and need not be discussed in further detail.

In FIG. 1 the pillar 2a serves to space at a distance the front plate 2 and the conducting plate 3. This pillar 2a is drawn somewhat displaced as a whole from the housing cap 1, the latter being opened up for the purpose of a better view. It is clear from this exploded view that both pillars 1a and 2a have respective bores 1a' and 2a' and respective front surfaces 1a'' and 2a''. Whenever the front plate 2 is moved into its functional position, the pillar 1a enters the pillar 2a until the surface 1a'' engages the surface 2a''. Thus, the bores 1a' and 2a' are coaxially arranged.

This attachment-pillar arrangement according to the invention now permits, after putting on the conducting plate 3, to attach the plates 2 and 3 to each other and to the housing cap 1 with a single self-tapping screw 5

that extends through the bore 1a' in the pillar 1a. The screw 5 enters through an opening in the plate 3 that is coaxial with the bores 1a' and 2a'. The screw can tap into both the pillars 1a and 2a, or just to the pillar 1a so as to sandwich the plate 2 between the housing cap 1 and the plate 3.

As becomes clear from FIG. 1, a pillar 1b with a supporting sleeve 1b', as well as at least one additional supporting pin 1c, are provided on the housing cap 1. As will be discussed, the pillar 1b and the pin 1c stabilize the distance between plate 2 and the cap 1 to secure the front plate 2 against twisting. In accomplishing this, the plate 2 includes a hollow fixating pillar 2b which receives the pillar 1b. The pillar 1b thus defines a peg which fits into the hollow pillar 2b.

The rear or conducting plate 3 is also stabilized with regard to distance and secured against twisting by a peg 2b' which extends between the fixating pillar 2b and the plate 3. At least one supporting pillar 2c is provided on the plate 2 to engage the plate 3 so as to provide further stabilization.

The attachment-pillar combination 1a/2a is advantageously located at the smallest possible distance from the hand axis Z. This distance is determined by the largest gear 6 on this axis, shown in broken lines in FIG. 1.

It will be apparent that the pillars 1a, 2a define a primary pillar assembly which space apart the plates 2, 3 and housing cap 1. The primary pillar 1a is operatively disposed between the housing cap and the front plate 2. The other primary pillar 2a is operatively disposed between the front and rear plates 2, 3.

The fastener screw 5 defines the sole fastener for securing together the front and rear plates 2, 3 and the housing cap 1.

The pillars 1b, 2b define an auxiliary pillar assembly which prevents twisting of the plates and housing cap. The auxiliary pillar 1b is operably disposed between the housing cap and the front plate to prevent relative movement therebetween in a direction transverse to the axis Z. Likewise, the auxiliary pillar 2b is operably disposed between the plates 2, 3 to prevent similar relative movement. This is accomplished by the peg defined by the pillar 1b and the peg 2b'.

The pillars 1c and 2c define secondary pillars to assist in spacing the plates and housing cap apart.

The previously described attachment-pillar combination according to the invention is used in this case for example in the case of a plate frame assembly in which the parts of the gear mechanism are mounted only on the front plate 2. The conducting plate 3, therefore, does not carry out any significant mounting function beside its primary task. It does, however, serve to axially limit the parts of the gear mechanism.

The combination is suited, however, just as well for a clockwork mechanism extending through two plates, whereby the rear plate can be effectively developed in a conventional manner as a conducting plate. The conventional clock mechanism (not shown) is built up in such a way, that the minute gear lies in the space of the mechanism for the hands. This construction of the gear mechanism has proven itself in the assembly to be very advantageous in connection with the attachment-pillar combination, according to the invention.

FIG. 2 shows another form of the invention. Here, a primary attachment-pillar combination 11a, 13a is on the rear plate 13 and the housing cap 11. The rear plate 13 can be developed as a conducting plate. A bead 12a,

projecting from the front plate 12 presents a recess receiving the pillar 11a. This serves, for example, for fixation and stabilization. A self-tapping screw 14 is received in the coaxial bores of the pillars 13a and 11a and the front plate 12 to secure these elements together.

For the purpose of further stabilizing the distance and securing against twisting of the front plate, auxiliary or fixating pillars 11b are provided on the cap 11. The fixating pillars 11b include supporting rods 11b' received in the front plate 12. A secondary pillar 11c projects from the housing cap 11 and abuts the front plate 12.

Likewise, a fixating pillar 13b and a distancing pillar 13c are formed on the rear plate. The pillar 13b includes a rod which enters the front plate 12. In this example according to the invention, the front plate 12 does not represent a part of the attachment-pillar combination, but is jammed between this combination 13a, 11a.

In the case of the example of the invention shown in FIG. 3, the primary attachment-pillar combination 22a, 23a is developed exclusively from the front and rear plates 22 and 23. With regard to fixing and stabilizing, a similar arrangement is utilized here as in the case of FIG. 2 with one difference being that the fixating bead 21a has not been formed on the front plate, but rather on the housing cap 21. The pillar 23a projects into a recess of the front plate 22 for the formation of an additional fixating point. A self-tapping screw 24 connects the plates with the bore 21a' of the housing cap 21.

In FIG. 4 the primary pillar combination according to the invention, as mentioned initially, is formed in a known manner on both sides of the front plate 32 and is designated by 32a and 32b. A recess 31a in the housing cap 31 in this case serves as a fixating aid. Auxiliary pillars for the stabilization of the spacing distance and as security against twisting for the plates are designated by 32c, 32d, 32e, and 32f. The screw 34 in this case penetrates the frame in its entire depth and it cuts into the bore 31a' of the housing cap wall 31.

The stabilization of the spacing distance and security against twisting could in the case of the previously described examples of the invention also be accomplished by brackets formed on the plates.

These previously described additional means for keeping the distance and securing against twisting between the housing cap and the front plate can be omitted, whenever the attachment-pillar combination is made positively locking and twistproof. FIG. 5 shows such an example corresponding generally to FIG. 1 and drawn somewhat displaced. This FIGURE has also been modified with regard to the attachment according to the invention. Both modifications could be used in the case of each described FIGURE. The attachment in this case can be accomplished by a self-tapping nut or else by means of a clamping disc.

The numeral 41 designates the housing cap on which in this case a pillar 41a, having the shape of an L in its cross section, has been formed. The pillar 41a includes a bolt 41a' and front surfaces 41a''. On the front plate 42, there is a pillar 42a encompassing in the manner of a pocket the pillar 41a and corresponding to said pillar with a bore 42a' and the inside front surface 42a'', whereby the bore 42a' is penetrated by the bolt 41a'.

The pillar 42a can serve at the same time for fixing the rear plate 43 and for this purpose it carries pegs

42'', which penetrate the rear plate 43. The numerals 15 and 16 each designate an attaching element, as has already been mentioned, called nut or clamping disc, whereby the clamping disc 16 is pressed onto the peg 41a' instead of the nut, which is interesting particularly in the case of so-called "discardable time pieces." Otherwise the clock mechanism and the frame for the plates can be constructed as described in the case of FIG. 1.

It is possible for decreasing the transmission of sound to the housing cap to insert plastic inserts of rubber, etc. in the case of each example of the invention between the adjacent front surfaces.

SUMMARY OF MAJOR ADVANTAGES

The present invention provides a simplistic, yet effective arrangement for intercoupling and spacing the plates and housing cap of a timepiece. Significantly only a single fastener is required due to the effective design of the primary and secondary pillar assemblies. The ease of assemblage contributed thereby reduces the overall assemblage time and cost.

Although the invention has been described in connection with a preferred embodiment thereof, it will be appreciated by those skilled in the art that additions, modifications, substitutions and deletions not specifically described may be made without departing from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. In a timepiece having battery powered clock movement, frame means for mounting said clock movement, housing cap means, said frame means including spaced front and rear plate means, and connector means for coupling said plate means and said housing cap means, the improvement wherein said connector means comprises:

a primary pillar assembly including a pair of coaxial, hollow, primary pillar means, one of said primary pillar means being operably disposed and engaged between said front plate means and said housing cap means to separate said front plate means from said housing cap, and the other of said primary pillar means being operably disposed and engaged between said front plate means and said rear plate means to separate said front plate means from said rear plate means;

fastener means defining the sole means of securing together said housing cap, said front plate means, and said rear plate means against separation in the direction of the axes of said primary pillar means, said fastener means comprising a single fastener disposed along the coaxial axes of said pair of hollow, primary pillar means to secure said rear plate means, said front plate means, and said housing cap means together;

an auxiliary pillar assembly comprising a pair of coaxial auxiliary pillar means;

one of said auxiliary pillar means being operably connected between said front plate means and said housing cap means independently of a separate fastener, to prevent relative movement therebetween in a direction transverse to the axis of said one auxiliary pillar means, and

the other of said auxiliary pillar means being operably connected between said front plate means and said rear plate means to prevent relative

movement therebetween in a direction transverse to the axis of said other auxiliary pillar means.

2. A timepiece according to claim 1 wherein said one primary pillar means is formed on said housing cap means; said other primary pillar means being formed on said front plate means; said one auxiliary pillar means being formed on said housing cap means; and said other auxiliary pillar means being formed on said front plate means; said one auxiliary pillar means including a peg penetrating said front plate means, and said other auxiliary pillar means including a peg penetrating said rear plate means.

3. A timepiece according to claim 2 wherein said one primary pillar means is telescopingly received in said other primary pillar means; and said one auxiliary pillar means being telescopingly received in said other auxiliary pillar means.

4. A timepiece according to claim 1 wherein said one primary pillar means is formed on said housing cap means; said other primary pillar means being formed on said rear plate means; said one auxiliary pillar means being formed on said housing cap means; and said other auxiliary pillar means being formed on said rear plate means; said one auxiliary pillar means including a peg penetrating said front plate means, and said other auxiliary pillar means including a peg penetrating said front plate means.

5. A timepiece according to claim 1 wherein said one primary pillar means is formed on said front plate means; said other primary pillar means being formed on said rear plate means.

6. A timepiece according to claim 1 wherein said pair of primary pillar means are formed on said front plate means.

7. A timepiece according to claim 4 wherein said one primary pillar means engages a recess in said front plate means.

8. A timepiece according to claim 5 wherein said one primary pillar means engages a recess in said housing cap means.

9. A timepiece according to claim 6 wherein said one primary pillar means engages a recess in said housing cap means.

10. A timepiece according to claim 1 wherein said rear plate means defines an electrical conducting plate

for said battery powered hand-actuating means.

11. A timepiece according to claim 1 including secondary pillar means disposed between said housing cap means and said front plate means and between said front plate means and said rear plate means to assist said primary and auxiliary pillar means in spacing apart said plate means and said housing cap means.

12. In a timepiece having battery powered clock movement, frame means for mounting said clock movement, housing cap means, said frame means including spaced front and rear plate means, and connector means for coupling said plate means and said housing cap means, the improvement wherein said connector means comprises:

15 a primary pillar assembly including a pair of coaxial, hollow, primary pillar means, one of said primary pillar means being formed on said housing cap means and operably disposed between said front plate means and said housing cap means, and the other of said primary pillar means being formed on said front plate means and operably disposed between said front plate means and said rear plate means;

assembly and said housing cap means defining the sole means of securing said fastener means comprising a single fastener disposed along the coaxial axes of said pair of hollow, primary pillar means to secure said rear plate means, said front plate means, and said housing cap means together;

an auxiliary pillar assembly comprising a pair of coaxial auxiliary pillar means;

one of said auxiliary pillar means being formed on said housing cap means and including a peg penetrating said front plate means to connect said front plate means and said housing cap means to prevent relative movement therebetween in a direction transverse to the axis of said one auxiliary pillar means, and

the other of said auxiliary pillar means being formed on said front plate means and including a peg penetrating said rear plate means to connect said front plate means and said rear plate means to prevent relative movement therebetween in a direction transverse to the axis of said other auxiliary pillar means.

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