United States Patent

[11] 3,587,224

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[33] **Germany**
[31] **P 15 48 147.7**
J33275IX

[54] **TIMEPIECE HAVING A SETTING DEVICE ARRANGED COAXIALLY WITH THE HANDS ARBORS**
19 Claims, 13 Drawing Figs.

[52] **U.S. Cl.** **58/34,** 58/85.5
[51] **Int. Cl.** **G04c 9/00**
[50] **Field of Search** 58/34, 36, 37, 85.5, 152

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Assistant Examiner—George H. Miller, Jr.
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ABSTRACT: Timepiece with a manually operated setting knob rotatably mounted on the dial cover glass coaxial with the rotating hands arbors such that the seconds hand or both seconds and minutes hands can be set by pressing inwardly and rotating the setting knob.

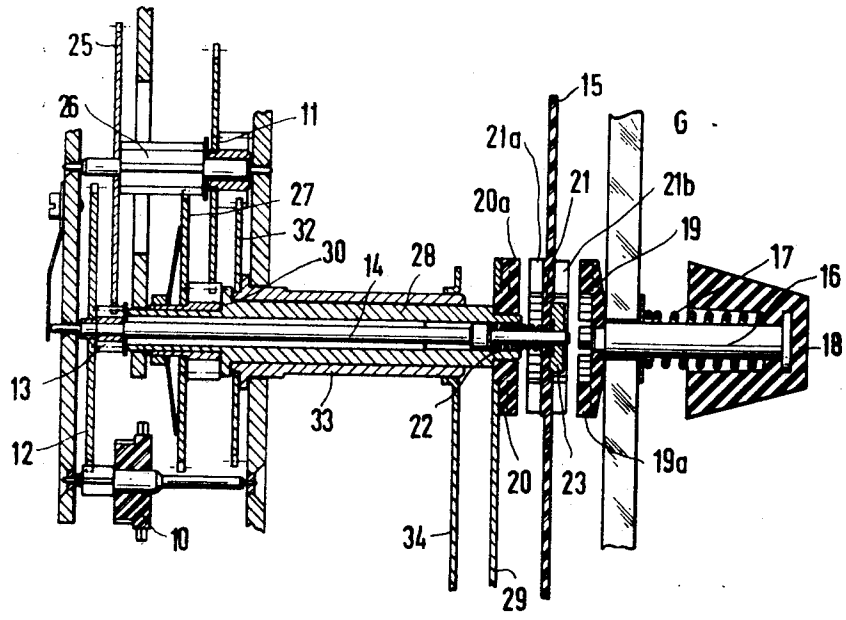

Fig.1

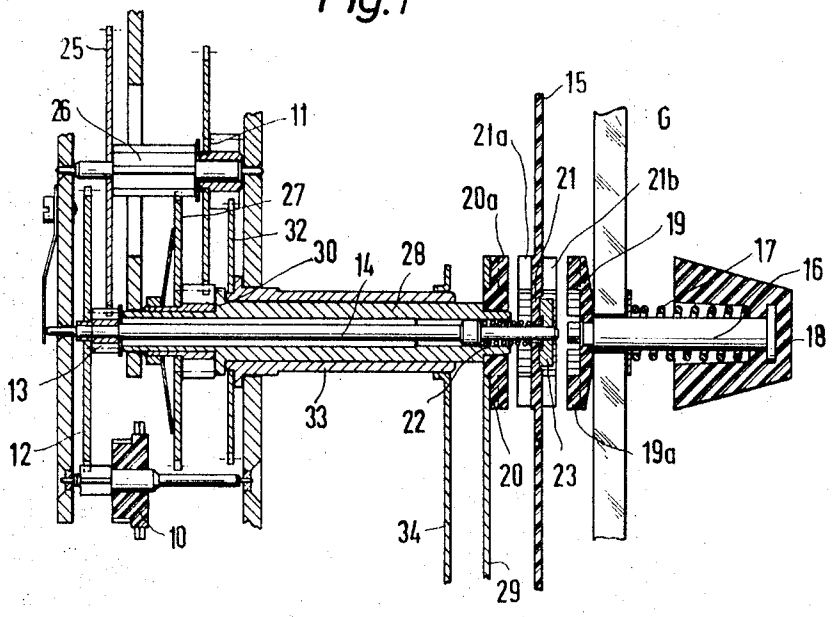

Fig.2

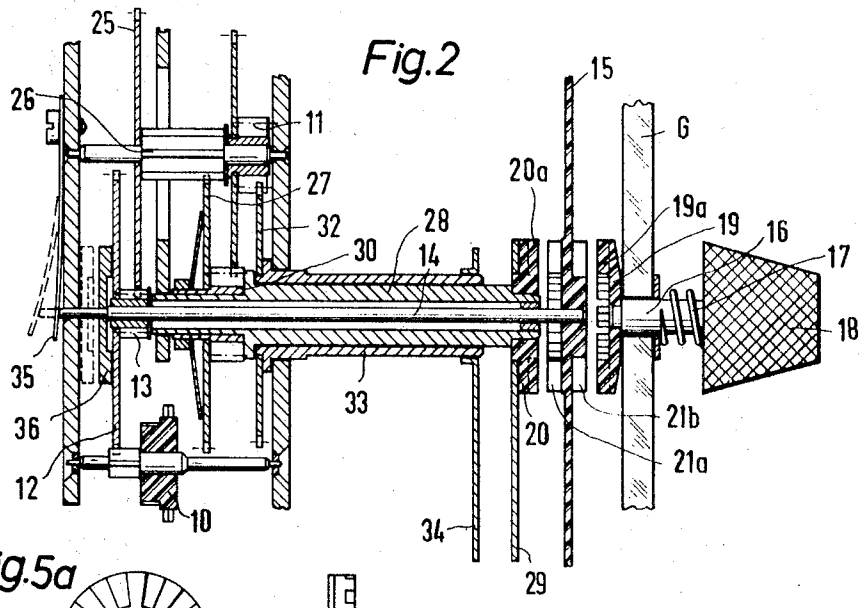

Fig.5a

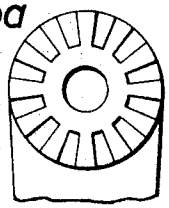

Fig.5b

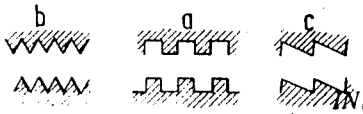

Fig.6

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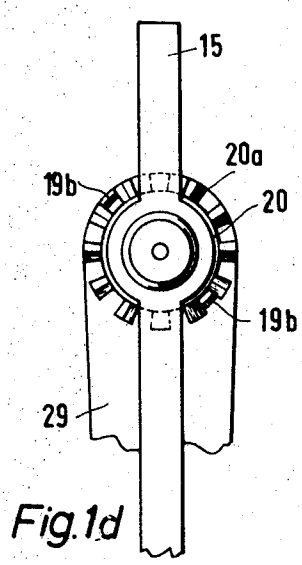

Fig. 1d

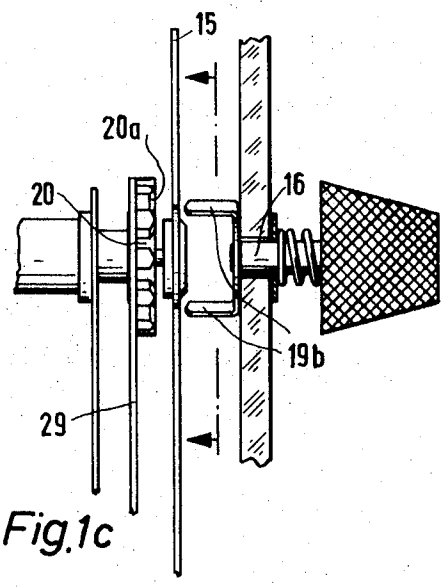

Fig. 1c

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Fig. 1a

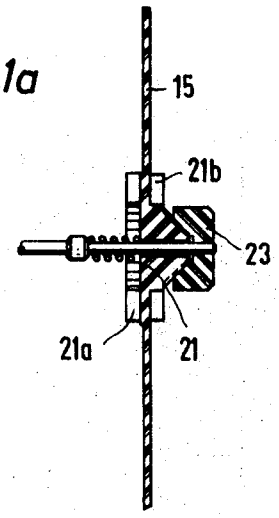

Fig. 1b

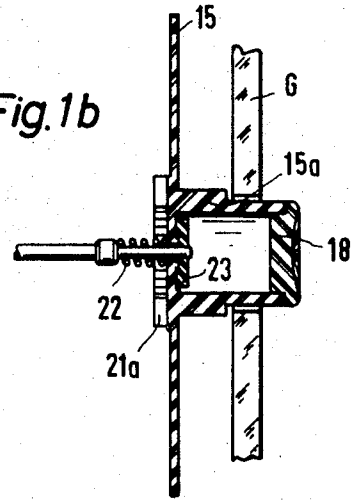

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Fig. 3

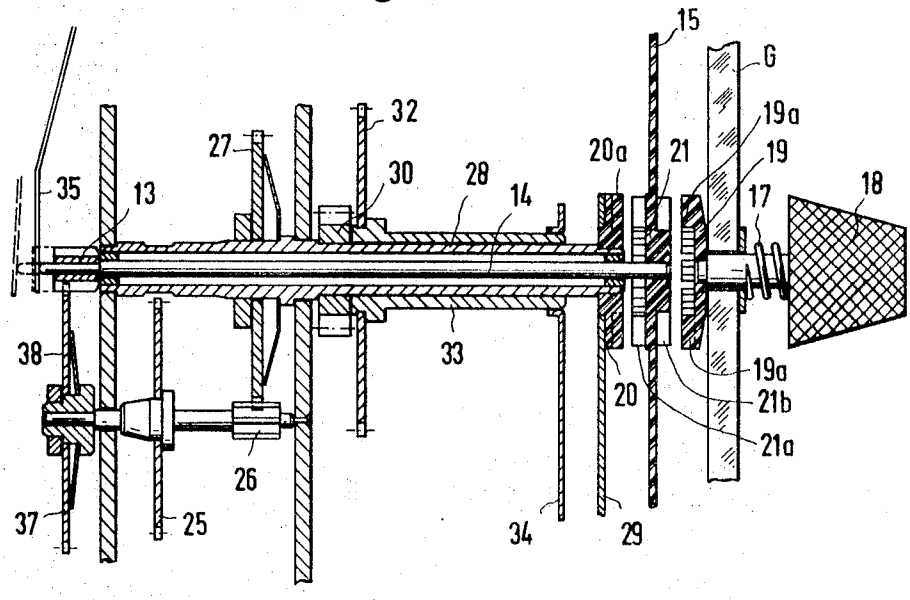
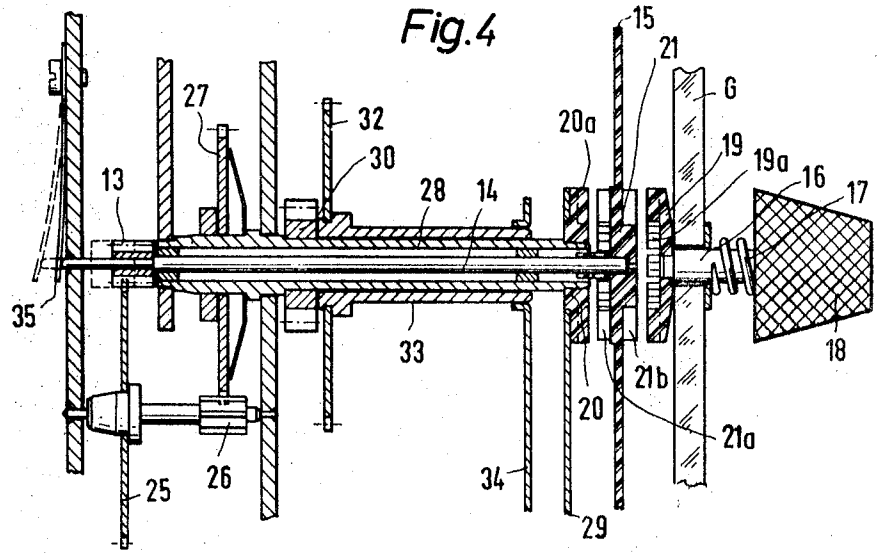


Fig. 4



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TIMEPIECE HAVING A SETTING DEVICE ARRANGED COAXIALLY WITH THE HANDS ARBORS

In timepieces arranged in an instrument panel in motor vehicles or other vehicles or craft, the rear side is inaccessible or very difficult of access. Consequently, it is not possible to adjust the hands in the otherwise customary manner from the rear by means of the hands spindles. Therefore central setting has already been provided for the minute hand, this being formed by an adjusting knob which is mounted on the timepiece glass and is adapted to be displaced in the direction towards the dial in opposition to spring pressure. But this has only been possible in the case of timepieces which did not have a sweep seconds hand. It is true that a setting device of this kind for timepieces forming part of the equipment of motor vehicles and the like is already known wherein a sweep seconds hand is provided. But in that case the seconds hand has to be fixed on the hollow arbor arranged about the minute arbor. However, this involves reconstructing the generally conventional arrangement wherein the seconds hand is arranged on the innermost arbor.

The invention obviates this disadvantage in that the setting device arranged in the timepiece glass in known manner is brought into driving connection by displacement in the direction of the dial first of all with the seconds hand and, on further displacement, with the minute hand. As a result it is possible to retain the conventional arrangement of the hands arbors and also to adjust not only the minute hand but also the seconds hand.

Conveniently, the setting device in its displacement first of all couples the seconds hand and, on further displacement, entrains the seconds hand in opposition to spring pressure until the minute hand is brought into engagement.

Further details of the invention will be apparent from the following description and the claims.

Several examples of embodiment are shown in the drawings wherein:

FIG. 1 shows a cross section through a motion work driven by the regulator with a first form of embodiment of the setting device according to the invention;

FIG. 1*a* shows the advantageous construction of a friction connection between the seconds hand and the seconds arbor;

FIG. 1*b* shows a modified construction of the setting knob;

FIG. 1*c* is a side view showing a further form of embodiment of the coupling device;

FIG. 1*d* is a plan view on to the device shown in FIG. 1*c*;

FIG. 2 shows a cross section through a motion work according to FIG. 1, but with a few modifications;

FIG. 3 shows a further form of embodiment of the setting device in a motion work in a subdivided arrangement;

FIG. 4 shows a further form of embodiment in a motion work according to FIG. 3;

FIGS. 5*a* and *b* are a plan view and side view of an end coupling element;

FIGS. 6*a*, *b*, *c* show various tooth shapes for the coupling elements.

In the embodiment shown in FIG. 1, the motion work drive is effected from the regulator **10** to the fourth wheel **12**, which is mounted fast with the fourth wheel pinion **13** on the fourth wheel arbor **14**. From the pinion **13**, drive is transmitted through the third wheel **25**, the third wheel pinion **26**, to the center wheel **27**. This is frictionally mounted on the minute pipe **28** which carries the minute hand **29**. By means of the minute pinion **30** mounted fast on the minute pipe **28**, and the minute wheel **11**, drive is imparted to the hour wheel **32** which is mounted fast on the hour wheel pipe **33** which supports the hour hand **34**.

The seconds hand **15** is mounted on the fourth wheel arbor **14**, in front of the hour and minute hands. The fourth wheel arbor **14** is driven by means of the fourth wheel **12**. In the glass G a hand setting spindle **16** is mounted so as to be displaceable and rotatable, and is adapted to be pressed inwards and turned by means of the setting knob **18** in opposition to the force of the spring **17** in order to set the hands.

An end coupling disc **19** is connected fast to the setting spindle **16**, an end coupling disc **20** to the minute pipe **28** and an intermediate coupling element **21** to the seconds hand **15**. The seconds hand **15** and with it the intermediate coupling element **21** is arranged freely on the fourth wheel arbor **14** and is connected by the spring **22** so as to be axially frictionally locked to the fourth wheel arbor **14** by means of the friction disc **23** mounted fast on the said arbor.

The end coupling discs **19** and **20** comprise at the side nearest to the seconds hand **15** and the intermediate coupling element **21** on both sides crown toothing systems **19***a*, **20***a*, **21***a*, **21***b* matching the associated element in each case.

When the hands are to be adjusted, the setting knob **18** is pressed inwards in opposition to the force of the spring **17**. When this happens, first of all the two coupling halves **19** and **21** are made to engage with their toothing systems **19***a* and **21***b*, possibly by slightly turning the knob **18** to and fro. In this position of the parts, only the seconds hand **15** can be adjusted. But if the minute hand **29** is to be turned, the knob **18** is pressed still further inwards, until the coupling elements **21** and **22** also come to engage at their toothing systems **21***a*, **20***a*. At this movement, the seconds hand **15** is displaced in opposition to the force of the spring **22** on the fourth wheel arbor **14**, whereby its frictional connection with the disc **23** is discontinued. If the knob **18** is released, the parts return under the action of the springs **22** and **17** to their position of rest shown in FIG. **1**.

In FIG. **1***a* the frictional connection between the seconds hand **15** and the disc **21** is made conical in shape in order to obtain better centering.

If the uncoupling capability between the seconds hand **15** and the setting knob **18** is dispensed with, according to FIG. **1***b* the setting shaft **15***a* is connected fast to the seconds hand **15** and taken outwards through the glass G. The setting knob **18** is fixed to the seconds hand setting shaft **15***a*. In this constructional form, the setting knob **18** rotates with the seconds hand.

A further possibility of coupling is shown in FIGS. **1***c* and **1***d*. There, the setting shaft **16** comprises a coupling fork **19***b* which is normally outside the path of the seconds hand **15**. But if it is moved inwards with the setting knob, it embraces the seconds hand **15** and moves into the teeth **20***a* of the end coupling disc **20** connected to the minute hand **29**. It is convenient to bevel the teeth and the fork ends in order to facilitate engagement in one another. If the seconds hand **15** is to be arranged fixedly on its arbor, a seconds friction element must be provided in the motion work.

In the embodiment shown in FIG. **2**, the hands are driven in the same way as in the embodiment shown in FIG. **1**, but with the difference that in this case the fourth wheel **12** is mounted with the fourth wheel pinion freely on the fourth wheel arbor **14**. Instead, the friction disc **36** is fixed on the fourth wheel arbor, which bears against the fourth wheel **12** under the pressure of the spring **35**. When the setting knob **18** is pressed inwards, in this embodiment the fourth wheel arbor **14** is displaced in opposition to the force of the spring **35**, the frictional connection between the parts **12** and **36** being discontinued.

The forms of embodiment according to FIGS. **3** and **4** show the conventional subdivided construction of the motion work, which however, as regards operation, corresponds to the modern compact construction shown in FIGS. **1** and **2**. The minute wheel between the center wheel and the hour wheel has been omitted as not belonging to the invention. The hour wheel **32** is mounted fast on the hour wheel pipe **33** with the hour hand **34**. The fourth wheel arbor **14** is driven by means of the transmission wheel **37** and the fourth wheel pinion **13**. The seconds hand **15** is connected fast to the intermediate coupling element **21**. The necessary friction mounting of the seconds hand **15** is effected by the spring **38** at the transmission wheel **37**. The axial displacement of the fourth wheel arbor **14** when coupling with the setting knob **18** is effected in opposition to the force of the spring **35**, the transmission

wheel 37 turning when hand adjustment rotational movement is carried out relatively to the spring 38. This frictional connection can be omitted if displacement of the fourth wheel arbor 14 brings the fourth wheel pinion 13 out of engagement with the transmission wheel 37.

The form of embodiment shown in FIG. 4 differs from that shown in FIG. 3 by the omission of the transmission wheel 37, since the third wheel 25 engages directly in the fourth wheel pinion 13. Also, the seconds hand 15 is connected frictionally to the fourth wheel arbor 14, so that there is no need for a special friction spring such as e.g. the spring 38 in FIG. 3. The axial displacement of the fourth wheel arbor 14 when coupling with the setting knob 18 is effected in opposition to the force of the spring 35. When the knob 18 is turned, the seconds hand 15 can turn relatively to the fourth wheel arbor 14. In this form of embodiment also the friction element between the seconds hand 15 and the fourth wheel arbor 14 can be omitted if on the axial displacement of the fourth wheel arbor the fourth wheel pinion 13 comes out of the path of the third wheel 25.

The coupling teeth of the end coupling discs 19 and 20 and of the central coupling element 21 can be given various shapes, as shown in FIGS. 6*a* to 6*c*. In an arrangement as shown in FIG. 6*c*, the hands can be rotated only in one direction. The arrangement of the teeth on the coupling discs is shown in plan view in FIG. 5*a* and in side view in FIG. 5*b*.

The various parts described may also be combined in other ways. Thus more particularly the various friction points can also be arranged differently from the arrangements shown here. Also the coupling teeth can be formed by bending-out and the coupling recesses by punching from the appropriate coupling element.

We claim:

1. In an automobile timepiece, substantially front and rear work plate means and a dial cover glass, a centrally located seconds arbor bearingly mounted on said plate means, a manually operated setting member rotatably and axially slidably mounted in the glass coaxial with the arbor, the member having an engagement inner end, a seconds pointer between the front plate means and said end, a carrier turnable about the axis of the arbor and carrying fast said pointer, a minutes tube around and coaxial with the arbor between the front plate means and the carrier and having peripherally uniformly spaced projections thereon directed toward the carrier, engagement means on the carrier for engagement with said engagement end when the setting member is pushed inwardly and turnable with the carrier for turning the carrier by the setting member, the engagement means being movable in the direction of the arbor axis, torque transmission means on the carrier and turnable therewith and movable with the engagement means in the direction of the axis of the arbor for engaging on said projections; first biasing means for normally holding said end outer from the engagement means and second biasing means for normally holding the transmission means outer from the projections on the minutes tube, whereby when the setting member is initially moved inwardly into engagement of said end thereof with the engagement means, the carrier and seconds pointer may be turned by the setting member, and upon further inward movement of the setting member the torque transmission means will be moved axially into engagement with the projections on the minutes tube so that turning of the setting member will then produce turning of the carrier and the minutes tube.

2. In an automobile timepiece according to claim 1, in which the seconds pointer has a forked end and the minute hand has coupling teeth so that the setting device when displaced first of all engages about the seconds pointer by means of the forked end and then engages in the coupling teeth of the minute hand.

3. Timepiece according to claim 1, characterized in that the frictional connection between the fourth wheel arbor and the seconds shaft is given a conical shape for centering purposes.

4. Timepiece according to claim 1, characterized in that the interlocking elements are provided with trapezoidal teeth.

5. Timepiece according to claim 1, characterized in that the interlocking elements are provided with sawtoothlike teeth.

6. Timepiece according to claim 1, characterized in that the glass passage for the setting shaft is ovalised.

7. Timepiece according to claim 1, characterized in that the friction discs are grooved.

8. Timepiece according to claim 1, characterized in that the coupling elements are made of plastics material.

9. Timepiece according to claim 1, characterized in that the seconds hand is made in one piece with the intermediate coupling element from plastics material.

10. Timepiece according to claim 1, characterized in that the seconds hand is made of metal and is embedded in the intermediate coupling element.

11. Timepiece according to claim 1, characterized in that the coupling teeth are formed by bending-out and the coupling tooth spaces by punching from the appropriate coupling element.

12. Timepiece according to claim 1, characterized in that the glass passage for the setting shaft is chamfered.

13. In a timepiece as claimed in claim 1, and disengageable coupling means interposed between the carrier and arbor, and biased to coupling position by said second biasing means, for disengaging the carrier from the arbor when the setting member is moved inwardly slightly more than sufficiently to engage the engagement means, whereby the arbor may continue normal turning while the seconds pointer is under the control of the setting member.

14. In a timepiece as claimed in claim 1, said carrier being substantially fast on the arbor and the engagement means and the torque transmitting means being movable in the direction of the axis of the arbor relative to the arbor, said arbor having a friction coupling thereon between the plate means so that turning of the carrier by setting member will not dangerously disturb a work train when the latter is used to drive the arbor.

15. In a timepiece as claimed in claim 1, and means for preventing rearward movement of the arbor when the setting member end engages the engagement means.

16. Timepiece according to claim 1, characterized in that coupling elements are provided constructed as interlocking elements with rectangular teeth.

17. Timepiece according to claim 16, characterized in that the interlocking elements are provided with triangular teeth.

18. In a timepiece as claimed in claim 1, the engagement means and the torque transmitting means being respectively, forwardly and rearwardly extending projections on the carrier and radial to the axis of the arbor.

19. In a timepiece as claimed in claim 18, the engagement means and the torque transmitting means being fast with respect to the arbor in the zone outer from the front plate means, said second biasing means acting through and engaging the arbor to hold the transmission means outer from the projections on the minutes tube.