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Challandes

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[54] **UNIVERSAL TIMEPIECE**

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[52] **U.S. Cl.** **58/42.5,** 58/85.5

[51] **Int. Cl.** **G04b 19/22,** G04b 27/00

[58] **Field of Search** 58/42.5, 43, 85.5

[56] **References Cited**

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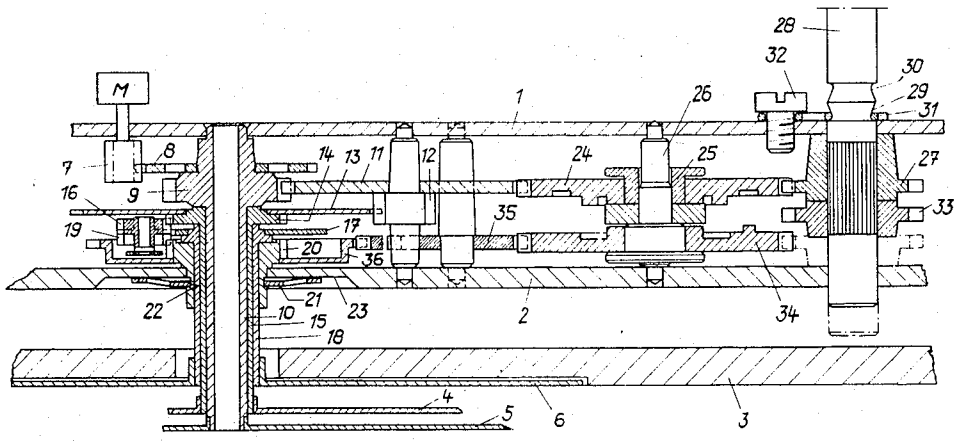
[57] **ABSTRACT**

A universal timepiece comprises a disc driven by means comprising meshing first and second planet wheels pivotally mounted on a rotatably carrier angularly fixed with the disc, the first planet wheel meshing with a pinion in an hours hand driving train, and the second planet wheel meshing with a solar pinion. The solar pinion is normally angularly fixed, but a setting train for the disc meshes with the solar pinion to enable rotation thereof.

7 Claims, 5 Drawing Figures



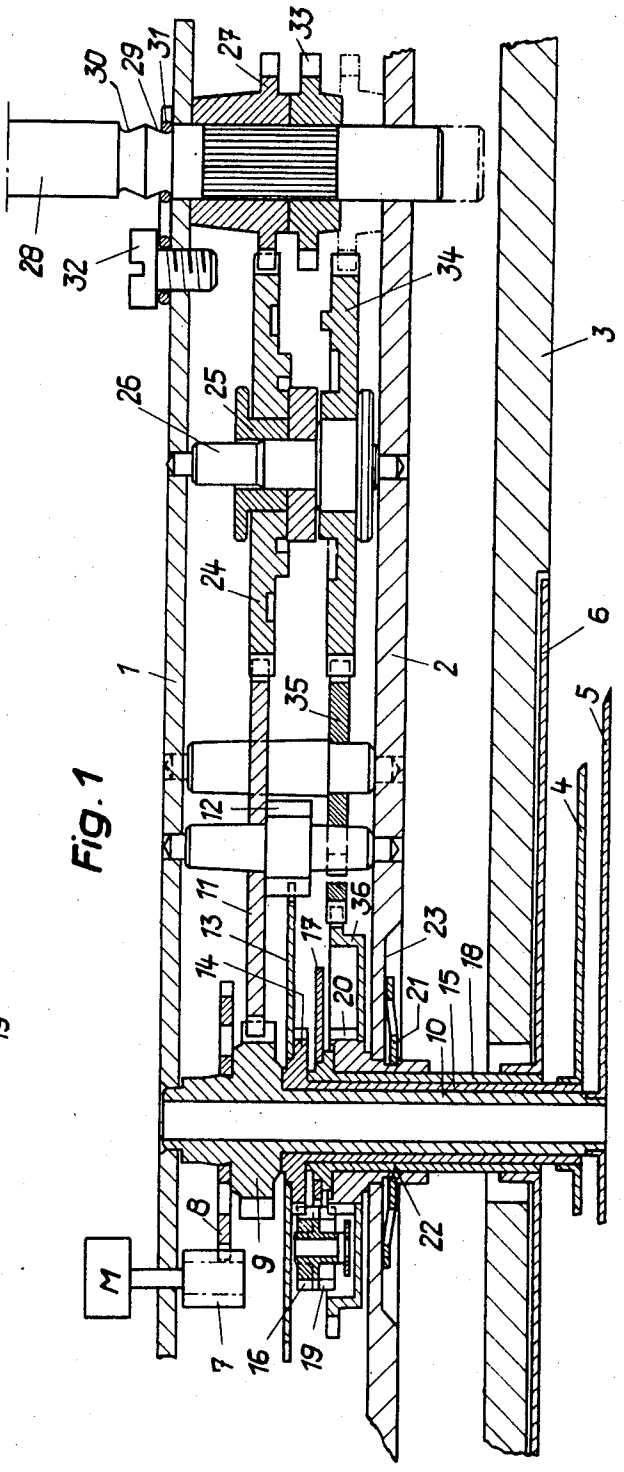

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Fig. 1

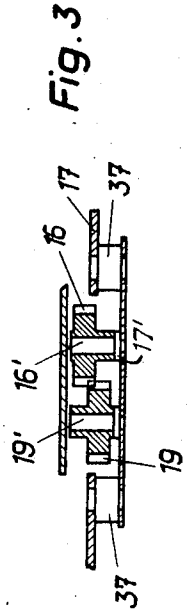
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Fig. 3

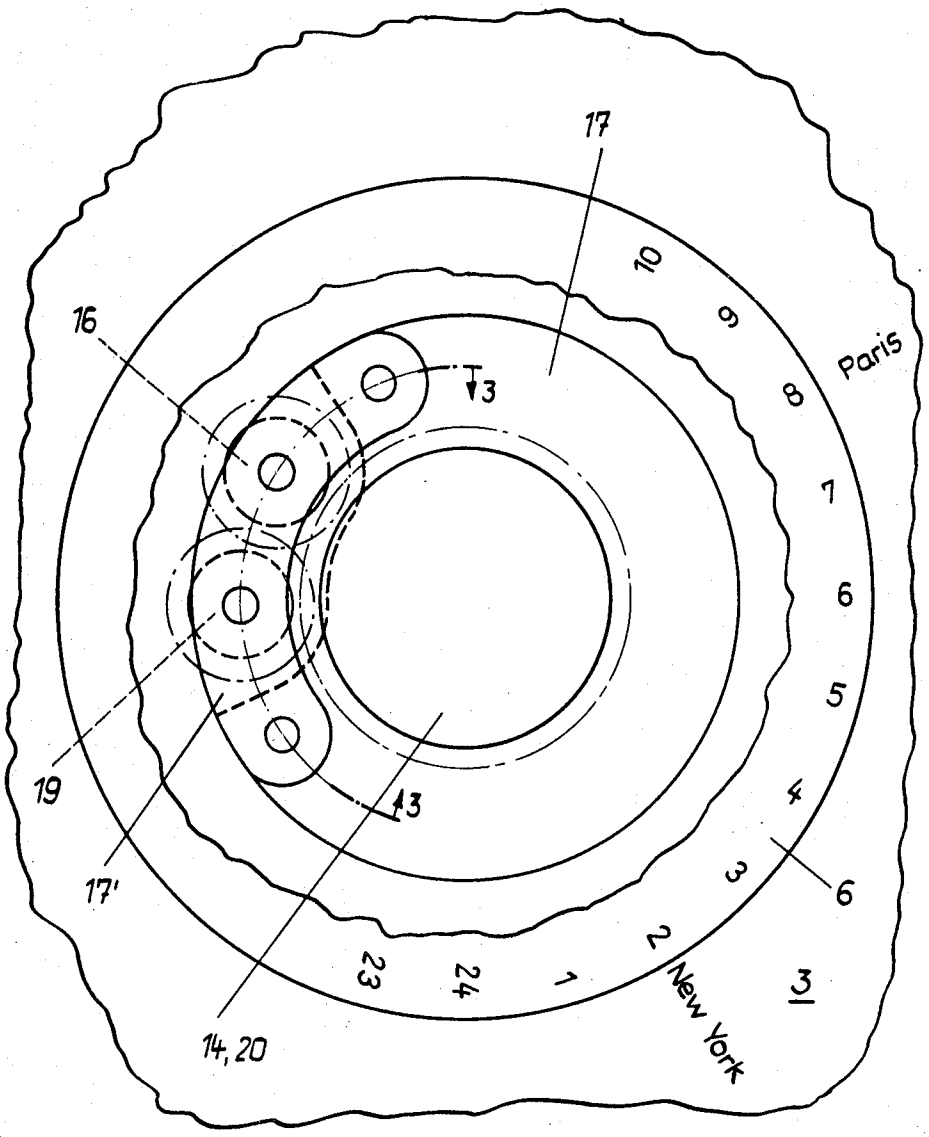


Fig. 2

Fig. 4

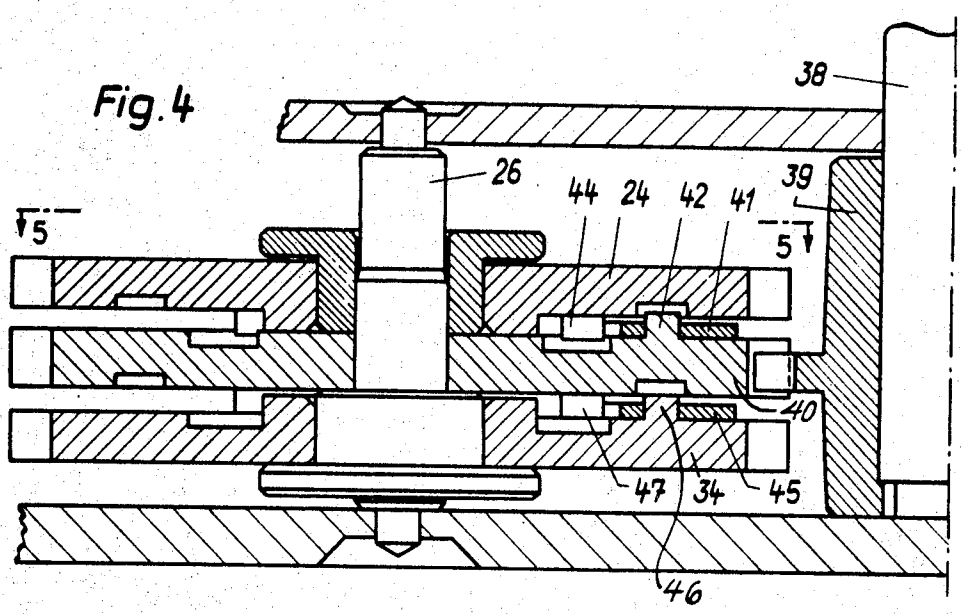
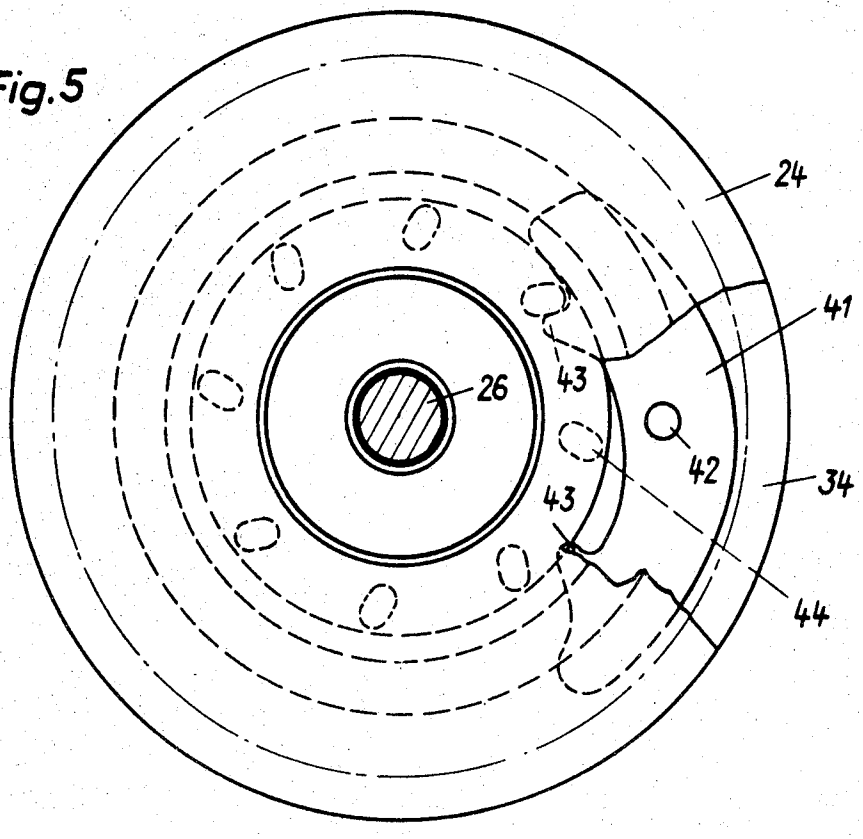


Fig. 5



UNIVERSAL TIMEPIECE

SUMMARY OF THE INVENTION

This invention relates to universal timepieces, that is to say timepieces designed for the rapid reading of time in different time zones.

It is an object of the invention to provide a universal timepiece comprising conventional hours and minutes hands, a disc carrying indications to show the time in different time zones, and a separate setting train for the disc to enable setting thereof without interference with the drive of the hours and minutes hands. Preferably, a second setting train which enables the simultaneous setting of the hours hand, minutes hand and disc is also provided.

A universal timepiece according to the invention comprises a minutes hand, an hours hand and a disc mounted for rotation about a fixed dial, indications being provided on the dial and disc for showing the time in different time zones. The minutes hand, hours hand and disc are respectively driven in the ratio 24:2:1 revolutions per minute by driving means comprising meshing first and second planet wheels pivotally mounted on a rotatable carrier angularly fixed with said disc, said first planet wheel also meshing with a first pinion angularly dependant with the hours hand, said second planet wheel also meshing with a solar pinion. Means are provided for normally holding said solar pinion angularly fixed, and means for setting said disc include a setting train meshing with said solar pinion to enable rotation thereof.

DESIGNATION OF THE DRAWINGS

An embodiment of a timepiece according to the invention and a varied embodiment will now be described, by way of example, with reference to the accompanying drawings, in which :

FIG. 1 is a partial cross-section through the embodiment;

FIG. 2 is a partially cut-away plan view from below the timepiece of FIG. 1;

FIG. 3 is a cross-section along line III—III of FIG. 2;

FIG. 4 is a view corresponding to a part of FIG. 1 for a varied embodiment; and

FIG. 5 is a partly cut-away plan view taken along V—V of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The mechanism shown in FIG. 1 is mounted between two plates 1 and 2 and drives an hours hand 4, a minutes hand 5, and a disc 6 past indications on a dial 3 covering the plate 2.

This mechanism comprises a pinion 7 driven by a known type of horological motor schematically represented by M and which, being well known to the person skilled in the art, will not be described in detail. For example, the motor could be an electro-mechanical oscillator motor, or a conventional spring driven motor with a balance wheel and escapement mechanism; in both cases a gear train (not shown) is provided so that pinion 7 is driven at a rate such that a wheel 8 meshing therewith is driven at an angular speed of 1 revolution per hour.

Wheel 8 is friction fitted on a cannon-pinion 9 the shaft 10 of which is pivotally mounted between plates 1 and 2 and protrudes out of plate 2 and through the dial 3. The minutes hand 5 is mounted on the end of shaft 10 protruding from the dial, so that it is driven at a rate of one revolution per hour. The cannon-pinion 9 meshes with a dial-train 11 angularly solid with a pinion 12 meshing with an hour wheel 13 fixed onto a pinion 14 made in one piece with a pipe 15 rotatably mounted on the shaft 10 of cannon-pinion 9. Pipe 15 also protrudes through the dial 3 and carries, at its outer end, the hours hand 4. The gear ratio between the cannon-pinion 9, dial-train 11, dial-train pinion 12 and hour wheel 13 is 1:12, so that the hours hand 4 makes one complete revolution around the dial for 12 revolution of the minutes hand 5, as in conventional timepieces.

Pinion 14 meshes with a planet wheel 16 pivotally mounted on a mobile wheel 17 fixed on a second pipe 18 concentric to pipe 15 and mounted rotatably thereabout. Wheel 17 also carries another planet wheel 19 meshing on the one hand with planet wheel 16 and on the other hand with a pinion 20 rotatably mounted about pipe 18. Since this differential gear system is provided with two planet wheels, 16 and 19, the disc 6, which is fitted onto pipe 18 adjacent to the dial 3, is rotated in the same direction as the hands 4 and 5.

The mounting of planet wheels 16 and 19 on wheel 17 is shown in detail in FIG. 3. The planet wheels are pivotally mounted on shanks 16' and 19' fixed to a plate 17' attached to wheel 17 by two pillars 37. The shank of pinion 20 passes through plate 2 and a spring 21 fitted in groove 22 of the shank of pinion 20 bears against the bottom of a recess 23 in the outer side of plate 2 so as to prevent pinion 20 from freely turning about the pipe 18. Consequently, pinion 20 forms a solar pinion about which the planet wheel 19, driven by planet wheel 16 meshing with pinion 14, is driven together with the wheel 17 and pipe 18 carrying disc 6. The gear ratio of pinions 14, 16, 19 and 20 is chosen so that the angular speeds of the wheel 17 and the pinion 14 are in the ratio 1:2. Consequently, disc 6 makes one revolution per 24 hours.

As shown in FIG. 2, disc 6 is graduated at its periphery from one to 24 and the fixed dial 3 carries, around disc 6 and in addition to the normal hour graduations, 24 sectors each corresponding to a time zone and which can be identified by an indication of an important city or country located in the zone. Hence, the disc 6 driven at a rate of one rotation per 24 hours indicates, when it is correctly set, the time for each zone whilst local time is indicated by the hands 4 and 5.

The "normal" time-setting mechanism comprises a wheel 24 meshing with the dial-train 11 and freely rotatably mounted on a stepped bush 25 tightly fitted on a shank 26 pivotally mounted between plates 1 and 2. Wheel 24 meshes with a pinion 27 keyed on an axially and rotatably movable control shaft 28 which can be actuated manually from the exterior of the timepiece, in this example from outside the bottom of the case, not shown. This control shaft 28 is mounted between the plates 1 and 2 and has two adjacent circumferential grooves 29 and 30. A spring 31, fixed by means of a screw 32 to the outer side of plate 1, penetrates into one or the other of grooves 29 and 30

according to the axial position of the control shaft **28** so as to hold the shaft in a chosen axial position.

A further pinion **33** is also keyed onto control shaft **28**. In the second axial position of the control shaft **28**, indicated in dotted and dashed lines in FIG. **1**, pinion **33** meshes with a wheel **34** coaxial to the wheel **24** but angularly fixed on the shank **26**. In this second position of the control shaft **28**, pinion **27** no longer meshes with the wheel **24**. Wheel **34** forms part of a gear train for setting disc **6** comprising a wheel **35** meshing with wheel **34** and with a wheel **36** fixed on the pinion **20**.

For "normal" simultaneous setting of the hands **4** and **5** and the disc **6**, the control shaft is placed in the position shown in full lines in FIG. **1**, and the shaft is manually rotated in one direction or the other according to whether it is desired to move the hands **4** and **5** forwards or backwards. The rotation of shaft **28** is transmitted to the wheel **24** by the pinion **27**. Wheel **24** drives the dial train **11** and the dial train pinion **12** of the motion work. Wheel **8** is frictionally fitted onto the shaft **10** of the cannon pinion **9** and consequently stays in mesh with the pinion **7** of the motor M. The frictional adjustment between the wheel **8** and the cannon pinion **9** thus enables the latter to be angularly freed from wheel **8** during setting. The dial train pinion **12** also transmits rotation to the wheel **13** fixed to pinion **14** made in one piece with the hours hand pipe **15**. Pinion **14** transmits a rotation in the ratio 1:2 to the mobile planet-carrying wheel **17** fixed to pipe **18** carrying disc **6**. The pinion **20** is held angularly fixed by the spring **21** during this operation, as for normal running of the timepiece.

For setting only the disc **6**, for example after having moved the hands **4** and **5** forwards or backwards by one hour when the user passes from one time zone to another, or after the time-piece has been stopped for a long period, the control shaft **28** is moved to the position shown in dotted and dashed lines, with the spring **31** engaging in groove **30**. By manually turning the shaft **28**, wheel **34** is driven by pinion **33** and in turn drives wheel **36** fixed on pinion **20**. Pinion **20** is thus turned against the action of the pressure exerted by the spring **21** and, by turning, drives the planet wheel **19** which in turn drives the planet wheel **16**. In this case, pinion **14** which is angularly held by the gear train **13**, **12**, **11**, **9** and **8** and the motor M acts as a fixed solar pinion, since its rotation at **1** revolution per **12** hours can be neglected. In this manner, the wheel **17** is rotated without disturbing the position and drive of hands **4** and **5**. Of course, rotation of wheel **17** fixed to pipe **18** causes rotation of the disc **6**, which can thus be set independently of the hands.

The normal rest position of the control shaft **28** is that shown in dotted-dashed lines. In fact, normal drive of the hands is accompanied by rotation of the wheels **11** and **24**. Since the control shaft **28** is gripped by the spring **31**, this spring exerts a braking action on the shaft **28** which would therefore cause stopping or slowing down of the hands **4** and **5** and disc **6** if the wheel **24** were left in mesh with the pinion **27** during normal running of the timepiece. Pinion **20** being angularly fixed during normal operation of the timepiece, the engagement of pinion **33** with wheel **34** causes no perturbation to the motion work and allows wheel **24** to turn freely. The provision of two axially separated coaxial pinions **27** and **33** is not absolutely necessary; however, this arrangement enables a reduction of the axial path for the control shaft **28**.

In the variant shown in FIGS. **4** and **5**, a time-setting stem **38** has a single axial position and has a single pinion **39** fixed thereto. Pinion **39** meshes with a toothed wheel **40** freely pivoted on a shaft **26** between wheels **24** and **34**. Wheel **40** has on its upper face a pawl **41** freely pivoted on a stud **42** integral with wheel **40**. Pawl **41** has two beaks **43** which engage with catches **44** carried by the wheel **24** when the wheel **40** turns in the counterclockwise direction (FIG. **5**) but which do not engage with the catches **44** when wheel **40** turns in the clockwise direction. Hence the wheel **24** and the setting train are only driven for one direction of rotation of the stem **38**.

The wheel **34** also carries a pawl **45** freely pivoted on a stud **46** integral with wheel **34**. The beaks of this pawl **45** are arranged so that the pawl does not engage with stud **47** carried on the lower face of the wheel **40** when this wheel is turned in the counterclockwise direction (FIG. **5**), whilst they engage with studs **47** when wheel **40** is turned in the clockwise direction.

In this manner, rotation of wheel **40** in the counterclockwise direction drives the wheel **24** and the setting train for the hands and disc, whilst rotation of wheel **40** in the clockwise direction drives the wheel **34** and the setting train for the disc **6** only.

Of course, other variants can be envisaged. Thus, instead of having a control shaft **28** parallel to the axis of the motion work and which is therefore accessible from outside the bottom of the timepiece, it would be possible to use a conventional control stem parallel to the general plane of the motion work. Such a stem could control the two distinct setting trains by means of a conventional type of setting mechanism, with pull-out-piece, jumper, clutch wheel, and rocking bar carrying two pinions respectively alternately in engagement with the wheels **24** and **34** by rocking the bar about the axis of an intermediate wheel driven by the clutch wheel. This type of mechanism is well known to the person skilled in the art, but it should however be noted that it is more costly to manufacture than the described embodiments.

What is claimed is:

1. An universal timepiece comprising : a fixed dial; a minutes hand, an hours hand and a disc mounted for rotation about the dial; indications on the dial and disc for showing the time in different time zones; means for driving the minutes hand, hours hand and disc respectively in the ratio 24: 2: 1 revolutions per twenty four hours, said driving means comprising meshing first and second planet wheels pivotally mounted on a rotatable carrier angularly fixed with said disc, said first planet wheel also meshing with a first pinion angularly dependent with the hours hand, said second planet wheel also meshing with a solar pinion; means for normally holding said solar pinion angularly fixed; and means for setting said disc including a first setting train meshing with said solar pinion to enable rotation thereof.

2. A timepiece according to claim **1**, comprising a second setting train including means for simultaneously setting the minutes hand, hours hand and disc.

3. A timepiece according to claim **2**, comprising single control means for selectively actuating the first and second setting trains.

4. A timepiece according to claim 3, in which said control means comprises a rotatable control shaft movable axially between a first position and a second position, third pinion means mounted on said control shaft, said third pinion means meshing with a first wheel of said first setting train in said first position and with a second wheel of said second setting train in said second position, the first and second wheels of said first and second setting trains being coaxially mounted together but angularly independent of one another and axially spaced apart from one another.

5. A timepiece according to claim 4, in which said third pinion means comprises two third pinions coaxially keyed on said control shaft, one third pinion meshing with said first wheel whilst the other third pinion is disengaged from the second wheel in said first position, and the other third pinion meshing with the second wheel whilst said one third pinion is disengaged from the first wheel in said second position.

6. A timepiece according to claim 1, in which said solar pinion is rotatably mounted in a plate of the timepiece, and comprising a spring urging the solar pinion against said plate to frictionally angularly lock the solar pinion on the plate.

7. A timepiece according to claim 2, which further comprises a control means comprising an axially fixed rotatable control shaft, a third pinion on said shaft, said third pinion being disposed between a first wheel of the first setting train and a second wheel of the second setting train, and means for rotatably engaging said third pinion with said first wheel for one direction of rotation of said shaft and rotatably engaging said third pinion with said second wheel for the other direction of rotation of said shaft.

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