United States Patent

[11] 3,633,354

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[33] **Germany**
[31] **P 19 33 049.5**

[54] **WORLD-TIME INDICATOR TIMEPIECE**
6 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **58/43,** 58/85.5
[51] **Int. Cl.** **G04b 19/22**
[50] **Field of Search** 58/4.5, 42.5, 43, 44, 85.5

[56] **References Cited**

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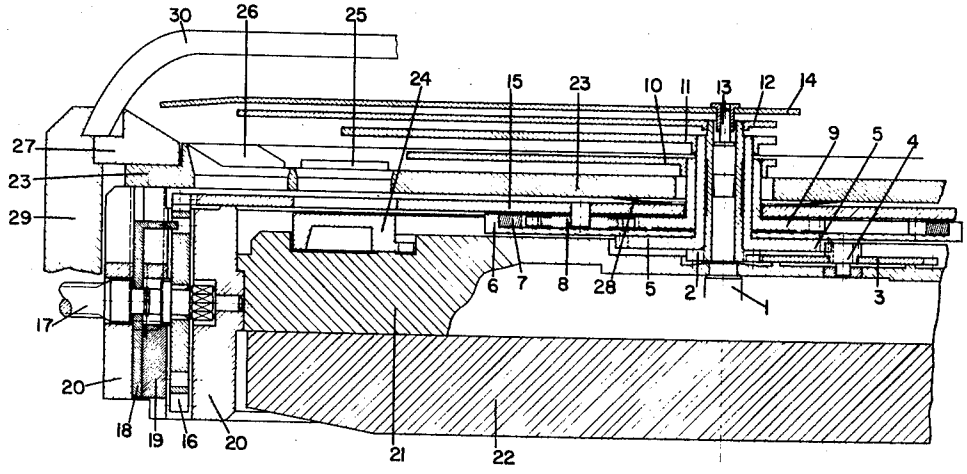
ABSTRACT: The timepiece comprises a minute hand, means having a 12-hour scale and a 24-hour scale, a 12-hour hour hand associated with said 12-hour scale, a 24-hour hour hand associated with said 24-hour scale, and setting means for jointly and mutually independently setting said 12-hour and 24-hour hour hands.



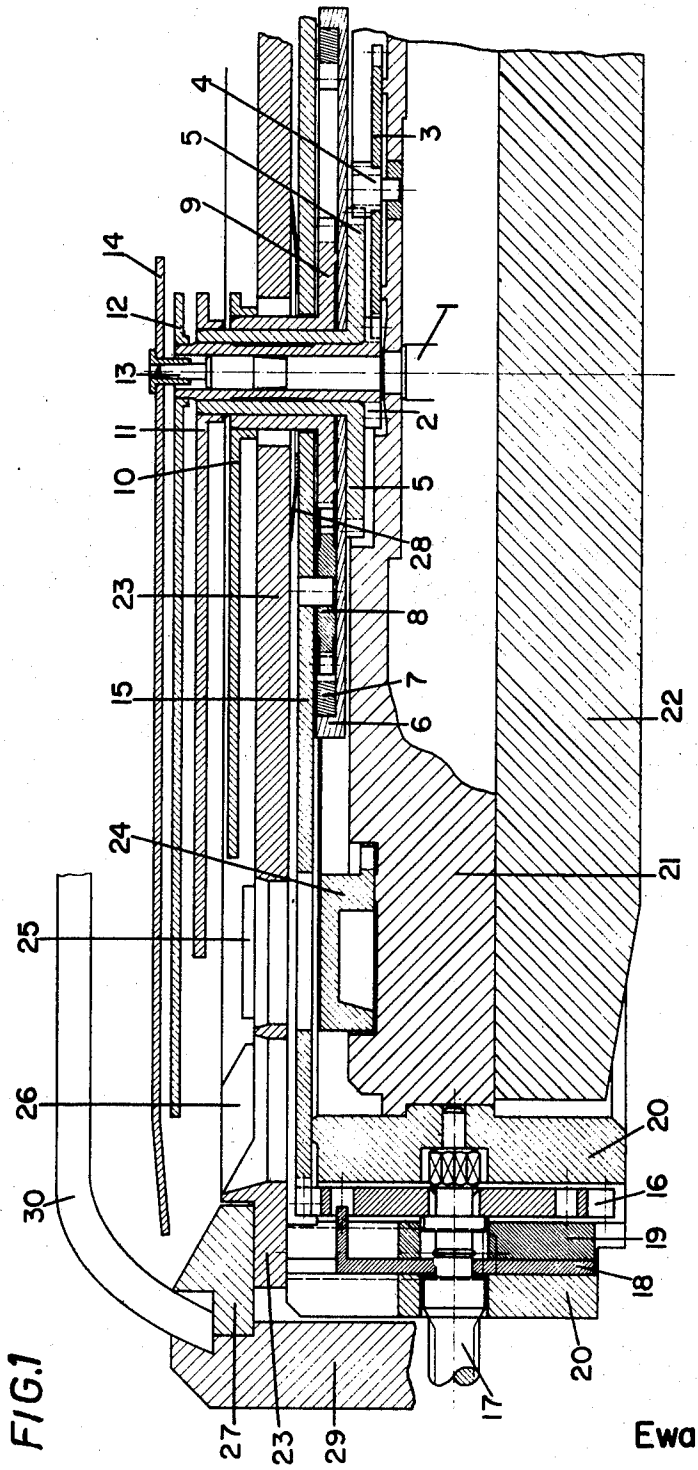


FIG. 1

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FIG. 2

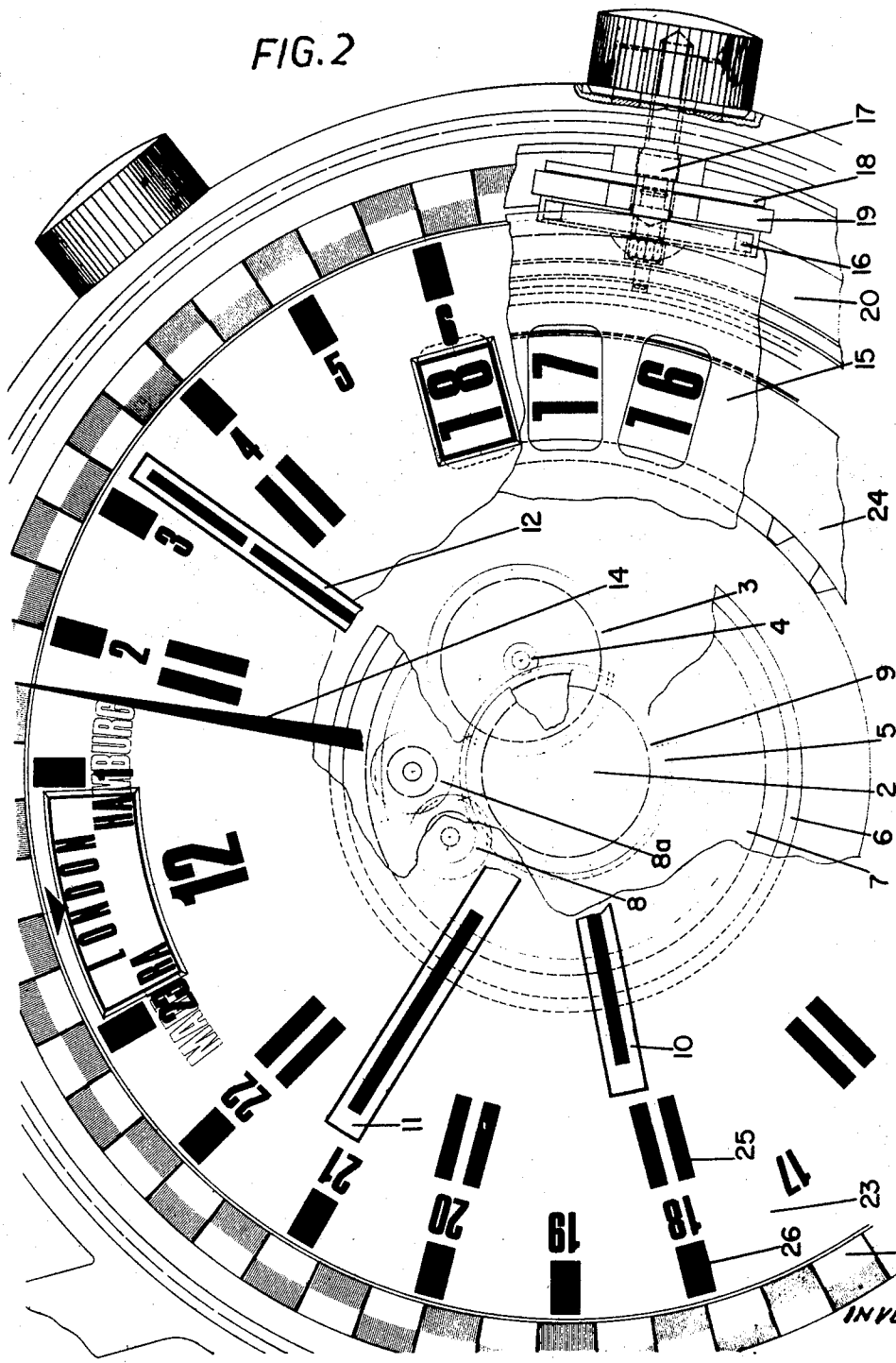

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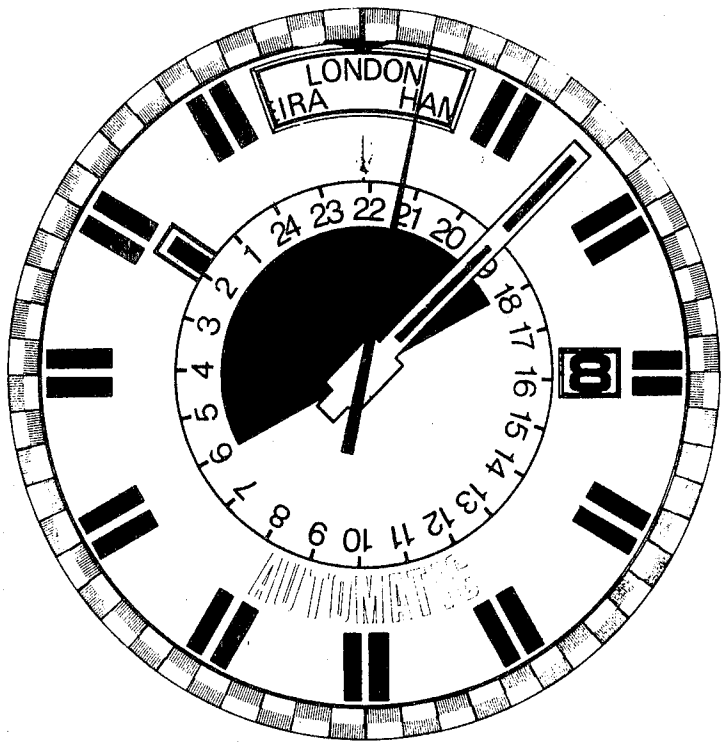
FIG. 3



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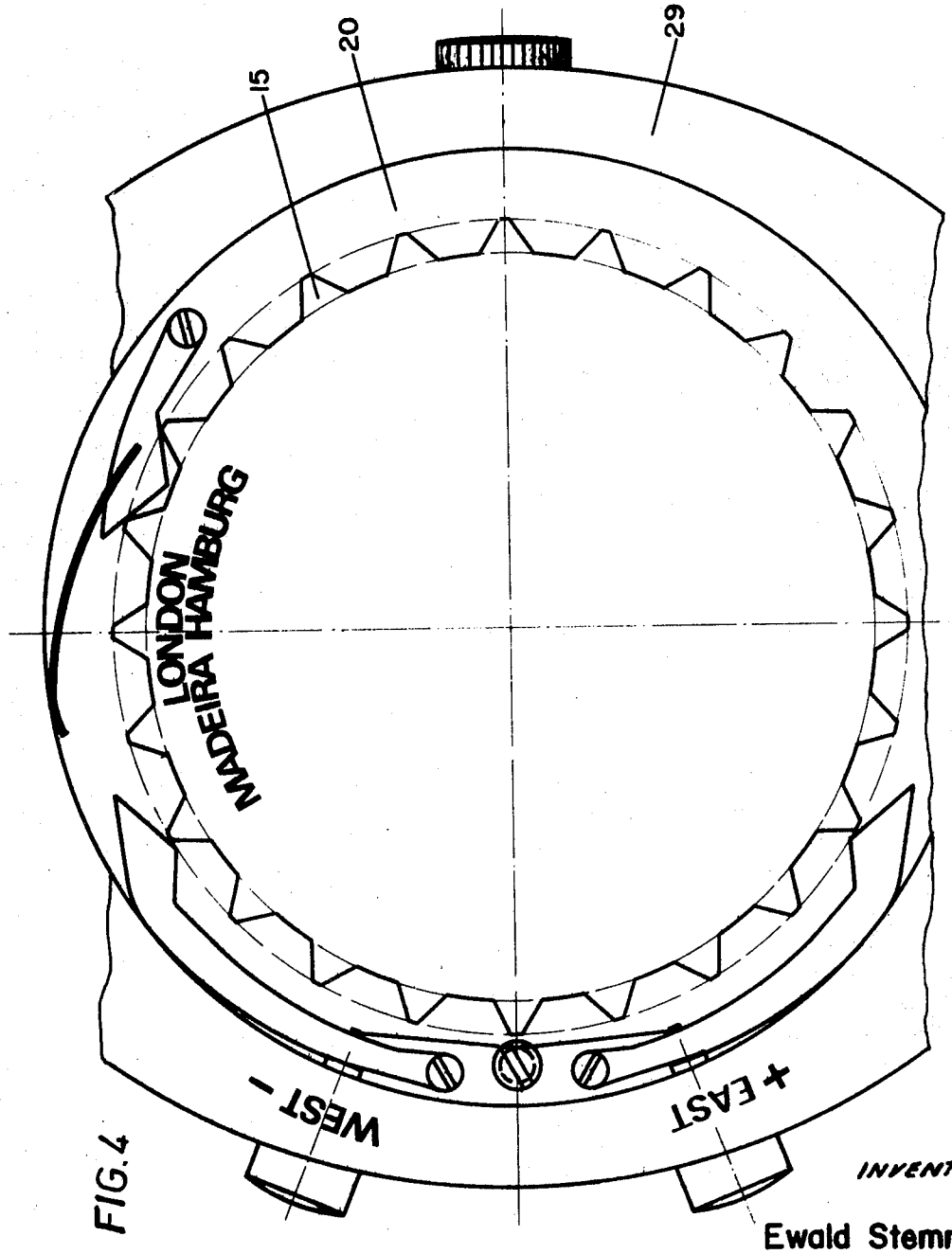

FIG. 4

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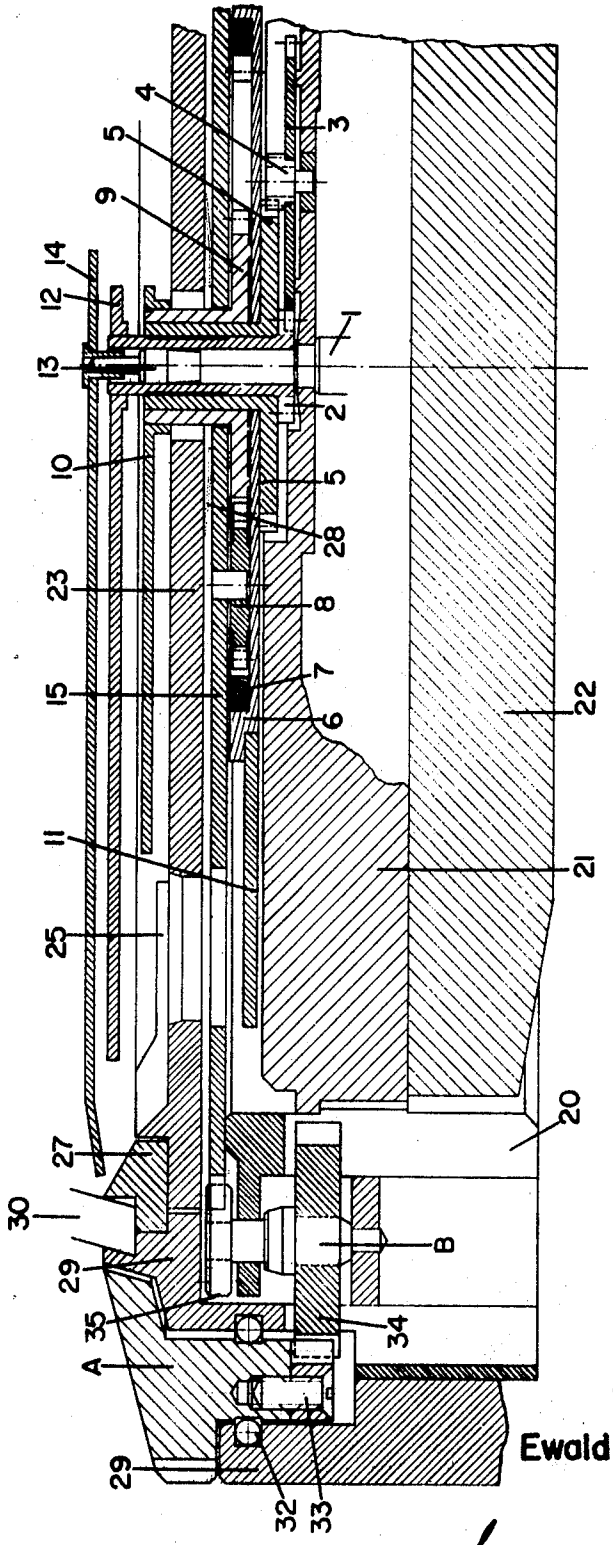

FIG. 5

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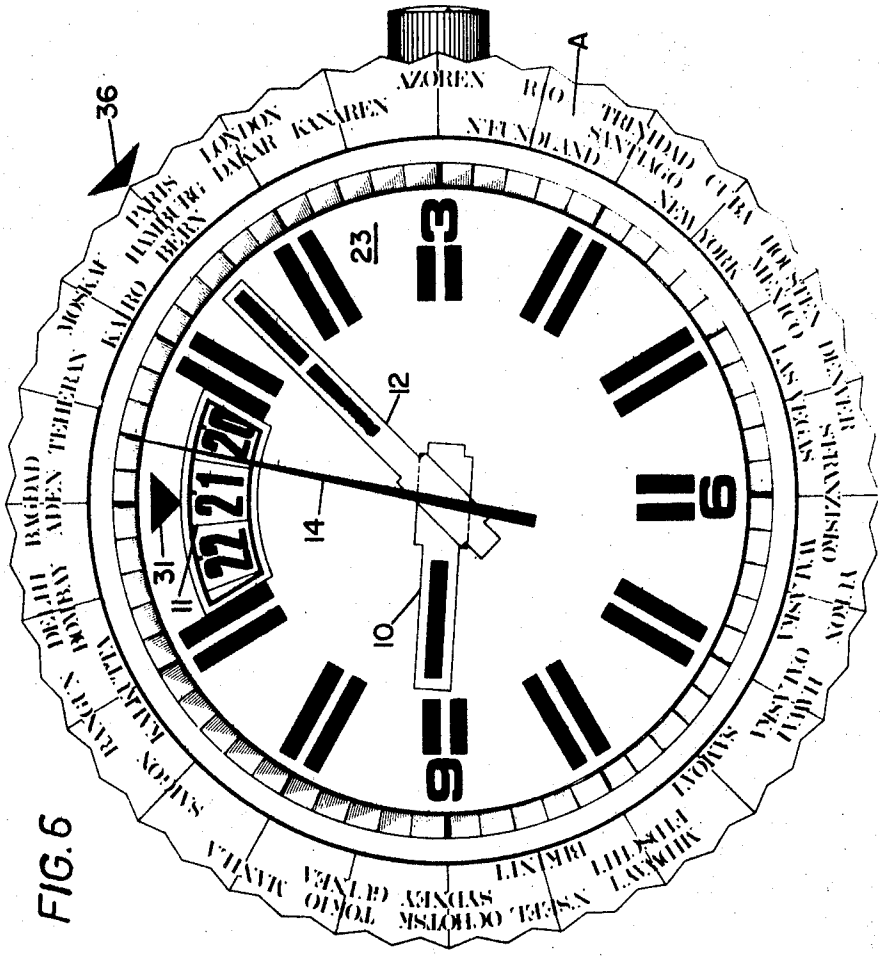

FIG. 6

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WORLD-TIME INDICATOR TIMEPIECE

This invention relates to a world-time timepiece, which comprises a minute hand and two hour hands, one of which is a 12-hour hour hand whereas the other is a 24-hour hour hand or a 24-hour graduated disc.

It is an object of the invention to provide a wrist watch which indicates to a person who is traveling between two places having different times (zone times) both the time at the place of departure and the time at the place of destination. A timepiece according to the invention may be used for the same purpose also as a wall-clock or the like in vehicles for long-distance transportation, such as aircraft, ships, railway trains and buses.

The above-mentioned object is accomplished in the timepiece according to the invention in that the two hour hands can be set arbitrarily either jointly or separately. The 12-hour hour hand may be set independently by a disc, which is concentric with the axis of the hand and on which time zones are indicated, e.g., by the names of representative places. The zone disc may be rotated in steps in both directions by a setting shaft, which protrudes from the watch housing and is provided with a setting knob, or two pushbuttons may be mounted in the watch housing and may be operable to rotate the zone disc in mutually opposite directions by means of a lever system. Each step has an angular extent of 15° (15° × 24 hours = 360°). The dial may have a window, which exposes one sector of the zone disc. Alternatively, the zone disc may consist of a finger-engageable ring surrounding the dial. The 24-hour hour hand may consist of a graduated disc, which is rotatably mounted and disposed under the dial, and a sector of this graduated disc may be exposed in a window of the dial.

Before a person begins a trip, he sets the zone disc to the place of destination so that the 12-hour hour hand indicates the time at the place of destination whereas the 24-hour hour hand continues to indicate the time at the place of departure. Hence, the user can check his watch at any time to find out whether the time is proper for a telephone call to his home town or whether such call should be deferred because the time is not appropriate. Besides, the timepiece according to the invention may be readily shifted to indicate the time of any place of the world when such time is desired as a basic time for any purpose whatever.

The 12-hour hour hand and the 24-hour hour hand are set jointly in the previously usual manner.

Further details of the invention, particularly of the watch movement, are diagrammatically illustrated, partly in section, in the drawing which shows illustrative embodiments of the invention.

FIG. **1** is an axial sectional view showing a watch movement embodying the invention.

FIG. **2** is a top plan view showing the dial of a watch in one embodiment of the invention.

FIG. **3** is a top plan view which is similar to FIG. **2** and illustrates another embodiment of the invention.

FIG. **4** shows one embodiment of the means for setting the zone disc.

FiG. **5** is an axial sectional view showing a watch movement which embodies the invention and comprises a zone disc which is set by a rotation of an external finger-engageable ring.

FIG. **6** is a top plan view showing the embodiment of FIG. **5**.

FIGS. **1** and **2** of the drawing, illustrating one embodiment of the invention, show a center wheel arbor **1** and a cannon pipe **2**, which are frictionally connected in the usual manner. The cannon pipe **2** carries a minute hand **12**. Torque is transmitted from the cannon pipe by the minute wheel **3** to the minute pinion **4**.

As far as to the minute pinion **4**, the transmission of torque is the same as in usual wrist watch movements. In the watch movement according to the invention, torque is further transmitted to a 24-hour wheel **5**, which is geared to perform one revolution in 24 hours. Hour wheel **5** is connected to hand **11**, the outer end of which is spaced from, but associated with, a

24-hour scale **26**. A flat cup **6** having an internal series of teeth **7** is keyed to the hour wheel **5** so that parts **5**, **6** and **7** form a unit, which rotates through 360° in 24 hours.

Planet pinions **8** and **8***a* are disposed in the cup **6** having the series of teeth **7** and serve to transmit torque to the 12-hour hour wheel **9**. The 12-hour wheel **9** carries the hand **10**, the end of which is spaced from but associated with the 12-hour scale **25** on the dial **23**.

Arbors for the planet pinions **8** and **8***a* are mounted in a zone disc **15** and are stationary during normal operation, planet pinions **8** and **8***a* are disposed to coact with the teeth **7** and with teeth (not shown) on the outer periphery of 12-hour wheel **9**, and because there are twice as many teeth **7** as there are teeth on the 12-hour wheel **9**, the latter will rotate through 720° during one revolution of the 24-hour wheel **5**, cup **6** and teeth **7** so that the transmission ratio is 1.2.

By means of an axially displaceable setting shaft **17**, the zone disc **15** may be engaged with the setting wheel **16** and may be rotated thereby. The planet pinions **8** and **8***a* mounted in the zone disc **15** follow the rotation of the latter to transmit the angular movement of the zone disc **15** to the 12-hour wheel **9**. As has been stated, these are twice as many teeth **7** as there are teeth on the 12-hour wheel **9** so that the angular movement imparted to the 12-hour wheel **9** by the planet pinions **8** and **8***a*, in the opposite direction, is twice as large as that imparted to the zone disc **15**.

As a result, an angular movement of the zone disc through 15° corresponds to an angular movement of 30° of the 12-hour wheel **9**, which corresponds to 1 hour of the associated 12-hour scale **25**. Owing to the frictional coupling between the center wheel arbor **1** and the minute hand tube **2**, the unit consisting of the 24-hour wheel **5**, the cup **6** and the series of teeth **7** remains unchanged and connected to the watch movement.

As in all conventional watch movements, the hands **12**, **11**, and **10** may be jointly set at the same time by means of the winding shaft not shown. The sweep second hand **14** is a friction fit on the second wheel shaft **13**, in a conventional manner. A calender date ring **24** is rotatably mounted under the zone disc **15** and the dial **23** and is visible through a window.

The zone-indicating towns printed on the zone disc **15** are visible through a window in the dial **23**.

The watch movement frame **21** and **22** is surrounded by a ring **20**, in which the setting, mechanism, including elements **16**, **17**, **18**, to be described later, detent device **19** in the form of a split-pin are mounted. The ring **20** is mounted in the housing **29**, which is provided with a minute-second scale **27** and with a glass cover **30**.

As is apparent from FIG. **3**, the 24-hour hour hand may be replaced by a friction-fitted hour disc having a 24-hour scale and performing one revolution in 24 hours.

As is apparent from FIG. **4**, the setting mechanism **16**, **17**. **18**, and **19** shown in FIGS. **1** and **2** may be replaced by push-buttons.

FIGS. **5** and **6** of the drawing show another embodiment of the invention. As seen in FIG. **6** the timepiece is similar in some respects to that described in conjunction with the embodiment of FIGS. **1** and **2**. Thus, the timepiece has a dial face **23** over which the 12-hour hand **10**, the minute hand **12** and the sweep second hand **14** move in association over appropriate scales under the impetus of a clockworks, which can be conventional. In this connection reference numerals used, and described, in FIGS. **1** and **2** are applied to the same pieces in FIGS. **5** and **6** and therefore will not be described here again in detail.

The embodiment shown in FIGS. **5** and **6** differ from that of FIGS. **1** and **2** in two principal areas. First the reference **11**′ as used in FIGS. **5** and **6** designates a 24-hour scale which is in the form of a disc instead of a pointer as in FIGS. **1** and **2**. This disc, with the **24** numerals on its outer periphery is rotatable, in a manner to be described below, under dial **23**, and as best seen in FIG. **6**, the numerals are visible through a window in dial **23** and can be read with reference to a pointer mark **31** on dial **23**.

The second area of difference is that a rotatable adjusting ring "A" is used to rotate the zone disc **15** instead of the setting shaft **17** and setting wheel **16**. As seen in FIG. **5** this ring "A" is rotatably supported by ball bearings **32** between housing **29** and ring **20**. Pinion **33**, secured to ring "A," transmit torque to the wheel **34** which carries a shaft member B. This shaft member "B" is rotatably mounted in ring **20** and has the pinion **35** at one end to transmit torque to the zone disc **15**. A pointer mark **36** provides a setting mark for ring "A" so that time areas for various cities of the world, printed on the disc, can be set to indicate the 24-hour time for a particular city. Thus in FIG. **6** the time for Paris, on the 24-hour scale **11'**, is shown as **2107**.

Referring to FIG. **5** it can be seen that a leaf spring **28**, disposed between dial **23** and zone disc **15**, urges zone disc **15** against 12-hour wheel **9** which in turn is urged against flat cup **6**. As the 24-hour scale **11'** is fixed to this cup rotation of zone disc **15** turns 12-hour hand **10** through 12-hour wheel **9**, but as in the embodiment of FIGS. **1** and **2**, the unit consisting of the 24-hour wheel **5**, cup **6**, and the series of teeth **7** remain unchanged and connected to the watch movement.

The invention may be embodied in mechanical electric and electronic wrist and pocket watches and in all kinds of table-clocks, period-clocks, large-size clocks and wall-clocks.

It is desirable to provide the timepiece with a date indicator.

What is claimed is:

1. A timepiece comprising, in combination:

a. a support frame disposed in a housing;

b. a dial mounted on said housing to overlie said support frame, said dial having associated but separate 12-hour and 24-hour scales;

c. a first hand mounted for rotation above said dial on support means at a central axis of said support frame, said first hand being associated with said 12-hour scale;

d. a second hand also mounted for rotation on said support means, said second hand being associated with said 24-hour scale;

e. first means carried by said support frame, for simultaneously rotating said second hand at an angular speed and said first hand at an angular speed twice that of said second hand, said mans including a zone disc mounted for rotation on said support means; and

f. second means for simultaneously rotating said zone disc independently of said first means and said first hand independently of said second hand.

2. A timepiece as defined in claim **1**, wherein a date ring is carried on said support frame to underlie said dial and said zone disc. Said zone disc and said dial having aligned window portions above said date ring.

3. A timepiece as defined in claim **1**, wherein said first means includes (i) a 24-hour wheel, (ii) a cup secured to said wheel, said cup having teeth on the internal wall surface thereof, (iii) a 12-hour wheel with teeth on its outer periphery, and (iv) planet pinions carried by said zone disc and disposed to transmit torque from said cup to said 12-hour wheel.

4. A timepiece as defined in claim **1**, wherein said second means includes a setting wheel associated with said zone disc and mounted on a setting shaft, said shaft being rotatably mounted on said support frame to extend through said housing, said shaft has a gripping means outside said housing whereby said shaft and the associated zone disc can be rotated.

5. A timepiece as defined in claim **1**, where said second means includes two pushbuttons extending through said housing to lever mans within said housing, said lever means being pivotally mounted on said support frame and having two end sections to engage and coact with a serrated wall section of said zone disc whereby said disc can be rotated in steps either in a clockwise or counterclockwise direction.

6. A timepiece as defined in claim **1**, wherein said second means includes (i) a rotatable ring mounted on the outer peripheral surface of said housing and (ii) pinion and gear means operatively disposed between said ring and said zone disc, whereby rotation of said ring produces rotation of said zone disc.

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