

Sept. 29, 1936.

J. DE ANGELIS ET AL

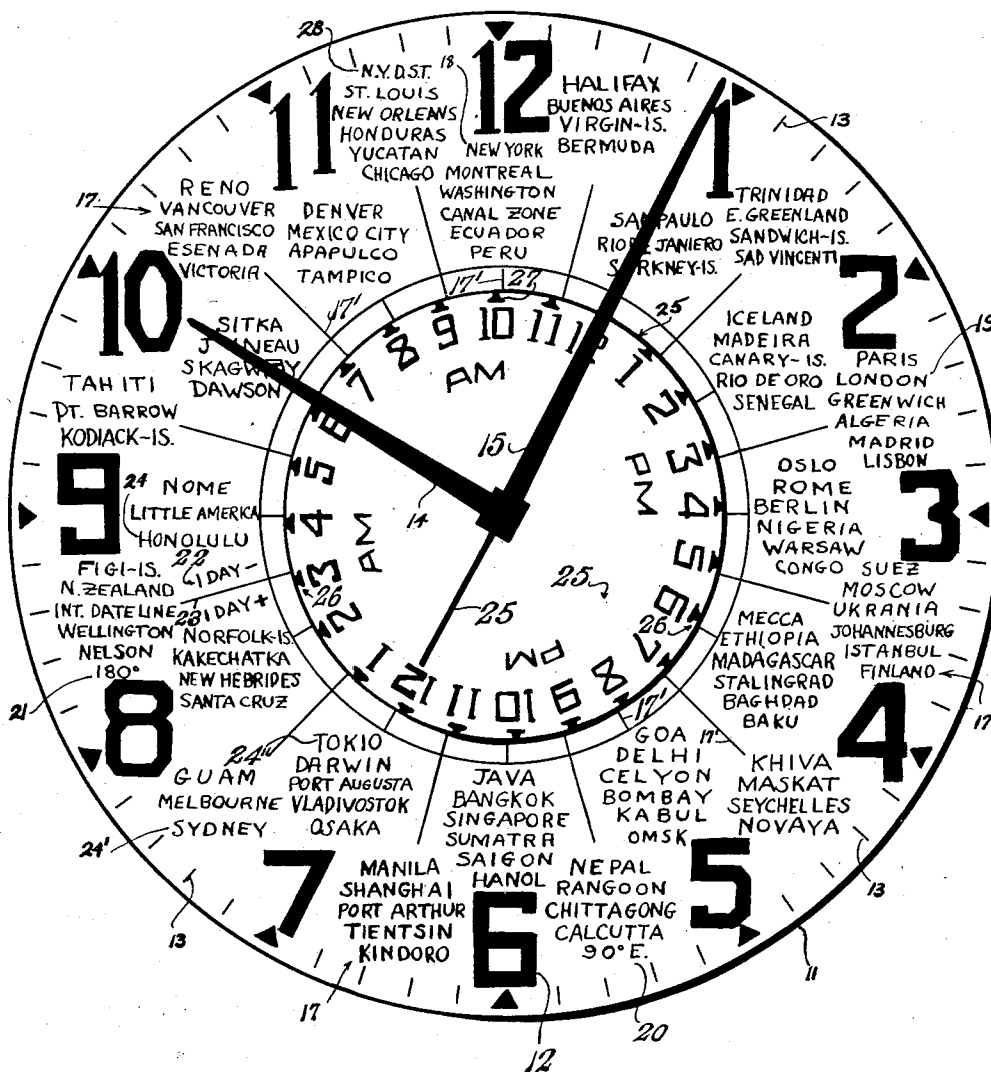
2,056,038

UNIVERSAL CLOCK

Filed June 25, 1935

2 Sheets-Sheet 1

Fig. 1



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2 Sheets-Sheet 2

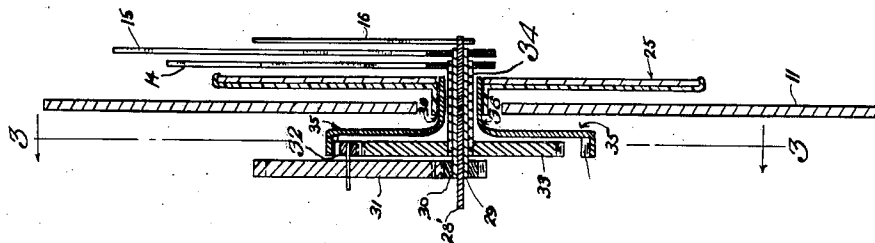


Fig. 2

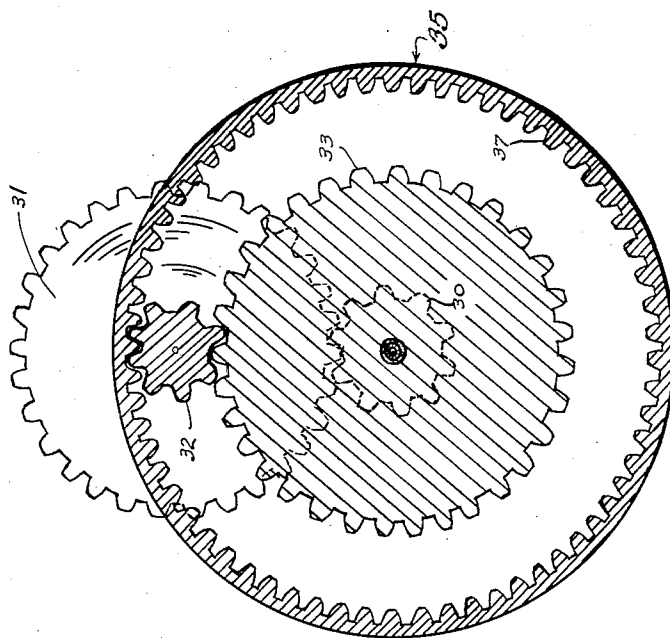


Fig. 3

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## UNITED STATES PATENT OFFICE

2,056,038

## UNIVERSAL CLOCK

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Application June 25, 1935, Serial No. 28,238

2 Claims. (Cl. 58—43)

Our invention relates to improvements in universal clocks.

The universal clock is a device which takes advantage of the fact that the earth is divided into twenty-four standard time zones, differing successively by integral hours. The "minute" and "second" indications of the universal clock are universal for all localities. Consequently, it is sufficient to indicate the "hour" and whether it is A. M. or P. M., in order to know the exact standard time for any place differing from the local time.

Previous efforts to provide a universal "hour" indication have accomplished this by requiring the reader to analyze or calculate from tables or charts and the indications of the clock in order to obtain the desired time. Names of localities were not horizontally disposed, so that much inconvenience in reading was encountered. Complicated dials and arrangements obscured or distorted the local time indications.

Our invention provides a universal clock by making a minimum amount of changes to the form, configuration, or construction of an ordinary clock. Upon an ordinary twelve hour dial we provide twenty-four areas arranged about the local "hour" numerals and containing the names of cities, localities, radio stations, etc. written horizontally, and designed as a background to the "hour" numerals. We provide a smaller movable dial, arranged with twenty-four divisions, and mounted concentric to the "hour" dial and driven in a cheap and novel manner by the ordinary clock mechanism. The clock retains its common construction throughout, including the hour, minute and second-hand mechanism.

Accordingly, an object of our invention is to provide a universal clock which will indicate directly and clearly, by a movable twenty-four hour dial, the standard time, A. M. or P. M., of any locality corresponding to the local time.

Another object of our invention is to provide a universal clock which will indicate local time in the usual and normal manner, by hour, minute and second-hands upon a twelve hour dial.

Still another object of our invention is to provide a universal clock upon which the names of cities and localities are read horizontally and are arranged in groups, according to the time zones in which they are located.

A further object of our invention is to provide a universal clock with a movable twenty-four hour dial which is driven in a novel, direct and cheap manner.

A still further object of our invention is to pro-

vide a universal clock which will indicate directly and clearly, by a movable twenty-four hour dial, the standard time, A. M. or P. M., of any radio station corresponding to the local time.

Further objects of our invention together with the foregoing will appear in the detailed description which is to follow in connection with the drawings, in which:

Fig. 1 is a front elevation of a clock embodying the present invention.

Fig. 2 is a central sectional view of the clock seen in Fig. 1, showing also some of the gears operating the clock.

Fig. 3 is an elevation of the gear mechanism located behind the clock dials for driving the hour-hand and the movable dial, being a section on the line 3—3 of Fig. 2 viewed from front of the clock.

The clock has a main dial 11 with the ordinary "hour" numerals 12 arranged clockwise in large figures from 1 to 12 as shown in Fig. 1. There are also the regular "minute" divisions 13 dividing the outer circumference into sixty divisions. The "hour" hand is 14 and the "minute" hand is 15. A "second" hand 16 is also included to indicate time to the second. These three hands, 14, 15 and 16 are prominent and show the local time as in any normal clock. All figures and hands are clearly visible to indicate this local time and no obscuring or confusion in reading it is had. Thus, for example, Fig. 1 illustrates 10:04:35 New York standard time, this city being chosen as the local place.

There are twenty-four circular areas 17 arranged about dial 11, one positioned at each hour numeral 12 and half way between these hour numerals. Each of these areas 17 have a radial line 17' to facilitate the reading of the time in connection with the inner movable dial 25. The areas 17 correspond to the twenty-four standard time zones of the earth. We have indicated the New York standard time zone 18 on top of the dial under the hour 12, but any other zone may be herein placed. The adjacent time zones are successively located according to their actual successive relation, with the zones east of New York arranged in a clockwise manner. Thus the Greenwich or London zone 19, which is five hours later than New York standard time is the fifth zone in a clockwise direction from the New York zone 18.

We arrange all printed matter horizontally to facilitate reading and time telling. Any desired information applicable to a zone area 17 may be printed therein. We have illustrated names of

cities and countries. As many names may be included in an area as one desires, a larger dial being necessary for more names. The meridians or degrees of longitude from Greenwich may be indicated as we have shown at 20 which is 90° east longitude, and at 21 which is 180° from or opposite Greenwich. The names of radio stations located in the zones may be used as well as the cities, or may be used independently for a clock that indicates the standard time at any listed radio station corresponding to the local time.

Movable dial 25 is arranged in the center of the clock. It is divided into twenty-four divisions, and marked 1 to 12 A. M. and 1 to 12 P. M. Arrowheads 26 mark off these divisions. This dial 25 is caused to rotate counter-clockwise, and to make one revolution each twenty-four hours in a manner hereinafter described.

This rotation of dial 25 represents the apparent rotation of the sun from east to west once each twenty-four hours, to successively pass through each time zone which differ by integral hours. In one revolution of the dial 25, each of the twenty-four hour divisions on it corresponding to each hour of the day or night, moves successively past any one zone area. We arrange this dial 25 so that the hour for any zone is indicated by the arrow-head 26 corresponding to the proper hour. The dial 25 is set so that it indicates the proper standard hour on the local zone, as read off the clock for local time. Thus, for example, if it were 10:00 A. M. New York standard time, the arrowhead 27 would line up directly with the radial line 17' of the New York zone 18. In the illustration for 10:04:35 A. M. local time, the arrowhead has progressed a little counter-clockwise, corresponding to the elapsed 4 minutes and 35 seconds. The dial 25 rotates so that each successive numeral will move past one of the radial lines 17' in one hour intervals. Thus the local hour indication will always correspond to that read on the clock dial 11.

The hours corresponding to the standard time at any other zone need merely be read as shown by the arrowhead 26 at the corresponding zone area. Thus, in the illustration of Fig. 1, the hour indication for Shanghai is 11 P. M. The actual standard time at Shanghai at the instant is therefore 11:04:35 P. M. The process of reading the time for any locality is thus very simple and direct with no necessary calculation involved.

New York daylight saving time is obtained by merely shifting this reading to the central standard time or Chicago zone 28, one hour counter-clockwise as shown in Fig. 1. The international date line is represented by radial line 23 at the 180° longitude zone 21. A twenty-four hour change is incurred as this line is passed. Thus at 22 we have marked 1 day+ and 1 day. Hence when it is 10 A. M. in New York, it is 4 A. M. in Honolulu, 24, of the same date. However, at Sydney 24', it is 1 A. M. of the following day. This fact seems reasonable when one considers that at Tokio, 24'', it is 12 P. M. when it is 10 A. M. in New York, and that the time difference between Tokio and Sydney is one hour since they lie in adjacent time zones.

Figure 2 is a central sectional view of the clock. We have not shown the actuating mechanism, the escapement, or the whole gear train which comprises the clock, since these are of standard construction and are well known in the art. The "second" hand 16 is driven in the usual manner by spindle 28'. The "minute" hand 15 is mounted

at the end of the tubular arbor 29 which is driven by the gear 30. The "minute" gear 30 drives gear 31, which gears bear a ratio of 1:3 to each other. Gear 31 rotates counter-clockwise, and carries integral and coaxial to it the smaller gear 32. This smaller counter-clockwise gear 32, in turn, drives the larger "hour" gear 33 which is larger in the ratio of 1:4. The "hour" gear 33 thus rotates at a ratio of 1:3:4 or one twelfth the speed of the "minute" gear 30. The "hour" hand 14 is connected to the "hour" gear 33 by the tubular arbor 34. The operation thus far described is standard and well-known in the art.

Although the specific source of power may be any of the well-known forms, such as a spring or electrical energy, the manner of transmitting the drive to the movable dial 25 is an important feature of this invention. The combination internal gear and arbor for this dial 25 is shown as 35. The tubular portion 36 fits over the "hour" arbor 34 and rotates thereon concentric thereto. The internal gear portion 37 has its teeth engage the counter-clockwise gear 32, as shown in Figures 2 and 3. The internal gear 37 is larger than the counter-clockwise gear 32 in a ratio of 8:1. The unit 35 therefore rotates 1:3:8 or one twenty-fourth the speed of the "minute" gear 30. Hence the movable dial 25, which is attached at the end 38 of the tubular portion 36, rotates once each twenty-four hours in a counter-clockwise direction as specified hereinbefore.

The dial 25 is attached to the tube 36 at 38 by a friction fit. This friction fit permits regular rotation of the dial 25 with the added feature of permitting simple readjustment of the angular setting of this dial to cause it to correspond to the proper locality, or to shift to daylight saving time in the same locality. This readjustment of dial 25 is accomplished without tampering or exposing the internal mechanism of the clock.

Although we have described in detail a preferred form of our invention, it will be obvious that modifications are feasible within the scope of this invention. Thus, the indicated zone areas need not be circular, nor disposed as illustrated. The clock might be made in the form of a watch or a panel instrument for an airplane or radio set. The geographical names may well be replaced with radio stations; or the clock marked for chronometer readings as against the zero of Greenwich to the 180 degrees at the international date line; etc.

What we claim is:—

1. A universal clock for directly indicating time of any locality comprising an ordinary twelve hour dial having in the foreground and conspicuously displayed the hour numerals and divided into twenty-four indicating areas arranged about the local hour numerals; a relatively small movable dial arranged with twenty-four hour divisions and mounted concentric to the hour dial; clock driving mechanism; a first gear; means whereby said first gear is driven by said clock driving mechanism; an arbor driven by said first gear for driving the minute-hand; a second gear rotating counter-clockwise when viewed from front of clock; said first gear driving said second gear and bearing a 1:3 ratio to said second gear; a third gear integral and coaxial with said second gear; an hour gear driven by said third gear, said third gear and said hour gear bearing a ratio of 1:4 to each other; an arbor connecting said hour-hand to the hour gear; said movable dial having an in-

ternal gear having a tubular portion concentric with and freely rotatable on said last mentioned arbor, the teeth of said internal gear meshing with the teeth of said third gear and bearing a ratio of 8:1 with said third gear so that said movable dial makes one complete counterclockwise revolution in twenty-four hours; and means whereby the angular settings of the movable dial may be adjusted to correspond to time shifts such as for daylight saving time.

2. A universal clock for directly indicating time of any locality comprising an ordinary twelve hour dial having in the foreground and conspicuously displayed the hour numerals and divided into twenty-four indicating areas arranged about the local hour numerals; a relatively small movable dial arranged with twenty-four hour divisions and mounted concentric to the hour dial; clock driving mechanism; a first gear; means whereby said first gear is driven

by said clock driving mechanism; an arbor driven by said first gear for driving the minute-hand; a second gear rotating counter-clockwise when viewed from front of clock, said first gear driving said second gear and bearing a 1:3 ratio to said second gear; a third gear integral and coaxial with said second gear; an hour gear driven by said third gear, said third gear and said hour gear bearing a ratio of 1:4 to each other; an arbor connecting said hour-hand to the hour gear; said movable dial having an internal gear having a tubular portion concentric with and freely rotatable on said last mentioned arbor, the teeth of said internal gear meshing with the teeth of said third gear and bearing a ratio of 8:1 with said third gear so that said movable dial makes one complete counterclockwise revolution in twenty-four hours.

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