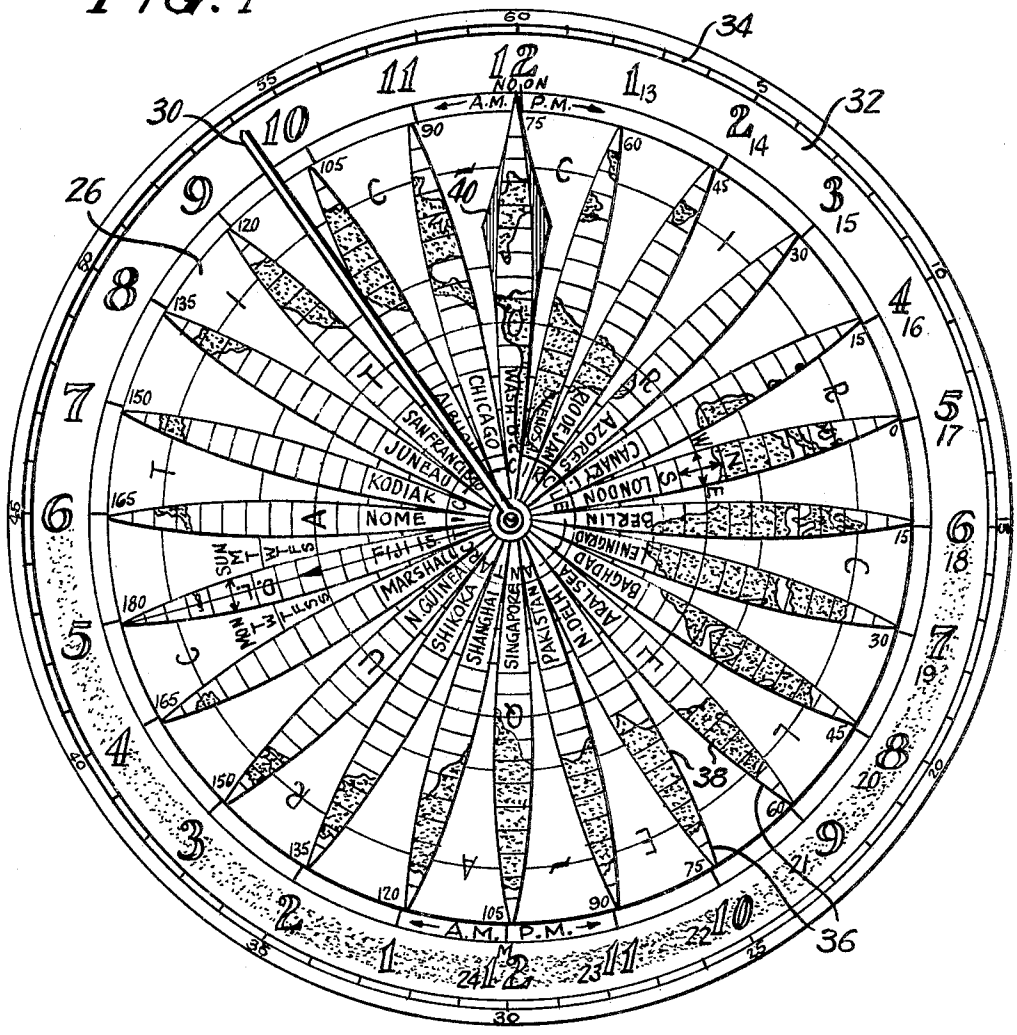
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FIG. 1



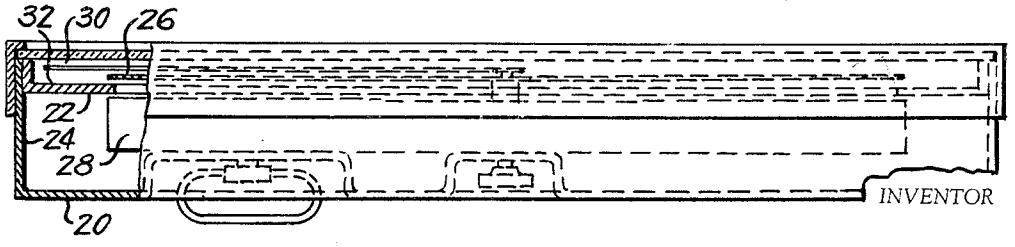


FIG. 2

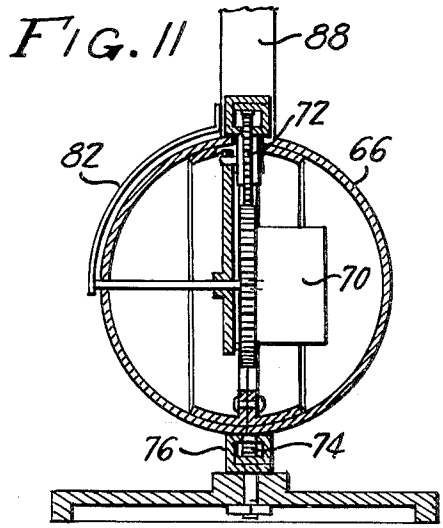
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FIG. 11



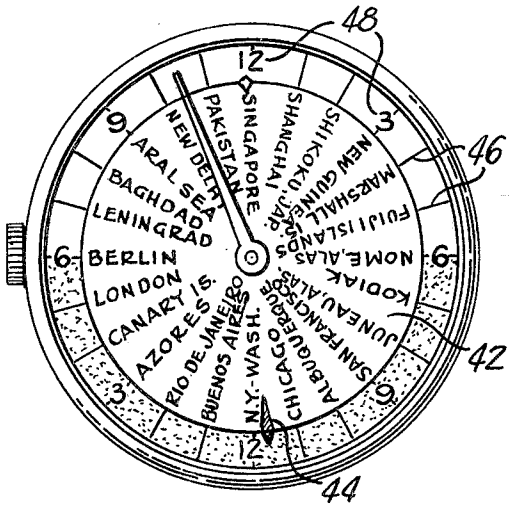


FIG. 3

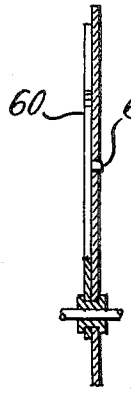


FIG. 6

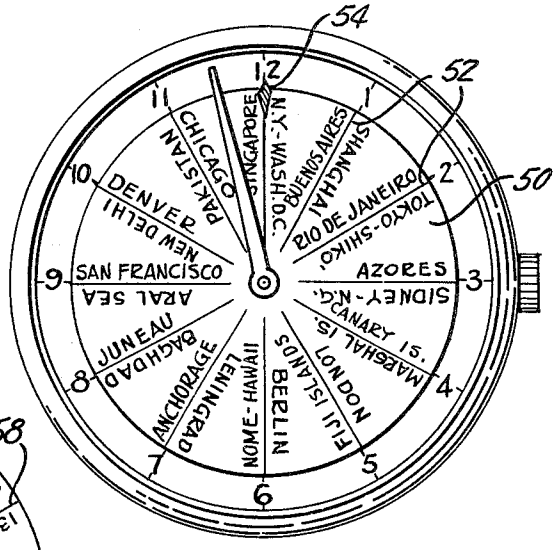


FIG. 4

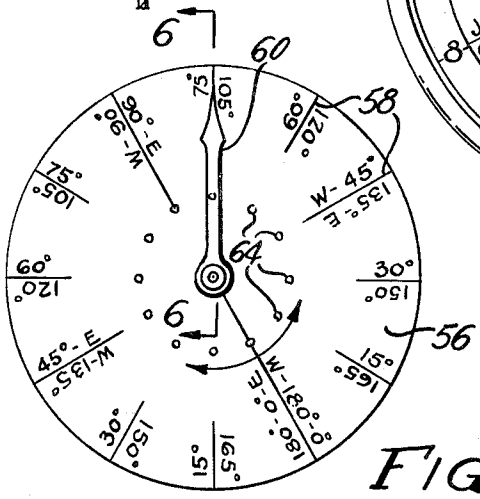


FIG. 5

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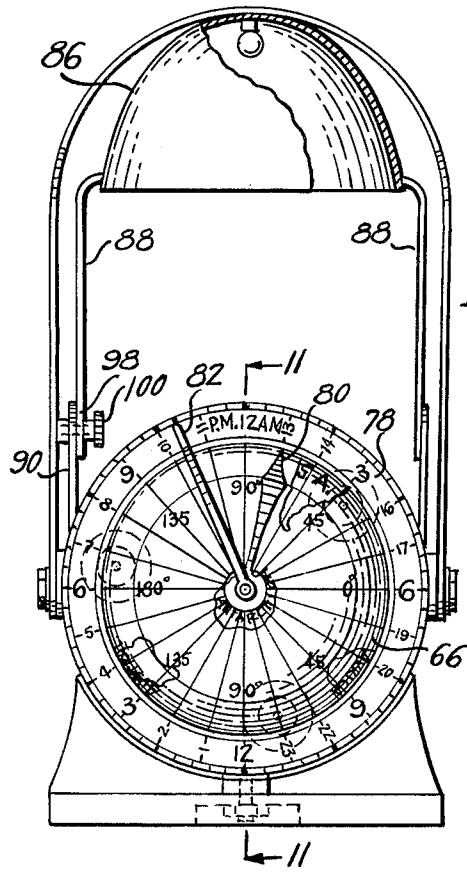


FIG. 7

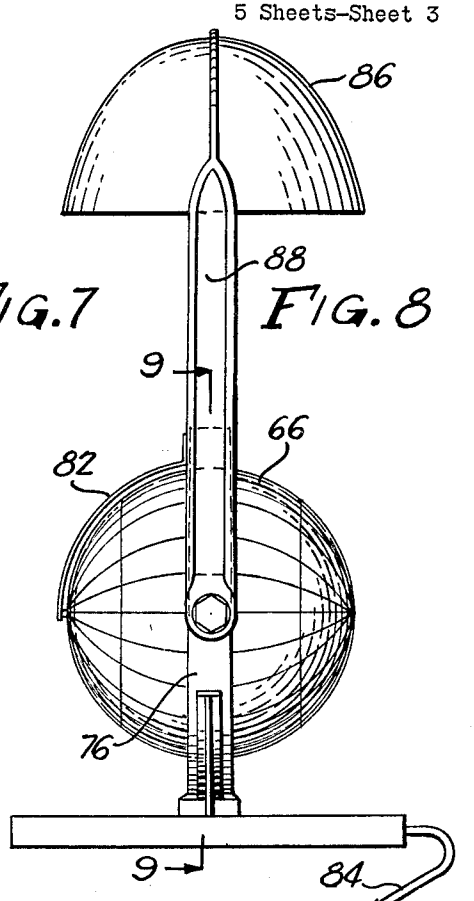


FIG. 8

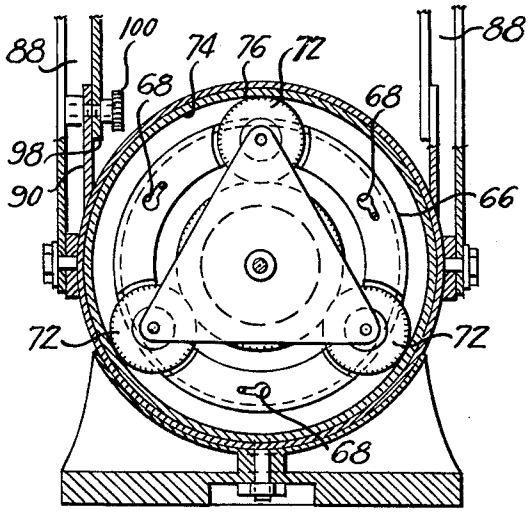


FIG. 9

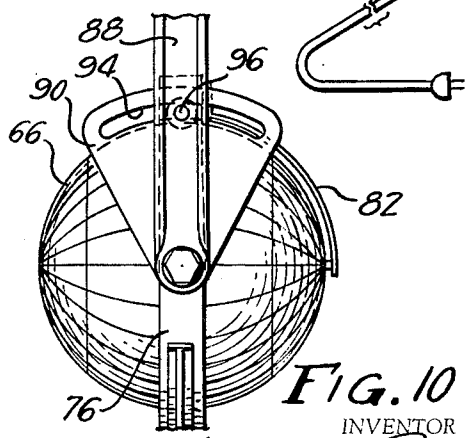


FIG. 10

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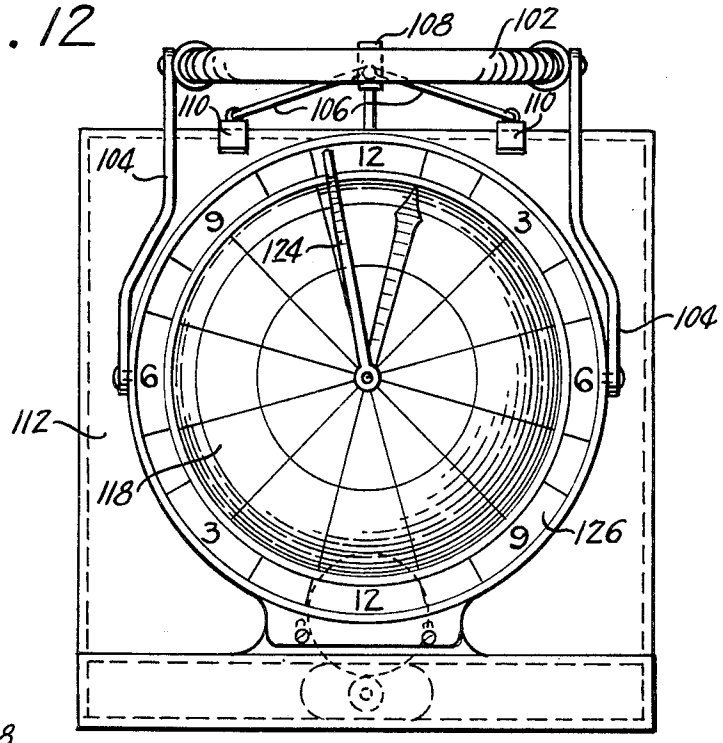
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FIG. 12



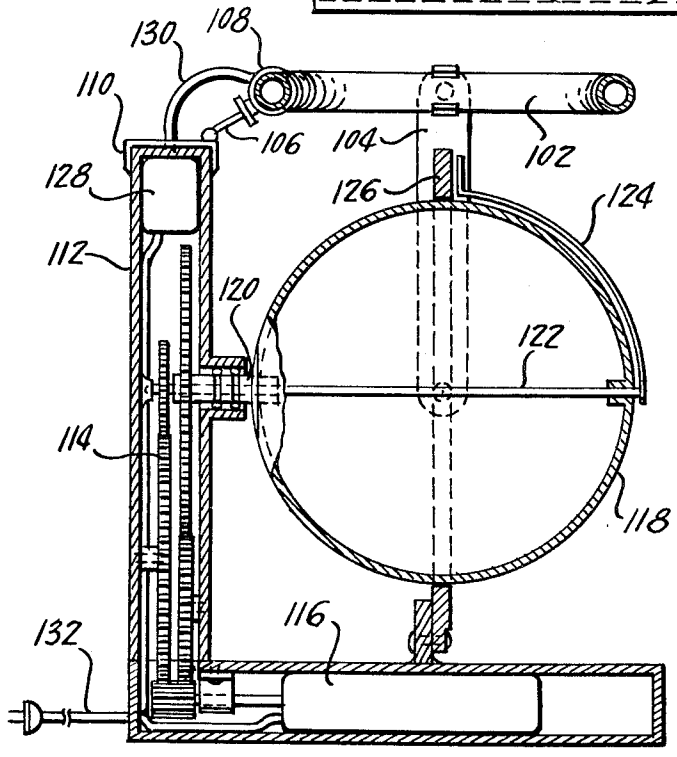


FIG. 13

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FIG. 14

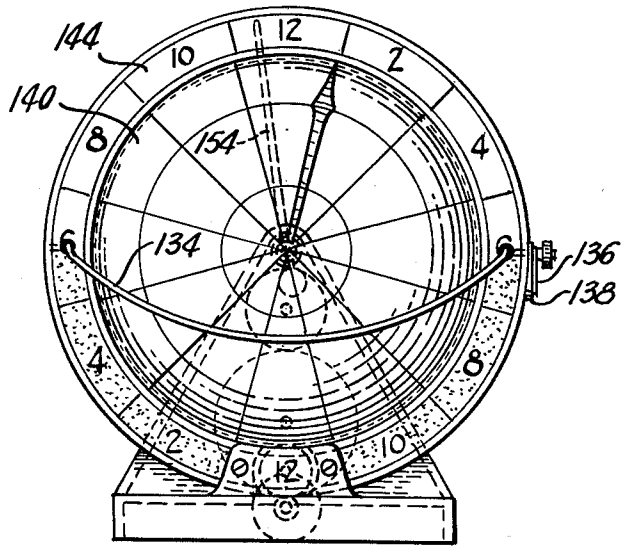
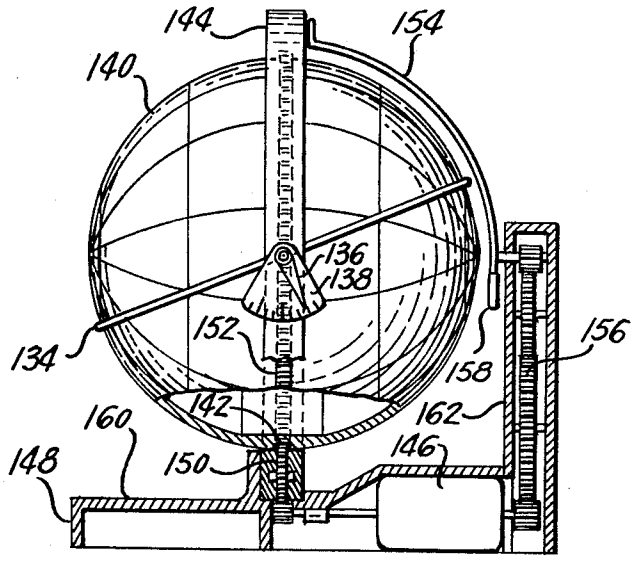


FIG. 15



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United States Patent Office 3,091,915 Patented June 4, 1963

3,091,915

UNIVERSAL TIMEPIECE

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Filed Apr. 13, 1960, Ser. No. 21,926
2 Claims. (Cl. 58—44)

This invention relates to universal clocks and watches for simultaneously indicating the time in all other longitudinal time zones besides the local time zone and for indicating the corresponding position of the twilight zone line in each time zone through which it extends.

The main object of this invention is to use an image of the earth's surface with lines of longitude spaced 15° apart and radiating from south pole at the center of rotation of said image, as a multiple hour hand in a time piece having a 24-hour dial, timed to make one complete revolution per day.

A further object is to use this image of the earth's surface on a globular surface, placing the hour and minute scales about the equator, mounting the globe and minute hand rotatably on its polar axis and providing twilight zone line indicating means, adjustably mounted on the six o'clock scale axis for movement in accordance with the seasonal changes of the earth's inclination with respect to the sun.

A further object is to use a great circle wire ring around the globe for said indicating means.

A further object is to use lighting means simulating the sun's rays to reproduce the great circle shadow line to indicate the twilight zone on the globe.

A further object is to use electric clockwork to operate the image and the minute hand, and superposing an hour hand over the local time zone on said image.

A further object is to conceal the clockwork inside said globe.

A further object is to mount the globe in an equatorial bearing in the hour and minute scale ring, and to mount the minute hand on the polar axis adjacent to the globe.

A further object is to represent the earth's surface on a flat dial by cutting its globular map into 15° longitudinal zones representing the hour zones and placing the south pole at the center of the dial and spreading the zones flat in starlike fashion radiating at 15° intervals to circumferential points on the dial, moving over a peripheral stationary hour scale with hour indications at similar intervals indicating the time in the corresponding time zones, a minute hand extending over the hour zone dial and scale to a surrounding minute scale.

A further object is to frame an hour hand around the local hour zone to facilitate reading the local time at a distance.

A further object is to reduce time zones in the representation of the above map to simply a corresponding arrangement of names of some well known key cities to designate the respective zones on a movable hours dial in combination with a 24-hour time scale, and a minute hand with a surrounding minute scale.

A further object is to use a double hemispherical hour dial in combination with a 12-hour scale for small clocks and watches, and to indicate the hour zones by the corresponding key cities arranged around the hour dial clockwise for one hemisphere and counterclockwise for the other.

A further object is to indicate the hour zones simply by 15° radial lines east or west longitude spaced 30° on an hour dial for use in combination with a 12-hour scale, and a removable hour hand adapted for mounting on said dial over any local hour zone.

Other and further objects will appear in the following detailed description of several modifications of the present

invention, as illustrated in the accompanying drawings, wherein:

FIG. 1 is a face view of one form of timepiece made in accordance with the present invention,

FIG. 2 is a side view thereof,

FIG. 3 is a face view of a similar timepiece adapted especially for small clocks and watches of the 24-hour type,

FIG. 4 is a similar view of a watch of the common 12-hour type,

FIG. 5 is a modified form of hour dial having a removably superposed hour hand for mounting in any hour zone indicated by the dial,

FIG. 6 is a detail section taken on the line **6—6** in FIG. 5,

FIG. 7 is a front face view of a globe form of clock with a lighting means for indicating the extent of the daylight zone on the globe,

FIG. 8 is a side view thereof,

FIG. 9 is a section of the globe portion taken on the line **9—9** of FIG. 8,

FIG. 10 is a reverse side view of the globe portion,

FIG. 11 is a section of the globe portion taken on the line **11—11** of FIG. 7,

FIGS. 12 and 13 are front and sectional side views, respectively, of another form of globe clock with daylight lighting means, and

FIGS. 14 and 15 are front and side views, respectively, of a still further modification of globe clock, parts being broken away in FIG. 15 to show the operating mechanism.

With the advent of mass air transport facilities and travel across continents and even hemispheres as well as the increased communications facilities by radio, it is becoming more useful to greater numbers of people to have access to universal timepieces, not only at travel terminals but also for personal use in the form of travel clocks and watches. A universal clock of the globe type can also be made very ornamental for display and home use and serves as an educational aid in geography and geophysics.

The present invention was conceived to satisfy the growing demand for a timepiece that would tell at a glance the time in any other time zone in the world as well as locally, and which might even be made to show the corresponding location of the twilight zone line, and the times of day twilight will occur either in the local latitude or in any other latitude in either hemisphere, at the particular time of the year.

The flat face dial timepiece is the simpler form and is illustrated in FIGS. 1 to 6 in four modifications. The rest of the figures illustrate three modifications of the globe type which also include a twilight zone line indicating means.

The form illustrated in FIGS. 1 and 2 comprises a round open face casing **20**, annular scale shoulder **22** fixed inside the peripheral wall **24**, a dial **26** rotatably mounted on and timed by the clockwork **28** in said casing, to revolve once in 24 hours. A minute hand **30** is mounted on a shaft telescopically rotated by the same clockwork through the shaft of the dial. A 24 hour scale **32** is inscribed on the shoulder **22**, and is circumscribed on its border by a minute scale **34**, toward which the minute hand is extended to indicate the minute portion of the time after the hour in any hour zone in the world, as indicated by the points **36** of the 15° longitude strips **38** of the world map arranged in star like fashion on the flat faced dial surface, which is timed to turn one complete revolution in 24 hours. The 75° W. longitude strip is shown framed by an hour hand **40** for use in the Eastern standard time zone of the United States to facilitate reading the local time from a distance at which it might be

difficult to recognize this strip by reading the map portion embraced by it.

Each strip **38** is designated near its extremity by the degree of longitude it is east or west of Greenwich which is at 0° longitude. These strips are further designated toward the center of the dial by their respective key cities, such as Washington, D.C., for the local time zone strip indicated by the local hour hand framing **40**.

The lower half of the hour scale, between 6 p.m. and 6 a.m. may be shaded as shown to indicate the night time half. The left and right halves of the hour scale may be designated by a.m. and p.m. respectively. The p.m. hour numerals 1 to 12 may be supplemented by numerals 13 to 24 designating the order of hours in entire day from midnight to midnight.

A more simplified version of this timepiece is shown in FIG. 3, wherein the hour dial **42** has only the name of the key cities arranged radially around the center at 15° intervals for use as the hour hands for the respective time zones. The hour hand for New York and Washington is shown supplemented by an hour hand **44** to show the local time at a glance even when the key cities cannot be read because of darkness or distance. The hour divisions **46** on the hour scale may be designated by numerals **48** only at suitable intervals for simplicity.

The watch illustrated in FIG. 4 has the usual 12 hour scale and the hour dial **50** has 12 radial lines **52** representing the hour hands, the corresponding key cities being arranged on these lines reading down in a clockwise direction for the eastern hemisphere and in a counterclockwise direction for the western hemisphere. The hour hand **54** is superposed on one of the hour lines **52** to designate the local time.

A modified hour dial **56** as shown in FIG. 5, may be used with a 12 hour scale. In this modification the radial hour lines **58** are designated to read their longitudes upwardly clockwise for east longitude hour zones and upwardly counterclockwise for west longitude hour zones. The superposed hour hand **60** is rotatably mounted relative to the dial **56** and is made of some springy material so that its peg **62** may be lifted out of one of the holes **64** on the lines **58** and into another for shifting the local hour hand as may be desired.

The globe clock modifications are more realistic representations of the earth and its rotation relative to the sun that the flat face forms. One of these modifications is shown in FIGS. 7 to 11. The globe shell **66** may be of very light construction and is split along the equator. Each half is reinforced by a frame work provided with complementary bayonet locking means comprising the headed pin and arcuate slot connections **68**. A clockwork motor **70** and mechanism including planetary gears **72** are mounted on this frame inside the shell **66** except for the gears **72** which extend through circumferential slots in the shell along the equator, and mesh with the stationary internal ring gear **74** in the hollow annular casing **76** on which the hour and minute scales **78** are inscribed, for cooperation with the rotating hour dial and local hour hand **80** on the globe and the minute hand **82** to indicate the local as well as other times over the other time zones throughout the world simultaneously. The clockwork is geared so that as the planetary gears **72** carry the globe through 15° of rotation each hour it rotates the minute hand **82** through 345° so as to complete a full revolution for the minute hand with respect to the stationary scale **78**. The electric current supply to the motor **70** is conveyed to it from the cord **84** through ring and wiper contacts between the stationary casing and the rotating globe frame (not shown).

This globe clock may be provided with lighting means **86** mounted on a pair of arms **88** adjustably pivoted at their lower ends to the casing **76** at the diametral axis through the equator on the 6 o'clock line of the scales. The arms **88** are substantially of I beam section and are

partially cut away to slidably accommodate the bracket plate **90** fixed to the sides of the casing **76** to guide the arms **88** in their angular adjustment, plate **90** having an arcuate guide slot **94** for guide pin **96** on arm **88** and passed loosely through a bore in the inner flange **98** of the I beam. A clamp nut **100** threaded on the end of pin **96** is used for locking the arms in any angular adjustment to move the lighting means in accordance with the seasonal changes in the direction of the sun's rays with respect to the earth's polar axis. The lighting means is made to simulate the sun's rays in that the light rays are projected in a beam of substantially parallel rays around the periphery of the beam which is of substantially the same diameter as the globe, so as to cause a shadow line on the globe between the instant day and night zones to indicate the exact location of the actual twilight zone line on earth.

The rays from the lighting means do not necessarily have to be concentrated in a cylindrical beam of parallel rays as in the lighting means **86**, as long as the source of light is circular and of substantially the same diameter as the globe. Thus, a circular neon light **102** may be used as shown in the modification of FIGS. 12 and 13.

In this modification the arms **104** support the light **102** pivotally on the 6 o'clock axis and the braces **106** universally pivoted to the light clamp **108** are pivoted at their other ends to spring clips **110** movable along the top of casing **112** for adjustment of the light about the 6 o'clock axis in accordance with the seasons.

This modification has the clockwork **114** and motor **116** outside of the globe **118** in the casing **112**, and the globe is mounted on the sleeve shaft **120** through which the minute hand shaft **122** operates to rotate the minute hand **124**. An annular ring **126** mounted around the equator provides the hour and minute scales and may be of transparent material to facilitate reading from either side. This ring may be adjustably mounted on a flat base forming the top of the horizontal portion of the casing **112**. The ballast **128** for the neon light may be mounted inside the casing **112** and connected by flexible cord **130** to the light bulb **102** and to the outside cord **132** to which the motor **116** is also connected. The top of the casing **112** may be scaled to indicate the adjustment required for the various seasons.

Another means for indicating the twilight zone line is shown in the modification of FIGS. 14 and 15. In this case the line is indicated by a great circle wire ring **134** pivoted on the 6 o'clock axis and having a pointer **136** reading on a scale **138** the adjustment required for the seasonal changes in the position of the twilight zone line.

In this modification the globe **140** is rotatably mounted by an equatorial groove **142** in the globe cooperating with an internal ridge on the scale ring **144** which extends loosely into the groove. The motor **146** in the casing **148** drives the globe through a gear **150** meshing with the gear **152** formed in the bottom of the groove **142**, and also drives the minute hand **154** through gear train **156** in properly timed relation. The minute hand **154** may be counterbalanced by a weight **158**, and the ring **144** may be of transparent material so as to facilitate reading the time from either side.

The casing walls **160** and **162** may be mirrored to facilitate seeing all the parts of the clock when desired. In all the several forms illustrated front face of the clock is the one in the center of which the minute hand and the south pole are located because that is the face which is rotated in a clockwise direction.

These globe clocks lend themselves to many different ornamental arrangements, and many obvious modifications in design and details of construction may be made without departing from the spirit and scope of the present invention, as defined in the appended claims.

What is claimed is:

1. A universal timepiece comprising an annular hour

and minute scale in a vertical plane, a central rotary globe map of the world on a horizontal axis with great circle hour lines radiating from the poles at 15° intervals to the inner edge of said annular scale to indicate the hour portion of the times in the corresponding time zones represented by said lines, a minute hand extending radially over said globe map to the minute portion of the annular scale to indicate the times in minutes after the respective hours indicated by the hour lines for the several time zones respectively, a clockworks operatively connected to rotate said globe map over an angular distance of one hour on the scale while rotating said minute hand one complete revolution, said globe map being hollow, an interval ring gear in said annular scale, a clockworks in said hollow globe map, including a set of planetary drive gears for said globe map extending through peripheral slots spaced around the equator of the globe map to mesh with said internal ring gear, and a shaft extending through the south pole to operate said minute hand.

2. A universal timepiece as defined in claim 1, and a twilight zone indicating means comprising a light source above said globe providing a beam of rays having substantially the same diameter as the globe so as to produce a great circle shadow line on said globe indicating the position of the twilight zone line, said light source having a pair of supporting arms pivoted on the 6 o'clock diametral axis at the sides of said annular scale, and said shifting means comprising a releasable clamping nut on

a bolt in one of said arms, a bracket plate on said annular scale having an arcuate guide slot for said bolt over which said nut is clamped to hold said light source in any angularly adjusted position.

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