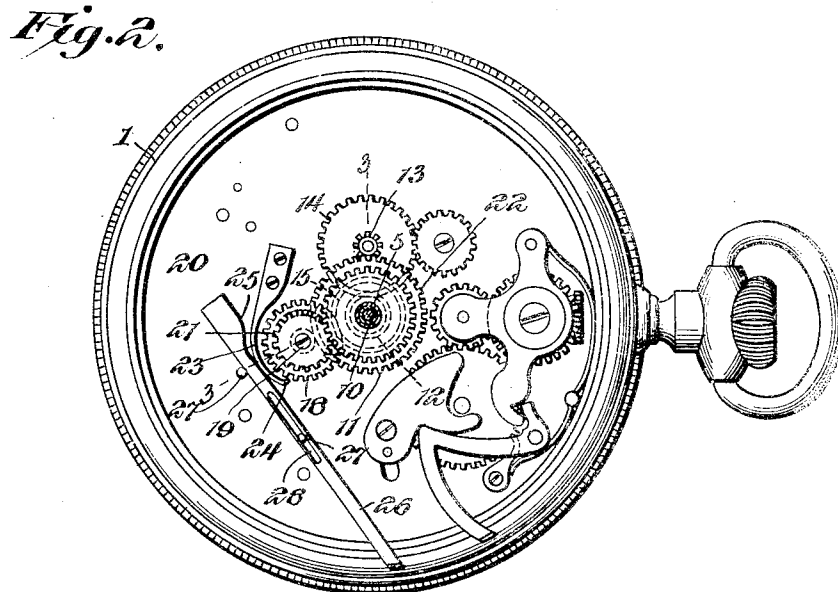
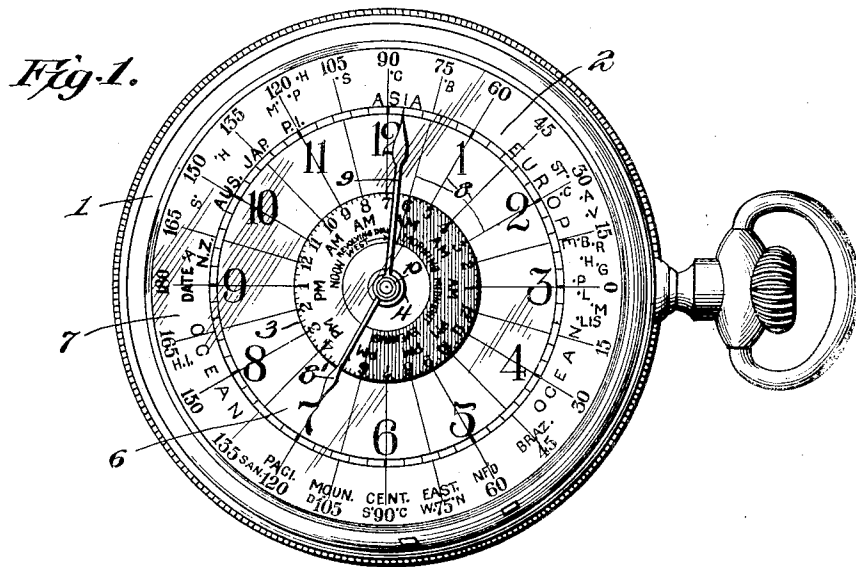


No. 811,585.

PATENTED FEB. 6, 1906.

I. F. PHEILS.
UNIVERSAL TIMEPIECE.
APPLICATION FILED JAN. 30, 1904.

2 SHEETS—SHEET 1.



Isaac F. Pheils, Inventor,

By

E. J. Figgers

Attorney

Witnesses

Howard W. Orr
Lucas S. Julihn

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2 SHEETS—SHEET 2.

Fig. 3.

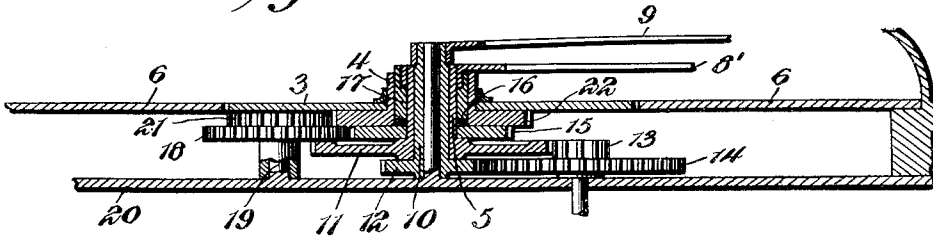


Fig. 4.

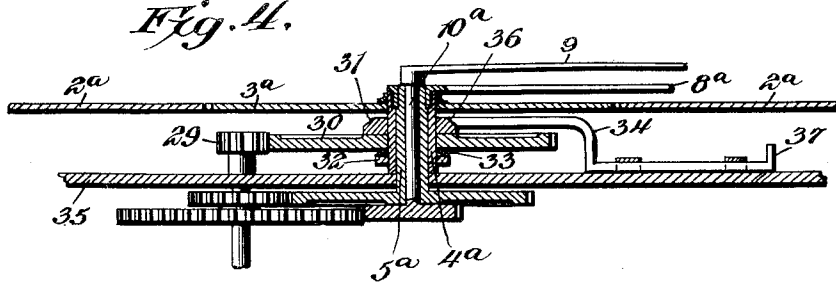


Fig. 5.

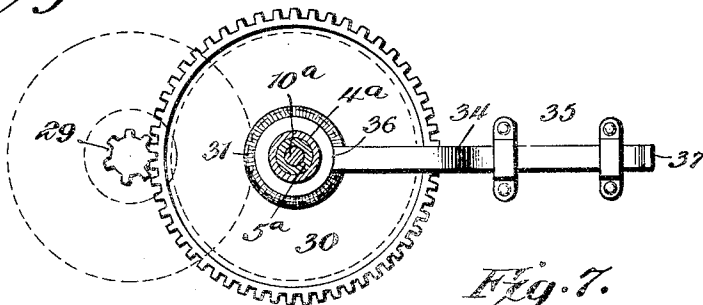
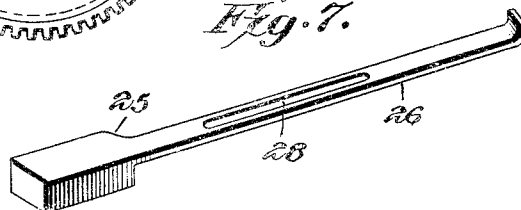


Fig. 6.



Fig. 7.



Isaac F. Pheils, Inventor,

By

C. G. Siggers

Attorney

Witnesses

Howard W. Orr

Louis G. Julihn

UNITED STATES PATENT OFFICE.

ISAAC F. PHEILS, OF WOODVILLE, OHIO.

UNIVERSAL TIMEPIECE.

No. 811,585.

Specification of Letters Patent.

Patented Feb. 6, 1906.

Application filed January 30, 1904. Serial No. 191,351.

To all whom it may concern:

Be it known that I, ISAAC F. PHEILS, a citizen of the United States, residing at Woodville, in the county of Sandusky and State of Ohio, have invented a new and useful Universal Timepiece, of which the following is a specification.

My present invention relates to a universal timepiece by means of which the time in any part of the world may be ascertained without the necessity of calculation. Timepieces of this character are known as "geographical" watches or clocks and embody a local-time dial traversed by hour and minute hands, as usual, and a universal dial, the latter bearing twenty-four-hour designations movable with reference to a geographical dial bearing certain geographical designations and subdivided by lines indicating standard meridians of longitude dividing the earth's surface into what are known as "time-belts." The universal dial makes a complete rotation once in twenty-four hours, its movement thus corresponding to the apparent movement of the sun around the world and serving to present the hour designations thereon in succession to each standard-time meridian for the purpose of indicating the hour in a given belt at a given time. It will of course be understood that the twenty-four time-belts are bisected by the twenty-four standard meridians of longitude, each belt extending seven and one-half degrees east and west of its meridian. The minutes before or past the hour in any given belt are indicated by the minute-hand of the local-time mechanism, since when the minute-hand is at twelve each of the several twenty-four designations on the universal dial will be directly opposite a standard meridian, and during one complete traverse of the local-time dial by the minute-hand each hour designation on the universal dial will advance from one standard meridian to the next. It follows, therefore, that the minute-hand not only serves to indicate the number of minutes past the hour designated by the hour-hand, but also designates the minutes past the hour indicated at any time-belt by the adjacent hour designation on the universal dial.

In timepieces of the character specified it is usual to arrange the stationary local-time dial at the center and to surround this by the universal dial, which is in turn surrounded by the stationary geographical dial or map. This arrangement necessitates a complica-

tion of the structure, involving, for instance, the provision of a fixed sleeve surrounding the hand-arbors for the support of the stationary local-time dial and serving as a support or axis for the sleeve carrying the universal dial.

One of the primary objects of my present invention is to simplify the arrangement by placing the universal dial instead of the local dial at the center of the watch or clock and by utilizing a combination local and geographical dial retained at its outer margin and surrounding the rotary universal dial, the bearing-sleeve of the latter directly surrounding the arbor of the hour-hand instead of being carried by the extra supporting-sleeve usually provided for the support of the local-time dial.

A further object of the invention, which is attained by this rearrangement, is to bring out the hours of the local dial prominently and at the same time to give as much space as possible for the geographical abbreviations indicating continents, oceans, cities, &c., on what may be termed the "geographical" area of the combination-dial.

Another objectionable feature of the ordinary forms of geographical timepieces is that in order to set the watch for different time-standards—that is to say, for central, eastern, Pacific, or mountain time—it is necessary to remove the hands from the arbors and to effect their reattachment in their set positions.

A further object of my invention, therefore, is to provide means whereby the universal dial may be held stationary during the independent setting of the hands by the operation of the usual forms of setting mechanism found in standard makes of watches and clocks.

To the accomplishment of the recited objects and others subordinate thereto the preferred embodiment of the invention comprehends that construction and arrangement of parts which will be hereinafter described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In said drawings, Figure 1 is a face view of a watch constructed in accordance with my invention. Fig. 2 is a similar view with the hands and dials removed and the hand-arbors in section. Fig. 3 is a sectional view of so much of a watch as is necessary for the present purpose, the section being indicated by the line 3 3 in Fig. 2. Fig. 4 is a similar

sectional view of a portion of a clock construction arranged in accordance with my invention. Fig. 5 is a detail plan view of certain elements shown in Fig. 4. Fig. 6 is a detail sectional view of one of the friction-springs, and Fig. 7 is a detail sectional view of the pull-rod shown in Fig. 2.

Like numerals of reference are employed to designate corresponding parts in the several views.

1 indicates the case of a watch equipped with a combination-dial 2, having a central opening for the reception of what may be termed the "universal" dial 3, having a coaxial sleeve 4 surrounding the hour-hand arbor 5 of the watch. The combination-dial 2 is stationary and is divided into inner and outer areas, respectively, constituting a local-time dial 6 and a geographical dial 7. The local-time dial 6 bears, as usual, twelve hour designations, its margin or periphery bearing sixty equidistant graduations indicating minutes. The geographical dial is divided by twenty-four standard meridian-lines 8 of contrasting color, radially disposed and extended entirely across the combination-dial—that is to say, the standard-meridian lines, indicating the twenty-four meridians of longitude which have been selected as time-standards, extend from the outer edge of the watch-face to the edge of the universal dial 3. The geographical dial 7 or the geographical area of the combination-dial is, in fact, a condensed map, it being a projection of the world with the center of the watch constituting the north pole. This map is made up of any desired geographical data. For instance, in the accompanying drawings continents, oceans, and other geographical subdivisions are designated by the names thereof printed upon the map at such points as these divisions occur, while small political divisions—as, for instance—cities, are indicated by abbreviations—as, for instance, initials. In addition to this geographical data the several standard meridians are numbered, and the one hundred and eightieth meridian is additionally designated by the word "Date," indicating that this is the arbitrary date-line where the day veritably begins and ends. Furthermore, the forty-fifth, sixtieth, seventy-fifth, ninetieth, one hundred and fifth, and one hundred and twentieth meridians are marked by abbreviations, indicating that these are the standard meridians for Brazilian, Newfoundland, eastern, central, mountain, and Pacific time, respectively.

The universal dial 3, which is designed to make one complete rotation in twenty-four hours, bears upon its surface twenty-four hour designations. In the present instance these designations are the numbers "1" to "12" arranged in two series, one-half of the dial being shaded to indicate night as distinguished from day, indicated by the light side

of the dial. It should be understood, however, that it is immaterial what particular hour designations are employed on the universal dial, it being obvious that the dial may be numbered from "1" to "24" if this method is preferred.

The hour-hand 8' is attached to the hour-hand arbor 5 in the usual manner, and the minute-hand 9 is attached to the upper end of the minute-hand arbor 10, said arbors being provided with gear-wheels 11 and 12, meshing with and driven by gears 13 and 14 of the power-train. Since the universal dial 3 is designed to rotate at one-half the speed of the hour-hand—that is to say, once in twenty-four hours—it could be geared directly to the gear-wheel 11 on the arbor 5. This is not done, however, for the reason that in different makes of watches the number of teeth in the gears vary, and one of the objects of the present invention is to arrange the extra parts so that they are capable of application to timepieces of many makes. Therefore in equipping a watch of ordinary construction with the mechanism for indicating universal time I place loosely upon the hour-hand arbor 5 a gear-wheel 15, imposed against the upper side face of the gear 11 and retained in frictional engagement therewith by an annular spring 16, backed by a projection on the arbor 5, this projection being formed, as, for instance, by the lower end of a sleeve 17, surrounding the arbor 5 and rigid therewith. The gear-wheel 15 thus frictionally connected with the hour-hand arbor is in mesh with a gear 18 of like diameter, mounted on a post 19, supported by the upper plate 20 of the movement. To the upper side of the gear 18 is secured a somewhat smaller gear-wheel 21, meshing with a comparatively large gear-wheel 22, fixed to the lower end of the bearing-sleeve 4 of the universal dial 3. (See Fig. 3.) It will be noted that since the gears 15 and 18 are of like diameters and since the gears 21 and 22 bear the relation of two to one the universal dial will be driven from the hour-hand arbor; but at one-half the speed thereof. In other words, the gearing is so proportioned that the hour-hand will traverse the local-time dial twice during each complete rotation of the universal dial.

It will now be seen by reference to Fig. 1 of the drawings, wherein the hands are adjusted for central time, that when it is one minute past seven in the central time—that is to say, in that belt bisected by the ninetieth degree of longitude—it will be one minute past one a. m. at the prime meridian, or the meridian of Greenwich, from which longitude is reckoned and upon which London is located. If now the hour-hand moves from "7" to "8" on the local-time dial, the digit "1" will simultaneously move from the prime meridian to the fifteenth meridian and will be replaced at the prime meridian by the numeral "2."

During this movement of the hour-hand from one hour to another on the local-time dial and of the hour designation on the universal dial from one standard meridian to the next the minute-hand will be making a complete traverse of the local-time dial, and it therefore serves as a universal minute-hand, because it marks the progress of the hour indicated by any of the hour designations on the universal scale in precisely the same manner that it indicates the progress of the hour indicated by the hour-hand of the local-time scale. What has been said of the relation of the universal dial to the prime meridian is true of every other standard meridian on the dial, since the hour designations on the universal dial will indicate the hour in every time-belt at any given period of time, it being understood that as there is exactly one hour's difference between the time of each belt the number of the hours will differ, while the number of minutes past or before the hour will be the same in every instance.

It has been stated that when it is desired to readjust the hands of the watch to indicate local time at different places it has heretofore been necessary to remove the hands from the arbors and refix them in their new positions. This is undesirable, and I have therefore provided the described arrangement for procuring a frictional engagement between the universal dial and the hour-hand arbor, and in addition I have provided a simple and efficient stop mechanism by means of which the universal dial may be locked against movement, so that its relation to the standard meridians of longitude may not be disturbed while the hands of the watch are being set for central, eastern, or other time. While many forms of stop mechanism may be employed, I prefer to mount upon the front plate 20 of the movement a brake-spring 23, having a curved end 24 and a knurled face disposed to engage the periphery of the gear-wheel 18, constituting an element of the train which drives the universal dial 3. The resiliency of the spring 23 normally retains it out of engagement with the gear; but when it is desired to set the watch said spring is moved to its engaging position by a cam 25, formed at one end of what may be termed a "stop-rod" 26, having one end thereof extended to the periphery of the watch-case for convenient manipulation. The rod 26 is suitably guided—as, for instance, by pins 27, one of which is located in a slot 28 in the rod, so as to prevent lateral movement thereof. It therefore follows that when the stop-rod 26 is drawn out longitudinally the cam 25 will engage the spring 23 and urge it into engagement with the gear-wheel 18, the extremity of the spring first engaging the wheel and the curved portion thereof being subsequently urged into engaging position to insure the locking of the wheel 18, and con-

sequently the locking of the universal dial against movement. Having locked the dial, the hands may be set by the manipulation of the setting mechanism of the watch in the ordinary manner to change from one time standard to another. It is also possible to set the hands for exact sun-time, since the sun-time bears a definite relation to standard time at different meridians.

In clock constructions the leading characteristics heretofore described are preserved. In Fig. 4 is shown a sectional view of a portion of a clock in which the combination-dial 2^a is supported at its outer periphery in a manner similar to the watch construction. The universal dial 3^a is provided with a bearing-sleeve 4^a, surrounding the hour-hand arbor 5^a, in which rotates the independent minute-hand arbor 10^a. An extra pinion 29 is attached to one of the shafts of the movement and is arranged to engage and drive a gear-wheel 30, having frictional connection with the sleeve 4^a of the universal dial 3^a. This frictional engagement is preferably effected by interposing the gear 30 loosely between a pair of fixed collars 31 and 32 on the sleeve 4^a, one of these collars serving as a backing for a friction-spring 33, bearing against one face of the wheel 30. This manner of connection causes the universal dial 3^a to move normally with the gear 30 as the latter is driven by the clock movement, but permits the dial to be held stationary without interfering with the movement of the gear 30 as the hands of the watch are turned in setting. In this construction the stop mechanism instead of being applied to an element of the gearing between the hour-hand arbor and the sleeve of the universal dial is applied to the sleeve directly. This stop mechanism is in the form of a push-rod 34, slidably mounted on the front face-plate 35 of the movement and having a knurled inner end 36 arranged for presentation to the knurled periphery of the collar 31 of the sleeve 4^a. The outer extremity of the push-rod 34 is provided with a finger-piece 37, exposed at a convenient point to facilitate the manipulation of the rod. Ordinarily the stop mechanism is in its retracted position to permit the universal dial to move with the hands; but when it is desired to set the clock this stop mechanism is pushed in, thus causing the universal dial to be held stationary while the hands are being adjusted in an obvious manner.

Attention may now be directed to the several salient points of novelty embraced by both forms of the invention. First, the rotary universal dial is located at the center of the timepiece, and is supported directly by the hour-hand arbor and retained in place by the hands, and is surrounded by the two fixed dials—to wit, the local-time dial and the geographical dial—each of the several dials being located in the same plane as distin-

guished from ordinary constructions wherein the inner dial is a fixed local-time dial located in a separate plane; second, the local-time dial instead of being provided with an independent support is integral with the geographical dial, which is supported at its periphery, and, third, the universal dial is connected to its operating mechanism by the interposition of a friction device or clutch and is provided with stop mechanism for holding the dial stationary to prevent the disturbance of its relation to the standard meridians during the setting of the hands of the timepiece for the purpose of correcting errors or for changing from one time standard to another. Obviously either type of gearing or brake mechanism herein described may be employed indiscriminately in watch and clock mechanisms.

It is thought that from the foregoing the construction, operation, and many advantages of my improved timepiece will be clearly apparent; but while the illustrated embodiments of the invention appear at this time to be preferable I do not wish to be understood as limiting myself to the structural details defined, as, on the contrary, I reserve the right to effect such changes, modifications, and variations of the illustrated structures as may fall fairly within the scope of the protection prayed.

What I claim as new is—

1. In a geographical timepiece, the combination with hour and minute arbors and the usual hour and minute hands arranged to make a complete traverse in twelve hours and one hour, respectively, of a rotatable twenty-four-hour dial surrounding the hour-arbor and rotatable in the same direction as the hour-hand and once in twenty-four hours, a rigid twelve-hour local-time dial surrounding the twenty-four-hour dial, and a geographical dial surrounding and supporting the local-time dial, the several dials being located in substantially the same plane.

2. In a geographical timepiece, the combination with hour and minute hands and their arbors, of a twenty-four-hour dial rotatable on the hour-arbor in the same direction as the hour-hand but at a different speed and held in place by the hands, a rigid twelve-hour local-time dial surrounding the twenty-four-hour dial, and a peripherally-secured geographical dial surrounding the local-time dial and supporting the same, the several dials being located in the same plane and standard-meridian lines extending over both the local-time dial and the geographical dial from the periphery of the twenty-four-hour dial.

3. In a geographical timepiece, the combination with a twenty-four-hour dial, a twelve-hour dial, and a geographical dial, one of said dials being rotatable, of hour and minute hands, driving mechanism common to the

hands and rotary dial and having frictional connection with the latter, and stop mechanism for holding the rotary dial stationary during the setting of the hands, whereby the necessity for turning the dial back after the hands have been set is avoided.

4. In a geographical timepiece, the combination with the hands, a rotary twenty-four-hour dial, a fixed local-time dial, and a fixed geographical dial, of driving mechanism for the rotary dial and the hands, a friction device normally connecting the rotary dial with its driving mechanism, and stop mechanism for holding the said dial stationary during the setting of the timepiece.

5. In a geographical timepiece, the combination with hour and minute hands and their arbors, of a twenty-four-hour dial rotatable on the hour-arbor and retained in place by the hour-hand, said dial making one complete rotation every twenty-four hours and moving in the same direction as the hour-hand, and a stationary combination-dial comprising a local twelve-hour dial, and a geographical dial divided by twenty-four equidistant standard-meridian lines properly numbered, each alternate line being disposed midway between two hour designations of the local-time dial.

6. In a geographical timepiece the combination with hour and minute hands and their arbors, of a twenty-four-hour dial rotatable on the hour-arbor, a stationary combination dial located in the plane of the twenty-four-hour dial and comprising a local twelve-hour dial, and a geographical dial divided by twenty-four equidistant standard-meridian lines properly numbered, each alternate line being disposed midway between two hour designations of the local-time dial, and gearing whereby the minute-hand makes a complete traverse each hour, the hour-hand each twelve hours and the twenty-four-hour dial each twenty-four hours, the hour-hand indicating the hour on the local dial, the twenty-four-hour dial indicating the hour at any standard meridian, and the minute-hand serving to indicate the minutes past the hour designated by both the hour-hand and the twenty-four-hour dial.

7. In a geographical timepiece the combination with hour and minute hands and their arbors, of a twenty-four-hour dial rotatable on the hour-arbor once in twenty-four hours, a stationary combination-dial comprising a local twelve-hour dial and a geographical dial divided by twenty-four equidistant standard-meridian lines properly numbered, each alternate line being disposed midway between two hour designations of the local-time dial, a friction device normally connecting the twenty-four-hour dial with its driving mechanism, and stop mechanism for holding said dial stationary during the setting of the hands.

8. In a geographical timepiece, the combination with a rigid twelve-hour local-time dial and a geographical dial surrounding and supporting the same, of hour and minute hands and their arbors, mechanism for rotating said arbors, a twenty-four-hour dial rotatable on the hour-arbor and located in the plane of the first-named dials, a gear-wheel mounted on the hour-arbor, a friction device connecting said gear-wheel to the arbor, and gearing operatively connecting said gear-wheel to the twenty-four-hour dial.

9. In a geographical timepiece, the combination with a rigid twelve-hour local-time dial and a geographical dial surrounding and supporting the same, of hour and minute hands and their arbors, a twenty-four-hour

dial surrounding the hour-arbor and located in substantially the same plane as the rigid dials, and a shaft geared to the hour and minute arbors and to the twenty-four-hour dial, said gearing being so proportioned that the minute-hand will rotate once every hour, the hour-hand once every twelve hours, and the twenty-four-hour dial every twenty-four hours.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses

ISAAC F. PHEILS.

Witnesses:

C. C. LAYMAN,
E. A. LAYMAN.