

No. 694,256.

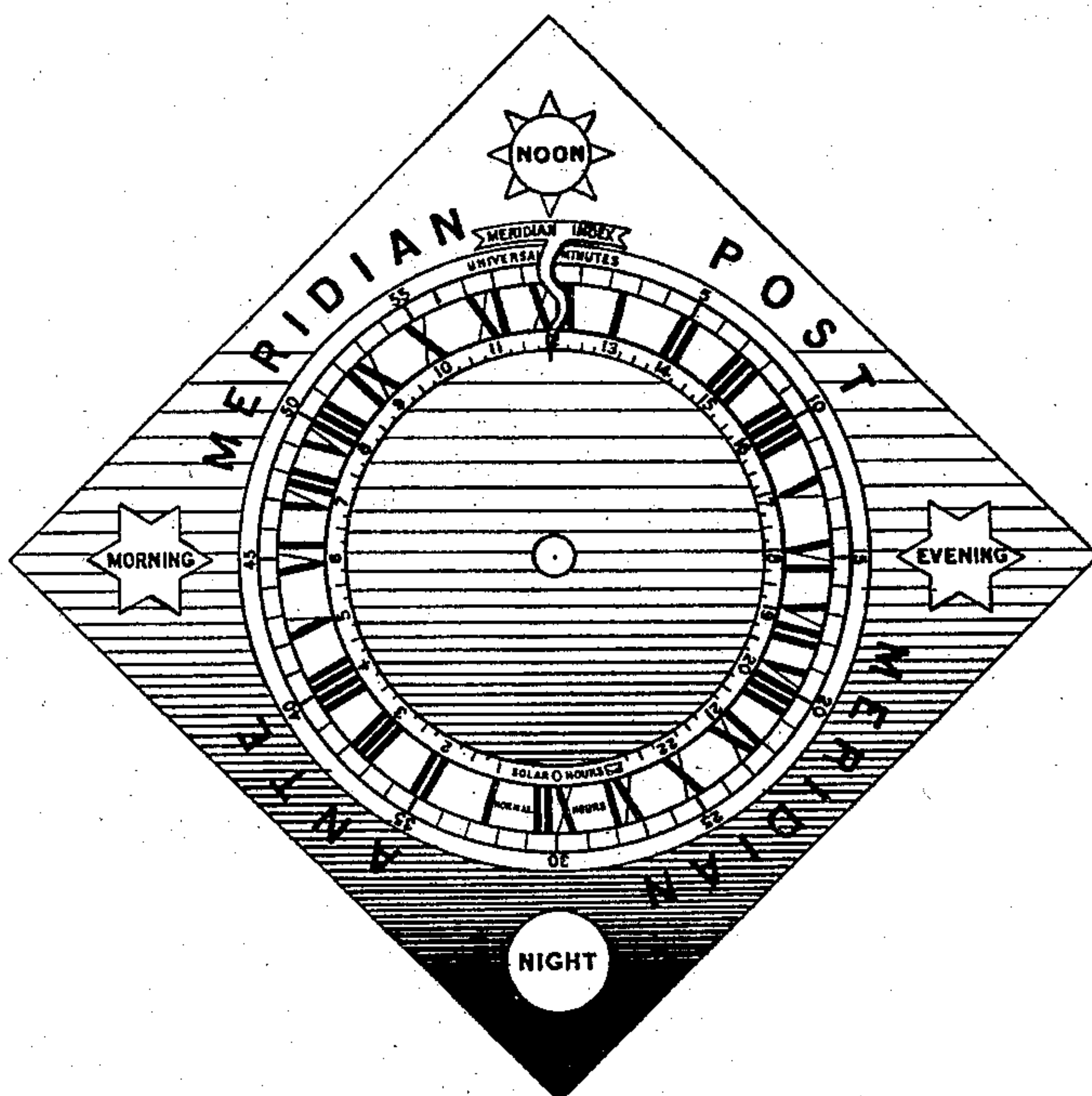
Patented Feb. 25, 1902.

A. J. DAY.
GEOGRAPHICAL CLOCK.
(Application filed June 20, 1899.)

(No Model.)

6 Sheets—Sheet 1.

Fig. 1.



Witnesses:
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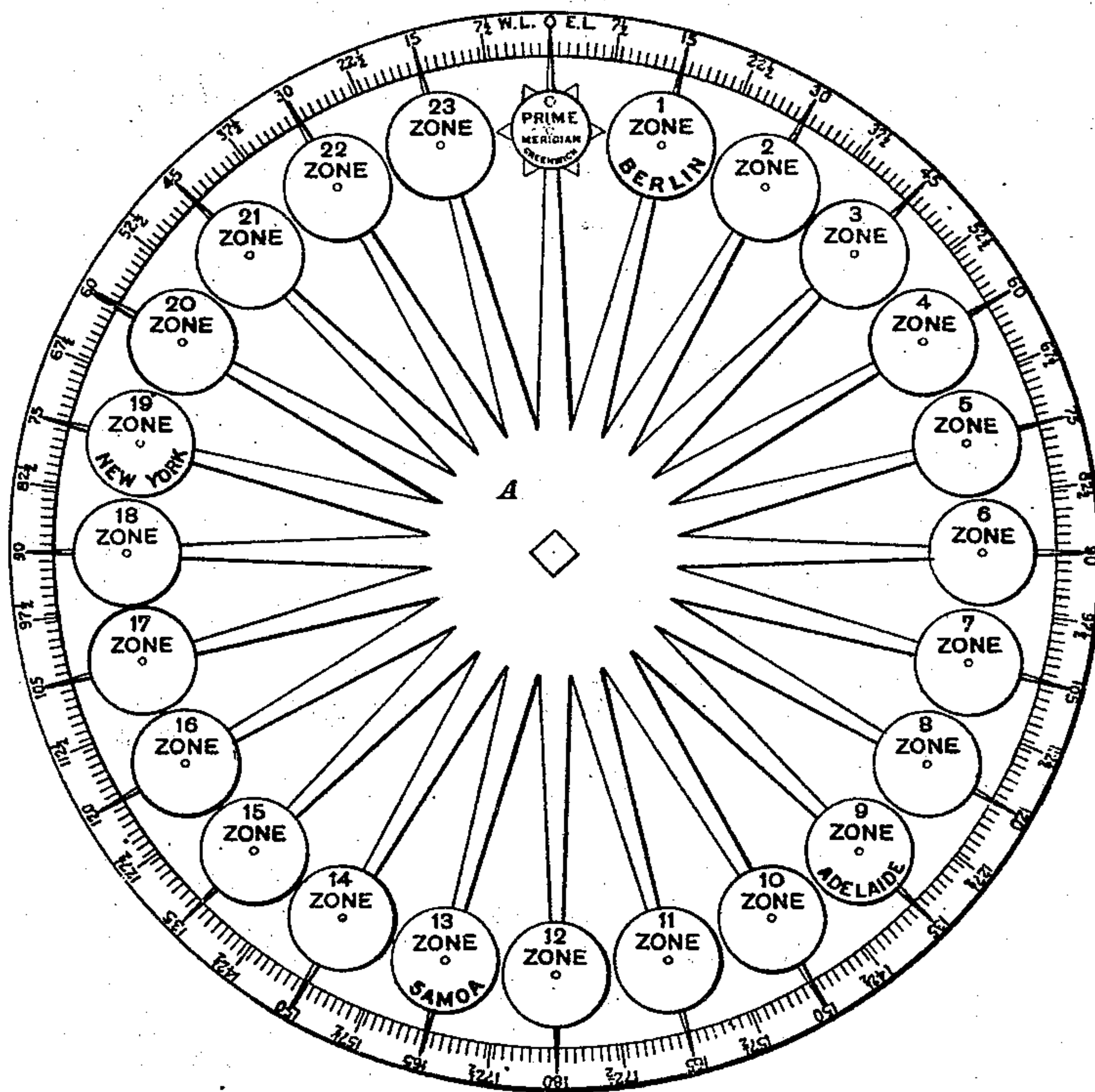
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Fig. 2.



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Fig. 3.

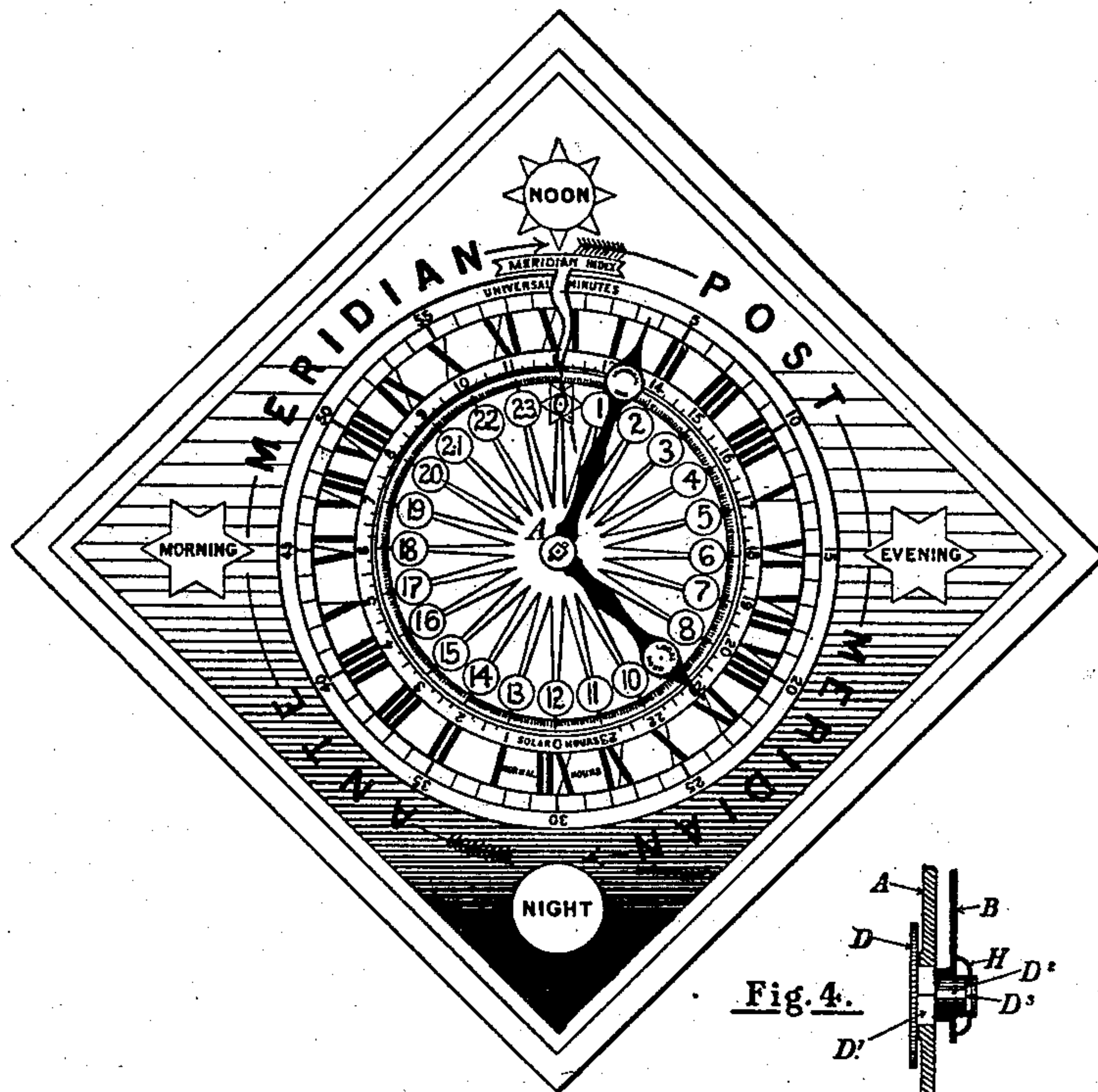
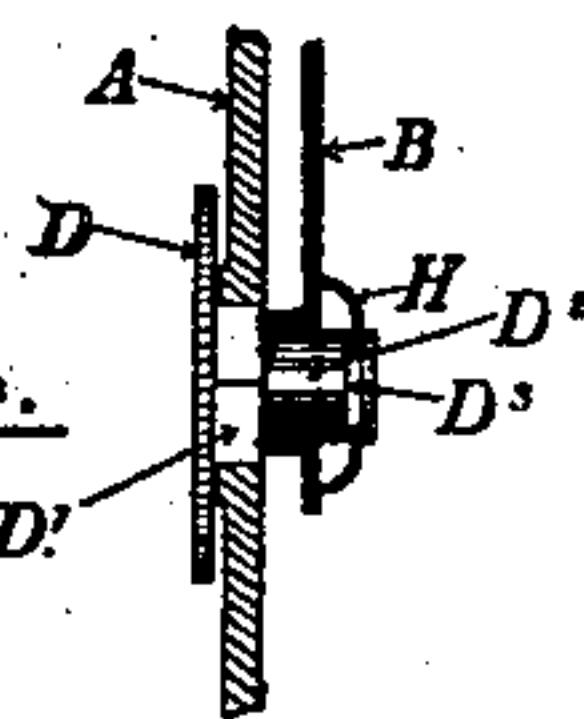


Fig. 4.



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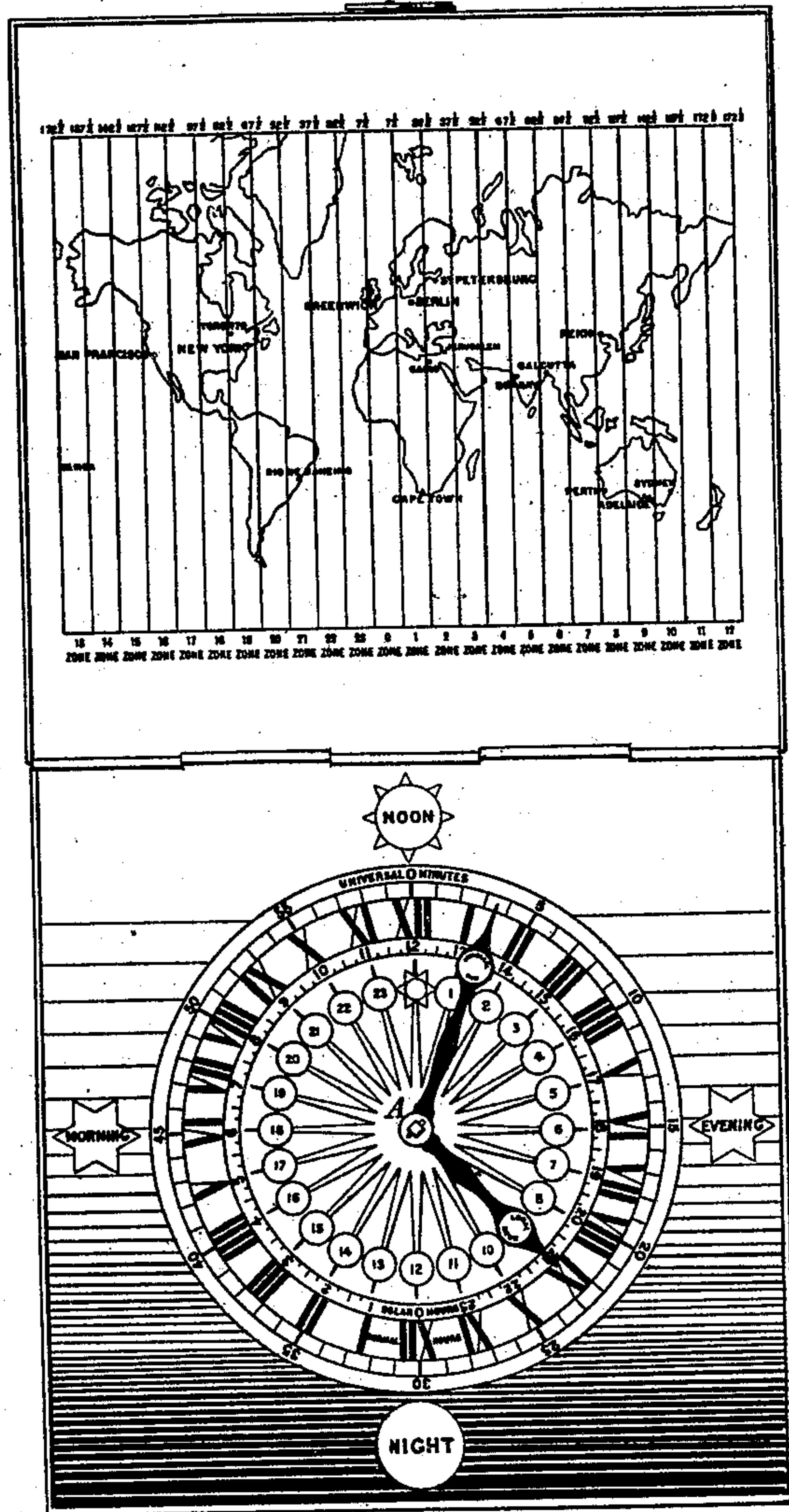
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Fig. 5.



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No. 694,256.

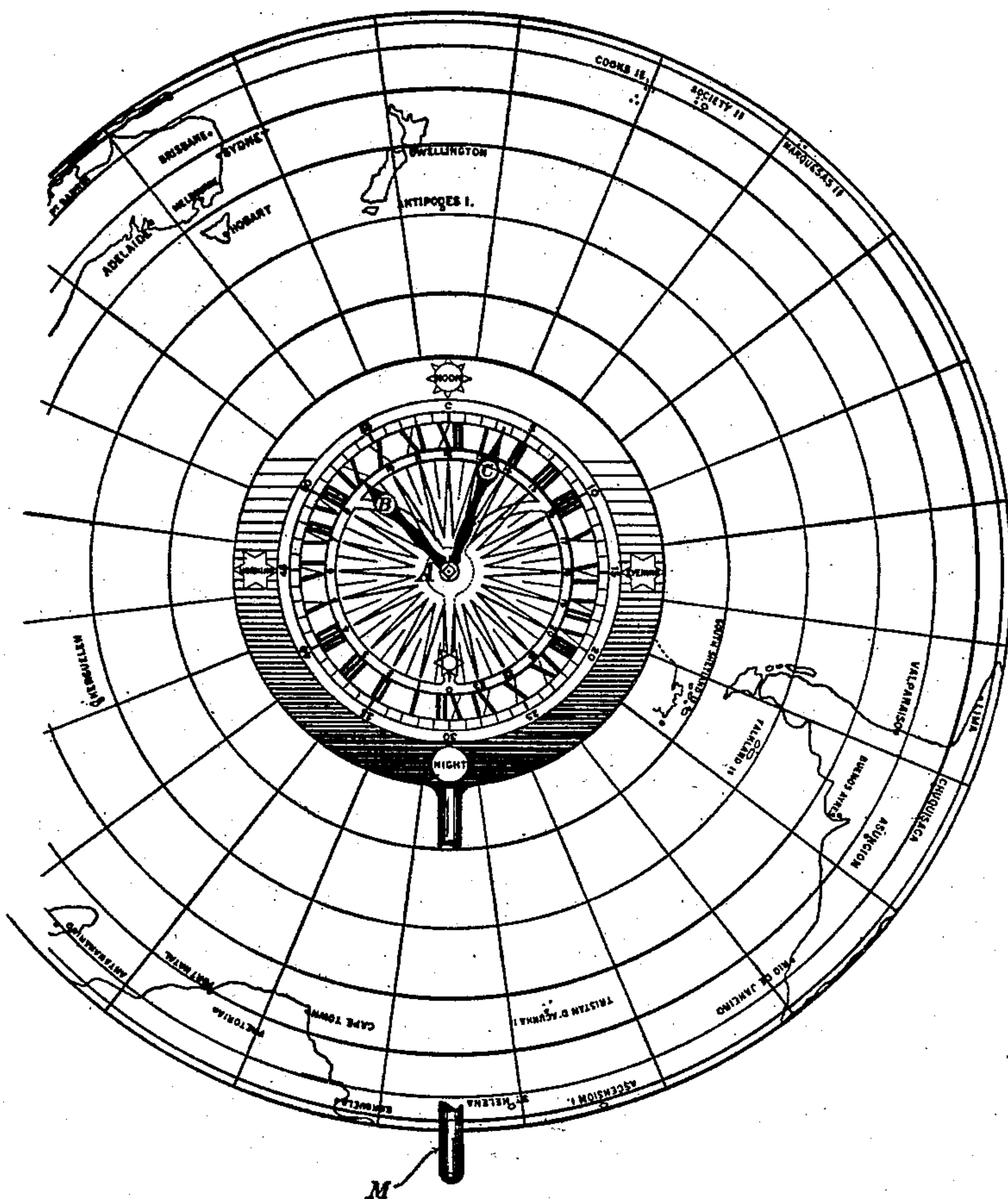
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Fig 6.



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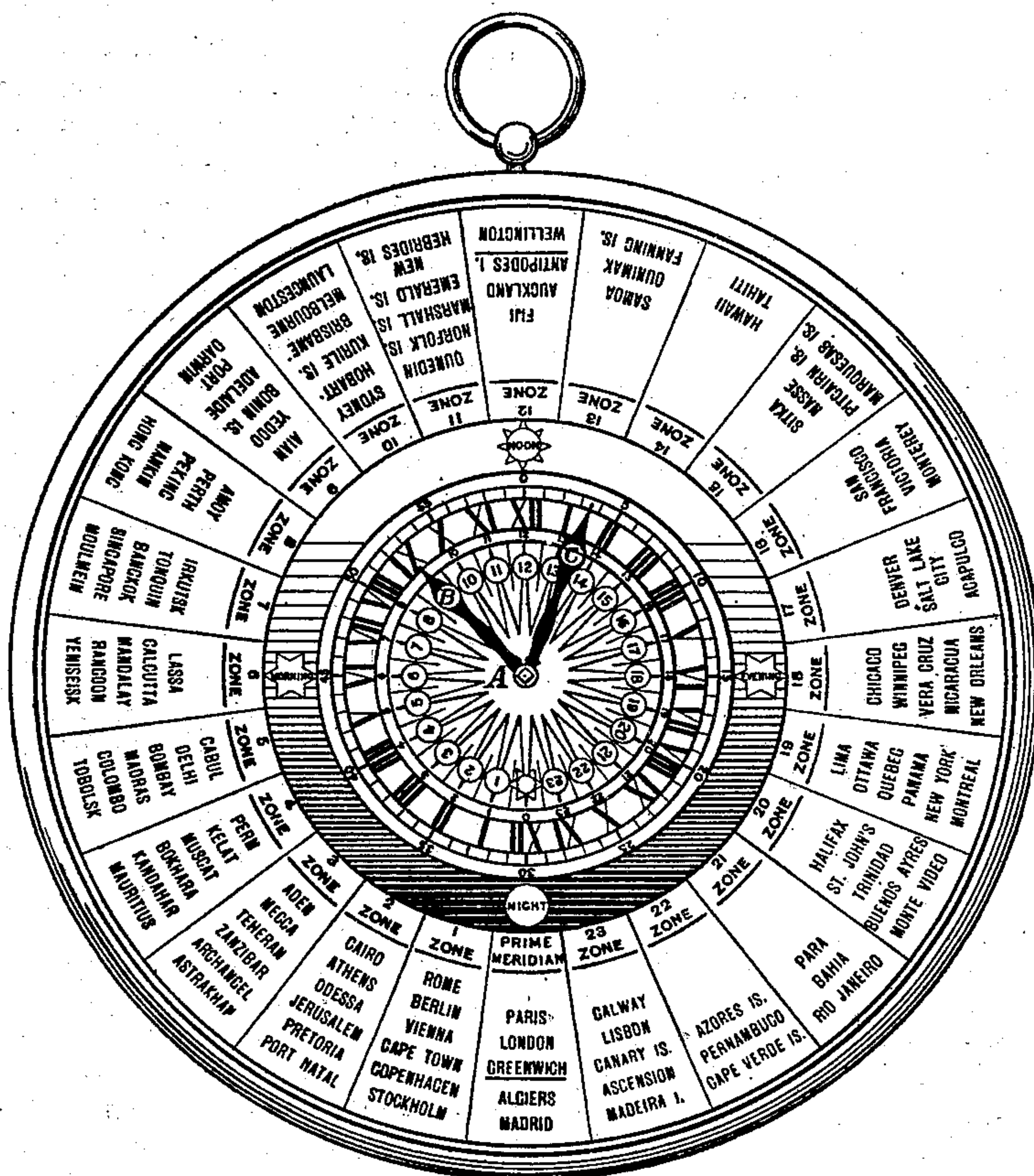
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6 Sheets—Sheet 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

ANDREW JOHN DAY, OF EXETER, SOUTH AUSTRALIA, AUSTRALIA.

GEOGRAPHICAL CLOCK.

SPECIFICATION forming part of Letters Patent No. 694,256, dated February 25, 1902.

Application filed June 20, 1899. Serial No. 721,263. (No model.)

To all whom it may concern:

Be it known that I, ANDREW JOHN DAY, watchmaker, a subject of the Queen of Great Britain and Ireland, and a resident of Semaphore road, Exeter, in the State of South Australia, Australia, have invented a certain new and useful Horological Apparatus for Indicating Local Standard Time and Universal Zone-Time and for Finding the Time at all Parts
10 of the World, of which the following is a specification.

Figure 1 is a representation of a dial with a meridian-index constructed according to my invention. Fig. 2 is a representation of
15 the radiant and equatorial circle attached thereto. Fig. 3 is a view of the face of the timekeeper or time-finder complete with the local-hour hand, the radiant, and the equatorial circle and the minute-hand attached.
20 In this figure for the sake of clearness the shading in the center of the dial and the numbers of the degrees on the equatorial circle are omitted. Fig. 4 is a sectional view showing the attachment of the radiant and the
25 hour-hand to the hour-wheel. Fig. 5 shows a folding case having a time-finder on one side and a map with the twenty-four time zones marked thereon on the other side. In this figure for the sake of clearness the shading
30 in the center of the dial is omitted. Fig. 6 represents a globe to which a time-finder is attached at the southern pole. In this arrangement there are no disks on the radiant. Fig. 7 is the view of the face of a timekeeper
35 or time-finder on which the names of the principal places in each time zone are exhibited.

Similar letters refer to similar parts in all the figures.

In Figs. 5, 6, and 7 for the sake of clear-
40 ness the words "ante meridian" and "post meridian" are omitted.

The object of this invention is by one instrument and with one dial to indicate standard time at all parts of the world and also to
45 indicate the point on the equator at which the sun is at its meridian and enable the mean time to be calculated therefrom by a simple well-known formula. It is to be used in connection with an ordinary map or globe, and
50 the zone-time system, which consists in dividing the earth (the equator being a circle of three hundred and sixty degrees) into

twenty-four zones of fifteen degrees of space each measured east and west and equal to one hour of time each, and thus as the earth
55 revolves on its axis once in twenty-four hours the twenty-four pointers, constructed and operated as hereinafter described, in combination with the minute-hand, (the minutes being universal,) indicate the time in each and all of
60 twenty-four time zones. A circle is attached to the under side of the pointers, having the three hundred and sixty degrees of the equator marked thereon, and an index, called the "meridian-index," depends from
65 the noon "XII" on the dial. The index shows on the dial at any moment the actual meridian and its longitude. It will be obvious that by the application of a simple well-known formula the mean time at any place can be
70 calculated from the above.

Although to find the times of every place in the world a map or globe is required, I would point out that for a limited number of
75 places the exact time can be indicated without any such map or globe by marking, according to their zone locality, as many names of places as there is room for upon each zone-pointer. Thus, for instance, upon a large
80 clock or time-finder all the principal towns in No. 3 zone could be marked upon No. 3 pointer, while upon watches or small dials the number would be limited, and without any names on the pointers a map or globe would
85 be used. In ships' and travelers' clocks, which are constantly being moved from place to place, the alteration of hands may be entirely avoided by using a zone-indicator, which may consist of a roller or table. This can be
90 adjusted from time to time, so as to show when set, according to longitude, the number of time zone in which the vessel or traveler is located. The number thus indicated will be the number of the pointer which will give the
95 hour-time.

In applying this invention I employ a dial or diagram of twenty-four hours with a double set of Roman or other numerals "I" to "XII" in one and the same circle in combination with a radiant, as hereinafter described.
100 For the purpose of distinguishing the periods—such as night, noon, morning, and evening—the background of the dial may be toned from black at the lower night "XII"

to a light shade or color at the upper or noon "XII." In further carrying out the same purpose a moon or disk in white or light color appears adjacent to the night "XII" and may have the word "Night" displayed upon it, a sun-disk adjacent to the noon "XII" having the word "Noon" upon it, stars with "Morning" and "Evening" thereon adjacent to the left hand "VI" and the right hand "VI," respectively, and the words "Ante meridian" and "Post meridian" on the left and right, respectively. The meridian-index projects from the dial immediately over the equatorial circle. In conjunction with such dial and for the purpose of indicating times at all places a radiant is provided, consisting of a boss with twenty-four pointers corresponding with the twenty-four time zones into which the face of the world is divided and an equatorial circle attached to the under side of the pointers and also one minute-hand indicating the minutes, which are universal. The radiant is attached to the central arbor of the timekeeper or time-finder, and the usual hour-hand is attached over the radiant with a spring-tight action, so that the hour-hand can be set to the local time of the zone in which the radiant is being used for the time being. The radiant with the hour-hand is caused to perform one revolution in the course of twenty-four hours. The minutes, which in zone-time calculations are universal, are marked on the dial by dividing it, as usual, into sixty spaces, and one hand indicates the minutes of time at all places. Each of the twenty-four pointers is numbered to indicate the zone it applies to, and attached to the under side of the pointers is the equatorial circle having the three hundred and sixty degrees marked thereon, as shown more particularly in Fig. 2. Upon each pointer of the radiant it is convenient to place a circular or other plate or device containing the number of the zone and sometimes the principal place or places therein. This plate may in vertical dials be attached by a pin or pivot, on which it hangs loosely, and may be weighted, so as to retain all the numbers or names in horizontal position for reading. Upon each pointer or plate the longitudes may be shown. As the radiant is rotated by the movement of the hour-hand being set over the pointer of the local-time zone and set to local time will indicate the local time, and each of the twenty-four pointers will simultaneously indicate the hour at the same period in its respective time zone, while the minute-hand revolving once in an hour indicates the minutes at all places. To get the time of any place in the world, observe the number of the zone in which it is situated. The pointer correspondingly numbered is the hour-hand of that zone and indicates the hour, while the long hand indicates the minute.

The foregoing description applies chiefly to timekeepers. My invention may also be applied for educational or commercial purposes

to finding the times, respectively, at different places. It will also be evident that with and without movement attachments this invention may be adapted to a great variety of purposes connected with practical, business, and scientific pursuits. For instance, a dial or diagram with radiant may be printed on celluloid and placed in the back case of a watch, book, or diary, or dials or diagrams and radiants may be mounted and used upon an ordinary map or globe ruled in time zones or as office conveniences and in a great variety of styles for many other purposes.

The words "timekeeper" and "time-finder" are used in this specification to indicate instruments, diagrams, and appliances used for indicating, recording, or measuring time or for showing zone-time at different parts of the earth's surface and meridian, (noon.) The word "radiant" in this specification is used to mean the boss having twenty-four pointers and the equatorial circle attached to the under side of the pointers.

Referring to Fig. 1, which represents the dial, the background is toned from black at the lower or night "XII" to light shade or color at the upper or noon "XII." Upon this background is a white circle on which are painted or otherwise marked a double set of Roman or other numerals "I" to "XII." The minutes, which in zone-time calculations are universal, are marked on the dial by the numbers "0" to "55" outside the hours, as usual. Upon an inner circle the solar hours are enumerated from "0" to "23," with subdivisions of quarter, half, and three-quarters. A moon or disk is shown in white on the dark background adjacent to the night "XII" and having the word "Night" thereon, a sun or disk adjacent to the noon "XII" having the word "Noon" upon it, a star upon the right hand having the word "Evening" upon it, and a star on the left having the word "Morning" upon it. The left half of the dial is marked "Ante meridian" and the right half "Post meridian." The meridian-index projects from the dial immediately over the equatorial circle. The dial may be printed or painted in or upon metal, card, celluloid, or other material, the meridian-index being cut and raised or else attached separately.

In the drawing Fig. 2 I have illustrated the radiant A, which consists of a central boss having twenty-four pointers and an equatorial circle attached to the under side of the pointers. It can be cut or formed out of or printed upon aluminium, celluloid, card, or other material. Each of the pointers has marked, either upon itself or upon a plate or ticket attached, its zone-number and, if desired, the principal place or places in such zone. Each of the plates is attached by a pin or pivot, on which it hangs loosely, and being weighted at the bottom retains the writing in horizontal position for reading.

In the drawing Fig. 3, which represents the face of the timekeeper or time-finder com-

plete, the minute-hand is marked "Universal minute" and the hour-hand is marked "Local hour."

In timekeepers the hands and radiant are operated by clockwork, the minute-hand is attached to a square arbor, and the hour-hand is attached to the hour-wheel arbor by a spring-tight attachment, while the radiant is attached rigidly to the hour-wheel arbor by a square socket, so that it cannot move except by the motion of the wheel. This is shown in Fig. 4. D is the hour-wheel, D' a squared portion of the arbor which carries the radiant A, and D² a round portion which carries the local-hour hand B, which is secured by the key-spring H in the annular slot D³. In the drawings the local-hour hand is set coincident with the pointer of the time zone No. 9, in which "Adelaide" is situated. In time-finders as distinguished from timekeepers the hand B is preferably formed in one piece with the radiant A, though they may be made separate, if desired, and the minute-hand C is attached to a free arbor or riveted or eyeleted to the dial, so as to be capable of adjustment relatively to the radiant or hour-hand.

In the drawing Fig. 5 is represented a folding case which contains on one side a map of the world with the twenty-four time zones marked thereon. Upon the other side is placed a time-finder, as hereinbefore described.

In the drawing Fig. 6 is represented a globe upon which the twenty-four time zones are marked and a time-finder is fixed at the pole. In this application of my invention the dial is held rigidly in position by means of the rod or standard M, which carries the bearings of the central spindle of the globe and is provided with suitable weighted foot. The globe is rigidly attached to its central spindle, to which also the radiant and local-hour hand are rigidly attached, but outside the dial. The minute-hand moves freely upon the end of the spindle. In this case the numbers of the zones may be dispensed with, as the map moves with the radiant.

In the drawing Fig. 7 is shown a time-finder, which dispenses with the necessity of referring to a time-zone map. Around the outer circle of the dial thereof is provided a radially-tabulated arrangement of the names

of the chief places in each of the twenty-four time zones, each table being numbered according to its zone position. In the drawing some of the names are inserted by way of illustration. By this the time in any of the chief places of the world can be found without any map.

I would have it understood that I do not limit myself to the details herein set forth. A great variety of forms and styles may be adopted in the construction and arrangement of dials and radiants according to the principle of my invention.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim is—

1. A horological apparatus, comprising a dial having hour-numerals in two sets 1 to 12, and solar-hour numerals 0 to 23, produced thereon in concentric circles, a radiant having twenty-four pointers corresponding to the twenty-four zones of time, a pivoted and weighted plate on each pointer adapted to contain the number of the zone and the principal place or places therein, an hour-wheel arbor, to which the radiant is secured, an hour-hand adjustably secured to the arbor to rotate therewith, and a minute-hand revolving once in each hour, as set forth.

2. A horological apparatus, comprising a dial having hour-numerals in two sets 1 to 12, and solar-hour numerals 0 to 23 produced thereon in concentric circles, a radiant consisting of twenty-four pointers corresponding to the twenty-four zones of time, a pivoted and weighted disk on each pointer adapted to contain the number of the zone and the principal place or places therein, and an equatorial circle attached to the pointers, a meridian-index projecting from the dial over the equatorial circle, an hour-wheel arbor, to which the radiant is secured, an hour-hand adjustably secured to the arbor to rotate therewith, and a minute-hand revolving once in each hour, as set forth.

In witness whereof I have hereto set my hand in presence of two witnesses.

ANDREW JOHN DAY.

Witnesses:

CHARLES NICHOLAS COLLISON,
ARTHUR GORE COLLISON.