

N<sup>o</sup> 15,914



A.D. 1911

Date of Application, 10th July, 1911

Complete Specification Left, 10th Jan., 1912—Accepted, 2nd May, 1912

# PROVISIONAL SPECIFICATION.

## Improvements in Sundials.

I, WILLIAM RENARD PILKINGTON, of Dowry House, Bamber Bridge, near Preston, in the County of Lancaster, Engineer, do hereby declare the nature of this invention to be as follows;—

This invention relates to time indicating apparatus which can be adjusted to compensate for the difference between solar time and mean time at different periods of the year and also to shew the time at any longitude, and to that type of apparatus in which the shadow or sun ray for indicating the time is produced by two screens arranged to receive an angular movement about a centre for causing the shadow or sunray from one screen to fall centrally upon the other, in which position the time can be ascertained by means of graduations arranged around a disc.

The present invention has for its chief object to construct a simple and efficient form of apparatus which can be readily and accurately set for effecting the aforesaid corrections and will not be liable to be detrimentally affected by long continued exposure to varying climatic conditions. A further object of the invention is to obtain a more sharply defined sun ray for facilitating the accurate reading of the apparatus.

According to this invention the aforesaid screens are arranged in rigid connection with each other and are pivotally mounted in relation to a fixed and a movable disc or member each of which bears a date circle divided into months and subdivided into days by graduations which are so spaced and arranged as to indicate by what amount the movable member must be rotated on a given date to shew mean time instead of solar time, the last mentioned member also bears a time circle divided by graduations into hours and minutes or other appropriate periods of time, and in order to shew mean time at any longitude, a pointer is adjustably mounted upon the aforesaid screen and is arranged to be secured in line with or to one side or the other of the sun ray or shadow hereinbefore referred to.

A feature of the invention in connection with the aforesaid screens consists in so constructing and arranging the same that the ray of light passes into a darkened chamber whereby such ray becomes more sharply defined and its position in relation to the centre line on the rear screen can be more readily ascertained. For this purpose the screens which may be referred to as the front and rear screen may comprise the front and rear walls of a rectangular chamber open at the top but closed in at the sides, the front wall having a narrow slit extending therethrough or a series of holes for the passage of the sun ray and the rear wall being pierced, engraved, or otherwise marked on its inner surface with a centre line for locating the position of the sun ray. The chamber so formed is centrally pivoted upon the aforesaid fixed disc or member, and both the fixed and the movable discs or members are preferably arranged so that their upper faces lie upon the same plane. The movable disc is advantageously provided with projections, handles, or the like, for facilitating its adjustment, and with stops for limiting the amount of its movement, and both the fixed and the movable discs or members are advantageously mounted upon a frame or

[Price 8d.]



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base which will permit of the apparatus being set to any latitude and adjusted about a vertical axis. The pointer for effecting corrections to suit different longitudes is conveniently pivoted to the base of the aforesaid screen chamber, and may occupy a position between the latter and the adjacent portion of the disc or discs, a clamping screw or other holding device being provided on or in the screen chamber for retaining the pointer in any adjusted position. 5

Dated this 7th. day of July, 1911.

BRIERLEY & APPELYARD,  
Halifax and Blackburn,  
Agents for the Applicant. 10

## COMPLETE SPECIFICATION.

**Improvements in Sundials.**

I, WILLIAM RENARD PILKINGTON, of Dowry House, Bamber Bridge, near Preston, in the County of Lancaster, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:— 15

This invention relates to time indicating apparatus which can be adjusted to compensate for the difference between solar time and mean time at different periods of the year and also to shew the time at any longitude, and to that type of apparatus in which the shadow or sun ray for indicating the time is produced by two screens arranged to receive an angular movement about a centre for causing the shadow or sun ray from one screen to fall centrally upon the other, in which position the time can be ascertained by means of graduations arranged around a disc. 20

The present invention has for its chief object to construct a simple and efficient form of apparatus which can be readily and accurately set for effecting the aforesaid corrections and will not be likely to be detrimentally affected by long continued exposure to various climatic conditions. A further object of the invention is to obtain a more sharply defined sun ray for facilitating the accurate reading of the apparatus. 25

According to this invention the aforesaid screens are arranged in rigid connection with each other and are pivoted centrally in relation to a fixed and a movable disc or member each of which bears a date circle divided into months and subdivided into days by graduations which are so spaced and arranged as to indicate by what amount the movable member must be rotated on a given date to shew mean time instead of solar time, the last mentioned member also bears a time circle divided by graduations into hours and minutes or other appropriate periods of time, and in order to shew mean time at any longitude, a pointer is adjustably mounted upon the aforesaid screen and is arranged to be secured in line with or to one side or other of the sun ray or shadow hereinbefore referred to. 30 35 40

A feature of the invention in connection with the aforesaid screens consists in so constructing and arranging the same that the ray of light passes into a darkened chamber whereby such ray becomes more sharply defined and its position in relation to the centre line on the rear screen can be more readily ascertained. 45

In order that the said invention may be clearly understood and readily carried into effect, the following is a complete description of same with reference to the accompanying drawings, in which:—

Figure 1, is a plan of the dial of the apparatus shewing the various graduations. 50

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Figure 2, is a plan of the fixed and movable disc together with the screens, the greater portion of the graduations being omitted.

Figure 3, is a section taken on line 3—3 of Figure 2, the screens being shewn in elevation.

5 Figure 4, is a detached section of the fixed disc taken on line 4—4 of Figure 5.

Figure 5, is an inverted plan of Figure 4.

Figure 6, is a detached section of the movable disc.

Figure 7, is an inverted plan of Figure 6.

10 Figure 8, is a detached section of a ring for supporting the fixed and movable discs, taken on line 8—8 of Figure 9.

Figure 9, is a plan of Figure 8.

Figure 10, is a vertical section of the apparatus.

Figure 11, is a side elevation, and

15 Figure 12, is a rear elevation shewing a known adjusting device to permit of the apparatus being set to any latitude.

Figures 13 and 14, are similar views to Figures 11 and 12, shewing a further known form of adjusting device.

20 A indicates the chamber carrying the two screens, B the fixed disc, C the movable disc, and D the pointer for effecting corrections to suit different longitudes.

In the arrangement shewn in Figure 1, *b* and *c* indicate the graduations of the date circles, which as already mentioned are spaced and arranged to indicate by what amount the disc C must be rotated on a given date to shew mean time instead of solar time, *c*<sup>1</sup> indicates the graduations of the time circle, and *c*<sup>2</sup> *c*<sup>3</sup> indicate handles or projections for rotating the disc C upon the disc B. The upper faces of the discs B and C are preferably arranged on the same plane, and a convenient method of supporting such discs is illustrated in Figures 3 and 10. The disc B shewn detached in Figures 4 and 5 is recessed at *b*<sup>1</sup> around its outer peripheral portion for the reception of a flange *c*<sup>3</sup> (Figure 3) projecting inwardly from the annular disc C. On the under side of the disc B are three tapped bosses *b*<sup>2</sup> for the reception of screws *b*<sup>3</sup> Figure 3 by means of which the disc B is clamped to a supporting ring E fixed to a bowl or plate F that is capable of adjustment to suit various latitudes. The movable disc C, shewn detached in Figures 6 and 7 rests upon the supporting ring E and is retained in position thereon by the flanged portion *c*<sup>3</sup> engaging with the recess *b*<sup>1</sup> in the fixed disc B. The supporting ring E shewn detached in Figures 8 and 9 is formed with internal projections *e* for the aforesaid screws *b*<sup>3</sup> and with a flange *e*<sup>1</sup> which encircles the outer peripheral portion of the bowl or plate F, screws or other suitable means being employed for securing the ring E to the bowl of plate F. The chamber A in the example shewn is made in the form of a rectangle of which the front wall *a* constitutes the front screen and the rear wall *a*<sup>1</sup> the rear screen. Extending through the front screen *a* Figure 10 is a narrow slit *a*<sup>2</sup> through which the sun ray passes onto a centre line pierced, engraved, or otherwise marked on the rear screen *a*<sup>1</sup>, the side walls of the chamber serving to darken the interior thereof, with the result that the sun ray is more sharply defined, and its position in relation to the centre line on the rear screen can be more readily ascertained.

50 If desired a series of holes may be substituted for the narrow slit *a*<sup>2</sup> shewn in Figure 10 for the passage of the sun ray. Projecting from the bottom of the chamber A is a pivot *a*<sup>3</sup> which passes through a boss *b*<sup>3</sup> extending from the centre of the fixed disc B and is secured to the latter by a nut *a*<sup>4</sup> mounted upon a reduced portion of the pivot. The base of the chamber A is recessed at *a*<sup>5</sup> to receive the pointer D which is pivoted on a shouldered portion *a*<sup>6</sup> Figure 10 of the pivot *a*<sup>3</sup> and is secured in any adjusted position in relation to the sun ray or shadow passing through the front screen onto the rear screen by a screw *d* passing through a slot *d*<sup>1</sup> in the pointer D. In the example shewn in Figure 10 the support for the dials comprise a bowl F supported in a cup G and capable

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of angular adjustment therein in a vertical plane for enabling the dials to be set to any latitude. This is effected in the example under consideration by forming a slot  $f$  in the bowl  $F$  for a stud  $f^1$  which passes through such slot and enters a tapped hole in the aforesaid cup  $G$ , a washer  $f^2$  and nut  $f^3$  being employed for clamping the bowl in any adjusted position. The adjustment is indicated by a scale  $f^4$  carried by the bowl, and in the present example such scale is indicated upon a slotted sector  $f^5$  that is received within a slotted portion of the cup  $G$ . The latter rests upon a base plate  $H$ , and is formed around its lower portion with a flange  $g$  that is engaged by a clamping ring  $g^1$  screwed to the base plate  $H$ . This arrangement permits of the whole apparatus being swivelled for adjustment about a vertical axis and secured in any adjusted position. Any suitable device, such for example as a rag bolt  $h$  and nut  $h^1$  may be employed for securing the base plate to a pedestal or other support. The angular adjustment of the dial and the swivelling of the apparatus about a vertical axis may be carried out in any appropriate manner as such adjustments are well known and form no part of the present invention.

In the modification shewn in Figures 11 to 14, a plate  $F^1$  is substituted for the bowl  $F$ , the adjustment for various latitudes being effected in Figures 11 and 12, by a graduated sector  $f^6$  slidably mounted in a bracket  $G^1$  and secured in any adjusted position thereon by a stud  $f^1$  passing through a slot  $f^7$  in the sector and provided with a washer  $f^2$  and nut  $f^3$ .

In Figures 13 and 14, the plate  $F^1$  is suspended from two pivots  $f^8$  projecting from brackets  $f^9$  secured to the back of the plate. These pivots are journaled in a bracket  $G^2$  that is rigidly secured to the bracket  $G^1$ . In this example, one or both of the brackets  $f^9$  may be graduated for indicating lateral adjustment and be slotted as shewn at  $f^{10}$  for the reception of an adjusting screw  $f^{11}$  screwed onto the bracket  $G^2$ .

Adjustment of the bracket  $G^1$  in the aforesaid modifications is provided for by the clamping ring  $g^1$  on the base plate  $H$  in a similar manner to that which has already been described with reference to Figure 10. In each of the modifications the dials are secured to the plate  $F^1$  by the supporting ring  $E$  previously referred to. If desired such ring may be provided with suitable stops for limiting the amount of movement of the disc  $C$  relatively to the disc  $B$ .

To utilize the instrument the outer ring  $C$  is turned until the current date indicated by one or other of the graduations  $c$  coincides with the current date indicated by one or other of the graduations  $b$  on the fixed disc  $B$ , the dial is now adjusted for the equation of time. The screen carrying member  $A$  is now turned until the sun throws a sun ray through the narrow slit  $a^2$  in the front screen  $a^1$  onto the line or indication mark on the rear screen  $a^2$  whereupon the correct time is indicated by the pointer  $D$ . By adjusting the position of the latter to one side or other of the narrow slit  $a^2$ , the instrument can be corrected for longitude to shew Greenwich time in this country or true clock time in any other country.

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

1. Time indicating apparatus of the kind set forth, comprising a front and a rear screen arranged in rigid connection with each other and centrally pivoted in relation to a fixed and a movable disc or member, each of which is graduated substantially as described for the purpose specified.

2. Time indicating apparatus of the kind set forth in the preceding claim, wherein a pointer is adjustably mounted upon the aforesaid screen and is arranged to be secured in line with or to one side or other of the sun ray or shadow for the purpose specified.

3. Time indicating apparatus of the kind set forth, wherein the front and

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rear screen are connected together by side walls, with or without an adjustable pointer substantially as described for the purpose specified.

4. Time indicating apparatus of the kind set forth, having its parts constructed, arranged and adapted to operate substantially as hereinbefore described with  
5 reference to Figures 1 to 10 of the accompanying drawings for the purpose specified.

Dated this 9th. day of January, 1912.

BRIERLEY & APPLEYARD,  
Halifax and Blackburn,  
Agents for the Applicant.

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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1912.

Fig. 1.

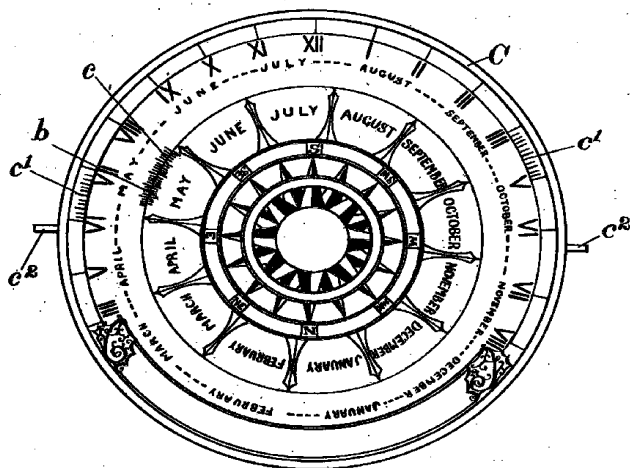


Fig. 2.

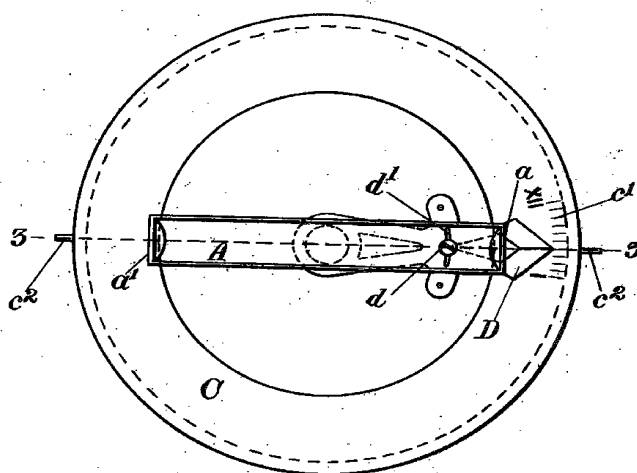


Fig. 3.

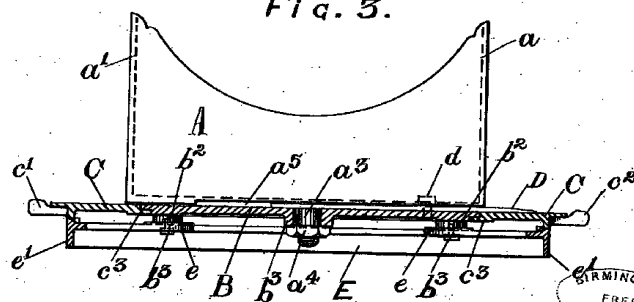
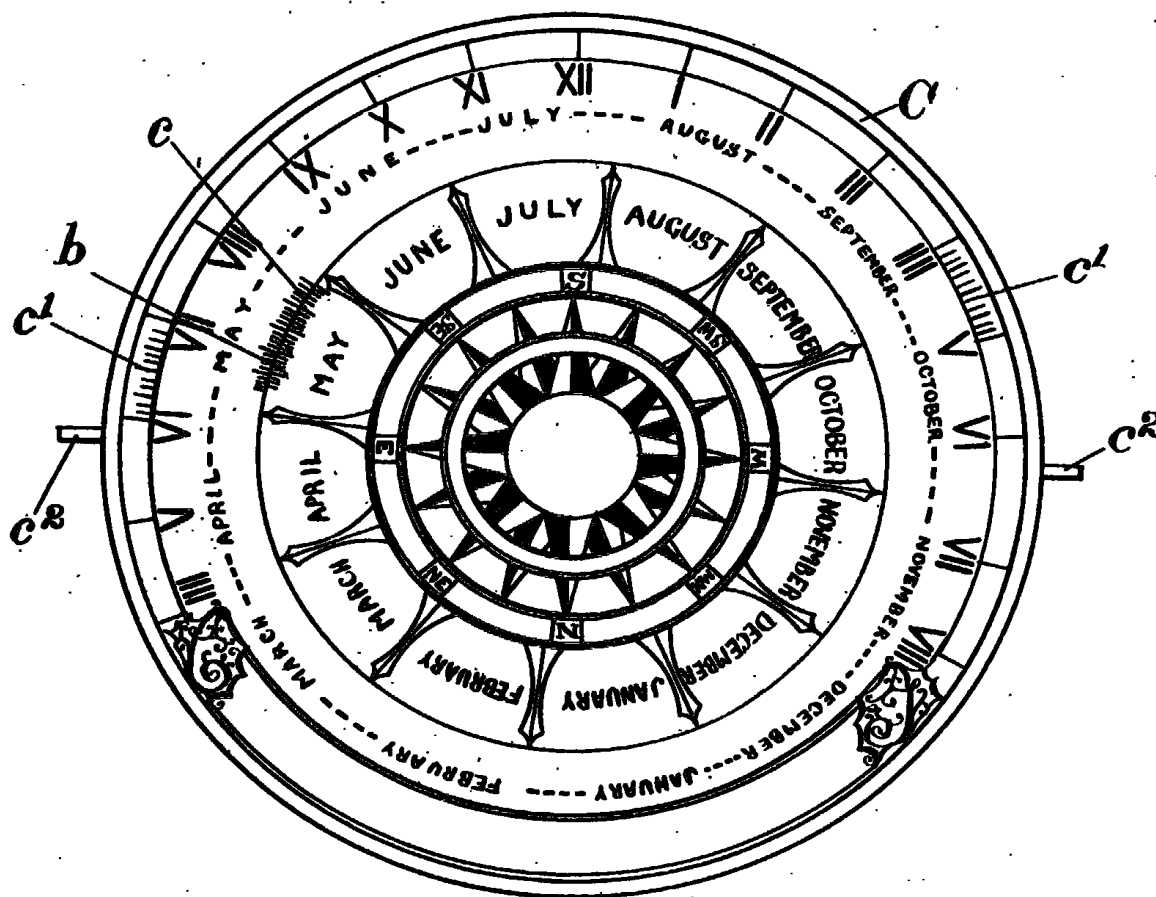


Fig. 1.



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Fig. 2.

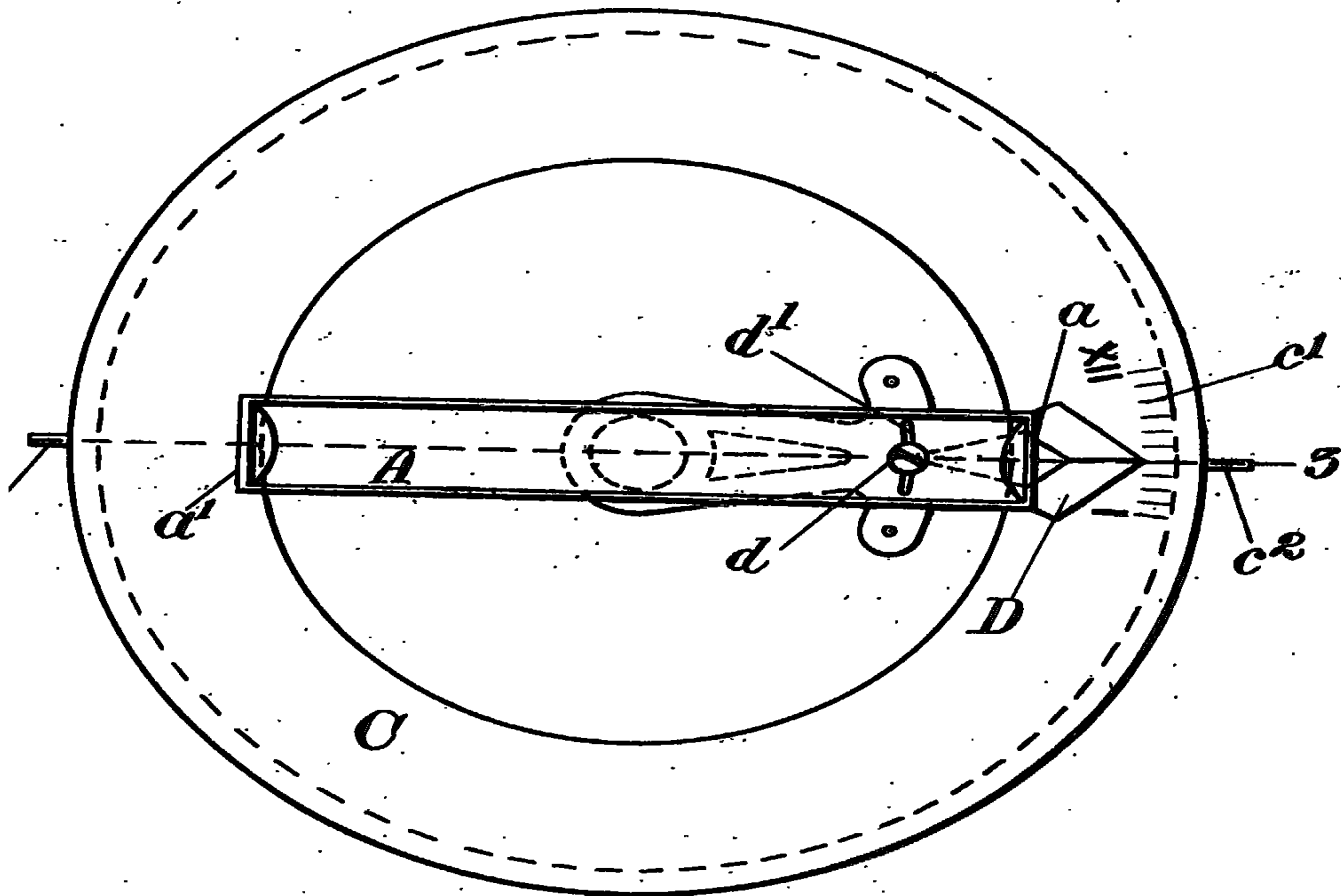
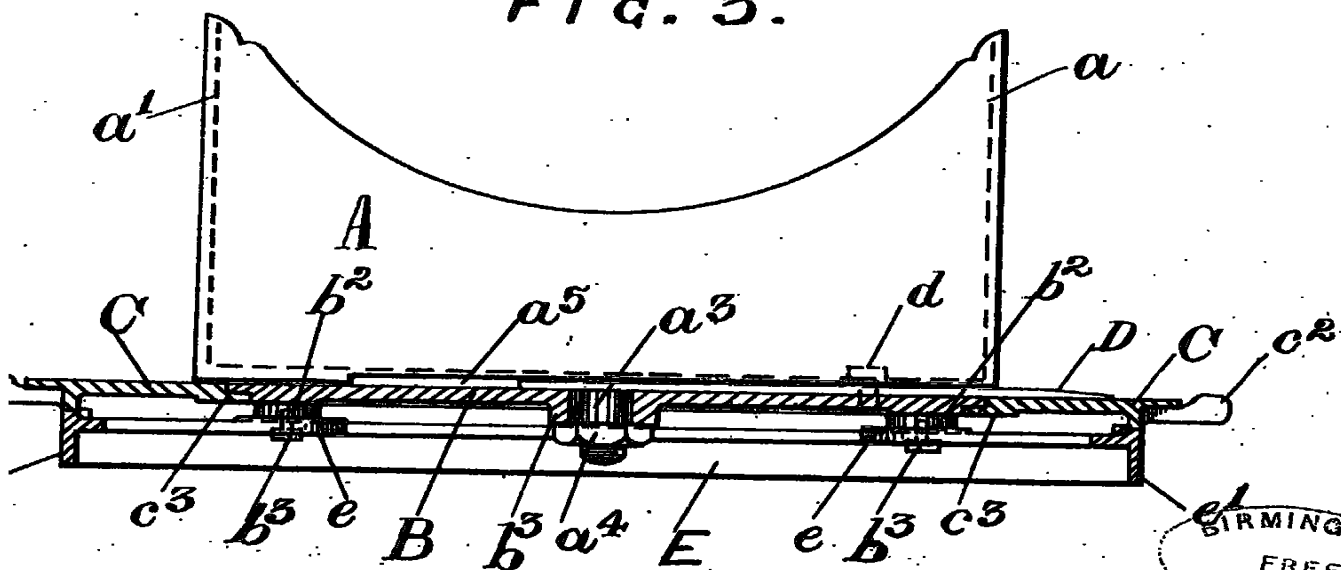
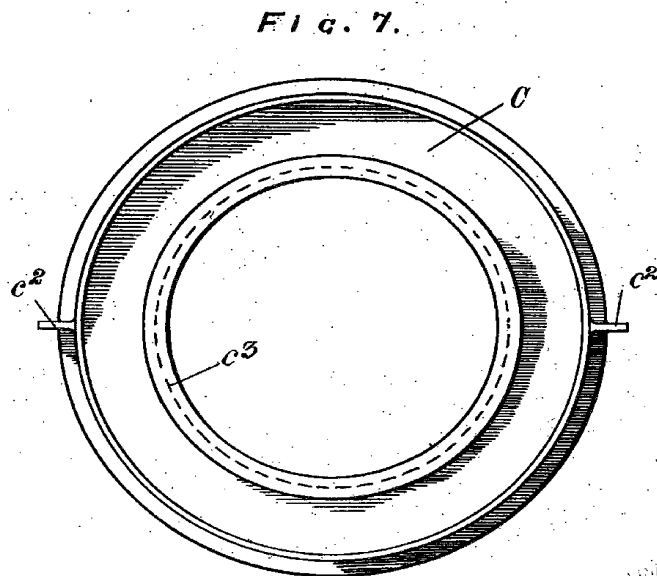
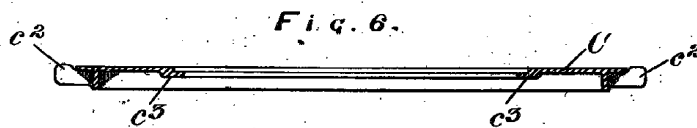
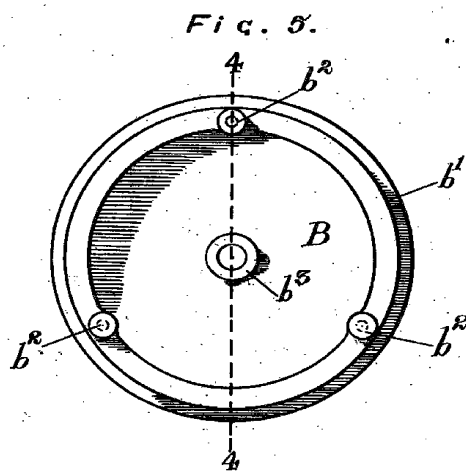
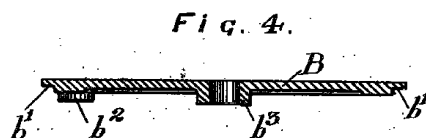


Fig. 3.

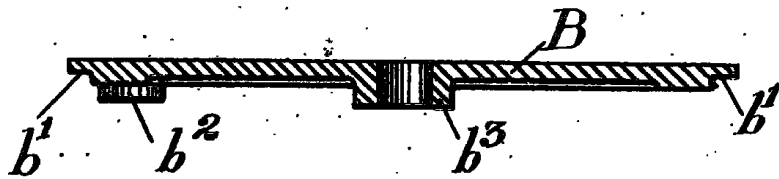




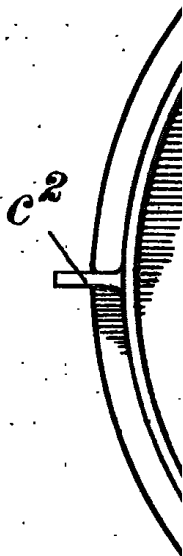
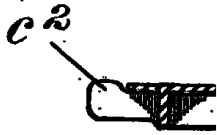
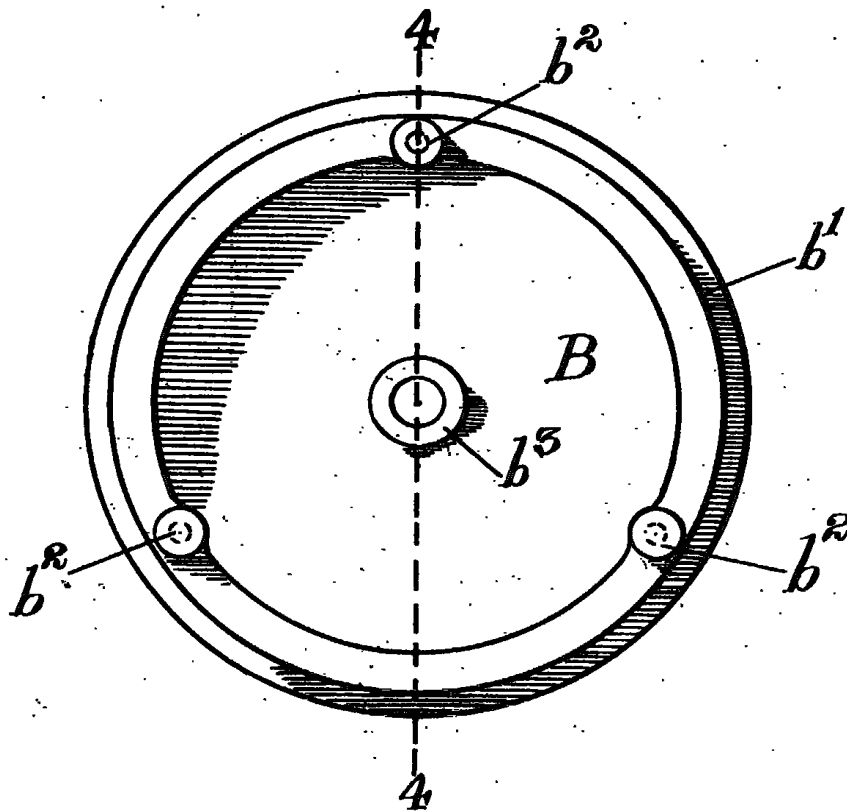


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*Fig. 4.*



*Fig. 5.*



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Fig. 6.

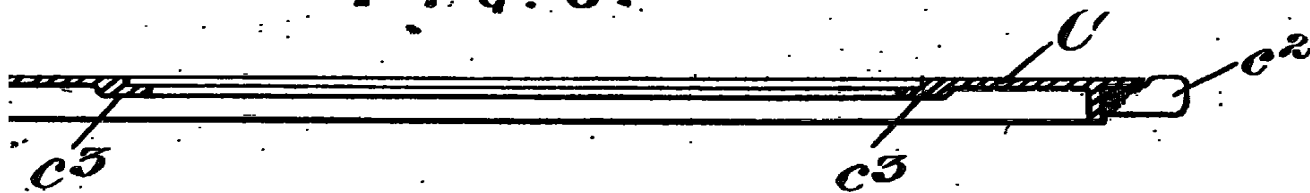
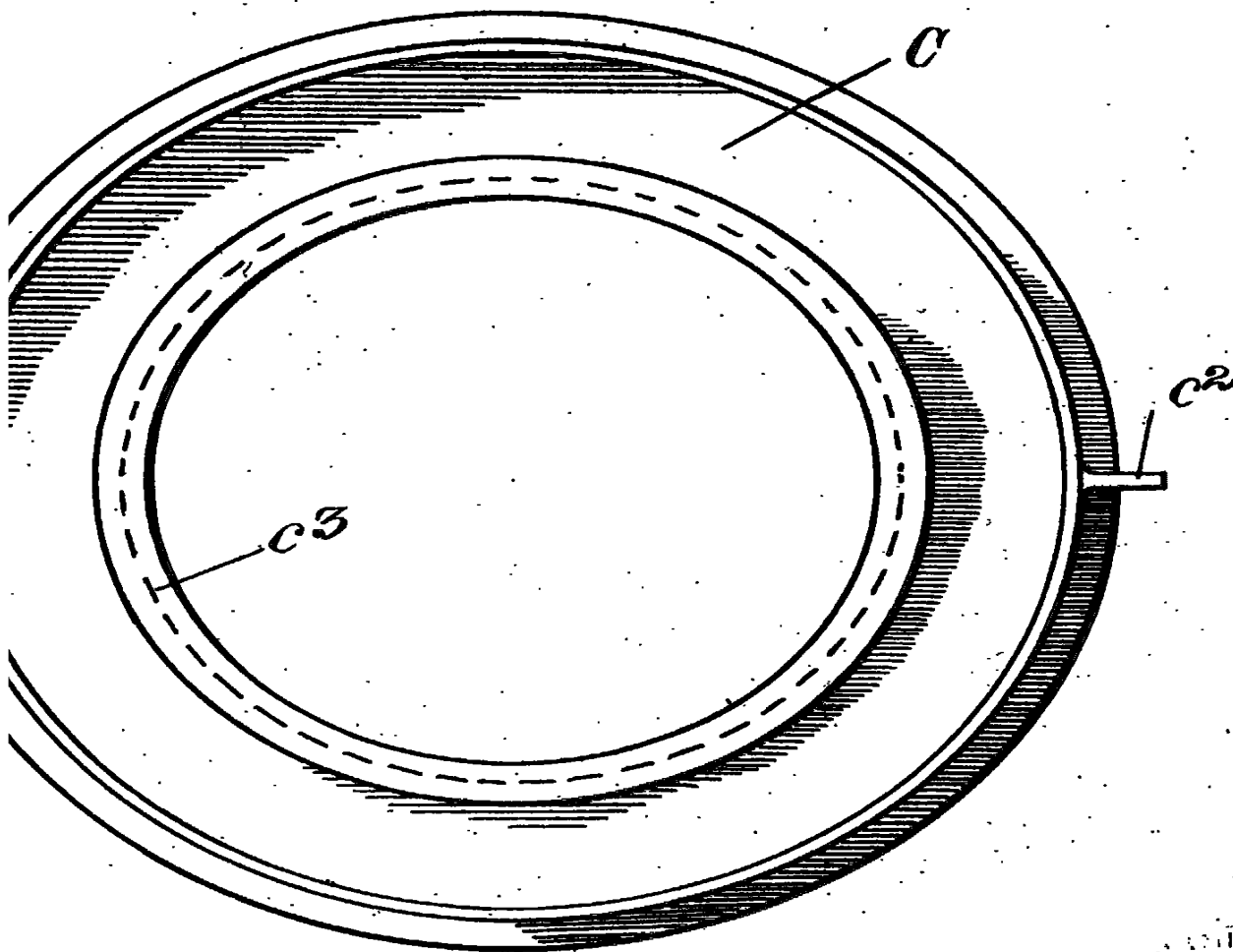


Fig. 7.



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Fig. 8.

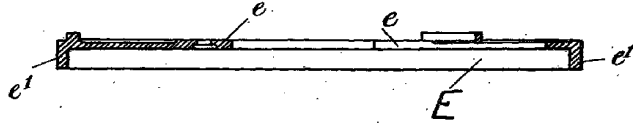


Fig. 9.

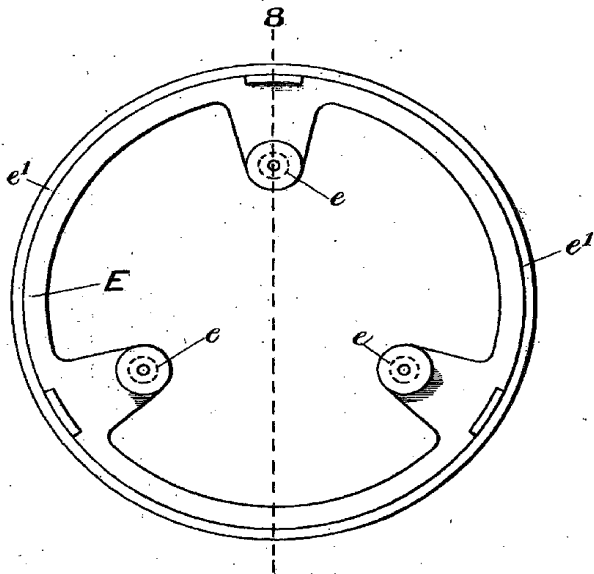
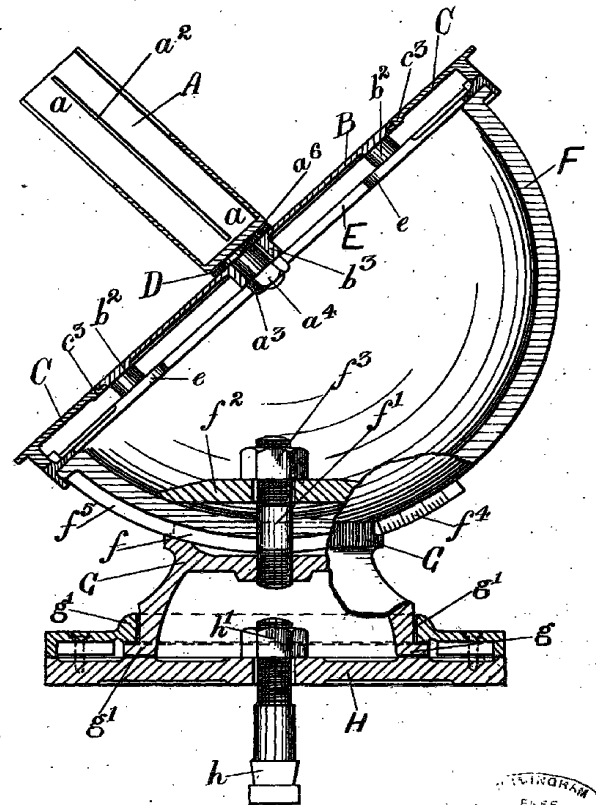


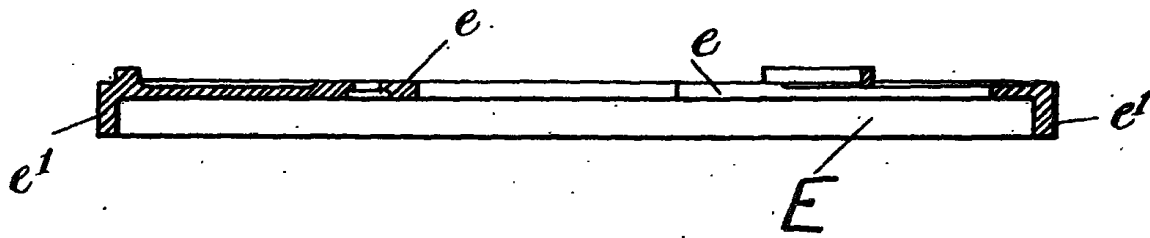
Fig. 10.



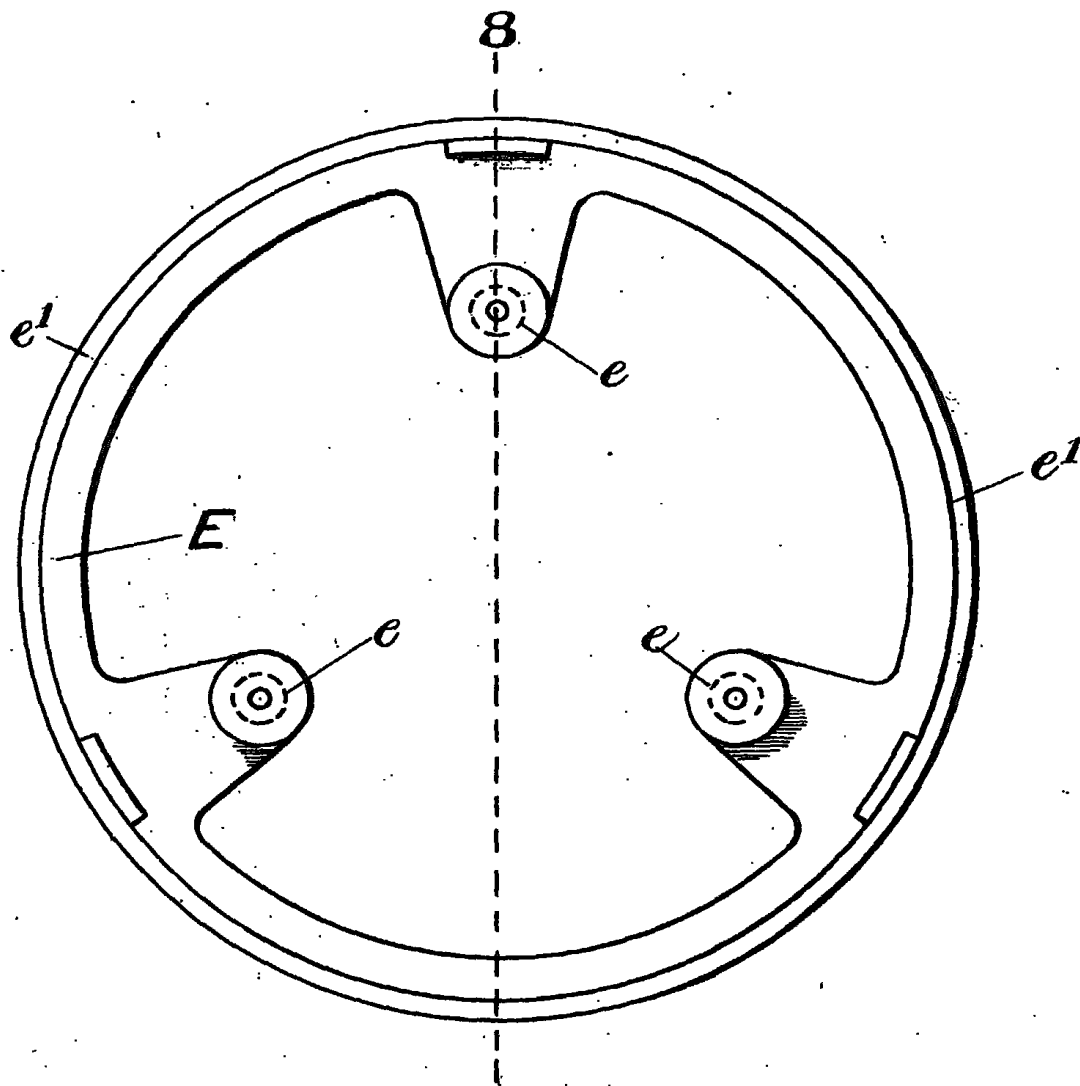
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*Fig. 8.*

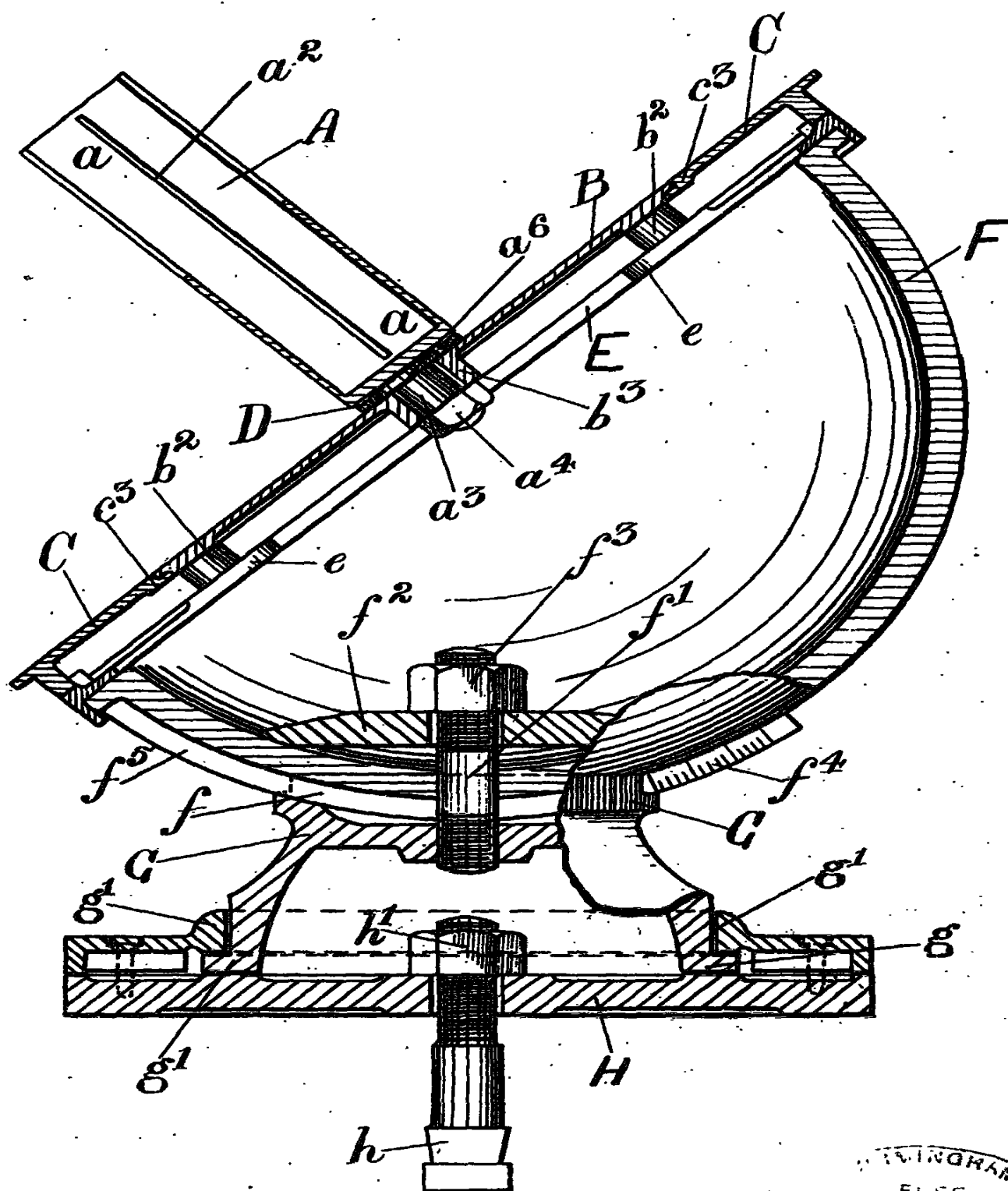


*Fig. 9.*



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FIG. 10.



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Fig. 11.

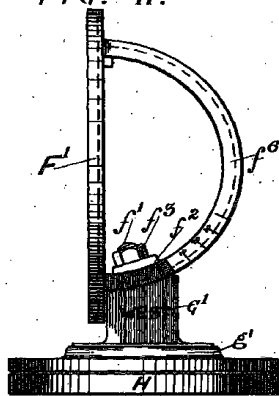


Fig. 12.

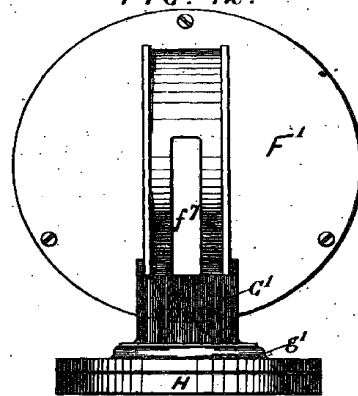


Fig. 13.

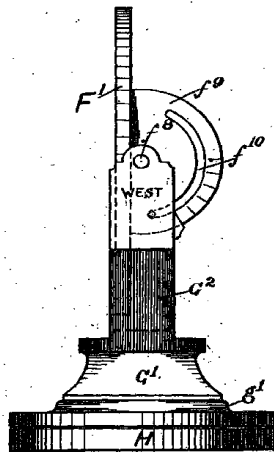
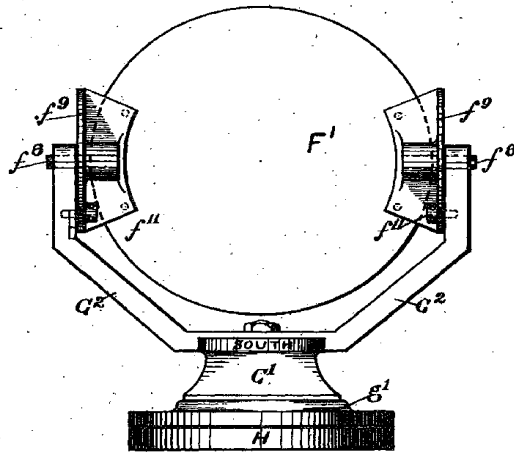


Fig. 14.



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Fig. 11.

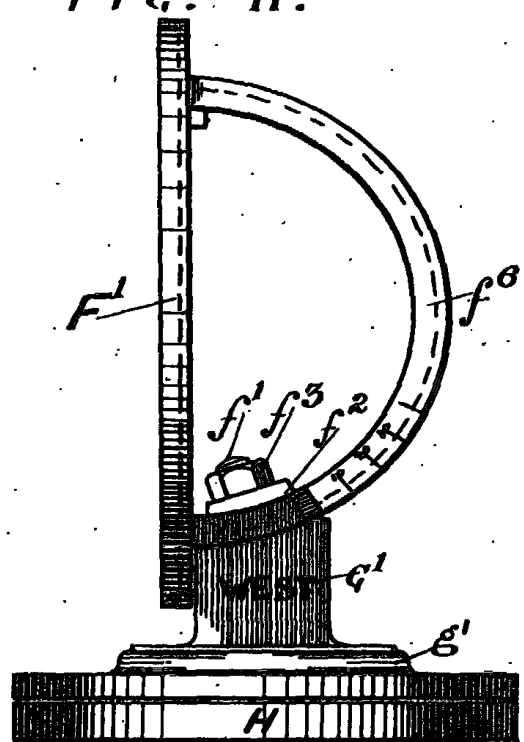
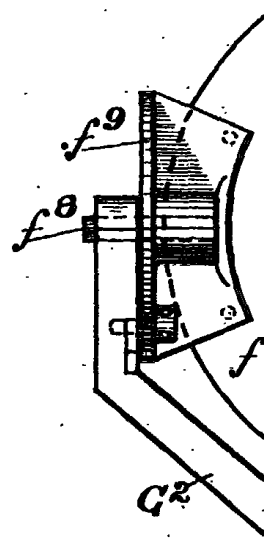
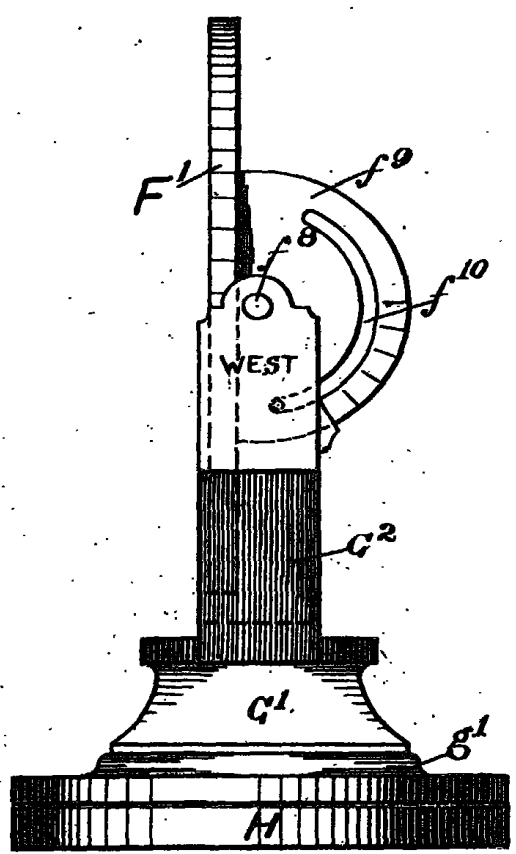


Fig. 13.



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FIG. 12.

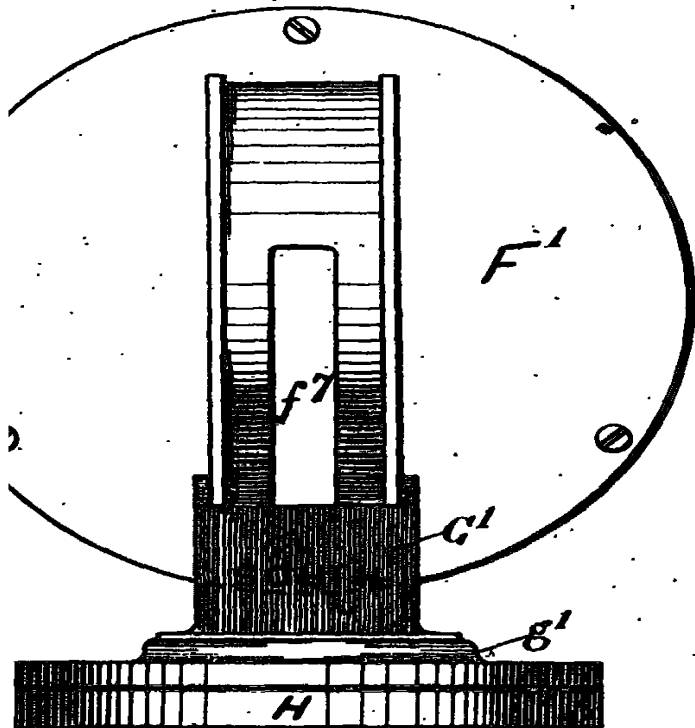
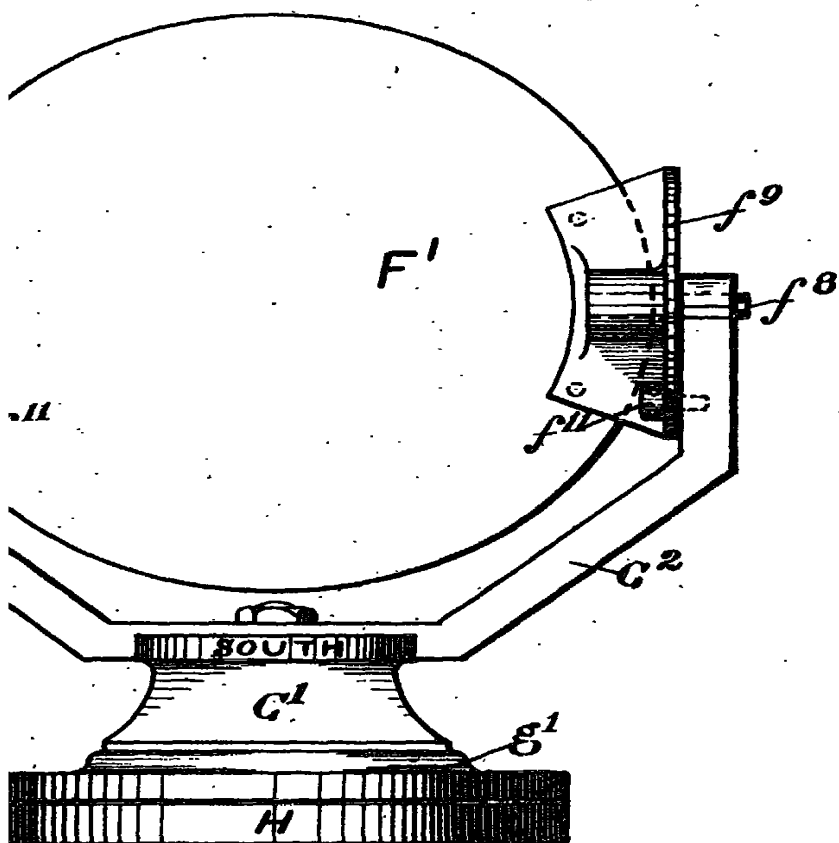


FIG. 14.



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