

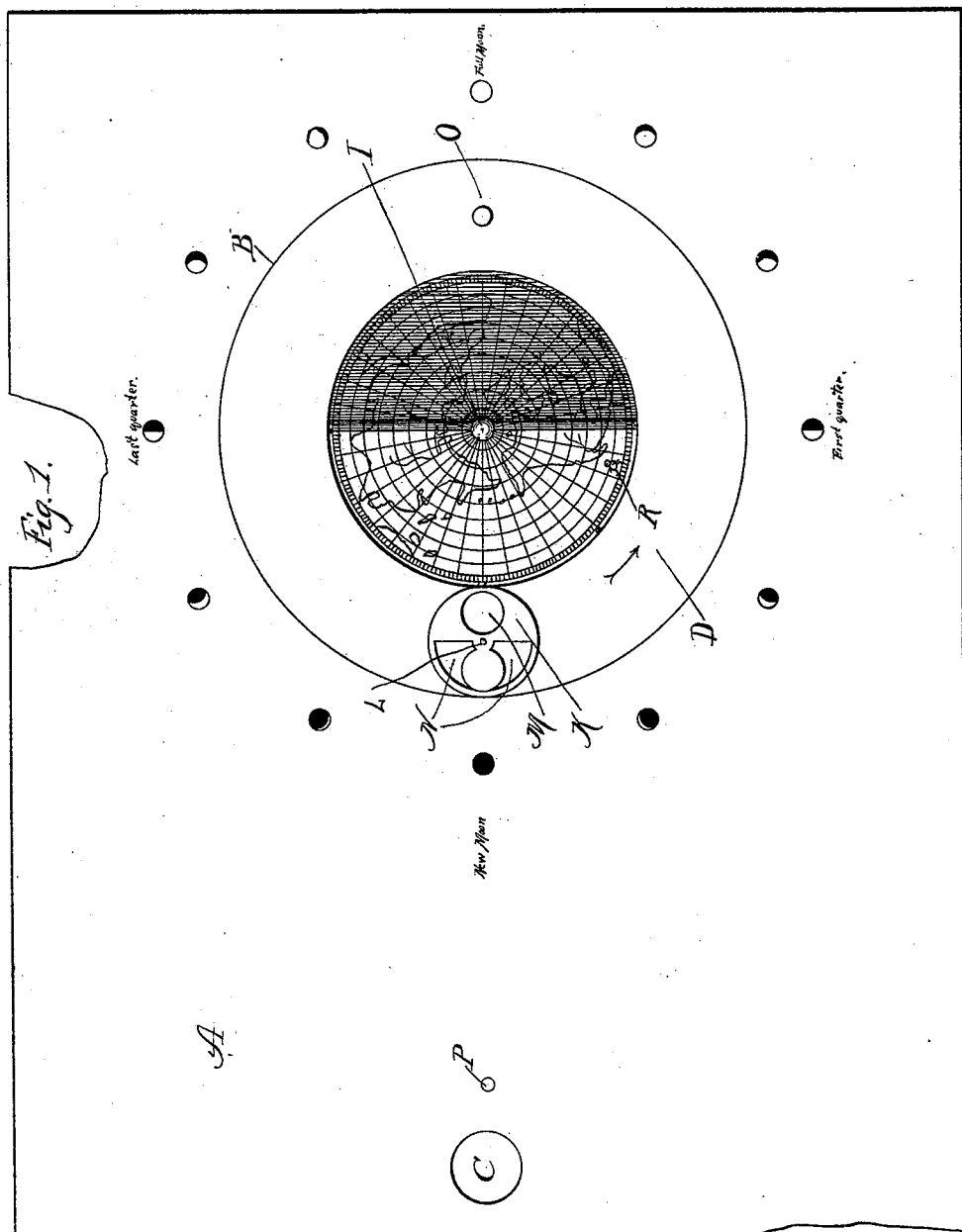
(No Model.)

5 Sheets—Sheet 1.

L. W. YAGGY.  
ASTRONOMICAL CHART.

No. 554,809.

Patented Feb. 18, 1896.



Witnesses:

W. C. Corlies  
J. C. Page?

Inventor:

Levi W. Yaggy.

By Coburn V. Kuehn

Atty's.

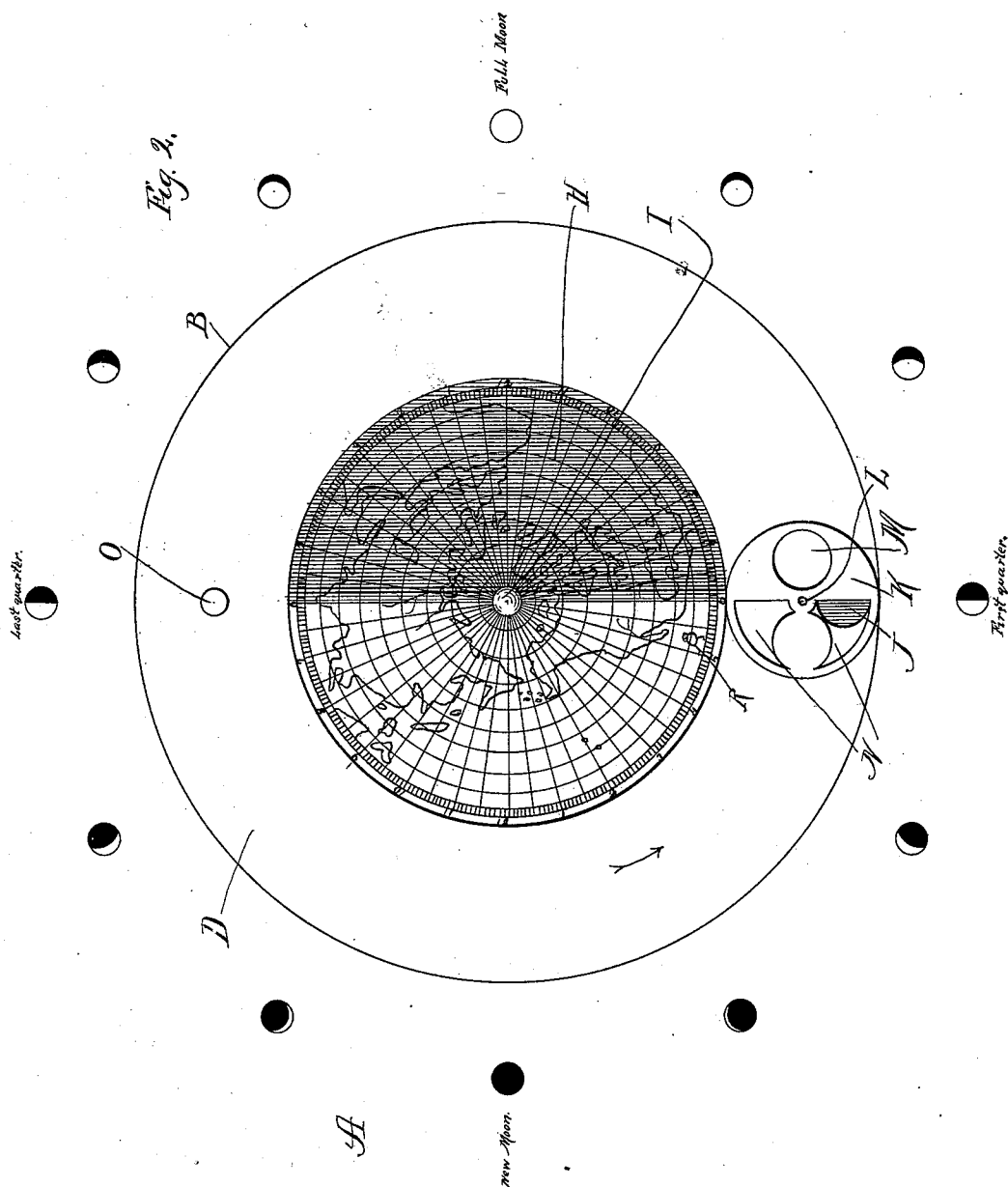
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Witnesses:

W. C. Corlies  
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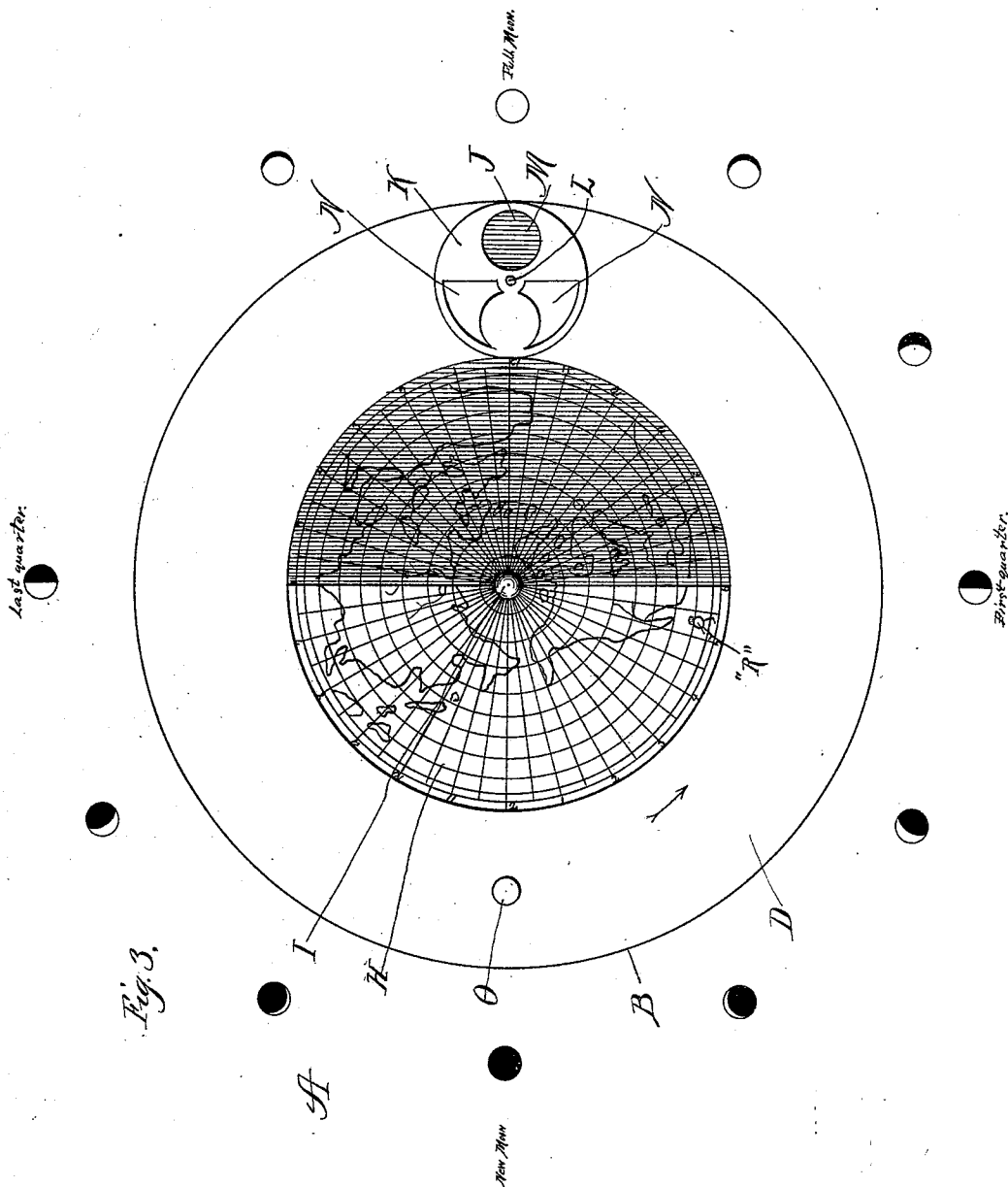
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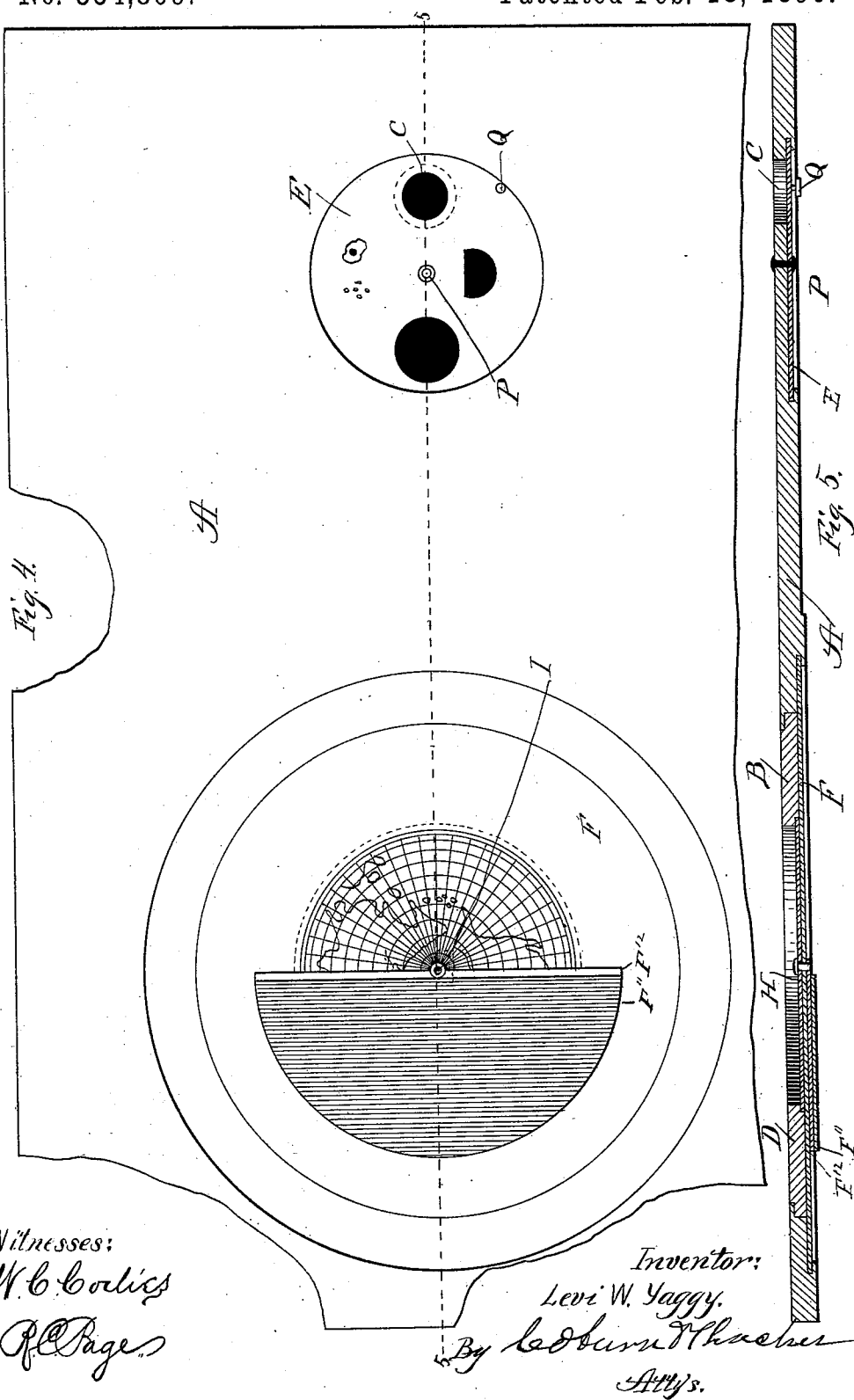
Witnesses:  
W. C. Corlies  
J. A. Page

Inventor:  
Levi W. Yaggy.  
By: Gibson & Cochrane  
Attys:

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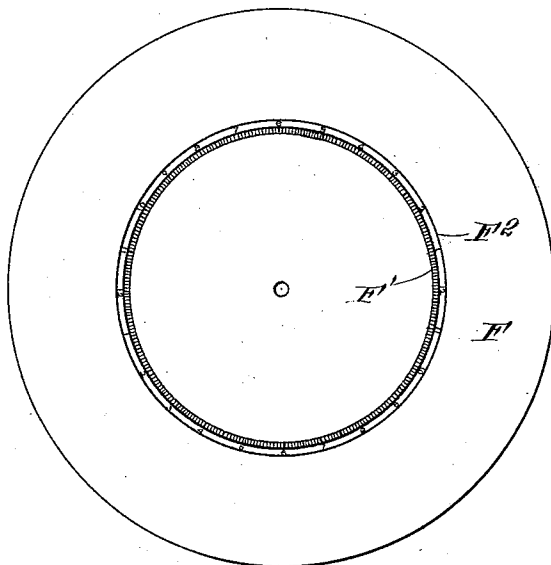
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*Fig. 6.*



*Witnesses:*

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*H. G. Strong.*

*Inventor:*

*Levi W. Yaggy*

*By* *Coburn & Yaggy*  
*Attys*

# UNITED STATES PATENT OFFICE.

LEVI W. YAGGY, OF LAKE FOREST, ILLINOIS.

## ASTRONOMICAL CHART.

SPECIFICATION forming part of Letters Patent No. 554,809, dated February 18, 1896.

Application filed May 1, 1893. Serial No. 472,600. (No model.)

### *To all whom it may concern:*

Be it known that I, LEVI W. YAGGY, a citizen of the United States, residing at Lake Forest, in the county of Lake and State of Illinois, have invented a certain new and useful Improvement in Astronomical Charts illustrating the Moon's Changes, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 shows the moon between the earth and sun. Fig. 2 shows the moon just ending its first quarter, it having traveled one-fourth of its orbit around the earth. Fig. 3 shows the moon just having traveled over one-half of its orbit around the earth, showing the full moon. Fig. 4 shows a rear elevation of my chart, and Fig. 5 a longitudinal sectional view taken at the line 5 5 of Fig. 4. Fig. 6 is a detail view in plan of the disk F, showing its annular dial.

The object of my invention is to illustrate by a chart the changes in the moon as it travels in its orbit around the earth; and my invention consists in the devices hereinafter fully described and made the subject-matter of the claims hereof.

In the accompanying drawings, A represents the frame of the chart, which I preferably make of thick cardboard or equivalent material. There are two openings B and C in this frame. The opening B has a thick opaque ring D, which fits into the opening B so as to turn readily therein, and behind the opening C there is a transparent or celluloid disk E.

I attach to the frame A a transparent or celluloid disk F, in front of which there is a second transparent or celluloid disk, H, which is held in place by means of a pivot I that passes through the disk or plate F, as well as the disk or plate H, and allows the front disk or plate, H, to be turned on the stationary disk or plate, F. I print on the disk or plate H a representation of the earth, which shows through the ring D. The north pole of the earth, which is shown in this representation of the earth, is placed at the pivot I, so that, as the transparent or celluloid disk H is revolved on its pivot, it represents the earth turning on its axis. There is an opening J in the ring D to represent the moon. This

opening is carried around with the ring D as it is turned in its bearings in the frame A. There is also a circular piece K pivoted to the ring D at L. The piece K has openings M and N through it. By turning this piece K on its pivot the opening J through the ring is covered in such a way as to indicate all of the changes of the moon. In Fig. 1 this piece K is turned so that the opening J is entirely covered and no portion of the moon is visible. When the moon has just finished the first quarter of its orbit, one-half of the opening J is shown through one of the openings, N, and when the ring D is turned into the position shown in Fig. 3, then the piece K is turned on its pivot so that the openings M and J are directly over each other, and the moon is shown full.

I have indicated on the chart A, around the ring D, the different phases of the moon at its different positions in its orbit. By turning the ring D and also turning the piece K on its pivot I represent the phase of the moon through the opening J in the ring at any point in its orbit around the earth.

I attach to the ring D a suitable thumb-piece O, by which the ring is turned in the frame A. The transparent or celluloid disk E is centrally pivoted to the frame A at P and has a thumb-piece Q, by which it is revolved on its pivot. I place on this celluloid plate E colors to indicate the sun-spots and also the eclipses. These sun-spots and eclipses are brought in front of the opening C by turning the celluloid disk E on its pivot.

The plate F is printed with an annular dial comprising an inner ring, F', divided into hours, half-hours, and smaller intervals, and an outer ring, F<sup>2</sup>, printed with the numbers of the hours from one to twelve and from one to twelve again. The pivoted plate H, carrying the representation of the earth, is printed with the meridians of longitude. As the plate H is revolved upon the plate F, the time of day or night at any point of the hemisphere represented is shown, also the change in the hours at any given point as the earth revolves, and also the corresponding times on different parts of the earth.

By coloring the stationary celluloid plate or disk F on the portion farthest from the sun and giving it a lighter tint across the center

on the edge of the colored portion I indicate night and day and twilight, showing when the sun rises as the front celluloid plate is revolved on its pivot. I attach to this front  
 5 celluloid plate a little image, (marked R in the drawings,) which is movable, so that it can be brought to a certain position at twilight and carried around with the disk until evening, when it is given another position to indicate that it is time to retire. This makes an  
 10 object-lesson, representing morning and evening and day and night.

By having two celluloid disks I can make the different tints on the stationary disk, which show more or less through the other  
 15 disk, to represent different phases of light and darkness and the different conditions of atmosphere or temperature.

Instead of coloring the stationary celluloid  
 20 plate to different degrees of opaqueness I can place behind it paper half-disks, as F' F<sup>2</sup>, or other articles of greater or less degree of transparency. I can readily represent in this way which portion of the earth is approaching  
 25 twilight and daylight and which portion is approaching darkness.

By revolving the front celluloid plate on which the representation of the earth is printed, in connection with the ring which  
 30 carries the opening through which the moon is represented, any portion of the earth can be brought into position to make the moon visible in any desired phase of the moon.

Having fully described the construction and  
 35 operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an astronomical chart, a stiff frame having openings through which to exhibit  
 40 representations of the heavenly bodies, and two or more transparent disks in one or more of said openings, one of said transparent disks being stationary and tinted or shaded over part of its surface and the other pivoted to  
 45 admit of its being revolved for the purpose of making varying shades of light and darkness and colors, substantially as specified.

2. In an astronomical chart, the frame A

having an opening in which there is a ring fitted that can be rotated therein; a ring fitted into said opening so as to revolve therein, and having an opening to represent the moon; a rotating disk pivoted on the ring and revolving thereon to indicate the different  
 55 phases of the moon; a celluloid plate with the representation of the earth printed thereon, placed so as to be seen through the ring; and a celluloid plate placed behind an opening in the chart to represent the sun.

3. In an astronomical chart, the frame A; the ring D rotating in said frame and having an opening J; the pivoted piece K containing one or more openings through which by the revolution of the piece K the different  
 65 phases of the moon may be indicated; the representation of the sun in said chart; and the stationary representations printed on said chart around the ring D showing the different phases of the moon at the different positions  
 70 of its orbit around the earth.

4. In an astronomical chart, the frame A; the two celluloid disks F and H, one having printed on it the representation of the earth with its meridians of longitude and being pivoted to the other carrying an annular dial so  
 75 that the first disk rotating on the second shall illustrate day and night and the relative time of day at different parts of the earth, substantially as specified.

5. In an astronomical chart, the frame A with an opening for the representation of the earth and an opening for the representation of the sun; transparent or celluloid disks in the opening for the representation of the earth; and a transparent or celluloid disk  
 85 movable on the frame back of the opening for the representation of the sun, with colored spots on said disk of such shape as by their successive rotation into position over the opening will produce a representation of the sun-spots and of the various eclipses of the sun, substantially as specified.

LEVI W. YAGGY.

Witnesses:

ALOYSIA HELMICH,  
 ROBERT C. PAGE.