(No Model.)

E. L. RUGG.

ASTRONOMICAL APPARATUS.

No. 384,285. Patented June 12, 1888.

Fig. 1.

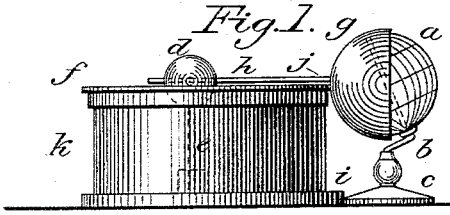


Fig. 2.

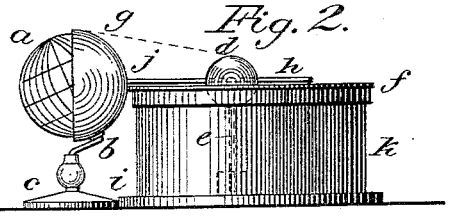


Fig. 3.

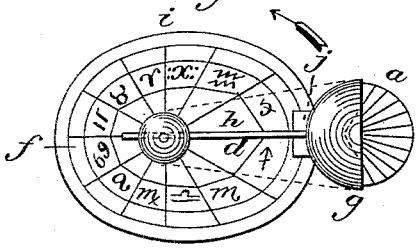


Fig. 4.

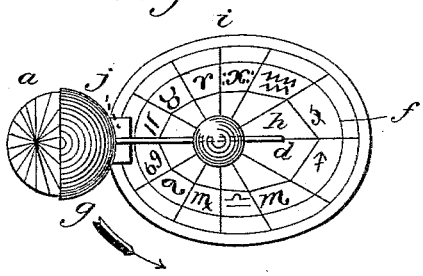


Fig. 5.

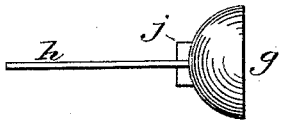


Fig. 6.

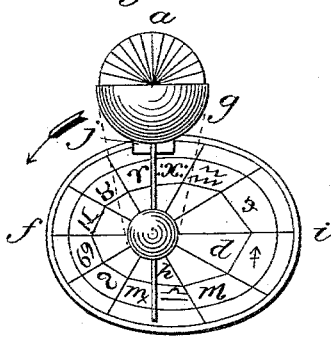
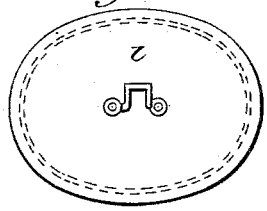


Fig. 7.



Witnesses:
George Harrington,
Jas. N. Harrington.

Inventor:
E. L. Rugg.
per G. L. Reece
Attor.

UNITED STATES PATENT OFFICE.

EARLE L. RUGG, OF WOODLAND, CALIFORNIA.

ASTRONOMICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 384,285, dated June 12, 1888.

Application filed September 3, 1887. Serial No. 248,765. (No model.)

To all whom it may concern:

Be it known that I, EARLE L. RUGG, a citizen of the United States, residing at Woodland, Yolo county, California, have invented a new and useful Apparatus for Illustrating Certain Planetary Movements, of which this is a specification.

My invention relates to that class of school apparatus designed to illustrate the relative positions of the earth and sun at all seasons of the year and the resultant phenomena attending the revolutions of the earth about the sun and upon its axis. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figures 1 and 2 are longitudinal elevations. Figs. 3, 4, and 6 are top views, and Figs. 5 and 7 are details to be hereinafter explained.

Similar letters refer to like parts throughout the several views.

k is an oval box having a projecting bottom, *i*, and top *f*. In this top, which can be removed at pleasure, is a hole sufficient to admit the ball *d*, which is supported and revolves freely on its pivot *e*. This ball represents the sun, and is not located at the junction of the major and minor axes of the ellipse *f*, but at one side of the minor, but on the major axes, bringing it to one end of the ellipse. This ball also has a small hole horizontally through its center, to allow the rod *h*, to which the envelope of light *g* is attached, to move freely. Around the ball *d*, representing the sun, the top *f* is, by paint or otherwise, divided into twelve divisions, each designated by one of the signs of the zodiac, as shown in Fig. 4.

a is another but larger ball moving freely upon an inclined spindle, *b*, attached to the pedestal *c*, and represents the earth with its axis inclined twenty-three and one-half degrees from the vertical, as shown in Figs. 1 and 2. When the edge of the pedestal is in contact (which it should be when in use) with the projecting edge of the oval box *k* at *i*, and one-half of the globe *a* covered with the envelope of light *g*, as shown in Figs. 1 and 2, the globe *a* can revolve freely upon its spindle *b* without touching anything, while another important point is, that the projecting edge *f* and the center of globe *a* should be of the same height. The envelope of light *g* is prevented from rotating by the guides *j*, attached to the rod *h*, as shown in Figs. 3, 4, 5, and 6.

When the apparatus is not in use, its separate parts—as the globe, pedestal, envelope of light, and the ball representing the sun—can be snugly packed in the case or oval box *k*, and the box closed by the cover *l*, Fig. 7, and thus kept from being injured. To operate it, place the box *k*, sun *d*, envelope of light *g*, globe *a*, and pedestal *c* in the position shown in Figs. 1 and 3, with the edge of the pedestal *c* touching the projecting bottom of the box *k*, as shown at *i*, Figs. 1 and 2, and it must be borne in mind that the envelope of light *g* represents that part of the globe *a* which it covers as being illuminated by the nearly-direct rays of the sun *d*, which extend beyond the upper or north pole but fall short of reaching the lower or south pole to the extent of twenty-three and one-half degrees when in the position as represented in Figs. 1 and 3, the earth in this position being farthest from the sun and relatively in that position it occupies on or about the 21st day of June, showing perpetual day and night, respectively, at the north and south poles for the space of six months of the year, and also long days and short nights in the whole northern hemisphere, and the earth is said to be in its summer solstice. Now move the pedestal and globe in the direction indicated by the arrows (bearing in mind that the upper or north pole must always point in the same direction) until it reaches the position shown in Fig. 6, when it will be seen that the envelope of light just reaches the north and south poles, illustrating the phenomena of equal lengths of days and nights the world over. The earth is now said to be at its equinoxes, which occurs on or about the 21st day of September. Continuing to move forward the pedestal and globe until they reach the position shown in Figs. 2 and 4, it will be seen that the envelope of light falls short twenty-three and one-half degrees of reaching the north but extends beyond the south pole to the same amount, exactly the reverse to that shown in Figs. 1 and 3, and also reversing the seasons. In this position the earth is in what is said to be its winter solstice, which occurs on or about the 21st day of December, and to continue the circuit would be to repeat.

Now it will be seen that by the use of the oval form of the box *k*, which in this apparatus represents the orbit of the earth, the phenomena of the varying and constantly-changing length of days and nights can be truly illustrated; but were it a circle, as are all apparatus for the purpose of which I am acquainted, no such phenomena could be produced, and to allow the envelope of light to adjust itself to its elliptical pathway the rod *k* slides freely through the center of the ball representing the sun.

Having illustrated and described my invention, what I deem as new, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus illustrating the phenomena of day and night, the oval box *k*, having a cover, *f*, which is divided and marked to represent and illustrate the zodiac, the ball *d*, representing the sun, the envelope of light *g*, having the rod *h* and guides *j*, said rod passing through the center of the ball *d*, in combination with the ball *a*, representing the earth, and revolving freely upon the inclined spindle attached to the pedestal *c*, substantially as and for the purpose set forth.

2. The combination, in a teaching apparatus, of the oval box having a projecting top and bottom, the ball *d*, the envelope of light *g*, having the rod *h*, the globe *a*, and pedestal *c*, having an inclined spindle, *b*, substantially as and for the purpose described.

In witness whereof I hereunto set my hand this 26th day of August, 1887.

E. L. RUGG.

In presence of—
G. L. PIERCE,
OTIS V. SAWYER.