

LA VERNE W. NOYES.  
SIDEREAL SPHERE.  
APPLICATION FILED NOV. 16, 1912.

1,079,358.

Patented Nov. 25, 1913.

2 SHEETS-SHEET 1.

Fig. 1.

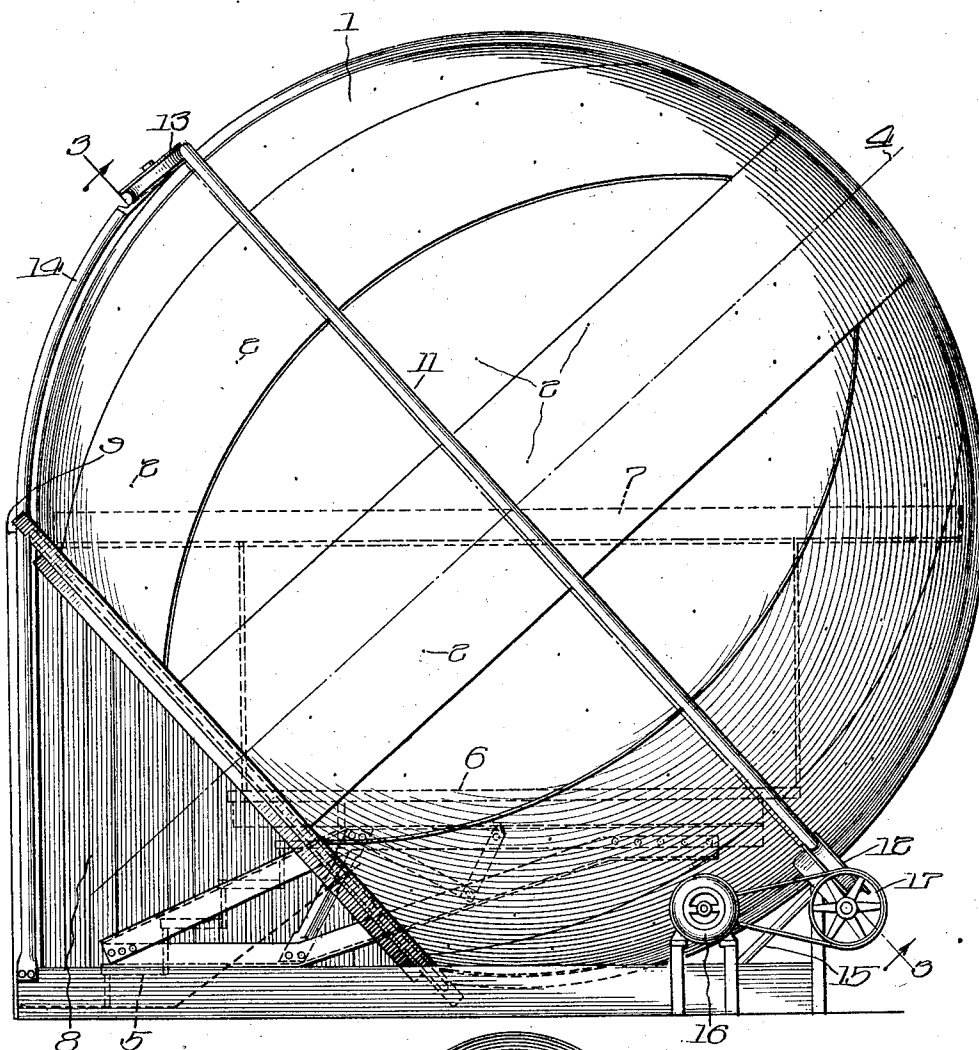
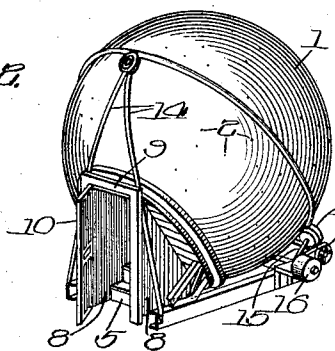


Fig. 2.



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Jno. B. Nelson  
Ella L. White

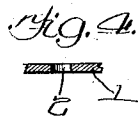
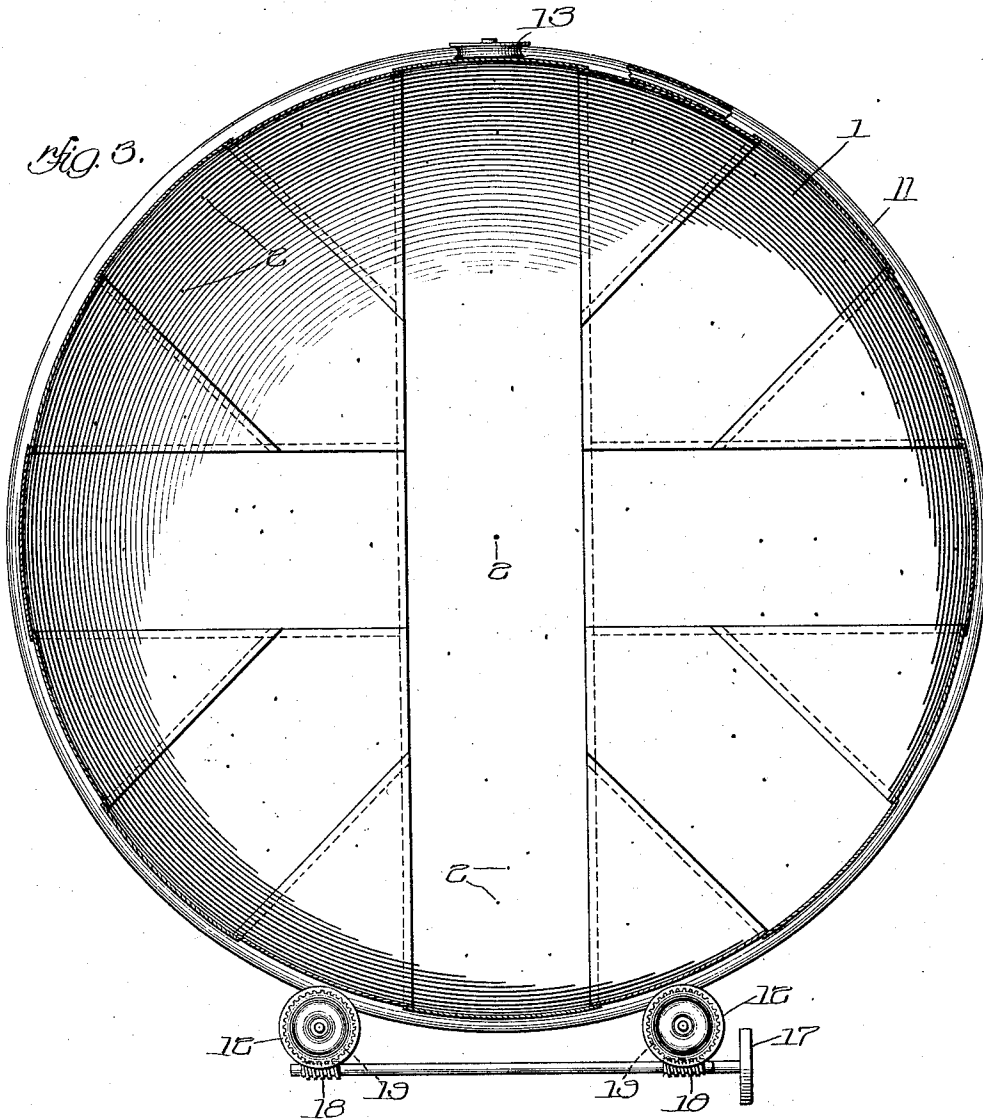
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

LA VERNE W. NOYES, OF CHICAGO, ILLINOIS, ASSIGNOR TO AERMOTOR COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SIDEREAL SPHERE.

1,079,358.

Specification of Letters Patent.

Patented Nov. 25, 1913.

Application filed November 16, 1912. Serial No. 731,763.

*To all whom it may concern:*

Be it known that I, LA VERNE W. NOYES, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Sidereal Spheres, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to sidereal spheres and in its preferred embodiment constitutes an improvement upon the sidereal sphere disclosed in Patent 1,019,405, dated March 5, 1912, though the invention is not to be limited to its preferred embodiment.

My invention has for one of its objects the provision of luminous points observable from within the sphere interior and representing the stellar system or a portion thereof. In accomplishing this object of my invention the sheet metal of which the sphere is preferably formed is perforated, light from without the sphere entering the sphere through the perforations which thus are well adapted to simulate stars, the perforations being sufficiently minute for this purpose. The sphere is provided with an opening to permit the access of an observer to its interior and, in order that the light may be more prominent at the perforations, such an opening is provided with a light excluding closure.

In the device of the aforesaid patent the sphere is mounted to rotate upon a bearing that intercepts the polar axis, the bearing and its supporting structure being in line with the observer and the star representations in the region of said bearing. In order that the perforations, which I preferably employ to represent the stars, may be formed in such polar region I rotatably support the sphere between its poles and whereby the pole star may be represented as I desire. Where the sphere is provided with a bearing at the upper pole thereof the material of which the sphere is made must be sufficiently strong inherently to enable the sphere to retain its shape, a characteristic that will make the cost of manufacture too great to enable the wide use of the device. In order to enable me to use sheet metal of such thinness as materially to reduce the cost of construction of the sphere of my invention, the mounting upon which the

sphere is rotatably supported is disposed at the equatorial zone of the sphere, and in order that the mounting may be simplified it is disposed at the equatorial plane, it being understood that such plane is inclined with respect to the horizontal. Such an arrangement has permitted me to construct a sphere with a diameter of fifteen feet with sheet metal having a thickness of one sixty-fourth of an inch. The sheet material selected for the purpose is desirably galvanized steel. It is to be understood, however, that I do not limit myself, in all embodiments of the invention, to the thickness of the material of which the sphere is made nor to the absence of the bearing at the upper pole of the sphere as that feature of my invention which involves the perforations of the sphere to secure star representations may be practised independently of any reasonable thickness of the material of which the sphere is made.

I will explain my invention more fully by reference to the accompanying drawings showing the preferred embodiment thereof and in which—

Figure 1 is a side view of the sidereal sphere structure made in accordance with the invention; Fig. 2 is a perspective view of the structure illustrated in Fig. 1; Fig. 3 is a sectional view on line 3 3 of Fig. 1, a portion being broken away to reveal a detail of construction; and Fig. 4 is a sectional view illustrating the formation of a perforation in the sheet metal of which the sphere is made.

Like parts are indicated by similar characters of reference throughout the different figures.

The hollow sphere 1 is, in accordance with the preferred embodiment of the invention, provided with comparatively minute punctures or perforations 2 through the material forming the same so that light from the exterior may find passage to the sphere interior for the purpose of representing stars and these apertures may be of differing sizes so as to represent stars of differing magnitude. The sphere has its polar axis, indicated by the dot and dash line 4, inclined with respect to the horizontal and the lower polar zone of the sphere is removed so as there to afford an opening for the entrance of an observer to the sphere interior. Steps 5 lead through the opening at the

lower end of the sphere to an observer's platform 6 within the sphere. This platform supports the horizon ring 7 whose function is made clear by the aforesaid patent. The steps 5 are provided with side walls 8 that extend from the floor to the sphere. A doorway frame 9 supports a swinging door 10 that constitutes a light excluding closure, the walls 8 and the door 10 preferably cooperating to exclude practically all light from the sphere interior excepting that which shines through the perforations 2 whereby the light finding entrance at these perforations causes the representations of stars at these perforations to be very effective, and as the upper pole of the sphere is preferably relieved of direct engagement with a bearing the light is free to shine through the perforation at the upper pole of the sphere effectively to simulate the pole star.

The equatorial zone of the sphere preferably engages the bearing element by which the sphere is permitted to rotate about its inclined axis, the equatorial portion of the sphere being the part that is preferably directly engaged with the bearing structure. The sphere is desirably provided with an encompassing band 11 in its equatorial plane, this band being preferably in the form of iron piping soldered to the galvanized steel forming the sphere. The equatorial band or ring 11 desirably rests upon two lower wheels 12 that rotate in the equatorial plane and an upper wheel 13 that is rotatable in a plane transverse with respect to the equatorial plane and the periphery of which latter wheel engages the lower portion of the pipe band 11 there to offset the action of gravity. The wheel 13 is provided with a fixed axis of rotation by being mounted upon the bifurcated support 14, while the wheels 12 are afforded fixed axes of rotation by being mounted upon the supporting structure 15. A motor 16 is desirable for driving the wheels 12, the wheels 12 in turn driving the band 11 that carries with it the sphere. The motor 16 is belted to a driving pulley 17 upon whose shaft are located two worms 18 in mesh with worm wheels 19 upon the shafts of the wheels 12.

The sphere is desirably made of sections of galvanized sheet steel which are overlapped and soldered, the overlapping being indicated in Fig. 3 in exaggerated form, the sheet material being actually so thin that the interior surface of the sphere is substantially smooth, particularly when it is painted. Solder is the most effective material that may be employed for joining the sections of sheet metal to constitute the sphere, but it would not be strong enough to perform its function were it not for the manner of supporting the sphere which I have provided. The thin sheet material which I employ

could not be used if the sphere were provided with a pivotal mounting at its upper pole. Neither the sphere or its band when separated have the strength which they have when assembled, the sphere preventing the band from sagging materially and the band preventing local deformations of the sphere and while the band in the form of a pipe best serves the purpose I do not limit myself to this pipe. A pipe of two and three-eighths inches external diameter is sufficient with a sphere having a diameter of fifteen feet. Any star representations which properly should be located exactly at the equator may be slightly offset from the equator without impairing the utility of the structure.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but

Having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A hollow rotatable sidereal sphere structure formed of thin material and having an axis of rotation inclined with respect to the horizontal, said structure including a ring engaging the sphere portion in the region of its equator and in a plane perpendicular to the axis of rotation of the sphere; and a mounting element engaging the sphere structure in the region of the ring.

2. A hollow sidereal sphere formed of thin material and having an axis of rotation inclined with respect to the horizontal; a band encompassing and engaging the sphere in a plane perpendicular to the axis of rotation of the sphere and located between the poles of the sphere; and a mounting structure upon which said band may move rotatably to support the sphere.

3. A hollow sidereal sphere having an axis of rotation inclined with respect to the horizontal; and a mounting structure upon which the sphere is rotatably supported and engaging the sphere structure at its equatorial zone.

4. A hollow sidereal sphere having an axis of rotation inclined with respect to the horizontal and free of bearing support at its upper pole; and a mounting structure upon which the sphere is rotatably supported and engaging the sphere between its poles.

5. A hollow sidereal sphere formed of thin material and having an axis of rotation inclined with respect to the horizontal; and a mounting structure upon which the sphere is rotatably supported and engaging the sphere structure in the region of its equator.

6. A hollow sidereal sphere mounted to rotate upon an axis inclined with respect to the horizontal and having perforations for the transmission of light between the exte-

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rior and interior of the sphere and which perforations are sufficiently minute to represent stars.

5 7. A hollow sidereal sphere having perforations for the transmission of light between the exterior and interior of the sphere and which perforations are sufficiently minute to represent stars, said sphere having an opening for the admission of an observer; 10 and a light excluding closure for said opening.

8. A hollow sidereal sphere having per-

forations for the transmission of light between the exterior and interior of the sphere and which perforations are sufficiently minute to represent stars. 15

In witness whereof, I hereunto subscribe my name this 15th day of November A. D., 1912.

LA VERNE W. NOYES.

Witnesses:

L. C. WALKER,  
D. R. SCHOLES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."