

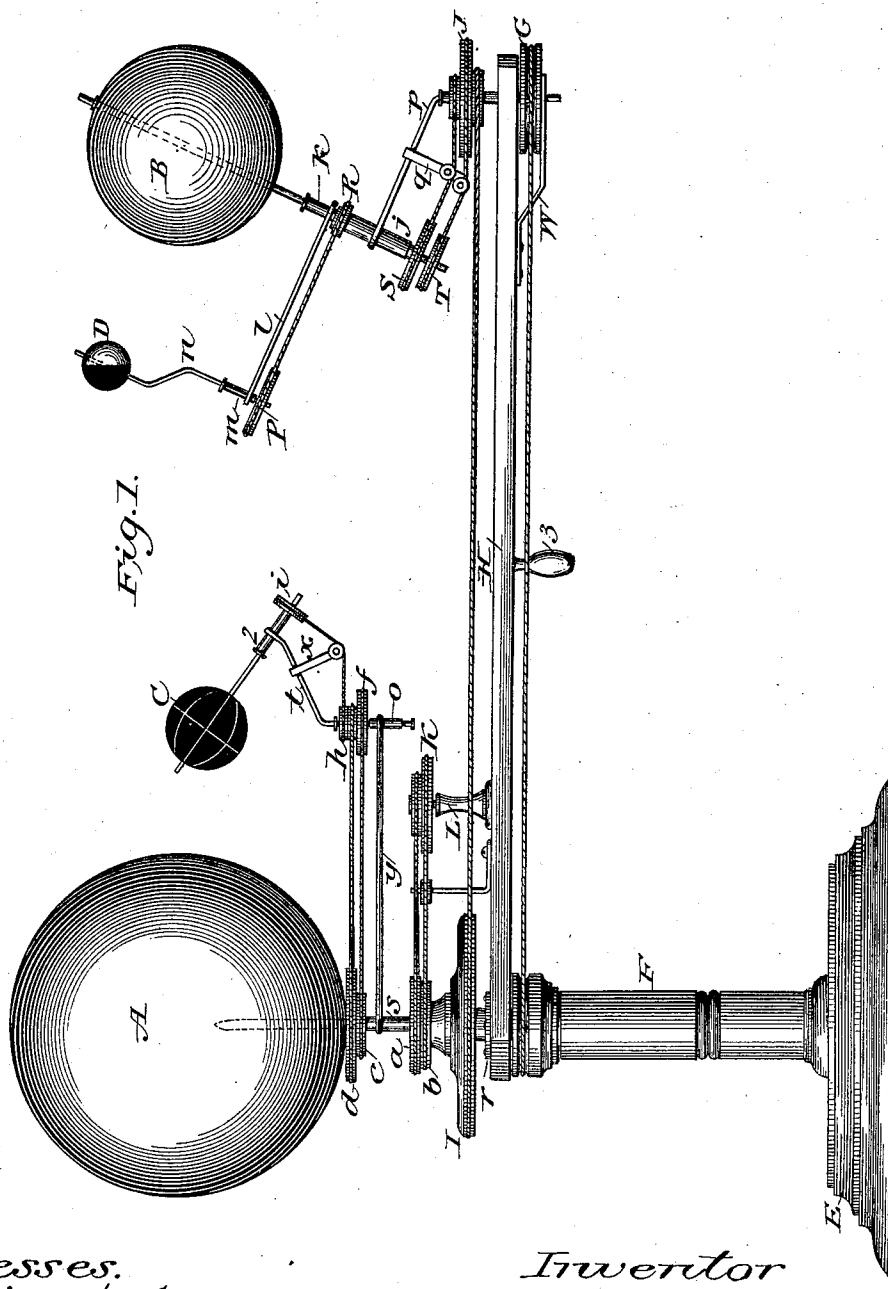
(No Model.)

2 Sheets—Sheet 1.

A. LAING.
PLANETARIUM.

No. 578,108.

Patented Mar. 2, 1897.



Witnesses.
J. B. Stratton
Louis St. Klii.

Inventor
Alexander Laing
Per Nedley V. Richardson
his attorney in fact

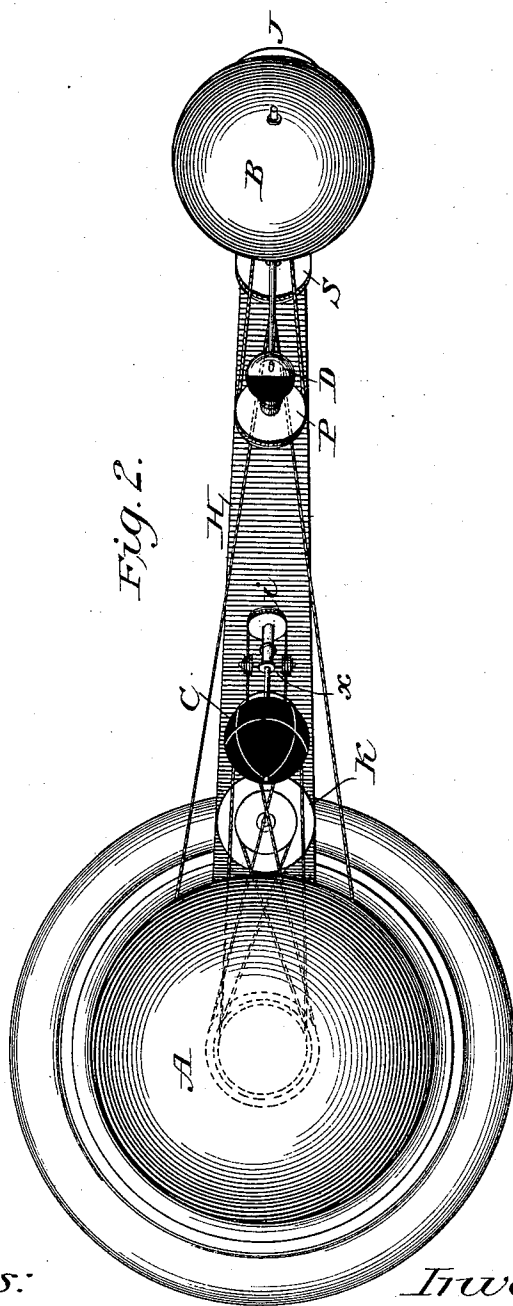
(No Model.)

2 Sheets—Sheet 2.

A. LAING.
PLANETARIUM.

No. 578,108.

Patented Mar. 2, 1897.



Witnesses:

W. B. Stratton
Louis H. Klei.

Inventor:

Alexander Laing
Per Hedley V. Richardson
his attorney in fact

UNITED STATES PATENT OFFICE.

ALEXANDER LAING, OF ESSEX, CANADA.

PLANETARIUM.

SPECIFICATION forming part of Letters Patent No. 578,108, dated March 2, 1897.

Application filed February 1, 1896. Serial No. 577,757. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER LAING, a citizen of Canada, residing at Essex, in the county of Essex, in the Province of Ontario, Canada, have invented a new and useful Machine called "Laing's Planetarium," of which the following is a specification.

My invention relates to an improved method of illustrating the motions and other phenomena of the planets.

The objects of my invention are, first, to secure the parallelism of the axes of the earth and Venus automatically as they revolve about the sun; second, to secure the different inclinations of their equators to the ecliptic; third, to secure the diurnal motions of the earth and Venus; fourth, to show the relative velocities of the earth and Venus in their orbits around the sun; fifth, to secure the motion of the moon about the earth with its orbit at a constant inclination to the ecliptic; sixth, to show the moon's phases by keeping the white or illuminated face of the moon toward the sun; seventh, to show the moon's nodes and cause of the eclipses; eighth, to illustrate the apogee and perigee of the moon; ninth, to show the perihelion and aphelion of the planets; tenth, to have all the above motions going on simultaneously. I attain the objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the entire machine, showing very clearly all its parts. Fig. 2 is a top view.

Similar letters and figures refer to similar parts throughout both views.

E is the base or foot of the machine, into which the standard F is securely fixed. This standard is shouldered down at the point where it strikes arm H and runs up through arm and pulleys I and b to the point between the pulleys a and b. The part of the standard above arm H is slightly tapered, so that the pulleys I and b can be slipped on tightly in order that they may remain stationary. The arm H revolves around on shoulder of standard F by pressing with thumb and finger on handle 3, and is kept down on shoulder of standard by the washer r, which is firmly secured to standard at that point with two pins running through above washer. The sun A

is supported on a brass rod running up into ball, as shown by dotted lines. This rod runs down through pulleys d and c, also brass sleeve s, firmly into center of standard F. Sleeve s extends from top of pulley b to lower side of pulley c and has pulley a firmly fixed on said sleeve. This sleeve s (with its pulley a firmly fixed to it) is the only thing which revolves around the rod which supports the sun, and as this sleeve revolves it carries with it the brass rod or arm y, which is firmly fixed to said sleeve, and arm y carries with it the brass sleeve o, which is also fixed to said arm.

Sleeve o carries with it the bent brass rod t, which turns freely in sleeve. This bent rod carries with it, first, the pulley f, which is firmly fixed to it; second, the double pulley h, which revolves freely on it; third, the square brass rod x, through which it goes and to which it is secured, and, fourth, the sleeve 2, to which it is also firmly secured.

The square rod x carries with it two small pulleys or idlers, one of which shows in Fig. 1, the other being directly opposite. These two idlers revolve on an axle running through bar x, as shown in Fig. 2.

The brass rod or axis of Venus C runs loosely through sleeve 2 and has a collar fixed so as to rest on top end of sleeve. On the lower end of this axis the pulley i is firmly fixed, coming nearly up to bottom of sleeve, leaving axis free to revolve.

The turned stud L is firmly fixed on top of arm H and is carried about with said arm. In the center of top end of stud L is fixed a brass rod or axle which runs up through differential pulley K. This axle turns in pulley while pulley is being carried around the sun on arm H. The lines connecting pulleys are strings or belts of any suitable material. The lower part of differential pulley K is the same diameter as stationary pulley b, and k is kept from rotating on its axis as it moves around the sun by the straight belt from pulley b to said k.

The cross-belt from top part of differential pulley K to pulley a imparts to said pulley a a rotary motion, causing arm y (with all that it supports) to move around the sun in the same direction and at the same time as arm H, the velocity of arm y being enough greater

than H to cause Venus C to complete one revolution around the sun in the same time that it takes the earth B to complete two hundred and twenty-four days.

5 The axis of Venus C inclines fifty-five degrees from the perpendicular, and the parallelism of this axis is secured by the straight belt from stationary pulley *c* to pulley *f*, thus illustrating the vicissitudes and intensity of
10 the seasons of Venus as it travels around the sun.

The rotary or diurnal motion of Venus is obtained by the cross-belt from stationary pulley *d* to the lower part of loose pulley *h*, and another belt from top part of *h*, running
15 below the two idlers at *x* and up to pulley *i*.

The pulley G is firmly fixed on bent brass rod P as it passes loosely down through arm H and brass plate W. This pulley is kept
20 from rotating by the straight belt from it to the top of standard F, which is the same diameter. This secures the parallelism of the axis of the earth B, as the bent rod P is by this means kept continually pointing in the
25 same direction as it moves around the sun. The top end of bent rod P has an eye into which the sleeve *j* is firmly secured. This sleeve runs from top of pulley S up through pulley R.

30 The square brass rod *q* has a hole drilled at top end and is slipped onto rod P, where it is fastened. The bottom part of this rod has two holes, into which the two axles for the four idlers are fixed. These small pulleys
35 or idlers are used for the purpose of lining up the belts between triple pulley J and pulleys S and T.

The triple differential pulley J is all in one piece and revolves freely on the rod P and is
40 caused to rotate in the proper direction by means of the cross-belt from stationary pulley I to the lower part of pulley J.

The motion of the moon D in its orbit from west to east around the earth is effected by means of the belt from top part of pulley J
45 to pulley S, which is firmly secured to lower part of sleeve *k*, which sleeve runs freely up through sleeve *j* and has the brass rod or arm *l* firmly fixed at top end. This arm, being
50 fixed to sleeve *m*, carries with it the pulley P, fixed on the brass rod *n* as it passes down through the sleeve. This rod carries with it the moon D. The brass rod or axis of the earth B runs down through the sleeve *k* and
55 has the pulley T fixed firmly at bottom. This rod has a collar at top of sleeve to keep it in place. The belt from pulley J to pulley T imparts to the earth its rotary or diurnal motion. The pulley R is firmly slipped
60 onto the sleeve *j* and is half the diameter of the pulley P. By this means the white or illuminated side of the moon is kept toward the sun, thus illustrating the phases of the moon. The jog in the rod *n*, which supports
65 the moon, is made for the purpose of illustrating the apogee and perigee of the moon in its orbit about the earth. When the arm

H is in the position shown in the drawings, Fig. 1, it requires to be moved from the operator (or from west to east) in order to show
70 the proper motions above specified. The position shown in drawings is at the time of the December solstice, the sun being then perpendicular to the tropic of Capricorn, and
75 when the arm is moved to the angle of ninety degrees it will give the March equinox, with the sun perpendicular to the equator, and when the arm is moved to one hundred and
80 eighty degrees it will give the June solstice, showing the earth at its greatest distance from the sun and the sun perpendicular to the tropic of Cancer. The arm will then be
85 moved around to the angle of one hundred and seventy degrees, which will illustrate the September equinox, and so on till it reaches the point in December from which it started, where the earth is shown at a point in its orbit
90 nearest to the sun. The axis of the earth and Venus have been kept each pointing in the same direction as they were when the arm was started to revolve around the sun. The orbit of the moon D bears a constant inclination to the ecliptic, which in this case is exaggerated for the purpose of showing more
95 plainly to the pupils or others the moon's nodes and cause of the eclipses and of their not occurring at every new or full moon.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a planetarium, the combination of the
100 standard F carrying the sun-globe A and the stationary disk I, the arm H pivoted to said standard, the bent rod P having its vertical arm passed through the outer end of arm H and supported by the plate W, the pulley G
105 firmly secured to rod P beneath arm H, the triple pulley J loosely carried by rod P, above arm H, the sleeve *j* secured to the upper end of rod P, the sleeve *k* revolvably supported in sleeve *j*, and having the pulley S fast to its
110 lower end, an earth-supporting rod passing through sleeve *k*, carrying an earth-globe at its upper end and having the pulley T fast to its lower end, the rod *q* fast to the bent
115 portion of arm P and carrying four idlers at its lower end, and separate belts passed respectively from the upper part of standard F around pulley G, from disk I around the lower member of the triple pulley J, from the middle member of pulley J beneath the
120 two idlers on arm *q* to and around pulley T, and a belt passing from the upper member of pulley J beneath two of the idlers on arm *q* to and around pulley S, the whole being arranged and combined so that as the arm H is
125 rotated around standard F the parallelism of the earth's axis will be constantly maintained, as well as the earth rotated on its axis and revolved around the sun, substantially as described.

2. In a planetarium the combination of a
130 standard, a rotatable arm pivoted to said standard, the rod P carried at the outer end of said arm, the sleeve *j* supported at the outer

end of said rod, the sleeve *k* carried by sleeve *j*, the pulley *R* fast to sleeve *j*, the arm *l* carried by sleeve *k* and having the sleeve *m* secured at its outer end, the bent rod *n* passing through sleeve *m*, carrying moon-ball at its upper end and having pulley *P* fast to its lower end, and a belt from pulley *R* to and around pulley *P*, substantially as described, for the purpose specified.

10 3. In a planetarium, the combination of the standard *F* provided with an upwardly-projecting spindle, the stationary pulleys *c* and *d* firmly fixed to said spindle, the sleeve *s* loosely supported by said spindle, the arm *y* 15 attached to sleeve *s* and having fast to its outer end sleeve *o*, the bent rod *t* supported by sleeve *o*, the pulley *f* fixed to rod *t*, the pulley *h* loosely carried by rod *t*, a collar 2 mounted at the outer end of said rod *t*, a 20 planet-supporting spindle carried by collar 2, having the ball *C* fixed to its upper end, and the pulley *i* attached to its lower end, the bar *x* attached to the bent portion of the rod *t*, carrying two idlers fast to its lower end, and 25 separate belts passed respectively from stationary pulley *c* around pulley *f*, from stationary pulley *d* crosswise to and around the lower part of pulley *h* and from the upper part of pulley *h* beneath the idlers on the bar

x to and around pulley *i*, substantially as described. 30

4. In a planetarium the combination of a standard *F* provided with an upwardly-projecting spindle, a sleeve *s* loosely carried by said spindle, an arm *y* attached to said sleeve 35 *s*, carrying at its outer end the planet *C* with rotating mechanism, the stationary disk *a* fast to sleeve *s*, and the stationary disk *b* firmly fixed to the tapered part of standard *F*, the 40 rotatable arm *H* pivoted to standard *F*, the stud *L* firmly fixed to the arm *H* and carrying at its upper end the differential loose pulley *K*, a belt passing from the lower part of pulley *K* to and around stationary disk *b*, and a 45 cross-belt from the upper part of pulley *K* to and around the stationary disk *a*, the whole being arranged and combined so that, as the arm *H* is rotated around standard *F*, the parallelism of the axis of planet *C* will be constantly maintained, also the planet will be 50 rotated on its axis and at the same time revolved around the sun, all substantially as described.

ALEXANDER LAING.

Witnesses:

ALEXANDER WALLACE,
GEORGE MILLARD.