(No Model.) 2 Sheets—Sheet 1.

W. R. DUNHAM.

TELLURIAN.

No. 493,988. Patented Mar. 21, 1893.

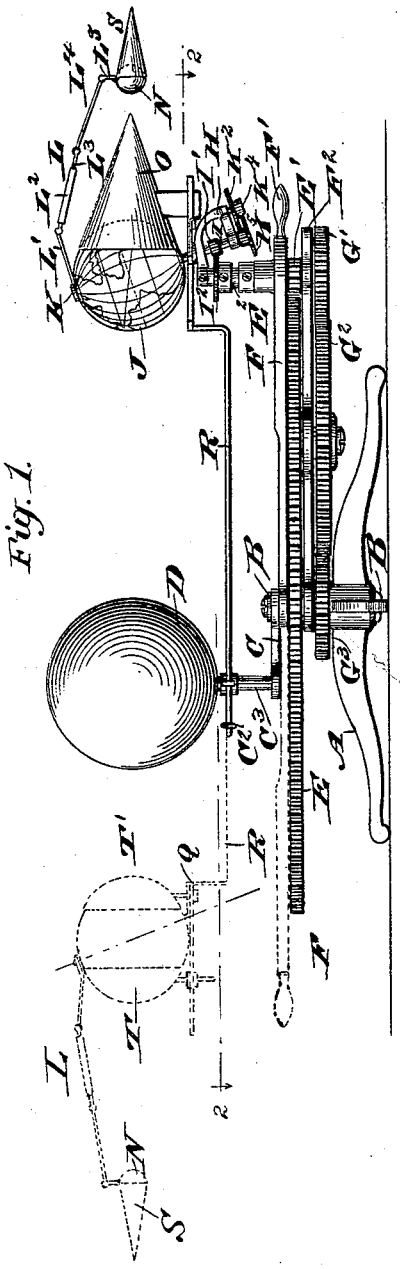

Fig. 1.

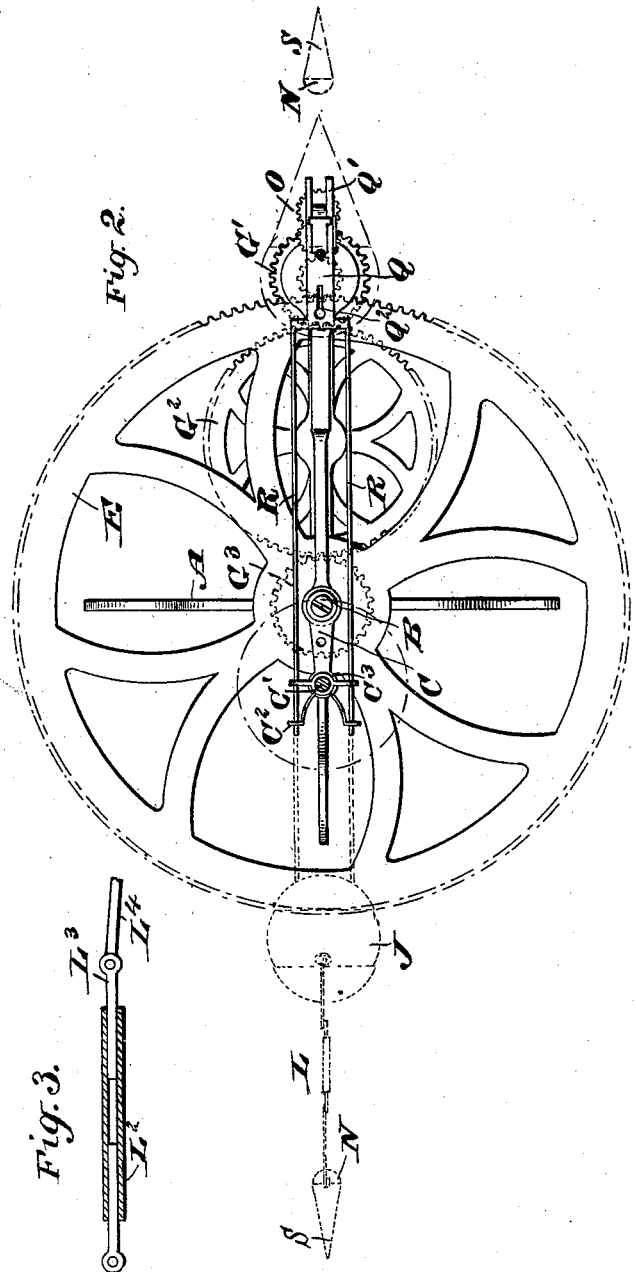

Fig. 2.

Fig. 3.

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(No Model.) 2 Sheets—Sheet 2.

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TELLURIAN.

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Fig. 4.

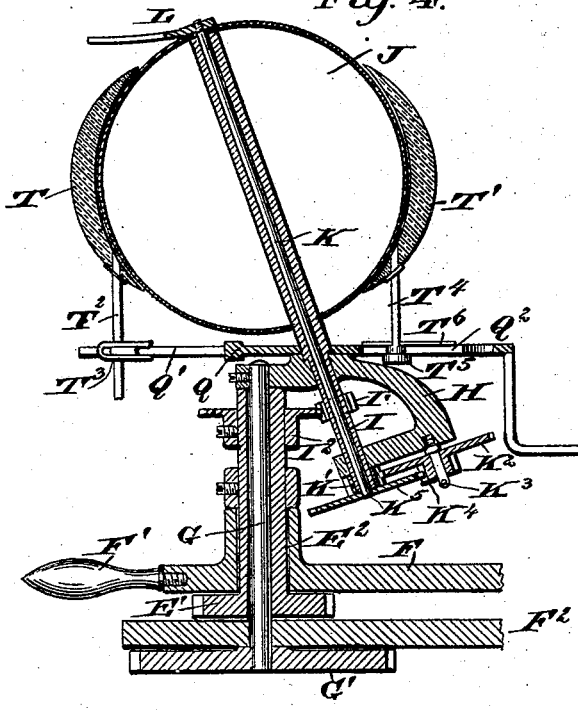


Fig. 5.

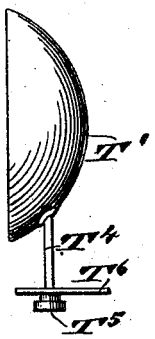


Fig. 6.

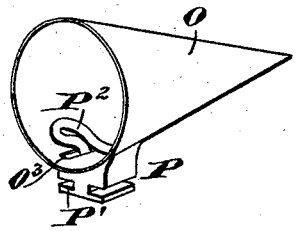


Fig. 7.

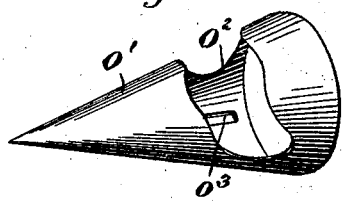


Fig 8.

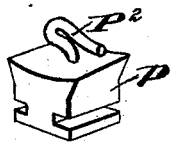


Fig. 9.

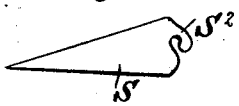


Fig. 10.

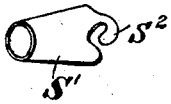


Fig. 11.

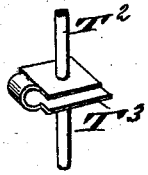


Fig. 12.

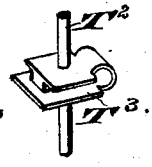
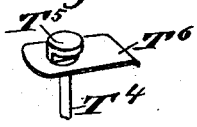


Fig. 13.



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ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM R. DUNHAM, OF TROY, NEW HAMPSHIRE.

TELLURIAN.

SPECIFICATION forming part of Letters Patent No. 493,988, dated March 21, 1893.

Application filed May 9, 1892. Serial No. 432,295. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM RUSSELL DUNHAM, of Troy, in the county of Cheshire and State of New Hampshire, have invented a new and Improved Tellurian, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved tellurian, which is simple and durable in construction, and arranged to illustrate the motion of the earth and its path around the sun, the movement of the moon, the eclipses, and the tides on the earth.

The invention consists of certain parts and details and combinations of parts, as will be hereinafter described and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a sectional plan view of the same on the line 2—2 of Fig. 1. Fig. 3 is an enlarged sectional side elevation of the arm for supporting the moon. Fig. 4 is an enlarged sectional side elevation of the earth and means for actuating the same. Fig. 5 is a side elevation of one of the tide water indicating disks. Figs. 6 and 7 are perspective views of cones representing the shadows of the earth. Fig. 8 is a perspective view of the supporting block for the said cones. Figs. 9 and 10 are perspective views of cones to represent the shadows of the moon; and Figs. 11, 12 and 13 are perspective views of the supporting device for the tide water indicating disks.

The improved tellurian is provided with a suitably constructed base A, carrying a post B, on the upper end of which is secured an arm C, supporting a pin C'; on which is mounted to turn loosely a ball D, representing the sun. Thus, the axis of the latter is eccentric to the axis of the post B which position corresponds to the eccentrical position of the sun in relation to the earth's orbit in the heavens. On the latter is fixedly secured a gear wheel E, in which meshes a small pinion E', provided with a hub E^2, mounted to rotate loosely in a suitable bearing formed near the outer end of an arm F, fulcrumed loosely on the post B and extending directly over the gear wheel E. The extreme outer end of the arm F is formed with a handle F', for conveniently turning the said arm so that the pinion E' turns on the large fixed gear wheel E, for the purpose hereinafter more fully described.

Within the hub E^2 of the pinion E' is mounted to rotate a shaft G, extending through an arm F^2, also loosely fulcrumed on the post B, and extending under the fixed gear wheel E directly below the arm F, with which the said arm F^2 moves on account of engaging the shaft G. On the lower end of the latter is secured a gear wheel G', in mesh with an intermediate gear wheel G^2, rolling off a smaller gear wheel G^3, fixedly secured on the post B below the arm F^2, as will be readily understood by reference to Fig. 1.

On the upper end of the shaft G is secured one end of a frame H, in which is journaled a sleeve I, standing at an angle to the shaft G and carrying a ball J, representing the earth, the said sleeve I being the axis of the latter. On the sleeve I is secured a pinion I', in mesh with a gear wheel I^2, secured on the hub E^2 of the pinion E', so that when the latter is rotated by moving the arm F around so that the pinion turns on the gear wheel, then the said gear wheel I^2 rotates the pinion I', which latter imparts a rotary motion to the sleeve I, so that the earth J is rotated. The proportion of the gear described is such that at every complete revolution of the arm F, the earth J has revolved three hundred and sixty-five times.

Within the sleeve I is journaled a shaft K, carrying at its upper outer end on the top of the earth J, an arm L, supporting a small ball N, representing the moon. The arm L is preferably made in sections L', L^2, L^3, L^4, L^5, connected with each other by pivots, as shown, the section L^2 being however, in the form of a tube or sleeve in which section L^3 is held by friction, yet not so tightly as to prevent it from being turned by force applied manually as required to give the proper position to the moon relative to the earth and the sun. A rotary motion is given to the shaft K from the sleeve I for the purpose of revolving the moon N around the earth J in the proper time, and for this purpose the lower end of the sleeve I carries a pinion K', in mesh with a gear wheel

K^2, mounted to turn loosely on a stud K^3, secured in the frame H.

On the face of the gear wheel K^2 is secured a pinion K^4, in mesh with a large gear wheel K^5, attached to the lower end of the shaft K, so that when the sleeve I is revolved, as previously described, a rotary motion is transmitted from the said sleeve to the shaft K by the pinion K', the gear wheel K^2, the pinion K^4 and the gear wheel K^5. Thus the moon ball or globe N is rotated slower than the earth ball J, and so makes some thirteen revolutions around the latter during each complete circuit of the earth ball around the sun ball D. Now, it will be seen that when the operator takes hold of the handle F' and swings the arm F around, then the earth J is revolved on its axis, the sleeve I, and the latter is carried around in the frame H revolving with the shaft G, which latter receives its motion from the train of gear wheels G', G^2 and G^3, as previously described. Thus, the position of the earth relative to the sun D is fully illustrated by making one complete revolution of the arm F, the said revolution representing one full year of our time. At the same time, the moon N swings around the earth J owing to the connection of the sleeve I with the shaft K, as above described.

In order to illustrate eclipses, I provide cones O and O', which represent the shadows of the earth and are adapted to engage with their hollow base ends part of the earth J, as shown in Fig. 1. The cone O represents the earth shadow while the other cone O' is cut out, as at O^2, for representing partial and total eclipses of the moon. The cones O and O' are adapted to be attached to a block P, provided with a dovetail P', fitted to slide on the forked end Q' of a plate Q, through which plate passes the sleeve I, so that the said plate Q is moved inward or outward according to the position of the frame H in which the said sleeve I is journaled. The inner end of the plate Q is provided with two rods R, extending inwardly and fitted to slide in suitable bearings in the frame C^2, attached on a sleeve C^3, mounted to rotate loosely on the pin C' carrying the sun D.

In order to attach each block P to the respective cone O or O' each of the latter is provided with a slot O^3, adapted to be engaged by a button P^2, mounted to turn on the top of the block P and adapted to pass through the slot O^3. When the said button has been passed through the slot it is given a quarter turn so as to engage with its head the inner surface of the cone, thereby attaching the latter to the block. In order to place the cone in the proper position, the block P is slid over the forked end Q' of the plate Q until the base end of the cone engages part of the earth J.

The shadow of the moon is represented by cones S and S', of which the latter is the frustum of a cone, and each is provided at its base end with a hook S^2, adapted to engage the last section L^5 of the arm L, so as to hold the respective cone S or S' in position on the moon, the base end of each cone engaging one half of the moon, as plainly shown in Fig. 1. It will be seen that by moving the arm F around, as above described, the frame H is carried around by its revolving shaft G, so that a sliding motion is given to the plate Q to bring the cone O or O' into the proper position, the cones sliding with their blocks P on the forked end Q' of the plate Q according to the position of the earth J.

In order to demonstrate the tides, I provide two disks T and T', see Figs. 4 and 5, made in the shape of spherical segments, the inner surface corresponding to the periphery of the earth, as shown in the figures referred to. The disk T is supported on a rod T^2, attached to a block T^3, fitted to slide in the forked end Q' of the plate Q. The other disk T' is supported on an arm T^4, formed on its lower end with a head T^5, part of which is notched to engage a slot Q^2, formed in the top of the plate Q, as will be readily understood by reference to Figs. 2 and 4. The outer end of the slot Q^2 is enlarged for the passage of the head T^5 to engage the reduced part with the slot.

In order to hold the rod T^4 with the disk T' in position a spring plate T^6, is attached to the said rod above the head T^5, the said spring plate resting on top of the plate Q, to clamp the head T^5 on the under side of the plate Q to hold the disk T' in place.

The rise and fall of the tide are illustrated at the time the arm F is in the position shown in dotted lines in Fig. 1, that is when the earth J is at the aphelion position, that is nearest to the sun.

It will be seen that the gear wheel E represents the earth's orbit, so that when the arm F is swung over the said wheel, the earth travels around the sun and as the axis of the latter is set eccentric to the axis of the said gear wheel, on the post B of which swings the arm F, the proper orbit is obtained.

By the arrangement of gear wheels G', G^2 and G^3, and the frame H held on the shaft G of the said gear wheel G', the same relative inclination of the earth's poles is maintained to the plane of the earth's orbit while the earth is executing its yearly journey around the sun.

The cone S represents the full length of the moon's shadow, and is used to illustrate the partial and annular eclipse of the sun, while the frustum of a cone S' is used to illustrate the total eclipse of the sun.

In order to illustrate the eclipse of the moon the cone O' having the recess O^2 is used in connection with the earth J as above described.

It is understood that the eclipse of the moon is only demonstrated when the earth is in a perihelion position; that is farthest from the sun, as shown in Fig. 1.

In order to illustrate the tides, the earth J is placed at a point or place in its orbit nearest to the sun, see dotted lines in Fig. 1. The

two disks T and T′ are then placed in position on the arm Q, as illustrated in Fig. 4, and the earth J is revolved very slowly in its yearly path by moving the arm F as described. The edge of the disks represents low tide while its convex and central portion illustrates high tide. Now, a person being at a place of low tide, the earth revolves or carries him for six hours so to speak, into deep water, six out, six in and again six out, thus making twenty four hours. It will be observed that during the earth's yearly journey around the sun, the inclination of the axis of the earth is inclined to the plane of the earth's orbit, so as to demonstrate the change of seasons.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a tellurian, the combination with a frame mounted to turn, of a sleeve journaled in the said frame and set at an angle to the axis of the pivot of the said frame, a ball held on the said sleeve, and two opposite disks which have a concavo-convex form and made thickest at the middle and gradually thinner from that point to the edge, the same arranged in conjunction with the said ball to indicate the position of the tides, substantially as shown and described.

2. In a tellurian, the combination with a ball representing the sun, of an arm mounted to swing and having its fulcrum eccentric to the support of the said ball, a frame secured on a shaft mounted to turn in the said arm, a sleeve journaled in the said frame and set at an angle to the said shaft, a ball attached to the said sleeve and revolving with the same when the arm swings around, means, substantially as described, for imparting a rotary motion to the said sleeve and the said frame on swinging the said arm, a shaft journaled in the said sleeve and deriving its rotary motion from the latter by intermediate gear wheels, and an arm supported on the said shaft and carrying a ball representing the moon, the said arm being made in sections jointed together, substantially as shown and described.

3. In a tellurian, the combination with a ball representing the sun, of an arm mounted to swing and having its fulcrum eccentric to the support of the said ball, a frame secured on a shaft mounted to turn in the said arm, a sleeve journaled in the said frame and set at an angle to the said shaft, a ball attached to the said sleeve and revolving with the same when the arm swings around, means, substantially as described, for imparting a rotary motion to the said sleeve and the said frame on swinging the said arm, a shaft journaled in the said sleeve and deriving its rotary motion from the latter by intermediate gear wheels, and an arm supported on the said shaft and carrying a ball representing the moon, the said arm being made in sections jointed together, one of the sections being mounted to turn in the adjacent section, substantially as described.

4. In a tellurian, the combination with a ball representing the sun and a frame adapted to rotate around the center on which said ball is fixed, of a sleeve journaled in the said frame and standing at an angle to the axis of the pivot of the said frame, a ball secured on the said sleeve and rotating with the same, a plate engaged by the said sleeve, and a cone fitted to slide on the said plate and having its base end engaging the said ball, substantially as shown and described.

5. In a tellurian, the combination with a ball representing the sun and a frame adapted to rotate about it, of a sleeve journaled in the said frame and standing at an angle to the axis of the pivot of the said frame, a ball secured on the said sleeve and rotating with the same, a plate engaged by the said sleeve, a block fitted to slide on the said plate, and a hollow cone adapted to be attached to the said block and arranged to engage with its base end part of the said ball, substantially as shown and described.

6. In a tellurian, the combination with a ball representing the sun, a frame adapted to travel around the center on which said ball is fixed and a ball representing the earth, of an adjustable arm, which is made of jointed sections and mounted on the axis of the earth ball to swing with it, a ball attached to the outer end of such arm, and a cone having its base contiguous to the last mentioned ball, substantially as described.

7. In a tellurian, the combination with a ball representing the sun and a sleeve mounted to turn and journaled in a revolving frame, of a ball representing the earth and secured on the said sleeve, a shaft mounted to turn in the said sleeve, an adjustable arm attached to the said shaft and made in sections, a ball attached to the outer section of the said arm, and a cone adapted to engage with its base end the last mentioned ball, substantially as shown and described.

WILLIAM R. DUNHAM.

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MELVIN T. STONE.