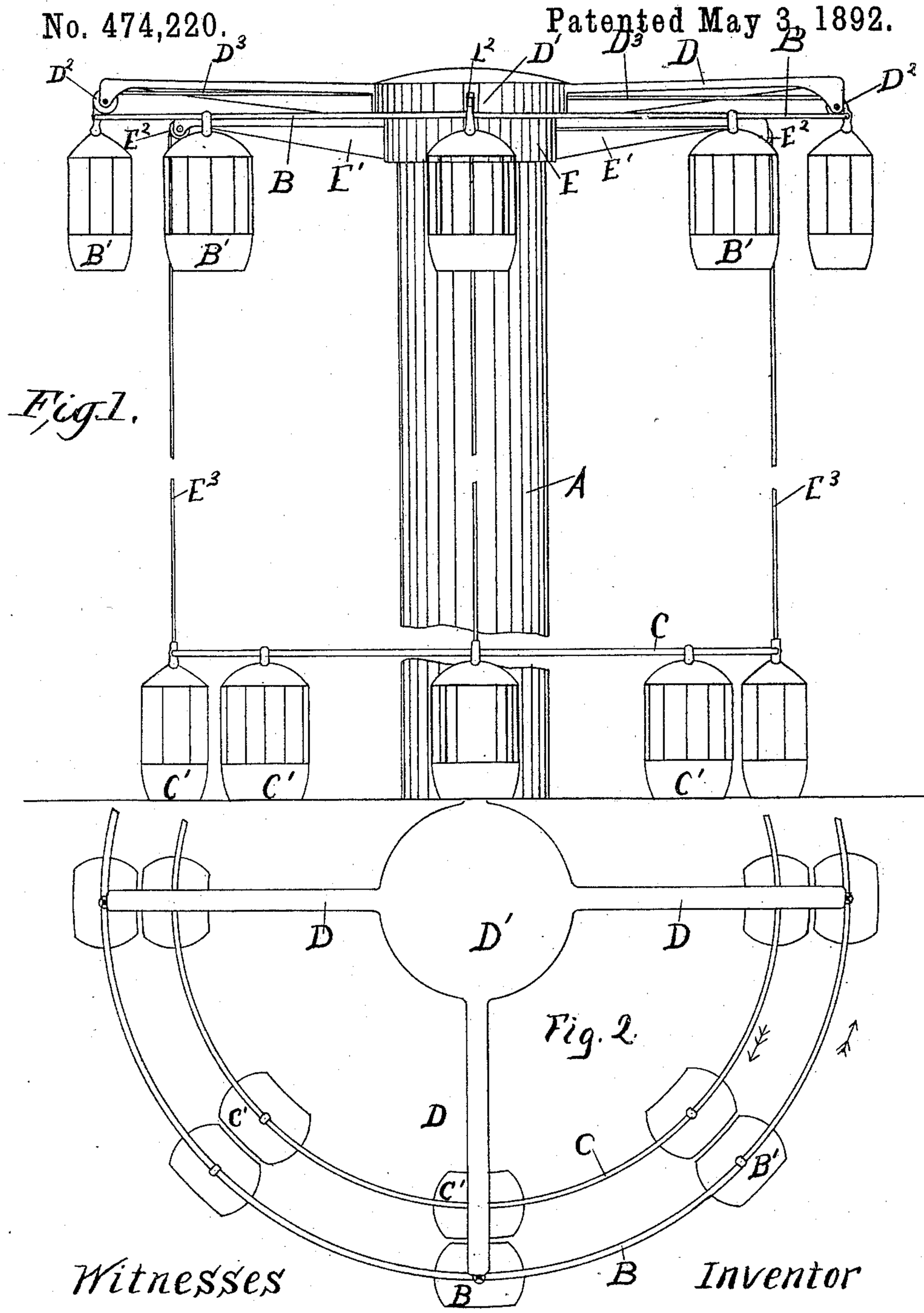
(No Model.) 2 Sheets—Sheet 1.

F. C. CROWE.

ROTARY OBSERVATORY.

No. 474,220. Patented May 3, 1892.



Witnesses

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(No Model.) 2 Sheets—Sheet 2.

F. C. CROWE.

ROTARY OBSERVATORY.

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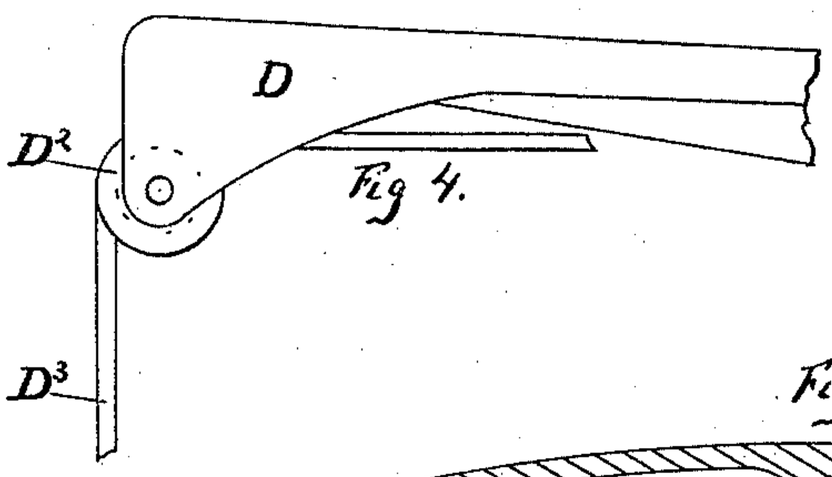


Fig 4.

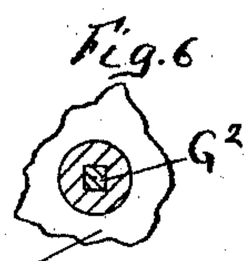


Fig. 6

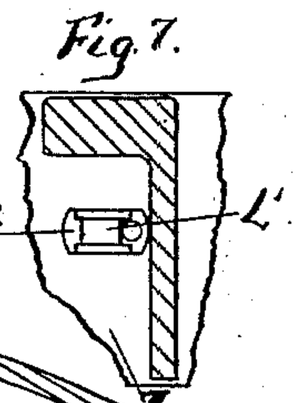


Fig. 7.

Fig. 3.

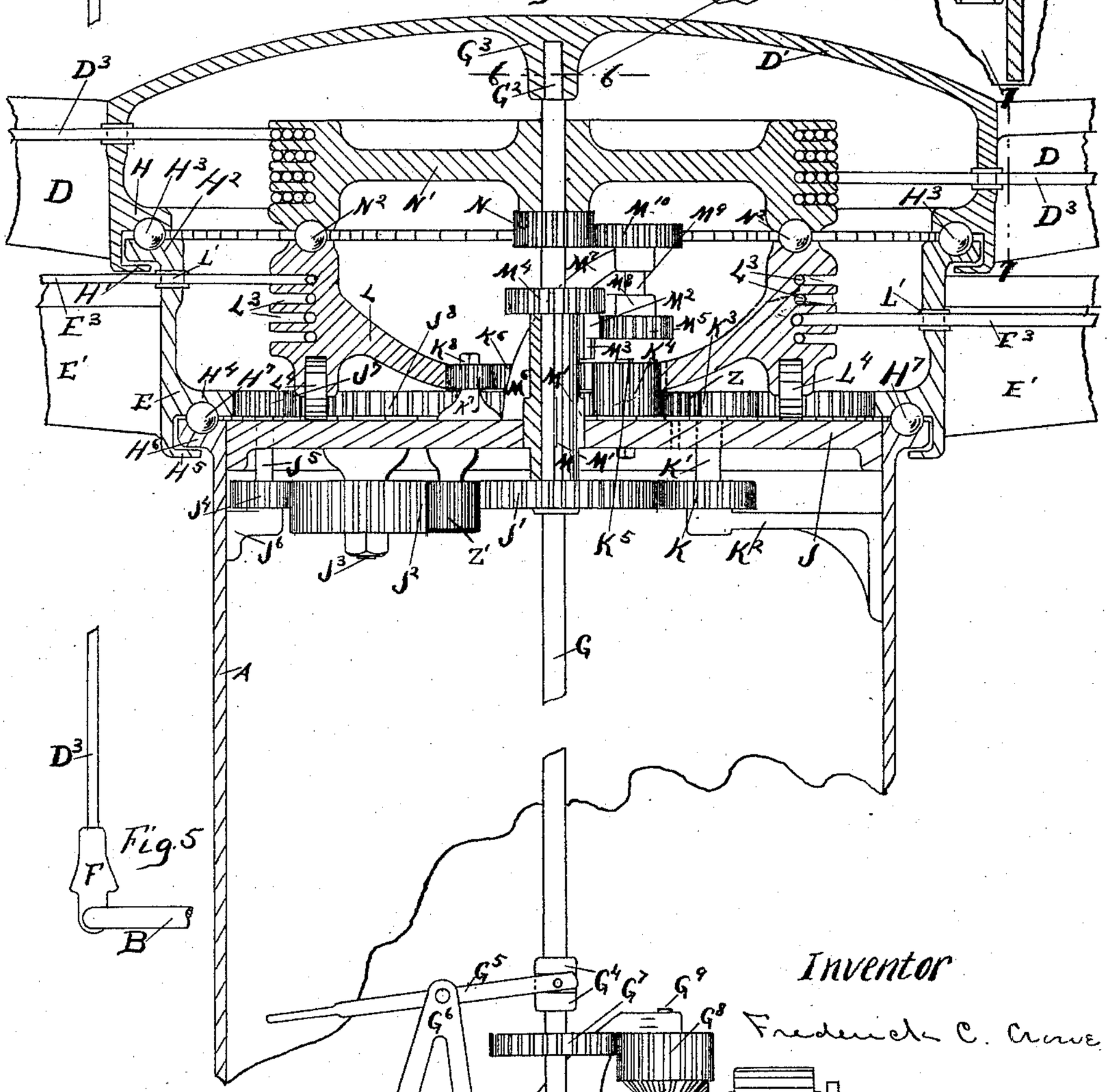
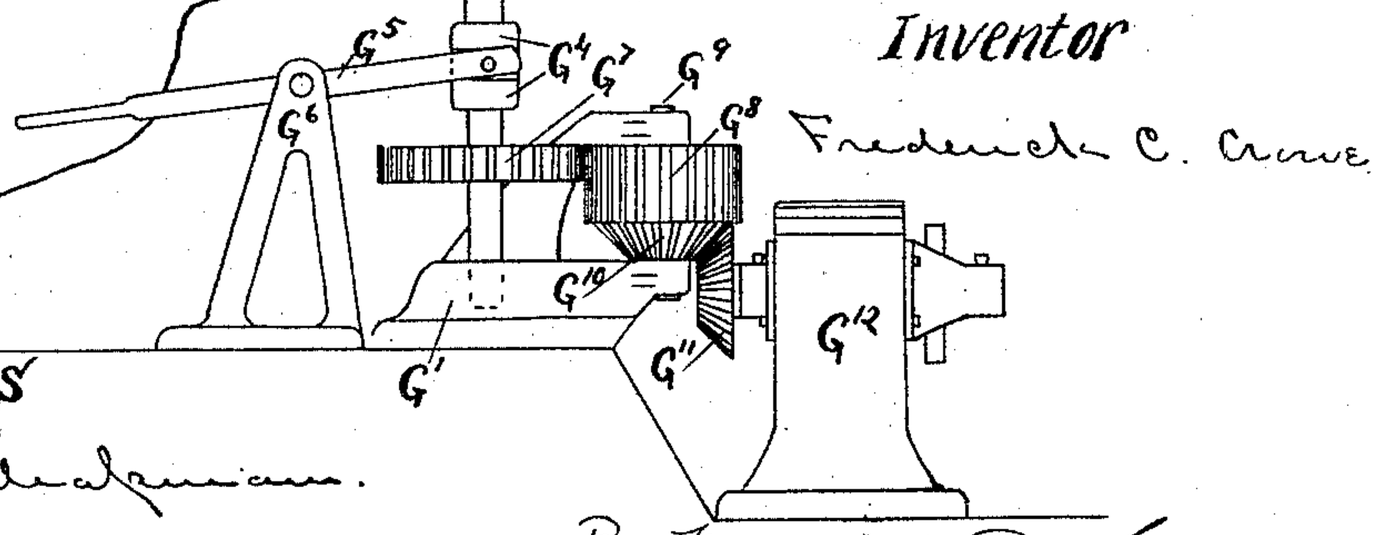


Fig. 5



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UNITED STATES PATENT OFFICE.

FREDERICK C. CROWE, OF CHICAGO, ILLINOIS.

ROTARY OBSERVATORY.

SPECIFICATION forming part of Letters Patent No. 474,220, dated May 3, 1892.

Application filed June 26, 1891. Renewed February 29, 1892. Serial No. 423,112. (No model.) Patented in England July 20, 1891, No. 12,294.

To all whom it may concern:

Be it known that I, FREDERICK C. CROWE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rotary Observatories, (for which I have received provisional protection in Great Britain by application No. 12,294, dated July 20, 1891,) of which the following is a specification.

My invention relates to rotary observatories and the like, and has for its object to provide a cheap, simple, and convenient rotating device. It is illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of the device with parts removed and broken away, and Fig. 2 is a portion of a plan view. Fig. 3 is a vertical section through the operating mechanism. Fig. 4 is a detail of the supporting-arms and pulley. Fig. 5 is a detail of the ring connection; Fig. 6, a section on the line 6 6; Fig. 7, a section on the line 7 7.

Like parts are indicated by the same letters in all the figures.

A is a central stand-pipe or tower of convenient size and resting upon suitable foundations.

B is a ring, from which depend a series of carriages or cabs B′ B′, and C is a smaller ring, concentric with the other ring and in like manner supporting a series of carriages or cabs C′ C′.

D D are arms laterally projecting from a cap or plate D′ and provided each at its outer end with a sheave or pulley D^2, over which plays the rope D^3, which leads from the inner operating mechanism to the ring B. By this means the ring and its cabs are supported so as to be moved up and down.

E is a rotating ring beneath the cap D′ and provided with laterally-projecting arms E′ E′, upon the outer end of each of which is a sheave E^2, over which passes a rope E^3 from the interior operating mechanism to the ring C. By this means the ring C is supported so as to be capable of being raised or lowered. The connection between the several ropes and rings may be made in any desired manner—as, for example, by the coupling-piece F.

G is a central vertical driving-shaft, supported at one end by the block G′ and squared at the other end G^2 to be received, so as to be capable of reciprocation, in the angular aperture in the projection G^3, depending from the inner part of the cap D′. This shaft is provided with collars G^4 G^4, between which is received one end of the lever G^5, pivoted on the standard G^6 and adapted to be used to raise and lower the shaft. On the shaft is a pinion G^7, meshing with the long-faced gear G^8 on the shaft G^9, upon which shaft is also rigidly secured the beveled gear G^{10}, meshing with the gear G^{11}, which is driven by the electric motor G^{12}. Thus the shaft is driven by the motor and may at the same time be reciprocated a certain distance in the direction of its length.

The cap D′ is provided with two inwardly-projecting flanges H H′, between which is the upper flange H^2 of the ring E, and the cap is supported upon the ring by the balls H^3 or other similar or suitable anti-friction devices. The ring E is provided with two similar inwardly-projecting flanges H^4 H^5, between which is interposed the upper flange H^6 of the cylinder A, and the ring E is supported upon the cylinder by the balls H^7. It is apparent that the manner in which these three parts—the cap, the ring, and the cylinder—are associated and the manner in which and the means whereby one is rotatably supported on the other could be greatly varied without departing from the spirit of my invention. The cap, ring, and cylinder are concentric with the shaft. These several parts could be made in sections, as desired, so as to be easily brought together.

The cylinder is provided with a rigidly-fixed head J to support the operating mechanism.

J′ is a pinion rigid on the shaft and engaging the gear Z′, which engages the long face of the gear J^2, which is pivoted upon the downwardly-depending stud J^3 and drives the pinion J^4, which is journaled upon the shaft J^5. This shaft is supported on the bracket J^6, passes through the head-plate, and carries the pinion J^7, which meshes with the internal gear J^8 on the inner edge of the flange H^4 on the ring E, so that said ring is continuously driven from the shaft in one and the same direction, thus carrying its laterally-extending arms, and

hence the ring and cabs supported thereby, continuously in the same direction. The pinion or gear J′ will engage and drive the pinion Z′ whether the shaft be raised or lowered. When the shaft is elevated, the gear J′ meshes with the pinion K, which is rigid on the shaft K′, which is supported by the bracket K^2. This shaft passes through the cylinder-head and carries the pinion K^3, which meshes with the pinion Z, which meshes with the long-faced pinion K^4, which is journaled upon a stud K^5, which rises from the cylinder-head. This pinion K^4 engages the internal gear K^6 on the inner edge of the lower drum.

K^7 is an idle-gear on the stud K^8, which rises from the cylinder-head. This gear also engages the internal gear of the drum.

L is the lower drum, adapted to receive the several ropes E^3 E^3, which pass each over the friction-roller L′ and through apertures L^2 in the side of the ring E and are received into the grooves L^3 L^3 in the exterior surface of the drum L. This drum is provided with a series of wheels L^4 L^4, whereby it is rotatably supported on the cylinder-head, and is obviously continuously driven in the same direction from the shaft, so long as the shaft is elevated, but stops rotating when the shaft is lowered, for in that event the gear J′ disengages from the pinion K.

M is a sleeve concentric with the shaft G and provided with laterally-projecting teeth M′ M′, whereby it is held in the cylinder-head so as to reciprocate therethrough but not rotate thereon. This sleeve carries two laterally-projecting arms M^2 M^3 and lies between the gear J′ and the gear M^4, which are rigid upon the shaft. These arms are adapted the lower to engage the pinion K^4 when the shaft is down and the other to engage the pinion M^5 when the shaft is up, as is illustrated in Fig. 3.

M^6 is a standard rising from the cylinder-head and provided with two branches M^7 M^8, upon which are supported the bearings of the vertical shaft M^9, which carries at one end the pinion M^5 and at the other the pinion M^{10}. The pinion M^{10} is adapted to engage the pinion N, rigid upon the drum N′, which is journaled upon the shaft and rotatably supported upon the drum L by the anti-friction bearings N^2, and is provided upon its outer surface with grooves to receive the ropes D^3 D^3, which pass through apertures L^2 and over pulleys L′ in the same manner as the ropes E^3 E^3.

It is obvious that the several features just described may be very greatly altered, and may some of them be dispensed with and may be replaced by others without departing from the spirit of my invention, and I do not wish to be limited to the form, construction, relation, or number of parts just as shown.

The use and operation of my invention are as follows: The figures are designed to illustrate a device in such relation that the outer or larger ring is elevated while the inner ring is down with the motor stopped. The persons who desire to use the rotary observatory will now enter the cabs or carriages upon the lower inner ring, and when the apparatus is ready to be started the operator, by manipulating the lever G^5 or otherwise, will lower the shaft, thus disengaging the pinion J′ from the pinion K and bringing the pinions M^4 and M^5 into engagement, and the motor is then applied to drive the shaft in the same direction as before. This lowering of the shaft also brings the arm M^3 into engagement with the pinion K^4. The shaft, rotating, drives the gears J′, Z′, J^2, J^4, and J^7, which latter gear engages with the internal gear J^8, so as to drive the ring E about its center, thus carrying its projecting arms about the cylinder or stand-pipe. Since the drum L is driven from the pinion K^4, and since the pinion K^4 is locked from rotation by the engagement of the arm M^3 therewith, and since the driving power is disengaged from such drum by the disengagement of the pinion J′ from the pinion K, it is clear that the drum L is standing still, and therefore since the ring E is rotating the ropes E^3 will be wound upon the drum into their respective grooves, and thus the inner ring and cabs C′ C′ will be raised up toward the top of the pipe while they rotate in the direction of the arrow indicated in Fig. 2. In this same condition of the parts, however, since the gear M^4 engages the gear M^5, it will drive the drum N′ by means of the shaft G, pinion M^4, pinion M^5, shaft M^9, pinion M^{10}, and exterior gear N. Since the same number of gears are interposed between the shaft G and the internal gear j^8 and external gear N, and since of these two latter gears one is internal and the other external it is obvious that the drum N′ will move in the opposite direction from the ring E, or, in other words, will move in the same direction as the cap D′, and this cap moves in the opposite direction from the motion of rotation of the ring E or with the shaft G. The relation of the gears which drive the ring, however, is such as to cause the drum to move faster than the cap, and thus to pay out the ropes and permit the larger ring and its cabs to descend. In other words, when the position of the parts is reversed and the shaft is lowered and the motor applied, the two sets of arms and rings will rotate with equal rapidity in opposite directions and the lower drum will be stationary, so that its ropes will be wound upon it to raise the inner ring, while the upper drum will rotate more rapidly than the cap to pay off its ropes, and thus lower the outer ring. When the two rings have reached the limit of their excursion, the motor will be stopped by hand, or automatically, if preferred, and when the carriages have been reloaded the mechanism may be reversed by lifting the shaft in the position shown in Fig. 3. In this position the motor is again applied, the ring and cap are driven in opposite directions, as before, the inner drum is rotated by the pinions J′, K, K^3, Z, K^4, and the internal gear K^6, the relation be-

ing such that the drum will be driven more rapidly than its associated ring, and will therefore unwind or pay off its rope. At the same time the driving mechanism for the drum N′ is disengaged by the disengagement of the pinion M^4 from the pinion M^5, and the drum N′ is locked from rotation by the engagement of the arm M^2 with the pinion M^5, so that the ropes D^3 will be wound thereon to raise the exterior cabs, and this operation will continue until the excursion is complete and all the parts brought into the position indicated in the diagram.

It will be observed that both of the sets of cabs are supported from and raised and lowered by the same driving-shaft, and hence the tendency of each in the arrangement shown is to balance the other, so that the power required to drive the shaft is only that necessary to raise the difference between the weights of the two sets of carriages. In other words, one set of carriages is descending, and thus tending to turn the shaft in the normal direction of its rotation, while the other is ascending under the influence of such rotating shaft.

In some instances it would be found preferable to have a smaller and lighter machine, in which event a single set of carriages could be employed.

I claim—

1. In a rotary observatory, the combination of two circular sets of concentrically-supported carriages, a frame on which they are normally supported at different altitudes, driving mechanism to rotate them each constantly in the same direction, but in a direction opposite to that of the other, and lifting mechanism to simultaneously move the carriages in opposite vertical directions.

2. In a rotary observatory, the combination of two sets of concentrically-supported carriages with driving mechanism to rotate them in opposite directions and lifting mechanism to raise and lower them, said mechanism connected with the sets of carriages, so that their weights tend to balance each other.

3. In a rotary observatory, the combination of two sets of carriages concentrically supported in circles of different diameters, ropes whereby they are raised and lowered, laterally-extending arms which support such ropes, winding-drums alternately fixed and rotating, on which such ropes are wound, and mechanism to rotate said arms in opposite directions, the relation between the arms and drums being such as to simultaneously move the carriages in opposite vertical directions.

4. In a rotary observatory, the combination of a series of carriages arranged in a circle, ropes whereby they are raised and lowered, laterally-extending arms which support such ropes, and a winding-drum within said circle, on which such ropes are wound and about which they are carried by the arms, and driving mechanism to rotate such arms continuously in one and the same direction and also to rotate such drums intermittently in one and the same direction, but at a greater speed than the arms.

5. In a rotary observatory, the combination of two sets of carriages arranged in circles of different diameters and normally at different altitudes, ropes whereby they are raised and lowered, laterally-extending arms which support such ropes, winding-drums within said circle, on which such ropes are wound and about which they are carried by the arms, and guiding mechanism to rotate such arms each continuously in one and the same direction, but opposite to the direction of rotation of the other, and driving mechanism to rotate such drums intermittently each in one and the same direction, but in an opposite direction from the rotation of the other, said drums during rotation adapted to be moved each at a greater speed than the speed of its associated set of arms.

6. In a rotary observatory, the combination of two sets of concentrically-supported carriages with supporting-arms, one series for each set of carriages, and supporting-ropes, driving mechanism to rotate the arms in opposite directions, and concentric winding-drums to receive the ropes for the purpose of raising and lowering the carriages, said drums alternately locked to and freed from the driving mechanism.

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