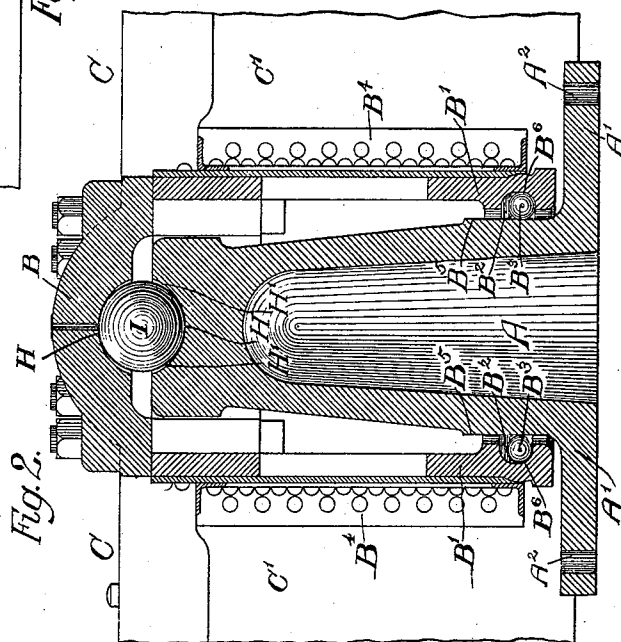
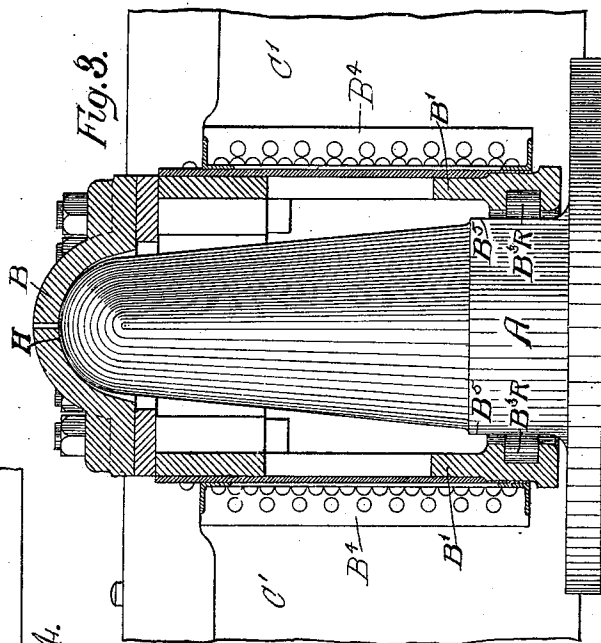
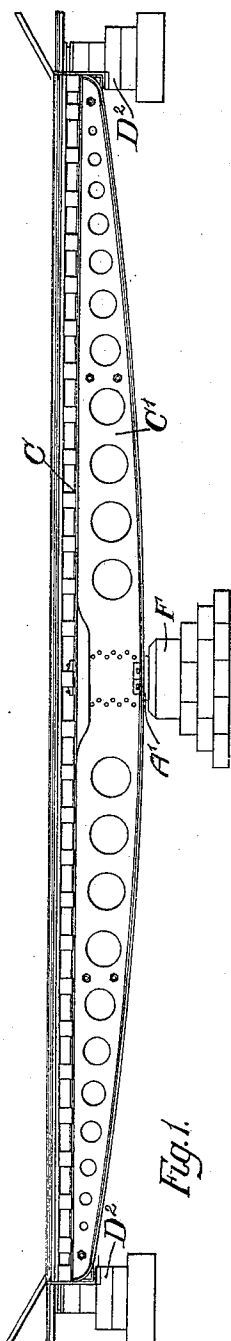


(No Model.)

C. A. GREENLEAF.
TURN TABLE.

No. 563,480.

Patented July 7, 1896.



Attest:
Henry Appleton
H. Smith.

Inventor:
Clements A. Greenleaf
per Wm. Hubbell Fisher,
Attorney.

UNITED STATES PATENT OFFICE.

CLEMENTS A. GREENLEAF, OF INDIANAPOLIS, INDIANA.

TURN-TABLE.

SPECIFICATION forming part of Letters Patent No. 563,480, dated July 7, 1896.

Application filed April 14, 1892. Serial No. 429,164. (No model.)

To all whom it may concern:

Be it known that I, CLEMENTS A. GREENLEAF, a citizen of the United States of America, and a resident of the city of Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Turn-Tables, of which the following is a specification.

The several features of my invention and the various advantages resulting from their use, conjointly or otherwise, will be apparent from the following description and claims.

In the accompanying drawings, making a part of this specification, and to which reference is hereby made, Figure 1 is a side elevation of a turn-table whose construction illustrates my invention. Fig. 2 represents a vertical central longitudinal section of the central portions of the turn-table. Fig. 3 represents a like section of the central portions of the turn-table and showing a modification of certain of the details of construction. Fig. 4 is an elevation of either end of the turn-table and an elevation of the improved bearing to receive the said end of the turn-table.

A indicates the center post or pedestal, upon which the platform C of the turn-table is centrally supported. This center post A rests upon a suitable foundation F, and is properly secured thereto. In the present illustrative instance the center post has an annular basal brace or foot-flange A', extending out horizontally and provided with openings A², whereby the said flange may be firmly secured to the foundation F. Above and over this center post A is the cap B, connected firmly and rigidly to the platform C in any suitable manner. The cap is prolonged down on the sides of the center post by means of suitable vertical pieces or extensions B⁴, and to these the bracework C' of the platform C of the turn-table is united. These vertical pieces or extensions B⁴, it will be understood, are preferably united together at the sides, forming a sleeve or hollow cylindrical body extending around the center post and embracing the latter. At the lower portion of the sides B⁴ the latter have the bearings or boxes B', each provided with a recess B².

The center post A is exteriorly provided at or near its lower end or base with the annular

bearing B⁵, and in contact with this bearing are ball-bearings B³. The greater portion of each ball is received in the annular recess B² and is supported thereby. The back B⁶ of this annular recess is distant from the bearing B⁵ of the post just the diameter of the ball, so that the extensions B⁴ B⁴ of the cap have substantially no lateral play whatever at the base of the center post. The annular recess B² is in height somewhat greater than the diameter of the ball to allow a certain vertical play or movement of the extension B⁴ and cap B in the manner hereinafter mentioned. Centrally located in the top of the center post is a concavity H, substantially hemispherical in form. The opening of this concavity is upward. Centrally located in the cap is a similar hemispherical concavity H, which concavity faces downward toward the center post. The vertical diameter of the concavity H of the center post coincides with the vertical diameter of the concavity H of the cap.

I is a spherical body or ball, the lower portion of which rests in the concavity H of the center post, and the upper portion of which is located in the concavity H of the cap B. This ball I is of some hard strong metal, preferably steel, inasmuch as it supports the entire weight of the turn-table and whatever load the turn-table at any time receives.

The concavities H H of the center post and cap are not complete hemispheres, but are as regards their vertical extension truncated. Hence the cap B at the edge of its concavity H, and in the neighborhood thereof, cannot touch the edge of the concavity H of the center post. In other words, the bottom of the cap will be separated some distance from the top of the center post.

The radius with which the hemispherical concavities H H of the post and cap are described is greater than the radius with which the hemisphere or ball I is described. Consequently, when the cap B, ball, I and center post are combined as hereinafter described and as shown in Fig. 2, the ball I will touch the bottom only of the concavity H of the center post and the top only of the concavity H of the cap.

Between the ball and the center post everywhere except at the bottom of the concavity

If there will be an annular space H' , which increases in width from the lower portion of the said concavity H toward the top thereof. Thus there is formed in the combination of the ball I and the concavities or sockets H , respectively present in the cap B and center post A , what may be termed a "differential ball-and-socket joint." The play allowed by this peculiar ball-and-socket joint permits the turn-table to tip, that is to say, permits either end of the turn-table to be depressed as said end receives the weight of a locomotive coming onto the turn-table. The downward movement of the end of the turn-table receiving the locomotive will be and is limited by a suitable bearing, as D^2 , which rests upon the requisite foundation. This bearing is located immediately below where the end of the turn-table comes when the track of the turn-table coincides with a given track. Similar bearings are respectively located beneath each place where the end of the turn-table comes when the track of the turn-table coincides with a track on the adjoining ground or other foundation from which a locomotive is to be run onto the turn-table onto which a locomotive is to be run from the turn-table.

Inasmuch as there is substantially no play between the bearing of the center post A near its base and the extension of the platform B' with bearing B^3 , the action of the turn-table as it tips is substantially as follows: Where that end of the turn-table which is at the right hand in Fig. 1 is depressed, the cap B is moved slightly toward the right, and the ball I is forced to roll or slip a little up the right incline of the concavity or socket H of the center post, and consequently to leave the bottom of said concavity. At the same time the ball leaves the bottom of the concavity H of the cap and moves against that incline of said cavity which is on the left hand in Fig. 2. The turn-table will continue in this position until the locomotive has left the turn-table, or has altogether run onto the latter, so that the center of the weight of the locomotive is substantially over the center post of the table. In either of these instances the turn-table will be free to right itself. This it will at once do, bringing itself to an equable balance, and the track of it to a horizontal position. The table is caused to take this position for the following reason: The superincumbent weight of the turn-table exerted upon the cap B presses upon the ball I and imparts to the ball a tendency greatly in excess of that caused by the weight of the ball itself to roll or move down the right incline of the concavity H of the center post A to the bottom of the said concavity, and on account of the said weight of the said turn-table the cap has a tendency to settle and move, so that the top of the ball I shall rest in the upper or deepest portion of the concavity H of the cap, and these latter movements of the ball and cap

take place when the turn-table has its usual balance, that is to say, when the weight of both ends of the turn-table are substantially the same.

When the left-hand end of the turn-table is depressed by a locomotive running off or onto the table, as aforementioned, the cap is moved toward the left and the ball I moved away from the deepest part of each of the opposing concavities H , and moved up the left incline of the lower concavity H and down the right incline of the upper concavity.

Whenever the turn-table becomes balanced over the center post by the load on the turn-table becoming balanced over the central post, or having been run off the turn-table, the latter will right itself and bring its track to a horizontal position, on account of the aforesaid tendency of the ball to seek the deepest points of the concavity as the weight upon opposite ends of the turn-table becomes equal.

In the accompanying Fig. 3 is seen an illustration of a modified form, which may be described as follows: The top of the center post is of a hemispherical shape, and the cap B has a concavity H , described with a radius greater than the radius with which the semihemisphere is described. The action of the hemisphere in relation to the cap B is substantially the same as the action of the ball I in relation to cap B . The ball and socket have different diameters, the ball being enough smaller than the socket to allow play enough in said differential ball-and-socket joint for the turn-table to tip to a bearing at the outer end of the platform to receive or discharge the load. The bearing of the platform against the center post near its base is to be a close fit, without any lateral motion except that it may revolve around the center post. The load in coming onto the table presses down the outer end to a bearing on the support that must be provided to receive it, thus tipping the turn-table platform out of a horizontal plane, which rolls the ball from its bottom center bearing in the socket. Any movement of the ball away from this bottom center of the socket in any direction must be upward, at least as fast as the steep incline of the sides of the socket. The turn-table with its load resting on the top of the ball must with this movement be lifted bodily up. The platform is in this position while the load is passing on or off the turn-table. As soon as the preponderance of weight on either end is not sufficient to lift the table (empty) the ball by the gravity of the empty table is forced again to resume its point of rest, which is the bottom center of the socket. When the turn-table is constructed, it is so made that the top of the platform is in a horizontal plane when said ball and socket are at a point of rest.

A socket at either top or bottom of the joint with only a half or smaller section of a ball would operate the same as described

above with a whole ball, but with more friction, and not at all if the diameters were not different.

The joint formed by the ball I on hemisphere and the concavities or concavity II would not cause the track and platform of the turn-table to assume a horizontal position and maintain it unless in combination with the bearing of the platform near the base of the center post.

Among the various advantages resulting from this improvement is the important one that it enables a circular track under the outer edge of the turn-table as the latter turns to be dispensed with. Thus the entire cost of this circular track and of the masonry required to support the same is saved.

In lieu of the ball-bearing B³, (shown at the base of the center post in Fig. 2,) other suitable bearings may be employed. One description of such bearing is shown in Fig. 3, where rollers B³ R are present, the axis of each roller being vertical and duly fixed in that portion B' of the downward extension of the cap B which surrounds the center post A. These rotatable bearings B³ or B³ R are present between the bearing B' and the bearing B³, in order to allow the table to be turned with the least friction. One advantage of this part of my invention is that the bearings or rolls near or at the base of the center post are very near the center of motion, and hence the table turns more easily than any circular track can turn.

In the modified construction shown in Fig. 3 the head or upper end of the center post A has a form substantially hemispherical, and the cap B has a concavity substantially hemispherical, the said convex head of the post being received into the concavity of the said cap. The radius of the hemispherical portion of the post is less than the radius of the hemispherical concavity of the cap.

Those bearings of the platform which are at the basal portion of the post A fit closely to the latter, as aforementioned.

Any suitable means for accurately holding the turn-table in position, so that the rails of its track may respectively coincide with the respective rails of the stationary track with which it is desired that the turn-table connect, may be used.

A novel and convenient means for causing the track of the turn-table to accurately register with the adjacent desired stationary track and for holding the turn-table exactly in such position while the locomotive or car is coming on or going off of the turn-table is as follows: In the stationary bearing-piece D² are recesses D D. The distance between each two of these recesses is the same as is the distance between the center of two vertical pieces C² C², located on and at the end of the turn-table. The bottom of each recess is of the same width as is the width of either of the pieces C², and the sides of each recess are flared or beveled so that the upper part

of the said recess is wider than the bottom. The turn-table being turned so that each piece C² is directly over its adjacent recess D, the load is moved on or off of the turn-table. While the load is moving off or on the turn-table at that end which is so located in relation to the recess D, the said end of the turn-table will be depressed in the manner aforementioned, and each piece C² will move downward into its adjacent recess. If at the commencement of said depression of the end of the turn-table the piece C² is not directly over the bottom of the recess D, the flared sides of said recess will immediately guide each piece C² to the bottom of the recess D and thus cause the tracks on the turn-table to accurately register or coincide with the adjacent stationary track, and at the same time the recess D will prevent the turn-table from shifting laterally until the engine or car has been run off of the turn-table or until the said vehicle has been run onto the turn-table and balanced on the center thereof. In such event the end of the turn-table will lift as the turn-table assumes a horizontal position, for the reasons aforementioned. The turn-table will then be free to again turn in the direction desired. Of course the flare or bevel present on the recess D may, when desired, be located on the lower end of each of the pieces D², or the recesses D may retain their beveled sides and the side edges of the pieces C be likewise beveled.

For convenience of erection and construction the recesses D D are preferably contained in strong pieces D', set into the platform and made of some solid metal.

The turn-table is useful not only for railroads, but for various other purposes.

While the various features of my invention are preferably employed together, one or more of the said features may be used without the remainder, and in so far as applicable one or more of said features may be employed in connection with turn-tables other than the one herein specifically specified.

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

1. In a turn-table, the combination of the rotatable platform and a cap or piece B connected thereto, and a center post, substantially as A, having a bearing-surface in the vicinity of its base, the said platform being provided with bearings in close contact with the said bearing at the vicinity of the base or center post, the turn-table of the center post being surmounted or provided with a convex bearing of a form substantially hemispherical received into the recess in the said cap, the recess in the cap being of a form substantially hemispherical and of a radius greater than that of the convex portion surmounting the center post A, a limited lateral play being allowed between the top of the central post and the surrounding upper portion of the turn-table, substantially as and for the purposes specified.

2. In a turn-table, the combination of the rotatable platform and a cap or piece B connected thereto, and a center post, substantially as A, having at its periphery the basal bearing B⁵, rotary bearings being interposed between the platform and the basal bearing B⁵ and in close contact with the latter, the turn-table of the center post being surmounted or provided with a convex bearing of a form substantially hemispherical received into the recess in the said cap, of rotatable platform, the recess in the cap being of a form substantially hemispherical and of a radius greater than that of the convex portion surmounting the center post A, a limited lateral play being allowed between the top of the central post and the surrounding upper portion of the platform, substantially as and for the purposes specified.

3. In a turn-table, the combination of the rotatable platform and the cap or piece B connected thereto and center post, having a bearing-surface B⁵ in the vicinity of its base, ball-bearings B³ interposed between the turn-table and the basal bearing B⁵, the turn-table of the center post being surmounted or provided with a convex bearing of a form substantially hemispherical received into the recess in the said cap, the recess in the cap being of a form substantially hemispherical and of a radius greater than that of the convex portion surmounting the center post A, a slight lateral play being allowed between the top of the central post and the surrounding upper portion of the turn-table, substantially as and for the purposes specified.

4. In a turn-table, the combination of the center post provided at its upper end with a convex piece and a cap or piece attached to the platform of the turn-table and provided with a concavity H also hemispherical in form, and of a radius greater than that of the convexity of the top of center post, a slight lateral play being allowed between the top of the central post and the surrounding upper portion of the rotatable platform, and the bearing B' located in the vicinity of the lower or basal portion of the center post, the center post being provided with an annular bearing B⁵, bearing B' on the turn-table platform being provided with annular recess, and the ball-bearings B³ located in said recess, and in contact with said annular bearings, substantially as and for the purposes specified.

5. In a turn-table, the combination of the center post provided at its upper end with a convex piece and a cap or piece attached to the platform of the turn-table and provided with a concavity H also hemispherical in form, and of a radius greater than that of the convexity of the turn-table center post, a limited lateral play being allowed between the top of the central post and the surrounding upper portion of the turn-table platform, and the bearing B' located in the vicinity of the lower or basal portion of the center post, the center post being provided with an annular bear-

ing B⁵, the bearing B' on the turn-table being provided with recess or annular recess, and the ball-bearings B³ located in said recess, the recess being made vertically of greater width than the diameter of said ball-bearings, the ball-bearings being in contact with the annular bearing, substantially as and for the purposes specified.

6. In a turn-table arranged to tip at its end as the load goes over it or comes upon it, the stationary bearing D² provided with recess D, and the pieces C², C³, at the end of the turn-table adapted to be respectively received into said recesses as the end of the turn-table is depressed, substantially as and for the purposes specified.

7. In a turn-table arranged to tip at its end as the load goes over it or comes upon it, the stationary bearing D² provided with recess D, and the pieces C², C³, at the end of the turn-table adapted to be respectively received into said recesses as the end of the turn-table is depressed, said device being provided with one or more beveled edges or sides for enabling the said pieces C², C³, to be guided respectively to an accurate position as they pass into the recesses D, D, substantially as and for the purposes specified.

8. In a turn-table, the combination of the center post provided at its upper end with a convex piece, and a cap or piece attached to the rotatable platform of the turn-table and provided with a concavity H also hemispherical in form, and of a radius greater than that of the convexity of the convex piece at upper end of center post, and the bearing B' located in the vicinity of the lower or basal portion of the center post, the center post being provided with an annular bearing B⁵, the bearing B' on the turn-table platform being provided with an annular recess, and the ball-bearings B³ located in said recess, the recess being made vertically of greater width than the diameter of said ball-bearings, the stationary bearing D² provided with recesses D, D, and the pieces C², C³, at the end of the turn-table adapted to be received into said recesses as the end of the turn-table is depressed, said devices being provided with one or more beveled edges or sides for enabling the said pieces C², C³, to be guided respectively to an accurate position as they pass into the recesses D, D, substantially as and for the purposes specified.

9. The combination of the turn-table having a rotatable platform provided with a cap B provided with a concavity of the form of a portion of a sphere, and a center post provided with a similar concavity H and a ball or sphere I interposed between the said cap and post and received into the said concavities H, the radius of each of the concavities H being greater than that of the ball I, and the cap being everywhere separated from the top of the post, substantially as shown and described, a slight lateral play being allowed between the top of the central post and the

surrounding upper portion of the turn-table, and the ball I, the lower end of the post being provided with a bearing against which bearings of the platform continually bear, substantially as and for the purposes specified.

10. The combination of the turn-table having a rotatable platform provided with a cap B provided with a concavity of the form of a portion of a sphere, and a center post provided with a similar concavity H and a ball or sphere I interposed between the said cap and post and received into the said concavities H, the radius of each of the concavities H being greater than that of the ball I, and the cap being everywhere separated from the top of the post, substantially as shown and described, a slight lateral play being allowed between the top of the central post and the surrounding upper portion of the turn-table, and the ball I, the lower end of the post being provided with a bearing against which bearings of the platform continually press, and the platform being provided with the annular bearing B' having recess B⁶ containing rotatable bearings, substantially as and for the purposes specified.

11. The combination of the turn-table having a rotatable platform provided with a cap B provided with a concavity of the form of a portion of a sphere, in combination with a center post provided with a similar concavity H and a ball or sphere I interposed between the said cap and post and received into the said concavities H, the radius of each of the concavities being greater than that of the ball I, and the cap being everywhere separated

from the top of the post, substantially as shown and described, a slight lateral play being allowed between the top of the central post and the surrounding upper portion of the platform, and the ball I, and the lower end of the post being provided with a bearing against which bearings of the platform continually press, and the platform being provided with the annular bearing B' having recess B² containing ball-bearings, the recess being higher vertically than the diameter of the balls, substantially as and for the purposes specified.

12. The combination of the turn-table having a rotatable platform provided with a cap B provided with a concavity of the form of a portion of a sphere, and a center post provided with a similar concavity H and a ball or sphere I interposed between the said cap and post and received into the said concavities H, the radius of each of the concavities H being greater than that of the ball I, and the cap being everywhere separated from the top of the post, substantially as shown and described, the lower end of the post being provided with a bearing against which bearings of the platform continually press, the stationary bearing D² provided with recesses D, D, and the pieces C², C², at the end of the turn-table adapted to be received into said recesses as the end of the turn-table is depressed, substantially as and for the purposes specified.

CLEMENTS A. GREENLEAF.

Attest:

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