

No. 758,399.

PATENTED APR. 26, 1904.

R. WILKE.
TRACK OR THE LIKE FOR CRANES.

APPLICATION FILED MAR. 24, 1903.

NO MODEL.

7 SHEETS—SHEET 1.

Fig. 1.

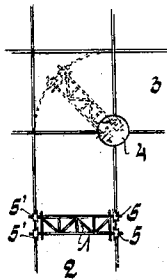


Fig. 2.

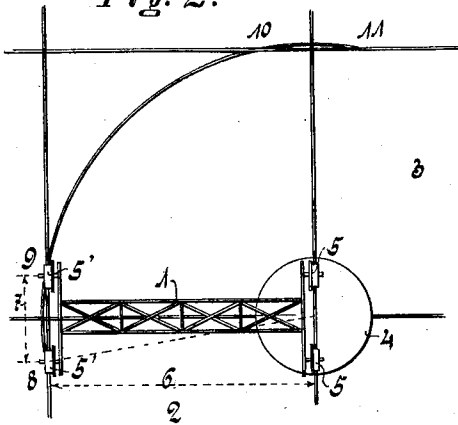


Fig. 3.

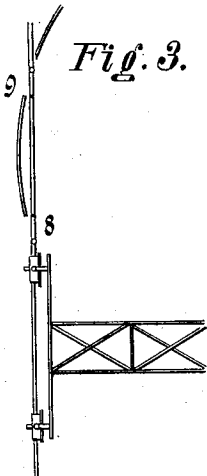


Fig. 4.

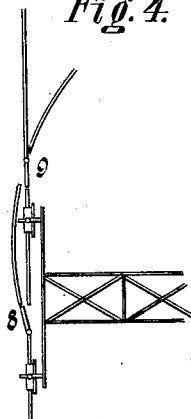


Fig. 5.

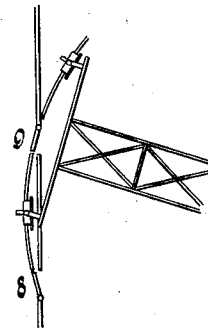


Fig. 6.

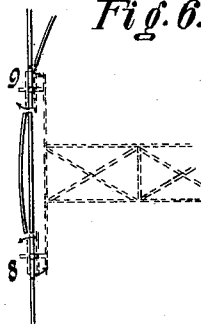
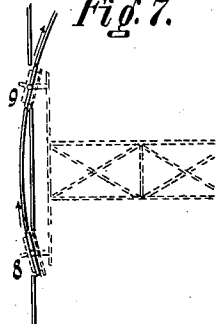


Fig. 7.



Witnesses.

James L. Morris, Jr.
Robert Everett,

Inventor.
Richard Wilke.
By James L. Morris.
Att'y.

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7 SHEETS—SHEET 2.

Fig. 8.

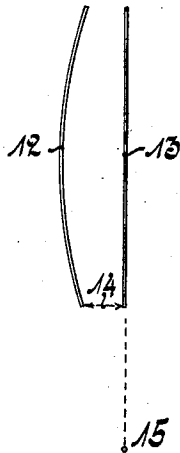


Fig. 9.

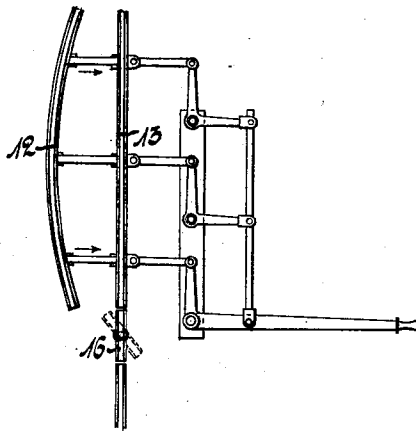
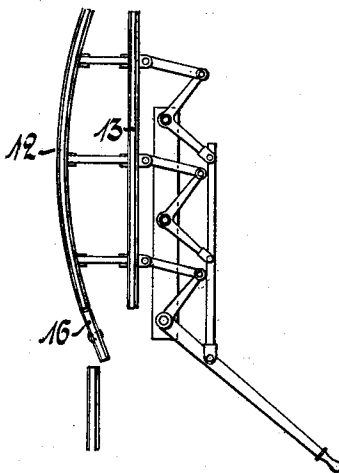
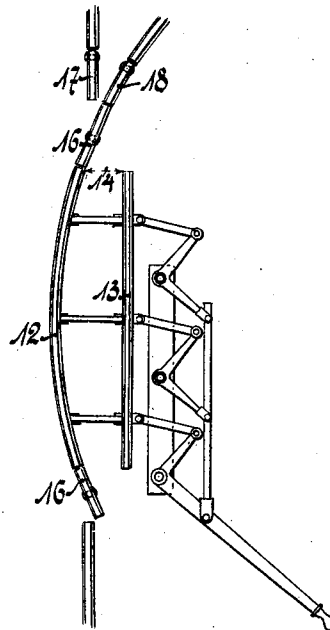


Fig. 11.

Fig. 10.



Witnesses:
James L. Norris
John K. Kuf

Inventor
Richard Wilke
By *James L. Norris*
Atty.

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7 SHEETS—SHEET 3.

Fig. 12.

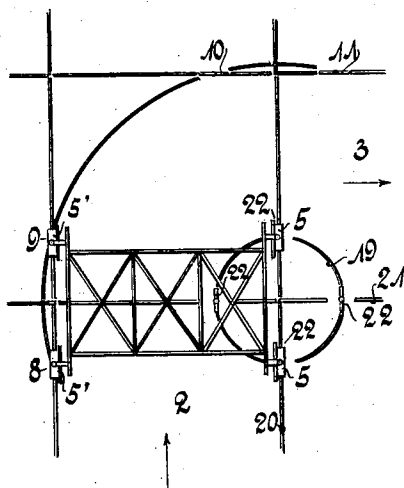


Fig. 13.

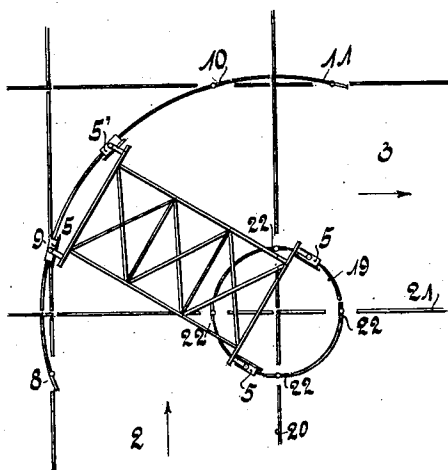


Fig. 14.

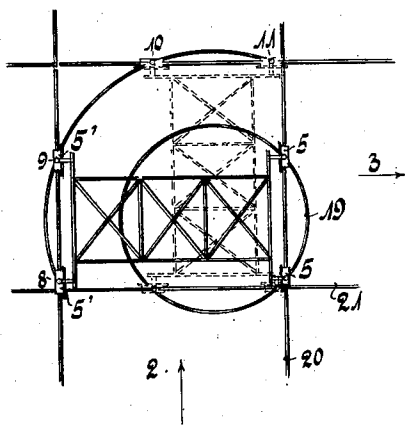
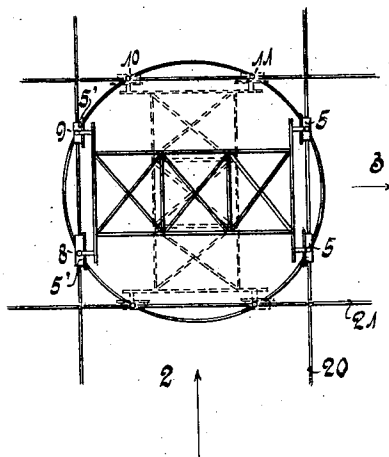


Fig. 15.



Witnesses.

James L. Norris, Jr.
Robert Everett,

Inventor.
Richard Wilke.
By James L. Norris.
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7 SHEETS—SHEET 4.

Fig. 16.

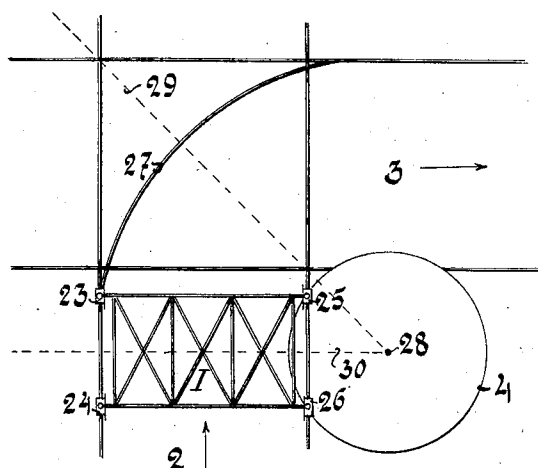


Fig. 16a.

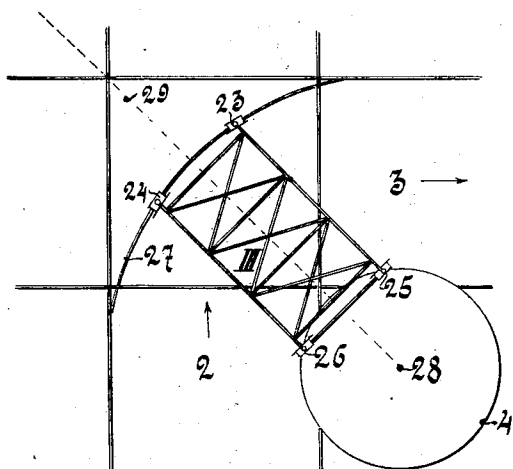
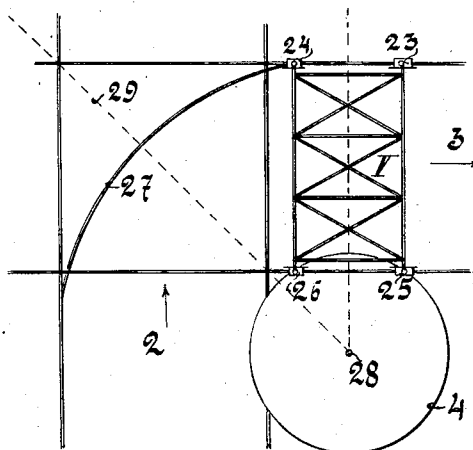


Fig. 16b.



Witnesses:

James L. Norris, Jr.
J. B. Keefe

Inventor
Richard Wilke
By James L. Norris
Atty.

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7 SHEETS—SHEET 5.

Fig. 17.

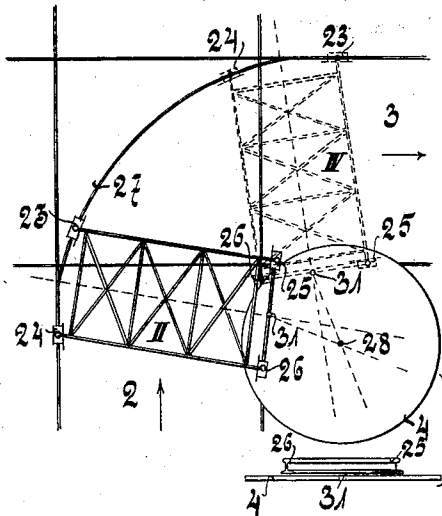


Fig. 19.

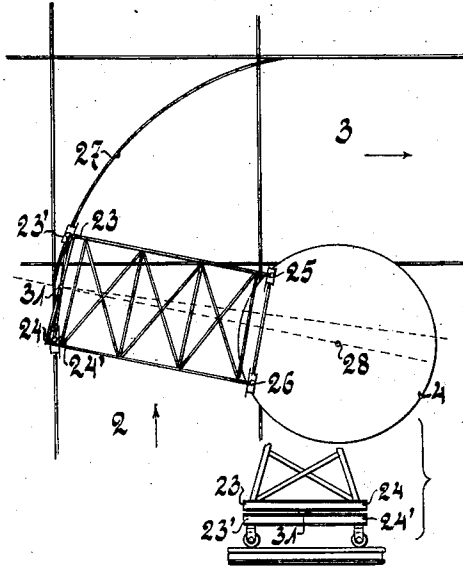


Fig. 18.

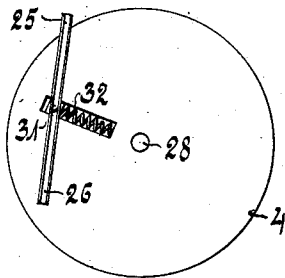
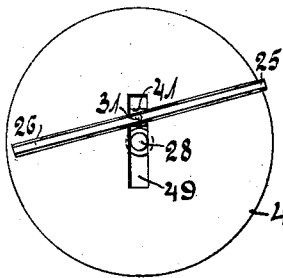


Fig. 25.



Witnesses:
James L. Norris, Jr.
For Invention

Inventor
Richard Wilke
By James L. Norris
Atty.

No. 758,399.

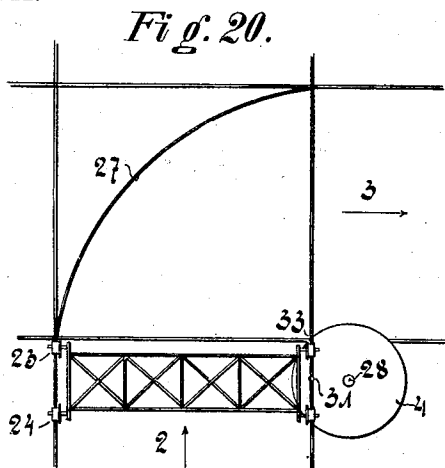
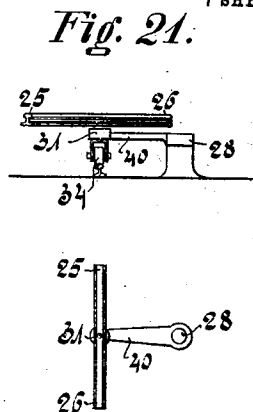
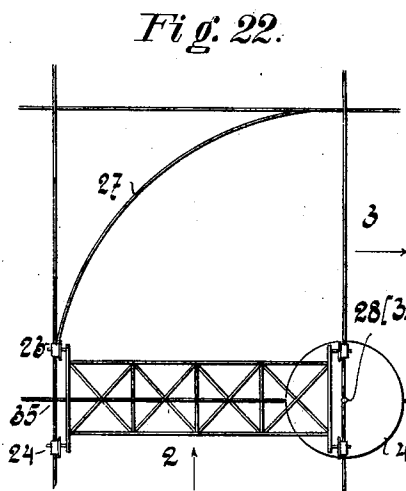
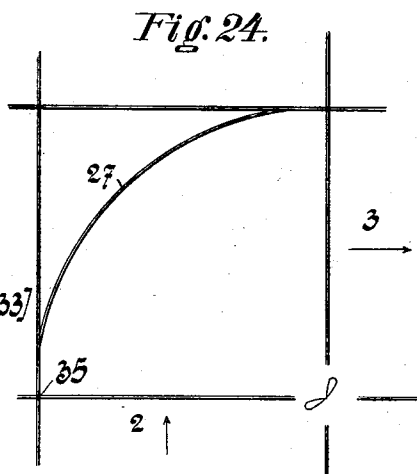
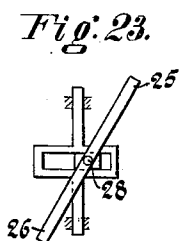
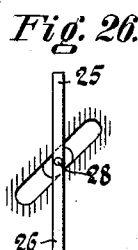
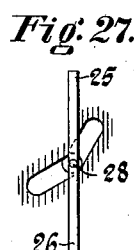
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7 SHEETS—SHEET 6.



Witnesses:
James L. Morris, Jr.
Robert Everett

Inventor,
Richard Wilke.
By *James L. Morris*
Att'y.

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7 SHEETS—SHEET 7.

Fig. 28.

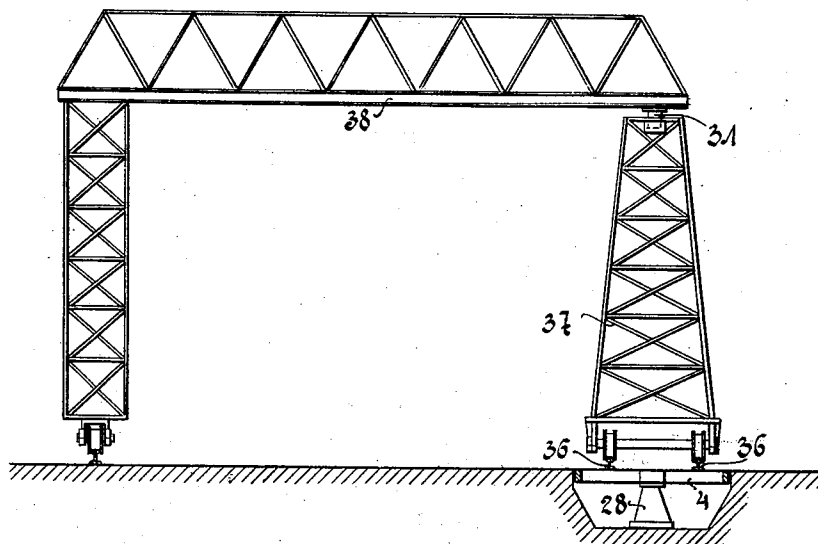
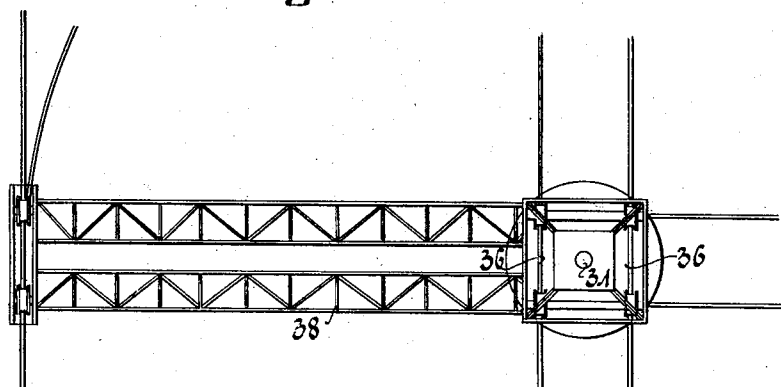


Fig. 29.



Witnesses.

James L. Norris, Jr.

Robert Smith,

Inventor,

Richard Wilke.

By James L. Norris,

Att'y.

UNITED STATES PATENT OFFICE.

RICHARD WILKE, OF BRUNSWICK, GERMANY.

TRACK OR THE LIKE FOR CRANES.

SPECIFICATION forming part of Letters Patent No. 758,399, dated April 26, 1904.

Application filed March 24, 1903. Serial No. 149,394. (No model.)

To all whom it may concern:

Be it known that I, RICHARD WILKE, engineer, a subject of the Emperor of Germany, residing at Brunswick, Duchy of Brunswick, Empire of Germany, have invented certain new and useful Improvements in and Connected with Tracks or the Like for Cranes, of which the following is a specification.

This invention has for its object an arrangement for altering the direction of movement of large articles traveling on rails, such as traveling cranes or the like, more particularly articles which extend considerably in one direction.

In the accompanying drawings, Figure 1 is a diagrammatic explanation of the above-mentioned problem; Figs. 2, 12, 16, 16^a, 16^b, 20, and 21, arrangements of the apparatus in different forms of construction; Fig. 3, different positions of the crane in an arrangement of the kind shown in Fig. 2. Figs. 4 to 11 are detail views. Fig. 13 represents the crane shown in Fig. 12 in a different position. Figs. 14 and 15 are modifications of the arrangement shown in Fig. 12. Figs. 17 and 19 are different positions of the crane shown in Figs. 16, 16^a, 16^b. Figs. 18, 22, 23, 25, 26, and 27 are detail views. Fig. 24 is a diagram showing the theoretical basis of the arrangements shown in Figs. 23, 25, 26, and 27. Fig. 28 is an elevation, and Fig. 29 a plan view, of the traveling crane.

If it be desired to move the crane 1, Fig. 1, by means of a turn-table from the rails 2 to the rails 3, this turn-table must, ordinarily speaking, have a larger diameter than the length of the crane, and in order to get over this the following arrangement is adopted:

A turn-table 4 is arranged at the crossing place of the inner rails, which turn-table is only large enough to afford room for the wheels 5 of one side of the crane 1. The two outer rails, however, are connected by an arc-shaped rail, along which the wheels 5' of the outside of the crane may travel. This curved rail cannot, however, connect tangentially with the straight track, as shown in Fig. 1, as the radius of this curved rail, as is easily evident

from Fig. 2, must not be equal to the track width of the crane; but taking the dotted line 6 as the track width of the crane and the dotted line 7 the distance of the center of both wheels of one side from one another it must amount to $\sqrt{6^2 + \frac{7^2}{(2)^2}}$. It follows from this

that the straight track cannot connect tangentially to this arc of a circle; but it must be situated relatively to it as shown in Fig. 2.

In order to enable the wheels of the crane to follow the straight or the curved rails, as may be desired, at the places 8, 9, 10, and 11, each wheel or, where instead of one wheel two such are employed, each group of wheels must be arranged on the crane so as to pivot on a vertical pin, and, further, at the said places switch-pieces capable of being deflected either by means of points or turn-tables must be provided for the passage or transfer of the crane-wheels, which switch-pieces need only to be movable through a small angle.

Figs. 3 and 4 show an arrangement of points for the crossing places 8 and 9. If the crane is to be brought from off the track 2, Fig. 2, onto the track 3, the two switches 8 and 9 are first placed in the manner shown in Fig. 3. The crane is then moved until the first wheel has passed over the switch 8. The switch 8 is then moved into the position shown in Fig. 4, and when the crane by being moved farther has reached the position shown in Fig. 5 the switch 9 is brought into the position shown in that figure. Inequalities in the width of the track must be compensated for by the wheels having sufficiently-wide treads or by making the axles displaceable longitudinally. The arrangements at the places 10 and 11, Fig. 2, may be similar.

Instead of switches turn-tables or switches pivoted at their center and swinging through a comparatively small angle may be employed, as stated. This arrangement is shown in Figs. 6 and 7 again for places similar to the places 8 and 9 in Fig. 2. Here the crane has traveled so far that the wheels have reached the positions 8 and 9 on the swinging rails there

indicated. These rails are then turned in the direction indicated by the arrows and assume the position shown in Fig. 7, thus allowing the crane to be deflected.

Fig. 8 explains the requirements of a subsidiary mechanism. As the curved rail 12 begins at a very acute angle in the direction of the straight rail 13 and on account of the wheel-flange the distance (dotted line 14) between the rails must not be too small, the point of section 15 of the tangent to be laid at the end of the curved rail 12 must lie comparatively far from the rail ends—that is to say, the movable rail must be of considerable length. In order to avoid this difficulty, the arrangement shown in Fig. 9 is adopted. The rail-sections 12 and 13 are connected with one another and arranged so as to be capable of being displaced transversely to the direction of the rails. This displacement may be effected by means of coupled elbow-levers, screws, or the like. The movable or deflectable rail 16 is made so short that, as in Fig. 7, it cannot fit against the curved rail by simple deflection. The rails 12 and 13, however, are displaced to the right, so that, as shown in Fig. 10, the correct connection is formed. The width of track determined by the curved rail must of course from the first be assumed to be to a certain extent greater in order that after the displacement shown in Fig. 10 it may be of the right size. Finally, a subsidiary arrangement must also be mentioned which may be employed at the places 9 and 10 of Fig. 2. By the precaution explained in Figs. 9 and 10 it is provided that the necessary distance 14 should be maintained between the rail ends 12 and 13; but the same is not the case as regards the opposite rail ends 17 and 18. These would come very closely together unless the length of the movable rail 16 were made very great and would not give the wheel-flanges sufficient room. It is therefore advisable to make the two ends like switches, so that they may be moved toward and away from the rail, as required. This arrangement is shown in Fig. 11.

In cranes or the like which are moved by mechanical means care is taken and a suitable mechanism is provided for throwing part of the same out of action, so that during the turning of the crane only the wheels traveling over the curved rail at one side of the crane are driven, while the wheels on the other side which are standing on the turn-table remain stationary.

Instead of employing a turn-table a similar rail arrangement may be also employed for the inner wheels as well as for the outer. This arrangement is shown in Fig. 12. The outer rail 8, 9, 10, and 11 is also used in this case. In addition, however, there is also a curved rail 19, lying in the center, through which the rails 20 and 21 of the straight track

run. Movable or pivoted rails are placed at the crossing places 22, and each of the two wheels 5 is pivotal on a vertical axis.

When the crane traveling on the track 2 in the direction indicated by the arrow has been brought into the position shown in Fig. 12, the wheels 5 are turned ninety degrees, together with the movable sections of rails belonging thereto, and then the entire crane is deflected, as indicated in Fig. 13. As regards the outer wheels 5', the method followed is the one indicated in Figs. 1 to 11. When the crane has been turned through the angle formed by the tracks 2 and 3, the wheels 5 are again turned ninety degrees on their vertical axes, after which the crane may travel on to the track 3. In place of separate wheels groups of wheels may of course here be employed, and in place of the movable rails 22 small turn-tables may be adopted.

The center point of the rail 19 of course does not necessarily lie at the point of intersection of the inner rails 20 and 21. It may, for instance, as shown in Fig. 14, be displaced outward, by which means the diameter of the circle will be of course enlarged. The outer arcs 8 9 10 11 must of course be described from the same center point. The two rectangles in Fig. 14 indicate the two positions of the crane.

If the center point be displaced farther outside, the diameter of the inner circle 19 will finally equal that of the outer 8 9 10 11—that is to say, both rail-tracks will lie on the same circle. Fig. 15 shows a diagram of this arrangement.

If it be desired to avoid the outer rail-arcs 8, 9, 10, and 11 crossing the straight track, turn-tables or movable rail-pieces must be employed at these places. This object may be obtained by a peculiar arrangement of the inner turn-table, which is as follows:

In Figs. 16, 16^a, and 16^b, 2 and 3 are the two tracks to be connected. As the necessary explanations are almost entirely of a geometrical nature, the drawings are made in a geometrical fashion. 23 24 25 26 show the points of support of a crane—that is to say, the points on which its wheels, assuming them in this instance to be four, rest on the rails. The position I, Fig. 16, is the one in which the crane is moving in the direction indicated by the arrow and from which it must commence its deflection into position V, Fig. 16^b. A curved rail 27 is first arranged so as to start from the point 23. The center 28 of the arc described by this curved rail is determined, on the one hand, by the line 29, bisecting the angle made by the two tracks, and, on the other hand, by the prolongation of the center line 30, connecting the wheel centers of the crane, which has reached the end of its straight course and is commencing the deflecting or turning movement, (position I in Fig. 16.)

The semidiameter of the curved rail 27 thus appears as the hypotenuse of a right-angled triangle from the distance between the point of rotation 28 and the outer rail and the half-distance between the wheels of the crane (23 and 24). The point 28 is also the point of

rotation of a turn-table 4, which carries a section of rails 25 and 26, on which the wheels which correspond to the points 25 and 26 rest.

If the crane be deflected with its wheels 23 and 24 on the curved rail 27 and is turned until both wheels 23 and 24 stand thereon, (the position III, Fig. 16^a, is the one in which the crane has already reached the middle of the curved rail 27,) the turn-table 4 turns of itself, whether it is assisted by an outside force or not, in conjunction with the wheel-line 25 26, and the geometrical position of the parts relative to the point of rotation 28 corresponds exactly to position I, Fig. 16, so that no difficulty in moving exists. When, later on, the pair of wheels 23 and 24 have, as shown in position V, again quitted the curved rail 27 and both wheels stand on the straight rail of the track 3, the relative position of the crane to the turn-table is again similar to what it was in positions I and III. Difficulties, however, result in the transfer positions where one wheel of the pair of wheels 23 24 rests on the straight rail and the other on the curved rail 27. In this case, which is shown in Fig. 17 by two examples, (positions II and IV,) the prolongation of the center line 30 does not go through the point of rotation 28, but an alteration of direction takes place at 31. In order to allow of this, the rail 25 26 is not firmly connected with the turn-table 4, but a pivot is arranged at 31, on which the rail 25 26 can turn. A more exact geometrical examination shows us, however, that in this position II and the equivalent positions the point 31 no longer lies exactly on the original circle described round the point 28, but that this radius during the period in question is somewhat diminished. In order to allow for this, the pin assumed to be on the rail 25 26 is located in a prismatic guide—for instance, in a slot in the turn-table 4, as shown in Fig. 18. The return of the pin 31 into its initial position may be insured by means of a spring—for instance, a spiral spring 32. In this manner the transfer of the crane from the track 2 to the track 3 is effected without difficulty.

In certain dimensions the alteration of the diameter is so small that it may be compensated for by the elasticity of the pins and the play of the wheels on the rails, and in such a case the displaceable mounting of the pin 31 may be dispensed with. The point of rotation 31 may also be placed on the other side of the crane, as indicated in Fig. 19, the crane-foot 23 24 resting with a pivot 31 on the wheel-frame 23' 24' or the upper crane-beam being pivotally connected with the crane-foot.

Fig. 20 shows a modification of the arrangement hereinbefore described. The crane here commences its deflecting motion only when it has reached a position on track 2 in which the inner rail of track 3 cuts it. The ordinates of the point of rotation 28 from the point 33 of intersection of the inner rails are here equal to half the wheel distances $\frac{25\ 26}{2}$.

The turn-table 4 is of course in this case preferably smaller. A turning arm 40 may also be employed instead of the turn-table 4, as is shown in elevation and plan view in Fig. 21, which arm connects the pivots or axes of rotation 28 and 31. Means (roller 34) are preferably provided for supporting the pivot 31, and, if necessary, runners supporting the rails 25 and 26 may also be provided.

If the points of rotation 28 and 31 coincide entirely with the point 33 of intersection of the rails, Fig. 22, care must be taken to provide for the adjustability of the pivot. This can take place, as indicated in Fig. 23, by locating the pivot 28 of the turn-table in such a way as to be displaceable in two directions, so that it can follow during the period in question the course described by the wheels 23 and 24, as is shown in Fig. 24. This track consists of two loops, one projecting into the track 3, which is to be reached by the wheels, and the other into the track 2, quitted by the wheels. The forward-directed branch of the first named will run from the point 28 when the point 23 of the crane, Fig. 22, is on the curved rail 27 and the point 24 still on its straight rail, but has not reached the point 35, at which it cuts the prolongation of the inner rail of the second track 3. The rear branch of this loop is described by the point 28 when the point 24, Fig. 22, has passed the point 35. From the moment in which the point 24 of the crane reaches the point 23, Fig. 22, of the rail the point 28 remains stationary in the center of the loop until the point 23 of the crane has quitted the curved rail, whereupon the loop projecting into the track 2 is run through in the reverse succession to what was previously described.

Fig. 25 shows an arrangement in which the displaceability of the rail 25 26 is made possible by arranging in the disk 4, which rotates on the pin 28, a slot 49 or other suitable slide-track, in which the pivot-pin 31 of the rail 25 26 may be displaced by means of a slide-block 41, in which said pin 31 is mounted. In the positions I, III, and V of Figs. 16, 16^a, and 16^b these two pins stand vertically one above the other. In the transfer positions II and IV, Fig. 17, the pivot 31, however, is displaced by the turning of the part 4.

By suitable dimensions of and suitable free play in the treads of the wheels it will suffice to arrange the pivot 28 so as to be capable of being displaced in the main extension of the curve of Fig. 24, as shown in Fig. 26, or,

what is preferable, the loop-shaped curves, as indicated in Fig. 27, with the displaceability toward the two main extensions.

A practical modification of the arrangement shown in Fig. 25 is indicated in elevation and plan view in Figs. 28 and 29. The part 4 here assumes the form of a turn-table with rails 36. The practical equivalent of the sliding block 41 in Fig. 25 is here formed by the foot of the crane 37, which is provided with wheels, and a link-pivot 31 is here arranged at the upper end of the frame 37 in such a way that the bridge 38 of the crane can be turned about the frame 37.

I declare that what I claim is—

1. In tracks and the like for cranes and the like, a plurality of angle-tracks, and means to turn the inner wheels of the crane.

2. In tracks and the like for cranes and the like, a plurality of angle-tracks, and an element to turn the inner wheels of the crane, the center of said element being located on a line drawn through the angles of said tracks.

3. In tracks and the like for cranes and the like, a plurality of angle-tracks, and a rotatable element to turn the inner wheels of the crane, the center of said element being located on a line drawn through the angles of intersection of said tracks.

4. In tracks and the like for cranes and the like, a plurality of angle-tracks, and a pivoted element to turn the inner wheels of the crane, the fulcrum of said pivoted element being located on a line drawn through the angles of intersection of said tracks.

5. In tracks and the like for cranes and the like, a plurality of angle-tracks, means to turn the inner wheels of the crane, and means to compensate for lateral movement of the crane.

6. In tracks and the like for cranes and the like, a plurality of angle-tracks, an element to turn the inner wheels of the crane, the center of said element being located on a line drawn through the angle of intersection of said tracks, and means to compensate for lateral movement of the crane.

7. In tracks and the like for cranes and the like, a plurality of angle-tracks, a rotatable element to turn the inner wheels of the crane, the center of said rotatable element being located on a line drawn through the angles of

intersection of said tracks, and means to compensate for lateral movement of the crane.

8. In tracks and the like for cranes and the like, a plurality of angle-tracks, a pivoted element to turn the inner wheels of the crane, the fulcrum of said pivoted element being located on a line drawn through the angles of intersection of said tracks, and means to compensate for lateral movement of the crane.

9. In tracks and the like for cranes and the like, a plurality of angle-tracks, and arc-shaped tracks combined with said angle-tracks to aid in turning the crane and to compensate for lateral movement thereof.

10. In tracks and the like for cranes and the like, a plurality of angle-tracks, laterally-movable arc-shaped track-sections combined with said angle-tracks to aid in turning the crane and to compensate for lateral movement thereof.

11. In tracks and the like for cranes and the like, a plurality of angle-tracks, arc-shaped track-sections combined with said angle-tracks to aid in turning the crane, and movable track-sections located between the angle-tracks and the arc-shaped sections.

12. In tracks and the like for cranes and the like, a plurality of angle-tracks, arc-shaped tracks combined with said angle-tracks to turn the outer wheels of the crane and to compensate for lateral movement thereof, and means to turn the inner wheels of the crane.

13. In tracks and the like for cranes and the like, a plurality of angle-tracks, means to turn the outer wheels of the crane, and means independent of said first-mentioned means to turn the inner wheels of the crane.

14. In tracks and the like for cranes and the like, a plurality of angle-tracks, means to turn the outer wheels of the crane and to compensate for lateral movement thereof, and means independent of said first-mentioned means to turn the inner wheels of the crane.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

RICHARD WILKE.

Witnesses:

WILHELM LEHNKE,
JULIUS SECKEL.