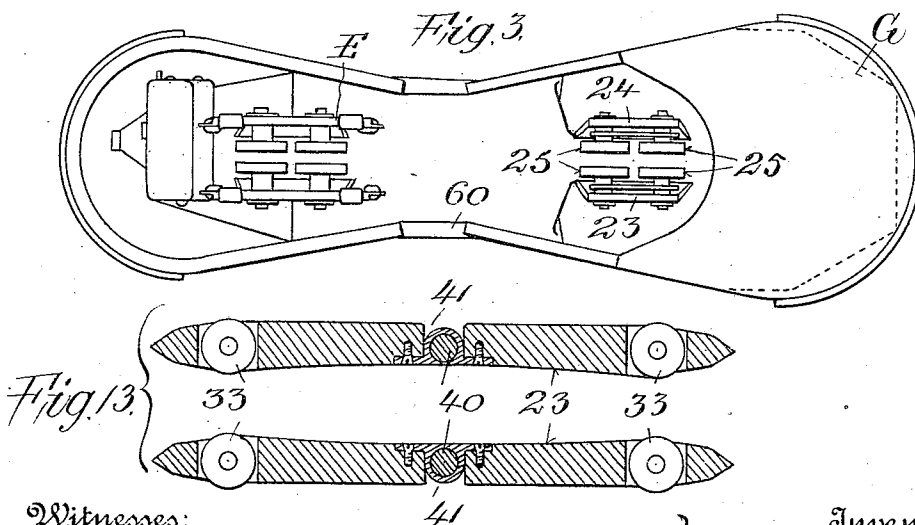


POWER DRIVEN TROLLEY FOR FIXED TONGUE SWITCH TRACK SYSTEMS.

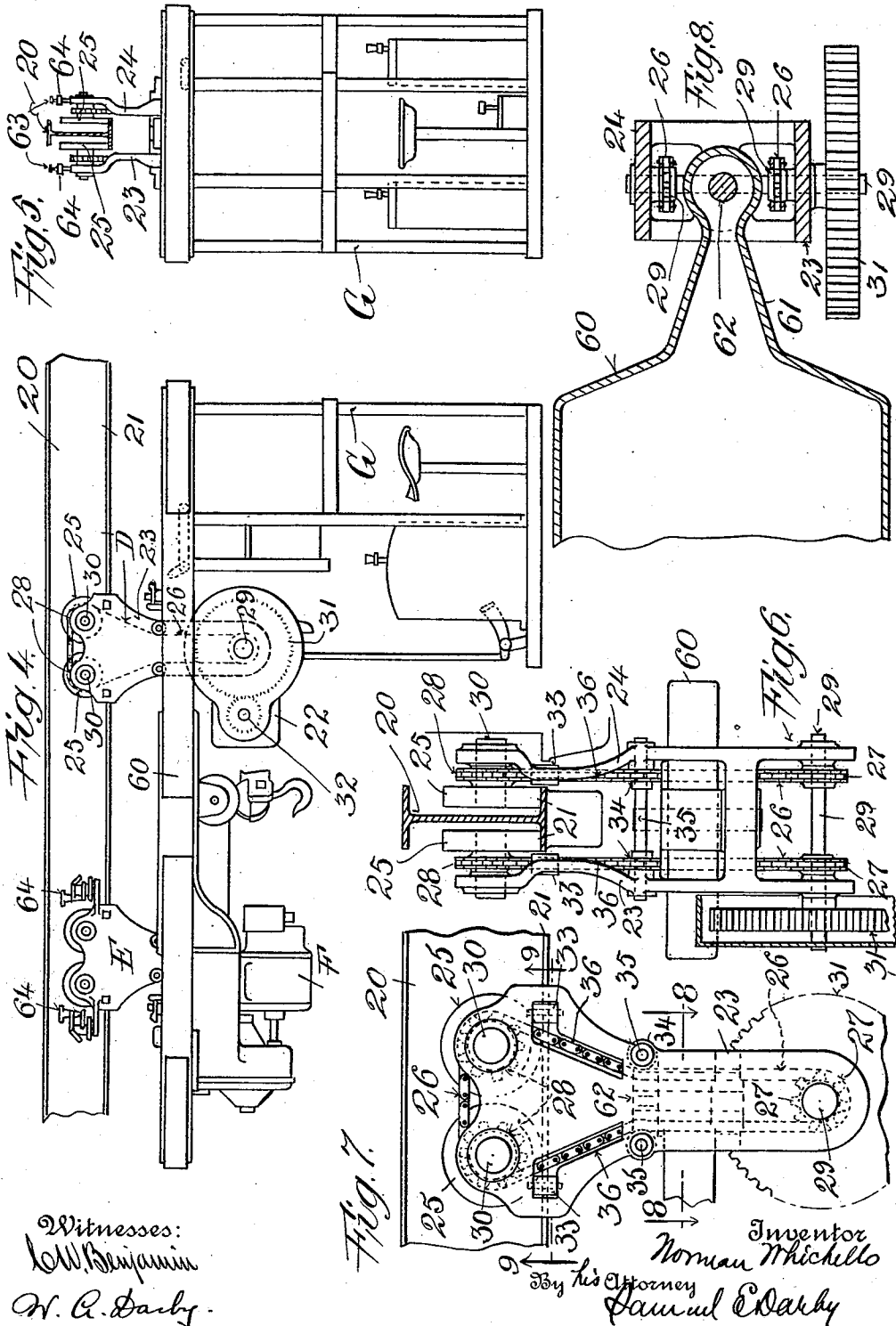
Patented June 10, 1913.

1,064,411.



Norman Whitchello Inventor
By his Attorney Samuel C. Darby

N. WHICHELLO.
 POWER DRIVEN TROLLEY FOR FIXED TONGUE SWITCH TRACK SYSTEMS.
 APPLICATION FILED DEC. 13, 1912. Patented June 10, 1913.
 1,064,411. 3 SHEETS—SHEET 2.



Witnesses:
 W. Benjamin
 H. C. Darby.

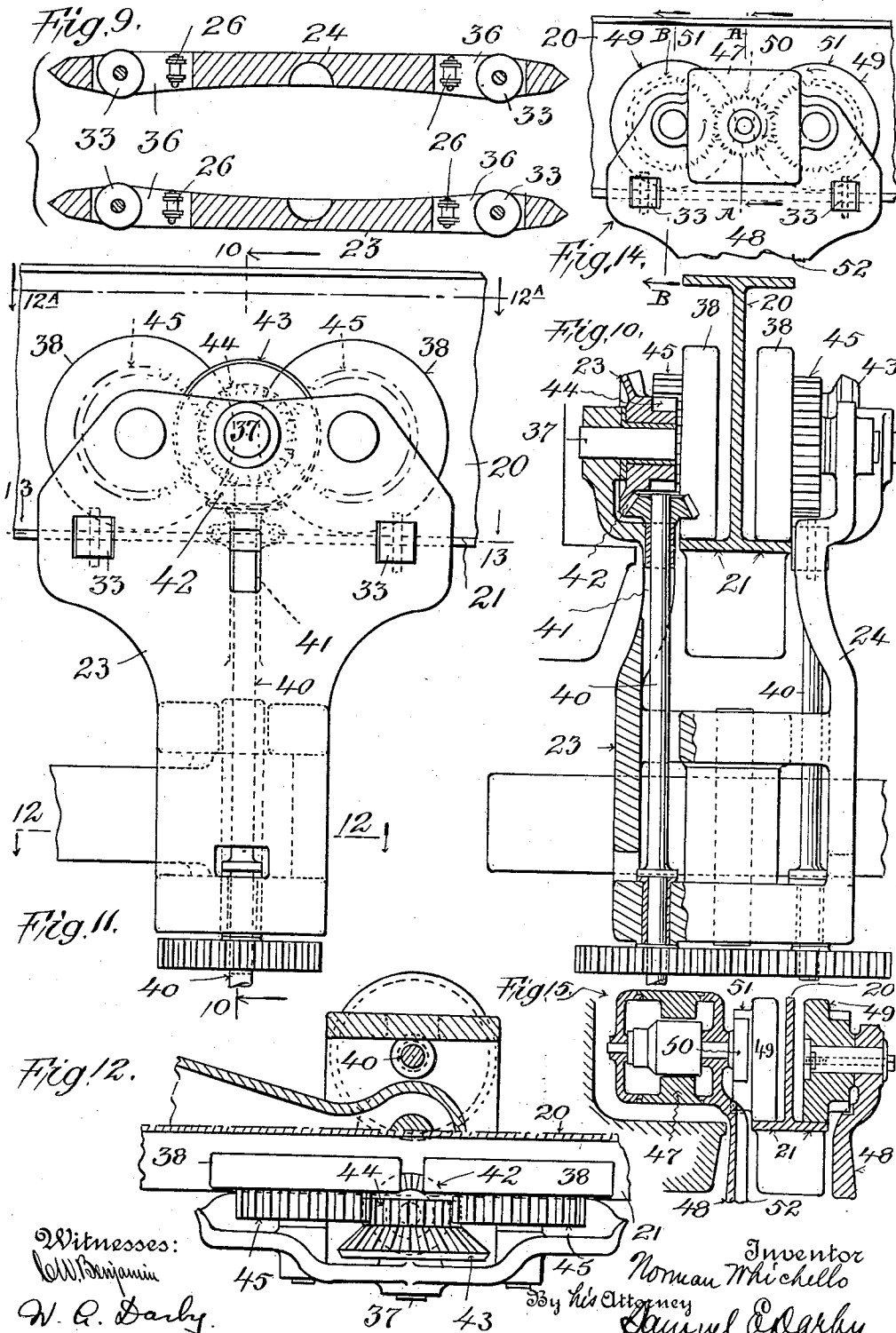
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UNITED STATES PATENT OFFICE.

NORMAN WHICHELLO, OF MUSKEGON, MICHIGAN.

POWER-DRIVEN TROLLEY FOR FIXED-TONGUE-SWITCH TRACK SYSTEMS.

1,064,411.

Specification of Letters Patent.

Patented June 10, 1913.

Application filed December 13, 1912. Serial No. 736,550.

To all whom it may concern:

Be it known that I, NORMAN WHICHELLO, a subject of the King of England, residing at Muskegon, county of Muskegon, State of Michigan, have made a certain new and useful Invention in Power-Driven Trolleys for Fixed-Tongue-Switch Track Systems, of which the following is a specification.

This invention relates to power driven trolleys, and particularly to trolleys of this nature designed for use over track systems employing fixed tongue switches.

The object of the invention in its broadest statement is to provide a power driven trolley for operation over or along a track system employing fixed tongue switches.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings:—Figures 1 and 2 are diagrammatic top plan views showing an arrangement of fixed tongue switch in a track system, and the relation of the truck sides while passing through the switch slots. Fig. 3 is a top plan view of one form of power driven trolley embodying my invention, and designed for use in connection with a fixed tongue switch structure in the track system. Fig. 4 is a side elevation of the construction shown in Fig. 3. Fig. 5 is an end view of the same. Fig. 6 is a view in end elevation on a larger scale than Figs. 3, 4 and 5, showing one form of drive gearing for the truck wheels embodying and embraced within the scope of my invention. Fig. 7 is a side view of the construction shown in Fig. 6. Fig. 8 is a view in section on the line 8, 8, Fig. 7, looking in the direction of the arrows. Fig. 9 is a view in section on the line 9, 9, Fig. 7, looking in the direction of the arrows. Fig. 10 is a view partly in end elevation, and partly in transverse section on the line 10, 10, Fig. 11, showing another form of gearing for driving the truck wheels included within the scope of my invention. Fig. 11 is a view in side elevation of the same. Fig. 12 is a view partly in section on the line 12, 12 and

partly in section on the line 12^A, 12^A, Fig. 55 11. Fig. 13 is a view in section on the line 13, 13, Fig. 11. Fig. 14 is a view in side elevation showing a modified arrangement of driving motor with reference to the truck frame carrying it, and embraced within the 60 spirit and scope of my invention. Fig. 15 is a view in section, the left half on the line A, A, Fig. 14, and the right half on the line B, B, Fig. 14.

The same part is designated by the same 65 reference sign wherever it occurs throughout the several views.

In shops, factories, warehouses, stores, and the like, it is a common expedient to employ movable trolleys, operating along 70 an overhead track system, for the convenient handling and transportation from one point to another of the goods, machinery, or other articles. The overhead track systems employed for this purpose are provided with 75 switches to enable the trolleys employed for transporting and handling the goods, and which operate along the overhead track system, to pass from one to another of the track rails at intersections and junctions of 80 main and branch tracks. The trolleys employed in connection with such systems are ordinarily of two general types, namely, "push travel" and "power driven." The push travel trolleys are usually of simple 85 structure and are propelled along the track system by the attendant simply pushing on the load suspended from the trolley, or pushing on the suspending devices of the trolley when there is no load. The power 90 driven trolleys, however, are power operated and are commonly propelled by a motor usually carried by the truck frame, and suitably geared to the truck wheels which operate along the overhead track system. It is 95 obvious that hand power may be employed to drive the truck wheels, and therefore by the term "power driven" I include any arrangement in which the truck wheels are rotated to drive the same and to propel the 100 trolley along the track system whether by motor power or hand power as distinguished from the arrangement wherein the propelling power is applied by merely pushing the trolley along the track system. The track 105 switches employed are also usually of two general types, namely, "movable tongue" and "fixed tongue" type. In the case of

“movable tongue” switches the difficulty is encountered of shifting the switch tongue when it is desired to permit the trolley, whether of the “push travel” or of the “power driven” type, to pass from one track rail to a branch of the track system. This, in practice, is objectionable. It frequently delays the operation of the trolleys, and, besides, it increases the expense of the track system, in the installation and maintenance thereof, as well as care and attention to properly throw the switch tongues. In the case of fixed tongue switches these objections are obviated since there is no part of the switch to be moved, and the trolleys operate past and through the switches without special care or attention, without interruption, and moreover, the structure is more simple and easily and economically applied. In the case of “push travel” trolleys no special difficulty is encountered with fixed tongue switches since the side members of the truck frame which depend below the track and support the hoisting devices and load may easily be made of such dimension as to thickness as to be capable of readily passing through the slots of the fixed tongue switch structure. In the case of power driven trolleys, however, difficulty is encountered by reason of the necessity for the driving connections from the motor to the driven trolley wheels, as well as the current supply conductors to the motor, also to pass through the switch slots when the motor is suspended on the truck frame below the track. Difficulty is also encountered in the use of power driven trolleys with fixed tongue switches of overhead track systems when the driving motor is placed above the track on which the trolley operates, for the reason that sufficient strength of trolley side plates, and accommodation for current supply conductors must be provided at the points thereof which pass through the switch slots.

It is among the special purposes of my present invention to provide a construction of power driven trolley for use in connection with an overhead track system wherein fixed tongue switches are employed and I have shown various arrangements of the driving motor, and also various forms of gearing connections between the motor and truck wheels to be driven, as illustrating the broad scope of my invention as defined in the claims.

In the drawings 20, designates the track rail of an overhead track system. In the form shown, to which, however, in its broadest scope, as defined in the claims, my invention is not to be limited or restricted, the track rail is in the form of a flanged beam of the I-beam type, upon the lower flanges 21 of which the trolley wheels operate.

In Figs. 3, 4 and 5, I have shown my in-

vention as applied in a structure in which the motor is suspended beneath the flange of the track on which the trolley wheels operate. In this construction the motor, which may be of any suitable, convenient or desirable type or construction is shown at 22, as an electric motor and is carried in the side plates 23, 24 of the truck frame below the flange 21 of the track rail on which the truck wheels 25, operate. In this instance I have shown the truck provided with two pairs of wheels, one pair on each side of the web of the track rail, but it is to be understood that my invention is not to be limited or restricted in this respect. These wheels are shown as journaled upon short fixed shafts or axles secured in the truck side plates 23, 24 but it will be understood that my invention is not to be limited or restricted in this respect.

As above indicated and defined the truck wheels are power driven whether by hand or motor. It is obvious that many specifically different structures of drive gearing may be employed. My invention, therefore, is not to be limited or restricted in this respect. Where a motor drive is used any suitable or convenient form of gearing intermediate the motor and the truck wheels for driving the latter may be employed. In Fig. 4, I have shown a form of drive consisting of sprocket chains 26, see Figs. 6, 7, 8 and 9. These chains operate over sprocket wheels 27, 28, carried respectively, by shaft 29, journaled in the side frames 23, 24 of the truck and the axles 30, of the truck wheels. A gear wheel 31 is mounted on shaft 29, and is driven through an intermeshing gear 32, from the motor.

In practice I prefer to provide the truck side plates 23, 24, with means to engage the sides or edges of the switch slots and the track flanges 21, in order to guide the truck when passing through the switch and when running on the track. Said engaging and guiding means may take any suitable or convenient form. As shown, they are in the form of roller 33, suitably journaled on vertical axes in the truck frame side plates, and, in operation, bear laterally against the edges of the switch slots or openings, as shown most clearly in Figs. 1 and 2, presently to be referred to and described, or against the edges of the track flanges.

Where more than one truck wheel is employed on each side of the track rail and all of said wheels on the same side of the track rail are driven by the same sprocket chain, it may be found desirable to employ suitable guides to properly deflect the runs or legs of the sprocket chains. I have shown deflecting guides for this purpose in the form of wheels 34, mounted upon shafts 35 carried at their ends in the truck side plates 23, 24. Of course it will be understood that in some

In Figs. 3, 4 and 5, I have shown my in-

cases deflecting guides will be unnecessary since it may sometimes be convenient for the legs or runs of the sprocket chains to be straight from the sprocket wheels 27 on shaft 29 to the sprocket wheels on the truck wheels.

In order that the trolley may readily and easily pass by the track switch, and particularly where a driving motor is employed and is carried by the truck frame at a point below the track rail flanges on which the trolley wheels operate, it is necessary not only that the truck frame side plates pass readily through the slots of the switches but also that the driving connections intermediate the underhung motor and the truck wheels, as well as the current supply conductor connections should pass through the switch slots without difficulty. Herein lies the difficulty which my present invention overcomes. Referring to Figs. 1 and 2, let us assume that A and B, are the proximate ends of alined track rails, and C, the proximate end of a branch track rail, and that said track rail ends are provided, respectively, with the fixed tongues D, E and F. In practice these tongues are positioned with reference to each other to provide the openings or passages G, H therebetween, which should be as narrow as possible, in order to insure an adequate support of the truck as a whole during the passage of individual truck wheels over or across the switch openings when they are without support. The open spaces between the vertical webs of the switch tongues must, of course, be large enough to permit the passage therethrough of all truck parts above the switch tongue level. The larger the parts which have to pass through the switch openings the wider these switch openings must be. The wider these openings the greater must be the cantaliver lengths of the switch tongues measured from the end edges of their vertical webs to the extremities of the tongues. The greater this cantaliver length of the switch tongues, the greater, of course, will be the bending strains imposed thereon when the trolley and its load passes thereover. To enable the switch tongues to resist said bending strains it becomes necessary to increase the cross-sectional area of the tongues. Thus, it will be seen that in order to enable the motor and truck parts to pass through the track switch openings, where fixed tongue switches are employed, it is not only necessary to increase the lengths of the tongues but also their size or cross sectional dimensions, thereby necessitating an expensive heavy and cumbersome switch structure which is objectionable and undesirable. To avoid these and other objections, I propose, in one form of my invention to drive the truck wheels from a motor suspended by the truck frame below

the track rail, through suitable gearing connections, and in order to permit the gearing connections intermediate the motor and truck wheels to readily pass through the openings of the fixed tongue switch, I propose to confine said gear and conductor connections intermediate the side surfaces of the truck side plates or members. And, where an underhung electric motor is employed and is supplied with current from a line conductor positioned above the track rail or its track flanges, through current supply connections, it is also necessary that these be also so accommodated as to enable them to readily pass through the switch slots. Since these slots should be of as small dimensions as possible, I have conceived the idea of accommodating the truck wheel drive gearing whatever may be the form of such gearing, and also the motor current supply connections, when desired or required, as in the case of an underhung electric motor, as well as the truck side plates, within the confines of the restricted space limits or dimensions of the switch slots. Herein lies the great merit of my invention and in carrying out this conception, I form the truck side plates with vertical slots or openings, indicated at 36, which extend from a point below the rail flange to a point above the same, and the truck wheel drive gearing as well as the conductor connections are accommodated within these openings, thereby bringing said driving and conductor connections within the space of the thickness of said truck side plates and consequently within the confines of the side surfaces of said plates. It will, of course, be understood that it is not necessary for the slot or channel 36 to penetrate clear through the side plates. The essential feature is that such a slot or channel is formed in the truck side plates as will receive and afford a sufficient space to accommodate therein the truck wheel drive, and the motor current supply connections, and within the space limitations of the switch openings, thereby not only enabling such connections to readily pass through the switch slots but also protecting them from the danger of being caught by the sharp points of the switch tongues while the truck is passing through the switch.

In the construction above described the gearing intermediate the motor and the truck wheels is in the form of sprocket chains, said chains operating over sprocket wheels mounted respectively upon the motor driven shaft 29, and the truck wheels, said chains, or the legs or runs thereof, passing through the slots or channels 36 in the side plates 23 and 24 of the truck frame particularly at the vicinity of the rail track flanges 21, so as to lie between the planes of the side surfaces of said plates.

My invention, however, in its broadest scope, as defined in the claims, is not limited or confined to this particular form of gearing for driving the truck wheels, as other forms may be equally well adapted for such use. Thus, in Figs. 10, 11, 12 and 13, I have shown a form of shaft drive which is within the scope of my invention and wherein shafts 40 are driven by any suitable form of gear connection from the motor, said shafts being journaled in suitable bearings in the truck side plates 23, 24 and lying within the slots or openings 41, therein which are in essential respects similar to the slots 36, above described. These shafts 40, are gear connected in any suitable manner to the trolley wheels 38. A simple gear connection is shown wherein each shaft 40 is provided at its upper end with a bevel gear 42, arranged to mesh with and drive a bevel gear 43 mounted on a short fixed pin 37, and which bevel gear is formed with spur gear teeth 44, arranged to mesh with and drive the gear 45 connected to the truck wheels 38. It is obvious that other forms of drive gearing may be equally well adapted for this purpose.

Of course it will be understood that ordinarily the truck wheels on both sides of the track rail are to be driven, and consequently the drive gear connections are arranged accordingly.

In the constructions above described the driving motor is shown, as carried on the truck frame below the track rail. While this arrangement, which I have referred to as an underhung motor, is, for many reasons, deemed the best and most practical, my invention is not to be limited or restricted in this respect, as the motor may be located above the level of the track rail flanges on which the truck wheels operate and still fall within the spirit and scope of my invention as defined in the claims. Such an arrangement of motor is shown in Figs. 14 and 15, wherein the motor 47 is shown as constructed, in part, integral with the truck side plate 48. The truck wheels 49 are driven from the motor through any suitable or convenient form of gearing such as the intermeshing gears 50, 51. In this case the side plate 48 is provided with a channel or slot 52, to accommodate the wires or conductors required to connect the motor with the controller (not shown) which would naturally be located at a convenient point below the track rail. While it is obvious that the wheels on both sides of the track rail may be motor driven, the driving motor may be dispensed with on one side if desired.

It will be understood that the load to be carried may be suspended from the truck frame. In some cases it may be desired to employ hoisting mechanism for raising the

load, the hoisting mechanism being carried by the truck frame. In such case it is obvious that any suitable form of hoisting devices and appliances such as are ordinarily employed in apparatus of this nature may be used. It will also be understood that the truck wheel driving motor may be controlled from any convenient point as above indicated, and that instead of suspending the load or hoisting it directly from the truck frame, a trailer truck frame carrying the hoist may be employed. Of course it will be understood that the hoist may be carried in any suitable or convenient manner and in this respect, my invention is not to be confined to the particular arrangement shown. In Figs. 3, 4 and 5, I have shown an arrangement embodying these features. In this arrangement as shown the apparatus consists of the driving truck D, the trailing truck E, the main trolley frame 60 which may include, as well, the hoisting mechanism F and the cage G, for the operator and the control mechanism. The driving truck in this case is attached to the main frame 60 of the trolley in such manner as to be capable of swiveling relatively thereto through a limited angle. This arrangement is shown in Figs. 7 and 8, wherein the main trolley frame 60 is provided with a neck 61, is journaled upon a vertical pin 62, of the trolley frame and which constitutes a swivel connection therefor. The trailing truck may also be connected to the main trolley frame 60, in a manner which will permit relative swiveling, and the cage G may be carried in any convenient manner, as, for instance, by attachment to the frame 60.

The current for operating the motor may be supplied from any convenient source and the conductor therefor located in any convenient position. Ordinarily, where the track rail is an I-beam and the truck wheels operate along the lower flanges thereof, the main conductor is located above the track flanges. In Fig. 5, I have shown the current conductors 63, in cross section and with which contact the collectors 64, which are connected by supply conductors to the motor or the motor controller in the manner above described.

It will be understood that the trailing truck, hoisting mechanism and cage are not essential features of my invention.

Having now set forth the object and nature of my invention, and various constructions embodying the principles thereof, what I claim as new and useful, and of my own invention, and desire to secure by Letters Patent of the United States is,—

1. The combination with an overhead track rail system having a fixed tongue switch therein, of a trolley truck having wheels to operate along the track system

and through said switch, and means, also arranged to pass through the switch for driving said wheels.

2. The combination with an overhead I-beam track system having a fixed tongue switch, of a trolley truck having wheels to operate along the flange of the said I-beam track system, a motor carried by said truck and means operated thereby and arranged to pass freely through the switch for driving said wheels.

3. The combination with an overhead track system having a fixed tongue switch, of a trolley truck having wheels to operate along said track system, a propelling motor carried by the truck below the level of the switch tongues, and means arranged to pass freely through the switch driven by said motor for driving said wheels.

4. The combination with an overhead track system having a fixed tongue switch, of a trolley truck having a side plate arranged to pass freely through the switch openings, a motor carried by said truck, a truck wheel carried by said side plate and operating along the track system, and means also arranged to pass freely through the switch openings and operated by the motor for driving said wheel.

5. The combination with an overhead track system having a fixed tongue switch of a trolley truck including a side plate adapted to pass freely through the switch openings, wheels carried by said plate and arranged to operate along said track system, a motor carried by the truck, and means intermediate the motor and truck wheels and also arranged to pass freely through the switch openings to drive the truck wheels.

6. The combination with an overhead track system having a fixed tongue switch, a truck frame including a side plate adapted to pass freely through the switch openings, and having wheels to operate along said track system, said plate having a channel or slot therein, a motor and means intermediate said motor and wheels for driving the latter, said means being accommodated in said slot or channel.

7. The combination with an overhead track system having a fixed tongue switch, a truck including a side plate arranged to pass freely through the switch openings and having wheels to operate along said track system, a motor carried by the truck beneath the track system, and means between the motor and truck wheels for driving the latter, said driving means lying in the plane of said side plate where it passes through the switch opening.

8. The combination with an overhead I-beam track rail having a track flange at its lower edge and a fixed tongue switch, a truck having wheels to operate along said track flange, a motor carried by

the truck beneath said track flange and means arranged to pass freely through the fixed tongue switch openings for driving the wheels from the motor.

9. The combination with an overhead I-beam track rail having a fixed tongue switch, a truck having wheels to operate along the lower flanges of said rail, a motor carried by the truck, and means operated by the motor for driving said wheels, said means arranged to pass freely through the fixed tongue switch openings.

10. The combination with an overhead track system having a fixed tongue switch, a truck having wheels to operate along said track system, a motor carried by the truck beneath the track system, and chains driven by the motor for driving said wheels, said chains arranged to pass freely through the fixed tongue switch openings.

11. The combination with an overhead track system having a fixed tongue switch, a truck including a side plate arranged to pass freely through the switch openings and having truck wheels to operate along said track system, a motor carried by the trolley beneath the track system, and chains driven by the motor for driving said wheels, said chains located within the plane of said plate for a portion of its length.

12. The combination with an overhead track system having a fixed tongue switch, of a truck having wheels to operate along said track system, a main frame, said truck having swivel connections with the main frame, a motor carried by the truck and located below the track system, and means arranged to pass freely through the switch openings and driven by the motor for driving said wheels.

13. The combination with an overhead track system having a fixed tongue switch, of a driving truck having wheels to operate along said track system, a main frame, said truck having swivel connections with said main frame, a trailing truck also connected to the main frame, a motor carried by the driving truck and means arranged to pass freely through the switch openings and operated by the motor for driving said wheels.

14. The combination with an overhead track rail system having a fixed tongue switch therein, of a truck having wheels to operate along the track system, said truck having a side plate arranged to pass freely through the openings of the switch, said plate having a slot or channel therein, a motor for driving said wheels and a current conductor carried by the truck and located in said slot or channel for supplying current to the motor.

15. The combination with an overhead track rail having a fixed tongue switch, of a truck having wheels to operate along the

track rail, a motor supported beneath the track system by the truck, for driving said wheels and means arranged to pass freely through the fixed tongue switch opening for
5 supplying motive power to the motor.

16. The combination with an overhead track rail having a fixed tongue switch, of a truck having wheels to operate along the track and a depending side plate, a motor
10 supported beneath the track system by said side plate for driving said wheels, and means for supplying motive power to the motor, said means lying in the plane of said side plate where it passes through the fixed
15 tongue switch opening.

17. The combination with an overhead track rail having a fixed tongue switch, of a truck having wheels to operate along the track rail, a motor supported beneath the
20 track system by the truck for driving said wheels, a current supply conductor supported above the track surface on which the wheels operate, and means arranged to pass freely through the fixed tongue switch opening
25 for supplying current from said conductor to the motor.

18. The combination with an overhead track rail having a fixed tongue switch, of a truck having wheels to operate along the track rail and a depending side plate, a
30 motor supported beneath the track system by said side plate for driving said wheels, a current supply conductor supported above the track surface on which the wheels operate, and means for supplying current from
35 said conductor to the motor, said means lying in the plane of said side plate where it passes through the fixed tongue switch opening.

19. The combination with an overhead track rail having a fixed tongue switch, of a truck having wheels to operate along the track rail and a depending side plate, said
40 side plate having a vertically extending slot or channel, a motor supported beneath the track system by said side plate for driving said wheels, a current supply conductor supported above the track surface on which the
45 wheels operate, and means for supplying current from said conductor to the motor, said means located in the slot or channel in said side plate.

20. The combination with an overhead track rail having a fixed tongue switch, of
55 a truck having side portions and wheels to operate along said track rail, a motor sup-

ported beneath the track system by the truck side portions for driving said wheels and means located within the space limitations of the truck side portions to pass with
60 said side portions freely through the switch openings, for supplying motive power to the motor.

21. The combination with an overhead track rail having a fixed tongue switch, of a
65 truck having wheels to operate along said track rail, and a depending side plate, said side plate having a vertically extending slot or channel, a motor supported beneath the track system by said side plate, driving con-
70 nections between said motor and wheels for driving the latter, and means for supplying motive power, supplying means being located in said slot or channel.

22. The combination with an overhead
75 track rail having a fixed tongue switch, of a truck having wheels to operate along said track rail, a motor suspended beneath the track system from said truck, driving connections between the motor and wheels for
80 driving the latter, means for supplying motive power to the motor, and means for preventing contact of said driving connections and motive power supply means with the switch tongues or associated parts while
85 passing through the opening therein.

23. The combination with an overhead track rail having a fixed tongue switch, of a truck mounted to operate along said track rail, a motor located below the track rail
90 and supported by the truck, and means arranged to freely pass through the fixed tongue switch openings for supplying motive power to the motor.

24. The combination with an overhead
95 track rail having a fixed tongue switch, of a truck mounted to operate along said track rail, a motor located below the track rail and supported by the truck, a current supply conductor supported above the track rail
100 surface along which the truck operates, and means arranged to pass freely through the fixed tongue switch openings for supplying current from said conductor to the motor.

In testimony whereof I have hereunto set
105 my hand in the presence of the subscribing witnesses, on this 11th day of December A. D., 1912.

NORMAN WHICHELLO.

Witnesses:

W. A. DARBY,
S. E. DARBY.