H. SAWYER.

FREIGHT HANDLING APPARATUS.

APPLICATION FILED JUNE 24, 1912.

1,079,519.

Patented Nov. 25, 1913.

4 SHEETS—SHEET 1.

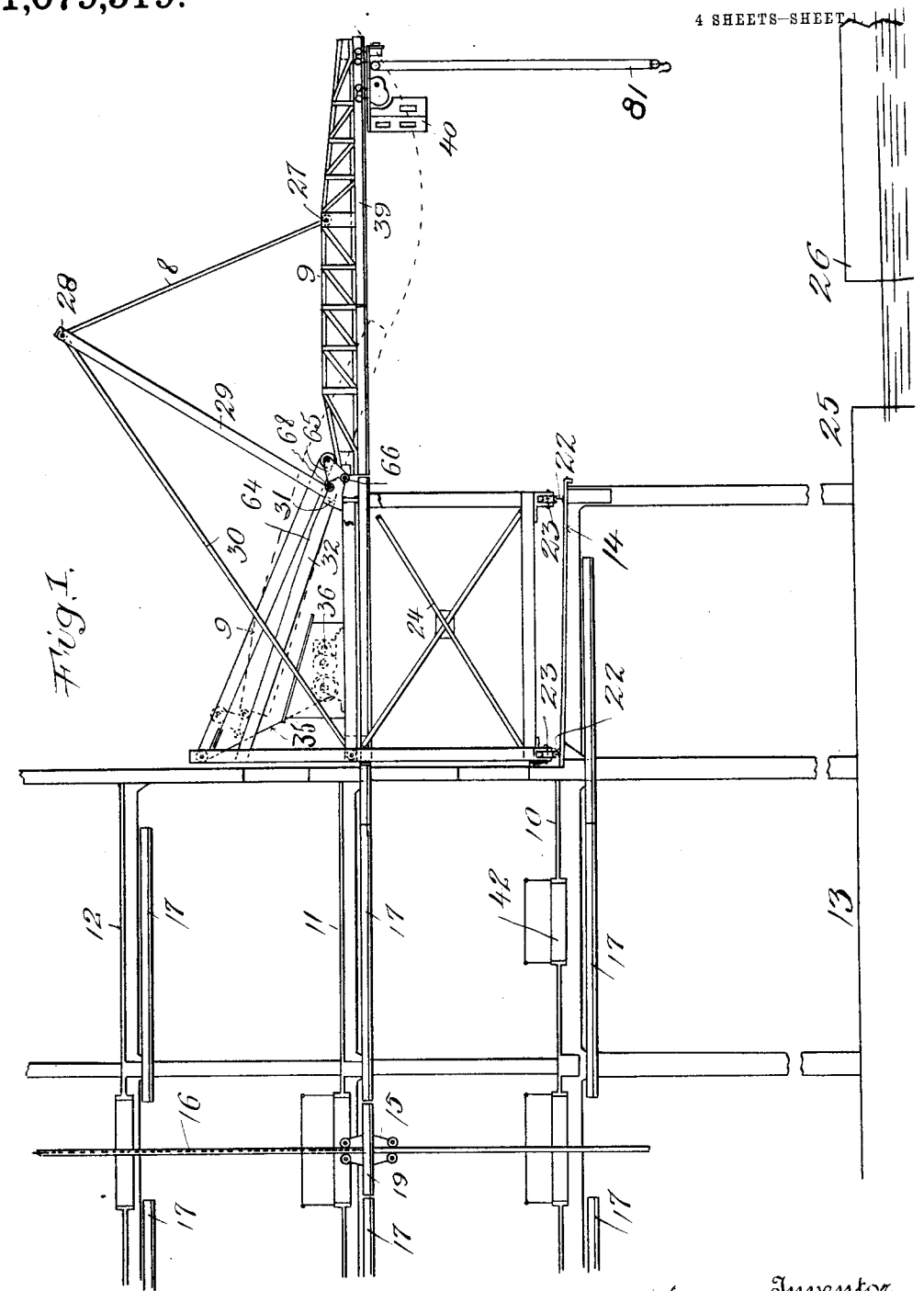


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.a

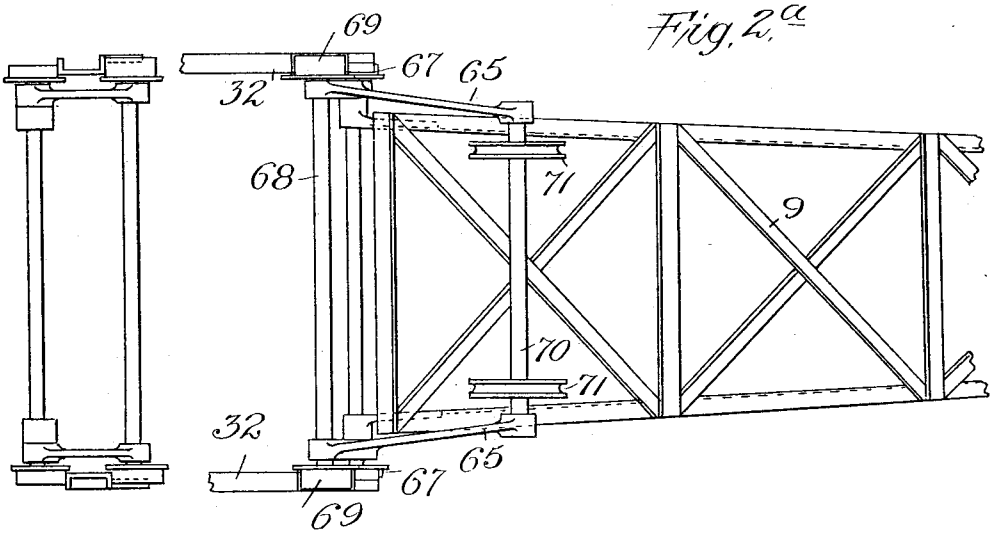
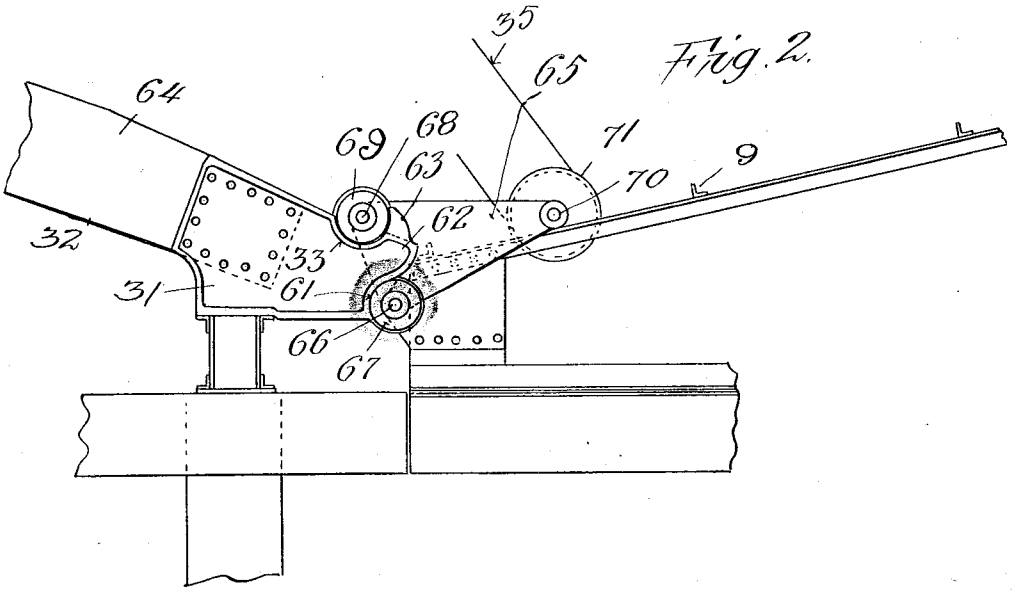


Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 7.

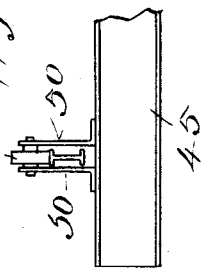


Fig. 4.

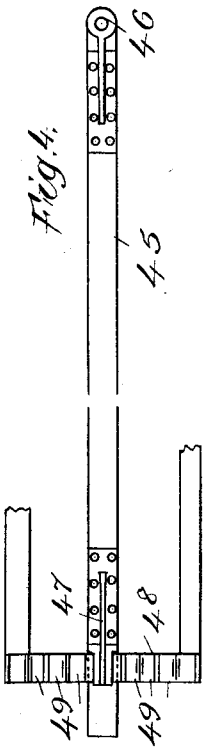


Fig. 3.

Fig. 5.

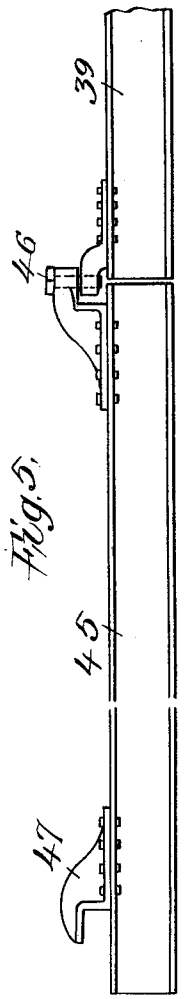
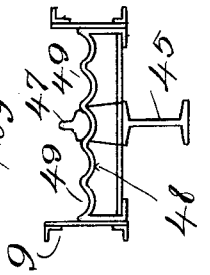


Fig. 6.



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4 SHEETS—SHEET 4.

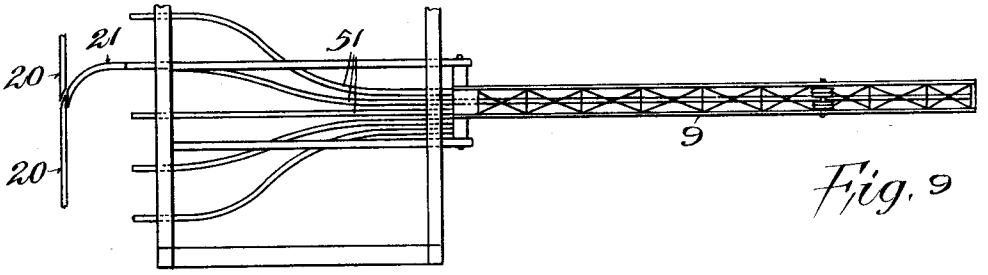


Fig. 9

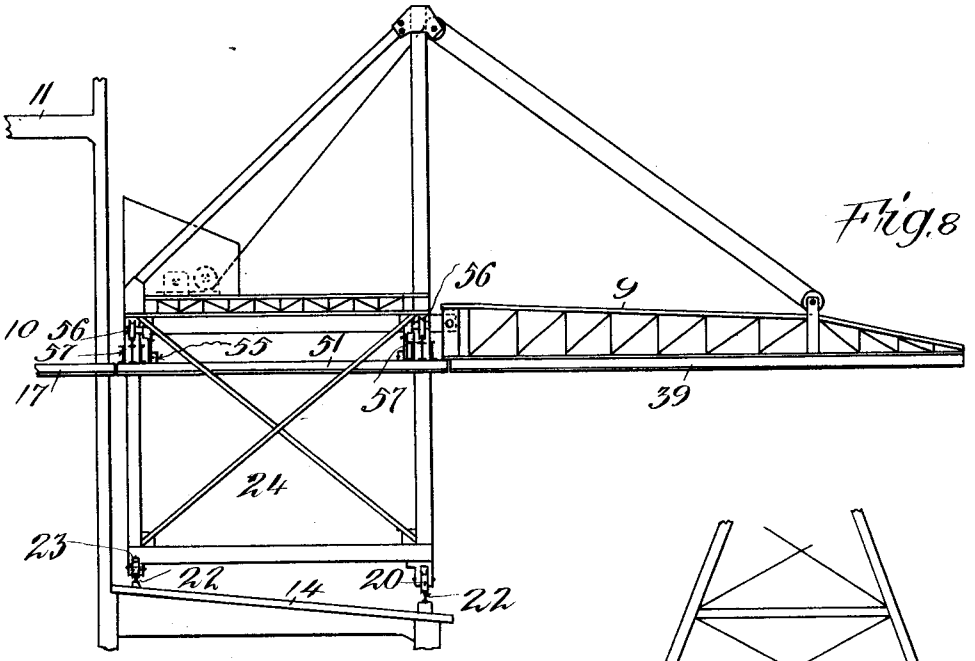


Fig. 8

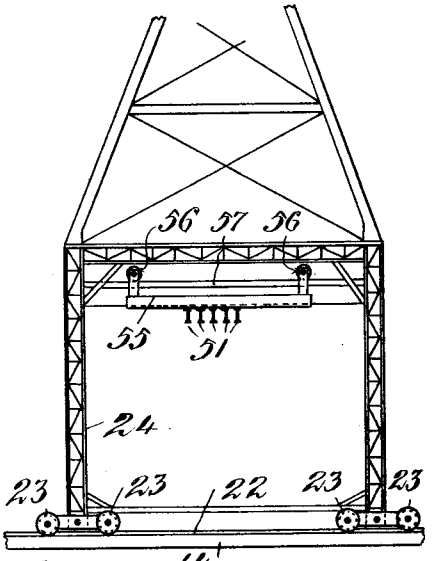


Fig. 10.

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UNITED STATES PATENT OFFICE.

HARRY SAWYER, OF MUSKEGON, MICHIGAN.

FREIGHT-HANDLING APPARATUS.

1,079,519. Specification of Letters Patent. Patented Nov. 25, 1913.

Application filed June 24, 1912. Serial No. 705,421.

To all whom it may concern:

Be it known that I, HARRY SAWYER, a citizen of the United States, residing at Muskegon, county of Muskegon, State of Michigan, have made a certain new and useful Invention in Freight-Handling Apparatus, of which the following is a specification.

This invention relates to apparatus for handling freight.

The object of the invention is to provide a freight handling apparatus which is simple in construction and efficient in operation, and which is particularly designed for use in handling freight from a lower to a higher elevation.

A further object of the invention is to provide a freight handling apparatus of the nature referred to wherein is employed a crane structure preferably, though not necessarily, in which the crane is carried upon an elevated support as, for instance, the roof or a low roof portion of a building, wharf shed, or the like, where it is elevated out of position where it might interfere with the proper handling of the freight, and with which a boom is employed the outer end of which, when in position for use, is designed to extend out over a deck, boat, lighter or the like, lying alongside the dock or pier upon which the crane is mounted. In an apparatus of this general nature it is desirable to employ a monorail track system along which operate telphers or trolleys carrying freight hoisting and transporting devices. In the use of apparatus of this nature it frequently occurs that hatches on the boat or lighter and compartments in the building, pier shed or the like, are situated in such relation to each other that it is difficult to bring the boom, and its supporting crane into proper or convenient relation with reference to the desired hatchways and compartment and still have the monorail track system in proper register.

It is therefore among the special purposes of my invention to provide an apparatus of the character referred to in which a switch track system is employed for the truck or trolley which carries or transports the freight, and wherein a monorail track system is arranged so that the crane structure may be accurately located with reference to the particular hatch over which the boom is to be employed regardless of the relative location of the monorail track system and still permit the truck or carrier to operate along the monorail track system.

A further object of the invention is to provide an apparatus of the nature referred to in which provision is made for efficiently withdrawing the operating boom along which the telpher or freight handling trolley or carrier operates, that is, withdrawing the same from obstructing relation to rigging, smoke-stacks or other obstructions that might be encountered when the crane structure is shifted so as to handle freight to or from different parts or hatches of the boat or lighter.

A further object of the invention is to provide an apparatus of the nature referred to in connection with suitable tracking systems whereby the freight may be handled to or from different floor levels on the dock, pier, pier shed, or other structures employed in connection with the freight handling operation.

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, and to the various views and reference signs appearing thereon, Figure 1 is a view in elevation showing a crane freight handling construction embodying the principles of my invention. Fig. 2 is a somewhat enlarged broken detail view showing the manner of connecting the inner end of the boom to the crane structure, whereby the boom is permitted to be shifted endwise into the position indicated in dotted lines in Fig. 1, in order to withdraw the boom endwise from working position. Fig. 2ª is a broken view in top plan of a portion of the construction shown in Figs. 1 and 2. Fig. 3 is a broken detail view in top plan showing one arrangement of switch track employed in connection with the monorail track system of the boom, crane and building, shed or warehouse, in connection with which the freight handling operations are to be carried out; Fig. 4 is a detail view in top plan, showing an arrangement of pivoted section of track rail employed on the boom of Figs. 1, 2 and 3. Fig. 5 is a side elevation of the construction shown in Fig. 4.

Fig. 6 is a detail view in end elevation showing an arrangement for locking or holding the swinging track section of the boom in adjusted position. Fig. 7 is a broken detail view showing a slightly modified arrangement for locking or holding the swinging monorail track section of the boom in position. Fig. 8 is a view similar to Fig. 1, showing a modified arrangement embodied within the scope of my invention. Fig. 9 is a top plan view of the modified arrangement of switch track system shown in Fig. 8. Fig. 10 is a view in side elevation of the modified arrangement shown in Figs. 8 and 9.

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

Referring to the accompanying drawings, and particularly to Fig. 1, I have shown a portion of a building having various floors, 10, 11, 12, which are preferably elevated above the floor 13, of the dock, shed, warehouse or the like, said building also having a roof portion 14, lower than the floors 11, 12 and so forth, of the building. The roof portion 14, is preferably elevated above the floor 13, of the dock, shed or the like. An elevator indicated at 15, and operated by suitable hoisting cables, 16, or otherwise, is employed for the purpose of elevating the freight to be handled from one floor to another of the building. On each floor of the building I propose to arrange an overhead suspended monorail track system, indicated at 17, along which a telpher or freight handling trolley, or truck, is designed to operate in a well understood manner and in connection with which the elevator 15, operates, said elevator having a monorail track section 19, designed to coöperate with the track system 17, when brought into suitable relation therewith. Located either inside or outside of the building, as may be desired, is a horizontal track system, indicated at 20, see Figs. 3 and 9, having suitable spur connections 21, designed to coöperate with suitable switch track sections carried by the crane structure as will be more fully hereinafter described. Or, if desired, the spurs 21, may coöperate with the track system, 17, at suitable points along the building wall.

In the arrangement shown in Fig. 1, the roof portion 14, of the building, is arranged adjacent the building proper, and preferably alongside the same, and at a lower level than the upper floors of the main building, preferably at or near the level of the first floor 10, and said low roof portion carries suitable track rails 22, along which operate the wheels 23, of the crane structure, indicated, generally, by reference letter 24, preferably, though not necessarily, the crane structure 24, operates along the lower roof portion 14, lengthwise of the latter and in a direction or path parallel to the edge 25, of the dock or pier upon which the building or shed is erected. A boom 9, is carried by the crane structure, and when in operating relation for use extends horizontally outwardly from the edge of the crane structure with its outer end arranged over the boat, lighter, or other vessels, indicated by reference numeral 26, for the purpose of handling freight to and from the same, or to and from the building, pier, shed, warehouse or the like. The outer end of the boom 9, is supported in substantially horizontal position by means of a rod, 8, which is pivoted to the boom 9, as indicated at 27, and at its other end is pivoted as at 28, to a strut 29, carried by the outer portion of the crane structure 24. If desired the strut 29 may be suitably braced by the brace rod 30, and frame struts or members 32. At their lower ends the frame strut members 32, of the crane structure are provided with horn pieces 31, which are provided with seats or depressions 33, in the upper surfaces thereof, see Fig. 2, and also with seats 61, in the outer end surfaces thereof. Between the seats 33, 61, the horns 31, are formed with the toes 62. Adjacent the lower boundary of each upper seat 33, the horn 31, is provided with an upwardly projecting lug 63. The upper surface of the member 32, does not lie in a straight line but a sloping or cam surface is formed thereon, as indicated at 64, Fig. 1, which cam surface is adjacent the lower end of said member the rise of said surface being of increasing extent from the extreme lower end of said member for a short distance longitudinally thereof, and of decreasing extent thereafter toward the other end of said member. The objects and purposes of these various features will now be described in connection with the construction of and operating means for the boom 9.

Attached to each side of the boom 9 at its inner end is a triangular shaped plate 65, which is arranged to pivotally swing from the lower inner corners thereof on a shaft 66, mounted in side members of the boom at the extreme inner end of the latter. Also carried by said shaft 66, at each end thereof, outside each plate 65, is a flanged wheel 67, having a comparatively narrow tread. The upper inner corners of the triangle plates 65, are connected by a shaft 68, which has mounted on the outer ends thereof the flanged wheels 69, having comparatively broad treads. The other or outer corners of the plates 65 are connected by a shaft 70, upon which are mounted sheaves 71, over which operate cables or other connections 35, which are controlled by the motor 36. When the boom 9 is in position for use, it extends substantially horizontally and the rollers 67, 69, are respectively seated in the seats 61, 33, with the rollers 69, resting against the lugs 63. This construction

affords an efficient brace for the boom to lock and hold the same in substantially horizontal position for use with an extended overhang of the free end thereof from the crane structure and which bracing serves to resist any tilting strains imposed by the overhanging weight of the boom or a load carried thereby. In this position of the boom the triangular plates and their connecting shafts occupy the respective positions thereof shown in full lines. Now when it is desired to withdraw the boom from its operating horizontal position, as for instance when it is desired to shift the crane structure from one point to another along its supporting tracks 22, instead of swinging the boom vertically about a pivotal support to permit it to clear any obstructing rigging, smoke-stack or the like, as is the ordinary way in crane structures, the boom, in accordance with my invention, is withdrawn endwise and moved bodily inwardly. This is accomplished by suitably actuating the motor 36, which operates on the cable connections 35. The first result of this action is to rock the plates 65, about the fulcrum afforded by the bearing of the wheels 69 in their seats 33; this causes the boom to move slightly outwardly in the direction of its length and sufficiently to cause the lower wheels 67, to travel upwardly along the lower curved edges of the toes 62, and to offset the inner end of the boom and its track rail from the adjacent crane structure and switch track sections. When the wheels 67, pass the points or toes 62, of the horns 31, the triangular plates 65, assume an upright position and the wheels 69, 67, then travel along the upper edges of the frame members 32, which thereby constitute tracks therefor. The stop lugs 63, are formed at the outer sides of the horns, and hence, by reason of the narrow treads of wheels 67, the latter are enabled to readily pass by said lugs as the said wheels progress along the upper or track surfaces of the members 32. At the same time the broader treads of the wheels 69, bring up against said lugs, when the boom is in position for use, thereby forming locking stops. It will be seen that when the wheels 69, 67, begin their travel along the tracks 32, and the boom begins its inward longitudinal movement, the tendency is for its outer free end to drop rapidly, to overcome this and to insure a constant elevation of the center of gravity of the boom as it is withdrawn, a comparatively steep incline of track surface of the member 32 should be provided so as to cause a rapid elevation of the inner end of the boom. As the link or rod 8 which supports the outer end of the boom assumes a more nearly vertical position the tendency of the outer end of the boom to be lowered decreases so that the continued track incline need not be so acute. For this reason, I provide the cam surface 64 in the track members 32, which permits the attainment of the results stated.

It is to be understood that other forms of construction for securing the results above noted might readily occur to persons skilled in the art and still fall within the spirit and scope of my invention as defined in the claims.

The boom 9 is provided with an overhung monorail track indicated by reference numeral 39, along which a telpher or trolley 40, is designed to operate, said telpher or trolley carrying suitable hoisting apparatus 81, for hoisting and transporting the freight to be handled. The telpher or trolley 40, operates along the monorail track 39, and in conjunction therewith, also along the track rail system of the building and of the crane structure, the latter to be more fully explained hereinafter.

By the construction and arrangement above described freight may be transported to the boat, or lighter, or other vessels 26, or from the same and into or from the pier, shed or building, and transported or transferred inside the building from one floor to another without releasing the same from the hoisting apparatus 81 of the trolley or telpher 40.

If desired floor 10 of the building may be provided with a hatchway or opening indicated at 42, through which freight may be raised or lowered from and to the pier floor 13, by means of the trolley carrier or telpher 40 in a manner readily understood.

It may sometimes be impossible or inconvenient for the crane structure 24, to be so positioned, with reference to the boat, lighter, freight car, or the like, as to enable the boom 9 to be positioned directly over a particular hatchway of the latter, or similarly it may be difficult to so position the crane as to enable the boom track 39 for the telpher or trolley 40 to be brought into proper registering relation with reference to the track system of the building at any particular point. To overcome this objection I propose to provide the crane structure with a series of switch tracks designed to coöperate with the track spurs 21, the latter coöperating in a well known manner with the track rail system 20 of the pier, shed or building. A convenient arrangement may serve as an illustration of the system. Suppose, for instance, that a spur track 21 be employed, say, every twenty feet in the direction of the length of the crane track rails 22, then the crane structure may be provided with a series of switch track sections or portions 41, any one of which may be brought into longitudinal registering relation with reference to a spur section 21. These switch track sections 41, for instance, may be lo-

cated say 4, 3 or 5 feet apart. Now by suitably bringing the monorail track portion 39, of the boom into proper relation and register with one or another switch section 41 of the crane structure, according to which one is in register with the spur section 21, it will be seen that the telpher or trolley carrier 40 may be operated along the boom track monorail 39, onto the proper switch track section 41, and then to the spur track 21, to track system 20, 17 of the building, as may be desired. This enables me to place the crane structure properly with reference to any particular hatch or freight opening through which or from which the freight is to be transported or handled. Many suitable and specifically different convenient constructions and arrangements may be employed to accomplish this object of bringing individual members of the switch track sections 41, into registered relation with reference to the monorail track portions 39 of the boom. In Figs. 1 to 7 inclusive, an arrangement is shown wherein the boom is provided with pivoted monorail track section 45, which is pivoted as at 46, to or adjacent to, the inner end of the monorail track portion 39 of the boom. Now by suitably shifting the inner end of the pivoted track section 45, said track section may be brought into suitable registering relation with any desired one or another of the switch track sections 41 of the crane structure. In order to retain the swinging track section 45, at registering relation with one or another of the crane switch track portions 41, any suitable or convenient arrangement may be employed. In Figs. 4, 5 and 6, I have shown a suitable arrangement wherein an overhanging neck portion 47 is employed and connected to the swinging track section 45. This neck portion 47, overhangs a transverse bar 48, having suitable pockets or seats, indicated at 49, formed therein corresponding consecutively with the switch track sections 41. By suitably shifting the track section 45, laterally into position for the overhanging portion 47 thereof to rest in any desired seat 49, of the transverse bar 48, the swinging track section 45, will be held in alinement or registering relation with the corresponding crane switch track section 41. In Fig. 7, I have shown a slightly modified arrangement wherein I provide a roller 7, carried in upright portions 50, mounted upon the swinging track section 45 and designed to operate in or to be received in one or another of the seats 49, of the transverse bar 48. It is obvious that other specifically different arrangements for accomplishing the same results might readily occur to persons skilled in the art without departing from the spirit and scope of my invention as defined in the claims.

In Figs. 8, 9 and 10, I have shown a modified arrangement wherein the switch track sections 51, of the crane structure are shifted bodily along track ways carried by the crane structure. In this arrangement the boom 9 is not provided with any swinging track section similar to swinging track section 45, of the construction shown in Figs. 1 to 7. Instead of using a swinging track section, one continuous track section 39 is provided for the boom 9. At its inner end the track rail section 39 of the boom is designed to be brought into registering relation with reference to one or another of the switch track sections 51, of the crane structure by shifting the crane structure track system along the crane structure itself. This may be accomplished by suspending the switch track system 51 of the crane structure upon a carrier frame indicated at 55, which is provided with wheels 56, designed to operate along tracks indicated by 57, carried by the crane structure. By this arrangement it will be observed that any one or another of the switch track sections 51 of the crane structure may be brought into registering relation respectively with the particular spur track 21, and the boom track 39, as may be desired. In other respects as is obvious the structure may remain the same as above described with reference to Figs. 1, 2 and 3. Of course it will be understood that the switch track sections 51, of the construction shown in Fig. 9 and Fig. 10, as well as the switch track section 41 of the construction shown in Figs. 1 to 7 are of the overhead monorail type, and along which the telpher or trolley carrier 40 is designed to operate in the usual manner of monorail transmission.

The operation of the apparatus will be readily understood. Referring particularly to Fig. 1 with the apparatus in position for use the boom 9 is in substantially horizontal operative position. The trolley or telpher 40 is supported or carried at the outer end thereof with the hoisting portion 81 thereof in position ready to be lowered into the boat 26 alongside of the pier or dock to receive or to deliver a load of freight. Suppose the freight is to be transferred from the boat to the building of the pier or dock shed. The hoisting apparatus 81 is suitably controlled or manipulated so as to cause the same to be lowered into the boat to receive a load, the load is then hoisted until it is clear of the upper deck or upper structure of the boat as well as of the lower part of the crane structure and roof 14. The trolley carrier 40 is then operated to move along the track system 39, 45, 41, 21, 20 and along the floor track section 17. If desired, after arriving inside the building, the load or freight may be lowered on to the floor 13 of the pier through the hatch 42, or the trolley may continue on to the elevator 15, and then pass

to any desired floor of the building and thence along the desired or appropriate floor track sections 17, to the desired point. If it should happen that the boom track 39, when placed over the hatch, is not in line with a track spur, 21, then, by suitably changing or varying the relation of the boom track and the switch track system on the crane structure, the desired connection is made and the operation of handling the freight is carried on without interference.

Having now set forth the objects 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. In an apparatus for handling freight, a movable crane having a plurality of switch track sections, a boom having a track rail, said switch track sections extending in the same general direction as the boom track rail, and means to bring the boom track rail into coöperative relation with any desired switch track section.

2. In an apparatus for handling freight, a movable crane having a plurality of switch track sections and a boom, said boom having a track rail, the crane switch track sections extending in the same general direction as the boom track rail, said track rail having a movable portion adapted to be brought into registering relation with any one of the switch track sections.

3. In an apparatus for handling freight, a movable crane having a plurality of switch track sections, a boom carried by said crane and provided with a track rail, the crane switch track sections extending in the same general direction as the boom track rail, said track rail having a movable portion adapted to be brought into registering relation with any one of the switch track sections, and means for retaining said movable track rail portion in adjusted position.

4. In an apparatus for handling freight, a crane, means for supporting a boom from said crane in substantially horizontal position for use, and means for elevating the inner end of said boom and shifting the latter endwise inwardly to withdraw the same from position for use.

5. In an apparatus for handling freight, a crane having seats, a boom suspended at its outer end from the crane and having means at its inner end adapted to said seats, whereby when in position for use, said boom is maintained in substantially horizontal position and means for raising the inner end of the boom out of said seats and shifting the same endwise to withdraw it from position for use.

6. In an apparatus for handling freight, a crane having a plurality of switch track sections, means for suspending a boom from said crane in substantially horizontal position for use, said boom having a track rail, means for causing said boom track rail to register with any one of the switch track sections when said boom is in position for use, and means for shifting said boom endwise inwardly to withdraw the same from its position for use.

7. In an apparatus for handling freight, a crane having a track-way, a seat formed in the track-way at its outer end, an overhung boom suspended from the crane, having means at its inner end to be received in said seat when said boom is in position for use, and means connected to the inner end of the boom for releasing said seating means and withdrawing the boom endwise along said track.

In testimony whereof I have hereunto set my hand in the presence of the subscribing witnesses, on this eighth day of June A. D., 1912.

HARRY SAWYER.

Witnesses:
T. E. Hammond,
Fred M. Breuninger.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."