

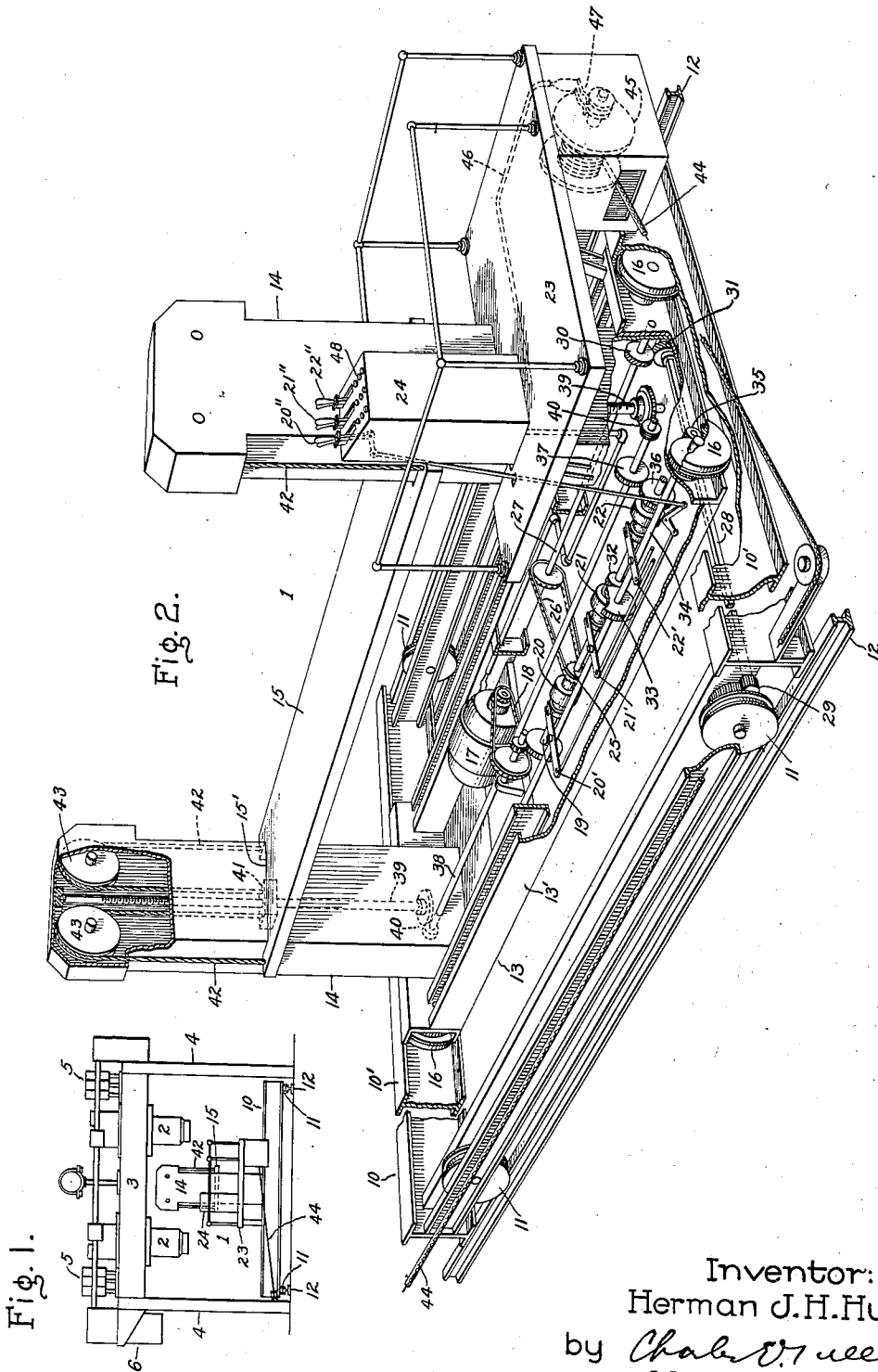
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H. J. H. HUBER

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ELEVATING AND TRANSFER TRUCK UNIT

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Inventor:
Herman J.H. Huber
by *Charles V. Tuller*
His Attorney.

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ELEVATING AND TRANSFER TRUCK UNIT

Herman J. H. Huber, Brookline, Pa., assignor to
General Electric Company, a corporation of
New York

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My invention relates to elevating and transfer truck units, as for example of the character required for positioning and removing the circuit breakers and other apparatus in a metal clad, oil filled bus and switch station of the type having overhead supporting structure.

In a station of the aforesaid type wherein heavy and comparatively massive circuit breaker units are suspended in operative position from overhead supporting structure, inspection, repair or transfer of the circuit breaker necessitates the provision of means for removing and replacing said units, as by means operating beneath the supporting structure. Since the height of the overhead supporting structure is a factor in the cost of a station, it is desirable that the aforesaid means operating beneath the structure be compact in design, of minimum height, and readily accessible for inspection and operation.

The principal object of my invention is the provision of an improved elevating and transfer truck unit which is rugged and compact in design and which may be controlled and operated by a single attendant.

My invention will be more fully set forth in the following description referring to the accompanying drawing, and the features of novelty which characterize my invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

Referring to the drawing, Fig. 1 is an end elevational view of a metal clad bus and switch station having an elevating and transfer truck unit embodying the present invention, and Fig. 2 is a perspective view, partly in section, of the aforesaid truck unit.

An elevating and transfer truck unit 1 is illustrated, by way of example, as incorporated in a metal clad bus and switch station of the type wherein oil circuit breaker units 2 are suspended from overhead supporting structure 3. The overhead structure 3 having vertical supporting pillars 4 is generally fabricated of structural steel and in addition to the heavy oil circuit breaker units 2, supports associated apparatus as the busbar structure 5 and potential transformer 6. The metal clad bus and switch station per se forms no part of the present invention, the type in question being well known to those skilled in the art, and further detailed description is unnecessary other than to mention that the overhead supporting structure is generally arranged to form adjacent bays, so that there is a continuous passageway beneath the structure in which the elevating and transfer truck unit 1 may operate.

The truck unit 1 comprises a supporting frame 10 mounted for longitudinal movement beneath the overhead structure. The frame 10 is mounted on and guided by wheels 11 on a track 12 which extends longitudinally of the station. A carriage 13 is similarly mounted on the frame 10 for movement transversely thereof for the purpose of placing the same in operative position with respect to the circuit breaker units 2 or other apparatus. The carriage 13 is provided with supporting towers 14 at opposite ends thereof from which is suspended the work-receiving platform 15 which is movable vertically with respect to the carriage 13.

Accordingly, it will be apparent that the work-receiving platform 15 may be positioned beneath a circuit breaker 2 for lowering and replacing the same, by first rolling the supporting frame 10 to the approximate point in the bay in which the circuit breaker unit is located, moving the carriage 13 transversely of the frame until the platform 15 is substantially beneath the circuit breaker unit, and finally elevating the platform until it is directly beneath the circuit breaker unit so that the same may be unclamped from the overhead supporting structure and lowered on the platform. The circuit breaker unit may be removed from the station by lowering the platform 15 and moving the carriage 13 transversely until the supporting towers 14 are approximately centrally of the bay so that there is no interference between the supporting towers and remaining circuit breaker units as the truck unit is rolled out of the station.

Referring more particularly to Fig. 2 which shows the elevating and transfer truck unit in greater detail, the supporting frame 10 comprises a rectangular structure fabricated of structural steel having channel sections, as I-beams 10', forming the transverse ends of the frame. The supporting wheels 11 are suitably mounted on the sides of the frame for guiding the unit on the track 12. The carriage 13 which is mounted on and movable transversely of the frame 10 includes a base structure 13' comprising channel sections, the base extending longitudinally across the frame 10 and provided with wheels 16 at its opposite ends bearing on the lower flanges of the end I-beams 10' for guiding the carriage 13 transversely of the supporting frame. Accordingly, it will be noted that the carriage 13 is mounted well within the frame 10 and but a short distance above the track 12 so that there is a comparatively small increase in the height of the carriage 13 with respect to the main track 12 as would other-

wise be the case if the carriage were mounted on top of the supporting frame.

The towers 14 carried at opposite ends of the carriage 13 for supporting and guiding the platform 15 in vertical movement each forms a housing for operating means coacting with the corresponding end of the platform.

For the purpose of actuating the truck unit and the component parts thereof by single motive means mounted on the truck unit, there is provided a motor 17 suitably mounted on the base 13' of the carriage and operatively connected, as by selectively actuated unidirectional clutch mechanism, the supporting frame 10, carriage 13 and the work-receiving platform 15. To this end the motor 17 is connected by means of chain gearing 18 to a countershaft 19 on which is mounted clutch mechanism 20 for connecting the motor to the supporting frame 10, clutch mechanism 21 for connecting the motor to the carriage 13 and clutch mechanism 22 for connecting the motor to the platform 15. The aforesaid clutch mechanisms are not illustrated in detail in the interest of clearness, it being of course understood that any suitable clutching device, as of the well-known cone type for example, may be used if desired.

The separate clutch mechanisms are each provided with actuating means indicated at 20', 21' and 22', respectively, comprising levers pivoted so as to cause engagement and disengagement of the corresponding clutch upon actuation of the clutch lever.

For the purpose of centralizing the control of the clutch actuating means at a single point on the truck unit, a control pedestal 23 is mounted on the carriage 13 and is provided with a control box 24 for operating levers 20'', 21'' and 22'' suitably connected through connecting rods and cranks to the clutch actuating means 20', 21' and 22', respectively. Accordingly, an attendant standing on the control pedestal may control the operative connections between the motor 17 and the frame 10, carriage 13 and platform 15.

As illustrated, the motor 17 may actuate the aforesaid movable portions either selectively or simultaneously. In certain cases it may be desirable to interlock the clutch operating handles so that but a single clutch for example may be engaged at a time. In this case any suitable interlocking means may be used, such interlocking of operations being well known and description and illustration of the same being unnecessary for understanding the present invention.

Referring more particularly to the operative connections between the motor 17 and the truck unit and movable parts thereof, the connections between the motor and the frame 10 comprises the clutch mechanism 20, the clutch-controlled idler gear 25 mounted on the shaft 19, chain drive 26 and countershaft 27 which is suitably journaled to bearings fixed with respect to the base structure 13' of the carriage 13. A pair of wheels 11 of the frame 10 are connected to a main drive shaft 28 as by the gearing 29, and the countershaft 27 is operatively connected to the drive shaft 28 by gear couplings 30-31 so as to provide for actuation on the drive shaft 28 regardless of the transverse position of the carriage on the supporting box. In the present instance this is accomplished by a sliding, keyed connection between the shaft 28 and gear 31. The shaft 28 is preferably square in cross section within the range of movement of the carriage 13, the gear 31 being free to slide longitudinally of the shaft 28 but, of course, keyed

thereto with respect to rotative movement. It will, therefore, be apparent that as the carriage 13 is shifted transversely of the supporting frame, the gear 31, which is in mesh with the coacting gear 30, is correspondingly shifted so that a driving connection between the motor and truck unit may be effected at any time.

The connection between the motor and the carriage 13 comprises the clutch mechanism 21, the clutch-controlled idler gear 32 on shaft 19, coacting gear 33, countershaft 34 and the gear drive connection 35 for directly driving a pair of wheels 16 of the carriage. Transverse movement of the carriage is, therefore, readily effected by engaging the clutch mechanism 21.

The connection between the motor and the work-receiving platform 15 comprises the clutch mechanism 22, the clutch-controlled idler gear 36 on shaft 19, coacting gear 37 and countershaft 38 at the opposite ends of which a pair of jackscrews 39 are actuated through the gearing 40. Each jackscrew is preferably mounted and housed by a supporting tower 14 as best illustrated by the broken-away portion of the drawing. For the purpose of connecting the platform 15 to its actuating means so as to prevent binding or jamming in the event of eccentric loading of the platform, and for allowing slight sidewise or pivotal movement of the platform for properly aligning the circuit breaker unit when elevated into position, each jackscrew is connected to one end of the platform 15 by means of a single traveling nut 41 and a pair of cables 42 operating on pulleys 43. The pulleys 43 are suitably mounted in the upper part of the corresponding supporting tower and are connected at one end to the traveling nut 41 and at the other end to an outer edge of the platform 15. The platform 15 is preferably notched as at 15' so that the opposite ends of the platform are loosely guided by the towers 14.

By reason of the aforesaid suspension of the platform at its opposite ends, a limited degree of sidewise or pivotal movement of the platform is permitted for final and accurate positioning of the circuit breaker units. Furthermore, the use of a single traveling nut on an end jackscrew prevents binding or jamming at the screw threads as might be the case where a pair of jackscrews at each end of the platform are used.

The motor 17 is supplied with power from a point fixed with respect to the truck unit by means of a flexible power cable 44 which is led out along the outer side of the track 12, as indicated, and maintained under tension by a cable reel 45 mounted beneath the control pedestal 23. The cable reel 45 feeds out the cable when the truck unit is moved along the station and takes up the slack when the truck unit is returned. By laying the cable along the outer side of the track the probability of damage to the cable by the truck unit itself is minimized and the cable likewise is less in the way of attendants working around the truck unit. The electrical connection between the cable reel and the motor may comprise a rigid conduit 46 for housing the power conductors in view of the fact that the motor is mounted on the carriage itself. The connection between the cable reel and the conduit 46 is suitably made as by the slip ring connections 47.

The electrical control connections for the motor are not illustrated, such illustration being obviously unnecessary for an understanding of the present invention and further in view of the fact that the connections may vary considerably

in accordance with operating requirements. For example, where no limit switches are considered necessary in the travel of the carriage and work-receiving platform, three push button switches for the motor are sufficient; that is, forward, reverse and stop switches. Where, however, the limit switches are desired, a separate set of push button switches, as generally indicated at 48 on the control box, are used for each operation.

It should be understood that my invention is not limited to specific details of construction and arrangement thereof herein illustrated, and that changes and modifications may occur to one skilled in the art without departing from the spirit of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is,—

1. An elevating and transfer truck unit comprising a supporting frame mounted for longitudinal movement, a carriage mounted on said frame for movement transversely thereof, a work-receiving platform mounted on and movable vertically with respect to said carriage, a motor mounted on said carriage, means operatively connecting said motor to said supporting frame including a drive shaft for said frame and a driving gear slidably mounted thereon and movable with said carriage and clutch means between said motor and said frame, carriage and platform for effecting selective actuation of the same.

2. An elevating and transfer truck unit comprising a supporting frame mounted on a track for longitudinal movement, a carriage similarly mounted on said frame for movement transversely thereof, a work-receiving platform extending across and suspended at opposite ends from said carriage and vertically movable with respect thereto, a motor carried by said unit, and selectively actuated clutch mechanism for operatively connecting said motor to either said supporting frame, carriage or platform.

3. An elevating and transfer truck unit comprising a supporting frame mounted for longitudinal movement, a carriage mounted on said frame for movement transversely thereof, a work-receiving platform mounted on and movable vertically with respect to said carriage, a reversible motor mounted on said carriage, and uni-directional clutch means operatively connecting said motor to said supporting frame, carriage and platform for effecting selective actuation of the same.

4. An elevating and transfer truck unit comprising a supporting frame mounted and guided on a track for longitudinal movement, said frame having transverse side members forming channel sections, a carriage having supporting wheels at opposite ends thereof guided within and at the lower parts of said channel sections so that said carriage may move transversely of said frame, supporting structure mounted at opposite ends of said carriage, a work-receiving platform positioned between and depending from said structures, and means for selectively actuating said platform, carriage and supporting frame.

5. An elevating and transfer truck unit comprising a supporting frame mounted for longitudinal movement, a carriage mounted on said frame for movement transversely thereof, a work-receiving platform mounted on and movable vertically with respect to said carriage, a vertically positioned supporting tower including a jackscrew and a pair of cables operatively interconnecting said jackscrew and one end of said platform mounted at opposite ends of said carriage, each of said cables being connected at one end to the corresponding jackscrew and at its other end to the outer edge of said platform so as to provide for eccentric loading of said platform, a motor mounted on said carriage, and selective clutch mechanism for operatively connecting said motor to said jackscrews for raising or lowering said platform and to said carriage for effecting transverse movement thereof.

6. An elevating and transfer truck unit comprising a supporting frame having wheels mounted on a track for longitudinal movement, a carriage similarly mounted on said frame for movement transversely thereof, a work-receiving platform suspended from said carriage and vertically movable with respect thereto, a motor mounted on said carriage, a control pedestal for said motor mounted on said carriage, a clutch mechanism for operatively connecting said motor to said platform, a second clutch mechanism for operatively connecting said motor to said carriage, and a third clutch mechanism operatively connecting said motor to a drive shaft for moving said supporting frame and truck unit along said track, said drive shaft having a driving gear mounted for longitudinal movement on said shaft for coacting with a gear mounted on said carriage, said clutch mechanism being selectively controlled from said control pedestal.

HERMAN J. H. HUBER.