July 28, 1953 R. F. DEHN 2,646,892

CRANE CAB

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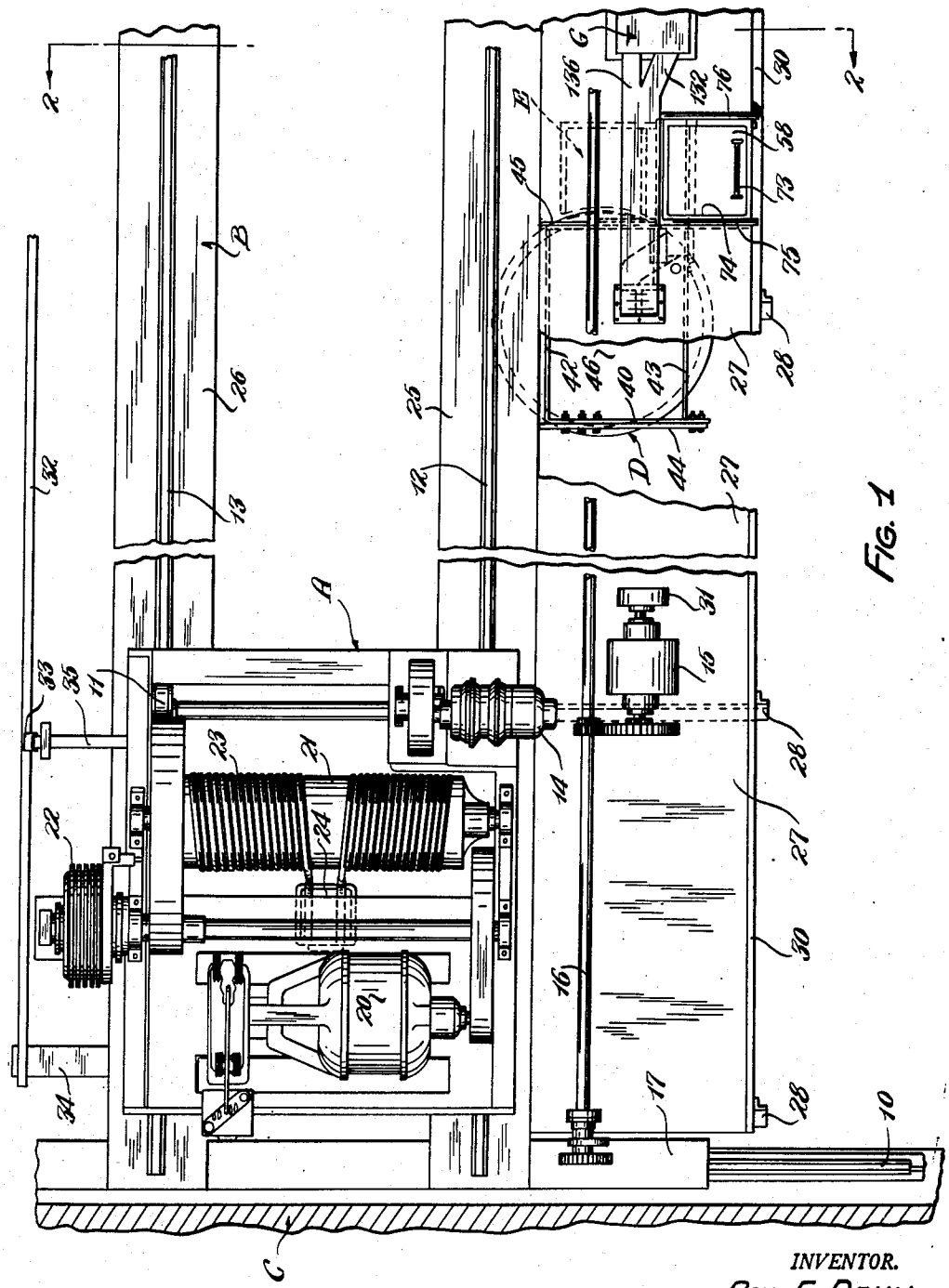


FIG. 1

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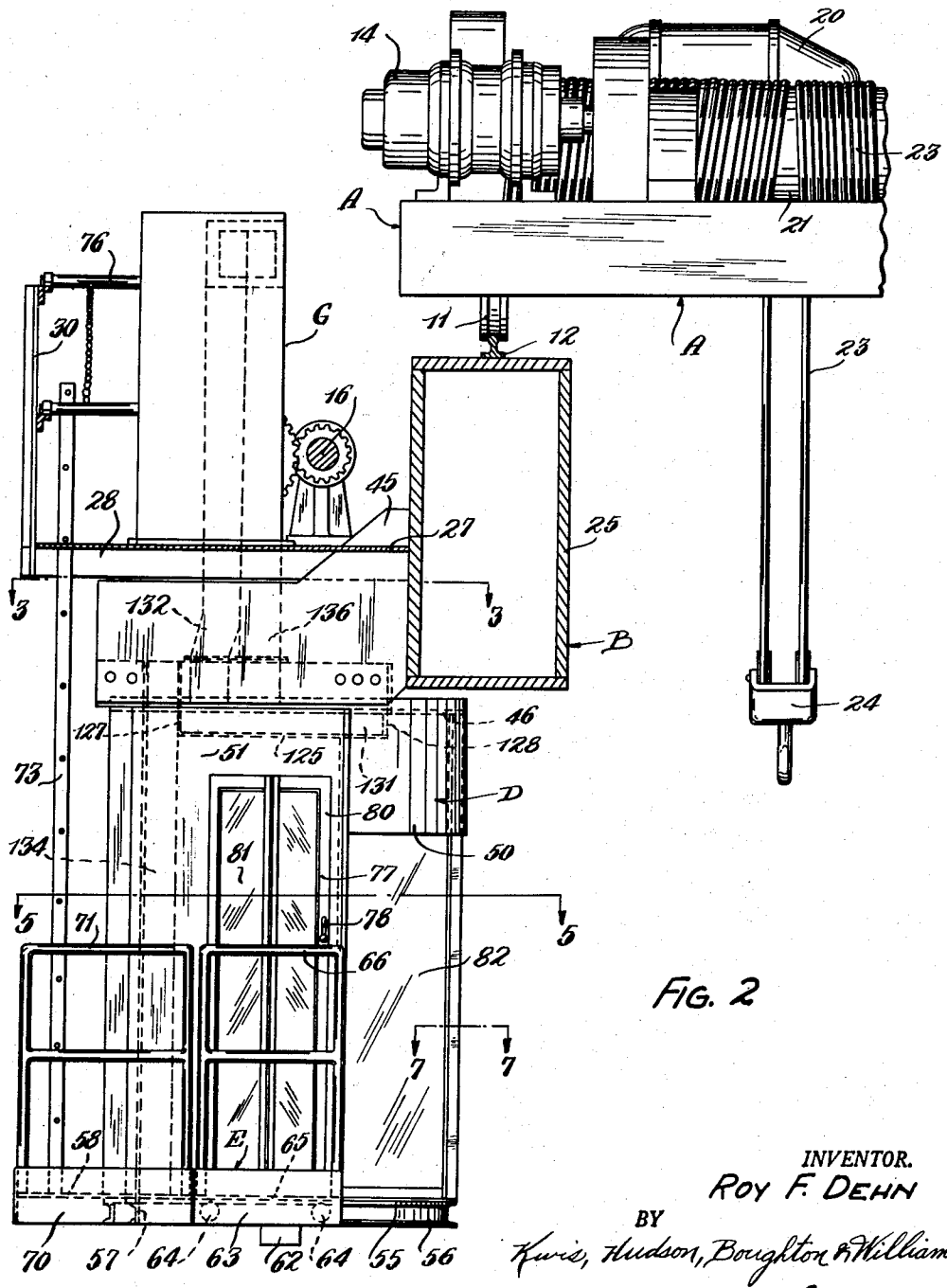


FIG. 2

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CRANE CAB

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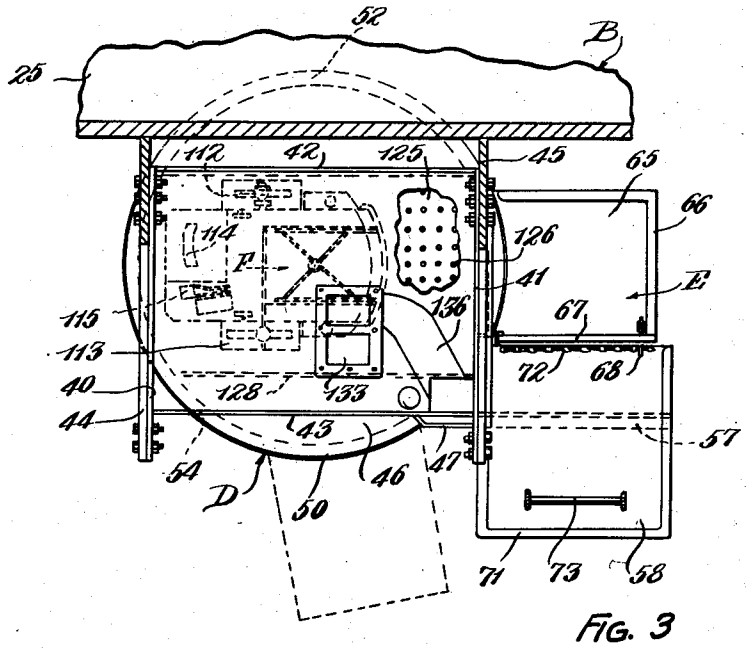


FIG. 3

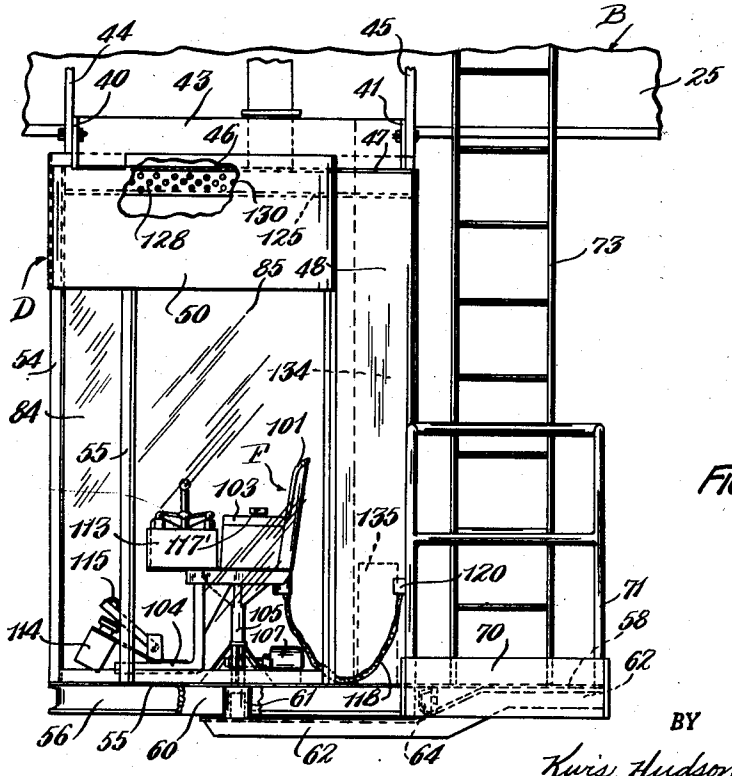


FIG. 4

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CRANE CAB

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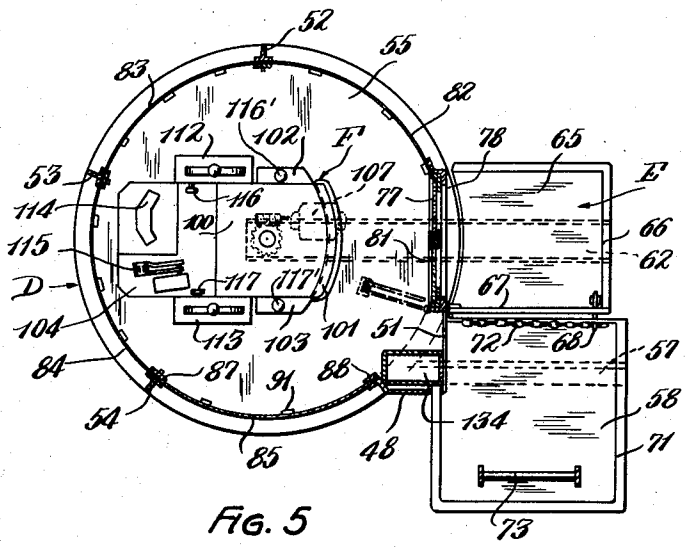


FIG. 5

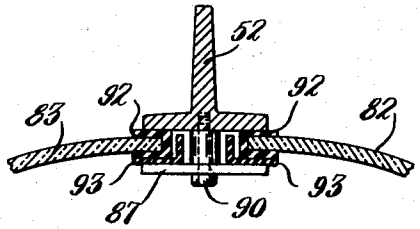


FIG. 7

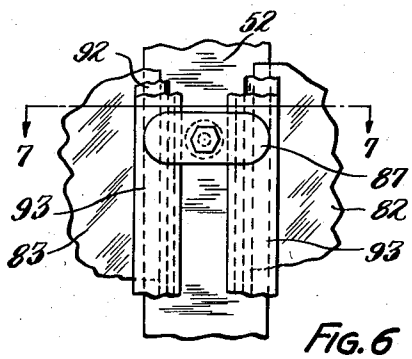


FIG. 6

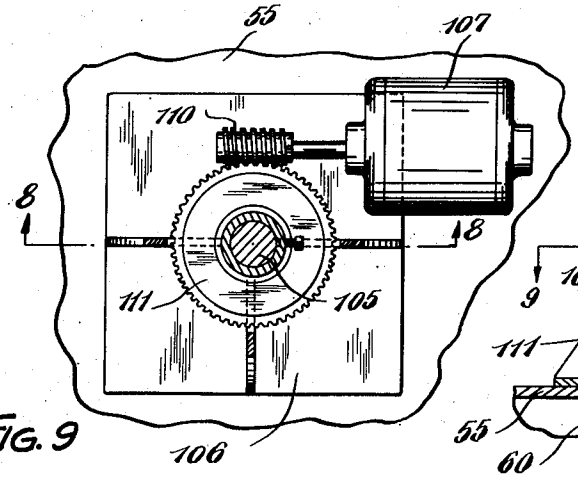


FIG. 9

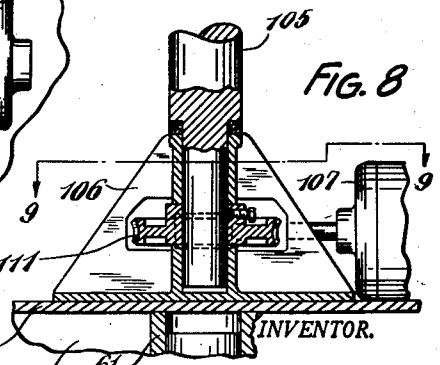


FIG. 8

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UNITED STATES PATENT OFFICE

2,646,892

CRANE CAB

Roy F. Dehn, Cleveland, Ohio, assignor to The Cleveland Crane & Engineering Company, Wickliffe, Ohio, a corporation of Ohio

Application December 4, 1947, Serial No. 789,645

6 Claims. (Cl. 212—21)

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The present invention relates to overhead operator's enclosures or cabs and, more particularly, to operator's cabs for overhead traveling cranes.

One of the principal objects of the invention is the provision of a novel and improved operator's enclosure or cab for an overhead traveling crane comprising a rotatable operator's seat having the bridge, trolley and hoist controls connected thereto so that they will rotate with the seat.

Another object of the invention is the provision of a novel and improved cab of the character referred to including a rotatable operator's seat and means controlling the rotation of the seat, the actuation of which the operator may control by moving a part or parts of his body.

The invention resides in certain constructions and combinations and arrangements of parts and further objects and advantages will be apparent to those skilled in the art to which it relates from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of this specification in which similar reference characters designate corresponding parts, and in which

Fig. 1 is a fragmentary plan view of an overhead traveling crane embodying the present invention;

Fig. 2 is a sectional view approximately on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional view approximately on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary elevational view looking from the left of Fig. 2 or the bottom of Fig. 3;

Fig. 5 is a sectional view approximately on the line 5—5 of Fig. 2;

Fig. 6 is an enlarged elevational view showing the manner of securing the transparent panels to the frame proper;

Fig. 7 is a fragmentary sectional view approximately on the line 7—7 of Figs. 2 and 6;

Fig. 8 is an enlarged view of a portion of Fig. 4, with portions in section, approximately on the line 8—8 of Fig. 9; and

Fig. 9 is a sectional view approximately on the line 9—9 of Fig. 8.

Although the present invention is susceptible of numerous embodiments, it is particularly applicable to overhead traveling cranes and is herein shown and described as embodied in an overhead traveling crane. The construction of the crane, aside from the cab, may be that of any well-known commercial overhead crane and the showing thereof in the drawings is more or less diagrammatic. Only those parts of the crane are shown and referred to which are necessary to an understanding of the present invention. My copending application S. N. 743,545, filed April 24, 1947, now Patent No. 2,629,500, and the copending application of William G. Wehr, S. N. 562,234, filed November 6, 1944, and now issued

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as Patent No. 2,471,295, relates to the same general subject matter as the present invention and some of the features herein disclosed are claimed in said applications.

Referring to the drawings, the crane shown comprises a crane trolley A movable along a crane bridge B, which bridge is, in turn, movable along crane runways comprising rails 10 located adjacent to opposite ends of the bridge and fixed to the building or structure C within which the crane is housed. The crane trolley A is supported by wheels 11 upon rails 12, 13 on the bridge B and is adapted to be moved in opposite directions lengthwise of the bridge B by a reversible, electric, trolley travel motor 14 located on the trolley and connected to one or more of the wheels 11. The bridge B is adapted to be moved in opposite directions along the crane runway, located at right angles with the length of the bridge, by a reversible, electric, bridge travel motor 15 located on the bridge and connected by mechanism, including a shaft 16, to a plurality of the wheels of the end trucks 17, which wheels support the bridge on the rails 10 of the crane runway. In addition to the trolley travel motor 14, the trolley comprises a reversible, hoist motor 20 operatively connected to the cable drum 21 by a so-called load brake 22 through which it is adapted to rotate the drum in opposite directions to take up or let out the load cable 23 and, in turn, raise or lower the crane hook 24 carried thereby.

The crane bridge comprises two spaced girders 25, 26, opposite ends of which are supported on the end trucks 17, only one of which is shown, and the construction of the hoist mechanism is such that the load cable 23 extends downwardly between the girders. As is also usually the case with cranes of the character referred to, the bridge is provided with a walkway along one side for the purpose of facilitating inspection and maintenance of the equipment thereon. As shown, the walkway comprises a floor plate 27 supported upon a plurality of projecting angle irons 28 welded to the outside of the left-hand girder, as viewed in Fig. 2, and a hand rail 30 spaced from the girder. The bridge travel motor 15 is also preferably provided with a solenoid brake 31 or some similar device for helping to control the movement of the bridge.

The actuation of the trolley travel motor 14, the bridge travel motor 15, the hoist motor 20, and the application and release of the brake 31 are manually controlled from an operator's cab D, which cab is an air conditioned, generally cylindrical enclosure or housing having transparent side walls suspended from the bridge adjacent to the middle thereof and offset from the longitudinal centerline of the bridge so as to allow the load cable 23 and crane hook 24 to pass thereby. The electrical connections between the manually operated control devices

which control the actuation of the trolley travel motor 14 and the hoist motor 20, respectively, include conventional trolley conductors and trolley collectors 32, 33 supported on the bridge and trolley, respectively, by brackets 34, 35 and are made in a manner well-known in the art. The operation of the bridge travel motor 15 and the brake 31 is controlled by foot-operated controllers in the cab.

The cab proper is preferably approximately four or five feet in diameter and is suspended from the crane bridge with its longitudinal axis extending vertically. As previously stated, the side walls of the cab are largely formed of transparent material so that the operator has substantially an unobstructed view of the area within which the crane operates. As shown, the frame of the cab is made of welded-up structural steel members and steel plates and includes a box-like member at the top formed by vertically positioned plates 40, 41, 42 and 43 welded together. The cab is suspended from the bridge B by bolting the plates 40, 41 to plate-like brackets 44, 45 located immediately to the outside thereof, which brackets are relatively deep and are welded to the outside of the adjacent girder 25 of the bridge. The box-like member and the brackets 44, 45 space the top of the cab proper below the walkway a sufficient distance so that the part of the cab adjacent the girder 25 may project underneath the girder a limited extent.

The cab D is generally cylindrical but has two small, narrow, flat or straight sections of wall, one along the side remote from the bridge and the other where the entrance door is located and comprises a generally cylindrical, top plate 46 welded to the underside of the box-like frame formed by the plates 40 to 43. The top plate 46 projects beyond the box-like frame on their sides and underneath the bridge, as clearly shown in the drawings. The short, straight edge 47 of the top plate 46 is welded to a narrow, vertical plate 48, which forms a part of one wall of the cab proper, and to a semi-tubular, vertical plate 50 which conforms in shape to the curved part of the plate 46. The upper edge of the plate 50 extends slightly above the top plate and the lower edge extends some distance below the top plate. One end of the plate 50 is welded to the plate 48 and the other end to a vertical plate 51 which has the doorway cut therein, which plate 51 is, in turn, welded to the other of the two straight sides of the top plate 46 and to the right-hand edge of the plate 48, as viewed in Fig. 4.

The plates 48, 50 and 51 and a plurality of vertical members 52, 53, 54 form the support or suspension for the floor structure comprising a circular floor plate 55 reinforced by a circular channel member 56 welded to the periphery of the floor plate adjacent to its edge. Opposite ends of the channel member 56 are welded to a short section of channel 57 projecting beyond the cab proper parallel with the bridge and to the right, as viewed in Figs. 3 and 4, which forms a support for a rectangular extension 58 of the floor plate 55. In addition to the reinforcing member 56 referred to, the floor plate 55 may be reinforced by a plurality of members 60 underneath the floor plate welded thereto and to the peripheral channel member 56. The inner ends of some or all of the reinforcing members 60 are welded to a boss 61, which boss is, in turn, welded to the underside of the floor plate 55 and forms a pivot for the radially extending member 62 of a movable platform, designated generally by the reference character E, which is similar to the platform shown in my above-mentioned copending application and comprises a box-like frame 63 supported for rotation about the cab proper by the pivoted member 62 and a plurality of rollers 64 connected to the frame 63 and engaging within the channel portion of the member 56. The movable platform E comprises a floor plate 65 welded to the top of the box frame 63 and is provided with a guard rail 66 around the three outer sides thereof, one portion 67 of which is hinged so that it may be opened when an operator desires to enter or leave the platform and, in turn, the cab proper. The platform E is rotatable about the cab proper so that the transparent wall sections, hereinafter referred to, can be readily cleaned. Normally the platform is retained in the position shown in Figs. 2, 3 and 5 by a hook-like latch 68 which may be released when it is desired to rotate the platform about the periphery of the cab.

The platform E, when in its normal position, aligns horizontally with and adjoins a platform formed by the extension 58 of the floor and a plate 55 welded to the top of the channel 57, previously referred to. As shown, the free edges of the extension 58 are preferably reinforced by plates 70 welded to the periphery thereof. The open sides of the platform formed by the extension 58 are provided with a guard rail 71 to prevent an operator from falling off. The side of the platform formed by the extension 58 nearest to the movable platform E is provided with a guard chain 72 which may be raised or lowered to permit an operator to enter and leave the platform E. Access to and from the platform, formed by the extension 58, is provided by a ladder 73 resting upon the extension 58 and welded thereto and projecting upwardly through an opening 74 in the floor 27 of the walkway. The opening 74 is preferably surrounded by a guard rail 75 which cooperates with the guard 30 to eliminate all possibility of an operator accidentally falling through the opening. The guard 75 is provided with a movable section 76 for permitting access to and from the upper end of the ladder 73.

When the movable platform E is in its normal position, it aligns with a folding door 77 hinged to one edge of the doorway formed in the plate 51. The opposite side of the door is provided with a latch 78 for retaining the same closed. The door comprises steel frames 80 each provided with a removable, transparent panel 81. The remaining walls of the cab are formed by four interchangeable, curved panels 82, 83, 84, 85 made of glass or other suitable transparent material. The panels 82 to 85 are detachably secured to the vertical members 52, 53, 54 and the edges of the vertical plates 48, 51 adjacent thereto by members 87, 88, respectively. The members 87 are secured to the members 52, 53, 54 by screws 90 and overlie the adjacent edges of the transparent panels. The members 88 are similarly secured to the plates 48, 51 but are shorter than the members 87 since they overlie merely the edge of one panel adjacent thereto. Members 91 similar to the members 88 are provided around the upper and lower edges of the transparent panels. The edges of the transparent panel members are preferably surrounded by channel-shaped members 92 made of rubber, metal, or the like. If made of metal, a rubber or like member 93 is preferably placed underneath the clamp members to better protect the

edges of the transparent panels and prevent the leakage of air therearound.

The cab includes an operator's seat or chair F, the center of which coincides with the center of the cab, as clearly shown in Fig. 3. The operator's chair F comprises a cushion or seat proper 100, a back rest 101, arm rests 102, 103 and a foot rest or platform 104 fixed with respect to the seat proper, etc., which is rotatable about an axis coincident with the center of the cab. As shown, the seat proper is fixed to the upper end of a vertical spindle 105 rotatably supported in a bracket 106 fixed to the floor plate 55 of the cab. The spindle 105 and, in turn, the seat, etc., are adapted to be rotated in opposite directions by a reversible, electric motor 107 fixed to the floor of the cab and operatively connected to the spindle 105 by a suitable worm and worm gear 110, 111. When seated, the operator has a substantially unobstructed view of the area over which the crane operates and of other cranes which may be operating on the same runway. By leaning forward, the operator can see the crane hook even though the trolley may be above the cab and the hook a considerable distance therebelow. As will be readily understood, any desired number of controls for the crane may be located in the cab proper. The controls shown include hand-operated, reversing controllers 112, 113 which are fixedly secured to the chair F at opposite sides of the seat 100 and immediately in front of the arm rests 102, 103 for controlling the trolley travel and hoist motors, respectively, and the foot-operated controller 114 for controlling the operation of the bridge travel motor. The brake for the bridge is controlled by the treadle-operated switch 115.

In addition to the controls referred to above, the chair F comprises controls for actuating the reversible electric motor 107 which rotates the chair in opposite directions. As shown, these controls comprise two pair of push button switches 116, 117 and 116', 117' connected to the housings of the controllers 112, 113 on the sides thereof adjacent to the operator when seated in the chair and to the top of the arm rests 102, 103, respectively. The push button switches 116, 116' and 117, 117' are preferably connected in parallel circuits and are so located that they can be actuated by the operator by moving his legs into and out of engagement with the switches 116, 117 and his elbows or underarms into and out of engagement with the switches 116', 117'. The construction is preferably such that actuation of either of the right-hand switches 116, 116' actuates the motor 107 to rotate the chair to the right and actuation of either of the left-hand switches 117, 117' actuates the motor to rotate the chair to the left. The connection between the motor and the chair is preferably such that the motor rotates the chair at a relatively slow speed and actuates only when one or the other of the switches 116, 117 or 116', 117' is depressed by the operator. The switches are connected to a commercial, reversible control panel for the motor 107 in a conventional manner. Either pair of switches 116, 117 or 116', 117' may be omitted, if desired. Alternatively, the switches may be otherwise located, as for example, the switches 116', 117' may be located on the inside of the armrests or all or parts of the armrests may constitute the actuation buttons or members for the switches. The various electrical connections to the chair F are made by a flexible cable 118 comprising a number of conductors, opposite ends of which are connected to the chair and to a control or junction box 120. If desired, limit switches can be provided for preventing rotation of the chair through 360°, thus eliminating the possibility of the operator so actuating the motor 107 to wrap the cable about the spindle 105.

A portion of the ceiling for the cab proper is formed by a plate or partition 125 provided with a multiplicity of relatively small apertures 126, see Fig. 3. The plate or partition 125 is spaced from the top plate 46 by side plates 127, 128 also provided with a multiplicity of relatively small openings 130 so as to provide a relatively large chamber 131 therebetween and the top plate. The chamber 131 is connected to an air conditioning unit G located on the crane walkway 27 by a fresh air conduit 132 which is in communication with the chamber through an aperture 133 in the top plate 46. The air conditioning unit G may be of any commercial construction. In addition to the fresh air duct 132 and the perforated plates 125, 127, 128 forming a part of the ceiling of the cab proper, the air conditioning unit includes a return air duct 134 extending from the floor of the cab to a point above the ceiling plate and welded to the floor plate 55 and the ceiling plate 46. The lower end of the duct 134 is provided with an aperture within which a plurality of replaceable air filters 135 are secured. The upper end of the duct 134 which is closed is connected to the air conditioning unit G by ducts 136 of suitable construction.

Air is continuously circulated through the cab proper by the air conditioning unit G including a motor-driven fan. The air is filtered, humidified or dehumidified, as desired; heated or cooled, as desired; or, otherwise conditioned so that the atmosphere within the cab may be maintained free of dirt, fumes, and the like and at a comfortable temperature.

Preferably the plates 125, 127, 128 are provided with a multiplicity of uniformly spaced, small holes as with this construction a uniform flow of air through the cab can be obtained; in other words, the flow will not be concentrated at one part of the cab. A commercially available plate having uniformly spaced, 1/8" holes located on 1/4" staggered centers is suitable for most purposes. Sufficient air can be circulated without producing a noticeable flow in the cab. With plates of this character, the cool air appears to merely settle in the cab. The flow is so small and uniform that the operator is not conscious of it but nevertheless it is sufficient to cause him to feel cooler than the actual temperature of the air being circulated would indicate or suggest.

As an alternative construction, the area of the holes in the plates 125, 127, 128 for any given unit of plate area may be varied. In this event, the area of the holes is preferably increased toward the front and side of the cab away from the operator. This arrangement of the holes, together with the location of the air return opening containing the filters 135 to one side of the operator's seat, produces a concentrated flow at the front and sides of the cab and without subjecting the operator to drafts or the like which might be injurious to his health. The provision of more and/or larger holes adjacent to the periphery of the cab proper causes most of the air to enter the cab in front and to the sides of the operator as distinguished from directly above him and allows maximum circulation of air without producing serious drafts.

The suggested variation in the area of the holes for any given unit of plate area can be obtained by employing holes of uniform size but spaced closer together adjacent the edge of the cab or by having the apertures uniformly spaced but increasing in size toward the edge of the cab. Alternatively the holes directly above and/or behind the operator may be omitted.

The cab shown also includes interlock means, not shown, but similar to that shown in my above-mentioned copending application for preventing the opening of the door 80 unless movable platform E is in its normal position in front of the door and for preventing movement of the platform E away from its normal position in front of the door unless the door is closed.

From the foregoing, it will be apparent that the objects of the invention heretofore enumerated and others have been accomplished and that there has been provided a novel and improved operator's cab of the character referred to adapted to be located at the center of a crane or the like and including air conditioning system which will not subject the operator to undue drafts, a plurality of interchangeable, transparent side wall panels readily replaceable from the inside of the cab, and a rotatable operator's seat or chair which carries all of the required controls and is readily rotatable by the operator to facilitate his view. While the preferred embodiment of the invention has been described in considerable detail, the invention is not limited to the particular construction shown and it is my intention to cover hereby all adaptations, modifications and uses thereof which come within the practice of those skilled in the art to which the invention relates.

Having thus described my invention, I claim:

1. In an operator's cab of the character referred to, an operator's seat supported in the cab for rotation relative thereto, power means operatively connected to said operator's seat for rotating it in opposite directions, and control devices carried by and rotatable with said operator's seat and operatively connected with said power means for controlling actuation of the latter, the said control devices including actuating portions disposed at both sides of said seat for engagement by movement of parts of the body of the operator other than his hands and feet.

2. In an operator's cab of the character referred to, an operator's seat supported in the cab for rotation relative thereto, power means operatively connected to said operator's seat for rotating it in opposite directions, and control devices carried by and rotatable with said seat and operatively connected to said power means for controlling the actuation of the latter, the said control devices including actuating portions disposed at both sides of and adjacent the front of said seat for actuation by side movement of the legs of the operator.

3. In an operator's cab of the character referred to, an operator's seat supported in the cab for rotation relative thereto, arm rests on said seat, power means operatively connected to said operator's seat for rotating it in opposite directions, and control devices carried by and rotatable with said operator's seat and operatively connected to said power means for controlling the actuation of the latter, the said control devices including actuating portions carried by said arm rests and positioned for engagement by movement of the arms of an operator.

4. An operator's seat for use in a cab of the character referred to comprising means supporting said seat for rotation about a vertical axis, a foot rest rotatable with said seat, arm rests for said seat, control devices carried by said foot rest and operatively connected to power operated means for controlling the operation thereof, other control devices including handle portions rotatable with said seat and positioned adjacent said arm rests for controlling the operation of other power operated means, power means operatively connected to said operator's seat for rotating the same in opposite directions, and manually operable control devices mounted for rotation with said seat and operatively connected with said last-mentioned power means for controlling the actuation thereof, whereby an operator may control and observe a plurality of different operations from different angular positions of said seat without leaving the latter.

5. A combination as defined in claim 4 wherein the control devices carried by and rotatable with said operator's seat for controlling the actuation of the last mentioned power means, include portions disposed at both sides of said seat and positioned for actuation by movement of parts of the operator's body other than his hands and his feet.

6. In a multimotored, electrically operated, overhead traveling crane having a movable bridge, a trolley movably supported on said bridge, hoisting mechanism including a load cable carried by said trolley, individual electric motors for moving said bridge, trolley and hoisting mechanisms, and an operator's cab having transparent walls immovably suspended from the bridge of the crane with the longitudinal axis of the cab extending vertically and with said cab offset with respect to the vertical longitudinal center plane of said bridge so that the load cable of the hoisting mechanism can pass by said cab; the improvement which comprises an operator's seat located in said cab and supported for rotation about a vertical axis, an electric motor operatively connected to said seat for rotating it in opposite directions, a foot rest rotatable with said seat, and control devices fixed with respect to said operator's seat for rotation therewith and operatively connected to said electric motors for effecting rotation of said seat and the movement of said bridge, trolley and hoisting mechanisms; certain of said control devices including portions supported on said foot rest for actuation by the feet of the operator, others of said control devices including portions at either side of and adjacent the front of said seat for actuation by the hands of the operator, and the remainder of said control devices including portions disposed at either side of said seat and positioned for actuation by movement of parts of the operator's body other than his hands or feet.

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