Oct. 2, 1934. B. F. FITCH 1,975,094

TRAVELING CRANE

Filed March 26, 1932 4 Sheets-Sheet 1

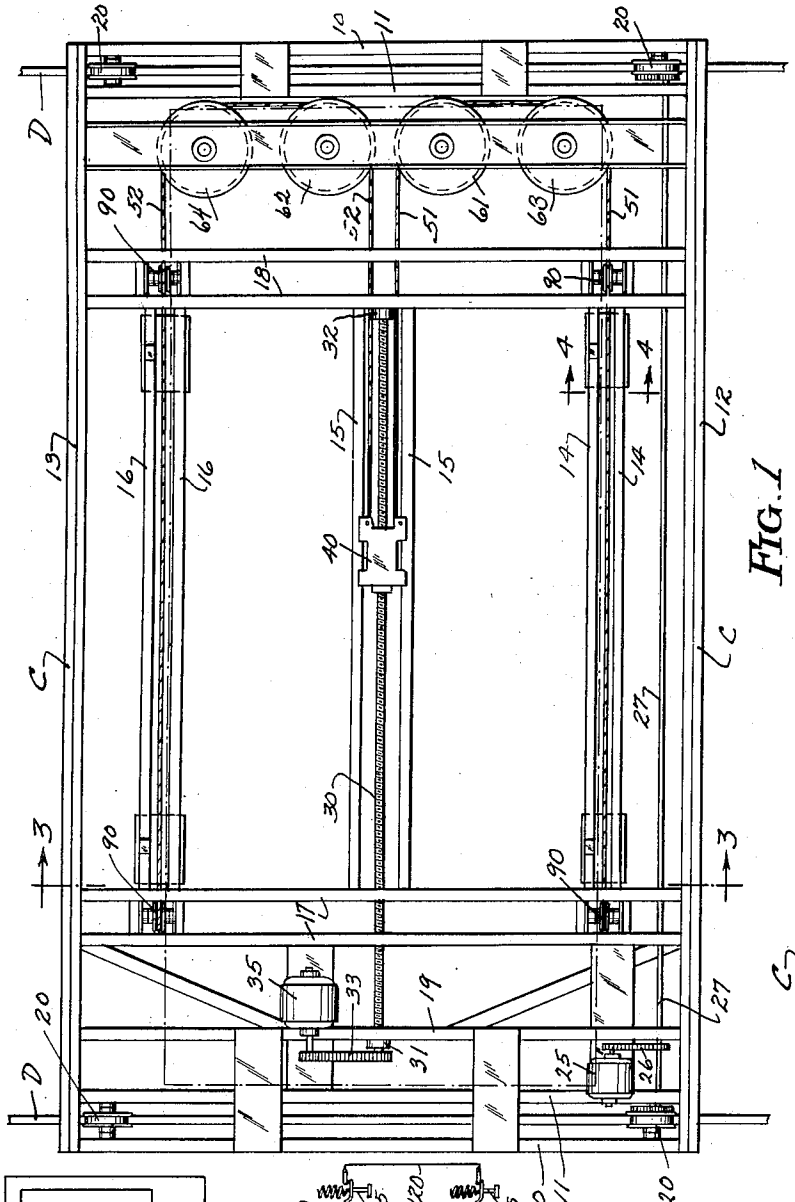


FIG. 1

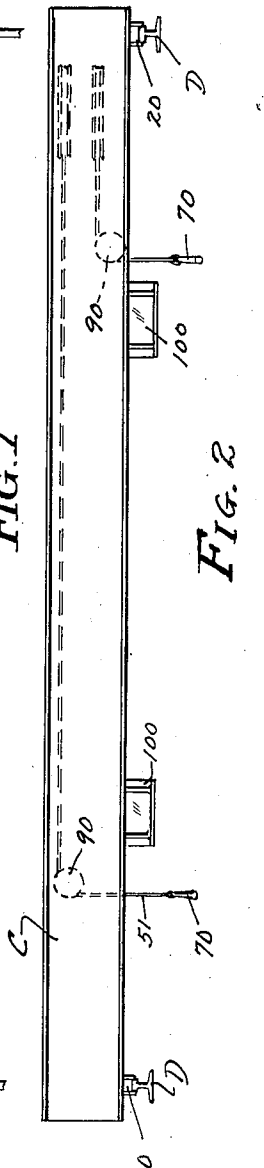


FIG. 2

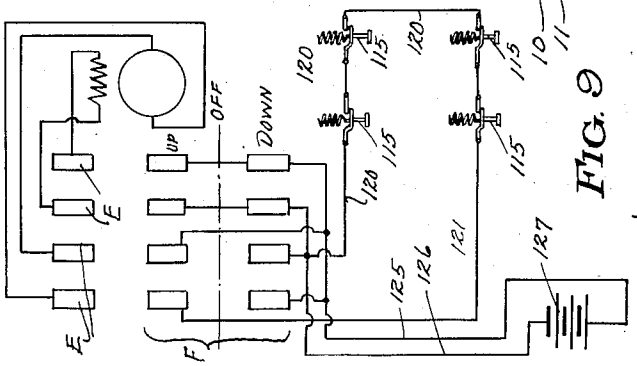


FIG. 9

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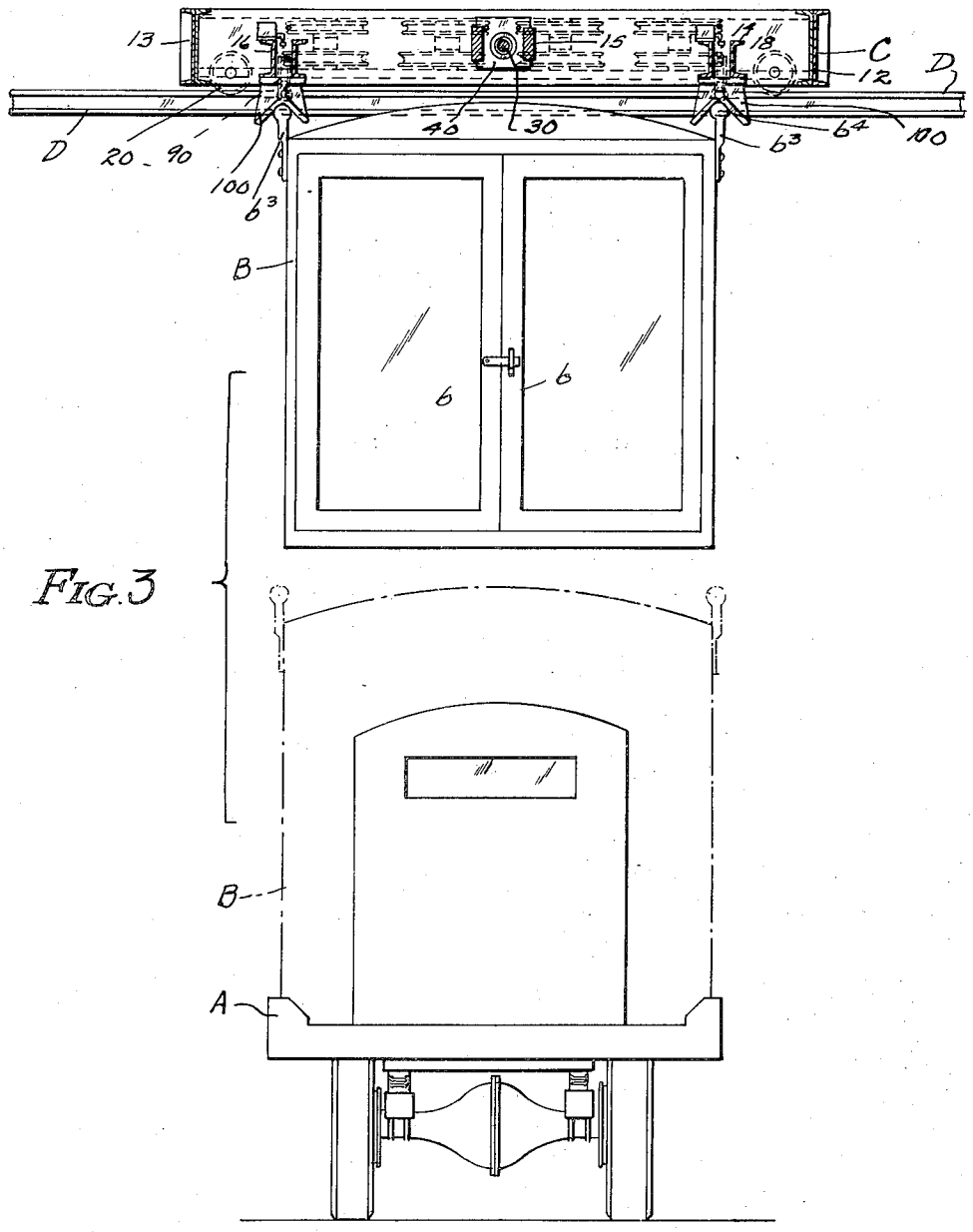


FIG. 3

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TRAVELING CRANE

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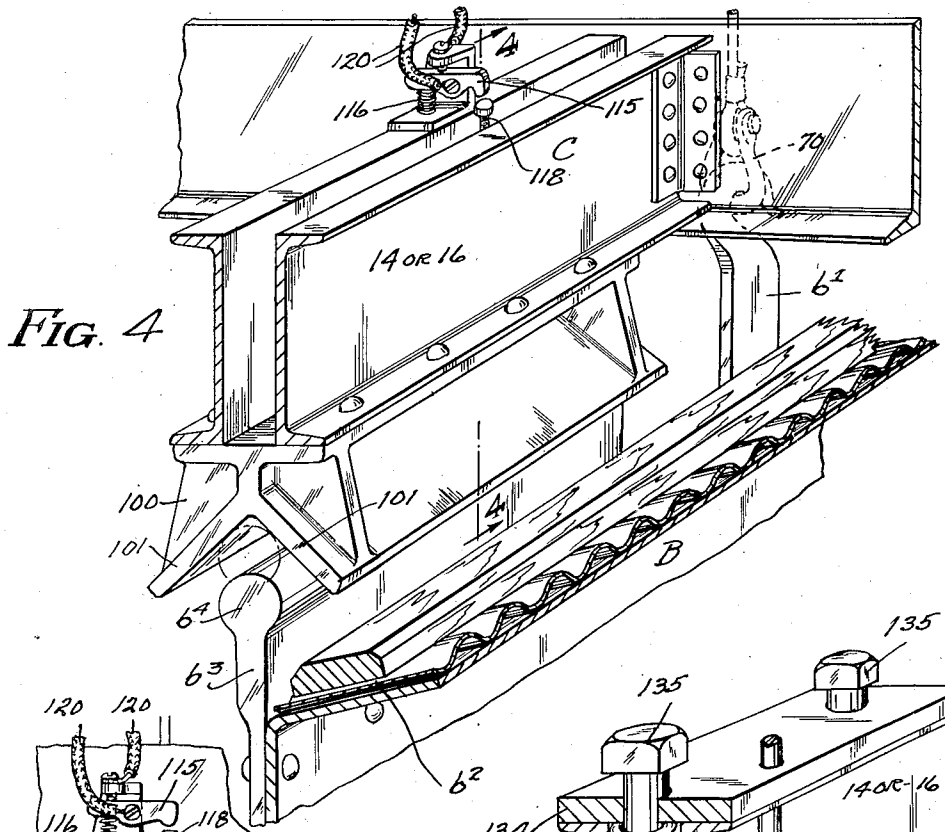


FIG. 4

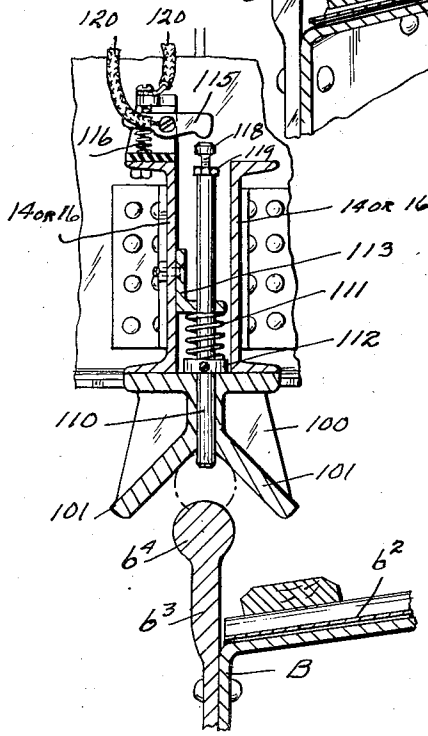


FIG. 5

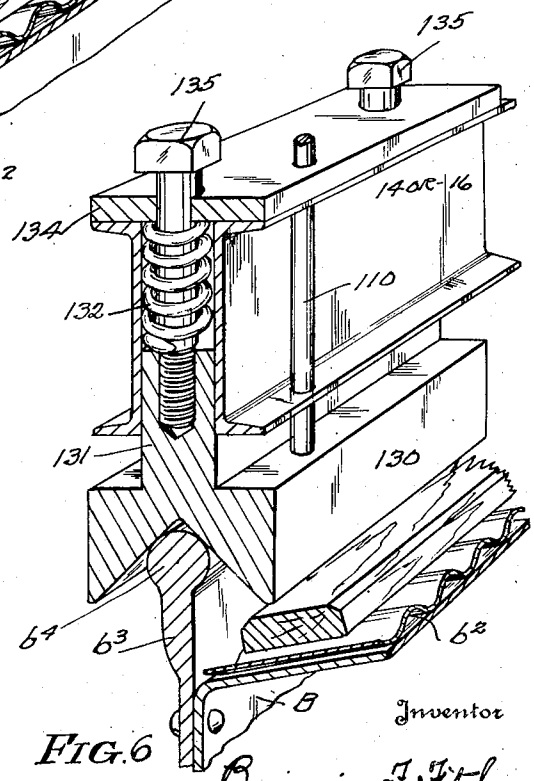


FIG. 6

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TRAVELING CRANE

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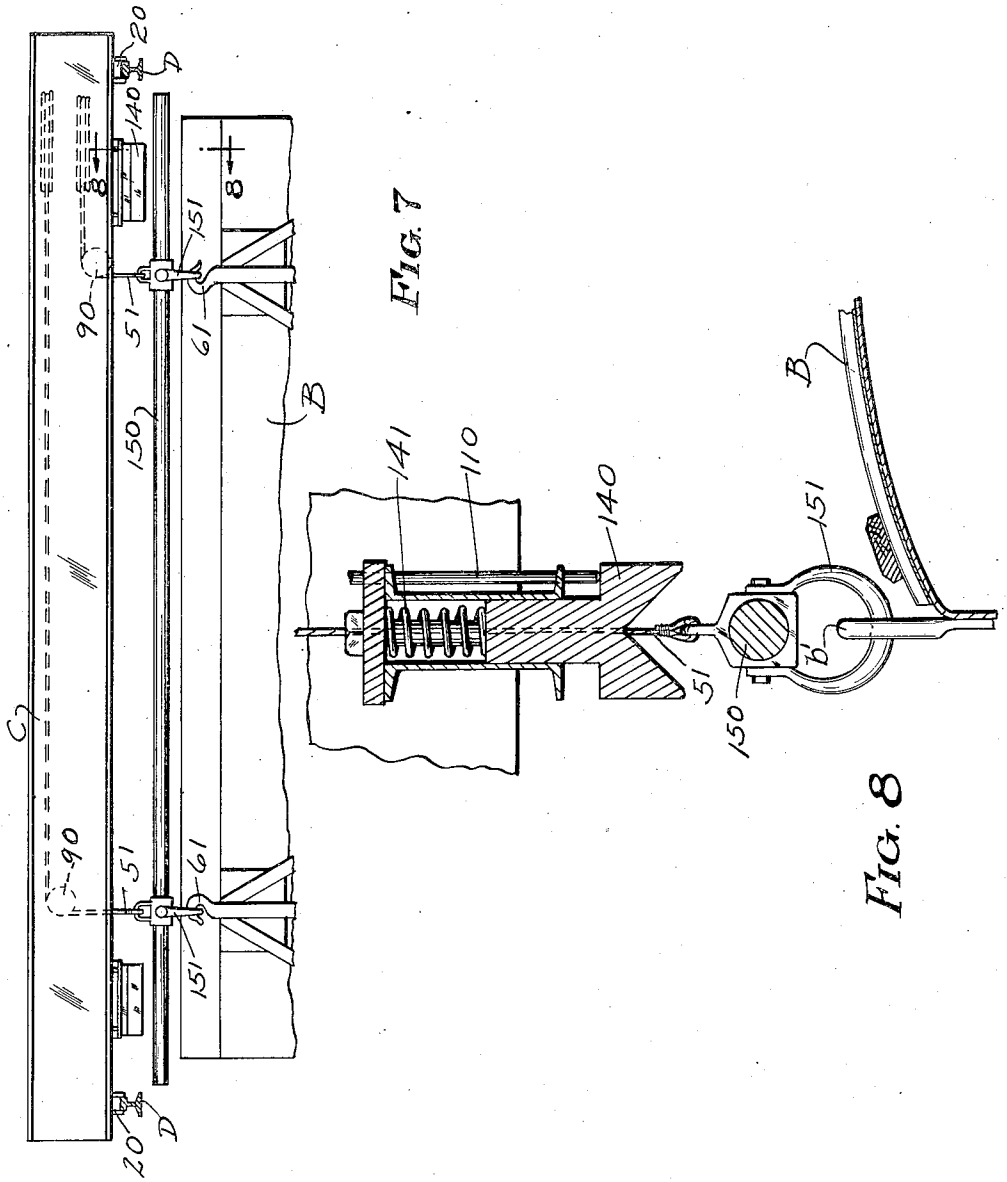


FIG. 7

FIG. 8

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UNITED STATES PATENT OFFICE

1,975,094

TRAVELING CRANE

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Application March 26, 1932, Serial No. 601,429

13 Claims. (Cl. 212—77)

This invention relates to traveling cranes, and particularly cranes adapted to raise and transport demountable automobile bodies.

One of the objects of the invention is to enable the raising of such body, or an intermediate cradle connected to the body, tight against the under side of the crane frame without danger of injuring either the body or the frame, or the cradle, if one be employed. Another object is to provide simple mechanism for automatically shutting off the raising power when the demountable body reaches its maximum height.

Still another object is to enable the crane to effectively hold the raised load against lateral shifting independently of the crane during the traveling movement of the crane.

Another feature of the invention, which may be employed if desired, relates to a shock-absorber to cushion the blow if the body or cradle should be raised with an excessive force against the crane.

The invention comprises the means by which I accomplish the results above referred to, or any of them, and is hereinafter more fully explained in connection with illustrative embodiments of the invention shown in the drawings.

In the drawings:

Fig. 1 is a plan of a traveling crane having features of my invention.

Fig. 2 is a side elevation of such crane.

Fig. 3 is a vertical transverse section of the same, showing also the demountable body as attached directly to the crane and fully raised, the view indicating also the position of such body when on the truck.

Fig. 4 is a perspective of a portion of the crane and cooperating portion of the demountable body as it is approaching its final position.

Fig. 5 is a cross section through the portion of the crane and body shown in Fig. 4, the section being on the plane indicated by the line 4—4 on Fig. 4.

Fig. 6 is a sectional perspective of a modified form of crane attachment embodying the shock-absorbing feature and shown as associated with the demountable body.

Fig. 7 is a side elevation of the crane supporting a cradle which supports the body.

Fig. 8 is a vertical section on the line 8—8 on Fig. 7.

Fig. 9 is a diagram of an illustrative controller and electric circuits which may be employed for controlling the raising motor manually and automatically.

In Fig. 3 of the drawings, A indicates a suitable automobile truck, and B a demountable body therefor, which may be carried by the truck and raised by the crane C. The body is shown as having end doors b; and may also have side doors, if desired. Projecting upwardly from the eaves of the body are four supporting hooks b^1, two on each side, by which the body may be lifted. Secured to the body sides, and projecting some distance above the roof b^2 thereof at the eaves, are four bumper bars b^3 which are shown as vertical plates, each terminating in a rounded enlargement b^4. The crane hereinafter described has four depending raising members which may respectively engage the hooks b^1 and may raise the body until the bumper tops b^4 coact with positioning and controlling means as hereinafter described.

In Figs. 1, 2 and 3, I have shown a pair of crane trackways D suitably supported in any desired manner at a proper elevation over the runway for the trucks and extending, if desired, over a platform (not shown) upon which the bodies may be deposited. Reference may be made, for instance, to my prior Patent No. 1,437,968, for such platform and the system of trolleying bodies with reference thereto.

The crane proper has four raising cables depending at the four corners of a rectangle into position to engage the attaching hooks b^1 of the body. The mechanism for simultaneously raising and lowering these cables may comprise a rotatable screw with traveling nut to which the cables are anchored, and suitable sheaves about which the cables pass, such construction being shown and claimed in my Patent No. 1,747,765, issued February 18, 1930. It is illustrated particularly in Fig. 1 of the drawings hereof, and will now be described.

The crane frame shown comprises duplicate end beams 10 and 11; side beams 12 and 13 which span the trackway; and various intermediate beams arranged in pairs 14, 15 and 16; suitable cross beams 17, 18 and 19; and various braces.

Mounted between the end beams 10 and 11, at each end, are a pair of supporting wheels 20 which ride on the rails of the trackway D. I have shown a suitable motor 25 connected by a gearing 26 to a shaft 27 which is geared with one of the wheels at each end to propel the crane frame as desired.

Rotatably mounted between the central transverse beams 15 and 15 is a screw 30 extending from a point near one end of the crane to a point near the other. This screw is indicated as having bearings in the beams 18 and 19. It has a thrust

bearing 31 on a far side of the beam 19 resisting a pull on the screw. The other end of the screw is slidable through its bearings 32 on the beam 18. Beyond the bearing 31 is suitable gearing 33 connecting the screw with a driving motor 35. On the screw 30 is a nut 40 to which the load cables referred to are attached, the nut being slidably guided by engaging the beams 15.

There are four load cables, which are all anchored to the nut 40 and extend in the same direction therefrom, that is, toward the right-hand end of the frame in Fig. 1. The load on these cables tends to pull on the nut, putting the portion of the screw between the nut and the thrust bearing 31 under tension, while the free bearing 32 at the other end of the screw prevents any portion of the screw being under compression.

In the plan, Fig. 1, one of the cables is directly beneath the cable designated 51, and on the other side of the frame is a cable directly beneath the cable designated 52. The cables pass from the nut about sheaves 61, 63 and 62, 64, and then lead parallel with the screw, passing downwardly respectively over four sheaves 90. The four sheaves are shown as suitably carried by the transverse beams 17 and 18. They are so located that the four cables depend in position to carry shackles 70 (Fig. 4) which may engage four attaching devices b^1 on the body, where direct attachment is desired.

It will be seen that when the body is engaged, the operation of the motor 35 rotating the screw may move the nut longitudinally to pull on the four cables and thus raise the body. The pitch of the screw is such that the device is self-locking, the nut holding the load at any elevation to which it may be raised.

When the four cables are attached to the four hooks of the body, the body may be raised while remaining level, irrespective of its loading. To minimize the head room required and also to prevent lateral shifting of the body during travel, the body may be raisable tightly against the under side of the hoist. To enable this to be accomplished without injury to the body or hoist, I provide abutment blocks on the under sides of the crane frame adapted to be impinged by the bumpers b^3 on the bodies, and I provide means for shutting off the power of the raising motor as soon as the impingement takes place. Such construction is indicated generically in Figs. 1 and 2; while two different embodiments of it are shown in Figs. 4 and 5 and in Fig. 6, respectively.

Referring first to the embodiment of Figs. 4 and 5, there will be seen, secured to the under side of the pair of crane beams 14 or 16 the bumper blocks 100, which are castings suitably ribbed for strength and have, on their under portions, divergent webs 101 providing, between them, an inverted V-shaped recess into which the enlargement b^4 of the bumper b^3 may readily pass as the body is drawn up by the cables attached to the hooks b^1. Such engagement not only limits the upward movement of the body, but effectively holds it against lateral swinging.

To shut off the power automatically as the bumpers become seated in the abutment blocks, I may provide one or more plungers 110 mounted vertically between crane frame bars extending downwardly through the abutment block into the path of bumpers b^3. A suitable spring 111 compressd between a shoulder 112 on the bar and a stationary angle clip 113 on one of the frame beams presses the rod downwardly. Directly over the rod 110 is a suitable electric switch indicated at 115, which normally connects two conductors 120 leading to the motor hereinafter described. A suitable spring 116 normally maintains the connection.

Now, as the body is reaching its final elevation, the enlarged upper edge of the bumper b^3 engages the lower end of the rod 110 and raises it so that it abuts and swings the switch lever 115, breaking the connection between the conductors 120 and opening a circuit to the motor. An adjustment may be provided, if desired, of the rod 110, as, for instance, by a screw 118 threaded into the upper end of it and locked by a jamb nut 119.

The switch control described may be provided at only one of the abutments, or, if desired, at two or at all four of them, being connected in series so that the motor will stop as soon as any one of the bumpers has been brought snugly into engagement with its abutments.

In place of controlling the motor by a rod slidable through the bumper, I may make the bumper itself slidable under a control of stiff springs, and this has the further advantage of providing a shock absorber gradually stopping the upward movement of the body. Such construction is illustrated in Fig. 6.

As shown in Fig. 6, the abutment 130 has an upwardly extending neck 131 slidable between the frame bars 14 or 16. Suitable springs 132, compressed between the upper end of this neck and a plate 134 on top of the frame bars, tends to press the abutment downwardly. Bolts 135, passing loosely through the plate 134 and threaded into the bumper, may occupy the springs and position them, and the heads on these bolts may limit the downward position of the abutment.

In this embodiment, when the bumper b^3 on the container comes into the constricted region of the trough of the abutment, the abutment is raised, compressing the springs 132; and this movement raises a suitable control rod, not specifically shown, but indicated at 110, which corresponds to the rod 110 of Fig. 5 and operates the switch in similar manner.

In the embodiment of Fig. 6 just described, the top of the abutment proper outside of the neck forms shoulders beneath the flanges of the beams of the crane frame and positively limits the upward movement of the abutment; but it is intended that before engagement of these abutment faces with the beam flanges takes place, the switch rod will have opened the switch and stopped the operation of the motor.

In Figs. 7 and 8, I have illustrated a hoist structure 12 similar to that of Figs. 1 and 2, but arranged to have the four cables (two of which are shown at 51) connected to a cradle which has means to engage the body hooks. Accordingly, the hoist here shown will not be further described, except to state that the abutments 140 are similar to those already described in Fig. 6; but are preferably located beyond the cables instead of between them, as shown for the abutments 100 in Fig. 2.

The cradle designated 150, in Figs. 7 and 8, may be of the general form shown in my Patent No. 1,838,139, comprising longitudinal bars and transverse bars forming an open rectangular frame, suitable shackles 151 pivoted to the side bars directly beneath the supporting cables 51, etc. These shackles may be suitably swung by means not shown, but illustrated in the patent, to cause them to engage or to disengage the body hooks b^1. Accordingly, when the crane lowers the

cradle over the body resting beneath it, the shackles become attached to the body hooks and then the crane pulling upon the cables 51, etc., raises the cradle and body attached to it. As the maximum height is reached, the side bars of the cradle (here shown as round bars) come into the downwardly facing recesses of the abutment 140, which are thus raised a slight distance against the action of their resisting springs 141. In such movement, a rod 110 carried by one of the abutment blocks operates the electric switch, as heretofore described with reference to Fig. 5. The mechanism therefore provides a shock absorbing abutment for the cradle attached to the load; and also an effective means to shut off the power when the load reaches the maximum height.

Any suitable circuit arrangement may be employed between the motor and the switch which is automatically actuated when the cradle or body reaches its maximum height. In Fig. 9, however, I have illustrated a manual controller for reversing the motor associated with four of these switches 115 controlled by four vertically movable rods 110 supposed to be mounted in the four bumpers of any of the embodiment.

Referring particularly to the diagram of Fig. 9, E represents a set of stationary contact fingers forming terminals of the field and armature of the motor which raises the rod; F represents a rotary or oscillatory barrel having contact plate adapted to variably contact with the fingers according to the position of the barrel. In this diagram, 120 and 121 indicate the conductors leading from the set of controlling switches 115 coupled in series; 125 and 126 designate lines from a source of supply indicated at 127.

It is not regarded as necessary to trace specifically the various circuits to the contact plates of the controller, as the controller shown is merely illustrative. It will be noticed, however, that in the central position of the controller barrel designated "off", no current is flowing to the motor nor through the line 120—121 to the controlling switches. When the controller barrel is moved to the "up" position, the current flows from the source of supply to the field of the motor, and through the armature and the set of switches 115 in series with each other and with the armature on a line which is in shunt with the field. The opening of any of the switches 115, therefore, opens the armature line and stops the motor.

Now, when the controller is turned to the "down" position, not only are the lines to the armature reversed with reference to the field, but the armature is now directly connected across the field lines independently of the switch circuits 120 and 121, so that the motor may operate to run the load down, notwithstanding one or more of the switches 115 are open, until the motor is stopped by the operator turning the controller to neutral position. In the meantime, the switches have automatically closed themselves, and the circuits are ready for action when the load is to be raised.

It will be seen that my mechanism, whatever form of embodiment, is effective to stop the upward movement of the body, or the cradle and body, while enabling such load to come into tight contact with the hoist frame, so that the head room is minimized. In each case, the downwardly inclined under face of the abutment blocks form sockets to receive the body projections or the cradle bars and accurately position the load, so that it comes into a definitely determined region. When in such final position, the body is effectively held against lateral movement, for even if the cradle is employed it has a substantially tight engagement with the body; and thus the hoist may travel at a high speed without danger of swinging the body. Should the form of Fig. 6 or 7 be employed, the above advantages are all obtained, together with the further feature of a shock absorber to retard the movement of the load as it comes into final position. It should also be noted that my device is a simple construction, and may be readily applied.

I claim:

1. The combination of a traveling crane having a pair of rigid frame members parallel with each other and spaced a short distance apart, an abutment rigidly secured to the bottoms of said frame members, said abutment having a recess on its under face in the form of an inverted V, a vertically slidable rod mounted between said frame members and extending downwardly through an opening in the abutment beyond the apex of the abutment recesses, a spring for pressing said rod downwardly, and an electric switch operated by the upward movement of the rod.

2. The combination of a crane having four depending raising members and means for operating them as a unit, four downwardly facing abutments spaced apart on the crane frame, and a demountable automobile body having four hooks adapted to be engaged by four shackles suspended by said depending raising members, said body having also four bumpers extending above the eaves and adapted to engage said abutments, two of the shackles and two of the abutments being on one side of the crane frame and the other two on the other side, and two of the hooks and two of the bumpers being on one side of the body and the other two on the other side.

3. The combination with an automobile body having sides and a roof, of a bumper secured to the body at the side and extending above the junction of the roof and side, and a crane having a downwardly facing abutment with a recess in the form of an inverted V adapted to be engaged by the bumper, and a switch-controlling rod depending through the abutment into the V-shaped recesses into position to be engaged by the same bumper.

4. The combination of a crane having parallel horizontal beams in its frame and having raising mechanism, a downwardly facing abutment having a shank extending upward and slidable between said beams on the crane, a spring acting on the abutment to press it downwardly, and means for limiting the downward movement.

5. The combination of a crane having raising mechanism, an abutment yieldingly mounted on the crane frame and pressed downwardly by a spring, said abutment having a downwardly facing socket adapted to be entered by means attached to the raised load, an electric motor for operating the crane, and a switch for controlling the motor operated by upward movement of the abutment.

6. The combination of a traveling crane having a horizontal frame comprising structural shapes secured together, said frame including two pairs of parallel beams, said pairs being spaced apart a considerable distance, downwardly facing abutments beneath the respective pairs and having re-entrant lower faces adapted to coact with bumpers attached to the raised load, said abutments having upwardly extending parallel-sided shanks having a sliding movement be-

tween said beams, and there being springs acting downwardly on the abutments.

7. The combination of a crane frame, raising mechanism mounted thereon, four depending cables operated by the raising mechanism, a cradle comprising an open rectangular frame carried by said raising members, said cradle having provision for engaging a demountable automobile body at four points, two on each side, and laterally and longitudinally spaced bumpers carried by the crane frame, and adapted to be engaged by the cradle when sufficiently elevated.

8. The combination of a crane having a plurality of laterally spaced abutments to engage an elevated automobile body in various regions, the crane having raising mechanism and an electric motor for operating it, a plurality of switches for stopping the motor, said switches being connected in series with each other and with the motor and being respectively associated with the different abutments whereby the raising operation may be stopped by engagement of the load with any of the abutments.

9. The combination of a crane frame, four abutments in the form of inverted V's, two on each side and spaced apart, longitudinally, a demountable body, four shackles, two on each side and spaced apart, adapted to engage the body, raising mechanism on the crane frame for lifting the four shackles simultaneously, and means raised with the body by said raising mechanism adapted to engage the four abutments.

10. The combination of a crane having four depending raising members and means for operating them as a unit, four downwardly facing abutments spaced apart laterally and longitudinally on the crane frame, a demountable automobile body having four hooks adapted to be engaged by four shackles suspended by said depending raising members, means raisable with the body when the shackles are connected to it, adapted to engage said abutments, two of the shackles and two of the abutments being on one side of the crane frame and the other two on the other side, and two of the hooks being on one side of the body and the other two on the other side.

11. The combination of a crane frame, raising mechanism mounted thereon, four depending cables operated by the raising mechanism, a cradle carried by said raising members and having side bars and end bars, said cradle having provision for engaging a demountable automobile body at four points, two on each side, and four bumpers carried by the crane frame adapted to be engaged by the side bars of the cradle when the cradle is sufficiently elevated, said bumpers being movable upwardly, and springs tending to resist such upward movement, whereby said bumpers act as shock absorbers.

12. The combination of a demountable automobile body having side walls and a roof, of bumpers on opposite sides of the body having downwardly and longitudinally extending webs secured to the side walls and having horizontal enlargements along the upper edges above the roof.

13. The combination of a crane frame having four downwardly facing bumpers spaced laterally and longitudinaly and having re-entrant lower faces, a cradle, mechanism on the cradle whereby it may engage a demountable automobile body at four points, two on each side, raising mechanism on the crane frame connected to the cradle, and means whereby the cradle engages the bumpers when the cradle and load are elevated.

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