Aug. 4, 1931. A. T. MUNNS 1,817,418

ELEVATOR

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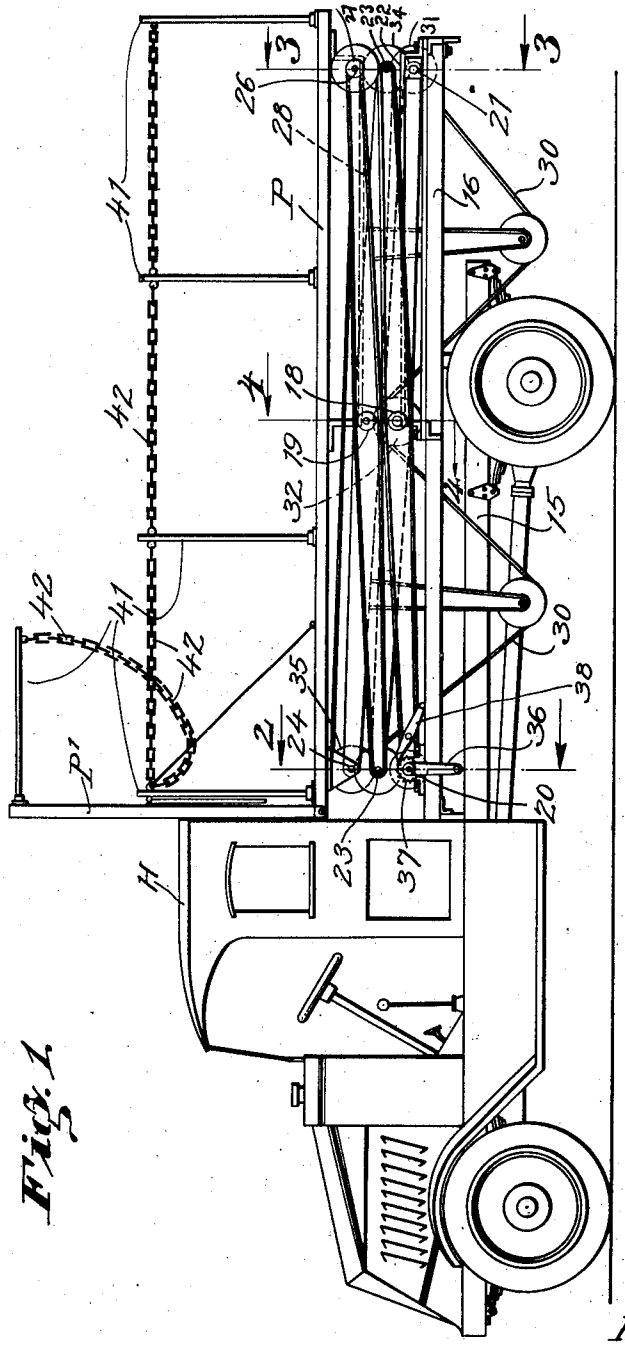


Fig. 1.

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Fig. 2.

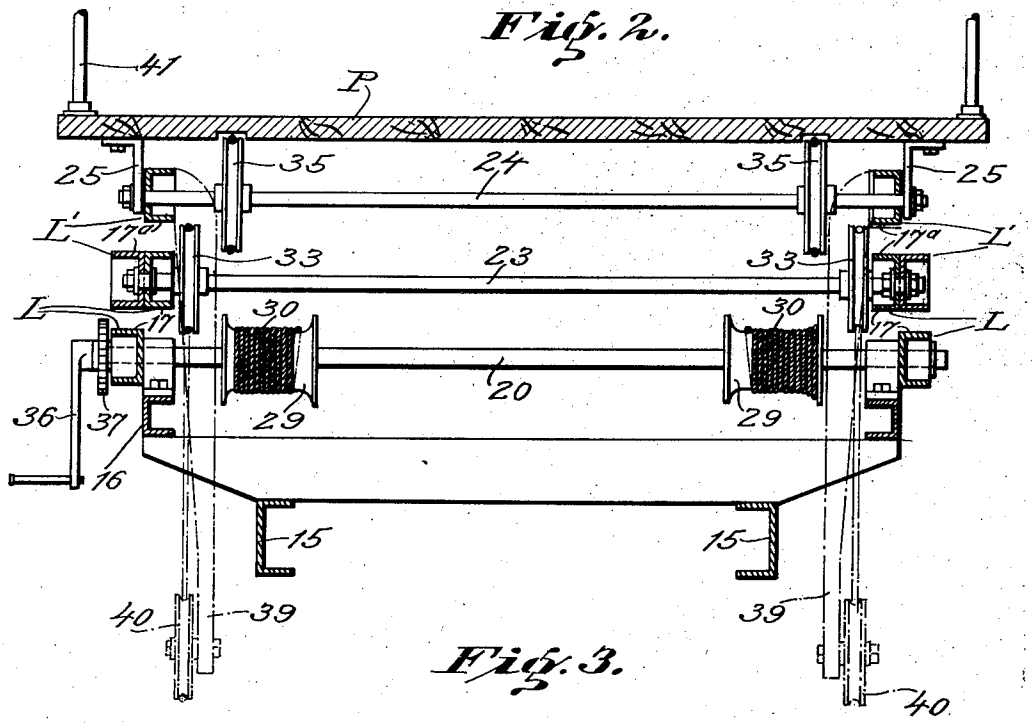
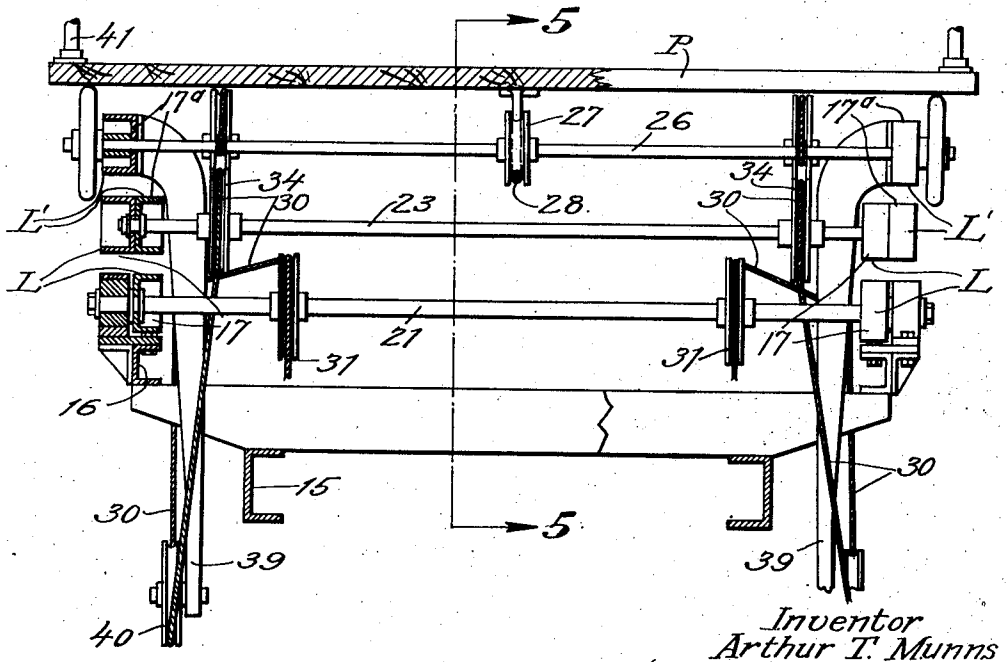


Fig. 3.



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Fig. 5.

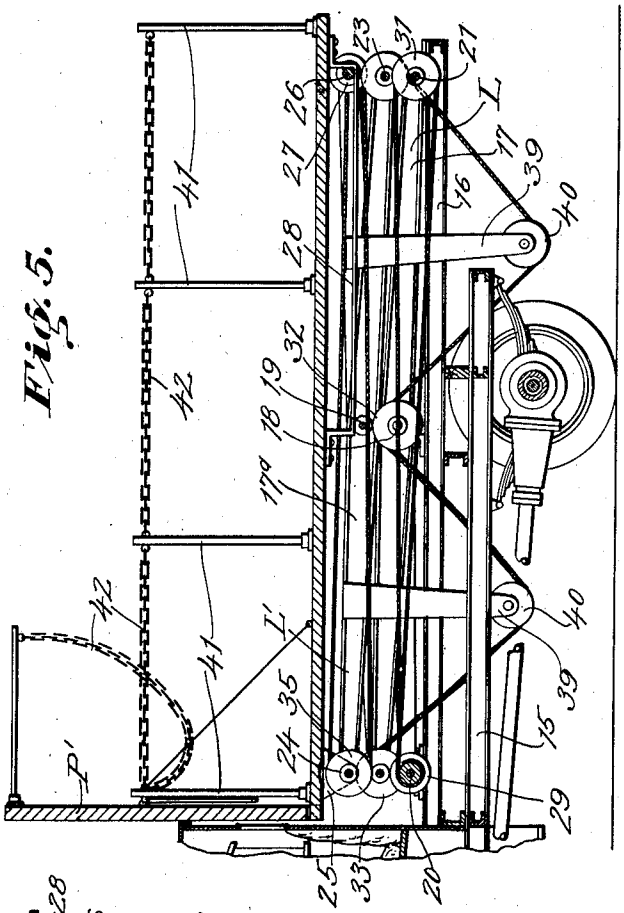


Fig. 6.

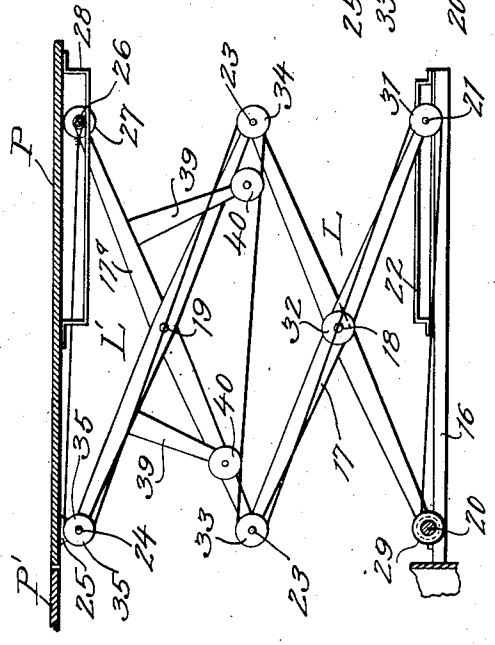
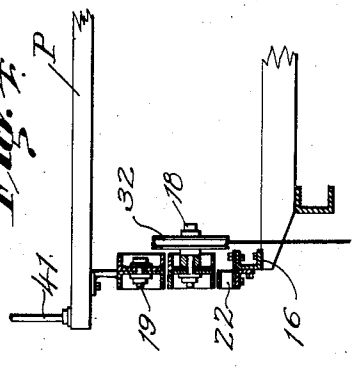


Fig. 4.



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Fig. 8.

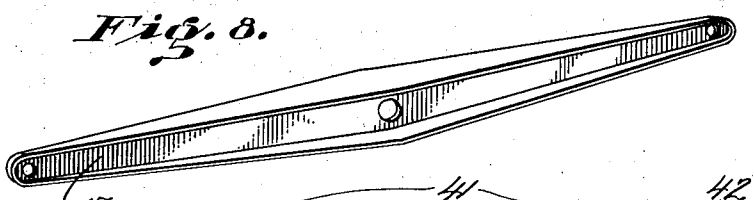
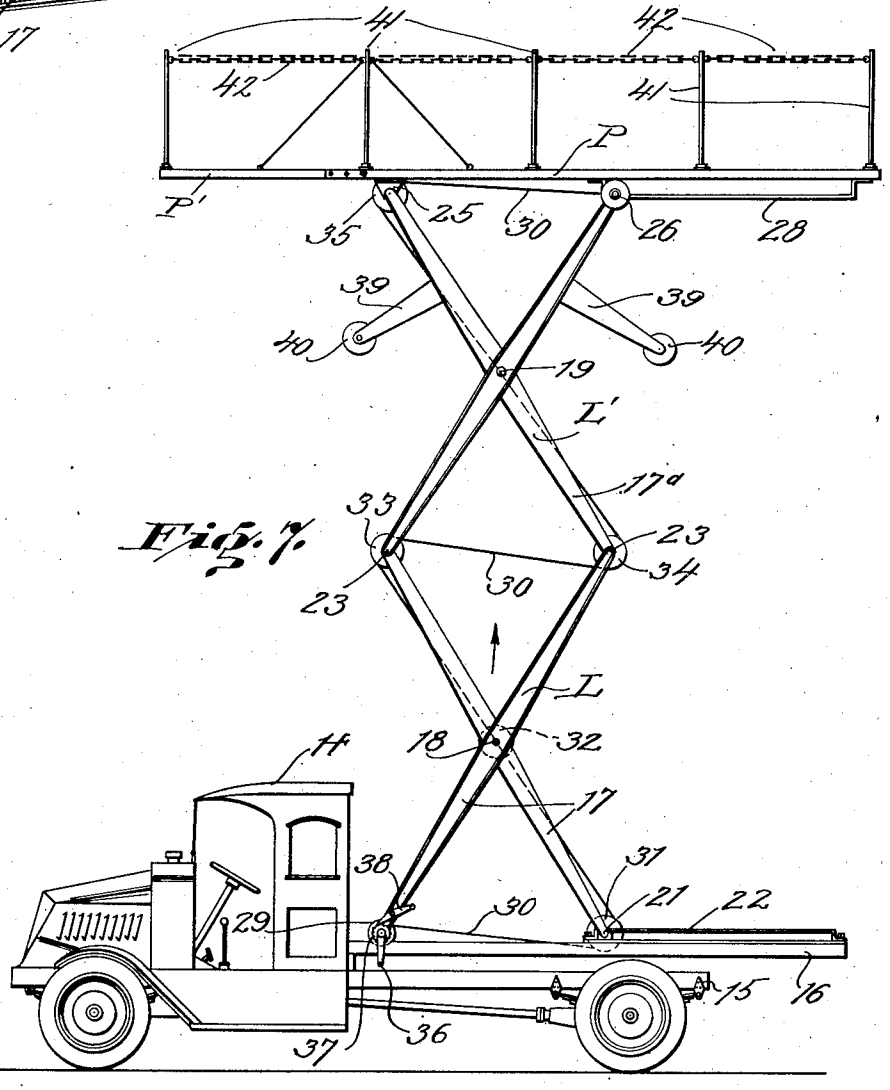


Fig. 7.



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Patented Aug. 4, 1931 1,817,418

UNITED STATES PATENT OFFICE

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ELEVATOR

Application filed February 18, 1929. Serial No. 340,901.

My invention relates to elevators of the type embodying a platform supported on a lazy-tong structure, the latter being operable by a mechanism to raise and lower the platform and to support the platform at any desired elevation within the range of adjustment of the lazy-tong.

The mechanisms heretofore proposed for moving the lazy-tongs to extended position from a folded position have been such as to render very difficult the initial actuation thereof to the extent of requiring a relatively greater source of power and one wholly beyond the range of practicability particularly where the elevator is a portable one and great loads are adapted to be lifted.

It is a purpose of my invention to provide in an elevator of the type above described, a mechanism for operating the lazy-tong structure which is characterized by exerting a force vertically upward and in such manner that the structure may be moved to an extended position with the application of a minimum amount of force and even when elevating relatively heavy loads. My operating mechanism is characterized further by the application to the levers of the lazy-tong structure of forces which act horizontally to contract the ends of adjacent levers to the end of moving the structure to an extended position beyond that possible by the vertical force or forces exerted by the operating mechanism.

I will describe only one form of elevator embodying my invention and will then point out the novel features thereof in claims.

In the accompanying drawings:

Fig. 1 is a view showing in side elevation one form of elevator embodying my invention in applied position to a motor truck.

Figs. 2 and 3 are enlarged vertical sectional views taken on the lines 2—2 and 3—3, respectively, of Fig. 1.

Fig. 4 is a fragmentary vertical sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a vertical longitudinal sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is a semi-diagrammatic view of the elevator as shown in the preceding views and where the lazy-tong structure is in partly extended position.

Fig. 7 is a view similar to Fig. 1 showing the elevator in fully extended position.

Fig. 8 is an enlarged detail perspective view of one of the levers embodied in the lazy-tong structure of the elevator.

My invention in its present embodiment is shown applied to a motor truck of conventional form in order that the elevator which it supports may be readily moved from place to place and hence rendered portable. The elevator may be directly applied to the chassis of the truck but in the present instance I have shown the elevator supported on a supplemental frame 16 which is fixed to and supported on the chassis 15 of the truck. The supporting frame 16 is of rectangular form and is of such length that its rear end projects beyond the corresponding end of the chassis in order that it may accommodate and support a lazy-tong structure having relatively long levers that it may be extended vertically to relatively high elevations. The lazy-tong structure in the present instance comprises a lower unit and an upper unit, designated respectively at L and L^1, and each consisting of two pairs of levers 17 and 17*a* respectively, disposed at opposite sides of the supporting frame 16 and the levers of each pair arranged in intersecting relation and fulcrumed at the point of intersection so as to be free to be moved to folded or extended position. As illustrated to advantage in Fig. 4, stub axles 18 provide the fulcrums for the levers 17 of the lower lazy-tong unit, while stub axles 19 provide the fulcrum points for the levers 17*a* of the upper unit L^1. One lever of each pair of levers of the lower unit L are pivoted on a shaft 20 and journaled in the frame 16, and which shaft is adapted to be operated manually or by power for actuating the mechanism to operate the lazy-tong structure. The lower ends of the remaining levers of the lower unit are connected to each other by an axle 21, and this axle is movable within yokes 22 secured to the upper side of the supporting frame 16. By this construction the levers connected by the axle 21 are free to

move longitudinally within the yokes 22, thus permitting the lower unit L to be moved to extended and folded positions.

The upper unit L^1 is of course supported on the lower unit and for this purpose axles 23 are provided which extend through the meeting ends of the levers of the two units to provide a pivotal connection between the same as illustrated to advantage in Fig. 3. The upper end of one lever 17*a* of each pair is fixedly secured to the under side of a platform P by means of an axle 24 mounted in brackets 25 secured to the platform. The upper ends of the other two levers are connected by an axle 26, and this axle is provided with a pulley 27 (Fig. 3) which is movable in a yoke 28 secured to the under side of the platform P. This structure permits movement of the axle 26 longitudinally within the yoke 28 so that the corresponding ends of the levers are free to move within the yoke in allowing the upper unit to occupy folded and extended positions.

For operating the aforedescribed lazy-tong structure so that it may be moved to an extended position on the truck for elevating the platform P and similarly to move the lazy-tong structure to a folded position in a manner to control the descent of the platform, I provide a mechanism which comprises a series of pulleys for cables, and which therefore may be termed a flexible mechanism. This mechanism includes the shaft 20 to which is fixed a pair of windlasses 29 about which latter are wound a pair of cables 30 as clearly illustrated in Fig. 2. From the windlasses, the cables 30 are extended rearwardly and then upwardly and around pulleys 31 (Fig. 5), mounted on the axle 21. From the pulleys 31 the cables are extended forwardly and over pulleys 32 mounted on the stub axle 18. From this point they are extended forwardly and about pulleys 33 mounted on one of the axles 23, and from the latter rearwardly and about pulleys 34 on the other axle 23. From the pulleys 34 the cables are again extended forwardly and about pulleys 35 mounted on the axle 24, and from the latter pulleys the cables are extended rearwardly where their ends are fixed to the axle 26.

This cable and pulley mechanism is adapted to be operated by rotation of the shaft 20 to wind the cables 30 thereupon and to thereby shorten the cables in transmitting horizontal forces to the ends of the levers 17 and 17*a* whereby the ends of such levers are contracted or drawn toward each other in moving the lazy-tong units to extended position. In the present instance I have shown the shaft 20 provided with a crank 36 by which the shaft may be manually rotated, although it is to be understood that the shaft 20 may be power driven through a suitable connection (not shown) to the motor of the truck. To prevent unwinding of the cables from the windlasses, the shaft 20 is provided with a ratchet wheel 37 engaged by a pawl 38 that may be moved manually to a released position for freeing the shaft and thus releasing the cables to allow the lazy-tong structure to descend to fronted position.

As previously expressed herein, initiating movement of the lazy-tong structure to extended position is very difficult particularly when dealing with relatively heavy loads, and although the pulley and cable mechanism thus far described is sufficient to move the lazy-tong structure when dealing with light loads, it is incapable of initiating movement of the lazy-tong structure when elevating relatively heavy loads. However, such mechanism may be rendered operable to extend the lazy-tong structure when dealing with heavy loads by the provision of one or more arms 39 fixed to and depending from the levers 17*a* of the upper unit at points above the fulcrum 19. In the present instance I have shown each of the levers 17*a* provided with a single arm on the lower end of which is mounted grooved pulley 40 to receive a cable 30 in the manner illustrated in Fig. 5. As here shown the lazy-tong structure is in completely folded position, the arms 39 extending below the supporting frame 16 and the pulleys 40 engaging those stretches of the cables 30 which extend between the pulleys 31 and 32 and 32 and 33, all in such manner that the cable stretches are extended in a V form.

In practice, the mechanism for moving the lazy-tong structure to extended position is operated by rotating the shaft 20 to wind the cables on the windlasses. When initiating such movement the cables under the pulling force exerted by the windlasses tends to remove or straighten the V-shaped stretches of cable and in consequence of which the pulling force which may be said to be acting horizontally is, by reason of the arms 39, converted into a vertical force which operates to move the arms upward. As the arms are fixed to the levers 17*a* adjacent to their upper ends, it will be clear that the vertical force or forces acting through the arms will operate to move the levers 17*a* upward to extended position. The lifting action of the cables in respect to the arms will be understood from a comparison of Figs. 5 and 6 from which it will be seen that initially the cables exert a force vertically through the arms 39 to first move the levers of the upper unit to extended position and all before the cables exert any force upon the levers of the lower unit. This application of force vertically continues until the V-shaped stretches of cables have been transformed into a single linear stretch as illustrated in Fig. 6 when this

part of the cables is no longer effective through the arms 39 to extend the levers. However, with continued operation of the windlasses the cables acting through the pulleys about which they are trained exert resultant forces which act substantially horizontal to draw the lever ends toward each other until the lazy-tong structure is moved to fully extended position. In this manner the platform P is moved to the elevated position shown in Fig. 7, and it will be understood that the lazy-tong structure may be retained extended and the platform elevated by securing the shaft 20 against reverse rotation by means of the pawl and ratchet.

The platform P is shown in Figs. 5 and 7 as provided with a supplemental section P^1 which is hingedly mounted thereon to occupy folded and extended positions. The operator's seat on the motor truck is shown provided with a protecting top or housing H which in its association with respect to the platform section P^1 functions as a projection to move the section to the folded position shown in Fig. 5. The hinged mounting of the platform section is such that once it is elevated clear of the top H it gravitates to the position shown in Fig. 7 in which it is aligned horizontally with the platform P to form an extension of the latter. As the elevator is lowered to folded position, the platform section P^1 engages the housing H and is thus moved to the folded position shown in Fig. 5.

In the present instance I have shown the platform P and its supplemental section provided at intervals with uprights or posts 41 connected by chains 42 to form a protecting railing around the platform. The chains allow the section P^1 to be moved to folded and extended positions on the main platform, and with the section extended the chains and posts form a continuous railing around the platform.

Although I have herein shown and described only one form of elevator embodying my invention, it is to be understood that various changes and modifications may be made herein without departing from the spirit of the invention and the spirit and scope of the appended claims.

I claim:

1. In an elevator, a lazy-tong structure, flexible means for moving said structure vertically to extended position, and means on the uppermost levers of said structure and between the ends of said levers by which the flexible means when operated exerts a force vertically upward on said levers whereby movements of said structure to extended position is initiated by upward movement of said levers.

2. In an elevator, a lazy-tong structure, flexible means for moving said structure vertically to extended position, said means including cables, and arms fixed to and depending from the uppermost levers of said structure and engaged by said cables so that when the flexible means is operated the cables will exert a force upward on said levers whereby movement of said structure to extended position is initiated by upward movement of said levers.

3. In an elevator, a truck having a seat top, a lazy-tong structure mounted on the truck for movement vertically to occupy extended and folded positions, means for operating said structure, and a platform on said structure having a part hinged to occupy folded position and to gravitate to extended position, said part being positioned to be engaged by said seat top and moved to folded position.

4. In an elevator, a lazy-tong structure, pulleys at the ends of the levers of said structure, cables trained about the pulleys so that when operated they will exert forces to draw the ends of the levers toward each other for moving the structure to extended position, arms fixed to and depending from the uppermost levers of said structure, pulleys on the arms, about which the cables are trained, said pulleys and arms being positioned to produce in the cables V-shaped stretches that tend to straighten when the cables are actuated to move the arms vertically upward, and means for operating the cables.

5. In an elevator, a lazy-tong structure, pulleys at the ends of the levers of said structure, cables trained about the pulleys so that when operated they will exert forces to draw the ends of the levers toward each other for moving the structure to extended position, arms fixed to and depending from the uppermost levers of said structure, pulleys on the arms and pulleys on the fulcrums of the lowermost levers of said structure about which the cables are trained, said pulleys and arms being positioned to produce in the cables V-shaped strips which tend to straighten when the cables are actuated to move the arms vertically upward, and means for operating the cables.

ARTHUR T. MUNNS.