D. E. HENNESSY.

ELEVATING TRUCK.

APPLICATION FILED APR. 29, 1913.

1,201,180.

Patented Oct. 10, 1916.

5 SHEETS—SHEET 1.

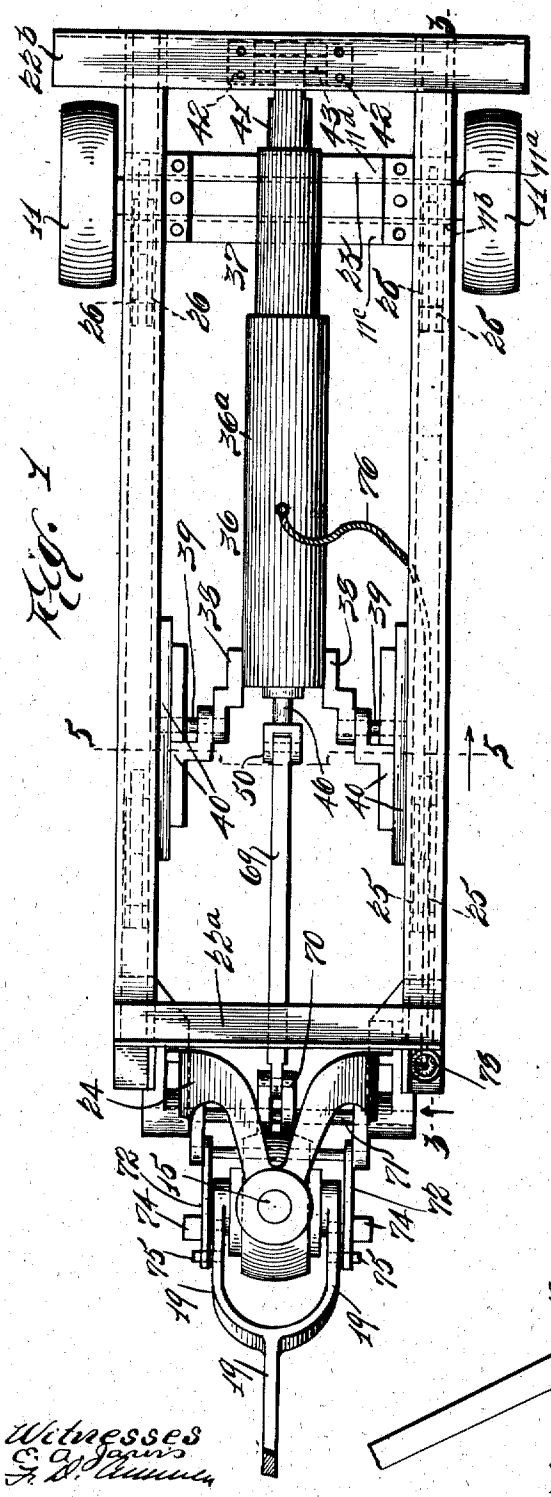


Fig. 1.

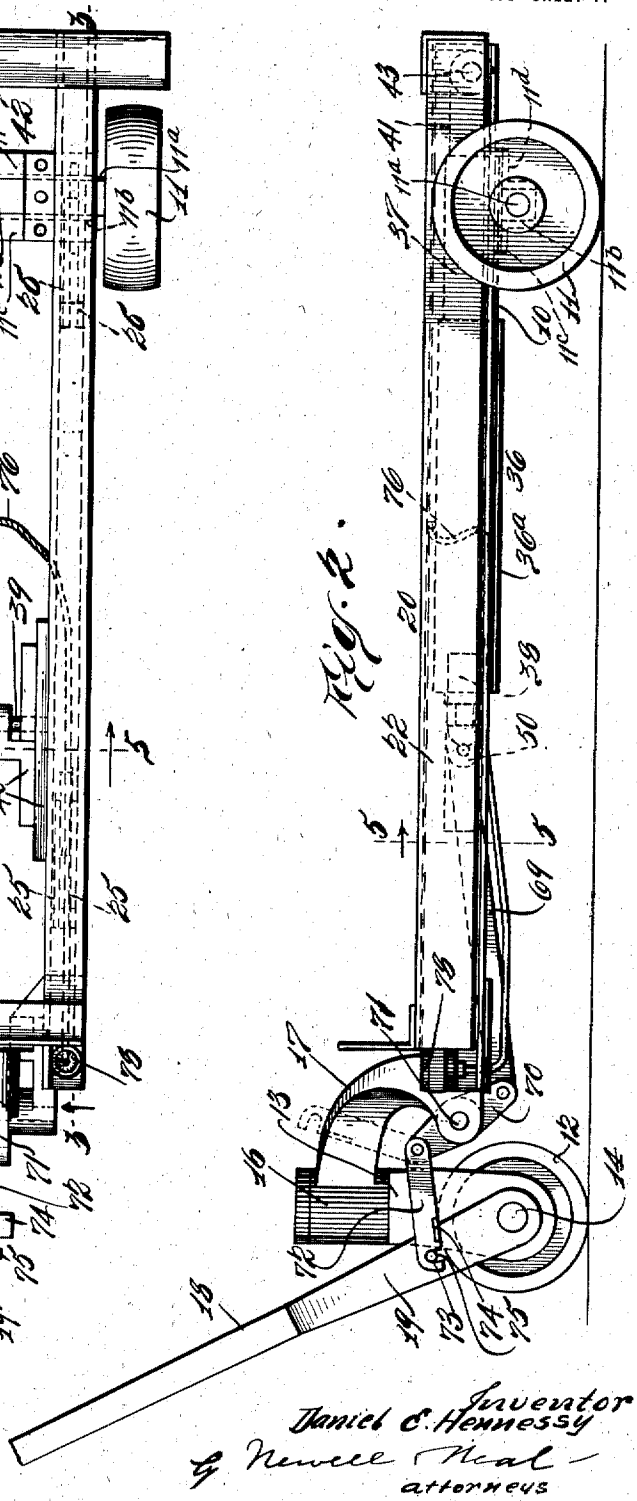


Fig. 2.

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Fig. 3.

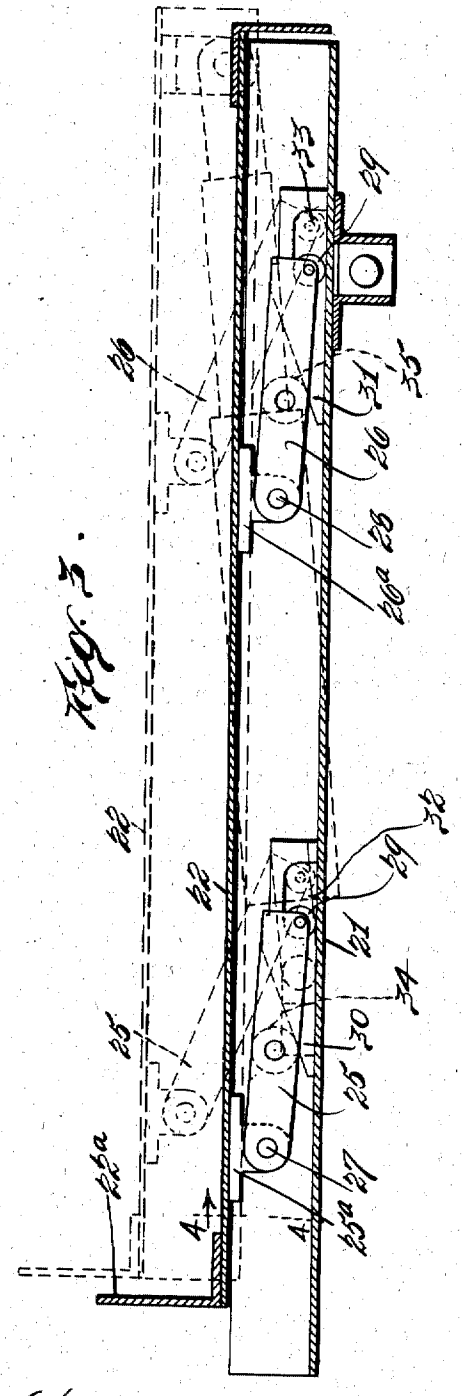


Fig. 5.

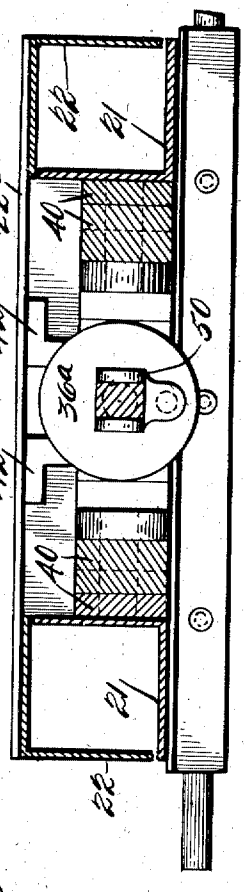
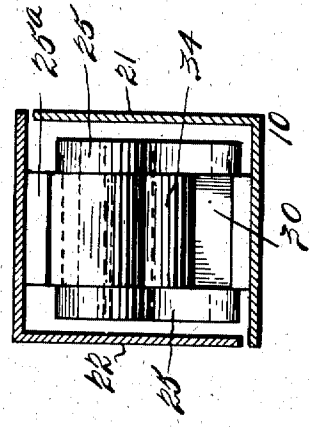


Fig. 4.



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5 SHEETS—SHEET 3.

Fig. 6.

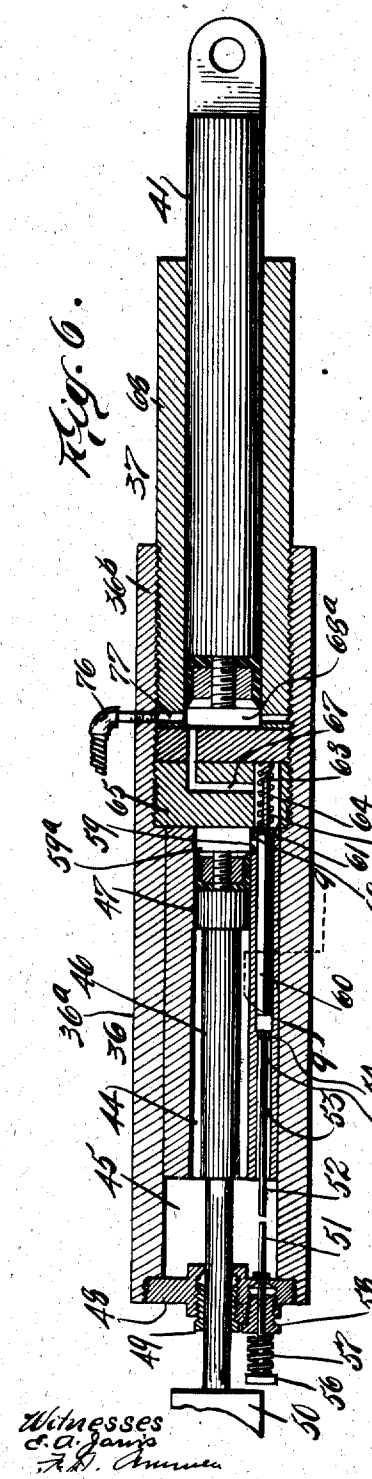


Fig. 7.

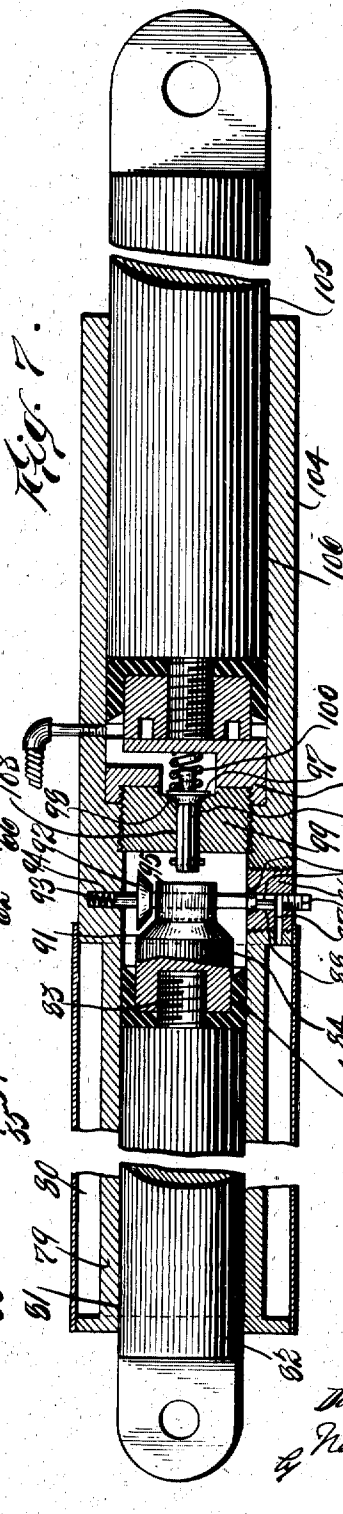


Fig. 9.



Fig. 8.



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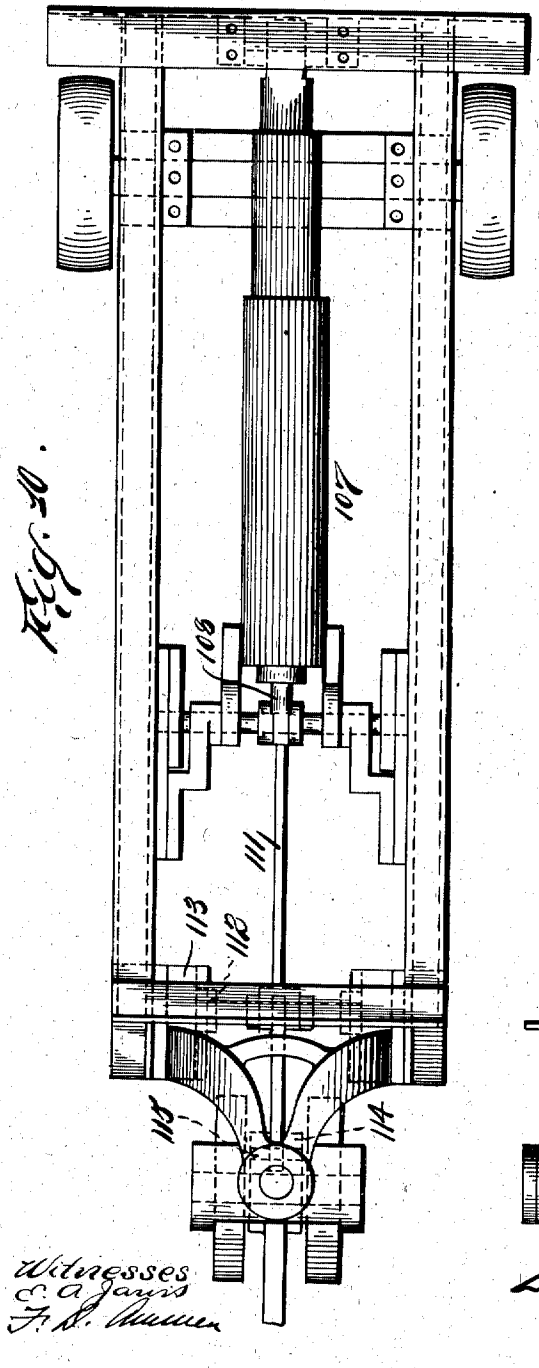


Fig. 5.

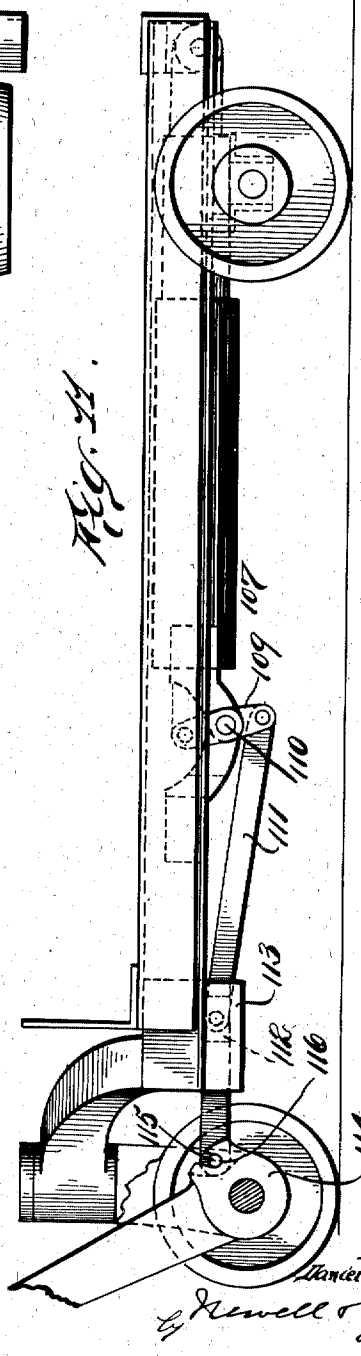


Fig. 4.

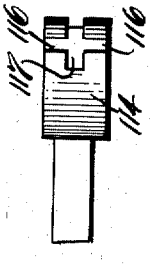


Fig. 12.

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ELEVATING TRUCK.

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5 SHEETS—SHEET 5.

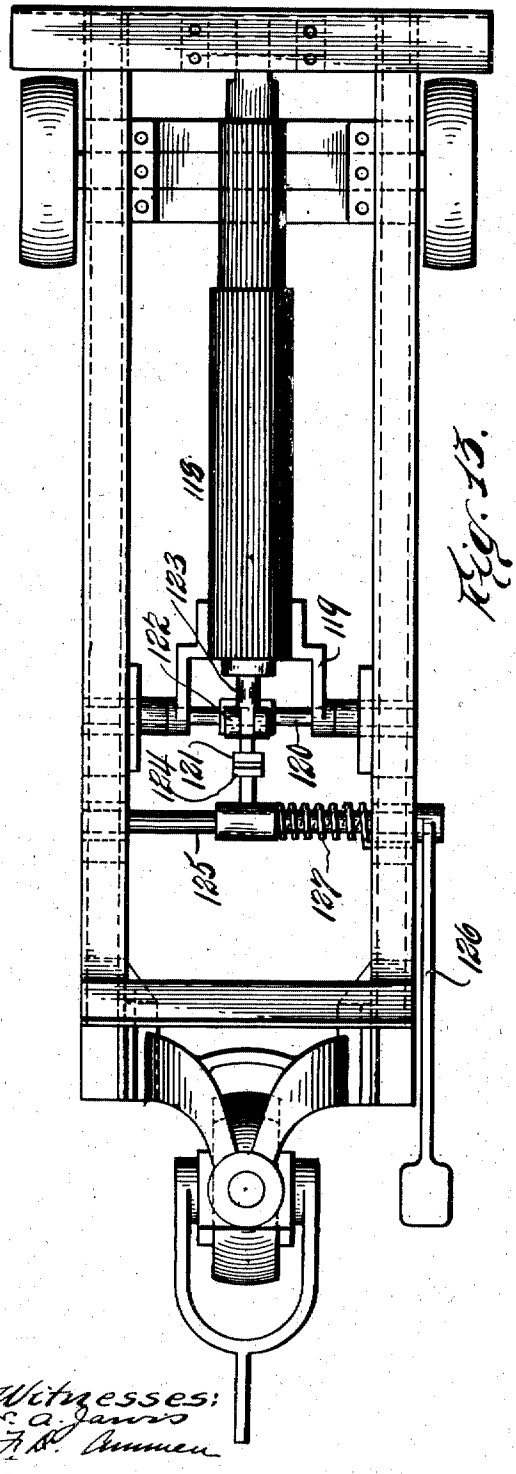


Fig. 13.

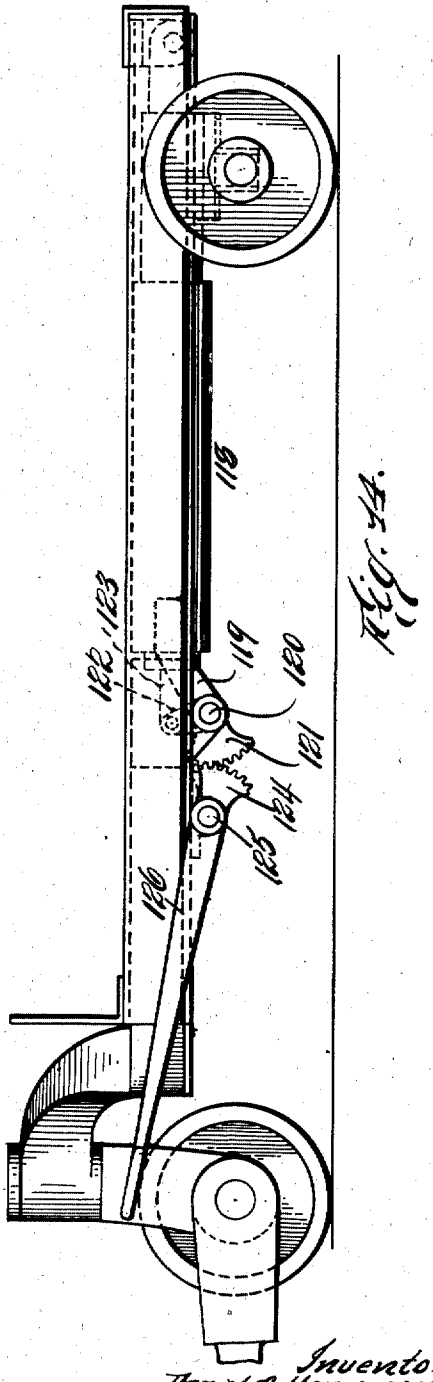


Fig. 14.

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UNITED STATES PATENT OFFICE.

DANIEL E. HENNESSY, OF HOLYOKE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HERBERT W. COWAN, J. LEWIS WYCKOFF, AND EDWARD N. WHITE, AS TRUSTEES.

ELEVATING-TRUCK.

1,201,180. Specification of Letters Patent. Patented Oct. 10, 1916.

Application filed April 29, 1913. Serial No. 764,322.

To all whom it may concern:

Be it known that I, DANIEL E. HENNESSY, a citizen of the United States, residing at Holyoke, Massachusetts, have invented certain new and useful Improvements in Elevating-Trucks, of which the following is a clear, full, and exact description.

This invention relates to elevating trucks and has for one of its objects the improvement of certain features of the same to provide a low compact trucking vehicle with great lifting capacity.

More particularly the invention aims so to incorporate a jack in an elevating truck that, without in any way sacrificing compactness and lowness in the truck construction, a most effective utilization of the multiplying power of the jack may be obtained.

In the illustrated preferred embodiment of the invention I have so arranged a laterally rigid, longitudinally extensible jack between the base or frame of an elevating truck and the part or parts to be acted upon by the jack, that the thrust of the jack is exerted substantially lengthwise of the truck and at all times directly upon the parts to which the relative lengthwise movement is to be imparted, the jack adjusting itself automatically and bodily to the different relative positions of said parts.

An important feature of the invention is the arrangement of a jack of the type hereinabove referred to between the base or frame of an elevating truck and the part or parts to be acted upon by the jack, in such manner that the jack is wholly supported by pivotal connections between its respective members and the parts upon which it exerts its separating thrust, and is arranged to telescope between said pivotal connections, whereby it does not add materially either to the length or to the height of the truck construction, the jack lying at all times below the top and within the ends of the truck.

Other objects and important features of the invention will appear from the following description and claims when considered in connection with the accompanying drawings, in which—

Figure 1 is a plan view of one construction of truck in accordance with the present invention; Fig. 2 is a side elevation of the same; Fig. 3 is a longitudinal section on the line 3—3, Fig. 1, illustrating suitable means which may be adopted to coöperate with the power means with a view to elevating and lowering the platform; Fig. 4 is an enlarged transverse section of the same on the line 4—4, Fig. 3; Fig. 5 is an enlarged transverse section on the line 5—5, Figs. 1 and 2; Fig. 6 is a longitudinal central section of power means comprising a pump and liquid pressure means adapted to the present invention; Fig. 7 is a longitudinal section of a modification of the apparatus shown in Fig. 6; Fig. 8 is a detail view of a plunger head shown in Fig. 7; Fig. 9 is a transverse section on the line 9—9, Fig. 6; Figs. 10 and 11 are respectively a plan view and a side elevation of a modified construction of truck; Fig. 12 is a detail plan view of a member adapted to the said modification; Figs. 13 and 14 are respectively a plan and side elevation of another modified construction of truck.

Referring to Figs. 1 and 2, the base 10 of the truck may be of any suitable construction and is shown as provided with rear wheels 11 and a front caster-wheel 12 which is supported in a caster-frame 13 by means of an axle pin 14. Said caster-frame is provided with a vertical swivel pin 15 which journals in a suitable bearing 16 in a bracket 17 extending upwardly and forwardly from the base 10. Means for moving the truck comprise a tongue 18 provided with bifurcations 19 which are perforated at the ends to receive the ends of the axle pin 14 upon which the said tongue may be swung vertically. The upper frame or support 20 of the truck may be constructed to constitute in itself a goods-carrying frame, or it may serve simply as a part of the means by which a longitudinal extension of the jack is converted into a rising or lowering movement and by which this movement is transmitted to any suitable goods-support or platform. In the illustrated construction the base comprises angle-iron side bars 21, and the upper frame comprises angle-iron side bars 22. A rear cross-bar 23 and a front cross-piece 24 connect the end portions of the side bars 21 of the base, and front and rear cross-bars 22^a and 22^b, respectively, connect the end portions of the side rails of the upper frame 20.

From an inspection of Figs. 4 and 5 of the drawings, it will be noted that the upper and lower frames are so constructed that one telescopes within the other when the

upper frame is brought into its lowered position, thereby contributing both to the compactness and to the lowness of the truck construction. It will be seen that the upper frame rests upon the base and may be raised or lowered through the intervention of suitable mechanism. Obviously the upper frame may be raised directly upwardly and lowered directly downwardly relatively to the base, but in the preferred form of the present invention, the upper frame is adapted to be raised through the application of power which is so applied that through the intervention of suitable mechanism between the base and the upper frame, the upper frame is elevated and at the same time the base and upper frame are shifted longitudinally relatively to each other. One means for accomplishing this when power is suitably applied is shown in Figs. 1 to 5 inclusive. Paired front links 25 and paired rear links 26 are provided and these are connected with the upper frame, to which end the links 25 are pivotally supported by pivots 27 mounted in suitable brackets or hangers 25ª at the lower side of the front portion of the upper frame, and the rear links 26 are pivotally supported on pivots 28 which are mounted in brackets 26ª suitably secured to the rear portion of said upper frame. Each link 25, 26 is provided at its rear end with an anti-friction roller 29, which rollers are adapted to travel upon the horizontal members or rails of the side bars 21 of the base. Adjacent the links 25, 26 are wedges 30, 31 respectively at the front and rear of the base, these wedges being fixed stationarily to said base, and provided respectively with guide slots 32, 33 which extend longitudinally of the base, and in these guide slots the said anti-friction rollers 29 are adapted to travel. Intermediate of the ends of the links 25 and 26, friction rollers 34, 35 respectively are provided, and these rollers 34, 35 may travel respectively upon the inclined surfaces of the wedges 30, 31. It will be seen that when the upper frame is lowered the said links and correlated parts are in the position shown in full lines, and when the upper frame is elevated they are in the position shown in dotted lines, power being so applied to the base and upper frame that the latter are shifted longitudinally relatively to each other, while the link construction is adapted to gradually raise said upper frame. It will be seen that the rollers 29 are guided rearwardly in the slots 32, 33 and that they cannot rise, whereas the wedges 30, 31 acting upon the rollers 34, 35 gradually raise the links into the inclined position shown in dotted lines, the said rollers 29 serving as fulcrums. This link mechanism is shown and claimed in a copending application filed by George P. Taylor on December 9th, 1912, Serial Number 735,691.

Reverting to Figs. 1 and 2, which illustrate suitable power means, a pump 36 is provided which is adapted to force pressure fluid or liquid to a liquid pressure device or hydraulic jack 37. The said pump comprises a cylinder 36ª which is pivotally connected with the base 10 through the medium of arms 38 at the forward end of said cylinder 36ª and pivots 39 which are carried by bracket members 40 suitably secured to the inner sides of the side bars of the base. The liquid pressure device or hydraulic jack 37 is provided with a ram 41, and a bracket 42 is secured to the rear cross-piece of the upper frame, while a pivot 43 connects the said ram 41 with said bracket 42. It will be noted that the pivots 39 and 43 pivotally connect the power means described respectively with the base and the upper frame of the truck and serve as supports for said means, the illustrated jack being laterally rigid between said connections whereby it swings bodily to accommodate itself to the different relative positions of said connections, the thrust of the jack being thus always along a straight line through said pivots.

A suitable construction of pump and jack or liquid pressure means is illustrated in Fig. 6. The pump cylinder 36ª is provided with a small bore or liquid chamber 44, while at the forward end of said cylinder a larger bore or liquid chamber 45 is provided. A plunger 46 guided in the pump is provided with a sucker head 47 of any suitable construction, and for the purpose of guiding the plunger and closing the chamber 45 of the pump cylinder, a cap 48 is screwed into the end of the pump cylinder and provided with a bushing 49, constituting part of a stuffing box in which and in a portion of said cap 48 the said plunger 46 is guided. Carried by the plunger 46 outside the pump cylinder is a fork 50 with which the operating mechanism of the pump is connected as later described, and which provides a lug or toe outside the pump cylinder for the purpose of actuating the valve mechanism. Any suitable valve mechanism may of course be provided which is adapted to be actuated by the sucker head 47 and the lug 50. The valve means shown comprise valve stems 51 and 52 which are guided in alinement with each other and which are normally separated. The valve stem 52 moves in a liquid or fluid passage 53 formed by a bore in the side wall of the pump cylinder and which is provided with a seat 54 for a valve 55 which is mounted on said valve stem 52. A nut 56 is applied to the outer end of the valve stem 51 which protrudes through the end of the pump cylinder and under said nut is confined a spring 57

which is seated against a bushing 58 which is screwed into the pump cap 48 and forms part of a stuffing box, said valve stem 51 being guided in said bushing. The tendency of the spring 57 is to draw the valve stem 51 outwardly. Said valve stem 51 may well be designated a pusher rod, and is held normally separated from the adjacent end of the alined valve stem 52 by the action of said spring 57. The inner end of the passage 53 is enlarged and by means of a port 59 in the inner wall of the cylinder 36[a] it communicates with the pressure chamber 59[a] of the pump, and in this enlarged chamber portion a grooved elongated valve member 60 is arranged and carries a valve 61, said member 60 being guided longitudinally by the wall of the passage 53 and its grooves serving to conduct fluid or liquid between it and the wall of said passage as shown in Fig. 9. At the enlarged end of the passage 53 a seat 62 is provided for valve 61, while a valve stem 63 carried by said valve and surrounded by a spring 64 is arranged in a block 65 which is provided with a passage or chamber 66 which surrounds said spring and valve stem. The said block 65 is screwed into the end of the pump cylinder 36[a], said block being provided with an angular passage 67 which communicates with the chamber or passage 66. Into the screw-threaded end 36[b] of the pump cylinder is screwed the cylinder 68 which receives and guides the ram 41, which, together with the said cylinder 68 and concomitant parts, provides a hydraulic jack or fluid or liquid pressure means.

Again referring to Figs. 1 and 2, a link 69 is pivoted at one end to the plunger fork 50 and at the other end it is pivotally connected with the lower arm of a lever 70 which is pivoted at 71 to the forward end of the base of the truck. To the upper arm of said lever 70 is pivoted a latch 72 which is provided at its outer end with a recess which may be formed by a hook 73, and said latch may be operated by means of a finger piece or lip 74, to enable the hook end of the latch to be engaged with and disengaged from a stud 75 at one side of the tongue 18. As shown in Fig. 1, the latch construction may be duplicated, that is to say there may be latching means arranged at both sides of the bifurcated end 19 of the tongue. Obviously the said tongue 18 constitutes a pump handle or lever adapted to actuate the pump when connected with the pump plunger as described. Obviously also when the latch 72 is disengaged from the tongue, the latter may be used as means for steering and guiding the truck upon the caster-wheel 12. In dotted lines the latch 72 is shown in a disengaged position.

In Figs. 1, 2 and 6, means are shown for weighing the load which is placed on the truck. The same comprises a flexible tube or hose 76 which at one end is connected with a port 77, which extends into the pressure chamber 68[a] of the jack, and at the other end is connected with a registering scale 78 suitably supported upon the base of the truck.

In Fig. 7 a modified form of pump and jack is shown. A pump cylinder 79 is provided with a jacket chamber 80, and in the pump chamber 81 is guided the plunger or piston 82 which may be suitably connected with the tongue of the truck as before described. The piston 82 is provided with a screw neck 83 on which is screwed a head 84 between which and the piston suitable packing 85 may be provided. In a screw opening in the side wall of the pump cylinder 79 there is screwed a plug 86 which is provided with a passage 87 which connects at one end with the chamber 80, its other end leading to a bore or passage 88. A valve 89 is seated at the inner end of the passage 88 and is provided with a stem 89[a] inserted in said passage, which latter is closed at its outer end by screw plug 90. Plunger head 84 has an inclined or beveled surface 91 which is adapted to come in contact with a conical disk 92 which is arranged on an extension stem 93 from the valve 89, which stem 93 is guided in a bore 94 in the pump cylinder wall. Prolongated abutments 95 extend longitudinally from the head 84, at opposite sides of a notch or recess 96 which receives the stem 93, so that the pump plunger may be operated without interfering with the stem 93 and the parts supported thereby. This construction is more clearly shown in Fig. 8. A valve 97 is adapted to rest against a seat 98 formed in a screw block 99 which is screwed into the end of the pump cylinder. The valve is kept seated by means of a spring 100 which is located in a block 101, and said valve is provided with a stem 102 which is suitably grooved so that fluid or liquid may be forced through passage 103 in said block 99, in which said valve stem 102 is guided. Ram cylinder 104 is formed as an extension of the pump cylinder 79 and receives and guides the ram 105, which operates in a chamber 106.

The operation of the improved truck described is as follows: The truck is pushed under the load to be raised, and thereafter the tongue 18 latched to the pump mechanism. Referring to Figs. 1, 2 and 6, the tongue 18 which now constitutes a pump handle is oscillated so as to impart a pumping action, the range of each oscillation being such that the valve 55 is opened and closed by suction and pressure, without the necessity of striking the adjacent end of the elongated valve member 60. It will be seen that the outward movement of the plunger head 47 will suck the liquid contained in the

chambers 44 and 45 through the passage 53 and the port 59 into the pressure chamber 59ª, the valve 55 being sucked open. At each instroke of the sucker head 47 the liquid in the chamber 59ª is pressed through the port 59 against the valve 61 which is thereby opened and the liquid from the chamber 59ª will therefore flow through passages 66 and 67 into the chamber 68ª of the jack or liquid pressure means. The result is that the repeated oscillation of the pump handle will gradually force the ram 41 outwardly, with the effect of pushing on the upper frame and on the base in opposition, so that through the intervention of the link mechanism described or its equivalent, the upper frame is gradually elevated. It will be noted that during the elevating movement, the pump and jack will be moved on their pivot connections with the base and upper frame into the position shown in dotted lines in Fig. 3, the thrust of the jack being at all times along a straight line through said pivots. When the load is to be deposited at some other point, the pump handle 18 is quickly oscillated through a wider range of oscillation than when pumping, with the result that the valve stems 51 and 52 are given a greater movement sufficient to bring the stem and valve 55 in contact with the adjacent end of the elongated valve member 60, whereby the valve 61 is positively opened. The pump handle is held lowered for a sufficient length of time to hold the valve 61 open, while the weight imposed upon the ram 41 will cause the latter to force the fluid or liquid in the jack chamber 68ª back into the pump chambers and passages, the jack now acting as a fluid jack or dash-pot to prevent too rapid descent of the load. The latch device may now be disconnected from the handle or tongue, and the latter can now be used for the purpose of moving the truck out from under the load and steering the same to any other desired point.

In the modified form of pump and jack shown in Fig. 7, the action is as follows: The oscillation of the tongue which is at the time converted into a pump handle, reciprocates the plunger or piston 82, and the range of oscillation of the handle is such that the abutment 95 does not come in contact with the valve stem 102. It will be noted that the space between the abutment 95 and the said stem 102 is greater than the space between the beveled portion 91 of the head 84 and the tapering disk 92. During the ordinary pumping action, valve 89 is opened by suction without the necessity of being positively opened by beveled faces 91, 92. But if the upper frame is to be lowered, the pump handle is quickly swung downwardly with a greater range of movement than when pumping, with the result that not only is the valve 89 unseated, but the abutment 95 comes in contact with the valve stem 102 and positively opens the valve 98, so that the liquid in the jack chamber 106 is forced by the ram back into the pump.

Wheels 11 at the rear of the truck may be supported in any suitable manner as by means of an axle 11ª supported in bearing boxes 11ᵇ which are clamped or secured between transverse angle plates 11ᶜ and 11ᵈ which connect the side bars of the base. See Figs. 1, 2 and 3.

A modified form of truck is illustrated in Figs. 10, 11 and 12, and this will be briefly described, the parts not described in this connection being substantially the same as in the construction before described. The pump 107 has its plunger 108 connected pivotally with the upper arm of a lever 109 which is pivoted at 110 to an underhanging portion of the truck base, the other arm of said lever being pivoted to a link 111 which in turn is pivotally connected with a slide 112 guided longitudinally of the truck by means of a guide 113 supported on the base. The combined tongue and pump handle is provided with a head 114 at its pivot end, with which the said slide 112 may be connected or from which it may be disconnected at will. To this end the said slide is provided with pins 115 which are adapted to be engaged in notches 116 produced by a slot in said head 114, which is crossed by means of a slot 117. The slot 117 permits of the oscillation of the handle, see dotted line in Fig. 11 illustrating the bottom of slot 117.

Referring now to Figs. 13 and 14, another modification of the invention is illustrated. Herein the pump 118 may be of any suitable construction while adjacent to the forward end of the pump at opposite sides of the base of the truck hangers or brackets 119 are supported. Journaled in these brackets is a rock-shaft 120 on which is mounted a toothed segment 121 and also a rock-arm 122 which is pivotally connected with the plunger 123 of the pump. Said toothed-segment 121 meshes with another toothed segment 124 which is mounted on a rock-shaft or pivot 125 from which extends a foot or power lever 126. By using the foot to quickly oscillate the lever 126, the pump and jack may be operated, a spring 127 being employed to return the lever 126 after each depression by the foot. It will be noted in this modification that the tongue of the truck is at all times independent of the power mechanism, that is to say the latter may be operated without using the tongue of the truck for that purpose. The tongue will therefore be free at all times, if the specific modification is used, unless of course the same be linked up in any suitable manner to the lever 126.

From an inspection of Figs. 2 and 11 of

the drawings, it will be noted that the jack is so connected to the vertically separable telescoping frames that when the elevating mechanism of the truck is in lowered condition, the jack lies in substantial horizontal parallelism to said frames and within the sides of the frames. Moreover, it will be seen that the jack and its attached pump are so connected to the lower frame or base of the truck, that when the jack swings during the elevating operation, there is no substantial projection of any portion of the jack or pump below the lower frame. It will thus be seen that the truck body, when the parts are in lowered condition, has very small vertical dimensions and that by reason of the construction of the elevating mechanism and the mounting of the jack and pump, low supporting wheels may be used in connection with the body. It will be noted, also, that all parts of the jack and pump lie within the ends of the truck in all positions of the elevating mechanism.

Obviously the invention as defined by the claims not only comprehends power means capable of working under liquid pressure, but any other flowing medium such as air or gas, and the word "liquid" or other word covering such a medium as used herein and in the claims is to be understood as covering such a medium either singly or combined.

Various means may be employed for supplying operating fluid under pressure to the power means. In the preferred embodiment, such means will be mounted on the truck.

Obviously this invention is susceptible of a wide range of modification, some of which modifications are illustrated, as parts may be omitted, parts added, or parts substituted and differently constructed without departing from the spirit and scope of the invention as defined in the claims.

What I claim is:—

1. In an elevating truck, in combination, a base, elevating means comprising means movable both lengthwise of said base and up and down with respect thereto and means whereby such lengthwise movement effects the up and down movement, and a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to said means movable lengthwise of and up and down upon said base, said jack being wholly supported by said pivotal connections and being constructed to telescope between said connections.

2. In an elevating truck in combination, a base, elevating means comprising means movable both lengthwise of said base and up and down with respect thereto, said means being so mounted upon said base that the lengthwise movement effects the up and down movement, a laterally rigid, longitudinally extensible fluid-operated jack having its respective members pivotally connected to said base and to said means movable lengthwise of and up and down upon said base, and a pump carried by said jack for supplying operating fluid thereto under pressure, said jack and pump being wholly supported by said pivotal connections and lying below the upper pivot and within the ends of the truck.

3. In an elevating truck in combination, a base, elevating means comprising means movable both lengthwise of said base and up and down with respect thereto, said means being so mounted upon said base that the lengthwise movement effects the up and down movement, a laterally rigid, longitudinally extensible fluid-operated jack having its respective members pivotally connected to said base and to said means movable lengthwise of and up and down upon said base, a pump carried by said jack for supplying operating fluid thereto under pressure, said jack and pump being wholly supported by said pivotal connections, a handle for moving said truck, and a link whereby said pump may be connected to said truck handle for operation thereby.

4. In an elevating truck, a base, elevating means comprising parallel links pivoted upon said base and means for maintaining the substantial parallelism of said link throughout their pivotal movement, and a laterally rigid, longitudinally extensible jack having its respective members directly pivoted upon said base and upon said parallel link elevating means at points spaced lengthwise of said truck, said jack being wholly supported by said connections whereby the thrust of said jack is at all times along a straight line between said pivots and being constructed to telescope between said pivots into a position in which it lies lengthwise of the truck, below the top and within the ends thereof.

5. In an elevating truck, in combination, a base and an upper frame, means whereby relative horizontal movement of said base and said upper frame effects the separation thereof, and means for effecting said relative horizontal movement comprising a laterally rigid jack having longitudinally separable members pivotally connected respectively to said horizontally relatively movable parts, said jack being wholly supported by said pivotal connections below the top and within the ends of the truck and being constructed to telescope between said connections.

6. In an elevating truck, in combination, a base and an upper frame, means whereby relative horizontal movement of said base and said upper frame effects a separation thereof, means for effecting said relative horizontal movement comprising a laterally rigid fluid-operated jack having longitudinally separable members pivotally connect-

ed respectively to said horizontally relatively movable parts, a pump carried by said jack for supplying fluid thereto under pressure, said jack and pump being wholly supported by said pivotal connections and lying below the upper pivot and within the ends of the truck.

7. In an elevating truck, in combination, a base and an upper frame, means for effecting a separation of said base and said upper frame comprising means movable lengthwise of said base and means for causing such lengthwise movement to effect the movement of separation, and a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to said means movable lengthwise of said base, said jack being wholly supported by said pivotal connections below said lengthwise movable means and within the ends of the truck and being constructed to telescope between said connections.

8. In an elevating truck, in combination, a base and an upper frame, means for effecting a separation of said base and said upper frame comprising means movable both lengthwise of said base and transversely thereto, and means whereby such lengthwise movement effects the transverse movement, a laterally rigid, longitudinally extensible fluid-operated jack having its respective members pivotally connected to said base and to said means movable lengthwise of and transversely to said base, said jack being wholly supported by said pivotal connections, a pump carried by said jack for supplying operating fluid thereto under pressure, a handle for moving said truck and a link whereby said pump may be connected to said truck handle for operation thereby.

9. In an elevating truck, in combination, a base and an upper frame, connections between said base and said upper frame whereby a relative shifting movement in parallelism effects a separation thereof, and a jack for effecting the combined shifting and separating movement of said base and said upper frame, said jack having its separable parts respectively pivoted to said base and to said upper frame at points spaced along the path of shifting movement and being constructed to telescope between said connections arranged to swing between a position lengthwise of the truck when the truck is in lowered condition and an oblique position, whereby it accommodates itself both to the telescoping and to the separating movement.

10. In an elevating truck, in combination, a base and an upper frame, connections between said base and said upper frame whereby a relative shifting movement effects a separation thereof, and a jack comprising separable parts confined for rectilinear relative movement, one of said parts being pivotally connected to said base and the other to said upper frame at points spaced along the path of shifting movement, said jack being constructed to telescope between said pivotal connections and being free to swing bodily during the combined shifting and separating movement to accommodate itself to the new relative positions of its pivotal connections.

11. In an elevating truck, in combination, a base, elevating means comprising means movable both lengthwise of said base and up and down with respect thereto, and means whereby such lengthwise movement effects the up and down movement, a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to the means movable lengthwise of said base, said jack being wholly supported by said pivotal connections and being constructed to telescope between said connections, and reciprocating means for effecting the extension of said jack, carried by said jack and effective for this purpose for a stroke of any length between its limits of reciprocation.

12. In an elevating truck, in combination, a base, elevating means comprising means movable both lengthwise of said base and up and down with respect thereto, and means whereby such lengthwise movement effects the up and down movement, a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to the means movable lengthwise of said base, said jack being wholly supported by said pivotal connections and being constructed to telescope between said connections, and means for effecting the extension of said jack, mounted on said jack and arranged for rectilinear reciprocating movement along the line of extension.

13. In an elevating truck, in combination, a base, and elevating means, comprising means movable parallel to said base and means whereby such parallel movement effects a separation of said base and said aforementioned means, a jack for effecting said movements, said jack having its respective members pivotally connected to said base and to the means movable parallel to said base, being wholly supported by said pivotal connections and being constructed to telescope between said connections, a pivoted truck handle, and connections between said jack and said truck handle whereby movement of said handle about its pivot effects the extension of said jack.

14. In an elevating truck, in combination, a base, elevating means comprising means movable lengthwise of said base and up and down with respect thereto, said means being so mounted upon said base that the lengthwise movement effects the up and

down movement, a laterally rigid, longitudinally extensible, fluid-operated jack having its respective members pivotally connected to said base and to said means movable lengthwise of said base and arranged to telescope between said connections, a pump rigidly connected to said jack and comprising a piston movable along the line of extension of said jack and a cylinder located between said pivotal connections, said jack and pump being wholly supported by said pivotal connections.

15. In an elevating truck, in combination, a base, elevating means comprising means movable both lengthwise of said base and up and down with respect thereto, said means being so mounted upon said base that the lengthwise movement effects the up and down movement, a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to said means movable lengthwise of said base, said jack being wholly supported by said pivotal connections and lying within the ends of the truck when the elevating parts are in lowered position, and means comprising a member pivoted upon said base for effecting the extension of said jack.

16. In an elevating truck, in combination, a base and an upper frame, means whereby relative lengthwise movement of said base and said upper frame effects the separation thereof, a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to said frame, said jack being wholly supported by said pivotal connections and being constructed to telescope between said connections, a truck handle and means for effecting the extension of said jack arranged to be connected at will to said truck handle for this purpose.

17. In an elevating truck, in combination, a base and an upper frame, means whereby relative lengthwise movement of said base and said frame effects the separation thereof, and means for effecting such movement comprising a laterally rigid, fluid-operated jack and a pump for supplying operating fluid thereto, said jack having its respective members pivotally connected to said base, and to said frame and said pump being carried by said jack and being arranged to swing with said jack upon said pivots, and means mounted on said base for operating said pump having connections with said pump constructed to permit the movement of said pump with said jack.

18. In an elevating truck, in combination, a base and an upper frame, means whereby relative lengthwise movement of said base and said upper frame effects the separation thereof, a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to said frame, said jack being wholly supported by said pivotal connections and being located entirely below said upper frame, and means for effecting the extension of said jack comprising a lever pivoted upon said base, and a link connecting said lever with said jack.

19. In an elevating truck, in combination, a base and an upper frame, means whereby relative lengthwise movement of said base and said upper frame effects the separation thereof, a laterally rigid, longitudinally extensible jack having its respective members pivotally connected to said base and to said frame, said jack being entirely confined between said base and said frame and being constructed to telescope between its pivotal connections, and means for effecting the extension of said jack comprising a lever fulcrumed upon said base.

20. In an elevating truck, in combination, a base and an upper frame, means whereby relative lengthwise movement of said base and said upper frame effects the separation thereof, a laterally rigid, longitudinally extensible fluid-operated jack having its respective members pivotally connected to said base and to said frame, said jack being entirely confined between said base and said frame and being constructed to telescope between its pivotal connections, means for effecting the extension of said jack comprising a pump carried by said jack for supplying operating fluid thereto, and a lever fulcrumed upon said base for operating said pump.

21. In an elevating truck, in combination, a base, an upper frame adapted to move upwardly and downwardly in parallel relationship with respect to said base, means for converting a longitudinal movement of said frame into a vertical movement thereof in moving said frame up and down, a jack mechanism for moving said frame comprising telescoping jack members forming a laterally rigid rectilinearly extensible connection between said base and frame, one jack member being pivotally connected to said base and the other jack member being pivotally connected to said frame at points spaced along the path of longitudinal movement and being arranged to telescope between said points, whereby said jack is adapted to fold between said frame and said base into a substantially horizontal position when said frame is lowered.

22. In an elevating truck, in combination, a base, an upper frame adapted to move upwardly and downwardly in parallel relationship with respect to said base, means for converting a longitudinal movement of said frame into a vertical movement thereof in moving said frame up and down, a jack mechanism for moving said frame comprising telescoping jack members forming a laterally rigid rectilinearly extensible con-

nection between said base and frame, one jack member being pivotally connected to said base and the other jack member being pivotally connected to said frame at points spaced along the path of longitudinal movement and being arranged to telescope between said points, whereby said jack is adapted to fold between said frame and said base into a substantially horizontal position when said frame is lowered, step by step operating mechanism for extending said jack members and a manually operated lever for actuating said step by step mechanism.

23. In an elevating truck in combination, a base, an upper frame adapted to move upwardly and downwardly in parallel relationship with respect to said base, means for converting a longitudinal movement of said frame into a vertical movement thereof in moving said frame up and down, a jack mechanism for moving said frame comprising intersliding jack members forming an extensible connection between said base and frame, one jack member being pivotally connected to said base and the other jack member being pivotally connected to said frame, said intersliding jack members arranged in a fore-and-aft direction diagonally between said parallel frame and base when said frame is raised and adapted to fold between said frame and base into a substantially horizontal position when said frame is lowered, a step by step operating mechanism for extending said jack members, a steering wheel for said truck, a steering handle therefor and mounted thereon for an up and down movement, and means for connecting said steering handle with said step by step operating mechanism for actuating the same by hand.

24. In an elevating truck in combination, a base, an upper frame adapted to move upwardly and downwardly in parallel relationship with respect to said base, means for converting a longitudinal movement of said frame into a vertical movement thereof in moving said frame up and down, a hydraulic jack mechanism for moving said frame comprising a ram chamber and a ram slidable therein, and connected one to said frame with a pivotal connection and one to said base with a pivotal connection, said ram and ram chamber arranged in a fore-and-aft direction diagonally between said parallel frame and base when said frame is raised, and adapted to fold between said frame and base into a substantially horizontal position when said frame is lowered, hand-operated pumping mechanism for pumping fluid into the ram chamber in extending said ram, and means to release the pressure of said fluid and allow said ram to slowly return into said ram chamber in lowering said frame.

25. In an elevating truck, in combination, supporting wheels, an axle upon which said wheels are mounted, a truck base comprising a frame carried by said axle between said wheels, an upper frame, and elevating means between said frames comprising a laterally rigid jack arranged between the sides of said base frame to extend lengthwise thereof and means whereby the extension of said jack effects a vertical separation of said frames.

26. In an elevating truck, in combination, supporting wheels, a frame carried by said wheels, an upper frame supported by said first mentioned frame, and means for effecting an elevation of said upper frame, comprising a laterally rigid jack carried by said first mentioned frame between the sides thereof and arranged to extend lengthwise of said frame and means whereby the lengthwise extension of said jack effects the vertical separation of said frames, said jack lying substantially parallel to said frames when said upper frame is in lowered position.

27. In an elevating truck, in combination, a truck base comprising an open frame, an upper frame movable into different positions of elevation with respect to said base frame, and means for effecting the elevation of said upper frame comprising a laterally rigid jack mounted upon one of said frames within the sides thereof and arranged to extend lengthwise thereof, means whereby the lengthwise extension of said jack effects the vertical separation of said frames, and means for effecting the extension of said jack comprising a lever fulcrumed on one of said frames.

28. In an elevating truck, in combination, a base comprising an open frame, an upper frame supported upon said base frame and arranged to be moved into different positions of elevation with respect thereto, a laterally rigid jack mounted upon said base frame between the sides thereof and arranged to extend lengthwise thereof, and means for causing the extension of said jack to effect a vertical separation of said frames, comprising connections between which said jack is constructed to telescope.

29. In an elevating truck, in combination, a base comprising an open frame, an upper frame supported upon said base frame and arranged to be moved into different positions of elevation with respect thereto, a laterally rigid jack mounted upon said base frame between the sides thereof and arranged to extend lengthwise thereof, means for causing the extension of said jack to effect a vertical separation of said frames, comprising connections between which said jack is constructed to telescope, a pivoted truck handle and connections between said truck handle and said jack for effecting the extension of said jack.

30. In an elevating truck, in combination, a base comprising an open frame, an upper frame supported upon said base frame and arranged to be moved into different positions of elevation with respect thereto, a laterally rigid jack mounted upon said base frame between the sides thereof and arranged to extend lengthwise thereof, means for causing the extension of said jack to effect a vertical separation of said frames, comprising connections between which said jack is constructed to telescope, a pivoted truck handle, means whereby said truck handle may be connected at will to said jack to effect the extension thereof, and other means for effecting the release of said jack.

31. In an elevating truck, in combination, a pair of supporting wheels, an axle upon which said wheels are mounted, an open frame carried by said axle between said wheels, a third supporting wheel mounted at the forward end of said frame to swing about a substantially vertical axis for steering said truck, an upper frame supported by said first mentioned frame and arranged to be moved into different positions of elevation with respect thereto, means for effecting the elevation of said frame comprising a laterally rigid fluid-operated jack mounted between the sides of said first-mentioned frame and arranged to extend lengthwise thereof, a pump carried by said jack for supplying operating fluid thereto, means whereby the extension of said jack effects the vertical separation of said frames, a draft and steering handle pivotally mounted upon said truck, and connections between said pump and said handle for effecting the extension of said jack.

32. In an elevating truck, in combination with supporting wheels, elevating mechanism comprising horizontally extending, vertically separable parts, means for maintaining the parallelism of said parts during their relative movements of approach and separation, and a jack located between and extensible lengthwise of said parts, said jack having its members respectively directly pivoted to said parts and being wholly supported by and arranged to telescope between said pivotal connections.

33. In an elevating truck, in combination with supporting wheels, elevating mechanism comprising horizontally extending, vertically separable parts, means for maintaining the parallelism of said parts during their relative movements of approach and separation, a jack located between and extensible lengthwise of said parts, said jack having its members respectively directly pivoted to said parts and being wholly supported by and arranged to telescope between said pivotal connections, and means for effecting the extension of said jack comprising a lever pivoted upon one of said parts and so connected to said jack as to permit movement of said jack relative to said parts during the relative movement of said parts.

34. In an elevating truck, in combination with supporting wheels, elevating mechanism comprising horizontally extending, vertically separable parts, means for maintaining the parallelism of said parts during their relative movements of approach and separation, a jack located between and extensible lengthwise of said parts, said jack having its members respectively directly pivoted to said parts and being wholly supported by and arranged to telescope between said pivotal connections, and means for effecting the extension of said jack comprising a lever pivoted upon one of said parts and so connected to said jack as to permit movement of said jack relative to said parts during the relative movement of said parts, said lever being arranged to serve as a draft and steering handle for said truck.

35. In an elevating truck, in combination with supporting wheels, elevating mechanism comprising horizontally extending, vertically separable telescoping frames, means for maintaining the parallelism of said frames during their relative movements of approach and separation, and a jack having its members respectively directly pivoted to said frames and extensible lengthwise thereof, said jack being wholly supported by and arranged to telescope between said pivotal connections.

36. In an elevating truck, in combination with supporting wheels, elevating mechanism comprising horizontally extending, vertically separable telescoping frames, means for maintaining the parallelism of said frames during their relative movements of approach and separation, and a jack having its members respectively directly pivoted to said frames and extensible lengthwise thereof, said jack being wholly supported by and arranged to telescope between said pivotal connections and being arranged to move into substantial horizontal parallelism to said frames when said elevating mechanism is in its lowered condition.

37. In an elevating truck, in combination with supporting wheels, elevating mechanism comprising horizontally extending, vertically separable telescoping frames, means for maintaining the parallelism of said frames during their relative movements of approach and separation, and a jack having its members respectively directly pivoted to said frames and extensible lengthwise thereof, said jack being wholly supported by and arranged to telescope between said pivotal connections and being arranged to lie within the sides of said frames when in telescoped condition and in substantial horizontal parallelism thereto.

38. In an elevating truck, in combination with supporting wheels, an elevating mechanism comprising horizontally displaceable and vertically separable parts, means between said parts whereby an application of force substantially lengthwise of said parts to effect a horizontal displacement thereof also effects a vertical separation thereof in substantial parallelism, a piston and a cylinder in which said piston is confined for rectilinear movement relative to said cylinder, said piston and cylinder being respectively so pivotally connected to said horizontally displaceable and vertically separable parts that the aforementioned rectilinear relative movement between the piston and cylinder is substantially lengthwise of the truck, and said piston and cylinder being wholly supported by and arranged to telescope between the said pivotal connections and lying substantially horizontal when the parts are in lowered condition.

39. In an elevating truck, in combination, a base and an upper frame, means whereby relative lengthwise movement of said base and said frame effects the separation thereof, a piston and a cylinder in which said piston is confined for relative rectilinear movement, one of said parts being pivotally connected to said base and the other to the upper frame at points so spaced lengthwise of the truck that the relative rectilinear movement of said piston and said cylinder is substantially lengthwise of the truck, said piston and cylinder being wholly supported by, and arranged to telescope between, said pivotal connections.

40. In an elevating truck, in combination with supporting wheels, an elevating mechanism comprising horizontally extending upper and lower parts, means between said parts whereby an application of force substantially lengthwise of said parts effects a vertical separation thereof in substantial parallelism, a cylinder having a piston confined therein for rectilinear movement, said cylinder and piston being arranged to extend lengthwise of said truck and to lie wholly between said upper and lower parts for operatively controlling the descent of said upper part upon said lower part.

41. In an elevating truck, in combination with supporting wheels, an elevating mechanism comprising horizontally extending vertically separable parts, means between said parts whereby an application of force substantially lengthwise of said parts effects a vertical separation thereof in substantial parallelism, a cylinder having a piston confined therein for rectilinear movement, said piston and cylinder being respectively pivotally supported each at its outer end between said vertically separable parts and arranged to extend lengthwise of said truck so that the rectilinear movement between said piston and cylinder is substantially lengthwise of said truck, said piston and cylinder being wholly supported between their pivotal supports and arranged to telescope between the same and to lie substantially in horizontal position when the parts are in lowered condition.

Signed at Holyoke, Mass., this 24 day of April, 1913.

DANIEL E. HENNESSY.

Witnesses:

ARTHUR L. LEWIS,

GEO. R. BURKHARDT.

Correction in Letters Patent No. 1,201,180

It is hereby certified that in Letters Patent No. 1,201,180, granted October 10, 1916, upon the application of Daniel E. Hennessy, of Holyoke, Massachusetts, for an improvement in "Elevating-Trucks," an error appears in the printed specification requiring correction as follows: Page 6, lines 52–53, claim 9, for the word "connections" read *points and being;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of October, A. D., 1916.

[SEAL.]

R. F. WHITEHEAD,

Cl. 254—10.

Acting Commissioner of Patents.