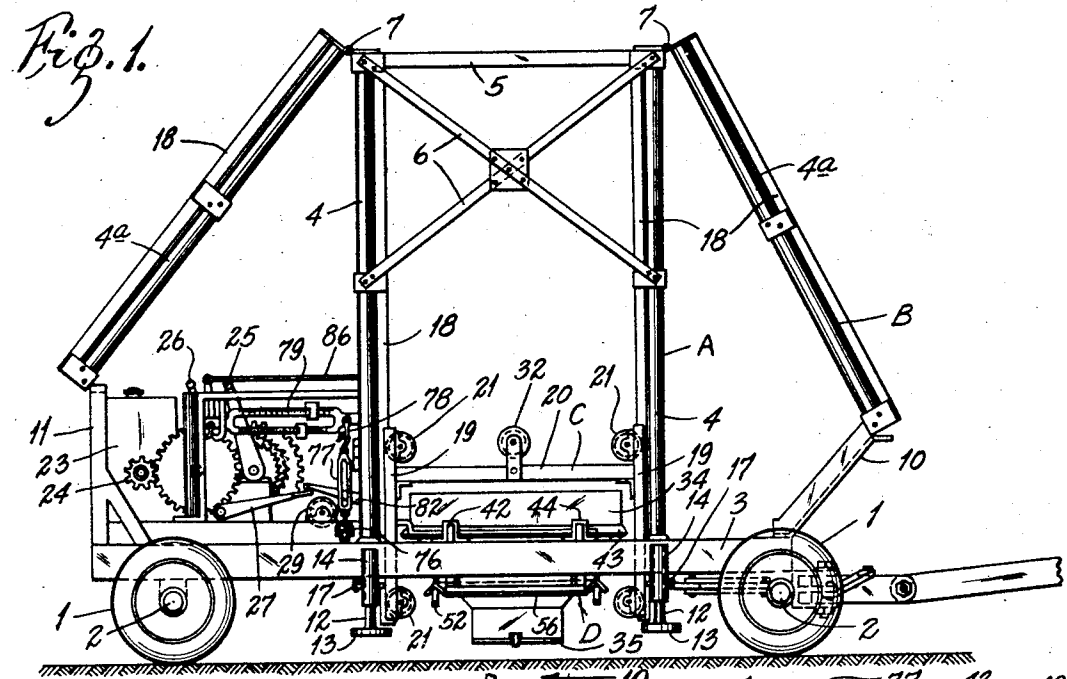
July 9, 1940. E. D. FIVECOATE ET AL 2,207,053

PORTABLE HOIST

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Fig. 1.



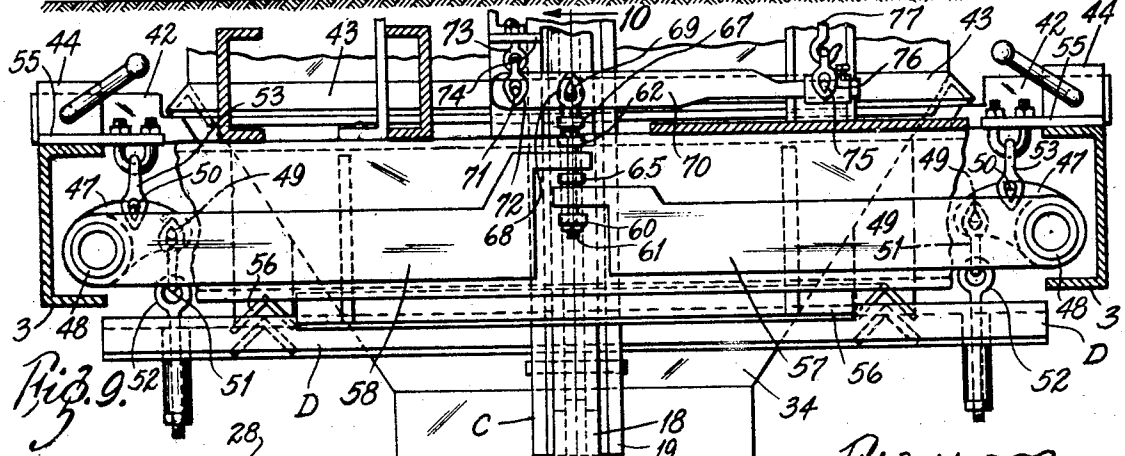


Fig. 9.

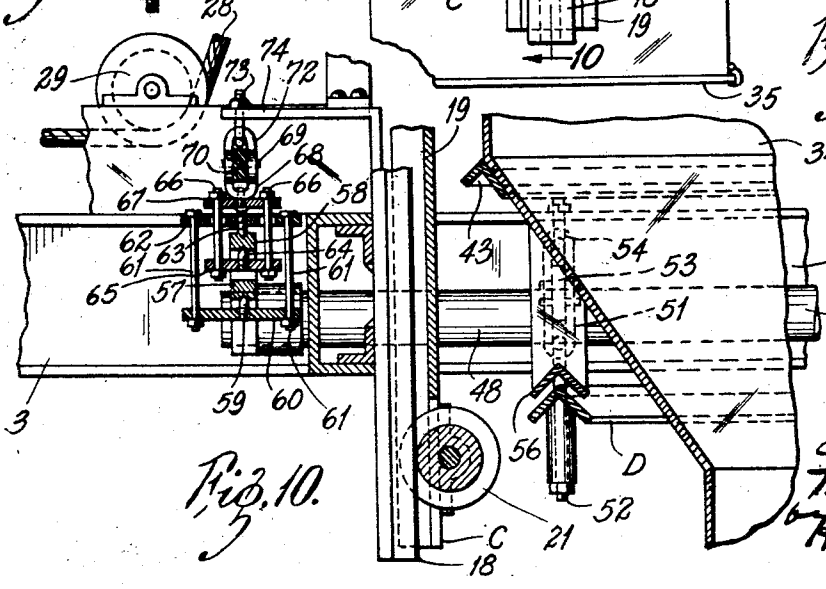
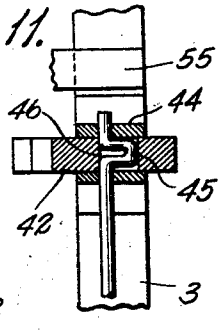


Fig. 10.

Fig. 11.



INVENTORS

E. D. Fivecoate

T. H. Fleming

by Ernest Cahn

A. Gruenberg

THEIR ATTORNEYS.

July 9, 1940. E. D. FIVECOATE ET AL 2,207,053

PORTABLE HOIST

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Fig. 2.

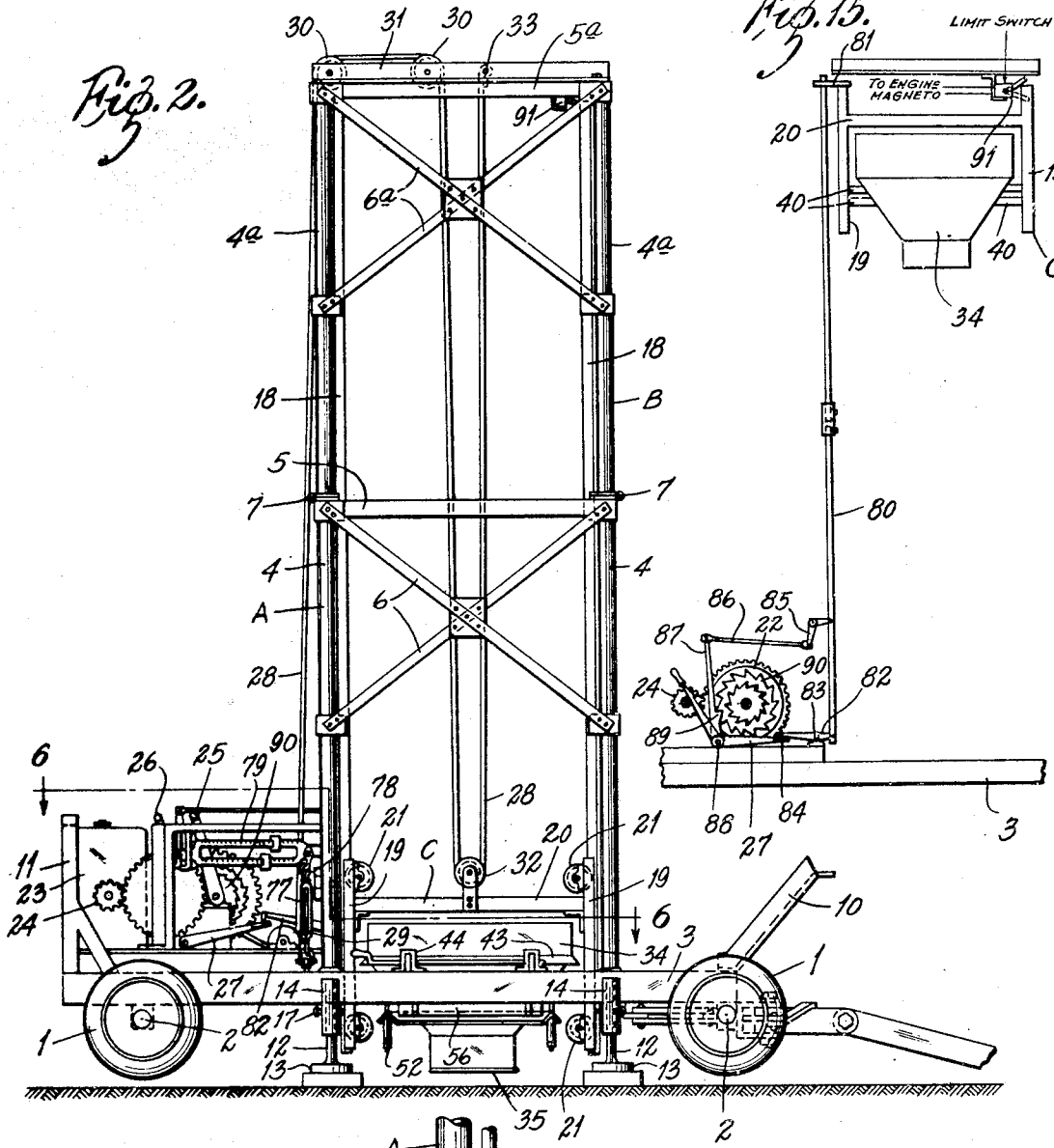
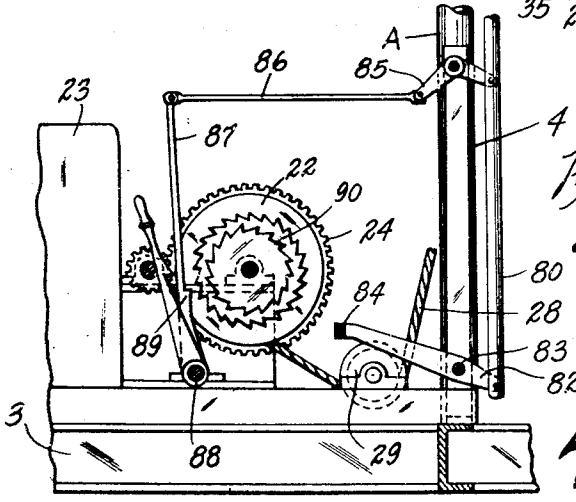


Fig. 15.

Fig. 14.



INVENTORS:
Edward D. Fivecoate
Thomas H. Fleming
by Cushman Darby & Cushman

THEIR ATTORNEYS.

July 9, 1940. E. D. FIVECOATE ET AL 2,207,053

PORTABLE HOIST

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Fig. 3.

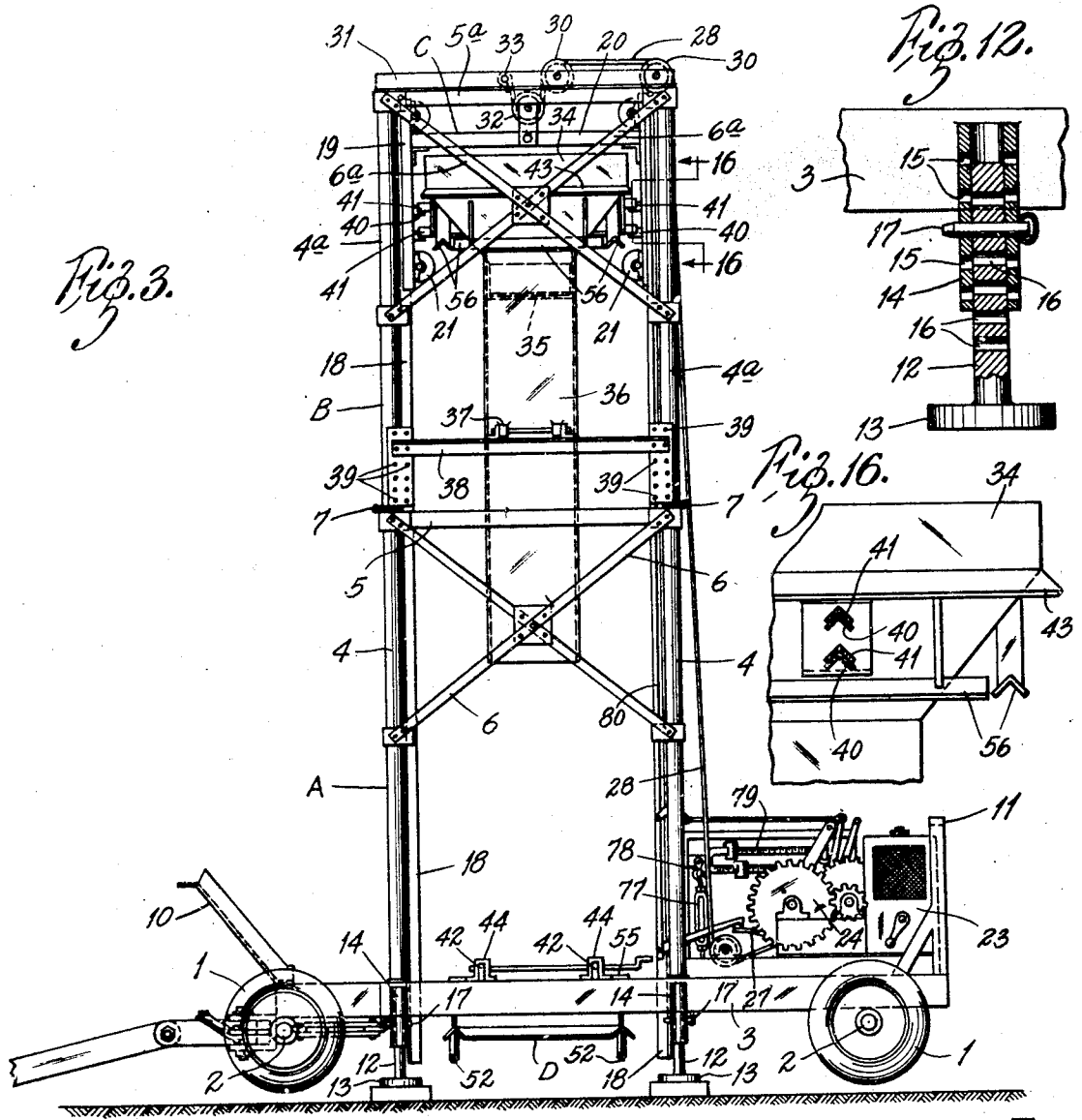


Fig. 12.

Fig. 16.

Fig. 5.

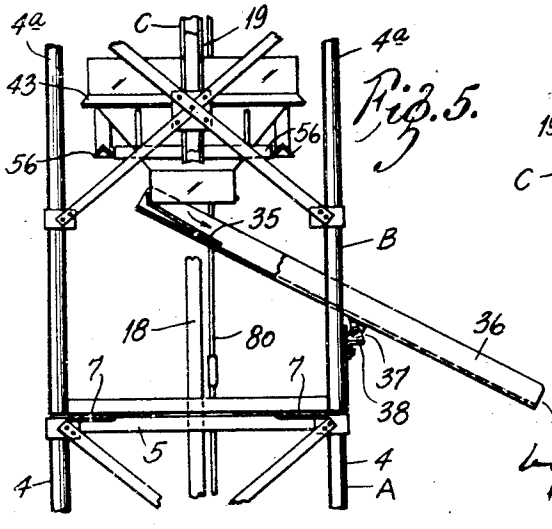
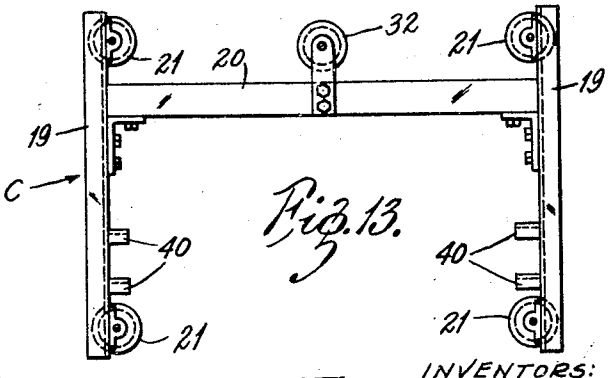


Fig. 13.



INVENTORS:

Edward D. Fivecoate &
Thomas H. Fleming
by Albert Hunt Bradley

THEIR ATTORNEYS

July 9, 1940. E. D. FIVECOATE ET AL 2,207,053

PORTABLE HOIST

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Fig. 4.

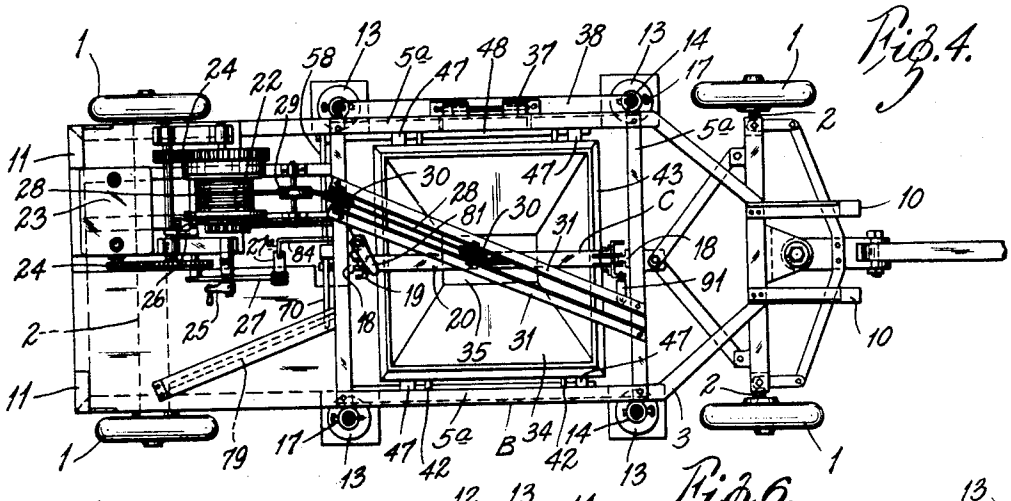


Fig. 6.

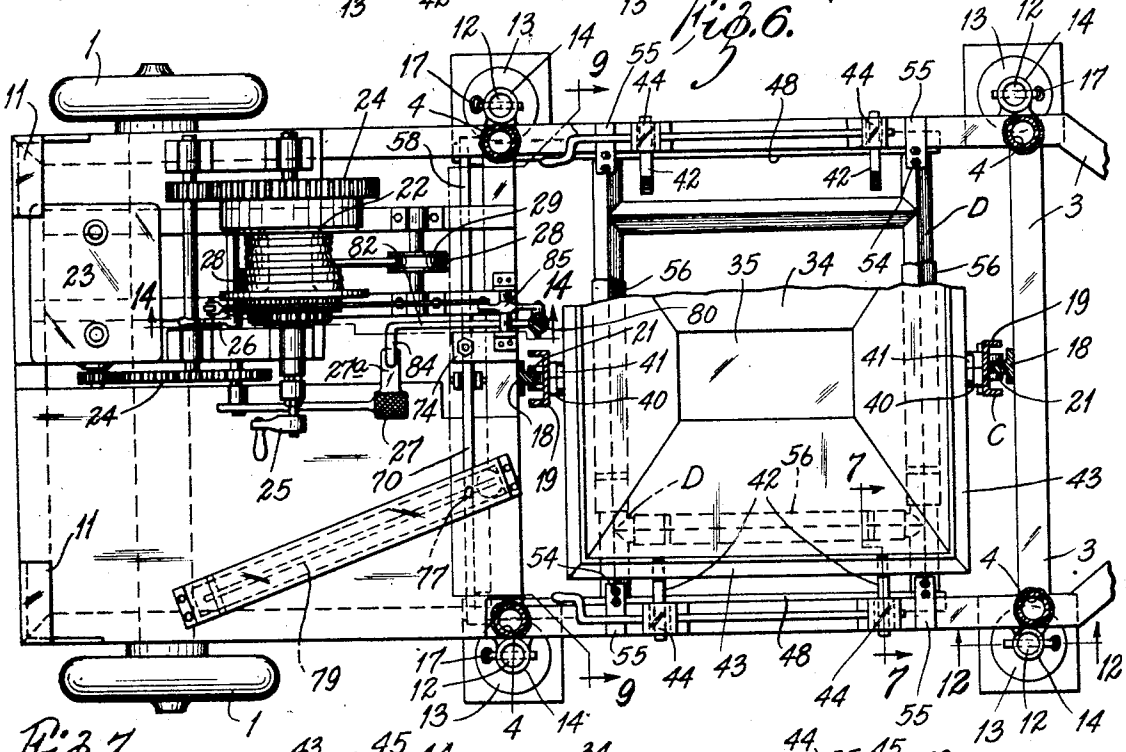


Fig. 7.

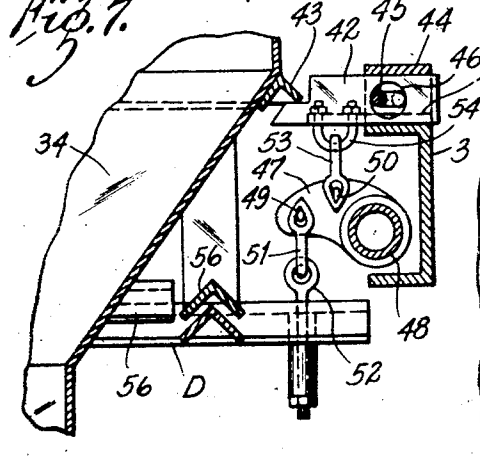
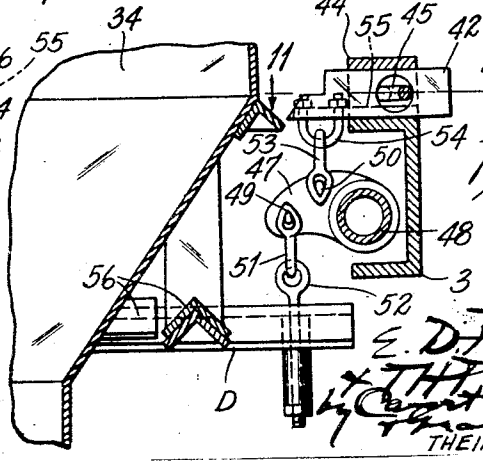


Fig. 8.



INVENTORS
E. D. Fivecoate
T. H. Fleming
By Cahill Cahill & Reynolds
THEIR ATTORNEYS.

Patented July 9, 1940 2,207,053

UNITED STATES PATENT OFFICE

2,207,053

PORTABLE HOIST

Edward D. Fivecoate, St. Louis, and Thomas H. Fleming, Brentwood, Mo.; said Fivecoate assignor to said Fleming

Application June 25, 1938, Serial No. 215,738

5 Claims. (Cl. 187—11)

This invention relates to hoists, particularly portable hoists for ready-mixed concrete and the like or the materials therefor. It has for its principal objects to provide for weighing the ready-mixed concrete or proportioning by weight the materials therefor in the hoist; to provide for the easy erection and leveling of the machine and the extension of its hoisting tower; to transfer the load to the scale without jarring or jolting and to relieve the scale of the weight of the hoisting platform and the material carried thereby except during the weighing operation; to provide for automatically stopping and holding the hoisting platform at a predetermined point in its upward travel; and to provide a removable hopper for said platform and a vertically adjustable chute for receiving the contents of said hopper. The invention consists in the portable material weighing and elevating machine and in the construction, combinations and arrangements of parts hereinafter described and claimed.

In the accompanying drawings, which form part of this specification and wherein like symbols refer to like parts wherever they occur,

Fig. 1 is a side elevation of a portable hoist embodying our invention, the hoist being shown in the condition in which it is transported from place to place;

Fig. 2 is a view similar to Fig. 1, showing the tower extended and the entire hoist supported in leveled position on its retractable legs;

Fig. 3 is a view similar to Fig. 2 looking at the opposite side of the hoist;

Fig. 4 is a plan view of the hoist;

Fig. 5 is a fragmentary front view of the hoisting tower with the hopper elevated and in position to discharge its contents into the upper end of the delivery chute;

Fig. 6 is a horizontal section on the line 6—6 in Fig. 2;

Fig. 7 is an enlarged fragmentary vertical cross-section on the line 7—7 in Fig. 6, showing the hopper stop in inoperative position;

Fig. 8 is a view similar to Fig. 7, showing the stop in inoperative position and the hopper resting on the weighing platform;

Fig. 9 is an enlarged vertical cross-section on the line 9—9 in Fig. 6;

Fig. 10 is a fragmentary vertical longitudinal section on the line 10—10 in Fig. 9;

Fig. 11 is a horizontal section on the line 11—11 in Fig. 8;

Fig. 12 is a vertical section on the line 12—12 in Fig. 6;

Fig. 13 is a side elevation of the hopper-supporting carriage;

Fig. 14 is a longitudinal section on the line 14—14 in Fig. 6;

Fig. 15 is a diagrammatic view illustrating the automatic safety stop mechanism for the carriage; and

Fig. 16 is a detail section on the line 16—16 in Fig. 3.

The machine shown in the accompanying drawings comprises a wheeled vehicle of the trailer type including front and rear pairs of wheels 1, axles 2 therefor and a body frame 3 suitably supported on said axles. Mounted on the vehicle body 3 intermediate between the front and rear ends thereof is an extensible skeleton tower having a lower portion or section A comprising four upright frame members or corner posts 4 connected by horizontal top frame members 5 and by diagonal braces 6, and an upper section B comprising two pairs of corner posts 4a hinged, as at 7, to the front and rear top rails 5 of the lower section so as to be swung upwardly into vertical alinement with the corner posts 4 of said lower section. The corner posts of the upper section B are connected by detachable top frame members 5a and by detachable diagonal braces 6a. In the lowered position of the hinged front and rear corner posts 4a, the free or lower ends thereof rest upon suitable supporting seats or brackets 10 and 11 provided therefor at the front and rear ends, respectively, of the vehicle body 3.

The body frame 3 is provided adjacent to the four corners of the tower with retractable legs 12 that have foot flanges 13 and are reciprocable in vertical bores provided therefor in brackets 14 that are welded or otherwise rigidly secured to the side rails of said frame. Each of the tubular leg supporting brackets 14 is provided with a series of vertically spaced diametral holes 15; and each of the legs 12 is likewise provided with a series of vertically spaced diametral holes 16, the spacing of the holes in each leg differing from the spacing of the holes in its supporting bracket. The legs are held in the desired position of adjustment in their supporting brackets by means of pins 17 that are inserted in the registering holes 15 and 16 in the brackets and legs, respectively. With this arrangement, the entire vehicle may be raised off the ground and leveled by means of jacks or other lifting devices with the foot flanges 13 of the legs 12 resting upon the ground. The legs are then locked to their respective brackets 14 by means of the pins 17. The jacks are then removed and the weight of the entire machine is supported on the four retractable legs 12 with the wheels 2 clear of the ground.

Mounted for vertical movement in the skeleton tower is a hoisting carriage or platform C comprising two vertically disposed, channel-shaped side rails 19 that are connected adjacent to their upper ends by a horizontal frame member 20. The side rails 19 are arranged with their chan-

nels facing outwardly and are provided with vertically spaced grooved rollers 21 that straddle the web portions of vertically disposed T-shaped guide rails or tracks 18 that are rigidly secured to the inner faces of the horizontal frame members of the hoisting tower. The carriage C is raised and lowered by means of a conventional hoisting mechanism including a usual winding drum 22 driven by an engine 23 through suitable gearing 24, a clutch lever 25, a reversing lever 26 and a brake pedal 27. The carriage is supported by a cable 28 which is attached to and wound upon the winding drum 22, passes beneath a sheave 29 on the body 3, thence upwardly alongside of the tower, thence over a pair of sheaves 30 supported on a pair of braces 31 that extend at an oblique angle from the rear to the front top rail of the upper section of the tower, thence downwardly beneath a sheave 32 journaled on the cross rail 20 of said carriage and thence upwardly where it is anchored, as at 33, to said braces. By this arrangement, the sheave 32 on the carriage is suspended from a loop in the cable 28 and is raised when the winding drum 22 is rotated to shorten the loop and is lowered when the winding drum is rotated in the reverse direction to lengthen said loop.

Removably mounted in the carriage is an open-topped, hopper-shaped container 34 for the material to be hoisted with a discharge opening in its bottom that is closed by a hinged closure member 35. When open, the free or lower end of the closure member 35 is adapted to rest in the upper end of a discharge chute 36 that is pivotally supported, as at 37, intermediate between its ends on a cross member 38 that is bolted to one side of the upper section of the hoisting tower. Series of vertically spaced bolt holes 39 are provided in the upper tower section, whereby the height of the chute may be adjusted. Each of the side rails 19 of the carriage is provided with a pair of inwardly projecting vertically spaced projections or lugs 40 of inverted V-shaped cross-section adapted to form seats or supports for a similar pair of outstanding lugs 41 on the adjacent side walls of the hopper 34, whereby said hopper is supported in said carriage between the side rails thereof but is removable therefrom laterally thereof when the lugs of the hopper are lifted clear of the lugs on the carriage.

Downward travel of the hopper is limited by means of releasable stops 42 that extend beneath a collar or exterior edge flange 43 rigid with said hopper. These stops are arranged in pairs on opposite sides of the body frame 3, each pair being slidably supported in brackets 44 secured to a side rail of said frame and being moved simultaneously into and out of the path of the collar 43 of the hopper by means of a horizontal rod or shaft, which is rotatably supported in said brackets and has cranks 45 thereon that turn in cylindrical openings 46 provided therefor in said stops.

The hoist is provided with a weighing apparatus including an openwork weighing frame or platform D adapted to receive and support the hopper 34 and counterbalanced levers 47 for supporting said platform. These levers are arranged in pairs on opposite sides of the vehicle and are disposed transversely thereof above the platform D. The levers of each pair are connected at one end by a counterweight in the form of a heavy tube 48 are are provided at their other ends with knife-edge pivots 49 and intermediate said ends with knife-edge pivots 50. The weighing platform D is suspended from the levers 47 by means of links 51 whose upper ends are supported on the knife-edge pivots 49, and by eye bolts 52, whose upper or eye ends are supported in the lower ends of said links and whose lower ends are secured to said platform. The levers 47 are, in turn, suspended from the side rails of the vehicle body by links 53, whose lower ends support the knife-edge fulcrum pins 50 of said levers and whose upper ends are supported in U-bolts 54 carried by plates 55 fixed to said side rails. The weighing frame or platform D has side rails of inverted V-shaped section; and the hopper 34 has members 56 rigid with the four sides thereof also of inverted V-shaped section that are adapted to straddle and seat upon the V-shaped platform rails when the stops 42 are moved outwardly clear of said hopper, thereby transmitting the weight of said hopper to said platform.

The counterweighting tubes 48 are provided with relatively long arms 57 and 58, respectively, that extend towards each other rearwardly of the platform D with their free ends in overlapping relation. The free end of the arm 57 of one tube seats on the pointed upper end of a pin 59 fixed to a plate 60 that is suspended by hanger bolts 61 from another plate 62 having a stud 63 depending therefrom whose tapered lower end portion seats on the free overlapping end of the arm 58. This arm is, in turn, supported on the tapered upper end of a stud 64 fixed to a plate 65, which is suspended by means of hanger bolts 66 from a plate 67. The plate 67 is supported on the lower end of a link 68 whose upper end rests on the knife-edge pivot 69 provided therefor intermediate between the ends of a lever 70, one arm of which has a knife-edge pivot 71 supported in a link 72 carried by an eye-bolt 73 that depends from a bracket 74 provided therefor on the adjacent face of the hoisting tower. The other or long arm of the lever 70 has a knife-edge pivot 75 thereon which seats in a link 76 carried by the hooked lower end of a link 77 having a hooked upper end supported in a link 78 pivoted to the graduated beam 79 of the scale. The hereinbefore described connections between the overlapping ends of the two arms 57 and 58 and the scale beam 79 are well known and it is considered unnecessary to illustrate or describe them in detail.

Located in the hoisting tower is a vertically disposed rod 80 which terminates adjacent to the upper end of said tower in a horizontal arm 81 whose free end overhangs one of the channel-shaped vertical side rails 19 of the carriage C and is adapted to be engaged thereby at the limit of its upward travel. The lower end of the rod 80 is pivotally connected to one arm of a lever 82 pivoted at 83 for vertical swinging movement on the body frame 3. The other arm of the lever 82 terminates in a lateral extension 84 that is disposed in overlapping relation to a lateral extension 27a of the brake operating pedal 27. A bell-crank lever 85 has one arm connected to the vertically disposed brake operating rod 80, the other arm of said lever being connected by means of a link 86 with the free upper end of an arm 87 whose lower end is pivoted, as at 88, on the body frame. The arm 87 has a pawl 89 thereon adapted to engage a ratchet 90 which turns with the hoisting drum 22. By this arrangement, when the carriage abuts against the arm 81 at the upper end of the vertically movable rod 80,

said rod is lifted by said carriage, thereby actuating the lever 82 at the lower end of said rod and applying the brake to the winding drum. At the same time, the rod 80 actuates the bell-crank lever 85 and moves the pawl 89 into engagement with the drum locking ratchet 90, thereby holding the elevator in raised position. Mounted on the top rail of the tower is a normally closed, spring loaded limit switch 91 adapted to be opened by the carriage when the latter raises the rod 80 to apply the brake and pawl of the winding mechanism. The switch 91 is preferably located in the magneto circuit (not shown) of the engine 23 whereby the opening of said switch renders the magneto inoperative and thus stops the engine at the limit of upward travel of the carriage.

The hereinbefore described weighing and elevating machine may be readily transported from place to place by hitching it to a motor vehicle, or the machine may be self-propelled. The retractable legs hold the machine level and the tower plumb and thus insure accurate weight and easy travel of the carriage. The two hinged portions of the upper section of the tower are readily swung upwardly into operative position and rigidly connected by the top frame members and diagonal braces. The machine may be used for elevating various materials and articles.

The weight of the material in the hopper may be accurately determined by means of the weighing mechanism which may also be used for proportioning by weight the different materials used in making concrete, mortar or plaster. The weighing platform is at all times relieved of the weight of the carriage; and the hopper is prevented by the stops from engaging said platform except during the weighing operation. When it is desired to weigh the material, the hopper is lowered onto the stops which are then withdrawn, thereby permitting the hopper to drop a very short distance onto the scale without appreciable shock or jar to the weighing mechanism. During this relatively short downward travel of the hopper into engagement with the platform, the cooperating inverted V-shaped portions of said hopper and platform serve to center the former in the latter. Likewise, the hopper is centered in the carriage by the cooperating inverted V-shaped portions thereof. When the weight is applied to the platform, the counterbalanced levers rock on their supporting links, thus causing the counterweighting tubes to swing upwardly and the long arms thereof to swing downwardly and actuate the graduated beam of the scale mechanism through the linkage arrangement hereinbefore described.

When the carriage nears the upper end of the tower, it automatically stops the drum operating engine, applies the brake to the drum and locks the carriage in raised position.

The discharge chute may be adjusted vertically to suit the elevated position of the hopper, and the contents of the latter may be discharged into the upper end of the chute merely by opening the discharge gate of the hopper, which gate serves to guide the material into the chute.

Obviously, the hereinbefore described machine admits of considerable modification without departing from the invention; therefore, we do not wish to be limited to the specific construction shown and described.

What we claim is:

1. A portable hoisting machine comprising a wheeled body, a tower thereon, a carriage in said tower, a hoist mounted on said body for raising and lowering said carriage, a container mounted on said carriage, a scale including a platform mounted on said body at the base of said tower for supporting said container, and releasable means for preventing the engagement of said container with said platform in the lowered position of said carriage.

2. A portable hoisting machine comprising a wheeled body, a tower thereon, a carriage in said tower, a hoist mounted on said body for raising and lowering said carriage, a hopper mounted in said carriage, a weighing platform mounted on said body at the base of said tower, means for supporting said hopper free of said carriage and said platform in the lowered position of said carriage, and means for disengaging said supporting means from said hopper, whereby said hopper is adapted to move downwardly a comparatively short distance onto said weighing platform.

3. A portable hoisting machine comprising a wheeled body, a tower thereon, a carriage in said tower, a hoist for raising and lowering said carriage, a weighing platform mounted on said body at the base of said tower, a hopper carried by said carriage, releasable means for preventing the engagement of said hopper with said weighing platform at the end of the downward travel of said carriage, said means comprising members movably mounted on said body and adapted to support said hopper independently of said carriage and clear of said platform, and manually operable means for actuating said members.

4. A portable hoisting machine comprising a wheeled body, a tower thereon, a carriage in said tower, a hoist for raising and lowering said carriage, a weighing platform mounted on said body at the base of said tower, a hopper supported on said carriage, stops slidably mounted on said body and adapted to be moved beneath said hopper to hold the same clear of said platform at the end of the downward travel of said carriage, and means for actuating said stops comprising a manually rotatable shaft having cranks thereon turning in openings provided therefor in said stops.

5. A portable hoisting machine comprising a wheeled body, a tower thereon, a load supporting member in said tower, means for raising and lowering said member in said tower, and a weighing mechanism mounted on said body, said weighing mechanism including a beam and a weighing platform adapted to support said member, and pairs of levers located on opposite sides of said platform and pivoted intermediate between their ends for vertical swinging movement with one arm connected to said platform to support the same, the other arms of each pair of levers being connected by a member adapted to counterbalance the weight of said platform, the counterbalancing members of said levers having arms thereon adapted to transmit the motion of said levers to said beam, and releasable means for relieving said weighing platform of the weight of said load supporting member in the lowered position of the latter.

EDWARD D. FIVECOATE.
THOMAS H. FLEMING.