Nov. 8, 1960 P. J. CAWOOD 2,959,302

PORTABLE CONCRETE BATCHING PLANT

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Fig. 1

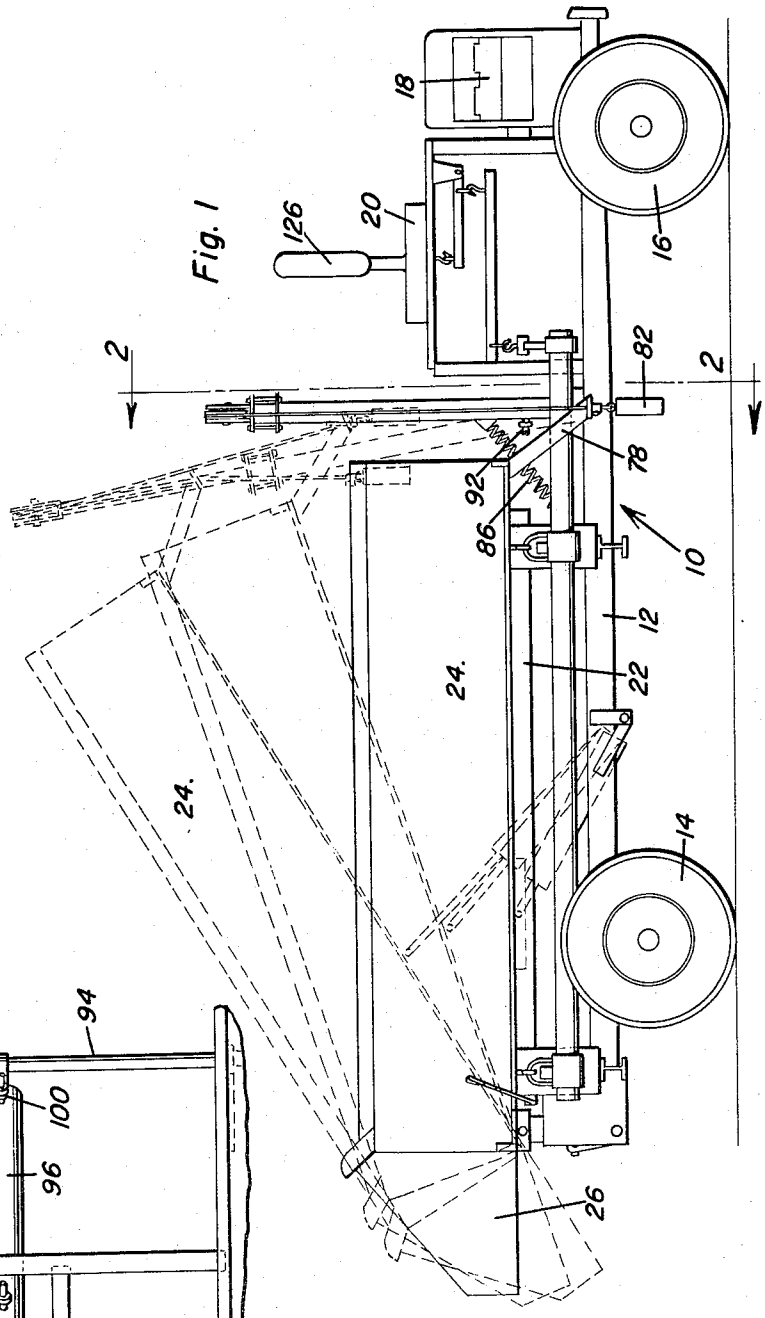
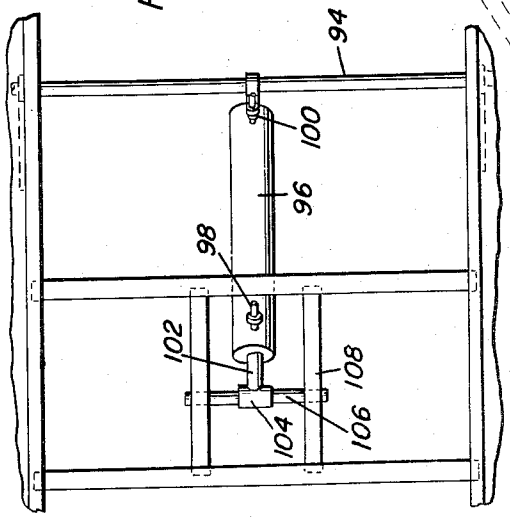


Fig. 8



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Fig. 2

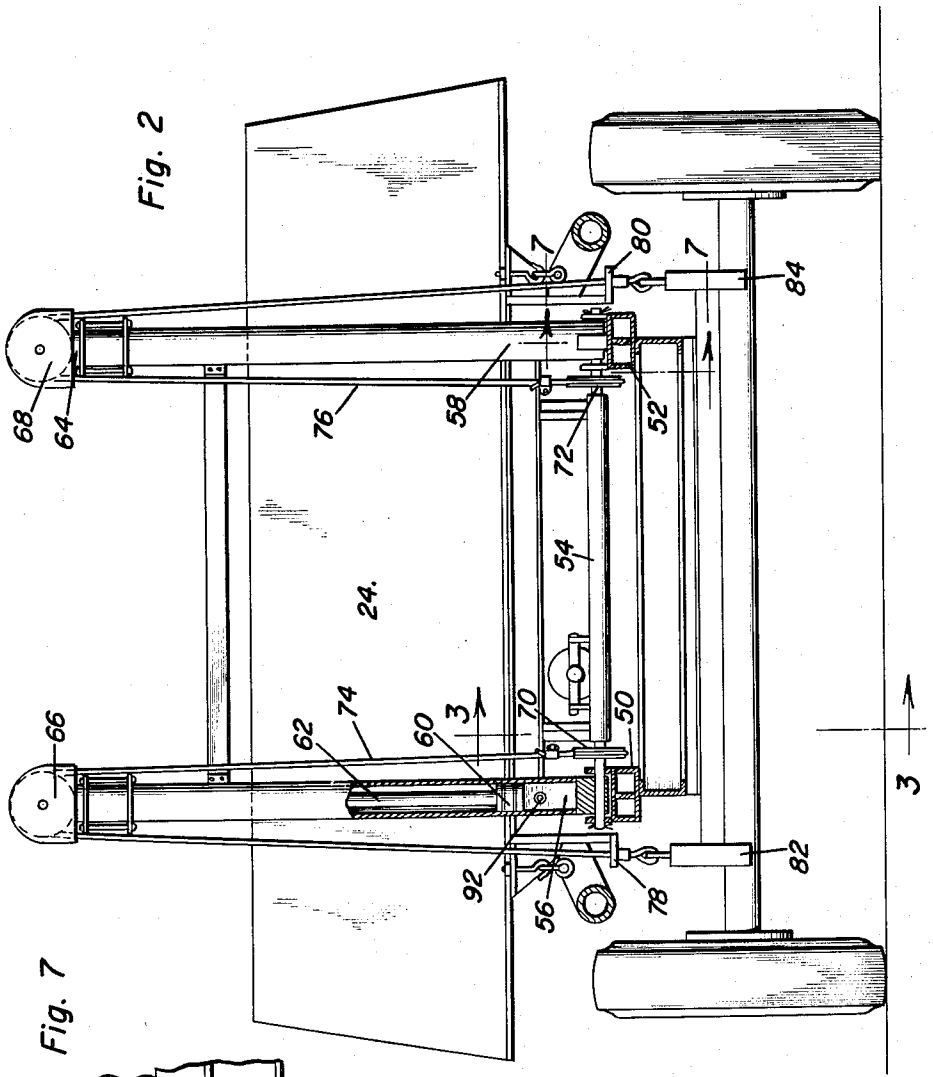
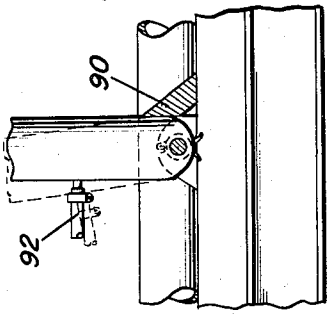


Fig. 7



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Fig. 3

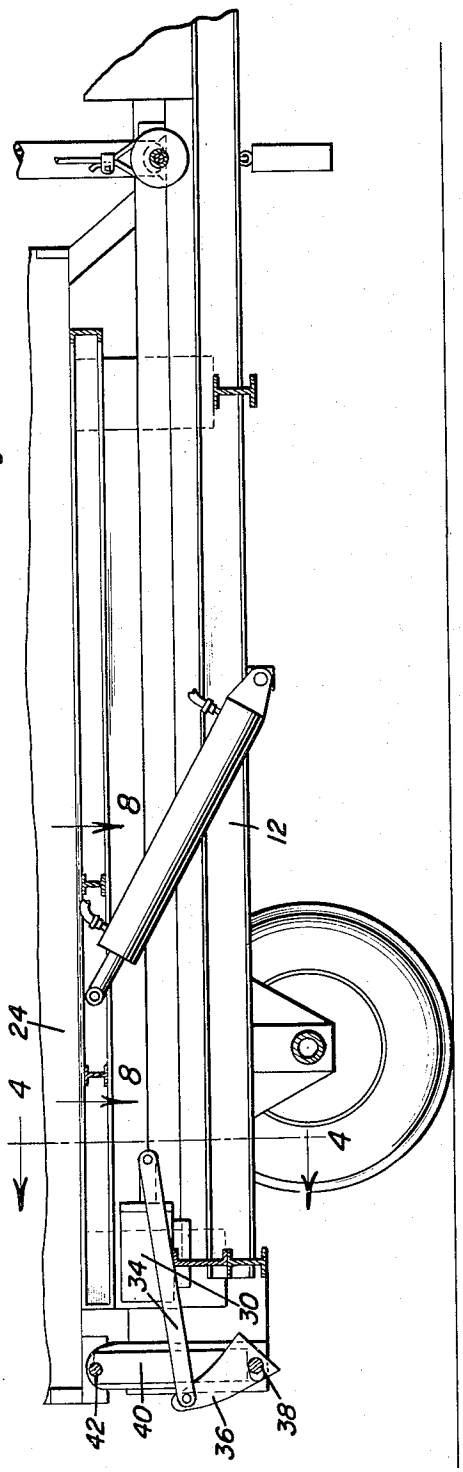
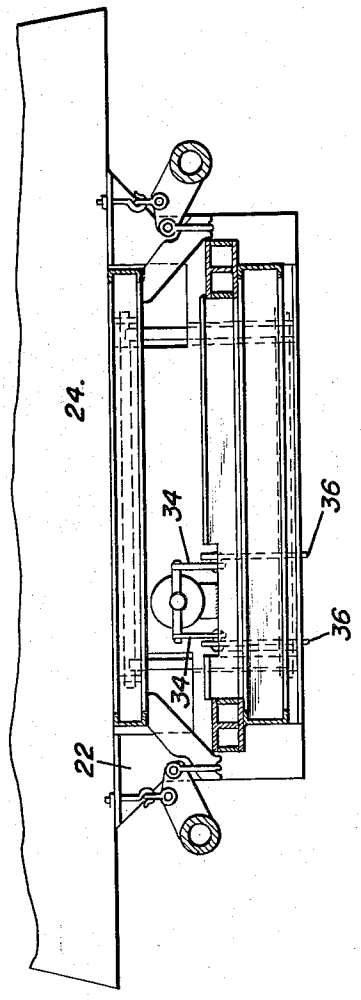


Fig. 4



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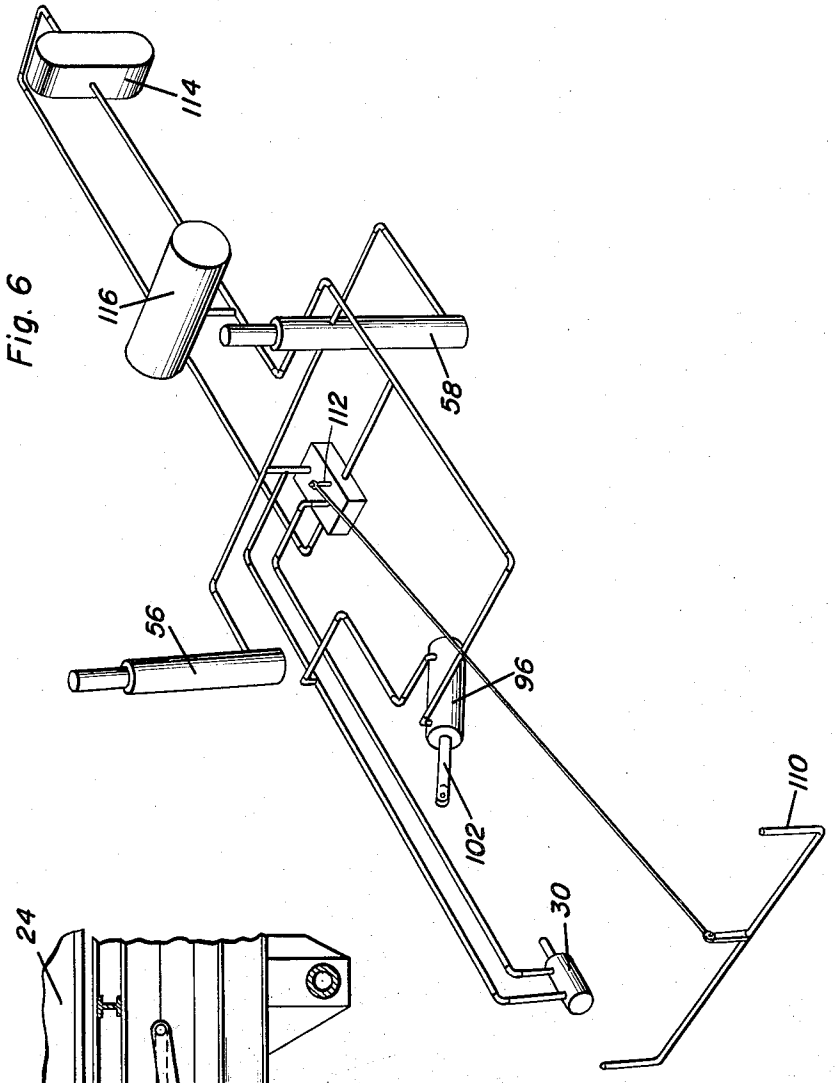


Fig. 6

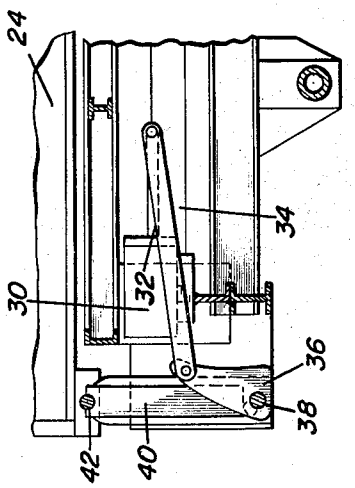


Fig. 5

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United States Patent Office

2,959,302

Patented Nov. 8, 1960

2,959,302

PORTABLE CONCRETE BATCHING PLANT

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Filed July 3, 1957, Ser. No. 669,823

9 Claims. (Cl. 214—2)

This invention relates to a portable concrete batching plant and more particularly to a novel arrangement of an aggregate and cement hopper mounted on a platform type scale and adapted to be lifted off the scale for discharge of the contents of the hopper.

The primary object of the present invention resides in the provision of an automatic portable concrete batching plant which consists of a hopper adapted to weigh the aggregate placed therein and which may be arranged so that after the desired load is within the hopper, the latter may be lifted off the scale for discharge of the contents.

A further object of the present invention resides in the provision of a portable concrete batching plant which is mounted on a steel chassis or frame with suitable rubber tired wheels for conveniently enabling the batching plant to be towed behind a truck or other similar tractor vehicle.

The construction of this invention features a novel three-stage lifting of the hopper which includes a means for lifting the hopper off of the scale platform, means for initially pivoting and raising the hopper, and final means for completing the raising of the hopper to a discharge position.

Still further objects and features of this invention reside in the provision of a portable concrete batching plant that is essentially simple in construction, convenient to use, which may be powered by either gasoline or electric motor, and which utilizes a novel hydraulic system arrangement.

These, together with the various ancillary objects and features of the invention which will become apparent as the following description proceeds, are attained by this portable concrete batching plant, a preferred embodiment of which has been illustrated in the accompanying drawings, by way of example only, wherein:

Figure 1 is a side elevational view of the portable concrete batching plant comprising the present invention showing the device in phantom lines in the partially and fully raised positions;

Figure 2 is an enlarged vertical transverse sectional view take along the plane of line 2—2 of Figure 1 illustrating in particular the pair of hydraulic cylinder assemblies used for initially raising the hopper;

Figure 3 is a fragmentary vertical longitudinal sectional view taken along the plane of line 3—3 of Figure 2 showing on an enlarged scale the means for lifting the hopper off the scale platform and the secondary means for raising the hopper to its completely elevated position;

Figure 4 is an enlarged vertical transverse sectional detail view taken along the plane of line 4—4 in Figure 3 further illustrating the construction of the means for raising the hopper off the scale platform;

Figure 5 is a sectional detail view of a portion of the invention as shown in Figure 3 and showing the means for raising the hopper off the scale platform in actuated position;

Figure 6 is a schematic diagram of the hydraulic system included in the invention;

Figure 7 is a vertical longitudinal sectional detail view taken along the plane of line 7—7 in Figure 2 and illustrating the stop means for limiting the movement of the pair of hydraulic cylinder assemblies; and

Figure 8 is a partial plan view illustrating the construction of the means for completing the raising of the hopper being taken along the plane of line 8—8 in Figure 3.

With continuing reference to the accompanying drawings wherein like reference numerals designate similar parts throughout the various views, reference numeral **10** is used to generally designate the portable concrete batching plant comprising the present invention which includes a wheeled chassis **12** having rubber tired wheels as at **14** and **16** arranged in pairs for supporting the chassis **12**. Mounted on the chassis is a gasoline engine **18**. Alternatively, an electric motor or the like may be employed. Also provided on the chassis **12** is a platform type scale **20** which may be a Howe platform scale (20,000 lb. scale). The scale is provided with a platform **22** upon which a hopper **24** normally rests which hopper is adapted to be filled with the aggregate and cement. The hopper is provided with a rear discharge chute **26**.

Referring now more particularly to Figures 3, 4 and 5, it will be noted that the chassis **12** has mounted thereon a hydraulic cylinder **30** which operates a piston having a piston rod **32** connected thereto. Pivotally connected to the piston rod are a pair of cam actuating links **34** which are pivoted to cams **36**. The cams **36** are carried by a camshaft **38** which is suitably journaled and function to raise a support block **40** which support block has a pivot point or shaft **42** to which the rear end of the hopper **24** is pivoted. Hence, actuation of the hydraulic cylinder **30** will serve to move the piston **32** causing the cam links **34** and the cams **36** to be actuated thus raising the block **40** and raising the rear end of the hopper off of the scale platform.

Secured to the front end of the channel-shaped members **50** and **52** of the chassis **12** is a shaft **54** having a pair of hydraulic cylinder asesmblies **56** and **58** secured thereto and thus pivotal therewith. Within the cylinder assemblies are suitable pistons as at **60** having actuating piston rods **62** and **64** carrying sheaves **66** and **68**. Also secured on the shaft **54** are pulleys **70** and **72**. Entrained about the sheaves **66** and **68** are cables **74** and **76** the cables being secured at one end thereof to the pulleys **70** and **72** and at the other ends thereof to brackets **78** and **80** depending from the hopper **24**. Also, counterweights **82** and **84** depend from the cables **74** and **76** for returning the cables to their initial position. Coil springs, as at **86**, Figure 1, are provided for urging the cylinder assemblies **56** and **58** to the upright position shown in solid lines in Figure 1 from the tilted position as shown by phantom lines in Figures 1 and 7 and movement toward its full line position is limited by the limit stop **90** welded or otherwise secured to the cylinder assemblies. The cylinders receive their hydraulic fluid from hydraulic connections as at **92**.

Pivoted to a shaft **94**, see Figure 8, depending from the chassis **12** is a further hydraulic cylinder assembly **96** having hydraulic means connected thereto as at **98** and **100** for operating the hydraulic cylinder **96** to actuate a piston having a piston rod **102** which is pivoted as at **104** to a shaft **106** mounted by means of a bracket **108** on the hopper **24**. The hydraulic system, as shown in Figure 6, is provided with a manual control lever **110** functioning to actuate a valve **112** controlling flow of hydraulic fluid from the pump **114** and the reservoir **116** to the hydraulic cylinder **30** first, the hydraulic cylinders **56** and **58** next and subsequently to the hydraulic cylinder **96**.

The operation of the invention is subsequent to placing the aggregate and cement into the hopper by means of any suitable loading mechanism. This is measured by means of the weight which is registered on the scale dial **126** of the platform scale **20**. If the gasoline engine **18** is not running at this time, it is then placed into operation. It is not necessary that the motor be operated while loading the hopper. However, in continuous batching the motor may remain in operation during the loading. A by-pass valve, not shown, on the hydraulic control valve may be provided for by-passing oil discharged by the pump when the motor **18** is operating and it is not desired to raise the hopper. When the control valve is placed in the hoisting position the oil by-pass valve is closed by the control valve. The scale lockout assembly is the first part to come into operation. The hydraulic cylinder **30** because of the manner of the operation of the special valve **112** will first receive fluid which will cause the block **40** to rise from the position as is shown in Figure 3 to the position as is shown in Figure 5 thus lifting the rear end of the hopper and taking its weight off the scale. The moment the hydraulic cylinder **30** has moved its piston into its outermost position, so that its piston is in a full locked position, the primary lifting cylinders **56** and **58** next receive fluid and begin to raise the front end of the hopper.

Movement of the pistons **62** and **64** will cause the hopper to re-raise due to the action of the cables **74** and **76**. The cylinders will swing about the axis of their support shaft **54** with the arc of the hopper as the latter moves up to the full dump position. The advantage of this arrangement is that there is no danger of the cables riding out of the sheaves or having undue strain placed upon them. The return stop **90** engages the chassis beams to limit the return position of the cylinder assemblies. Further, the return springs **86** continuously urge the cylinders to their upright position. The return weights prevent slack in the hoisting cables.

The secondary hoist comes into operation after the cylinders **56** and **58** and helps hoist the hopper. When the cylinders reach their peak the secondary hoist cylinder **96** then takes the hopper from the lower position shown in phantom lines in Figure 1 to the full dump position and will hold it at this point until the control lever is placed into a "lower position."

The advantage of the control valve is that the hopper can be stopped and held in position from stop to full dump based on the control valve setting.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A portable concrete batching plant comprising a wheeled chassis having a scale platform thereon, a pair of rear support blocks vertically movably mounted on said chassis, means to vertically move said support blocks for initially raising the end of the hopper from said platform, a hopper pivoted at its rear end to said support blocks and resting on said scale platform and raisable off said platform upon upward movement of said support blocks, first hydraulically actuated lifting means pivotally secured to the front end of said chassis in front of said hopper for partially raising said hopper and tilting the latter about said support block pivots, and second hydraulically actuated lifting means for completely raising said hopper and being pivoted to said hopper and to said chassis beneath said hopper.

2. The combination of claim 1 including cams connected to said blocks for vertically raising said blocks, cam arms pivoted to said cams and a hydraulic cylinder assembly mounted on said chassis and having a piston rod actuated thereby, said piston rod being connected to said cam arms.

3. The combination of claim 1 wherein said first lifting means comprises a pair of hydraulic cylinder assemblies fixedly mounted on a shaft carried by said chassis and pivoting with said shaft, pistons operated by said hydraulic cylinder assemblies having sheaves mounted thereon, pulleys on said shaft, cables entrained about said pulleys and sheaves and secured to said hopper for raising said hopper upon upward movement of said pistons.

4. The combination of claim 1 including cams connected to said blocks for raising said blocks, cam arms connected to said cams, and a hydraulic cylinder assembly mounted on said chassis and having a piston rod actuated thereby, said piston rod being connected to said cam arms, said first lifting means comprising a pair of hydraulic cylinder assemblies mounted on a shaft carried by said chassis and pivoting with said shaft, spring means urging said cylinder assemblies into a vertical position, stop means engaging said cylinder assemblies and limiting their pivotal movement in one direction to said vertical position.

5. The combination of claim 1 including a hydraulic actuating system connected to said first and second lifting means and to said blocks and operable to initially lift said blocks and lift said hopper from said scale platform, thereafter actuate said first lifting means and subsequently actuate said second lifting means.

6. The combination of claim 1 wherein said first lifting means comprises a transverse shaft pivotally journaled upon said chassis and a pair of upwardly extending hydraulic cylinder and piston units fixedly secured to said shaft and pivotable therewith; spring means urging said units into a vertical position, said units being disposed forwardly of the front end of said hopper, means connecting said units to said hopper.

7. The combination of claim 6 wherein said connecting means produces an amplified lifting movement of said hopper upon movement of said units.

8. The combination of claim 7 wherein said connecting means includes pulleys carried by said units and movable therewith, a cable trained over each pulley and having its ends secured to said hopper and to a stationary anchor.

9. The combination of claim 8 wherein said anchor comprises a pulley secured to said shaft.

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