Feb. 21, 1950 E. G. SMITH ET AL 2,498,117

SKIP LIFT MECHANISM FOR CONCRETE MIXING MACHINES

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Fig. 1

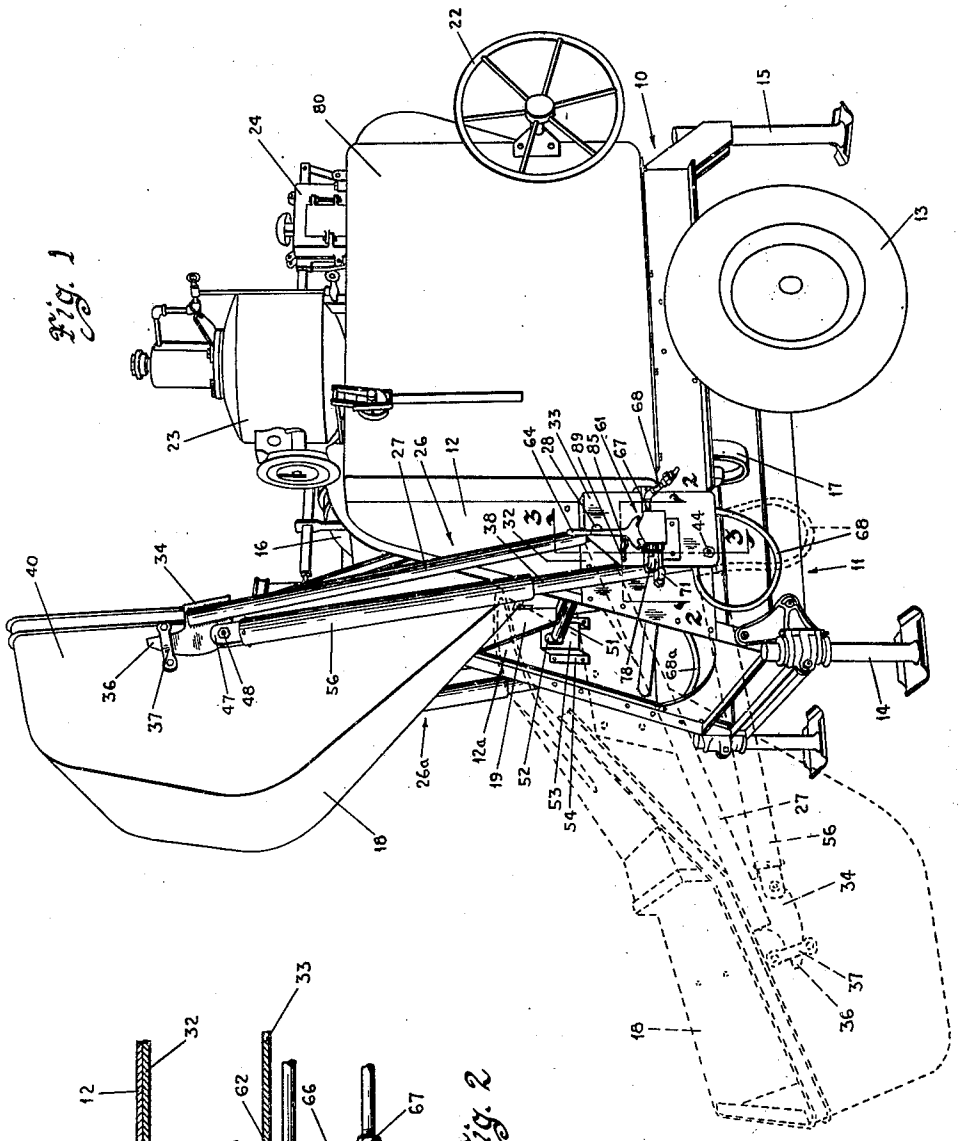
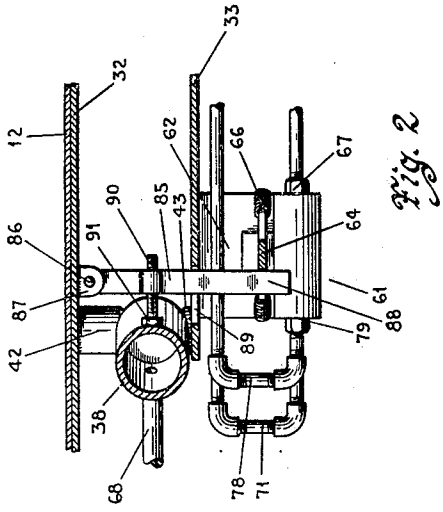


Fig. 2



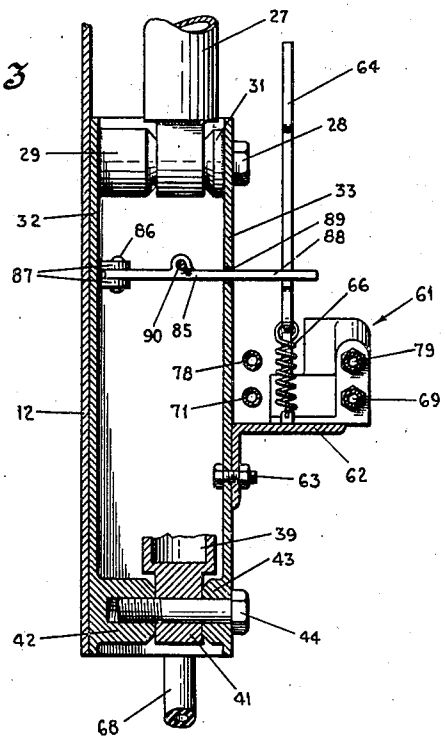
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Fig. 3



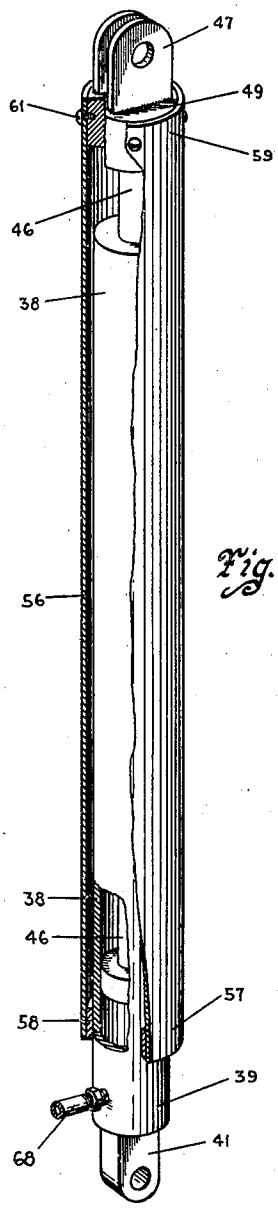


Fig. 4

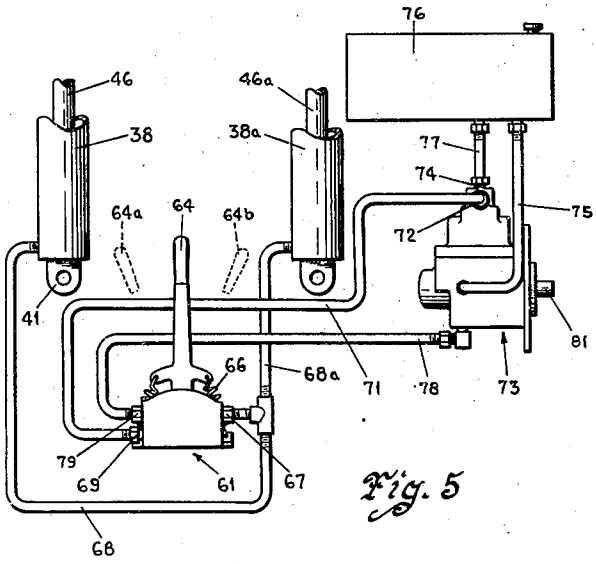


Fig. 5

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SKIP LIFT MECHANISM FOR CONCRETE MIXING MACHINES

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5 Claims. (Cl. 214—130)

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This invention relates generally to concrete mixing machines and in particular to an hydraulic lifting mechanism for raising and lowering the skip or hopper of a concrete mixing machine.

An object of this invention is to provide an improved concrete mixing machine.

Another object of this invention is to provide a concrete mixing machine in which lift pistons forming part of an hydraulic lifting apparatus for raising and lowering the skip, are fully protected from dust and the like raised by the material handled in the skip.

A further object of this invention is to provide a concrete mixing machine having a hydraulic lift mechanism for the skip or hopper, which is of a compact design, of a construction to operate efficiently over prolonged periods of time with a minimum of service and maintenance attention, and capable of being actuated from a position adjacent to the skip.

A still further object of this invention is to provide an hydraulic lift mechanism for the skip of a concrete mixing machine in which lift arms and hydraulic cylinders, operable as a unit to lower and raise the skip, are movably assembled with the skip such that the skip can be shaken or bumped in its fully raised position relative to the cylinders and lift arms.

A further object of this invention is to provide a hydraulic lift mechanism for the skip of a concrete mixing machine, in which a valve unit for controlling the supply of fluid under pressure to the lift mechanism is actuated in response to a movement of the skip to its raised position to shut off the supply of fluid to the lift mechanism when the skip is in such raised position.

A particular feature of this invention is found in the provision of a hydraulic lift mechanism for the skip of a concrete mixing machine, embodying hydraulic cylinders and pistons therefor, in which dust protective means for the pistons comprise tubular sleeves slidably supported on the cylinders for longitudinal movement and connected at one of their ends with the outer ends of the pistons for movement with the pistons. The sleeves are of a length such that for all moved positions of the pistons, their opposite ends are in slidable contact with the cylinders, whereby the extended portions of the pistons are always enclosed by the sleeves.

Another feature of this invention is found in the provision of a concrete mixing machine in which a skip is movably supported at one end on the machine frame for pivotal and linear up and down movement. An hydraulic lift mechanism includes a pair of pivoted lift units which are arranged at opposite sides of the skip and movably connected at their free ends with the skip to provide for a limited longitudinal movement of the skip relative to the lift units, whereby the lift units are operable to pivotally raise and lower the skip and to hold the skip in a raised position while it is longitudinally reciprocated or shaken to facilitate a dumping of material therefrom.

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Further objects, features and advantages of this invention will become apparent from the following description when taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of a concrete mixing machine showing the hydraulic lift mechanism of this invention in assembly relation therewith;

Figs. 2 and 3 are enlarged sectional detail views as taken on the lines 2—2 and 3—3, respectively, in Fig. 1, showing the relative assembly of a lift unit and the control means therefor;

Fig. 4 is a perspective view of an hydraulic cylinder embodied in the skip lift mechanism of this invention, with certain parts broken away to more clearly show its construction; and

Fig. 5 is a diagrammatic showing of the fluid system for the hydraulic lift mechanism.

With reference to the drawings, the skip lift mechanism of this invention is illustrated in Fig. 1 in assembly relation with a concrete mixing machine of two wheel portable type including a main horizontal frame 10, a sub-frame 11, and upright side frame structures 12 and 12a. Wheels 13 carried at the rear end of the sub-frame 11 support the machine for road travel. In use the machine is stabilized and supported in a stationary position by legs or standards 14 adjustably mounted at the front end of the sub-frame 11, and adjustable legs 15 carried at the rear end of the main frame 10.

A mixing drum 16 is rotatably carried in a usual manner on the main frame 10 by rollers 17, only one of which is illustrated in Fig. 1. The drum is operatively associated in a driven relation with an engine or motor (not shown) suitably mounted on the main frame 10 to the outside of the side structure 12a. A material receiving opening (not shown) in the forward end of the drum 16, is adapted to receive material to be mixed from a skip 18 pivoted at its rear or delivery end 19 between the side frame structures 12 and 12a.

The rear end of the drum is formed with a discharge opening (not shown) through which

the mixed material is delivered to a usual discharge chute (not shown) manually operated by means including a hand wheel 22. A water meter 23 and batch meter 24, for controlling the consistency and uniformity of the mix are illustrated as being carried on the side structure 12.

The skip lift mechanism of this invention includes a pair of lift units, designated generally as 26 and 26*a*, which are arranged at opposite sides of the skip 18 (Fig. 1). Since the lift units 26 and 26*a* are of a like construction and similarly assembled with the skip and side structures 12 and 12*a*, only the lift unit 26 will be described in detail.

The lift unit 26 is comprised of a lift arm 27 (Figs. 1 and 3) of a tubular construction and pivotally supported at its rear end on a bolt 28 carried in oppositely arranged boss members 29 and 31. The boss 29 is secured, as by welding, to the outside of an upright plate 32, formed as part of the side structure 12, and the boss 31 is secured, also by welding, to the inside of an upright supporting plate 33 which is mounted on the side plate 32 in an outwardly spaced parallel relation therewith. As best appears in Fig. 1, the rear end of the lift arm 27 is pivotally supported at a position adjacent to the front end of the side structure 12.

Mounted on the front end of the lift arm 27 (Fig. 1) is an upright connecting plate member 34 formed with a forwardly tapered front extension or finger 36 for a purpose which will appear later. The finger 36 is loosely received within a loop or outwardly bent strap member 37 carried near the top of a skip side wall 40 at a position spaced inwardly from the free or loading end of the skip 18.

An hydraulic cylinder 38 (Figs. 1, 3 and 4) is provided at its closed or rear end 39 with an extension or lug 41 which is received between boss members 42 and 43 oppositely arranged on the plate members 32 and 33, respectively, at positions below and forwardly of the boss members 28 and 29 for the lift arm 27. A bolt 44 extended between the boss members 42 and 43 and through the lug 41 pivotally supports the cylinder for up and down movement.

A piston 46, for the cylinder 38, has a U-shape bracket 47 at its free or outer end which is capable of straddling a rear end portion of the connecting plate 34 at a position below the front end of the lift arm 27. The bracket is pivotally connected with the plate 34 by a bolt 48. Integrally formed with the bracket 47 is a base member 49 of a circular shape corresponding in size substantially to the diameter of the cylinder 38 for a purpose which will appear later.

It is seen, therefore, that the cylinder 38 and lift arm 27 are relatively arranged for up and down pivotal movement together in a common vertical plane, with the front end of the lift arm 27 being rigidly secured to the connecting plate 34, and with the outer or free end of the piston 46 being pivotally connected with the plate 34 at a position below the front end of the lift arm.

In the operation of the skip lift mechanism, assume the skip to be in its lowered or loading position shown in dotted lines in Fig. 1. At this position of the skip 18, the pistons 46 are contracted within the cylinders 38 and 38*a*, and the extensions or fingers 36 are engaged with the loops 37 at positions nears the front ends of the fingers.

On the supply of fluid under pressure to the cylinders 38, the pistons 46 are extended to raise the skip 18 to its elevated position shown in full lines in Fig. 1. In such raised position, the fingers 36 are in substantially upright positions, while the loops 37 on the skip sidewalls 40 are arranged substantially normal thereto, or in a horizontal plane.

The delivery or rear end 19 of the skip 18 is secured to a transverse shaft member 51 (Fig. 1), the opposite ends of which are movably supported within upright elongated slots 52 formed in the base sections 53 of U-shaped brackets 54 secured in oppositely arranged positions on the inner sides of, and adjacent to the front ends of the side frame structures 12 and 12*a*. Stated otherwise, the side walls of the openings 52 constitute bearings which support the opposite ends of the shaft 51 for pivotal movement, and for limited linear up and down movement between positions defined by the end walls of the slots 52.

The shaft 51 is operatively associated with a bumping or shaking apparatus (not shown) which is capable of being operated by engagement of a portion thereof with cams (not shown) angularly spaced about the mixing drum 16. It is contemplated that the shaking apparatus be manually actuated into engagement with the mixing drum.

During a shaking operation the skip 18, in its fully raised position, is reciprocated in an up and down direction by the action of the shaking apparatus on the shaft 51. This reciprocal movement takes place by virtue of the support of the shaft 51 in the slots 52 and the loose reception of the fingers 36 within the loops 37. Further, it is apparent that this movement of the skip 18 takes place relative to the lift units 26 and 26*a*.

In order to lower the skip 18, it is only necessary to shut off the supply of fluid to the cylinders 38 and 38*a*, with the skip 18 being returned from its full line position to its dotted line position, shown in Fig. 1, by the action of gravity.

In the handling of cement, sand and gravel, by the skip 18, and during the loading of these materials into the skip, some dust is raised which tends to settle over the machine and the lift mechanism. It is further apparent that in the handling of cement and sand during the loading of the skip 18, portions of such material may accidentally fall directly on those parts of the lift mechanism adjacent to the side walls of the skip. Any adherence, particularly of the sand and cement or the dust therefrom, on the extended portions of the pistons 46, results in an abrasive action on the pistons which would appreciably shorten their service life and result in oil leakage from the cylinders 38.

In order to protect and seal the pistons 46 from dust in all moved positions thereof, a tubular sleeve 56 is slidably mounted on each of the cylinders 38 and 38*a* (Figs. 1 and 4). The rear or inner end 57 of a sleeve 56 is provided with an inside ring 58 adapted to ride in contact engagement with the outer periphery of the cylinder 38. The outer, or front end 59 of a sleeve 56, is secured, as by screws 61, with the base 49 of the bracket 47, which base is received within the tube front end to close the same. The sleeve 56 is of a length corresponding substantially to the working stroke of the piston 46 such that the contact ring 58 is always in riding engagement with the cylinder 38. As a result any extended section of the piston 46 is always completely covered by the sleeve 56.

The oil control system for the cylinders 38 and 38*a* includes a control unit of a commercially available type, indicated generally as 61 (Figs. 1,

2 and 3) which is mounted to the outside of the supporting plate 33 on an angle plate 62, secured to the plate 33 by bolts 63. A manually-operated pivoted handle or lever 64, for the control unit 61, is arranged for pivotal movement in a path parallel to the plane of the plate member 33. Tension springs 66, forming part of the unit 61, act to always return and maintain the handle 64 in an upright or neutral position, when the handle is released.

The unit 61 includes an oil outlet 67 (Fig. 5) which is connected with the cylinders 38 and 38a through conduits or tubes 68 and 68a, respectively. An oil inlet 69, of the control unit 61, is connected through a pipe 71 with the outlet 72 of a pump unit 73. The pump inlet 74 is in communication with an oil reservoir 76, through a pipe 77, so that the pipe 77 constitutes an outlet from the reservoir 76. An oil return line to the reservoir 76 includes a pipe 75 connected between the reservoir 76 and a reservoir (not shown) formed as part of the pump unit 73; and a pipe 78 connected between the pump unit reservoir and an oil return outlet 79 on the valve unit 61.

The reservoir 76 and pump unit 73 are supported on the main frame 10 and within a laterally extended housing portion, indicated as 80 in Fig. 1, which forms part of the side wall structure 12. It is contemplated that the pump shaft 81 be connected in a driven relation with the mixing drum 16 so as to be operated concurrently with the operation of the mixing drum.

In order to elevate the skip 18 from its loading position shown in dotted lines in Fig. 1, to its dumping position shown in full lines in Fig. 1, the hand lever 64 (Fig. 5) is moved forwardly, or to the left, from its upright or hold position to its raise position indicated at 64a. With the handle 64a in a raise position, oil from the pump outlet 72 travels through the pipe 71, through the control unit 61 and into the pipes 68 and 68a which are connected with the cylinders 38 and 38a, respectively. Concurrently with the actuation of the valve unit 61 to supply oil to the pipes 68 and 68a, the outlet passage 79 in the valve unit is closed.

On a return of the handle 64 to its hold or neutral position, the outlet 67, in the valve unit 61, is closed, the valve unit oil inlet 69 is maintained open and the oil return passage 79 is opened so that oil from the pump outlet 72 flows through the pipe 71, through the valve unit 61 and then outwardly from the valve unit 61 through the pipe 78 into the pump unit reservoir and through the pipe 75 into the reservoir 76. From the reservoir 76 oil enters the pump unit inlet 74 through the pipe 77.

To lower the skip 18 the handle 64 is moved from its neutral position in a rearward direction, or to the right as viewed in Fig. 5, to its down position illustrated at 64b. In this down position of the handle 64 the oil outlet 67, the oil inlet 69 and the oil return passage 79 in the valve unit 61 are all open whereby the oil from the pump outlet 72 and the oil being returned from the cylinders 38 and 38a flows through the valve unit 61 and outwardly therefrom through the pipe 78, the pump unit reservoir and the pipe 75 into the reservoir 76. On release of the handle 64 from either its raise position or its down position, the springs 66 act to automatically return the handle 64 to its neutral or hold position.

In order to automatically move the lever 64 to its neutral position, on raising of the skip 18 to its dumping position, there is provided a pivoted

actuating arm 85 (Figs. 1, 2 and 3) which is pivotally supported at one end on a pin 86 carried between a pair of outwardly projected vertically spaced ears 87 on the supporting plate 32. The outer end 88 of the arm 85 is projected through a horizontal slot 89 formed in the supporting plate 33 to permit a horizontal pivotal movement of the arm 85. The arm is located intermediate the pivoted ends of the cylinder 38 and lift arm 27 so as to be engaged by the cylinder 38 on movement of such cylinder to a fully raised position for the skip 18. Also, the end 88 of the arm 85 extends outwardly from the supporting plate 33 so as to extend across the path of pivotal movement of the control lever 64.

The control lever 64, during its movement from a neutral position to a raise position therefor, engages and moves the arm 85 in a forward direction. As the cylinder 38 approaches an upright position corresponding to a dump position for the skip 18, the cylinder engages and moves the arm 85 in a rearward direction. The arm 85 in turn engages and moves the control lever 64 from its raise position to its neutral position. It is seen, therefore, that the supply of oil under pressure to the cylinders 38 and 38a is automatically stopped as the cylinders approach positions corresponding to a raised position of the skip 18.

To assure an actuation of the control lever 64 in a timed relation with the movement of the skip 18 to its dumping position, an adjusting screw 90 is carried on the arm 85 at a position between the supporting plates 32 and 33 such that the screw head 91 is engageable with the rear side of the cylinder 38.

From a consideration of the above description, it is seen that the invention provides a hydraulic lift mechanism for a concrete mixing machine which is of a simple and compact construction, efficient in operation, and with the pistons for the lift cylinders fully protected from the dust of the material being handled by the skip. The lift mechanism is arranged and assembled relative to the skip such that when the skip is in a raised or dumping position therefor, it is capable of being reciprocated or shaken in directions longitudinally thereof, independently of any movement of the lift mechanism.

It is further apparent that the movement of the skip relative to the lift mechanism provides for the lowering of the skip to a supported position on a ground surface which may be at varying elevations relative to the elevation of the ground surface below the main frame 10.

Further, to facilitate the operation of the skip to its dumping position, means are provided to automatically cut off the supply of oil to the lift cylinders in response to a movement of the skip to its dumping position.

Although the invention has been described with respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications can be made therein which are within the full intended scope of this invention as defined by the appended claims.

We claim:

1. In a concrete mixing machine including a frame and a skip movably supported on said frame for up and down pivotal and linear movement, means for raising and lowering said skip including a pair of pivoted lift arms arranged at opposite sides of said skip, means pivotally supporting said arms at one of their ends on said frame, means movably connecting the other ends

of said arms with said skip adjacent the free end thereof including loop members on said skip for loosely receiving the other ends of said lift arms therethrough whereby to provide for a longitudinal movement of said skip relative to said lift arms corresponding to said linear movement, a pair of hydraulic cylinders arranged at opposite sides of said skip, means pivotally supporting said cylinders on said frame, pistons for said cylinders, means pivotally connecting said pistons with said other ends of the lift arms, and means for supplying fluid under pressure to said cylinders.

2. In a concrete mixing machine having a frame and a skip movably supported for pivotal and linear movement at one end on said frame, means for raising and lowering said skip including a pair of lift arms arranged at opposite sides of said skip and pivoted at one of their ends on said frame, means connecting said arms with said skip such that the skip is longitudinally movable relative to said arms, a pair of hydraulic cylinders arranged at opposite sides of said skip and pivoted at one of their ends on said frame at positions spaced downwardly from the pivoted ends of said arms, piston rods for said cylinders, means pivotally connecting the outer ends of said piston rods with the other ends of said lift arms, tubular jacket means slidably mounted on said cylinders and connected at one of their ends with the outer ends of said piston rods, with said jackets being of a length greater than the working stroke of said pistons, and means for supplying fluid under pressure to said cylinders.

3. In a concrete mixing machine having a frame and a skip pivotally supported at one end on said frame for up and down movement, means for raising and lowering said skip including a pair of lift arms arranged at opposite sides of said skip and pivoted at their rear ends on said frame, means movably connecting the front ends of said arms with said skip, a pair of hydraulic cylinders arranged at opposite sides of said skip, means pivotally supporting said cylinders at one of their ends on said frame at positions spaced downwardly from the rear ends of said arms, pistons for said cylinder pivotally connected at their outer ends with the front ends of said lift arms, means for controlling the supply of fluid under pressure to said cylinders including a control lever movable to a neutral position to shut off the supply of fluid to said cylinders, and actuating means, responsive in operation to a movement of said skip to a fully raised position therefor, to move said control lever to said neutral position.

4. In a concrete mixing machine having a frame and a skip pivoted on said frame for up and down movement, means for raising and lowering said skip including lift arms movably connected between said frame and skip, hydraulic cylinders for operating said lift arms pivotally supported on said frame, piston rods for said cylinders, means connecting the outer ends of said piston rods with said lift arms, means for sealing said piston rods from the dust of material handled by said skip comprising tubular members slidably mounted on said cylinders for longitudinal movement, and means connecting one of the ends of said tubular members with the outer ends of said piston rods, with said tubular members being of a length such that their opposite ends are in contact engagement with the cylinders when the piston rods are in fully extended positions.

5. In a concrete mixing machine including a frame and a skip having one end movably supported on said frame for pivotal and linear movement, means for raising and lowering said skip including a lift arm pivotally supported at one end on said frame, a guide member adjacent the free end of said skip movably engageable with the free end of said lift arm to provide for the linear movement of said skip relative to said lift arm, and a hydraulic lift means pivotally supported on said frame and pivotally connected with said lift arm.

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