

April 17, 1951

J. D. NOBLE

2,549,704

AGGREGATE BATCHER BY WEIGHT

Filed Dec. 8, 1945

6 Sheets-Sheet 1

**FIG. 1**

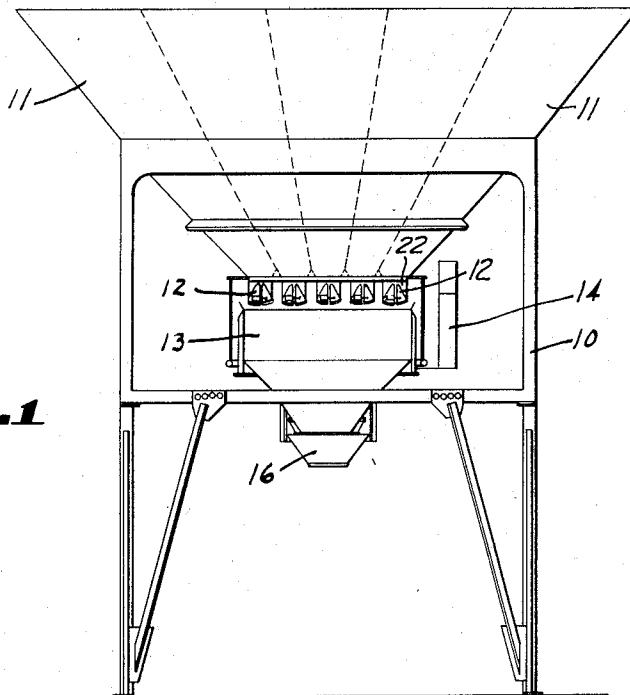
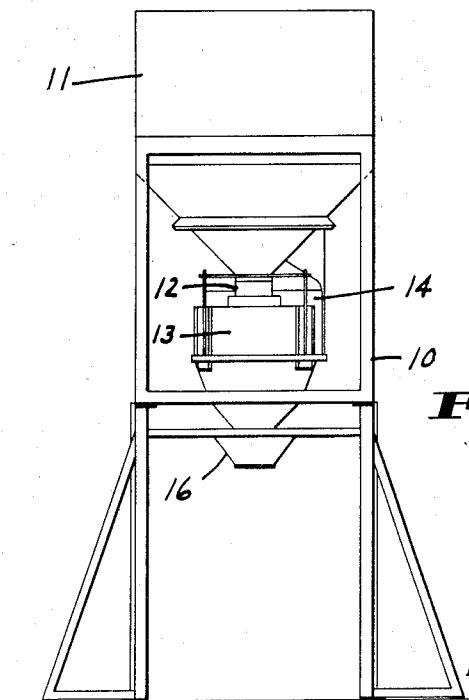


**FIG. 2**



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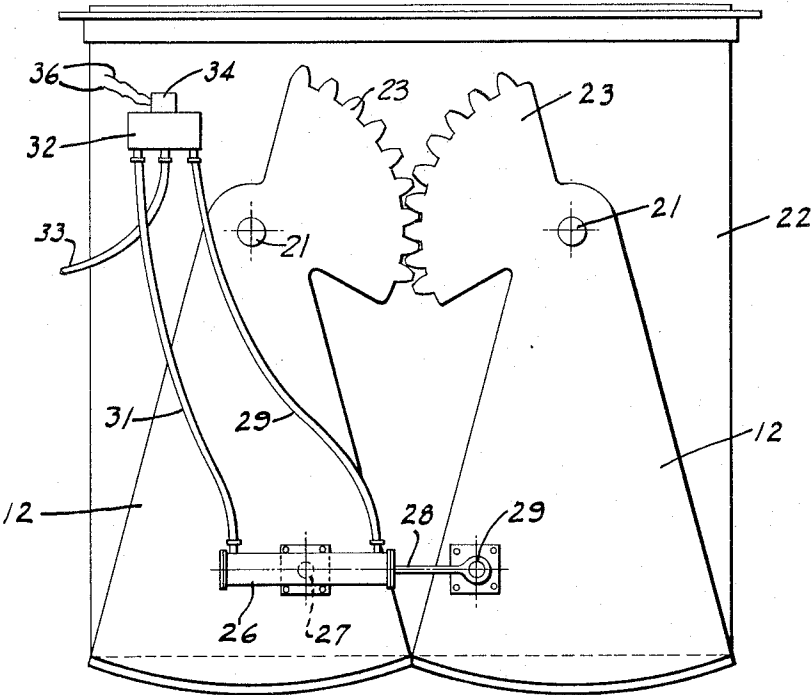


**FIG. 3**

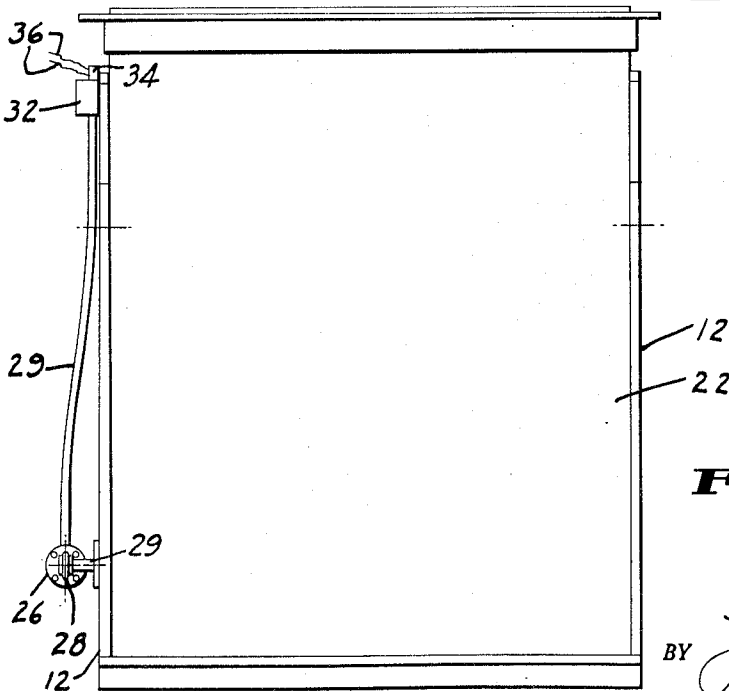


**FIG. 4**

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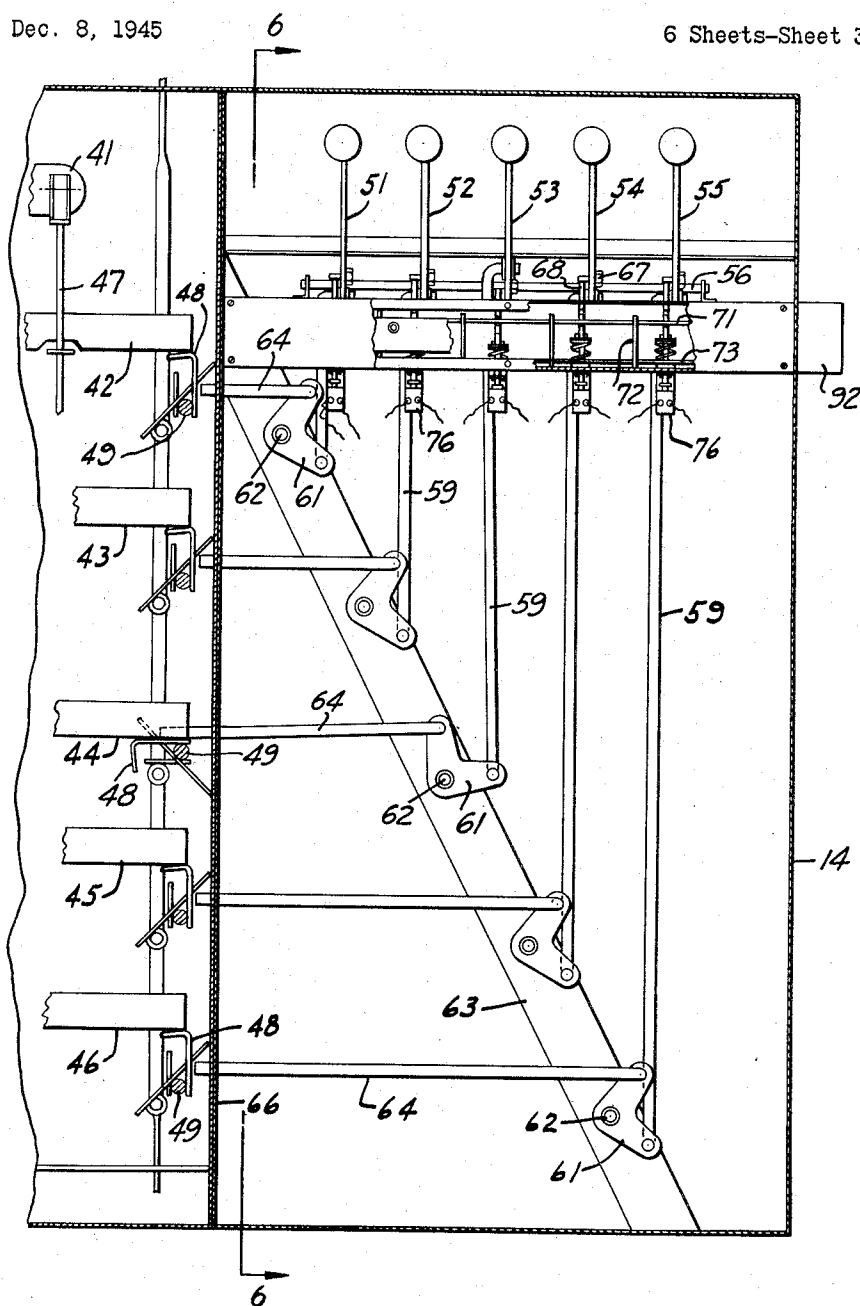


**FIG. 5**

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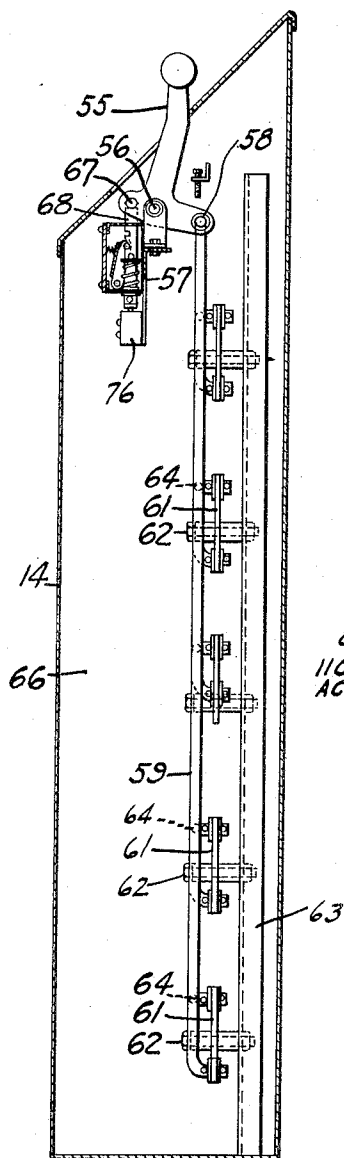


**FIG. 6**

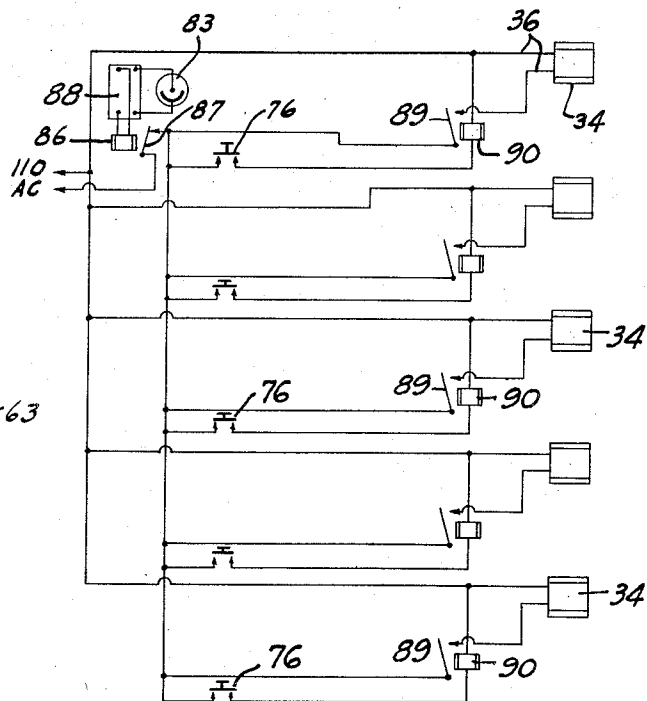
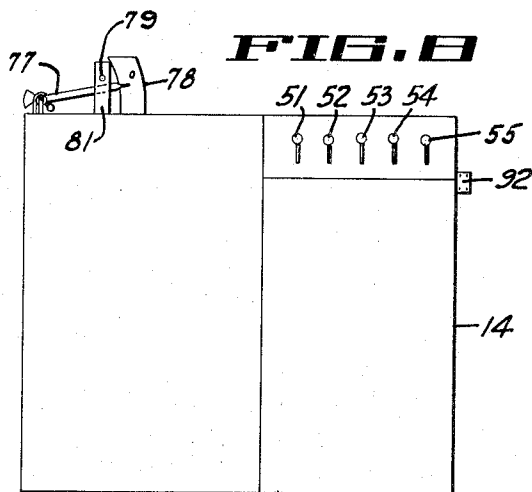


**FIG. 7**

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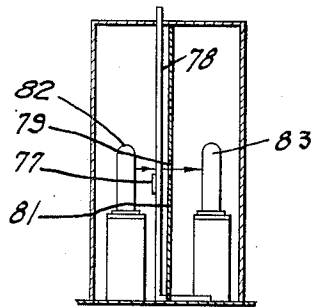


**FIG. 9**

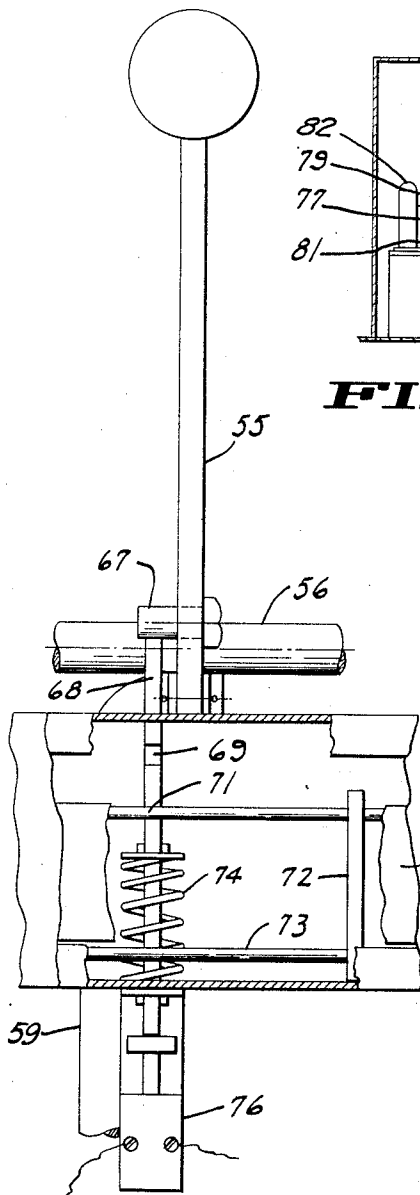


**FIG. 10**

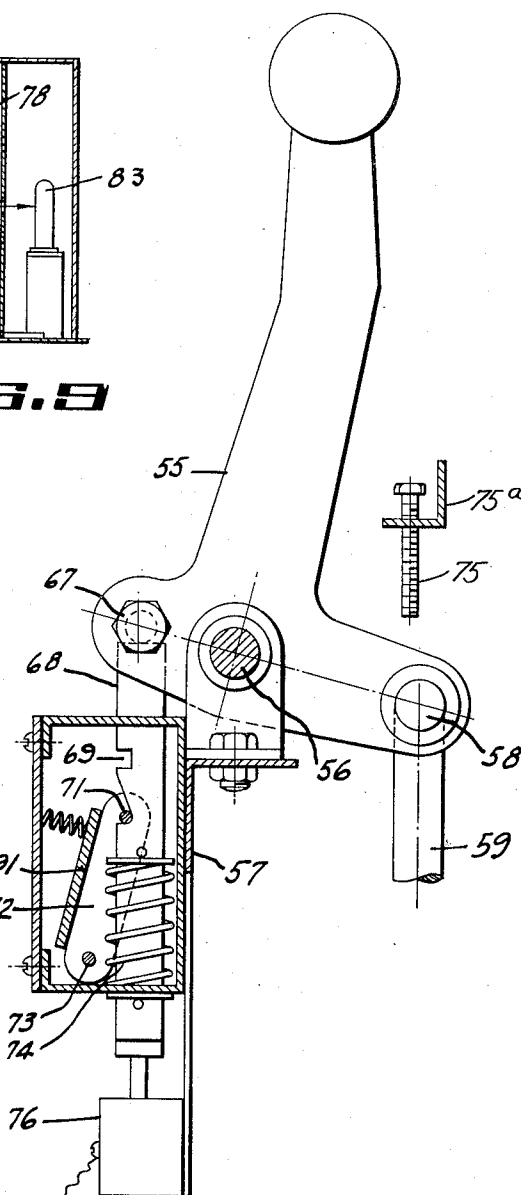


**FIG. 11**

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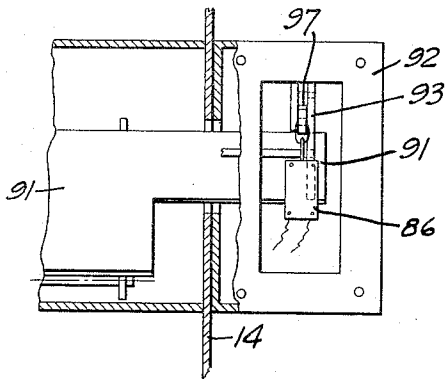


**FIG. 12**

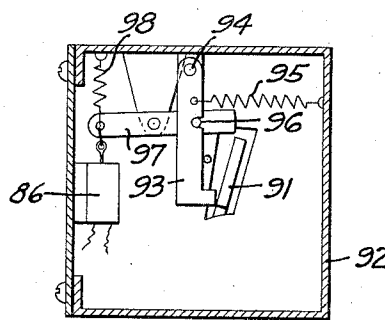


**FIG. 13**

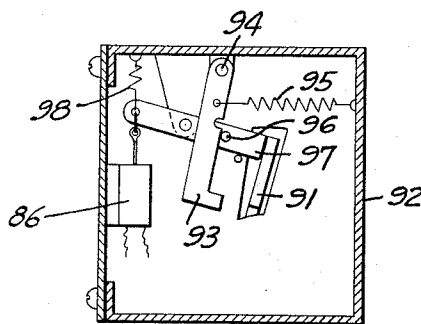


**FIG. 14**

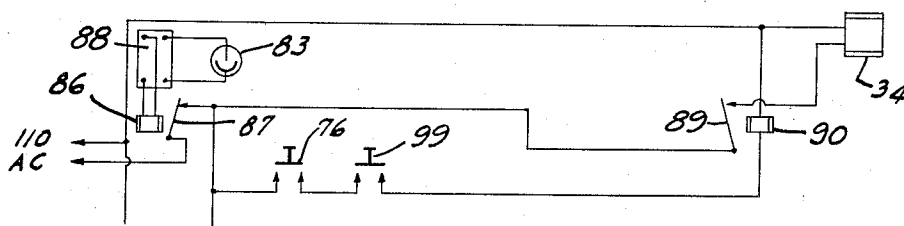


**FIG. 15**

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## UNITED STATES PATENT OFFICE

2,549,704

## AGGREGATE BATCHER BY WEIGHT

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Application December 8, 1945, Serial No. 633,593

6 Claims. (Cl. 249-14)

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The instant invention relates to aggregate batchers of the character used in connection with the mixing of concrete or other surfacing mixtures, and is concerned more particularly with the provision of batchers of the above character employing improved control means in conjunction with the weighing and feeding of the various ingredients to form a batch.

It is a general object of the invention to provide improved apparatus for controlling the weighing and feeding of different ingredients to form a batch of concrete or other road surfacing mixtures.

Another object of the invention is to provide improved weighing control apparatus for use in aggregate batchers.

Another object of the invention is to provide improved apparatus of the above character having an automatic settable control of the weighing operation.

A further object of the invention is to provide improved means for operating the discharge gates from the bins of an aggregate batcher.

Other objects and advantages of the invention will be apparent from the following description of the preferred embodiment of the invention as illustrated in the accompanying drawings, in which:

Figure 1 is a front elevational view of an aggregate batcher embodying the invention.

Figure 2 is a side elevational view of the apparatus shown in Figure 1.

Figure 3 is an enlarged view of the discharge gates of the character shown in Figure 1.

Figure 4 is another view of the discharge gates shown in Figure 3.

Figure 5 is an elevational view, partially in section, showing the operating controls for the different discharge gates in their relation to the weighing apparatus.

Figure 6 is a side elevational view, partially in section, of the control apparatus shown in Figure 5, the view being taken or indicated by the line 6-6 in Figure 5.

Figure 7 is a wiring diagram of the control apparatus.

Figure 8 is an elevational view of the scale cabinet incorporating the control apparatus shown in Figure 5, with some parts omitted to show other details of construction.

Figure 9 is a sectional view of the light sensitive control unit.

Figure 10 is a view similar to Figure 5, enlarged to show the details of construction.

Figure 11 is a transverse sectional view of the mechanism shown in Figure 10.

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Figure 12 is an elevational view of an interlock mechanism for the control members.

Figure 13 is a side elevational view of the parts shown in Figure 12.

Figure 14 is a view similar to Figure 13, but showing the parts in a different operative position.

Figure 15 is a circuit diagram of a modified form of the invention.

Referring to Figures 1 and 2, the aggregate batcher includes a rectangular framework 10 which supports at its upper portion a plurality of bins 11 for receiving and storing different ingredients of a desired mixture of concrete or other similar road surfacing material. Each of the bins 11 is provided with a discharge means in the form of a pair of clam-shell discharge gates 12 which are described in greater detail hereinafter. The various discharge gates 12 are disposed above a weighing bin 13 for receiving the different ingredients from the various storing bins 11. The weighing bin 13 is movably supported in the usual counterbalanced manner in conjunction with a weighing scale mechanism of the character disclosed in the co-pending application of Harold L. Fate, Serial No. 598,985, filed June 12, 1945 for "Weighing Apparatus" now Patent No. 2,467,300. This weighing apparatus includes a scale cabinet 14 also referred to in greater detail hereinafter. The different ingredients fed to the weighing bin 13 may be discharged therefrom through a gathering hopper 16 to a truck or mixing apparatus (not shown) which can be driven under the hopper 16 between the posts of the frame 10.

The discharge gates 12 referred to above are illustrated in greater detail in Figures 3 and 4, each gate 12 being pivotally supported at 21 on the rectangular discharge extension 22 of the associated bin 11. Each gate 12 is provided with a gear sector 23 meshing with the similar gear sector of the companion gate so that the gates will be opened and closed simultaneously. Preferably, a pneumatic operating means is provided for the opening and closing of the gates in the form of a cylinder 26 pivotally mounted at 27 on one of the gates 12 and having its piston mechanism including the piston rod 28 pivotally connected at 29 to the companion gate 12. Air under pressure can be introduced selectively to either end of the cylinder 26 by means including respective flexible air conduits or hoses 29 and 31 leading from a solenoid controlled two-way air valve 32 to which an air feed conduit 33 is also connected. The operating solenoid for the valve 32 is indicated schematically at 34 to

gether with its lead wires 36, the control and operation of the solenoid 34 and its associated valve 32 being described in greater detail hereinafter.

As previously explained, the weighing apparatus associated with the weighing bin 13 is of the general type disclosed in the said co-pending application, Serial No. 598,985, and includes a master weighing beam 41 (Figure 5) of conventional construction and a series of auxiliary weighing beams 42, 43, 44, 45 and 46, one for each of the bins 11, by means of which the proportion by weight of the different types of ingredients, such as cement, fine aggregate, coarse aggregate, etc., to be employed in a batch can be controlled. In order to selectively connect the various auxiliary weighing beams to the master weighing beam, a depending linkage 47 is provided connected to the master weighing beam at one end and adapted for connection selectively to any one of the auxiliary weighing beams 42 to 46, respectively. Each auxiliary weighing beam is normally locked out of operative relation to the master weighing beam by a lock out latch 48 pivotally mounted in a shaft 49. Each latch is adapted to be moved between a beam lock out position (see position of latches for beams 42, 43, 45 and 46 of Figure 5) and a release position (see position of latch 48 for beam 44 in Figure 5). When in release position the associated beam is operatively connected to the main weighing beam through the linkage 47, all as disclosed in said application. The shaft 49 of each latch 48 carries a counterbalancing weight (not shown) which urges the latch toward both limiting positions, and which passes over a dead center position when the latch is moved from one limiting position to the other.

Selective automatic control means is provided for the various auxiliary weighing beams in the form of a plurality of control levers or keys 51 through 55, respectively. Each control lever, for example, the bellcrank lever 55 (Figures 5, 6, 10 and 11), is pivotally mounted at 56 on an L-shaped support bracket 57, and is provided with two arms for control of different portions of the weighing control means. One arm of the lever 55 is pivotally connected at 58 to a link 59 which is pivotally connected at its lower end to a bellcrank member 61 pivoted at 62 on a frame member 63 within the scale cabinet 14. The other arm of the bellcrank 61 is pivotally connected to a latch operating rod 64 which is slidably mounted in a partition 66 of the scale cabinet and has its end disposed adjacent the latch 48 for the associated auxiliary weighing beam 46. Thus, when the operating lever 55 is rocked counterclockwise, as viewed in Figure 6, the latch 48 will be moved to its release position so that the associated auxiliary weighing beam is released for a weighing operation.

The other arm of the control lever 55 (Figures 10 and 11) carries a pin 67 disposed above a latching and control link 68 having a notch 69 for cooperation with a spring-urged latching rod 71 carried by a plurality of arms 72 which are pivotally mounted on a transverse rod 73. Thus, upon rocking of the control lever 55 to an operated position the associated link 68 is depressed and is latched in this position. Because of the cam face provided on each link 68 below its notch 69 an other depressed link 68 associated with one of the control levers 51 through 54 will be released. The latching link 68 is spring urged to its upward position by a spring 74 and has its lower end operatively related with a

suitable electrical switch 76 to close the switch and enable the automatic control circuit associated with the weighing apparatus including a light sensitive control means related to the master weighing beam. Also, as later described, a depressed control link of the weighing and feeding control means is locked in depressed position until completion of the feeding operation initiated and controlled thereby. Movement of lever 55 in a counterclockwise direction as viewed in Figure 11 is limited by the adjustable stop screw 75, which is carried by a convenient fixed member 75a of the machine.

As explained in said co-pending application, the master weighing beam 41 has associated therewith a pointer or indicator arm 77 (Figures 8 and 9) cooperating with the scale 78 which indicates the number of pounds the arm 77 is displaced from its 0 position when one of the auxiliary weighing beams is connected to the master weighing beam. In accordance with the instant invention, the indicator arm 77 has associated therewith a control circuit which is operative in connection with the starting and stopping of an aggregate feeding operation. In its 0 position the indicator arm 77 covers an aperture 79 in a plate 81 which is disposed between a light source 82, and a light sensitive cell 83, so that the light to the cell is interrupted whenever the master weighing beam 41 is in its zero or balanced position.

The electrical circuit associated with the light sensitive cell 83 is illustrated in Figure 7 and as shown, the light sensitive cell includes in its circuit an amplifier 88 and a relay 86, the amplifier being of the type to energize the relay whenever the light to the cell 83 is interrupted so that the relay 86 is energized when the indicator arm 77 in Figure 8 closes the aperture 79. In other words the relay is energized at the beginning of a weighing and feeding operation and again at the end of such an operation.

The relay 86 has associated therewith a switch 87 which is common to the individual circuits associated respectively with the control levers 51 to 55. Each of these individual control circuits includes two parallel branches both in series with the relay switch 87. Thus the relay switch 87 is in series with the switch 89 and the control solenoid 34 for the associated air valve 32 previously described. The relay switch 87 is also in series with the switch 76 closed upon operation of one of the control levers 51 to 55 and the relay winding 90 for switch 89.

It will be understood that the two parallel circuits including the switch 89 and the solenoid 34 in one instance, and the switch 76 and the relay winding 90 in the other instance, are individual to each control circuit for one of the control levers 51 to 55, while the switch 87 and its relay winding 86 are common to all of these circuits. Each one of the control levers 51 to 55 inclusive is provided with an associated switch 76 whereby when a particular lever is pulled to the left from the position shown in Figure 6, the associated switch 76 is closed.

The operation of the circuit briefly is as follows: When a control lever, say the lever 55, is operated, the associated switch 76 is closed and the associated auxiliary weighing beam is connected to the master weighing beam to depress the indicator arm 77. Light impinges upon the light sensitive cell 83 to thereby de-energize the winding 86 so that the switch 87 is closed. When the switch 87 is closed, a circuit is completed through the switch 87, the switch 76 and the

solenoid 90 to close the switch 89 and this circuit will be maintained so long as the control link 68 associated with the operator control lever is locked in depressed position as later described. When the switch 89 is closed, a circuit is completed through the switch 87, the switch 89 and the solenoid 34 to operate the related air valve 32 so that the associated pair of gates 12 is opened and a material feeding operation is started from the bin controlled by the gates which have been operated. At the conclusion of the weighing operation and when the required weight of material has been fed, the light beam from the lamp 82 is again interrupted so that the relay 86 is energized to open the switch 87 and thereby interrupt the circuit for the solenoids 34 and 90.

The lock mechanism associated with the respective control levers 51 to 55 and their associated control links 68 includes a mechanism associated with the latching rod 71 for the links 68 and particularly includes a plate 91 which is attached to the latch levers 72 and which has its one end projecting within an auxiliary housing 92. Within this housing, plate 91 is in abutting relation with a latch lever 93 pivotally mounted at 94 and urged in a counterclockwise direction by spring 95. The latch lever 93 has a notch normally engaging a pin 96 of a lock lever 97 which is spring urged clockwise by the spring 98 and is connected to the armature of the relay 86. Whenever the latching rod 71 (Figure 10) is rocked by depression of link 68 the latch lever 93 is moved to the position shown in Figure 14 so that the lock lever 97 can be moved by its spring 98 into locking relation with the extension 91. This condition of the parts will obtain until the end of a weighing operation when the solenoid 86 is energized as previously explained to rock the locking lever 97 back to its inactive latched position as shown in Figure 13. Thus when a weighing operation is initiated by operating a control lever, a second lever cannot be operated until the previous weighing operation has been completed.

The modified circuit shown in Figure 15 is similar in all respects to the circuit shown in Figure 7 for one of the valve controlled solenoids 34 with the exception that a second manually operable switch 99 is placed in series with the switch 76 so that after operation of the associated control levers 51 to 55, the weighing and feeding operation will not be initiated until the switch 99 is also operated.

To summarize briefly the operation of the above apparatus, when it is desired to form a batch of aggregate, the levers 51 to 55 are operated in sequence to cause feeding of weighed portions of each of the ingredients. A similar operation occurs upon manipulation of each of the levers 51 to 55 so that the description will be limited to the operation which occurs when one of the levers is operated. Assuming operation of the lever 55 for example, the rod 59 (Figure 5) is lifted to operate through the bellcrank 61 and the rod 64 to release the latch 48 for the associated auxiliary weighing beam 46. In this way the adjusted weight of this weighing beam is transmitted through the link 47 to the master weighing beam 41.

Also when the control lever 55 is operated its associated control link 68 is depressed and latched in depressed position by the latch rod 71, which in turn is locked in its latching position by the lock lever 97. Depression of the control link 68 also closes the associated switch 76.

When the weight of the auxiliary weighing beam is transmitted to the master weighing beam the indicator arm 77 (Figures 8 and 9) is depressed so that it no longer interrupts the light beam from the lamp 82 to the light sensitive cell 83. When this occurs, the solenoid 86 (Figure 7) is deenergized allowing closing of the switch 87 and, the switch 76 having been previously closed, the solenoid 90 is energized to close the switch 83. Closing of the switch 89 completes the circuit for the solenoid 34 which operates the air valve 32 to open the associated gates 12 for the ingredient of the batch corresponding to the control lever 55. At the end of the weighing operation the indicator arm 77 is lifted sufficiently to interrupt the light beam passing through the aperture 79 so that the solenoid 86 is energized to open the switch 87 and terminate the weighing operation by allowing the valve 32 to again cause closing of the gates 12. At the same time, the energization of the solenoid 86 restores the locking lever 97 to its inoperative position, so that the parts are conditioned for a subsequent operation of another of the control levers 51 to 55. By sequential operation of these levers, therefore, the various ingredients of a batch of aggregate can be delivered to the weighing hopper 13 and transmitted therefrom through the gathering hopper 16 to a suitable receptacle such as a truck or mixing apparatus.

While I have described my invention as illustrated in the preferred embodiment thereof, it will be apparent that the invention is capable of both variation and modification from the form shown, and its scope therefore should be limited only by the scope of the claims appended hereto.

I claim:

1. In apparatus for use in forming batches of concrete and similar road mixtures, a weighing bin for receiving the separate ingredients of the mixture, a plurality of storage bins, disposed to feed the separate materials to said weighing bin, means for controlling selective discharge of material from each of said storage bins into said weighing bin, said discharge controlling means including a plurality of manually operable control members, a latch common to said control members for holding an operated one of said members in its operative position, releasably locking means for said latch, means controlled by said latch upon movement thereof into latching engagement with one of said control members for causing said locking means to lock the latch in such engagement, and means controlled by said weighing bin for releasing said locking means at the end of a material feeding and weighing operation.

2. Apparatus as in claim 1 together with weighing means for weighing the separate ingredients as supplied to the weighing bin, and means actuated by movement of any one of the control members to operative position for rendering the weighing means operative to weigh out a predetermined amount of an ingredient.

3. In apparatus for use in forming batches of concrete and similar road mixtures, a weighing bin for receiving the ingredients of the mixture, a plurality of material storage bins adapted to supply a particular material to the weighing bin, weighing means for the weighing bin including a main weighing beam and a plurality of secondary weighing beams, the secondary beams being connectable to the main beam, feed gates serving to control discharge of material from the storage bins, means for controlling operation of said

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gates including a plurality of control levers, each control lever being movable between release and material feed positions to control supplying of a particular material to the bin, means for urging the control levers toward their release positions, elongated links operatively attached to said levers and movable lengthwise of the same upon movement of the levers between release and feed positions, means serving to operatively connect a corresponding secondary beam to the main beam when a corresponding control lever is moved to its feed position, a latch common to all said links and adapted to engage and retain in locking engagement any one of said links when the lever corresponding to the same is moved to its feed position, and means for releasing said latch means responsive to movement of another one of said levers to its feed position.

4. Apparatus as in claim 3 in which each of said links is provided with a notch for effecting said locking engagement with the latching means when the corresponding control lever is moved to feed position, and in which said releasing means comprises cam means on each link for moving the latching means to released position with respect to an engaged link, responsive to movement of another control lever to its feed position.

5. Apparatus as in claim 3 together with means serving to obstruct the operation of a control lever during a feeding and weighing operation, said means including a second locking means for retaining the latching means in engaged position after operation of a control lever, and means energized at the end of a particular weighing operation to release said locking means.

6. In apparatus for use in forming batches of concrete and similar road mixtures, a weighing

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bin for receiving the ingredients of the mixture, a plurality of storage bins disposed to feed material to said weighing bin, means for controlling selective discharge of ingredients from each of said storage bins into said weighing bin, said discharge controlling means including a series of manually operable control levers, a latch common to said control levers for holding an operated one of said levers in its operative position, means serving to urge each of said levers toward the release positions of the same, means for effecting automatic release of a control lever when another one of said control levers is moved from release to material feed position, releasable locking means for said latch, means controlled by said latch upon movement thereof into latching engagement with one of said control members for causing said locking means to lock the latch in such engagement, and means controlled by said weighing bin for releasing said locking means at the end of a material feeding and weighing operation.

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