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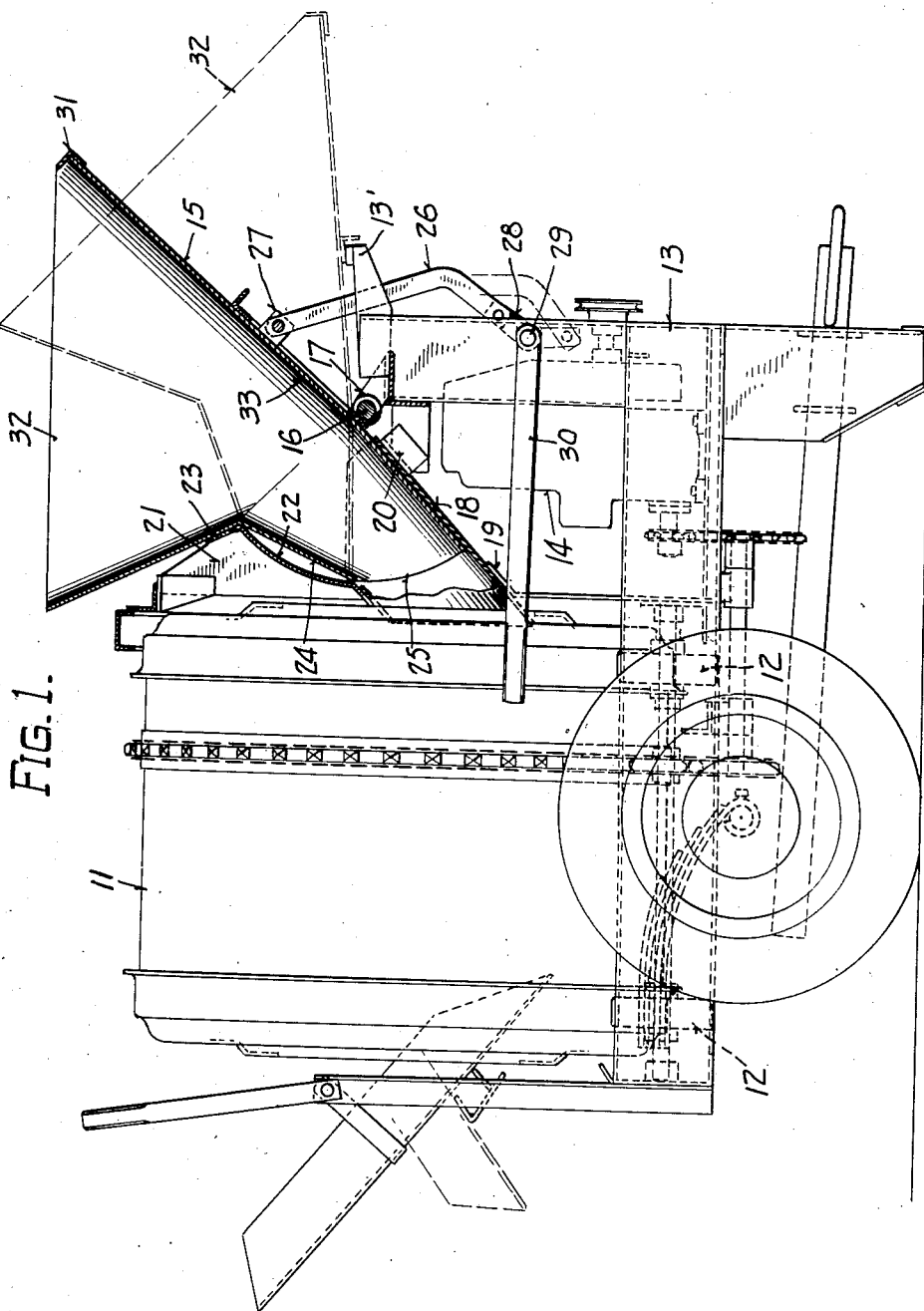
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HOPPER FOR BUILDING MIXERS

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2 Sheets-Sheet 1



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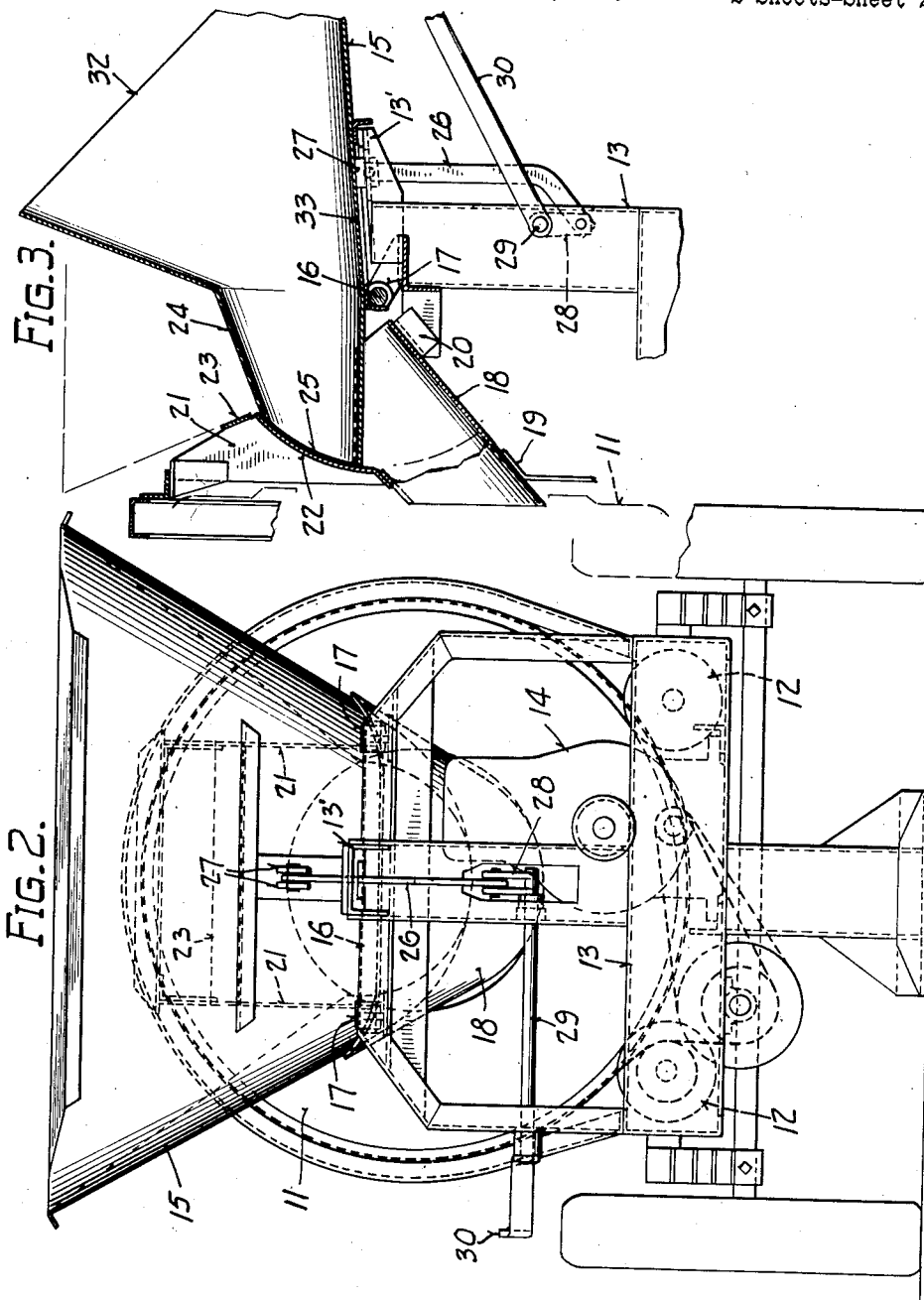
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HOPPER FOR BUILDING MIXERS

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4 Claims. (Cl. 214—17)

This invention relates to concrete mixers of the type commonly used in the building trades and hence designated building mixers. Generally with these machines, charging of the drum is effected by a power loading mechanism comprising a pivoted skip arranged when lowered to the ground to receive material and when elevated to discharge its load into the mixing drum. The capacity of the skip should be sufficient to provide one complete batch of concrete forming ingredients to the mixer drum.

In the case of the smaller sizes of these machines, a power loader has been dispensed with because of its additional and possibly disproportionate cost. Loading of the batch has been done by hand after the previous batch has been mixed and discharged from the drum. Since mixing is not considered to begin until the entire batch has been loaded, this results in loss of time. To overcome this handicap a stationary hopper or batch assembly device has been employed, said hopper having a roughly funnel shape with its throat portion feeding into the end of the drum. Material is shovelled by hand into the hopper and retained there by a gate across the bottom of the throat. With the gate closed, the hopper may be filled with material while a batch is being mixed in the drum, and when the latter is discharged, the hopper gate may be opened and the materials charged into the drum.

With a stationary hopper there is a serious conflict between desire to reduce the height of the hopper and the necessity to maintain a steep slope to the sides and bottom to facilitate rapid and complete emptying of aggregates. The common types now in use represent a compromise which is not entirely satisfactory from either point of view, the top edge of the hopper over which material must be thrown remaining high, while the slope of the sides and bottom is not steep enough to permit the type of discharge which is desirable. In fact, if the inside of the hopper is at all moist, material may adhere to the sides and eventually set as a concrete mass, making it generally necessary to push the material into the drum with a stick or spade at each emptying operation.

Furthermore the hopper gate is by necessity positioned directly at the charging opening of the drum where it is exposed to the splashing of concrete, which may set on the gate and interfere with its sliding or hinging action.

Still another fault with this type of hopper is the plugging of material across the throat of

the hopper. Two factors promote this, first the generally funnel shape which causes material to settle and pack the throat due to the force of successive shovel-fulls landing on the mass, with the result that when the gate is opened, there is an "arch" of material which prevents or retards the flow. Second, vibrations of the machine by the engine, accentuate this compacting and arching effect especially where the engine is a single rather than a multi-cylinder internal combustion engine.

Finally with a fixed hopper and a movable gate, it is practically impossible to introduce water through the charging opening of the drum, and consequently water cannot be added at this end, inside the drum, where it may be used to flush the head of the drum. Hence materials may build up on the head and interfere with efficient mixing action. Bringing the water pipe through the discharge opening at the other end of the drum and extending it across the drum is not considered practical, nor can the throat of the hopper be decreased to provide a space at the charging opening without further accentuating the packing tendencies just described.

It is an object of the present invention to provide a hopper for machines of this character which will be easier to load and more efficient in discharge and which will not in any way interfere with the most advantageous disposition of the water supply system or other parts of the machine.

Another object of the invention is the elimination of a sliding or swinging gate, which may cause trouble due to "sticking," and the provision of a more effective operating structure therefor.

With these objects and other objects in view, which will be more fully discussed hereafter, the invention resides in the novel construction, combination and arrangement of elements substantially as hereinafter described and more particularly defined in the appended claims.

The invention will now be described on reference to the accompanying drawings, in which:

Figure 1 is a side elevation, partly in section of a machine incorporating therein a preferred embodiment of the invention;

Figure 2 is a front end view of the machine shown in Figure 1; and

Figure 3 is a fragmentary detailed view showing the hopper in loading position in contrast to the discharging position shown in Figure 1.

Referring to the drawings, the numeral 11 represents the drum of the mixer, which is mounted for rotation about a horizontal axis,

said drum resting on rollers 12 mounted on a frame 13 in the well known manner. Disposed forwardly of the drum but within the limits of the side bars of frame 13 is an engine 14 which furnishes the power for rotating the drum. Preferable chain transmissions are effected between countershafts for speed reduction and a chain drive, encircling the drum, transmits the final power which is utilized for mixing purposes. Within the drum there are arranged mixing blades of the type well known in the art and consequently not shown herein.

Disposed above the engine 14 is a batch assembly device 15 of a capacity at least sufficient to hold one complete batch of aggregates, viz. sand, gravel and cement, as required by the drum for mixing operations. The loading device 15 is rigidly connected to a horizontal rod 16 journaled for rotation in bearings 17 mounted on the frame, said frame having a substantially horizontal forward extension or arm 13' on which the loading device may rest when in lowered or material receiving position as shown in Figure 3.

Charging device 15 is hopper shaped, in that it is narrowed at its discharge end or throat portion, so that when pivoted into discharging position, the throat portion may generally occupy or nest within a stationary U-shaped chute 18 mounted on the frame, which chute has a discharge end feeding into an opening in the mixer drum. The lower end of chute 18 is supported on a bracket 19 in fairly close proximity to the drum head while the higher portion is supported on a bracket 20.

Arranged above chute 18 and spaced equidistant on either side of the center of the hopper are a pair of vertical plates 21, said plates being spaced apart slightly more than the width of the discharge opening in the bottom of the hopper. Extending between these plates is a curved plate 22 formed on a radius having a center in close proximity to the pivot rod 16. The adjoining edges of plates 21 are similarly curved so as to form a nice fit with the plate 22 to which they are rigidly secured. This assembly, comprising the plates 21 and 22, may be rigidly suspended from the top of the housing frame or shield surrounding the drum.

The back wall of the hopper is shaped so that in pivoting it will clear plate 22, and when its lower portion is nesting within chute 18, the back wall rests against a stop 23 fastened to the plates 21 a distance above plate 22, said stop forming a restraint against further pivoting. To permit the clearance sought, the back of the hopper is shaped inwardly with a surface 24 forming a chord across the curved plate 22 when the two are in juxtaposed relation. The lower portion of the hopper, i. e. the edges 25 of the sides of the discharge opening, are curved on a radius having the same center but slightly less than that of plate 22 so that as the hopper is pivoted to load-receiving position, there will be no interference, but rather a close fit, with plate 22 closing the discharge opening of the hopper. Consequently the hopper may be filled with the necessary quantity of material without leakage, and then through pivoting of the hopper this material may be emptied as a batch into the drum.

For operating the hopper, there is a bent link 26, one end of which is pinned between a pair of ears 27 on the underside of the hopper while the other end is pinned to arms 28 attached to one

end of a horizontal shaft 29, said arms being actuated by a lever 30 attached to the other end of the shaft in convenient position for manual operation. With this arrangement the center of mass of a batch of material which, due to the shape of the hopper, is disposed closely to the pivot point 16, is quickly shifted during pivoting to the discharge side, thereby reducing the amount of work required of the operator. The toggle arrangement is such that the greatest mechanical advantage is available at the start of the tilting operation, thereby compensating for the fact that the load is heaviest at this time.

When the hopper is in load-receiving position, as shown in Figure 3, the forward edge, which may be provided with a stiffening lip 31, is at an elevation such that material may be easily thrown by shovel over this edge. The upper edges 32 of the sides of the hopper when in this position slope slightly more than the angle of repose of the material, thereby permitting a large portion of the hopper to be utilized without spilling.

When the hopper is in receiving position, material is supported by bottom wall 33 which is practically horizontal and of relatively large area, and the pile which is accumulated is of comparatively shallow depth. Material which strikes the back of hopper has its motion arrested so that its fall onto material in the hopper does not result in a packing effect, particularly at the throat portion. Nor does engine vibration result in packing or arching. Eventually when the hopper is pivoted, the material, which is in a loose pile and not pressed tightly against the walls, takes a rolling motion as it passes down the incline.

Upon pivoting the hopper counterclockwise into the discharge position as shown in Figure 1, the discharge opening, which moves relative to the barrier formed by plate 22, permits aggregates to flow into chute 18 and hence into the drum. With the machine illustrated in the drawings, the hopper may be tilted to a position where the bottom 33 forms an angle of as much as 50 degrees with the horizontal, which angle is normally sufficient to enable all material to pass rapidly through the discharge opening. Should any sticking occur, however, the back of the hopper may be bumped against the stop 23 thereby shaking loose the adhering material and effecting a clean discharge.

With the stationary barrier disclosed, a pipe may be arranged so as to pass through the space between plates 21 and between plate 22 and the drum to conduct water through the upper portion of the charging opening. In this way the jet of water may be directed back against the head at the charging end of the drum and improved mixing obtained. Moreover disposition of the barrier removed from the opening prevents concrete from accumulating thereon.

These advantages combined with the fact that the hopper may be manually operated with a minimum of effort constitute a decided improvement over present practices and machines.

The invention having been described, what I claim as new and seek to protect by Letters Patent is:

1. In a concrete mixer having a mixing drum with an opening at one end for receiving materials, charging instrumentalities comprising an inclined chute communicating with the drum opening for feeding materials therethrough, a stationary barrier disposed above said chute and forwardly of said mixer drum, a pivotal charging hopper having a bottom wall and a charging

outlet at one end, said charging outlet being disposed for closure by said barrier when the bottom wall is in substantially horizontal position, and manually operable means for pivoting said hopper from said last named position into a position in which said bottom wall is inclined and said outlet is freed from said barrier and communicates with said chute for passage of materials into said drum.

2. In a concrete mixer having a mixing receptacle provided with a material-transfer opening, mechanism for receiving and charging a batch of concrete-making materials into the receptacle through said opening, comprising an inclined chute communicating with said opening; a stationary barrier disposed above said chute; a hopper having a discharge end portion disposed adjacent said receptacle, said hopper being pivotally mounted intermediate its ends whereby the hopper may be swung between an inclined position in which said discharge end portion is disposed in nesting relation to said chute whereby the materials in the hopper may be gravitationally transferred into the receptacle, and a batch receiving position in which said end portion is closed by the barrier, said pivotal mounting of the hopper being so disposed relative to the center of gravity of the hopper when either empty or loaded that swinging of the hopper between said positions will shift said center of gravity from one side of the pivot to the other thereby biasing the hopper toward the position to which it is being moved; means for limiting the movement of the hopper in each direction; and means for moving said hopper.

3. In a concrete mixer having a mixing drum provided with a material transfer opening, mechanism for receiving and charging a batch of concrete-making materials into said drum through said opening, comprising an inclined chute communicating with said transfer opening, a hopper having a bottom wall and a discharge opening, said hopper being pivotally mounted intermediate its ends, limits on either side of the hopper pivot defining batch-receiving and batch-charg-

ing portions, the bottom wall of said hopper when in batch-receiving position being substantially horizontal, whereby packing and arching of the material in the discharge portion is avoided, and when in batch-charging position being inclined with the discharge portion disposed cooperatively with respect to said chute to permit gravitational descent of material into said transfer opening, a gate across said throat to prevent discharge of material received when the hopper bottom is in substantially horizontal position, and means for moving said hopper between said positions and for bumping said hopper against one of said limits to effect clean discharge of the hopper contents when in batch-charging position.

4. In a concrete mixer having a mixing drum provided with a material-transfer opening, mechanism for receiving and charging a batch of concrete-making materials into said receptacle through said opening, comprising an inclined chute communicating with said opening, a stationary barrier disposed above said chute, a hopper disposed adjacent said receptacle having a discharge portion for discharging materials through the drum opening, said hopper being pivotally mounted intermediate its ends with the center of gravity of the hopper when either empty or loaded so disposed with respect to the pivot that swinging of the hopper from one position to the other will shift the center of gravity from one side of the pivot to the other, thereby biasing the hopper toward the position to which it is being moved, the discharge portion of said hopper being closed by said barrier when the hopper is receiving material and being clear of said barrier when discharging material into said chute, and means for moving said hopper from batch-receiving position to batch-charging position including a toggle linkage arranged so that the greatest mechanical advantage is obtained prior to shifting the center of gravity over the pivot.

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