April 27, 1965 A. O. SWANSON 3,180,686

MECHANISM FOR DELIVERING CONCRETE

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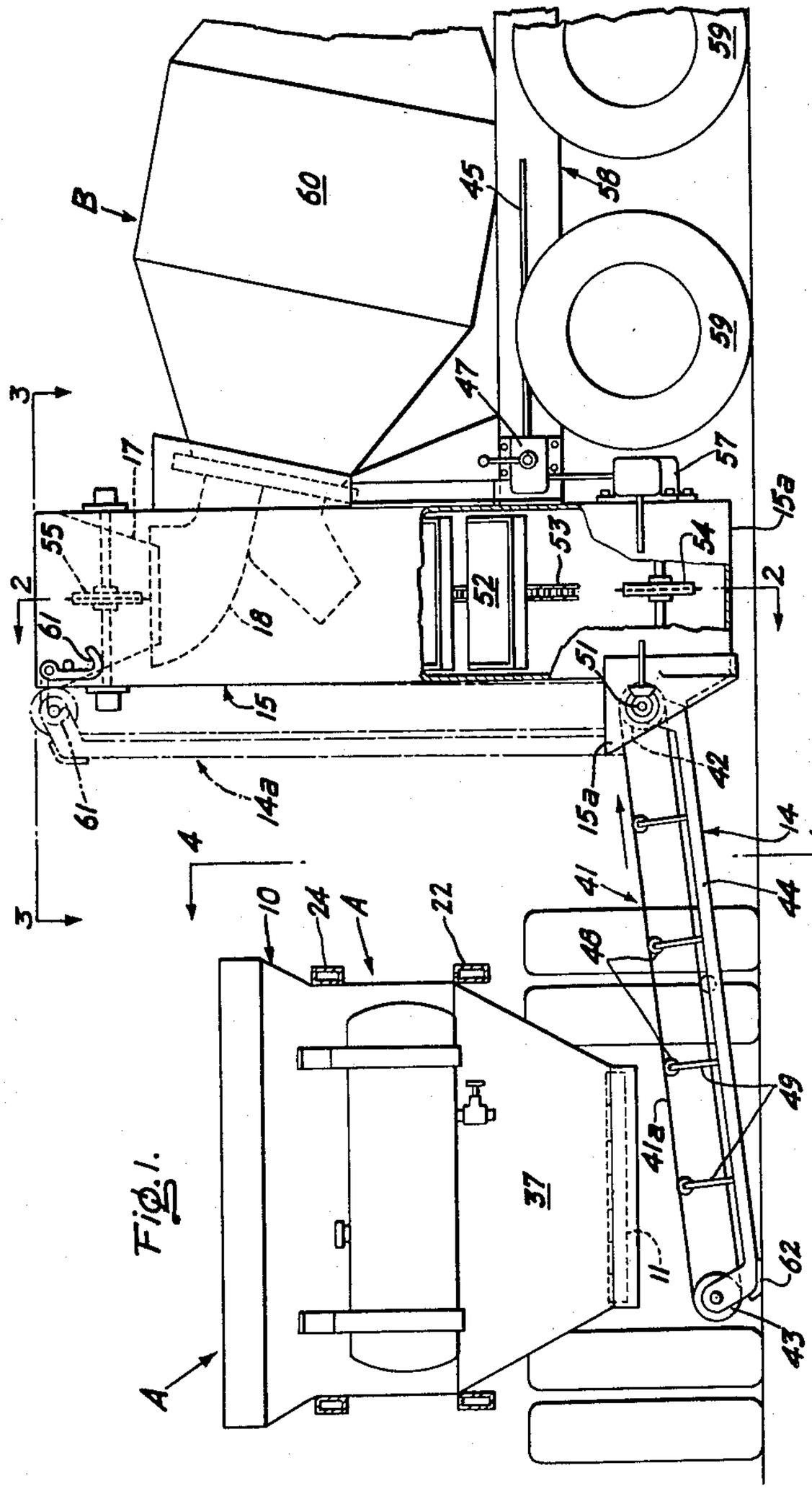

Fig. 1.

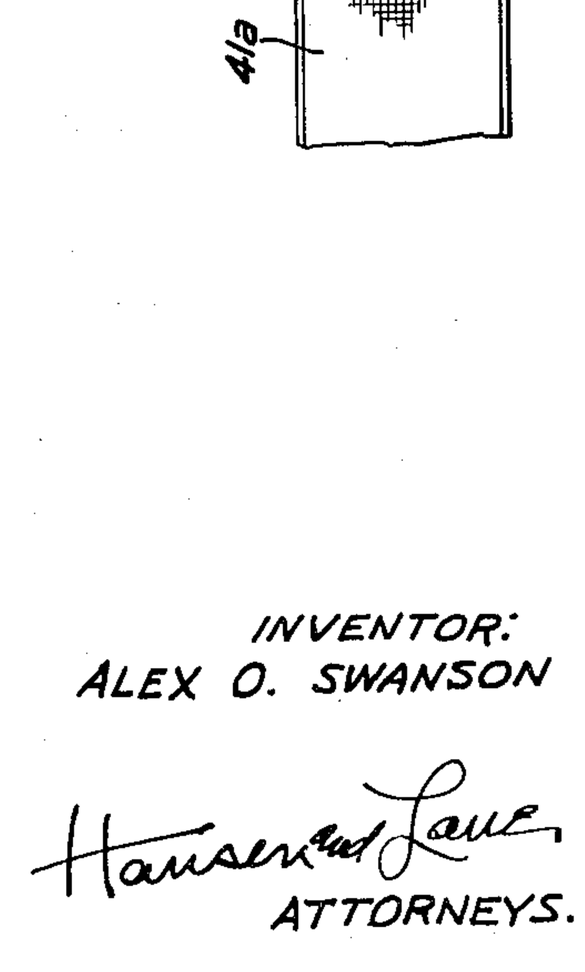

Fig. 3.

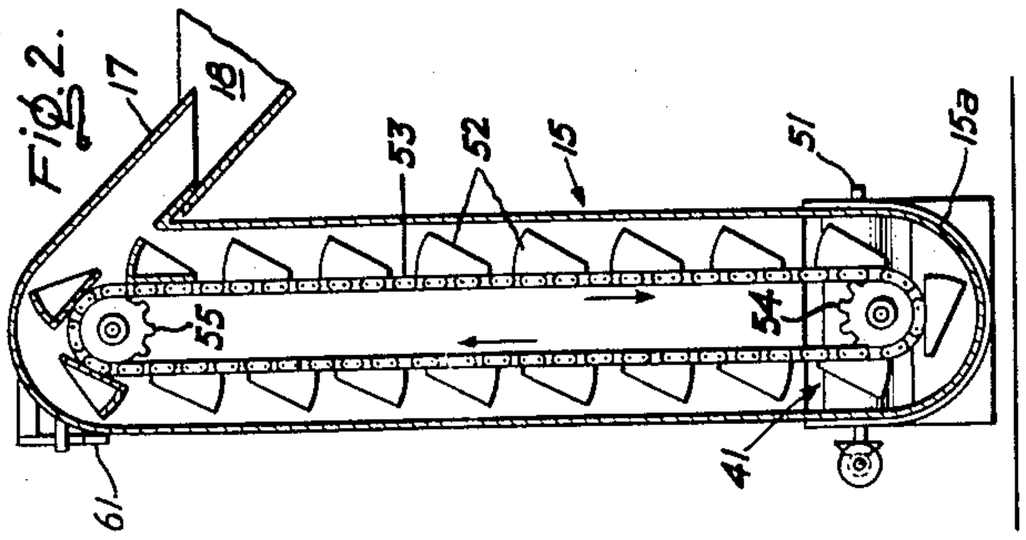

Fig. 2.

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Fig. 4.

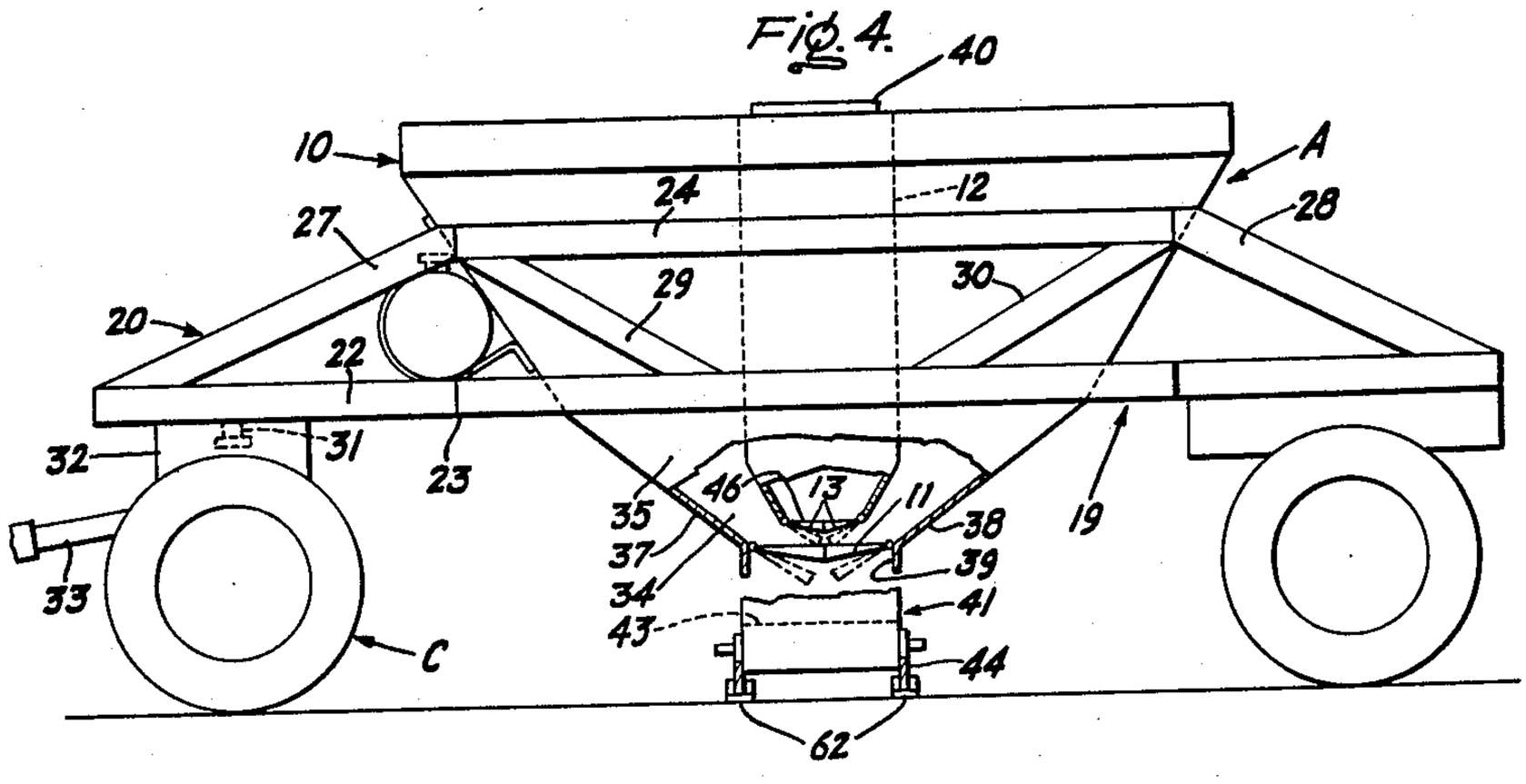
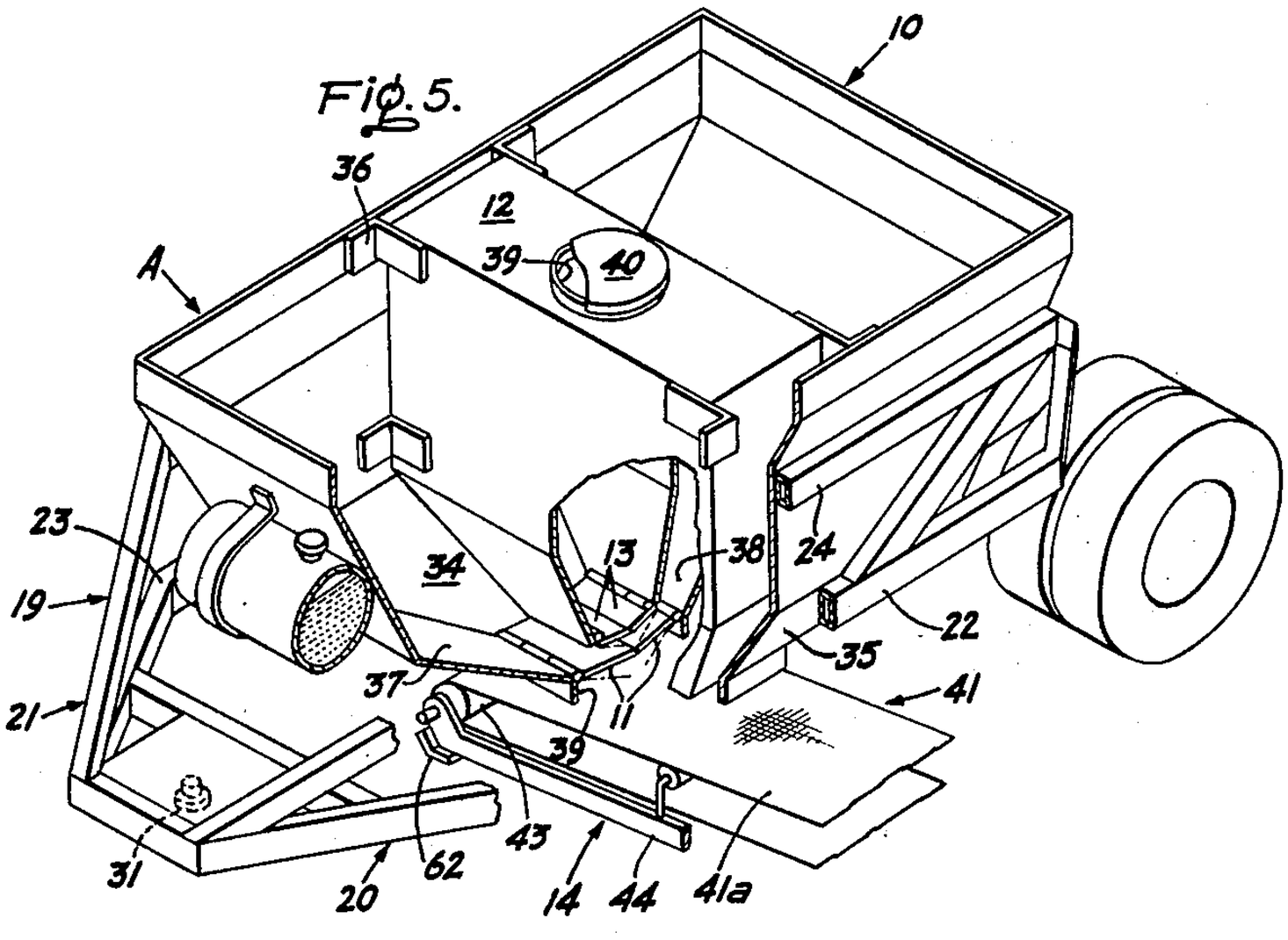


Fig. 5.



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MECHANISM FOR DELIVERING CONCRETE

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2 Claims. (Cl. 298—30)

The present invention relates to the handling and delivering of concrete batch materials and pertains more particularly to an improved mechanism for the handling and hauling of such materials for jobs remote from a batch plant.

In most large cities tremendous amounts of concrete are used, and, at least in the United States and Canada, by far the largest portion of this concrete is hauled to the various job sites in well known concrete mixing trucks. These trucks are each provided with a large, revolving drum in which a batch of concrete is mixed during the time the truck is en route from the batch plant to the job site.

Where a batch plant for loading these trucks is located conveniently to a job site this is a very efficient and satisfactory means for supplying the concrete. However, zoning restrictions, and the very substantial cost of a batch plant, frequently necessitates long hauls from the batch plant to the job site, and in such cases the cost per yard of delivering the concrete becomes substantial.

The present invention provides a trailer for hauling the ingredients for a batch of concrete, and wherein the cement is segregated from the sand and other aggregates, the trailer being arranged for the gravity discharge of its contents onto a conveying and elevating mechanism for transfer into the rotary mixing drum of a concrete mixing truck.

The invention also provides a pre-batch trailer for hauling the ingredients for a batch of concrete, and operates in combination with a concrete mixing truck having transferring mechanism embodied therewith for receiving the batch materials from the trailer, and transferring them into the receiving hopper of the concrete mixing truck.

A further object of the invention is to provide a pre-batch trailer for holding the dry ingredients for a batch of concrete with the cement held separately in a sealed, weather proof container having a gravity discharge gate in the bottom thereof, said gate being mounted over a gravity discharge gate in the trailer itself, whereby the contents of the cement compartment are discharged by gravity along with the sand and aggregate from the trailer for transfer to a concrete mixing mechansim.

A further object of the invention is to provide improved and simplified mechanism for reducing the delivered cost of concrete at remote job sites.

A further object of the invention is to provide an improved pre-batch trailer for holding the ingredients for a batch of concrete, and the combination therewith of a concrete mixing truck having power driven means for receiving the contents of such trailer and elevating such contents into the receiving hopper of a ready mix concrete truck.

These and other objects and advantages of the invention, will be apparent from the following description and the accompanying drawings wherein:

FIG. 1 is a side elevational view of the rear portion of a concrete mixing truck having material conveying and elevating mechanism mounted thereon, and in position to receive concrete batch ingredients from a trailer, all in accordance with the present invention, frame members of the trailer being shown in section.

FIG. 2 is a sectional view through the elevator portion of the conveying and elevating mechanism of FIG. 1, taken along line 2—2 of FIG. 1.

FIG. 3 is a fragmentary plan view looking in the direction of the arrows 3—3 of FIG. 1.

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FIG. 4 is a sectional view taken along line 4—4 of FIG. 1, and showing the trailer in side elevation.

FIG. 5 is a perspective view of the trailer and the portion of the conveyor shown in FIG. 4, portions being broken away.

Brief description

Briefly, the invention comprises a pre-batch trailer A having a hopper body 10 with discharge gates 11 in the bottom thereof, and with a cement compartment 12 fixedly secured in the body of the trailer. The cement compartment also has bottom discharge gates 13, which are mounted directly above the discharge gates 11 of the trailer body 10, so that upon opening both gates 11 and 13 the contents of the trailer body 10 and cement compartment 12 are discharged simultaneously through the trailer body gates 11.

A folding conveyor 14, which swings downwardly from its broken line position 14*a* of FIG. 1 to its solid line position, is spotted beneath the trailer body discharge gates 11 to receive the contents of the trailer upon their gravity discharge therefrom. These batch materials are carried by the conveyor 14 into the housing 15 of a bucket elevator 16, which elevates them and discharges them into a chute 17. The latter in turn discharges them into the usual receiving hopper 18 of a concrete mixing truck B.

Detailed description

Referring to the drawings in greater detail, the pre-batch trailer A (FIGS. 4 and 5) comprises a suitable chassis 19 of welded steel construction, which may be of a type commonly employed in the construction of the well known hopper-bottom cement trucks. This chassis 19 comprises two similar, but reversed, trussed frame side frames 20 and 21. Each side frame comprises a longitudinal lower member 22, bent inwardly at 23 at its forward end, and a parallel top frame member 24. These lower and upper members 22 and 24 are interconnected and braced by angularly extending front and rear members 27 and 28, and diagonally extending intermediate members 29 and 30.

A conventional king pin 31 is provided at the forward end of the chassis 19 for engaging a conventional hitch 32 (FIG. 4) of the so-called "fifth wheel" type, commonly employed for hitching a cargo type trailer to its towing vehicle. Where it is desired to tow one of the trailers A behind a truck not provided with a "fifth wheel" towing arrangement, a conventional dolly C (FIG. 4), having the "fifth wheel" 32 thereon, may be mounted beneath the forward end of the trailer A. Such dolly may be provided with a tongue 33 for connecting it in a conventional manner to a towing vehicle, such as the concrete mixing truck B of FIG. 1. Since such towing hitches and dollies are well known, it will be unnecessary to illustrate or describe them in further detail herein.

The hopper body 10 of the trailer A preferably is fabricated of suitable metal plates, such as aluminum or steel, shaped and interconnected, as clearly shown in FIGS. 1, 4 and 5. The lower side plates 34 and 35, and lower end plates 37 and 38 of the trailer body slope toward the discharge opening 39 thereof, so that the contents of the trailer will gravitate toward and through this opening 39 when the gates 11 are opened.

The discharge gates 11, which may be of a well known type commonly employed in hopper-bottom cement trucks, are hingedly mounted, one on each side of the discharge opening 39 for controlling the gravity discharge of the contents of the trailer as desired. Since such gates and various satisfactory forms of operating them are well known, the details thereof are not illustrated or described herein.

The cement compartment 12, which is of a size to hold the maximum amount of cement which will be required for the quantity of sand and aggregates in the trailer body 10, is fixedly secured in the trailer body by suitable means such as brackets 36, FIG. 5. The cement compartment 12 may be fabricated of suitable metal plates like the body 10, and is completely sealed on its sides and top except for a filler opening 39 which is provided in the top thereof. This filler opening 39 is closed during transit by a weather tight closure cover 40.

A bottom discharge opening 46 is provided in the cement compartment 12 through which the contents of the cement compartment 12 will gravitate when the discharge gates 13 are opened. These gates, which may be conventional gates installed and operated like those 11 on the hopper body 10, securely retain the contents of the cement compartment 12 therein during transportation.

When it is desired to transfer the contents of the trailer 10 into the mixing truck B, the discharge gates 11 of the trailer body 10 are spotted over the conveyor 14 in its lowered, operative position shown in solid lines in FIG. 1. The conveyor 14 comprises a conventional, flat, conveyor belt 41, passed around a conventional power driven head roller 42 and an idler tail roller 43. These belt rollers 42 and 43 are journaled on opposite ends of a conveyor frame 44, which may be of structural steel material. The head roller 42 is driven by suitable power means, such as the usual power-take-off mechanism 45 of the mixing truck B, through suitable gearing 47.

A plurality of intermediate belt support rollers 48 are journaled on individual brackets 49 secured to the conveyor frame 44, and thus provide support for the upper run 41*a* of the conveyor belt 41 and its superposed load of materials discharged thereon from the trailer A.

The shaft 51 of the head roller 42 extends through opposite sides of an extension 15*a* at the lower end of the elevator housing 15 to provide a pivot about which the entire conveyor 14 may be swung between its raised, broken line, inoperative position 14*a* of FIG. 1, and its lowered, solid line, operative position 14 of the same figure.

The elevator housing 15, including its extension 15*a*, may be made of suitable sheet metal, for example, steel or aluminum. The housing extension 15*a* opens into the lower end portion of the elevator housing 15, so that materials discharged from the conveyor belt 41 into the housing extension 15*a* will gravitate therethrough into the lower end of the elevator housing 15. There they are picked up by elevator buckets 52, and are carried upwardly through the elevator housing 15.

The elevator buckets 52 are mounted in a conventional manner on a link chain 53, which is passed around a driven lower sprocket 54 and an idler upper sprocket 55. The lower sprocket 54 may be driven by any suitable power means, such as through suitable gearing 57 (FIG. 1) from the usual power take off mechanism 45 of the mixing truck B.

As the elevator buckets 52 pass over the upper sprocket 55 in the direction of the arrows shown in FIG. 2 they discharge their contents by gravity through a discharge chute 17 and into the usual intake hopper 18 of the concrete mixing truck B. The latter, except for the conveyor 14 and elevator 16 mounted thereon, may be a conventional concrete mixing truck, with usual chassis 58, support wheels 59, and rotary, power driven, cement mixing drum 60.

Operation

In operating the present invention; with the trailer body gates 11, and the cement compartment gates 13 securely closed, the trailer A may be loaded with the ingredients for making a batch of concrete by any suitable means, such as by gravity discharge from a conventional batch plant (not shown). The trailer hopper body 10

outside the cement compartment 12 is filled with properly weighed quantities of sand and suitable sizes of gravel or crushed rock, while the cement compartment 12 is filled with a suitable weight of cement. The weather tight cover 40 is then secured in place over the cement compartment filler opening 39 to retain the cement therein and to protect it from the weather.

The trailer thus loaded is then hauled to the job site, either by the concrete mixing truck B, or by some other suitable towing vehicle. Assuming that the trailer A is towed to the job site by the concrete mixing truck B, which mixes its own batch of concrete in the usual manner enroute, when the truck B and trailer A arrive at the job site, the trailer A is spotted at a convenient point near that at which the truck B is to discharge its own load of mixed concrete. The trailer A is then unhitched, and the mixing truck discharges its load of concrete as required. During these towing and concrete discharging operations, the conveyor 14 is retained in its upwardly swung, broken line position of FIG. 1 by conventional latch means 61 as shown in broken lines in FIG. 1.

After the truck B has discharged its own load of concrete, it is returned to the trailer A, and is backed into a position with its rear end directed toward the side of the trailer, with the conveyor 14 laterally opposite the discharge gates 11, and spaced therefrom by a distance slightly greater than the length of the conveyor 14. The latter is then swung downwardly to its solid line position 14 of FIG. 1. In this downwardly swung position of the conveyor 14, its free end rests upon skids 62 provided for this purpose on its free end. The truck B is then backed up to spot the conveyor 14 in centered position beneath the trailer body discharge gates 11 as shown in FIGS. 1, 4 and 5. The conveyor head roller 42 is then driven in the direction indicated by the arrow in FIG. 1 to move the upper run 41*a* of the belt 41 toward the elevator 16, and the lower elevator chain sprocket 54 is driven simultaneously to move the elevator chain 53 and the buckets 52 thereon in the direction of the arrows shown in FIG. 2.

The trailer body gates 11 and the cement compartment gates 13 are then opened sufficiently to permit the contents of the trailer body 10 and of the cement compartment 12 to gravitate therethrough at a desired rate onto the conveyor belt 41. The latter discharges the commingled sand, gravel or crushed rock, and cement into the elevator housing extension 15*a*, through which it gravitates into the lower end of the elevator housing 15. There the elevator buckets 52, operating in a conventional manner, scoop up the materials and carry them upwardly, over the upper sprocket 55, and dump them into the discharge chute 17. Thence they gravitate through the usual loading hopper 18 of the mixing truck B and into the rotary drum 60, where water, carried in a usual manner by the cement truck B is added and they are mixed into concrete. If desired a water tank 23 may be provided on the trailer A to supply additional water in the event that it should be required.

The invention provides a simple and effective mechanism for saving time on the road for the cement mixing trucks, and also permits the delivery of a greatly increased yardage of concrete on the job for a given number of trips of a mixing truck. This results in a substantial saving in the delivery costs of the concrete. If desired, instead of towing the trailers A to the job site by means of the concrete mixing truck themselves, the trailers, or such additional trailers as may be required, may be towed by conventional truck-tractors, and may even by towed in tandem in those states the laws of which will permit it.

While I have illustrated and described a preferred embodiment of the present invention, it will be understood, however, that various changes and modifications may be made in the details thereof without departing from the scope of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is defined in the following claims:

1. A pre-batch highway type trailer for transporting a pre-measured single batch of concrete batch materials in each of a succession of trips to and from a batch plant and a job site having elevating mechanism for receiving the gravity discharged contents of the trailer and elevating such contents into a concrete mixing truck of a capacity to receive and mix such contents, said trailer comprising:

(*a*) a wheeled, highway type trailer chassis,

(*b*) means for coupling the trailer chassis to a towing vehicle,

(*c*) a hopper body mounted on the chassis and having a bottom opening therein for gravity discharge of the contents of said body therethrough,

(*d*) a gate mounted in the body discharge opening to control the gravity discharge of the contents of the trailer body through such opening,

(*e*) a hopper type cement compartment of a size to contain the maximum amount of cement required for a known maximum size batch of concrete to be transported by said trailer, and mounted within said body above and clear of the discharge opening therein, the cement compartment having a bottom opening therein located above the body discharge opening for gravity discharge of the contents of the cement compartment therethrough and thence through the bottom opening of the trailer body,

(*f*) a water tight cover for the cement compartment,

(*g*) the capacity of the trailer body externally of the cement compartment being such as to contain the dry ingredients, other than the cement, for such known batch of concrete.

2. A pre-batch highway type trailer for transporting a pre-measured single batch of concrete batch materials in each of a succession of trips to and from a batch plant and a job site, having elevating mechanism for receiving the gravity discharged contents of the trailer and elevating such contents into a concrete mixing truck of a capacity to receive and mix such contents, said trailer comprising:

(*a*) a wheeled, highway type trailer chassis,

(*b*) means for coupling the trailer chassis to a towing vehicle,

(*c*) a hopper body mounted on the chassis and having a bottom opening therein for gravity discharge of the contents of said body therethrough,

(*d*) a gate mounted in the body discharge opening to control the gravity discharge of the contents of the trailer body through such opening,

(*e*) a hopper type cement compartment of a size to contain the maximum amount of cement required for a known maximum size batch of concrete to be transported by said trailer, said compartment being mounted within said body in inwardly spaced relation from a side thereof and in upwardly spaced relation from the bottom opening therein so as to be clear of obstructing the discharge opening therein, said cement compartment having a bottom opening therein located clear of the body discharge opening for gravity discharge of the contents of the cement compartment through the bottom opening of the trailer body,

(*f*) a water tight cover for the cement compartment,

(*g*) the capacity of the trailer body externally of the cement compartment being such as to contain the dry ingredients, other than the cement, for such known batch of concrete, and

(*h*) a water reservoir on said trailer of a size to contain sufficient water for such known batch of concrete of a selected maximum slump or wetness.

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