May 28, 1968 W. L. YOUNG 3,385,476

APPARATUS FOR DELIVERING READY FOR MIXING PROPORTIONED INGREDIENTS OF CONCRETE

Filed July 13, 1966 3 Sheets-Sheet 1

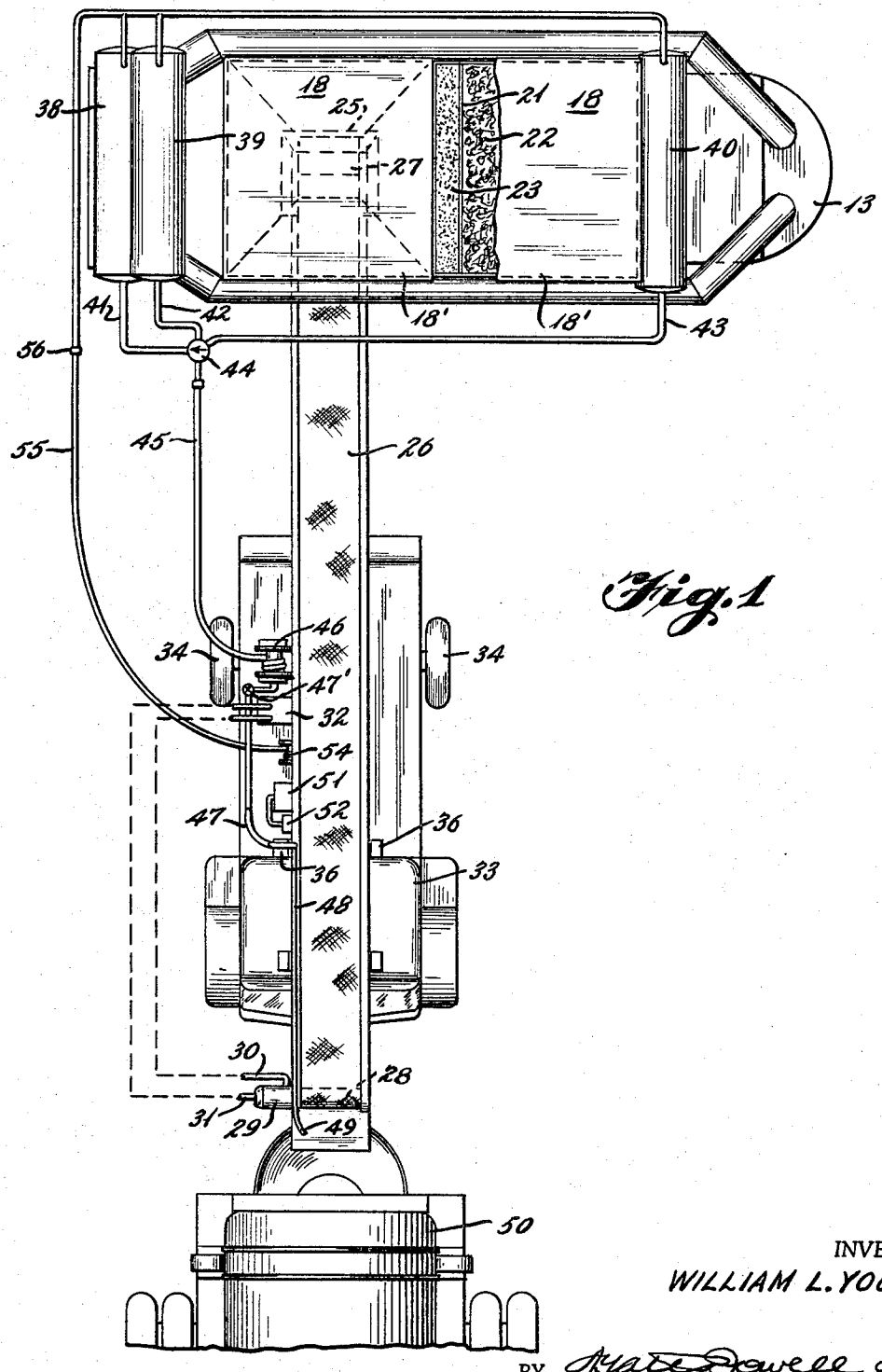


Fig. 1

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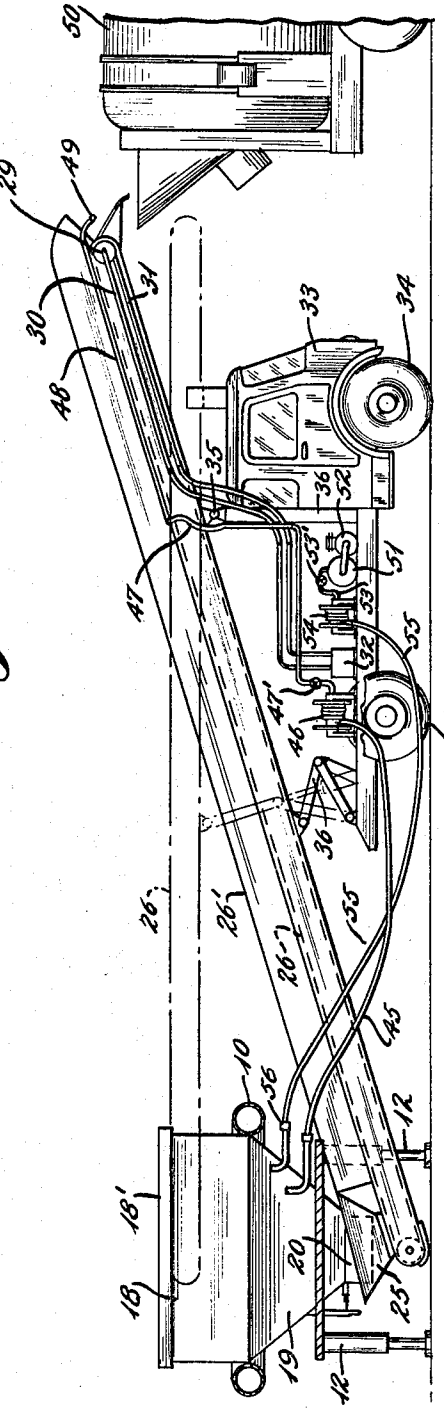
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Fig. 2



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Fig. 4

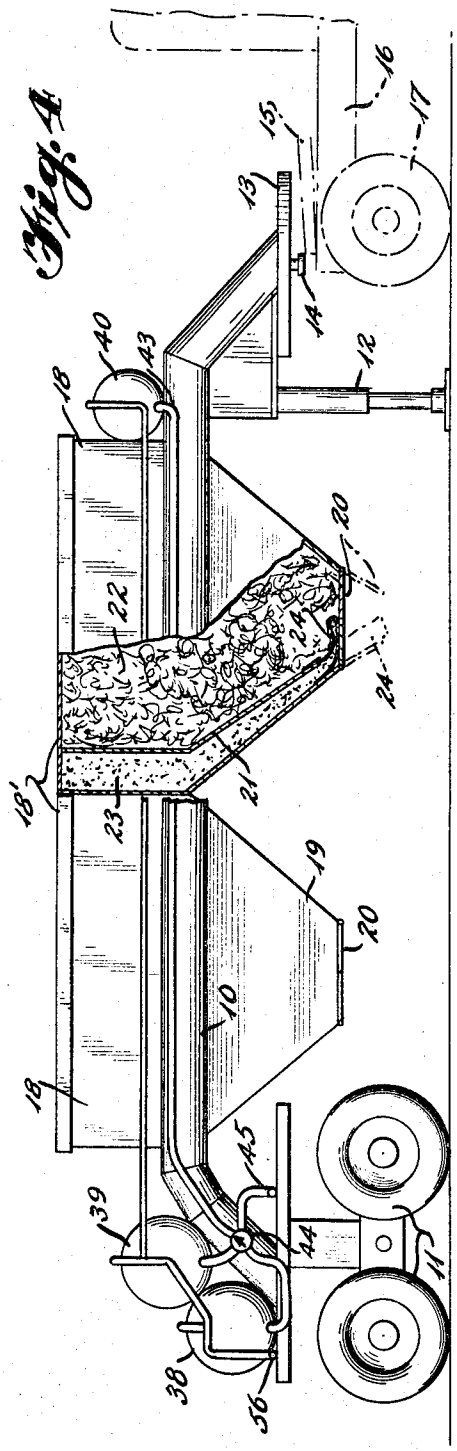
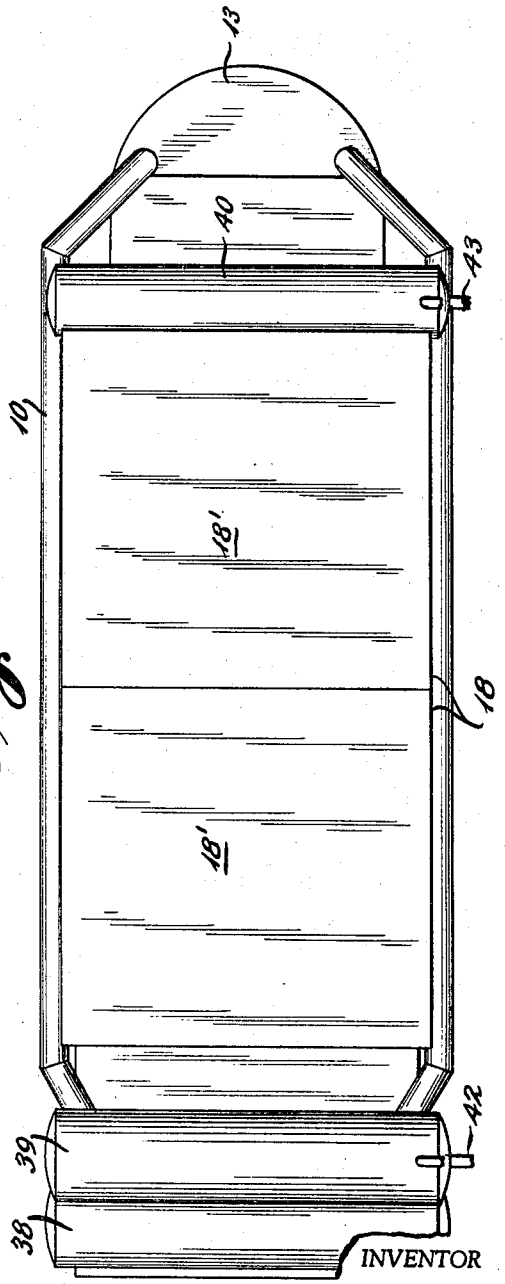


Fig. 3



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APPARATUS FOR DELIVERING READY FOR MIXING PROPORTIONED INGREDIENTS OF CONCRETE

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ABSTRACT OF THE DISCLOSURE

Apparatus for delivering pre-proportioned amounts of ingredients for making cement and including a vehicle for transporting the ingredients to a mixing site and a transfer vehicle with a conveyor for removing the materials from the transportating vehicle to a mixer. The transporting vehicle has a hopper with an auxiliary compartment and a flexible member which is collapsed by the material in the hopper for keeping the materials separated until discharged at which time such materials will be discharged simultaneously.

This invention relates to apparatus for the distribution of proportioned concrete aggregate, cement and water to outlying points from a central plant in a condition that delays in transit or holdups on job do not affect the concrete, the aggregates, cement and water being in separate compartments and each ingredient which would be affected by contact is prevented from such contact.

Heretofore in the building of a concrete structure a fleet of vehicles carrying concrete mixers have been utilized which traveled from a batching station where the ingredients were placed in a concrete mixer in the proper proportions and such ingredients were mixed during transit between the batching station and the construction site. It is well known in the industry that there is an optimum time for mixing concrete ingredients which depends upon the formula or proportions of ingredients and in some areas the local building codes have specified maximum and minimum mixing times for concrete. When a concrete mixer has to transport the ingredients from a distant batching station to the construction site, the time in transit often varies due to road and traffic conditions, as well as the distance between the batching station and the construction site. Frequently the workmen at the construction site are ready before the concrete mixer arrives and therefore have to wait, or the concrete mixer arrives before the workmen are ready and the concrete has to wait. For these and other reasons prior systems have not been fully satisfactory.

It is an object of the invention to provide portable concerte batching apparatus capable of receiving measured amounts of ingredients, in accordance with any desired formula, in separate compartments at a distant batching station and transporting such ingredients while still separated to a construction site and with transfer apparatus for discharging such ingredients into a conventional concrete mixer.

A further object of the invention is to provide a portable concrete batching apparatus including a delivery vehicle having a plurality of individual compartments for receiving various ingredients and a transfer vehicle having means for transferring the ingredients from the delivery vehicle into a conventional concrete mixer where the ingredients are mixed.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a diagrammatic top plan view illustrating the two units of the apparatus in cooperation relation;

FIG. 2, a side elevation thereof;

FIG. 3, a top plan view of the batch delivery vehicle; and,

FIG. 4, a side elevation of the batch carrying vehicle of FIG. 3 with parts broken away.

Briefly stated the apparatus of the present invention comprises delivery and transfer mechanism with the delivery mechanism composed of one or more vehicles preferably, although not limited to, semi-trailers or trailers pulled by standard truck tractors, or any other conveyance having compartments for containing the pre-proportioned or measured ingredients or materials such as water, admix, cement, fine and coarse aggregate, with the water and cement contained in separate compartments from each other and from the fine and coarse aggregate which can be stored together. Such compartments or hoppers may have suitable covers for protection from the elements. When the place of use is reached the delivery vehicle or vehicles are left at a predetermined location and in the case of a semi-trailer or trailer the truck tractor may be cut loose and returned for another trailer while the first trailer is in readiness for unloading. Transfer apparatus is employed to transfer the ingredients to a conventional concrete mixer. This transfer apparatus is mobile and powered, with a conveyor belt, preferably with a cover to protect the component materials from the elements and with a pump or compressed air device capable of moving the pre-batched water as the other ingredients are transferred from the trailer to the mixer. One end of the conveyor belt is moved to a position beneath one of the hoppers and quick coupling connections are made to the water tanks on the trailers and the pump or compressed air supply, and the conveyor operated to produce the desired transfer to the conventional concrete mixer and the discharge of the ingredients from the end of the conveyor.

With continued reference to the drawings the invention includes one or more trailers for use with a truck type tractor, or such trailers may be self-propelled. Each trailer includes a frame **10** supported by ground-engaging wheels **11** at one end, and when the trailer is disconnected from a tractor at a construction site where it is to be unloaded, it is supported by ground-engaging supports **12** adjustable downwardly to engage the ground and provide a support for the end of the trailer opposite the wheels **11**. In order to connect to a conventional tractor to make it possible to move the trailer from place to place, the trailer is provided with a support **13** and a pin **14** for engagement with a support **15** on a tractor **16**, such structure generally being referred to as a fifth wheel. The tractor **16** is supported on wheels **17**.

On the trailer frame **10** are mounted hoppers **18** having tapered discharges **19** with control gates **20**. Each hopper **18** is provided with a partition wall **21** which serves to define a main compartment **22** for aggregate, such as sand and gravel, and a smaller compartment **23** for cement. In order to protect the contents of the hoppers **18** cover means **18'** may be mounted over the hoppers **18**. The relationship of the compartments of the hoppers is such that the ingredients are kept separate until the discharge gates of the hopper are open whereupon mixing or blending is accomplished. At the lower end of the compartment **23** is provided a sleeve **24** having a flexible free end portion adapted to be maintained closed or collapsed by the weight of the aggregate in the main compartment **22**. The cement in compartment **23** will be retained until the gates **20** are open, whereupon the aggregate and the cement will be discharged simultaneously into a generally funnel type portion **25** of the transfer apparatus for discharging onto a conveyor belt **26** mounted around pulleys **27** and **28**. The conveyor may have a cover **26'** for protecting the materials carried after being discharged from the hoppers during use of the conveyor.

The conveyor is operated by the pulley **28** at the remote end of the conveyor being driven by a hydraulic motor **29** through lines **30** and **31** from a pump **32**.

The conveyor belt **26** may be carried in any desired manner, for example, on a truck or vehicle **33** supported on wheels **34**, the conveyor being fastened by a hinge **35** to a supporting post **36**. In order that the conveyor may be swung about the hinge **35** an elevating and lowering jack **37** may be employed. Thus the conveyor can be carried in a generally horizontal position until ready for use and then adjusted to the proper angular position to locate the hopper **25** beneath the bottom of the inclined discharge **19** and gate **20** of the hopper **18**.

In order to carry water on the trailer one or more tanks **38**, **39** and **40** may be provided having discharges **41**, **42** and **43**, respectively, the discharge of which is made through a three-way valve **44** and a discharge line **45**. The water line **45** may extend about a reel **46** mounted on the truck **33** and through a flexible connection **47** to a discharge line **48** and nozzle **49** so that the mixture on the conveyor **26** with water through the nozzle **49** can be discharged into a mixer **50** of conventional character. If desired a manual shut-off valve **47'** may be provided.

In order to provide pressure within the tanks **38**, **39** and **40** sufficient to force the discharge of water therefrom, a compressed air tank **51** may be provided to supply air under pressure from a pump **52**. From the air tank **51** an air line **53** may extend about a reel **54** with a flexible line **55** extending to the top of the water tank and connected by a coupling **56** to the water tanks **38**, **39** and **40**. If desired a cut-off valve **53'** may be interposed in the air line **53**.

With the construction just described the components are loaded in the hoppers of the trailer or trailers and the water tanks are filled with water, whereupon the trailer or trailers are transpoted to the construction site or place of use, the trailer is parked and uncoupled, and the mixer **50** is moved into position ready to mix the ingredients as they are received. The conveyor **26** on the truck **33** is then inclined so that the hopper portion is at the proper level and beneath the discharge gate **20** of the desired hopper with the upper end of the conveyor and the nozzle **29** disposed in the proper position to discharge their contents into the mixer **50** which has been moved into the proper position. The water line **45** and the air line **55** are connected and the valves operated to discharge water through the nozzle **49**. At the same time the drive for the conveyor is operated to carry the components of the mixture upwardly and to be discharged from the remote end of the conveyor. As the conveyor belt moves, both the cement and the aggregate are carried upwardly to the location of discharge, while water likewise is discharged at the same general location, the cement and aggregate being combined on the conveyor belt as it moves. Thus the proper mixing time can be given with minimum loss of time of the workmen and equipment, and without the ingredients being over-mixed and allowed to harden too rapidly. The invention also makes it possible to move to the place of use the proper amount of material for a complete operation without a break insuring a superior unitary integrated structure.

It will be apparent from the foregoing that the apparatus and the operation is flexible as the correct number of tractor and batch trailers may be employed to meet the requirements of the particular job. Also there will be a minimum tie-up of equipment as one transfer device may be used with multiple trailers left by a tractor to move the cement and aggregate from the trailer to a mixer.

It will be obvious to one skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. Portable concrete batching apparatus for transporting and thereafter discharging at a generally common location measured amounts of ingredients to be mixed in the manufacture of concrete, comprising at least one trailer type vehicle to be towed by a propelling vehicle, and at least one transfer vehicle for connection with said trailer type vehicle for unloading the measured ingredients carried by the latter, said trailer type vehicle having a tank for water thereon and also having a plurality of individual compartments for maintaining at least certain of said ingredients apart from others until discharge, means on said trailer type vehicle for discharging material from said compartments, at least one of said compartments having a flexible collapsible member overlying said dischanging means and being of a character to be collapsed by material in another compartment when said discharge means is closed and to discharge material simultaneously when said discharge means is open, a water hose and a conveyor each carried by said trasfer vehicle in a manner to discharge at a generally common location, means for coupling said water hose to said water tank, means for driving said conveyor, and means for causing the discharge of water through said hose from said water tank.

2. Portable concrete batching apparatus for transporting measured amounts of ingredients of concrete and thereafter discharging the same at a location for mixing, said apparatus comprising support means, a plurality of hoppers mounted on said support means, discharge gate means for each hopper, each of said hoppers having multiple compartments for mantaining the ingredients separate until discharged, at least one of said compartments having a flexible discharge member located adjacent to and overlying said gate means when the gate means is closed and being of a character to be collapsed by the material in an adjacent compartment, whereby when the gate means is opened the material in said multiple compartments will be discharged simultaneously.

3. Portable concrete batching apparatus for transporting and discharging measured amounts of ingredients to be mixed in the manufacture of concrete, said apparatus comprising a vehicle having a compartment with wall structure defining a hopper, gate means mounted on said hopper and being selectively operable to discharge material therefrom, a partition disposed along one side of said hopper and defining an auxiliary compartment, said partition being relatively rigid and adapted to separate various materials within the hopper, a flexible collapsible member mounted on the lower end of said auxiliary compartment and extending downwardly into overlying relation with said gate means when the gate means is closed whereby a first material can be placed within the hopper and the weight of such material will collapse the flexible member at the bottom thereof and a second material may be placed in said auxiliary compartment and will remain separated from said first material by said partition and will be prevented from being discharged by said collapsed member until said gate means is opened to permit said member to extend downwardly through said gate means and discharge the material from said auxiliary compartment simultaneously with the discharge of material from said main compartment.

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