April 29, 1969 M. H. ISTA 3,441,255

CONCRETE MIXER APPARATUS

Filed Oct. 3, 1967 Sheet 1 of 2

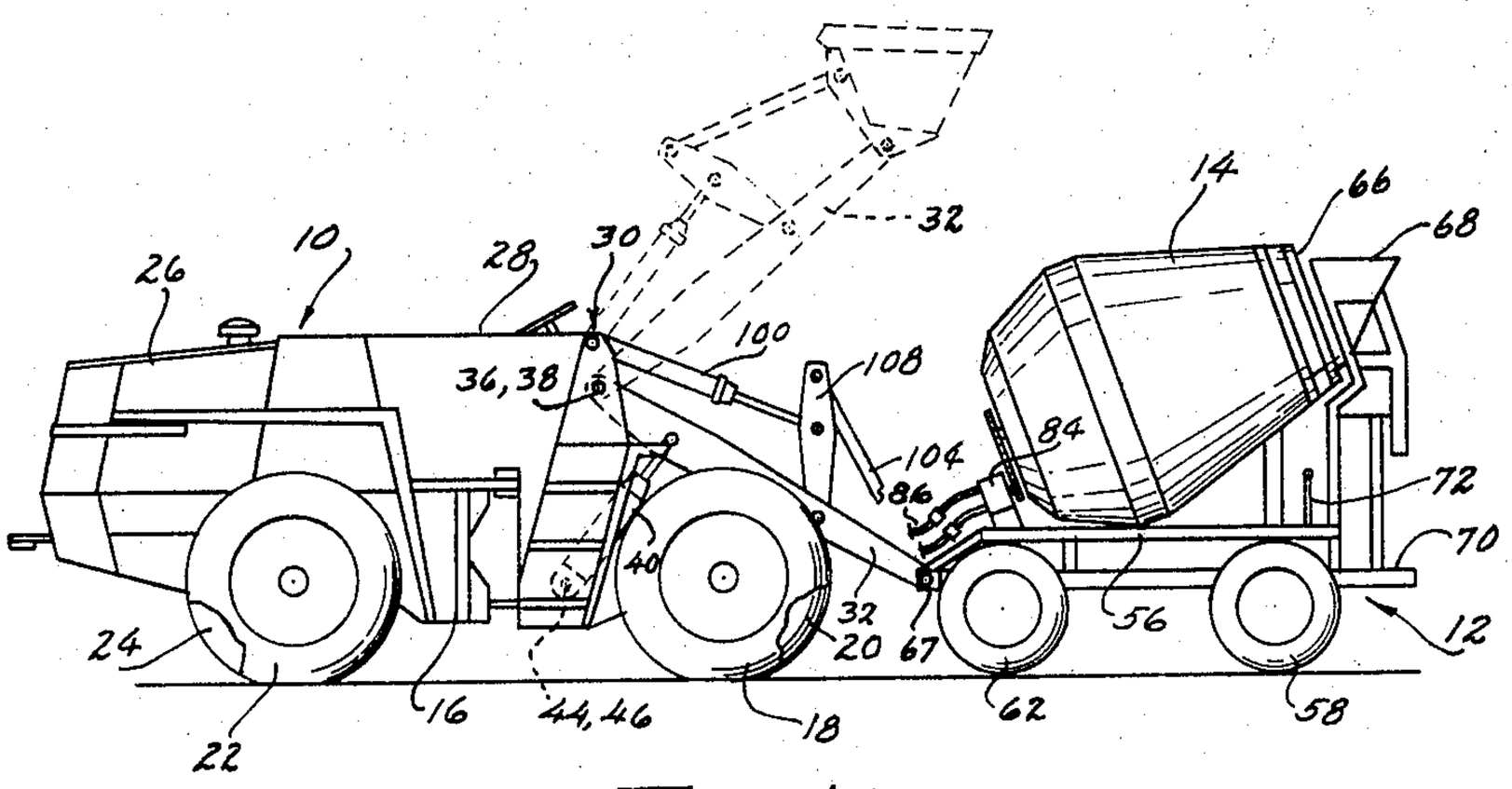


FIG. 1

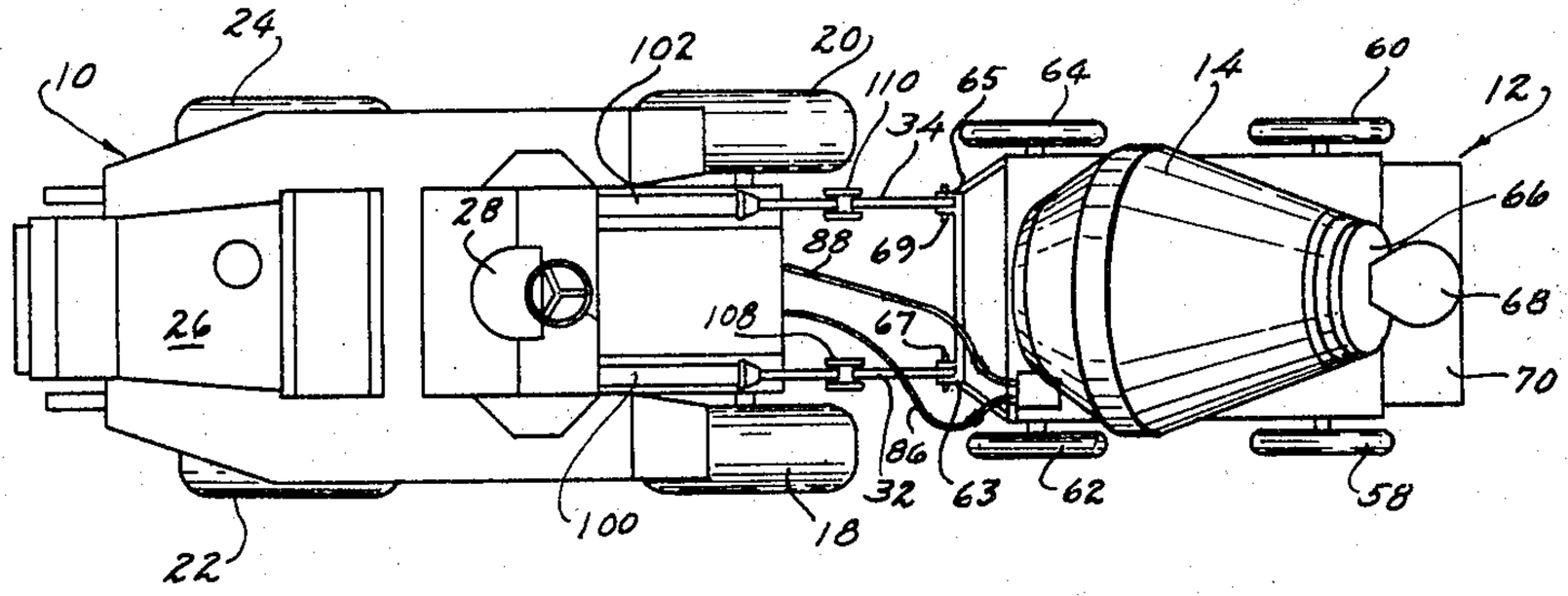


FIG. 2

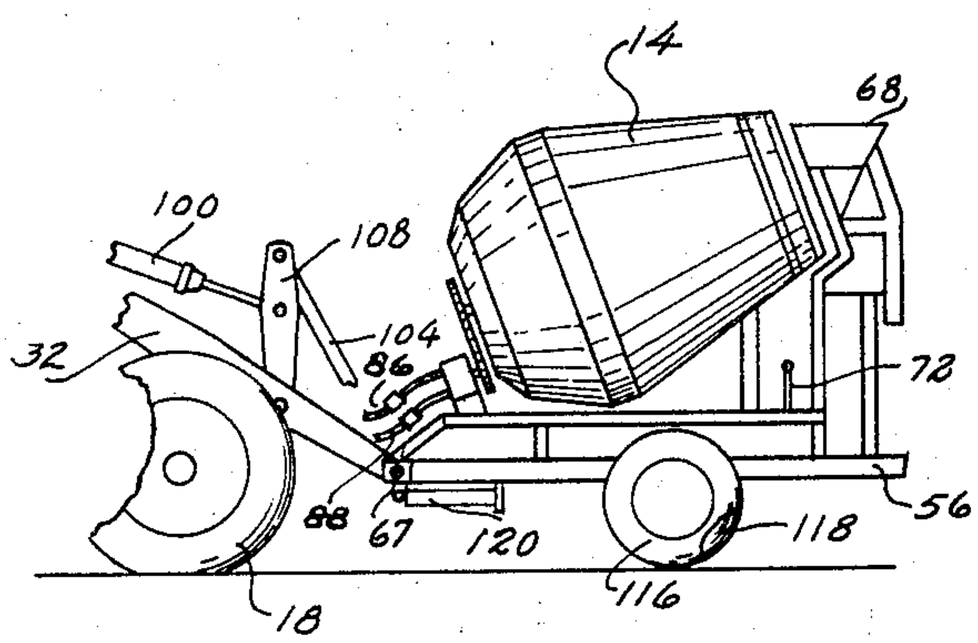


FIG. 4

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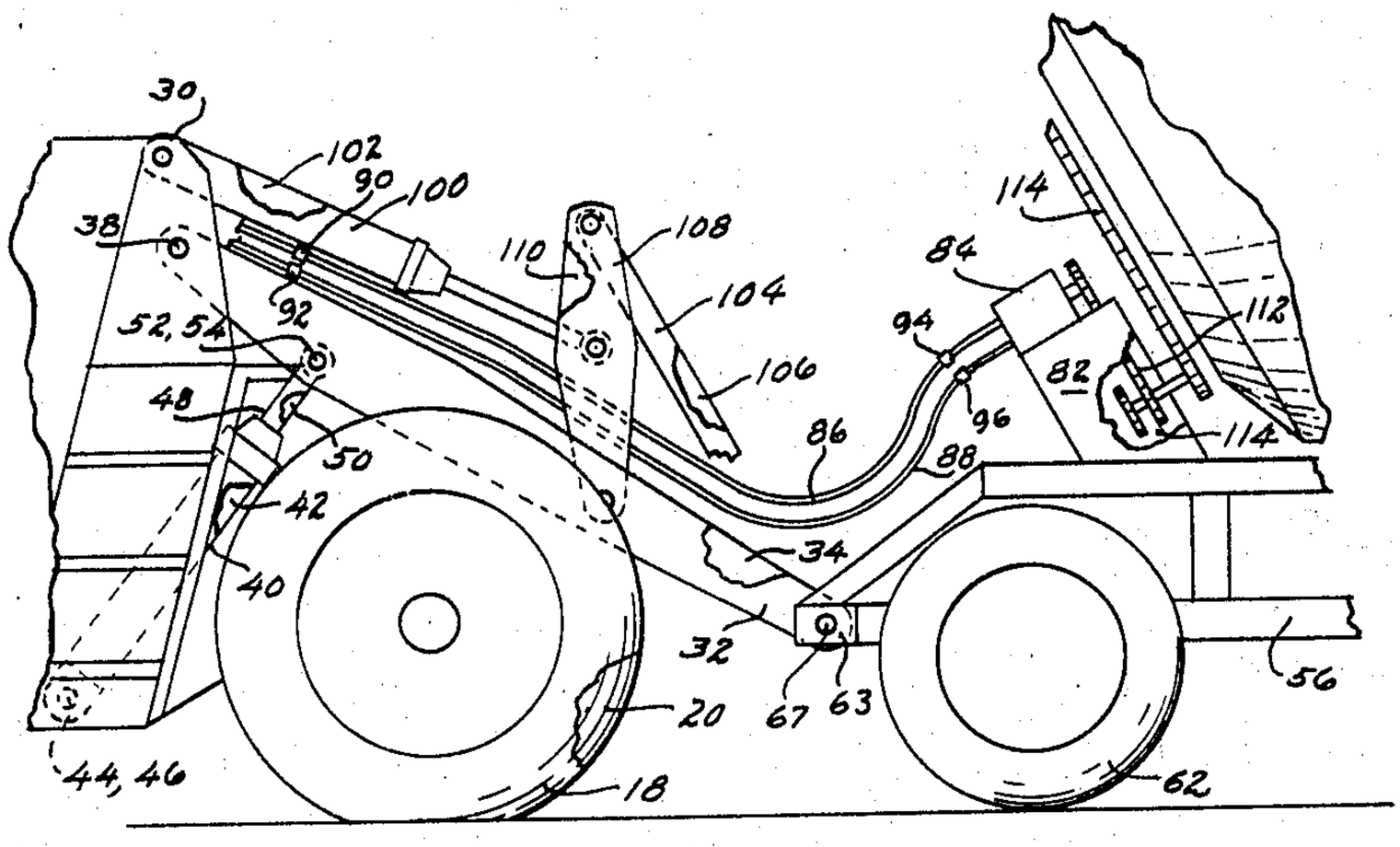


FIG. 3

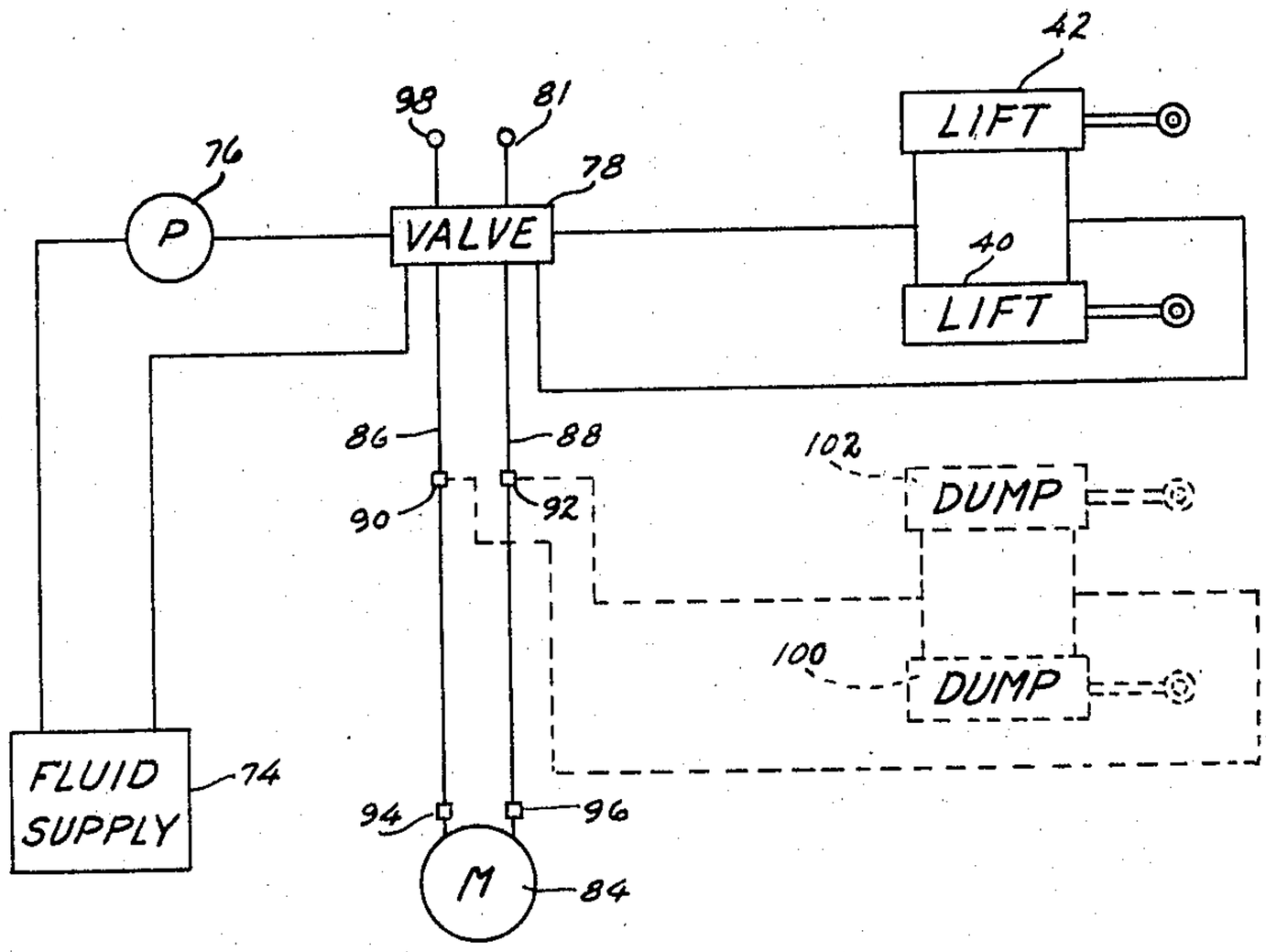


FIG. 5

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CONCRETE MIXER APPARATUS

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4 Claims

ABSTRACT OF THE DISCLOSURE

A concrete carrier propelled by a tractor having guide arms adaptable for quickly connecting and disconnecting the tractor from the carrier, and hydraulic means for rotating a container on the carrier. The hydraulic means includes a fluid pump on the tractor, a fluid motor on the carrier for rotatively driving the container and a control system connecting the pump and the motor. The carrier also has means for reversing direction of rotation of the container.

Background of the invention

The invention relates to industrial equipment in the concrete mixing field wherein concrete is transported from a mixing plant to a construction site. As is well known, concrete carrying trucks are utilized to move the prepared concrete from a large mixing plant over great distances to the site. However, in the case of very large projects such as airfields, hydro dams, or highways, a batch plant is set up at the site to cut down on transport time and costs and to have readily available the required amounts of mixed concrete when "ready for pour." At these batch plants, the usual concrete mix trucks are needed to move the material to the pour area, where the material is then carted or pumped to the required location. It is not uncommon for a contractor, on these large jobs, to have a dozen or more ready mix trucks available to haul the material from the batch plant to the pour area and, of course, there are times throughout the day when all of these trucks are in use at any one time as when the requirement for concrete is heavy, and there are other times when only a few are required depending upon the progress of the forming job.

Along with the concrete mix trucks there are usually other types of industrial equipment on the job such as bulldozers, graders, loaders, and the like which are used in preparing the site and also for backfill work. At certain times some of this equipment stands idle as when the forming is completed in a part of the project and the job is ready for pour, so that all available mix trucks are pressed into service. Between pours, many of these trucks stand idle so it has been a problem of the contractor to maintain as much equipment in use as possible at all times.

Because of the versatility of some of the machines, it is possible to utilize a machine for more than one function. In the case of concrete carrying vehicles it is seen that a tractor mounted loader, which may otherwise stand idle, can be adapted to propel the vehicle. The prior art shows the use of one truck or tractor being used for propelling two or more concrete carrying vehicles as taught in McNeil No. 3,282,448.

Summary of the invention

The present invention relates to concrete conveying apparatus wherein a tractor normally used for loading materials is used for propelling and for driving a mixer container on a wheeled chassis. The tractor includes means for connecting and disconnecting the bucket lift arms to and from the concrete carrying vehicle. The loader

bucket is removed from the lift arms and the arms are attached to the vehicle for propelling and for guiding it. The vehicle, which may be called a trailer or carrier, is supported on wheels and a barrel-shaped container or drum is carried thereon. The container includes mixing means and a delivery chute or spout for directing the concrete to the specific location at the pour site.

The tractor and trailer combination also includes an engine driven hydraulic pump and control means for directing hydraulic fluid to a hydraulic motor on the trailer for rotating the material container in a forward or a reverse direction. The forward direction is taken here as meaning rotation for mixing and for keeping the material in a mixed condition as it is being transported from the batch plant to the pour area. The lift arm cylinders on the tractor are utilized for positioning the lift arms when connecting and disconnecting them from the trailer and they may also be used for raising and lowering the arms slightly when guiding or steering the trailer into place for loading or unloading the concrete. The hydraulic tilt or dump cylinders are not used for practicing the invention, however the hydraulic control and circuitry normally used for tilting the loader bucket is applicable for driving the hydraulic motor on the trailer.

The advantages of the invention are apparent where it is desired to obtain maximum utility from tractor and trailer type equipments in the moving of concrete from the batch plant to the pour area. Each concrete carrying vehicle does not require its own propelling means, which, of course, greatly reduces the cost of these vehicles.

Other advantages of this apparatus will become apparent from a reading of the following description taken together with the annexed drawings, in which:

FIGURE 1 is a side elevational view of a tractor loader with the loader bucket removed and the lift arms connected to a trailer;

FIG. 2 is a plan view of the tractor-trailer apparatus;

FIG. 3 is a detailed view of the connection and drive between the tractor and trailer;

FIG. 4 is a view showing a tractor connected to a different type trailer; and

FIG. 5 is a schematic diagram of the hydraulic system.

The tractor and concrete carrying trailer provide a means for utilizing equipments which would otherwise stand idle at certain times at the construction site. The barrel-shaped container or drum may be the usual apparatus except as modified for the present invention, and the tractor may be a regular wheeled loader type or it may be an articulated wheeled type again modified for this invention.

As seen in FIGS. 1 and 2, a four-wheeled tractor **10** is connected to a four-wheeled trailer **12** carrying a concrete mixing drum **14**. The tractor, of course, has a frame **16** on driving wheels **18** and **20** and steering wheels **22** and **24**, and an engine **26** on the frame. As stated, the tractor may be a regular or an articulated type and the driving and steering wheels may be different sized or the driving and steering may be different from that shown. This would depend upon the type of idle equipment which is available at the site. A crawler type tractor may also be applicable in practicing the invention. The operator's station **28** faces the end **30** of the tractor opposite from the engine **26**. Lift arms **32** and **34** are attached at end **30** by means of pins **36** and **38** to the tractor frame and are adaptable to swing in an up and down direction about the pins. Hydraulically operated lift cylinders **40** and **42**, more clearly seen in FIG. 3, are pivotally connected as at **44** and **46** to the frame and the cylinder rods **48** and **50** are connected to arms **32** and **34** at pins **52** and **54**. The lift arms and the bucket are shown dotted in FIG. 1.

The trailer **12** includes a frame **56** on rear wheels **58**

and **60** and front wheels **62** and **64**, the front wheels having steering mechanism such that they can be turned. Brackets **63** and **65** are secured to the front of trailer **12** for connection with lift arms **32** and **34** by means of pins **67** and **69**. Trailer **12** carries the mixing drum **14** which is open at the rear end **66** and includes a hopper **68** for filling the drum with materials.

The trailer also includes an operator's station **70**, controls **72** and a spout and chute for delivery of the mixed material from the drum. The drum, of course, contains a conventional mixer adaptable for rotation with the drum in either a CW or a CCW direction. When viewed from end **66**, rotation of the drum in a CW direction mixes the materials and rotation in a CCW direction empties the drum. Reversal of rotation of the drum is normally done at the pour site by operation of controls **72** at the material exit end.

A hydraulic system, shown schematically in FIG. 5, is provided for the apparatus, there being a supply of fluid **74** on the tractor, a pump **76** driven by the engine, control means **78** and fluid conduits connecting the pump, the controls and the lift cylinders. A control handle **81** is operated to move the lift cylinders. At the front end **80** of drum **14** is drive mechanism **82** including gears for driving the drum in a forward or a reverse direction. Connected to the drive mechanism is a hydraulic motor **84**, the motor being connected to the control means **78** by fluid lines **86** and **88**. Lines **86** and **88** have couplings **90** and **92** at the front of the operator's station for connecting and disconnecting the lines. Similar couplings **94** and **96** are at the motor **84**. Since the loader bucket has been removed from the tractor, the hydraulic circuit normally used for dumping the bucket is now used for driving the hydraulic motor for mixing the materials. The tractor operator moves a control handle **98** from a neutral to an open or drive position and the fluid flows through lines **86** and **88** and drives the hydraulic motor to turn the drum in a CW direction for mixing the materials.

When it is desired to practice the present invention, the loader bucket is unpinned from the lift arms **32** and **34** and the dump cylinders are disconnected from the bucket. These are shown structurally as **100** and **102** in FIG. 3 and dotted in FIG. 5. The dump links **104** and **106** are also disconnected from the bucket and may be allowed to hang on their pivots or they may be unpinned from links **108** and **110**. The tractor is then driven to the trailer and the lift arms are raised by the lift cylinders to the position for connecting the arms to brackets **63** and **65** with pins **67** and **69**. Fluid lines **86** and **88** are connected at couplings **90**, **92**, **94** and **96** and the apparatus is ready for operation.

In operation the tractor tows the trailer to the mix or batch plant and the proper amounts of sand, gravel, cement and water are deposited into the drum. The trailer is then towed to the pour site and the material is thoroughly mixed during transit by means of the pump driving the fluid through the motor for turning the drum. Depending upon the distance to be traveled, the speed of rotation of the motor may be varied such that for short distances the drum is turning at a higher speed whereas for longer distances the drum would be rotating slower to obtain proper mixing of the materials. In some cases, the materials may be either partially or entirely mixed at the mixing plant so that rotation of the drum is required only to maintain the mixture during transport to the pour area. When the apparatus gets to the pour site, the trailer is guided into place and an operator lowers the spout or chute and moves the controls **72** to reverse the direction of rotation of the drum. The hydraulic motor continues to be driven in the same direction by fluid flow from the pump on the tractor but the reversing gears on the drum drive mechanism turn the drum in a CCW direction to empty the contents. The reversing mechanism may be any suitable countershaft device **112** connected with a drive chain **114** for rotating the drum.

FIG. 4 shows a wheeled tractor connected to a trailer having two wheels **116** and **118**, wherein the lift arms are utilized to support a part of the load in addition to guiding the trailer. As is well known, concrete is extremely heavy so the two-wheeled trailers would be used with smaller capacity drums. This apparatus is very similar to that described for four wheels except that a jack **120** may be used to support one end of the trailer when not connected to the tractor.

The tractors shown may be of the standard rigid chassis type or they may be the articulated type which includes a pivot connection near the center of the tractor. The rigid chassis or the articulated type may be used with either the two or four-wheel trailer depending upon the availability and requirements of the particular equipments. However, the articulated type shown presents a longitudinally rigid structure from the tractor center, at its point of articulation, through the trailer. So the trailer can be properly steered backwards. Another feature of the lift arms is to raise the front end of the trailer when it is nearly empty to speed up the operation and to remove all the concrete from the drum. In this event, the four wheel trailer offers advantages in that the drum outlet is at the rear and over the trailer rear wheels **58** and **60**, as seen in FIGS. 1 and 2, and this permits maximum tipping of the trailer before its frame **56** or platform **70** meets the ground.

It is thus seen that herein shown and described is a versatile concrete carrying apparatus which makes use of machinery which may otherwise stand idle at certain times. While several embodiments have been shown and described, variations may occur to those skilled in the art, and it is to be understood that all such variations are contemplated as being within the scope of the invention. The invention is not intended to be taken as limited by the embodiments disclosed, nor in fact, in any manner except as defined in the following claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a concrete conveying and handling apparatus, a tractor including powered lift arms extending longitudinally of said tractor, a trailer including a rigid frame and ground-engaging wheels and a hitch for vertically pivotally connecting said tractor lift arms to said trailer to have the latter towed and lifted by said tractor, a concrete drum rotatably mounted on said trailer frame, powered rotation drive mechanism on said trailer frame and connected to said drum for rotating said drum, a power connection extending between said tractor and said powered rotation drive mechanism for driving the latter in the rotation of said drum, the improvement comprising said trailer hitch being rigid with said rigid frame for presenting a rigid structure to which said tractor lift arms are vertically pivotally connected on a horizontal axis, said tractor being of the articulate type which is pivotal about a vertical axis extending through a central portion of said tractor for providing the only and all ground steering and tracking action through the entire combined tractor and trailer.

2. The subject matter of claim **1**, wherein said trailer is provided with four said ground-engaging wheels with two thereof forwardly located and two thereof rearwardly located relative to a forward direction of said tractor, and said concrete drum includes an outlet disposed directly above said two rearwardly located wheels and with the remainder of said concrete drum being located toward said two forwardly located wheels, and said lift arms being movable relative to said tractor for raising said trailer off the ground about said two rearwardly located wheels for emptying said concrete drum.

3. The subject matter of claim **1**, wherein said tractor is of the loader bucket type and is convertible into powering said concrete drum and includes a hydraulic pump and first hydraulic means connected between said pump and said lift arms for powering said lift arms and thereby

raise and lower said trailer, and said tractor includes second hydraulic means extending along said lift arms and being pivotally connected therewith and being of the type for pivoting a loader bucket mountable on said lift arms, tractor hydraulic hoses extending from said pump to said second hydraulic means, and said powered rotation drive mechanism includes a hydraulic motor, and said power connection includes extension hydraulic hoses releasably coupled with said tractor hydraulic hoses for powering said hydraulic motor, and said tractor includes a hydraulic valve hydraulically connected with said pump for controlling hydraulic flow through said tractor hoses and said extension hoses to control said hydraulic motor.

4. A method of utilizing a tractor loader of the type having lift arms supporting a bucket which is connected to hydraulic means for tipping the bucket for loading and dumping, the steps of removing the bucket from the lift arms, draft-attaching the lift arms to a trailer having

ground-engaging wheels and having a hydraulic power unit and a rotating concrete drum connected to the power unit, connecting the hydraulic means to the power unit for power-rotating the drum, and controlling rotation of the drum from a location on the trailer.

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U.S. Cl. X.R.

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