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A. K. BRUMBAUGH

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DUMP TRUCK

Filed July 22, 1932

3 Sheets-Sheet 1

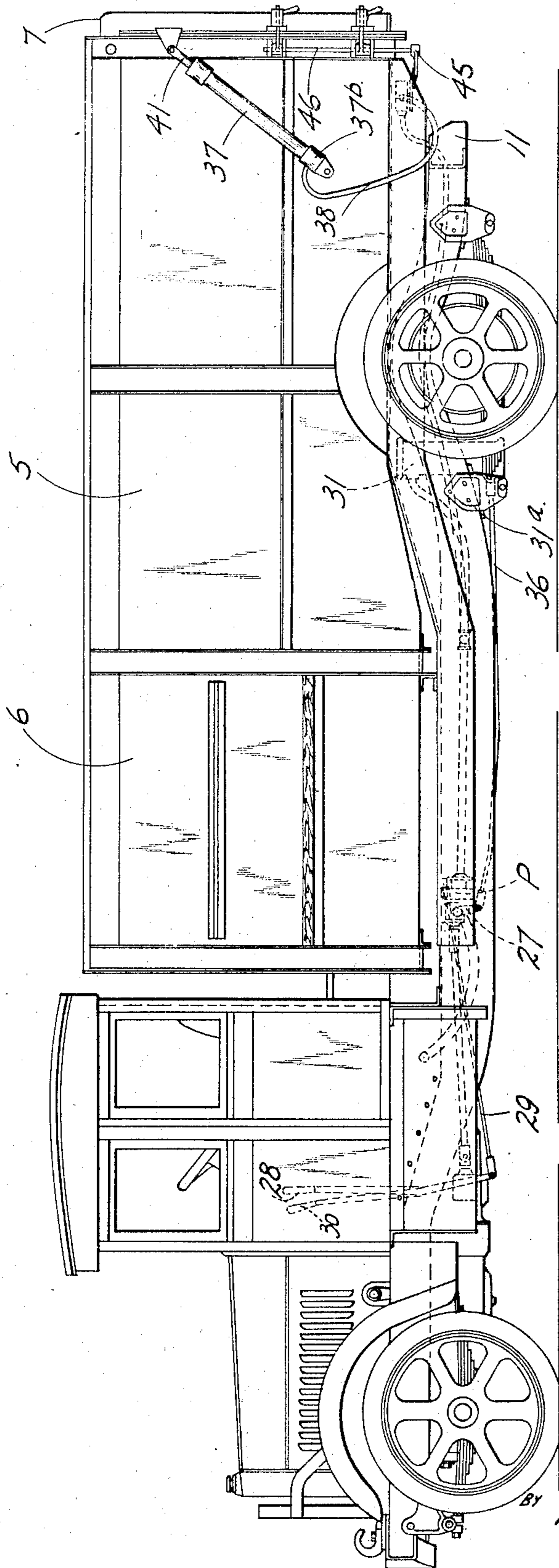


Fig. 1

Inventor

ANDREW K. BRUMBAUGH.

BY *Richard H. Harte*  
Attorney

June 5, 1934.

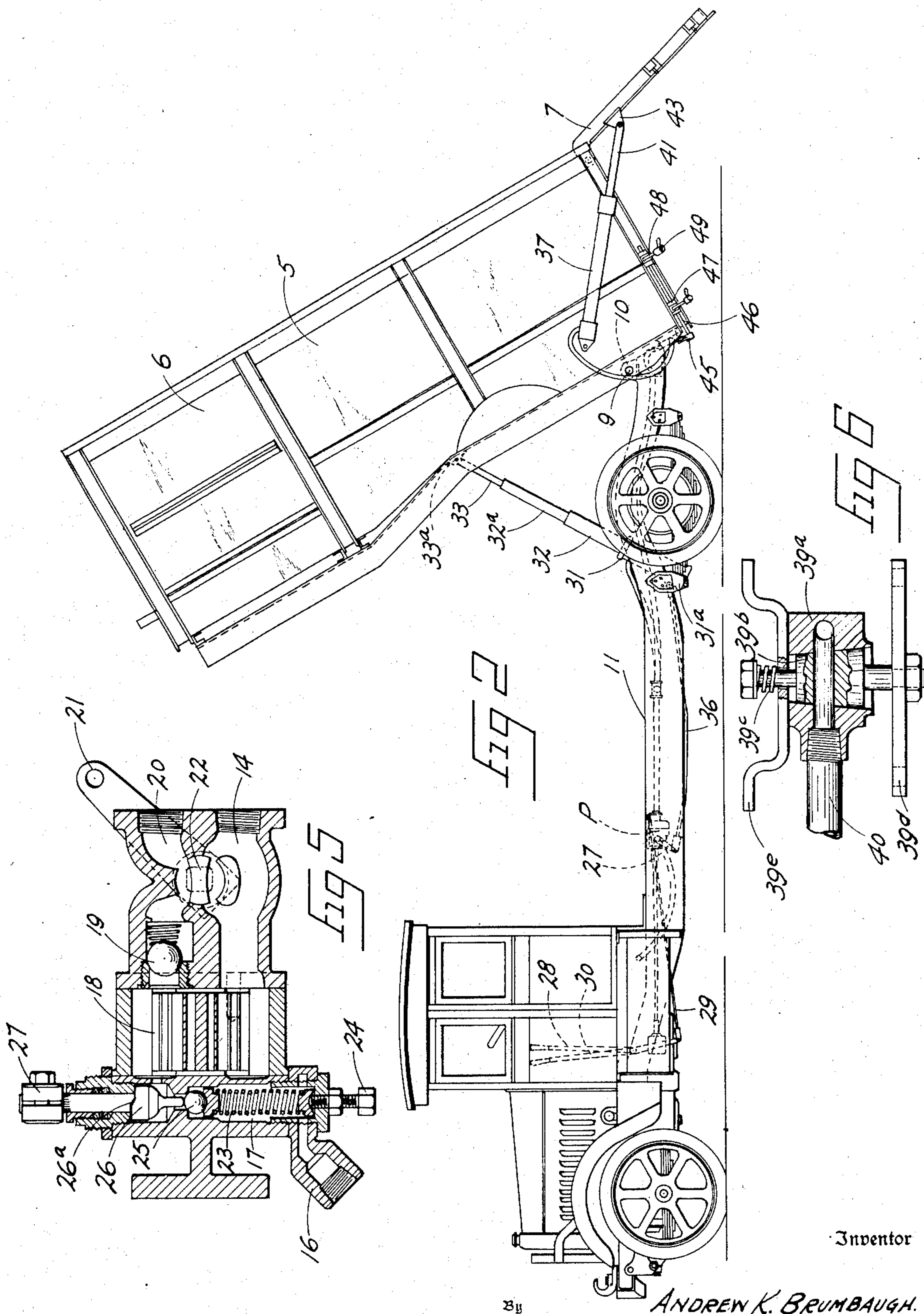
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Inventor

ANDREW K. BRUMBAUGH.

*Richy & Hatto* Attorney

June 5, 1934.

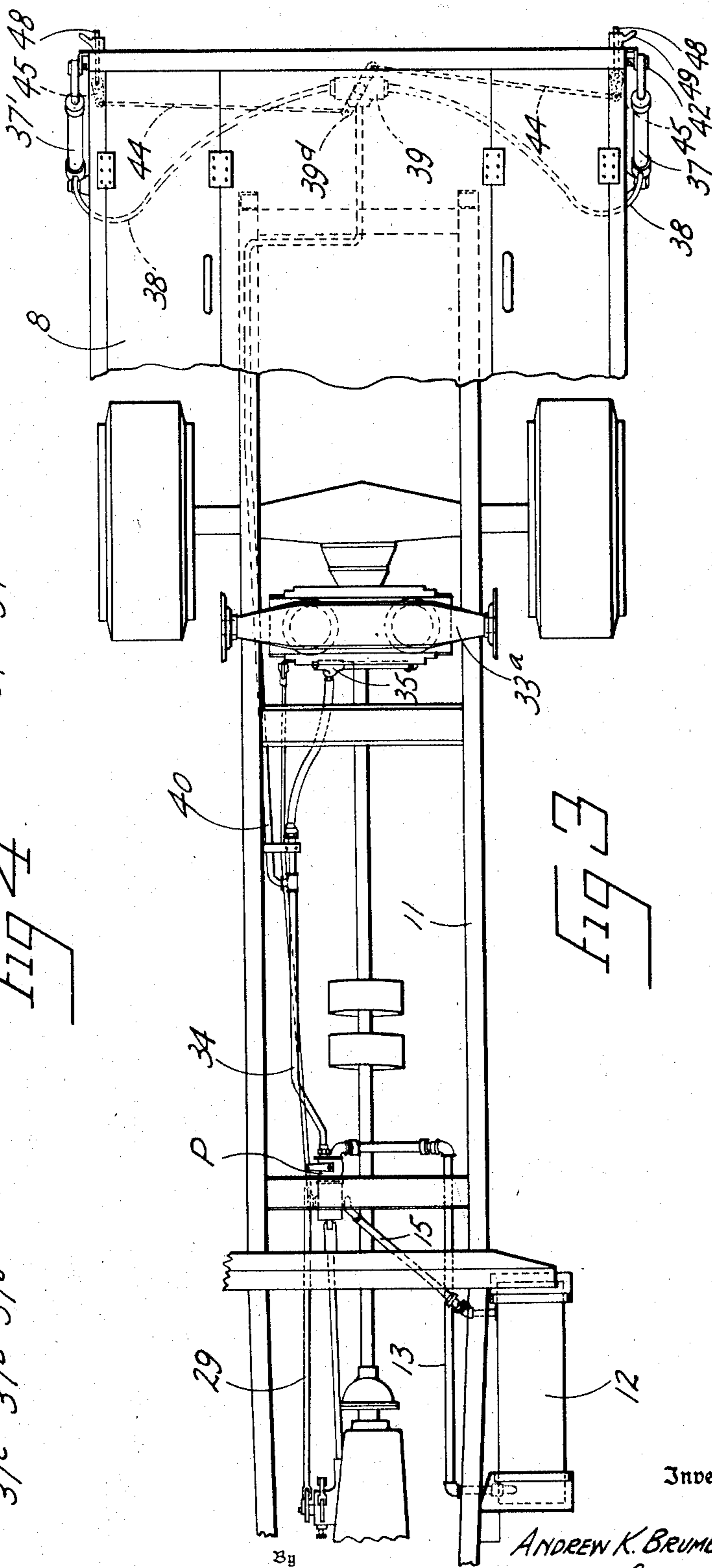
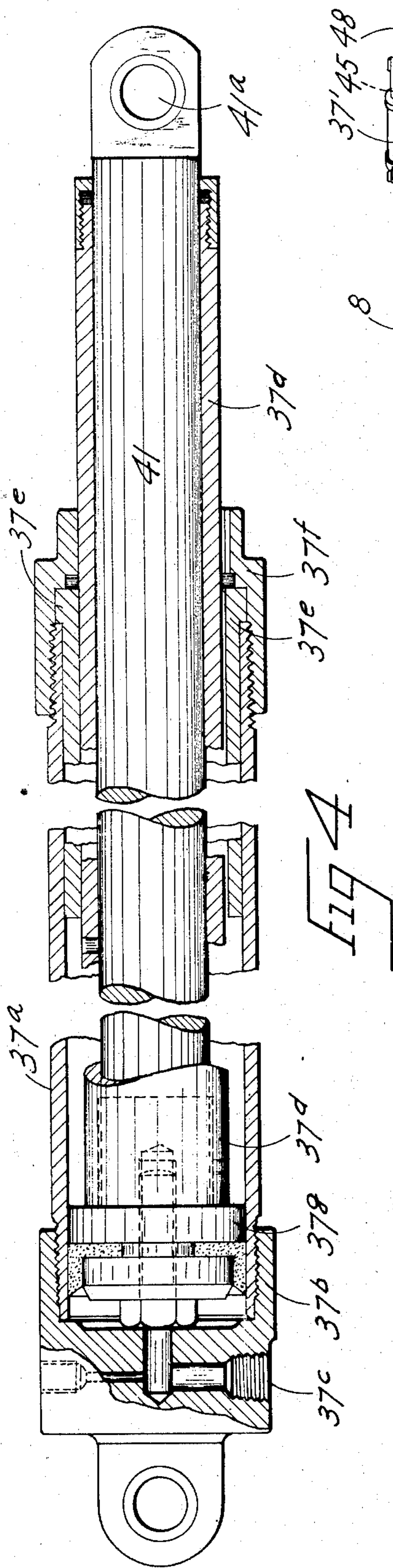
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3 Sheets-Sheet 3



Inventor

ANDREW K. BRUMBAUGH

Richy & Math  
Attorney

## UNITED STATES PATENT OFFICE

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## DUMP TRUCK

Andrew K. Brumbaugh, Cleveland, Ohio, assignor  
to The White Motor Company, Cleveland, Ohio,  
a corporation of Ohio

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17 Claims. (Cl. 298—22)

This invention relates to trucks broadly and more particularly to trucks of the self-dumping type.

An object of the invention is to provide a particularly advantageous type of fluid-actuated mechanism for the dumping doors of dump trucks.

A further object is to provide a combined body-hoisting and dump door opening mechanism of the fluid-actuated type.

A further and more specific object is to provide fluid-actuated mechanism for the dumping door of a dump truck body which will act positively to open or swing back the door to a certain point and which will permit the door to swing back still further without injury to the door or the mechanism, as in clearing dumped material.

A further object is to provide fluid-actuated door opening mechanism for dump trucks wherein provision is made for opening the door either in conjunction with the body-hoisting operation or independently thereof.

It is a further object of my invention to generally improve hoisting mechanisms and door opening mechanism of the type above referred to.

The foregoing and other objects and advantages will be rendered apparent in view of the following description taken in conjunction with the drawings, wherein:—

Figure 1 is a view in side elevation of a dump truck and hoisting mechanism therefor embodying features of the present invention;

Fig. 2 is a view similar to Figure 1, showing the body hoisted to dumping position;

Fig. 3 is a view in plan of the principal parts of the truck chassis and hoisting mechanism, the body being broken away;

Fig. 4 is an enlarged broken longitudinal sectional view of one of the pressure cylinders for opening the rear end door;

Fig. 5 is a view in section taken through the pressure pump, showing its internal construction.

Fig. 6 is an enlarged sectional view of a control valve for the rear end dumping door.

The body 5 of the truck is of a type which is of particular advantage in the hauling and handling of garbage, leaves, snow and like refuse, and is provided with side doors 6, which permit loading of the body from a point well down along the sides thereof, a rear end dumping door 7 and top doors 8. A preferred method of loading this type of body is to load the material into the front thereof through the side door opening until a certain amount has been deposited at

this point, and then hoist the body and slide the material to the rear, repeating the process until the truck is loaded. Obviously, the rear end dumping door 7 must be closed while the loading operation is being carried on, and one of the features of the present invention is concerned with a door-opening control which has been found of especial advantage with this type of body. The body during hoisting is pivotally supported by a shaft 9 mounted in bearing brackets 10 which are fixed to the rear end of the chassis 11 of the truck.

The hydraulic hoisting mechanism as adopted herein for the purposes of illustration comprises a tank or reservoir 12, note particularly Fig. 3, having connected thereto the one end of a low pressure conduit 13 which connects at its opposite end with the low pressure port 14 of a pump P, note Fig. 5. A return conduit 15 also connects at one end with the tank 12 and at its opposite end connects with a nipple 16 for the pump pressure-relief chamber 17.

The pump P may in general be of conventional design and only a portion thereof is shown in section in Fig. 5, including the driving gear 18, check valve 19, high pressure port 20, control lever 21 and valve 22; and relief valve assembly comprising spring 23, pressure-adjusting screw 24, valve 25, valve kickout member 26 and kickout lever 27, the kickout member being provided with a cam 26a which opens the valve when the body 5 attains a predetermined dumping angle, in a manner to be described.

The power take-off for the drive on the pump may be of conventional sliding gear design controlled by a lever 28 within easy reach of the driver, and the valve control lever 21 is shown connected by a link rod 29 with a manual lever 30 located adjacent lever 28.

The hoisting cylinder assembly comprises companion hoisting cylinders 31, which are rigidly connected by a hoist frame and mounted in lower trunnion bearings 31a so that they assume the proper angle as the body rises, outer and inner hollow pistons 32 and 32a, and pistons 33 which are pivotally connected to an upper trunnion bearing 33a, in turn connected to the side frame members of the body 5.

The high pressure port 20 (note Figs. 5 and 3) connects by means of a conduit 34 with a hoist manifold 35, which supplies the main hoisting cylinders 31 with fluid under pressure.

The operation of the hoisting apparatus above described will be readily understood by those familiar with the art. When the body is desired to

be hoisted, the operator puts the pump in operation by throwing lever 28. He then throws lever 30 which in turn throws lever 21 into the position shown in Fig. 5, (the raising position), thereby delivering fluid under pressure to the conduit 34, manifold 35 and main hoisting cylinders 31, forcing the telescoping cylinders 32, 32a and 33 upward and causing the body to rise.

The kickout lever 27 connects with the hoisting cylinder frame by means of a pivotally-connected link rod 36, so that when the body reaches its approximate uppermost position, the lever is turned to idling position, and cam 26a on the kickout member 26 drives the said member down and opens the ball valve 25, thereby permitting the pump to idle. Since valve 19 is a one-way valve, pressure remains constant in the port 20, conduit 34 and hoist manifold 35, thus holding the body in dumping position until lever 21 is thrown to lowering position, whereupon pressure on the high-pressure line is relieved and the body lowers. Cylinders 31 then assume a substantially upright position, pulling link rod 36 back to the position shown in Fig. 1 and closing valve 25. As will be understood, valve spring 23 is adjustable by means of screw 24 to maintain a suitable hoisting pressure in the high pressure port 20.

The hydraulic pressure system embodies means for opening the rear end door, which means is preferably rendered operative through manipulation of the latching mechanism for said door, said means comprising companion cylinders 37, 37', mounted at the sides of the rear of the body 5 and connected into the high pressure line through flexible conduits 38, valve 39 (to be described) and conduit 40.

An enlarged section of one of the cylinder assemblies 37, 37' is shown in Fig. 4. Each assembly comprises a cylinder 37a which at its lower extremity is threaded into a bracket cap 37b, the latter being pivotally anchored to the side of the body 5. Cap 37b is provided with a port 37c, which leads into the cylinder chamber and is interiorly threaded to provide a nipple connection for the flexible conduit 38. Mounted to reciprocate in the cylinder 37a is a hollow plunger or piston 37d. An adjustable bushing or bearing member 37e is fitted into the upper extremity of the cylinder and held in assembled position by an adjusting cap 37f. Bushing 37e limits the stroke of the piston 37d, since the latter is provided with a cap 37g adapted to contact with said bushing. Thus by adjusting cap 37f, the stroke of the plunger 37d may be regulated.

A floating, door-connecting rod 41 is mounted for independent reciprocatory movement in the hollow piston 37d, and is provided at its free end with an eye 41a and a trunnion pin 42 which is journaled in a bracket 43 fixed to the door 7.

It will be seen that when fluid pressure is set up in the cylinder 37a thru port 37c, piston 37d is driven outwardly, opening the door, the piston 37d and rod 41 moving as a unit until said piston reaches the limit of its stroke, whereupon the positive drive on the door ceases. The door may open still further, however, since the rod 41 is free to move outwardly in piston 37d. It will also be seen that the door may be opened manually due to the floating rods 41.

Valve 39 controls admission of fluid pressure to the conduits 38, and is connected with door-latching mechanism (to be described) in a manner such that the cylinders 37, 37' are rendered operative when the door 7 is unlatched. This valve is shown more or less in detail in Fig. 6 and

comprises a casing 39a formed with ports having threaded nipple connections for the lines or conduits 40 and 38, (see also Fig. 3) a conical valve member 39b which is normally urged to its seat by a spring 39c, and a lever 39d which is connected to the valve member 39b to turn the latter. The valve assembly as a whole is carried by a bracket 39e which may be attached to the bottom of the body 5.

Lever 39d is pivotally connected at opposite ends to link rods 44 which in turn are pivotally connected to crank arms 45 secured to rods or shafts 46, the latter being mounted for rotation in lugs 47 fixed to, or forming part of, the body 5. Fixed to the rods 46 are latch pins 48 having threaded thereon handle nuts 49.

To unlatch the door 7, handle nuts 49 are unscrewed and pins 48 swung outwardly. This action turns the rods 46 and the cranks 45, throwing lever 39d and opening valve 39, thereby permitting fluid pressure to build up in the lines or conduits 38 when the body is hoisted.

The operation, in general, of the improved hoisting mechanism is as follows. Assuming that the truck is to be used for collecting garbage: the material is loaded into the front of the body 5 through the opening provided by the doors 6. When a certain amount has been deposited at the front of the body, the operator throws the lever 28 to connect the drive on the pump, and then lever 30 which turns the lever 21 into the position shown in Fig. 5, thereby establishing fluid pressure in the conduit 34 and hoisting cylinders 31, 32 and 32a, forcing the body upward to the position shown in Fig. 2. This slides the material to the rear of the body. This method of loading may be carried on until the body has been filled, the rear dumping door 7 being closed during loading of said body. When it is desired to dump the body, an attendant unlatches the door 7 thereby actuating valve member 39b and establishing communication between conduits 34, 40 and 38 and the hoisting cylinders 37 and 37'. With the lines 40 and 38 in communication, when hoisting pressure is established in the conduit 34, this pressure is communicated to door-opening cylinders 37, 37' and the door is swung open as the body rises. Should the door strike the dumped material when the truck is moving during or after the dumping operation, said door will be free to swing back to clear the material due to the fact that floating rods 41 are permitted to move outwardly in the pistons 37d. Should it be desired to open the door without raising the body, the door may be unlatched and pressure just sufficient to open the door without hoisting the body permitted to build up in the system.

A feature of advantage of the present improved fluid-pressure operated dump truck over those of the mechanically-hoisted and door-opened type is that the pressure in the door-opening cylinder line may be easily regulated so that the door will open sufficiently in advance of the tilting of the body to provide ample door clearance before the body rises.

It will be understood that the foregoing is simply illustrative of the operation of the improved hoisting mechanism, and that the truck may be used for handling and hauling various materials. The advantages of a combined hoisting and door opening mechanism of the type herein disclosed are many, and no attempt has been made to enumerate the same in the foregoing brief description.

It will also be understood that the door open-

ing cylinders 37, 37' could be operated by a separate fluid-pressure system or said cylinders could be connected up with the conventional air brake system in a manner substantially as taught by the present disclosure.

I claim:—

1. In a dump truck, a tiltable body, a dumping door for said body, fluid pressure means for hoisting said body to an angle to dump material therefrom, and fluid pressure means connected up with said first named fluid pressure means for opening said door.

2. In a dump truck, a body, a door for said body from which material is dumped, fluid pressure means for hoisting said body, and a fluid pressure cylinder for opening said door, said cylinder being operatively connected with said fluid pressure hoisting means.

3. A truck comprising a chassis, a tiltable body mounted on said chassis, a rear end door for said body, fluid pressure means for hoisting said body to dump material therefrom, and fluid pressure means for opening said door, said door opening means exerting pressure on the door to open the latter to dump material from the body, and a floating connection for said means to permit further opening movement of said door.

4. A truck comprising a chassis, a tiltable body mounted on said chassis, a door for said body, fluid pressure means for hoisting said body, and a fluid pressure cylinder connected up with said fluid pressure hoisting means, said cylinder being provided with a plunger which exerts pressure on said door to open the latter when hoisting said body.

5. A truck comprising a chassis, a tiltable body mounted on said chassis, fluid pressure means for hoisting said body, a door for said body and means for opening said door, said means comprising a fluid pressure cylinder provided with a plunger, and a floating member mounted in said plunger and connected to said door to provide a limited range of free opening movement for the door beyond the outward stroke of the plunger.

6. A truck comprising a chassis, a tiltable body mounted on said chassis, fluid pressure means for hoisting said body, and a fluid pressure cylinder operatively connected with said means and provided with a plunger having operative connection with said door to open the latter during hoisting of said body.

7. A truck comprising a chassis, a tiltable body mounted on said chassis, fluid pressure means for hoisting said body, and a fluid pressure cylinder operatively connected with said means and provided with a plunger having operative connection with said door to open the latter during hoisting of said body, said piston being provided with a door-connecting member which is free to have limited travel in said piston.

8. In a truck, a chassis, a tiltable body mounted on said chassis, a door for said body, fluid pressure means for hoisting said body to dump material therefrom, and means for opening said door, said means comprising a fluid pressure cylinder having operative connection with said hoisting means, a piston in said cylinder, and an independently movable member in said piston connected to said door.

9. In a truck, a chassis, a tiltable body mounted on said chassis, a door for said body, fluid pressure means for hoisting said body, and means for opening said door when said body is hoisted, said means comprising a fluid pressure cylinder

having operative connection with said hoisting means, a reciprocating piston mounted in said cylinder, and a connecting rod mounted for free reciprocation in said piston and connected to said door, whereby when fluid pressure is admitted to said cylinder, said piston is forced outwardly to open the door after which said door is permitted further outward movement through said freely reciprocating rod.

10. In a truck, a chassis, a tiltable body mounted on said chassis, a fluid pressure means for hoisting said body, and fluid pressure means for opening said door, said latter means having operative connection with said hoisting means and provided with a floating door connecting member to permit unlimited opening movement of said door.

11. In a truck, a chassis, a tiltable body mounted on said chassis, a door for said body, latch mechanism for said door, fluid pressure means for hoisting said body to dump material therefrom, and fluid pressure means for opening said door, said door opening means having operative connection with said hoisting means and said latch mechanism whereby when the door is unlatched said door opening means is automatically connected with said hoisting means.

12. In a truck, a chassis, a tiltable body mounted on said chassis, a door for said body, latch mechanism for said door, fluid pressure means for hoisting said body, and fluid pressure means for opening said door, said latter means including a cylinder, a piston in said cylinder, said piston having an operative connection with said door, and a valve for connecting said cylinder with said fluid pressure hoisting means, said valve being controlled by the latch mechanism of said door.

13. A truck comprising a chassis, a tiltable body on said chassis, a door for said body, latch mechanism for said door, fluid pressure means for hoisting said body, fluid pressure means for opening said door, and a valve for establishing an operative connection between said hoisting means and said door opening means, said valve being connected to the door latching means whereby when the door is unlatched said door opening means is rendered operative.

14. In a truck, a chassis, a tiltable body mounted on said chassis, a door for said body, fluid pressure cylinders for hoisting said body, a pump, a conduit connecting said pump with said cylinders, and fluid pressure cylinders for opening said door, said cylinders being supplied with fluid pressure through conduits which are connected to said first named conduit whereby when the pressure is established in said hoisting cylinders, it is also established in said door opening cylinders to open the door when the body is hoisted.

15. In a dump truck, a tiltable body, a door for said body, one or more fluid pressure cylinders having an operative connection with said door, a fluid pressure system for said cylinders, and floating members in said cylinders permitting movement of said door beyond the stroke of said cylinders.

16. In a truck, a chassis, a tiltable body mounted on said chassis, a swinging door for said body, latches for said door, fluid pressure cylinders having an operative connection with said door for opening the latter, a fluid pressure system for supplying said cylinders with pressure, said system including a valve for admitting fluid to said cylinders, and means operatively connecting said

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latches with said valve for rendering said cylin- fluid pressure system common to said hoisting  
ders operable through the unlatching of said means and door opening cylinders whereby when  
door. pressure is built up in said hoisting means it is

17. In a truck, a chassis, a tiltable body mount- also built up in said door opening cylinders to  
5 ed on said chassis, a swinging door for said body, thereby initiate opening of said door prior to 80  
fluid pressure means for hoisting said body, fluid and/or during hoisting of said body.  
pressure cylinders for opening said door, and a

ANDREW K. BRUMBAUGH.

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