Nov. 10, 1931. S. B. WINN 1,831,154

TRACTOR ACTUATED DUMP BODY TRAILER

Filed Feb. 18, 1927 4 Sheets-Sheet 1

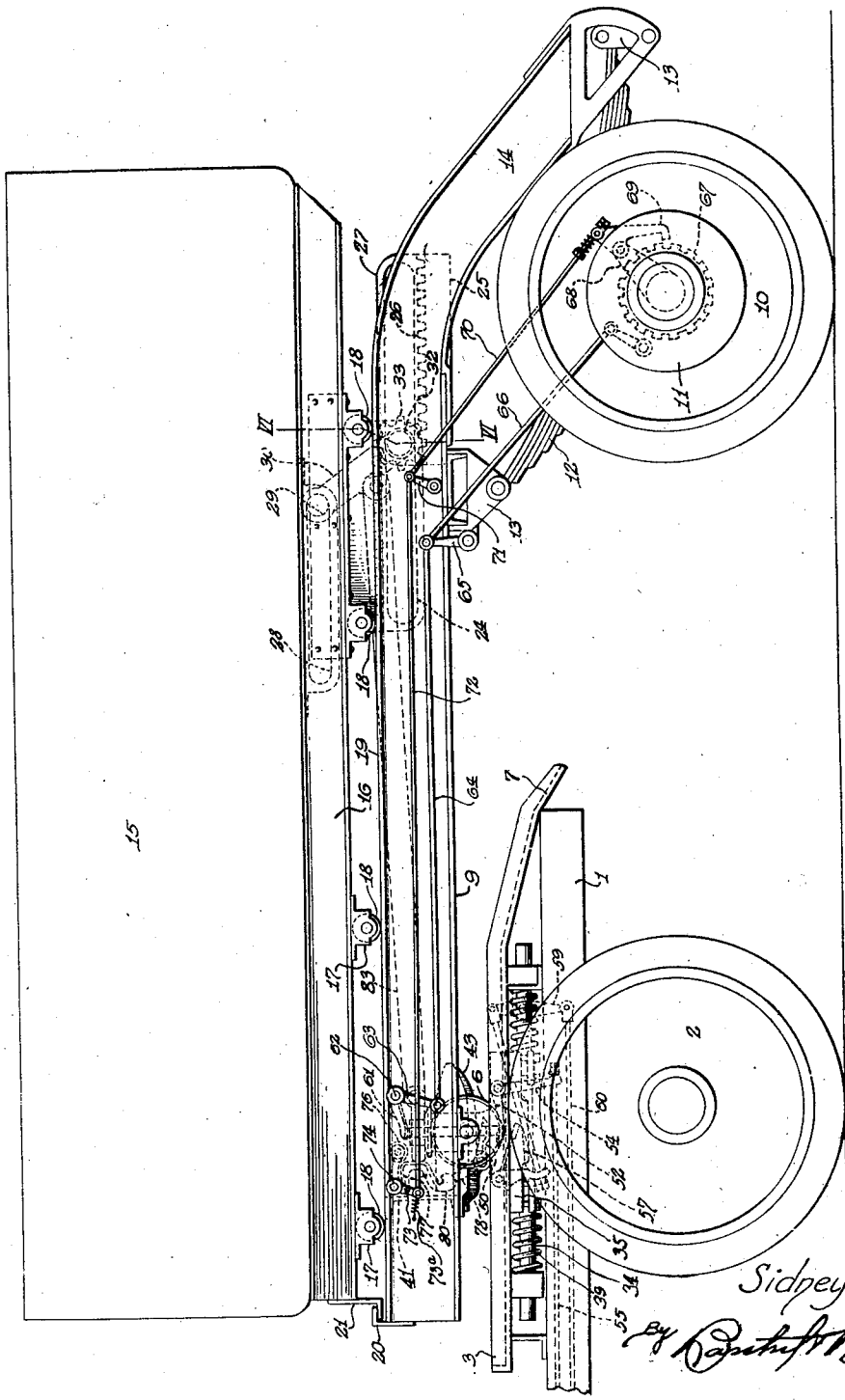


Fig. 1.

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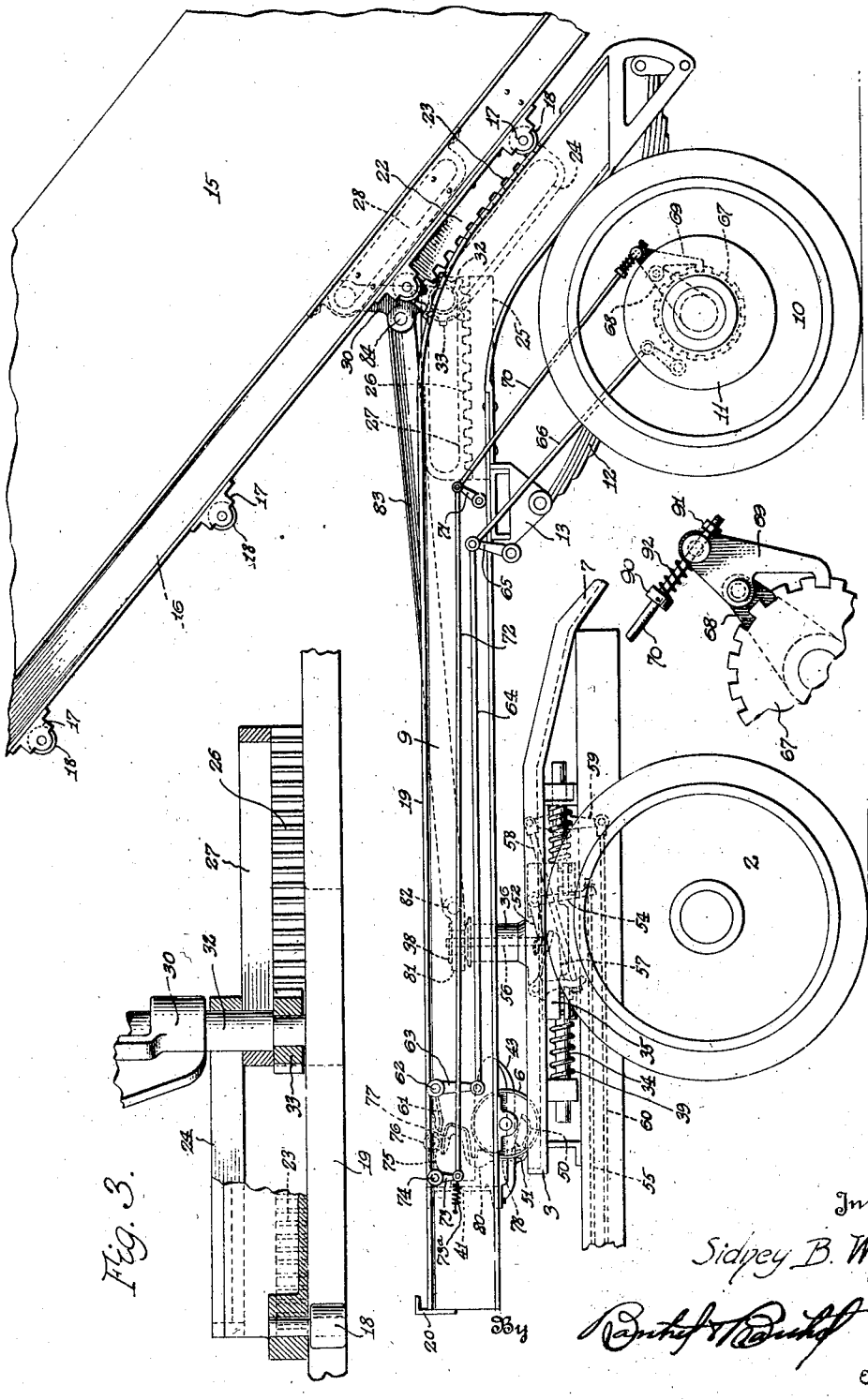


Fig. 2.

Fig. 3.

Fig. 7.

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TRACTOR ACTUATED DUMP BODY TRAILER

Filed Feb. 18, 1927 4 Sheets-Sheet 3

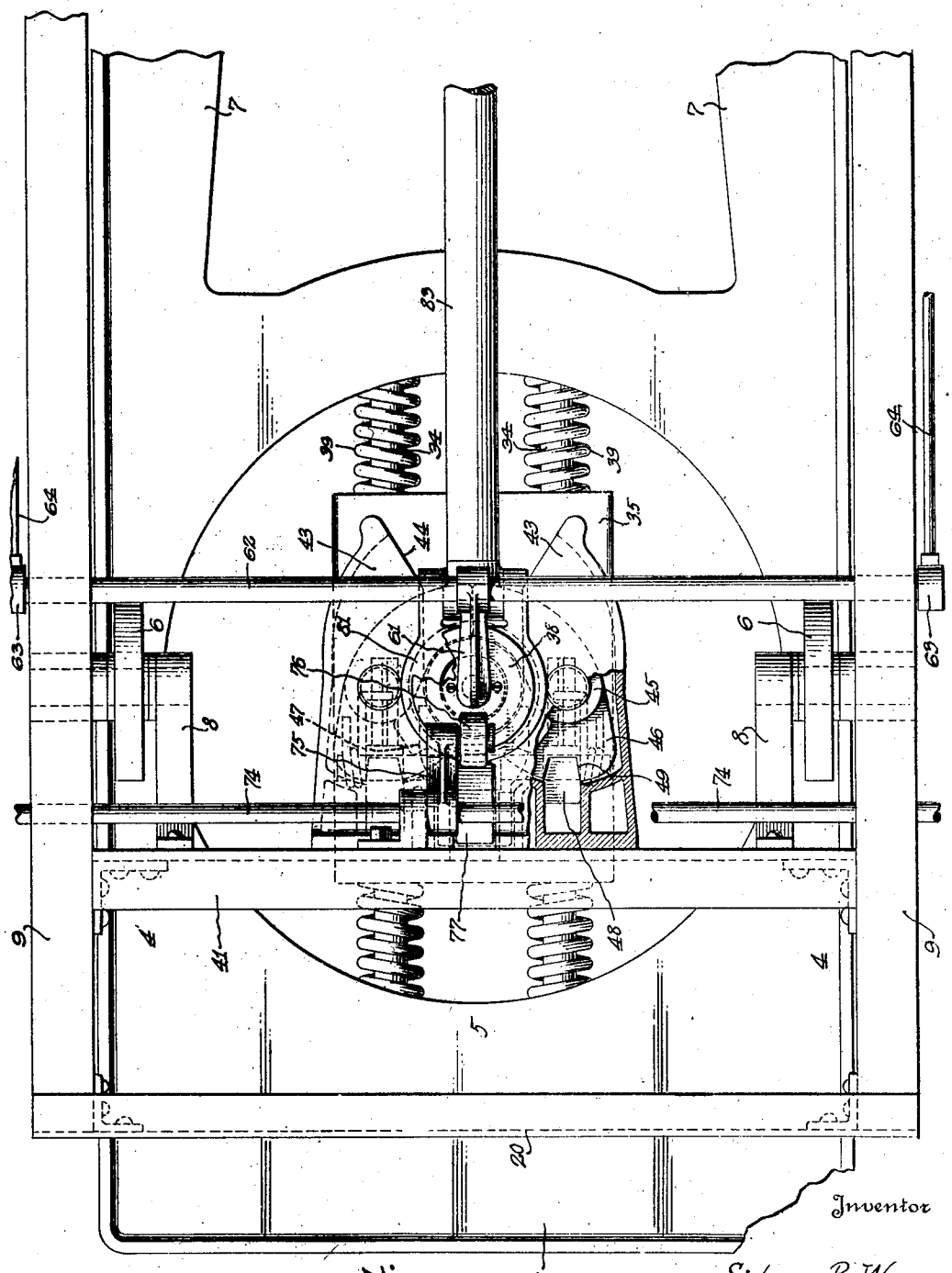


Fig. 4.

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Nov. 10, 1931. S. B. WINN 1,831,154

TRACTOR ACTUATED DUMP BODY TRAILER

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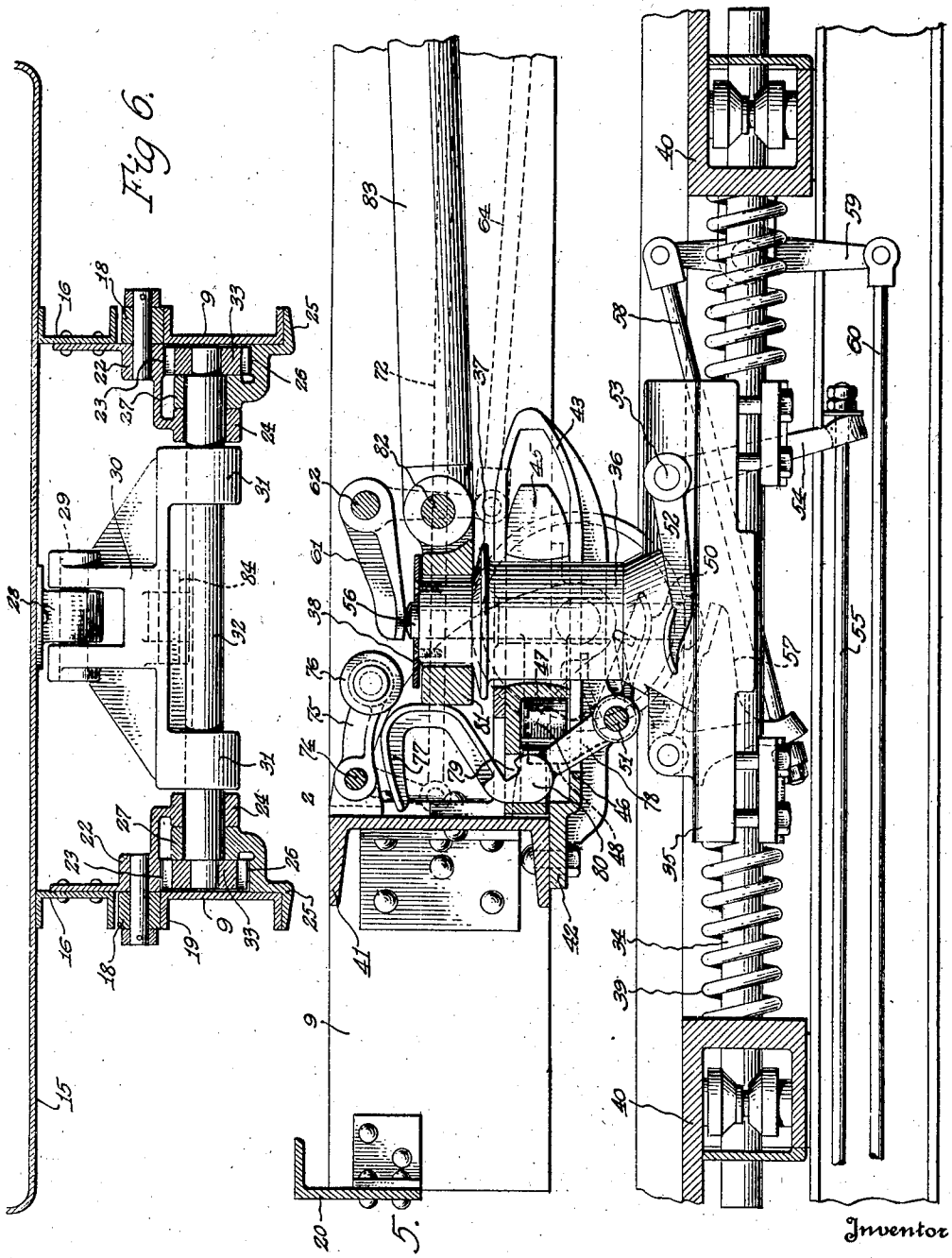


Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE

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TRACTOR ACTUATED DUMP BODY TRAILER

Application filed February 18, 1927. Serial No. 169,217.

My invention aims to provide a tractor actuated dump body trailer and in developing this invention I aim to utilize parts which have now become standard in the manufacture of tractor trailer combinations. For instance, in my Patent No. 1,548,967 dated Aug. 11, 1925, there is disclosed a tractor having its rear end adapted for supporting the forward end of a trailer. The tractor equipment includes a draft appliance supporting a coupling member engageable and disengageable with a coupling member on the forward end of the trailer. The trailer is equipped with brakes and the coupling mechanism of the tractor and trailer includes a trailer brake control mechanism by which the trailer brakes may be controlled from the tractor. There are certain parts of these coupling and brake mechanisms that I now use in connection with this invention, some of which are arranged as in my prior patent and others of which are rearranged and adapted for a dump body trailer. Other parts disclosed in my prior patent are modified or reconstructed, and in this connection reference may be had to the type of tractor trailer coupling disclosed in my application filed March 13, 1926, Ser. No. 94,406, and my application filed Aug. 5, 1925, Ser. No. 48,201 and allowed Nov. 17, 1926.

In my Patent No. 1,588,396 there is disclosed a tractor dump body trailer combination wherein the trailer has a yieldable dump body to be tilted by a hoist located on the tractor. To obviate the necessity of using such a hoist or any means other than the movement of a tractor, is the real purpose of this invention and is attained by positively connecting the tiltable dump body of a trailer with the rear end of a tractor, so that when trailer brakes are locked the tractor may be backed relative to the trailer to raise or tilt the dump body of the trailer.

My invention further aims to furnish a trailer or towed vehicle with an endwise tiltable dump body adapted to be shifted rearwardly relative to the trailer chassis so that the body load may assist in tilting the body to a rear end discharge position. The trailer chassis is constructed to facilitate tilting of the body and allow the body to assume a safe angle for discharge purposes.

My invention further aims to provide a dump body trailer wherein a novel connection is established between the dump body and the trailer chassis, the connection allowing the dump body to be pushed rearwardly and tilted with the connection limiting the movement of the body so that power utilized for shifting the body rearwardly may be further utilized for tilting the body and afterwards restoring it to normal position. The connection is further characterized by preventing a sudden or slamming action of the tiltable body during its movement.

My invention further aims to provide a tractor actuated dump body trailer with a positive lock brake mechanism as an auxiliary to the usual trailer brake mechanism, so that the positive lock mechanism may be employed to prevent a trailer from backing during such movement of the tractor for tilting the dump body on the trailer. The positive lock brake mechanism is made automatic by being applied when the tractor is backed relative to the trailer, and released when a full coupled relation is established between the tractor and trailer for moving such coupled vehicles.

My invention still further aims to provide a tractor trailer combination wherein the trailer is established by coupling members, one of which assists in operatively connecting a dump body of the trailer to the tractor to permit of the tractor actuating the dump body. Ordinarily a tractor coupling member is moved forward and away from a trailer coupling member during an uncoupling operation, but in this tractor actuated dump body

trailer the tractor coupling member is shifted rearwardly away from the trailer coupling member while the tractor is used for actuating the trailer dump body. It is in this connection that I believe I am the first to utilize a backing movement of a tractor to effect tilting of a trailer body for discharge purposes.

My invention will be hereinafter specifically described and then claimed, and reference will now be had to the drawings, wherein

Figure 1 is a side elevation of a tractor actuated dump body trailer with the forward part of the tractor broken away and showing the dump body in a normal horizontal position on the trailer chassis;

Fig. 2 is a similar view showing a tractor having been moved to actuate the dump body of the trailer and placed it in a tilted or discharging position;

Fig. 3 is an enlarged horizontal sectional view of one of the connections established between the trailer chassis and its dump body;

Fig. 4 is an enlarged plan of a portion of the tractor trailer combination showing the coupling mechanism between the tractor and trailer;

Fig. 5 is a vertical longitudinal sectional view of the same;

Fig. 6 is an enlarged cross sectional view taken on the line VI—VI of Fig. 1, and

Fig. 7 is a detail view of a portion of the positive lock brake mechanism.

In the drawings, the reference numeral 1 denotes a portion of a tractor chassis or frame having a rear axle assembly 2 and mounted on the rear end of the chassis or frame is a platform or turn-table 3 which is substantially rectangular in plan in order to provide longitudinal parallel runways 4 as well as a circular way 5 for a set of trailer wheels 6. This platform or turn-table has rearwardly extending inclined rails 7 constituting a track to the platform up which the trailer wheels 6 may ascend when assembling the trailer relative to the tractor. This track will permit of the tractor being used independent of the trailer and in connection with that type of trailer disclosed in my prior patent above referred to. The platform or turn-table differs from the platform or turn-table of my prior patent in having the longitudinal runways 4 which will permit of the platform or turn-table being moved rearwardly under the wheels 6 as the tractor is backed relative to the trailer to actuate the dump body. At all times there is a safe support for the wheels 6 and a fifth wheel action is established by the coupling mechanism of the tractor and trailer, as will hereinafter appear. The set of wheels 6 are supported by suitable bearings 8 at the sides of a trailer chassis or frames 9, preferably contiguous to the forward ends of said frames so that the forward end of the trailer chassis may have a substantial overhanging position relative to the platform 3, as best shown in Fig. 4.

The rear end of the trailer includes a rear axle assembly 10 having a conventional form of brake mechanism 11 and a spring suspension 12. The spring suspension 12 is disposed so as to be conveniently connected by brackets 13, shackles or the like to the rear ends of the frames 9 which are bent or otherwise formed to provide inclined portions 14 adapted to determine the angularity of a trailer dump body 15 when placed in a tilted discharge position, as best shown in Fig. 2. The dump body 15 is supported by bed frames 16 provided with bearings 17 for a plurality of spaced anti-frictional rollers 18 adapted to travel on the upper edges or flanges 19 of the trailer frames 9 (see Fig. 6). It is by virtue of the rollers 18 that the dump body 15 may be easily shifted longitudinally of the trailer frames, and novel connections are established between the dump body 15 and the trailer chassis to prevent lateral or vertical displacement of said dump body during movement of the tractor trailer combination.

One of the connections is automatically engageable and disengageable and is located at the forward end of the dump body and the trailer. At the forward end of the trailer is an angular keeper or transverse angle bar 20 under which may extend a latch or angle bar 21 carried by the forward end of the dump body 15. This connection will prevent vertical displacement of the forward end of the dump body relative to the trailer chassis, except when the dump body is pushed rearwardly to remove the latch 21 from under the keeper 20, preparatory to tilting the dump body.

The other connection between the dump body 15 and the trailer chassis is established at the rear end of the horizontal portion of the trailer chassis and contiguous to the rear end of the dump body 15. The connection includes a set of opposed dump body rack housings 22 which may be conveniently attached to the inner walls of the bed frames 16 with said rack housings serving as bearings for some of the rollers 18, as best shown in Figs. 1 and 6. Each dump body rack housing includes an upper rack 23 and an oblong guide 24 which takes the form of an oblong slot approximating the length of the rack 23, but the guide 24 is set in from the plane of the rack 23 so that there will be a space between the guide 24 and the trailer frame 9 to accommodate other parts of the connection, as will hereinafter appear.

Suitably fixed to the trailer frames 9 is a set of trailer rack housings 25 having longitudinal racks 26 and slotted guides 27. The racks 26 are in the same vertical planes as the racks 23 and the guides 27 are similar to the guides 24 and extend upwardly at the

outer sides of the guides 24, as shown in Fig. 6, so that the slots of said guides may register in part or as a whole depending on the position of the dump body 15 relative to the trailer chassis. It will be noted that there is considerable similarity between the rack housings 22 and 25 and the end walls of these rack housings serve as stops or sockets to the extent of defining a tilted position of the dump body 15.

Suitably attached to the bottom of the dump body 15 and between the rack housings 22 is a slotted guide 28. Slidable in this guide is a pin 29, roller or the like, supported by a yoke 30 provided with bearings 31 for a transverse shaft 32. This shaft has its ends extending through the guides 24 and 27 of the housings 22 and 25 respectively. On the outer ends of the shaft 32 are mounted pinions 33 meshing with the racks 23 and 26 of the housings 22 and 25 respectively. The pinions 33 have rolling action between the racks when the dump body 15 is shifted longitudinally of the trailer chassis, and when the shaft 32 approaches the rear ends of the guides 27 and the forward ends of the guides 24 and 28 the dump body 15 may be tilted with the tilting action allowing certain of the rollers 18 to remain on the trailer frames 19 while the rollers 18 at the forward end of the dump body are raised from the trailer.

The forward end of the trailer is connected to the rear end of the tractor by a coupling mechanism which is semi-automatic and may be controlled from the tractor. The tractor equipment of this coupling mechanism includes a draft appliance mounted on the tractor chassis or frame 1, said appliance including reciprocable roller supported rods 34 supporting the base 35 of a tubular tractor coupling member 36 which is in the form of an upstanding post having a collar 37 and a cap 38. On the rods 34 are coiled springs 39 interposed between the base 35 and roller housings 40 that may support the platform 3 relative to the trailer chassis or frame 1. The springs 39 permit longitudinal movement of the tractor coupling member 36 and this sets up a draft condition that is desirable when coupling the tractor and trailer together or during the operations of the tractor and trailer.

The trailer chassis includes a transverse member 41 and intermediate the ends of this member and at the lower edge thereof is a trailer coupling member 42 having rearwardly extending hollow jaws 43 providing a throat or entrance slot 44 for the tractor coupling member 36, as best shown in Fig. 5. Pivotally mounted in the hollow jaws 43 are horizontally disposed knuckles 45 adapted to cooperate with the jaws 43 in embracing the tractor coupling member 36 to couple the tractor and trailer together. The knuckles are of such a configuration relative to the jaws 43 and the tractor coupling member 36 that should one knuckle be broken or rendered inoperative the other knuckle will prevent disengagement of the tractor and trailer coupling members. These pivoted knuckles have somewhat hook shaped arms 46 extending into a knuckle actuating member 47 slidable in the trailer coupling member 42 and functioning to close the knuckles 45 about the tractor coupling member 36 when said member impinges against the knuckle actuating member 47 incident to coupling the tractor and trailer together. The knuckle actuating member 47 also articulates the knuckles for movement in synchronism and said knuckle actuating member and its knuckles may be held against movement by locking members 48 engageable in notches 49 provided therefor in the arms 46. The locking members 48 are adapted to extend upwardly through the bottom wall of the tractor coupling member 42 and said locking members may be in the form of bell cranks 50 loose on a transverse shaft 51 supported from the bottom of the trailer coupling member 42. The bell cranks 50 are at the sides of the tractor coupling member 36 and are adapted to be engaged by cranks 52 mounted on a rock shaft 53 supported by the base 35 of the tractor coupling member. On the rock shaft 53 is a crank 54 connected to an operating rod 55 extending forwardly on the tractor for operation by the driver of the tractor. The elements 48 to 55 inclusive constitute a locking mechanism controlled by the driver of the tractor for securing the knuckles 45 in a closed position about the tractor coupling member 36.

The tractor equipment includes a trailer brake operating mechanism comprising a pin 56 slidable axially of the tractor coupling member 36. The lower end of the pin 56 is normally engaged by a bell crank 57 pivotally supported by the base 35 of the tractor coupling member 36. The bell crank 57 is operatively connected by a rod or link 58 to a rock arm 59 supported from the platform 3 of the tractor. Connected to the rock arm 59 is a forwardly extending rod 60 adapted to be actuated by the driver of the tractor to shift the pin 56 in the tractor coupling member 36.

Normally engaging the upper end of the pin 56 is a crank 61 on a transverse rock shaft 62 suitably supported by the trailer chassis. The ends of this rock shaft have cranks 63 connected by rearwardly extending reach rods 64 to pivoted cranks 65 supported from the trailer chassis. These cranks are connected by rods 66 to the brake mechanism 11, which may be used for service purposes similar to ordinary vehicle brakes.

The tractor trailer combination also includes a positive lock brake mechanism. There may be times when the service brake mechanism described above fails to firmly

hold the trailer, particularly when the tractor is backing under the forward end of the trailer to discharge a load. The positive lock brake mechanism includes a toothed wheel 67 fixed for rotation with each ground engaging wheel of the trailer. Adjacent the toothed wheels 67 are brackets 68 supporting pivoted toothed dogs 69 adapted to engage the toothed wheels 67 and prevent rotation thereof.

The dogs 69 are slidably engaged by rods 70 having abutments 90 and 91 with coiled expansion springs 92 encircling said rods between the dogs 69 and the abutments 90. When the rods 70 are pushed upon the dogs 69 are forced into engagement with the tooth wheels 67. If the dogs 69 rest on the teeth of the wheels and do not immediately interlock therewith, the rods 70 slide and compress the springs 92, so that slight movement of the tooth wheels 67 releases the dogs 69 to snap into mesh with the wheels under the influence of the springs 92. The abutments 91 are brought into action by pulling on the rods 70 to disengage the dogs 69 from the tooth wheels 67.

The rods 70 are connected to pivoted cranks 71 on the trailer chassis and these cranks are connected by forwardly extending reach rods 72 to cranks 73 on a transverse rock shaft 74, carried by the trailer chassis. Springs 73*a* are attached to the cranks 73 or located at some convenient place throughout the brake connections to hold the dogs 69 disengaged. On the rock shaft 74 is a crank 75 having an anti-frictional roller 76 adapted to be engaged by the upper cam end 77 of a crank 78 loosely mounted on the rock shaft 51. The crank 78 necessarily extends through the bottom of the trailer coupling member 42 and also through an opening 79 in the knuckle actuating member 47, said crank having a rounded enlargement 80 within the opening 79 so as to easily move therein.

On the upper end of the tractor coupling member 36 and retained thereon by the cap 38 is an eye head 81 pivotally connected by a pin 82 to the forward end of a reach rod 83 extending rearwardly and having its rear end pivotally connected, as at 84, to the yoke 30 which articulates the dump body 15 relative to the trailer chassis. The reach rod 83 constitutes a connection between the tractor coupling member 36 and the dump body 15 whereby backing of the rear end of the tractor under the forward end of the trailer may actuate the dump body. By removing the pin 82 the dump body trailer may be disconnected from the tractor and thus permit of the tractor being used for other purposes. Obviously some means will be provided for supporting the forward end of the trailer when not connected to the tractor. This condition, however, is not a salient feature of my invention, because the trailer is adapted to be a permanent part of the tractor and constitute a six-wheel vehicle of such size that large loads can be safely carried and just as readily moved as a four-wheel vehicle. From a manufacturing standpoint the greater part of the tractor structure is standardized and thus may be used in connection with a dump body trailer or any other form of trailer or towed vehicle.

In describing the operation of the tractor actuated dump body trailer it will be assumed that the dump body 15 is in a horizontal loaded condition and has been placed for discharging its load. To accomplish this the driver of the tractor may actuate the rod 60 to set the service brake mechanism 11 of the trailer.

The driver then actuates the rod 55 and through the medium of the elements 54, 53, 52 and 50 the locking members 48 are shifted out of engagement with the arms 46, thus unlocking the knuckles 45. The driver then backs the tractor relative to the trailer causing the tractor coupling member 36 to open the knuckles 45 and through the medium of the arms 46 the knuckle actuating member 47 is advanced, as though following the tractor coupling member 36, thereby causing the crank 78 to swing towards an upright position thus carrying the upper cam end 77 of the crank under the anti-frictional roller 76. This causes the shaft 74 to be rocked and by virtue of the rods 72 and 70 the dogs 69 are interlocked with the tooth wheels 67. As the dogs 69 are carried by the stationary brackets 68 the ground engaging wheels of the rear axle assembly will be positively held against rotation. This is in addition to the service brake and even though the driver of the tractor has not set the service brake the positive lock brake mechanism has been automatically set by rearward movement of the tractor relative to the trailer. Since the trailer wheels 6 move on the runways 4 of the platform 5, the trailer does not move rearwardly very far before the positive lock brake mechanism would be set to secure the trailer against backing during further backing of the tractor. This movement of the trailer, however, is prevented, during initial movement of the tractor, by the driver applying the service brakes of the trailer. The set condition of the positive lock brake mechanism has been shown in Fig. 2 and the tractor uncoupling member 36 fully disengaged from the trailer coupling member 42. It will be noted that the brake control mechanism of the tractor is separable from the brake control mechanism of the trailer and that while the service brake mechanism of the trailer has been released, the brake action has been transferred from the service mechanism to the positive lock brake mechanism.

As the tractor is backed the tractor coupling member 36 pushes on the reach rod 83 and the dump body 15 is caused to roll rear-

wardly on the trailer chassis. The pinions 33 roll on the racks 26 of the trailer housings 25 and motion is translated by these pinions to the racks 23 of the trailer housings 22. By virtue of the coupling pin 29 engaging the rear end wall of the slotted guide 28 the dump body 15 is moved rearwardly thus carrying a part of the load to an overhanging position relative to the inclined portion 14 of the trailer chassis. The shaft 32 having reached the forward ends of the trailer guides 24 and the rear ends of the trailer guides 27 the yoke swings to substantially a vertical position with the pin 29 sliding in the dump body guide 28, thus elevating the forward end of the dump body. Some of the rollers 18 are necessarily removed from the trailer chassis, but the rearmost rollers remain in engagement with the inclined portion 14 of the trailer chassis. These rollers will cooperate with the three-point connection established by the yoke 30 in defining the angularity of the dump body relative to the trailer chassis. The angularity is such that a load may be readily discharged from the rear end of the dump body.

The load having been discharged the driver can move the tractor forward and gradually place the dump body 15 in its normal horizontal position on the trailer chassis. As the dump body 15 assumes normal position the tractor coupling member 36 enters the trailer coupling member 42 and impinges against the knuckle actuating member 47 which not only closes the knuckles 45 about the tractor coupling member 36, but will swing the crank 78 to release the anti-frictional roller 76 and the positive lock brake mechanism. This is also accomplished by the head 81 of the trailer reach rod 83 impinging against the cam end 77 of the crank 78. The pin 56 of the tractor coupling member 36 assumes an operative position relative to the crank 61, so that the service brake mechanism is again placed in a control condition. When the tractor coupling member 36 causes the knuckles 45 to cross about it, the knuckles receive the locking members 48, this locking of the knuckles being an automatic operation which permits the tractor manipulating the trailer in the usual manner. The tractor coupling member being mounted on a draft appliance permits of this appliance serving as a yieldable connection between the tractor and the dump body 15, so that should the dump body tend to stick in any of its positions there is no danger of tractor movement subjecting the dump body connections to excessive strains and stresses that would tend to break the same.

The co-operation of the service and positive lock brake mechanisms is such as to suggest proportioning the crank 61 and the upper end 77 of the crank 78 so that the latter will ride under the former and thus maintain the service brake applied during application of the positive lock brake mechanism.

In connection with the operation of the structure in moving the dump body to and from its dumping position by the backing of the tractor, it is to be noted that the dump body movements are practically arranged to provide for two distinct movements of the body—first, a movement in a horizontal plane to position the body in the tilting position (the length of this movement defining the distance travelled by the body rearwardly from its transportation position), and second, the tilting movement which takes place when the body has reached the limit of its horizontal movement; as presently pointed out, the tilting movement is, in the specific form illustrated, divided into movements on two separate axes. This will be apparent from the following:

When the knuckles of the coupling instrumentality are released to permit the backing movement of the tractor relative to the trailer, the movement of the tractor, in backing, places the power of the tractor upon yoke 30 through the reach rod 83, which connects the coupling member with the yoke. At this time the body is being supported in its horizontal plane through rollers 18 resting on frames 9, with the body in its forward position and so located as to place its center line (vertical) well forward of the center of the distance between the axis of the trailer wheels 10 and the axis of the tractor wheels 2, the load weight thus being well distributed with a large part carried by the tractor. It may be noted that, throughout the travel of the body in such horizontal plane, this center line of the body does not reach a vertical plane extending through the axis of the trailer wheels 10, so that the load weight distribution remains divided between tractor and trailer throughout the travel in this plane; hence there is no tilting action produced or aided by the load weight, so that the conditions of overbalancing of the dump body through the action of the load weight is eliminated.

When the tractor begins its backward movement relative to the trailer, the application of the power to the yoke 30 sets up certain conditions. As pointed out heretofore, the yoke connects the body and trailer—indicated in Fig. 5—the upper or body end of the yoke being mounted in the slot of member 28, while the lower or trailer end of the yoke is located in the slot of member 27. The body is also connected with this lower end of the yoke through the fact that shaft 32 also extends in the slot of member 24 which is connected to the body, the reach rod 83 being connected to the yoke intermediate the ends of the latter. Members 27 and 28 are so located that the distance between the upper and lowers ends of the yoke is greater

than the distance between the planes of the slots of these members—the distance between the axes of pin 29 and shaft 32 being greater than the distance between parallel planes which extend horizontally through the centers of the slots of members 27 and 28; as a result, the yoke normally extends in a direction inclined rearwardly and downwardly from its upper end, as indicated in Fig. 1. This inclination of the yoke is maintained during the travel of the body in the horizontal plane, due to the fact that any attempt of the yoke to rock has the effect of requiring the axis of pin 29 to travel in an arc of which the center line of the slot of member 28 would form the chord; to permit such travel, it would be necessary for the rear end of the body to rise, and this would be prevented because of the relation of member 24 and shaft 32; hence, as long as there is no resistance to the travel of shaft 32 rearward sufficient to form a positive stop to such movement, these conditions will be maintained with the yoke inclined, since the alternative to raising the rear end of the body is that of raising the forward end, and the absence of such stop would place the load of the front of the body as preponderant over the resistance to travel of shaft 32 rearwardly prior to the time when the stop condition is set up.

As a result of this condition and the use of the rack and pinion arrangement certain characteristic features are produced. Since pin 29 is held from travelling in an arc when the power is first applied to the yoke, said pin tends to produce a resistance to the advance of the yoke, thus constituting the yoke as a lever tending to operate with the pin as an axis, the result being that the shaft 32 and of the yoke receives the effect of the power being applied, so that shaft 32 is caused to travel rearward in the slot of member 27. As pinion 33 is carried by shaft 32, the axis of the pinion is moved a corresponding distance. But, owing to the connection of the pinion with racks 23 and 26, this movement of the pinion axis becomes translated into movement of the body rearward, with the movement of the body at twice the speed of that of the pinion axis; this is due to the fact that the body not only moves the distance traversed by the pinion axis, but is also moved the distance which represents the arc of the pinion in which are found the teeth which have traversed the teeth of rack 26 in moving this distance—a corresponding number of teeth of rack 23 having been engaged by the pinion teeth during this period. This will be understood by comparing Figs. 1 and 2; in the former, shaft 32 occupies a mid position between the forward end of the slot of member 24 and the rearward end of the slot of member 27—in the latter view, the forward end of the slot of member 24 has practically reached the location of the rear end of the slot of member 27; obviously, the movement of the forward end of the slot of member 24 has taken the same length of time to travel this distance as is taken by shaft 32 in travelling the length of the slot of member 27 with the result that during this period of travel of the shaft, the body has travelled twice the length of travel of the shaft, since member 24 is carried by the body.

During this period, however, pin 29 has moved rearwardly at the same speed of travel as that of shaft 32, although the body has been moving at twice this speed. This difference in speed of travel of the pin and body is permitted by reason of the slot of member 28, the rear end of this slot gradually moving away from the pin 29, as the body is moved rearwardly. While the removal of the wall of the rear end of the slot of member 28 would seemingly take away the resistance to movement of the pin and permit the latter to follow the walls, such is actually not the case, due to the fact that the resistance to movement of the pin is provided by the inability of the pin to travel in an arc, being limited to travel along the chord of the arc, as long as shaft 32 is free of travel in the direction of length of the slot of member 27, as above pointed out. As a result, the rearward movement of the body during this period will have the effect of gradually placing the forward end of the slot of member 28 in juxtaposition to the pin 29 as shaft 32 reaches the end of its rearward travel.

From the above it will be seen that, based on the dimensions of parts illustrated in the embodiment shown in the drawings, when shaft 32 has reached the rear of the slot of member 27, the body has travelled rearward a distance where the front end of the slot of member 24 is also engaging the shaft, and from the relation of the roller 18 above this forward end of the slot, in Fig. 1, it will be apparent that this particular roller is then located about at the point where the inclination of the ends 14 begins, a point that is in the vicinity of a vertical plane extending through the axis of the trailer wheels 10; however, a comparison of the length of the body in advance of this roller and that which is in rear of this roller, will clearly indicate that the preponderance of weight is forward of the roller, with the result that the body still remains in the horizontal plane, with the rear roller 18 out of contact with frame 9 and spaced a considerable distance from such frame. However, this shift of the body has placed the latter so as to place a considerable part of the load weight in rear of the vertical plane through the axis of wheels 10—and particularly the axis of this roller 18 which is located in the vicinity of such axis—so that the weight to be raised in tilting the body, is largely reduced, being simply the pre-

ponderance of the load which is forward of such vertical plane over that which is in rear of such plane.

When this position of the body is reached, further application of power to yoke 30 has the effect of changing the leverage of the yoke. During the previous movement the effect of the power was placed more particularly on the shaft end of the yoke due to the inability of pin 29 to travel in an arcuate path, although permitted to travel in a straight path; in this later position of the parts, however, further movement of the shaft rearward is prevented by reason of its contact with the rear end of the slot of member 27, and hence said shaft now becomes the fulcrum of leverage of the yoke. As a resnlt, the application of the power is made effective on the pin end of the yoke to raise the forward end of the body, the effective load weight of which has been largely decreased through the change in position of the body as above pointed out. This result is produced by the pin 29 beginning to traverse its arc of movement, with the axis of motion provided by shaft 32. The raising movement of the forward end of the body is a pivotal movement with the pivot point provided by the roller 18 that is now located in the vicinity of the vertical plane through the axis of the wheels 10, the rear end of the body being free to move downward due to the inclined ends 14. As the axis of yoke movement and the axis of body movement are not alined, the travel of pin 29 in its arc will cause the pin to move closer to the forward end of the slot of member 28; since the pivot roller 18 is practically held from moving downward over the inclined end 14 by the inability of the pinion to rotate because of its engagement with the racks 23 and 26, the tilting motion of the body is simply pivotal, with the said roller 18 serving as the pivot until the body has been tilted sufficient to bring the rear roller 18 into contact with the inclined end 14; if further power is applied, the rear roller 18 takes up the service of pivot for the body movement, as indicated in Fig. 2, this movement being limited, however, by pin 29 reaching the forward end wall of the slot of member 28, this taking place before the yoke has the opportunity of carrying pin 29 past the dead center of its arcuate movement; in this position the yoke is practically vertical, as illustrated in Fig. 2.

As will be understood, the weight preponderance has been forward of the axis of pivotal movement (excepting possibly during the few moments of actual dumping), and hence, when the load has been dumped, this weight factor remains active as an aid to restore the body to its horizontal plane as the tractor begins to move forward to restore the parts to their initial position; the reach rod 83 can serve to draw the yoke from a dead center position, if the latter has been reached. This preponderance of weight, however, is incapable of producing a sudden drop of the front end of the body, due to the fact that such movement would have to take place with pin 29 as the axis of movement, and the fact that member 24 is still held by shaft 32, prevents pivotal movement of the body with pin 29 as the axis of motion. As a result, the body will return to its horizontal plane at the speed represented by the advancing movement of the tractor, so that the operator of the latter is able to control the lowering movement of the body through his control of the tractor movements, reach bar 83 serving as the control in this respect, since the yoke can not move to its inclined position any faster than the reach rod will permit. After the body has reached its horizontal plane, the forward movement of the tractor provides the power, applied to the yoke 30 through reach rod 83, for advancing the body to its forward position. During this latter period, the leverage conditions of the yoke take on the characteristics which were present during the rearward travel of the body, with the exception that movement of the pin end of the yoke in an arc of the opposite direction is prevented by the lower wall of the slot of member 28, and hence the power is applied to the shaft end of the yoke to move the latter forwardly and causing the consequent movement of the pinion to move the body forward at twice the speed of advance of the shaft, the body being permitted to have this movement by reason of pin 29 travelling in the slot of member 28.

There are a number of advantages resulting from this arrangement. Among these is the fact that the load weight is practically all forward of the trailer axle during transportation, and thus well distributed between tractor and trailer. Since the arrangement at no time sets up the condition where the rear of the load can overbalance the forward end of the trailer there is no likelihood of this taking place accidentally. The power requirements for moving the maximum load are limited to those required to move the load in the horizontal plane, so that there is no requirement of power sufficient to raise the maximum weight; when tilting action takes place, the effective load weight to be raised has been greatly reduced by placing the pivot point of tilting action intermediate of the length of the body, causing a portion of the load weight to be balanced before tilting action begins. During the tilting movement, the rear end of the body is being moved toward the ground, such end describing an arc leading downwardly from the horizontal. The tilting action being on an intermediate pivot, the inclination is developed rapidly, if desired, the rate of development being entirely under the control of the operator through his control of the speed of the trac-

tor. The development of the inclination can be stopped at will, and will be retained in any position in which it is stopped. As a result, the tilting action is of maximum flexibility to meet particular needs.

In addition to these advantages bearing on the tilting action, the rack and pinion activities in connection with the yoke movements provide the advantage of obtaining the desired length of movement of the body in the horizontal plane with a shortened length of movement of the tractor. This is of importance because of the fact that since the front end of the trailer is supported on the tractor and remains so supported throughout the movements described, the ability to obtain the desired length of body movement as well as the tilting movement of the body by a comparatively short length of movement of the tractor permits the platform 3 to be of a reasonable length in the direction of traction—a length which is not detrimental to use of the tractor for other services, and which does not require the use of a tractor of greatly increased length. Hence, it is possible to employ dump bodies of comparatively large capacities without unduly increasing the length of the tractor trailer combination—an advantage in transportation conditions because of greater ease in turning corners, etc.

In addition to these, however, there is the greater advantage that is presented by the combination as an entirety, in that the entire operation is under the control of the tractor operator while the latter is in position to control the tractor operations. The fundamental of the invention is to utilize the power of the tractor for the purpose of dumping, with the power made manifest by the movement of the tractor bodily; to control the tractor movements in order to make this power manifest, it is essential that the operator be at his tractor-operating station. Hence, the fact that the controls of the dumping operation are also brought to this station, makes it possible for the operator to have complete control of the movements of the dumping body. The service brake mechanism control and the control of the knuckle lock of the coupling instrumentality are located at this station. With these, the operator is able to set in motion the successive developments of the dumping activities, through the fact that the positive trailer lock is brought into activity automatically, after which the succeeding developments are dependent upon his manipulation of the tractor controls to set up the desired movements of the tractor. Aside from manipulation of end gate structures, if present, the entire operation is one which is under the direct control of the tractor operator while at his station on the tractor.

What I claim is:—

1. In a tractor-trailer combination, a tractor, a trailer having supporting wheels, a dump body on and carried solely by the trailer, a coupling means for said tractor and trailer, said coupling means being operatively controlled from the tractor, and means connecting the tractor and dump-body so that movement of the tractor independent of the trailer will cause longitudinal movement and tilting of the dump-body relative to the trailer, said latter means being inactive when the coupling means is active and being rendered active during relative movement of the body and trailer supporting wheels in the direction of traction.

2. A tractor trailer combination as called for in claim 1 and a connection between said trailer and dump body which limits the tilting action of said dump body by said tractor.

3. In a tractor-trailer combination, a tractor, a trailer having supporting wheels, a dump-body on and carried solely by the trailer, a coupling member on said tractor, a coupling member on said trailer engageable and disengageable with said tractor coupling member, the coupling and uncoupling activities of said coupling members being controlled from the tractor, and means connecting the tractor coupling member and the dump-body so that movement of the tractor independent of the trailer will cause longitudinal movement and tilting of the dump-body relative to the trailer, said latter means being inactive when the coupling means is active and being rendered active during relative movement of the body and trailer supporting wheels in the direction of traction when the coupling members are inactive for coupling purposes.

4. The combination of a tractor, a coupling member thereon, a trailer, a coupling member on said trailer in front of said tractor coupling member and adapted to be engaged and disengaged by said tractor coupling member, and a tiltable dump body on said trailer operatively connected to said tractor coupling member and adapted to be tilted by movement of said tractor coupling member to and from said trailer coupling member.

5. A tractor trailer combination as called for in claim 4 and a connection between said trailer and dump body which limits the tilting action of said dump body by said tractor coupling member.

6. The combination of a tractor, a coupling member thereon, a trailer, a coupling member on said trailer adapted to be engaged and disengaged by said tractor coupling member, and a body on said trailer operatively connected to the tractor coupling member and adapted to be moved to its load discharge position by movement of said tractor coupling member away from said trailer coupling member.

7. The combination called for in claim 6 wherein the operative connection and control

of said body by said tractor coupling member is attained by a reach rod between said body and tractor coupling member.

8. The combination called for in claim 6 wherein the zone of movement of said tractor coupling member is in the rear of its coupling position with said trailer coupling member.

9. The combination called for in claim 6 wherein the movement of said body to its load-discharge position includes a longitudinal and a rear end tilting movement relative to said trailer.

10. The combination of a tractor, a trailer, coupling members connecting said tractor and trailer, said members being separable by relative movement in the direction of traction, said trailer having its forward end normally resting on the rear end of said tractor so that the forward end of said trailer may be supported by said tractor during a backing movement of said tractor under said trailer, said coupling members being adapted to be separated by backing of said tractor relative to said trailer, and a dump body on said trailer connected to the coupling member of said tractor with the connection operative to move the dump body toward its dumping position by and during the separating movements of the coupling members.

11. In a tractor trailer combination, a tractor, a coupling member thereon, a trailer, a coupling member on said trailer adapted to be connected to said tractor coupling member by longitudinal movement of said tractor relative to said trailer, said tractor having its rear end supporting the forward end of said trailer with said trailer coupling member in front of said tractor coupling member whereby said tractor may be backed under said trailer to separate said coupling members, a body movable on said trailer, and means actuated by backing of said tractor relative to said trailer adapted to effect movement of said body on said trailer.

12. A tractor trailer combination as called for in claim 11 wherein said means includes a connection with said tractor coupling member, said connection having a sliding engagement with said trailer and with said body.

13. In a tractor trailer combination, a tractor, a trailer, a dump body on said trailer adapted to be shifted rearwardly and tilted, and means operatable by movement of said tractor relative to said trailer adapted for shifting said body to and from its tilting position, said means including a connection between said body and trailer which affords a shiftable pivot for said body, and complemental rack and pinion formations operatively connecting the body and trailer for controlling movements of the body to and from its dumping position.

14. In a tractor trailer combination, a tractor, a trailer having its forward end supported on the rear end of said tractor and normally coupled thereto, a dump body movable lengthwise of said trailer and tiltable at the rear end of said trailer, housings on said body, housings on said trailer, a shaft having its ends extending into said housings, a yoke pivotally connected to said shaft and slidably connected to said body, and a reach rod connecting said yoke to said tractor whereby said tractor may be moved to cause tilting of said dump body.

15. A tractor trailer combination as called for in claim 14 and racks in said housings and pinions on said shaft meshing with said racks to control the movement of said dump body.

16. A tractor trailer combination as called for in claim 14 wherein rollers support said body on said trailer and said trailer has a rear inclined portion on which said rollers travel and assist in defining a tilted position of said body.

17. A dump body trailer including a chassis having a rear inclined portion, a dump body movable on said trailer chassis and tiltable at the inclined portion thereof, a tractor normally coupled to said trailer and adapted to be uncoupled by backing the tractor under the trailer, and means actuated by the backing of said tractor relative to said trailer adapted to move said dump body on said trailer chassis and tilt it onto the inclined portion of said chassis.

18. In a tractor trailer combination, a trailer, a tiltable dump body on said trailer, a tractor normally coupled to said trailer and adapted to be uncoupled by backing said tractor relatively to said trailer, means actuated by backing said tractor adapted to tilt said dump body, and means actuated by uncoupling said tractor relative to said trailer adapted to hold said trailer against backing during a backing movement of said tractor.

19. A tractor trailer combination as called for in claim 18, wherein said means includes a trailer positive lock brake mechanism.

20. In a tractor-trailer combination, a tractor, a trailer carrying a dump body thereon with the body adapted to be placed in load discharging position by longitudinal movment and tilting of the dump body relative to the trailer, coupler members normally coupling said trailer to the tractor and adapted to be moved from coupled relation by backing of the tractor relative to the trailer, means operatively connecting the tractor and body by which backing of the tractor while the coupling members are in uncoupled relation will move the body to its load discharging position, and means operable by the operation of uncoupling the tractor and trailer adapted to hold said trailer from backing during such backing operation of the tractor.

21. A tractor trailer combination as called

for in claim 20 wherein said trailer-holding means extends through one of said coupling members and is actuated through the medium of the other coupling member.

22. In a tractor trailer combination, a trailer, a movable dump body on said trailer adapted to be moved to discharge its load, a tractor, means connecting said trailer to said tractor so that said tractor may pull said trailer, said means being disconnected by backing said tractor relative to said trailer, means operatable by backing said tractor adapted to move said dump body for load discharging purposes, and means set in action by disconnecting said tractor and trailer adapted to hold said trailer against backing under the influence of said tractor.

23. A tractor trailer combination as called for in claim 22 wherein the first mentioned means includes knuckles actuated by backing of said tractor, and the last mentioned means a brake mechanism applied by movement of said knuckles.

24. A tractor trailer combination as called for in claim 22, wherein the last mentioned means includes a positive lock trailer-brake mechanism.

25. In a tractor-trailer combination, a tractor, a dump-body trailer having a body adapted to be moved to its load-discharge position by backing the tractor relative to the trailer, said tractor and trailer being normally held against such relative backing movement by means controlled from the tractor, said tractor backing movement for body-positioning being contingent on said trailer being held against backing movement with the tractor, and means operative to hold said trailer against backing during dump-body positioning movements, said means comprising a trailer brake mechanism automatically applied by initial backing movement of the tractor, whereby the load discharge is controllable from the tractor.

26. A tractor-trailer combination as in claim 25 characterized in that the normal holding includes engagable and disengagable means connecting the tractor and trailer and operably controlled from the tractor, said means being normally engaged to prevent relative movement of tractor and trailer for load discharge activity and being disengaged to permit such relative movement.

27. A tractor-trailer combination as called for in claim 25, wherein the last mentioned means includes a positive lock clutch mechanism released by forward movement of said tractor relative to said trailer.

28. In a tractor-trailer combination, a trailer, brakes for the trailer, a dump body on said trailer normally positioned away from dumping position, a tractor supporting the forward end of the trailer, a coupling instrumentality for the tractor and trailer adapted to concurrently effect movement of the dump body longitudinally to its dumping position and actuation of the trailer brakes when the tractor is backed relative to the trailer, means being provided for operatively connecting the body and instrumentality.

29. In a tractor trailer combination, a trailer, brakes for said trailer, a movable dump body on said trailer, a tractor supporting the forward end of said trailer, a coupling for said tractor and trailer adapted to be uncoupled by backing said tractor relative to said trailer, and means operatable by such uncoupling operation adapted to apply said trailer brakes and move said dump body relative to said trailer.

30. In a tractor trailer combination, a trailer, a tiltable dump body on said trailer adapted to be moved to and from a tilting position, a tractor normally coupled to said trailer and adapted to be backed under said trailer to position the body in tilting position and to effect tilting of said dump body to dump the latter, brakes for said trailer, and means operatable by the backing of said tractor to apply the brakes of said trailer, said means being restored to normal condition with the trailer brakes released by said tiltable dump body assuming its normal position on the trailer.

31. In a tractor trailer combination, a trailer, a tiltable dump body on said trailer, a tractor normally coupled to said trailer and adapted to be backed under said trailer to an uncoupled position and during such backing cause said dump body to be moved and tilted, brakes for said trailer adapted to be applied by said tractor backing under said trailer, and means actuated by said tractor assuming a coupled relation to said trailer adapted to successively restore said dump body to normal position and release said brakes.

32. In a tractor trailer combination, a tractor, a trailer, a platform on said tractor supporting the forward end of said trailer and of such configuration that said tractor may back under said trailer and support said trailer during such backing, coupling members connecting said tractor and trailer at said platform and adapted to be disconnected by said tractor backing relative to said trailer, brakes for said trailer, and means operatable at said coupling members by disconnecting said members adapted to apply said trailer brakes, said means being operatable to release said brakes when said coupling members are connected.

33. A six-wheel vehicle comprising a tractor trailer combination with the forward end of the trailer overlapping the rear end of the tractor, separable coupling members establishing such overlapped relation and adapted to be separated by said tractor backing under said trailer, a tiltable dump body rollable on said trailer and tiltable at the rear end of said trailer, a three-point connection between

said dump body and trailer which defines the tilting action of said dump body, and means connecting one of said coupling members to said three-point connection so that backing of said tractor relative to said trailer effects rolling and tilting of said dump body.

34. In a tractor trailer combination, a tractor, a trailer, a movable body on said trailer, a trailer coupling member, a tractor coupling member engageable and disengageable with said trailer coupling member, a connection between said tractor coupling member and said movable body so that disengagement of said coupling members causes movement of said body, and means supporting said tractor coupling member relative to said tractor adapted to cushion movement of said body.

35. In a tractor trailer combination wherein a dump body trailer carries a dump body adapted to be placed in load discharging position by backing a tractor relative to the trailer, and wherein such tractor backing is contingent on said trailer being held against backing under the influence of the tractor;—means adapted for holding said trailer against backing, said means including a trailer service brake operatable from the tractor for holding said trailer during initial backing movement of said tractor, and a positive locking trailer brake mechanism automatically applied by backing movement of the tractor.

36. In a tractor trailer combination wherein backing of the tractor relative to the trailer is adapted to perform work in connection with the trailer, and wherein such tractor work performance is contingent on said trailer being held against backing under the influence of the tractor;—means adapted for holding said trailer against backing, said means including two sets of brake mechanism for the trailer, one set being automatically operatable by movement of the tractor relative to the trailer and the other set being manually operatable from the tractor in advance of the automatic operation of the first mentioned set.

37. In tractor-trailer combinations of the dump-body type, and wherein the movements of the dump body to and from dumping position are provided by relative movement of tractor and trailer in the direction of traction, a coupling instrumentality adapted to connect the tractor and trailer for draft purposes during periods when the dump body is in position for transportation purposes, said instrumentality including coupling members separable in the direction of traction, said members being adapted for automatic coupling when being returned from separated relation, means controlled from the tractor for preparing the instrumentality for separation of the coupling members preliminary to movement of the dump body to its dumping position, and means operatively connecting the dump body and tractor for causing movement of the dump body to and from dumping position by relative movement of tractor and trailer in the direction of traction during periods when said members are uncoupled, whereby dump body movements are under the control of the tractor operator during periods when such operator is in position to control tractor movements.

38. A tractor-trailer combination as in claim 37 characterized in that the trailer and body are operatively connected with the connections correlated with the connections between tractor and body to include means for automatically controlling the rate of dump body movement by the rate of relative movement of tractor and trailer.

39. A tractor-trailer combination as in claim 37 characterized in that the body and trailer are operatively connected to include movement of the body relative to the trailer in the direction of traction, such connections being arranged to cause movement of the body in such direction of traction at a rate proportionately with but greater than the rate of relative movement of tractor and trailer in producing body movement.

40. A tractor-trailer combination as in claim 37 characterized by positive lock mechanism for the trailer adapted to be rendered active automatically during periods of separation of the coupling members, whereby movements of the dump body to dumping position are provided by backing movement of the tractor.

41. A tractor-trailer combination as in claim 37 characterized by brake mechanism for the trailer controlled from the tractor for transportation service conditions and adapted to be automatically rendered inactive to control from the tractor by the relative movement of tractor and trailer in moving the dump body to dumping position, and an independent brake mechanism for the trailer adapted to be rendered active automatically by such relative movement of tractor and trailer, said service brake mechanism being active and the independent brake mechanism inactive when the tractor and trailer are relatively positioned with the coupling instrumentality serviceable for draft purposes.

42. In tractor-trailer combinations of the dump-body type, and wherein movements of the dump body to and from dumping position are provided by relative movement of tractor and trailer in the direction of traction, means operatively connecting the dump body and trailer to permit relative movement therebetween in the direction of traction and in parallel planes, and operative connections between the tractor and said means to render the latter active by relative movement of tractor and trailer in the direction of traction, said means being operative to translate distance increments of tractor movement into

distance increments of body movement of increased length.

43. In tractor-trailer combinations of the dump-body type, and wherein movements of the dump body to and from dumping position are provided by relative movement of tractor and trailer in the direction of traction, coupling members for the tractor and trailer adapted to be separated by the relative movement of tractor and trailer in producing dump-body movements, means operatively connecting the dump body and trailer to permit relative movement therebetween in the direction of traction and in parallel planes, and operative connections between the tractor and said means to render the latter active by relative movement of tractor and trailer in the direction of traction, said means and operative connections being operative to limit the length of such relative parallel plane movements of body and trailer and to produce a pivotal tilting movement of the body on the trailer by further relative movement of the tractor and trailer in the direction of travel when the body and trailer are in relative position in one extreme of such relative parallel plane movement of body and trailer.

44. A tractor-trailer combination as in claim 43 characterized in that the connecting means between body and trailer are arranged to cause relative rates of movement of tractor and body relative to the trailer to be in proportion during the parallel plane relative movement period, with the proportion such that the rate of movement of the tractor will be less than that of the body.

In testimony whereof I affix my signature.

SIDNEY B. WINN.