

Sept. 21, 1965

P. J. TROJAN

3,207,342

FRONT END LOADER

Filed Feb. 25, 1963

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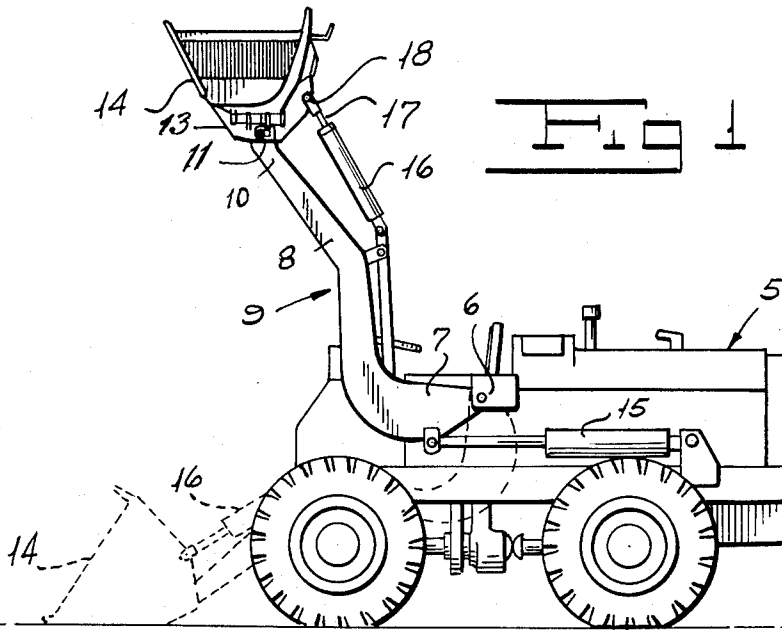
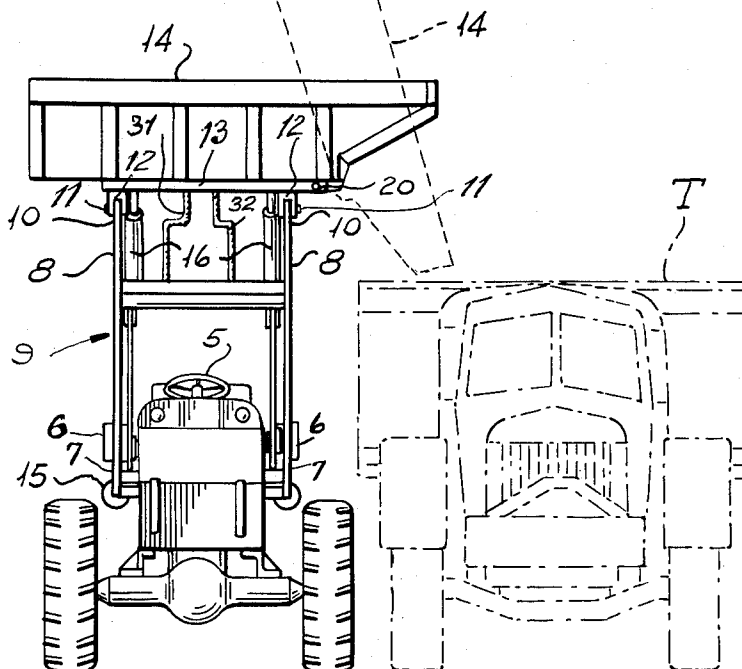


FIG 2

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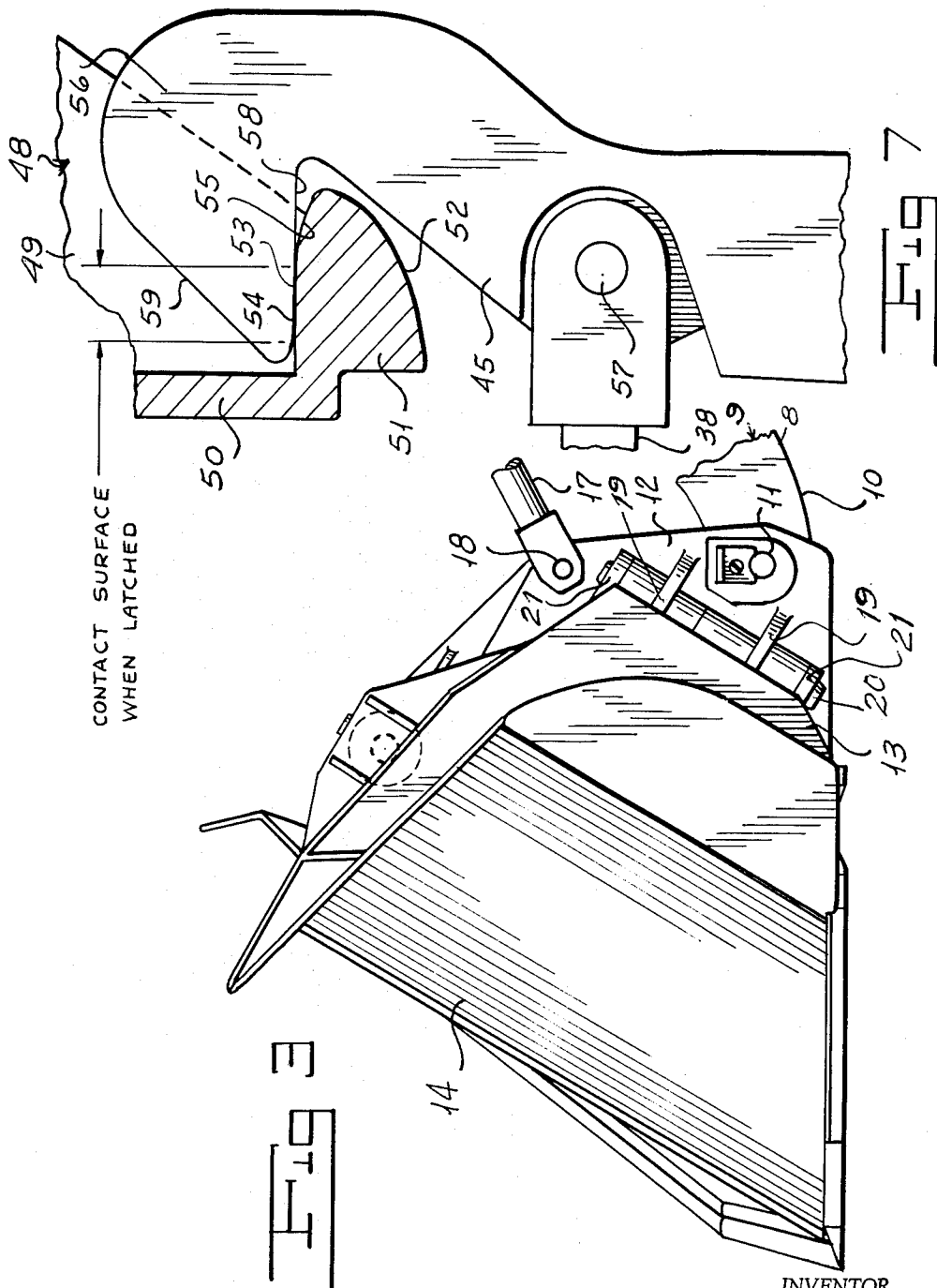
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5 Sheets-Sheet 2



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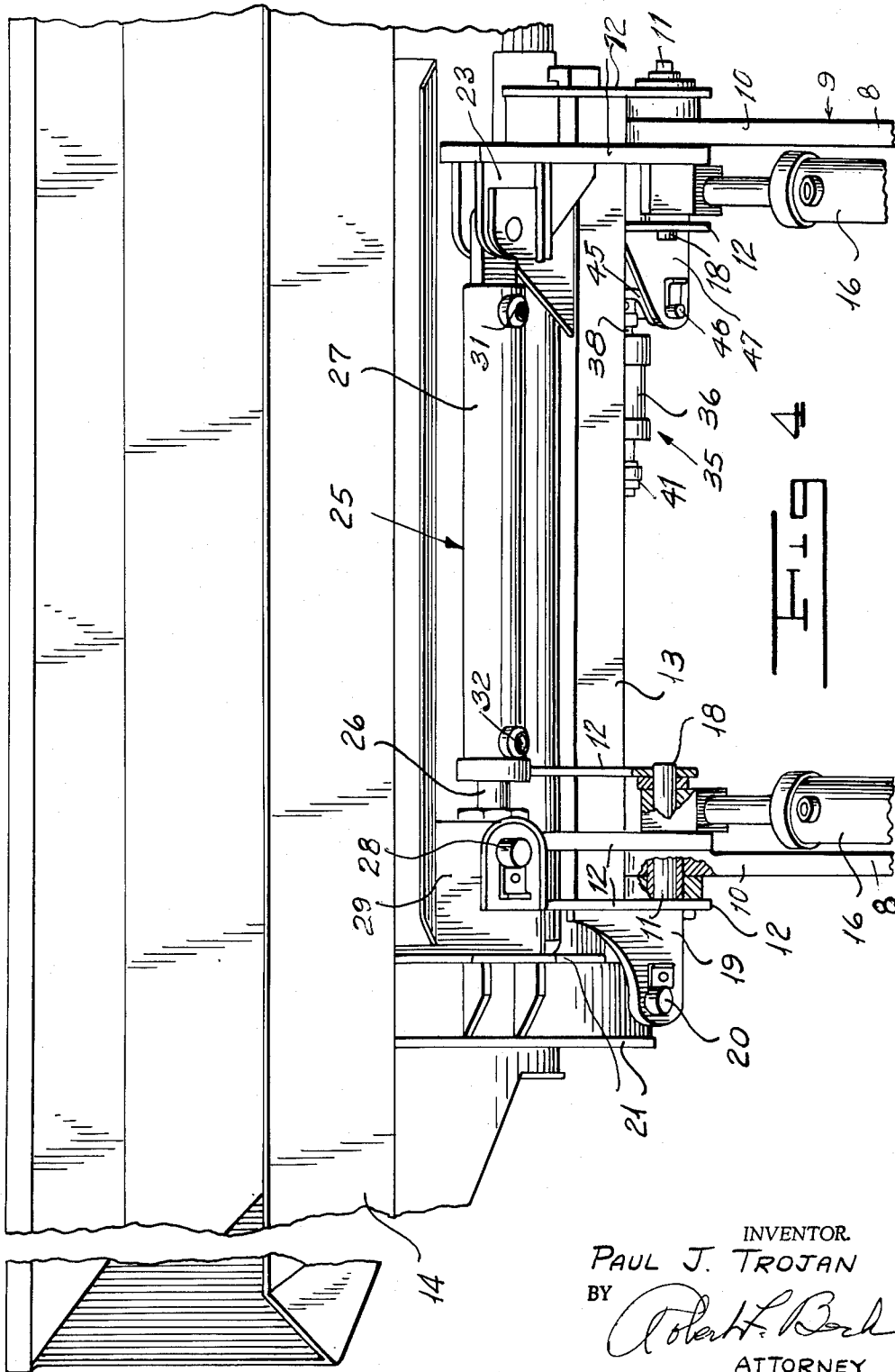
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5 Sheets-Sheet 3



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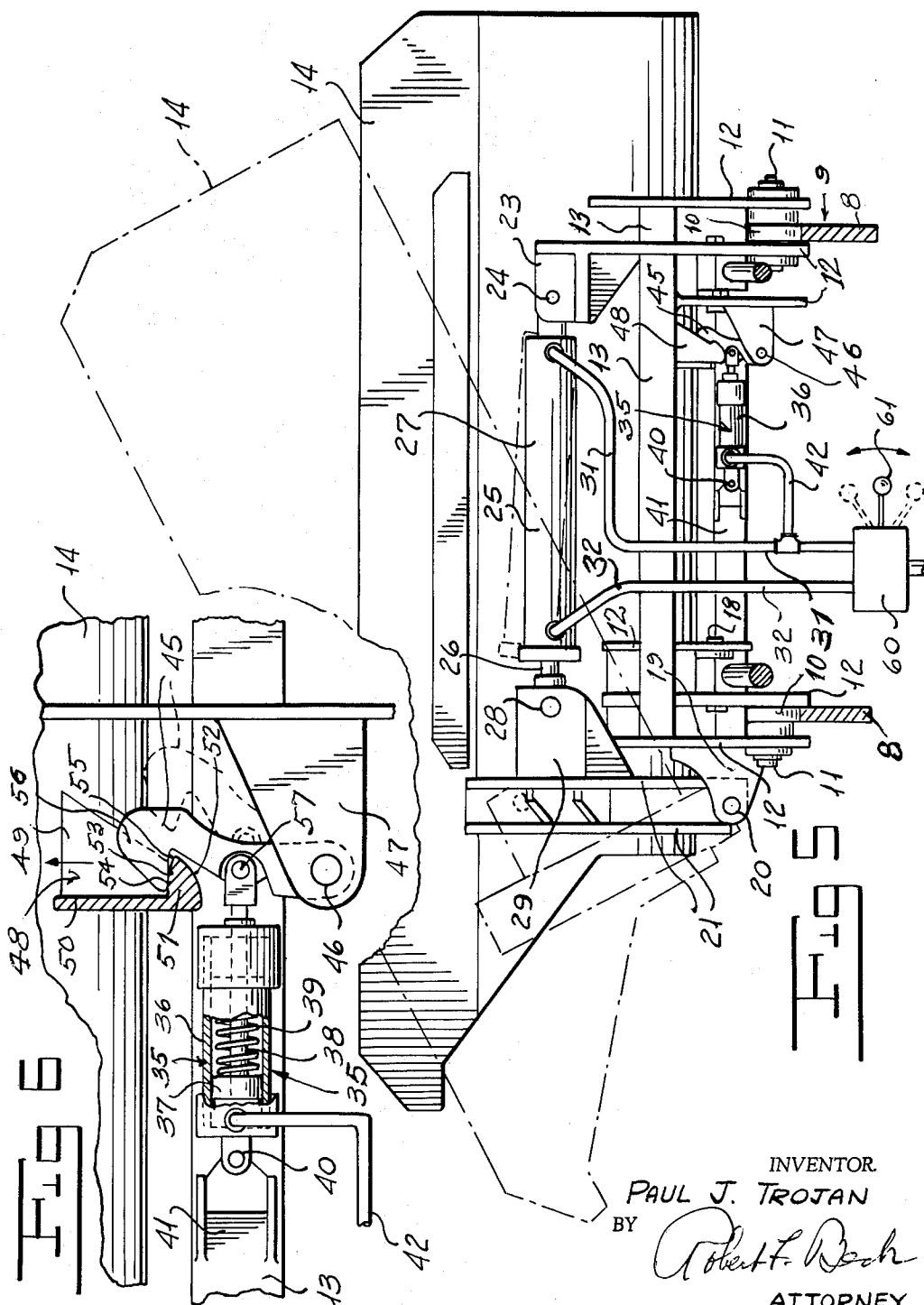
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5 Sheets-Sheet 4



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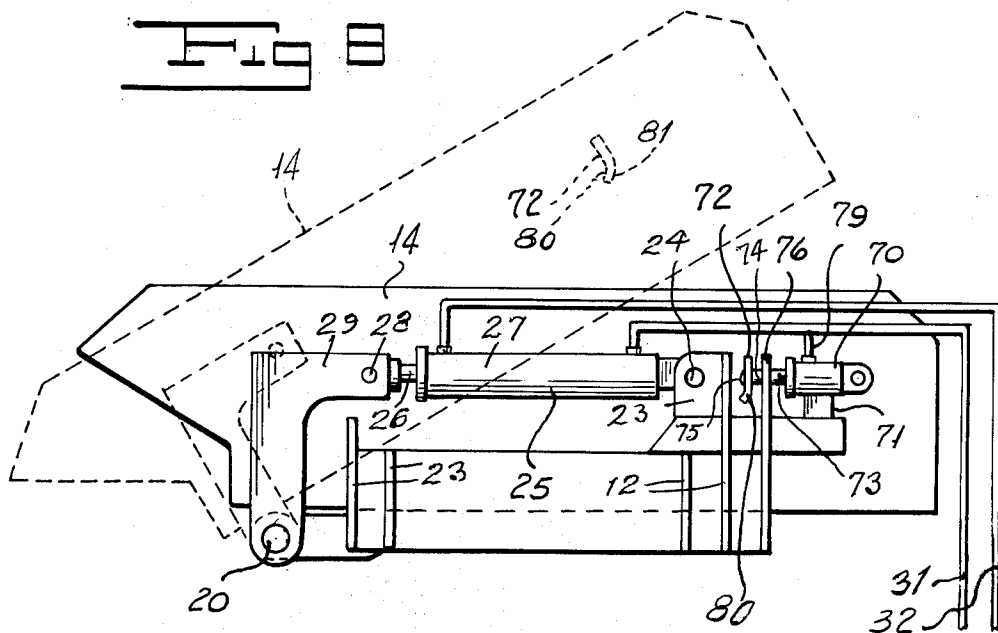
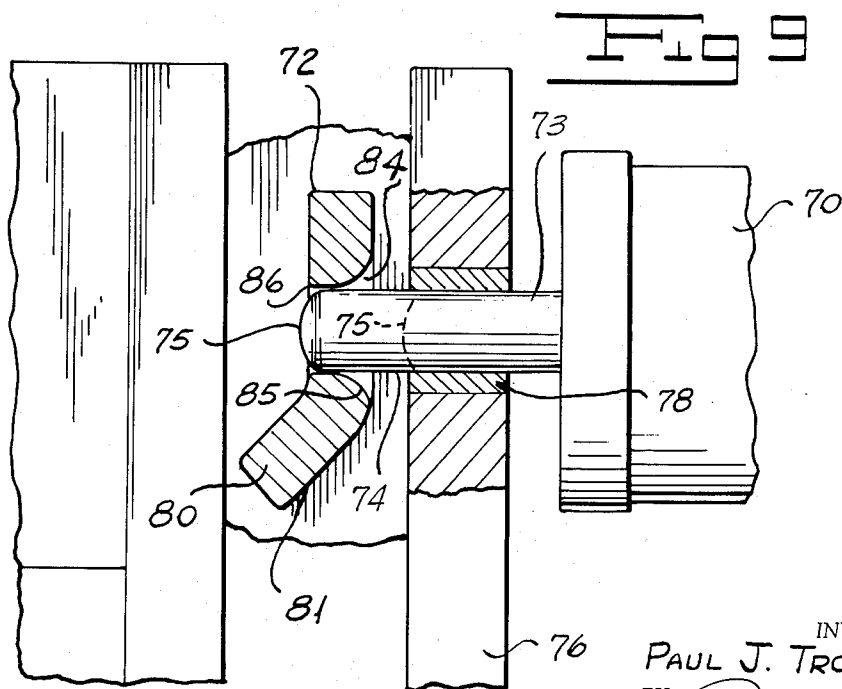
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5 Sheets-Sheet 5



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3,207,342

FRONT END LOADER

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4 Claims. (Cl. 214-140)

My invention relates to loaders and more particularly to side dump loaders, examples of the latter being disclosed in U.S. Patents Nos. 2,631,745, 2,679,326, 2,821,313, 2,924,345, and 3,022,910.

A typical prior art side dump loader comprises a front loading bucket for support after loading in a predumping position on a carrier or frame connected to a boom structure mounted on a vehicle, for instance, a tractor. The bucket, when loaded, is operated by bucket dumping mechanism to a vertical dumping position laterally of the carrier to effect discharge of its contents to a truck or other means disposed sidewise of the tractor.

Heretofore, considerable difficulty has been experienced in securing the bucket to the carrier against premature side dumping. In order to overcome this difficulty, resort has been had to various types of latches to secure the bucket in the loading as well as the predumping position on the carrier. When thus employed, the latch must be operated to release the bucket for dumping in advance of the operation of the bucket to its dumping position. In some installations, dual-stage power control means is provided for effecting (1) release of the latch and (2) the operation of the bucket to dumping position in sequential order. This dual-stage power control means is not entirely satisfactory because of the considerable time lag, between the release and dumping operations, occasioned by the manipulation of the operator to insure complete release of the latch before operation of the bucket to its dumping position, it being noted that the manipulatory time of various operators has a wide range of variance. Some attempts have been made to overcome this unsatisfactory condition by providing a single unit, for instance, a hydraulic cylinder, for effecting both of the operations in consecutive order. Such a single unit has proven unreliable and unsatisfactory because the latch mechanism often fails to completely release the bucket from its predumping position with the result that the latch mechanism and other associated components become damaged, impaired or unduly worn thereby necessitating frequent replacement or repair with a consequent loss of time. With further reference to various prior art loaders, it has been observed that when the bucket is disposed in full dumping position, the latter position is such that the contents of the bucket are not wholly discharged to the truck, but between the latter and the tractor by reason of the bucket being pivoted too close to the carrier.

My invention overcomes the foregoing attentioned difficulties, disadvantages and unsatisfactory results, it being one of the objects of my invention to provide a side dump loader which is so constructed and arranged as to effect, in sequential order, operation of a latching mechanism to fully release the bucket from its predumping position and, upon said release, to effect operation of a bucket dumping mechanism to pivot the bucket to dumping position when power of the same operating value is applied to both mechanisms simultaneously.

Another object of my invention is to provide a loader of the foregoing described character wherein the dumping position of the bucket is spaced a sufficient distance from the side of the carrier or tractor to insure discharge of the entire contents of the bucket to a truck positioned sidewise of the tractor.

A further object of my invention is to provide a loader of the foregoing described character equipped with means

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responsive to a single-stage power control means for effecting, in sequential order, release of the bucket for movement relative to the carrier, and operation of the dumping mechanism to move the bucket to its side dumping position.

A still further object of my invention is to provide a loader of the foregoing described character wherein a latching mechanism is operable to initiate the release of the bucket from its predumping position on the carrier in response to a surge of the power for operating the dumping and latching mechanisms to insure operation of said latching mechanism in advance of said dumping mechanism.

An important object of my invention is to provide a side dump loader of the foregoing described character which is relatively simple in construction, durable in use, efficient in operation, and economical in manufacture.

With the above and other objects in view, as will hereinafter appear, the invention consists in the combination and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Referring to the drawings wherein like reference characters designate like parts throughout the several views: FIGURE 1 is a side elevation of a loader constructed in accordance with my invention;

FIGURE 2 is a front end elevation of the loader and illustrating, in dotted lines, a truck disposed in sidewise relation to the loader for receiving the contents of the bucket;

FIGURE 3 is a fragmentary side elevation of the loader and illustrating the bucket in digging position;

FIGURE 4 is a top plan view of the structure disclosed in FIGURE 3;

FIGURE 5 is a rear elevation of the carrier with the bucket disposed in predumping position;

FIGURE 6 is a fragmentary rear elevation, partly in section, of the latching mechanism and illustrating, in full lines, the dog disposed in latching position with the keeper and, in dotted lines, in released position relative to the keeper;

FIGURE 7 is a fragmentary detail side elevation of the latching mechanism on an enlarged scale and illustrating the dog disposed in latching position with the keeper;

FIGURE 8 is a diagrammatic rear elevation of the carrier and bucket and illustrating a modified form of latching mechanism; and

FIGURE 9 is a fragmentary rear elevation, partly in section, of the latching mechanism disclosed in FIGURE 8.

In practicing my invention, as illustrated in FIGURES 1 to 7 inclusive of the drawings, I provide a vehicle, for instance, a tractor 5 on which is pivotally mounted, by suitable bearings 6 carried by the tractor, the lower or inner ends 7 of a pair of spaced forwardly extending arms 8 constituting a vertical movable boom 9. The upper or outer ends 10 of the arms 8 have pivotally connected thereto, by means of transversely extending pins 11, rearwardly disposed bearing brackets 12 of a bucket carrier 13 on which is supported a front loading bucket 14.

Hydraulically operated means or a ram 15 is provided on each side of the tractor and connected to the lower ends 7 of the arms 8 for lowering and raising the boom during operation of the boom to loading and unloading positions. A pair of similarly operated rams 16 are carried by the boom and are pivotally connected to the brackets 12 as at 18 to effect pivoting of the carrier into

loading, retracted, and dumping positions in the manner practiced in the prior art.

As illustrated in the drawings, when the boom is in raised position, the rams 16 function to maintain the bucket 14 on the carrier in a predumping position or, in other words, a position from which a loaded bucket may be operated to a vertical and side dumping position laterally relative to the carrier and tractor as hereinafter more fully described, it being understood that the bucket, which is somewhat elongated, extends transversely of the carrier and has its sides spaced an appreciable distance beyond the sides of the carrier as clearly illustrated in FIGURES 2 and 5.

One side of the carrier is provided with laterally outwardly extending bearings 19 to which is connected, by pivot means 20, bearing brackets 21 carried by and depending from the bucket 14. The pivot means 20 has its axis extending in a fore-and-aft direction relative to the boom when the bucket is raised to the position shown in FIGURE 2 thus enabling the bucket to be pivoted from a predumping position on the carrier to a vertical and lateral dumping position at the side of the carrier. Furthermore, the pivot means 20 is disposed a sufficient distance laterally and outwardly of the carrier to position the bucket, when in dumping position, an appreciable distance beyond the widths of the carrier and tractor to insure discharge of the entire contents of the bucket to a truck T or other means disposed under the bucket and laterally of the tractor as illustrated in dotted lines in FIGURE 2 of the drawings.

One of the bearing brackets 12 of the carrier is provided with an inwardly extending flange 23 to which is pivoted, as at 24, one end of a ram 25 constituting a bucket actuating mechanism. The opposite end of the ram 25 has extending therefrom a piston rod 26 connected to a piston disposed within the cylinder 27 of the ram. The outer end of the rod 26 is pivotally connected as at 28 to a plate 29 fixed to the adjacent bracket 21 of the bucket 14.

The inner and outer ends of the cylinder 27 have connected thereto conduits 31 and 32, respectively, whereby when hydraulic power (fluid under pressure) is introduced into the cylinder through the conduit 31, the rod 26 of the piston will be operated outwardly from the cylinder and thus effect pivoting of the bucket about the pivot means 20 towards side dumping position as illustrated in dotted lines in FIGURES 2 and 5 of the drawings. When the hydraulic power is introduced into the cylinder through the conduit 32, the rod 26, by means of its piston, will be operated to its retracted position to pivot the bucket into its predumping position as depicted in full lines in FIGURES 2 and 5, it being understood that the hydraulic fluid is discharged from one end of the cylinder when introduced into the opposite end through the respective conduits as is usual in rams of this character.

In order to preclude premature operation of the bucket 14 from its predumping position, I provide bucket latching mechanism including a hydraulically operated ram 35 operatively connected thereto. In the present instance, the ram 35 comprises a cylinder 36 in which is operated a spring-pressed piston 37 provided with a piston rod 38 about which is sleeved a spring 39. The rod 38 projects out of one end of the cylinder while the other end of the cylinder is pivotally connected as at 40 to a bracket 41 fixed to the carrier 13.

Hydraulic power, for instance, a suitable fluid under pressure, is introduced into the end of the cylinder 36 adjacent the bracket 41 by means of a conduit 42 which is connected to the conduit 31 for a purpose hereinafter made apparent. When the fluid is thus introduced into the cylinder 36 through the conduit 42, the piston 37 will be actuated against the tension of the spring 39 and move the outer end of the rod 38 in a direction away from the cylinder and into a projected position. The

spring 39 serves to move the piston in the opposite direction when the pressure in the conduit 42 is reduced to force fluid from the cylinder into the conduit 42 and thence into the conduit 31. As fluid is forced from the cylinder 36, the piston rod 38 is moved to its retracted position as shown in FIGURE 6.

The latching mechanism comprises a latch member or dog 45 having one end pivoted as at 46 to a plate 47 fixed to the carrier 13, and a keeper 48 mounted on and fixed to the bucket 14 for cooperation with the dog 45. The keeper 48 is provided with side and rear walls 49 and 50, respectively, an open front for accommodating the dog, and a bottom 51 disposed at the lower ends of the walls 49 and 50 and constituting a cam. The latter is fashioned with a pair of lower and upper faces 52 and 53, respectively, with the lower face 52 being curved to form a cam surface. The upper face 53 has a relatively flat portion 54 adjacent the wall 50 and which connects with an end of a slightly curved portion 55 forming a cam surface and merging at its opposite end with the lower face 52 as clearly illustrated in FIGURE 7 of the drawings.

The latch member or dog 45 is fashioned with a hook 56 at its opposite end and is pivotally connected between its ends to the rod 38 by a pivot 57. The hook 56 is formed with a pair of angularly related cam engaging faces 58 and 59, respectively, converging towards each other at one side. When the mechanism is in latched condition, the hook extends over the cam 51 to dispose the face 58 in engagement with the flat portion 54 of the upper face 53 as shown in full lines in FIGURE 7, thereby latching the bucket in predumping position on the carrier. A source of hydraulic power (not shown) is connected to a single-stage control means or valve 60 which, in turn, is connected to the conduits 31 and 32.

When it is desired to operate the mechanisms to release the bucket from its predumping position and effect pivoting of the bucket to its dumping position, the valve 60 is operated by means of a handle 61 to connect the conduits 31 and 42 with the source of power for operating the rams and at the same time permit fluid to be forced from the ram 25 through the conduit 32. By operating the handle to a reverse or bucket return position, the conduit 32 is connected to the source of power for operating the ram to return the bucket from its dumping position to its predumping position on the carrier and, at the same time, permit fluid to be forced from the ram 25 through the conduit 31 by its piston and fluid from the ram 35 through the conduit 42 by the action of the spring 39.

As the rod 38 of the ram 35 moves to its retracted position by the action of the spring 39, it will pivot the latch member from its release position to its latching position and, as the bucket is pivoted to its predumping position, the face 52 of the cam 51 will engage the face 59 and pivot the latch member against the tension of the spring 39 to permit the hook to snap over the cam 51 and effect engagement of the faces 53 and 58 as heretofore described. It is to be understood that the rams 25 and 35 are operable in response to hydraulic power of the same operating value when applied simultaneously to the respectively different areas of the faces (see FIG. 5) of both of said rams.

Furthermore, the surge of the power, when initially applied to these respectively different areas of the rams, serves to initiate a slight movement of the rod 38 to cause sufficient pivoting of the member 45 to dispose the face 58 thereof into engagement with the curved face 55 of the cam 51. This action enables continued pivoting of the member 45, by reason of the camming action of the face 55 occasioned by the pressure applied by the cam through the ram 25, until the member is released from the cam 51 thus permitting pivoting of the bucket by the ram 25 to its side dumping position. As shown in the drawings, the side of the bucket, adjacent the pivot

means 20, is of a scoop-like construction to facilitate and effect discharge of the entire contents of the bucket when pivoted to its dumping position.

In instances where it may be desirable to effect front dumping of the bucket, the boom is raised a desirable distance from the bucket loading position and the tractor moved to dispose the bucket over material receiving means or area. When the bucket is thus positioned, the rams 16 are operated to pivot the carrier forwardly about the pivots 11 and thus tilt the bucket, which is latched to the carrier, into front dumping position. By a reverse operation of the rams 16, the carrier is retracted to dispose the bucket in front loading position.

From the foregoing it will be apparent that my invention provides a loader, having a front loading and dumping bucket attached to a carrier, with simple and novel means for locking or latching the bucket in predumping position on the carrier and, in response to suitable power, for releasing the bucket relative to the carrier, and which means is effective upon release of the bucket for pivoting the latter to a dumping position at the side of the carrier and thereafter returning said bucket to said predumping position, said means being operated solely under the control of a single-stage actuating device for supplying said power thereto. Furthermore, said means is operable in response to the initial surge of the power to initiate the release of the bucket thereby insuring complete release to preclude damage, impairment, or undue excessive wear to various components of said means.

In the modification illustrated in FIGURES 8 and 9 of the drawings, the ram 25 serves to pivot the bucket 14, from predumping position on the carrier 13, to its side dumping position and returns the bucket to said predumping position in the same manner as heretofore described. In this form of my invention, a ram 70 is connected in fixed relation to the carrier by means of a bracket 71 while a member or keeper 72 is fixed to the bucket in a suitable manner, for instance, by welding. The ram 70 and keeper 72 are employed in lieu of the ram 35 and keeper 49, respectively, heretofore described.

The ram 70 comprises a cylinder in which is reciprocally mounted a spring pressed piston having a piston rod 73 extending outwardly from one end of the cylinder and normally maintained in a projected position, as shown in FIGURES 8 and 9, by the spring within the cylinder. The outer end section of the rod 73 constitutes a latch member 74 having an outer hemispherical end 75. The carrier is provided with a bracket 76 having a piston rod bearing 78 through which the latch member 74 is reciprocated to retracted and projected positions as illustrated in dotted and full lines, respectively, in FIGURE 9 of the drawings. The cylinder of the ram 70 has connected to an end thereof, adjacent the bracket 76, a conduit 79 which, in turn, is connected to the conduit 31 leading from the source of hydraulic power to the ram 25 whereby, when fluid under pressure is introduced into the cylinder through the conduit 79, the piston therein will be actuated to move the latch member 74 to its retracted position against the tension of the spring within the cylinder.

The keeper 72 is fashioned at one end with an angularly offset portion 80 having a cam surface 81 for engaging the end 75 of the member 74 to move the latter axially towards its retracted position when the bucket is operated from its dumping position to the predumping position. When the latch member 74 is thus moved, it will be projected, upon continued movement of the keeper, into a somewhat companioniform opening 84 formed in the keeper in substantially axial alignment with the member 74 thereby latching or locking the bucket to the carrier in its predumping position. Substantially one-half of the opening adjacent the bracket 76 is defined by an outwardly flared face 85 while the other half, which merges with the face 85, is defined by an inner cylindrical face 86 of a substantially uniform diameter through-

out its length. When the latch member 74 is disposed in projected position within the opening, its outer end portion will have seating engagement with the face 86 thereby latching the bucket to the carrier. Upon application of power to the rams 25 and 70 for releasing and actuating the bucket to side dumping position, the initial surge of the power will effect sufficient retraction of the member 74 to dispose the end 75 thereof into engagement with the face 85 which serves as a camming surface coacting with the end 75 to initiate release of the keeper 72 from the member 74, it being understood that continued application of power will effect full retraction of the member 74 and release of the keeper thus effecting pivoting of the bucket to dumping position.

Without further elaboration, the foregoing will so fully explain the invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and subcombinations.

It is obvious that the invention is not confined solely to the use herein disclosed in connection therewith as it may be utilized for any purpose to which it is adaptable. It is therefore to be understood that the invention is not limited to the specific construction as illustrated and described, as the same is only illustrative of the principles involved which are capable of extended application in various forms, and the invention comprehends all construction within the scope of the appended claims.

What I claim is:

1. In a side dump loader, a bucket carrier, a front loading bucket supportable on said carrier in predumping position, pivot means connected to said bucket outwardly of said carrier for pivoting said bucket from said predumping position to a dumping position laterally of the carrier, a bucket actuating mechanism including a first actuator connected to said carrier and said bucket to effect said pivoting, a bucket locking mechanism including a second actuator mounted independently of said first actuator for releasably latching said bucket to said carrier in said predumping position, whereby the force exerted by said first actuator in pivoting said bucket is not transmitted to said second actuator, and means for supplying power of an operating value from a common source to both of said actuators simultaneously, said first actuator having a substantially greater operating area than the operating area of the second actuator and deriving a substantially greater operating force thereon from said operating value of power than that derived by said second actuator, said second actuator operating in response to the initial application of power thereto and deriving sufficient operating force therefrom to initiate the release of said bucket locking mechanism and automatic operation thereof in response to the pivoting of said bucket.

2. In a side dump loader, a bucket carrier, a front loading bucket supportable on said carrier in predumping position, pivot means connecting said bucket to the side of said carrier for pivoting said bucket from a predumping position to a dumping position laterally of the carrier, a first hydraulic ram connected to said carrier and said bucket to effect said pivoting, a second hydraulic ram connected to said carrier independently of said first hydraulic ram such that the operating force of said first ram is not exerted upon said second ram, a bucket latching mechanism including cooperating latching surfaces for releasably latching said bucket to said carrier in said predumping position, one of which surfaces is operatively connected to said second ram for releasably latching said bucket to said carrier in said predumping position, said latching surfaces when partially released having a camming relationship to each other such that pivotal dumping movements of said bucket tend to cam said latching surfaces apart, hydraulic means including a common supply conduit for applying a hydraulic fluid under an oper-

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ating pressure simultaneously to both of said rams, said latching mechanism being operable by said second ram to release said bucket from said carrier automatically in response to the pivoting of the bucket by said first ram upon application of said power to said rams simultaneously.

3. In a side dump loader, a bucket carrier, a front loading bucket supportable on said carrier in predumping position, pivot means connecting said bucket to the side of said carrier for pivoting said bucket from a predumping position to a dumping position laterally of the carrier, a first hydraulic ram connected to said carrier and said bucket to effect said pivoting, a second hydraulic ram connected to said carrier independently of said first hydraulic ram and having a working area substantially smaller than that of said first hydraulic ram, a bucket latching mechanism operatively connected to said second mentioned ram for releasably latching said bucket to said carrier in said predumping position, hydraulic means for applying a hydraulic fluid under an operating pressure simultaneously to both of said rams, whereby said first hydraulic ram derives from said hydraulic fluid an operating force substantially greater than that derived by said second hydraulic ram, said latching mechanism being operable by said second ram to release said bucket from said carrier automatically in response to the pivoting of the bucket by said first ram upon application of said operating pressure to said rams simultaneously.

4. In a side dump loader, a bucket carrier, a front load-

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ing bucket supportable on said carrier in predumping position, pivot means connected to said bucket outwardly of a said carrier for pivoting said bucket from said predumping position to a dumping position laterally of the carrier, a bucket actuating mechanism connected to said carrier and said bucket and having a first actuator operable in response to power of a definite operating value to effect said pivoting, a bucket locking mechanism including cooperating latching surfaces for releasably latching said bucket to said carrier in said predumping position and having a second actuator operable to release said bucket from said carrier, said latching surfaces when partially released having a camming relationship to each other such that pivotal dumping movements of said bucket tend to cam said latching surfaces apart, means for connecting a source of operating power to said actuators for simultaneous energization thereof, said second actuator operating in response to the initial application of power thereto to initiate the release of said bucket locking mechanism in advance of the pivoting of said bucket.

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