Jan. 14, 1969 E. J. MOYER 3,421,236

LINKAGE FOR AN EJECTOR TYPE BUCKET LOADER

Filed June 22, 1967 Sheet 1 of 2

FIG. 2.

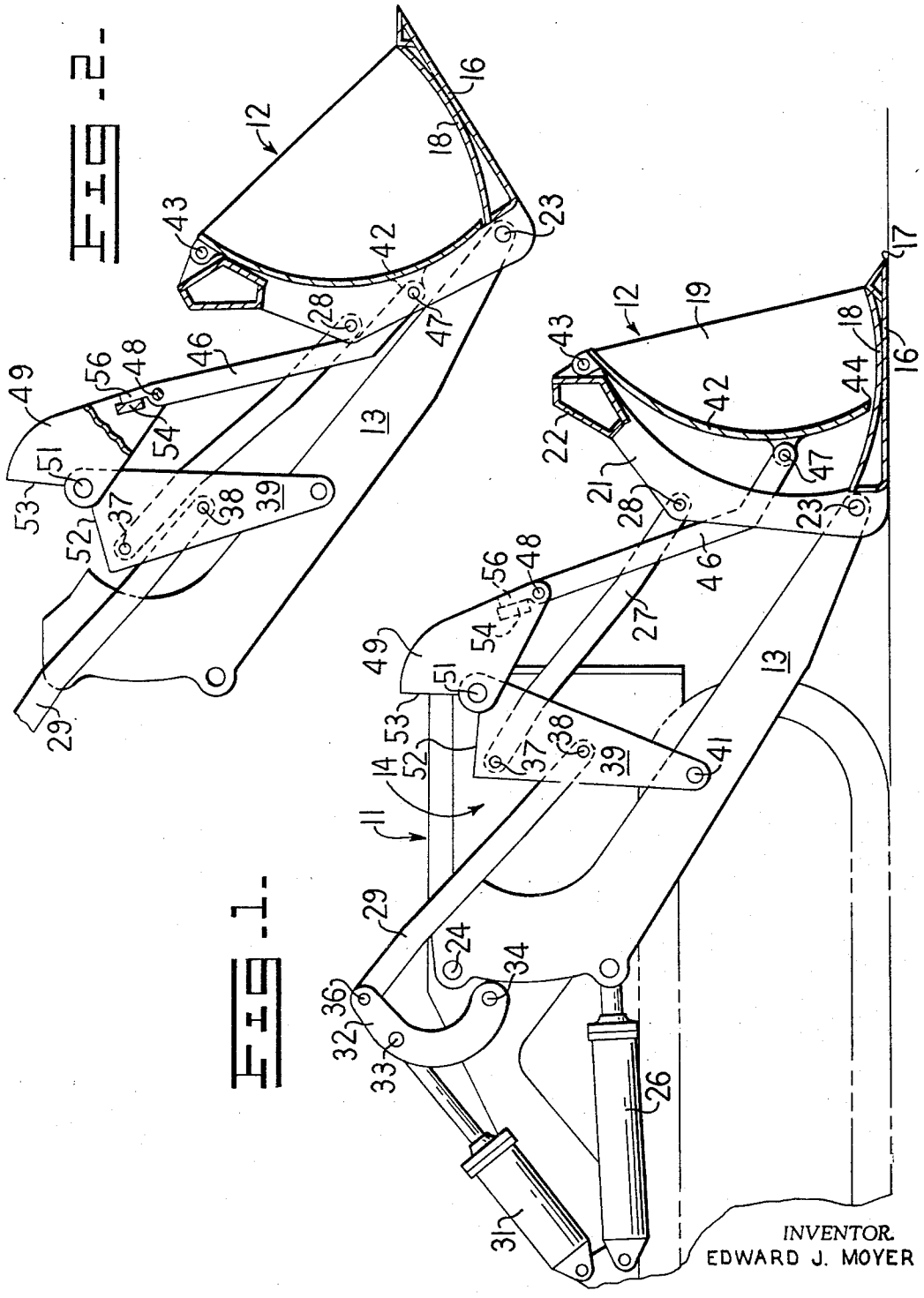

FIG. 1.

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FIG. 4.

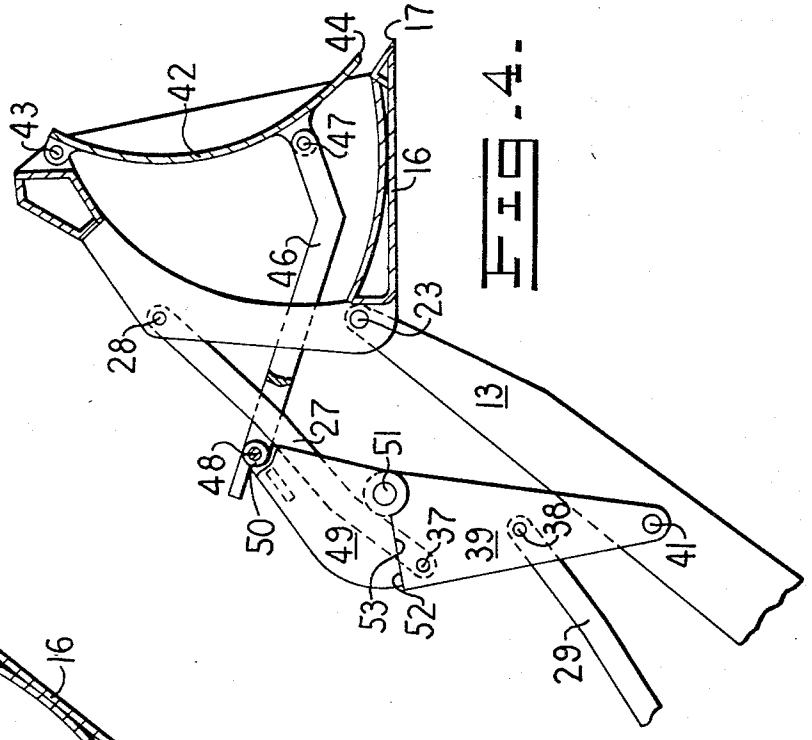
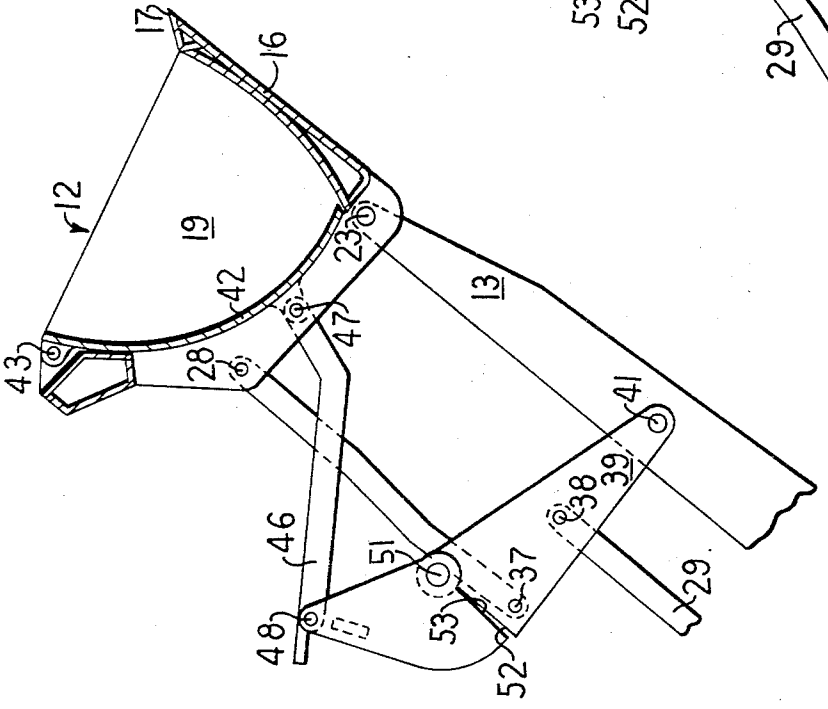


FIG. 3.



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LINKAGE FOR AN EJECTOR TYPE BUCKET LOADER

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U.S. Cl. 37—117.5 8 Claims
Int. Cl. E02f 3/76; E02f 9/00; B60p 1/20

ABSTRACT OF THE DISCLOSURE

An improvement in tractor loaders having an ejector type bucket, lift arms for raising and lowering the bucket, and tilt linkage for controlling forward and rearward tilting of the bucket. An ejector link extends from the bucket ejector plate to a pivotal connection with the tilt linkage by means of a tilt linkage lever and an ejector lever. The tilt linkage and ejector levers each have contacting surfaces which radially extend from their common pivot connection and pivot into positive contacting relation to subsequetnly pivot the ejector plate forwardly according to operation of the tilt linkage.

Background of the invention

The present invention relates generally to bucket loaders and more particularly to a tractor loader having an ejector type bucket wherein the ejector plate is controlled by the tilt linkage associated with the bucket.

Typical tractor loaders of a type having an ejector with the primary purpose of positively unloading material from the bucket, commonly have a pair of lift arms and a tilt linkage for controlling the bucket while the ejector is controlled by a separate hydraulic jack within the bucket assembly. Such a separate hydraulic jack for controlling the ejector undesirably increases the weight of the bucket assembly and further places additional manipulative duties on the loader operator.

It has thus been found desirable to automate the operation of the ejector plate while reducing the weight of components within the bucket assembly. One such solution is to provide a pair of cam surfaces on the rear of the ejector plate with members of the tilt linkage being in sliding contact with those cam surfaces. The cam surfaces are so shaped that the ejector plate is pivoted forwardly in desired relation to the tilt position of the bucket. However, such a cam arrangement for controlling the ejector has generally been found to have an unsatisfactory mechanical advantage causing undue wear in the tilt linkage members acting against the cam surfaces.

Summary of the invention

The present invention provides an improved ejector control in tractor loaders having an ejector type bucket, lift arms for raising and lowering the bucket, and a tilt linkage for controlling forward and rearward tilting of the bucket. The bucket includes a pivotal ejector plate which forms the rear wall of the bucket. A link element is connected to the ejector plate and extends from the ejector plate toward a link actuating portion of the tilt linkage. The ejector plate is moved forwardly in the bucket by the ejector link according to being positive actuating contact in the link actuating portion of the tilt linkage only after an initial portion of the forward tilting of the bucket by the tilt linkage.

Brief description of the drawings

FIG. 1 is a partial side view in elevation of a tractor loader with its bucket in a loading position;

FIG. 2 is a partial side view similar to FIG. 1, but with the bucket in a racked back position assumed immediately after it is loaded;

FIG. 3 is a side view similar to FIG. 2, but with the ejector bucket raised and assuming a typical carry position;

FIG. 4 is a side view similar to FIG. 3 and shows the ejector bucket in a position just subsequent to dumping.

Description of a preferred embodiment

Referring now to FIG. 1, a typical tractor loader has a tractor **11** and a bucket assembly **12** which is pivotally connected to the tractor by a pair of lift arms, one of which is indicated at **13**, for raising and lowering the bucket. The attitude of the bucket on the lift arm is controlled by a tilt linkage on either side of the tractor, one such tilt linkage being indicated at **14**.

The bucket assembly has a floor portion **16** with a cutting blade **17** along its forward edge and an arcuate interior floor surface **18**. The bucket floor and a pair of bucket sidewalls, one of which is indicated at **19**, are connected to a pair of generally vertical bucket support members located at the rear and to either side of the bucket, one such support member being indicated at **21**. A cross beam **22** is connected across the tops of the support members. Each of the lift arms **13** is pivotally connected to one of the bucket support members at a pivot connection **23** and extends rearwardly to a pivot connection **24** with the tractor. A hydraulic jack **26** is pivotally connected between the tractor and each of the lift arms for operating the lift arms to raise and lower the bucket. The tilt linkage on either side of the tractor comprises a first member **27** which is pivotally connected to one of the bucket support members at a pivot connection **28** and extends rearwardly therefrom. A second elongated member **29** is connected to a hydraulic jack **31** by means of a bellcrank member **32** and extends forwardly therefrom. The bellcrank member **32** has a central pivot point **33** which is connected to the hydraulic jack rod and two end pivot points **34** and **36** which are respectively connected to the tractor adjacent its pivot connection **24** with one of the lift arms and the rearward end of the second element **29** to provide for some automatic tilting of the bucket according to the movement of the lift arms to raise and lower the bucket. The rearward end of the first tilt linkage element **27** and the forward end of the second tilt linkage element **29** are pivotally connected at respective points **37** and **38** to a tilt linkage lever **39** which is also pivotally connected to the lift arm **13** generally midway along its length at pivot point **41**.

The bucket **12** has an ejector plate **42** which is arcuately shaped, forms the rear wall of the bucket assembly **12** and is pivotally connected to the bucket support members at the top of the bucket assembly by pivot connections **43**. Thus, the ejector plate may pivot forwardly from its position at the rear of the bucket with its lower edge **44** sweeping along the arcuate floor surface **18** toward the cutting edge **17**.

To provide for automatic control of the ejector plate according to the tilt linkage by apparatus which is of simple and reliable construction, an ejector link **46** is connected to either side of the ejector plate generally adjacent one of the bucket support members at a pivot connection **47**. Each ejector link extends rearwardly to a pivot connection **48** with an ejector lever **49**. A rearward portion of the ejector lever has a pivot connection **51** with a portion of the tilt linkage lever **39** which is remote from the pivot connection of the tilt linkage lever with the lift arm **13**. A generally upward facing contact surface is defined at the upper extremity **52** of the tilt link-

age lever **39** as a radial projection from the pivot connection **51** between the tilt linkage lever **39** and the ejector lever **49**. The ejection lever **49** has a generally rearward facing contact surface **53** which also radially projects from the pivot point **51**. It is readily apparent by comparison of FIG. 1 with subsequent figures, particularly FIGS. 3 and 4, that as the tilt linkage lever **39** is forwardly pivoted about its pivot point **41** on the lift arm during forward tilting of the bucket, the angular opening between the contacting surfaces **52** and **53** will be closed and that after this initial forward tilting of the bucket, the tilt linkage lever **39**, the ejector lever **49** and the ejector link **46** will form a continuous lever in effect which pivots the ejector plate forwardly according to subsequent forward tilting of the bucket by the tilt linkage. Each ejector lever **49** also has a stop **54** for contacting a rearward extension **56** of the ejector link **46** to limit downward pivoting between the ejector lever **49** and the ejector link **46** as illustrated in FIGS. 1 and 2. Further, each pivot connection **48** between one of the ejector levers **49** and one of the ejector links **46** projects inwardly above the first tilt linkage member **27** and preferably has a bushing **50** thereon (see FIG. 4) to act as a second stop to contact the forward member **27** and limit the forward pivoting of the ejector plate. The geometry of the tilt linkage and the positions of the stops are selected to provide for proper positioning of the bucket and the ejector plate during the hereinbelow descirbed modes of operation.

When the bucket is in a position to commence loading, with the floor of the bucket substantially level with the ground, the interrelation of the ejector link with the tilt linkage permits some freedom of motion in the ejector to prevent binding and the ejector plate is accordingly positioned somewhat forwardly in the bucket as illustrated in FIG. 1. As material enters the bucket during loading, it acts against the ejector plate and tends to move it rearwardly against the bucket supports to permit complete filling of the bucket. This rearward motion of the ejector is accompanied by counterclockwise rotation of the ejector lever **49** and the ejector link **46** would pivot downwardly toward the tilt linkage lever **39** such that on subsequent forward tilting of the bucket, the ejector linkage would not perform properly.

It is also apparent from FIG. 1 that if the bucket is raised by the lift arms and forwardly tilted by the tilt linkage to have only its cutting edge **17** in contact with the ground, the ejector plate will be pivoted forwardly to have its sweeping edge **44** aligned with the cutting edge **17** of the bucket. Thus, an effective bulldozing surface may be provided by the combination of the bucket cutting edge **17** and the ejector plate **42**.

Referring now to FIG. 3, when the bucket is raised by the lift arms to its normal carry position, the action of the bellcrank member **32** tilts the bucket automatically to permit it to maintain its load. In this carry position, where the bucket is at a preselected and preferred elevation for dumping, for example into a truck, it is to be noted that the angular opening between the contacting surfaces **52** and **53** of the tilt linkage lever and the ejector lever respectively is almost closed such that subsequent forward pivoting of the bucket will be accompanied by forward pivoting of the ejector plate within the bucket. Such a forward pivoting action is illustrated at its completion in FIG. 4 where the contacting surfaces **52** and **53** have made positive contact and the ejector plate has been pivoted forwardly at least to be aligned with the cutting edge of the bucket. Referring further to FIG. 4, when the ejector plate has traversed the bucket floor and completely unloaded materail from the bucket, the bucket floor is substantially level, thereby permitting the tractor loader to depart from its dumping site, for example over the walls of a truck body, without first stopping to again raise the bucket to permit clearance with the truck. Thus, the efficiency of the tractor loader is further increased.

The function of the second stop **50** may also be seen from FIG. 4. As it comes in contact with the forward tilt linkage member **27**, it prevents outward swinging of the ejector plate from the bucket to prevent it from impinging or becoming entangled with a structure forward of the bucket during dumping.

I claim:

1. In a tractor mounted loader having a bucket, lift arms pivotally connected to the bucket for raising and lowering the bucket, tilt linkage connected to the bucket for tilting the bucket forwardly and rearwardly and an ejector plate which forms the rear wall of the bucket and is pivotally connected to the bucket to permit forward and rearward pivoting of the ejector plate, the improvement comprising:

a link connected to the ejector plate for controlling the forward and rearward positioning of the ejector plate in the bucket and an ejector lever joined to the link and pivoted to a lever portion of the tilt linkage, the ejector plate being movable forwardly through the bucket by the link according to positive interaction between the ejector lever and tilt linkage lever after initial forward tilting of the bucket by the tilt linkage.

2. The combination of claim **1** wherein said ejector lever is pivotally joined to said ejector link, said actuating levers having contacting surfaces radially extending from their common pivotal connection, said contacting lever surfaces coming into positive contact with each other to subsequently pivot the ejector plate forwardly according to forward tilting of the bucket only after initial forward tilting of the bucket is effected.

3. The combination of claim **2** wherein one of said levers is a tilt linkage lever which is also pivotally connected to a midportion of the lift arm and a member of the tilt linkage extends from a pivotal connection with the bucket to a pivotal connection with said tilt linkage lever, said pivotal connection of said member with the tilt linkage lever being interposed on the tilt linkage lever between its respective pivotal connections with the lift arm and said ejector link.

4. The combination of claim **3** wherein said ejector link is connected to the ejector at a suitable point for achieving a desirable mechanical advantage in the pivoting of the ejector plate by the tilt linkage.

5. The combination of claim **3** wherein a first mechanical stop is operatively disposed with relation to the ejector plate to limit its forward pivotal motion.

6. The tractor loader of claim **3** wherein the geometry of the lift arms, tilt linkage and said actuating levers are selected to insure that, when the bucket is positioned by the lift arms at preferred dumping height, said tilt linkage lever acts against said other ejector lever to position the sweeping edge of the ejector plate at the forward edge of the bucket floor when the bucket is in a tilted position to have its floor substantially level.

7. The tractor loader of claim **6** wherein the geometry of the lift arms, tilt linkage and said actuating levers are selected to insure that, when the bucket is positioned by the lift arms approximately at ground level and the bucket is forwardly tilted by the tilt linkage to have its forward cutting edge suitably disposed with relation to the ground for bulldozing, said ejector link positions an edge of the ejector plate upon the cutting edge of the bucket to provide a bulldozing surface above the cutting edge of the bucket.

8. A bucket loader disposed on a tractor and having:

a bucket with a floor having a substantially straight outside surface and an arcuate inside surface, an ejector plate forming the rear wall of the bucket and being pivotally connected to the bucket to permit forward and rearward pivoting of the ejector pate such that an edge of the plate sweeps along the arcuate surface of the bucket floor;

a pair of lift arms pivotally connected to the bucket

and extending rearwardly to the tractor, said lift arms operable by hydraulic jacks for raising and lowering the bucket;

a tilt linkage operable by a pair of hydraulic jacks for forwardly and rearwardly tilting said bucket about its pivot connections with the lift arms, said tilt linkage having a first pair of members, each operably connected to one of the pair of jacks, each of said first members pivotally connected to a lever which is also pivotally connected to one of said lift arms and a second pair of members each pivotally connected between one of said tilt linkage levers and said bucket, each of said levers having an ejector lever pivot connection remotely disposed from its pivot connection with one of said lift arms and an upper contacting edge radially projecting generally rearwardly from said ejector lever pivot connection; and

a pair of ejector levers, each pivotally connected between one of the ejector lever pivot connections of said tilt linkage levers and said ejector plate, each of said ejector levers having a rearward contacting

surface radially projecting from its pivot connection with one of said tilt linkage levers, said ejector lever contacting surfaces being contacted by said contacting surfaces of said tilt linkage levers after initial forward tilting of said bucket to result in subsequent forward pivoting of said ejector plate according to forward tilting operation of said pair of tilt linkage jacks, said ejector levers comprising stops for limiting pivotal separation of each adjacent pair of said contacting surfaces on one of said ejector levers and one of said tilt linkage levers.

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U.S. Cl. X.R.

214—767, 510; 37—126