United States Patent

Rockwell et al.

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[54] **LOADER WITH EJECTOR-TYPE BUCKET**

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[52] **U.S. Cl.** ..... **214/767,** 214/146 E

[51] **Int. Cl.** **B66f 9/00**

[58] **Field of Search** ..... 214/146 E, 767, 510

[56] **References Cited**

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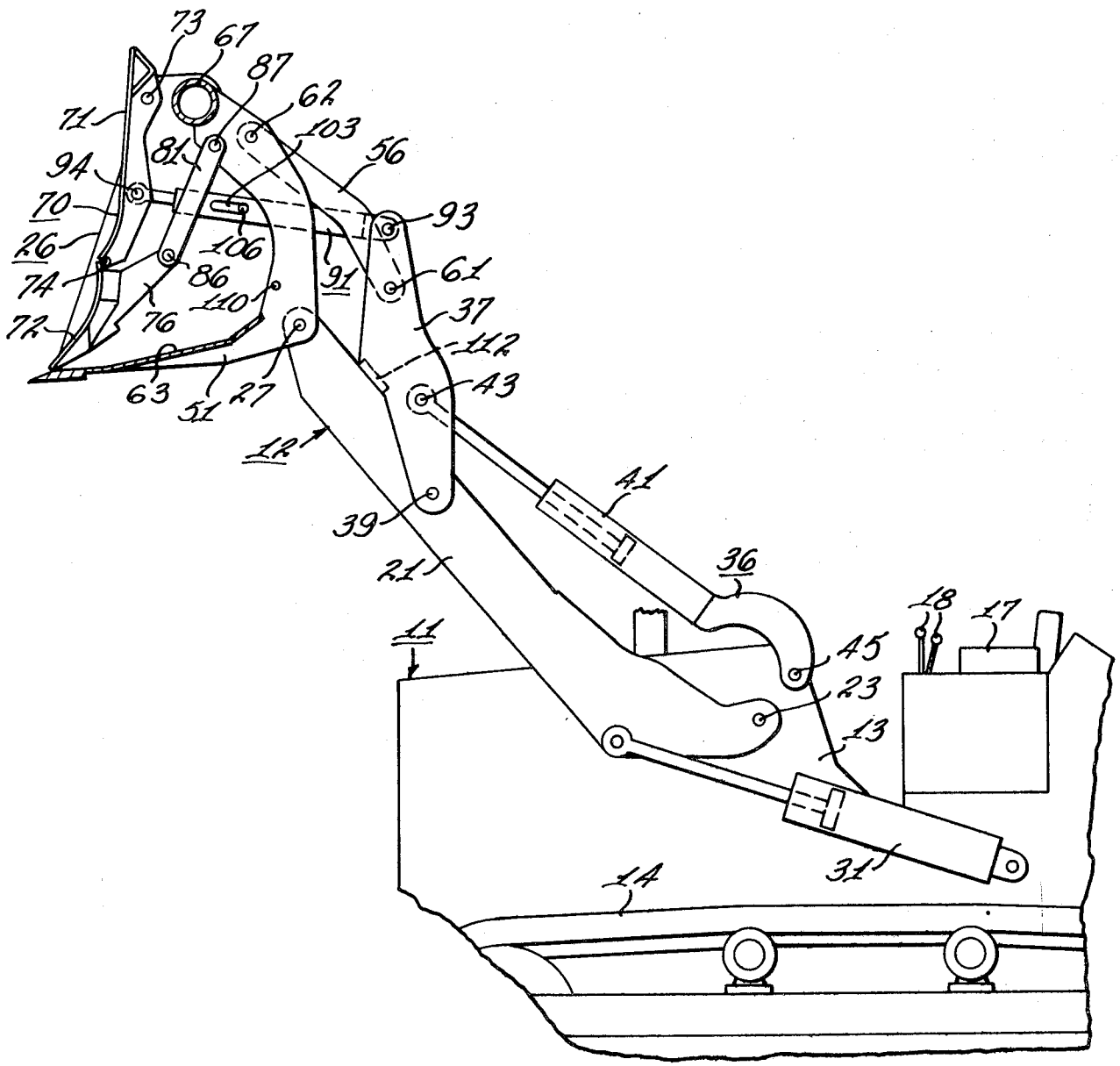
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[57] **ABSTRACT**

A bucket ejector with two hinged sections is automatically moved from a retracted position, in which the two sections form the rear wall of the bucket, to a forward eject position when the bucket tilt linkage causes the bucket to be moved from its loading position to its dumping position.

9 Claims, 7 Drawing Figures



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SHEET 1 OF 2

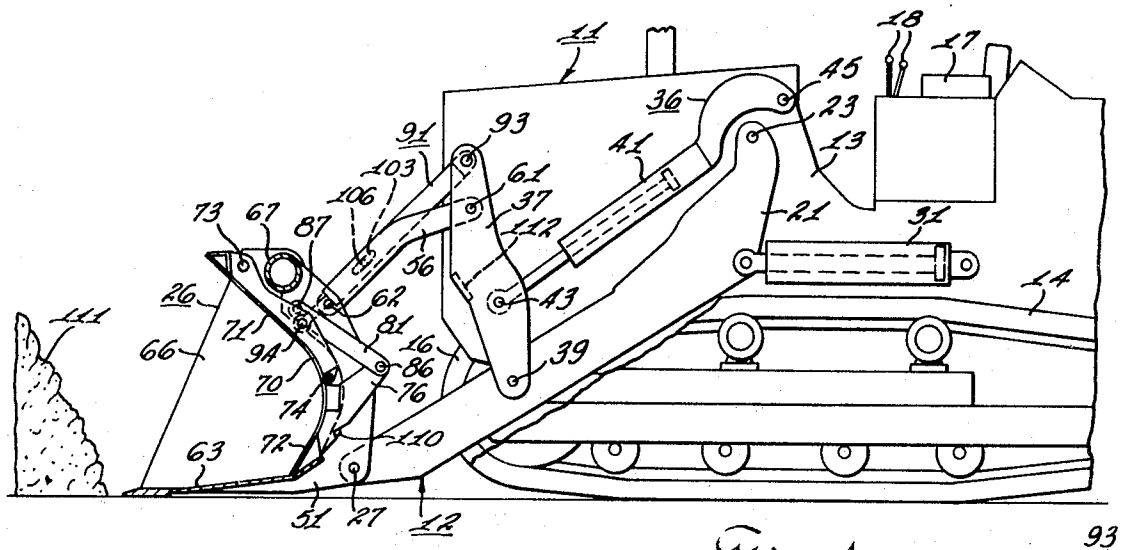


Fig-1

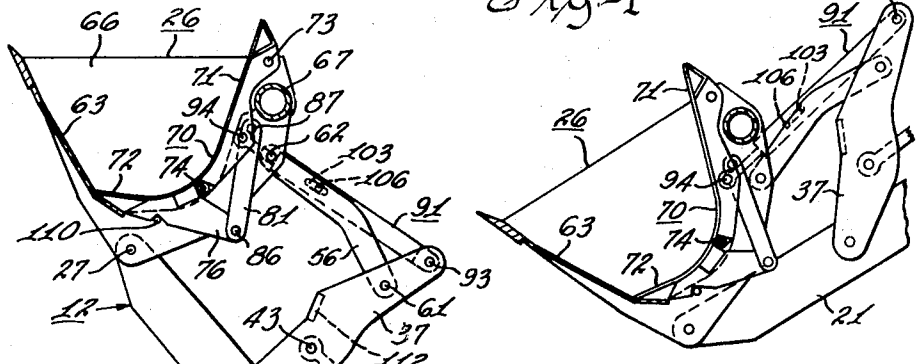


Fig.2

Fig.3

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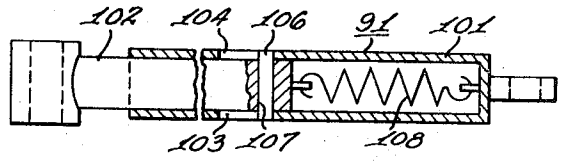


Fig. 6

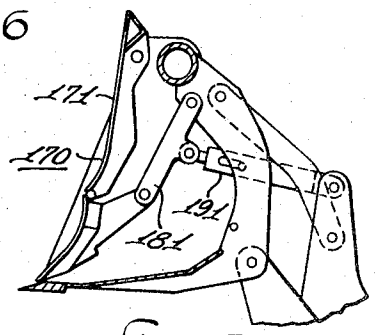


Fig. 7

Fig. 5

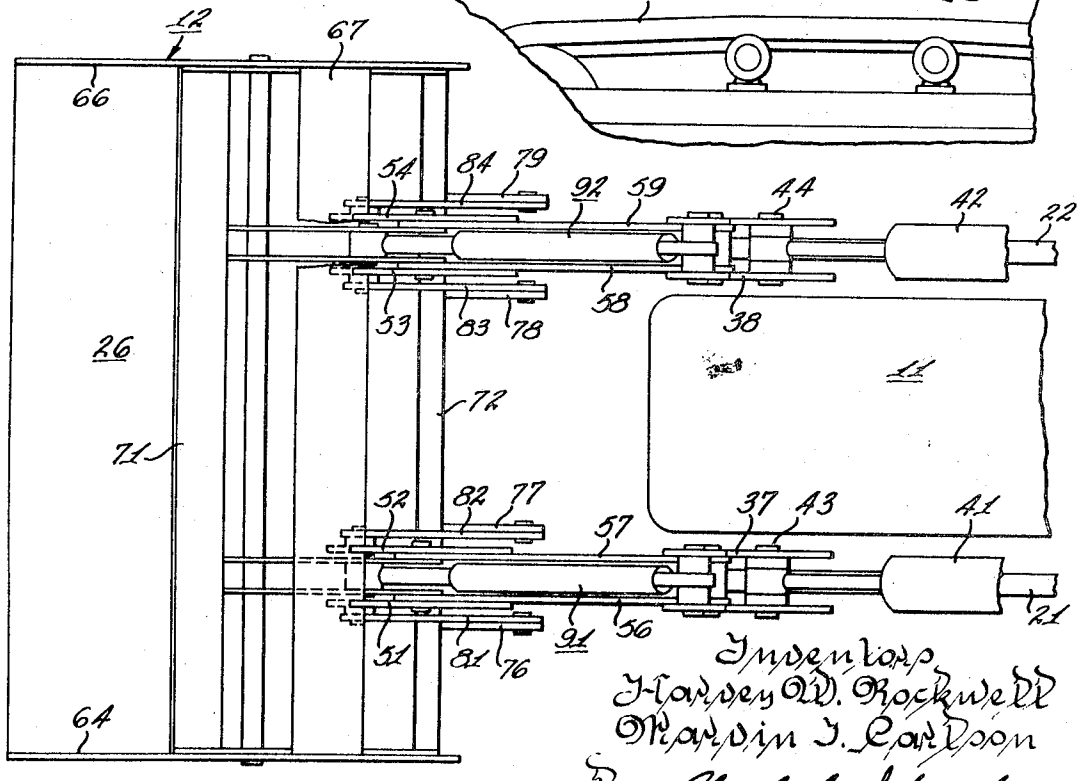


Fig. 4

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LOADER WITH EJECTOR-TYPE BUCKET

This invention relates to a bucket ejector formed in two hinged sections which are moved automatically from their retracted position, in which they form the rear wall of bucket, to a forward eject position by an interconnection with the bucket tilt linkage.

Heretofore others have suggested ejector mechanisms for excavating buckets wherein the ejector serves as the rear wall of the bucket in its retracted position and operates to eject the load when moved forwardly by actuating means. One pertinent prior art device is shown in FIGS. 1 through 6 of U.S. Pat. No. 3,523,621 issued Aug. 11, 1970 to R. H. Anderson et al. entitled "Ejector for Loader Bucket." One shortcoming of the device of the before-mentioned prior art patent is that the ejector mechanism is not fully retracted in the load receiving position of the bucket. In such device the ejector is forced to its rearmost position by the material being excavated. The presence of foreign material during retraction of the ejector makes the ejector susceptible to jamming thereby increasing the possibility of only achieving a partial loading of the bucket. In the present invention a spring loaded link is employed to return the ejector mechanism to its retracted position, thereby ensuring a full payload.

It is an object of the present invention to provide an improved bucket ejector mechanism wherein the ejector is automatically returned to its rearmost bucket loading position when the boom is lowered and the tilt linkage is adjusted to place the bucket in a loading position.

It is a further object of this invention to provide an improved bucket ejector mechanism which is operated automatically between its retracted position and eject position by link means connected to the bucket tilt linkage.

These and other objects and advantages of the present invention will be apparent to those familiar with the art when the following description is read in conjunction with the drawings in which:

FIG. 1 is a side view of a crawler loader incorporating the present invention;

FIG. 2 is a side view of the mechanism shown in FIG. 1 illustrating the loader in a raised position;

FIG. 3 shows the bucket in a rollback position;

FIG. 4 is a top view of FIG. 1;

FIG. 5 is a view similar to FIG. 2 but showing the bucket in its eject position;

FIG. 6 is a top view of the spring loaded ejector operating link; and

FIG. 7 shows a modified form of the invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1, the present invention is incorporated in a crawler loader comprising a crawler tractor 11 having a front end loader attachment 12 mounted thereon. The crawler tractor includes a chassis 13 to which a pair of endless track mechanisms 14, 16 are secured. An operator's station 17 is located centrally on the tractor and has controls 18 located adjacent thereto for controlling operation of the front end loader attachment 12.

The front end loader attachment 12 includes a pair of longitudinally extending booms 21, 22 pivotally connected to the chassis 13 of the tractor on a transverse axis 23. A forwardly open bucket 26 is pivotally connected to the forward end of the booms 21, 22 on a transverse axis 27 about which it may be moved between a rollback position as shown in FIG. 3 to its dumping position shown in FIG. 5. The booms 21, 22 are raised and lowered between the positions shown in FIGS. 1 and 2 by a pair of double-acting hydraulic jacks 31, only one of which is shown.

Referring also to FIG. 4, the bucket 26 is tilted about its mounting axis 27 by a tilt linkage 36 which includes a pair of upright levers 37, 38 having their lower ends pivotally connected by aligned pins 39, only one of which is illustrated. The bucket is tilted about its pivot axis 27 by a pair of tilt cylinders 41, 42 which have their rod ends pivotally connected to the tilt levers 37, 38 by a pair of aligned pins 43, 44 and their rear ends pivotally connected on a transverse axis 45 to the chassis 13 of the tractor 11. Four longitudinally extending links 56, 57, 58, 59, have their corresponding opposite ends connected to the tilt levers 37, 38 and frame members 51, 52, 53, 54 of the bucket 26, such connections being on transverse axes 61, 62. The bucket 26 includes a bottom wall 63 having its opposite lateral ends secured, as by welding, to a pair of vertical sidewalls 64, 66. The sidewalls 64, 66 are reinforced by a transverse hollow cylindrical member 67 welded thereto. It will also be noted that the upper ends of the bucket frame members 51, 52, 53, 54 are welded to the hollow cylindrical member 67.

In the present invention an ejector 70 forms the rear wall of the bucket 26 when in its retracted position as shown in FIGS. 1, 2 and 3. The ejector 70 is constructed in two parts 71, 72 and the upper part 71 is pivotally connected on a transverse axis 73 to the sidewalls 64, 66 of the bucket. The upper end of the lower part 72 is pivotally connected to the lower end of the upper part on a transverse pivot axis 74. The upper part 71 of the ejector 70 is relatively flat on its forward face except for a slight curvature at its lower end. The lower part 72 of the ejector is curved to provide a bucket shape providing good loading characteristics. The lower part 72 of the ejector 70 has four arms 76, 77, 78, 79 extending rearwardly therefrom to which position control link parts 81, 82, 83, 84 are pivotally connected on a transverse axis 86. The upper ends of the link parts 81, 82, 83, 84 are pivotally connected to the vertical frame members 51, 52, 53, 54 on a transverse axis 87 spaced to the rear and below ejector pivot axis 73. The combined wall and ejector 70 is actuated by ejector actuating linkage comprising a pair of spring-loaded links 91, 92 pivotally connected at their rear ends to the upper ends of levers 37, 38 on a transverse axis 93 disposed above the axis 61 of the connection of links 56, 57, 58, 59, to levers 37, 38. The forward ends of the spring-loaded links 91, 92 are pivotally connected to the upper part 71 of the ejector on a transverse axis 94.

The details of the spring-loaded links 91, 92 are illustrated in FIG. 6, wherein link 91 is shown in longitudinal section. The link 91 includes a cylindrical element 101 and a rod element 102, the latter being reciprocably mounted in the base of the cylindrical element 101. The cylindrical element 101 has a pair of axially elongated slots 103, 104 in which a pin 106 is free to slide in the direction of the axis of the extensible and contractable spring loaded link 91. The pin 106 is press fit in a bore 107 of rod element 102. The rod element 102 is biased to the position illustrated, wherein pin 106 is in the end of slot nearest the cylinder end of the link 91, by a tension spring 108 interconnecting one end of the element 102 and an interior part of the cylinder element 101.

OPERATION

In FIG. 1 the bucket 26 is in a load receiving position and upon forward movement of the tractor 11, the bucket 26 will be moved into a pile of material 111. In the condition illustrated in FIG. 1, the tension spring 108 of the spring-loaded link 91, together with the corresponding spring in link 92, are effective to hold the two-part ejector 70 in its rearmost retracted position in which it forms the rear wall of the bucket. A suitable stop 110 may be provided to limit rearward movement of the ejector 70. In this loading position the bucket will completely fill when crowded into the pile of material 111. It will be noted that the pin 106 is in an intermediate position in the slot 103 when the bucket is in its loading position shown in FIG. 1. When the bucket is tilted back to the rollback position shown in FIG. 3, the distance between the axes 94 and 93 increases and the spring 108 will be further extended as the pin 106 moves to the extreme forward end of slot 103. When the boom is next raised by expansion of jacks 31 to the position shown in FIG. 2, the geometry of the tilt linkage 36 is such that the levers 37, 38 will be pivoted forwardly on their pivot axis

39. This will cause the extensible linkage **91, 92** to be shortened to the condition wherein the pin **106** moves toward the rearward end of the slot **103**. If the tilt rams **41, 43** are now expanded, the bucket will be pivoted forwardly about its axis **27** to the position shown in FIG. **5** and the linkage **91, 92** will operate to push the ejector **70** forwardly to the full eject position as illustrated. As the ejector mechanism is moved toward its eject position, it will be noted that the position control link parts **81, 82, 83, 84** will cause the lower part **72** of the ejector **70** to pivot downwardly in relation to the upper part **71** to a condition as illustrated in FIG. **5** wherein the parts are in substantial alignment. A transverse member **112** on a tilt link **37** limits the forward rotational movement of the link **37** relative to the boom **21**. It will be noted that the pin **106** is in the rearmost position in slot **103** during ejection movement of the tilt linkage **36**.

From the foregoing description it will be noted that forward movement of the tilt linkage **36** automatically effects ejection of the load from the bucket by forward movement of the ejector. By making the rear wall ejector in two parts, it is possible to form the ejector to provide the desired rear wall curvature in its rearmost position and permit the ejector to assume a more vertical alignment of its two parts for full ejection of the load when it is in an eject position. By placing the ejector actuating linkage **91, 92** at the upper end of the tilt linkage and bucket, rather than in a lower position, the extensible and contractable components **91, 92** are out of the area where materials spilling from the bucket or the like will be apt to interfere with proper operation of the lost motion connection between the elements of the linkage **91, 92**.

In the embodiment of the invention shown in FIG. **7**, the extensible link **191** is connected to link part **181** rather than the upper part **171** of the ejector **170**. This allows a somewhat shorter operating link to be used for the ejector.

The embodiments of the invention in which an exclusive property of privilege is claimed are defined as follows:

1. In a vertically swinging boom-type loader having a forwardly open bucket pivotally connected to the front end of a boom for tilting movement between rollback, loading and dumping positions and bucket tilt mechanism including an upright lever pivotally connected to an intermediate portion of the boom and a longitudinal link disposed above said boom connected at its opposite ends to the bucket and the upright lever, respectively; an ejector mechanism, comprising:

a top ejector part extending substantially the full width of said bucket and pivotally connected on a transverse axis to an upper portion of said bucket,

a bottom ejector part extending substantially the full width of said bucket and pivotally connected on a transverse axis to the lower end of said top ejector part,

a link part pivotally connected at one end to an upper portion of said bucket and pivotally connected at its other end to said bottom ejector part,

an ejector actuating linkage including a pair of elements connected to one another for limited relative movement between contracted and expanded positions and means biasing said elements toward said contracted position,

means pivotally connecting one of said elements to one of said parts, and

means pivotally connecting the other of said elements to said lever on an axis spaced above said connection of said link to said lever, said top and bottom ejector parts being automatically positioned, by said ejector actuating linkage, at the rear of the bucket to form the rear wall thereof when said bucket is in its rollback and loading positions and said ejector mechanism being automatically positioned, by said ejector actuating linkage, in a forwardly disposed eject position when said bucket is moved to its dumping position.

2. The invention of claim **1** wherein said elements are interconnected for limited reciprocal lost motion.

3. The invention of claim **2** wherein said means biasing said elements toward said contracted position is a tension spring connected at its opposite end to said elements, respectively.

4. The invention of claim **1** wherein said one of said parts is said top ejector part.

5. The invention of claim **4** wherein said elements are interconnected for limited reciprocal lost motion.

6. The invention of claim **5** wherein said means biasing said elements toward said contracted position is a tension spring connected at its opposite ends to said elements, respectively.

7. The invention of claim **1** wherein said one of said parts is said link part.

8. The invention of claim **7** wherein said elements are interconnected for limited reciprocal movement.

9. The invention of claim **8** wherein said means biasing said elements toward said contracted position is a tension spring connected at its opposite ends to said elements, respectively.

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