July 2, 1968 L. G. McMULLEN 3,390,793

BACKHOE

Filed March 21, 1966 2 Sheets-Sheet 1

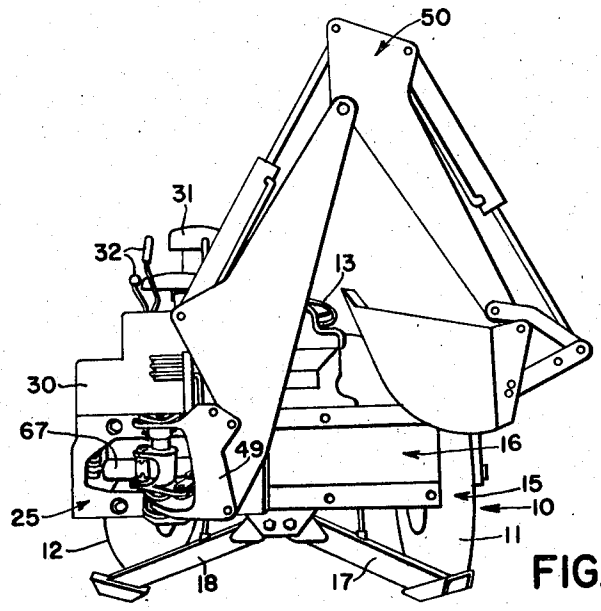


FIG. 1

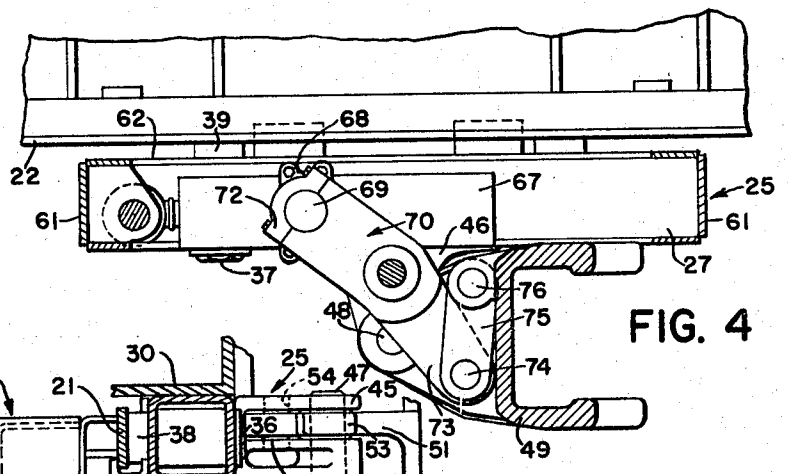


FIG. 4

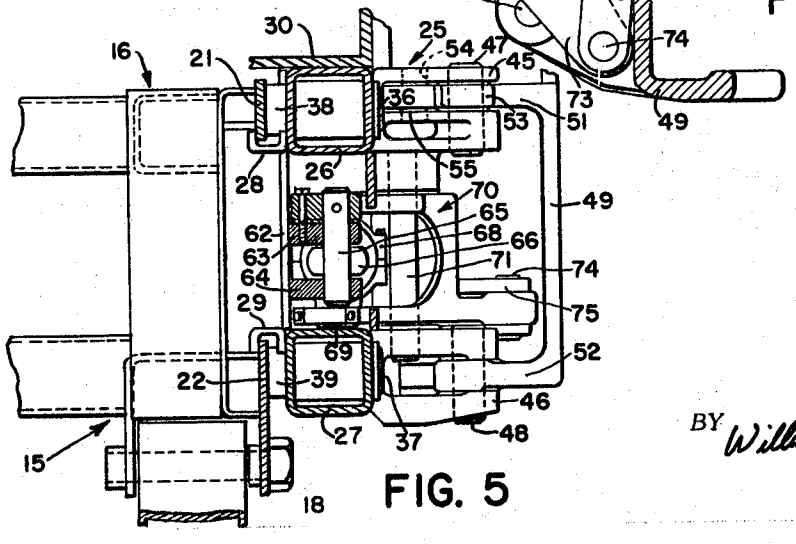


FIG. 5

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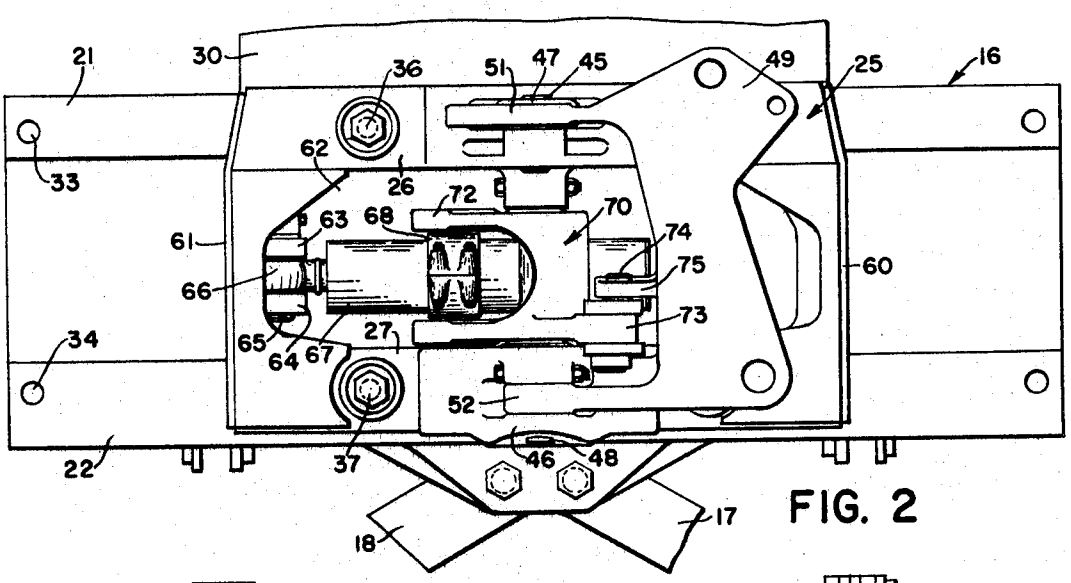


FIG. 2

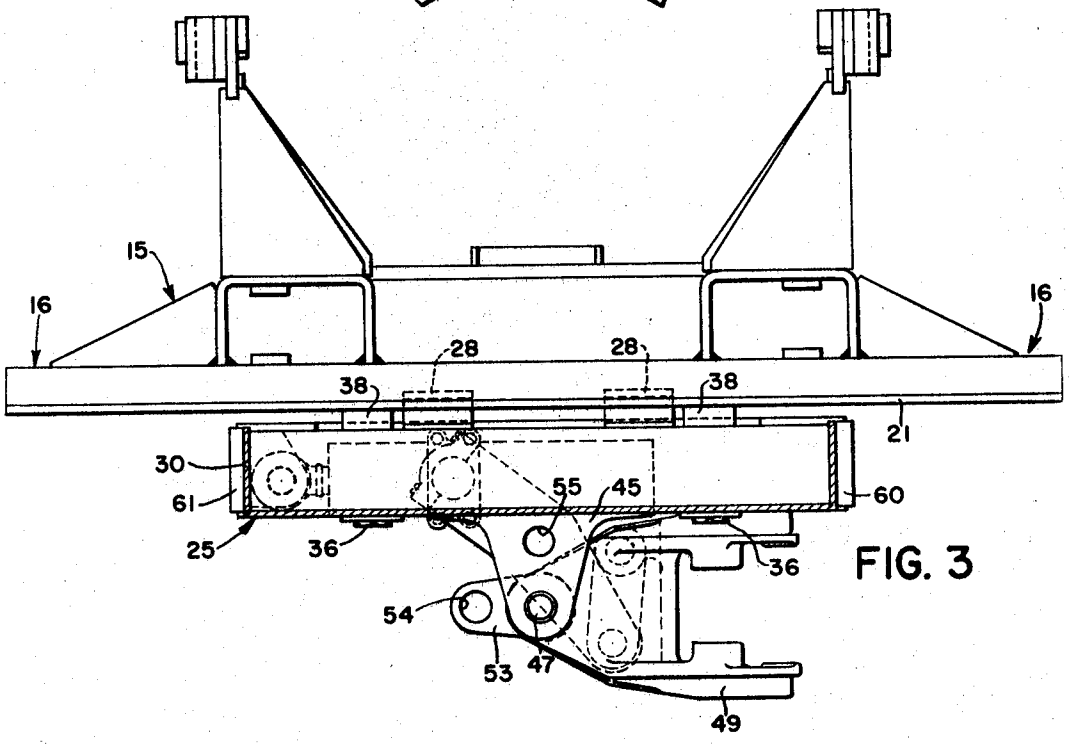


FIG. 3

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BACKHOE

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ABSTRACT OF THE DISCLOSURE

A backhoe structure including an upright transversely elongated supporting stand; a transversely elongated backhoe support including upper and lower vertically spaced beams positioned forward of the supporting stand and supported on the stand for transverse movement; a forwardly positioned upright pivot on the support for carrying a backhoe; means for locking the support at various transverse positions; an extendible and retractable hydraulic cylinder and ram device carried on the support in the vertical spacing between the upper and lower beams; a backhoe supported on the pivot for lateral swinging movement; and lever and link means connecting the backhoe and cylinder and ram device for adjusting the lateral position of the backhoe in response to extension and retraction of the ram within the cylinder.

This invention relates to a backhoe that is transversely shiftable along a transverse supporting stand. More particularly the invention relates to a swivel structure and the backhoe support that may best be utilized in a transversely shiftable backhoe.

Heretofore there have existed backhoes that may be transversely shiftable along track means carried on a transverse supporting stand. An example of such is shown in U.S. Patent 3,155,250 that issued to Messrs. John L. French, Albert J. Van Auwelaer, and Douglas C. Ager on Nov. 3, 1964. The transversely shiftable backhoes normally utilize a rotary type hydraulic motor for shifting or swinging the backhoe about an upright axis. Such is utilized for the reason that it can be axially aligned with the vertical axis of the backhoe and consequently may be carried on the support that carries the backhoe on the supporting stand. Ram and cylinder type hydraulic motors are often used as the power source for swiveling a backhoe about its upright axis. However, due to space limitations such is not used on backhoes that are transversely shiftable along the main supporting stand. It should be recognized that in many instances there is a cost advantage in utilizing the extendable ram and cylinder motor for swinging the backhoe.

With the above in mind, it is the primary object of the present invention to provide a transverse shiftable backhoe that utilizes an extensible and retractable hydraulic cylinder and ram device as the power unit for swinging the backhoe about its upright axis.

Specifically it is the object of the present invention to provide a backhoe support forward of the main supporting stand and supported thereon for transverse movement along the supporting stand. The backhoe support has a forwardly positioned upright pivot and is elongated in a transverse direction. The support includes upper and lower transverse horizontal beams that are disposed forwardly of transverse horizontal tracks on the main supporting stand. A transversely disposed extensible and retractable hydraulic cylinder and ram device is carried between the upper and lower beams with the ram being connected at one end of the transverse backhoe support. A trunnion is provided on the outer surface of the cylinder and has an upright pivot thereon. A lever has its

rear end mounted on the upright pivot, a midportion carried on the support forwardly of the trunnion, and a forward end that is connected to the backhoe by a link. Consequently as the cylinder is extended or retracted on the ram, it will effect swinging action of the backhoe about its upright pivotal connection on the backhoe support. Other objects and advantages of the invention will become apparent to those skilled in the art as the nature of the invention is better understood from the following description and as shown in the accompanying drawings.

FIG. 1 is a front perspective view of the backhoe mechanism and the vehicle on which it is mounted.

FIG. 2 is a front view showing the portion of the main supporting stand and the backhoe supporting structure.

FIG. 3 is a plan view of the structure shown in FIG. 2.

FIG. 4 is a sectional view taken substantially along the line 4—4 of FIG. 2.

FIG. 5 is a sectional view taken substantially along the line 5—5 of FIG. 4.

The backhoe mechanism is normally supported on a vehicle **10** having a pair of transversely spaced transport wheels **11, 12** and a driver or operator station **13.**

Supported forwardly of the tractor **10** and supported thereon is a main upright transversely elongated supporting stand, indicated in its entirety by the reference numeral **15** that includes a main upper track structure **16** and a pair of lower stabilizing legs **17, 18** that are retractable for transport, but normally engage the ground during operation of the backhoe. The stabilizing legs **17, 18** may be raised and lowered by a pair of hydraulic cylinders shown partially at **19** and **20.** The track structure **16** includes upper and lower transversely extending and horizontal track plates **21, 22** defining therebetween a transverse horizontal slot extending the width of the stand. Carried on the track structure **16** is a backhoe support **25** composed of vertically spaced upper and lower transverse beam members **26, 27** respectively that are positioned just forwardly of the respective tracks **21, 22.** Transversely spaced upper guide elements **28** are fixed to the rear surface of the beam **26** and extend under the lower edge of the track **21** to engage the backside of the track. Lower guide elements **29** are fixed to the rear surface of the beam **27** and extend rearwardly and over the upper edge of the lower track **22.** As is clearly evident in FIG. 5, the guide elements **28, 29** are U-shaped and serve to support the backhoe support **25** for transverse movement along the main supporting stand **15.**

A backhoe operator's station **30** is supported on the upper beam **26** and carries an operator's seat **31** and various control elements **32** thereon. Consequently as the backhoe support **25** is adjusted transversely along the main stand **15,** the operator's station **29** will also move therewith.

The tracks **21, 22** have vertically aligned and transversely spaced bolt openings **33, 34** respectively that receive bolts **36, 37** extending through the upper and lower beams **26, 27.** Consequently the bolts **36, 37** operate to lock the support **25** against transverse movement on the tracks **21, 22.** Spacers **38, 39** are fixed to the rear surface of the beams **26, 27** and engage the front surface of the tracks **31, 32.** The spacers **38, 39** provide suitable spacing and small sliding surfaces so as to reduce the frictional load required in moving the frame **25** transversely on the tracks **21, 22.**

Integral with the transverse beams **26, 27** and projecting forwardly therefrom are vertically bifurcated upper and lower pivot pin supports **45, 46** that carry vertically aligned pivot pins **47, 48.** Carried on the pins **47, 48** is the base **49** of a backhoe **50.** The base **49** has upper and lower horizontal platelike elements **51, 52** that fit between the bifurcated portions of the brackets **45, 46.** The upper plate **51** has a rearwardly projecting extension **53** with

an aperture 54 therein that may be aligned with an aperture 55 in the upper bifurcated bracket 45 so that a pin may be passed through the respective apertures 54, 55 for locking the backhoe 50 against lateral swinging.

A pair of end plates 60, 61 and a rear upright plate 62 rigidly interconnect the beams 26, 27 and defines therewith an opening forwardly aligned with the slot between tracks 21, 22. Fixed to the end plate 61 and the wall 62 adjacent the end plate 61 is a pair of vertically spaced ears 63, 64 that carries a pivot pin 65 that extends through the ram 66 of a cylinder and ram device. A cylinder 67 extends transversely from the pin 65 and in the opening between the upper and lower beams 26, 27. Mounted on the outer surface of the cylinder 67 is a trunnion 68 having vertically aligned upper and lower pivot studs 69. A horizontally disposed lever 70 is pivotally mounted on the forwardly projecting brackets 45, 46 by means of an upright pivot pin 71. The rear end 72 of the lever 70 is bifurcated to fit above and below the cylinder 67 and on the pivot studs 69. A forward end 73 of the lever 70 projects forwardly and is pivotally connected at 74 to a link 75. The link 75 is pivotally connected at 76 to the backhoe base 49. Thus it will be seen that as the hydraulic cylinder 67 is moved axially along the ram 66, it will cause the lever 70 to swing transversely and to impart rotational movement to the backhoe base 49. The ram 66, being pivoted on the vertical pin 65 will automatically adjust itself to the necessary effective radius of the lever 70 as the cylinder moves axially. However, the cylinder 67 will be retained on a substantial transverse line, although it may move slightly fore and aft due to the effective radius between the pin 71 and the pin 69 and at times the cylinder will swing in the slot between tracks 21, 22.

Thus, there has been shown in combination an upright transversely elongated supporting stand 15 having a backhoe support 25 disposed forwardly thereof and supported thereon for transverse movement along the tracks 21, 22. The backhoe support 25 has a forward pivot as defined by the pivot pins 47, 48 and transversely spaced opposite ends as defined by the end plates 60, 61. A transversely extending ram 66 and cylinder 67 extends across the backhoe support 25 rearwardly of the forward pivot pins 74, 75. A backhoe 50 is supported on the pins 74, 75 and link means including the lever 70 and link 75 extend between the base 49 of the backhoe 50 and the cylinder 67. The lever 70 is carried on suitable trunnion means on the outer surface of the cylinder 67 so that lateral movement of the backhoe will occur in response to extension and retraction of the ram and cylinder.

I claim:

1. In a backhoe structure, the combination of an upright transversely elongated supporting stand having upper and lower tracks extending transversely across the forward side of the stand and defining therebetween an elongated transverse slot substantially the length of the stand; a backhoe support forward of the supporting stand having a forwardly positioned upright pivot centrally located between its transversely spaced opposite upright ends, the support further having upper and lower horizontal beams substantially shorter than the transverse expanse of the tracks and forwardly of and substantially parallel to the tracks, the ends and beams defining an opening forwardly aligned with the slot; guide means supported on the beams and extending rearwardly to engage and carry the support for transverse movement on the tracks; means for locking the support in a desired transverse position along the supporting stand; a transversely disposed extensible and retractable hydraulic cylinder and ram device disposed in the opening and pivotally connected at one end to the support adjacent one of the support ends to swing laterally fore and aft in the opening and slot and extending transversely therefrom behind the pivot toward the opposite end of the support; a backhoe supported on the pivot for lateral swinging movement; and link means extending between the backhoe and cylinder and ram device for adjusting the lateral position of the backhoe in response to extension and retraction of the cylinder and ram device.

2. The structure as set forth in claim 1 in which the link means includes a horizontal lever pivoted on the support with a forward end and a rearward end, and means connecting the forward and rear ends to the backhoe and cylinder and ram device respectively.

3. The structure as set forth in claim 2 in which the means connecting the forward end of the lever to the backhoe is a link.

4. The structure as set forth in claim 1 in which the cylinder of the cylinder and ram device carries a trunnion on its outer surface with an upright pivot, and the link means that connects the cylinder and ram device includes a horizontal lever with a rear end suppported on the trunnion pivot, a midportion pivotally supported on the support, and a forward end connected to the backhoe.

5. The structure as set forth in claim 1 further characterized by the backhoe support having rigid therewith an operator's station that extends rearwardly and above the supporting stand.

6. In a backhoe structure, the combination of an upright transversely elongated supporting stand having a transversely elongated and forwardly opening slot; a transversely elongated backhoe support of a transverse expanse less than that of the stand including upper and lower vertically spaced beams defining upper and lower limits of an opening forwardly aligned with the slot, the support being forward of the supporting stand and supported thereon for transverse movement along the supporting stand, the backhoe support also having a forwardly positioned upright pivot; means for locking the support in a desired transverse position along the supporting stand; extensible and retractable hydraulic cylinder and ram device means pivotally carried on the support and disposed in the opening between the upper and lower beams; a backhoe supported on the pivot for lateral swinging movement; and means connecting the backhoe and cylinder and ram device means for adjusting the lateral position of the backhoe in response to extension and retraction of the cylinder and ram device, with at least a part of the cylinder and ram device being disposed in the slot as the backhoe is adjusted to various lateral positions.

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HUGO O. SCHULZ, *Primary Examiner.*