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[54] **MECHANICAL SHOVEL ATTACHMENT**

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[52] **U.S. Cl.**.....**214/138 C**

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

[58] **Field of Search**.....214/138 R, 138 C, 132, 145; 212/145

[56] **References Cited**

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[57] **ABSTRACT**

An attachment for mechanical shovels and the like having a lever pivotable relative to a rotating column. An arm pivotally connected to the lever and a hydraulic cylinder working in conjunction with the arm, lever and locking means for moving a shovel from a working position to a travelling position.

10 Claims, 5 Drawing Figures

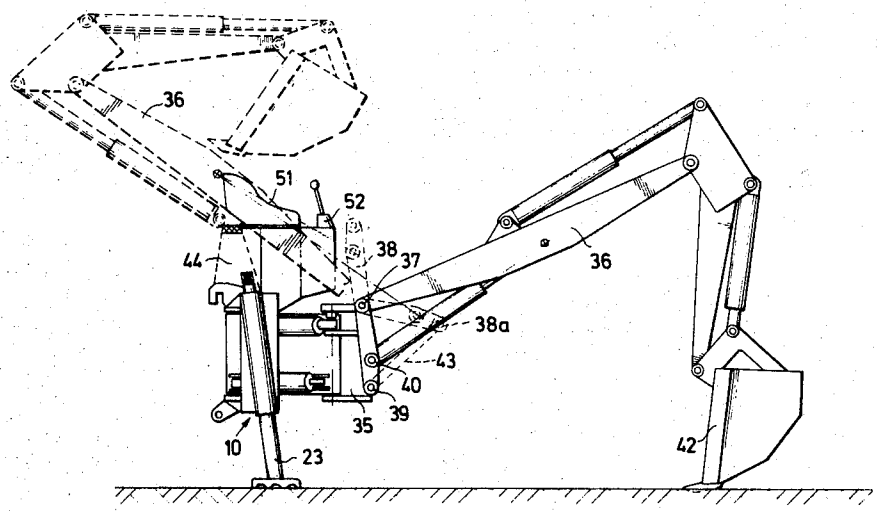


Fig. 1

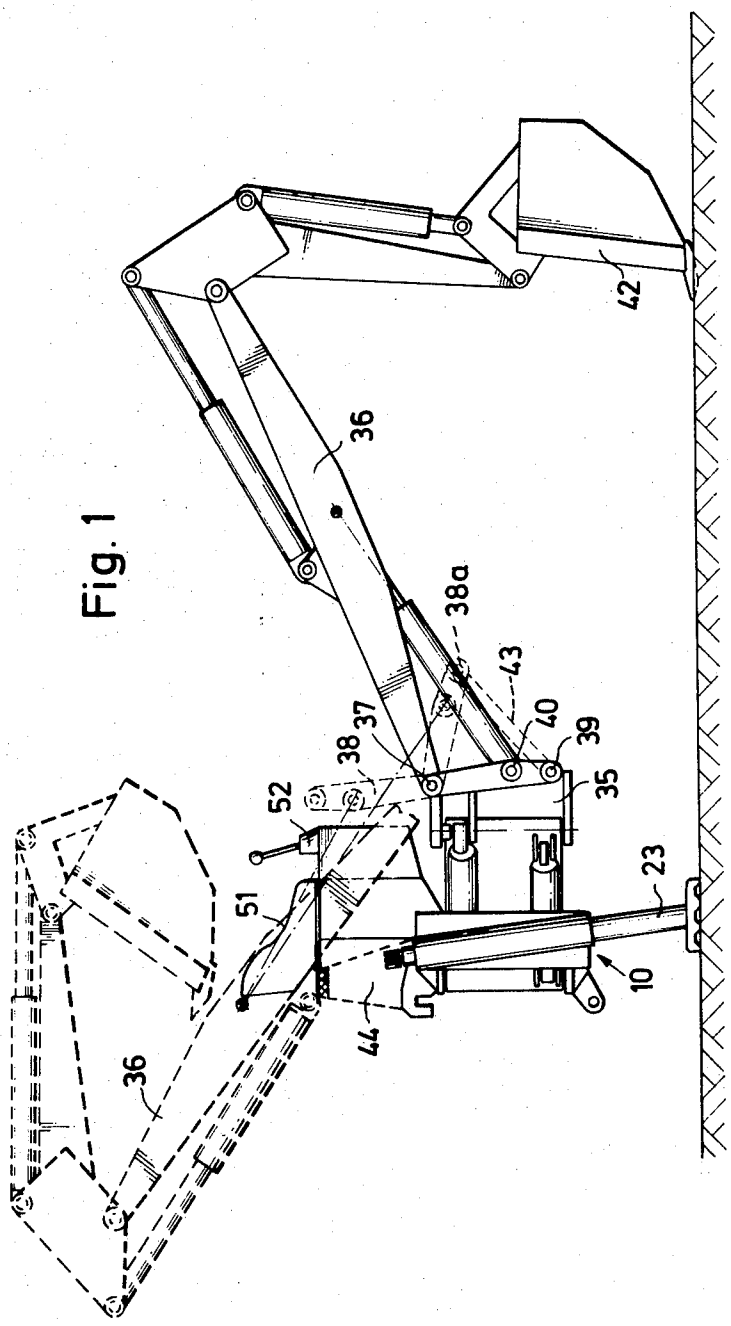
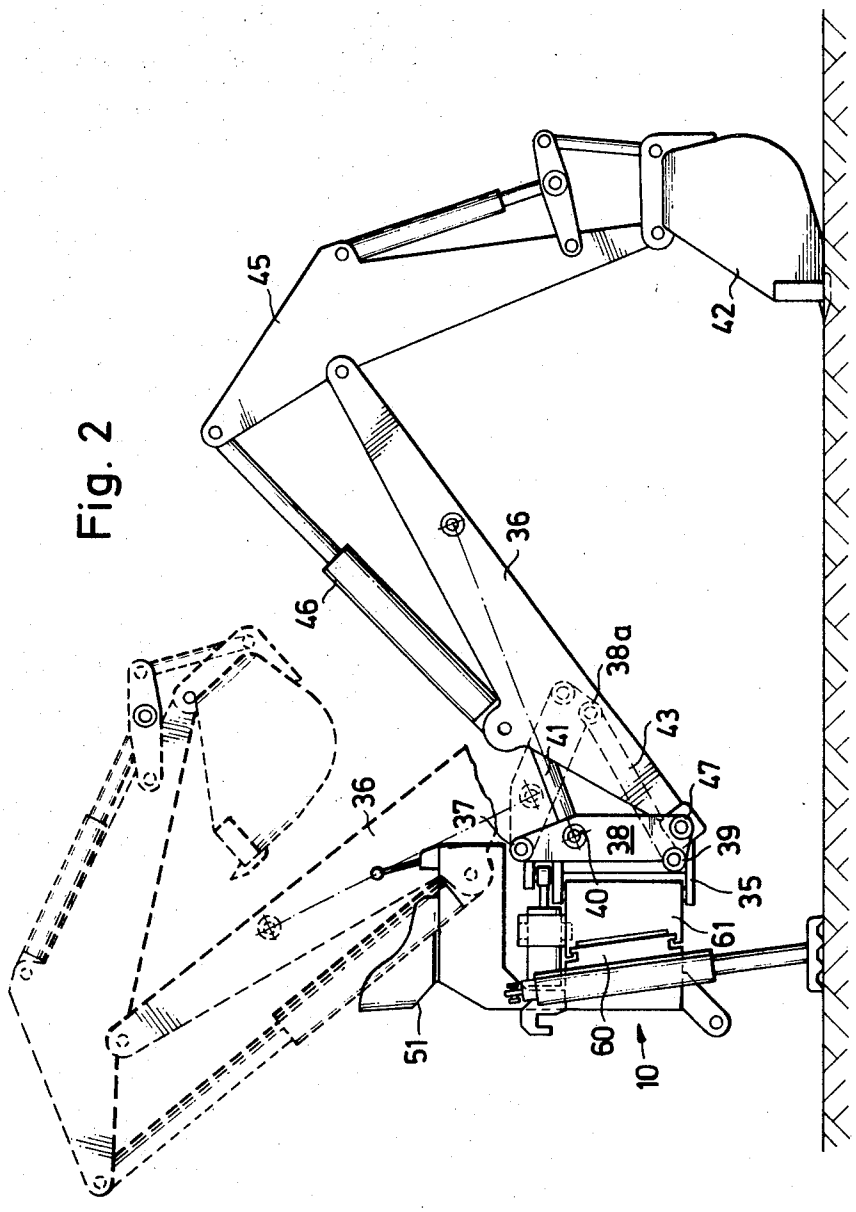


Fig. 2



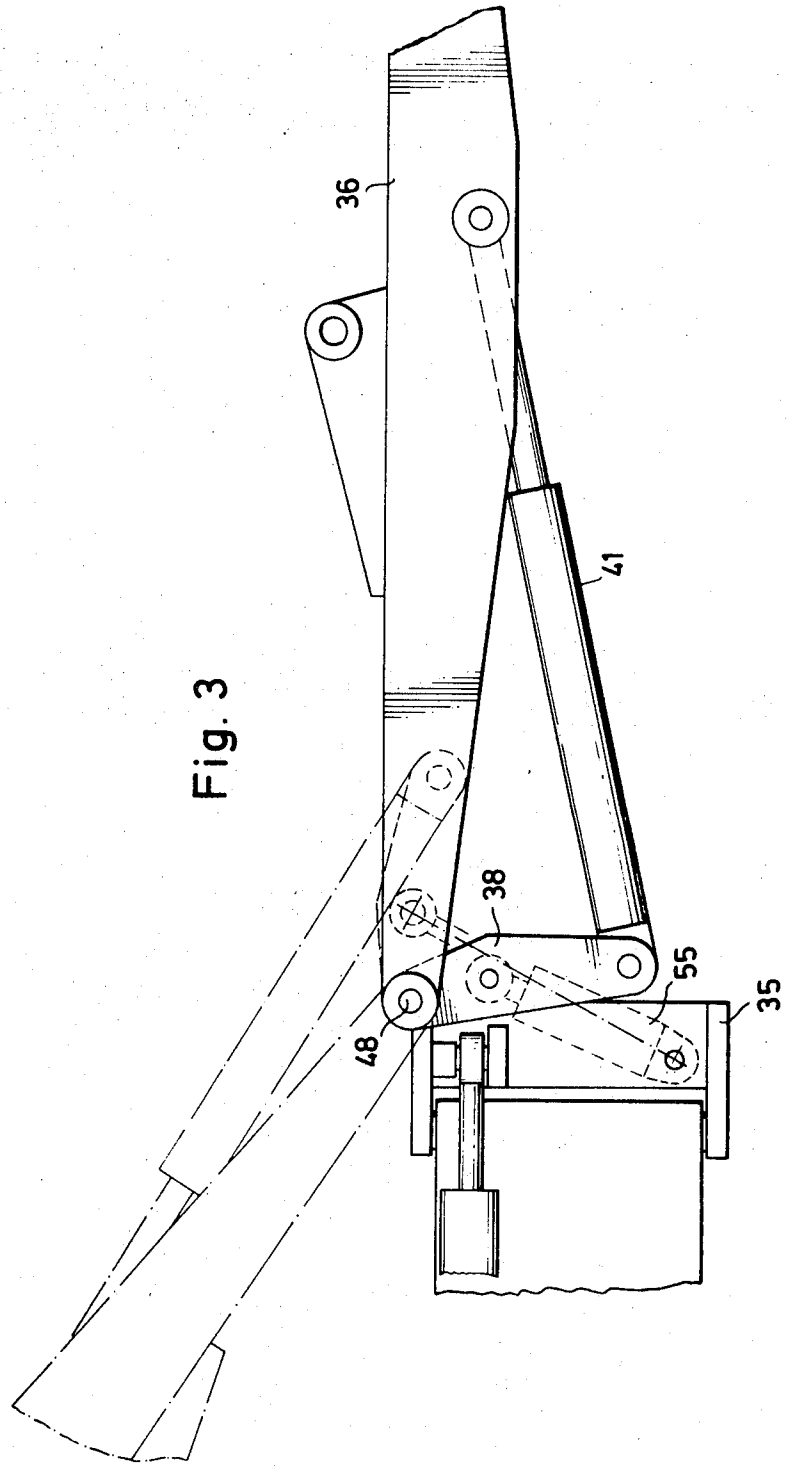


Fig. 3

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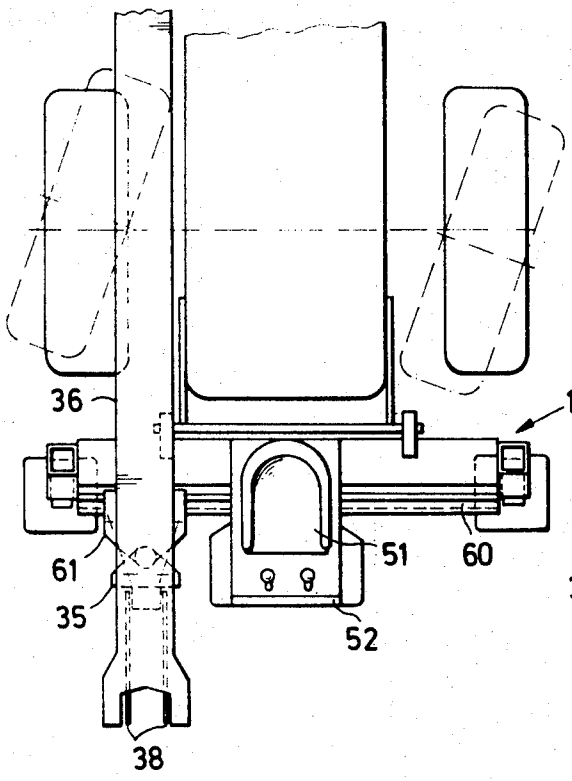

Fig. 5

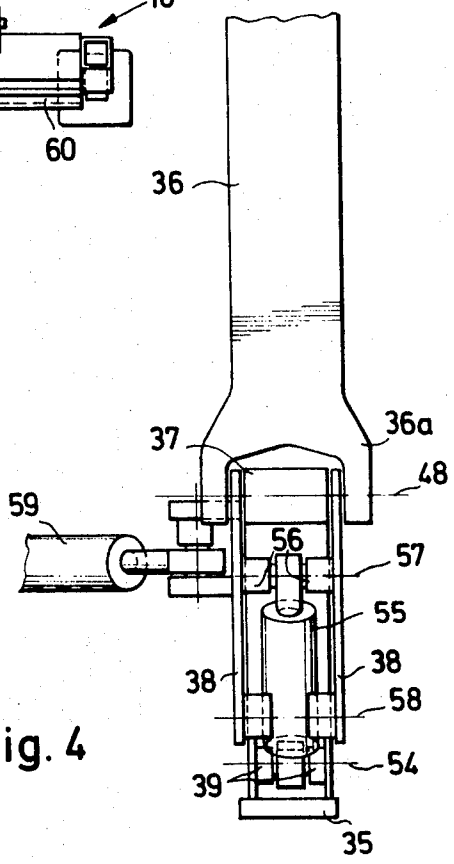

Fig. 4

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MECHANICAL SHOVEL ATTACHMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to mechanical shovel attachments, and in particular, to shovel attachments having a frame for connection to a carrier vehicle. This type of device includes a vertical pivoting column attached to the frame and is rotatable about a vertical axis. A shovel arm extends from the vertical column and pivots about a horizontal axis, and, optionally, a connecting member is movable horizontally.

2. Description of the Prior Art

Known mechanical shovel attachments are supported on the ground by means of downwardly pivoting or downwardly extending supporting struts which, together with the carrier vehicle, form a sufficiently stable structure to withstand the working forces and the weight of the shovel arm having a loaded scoop. When the mechanical shovel is to be moved toward or away from the working area, the supporting struts are retracted, and the arm is pivoted upwardly into a retracted position as steep as possible in order to reduce the rear axle load on the vehicle. To a certain extent, this rear axle load remains, nevertheless, present with all carrier vehicles carrying mechanical shovel attachments. This is the reason why shovel attachments of a certain size can only be carried by correspondingly heavy vehicles, or vehicles whose weight distribution has been correspondingly modified.

The problem with rear axle loading is especially accentuated in mechanical shovel attachments where the pivoting column is laterally movable relative to the frame by means of a transverse carriage, for example, which is attached to the frame. Such intermediate mechanisms further remove the center of gravity of the shovel attachment from the rear end of the vehicle. In addition to the rear axle loading condition mentioned, the rearward extension of the shovel attachment, even in its upwardly retracted travelling position, involves problems of maneuverability. Examples of this are encountered when rounding a tight corner, passing under low bridges or entrances, storing the vehicle with its upwardly extending arm and scoop in a shed or the like.

SUMMARY OF THE INVENTION

According to the invention, the above mentioned shortcomings and difficulties in connection with mechanical shovel attachments can be overcome by a structure wherein the shovel arm as well as the one end of its operating cylinder, are attached, one above the other, to a lever whose upper end is pivotably supported on a horizontal pivot which in turn is mounted on the upper end of the vertical pivoting column. The lever is rotatable about its pivot between the downwardly extending working position and at least one higher travelling position. The lever further may be locked in these positions relative to the pivoting column. In the proposed design the lever forms a supporting base for the shovel arm and its hydraulic cylinder, the base being pivotable upwardly from its normal working position and lockable in its new position from which the shovel arm can execute a further upwardly or backwardly directed pivoting motion so as to allow the shovel attachment to be moved as close as possible to the carrier vehicle. Depending upon the space available, the position is preferably parallel to the longitudinal center axis of the carrier vehicle located between the operator's stand and one of the wheels. The device thus permits a considerable reduction in the rear axle load of the carrier vehicle during travelling, while simultaneously improving its maneuverability. Furthermore, the mechanical shovel attachment of the invention, whose unhooked from the carrier vehicle, requires only a comparatively small storage space. The structural requirements for embodying the invention are very simple, requiring neither any design changes nor any additional space, and it may be incorporated in all known types of mechanical shovel attachments.

In a preferred embodiment of the invention, the lever comprises two parallel spaced plates of identical contour which are mounted and positioned on the upper end of the vertical pivoting column by means of a central mounting ear forming the horizontal pivot. Oppositely arranged bushings in the plates for the reception of the support pin of the shovel arm cylinder are also provided.

In the preferred embodiment of the invention, the locking of the lever relative to the vertical pivoting column is achieved by means of a locking ear at the lower end of the pivoting column which corresponds to appropriate bores in the lower end of the plates of the lever in its working position for the introduction of a locking pin. In its raised position, the lever is locked by means of an additional locking link attached on one end to the locking ear of the vertical column and on its other end to the plates of the arm. In order to move the arm from its working position to its travelling position, the scoop strut and working tool are rested on the ground. Whereupon the locking pin is removed and, depending upon the particular structure of the attachment, either the scoop strut cylinder and/or the arm cylinder is operated. The lever is thereby raised from its downwardly extending position, after which the additional locking link can be installed between the lever and the locking ear on the vertical pivoting column. It may also be desirable to obtain the upward motion of the lever by means of a separate hydraulic cylinder wherein the fixed end is linked to the pivoting column and the mobile end is attached to the lever plates at a distance below their horizontal pivoting axes. No special locking link is required in this case.

BRIEF DESCRIPTION OF THE DRAWINGS

Further advantages of the invention will become apparent from the description below, when taken together with the accompanying drawings which illustrate, by way of examples, several preferred embodiments of the invention represented in the various figures as follows:

FIG. 1 is a side view elevation of a mechanical shovel attachment embodying the invention, the shovel attachment being shown in its working position and in its travelling position;

FIG. 2 is a representation similar to that of FIG. 1, showing a modified embodiment of the mechanical shovel attachment of the invention;

FIG. 3 is an enlarged partial side view elevation of a further modification of the invention including an operating cylinder attached to the lever;

FIG. 4 shows the embodiment of FIG. 3 in a front view elevation, as seen when looking toward the vehicle;

FIG. 5 shows, in a somewhat simplified plan view, the rear end of a carrier vehicle carrying the mechanical shovel attachment of the invention, the attachment being shown in its laterally offset, retracted travelling position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIG. 1, the mechanical shovel attachment consists of a frame **10** which is adapted for connection to a suitable carrier vehicle and having a pair of lateral support struts **23**. A support bracket **20** is attached to the frame **10** for lateral pivotability relative thereto, and a vertical pivoting column **35** is attached to the exterior edge of the support bracket **20**. The upper end of the pivoting column **35** includes a pivot ear having a pivot pin **37** mounted therein for pivotable support of a shovel arm **36** on the pivoting column. Also, pivotably supported on the pivot pin **37** is the upper end of a lever **38**, the lower end of the lever having a locking bore **38***a* matching a corresponding locking bore on a locking ear **39** located on the lower end of the vertical pivoting column **35** and lockable thereto by a pin (not shown). One end of an operating cylinder **41** for the shovel arm **36** is attached to the lever **38** at the point **40** located between the two ends of the lever.

The working mechanism may be pivoted upwardly and backwardly until it comes to rest on a support lock **44** attached to the frame **10**. This is accomplished by resting shovel scoop **42** on the ground, whereupon the pin locking the lever **38** at the locking ear **39** is removed. The operating cylinder **41** is then retracted. This causes the lever **38** to pivot upwardly into a position shown by broken lines in FIG. 1. A special locking link **43** can now be inserted between the locking ear **39** of the column **35** and the free end **38***a* of the raised lever. If the cylinder **41** is now extended, the shovel arm **36** is permitted to be raised until it comes to rest on the support **44**. In this rest position, the locking link **43** is no longer under load and, after removal of the link, the cylinder **41** can again be retracted, thereby further pivoting the lever **38** upwardly until it is completely retracted as shown by broken lines in FIG. 1. In the example described, it was assumed that the frame **10** also includes an operator's seat **51** and a control panel **52** which are essentially arranged in the middle of the structure so that, when the support bracket **20** is pivoted to one side, the shovel arm **36** can be positioned along side the operator's seat and above the carrier vehicle. This is similar to the position shown in FIG. 5, where a laterally movable vertical pivoting column is attached to the frame.

The embodiment of FIG. 2 includes a frame **10** carrying on a slide **60** a transversely movable carriage **61**. The vertical pivoting column **35** is attached to the outer portion of the carriage **61**. The lever **38** is again pivotably attached to the upper end of the pivoting column **35** by means of a horizontal pivot pin and pivot ear **37**. The shovel arm **36** is attached to the lower end of the lever **38** by means of an attachment **47**, while the actuating cylinder **41** is, in this case, attached above the shovel arm at point **40**. Near the lower end of the lever **38** is further provided a locking bore **38***a* which can be aligned with a matching, locking ear **39** on the lower end of the pivoting column **35** for the insertion of a locking pin.

In order to move the lever **38** into the travelling position as indicated by broken lines in FIG. 2 the scoop strut **45** and scoop **42** are first rested on the ground as described in the previous example. After removal of the locking pin from the ear **39**, the hydraulic cylinders **41** for the shovel arm end **46** for the scoop strut are activated, preferably in a parallel operation by extending cylinder **41** and cylinder **46** at the same time until the lever **38** reaches its raised position indicated by dotted lines in FIG. 2. In this operation, the scoop **42**, the scoop strut **45**, and the shovel arm **36** have to pivot clockwise around the support of the scoop on the ground, whereby the angle enclosed between the lever **38** and the arm **36** is increased, while the angle enclosed between the arm **36** and the scoop strut **45** is decreased. Following installation of the locking link **43** by attaching it to the bore **38***a* of the lever and the locking ear **39** of the column, the shovel arm cylinder **41** can be retracted, thereby raising the entire shovel mechanism until it reaches the retracted end position shown in FIG. 2.

The embodiment illustrated in FIGS. 3 and 4 shows a lever **38** which, as in the previous examples, is pivoted on its upper end by means of a horizontal pivoting pin **48** mounted in a pivoting ear **37** of the vertical pivoting column **35**. As can be seen in FIG. 4, the shovel arm **36** includes a forked end portion **36***a* which reaches over the two plates constituting the lever **38**, thereby retaining the latter on the horizontal pivoting pin **48** at a fixed distance to one another. A hydraulic cylinder **55** is attached by its lower end to the bottom portion of the pivoting column **35** by means of mounting ears **39** and a horizontal pin **54** on the pivoting column. The working end of the cylinder **55** is attached to the plates of the lever **38** by means of welded eyes **56** and a cross pin **57**. To the lower end of the lever **38** is pivotably attached one end of the shovel arm cylinder **41** by means of a pin **58**. A cylinder **59** provides the pivoting drive for the vertical pivoting column **35**.

As can be seen in FIG. 3, the lever **38** can be raised to its travelling position indicated by broken lines by actuating the cylinder **55**. If the cylinder **41** has been extended before the lever **38** is raised, the resultant position of the shovel mechanism becomes the fully retracted position as shown in FIG. 3.

In FIG. 5 is illustrated the rear portion of a carrier vehicle to which has been attached the frame **10** of a mechanical shovel attachment. The frame **10** carries an operator's seat **51** and a control panel **52**. Below the seat is a horizontal slide **60** and a carriage **61** with the vertical pivoting column **35** attached thereto, as previously described in connection with FIG. 2. The carriage **61** is shown laterally displaced out of its median position. The lever **38** in this case is in its raised travelling position as indicated in FIG. 2 so that the shovel arm **36** attached to the lower end of the lever **38** at **47** extends backwardly over the attachment frame **10** and over the carrier vehicle.

It should be understood, of course, that even though the embodiments described above include various con-

necting elements allowing lateral displacement of the vertical pivoting column **35** with respect to the frame **10** by means of the bracket **20** or the carriage **61**, for example, the invention can equally well be applied to mechanical shovel attachments where the pivoting column is directly mounted to the frame and where the operator's seat is arranged laterally offset with respect to the vertical pivoting column.

While there has been described and illustrated specific embodiments of the invention, it will be clear that variations in the details of the embodiments specifically illustrated and described may be made without departing from the true spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. An attachment for mechanical shovels and the like comprising:

a. a frame for connection to a vehicle,

b. a pivoting column rotatable about a vertical axis relative to said frame,

c. an arm having a shovel or the like attached to one end thereof, the other end thereof being pivotally connected to said column and rotatable about a horizontal axis,

d. a lever being pivotally connected to said column about a horizontal axis at one joint, and

e. an operating cylinder member having a movable piston member therein, one of said members being pivotally connected to said lever and the other member being pivotally connected to said arm, whereby operation of said operating cylinder and piston members causes said lever to rotate about its horizontal axis.

2. An attachment as defined in claim **1** including means for locking said lever in a given position.

3. An attachment as defined in claim **1** wherein said arm is connected to said lever at a point above the connection of one of said members.

4. An attachment as defined in claim **1** wherein said lever includes a pair of parallel plates maintained a given distance from one another by pivot ear means on the upper end of said column, and means on said plates for supporting one of said members.

5. An attachment as defined in claim **1** wherein said column includes a locking ear at the lower end thereof, another point on said lever having a bore therein aligned with said locking ear when in a working position, a locking pin insertable in said bore and locking ear whereby said lever can be locked in a raised travelling position by locking said lever to said locking ear by the insertion of a locking link.

6. An attachment as defined in claim **1** wherein said lever is movable between a working position and a travelling position by means of a second operating cylinder having one end attached to said column and another end attached to said lever.

7. An attachment as defined in claim **1** wherein said arm and lever are pivoted relative to said column at the same point.

8. An attachment as defined in claim **1** wherein said arm is attached to said lever at the lower end thereof, and one of said members being attached to said lever between the ends thereof, and means for locking said lever to said column also positioned at the lower end thereof.

9. An attachment as defined in claim **1** including a support on said frame for supporting said arm in an upwardly and rearwardly retracted position.

10. An attachment as defined in claim **1** including means for laterally moving the attachment relative to the vehicle.

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