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SLOPE CUTTING ATTACHMENT FOR BULLDOZERS

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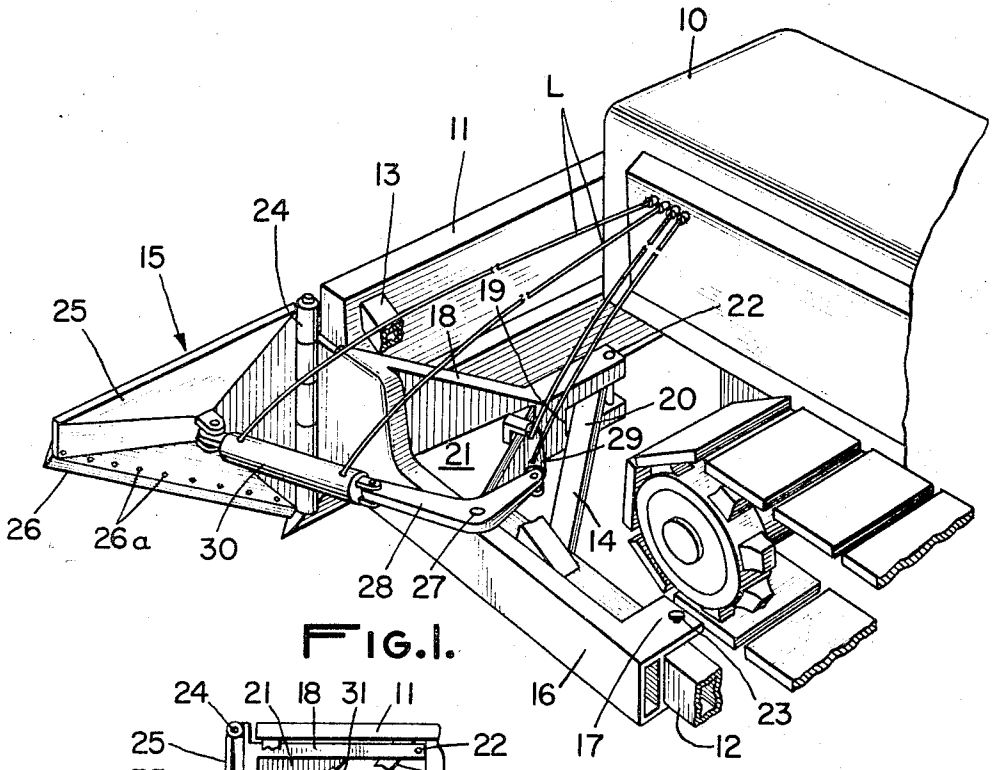

FIG. 1.

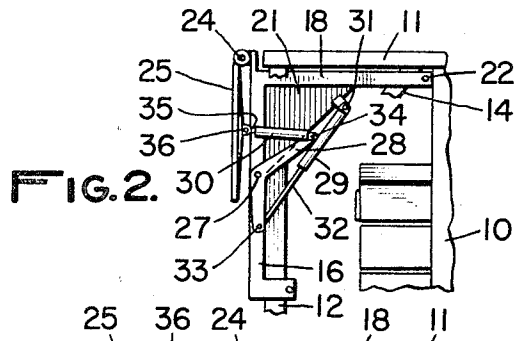

FIG. 2.

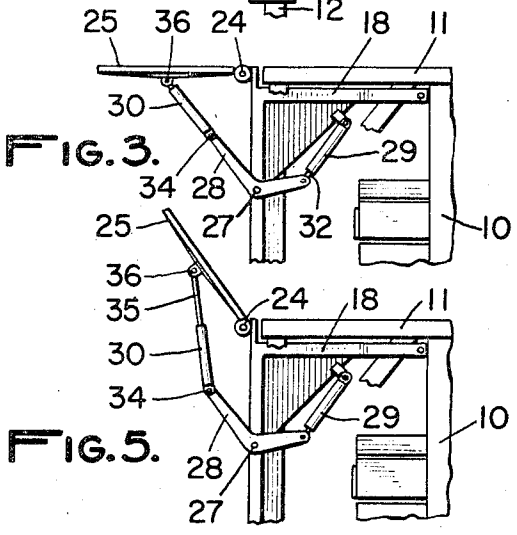

FIG. 3.

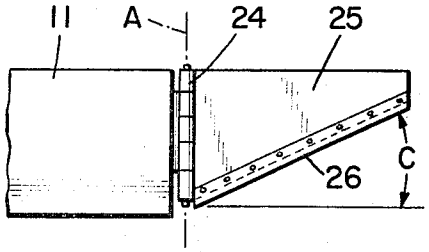

FIG. 4.

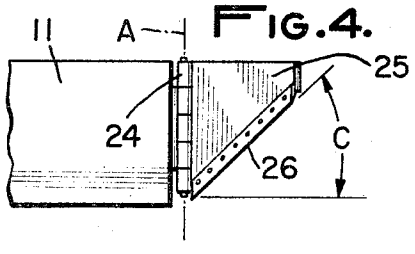

FIG. 6.

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SLOPE CUTTING ATTACHMENT FOR BULLDOZERS

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ABSTRACT OF THE DISCLOSURE

A bulldozer is equipped with an adjustable cutting accessory, designated a slope board, pivotally coupled adjacent an edge of the main blade. The slope board is triangular shaped and has a lower cutting edge sloped for slicing into earth. A linkage system for swinging the slope board about a vertical axis has a first power unit for moving the board from a retracted position to a position substantially coplanar with the main blade, and, a second power unit for swinging the board further around to a forward position. As the board is moved from the coplanar to its forward position, the cutting edge slope becomes increasingly steeper so that a desired angle for cutting the earth can be conveniently selected.

This invention relates generally to attachments for earth-moving devices and more particularly to a slope cutting device adapted to be attached to the blade structure of a bulldozer or the like for the purpose of cutting into earth at angles with respect to the horizontal.

The construction of roads and similar projects often involves constructing the roadway to an elevation lower than the surface of the ground. In these areas, called "cuts," the design specifications often require that the areas adjacent the roadway slope upwardly at an angle with respect to the roadway surface to prevent the earth in those areas from sliding down onto the roadway.

In present use, bulldozers having front-mounted, push-blades thereon, are used to construct roadways through these "cuts." However, the bulldozer blades are mounted in such a manner so as to be incapable of being vertically tilted or angled with respect to the bulldozer. Thus, the construction of the sloped areas adjacent the roadway surface often requires additional earth-moving equipment with the consequent increase in time and expense.

It would, accordingly, be desirable to provide the conventional bulldozer-mounted blade with an attachment which would permit the operator to make angled or sloped cuts in conjunction with the construction of the roadway.

With the foregoing in mind, it is accordingly a primary object of this invention to provide a novel attachment for bulldozers which permits sloped cuts to be made.

Another object is to provide an attachment which may be adjusted to cut into earth at a variety of angles.

Another object is to provide an attachment which may be easily moved into an inoperative position when not in use.

Another object is to provide an attachment of rugged simplified construction which is quickly and easily attachable to and detachable from a bulldozer blade structure without requiring any modification of the bulldozer itself.

Briefly, these and many other objects and advantages of this invention are attained by providing a device which

includes a generally L-shaped frame member adapted to be coupled to the existing structure of a bulldozer blade supporting frame. A generally triangular board, hereafter referred to as a slope board, in turn is pivoted for swinging movement about a vertical axis to the frame member and includes a cutting blade secured along its bottom edge. The cutting blade slopes upwardly from the lower end of the vertical pivot axis. Coupled between the slope board and the frame member is a linkage mechanism which includes a primary and a secondary power unit adapted to be operated by a hydraulic power source and control means mounted on the bulldozer.

The linkage mechanism may be actuated to move the slope board from an inoperative position to a variety of cutting positions as desired by the operator. In so doing, the effective cutting angle of the slope board may be varied between given minimum and maximum angles as desired.

The device is preferably constructed to be coupled to the bulldozer blade with only two pins, without requiring any modification of the blade or bulldozer structure.

A better understanding of the invention will be had by now referring to a preferred embodiment thereof as shown in the accompanying drawings, in which:

FIGURE 1 is a fragmentary perspective view of a bulldozer-mounted blade with the slope cutting attachment of this invention coupled thereto;

FIGURE 2 is a fragmentary plan view of the cutting attachment in inoperative position;

FIGURE 3 is a fragmentary plan view of the cutting attachment in an extended operative position;

FIGURE 4 is a fragmentary front elevation view of the attachment as shown in FIGURE 3;

FIGURE 5 is a fragmentary plan view of the cutting attachment in another operative position; and

FIGURE 6 is a fragmentary front elevation view of the attachment as shown in FIGURE 5.

Referring now to FIGURE 1, there is shown a bulldozer **10** having a conventional push-blade **11** attached thereto by means of a blade support member **12**. Attached between the blade **11** and support member **12** is a support brace **13** and a cross brace **14**.

Coupled to the blade **11** and its supporting structure is the novel slope cutting attachment **15** of this invention. The slope cutting attachment **15** includes a first frame member **16** having a laterally extending fork structure **17** on an end thereof for straddling a portion of the support member **12**. Integrally attached to the other end of the frame member **16** is a second frame member **18** extending generally at right angles thereto. The frame member **18** terminates in a fork **19** for straddling a portion **20** of the cross brace **14**. A triangular plate **21** is positioned across the juncture of the frame members **16** and **18** to overlie a portion of the support member **12**. The frame member **18** is coupled to the cross brace **14** by a pin **22** extending through the fork **19** as shown. The frame **16** is similarly coupled to the support member **12** by a second pin **23** passing through the fork **17**.

The front end of the frame member **16** adjacent to the bulldozer blade **11** terminates in a vertical hinge **24** pivotally mounting a slope board **25**. Positioned along the bottom edge of the slope board **25** is a cutting blade **26** secured as by rivets or fasteners **26a**. The cutting blade **26**, as shown, slopes upwardly from the horizontal.

Swinging movement of the slope board **25** about the hinge **24** is effected through a linkage mechanism in-

cluding a pivot pin **27** pivotally mounting a bell crank **28** to a frame member **16**, together with primary and secondary power units **29** and **30**.

Connected to the end of each of the power units **29** and **30** are hydraulic lines L which conduct hydraulic fluid from a bulldozer mounted power source (not shown) to the respective power units.

As best shown in FIGURE 2, the primary power unit **29** may constitute a hydraulic cylinder pivotally mounted at **31** to the plate **21** and including a piston rod **32** pivotally mounted at **33** to an end of the bell crank **28**. The secondary power unit **30** similarly may constitute a hydraulic cylinder pivotally mounted at **34** to the other end of the bell crank **28** and including a piston rod **35** pivotally mounted at **36** to the slope board **25**.

Referring now to FIGURE 3, it will be seen that the power unit **29** has been actuated to pivot the bell crank **28** such that the slope board **25** is disposed generally at right angles with respect to the frame member **16**.

In this position, and as shown in FIGURE 4, which is a front view of the device in the position shown in FIGURE 3, the cutting blade **26** forms an angle C with a line forming a right angle with the direction of travel of the bulldozer or parallel to the bottom edge of the bulldozer blade **11**. This angle C represents an effective cutting angle for the slope board **25**.

Referring now to FIGURES 5 and 6, when the power unit **30** is actuated to swing the slope board **25** to a more forward position with respect to the frame member, the effective cutting angle C is increased over that shown in FIGURE 4.

With the foregoing description in mind, the entire operation of the slope cutting attachment will now be described.

Initially, the bulldozer may be used in a conventional manner with or without the attachment. In this respect, if the attachment is secured to the bulldozer blade frame structure by the pins **22** and **23** as described, the slope board **25** may be swung adjacent to the frame member **16**, as shown in FIGURE 2, in an operative position until such time as it is desired to use the same.

To pivot the slope board to the position shown in FIGURE 3, the power unit **29** is actuated to draw the piston rod **32** within the unit. This movement causes the bell crank **28** to pivot about the pin **27**, causing the slope board to pivot about the hinge **24** to the position shown in FIGURES 3 and 4. In this position a minimum slope cutting angle C is defined.

To increase the effective cutting angle, the slope board may be pivoted forwardly to the position shown in FIGURES 5 and 6 by the movement of the piston rod **35** outwardly from the secondary power unit **30**, or alternately, the slope board may be pivoted or swung rearwardly to a position intermediate that shown in FIGURES 2 and 3.

From the foregoing, it is apparent that the slope board can be pivoted to any position desired, thus varying the effective cutting angle C from a minimum when the slope board is in the position shown in FIGURES 3 and 4 to greater angles when the slope board is pivoted forwardly or backwardly from that position.

It is also apparent that the slope board can be easily pivoted back to an inoperative position when desired as shown in FIGURE 2, or all the way forwardly to define a side scoop for the main bulldozer blade **11**.

The simplified construction of the novel slope cutting attachment enables the device to be quickly and easily attached to and removed from a conventional bulldozer blade without modifying the existing structure of the blade, the insertion and/or removal of the two pins **22** and **23** being the only operation required.

It should be understood that an additional slope board could be attached to the other side of the bulldozer blade **11** if desired and both operated simultaneously or individually.

Various other changes falling within the scope and spirit of this invention will occur to those skilled in the art. The slope cutting attachment is, therefore, not to be thought of as limited to the specific embodiment set forth.

What is claimed is:

1. A slope-cutting attachment adapted to be mounted on a blade support member and a cross-brace connecting a blade to a bulldozer, comprising: an L-shaped frame member having means on the ends thereof for coupling said frame member to said blade-support member and said cross brace; a slope board pivotally connected to said frame member; a bell crank pivotally connected to said frame member; a first power unit coupled between an end of said bell crank and said frame member; and a second power unit coupled between another end of said bell crank and said slope board, whereby said power units may be actuated to cause said slope board to pivot with respect to said frame member.

2. The subject matter of claim **1**, in which said slope board has a cutting blade disposed along the bottom edge thereof, said cutting blade sloping upwardly at an angle to the horizontal.

3. The subject matter of claim **1**, in which said first and second power units each includes a hydraulically operated piston rod and cylinder.

4. A slope-cutting attachment adapted to be mounted on a blade-support member and a cross brace connecting a blade to a bulldozer, comprising: a first frame member having a fork integrally attached to an end thereof, said fork being adapted to receive a first pin therethrough for coupling said first frame member to said blade-support member; a second frame member having one end thereof integrally connected to said first frame member, said second frame member having the other end thereof terminating in a fork adapted to receive a pin therethrough for coupling said second frame member to said cross brace; a triangular slope board pivotally coupled to said first frame member at an end thereof, said slope board having a cutting blade thereon; a bell crank pivotally connected to said first frame member; a primary power unit having one end thereof pivotally connected to an end of said bell crank, said primary power unit having the other end thereof pivotally connected to said first and second frame members; and a secondary power unit having one end thereof pivotally connected to another end of said bell crank, said secondary power unit having the other end thereof pivotally connected to said slope board, whereby said primary and secondary power units may be actuated to cause said slope board to pivot with respect to said frame members.

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