Sept. 2, 1969 S. B. McKELL 3,464,499

ADJUSTABLE BLADE DEVICE

Filed Aug. 23, 1965

Fig. 1.

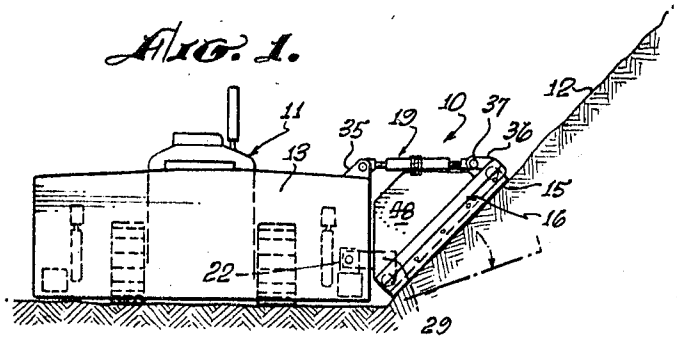


Fig. 2.

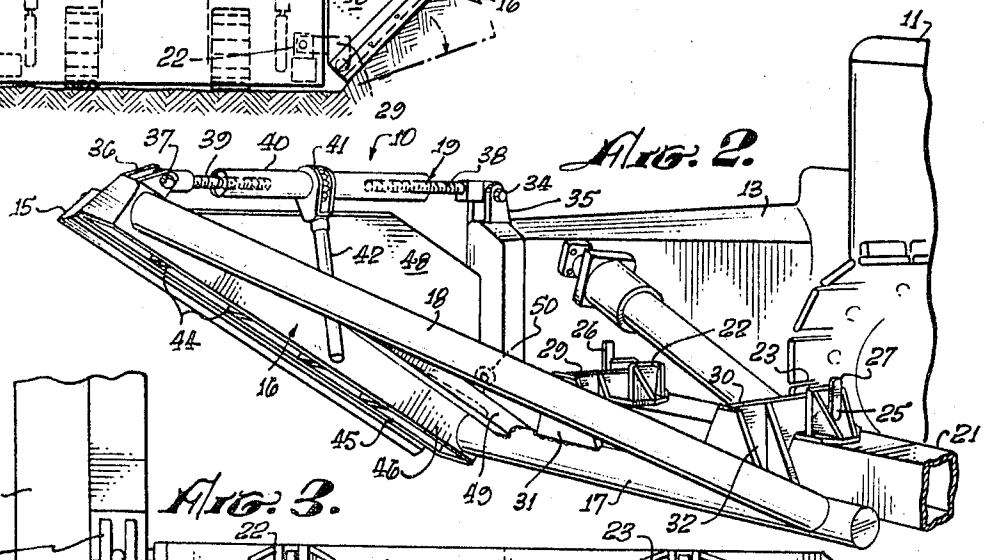


Fig. 3.

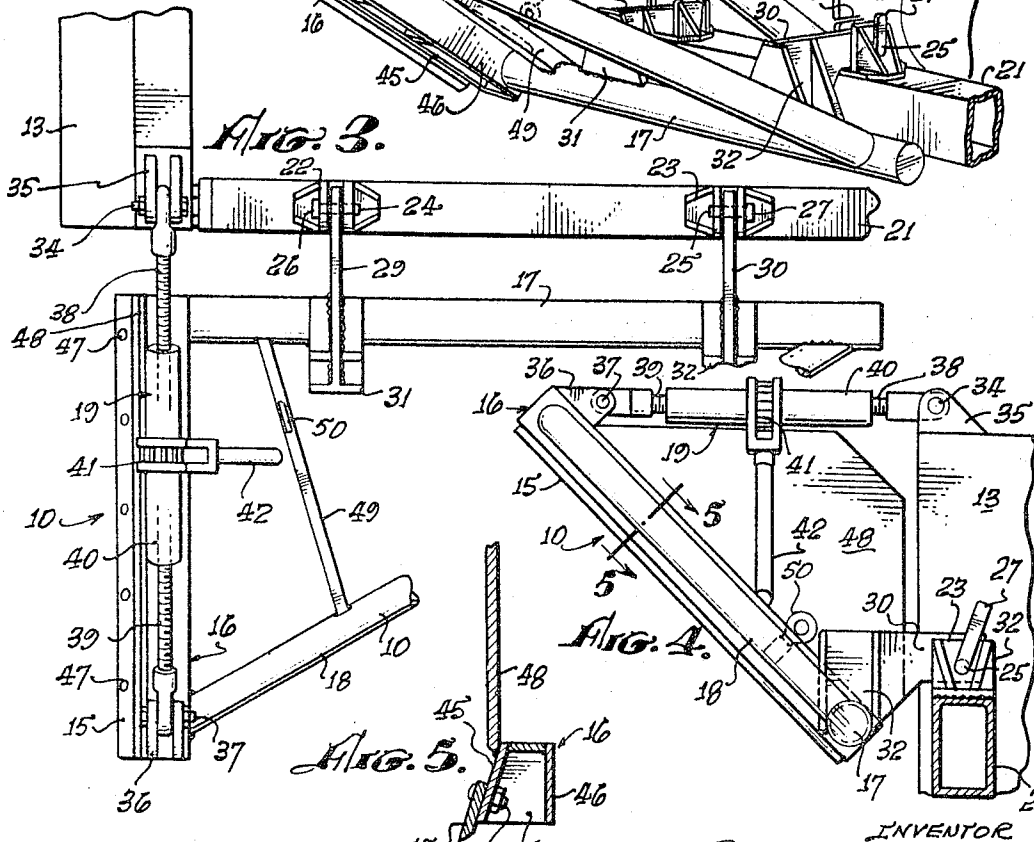


Fig. 4.

Fig. 5.

INVENTOR
SAMUEL B. McKELL,

By Jaeschke & Carr
ATTORNEYS.

United States Patent Office 3,464,499 Patented Sept. 2, 1969

3,464,499

ADJUSTABLE BLADE DEVICE

Samuel B. McKell, 1312 W. Orangethorpe, Fullerton, Calif. 92633

Filed Aug. 23, 1965, Ser. No. 481,565
Int. Cl. E02f 3/76
U.S. Cl. 172—802 11 Claims

ABSTRACT OF THE DISCLOSURE

An adjustable slope board device for a bulldozer that includes a triangular beam arrangement having a generally horizontal beam alongside the side rail of a bulldozer, an upwardly and outwardly extending moldboard beam, and an inclined beam that extends downwardly and inwardly from the outer end of the moldboard beam to the rearward end of the horizontal beam. A blade is carried longitudinally by the moldboard beam, which at its upper end is secured to the bulldozer by an element of adjustable length. Spaced hinges connect the horizontal beam to the side rail of the bulldozer, the hinges including brackets attached to the upper surface of the side rail where the connection is made by removable pins which limit the pivotal movement of the slope board to that about an axis longitudinal of the side rail.

This invention pertains to an adjustable blade arrangement especially adapted for earth-moving equipment to cut a slope to a desired angle.

While adaptable to different types of machinery, the principal field of use of the device of this invention is as an attachment to a bulldozer to provide an adjustable slope board. It is auxiliary to the main blade of the bulldozer used for the specialized purpose of cutting earth to established angles as required by the specifications laid down for a construction project. In the past, there have been some suggestions for adjustable slope board devices, but these have had severe shortcomings. One proposed construction involves a complicated assembly, costly to manufacture and install. It utilizes hydraulic cylinders to effect the required movement despite the fact that the setting of a slope board is varied only occasionally. The hydraulic cylinders inevitably leak after a period of time as the seals deteriorate, and frequently lock so that they cannot be moved satisfactorily after having held a fixed setting for an extended period. Of course, hydraulic cylinders necessitate the expense of a hydraulic system. One of the greatest difficulties with this prior adjustable slope board has arisen from the manner of attachment to the bulldozer, which has been effected through a ball-and-socket joint. This type of joint lacks rigidity and will not stand up under the hard service to which earth-moving equipment is subjected.

The present invention provides a rugged and reliable design that can withstand virtually any amount of punishment without failure, and which can be adjusted easily to an exact angle desired. It includes a horizontal beam that is pivotally connected to the structure of a bulldozer at spaced hinged joints. A brace extends from one extremity of the base beam to the upper end of a moldboard that carries the cutting bit. The lower end of the moldboard is fastened to the base beam. Forces transmitted by way of the brace to the frame load the brace in compression as a column, enabling it to withstand forces of a high magnitude. The base beam similarly is loaded in compression as the device is used. The spaced hinge joints provide rigidity against all movement except that in the direction for controlling the slope board angle. Adjustment of the angle is accomplished through a screw-type device extending to the upper end of the moldboard, preferably in the form of a turnbuckle with a ratchet handle. This enables an infinite variety of angular settings to be obtained, permitting the adjustment to be accomplished easily and rapidly.

The entire device may be removed from the bulldozer simply by removing the pins at the hinge joints so that the bulldozer may be used in the conventional manner. The slope board attachment, when separated from the bulldozer, is readily transportable in a pick-up truck. This enables one of the devices to be used for several different bulldozers, which may be at various locations, in view of the ease with which the device may be attached or removed. Upon removal, the hinge brackets that remain fastened to the bulldozer do not overhang the side of the bulldozer, so that the overall width of the bulldozer remains unchanged. This is of importance particularly in the moving of the bulldozer from one job site to another because of regulations limiting the width of such loads on the highway.

An object of this invention is to provide an improved adjustable blade device.

Another object of this invention is to provide a slope board for bulldozers that can set to various angles and which will retain the setting through hard usage.

A further object of this invention is to provide an adjustable slope board that is rugged and able to withstand extreme loads, yet which can be readily removed from a bulldozer in its entirety or easily attached to it as the occasion demands.

An additional object of this invention is to provide an adjustable removable slope board that does not increase the width of the bulldozer when the device is removed.

These and other objects will become apparent from the following detailed description taken in connection with the accompanying drawing in which:

FIGURE 1 is a front elevational view of the device of this invention as attached to a bulldozer;

FIGURE 2 is an enlarged perspective view of the device as viewed from the rearward side;

FIGURE 3 is a top plan view of the device with the slope board extended to a shallow angle;

FIGURE 4 is a fragmentary rear elevational view of the device with the slope board in its fully raised position; and

FIGURE 5 is a transverse sectional view taken along line 5—5 of FIGURE 4, showing the construction of the moldboard and the attachment of the cutting bit thereto.

As illustrated in the drawing, the slope board assembly **10** of this invention is associated with a bulldozer **11** and used in cutting earth at an angle. Thus, as viewed in FIGURE 1, the slope board accomplishes angular removal of earth to provide a sloping surface **12**. The slope board assembly **10** is secured to the bulldozer so that it projects to one side of the conventional bulldozer blade **13**.

Generally speaking, the slope board attachment **10** includes a cutting bit **15** attached to a moldboard **16** that projects outwardly at an angle from a position adjacent the bottom side edge of the bulldozer blade **13** with which it is aligned. The lower end of the moldboard **16** is welded to a tubular beam **17** that extends horizontally to the rear from the moldboard **16** along the side edge of the bulldozer. A brace column **18** extends angularly from the rearward end portion of the base beam **17** to an attachment of the top end of the moldboard **16**. Adjustment of the angle of the moldboard and the bit that it carries is accomplished through a link **19** that is of variable length.

The base beam **17** of the slope board attachment **10** is pivotally connected to the bulldozer at the side rail **21**

that is an existing part of the bulldozer, extending longitudinally to the blade **13**. In accomplishing this pivotal connection, bifurcated reinforced brackets **22** and **23** are welded to the upper surface of the rail **21**. These brackets are apertured to receive hinge pins **24** and **25**. The hinge pins have secured to them side extensions **26** and **27** to facilitate their removal from the brackets **22** and **23**, enabling them to be driven out with a hammer.

Received in the brackets **22** and **23** are engaged by the hinge pins **24** and **25** are supports **29** and **30** that project laterally outwardly past the rail **21**. The supports **29** and **30** include downwardly extending braced outer portions **31** and **32** that are welded to the upper side of the base beam **17**. Thus, the beam **17** is made pivotal relative to the side rail of the bulldozer by virtue of this connection through the supports **29** and **30** to the hinge pins **24** and **25** that are carried by the fixed brackets **22** and **23**. This supports the beam **17** horizontally so that it can move only by rotation about its axis, which is longitudinal of the bulldozer **11**.

The link **19** that accomplishes the pivotal movement about the hinge pins **24** and **25** is secured at one end to the top outer edge of the blade **13** by a pin **34** extending through a clevis **35** that is welded onto the blade. A second clevis **36** is attached to the moldboard **16** and is secured to the link **19** by a pin **37**. The link **19** is made adjustable in length by construction as a turnbuckle, including two screw portions **38** and **39** that extend into the central tubular section **40**. The latter part is actuated by a ratchet **41** from which extends a handle **42**. This permits the adjustment of the angle of the moldboard and hence the cutting bit **15** to be accomplished simply by reciprocation of the handle **42**, which either will extend or retract the effective length of the turnbuckle link **19**. In this manner, any desired setting can be effected to provide the angle required for cutting a slope. The link can be made sufficiently variable in length to permit any angle normally encountered in earth-moving operations to be set to the blade **15**. Typically, this will be for a one-to-one ratio when the unit is in the raised position, such as shown in solid lines in FIGURE 1, and it can be lowered to a two-to-one ratio for a shallower slope, as indicated by the phantom line in FIGURE 1.

In providing the unit with adequate strength, the moldboard **16** is made as a channel beam with several reinforcing webs **44** extending between its side flanges **45** and **46**. The cutting bit **15** is attached to the forward flange **45** by a plurality of bolts **47**. Preferably, the cutting bit **15** is canted forwardly at an angle, as best seen in FIGURE 5, which is accomplished through a corresponding angular inclination given the front flange **45** of the moldboard **16**. Dirt cut by the bit **15** is directed inwardly toward the blade **13** by a spill board or plate **48** that is secured to the inner edge of the moldboard **16**.

A rod **49** is secured at its ends to the base beam **17** forwardly of the front support **29**, and to the brace **18** near the forward section of the latter element. An eye **50** is secured to the rod **49** toward the lower end of that member. The eye **50** in this manner is positioned at the center of gravity of the unit **10**. Consequently, once the device has been separated from the bulldozer, it can be lifted by a hook engaging the element **50** so that through a single point of attachment the unit can be placed in a truck or otherwise positioned as desired.

This construction provides a design of exceptional strength and rigidity. It can be seen that the brace **18** will absorb loads imposed on the outer part of the bit, transmitting them in compression to the aft end of the base beam **17**. The compression loading of the member **18** enhances its ability to withstand the high loads it encounters. Also, the reinforced moldboard will not bend intermediate its ends. With the upper end attached to the support **18**, this section of the adjustable slope board is rigidly braced. The opposite end of the moldboard is similarly supported through its attachment to the base beam **17**. The latter element also is loaded in compression by the forces imposed on it in transmitting these loads to the side rail **21** of the bulldozer through the supports **29** and **30**. The use of a two-point attachment to the side rail through the spaced supports **29** and **30** also renders the attachment stronger and more rigid and increases its durability. Only movement in one plane is permitted by the spaced hinges, and the operational forces provide very little load in that direction.

When the device **10** is to be removed from the bulldozer **11**, the hinge pins **24** and **25** are driven out by means of their side projections **26** and **27**, and the pin **34** is pulled from the clevis **35**. This is all that is necessary in separating the unit **10** from the bulldozer **11**, permitting it to be lifted through the eye **50** and placed in any preferred location. Upon removal of the device from the bulldozer, there remain only the clevis **35** and the brackets **22** and **23**. All these elements are within the lateral confines of the bulldozer. In other words, there is nothing projecting beyond the side edge of the bulldozer so that its width is unchanged by the inclusion of the elements **35**, **22** and **23**. Consequently, the bulldozer may be transported without danger of violating highway load width regulations through the inclusion of the attaching brackets for the adjustable moldboard device **10**. With the attachment being accomplished through the simple expedient of the clevis **35** and the brackets **22** and **23**, it is possible to equip several bulldozers with these elements, permitting the slope board to be associated with different ones as desired.

For the initial installation of the slope board attachment, perfect alignment of the hinges is easily accomplished by connecting the supports **29** and **30** to the brackets **22** and **23** by the hinge pins **24** and **25** before the brackets are fastened to the rail **21**. After this, with the unit **10** so connected, the brackets **22** and **23** are welded to the top surface of the rail **21**, positioning the brackets so that the hinges always will work freely thereafter.

The foregoing detailed description is to be clearly understood as given by way of illustration and example only.

I claim:

1. In combination with a bulldozer having a blade and a substantially horizontal rail extending longitudinally on one side of said bulldozer, an adjustable slope board device comprising:

a pair of spaced brackets secured to said rail,

a pair of support members,

each of which extends laterally outwardly from said rail at one of said brackets,

a removable pin pivotally securing each of said support members to its adjacent bracket,

a first beam carried by said support members laterally outwardly of and substantially parallel to said rail,

a moldboard beam extending laterally outwardly and upwardly from one end of said first beam,

said moldboard beam being laterally to one side of said blade and substantially aligned therewith,

a brace beam one end of which is secured to the distal end of said moldboard beam,

said brace beam extending to said first beam adjacent the opposite end thereof and being secured thereto,

a cutting bit extending longitudinally of the outer edge of said moldboard beam,

a plate inwardly of the inner edge of said moldboard beam for deflecting material cut by said bit toward said blade,

and a link interconnecting said distal end of said moldboard beam and the upper edge of said blade,

said link including means for varying the effective length thereof for thereby controlling the

angularity of said moldboard beam and bit relative to said bulldozer.

2. A device as recited in claim 1 in which:

said brackets extend laterally outwardly no farther than the side edge of said rail,

whereby said brackets do not overhang said side edge.

3. A device as recited in claim 1 in which:

said cutting bit is canted forwardly relative to said bulldozer from said outer edge of said moldboard beam to the outer edge of said cutting bit.

4. A device as recited in claim 1 in which:

said means for adjusting the length of said link includes:

a turnbuckle,

and a ratchet handle for operating said turnbuckle.

5. In combination with a bulldozer having a transverse blade at the forward end thereof and a generally horizontal side rail extending rearwardly of said blade, an adjustable slope board device comprising:

a first generally horizontal beam alongside and outwardly of said side rail,

a second beam connected to the forward end portion of said generally horizontal beam and projecting laterally outwardly and upwardly therefrom,

a third column brace beam one end portion of which is connected to said second beam at a location laterally outwardly and upwardly of said first beam,

said third beam being inclined inwardly and downwardly from said one end portion thereof to the opposite end portion thereof,

said opposite end portion being attached to said first beam at the rearward end portion thereof,

whereby said beams define a generally triangular structure,

a cutting blade carried by said second beam,

said cutting blade having an outer cutting edge extending longitudinally of said second beam and projecting outwardly therefrom,

a plate inwardly of said cutting blade for deflecting material cut by said blade,

a duality of hinge means removably connecting said generally triangular structure to said side rail,

one of said hinge means being adjacent the forward end of said first beam and the other of said hinge means being adjacent the rearward end of said first beam,

said hinge means providing for pivotal movement of said triangular structure only about an axis generally longitudinal of said side rail,

and a rigid element interconnecting the outer and upper portions of said triangular structure at said second beam and said bulldozer for providing a pivotal support for said triangular structure,

said rigid element being adjustable in length for thereby controlling the angular position of said triangular structure.

6. A device as recited in claim 5 in which said second beam is substantially perpendicular to said side rail.

7. A device as recited in claim 5 in which said blade is canted forwardly such that said outer cutting edge thereof is positioned forwardly of inner portions of said blade.

8. A device as recited in claim 7 in which for canting said blade forwardly said second beam includes a forwardly inclined surface engaged by said blade, said blade

being attached to said second beam at said surface of said second beam.

9. A device as recited in claim 5 in which said hinge means includes:

a duality of spaced brackets attached to the upper surface of said side rail,

a duality of spaced members connected to said triangular structure and extending laterally inwardly to positions above said side rail and in juxtaposition with said brackets,

said brackets and said spaced members having aligned openings therethrough generally longitudinally of said side rail,

and a duality of hinge pins extending through said openings in said brackets and said spaced members for thereby pivotally connecting said triangular structure to said side rail.

10. A device as recited in claim 9 in which said hinge pins are removable for permitting separation of said slope board device from said bulldozer.

11. In combination with a bulldozer having a blade and a substantially horizontal rail extending longitdinally on one side of said bulldozer, an adjustable slope board device comprising:

a pair of spaced brackets secured to said rail,

a pair of support members,

each of which extends laterally outwardly from said rail at one of said brackets,

a pin pivotally securing each of said support members to its adjacent bracket,

a first beam carried by said support members outwardly of said rail,

a moldboard beam extending laterally outwardly and upwardly from adjacent one end of said first beam,

said moldboard beam extending laterally to one side of said blade,

a brace beam one end of which is secured to the distal end portion of said moldboard beam,

said brace beam extending to said first beam adjacent the opposite end thereof and being secured thereto,

a cutting bit extending longitudinally of the outer edge of said moldboard beam,

a plate inwardly of the inner edge of said moldboard beam for deflecting material cut by said bit,

and a link interconnecting said distal end portion of said moldboard beam and the upper edge of said blade,

said link including means for varying the effective length thereof for thereby controlling the angularity of said moldboard beam and bit relative to said bulldozer.

References Cited

UNITED STATES PATENTS

1,594,972	8/1926	Mautz.	
1,871,473	8/1932	Schmid et al.	
2,241,666	5/1941	Hueter.	
2,312,255	2/1943	Lowdermilk.	
3,061,955	11/1962	Violette.	
2,088,630	8/1937	Winsor	172—783
2,345,720	4/1944	Winge	172—740
2,656,777	10/1953	Mohn et al.	172—305

ANTONIO F. GUIDA, Primary Examiner

A. E. KOPECKI, Assistant Examiner