May 6, 1969 M. J. HYMEL 3,442,035

DOUBLE-BLADE DITCHER

Filed Jan. 5, 1966 Sheet 1 of 3

Fig. 1

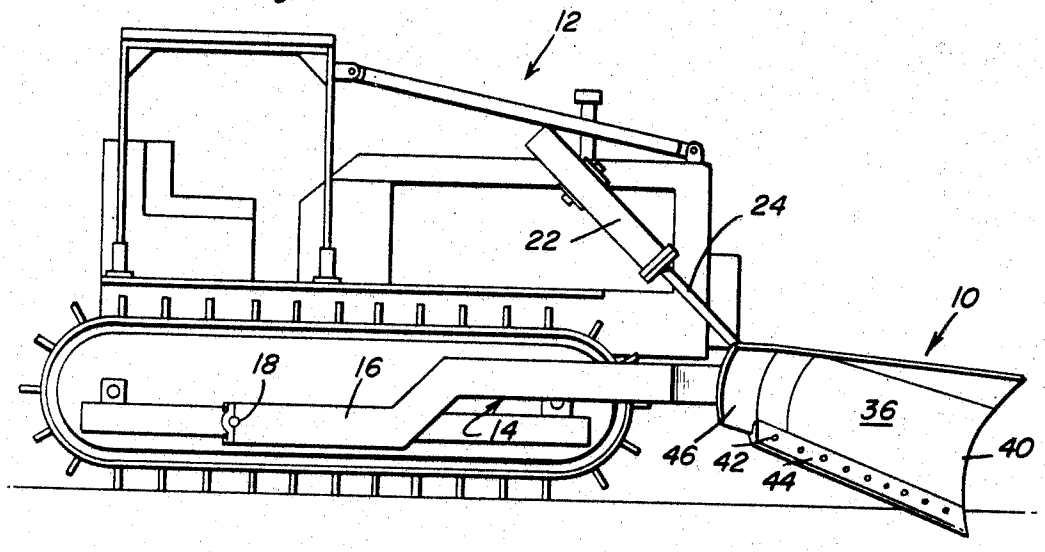
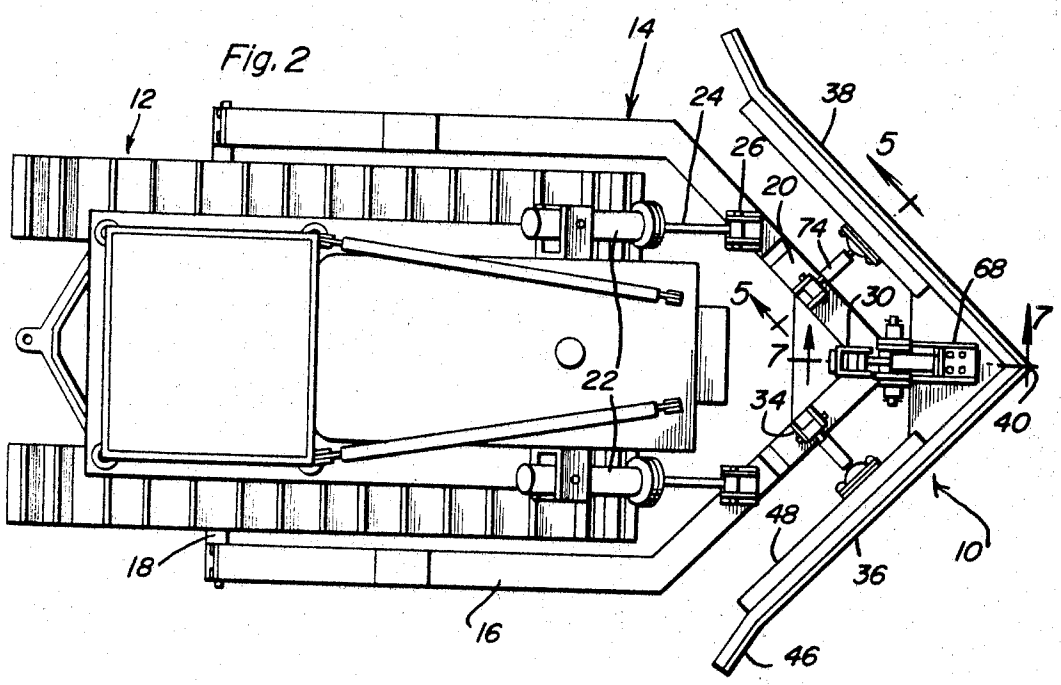


Fig. 2



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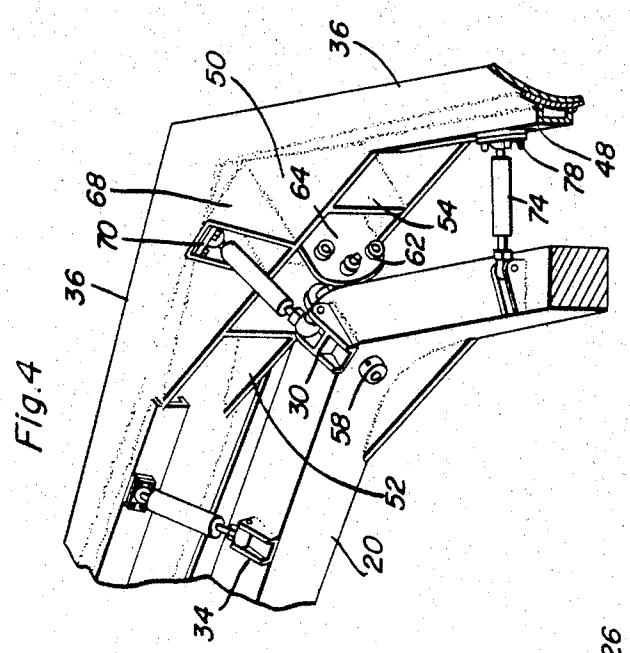


Fig. 4

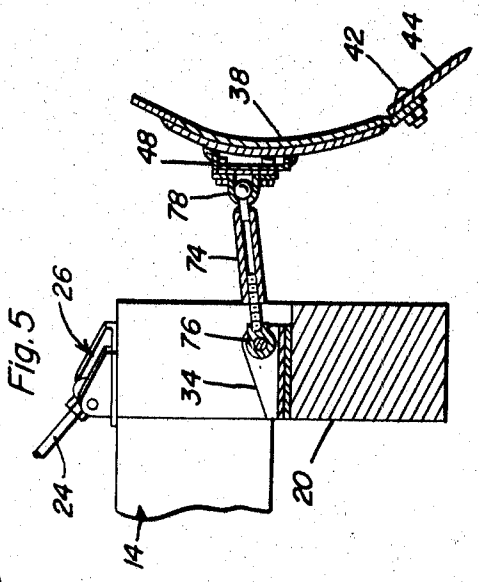


Fig. 5

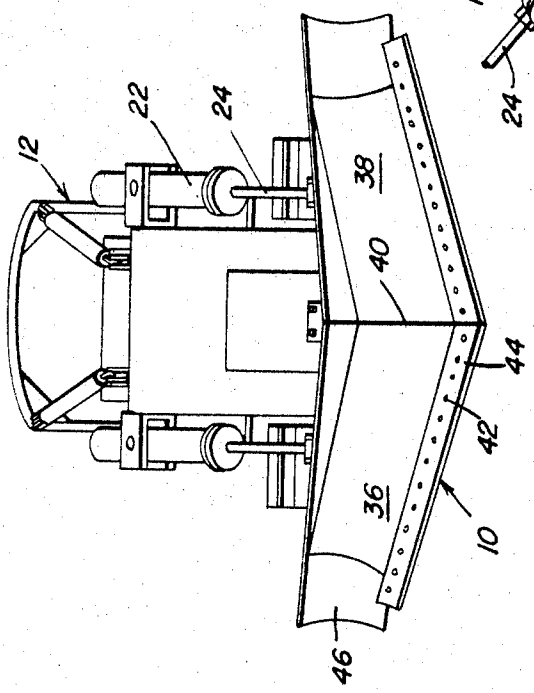


Fig. 3

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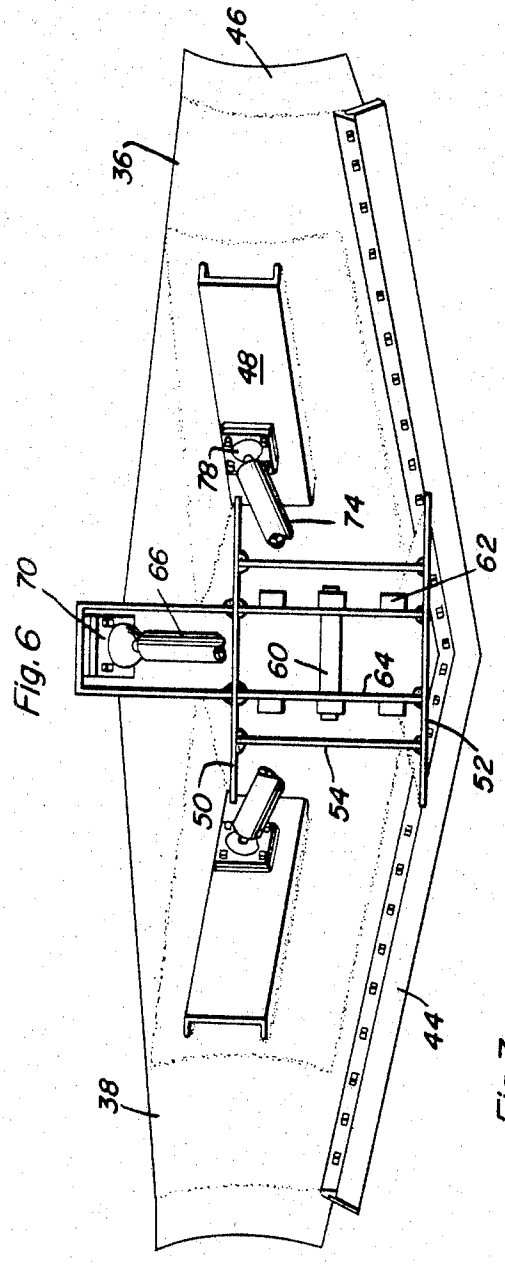


Fig. 6

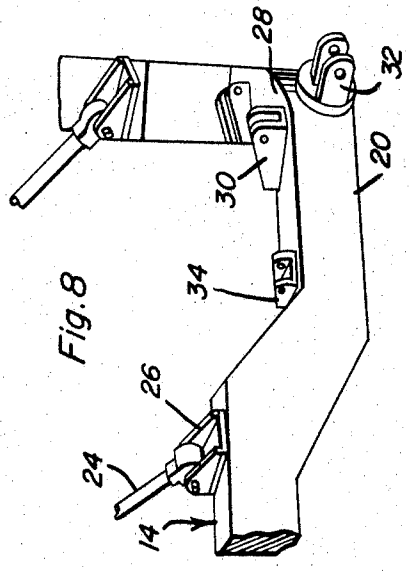


Fig. 8

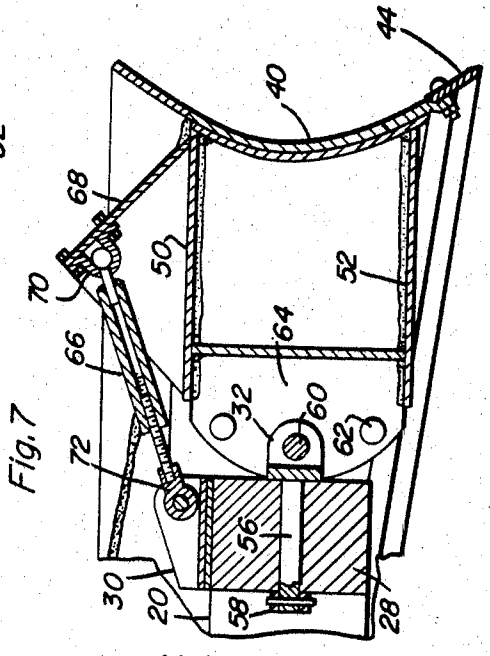


Fig. 7

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3,442,035

DOUBLE-BLADE DITCHER

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Int. Cl. E02f 5/02, 3/85; A01b 59/048
U.S. Cl. 37—98
11 Claims

ABSTRACT OF THE DISCLOSURE

A ditcher blade assembly positioned by a tractor-mounted pivoted support for ditch digging purposes. A blade backing frame consisting of laterally spaced channels interconnected by triangular front braces mount rearwardly diverging blade sections from which lower cutting edge portions project. The frame is adjustably positioned on the pivoted support by turnbuckle joints.

This invention relates to earth moving apparatus in general and more particularly to a ditcher blade assembly.

A primary object of the present invention is to provide a blade construction adapted to be mounted on track laying vehicles or the like for the purpose of forming a complete ditch in one pass of the vehicle. Toward this end, a pair of blade sections are interconnected forwardly of the propelling vehicle and diverge from a forward edge rearwardly, extending laterally beyond the vehicle so as to properly position cutting edge members along lower portions of the blade sections. The entire blade assembly is supported by a pivotal supporting structure mounted by the vehicle capable of displacing the blade assembly between a lowered operative position and an elevated position for transport purposes.

An additional object of the present invention in accordance with the foregoing object, is to provide in combination with a double-blade construction, a supporting and bracing structure for mounting the blade assembly on a vehicle in such a manner as to absorb the thrust applied to the blade during a ditching operation.

A further object of the present invention in accordance with the foregoing object is to provide in combination with a ditcher blade, supporting and bracing structure whereby the ditcher blade may be properly orientated relative to the supporting vehicle in order to effectively excavate a complete ditch in one pass of the vehicle.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a side elevational view of a track laying vehicle mounting a ditcher blade assembly in accordance with the present invention.

FIGURE 2 is a top plan view of the arrangement shown in FIGURE 1.

FIGURE 3 is a front elevational view of the vehicle and ditcher blade assembly shown in FIGURES 1 and 2.

FIGURE 4 is a perspective view of a portion of the ditcher blade assembly and its mounting.

FIGURE 5 is an enlarged partial sectional view taken substantially through a plane indicated by section line 5—5 in FIGURE 2.

FIGURE 6 is a rear elevational view of the ditcher blade assembly.

FIGURE 7 is an enlarged partial sectional view taken substantially through a plane indicated by section line 7—7 in FIGURE 2.

FIGURE 8 is a perspective view of the forward portion of the supporting structure on which the ditcher blade assembly is mounted.

Referring now to the drawings in detail, and initially to FIGURES 1 through 3, it will be observed that the ditcher blade assembly generally denoted by reference numeral **10** is mounted forwardly of a supporting vehicle **12** of the track laying type by means of a supporting structure generally referred to by reference numeral **14**. The supporting structure includes a pair of side arm portions **16** pivotally mounted rearwardly of the vehicle by the supporting shaft **18**, the side arm portions being interconnected forwardly of the vehicle by an angulated forward portion **20**. The ditcher blade assembly **10** is mounted on the forward portion **20** of the supporting structure through which it is displaced between an operative lower position as shown in FIGURE 1 and an elevated position withdrawn from the ground so that it may be transported from one place to another. A pair of hydraulic cylinder devices **22** are therefore mounted by the vehicle on either lateral side thereof for elevating and lowering the supporting structure **14** in order to raise or lower the ditcher blade assembly. Suitable control valve facilities (not shown) will therefore be associated with the hydraulic devices **22** through which the vehicle operator may control the position of the ditcher blade assembly. The piston rods **24** which extend downwardly and forwardly from the hydraulic devices **22** are therefore pivotally connected to the supporting structure **14** by means of the pivotal bracket assemblies **26** mounted on elevated sections of the forward connecting portion **20** of the supporting structure.

Referring now to FIGURES 4 and 8 in particular, it will be noted that the forward portion **20** of the supporting structure fixedly mounts as by welding on top of the apex **28** a pivot bracket **30** while a clevis member **32** projects forwardly from the apex and is rotatably mounted about an axis which is generally parallel to the central longitudinal axis of the vehicle as will be further explained hereafter. Also fixedly secured to the top of the forward portion **20** of the supporting structure equally spaced from the pivot bracket **30**, are a pair of pivot brackets **34**. The pivot brackets **30** and **34** thus serve to pivotally mount the ditcher blade assembly in forwardly spaced relation to the forward portion **20** of the supporting structure as will be hereafter explained.

As shown in FIGURES 1 through 3, the ditcher blade assembly includes a pair of blade sections **36** and **38** which are interconnected along a forward edge **40** and diverge rearwardly therefrom at an angle to the longitudinal axis of the vehicle. Secured to each of the blade sections by fasteners **42** are cutting edge members **44** to form an imperforate blade assembly as shown. The cutting edge members project downwardly from the blade sections and diverge upwardly and rearwardly from the forward edge **40** so as to effectively cut and excavate a ditch. Each of the blade sections is also provided with a deflector portion **46** which extends at an angle to the blade section laterally beyond the cutting edge members in order to pile up earth on opposite longitudinal sides of the ditch being formed. In this regard, it will be noted that the cutting edge members **44** extend laterally beyond the vehicle **12** so that the vehicle will move through the ditch being formed forwardly thereof by the ditcher blade assembly and pack the soil in the bottom of the ditch so formed.

As shown in FIGURES 2, 4 and 6, a longitudinal backing member in the form of the channel **48** is secured as by welding rearwardly of each blade section spaced from the forward edge **40**. A bracing assembly is also secured rearwardly to the blade sections between the longitudinal backing channel **48** in order to render the blade assembly most rigid at the portion thereof subject to the maximum thrust. The bracing assembly includes a pair of horizontal, trangular plate members **50** and **52** interconnected by

vertical spacer plates **54**. Thus, the triangular plate members **50** and **52** form a rigid assembly welded along two edges thereof to the blade sections bridging the longitudinal backing channels **48**.

Referring now to FIGURE 7 it will be observed that the ditcher blade assembly is swivelly connected to the supporting structure at the apex **28** by means of a swivel connection about two perpendicular intersecting axes by means of a swivel connection including a swivel pin **56** rotatably mounted about one of the perpendicular axes parallel to the general plane of the supporting structure **14**. The swivel pin **56** is connected at its forward end to the clevis **32** and is held assembled in the forward portion **20** of the supporting structure by the collar **58**. A connecting pin **60** extends through the clevis **32** about the perpendicular axis intersecting the axis of the swivel pin **56**. The connecting pin **60** is received through one pair of a plurality of aligned apertures formed within journal extensions **62** which project laterally from a pair of vertical plate members **64**. The plate members **64** are interconnected as by welding between the triangular plate members **50** and **52** of the bracing assembly and project rearwardly therefrom so as to expose the journal extension **62**. Accordingly, the ditcher blade assembly may be adjustably connected to the swivel connection in order to properly orientate the blade relative to the vehicle in accordance with different requirements.

The angular position or pitch of the ditcher blade assembly about the axis extending through the connecting pin **60** is adjusted by means of a pitch adjusting turnbuckle device **66** pivotally mounted at the apex **28** of the supporting structure by the pivot bracket **30**. A bracket **68** is therefore fixedly mounted as by welding to the top triangular plate member **50** of the bracing assembly and extends upwardly and rearwardly therefrom so as to mount a ball receiving socket **70** to which the turnbuckle device is universally connected. It will therefore be apparent, that the length of the turnbuckle device may be adjusted in order to obtain the desired pitch for the ditcher blade assembly before it is pivotally connected to the pivot bracket **30** by its pivotal connector **72**. Similarly, the ditcher blade assembly may be laterally adjusted in spaced relation to the supporting structure by the turnbuckle devices **74** as more clearly seen in FIGURES 2, 4 and 5. Each of the turnbuckle devices **74** is therefore pivotally connected by a pivotal connector **76** to the pivot brackets **34** and are universally connected to the backing channels **48** by the ball socket receiving elements **78** mounted thereon. The ditcher blade assembly will therefore be supported in its orientated position at several locations designed to resist all forces and moments imposed thereon during the ditching operation. Thus the supporting turnbuckle devices **74** are pivotally connected to the ditcher blade assembly in a plane disposed between the plane containing the perpendicular axes extending through the swivel pin **56** and connecting pin **60** and the plane containing the point at which the pitch adjusting turnbuckle device **66** is connected by the bracket **68** to the ditcher assembly. Vertical turning moments about the axis extending through the connecting pin **60** are thereby resisted. The disposition of the supporting turnbuckle devices **74** on either side of a longitudinal axis on the other hand, resists horizontal turning moments about the axis extending through the swivel pin **56**. Also, the perpendicular axis associated with the swivel connection are positioned by the supporting structure relative to the blade assembly at a location for transmitting thrust to the blade for effectively excavating the ditch.

The foregoing is considered as illustrative only of the principles of the inventoin. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. In combination with a propelling vehicle having a pivotally mounted supporting structure, a ditcher blade assembly operatively positioned by the supporting structure comprising a pair of blade sections interconnected forwardly of the supporting structure along a longitudinal axis of the vehicle forming a forward edge and having lower edges, said blade sections diverging rearwardly from said forward edge at an angle to said longitudinal axis, an imperforate cutting edge member secured to each of said blade sections and projecting downwardly from the lower edge for engagement with the ground in an operating position of the blade assembly, longitudinal backing members secured rearwardly to each of the blade sections in spaced relation to the forward edge, pivotal support members connecting the backing members to the supporting structure forwardly spacing the blade sections therefrom, a bracing assembly interconnecting the backing members and secured rearwardly to the blade sections between the backing members, swivel means pivotally connecting the supporting structure to the bracing assembly about perpendicular axes parallel to the general plane of the supporting structure for lateral and vertical displacement of the blade sections relative to the supporting structure, and pitch adjusting means pivotally connecting the supporting structure to the bracing assembly above the swivel means for vertical adjustment of the blade sections relative to the supporting structure.

2. The combination of claim **1** wherein said supporting structure includes an angulated forward portion on which the pivotal support members and swivel means are mounted forwardly of the vehicle, said swivel means including a pair of vertical plate members projecting rearwardly from the bracing assembly in parallel spaced relation to the longitudinal axis, said plate members having a plurality of aligned apertures, a connecting pin extending through one pair of said aligned apertures through which one of said perpendicular axes extends, a swivel pin extending through the forward portion of the supporting structure about the other of the perpendicular axes intersecting the connecting pin and a clevis connected to the swivel pin and pivotally mounted on the connecting pin between said plate members.

3. The combination of claim **2** wherein said bracing assembly includes a pair of triangular plates secured to the blade sections in bridging relation to the backing members, and vertical spacers interconnecting said triangular plates above the cutting edge members.

4. The combination of claim **3** including deflector portions secured to the blade sections and extending laterally outwardly therefrom beyond the cutting edge members at an angle to the blade sections.

5. The combination of claim **4** wherein said pitch adjusting means includes a bracket secured to the bracing assembly and projecting upwardly therefrom above the blade sections, and a turnbuckle device pivotally connecting the supporting structure to the bracket.

6. The combination of claim **1** wherein said bracing assembly includes a pair of triangular plates secured to the blade sections in bridging relation to the backing members, and vertical spacers interconnecting said triangular plates above the cutting edge members.

7. The combination of claim **6** wherein said pitch adjusting means includes a bracket secured to the bracing assembly and projecting upwardly therefrom above the blade sections, and a turnbuckle device pivotally connecting the supporting structure to the bracket.

8. The combination of claim **1** wherein said pitch adjusting means includes a bracket secured to the bracing assembly and projecting upwardly therefrom above the blade sections, and a turnbuckle device pivotally connecting the supporting structure to the bracket.

9. The combination of claim 8 wherein said supporting structure includes an angulated forward portion on which the pivotal support members and swivel means are mounted forwardly of the vehicle, said swivel means including a pair of vertical plate members projecting rearwardly from the bracing assembly in parallel spaced relation to the longitudinal axis, said plate members having a plurality of aligned apertures, a connecting pin extending through one pair of said aligned apertures through which one of said perpendicular axes extends, a swivel pin extending through the forward portion of the supporting structure about the other of the perpendicular axes intersecting the connecting pin and a clevis connected to the swivel pin and pivotally mounted on the connecting pin between said plate members.

10. The combination of claim 1 including deflector portions secured to the blade sections and extending laterally outwardly therefrom beyond the cutting edge members at an angle to the blade sections.

11. The combination of claim 1 wherein said backing members are channel-shaped having leg portions welded

to the blade sections and web portions to which the pivotal support members are pivotally connected.

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