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Hancock

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[54] **ADJUSTABLE SCRAPER BLADE**

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[73] Assignee: **Clark Equipment Company,** Buchanan, Mich.

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[52] **U.S. Cl.** ..... **37/141 R,** 172/767

[51] **Int. Cl.** **E02f 9/28**

[58] **Field of Search** ..... 37/141 R, 141 T, 142 R, 37/142 A, 124–129; 172/767–770

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[57] **ABSTRACT**

A blade for earth working machines having a blade frame fixed to the machine and longitudinally, inclined, extensible blade sections which may be extended to increase local penetration of the cutting edge depending on soil condition.

6 Claims, 4 Drawing Figures

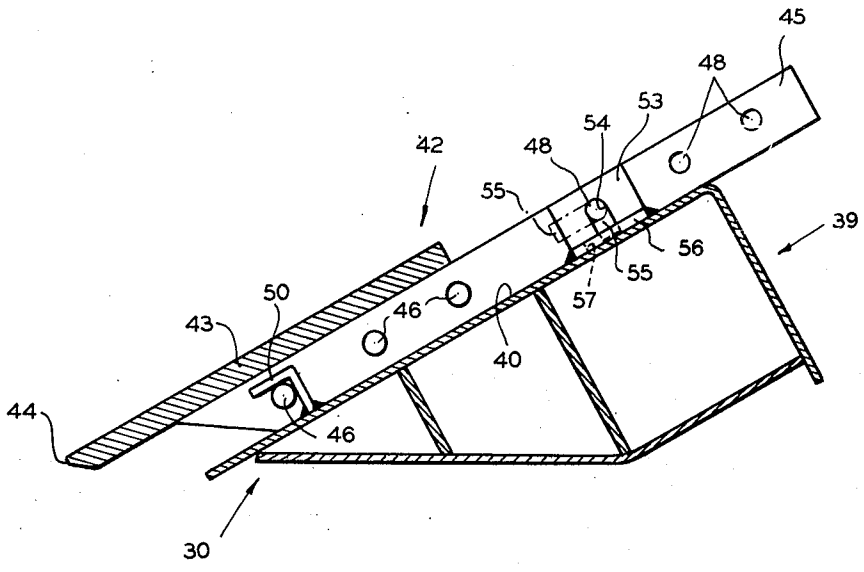

FIG. 1

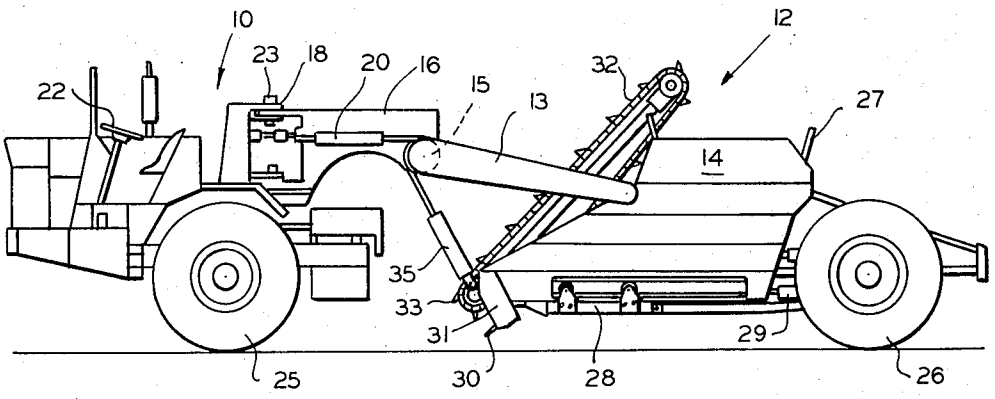
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FIG. 2

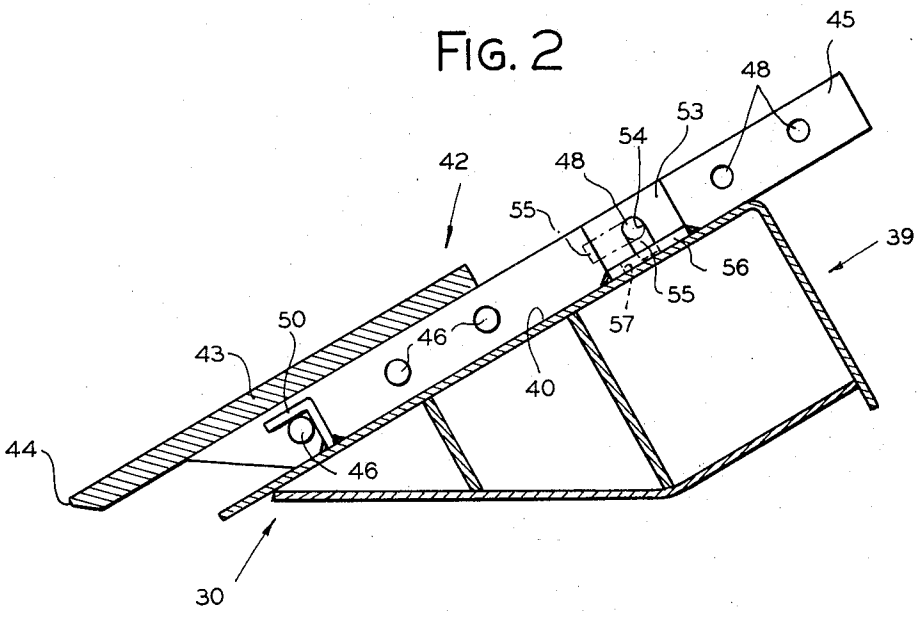
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FIG. 3

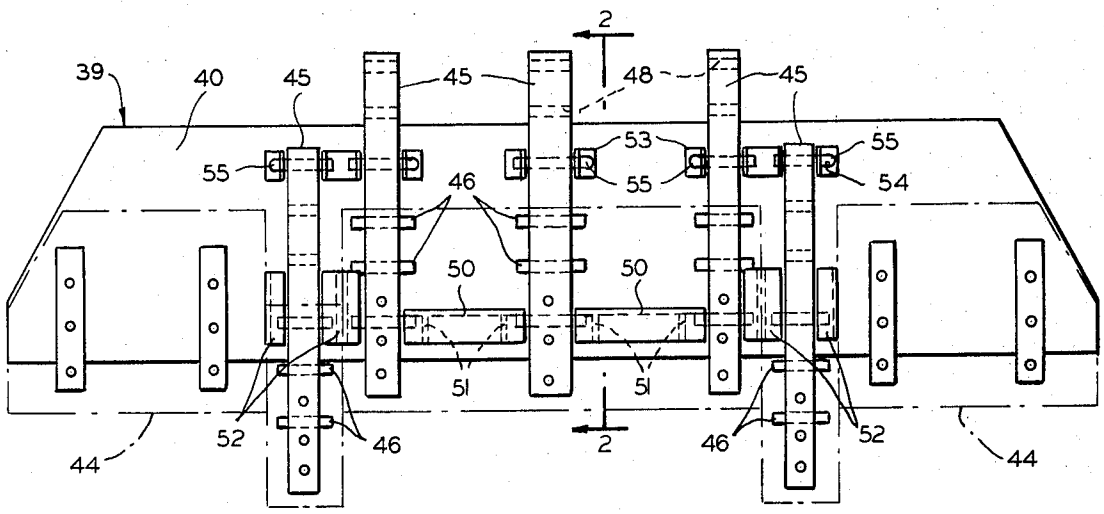
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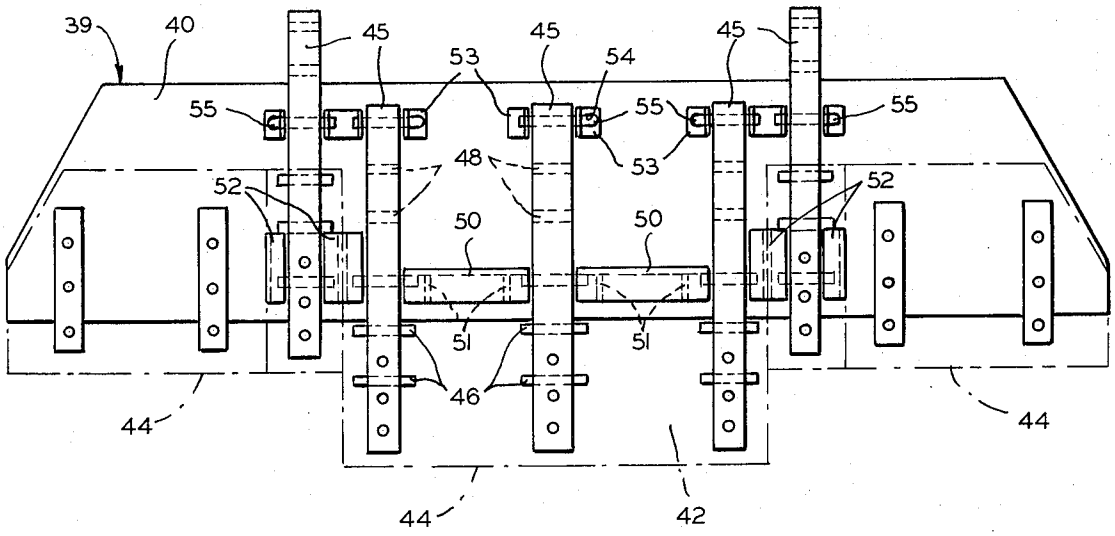
FIG. 4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ADJUSTABLE SCRAPER BLADE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention pertains to the art of mobile earth working machines and more particularly to self-propelled elevating tractor scrapers in which the scraper has side walls, bottom and rear walls but will be open at the front defining a bowl for collecting earth material. A blade is inclined downwardly between the side walls at the front and may be lowered into engagement with the ground for digging. It will be appreciated that while the invention is described herein with respect to a tractor scraper blade, other earth moving machines and material handling equipment may utilize a blade of similar type, such as found on bulldozers or tractor shovels, for which the invention will be equally applicable.

2. Description of the Prior Art

It is not uncommon for tractor scrapers to work in hard clay or rocky soils which resist penetration by the cutting edge of the scraper blade and considerably reduce the digging efficiency, consequently making it difficult to obtain a full load in any reasonable time. It has been a common practice to employ blades with a solid, fixed portion protruding beyond the cutting edge which will increase the penetrating power of the blade in hard clay and assist in breaking up the soil in advance of the cutting edge. Such blade protrusions or extensions may vary depending on the type of soil from relatively sharp tooth-like projections in one case, which may be used for ripping up roots and overturning bolders, to a wide blade extension projecting beyond the normal straight cutting edge of the blade, which may be used in moist, heavy clay or compact soil.

No single blade is known to exist suitable in all types of soil, nor is it usually convenient to change blades in practice since each blade or blade section requires numerous bolts for securing it to the blade frame. As a result, it is normal practice to try to anticipate the type of ground conditions existing at the job site and install a blade at the garage having the configuration of cutting edge best suited for that terrain. However, this obviously leads to inefficiency where some of the soil conditions are favorable for use of the full width cutting edge and others are not if the blade has been outfitted with a narrow chisel because of patches of clay or hard ground.

SUMMARY OF THE INVENTION

An adjustable blade is provided having a blade frame. One or more extensible blade sections is mounted on the blade frame. Guide members on the blade frame and extensible section cooperate for guiding the blade section between extended or retracted positions and a locking device is employed to rigidly hold the blade section in one of several of such positions.

In a specific application of the invention, the guide members may take the form of bars fixed to the underside of the extensible section. A row of lugs project outwardly from the bar adjacent its lower end and a row of holes in the bar adjacent its upper end cooperate with guide blocks on the blade frame to secure the blade section in position. A locking pin is inserted when a hole in a guide block is aligned with a hole in the guide bar. Some of the guide blocks have portions overlying the ends of the lugs preventing the blade section from lifting off the surface of the blade frame.

It is contemplated in a preferred embodiment of the invention that a center section of the blade, approximately one-third the full width, will be extensible to form a deep cutting section, while on adjacent sides, the blade will be at normal cutting edge depth; or on either side of the center cutting section extensible chisels may be extended to widen the center cutting section; or with the center section retracted, the chisels may be projected alone to provide ripping teeth all as soil conditions may require. Any number or combination of blade sections may be incorporated depending on blade size and working conditions.

One of the main advantages of the invention is the provision of a blade structure providing a plurality of extensible sections which can be independently adjusted to change the cutting edge configuration to suit the particular ground conditions.

A further advantage is that the individual blade sections may be rapidly and economically replaced without having to replace an entire cutting blade.

It is also considered an advantage of the invention that the operator may change the blade configuration in the field. That is, upon encountering resistance to blade penetration, the operator may simply extend one or more of the blade sections to increase the penetrating power of the blade without having to carry special tools or return to the garage for the appropriate blade required.

These and other advantages will be more apparent by reference to the following detailed description of the invention which proceeds with a description of the drawings wherein:

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a tractor scraper equipped with a scraper blade according to the invention;

FIG. 2 is a cross-sectional view of the blade;

FIG. 3 is a plan view of the blade showing only the chisels extended; and

FIG. 4 is a plan view of the blade similar to the view in FIG. 3 showing the chisels retracted and the center cutting section extended.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a two-wheeled, over-hung tractor **10** towing a two-wheeled scraper **12.** The scraper **12** has a pair of arms **13** connected at the forward edges of the scrapers side walls **14.** The arms **13** are joined by a cross beam **15** at the front. A yoke **16** is attached to the cross beams and extends forwardly for mounting on the tractor **10** by means of a kingpin coupling **18.** A pair of steering jacks **20,** one on each side of the yoke **16,** is controlled by a steering valve (not shown) operated by the steering wheel **22** on the tractor for effecting turning movements of the tractor relative to the scraper about the vertical steer axis of the kingpin **23.** The operator of the tractor **10** steers by turning the tractor relative to the scraper about the steer axis as jacks **20** are extended and retracted on opposite sides of the yoke **16.** The tractor is supported on wheels **25** and the scraper on wheels **26.** The scraper side walls **14** define an open bowl having an ejection gate **27** at the rear and a rolling door **28** at the bottom which are sequentially

operated by hydraulic cylinders **29** sliding the door **28** rearwardly and pushing the end gate **27** forwardly when dumping dirt from the bowl. In front of the rolling door **28** is a scraper blade **30** which is fixed between moldboards **31** on opposite sides of the scraper. An elevator **32** inclines downwardly across the front of the bowl and carries a plurality of chain driven drags or flights **33** which engage the ground in front of the blade **30** to assist in loading dirt into the bowl when the blade is lowered to a cutting position. A pair of lift cylinders **35**, one on each side, is attached at its lower end to the moldboard **31** and at the upper end to the cross beam **15.** The cylinders **35** are controlled by the operator from the tractor and may be extended to lower the front of the scraper to the ground so that the cutting edge of the blade **30** is brought into engagement with the ground for digging.

Referring now to FIGS. **2–4,** the scraper blade **30** includes a blade frame **39** secured at its opposite ends between the moldboards **31.** The blade frame includes an upper, downwardly inclined, surface **40** on which are positioned a plurality of blade sections **42** arranged in side-by-side relatiohship to form a substantially continuous upper surface **43** which inclines forwardly to a cutting edge **44.** In accordance with the preferred embodiment of the invention, each blade section **42** has mounted on the underneath side thereof a bar **45** which bears on the upper surface **40** of the blade frame. Each bar **45** has a row of longitudinally spaced transverse lugs **46** adjacent its lower end projecting outwardly on opposite sides and a row of longitudinally spaced holes **48** adjacent its upper end. Fixedly mounted on the upper surface **40** of the blade frame **39** are transverse guide blocks **50** generally in the form of metal angles having gussets **51.** The back leg of the angle is welded to the upper surface **40** and the top leg projects forwardly toward the cutting edge **44.** Other guide blocks **52** extend longitudinally along opposite edges of the blade sections and overlie the ends of the lugs **46** projecting from the bars **45** (FIGS. **3** and **4**). The transverse blocks **50** are eliminated for the narrow blade sections where only one bar **45** is used. In addition to the blocks **50,52** are upper blocks **53** arranged on opposite sides of the bars **45** and having a hole **54** which may be aligned with one of the holes **48** in the bars **45** for insertion of a locking pin **55.** The bottom leg **56** (FIG. **2**) of the upper block **53** on one side is notched at **57** and the pin **55** has a right angle end, dotted lines in FIG. **2,** that is rotated down into the notch **57** to lock the pin in place.

It will be appreciated by reference to FIGS. **3** and **4** that any blade section **42** may be extended to change the cutting edge configuration. To extend the center blade section it is only necessary to release the locking pin **55,** move the blade section forward so that the lug **46** clears the overlying leg of the transverse blocks **50** and the longitudinal side blocks **52.** Thereafter the blade section may be lifted so that a following lug **46** is put in the place previously occupied by the previous lug and in which position a hole **48** in the bar will be aligned with the hole **54** in the upper block allowing reinsertion of the pin **55.** In extending one of the narrow blade sections, since there is no transverse block **50,** it is only necessary to release the locking pin and slide the blade forward guided by the longitudinal blocks **52** and lugs **46** on each side.

As may be appreciated in FIG. **4** the center blade section **42** may be extended to provide a deep cutting section; or as shown in FIG. **3,** two narrow blade sections, one on each side of the center section, may be extended for a ripping action; or by extending all of the sections a wider, deep center cutting section is obtained; or by retracting all of the blade sections, a straight full width cutting edge is obtained thus, in effect, providing four blades in one.

Having thus described a preferred embodiment of the present invention, it will, of course, be understood that various changes may be made in the form, details, arrangement and proportion of the parts without depraring from the scope of the invention which consists of the matter shown and described herein and set forth in the appended claims.

I claim:

1. A blade for earth moving equipment comprising a blade frame fixed to the equipment, a cutting element mounted on the blade frame and inclined forwardly defining a cutting edge which may be lowered to the ground for digging, a plurality of extensible blade sections forming a portion of said cutting element and being extensible to provide a deeper cut than the rest of the cutting edge and a plurality of guide means for guiding the blade sections between the extended and retracted positions, locking means associated with certain of said guide means for holding the blade sections in position and wherein said guide means include a bar secured to the back of each blade section, a plurality of longitudinally spaced lugs projecting from each bar adjacent one end, a plurality of longitudinally spaced holes in each bar adjacent its opposite end, guide blocks projecting upwardly from the blade frame adjacent the opposite ends of said bars, one of said guide blocks providing a portion overlying said lugs and the other of said guide blocks having a hole therein adapted to be aligned with a hole in the bar and said locking means including a locking pin insertable through said holes for holding each blade section in position.

2. A scraper blade for a mobile scraper having a dirt collecting bowl defined by side walls, a floor and an end wall, being opened at the front and a scraper blade mounted between the side walls at the lower front portion thereof and inclined forwardly to a cutting edge adapted to be lowered to the ground for digging, said scraper blade comprising a blade frame secured between the side walls having a forwardly inclined upper surface, a plurality of movable blade sections mounted on the upper surface of the blade frame in side-by-side relationship defining a portion of a substantially continuous upper surface, the forward ends thereof forming a portion of said cutting edge, each of said blade sections having mounted on the back thereof, a longitudinally extending bar, a guide means on the upper surface of said blade frame cooperating with each bar permitting one or more of said blade sections to be slidably adjusted relative to the blade frame so as to provide an extension in said cutting edge, wherein each said bars has a longitudinal row of transverse lugs projecting from the lower end thereof and a row of longitudinally spaced openings formed in the upper end thereof, said guide means comprising upper and lower guide blocks secured to the upper surface of the blade frame, the lower blocks projecting upwardly opposite said row of lugs and having a laterally extending portion overlying

said lugs to prevent lifting of the blade sections relative to the blade frame and the upper blocks projecting upwardly opposite said openings in the bar and having an opening therein alignable with one of the openings in said bar and a locking pin insertable through said openings to secure the longitudinal position of said bars relative to the blade frame.

3. A scraper blade according to claim **2** wherein a wide center section has a plurality of laterally spaced bars, other guide blocks secured to the blade frame intermediate the bars on said center section and extending transversely between said bars having an upper portion extending forwardly toward the cutting edge overlying at opposite ends one of said lugs on each bar and co-operating with said laterally extending portion of the lower guide blocks to prevent lifting of the center blade section and with the upper guide blocks as a longitudinal stop for said center section.

4. In a mobile scraper having a dirt collecting bowl, side walls, a floor and an end wall, being open at the front and a scraper blade mounted between the side walls and inclining downwardly to a cutting edge adapted to be lowered to the ground for digging, the improvement comprising a blade frame secured between the side walls adjacent the front lower edge thereof having an upper surface inclining downwardly, a blade mounted on the upper surface of said frame extending forwardly thereof forming said cutting edge, an adjustable center blade section having a width approximately one-third the full width of the blade providing a relatively wide extension of the cutting edge when extended and defining with the remaining portions of the blade in the retracted position a continuous cutting edge said adjustable blade section having a plurality of longitudinally extending laterally spaced guide members secured on the back side thereof and extending rearwardly generally parallel to the upper surface of said frame providing an upper portion spaced to the rear of the blade having free access from above and a lower portion extending beneath the blade adjacent the cutting edge, upper and lower guide means mounted on said blade frame adjacent the upper and lower portions of said guide members and locking means operable between said upper guide means and upper portion of each guide members for securing the blade section against longitudinal movement relative to the blade frame and being accessible from above to permit release of the blade section for adjustment and said lower guide means cooperating with said lower portions of each guide members for preventing upward movement of the blade section out of the plane of the upper surface of the blade in the locked position.

5. The improvement according to claim **4** wherein the lower guide means includes guide blocks secured to the blade frame being laterally spaced to provide an opening through which said guide members may extend, laterally projecting means on the lower portions of each said guide member, each guide block having a portion overlying said laterally projecting means permitting said blade section to be slidably moved slightly to clear said overlying portions and thereafter lifted free of said blade frame.

6. The improvement according to claim **5** wherein said upper guide means includes guide blocks spaced so as to permit said guide members to extend therebetween, a plurality of openings spaced in the upper portion of each guide members, an opening in each guide block alignable with one of said openings in the guide members and a pin insertable through said openings for locking the guide members into position.

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