United States Patent [19]

White

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[54] **SNOW LEVELER**

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[52] **U.S. Cl.** **172/145,** 172/178, 172/188, 172/393

[51] **Int. Cl.** **A01b 5/00**

[58] **Field of Search** 172/145, 170, 177–178, 172/180–181, 188, 195, 200, 387, 393, 780, 784–787; 37/10, 41; 280/19

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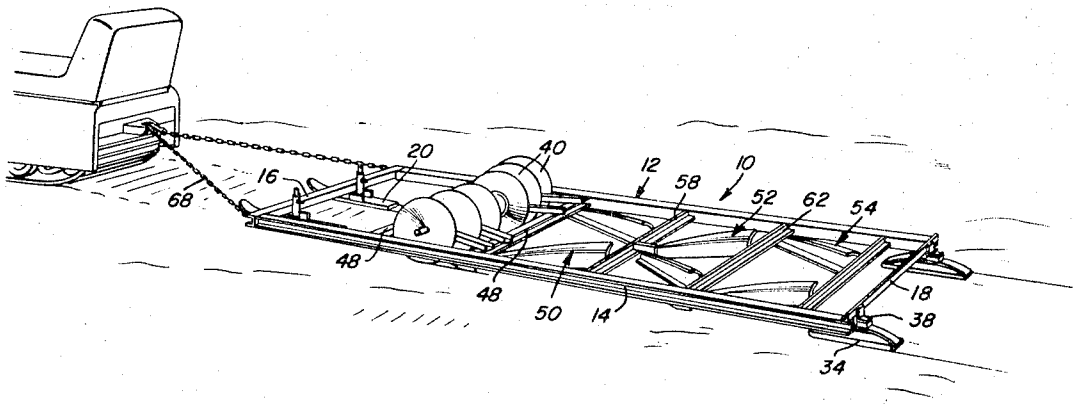
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[57] **ABSTRACT**

A lightweight snow leveler for redefining snowmobile trails incorporating an elongated rectangular frame having front and rear traveling skis. The frame mounts a leading series of snow pulverizing discs and trailing cooperating sets of snow-shifting blades alternately rolling the pulverized snow inward, then outward and finally inward so as to provide a soft redefined trail.

7 Claims, 6 Drawing Figures



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SHEET 1 OF 2

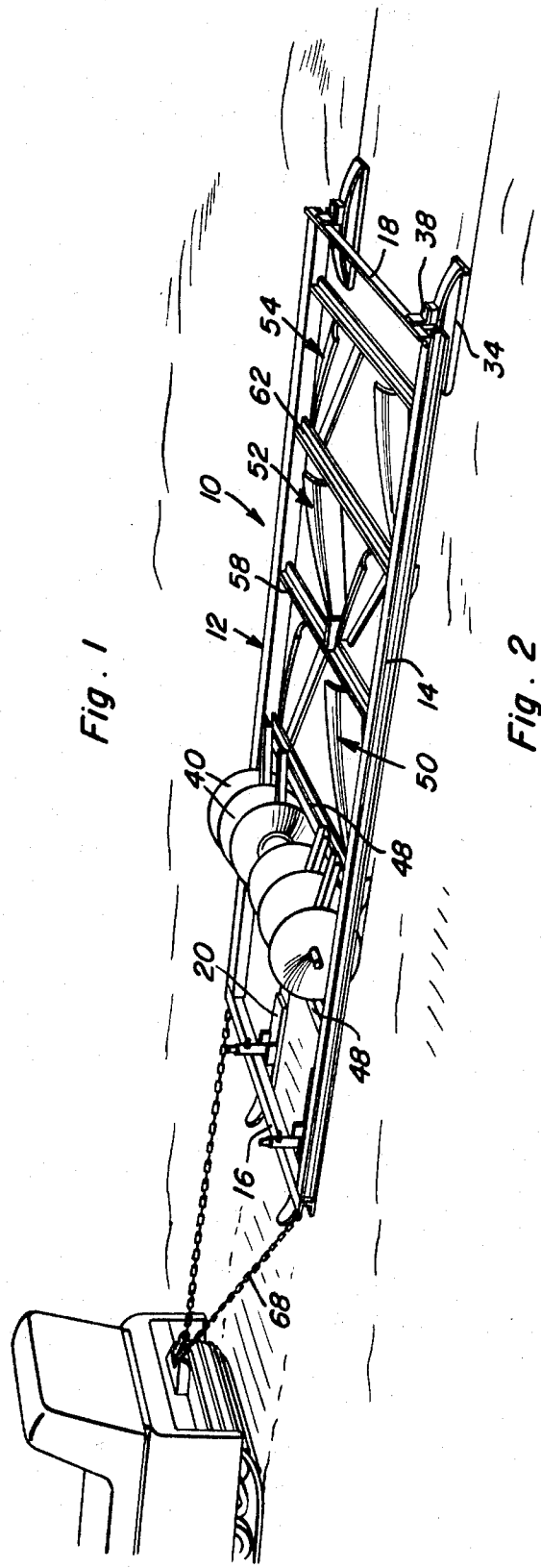


Fig. 1

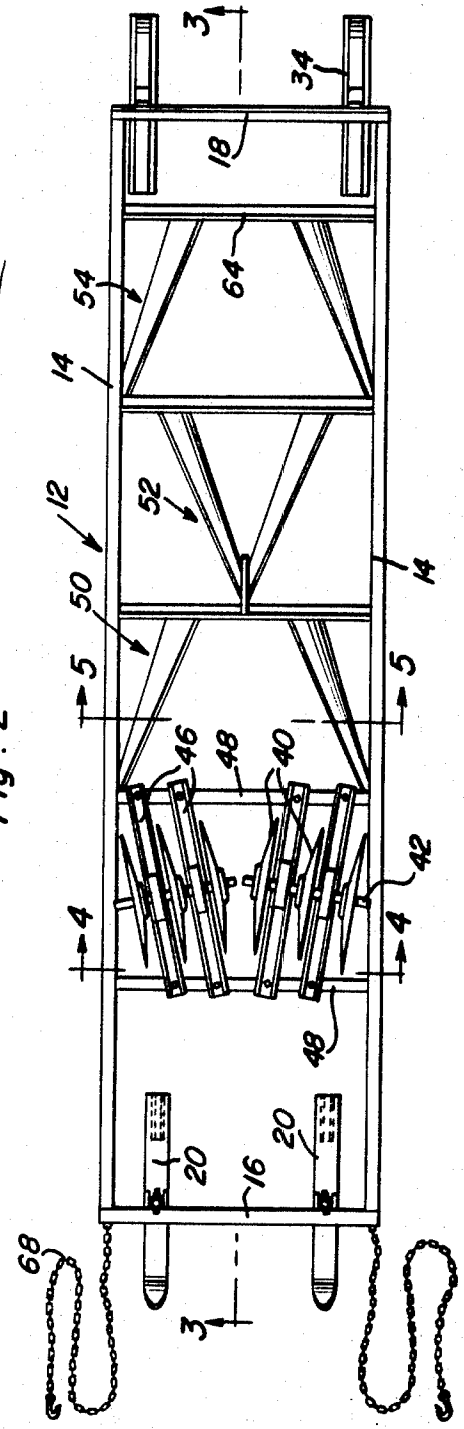


Fig. 2

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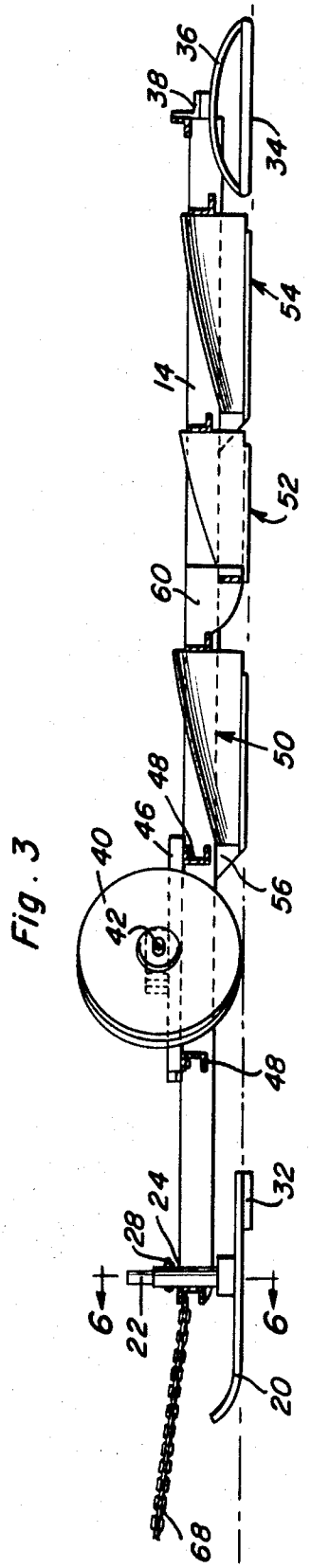


Fig. 3

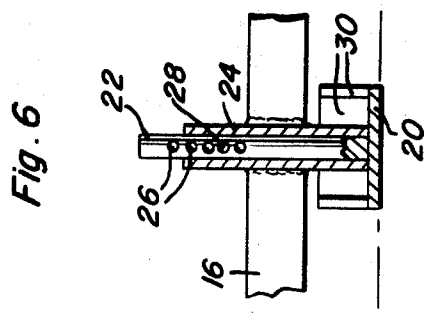


Fig. 6

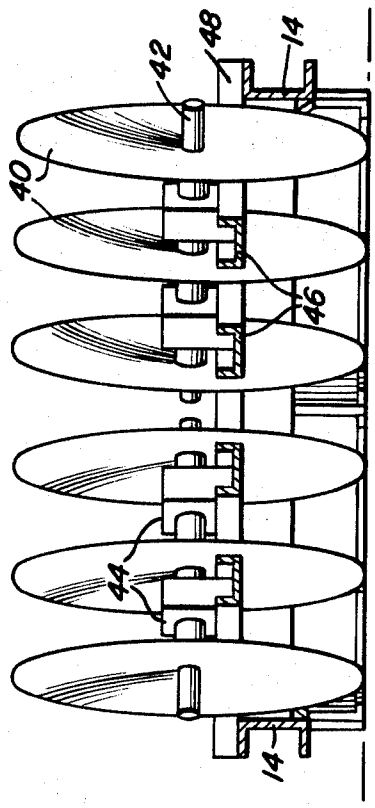


Fig. 4

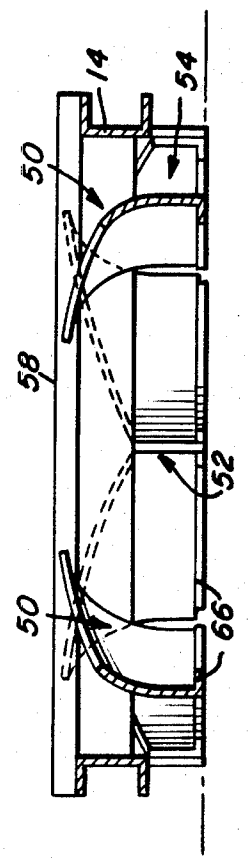


Fig. 5

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SNOW LEVELER

The present invention involves snow levelers, and more particularly relates to a lightweight leveler specifically adapted for grooming or redefining snowmobile trails by removing the large humps formed therein through continued use and providing a soft relatively smooth snow layer.

It is a significant object of the instant invention to provide a snow leveler or drag which, in addition to properly and efficiently redefining a snowmobile trail, is of a lightweight compact construction easily towed behind a conventional snowmobile.

Another significant object of the invention resides in the provision of a snow leveler which effectively removes the large humps or ridges developed on snowmobile trails after a period of use and reconditions the trail, by providing a layer of pulverized softened and relatively smooth snow there along.

In conjunction with the above object, it is also a significant object of the instant invention to provide a leveler which redefines the trail through a working of the top layer of the snow without any excessive gouging or plowing of the snow or underlying earth such as could hamper the speed and effectiveness of the leveling operation.

Basically, the leveler of the instant invention includes an elongated rectangular frame, ski or skid mounted for mobility, which mounts a leading bank of freely rotating pulverizing discs which encounter and pulverize the formed humps. The discs are followed by alternating inward and outward redirected pairs of blades which encounter, raise and turn the pulverized snow to complete the pulverizing operation and effect a general leveling thereof.

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:

FIG. 1 is a perspective view of the leveler of the instant invention mounted in operative position behind a snow-mobile;

FIG. 2 is an enlarged top plan view of the leveler;

FIG. 3 is a longitudinal cross-sectional view through the leveler taken substantially on a plane passing along line 3—3 in FIG. 2;

FIG. 4 is an enlarged transverse cross-sectional view taken substantially on a plane passing along line 4—4 in FIG. 2;

FIG. 5 is an enlarged transverse cross-sectional view taken substantially on a plane passing along line 5—5 in FIG. 2; and

FIG. 6 is a sectional detail taken substantially on a plane passing along line 6—6 in FIG. 3.

Referring now more specifically to the drawings, reference numeral **10** is used to generally designate the leveler comprising the instant invention. The leveler **10** has all of the snow engaging operating components thereof mounted on an elongated rectangular frame **12** comprising a pair of laterally spaced side beams or rails **14**, a forward cross beam **16** extending between and interconnecting the forward ends of the side beams **14**, and a rear cross beam **18** overlying and interconnecting the rear ends of the side beams **14**. The side beams **14** and the front cross beam **16** are preferably in the nature of outwardly directed channel members so as to combine both strength and relative lightness. The rear cross beam **18**, which as indicated overlies and is secured to the tops of the rear ends of the side beams **14**, will normally be an angle member with the vertical flange thereof orientated toward the rear of the frame **10**.

A pair of skis or ski-like skids **20** are secured to the front cross beam **16** at laterally spaced points thereon so as to support the forward end of the frame for travel over the snow surface. Each of the skis **20** includes a centrally located verti-cally upwardly projecting mounting rod or shaft **22** which is slidably received through an elongated sleeve **24** welded to the rear face of the front cross beam **16** whereby an adjustment in the vertical height of the front of the frame **12** can be effected. In order to fix the height of the frame in any of a plurality of vertically adjusted positions, each of the ski shafts **22** is provided with a series of apertures **26** therethrough which selectively align with a pair of opposed openings in the sleeve **24** immediately above the cross beam **16** for the selective reception of an appropriate pin or bolt **28** therethrough. If desired, a short protective housing, defined by side and front vertically projecting plates **30**, can be provided on each ski **20** about the lower end of the ski mounted shaft **22**. In addition, if deemed desirable, short stabilizing rudders **32** can be provided on each ski **20**. As will be appreciated from the drawings, the skis **20** generally centrally underlie the front cross beam **16** and are provided with slightly upturned leading ends for ease of movement over the rough humped trail surface to be encountered thereby. Likewise, the frame itself can have the front slightly raised relative to the rear for ease in passing over obstacles.

The trailing end of the frame **12** will normally also be supported on a pair of laterally spaced skids **34**. Each of these skids **34** mounts on the opposed ends of an upwardly bowed leaf spring **36** which is in turn centrally secured to an appropriate mounting bracket **38** affixed to the rear elevated cross beam **18**. The utilization of a leaf spring type mounting provides for a slight floating action to the rear of the frame which assists in providing the desired softened or fluffed snow condition.

The actual pulverizing operation is initiated by a forwardly located bank of vertical snow cutting and turning discs **40**. The discs are provided in two sets of three discs each, the discs being angled rearwardly and outwardly with the two sets diverging slightly from each other as will be best appreciated from FIG. **2**. The discs **40** are freely rotatable upon engagement with the snow surface and are mounted on shafts **42** journaled within appropriate support blocks **44** mounted on rearwardly and outwardly angled support bars **46** which are in turn fixed to a pair of crossbars **48** located to the front and rear of the discs **40**.

Following the pulverizing discs **40** are three pairs of blades **50**, **52** and **54**. The blades **50** have the forward ends thereof affixed, either directly or through filler plates **56**, to the opposite ends of the cross beam **48** immediately rearward of the discs **40**. The two blades **50** converge rearwardly and are secured, in laterally spaced relation to each other, to a cross beam **58** extending between and affixed to the opposed side rails **14**. The second pair of blades **52** have engaged forward ends thereof affixed, either directly or through a mounting plate **60**, to the cross beam **58** centrally be-

tween the converged rear ends of the forward blades **50.** The blades **52** diverge rearwardly with the rear ends thereof engaged and affixed to a rearwardly located cross beam **62** adjacent the outer ends thereof. The final set of blades **54** have forward ends affixed to the cross beam **62,** laterally outward of the rear ends of the blades **52.** These blades **54** converge rearwardly with the rear ends thereof terminating in laterally spaced relation to each other and fixed to a cross beam **64** positioned forward of the rear cross beam **18.** The blades orientated in this manner will result in a lateral inward, outward and inward shifting and rolling of the disc pulverized snow so as to continue the pulverizing action and result in a final soft and fully reconditioned product.

Noting FIGS. **1** and **2,** as well as the detail of FIG. **5,** each of the blades **50, 52** and **54** includes a substantially horizontal lower edge incorporating a laterally turned or directed flange **66** which tends to engage beneath and assist in elevating the disc cut snow. Each of the blades is of a gradually increasing height from the forward to the rear end thereof with the blade initially rising vertically and, along the upper portion thereof, arcing laterally to cause an over-rolling or turning effect on the encountered upper cut layer of snow. It will of course be appreciated that the discs and blades project below the peripheral frame **12** and at a depth sufficient so as to engage and recondition the upper layer of snow along a snowmobile trail whereon the snow has been packed by frequent travel thereon. The particular packing that occurs on snowmobile trails results, from the nature of the snowmobiles themselves, in a hard surface with multiple humps therein which make further riding both difficult and uncomfortable.

The leveler of the instant invention effectively reconditions the upper layer of packed snow without disturbing the ground therebeneath and in an efficient manner which ultimately produces a relatively smooth layer of softened snow, such being ideal for snowmobile traffic. Also of significance is the fact that the leveler is so constructed as to be specifically adapted for trailing behind a snowmobile as suggested in FIG. **1.** Appropriate tow chains or the like **68** will of course be provided.

The foregoing is considered as illustrative only of the principles of the invention. 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.

What is claimed as new is as follows:

1. A snow leveler for packed snowmobile trails and the like, said leveler comprising a frame, skid means supporting said frame for travel over the surface of snow, a series of snow pulverizing discs rotatably mounted transversely across the forward portion of said frame for initial pulverizing engagement with the snow, said discs being generally vertically orientated in a front-to-rear direction, and three pairs of snow-turning blades mounted rearward of said discs for sequential engagement with the disc pulverized snow, the first pair of blades, immediately behind the discs, converging rearwardly from forward ends located adjacent the sides of the frame to rear inwardly converged ends, the second pair of blades commencing at converged forward ends immediately rearward of the converged rear ends of the first pair of blades and diverging rearwardly to terminate in rear laterally spaced ends, the third pair of blades converging rearwardly from forward ends positioned immediately outward of the diverged rear ends of the second pair of blades, said third pair of blades terminating in laterally spaced rear ends converged inwardly relative to the forward ends thereof, each blade including a substantially horizontal lower edge having a laterally turned or directed flange thereon for engagement beneath the disc pulverized snow, each blade, along the height thereof from the lower edge, curving slightly laterally to provide a turning effect to the snow engaged thereby, and each blade, along the length thereof, being of a progressively greater height from the forward end to the rear end.

2. The leveler of claim **1** wherein said discs are provided in two laterally spaced sets, the discs of each set being orientated in a rearwardly and outwardly directed inclination relative to the length of the leveler.

3. The leveler of claim **2** wherein said skid means includes a pair of pivotally adjustable front skis depending from the forward end of said frame.

4. The leveler of claim **3** wherein said skid means also includes a pair of ski-like members fixed to the rear of said frame and depending therefrom.

5. A snow leveler for packed snowmobile trails and the like, said leveler comprising a frame, surface engaging support means supporting said frame for travel over the surface of snow, and three pairs of snow-turning blades mounted on said frame for sequential engagement with the snow, the first pair of blades converging rearwardly from forward ends located adjacent the sides of the frame to rear inwardly converged ends, the second pair of blades commencing at converged forward ends immediately rearward of the converged rear ends of the first pair of blades and diverging rearwardly to terminate in rear laterally spaced ends, the third pair of blades converging rearwardly from forward ends positioned immediately outward of the diverged rear ends of the second pair of blades, said third pair of blades terminating in laterally spaced rear ends converged inwardly relative to the forward ends thereof, each blade, along the height thereof from the lower edge, curving slightly laterally to provide a turning effect to the snow engaged thereby, and each blade, along the length thereof, being of a progressively greater height from the forward end to the rear end.

6. The leveler of claim **12** including a plurality of snow pulverizing discs rotatably mounted transversely across the forward portion of the frame forward of the first pair of blades.

7. The leveler of claim **13** wherein said discs are provided in two laterally spaced sets, the discs of each set being orientated in a rear-wardly and outwardly directed inclination relative to the length of the leveler with the sets of discs rearwardly diverging relative to each other.

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