United States Patent [19]

Brown

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[54] **SNOW GRADER**

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[52] **U.S. Cl.** **172/789,** 172/393, 37/50

[51] **Int. Cl.** **E02a 3/12**

[58] **Field of Search** 172/787, 786, 789, 396, 172/387, 392, 393; 37/50–52, 122–123

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[57] **ABSTRACT**

This invention relates to a snow grader comprising a support frame, a plurality of baffle means attached to said frame with the bottom thereof being in substantially the same plane as the bottom of said frame, runners movably mounted on said frame, and means for moving said runners to and from a position above the bottom of said frame to a position therebelow, said baffles being substantially parallel to each other and positioned at 90° to the direction of travel of the grader.

1 Claim, 3 Drawing Figures

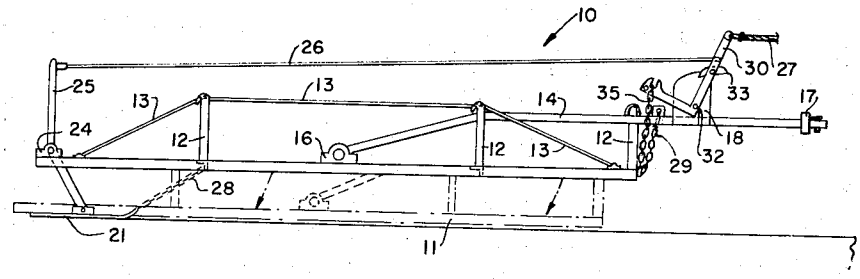


FIG. 1.

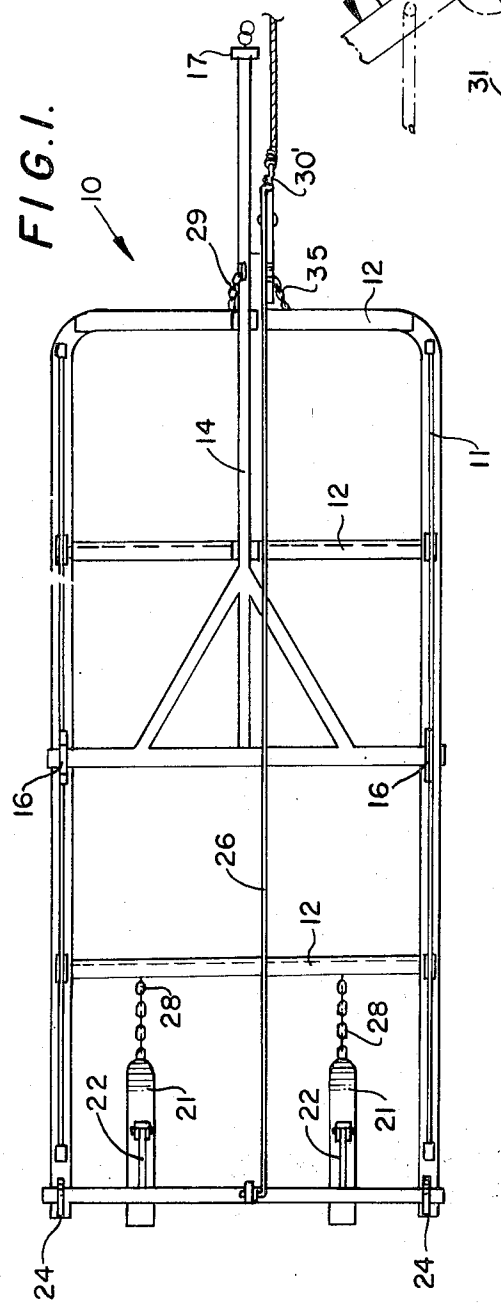


FIG. 3.

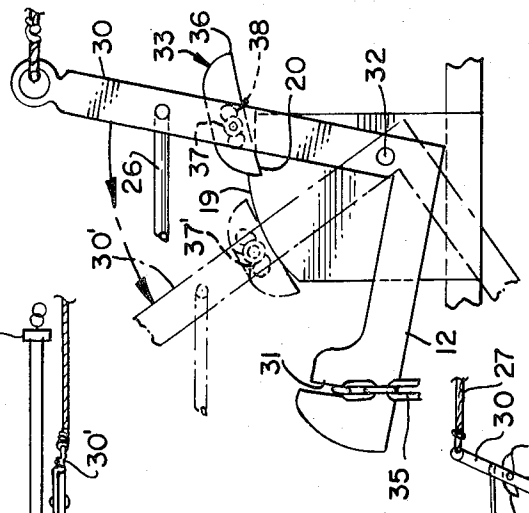
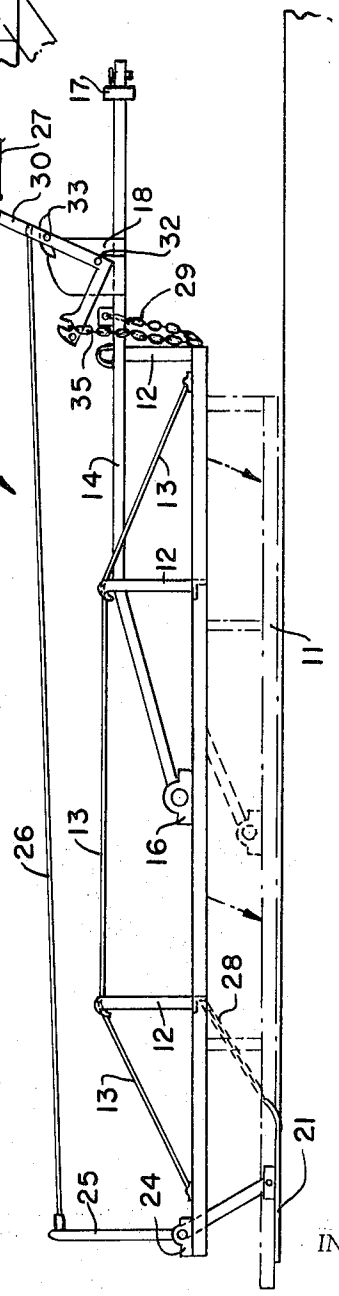


FIG. 2.



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SNOW GRADER

BACKGROUND OF THE INVENTION

As winter sports have become more popular and diversified, the areas suitable for engaging in such sports have become more crowded and more limited. This is particularly true with respect to the sport of snowmobiling. In some areas, legislation has further limited areas which can be used for this sport, and with large numbers of people engaged in this sport, a serious problem has arisen with respect to maintenance of snowmobile trails and roads. Specifically, snowmobiles usually rely on treads to propel them across the snow. Such treads dig into the snow, leaving a rough, corrugated surface which becomes even more irregular upon repeated use of the trail. Freezing and thawing cycles and repeated snowfall act to aggravate this irregularity to the point where some trails and roads become unusable. Attempts to maintain the trails have not been successful because equipment presently in use is not suitable for smoothing the trails and packing them so that they can be used by snowmobiles. The surface on which snowmobiles travel must not only be smooth but also packed to some extent in order to permit proper function of the means, such as tread, which act to propel the snowmobile.

BRIEF SUMMARY OF THE INVENTION

The present invention relates to grading apparatus which will quickly and conveniently smooth and pack areas of snow so that they will be suitable for use by snowmobiles.

Briefly stated, the present invention comprises a snow grader comprising a support frame, a plurality of baffle means attached to said frame with the bottom thereof being in substantially the same plane as the bottom of said frame, runners movably mounted on said frame, and means for moving said runners to and from a position above the bottom of said frame to a position therebelow, said baffles being substantially parallel to each other and positioned at 90° to the direction of travel of the grader.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a grader according to the present invention;

FIG. 2 is a top plan view thereof; and

FIG. 3 is an enlarged partial view of the lifting and locking device illustrated in FIG. 2.

DETAILED DESCRIPTION

Referring to the drawings, and in particular FIGS. 1 and 2, there is shown a grader 10, which comprises a support frame 11, preferably formed of angle iron, and a plurality of snow leveling means 12, attached to the frame as by welding, which are suitably solid baffles formed of iron or other rigid material which are further strengthened against dislocation by means of struts 13. While three baffles have been shown, it will be evident that more can be used if desired.

A drawbar 14 is attached to a shaft 15 which is in turn rotatably mounted to the frame by means of standard bearing assemblies 16. The drawbar has a swivel hitch 17 which rotates freely through 360° attached to its forward end and it is by this means that the grader is connected to the vehicle which is to draw it through

the snow. The drawbar also has affixed to it a plate 18 having an arcuate upper surface 19 and a locking detent 20 whose purpose will be explained later in connection with FIG. 3. The drawbar 14 is mounted near the center of the length of the grader frame 11 so as to minimize the influence of the up and down motion of the vehicle drawing the grader and thereby permit the grader to "float" freely over the surface being graded.

Runners 21 are attached to shaft 23 by means of legs 22. The runners are preferably ski-shaped in form in order to permit the grader to ride over snowy surfaces and are used as a means of moving the grader to various locations when it is not in use. The shaft 23 is mounted on the frame 11 by means of standard bearing assemblies 24 so that it can be rotated, thereby moving the runners 21 to a position above the bottom of the frame, or to the position therebelow as illustrated in FIG. 2. Restraining means, such as a chain 28, are used to insure that the runners 21 will not be rotated beyond the position desired. Rotation is accomplished by means of lifting and locking means comprising the arm 25 affixed to the shaft 23, which arm 25 is connected to a rod 26, which is in turn attached to an L-shaped arm 30 which is movably attached to the plate 18 by means of a pivot pin 32. This L-shaped arm 30 has movably affixed thereto a dog 33, with a locking snout 34 and a bottom surface shaped to travel along the arcuate surface 19 of the plate 18 as best shown in FIG. 3. Locking bolt 37 passing through slot 38 is used to movably mount the dog 33 to the arm 30. Pivoting the L-shaped arm 30 by pulling on the rope 27 causes the dog 33 to ride along the arcuate surface 19 to a position where it will be locked into the locking detent 20 of the plate 18. This acts to maintain the runners 21 in their extended position below the frame. The dog 33 is counterweighted at its forward end 36 so that when the L-shaped arm is further pivoted it will unlock from the detent 20 and move along the arcuate surface 19, thereby causing the runners 21 to be lifted above the bottom of the frame 11. The means for moving the L-shaped arm 30 about the pivot pin 32 to raise or lower the runners 21 is a rope 27 which is manipulated by the operator of the vehicle pulling the grader. Keeper chain 35, attached to the frame and passing through slot 31 in L-shaped arm 30, can be used to adjust the height to which the runner can be raised. Also provided is chain 29 attached to the frame 11 and to the drawbar 14 for adjusting the height of the grader with respect to the drawbar 14. It may be desired to vary the height of the forward end of the grader, depending upon snow conditions and conditions of the surface upon which the grader is acting.

While operation of the device is largely evident from the foregoing description, it will be seen that once the grader is attached to the drawing vehicle by means of a swivel hitch 17 the grader can be towed to the area where it is to be used in an inoperative position by locking the runners 21 into their position below the frame. Once the area is reached which is to be graded, the runners 21 are retracted by the operator pulling the rope 17, thereby causing the L-shaped arm 30 to pivot to release the dog 33 and permit rod 26, arm 25 and legs 22 to move the runners. The correlated movement of the arm 30, dog 33 and rod 26 is further illustrated by the broken line representation of these elements which shows the position of these elements (30', 33', and 26') when the dog has been released from its locked posi-

tion in detent **20.** The frame **11** then rests on the surface to be graded together with the baffles **12,** and their combined weight as the grader is moved causes the snow surface to be treated so as to scrape the high spots and deposit the snow onto the low spots while also packing the snow. This lifting of the snow by the baffles also acts to deaerate snow and the sliding of the grader also packs the deaerated snow leaving to the rear of the grader a substantially even, smooth, hardened trail.

As to materials, the support frame, baffles, drawbar assembly and lifting and locking means are preferably made of metal, such as steel or iron, since it provides the best resistance to wear and the weight necessary to give the most effective scraping, packing and smoothing.

It will be understood that it is intended to cover all changes and modifications of the invention herein chosen for the purpose of illustration which do not constitute departures from the spirit and scope of the invention.

What is claimed is:

1. A snow grader comprising a horizontal support frame, a plurality of substantially vertical baffles attached to said frame with the bottom thereof being in substantially the same plane as the bottom of said frame, ski-shaped runners movably mounted to said frame at the rear portion thereof, means affixed to said runners for moving said runners to and from a position above the bottom of said frame to a position therebelow and said frame and baffles into and out of contact with the surface of the snow, means on said moving means to lock said runners in the position below the bottom of said frame, means for attaching said grader to a vehicle, and means on the forward portion of said frame to vary the height of the forward end of the grader in relation to said attaching means, said attaching means extending from a point substantially about the middle of the length of said frame to a point in front of said frame and said baffles being substantially parallel to each other and positioned at 90° to the direction of travel of the grader.

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