Fig. 8

Fig. 9

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This invention pertains to snow removal equipment and more particularly to a device for attachment to a road maintainer, a snow plow or other snow removal equipment which will be usable for removing the ridge of snow laid up by such snow removal equipment in driveways or the like.

In the clearing of snow from highways and streets or the like, the usual technique is simply to push the snow from the roadway over to the edge of the road. This results in the piling up of a ridge of snow all along the edge of the roadway. In most instances especially in open country this ridge causes no trouble. In towns and cities, however, much trouble can result from this ridge. For example, at driveways or other intersections, such ridges are extremely bothersome, and may be dangerous.

By our invention we provide a device attachable to the blade of a road maintainer, snow plow or the like, which device can be raised out of service when not needed, but can also be lowered to remove the snow in the ridge from the driveway or intersecting roadway, thus leaving the intersection clear. Various safety devices are provided in order to ensure full floating device which will not suffer serious damage upon impact with objects alongside the roadway.

A clearer understanding of our invention in its embodiment may be had from a study of the following specification and the figures in which:

FIG. 1 is a rear elevational view of our device as attached to the blade of a road maintainer with a small part broken away to show underlying parts.

FIG. 2 is a view similar to FIG. 1 showing the wing in a raised position.

FIG. 3 is a view similar to FIG. 1 showing the blade of the wing tilted as upon impact with a surface irregularity.

FIG. 4 is a detailed view of the attachment means on the blade with the wing removed.

FIG. 5 is a view similar to FIG. 4 showing the reverse side of the attachment means.

FIG. 6 is a sectional view along line 6--6 of FIG. 1.

FIG. 7 is a view similar to FIG. 6 showing the blade tilted to the position shown in FIG. 3.

FIG. 8 is a front elevational view of the device as shown in FIG. 1, and

FIG. 9 is a detailed sectional view to an enlarged scale showing the elevating mechanism in three alternate positions.

Basically our invention comprises a wing attachment for a road maintainer, snow plow or other snow removal equipment. This attachment is removably fastened to the end of the blade of the removal equipment and has hydraulic or similar mechanism for raising or lowering the wing. The wing is fixed at an angle to the path of travel such that in its operable position it will carry snow with it, and not allow it to drop off the end of the blade to pile up a ridge. Various safety means are embodied in the device to prevent breakage.

More specifically and in reference to the drawings, we have shown our device affixed to the blade 10 of a road maintainer device. It will be apparent that our invention could be just as easily attached to many other types of snow plows or snow removal equipment.

Only a slight modification of the blade is needed in order to attach our device to such a blade. Ears 11 and a boss 12 (FIG. 4) may be welded to the blade 10. These are provided with holes for the reception of pins as will later appear.

Nearly all of the mechanism of my device is enclosed within a box-like carrier 13 which is affixed to the blade 10 by means of a heavy pin 15 (FIGS. 4 and 5) extending through the boss 12 and through two bosses 16 on the carrier. The shaft pin 15 is considerably weaker than the pin 14 for a purpose to be explained later.

As best shown in FIG. 9, the carrier 13 is formed to enclose a support arm 18 pivotally journalled on a lower axle 19. This arm 18 is a large rectangular member extending from the axle outwardly through a slotted end 20 of the carrier 13.

As is well known in the art, the blade 10 is carried at an angle to the line of travel such that one end trails behind the other end for the purpose of moving snow along the blade to the edge of the road. The snow slides off the trailing end. Our device is adapted to be fixed to the blade at this trailing end.

At a point about at the end of the blade 10, the arm 18 is bent forward at 21 so that it forms an angle with the line of travel of the blade nearly opposite to the angle of the blade 10. This is the preferred angle. It will be apparent hereafter, however, that this bend could be somewhat less, and that the bend could be such that the arm extends perpendicular to the line of travel and that our device would still operate successfully. Moreover the bend could also be greater, forming an even sharper angle to the line of travel without seriously interfering with the operation. Outboard of this bend the auxiliary scraper blade or wing 23 is fastened to the arm 18, by means described hereinafter.

However, it is now apparent that the scraper blade 23 will carry any snow along with it and not permit it to drop off the outer end with the result that the snow will be collected on the wing or scraper 23.

At a distance somewhat above the axle 19 in the carrier 13, we provide an upper axle 24, on which is pivotally journalled a lift mechanism. This axle 24 may be located as shown or may be dropped down to the hole 22. This mechanism comprises principally a hydraulic cylinder device 25 adapted to be connected to a controllable hydraulic pump, not shown. The piston rod 26 extends from the piston within the cylinder and is adjustable connected to a pull rod 27 by means of a turn buckle 28. The pull rod 27 in turn is pivotally fastened to a crank device 30.

Mounted on the arm 18 is a tubular slide 31. This slide is formed with an opening in which the crank device 30 is adapted to slide longitudinally of the arm 18. The crank and the opening in the slide are preferably formed with complementary surfaces such that no rotation of one with respect to the other is possible. These surfaces may be simply rectangular surfaces or they may be splined, keyed or the like to prevent the relative rotation.

It should be noted that this is merely a preference and is not absolutely necessary because the structure of the slotted end 20 also holds the arm 18 and rods 26 and 27 in proper relationship.

The end 30 is formed with a fairly large slot 32 adapted to embrace both the arm 18 and the rods 26 and 27 as well as the turnbuckle 28. The slot is formed so as to allow a vertical pivoting of the embraced parts, but no movement in any other direction. Thus movement backward or forward of the blade 10 by the arm 18 is restricted.

The arm 18, as noted above is pivoted on the axle 19 so that it is free to move arcuately up and down at positions remote from the axle 19. Because of the freedom allowed by the sliding action between the crank 30 and
the slide 31, the arm can rise without movement of the rods 26 and 27 as shown by the lower two positions shown in FIG. 9. It will be noted that in the lowest position the crank is moved as far to the left in the figure as possible. As the arm 18 is raised, and without movement of the rods 26 and 27, the slides outwardly of the slide 31. This allows the arm to "float" freely above a certain point without movement of the piston within the hydraulic cylinder 25. However, by pulling the rod 26 into the cylinder 25 by hydraulic action, the crank 30 can be effectively shortened or pulled further to the left (in the figure) so that an edge 29 of one leg of the crank 30 engages the slide 31 in a hooked engagement. Further pulling of the rods will cause the arm to be pulled pivotally upward as illustrated by the upper position in FIG. 9. Thus, while the arm is free to float above any given position without movement of the piston within the cylinder, it can be effectively raised by hydraulic action if desired. As will be apparent to those skilled in the art, the raising of the scraper blade 23 would be done with shorter strokes of the rods 26 and 27 if the axle 24 were located at the hole 22. If speed is necessary or desirable, we can thus make it possible. It will be evident at this point that equivalent raising mechanism such as a cable pulling device could be used for this purpose and that we have only described our preferred mechanism.

As illustrated, the carrier 13 is open on top to allow the mechanism freedom of travel in this direction.

As stated above, the arm 18 carries the wing 23. In order to do this with safety, it is necessary that the wing 23 be tiltle so that if it hit a surface irregularity such as a curbing or the like, it will simply tilt from the position shown in FIG. 6 to the position shown in FIG. 7 and then ride up and over the irregularity. In order to make our wing tiltable, we form the arm 18 to a cylindrical shape of circular cross section beyond the bend 21. Brackets 34 fixed to the wing 23 are journalled on the cylindrical end of the arm 18. These brackets are spaced apart so that the wing is carried on the arm without movement except a rotary movement about the arm 18. In order to control the rotary movement, we provide a spring loaded arrangement to urge the wing to its normal scraping position as shown best in FIG. 1 and FIG. 6. This springloaded mechanism includes a spring platform 35 fixed to the wing 23 and, for extra support, the brackets 34. The bolt means 36 carrying spring engaging bases 37 are threaded through the platform 35 to provide adjustment of the SPRINGS as will appear. The springs 38 are compression type springs and are engaged between the base 37 and a bar 40 fixed to the arm 18. This bar 40 may be additionally supported by a fin 41 also fixedly attached to the arm 18. This fin 41 also extends upwardly above the arm and is formed as a stop device to hold the wing 23 in its normal use position and to prevent further rotation beyond that position under the pressure of the springs 38.

In use, our device is normally carried in its upper or carried position as illustrated in FIG. 2. It is raised and held here by means of the hydraulic lift mechanism previously described. As the plow or other snow removal equipment approaches a driveway, the wing 23 is lowered to the position illustrated in FIG. 1 which is the normal use position. At this position, the snow which was previously rolled off the end of the blade 10 into a windrow or ridge along the edge of the road, is caught by the wing 23 and held on the wing or between the two blades. To assist in this we provide an outer end shield 44 (FIG. 8).

As soon as the driveway (or another roadway intersection) is passed, the wing may again be raised by the hydraulic mechanism as described. This causes the snow previously entrapped to be left at that point. Meanwhile the intersection, or driveway is free from any windrow or ridge of snow.

Among the safety features we provide for our device is a wing which floats freely above the lower limit of operation. This was fully described in reference to FIG. 9 and will not be described again here except to call attention to it. It will be clear that when the wing 23 is low at the crank 30 simply slides outwardly of the slide 31. This allows the arm to "float" freely above a certain point without movement of the piston within the hydraulic cylinder 25. Moreover, by pulling the rod 26 into the cylinder 25 by hydraulic action, the crank 30 can be effectively shortened or pulled further to the left (in the figure) so that an edge 29 of one leg of the crank 30 engages the slide 31 in a hooked engagement. Further pulling of the rods will cause the arm to be pulled pivotally upward as illustrated by the upper position in FIG. 9. Thus, while the arm is free to float above any given position without movement of the piston within the cylinder, it can be effectively raised by hydraulic action if desired. As will be apparent to those skilled in the art, the raising of the scraper blade 23 would be done with shorter strokes of the rods 26 and 27 if the axle 24 were located at the hole 22. If speed is necessary or desirable, we can thus make it possible. It will be evident at this point that equivalent raising mechanism such as a cable pulling device could be used for this purpose and that we have only described our preferred mechanism.

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As soon as the driveway (or another roadway intersection) is passed, the wing may again be raised by the hydraulic mechanism as described. This causes the snow previously entrapped to be left at that point. Meanwhile the intersection, or driveway is free from any windrow or ridge of snow.
lift means including means attached between said carrier means and said arm means to allow free upward pivotal motion of said arm means above a lower fixed position set by said lift means, scraper blade means carried by said arm means at an angle to said main blade such that snow moved by said main blade is caught and held by said scraper blade, said scraper blade being raisable by said lift means to dump said snow at a desired location.

5. The device of claim 4 in which said scraper blade is pivotally carried by said arm means such that said scraper blade is pivotally about the longitudinal axis of said arm means, spring means engaged between said arm means and said scraper blade to bias said scraper blade to a normal use position.

6. For attachment to mobile snow removal equipment having a main blade, a snow moving device comprising carrier means mountable on said main blade, arm means pivotally mounted on said carrier means for pivotal movement about a substantially horizontal axis, lift means connected to said carrier means, slide means on said arm means, crank means attached to said lift means and slidably engaged in said slide means, part of said crank means being engageable with said slide means in a hooked engagement to allow, by said sidable engagement, free movement of said arm means upward from any position in which said arm means is positioned by said lift means but to prevent movement downward therefrom, scraper blade means carried by said arm means at an angle to said main blade such that snow moved by said main blade is caught and held by said scraper blade, said lift means being operable to raise said scraper blade to a carried position, said scraper blade being pivotally mounted on said arm means for oscillating pivotal movement about the longitudinal axis of said arm means, adjustable spring means engaged between said arm means and said scraper blade whereby said scraper blade is resiliently biased in one direction, stop means on said arm means engageable with said scraper blade to hold said scraper blade in a fixed use position against the bias of said spring means, said scraper blade being thereby adapted to pivot from said use position to a release position upon engagement of said scraper blade with an obstruction.

7. The device of claim 6 in which the carrier means is pivotally connected to said main blade, flange means engaged between said carrier means and said main blade adapted to prevent pivotal movement of said carrier means relative to said main blade except upon such impact as will fracture said flange means.

8. A device for removing ridges of snow or the like from the edge of a roadway, said device being adapted for attachment to the blade of mobile snow removal equipment and comprising a scraper blade tiltably attachable to said first named blade, said tiltable attachment being such as to carry said scraper blade at such an angle to the path of travel of said removal equipment that snow or the like will be collected thereon, lift means including a hydraulic cylinder-piston assembly pivotally connectable to said first named blade, and free-floating connection means between said lift means and said scraper blade, said connection means including crank means slidably connectable to said scraper blade to allow the free-floating upward movement of said scraper blade.

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