CUTTER ATTACHMENT FOR ROTARY SNOW PLOW

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This invention comprises a novel and useful cutter attachment for rotary snow plows and more particularly relates to an accessory adapted to be mounted upon and carried by a conventional rotary snow plow at the front thereof in order to increase the efficiency of operation of the latter.

Conventional snow plows adapted to be mounted upon the front of tractor vehicles, such as trucks and the like and especially plows of the type having horizontally disposed auger or conveyor screws or power driven and extending transversely of the tractor vehicles are limited in their operation as to the height of a bank or drift of snow with which they may be used for clearing a roadway through. Further, when the mass of snow being removed has hardened into ice, the conventional type of snow plow is frequently stalled or at best is rendered very inefficient in its operation under such conditions.

It is the primary purpose of this invention to provide a cutter attachment which may be applied to such conventional plows and shall be extremely effective for overcoming the above-mentioned conditions.

A further object of the invention is to provide an attachment which is readily applicable to conventional snow plows and which will enable the latter to cut through bank and drifts or snow or ice of a greater height than that hitherto possible with such conventional plows.

A further object of the invention is to provide an attachment for conventional snow plows which will enable the latter to more easily make turns in drifts and banks without imposing an excessive strain laterally upon the snow plow and its associated structure and mechanism.

A further object of the invention is to provide an attachment in accordance with any of the foregoing objects which will facilitate the break-up and feeding of the snow or ice from the drift or bank into the snow removal mechanism of the conventional snow plow.

An additional important object of the invention is to provide an attachment in accordance with the preceding objects and which will enable a conventional snow plow to effectively remove a bank or drift of snow or ice which is higher than and/or harder than that customarily capable of removal by the conventional snow plow.

Still another important object of the invention is to provide an attachment which may be mounted upon and driven by the conventional snow plow for thereby increasing the effectiveness of operation of the latter.

A still further important object of the invention is to provide an attachment in accordance with the foregoing objects which will effect the cutting and removal of snow in advance of and along a path of greater width than that of the snow plow itself; which may effect its cutting operation even while the snow plow is stationary; and will operate to provide a clearance both forwardly and laterally of the front end of the conventional snow plow to facilitate turning of the snow plow and its tractor vehicle and will eliminate or reduce lateral thrust and strains imposed upon the snow plow during such turning movement.

Another object of the invention is to provide an attachment in accordance with any of the foregoing objects wherein the attachment drive means by which the cutting means of the attachment is operated itself constitutes an additional cutting element for increasing the lateral width of the cut of the attachment.

And a final object of the invention to be specifically enumerated herein resides in the provision of attachment in accordance with the foregoing objects which shall be capable of easy and quick mounting of the attachment upon a conventional snow plow or its removal therefrom thereby enabling a conventional snow plow to be selectively adapted to satisfactorily handle the removal of snow under conditions for which the conventional snow plow was hitherto unsatisfactory in its operation and capacity.

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 perspective view of a front portion of a tractor vehicle showing a conventional rotary snow plow mounted thereon and showing the cutter attachment of the present invention operatively applied to and carried by the tractor vehicle and the snow plow, the attachment being shown in its position for cutting the face of a drift or snow bank of a maximum height;

FIGURE 2 is a detail view in horizontal section through the front portion of the arrangement of FIGURE 1 and showing the attachment of the present invention applied to and mounted upon the front portion of the carriage for supporting framework of a conventional rotary snow plow;

FIGURE 3 is a view in vertical section through the support frame of this attachment and showing the mounting of one of the plurality of endless chains forming a part of the cutting means of the attachment; and

FIGURE 4 is a fragmentary view taken in vertical transverse section through the attachment of FIGURE 1 and showing in full lines the vertical positioning of the attachment for effecting a maximum vertical cut of a snow bank or drift; and showing in dotted lines successive forwardly tilted positions of the attachment for removing snow at varying distances in advance of the conventional rotary snow plow to provide a clearance for the latter in a snow bank or drift.

In the accompanying drawings, the numeral 10 designates generally the forward portion of a tractor vehicle such as a truck or the like and upon which there is mounted a conventional rotary snow plow 12, while the outer attachment of this invention designated generally by the numeral 14 is shown supported by and mounted in advance of the snow plow 12.

It will be appreciated that the cutter attachment of this invention is capable for use with a variety of rotary snow plows and is especially useful for the type of snow plow as illustrated in FIGURE 1. In the rotary snow plow of FIGURE 1 there is shown a plurality of horizontally extending conveyor or auger screws 16 which are journaled in side walls 18 of the carriage or supporting framework 20 of the rotary snow plow, it being understood that the latter is secured to the front end of the tractor vehicle in any suitable manner. It will also be understood that the conveyor screws 16 are power operated from the power plant of the tractor vehicle or in any other suitable manner as desired. In operation, the conventional snow plow is moved forward by the tractor vehicle into engagement with the base of a drift or bank of snow and the rotating conveyor 16 will then remove the snow in a conventional manner which in itself forms no part of the present invention.

In accordance with the present invention, the attachment 14 is removably secured to, supported by and is driven from the snow plow assembly 12 in a manner to be now described. The lowermost of the conveyor
The projections of the shaft 22 are provided with driving cogs 34 over which are entrained sprocket chains 36 provided with cutting teeth 38 thereon. It will be observed that these chains are disposed outwardly of the side walls 18 and of the support frame 14 so that during operation of the chains their cutting teeth will serve to increase the lateral width of the space cleared by the attachment 14 and the rotary snow plow 12, thus facilitating the maneuvering or turning of the snow plow in drifts or banks by reducing the lateral pressure of the snow thereagainst.

It will now be understood that the sprocket chain 36 constitutes a part of the driving means which derives its power from the shaft 22 of the rotary plow assembly 12 and which in turn drives the cutting means carried by the support frame of the attachment 14, and which is to be now described.

The support frame of the cutter attachment 14 consists of a plurality of parallel support members 40 which are rigidly connected together as by cross rods 42 as by means of welding or the like as at 44, see FIGURE 4, Secured to the lower ends of the members 40 are hanger brackets 46 fastened to the support members as by bolts 48, see FIGURE 3, and between which is received the driven sprockets carried by a shaft 52 which is journaled in the hangers. It will thus be observed that the shaft 52 is disposed at the lowermost portion of the support frame of this attachment and carries thereon driving sprockets for a purpose to be subsequently apparent. The opposite ends of the shaft 52 project outwardly beyond the support frame of the attachment and are provided with sprockets 54 thereon over which the previously mentioned sprocket chain 36 is entrained. Thus, the sprocket chain 36 serves to transmit power from the rotary snow plow 12 to the shaft 52 of the cutter attachment.

At the upper end of each of the members 40 of the support frame of the attachment there are provided upwardly extending pairs of hangers or brackets 56, see in particular FIGURES 3 and 4, which are provided with elongated slots 58 through which extend fastening bolts 60 by which these brackets are vertically adjustable upon the upper ends of the members 40. Disposed between each of the pairs of brackets 56 carried by each of the members 40 is an idler sprocket gear 62 which is disposed in vertical alignment with the driving sprockets 50 previously mentioned and carried by the shaft 52. An endless chain 64 is entrained over each of the sprockets 62 and sprockets 59 at the other end of the support frame, these chains each embracing one of the members 40 and thus encircling the entire support frame of the attachment. The adjustment of the bracket 56 upon the members 40 by the bolts and slots previously mentioned serves to enable proper tensioning of the endless chains 64.

Fittedly secured to the endless chains 64 are a plurality of cross bars 66 which are in the form of angle members having mounting flanges 68 by which they are secured to the chains and perpendicular laterally outwardly extending flanges 70. Detachably secured to the flanges 70, see also FIGURE 2, are a plurality of cutter elements 72 in the form of teeth or blades which are removably secured by fasteners 74 to the flanges 70.

The arrangement is such that when power is supplied to the shaft 52, the endless chain 64 with their cross bars and cutter elements will be caused to revolve continuously in the face of a bank or drift, the cross bars and their cutter elements will cut and remove the snow or ice, move the same downwardly along the support frame from which it will be picked up by the snow plow 12 following the attachment.

As far described it will be understood that the support frame of the attachment 14 is supported and mounted at its lower end and by means of the shaft 52 upon the forwardly projecting end of the bars 24. In a manner to be now described, this mounting also constitutes a pivotal support for the attachment whereby the same may be tilted about a horizontal axis of the shaft 52 between a vertical position shown in FIGURE 1 and in full lines in FIGURE 4 to successively inclined outwardly extending position shown in dotted lines in FIGURE 4 and finally into a lowered horizontal position shown in FIGURE 4.

Actuating mechanism is secured to the upper end of the support frame of the attachment and to the tractor vehicle 10 to effect by power operation a controlled adjustable tilting of the attachment about the horizontal axis of the shaft 52. This actuating means comprises a fluid pressure actuated cylinder piston unit designated generally by the numeral 80 and which is pivoted at 82 at its mid-position to a support bracket structure 84 carried by the front end of the tractor vehicle. Fluid pressure is supplied from any suitable source, not shown, as by the conduits 86 to the opposite ends of the unit 80 to effect operation of the piston therein, not shown, which in turn through the piston rod 88 imparts reciprocating linear reciprocation to the support fork 90 mounted thereon. The ends of the fork are pivoted as by the pins 92 to the hanger brackets 56 at the upper ends of the support frame and these pins may also function as the shafts about which the sprocket gears 62 are mounted.

The arrangement is such that upon actuation of the fluid pressure unit 80, the fork 92 may be moved inwardly or outwardly of the unit to selectively position the support frame of the attachment in its vertical position as shown in FIGURES 1 and 4 in full lines, which position effects the maximum vertical position of the cutting means. In this position, the cutting elements of the attachment extend vertically a considerable distance above the top of the rotary plow 12 and thus are effective to cut and remove the face of a snow drift or bank of a greater vertical height than that capable of being removed by the conventional snow plow 12.

However, when it is desired to provide a clearance in front of the snow plow, as for example to facilitate turning of the latter, the support frame of the snow plow may be progressively tilted forward as shown in dotted lines in FIGURE 4 by proper manipulation of the fluid pressure actuating means 80. When tilted forward it is evident that the cutting elements will effect a penetration of the face of the snow bank or drift for a considerable distance in advance to the rotary snow plow, and the snow so cut will be removed by the cross bars and cutting elements rearwardly and beneath the attachment and into the conveyor screw 14 or discharged therefrom. Thus the device may be manipulated to effect the removal of snow to provide a clearance space in front of the conventional snow plow. At the same time, as previously mentioned, the driving chains 36 of the driving means of the attachment will also cut and remove snow to the sides thereof and thus provide widened clearance in advance of the snow plow. In this manner a conventional snow plow may be adapted to successively handle the removal of snow of a greater depth and of a greater hardness than is possible hereeto-
fore with the conventional snow plow being unaided in this operation; and will enable to provide a clearance in front of and laterally enlarged with respect to the snow plow to facilitate turning of the plow while in a snow bank or drift and without imposing excessive lateral strains by the bank or drift against the sides of the snow plow and its structure. It will be particularly observed that in this invention the shaft 52 serves both as a means to illimitably and pivotally support the attachment and also to apply power thereto; the sprocket chain 36 comprise a driving means which both supplies power to the attachment and also serves as auxiliary cutting elements to enlarge the cut made by the attachment; and the pivotal connection of the support frame of the attachment at 92 to the fork 90 of the actuating means serves both to provide axles or journals for the upper idler sprocket 65 and also for a connection to the support frame to effect pivotal movement of the latter.

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 as claimed.

What is claimed as new is as follows:

1. In combination, a rotary snow plow having a power operated snow remover connected to and extending transversely across the front of a tractor vehicle and a cutter attachment therefore, said cutter attachment comprising an elongated support frame, mounting means pivotally connecting said support frame at one end thereof to said snow remover in advance of the latter and at the lower end thereof, said mounting means supporting said attachment for pivotal movement between horizontal and vertical positions about the pivotal connection of said mounting means, cutting means mounted upon said support frame, driving means connected to said cutting means for controlling it.

2. The combination of claim 1 wherein said support frame and its cutting means extend across the entire width of said snow remover.

3. The combination of claim 1 wherein said support frame and cutting means mounted thereof are of sufficient length to project upwardly above the vertical extent of said snow remover when said attachment is in its vertical position.

4. The combination of claim 1 wherein said driving means is connected to and is driven from said power operated snow remover.

5. The combination of claim 1 including a shaft journaled in said mounting means and in said support frame, said shaft comprising said mounting means and a part of said driving means.

6. The combination of claim 1 wherein said cutting means comprises a pair of driving chains rotatably supported on said frame and a plurality of cross bars disposed in side-by-side relation upon said driving chains and each extending transversely of said support frame, cutting elements carried by said cross bars, the assembly of cutting elements covering an area which is at least equal to the width and height of said snow remover.

7. The combination of claim 1 including actuating means connected to the other end of said frame for controllably tilting the latter about said mounting means.

8. The combination of claim 1 wherein said driving means includes a shaft comprising said mounting means and which is journaled and extends transversely through said support frame, and a gearing assembly drivenly engaging said shaft, gearing assembly being disposed outwardly of said frame and mounting means.

9. For use with a rotary snow plow having a power operated snow remover positioned forwardly and extending transversely across the front of a tractor vehicle, a cutter attachment comprising; an elongated support frame, mounting means pivotally connecting the latter to said frame and adapted to mount said frame at the lower end and forwardly of a snow remover in a position to extend transversely across the front of the latter, said mounting means supporting said attachment for tilting between horizontal and vertical positions about a horizontal axis extending transversely of the line of travel of said attachment, cutting means on said attachment, driving means for said cutting means, said driving means including a shaft journaled in and extending transversely through said frame and constituting a pivot for connecting said frame to said mounting means, said mounting means comprising a pair of support members in which said shaft is journaled, said driving means including a gearing assembly connected to said shaft and disposed upon the exterior of said support members.

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