TRACTOR MOUNTED SNOW THROWER WITH POWERED SWIVEL CHUTE

Inventors: Darrel B. Deen, Whiting; F. John Roost; James E. Hrdy, both of Sioux City, all of Iowa

Assignee: American Equipment Corporation, Sioux City, Iowa

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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—Eugene H. Eickholt
Attorney—Scofield, Kokjer, Scofield & Lowe

ABSTRACT

The snow thrower has a snow impeller mounted within a housing and operating to discharge snow through a discharge throat on the housing to a guide chute. The chute is rotatably mounted with respect to the throat. A double acting hydraulic cylinder reciprocates a drive member which represents part of a drive assembly so connected with the chute as to rotate the chute in one direction or the other, depending on the direction of the movement of the drive member, thereby to change the direction of snow discharge relative to the tractor.

2 Claims, 7 Drawing Figures
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BACKGROUND AND SUMMARY OF THE INVENTION

Snow throwers are used extensively in winter climate areas for removing snow from roads and streets, airport runways, parking areas and the like. Such throwers usually include a snow gathering mechanism which plows up or scrapes the snow and feeds it to an impeller which throws the collected snow off to one side or other of the path of the unit.

Among units which can be utilized as attachments for equipment usually readily available to the farmer, small airport operator or city street department are those which can be attached to the rear of a tractor and driven from the power take-off system of a tractor. The present invention relates to such a unit.

One of the principal objects of the present invention is to provide, in combination with a tractor mounted snow thrower, a snow discharge chute which can be selectively swiveled to different positions thereby to change the direction of snow discharge at the will of the operator of the tractor operating from a point remote from the chute location. In our invention the discharge direction of the chute can be quickly changed as desired, the degree of change possible being up to 240° or even greater. Thus snow can be directed through a wide range of discharge paths relative to the thrower unit and its path of advance.

Another object of the invention is to provide a swivel chute arrangement of the character described in which accidental discharge of snow directly toward the operator of the tractor is impossible. In our arrangement the position of the chute is positively controlled at all times, and the swiveling of the chute is limited within positively determined limits which do not permit the chute to be directed at the operator.

Still another object of the invention is to provide a swivel chute arrangement in which the mechanical components for effecting swiveling of the chute are simple, non-fouling and low in cost of fabrication. In our arrangement a minimum number of parts are needed and they can be assembled with the thrower unit quickly and easily.

Other and further objects of the invention together with the features of novelty appurtenant thereto will appear in the course of the following description.

DESCRIPTION OF THE DRAWINGS

In the accompanying drawings which form a part of the specification and are to be read in conjunction therewith and in which like reference numerals indicate like parts in the various views:

FIG. 1 is a rear perspective view of a revolvable discharge chute snow thrower according to the preferred form of the invention, the unit being shown as attached to the three-point hitch of a conventional tractor;

FIG. 2 is a fragmentary sectional view taken along line 2—2 of FIG. 1 in the direction of the arrows, the view being somewhat schematic;

FIG. 3 is a perspective view on an enlarged scale showing the chute's revolving mechanism from one side;

FIG. 4 is another fragmentary perspective view showing the revolving mechanism from another vantage point;

FIG. 5 is a fragmentary view showing the ring and chain portion of the chute throat, the view taken generally along line 5—5 of FIG. 2;

FIG. 6 is a top plan view of the chute ring and chain; and

FIG. 7 is a fragmentary sectional view, on an enlarged scale, taken along line 7—7 of FIG. 4 in the direction of the arrows.

The invention is utilized in connection with a tractor mounted horizontal snow thrower of the nature shown in FIG. 1. In the illustrated unit the entire thrower assembly is supported on the three-point hitch of the tractor 10. The power take-off shaft 11 drives a drive shaft 12 which is connected through appropriate universal joints with the shaft 11 and the blade shaft 13 of the thrower. The shaft 13 carries a series of pivotal blades or flails 14 which operate to feed snow into the thrower arms or impellers 15 which are also mounted on shaft 13 and which throw the snow upwardly through the throat 16 and into the chute 17. The chute 17 then directs the snow stream to the desired location.

The blades are located within a housing 18 having flared side wing portions 18a which converge toward and merge into the cylindrical portion 18b on which the chute throat 16 and chute 17 are mounted.

Referring to FIGS. 4 and 7, chute 17 is supported on a ring 19. In the preferred embodiment, the lower edges of the chute are welded to the ring. The ring is of inverted L-shape in cross section. The throat 16 of the housing is provided near its upper edge with an annular collar or flange 20 affixed thereto. The under surface of the horizontal leg of the ring 19 rests slidably on the upper surface of the flange 20. A retainer bar 21 is fastened to the inside of the vertical leg of the ring by one or more bolt and nut assemblies 22. The retainer bar 21 underlies the lower side of the collar 20 and prevents upward separation of the chute from the throat. The chute is free, however, to turn about the throat axis.

Trained about the upper exterior of the ring 19 is a length of roller chain 23. The chain is secured to the ring by end brackets 24 and 25, each of which is attached to one end of the chain. As best seen in FIG. 5 the connection between the bracket and ring and chain is in each case established through the medium of a U-shaped chain end retainer 26 which is adapted to receive a chain link. The legs of each bracket are apertured to receive a cotter pin 27 or other locking pin which passes through the bracket and the chain link to connect them together.

Chain end brackets 24 and 25 are curved to conform to the curvature of the outer surface of the ring. Each is secured in place to the collar by bolt and nut assembly 28 and a tighter nut and bolt assembly 29. The latter is received through appropriate openings formed in the confronting outturned flanges 24a, 25a on the chain end brackets. The bolts to the ring are each received in elongate openings 24b, 25b formed in the respective brackets. The elongate openings permit some adjustment of the position of the brackets on the ring and thus assure that the chain can be drawn fully taut even though there may be some variations in individual chain lengths.
It will be noted that on each bracket 24, 25, the chain end retainer 26 is located on the upper edge. This permits the chain to be supported at or near the upper edge of the ring without interference between the bolt assemblies 29 and the support collar 19.

The chain 23 serves as part of a drive mechanism for revolving the chute 17 so that the direction of discharge of snow from the unit can be selectively controlled from a position remote from the snow blower, as from the seat of the tractor unit.

The chain 23 cooperates with a toothed sprocket 30 which is affixed to a vertical shaft 31 extending downward and supported rotatably by a spindle 32. The spindle 32 is firmly secured to a mounting assembly 33 which is anchored to the top of the thrower housing. The shaft 31 carries a second and smaller sprocket 34 which cooperates with a linear chain length 35. The length of chain 35, which is roller chain like chain 23, is supported on a bar 36. The bar 36 carries chain end retainers 37 which are U-shaped in cross section and which are adapted to receive chain links at the ends of the chain so that they can be pinned to the retainers by a locking pin such as cotter pin 38.

The bar is guided for longitudinal reciprocating movement in a U-shaped guide 39 which forms a part of the mounting assembly 33. The bar is connected to one end of a piston shaft 40 which is connected to the piston of a double acting hydraulic cylinder 41. The cylinder 41 is supported by connecting its rearmost end to an upright pin 42 secured at its base to the top of the snow thrower housing. Apertureed lugs 43 are pivotally slipped over pin 42, and a spring locking member 44 engages in a grooved portion of the upper end of the pin 42 to maintain the parts connected.

The hydraulic cylinder is supplied with hydraulic fluid through lines 45, 46 which in turn are connected with the conventional four-way valve (not shown) which is associated with the hydraulic system for the tractor (also not shown). Such systems are conventionally included in many tractors and the details thereof form no part of the present invention, so no further description is believed needed.

In operation, by actuating the hydraulic cylinder to drive the bar 36 in one or another direction, the shaft 31 will be rotated due to the cooperation between chain 35 and sprocket 34. The rotation of shaft 31 effects rotation of the sprocket 30, thereby causing the chain 23 to be advanced relative to the sprocket and swiveling the chute 17. The chute can be swiveled selectively to any desired direction within the limits of its movement simply by controlling the direction of flow of hydraulic fluid through lines 45 and 46.

The pivotal mounting of the hydraulic cylinder allows for any play between shaft 36 and sprocket 34 and insures of safe operation without binding.

Referring to FIG. 2, the relative lengths and positioning of the bar 36 with respect to its associated chain 35 and the chain 23 on the chute is such that when the bar is approximately at the midpoint of its travel, the chute and chain are also at approximately the midpoint of their travel. In this position, the chute faces straight to the rear. As the piston and the bar are impelled to the left, the chute will swing in a clockwise direction and will be moved to an end position which is approximately 30° to the right of the vertical as viewed in FIG. 2. The extreme left travel of the chute is counter-clockwise to approximately 30° to the right of the vertical. The total encompass arc of sweep of the chute is approximately 240° thus providing a very wide range of choice of direction for throwing the snow.

The sprockets 34 and 30 and associated engagement points with the chains are guarded from the exterior by a U-shaped guard shield 48 which is mounted to the support assembly 33. The chute is cut away as of 17a and 17b to provide for clearance between the chute and guard shield during swiveling of the chute.

From the foregoing, it will be seen that this invention is one well adapted to attain all the ends and objects hereinafore set forth, together with other advantages which are obvious and inherent to the invention.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

Since many possible embodiments may be made of the invention without departing from the scope thereof, it will be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

1. In a tractor mounted snow thrower including a snow impeller and a housing provided with a discharge throat above the impeller, the combination of
   a discharge chute above and communicating with said throat, said chute mounted for rotation about the axis of said throat,
   a reciprocal drive assembly carried by said housing and having a reciprocal drive member with an extended position and a retracted position, and cooperating means interconnecting said drive member and chute whereby to rotate said chute in one direction upon movement of said drive member in a first direction toward said extended position and in the opposite direction on movement of said drive member and a second direction toward said retracted position,
   said cooperating means including
   a. a ring member attached to said chute,
   b. a chain extending along the periphery of said ring member, and
   c. a sprocket member engaged with the chain and driven in response to reciprocation of said drive member,
   d. said chain supported means adjustable with respect to said ring whereby to provide for adjustment of the tautness in the chain, and
   means for selectively moving said drive member between said first and second positions.
2. The combination as in claim 1, wherein said chain is anchored to the ring only at the opposite ends of the chain with the chain stretched taut around the ring.