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SNOW BLOWER CHUTE

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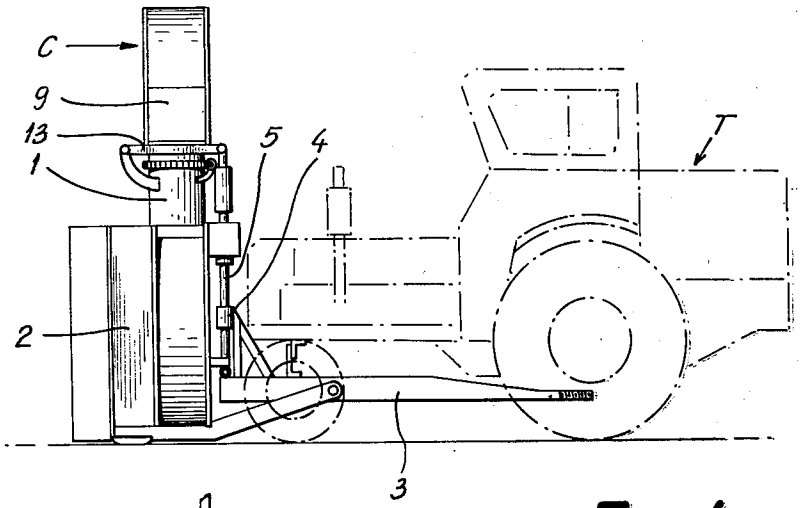

Fig. 1

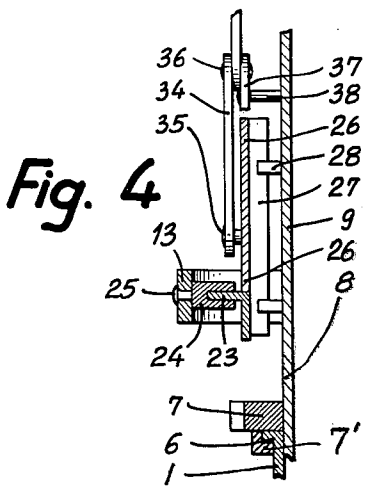

Fig. 4

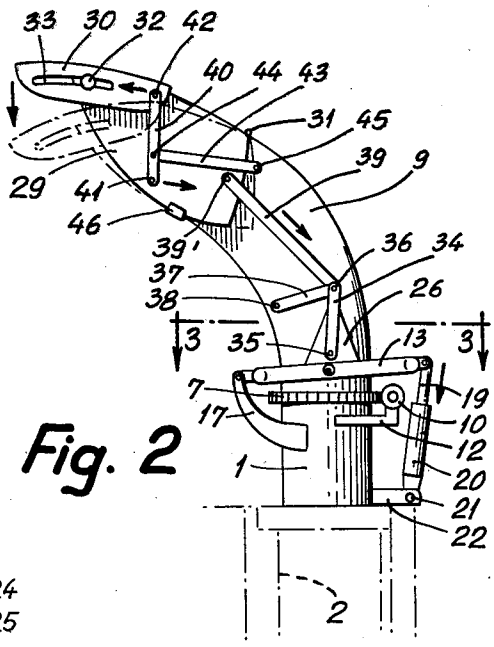

Fig. 2

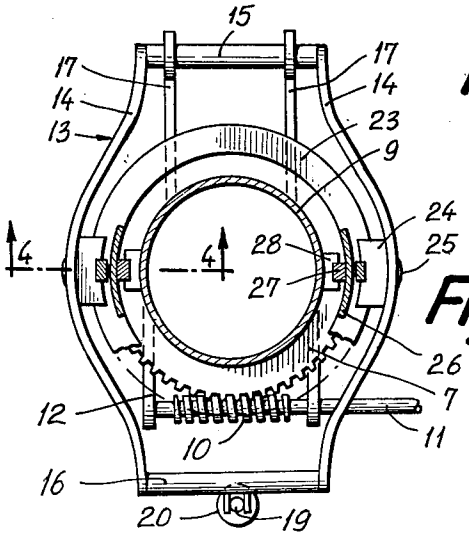

Fig. 3

INVENTOR
Adrien VOHL

By Pierre Lespérance

PATENT AGENT

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SNOW BLOWER CHUTE

Adrien Vohl, 2 St. Gilbert, St.-Marc-des-Carrieres, Quebec, Canada

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The present invention relates to snow blowers and more particularly to an improved chute for snow blowers for ejecting the snow in any desired direction.

It is known to provide snow blower chutes consisting of a main conduit mounted for rotation about a vertical axis on the snow receiving casing of the snow blower, said main conduit being provided at its outer end with telescopically engaging sections pivotally interconnected for varying the vertical angle of ejection of the snow whereas rotation of the chute assembly provides for ejecting the snow in any desired horizontal direction. In known chute systems for snow blowers, the telescopic sections are actuated by one or more hydraulic cylinder and piston units which are mounted on the main conduit for exerting a force between said conduit and the sections whereby the hydraulic cylinder and piston units turn around said vertical axis with the main conduit. However, due to the fact that the hydraulic cylinder and piston units have to be fed with hydraulic fluid under pressure from a system mounted generally either on the casing or on the truck of the snow blower, it is clear that the flexible tubes for feeding fluid to the cylinder units prevent in practice the rotation of the chute about its vertical axis for more than one complete rotation because the tubes will wind around the chute. It is therefore necessary to operate the chute in such a way as to allow for the limitations imposed by the hydraulic fluid tubes attached to the cylinder unit actuating the telescopic sections, which considerably decreases the efficiency and rapidity of operation of the snow blower, especially when loading trucks with the chute.

The main object of the present invention resides therefore in the provision of a snow blower chute which obviates the above noted disadvantage.

A more specific object of the present invention resides in the provision of power means for actuating the telescopic sections of the chute which are mounted in a non-rotary manner on the snow receiving casing and which are associated with a mechanism which transmits the action of these power means to the telescopic sections independently of the horizontal direction of the chute assembly whereby said power and transmission means allow rotation of the chute any number of turns in one direction or the other.

Another important object of the present invention resides in the provision of an actuating system for the chute telescopic sections which is of simple and inexpensive construction and of trouble-free operation despite the icing and low temperature conditions under which snow blowers normally operate.

The foregoing and other important objects of the present invention will become more apparent during the following disclosure and by referring to the drawings, in which:

FIGURE 1 is a side elevation of a snow blower provided with the chute in accordance with the invention, the snow blower being mounted at the front end of a prime mover such as a tractor indicated in dot and dash line;

FIGURE 2 is a side elevation of the chute;

FIGURE 3 is a plan section taken along line 3—3 of FIGURE 2; and

FIGURE 4 is a partial section taken along line 4—4 of FIGURE 3.

Referring now more particularly to the drawings in which like reference characters indicate like elements throughout, the chute in accordance with the invention is generally indicated at C and is mounted for rotation about a vertical axis on the top end of a vertical pipe 1 which is secured to and is in communication with the interior of a snow receiving casing 2 provided with the usual means for collecting the snow and fan for ejecting the snow under centrifugal force through pipe 1 and the chute C. Casing 2 is normally mounted at the front end of a prime mover, such as tractor T, by means comprising a framework 3 secured to and extending underneath the tractor T, and on which are secured sleeves 4 which surround and slide along vertical rods 5 secured to the back of casing 2 so arranged that the casing can be raised or lowered with respect to the tractor. The means for mounting the casing on the tractor do not form part of the present invention.

In accordance with the present invention, the upper end of pipe 1 is provided with a flange 6 (see FIGURE 4) on which rests and can slide a crown gear 7 secured to the periphery of the lower part 8 of a main conduit 9 which forms part of the chute C itself. The lower part 8 of the conduit 9 telescopically engages pipe 1 and can turn about a vertical axis with respect to pipe 1. A worm screw 10 which meshes with crown gear 7 serves to rotate conduit 9. The worm screw 10 is mounted at the end of a shaft 11 which turns in journals formed at the upper end of brackets 12 secured to pipe 1. Shaft 11 is rotated by any desired motor means and preferably by a hydraulic motor (not shown). A collar 7' is removably secured to the crown gear 7 and overlaps the flange 6 to retain conduit 9 in position on top of pipe 1.

A yoke member 13 freely surrounds the lower part 8 of main conduit 9 and consists of two curved arms 14 diametrically opposed and interconnected by transverse end rods 15 and 16. Rod 15 is rotatably mounted in the upper end of a pair of brackets 17 secured to pipe 1. The middle of rod 16 is pivotally connected to the upper end of the piston rod 19 of a hydraulic cylinder 20, the lower end of which is pivoted at 21 to a bracket 22 which is secured to the lower end of pipe 1. Hydraulic cylinder 20 is double acting and is fed with hydraulic fluid under pressure by means of flexible pipes (not shown) which are connected to a control valve mounted within the driver's compartment of tractor T and also connected to a pump for supplying hydraulic fluid under pressure (the pump and valve are not shown in the drawings). Movement of cylinder 20 causes pivotal movement of yoke 13 in a vertical plane about the pivot rod 15.

A ring 23 of L-shaped cross-section is co-axial with and freely surrounds the main conduit 9 at the level of yoke 13 and within the latter. This ring 23 engages and can slide within grooves of guiding blocks 24 which are diametrically opposed with respect to pipe 1 and which are rotatably mounted on the yoke 13 by means of stud bolts 25 secured to said yoke 13.

Two triangular plates 26 are secured to ring 23 opposite guiding blocks 24 and extend upwardly in spaced parallel relationship with main conduit 9. Each plate 26 is provided with a vertical rail 27 adapted to slide within the grooves of guide blocks 28 secured to main conduit 9 in vertically spaced position. Thus, plates 26 can move vertically with respect to main conduit 9 and serve to maintain ring 23 in a substantially horizontal plane. Pivotal movement of guide blocks 24 with respect to yoke 13 and sliding rotational movement of ring 23 within blocks 24 allows inclination of yoke 23 under action of hydraulic cylinder 20 while maintaining ring 23 in a horizontal plane and allowing rotation and vertical displacement of said ring 23 with respect to main conduit 9.

The vertical movement of ring 23 with respect to main

conduit 9 serves to actuate the telescopic sections 29 and 30 mounted at the upper end of main conduit 9 independently of the horizontal angle made between the chute assembly and the casing 2.

Telescopic section 29 has a U-shaped cross-section and surrounds in overlapping relationship the side walls and the top of the upper inclined part of main conduit 9. Telescopic section 29 is pivoted to main conduit 9 by means of a top horizontal hinge 31 for movement in a vertical plane. Telescopic section 30 is also of U-shaped cross-section and overlaps and can slide longitudinally with respect to the outer portion of telescopic section 29. Laterally extending stud bolts 32 are secured to the side walls of section 29 and slidably engage elongated slots 33 made in the side walls of section 30 in order to guide the relative movement of said latter section 30 with respect to section 29.

The vertical movement of ring 23 is transmitted to sections 29 and 30 in the following maner, the transmission mechanism being identical on each side of the chute: said mechanism consists for each side of the chute of a lever 34 pivoted at 35 to the triangular plate 26 and at 36 to the outer end of a lever 37 pivoted at its other end directly to the main conduit 9 at 38. A link 39 is connected at 36 at one end and at 39' at the other end directly to the lateral wall of the telescopic section 29 below the hinge 31. A lever 40 is pivoted at 41 to the side of section 29 and at its upper end 42 to the side of section 30 near the rear end of the latter. Finally, a lever 43 is pivoted at 44 to lever 40 intermediate its ends and at 45 directly to the main conduit 9 near the hinge 31.

A guiding block 46 is secured to the lower edge of the lateral wall of main conduit 9 and is provided with a groove in which slides the lower edge of the lateral wall of telescopic section 29.

The chute in accordance with the present invention operates in the following maner: To throw snow in any horizontal direction the worm 10 is actuated which rotates the main conduit 9 through crown gear 7, about the vertical axis of pipe 1; during this rotation, yoke 13 and hydraulic cylinder 20 remain stationary but ring 23 turns with main conduit 9 by sliding within blocks 24. Because hydraulic cylinder 20 does not rotate with conduit 9, its flexible tubes for feeding hydraulic fluid do not wind themselves around the chute. In order to vary the vertical angle of snow ejection, the hydraulic cylinder 20 is actuated in one direction or the other for raising or lowering yoke 13 which pivots about its pivot rod 15. When the yoke 13 is raised, sections 29 and 30 are in a completely opened or extended position, as shown in full lines in FIGURE 2, and the snow is thrown at a maximum vertical inclination.

By lowering yoke 13 by cylinder 20, the link bar 39 is moved downwardly and pivots section 29 about its hinge 31 whereby the latter takes the retracted position shown in dotted lines in FIGURE 2. The lower end of lever 40 is also moved rearwardly which causes rotation of lever 40 in an anticlockwise direction due to the retraction of lever 43 which is directly pivoted to main conduit 9 and constitutes a rest point. Therefore, section 30 is moved outwardly with respect to section 29 to take the inclined extended position shown in dot and dash lines in FIGURE 2. All these elements make a movement in opposite direction when the yoke 13 is raised.

It should be noted that hydraulic cylinder 20 can be retracted or extended for lowering or raising yoke 13 independently of the angular horizontal position of the chute assembly.

In accordance with the invention, the chute assembly can be rotated about its vertical axis any number of turns and in either one of the two directions of rotation because the hydraulic cylinder 20 is stationarily mounted with respect to the snow blower casing.

While a preferred embodiment in accordance with the present invention has been illustrated and described, it is understood that various modifications may be resorted to without departing from the spirit and scope of the appended claims.

What I claim is:

1. Chute for a snow blower having a snow receiving casing with a snow discharge opening formed by a vertical pipe secured to said casing, a conduit rotatably mounted on said pipe, and in communication therewith for rotation about a vertical axis with respect to said pipe, telescopic chute sections mounted on the outer end of said conduit for movement with respect to the latter in a vertical plane between a retracted position and an extended position, means for rotating said conduit and said sections with respect to said pipe about said vertical axis, means for displacing said sections between said retracted and extended positions, said last named means comprising a yoke member freely surrounding said conduit and pivotally connected to said pipe for pivoting movement of said yoke in a vertical plane, power means mounted in a non-rotatable position with respect to said pipe for raising and lowering said yoke, a ring freely surrounding said conduit and supported by said yoke for rotation about a vertical axis with respect to said yoke but for raising and lowering movement along with said yoke, means connecting said ring to said conduit for preventing relative rotation between said ring and said conduit but for allowing vertical movement of said ring with respect to said conduit, and means connecting said telescopic sections to said ring to move said sections between their extended and their retracted position by the vertical movement of said ring with respect to said conduit.

2. A chute for snow blower as claimed in claim 1, wherein said power means for raising and lowering said yoke comprise a hydraulic cylinder and piston unit, one end of which is pivotally conected to the end of said yoke opposed to the pivotal connection of said yoke to said pipe, and the other end of said cylinder being pivoted to a bracket secured to said pipe.

3. A chute for snow blower as claimed in claim 1, wherein said ring is disposed within said yoke and at the level of the latter, and said means interconnecting said ring to said yoke consisting of guiding blocks pivotally mounted on said yoke for rotation about a horizontal axis, and slidably supporting said ring.

4. A chute for a snow blower as claimed in claim 1, wherein said means interconnecting said ring to said conduit consist of vertical rails secured to said ring, guide blocks secured to said conduit and slidably receiving said guide rails.

5. A chute for a snow blower as claimed in claim 1, wherein said telescopic sections comprise a first section hinged about a horizontal axis to the top of the upper part of said conduit and a second section mounted and slidably guided on said first section for a movement between a retracted and an extended position with respect to said first section, and said means interconnecting said sections to said ring comprising a system of levers and links on each side of said main conduit.

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