Aug. 27, 1968 S. D. POOL ET AL 3,398,470

SNOW REMOVAL DEVICE

Filed June 22, 1965 3 Sheets-Sheet 1

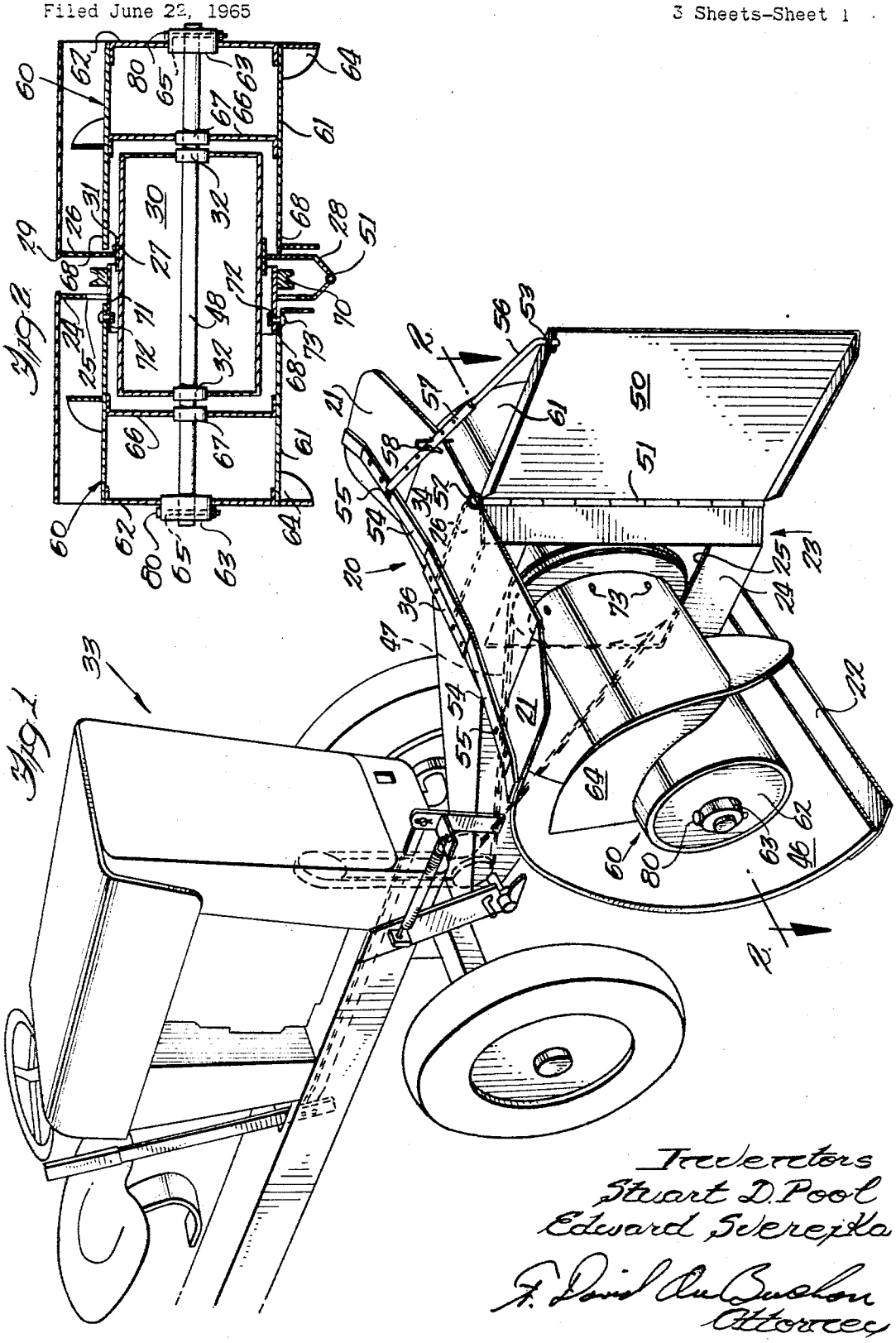


Fig. 1

Fig. 2

Inventors
Stuart D. Pool
Edward Sekerka
F. David DeBuchon
Attorney

Aug. 27, 1968 S. D. POOL ET AL 3,398,470

SNOW REMOVAL DEVICE

Filed June 22, 1965 3 Sheets-Sheet 2

Fig. 3

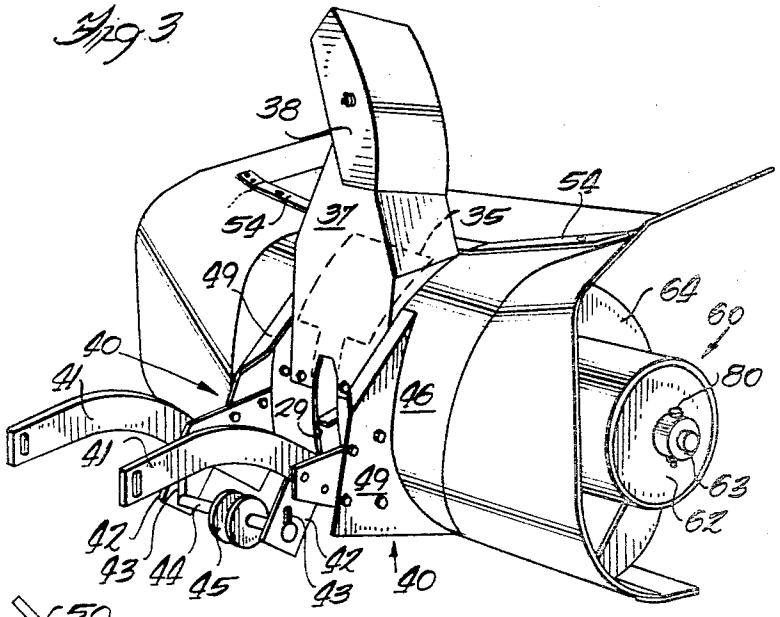


Fig. 4

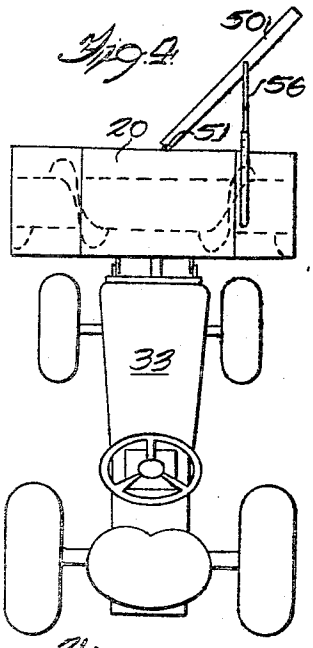


Fig. 5

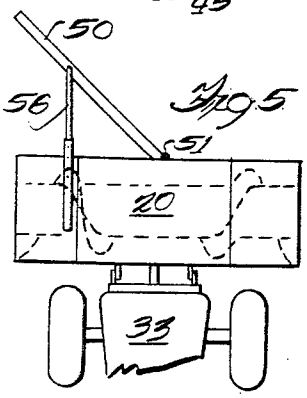


Fig. 6

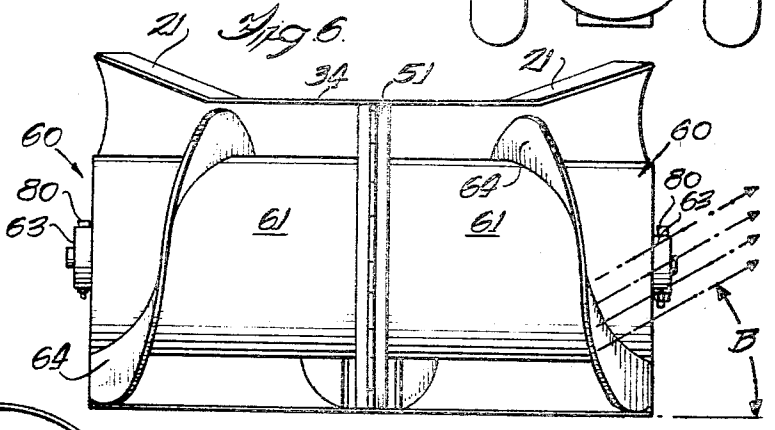
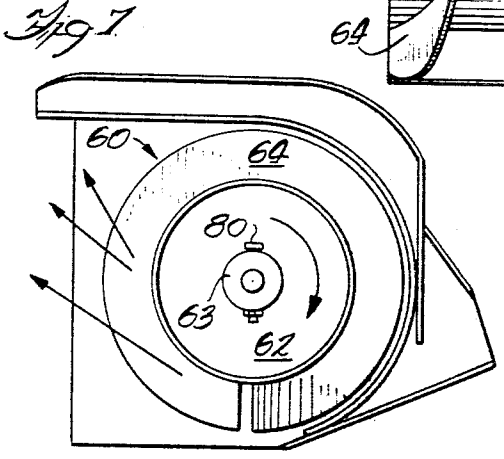


Fig. 7



Inventors
Stuart D. Pool
Edward Sereika
By David McQueen
Attorney

Aug. 27, 1968 S. D. POOL ET AL 3,398,470

SNOW REMOVAL DEVICE

Filed June 22, 1965 3 Sheets-Sheet 3

Fig. 8

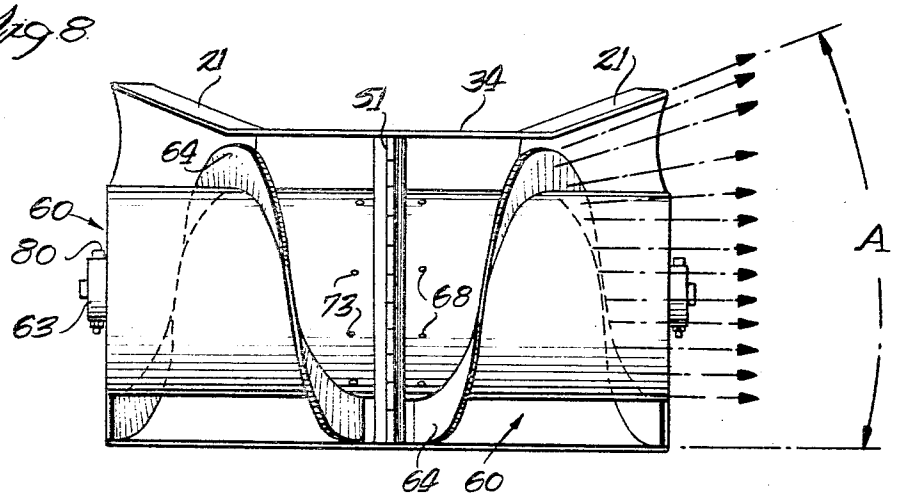


Fig. 9

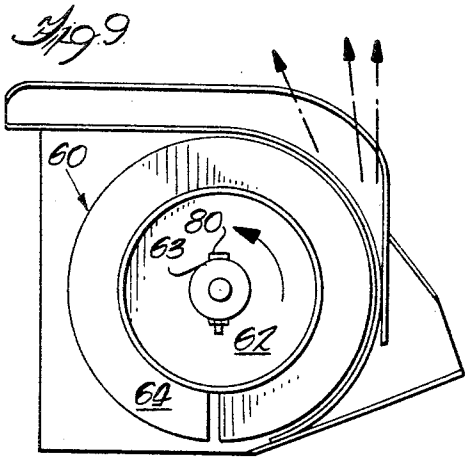
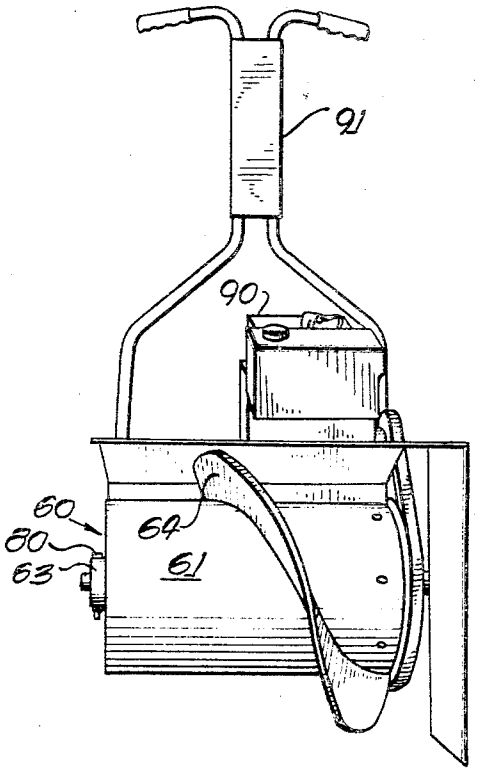


Fig. 10



Inventors
Stuart D. Pool
Edward Sverepka
F. David LaBuchon
Attorney

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SNOW REMOVAL DEVICE

Stuart D. Pool, Naperville, and Edward Svereika, Chicago, Ill., assignors to International Harvester Company, Chicago, Ill., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

A snow removal machine that can be set up to remove snow by different methods as dictated by the prevailing conditions. The machine includes a pair of augers that can be mounted such that the flighting is either right or left-hand feed and the augers can be rotated in either direction.

The present invention relates generally to improvements in snow removal devices and the like and more particularly to a new and improved machine that can function either as a snow blower or as a snow tedder.

Snow removal machines operate to remove snow by various methods. The most common snow removal machine is the snow plow which includes a blade arranged at an angle to the path of the machine and functions by deflecting the snow from the path into a row parallel to the path. Another type snow removal machine is called the snow blower which moves along a path feeding the snow centrally of a machine by rotating augers. The centrally fed snow is then thrown or blown upwardly through a chute where it is discharged as a stream of snow to one side or the other. Machines of this type are limited by the amount of snow that can be fed through the chute, and must proceed along its path slowly because excess snow is fed over the auger and back into the path of the machine. The stream of snow thrown by this type of machine is influenced by the direction and velocity of the wind which under some conditions can render this type of machine undesirable.

Another type of snow removal machine moves along a path and includes a rotating auger that functions to move the snow in its path transversely towards one end of the auger. The snow leaves the end of the auger at a rather low trajectory and thus tends to pile up the snow along a row paralleling the cleared path. If the path cleared by a single swath of the snow removal machine is sufficient, this of course is not a disadvantage. However, if the area to be cleared requires several passes of the snow removal machine, the increasing depth of the snow eventually will render the machine inoperative for its purpose. However, this type of machine requires considerably less power and will move more snow than a comparable snow blower of the type previously discussed.

The type of snow and the ambient weather conditions obviously determine how well a particular snow removal machine will operate in a given condition. And it is obvious that under some conditions one type of machine will perform better than others. The general purpose of this invention is to provide a snow removal device which embraces all the advantages of other machines and has the added advantage that it can be arranged to remove snow by different methods as dictated by the prevailing conditions. To attain this, the present invention contemplates a unique snow removal machine having a pair of auger portions that can be driven in either direction and can be reversed in position, one with respect to the other. In addition an adjustable deflector that functions as a snow plow, is provided so that the snow can be fed to either one auger portion or the other.

An object of the present invention is the provision of

the snow removal machine that can remove snow from its path by any of several methods.

Another object is to provide a snow removal machine made up of basic subassemblies that can be assembled to form machines that operate to remove snow by different methods.

Still another object is the provision of a snow tedder that can function to divide the snow encountered in its path and deposit it equally on both sides of the snow tedder.

Still another object is to provide a snow tedder that can direct all snow encountered to one side of the snow tedder.

These and other objects of the invention will become more apparent from the specification and drawings wherein:

FIGURE 1 shows a side elevation of the apparatus shown mounted upon a tractor.

FIGURE 2 is a cross sectional view of the apparatus taken along lines 2, 2 of FIGURE 1.

FIGURE 3 is a rear elevation view of the apparatus having a chute mounted thereon.

FIGURE 4 is a diagrammatic plan view of the apparatus mounted on the tractor having the deflector adjusted in one position.

FIGURE 5 is a diagrammatic plan view showing the apparatus mounted on a tractor having the deflector mounted in another position.

FIGURE 6 is a front view of the apparatus functioning as a tedder wherein the auger rotation is reverse.

FIGURE 7 is a side view of FIGURE 6.

FIGURE 8 is a front view of the apparatus operating as a tedder with the auger rotating in a forward direction.

FIGURE 9 is a side view of FIGURE 8.

FIGURE 10 is another embodiment of the apparatus using only one of the auger portions.

Referring now to the drawings wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIGURE 1 a tractor designated 33 having applicants' snow removal device mounted thereon. The snow removal device includes a casing 20 having a top wall 34 and a back wall 46. The end portions of the top wall 34 are flared up as designated at 21. A cutter shoe 22 is secured to the casing along the lower edge of the back wall 46. An opening 29 is formed in the central portion of the back wall 46 through which the drive belt 47 passes. Openings, one on each side of opening 29 extend into a portion of the top wall 34. These openings 35, are either covered by a cover plate 36 as seen in FIGURE 1 or by a chute 37 as seen in FIGURE 3.

A central bulkhead 23 is secured to the casing extending in a general vertical plane and connected to the casings top wall 34 and back wall 46. The central bulkhead 23 includes a first wall 24 having an opening 25 formed therein and a second wall 26 having an opening 27 formed therein. The first and second walls 24 and 26 respectively, are connected by a bite portion 28. A hinge 51 extends along the forward vertical edge of the bite portion 28 for a purpose that shall be discussed. The opening 27 formed in the second wall 26 has a reinforcing ring 31 secured as by welding around its peripheral edge. An arbor 30 is secured to the reinforcing ring 31 as illustrated in FIGURE 2. The arbor 30 carries a pair of bearings 32 that function to journal the shaft 48. The opening 25 formed in the first wall 24 is larger than the opening 27 and provides a clearance between the opening 25 and the pulley 70.

Reference is made to FIGURE 3 for a description of the means for mounting the snow removal device upon a tractor or the like. The tractor mounts 40 each include a mounting plate 49 secured to the back wall 46 of the

casing and extending rearwardly therefrom. A pair of generally horizontal arms **41** extend rearwardly from said mounting plates and are connected to the tractor or the like at their free end. Tabs **42** extend from the mounting plates **49** and have elongated slots **43** formed therein. A shaft **44** is mounted in the slots **43** and can be secured in an adjusted position within the slot. A double pulley **45** is journalled on the shaft **44**.

A pair of auger portions **60** are mounted for rotation within the casing **20**. Each auger portion **60** includes a cylinder or core **61** that is closed at one end by an outer head **62**. A bushing **63** is secured to the outer head **62** for the purpose of mounting the auger portion on the shaft **48**. A helical flighting **64** is secured about the outer surface of the cylinder or core **61**. An inner head **66** is provided within the cylinder or core **61** between the outer head and the open end of the auger portion. A bushing **67** is mounted on the inner head in alignment with bushing **63**. A plurality of apertures **68** are formed in the cylinder or core **61** adjacent its open end. Since both of the auger portions are identical in construction, a description of one auger portion is considered sufficient.

As can be best seen in FIGURE 2, a drive pulley **70** is secured to a sleeve or collar **71**. The sleeve or collar **71** is of such a size that it telescopes within the cylinder or core **61** of an auger portion. Apertures **72** are formed in the sleeve or collar **71** and upon insertion of the sleeve or collar within the cylinder **61**, apertures **72** and **68** can be aligned. The sleeve or collar can then be secured to the cylinder **61** for example by nuts and bolts **73**. As can be readily understood since each auger portion **60** has apertures **68** formed therein, the drive pulley **70** can be secured to either auger portion. Radially extending apertures are **65** formed in the bushings **63** through which bolts **80** extend for the purpose of securing the auger portions **60** to the shaft **48**.

As can be best seen in FIGURE 1, a deflector 50 is secured to the casing **20** by a hinge **51** extending vertically along the bite portion **28** of the central bulkhead **23**. A hinge pin **52** having a ring secured to one end is removable to permit the deflector to be readily attached or detached from the casing. A strut **54** is secured to the upper wall of the casing **20** and has an aperture **55** formed in each end portion thereof. An aperture **53** is formed in the deflector **50** adjacent its free end. A telescoping link **56**, having alignable apertures **57** through which a locking pin **58** can be inserted, has offset end portions which extend through apertures **55** and **53** to thus support the deflector **50** in the desired position relative to the casing.

Referring now to FIGURE 1, the auger portions **60** are arranged such that upon rotation they tend to feed snow outwardly in both directions. FIGURES 8 and 9 are front and side views respectively, of the snow removal device as arranged in FIGURE 1. In FIGURES 8 and 9 the deflector **50** has been removed. As is best illustrated in FIGURES 8 and 9, the flightings **64** rotate downwardly into the snow and tend to carry the snow rearwardly and upwardly against the back wall **46** and top wall **34**. The flared ends **21** function to direct the snow outwardly and upwardly at a shallow angle. Thus when operating with the augers arranged as they are in FIGURES 1, 8 and 9, and with the deflector **50** removed, the snow removal device clears a path through the snow by dividing the snow equally and discharging it in a transverse direction at a shallow upward angle. If it is desirable to deposit the snow on only one side of the snow removal device or to deposit a majority of the snow on one side of the device, then the deflector **50** is hingedly secured to the casing by the hinge pin **52** and is positioned by the telescoping link **56** to direct as much snow as is desirable to the opposite side of the snow removal device. If it is desirable to deposit all the snow on the left side of the tractor the deflector **50** is arranged as shown in FIGURE 4. If it is desirable to direct all the snow to the right hand side of the tractor the deflector **50** is arranged as is shown in FIGURE 5. When utilizing the deflector **50**, it functions as a snow plow to direct all material that it encounters toward the auger portion **60** located on the opposite side of the snow removal device.

Referring now to FIGURES 6 and 7 an alternate method of removing snow utilizing the same elements as in FIGURES 1, 8 and 9 will be discussed: As can be best seen by comparing FIGURES 6 and 7 with FIGURES 8 and 9, it is seen that the auger portions have been reversed such that the flighting now tends to feed in the opposite direction. However the direction of rotating the augers has also been reversed and thus by reversing both the direction of rotation and the auger portions, material will still be fed outwardly from both ends of the casing. The auger portions are interchanged on the casing by removing nuts and bolts **80** thus permitting each auger portion to be removed from the shaft **48**. The drive pulley **70** is then removed from the one auger portion by unfastening the nuts and bolts **73** and securing the drive pulley **70** to the other auger portion **60** by the same nuts and bolts. The auger portions **60** are then reassembled on the shaft **48** and secured in place by the bolts **80**. The direction of rotation of the augers is reversed by merely twisting the belt **47** to the left as seen in FIGURE 1 rather than to the right. In other words as seen in FIGURE 1, that portion of the belt **47** now directed to the top of pulley **70** is directed to the bottom of pulley **70** and that portion of belt **47** as seen in FIGURE 1 directed to the bottom of pulley **70** is directed to the top of said pulley. As is illustrated in FIGURE 6, the material thrown from the ends of the auger portions, is thrown at a relatively steep angle indicated as B as compared to the relatively shallow angle A as seen in FIGURE 8. The reverse auger rotation arrangement has been found to be superior when working in deep or very wet heavy snow. The benefit of the guidance by the flared ends **21** is forfeited in this arrangement. However, with the snow being thrown off the front portion of the auger **60**, snow can be removed that would tend to clog or stall the arrangement as shown in FIGURES 8 and 9.

If the conditions dictate the use of the snow blower, the cover plate **36** can be removed and the chute **37** installed. To operate as a snow blower, the auger portions **60** must be interchanged from their arrangement as shown in FIGURE 1. With the augers so arranged and their direction of rotation unchanged, the augers tend to convey snow rearwardly and towards the center of the device. When the material reaches the center of the casing **20**, it follows the contour of the casing upwardly and is discharged through the aperture **35** and is deflected either to the right or to the left by the deflector **38**.

Referring now to FIGURE 10, a walk-behind snow removal device of the tedder type is disclosed. In this device, only one of the auger portions **60** is utilized and is arranged to feed material outwardly and deposit it along one side of the cleared path. A snow removal machine of the type such as this includes an engine **90** and handles **91** through which the operator controls the machine.

Thus it is seen that a snow removal machine has been provided, made up of elements that can readily be arranged to remove snow in the most expedient manner. Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a snow removal device:

an elongated casing having open ends and an open forward side, an opening formed in the central portion of said casing,

a bulkhead secured to the central portion of said casing and extending transverse thereto,

an arbor carried by said bulkhead, said arbor including a bearing,

a pair of auger portions, each including a generally cylindrical core and a head including a bushing mounted within said cylindrical core adjacent one end thereof, a shaft adapted to be journaled in said bearing and to extend through said bushings, means for releasably securing said heads to said shaft, and means extending through said opening formed in the central portion of said casing for driving said pair of auger portions.

2. The invention as set forth in claim 1 wherein said bulkhead includes a first and second spaced wall,

said arbor secured to said first wall such that it extends outwardly therefrom in both directions,

an opening formed in said second wall permitting said arbor to pass freely therethrough.

3. The invention as set forth in claim 2 weherin there is provided a pulley including a collar adapted to be releasably connected to a said cylindrical core and to extend through the opening formed in said second wall.

4. The invention as set forth in claim 1 wherein said elongated casing has a top wall and the free ends of said top wall include upwardly flared portions.

5. In a snow removal device:

an elongated casing having open ends and an open forward side,

an opening formed in the central portion of said casing,

a bulkhead secured to the central portion of said casing and extending tranversely thereto,

an arbor carried by said bulkhead,

a pair of auger portions having oppositely directed spiral flightings,

said arbor including means for interchangeably journaling said auger portions such that upon rotation of said auger portions in one direction they either both feed material inwardly toward said bulkhead or outwardly away from said bulkhead, and means extending through said opening formed in the central portion of said casing for driving said pair of auger portions.

6. The invention as set forth in claim 3 wherein tractor mounts extend rearwardly from said elongated casing and include a double pulley mounted for rotation about a horizontal axis in general alignment with said pulley conected to said cylindrical core.

7. In a snow removal device:

an elongated casing having open ends and on open forward side,

an opening formed in the central portion of said casing,

a bulkhead secured to the central portion of said casing and extending transversely thereto,

an arbor carried by said bulkhead,

a pair of auger portions having oppositely directed spiral flightings,

said arbor including means for journaling said auger portions such that they rotate as a single unit,

a pulley secured to the inner end of one of said auger portions in alignment with said opening formed in the central portion of said casing,

tractor mounts secured to and extending rearwardly from said elongated casing and including a double pulley mounted for rotation about a horizontal axis in general alignment with said pulley secured to the inner end of one of said auger portions.

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ABRAHAM G. STONE, *Primary Examiner.*

A. E. KOPECKI, *Assistant Examiner.*