March 29, 1955

A. J. TORREY

ROTARY SAND SPREADER

2,705,149

Filed Nov. 25, 1952

4 Sheets-Sheet 1

Fig. 1.

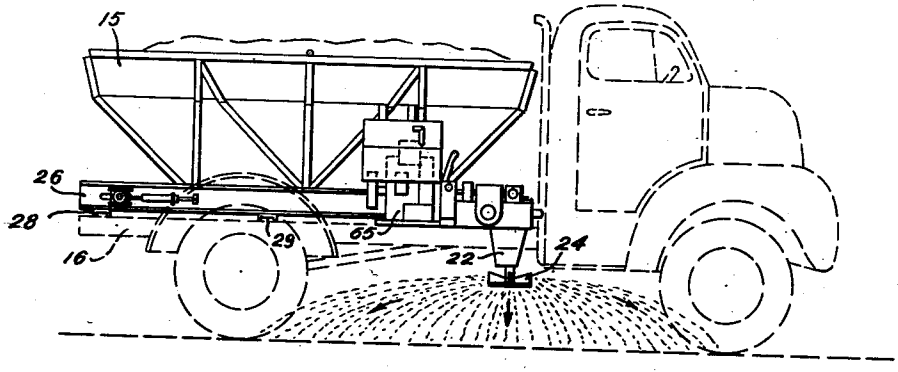



Fig. 2.

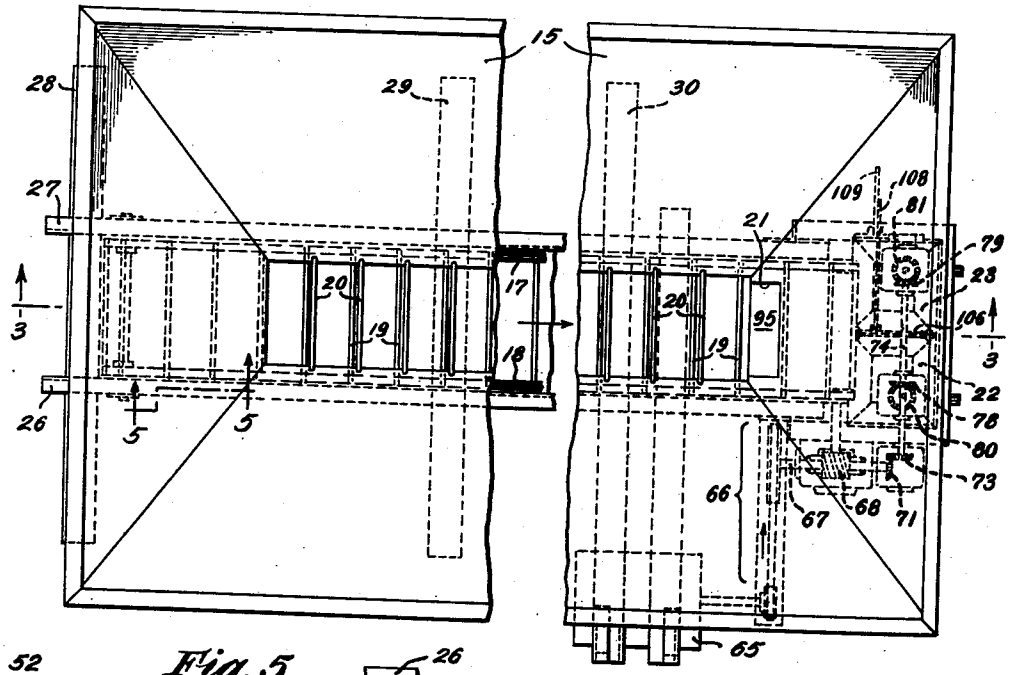
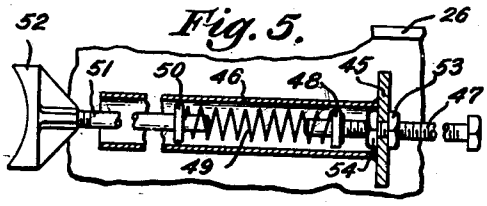



Fig. 5.




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Fig. 3a.

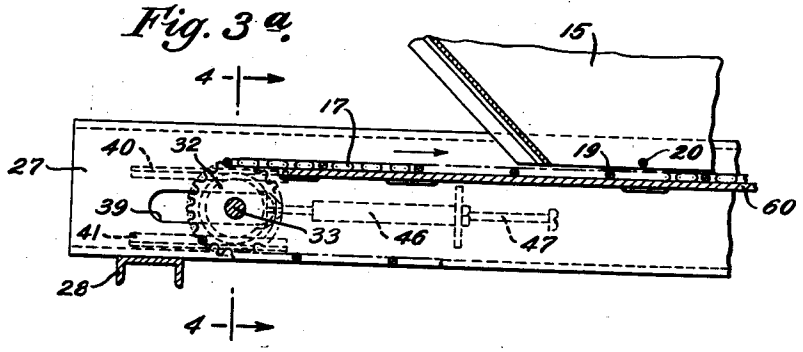



Fig. 3b.

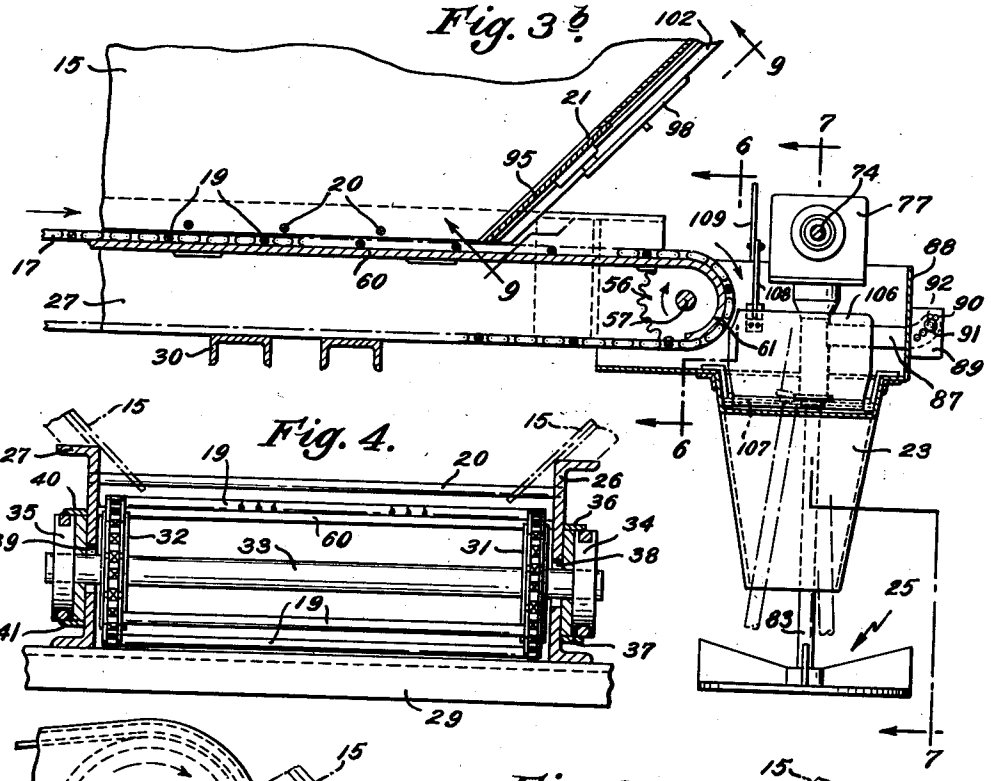
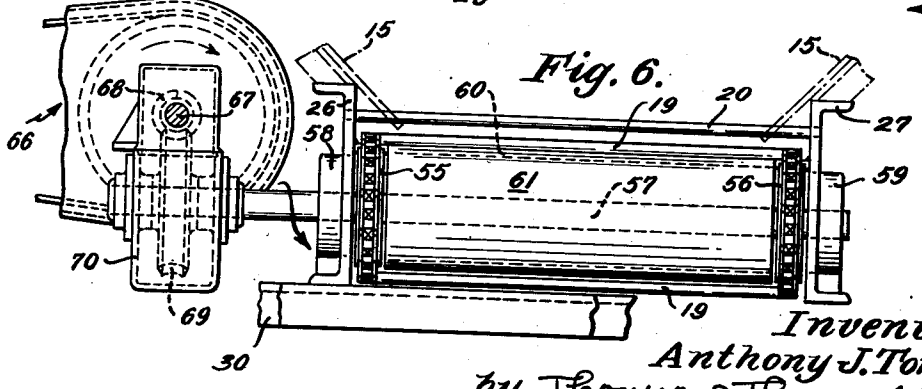



Fig. 4.




Fig. 6.




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Fig. 7.

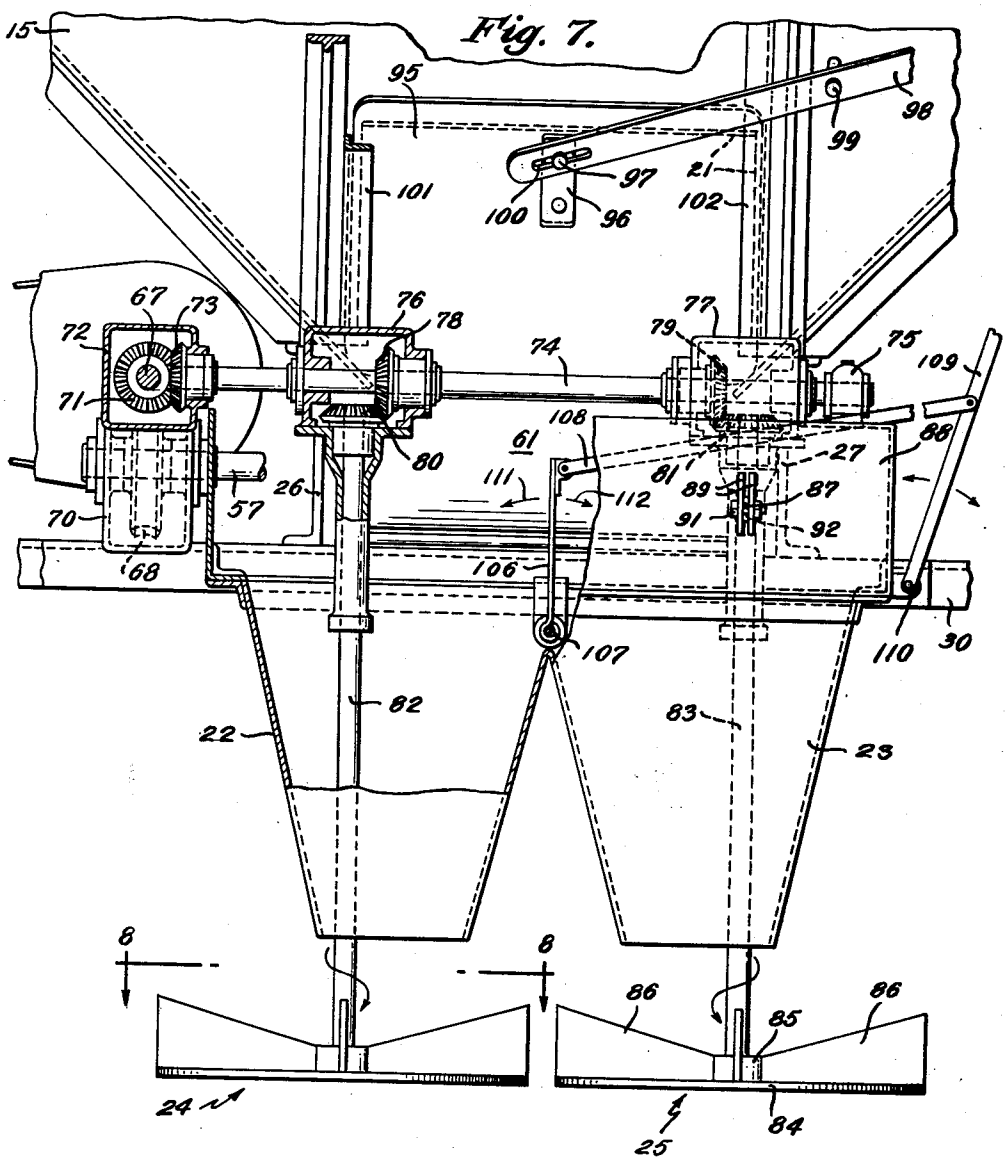
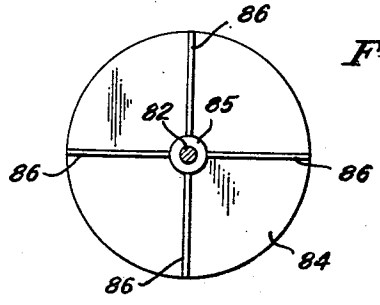



Fig. 8.




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Filed Nov. 25, 1952

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Fig. 9.

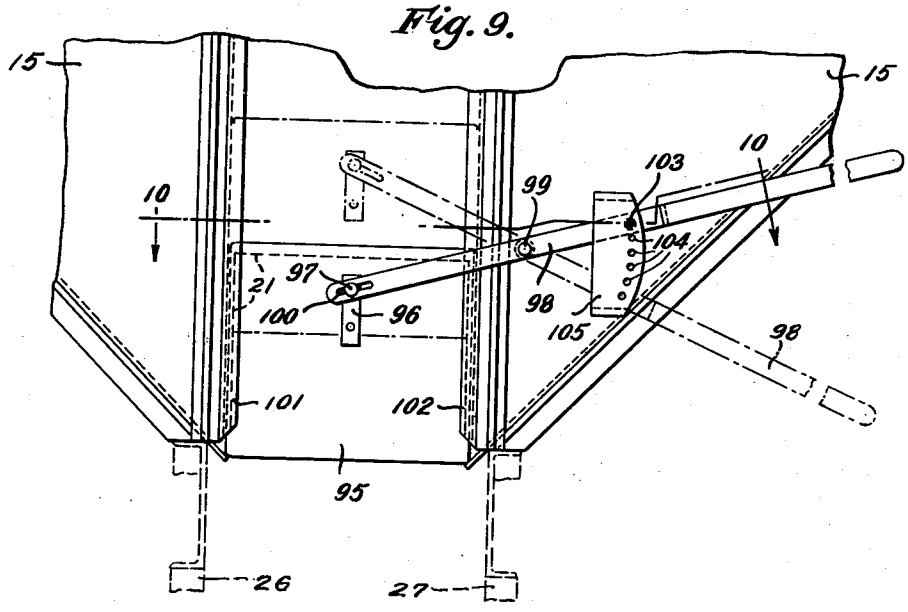
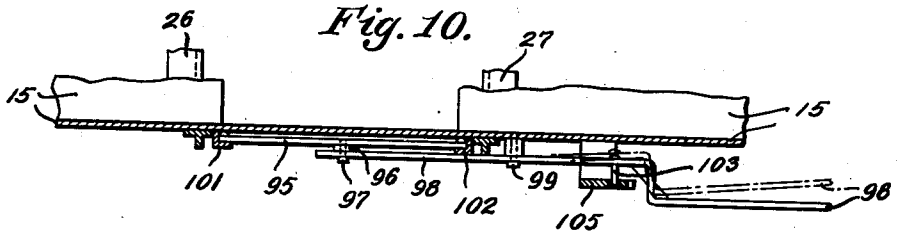



Fig. 10.




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United States Patent Office 2,705,149
Patented Mar. 29, 1955



2,705,149

# ROTARY SAND SPREADER

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Application November 25, 1952, Serial No. 322,375

9 Claims. (Cl. 275—8)

This invention relates to vehicles for sanding roads and highways, and more particularly to a sand spreading device in which the volume and distribution of the sand deposited on the road may be varied to suit different surface and traffic conditions.

The object of the invention is to provide a road sanding device which is suitable for mounting on standard trucks or other vehicles, which eliminates much of the hand labor hitherto required for sanding, especially in congested areas, which insures free flow of the sand at freezing temperature, which has provision for controlling the rate of flow to suit various traffic and surface conditions, which, by means of a simple adjustment may be made to distribute the greater part of the sand forward or backward, or to the right or left of the vehicle, and which is adapted to spread sand under all four wheels of the vehicle so as to maintain adequate traction.

In the drawings illustrating the invention,

Fig. 1 is a side elevation of a sand spreader constructed according to the invention, part of the truck body on which the spreader is mounted being shown in dotted line,

Fig. 2 is a plan view, partly cut away, of the sand spreader,

Fig. 3*a* is a cross-section through the rear end of the spreader taken along line 3—3 of Fig. 2,

Fig. 3*b* is a cross-section through the front end of the spreader taken along line 3—3 of Fig. 2,

Fig. 4 is a cross-section taken along line 4—4 of Fig. 3*a*,

Fig. 5 is a detail of the conveyor chain mounting, shown in cross-section taken along line 5—5 of Fig. 2,

Fig. 6 is a cross-section taken along line 6—6 of Fig. 3*b*,

Fig. 7 is a cross-section taken along line 7—7 of Fig. 3*b*,

Fig. 8 is a detail of one of the impellers which distribute the sand,

Fig. 9 is a view of the mechanism which controls the volume of sand flow taken along line 9—9 of Fig. 3*b*, and

Fig. 10 is a cross-section taken along 10—10 of Fig. 9.

Referring to Figs. 1 and 2, the supply of sand is carried in a hopper body **15** of any suitable construction but preferably tapered inward at the bottom, mounted on a standard truck chassis **16**, or other suitable vehicle. A pair of conveyor chains **17** and **18**, connected together at intervals by cross-rods **19** run across the bottom of the hopper and are continuously driven, by a mechanism to be further described, in the direction of the arrow in Fig. 2. The conveyor carries the sand through an opening **21** at the forward end of the hopper body and dumps it into chutes **22** and **23**, whence it falls onto rotating impellers **24** and **25** and is sprayed out over a generally circular area by each impeller, as indicated by the arrows in Fig. 1. Stationary cross-rods **20** mounted at intervals across the hopper above the conveyor cooperate with rods **19** to break up lumps in the sand, such as might occur in severe weather when the moisture in the sand tends to freeze.

The hopper body is supported on two longitudinal channels **26** and **27** resting on inverted lateral channels **28**, **29**, and **30**. The conveyor chains run over front and rear sprockets of generally conventional design. The mounting of the rear sprockets is shown in Figs. 3*a* and 4. The sprockets **31** and **32** are mounted on a common shaft **33** which projects through slots **38** and **39** in channels **26** and **27** respectively and carries end rollers **34** and **35**.



The rollers have grooved rims which fit over pairs of horizontal angle shaped guides **36** and **37**, and **40** and **41** mounted on the outside of channels **26** and **27** respectively. The entire rear sprocket mounting is slidable horizontally for adjustment of the chain tension, and is held in position by a pair of resilient adjusting devices, one of which is shown in Fig. 5. A tubular sleeve **46** is mounted on channel **26** and has an attached end plate **45** in which is threaded a screw **47**. The screw carries a collar **48** which forms a seat for one end of spring **49**. The other end of spring **49** seats on a collar **50** carried by stud **51**. On the outer end of stud **51** is a shoe **52** which engages the grooved rim of roller **34**. Screw **47**, which may be locked by nuts **53** and **54**, provides for adjustment of the spring force against the roller. A similar adjusting device for roller **35** is mounted on channel **27**.

The mounting of the front sprockets is shown in Figs. 3*b* and 6. The sprockets **55** and **56** are mounted on a shaft **57** which is journalled on channels **26** and **27** and secured by collars **58** and **59**. It will be noted that the floor **60** of the hopper body extends forward between the sprockets and curves over to form an apron **61** which guides the sand into the chutes **22** and **23**.

The drive mechanism for the conveyor is best seen in Figs. 2 and 6. A small gasoline motor **65**, is mounted in any suitable manner on the side of the hopper body **15**, and is connected through a suitable clutch (not shown) to a conventional chain and sprocket drive **66** to a longitudinally disposed shaft **67**. Controls for engaging and disengaging the clutch so as to start and stop the sanding mechanism may be mounted in the cab of the truck. Mounted on shaft **67** is a worm **68** which engages a bull gear **69**. Both the worm and the bull gear are enclosed in a gear box **70**. The bull gear is attached to the drive shaft **57** of the conveyor.

Shaft **67** also transmits power to the drive mechanism for the impellers which is illustrated in Figs. 2 and 7. A miter gear **71** mounted on the end of shaft **67** and enclosed in a suitable gear box **72** engages a second miter gear **73** which is mounted on a transverse shaft **74**. The outer end of shaft **74** is journalled on a pillow block **75**. A pair of floating gear boxes **76** and **77** are rotatably mounted on shaft **74**, and house a pair of miter gears **78** and **79**, respectively, which are splined to the shaft. These gears engage miter gears **80** and **81** which are mounted on the impeller shafts **82** and **83** respectively. The impeller shafts extend through the bottoms of chutes **22** and **23** and have the impellers **24** and **25** mounted on their lower ends. As is apparent from the gear arrangement, rotation of shaft **74** results in driving the impellers simultaneously in opposite directions.

The construction of the impellers, for example, impeller **25**, is illustrated in Fig. 8. A circular disk **84** is attached by means of a collar **85** to the shaft **83**. Four evenly spaced vertical fins **86** extend from the collar to the outer edge of the disk. The fins increase in height toward the outer edge as shown in Fig. 7. Impeller **24** is similarly constructed.

The impeller shaft assemblies can be tilted about shaft **74** by means of adjusting mechanisms, as exemplified in Figs. 3*b* and 7. Attached to gear box **77**, is link **87** which projects through a suitable slot in the face plate **88** which encloses the upper forward part of the two chutes. A bracket **89** is mounted on the outside of the face plate and has a series of holes **90**, through which a locking bolt **91** may be inserted. Hole **92** in link **87** may be locked by the bolt in alignment with any one of the holes **90**, thus providing adjustment of shaft **83** to a position either side of the vertical as indicated by the dot and dash lines in Fig. 3*b*. A similar adjusting device is provided for shaft **82**. By adjusting the angle of the impeller shafts the distribution and area of spread of the sand may be varied to suit the road conditions. When the shafts are placed so that the centers of the impellers are in line with the centers of the chutes the sand is thrown out uniformly in all directions. When the shafts are tilted further back the major portion of the sand hits the front part of the impellers where the fins are

turning inward, and consequently the sand is spread thicker in the middle and over a narrower area. When the shafts are tilted forward, the major portion of the sand hits the rear of the impellers where the fins are turning outward and the spread is wider and thicker toward the outside.

The volume of sand delivered to the impellers is controlled by means of an adjustable gate which is illustrated in Figs. 7, 9, and 10. A pair of angular guides **101** and **102** are mounted on the forward wall of the hopper body **15** on either side of the opening **21**. A gate **95** is slidably mounted in the guides. A lever **98** is pivoted on a stud **99** attached to the hopper body alongside of the guide **102**. At the inner end of the lever is a slot **100** which engages a stud **97** protruding from a strap **96** attached to the gate. The outer end of the lever is offset to form a handle. Near the offset is a pin **103** which may be made to engage any one of a series of holes **104** in a plate **105** attached to the hopper body, and thus lock the gate **95** in one of several positions. It is apparent that the position of the gate determines the volume of sand delivered to the impellers by the conveyor. The volume control is employed for two purposes, first, to vary the thickness of the deposit, and, second, to allow for different speeds of operation of the truck. For example, in a congested area, it may be necessary to drive the truck very slowly. The rate of delivery of sand to the impellers may be cut down accordingly to avoid the waste resulting from an unnecessarily thick deposit. In rural areas, where the truck may be driven more rapidly, the rate of flow of sand must be more rapid to produce satisfactory coverage.

Centrally mounted between the two hoppers is a vane **106**, which is hinged on a rod **107**. As shown in Fig. 7, a link **108** is connected to the top of the vane and also to a lever **109** journalled on a pin **110** on frame member **30**. By means of the lever and link, vane **106** can be moved to the left or right, as indicated by the arrows **111** and **112**, so as to shut off part or all of the sand flow to one or the other of the chutes. The control of sidewise distribution thus provided is useful, for example, for sanding in heavy traffic where it is frequently necessary to stop spreading on one side or the other of the truck to avoid throwing sand on oncoming or parked cars. This feature makes the spreader usable in congested areas where, previously, much of the sanding had to be done by hand.

It will be noted in Fig. 1 that the arrangement of the impellers under the central part of the vehicle results in distribution of the sand under all four wheels, so that adequate traction is maintained for safe operation. For certain types of operations, however, such as spreading sand or crushed stone on newly laid tar roads, it may be preferable to back the truck. In this case the entire hopper and sanding assembly may be mounted in reverse on the chassis so that the chutes and impellers are on the rear.

What is claimed is:

1. A sand spreader for a truck or similar vehicle comprising: a container for storing a supply of sand; a pair of chutes disposed near one end of said container and having top entrances and bottom outlets; a conveyor adapted to deliver sand from said container to the top entrances of said chutes; a pair of shafts, mounted one within each of said chutes, each shaft having an upper end projecting above the top entrance and a lower end projecting below the bottom outlet of the chute in which it is mounted; a pair of rotary impellers, one mounted on the lower end of each of said shafts; drive means connected to the upper ends of said shafts for rotating said shafts; and means for transversely shifting the lower ends of said shafts with respect to said outlets, thereby exposing different portions of the impellers to the flow of sand through said outlets.

2. A sand spreader for a truck or similar vehicle comprising: a container for storing a supply of sand; a pair of chutes disposed near one end of said container and having top entrances and bottom outlets: a conveyor adapted to deliver sand from said container to the top entrances of said chutes; a pair of shafts, mounted one within each of said chutes, each shaft having an upper end projecting above the top entrance and a lower end projecting below the bottom outlet of the chute in which it is mounted; a pair of rotary impellers, one mounted on the lower end of each of said shafts; a common drive mechanism connected to said top ends and adapted to rotate said shafts in opposite directions; and means for transversely shifting the lower ends of said shafts with respect to said outlets in the longitudinal direction of the vehicle, thereby exposing different portions of the impellers to the flow of sand through said outlets.



3. A sand spreader for a truck or similar vehicle comprising: a container for storing a supply of sand; a pair of chutes disposed near one end of said container and having top entrances and bottom outlets; a conveyor adapted to deliver sand from said container to top entrances of said chutes; means for varying the rate of delivery of sand to said chutes; a pair of shafts, mounted one within each of said chutes, each shaft having an upper end projecting above the top entrance and a lower end projecting below the bottom outlet of the chute in which it is mounted; a pair of rotary impellers one mounted on the lower end of each of said shafts; drive means connected to said upper ends for rotating said shafts; and means for transversely shifting the lower ends of said shafts with respect to said outlets in the longitudinal direction of the vehicle, thereby exposing different portions of the impellers to the flow of sand through said outlets.

4. A sand spreader for trucks and similar vehicles comprising: a sand storage container having a forward wall; an opening in the lower part of said wall; a gate slidably mounted on said wall to overlie said opening, means for locking said gate in any of several positions, thereby varying the size of said opening; a pair of chutes mounted forward of said wall, said chutes having top entrances and bottom outlets; a conveyor traversing the floor to said container and extending through said opening to a point adjacent said entrances; means for driving said conveyor to carry sand to said chutes; a pair of impeller shafts mounted one in each of said chutes, each shaft having an upper end projecting above the top entrance and a lower end projecting below the bottom outlet of the chute in which it is mounted; drive means connected to the upper ends of said shafts for rotating said shafts; impellers mounted on the lower ends of said shafts; and means for shifting said lower ends in longitudinal direction of the vehicle, thereby exposing different portions of said impellers to the flow of sand from said chutes.

5. A sand spreader for a truck or similar vehicle comprising: a container for storing a supply of sand; a pair of chutes disposed near one end of said container and having top entrances and bottom outlets; a conveyor adapted to deliver sand from said container to said entrances; means disposed between said conveyor and said entrances for varying the apportionment of the sand delivered to said entrances; a pair of shafts, one mounted in each of said chutes, each shaft having an upper end extending above the entrance and a lower end extending below the outlet of the chute in which it is mounted; a pair of rotary impellers, one mounted on the lower end of each of said shafts; drive means connected to the upper ends of said shafts for rotating said shafts; and means for transversely shifting the lower ends of said shafts with respect to said outlets, thereby exposing different portions of the impellers to the flow of sand through said outlets.

6. A sand spreader for a truck or similar vehicle comprising: a container for storing a supply of sand; a pair of chutes disposed near one end of said container and having top entrances and bottom outlets; a conveyor adapted to deliver sand from said container to said entrances; a movable deflector plate disposed between the entrances of said chutes; means for shifting the position of said deflector so as to vary the apportionment of the sand delivered to said entrances; a pair of shafts, one mounted in each of said chutes, each shaft having an upper end projecting above the entrance and a lower end projecting below the outlet of the chute in which it is mounted; a pair of rotary impellers, one mounted on the lower end of each of said shafts; drive means connected to the upper ends of said shafts for rotating said shafts; and means for transversely shifting the lower ends of said shafts with respect to said outlets, thereby exposing different portions of the impellers to the flow of sand through said outlets.

7. A sand spreader for trucks and similar vehicles comprising: a container for storing a supply of sand; a pair of chutes disposed near one end of said container and having bottom outlets; a conveyor for delivering sand from said container to said chutes; a cross-shaft mounted laterally across said vehicle above said chutes; means for

continuously driving said shaft; a pair of impeller shafts, each having a miter gear on its upper end, disposed one in each of said chutes and extending through said openings; a pair of shaft supporting members journalled on said drive shaft and supporting said miter gears; a pair of miter gears mounted on said cross-shaft and meshing with the gears on said impeller shafts; a pair of rotary impellers one mounted on the lower end of each of said impeller shafts; and means for locking said members in any of several rotational positions about said cross-shaft, thereby adjusting the angle of said impeller shafts so as to expose a desired portion of the impellers to the flow of sand through said openings.

8. A sand spreader as described in claim 7, said conveyor comprising a pair of chains traversing the floor of said container and connected together by a plurality of cross-rods, and said container having a plurality of stationary rods mounted therein adjacent and parallel to said cross-rods.



9. A sand spreader as described in claim 7 having a drive shaft for said conveyor disposed laterally across said vehicle, a bull gear mounted on said conveyor drive shaft, a main drive shaft disposed longitudinally on said vehicle, a worm mounted on said main drive shaft and meshing with said bull gear, a third miter gear mounted on said cross-shaft, and a miter gear mounted on said main drive shaft and meshing within said third miter gear.

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