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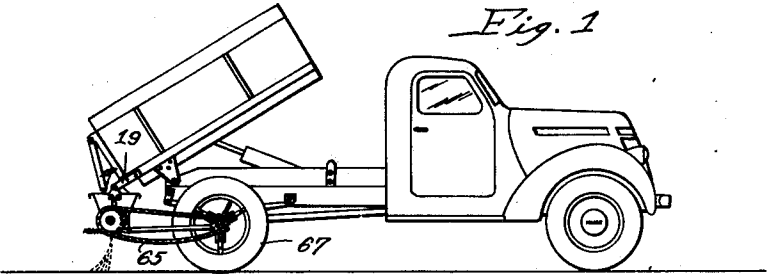
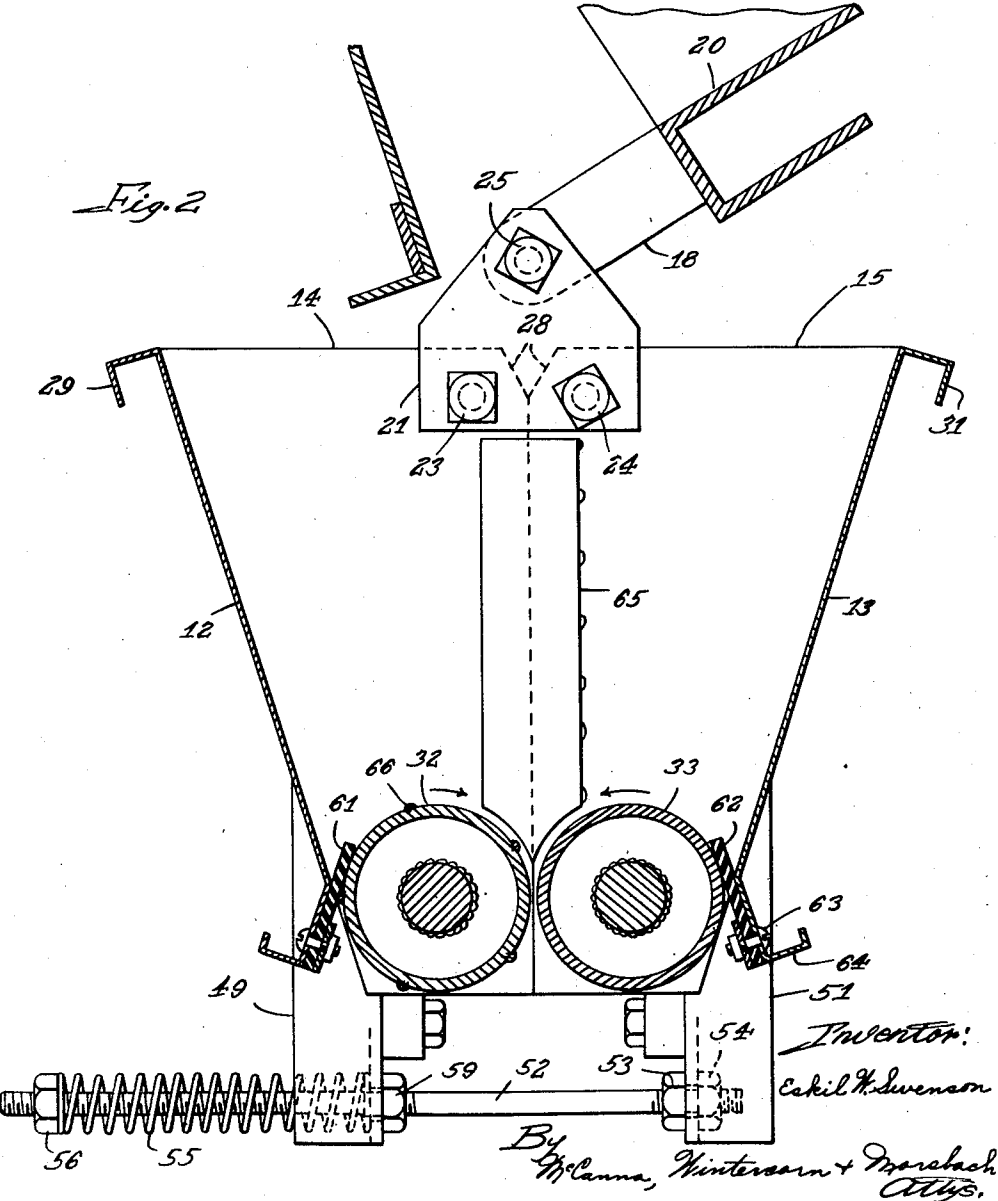
E. W. SWENSON

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MATERIAL SPREADER

Filed Oct. 14, 1940

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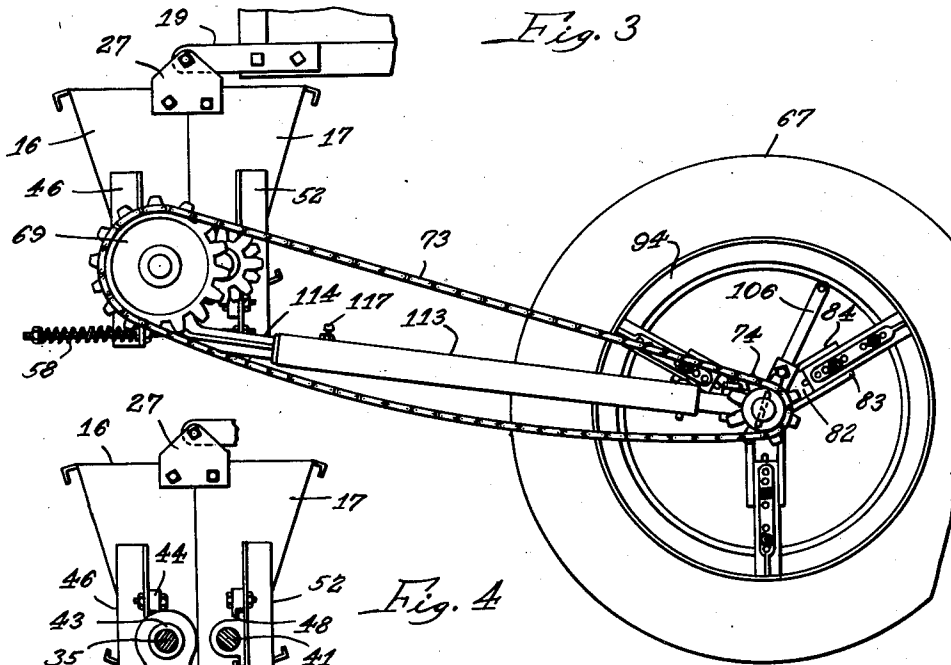
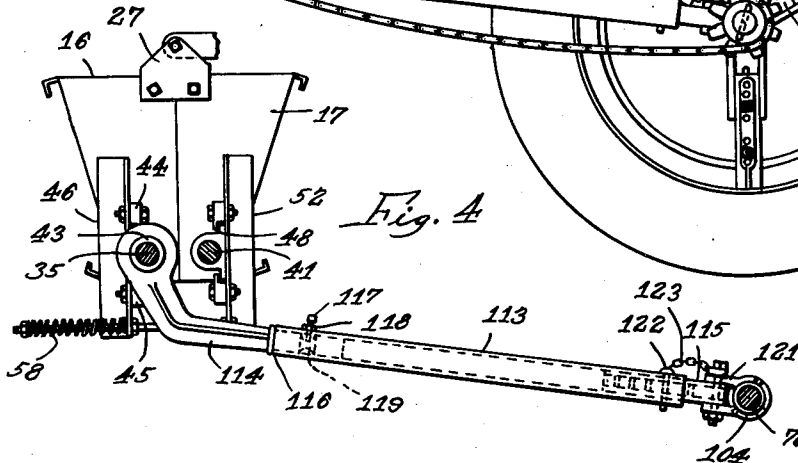
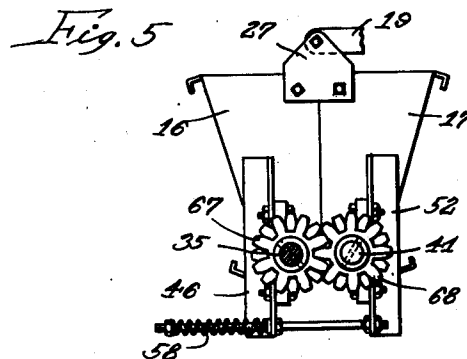
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MATERIAL SPREADER

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4 Sheets-Sheet 2



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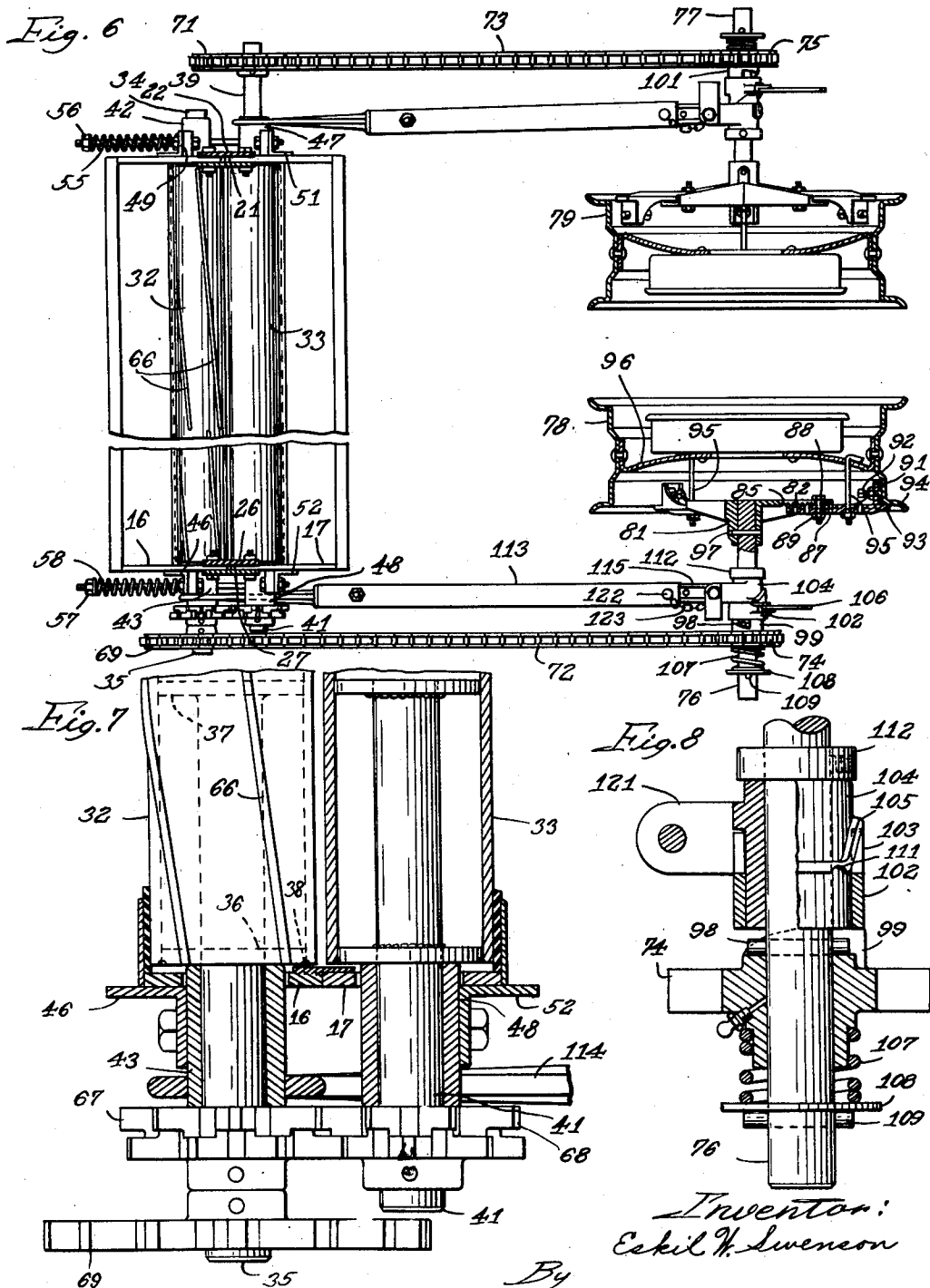
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MATERIAL SPREADER

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4 Sheets-Sheet 3



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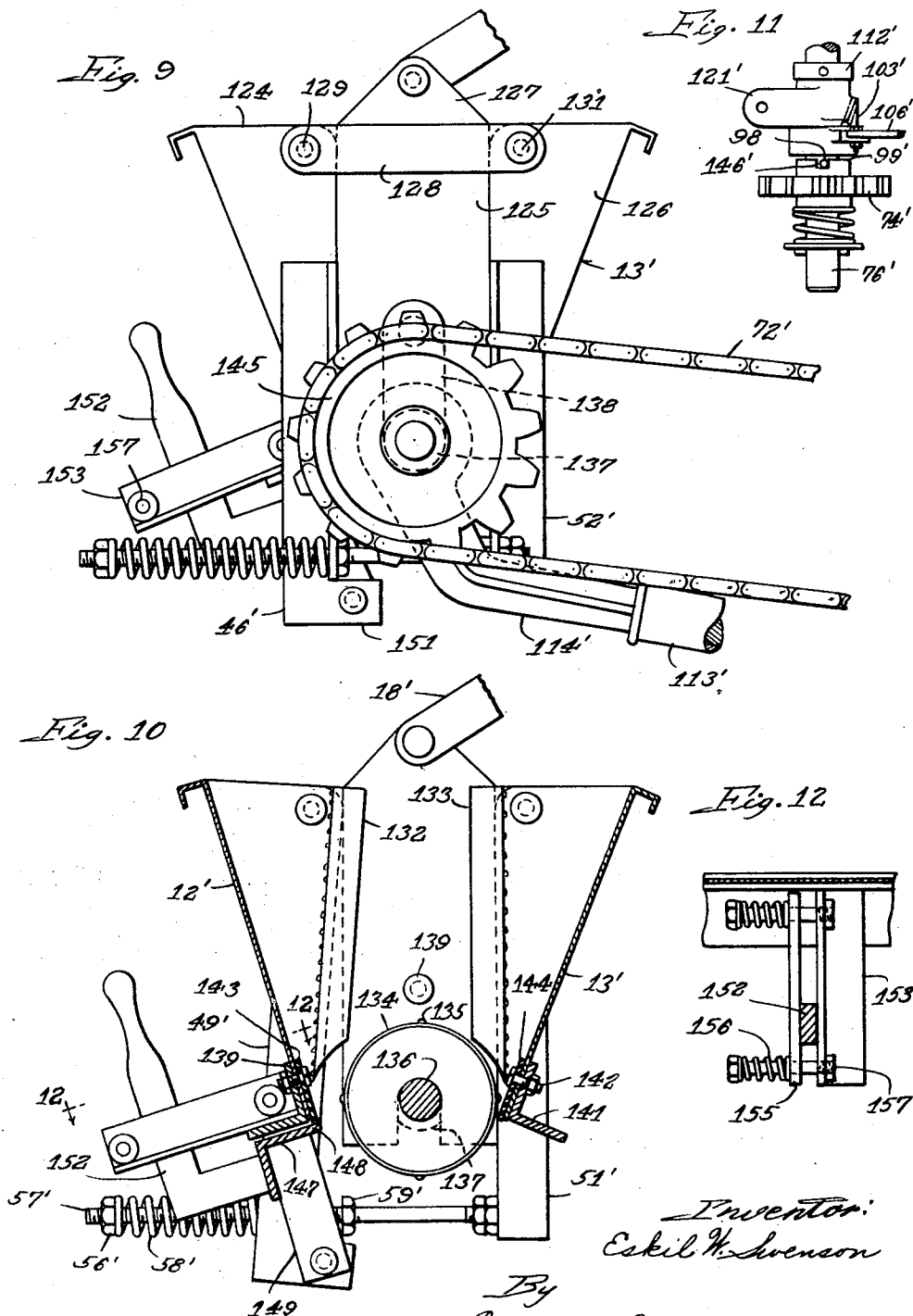
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MATERIAL SPREADER

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UNITED STATES PATENT OFFICE

2,327,679

MATERIAL SPREADER

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Application October 14, 1940, Serial No. 361,088

20 Claims. (Cl. 275—2)

This invention relates to road material crushers and spreaders used for spreading cinders, pea gravel and other types of road material.

In the past it has been the custom to spread cinders on icy pavements in their normal shape and size without pre-crushing them. The main objections to spreading cinders in this manner is that it is difficult to obtain a uniform spread when they are of different sizes, and most importantly, the capacity of larger sized cinders to provide a frictional surface for the wheels of passing vehicles has been found to be very slight when compared with the results obtained from more finely crushed cinders that are reduced to about $\frac{1}{4}$ " size. It is, therefore, an important object of my invention to provide a spreader that may be easily attached to a dump truck and that has a simultaneous spreading and crushing function whereby cinders may be reduced to a size giving the greatest frictional surface to an icy pavement as well as increasing the distance over which a given quantity of cinders may be spread.

Many of the types of spreaders in use prior to my invention have employed a revolving disk to perform the spreading function. These have been found objectionable in part because of the difficulty in controlling the area of spread. With such a device it will be seen that the heavier particles will travel farther than the smaller and lighter particles and therefore the finished spread lacks uniformity across the roadway, the heavier particles being thrown to the outside and the lighter particles falling in the center. For example, if a piece of iron finds its way onto the disk, it might be carried beyond the side of the truck where it might damage another vehicle or injure a pedestrian. Furthermore, the speed of such a disk is directly proportional to the speed of the truck, and it will throw the material a greater distance as the truck increases its speed. This may not only waste cinders by throwing them onto the road shoulder but may also damage passing or parked vehicles. Provision is made in my invention for roll means for crushing and spreading having a speed proportional to the speed of the truck. These roll means extend across the width of the truck so that the width of the spread is substantially constant at different speeds. It is therefore another object of my invention to provide a combination crusher and spreader operable at relatively high speeds that uniformly distribute material at all speeds and at a substantially constant width.

Prior to my invention, it has been frequently

necessary in the application of cinders or other non-skid material to pavements to require hand labor to ride on the back of the truck doing the spreading. The duties of such an operator are to feed the material from the truck at as nearly a uniform rate as possible and otherwise control the spreading. If some other device is used to facilitate the spreading, he is required to control it as by regulating its rate of discharge. The hazardous character of this sort of an undertaking is apparent and many serious accidents befall these operators. It is therefore another object of my invention to provide a spreader whose operation is of such an automatic character that it keeps a hopper filled and uniformly discharges material from this hopper without the necessity for a workman to ride on the back of the truck.

Another object of my invention is to provide a spreader which may be attached to the rear of a truck bed of the dump type and which utilizes the driving power of the vehicle to which it is attached so as to require no independent source of engine power nor attendance when the inclination of the truck bed is changed.

Still another important object of my invention is to provide a device for the uniform spreading of material such as cinders, sand, agricultural limestone, gravel and the like in which the parts are articulated to prevent breakage under extreme operating conditions, as, for example, when uncrushable material finds its way into the hopper.

Other objects and advantages will become apparent from the following description and the accompanying drawings, in which—

Fig. 1 is a side elevation of the spreader and truck in operating position;

Fig. 2 is a transverse vertical section of the hopper of the spreader showing its mounting to a truck;

Fig. 3 is a side elevation of the hopper of the spreader and of the wheel mounting providing the drive therefor;

Fig. 4 is a side elevation of the hopper showing the adjustable spacing means between the truck wheel and the hopper;

Fig. 5 is a side elevation of the hopper showing the constant mesh gears on the shafts of the rolls;

Fig. 6 is a top elevation of my device showing its driving connections to the truck wheels and fragmentary sections of the mounting of the driving axle to the wheel;

Fig. 7 is a longitudinal horizontal section showing the driving gears at one end of the rolls;

Fig. 8 is a section of one of the clutch mechanisms on the driving axle;

Fig. 9 is a side elevation of an alternative embodiment of my device in which there is a single roll;

Fig. 10 is a vertical transverse section of this alternative embodiment of my invention;

Fig. 11 is a detailed view of the hub mounted on the driving axle in this alternative embodiment of my invention, and

Fig. 12 is a view on the line 12—12 of Fig. 10.

Referring to the embodiment of the invention shown in Figs. 1 to 8, the hopper is composed of inclined rear and front walls 12 and 13 and two side walls each consisting of a pair of panels 14 and 15 and an opposite pair 16 and 17 which meet at their inner vertical edges. The hopper is suspended from a truck body, such as that shown in Fig. 1, by bars 18 and 19 bolted to the truck bed 20 and projecting rearwardly therefrom. A pair of plates 21 and 22 are bolted to the upper inner corners of side sections 14 and 15 by bolts 23 and 24, the upwardly projecting portions of these plates being pivotally mounted to the bar 18 by bolt 25. The opposite side of the hopper is similarly mounted from a pair of plates 26 and 27. This mounting arrangement permits the hopper to remain in vertical alignment regardless of the inclination of the truck bed 20, so that when the dump body of the truck assumes any inclined or horizontal position, the hopper will maintain its vertical alignment.

The mounting of the side sections, such as 14 and 15, to the pair of plates 21 and 22 permit these sections to part progressively downwardly to enlarge the bottom opening of the hopper. As is clear from Fig. 2, the mitered corners 28 and the pivots formed by bolts 23 and 24 permit this spreading. Angle ribs 29 and 31 integral with the rear and front walls 12 and 13 of the hopper reinforce the walls to prevent outward buckling when the hopper is loaded with material. Two rolls 32 and 33 extend along the bottom opening of the hopper and are rotatably mounted in the side sections of the hopper. Shafts 34 and 35 have end portions entered into the opposite ends of roll 32 being secured therein in axial alignment with the rolls by parallel spacer disks 36 and 37, as illustrated in Fig. 7. These disks, and accordingly the shafts which are welded thereto, are secured in the ends of the rolls by a weld at the periphery of the outer disk, such as the weld 38 of the disk 36. The shafts 39 and 41 are located and secured in the opposite ends of roll 33 in a like manner.

Journals of a floating construction are provided for the shafts, such as shafts 34 and 35, by hubs 42 and 43 having upwardly and downwardly extending finger portions, offset with respect to the rotating axis. Retainers such as 44 and 45 in Fig. 4 are bolted to angle supports, such as a support 46, and are secured to a side section 16 of the hopper by welding. The retainer 44 has a downwardly projecting portion spaced from the support 46 while the retainer 45 has a similar upwardly projecting portion. The projecting portions of these retainers 44 and 45 engage the corresponding fingers on the hub 43 to form a mounting for the hub. The tolerance permitting relative movement between the hub and the retainers is sufficient to provide the desired amount of float in this bearing mounting. In a similar manner, the hubs 42, 47, and 48 are mounted to angle supports 49, 51 and 52, respectively. This floating method of mounting the

rotatable rolls within the hopper acts as a self-aligning device for the rolls and decreases the possibility of breakage in the machine by providing an optimum amount of flexibility. Through this, distorting movements imparted to the rolls by the passage of either foreign material or different sized pieces of spread material are absorbed.

Referring to Fig. 2, the angle supports 49 and 51 are spaced in a parallel vertical relation being connected together at their bottom ends by a rod 52 that is entered through holes in the outwardly extending member of the support. One end of the rod 52 is secured to the support 51 by bolts 53 and 54. A coiled compression spring 55 is mounted on the opposite end portion of the rod 52 being restrained at one end by nut 56, its other end being urged against the support 49. The opposite end of the hopper has a bolt 57 and a spring 58 similarly mounted with respect to the supports 46 and 52. The springs 55 and 58 act to restrain enlargement of the opening in the bottom of the hopper by urging the respective side wall sections of the hopper together, tensioning the longitudinal halves of the hopper together at its bottom so that material passing between the rolls 32 and 33 is crushed. The pressure of the spring 55 may be regulated by nut 56 to adjust the roll pressure to the kind of material being spread.

The division of the side wall sections of the hopper and the spacing between the rolls may be adjusted by the nut 59. The rolls 32 and 33 are so positioned in the bottom of the hopper that when they contact one another at their circumferential peripheries the side wall sections, such as 14 and 15, of the hopper are in a closed relation. Where it is desired to spread a coarser material, the rolls may be spaced from one another by adjusting the nut 59 which causes the hopper to divide at its bottom.

Material is prevented from falling between the outer circumferential peripheries of the rolls 32 and 33 and the front and rear walls 12 and 13, respectively, by inwardly inclined rigid rubber strips 61 and 62 which extend along the bottom edges of the rear and front walls 12 and 13 in a tangential relationship with the peripheries of the rolls. The strips 61 and 62 are secured by bolts 63 to outwardly flared bottom portions of the front and rear walls 12 and 13 of the hopper. The channel construction 64 of these bottom walls acts as a reinforcement to prevent outward bulging or binding. As the rolls rotate in opposite directions to discharge material, it will be the disposition of material within the hopper to be moved by the rolls to the center and discharged therebetween. Material is prevented from spilling between the gap occurring in the side sections of the hopper, such as sections 14 and 15, by vertical plates 65 which are secured to one side wall section, such as section 15, by a weld, overlapping the adjacent side wall section such as section 14. Thus, when the opening in the bottom of the hopper is enlarged either through pieces of uncrushable material passing between the rolls or through spacing the rolls by adjusting nuts 59, no material will wedge or spill between the inner edges of side sections, such as 14 and 15. Helicoidal ribs 66 in a staggered relationship are mounted on the roll 32 to increase the crushing and feeding efficiency of my invention by insuring that a constant amount of material is carried between the rolls and discharged therefrom. Another kind of roll sur-

face that could also be used is a corrugated type.

The rolls 32 and 33 are geared together to rotate in opposite directions by gears 67 and 68 that are pinned to the shafts 35 and 41, respectively. The teeth of these gears 67 and 68 are sufficiently long so that they will not become disengaged from one another upon spreading of the bottom of the hopper under normal usage. Drive is transmitted to the rolls from one or the other of the rear truck wheels, depending on whether the truck is moving forwardly or backwardly, by a sprocket 69 secured on an extension of shaft 35 and a sprocket 71 secured on the opposite side to an extension of the shaft 39. Chains 72 and 73 of sprockets 69 and 71 extend to respective gears 74 and 75 mounted on axles 76 and 77. The axles 76 and 77 are mounted in axial alignment with the axles of the truck wheels 78 and 79 which supply the driving power for the spreader when the truck is placed in motion.

The axles 76 and 77 are secured to the wheels by a universal adapting mechanism each consisting of a hub 81, a tripod piece integral therewith consisting of three arms 82 having outwardly extending flanges 83 and 84 on each edge to form a channel, and a corrugated surface consisting of integral, transverse ribs 85 on the arm 84 to fit within the complementary ribs of a bar 87 that fits within the channel formed by the flanges 83 and 84. The bar 87 is secured to the arm 84 by a bolt 88 and nut 89 which is entered in a longitudinal slot in the arm 84 and in a hole in the bar 87. The outer end portion of the bar 87 contains an inwardly projecting lug 91, tapped for a screw 92. As is clear from Figs. 3 and 6, an extreme end portion 93 of the bar 87 has its inner face abutting a rim flange 94. The screws 92 are tightened in the lugs 91 of the three bars 87 to firmly secure the hub 81 to the wheel 78 and to align the axle 76 with the truck axle. Bolts 95 are entered in holes in the wheel disk 96 and through corresponding holes in the bars 87 to complete the fastening of the hub 81 to the wheel. It is clear that the hub 81 may be mounted to any one of a number of different sized wheels, since the spokes of the hub consisting of the arm 84 and the bar 87 are adjustable as to length. Both axles 76 and 77 are secured to their respective hubs to turn therewith by cross-pins 97.

When the truck is moving forwardly, the axle 76 rotates in a clockwise direction so that a cross-pin 98 engages cam shoulders in a diametric relation in the hub 99 of the gear 74 causing the gear 74 to rotate and turn sprocket 69 which causes the roll 32 to rotate in a clockwise direction and the roll 33 to rotate in the opposite direction through the mesh of gears 67 and 68.

A hub 101 of the opposite gear 75 has oppositely cut cam shoulders for engaging a drive pin on the shaft 77 to rotate gear 75 in a counterclockwise direction when the truck is moving backwardly, thereby causing shaft 39 to rotate in a like direction to rotate the rolls 32 and 33 in the same direction as when the truck is moving forwardly. This permits spreading of material within the hopper when the truck is moving backwardly as well as forwardly.

Clutch means are provided on each axle 76 and 77 to disengage respective gears 74 and 75 from the drive pin, such as pin 98. Referring to Fig. 8, a ring 102 having a projecting V-shaped cam 103 is rotatably mounted on a collar 104 in which

the shaft 76 is permitted to rotate. The collar 104 contains a ridge 105 of the contour of the cam 103, whereby the ring 102 is moved outwardly away from the collar 104 as the ring 102 is given approximately a one-quarter turn in a counterclockwise direction by the handle 106 secured thereto. This forces the hub 99 outwardly on the shaft 76 against a compression spring 107 that abuts a washer 108 and a pin 109 at its opposite end, thereby disengaging the hub 99 from the drive pin 98. The point of the cam 103 enters a notch 111 at this open position so that it will not return to the engaged position until the operator moves the bar 106. The spacing of the collar 104 from the hub 81 is maintained by a block 112 that is fastened to the shaft 76 to rotate therewith. The clutch mechanism on the shaft 77 is identical with that on the shaft 76 and provides a means for engaging and disengaging the hub 101 from the axle 77.

The ratchet means provided for the engagement of the hubs 99 and 101 with the respective shafts 76 and 77 will operate to prevent drive being transmitted to the rolls when the truck moves in a direction opposite from that in which it drives its respective hub, notwithstanding that the clutch is in the engaged position. This is clear from the fact that the drive pin, such as pin 98, will force the hub 99 outwardly along the axle 76 against the spring 107 to prevent engagement with the pin 98 when the truck moves backwardly. As soon as the truck resumes its forward movement, the pin 98 will engage hub 99 causing the rolls 32 and 33 to revolve as before.

Spacing between the shafts 35 and 39 and the axles 76 and 77, respectively, is maintained by adjustable arms extending therebetween. Each arm consists of a center tube portion 113 in one end of which an L-shaped brace 114 is fitted and in the other end of which a rod 115 containing spaced holes along its length is inserted. The brace 114 has a shoulder 116 abutting the end of the tube 113 and is rotatably secured to the tube 113 by a bolt 117, having a locking nut 118, that engages an annular ring 119 in the brace 114. The opposite end of this brace is mounted on the hub 43. One end of the rod 115 is pivotally mounted in a yoke 121 that projects from the collar 104. A detachable pin 122 that is held by a chain 123 to the yoke 121 is entered into one of the holes in the rod 115. The desired amount of tautness in the driving chains 72 and 73 is adjusted by entering the pin 122 into the proper hole in the rod 115. Tilttable movement of the rear axle of the truck relative to the hopper will not affect the operation since this movement will be taken up by the rotary movement of the tube 113 relative to the brace 114.

To operate my device, the truck bed is inclined to an angle at which the material to be spread will flow into the hopper. As the hopper fills, the material is backed up into the truck body to prevent overloading of the hopper and yet assure its being filled at all times. After the size of the spread is determined upon, the spacing between the rolls 32 and 33 is set by moving the adjusting nuts 59 of the rod 52. If a coarse spread is desired, the distance between the rolls will be greater, whereas if a fine spread is desired or the material is sufficiently fine that no crushing is required, there is either a slight distance or none at all between the rolls. Because the rolls which extend across the rear of the truck turn at a speed directly proportional to

the speed of the truck, it has been found that the distribution of spread per unit of road area will be constant at low or relatively high truck speeds. It has also been found that the path of the spread at any speed is substantially constant. The driver operates the truck either forwardly or backwardly, depending upon which is the most expedient direction for driving. To move forwardly, he moves the lever 106 to the engaged position whereby the pin 98 drives the hub 99 transmitting rotation to the rolls 32 and 33. If it is found necessary to reverse the truck, he may do so without disengaging the clutch 106 since the pin 98 will not drive the hub 99 when the truck is moving backwardly. If the driver wishes to spread the material while moving backwardly, he moves the lever corresponding to lever 106 on the opposite side of the truck to the engaged position. At times the driver may wish to prevent spreading of the material altogether, in which case he moves lever 106 and the corresponding lever on the opposite side to their disengaged positions.

Figs. 9 and 10 show an embodiment of my invention in which there is a single roll. Here the hopper is suspended from bars 18' in the same relative position from the truck bed as the embodiment shown in Figs. 1 to 8. The hopper is composed of inclined rear and front walls 12' and 13' and side walls each consisting of three panels 124, 125 and 126. The end panels 124 and 126 are fastened to the rear and front walls 12' and 13' along adjoining edges and are spaced one from the other by the center panel 125 which also contains an upwardly projecting portion 127 that is mounted on the bar 18'. The rear wall 12' and its adjoining side section 124 and its corresponding panel have hinge movement relative to the center section 127 provided by the pivotal mounting of this portion of the hopper to a bar 128 at 129, the bar 128 being secured to center panel 125. Likewise, the front wall 13' of the hopper and its adjoining side panels are pivotally mounted to the bar 128 at 131. Apron pieces 132 and 133 which overlap the opening created when the hopper sections divide are secured by a method such as welding along the vertical edge of the panels 124 and 126. These aprons 132 and 133 prevent spilling of the material when the hopper sections divide and also prevent pieces of material from jamming in these openings.

A pair of angle supports 49' and 51' are secured in a parallel spaced relation to the inside sections 124 and 126 at each end of the hopper. At the lower end of each pair of angle supports, a bolt 57' is entered through holes therein. A compression spring 58' confined between the angle support and a nut 56' provides a tensioning means for constantly urging the dividable portions of the hopper together, the bolt being secured to the angle support 51' by nuts. The dividable side wall sections of the hopper may be maintained in any open position, in which the longitudinal slot in the hopper bottom is enlarged, by moving the adjusting nuts 59' outwardly.

A single roll 134 containing helicoidal ribs 135 is rotatably mounted in the bottom of the hopper. The roll 134 has projecting shafts at each end mounted in the same manner as the rolls 32 and 33 of the first described embodiment of my invention. These shafts, such as shaft 136, project through an open-end, upwardly extending slot in the center section of the side wall and

are journaled in hubs 137 which abut the side sections, such as section 125, on the outside. The hubs 137 have an upwardly extending portion 138 integral therewith, at the top of which bolts 139 secure the same to the center side panels so as to permit limited relative movement of the hubs 137 and the center panels. The bottom edge of the rear and front walls 12' and 13' of the hopper are reenforced by angle bars 139 and 141 being bolted to the said walls by bolts 142 which also secure additional reenforcement strips 143 and 144 on the inner side of the rear and front walls 12' and 13'.

The roll 134 is rotated by the sprocket chain 72' which engages a sprocket 145 that is secured to one end of one of the roll shafts. As the roll rotates in either direction, material from within the hopper will be disposed to pass between either the rear or front wall 12' or 13' of the hopper and the periphery of the roll 134, and in so passing will be crushed to a predetermined size, depending upon the amount of spacing between the roll and the complementary wall of the hopper and upon the amount of tensioning in springs 58'. As has been before mentioned, this spacing is adjusted by the nuts 59'. If tramp iron or other uncrushable material comes into the hopper, it will be permitted to pass therethrough, since in such a case the sections of the hopper will divide against the urging of the springs 58' to permit its passage and prevent breakage of the device. In its normal operation, these springs 58' supply the tensioning power of the hopper wall against the roller through which the crushing of the material being spread is accomplished.

Since either the rear wall 12' or the front wall 13' of the hopper provide a crushing surface, in conjunction with the roll 134, depending upon which way the roll is turning, this embodiment of my invention is operative regardless of which direction the truck is moving. All that is required is that the roll 134 rotate in one direction or the other.

The power take-off for chain 72' is the same as that shown in the first-mentioned embodiment of my invention except that the drive hub 74' has a hub 99' having notches 146 in a diametric relation to the hub into which the drive pin 98' on the shaft 76' engages. This drive pin 98' will drive the gear 74' when in the engaged position regardless of which direction the truck is moving. When the drive pin 98' is disengaged from the gear 74' by operation of the clutch controlled by the handle 106', the roll 134 will not be rotated regardless of forward or backward movement of the truck.

When the spreader is not being operated, means are provided for preventing material spilling between the roll and the rear and front walls 12' and 13' of the hopper by the movement of an angle bar 147 inwardly so that its edge 148 contacts the periphery of the roll 134 to force it forwardly against the bottom edge of the wall 13' of the hopper. When so moved, the openings between the roll 134 and the walls 12' and 13' are closed to seal the bottom of the hopper. The angle bar 147 is mounted at each end on bars 149 which at their lower ends are pivotally mounted to right angled end portions 151 of the supports 46'. This mounting permits radial movement of the angle bar 147 through which its sealing function is accomplished. A manual control for this angle bar 147 consists of a right angled handle 152 having one end secured to the angle bar 147,

its other end extending upwardly for convenient grasping. The handle 152 moves within a channel formed by bar 153 that is attached to angle bar 139 and parallel bar 155. Springs 156 and bolts 157 urge the bar 155 toward the bar 153 to restrain movement of the handle 152, whereby inadvertent movement of angle bar 147 is made unlikely.

It should be clear that when the roll 134 is rotated, the operation of this embodiment of my invention will be similar to that of the first-mentioned embodiment. Material will be crushed and spread as it passes between the roll and its complementary edge of one of the hopper walls, so that it is evenly distributed in a path substantially the width of the rear of the truck. As the truck increases its speed, the quantity of spread will increase to maintain the evenness of the spread on a given unit of pavement. At even relatively high speeds, the material will not extend any objectionable distance beyond the sides of the truck.

I claim:

1. In a device of the character described, a hopper consisting of front and rear walls and side walls, each of the said side walls consisting of a pair of panels having adjoining inner vertical edges hinged together at their top portions to permit division of the said hopper whereby an opening in the bottom thereof may be enlarged, a pair of rolls rotatably mounted in the bottom of the hopper, each roll being mounted in one half of the said hopper, resilient means urging the halves of the hopper together so as to restrain enlarging the spacing of the rolls from one another whereby the rolls will crush material passing therebetween but permit uncrushable material to also pass, means for rotating the rolls in opposite directions so that material within the hopper will be disposed to pass therebetween, and means for suspending the said hopper from the rear of a truck.

2. In a spreading device for attachment to the rear of a truck, a hopper consisting of front and rear walls and side walls, each of the said side walls consisting of a pair of panels having adjoining inner vertical edges hinged together at their top portions to permit division of the said hopper, whereby a longitudinal opening in the bottom thereof that is substantially the width of the rear of the truck may be enlarged, a pair of rolls having a length substantially equal to the width of the truck rotatably mounted in the bottom of said hopper, each roll being mounted in one-half of the said hopper, resilient means urging the halves of the hopper together so as to restrain enlarging of the spacing of the rolls from one another, whereby the rolls will crush material passing therebetween but permit uncrushable material also to pass, and means for rotating the rolls in opposite directions so that material within the hopper will be disposed to pass therebetween, the said means rotating the rolls at a speed directly proportional to the speed of the truck.

3. In a device of the character described, a hopper consisting of front and rear walls and side walls, each of the said side walls consisting of a plurality of panels, said panels having their outer edges secured to the ends of the respective front and rear walls, hinge means at the top portions of said panels to permit outward hinged movement of the front and rear walls of the hopper, rotatable means in the bottom of the hopper for feeding material within the hopper, resilient

means urging the front and rear walls inwardly to restrain outward hinged movement thereof to control the character of the feed, means for rotating the said rotatable means, and means for suspending the said hopper from the rear of a truck.

4. A device of the character described comprising a hopper consisting of front, rear and side walls, hinge means for mounting the front and rear walls whereby an opening in the bottom of the hopper may be enlarged by outward hinged movement of the front and rear walls, rotatable means in the bottom of the hopper operative against a part carried on one of said walls for crushing and feeding material passing therebetween, resilient means urging the front and rear walls inwardly to restrain outward hinged movement thereof to control the character of the feed and to apply crushing pressure to material passing between said rotatable means and said part, means for rotating the said rotatable means, and means for suspending the said hopper from the rear of a truck.

5. A device as described in claim 1, in which the rolls are rotatably mounted in journals in a floating relation to the side walls of the hopper permitting limited relative movement between the journals and the said side walls.

6. A device as described in claim 1, in which the means for rotating the rolls in opposite directions consists of a gear mounted to each roll so as to be in a constant mesh relationship and a wheel on one of the said rolls connected by an endless flexible means to another wheel mounted on a driven shaft.

7. In a device of the character described, a hopper consisting of front and rear walls and side walls, each of the said side walls consisting of a pair of panels having adjoining inner vertical edges hinged together at their top portions to permit division of the said hopper whereby an opening in the bottom thereof may be enlarged, a pair of rolls rotatably mounted in the bottom of the hopper, each roll being mounted in one half of the said hopper, resilient means urging the halves of the hopper together so as to restrain enlarging the spacing of the rolls from one another whereby the rolls will crush material passing therebetween but permit uncrushable material to also pass, projecting stub shafts at the ends of said roll, gears mounted to each of the stub shafts at one end of the said rolls, the said gears being in a constant mesh relationship, a wheel mounted on a stub shaft at one end of the rolls and another wheel mounted on a stub shaft at the opposite end of the other roll, driving wheels mounted on a driven shaft, endless flexible means engaging respective pairs of the driving wheels, and wheels mounted on the stub shafts for driving the said rolls for rotating them in opposite directions so that material within the hopper will be disposed to pass therebetween, the said driving wheels rotating independently of one another and driving in opposite directions so that the said rolls will rotate in their same respective directions regardless of the driving wheel that is rotating, and means for suspending said hopper from the rear of the truck.

8. A device as described in claim 7, in which the driving wheels are mounted to shafts projecting outwardly from each of the rear wheels of the truck, the said shafts being in axial alignment with the truck axles and being adapted to rotate when the truck wheels revolve, means on each of the said projecting shafts for automatic-

ally disengaging the driving wheels thereon so that each of the rolls within the hopper will be driven in a constant direction by one or the other of the driving wheels regardless of which direction the truck is moving.

9. A device as described in claim 1, in which inclined strips are secured along the bottom edges of the front and rear walls of the said hopper extending inwardly and upwardly to contact the circumferential peripheries of the said rolls at a tangential relationship whereby material from within the hopper is prevented from spilling from between the rolls and the respective front and rear walls of the hopper.

10. A device as described in claim 1, having means for adjusting the minimum spacing between the rolls to control the character of the spreading action.

11. A device of the kind described comprising a hopper having front, rear and side walls, each of said side walls consisting of a center panel and end panels on each side thereof, the inner edges of said end panels adjoining the side edges of the said center panel, hinge means at the upper-inner portions of the end panels of the side walls whereby an opening in the bottom of the hopper may be enlarged by outward hinge movement of the front and rear walls of the hopper with respect to the center panels of the side walls, a roll rotatably mounted across the bottom opening of the hopper, resilient means urging the front and rear wall sections of the hopper inwardly so as to restrain enlarging the opening in the bottom of the hopper so that when the roll is rotated in either direction it will be disposed to crush material passing between it and the lower edge of either the front or rear wall of the hopper and permit uncrushable material to also pass, means for rotating the said roll, and means for suspending the said hopper from the rear of a truck.

12. In a spreading device for attachment to the rear of a truck, the combination of a hopper having front, rear and side walls, each of the said side walls consisting of a center panel and end panels on each side thereof, the inner edges of the said end panels adjoining the side edges of the said center panel, hinge means at the upper inner portions of the end panels of the side walls, whereby an opening in the bottom of the hopper may be enlarged by outward hinge movement of the front and rear walls of the hopper with respect to the center panels of the said side walls, the said bottom opening in the hopper being of a length substantially equal to the width of the truck, a roll rotatably mounted across the bottom opening of the hopper, resilient means urging the front and rear wall sections of the hopper inwardly so as to restrain enlarging the opening in the bottom of the hopper so that when the roll is rotated in either direction it will be disposed to crush material passing between it and the lower edge of either the front or rear wall of the hopper and permit uncrushable material also to pass, and means for rotating the said roll at a speed directly proportional to the speed at which the truck is traveling.

13. A device as described in claim 11, having manually operable means for sealing any opening in the bottom of the hopper existing between the circumferential periphery of the roll and the lower edges of the front and rear walls of the hopper, whereby material is prevented from leaking through the hopper when the device is not operating.

14. In a device as described in claim 11, having means for pivotally suspending said hopper at the top portions of the center panels of its side walls from the rear of a truck bed mounted on wheels.

15. A device of the kind described for attachment to the rear of a truck, comprising a hopper having front, rear and side walls, each of said side walls consisting of a center panel and end panels on each side thereof, the inner edges of said end panels adjoining the side edges of the said center panel, hinge means at the upper-inner portions of the end panels of the side walls whereby an opening in the bottom of the hopper may be enlarged by outward hinge movement of the front and rear walls of the hopper with respect to the center panels of the side walls, a roll rotatably mounted across the bottom opening of the hopper, resilient means urging the front and rear wall sections of the hopper inwardly so as to restrain enlarging the opening in the bottom of the hopper so that when the roll is rotated in either direction it will be disposed to crush material passing between it and the lower edge of either the front or rear wall of the hopper and permit uncrushable material to also pass, a stub shaft projecting outwardly from the said roll, a wheel mounted on the stub shaft, an axle projecting from the hub of a rear wheel of the said truck in axial alignment with the axle of the said truck wheel for rotation therewith, endless flexible means connecting the said wheels whereby the roll is caused to rotate in a like direction when the truck moves forwardly and backwardly, means for suspending the said hopper from the rear of the truck.

16. A device as described in claim 15, in which a spacer bar is rotatably mounted at its ends to the stub shaft of the roll and the axle projecting from the truck to retain the hopper in upright position in opposition for the crushing force and to maintain uniform tension on said endless flexible means.

17. In a device of the character described, a hopper consisting of front and rear walls and side walls, means for mounting the said front and rear walls of the hopper to permit outward movement of the said front and rear walls whereby the spacing between the lower edges of the front and rear walls of the hopper may be varied, rotatable means in the bottom of the hopper for feeding material within the hopper, resilient means interconnecting the front and rear walls for urging the front and rear walls inwardly to restrain outward movement thereof to control the character of the feed, and means for rotating the said rotatable means.

18. A device of the character described comprising a hopper consisting of outside front, rear and side walls, means for mounting the front and rear walls for pivotal movement about points near the top of the hopper whereby the spacing between the lower portions of the front and rear walls may be enlarged by movement of the said front and rear walls, rotatable means in the bottom of the hopper for feeding material therein, resilient means disposed below said hopper for urging the front and rear walls inwardly to restrain outward movement thereof to control the character of the feed, and means for rotating the said rotatable means.

19. In combination, a truck having rear wheels and having a bed normally horizontal but which may be inclined at any of a plurality of degrees of inclination for the dumping of material there-

from, a hopper pivotally suspended from the rear end of said bed so that regardless of the degree of inclination of said bed the hopper will remain in upright position to receive material dumped therefrom, a rotatable roll at the bottom of said hopper for spreading material therefrom, a sprocket wheel on said roll for driving the same, an axle projecting from the hub of one of said truck wheels in axial alignment with said truck wheel for rotation therewith, a sprocket wheel secured to said axle, a chain connecting the sprocket wheel on said roll and the sprocket wheel on said axle to transmit drive to the sprocket wheel on said roll, and a spacer bar comprising a tube having a fitting at one end adjustable with respect thereto mounted for free turning motion on said axle and a fitting at the other end of said tube for free turning motion on said hopper to maintain said hopper upright and said flexible means in taut relation upon change in inclination of said bed.

20. In a device of the character described, the combination of a truck having a bed adapted to be tilted so that material thereon will fall off the rear end of said bed, a hopper carried on and suspended under the rear end of said bed and adapted to be automatically supplied by material falling therein from said bed, said hopper comprising front, rear and side walls, each of said side walls comprising a plurality of panels having outer edges secured to the ends of the respective front and rear walls, hinge means at the top portions of said end panels to permit outward hinged movement of the front and rear walls of the hopper, rotatable means in the bottom of the hopper for feeding material within the hopper, resilient means for urging the front and rear walls inwardly to restrain outward hinged movement thereof to control the character of the feed, and means for rotating said rotatable means.

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