April 27, 1965 V. H. PEOPLES ETAL 3,180,530

WHEELED DEVICE WITH LEG CONSTRUCTION

Original Filed March 20, 1957 2 Sheets-Sheet 1

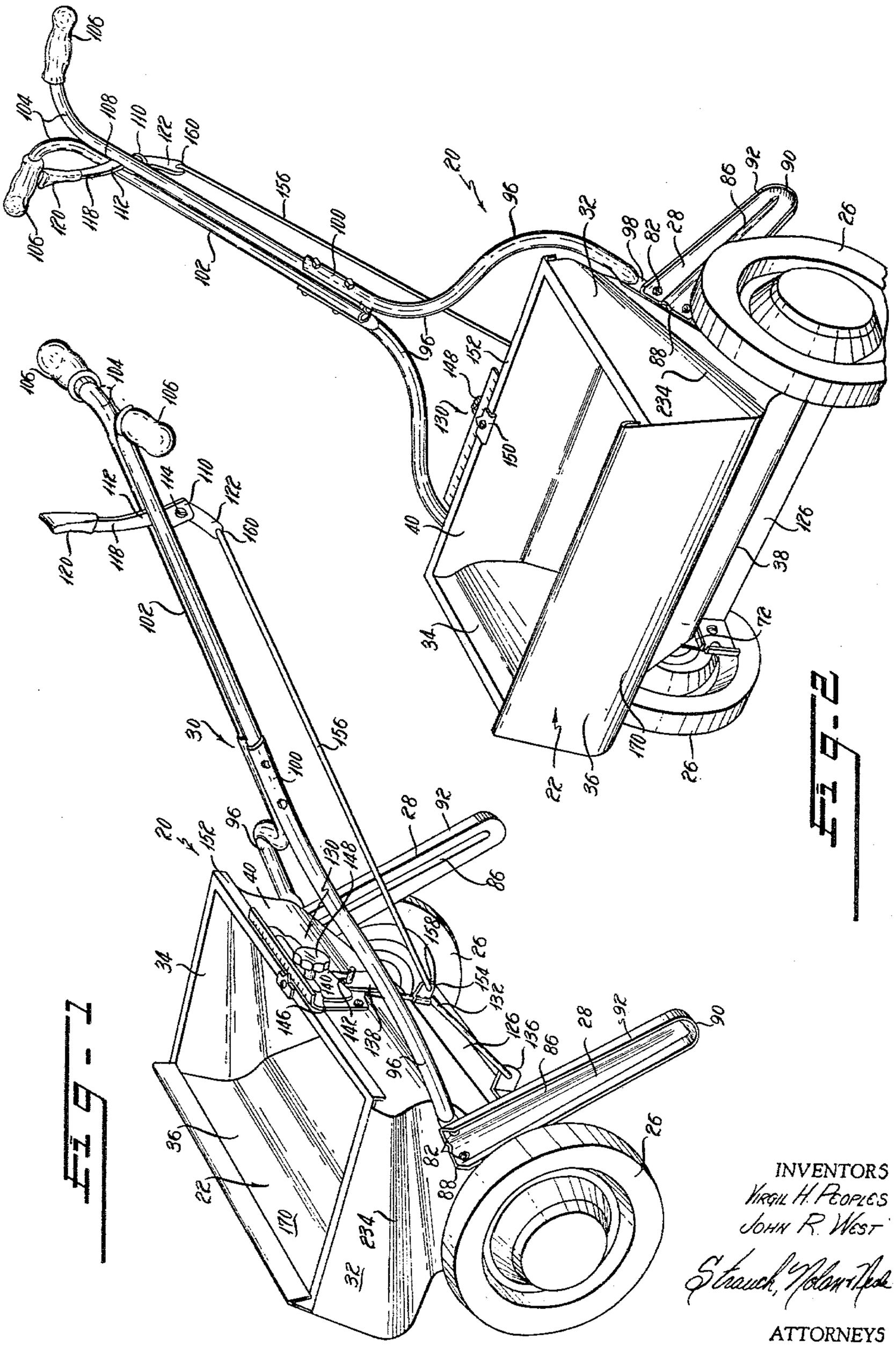

FIG. 2

FIG. 1

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Fig - 4

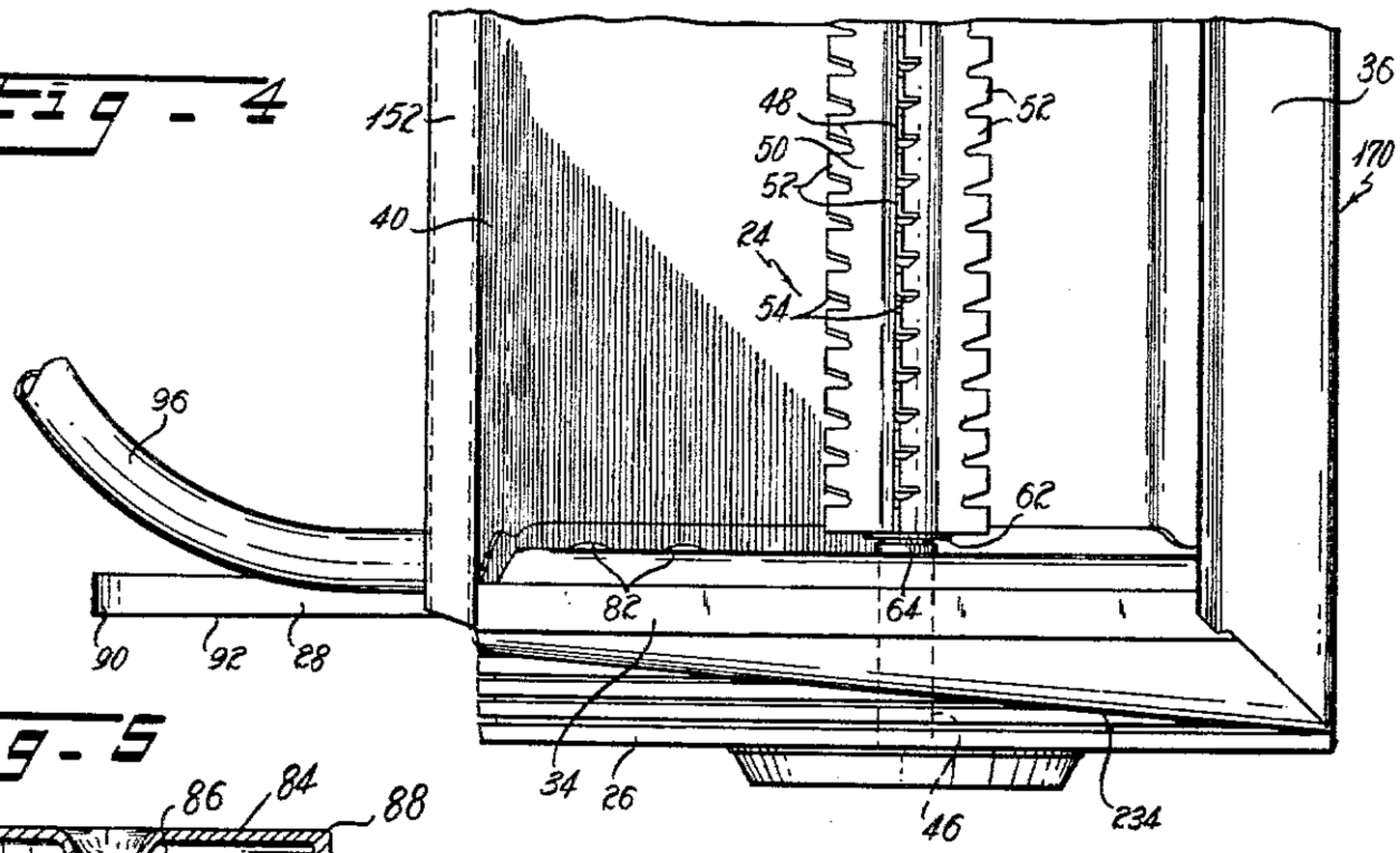


Fig - 5

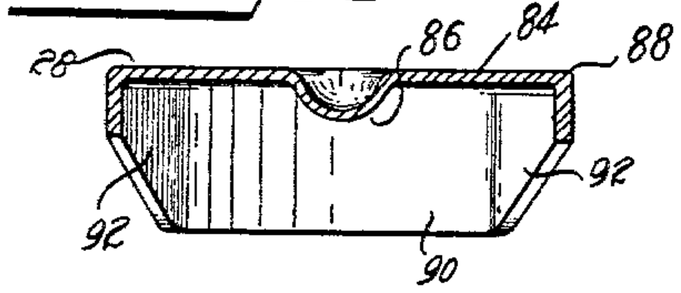


Fig - 3

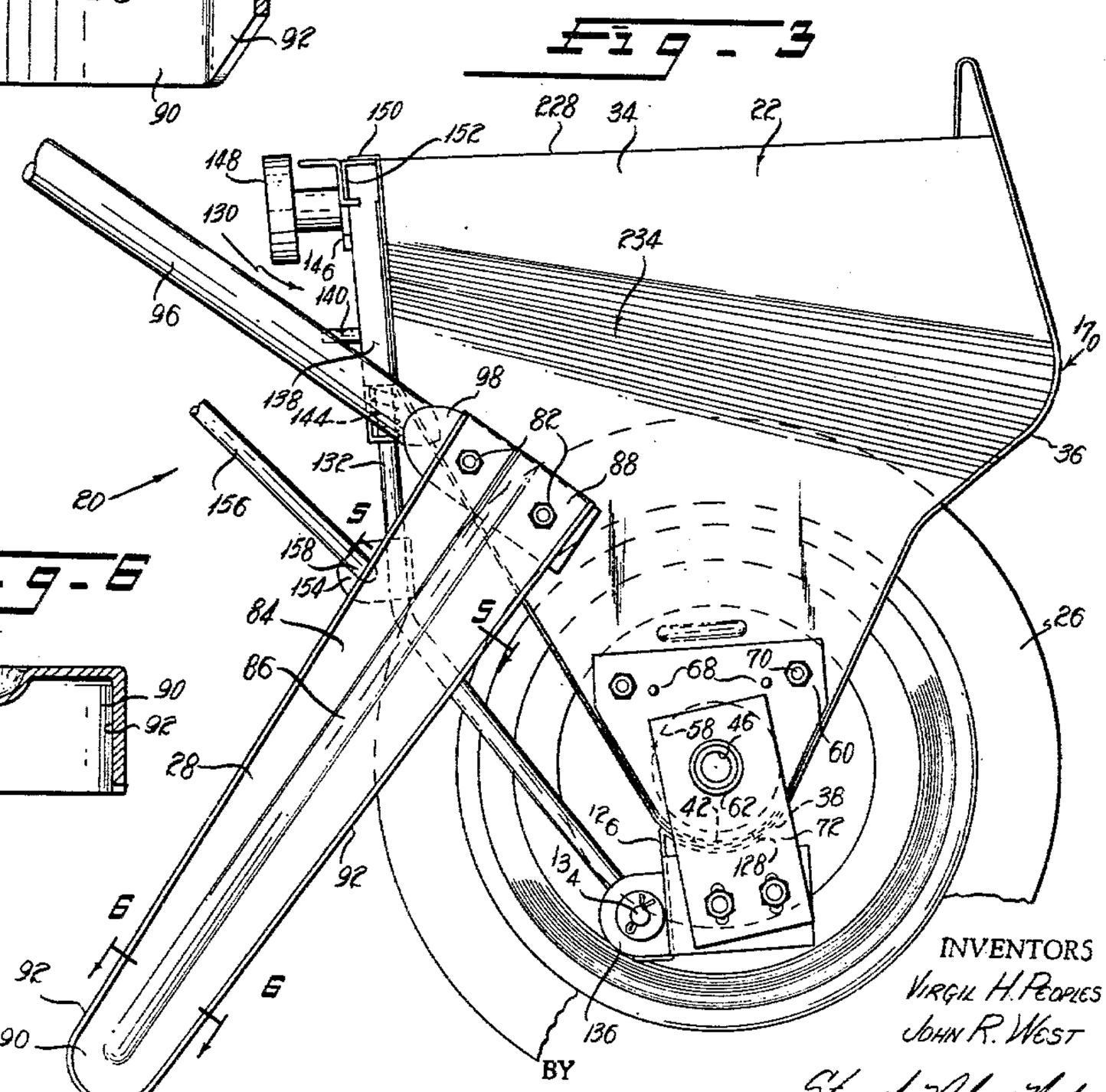
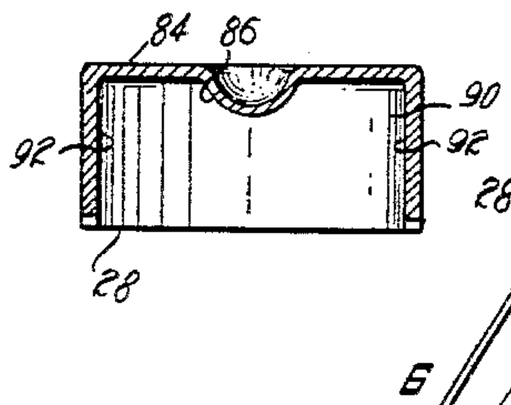


Fig - 6



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WHEELED DEVICE WITH LEG CONSTRUCTION

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Original application Mar. 20, 1957, Ser. No. 647,229, now Patent No. 2,973,884, dated Mar. 7, 1961. Divided and this application July 25, 1960, Ser. No. 45,087

13 Claims. (Cl. 222—177)

This invention relates to leg construction for wheeled devices and is particularly related to the support or leg structure on material distribution devices known as spreaders having self contained storage means with mechanism for controlled distribution of various materials such as grass seed, fertilizer, lawn treatment chemicals and the like. This application is a division of United States application Serial No. 647,229, filed March 20, 1957, now Patent No. 2,973,884.

The spreader construction disclosed in parent application Serial No. 647,229 was developed to overcome disadvantages of previously known spreader construction. It increased the material carrying capacity of the hopper without increasing overall dimensions, the sides of the hopper above the side wheels being bulged outwardly to overhang the wheels to utilize space entirely ignored in normal spreader construction, which space is wasted in warehouse storage, shipping containers and user storage. In operating position, the spreader handle arrangement is so disposed to provide a forward tilt to the median plane between inclined lower portions of front and rear walls which result in a slight inward inclination of the upper portion of the rear wall. The upper half of the front wall has been bulged forwardly providing increased strength and capacity, balancing the weight of the loaded hopper and resulting in a convergent operational relationship between the upper portions of front and rear walls. The accumulated increased capacity of these features is approximately 40 percent higher than the capacity of a conventional flat walled spreader having similar overall configuration dimensions, and reduces the total time required to make application to a given area by 20 percent.

An important advantage of the invention claimed in parent application Serial No. 647,229, now Patent No. 2,973,884 is in the increased hopper strength resulting from the use of reversely contoured areas and/or curvatures in the various wall portions and their edges which meet and are welded along reversely directed joinder lines in some cases being three dimension joinder lines which result from adjoining walls with compound curvatures. The hopper does not twist and bend under the strain of load weight and operation as do the ordinary flat wall box type hoppers which have no reversely directed or three dimensional joinder lines. Increased load weight due to the forty percent higher capacity can be handled by a hopper constructed according to this invention with no twisting or bending and there is no necessity of using a heavier gauge metal than would be used in an equivalent overall dimension flat walled hopper.

To meet competition, it is essential that the cost of spreader structure be kept as low as possible. This application discloses a new light weight rigid and high strength leg. These legs are for use as supports on spreaders and are made from stamped sheet metal at a much more reasonable cost than that which accrues from the previously known legs made from strap iron, angle iron and channel iron. The sheet metal leg obtains extreme stiffness from integral side flanges, their continuous nature and the fact that the side flange passes around the end of the leg. Further rigidity is obtained by the longitudinal, stamped rib deformation which extends across the mounting portion end of the leg. A further advantage is that the extremely rigid curved end flange serves as a wide area curved foot portion. The manner of mounting the leg on the spreader results in a vertical disposition of a wide area central planar portion of the leg and assures that the high loads sustained by the leg will be absorbed in shear in the planar portion rather than resulting in a bending stress as is true of previously known strap metal legs and channel iron legs. Furthermore, the integral flanges and the ribbed protrusion in the leg provide high strength against lateral bending of the leg and this aspect, together with the extremely rigid wide end which is secured tight against and cooperates with a substantial extent of the previously noted rigid hopper side wall, substantially prevents all lateral flexing of the support leg. In previously known spreaders the flexing of the leg due to vertical and side forces on the leg and the flexing of the hopper walls and the resultant combined effect at their joinder deriving from any lateral bending force on the leg culminated in failure of leg and hopper walls due to metal fatigue.

Accordingly, a primary object of this invention resides in the provision of spreaders incorporating novel leg construction enabling extremely rigid spreader support. An associated object resides in the provision of a novel combination handle, leg and hopper construction in which the handle and leg are fastened in a cooperative manner to the spreader hopper.

A further object resides in the provision in a material spreader of a novel sheet metal support leg structure adaptable for use on either side of the spreader hopper.

Still another object resides in the provision of a novel sheet metal leg construction having an elongate central planar portion which has bent flanges on each side being continuous around a curved end of the leg and an integral rib deformation extending substantially the length of the planar portion.

Further novel features and other objects of this invention will become apparent from the following detailed description, discussion and the appended claims taken in conjunction with the accompanying drawings showing preferred structures and embodiments, in which:

FIGURE 1 is a perspective view from the rear illustrating a preferred spreader using a leg and handle construction in accord with this invention;

FIGURE 2 is a further perspective view from the front illustrating the spreader shown in FIGURE 1;

FIGURE 3 is a side elevation view of the spreader of FIGURE 1 with the near wheel removed to illustrate details of hopper, handle and leg construction;

FIGURE 4 is a partial plan view of the spreader of FIGURE 1 illustrating additional hopper, leg and handle features;

FIGURE 5 is a section through the upper portion of the leg taken on line 5—5 of FIGURE 3; and

FIGURE 6 is a section through the lower portion of the leg taken on line 6—6 of FIGURE 3.

With specific reference to the embodiment illustrated in FIGURES 1–4 a spreader 20 consists of a hopper 22, agitator assembly 24, wheels 26, legs 28, handle assembly 30 and material distribution control mechanism to be briefly described hereinafter.

Hopper 20 has side plates 32 and 34 secured as will be later fully described, to front, bottom and rear walls 36, 38 and 40 respectively, which comprise a single sheet of material. Bottom 38 constitutes a curved transition between the front and rear walls, having a cross section of essentially constant radius. The lower portions of the side plates 32 and 34 are substantially vertically disposed and, with bottom wall 38 and the lower portions of the front and rear walls 36 and 40, provide a downwardly convergent hopper with a laterally straight bottom wall 38 rounded in the fore and aft direction. A lat-

eral row of elongate apertures 42 is formed in the rounded bottom wall 38 and the front end portions 44 of the aperture edges are convergent (not shown).

Agitator assembly 24 (FIGURE 4) has a shaft 46 with two double vane sets 48 fixed thereto as by welding. Each vane set 48 has two vanes 50 disposed on radial planes through the axis of shaft 48 and extending from adjacent one side plate 32 to adjacent the other side plate 34. Vanes 50 have a plurality of radial outwardly tapered blades 52 formed by making a series of cuts from the outer edge of vane 50 and bending a small wing tab 54 forward along the side of each blade 52. Wing tab 54 is bent in a direction to lead the blade 52 during agitator rotation.

The number and lateral space relationship of the blades 52 on each vane 50 corresponds to the number and spacing of each aperture 42 in hopper bottom 38 and during rotation each blade 52 will pass over an associated aperture 42, the radially outer edge of each wing tab 54 passing along a path above and adjacent a side edge of the aperture 42 associated with the blade 52 which carries the wing tab. The agitator construction and its association with the hopper discharge openings is fully described in United States Patent No. 2,753,086 to George D. Tuttle, to which reference may be had if details are desired.

Agitator shaft 46 is journalled in side plates 32 and 34 on an axis substantially coincident with the axis of the curved bottom 38 and is disposed so the tips of blades 52 have only a slight clearance above the bottom surface of the hopper during agitator rotation. One end of the shaft 46 projects through and is journalled in a flanged bushing disposed through an aperture in side plate 32. The opposite side plate 34 (FIGURE 3) has a circular aperture 58 large enough to permit insertion of the agitator assembly 24 into the hopper 22 so an end of shaft 46 projects through the bushing in side plate 32. A journal plate 60, carrying a flanged bushing 62, disposed through an axially flanged aperture 64, fitted over the other end of shaft 46, is accurately located and secured to side plate 34 by matched dimples 66 and 68 and bolts and nuts 70. Axially flanged aperture 64 and the aperture in hopper side plate 32 are similarly shaped, and the flanged bushings are similar, the bushings each being disposed with their flange portion on the inside of hopper 22 and cooperating with the end edges of vane sets 48 to be thereby retained between the hopper side plates.

The two bushings (see 62) project a short distance beyond the exterior surface of the hopper and each journals a depending bracket plate 72 for a purpose to be hereinafter described.

A wheel 26 is coaxially mounted on each projected end of agitator shaft 46, one of the wheels being keyed to the shaft and the other rotatably mounted and retained by a washer and cotter pin. In this matter, movement of spreader 20 over the ground will provide drive engagement through one wheel to rotate the agitator assembly 24 while the other wheel is freely rotatable. A preferred wheel construction is fully disclosed in copending application Serial No. 615,277 filed October 11, 1956, by A. D. Ellies.

The rest position of spreader 20 is (FIGURE 3) determined by two legs 28 which are fastened on the exterior of side plates 32 and 34 by bolts and nuts 82 and extend downwardly and rearwardly. Both of legs 28 are identical and are made of sheet metal stampings with a central elgonate sheet metal web portion 84 having a longitudinal rib deformation 86 extending from upper end 88 to a position adjacent lower rounded end 90. Leg portion 84 and rib deformation 86 have a slight convergent taper from upper end 88 toward lower end 90 (FIGURES 3, 5 and 6). An edge flange 92 extends from a corner of upper end 88 along one side, around the curved end 90 and back along the opposite side to the other corner of end 88 and is of relatively narrow width at upper end 88, becoming progressively wider as rounded end 90 is approched.

Flange 92 and rib deformation 86 provide great structural rigidity to the sheet metal leg 28 and the cooperative tapering configuration of leg 28, rib 86 and flange 92 enable approximately equivalent strength at both ends of the leg with a relatively wide ground engaging portion of flange 92 at lower end 90 and a shallow wide portion at upper end 88. Bolt holes are symmetrically located on either side of the longitudinal center line of leg 28 in the wide shallow upper end 88. The shallow symmetrical configuration of end 88 enables the legs to be fastened to and engage a large handle assembly surface on either of hopper side plates 32 or 34 and permits ready access to assemble or disassemble the aforementioned bolts and nuts 82.

The tubular handle assembly 30 (FIGURES 1, 2 and 3) consists of two similar, bent tubular arms 96 each having its lower end 98 pressed flat and provided with bolt holes enabling the ends 98 to rest firmly against the hopper side plates 32 and 34 under the ends 88 of legs 28 and be secured by the bolts and nuts 82. The upper ends 100 of tubular arms 96 are pressed together in a curved configuration and extend for a short distance in spaced parallel fashion. An upper handle bar portion 102 of assembly 30 is made of two tubular rods welded side by side and having their upper ends 104 bent apart to form handles upon which are placed grips 106.

The two rods of bar 102 are slightly deformed just below upper handle ends 104 to provide a slot 108 below which, two depending brackets 110 are welded. A lever 112 (FIGURES 1 and 2) is disposed through slot 108 and pivotally mounted by a bolt 114 and lock nut. The end of an upper arm 118 on lever 112 carries a wedge shaped flared end knob 120 and the lever is so shaped that lower arm 122 will abut bar 102 when the wedge shaped knob on arm 118 is approximately aligned with the top of handle grips 106, the position in which the hopper discharge openings are closed.

Construction of the material distribution control mechanism, with the exception of the specific location of lever arm 118 and knob 120, is substantially identical to that disclosed in United States Reissue Patent No. 24,189 and will be only briefly described in this specification. A shutter plate 126 (FIGURES 3 and 4) has end flanges fastened in an adjustable manner to the aforementioned depending bracket plates 72. The upper portion of plate 126 has a curved, contour with a straight lateral front edge 128 and is disposed in a snug free swinging fit under the curved hopper bottom 38. The upper portion with front edge 128 cooperates with the discharge apertures 42 to control the size of all discharge openings or cover all discharge openings dependent upon the pivotal position of shutter plate 126. As the shutter 126 is pivoted to open the apertures 42, the leading edge 128 is shifted from the front toward the rear.

Operational adjustment of the shutter 126 is determined by a rate control assembly 130 (FIGURES 1 and 3) mounted on the rear wall 40 of hopper 22 and consisting of a rod 132 with a bent lower end 134 pivotally engaged in a hole formed in a control shutter lug 136. Rod 132 has an intermediate bend and extends vertically along the exterior of rear hopper wall 40 into a boxlike bracket 138 adjacent the upper edge of rear wall 40. The rod 132 projects through a lower flange of bracket 138 and has an upper end 140 bent rearwardly and projecting through a vertical slot 142 in bracket 138. A compression spring 144 on rod 132, inside the bracket 138, cooperates between the bracket and rod 132 to bias the rod upwardly and pivot shutter 126 to the rear which movement will uncover discharge apertures 42. A cam plate 146 is slidably fastened to the upper part of bracket 138 by a stud welded on bracket immediately above slot 142 and a suitable cooperating nut encased in knob 148.

Scale indications are provided on a top flange of cam plate 146 and cooperate with an indicator 150 bolted on the turned rear edge 152 of hopper rear wall 40. Lugs on cam plate 146 are disposed under the turned rear edge 152 of hopper 22 to maintain the cam plate in horizontal position.

Depending upon the laterally adjusted position of cam plate 146, rod 132 can be permitted to move under bias action of spring 144 to a predetermined position where the upper bent end 140 engages the inclined lower edge of cam plate 146. This abutment limits and determines pivotal position of shutter 126 to uncover the desired extent of outlet apertures 42.

An apertured ear 154 is fixedly secured to rod 132 adjacent its intermediate bend and an operating rod 156 with bent ends 158 and 160 is pivotally connected to ear 154 and the apertured lower arm 122 of control lever 112. When lever 112 is positioned with the upper pivot end 160 of operating rod 156 below a line between the lever pivot bolt 114 and the lower pivot end 158 of rod 156, the entire linked assembly of shutter 126, vertical rod 132, operating rod 156 and lever 112 will be biased by spring 144 to a position where rod end 140 engages the cam plate 146.

When knob 120 of control lever 112 is pulled back to limit position, its lower lever arm 122 moves the upper pivot end 160 of operating rod 156 past dead center between lever bolt 114 and lower rod end 158, the operating rod 156 is moved down, forcing rod 132 forward and down against spring bias to move shutter 126 to close the outlet apertures 42. Bias force of the spring 144 tends to force operating rod 156 toward the handle but such movement is prevented by the aforementioned overcenter condition of the connection between lever 112 and rod 156. Inasmuch as the rigidly fixed spreader structure such as hopper 22 and the handle assembly 30, and the moving link structure of the shutter end pivot brackets 72, the shutter 126, the vertical rod 132, operating rod 156 and lever 112 constitute a link mechanism the spring connections could be properly made between different ones of the relatively shiftable links in the mechanism and the same biasing function would result, although location of spring 144 between bracket box 138 and rod 132 is preferable since it conveniently results in a strong aligned biasing force on rod 132 and the spring is placed in a protected location.

FIGURES 1–4 also illustrate the relationship between bulged upper portion 170 of front wall 36 and the upper bulged overhang 234 of side wall plates 32 and 34. The hopper construction is fully described and claimed in parent application Serial No. 647,229 and will not be further described in this application. If desired, reference to the aforesaid parent application may be had for further description.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A spreader for distributing material comprising: a wheeled hopper having material distribution means with an adjustable outlet control; structural means fixed to said hopper for moving the spreader; an operating means for said outlet control; said hopper comprising front, rear and side wall construction; and at least one rearwardly disposed elongate sheet metal leg secured to a wall of said hopper, one end of said leg projecting from said hopper and constituting a foot, said leg including an elongate planar web portion, substantially the entire extent of

which is flat and is disposed substantially normal to the hopper wheel axes and a structurally integral continuous flange extending transverse to said flat planar web portion along both of the long side edges of said planar web portion and curved completely around one end of said web portion to constitute said foot.

2. A spreader as defined in claim 1, wherein at least a portion of the exterior surface of each side wall adjacent the rear wall is flat and disposed substantially normal to the wheel axis vertically and wherein two identical ones of said sheet metal legs are disposed on said spreader, one leg on said vertical exterior surface of each said side wall of said hopper, the planar web portion of each leg includes a longitudinal rib deformation and fastening means to rigidly secure said legs to said side walls.

3. A material distribution spreader as defined in claim 2 wherein said structural means fixed to said hopped comprise symmetrical tubular means having lower laterally spaced apart flattened extremities underlying the secured portions of associated legs and upper parallel tubular portions rigidly secured in such parallel relation and having upper handle bar extremities, and the means securing said legs to said side walls also rigidly secure said lower extremities to said side walls.

4. A spreader for distributing material including: a hopper; a pair of ground engaging wheels on a common axis, one wheel disposed on each side of said hopper; material distribution means with outlet control; structural means fixed to said hopped for moving the spreader; and at least one rearwardly disposed sheet metal leg including an elongate planar portion with one end constituting a foot, means securing said leg to said hopper, said leg planar portion including an integral continuous flange along its sides and around its foot.

5. A sheet metal leg for use as support structure for wheeled material distribution spreaders comprising: an elongate tapered planar section having an integral continuous side flange extending along the side edges from the wide end of said section and integrally passing completely around the edge of said small end of said section, the width of said flange at said small end being greater than the width at said large end and the side portions of said flange being tapered from end to end, and a longitudinal rib formation in said elongate planar section extending from adjacent said wide end to a position adjacent said small end and occupying space between said side flange portions.

6. A single piece sheet metal leg for use as a support structure for wheeled material distribution spreaders comprising: an elongate planar web section substantially flat over its entire extent from one end to the other and having an integral side flange extending transverse from said planar web section on both long side edges of said web section, said side flange being continuous from adjacent the upper end of the leg down one side, around and integral with the other end of said web section and still continuous along the other side to adjacent the upper end of the leg, and a longitudinal rib formation in said elongate planar web section extending to positions at least approximate the ends of said planar web section.

7. A sheet metal leg as defined in claim 6, wherein the end of said section around which the integral flange passes is curved.

8. A sheet metal leg as defined in claim 7, wherein the flange terminates on each side essentially at the end of said section opposite said curved end.

9. A sheet metal leg as defined in claim 7, wherein said longitudinal rib protrudes from said flat section in the same direction as said flange projects.

10. A hopper type material spreader comprising: a lateral wheeled hopper with adjustable material discharge outlet means, a handle assembly and support legs, said handle assembly having handle means with lower spaced apart extremities disposed at opposite sides of said hop-

per, said support legs each comprise identical longitudinally centrally ribbed sheet metal legs with a flat main portion extending between the upper and lower end of the legs and having a single structurally integral continuous exterior edge flange, said legs being disposed at opposite sides of said hopper adjacent respective attachment extremities of said handle means, a portion of the continuous exterior flange of each leg at one end thereof extending normal to said flat portion and providing a foot on said leg, and a set of fastening means rigidly secure each set of a leg and a handle attachment extremity to the respective side of said hopper.

11. A material spreader as defined in claim 10, wherein said set of fastening means includes at least two fasteners passing through a leg, a handle attachment and the hopper side and rigidly securing all three components in a unitary structure.

12. A wheeled material spreader comprising: a hopper with two spaced apart substantial vertical side portions; a rearwardly and downwardly directed elongate leg member on each said vertical side wall portion; each leg member having a flat planar portion extending from an upper end to a lower end, said upper end including means enabling said leg to be rigidly secured to its associted hopper side wall portion at least at two locations in said upper end to dispose said flat planar leg portion in a substantially vertical plane parallel with and closely adjacent its associated said vertical side wall portion, and a single continuous structurally integral flange substantially normal to and along both side edges and the foot end of said leg

planar portion; and fastening means cooperating with the means in the upper ends of both leg members and with said hopper side wall portions rigidly securing each leg at least at said two locations on each leg to, and with the upper leg end of said planar portion closely adjacent, its respective associated vertical side wall portion.

13. A single piece sheet metal leg with an elongate planar web portion having two ends and substantially flat over its entire extent from one end to the other one of said ends including a large flat area including means by which said leg may be secured flat against a body to be supported by said leg and the other of said ends being curved and constituting a foot end; a flange structurally integral with and substantially normal to said flat planar web portion starting at a location adjacent one side edge of said one end, passing along said one side edge to and around said curved foot end and continuing on up the other side edge of said flat planar web portion to a location adjacent said one end.

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