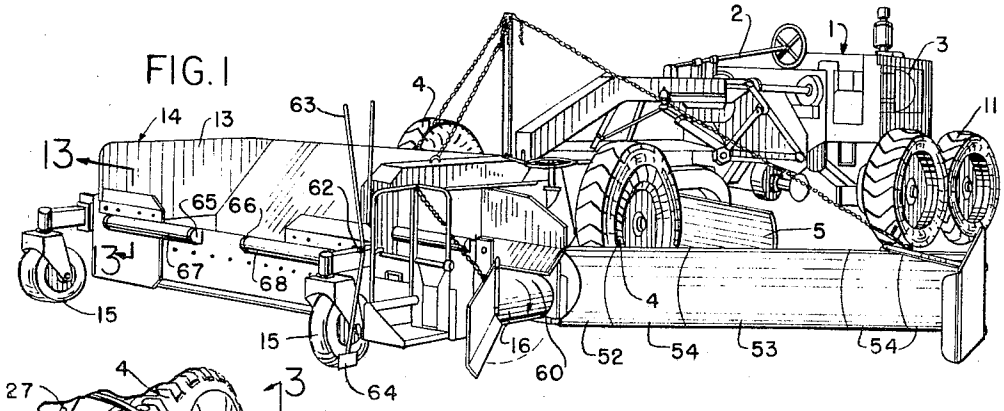
Nov. 9, 1965 R. D. MacDONALD 3,216,337

SPREADER ATTACHMENT

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FIG. 1



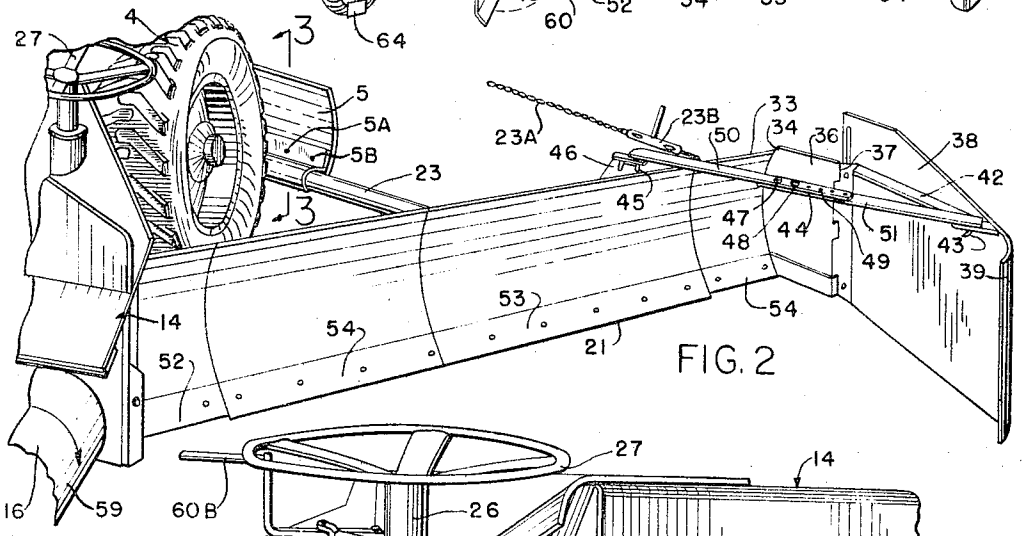


FIG. 2

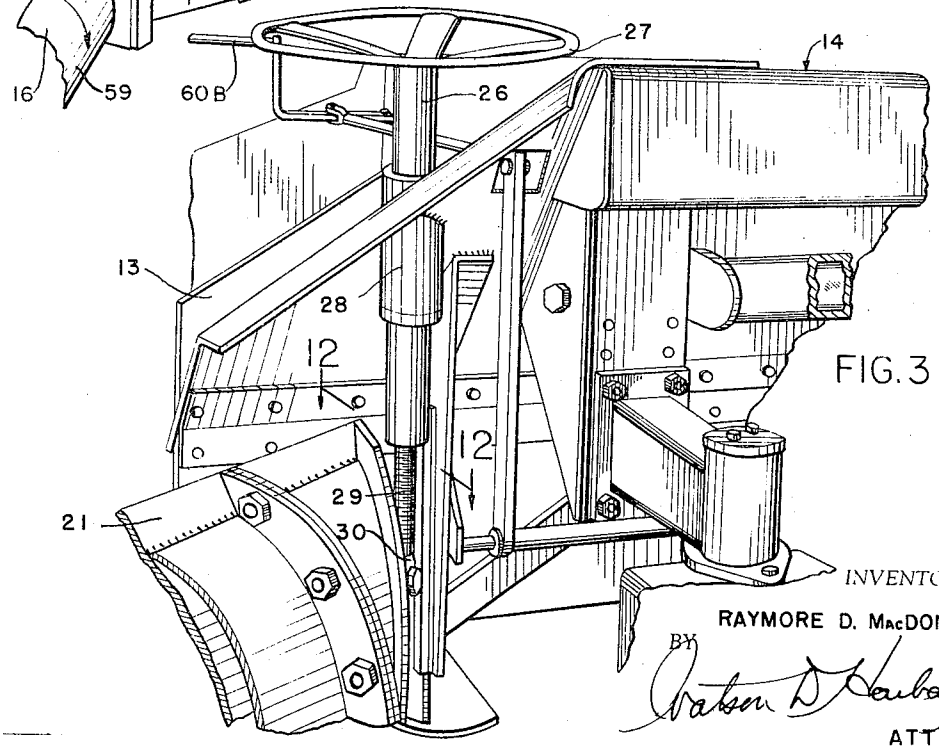


FIG. 3

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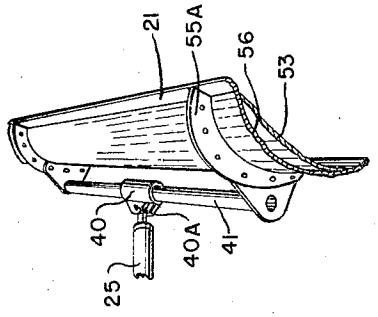


FIG. 5

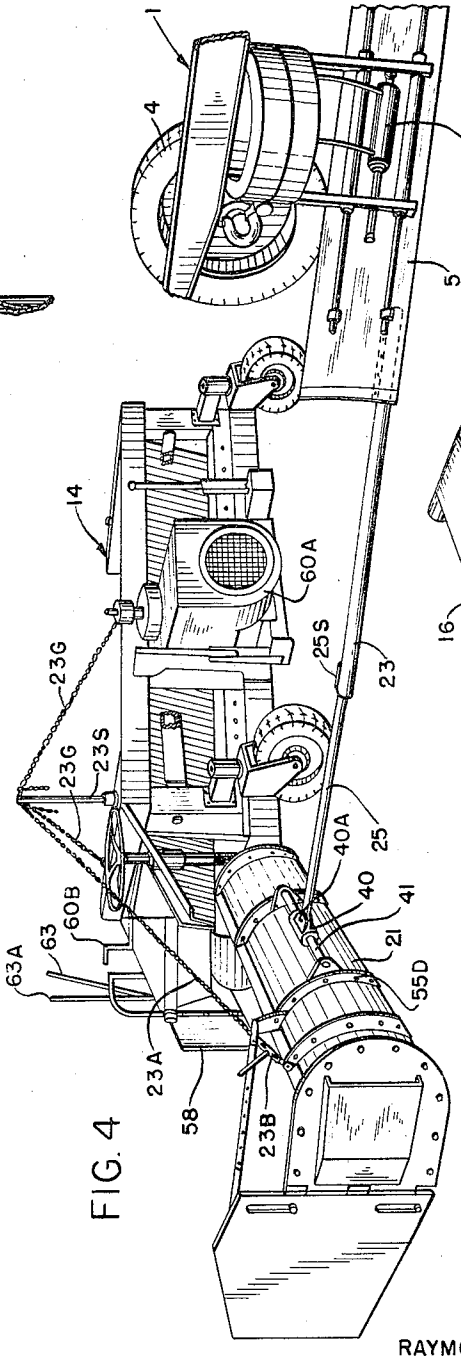


FIG. 4

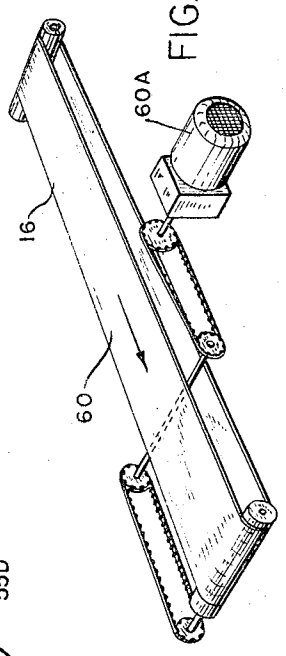


FIG. 6

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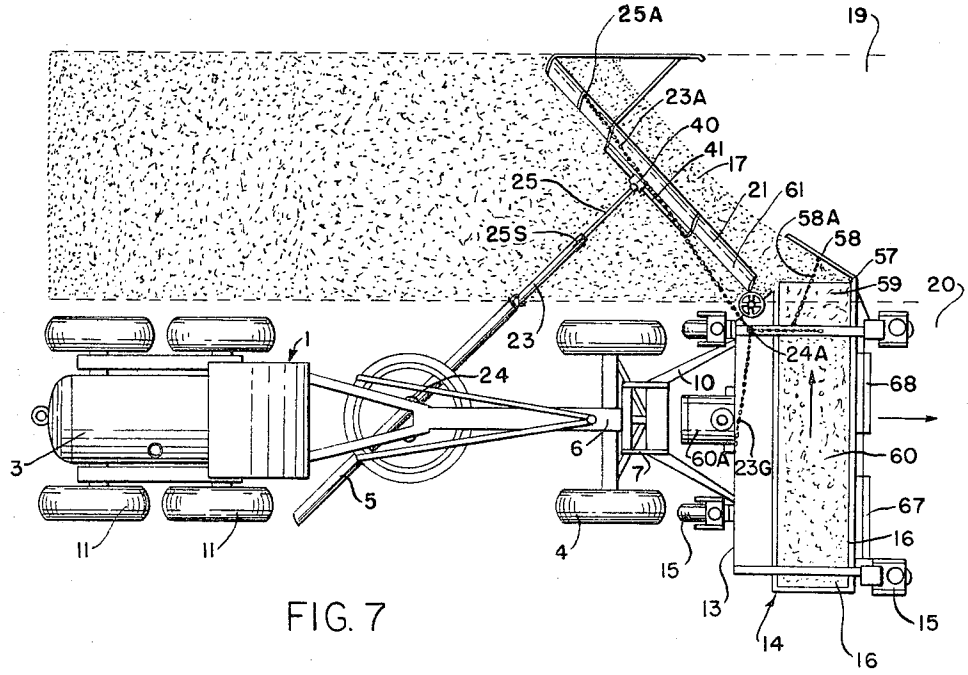


FIG. 7

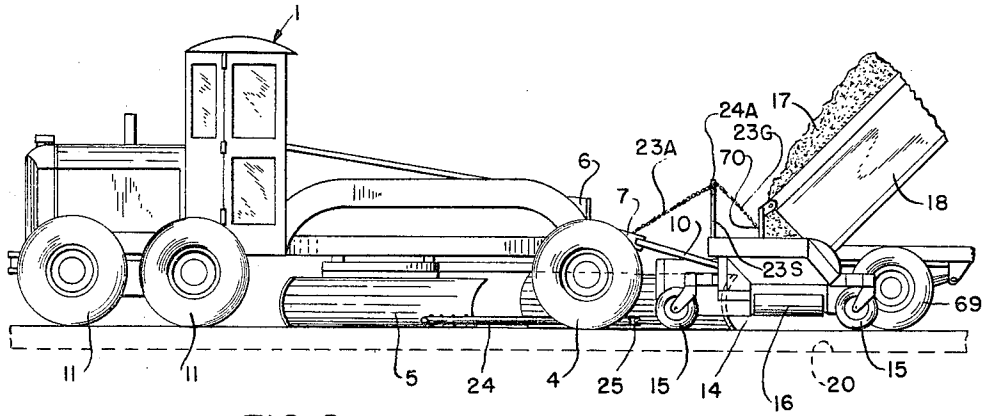


FIG. 8

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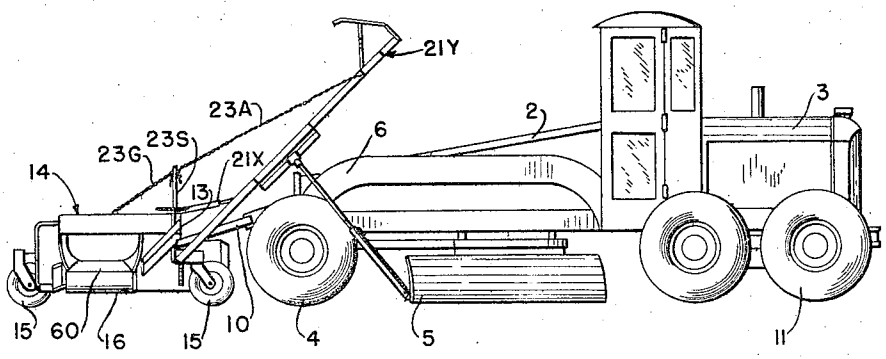


FIG. 8A

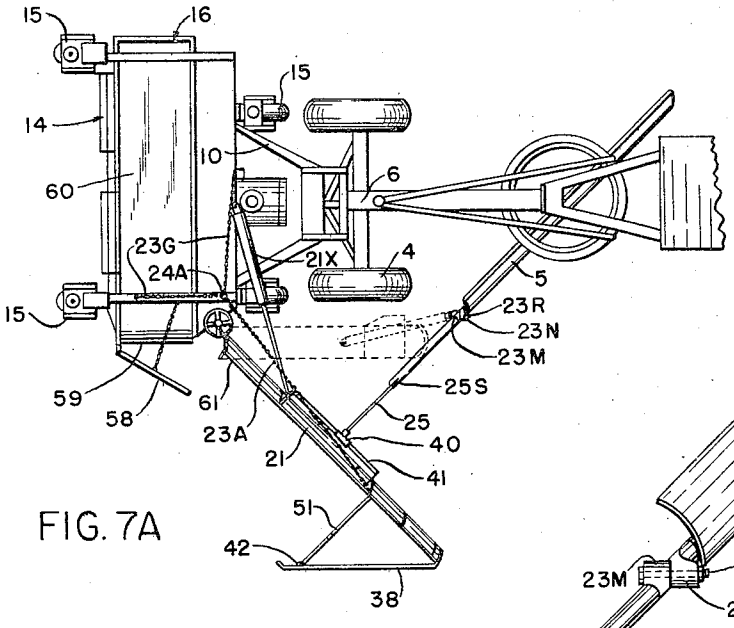


FIG. 7A

FIG. 15

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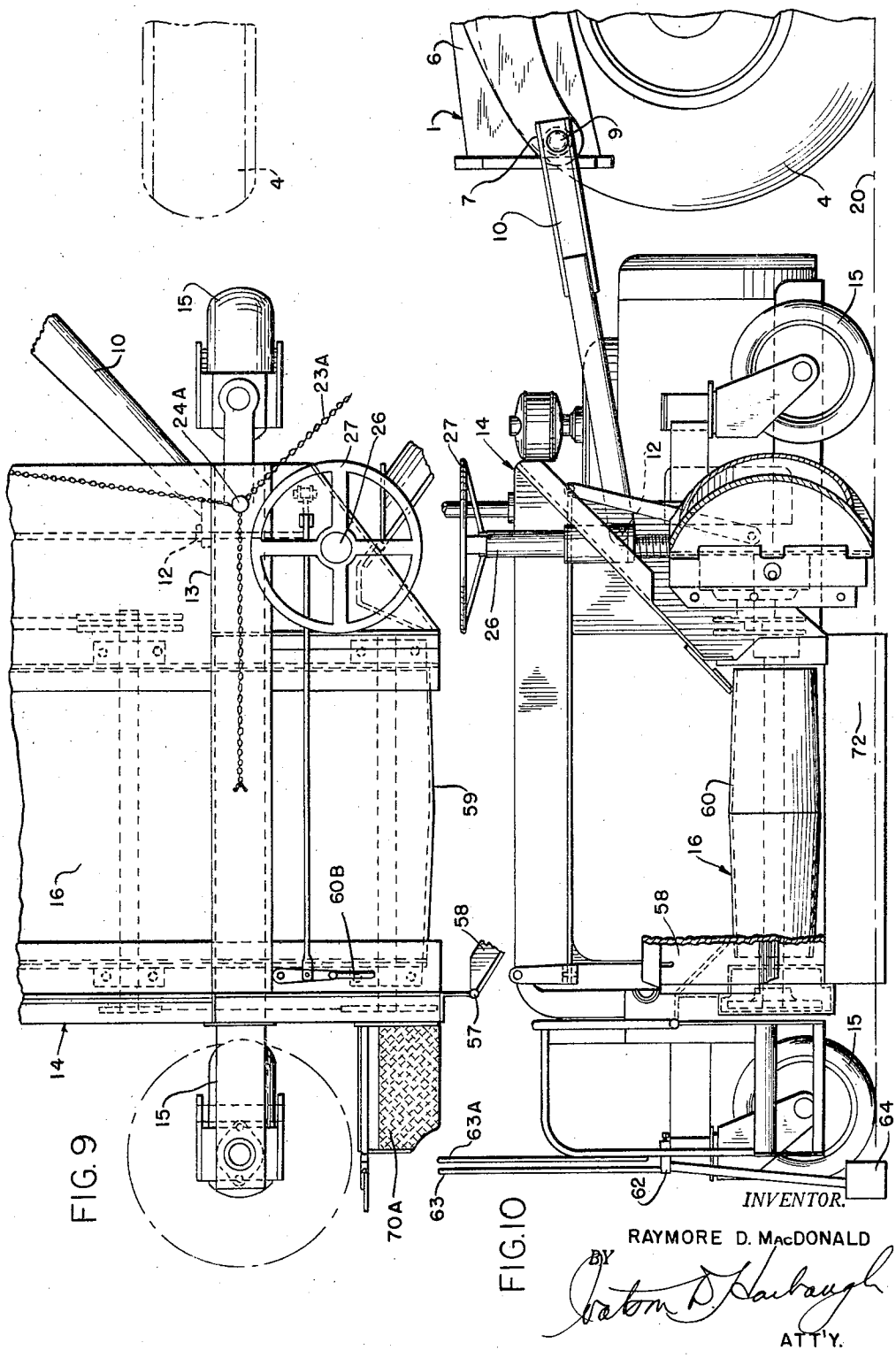


FIG. 9

FIG. 10

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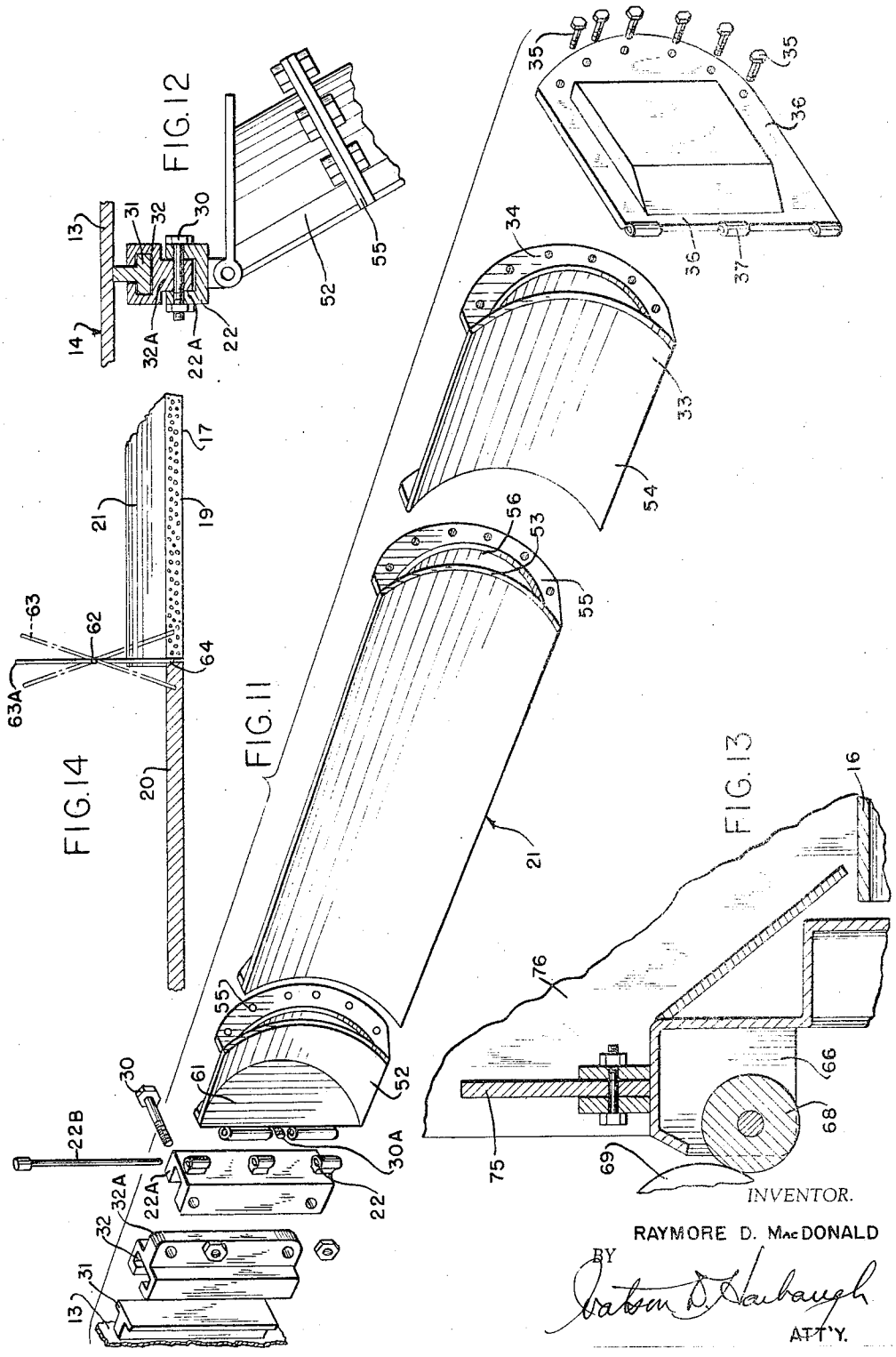
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Nov. 9, 1965 R. D. MacDONALD 3,216,337

SPREADER ATTACHMENT

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United States Patent Office 3,216,337 Patented Nov. 9, 1965

3,216,337

SPREADER ATTACHMENT

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Filed Aug. 20, 1962, Ser. No. 218,080
15 Claims. (Cl. 94—44)

This invention relates generally to road grading equipment and more specifically to shoulder spreader attachments for road building machinery such as road graders for widening roads. This application is a continuation-in-part of my application, Serial No. 859,480 filed December 14, 1959, now Patent No. 3,177,785.

From time to time it becomes desirable to utilize standard, powered road building machinery for jobs other than the uses for which they are initially built, particularly where the machinery can operate on a road surface whose grade is firmly established so that heavy equipment can perform heavy work along the side of the road, such as shoulder grading, shoulder aggregate spreading or roadside trench filling as powered, controlled and guided solely from the road grader surface. It is obviously a financially impractical matter to supply a particular machine adequately weighted and powered to do such tasks when an attachment may be made for standard road building machinery such as a road grader which will perform the tasks when so equipped, and supply the necessary power. The attachment is shown herein in connection with a road grader for purposes of illustration, although a motor truck or tractor can be used.

It is therefore the primary object of this invention to provide a new and improved material spreader and trench filler attachment for road graders which is a self contained unit that responds to the steering of the road grader yet imposes no varying weight upon the pneumatic tires thereof that would impair accurate and uniform grading of fill material along the side of the traveled portion of the road.

It is a more specific object of this invention to provide a self-supporting wheeled attachment for a propelling vehicle which may be suitably hitched to the forward end of the vehicle for the purpose of receiving aggregate material from dumping vehicles and for spreading and grading the same evenly along the shoulder area of a roadway.

A further object is to provide a trench filling material spreading attachment which maintains a steady position of the strike-off blade irrespective of the sub-grade of the trench and regardless of whether the attachment is empty or loaded yet the frame height can be selectively varied vertically to clear road conditions while receiving material from both large and small trucks without damage or spillage when engaging or disengaging the truck.

A further object is to provide an improved spreader whose spreading depth and rate of material transfer can be infinitely varied through the throttling of the prime mover for the material conveyor belt and the feeding and apportioning arrangement entails a minimized side draft at the outer end of the strike-off blade without any voids or spill-over at the top edge.

Another object of this invention is to provide an improved hitch connection between a wheeled material spreader attachment and a road grader both as to horizontal stability, draft and directional control wherein man power is minimized with the power and steering done by the motor grader and the handling of the truck dumping, spreading and general operation of the spreader is controlled by a single man on a walk-on platform in front of the material conveyor belt.

A further object of this invention is to provide an improved spreader blade construction for shoulder surface spreading attachments for road graders and an improved

support for same under the control of a powered element on the motor grader to raise and lower the blade.

Another object of this invention is to provide an improved adjustable supporting structure for a strike-off blade carried by a propelled material spreader attachment and an improved strike-off blade which is curved to mix and roll the material and has no openings on its front face and an end plate which prevents a trapping of rocks and a tearing of the surface of the material.

Another object of the invention is to provide a braced, laterally disposed strike-off blade construction that can be momentarily raised to clear obstructions without altering the present grade adjustments for immediate return to its working position.

A more specific object of this invention is to provide an improved shoulder grading attachment for prime movers wherein the attachment includes an improved transversely directed conveyor mechanism for delivering aggregate material to a point well within the shoulder area adjacent to a road surface for spreading and leveling by an improved adjustably connected spreader blade assembly.

These being among the objects of the invention, other and further objects and advantages will appear from the drawings and the following description and appended claims, certain embodiments of which are illustrated in the accompanying drawings, in which:

FIG. 1 is a perspective view of the road grader attachment of this invention hitched to the front end of a road grader with the material control gate moved forwardly to provide a clear view of the end of the conveyor belt at its location;

FIG. 2 is a fragmentary detail front view of the road grader attachment illustrating the strike-off blade and components in enlarged dimensions and a preferred manner in which the outer end is supported on the motor grader for vertical adjustment as well as the angle of the blade;

FIG. 3 is a fragmentary partially sectioned view taken along the line 3—3 of FIG. 2 and illustrates the vertical adjustment means for the inner end of the strike-off blade of the attachment reference being made to FIG. 12 for another view of it;

FIG. 4 is an angular rear view of the grader attachment taken from behind the strike-off blade;

FIG. 5 is a perspective view of several of the elements shown in FIG. 4 for bracing the outer end of the strike-off blade at right angles and slidably along a portion of the length thereof;

FIG. 6 is a diagram of the conveyor mechanism for the spreader attachment of this invention;

FIG. 7 is a plan view of a combined motor grader and spreader attachment of this invention in operation showing the solid rubber load weight support wheels of the trench filler and the depth adjustment of the outer end of the strike-off blade;

FIG. 7*a* is a view similar to FIG. 7 showing an improved means for raising the strike-off blade for transportation;

FIG. 8 is a view in side elevation illustrating in fragmentary form a vehicle in the process of dumping aggregate material on to the conveyor mechanism of the spreader attachment of this invention for support thereby independently of the pneumatic wheels of the motor grader;

FIG. 8*a* is a view similar to FIG. 8 but in the opposite side thereof with the strike-off blade of FIG. 7*a* in transport position and the hopper empty;

FIG. 9 is an enlarged fragmentary plan view of the dispensing side of the spreader attachment with the operator's walk-on platform ahead of the conveyor belt;

FIG. 10 is a view in front elevation of the dispensing end of the spreader attachment illustrated in FIG. 9 showing the relative disposition of the strike-off blade height

adjustment, the steering guide mechanism and the conveyor belt position;

FIG. 11 is a perspective exploded view of the scraper blade and its attachment to the road spreader attachment frame;

FIG. 12 is a fragmentary detailed sectional view of the vertical adjustment and hinged construction between the scraper blade and the spreader attachment structure taken along the line 12—12 of FIG. 3;

FIG. 13 is a fragmentary sectioned view taken the line 13—13 of FIG. 1;

FIG. 14 is a detailed view of the indicator rod attached to the spreader attachment to assist the driver of the road grader in steering the vehicles when used in combination; and

FIG. 15 is a view showing the apparatus by which the strike-off blade is raised for transportation.

Referring more particularly to the drawings, a standard road grader is generally indicated at **1** having a rear engine **3**, a steering mechanism **2** for the front wheels **4** and rear drive wheels **11**, and a centrally disposed road scraper or grader blade **5**. A hitch member **7** is secured to the forward framework **6** of the grader **1** and supports an H shaped connector **10** (FIG. 7) as pivoted thereto about a horizontal axis, by a pin **9** (FIG. 10) at one end and about a horizontal axis parallel thereto. The H frame **10** is connected at its forward terminal by pins **12** to the frame structure **13** of a shoulder spreader attachment assembly generally indicated at **14**. The four point securement provided by the H-frame hitch inter-transmits torsion forces, and, as will be noted later with the motor grader loaded with a light constant load in a clockwise direction by the down pressure upon the strike-off blade and the material spreader loaded with a counter-clockwise torque load by the weight of the strike-off blade, the assembly is rigidified as a unit under working conditions for constant uniform results irrespective of variations in the sub-grade and the hopper load of the material spreader.

For a levelling support the spreader attachment assembly is carried by a plurality of widely spaced solid rubber tired castered wheels **15** which render the attachment assembly solid with respect to the road and steerable by the action of the front wheels **4** of the motor grader **1** through the H-frame hitch connection **7** by the operator of the motor grader **1**.

Transversely disposed on the spreader attachment assembly is a conveyor belt mechanism **16** which, as illustrated in FIG. 8, receives aggregate or fill material from a dumping vehicle **18** for delivery laterally to the trenched-out shoulder area **19** contiguous to the traveled road surface **20**. Upon being deposited in the shoulder trench area **19**, the aggregate material **17** is engaged by a strike-off blade **21** and thereby spread forwardly, laterally and levelled to grade by the blade **21** with the forward movement of the vehicle.

In order to determine the angle of the blade or the width of aggregate spread, or both, the blade **21** is angularly adjustable about a hinged, vertically adjustable universal joint connection **22** on the frame **13** of a spreader attachment assembly **14** (FIGS. 11 and 12). The angular adjustment of the blade **21** about the hinge **22** is accomplished by means of a telescoping rod assembly **23** (FIG. 7) which is connected either rigidly or pivotally about a horizontal axis at its inner end **24** with a member of the motor grader **1** and at the other end **25** pivotally and preferably slidably along the back side of the strike-off blade **21** so that in all adjusted positions the rod assembly **23** is substantially square to the blade **21**. This is true when the conventional endwise adjustment of the scraper blade is accomplished by a hydraulic shift means **5***x* (FIG. 4).

In this connection, it is to be noted that the telescoping rod can be mounted directly on the motor grader frame as at **24** or rigidly to the grader scraper blade **21** and a

chain fall or guy **23***a* interconnects the outer end **25***a* and a support point **24***a* on the vehicle assembly. In FIG. 4 the connection **23** is shown as made directly to the motor grader scraper blade or frame as where a deflectable beam member **25** (FIG. 5) is adjustable telescopically in the sleeve portion **25***a* of the rod assembly **23**, and the sleeve portion is mounted for quick attachment by bolt **5***a* and **5***b* as secured to the front or back side of the blade **5**. The telescoping member **25** can be adjusted as to length by a latch arrangement **25***a*.

The chain **23***a* is preferably attached to the material spreader of the vehicle assembly so that it rigidly supports the blade **21** to determine its fixed lowered working position at its outer end. Downward pressure can be supplied by the scraper blade **5** through the deflection of the beam **25** to hold the blade **21** at the limit of the chain **23***a*. The blade **21** is thus rigidly supported with respect to the material spreader and to the motor grader through the H frame **10** to lay a perfect fill.

In order to adjust the strike-off level of the aggregate on the shoulder **19** at the inner end of the strike-off blade **21**, the vertical adjustment of the inner end of the strike-off blade **21** is accomplished by means of a manually adjustable vertical female threaded drive shaft **26** (FIG. 3) driven by a hand wheel member **27** at the top thereof. The shaft **26** is journalled on the frame structure **13** through a support **28**. The lower extremity of the shaft **26** threadedly receives at **29** the upper end of a bolt member **30** secured to the back of the blade assembly so that rotation of the shaft **26** will cause the blade **21** to move vertically. Guided movement vertically is accomplished by an assembly comprising a slide member **31** disposed in a key-way **32**. One of the elements is mounted on the main frame (FIG. 12) and the other element is vertically dovetailed and pivotally mounted horizontally to provide for vertical movement of the outer end of the strike-off blade **21** from a working position to a raised transport or traveling position by pivotal action about the horizontally disposed bolt **30**.

As seen in FIGS. 11 and 12 the bolt **30** is oriented for this purpose to provide a horizontal pivotal axis parallel with the direction of travel of the vehicle assembly. The bolt **30** is located near the top of the assembly and supports spaced flanges **22***a* on member **22** which dovetails with the member **32***a*. When in working position a lower bolt **30***a* can be employed to maintain the dovetail relationship which holds the strike-off blade in its working position against torsional strains. Upon its other side the member **22** provides a hinged connection that enables fore and aft movement of the blade. The pintle bolt **22***b* joins the strike-off blade to the element **22** in a well know manner.

By adjusting the relative position of the components of the telescoping rod assembly **23** and by adjusting the elevating shaft **26**, the blade **21** may be adjusted at its inner end to various vertical and angular positions relative to the shoulder fill to determine the strike-off level thereof and the width at which aggregate is deposited in the road shoulder trench.

The outer extremity **33** of blade **21** is provided with an offset flange **34** to which is connect by bolts **35** a transverse plate member **36**. Secured by a hinge assembly **37** to the forward end of plate **36**, is an adjustable side plate member **38** which is provided with an inwardly turned leading edge **39** which can be used to clean the bottom of the trench to the outer end for a full fill of aggregate. The interior surface of the plate **38** is provided with a bracket **42** to which is freely connected an adjustment arm assembly **44** by a pivot pin **43**. The other end of assembly **44** (FIG. 2) is freely connected by a pivot pin **45** to a flange **46** on the upper rear surface of blade **21**. By positioning bolts **47** and **48** in suitably aligned holes **49** of component arms **50** and **51** of the assembly **44**, the planar position of the plate **38** may be adjusted after the position of blade **21** has been determined so that the

said plane of the plate will be set with respect to the direction of motion of the vehicle assembly to thereby attain a constant width of aggregate material as is clearly illustrated in FIG. 7.

As illustrated in FIG. 11, the improved blade **21** includes a plurality of rigidly interconnected blade parts **52**, **53** and **54**, the parts **52**, **53** and **54** being interconnected through the use of abutting flanged members **55** through which extend a series of bolts **55***a*. Each blade section is made up of segments of cylindrical surfaces of different diameters, the segment **56** of smaller diameter being edge welded to the back of the segment **53** of greater diameter, not only to provide a contour easy to keep clean but a reinforced member having beam deflection strengths. Upon the back of the main one **53** of these parts is mounted a rod **41** longitudinally thereof to receive slidably thereon element **40** pivotally secured about a vertical axis at **40***a* to the outer end **25** of the beam **23**.

In order to adjust the over-all shoulder width range of the blade **21** above and beyond the adjustment provided by the assembly **23**, it is merely necessary to remove one of the sections **54** of different lengths and substittue therefor a similarly constructed unit of a lesser or greater length. It is preferred that the angle of the strike-off blade's working position at all times be a 45° angle to the direction of travel. Reinforcing flange members **55** are connected at the top and bottom ends thereof as by welding to the end extremities of the blade **21**. It will be noted from FIGS. 10 and 11 that the included arc of the flange members is smaller than the arc of the forward surface of the blade **21** and agrees with the arc of a reinforcing member **56** which is likewise welded to the rear surface of the blade member **21**. The purpose of the construction will be obvious to one skilled in the art in that it will assist in protecting a relatively light gauge blade from damage due to bending or breakage.

Forwardly of the conveyor belt **16** at its discharge end is positioned a gate member **58** which can be adjusted to limit material delivered by the conveyor to the road bed **19**. This gate is secured to the frame structure **13** preferably by a spring loaded hinge **57** as illustrated in FIG. 7, and as restrained by the chain **58***a* assists in guiding aggregate dispensed from the end **59** of the conveyor belt **60** to the immediately adjacent portion **61** of blade **21**. This prevents the omission of aggregate spread in the area immediately adjacent to the road surface **20** yet provides an adequate supply of aggregate to tumble outwardly and fill the trench as the strike-off blade **21** moves forwardly.

In this connection, it is interesting to note that the speed of the conveyor belt is controlled by adjusting the speed of a gasoline engine **60***a* with a throttle **60***b*, yet if the conveyor belt tends to overrun the material supplied, the gate serves as a retarding agent and slippage between the conveyor belt and the material will accommodate to the circumstances accordingly. Thus, the gate control and the speed of the belt can be adjusted accordingly merely by watching the "pile up" of the material at the gate.

Mounted on the frame structure **31** by means of a pivot pin **62** is a steering guide wand **63** which has a lower runner member **64** for engaging the outer edge of the road surface **20** during grading operations. The mounting of the guide wand **63** is spring-biased by means (not shown) so that the runner member **64** is held in engagement with the road edge surface at all times. Obviously, therefore, if the operator of the road grader **1** is not correctly following the road edge during a spreading operation, the guide member **63** will tilt to left or right of a vertical reference member **63***a* indicating a steering deviation as illustrated in broken lines in FIG. 14. Thus, the motor grader operator need only watch the upper end of the member **63** in order to make slight adjustments on the steering mechanism **2** to correct the direction of movement of the grader and hence of the attachment **14**.

Mounted on the frame structure **13** forwardly of the attachment assembly **14** is a pair of brackets **65** and **66** which carry in rotatable support thereon horizontal rollers **67** and **68** with yielding non-spillage flaps **75** above them as part of the front wall of the hopper **76** (FIG. 13). During an aggregate spreading operation a dumping vehicle **18** of any wheel size is moved into position forwardly of the assembly **14** so that the wheels **69** thereof engage the rollers **67** and **68**. The vehicle brakes are released and when the rollers and wheels engage, the tail gate **70** of the vehicle **18** is opened with the bed raised and material **17** will be deposited on the conveyor element **60** and fill the hopper above the conveyor belt while the grader **1** is moving both the attachment assembly **14** and the vehicle **18** forwardly through the engagement with rollers **67** and **68**. The rate of the spreading of the material **17** on the shoulder **19** is controlled by the speed of the grader **1** and by the speed of the conveyor belt **60** which is correlated therewith by means as already mentioned by the operator on the walk-on platform **70***a* where the throttle is located for that purpose.

Another advantage of the hitch frame **7** is that all weight of the aggregate material **17** is carried by the spreader attachment **14**, none of the working weight of the material in the hopper is transmitted through the hitch member to the forward frame structure **6** of the grader. If the weight were so transferred by a weight bearing hitch arrangement, there would be a vertical movement of the frame **6** due to variations in the running radius of the pneumatic wheels **4** and consequently a corresponding vertical variation in the strike-off level which would thereby affect the depth of the aggregate spread along the shoulder area **19** by the blade **21**.

Attached to the frame structure **13** adjacent to the dispensing end **59** of the conveyor belt is a relatively stiff rubber shield **72** which not only wipes the external surface of the belt but prevents aggregate from feeding back under the conveyor element **60** to such a position that it would interfere with the free movement of the caster wheels **15** as the attachment **14** is propelled by the grader but it also serves as a shield overhanging the edge of the trench to confine all material to the shoulder trench **19**.

Referring to FIGS. 7, 7*a*, 8, 8*a* and 14 it will be observed that the outer end of the strike-off blade **21** is rigidly supported by the chain fall **23***a* having a turnbuckle adjustment **23***b* interconnected therebetween. The other end of the chain fall is adjustably secured by a link lock to the top of a strut **23***s* that is carried by the attachment **14**. The strut in turn is guyed by guy chains **23***g*. Thus, with downward pressure supplied by suitable means such as the deflection beam **23** or by hydraulic jack **21***x*, the strike-off blade **21** is held quite firmly in constant working position and working level in relation to the four caster wheel supports of the attachment positioned on the traveled roadbed grade regardless of depth variations occurring with the trench **19**. Therefore, since the caster wheel supports are tired with solid rubber and exclusively determined the strike-off level of the strike-off blade **21**, the accuracy of the trench filling is assured where such could not be attained if pneumatic tires of the motor grader are involved.

In connection with FIG. 12, reference is made to FIG. 15 in which the beam **23** adjacent to the scraper blade **5** comprises two sections **23***m* and **23***n* jointed at 45° to pivot about a bolt **23***r* defining a horizontal axis coincident with that of bolt **30**. Thus with hydraulic jack **21***x* interconnecting the spreader attachment **14** and the strike-off blade **21**, when the pivot at **23***r* is present, the hydraulic jack **21***x* may also be used whereby the strike-off blade can be raised any distance desired from its working position in FIG. 7*a* to its raised position **21***y* shown in FIGS. 9, 8*a* and in dotted lines in FIG. 7*a* when clearing obstructions or for traveling as well as a hold down device to provide downward pressure on the strike-off blade in its working position.

Having thus described the invention and the embodi-

ments thereof, it will be seen how the objects set forth are fulfilled and in operation how the fill material moves immediately to the strike-off blade as soon as dumping of material starts, yet a hopper large enough to provide sufficient reserve material is utilized for uninterrupted operation between trucks. Moreover, the trucks are quickly handled because they can be received against the push rollers between the front caster wheels and non-spillage flaps provide a clean dumping operation with no apron to lower to enable departure of the truck.

The four wheel suspension on hard rubber tired caster wheels spaced as particularly shown in FIG. 7*a* with the greatest diagonal distance of the attachment in substantial alignment with the strike-off blade 21 provides the positive control and uniform strike-off level described, empty or loaded and does so in a completely self supporting way so that other prime movers can be used to propel the equipment without change in the stability of the strike-off blade. Also, it will be observed that the conveyor belt drive as illustrated in FIGS. 4 and 6 is driven from a gas engine and transmission through a simple chain drive with maximum efficiency and is protected from contamination at the front where it is readily accessible behind the walk-on platform.

As already indicated the hinged gate forms a box or feed mouth control as tethered adjustably by chain for maintaining uniform spread and depth load upon the strike-off blade to prevent spill over, voids and inordinate side draft drags at the outer end of the strike-off blade. Here again vertical adjustment by a bolt and slot arrangement shown in FIG. 1 along with the horizontal movement enables effective use of the gate for its purposes under all working conditions in controlling the amount of material leaving the hopper at given speed of the conveyor belt.

Furthermore, the strike-off blade itself minimizes its load upon the equipment in that it is a fabricated lightweight construction which is strong and which, as curved on its working face, mixes and rolls the material outwardly to minimize segregation and side draft. Moreover, there are no openings or recesses on its working face yet has a readily replaceable cutting edge without any obstructions. The end plate closes the end and serves also as a hinge plate and scraping edge with a rolling action that prevents any trapping of rocks and tearing of the fill surface.

The walk-on platform, movable pivotally for access to the chain drives is particularly useful at the forward edge because it is ahead of the material being laid and permits closer proximity to the material with less discomfort to the operator if hot asphalt is being spread. Thus, the platform as located dispenses with an extra man, leaving everything under the coordinated control of a team of two men, the grader operator and the one controlling the conveyor belt, thereby attaining the status of the limited personnel required to operate a self propelled trench filler, namely two men.

Moreover, the hitch frame is quickly detachable and all other adjustments for work conditions can be readily made including the combination edger flap and conveyor belt wiper located below and inwardly of the conveyor belt roller that overhangs the trench. Moreover, the spreader is narrow enough fore and aft that it can be easily rolled onto a trailer for travel on a highway and be within the conventional truck width limits.

Consequently, it will be readily seen how various and further modifications can be made without departing from the invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. In a shoulder spreading vehicle comprising a rear motor driven road engaging propelling unit and a front attachment unit coupled thereto in longitudinal alignment and propelled forwardly thereby

said rear propelling unit having an operator's station embodying controls for steering said shoulder spreading vehicle and for controlling the shoulder spreading operation,

said front attachment unit comprising solid rubber tired caster road wheels spaced a distance sufficient to receive a dump truck body between them at the front,

a hopper supported on said road wheels for receiving fill material from a dump truck which travels ahead of said front attachment unit, between said caster road wheels, whereby fill material in the hopper will hold the front attachment unit firmly to the road,

a conveyor travelling in the lower portion of said hopper for discharging fill material from said hopper to one side of said attachment unit,

a relatively long strike-off blade projecting diagonally outwardly and rearwardly from said attachment unit for receiving fill material discharged by said conveyor and for spreading such material outwardly and striking it off at a predetermined level,

said strike-off blade having its inner front end pivotally connected with said attachment unit at a point disposed rearwardly of and in relatively close proximity to the point of discharge of the fill material from said conveyor,

and extending rearwardly at a relatively sharp angle whereby to effect a substantially uniform distribution of the fill material out along the entire length of the blade,

said inner front connection comprising a universal mechanism having a substantially vertical axis and a horizontal axis pivot means accommodating horizontal and vertical angulation of said blade relative to said shoulder spreading vehicle,

means for vertically adjusting the strike-off level of the inner end of said strike-off blade,

an upright strut on said attachment unit above the last mentioned means,

outer rear connecting mechanism pivotally connecting an outer rear portion of said strike-off blade with said attachment unit and including an adjustable fall means supporting the outer end of said strike-off blade from the strut for adjusting the strike-off level of the outer end of said strike-off blade with respect to the front attachment unit,

a side draft sustaining boom pivotally connected at its outer end with an outer portion of said strike-off blade and extending inwardly from the back side of said blade to said propelling unit, whereby to hold said strike-off blade down at its strike-off level as a flexure stress and to bear a substantial portion of the side draft exerted by said fill material being deflected outwardly along said strike-off blade is borne as a compression stress in said boom.

2. In a shoulder spreading vehicle including a propelling vehicle unit,

a hopper propelled by the propelling vehicle unit for receiving fill material from a dump truck which travels ahead of it,

a conveyor travelling in the lower portion of said hopper for discharging the fill material from said hopper to one side of said attachment unit,

a strike-off blade extending outwardly and rearwardly and being pivotally connected at its inner front end with said shoulder spreading vehicle at a point disposed rearwardly of and in relatively close proximity to the point of discharge of the fill material from said conveyor,

solid rubber tired caster road wheels supporting said hopper, conveyor and strike-off blade on a roadway,

said pivotal connection including a vertical adjusting mechanism for controlling the level of said strike-off blade,

an upright strut on said shoulder spreading vehicle above said mechanism,

outer connecting mechanism pivotally connecting an outer rear portion of said strike-off blade with said shoulder spreading vehicle and including a chain fall supporting the outer end of said strike-off blade from the strut for adjusting the strike-off level of the outer end of said strike-off blade,

a side draft means interconnecting the propelling vehicle unit and the outer end portion of the strike-off blade to withstand the side draft exerted thereon by said fill material being deflected outwardly along said strike-off blade,

said side draft means exerting a downward pressure upon the strike-off blade.

3. A trench filler comprising a wheeled shoulder spreader assembly attached to a propelled vehicle for depositing and spreading aggregate material,

said shoulder spreader comprising a frame structure, four solid rubber tired castered wheels supporting said frame structure,

releasable hitch means interconnecting said assembly and said propelled vehicle for relative movement therebetween about a horizontal axis disposed transverse to the direction of travel of said assembly,

a conveyor mechanism carried by the frame structure having motion transverse to the direction of movement of said assembly for depositing aggregate material on the shouder area of a road surface,

a spreader blade projecting diagonally outwardly and rearwardly from said frame structure to engage and spread said deposited aggregate material,

first adjustable means interconnecting the inner end of said blade to the frame structure of said spreader assembly,

second adjustable means interconnecting the outer end of said spreader blade and said spreader assembly,

said second adjustable means including a chain fall holding the outer end of the spreader blade means against downward movement beyond its working position, and vertically adjustable means interconnecting said propelling vehicle and spreader blade for holding said spreader blade against upward movement from its working position and transmitting through said hitch means a torsional force holding said wheels against a road surface.

4. In a shoulder spreading vehicle comprising a rear driver unit and a front driven unit attached thereto in longitudinal alignment, a connection between the unit, providing for relative vertical movement about transversely disposed parallel horizontal axes, said driven unit being adapted for movement along a roadway,

said front driven unit comprising

a hopper for receiving fill material from dump trucks pushed along the roadway ahead of said front driven unit,

a conveyor belt supported and travelling in the lower portion of said hopper transversely of the direction of movement of the driven unit for discharging fill material from said hopper on the shoulder area of a road surface at the side of said driven unit,

solid rubber tired wheels supporting the weight of said driven unit,

a strike-off blade projecting diagonally outwardly and rearwardly from said driven unit for engaging and spreading outwardly and levelling fill material discharged by said conveyor belt,

said strike-off blade having its inner front end disposed at a point located rearwardly of and in relatively close proximity to the point of discharge of fill material from said conveyor,

a vertical strut on said driven unit above said point,

means pivotally interconnecting the inner front end of said strike-off blade to said driven unit for pivotal movement about a horizontal axis for substantially vertical movement of the outer end of said blade relatively to said vehicle,

said pivotal means interconnecting the inner front end of said strike-off blade and said driven unit including a mechanism for vertically adjusting the strike-off level of the inner end of said strike-off blade,

outer rear connecting mechanism comprising brace means interconnecting the outer portion of said strike-off blade and the driver unit to sustain the strike-off blade against side draft pressures,

support means interconnecting said strut and the outer portion of said strike-off blade in weight bearing relationship to adjust the strike-off level of the outer end of said strike-off blade in its lowered position with respect to the roadway surface contacted by said solid rubber tired wheels, and

hydraulic means interconnecting said driven unit and said strike-off blade for lifting and lowering the outer portion of said strike-off blade with respect to said adjusted strike-off level.

5. A shoulder spreading vehicle comprising a motor driven propelling unit having a vertically adjustable element, and a spreader unit,

means supporting said spreader unit upon a roadway surface including transversely spaced castered wheels having solid rubber tires,

horizontal pivot hitch means interconnecting said units including a pivot pin having its axis disposed horizontally transverse to the direction of travel to permit relative vertical movement therebetween and to support the units against relative torsional movement about an axis extending in the direction of travel,

a hopper carried by said spreading unit adapted to receive fill material from dump trucks,

a conveyor belt traveling in the lower portion of the hopper in a direction transversely of the roadway surface for discharging fill material from said hopper to the side of the spreading unit,

a strike-off blade extending diagonally rearwardly and outwardly from said shoulder spreading vehicle with the inner end of said blade disposed at the rear of the point of discharge from said conveyor belt to engage and spread fill material therefrom,

brace means interconnecting said strike-off blade and the vertically adjustable element on the motor driven propelling unit for urging the strike-off blade in a downward direction,

said brace means including telescoping members for adjusting the horizontal angularity of said strike-off blade, and

means interconnecting the outer end of the strike-off blade and said spreading unit for adjustably limiting the downward movement of the strike-off blade.

6. In a road travelling shoulder spreader for spreading fill material in a shoulder area comprising a rear propelling unit and a front driven unit disposed in longitudinal alignment;

coupling means interconnecting said units including horizontally disposed pivot means with its axes extending transversely of the road and spaced longitudinally of the road to permit free relative vertical movement between the units while maintaining said units rigidly in longitudinal alignment, said driven unit including:

a frame;

means supporting said frame for travel on a roadway including caster road wheels having solid rubber tires bearing the full weight of the driven unit, with two front wheels located at the front of the frame and spaced from each other in a direction transverse to the path of travel a distance wide enough to receive the rear end of a dump truck therebetween;

a hopper extending said distance and supported on the frame for receiving fill material from a dump truck which travels ahead of the hopper between said front wheels;

a conveyor traveling in the lower portion of said hopper towards the shoulder area side of the driven unit and extending laterally beyond the front wheel adjacent thereto to a point within said shoulder area to discharge the fill material from the hopper out of the path of travel of the shoulder spreader directly to the shoulder area and at a place ahead of one of the remaining said wheels located at the rear of the frame;

a strike-off blade having its inner front end disposed at a point located rearwardly of and in relatively close proximity to the place of discharge of the fill material from said conveyor and extending diagonally outwardly and rearwardly to spread outwardly and strike-off at a predetermined height the fill material discharged from the conveyor;

means interconnecting the strike-off blade and driven unit for supporting the strike-off blade at a predetermined level with respect to the roadway engaged by the solid tired wheels and including

a lifting and lowering mechanism connected to the inner front end of said strike-off blade and said driven unit for vertically adjusting the strike-off level of the inner end of the strike-off blade,

an upright member mounted on the shoulder spreader above said roadway and

adjustable members interconnecting the upright member and an outer portion of said strike-off blade in weight bearing relationship for lifting and lowering the outer portion of said strike-off blade to adjust the strike-off height of the outer end of said strike-off blade;

extendible assembly means interconnecting the shoulder spreader and the strike-off blade for firmly holding the strike-off blade downwardly to its adjusted height including

a side draft mechanism interconnecting said propelling unit and the strike-off blade for supporting the strike-off blade at its diagonal angularity to withstand the side draft exerted thereon by said fill material being deflected outwardly along the strike-off blade.

7. The combination called for in claim **6** including

a transverse plate member rigidly secured at one end to the outer end of the strike-off blade at a right angle thereto to confine and strike off the fill material marginally within the transverse dimension of the shoulder area,

a forward extending runner plate pivotally connected about a vertical axis to the other end of the plate member for movement in a horizontal direction and having its leading vertical edge curved inwardly towards the driven unit,

adjustment means for locating the runner plate with the leading edge horizontally spaced inwardly from the outer edge of the shoulder area,

and vertical adjustment means for lowering the lower edge of the runner plate below the strike-off level of the strike-off blade to approximately the level of the bottom of the shoulder area being filled to remove and deflect outwardly any loose material marginally present in the shoulder area ahead of the driven unit.

8. The combination called for in claim **6** including

gate means hinged about a vertical axis to the hopper at the forward side of the conveyor including

a vertical hopper front wall member on said driven unit extending along the forward side of the conveyor to a point beyond its discharge end

a deflection plate hinged to the vertical wall member and extending diagonally outwardly and rearwardly substantially parallel to the strike-off blade for deflecting fill material back in under the conveyor where it overhangs said shoulder area, and

adjustment means interconnecting said deflection plate and said driven unit at a point to the rear of said vertical wall member for holding said deflection plate in place against the force of said discharged fill material.

9. A wheeled shoulder spreader assembly for attachment to a propelled vehicle for depositing and spreading aggregate material comprising

a frame structure,

a hopper carried by said frame structure

a plurality of solid tired wheels supporting said frame structure in full load and weight bearing relationship on a surface of a roadway at a predetermined level,

releasable hitch means pivotally interconnecting said assembly and said propelled vehicle for relative vertical movement about horizontal axes disposed transversely to the roadway without loading said hitch means with the weight of the shoulder spreader attachment,

conveyor mechanism carried by the frame structure for depositing aggregate material on the shoulder area of a road surface,

means for propelling said conveyor mechanism at a gradually variable speed,

an adjustable spreader blade means pivotally secured to the frame structure at one end rearwardly of said conveyor mechanism and projecting diagonally outwardly and rearwardly therefrom,

means secured to said frame at said one end of the blade for adjustably holding said spreader blade means at a working level,

means interconnecting said blade intermediate to the ends thereof with said propelled vehicle for holding the other end of the blade at a fixed predetermined horizontal diagonal working angle,

adjustable means carried by said frame structure including a strut extending above said hopper and fall means interconnecting the strut and an outer portion of said spreader blade for supporting the spreader blade means at said predetermined strike-off working level throughout its length with respect to said roadway surface,

gate means pivotally supported along an edge to the hopper ahead of said conveyor mechanism and adapted to extend rearwardly across the conveyor discharge to control the flow of aggregate material from the conveyor, and

connected to said gate and frame structure for controlling the openness of the gate means for directing the flow of aggregate material from the conveyor mechanism to the area of the connection between the blade and the frame structure.

10. A roadway shoulder spreader having a rear propelling unit and a front driven unit coupled together in longitudinal alignment with the driven unit propelled forwardly and steered by the propelling unit, said driven unit comprising:

a frame;

a hopper supported on the frame for receiving fill material from dump trucks which travel ahead of the hopper;

means supporting said frame for forward travel on a roadway beside a shoulder including road wheels having solid rubber tires with two front wheels located at the forward corners of the frame and spaced from each other in a direction transverse to the path of travel a distance wide enough to receive a discharge end of a dump truck pushed forwardly therebetween and two transversely spaced rear wheels on the rear of the frame;

a conveyor in the lower portion of said hopper below said discharge end for receiving fill material thereon, said conveyor being adapted to travel towards the shoulder side of the driven unit for discharging fill material from the hopper out of the path of travel of the shoulder spreader and onto the shoulder area ahead of the rear one of said wheels that is located next to the shoulder;

an outwardly and rearward extending strike-off blade pivotally mounted at its inner forward end to the frame at a point rearwardly of the discharge end of the conveyor and in relatively close proximity to the place of discharge of fill material for receiving fill material from said conveyor and to spread outwardly and strike-off at a predetermined height in the shoulder area fill material discharged from the conveyor;

means interconnecting the strike-off blade and driven unit for supporting the strike-off blade at a predetermined level with respect to the roadway engaged by the solid tired wheels and including

a raising and lowering mechanism between the inner forward end of said strike-off blade and said driven unit for vertically adjusting the strike-off level of the inner forward end of the strike-off blade,

an upright strut supported on the frame above said rear one of said wheels and said mechanism, and

adjustable members interconnecting the strut and an outer portion of said strike-off blade in weight bearing relationship for raising and lowering the outer portion of said strike-off blade to adjust the working strike-off height of the outer end of said strike-off blade; and

side draft means interconnecting the propelling unit and the strike-off blade for holding the strike-off blade at its adjusted height including

a telescoping mechanism interconnecting said propelling unit and the strike-off blade for supporting the strike-off blade at a predetermined diagonal angularity to withstand the side draft exerted thereon by said fill material being deflected outwardly along the strike-off blade.

11. The combination called for in claim **10** in which the two mentioned interconnecting means include supporting elements pivotally interconnected for movement about substantially concentric horizontal axes, and means constructed and arranged to raise said strike-off blade about said concentric axes to an upright transport position.

12. The combination called for in claim **10** in which the last mentioned interconnecting means includes a bar extending longitudinally of and spaced from the back side of said strike-off blade and a connection on the side draft means slidable longitudinally on said bar.

13. A shoulder spreading vehicle for spreading fill material in a shoulder area comprising a motor driven propelling unit having pneumatic wheels and a self supporting spreader unit propelled forwardly thereby in a direction of travel along a roadway adjacent to a shoulder area,

coupling hitch means interconnecting said units including elements interconnected for relative pivotal movement between said units about a horizontal axis extending transversely to said direction of travel for steering the spreader unit by the propelling unit and supporting the units against relative torsional movement about an axis parallel to said direction of travel,

said spreading unit including a frame,

means supporting said frame for movement in said direction of travel including widely spread front and rear solid rubber tired road wheels bearing the full weight of the spreader unit with one of said rear wheels mounted on the rear of the frame adjacent to the shoulder area and said front wheels mounted at the front of the frame and spaced from each other in a direction transverse to the direction of travel with one adjacent to the shoulder area and another remote from the shoulder area and diagonally opposite said one rear wheel,

a hopper supported on the frame for receiving therein fill material from a dump truck during forward travel of the spreading unit, and extending over a distance transversely of the roadway greater than the width of the dump truck,

a conveyor belt mechanism in the lower portion of said hopper for supporting the fill material received therein from a dump truck, said conveyor in front traveling laterally in a direction towards the shoulder area to discharge fill material from the hopper directly to the shoulder area at a place ahead of said one rear wheel,

an outwardly and rearwardly extending strike-off blade pivotally mounted at its forward end to the frame rearwardly of the discharge end of the conveyor and adacent to said rear wheel, to engage and spread outwardly and strike-off the material discharged from the conveyor at a predetermined height along the shoulder area,

means at said forward end for raising and lowering the forward end of the strike-off blade to adjust vertically its working level adjacent to the roadway,

an upright member extending above said hopper supported against relative lateral movement on the frame above said rear wheel,

adjustable elements interconnecting the upright-member and an outer portion of the strike-off blade in weight bearing relationship for locating the outer portion of the strike-off blade at its working level, and

a vertically adjustable element supported by the propelling unit for transmitting a downward force,

side draft mechanism interconnecting said vertically adjustable element of the propelling unit and said strike-off blade, said vertically adjustable element transmitting said downward force upon said draft mechanism to place a torsional load on the hitch means along a longitudinal axis of the shoulder spreading vehicle and hold said strike-off blade firmly in a steady position and working level in relation to said wheels on the roadway diagonally opposite each other.

14. The combination called for in claim **13** including a rearwardly extending gate pivotally supported at its vertical forward edge to the forward wall of the hopper ahead of said conveyor mechanism, said gate extending rearwardly across the conveyor discharge to control the flow of aggregate material from the conveyor mechanism,

adjustable means interconnecting said hopper and gate means for controlling the opening of the gate means to direct the flow of aggregate material from the conveyor mechanism to the shoulder area and against said forward end of said strike-off blade.

15. A shoulder spreading vehicle comprising a motor driven propelling unit having a vertically adjustable element, and a spreader unit,

means supporting said spreader unit upon a roadway surface including transversely spaced castered wheels having solid rubber tires,

hitch means interconnecting said units including a pivot pin having its axis disposed horizontally transverse to the direction of travel to permit relative vertical movement therebetween and to support the units against relative torsional movement about an axis extending in the direction of travel,

a hopper carried by said spreading unit adapted to receive fill material from dump trucks,

a conveyor belt traveling in the lower portion of the hopper in a direction transversely of the roadway surface for discharging fill material from said hopper to the side of the spreading unit,

a strike-off blade extending diagonally rearwardly and outwardly from said shoulder spreading vehicle with the inner end of said blade connected to said spreader unit and disposed at the rear of the point of discharge from said conveyor belt to engage and spread fill material therefrom,

brace means interconnecting said strike-off blade and the vertically adjustable element on the motor driven propelling unit for urging the strike-off blade in a downward direction,

said brace means including telescoping members for adjusting the horizontal angularity of said strike-off blade, and

means interconnecting the outer end of the strike-off blade and said spreading unit for adjustably limiting the downward movement of the strike-off blade,

said vertically adjustable element comprising a road scraper blade and the first mentioned interconnecting means is rigidly secured thereto.

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