June 4, 1963 R. D. MacDONALD 3,091,999

BASE SPREADER

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FIG. 1

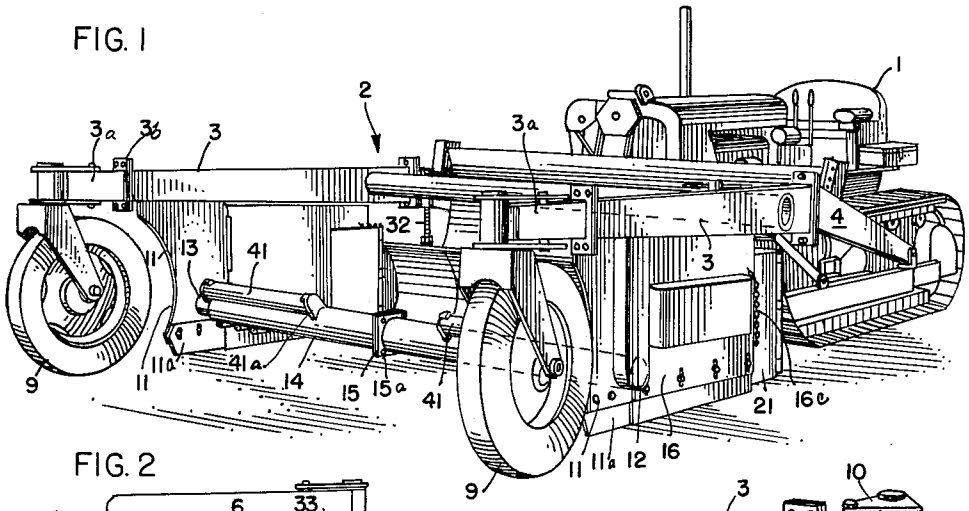


FIG. 2

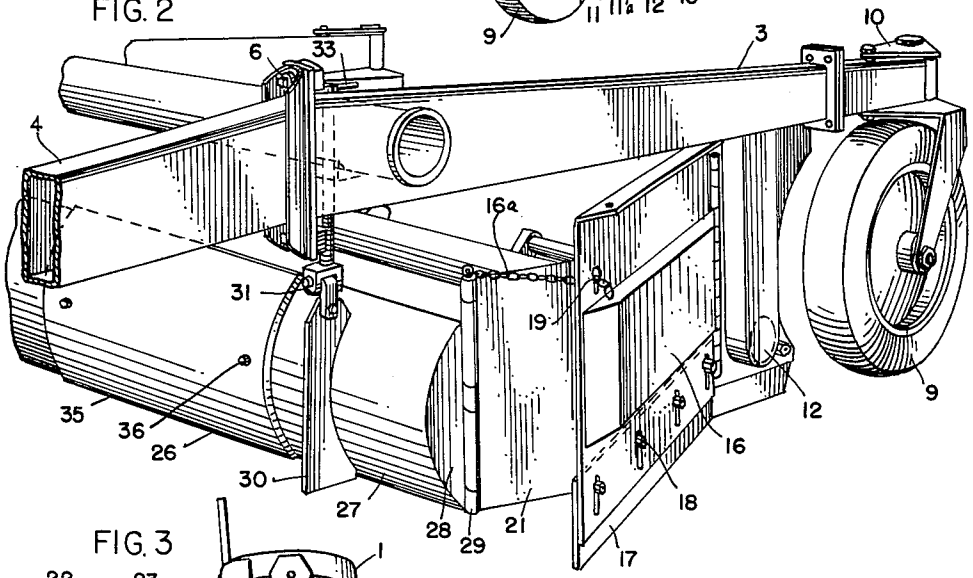
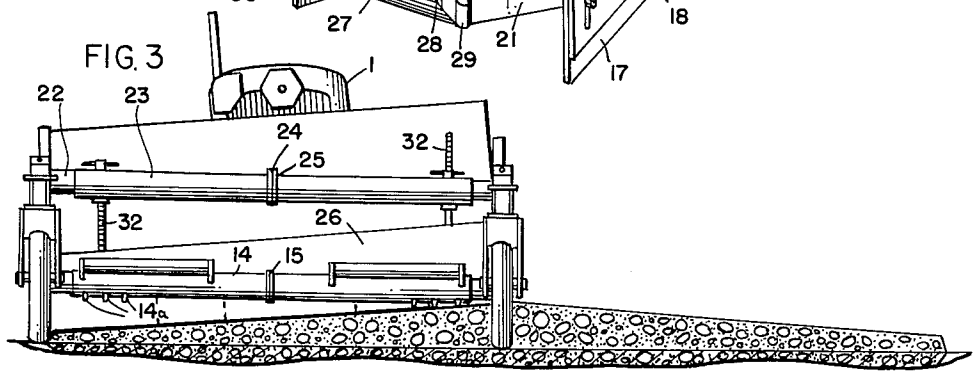


FIG. 3



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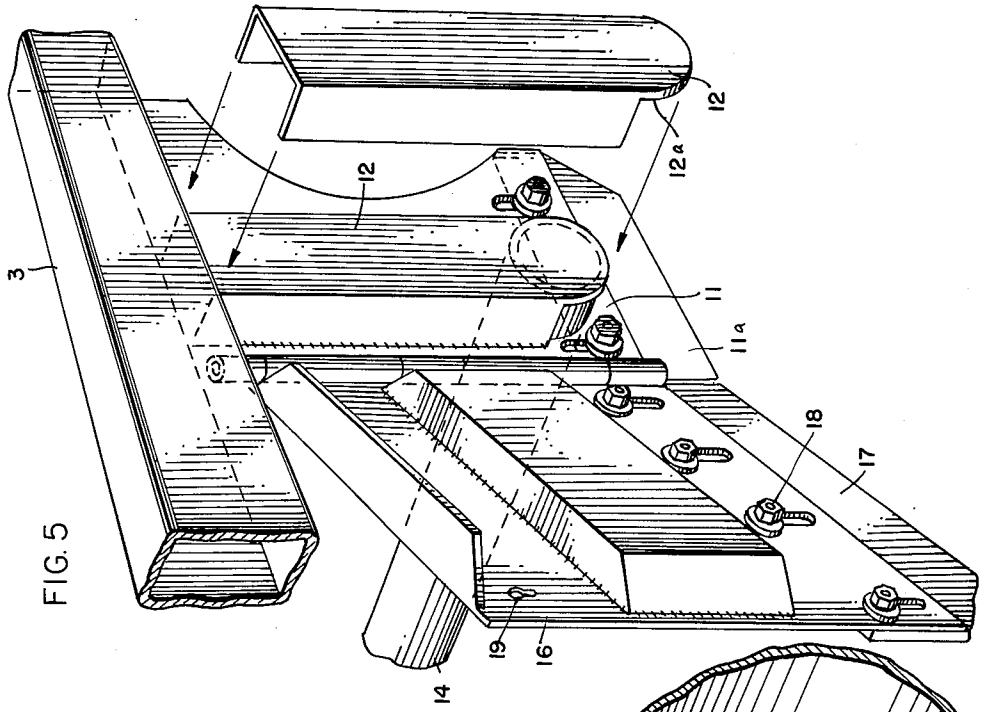


FIG. 5

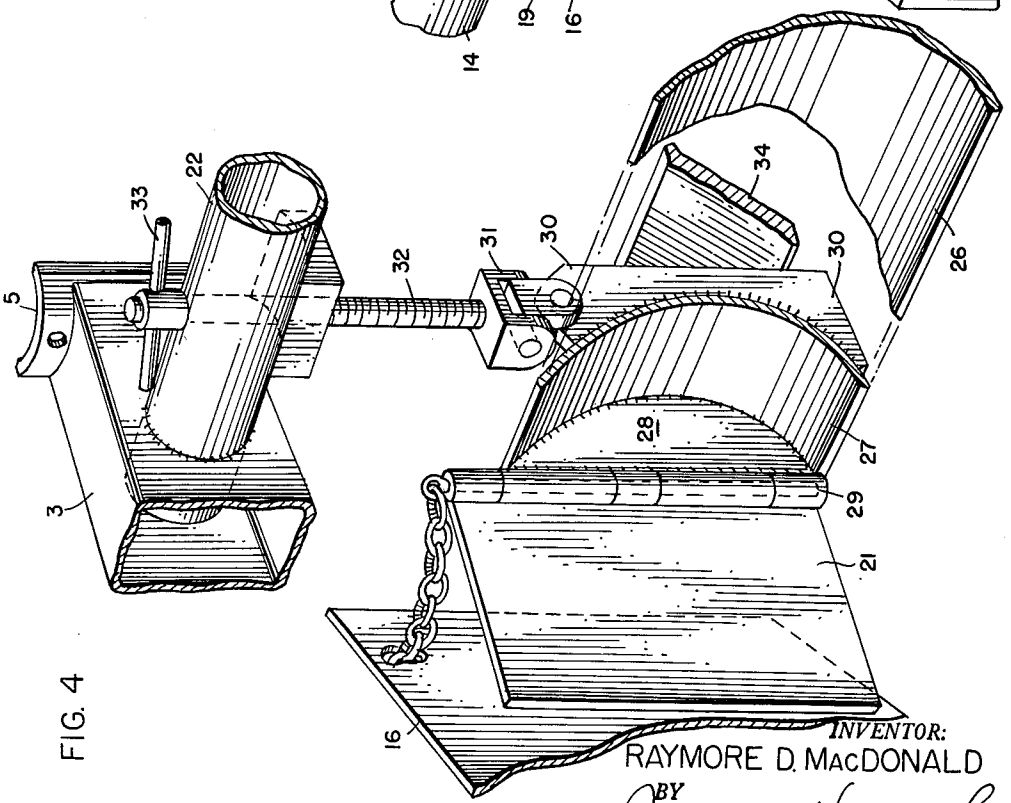


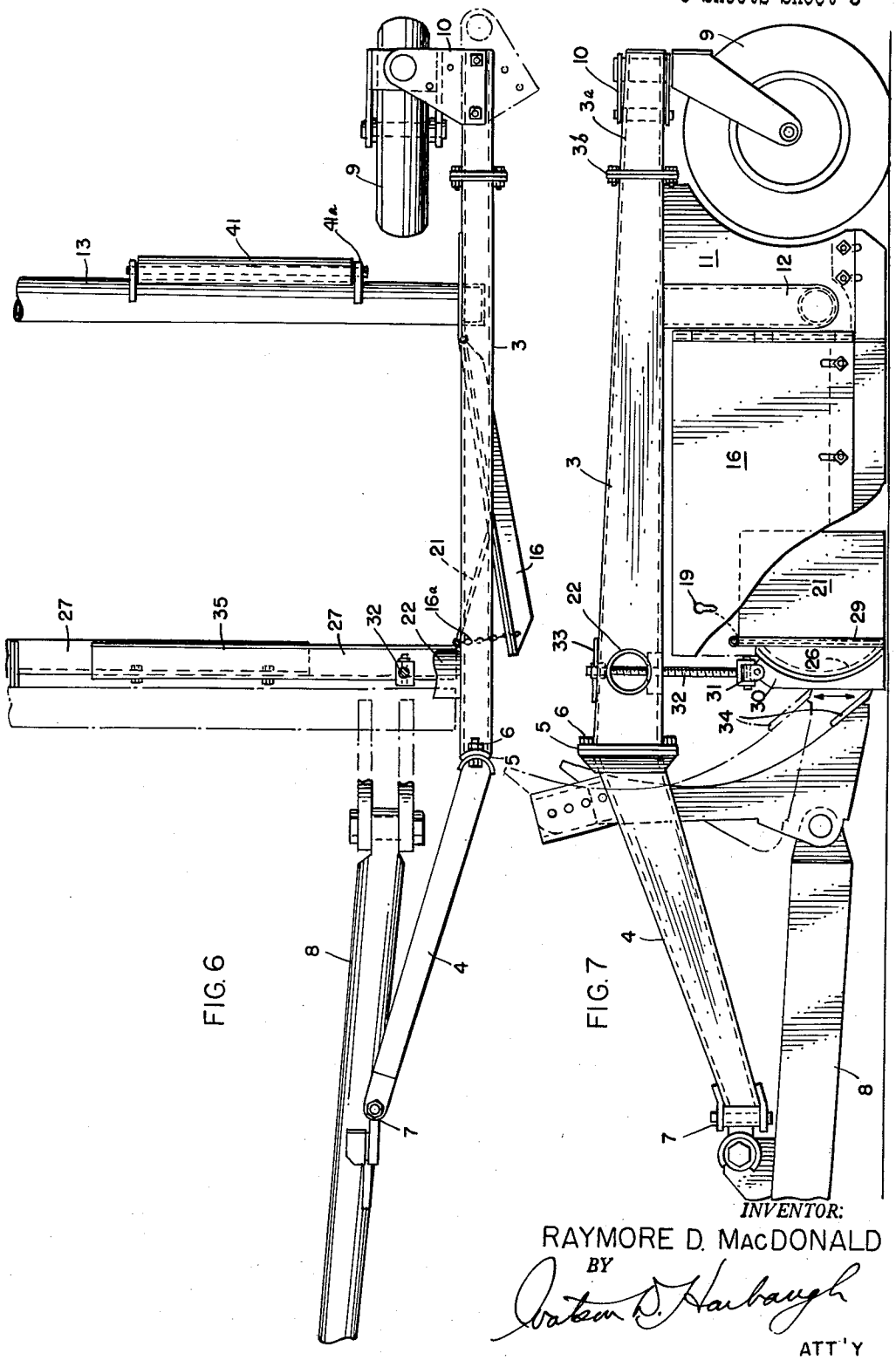
FIG. 4

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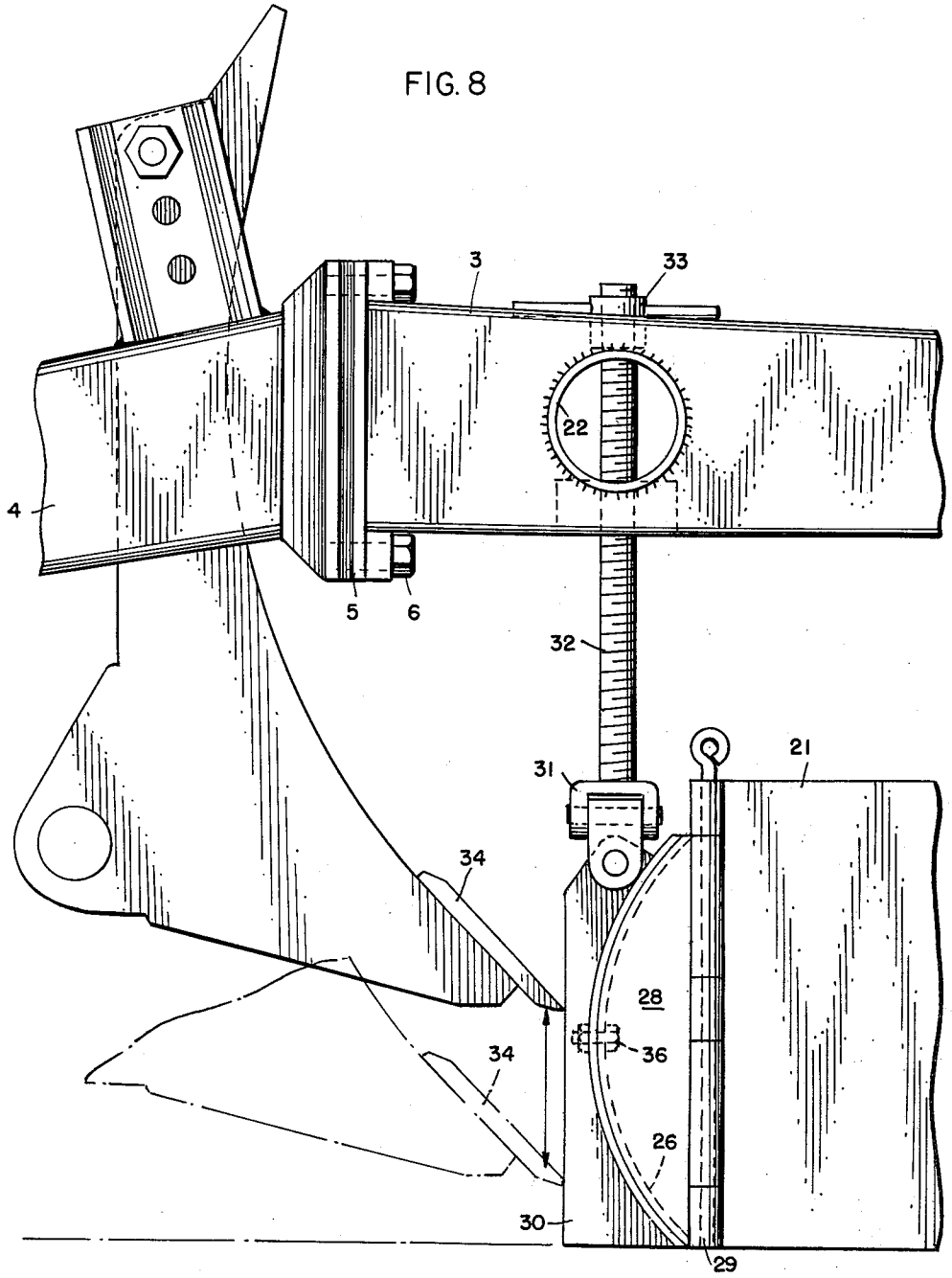
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FIG. 8



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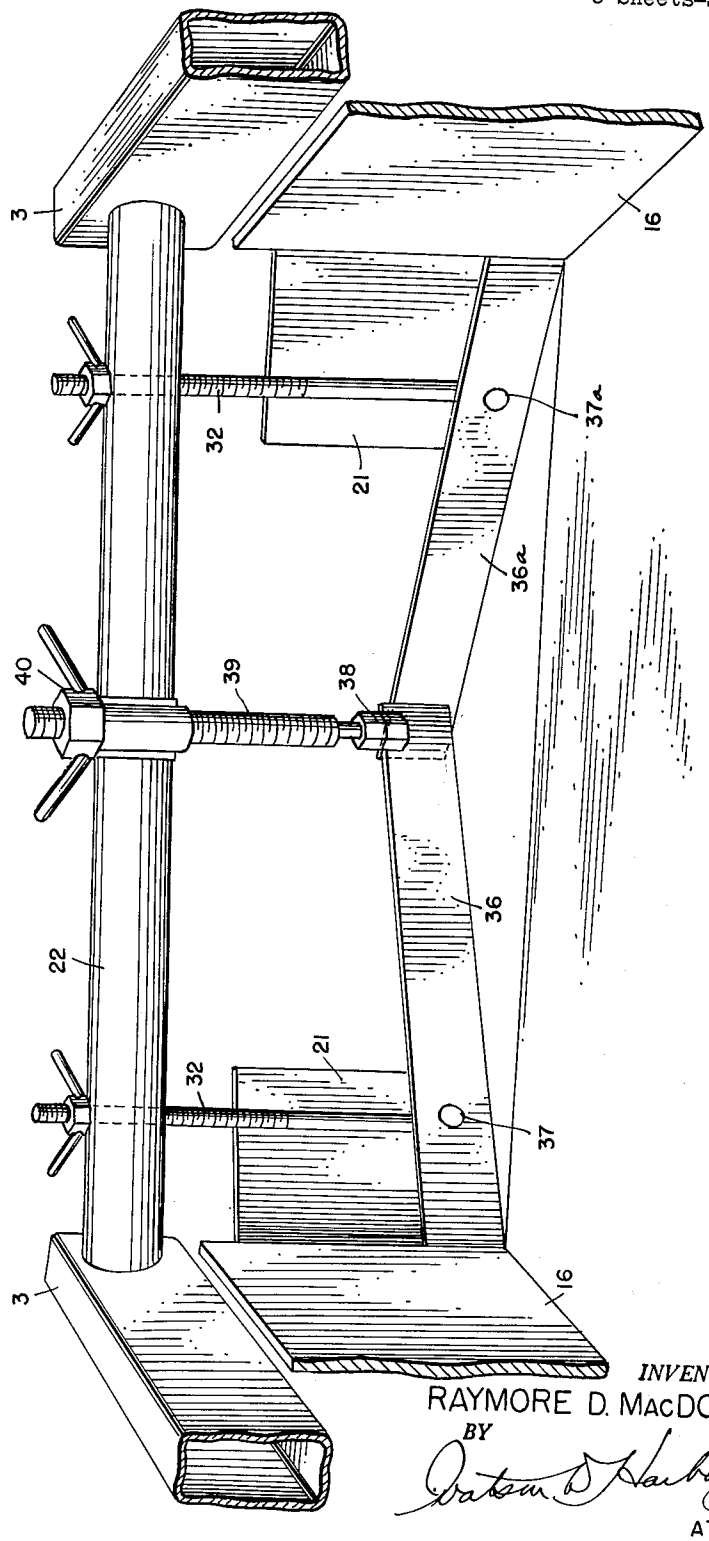


FIG. 9

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3,091,999

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Filed Jan. 7, 1960, Ser. No. 1,026
4 Claims. (Cl. 94—44)

This invention relates generally to apparatus for spreading aggregate material on road beds and more specifically to a base spreading apparatus for attachment to conventional tractor dozers of different sizes.

In the process of building roads or repairing them for high speed and heavy traffic, it is essential that the road bed be conditioned for surfacing by first placing in the road area a layer of base material of substantially constant crown and depth in order to minimize a rocking and dipping of a vehicle using the road, which no matter how slight is noticed at high speeds. Heretofore, the material, such as sand, gravel, stone, crushed rock, etc. usually has been brought to the construction site and stock-piled until the road area has been prepared to receive such material and although the preparation of the road area may be excellent, the methods heretofore used to spread such material from stock pile has a tendency to provide a road bed surface of varying crowns, widths or depths with the result that dips or weaving is felt in a motor vehicle. Not only is the rehandling of the material extra expense but expensive surfacing material must be thickened where dips occur if such are to be reduced in the ultimate road surface.

It is therefore the primary object of this invention to provide an improved and useful base spreading apparatus for attachment to tractor dozers to receive material directly from a truck and to spread a layer of the material at an even thickness with a predetermined crown on the road bed ahead of it and over which the tractor dozer passes in the process.

A specific object of this invention is to provide a wheeled base spreading apparatus which may be suitably connected to and positioned forwardly of a tractor dozer to continuously receive base aggregate material from dumping vehicles directly on the road bed in a horizontally movable hopper, and for spreading the material as a continuous operation as a layer of substantially constant depth crown and width on the road bed.

Another object of this invention is to provide an improved base spreading apparatus which can be assembled as a very wide machine for road building and disassembled quickly and is easily transported in two sections.

Another object of this invention is to provide adjustments for a base spreading apparatus to control the depth, crown, and width of the material being spread.

A further object of this invention is to provide an improved and useful crown setting mechanism for a base spreading apparatus which provides the proper crown contour as the base aggregate material is being spread evenly by the apparatus.

With the foregoing and other objects in mind, the invention resides in the following specification and appended claims, certain embodiments of which are illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the base spreading apparatus attached to the front of a tractor dozer;

FIG. 2 is a fragmentary perspective view of the base spreading apparatus;

FIG. 3 is a front elevation view of the base spreading apparatus attached to the tractor dozer with the dozer blade set at an angle;

FIG. 4 is af ragmentary perspective view showing the base spreading apparatus depth and width adjustments;

FIG. 5 is a fragmentary perspective view illustrating the extension plates for this invention;

FIG. 6 is a fragmentary plan view of this invention;

FIG. 7 is a view in side elevation illustrating the base spreading apparatus;

FIG. 8 is a fragmentary front elevation view of this invention illustrating the crown adjustment mechanism for the strike-off blade.

Referring to the drawings, a tractor dozer is indicated by the numeral 1. Adapted to be mounted in front of the dozer 1 is the base spreading apparatus of this invention and is indicated generally by the number 2. The base spreading apparatus is substantially rectangular in shape and has two upper equally spaced horizontal frame members 3. The frame members 3 may be of any suitable rigid metal and are illustrated in the drawings as hollow, rectangular, steel channels. A pair of pusher and steering arms 4, having a configuration similar to the frame members 3, are each secured at one end to a frame member 3 by the mating flanges 5 and bolts 6. The pusher arms 4 extend rearwardly in a downwardly inclined direction from the frame members 3 and are secured at the other end by a quick disconnect mechanism 7 to the blade actuating arms 8 of the tractor dozer 1. It is to be noted that the downward inclination of the arms is such that the frame members are disposed horizontally or parallel with the surface of the road for purposes hereafter noted.

The forward portion of the base spreading apparatus 2 is supported by a pair of caster wheels 9. Each caster wheel 9 is pivotally mounted to a multi-position adjustable plate 10 which is in turn pivotally mounted on the end portion 3*a* of each of the frame members 3. Each of the end portions 3*a* are supported for relative vertical adjustment for road crowning purposes by two facing plates 3*b* (FIG. 1) welded to the respective members and adjustably bolted together through multi-matching openings.

A side panel member 11 having a vertically adjustable knife member 11*a* at its lower edge of any suitable sheet steel, extends downwardly in a vertical plane from the underside of each of the frame members 3 and is secured thereto by any suitable means such as welding. The side members 11 have their forward edge recessed at 11′ to allow the caster wheels 9 to freely pivot and are perforated to receive the ends of a tubular cross member 13 therethrough a predtermined distance. A U-section support member 12 cut out as at 12*a* covers the open end of each of the tubular cross members and extends upwardly at right angles to each of the frame members 3 in contact with the panel 11. The panel 11, cross members 13 and support member 12 are secured together as a unitary re-enforced side assembly by welding to take the strains and stresses encountered with a forward movement of the members 3 and the pushing of trucks by the cross members 13.

Tubular telescoping members 14 are placed over the cross beam members 13 for relative adjustment and have their mating ends secured together by mating flanges 15 and bolts 15*a*. A plurality of spaced holes are drilled through the beam members 13 and the telescoping members 14 allowing the over-all width of the base spreading apparatus to be adjusted. Locking pins or bolts 14*a* (FIG. 3) are passed through the aligned holes of the members 13 and 14 to keep them in secured relationship after the proper width adjustment has been made. The combination of the members 13 and 14 not only provides a width adjustment means but also provides rigidity and support for the forward portion of the base spreading apparatus.

Roller members 41 for engaging truck wheels are supported as shown on the members 14 as supported on

bearing brackets 41*a* welded thereto (FIGS. 1 and 6) to provide a rolling contact for the rear wheels of a dumping vehicle to move it forwardly with the spreader.

A pivoted out-swinging extension door member 16, being of any suitable sheet metal, is hinged to the rearward edge of the side panel member 11 as adjustably held in any one of a number of predetermined positions by the chain 16*a* (FIG. 6). A vertically adjustable strike-off blade member 17, being of any abrasion resistant metal, is secured in place at the lower portion of the door member 16 by a plurality of locking bolts 18 to serve as an extension of the knife blade 11*a*. As already mentioned the extension door member 16 is manually positioned to a particular or desired open position as held there by material working against the inner face thereof and is restrained against further opening by the chain 16*a* as link-locked in the keyhole slot 19. The other end of the chain 16*a* may be secured to the frame member 3 but preferably is secured to a strike-off blade at the ends thereof (FIG. 4).

A gate member 21, formed of any suitable sheet metal, is hinged to the strike-off blade, which is to be explained later to be raised and lowered therewith, and is overlapped and limited in its outward movement by the extension door member 16. The positioning of the door member 16 and the outwardly swinging action of the gate member 21, due to the force exerted by the aggregate material being spread, controls the width of the layer of base material that is being applied and the lower edges of the gate members 21 serve as strike-off extensions of the strike-off blade. In other words, these two members provide extensions to allow additional width of base material to be spread over and above that determined by the strike-off blade.

Before describing the strike-off blade, a better understanding of its structure and functioning will be served by first describing the supporting structure. A pair of tubular cross beam members 22 are mounted towards the rearward portion of the base spreading apparatus in a horizontal position at right angles to each of the frame members 3 in alignment with each other, and are secured thereto by any suitable means as by welding. A tubular telescoping member 23 is placed over each of the cross beam members 22 similar to members 13 and 14 and likewise the mating ends of the telescoping member 23 are secured together by flange members 24 and bolts 25. The rearward tubular cross beam comprising members 22 and 23 is of the same material, configuration, and provides the same adjustment and support as the forward tubular cross beam comprising members 13 and 14.

The concave sectional strike-off blade 26, formed of any suitable abrasion-resistant high tensile steel, is mounted and supported below the rearward cross beam members 22 and 23. Referring specifically to FIGS, 2, 4 and 7, an end section 27 of the strike-off blade 26 has a closed end portion 28 and a hinge 29 for the gate member 21. A pusher track or bar 30, formed of any suitable rigid metal, is fixedly secured in a vertical position to the back of each of the strike-off end sections 27. Pivotally connected to the upper end of the pusher bars 30 by a double clevis and pin arrangement 31 is a depth adjusting screw 32. It is easily seen that the double clevis and pin arrangement provides a bi-directional movement for each end of the strike-off blade 26.

The depth adjusting screws 32 extend upwardly through the tubular cross beam members 22 and 23 and depth adjusting handle 33 engages each of the screws 32 and seats on the upper side of the cross member 23. Depth adjustment of the strike-off blade 26 is effected by the clockwise or counter-clockwise rotation of the handles 33.

Referring now to FIGS. 4 and 7, a dozer blade 34, if such is present on the bulldozer, is adjusted vertically against the pusher bars 30 to provide support for the strike-off blade 26 and to determine the angle at which the strike-off blade 26 engages the aggregate material to be spread. This provides an advantage to provide the best angle for particular materials.

Referring specifically to FIG. 2, the strike-off blade 26 has a removable center section 35 which is rigidly secured to the end sections 27 by the bolts 36 to provide a unitary strike-off blade if desired. Different width center sections 35 are installed for adjustment to correspond with the different road widths desired independently of the length or heighth of the tractors' dozer blade.

Referring now to FIGS. 8 and 9, a crown adjustment mechanism is attached to the base spreading apparatus. The mounting is the same as explained above except the strike-off blade consists of two sections 36 and 36*a*. Each section of the strike-off blade is pivotally connected to the pusher bars 30 at points 37 and 37*a*. The mating ends of the sections 36 and 36*a* overlap in the center of the base spreader and are pivotally connected by a pin and clevis 38. The pin and clevis 38 is pivotally secured to a road crown adjusting screw 39 which extends upwardly through the cross beam members 22 and 23. Crown adjustment is effected by the clockwise or counter-clockwise rotation of the adjusting handle 40 which threadedly engages the adjusting screw 39.

In operation, the effective width of the tractor dozer 1 to be used is measured. The base spreading apparatus, by means of the telescoping cross beam members 22, 23 and 13, 14 is adjusted to correspond with the desired gross width of the road to be laid. The tractor dozer 1 is then brought up to a position between the two extending pusher arms 4. The pusher arms 4 are secured by the connecting means 7 to the tractor dozer blade actuating arms 8.

The combined unit is then positioned on the road area to be prepared for paving and close width adjustments are made by angularly positioning the extension doors 16. Depth adjustments of the strike-off blade 26 is made by the rotation of the adjusting handles 33. If a crown contour is to be made, the crown adjusting mechanism and double strike-off blades are installed.

Upon completion of the above adjustments, a dumping vehicle is backed into position so that the rear wheels of the vehicle engage with the roller members 41. As the dumping vehicle begins to unload the base aggregate material, the units move forward under propulsion by the tractor dozer. The action of the concave strike-off blades 26 moves the base material forward leaving an even layer of base aggregate material of the proper depth as the vehicle units move along. Depending largely upon the type of base material being spread, the angle at which the strike-off blade 26 engages the material may be altered by re-positioning the dozer blade in a vertical plane as described above. The tractor runs on the base that is spread and thereby due to the long length of its support tracks assures the uniformity of depth, crown and grade accomplished.

As the contents of the dumping vehicle is exhausted, the vehicle is moved out and a second dumping vehicle is moved into position and immediately begins to unload, thus assuring a continuous spreading operation by the base spreading apparatus as the tractor dozer propels the apparatus along the road bed.

Having thus described the invention and the embodiments thereof, it will be seen how the objects set forth are fulfilled and how in operation the road material is dropped directly upon the road bed in a hopper large enough to receive enough material for uninterrupted spreading between dump trucks. Moreover, the trucks are quickly handled because they can be received readily against a self-cleaning cross-bar and push rollers between the front caster wheels, yet there is no material permitted to remain in the spread area which has not been worked over by a strike-off blade arrangement which has a strike-off edge which is uninterrupted by any supporting means which extends below the edge and leaves a grooved surface on the material spread.

Furthermore, it will be seen how the strike-off area is quickly adjusted for depth and crown with tubular telescoping cross members ruggedly constructed with simplicity to maintain adjustment and squareness of the frame throughout all operations. Also it will be noted that winged gates, disposed at a fixed level with uniform height throughout under a horizontal frame member above the gate opening, are provided which are hinged at their leading edge next to a strut box reinforcement forming part of the frame at the front cross tube so that rugged accuracy may be maintained in the material spread. These gates are provided with vertically adjustable scraper like edges at their lower edge so that when they are swung outwardly they smooth away any foreign material that may have collected along the edges of the road surface which is to be filled.

The gates are used in conjunction with a knifing blade at the leading edge of the hopper sides just behind the caster wheels. These knifing blades are adjustable vertically to provide a sharp edge on the fill or base material, the gates deflects excess and foreign material for removal, and working together they provide positive control to prevent irregular sides or edges of the spread and maintain the edge surface at a constant level. This is true particularly where an adjacent band of base material is being laid. The knife edge can cut away the edge slope of the previous band, return it to the hopper and the winged door can be swung out with its blade at the level of the adjacent band and the fill is provided with a smooth contiguous surface in which the overlap is a complete continuity. In doing this latter, and also where curbs may exist it will be observed that either or both caster wheels can be positioned in or out of the path of the knife edge, and, being located at the front end of the main frame members they can be raised or lowered as desired to provide any level adjustment, even to the point of running on the curb or adjacent band if desired. Moreover, the adjustment axis is ahead of the wheel axle and the front of the spreader provides a clear dumping area for trucks.

In connection with the strike-off blade and its adjustments it will be observed that it is telescopic, or adjustable as to length to match the adjustment of the main frame. Furthermore, it is concave in a sense which enables a rolling of the material, and this action can be controlled since the strike-off blade is pivoted near its top and the push effort of any element usable for that purpose on the dozer can be located at any heighth on the back of the blade. Also the strike-off is adjusted independently of the push element for depth, and crown, with the side strike-off wings automatically following the position of the hopper gate adjustment.

Adjustments are easily made while the spreader is in operation as well as before operations are commenced and the end product is a smooth base with an uninterrupted surface and of even depth and crown.

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

What is claimed is:

1. For use in combination with a tractor having a pusher element across the front end, an attachment for effectively applying base aggregate of substantially constant depth on a road bed comprising laterally spaced longitudinal frame members having horizontally disposed front beam portions supported by road bed engaging caster wheels at the front ends thereof, downwardly and rearwardly inclined rear pusher portions for support on the tractor at the rear ends thereof, means for adjusting the distance between the front beam portions including vertical axis pivotal means interconnecting the front beam and rear pusher portions of each side frame structure and extensible cross beam members interconnecting said front beam portions one of which is disposed proximate to said pivotal connections, side panel members secured to the side frame members below said front beam portions, adjustable extension doors hinged at their forward ends to said side panel members about vertical axes and extending to the surface of said road bed, a sectional strike-off blade element adapted to be propelled forwardly by said pusher element, a gate member hinged to each end of said sectional strike-off blade and movable vertically therewith, each gate member being outwardly overlapped by its respective extension door, means connected to said strike-off blade element for adjusting the working position of the extension doors, and vertically adjustable means supporting the sectional strike-off blade element and gate members on said one of said cross beam members to spread evenly a layer of aggregate on the road bed as propelled by said pusher element.

2. The invention according to claim 1 in which one of said element carries vertically disposed members adapted to be engaged by the other element for slidable engagement between the elements in a vertical plane and the vertically adjustable means for the strike-off blade comprises a double clevis and pin arrangement which allows bi-directional movement of the strike-off blade in a horizontal plane and an adjusting screw pivotally secured to the double clevis and pin arrangement to allow adjustment of the strike-off blade in a vertical direction with respect to said pusher element.

3. A wheeled base spreading apparatus for attachment to a tractor having a dozer blade for effectively applying base aggregate of a substantially constant depth on a road bed comprising longitudinal frame members, means to connect the frame members to the tractor, adjustable cross beam members secured to the frame members, side panel members secured to the frame members, adjustable extension doors hinged at their forward edges to said side panel members, a sectional strike-off blade, a gate member hinged to each end of said sectional strike-off blade, said gate member being overlapped by the extension doors, and vertically adjustable means supporting the sectional strike-off blade on said one of said cross beam members to evenly spread a layer of aggregate on the road bed including a rearward vertical portion connected to the rear of the strike-off blade for contact with the tractor dozer blade.

4. The combination called for in claim 3 in which said rear vertical portion comprises vertically disposed tracks adapted to be slidably engaged by said dozer blade and located adjacent to the ends of the strike-off blade and said vertical adjustable means includes double clevis and pin arrangements interconnecting said strike-off blade and said one of said cross beams for bi-directional movement for each end of the strike-off blade with respect to the dozer blade.

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