Dec. 6, 1960 W. W. NEFF 2,962,946

DRAG BROOM APPARATUS

Filed Oct. 24, 1956 4 Sheets-Sheet 1

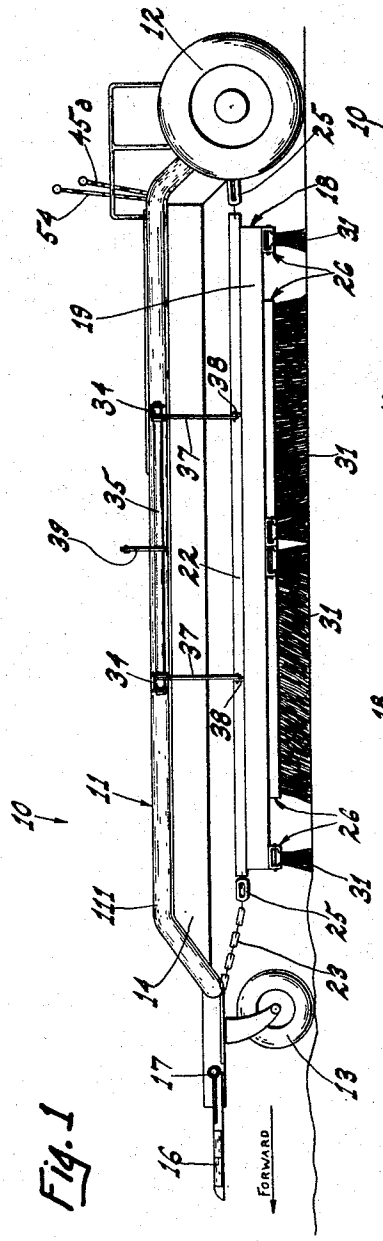


Fig. 1

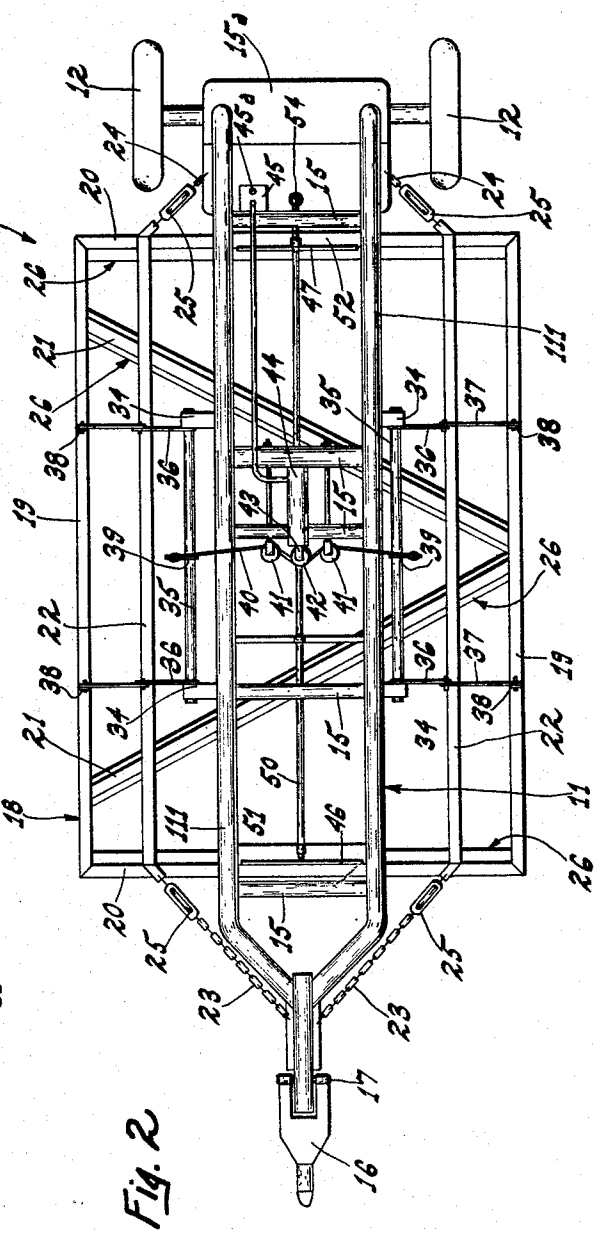


Fig. 2

INVENTOR.
WAYNE W. NEFF
BY
Michael Williams
ATTORNEY

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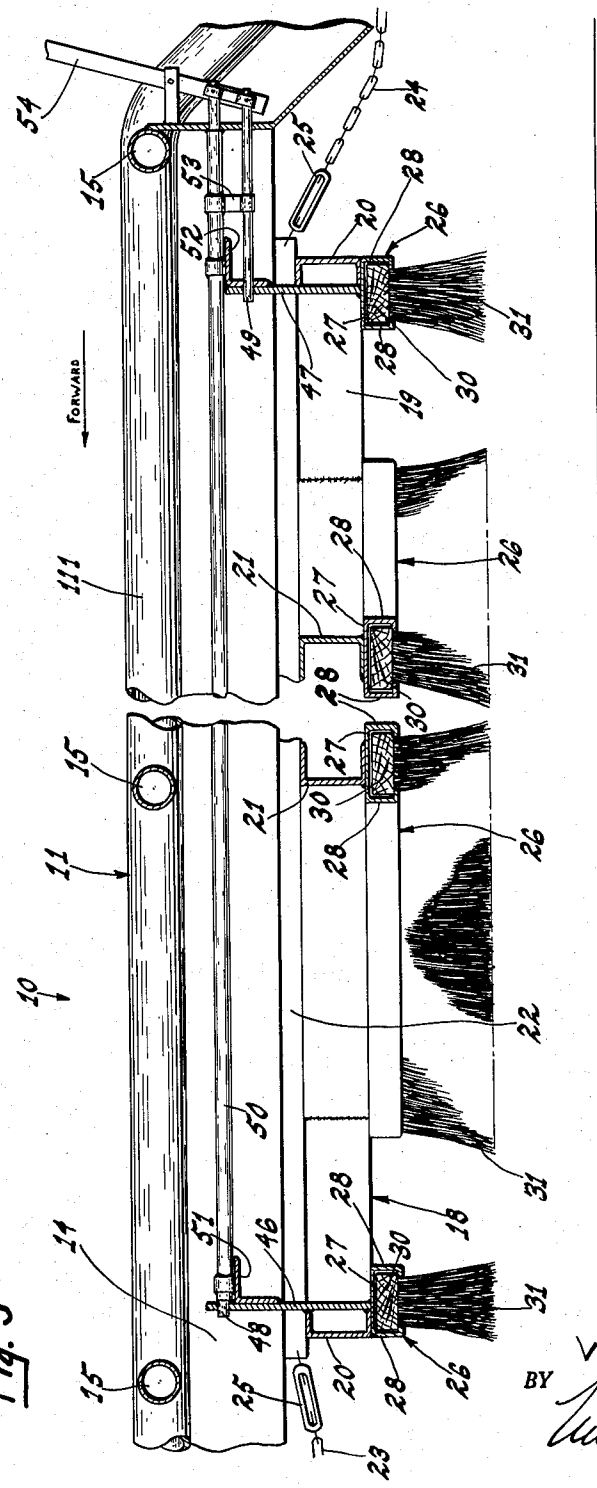


Fig. 3

INVENTOR.
WAYNE W. NEFF
BY
ATTORNEY

Dec. 6, 1960 W. W. NEFF 2,962,946

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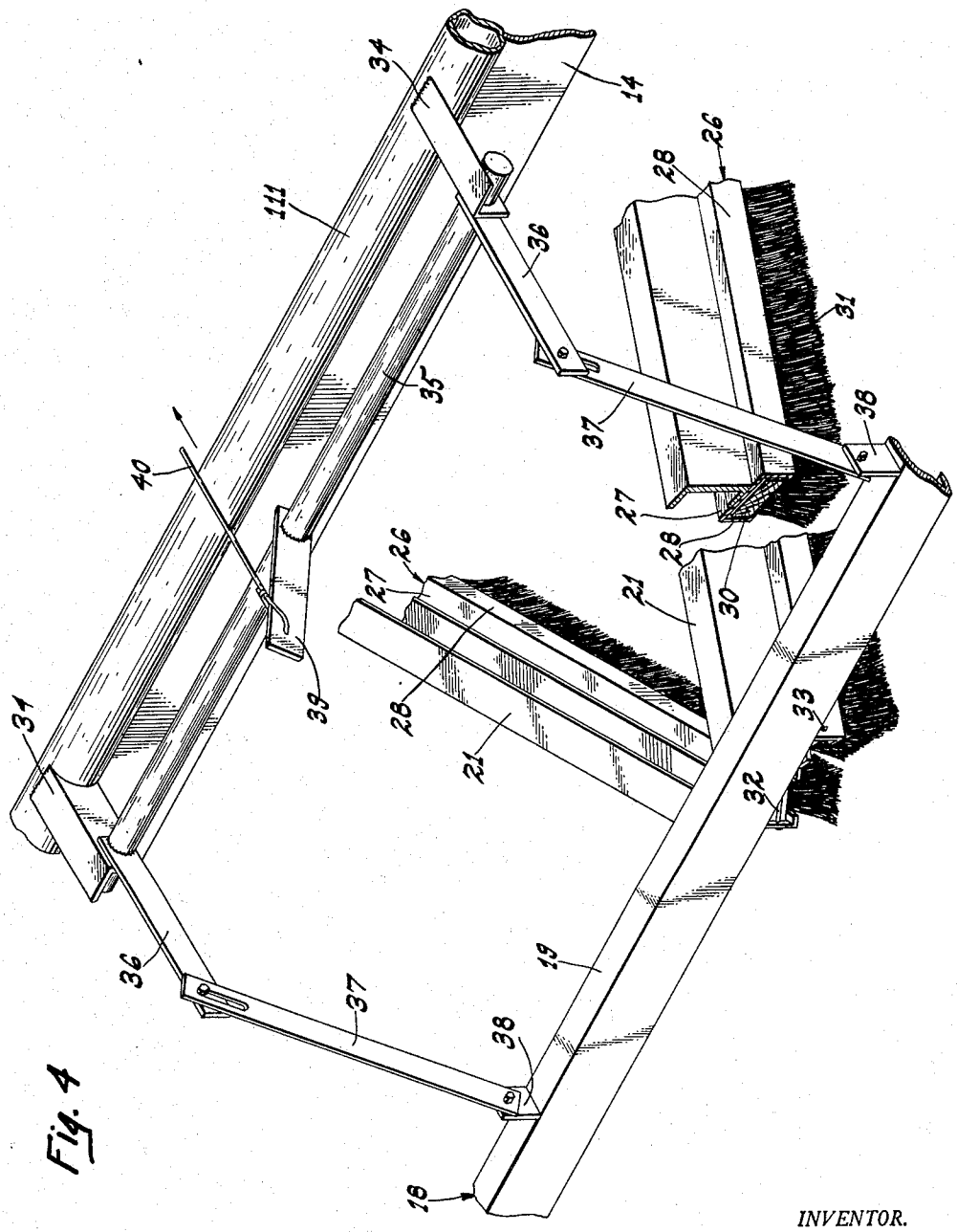


Fig. 4

INVENTOR.
WAYNE W. NEFF
BY
ATTORNEY

Dec. 6, 1960 W. W. NEFF 2,962,946

DRAG BROOM APPARATUS

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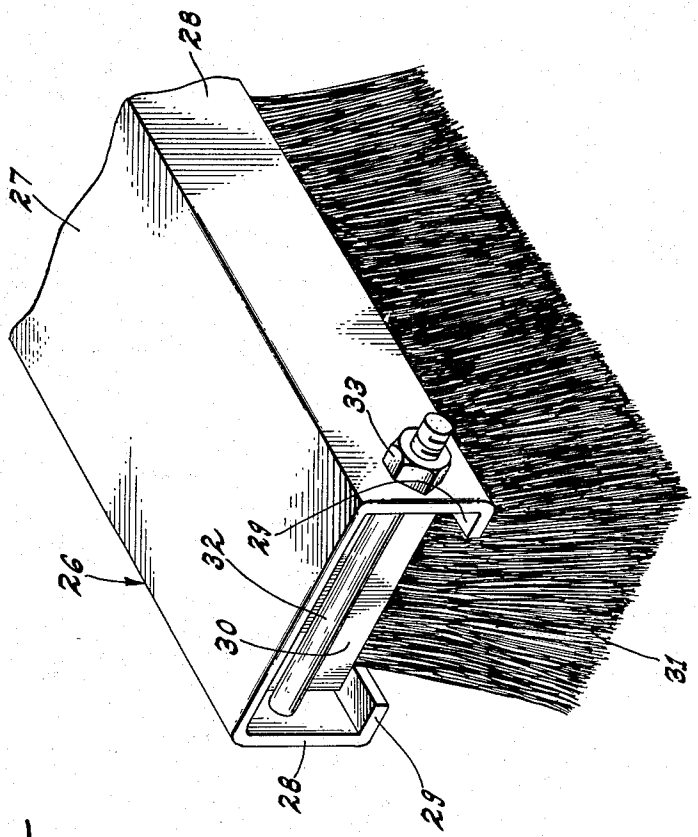


Fig. 5

INVENTOR.
WAYNE W. NEFF
BY
ATTORNEY

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2,962,946

DRAG BROOM APPARATUS

Wayne W. Neff, 679 Vine NE., Warren, Ohio

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2 Claims. (Cl. 94—44)

The present invention relates to apparatus for smoothing the top surface of a layer of gravel or the like, more particularly to drag broom apparatus, and principal object of the invention is to provide new and improved apparatus of such character.

When resurfacing roads and the like, it is a common expedient to first spread a layer of gravel over the road to fill any depressions therein. The gravel is then distributed to present a smooth upper surface and a suitable binder such as a liquid asphaltic solution or the like is then poured over the layer of gravel to bond such layer to the underlying road.

In the past, drag brooms have been drawn over the spread gravel to smooth the top surface thereof; however, those heretofore used were not entirely satisfactory. Most of the prior art drag brooms were little more than a framework having suitable brushes attached to the underside thereof. These drag brooms were then drawn behind a towing vehicle with the bristles of the brushes riding upon the gravel to be smoothed. While some of the prior art drag brooms functioned satisfactorily, they had one serious disadvantage in that transporting the drag broom to and from the job presented a problem. It was necessary to load the broom on a truck, transport it to the job, and then unload it. Since the broom is necessarily heavy in order to function properly, unloading it from the truck at the job site and loading it on the truck once again for transport elsewhere required the services of a number of workmen in the event a crane was not available.

The present invention provides a drag broom apparatus which is readied for transport or work in but a moment's time and by only one workman. Furthermore, drag broom apparatus of the present invention provides for ready replacement of one or more of the brushes in but a fraction of the time required to replace brushes of the prior art embodiments. These and other advantages will readily become apparent from a study of the following description and from the drawings appended hereto.

In the drawings accompanying this specification and forming a part of this application there is shown, for purpose of illustration, an embodiment which the invention may assume, and in these drawings:

Figure 1 is a side elevational view of drag broom apparatus constructed in accordance with the present invention,

Figure 2 is a plan view of the apparatus shown in Figure 1,

Figure 3 is an enlarged, fragmentary longitudinal sectional view of the apparatus but with certain parts in another position,

Figure 4 is a fragmentary perspective view of a portion of the apparatus, and

Figure 5 a still further enlarged, fragmentary perspective view of a detail.

As best shown in Figures 1 and 2, the present invention comprises a trailer **10** formed of a frame **11**, a pair of axially spaced, non-steerable rear wheels **12** and a

swivel mounted front wheel **13**. In the presently disclosed embodiment, frame **11** comprised a pair of spaced tubular frame members **111** to each of which is welded a depending rib **14** for strengthening purposes. Cross members **15** are welded between the members **111** and the latter are arched upwardly, intermediate the wheels **12** and **13**, to provide adequate road clearance for a purpose to become clear. A platform **15***a* is provided at the rear of the trailer between wheels **12**, **12** for an operator who may, if desired, ride thereon during operation of the apparatus.

The front of the trailer carries a tongue **16** which provides a draft connection whereby the trailer may be drawn behind a truck or other towing vehicle (not shown). It is an important feature that tongue **16** is pivotally secured to the trailer at **17** to provide for independent relative vertical movement between the trailer and the towing vehicle. In this way, the trailer will be unaffected by vertical movement of the towing vehicle as it passes over undulations in the surface to be smoothed.

Trailer **10** is adapted to carry means for smoothing the top surface of a layer of gravel or the like as before mentioned and, in the present embodiment, such means comprised a rectangular frame structure **18** formed of longitudinally extending frame members **19** and transversely extending frame members **20** which are welded or otherwise secured together to provide a rigid structure. By means later to be disclosed, brush means are secured to the underside of the frame structure for engagement with the gravel to be smoothed. Also secured to and extending transversely of frame members **19** are a pair of frame members **21** which are disposed between frame members **20** in diverging relation with each other. Secured to and overlying frame members **20**, **20** and **21**, **21** are a pair of longitudinally extending members **22**, each of which is disposed adjacent a respective frame member **19**.

Means are provided for connecting frame structure **18** to trailer **10** and it is an important feature of the present invention that such means maintain the frame structure in position beneath the trailer while permitting the frame structure to float freely upon the surface to be smoothed. In other words, relative horizontal movement between the frame structure and the trailer, both fore and aft of the trailer as well as from side to side thereof is limited while relative vertical movement between the frame structure and the trailer is unrestricted, within certain limits of course, so that the frame structure may float upon and follow the layer of gravel over which it is drawn.

It has been found that chains provide satisfactory means for connecting the frame structure to the trailer; accordingly, a chain **23** connects the forward end of each member **22** of frame structure **18** with the forward end of the trailer while a chain **24** connects the rear end of each member **22** with the rear of the trailer. A suitable turnbuckle or the like **25** is interposed in each chain **23**, **23** and **24**, **24** to permit the chain lengths to be adjusted.

As previously mentioned, frame structure **18** has brushes secured to its underside and one of the features of the present invention is the construction which provides for ready replacement of the brushes with a minimum of lost time.

As best shown in Figures 2 and 3, channel-like members **26**, each having a web portion **27** and spaced flange portions **28** are secured by welding or the like to the underside of respective frame members **20**, **20** and **21**, **21**. Channel members **26** are so secured to the frame structure that their flanges **28** extend downwardly from the frame structure. As most clearly shown in Figure 5, the flange

portions of each channel **26** are turned inwardly toward each other to provide aligned lips **29** which are spaced from each other and below web portion **27**.

Each channel **26** is adapted to carry a plurality of brushes in end to end relation and each brush of the present embodiment comprises a head **30** from which bristles **31** protrude. Channels **26** are proportioned to slideably receive the brush heads with their bristles extending between the spaced lips **29**. With this construction, vertical movement of the brushes relative to the channels is limited by engagement of brush head **30** with the underside of web portion **27** and by engagement with lips **29** which underlie the brush heads. Horizontal movement of the brushes transversely of the channels is limited by engagement of the brush heads with the facing surfaces of the flanges **28**. It will therefore readily be apparent that the brushes are confined by respective channels whereby their movement relative thereto will be limited to movement longitudinally of respective channels.

Means are provided to prevent escape of the brushes from respective channels **26** and in the present embodiment, as best shown in Figure 5, each channel is herein shown provided with a bolt **32** which passes through aligned apertures formed in respective flanges **28** and which is held in position by a nut **33**. While only one end of each channel is herein disclosed as being closed by respective bolts **32**, it will readily be understood that the opposite end of each channel may also be closed in the same or any other suitable manner. To replace the brushes in any channel **26** when such brushes become worn or for any other reason, it is only necessary to remove the appropriate bolt **32** and then slide the brushes longitudinally out of the channel. New brushes may then be slid into the channel and their escape therefrom then blocked by installing the bolt **32**.

While the construction thus far described provides workable drag broom apparatus, there is also provided means for elevating the frame structure from its working position shown in Figure 1 to the elevated position shown in Figure 3. It is an important feature of the present invention that while means are provided for elevating the frame structure, such means does not interfere with the previously mentioned free floating movement of the frame structure in its working position.

As best seen in Figures 2 and 4, a pair of longitudinally spaced brackets **34** are welded or otherwise secured to each trailer frame member **111** and each pair of brackets rotatably supports a rock shaft **35**. Each rock shaft **35** has arms **36** welded or otherwise secured thereto and each arm **36** is pivotably connected to one end of respective links **37** whose other ends are pivotably connected to respective lugs **38** carried by the frame structure **18**. Note that each link **37** is slotted at its point of connection with its arm **36** so that a lost motion connection is thereby provided.

Each shaft **35** carries an arm **39** to which, in the present embodiment, opposite ends of a cable **40** are secured (see Figure 2). Cable **40** passes over a pair of rollers **41** secured to one of the cross members **15** adjacent respective trailer frame members **111** and over a roller **42** carried by the piston rod **43** of a fluid cylinder **44**. Cylinder **44** is suitably secured to one or more of the cross members **15** and in the present embodiment, is connected to a hand pump **45** having an actuating lever **45***a* positioned for easy access to an operator riding upon platform **15***a*. In the position of parts shown in Figure 2, actuation of the actuating lever **45***a* of the hand pump **45** will force fluid into the cylinder to move piston rod **43** to the left. This will exert a pull on cable **40** and rotate rock shafts **35**. Rotation of rock shafts **35** will exert an upward pull on links **37** to thus elevate frame structure **18**. When it is desired to lower the frame structure, the fluid in the cylinder will be allowed to return to the pump (by actuating a valve, not shown) and the weight of the frame structure will then return piston rod **43** to the position shown in Figure 2.

It is undesirable to hold frame structure **18** elevated by means of fluid cylinder **44** for protracted periods since, in the event of slight leakage of the cylinder, the frame structure would eventually settle. Accordingly, latch means are provided to positively hold the frame structure in an elevated position for transport or storage.

With reference to Figure 3, an upstanding plate **46** is carried by the forward transverse frame member **20** of frame structure **18** and a similar plate **47** is carried by the rear transverse frame member **20**. Each plate **46, 47** is apertured to pass respective rods **48, 49** which extend longitudinally of the trailer and which are mounted for reciprocable movement in an axial direction in the following manner.

Rod **48** extends through a tube **50** which is secured to supports **51, 52** which extend between and are secured to respective ribs **14** of trailer frame members **111**. Rod **49** is positioned below rod **48** and is slideably supported by a hanger **53** depending from tube **50**. The right hand end of each rod **48, 49** is pivotably secured to a lever **54** which is pivoted to the trailer in position for easy access by the operator riding upon platform **15***a*.

In the position of parts shown in Figure 3, frame structure **18** is in its elevated position and is latched therein by virtue of the fact that rods **48, 49** extend through the apertures in respective plates **46, 47**. When it is desired to lower the frame structure, lever **54** will be shifted so as to withdraw the rods from their respective plates. This, it will be apparent, will permit the frame structure to descend under the influence of gravity until it rests upon the surface to be smoothed.

In operation and assuming frame structure **18** is latched in its elevated position shown in Figure 3 and that the trailer is attached to a suitable towing vehicle by means of tongue **16**, the trailer may be drawn to the site where it is to be used.

Upon arrival at the site and upon being drawn onto the gravel to be smoothed, lever **54** will be actuated to release the frame structure and allow it to come to rest upon the gravel to be smoothed (see Figure 1). The trailer will then be drawn by the towing vehicle while the brushes carried by the frame structure **18** smooth the upper surface of the gravel. As before described, the frame structure floats freely upon the surface of the gravel while being maintained in alignment beneath the trailer.

When it is desired to once again ready the apparatus for transport or to replace worn or damaged brushes, it is only necessary to actuate lever **45***a* to raise the frame structure **18** and to then latch the latter in its elevated position shown in Figure 3 by actuating lever **54**. With the frame structure thus elevated to raise the brushes from the road surface, the trailer may be transported to another site or the brushes may readily be replaced, as before described, if such replacement is required.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described, hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. Apparatus for smoothing the surface of a layer of gravel or the like, comprising a rigid longitudinally arched rectangular vehicle chassis having front and rear ground engaging wheels and a rigid rectangular frame having ground engaging brushes removably mounted therebeneath, said frame being flexibly connected to said chassis for universal floating movement relative thereto

to compensate for irregularities in the gravel surface to be smoothed, the flexible connection including flexible chains connecting the front and rear ends of said frame to said chassis, a pair of parallel rock shafts journaled in and extending longitudinally of said chassis on opposite sides thereof, a pair of longitudinally spaced arms extending from each of said rock shafts, and a pair of longitudinally spaced links pivotally secured to each side of said frame, said links having pin and slot connections with said arms on said rock shafts, an intermediate arm carried by each of said rock shafts, said latter arms being connected by a flexible cable having its intermediate portion in engagement with anti-friction rollers journaled on said chassis, hydraulic means engaging said cable and means for actuating said hydraulic means for exerting pull on the cable ends to rotate said rock shafts and thus elevate said frame relative to the chassis to disengage said brushes from the surface to be smoothed, and means for locking said frame in elevated position, disengagement of said locking means permitting said frame to be lowered by gravity and of its own weight into brushing engagement with said gravel surface, said flexible chains between said frame and chassis and said pin and slot connections between said links and rock shaft arms affording universal floating movement of said frame relative to said vehicle chassis within limits in horizontal and vertical planes to facilitate efficient smoothing of said gravel surface.

2. Apparatus for smoothing the surface of a layer of gravel or the like, comprising a rigid longitudinally arched rectangular vehicle chassis having front and rear ground engaging wheels and a rigid frame having ground engaging brushes removably mounted therebeneath, said frame being flexibly connected to said chassis for universal floating movement thereto to compensate for irregularities in the surface to be smoothed, the flexible connection including flexible chains connecting the front and rear ends of said frame to said chassis, a pair of parallel rock shafts journalled in and extending longitudinally of said chassis on opposite sides thereof, a pair of longitudinally spaced arms extending from each of

said rock shafts, and a pair of longitudinally spaced links pivotally secured to each side of said frame, said links having pin and slot connections with said arms on said rocks shafts, actuator means for rotating said rock shafts in a direction to elevate said frame relative to the chassis and to thus disengage said brushes from the surface to be smoothed, and means for locking said frame in elevated position, disengagement of said locking means permitting said frame to be lowered by gravity and of its own weight into brushing engagement with the surface to be smoothed, said flexible chains between said frame and chassis and said pin and slot connections between said links and said rock shaft arms affording universal floating movement of said frame relative to said vehicle chassis within limits in horizontal and vertical planes to facilitate efficient smoothing of said surface.

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