Aug. 9, 1955 C. E. COMPTON 2,715,029

TILTABLE MACHINE SUPPORTING STRUCTURE

Filed Oct. 30, 1952 2 Sheets-Sheet 1

Fig. 2.

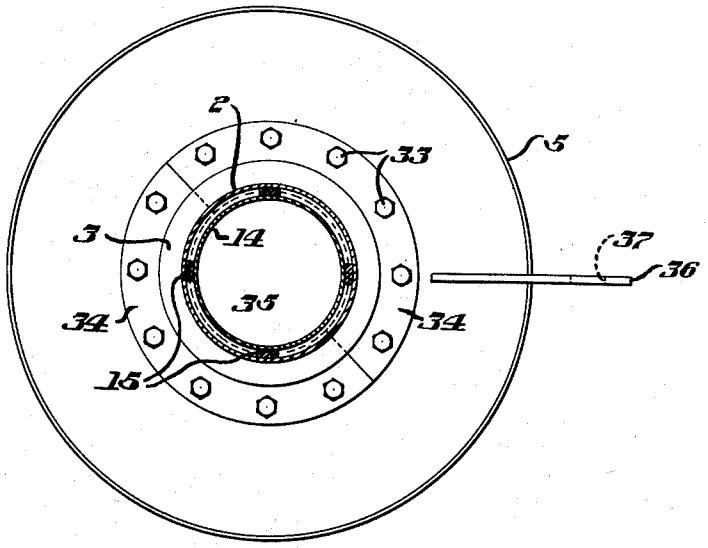
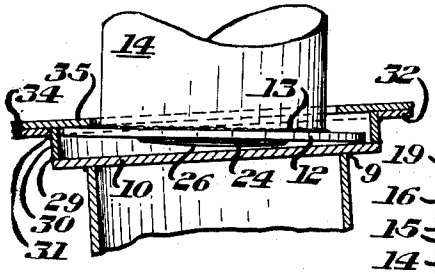


Fig. 4.



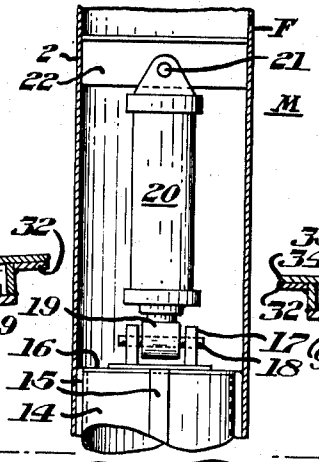


Fig. 3.

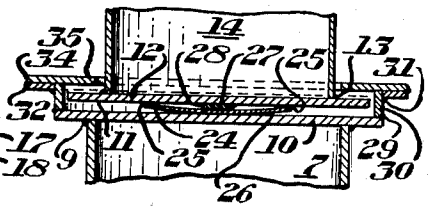
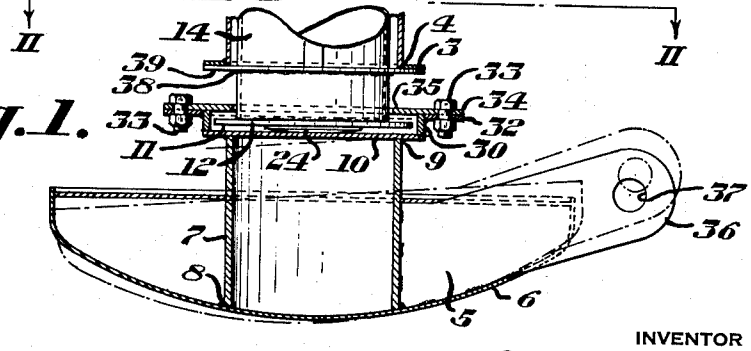


Fig. 1.



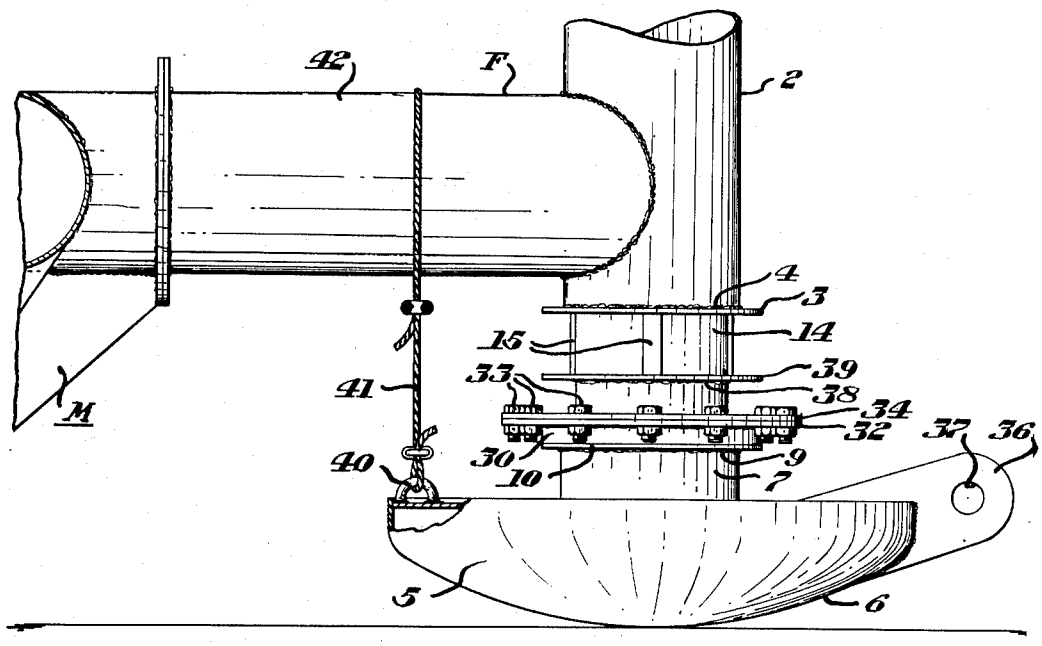
INVENTOR
CHARLES E. COMPTON
By Hopgood, Leonard & Calimafde
his Attorneys

Aug. 9, 1955 C. E. COMPTON 2,715,029

TILTABLE MACHINE SUPPORTING STRUCTURE

Filed Oct. 30, 1952 2 Sheets-Sheet 2

Fig. 5.



INVENTOR
CHARLES E. COMPTON
By Hoopes, Leonard & Glenn
his attorneys

United States Patent Office

2,715,029

Patented Aug. 9, 1955

2,715,029

TILTABLE MACHINE SUPPORTING STRUCTURE

Charles E. Compton, Clarksburg, W. Va.

Application October 30, 1952, Serial No. 317,648

11 Claims. (Cl. 280—12)

This invention relates to a supporting structure for a machine, particularly for a machine adapted to be moved about from place to place and used outdoors, especially on uneven ground.

While my invention is of broad utility I have used it with remarkable success for supporting a mining machine of the type shown in my copending application Serial No. 202,898, filed December 27, 1950. That machine includes a frame which supports a reciprocable carriage carrying a rotary mining head adapted to bore generally horizontally into a seam of coal or other mineral to remove material therefrom. The machine is used on uneven ground and has to be shifted from place to place. After a hole is bored the machine is shifted parallel to the working face for boring another hole, and so on. For purposes of explanation and illustration the invention will be described as embodied in a supporting structure for a mining machine of the type just referred to.

The machine may be mounted upon supports which rest upon the ground, such supports preferably each having an undersurface at least a portion of which slopes to facilitate movement of the support over uneven ground. The supports may be either elongated or circular, circular supports being at present preferred. The supports are known in the art as "pontoons" and will sometimes be so designated herein. A machine may have any appropriate number of pontoons, four being suitable in most cases. In machines of the type disclosed in my said application there are four supporting posts upon which the machine frame is mounted for vertical adjustment so that the machine may be properly oriented to operate upon a seam of coal or other mineral whether the seam is horizontal or slopes upwardly or downwardly. A pontoon underlies each post.

I have found that when the pontoons are rigidly attached to the posts difficulty is encountered in moving the machine from place to place over uneven ground and the machine does not have desirably firm bearing when positioned on uneven ground for a mining operation. When the machine is being moved from place to place the rigidly attached pontoons do not ride smoothly over uneven portions of the ground but tend to dig in or bury themselves, making it necessary to shovel away earth or smooth the ground to make paths for the pontoons. When the machine is resting on uneven ground and a pontoon happens to be disposed at the side of a depression or upon a small hill only part of the pontoon will engage the ground, the opposed part extending out above the ground in cantilever fashion. The result is insecure positioning of the machine with the danger that the machine may shift during the drilling of a hole, which is highly undesirable. Also the parts are subjected to heavy stress as the mass of the machine is great, and there may be danger of failure unless the parts are of otherwise unnecessarily heavy construction.

I have obviated the disadvantages above referred to by providing for tilting of the supports or pontoons relatively to the machine so that when the machine is being

moved over uneven ground the pontoons will change their angularity to conform to the ground surface, enabling the machine to be drawn along smoothly even upon ground which is quite uneven. Also, when the machine is mounted upon uneven ground for performing a mining operation the pontoons adjust themselves to the angularity of the ground immediately beneath them, thus insuring firm positioning of the machine despite the unevenness of the ground and obviating the danger of shifting of the machine during the drilling of a hole.

I provide a supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and means limiting the extent of relative tilting of the bearing elements. The means limiting the extent of relative tilting of the bearing elements may be connected with one of the bearing elements forming in effect an open-topped box with that bearing element forming the bottom of the box and the other bearing element disposed within the box, the box having inwardly projecting means at its top. Such means are preferably connected with the upwardly facing bearing element carried by the support; in other words, in a preferred structure I provide an upwardly open box-like receptacle carried by the support receiving the bearing element carried by the machine and inwardly projecting means at the upper portion of the receptacle overlying such bearing element permitting limited relative tilting between the bearing element and the receptacle.

The support is, as above indicated, preferably of modified pontoon shape having an undersurface at least a portion of which slopes to facilitate movement of the support over uneven ground.

Preferably at least one of the bearing elements has a convex bearing surface. One of the bearing elements may have a bearing member of restricted area bearing against the other bearing element so that relative tilting of the bearing elements is at least partly about an edge of the bearing member as a fulcrum. The bearing member may be generally convex to facilitate tilting.

The machine may comprise a post having connected therewith at its bottom the generally horizontally oriented bearing element above referred to. The machine may comprise a frame member, a supporting member connected with the frame member and means for generally vertically adjustably positioning the frame member relatively to the supporting member.

In a preferred supporting structure I provide a post, a generally horizontally oriented bearing element connected with the bottom of the post, a support adapted to rest upon the ground, a generally horizontally oriented plate connected with the support in opposed relationship to the bearing element so that the bearing element is adapted to bear downwardly against the plate, the bearing element and plate being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the post due to uneven ground while the bearing element bears downwardly against the plate, means at the plate edge extending generally upwardly to a level above the bearing element and inwardly projecting means carried by said last mentioned means

and overlying the bearing element limiting the extent of relative tilting of the bearing element and plate.

It may be desirable upon occasion to limit downward tilting of a portion of a support, as, for example, to prevent the possibility of its digging in to very rough ground when the machine is being moved over such ground otherwise than by pulling it by means connected to the support in question. In such case I may provide means extending between a portion of the support and a portion of the machine for limiting downward tilting of said portion of the support. Such means may take the form of a tension member connected with said portion of the support and extending generally upwardly therefrom to and connected with a portion of the machine.

Other details, objects and advantages of the invention will become apparent as the following description of a present preferred embodiment thereof proceeds.

In the accompanying drawings I have shown a present preferred embodiment of the invention in which

Figure 1 is a fragmentary vertical cross-sectional view through a supporting structure for a machine;

Figure 2 is a horizontal cross-sectional view of the supporting structure shown in Figure 1, taken on the line II—II of Figure 1;

Figure 3 is an enlarged fragmentary vertical cross-sectional view of a portion of the structure shown in Figure 1;

Figure 4 is a view generally similar to Figure 3 showing the components of the supporting structure in a different relative position; and

Figure 5 is a fragmentary elevational view, with portions in vertical cross section, showing how provision may be made for supporting the leading portions of pontoons when the machine is to be moved over uneven ground.

Referring now more particularly to the drawings, the letter M denotes broadly a mining machine which by way of example will be considered as being of the type disclosed in my said application. The machine M may comprise a frame designated generally by F, the frame comprising posts **2** which in the form shown are lengths of pipe oriented with their axes substantially vertical and each having at its foot a generally horizontal flange **3** welded thereto at **4**.

For supporting each post **2** I provide a support or pontoon **5** having an undersurface at least a portion of which slopes as at **6** to facilitate movement of the pontoon over uneven ground. While the pontoon shown in the drawings has a substantially continuously curved bottom, flat bottomed pontoons with upwardly curved or inclined edge portions may be employed.

In the structure shown in the drawings a vertical length of pipe **7** is welded to the pontoon **5** at **8** and projects above the top of the pontoon. Welded to the upper surface of the pipe **7** at **9** is a plate **10**. The plate **10** serves as a bearing element against which is adapted to bear downwardly a bearing element designated generally by reference numeral **11**. The bearing element **11** comprises a plate **12** welded at **13** to a generally vertically oriented length of pipe **14**. Mounted upon the outside of the pipe **14** are spaced apart vertically extending bearing strips **15**. The pipe **14** is provided at its top with a cap **16** on which are mounted brackets **17** through which passes a pin **18**. The pin **18** also passes through the lower portion of a plunger **19** operating in a cylinder **20** trunnioned at **21** to a cross member **22** rigidly fastened to the post **2** and positioned therewithin. The post is raised and lowered relatively to the pipe **14** by fluid operating within the cylinder **20**.

The bearing element **11** comprises in addition to the plate **12** a bearing member **24** welded to the underface of the plate **12** at **25**. While the bearing member **24** may be flat or planar I prefer to provide it with a convex bearing surface **26** adapted to bear against the plate **10**. This result can be accomplished by bowing the bearing member **24** as shown in Figure 3. Desirably a spacer **27** is welded

to the plate **12** at **28** centrally thereof. Whether or not the bearing member **24** is bowed it constitutes a bearing member of restricted area bearing against the plate **10** so that relative tilting of the bearing elements **10** and **11** may be at least partly about an edge of the bearing member **24** as a fulcrum. When the relative tilting is continued the edge of the plate **12** becomes the fulcrum.

Welded to the peripheral edge of the plate **10** at **29** and extending upwardly therefrom is a wall **30** to which is welded at **31** an annulus **32** having bolted thereto by a series of bolts **33** a ring **34** whose inner peripheral portion **35** projects inwardly of the wall **30** and overlies the edge of the plate **12** and thereby serves to limit the extent of relative tilting of the bearing element **12** relatively to the bearing element **10**. The ring **34** may be a two-part ring so that it may be applied to the annulus **32** after the pipe **14** with the plate **12** welded to the bottom thereof is positioned in the box-like receptacle formed by the plate **10** and the wall **30**.

Suitably attached to the pontoon **5** is a lug **36** containing an eye **37** to which a cable or chain is adapted to be connected for drawing the machine over the ground from one place to another.

Assuming that the machine is mounted upon four pontoons, two at each side, and that it is desired to move the machine laterally after drilling a hole so as to position it for drilling another hole beside the first mentioned hole, pulling means may be attached to the lugs of the pontoons at the side of the machine facing in the direction in which the machine is to be moved and the machine may be pulled to its new position. Alternatively the machine may be pushed to its new position by using a bulldozer or other suitable pushing means and pushing against the machine frame at the side thereof disposed away from the direction in which the machine is to be moved. Whether the machine is pulled or pushed, the pontoons travel over the surface of the ground and by reason of their being tiltable relatively to the machine they are adapted to change angularity while adjusting themselves to the contour of the ground. The result is that a machine may be moved smoothly and efficiently without the pontoons tending to dig into raised portions of the ground as is the case when the pontoons are fixed to the machine frame.

During movement of the machine from one place to another the machine as a whole maintains substantially fixed orientation although it may tilt slightly. Any tilting of the machine, however, is minor compared to tilting of the individual pontoons when the machine is moved over uneven ground. When a pontoon tilts relatively to the corresponding post **2** there is relative tilting between the bearing elements **10** and **12** which, as above mentioned, may initially be about the edge of the bearing member **24** as a fulcrum and upon continuation of the tilting may be about the edge of the plate **12** at the fulcrum. The tilting is limited when the portion of the edge of the plate **12** opposite the portion of such edge serving as a fulcrum engages the undersurface of the inwardly projecting portion **35** of the ring **34**.

Normally the plates **10** and **12** are circular providing for uniform tilting in any direction. However, if desired those plates may be of other than circular shape.

Welded to the pipe **14** at **38** is a substantially horizontally outwardly projecting flange **39** which forms a stop limiting downward movement of the post **2** relatively to the pipe **14**. The post **2** is shown in its lowermost position in Figure 2 and is adapted to be raised to predetermined higher positions by the pistion and cylinder **19—20**.

Figure 5 is a fragmentary elevational view showing how provision may be made for supporting the leading portions of pontoons when the machine is to be moved over quite rough ground to limit downward tilting of the leading portions of the pontoons. When the machine is being moved by pulling or drawing it over the ground by means connected with some of the pontoons there is no need for thus supporting the leading portions of those

particular pontoons. However, when the machine is being pulled by means connected with the pontoons on one side it may be desirable to support the leading portions of the pontoons at the trailing side of the machine, or when the machine is being pushed by a bulldozer or other pushing means it may be desirable to support the leading portions of all of the pontoons, to limit downward tilting thereof and thus obviate any tendency of the leading portions of the pontoons to dig in to raised portions of the ground. Such provision may not be necessary unless the ground is very rough.

The structure shown in Figure 5 is the same as that shown in the other figures but with some additions. The machine M, as in the other figures, comprises the frame F which comprises the post **2** having the pontoon **5** connected therewith at the bottom thereof as already explained. When the machine shown in Figure 5 is to be moved toward the left otherwise than by towing or pulling it by means connected with the pontoon shown, it may be desirable to support the leading portion of the pontoon to limit downward tilting thereof and thus counteract any tendency which it may have to dig in to the ground. Such support is provided for by attaching to the pontoon **5** an eye **40** which in the form shown is attached to the upper portion of the pontoon at the edge thereof. A tension member **41** is connected with the eye **40** and extends generally upwardly therefrom to and is connected with a portion **42** of the frame F. The portion **42** may be a generally horizontally extending pipe-like portion of the frame welded to the post **2** as shown in my said copending application. The tension member **41** may be a chain, cable or other suitable device which supports or holds up the leading portion of the pontoon **5** in a manner clearly apparent in Figure 5 whereby to limit downward tilting thereof and thus counteract any tendency which it may have to dig in to the ground.

While I have shown and described a present preferred embodiment of the invention it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied within the scope of the following claims.

I claim:

1. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing generally planar bearing plate carried by the support in opposed relationship to the bearing element so that the bearing element is adapted to bear downwardly against the plate, the bearing element and plate being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the bearing element bears downwardly against the plate, and means limiting the extent of relative tilting of the bearing element and plate.

2. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing plate carried by a machine, a support adapted to rest upon the ground, an upwardly open box-like receptacle carried by the support receiving the bearing plate and inwardly projecting means at the upper portion of the receptacle overlying the periphery of the plate permitting limited relative tilting between the plate and the receptacle.

3. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and means connected with one of the bearing elements forming in effect an open-topped box with that bearing element forming the bottom of the box and the other bearing element being of generally plate form and disposed within the box, the box having inwardly projecting means at its top limiting the extent of relative tilting of the bearing elements.

4. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and means connected with the second mentioned bearing element forming in effect an open-topped box with the second mentioned bearing element forming the bottom of the box and the first mentioned bearing element being of generally plate form and disposed within the box, the box having inwardly projecting means at its top limiting the extent of relative tilting of the bearing elements.

5. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground and having an undersurface at least a portion of which slopes to facilitate movement of the support over uneven ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and means limiting the extent of relative tilting of the bearing elements.

6. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, one only of the bearing elements having a curved bearing surface, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and means limiting the extent of relative tilting of the bearing elements.

7. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, one of the bearing elements having a bearing member of restricted area bearing against the other bearing element, the bearing elements being dis-

connected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, relative tilting of the bearing elements being at least partly about an edge of the bearing member as a fulcrum, and means limiting the extent of relative tilting of the bearing elements.

8. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, one of the bearing elements having a generally convex bearing member of restricted area bearing against the other bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, relative tilting of the bearing elements being at least partly about an edge of the bearing member as a fulcrum, and means limiting the extent of relative tilting of the bearing elements.

9. A supporting structure for a machine comprising a post, a generally horizontally oriented bearing element connected with the bottom of the post, a support adapted to rest upon the ground, a generally horizontally oriented plate connected with the support in opposed relationship to the bearing element so that the bearing element is adapted to bear downwardly against the plate, the bearing element and plate being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the post due to uneven ground while the bearing element bears downwardly against the plate, means at the plate edge extending generally upwardly to a level above the bearing element and inwardly projecting means carried by said last mentioned means and overlying the bearing element limiting the extent of relative tilting of the bearing element and plate.

10. A supporting structure for a machine comprising

a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and means extending between a portion of the support and a portion of the machine remote from the bearing elements for limiting downward tilting of said portion of the support.

11. A supporting structure for a machine comprising a generally horizontally oriented downwardly facing bearing element carried by a machine, a support adapted to rest upon the ground, a generally horizontally oriented upwardly facing bearing element carried by the support in opposed relationship to the first mentioned bearing element so that the first mentioned bearing element is adapted to bear downwardly against the second mentioned bearing element, the bearing elements being disconnected from each other so as to be relatively tiltable to permit the support to change its angularity to the machine due to uneven ground while the first mentioned bearing element bears downwardly against the second mentioned bearing element, and a tension member connected with a portion of the support and extending generally upwardly therefrom to and connected with a portion of the machine for limiting downward tilting of said portion of the support.

References Cited in the file of this patent

UNITED STATES PATENTS

886,956	De France	May 5, 1908
1,954,957	Smith	Apr. 17, 1934
2,310,930	Blanchett	Feb. 16, 1943
2,625,369	Lichty et al.	Jan. 13, 1953

FOREIGN PATENTS

112,519	Great Britain	July 23, 1917
127,844	Switzerland	Sept. 17, 1928