Feb. 26, 1952 U. O. GUIGNARD 2,587,463

TAMPING ROLLER FRAME

Filed June 22, 1946 4 Sheets-Sheet 1

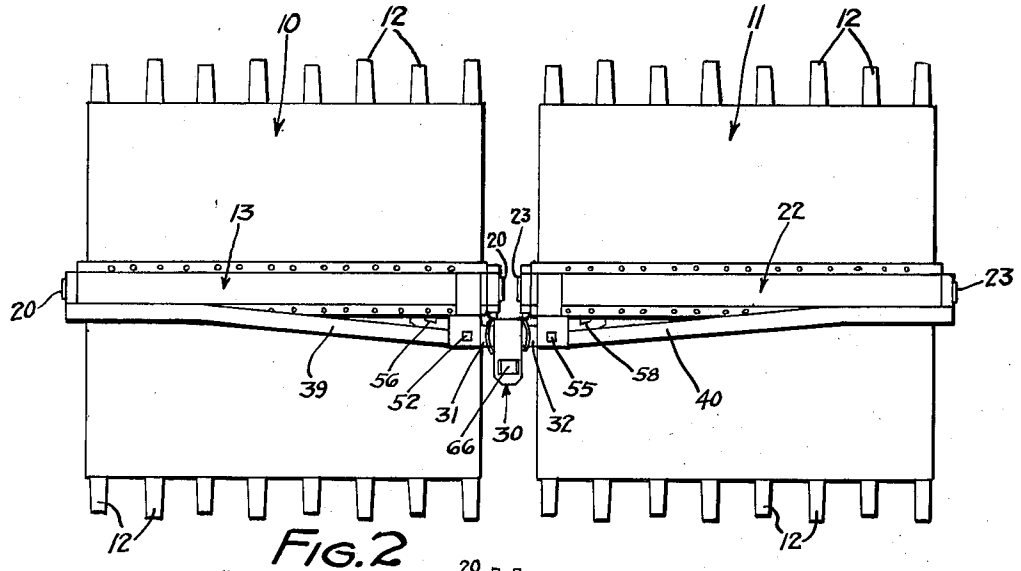

FIG. 2

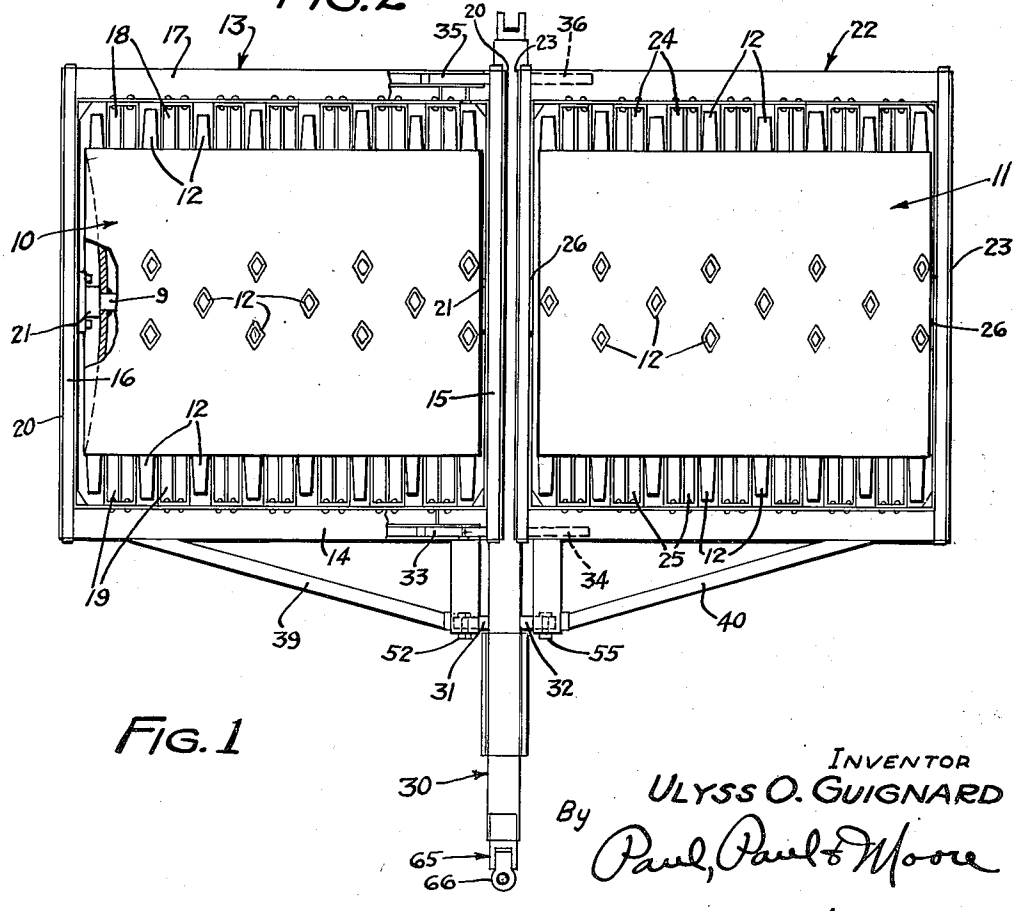

FIG. 1

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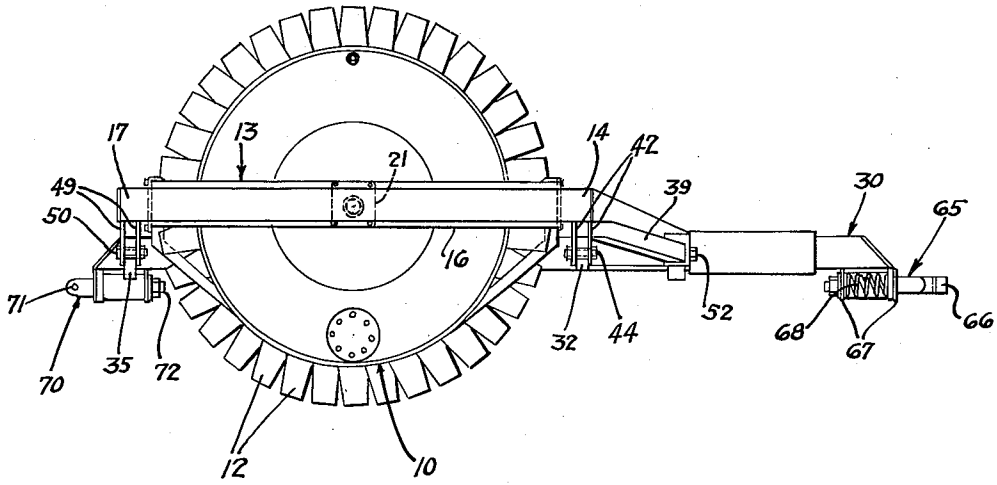

FIG. 3

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TAMPING ROLLER FRAME

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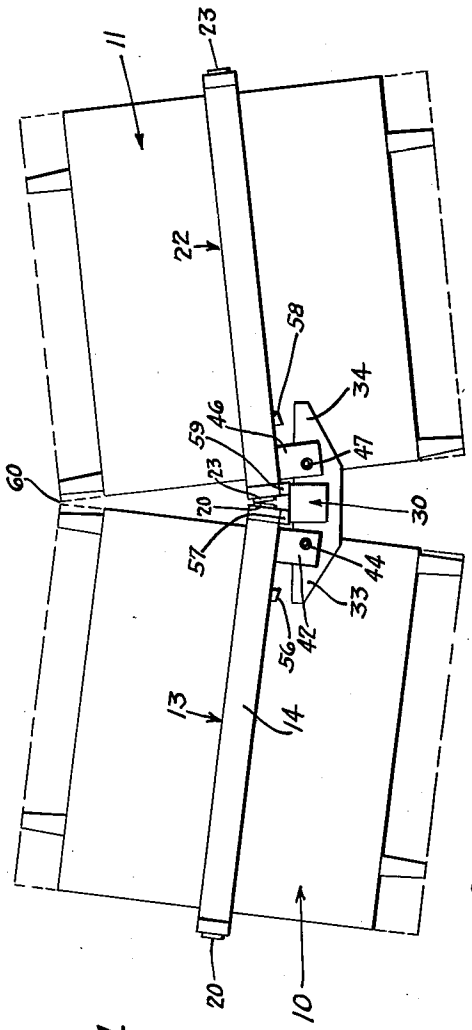

FIG. 4

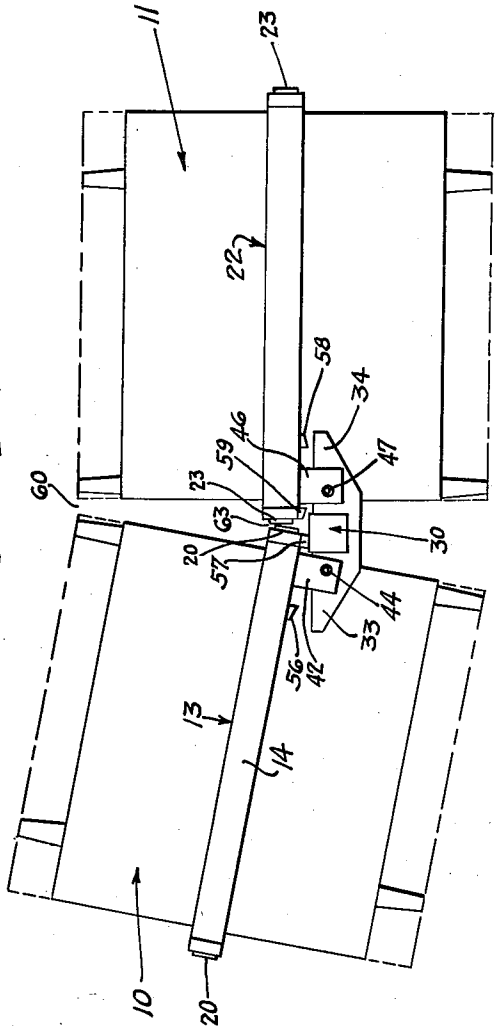

FIG. 5

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TAMPING ROLLER FRAME

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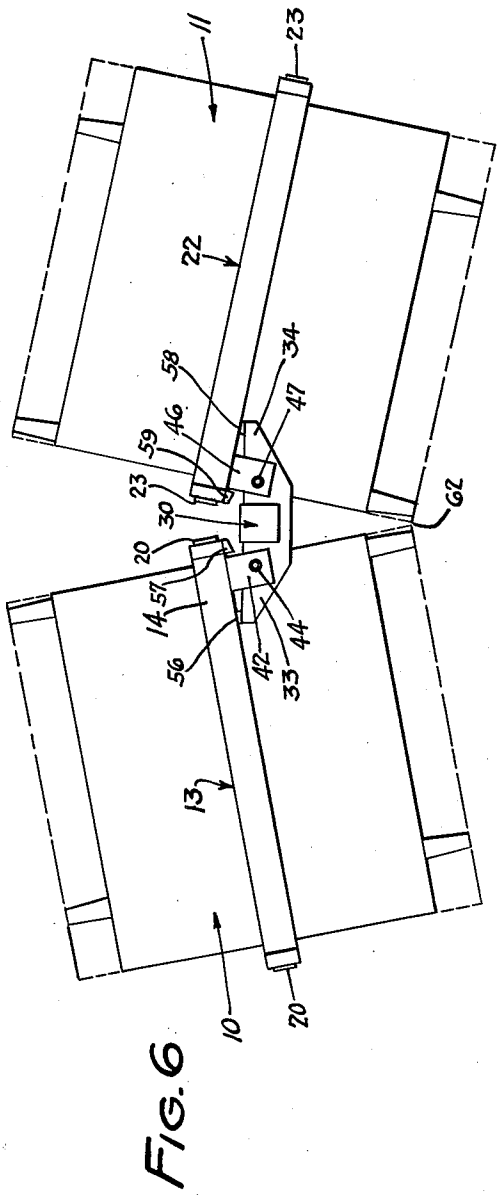

FIG. 6

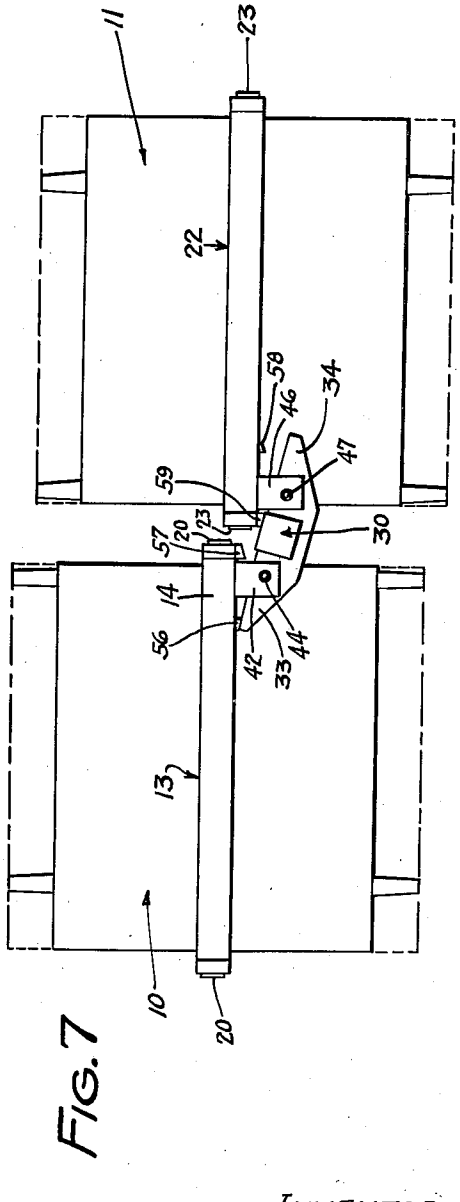

FIG. 7

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TAMPING ROLLER FRAME

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5 Claims. (Cl. 55—47)

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This invention relates to an improved tandem roller capable of free articulated movement in conformance with irregularities in ground pressure and earth compactness. Tandem rollers heretofore available have customarily been articulated according to two general plans.

In one method of articulation, the roll carrying frames have been hinged together along their adjacent edges and along an axis parallel to the drawbar axis. This method of articulation gives satisfactory results under many conditions but is wholly unsatisfactory where there is a vertical displacement of level of the soil under one roller as compared with the soil under the adjacent roller, or under conditions such that the degree of compaction changes abruptly between the two rollers. Hence, this center hinged type of roller is unsatisfactory for many conditions.

In accordance with another type of construction the roll carrying frames have been pivoted about spaced axes which extend in the direction of movement of the rolls and through the approximate center line of each roll. This construction is disadvantageous from the mechanical and cost standpoints in that the drawbar force has to be transferred first to a main transverse frame which circumscribes both rollers of the tandem and thence to the individual roller frames. Furthermore, all drawbar forces are taken through the centers or near centers of the roll frames and must be transmitted by the inherent stiffness of said frames as there is no easy way of bracing the structure.

It is an object of the present invention to provide an improved tandem roller wherein provision is made for hinged movement of each roll in respect to the other, and provision is also made for displacement of either roller up or down and parallel to a horizontal position and for any combination of such motions.

It is also an object to provide an improved tandem roller construction wherein the roller frames are connected to the drawbar solely along parallel axes displaced only slightly from the drawbar, the rollers and their roller frames being otherwise unconnected to the drawbar or to each other.

It is a further object of the invention to provide an improved tandem roller wherein the drawbar is made free to rotate and is provided with short sidewards extending lugs forming the sole support for rollers pivotally mounted on said lugs.

Other and further objects of the invention are those inherent in the apparatus illustrated, described and claimed.

The invention is illustrated with reference to the drawings wherein

Figures 1, 2 and 3 are, respectively, plan, front and side elevational views of the apparatus of

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the present invention and in which Figures 4, 5, 6 and 7 are illustrative schematic front (or rear) elevational views showing the various angular and translation positions to which the rolls may be moved under varying conditions of soil elevation or compactness.

Referring to the drawings the invention is illustrated with reference to a diamond foot type of roller and is composed of two ground rollers generally designated 10 and 11 on the cylindrical surface of which there are mounted a plurality of ground compacting teeth 12. The particular tooth shown is the diamond pattern, but any other pattern such as the sheep's foot pattern may be used, if desired. The rolls 10 and 11 are preferably made hollow so that they may contain a sand or water filling for increase of weight. Rolls 10 and 11 are each mounted upon a rectangular supporting and journaling frame. Thus, roll 10 is provided with a rectangular frame generally designated 13 composed of a front cross member 14, inner and outer longitudinal frame members 15 and 16 and a rear cross member 17. The cross members 13 and 14 are preferably of box frame construction and the side frames have stiffening bars 20 thereon, with the result that there is provided a rigid frame which circumscribes the roller. The box frames are filled with steel punchings prior to closure so as to provide increased weight. Scrapers 18 and 19 may be provided on the front and rear cross frame members 13 and 14 so as to clean out the dirt between the teeth 12 on the roll. Upon the longitudinal frame members 15 and 16 there are provided journals 21 which support the shaft 20 upon which the roll 10 is mounted by means of suitable antifriction bearings. The journal construction is shown broken away in Figure 1. The ends of the rolls are dished in to allow space for the journal box 21 which may be, for example, a sealed ball bearing race, which is equipped with a square base flange so as to be bolted to the side frames 15 and 16. The shaft 9 extends through and is welded to the ends of the rolls. The journals are then slipped on the ends of the shaft and the roll with the bearings on the protruding shaft ends is then lowered into the frame 13 and the journals made fast by bolting.

Roll 11 and its frame 22 are the same as roll 10 and frame 13, previously described. The frame 22 of roll 11 likewise serves as a mounting for the bearings 26 in which the shaft of roll 11 is journaled and serves as a mounting for the scrapers 24 and 25 which serve to clean out the dirt which may tend to pack in between the teeth 12 on the roll 11.

The two frames 13 and 22 are attached to the drawbar generally designated 30 as follows: The drawbar 30 is provided wtih three pairs of laterally extending supporting ears or lugs, as illus-

trated at 31—32, 33—34 and 35—36. The front pair of supporting ears 31—32 are relatively small and serve as means for attaching diagonal braces 39 and 40, as hereinafter described. The main attachment of the roll frames 13 and 22 is by means of the pairs of supporting ears 33—34 and 35—36. These are heavily constructed, as shown in Figures 4–7 and extend outwardly on each side of the drawbar 30 at positions immediately below the front and rear cross frame members 14 and 17 of roll frame 13 and the corresponding front and rear cross frame members of the roll frame 22. The attachment of front cross frame member 14 is by means of a pair of plates 42 (Figures 3–7) which extend down from the cross frame member 14 at the end of that member which is closest to the drawbar 30. The plates 42 are spaced apart in the fore and aft direction by an amount just sufficient so that they lie on the front and back of the heavy lug 33. A heavy pivot bolt extends through the members 42 and the lug 33, as illustrated at 44. There are likewise provided a pair of attachment plates 46 (Figures 4–7) which similarly extend down from the front cross frame member of the roll frame 22. These are likewise positioned immediately under said cross frame member and at the end of that member which is closest to the drawbar 30. The plates 46 likewise fit closely to the front and rear faces of the lug 34 and are attached thereto by means of pivot bolt 47. Similar lugs are provided under the rear cross frame member 17 of the roll frame 13 and under the corresponding rear cross frame member of roll frame 22. Those mounted upon cross frame member 17 are illustrated at 49 in Figure 3, and it will be observed they are positioned immediately under the cross frame member 17 and are spaced apart just sufficiently to accommodate the lug 35 to which they are attached by the pivot bolt 50. The attachment of the rear cross frame member of roll frame 22 to the lug 36 is not illustrated, but it will be understood to be in precisely the same manner.

The pivot bolts 44 and 50 are aligned and are parallel to and spaced slightly from the drawbar 30, and hence the entire frame 13 is free to pivot up and down with respect to the drawbar 30. Additional bracing force is supplied to the roll frame 13 by means of the diagonal brace 39 which is attached to the lug 31 by means of the pivot bolt 52. The bolt 52 is likewise axially aligned with bolts 50 and 44. Hence, the entire roll frame has free and unrestricted pivotal motion about this pivoting axis in respect to the drawbar 30. The pivotal connection of the roll frame 22 to the drawbar is exactly similar and need not be further described other than to say that it is about an axis parallel to the drawbar 30 and spaced therefrom at the opposite side by an amount equal to the spacing of the axis of bolts 52, 44 and 50 from the drawbar. The axis of pivoting of frame 22 extends through the pivot bolts 55 and 47. The roll frame 22 is likewise diagonally braced by brace 40 which is attached by pivot bolt 55 on lug 32, which is likewise axially aligned with pivot 47.

The brackets 33—34 at the front of the roll frames 13—22 and brackets 35—36 at the rear of the roll frames 13 and 22 extend outwardly beyond their pivots by a distance sufficient to form a stop against which the front and rear cross frame members of each of the roll frames may abut. Thus, referring to Figures 4–7, it will be observed that the front cross frame member

14 of the roll frame 13 is provided with a stop at 56 which engages the outer extremity of the bracket 33 and another stop 57 which is positioned so as to abut against the drawbar itself. Likewise, on roll frame 22 there is provided a stop 58 which abuts against the bracket 34, and an inner stop 59 which likewise moves into engagement with the drawbar 30. Similar stops are provided under the rear cross frame members of each of the roll frames so as to abut against the brackets 35—36 and the rear portion of the drawbar. It is the purpose of the brackets and the stops to limit the vertical oscillatory motion of each of the roll frames with reference to the drawbar, and hence with reference to each other. The stops likewise limit the rotation of the drawbar 30 as in Figure 7. In Figure 4 the stops 57 and 59 are shown in engagement with drawbar 30. This represents the maximum position to which the inner (adjacent) portions of the rolls may drop and still maintain clearance between their upper edges in the region 60. In Figure 6 it will be observed that the stops 56 and 58 are in engagement with the outer ends of brackets 33 and 34, respectively, and hence the roll frames 13 and 22, and accordingly the rollers thereon are limited against further movement of the outer portions of the rolls and frames downwardly. This prevents the lower portions of the rolls from running into each other in the region 62.

Figure 5 illustrates a condition where the roll 11 is running level and roll 10 is at an angle such that its outer edge is lifted an amount so as to bring the stop 57 into engagement with the drawbar 30, but the drawbar has not been rotated. In this position there is still some clearance between the adjacent axle ends at region 63, and any further upward movement of the outer edge of the roll 10 may occur. This will cause the drawbar 30 to be rotated about pivot 47 until the stop 59 is engaged by the drawbar at which time a minimum and irreducible clearance will still be maintained between the upper portions of the rolls at 60. This will correspond to the position shown in Figure 4, except that roll 11 would be level and roll 10 angularly elevated to about twice the amount shown in Figure 5. In Figure 7 there is illustrated a further condition of operation wherein the roll 10 is operated at an elevated but level position in respect to roll 11. This is permitted by the rotation of the drawbar 30 until the outer tip of bracket 33 engages the stop 56 and until the drawbar 30 engages the stop 59.

By this condition of operation it is possible to maintain each roll level, even though variation in elevation may occur, and thus obtain uniform compacting over level surfaces, a result not previously accomplished by available rollers.

The drawbar is freely rotatable within the limits imposed by two rollers and their frames. The rotation of the drawbar 30 is accomplished by a special hitch generally designated 65 which includes a hitch eye 66, the latter being journaled in brackets 67, the brackets being in turn fastened to the lower portion of the drawbar 30. A heavy drawbar spring is provided at 68 so as to permit limited motion of the drawbar eye 66 lengthwise with reference to the drawbar 30. Even under heavy conditions of operation the drawbar 30 is permitted to rotate freely with reference to the eye 66 which is normally prevented from rotating by its clevis attachment to the motive power unit. At the rear end of drawbar 30 there is likewise provided a hitch generally

designated 10 which is provided with a clevis eye 11 mounted on a shaft 12 extending lengthwise in respect to the drawbar. The shaft 12 is mounted so as to be freely rotatable with reference to the drawbar and hence the drawbar is not restricted by the attachment of any second or subsequent rollers or ground working implements that may be towed behind.

It is a feature of the invention that each of the roll frames 13 and 22 and the rollers journaled thereon are mounted solely by an arrangement in which the mounting axis is parallel to the drawbar so that each roll frame and roller is free to oscillate up and down to a limited extent about an axis parallel to the drawbar and the drawbar are also permitted to translate vertically with reference to the towing hitch. By this combination of linkages the rolls on each side of the drawbar are also permitted to translate vertically with respect to each other without at the same time introducing a tipping action on the roll, a disadvantage of previous rolling mechanisms.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof, it is to be understood that I do not limit myself to the specific embodiments herein except as defined by the appended claims.

What I claim is:

1. An improved articulated roller having two laterally spaced rolls at each side of a drawbar, a drawbar hitch pivotally connected to said drawbar, each roll including a rectangular frame for the roll, journals on the frame for the roll, each said frame being composed of front, rear, inner and outer frame pieces joined together as a rectangle which circumscribes the roll, the adjacent inner portions of the two rectangular frames having only clearance space therebetween, a drawbar positioned so as to extend between the rolls and so as to lie under and generally parallel to the adjacent inner members of the two frames, supporting lugs extending outwardly from the drawbar at opposite sides thereof so as to be under those portions of the front and rear rectangular frame members adjacent the drawbar, downwardly extending brackets on said adjacent portions of the front and rear members positioned so as to cooperate with the lugs to form pivotal connections therewith laterally spaced from the drawbar, and pivot members between each lug and the corresponding bracket, the axis of the pivots between the lugs and brackets which connect each frame to the drawbar being aligned parallel to the axis of the drawbar, said pivotal connections being the sole connection between the frames and the drawbar and between the frames whereby each roller has hinged movement with respect to the other and each roller is displaceable either up or down and parallel to a horizontal position either as a separate motion or a combination of such motions to assume corresponding positions.

2. The apparatus of claim 1 further characterized in that each roll supporting frame is mounted with respect to said drawbar so that said inner adjacent portions of the two roll supporting frames extend slightly over said drawbar and have stop portions thereon adapted to engage said drawbar to limit the pivotal movement of such roll supporting frame.

3. An articulated roller comprising a drawbar, a first pair of roll frame supporting brackets extending laterally at one side of said drawbar in spaced relation to each other and toward one

end of said drawbar, a second pair of roll frame supporting brackets extending laterally from the other side of the drawbar, said second pair being positioned approximately opposite the first pair, a pair of similar rigid rectangular roll supporting frames, one frame being pivotally connected at its end to the spaced brackets on one side of the drawbar so as to extend transversely at one side of said drawbar, said pivotal connection being along an axis parallel to the axis of the drawbar, and the other frame being pivotally similarly connected at its ends to the spaced brackets on the other side of the drawbar so as to extend transversely at the other side of said drawbar, said pivotal axis likewise being parallel to the axis of the drawbar, a diagonal brace for each roll supporting frame rigidly connected to its roll supporting frame and positioned so as to extend along a diagonal line towards a point on the drawabr spaced from the pairs of spaced roll supporting brackets, each such brace being pivotally connected to the drawbar along an axis coinciding with the axis of the pivotal connection between its frame and the drawbar, a roller pivoted on each frame with the axis of each roller in a plane transverse to the drawbar, and a drawbar hitch on the drawbar, said hitch including a pivotal journal between the drawbar and hitch which is parallel to the axis of the drawbar.

4. An articulated roller comprising a drawbar, a first pair of roll frame supporting brackets extending laterally at one side of said drawbar in spaced relation to each other and toward one end of said drawbar, a second pair of roll frame supporting brackets extending laterally from the other side of the drawbar, said second pair being positioned approximately opposite the first pair, a pair of similar rigid rectangular roll supporting frames, one frame being pivotally connected at its end to the spaced brackets on one side of the drawbar so as to extend transversely at one side of said drawbar, said pivotal connection being along an axis parallel to the axis of the drawbar, and the other frame being pivotally similarly connected at its ends to the spaced brackets on the other side of the drawbar so as to extend transversely at the other side of said drawbar, said pivotal axis likewise being parallel to the axis of the drawbar, said frames being otherwise unconnected to each other and to the drawbar, a roller pivoted on each frame with the axis of each roller in a plane transverse to the drawbar, and a drawbar hitch on the drawbar, said hitch including a pivotal journal between the drawbar and hitch which is parallel to the axis of the drawbar, each of said roll frame supporting brackets extending laterally from the drawbar being provided with an outer free end portion which serves as a stop for engagement with its corresponding pivotally attached roll supporting frame to limit the pivotal movement of such roll supporting frame.

5. An improved articulated roller having two laterally spaced rolls at each side of a drawbar, each roll including a rectangular frame for the roll, journals on the frame for the roll, each said frame being composed of front, rear, inner and outer frame pieces joined together as a rectangle which circumscribes the roll, the adjacent inner portions of the two rectangular frames having only clearance space therebetween, a drawbar positioned so as to extend between the rolls and so as to lie under and generally parallel to the adjacent inner members of the two frames, sup-

porting lugs extending outwardly from the drawbar at opposite sides thereof so as to be under those portions of the front and rear rectangular frame members adjacent the drawbar, downwardly extending brackets on said adjacent portions of the front and rear members positioned so as to cooperate with the lugs to form pivotal connections therewith laterally spaced from the drawbar, pivot members between each lug and the corresponding bracket, the axis of the pivots between the lugs and brackets which connect each frame to the drawbar being aligned parallel to the axis of the drawbar, and a diagonal brace provided for each roll supporting frame, each such brace being rigidly connected to its roll supporting frame and positioned so as to extend along a diagonal line towards a point on the drawbar spaced from the pairs of spaced roll supporting lugs, each such diagonal brace being pivotally connected to the drawbar along an axis coinciding with the axis of the pivotal connections between the corresponding frame and the drawbar.

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