

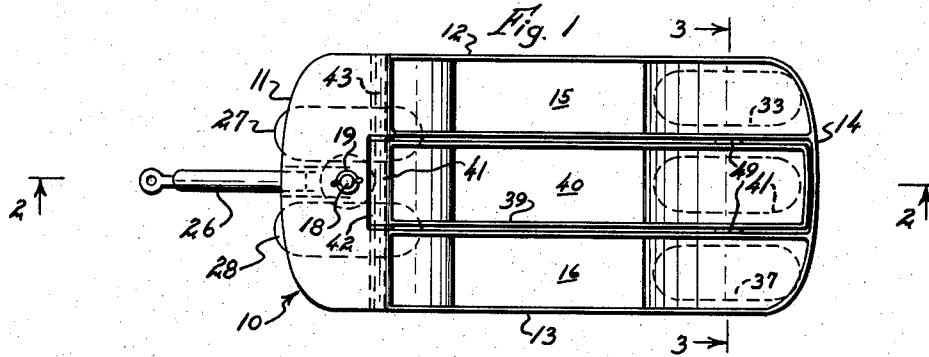
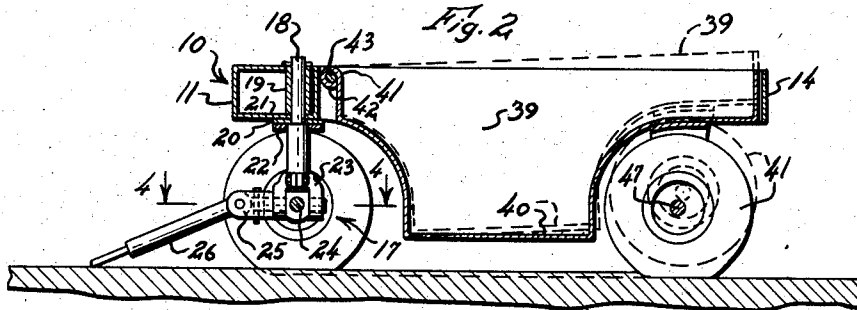
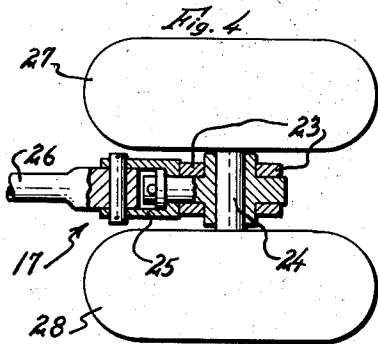
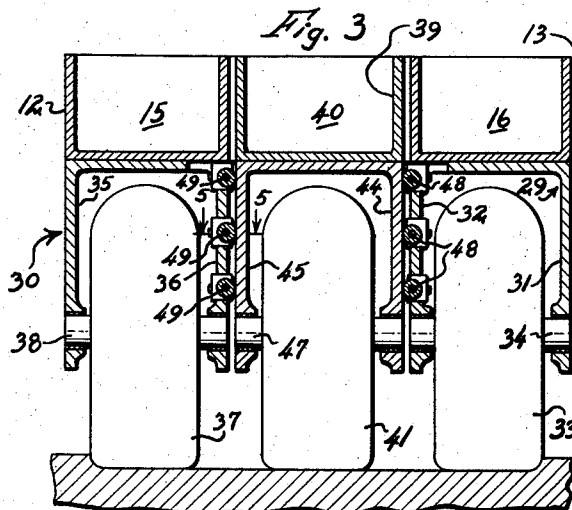
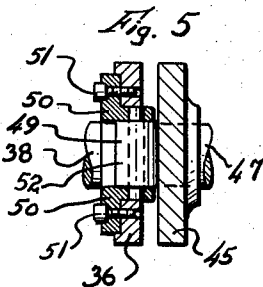
July 5, 1960

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2,943,541

COMPACTION ROLLER

Filed May 10, 1954



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2,943,541

COMPACTION ROLLER

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Filed May 10, 1954, Ser. No. 428,722

2 Claims. (Cl. 94—50)

This invention relates to a compaction roller and more particularly to a road roller of the type equipped with pneumatic tires supporting a weighted chassis.

Numerous road rollers have been proposed in the prior art, many of which utilize pneumatic tires which are aligned in the unit so that the tracks formed thereby in the earth will be heavily compacted and overlapped to produce a uniform compaction. Some of these devices have been constructed on the theory that all the tires be mounted rigidly on a frame and if a high spot in the earth to be rolled is encountered, the particular tire or tires rolling over such high spot, will lift the entire load of the device, the other tires being raised out of contact with the lower adjacent areas. The theory of such roll procedure is that the high spots receive the more severe treatment and therefore, become compacted to a lower level and consequently, cause the earth to be evened off.

The fallacy of this procedure lies in the degree to which any particular unevenly contoured area becomes compacted. Thus, even though rolling by apparatus having its wheels rigidly journaled with respect to one another, might result in a smooth and level job, the particular areas which were low at first, remain uncompacted while the higher areas are given direct treatment. The more highly compacted areas will withstand heavy loads during use while the less compacted areas sink down and create a bumpy and generally uneven surface.

We have found that best results in rolling such areas as roads and airplane runways are attained by uniformly compacting the earth regardless of leveling at the time of compaction, but following such treatment by resurfacing and rerolling so that the final surface will be level and uniformly compacted.

Other road rollers have been proposed in which each pneumatic tire is mounted on a spring pressed carriage so that the tires may operate independently and thereby enter depressions and compact them as well as the higher areas. Unfortunately, the compression of the spring mountings vary as the wheel and tire are urged downwardly under compressive force exerted by the extending spring. Here again, uneven compaction results and the cost of furnishing and maintaining such spring carriage is a considerable factor.

Still another type of road roller utilizes rubber tired wheels which wobble or make a zig zag track which theoretically produces an even and level compaction. We have found that such type of road roller can be successfully employed only on those roads the composition of which is low in clay or other "slip" material. The clay type of soil will often work back and forth under the influence of lateral compaction, the result being a dissipation of energy through slipping and squeezing the soil but without acquiring more than a moderate amount of compaction.

It is therefore an important object of this invention to overcome the foregoing objections and to provide a road roller capable of steering or guiding which will give uniform and efficient compaction with a minimum of construction and maintenance cost.

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It is another object of the invention to provide a suspension system where each wheel of the road roller will maintain a uniform degree of compaction on each wheel of the roller with the surface to be packed being either level or uneven.

Another object of the invention is to provide an apparatus which will compact the entire width of a surface strip with a minimum of working of the earth and with a slight overlap of tracks produced by staggered wheels, each having substantially equal pressure applied thereto during the rolling operation.

A further object of the invention is to provide a novel compartmented frame constituting a rigid structure with a three point suspension, the frame serving to strengthen the construction of the device and to provide lateral support for movable, compartmented structure mounted in association with the rigid portion, resiliently tired wheels being mounted on the device in such a manner as to lie in staggered relation with each other and to contribute equal compaction during use.

These and other objects and advantages of our invention will be more apparent from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

Fig. 1 is a plan view of our device, hidden portions thereof being indicated in dotted lines;

Fig. 2 is a vertical section of the apparatus shown in Fig. 1 and taken on the line 2—2 thereof, certain of the parts being shown in full line representation and a movement of oscillable portion of the frame to a higher position being indicated in dotted line;

Fig. 3 is an enlarged, vertical section of the rear mounting structure taken on the line 3—3 of Fig. 1, certain of the parts being shown in full line;

Fig. 4 is an enlarged, horizontal section of the front wheel suspension taken on the line 4—4 of Fig. 2, portions of the view being left in full line and the unessential portions of the draw bar being cut away; and

Fig. 5 is an enlarged, segmental detail of a roller support taken on the line 5—5 of Fig. 3.

Referring now more particularly to the drawing, our roller apparatus has a frame member indicated generally at 10 which comprises a head member 11 at the forward end and a pair of trailing leg members 12 and 13, as shown in Fig. 1. The leg members 12 and 13 may be joined at the trailing ends thereof by a smoothly curved, connecting band 14 so that the framework presents a pleasing appearance and the rigidity of frame 10 will be enhanced throughout. The head 11 is preferably of hollow structure, as shown in Fig. 2 and the leg portions 12 and 13 provide compartments 15 and 16 which are adapted to contain weights or ballast in order to provide the essential pressure on the wheel elements, as will be set forth in detail later in this specification.

The compartments 15 and 16 are so arranged that the center of gravity of the compartments when filled with ballast, is slightly to the rear of the center of the apparatus so that the rear ends of each of the legs 12 and 13 will be weighted more heavily than the forward ends.

The head 11 of frame 10 forms an apex adapted to be suspended by a plurality of roller wheels indicated generally at 17, as shown in Figs. 1, 2 and 4 and the rear ends of legs 12 and 13 also provide suspension points in symmetrical trailing relation with respect to the apex suspension at the head 11. The plurality of roller wheels 17 supports the forward end of the rigid frame by means of a vertical shaft 18 which extends upwardly through the head 11 and is journaled in sleeve 19 rigidly secured thereto. A bearing plate 20 is rigidly formed at the undersurface 21 of head 11 and the axial shaft 18 has a rigid flange member 22 which is adapted to lie in bearing

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contact with the flange 20 and be rotatable thereagainst. The axial shaft 18 extends downwardly and connects with a yoke member 23 which in turn supports the front wheel assembly 17 at the axis 24, as shown in Fig. 2. A clevis 25 is rigidly secured to the axis 24 and also pivotally bears a draw bar 26 which extends forwardly of the apparatus and is adapted to be attached to a vehicle such as a crawler tractor or the like. It is understood of course, that the device may be self-propelled, in which case the front roller wheel suspension would be steered from the apparatus itself.

The front roller wheel assembly 17 comprises a plurality of roller wheels which in the present instance, constitutes two rubber tired wheels 27 and 28 and these wheels lie in spaced relation, as shown particularly in Fig. 4. The vertical shaft 18 and the yoke 25 are both rotatable and hence the front roller wheel assembly 17 is pivotally secured to the head end 11 of the apparatus in such a manner as to constitute a universal joint. The roller wheels 17 may be swung around the vertical shaft 18 for steering the device and at the same time, the wheels 27 and 28 may rock in a lateral direction with respect to the shaft 18. Thus, a single suspension point is provided at the apex of the rigid frame even though the terrain encountered be uneven and causing the wheels 27 and 28 to move out of horizontal alignment.

Referring now to Fig. 3 of the drawings, each of the rearwardly extending legs 12 and 13 of the rigid frame 10 has a mounting structure 29 and 30 respectively. The mounting structure 29 has an outer support 31 and an inner support 32, across which is journaled the rubber tired wheel 33 at axle 34. The mounting structure 30 has a similar arrangement comprising an outer wall 35 and an inner wall 36 across which is journaled a rubber tired wheel 37 at the short axle 38, as shown. It will be observed that the supports 29 and 30 provide a symmetrical, three-point suspension in combination with the mounting of the front roller wheel support at the head end of the rigid frame 10.

Medially of the legs 12 and 13 is provided an oscillable frame 39 which has a compartment 40 similar to the compartments 15 and 16 of the outer legs 12 and 13. The oscillable frame 39 is hingedly mounted at 41 to the rear of head 11 and such pivotal mounting is preferably accomplished through a sleeve 42 secured to the front of the oscillable frame 39 and through which a shaft or pin 43 extends. The shaft 43 is secured to each side of the U-shaped, rigid frame at the juncture of legs 12 and 13 with the head 11. The oscillable frame 39 lies in close clearance with legs 12 and 13 and terminates at its rearward end in clearance with the connecting band 14 at the rear of the rigid framework 10. The oscillable frame 39 has a supporting structure comprising walls 44 and 45, as shown in Fig. 3 across which is journaled a resiliently tired wheel 46 at short axle 47. It is preferred that all of the wheeled members be of the same construction, such as rubber tires of equal diameter and width.

The supporting structure of the oscillable frame 39 is adapted to lie in guided contact with each of the legs 12 and 13 and this is preferably accomplished through a plurality of roller elements 48 rotatably mounted to the inner wall 32 of leg 12 and a similar plurality of roller elements 49 mounted to the inner wall 36, as shown in Fig. 3. A detailed view of the roller element is shown in Fig. 5 and constitutes a bearing mount 50 which is secured through an opening in each of the walls 32 and 36 by such means as bolts 51 threadedly secured in the wall and member 15 having journaled thereacross, a steel roller 52. The roller 52 of each of the roller elements 48 and 49 is adapted to engage at the left, as viewed in Fig. 3, the wall 45 of the oscillable leg 39 and at the right, the wall 44 of the oscillable leg.

In use and operation of our device, the draw bar 26

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is hitched to a vehicle such as a tractor (not shown) and the compartments 15, 16 and 40 are properly weighted with ballast material such as scrap iron or the like. Since the compartments extend over the rear wheels 33, 37 and 46, more weight will be applied to the rear ends than to the forward end. However, since there are only two tires at the front end and a total of three at the rear end, it will be appreciated that the distribution of weight may be so controlled that each of the tires will exert substantially the same pressure upon the surface to be rolled. It will be further noted that the wheels 27 and 28 of the front roller wheel assembly are spaced in such a manner as to lie in staggered relation with the three rear wheels 33, 37 and 46. Thus, the track formed will be uniformly compacted with a slight overlap in the compact tracks of the respective resiliently tired wheels.

When uneven ground is encountered, the entire apparatus will shift so as to conform to the three point suspension provided by the vertical shaft mounting at 18 at the head end or forward apex of frame 10 and the rear ends of the respective legs 12 and 13 through the supports on the respective wheels 33 and 37. The rigid frame will thus move so as to maintain a contact of equal pressure at the three triangular points of suspension. The oscillable frame 39 however, is independent with respect to irregularities in the surface to be rolled and hence, will not interfere with the orientation of frame 10 and will merely follow and seek its own level during the travel of the device. The weighted compartment 40 will provide its own force upon wheel 46 and thereafter may enter depressions or ride over high spots without affecting the operation of the remainder of the wheels.

Because of the considerable weight in all of the compartments and the consequent stress which is applied to the structure during operation, we have provided roller means 48 and 49 which will support the oscillable frame 39 against lateral shifting with respect to the rigid frame 10 but will permit relative vertical movement so as to not interfere with the independent compacting action of each of the rubber tired wheels.

If the plane defined by the rigid frame 10 should tilt to one side or the other during operation, it is understood that the front wheel suspension behaves as though a single wheel were mounted thereon. The reason for this is the universal pivotal action between the axial shaft 18 and the yoke 25, as shown in detail in Fig. 4. Thus, the weight distribution at the head end 11 will be applied equally to wheels 27 and 28 regardless of whether they are in contact with level earth or not.

It may thus be seen that we have devised a compaction roller which is simple in design and effective to transmit equal pressure throughout the individual roller wheels, regardless of the contours of the surface to be rolled and which provides a rigid and economical structure which will be easy to operate and maintain.

It will, of course, be understood that various changes may be made in the form, detail, arrangement and proportions of the parts without departing from the scope of our invention.

What is claimed is:

1. A road rolling apparatus comprising, a rigid, U-shaped frame having a forward apex and rearwardly extending legs, said forward apex providing a suspension point and the rearward ends of each of said legs also providing symmetrical trailing suspension points, a plurality of constantly spaced roller wheels supporting the forward suspension point, means journaling the wheels for free pivotal movement on the frame at the forward suspension point, roller wheel means supporting each of said trailing suspension points and journalled for rotation about fixed horizontal axes on the frame, an oscillable frame hingedly connected adjacent the forward apex of said rigid frame and lying in medial relation with respect to the side legs of said rigid frame, roller wheel means

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journalled for rotation about a fixed horizontal axis in supporting relation on the oscillable frame at the trailing end thereof and bearing means mounted between the rigid frame and said oscillable frame at each side thereof to permit vertical movement of the oscillable frame while rigidly supporting against relative lateral movement with respect to the rigid frame.

2. A road rolling apparatus comprising, a rigid U-shaped compartmented frame having an apex and trailing legs at each side, each of said legs being provided with a compartment for carrying ballast, a plurality of roller wheels journalled on a single axle and disposed beneath said forward apex, supporting means connecting said apex and said axis in universally swinging movement at a point suspension, a rear roller wheel journalled in a fixed vertical plane on and beneath each of said legs, each of said rear wheels providing another point of suspension for said rigid frame, an elongated frame pivotally mounted at its forward end portion on the frame rearwardly of said apex between the legs of said rigid frame and having a compartment for holding ballast, said pivoted frame having a roller wheel journaled thereon in rearwardly depending relation for rotation about a horizontal axis, said elongated frame together with the wheel thereon being pivotable only in a vertical plane parallel to each of said vertical planes passing through

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the aforementioned rear roller wheels, and guide and bearing means mounted inwardly of each of said legs and providing continuous supporting contact for said elongated frame during relative movement therebetween.

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