

Nov. 13, 1962

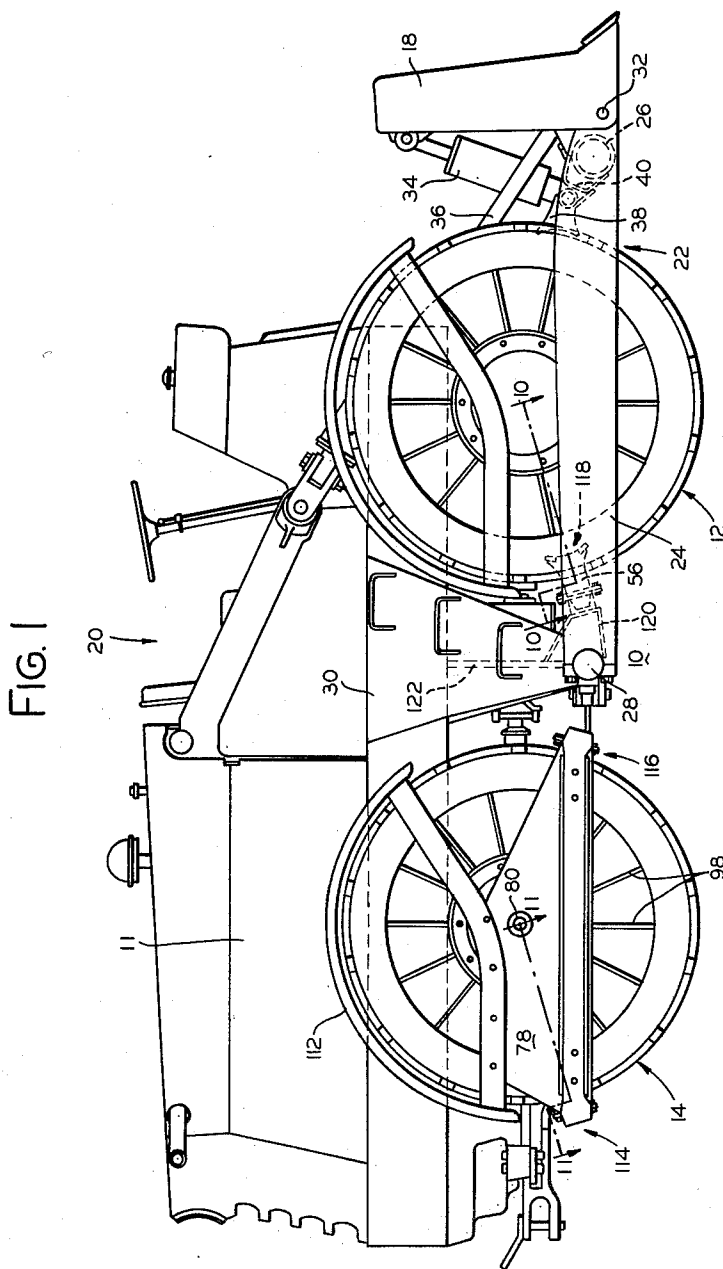
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3,063,177

CLEANER FOR COMPACTION MACHINES

Original Filed Sept. 16, 1958

5 Sheets-Sheet 1



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FIG. 2

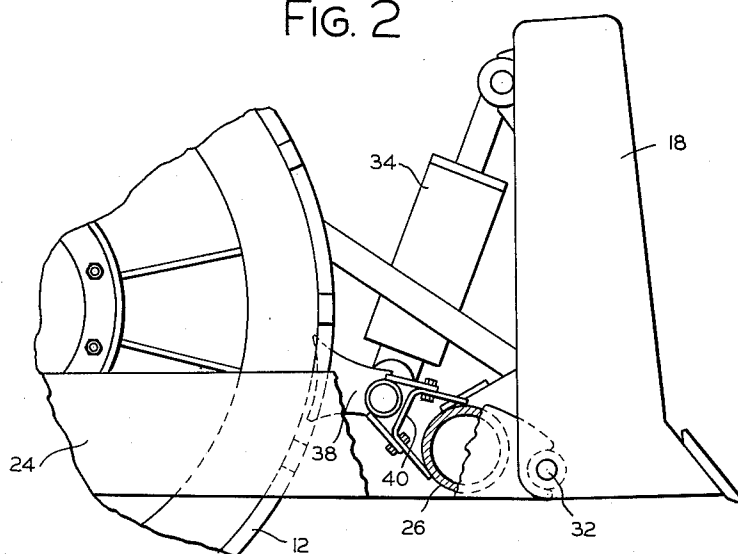
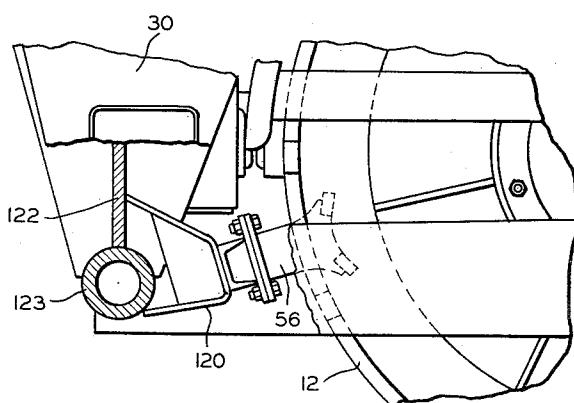


FIG. 3



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FIG. 4A

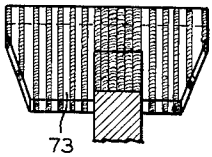


FIG. 4

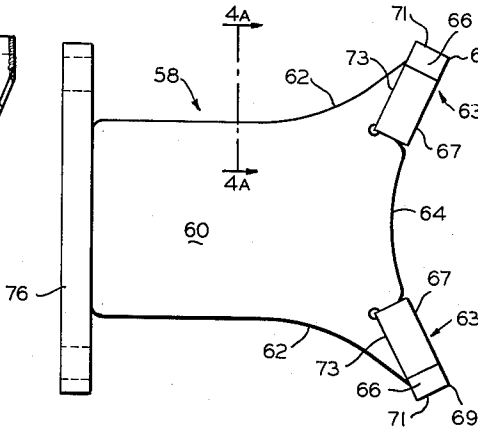


FIG. 5

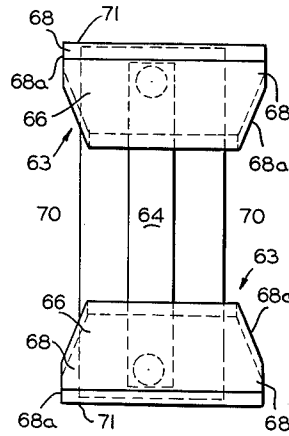


FIG. 6

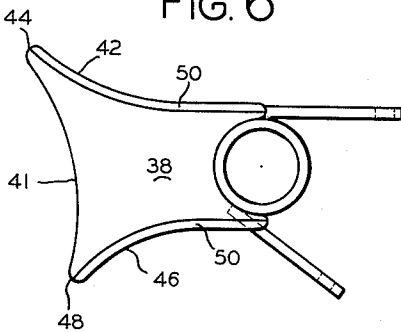


FIG. 7

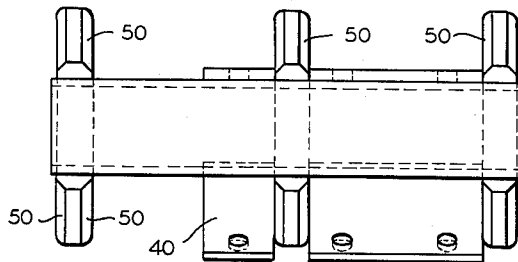
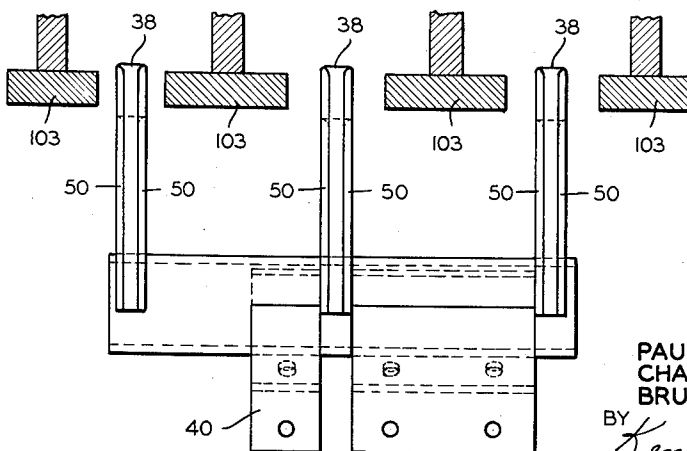


FIG. 8



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FIG. 9

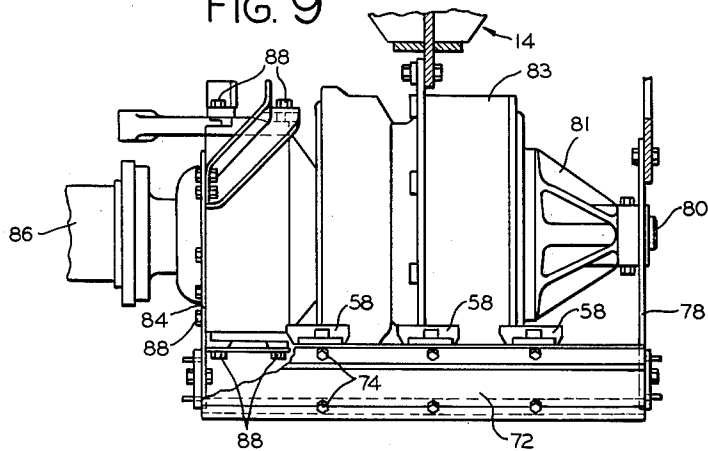


FIG. 10

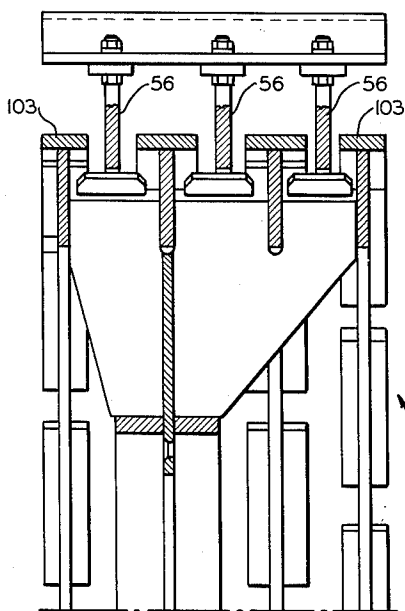
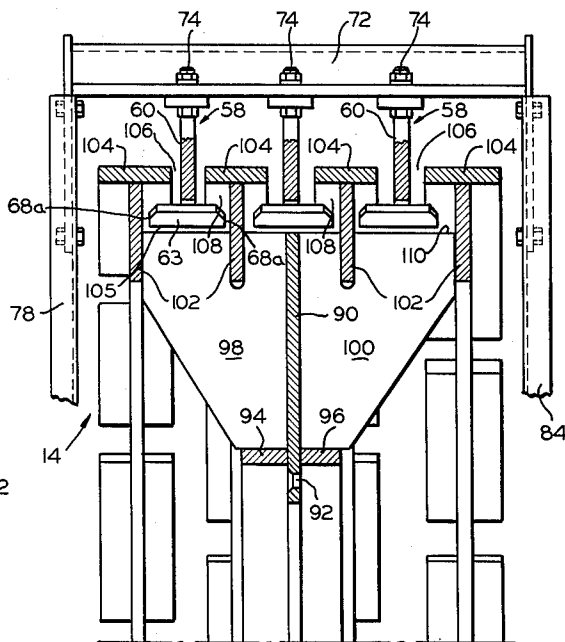


FIG. 11



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FIG. 12

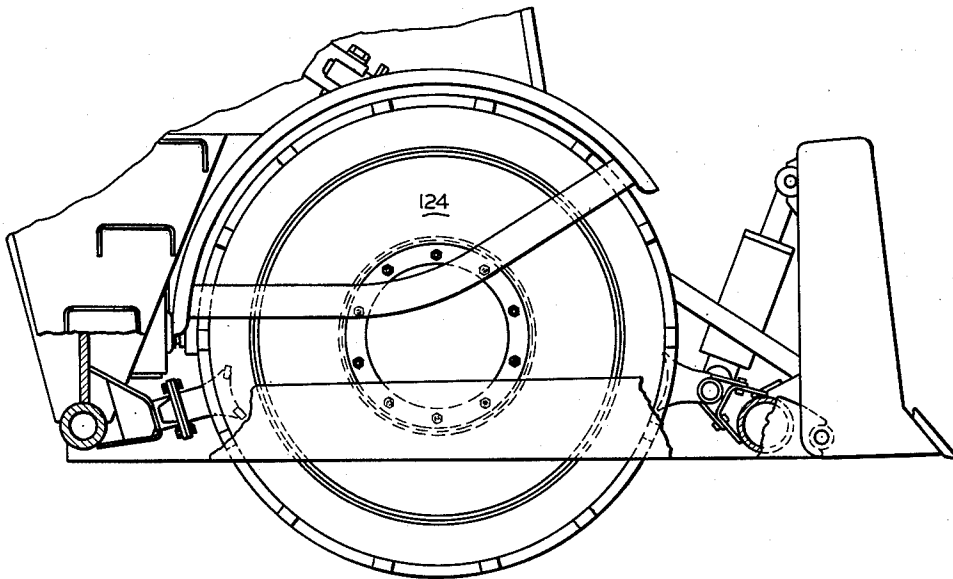
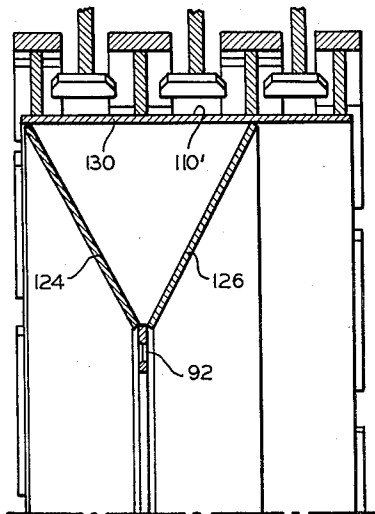


FIG. 13



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CLEANER FOR COMPACTION MACHINES

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Original application Sept. 16, 1958, Ser. No. 761,330.
Divided and this application Nov. 20, 1959, Ser. No.
854,456

6 Claims. (Cl. 37—146)

This invention relates to cleaners for compaction machines such as those which are used for compacting soil and other materials in connection with road building and similar projects.

This is a division of our application Serial Number 761,330, filed September 16, 1958.

Various types of compaction machines are known, such as the pad type, the sheep's foot type, the solid roll type, the pneumatic tire type and others. Practically all compaction machines have problems of keeping the rolls or wheels clean, the magnitude of such problems depending on the type of roll employed and the type of soil encountered, that is, whether it is clay, sand, gravel, silt, common earth, rocky or sandy mixtures or other type.

The principal object of the present invention is to provide an improved cleaner for compaction machines which is rugged and reliable but yet is serviceable for all types of soils and other materials which may be compacted by such machines.

Another object is the provision of a cleaner structure which will not damage the compaction machine or be damaged itself under abnormal operating conditions.

A more specific object is to provide teeth for pad type compaction wheels which are efficient in their cleaning action but, at the same time, cause minimum drag on the wheels during operation.

A feature of our invention in one aspect thereof is that the cleaner structure in part may be mounted on and carried by the same structure which carries a bulldozer blade or other earthworking implement.

In carrying out our invention in one preferred embodiment we provide a self-propelled vehicle having four pad type compaction wheels and a bulldozer blade at one end. Each wheel is provided with individual cleaner members or teeth both in front and behind it and these individual members extend through annular gaps between the rows of pads on the wheels. Some of such individual cleaner members are mounted on and carried by the structure which carries the bulldozer blade.

For a clearer and more complete understanding of our invention, reference should be had to the accompanying drawing in which:

FIGURE 1 is a side elevation view of a compaction machine embodying our invention in a preferred form thereof;

FIGURE 2 is an enlarged fragmentary view of a portion of FIGURE 1;

FIGURE 3 is an enlarged fragmentary view of another portion of FIGURE 1;

FIGURE 4 is a side view of an individual cleaner member;

FIGURE 4A is a fragmentary sectional view along the line 4A—4A of a portion of the cleaner member of FIGURE 4;

FIGURE 5 is an end view of the cleaner member of FIGURE 4;

FIGURE 6 is a side elevation of another cleaner member;

FIGURE 7 is an elevational view of a group of cleaner members of the construction shown in FIGURE 6, and the mounting therefor;

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FIGURE 8 is a top view of the structure of FIGURE 7; FIGURE 9 is an end elevation of the mounting of a portion of the cleaner structure for one of the rear wheels of the compaction machine;

FIGURE 10 is a partial sectional view through one of the front wheels and a portion of the cleaner structure along the line 10—10 in FIGURE 1;

FIGURE 11 is a partial sectional view through one of the rear wheels and a portion of the cleaner structure along the line 11—11 in FIGURE 1;

FIGURE 12 is a partial side view showing a modified wheel structure; and

FIGURE 13 is a partial sectional view of the wheel structure of FIGURE 12 and a portion of the cleaner structure.

The drawing shows a pad type compaction machine which is of the same general construction as that disclosed in copending application Serial No. 726,884 of Bruce V. Christensen, filed April 7, 1958, to which reference is made for further details on this type compaction machine.

FIGURE 1 of the drawing shows a rolling or compaction machine 10 which is equipped also for use as a bulldozer. This machine comprises a body portion 11 housing a prime mover such as a diesel or other internal combustion engine, along with other components necessary for propelling the machine. It is equipped with a pair of front wheels 12, only one of which is visible in this view, and a pair of rear compaction wheels 14, only one of which is visible. The machine 10 includes a bulldozer blade 18 which is discussed in more detail hereinafter, and an operator's station 20 and other components and features necessary for a machine of this type.

Each of the wheels of this particular machine comprises four spaced apart rows of annularly arranged curved pads forming an outer broken cylindrical surface; the enlarged fragmentary side views of FIGURES 2 and 3 and the sectional views of FIGURES 9 and 10 illustrate their construction. Each wheel also has two sets of cleaner members, with two individual cleaner members extending through the gap between each pair of rows of pads, and details of these cleaner members are revealed in the figures just mentioned plus FIGURES 4 through 8 inclusive.

The bulldozer blade 18 is mounted on a U-shaped frame member which we have indicated generally by the numeral 22. This frame member comprises a pair of side push beam portions 24, only one of which is visible, and a transverse tube member 26 which forms the bight portion of the U. The rear ends of the push beams 24 are pivotally mounted at 28 on bracket members 30 which depend from the frame of the machine.

Bulldozer blade 18 is mounted to pivot at location 32 on the U-shaped frame 22, and is tiltable forwardly and rearwardly about pivot axis 32 by means of a hydraulic actuator 34 which is controlled from the operator's station. The bulldozer blade 18 and frame structure 22 may be raised and lowered by a pair of hydraulic actuators 36, only a portion of one being visible in the drawing, which are connected between the body portion 11 of the machine and bight portion 26 of the U-shaped frame.

A plurality of individual cleaner members 38, one of which is illustrated in FIGURE 6, are mounted on member 26 by suitable means such as bracket means 40 to extend into the gaps between adjacent rows of pads 103 on the front wheels 12. In the particular machine illustrated, there are three of these individual cleaner members for each front wheel. FIGURE 7 is a view, looking toward the wheel, of such a group of three cleaner members for one front wheel and a portion of the bracket structure 40 for such group. Three cleaner teeth are required for

each front wheel inasmuch as each such wheel has four rows of pads, and FIGURE 8 illustrates in a top view the manner in which the cleaner members 38 cooperate with the front wheels 12 in cleaning between the pads 103 thereof. Inasmuch as cleaner members 38 move up and down as structure 22 is raised and lowered to move blade 18, the individual cleaner members 38 are relatively narrow, being less in width throughout than the width of the gaps between adjacent rows of pads 103; and these cleaners do not have enlarged portions within the wheel as do the other individual cleaner members described hereinafter.

Each individual cleaner member 38 has an arched or inwardly curved portion 41 and a flared curved portion 42, to form a projecting portion 44 which peels away the soil and other materials and objects which tend to clog the gap between adjacent rows of pads during forward operation of the machine 10. During reverse operation a similar flared portion 46 cooperating with portion 41 to form a projection 48 performs a similar function for the opposite rotation of wheel 12. As seen in FIGURES 6, 7 and 8 each member 38 preferably has chamfered portions 50 along the top and bottom edges respectively to facilitate forcing the cleaner members through the accumulated material between rows of pads and for minimizing drag on the wheels during operation.

Another set of individual cleaner members or teeth 56 for front wheels 12 are located rearwardly of these wheels and these additional cleaners will be covered in detail after a description of the cleaners for rear wheels 14.

The individual cleaner members and the mounting structure therefor for the rear wheels 14 are illustrated in detail in FIGURES 4, 5, 9 and 11. The individual cleaner members as shown in FIGURES 4 and 5 each comprises a shank portion 60 of less width than the gap between adjacent rows of pads. At the inner end of the cleaner member, which extends into an annular space immediately beneath the gap, each cleaner member 58 has two enlarged portions 63. The inner end also has an arched or inwardly curved surface 64, and flared portions 62 at the top and bottom of shank 60. A pair of transversely disposed wear or toe members 66 are located at the ends of the curved surface 64 in a manner such that they have one surface 67 conforming to and forming a part of the curved surface 64. While we have illustrated herein enlarged portions 63 which are formed by separate transverse members 66 that are secured to the body portion of the tooth member and made integral therewith by welding, thus making it possible readily to utilize metal for the toe portions which have better wear resisting qualities than the balance of the tooth member, it will be appreciated that the toe portions 66 may be formed integrally with and of the same material as the balance of the tooth structure, if desired.

The transverse members 66 project laterally on both sides of the shank portion 60 as illustrated in FIGURE 5, and these lateral projections which have been indicated by the numeral 68 form the two spaced apart enlarged portions 63 located at the inner end of the cleaner tooth and at opposite extremities of the arch 64, each of greater width than the shank portion. The curvature of arch 64 is preferably greater than the curvature of the annular space in which the arched portion 64 and enlarged portions 63 of the cleaner member operate; such configuration facilitates the action of the individual cleaner members in dislodging dirt, stones and other things which may be caught in the wheel and forcing them out through the annular or transverse spaces between the compactor wheel pads (it will be appreciated that in addition to the annular gaps between adjacent rows of pads, there are also transversely disposed gaps between individual pads in each annular row). Such configuration also presents a minimum of contact area with any packed material which builds up in the wheel beneath the cleaner inasmuch as only the tips 69 are in contact with such material. The cleaning action is also aided by the recesses 70 which are

formed on each side of the cleaner tooth between the opposed projections 68 on the respective sides, and in addition these recesses 70 minimize drag caused by the rubbing of the teeth on any packed material within the wheel along the sides of the teeth.

Preferably each cleaner member is provided with a layer of wear resistant material on the curved surfaces of flared portions 62 of shank 60 and on end surfaces 71, side surfaces 68a and outer surfaces 73 of toe portions 66. Such a wear resisting layer may be formed conveniently by deposits from welding rods of known composition as indicated in FIGURE 4A. Other means of providing hard wear resistant surfaces are also known and may be employed if desired. Hardening or providing a wear resistant layer on some of the surfaces in this manner causes such surfaces to wear less than other portions of the cleaner tooth such as the surface of arch 64, for example, which means that even after a great deal of service the cleaner tooth will retain its initial basic configuration with an arched portion at the inner end and laterally projecting enlarged portions at either extremity of the arched portion.

FIGURES 9 and 11 illustrate the mounting of cleaners 58 for cleaning action on the rear wheels 14. FIGURE 9 is a view from the rear of the right wheel showing the structure upon which the individual cleaners are mounted while FIGURE 11 shows in a partially sectional view the manner in which the individual cleaners extend between the rows of individual pads on the wheel. In FIGURE 9 the wheel has been omitted except for a fragment of it in section at the top in order to simplify this FIGURE. The individual cleaner members 58 are mounted on a transverse frame member 72 by means of bolts 74 which extend through the frame 72 and mounting brackets 76 (see FIGURE 4) on the individual cleaner members, or by other equivalent means. The outer end of frame member 72 is connected to another frame portion 78 and this, in turn, is mounted at 80 on a fixture member 81 on the hub 83 of wheel 14, so that member 81 supports and rotates within portion 78. The inner end of bracket 72 is connected to inner frame portion 84 which is secured to the axle housing 86 for the rear wheels at locations 88. As illustrated, machine 10 is a four wheel drive machine and the rear wheels 14 are steering or dirigible wheels. This, of course, makes the rear axle a steering drive axle. U.S. Patent 2,871,966, dated February 3, 1959, of Melvin E. Dreitzler illustrates a steering drive axle which is suitable for this service.

FIGURE 11 illustrates the manner in which the individual cleaners 58 extend through the gaps 106 between adjacent annular rows of pads 104 in a spoke type wheel such as illustrated in the previously mentioned copending application Serial No. 726,884. The wheel shown in FIGURE 11 comprises a centrally located flat ring or annular member 90 provided with openings 92 for lug bolts for connecting the wheel to the hub of the compaction machine. Member 90 is the main structural member of the wheel and it has a pair of cylindrical rings 94 and 96 welded or otherwise secured to opposite sides thereof. A plurality of spoke portions 98 are secured to one side of member 90 and to ring 94, while an equal number of spoke portions 100 are secured to the other side of member 90 and to ring 96, in alignment with the spoke members 98 respectively. Portions 98 and 100 are rigidly secured to member 90 and the rings by welding or other equivalent means, and each portion 98 combines with its aligned portion 100 to form a complete spoke member 98, 100.

Spokes 98, 100 carry four outer rings each indicated by the numeral 102 and around the outer periphery of each of these rings are secured a plurality of spaced, outwardly curved pads indicated by the numerals 104. It will be observed that the shank portion 60 of each of the individual cleaner members extends through a gap 106 between two adjacent rows of pads 104, while the enlarged

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portions 63 of the individual cleaner members are located within an annular space indicated by the numeral 108, bounded by rings 102 on each side, outwardly by pads 104, and inwardly by the outer edges of the spokes 98, 100. These outer edges 110 form a circle of predetermined radius, and the arch of portion 64 of the individual cleaners has a greater curvature than the circle formed by the outer edges 110 of the spokes, so that the center of the arch 64 is always spaced farther from the outer edge 110 than the enlarged portion 66.

As illustrated in FIGURE 1, the rear wheels 14 may conveniently be provided with fenders or mudguards 112. These fenders are mounted on the frame structure which supports the individual cleaner members.

Each rear wheel 14 is provided with two sets of cleaner members, as illustrated in FIGURE 1, one rearwardly of the wheel and one forwardly thereof. It will be appreciated that the details of the individual cleaners mounted forwardly of the wheel are the same as those mounted rearwardly thereof except that they are reversed. We have indicated the rearwardly mounted cleaners generally by the numeral 114 and the forwardly mounted ones generally by the numeral 116 in FIGURE 1.

It will be understood that frame structure 72, 78, 84, the individual cleaner teeth 58 mounted thereon forwardly and rearwardly of the wheel, and the fender 112 all pivot with respective wheels 14 during steering operation thereof. It will be appreciated that the assembly just described is normally somewhat flexible and subject to having portions thereof deformed or deflected from their normal positions during particularly severe operating conditions such as when it is necessary to eject stones or the like from the compaction wheels. It is important that this assembly never be deformed or deflected in such a manner as to permit one of the individual pads 104 to catch on the shank portion 60 of one of the cleaner teeth because such occurrence might destroy the entire cleaner assembly. To obviate this it is desirable that some of the individual cleaner teeth be so proportioned and arranged that the sides thereof will rub on adjacent pad mounting rings 102 of the compaction wheel during any abnormal deflection and thereby prevent contact between pads 104 and shank portion 60 of the cleaner teeth. We have indicated by the numeral 105 in FIGURE 11 a tooth 58 which is so arranged as to provide this protective action for the remainder of the cleaner structure. It will be apparent that the sides 68a of the enlarged portion 63 of this cleaner tooth 105 will rub the adjacent rings 102 during abnormal conditions as described and prevent contact between any other parts of the wheel and the cleaner structure.

The rearwardly mounted set of cleaners for the front wheels is indicated generally by the numeral 118 in FIGURE 1. The individual cleaners 56 of this set are the same as cleaner members 58 previously described hereinbefore for the rear wheels 14, except of somewhat different dimensions. Such individual cleaners 56 are mounted by means of a bracket structure 120 on a laterally disposed frame member 122 and tube 123 which extend across the machine between the two depending bracket members 30.

FIGURE 10 illustrates a portion of a front wheel and the associated individual cleaner teeth 56 in a similar manner to FIGURE 11 for the rear wheel. It will be observed that the spacing and dimensions of the pads and cleaners vary somewhat for the front wheel 12 as compared to the rear wheel 14. This is customary to provide optimum compacting action, and the reasons for it are explained in detail in application Serial No. 726,884.

In FIGURES 12 and 13 of the drawing we have illustrated the use of the present invention for wheels of modified design. Only a front wheel is illustrated in these two figures but it will be understood that the same construction may be employed for the rear wheels. This wheel may be called the disk type. Instead of the spoke structure of FIGURES 10 and 11 this wheel employs two

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dished annular members 124 and 126 and an outer cylindrical or drum member 130. These three members preferably are welded together to form a watertight enclosure which may be filled with water if desired to increase the weight of the compaction machine. Mounting holes 92 are provided in this wheel the same as in the wheel of FIGURES 10 and 11. In this wheel, the outer surface of drum member 130 corresponds to the outer circumference of the spokes 98, 100 and this outer surface is indicated by the numeral 110' to show that it corresponds to the outer peripheral edges 110 of spokes 98, 100.

While we have indicated and described herein certain preferred embodiments of our invention it will be understood that our invention is not limited to such embodiments, and that modifications may be made by those skilled in the art. We intend to cover by the appended claims all such modifications which fall within the true spirit and scope of our invention.

We claim:

1. A vehicle having a body portion and a pair of compaction wheels located at the front end thereof, each such wheel including a plurality of annular rows of ground engaging pads having an annular gap between adjacent rows, a pair of boom arms having their one ends pivotally mounted on the body portion of the vehicle and their other ends extending forwardly adjacent the said wheels, a transverse frame member connected between the said boom arms adjacent the forward ends thereof forming with the boom arms a substantially U-shaped structure, a transversely positioned bulldozer blade mounted at the forward ends of the said boom arms and arranged to be raised and lowered by pivoting of the boom arms, first cleaner means for the said compaction wheels comprising a plurality of cleaner teeth mounted on the said transverse frame member and movable with the said bulldozer blade, said first cleaner means comprising a plurality of individual cleaner tooth members so arranged that at least one such individual tooth member extends into each said annular gap, and additional cleaner means mounted in fixed position on the vehicle, said additional cleaner means comprising a plurality of additional cleaner tooth members so arranged that at least one such additional cleaner tooth member extends into each said annular gap, each said additional cleaner tooth member comprising a shank portion extending through the respective gap, an arch portion at the inner end of the tooth member, and a pair of enlarged portions at the inner end of the tooth member near the extremities of the said arch, said enlarged portions being of greater width than the respective gap.

2. A vehicle comprising a body portion and at least one compaction wheel located adjacent one end thereof, the said wheel having a plurality of annular rows of ground engaging pads with annular gaps between adjacent rows, a pair of boom arms pivotally mounted centrally of the said body portion and extending outwardly beyond the end of the body portion on which the compaction wheel is located, a transversely extending earth engaging member mounted on said boom arms and arranged to be raised and lowered relative to said compaction wheel by the pivoting of the boom arms, first cleaner means for said compaction wheel connected to and movable with the said earth engaging member, the said first cleaner means comprising a plurality of cleaner teeth extending into the said gaps, and additional cleaner means for the said compaction wheel fixed with respect to the said body portion, said additional cleaner means comprising a plurality of additional cleaner tooth members so arranged that they extend into the said annular gaps, each said additional cleaner tooth member comprising a shank portion extending inwardly past the outer periphery of the said compaction wheel, an arch portion at the inner end of the tooth member, and a pair of enlarged portions at the inner end of the tooth member near the extremities of the said arch.

3. A vehicle comprising a body portion and a pair of

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compaction wheels located at the front end thereof, each said wheel including a plurality of annular rows of ground engaging pads having annular gaps between adjacent rows, a pair of boom arms having their one ends pivotally mounted on the body portion of the vehicle and their other ends extending forwardly adjacent the said wheels, a transverse member connected between the said boom arms forwardly of the said wheels and forming with the boom arms a substantially U-shaped structure, means connecting said body portion and said U-shaped structure for pivoting the said boom arms for raising and lowering the said transverse member along a vertically disposed arc and for holding said transverse member at any position along said arc, first cleaner means for the said compaction wheels comprising a plurality of cleaner teeth mounted on the said transverse member and so arranged that at least one such cleaner tooth extends into each said annular gap, and additional cleaner means mounted on the vehicle in fixed relation to the said body portion, the said additional cleaner means comprising a plurality of additional tooth members so arranged that at least one such additional cleaner tooth member extends into each said annular gap.

4. A vehicle having a body portion and at least one compaction wheel adjacent one end thereof, the said compaction wheel mounted to the said body portion for rotation about an axis which passes beneath the said body portion but within the margin thereof, a pair of boom arms pivotally mounted centrally of the said body portion and extending outwardly beyond the end of the said body portion on which the compaction wheel is mounted, a transversely extending earth engaging member mounted on said boom arms and arranged to be raised and lowered relative to the said compaction wheel by the pivoting of the boom arms, and cleaner means cooperating with the said compacting wheel, said cleaner means being connected to and movable with the said earth engaging member relative to the said compaction wheel.

5. A vehicle having a body portion and at least one compaction wheel adjacent one end thereof, the said compaction wheel mounted to the said body portion for rotation about an axis which passes beneath the said body portion but within the margin thereof, a pair of boom arms pivotally mounted centrally of the said body portion

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and extending outwardly beyond the end of the said body portion on which the compaction wheel is mounted, a transversely extending earth engaging member mounted on said boom arms and arranged to be raised and lowered relative to said compaction wheel by the pivoting of the boom arms, first cleaner means for the said compaction wheel connected to and movable with the said earth engaging member relative to the said compaction wheel, and additional cleaner means for the said compaction wheel fixedly mounted on the said body portion.

6. A vehicle having a body portion and at least one compaction wheel adjacent one end thereof, the said compaction wheel mounted to the said body portion for rotation about an axis which passes beneath the said body portion but within the margin thereof, said wheel comprising at least two annular rows of ground engaging pads providing an annular gap between adjacent rows, a pair of boom arms pivotally mounted centrally of the body portion and extending outwardly beyond the end of the body portion on which the said compaction wheel is mounted, a transversely extending earth engaging member mounted on said boom arms and arranged to be raised and lowered relative to said compaction wheel by the pivoting of the boom arms, first cleaner means for the said compaction wheel comprising at least one cleaner tooth connected to and movable with the said earth engaging member and extending into the said gap, and additional cleaner means for the said compaction wheel comprising a cleaner tooth member mounted in fixed position on the vehicle and extending into the said gap.

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