

Sept. 23, 1941.

J. E. INGRAM

2,256,594

ROAD ROLLER

Filed Aug. 21, 1940

5 Sheets-Sheet 1

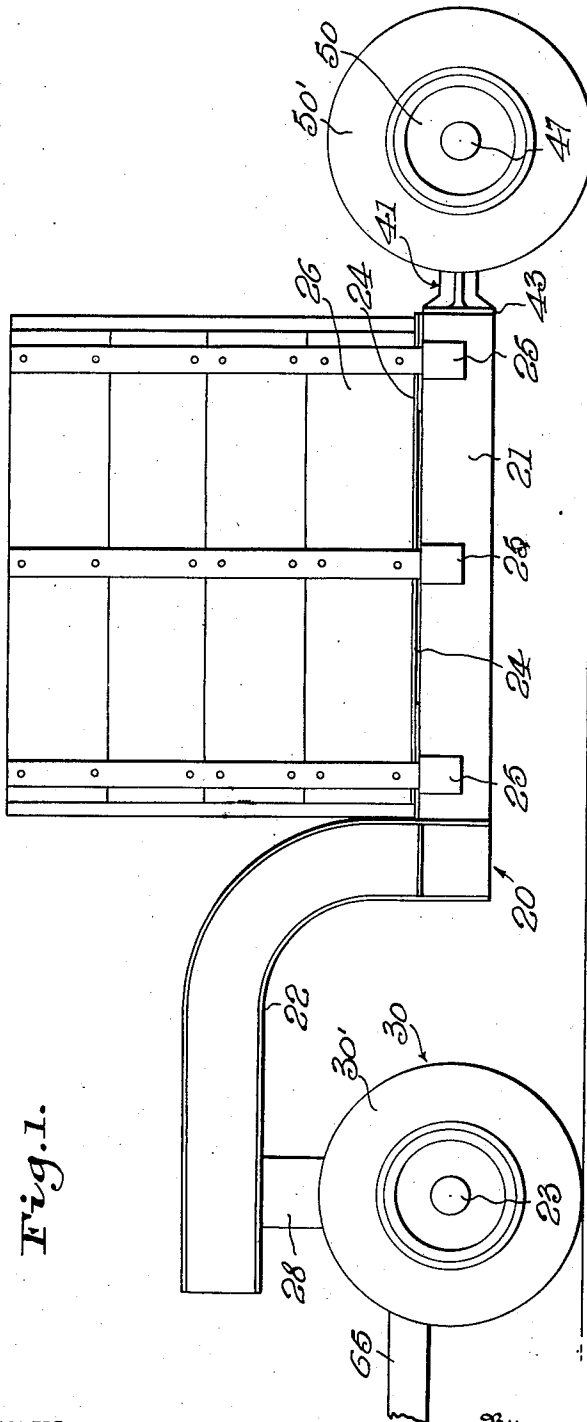


Fig. 1.

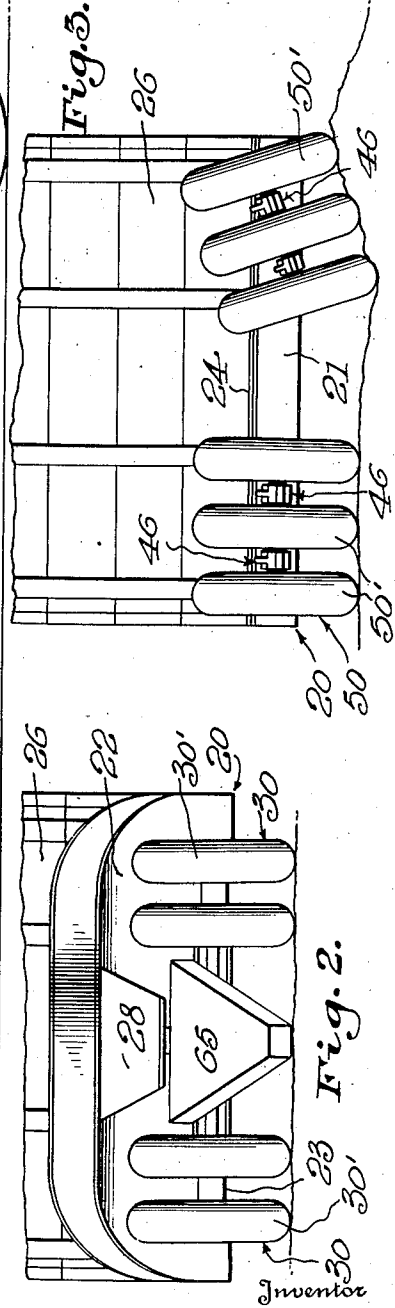


Fig. 3.

Fig. 2.

Inventor

J. E. Ingram

WITNESS
H. Woodards

By *A. B. Wilson*
Attorneys

Sept. 23, 1941.

J. E. INGRAM

2,256,594

ROAD ROLLER

Filed Aug. 21, 1940

5 Sheets-Sheet 2

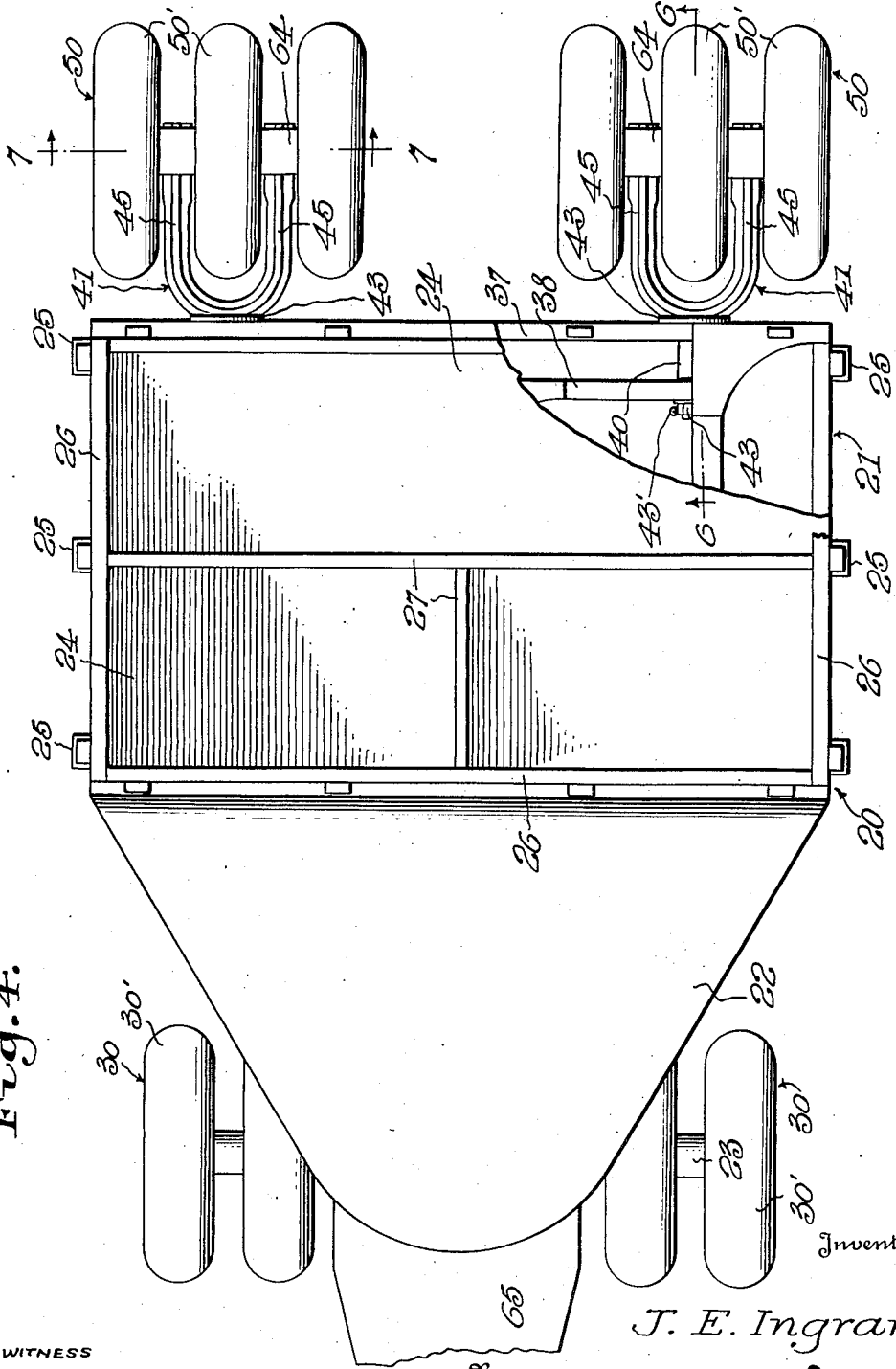


Fig. 4.

WITNESS
H. Woodard

Inventor
J. E. Ingram
By
H. B. Wilson
Attorneys

Sept. 23, 1941.

J. E. INGRAM

2,256,594

ROAD ROLLER

Filed Aug. 21, 1940

5 Sheets-Sheet 3

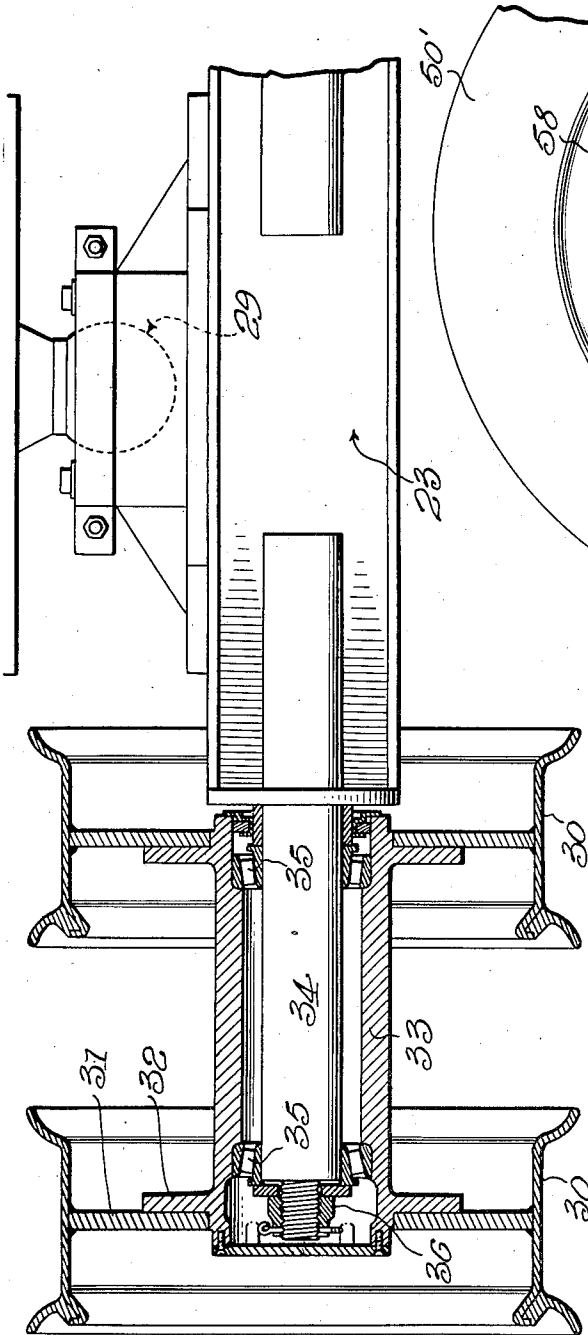
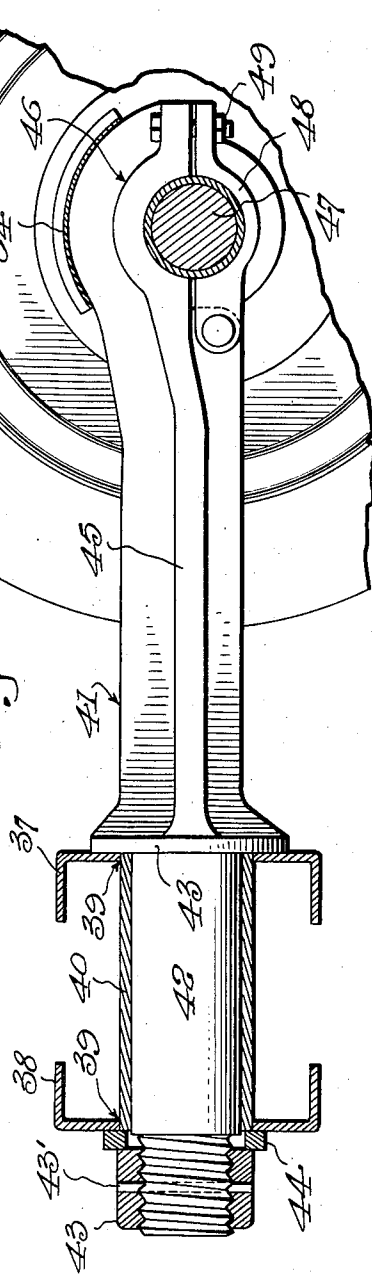


Fig. 5.

WITNESS
H. Woodard

Fig. 6.



Inventor
J. E. Ingram

By *A. B. Wilson*
Attorneys

Sept. 23, 1941.

J. E. INGRAM

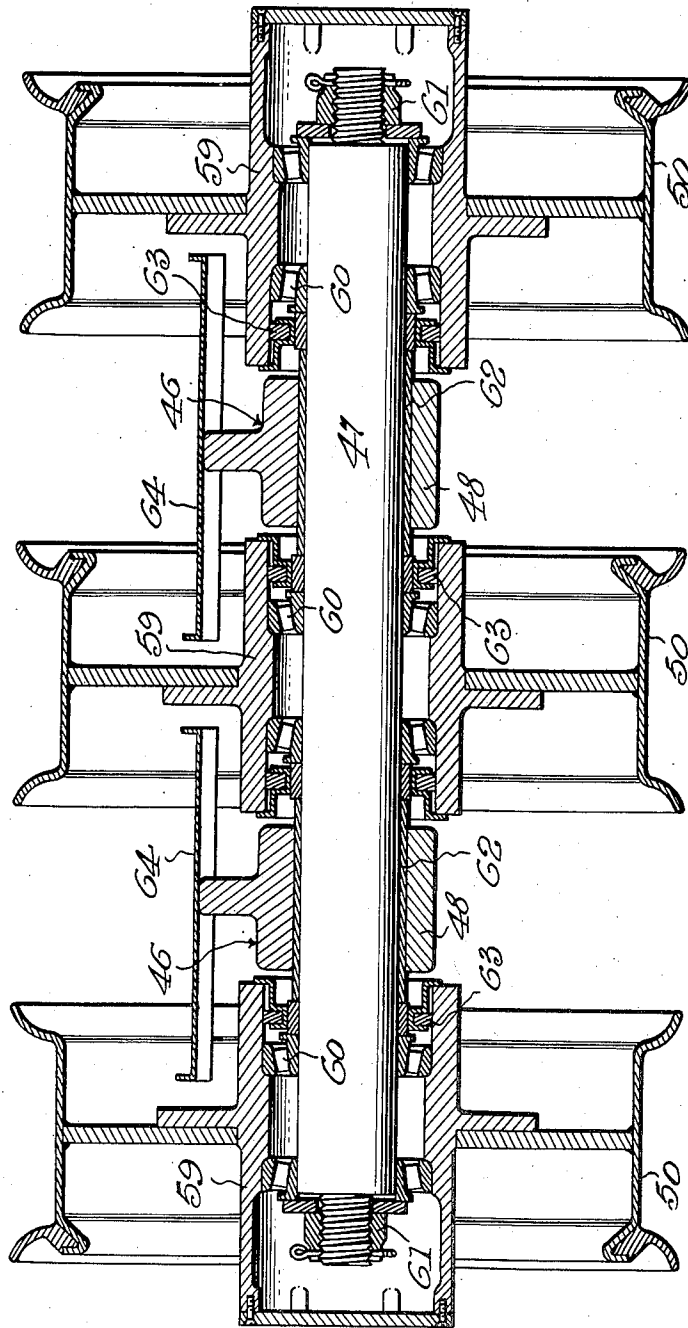
2,256,594

ROAD ROLLER

Filed Aug. 21, 1940

5 Sheets-Sheet 4

Fig. 7.



Inventor

J. E. Ingram

WITNESS
H. Woodside

By
A. B. Willson & Co.
Attorneys

UNITED STATES PATENT OFFICE

2,256,594

ROAD ROLLER

John E. Ingram, San Antonio, Tex.

Application August 21, 1940, Serial No. 353,569

7 Claims. (Cl. 94—50)

The invention relates to rollers which carry heavy loads of ballast and are provided with staggered wheels having pneumatic or other resilient tires for kneading and compacting various materials during highway construction.

One object of the invention is to provide a generally improved construction in which the wheels may move upwardly and downwardly as required to more effectively knead and compact all high and low portions, as well as the substantially level areas.

A further object is to provide a machine having an unusually low center of gravity with no danger of tipping over, even when rolling soft shoulders rather steeply declined away from the road, or when turning the machine around on unusually rough surfaces with the front wheels severely cramped.

A still further object is to provide a novel extension frame, whereby the machine may be increased in length for carrying a greater load for more compaction whenever required.

Another aim is to make novel provision whereby the weight of the ballast carried by the machine may be equally distributed upon all wheels and held against shifting.

A still further aim is the provision of a construction in which tires and/or wheels may be changed with comparative speed and ease.

Yet another object is to fulfill all requirements of highway construction engineers in a superior manner, providing not only a machine which will effectively accomplish the required work, but one which may be safely operated at higher speeds than those heretofore used.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Figure 1 is a side elevation showing the machine constructed in accordance with the invention.

Figure 2 is a front elevation.

Figure 3 is a rear elevation illustrating the manner in which the two sets of rear wheels may tilt about pivotal axes.

Figure 4 is a top plan view partly broken away.

Figure 5 is an enlarged fragmentary front elevation partly in section.

Figure 6 is an enlarged detail longitudinal section on line 6—6 of Fig. 4.

Figure 7 is an enlarged vertical transverse section on line 7—7 of Fig. 4.

Figure 8 is a plan view showing the extension frame operatively coupled to the main frame and the yokes of the rear wheels, the platforms of said frames being omitted.

Figure 9 is an enlarged detail section on line 9—9 of Fig. 8.

A construction has been illustrated which has proven highly advantageous from various standpoints, and while said construction will be rather specifically described, it is to be understood that within the scope of the invention as claimed, variations may be made.

The frame 20 of the machine includes a horizontal body portion 21 low to the ground, and an upwardly and forwardly extending portion 22 which overlies a front axle 23, said frame portion 21 being provided with a platform 24 and with stake sockets 25 which are instrumental in mounting a ballast box 26 upon said platform 24, to carry all required ballast for weighting the machine according to the extent of compaction to be effected. The ballast box 26 is provided with partitions 27 which permit it to be so loaded with rock, gravel, sand or other ballast as to distribute the weight evenly upon all wheels, and to hold the ballast against shifting. When using the present construction, the weight is distributed two-thirds upon the rear wheels and one-third upon the front.

The frame portion 22 is supported upon a rigid bolster 28 which is connected by a ball and socket joint 29, or other suitable universal joint, with the front axle 23, not only permitting this axle to turn as required in steering the machine, but allowing said axle to vertically oscillate as required, insuring that the front wheels 30 shall vertically move as required to compact all high and low portions of the roadway as well as the substantially level portions. There are four of the wheels 30, two on each end of the axle 23, and the tires 30' of these wheels are preferably of the pneumatic type, said tires being suitably mounted upon the wheels in any desired manner. Each wheel is preferably provided with a central web 31 bolted against a flange 32 on a hub 33, there being one of these hubs on each stub or spindle 34 of the axle 23. In mounting the hubs 33, suitable high-speed bearings 35 are employed, said bearings being of combined radial and end-thrust nature in the preferred construction. The hubs are secured upon the spindles 34 by suitably locked nuts or the like 36, and appropriate provision is of course made for thorough lubrication, grease retention and dust exclusion.

The horizontal body portion 21 of the frame 20 includes a rear end bar 37 and another bar 38 parallel with and spaced forwardly to some extent from said bar 37. Toward the right and the left ends of the frame, the bars 37 and 38 are formed with aligned openings 39 through which longitudinally extending sleeves 40 extend, said sleeves being securely welded in said openings. Behind these sleeves, I provide two sub-

stantially horizontal U-shaped yokes 41, the front ends of said yokes being provided with integral pivot stubs 42 which are turnably mounted in the sleeves 40. At the rear end of each pivot stub 42 is a shoulder 43 which abuts the rear end of the sleeve 40 and the rear side of the frame end bar 37. The front end of each stub 42 is provided with a nut 43 locked by a pin or the like 43', and a washer 44 is preferably interposed between this nut and the bar 38, said washer abutting said bar 38 and the front end of the sleeve 40.

The two rearwardly projecting arms 45 of each U-shaped yoke 41, are provided with clamps 46 to encircle a rear axle 47, there being two of these axles, one associated with each yoke 41. Each clamp 46 includes a pivoted half 48 held normally in operative position by bolts 49. Each axle 47 carries three rear wheels 50 having pneumatic or other resilient tires 50', there being one wheel between the yoke arms 45 and one at the outer side of each of said arms. The rear of the machine is thus provided with two sets of wheels, each set having three wheels, and these wheels are staggered with respect to the front wheels 30. The space between the two sets of rear and front wheels will of course miss all material when making one trip, but this material will be caught by both the front and rear wheels of the machine upon the return trip, during which trip, the spaces between the front and rear sets of wheels will simply straddle one of the areas rolled on the preceding trip. The front wheels 30 may vertically oscillate as required due to the universal joint 29, and the two rear sets of wheels 50 may oscillate as required, due to the pivot stubs 42 and bearings 40 therefor. It is thus insured that the wheels shall more readily knead and compact, not only level stretches, but high and low spots. Moreover, when rolling the shoulders of a road, the pivotal actions of the various wheels are of tremendous advantage. Even when rolling shoulders which are rather steeply declined from the roadway, there is no danger of the machine tipping over, on account of the unusually low center of gravity. This is also true when turning the machine around in minimum space, with the front axle severely cramped, whereas under such circumstances, prior machines have given a great deal of trouble.

I provide a novel extension frame 51 which may be inserted between the main frame 20 and the rear wheels 50, whenever a larger frame is required to carry greater weight for more intense compaction, the front end of said extension frame 51 being quickly and easily connectable with the rear end of the frame 20, and the rear end of said extension frame 51 being readily connectable with the yokes 41 which must of course be detached from frame 20 and moved rearwardly. This extension frame 51 is shown more particularly in Figs. 8 and 9, and it will be seen that said extension frame includes a front end bar 52, a rear end bar 53, a third transverse bar 54 parallel with and somewhat behind the bar 52, and a fourth transverse bar 55 parallel with and somewhat in advance of the rear bar 53. Two front bearing sleeves 56 are secured to the bars 52 and 54 in position to aline with the bearing sleeves 40, and securing bolts 57 are employed to pass through the alined sleeves 56 and 40 to securely fasten the front end of the extension frame 51 to the rear end of the main frame 20. Two rear bearing sleeves 58 are secured to the bars 53 and 55 in position to receive the bearing stubs 42 of

the yokes 41. By simply disconnecting these yokes from the main frame 20, moving said yokes and the rear wheels rearwardly, fastening the extension frame 51 to the main frame 20, and connecting said yokes 41 with said extension frame, a longer machine is provided to carry a greater load of ballast for more intense compaction whenever required. Either the normal length machine or the extension machine is also of course useable for hauling equipment, if desired.

The preferred manner of mounting the rear wheels 50 upon their axles 47, is shown more particularly in Fig. 7. These wheels are provided with individual hubs 59 to which they are bolted, and suitable high-speed bearings 60 are provided for each hub, said bearings being disposed in pairs as ordinarily in wheel mounting. Each bearing is preferably of combined radial and end-thrust type. The outermost bearings of the two outermost wheels on each axle are held in place by suitably locked nuts 61 on said axle. The innermost bearings of the two outermost wheels about the outer ends of two thrust sleeves 62 which surround the axle 47, and the inner ends of said thrust sleeves abut the bearings of the central wheel. The two sleeves 62 are held by the clamps 46 of the yokes 41. Whenever tire changing is necessary on one or the other of the wheels 50 at the outer sides of the yoke arms 45, this may be done in the usual way. When the tire on either wheel straddled by the yoke arms must be changed, it is an easy matter to release the clamps 46, move the wheel and axle assembly rearwardly, and remove the proper outside wheel to give access to the central wheel.

Within the exposed ends of the hubs 59, suitable grease retainers and dust excluders 63 are of course employed, and to further protect the bearings, the rear ends of the yoke arms 45 are preferably provided with shields 54 which overlie the adjacent ends of the hubs and prevent a great deal of dirt and other foreign matter from falling upon said hubs with possible danger of finding access to the bearings.

From the foregoing, taken in connection with the accompanying drawings, it will be seen that novel and advantageous provision has been made for carrying out the objects of the invention, and while preferred features of construction have been disclosed, attention is again invited to the possibility of making numerous variations within the scope of the invention as claimed. As to the manner of moving the machine forwardly, I have shown the front axle provided with a tongue 65 which may be connected with a tractor or truck, but it will be obvious that said machine could be provided with its own propelling motor and transmission mechanism, if desired.

What is claimed is:

1. In a machine of the class described, a single front axle having a plurality of resiliently tired wheels on each of its ends, a load-carrying frame having an upwardly and forwardly extending front end portion which overlies said front axle and wheels and a major horizontal portion which extends in a single plane from said front end portion to the rear extremity of said load-carrying frame, a universal connection between the front end of said load-carrying frame and the center of said front axle, two alined rear axles disposed a considerable distance behind the rear extremity of said major horizontal portion of said load-carrying frame

and each having at least three resiliently tired wheels staggered with respect to the front wheels, the entire length of the aforesaid major horizontal portion of said load-carrying frame being well below the tops of the front and rear wheels and close to the ground, one substantially horizontal U-shaped yoke astride the central wheel of one of said rear axles and having its side arms extended rearwardly from its arm-connecting portion and supported by said one axle, a second substantially horizontal U-shaped yoke astride the central wheel of the other of said rear axles and having its side arms extended rearwardly from its arm-connecting portion and supported by said other axle, and two pivots supporting the rear end of said load-carrying frame on the front arm-connecting portions of said U-shaped yokes respectively, the axes of said pivots being disposed longitudinally of said frame, all of said rear wheels being disposed behind the rear extremity of said frame.

2. In a machine of the class described having a weight-carrying frame, and front and rear independently rotatable wheels disposed in staggered relation; two aligned rear axles spaced a considerable distance behind the rear extremity of said frame and carrying said rear wheels in two groups with each group spaced entirely behind said rear extremity of said frame and including at least one wheel between two others, one substantially horizontal U-shaped yoke straddling said one wheel of one of said groups, said one U-shaped yoke having its side arms extended rearwardly from its arm-connecting portion and connected at their rear ends with one of said rear axles, a second substantially horizontal U-shaped yoke straddling said one wheel of the other of said groups, said second U-shaped yoke having its side arms extended rearwardly from its arm-connecting portion and connected at their rear ends with the other of said rear axles, and means pivotally connecting the front arm-connecting portions of said U-shaped yokes with the rear end of said frame on axes extending longitudinally of the machine.

3. In a machine of the class described having a weight-carrying frame, and front and rear independently rotatable wheels disposed in staggered relation; two aligned rear axles spaced a considerable distance behind the rear extremity of said frame and carrying said rear wheels in two groups with each group spaced entirely behind said rear extremity of said frame and including at least one wheel between two others, one substantially horizontal U-shaped yoke straddling said one wheel of one of said groups, said one U-shaped yoke having its side arms extended rearwardly from its arm-connecting portion and connected at their rear ends with one of said rear axles, a second substantially horizontal U-shaped yoke straddling said one wheel of the other of said groups, said second U-shaped yoke having its side arms extended rearwardly from its arm-connecting portion and connected at their rear ends with the other of said rear axles, elongated pivot stubs integral with the front arm-connecting portions of said U-shaped yokes and having their axes disposed longitudinally of the machine, and elongated bearings in which said pivot stubs are turnably mounted, said bearings being secured to the rear end of said frame.

4. In a machine of the class described, a weight-carrying frame having a rigid transverse

rear end bar and another rigid transverse bar spaced in advance of and parallel with said rear end bar, said bars having openings aligned longitudinally of the machine, an elongated bearing sleeve co-axial with said openings, said sleeve extending longitudinally of the machine between and being rigidly secured at its ends to said bars, a substantially horizontally U-shaped yoke behind said rear end bar and having its side arms extended rearwardly from its arm-connecting portion, said arm-connecting portion of said U-shaped yoke being provided with an integral pivot stud turnably mounted in said elongated bearing sleeve, a rear axle connected with said side arms of said yoke and supporting the same, and wheels on said axle disposed behind said frame.

5. In a machine of the class described, a main horizontal frame and wheeled means for supporting the front end thereof, the rear end of said main frame being provided with laterally spaced cylindrical bearings the axes of which extend longitudinally of said main frame, a horizontal extension frame whose front end abuts said rear end of said main frame, stubs projecting forwardly from said extension frame through said bearings and detachably securing the two frames together, the rear end of said extension frame being provided with laterally spaced cylindrical bearings the axes of which extend in the same direction as those aforesaid, wheeled yokes behind said extension frame and having forwardly extending pivot studs extending through said bearings of said extension frame, and releasable means holding said pivot studs of said yokes against withdrawal from said bearings of said extension frame; said pivot studs of said yokes being of such diameter as to be receivable in said bearings of said main frame when said yokes are detached from said extension frame and said extension frame is detached from said main frame.

6. In a resiliently tired machine of the class described, a frame, two rearwardly projecting arms on said frame provided at their rear ends with aligned circular clamps each having a fixed section and a removable section, a rear axle detachably held between said fixed and removable sections of said clamps, one wheel mounted on said axle between said arms, and other wheels removably mounted on said axle at the outer sides of said arms, said axle being removable from the fixed sections of said clamps upon removal of the removable sections of said clamps when said one wheel requires tire changing.

7. In a resiliently tired machine of the class described, a frame, an axle, three wheels having hubs surrounding said axle, three pairs of combined radial and end thrust bearings removably mounting said three wheels upon said axle, nuts on the ends of said axle holding the outermost of said bearings thereon, two sleeves on said axle holding the bearings of the central wheel in fixed spaced relation with the inner bearings of the other two wheels, and two arms on said frame straddling said central wheel and having clamps encircling said sleeve, each of said clamps having a fixed section and a removable section between which said sleeves are clamped, whereby the axle, sleeves, bearings, nuts and wheels are bodily removable from said fixed sections of said clamps upon removal of the removable sections of said clamps.

JOHN E. INGRAM.