W. CHRISTIE.

TRACTOR.

APPLICATION FILED AUG. 6, 1919.

1,336,131.

Patented Apr. 6, 1920.

5 SHEETS—SHEET 1.

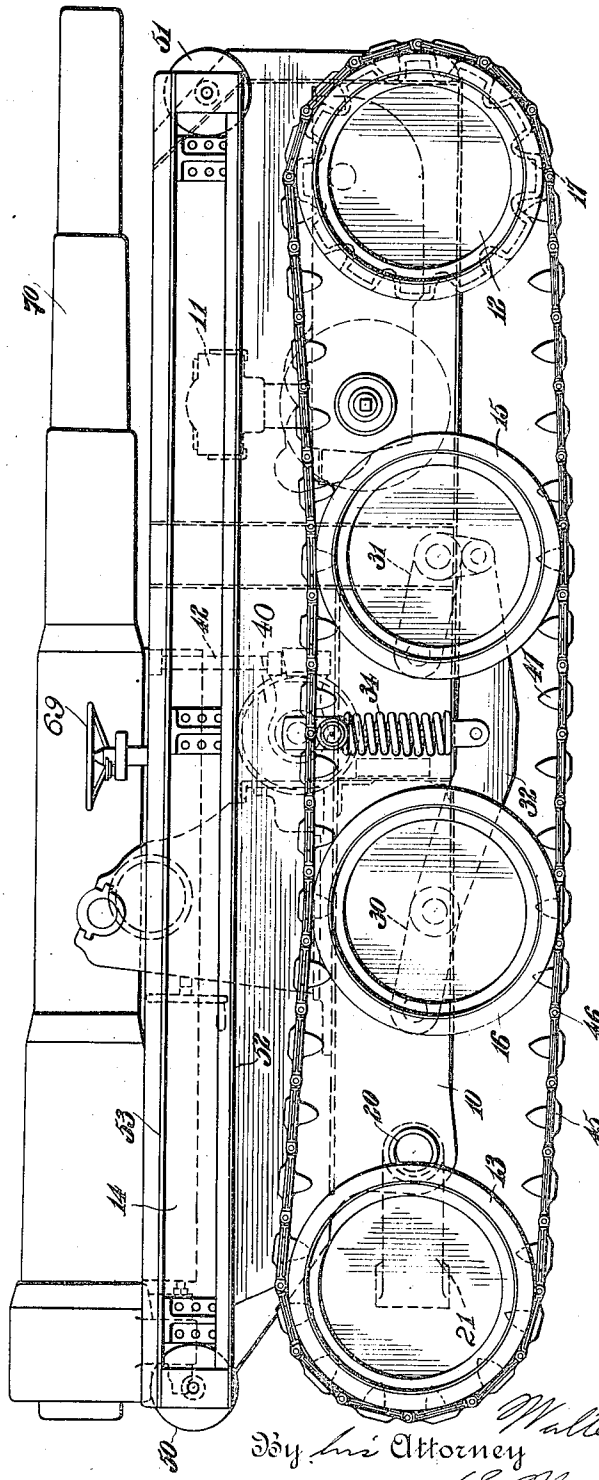


Fig. 1.

Inventor
Walter Christie
By his Attorney
E. W. Marshall

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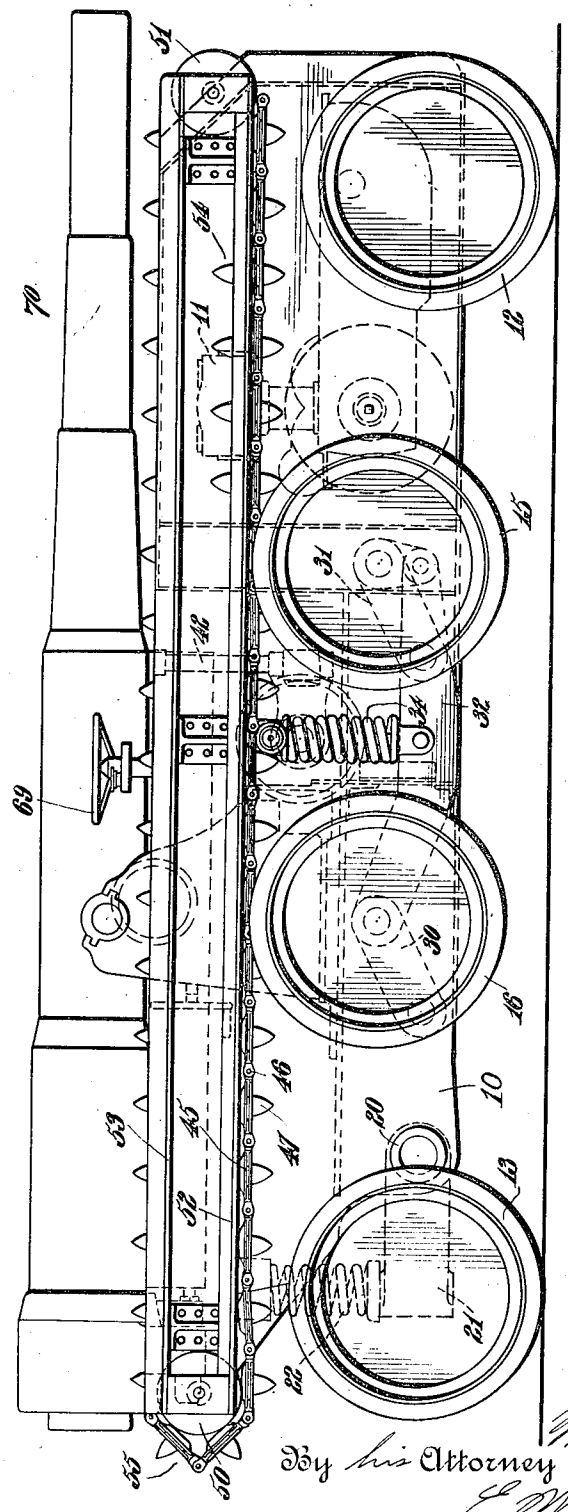


Fig. 2.

Inventor
Walter Christie
By his Attorney
E. W. Marshall

W. CHRISTIE.

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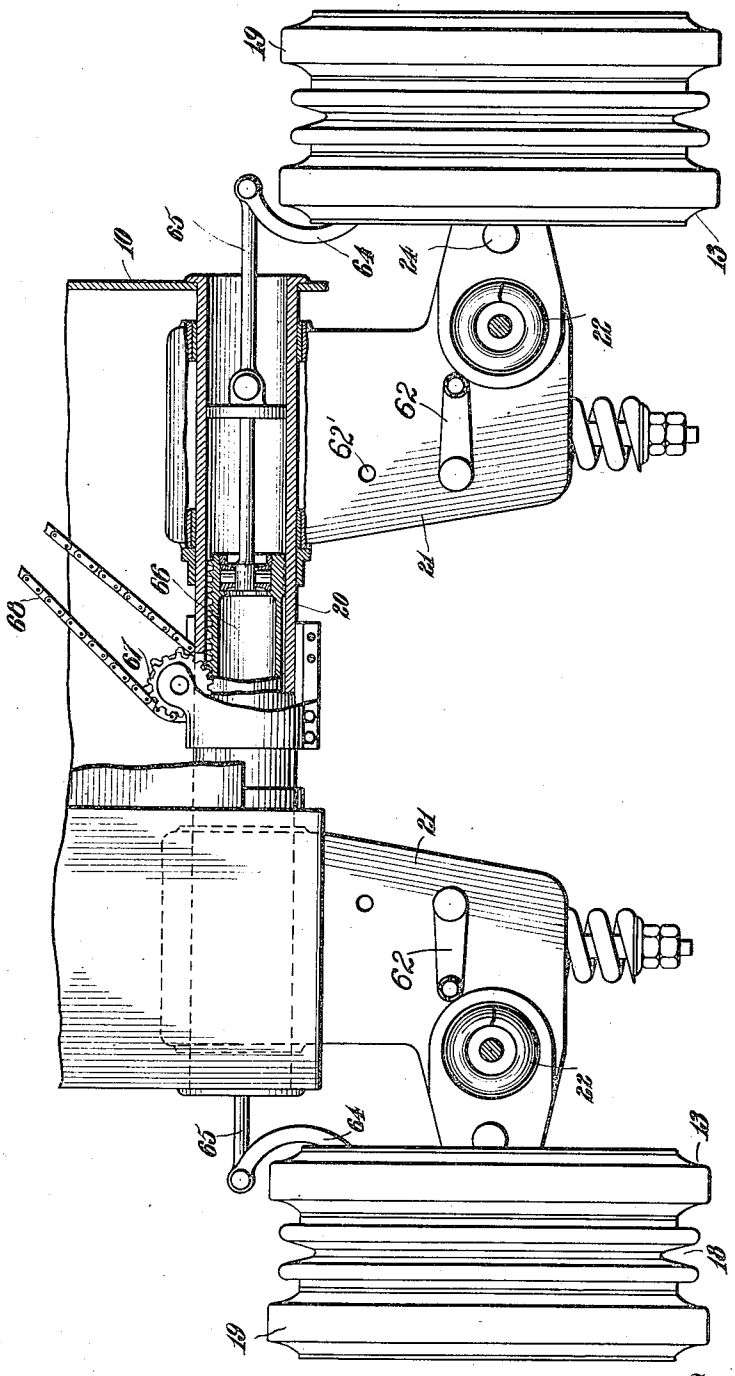


Fig. 3.

Inventor
Walter Christie
By his Attorney
E. W. Marshall

W. CHRISTIE.

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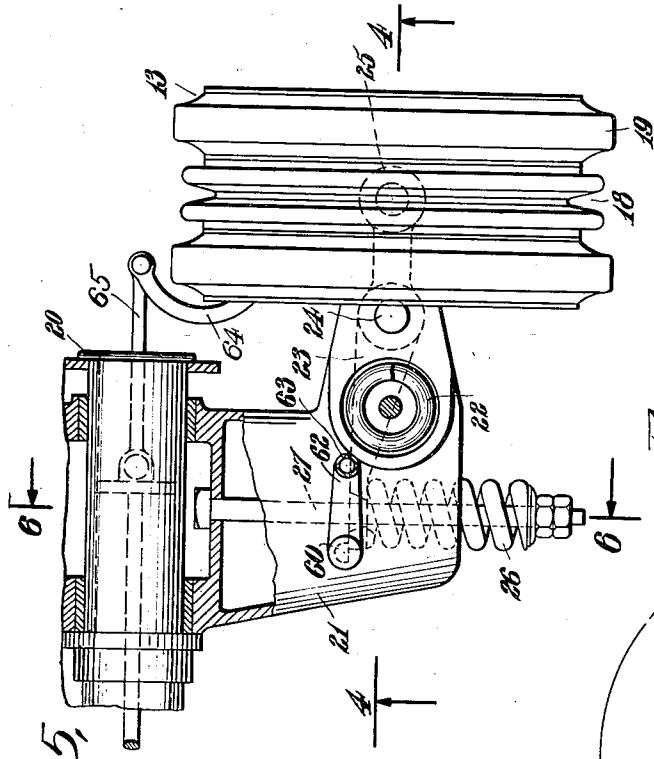


Fig. 5.

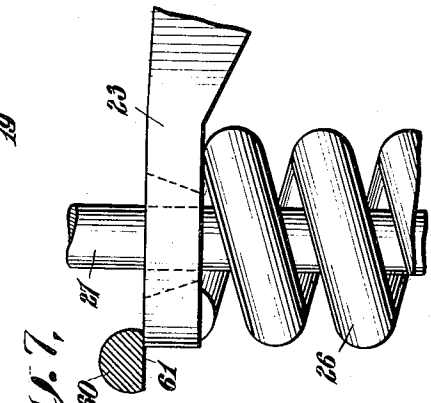
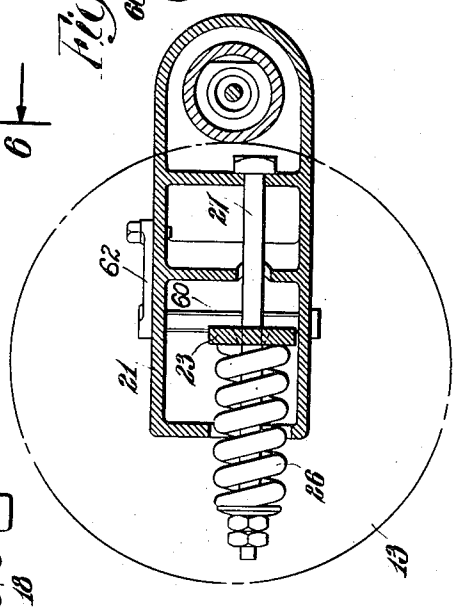


Fig. 7.



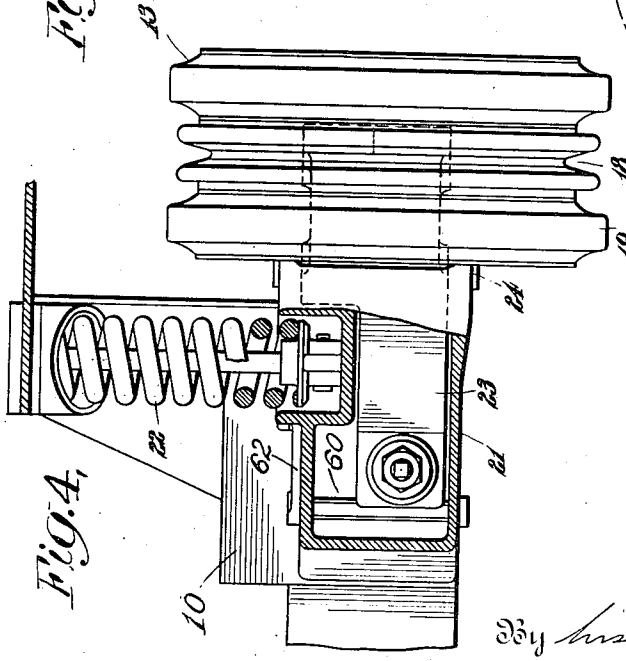


Fig. 4.

Fig. 6.

Inventor
Walter Christie
By his Attorney
E. W. Marshall

W. CHRISTIE.

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5 SHEETS—SHEET 5.

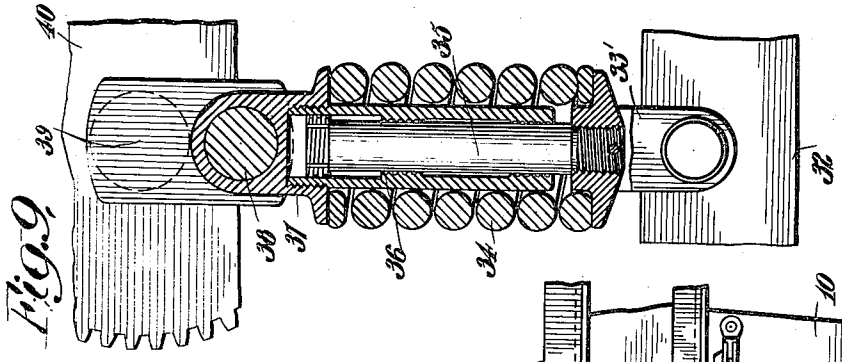


Fig. 9.

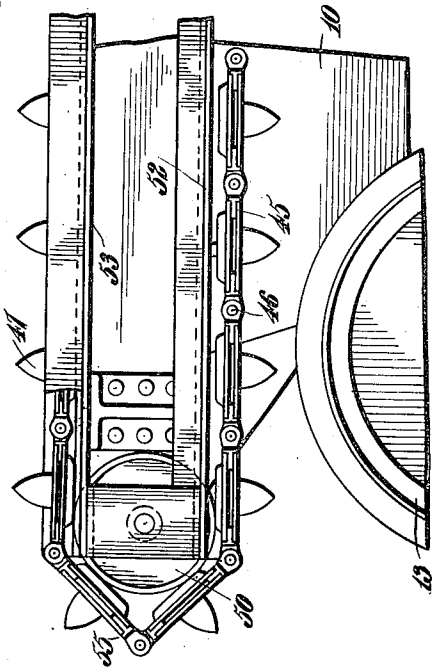


Fig. 10.

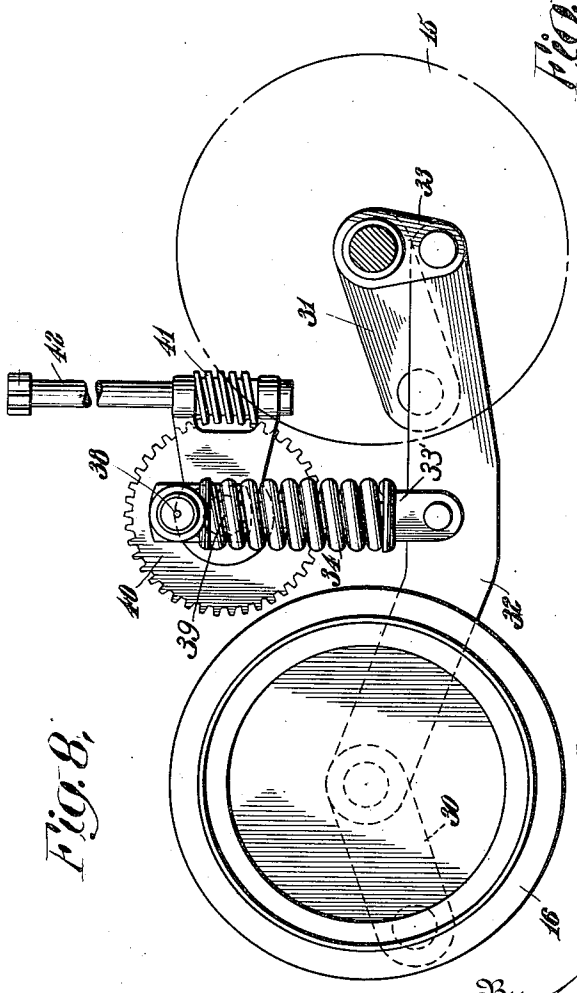


Fig. 8.

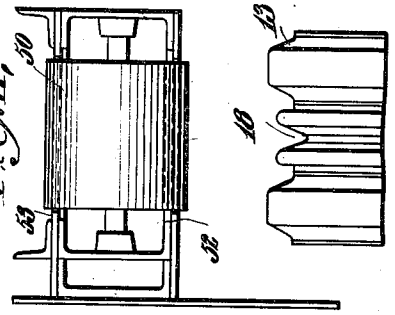


Fig. 11.

Inventor
Walter Christie
By his Attorney
E. W. Marshall

UNITED STATES PATENT OFFICE.

WALTER CHRISTIE, OF WEEHAWKEN, NEW JERSEY.

TRACTOR.

1,336,131. Specification of Letters Patent. Patented Apr. 6, 1920.

Application filed August 6, 1919. Serial No. 315,777.

To all whom it may concern:

Be it known that I, WALTER CHRISTIE, a citizen of the United States of America, and a resident of Weehawken, Hudson county, and State of New Jersey, have invented certain new and useful Improvements in Tractors, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to new and useful improvements in tractors and its object is to provide a simple and efficient apparatus of great strength.

Another object is to provide a dirigible tractor which may run either on its wheels or on chains under its wheels.

Another object is to provide a running gear of great flexibility with wheels which may carry tractor chains or can run on their own peripheries, with means for adjusting and maintaining the required tension on such chains. A further object is to provide an arrangement for readily removing such chains from the vehicle wheels and holding the chains on the vehicle when not in use. A still further object is to provide steering wheels with a simple arrangement for locking them in alinement with other wheels of the vehicle, and a power transmission of wide range and which is easily controlled.

These and other objects of the invention will be set forth in the following specification in which I will describe mechanism of a preferred form which embodies the invention and the novel features of which will be set forth in appended claims.

Referring to the drawings:

Figure 1 is a side elevation of a gun tractor which is made according to and embodies my invention, showing the way it is used as a creeper tractor.

Fig. 2 is a similar view of the same apparatus with the chains removed from the wheels and supported by the vehicle frame.

Fig. 3 is a plan view partly in section of one end of the apparatus showing the manner in which the front wheels are mounted.

Fig. 4 is an elevation partly in section of one of the front wheels and its connected parts, the section being taken on the line 4—4 of Fig. 5.

Fig. 5 is a view of one of the front wheels and its connected parts with a portion of the latter broken away to more clearly show the construction.

Fig. 6 is a sectional elevation of a chain tension device which is a part of this apparatus, the section being taken on the line 6—6 of Fig. 5.

Fig. 7 is an enlarged plan view with one part shown in section of a locking device for one of the front wheels.

Fig. 8 is an elevation of the supports for the intermediate wheels with one wheel thereon and the other removed, but with its position indicated by the dot and dash line.

Fig. 9 is a sectional elevation on a larger scale of certain parts of spring adjusting parts of these supports.

Fig. 10 is an elevation of one end of the frame showing the chain support bracket and one of the end rollers therefor.

Fig. 11 is an end elevation of the parts shown in Fig. 10.

Like characters of reference designate corresponding parts in all the figures.

10 designates a frame upon which the various parts of the apparatus are mounted. 11 is an engine set transversely on this frame near one of its ends and connected by independent and separately controlled transmission gearing to drive either or both of the rear wheels 12.

Near the other end of the frame is a transverse cylindrical member 20 upon which are rotatively supported housings 21 on which the front wheels 13 are mounted. The upper part of the frame is connected with these housings by springs 22. 23 is an arm pivoted in the housing at 24 and near the end of which one of the front wheels 13 is pivoted as at 25. 26 is a compensating or chain tensioning spring which surrounds a bolt 27 and bears against the inner part of arm 23.

Between each rear wheel 12 and front wheel 13 are auxiliary wheels 15 and 16 which are mounted in the manner shown in detail in Figs. 8 and 9. The axle of wheel 16 is near one end of a link 30, the other end of which is pivoted to the frame 10. The axle of wheel 15 is near one end of a similar link 31 the other end of which is

also pivoted to frame 10. 32 is a connecting bar from the axle of wheel 16 to a point below the axle of wheel 15 with which it is connected by a short compensating link 33. A bifurcated bracket 33′ is pivoted to this bar intermediate the wheels. This forms a seat for one end of a compression spring 34 and a receptacle for the lower threaded end of a plunger 35, the upper end of which is enlarged to form a head which has a limited sliding movement in a cylindrical chamber in a sleeve 36 within the spring. A bracket 37 screwed to the upper end of sleeve 36 forms a seat for the upper end of the spring and is pivoted to a pin 38 which is eccentric to the center 39 of a worm gear 40. A worm 41 on a shaft 42 provides means for rotating gear 40 and raising the pin 38 from its lowest position in which it is shown in Fig. 9 to its highest position as shown in Fig. 8. As the pitch of the worm is low, the pin may be left in any of its intermediate positions to vary the height of wheels 15 and 16 from the ground or to adjust the pressure of spring 34.

The tractor chain which forms the tread for the tractor when it is arranged as shown in Fig. 1, comprises a plurality of links 45 pivoted together at 46 with pointed lugs 47 intermediate the pivots. The rear driving wheels are constructed with pockets 17 to receive these lugs and to drive the chain. The other wheels are provided with central grooves 18 which provide clearance for these lugs. The links are broad enough to extend under the rubber tires 19 of all of the wheels.

Before describing specifically the other features shown in the drawings, I will show how this apparatus is used as a creeper tractor. With the chains in place as shown in Fig. 1, the auxiliary wheels are pressed downwardly by the springs 34 which are adjusted to make these wheels sustain their proportional part of the total weight of the apparatus. The supports of the front wheels have a vertical play about the pivoted supports of the housings 21 and a longitudinal play about the pivots 24 of the arms 23. The chains tend to pull these wheels backwardly and the compensating springs 26 tend to move them forwardly. Therefore these front wheels have a desired amount of flexibility of position.

The mounting of the auxiliary wheels 15 and 16 is such that they accommodate themselves to the contour of the surface over which they pass. Relative to the frame any one or more of them may move downwardly, and any one or more of them may move upwardly.

When used as creeper tractor the apparatus is steered by driving the two wheels 12 at the same or different rates of speed, or by driving one and not the other of them, or by driving them in opposite directions.

When the apparatus is to be moved over roads or other like surfaces, the chains may be removed and the apparatus supported on the tires 19 of the wheels. I have so arranged the device that the chains may be easily and quickly removed and replaced. To remove the chain, it is separated by removing the pivots at the points near the tops of the wheels 12 and 13, and the upper part of the chain lifted up against and secured to a longitudinal shelf 52 which is provided for this purpose. If desired, the wheels 15 and 16 may be raised to assist in lifting this part of the chain as shown in Fig. 2. Above this shelf is another one 53 and between them near their ends are rollers 50 and 51. By fastening a rope or cable to the ends of the lower part of the chain and running over the rollers 50 and 51 and the shelf 53, this part of the chain may be pulled up onto the upper shelf by advancing the apparatus. As the chain is somewhat longer than the combined lengths of the shelves 52 and 53, a short section of it may be removed and placed on shelf 52 as shown at 54 in Fig. 2. The chain sections may be connected as at 55 near roller 50 and the chain readily pulled back around the wheels when desired.

With the chain removed the apparatus may run on the wheels. It is desirable to lower the auxiliary wheels 15 and 16 until they contact with the ground without great pressure for the purpose of sustaining part of the weight. When bridges are encountered their spring may be forced farther down to an extent to equalize the weight sustained by all of the wheels. In order to steer the apparatus when run on its wheels instead of on its chains, the bars 23 are locked by the device shown in Figs. 4–7. A rod 60 which has a flattened side 61 has an arm 62 at its upper end by means of which it may be rotated 90° to bring a pin near the free end of the arm into alinement with a hole in the housing 21 which receives the pin. This brings the flattened side 61 back of arm 23 and holds it firmly against spring 26. The front wheels have projecting arms 64 which are connected by rods 65 with a toothed steering rack 66 within the cylindrical member 20. A pinion 67 is connected by a sprocket chain 68 and other mechanism, with a hand steering wheel 69 which is provided with a lock for use when the chains are employed. The arm 62 may be swung back until the pin near its end registers with a hole 62′ in the housing to move the flattened surface 61 away from the end of arm 23 to release this arm when the chain is to be used.

The apparatus illustrated is a gun carriage upon which is mounted a rifle 70 on a horizontal transverse pivotal support affixed to the frame 10. This rifle extends beyond

the end of the frame at the steering wheel end thereof, the space between the housings 21 provides clearance for elevating the rifle.

When the chains are employed they bear upon the rubber tires 19 of the wheels which eliminates noise. The machine thus equipped is capable of being run over rough and difficult surfaces and over steep grades and many obstacles. When run on its wheels it is capable of attaining a comparatively high rate of speed. Its mobility is of course of great military value when applied to gun carriages and the like.

Another advantage of the adjustable mounting of the auxiliary wheels 15 and 16 is that when the apparatus is arranged to be run on its wheels, it can be jacked or lifted by raising the auxiliary wheels to the position in which they are shown in Fig. 2, putting blocking under them and then forcing them down again.

The invention upon which this application is based is broader than the specific mechanism which has been described for the purpose of illustrating one of its practical embodiments, and I therefore intend no limitations other than those imposed by the following claims.

What I claim is:

1. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the motor, flexibly supported wheels near the other end of the frame, all of said wheels having peripheral treads to run on the ground and support the weight of the tractor, removable tractor chains passing under the wheels at opposite ends of the frame, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, and means to connect the chains with the motor for propulsion of the tractor.

2. In a tractor, a frame, a motor, sets of load carrying road wheels having peripheral treads to run on the ground and support the weight of the tractor, means to connect one of said wheels with the motor for propulsion of the tractor as a wheeled vehicle, removable tractor chains passing under all of the wheels of a set, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, means to connect the chains with the motor for propulsion of the tractor, wheels intermediate certain of the first named wheels of a set, respectively, equalizing devices connecting the last named wheels for each of the chains, respectively, and means to press the last named wheels yieldingly into engagement with the respective chains.

3. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, flexibly supported wheels near the other end of the frame, auxiliary wheels between said wheels near the ends of the frame, adjustable resilient means for varying vertically the positions of the auxiliary wheels, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, steering gear for the flexibly supported wheels and a pair of removable tractor chains.

4. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the motor, flexibly supported wheels near the other end of the frame, all of said wheels having peripheral treads to run on the ground and support the weight of the tractor, removable tractor chains passing under the wheels at opposite ends of the frame, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, and means to connect the chains with the motor for propulsion of the tractor, and means to support the chains on the tractor when not in use.

5. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the motor, steering wheels near the other end of the frame, all of said wheels having peripheral treads to run on the ground and support the weight of the tractor, removable tractor chains passing under the wheels at opposite ends of the frame, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, means to connect the chains with the motor for propulsion of the tractor and means to lock said steering wheels against angular movement when said chains are so applied.

6. In a tractor, a frame, a motor, driven wheels near one end of the frame, independently operable transmission connections between the motor and each of said driven wheels, flexibly supported steering wheels near the other end of the frame, all of said wheels having peripheral treads to run on the ground and support the weight of the tractor, removable tractor chains passing under the wheels at opposite ends of the frame, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, means to connect the driven wheels with the respective chains for propulsion of the tractor, and means for locking the steering wheels against angular movement when the chains are so applied.

7. In a tractor, a frame, a motor, sets of load carrying road wheels having peripheral treads to run on the ground and support the weight of the tractor, means to connect certain of said wheels with the motor for propulsion of the tractor as a wheeled vehicle, means to support certain others of the wheels flexibly, as steering wheels, removable tractor chains passing un-

der all of the wheels of a set, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, means to connect the driven wheels with the respective chains for propulsion of the tractor, auxiliary wheels between the first named wheels of the sets, respectively, and adjustable means to press the auxiliary wheels yieldingly into engagement with the respective chains.

8. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, a horizontal transverse bearing member near the other end of the frame, a pair of housings pivotally mounted on said bearing, a transverse bar pivoted on a vertical axis in each housing and a wheel pivoted on a vertical axis near the outer end of each bar, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, steering gear for the wheels supported on the housings, and a pair of removable tractor chains.

9. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, a horizontal transverse bearing member near the other end of the frame, a pair of spaced housings pivotally mounted on said bearing, a transverse bar pivoted intermediate its ends on a vertical axis in each housing and a wheel pivoted on a vertical axis near the outer end of said bar, a spring arranged to press against the inner portion of said bar, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, steering gear for the wheels supported on the housings, and a pair of removable tractor chains.

10. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, a horizontal transverse bearing member near the other end of the frame, a pair of spaced housings pivotally mounted on said bearing, a transverse bar pivoted intermediate its ends on a vertical axis in each housing and a wheel pivoted on a vertical axis near the outer end of said bar, a spring arranged to press against the inner portion of said bar, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, releasable means for locking said bars against movement in one direction, steering gear for the wheels supported on the housings, and a pair of removable tractor chains.

11. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, a horizontal transverse bearing member near the other end of the frame, a pair of spaced housings pivotally mounted on said bearing, vertical springs between the housings and the frame, a transverse bar pivoted intermediate its ends on a vertical axis in each housing and a wheel pivoted on a vertical axis near the outer end of said bar, a spring arranged to press against the inner portion of said bar, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, releasable means for locking said bars against movement in one direction, steering gear for the wheels supported on the housings, and a pair of removable tractor chains.

12. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the motor, a horizontal transverse bearing member near the other end of the frame, a pair of spaced housings mounted on said bearing, wheels mounted on the respective housings, all of said wheels having peripheral treads to run on the ground and support the weight of the tractor, removable tractor chains passing under the wheels at opposite ends of the frame, respectively, said wheels serving to carry the weight of the tractor when said chains are so applied, means to connect the chains with the motor for propulsion of the tractor, a gun and a mounting therefor including a horizontal transverse pivotal support, said gun extending over and arranged to be tilted down between the spaced housings.

13. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, flexibly supported wheels near the other end of the frame, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, resilient means for opposing the pull of the chains on the flexibly mounted wheels arranged to oppose the pull of the chains on said wheels, steering gear for the flexibly supported wheels, and a pair of removable tractor chains.

14. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, flexibly supported wheels near the other end of the frame, all of said wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, adjustable resilient means for opposing the pull of the chains on the flexibly mounted wheels arranged to oppose the pull of the chains on said wheels, steering gear for the flexibly supported wheels, and a pair of removable tractor chains.

15. In a tractor, a frame, a motor, driven wheels near one end of the frame connected with the engine, flexibly supported wheels near the other end of the frame, all of said

wheels having parts arranged to receive and guide a tractor chain and said driven wheels having parts arranged to drive such chain, resilient means for opposing the pull of the chains on the flexibly mounted wheels arranged to oppose the pull of the chains on said wheels, steering gear for the flexibly supported wheels, a pair of removable tractor chains, and means for locking said resilient means.

In witness whereof I hereunto set my hand this 24th day of July, 1919.

WALTER CHRISTIE.