

March 14, 1944.

P. KIANG

2,344,252

GUN CARRIAGE

Filed Aug. 18, 1942

4 Sheets-Sheet 1

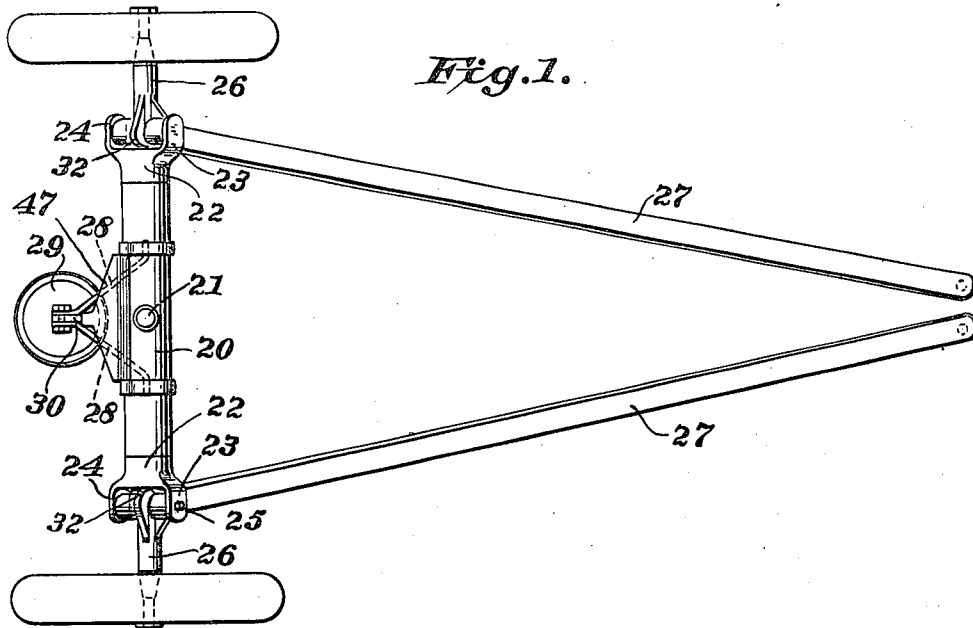


Fig. 1.

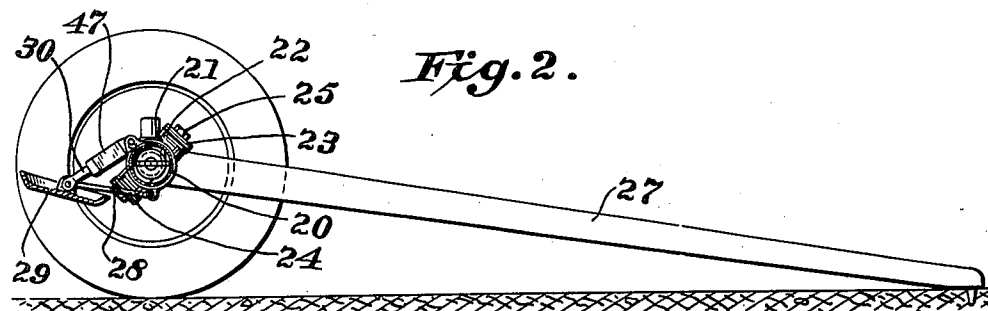


Fig. 2.

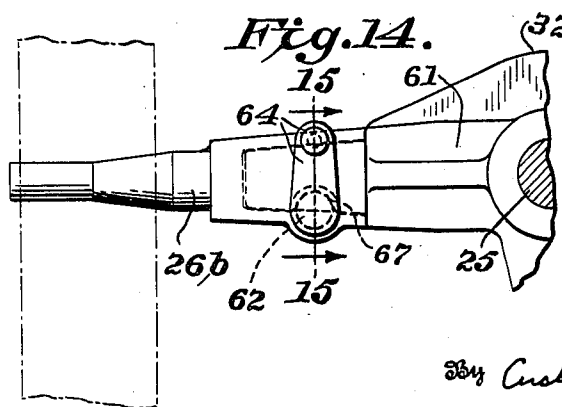


Fig. 14.

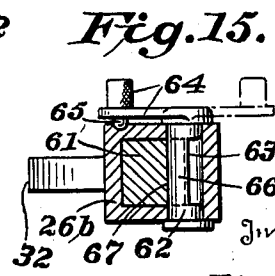


Fig. 15.

Inventor:

Piao Kiang,

Cushman Darby + Cushman
Attorneys

March 14, 1944.

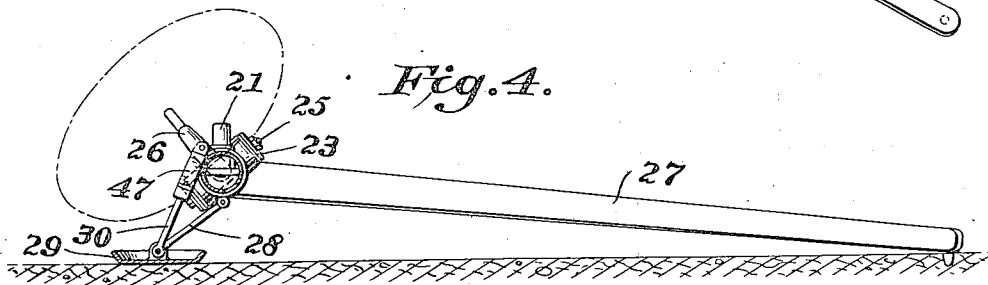
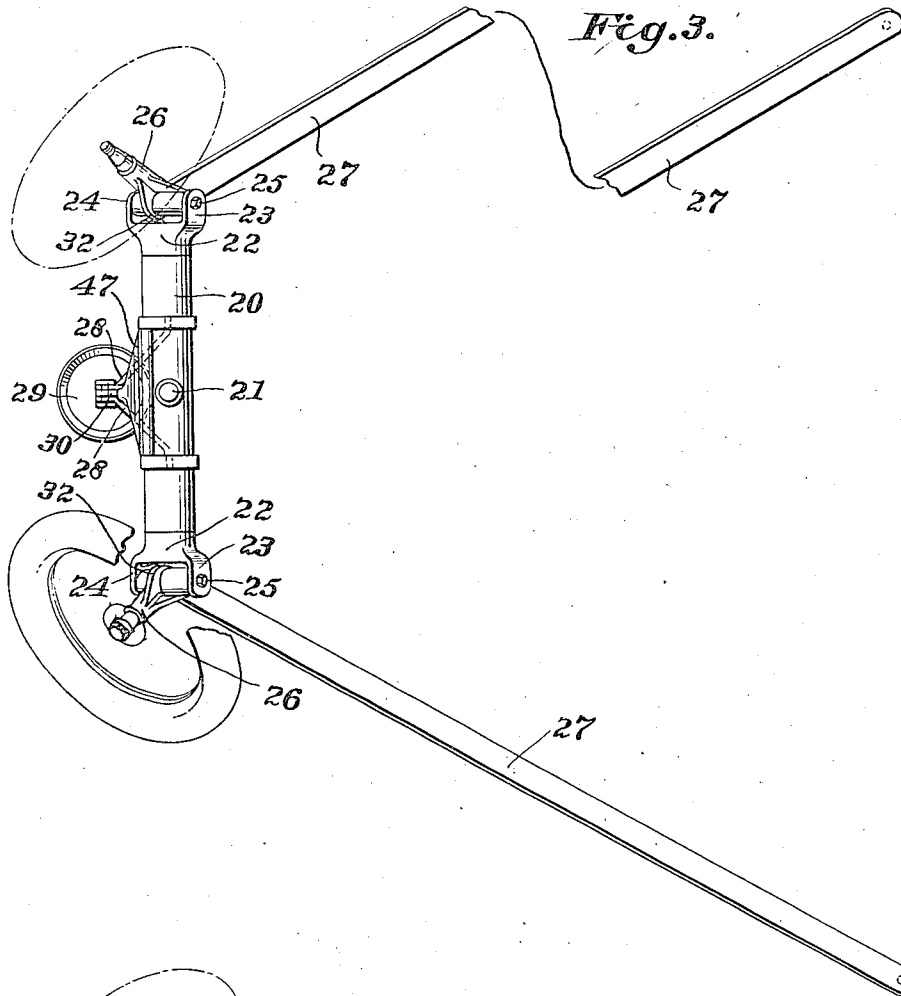
P. KIANG

2,344,252

GUN CARRIAGE

Filed Aug. 18, 1942

4 Sheets-Sheet 2



Inventor:

Piao Kiang,

By Cushman Darby & Cushman

Attorneys

March 14, 1944.

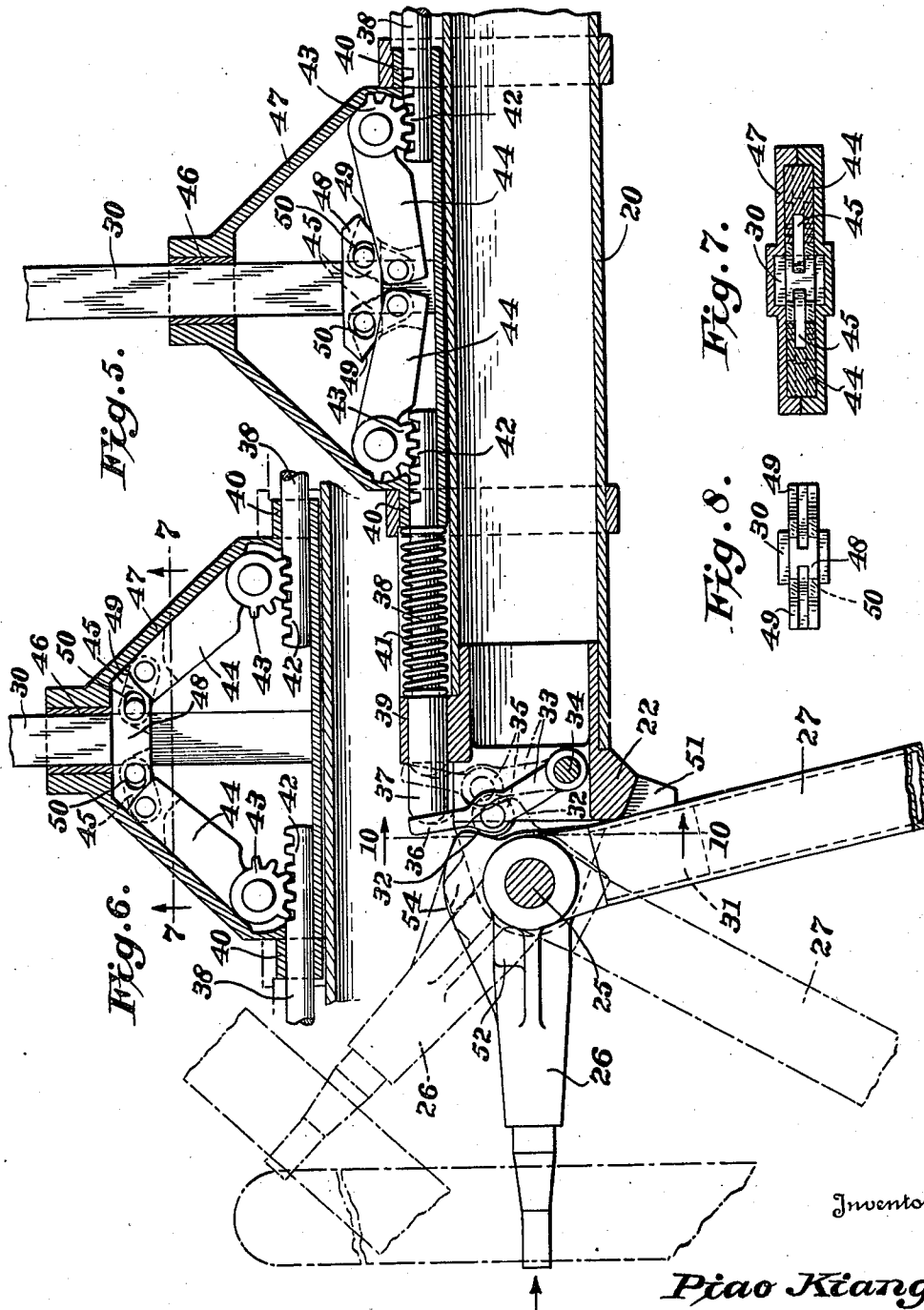
P. KIANG

2,344,252

GUN CARRIAGE

Filed Aug. 18, 1942

4 Sheets-Sheet 3



Inventor:

Piao Kiang,

By Cushman Darby + Cushman

Attorneys.

March 14, 1944.

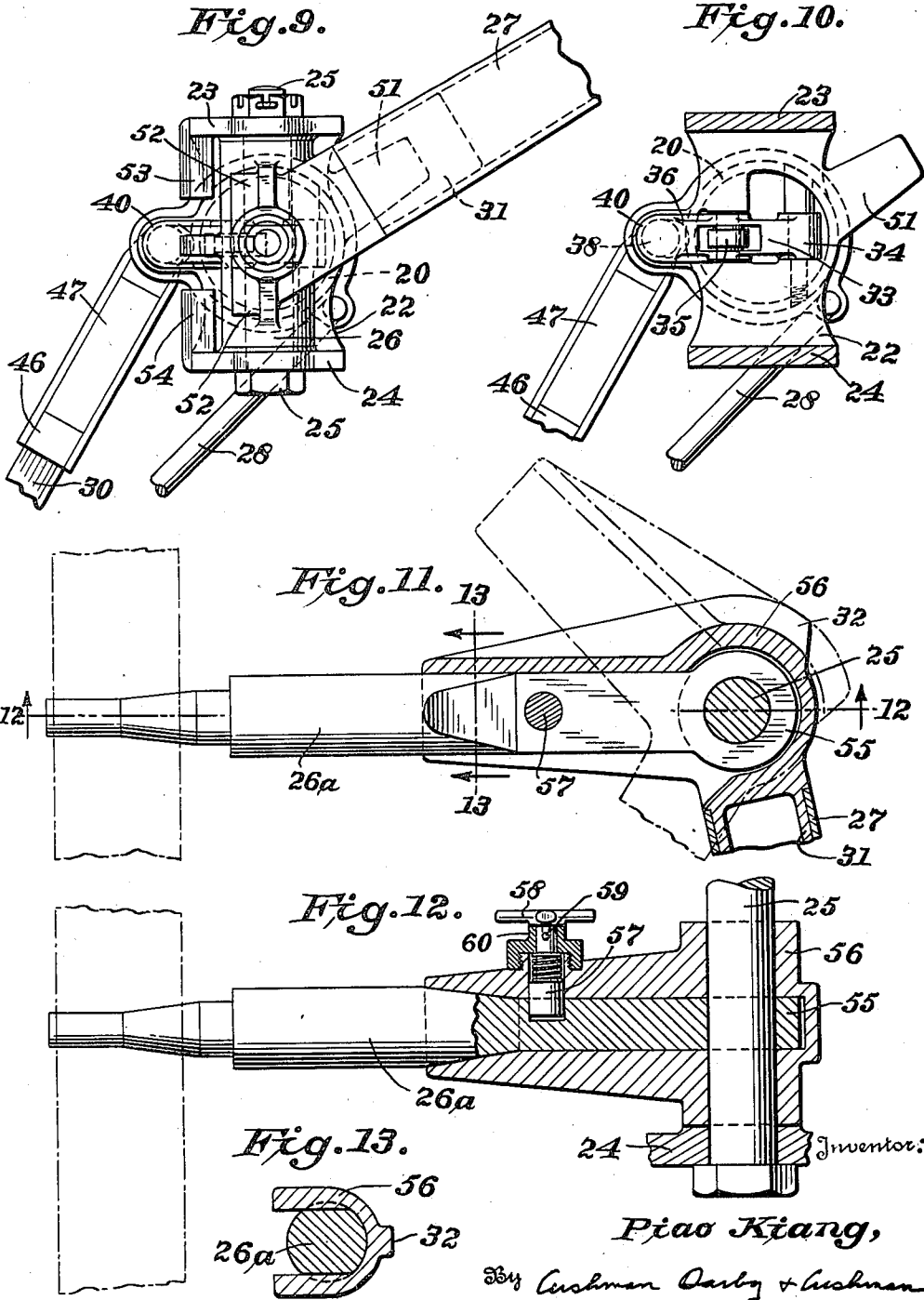
P. KIANG

2,344,252

GUN CARRIAGE

Filed Aug. 18, 1942

4 Sheets-Sheet 4



Inventor:
Piao Kiang,
By *Cushman Darby & Cushman*
Attorneys

UNITED STATES PATENT OFFICE

2,344,252

GUN CARRIAGE

Piao Kiang, Washington, D. C.

Application August 18, 1942, Serial No. 455,253

11 Claims. (Cl. 89—40)

The present invention relates to a wheeled gun carriage and more particularly to that form of gun carriage which may be easily and quickly converted from the travelling trim to the firing position by the action of spreading the trails.

The wheeled gun carriages commonly in use today are provided with pneumatic tires on the wheels. If the gun were to be fired with the gun carriage supported by the wheels and their pneumatic tires, numerous difficulties would be encountered due to the resilience of the gun mount as obtained from the pneumatic tires. Attempts have been made in the art to overcome these disadvantages by providing mechanisms for resting the gun carriage directly on the ground and relieving the wheels and pneumatic tires from any support of the gun load during the firing operations. To the best of my knowledge, the previous attempts in the art have all included cumbersome jack mechanisms or the like for elevating the gun carriage to raise the wheels from the ground, after which the wheels may be moved to any desired position, such as will not interfere with the firing of the gun.

It is, therefore, a principal object of my invention to provide a wheeled gun carriage in which a simple and easily operable mechanism is provided for relieving the gun carriage wheels from the support or load of the gun and for supporting the gun directly by a three point contact with the ground.

It is a further object of my invention to provide a wheeled gun carriage having the usual trail members but including mechanism associated with said trail members for elevating the wheels and lowering a gun support or strut when the trail members are spread to their open position for firing, thus supporting the gun by a direct three point contact with the ground, and relieving the wheels and pneumatic tires of the gun load during the firing operations.

It is a still further object of my invention to provide a wheeled gun carriage having split trail members and including a cam and lever system utilizing the leverage of said trails when being spread to the firing position to elevate the wheels and lower a base plate and gun support strut to thus support the gun carriage at three points by the trails and gun support strut.

It is also an object of my invention to provide a wheeled gun carriage that may be easily and quickly converted from the travelling wheeled position to a firing position and having removable wheel axles enabling the wheels to be removed or replaced when the gun carriage is in firing position.

It is further an object of my invention to provide a wheeled gun carriage having split trail members and including a cam and lever system

to lower a base plate and gun support strut and to elevate the wheels when the trails are spread to the firing position, the cam and lever system being so designed that the base plate and gun support strut will be lowered to support the gun carriage before the gun carriage is substantially lowered.

The gun carriage of my invention is particularly well suited for use as a gun mount for anti-tank guns, since the gun mount is lowered toward the ground when the gun carriage is converted from the travelling trim to the firing position. With such construction it is possible to have a wheeled gun carriage having sufficient clearance over normal obstacles encountered while travelling, but having a reduced height when converted to the firing position so as to provide an anti-tank gun mount which will be close to the road and provide effective coverage.

Further objects and advantages of my invention will be readily apparent by reference to the following specification and drawings in which:

Figure 1 is a top plan view of the gun carriage of my invention with the parts in road trim or travelling position.

Figure 2 is a sectional elevation of the gun carriage as shown in Figure 1.

Figure 3 is a top plan view of the gun carriage with the parts in firing or "out" position and the trails spread with the wheels elevated and the gun support strut lowered.

Figure 4 is a sectional elevation of the gun carriage as shown in Figure 3, with the gun carriage supported at three points by the two trail members and the gun support strut.

Figure 5 is a horizontal sectional plan view partly broken away, showing the details of the cam and lever means for lowering the gun support strut and base plate.

Figure 6 is a horizontal section showing an enlargement of the details of the rack and segment gears and levers for lowering the gun support strut and base plate with the parts shown in position for the lowered strut.

Figure 7 is a cross section taken on the line 7—7 of Figure 6, showing the details of the lever ends of the operating segments for the strut lowering mechanism.

Figure 8 is a cross section taken similar to Figure 7, but showing the details of the end of the operating bar for lowering the strut.

Figure 9 is an end view in the direction of the arrow *a* of Figure 5, showing the details of the king pin and axle mounting.

Figure 10 is a cross section taken on the line 10—10 of Figure 5, showing details of the cam and lever operating mechanism.

Figure 11 is a sectional plan view of a modified form of wheel axle.

Figure 12 is a longitudinal section on the line 12—12 of Figure 11.

Figure 13 is a cross sectional view taken on the line 13—13 of Figure 11.

Figure 14 is a plan view of a further modified form of axle, and

Figure 15 is a cross section taken on the line 15—15 of Figure 14.

Referring to the drawings, Figures 1 through 4 generally illustrate the gun carriage of my invention. The gun carriage comprises a body 20 which I have shown in the drawings to be of tubular cross section, although it should be understood that the body may be made with any other desired cross section. The body 20 is provided with a mounting pin 21 on which may be mounted a gun, not shown. At each end of the body 20, a yoke 22 is secured. The yoke 22 is provided with the ears 23 and 24, which carry a king pin 25. As will be seen by reference to Figures 2 and 4 of the drawings, the king pin is inclined rearwardly and upwardly at an angle from the vertical, the term "rearwardly" being used as meaning opposite to the direction in which the gun fires. Pivotally journalled on the king pins 25 at each end of the body are the wheel axles 26, and extending rearwardly but connected to the wheel axles are the trails 27. The trails 27 are fastened to the wheel axles 26 at such an angle that the trails will extend together rearwardly in closed or travelling position when the wheel axles 26 are extending outwardly in alignment with the body 20. Upon spreading the trails to the open or firing position, as shown in Figures 3 and 4 of the drawings, the wheel axles 26 will be pivoted about the inclined king pins 25 so that the wheel axles will extend forward and upward from the body, thus elevating the wheels.

Pivotally secured to the center of the body 20 are a pair of strut members 28 which are joined together at their outer ends to constitute a gun support strut. A base plate or foot 29 is pivotally connected to the outer ends of the struts 28. When the trails are in the closed position, as shown in Figures 1 and 2, the struts 28 and firing base 29 are maintained in an elevated position and out of contact with the ground. Upon spreading the trails to the open or firing position, as shown in Figures 3 and 4 of the drawings, the pivoted strut members 28 are lowered so that the base plate 29 contacts the ground to support the gun carriage. An operating lever 30 is provided to lower the strut members 28 and base plate 29 upon the spreading of the trail members 27. As will be described in detail hereinafter, the operating lever 30 is connected by suitable cam and lever means to the pivotal trail and wheel axles so that the spreading movement of the trail and the pivotal movement of the wheel axles will produce a movement of the operating lever 30 and struts 28 to lower the base plate 29 into contact with the ground.

As shown in Figures 1 through 4 of the drawings, I have provided a gun carriage which is supported by wheels when the trails are in the closed or travelling position, but which is supported by the trails and a gun support strut and base plate when the trails are spread to the firing position, thus relieving the wheels of the load of the gun while in firing position.

Referring now to Figures 5 through 10 of the drawings, which show the details of the cam and lever mechanism for lowering the gun support struts 28 and elevating the wheels, the gun carriage body 20 is provided with a yoke 22 mounted

at each of its ends and having the ears 23 and 24. A king pin 25 is carried by the ears 23 and 24. Pivotally journalled on the king pin 25 is the wheel axle 26. Attached to the wheel axle 26 by a socket joint 31 is the trail member 27. The solid lines in Figure 5 show the trail member in the closed or travelling position with the wheel axle 26 in alignment with the body 20. The dotted lines in Figure 5 of the drawings show the trail member 27 moved to the "out" or firing position with the wheel axle 26 pivoted so that it is extending forward and upward from the body 20, thus elevating the wheels. On the exterior surface of the journal of the wheel axle 26 is formed a cam surface 32. A lever 33 pivoted at 34 upon the yoke 22 is provided with a cam roller 35 which engages the cam surface 32. The lever end 36 of the lever 33 contacts the enlarged end 37 of a push rod 38. The push rod 38 is journalled in bearings 39 and 40 on the housing 20 and a spring 41 is provided to urge the enlarged end 37 of the push rod 38 into engagement with the lever end 36 of the lever 33 and thus urge the cam roller 35 into engagement with the cam surface 32. The push rod 38 is provided at its small end with a rack gear 42 which meshes with a segment gear 43. The segment gear 43 is provided with a lever extension 44 which is linked by the link 45 to the operating bar or lever 30. The operating bar or lever 30 is preferably a square bar journalled in a suitable bearing 46 of the gear housing or bracket 47. The gear housing 47 is pivotally mounted on the body 20 by means of the bearings 40 which also serve as bearings for the push rods 38. It is necessary to pivotally mount the gear housing 47 so that the gear housing 47 and operating bar 30 may pivot when lowering the base plate 29 and gun support struts 28 into engagement with the ground.

Figure 6 of the drawings is an enlarged detail view showing the operating bar 30 moved outward to lower the base plate 29 into contact with the ground. As shown in Figure 6, the push rods 38 have been moved in toward the center of the gun carriage body 20 by the movement of the trails 27 to their "out" or firing position. This movement of the push rods 38 toward the center of the gun, as may be shown by the dotted lines in Figure 5 of the drawings, results in a pivoting of the segment gear 43 meshing with the racks 42 on the end of the push rods 38. The lever end or extension 44 of the segment gear 43 will thus be moved to the position shown in Figure 6 to move the operating bar 30 to the "out" position, thus lowering the firing plate.

It is preferred that the shape of the cam surface 32 be so designed as to result in the operation of the levers 33 and push rods 38 to move the operating bar or lever 30 and lower the struts 28 with the base plate 29 into contact with the ground before any substantial movement of the pivotal wheel axles 26 on the inclined king pins 25 can result in an elevating of the wheels. Thus the conversion of the gun carriage from a wheeled or travelling trim position to a firing position with the wheels relieved of support of the gun will be smoothly made and at no time will the gun carriage be insecurely supported. I have found that the shape of the cam surface 32 shown in Figures 5 and 11 of the drawings is a suitable design to give the desired action of lowering the base plate and gun support struts before the wheels are substantially affected.

As shown in Figures 5 through 8 of the drawings, the operating bar 30 is provided with the

enlarged end 48 having a cam surface 49 which cooperates with the end of the segment lever 44. The links 45, which are pivoted to the segment lever 44, are also pivotally connected within oversize pivot holes 50 to the enlarged end 48 of the square bar 39. It is necessary that the pivot holes 50 be slightly elongated in order to assure a free action of the mechanism and prevent jamming, as will be readily understood.

Referring to Figure 5 of the drawings, I have provided stop mechanisms to prevent the opening of the trails 27 beyond a predetermined maximum and also to prevent the closing of the trails beyond the position which will cause the axles 26 to be in alignment with the gun mount 20. A stop projection 51 is formed on the yokes 22 at the end of the gun carriage body 29 to cooperate with the sides of the trail members 27, thus preventing the closing of the trails 27 beyond the point shown by the solid lines of Figure 5. This projection 51 is also clearly shown in Figures 9 and 10 of the drawings. In this position, as shown by the solid lines of Figure 5, the wheel axle is in alignment with the gun carriage body and the gun carriage and trail members are in travelling trim.

A stop projection 52 is also provided on the exterior surface of the journal of the wheel axle 26 and cooperates with lugs 53 and 54, depending from the ears 23 and 24 of the yoke 22 at the end of the body 20, as shown in Figure 9 of the drawings. When the trails are open to the position shown in the dotted lines of Figure 5 of the drawings, the projection 52 will engage the lugs 53 and 54 to prevent the spreading of the trails 27 and a pivoting of the wheel axles 26 beyond a predetermined maximum.

Figures 9 and 10 of the drawings are sectional views showing the details of the method of mounting the pivotal axle 26 on the king pin 25 and also showing details of the cam operated lever 33.

In Figure 9 of the drawings, the king pin 25 is shown carried by the ears 23 and 24 of the yoke 22 located at the end of the gun mount 20. The wheel axle body 26 is pivotally journalled on the king pin 25 and the trail member 27 is connected to the axle body by means of the socket joint 31.

Figure 10 of the drawings is a cross section taken on the line 10—10 of Figure 5, and shows the cam operated lever 33 pivoted to the yoke 22 at 34 and provided with the roller 35 to contact the cam surface 32 on the exterior surface of the journal of the wheel axle 26. This view also shows the projection 51 which cooperates with the sides of the trails 27 to limit the closing of the trails beyond a predetermined point.

In Figures 11 through 13 of the drawings, I have shown a modified form of wheel axle as used with the gun carriage of my invention. In this modified form, I have provided a two piece axle unit. The main wheel axle 26a is journalled upon the king pin 25 at 55. Also journalled on the king pin and surrounding the bearing 55 of the axle 26a is an axle housing member 56 having the cam surface 32 for operating the cam and lever mechanism (not shown) of the gun carriage. The axle housing member 56 surrounding the wheel axle 26a is of substantially U-shaped cross-section, as shown in Figure 13 of the drawings. I have provided means for locking or connecting the axle housing 56 to the wheel axle 26a, and such means may take the form of the spring locking pin 57 provided with the operating handle 58 and catch pin 59. When

it is desired to spread the trails 27 and pivot the wheel axle housing 56 about the king pin 25 without pivoting or moving the axle 26a, it is necessary to remove the locking pin 57 from engagement with the axle 26a by lifting on the handle 58 and turning the handle until the catch pin 59 is supported by the shoulder of the collar 60. With this arrangement, it is possible to spread the trails 27 and lower the base plate 29 and gun support struts 28 into engagement with the ground without lifting the wheels and wheel axle 26a completely off of the ground, thus facilitating the operation.

In Figures 14 and 15 of the drawings, I have shown a further modified form of wheel axle which may be used to advantage with my gun carriage. In this modified form the wheel axle 26b is removably secured to an axle housing 61 surrounding the king pin 25. The wheel axle 26b may be removably secured to the axle housing 61 by means of the bolt 62 journalled on the wheel axle 26b, as shown by Figures 14 and 15 of the drawings. The bolt 62 has the cut-out portion as shown at 63 in Figure 15 of the drawings and is provided with a handle 64 and detent 65 for maintaining the bolt in the locked position shown. The side 66 of the bolt adjacent the cut-out portion 63 fits within the cut-out portion 67 of the axle housing 61 when the bolt is in its normal locking position. When it is desired to remove the wheel axle 26b, it is only necessary to turn the handle 64 to the position shown in the dotted lines in Figure 15, thus rotating the bolt 62 so that the cut-out portion 63 of the locking bolt is facing the cut-out portion 67 of the axle housing 61. Thus the wheel axle can be removed as may be readily understood.

I have shown and described as my invention a wheeled gun carriage provided with split trails which may be easily and quickly converted from the wheeled or travelling position to a firing position with the wheels relieved of support of the gun, and with the gun supported at three points by the two trails and a base plate and strut arrangement. My invention provides an extremely simple mechanism to convert the gun from the travelling to the firing position by using the leverage obtained by spreading the trails from their road trim or travelling position to their firing position.

I claim:

1. A wheeled gun carriage comprising a body for supporting a gun, a strut pivotally connected to and extending downwardly from the center of the body and having a base plate at its end adapted to engage the ground, said strut and base plate normally maintained in an elevated position, king pins secured to each end of the body and rearwardly and upwardly inclined at an angle from the vertical, wheel axles pivotally journalled on said king pins and normally extending in alignment with the body, wheels mounted on said axles, trail members fastened to said pivotal wheel axles at an angle to cause said trail members to extend together rearwardly of the body in closed position when said wheel axles are in their normal position, and motion transmitting means operatively connected between said pivotal wheel axles and said pivoted strut, whereby the spreading of said trail members from their closed position will move said pivoted strut to lower the base plate into a ground-engaging relation for supporting the body in wheel-relieving position and will pivot the wheel axles about said king pins to assume a

position extending forward and upward from the body to elevate the wheels.

2. In a wheeled gun carriage as claimed in claim 1, the motion transmitting means operatively connected between said pivotal wheel axles and said pivoted strut being so constructed and arranged as to cause the pivoted strut to be moved to lower the base plate into a ground-engaging relation before the wheel axles and wheels are substantially moved.

3. A wheeled gun carriage comprising a body for supporting a gun, a strut pivotally connected to and extending downwardly from the center of the body and having a base plate at its end adapted to engage the ground, said strut and base plate normally maintained in an elevated position, king pins secured to each end of the body and upwardly and rearwardly inclined at an angle from the vertical, wheel axle housings pivotally journaled on said king pins and normally extending in alignment with the body, axles removably secured in said housings, wheels mounted on said axles, trail members fastened to said pivotal axle housings at an angle to cause said trail members to extend together rearwardly of the body in closed position when said wheel axle housings are in their normal position, and motion transmitting means operatively connected between said pivotal axle housings and said pivoted strut, whereby the spreading of said trail members from their closed position will move said pivoted strut to lower the base plate into a ground-engaging relation for supporting the body in wheel-relieving position and will pivot the axle housings about said king pins to assume a position extending forward and upward from the body to elevate the wheels.

4. In a wheeled gun carriage as claimed in claim 3, the motion transmitting means operatively connected between said pivotal wheel axles and said pivoted strut being so constructed and arranged as to cause the pivoted strut to be moved to lower the base plate into a ground-engaging relation before the wheel axles and wheels are substantially moved.

5. In a wheeled gun carriage as claimed in claim 1, the body having an abutment cooperating with said trail members constituting stop means to prevent the closing of said trail members beyond the predetermined point for aligning the wheel axles with the body, and the motion transmitting means operatively connected between said pivotal wheel axles and said pivoted strut including stop means to prevent spreading of the trails beyond a predetermined maximum.

6. In a wheeled gun carriage as claimed in claim 1, the motion transmitting means comprising cam surfaces on the exterior surfaces of the journals of said pivotal wheel axles, levers pivoted on the body and operatively associated with said cam surfaces, push rods carried by the body and engaged by the free ends of said levers respectively, said push rods provided with rocks, segment gears engaging said racks, and said segment gears provided with lever ends operatively connected to the pivoted strut whereby the movement of the pivotal wheel axles and cam surfaces will result in a movement of the pivoted strut.

7. In a wheeled gun carriage as claimed in claim 1, the motion transmitting means comprising cam surfaces on the exterior surfaces of the journals of said pivotal wheel axles, levers pivoted on the body and operatively associated

with said cam surfaces, push rods carried by the body and engaged by the free ends of said levers respectively, spring means associated with the push rods to engage said push rods with said lever ends, said push rods provided with racks, segment gears engaging said racks, and said segment gears provided with lever ends operatively connected to the pivoted strut whereby the movement of the pivotal wheel axles and cam surfaces will result in a movement of the pivoted strut.

8. A gun carriage comprising a body for supporting a gun, normally aligned stub axles pivoted to said body, wheels on said axles for supporting said body, means other than the wheels for supporting said body, the pivoting axes of said axles being so disposed that when said body is supported by said other means the axles can be swung in paths having a substantial upward component so that the wheels will be elevated, trails in pivotal connection with said body, and connections between said trails and axles respectively whereby spreading of the trails will cause the axles to swing as aforesaid.

9. A gun carriage comprising a body for supporting a gun, normally aligned stub axles pivoted to said body, wheels on said axles for supporting said body, means other than the wheels for supporting said body, trails in pivotal connection with said body, the pivoting axes of said axles being so inclined upwardly and in the direction of said trails that when said body is supported by said other means the axles can be swung in paths having a substantially upward component so that the wheels will be elevated, and connections between said trails and axles respectively whereby spreading of the trails will cause the axles to swing as aforesaid.

10. A gun carriage comprising a body for supporting a gun, wheels normally supporting said body, supporting means carried by said body in normally elevated position but lowerable to support said body, trails in pivotal connection with said body, connections between said trails and said supporting means whereby upon spreading the trails the supporting means will be lowered to support said body, mounting means for said wheels movable upwardly relative to said body to elevate said wheels when said body is supported by said supporting means, and connections between at least one of said trails and said mounting means whereby the spreading of said trails causes said mounting means to move as aforesaid.

11. A gun carriage comprising a body for supporting a gun, wheels for supporting the body, and means for supporting the body independently of the wheels comprising a pair of struts pivoted at one end to the body on a transverse horizontal axis between the wheels, a foot to which said struts are pivoted at the other end on an axis parallel to the first axis, a bracket pivoted to the body on an axis spaced longitudinally of the body from and parallel to the axis on which the struts are pivoted to the body, a bar guided in said bracket for sliding movements transversely of the pivoting axis of the bracket, said bar having one end pivoted to said foot on an axis parallel to the pivoting axis of the bracket, a pair of trails pivoted to said body, and motion-transmitting means between at least one of said trails and said bar whereby when the trails are spread apart said bar is projected to lower said foot into supporting position as guided by said struts.

PIAO KIANG.