

April 22, 1941.

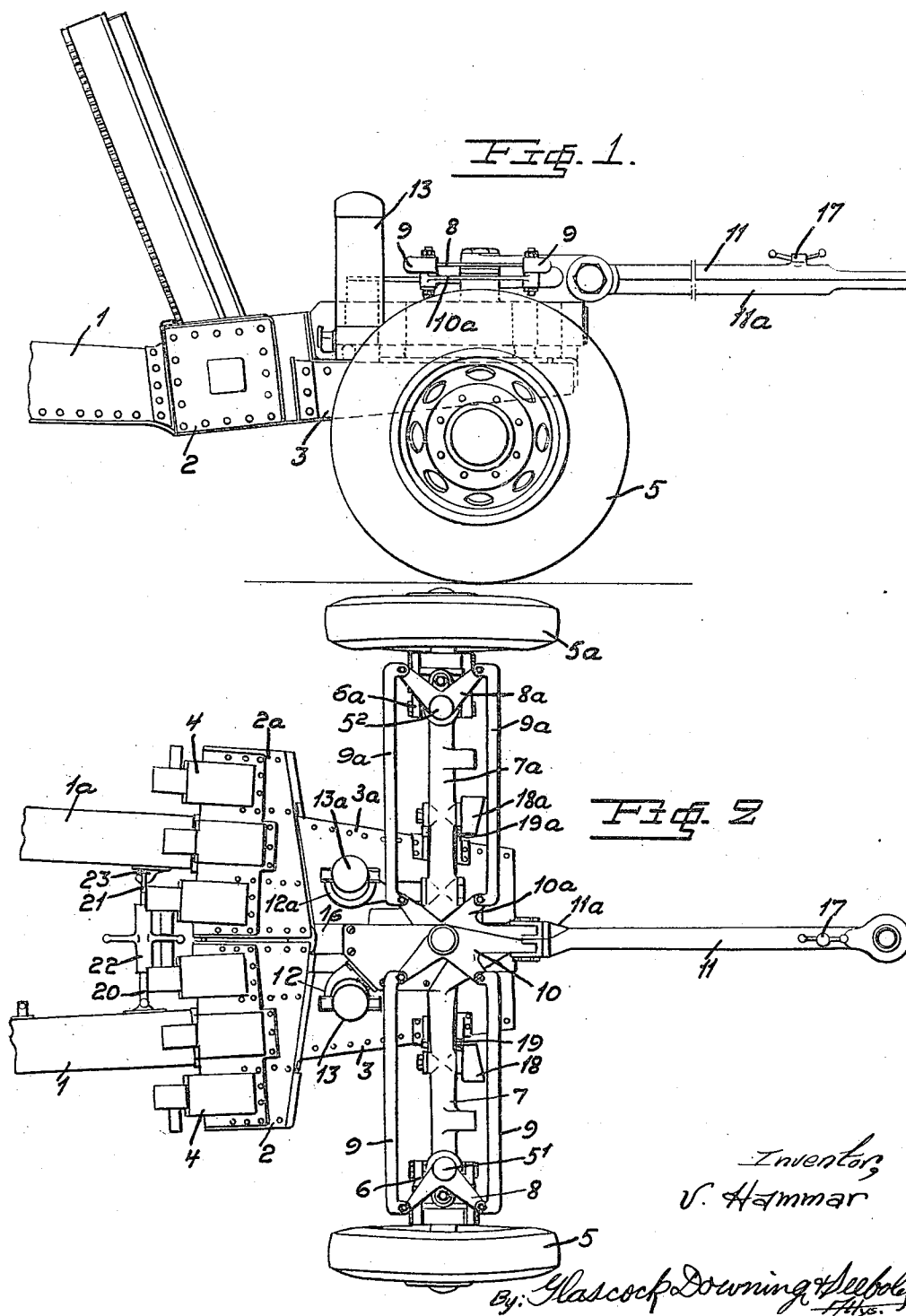
V. HAMMAR

2,239,559

FIELD PIECE OR FIELD GUN

Filed Dec. 5, 1938

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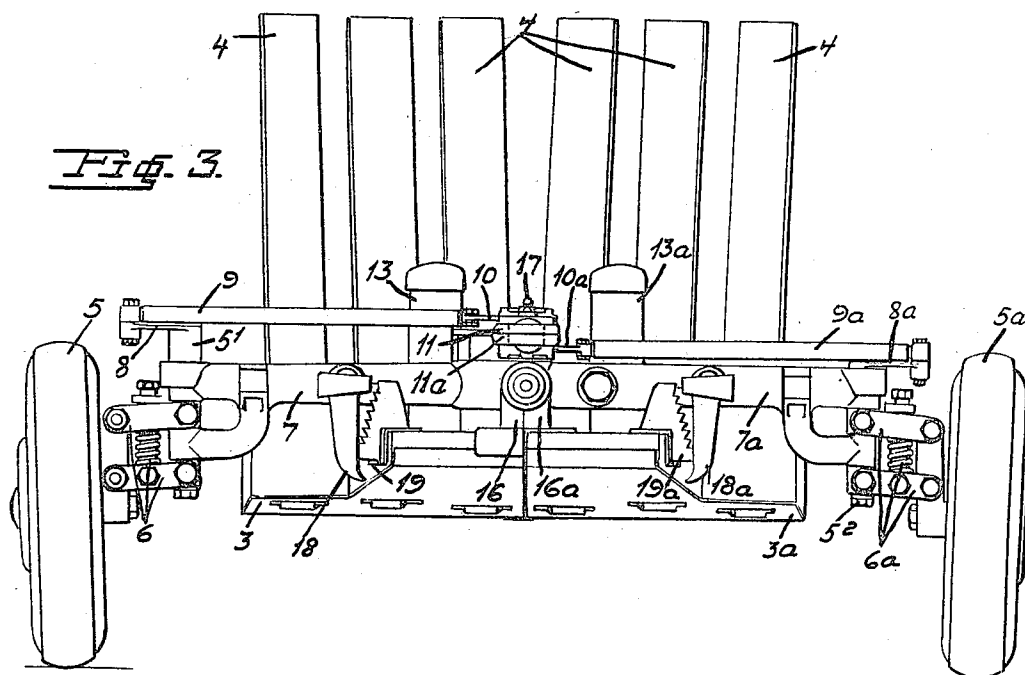
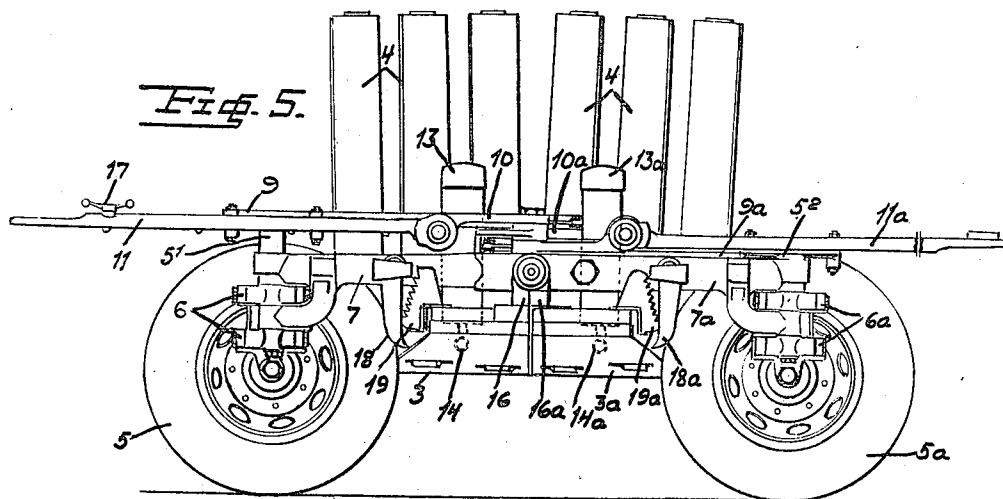
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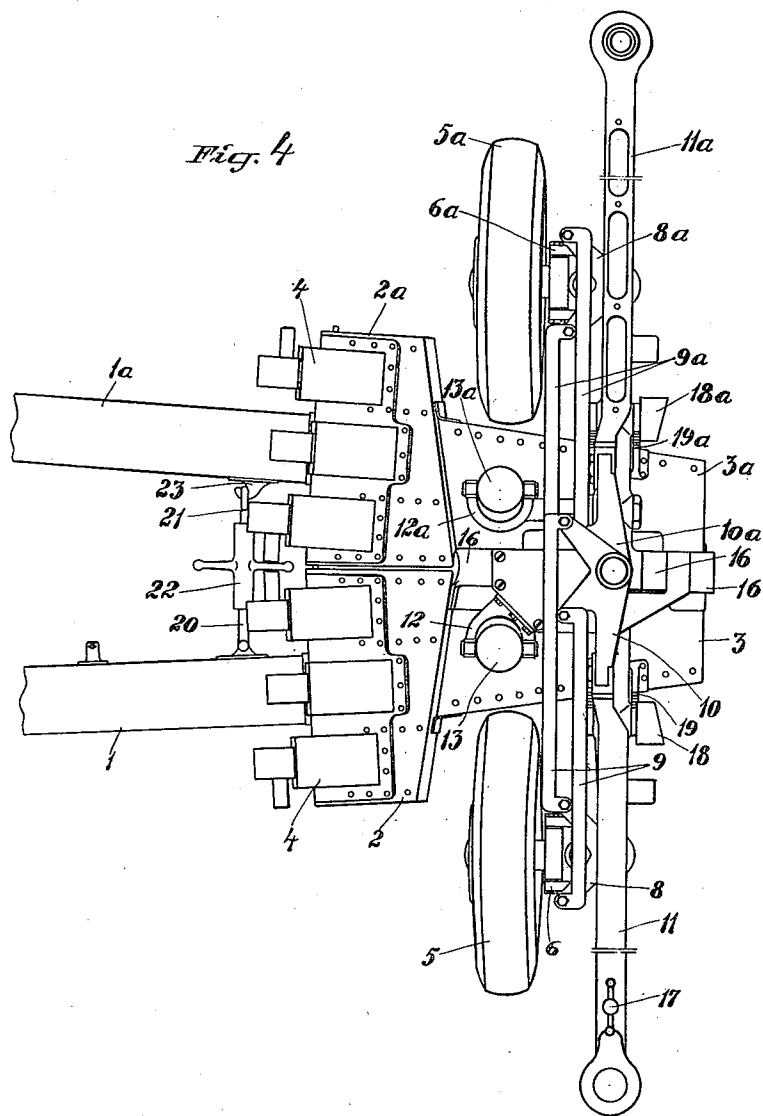
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FIELD PIECE OR FIELD GUN

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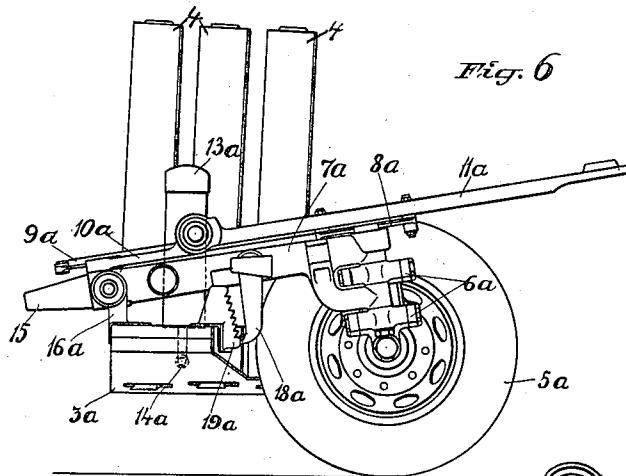
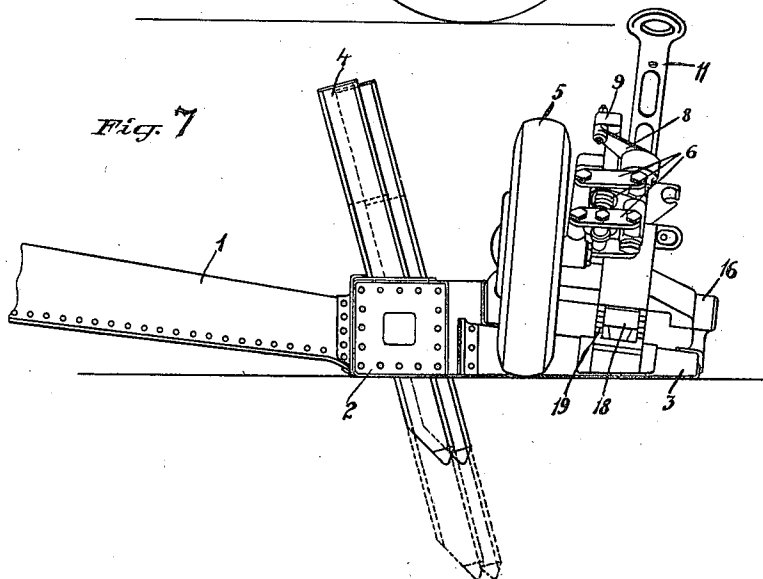
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FIELD PIECE OR FIELD GUN

Filed Dec. 5, 1938

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FIELD PIECE OR FIELD GUN

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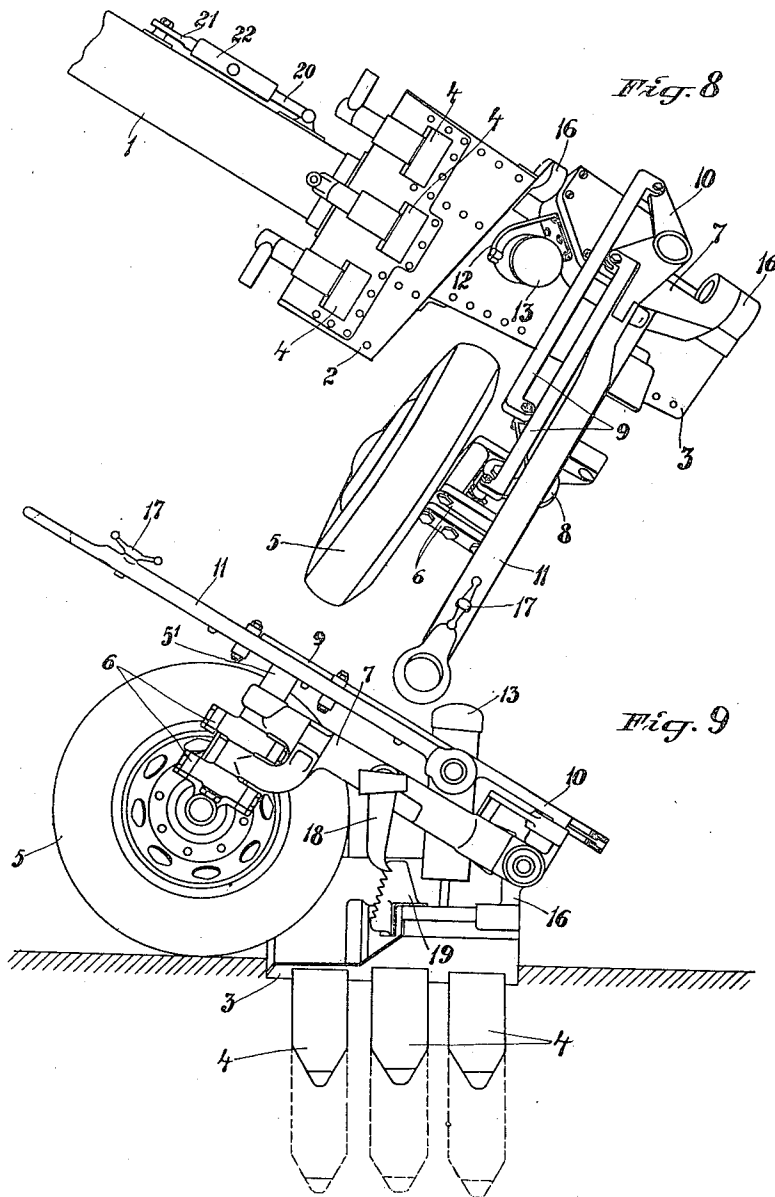


Fig. 8

Fig. 9

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UNITED STATES PATENT OFFICE

2,239,559

FIELD PIECE OR FIELD GUN

Victor Hammar, Bofors, Sweden, assignor to
Aktiebolaget Bofors, Bofors, SwedenApplication December 5, 1938, Serial No. 244,112
In Sweden March 3, 1938

10 Claims. (Cl. 89-40)

The invention pertains to improvements in and relating particularly to heavy field pieces or field guns having split trails, and the invention has for its object to facilitate operations required to convert the piece from a position for transport to a position for shooting and vice versa.

The invention includes a limber made in two detachable pieces, one of which is mounted on one of the gun carriage trails and the other on the other trail, the construction preferably being such that the wheels can be swung out in a lateral direction to serve as carrier wheels for the trails of the gun carriage when these are spread apart and brought together. As this construction avoids the necessity of handling or lifting the trails of the gun carriage the movements can be carried out quickly and easily by one or two operators.

The accompanying drawings show an embodiment of the invention applied to a heavy field piece. As the piece may be of any type having trails which can be spaced apart, only the limber and those parts of the carriage trails with which the invention is concerned have been shown in the drawings.

Fig. 1 is a side view of the limber and the rear ends of the carriage trails in the driving or transport position. Figs. 2 and 3 are a plan view and a rear view of the same parts in the same position. Fig. 4 is a plan view of the parts in the position they take up immediately before the trails of the carriage are disconnected and swung out. Fig. 5 is a rear view of the parts in the same position. Fig. 6 is a rear view of the limber showing the right limber wheel as carrier wheel for the right trail of the carriage. Fig. 7 is a side view of the rear part of the left trail of the carriage in the shooting position with the left half of the limber mounted thereon, and Figs. 8 and 9 are a plan view and a rear view of the last mentioned trail of the carriage also with the limber in the shooting position.

In the drawings the reference numerals 1 and 1a denote the split trails of the carriage, to the rear end of which are affixed spade boxes 2 and 2a having extensions 3 and 3a extending rearwardly and being provided with spade poles 4, three for each trail. The spade poles are in the transport position held in a raised position by a suitable locking mechanism.

According to the invention the limber is made in two detachable parts or halves, and in the embodiment shown one half is mounted on one of the spade box extensions 3 and 3a, and the other on the other extension. The limber comprises

the wheels 5 and 5a, which by means of spring operated link systems 6 and 6a are steerably mounted on fork-shaped wheel axles 7, 7a. The steering gear comprises outer bell cranks 8 and 8a connected with the steering pins 5¹ and 5² of the corresponding wheels and by means of double tie rods 9 and 9a with inner bell cranks 10 and 10a. These latter cranks are pivotally mounted in each of the spade box extensions 3 and 3a, the bearings being in different horizontal planes, so that in the closed position of the trails the bearings overlies each other and the turning axes coincide. To each of the inner bell cranks 10 and 10a is connected a pole 11, 11a, so as to be swingable in a vertical direction. In the transport position, Figs. 1, 2 and 3, the poles are folded together one over the other and held together by means of a screw bolt 17.

To each of the wheel axles 7 and 7a is rigidly connected a fork-shaped holder 12, 12a carrying a cylindrical spring housing 13, 13a containing a balancing spring (not shown), said springs by means of pull rods 14 and 14a, Figs. 5 and 6, being connected to the corresponding trails (through the boxes 2 and 2a with the extensions 3 and 3a) and having a lifting effect on these. The inner end of the right wheel axle 7a is provided with a long conical projection 15, Fig. 6, which in the closed position of the trails enters a corresponding seat in the inner end of the left wheel axle 7, so that in the transport position the two axles function as a single rigid axle. Each wheel axle 7 and 7a is further mounted in bearing members 16, 16a secured to the corresponding spade box extensions 3, 3a, so as to be swingable in a vertical plane. These bearing members are axially displaced relatively to each other and are further so disposed that in the closed position of the trails the bearing members 16 on the extension 3 in the form of a fork embrace the bearing members 16a on the extension 3a and their axes are coaxial, whereby also the common wheel axle composed of the compounded axles 7 and 7a becomes swingable in a vertical direction. In this way the advantage is gained that also when driving over uneven ground the four wheels of the carriage always are in touch with the ground.

On each of the wheel axles 7 and 7a is further swingably mounted a pawl 18, 18a adapted to engage with ratchet plates 19, 19a affixed to the extensions 3 and 3a of the spade boxes.

For the locking the trails together there is, in addition to the screw bolt 17 on the double pole 11, 11a, provided a locking device (see Fig. 4)

comprising two screws 20 and 21 having right and left handed threads and a strainer 22, the screw 20 being articulately secured to the inside of the left trail 1, whereas the other screw 21 by means of an eye can be hooked on to a hook 23 affixed to the inside of the right trail 1a.

In the positions of the various parts shown in Figs. 1-3 the piece itself as well as the limber, as mentioned, are in the transport position and for transport the double pole held together by the bolt 17 is connected to a tractor.

For changing to shooting position the screw bolt 17 is unscrewed and the two pole halves 11 and 11a are swung out 90° to each side (see Figs. 4 and 5). At the same time the wheels 5 and 5a are also turned by the steering mechanism 8, 9, 10 and 8a, 9a, 10a in the same direction as the corresponding part of the pole, so as to take up positions at right angles to the trails, in which positions the wheels serve as carriage wheels for the trails when these are spread apart. The locking mechanism 20-22 is disconnected and unhooked from the hook 23, and the trails are then pulled apart by means of the pole halves 11 and 11a. As soon as the cone 15 on the left wheel axle 7 is clear of the corresponding seat in the right wheel axle 7a the total weight of the trails is transferred to the balancing springs in the cylinders 13 and 13a, and the trails are depressed somewhat until the total load has been taken up by the springs.

When the trails have been pulled apart into the shooting position the spades 4 are let down, so that the points thereof rest against the ground, and they are then locked in this position. The means for letting the spades down may be any conventional construction and forms no part of the present invention. For instance such means may consist of pawl and ratchet members, similar to those shown in Fig. 3. When the gun is fired the spade boxes are pressed down against the ground by the firing pressure and the lower part of the spade poles enter the ground, as shown by the unbroken lines in Figs. 7 and 9, the wheel axles take up the inclined position shown in Fig. 9 and the pawls 18 and 18a on the wheel axles engage with the teeth of the corresponding ratchet plates 19 and 19a. In this way the balancing springs are prevented from raising the spade boxes (the rear ends of the trails) after the firing pressure has ceased.

If, when the piece is set up on loose ground, it is necessary to push the spade poles 4 deeper into the ground the following procedure is employed. The pawls 18 and 18a are released, when the spade boxes are lifted up from the ground by the balancing springs. The spade poles, however, are released and are not pulled up, and they are then again locked to the uplifted spade boxes. When then a shot is fired the spade boxes return to the ground position and the spade poles are pressed deeper into the ground, as shown with dotted lines in Figs. 7 and 9. The pawls 18 and 18a again engage with the teeth of the ratchet plates 19 and 19a.

In order to bring the piece again into the transport position the spade poles are released and then pulled up and locked in the uplifted positions. The pawls 18 and 18a are then released, when the trails are raised from the ground by the balancing springs as above described, so that they rest on the carrier wheels 5 and 5a. The trails are brought together and locked together by means of the locking device 20-22. The pole halves are brought together, when the

wheels are brought into the transport position.

The invention is obviously not limited to the construction of the separable limber shown in the drawings, as the various details may be modified without departing from the spirit of the invention.

What I claim as new and desire to secure by Letters Patent of the United States of America is:

1. In combination, a gun carriage having split trails and a limber for said carriage, said limber being made in two detachable parts, individually firmly secured to each one of said carriage trails.

2. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts, individually firmly secured to each one of said carriage trails, and means for swinging out the limber wheels substantially at right angles to the related carriage trail.

3. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts, individually firmly secured to each one of said carriage trails, means for swinging out the limber wheels substantially at right angles to the related carriage trail, and a pole on said limber, said pole comprising two detachable parts, individually swingably connected to each one of said limber parts and capable of being swung out substantially at right angles to the related carriage trail.

4. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts, individually firmly secured to each one of said carriage trails, a wheel swingably mounted on each one of said limber parts, a pole comprising two detachable parts individually swingably connected to each one of said limber parts, and a steering device on each one of said latter parts in operative connection with the related wheel and pole part.

5. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts individually firmly secured to each one of said carriage trails, means for swinging out the limber wheels substantially at right angles to the related carriage trail, a separate shaft for each of said limber wheels, and means for interconnecting said shafts to form a single stiff shaft in the interlocked position of said trails and limber parts.

6. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts, individually firmly secured to each one of said carriage trails, a wheel swingably mounted on each one of the said limber parts, a pole comprising two detachable parts individually swingably connected to each one of said limber parts, a separate shaft for each of said limber wheels, and means for interconnecting said shafts to form a single stiff shaft in the interlocked position of said trails and limber parts.

7. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts, individually firmly secured to each one of said carriage trails, a wheel swingably mounted on each one of said limber parts, a pole comprising two detachable parts individually swingably connected to each one of said limber parts, a separate shaft for each of said limber wheels, means for

interconnecting said shafts to form a single stiff shaft in the interlocked position of said trails and said limber parts, and a steering device on each one of said latter parts in operative connection with the related wheel and pole part.

8. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts individually firmly secured to each one of said carriage trails, means for swinging out the limber wheels substantially at right angles to the related carriage trail, a separate shaft for each of said limber wheels, means for interconnecting said shafts to form a single stiff shaft in the interlocked position of said trails and limber parts, separate bearing blocks for said wheel shafts on said trails, said blocks being in alignment with each other in said interlocked position of the trails and limber parts, and means permitting said single stiff shaft to perform tilting movements.

9. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts individually firmly secured to each one of said carriage trails, means for swinging out the limber wheels substantially at right angles to the related carriage trail, a separate shaft for each of said limber wheels, means for interconnecting

said shafts to form a single stiff shaft in the interlocked position of said trails and limber parts, and a balancing and lifting device in operative connection with each of said separate wheel shafts and the related carriage trail and effecting a lifting action on said trail when moving said trails from and to each other.

10. In combination, a gun carriage having split trails, a two-wheeled limber for said carriage, said limber being made in two detachable parts individually firmly secured to each one of said carriage trails, means for swinging out the limber wheels substantially at right angles to the related carriage rail, a separate shaft for each of said limber wheels, means for interconnecting said shafts to form a single stiff shaft in the interlocked position of said trails and limber parts, a balancing and lifting device in operative connection with each of said separate wheel shafts and the related carriage trail and effecting a lifting action on said trail when moving said trails from and to each other, and a locking device in operative connection with each of said separate wheel shafts and the related carriage trail, said device forming a rigid connection between each of said shafts and the related trail in the fire position of the gun carriage and thus neutralizing the lifting effect of said balancing device on the trail.

VICTOR HAMMAR.