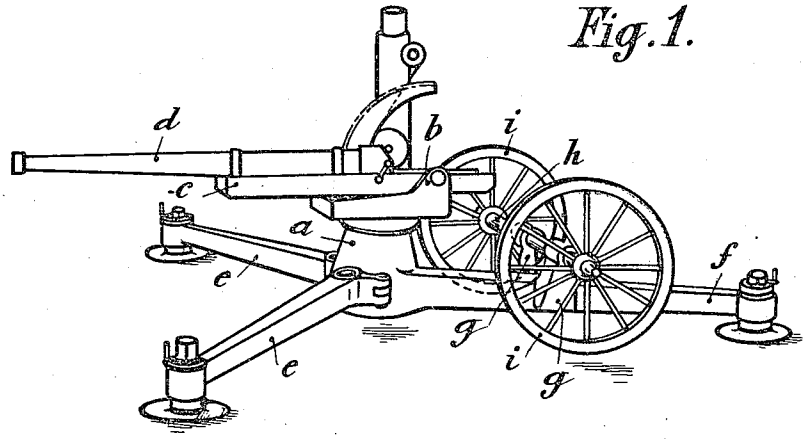
Sept. 27, 1932. N. E. METHLIN 1,879,705

ANTIAIRCRAFT GUN

Filed Sept. 30, 1931 6 Sheets-Sheet 1

Fig. 1.



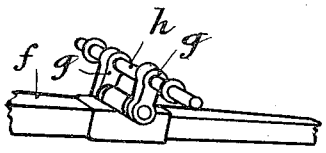


Fig. 2.

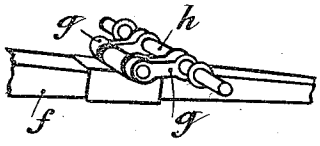
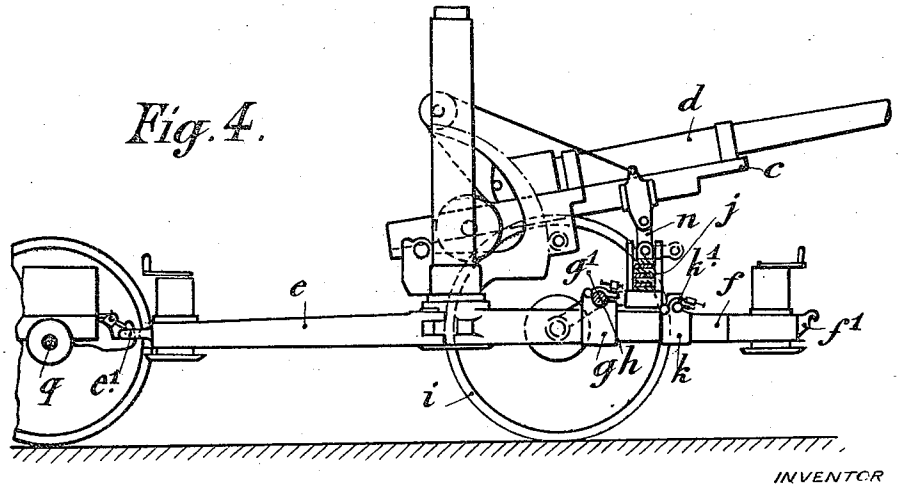


Fig. 3.

Fig. 4.



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By Cameron, Kerkam & Sutton.

ATTORNEYS.

Sept. 27, 1932. N. E. METHLIN 1,879,705

ANTIAIRCRAFT GUN

Filed Sept. 30, 1931 6 Sheets-Sheet 2

Fig. 5.

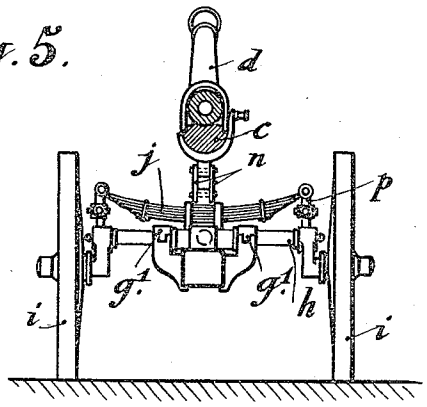


Fig. 6.

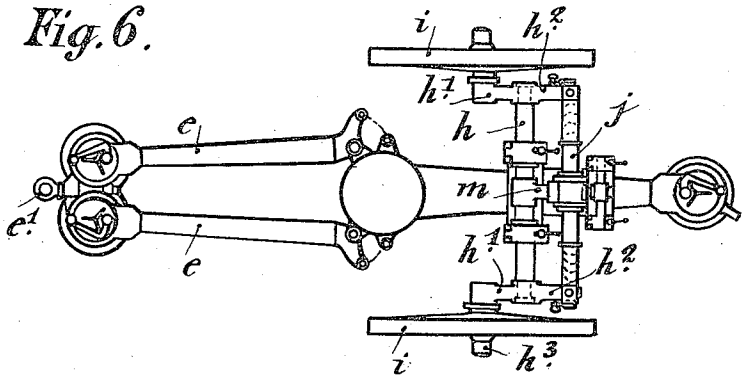
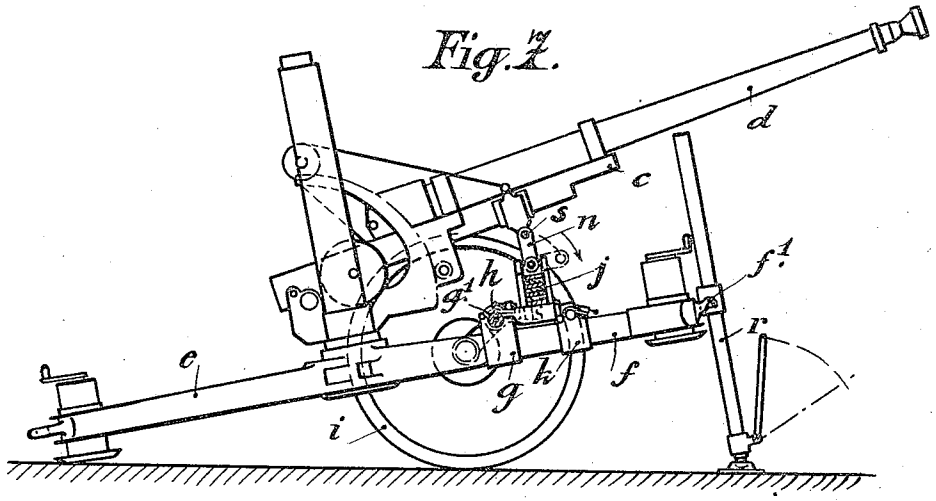


Fig. 7.



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Sept. 27, 1932. N. E. METHLIN 1,879,705

ANTIAIRCRAFT GUN

Filed Sept. 30, 1931 6 Sheets-Sheet 3

Fig. 8.

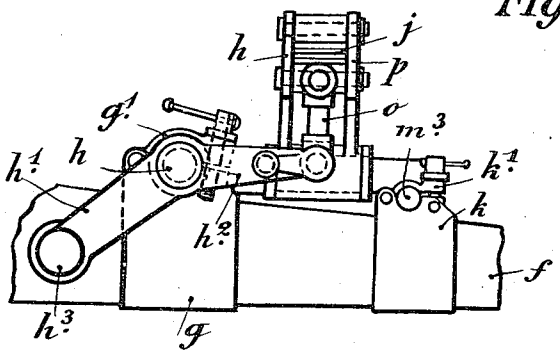


Fig. 9.

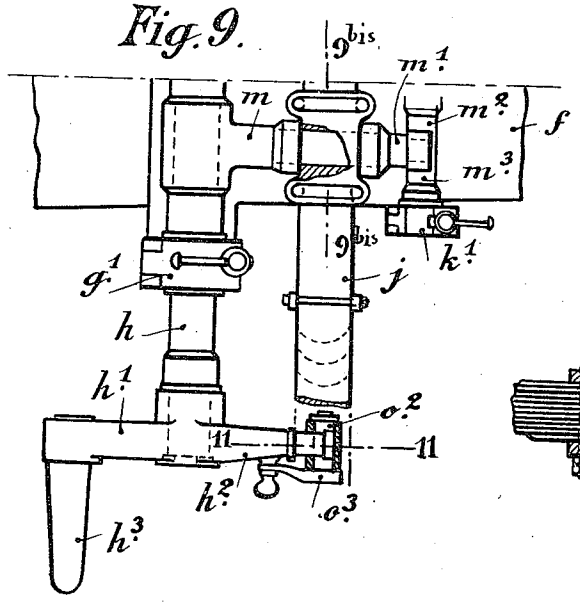


Fig. 9bis

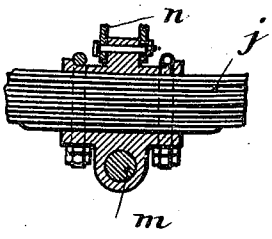


Fig. 10.

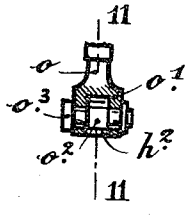
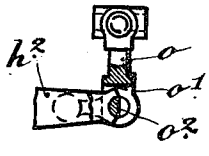


Fig. 11.



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ANTIAIRCRAFT GUN

Filed Sept. 30, 1931 6 Sheets-Sheet 4

Fig. 12.

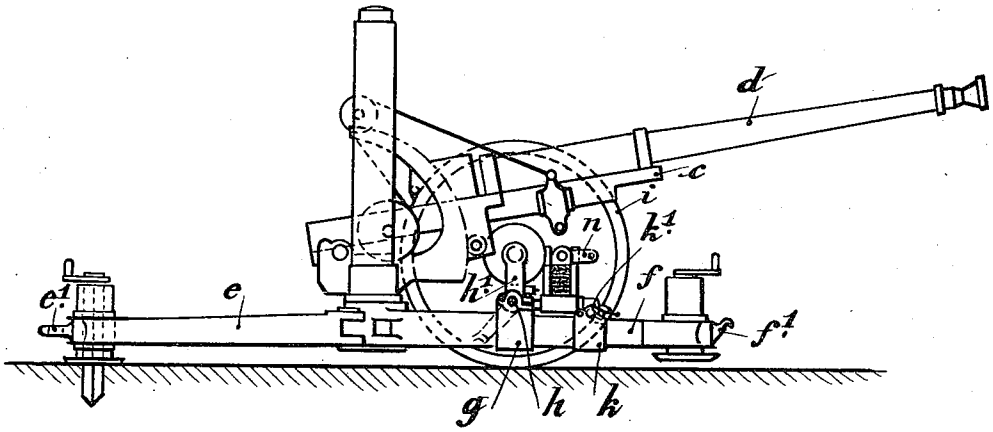
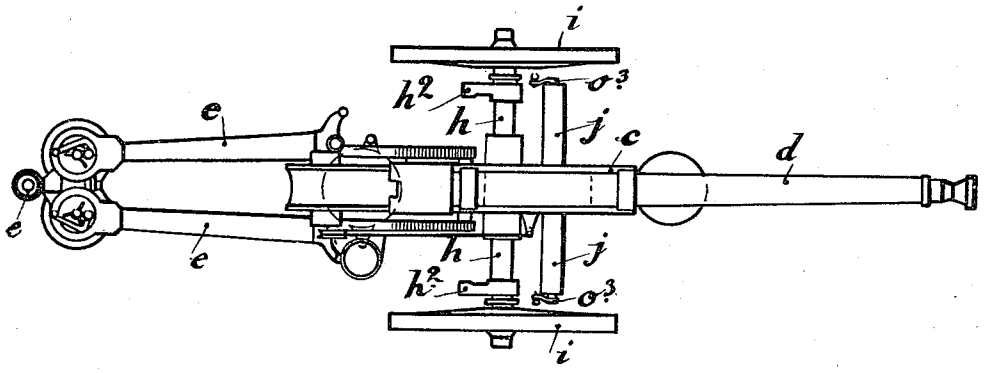


Fig. 13.



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Sept. 27, 1932. N. E. METHLIN 1,879,705

ANTIAIRCRAFT GUN

Filed Sept. 30, 1931 6 Sheets-Sheet 5

Fig. 14.

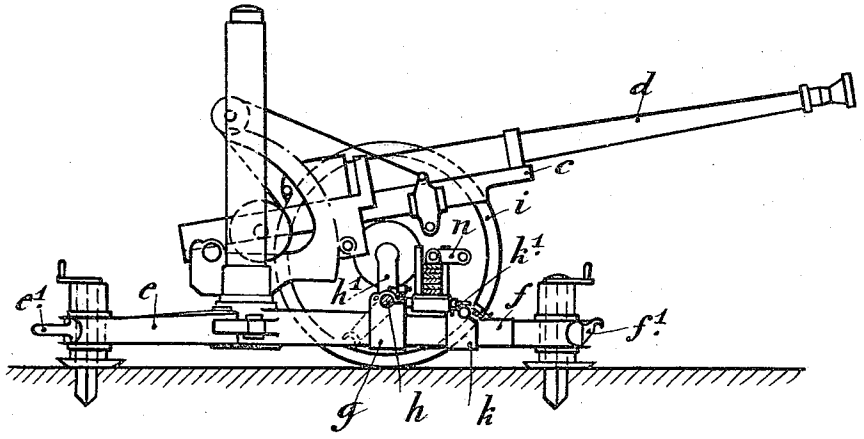
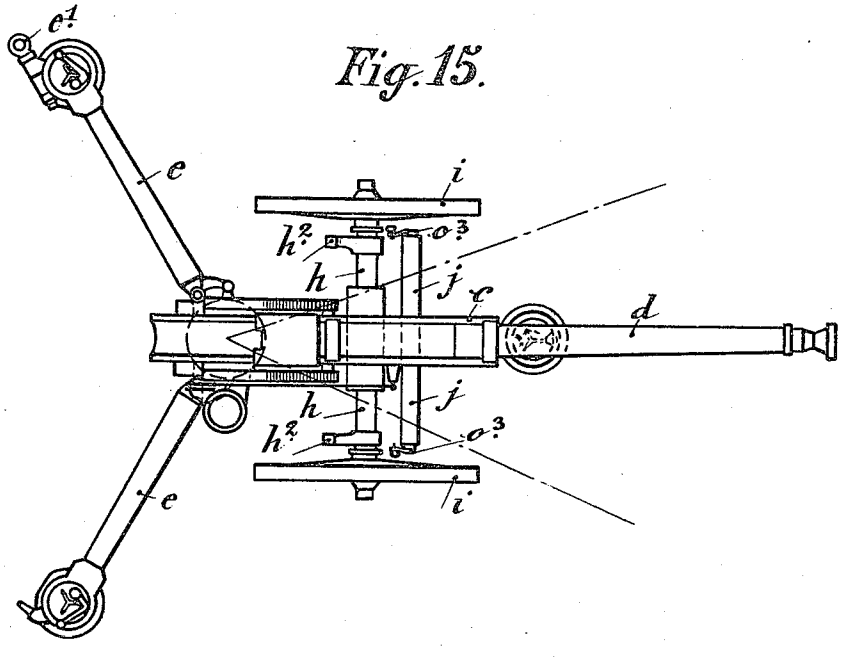


Fig. 15.



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Sept. 27, 1932. N. E. METHLIN 1,879,705

ANTIAIRCRAFT GUN

Filed Sept. 30, 1931 6 Sheets-Sheet 6

Fig. 16.

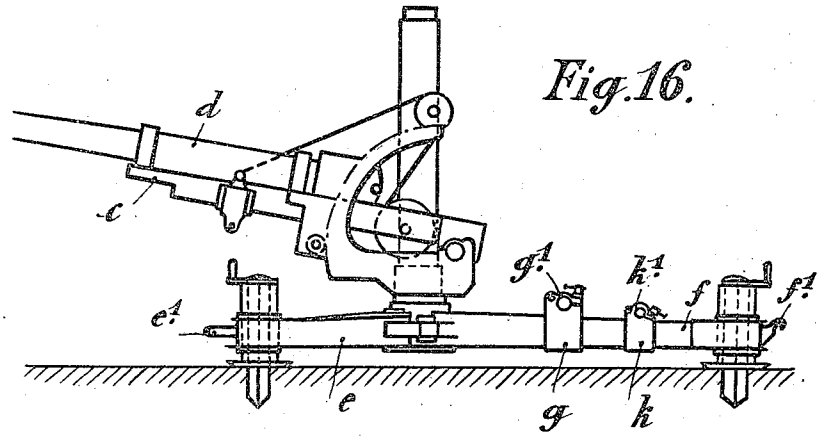


Fig. 17.

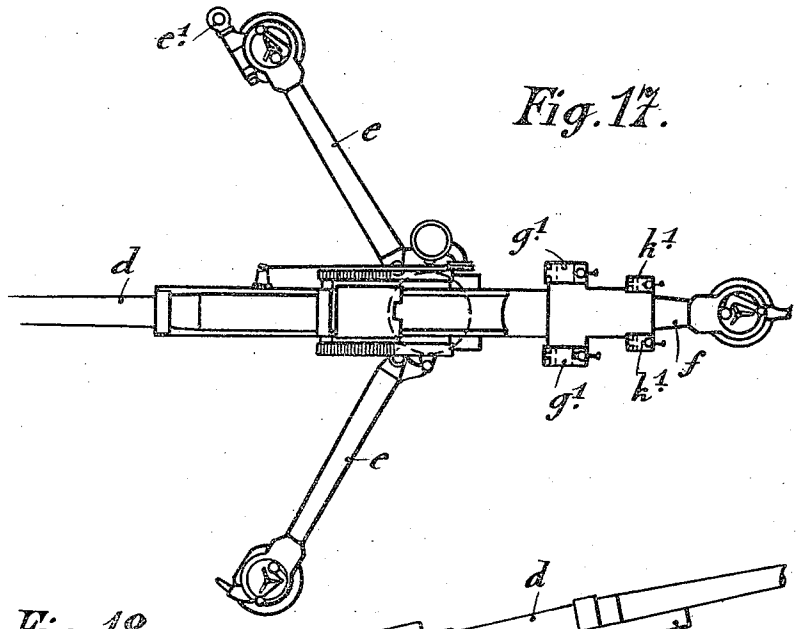
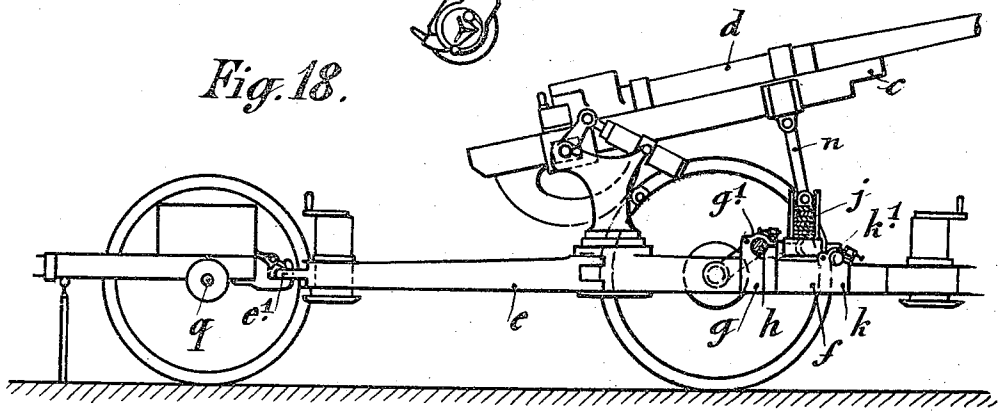


Fig. 18.



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Patented Sept. 27, 1932 1,879,705

UNITED STATES PATENT OFFICE

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ANTIAIRCRAFT GUN

Application filed September 30, 1931, Serial No. 566,147, and in France July 10, 1931.

It is sometimes of advantage to convert an existing anti-aircraft gun, or even to construct such a gun, so that whilst possessing all the features and advantages of its design in view of its main application as an anti-aircraft gun, and without involving considerable complications, it may be employed in case of need, and more particularly in case of surprise, for firing when mounted on wheels, using one of the wheel trains employed for the transport of the gun.

The present invention relates to a gun for firing at aerial objectives, which is adapted for firing when mounted on wheels, in case of surprise, with a relatively extensive field of fire according to circumstances.

According to the invention, the gun for firing at aerial objectives comprises in known manner, a saddle platform in which pivots the top carriage on which the oscillating gun body is supported by trunnions and to which are fitted arms, two of which at least are hinged to enable them to be spread open with a view to fixing them in the ground, and is characterized in that one of the arms or system of arms of the mounting is provided with a device for fixing thereto a wheel train serving for the transport of the gun, but detachable, whereby the said arm may carry permanently the axle of this wheel train and the said axle may be fixed or adapted to be raised for receiving the detachable wheels, when it is desired to change over from the normal position in battery for firing at aerial objectives into the travelling position.

Various constructional forms of the invention are shown by way of example in the accompanying drawings.

Figure 1 of the drawings shows diagrammatically a gun of the type specified, namely a gun for firing at aerial objectives, comprising a saddle pivot *a* in which a top carriage or mounting *b* is adapted to turn. The oscillating body comprising the cradle *c* and the barrel *d* is suported by trunnions in the top carriage *b*, and the said saddle pivot is provided with three arms *e*, *e* and *f*, one of which, *f*, is fixed to the said saddle while the other two arms are adapted to be spread open with a view to fixing them to the ground. In the known guns of this type, the arms *e*, *e* and *f*, in the battery position, must be raised a slight distance above the ground in order, when firing at very large angles, to permit the gun barrel to recoil without the necessity of elevating the line of fire. This necessity, with the usual transport devices, requires the system of trails to be raised a suitable height above the ground for travelling over broken ground.

According to the invention, the fixed arm *f* is provided with a device, such as the bearings *g* for fixing thereto a detachable wheel train (axle *h* and wheels *i*). This wheel train may, as desired, be put in position on the said bearings *g* for the purpose of wheeling or may be removed for putting the gun in battery position with a view to firing at aerial objectives. As will be seen from the modifications shown in part elevation in Figures 2 and 3, the support *g*—*g* for the axle *h* may be so constructed as to enable it to be lowered into the position shown in Figure 3, after removal of the wheels, and conversely, to be lifted into the position shown in Figure 2 for the purpose of placing the wheels in position. The axle *h* may thus remain permanently installed on the gun carriage even during firing at aerial objectives, without its presence obstructing the operation of laying the gun in direction.

In the examples which will be described hereinafter, it will be explained how the gun may be arranged for travelling, irrespective of the constructional form of the invention, and how the gun may be fired while mounted on wheels, particularly in case of surprise.

Figure 4 is a longitudinal elevation showing in the wheeling position, a gun for firing at aerial objectives, constructed according to the invention, in which the detachable wheel train, combined with the fixed arm in the form of a projection on the saddle, is combined with a laminated spring providing a resilient suspension for the carriage when coupled to a gun limber, Figure 5 is a sectional elevation through 5—5 in Figure 4. Figure 6 is a plan corresponding to Figure 4. Figure 7 is a longitudinal elevation similar to that shown in Figure 4 showing an intermediate position in changing over from the

position for wheeling to that for mounting the gun for the purpose of firing at aerial objectives, or vice versa.

Figures 8, 9, and 9*b* show in elevation, part plan in detail and section through 9*b*—9*b* in Figure 9, on a larger scale, the method of connection between the detachable wheel train and the suspension spring.

Figure 10 is a sectional elevation of a detail of this connecting device.

Figure 11 is a section, through 11—11 of Figures 9 and 10.

Figures 12 and 13 show, in longitudinal elevation and plan respectively, the gun mounted on wheels and put in battery position for firing in case of surprise by lowering the system of trails hinged to the saddle and remaining connected together, as they were for coupling up to a gun limber. Figures 14 and 15 show, in longitudinal elevation and plan respectively, the gun mounted on wheels and put in battery position for firing in a relatively large horizontal field of fire, the trails hinged to the saddle being spread open and fixed to the ground, the fixed arm itself being assumed to be secured to the ground.

Figures 16 and 17, show, in longitudinal elevation and plan respectively, the gun in battery position for firing at aerial objectives, the wheel train and the suspension spring being removed. Figure 18 is a longitudinal elevation showing in the wheeling position a gun constructed according to the invention, in which the system of oscillating body, equilibrating device and top carriage is of a type different from that shown by way of example in Figure 1 to 17, which forms the subject of U. S. Letters Patent No. 1,658,005.

In the various examples of Figures 4 to 16, the wheel train, for which an axle fixing support is provided on the arm *f* of the carriage, is of the known type comprising an axle *h*, at the ends of which are mounted rocking levers h^1—h^2, one of the arms h^1 of which carries a wheel spindle h^3, the end of the other arm h^2 being connected to one of the ends of a laminated spring *j* adapted to be fastened by its middle to an auxiliary support *k*, the arm *f* carrying, as in the example shown in Figure 1, a system of supports *g* for the axle body *h*. In this example, the axle support is constituted by bearings *g* solid with the arm *f*, the axle being retained in these bearings by caps *g'*.

Preferably, the laminated spring *j*, as shown in the drawings, is carried in its middle by the end of a lever *m* pivoted at the centre of the axle body *h*. To the end m^1 of the lever *m* is hinged a small rocking lever m^2—m^3 which, when the wheel train is in place, has its arms resting in bearings *k* where they are held by caps k^1. This method of fixing the suspension spring permanently connected to the axle body facilitates the placing of the spring in position and its removal, but it is evident that it may be replaced by any other appropriate fixing device. The laminated spring is arranged on its supporting lever *m* so as to be capable of oscillating transversely by means of its central shackle about the said lever *m*, as shown in Figure 9. In the practical form of construction shown, the middle shackle of the suspension spring in position on the arm *f* may constitute an attaching member for the oscillating gun body during travelling, being provided for this purpose with a pair of connecting rods *n*.

To facilitate mounting and dismounting, the connection between the levers h^1—h^2 and the ends of the springs *j* may be effected by means of rods *o* hinged at one end to the ends of the spring by a system of clasps *p* and at the other end by bearings carrying plug pins o^2 which may be provided with handles o^3, the plug hole for the pin being formed at the end of the lever arm h^2.

For travelling, the gun occupies the position shown in Figures 4, 5 and 6, the united trails *e* being coupled in known manner to a gun limber *q* by the common coupling hook e^1. Between the arm *f* carrying the axle body *h*, supported by the bearings *g* and by the wheels *i*, and the gun cradle *c* is interposed the spring *j* oscillating on the lever *m* fastened in its turn to the auxiliary support *k*, the result of which is that, on travelling, the gun is, properly speaking, suspended resiliently from the wheel train.

If, in case of surprise, it is desired to use the gun as an ordinary field gun, it is possible, by merely undoing the coupling between the hook e^1 and the gun limber *q*, to lower the system of trails *e*, as shown in Figure 7. Then, for example, by hooking the hooks f^1 carried by the arm *f* to a swivel jack *r*, it is possible, after having lifted slightly the arm *f*, to separate the levers h^1—h^2 from the spring *j*, by a manipulation of the handles c^3 which for travelling are locked on the lever arms h^2. Having done this, the carriage properly so-called may be lowered towards the ground by pivoting about the fixing devices of the trails *e*, which themselves rest on the ground. In this movement, a slight displacement of the wheels on the ground is produced in the direction of the arrow (Figure 7), and the gun assumes the position shown in Figures 12 and 13.

It is obvious that, for the operations described in the foregoing, the use of a jack is not indispensable, but that, by first bringing the oscillating body of the gun (gun and cradle) to a suitable inclination and into an appropriate position relatively to the arm *f*, the loads may be so balanced that one or two assistants can carry out by hand the operations of lifting or lowering with the help of a lifting bar.

Thereupon, after having first fixed the system of trails *e*, and possibly the arm *f*, to the

ground, firing may be carried out as in the case of an ordinary single-trail gun on wheels, that is to say, by resting on the system of a trails *e* and on the wheels. If the necessary time is available, the gun may be given an increased field of fire in direction and in elevation by spreading open the trails *e* and fixing them to the ground, thus converting the wheeled carriage into a gun having a large horizontal and vertical field of fire as shown in Figures 14 and 15. In this case, it is preferable to secure the fixed arm *f* also to the ground.

In putting the gun into battery position with a view to employing it for normal firing against aerial objectives, three situations may arise. It may be necessary to start from the wheeling position, from the single-trail firing position or from the double-trail firing position.

In all these cases, it is necessary of course to separate the gun from its limber. The wheel train and the suspension spring supporting it are then immediately removed.

If a start is made from the wheeling position or from the single-trail firing position, it is first of all necessary to spread apart the trails *e*, so that the angle between them is that which they will occupy on the ground. The connection between the oscillating gun body (gun and cradle) and the suspension spring is then undone by disengaging the pin *s* (Figure 7) allowing the rods *n* to drop into the position shown in chain lines in the said figure. The bearing caps k^1 and g^1 are then turned over liberating respectively the lever $m—m^1—m^2—m^3$ and the axle body *h*. Finally, after having suitably lifted the oscillating gun body (gun and cradle), the carriage may be lowered towards the ground by operating the jack *r*. Once the carriage rests on the ground, the jack *r* may be withdrawn and the wheel train disengaged, the carriage finally assuming the position shown in Figures 16 and 17.

It is obvious that the device described for permitting rapid and ready conversion of a gun with an all-round field of fire for firing against aerial objectives into a gun for firing on wheels may be employed irrespective of the type of top carriage or mounting in which the cradle oscillates and irrespective of the system of balancing the said body (gun and cradle).

Figure 18 shows diagrammatically, by way of example, the application of the converting device described in the foregoing to a gun in which the top carriage or mounting and its balancing means are of a known type different from that shown in Figures 1 to 17 and which, as indicated hereinbefore, forms the subject of a prior patent.

The operations of converting the gun may be simplified by dispensing with a resilient suspension during travelling. Thus, it is quite evident that the device shown in Figure 1 dispenses with all operations relating to the connection between the resilient suspension and the wheel train, it being possible to withdraw the wheel train by dismounting one of the wheels and removing the axle. In the example shown in Figures 2 and 3 it is possible merely to withdraw the wheels and to lower on to the arm *f* the system of bearings *g* with the axle body left permanently in position.

I claim:

1. In a portable gun mount of the type embodying a plurality of trail members, a readily detachable wheel train comprising an axle, wheels mounted on said axle, a bearing for said axle secured to one of said trail members, a bearing cap for retaining said axle in said bearing, and means for raising said cap relatively to said bearing to permit removal of said axle therefrom.

2. In a portable gun mount of the type embodying a plurality of trail members and a gun cradle supported thereby, a wheeled axle mounted on one of said trail members, a suspension spring attachable and detachable as a unit to and from said same trail member, and extending transversely thereto, and means for detachably connecting the ends of said wheeled axle to the corresponding ends of said spring whereby the wheels are resiliently suspended with respect to said gun mount during transportation.

3. In a portable gun mount of the type embodying a plurality of trail members and a gun cradle supported thereby, a wheeled axle detachably mounted on one of said trail members, a suspension spring secured to said same trail member, means operatively connecting said wheeled axle to said spring whereby the wheels are resiliently suspended with respect to said gun mount, and means operatively connecting said gun cradle to said spring for resilient support during transportation.

4. In a portable gun mount of the type embodying a plurality of trail members and a gun cradle supported thereby, a wheeled axle detachably mounted on one of said trail members, a suspension spring secured to said same trail member, means operatively connecting said wheeled axle to said spring whereby the wheels are resiliently suspended with respect to said gun mount, means operatively connecting said gun cradle to said spring for resilient support during transportation, and means for disconnecting said wheels and gun cradle from said spring when the gun is in firing position.

5. In a portable gun mount of the type embodying a plurality of trail members and a gun cradle supported thereby, a wheeled axle mounted on one of said trail members, a suspension spring attachable and detachable as a unit to and from said same trail mem-

ber, means operatively connecting said wheeled axle to the ends of said spring whereby the wheels are resiliently suspended with respect to said gun mount, means operatively connecting said gun cradle to said spring at a point intermediate its ends for resilient support during transportation, and means for disconnecting said wheels and gun cradle from said spring whereby the latter may be removed from said mount when the gun is in firing position.

6. In a portable gun mount of the type embodying a plurality of trail members, a wheel train comprising an axle, a bearing for said axle secured to one of said trail members, a lever pivotally mounted on each end of said axle, a wheel spindle carried by one arm of each of said levers, wheels mounted on said spindles, a suspension spring secured to and extending transversely to said same trail member, and means for connecting the other arm of each of said levers to one end of said spring whereby said wheels are resiliently suspended with respect to said gun mount.

7. In a portable gun mount of the type embodying a plurality of trail members, a readily detachable wheel train comprising an axle, a bearing for said axle secured to one of said trail members including a liftable bearing cap for facilitating removal of said axle therefrom, a wheel spindle pivotally mounted on each end of said axle, wheels mounted on said spindles, a suspension spring secured to and extending transversely to said same trail member, and means for detachably connecting said pivotally mounted wheel spindles to the opposite ends of said spring whereby said wheels are resiliently suspended with respect to said gun mount.

8. In a portable gun mount of the type embodying a plurality of trail members, a readily detachable wheel train comprising an axle, a bearing for said axle secured to one of said trail members including a liftable bearing cap for facilitating removal of said axle therefrom, a wheel spindle pivotally mounted on each end of said axle, wheels mounted on said spindles, a lever arm pivotally mounted at one end on said axle intermediate its ends and extending transversely thereto, a suspension spring pivotally mounted on said lever arm intermediate its ends and extending transversely thereto, means for detachably securing the other end of said lever arm to said same trail member, and means for detachably connecting said pivotally mounted wheel spindles to the opposite ends of said spring whereby said wheels are resiliently suspended with respect to said gun mount.

9. In a portable gun mount of the type embodying a plurality of trail members, a wheel train comprising an axle, a bearing for said axle secured to one of said trail members, a lever pivotally mounted on each end of said axle, a wheel spindle carried by one arm of each of said levers, wheels mounted on said spindles, a supporting arm pivotally mounted at one end on said axle intermediate its ends and extending transversely thereto, a suspension spring pivotally mounted on said supporting arm intermediate its ends and extending transversely thereto, means for detachably securing the other end of said supporting arm to said same trail member, and means for connecting the other arm of each of said levers to one end of said spring whereby said wheels are resiliently suspended with respect to said gun mount.

10. In a portable gun mount of the type embodying a plurality of trail members and a gun cradle supported thereby, a readily detachable wheel train comprising an axle, a bearing for said axle secured to one of said trail members, a lever pivotally mounted on each end of said axle, a wheel spindle carried by one arm of each of said levers, wheels mounted on said spindles, a supporting arm pivotally mounted at one end on said axle intermediate its ends and extending transversely thereto, a suspension spring pivotally mounted on said supporting arm intermediate its ends and extending transversely thereto, means for detachably securing the other end of said supporting arm to said same trail member, means for connecting the other arm of each of said levers to one end of said spring whereby said wheels are resiliently suspended with respect to said gun mount, and means operatively connecting said gun cradle to said spring for resilient support during transportation.

In testimony whereof I have signed this specification.

NICOLAS EMILIEN METHLIN.