E. SCHNEIDER.

CARRIAGE AND APPARATUS OPERABLE FROM A DISTANT STATION.

APPLICATION FILED DEC. 28, 1915.

1,233,712.

Patented July 17, 1917.

3 SHEETS—SHEET 1.

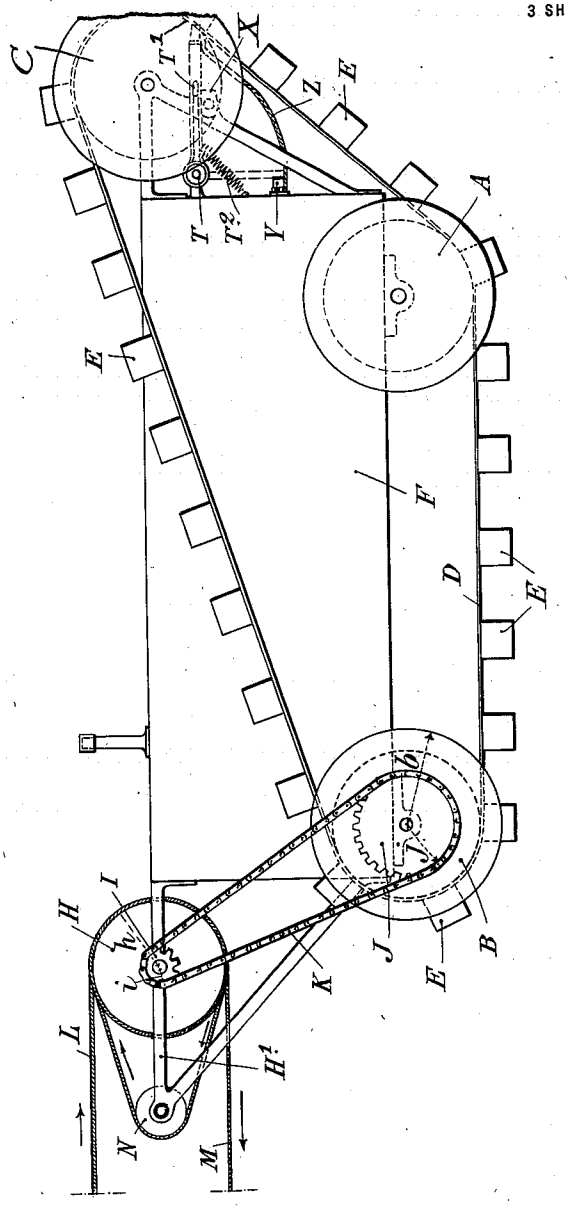
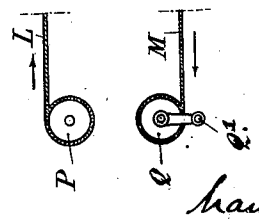


Fig. 1.



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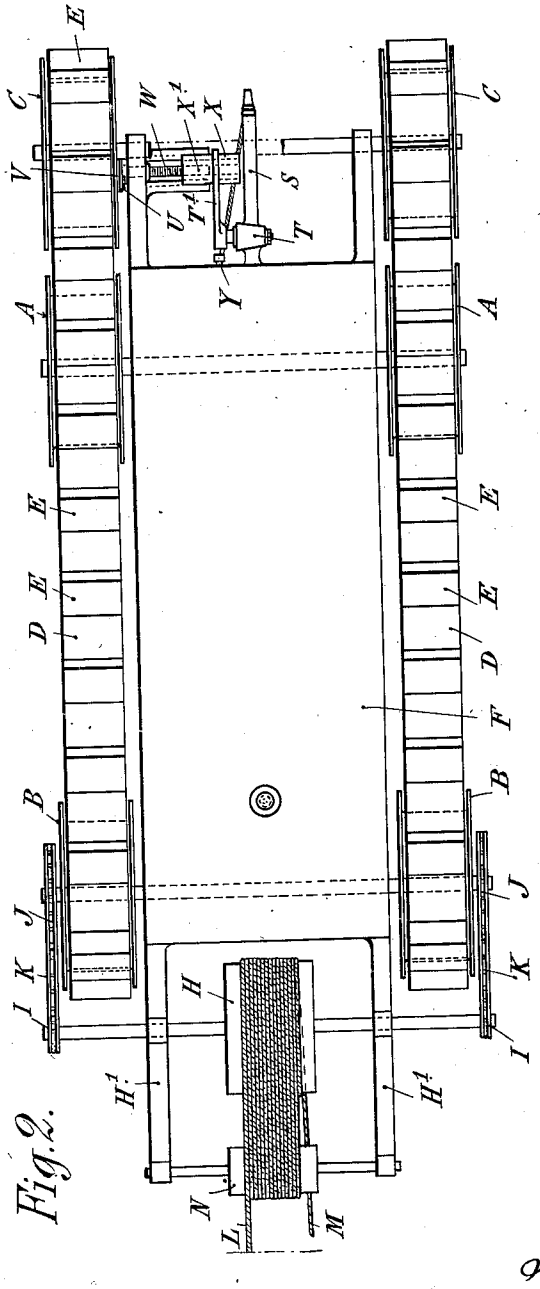


Fig. 2.

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3 SHEETS—SHEET 3.

Fig. 3.

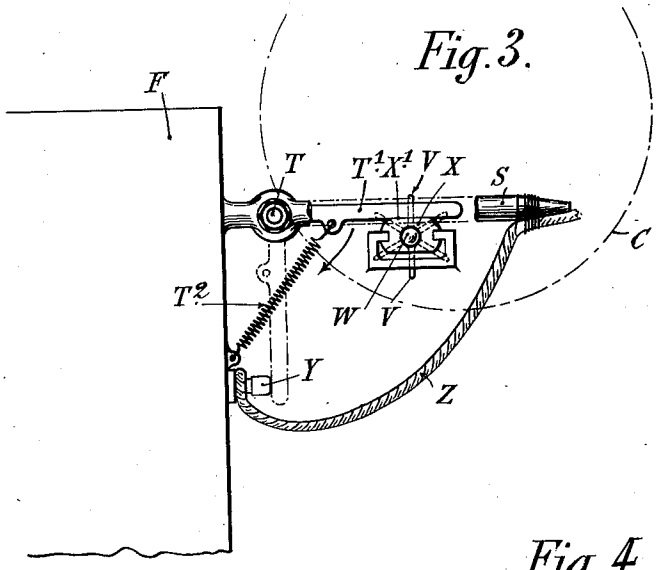
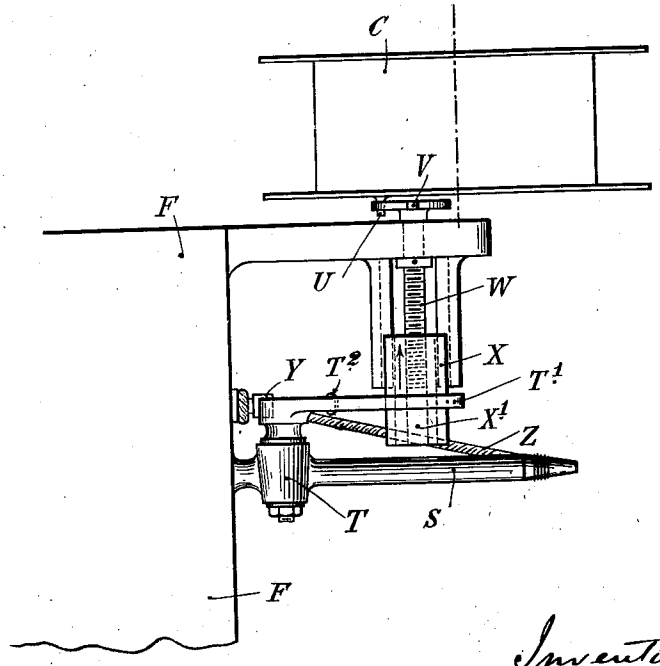


Fig. 4.



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UNITED STATES PATENT OFFICE.

EUGÈNE SCHNEIDER, OF LE CREUZOT, FRANCE.

CARRIAGE AND APPARATUS OPERABLE FROM A DISTANT STATION.

1,233,712. Specification of Letters Patent. Patented July 17, 1917.

Application filed December 28, 1915. Serial No. 69,100.

To all whom it may concern:

Be it known that I, EUGÈNE SCHNEIDER, a citizen of the Republic of France, residing at Le Creuzot, France, have invented a new and useful Improvement in or Relating to Carriages and Apparatus Operable from a Distant Station, which is fully set forth in the following specification.

This invention has for its object to provide an improved carriage constructed more particularly for being actuated by traction exerted from a distant station for the purpose of causing it to travel over variable distances and over very rough and uneven ground, and if desired, being finally returned to the said station by traction in the reverse direction. The improved carriage is adapted for transporting at a distance an agricultural implement (such as a machine for picking roots, beetroots and the like, combined for instance with a collecting vessel). It is also adapted to bring up to a variable distance from a battle front or firing line a war engine adapted to work by dropping, ejecting, throwing, time explosion, etc.

The problem of transport at a distance and of travel over very rough or uneven ground by simple traction exerted at the starting station, has been solved by the present invention which consists in the hereinafter described improvements.

An embodiment of the invention applied to a particular war engine is illustrated by way of example in the accompanying drawings. The combination of this war engine with the improved carriage also constitutes part of the invention.

In the drawings:—

Figure 1 is a longitudinal elevation;

Fig. 2 is a plan corresponding thereto;

Figs. 3 and 4 are respectively a plan and an elevation drawn to a larger scale of automatic apparatus for discharging a jet of inflammable liquid and igniting it at a determined distance in front of the engine.

As shown, the improved apparatus comprises a carriage F, the body of which may of course vary according to the purposes in view, and which in the example shown, is designed to discharge at the place of arrival a powerful jet of petrol, petroleum or other inflammable liquid. The carriage proper comprises on each side, in addition to the front wheel A and the hind wheel B, an elevated wheel C. Over these three wheels A, B, C, which are provided with side flanges or cheeks, there is stretched a metal band or belt D carrying a series of blocks E of wood or other suitable material. The hind wheels B are connected to a drum or wheel H journaled in brackets H^1 fixed to the body of the carriage, by means of gearing, such as the chain pinions I, J and the chain K. L M is a cable adapted to be wound on the drum H. For the purpose of increasing the adhesion of the cable, the latter is fitted with a tightening pulley or pulleys. For this purpose the cable after having passed over a certain portion of the circumference of drum H, is led around a pulley N mounted on an axle carried by the brackets H^1, and thence it can be wound once or twice more around the drum H.

The winding of the cable on the drum Q which is provided with a crank Q^1, causes the drum H to rotate and the carriage to move forward. Meanwhile, the cable is wound off the drum P on which it was wound. When it is desired to cause the carriage to move backward, the crank Q^1 is placed on the axle of the drum P, and the cable is unwound from the drum Q and wound on to the drum P. The drums P and Q may be mounted on axles provided on a windlass or any other suitable support already located at or brought up to the operating station.

When the wheels B are rotated, the belts are caused to move along, and as the blocks bear upon the ground, the carriage is caused to travel forward. If the carriage should happen to strike an obstacle with the portion of the belts situated between the wheels C and the wheels A, the blocks will grip the obstacle and will lift the front part of the carriage over the obstacle. The carriage in following the contour of the ground over which it passes in its travel, rolls on the lower stretches of the belts comprised between the wheels B and A, or on the stretches comprised between the wheels A and C.

In order that these effects shall be produced, the apparatus must satisfy certain conditions that result from the following technical considerations:

Let

t represent the traction exerted upon the cable M,

h the radius of the drum H,

i the radius of the pinion I,

j the radius of the pinion J, and

b the radius of the wheel B;

then the tangential stress produced by contact with the rolling surface will be:

$$t\frac{h}{i}\cdot\frac{j}{b}.$$

Now, since the force which opposes the forward movement of the carriage when it is rolling over the ground is P.r., P being the total weight of the carriage and r the coefficient of rolling (taking the gradient into consideration), and if, as has been assumed, a pulling force t is exerted in the reverse direction to the forward travel of the carriage, the resistance opposing the advance will be P.$r+t$.

Therefore, in order that the carriage shall be able to move from the point of traction upon the cable, it will be sufficient that

$$t\frac{h}{i}\cdot\frac{j}{b}>\text{P}.r+t$$

or

$$t\left(\frac{h}{i}\cdot\frac{j}{b}-1\right)>\text{P}.r$$

this being possible because h, i, j and b can be suitably chosen for the purpose.

It will be perceived that it is necessary that

$$\frac{h}{i}\cdot\frac{j}{b}>1,$$

that is to say, there must be a step-down in the transmission; in other words the speed of the cable must be greater than that of the carriage.

In order that the wheels shall not skid, it is necessary that the force acting tangentially on the wheels, shall be smaller than the adhesion. It is necessary therefore that

$$\text{P}.r+t<p.f;$$

p being the load on the driving part, and f the coefficient of sliding friction over the ground or:—

$$t<p.f-\text{P}r.$$

It will be seen that if the rolling is difficult, as for instance on plowed land, when r is not very much less than f, it will be necessary that p shall be a large fraction of P., that is to say, the whole of the load or almost the whole of the load must be on the driving part and f must also be as large as possible.

This result is assured by connecting the wheels A, B by means of the belt provided with a series of projections E. In these circumstances the whole of the weight P will come in aid to the adhesion to the ground and the coefficient f is increased by the projections. Further, r is diminished because the wheels instead of rolling on the ground, roll on a track constituted by the belt which bears with a large surface upon the ground. This arrangement also diminishes the effect of the unevenness of the ground, and thus diminishes also r. These belts may be made of metal for the purpose of reducing still more the resistance to rolling.

Instead of belts, cables, chains, rollers or any other devices may be used that will fulfil the same purpose.

Similarly, any desired means may be employed such as chains, belts, endless screws, etc. for transmitting the power from the driving drum to the driving wheels.

The function of the elevated wheels C is, as already stated, to allow of passing over high prominences. The projections E instead of being formed of blocks of wood, may be formed of angle bars riveted transversely on the belt.

The invention also consists in the combination of the improved carriage with a particular engine, one constructional form of which is illustrated by way of example in Figs. 3 and 4 of the accompanying drawings. In this example the body of the carriage is constituted by a tank filled with an inflammable liquid such as petrol up to a suitable level, the space above the petrol being occupied by compressed air.

The tank is provided in front with a nozzle or jet device S fitted with a tap T.

The apparatus for discharging the petroleum jet and igniting it at the moment when the carriage has reached a predetermined distance which can be adjusted at will, may for instance be as follows:

One of the wheels C carries as a projection from its inside cheek, a stud or pin U which at each revolution of the wheel causes a star wheel V to advance one tooth. This star wheel V is carried by one of the ends of a screw-threaded rod W journaled in a suitable support carried by the body of the carriage or by the wall of the tank. The other end of the rod W engages in a nut X which can slide but cannot rotate. The rotation of the rod W will therefore cause the nut X to slide longitudinally in the direction of the arrow. The lever T^1 of the tap T bears on a flat portion X^1 formed on the nut X and is subjected to the action of a spring T^2 that has a constant tendency to open the tap.

When the nut in its travel moves from under the lever T^1, which will occur at the end of a period of time determined by the starting position given to the nut, the tap will open and will allow the inflammable liquid or the like to escape under pressure.

The apparatus for igniting the jet of liquid may be constructed in various ways. According to one way, a percussion cap Y is arranged on a fixed support in the path of the lever T^1, so as to be struck by the latter when, by the action of the spring T^2, it has arrived at the end of its opening

stroke into the position shown in dash and dot lines in Fig. 3. This percussion cap will ignite a wick Z, one end of which is connected to the percussion cap holder, while its other end terminates close to the issue aperture for the jet.

The carriage, whatever may be the use for which it is intended, may be provided with accessories, more particularly scrapers for cleaning the inside surface of the belt D. Intermediate rolling or guiding drums or wheels may be provided between the wheels A and B and also between the wheels A and C.

One of the main features of this present invention is the apparatus whereby the carriage can travel over the contour of the ground on different bands or belts. This feature is also present in the arrangement of the series of wheels mounted on axles at different levels and connected together by a common band or belt which envelops them after the manner of a driving belt, and carries also projecting adhesion studs or projections.

This particular arrangement may obviously be employed not only in combination with the hereinbefore described apparatus for propulsion by traction, but also with any other suitable means of propulsion. It may for example be adapted to a motor-driven vehicle.

In the case of a carriage with belts as employed with the hereinbefore described traction system, it may be advisable in some cases to release or abandon the said carriage at the point of arrival. In such a case the traction apparatus can be simplified and may comprise only one stretch M of hauling cable, the whole of the remainder of the length of the cable being kept wound on the drum H.

What I claim is:

1. In a carriage adapted to be operated mechanically from a distant operating station, for the purpose of actuating agricultural implements, engines of war or other apparatus combined with said carriage, the combination of a supporting driving wheel, and a supporting guide wheel located on a line approximately parallel to the ground level, an elevated guide wheel located above and in front of said ground level guide wheel, an endless belt-like device wrapped around all three wheels, provided along the entire length of its outer surface with a series of ground-gripping projections, a wheel mounted on the carriage for receiving rotary power from the distant station, and means for transmitting said power from said wheel to said supporting driving wheel, whereby on said driving wheel being rotated the carriage will roll on said belt-like device by means of the wheels that are wrapped around by said device, and will thereby travel along the ground, and be capable of climbing over an elevated obstacle encountered by the forwardly and upwardly inclined stretch of said belt-like device.

2. In a carriage adapted to be operated mechanically from a distant operating station, for the purpose of actuating agricultural implements, engines of war or other apparatus combined with said carriage, the combination of a supporting driving wheel and a supporting guide wheel located on a line approximately parallel to the ground level, an elevated guide wheel located above and in front of said ground level guide wheel, an endless belt-like device wrapped around all three wheels, provided along the entire length of its outer surface with a series of ground-gripping projections, an elevated driving wheel mounted on the carriage, haulage gearing for transmitting rotary power from the distant station to said elevated driving wheel, and speed-reducing gearing for transmitting said rotary power from said elevated driving wheel to said supporting driving wheel, whereby the haulage member from the distant station to said elevated driving wheel has a higher linear velocity than the peripheral velocity of the supporting wheels and guide wheels of the carriage.

3. In a war engine for throwing burning jets of inflammable liquid to varying distances, the combination of a wheeled carriage, an endless belt-like device wrapped around the supporting wheels of said carriage, hauling gear for actuating and operating said carriage from a distant station, a reservoir for holding inflammable liquid under elastic compression, a nozzle communicating with said reservoir, a tap controlling the supply of inflammable liquid from said reservoir to said nozzle, means for automatically opening said tap when said carriage has traveled a pre-determined distance, and an automatic device for igniting the inflammable liquid on its issue from said nozzle, all substantially as set forth.

4. In a carriage adapted to be operated from a distant station, a plurality of supporting wheels, a further wheel on the front of the carriage above and in advance of said supporting wheels, an endless member in engagement with all of said wheels and driven by at least one of said wheels, said endless member being provided on its outer face with projections, and having a forward portion extending downwardly and rearwardly from said last-named wheel to one of said supporting wheels, and means driving said driving wheel from the distant station.

5. In a carriage adapted to be operated from a distant station, a plurality of supporting wheels, a further wheel on the front of the carriage above and in advance of

said supporting wheels, an endless member in engagement with all of said wheels and driven by at least one of said wheels, said endless member being provided on its outer face with projections and having a forward portion extending downwardly and rearwardly from said last-named wheel to one of said supporting wheels, means receiving power from the distant station, and gearing between said last-named means and said driving wheel.

6. In a carriage adapted to be operated from a distant station, a plurality of supporting wheels, a further wheel on the front of the carriage above and in advance of said supporting wheels, an endless member in engagement with all of said wheels and driven by at least one of said wheels, said endless member being provided on its outer face with projections and having a forward portion extending downwardly and rearwardly from said last-named wheel to one of said supporting wheels, means receiving power from the distant station, and speed-reducing gearing between said last-named means and said driving wheel.

7. In a carriage adapted to be operated from a distant station, a plurality of supporting wheels, a further wheel on the front of the carriage above and in advance of said supporting wheels, an endless member in engagement with all of said wheels and driven by at least one of said wheels, said endless member being provided on its outer face with projections and having a forward portion extending downwardly and rearwardly from said last-named wheel to one of said supporting wheels, a drum, a cable for rotating said drum from the distant station, and gearing between the drum and said driving wheel.

8. In a carriage adapted to be operated from a distant station, a plurality of supporting wheels, a further wheel on the front of the carriage above and in advance of said supporting wheels, an endless member in engagement with all of said wheels and driven by at least one of said wheels, said endless member being provided on its outer face with projections and having a forward portion extending downwardly and rearwardly from said last-named wheel to one of said supporting wheels, a drum, a cable for rotating said drum from the distant station, and speed-reducing gearing between the drum and said driving wheel.

9. In a war engine, a reservoir, means for propelling the same, a nozzle communicating with said reservoir, valve mechanism controlling the outlet of said reservoir to said nozzle, and means whereby said valve mechanism is automatically operated after a predetermined travel of said reservoir.

10. In a war engine, a reservoir, means for propelling the same, a nozzle communicating with said reservoir, valve mechanism controlling the outlet of said reservoir to said nozzle, and adjustable means whereby said valve mechanism is automatically operated after a predetermined travel of said reservoir.

11. In a war engine, a reservoir for holding inflammable liquid, a nozzle communicating therewith means for igniting the liquid, valve mechanism controlling the outlet of said reservoir to said nozzle, and automatic means for predeterminately operating said valve mechanism and said igniting means.

12. In a war engine, a reservoir for holding inflammable liquid, a nozzle communicating therewith, means for igniting the liquid, valve mechanism controlling the outlet of said reservoir to said nozzle, and adjustable automatic means for predeterminately operating said valve mechanism and said igniting means.

13. In a war engine, a reservoir, a nozzle communicating therewith, a valve controlling the outlet of said reservoir to said nozzle, means tending to open said valve, means normally restraining said valve-opening means, and means for predeterminately releasing said valve-opening means.

14. In a war engine, a reservoir, a nozzle communicating therewith, a valve controlling the outlet of said reservoir to said nozzle, means tending to open said valve, adjustable means normally restraining said valve-opening means, and means for releasing said valve-opening means.

15. In a war engine, a reservoir for holding inflammable liquid, a nozzle communicating therewith, means adjacent the nozzle for igniting the liquid, a valve controlling the outlet of said reservoir to said nozzle, means tending to open said valve, means normally restraining said valve-opening means, means for predeterminately releasing said valve-opening means, and means actuated by the release of said valve-opening means for igniting said ignition means.

16. In a war engine, a reservoir, a carriage carrying said reservoir, means for propelling said carriage from a distant station, and means for automatically discharging a liquid from said reservoir after a predetermined travel of said carriage.

17. In a war engine, a reservoir, automatic means controlling the discharge of a liquid therefrom, a carriage carrying said reservoir, rotary members carried by said carriage, an endless member engaging said rotary members and provided on its outer face with projections, and means driving one of said rotary members from a distant station.

18. In a war engine, a reservoir, automatic

means controlling the discharge of a liquid therefrom, a carriage carrying said reservoir, a plurality of wheels on said carriage, an endless member in engagement therewith and driven by at least one of said wheels, said endless member being provided on its outer face with projections, means receiving power from a distant station, and gearing between said last-named means and said driving wheel.

19. In a war engine, a reservoir, automatic means controlling the discharge of a liquid therefrom, a carriage carrying said reservoir, a plurality of wheels on said carriage, an endless member in engagement therewith and driven by at least one of said wheels, said endless member being provided on its outer face with projections, means receiving power from a distant station, and speed-reducing gearing between said last-named means and said driving wheel.

20. In a war engine, a reservoir, automatic means controlling the discharge of a liquid therefrom, a carriage carrying said reservoir, a plurality of wheels on said carriage, an endless member in engagement therewith and driven by at least one of said wheels, said endless member being provided on its outer face with projections, a drum, a cable for rotating said drum from a distant station, and gearing between the drum and said driving wheel.

21. In a war engine, a reservoir, automatic means controlling the discharge of a liquid therefrom, a carriage carrying said reservoir, a plurality of supporting wheels on said carriage, a further wheel above and in advance of said supporting wheels, an endless member engaging all of said wheels and driven by at least one of said wheels, said endless member being provided on its outer face with projections, and means driving said driving wheel from a distant station.

22. In a war engine, a carriage, a reservoir carried thereby, a nozzle communicating with said reservoir, valve mechanism controlling the outlet of said reservoir to said nozzle, means for propelling said carriage, and means automatically controlled by the propulsion of said carriage for opening said valve mechanism.

23. In a war engine, a carriage, a reservoir for holding inflammable liquid carried thereby, a nozzle communicating with said reservoir, valve mechanism controlling the outlet of said reservoir to said nozzle, means for igniting said liquid, means for propelling said carriage, and means automatically controlled by the propulsion of said carriage for opening said valve mechanism and igniting said ignition means.

24. In a war engine, a carriage, a reservoir carried thereby, a nozzle communicating with said reservoir, a valve controlling the outlet of said reservoir to said nozzle, means tending to open said valve, means normally restraining said valve-opening means, means for propelling said carriage, and means automatically controlled by the propulsion of said carriage for releasing said valve-opening means.

25. In a war engine, a carriage, a reservoir for holding inflammable liquid carried thereby, a nozzle communicating with said reservoir, a valve controlling the outlet of said reservoir to said nozzle, means tending to open said valve, means normally restraining said valve-opening means, means for igniting said liquid, means for propelling said carriage, means automatically controlled by the propulsion of said carriage for releasing said valve-opening means, and means actuated by the release of said valve-opening means for igniting said ignition means.

26. In a war engine, a carriage, a reservoir carried thereby, a nozzle communicating with said reservoir, valve mechanism controlling the outlet of said reservoir to said nozzle and normally tending to establish communication therebetween, an adjustable detent for said valve mechanism, means for causing the travel of said carriage, and means actuated by said last-named means for withdrawing said detent upon a predetermined travel of said carriage.

27. In a war engine, a carriage, a reservoir for holding inflammable liquid carried thereby, a nozzle communicating with said reservoir, means for igniting said liquid adjacent said nozzle, a spring-actuated tap controlling the outlet of said reservoir to said nozzle and normally tending to open, a detent for holding said tap closed, means for causing the travel of said carriage, means actuated by said last-named means for withdrawing said detent upon a predetermined travel of said carriage, and means actuated by the release of said tap for igniting said ignition means.

28. In a war engine, a carriage, a reservoir carried thereby, a plurality of wheels on said carriage, an endless member in engagement therewith and driven by at least one of said wheels, said endless member being provided on its outer face with projections, means driving said driving wheel from a distant station, a nozzle communicating with said reservoir, a spring-actuated tap controlling the outlet of said reservoir to said nozzle and normally tending to open, a detent for said tap, and means driven by one of said wheels for withdrawing said detent.

29. In a war engine, a carriage, a reservoir for holding inflammable liquid carried thereby, mechanical connections propelling said carriage from a distant station, means

controlling the discharge of liquid from said reservoir, and means whereby said discharge controlling means is actuated by a predetermined travel of said carriage.

30. In a war engine, a carriage, a reservoir for holding inflammable liquid carried thereby, mechanical connections propelling said carriage from a distant station, means controlling the discharge of liquid from said reservoir, means for igniting said liquid, and means whereby said discharge-controlling means is actuated and said ignition means ignited by a predetermined travel of said carriage.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EUGÈNE SCHNEIDER.

Witnesses:
CHAS. P. PRESSLY,
G. HOADLEY.