

**ELECTRICALLY-DRIVEN TARGET TRAINS IN THE GERMAN ARMY.**

BY DR. ALFRED GRADENWITZ.

The officers of the German army have long realized that moving targets are quite indispensable for the training of artillery. Hitherto targets have been used which were pulled either by horses, by horse-driven capstans, or by stationary steam engines. As all of these three methods are inconvenient, another outfit for the moving of targets was sought.

Fowler steam traction engines were eventually adopted to transport the machinery required for moving the targets, and likewise to supply the necessary energy.

The plant includes two steam road locomotives, two battery vans, two capstan vans, and one water van or portable water tank for carrying feed water.

In addition to transporting the remaining vehicles to the proving ground, the engines serve for the charging of the accumulator batteries installed in the battery van, for which purpose a dynamo, driven through belt transmission from the flywheel, has been installed on a platform in front of the steam boiler. The steam boiler of the traction engine is designed for a working pressure of 180 pounds, and is equipped with compound steam cylinders, insuring a practically noiseless exhaust and high economy with respect to the water and coal consumption. The engine has toothed gearing for two traveling speeds in addition to a differential gearing for traveling on sharp curves. On the axle of the rear running wheel has been installed a rope winch with 445 feet of wire rope, which winch is directly operated by the engine, and serves for hauling the battery, capstan vans, and other heavy loads. This device excludes any possibility of involuntary stoppage to the cars, which are about 13,200 pounds in weight.

The water tank has a capacity of 190 gallons, and the coal tank accommodates 550 pounds of coal. The capacity of the engine is 30 I.H.P. The dynamo is a shunt-wound machine of a normal capacity of 10 kilowatts, with 1,250 R.P.M. and 230 volts.

Each battery van carries sixty cells located in hard-rubber boxes, held in two wooden trays with acid-proof lining.

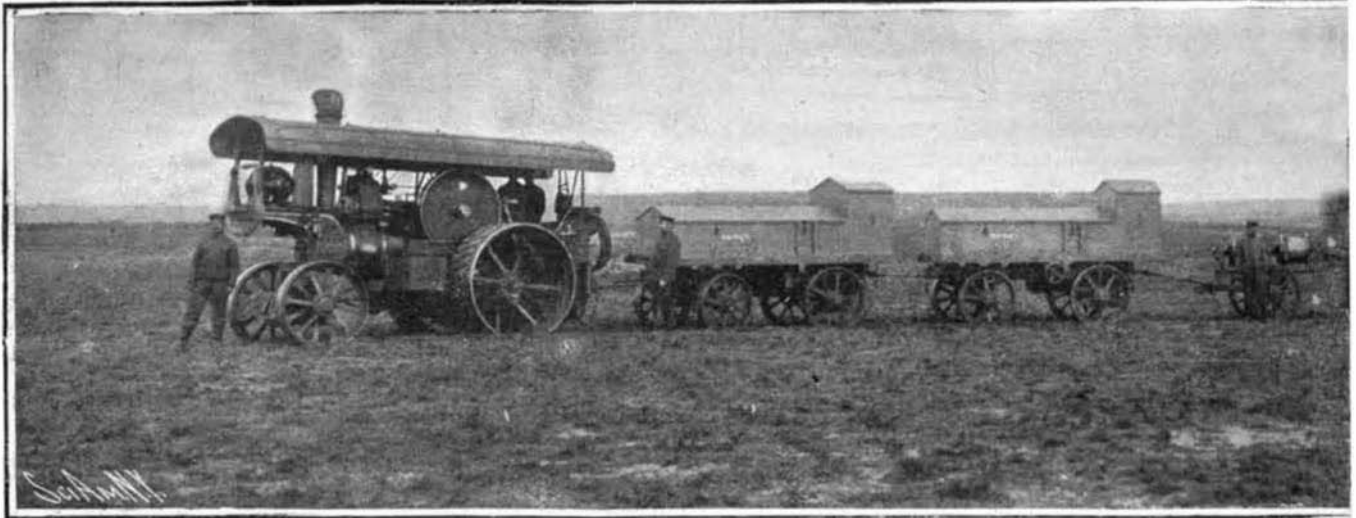
Each capstan van carries on a shaft located in five bearings four rope drums, each of which is able to receive about 8,200 feet of wire rope of 1/4 inch diameter. An automatic device insures a smooth winding of the wire rope. The shaft of the wire rope drums is driven by two electric motors. The targets, which are moved forward, backward, or sideways at a speed corresponding with the conditions actually obtaining in real military operations, represent infantry, cavalry, and artillery. They are made of some light stuff such as pasteboard and linen, and are about the natural size of a man or a vehicle with its horses. They are carried on a sled, the upper frame of which is connected with the lower by hinges, so as to allow of its being turned around at a moment's notice, in case advancing or retreating infantry is to be represented. Special arrangements have been provided to cause the upper frame to drop as soon as the displacement is discontinued, while other targets representing riflemen become visible at the same time. The approximate speed of the targets is recorded by a tachometer driven from the drum shaft.

The whole outfit is used either combined or in two sets of one battery van and one capstan van each at two different places. In case cavalry targets are to be given a speed higher than 400 yards per minute, the dynamo will have to be resorted to, while accumulator battery operation is otherwise quite sufficient.

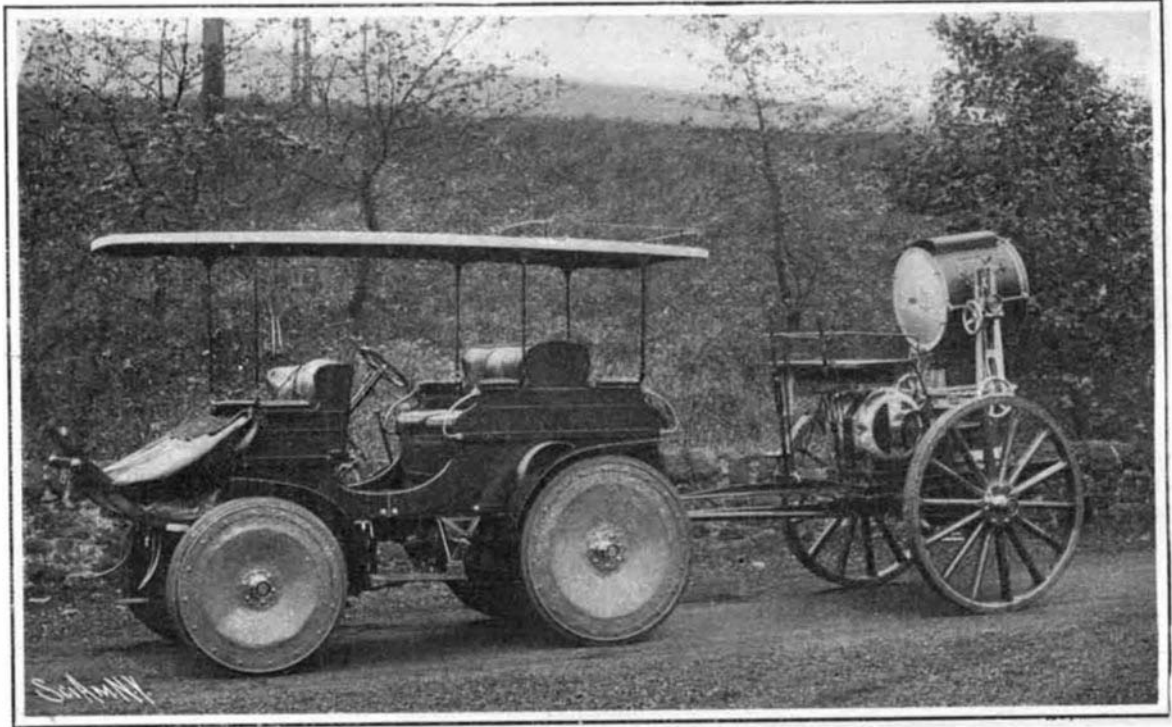
In one of our illustrations is shown a complete plant in course of transportation on the Münster (Hanover) proving grounds. Instead of the second traction engine this plant includes, however, an old petroleum locomobile, which is used only as a makeshift. The car behind the latter is a tool car, which is not required in the more recent plant described above, where any tools are arranged in special boxes. The traveling speed of a similar train obviously depends to a high extent on the conditions of the ground and weather, ranging in most cases between 10 and 25 miles per hour in the country. The same plant is represented in course of operation in a second engraving. The capstan cars are driven by the accumulator batteries, while the dynamos of both the road locomotive and the petroleum locomobile are at work supplying additional energy and instantaneously making up for any used-up current. It should, however, be remembered that the dynamos are resorted to only in exceptional cases.

**THE KRIEGER SEARCHLIGHT AUTOMOBILE**

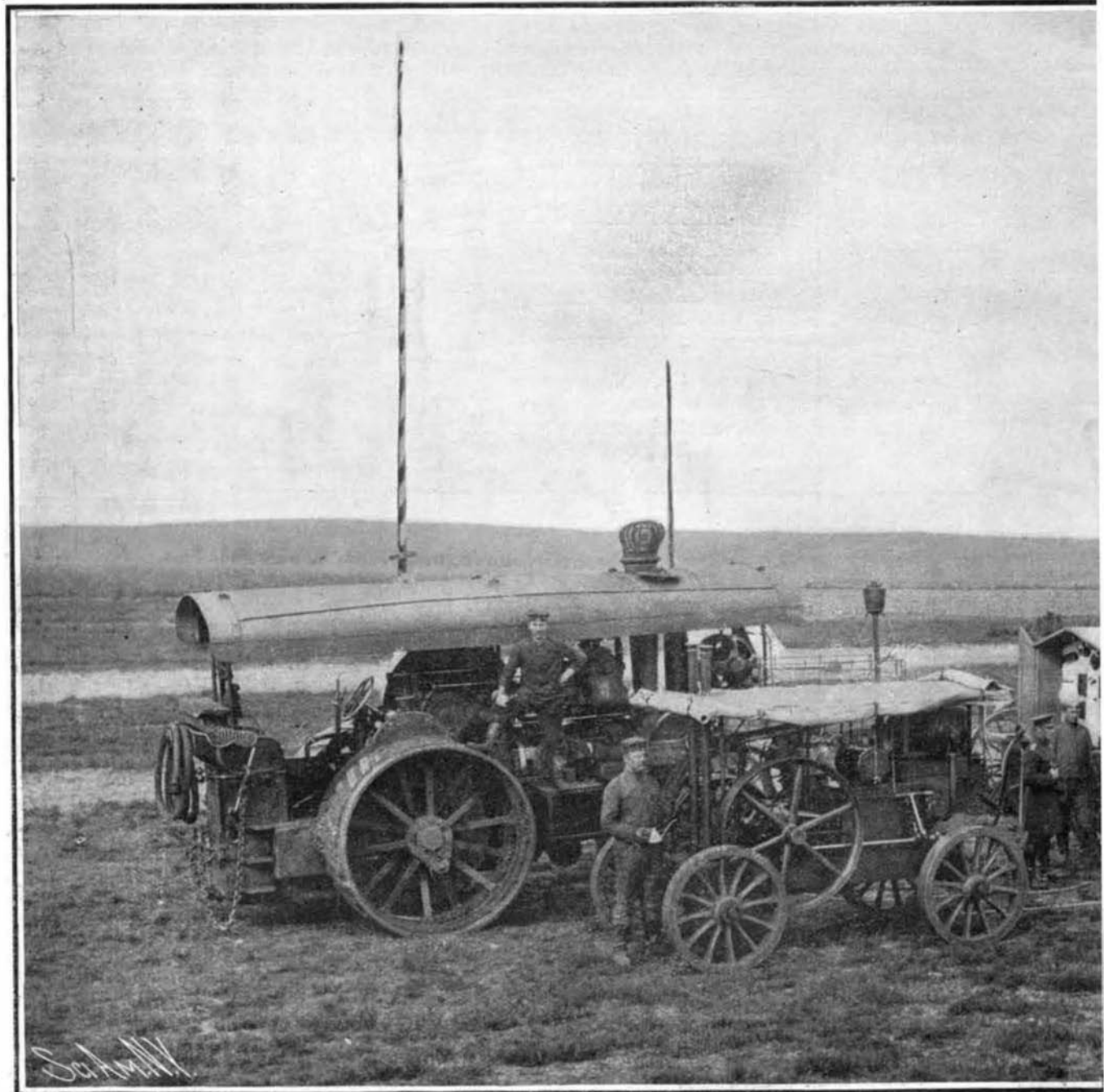
The new Krieger car is of the type known as gasoline electric, in which the usual form of gasoline motor is applied in connection with an electric outfit. This combination gives several advantages. The principle of the new car is as follows: In the front of the chassis is mounted a gasoline motor which is direct connected to a dynamo. The latter is used to supply current to the motors which are mounted directly against



A Complete Plant for Transporting Traveling Targets as Used by the German Army. S



An Automobile-Driven Field Searchlight Outfit.



This Plant for Hauling Moving Targets Has a Speed That Varies from  
**ELECTRICALLY-DRIVEN TARGET**

the rear wheel without using a dynamo, as there are thus by the current dynamo.

The gasoline engine also with the four cylinder with a 1,000 revolution per minute. The motor is connected to the dynamo directly through an elastic coupling of the type is placed. The aim of this has been to obtain a constant speed a electric power as the work electric motor.