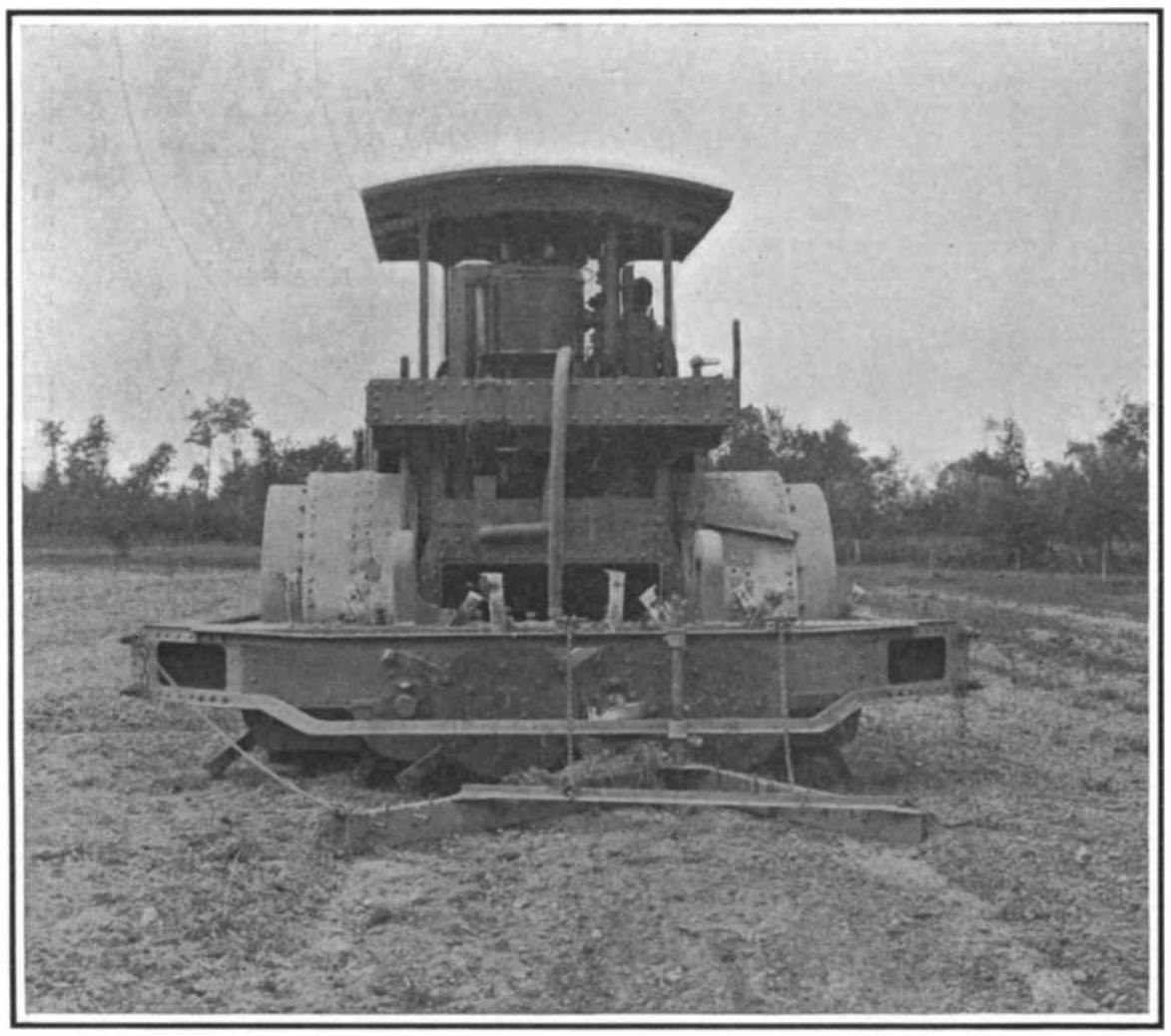
AN EGYPTIAN STEAM CULTIVATOR.

BY OUR CORRESPONDENT IN PARIS.

The steam cultivator illustrated in this article was designed by Boghos Pacha Nubar and is noteworthy for its original construction. The principles involved in it are an advance over what has been hitherto produced in the way of machines for working the soil. There are now several of the cultivators of the type illustrated herewith in actual use upon the farm lands of the inventor in Upper Egypt, and he is having others constructed. In this machine he uses the ideas involved in the researches of M. Dehérain upon the pulverization of the soil and the necessity of thorough stirring and also of aerating it at the same time that it is broken up. The cultivator is formed of a road locomotive having wide wheels and carrying in the rear a very strong U-shaped channel-iron frame. This is used to support the plowing parts, and it is pivoted upon the rear axle so that it can be raised or lowered. It also supports the gear mechanism for driving the plowing apparatus, and the mechanism is well protected from dust by a tight casing which surrounds it. For working the earth there is used a set of cutting blades which are curved at right angles at the ends, and which are fixed upon disks of iron plate. The disks are set in motion by means of a gear drive at a moderate speed, and when the framework is lowered, the blades sink in the ground and are thus made to cut the earth by upturning and breaking it so that the earth is left in a well-divided condition.

View showing the cultivator wheels lifted to clear the ground.



Rear view. The ground is broken up by the radiating arms on the disks.

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Two of the rotating disks will be noticed outside of the framework, where they are mounted close together. Behind them are mounted two similar disks inside the frame, and these are spaced farther apart by about half the diameter of the disk. At the back of the frame are placed two other disks, these being mounted at the exterior and near the rear wheels of the cultivator. In this way the ground is cut up the width of the cultivator by all the six disks working together. The head disks accomplish the first cutting and the operation is completed by the rear disks as they pass through the same earth. In this way the ground, after it leaves the rear disks, is well broken up. A countershaft runs across the framework and it is driven by a chain from the revolving rear axle. To the countershaft are connected the shafts of the six cutting disks by means of both spur and bevel gears.

As the disk frame can be raised or lowered at will, the earth can be cultivated to any desired depth up to 12 inches as a maximum. An official trial of the cultivator was made under practical conditions of working, and the tests were carried out by a special commission appointed for the purpose by the Khedival Agricultural Society. The experimenting ground of 25 acres was at Choubra, near Cairo. The soil was of a clayey nature and very compact, so that it was difficult to work. The cultivator, when passing across the field, left behind a well-worked band of earth of 11 feet in width, and the result was the same as would be secured by at least two plowing operations carried on successively by means of steam-operated plows driven by cable, or three plowings with the customary ox-plows of the country. It was found that the cultivator worked 1.58 acres of ground per hour, which, for a day of ten hours, represents 15.8 acres. During the tests the average depth of working the soil was 9 inches. Using a very ordinary quality of briquette coal for the engine, it was found that the amount of combustible employed was 220 pounds per acre. The ground had been previously planted in clover and had not been watered for three months, so that it was very dry and hard. With a single passage of the cultivator the ground was so well broken up that it was only necessary to pass over it with a roller and to make the furrows for planting the cotton. Another point which is worthy of notice is that the machine worked to good advantage in connection with fertilizers. It was found that when any fertilizer was spread on the field before plowing, it was thoroughly incorporated with the ground after the passage of the plow, and this took place throughout the whole depth of the furrow. The cost of the work per acre, for coal, oil, and personnel, including an engineer, fireman, and helper, also for the water tank cart which followed the machine, and two men and a mule, figures out to $4 per acre, or $13 per day of 10 hours. Out of the total time of 35 hours working, about 7 hours, or 20 per cent, was taken for the water supply, even though the water was drawn by means of a good injector. At present this loss no longer occurs, as the cultivator is followed along its course by the tank cart containing 200 gallons, and the water is taken by the machine without stopping by means of an injector and hose which passes to the tank. A deduction should therefore be made for this reason from the above figures for the cost per acre.

A series of official tests which were made at Milan at the time of the recent exposition also showed the application of the new machine to different kinds of fields. In one, the cultivator was run upon a field which was quite covered with very thick and high weeds, and these it pulled up and threw to the surface while plowing, so that when the operation was finished it only remained to pass the harrow over the ground in order to clean the field. As a general thing the farmers of the country using ordinary plows are obliged to carry out a surface plowing so as to remove the weeds, then to take these off by means of the harrow, and only after this is done can they begin the real plowing of the field. In general, these tests confirmed the results obtained by the Khedival Commission.

The inventor is having a new type of cultivator built. This contains some minor improvements over the one shown—improvements based on the results of numerous trials. One of the main improvements is the use of a 2-cylinder horizontal steam engine to replace the present vertical engine. This is mounted on the chassis as in the case of a locomotive. The change in the engine and its location was for the purpose of giving more room and better access to the different parts of the engine.

Protective Coating for Metals.

Steel, iron, bronze, brass, and copper may be protected from the oxidizing action of the air by the following cheap and simple method: The surface of the metal is cleaned, first with lye and then with dilute sulphuric or hydrochloric acid. A thin paste composed of a metallic powder mixed with water or other suitable liquid is then applied uniformly, with a brush for small objects and with a compressed air sprayer if large surfaces are to be covered. The metallic powder is composed of tin, pure or alloyed with lead or with lead and zinc. The metallic coating is next melted by means of a flame or a coke or charcoal fire. The moment of fusion is indicated by the change of color from gray to black. In order to avoid danger of burning off the coating it is advisable not to heat much above the fusing point. After the surface has cooled, it is washed with water. A glossy surface may be produced by friction with a brush or with tow.

Wrought iron and steel must be washed with sulphuric acid and, in some cases, a thin coating of copper must be applied by brushing or spraying with a slightly acid solution of copper sulphate and immediately washing with water before the tin is applied. Cast iron must be attacked with hydrofluoric acid before the washing with sulphuric acid, and electroplated with copper before tinning.

Standardization of sparking plugs for automobiles has been attempted by the American Association of Licensed Automobile Manufacturers. The mechanical branch of this association for some time has been working on proposed standards for the dimensions. The form now agreed upon has a ⅞-inch diameter of thread, 18 pitch, a shouldered or flanged seat 1⅛ inch in diameter, a minimum length below the shoulder of ½ inch, and a hexagon head ⅞ inch across the flats.