The Electrical Production of Caustic Soda

The principal chemicals used by paper manufacturers are caustic soda and chloride of lime, or bleaching powder, and these two substances constitute items of considerable expense in paper mills. For some time steadily increasing. According to the most modern past it has been hoped that these two chemicals would be obtained directly and economically from common salt by the aid of electricity. Many attempts illustrate Mr. F. Proctor's digging device, which is have been made in the past to effect this object, but we believe they have all ended in failure. This has probably been due to one or the other of two causesnamely, either a deficient knowledge of the laws regulating electric currents or badly constructed tanks and apparatus for effecting the decomposition economically. The practice has been to separate the products of electrolysis by porous plates or diaphragms, which offer considerable resistance to the passage of electricity and add to the general cost of useful work done, and are in other respects objectionable. At length, however, it would appear that caustic soda and bleach ing powder can be, and indeed are being, practically and economically produced from common salt by the aid of an electric current. This desirable end has been attained by Mr. James C. Richardson, of London, whose process has been in operation on a working scale for several months past at one of the largest paper mills in the kingdom. The whole apparatus is automatic, the salt solution passing regularly and the caustic soda being drawn off at any strength up to 10 or 12 per cent pure caustic soda. The chlorine, which can also be used direct for bleaching, is absorbed by slaked lime, and bleaching powder is thus produced. We are not at present at liberty to give any details respecting this process, but we may mention that it is not simply a method of producing a bleaching solution by electrolyzing salt, but a commercial process of producing these two important chemicals. The porous partitions are altogether dispensed with in Mr. Richardson's apparatus, and in other respects it differs materially from that employed in previous attempts to effect the same object. It is stated that the cost, both is sliced off and thrown back at each revolution of the electrically and commercially, is much below that of crank shaft. The reciprocating action of the forks is the ordinary Leblanc process of alkali manufacture,

STEAM DIGGING

"Steam digging" is the recognized expression for the art of forking land by steam power for the purpose of tillage, and its adoption has of late years been practice, it is performed with an ordinary traction engine of which the digging apparatus forms a part. We



manufactured by Messrs. Burrell & Sons, Thetford, and for which many advantages are claimed by its author. The device consists of : Three steel forks and fork handles, three-rocking levers, one wayshaft, and a three-throw crankshaft with its necessary bearings. Each fork is made up of steel tines, which are held firmly in a grooved clamp about 3 ft. in length and which is attached to the fork handle by a spring hinge somewhat similar to that which is used on the fork of a hay tedder. The crankshaft is fixed where the water tank of an ordinary traction engine is usually fitted.

The illustration, Fig. 1, shows the path which is traveled by the extremity of a fork tine of medium length, when the machine is stationary and when it is in motion, and also a section of the spit of earth which governed by the rocking action of the under lever, but

The width of this spit of earth is about 7 in., and the speed is regulated to turn over an average of 72 spits per minute.

In constructing a steam digger the greatest care should be taken to get the centers of the crank and way shafts in the correct relative position with each other. Machine proprietors have sometimes been tempted to alter their traction engines into steam diggers, but Mr. Proctor states that owing to the shaft centers being unsuitably arranged the work has proved unsatisfactory. Three methods are adopted for "taking a field :"

1. The machine travels round the outsides and then works inward similar to the path usually taken with the sheaf-binding harvesters.

2. Another plan is to start in the center of the field and describe with the machine a number of circularly ended rectangles till the whole field has been gone over.

3. In this case a straight up and down course is taken, and the machine is brought into the straight again by reversing the engine, much as is done with steam engines in reversing them by triangles. The time occupied in thus turning takes scarcely longer than that of an ordinary horse plow at the headlands, and it is the method which is most generally adopted.-Engineering.

Passiflora Edulis.

A luscious fruit is that of Passiflora edulis (the Brazilian passion flower), which is much grown at Tan-y-bwlch Hall, North Wales. We have never seen, says The Garden, a finer mass of it than here, one house being devoted to it, and plants also permitted to cover the back wall of a large vinery with their free growth and flower. This Passiflora, apart from its value as an edible fruit, is very pretty when in bloom, and also when bearing freely its plum-shaped fruits. It has been fruiting freely since last June. The fruits are like very large egg plums, deep maroon in color, but varying in tone according to their several degrees of ripeness, and with a very tough and thick skin. The pulp inside is yellowish and not very pleasant to and that at least three times the amount of chlorine is the action of this again is modified by the traveling the eye, but the flavor is brisk, agreeably acid, some-





IMPROVED STEAM DIGGER.

available from each ton of salt decomposed as against | motion of the machine itself, for it will be seen by the | thing between a melon and a pear. It is used largely that process. Thus a larger quantity of bleaching illustration that the slope at which the forks enter the for dessert here, and preferred before fruits regarded powder is produced and the purity of the caustic soda ranges very high. The erection of enlarged plant is than when it is stationary. The inclined nearly has little difficulty with it, fruiting it freely on vinery being proceeded with at the works where it is already in operation, and the adoption of plant is contemplated gine is stationary, and the steeper curved line when at the works of a few other leading paper manufacturers.

ground when the machine is traveling is more upright straight line shows the path of the fork when the enthe engine is moving. The cross hatching indicates the shape of the spit of earth turned off at each stroke. cultural department will try it.

generally as more luscious. Mr. Roberts. the gardener, walls. and yet the growth does not interfere with the vines planted in front. Here is a fruit which ought to be introduced in the United States. Perhaps the agri-