

PLOWING BY ELECTRICITY.

Experiments have just been made at Sermaize (Marne), France, with a new system of mechanical plowing, the invention of MM. Chrétien & Félix, two engineers of the above place, who are already favorably known to the industrial world.

Tillage by mechanical power, as practiced at present in England, the United States, and some parts of France, is based on the use of locomotive steam engines placed on a headland and actuating drums over which passes an endless steel rope serving to carry the plow back and forth over the field. These machines are very high priced; it costs a great deal to manage them and keep them in repair. Special care has to be exercised to make them work well; they are difficult to manage in the fields, especially in rainy weather; and, finally, they require a considerable supply of water. The work, however, is better done; and the deep tillage of the soil that mechanical plowing alone can effect, multiplies the nutritive surfaces of the arable layer and gives a mean increase of 30 per cent. in crops. But in spite of all its advantages, steam plowing has made little headway in France, both on account of the parceling out of the lands among numerous proprietors, and the inconveniences that we have just enumerated.

With a view to the more general adoption of mechanical power on farms, the engineers mentioned above have devised an arrangement by which motive power in a certain fixed position may be employed to do the work of several adjacent farms through the medium of electricity as an agent of transmission. They have for this purpose adopted the Gramme dynamo-electric machine for the generation of electricity, and similar machines as the electro-dynamic agent for re-conversion of the electricity, conveyed to any required distance by cables, into motive power.

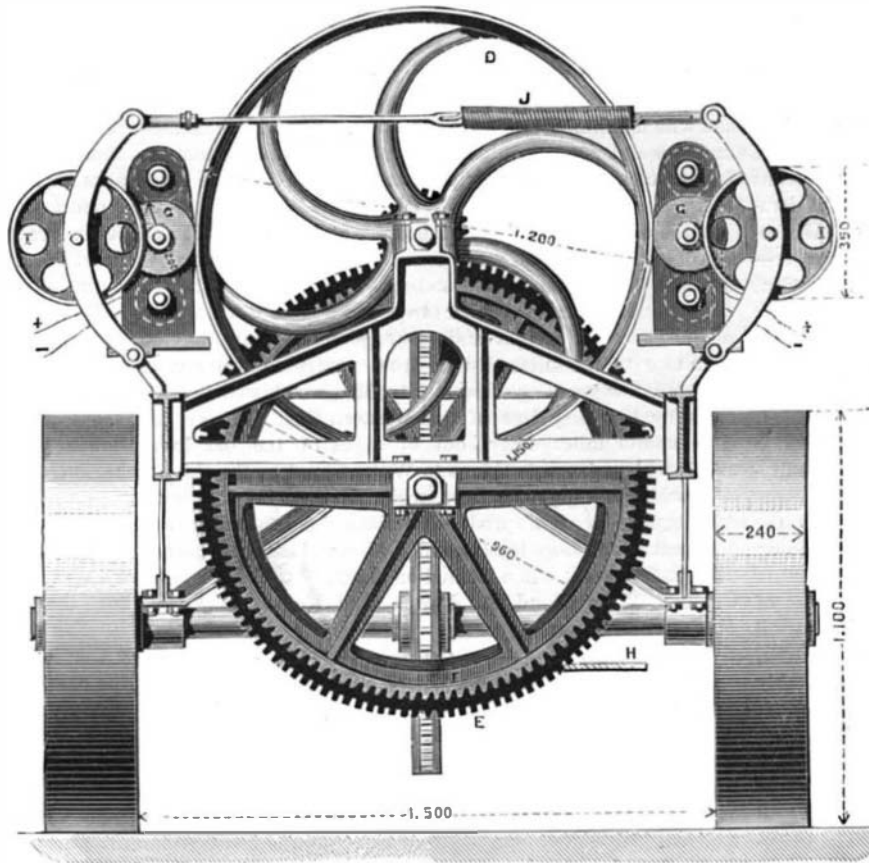
Two forms of these machines have already been established and experimented with at Sermaize—one of them designed for unloading beet boats, and the other for plowing. The former was in operation all of last winter, and its use was found to effect a saving of about 40 per cent over manual labor. Besides this, the beets were unloaded very much quicker (a matter of capital importance in the sugar-making industry) and without the aid of special workmen, who cannot always be depended upon. Within the past few weeks the power has been transmitted to some neighboring fields, which have been plowed by a balance plow and the windlasses which we illustrate here-with. Each of these consists of a carriage of wrought iron, the two side frame pieces being of I section, mounted on four iron wheels. Two Gramme electro-dynamic machines, G G, are mounted on a hinged frame attached to the side frames. These machines are connected together at their upper parts by means of a simple connecting rod and a pair of India rubber rings (the arrangement of friction wheel, I, and the spiral spring, J, was removed after trial, as not giving sufficient rigidity, though the friction was very small), which hold the pulleys on the end of the Gramme machine spindles, against the pulleys, D D. The small pulleys in the Gramme machines are recovered with gutta percha. The hauling drum, C, receives the movement of the pulleys, D, by means of the pinions, E or F, which give the slow or fast speed respectively. Upon the end of the spindle carrying the pulleys, D, is fixed a

bevel pinion gearing with the bevel wheel, K, upon the shaft carrying which is a pitch pinion, over which and the wheel, L, runs a pitch chain, by which the headland movement of the windlass is obtained. The steering of the windlass is effected by the hand wheel, as shown in front. For working, the hind wheels are fixed upon the axle by a set screw, which is loosened for traveling. The rope, H, is of steel, half an inch diameter and 1.3 miles in length, as used at

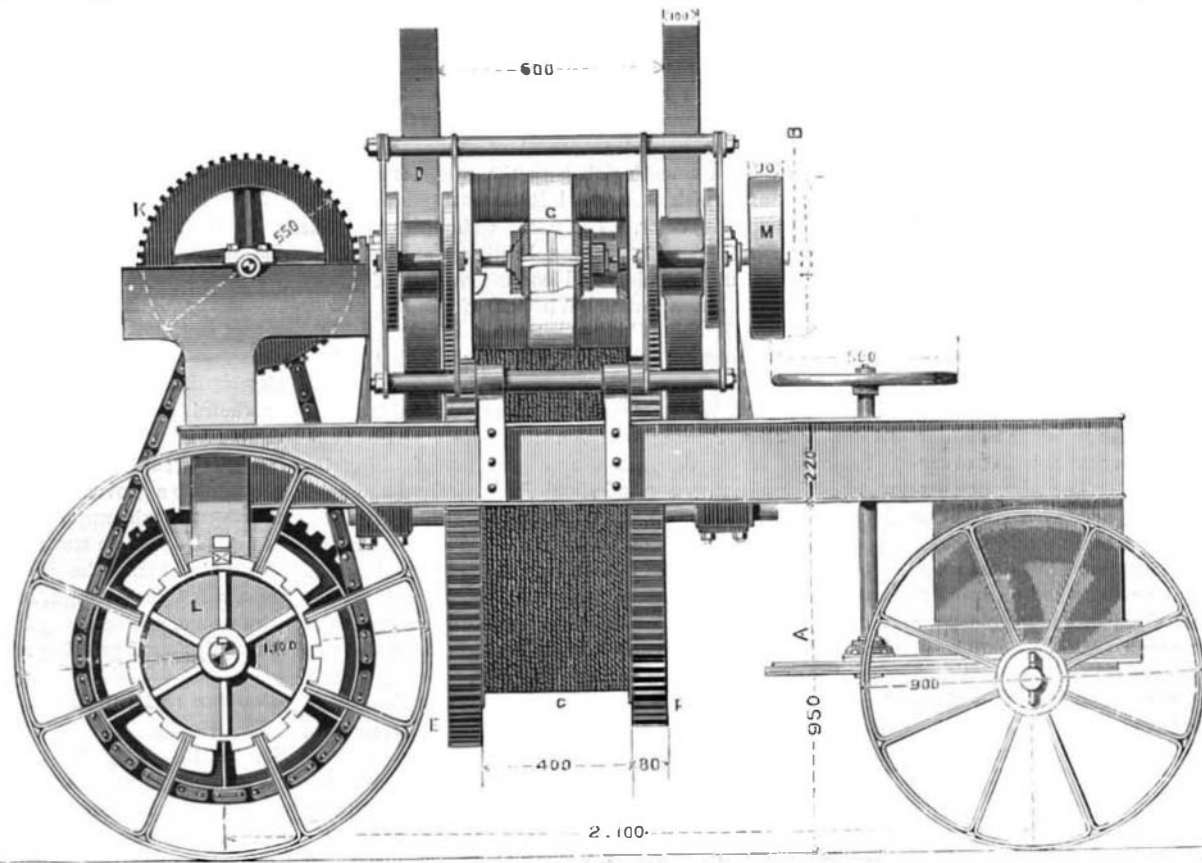
Sermaize. The electric cables are carried on posts, as for telegraphic purposes. They consist of wires each 0.04 inch in diameter, giving a total sectional area of about 0.33 inch. In the experiments the windlasses, constituted as above, were placed at a distance of 664 feet apart, and by means of commutators the electricity was alternately passed through the one and the other pair of machines as the plow crossed and recrossed the field. An engine in the sugar factory already mentioned, and situated 1,300 feet from the field, gave motion to the dynamo-electric machines which supplied the electricity, about eight horse power being employed. When in light ground two furrows have been made, but in heavy ground only one, the power transmitted to the plow being but that of three to four horses. The designers will, however, soon have machinery ready which will enable them to use a four furrow plow.

The gramme machines at the works were driven at 1,600 revolutions per minute, while those on the windlasses made 800 per minute. The pulleys, D, made 133 revolutions per minute, and the hauling drums 14 and 27 under the slow and fast speeds respectively, the corresponding speeds of the plow being 164 and 266 feet per minute. The furrows were 10.8 inches wide and 7.87 inches deep. Making two furrows, about 24 square yards were plowed per minute. It was found that about 50 per cent of the work of the fixed engine was realized on the field, and that the efficiency of the electro-dynamic apparatus is from 30 to 60 per cent, according to the distance of transmission.

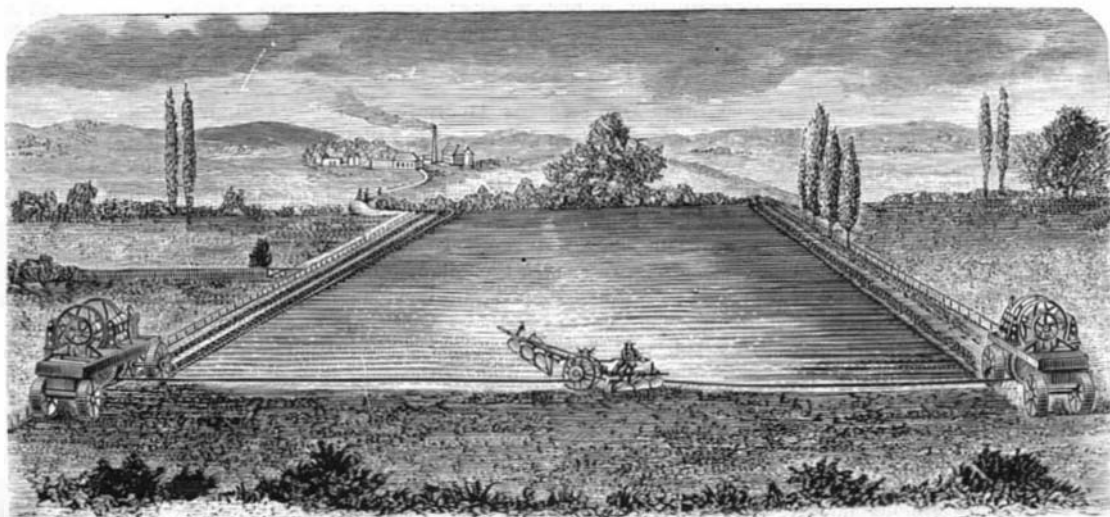
It is urged that the apparatus will provide in France the means of supplanting much hand labor, which is somewhat scarce, and that by its means many falls of water not now used may be usefully employed for generating power for transmission. Our illustrations are copied from those which have appeared in the *Revue Industrielle*.



TRANSVERSE SECTION ON LINE A B.



APPARATUS FOR PLOWING BY ELECTRICITY.



PLOWING BY ELECTRICITY AT SERMAIZE, FRANCE.

NEW AGRICULTURAL INVENTIONS.

An improvement in check row corn planters, consisting chiefly in the peculiar arrangement of devices for imparting motion from the drive shaft to the feed slides, and in a contrivance for throwing the slide-operating mechanism into and out of gear, has been patented by Mr. Charles G. Everet, of Belfontaine, O.

Mr. Aaron F. French, of Denison, Iowa, has patented an improved harrow, having its tooth bars connected by tubes threaded externally to receive the nuts by which the bars are held in place, and threaded internally to receive the hooks and eyes that connect the different sections of the harrow.

A new machine for planting corn in hills at a uniform distance apart has been patented by Mr. Theodore F. Tanner, of Jefferson City, Mo. It consists of a frame, carrying seed boxes, mounted on wheels, and provided with valves and slides that are opened at regular intervals by connections from the driving wheels of the apparatus.

An improved fertilizer distributor has been patented by Mr. William Hodges, of Okolona, Miss. The machine is provided with a hopper having hinged ends that are connected with a shaft or roller so that they may be drawn inward to aid in the discharge of the fertilizer.

Messrs. Arthur C. and Reuben W. Sriver, of New Baltimore, O., have patented an improved harvester reel and dropper, the principal features of which consist in novel means for regulating the vertical adjustment of the reel above the cutter bar, and in a device for intermittently discharging the cut grain.