commences his work in the spring, looks his farm over attentively, and decides which fields be will plow and which lay down; to what particular kind of grain, grass, or root crop each piece shall be devoted; how much manure he will apply, and how much seed. Before deciding these several things, judiciously, he must know the area of each lot.

In the late autumn, when he sits down and looks over the result of his summer's labour, how can he judge if his crops are up to the average, above it, or below, unless he can tell from how many acres a certain number of bushels of whatever it may be was taken?

No man having the interests of farming at heart but wishes to try experiments. It has been truly said, "It is only by experiments that progress in any branch of agriculture can be accomplished. Any one that accomplishes an experiment, and accurately reports it, advances the science and practice of agriculture." How can these experiments be accurately reported, or how can one judge of them himself, unless the land is carefully measured?

Reclaiming Lands.

A fifth consideration requiring the engineer in the man, is in reclaiming lands—brioging them from a cold, barren state, into one of fertility.

Water is one of the great necessities of life, both in plants and animals; it goes to make up a large portion of either; yet the farmer often finds it in the way of his improvements. This matter has, of late, in this country, been brought a good deal to our notice; a great deal has been said and written upon the subject, yet few of us fully appreciate its importance.

It has been ascertained, by careful observation, that more water falls upon the surface of the ground during the year than is needed for the growth of plants; this, in lands where i



Fig. 3.-Drain-Tile and Brick making Machine-Horse power.

cannot pass down through the subsoil, must be in some way removed by artificial means, or it will prove an injury to our crops.

Draining is a process of agriculture which, if well done, needs no repeating. It is the first step necessary in order to avail ourselves of improved modes of agriculture. We have a great deal of land—and the best we have, if properly drained—upon which the bestowal of any amount of labour and manure is useless unless it is first drained. We may plough deeply, and subsoil in vain, if the land is "water-logged;" the seeds will rot instead of germinating; the roots cannot penetrate to a sufficient depth to get nourishment or to sustain a drought. The land is sour and cold, and the grass that does manage to grow upon it is not at all palatable or nutritious to our stock, and in winter the land freezes much quicker and deeper.

Water is the only exception in nature, I belive, to the law that matter becomes more dense by cold and expands by heat. Water is

most dense at about forty degrees above zero, and expands both ways from this point. If land is saturated with water in winter the water as it freezes expands and causes the ground to "heave." Smail trees are often in this way thrown out of the ground, and many of our biennial and perennial crops injured, or entirely ruined, or "winter-killed" in this way. The land does not get suitably dry for cultivation till very late in the season, if at all, and thus our now too short season is rendered still shorter. Water passes from undrained lands almost entirely by evaporation. This is a refrigerative process, as any one can see by holding his wet hand in the wind. We often hear farmers speak of land as cold, and for this reason it is considered almost worthless. The land is cold, but not of itself. Place a man exposed to a stiff wind, with wet garments, and he will be cold ; the heat of the sun is expended in evaporating the water, and in this way the heat becomes latent. Exchange the man's wet garments for dry ones, and he is