

practice. The outlet should, if possible, be six inches or a foot above the bottom of the open drain or stream into which it flows.

An important adjunct to tile drains are openings at the junctions or other convenient points where the farmer can frequently ascertain how the drain is working. They should be in the form of catch-basins, where sediment coming down the drain may settle and be removed as often as necessary. If these are objectionable in the centre of the field, they may be placed at the line of the fences. They should be composed of iron, wood or other material not easily injured by frost, and should be securely covered. If located in the middle of a field, they can be placed at a convenient distance below the surface and covered with earth so as not to interfere with cultivation.

Tile should be hard burned, otherwise they will not stand the frost, truly circular and straight. In manufacturing they are frequently warped and twisted to such an extent that a close joint cannot be secured. All such should be culled, together with broken tile. The size should not be less than three inches and this only for very short distances as tile with so small a bore can scarcely be laid in such a manner as to have a clear outlet unless the fall is very great.

In deciding upon the size necessary regard must be had to the amount of water to be carried away, the fall, and to some extent the distance. A common defect is the presence of lint in the clay, which, when burned and afterwards exposed to moisture, will burst the tile.

In laying tile through quicksand, the best method is to completely surround the tile with saw dust. This at once acts as a sieve through which sand cannot penetrate, while it allows the water full liberty. In time, the sawdust decays and forms a porous and bark-like covering around the tile. Straw and elm bark are too coarse to act with the same degree of success and generally prove entirely useless. Slabs laid in the bottom of the trench cause an unequal distribution of pressure and frequently cause obstructions by broken pipe. In draining swamp land, allowance must be made for shrinkage of the soil, which is composed frequently of vegetable matter in an almost floating condition so that when the soil has completely subsided the outlet and drain may be deep enough.

The life of a tile drain varies with circumstances, but should be at least half a century if carefully laid. To take up tile, clean and relay them is generally a more expensive operation than constructing a new drain, and no pains should be spared to avoid this contingency.

The clerk of Markham Village is paid \$40 a year. Stouffville has increased its clerk's salary from \$80 to \$100.

Bridge at Niagara.

One of the greatest engineering feats of the coming year will be the construction of a steel arch bridge across the Niagara gorge. This chasm is now spanned by three bridges. One is of the cantilever pattern, while two are of the suspension type. The cantilever bridge is the property of the Michigan Central Railway, while one of the suspension bridges are owned by the International Railway Suspension Bridges Co., and affords accommodation to the trains of the Grand Trunk Railway, and the other is the property of the Niagara Falls & Clifton Suspension Bridge Company. It is the latter structure that the steel arch referred to is to replace, and when completed it will have the greatest span of any arch bridge ever built. From cliff to cliff the distance is 1,263 feet. The span proper of the arch will be 840 feet; in width the bridge will be forty-nine feet, the present structure being seventeen and a half feet. About twenty-three feet of the centre of the new bridge will be devoted to a double-track trolley line; on each side of this will be a carriage way about eight feet wide, while beyond these carriage ways on each side there will be elevated walks each about three feet nine inches wide for pedestrians. The centre of the Canadian end of the arch will be on the exact centre of the present suspension structure, but on the American side it has been found necessary to carry the centre a little to the south in order that the foundation abutments may avoid the portal of the Niagara Power Co.'s tunnel. It is estimated that fully 4,000,000 pounds of steel will be needed in constructing the bridge, and thus the condition of the steel market becomes a very important fact, or as to the time of letting the contract. The plans for the superstructure are not yet completed, but it is expected that they will be in the hands of the bridge company early in the season. The site of the present structure has been the scene of remarkable incidents, both in bridge construction and bridge destruction. The incidents in the history of the several bridges at this point are peculiarly significant of the progress of the locality and the effort and desire of the bridge company to keep pace with the demands made upon their facilities for crossing the Niagara gorge. In the early days crossing was made at this point by means of ferry boats but the need of the bridge was early apparent and the first steps in its construction was taken when ropes were cast across the river on an ice bridge. The original suspension structure had wooden towers and floor and was completed on the 22nd. Dec., 1868. The towers are originally erected, consisted of 12 x 12 in. timbers. Each leg consisted of four times 16 of which were grouped together under the saddle plate for the support of the main cables. In 1887 the work of replacing the wooden structure with steel

was commenced and shafts were sunk for a new and stronger anchorage to take the strain of the two additional cables required to support the additional weight of the superstructure as well as the weight of the wider floor. Then two and a half in. steel ropes, seven of which made up a cable, were placed in position and the suspenders for supporting the trusses were attached to the cables. The trusses in thirty feet sections were built out from each end until they met in the centre and were there connected, after which the work of removing the old wooden structure was begun. Two gangs of men worked day and night and the traffic was not interrupted. On the night of the 22nd of June, 1888, the last part of the old bridge was removed, and connections were made with the new trusses, thus for the first time giving double roadway from end to end. On the 15th of December the bridge was completed.

Within one month thereafter on the morning of January 10th, the Niagara gorge was visited by a windstorm of such destructive force as to break a fastening of one of the principle storm stays of the bridge which left it to the mercy of the gale with the result that the entire suspended structure was carried away and fell on the banks and in the river leaving nothing but the towers and cables as a monument to a large outlay of money and eighteen months of hard labor. The directors were hastily summoned and within forty-eight hours orders were placed for the material required for re-building the bridge. Work was carried on night and day in the various establishments so that delivery of material was made seventy days after the destruction. The work of re-building commenced in March and occupied thirty-eight working days so that 117 days after traffic was suspended the bridge was re-opened.

At that time the bridge company believed they were building of sufficient capacity for many years to come, but seven years have not yet elapsed and they find their structure inadequate to the demands. The principle reason for this is the development of electric railway lines. On each side of the gorge this development has been most marked and there is a desire to have a bridge over which the electric cars may run, located as is the bridge right at the gates or both Niagara Free Park—the New York State Reservation on one side and Queen Victoria Park on the other, and right in front of both American and Horseshoe Falls it is a delightful scenic spot, the view from which will never be interrupted by a bridge being built closer to the cataract.

Collingwood township has decided to repeal its dog tax by-law.

Thamesville council has passed the Curfew Bell by-law.

Middlesex county council has granted \$100 to the band of the 26th Battalion.