

table liquids seem naturally to acquire from long boiling, particularly when boiled with lime.

There are several ways of evaporating; indeed, as many as there seem to be of doing everything else relating to beet root sugar, and each plan by its *professor* is pronounced to be the *only one*; but the fact that more than one plan will answer is the best proof that the manufacture is not beyond Canadian intelligence and ingenuity.

I shall now proceed to describe in general terms these plans, merely remarking that the plan which affords the quickest means of getting rid of the superfluous water is the best, for longer boiling than is necessary is extremely injurious.

The first plan is that of the ordinary boilers or kettles, either deep or shallow, set in such a way that the fire does not act too strongly on them, so as to burn the juice. These vessels may be of any shape or size, according to the taste or means of the owner; but when he uses them he must be especially careful against burning, or browning the juice and syrup, as beet root juice burns and browns much more readily than maple sap.

The second, and perhaps the best for ordinary use, is a broad, flat pan, so stiffened and strengthened as to admit of its being rocked backwards and forwards (or rather up and down), with a considerable amount of liquid in it. This should be balanced on a centre cross bar, with bearings, and should be constructed in such a way as to admit of the ends being raised and depressed from two to four inches, according to the length of the pan. The fire is lighted directly under the pan, and the brick-work sides are so arranged as to leave the working of the pan up and down free from undue friction, but still enough to keep out the cold draft of air down by the sides, and the smoke from coming up. The draught of the chimney will, however, in a great measure, prevent this. The juice is put into this pan, and made to boil. As soon as it does, or is hot enough, the pan is raised and depressed slowly, so as to allow the contents to flow backwards and forwards over the surface of the iron. It must, however, be done so carefully as not to make the liquid rush over the ends of the pan. The evaporating power of this pan is very great, many times that of ordinary kettles, and as the contents are kept moving over the surface of the metal bottom, no burning occurs. In this vessel the juice may be evaporated down to the thickness of medium molasses; and after that, it should be evaporated still further in a double pan, the outside one being filled with water, or steam, and the syrup being in the inside one.

The third system of evaporation is the concretor, which has been described before, but which is lately made with some modifications.

The concretor system is entirely based on

the fact that a hot blast of air, driven over the surface of the liquor to be evaporated, evaporates the water at a rate infinitely faster than heat applied under the liquid, and that when the under heat and the hot blast are combined, evaporation proceeds with marvellous rapidity. It is for this reason that the concretor is generally made in two parts, the tray and the cylinder, (the third part or drum will never be required in Canada, until exportation of the concreted juice takes place). The tray is used for bringing the juice to the boiling point as soon as possible, and partly to evaporate it, and this it does in its passage backwards and forwards down the channels formed for it; it is then run into the cylinder, which is made to revolve slowly, in such a manner as constantly to expose fresh surfaces of the syrup to the action of the air; and through this cylinder a hot blast of air is continually forced by a fan, which is driven by machinery. The air is heated in a chamber either formed round the iron chimney of the apparatus, or steam engine, or by convoluted stove-pipes in a chamber, or in any other way; and it is a singular fact that however hot you make the air, it never burns the syrup. The watery particles of juice splashing through the cylinder, and the steam evolved from them, carry off all the extra heat, and the cylinder is now constantly used instead of the vacuum pan. In the first concretors the cylinder was plain and smooth inside, and the evaporation depended on the thin pellicle of juice that was carried up by the surface in the revolutions of the instrument. Now, the plan is carried further, and projections are made in the inside of the cylinder, which carry up the juice and syrup, and then drop it in a continuous shower through the moving hot current of air which is passing through it; thus each drop of the fluid is exposed on all its sides, and evaporation progresses most rapidly.

These cylinders are worked in two ways. In one a continual flow takes place, and there is a constant discharge of the concreted juice. In the other, the work is done by charges; a certain quantity being let into the cylinder, and which is then revolved until the evaporation is sufficient, when the contents are discharged at the lower end by depressing the cylinder. The cylinders are also worked with outside heat, as well as with the hot blast going through them, and with the hot blast alone. In this way the beet juice is brought to a thick brown syrup, which will keep for any length of time, and is in the proper state to be submitted to the skill of the refiner.

The price this syrup will bring will be entirely governed by its purity. If it is from well grown beets, is free from lime, or chalk, and has had the salts taken out of it by the "Osmose" process, it will bring the best price; every per centage of impurity will have the effect of lowering the value most materially.

VECTIS.

Our Roads.

BY ALAN MACDOUGALL, C. E.

As clay roads must always be looked upon as merely "temporary concerns," the first step as it were towards the more permanent institution, the gravel or macadamized road, it was not necessary to say so much when treating of them regarding the cutting of side ditches, drains in the road bed, &c., as it will be necessary to say now that permanent roads are being treated. As has been already stated, the width of the road should be 25 feet, and the metalled surface 20 or 22; this distance of 25 feet is ample on embankments, but for all cuttings where they are not too deep, or of too great an extent, the breadth should be increased so as to allow a small side ditch on each side at the foot of the slope, to catch any water coming down the slope, and coming off the road bed. These ditches need not be wider than 1 ft 6 in., or 2 feet, and about 12 or 15 inches deep. In all wet places in cuttings, and in long banks or cuttings, top drains should be cut to let off any spring water that may be found, or any surface water that is likely to be troublesome. These drains should be made about 9 or 12 inches square, either of wood or stone, or even tile pipes, if they can be got, can be advantageously used; they should be put down about 3 feet, so as to be out of the way of the frost, and should connect with the surface with proper eyes or traps.

The back slopes of the cuttings and the side slopes of the embankments, should be protected either by a few drains placed in them or by having a light coating of soil thrown over them, so as to form a ground for a sward. Ill weeds grow apace, says the proverb, and every farmer knows how difficult it is to keep his fields clear from weeds, so that there would be no difficulty in inducing a crop of grass and rough weeds to coat the sides of a road slope, were only a little soil put on the slopes to attract vegetation.

There are several matters of equally great importance in road making to those already noticed connected with the maintenance of roads, which will be taken up in future articles.

The editor of the *Gardener's Monthly* says that the Honey Locust is an admirable hedge plant for cold climates, and is far better than any other plant where the soil is poor and thin. There is one great advantage which it possesses over other plants. The Osage Orange, for instance, has thorns on its young growth, and that is the end of them; but thorns come out of the old wood of the locust and continue to come out year after year, branching and growing simply as thorns, and nothing will dare go through a hedge of this plant, even although there should be a tolerably large gap invitingly open.