

made to revolve very rapidly with a multiplying power, either by cog wheels or drums, and its speed is urged until the required effect is produced, and the molasses are ejected from the sugar; the speed required is very great.

Below is a cut of such a machine as might be made by an ordinary mechanic, and used by the farmer or small manufacturer; but on a large scale, the turbine must be obtained from a machine shop. They can be obtained ready to erect from Europe, or from H. J. Booth & Co., Union Iron Works, San Francisco, California, which enterprising firm have constructed several Beet Sugar works in California, which are meeting with great success; they make all the machinery. Where they can be had, these turbines are also used instead of presses for separating the pulp from the juice of the grated root; and where the diffusion plan is used, the sliced roots are, as before stated, dried with it. It is a most valuable machine, and the manufacture of sugar, in a useable shape, from the beet could not be carried on without it.

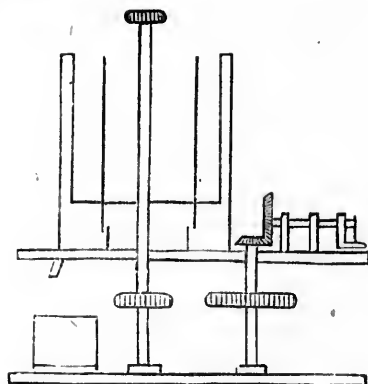
For a detailed description and plate of the turbine made on a manufacturing scale. I must refer the reader to a more elaborate work on beet sugar than the present.

THE FARMERS' TURBINE.

Procure a wooden tub, about inches diameter, and inches high. The hoops should be driven on from the top, but there should not be much flare to the tub. Standing in the centre of this vessel is a pipe, or cylinder, made of galvanized iron, strong, and tight, and this cylinder is passed through a hole in the bottom of the tub, and is well secured to it by a flange nailed on to the outside of the bottom, so as to be tight. This tub is to contain the molasses, and all joints about it must be very tight, for molasses will leak out where water will not. This tub is fixed to a strong bench, or table, which must be well stayed to the floor, or building, as the motion of the turbine is very powerful. Underneath the bench, or table, on which the tub stands, there is a bridge tree fixed for the toe of the spindle to work in.

The spindle, and basket of the turbine may be constructed of wood, although iron would, of course, be much better. If of wood, the spindle must be turned, and of about three inches diameter, well feruled on each end. In the lower end is driven a steel blunt point, which works in a tallow box on the bridge tree. The upper end must have a turned, or well filed iron pin inserted. This is to bear against the upper bar, which is fixed above the tub. On the spindle fits a small iron wheel, well secured with points, or rivets, which passes down through the cylinder in the tub, and rests on the bridge tree; into this a large iron wheel is made to work, driven from below the bench, and which wheel is turned by a winch. There should be a fly-wheel attached in this case; also belts, and pulleys may be used instead of cog

wheels. The following is a sketch of the concern.



The cylinder through the bottom must be large enough to allow the small wheel by which the machine is driven to pass freely through it, and the tub must be of sufficient diameter to allow of the basket and spindle of the turbine to be freely lifted in and out of it, so that when a charge is done, the basket and spindle may be lifted out, and the sugar emptied out of it, and be replaced ready for another charge, without jamming in the cylinder and against the sides of the tub.

There must also be a metal sleeve fixed to the bottom of the basket, which covers and comes down below the top of the cylinder. This is for the purpose of preventing leakage or dripping of the molasses through the cylinder, and this sleeve must be made large enough to allow the basket and spindle to be lifted freely in and out when it is required to be moved to empty out the charge.

I have purposely omitted all lengths and sizes in the foregoing description. The size of the turbine will entirely depend upon the amount of business to be done, and any ingenious person can get one constructed with the instructions here given. Belts and drums can be used as well as cog wheels, and in some cases are more advisable.

Beet sugar is finally reduced into refined loaf sugar by repeated filterings through large cylinders of bone black, and by several other processes of filtration and purification. I do not pretend to give such instructions as will enable any person to refine sugar on a great scale, and should not have alluded to the subject at all if I could have avoided it.

The refining of sugar has always been one of the "monster businesses," doing an immense amount of work, and requiring an enormous capital.

WORKING DRIED BEET ROOT.

One great advantage of the new process of diffusion is the power it gives of using dried beet root, and thus enabling small factories to work the whole year, instead of working