

be given material to make blood, and afterwards to strengthen it.  
*Dutchess County, N. Y.* *C. B. Country Gentleman.*

**Our Engravings.**—Our engravings for the month represent the buildings and apparatus invented and manufactured by Messrs Burrell and Whitman, Little Falls, N. Y.

1. Elevation and section of creamery.
2. Self-Agitating cheese vats.
- 3, 4, 5. Test tubes, instruments, &c.
6. Curd knives.
7. Curd mills.
8. Cheese box hoops, &c.
9. Cheese box bending machine.

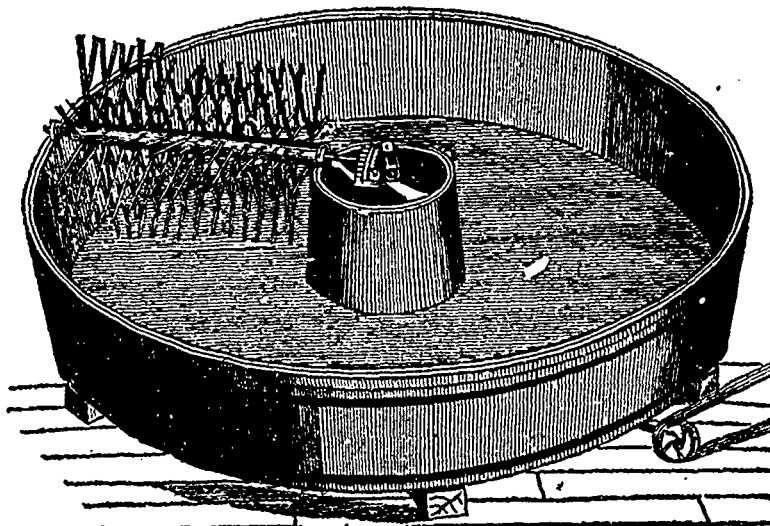
#### First Steps in Farming—Young Man's Department—Cattle feeding.

We have already seen that plants can convert the various raw materials they find in the air and in the soil into their own substance. Animals, on the other hand, are incapable of any such transformation. They must have their food in

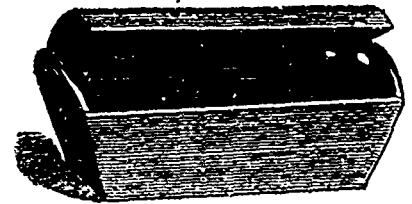
leaves, and rejects the solid parts. Had its digestive powers been more vigorous, it would have eaten less and liquefied more. The same is true of the higher organisms. In proportion to their power of liquefying food is the quantity of nutriment they extract from articles of food.

And the reasons why this liquefaction of food must precede the nourishment of the animal are twofold: first, the food has to be conveyed from the stomach to the various parts of the body which have to be nourished; and as it has to be conveyed in canals which are everywhere closed—blood vessels with no openings in their walls to let the food escape; it would be for ever carried to and fro by the torrent of the circulation, and the parts of the body through which this torrent rushes would be as little benefited by the food as if none were there. Secondly, supposing openings to exist, or to be repaired, and the solid food to be deposited on the organs, no nutrition could take place; because these organs are made up of innumerable little cells or vesicles, every one of which must be separately fed, and no one of which has any mouth, or opening, for the food to enter.

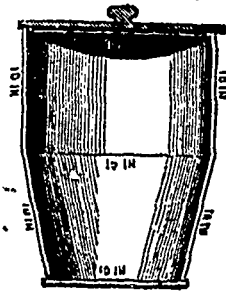
And now comes into play one of the most beautiful of all the laws of nature: the law of *Endosmosis*; as thus: the



Self-Agitating Cheese Vat.



Butter Tray.



Rennet Jars.

a manufactured state. The plant prepares, the animal uses; and in the case of the poor gazelle, is used in its turn by the carnivorous beasts. And the process by which the food of animals is utilised for their support is, as every one knows, termed digestion.

The ancients used to consider digestion as only a process of cooking, and in some respects they were right. It is a fact well worth bearing in mind, that only *liquid* food is capable of nourishing an organism, plant or animal. Our phosphates, lime, &c., must all be rendered liquid before our farm crops can absorb and convert them; and, in like manner, whatever food an animal consumes must be reduced to a liquid condition in the stomach before any nourishment can be extracted from it; all that is not capable of being made liquid, or of being held in solution, passes away as worthless. Take the silkworm, for instance; it devours about twice its own weight of mulberry leaves in the four and twenty hours, and in spite of this enormous consumption of food, its own increase is only two grains, while the refuse matter voided amounts to eighteen grains. And how comes this about? The worm uses only the juices of the

food has first to be carried away from the stomach by a vast network of closed vessels, through the walls of which it must ooze; and then it has to ooze through the walls of the tiny cells constituting the individual atoms of each organ. It is obvious that only liquid food can thus pass out of the blood-vessels into the cells; and the law may be formulated thus: a fluid moistening one side of a membrane will gradually change places with a *different* fluid moistening the other side of this membrane. Outside the blood-vessel there is a fluid, and with this the blood negotiates an exchange. The blood thus oozed from the vessel now finds itself outside the membrane (or cell-wall) of the cells which contain liquid; and between these two a similar process of exchange takes place: the cell gets new food, and gets rid of wasted material. So that all the process of digestion, nay, with us, all the previous process of cookery, is gone through to bring a little liquid into contact with the delicate membrane of a cell, visible only under the magnifying powers of the microscope. Every organ of the body is composed of millions upon millions of these cells, every one of which lives its separate life, and must be separately fed. The digestion of the carbo-