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X. *Account of the Method of making Sugar from Beet Roots, lately discovered by M. ACHARD. Communicated by A. N. SCHERER, Counsellor of Mines to the Duke of Saxe Weimar.*

Weimar, 14th Feb. 1799.

THE newest and most important discovery in Germany is that of the well known M. Achard, director of the physical class of the Academy of Sciences at Berlin, who has at length found a substitute for sugar in the beet root, (*Beta vulgaris*, Linn.) These beets in this country have been hitherto employed as fodder for cattle. The following is one of his principal experiments:—Twenty-five roots, which in their raw state weighed $32\frac{1}{2}$ pounds, being freed from the rind, bruised, and well pressed, gave, after the residuum had been extracted by boiling water, $19\frac{3}{4}$ pounds of juice. The expressed juice was then put into a tin saucepan, and evaporated to the consistence of honey over a slow fire. During this process the impurities contained in the juice, and which arose from the albumen of the beets, were skimmed off. The inspissated salt was next evaporated to dryness over a slower fire, and gave, when pounded, a dry powder of a very bright brown colour, which attracted little or no moisture; it was exceedingly sweet, without the intermixture of any other taste, and weighed two pounds three ounces. The above quantity, viz. $32\frac{1}{2}$ pounds of the raw roots, gave, therefore, two pounds three ounces of raw sugar. By another experiment it appeared, that a pound of this juice contained only $\frac{3}{4}$ of an ounce, or at most one ounce of gummy and mucilaginous particles: a circumstance which greatly facilitated the separation of the sugar. To obtain a portion of pure sugar from a quantity of juice evaporated and treated as above described, a portion of the juice, inspissated to dryness, was digested with a sufficient quantity of alcohol in a gentle heat; and after all the saccharine matter was dissolved, and the liquor had become perfectly cold, it was filtered

and the residuum properlyedulcorated with a fuitable quantity of alcohol. When all the spirit of wine had evaporated * over a gentle fire, the quantity of the pure white fugar obtained was fuch that in general 8 pounds of pure fugar may be expected from 100 pounds of raw beet roots. According to this refult, an acre of land, which may produce 46,000 pounds of beet root, will yield 22 hundred weight of raw fugar. If we allow four pounds of beet root to one fquare foot, a German mile will produce 16,756 hundred weight 2 quarters and 14 pounds. This is all as yet known refpecting the difcovery. What M. Achard ftill keeps fecret is the refult of his fifteen years experience refpecting the cultivation of thefe beets. He has found that the quantity of fugar to be obtained will depend on the foil in which they are fown, and the method of culture employed. The king of Pruffia has not only beftowed a confiderable reward on M. Achard for this difcovery, but is purfuing every poffible means to render it beneficial to his dominions.

XI. *Description of an Improved Machine for Cutting Chaff†, invented by Mr. ROBERT SALMON, of Woburn, Bedfordfhire. From Transactions of the Society for the Encouragement of Arts, &c. Vol. XV.*

WITH this machine the chaff is cut by two knives, AA, (Plate VI.) fixed on the infide of the fellies of two wheels, BB, which are ftongly connected together; the edge of the knives being at an angle of about forty-five degrees from the plane of the wheel's motion. Thefe knives are fo fixed as to be forced forward by fprings, CC, on the wheel; which fprings are formed to adjuft, and act more or

* Diffillation might be employed to fave the lofs of the alcohol. EDIT.

† Thirty guineas were voted to Mr. Salmon for this improved machine, of which a model is referved in the Society's repository for the infpection of the public.