tubular boiler of a steam engine, so as to send the flame through these tubes (horizontal cylinders), which are surrounded with cool sap, and thus economise heat that would otherwise waste up the chimney; *j j*, are the chimneys; *g f*, store-trough (compare fig. 1); *l l* (curved dotted lines), flexible rubber tubes, conveying sap from store-trough to heaters; *m m*, self-regulating sap-feeders; *n*, tall receiving can for syrup; *r r*, stopcocks for drawing off syrup; *s s*, siphon stopcocks for draining hot sap from heaters when desired. The tops of the siphons pass through the sides of the heaters (watertight) on a level with the bottom of the store-trough, and run outside below the bottom of the heater, so that when the sap is above that level the siphons will start when the stopcock is open, and flow till the heaters are drained dry. *o c* are tin tubes feeding hot sap from the heaters into the front end of the evaporators; *c d d d d* are doors, and *e e* are windows. The self-regulating sap feeders are Guild's patent, and are usually furnished with the evaporators.

The working of them, in brief, is this: A float rises and falls with the sap in the pan or heater, and works a pair of jaws which bite the flexible tube when it gives sap too fast, and relax their hold and admit more sap when it is needed. When the boiling is uniform, they admit a uniform stream just fast enough. If the man goes away over night, and leaves a big fire, these watchful sentinels supply sap while the fire lasts, and then stop the stream lest it should overflow the boilers.

4. The patent sorghum evaporator, is, in my opinion, the only pan that will make the very best grade of syrup uniformly, rapidly, and in large quantities. Kettles were long since abandoned, and flat sheet-iron pans introduced; and now the latter are fast being supplanted, among the best sugar-makers, by the patent evaporator. The principle is that of the rapid evaporation of a very shallow body of sap moving slowly and transversely over alternating hot and cool spaces. This result is secured by a succession of ledges or "crimps," running crosswise of the pan, one every six inches

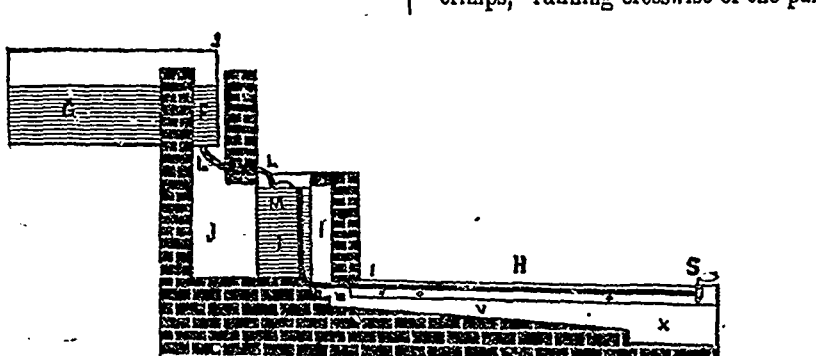

FIG. - Side view of the whole apparatus.
(Drawn and engraved for the Journal of Agriculture).

of the pan's length, the first meeting the side on the right, the next on the left, and so on (see fig. 3). The cool spaces are secured by letting the pan project beyond the fire on each side. The pan stands perfectly level, (it *e*, a 15 foot one should,) and the sap enters at *a*, passes slowly along the channels, around the points *b. c. d. e. f* etc., till it reaches the stopcock, *s*, in 30 or 40 minutes, finished syrup. In starting, just enought sap is admitted to cover the bottom and make it safe to boil. A few pailfuls must be at first drawn off at *s* and turned back near the middle of the pan, until it comes to syrup in the spaces, *u* and *v*, after which it will remain syrup there, and may be drawn off in a small continuous stream (which, I believe, is the rule for sorghum), or a gallon at a time every twenty minutes or so, which is perhaps preferable for maple syrup. At *o* and *r* are partitions with tight gates to check the flow of sap, if it is necessary.

The ledges that divide the channels are formed by "crimping" the broad sheet of heavy galvanized iron that forms the bottom as represented in fig. 4. The bottom is crimped clear across, of course, and then each alternate crimp is cut down vertically, six inches from the edge of the pan, split horizontally from its end to this point, lapped, countersunk, riveted and soldered, and a cap soldered over the open vertical end of the crimp. The crimps not only serve as ledges, but greatly increase the heating surface of the pan, for they are all open to the fire from beneath, as seen in fig. 4. These hints of construction are simply to explain the principles involved, and not to enable any one to make a pan. Every valuable feature is covered by patents which have been extended and do not expire again for several years. Expensive machinery is required in their manufacture. They are made by the Blymyer Co., Cincinnati, the original owners of the patents, and, under licence (with royalty) from them, by firms in St. Louis, Bellows Falls, Vt., and a few other places. They make better syrup, and do it much faster and easier than any other pan. Decent sorghum syrup cannot be made without their use, and to that fact are we indebted for the invention and the improvement they render possible in the quality of maple syrup. They secure an enormous saving of fuel and of labor too. All the man has to do is to fire up, skim, and draw off the syrup ready for market. With the fixtures in fig. 2, one man can boil into finished (11 lbs. to the gallon) syrup, 75 barrels of sap in 12 hours, and even more; and by boiling nights, during flush runs, the apparatus has a capacity for 2 500 average trees (buckets). But in order to do this, we must have the next essential.

5 This is fine, dry wood. The flame does the work. The wood is 3 feet long, the pan and heater are 17 feet. and yet the pan (evaporator) is in a perfect foam the whole length, and the sap in the heater usually scalding hot. But if the wood is green or very coarse, the pan will not boil the whole length, the steady flow of sap is not maintained, and the best quality of syrup cannot be made. The wood-shed should be filled for next season *as soon as one season is over*, or it is apt to be neglected. At least half of the wood should be split quite fine. The man who runs two evaporators has no time to split it.

6 Perfect cleanliness and sweetness of vessels and sap, is another essential. The Vermont climate is better, but in Ohio, as a rule. I find I must scald all the buckets about once a week, and store-troughs, evaporators, etc., much oftener. It costs a good deal, but pays in product. With a cask of