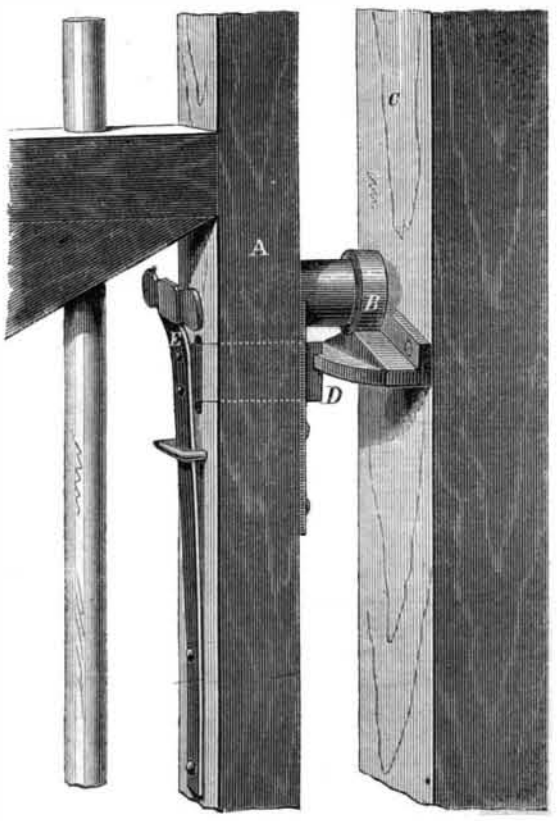
HENDRICKS' PATENT GATE CATCH.

The primary object of the device illustrated in the annexed engraving, is to afford a sure and sufficient support to the gate when closed, to prevent the loosening and permanent inclination of the hinge post. It also affords a ready means of opening the gate, and secures its effective latching when closed.



On the stile, or upright, A, is a slotted plate, screwed or bolted to the wood, and carrying a stud and roller, B. On the post, C, is a snug, or plate having a double incline, slightly hollowed at the apex to receive the perimeter of the roller, B. A projecting horizontal flange having inclined sides and a notch in the center is for the use of the catch, D, that is a part of the spring, E, which holds the catch in the notch. When the gate is to be opened, the spring, E, is pushed back, thus unlatching the gate and allowing it to swing in either direction. When closed, the roller, B, rests on the snug which then sustains the weight of the gate. It is not necessary that the gate should swing both ways; it may be furnished with this device adapted to suit the exigencies of any case. The device is cheap, easily attached to any swinging gate, and always reliable.

Patented through the Scientific American Patent Agency, Dec. 15, 1868, by Benjamin Hendricks, who may be addressed at Huntington, L. I.

The New Mode of Firing Gun-Cotton.

An interesting practical exhibition of the newly-discovered properties of gun-cotton when fired by concussion, instead of by the direct application of flame or heat, was afforded recently at Woolwich. The huge 36-in. Mallet mortar, weighing 52 tuns, which was placed in the marshes in 1857, and designed to fire a shell of 2,548 lbs. (empty), has, for some time past, been sinking in its great wooden bed, owing to the gradual decay of the wood. It was thought dangerous to run the risk of its falling upon any visitor by leaving it in this position. But weights of 52 tuns cannot be moved for nothing. To erect sheers and the necessary appliances for raising the mortar would have entailed an expenditure estimated at about £50. Under these circumstances, recourse was had to gun-cotton to destroy the bed, and precipitate the fall of the mortar. Four charges of 4 ozs. each, four of 6 ozs., and one of 8 ozs. (total, 48 ozs.) were placed on the wooden bed, and exploded by means of mining fuses charged with detonating composition. The material being rotten was especially unfavorable for the exertion of explosive force—for the force had, so to speak, nothing to act against. But what could be done was done. The huge bed was shattered, and particles flew in all directions. The mortar, although it altered its position, refused, however, to fall, being held, to some extent, by a thick wrought-iron screw bolt. The next experiment was made upon this bolt. A one-lb. disk of compressed gun-cotton was tied to the bolt and exploded. The explosion was thus wholly unconfined. Nevertheless the bolt was broken in two places, a result which exceeded the most sanguine anticipations. Still the huge mortar remained in its position. A third operation had, therefore, to be made. This time two 1-lb charges were disposed under the left trunnion, and the 1-lb. charge was so placed as to give the mortar a kick behind. The explosion of these charges completed the work. The monster mortar slowly and gracefully bowed forward and fell to the ground. The gun-cotton had thoroughly done its work, at a cost of 14*s.* 6*d.*—*Scientific Review.*

The Use of Zinc in the Reduction of Gold Ores.

M. D'Heureuse has been for some time experimenting in the use of zinc as a substitute for quicksilver in gold mining. According to the *Scientific Review*, he now finds that in the amalgamation process only about half the gold is extracted from the rock. Melted zinc appears to take up all the gold, allows slag and rubbish to float at its surface, requires little heat to keep it melted, and from its volatile nature can be distilled in a retort to separate the gold and re-collect the zinc itself. The mode of operating is simply to introduce gradually the gold-bearing rock, in a pulverized state, into a bath of melted zinc. This metal immediately attacks and dissolves nearly every particle of gold, while the *débris* rise to the surface of the bath, and can be skimmed off. When sulphurets are present, the rock must be previously roasted. Surely nothing can be more economical and effective than this when plenty of zinc ore is at hand.

Sugar from Pumpkins.

We condense the following from a Southern cotemporary for the benefit of our readers:

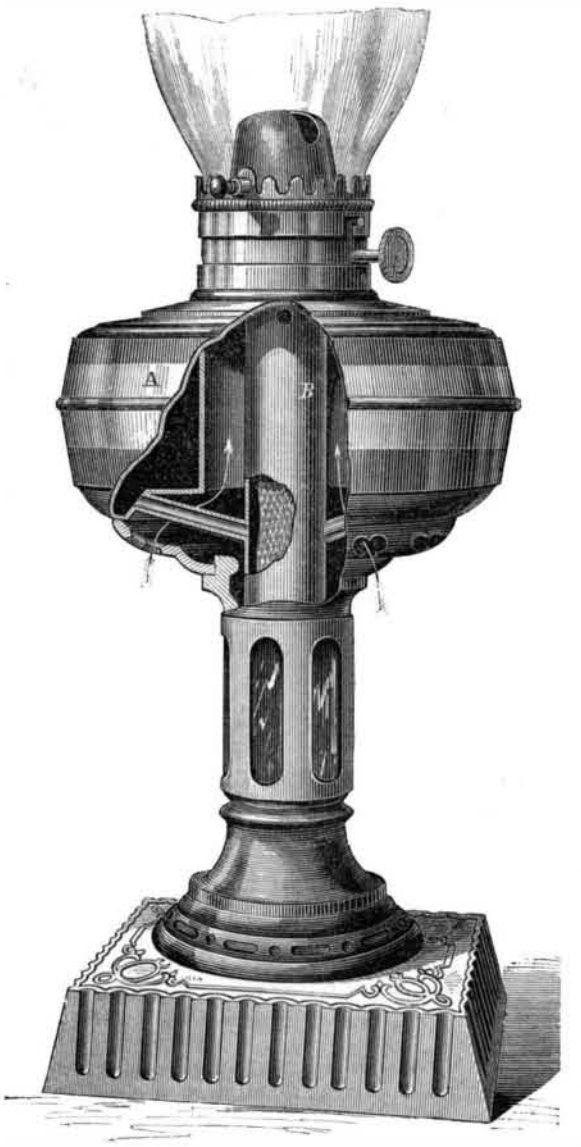
During late years, several more or less successful attempts have been made to introduce into the United States, sugar-producing plants to replace the cane. The beet root and sorghum are among the number, but one of the most valuable, which is cultivated in every cornfield in the Middle States as a side product, has been quite neglected. This plant is no other than the common pumpkin, the *Cucurbita pepo* of botanists. Its period of harvesting lasts longer than that of the beet, it is easier preserved and its refuse is just as valuable for the feeding of stock. Pumpkins weigh from 50 to 60 pounds; they furnish about 4 per cent of sugar; their contents in juice is 80 per cent. This juice indicates from 10 to 11 on Baumé's areometer.

The sugar obtained from pumpkins is of a good grain and color. Before refining, it has a slight flavor of melon. The sirup is of a very dark green color, nearly black, and tastes like cane sugar.

In Hungary, since the year 1837, several manufactories for making sugar from pumpkins have been in operation. The treatment of this fruit is perfectly identical with that of the beet root, and the machinery used for the purpose the same.

PERKINS AND HOUSE'S NON-EXPLOSIVE KEROSENE LAMP.

Any device, any plan of lamp, or any method of management that can render the form of hydrocarbon known as kerosene non-explosive, and insure safety to life and property, is certainly worthy attention and deserving of general adoption. The design of the style of lamp of which the accompanying illustration is a representation, is to provide a perfectly safe means of utilizing the light-giving qualities of kerosene. The lamp may be of any style of form or decoration desired, the essentials of the improvement not interfering with these qualities.



The globe, A, is of metal, therefore proof against breaking. It contains the oil, which is fed into a central tube, B, that holds the wick. The connection between the reservoir and the tube, B, or the wick, is made by pipes (shown where the shell of the lamp is represented as broken away), too small to permit flame to pass to ignite the oil in the globe, on the principle of the Davy and other gas safety-lamps. The air (oxygen) necessary to combustion, instead of being taken in near the flame, just below the cone, as usual, passes in, as shown by the arrows, through apertures at the bottom of the lamp, enveloping the central tube and keeping it and the oil it contains as cool as the surrounding atmosphere, thus preventing the generation of explosive gas by a higher temperature.

It is claimed that this lamp is absolutely safe, gives a superior light, and is economical in oil; results assured by the following facts: Safety by conducting the oil from the reservoir, or body of the lamp, to the wick by tubes impassable to flame; in case of overturning all the oil that can be spilled is that contained in the wick tube. By the reception of the air at the bottom of the lamp, the combustion of the oil is more perfect than in lamps in general use, according to experiments made by Prof. E. S. Snell of Amherst College, who ascertained that the amount of light obtained from this lamp is from forty to fifty per cent greater than from others using the same quantity and quality of oil. Its economy of oil is shown not only by the foregoing, but by the fact that only the amount necessary for the flame is taken up by the wick.

Patented December 11, 1866. For agencies, information, etc., address Votaw & Montgomery, at Springfield, Mass., or Cleveland, Ohio.

BEET ROOT SUGAR.

No. VI.

[TECHNOLOGY.—PART III.

DEFECATION, CONCLUDED.

The quantity of sugar contained in beet root juice varies between certain limits, the determination of which is important. Many various processes, chemical, mechanical, and optical, have been proposed for the attainment of this object, and tables have been computed and published in various works to facilitate the matter. The simplest, however, although a purely empirical method, is the direct use of Baumé's areometer (also called Baumé's hydrometer, saccharometer, or densimeter), which furnishes, by a very simple calculation, data which we found to approximate sufficiently to the truth, for all practical purposes.

The rule is as follows:

1. Float the Baumé areometer, in the saccharine solution, or beet root juice, and read off the degrees of density marked on the scale of the instrument.

2. Multiply the number of degrees thus noted by two, and subtract from the result the same product divided by ten.

The result obtained is the percentage of sugar in the liquid, very nearly.

If, for instance, the juice indicates a density of ten degrees, Baumé, we have:

$10 \times 2 - [(10 \times 2) \div 10] = 20 - 2 = 18$ per cent sugar.

If the instrument had marked only 4·8; the per cent of sugar would have been thus found:

$4{\cdot}8 \times 2 - [(4{\cdot}8 \times 2) \div 10] = 9{\cdot}6 - 0{\cdot}96 = 8{\cdot}64$ per cent of sugar.

The importance of the determination of the quantity of sugar contained in beets induces us to furnish the exact correspondence existing between each degree of Baumé's areometer and the percentage of sugar in a saccharine solution, as given in the books. It is as follows:

Degrees, Baumé.	Per cent sugar.	Degrees, Baumé.	Per cent sugar.
1	1·72	21	38·29
2	3.50	22	40·17
3	5·30	23	42·03
4	7·09	24	43·92
5	8·90	25	45·79
6	10·71	26	47·70
7	12·52	27	49·60
8	14·38	28	51·50
9	16·20	29	53·42
10	18·03	30	55·36
11	19·88	31	57·31
12	21·71	32	59.27
13	23·54	33	61·32
14	25·34	34	63·81
15	27·25	35	65·19
16	29·06	36	67·19
17	30·89	37	69·19
18	32·75	38	71·22
19	36·40	39	73·28
20	34·60	40	75·35

The lime used for defecation must be of as pure a quality as possible, and free from potash, a fact which is determined by previous chemical analysis.

To prepare it, stir it well into the water added for the purpose of slacking it, so as to convert it into a smooth, creamy mixture, to which water is then added, until the whole bulk of "milk of lime" marks a certain determined density on Baumé's areometer. This density must, when once adopted as a standard, be kept constant during the campaign. The strength of the mixture varies between 14 and 20 degrees Baumé in different establishments, but must be so regulated that the quantity of lime used shall be intermediate between one-half of one per cent and one per cent of the total weight of the beet roots worked up in the factory.

The lime ought to be slaked in considerable masses at one time to insure uniformity of composition, by successive additions of *hot* water (river or rain water if possible). When it has attained the desired consistency, it must be passed through a metallic screen sieve to remove the solid particles, small pebbles, etc., which may accidentally have been retained. It must be used freshly prepared. A good plan, where the lime is not chemically pure, is to let it rest and settle for a while after having been slaked and watered, to run off the supernatant water, and to repeat the addition of fresh water several times in succession. In this manner any contained potash (which abounds in wood-burned lime) is effectually washed out of it. We have found that heating the milk of lime to the boiling point, before admitting it into the defecating pans, accelerates its action, which it also renders more perfect.

It is known by the manufacturer that the right proportion of lime has been added during defecation, when the defecated juice is of a light, clear, transparent, amber color. If, on the contrary, this juice is of a green or greenish hue, and contains many floating opaque particles, the quantity of lime has been insufficient.