operation is performed in a dark place, light is also evolved. All sorts of imaginary causes have been assigned to account for these phenomena. They are referable, however, to a very simple and universal law. All substances during their change from a gaseous to a liquid, or from a liquid to a solid state, evolve heat, and *vice versa*. The intense cold produced by liquifying ice or snow by admixture with salt, is a familiar instance of the latter; and the heat evolved in solidifying carbonic acid under intense cold and pressure, is sometimes dangerous evidence of the former—the expansion of air consequent on the sudden liberation of heat from the carbonic acid in the moment of congelation, not unfrequently shattering the vessel to atoms.

Lime in slaking will absorb one-fourth its weight in water; but the slaked lime is not more moist than before. The water unquestionably, therefore, is chemically combined with the lime, and becomes solidified; and it is simply owing to this solidification of the water that heat is evolved.

Caustic lime has a strong affinity for water and carbonic acid. When kept in a dry place it gradually slakes, cracking, splitting and crumbling to powder with the evolution of heat—which, however, is not so perceptible on account of the length of time during which the process is extended—just as though it had been slaked by pouring on water. In this case the lime has obtained the twenty-five per cent. of water it needs to slake it from the atmosphere. There is this difference, however, between air-slaked lime and that which is water-slaked. The former is slaked precisely as the latter by water, but it also absorbs carbonic acid from the air, and instead of being simply a hydrate of lime, as when water-slaked, it is a definite compound of hydrate and carbonate of lime, 42·6 per cent. of the former, and 57·4 of the latter. Air-slaked lime, therefore, is far from being so caustic as water-slaked lime—upwards of one-half of it being reconverted into the same chemical state as it was in before burning.

After the lime has absorbed sufficient water and is completely fallen to pieces, carbonic acid is absorbed much less rapidly, especially in damp situations. In fact, though there is a constant tendency in lime to return to the state of carbonate in which it existed previous to burning, yet, by mere exposure to the air it does not attain this state in any assignable time. In some walls six hundred years old, the lime has been found to have absorbed only one-fourth of the carbonic acid necessary to convert the whole into carbonate; in others, built by the Romans eighteen hundred years ago, the proportion absorbed has not exceeded three-fourths of the quantity contained in natural limestone.

When slaked in the ordinary way, by the application of water, lime falls to pieces without the absorbtion of but little, if any, carbonic acid. But when slaked and exposed to the air, the absorbtion of carbonic acid is at first very rapid, but it gradually becomes very slow, and probably the same definite compound of hydrate and carbonate of lime is formed as in the case of air-slaked lime.

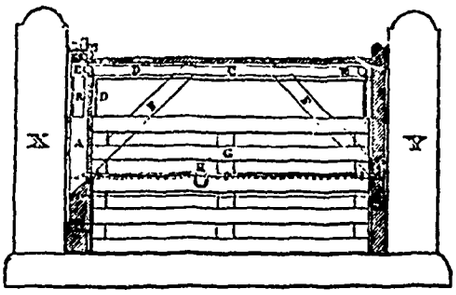
The original limestone, or any other form of carbonate of lime, then, is perfectly mild. By driving off the carbonic acid by heat, we get lime which is very caustic. By slaking this with water, we get a less caustic substance—hydrate of lime. By allowing it to air-slake, we get a still less caustic compound—a definite compound of hydrate and carbonate of lime. And by exposing it to the air for a sufficient length of time, we ultimately get the whole reconverted into its original mild form—carbonate of lime.

The commonly received notion that air-slaked lime is stronger than water-slaked lime, is an error. It is, in fact, not so strong.—*Rural Annual*

Save the Leaves.

They have a double value. First, in their natural state, as the best of all mulches. There is no protection against frost, and the effect of winter sunshine, to compare with forest leaves. In the woods they effectually protect tender plants and flowers, which die when subjected to the exposure of the garden. There is no better covering for strawberry beds and choice plants; and, for this purpose, a little brush is needed to keep them from blowing away. Secondly, leaves are a most valuable manure when decomposed. Leaf mould is considered by gardeners one of their most powerful fertilizers. In the compost-heap, the barn yard, the stable, and the pig-stye, they should be freely used. A pile of dry, clean leaves is an excellent resource for bedding animals during the late fall and winter. It greatly promotes the comfort of the animals, and adds not a little to the wealth of the dung heap.

Stovel's Self-Regulating Snow Gate.



The above is an engraving of a self-regulating gate designed especially as a convenient and safe arrangement for the season of deep snow, when ordinary gates get blocked up, and are very troublesome. It was invented and patented by E. & S. Stovel of Mount Forest, County of Grey, from whom the right of manufacture and use can be obtained, on terms set forth in their advertisement, which appears on the last page of our present issue.

DESCRIPTION OF GATE.

A. Heel Post on hinge, upon which the gate swings, and in which there is a slot or groove for the balance weight B to work in.

B. Balance weight helping the upward movement of the gate by being fastened to the cords D to the inner frame of the gate G, thereby allowing it to be moved up or down easily.

C. Top rail of the gate, on the under side of which the cords run, and pass over the pullies E at each end of it.

D. Cords, one end of which are fastened to the inner frame, and the other end to the balance weight.

F. Outer frame, or body of the gate, forming a box or case for the inner to slide "up or down as required" in.

H. A spring formed of a bent piece of wood, each end of which is attached to the end of a small rod running along one of the rails of the inner frame of the gate, and going into notches in the outer frame; so keeping the inner frame at any required height from the ground. By grasping the spring in your hand it draws the rods out of the notches, and so allows the gate to move up or down as required.

The advantages of this gate, as claimed by the inventors and patentees, are as follows:—

1. It is a strong, durable gate, that will work with or without snow.

2. Any farmer can make it himself.

3. It can be made cheaper than any other gate of the kind yet invented. The gate can be made for from $2 to $3, as there is no iron work required about it.

4. It will work equally well in winter, with two or even three feet of snow on the ground, as in the middle of summer, and will set as close to the snow as to the ground.

5. For side and back gates for farmers, it can be made without the cords and weight, as the inner frame can be raised by hand, it not being more than about 25 lbs. weight.

Cost of Steam Ploughing.

At the dinner of the Watlington Society, Mr. Taylor begged premission to say a few words as to the cost of working a steam plough. He had taken some little trouble to ascertain the actual cost of working by steam, so that there might be no mistake about the matter. He had no wish either to understate or overstate the cost. It was a very expensive implement, costing with its tackle about £1,000. It was one of Fowler's; and having had it in operation between two and three years, he could now state pretty accurately what was the actual cost. He could scarcely have done this the first year; for he would tell them candidly that its working the first year was by no means satisfactory, there being so many breakages and interruptions, principally from the gross carelessness of the persons in charge of it; so that the expense was very great. He was glad to say, however, that its present working was most satisfactory; the breakages were very few, and the work done was very much greater than in previous years. He would just give the details. He first of all calculated interest on first cost at 5 per cent; then put down for wear and tear 10 per cent—making 15 per cent upon £700; for he did not take the whole £1,000, the engine being employed three-tenths of its time in threshing, chaff cutting, sawing, grinding, &c., and therefore it was fair to reckon only seven-tenths. Fifteen per cent. on £700 came to £105 a year. That divided by a 100, the average number of days it worked in the year, gave about 22s. a day. For repairs of engine and tackle he put down 7s. 4d a day; for coal, oil, and tallow, 15s. 6d.; wages 11s.; and water cart, 7s., making a total expense per day of £3 2s. 10d. The daily average number of acres ploughed had been eight, and the cost had therefore been 7s. 10d. per acre. Now he thought those who knew what sort of land it was would know very well that it could not be ploughed with horses in an average season for anything like the same sum. In fact, when he commenced farming he wanted more ploughing than he could manage with his own horses, and therefore applied to a neighbouring farmer for the use of some of his. The farmer at first consented to plough for him at 12s. per acre, but he very soon gave it up, and said he could not do it under 14s., and that he could better afford to have his horses remain idle than take less. Thus, as ploughing on strong land cost 7s. 10d. an acre, and horse ploughing 12s., there was difference in favour of the former of 4s. 2d. He thought that was a fair statement of the case.—*Farmers' Magazine.*

Trenching Land.—We had a piece of garden soil turned up to twice the depth of the spade this spring, and planted thereon sweet corn. Alongside was another piece of ground not trenched, and planted with corn at the same time. The corn on the first piece of ground grew luxuriantly through six weeks of drouth, reaching ten feet in height, and the ears setting very thickly; while the other patch of corn, though highly manured, has not grown more than from five to seven feet in height, and is poorly furnished with ears. Would it not pay at this rate to trench the whole garden, and bring the rich subsoil, now hardened by long cultivation, to the top? We commend this example to all who doubt the benefits, pecuniary and otherwise, of deep ploughing and subsoiling.

Use of Potato Tops.—While talking about potatoes, it may not be amiss to give a suggestion made by a friend the other day *riding along the road*, in regard to the use to be made of the tops. He recommended to place them around apple trees, where they would act, not only as a mulch at first, but afterwards as they decay, as a fertilizer. We have mentioned this experiment and think well of this use to be made of them. We know by actual analysis, that the potato vine contains a large percentage of potash, and this ingredient alone may be, and undoubtedly is, valuable as a fertilizer for all trees, inasmuch as the wood must be made up in part of this alkali. It is an experiment easily tried, and we hope that the hint may be acted upon and the results on the trees be carefully noted and reported.—*Maine Farmer.*

The Hop Crop in England.—According to the following extract from the *N. Y. World*, the hop harvest in England has come considerably short the past season:—"The accounts from England, which now extend to very nearly the closing hours of the harvest, point to a deficiency of at least 40,000 bales, which is likely to reach 45,000—and may possibly extend to even 50,000 bales. The letter of our English correspondent is very full and satisfactory as to the condition of the crop at the moment of writing. It must always be borne in mind in considering estimates made *after the crop has matured*, that the estimate represents the *maximum*, and that, with a plant so exceedingly liable to disease and disaster as the hop, the probability of a variation from week to week is very great, and that this variation *must* aways be in a descending scale."

Potato Jubilee.—If the potato-loving people of New England ever had occasion to hold a potato jubilee, they have now. During the severity of the drouth in June and part of July, it seemed that the potato crop would never grow again, and it was the general opinion that what had been planted would not be worth digging. The rains which came so providentially, and followed so timely all along until now, began to revive them, and they pushed along in double quick time—the tops flourishing and the tubers swelling—and now, at digging-time, every one is astonished at the size, fair appearance, and excellent quality of them. It seems like old times to roll out such noble and sound potatoes as are found in almost every field. We have not seen or heard of a rotten one in all our walks. The drouth, probably, used that disease up, and good bye to it. It is thought by some that there will be a million more bushels dug in Maine this fall than there was last year. We do not know how it will be, but this is certain, what have been dug thus far are of the best quality.—*Maine Farmer*