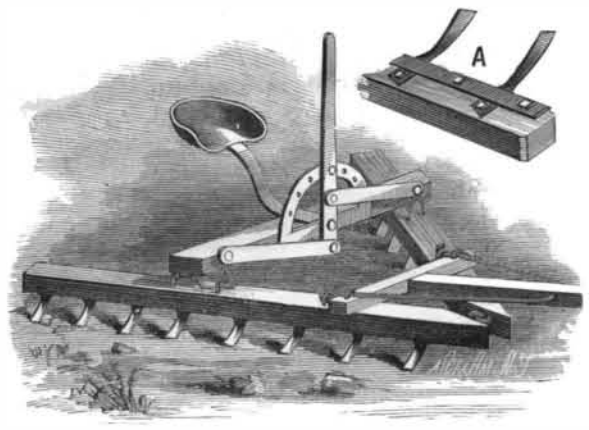
A SOD CUTTER AND PULVERIZER.

The invention herewith illustrated provides a simple and effective machine for cutting in pieces sods and pulverizing hard or baked soil. The inclined side bars and the cross bar are hinged to each other, and carry bent and twisted knives, adjusting bars, and a hinged tongue. The manner in which the knives are attached to the side bars is shown at A, where a rear part of one of the side bars is shown inverted. On the front of the cross bar, to which is attached a spring standard carrying the seat, is pivoted a lever, moving along an arched catch bar, and connected with two bars hinged at their outer ends to the side bars; by operating this lever the driver can turn the side bars upon their hinges to cause the knives to worker deeper or shallower in the



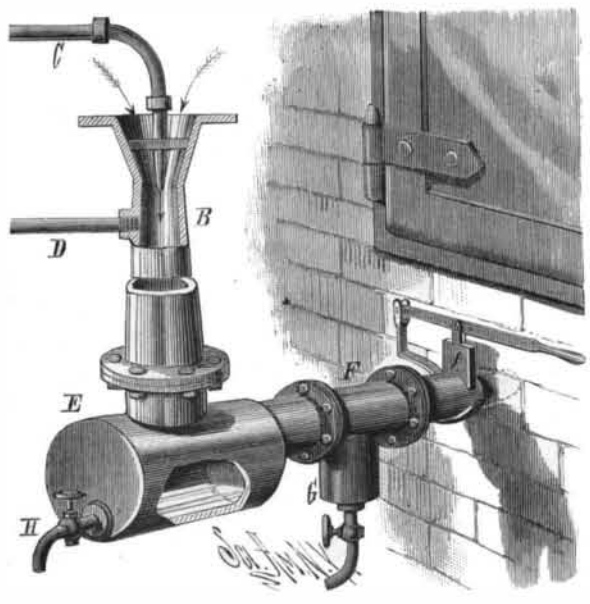
PHILLIPS' SOD CUTTER AND PULVERIZER.

ground, and this lever will be held by a pin or catch in any position at which it may be adjusted.

This invention has been patented by Mr. James R. Phillips, of Webster, Day County, Dakota Territory.

A MOIST AIR INJECTOR FOR FURNACES AND FORGES.

This injector is for supplying furnaces with air mingled with steam or moisture, to facilitate combustion, to protect the furnace or forge, and desulphurize the metal under treatment. The invention is an improvement on a former patented invention of the same inventors, and consists in novel combinations of water chambers and a water supply pipe with the air pipe and steam jet pipe discharging therein, which will be readily understood from the accompanying illustration. The air enters the pipe or trunk, B, around the nozzle of the steam inlet pipe, C, and is carried along by the pressure induced by the steam jet; the pipe, D, also discharges a regulated quantity of water opposite the nozzle of the steam jet, so that the air, steam, and water fall together into the chamber, E, in the bottom of which is a body of water, a pipe, F, leading out of the chamber, E, above the level of the water in its bottom to the place of discharge inside the furnace or forge. This pipe, F, has a pendent chamber or pocket, with a drain pipe orfaucet, G, and the chamber, E, has also a valve, H, so that there will be no excess of water in either place to be taken over with the air into the furnace. At the point where the nozzle enters the furnace there is a gate valve to regulate the supply of air as may be desired. By this



DAVIS & WALKER'S MOIST AIR INJECTOR FOR FURNACES AND FORGES.

arrangement it is claimed that the proper amount of moisture is better obtained and the steam more easily condensed than was formerly accomplished by the water jacket or box surrounding the discharge nozzle of the air pipe, and that much less water is required for the purpose.

This invention has been patented by Messrs. John B. Davis and William Walker, of Jermyn, Lackawanna County, Pa.

Hardening Plaster.

The *Journal du Ceramiste et du Chaufournier* describes a new method of hardening plaster of Paris; from it the following extract is made:

In 1878 and 1880 M. J. B. Mallion, of Lyons, made a number of experiments in the hardening of plaster from Piedmont. He first tried a mixture of plaster and fat lime; but the result was unsatisfactory, the object remaining granular and of a dubious color. He then experimented with the magnesites simply made caustic; his success was complete, the magnesia hardened the plaster better than lime, and the product was a pure white in color.

He used two methods. In the first he calcined the magnesites sufficiently to release the carbonic acid, and then reduced this caustic magnesite to an impalpable powder; then mixed it in the proportions of 15 to 30 per cent with the plaster, and tempered it with water; worked it up, and when the object thus made was dry, he poured over it a solution containing from 20 to 30 per cent of sulphate of zinc (if the objects are small, they are steeped about an hour in the solution); they are then dried and polished, and the product is found perfectly hard.

In the second method, when the solution fails to penetrate properly into the object, M. Mallion tempers his mixture of plaster and magnesia directly with the sulphate of zinc solution, a little less concentrated than before, and then at once uses it for the purpose intended. The resulting mass is homogeneous, handsome to the eye, has an astonishing resistance against crushing, and only an iron point will make an impression upon its surface.

The zinc solution is used on all objects that it is desirable to have remain white; in this manner are made fine statuary, mouldings of extraordinary beauty, blocks for statuary, fireplaces, columns, and ornaments of all kinds. By lining the interior of the moulds with plates of zinc, or better still with glass, the product will have the polish of marble. The richest marbles can be likewise imitated by simply tinting certain portions of the mixture of plaster and magnesia and disposing them with judgment and art. For floors, it is better to replace the sulphate of zinc by a solution of iron, which will give to the compound a very beautiful color, similar to pinewood, and this can be rendered still more pronounced by rubbing it with linseed oil.

To obtain the best results with this process two things are requisite: the magnesia must be free from silica, and it must be calcined very regularly. For the latter purpose a gas furnace, of the Siemens or Schwandorp type, is the best.

The best of the magnesites for this purpose are undoubtedly those from the Grecian Archipelago, at Afrati, Mandoudi, Lesbos, or Corinth; it is sold for 27 francs per ton on the ground. The average analysis is as follows:

	Afrati.	*Mandoudi.*
Carbonate of magnesia	94·50	97·53
Lime	4·15	0·75
Silica	0·75	0·15
Water	0·60	1·49
Alumina and oxide of iron	0	0·08

The magnesia of Germany is irregular in composition and too high in price. The Italian mineral is valueless on account of the great quantity of silica contained in it. The analyses from the principal sources of supply are as follows:

	Baldusiro.	*Casalette.*	*Island of Elbe.*
Carbonate of magnesia	80·75	86·30	84·49
Silica	18·50	13·25	12·85
Peroxide of iron, alumina, lime	0·75	0·45	2·80

These minerals are sold at from 20 to 30 francs per ton for the first two, and 33 francs per ton for the Elbe magnesia.

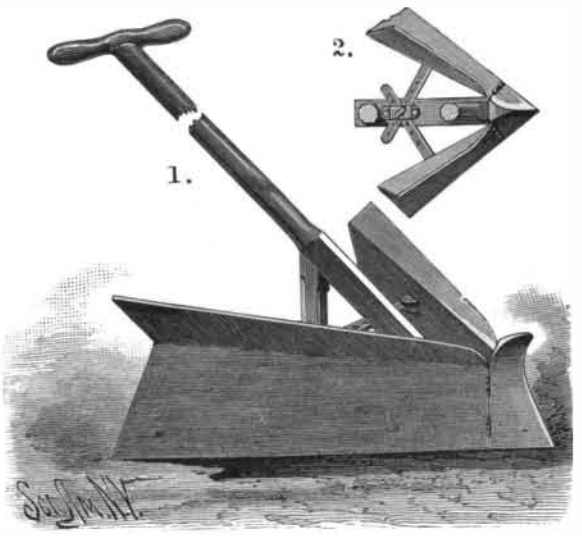
Galvanized Iron Water Pipes.

In the course of a paper on the above subject, by Dr. F. P. Venable, in the *Journal of the American Chemical Society*, he states that it has long been known that zinc dissolves in water, and that soft water, such as rain water, dissolves it more easily than hard water. Water containing carbonic acid is specially able to dissolve it. The use of galvanized iron for pipes and tanks being so much on the increase, the subject becomes more and more important, and it is desirable to ascertain, as far as possible, to what extent solution of the zinc coating takes place, and how far water contaminated by zinc is injurious to health. The author quotes several investigators as to the latter point; the evidence being to some extent conflicting, but giving a very decided balance on the side of the view that such water is considerably injurious.

Investigations made on behalf of the French Government resulted in the prohibition by the Ministry of Marine of the use of galvanized iron tanks on board men-of-war. Professor Heaton has given an analysis of a spring water, with a further analysis of the same water after it had traveled through half a mile of galvanized iron pipe. It had taken up 6·41 grains of zinc carbonate per gallon. Dr. Venable gives the results of an observation of his own, where spring water passed through 200 yards of galvanized iron pipes to a house, and took up 4·29 grains of zinc carbonate per gallon. It therefore seems pretty clear that drinking water should not be allowed to come in contact with zinc.

AN IMPROVED HAND SNOW PLOW.

The plow herewith shown is designed for ready adjustment for the making of paths of different widths. The share, secured to the front end of the bottom runner, is of wood, and is inclined to the sides and rear; a wing is hinged to each side of the share in such manner that it can swing to and from the frame, iron or steel runners being attached to the bottom edges of the wings, and their upper edges having flanges to prevent the snow from passing over into the inside, and to throw it back so far that it cannot slide again into the



FRANZ'S IMPROVED HAND SNOW PLOW.

furrow as the plow is pushed along. Fig. 2 shows in detail how braces attached to each wing cross each other on the central bottom piece or runner of the frame, where a pin may be placed to hold the wings adjusted at any desired width, or permanent braces may be used in place of the adjustable ones.

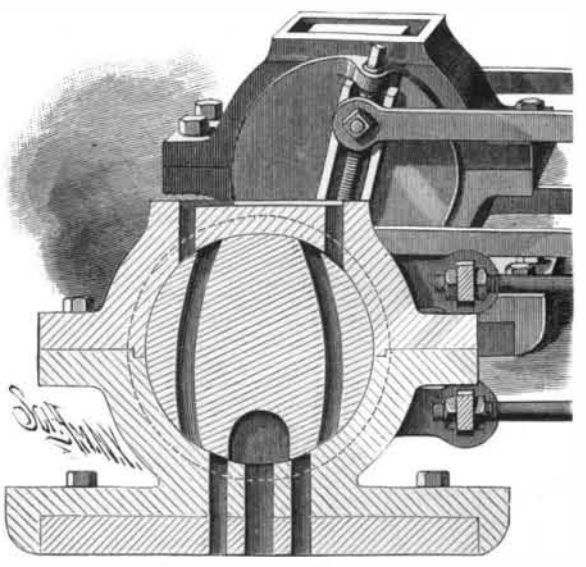
This invention has been patented by Rev. Julius Franz, of Warsaw, Ill.

Gas Engines of Large Power.

The company engaged in the manufacture of the Otto gas engines at Deutz, Germany, have recently erected a water works to the order of the authorities of the city of Duren. The pumps of the establishment are driven by two Otto gas engines, each of forty horse power. The same company have a similar contract which they are carrying out at Coblenz, where they will install two forty horse engines; and in addition to the above they will equip the city of Quedlinburg with a water supply plant, and operate the pumps thereof with gas engines.

A VIBRATING CYLINDER STEAM VALVE.

The illustration herewith shows transverse sectional and exterior views of a steam valve recently patented by Mr. William Mitchell, of Altoona, Pa. The case of the valve is formed of two half boxes, making part of or attached to a base plate, which may form part of an engine cylinder. In the base are two steam ports, and between them an exhaust port, while in the top portion of the valve case are two inlet steam ports. The valve, which is cylindrical, has heads that overlap on the ends of the case, so as to pack the valve and prevent its end-



MITCHELL'S STEAM VALVE.

wise movement. Transversely of the valve are two passages, placed to coincide with the top and bottom ports alternately when the valve is rocked or vibrated, the valve having an exhaust cavity corresponding with the exhaust port in the base plate. Two valves of this construction may also be linked together, so that both valves will be simultaneously rocked, each valve then having but one inlet passage, with the view of one valve supplying steam to one end of the cylinder and the other valve to supply the other end.

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