

Plaster of Paris.

The Berlin *Bautechnische Zeitschrift* gives some curious particulars in regard to the use of plaster of Paris. The employment of this material is much less general with us than it is abroad, but there are still many mechanics and artists here who would like to know enough of its properties to handle it to advantage. In the first place, a great deal of plaster of Paris is spoiled in the calcination by the notion that it is necessary to raise it, like quicklime, to a high temperature. The consequence is that the commercial plaster is burned very much at random in kilns, which deliver one portion overburned, and, therefore, inert, a second portion underburned, and also inert, and the rest calcined to the proper degrees, but, if coal is used for burning, often contaminated with sulphide of calcium, and, therefore, unsuited for use. Before delivery, all these qualities are ground up together, the mixture thus depending for its setting quality entirely on the comparatively small percentage of properly burned and pure plaster which it contains. In consequence of this irregularity of the commercial material, sculptors abroad usually prefer to calcine their own plaster. They buy, when they can, powdered gypsum from a deposit known to be granular, rather than stratified, and heat it on a sheet iron plate over a gentle fire to about the temperature of boiling water. If there is good access of air to the mass of gypsum, the heat may be somewhat less than that of boiling water, and it should never much exceed it, or the resulting plaster will be overburned and inert. As the heating of the gypsum powder proceeds, steam, or watery vapor, disengages itself from the mass, at first freely, and then locally, from little craters, which form themselves for a moment and then disappear. When this phenomenon is observed, the powder should be stirred until the craters cease to form, and a cold piece of glass held over the heap of powder is not dimmed by the vapor. The operation is then complete, and the plaster should be removed from the fire and allowed to cool. So prepared, plaster can be used over and over again. After it has been mixed with water, hardened and used for moulds, it is still plaster, with nothing added but water, which can be driven off by pulverizing and heating the powder exactly as before, when the plaster is recovered in as good condition for use as ever.—*Am. Architect.*

Soldering Metal for Aluminum.

This is the invention of Alexius Rader, of Christiania, Norway. It consists in combining cadmium, zinc and tin mixed in substantially the following proportions, viz.: cadmium, fifty parts; zinc, twenty parts; tin, the remainder. The zinc is first melted in any suitable vessel, then the cadmium is added, and then the tin in pieces. The mass must be well heated, stirred and then poured.

This soldering metal can be used for a variety of different metals, but is especially adapted to aluminum.

The proportions of the various ingredients may be varied in accordance with the use to which the article is to be put. For instance, where a strong and tenacious soldering is required, a larger proportion of cadmium can be used; where great adhesion is desired, a larger proportion of zinc would be used; and where a nice and durable polish is desired, a greater per cent of tin would be used.

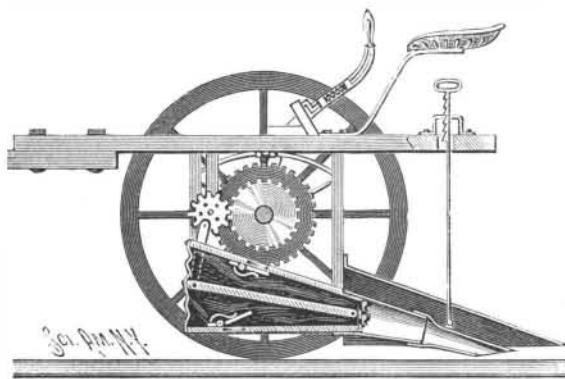
The alloy thus made, independent of its use as a solder for aluminum, is light in weight and capable of taking a high polish.

THAT inebriety is a disease of a physical nature is susceptible of the clearest demonstration, and is generally recognized. There is now no question or doubt of its being hereditary, and no one doubts that it is acquired by social customs. That it is also a disease of the moral nature, engendered by allowing the intellectual faculties to remain inactive, by not exercising the power of conscience and will, by permitting the

power of appetite and passions to dominate over conscience, by the lack of a positive character, by defective moral education, and by the want of self-culture, is equally as certain, and can be as clearly proved.—*Dr. Day.*

A NOVEL DEVICE FOR BLOWING DUST FROM HIGHWAYS.

"It is as important to remove the worn-out material from a stone road as to put on new material," and "all mud should be brushed from the road surface before applying more stone." These were leading precepts in the mind of John Loudon Macadam, the



ROAD CLEANER-SECTIONAL VIEW.

Scottish engineer whose name has for half a century been connected with the excellent road-making system he introduced, and which now everywhere bears his name. Road making, after his system, was practically commenced in England in 1816, and within eight years from that time over twenty thousand miles of the public roads of Great Britain were macadamized. The proper cross section and grading being established, with adequate provision for thorough drainage at all times, the Macadam system primarily consists of laying small angular broken stones directly upon the earth, a yielding bed being preferred to a rigid foundation, and the angular shape of the stones causing them to bind together to a greater or less extent, as they are fixed in their places first by the roller, and afterward by the traffic upon the road. The number of courses and their thickness and the different sizes and kinds of stone will, of course, vary with the location and circumstances and the amount to be expended on any given length of roadway, but the precepts above quoted, as to the removal of dust and

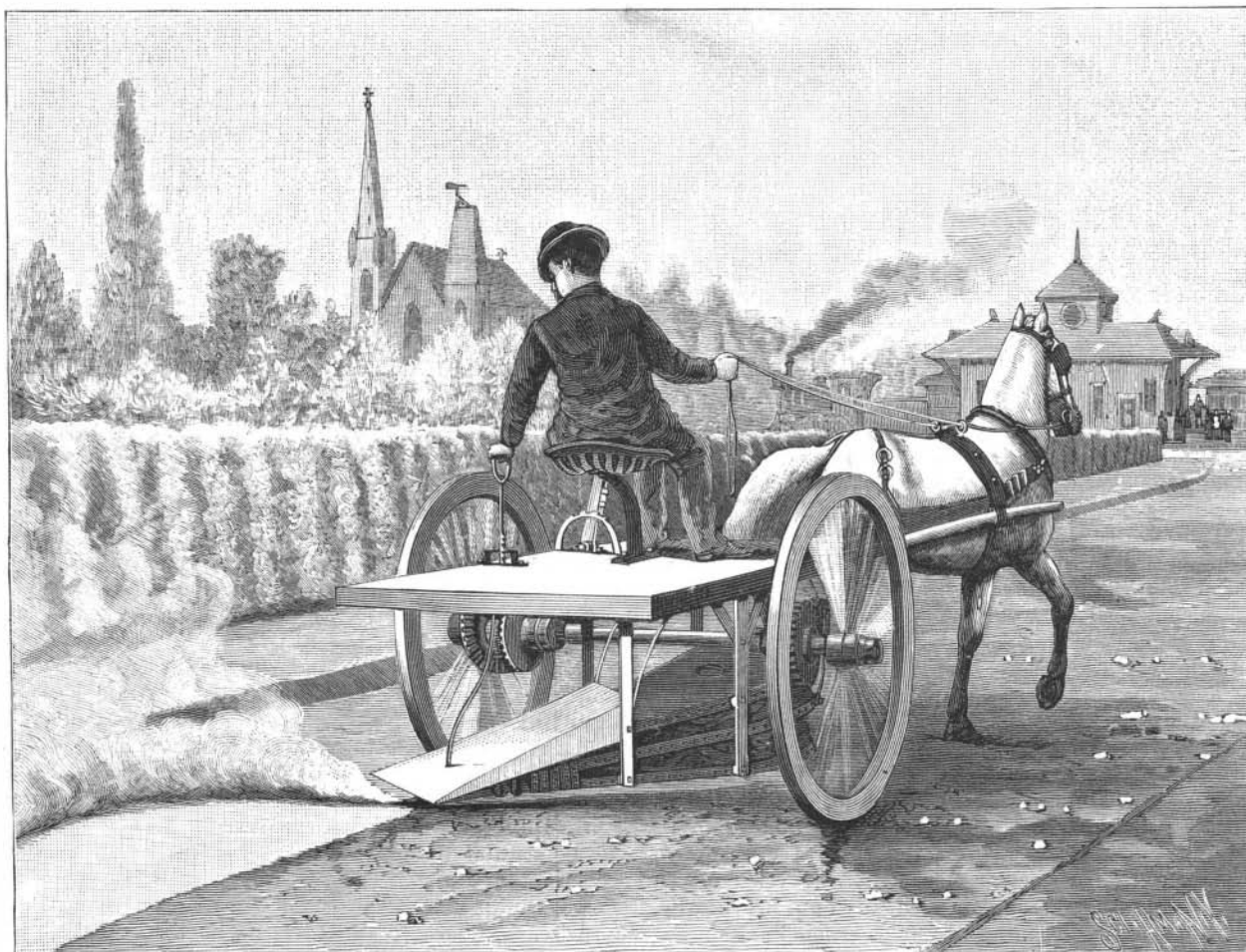
whence it may be conveniently removed, as may be desired by the operator of the machine. This feature of the machine adapts it for use for efficiently cleaning streets in country towns as well as for work on the public roads beyond such limits.

Upon the inner face of one of the two traction wheels, loosely mounted on the axle of the machine, is a bevel gear meshing with a bevel pinion supported by a bracket, the pinion meshing with a bevel gear splined upon and having a slight longitudinal movement along the axle. The latter gear is moved by a hand lever extending upward through the platform, and having a thumb latch for engagement with a rack or other keeper, the arrangement being such that, according to the adjustment of the hand lever, the axle will or will not be rotated, as may be desired, by the revolution of the traction wheels as the machine is drawn along. A double-acting bellows, supported in a diagonal position under the platform, affords a continuous blast of air when the machine is in operation, the top and bottom plates of the bellows being rigidly attached to the supports, and a central pivoted partition having an up and down movement communicated from a gear mounted on the axle. An adjustable connection, through a pinion, affords means of giving more or less throw to the central pivoted partition of the bellows, or other gearing may be employed to increase the power of the bellows, the force of the air blast being readily adjustable for the purpose of placing the dust in windrows on one side or blowing it to a distance from the road. The bellows has a supplemental nozzle, adjustable vertically and laterally, the distance at which this nozzle is supported above the ground being conveniently regulated by a hand lever within easy reach of the driver. To keep the dust from flying upward, a hood covers both the nozzle proper and the auxiliary nozzle.

It will be seen that, by means of this machine, an air blast of almost any desired force may be obtained, and that it can be readily directed by the driver in such way as to be most efficient in completely clearing the roadbed of dust or any light or loose foreign matter. The great advantage this machine has over brushes is that there is nothing in the air blast to wear out or to remove the solid part of the roadbed.

The subject of road making has come into a good deal of prominence during the past few months, largely from the efforts of a few public-spirited individuals, who have taken pains to point out, in a most conspicuous manner, the generally wretched character of our roads. Road making has been too

much neglected since the railway age set in, and the farmer and country people generally are paying dearly for such neglect. In the making of new roads, using broken stone, and rolling, as is most common, there has lately been started a healthy movement, but it will be years before we shall see such an improvement as is most urgently to be desired. It has been more for the sake of aiding such efforts than for any other reason that this inventor has given his attention to the subject, and has constructed the practical and efficient machine shown in the illustration.



J. J. ASTOR'S PNEUMATIC ROAD-CLEANING MACHINE

loose material from the surface, apply in all cases where a good and permanent roadbed is to be maintained.

The pneumatic road-cleaning machine shown in the accompanying illustration, which has been invented by Mr. John Jacob Astor, of New York City, and a model of which is in use on his place at Ferncliff, Rhinebeck, N. Y., is especially designed to facilitate the thorough, rapid, and inexpensive removal of this worn-out material, or detritus, from the roadbed, either blowing it into the bushes or over the adjacent fences at the side of the road, or laying it in windrows,

connection with electrical instruments for measuring the velocity with which the shots traveled. In the test made, the object was to obtain the velocity of a 250 pound shot fired from an 8 inch gun with a charge of 81 pounds of hexagonal prismatic powder. The standard set down for these conditions is 1,700 feet per second, or at the rate of about 1,200 miles per hour. The instruments showed a velocity of 1,702 feet for the first shot fired; this came so close to the standard that further tests were considered unnecessary. This is said to be one of the most satisfactory tests made in the history of modern ordnance.

The Velocity of a Cannon Ball.

The first firing was done on the new proving grounds of the Bethlehem Iron Works on the 28th of July. Screens were arranged in