

very much finer. To give the mill all the water that can be used requires but 400 gallons per ton of pulverized ore. This compares very favorably with the amount of water used by the stamp mills in the Black Hills, where they must economize water. They use 2,500 gallons per ton of ore. At the Rara Avis mine just enough water to carry the pulp over the plates was found to be all-sufficient. This mill, which has used the machine longest, is doing satisfactorily from 3 to 4 tons per hour, with but little wear.

There is no wear of note on any part of the mill except on the ball and shoe ring. The latter is made of rolled steel, and will wear for several months. The ball is made of the very best cold blast charcoal iron, deeply chilled, which gives it a degree of hardness not exceeded by the best tool steel. The wear on the ball is very slight; at the rate of 60 tons per day the ball will last from two to three months; in fact the total wear is not 20 per cent as much as a stamp mill with an equal capacity. The amount of slimes made is but a very small percentage of that made by a stamp mill, and from the peculiar form of the pulp is more readily concentrated, as shown by actual workings on a very large scale.

The mill in its construction is very simple and easily set up. Any wearing part can be replaced in one hour. The lower half of each screen frame is supplied with a door, which is hung on hinges, so that it can be raised and the mill cleaned out while it is in operation, if necessary. It is not possible for rust gold to escape being brightened by the rubbing it receives while in the mill.

All parts of the mill are made very exact by templates, which assures a fit when extras are required at the mines. Another great point in the mill is its very low speed and small power required. The large mill, which reduces 60 tons per day through a 60 mesh screen, and is really capable of doing much more, only requires 10 horses power, which drives it very easily, the speed of the shaft being but 190, while the ball makes about one-third less revolutions per minute.—*Scientific American*.

SODA BY THE INCH.

Soda which is imported at the cost of \$52 to \$55, can be taken from soda lakes in Wyoming and placed in the Eastern markets at a cost not exceeding \$25 per ton. The Wyoming soda is chemically purer than the imported, and the method and rate of supply indicates practical inexhaustibility. Means are now being taken to secure early access to the deposits, and when these are perfected our import totals will lose an annual item of from \$6,600,000 to \$7,000,000. In Nevada crystallized soda can be dug up as ice from a pond, except in the case of soda no one knows how far it is to the bottom of the pond. Out near Ragtown there is an inexhaustible supply of pure soda extending down to an unknown depth. On the surface of the ground are two or three feet of sand, but below this lies the soda, looking like a solid mass of ice. It was this soda that gave rise in early days—when the emigrants were crossing the plains—to stories that in places there was to be found, under a few inches of sand a solid mass of ice. The soda as dug up from the plains, in sheets from two to three inches in thickness really does look more like ice than does any other mineral formation.—*Mining News*.

FORMATION OF ALLOYS BY PRESSURE.

W. Spring has shown that, when a mixture of bismuth filings, cadmium, and tin, in the proportions necessary for the formation of Wood's alloy, is subjected to a pressure of 7,500 atmospheres, the mass thus obtained powdered and again subjected to the same pressure, a metallic block is formed which has all the physical properties of the alloy. Its specific gravity, color, hardness, brittleness, and fracture are the same; and when thrown into water heated to 70°, it melts at once. In like manner Rose's metal was made by subjecting the proper mixture of lead, bismuth, and tin to high pressure. If zinc and copper filings are repeatedly subjected to pressure, a mass resembling brass is finally obtained.—*Berichte der deutsch, chem. Gesell.*

ANNEALING CHAINS.—It cannot be too much insisted upon that chains of cranes, or those used for other purposes, should be regularly and periodically inspected. As all chains are liable to become brittle by use, they should be annealed once a year, by heating them in a furnace uniformly to a dull red heat and then allowing them to cool very slowly.

Chemistry, Physics, Technology.

THE BLUE PROCESS OF COPYING TRACINGS.

As we have had several inquiries recently in regard to the best method of copying tracings by what is known as the "blue printing process," we will give a brief description of the method employed by us; we do not say it is the best, but it certainly is as simple as any other, and has always given us perfect satisfaction.

The materials required are as follows:

1st. A board a little larger than the tracing to be copied. The drawing-board on which the drawing and tracing are made can always be used.

2d. Two or three thicknesses of flannel or other soft white cloth, which is to be smoothly tacked to the above board to form a good smooth surface, on which to lay the sensitized paper and tracing while printing.

3rd. A plate of common double-thick window glass of good quality, slightly larger than the tracing which it is wished to copy. The function of the glass is to keep the tracing and sensitized paper closely and smoothly pressed together while printing.

4th. The chemicals for sensitizing the paper. These consist simply of equal parts, by weight, of citrate of iron and ammonia, and red prussiate of potash. These can be obtained at any drug store. The price should not be over 8 or 10 cents per ounce for each.

5th. A stone or yellow glass bottle to keep the solution of the above chemicals in. If there is but little copying to do, an ordinary glass bottle will do, and the solution made fresh, whenever it is wanted for immediate use.

6th. A shallow earthen dish in which to place the solution when using it. A common dinner-plate is as good as anything for this purpose.

7th. A brush, a soft paste-brush about 4 inches wide, is the best thing we know of.

8th. Plenty of cold water in which to wash the copies after they have been exposed to the sunlight. The outlet of an ordinary sink may be closed, by placing a piece of paper over it with a weight on top to keep the paper down, and the sink filled with water, if the sink is large enough to lay the copy in. If it is not, it would be better to make a water-tight box about 5 or 6 inches deep, and 6 inches wider and longer than the drawing to be copied.

9th. A good quality of white book-paper.

Dissolve the chemicals in cold water in the following proportions: 1 ounce of citrate of iron and ammonia, 1 ounce of red prussiate of potash, 8 ounces of water. They may all be put into a bottle together and shaken up. Ten minutes will suffice to dissolve them.

Lay a sheet of the paper to be sensitized on a smooth table or board; pour a little of the solution into the earthen dish or plate, and apply a good even coating of it to the paper with the brush; then tack the paper to a board by two adjacent corners, and set it in a dark place to dry; one hour is sufficient for the drying; then place its sensitized side up, on the board on which you have smoothly tacked the white flannel cloth; lay your tracing which you wish to copy on top of it; on top of all lay the glass plate, being careful that paper and tracing are both smooth and in perfect contact with each other, and lay the whole thing out in the sunlight. Between eleven and two o'clock in the summer time, on a clear day, from 6 to 10 minutes will be sufficiently long to expose it; at other seasons a longer time will be required. If your location does not admit of direct sunlight, the printing may be done in the shade, or even on a cloudy day; but from one to two hours and a half will be required for exposure. A little experience will soon enable any one to judge of the proper time for exposure on different days. After exposure, place your print in the sink or trough of water before mentioned, and wash thoroughly, letting it soak from 3 to 5 minutes. Upon immersion in the water, the drawing, hardly visible before, will appear in clear white lines on a dark blue ground. After washing, tack up against the wall, or other convenient place, by the corners to dry. This finishes the operation, which is very simple throughout.—*The Locomotive*.

BASIC SPOULE of the Bessemer retorts, Martin furnaces, etc., containing as they do from 10 to 15 per cent of phosphoric acid, M. Naujean thinks could be utilized with advantage in the manufacture of artificial manures.