

4,045 tons; *Royal Oak*, 40 guns, 3,716 tons; *Royal Alfred*, 40 guns, 3,716 tons. In addition to these three large three-deckers are to be cut down and constructed with revolving turrets. At the end of this year they will, therefore, have twelve iron-clad vessels completed, forming a very powerful fleet.

PIEDMONT GOLD MINING AND AMALGAMATING SYSTEM.

No metal is more universally distributed than gold, and yet there are but few places where gold mining is carried on profitably. This is owing to the precious metal being distributed in such limited quantities in most sands and rocks, also the imperfection of the processes most commonly employed for its extraction. An accurate valuation of gold veins cannot be ascertained from analysis of selected fragments of ore, but by the treatment of such a large quantity as will conclusively determine its general richness. Gold has lately been discovered throughout a considerable extent of Nova Scotia, and also in several places in Vermont, but we know not whether it occurs in such quantities as will pay the expenses incurred in the operations usually employed for extracting it from its ores in these regions. In some countries gold ores, containing what may be considered a very small amount of the precious metal, are operated with profit, owing to the economical processes employed in treating them, while in other places the mining of richer ores has proved ruinous to many parties, because of the expensive modes adopted for treating them. In all cases the cheapest processes should be employed, but the question naturally arises here, "What are really the most economical processes of gold operations?" Mr. Joseph Alcide Bertola, No. 29 St. Mark's Place, this city, having had his attention drawn to the inquiries made in our columns respecting Nova Scotia ores has called upon and given us some information respecting gold mining in Piedmont, Italy, where such operations have been carried on from time immemorial with very lean ores.

The auriferous sands in that country, he states, are exceedingly poor, but there are several tribes of gypsies who engage frequently in gold washing, and each person gathers from 50 to 140 cents worth of gold daily by a very simple apparatus. This consists of a board five feet long and two feet wide, with cross grooves half an inch in depth cut into it at short distances apart. A trough with a grating upon it is also secured to the upper part to separate the very coarse from the fine sands. This board is placed in an inclined position and the sands (which are frequently gravelly) are shoveled into the trough, and a thin stream of water made to flow equally through it. The water carries off the lighter particles, while the gold, being much heavier than the sands, remains behind in the grooves. These are cleaned out occasionally, and the contents set aside for a second operation. This consists in placing them in a wooden bowl about 2½ feet wide, shaped like a watch glass (quite shallow), and having a small cavity, formed like a lady's sewing thimble, in the center of the bottom. The second and final operation is always performed towards the close of the day by the gold washer. The bowl is filled with water, then about three pounds of the concentrated washings taken from the grooves of the board are put into it and stirred well with the hand. While this is being done the bowl is also moved from side to side, and made to revolve rapidly when the lighter particles, consisting of black sands, are made to flow over, and the gold is whirled into the center and caught in the thimble pocket. The proper movements of the bowl are only acquired by considerable practice.

As gold has been found in greater or less quantities in all the coast range of mountains stretching from beyond Quebec down into North Carolina, probably the sands in the streams which flow from these mountains may be much richer in the precious metals than the sands which are washed by the gypsies in Piedmont, and the same mode of gold washing may perhaps be profitably conducted, in many places where no gold is now supposed to exist.

Quartz mining is carried on in Piedmont on the mountains. Tunnels are cut into the rocks and are so inclined as to carry off the water. The rock is a hard porphyroid gneiss. Whenever a mine reaches such a depth that it cannot carry off the water from it a new tunnel is sunk at a lower level. In many

places the entrances of these tunnels may be seen at different heights on the mountain-side like the windows in the different stories in a house. The ore taken out from a mine is first broken into small pieces with hammers to free it from as much gangue as possible, then it is carried in baskets through rough, narrow paths to the mill house, by the girls of the country, who are very strong and industrious. The ore receives its first grinding between burr stones made of porphyroid gneiss. In the very smallest establishments, one grinding mill and four amalgamating mills are used. In some establishments there are no less than 80 mills employed. Each is operated by a small horizontal water wheel of the most simple construction. The miners make and repair them, as well as most of the machinery. These amalgamating mills are very plain. They consist of two thick circular gneiss stones; each about 2½ feet in diameter, the lower one being stationary, the upper one the runner, and the whole inclosed in a wooden vat which contains about five pails full of water. The ground ore is introduced into the amalgamating mills in small quantities of about from 10 to 15 lbs., and it here undergoes a second grinding in contact with the mercury. The ore and water are thoroughly stirred by the running stones, and the mill is charged every hour without stopping the stones, by pulling out the plug of the vat, and permitting the slush water to run off, leaving the amalgam behind. A new charge is then put in, clean water added and the operations thus continued until the mercury is saturated with gold. Each amalgamating mill is charged with only eight ounces of mercury, and the amalgam obtained with the gold, is taken out but once a week, excepting when the ore is very rich. It is removed with a long iron spoon, and the gold is separated from the quicksilver by squeezing the amalgam in a soft leather bag—the gold remains behind, and the mercury passes through the pores of the bag. All the mercury may be driven off from an amalgam of gold by submitting it to heat in a suitable retort.

A very small capital is required to start a Piedmontese gold mill, the machinery being so simple and inexpensive. The great object of all gold mining operations, as stated before, should be to extract the precious metal at the smallest possible cost. The Piedmontese system, improved by Mr. Bertola, has been introduced, he informs us, in a few cases, in California, with gratifying success.

RECENT FOREIGN INVENTIONS AND DISCOVERIES.

Odontalgic Elixir.—M. A. F. Mennons, of Paris, has taken out a patent for the following medicinal extract, to be applied in the treatment of caries and other diseases of the teeth. Take about 10 quarts of alcoholic spirit, add thereto 2½ lbs. of cochlearia; 13½ oz. of tulfol; cochineal, 2 oz., and 1 oz. each pulverized cloves and cinnamon. The mass is left to infuse for 15 days, then it is filtered and to it is added 10 oz. of the tincture of quinquina; concentrated essence of aniseed, 1½ oz.; essence of mint ¾ oz.

Shirt Collars, Fronts, &c., of Enamelled Cloth.—A patent has been taken out by A. Granger, of London, for making the above-named articles of a material which he states is known in England by the name of "American leather cloth." This is our white enameled cloth which is prepared with white paint and white varnishes. White enameled cloth resembling sheep skin is also made by saturating cotton cloth with French white and a strong solution of glue and starch, then submitting it to the glazing operation by running it between polished iron rollers.

Horn Pens.—Pens have been and are made of reeds, quills, steel, brass, copper, hard india rubber, glass and gold, and to these M. Evans and E. Concannon, of London, have added pens made of horn. The horn is first heated, then rolled out under pressure into sheets, after which it is cut out by a stamping machine into the blanks of pens of any suitable size. These blanks are then softened by steam, placed in dies, the slits made in them, and the proper shape given.

New Gunpowder.—E. Harrison and T. S. Yates, of Oldham, England, have applied for a patent for the following composition:—Chlorate of potash, 56 parts, (by weight); prussiate of potash, 28 parts; starch, 4; sulphur, 7; charcoal, 5. This makes a very good powder, it is stated, for general purposes.

Pickers of Shuttles.—J. B. Wood, of Broughton, near Manchester, England, has obtained a patent for making a shuttle picker of one solid piece of a compound of buffalo or other rawhide, instead of folding a piece of pure hide upon itself, and securing it by a wire in the usual way. The untanned hide for making the new solid picker is macerated in water of about 80° Fah. in temperature for one or two days, when it becomes soft for further operation. It is now lifted and exposed to the atmosphere for about 24 hours, then cut into strips, and passed first through fluted iron rolls, then between a pair of smooth rolls, until it is converted into a uniform pulpy mass, which is kept at a temperature of 90° Fah. for two days, during which time it is frequently turned over. This soft mass is now mixed with about 10 per cent of flax, or like fiber, then pressed between heavy iron rollers for the purpose of mixing the two substances. This pressure converts it into flat cakes of the thickness required, and when it becomes dry the pickers are stamped out of it with a machine, then it is placed in a mold and subjected to hydraulic pressure. After this it is removed and placed upon a shelf until it is completely dried. Pickers thus made are stated to be of a very superior character.

Soapstone-Powder Lubricator.—Soapstone, or steatite, is used for making a great number of articles, such as griddles for cooking pancakes, bricks for lining furnaces, smoking pipes, &c., and John Bethell, of London, has taken out a patent for using it in the form of dust as a lubricant for the axles of machines. For this purpose it is prepared as follows:—It is first reduced to the condition of very fine powder, then it is washed to remove all gritty particles, then it is steeped for a short period in dilute muriatic acid (about one quart of acid to twenty of water) in which it is stirred until all particles of iron which it contains are dissolved. The powder is then washed in pure water again to remove all traces of acid, then it is dried and is the purified steatite powder used for lubrication. It is not used alone, but is mixed with oils and fats, in the proportion of about 35 per cent of the powder added to paraffine, rape or other oil. This steatite powder mixed with any of the soapy compounds which are also now used in many cases for lubrication, also answers a good purpose. It is chiefly intended for heavy machinery, such as the journals of water wheels, railway and other carriages.

Naphthaline Purple Dye.—W. L. Scott, of Bayswater, England, has obtained a patent for a product of binitro-naphthaline as the basis for red and other dyes. He takes ten parts of sulphuric acid (specific gravity 1.650) and heats it to 360° Fah., and adds to this from two to four parts of binitro-naphthaline, and a small quantity of sulpho-naphthalic acid. When the mixture is completed small strips of zinc are added for the purpose of deoxidizing it, and when it is fully deoxidized the color becomes deep red. It is now allowed to cool, some dilute alkali, such as soda, added partly to neutralize the free acid, and the whole is then boiled for a short period of time under pressure. The liquor is now filtered, and the clear coloring matter separated from the precipitate. By treating the precipitate with benzole, or an alkali, all the red matter is extracted. It is called *dianthine*. When this product is treated with nitric acid so as to form the nitrate of dianthine, and this again treated with ammonia and alcohol, it makes a beautiful red dye of a scarlet tint.

W. Bennet, of Paddington, England, has taken out a patent for fire kindlers made of little blocks of dried peat dipt into melted resin and then dried.

A RAILROAD "SINK."—The Lafayette, Ind., *Journal* says a portion of the track of the Pittsburgh, Fort Wayne and Chicago Railroad has sunk out of sight three times. The space where this occurred is about two hundred feet long. After losing two other tracks, the company inserted piles. These have also sunk out of sight. They are now driving down piles of over sixty feet in length, and yet have not found hard ground. This spot is supposed to have been once occupied by a lake, over which vegetation has spread a thin crust.

At the Brooklyn Navy Yard are a number of large bronze cannon captured in Mexico. They have the date of their manufacture upon them, and are all more than 100 years old.