THE UNITED STATES ASSAY OFFICE IN NEW YORK.

We condense from one of our city cotemporaries the following in relation to the United Assay office, in this city:—

Adjoining the sub-treasury in Wall street is a granite building of modest appearance, bearing over its entrance the words "Assay office." It is fitted up in the same style as a broker's office, and three or four clerks appear to be quite able to transact all the business pertaining to this Bureau without over-exerting themselves. In fact, it would not appear at a first glance that much business is ever transacted there; yet there from $14,000,000 to $15,000,000 of the precious metals are received and accounted for during the year. The larger portion of this is in the form of gold dust from California, Nevada, Montana, and Idaho. Much the larger portion of all the bullion received is either in the form of dust, grains, bars, or amalgam. A comparatively small quantity comes in the shape of gold and silver plate, watch cases, foreign coin and ornaments. These are sent in by jewelers or private parties to be remelted, for plate, watch cases, and ornaments change their fashion like other things of less value, and have to be remodeled to be salable.

Few persons are aware of the actual quantity of gold produced by our mines since their first discovery. In a recent official report this amount is placed, in round numbers, at $1,000,000,000. Since 1849 California has produced $900,000,000. Her productive powers, however, for the last thirteen years have steadily decreased, and for 1869 the estimate is only $25,000,000. Montana has produced $65,000,000; Idaho, $45,000,000; Colorado, $25,000,000. The estimated production of Nevada in 1869 is placed at $20,000,000; of Montana, $12,000,000. It is believed that not more than 50,000 persons are now engaged in mining in this country—a considerable falling off from the numbers of previous years.

The deposits received having been carefully weighed and a certificate given, are numbered and sent at once to the melting room, a spacious apartment provided with furnaces, tanks, etc., and floored with iron tiles. Each deposit, or as much of it as can be conveniently handled at once, is placed in a crucible, and as soon as melted is poured into iron molds. If the deposit is of gold, two pieces are cut from the lump and set aside for the Assayer. If of silver, a small portion of the fluid metal is dropped into water, which granulates it, and these granules are used by the Assayer. The crucibles are carefully scraped after being used, so that not a particle of the metal is lost, for the Assayer, it must be understood, has to account for every grain of the metal received.

About 7½ grains of gold are used it each assay. This small quantity, with the right proportion of silver, which is estimated by the Assayer with an accuracy attained by incessant practice, is placed in a cupel—a cup of calcined bone—and deposited in a small furnace heated to redness. A strong current of air passes over the contents of the cupel, oxydizing the lead. The oxide dissolves the oxides of the other base metals, which are absorbed by the cupel, and the result is a button of pure silver and gold. This button, after being hammered and rolled, is placed in a bottle partly filled with nitric acid, which is set in a sand bath. This acid dissolves the silver, leaving the gold untouched. When the process is finished, the pure gold left in the cupel resembles tinder. It is then annealed, rendered into a compact coil, called the "cornet," and weighed. The weight gives the exact amount of pure gold.

Two pieces were, it will be remembered, taken from the metal after it had been melted. Each of these pieces is assayed separately, and the results must, of course, agree. If they should not do so, it is evident that a mistake must have occurred somewhere, and the whole process has to be repeated.

As soon as the assays are completed the Assayer reports to the Assistant Treasurer of the United States, and, on this report, the depositor is paid. If he desires to receive gold coin, one-half of one per cent is charged. For gold bars, which are handier for shipment, he has to pay six cents for $100. For every ounce of pure gold which his deposit has yielded, he receives $20·672, less the charges stated above. Depositors of silver receive its full value, less what is called the "parting charge," which is about five cents per ounce. Brittle metal has, however, to be toughened, for which there is an extra charge. The private assayers of California, before the establishment of a Government Assay Office there, used to make no charge for the assay, taking their pay out of the drippings from the crucibles. The Government Assayers account for the entire weight of the deposit.

The depositor having received the full value of his deposit, the latter of course becomes the property of the Government, and it now has to undergo a process called "parting" before it is sent to the Mint, or used in any way for commercial purposes. In parting gold, silver is added in the proportion of about two parts in weight of silver to one of gold. Formerly no account was taken of the silver already in the gold, but Mr. Mason, in charge of the melting and refining department, found that a great saving might be effected if it was first ascertained how much silver the gold bullion already contained. This practice is now carried out, and instead of invariably adding two parts of silver to one of gold, only sufficient silver is added to make the proportions above stated. There is thus a saving, by Mr. Mason's method, of about 30 per cent in the material, and in one year the sum of $22,000 was saved. The mixture of gold and silver is next melted, thoroughly mixed, and poured into water, by which it is granulated. The granules are placed in porcelain jars containing nitric acid. Heat is then applied, and as the acid boils, the yellow fumes which our readers have doubtless so often seen proceeding from the chimney of the Assay Office, are given off. This process goes on for about twenty-four hours, when the jars are emptied, and in the bottom is found a brown substance resembling mud or anything else upon earth rather than "gold—glittering gold." It is in fact, however, pure gold, or at least, very nearly so. The silver has been dissolved by the nitric acid, and is in solution. It is carefully put aside for future treatment, for in the Assay Office nothing must be lost or wasted. The brown substance found at the bottom of the jars is placed in large wooden tubs and washed by percolation in warm water until all traces of acid have disappeared, and it is said to be "sweet."

The gold is then of ·940 fineness. Formerly it was subjected to a second boiling in nitric acid, which left it about ·993 fineness, but by the process at present in vogue it is treated with sulphuric acid, by which a fineness of ·998 is attained. This is termed pure gold, although it is not actually so, but to deprive it of the two parts of alloy it now contains would involve an expenditure of time, money, and trouble altogether useless. After its treatment with sulphuric acid, the gold, which still looks more like red mud than a precious metal, is again washed until "sweet." It has now a redish yellow hue. After being dried, it is taken to a hydraulic press, where it is made into "cheeses," so called from the color and shape. The cheese made in the Assay Office is richer far than the most fertile vales of Gloster ever produced. Each "cheese" is but thirteen inches in diameter, but it is worth about $20,000. These cheeses are baked in an oven heated by steam until all remaining moisture is expelled, when they are remelted, cast into bars or bricks, assayed and stamped with the weight, fineness, and value. And now they look like gold indeed.

The reader will remember that the nitric acid poured over the gold and silver granules, in the porcelain jars, and now containing a large quantity of silver in solution, has yet to be disposed of. A solution of chloride of sodium—common salt—is first added to the solution, and a deposit of white powder is the result. This powder is chloride of silver. The next process is to free the chlorine from the silver, and this is done by placing it in vats with granules of zinc, The chlorine and zinc readily combine, and the silver is set free in the form of a light gray powder. This like the gold, is washed, pressed, and formed into "cheeses" worth $800 each. These are melted, weighed, stamped, and ready to be disposed of as occasion may require. The silver obtained by the above process contains but one part of alloy in 1,000. Some silver is so pure that it requires no "parting," and, after being assayed, is sent at once to the mint.

The Assay Office was established in this city in October, 1854, and since that time over $160,000,000 have passed through the hands of its officers.

BAROMETERS AS INDICATORS OF THE WEATHER.

As indicators of weather, barometers have fallen somewhat into disrepute; and yet, when used in connection with other instruments, they are very useful in foretelling what the probable state of the weather will be within reasonable limits. In many cases they are to be found hanging by themselves, and scarcely ever referred to, on account of their supposed liability to error. The usual weather marks upon the dial of a wheel barometer very often deceive the superficial observer.

A barometer indicates only two of the conditions upon which weather changes depend, viz., weight of the air dependent upon moisture, and disturbances in the atmosphere more or less remote, according to their violence.

In certain latitudes, a sudden fluctuation of the mercury is always to be regarded as an indication of foul weather; but it is not necessarily an indication of rain, although a violent disturbance of the atmosphere is generally attended with more or less condensation of the moisture which it holds in suspension.

If a barometer were sufficiently delicate in its operation to show the disturbances which take place at a great distance from its location, and which take place in rapid succession, at from twelve to twenty-four hours previous to heavy storms, it would be far more reliable than the ordinary instruments, which, although they are sensitive to remote disturbances, do not show them with sufficient plainness to be easily observed in the ordinary method of reading the instrument. It is also so inconvenient to make such observations with sufficient frequency to take account of the rapid and slight variations dependent upon such remote causes, that they usually elude observation. Recent experiments, however, go to show that they are most important in their relations to weather phenomena.

It is frequently the case that when air is in the same hygrometrical condition, that the mercury in the barometer will move in different directions within an interval of three hours, proving that weight, or, more properly, pressure of the atmosphere, does not depend upon the moisture held in suspension solely, but also upon the waves produced at a distance and communicated through air, very much as winds at sea produce heavy swells very far from the place where they acting directly upon the water.

Changes in weather depend upon atmospheric disturbances, and the nature of the change depends upon the temperature, and the hygrometical condition of the atmosphere. A barometer used together with a thermometer and a hygrometer, and the indications of change shown by the barometer, interpreted by the indications of the two latter instruments, will be found more reliable than is at present currently believed.

DRILLED VS. PUNCHED HOLES.—A large number of specimens of steel plates were recently tested at Chatham Dockyard, to determine the difference in strength between steel plates with punched and drilled holes. Although the pieces were so prepared that they should break at the smallest part, they all, without exception, fractured at a place where two small holes had been punched. But when the holes were drilled, and in the largest sectional area of the steel, they as uniformly broke in the smallest part, exactly the reverse of the previous trial. From this and other experiments the advantage in tensile strain, gained when the holes are drilled rather than punched, was calculated to be 22·5 per cent.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

During the construction of a mountain tunnel for the Don Pedro II. railway, of Brazil, a temporary road of five feet three inches gage was laid over the mountains, having the extraordinarily short curves of 230 feet radius, on gradients 296 feet to a mile, or a little steeper than one in eighteen. The line was regularly and successfully worked for three years, with six-coupled and eight-coupled engines. The former were provided with trucks under the leading ends, the others with an arrangement for permitting the end wheels to traverse laterally.

The town of Winchendon, Mass., claims to manufacture more wooden ware than any other town in the world. Two of the largest firms turn out $500,000 and $200,000 worth per year, respectively, and the smaller establishments of the place make the aggregate annual product of the wooden ware interest mount up to over $1,000,000. In addition to these factories, Winchendon contains two cotton mills, two bobbin factories, two machine shops, and two sewing machine manufactories.

The dimensions of the heavy express engines, on the Great Northern railway of England, referred to in our last week's issue, are as follows:—Driving and trailing wheels, 7ft. in diameter, and coupled together; leading and tender wheels, 4 ft. 3 in. in diameter throughout; barrel of boiler, 10 ft. 1 in. long by 3 ft. 10 in. in diameter inside, in the smallest part; fire-box casing, 6 ft. 4 in. long by 4 ft. wide outside; cylinders, 17 in. in diameter, with a stroke of 24 in.; heating surface in box, 114¼ square feet, and in the tubes 907 square feet, making a total heating surface of 1,021¼ square feet, with a grate surface of 19⅝ square feet. The tenders hold 2,500 gallons of water, and two tuns of fuel. The propelling power of each engine is equal to 12,000 lbs., and the adhesion on the rails may be taken at 11,700 lbs.

Gold prospecting in Siberia is carried on after a somewhat singular plan. The mines are an object of much attention on the part of the Russian government, and while it is opened free for any one to search for gold deposits in any part of the territory, the successful discoverer is obliged to report to the nearest government official, who apportions him a space of about four square miles, on condition that all the precious metal he obtains is to be carried to a government depot, where it is coined into money, the proceeds, less fifteen per cent for expenses, being then paid to the discoverer.

The bridge over Dale Creek, upon the highest summit of the mountains where the Union Pacific railroad crosses, is a pine timber bridge, 640 feet in length and 135 feet above the creek. The structure was all built, ready for the transit trains, in the short space of thirty-five days.

The recent report of the directors of the Pittsburg, Fort Wayne and Chicago railway, shows that the deterioration of iron rails necessitates the relaying of their whole road with new iron every four years, and that the cross ties for the entire line must be replaced every four and two thirds years. The great wear of rails is attributed to the increased weight of locomotives and cars that of late years have gradually and almost imperceptibly come into use. When steam power was first applied on railroads, the engines weighed eight, ten, or twelve tuns each; now they weigh from forty to fifty tuns each. As the locomotives cannot well be made lighter, the only apparent remedy is the employment of steel rails.

Work on the West Shore Hudson river railway is to commence immediately, the contract for building the road as far up as Newburgh—which point can be reached without tunneling—having been awarded some weeks ago. The capital stock of the road is $750,000, a large portion of which has been subscribed.

The Lebanon Springs railroad, connecting the Harlem with the Bennington and Rutland road, it is expected will be completed and in running order in the month of August. The road, when finished, will constitute an important connecting link, so that passengers and freight will go directly through from New York to Montreal without change of cars.

The California Legislature has offered a premium of five dollars per ton for the first thousand tuns of blast or pig iron produced in that State from native ore.

Quite a new feature in the geology of Berlin, Prussia, has lately been developed in the discovery in the immediate neighborhood of the city, of an inexhaustible bed of salt. Government having undertaken to work this deposit, a solid bed, struck at a depth of 277 feet, has proved to be an uninterrupted stratum of five hundred feet thickness. How much deeper it goes is not yet known, but orders have been given to continue the borings until the thickness of the bed is determined. This discovery is of great national importance, for it opens a supply of this article of every-day consumption sufficient to supply all of Prussia, and make the country independent of the imported article,

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

OYSTER DREDGE.—C. T. Belbin, Baltimore, Md.—This invention relates to the old-fashioned oyster dredge, and consists in a new method of attaching the lower draft rods to the head, whereby the instrument is made to operate to better advantage, while its cost of construction is not increased.

CIDER AND WINE MILL.—James Walton, Sunfish, Ohio.—This invention relates to that class of mills in which an endless apron carrier is employed, and consists in a new arrangement of gear for running the apron, a new adjustable bearing for the grinding rolls, another for the apron rolls, and a new arrangement of hoppers for feeding either apples or grapes.

COMPOSITION FOR DEPILATING HIDES.—Peter G. Schlosser, Middletown, Md.—The object of this invention is to produce a composition by which hides whether green or dry, can be depilated in an easy and expeditious manner, without destroying or injuring the material of the hide, and so as to produce a greater percentage, in weight, of leather, than is possible by any other process.

CARRIER FOR BRAIDING MACHINES.—Dexter Avery, Westfield, Mass.—This invention relates to a carrier for braiding machines, the object of which is to produce the required tension of the threads to protect the spring, which keeps the thread tense, from wear, and to obtain a complete and effective carrier in the simplest and least expensive manner.

VENT FOR BARRELS.—Richard C. Fleming, Philadelphia, Pa.—This invention relates to a device for preserving beer, ale, and other liquids, and consists in a novel manner of inserting in the barrel, and of inflating an expansible bag, which is to be filled with air, and which, as the liquid is being gradually withdrawn, is becoming filled, and fills the vacuum which is created in the barrel by the discharge of the contents.

TAILORS' SEAT.—Friedrich Neuhaus, Belleville, Ill.—This invention relates to a new seat for tailors, which is so arranged that it will allow its occupant to assume a convenient position, and that it will not prevent the proper circulation of the blood.

GAS MACHINE.—H. S. Maxim and John F. Lockwood, New York city.—This invention relates to a new gas-making device, which is more particularly intended for use on railroad cars. The invention chiefly consists in heating the hydrocarbon in the reservoir by a flame produced from the contents of the reservoir, the gas thus produced operating a valve, which, when closed, prevents further escape of liquid to the flame.

APPARATUS FOR CONVEYING AND DUMPING COAL, ETC.—Henry C. Clark and Robert B. Little, Providence, R. I.—This invention consists in providing the bucket or vehicle in which the coal is transported, with a hinged gate, which, when closed, forms an inclined wall of the vehicle so as to be held