

thus extracted, passes down to the basement, and through underground conduits is washed into the Yahoola River.

The stamp mill is run by water power. The hand ditch conveys the water from the Yahoola River to a reservoir, on a hill near the mill, and under a head of 235 vertical feet, the water is admitted through a 44-inch wooden tube, at a pressure of about 100 pounds per square inch, upon the Pelton water wheels, each of 500 horse power and each capable of running the mill. The water escaping through two nozzles of 2 and 2½ inches diameter at each wheel is forced against cups on the periphery of the wheels, and under full power uses about 2,900 cubic feet of water per minute. The smaller 40-horse power wheels operate the Frue Vanner concentrating tables. The drills in the mines are operated by a 200 horse power air compressor. Two dynamos are driven by the water power; one for operating electric lights for the mill, mines, plant and premises; and a power dynamo for propelling the ore tram cars, as heretofore noted.

The hand ditch is itself a remarkable piece of engineering skill. It brings water from a point in the Yahoola River about seven miles from Dahlonega. But on account of the many ridges around which it must travel, its course is very sinuous, and it is nearly 20 miles long. It was begun in 1859, but was not completed until after the war. Its construction cost over \$300,000, and required the excavation of over 5,000,000 cubic feet of earth, and the blasting of thousands of tons of rock. The open part of the ditch is 6 feet wide at the bottom; 10 feet wide at the top; vertical depth, 4 feet. But in eight places it is carried across deep ravines through great inverted siphons, and across streams in iron tubes from 38 to 48 inches in diameter, and in spans from 200 to 3,840 feet in length. The total length of this tubing is 10,526 feet. Flowing at full capacity this ditch will discharge at the mill 4,000 cubic feet of water per minute.

From the stamp will the concentrate ore is carried on tram cars to the chlorination plant and dumped through a hopper into the roasting furnace. This is 100 feet long and 14 feet wide, and about 9 feet high, and is on the ground floor. About two and one-half hours are required for the ore to traverse this; as it is slowly carried along it is constantly stirred by revolving riddles. This furnace is heated by four fireboxes, using wood fuel. The iron flue chamber, 6 feet in diameter and 90 feet long, leads to a chute of masonry 45 feet long, and it to the brick stack, 66 feet high. The capacity of this furnace is twenty-five tons of concentrates every twenty-four hours. This process expels the sulphur.

Beneath this furnace, and of the same length and width, is the cooling hearth on which the roasted ore is slowly carried back, being stirred and cooled, to the hopper end. Here a screw conveyer moves the ore about 30 feet to the elevator that carries it to the storage bin on the fourth floor. From here it passes by gravity to the charge hopper and scales, on the third floor, where it is weighed for charging the

chlorination barrels, on the second floor. These are charged with ore, water, sulphuric acid, and calcium chloride. There are two of these barrels, each of five tons capacity. They are of steel, lined with ½-inch lead, cylindrical, 5 by 8 feet inside measurement, and are swung horizontally. When charged and sealed they are rotated at about six revolutions per minute for three to five hours. The solution is then washed out of the barrels, hose attachments being provided; but

furnace, for which there is place, will be added to the chlorination plant, which will make it double throughout, and it will then serve both mills. This company's first order for lumber for the construction of the new mill provided for 1,000,000 feet.

The Crown Mountain Gold Mining Company has begun the erection of a 60-stamp mill, and will likely treat its concentrates by the cyanide of potassium process.

The Dahlonega Gold Mining Company and the Chicago New South Gold Mining Company, both recently organized, expect to build large mills, beginning this summer.

These are all near Dahlonega. But in several of the adjoining counties there is great activity in gold, copper, and iron mining, and North Georgia bids fair to soon become relatively more prominent as a mineral and gold mining center than it was two generations ago.

THE ELEVATED RAILWAY DRAWBRIDGE, BOSTON.

The large drawbridge herewith illustrated forms an important link both in the elevated railway and street car systems and in vehicle and pedestrian traffic across the Charles River, Boston. The elevated railway accommodates the through traffic from Dudley Street, Roxbury, to Sullivan Square, Charlestown, a distance of about 4½ miles. At the point of crossing, there is also concentrated a large

amount of street railway traffic, in addition to a considerable volume of surface travel, for which the new bridge will form the natural point of crossing.

The total length of the bridge with its approaches is 1,920 feet, of which about 1,000 feet is built across the water. The fixed spans of the approaches, which are of plate-girder construction, are each 85 feet in length, while the draw-span has a total length over all of 240 feet. The total width of the bridge is 100 feet, the space being occupied by two 10-foot sidewalks, two 29-foot roadways, and a space at the center 22 feet wide for the accommodation of the street railways. The draw-span, which weighs 1,200 tons, has several features of interest, among which may be mentioned the fact that it consists of four parallel trusses, this being, we believe, the only instance in which this number has been used in a bridge of this kind. It rotates on a circular track which is 54 feet in diameter. The

load is carried upon seventy solid, cast steel wheels, which are 26 inches in diameter. The motive power and machinery for operating the draw are located in a room beneath the floor of the bridge and in the center of the turntable. The draw is opened and closed by means of two 28 horse power railway motors. They are placed outside the power house, one on each side of the turntable, with which they are connected by the usual shafting and gears.

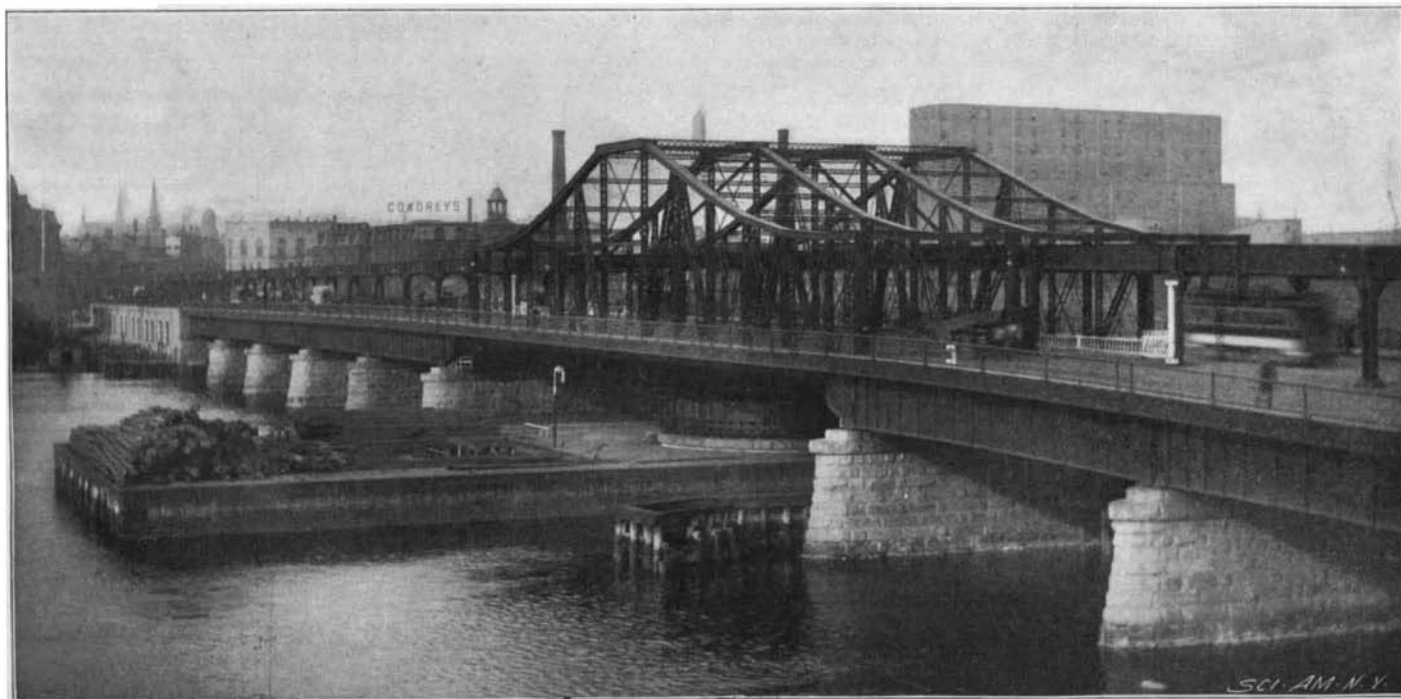
The draw-span is provided with eight hydraulic jacks, four at each end, which are utilized to lift the ends of the draw when it is closed. The rams are located vertically beneath the end posts of the trusses, those beneath the two outer trusses having a capacity of 100 tons each, and those beneath the two inner trusses having a capacity of 300 tons each. When the draw is closed, the ends are raised 3½ inches, and a



GENERAL VIEW OF THE DAHLONEGA GOLD MINING PLANT.

within the barrels are filters that retain most of the tailings. This filtrate solution containing the gold passes into settling tanks on the first floor, where it remains about twenty-four hours. It is then conveyed by a Montjose air pressure tank into the two precipitate tanks, each 8 feet cube, on the second floor, where jets of hydrogen sulphide from a generator are introduced under pressure at the bottom, and this gas passing up through the solution precipitates the gold chloride. This precipitate is then by air pressure forced through the filter in the basement story. The gold chloride is here caught on the filter paper and canvas. It is then roasted, fluxed, smelted, and cast into bars—the precious metal. The entire process, for a given mass of ore, requires about 36 hours.

The power for this plant is furnished by a 20 horse power electric motor using current from the stamp mill dynamo.



Span, 240 feet; width, 100 feet; weight, 1,200 tons.

NEW ELEVATED RAILWAY DRAWBRIDGE, BOSTON.

The Consolidated Gold Mining Company has now in its employ about 600 men, and in full operation it will regularly employ about this number. It has already mined and ready for the mill over 50,000 tons of gold ore.

The Standard Gold Mining Company has begun the erection of another 120-stamp mill just across the river from the plant above described. Another roasting

series of steel wedges which serve to hold the draw in position are thrown into place by means of a lever.

A novel feature of this bridge is the fact that over a portion of its width it is double-decked, the upper deck being of the same height as and forming a continuation of the elevated railway above referred to. The elevated structure is 18½ feet above the surface of the roadway, there being a clearance of about 14 feet from the surface of the roadway to the under side of the plate girders. The plate girder spans of the fixed portion of the bridge are, as we have said, each 85 feet in length, while the span of the elevated structure girders is just one-half as great, the columns which carry them being located alternately upon the masonry piers and at the center of the 85-foot plate girders below.

As it takes about ten minutes to open and close the draw, an arrangement has been made by which a switchman at the end of each approach to the bridge will be notified by an electric signal whenever the draw is to be opened. This will enable him to switch the surface cars on to the other tracks, which will carry them across the river by means of a bridge located a short distance up the river.

The grade of the approaches to the bridge is nowhere greater than three per cent. The structure is brilliantly lighted throughout, and thus far it has not only proved itself to be a thorough success in operation, but it forms one of the most slightly and attractive engineering features of the city.

Observations of the Sun's Spots.

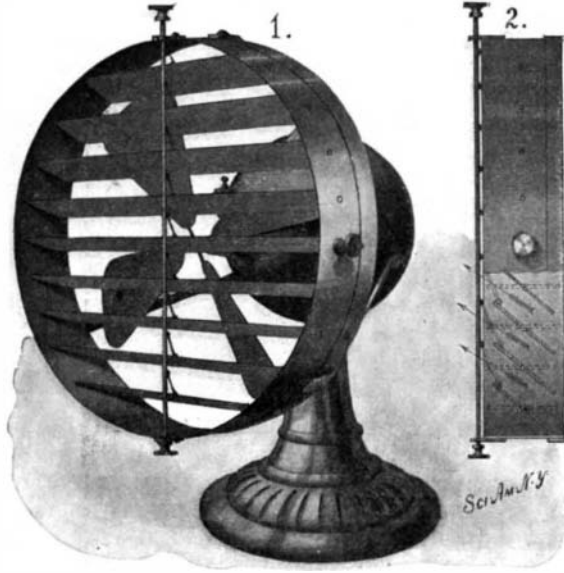
A memoir has been recently published by Mr. Christie, Royal Astronomer of England, in the monthly record of the Royal Astronomical Society. The memoir treats of the mean surface and latitude of the sun spots which have appeared during the year 1898, these having been deduced from a series of photographs taken at the Observatory of Greenwich, at Dehra Dun, India, and at Mauritius Island. The year 1898 has been marked by three principal eruptions of spots. The first commenced the 6th of March by the simultaneous appearance, at equal distances from the equator, of two large groups of spots. The second of the series, and the most remarkable, made its appearance on the 11th of August, under the form of one, then of two minute spots. This group was almost insignificant up to the time of its disappearance near the western border on the 16th of August, but became very striking upon its reappearance, on the 3d of Septem-

ber, its extent increasing from day to day. It arrived at a maximum (0.002235 of the sun's visible surface) on the 10th of September, and then commenced to decrease. It was still of considerable size at its third appearance on the 30th of September, but afterward diminished rapidly, and on its fourth return, the 28th of October, only a few small spots remained. The third remarkable group of the year appeared on the 28th of October, but was visible during a single passage only. The principal characteristics of the year 1898 have been the return of spots at a high latitude, 10.5°, compared with 8° in 1897. The number of days upon which no spots were seen has considerably increased, this being 48 in 1898, 32 in 1897 and 8 in 1896. The year 1898 resembles greatly the year 1896 by the mean daily surface of spots, their mean distance from the equator and the number of days without spots. If the diminution follows the course of the last cycle, the next minimum will arrive at the beginning of 1901.

AN AIR-DIRECTING DEVICE FOR ELECTRIC FANS.

A device by means of which the blast of air discharged from an electric fan can be thrown in any direction is the subject of an invention which has been patented by Edgar Tripp, of Port of Spain, Trinidad.

Rigidly connected with the casing of the fan is a circular carrier mounted directly in front of the fan-



THE TRIPP AIR-DIRECTING DEVICE FOR FANS.

blades. The carrier is provided with segmental slats, through which project the studs of a ring. The ring, therefore, can rotate to a certain extent with respect to the carrier. In the inner portion of the ring a series of slats are hinged on parallel axes, each slat being pivoted to an operating-bar fitted to slide in guides. In order to secure the slats in any position after adjustment, the axes of the central slat is extended and provided with a clamping nut.

The device is simply enough operated. According to the angle at which the slats are adjusted, the current of air produced by the fan is discharged horizontally, as usual, or deflected upwardly or downwardly. By rotating the ring in the carrier, the axes of the slats are inclined so that the air is deflected to the right or to the left, as well as upwardly or downwardly. When the ring is turned so that the slats are in a vertical position, the deflection of the air is wholly lateral. By the use of the device there is no necessity for changing the position of the fan, since the air can be deflected at any angle desired.

ABBE MAREUX has discovered by means of the great telescope at the Paris Exposition a remarkable solar spot which is part of an extended group, having a diameter of 25,000 miles. This information was cabled over to The New York Sun.

The Current Supplement.

The current SUPPLEMENT, No. 1279, is commenced by an article entitled "China and the Chinese," giving detailed references and a plan of Peking. "The Eclipse of the Sun in Spain" is also illustrated. "The Gutenberg Celebration" is accompanied by several interesting reproductions of old prints and types and the article is particularly timely, owing to the celebration which occurs this month. "The Rolling Platform of the Exposition of 1900" describes its operations in detail. "United States Mineral and Metal Production" is accompanied by valuable tables.

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RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

COTTON-SCRAPER.—JAMES M. SUGG, Harkey, Ark. The invention is an improvement in implements used in scraping the soil away from rows of cotton-plants before they are hoed, thus leaving the plants on a tapering ridge. The implement devised by Mr. Sugg scrapes from both sides of a row at the same time, permits the adjustment of the scraping-blades with respect to each other, and enables the man who is following the scraper to observe at all times the position of the blades while scraping.

Electrical Apparatus.

AUTOMATIC ELECTRIC SWITCH.—PHILIP S. TIBBELL, Groveton, N. H. It is often desirable to operate "long-burning" arc-lamps from the regular mains and to control them from a central station. For this purpose the inventor finds a light iron wire amply sufficient. His switch requires energy only for the instant it is in operation. It can be used as an entrance-switch. At places where the entrance is effected at inconvenient places, the switch is particularly serviceable. By the use of the switch, a push-button can be located at any convenient place, and the entrance-switch can be operated at any convenient predetermined point. The device can also be used as a three-point or "lazyman's" switch.

Engineering Improvements.

COMBUSTION-ENGINE STARTING AND REVERSING DEVICE.—EDWARD S. HAINES, Jacksonville, Fla. The gas-engines in common use cannot be started merely by feeding carbureted fuel to the cylinder. The crank-shaft must be manually turned by means of a hand-wheel or the like, necessitating the expenditure of much effort. To obviate the difficulty the inventor has devised a very ingenious and simple mechanism by which the engine is automatically started and reversed, thus saving time and labor.

ROTARY ENGINE.—GEORGE C. ROHDE, Gunnison, Colo. This engine has ports opening at the side of the piston-disk. A steam-chest incloses the ports, and comprises two parts, one consisting of a disk having segmental openings or ports, and the other consisting of a member having segment-arms designed to close the openings in the disk and to turn in order to vary the port-opening. A sleeve is secured to the adjustable or turning member of the valve and has teeth on its periphery arranged at right angles. A rod entering the steam-chest has teeth extending in rows and engaging the teeth of the adjustable valve member, whereby the valve can be moved bodily toward or away from its ports and turned about its axis.

Gas Apparatus.

ACETYLENE GENERATOR.—OLIVER D. FRY, Altoona, Penn. The apparatus comprises a gasometer and a number of generators designed to contain water and carbide. Water-receptacles communicate with the generators and are located at opposite sides of the gasometer.

Displacers are carried at opposite sides of the gasometer-bell and are movable in the receptacles to force the water in and out of contact with the carbide. The oppositely-arranged displacers serve to balance the bell and can be weighted to increase the pressure on the gas within the bell.

CARBURETING-LAMP.—ARTHUR L. TABER, Corona, Cal. The inventor has devised a simple, economic, and effective apparatus for feeding inflammable vapor to a burner. He has succeeded in supplying a steady flow of oil to the vaporizing chamber and in insuring the generation of the vapor in the chamber by means of drafts of air rather than by the direct application of heat.

GAZ-STOVE.—WILLIAM J. RANCK, Columbus, Ohio. This invention relates to a burner and stove adapted especially for use in connection with natural gas. The construction enables one to secure the greater portion of the heating energy of the gas, since the arrangement of the burner insures complete combustion. The tortuous course which the heated gases are caused to take, heats all parts of the stove and insures the radiation of the heat. The noxious gases are drawn off and a continuous circulation of air is maintained, thus producing a thoroughly healthful and efficient instrument.

Mechanical Devices.

DIAPHRAGM-MOTOR.—GEORGE W. LEWIS, Grinnell, Iowa. The motor is designed for driving various machinery, and is particularly well adapted for use in gas systems to pump the desired quantity of air to the carburetor, according to the amount of motive agent used in the gas-engine. A reservoir having a bell is joined by valved pipes with a number of pumps. These pumps are actuated by the diaphragm-motor, means being provided for controlling the admission and exhaust of the motive agent to and from the motor-cylinders. A rack-bar, connected with the diaphragms, is geared with a shaft to actuate the pumps. The motor and pump are completely automatic in operation.

SCREW-PROPELLER.—PETER G. LAVIGNE, Napa, Cal. By the improved form of blade provided, a much greater surface area, and hence propelling power, is gained, compared with an ordinary wheel of the same diameter and length of hub. Such power is still further increased by the varying pitch of the blade; for the pitch is extreme on the edge which first takes hold of the water, and the blade is so formed that churning is almost entirely obviated. This result is due to the principle of securing the necessary pitch by the conformation of the blade independently of the angle made by the blade with the axial line of the hub. A rim is combined with the blade in order to overcome the centrifugal effect of the revolving wheel.

Miscellaneous Inventions.

ATTACHMENT FOR BOOK TYPE-WRITERS.—JULIA K. McDANIEL, 312 A Street, Washington, N. E., D. C. The invention is an attachment to the Elliott and Hatch book type-writers which have a hinged platen, vertically adjustable at its free end. The invention pro-

vides means for adjustably supporting the free end of the platen, whereby it may be secured and supported at any desired height.

BUCKSAW.—HUGH HENRY, Ennis, Tex. This buck-saw comprises a frame having top and end bars. To the top-bar a handle-bar is pivoted, having a lever-arm extending thereover and provided in its upper side with notches. A sliding loop or ring is fitted over the top bar and lever-arm, and engages the notches. The saw-blade, by reason of this construction, can be easily tightened. It will be observed that the use of threaded tension-rods is avoided.

ANCHOR.—AUGUST S. PETERSON, Battle Lake, Minn. This anchor is made with pivoted fluke-arms, so that when the anchor is not in use and is hauled upon the deck of the vessel, both fluke-arms can be readily closed, so as to occupy as little room as possible. Fouling or entangling of the anchor-chain or rope is completely prevented.

RAZOR-GUARD.—T. F. CURLEY, 6 Warren Street, Manhattan, New York city. The invention provides an improved razor-guard which is readily attachable to or removable from the razor and is easily adjusted to bring the guard in proper position relatively to the edge of the blade. The guard-bar is formed at its ends, with screw-threaded lugs on which nuts screw. The outer nut has a pin designed to enter an opening in the outer end of the back of the razor. The inner nut is formed with a fork for engagement with the back of the razor. A fastening device holds the guard in position.

ELEVATOR AND SEPARATOR FOR GOLD.—SCHUYLER C. and WILLIAM N. RUEBE, Golden, Ore. In carrying out the invention, the placer material is treated so as readily to separate the fine, gold-bearing material, by subjecting the placer material first to the action of a stream of water under pressure to set the material in motion and then subjecting the moving placer material to the action of a second stream of water under pressure at an angle to the first stream, to drive the material up an incline and allow the fine material to separate from the coarse and to pass by its own gravity and the assistance of the water through openings in the incline, while the coarser material travels farther up the incline to be finally discharged therefrom and piled up. After the separation of the fine from the coarse material, the former is gathered in a flume having riffles which finally separate the gold from the tailings.

Designs.

ORIENTAL CARPET.—HOVCEP SARAFIAN, Titusville, Penn. Three design patents have been secured by this inventor for oriental carpets of characteristic weave and color-scheme.

BADGE.—DENNIS C. FAUSS, Brooklyn, New York city. The designer has provided a neat pin for a girl's high school, the letters G. H. S. being tastefully combined in a monogram.

NOTE.—Copies of any of these patents can be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

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(7908) L. M. R. asks: Does a bar of soft iron change in any dimension upon being magnetized? A. A bar of iron increases in length when magnetized. Joule found the increase to be 1/1000 of the length. It has since been shown that by increasing the magnetizing force a point is reached at which the effect is reversed and the bar shortens. You will find this discussed in Thompson's "Elementary Electricity," price \$1.40, a book which should be in your school library, in Section 124. Perhaps your physics class can devise and construct an apparatus for showing this elongation. It has been done. If you can make such a device, have a photograph of it taken, and send us a copy of it.