

### THE PACIFIC RAILROAD—ITS SEVERAL GRAND DIVISIONS.

THE CENTRAL PACIFIC RAILROAD OF CALIFORNIA.—The Pacific Railroad is to owe its anticipated early completion (1870) to three causes: the unequalled material intensity of California life and enterprise; the opportune interposition of the cheap Chinese labor; and the judicious subsidy of the national government, which allows each company—that building from the west and that building from the east—all the road it can build, with the loan of national bonds to the amount of \$16,000 a mile for the same. The Californians (Central Pacific Railroad Company of California) have shown their mettle in this competition, and have driven their end of the road forward with an energy that has accomplished wonders. The whole mountain ascent and descent is now nearly graded, and most of the heaviest portion completed and running. The chief difficulties of the undertaking had to be encountered on that part of the line. The dreaded barrier of the Sierras, of impassable altitude and obstructed with impassable snows in their season, was met in the first one hundred miles. Before bold determination and able engineering these difficulties have dwindled so that, considering relative prices of all things, the road has not proved after all so much "steeper" in cost or grade than some others built long before, and the expected impassable snows have proved sufficient to make only three days interruption of trains in a whole winter as severe as the last. The estimated cost of the ninety-four miles in operation since last fall, with the remaining eleven miles to the summit, was above that of any road heretofore built, having been fixed at \$88,400 per mile, against about \$80,000 for the Hudson River and New York and Erie, and \$81,273 for the Boston and Providence. Nearly \$15,000,000 have been expended on the above 94 miles with about one third of the work on the next 25 miles and a liberal equipment of rolling stock. When 150 miles are completed, which is expected in July next, the costly work will be done, and the total construction cost will be, it is now supposed, about \$15,000,000, or \$100,000 per mile. There will then remain 575 miles to Salt Lake City, which it is supposed will be built for \$60,000 per mile, and in one fourth the proportional time of building the mountain section. One hundred miles of this are promised us by the end of 1867, making 250 in all.

The average ascent on the California side is 75 feet to the mile: the heaviest grades completed being 105 feet. Of the grades of the 11 miles remaining we have no particulars. The time now occupied by trains is six hours: thus running nearly sixteen miles an hour. Fourteen tunnels have been made or are making, to secure the easiest possible grades, the longest of which, piercing the crest of the summit, is 1,658 feet in length, and lacks 500 feet of being completed, but is going forward with a large force of hands, working night and day. Protection from snow slides has to be provided in some places by sheds adapted to shoot the snow slides across and clear of the track. Two miles of these sheds will be required. The highest elevation is 7,042 feet above the sea level, or three times as high as railroads have ever before been constructed on this continent. Large working parties have been employed at the summit all winter: which reads singularly when we think of the exploring party under Fremont, that perished almost entirely in the attempt to pass the snows of the Sierras a few years ago. The earnings of the road are already nearly \$10,000 a mile per annum, in its fragmentary condition; and even without natural growth and the addition of through traffic, would yield at the same rate a handsome profit for the whole capital to be invested.

THE UNION PACIFIC RAILROAD COMPANY is not disparaged by comparison with its western rival. It agreed to finish 250 miles the current year. It has already so far made good the promise that its fulfillment is morally certain, and we may look, therefore, by the end of 1867, for 600 miles of railroad in operation from St. Louis toward the Rocky Mountains. This will reach the border of Colorado, leaving but 750 miles between the two lines, which will be finished under the spur of competition and urgent demand, in less, if anything, than the two years appropriated to the task. When this is done, the year will be one of the most memorable turning points in the material progress of mankind, and a more remarkable starting point than any before it in the advancement of the United States in population and resources, which will then pour into our territory in redoubled ratio from all parts of the world, to be again redoubled every year by the development of the virgin treasures of the continent.

THE SOUTHERN LINE.—The "South-west Pacific," from St. Louis to the state line in the south-west (capital \$8,000,000), and the "Atlantic and Pacific," from the latter point to the Pacific Ocean via Albuquerque (capital \$100,000,000), are said to be virtually united in one mammoth corporation, possessing grants amounting to 56,036,000 acres of public lands, and 126 miles of the former road, reaching from St. Louis to Gasconade River, completed. Their line is represented to be shorter and easier than the Central, and offers to the public the advantages of crossing the projected North and South road from Leavenworth to Galveston, the Little Rock and Memphis road, and the Arkansas and Colorado Rivers at the head of navigation in each. The Southwest Pacific was forfeited to the State of Missouri after 113 miles had been built from St. Louis to Rolla, and sold by the State last year to General Fremont, who has conveyed it to the present company. The Southwest Pacific company has pushed on its work with energy, having already completed 13 miles and contracted 54 more, of which at least twenty will be opened by August next. This embraces the most difficult part of the work. The distance to the state line, constituting what is to be the Missouri Division of the Atlantic and Pacific, is 317 miles. The line then passes due west, through the Indian Territory, New

Mexico and Arizona to California. Work can be commenced in both directions at two points on the line—using the navigation of the Colorado and Arkansas Rivers—as well as at each extremity, making six leading points of departure reached by existing routes of steam carriage. A San Diego letter states that ground will soon be broken at that port, as the Pacific terminus of the road. This makes a short and direct line across the southern end of California, and will make a second Pacific metropolis of San Diego.

### Science Familiarly Illustrated.

#### What is Gold Thread?

Gold in the minutest particles is used for ornamental purposes in the form of plating, leaf, wash, etc., but one of its most delicate applications is that of a finethread either woven into a fabric of silk, used for embroideries, twisted into fringe or netted into lace. In none of these forms, however is the thread a filament or wire of solid gold; the thread is gilded and consists of two metals and a core of silk. Wire for gold thread is of silver with a coating of gold so infinitesimally thin as to be beyond our comprehension. A rod of silver is coated with gold to a thickness of about one-hundredth part of that of the silver, and then this silver gilt wire is drawn down to a wire much finer than the finest human hair, and yet it will be then perfectly coated with the gold, still maintaining its relative thickness of one hundredth part, one-tenth the thickness of fine gold leaf.

This gilded wire is then passed between highly polished and hardened steel rollers and flattened, preparatory to being spun upon the silk thread. In this form of a film-like ribbon it is so light that a handful of it tossed into the air will float in the atmosphere of a room like gossamer. This flattened wire—if its diminutiveness deserves the name—is spun around a thread of silk, covering it in a spiral coil, so closely laid that it appears like a solid gold thread, while in fact the gold is as nothing compared to the other material. This thread is so delicate, although of triple composition, that it can be easily threaded in a fine needle and used for embroidering purposes. It can be woven into silk or into gold lace, or spun and twisted into cord, bullion, and fringe. The lace that decorates the uniforms of our soldiers, the bullion fringe of their epaulettes, which has such a massively rich appearance, is but this fine hair-like thread of silk, silver, and gold.

But the larger part of our gold lace and other ornamental gilt material is base, having not a particle of gold in its composition. That which represents gold is merely one of the compositions having copper for a base, ductile and tenacious, and worked in the same manner as in the true gold thread. This wire, however, has no silver core, nor is it usually spun upon silk but on orange colored cotton. This is largely manufactured in this country, and when just from the workman's hand is very rich in appearance, but soon tarnishes, and, if exposed to moisture, turns green from oxidation, which quickly rots the cotton core.

Gold thread and its manufactures are costly, not so much for the material employed as for the skill and care necessary in its production. It is wonderfully strong when properly made, and if protected from moisture the lace and embroidery will retain their luster for years.

NOVEL PLAN FOR A BRIDGE.—A French engineer named Boutet proposes to bridge the English Channel (20½ miles) with a structure on the suspension plan aided by the buoyant power of water. His foundation would be in effect a submerged wire suspension bridge, a fabric of sixty 7-inch wire cables, crossed and laced together by smaller cables, all carefully galvanized, and the whole thickly coated with gutta-percha and supported at intervals by immense iron buoys. Upon this foundation would rise 65 iron structures of great breadth of base and 600 to 900 feet high, as supports at proper intervals for the bridge road, formed of a network of great wire cables, like the foundation. It would be a double suspension bridge on a monstrous scale, with the sixty-five cable towers acting as trusses between the upper and lower stringers, and with the peculiarity of resting the lower portion in the depths of the channel on buoyant supports. The cost is estimated at some \$75,000,000.

THE NAVAL RAM.—According to the opinion of some engineers, the best naval gun, and the one destined in future to do the most terrible execution and decide the fate of combats, is a steam ship: the best shot for naval purposes is ditto: the best gunpowder is coal, or perhaps petroleum or some other giant progeny of carbon and hydrogen, acting through the expansion of water or directly through its own, to hurl the sharp-beaked and enormous weapon into the ribs of the foe. Nothing less than mountains of iron—thunder mountains or *Dunderbergs*—are to be considered fit ammunition for modern Titans to launch at each other across the oceans that divide them.

THE LONDON UNDERGROUND RAILWAY.—During the four years since the opening of this line 58,214,075 passengers have been carried, and the amount of fares received exceeded \$2,850,000. The largest number of passengers ever carried was during Whitsun week of last year, when 505,524 persons were transported in safety over the road. Strange to say there has never been a single fatal, and but one minor accident on the road since it was opened to the public.

IT IS STATED that although more than three months have elapsed since the explosion of the Oaks Colliery in England, little progress has as yet been made in extinguishing the body of fire raging at the bottom. All the shafts have been sealed up.



ISSUED FROM THE U. S. PATENT OFFICE  
FOR THE WEEK ENDING APRIL 30, 1867.  
Reported Officially for the Scientific American

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat.....	\$10
On filing each application for a Patent, except for a design.....	\$15
On issuing each original Patent.....	\$20
On appeal to Commissioner of Patents.....	\$30
On application for Reissue.....	\$30
On application for Extension of Patent.....	\$50
On granting the Extension.....	\$50
On filing a Disclaimer.....	\$10
On filing application for Design (three and a half years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

64,185.—RAILROAD SWITCH.—Joseph B. Alexander (assignor to himself and Wm. H. Frear), Washington, D. C.

I claim the construction and arrangement of the switch rails, C and C', with the arms of the wings of a plate of iron or wood turning on a central fulcrum in such a manner as to oscillate and open one track while it closes the other as described and for the purpose set forth.

I also claim the anchor-shaped cam, K, with the wings, L and L', and the friction roller, M, as described and for the purpose set forth.

I also claim, in combination with the above, depressing rails E and E', so constructed and arranged as to be operated upon by the shifting roller or wheels, C, attached to the locomotive engine, as described and for the purpose set forth.

64,186.—CARRIAGE CURTAIN FIXTURE.—A. C. Babcock and John Duffy, New Haven, Conn.

First, We claim the plate, E, in combination with a spring, F, when constructed and arranged so that the said spring bears upon the surface of the plate, E, as and for the purpose specified.

Second, The spring, F, attached to the stud, D, and so as to form the handle, G, substantially as and for the purpose specified.

Third, In combination with D, plate, E, and spring, F, we claim the stop, d, in the manner specified.

64,187.—MACHINE FOR MAKING WATER, GAS, AND OTHER PIPES.—Geo. H. Bailey, Jersey City, N. J.

First, I claim the employment, in the manufacture of pipes composed in whole or in part of cement or plastic material, of a plunger either movable or stationary, which is shaped substantially as set forth, either with or without spiral cutters, and which, by the application of power or by its own weight and momentum, displaces the cement in front of it, causing the latter to adhere to the pipe, and rendering it solid and compact, substantially as described.

Second, The combination with the plunger, D, of the top and bottom collars, C and C', with vent holes for the admission and escape of air, substantially as described.

Third, The application of lifting rods, g, g, to the collar, C, for lifting this collar when the plunger is raised, substantially as described.

Fourth, I claim a plunger working within a metallic pipe or mold having one or both ends closed, so as to more perfectly and forcibly compact the cement or plastic material within it, substantially as described.

64,188.—MODE OF LIGHTING GAS.—Arthur Barbarin, New Orleans, La.

First, I claim the direct use and application of spongy or finely divided platinum (without extra pipe for conveying the hydrogen gas upon the same) to an ordinary gas burner in such manner that shall cause the platinum to be directly in the path of hydrogen or hydro-carbon gas, when issuing through such ordinary burner, whether these gases be separate from each other or mixed together, whether the burners have additional jets or not, and whether the platinum be used and applied permanently or temporarily to said burner, for the purpose set forth.

Second, The lighting of hydrogen or hydro-carbon gas, whether separate or mixed, by means of spongy or finely divided platinum placed on a gas burner as herein specified, whether the said platinum be temporarily or permanently attached to the burner, or whether it be temporarily piled in any other way to hydrogen or hydro-carbon gases, either separate or in a mixed state, when issuing from a burner.

Third, The use of the same pipes and branches, as herein described, for the purpose of conveying the gases, whether they are mixed or separate, to the burners, for the purpose set forth.

Fourth, Conveying the gases, in a separate or mixed state, or one before the other, through the same pipe and branches as described, for the purpose set forth.

64,189.—COMPOUND FOR CLEANSING THE HUMAN BODY FROM OFFENSIVE ODORS.—Henry D. Bird, Petersburg, Va.

I claim a compound for cleaning the surface of the human body, substantially as herein set forth.

64,190.—GATE.—Daniel Bordner, Canton, Ohio.

I claim the peculiar arrangement of the levers, K and L, in shaft, S, acting on the bar N, through the iron, M, the said bar, N, having the cord, I, attached to it and to the end, W, of the upper bar, A, of the gate, the several parts operating in the manner and for the purpose specified.

64,191.—GRATE BAR.—Henry L. Budd, New York City.

I claim a furnace grate bar formed of a series of sections, b, attached to the longitudinal bar, a, said sections interlocking, and being constructed substantially as specified.

64,192.—WELL PIPE.—James Budd, Pittsford, N. Y., assignor to Budd & Briggs.

I claim the combination and arrangement of tubes, f o, the flanged collar, a, and flanged point, a, the whole substantially as and for the purpose set forth.

64,193.—GATE.—James Budd, Pittsford, N. Y., assignor to Budd & Briggs.

I claim the combination of the double action lever, a, with the levers, b double action levers, d d, horizontal bar, c, strips, e e e and f f, guiding boards, h and h, also posts, m m, with arms, r r, the whole operating substantially in the manner described and for the purpose set forth.

64,194.—GAS CONDENSER, SCRUBBER, AND WASHER.—Thos. B. Burtis, Chicago, Ill.

First, I claim the lengthy and narrow boxes, D, the water vessels, D2, above the same, and the water spaces, E, between the same, substantially as and for the purpose set forth.

Second, The method of applying the water to condense, scrub, and wash the gas, substantially as set forth.

Third, The combination of the vessels, D2, the overflow pipes, k, water pipe, E, service pipes, l, and water chambers, M, as and for the purposes set forth.

Fourth, The application of the jet chamber, M, as and for the purposes set forth.

Fifth, The application of obstruction pieces extending from top to bottom of the boxes, D, substantially as and for the purposes set forth.

Sixth, The arrangement and combination of the pipes, F and G, f and g, with their stop cocks, valves and the boxes, d #1 d3 and #7, as and for the purposes set forth.

64,195.—BRUSH BLOCK.—Wm. B. Burnett, New York City.

I claim a whitewash brush block which is constructed with a strip of wood which is harder than the wood of which the block is made, inserted into a kerf in its lower edge, so that the grain of the strip shall run at right angles to the grain of the block, as herein described and shown, thereby producing a new and improved article of manufacture.

64,196.—MANUFACTURE OF PORCELAIN.—Waldron J. Cheyney, Wallingford, Pa. Antedated March 29, 1867.

First, I claim the use of the minerals known as cryolite and chiolite, or their equivalents, in combination with silica, for the purpose of producing a vitreous porcelain, substantially as described.

Second, The fusing of either of the before-named minerals or fluellite or their equivalents with silica, in combination with soda, potash, lime, or other alkali or oxide, substantially as described.

Third, A new article of manufacture made by fusing silica with the above-named minerals or their equivalents, which I call "Hot-cast Porcelain."

64,197.—MACHINE FOR PUNCHING PAPER.—Spencer M. Clark, Washington, D. C., assignor to John Q. Laman.

First, I claim the combination with the punches and surrounding clamps and the springs of the screw bolts and rods, for adjusting the tension of said springs, and for effecting the combined movement of the clamp and punches, substantially in the manner herein specified.

Second, The combination with the clamp and connecting screw rods or bolts of the sliding cross head, punches, and surrounding springs, under the arrangement and for operation as herein set forth and described.

64,198.—STOP COCK.—Z. Erastus Coffin, Boston, Mass.

I claim the taper valve operated by connected screws and moving on conical guides, arranged within the shell or body of a stop cock, substantially as described.