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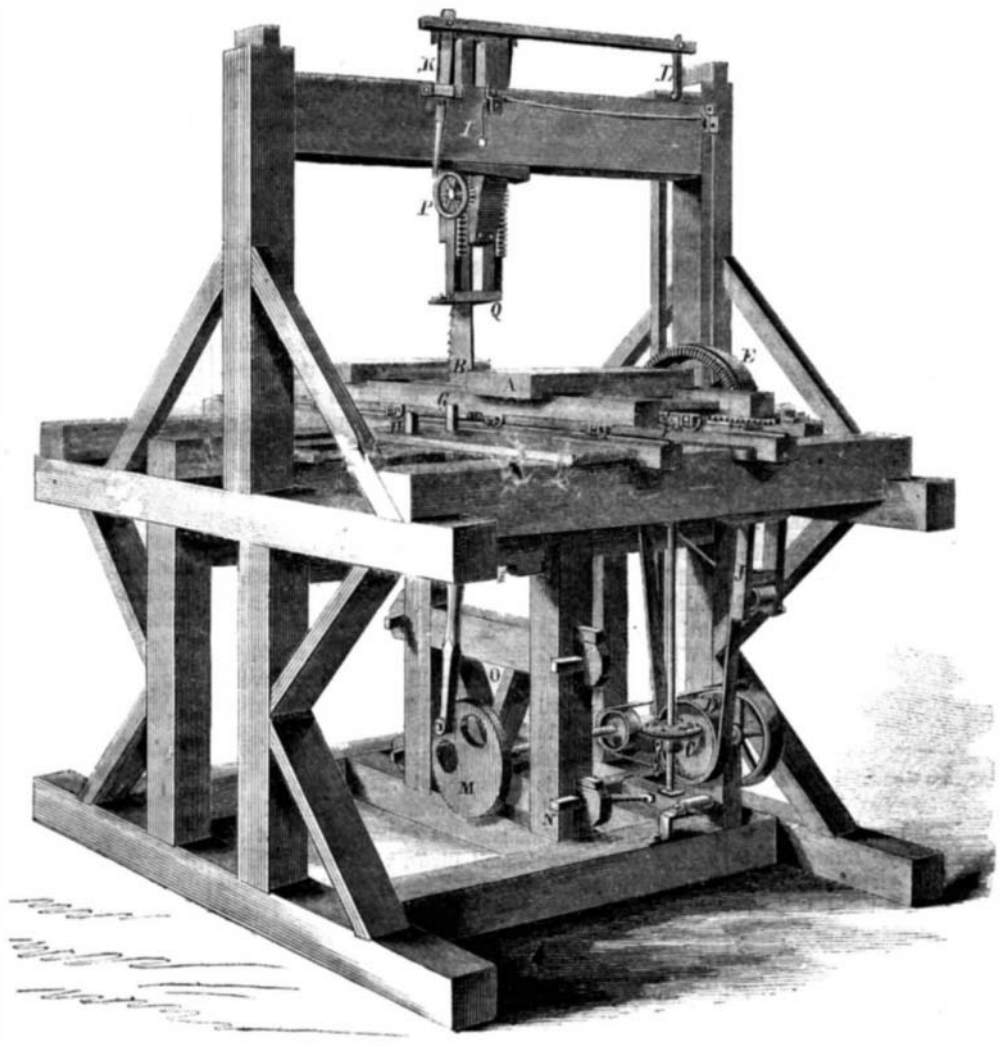
Improved Saw-mill.

Very great advantages have ensued from dispensing with the heavy and cumbrous sash or slide formerly used in saw-mills, and substituting therefor light but rigid guides, which answer the same purpose, but do not require a tithe of the power to stop and start them from a state of rest that the sash did.

This saw-mill is exceedingly well designed in its several parts, and, at the same time, it is as simple and free from complexity in its details as such machinery can be. By examining the engraving it will be seen that it is substantial and conveniently arranged for access; every detail can be inspected or adjusted as required, with little trouble or waste of time. The details of the mill are as follows:—The timber to be cut is placed on the carriage, A, which receives a regular and gradual feed or advancing motion toward the saw, B, by means of gearing. This gearing consists of a friction wheel, C, below the frame, and the driver, D; the friction-wheel shaft has a small pinion on the which is hidden by the frame. This pinion gears into the belt wheel, E, by the teeth on its edge, and thus (through the agency of another pinion, F,) advances the carriage in the manner previously described. After the saw has finished one cut the carriage is "gigged" back by throwing the friction wheeel out of gear with its driver. This is done by moving the lever, G, which releases a catch, H, that held the pinion on the friction shaft in gear with the large wheel, and throws the pinion clear of the teeth in it. By grasping the cord, I, the idler pulley, J, is thrown into contact with the belt, forcing it to hug the wheel, E, and thus return the carriage rapidly in the contrary direction from that in which the feed gear moved it.



GIBBS'S SAW-MILL.

The amount of feed is varied by moving the friction wheel up on its shaft, so as to be nearer to, or farther from, the center of the driver. This movement is accomplished by the rods, K and L. This latter rigging is always within reach of the sawyer, and can be adjusted instantly. The black edge on the friction wheel in the engraving indicates a band of rubber, which is confined by disks of metal, thus obtaining a friction wheel which is certain to adhere under all ordinary circumstances.

The crank shaft, or wheel, M, can be adjusted laterally and vertically by keys, N, in the timbers on which the bearings are placed, and the main bearing is further strongly braced by the timber, O, above it. The crosshead is guided at the bottom by bars, which are not shown, and at the upper end by other guides—the back of which only appear. Both of these crossheads are simply constructed to avoid excessive friction and weight on the guides under the rapid motion they are subjected to. The gearing, P, on the upper part of the frame serves to adjust the foot, Q, by which the timber is held down when being cut. These several parts thus arranged are, as we have said, well adapted for their work, and are free from the objections which attach to complex saw mills.

The invention was patented on the 12th of May, 1863, by D. C Gibbs, of Fleetville, Pa.; address him at that place for further information.

Laying the Atlantic Telegraph Cable.

The London *Times*, of June 30th, says:—"Since the *Great Eastern* has been moved from Sheerness, all the final arrangements for her great undertaking have been pushed forward to the utmost, and in the course of another few days she will be in a condition to start, though it is not probable that she will really move to sea before the 9th or 10th of July. She is now anchored in the channel, about seven miles below the Nore, swinging freely to the wind and tide, held only by a single six-tun Trotman anchor, and having a minimum depth of eight fathems under her at low water. Since she has been moved from her old berth in the Medway the work of coaling her to the utmost has been steadily going forward. Half of her extra supply of 1,500 tuns is already aboard, and the rest will be stowed away by the end of next week. With all her weights she will then draw a little over 33½ feet, though with 24,000 tuns on board.

"Mr. Glasse starts with the massive shore end for Ireland early next week. This enormous solid portion of the cable goes in a special vessel, and will be submerged from Valentia to a distance of twenty-five miles from the shore on the 10th. The end at sea will be buoyed to await the *Great Eastern's* arrival; that on shore will be put in communication with the wires of the International and Magnetic Companies, which already give free communication to Valentia. When the *Great Eastern* arrives and the splice is completed her voyage will instantly commence; a line steamer—the *Hawk*—accompanying her for a distance of some thirty or forty miles. In this steamer will be the directors of the company and a few invited guests, but absolutely none not connected with laying the cable will be allowed on board the *Great Eastern*. Twice a day, in the morning and in the evening, signals will be sent from the ship to Valentia, stating where the vessel is, etc., and these will be regularly transmitted direct to London. Anything, therefore, occurring on board the ship will be instantly known in England, while, on the other hand, anything going wrong with the cable itself, will be as quickly ascertained—not alone from the cessation of signals, but from the tests that can be applied to the end at Valentia.

"The paying-out machine is being fixed upon board the ship, and the leading trough has also been completed along the deck. This latter is a plain timber frame, supporting a semi-circular trough of iron, down which the cable is drawn to the paying-out machine, the friction of its passage sufficing to keep it 'taut,' and obviate all chances of 'kinks' entering the machine. All three tanks containing the cable have now been completely filled with water, and the wire, in fact, is as much submerged now as it will be at the bottom of the Atlantic—with this difference, that the pressure of the immense depths of the ocean will materially improve the condition of the cable by the compression of the gutta-percha. In these three tanks the temperature and quantity of water are kept precisely equal, and a series of electrical tests have been taken for the last three days, and will be continued for five days more, in order,

from the results of all, to obtain a standard of what the condition of the cable should be while paying out. The contents of the three tanks—that is, the entire length of 2,500 miles of cable, have now been coupled up, and signals are sent through morning and evening.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

SUBSTITUTION OF MAGNESIA FOR LIME IN THE OXY-HYDROGEN FLAME.

The light emitted by the metal magnesium, in undergoing combustion, is due solely to particles of the magnesia, or oxide of magnesium, which is formed by the combination of the metal with the oxygen of the air, being raised to an exceedingly high temperature by the enormous heat developed during that combination. Pondering this fact, a French chemist, M. Carlevaris, was led to conceive the idea of obtaining the same light, so valuable for its great actinic power, by heating magnesia in the oxy-hydrogen flame, just as lime is heated in the case of the lime-light, and so without the intervention of metallic magnesium. His method is to place in the flame a piece of chloride of magnesium, fixed to a support of retort carbon. The chloride decomposes, its chlorine flying off and being replaced by oxygen; the oxide thus formed remaining as a spongy but coherent mass, of the same shape as the original piece of chloride. By this arrangement it is said that M. Carlevaris obtains a light possessing in all respects the same properties as that obtained by burning metallic magnesium. His method has one advantage over that of obtaining the light directly from the metal, being free from the only inconvenience which attends the latter method, the inconvenience due to a large part of the magnesia produced by the combustion of magnesium being thrown off as an infinitesimally fine powder, or dust, which soon pervades the whole atmosphere of the room in which the magnesium is being burnt, and renders it exceedingly unpleasant. On the other hand, M. Carlevaris's method requires the generation of oxygen and hydrogen, and involves the use of bulky reservoirs in which to contain these gases, and a complicated apparatus for applying them. The materials for the production of the light by his method cannot be carried in a waistcoat pocket, as magnesium-wire enough to burn for twenty-four hours can. To which method the *balance* of advantages belongs, however, can only be decided by experience. It may be that it lies with neither, absolutely, but that one method may be the best adapted for some purposes, while for other purposes the other may be the most suitable.

IMPROVED BATTERY.

The numerous efforts which are being made towards the attainment of a cheap means of procuring electricity are certainly leading to valuable results. A very promising new form of battery was described in these "Notes" only last week, and now we have to speak of still another. In an ordinary "Bunsen's battery," as the reader is aware, each couple consists of a hollow cylinder of carbon and a cylindrical bar of amalgamated zinc. The latter is enclosed in a vessel of porous earthen-ware, containing dilute sulphuric acid, and this vessel is placed within the hollow cylinder of carbon, the whole being enclosed in a glass or other vessel containing nitric acid. Some little time ago M. Duchemin discovered that the nitric acid in this battery might be replaced by a solution of perchloride of iron, and the sulphuric acid by a solution of chloride of sodium, or common salt, with great advantages as regards both cost, convenience, and constancy, and he has just announced to the Academy of Sciences that he finds that still better results are obtainable by the use of chloride of potassium instead of sodium chloride. This substitution does not appreciably increase the cost of working the battery, while it greatly increases its electro-motive force.

OXYGEN FROM AIR AND WATER.

M. Tellier, with whose ammonia engine our readers are already acquainted, is a gentleman with a genius for original conceptions lacking neither in boldness nor in ingenuity. His latest proposal is to use *iron* as *fuel*, for a purpose to which we shall refer on another occasion burning the iron in pure oxygen, obtained, by a very novel and ingenious process, from the atmosphere. If you pass a mixture of hydrochloric acid gas and atmospheric air over pummice heated to redness, in a suitable apparatus, the hydrochloric acid will be decomposed, its hydrogen uniting with the oxygen of the air, to form water, and its chlorine being set free. There will thus issue from the apparatus, instead of the mixture of hydrochloric acid and air which entered it, a mixture of steam, chlorine, and nitrogen. On the other hand, if you pass a mixture of free chlorine and steam through a red hot tube, the chlorine will decompose the steam, combining with its hydrogen to form hydrochloric acid, so that what will issue from the tube will be a mixture of hydrochloric acid gas and free oxygen,—the constituents of this mixture being easily separable. M. Tellier proposes to obtain oxygen by forming a circuit in which two sets of reactions should go on continually. First, hydrochloric acid should be made to decompose steam. The reaction between the chlorine and the steam would yield, as we have seen, not only free oxygen, but also hydrochloric acid, with which to repeat the process, so that the same chlorine could be used over and over again, *ad infinitum*, the only materials employed in the process fresh supplies of which would be required for each repetition of it being those two exceedingly cheap ones, air and water. The cost of oxygen obtained by this method would thus be simply that of fuel and wear and tear of apparatus, *plus* that of separating the nitrogen from the triple mixture obtained as the result of the first reaction. We do not see how this nitrogen is to be removed, but M. Tellier says that he does; and if he really can overcome that difficulty there can be no question but that he has solved the problem of how to obtain cheap oxygen.—*Mechanics' Magazine.*

THE PACIFIC RAILROAD.

This is now one of the most urgent needs of the nation. Capital has been to a great extent thrown out of its recent channels, and become stagnated by the sudden cessation of the war. Its most natural and useful employment would be found in opening and developing the vast mineral resources of the mountain regions of the West. But until this railroad is built, it is plain to every practical man that most of the mining schemes, so plentifully projected, are sure to be unprofitable. Expenses of transportation and subsistence eat up all the income of enterprises sincerely pursued; while empty speculation, building its silver and golden fancies in the clouds, absorbs in profitless interchange of worthless stock, the money which ought to be swelling the stream of legitimate business.

With the railroad built, however, capital would be at no loss to discover opportunities for paying investment in the actual working of mines, not on paper, but in the all-producing earth.

So much would such a result redound to the general good, that it is to be hoped that Congress will lend all possible aid to the work. One hundred and sixteen millions of dollars, the estimated cost of the central route from Council Bluffs, via. South Pass to Benicia, (a distance of 2,032 miles) would soon be repaid by the road to the nation in more ways than one.

First, in the way already suggested, of increasing the production of wealth.

Second, in the increased income of the government, derived from that increasing wealth.

Third, the decrease of government expenses for transportation of mails, troops, etc., and for subsistence of troops in remote regions.

Fourth, as a means of national defence in case of foreign war, it would pay its cost in a single year; and as a security against such a war, and as an additional bond of unity between East and West, its ounce of prevention outweighs the pound of cure.

Fifth, the rapid accumulation of specie consequent upon the completion of such a road would soon make a California of the whole nation; and even the anticipation of such a result would enable the government to resume a specie basis of finance at an earlier period, thereby saving both government and people a large percentage of present outlays.

These considerations, involving both the national defense and the general welfare, seem to make the completion of at least one through trunk line, a duty as well as a privilege of the general government. There is but little doubt that the people at large clearly recognize the common interest in the matter, and are unanimously minded to have the Pacific Railroad built in the quickest possible way. They perceive the propriety of a common contribution of expense where the benefit is common, without quibbling about its exact distribution, which is impossible. Especially so in a work like this, so vast that private enterprise cannot grapple with it, and would accomplish it, if at all, only by piecemeal, nibbling its way along as it felt itself supported or impelled by the oncoming tide of population. It is doubtful whether indeed private enterprise would ever get through with it. The vast tracts of unarable land on these routes seem to make the work impossible except as a public one.

On this central route, above mentioned, there are estimated to be only 632 miles of arable land to 1,400 miles not capable of cultivation, about 31 per cent. On the great Northern route, from St. Paul's to Puget's Sound, the proportion is 535 miles arable out of 2,025 miles, total, about 26½ per cent. On the coast route near the 32d parallel, from Fulton to San Francisco, only 834 out of 2,034 miles are arable. This last is the largest proportion on any practicable route, being about 41¼ per cent.

In this view of the subject it would seem that Providence had veined and crypted these mountain regions with the precious metals in order to insure the coming together of the people from East and West, and the consequent unity of the nation forever. It has thus made a bridge of what promised to be an inseparable barrier. And where a heaven-high wall of ice-crowned rock seemed to mark a natural boundary between two peoples, silver gates have opened and the East and West have met in chambers of gold.

For thus it is this road must be built, in two sections prosecuted simultaneously from the East and from the West. The two parts coming from either side to the great barrier ridges, will there tap the golden current, the outflow of which will give them vitality to toil on and overcome the mountains, till at last united in one great trunk line. This being completed, it would be more natural and easy to run branch lines north and south over the valley routes than to construct other trunk roads across the heavy mountain ridges. Such branch lines would quickly and efficiently develop the country, and it is therefore doubtful whether more than one trunk road can or ought soon to be built. The southern route seems quite feasable; but for this species of development it is evidently insufficient; and other routes would still be required. The central route, having medium difficulties to overcome, presents the most obvious advantages for the speedy development of the country. And its great present advantage is this one adverted to, of striking the gold and silver regions as a sort of midway house on either half of the route in the Pike's Peak region on the eastern half, and in the Sierra Nevada on the western portion. While its solitary middle way through the deserts of Utah is cheered by the oasis of Salt Lake City. Here meeting in the mountain-hedged valleys, the two currents from the East and West will spread out over regions otherwise to be long uninhabited; and that apparantly barren and inaccessible region will become eventually the seat of empire, as it is the rocky summit of the continent.

Thus the future throne of America is literally one of native silver; and the golden scepter which God hath given her, she shall wield sitting above the clouds.

A New Horse Nail Machine.

We recently had the pleasure of seeing a new machine for making horse nails in successful operation at Messrs. Taylor's machine shop in this city. Little attendance is required, it being merely necessary to heat the rods in a furnace by the machine and put them in a carriage; the rods are then fed in and the nails are turned out at the bottom very rapidly. This machine makes hammered nails not rolled ones, and the quality of them appears to be excellent. See advertisement on another page—of Foreign Patents for sale.

WE are indebted to the Hon. D. P. Holloway, Commissioner of Patents, for copies of the Patent Office Report for 1862. We hope soon to receive the Report for 1863.