

when it reached the bottom would be instantly released. At the same time a small portion of the bottom would adhere to light hollow tubes attached to the line, so that when recovered the character of the bottom could be ascertained. The latter invented a small instrument by which the exact vertical distance traversed by the weight in its descent would be indicated. The form of the lead was subsequently changed to a double cone about two feet in length, having its greatest diameter four inches from the lower end, and tapering from this point to the top, where it was about two inches in diameter. Through the center of the lead, which weighed from one hundred to one hundred and fifty pounds, an iron shaft extended. In a hollow at the lower end pieces of quill barrels were inserted, which penetrating into the bottom retained a portion. When this apparatus was used on the steamer Arctic by Lieutenant Berryman, the detaching apparatus of Brooke was dispensed with as Massey's sounding machine was sufficient to determine the depth when enough line was run out to render it absolutely certain that the bottom had been reached. Delicate self-registering thermometers were also attached to the apparatus, by means of which it was ascertained that the sea was much colder at greater depths than near the surface. With this apparatus the deep soundings we have described were made, and there is no doubt that they were very nearly correct.

CHROMO LITHOGRAPHY.

Without admitting all or nearly all that is claimed for it, we must admit that chromo-lithography is a wonderful art. It is not necessary to believe that the chromos so much praised by some of our exchanges are exact copies of the paintings they represent, to properly estimate their worth. An exact copy of a painting was never yet produced; nor yet so nearly produced as to obtain the full effect of any truly great picture, whether it was done by the most skillful painter or by chromo-lithography. It is enough that a well-executed chromo is better than a badly painted copy, for most of the painted copies are bad. Chromo-lithography gives a good picture at a cheap rate, for which it is justly entitled to praise. The process is a difficult one, although the principles upon which it is based are simple enough. The effects most difficult to produce in chromo-lithography are those which are produced in painting by the blending of colors while they are fresh and soft on the canvass. This blending can never be produced in any other way so perfectly as the artist can do it with his brush, and it is the comparative absence of these effects which enables an expert to detect, even at some distance, a chromo from an oil painting. In the former, the colors are superimposed; in the latter, they are mixed.

Lithography is the art of drawing upon stone, and taking impressions of the picture thus produced upon paper. The prefix *chromo* signifies colored. The art, as practiced in Europe, and, until lately, in this country, is entirely distinct from engraving. The stones from which the impressions are taken being perfectly smooth. Lately, the last impression is taken from an engraved stone, by which a nearer approach to oil painting is secured. This improvement is due, we believe, to Mr. Prang, of Boston, and has greatly added to the artistic effect of the pictures.

The stone used is a peculiar species of limestone found in Bavaria, which is capable of receiving a very fine polish, beside possessing chemical qualities which render it adapted to the purpose. The stone is cut into plates of the proper size, as many plates being requisite as the different colors necessary to complete the picture. Each of these plates has a separate portion of the picture drawn upon it. The drawing is executed with a colored chemical preparation, which, upon the subsequent application of suitable reagents enters into combination with the stone itself, and becomes permanent. The drawings are so made, that were they all superimposed upon each other, and the plates were transparent, by looking through them, the entire picture would be shown complete. The lines which constitute the drawing have an oily surface which repels water, so that when the stone is dampened with water, and printers' ink or oil colors are applied, the ink or the colors, being repelled by the moistened parts of the plates, adhere only to the lines of the drawing. Thus, when an impression is taken, these lines only are transferred to the paper.

Every stage of the operation requires the most delicate and accurate manipulation. Conceive the difficulty of making a drawing on thirty different plates, each plate having upon its face numerous fragments of the entire picture scattered in different positions, the whole to be so accurately done that when one after another shall have been proved by an impression taken upon a single sheet of paper, a complete picture will be presented; and remember that a variation of a hair's breadth will destroy the work. Another difficulty is what is technically known to printers as registering. This means the placing of any number of sheets, always in the same position, upon the plate or form, in the press. The greatest accuracy is required here, as all the preceding nicety of workmanship counts for nothing unless this is secured.

The final operations consist in embossing and varnishing. The former gives the rough grained appearance to chromos which is seen in oil paintings, and softens the outlines of the picture. This brief sketch will give an idea of the methods employed in this art, which, if it can not equal, is familiarizing the American public with the works of the great artists, hitherto entirely inaccessible to those not having the means and opportunity to visit the galleries of Europe, where the most of them are only to be found.

THE smoke from the late volcanic eruption on the Sandwich Islands floated off in a line of one thousand miles across the sea, and was so dense that at a distance of 500 miles officers of ships were prevented from making their observations.

Submarine Telegraphy—A Curious Phenomenon.

The Memphis *Appeal* gives an account of a case which has very much perplexed the electricians. We allude to the late obstruction and restoration of telegraphic communication with the trans-Mississippi. For some weeks past the cable has been working very irregularly. At intervals no communication could be had for hours, and all at once it would revive and the fluid pass through it as usual. This state of affairs continued for several weeks, and at last communication ceased entirely. After several ineffectual attempts to revive it, it was determined to raise it and find out the reason for the cessation. The cable crossing at this point is considered one of the best ever laid in this country, having been manufactured originally for the Red Sea, but for some reason not used, and afterwards was purchased and laid down by the Western Union Telegraph Company, at a very heavy expense. The operation of "under running" and taking the cable up was successfully performed by Colonel Coleman and Captain Baker, in a steam tug with a barge attached. As it was raised, and at intervals of a few yards, a needle was driven into the cable so as to touch the conducting wire, and instruments were applied to test the soundness of the portion raised. When near this shore by this means it was discovered that the disturbing cause lay within a space of twenty yards between two points. This piece was cut out, the two ends spliced, and the cable immediately worked throughout its whole length. The piece cut out was brought ashore and examined by Colonel Coleman and Captain Baker at their leisure, and developed one of the most singular facts in telegraphing that has ever come under their notice. On cutting the cable it was found that about four inches of the conducting wire had been burned out, and was gone completely. It is supposed that a severe shock of lightning had passed along the land line of wires, and had left them and followed the cable, burning this piece out in its passage. The curious and inexplicable part of the affair is the action of the cable after the burning. At times a current of electricity passed through and communication was kept up between Memphis and Little Rock; then ceasing entirely for awhile, it would again revive, keeping up this fitful action, as we have stated, for some time before its total suspension.

Many theories and surmises are advanced by the gentlemen connected with the telegraph office here as to the explanation of this remarkable phenomenon, the only one of which is at all satisfactory is that of Colonel Coleman, that "a slight connection was formed between the burnt ends of the conductor by moisture which had penetrated the cable in sufficient quantities to keep up the circuit there being a battery on the Memphis end strong enough to drive the electricity through at intervals." This, says Colonel Coleman, to whom we are indebted for most of the above facts, is a remarkable case and may never occur again. The question now naturally suggests itself, cannot some mode be established whereby communications can be passed through large bodies of water without a cable? It has been proven in this instance that messages passed to and fro across the Mississippi without a metal connection. Let the scientific work it out.

Sleep—The Amount Necessary.

Prof. Dickson, in his Essay on Sleep, says the necessary amount must differ in the various tribes, as well as in different individuals, according to numerous and varied contingencies. The average proportion of time thus employed by our race may be stated pretty fairly, I think, at one third. The allotment of Sir William Jones, slightly altered from an old English poet, does not depart much from this standard:

"Seven hours to books, to soothing slumber seven,
Ten to the world afloat, and all to Heaven."

The busy engagement of ambition and avarice may induce men to subtract more or less from their due repose, but any considerable deduction must be made at a great risk to both mind and body. Sir John Sinclair, who slept eight hours himself, says that in his researches into the subject of longevity, he found long life under all circumstances and every course of habit; some old men being abstinent, some temperate; some active, and some indolent; but all had slept well and long. Yet he gives a letter from a correspondent, recording the case of an old man of ninety-one years of age who had slept through life but four hours a day. Alfred the Great slept eight hours, Jeremy Taylor but three. Dr Gooch tells us of an individual who slept only fifteen minutes in the day; but it is scarcely credible. Bonaparte, during the greater part of his active life was content with four of five hours' sleep; the same is said of Frederick the Great and of John Hunter. I know familiarly a person whose average has been even lower than this; I have heard his wife say that they were married four years before she had ever seen him sleep. Seneca is quoted as telling the incredible story of Mæcenas, that he had passed three years without sleeping a single hour. Boerhave says of himself that he was six weeks without sleep, from intense and continued study. Statements like these demand close examination and clear proof.

Of long protracted sleep there are numerous and wonderful tales, from the story of the Seven Sleepers of Ephesus and their dog—to be found in the early legends of the Church; in the Koran, chapter of the Cave; all over the East, as Gibbon tells us; and even in Scandinavia—down to the exquisite Rip Van Winkle of our Washington Irving. In the *Philosophical Transactions* we read of one Samuel Clinton, a laboring man, who frequently slept several weeks at a time, and once more than three months without waking. In the *Berlin Memoirs of the Academy of Sciences*, there is a curious history of a lady of Ni-mes, who fell asleep irresistibly at sunrise, woke for a brief interval at noon, fell asleep again, and continued in that state until seven or eight in the evening, when she awoke and remained awake until the next sunrise.

Heat in Mines.

Every one who has had anything to do with mining knows that water is one of the most formidable enemies the miner has to contend with. It begins to flow in as soon as the depth of an ordinary well is reached, and must be pumped out, at great expense, to enable the work to proceed. The steam engine was first devised for the sake of providing power to do this pumping, and was for a Cornish mine that Watt invented his great improvement on the original machine.

Without this help many of the mines in England would be worthless; and as it is, some of them are limited in their depth by the difficulty and expense of getting rid of the water.

A curious fact has, however, been lately brought to notice in regard to the Nevada silver mines. Heat, not water, is the chief enemy encountered after reaching a great depth, and, instead of pumping out water, the companies have to pump in air. A Nevada paper says:

"The increase in the heat of our mines is now beginning to give many of our mining companies more trouble, and is proving a great obstacle to mining operations in those levels lying below a depth of one thousand feet than any veins or 'pocket' deposits of water yet encountered. A number of the leading companies on the Comstock are now engaged in putting in engines to be used expressly for driving fans for furnishing air to the lower levels, to circulate it through large tubes of galvanized iron. With this great increase of heat in our mines comes a great decrease of water; in fact, in our deepest mine—the Bullion, which has attained the depth of twelve hundred feet—not a drop of water is to be seen; it is as dry as a lime-kiln and as hot as an oven. In the lower workings of the Chollar-Potosi mine, which are a perpendicular depth of eleven hundred feet below the surface, the thermometer now stands at one hundred degrees—a frightful heat to be endured by a human being engaged in a kind of labor calling for severe muscular exertion. Here also we find the water to have decreased till there is at the present time a very insignificant amount, it being necessary to run the pump but four hours out of the twenty-four."

This corroborates the theory of some geologists, that the interior of the earth is a mass of melted rock. Suppose one of these Nevada miners should accidentally make a hole in the solid crust, what would become of him?—*Sun.*

Editorial Summary.

THE largest tannery in America is claimed by Chicago. It belongs to the Union Hide and Leather Company. An exchange thus describes these works: They are situated on the north side of the Chicago River, and occupy nearly 5 acres, including docks. The main building is 241 by 80 feet and 3 stories, and on this is a two storied superstructure 75 by 35 feet. The building is constructed without angles inside, so that every workman is under the eye of the foreman. A steam elevator in the center of the building is used for hoisting purposes. The working force of the establishment is 100 hands, and its producing capacity 1000 hides per week, including wax, buff and upper leather, and a small quantity of harness leather. About one half of this product is sold in Chicago, and one half in Boston. The beam-house is 140 by 41 feet, and the machinery in use comprises 3 Winn splitting machines, 2 scouring and 1 stuffing wheel, 1 hide mill, pumps, etc. The building is heated by means of 12,000 feet of 1½ inch pipe.

A DESCRIPTION of a clock which is apparently only a single plate of glass having the usual figures of the dial upon it, and a hand which keeps the time with apparently nothing to move it, is circulating largely among our exchanges. This is probably no new contrivance but an imitation of the celebrated glass clock constructed by Houdin, the French prestidigitateur many years ago, which was so ingeniously devised, that a person looking at it ever so closely could not discover the works, although he might to all appearance look entirely through the entire apparatus and see all the objects upon the opposite side of it.

A LARGE meat in a very hard nut to crack was found by some burglars recently in San Francisco. A safe which resisted their attacks for a long time and demanded all their skill as crackmen, at last yielded, and was found to contain a large—joint of cold mutton. This, with a few other cold edibles, comprised the entire contents, the safe having been used for some time as a refrigerator.

A VENERABLE plow is announced for exhibition at the Maine State Fair. It has a seven-foot beam of white oak, a stout iron colter, an oak share sheathed with iron, and a pair of ash handles, like immense davits, projecting four feet in the rear. The wood is seamed and wrinkled, but tough and sinewy still.

DURING the recent laying of the siphon under the Seine at Paris, one of the divers employed remained at the bottom so long as to excite the alarm of the attendants. The bubbles which arose indicated that he was alive and remaining stationary, but he could not or would not reply to signals. Another diver was sent down, who found his predecessor gloriously drunk, and enjoying a cosy nap upon the bottom of the river.

THE Rappahannock Canal was recently sold for the paltry sum of \$1500. It had ceased to be of any value as an internal improvement.