and becomes homogeneously adherent thereto. Iron articles so heated are rendered impervious to rust. The process is superior as a preservative to galvanizing, while the cost is estimated at only half a cent per superficial square foot. This coating is of dark color.

The above is the foundation process, after which other processes, which give ornamentation to the article, may be added as follows: After the iron has been treated as just described, it may be enameled, so as to have a smooth polished surface, by painting it with a compound made of borate of lead, litharge, and essence of lavender. An extensive variety of colored enamels, of great durability and fine polish, may thus be produced. The cost is two to three cents per superficial square foot.

When an ornamental surface resembling dull silver is wanted, the iron article, after having been treated by the process first above described, is now painted with a mixture of dry chloride of platinum dissolved in ether. The article is then again heated to 350° to 400° Fah., whereby the platinum becomes incorporated with the inoxidated surfaces, and a firm, durable, and excellent dull silvered appearance is attained. The cost of this last process is stated to be from three to six cents per superficial square foot.

When a highly polished silver surface is wanted, two coats of the enamel, before mentioned, are first given, and an increased quantity of the platinum solution is used.

A golden surface, instead of silver, may be obtained by preparing a compound in which chloride of gold instead of platinum is used.

A paper on this discovery was lately read before the Society of Arts, London, followed by a very interesting discussion, all of which are given at length in our SUPPLEMENT for the current week, No. 177. Many splendid specimens of iron articles treated by the process were at the same time submitted for inspection.

WHO ORIGINATED THE ATLANTIC CABLE?

The recent cable celebration has called out a claim for the late Col. John Henry Sherburne, of Washington, D. C., as deserving the honor of originating ocean telegraphy. The claim is based on the following entry in the journal of the Senate of the United States Senate for the second session of the XXXth Congress. to wit: "Monday, January 28, 1849. The Vice President presented the memorial of John Henry Sherburne and Horatio Hubbell, praying the aid of Government in the establishment of a telegraphic communication across the Atlantic Ocean, which was referred to the Committee of Commerce."

In the memorial referred to the geographical points are indicated from which the communication can be most conveniently made between Newfoundland and Ireland, the distances given, the probable existence of soundings quite across suggested, or the possibility of anchoring buoys without soundings, and the apparatus necessary to effect the design.

The sudden death of Colonel Sherburne is claimed, by his son, to have prevented the carrying out of his father's favorite project.

The right of Cyrus W. Field to the honor of inaugurating the first Atlantic cable does not seem to be in any way lessened by the earlier project of Colonel Sherburne and Mr. Hubbell. The idea of ocean telegraphy was not original with either. As early as 1842, Professor Morse telegraphed through insulated wire, a submarine cable, stretched between Castle Garden and Governor's Island. And with reference to later investigations, Professor Morse wrote in a letter to the Secretary of the United States Treasury, under the date of August 10, 1843, these memorable words: "The practical inference from the law just elucidated is that a telegraphic communication on my plan may with certainty be established across the Atlantic! Startling as this statement may now seem, the time will come when the project will be realized."

Possibly, if Colonel Sherburne had lived, he, and not Mr. Field, would have been the founder of the first Atlantic Telegraph Company. Possibly also he might have fought the enterprise through to successful issue. This, however, is a question of fact, not of possibilities. Col. Sherburne proposed—and died. Mr. Field proposed, and happily lived to see his plans succeed.

THE WORLD-CIRCUIT AND TIME PUZZLE.

The everlasting problem of the two men traveling in opposite directions around the world and meeting to find their time reckoning at variance, must be the source of much revenue to the postal department. Sooner or later every youth falls foul of it, and, getting into a dispute over it, appeals to his favorite newspaper for a decision. The number of such communications coming to the office of the SCIENTIFIC AMERICAN is in one sense highly gratifying, in that it shows no small percentage of the youth of the country to be among its friends. Nevertheless the incessant repetition of even an interesting question becomes monotonous in the course of years. In the hope of setting the matter at rest for a little while, to the saving of time and correspondence, to say nothing of disputation, the question may properly be taken out of the department of "Notes and Queries," and considered at greater length than would be possible there.

The great trouble with the question clearly arises from the circumstance that it involves two different ways of noting time—by sunrises, and by actual duration as measured by the clock—while those who attempt its solution do not always keep the two ideas of time distinct and separate.

Sometimes the journey is supposed to be made in one day; at others a year is allowed. Let us begin with the first case. Assuming it possible to travel at the rate of 15° an hour, so as to make the circuit of the world in twenty-four hours, we will consider the cases of A, B, and C, the first going westward, the second eastward, the third remaining at home. The time of starting is, say, noon, January 1, and each is provided with an accurate calendar clock.

At noon, January 1, A starts on his journey, travels with the sun, and makes the circuit of the world in twenty-four hours by the clock.

B, starting at the same instant, travels eastward at the same rate (15° an hour), and completes his journey in twenty-four hours by the clock.

C remains at home.

When it is noon, January 2, by C's reckoning, both by the sun and by the clock, the three men compare their reckonings. Obviously the three clocks will agree in indicating noon, January 2. During the preceding twenty-four hours, however, the sun, to A, has been steadily at the meridian, and utterly useless as an indicator of time movement. A has seen neither sunrise nor sunset, and in comparison with C's sun reckoning, he has missed one sunrise, and has accordingly lost one day. Meantime B has seen the sunrise twice, once more than C, and twice more than A. By sun reckoning, therefore, A and B are two days apart.

Suppose the time of the journey prolonged to a year of 365 days, the calendar clocks not being interfered with. Obviously all three clocks will register the same absolute duration, and stand, at noon, January 1, one year later than the time of starting.

Assuming A's progress westward to be uniform, he must, by the direction of his travel, lengthen each day (in other words, put back sunrise) nearly four minutes, the aggregate for the year making one whole day; and of course, if his speed is variable, that would be the average gain—that is, to each day's length, making the aggregate number of days for the year one less than if he had stood still. As a consequence, he will see the sunrise but 364 times in 365 days by the clock; in other words, his date by sun reckoning will be noon, December 31, the year of starting.

The days of B, on the other hand, will be similarly shortened. He will see the sun rise 366 times in 365 days by the clock, and his date, by sun reckoning, will be noon, January 2, the year after starting.

Thus, reckoning by sunrises, A will be one day behind C, and B one day ahead of C. The reckoning of A and B will, therefore differ by two full days.

Since the meridian of 180° E. or W. of Greenwich falls in mid Pacific, touching no land of consequence, it is usually chosen as the line for time correction, the day lost or gained being there added or dropped, as the case may require.

PROF. BERT'S NEW ANÆSTHETIC.

Not long since we called attention to an important paper read by M. Paul Bert before the French Academy, and in which the author suggested the benefits to be derived in surgical operations from the use of nitrous oxide as an anæsthetic, when combined with oxygen and administered under tension. M. Bert's conclusions were drawn solely from experiments that had been made by him on the inferior animals.

The first trial of the new anæsthetic on a human being has recently been made in Paris, and has proved so successful in every respect that it deserves to be made known in all its details. The experiment, according to the Paris correspondent of the *Lancet*, was performed on the 13th of February, in the "Acrōpathic" establishment of Dr. Daupley, Rue Malesherbes. Dr. Labbé, surgeon to Lariboisière Hospital, was to operate on a young woman of twenty for in-growing nail; and M. Préterre, who has great experience in the use of nitrous oxide, was to apply the gas. The other persons present were Prof. Paul Bert, and MM. Reynard, Laffont, and Blanchard. At 11 o'clock the party entered the large compressing bell of the establishment, and the patient reclined on some mattresses on the floor. At ten minutes past eleven the pressure had increased to 17 centimeters without any of the party having experienced any discomfort, except some noises in the ears and a feeling of tension in the membrana tympani, but which were easily removed by a movement of deglutition. At this moment M. Préterre applied to the patient's nose and mouth the apparatus which he is in the habit of using, and which communicated with a large bag containing 120 liters of the following mixture: Nitrous oxide, 85 parts; oxygen, 15 parts. After a few seconds of hesitation the patient began to breathe deeply, and in about a quarter of a minute insensibility and muscular relaxation were complete. Dr. Labbé then leisurely performed the operation, during which the patient never gave a single sign of pain or reflex action. Her eyes were shut and insensitive, the pupils slightly contracted. About the fourth minute, as Dr. Labbé was beginning the dressing, there were a few contractions of the hands and feet; but this was all, and, as the operation was now over, the apparatus was removed.

It was then fifteen minutes past eleven. The contractions ceased, and the patient remained motionless and asleep for half a minute. She then complained of pain in her toe, and cried a little. Less than a minute afterward she sat up, and declared she had felt nothing during her sleep, but that (to use her own words) "she had gone to heaven, and had seen everything blue with stars." She declared she felt no pain, except slight headache, to which she is subject. Nothing could be more striking than this calm and quiet awakening, compared with that which follows chloroform. Her pulse had been constantly calm, and her complexion natural and rosy.

The following technical figures given by Prof. Bert are of scientific interest: The depression commenced at 11:15 o'clock, and ended at 11:19. The total pressure having ascended to 75 c. + 17 c. = 92 c. The tension of the nitrous oxide was expressed thus: $85 \times \frac{92}{75} = 104$, or, in other words, was slightly above that of pure nitrous oxide breathed in the open air under normal tension. The tension of the oxygen was $15 \times \frac{92}{75} = 18{\cdot}4$, or, in other words, slightly below that of ordinary air (20·9). But the difference is too slight to be of any consequence.

This experiment has successfully shown that Prof. Bert's mixture, which does not produce any anæsthetic phenomenon under ordinary pressure, has the effect when applied under tension of producing complete insensibility. Prof. Bert, therefore, claims for the new anæsthetic that its application is simple, that it is easily dosed, that it is perfectly harmless, and that it is not preceded by a period of excitement, or followed by the stage of reaction.

The Microphone in Mine Disasters.

The buried miners at Sugar Notch tried very hard, by pounding on the walls and doors of their rocky prison, to let their friends outside know they were alive, but did not succeed. The question is raised whether the long and distressing uncertainty as to their fate might not have been relieved had a microphone been employed. Also whether it would not be possible to devise and make known to all workers underground a simple code of microphonic signals, to be communicated by rapping and heard by means of the microphone, whereby some sort of intercourse might be kept up between those without and those within a mine under such circumstances.

International Postal Cards.

The Post Office Department has approved a design for the new international two cent postal card provided for by the Universal Postal Union and the recent act of Congress. On the upper left corner are the words "Universal Postal Union, United States of America," in English and French, the Postal Union requiring that the inscription shall be in the language of the country from which the card is sent and in French. On the right upper corner is the stamp, consisting of the head of Liberty copied from the gold double eagle, surrounded by a ribbon border, with a monogram "U. S." at the top and a buckle at the bottom with the figure "2" in octagon blocks on either side. In the upper half of the circle are the words "postal card," and in the lower half "two cents." The card has also, to more clearly define it from the ordinary one cent card, a neat border around the edge on the address side.

Hand-Training in Education.

In a paper on hand-training in the public schools read before a Massachusetts County Teaching Association, the reader, Rev. G. L. Chaney, laid special emphasis on the need of giving public school children the proper bias toward, not against, manual labor. At present children are taught in such a way that they look down upon manual labor. Education should not thus be prejudicial to the laboring interests of the country. Industrial education is absolutely necessary for us as a people. Hand-training is in reality mind-training, or "brain-building by hand." Mr. Chaney argued that special trade schools should be maintained by manufactories, for which the public school training should be a preparation. The work of the Industrial School Association in Boston was alluded to as an example of what might be accomplished in the manipulation of tools common to all the trades.

Antidote to Arsenic.

Dr. James B. McCaw, according to the *Canadian Journal of Medical Science*, remarks that dialyzed iron (which has recently been recommended as an antidote to arsenic) is simply a peroxide of iron, and exceedingly sensitive to oxygen. Hence, on slight exposure to the atmosphere, it unites with the oxygen of the latter, forming a solid oxide. He suggests the following formula as one not generally known for an antidote to arsenic, and claims for it precedence over all others; first, because it forms the surest antidote; and second, because the ingredients are always readily accessible, even to the country physician who carries saddle bags: Tincture of chloride of iron, one drachm; bicarbonate of soda (or potash), one drachm; tepid water, a teacupful. Mix. The sesquioxide of iron is immediately formed in a solution of chloride of sodium. Give this mixture almost *ad libitum*. It is a perfect antidote to arsenic.

American Coal in Switzerland.

The *Continental and Swiss Times*, published in Geneva, contains the following suggestive advertisement:

"American anthracite coal for sale at 50 francs per 1,000 kilos. Carriage free. Apply J. Lafond, 10 Rue Bonivard."

If American coal can be sold at a profit in Geneva, we see no reason why a more advantageous market may not be found at Marseilles and other ports on the Mediterranean, thus furnishing an opening for another of our products.

PROFESSOR LEWIS SWIFT, of Rochester, has been elected a Fellow of the Royal Astronomical Society of England, as a token of appreciation of his astronomical discoveries.