Correspondence.

Taking Cold—A War Experience.

To the Editor of the Scientific American:

Your correspondent Van Bibber's army experience with "Taking Cold" was very much my own. I served with the 13th N. C. Regiment, and though considered a quite delicate young man, I went through with the rest much hardship and exposure. The severest cold I had in the war was when my company was "eating its wheat bread," in the winter of 1861, at Todd's Point, Va., where we had close, comfortable cabins and large roaring fires. There was too much comfort. I had suffered for years from severe attacks of tonsilitis and ulcerated sore throat, that every year confined me to bed for weeks. Yet as a private in infantry fifteen months, and an officer in line the rest of the war, doing hard service, marching through snow, sleet, rain, mud, often sleeping in mud and water, and occasionally waking in the morning covered with snow, I had but *one* attack the whole war, and that was in November, 1863, when we left newly built winter quarters near Orange C. H., Va. (the close, comfortable cabins again!) to go after Meade at Vadairsville. It was a cool night, we were on line of battle, ordered to charge the enemy at early dawn, and hence were allowed little or no fire. My servant had my overcoat and blanket, and was afraid to come to me on line, and I sat all the night over a few coals, green, smoking pine, my throat much swollen, and with a fever. In the morning Meade was gone. My throat was well in two days, I did not quit duty, and I have had but one attack of tonsilitis since, and that was soon after the war.

P. S.—While fully up with the great damage of an intemperate use of tobacco to the nervous system, I always felt more comfortable, and, somehow, as better proof against "taking cold," if in the cold and wet in the trenches, or roughing it on the open plains, I had the quid in my mouth. But it is a nerve destroyer. I am satisfied of that. T. C. EVANS.

Reidsville, N. C., February 2, 1887.

The Boiler Explosion.

To the Editor of the Scientific American:

Seeing the article in your paper of January 1, on "Remarkable Boiler Explosion," by Mark Bacuitt, also in your issue of January 22 by W. P. Woodward, I venture to make a few remarks, which I think, if carefully considered by practical men, will throw a little light on the mystery of boiler explosions.

Mr. Ames, the master mechanic, claims to see no reason for explosion, beyond the fact that the cock in the steam gauge pipe was partially turned off.

FIRST QUESTION.—What was the cock turned off for? ANSWER.—When the spring in a gauge gets weak, or sometimes when the parts are worn, or sometimes in an improperly constructed gauge, the hand of the gauge will vibrate when the locomotive is in motion; to remedy this, the cock in the gauge pipe is turned off until the hand stops vibrating.

SECOND QUESTION.—About how large is the hole left for steam to pass through the cock? ANSWER.—Gauges vary; sometimes, the cock has to be almost closed before the hand stops vibrating.

THIRD QUESTION.—Was this cock put in for this purpose? ANSWER.—No, it was intended to turn off the steam, so that the gauge might be taken off and repaired while there was steam in the boiler.

FOURTH QUESTION.—Is it advisable to turn off the steam from the gauge in any way? ANSWER.—No, repair or renew the gauge.

FIFTH QUESTION.—Is a gauge pipe more liable to plug up by being tested by cold water pressure than by steam? ANSWER.—Yes, especially after extensive repairs on inside of boiler, more or less light substance will be left on the inside of the boiler, which will float on top of the water, find its way to the highest places, one of which is the steam gauge pipe; being too large to pass through the almost closed cock, stick and swell. W. S. FOSTER.

Farnham, P. Q., January 23, 1887.

How Cut Glass is Made.

To the Editor of the Scientific American:

Referring to question 9, J. S. B. (who asks how cut glass is made), in issue of January 22, 1887, page 59, cut glass table ware is not common pressed glass cut over, etc.

In making cut glass, the articles are always blown, not pressed. Goblets, wineglasses, fingerbowls, etc., are made "off hand," that is, they are blown and shaped by hand, the only tools used being a blowpipe and the gaffer's tool. Oval and irregular shaped articles are blown into proper moulds having smooth surfaces, the moulds serving merely to give the shape, and not to impress any pattern. All articles leave the glass maker's hands with a smooth surface, and in this state they are called "blanks." The pattern or design is cut out of the smooth surface with iron wheels adapted to the work. Every line is then "smoothed" on stone wheels, and finally buffed and polished with crocus and rouge on leather and linen wheels. The essential difference in cost and appearance between cut and other varieties of table ware is that in the former the pattern or design is entirely cut out of the solid mass of the glass.

A pressed article, though it were smoothed and polished over, would not be properly called cut glass, nor would it look at all like a genuine cut piece. I will briefly give the reasons for its inferior appearance. In the first place, the glass always shows a "chill" where it was in contact with the iron of the mould.

This "chill" can be taken off the outside surface of any article by subsequently heating the surface to very nearly the melting point, but it cannot be removed from the inner surface of a goblet, for instance. This is one reason why a goblet first pressed and then polished over would not have the brilliancy of a cut goblet. In the second place, the pressure brought to bear on the soft glass when it is pressed greatly affects the refraction of light in the finished article. When the goods are sold as pressed ware, the refraction is again partly restored by reheating the surface, as before mentioned, after the pressure is removed, such reheating serving to take off the chill as well as to swell a thin skin of the glass into a state in which it seems to regain its refractive powers, in other words, its brilliancy.

In cutting over such a pressed article, this thin skin of refractive glass would be abraded, and the brilliancy of the whole article impaired.

The value of cut glass is in proportion to its purity of color and the brilliancy of the "metal," or glass; and it is a matter in the experience of every glass maker that a pressed article cut over is *not* as brilliant as the same piece not cut, and having the fire polished or reheated surface intact. Hence, though it is cheaper to press a piece first, and then cut over the pattern, such goods are so inferior that they would not bring as much as the merely pressed and fire polished article.

It can be considered a rule that the less pressure there is put on the glass while bringing it into shape, the more brilliant the final cutting will appear.

These remarks may be verified by a visit to the Dorflinger Flint Glass Co., White Mills, Pa., or to the Mt. Washington Glass Co., New Bedford, Mass., where the reader may make himself fully acquainted with all the details of the manufacture of cut glass proper. ANDREW GOTTSCHALK.

A New Method of Blasting.

Dr. Kosman proposes, in blasting in fiery mines, to substitute for gunpowder, dynamite, and other explosives requiring ignition, cartridges containing zinc dust (the mixture of finely divided zinc and zinc oxide that collects in the condensers of the zinc retorts) and diluted sulphuric acid. The cartridge case is a glass cylinder, 7 inches long and 1 inch in diameter, closed at the bottom, and divided into two parts, whose volumes are in the proportion of 1 to 4, by a choking or contraction, which reduces the bore at the junction of the two chambers three-tenths or four-tenths of an inch. The lower or larger division is filled with diluted sulphuric acid, and the contracted opening is stopped with a plug of cork, India rubber, or asbestos, in which state it is given to the miner.

When required for use, the upper part of the case is filled with zinc dust, and the shooting needle is passed through it into the plug closing the acid chamber. The shot hole is loaded and tamped in the ordinary way, first with tempered and then with dry clay or broken up shale. If the rock is porous or jointed, the hole should be carefully clayed, to prevent the gas escaping through the cracks. The shot is "fired" by one or more smart blows on the shooting needle, which drives in the plug and breaks the glass at the choked part, when the zinc dust mixes with the acid, and a rapid, although not instantaneous, evolution of hydrogen takes place, whose expansive power is sufficient to break down the rock. The following figures are given as a measure of the power available:

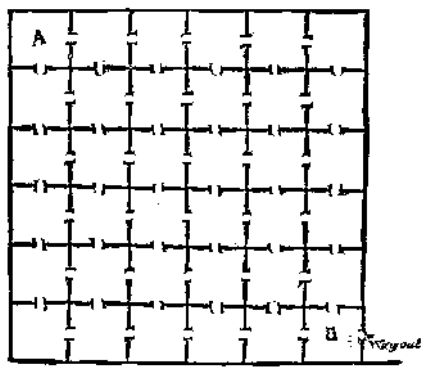
A cartridge of 25 millimeters in diameter and 180 millimeters long is approximately of the capacity of 90 cubic centimeters. The charge consists of 50 cubic centimeters of sulphuric acid and 12 grammes of zinc dust, which, according to its average commercial composition, will contain about 10 grammes of metallic zinc.

According to the formula, $Zn + H_2SO_4 = ZnSO_4 + 2H$, 10 grammes of zinc will liberate 0·3 gramme of hydrogen, or by volume 3·37 cubic meters (1 cubic meter of hydrogen at 760 millimeters barometer pressure weighs 0·089 gramme). This volume of gas being confined to 90 cubic centimeters, the resulting pressure will be $\frac{3{,}370{,}000}{90} = 37{,}000$ atmospheres in round numbers. This is computed at zero, but at higher temperatures, such as prevail in mines, the pressure will be notably greater. In blasting with gunpowder, the pressure developed is below 5,000 atmospheres. The production of the cartridge cases has been intrusted to a single firm, in order to obtain uniformity in the manufacture. The cost of a shot will vary with the caliber and weight of the charge, from about 1½d. to 2d.

The question whether danger might be apprehended from the sudden addition of a large volume of hydrogen to the air of mines already containing inflammable gas must, Dr. Kosman thinks, be answered in the negative, as hydrogen diffuses so rapidly in atmospheric air that the power of inflaming is soon dissipated. For instance, if zinc dust is covered with diluted sulphuric acid in an open dish of 500 cubic centimeters capacity the gas cannot be fired by a naked light at the edge of the dish, and the flame must be applied to the bubbles of hydrogen as they form to obtain a detonation. This rapidity of diffusion is likely, therefore, to prevent any danger by the addition of hydrogen to the air in mines which are well ventilated and worked with safety lamp. The heat developed by the action of the acid upon the zinc also causes a considerable development of steam, which, mixing with the gases, acts in diminution of the explosive power. These and other points can, however, only be settled by experiment on the large scale.

A PUZZLE.

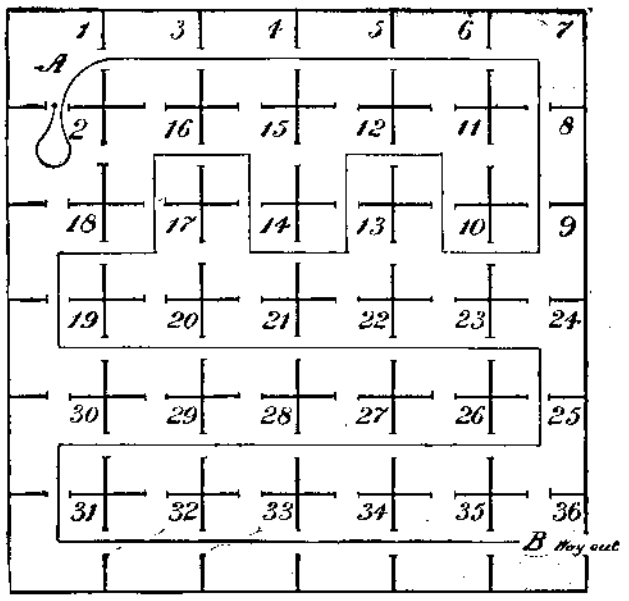
The following, I believe, has a solution, but what that solution may be I by no means promise to tell—for a most excellent reason.



The figure represents the plan of a prison with intercommunicating cells (bless the Latin!); a prisoner in A is offered his freedom if he can make his way to B, after passing once, and once only, through all the 36 cells. How is he to do it?—*Knowledge.*

The above is the puzzle as published in our number of January 15, page 36. We have received a large number of replies, some of which deny the possibility of its solution if the exact terms are complied with. Others find no difficulty in its solution in the manner stated as follows by one of our correspondents:

The prisoner says to the keeper: "Come, we will go



through room No. 2; now we will go through my room No. 1, then No. 3, and so on as per diagram. In this way we go through all the 36 rooms once, and once only." W. P. MURPHY.

Ridgway, Elk County, Pa.

Crown Jewels of France.

Since France has been under republican rule, the disposition of state treasures has been a subject of frequent discussion in her legislative halls. At one time the money obtained for the crown jewels was to be applied to the founding of trade schools, and the collection was exhibited once in the Tuileries in order to help the metal workers in setting up a special school for their apprentices. Now it is said that the products of the sale are to be turned into the treasury. The whole collection is not to be sold. Three objects are to go to the melting pot, viz., the Imperial crown, the glaive of Louis XVIII., and the glaive of the Dauphin. Several of the stones will be handed over to the Mineralogical Museum and the School of Mines, to be used henceforth as specimens. A few objects will be preserved as curiosities, viz., the military sword, the reliquary brooch, the Regent diamond, the Mazarin diamond, the watch presented by the Dey of Algiers, the large ruby, the dragon pearl, and the badge of the Little Elephant of Denmark. The remaining treasures will be treated as if they were seized for debt, and will be sold by auction in the Hotel Drouot.

The Geological Survey of New Jersey.

We have received from Prof. Geo. H. Cook, State Geologist of New Jersey, three sheets of the topographical map of the State, now in process of completion. Each sheet is 27 by 37 inches in size. Seventeen sheets are to complete the State, of which thirteen have been issued, and the completion of the work is promised in 1888. The scale is one inch to the mile, and the country is laid out in 10 foot contour lines, with special references to heights of points of interest. The work, now so near completion, is of the highest interest and value to all interested in the State of New Jersey. The execution of the maps is most excellent, the work being done by the well known firm of Julius Bien & Co., so long associated with government map work. We also note the receipt from the same survey of the agricultural station report, giving interesting statistics upon the sorghum plantation at Rio Grande, and the results attained by the diffusion battery in extracting sirup from the cane. This review of the well known experiment in northern sugar culture will be appreciated by all sugar manufacturers and planters.

Injury to the Brain.

A most remarkable accident, illustrating the necessity of using the greatest care in fixing cutting tools in machines, is reported in *Science*. While a wood turner of San Francisco was at work at his trade, a steel chisel became detached from a grooving machine, and struck him in the head, producing a fracture of the bones of the nose, and severely injuring the left eye, so seriously as to destroy that organ and necessitate its removal. After the removal of the eye, the surgeons found behind it a piece of steel 3½ inches long, one inch wide at the center, and tapering to sharp points at the ends. One end was buried 1½ inch in the brain. The velocity and force with which this chisel must have entered the brain may be imagined when it is stated that the drum to which it was attached was making 2,300 revolutions a minute. The injury to the brain was not discovered until several days afterward, and the man died at the tenth day.

Cleaning Cherry or Ash.

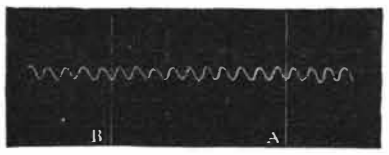
As the proper cleaning and finishing of oak or cherry require considerable care and skill, it will be interesting to notice the practical treatment which the woods undergo under the hands of the woodworker.

Cherry, as in tables, framing, etc., is usually roughed off by the planing machine and worked into its required shape before finishing. When, as in the case of a veneered door, the frame is ready for cleaning off, it is laid on and firmly fastened to the bench by strips cut in between the joggles, then carefully surfaced or leveled over with the fore plane. This is in itself a delicate operation, as the surfaces of the pieces must be exactly flush under a straight edge—that is to say, across the face stiles must be on the same level as the face of the rails, and the latter on the same level as the mullions; in short, the surfaces must all be in the same plane and the stiles likewise straightened. All lumps must be reduced, and great caution exercised to avoid sprawling corners. Use the plane with the grain, as the contrary works out holes, and causes more trouble with the smoother. This done, it is usual to smooth off with a closely set, well-sharpened plane, or, better still, a Bailey iron plane. Some woodworkers object to using the iron plane, as it marks the stuff, and causes much scraping afterward, but it never breaks corners, and will work well against cross-grained stuff like this. Having finished smoothing, proceed to scrape the surface with a scraper which will cut to a shaving. Work carefully with the grain and take out all holes and rough spots, especially near the joints. When scraping across joints, bend the scraper with the hands, and avoid tearing up the grain on either side of the joint. Obliterate every imperfection noticeable before applying the sandpaper, which should be No. 1, and used with a broad, flat cork rubber. On no account sandpaper across the joints, as the grit in the sandpaper will score across the sensitive surface, but work close to the end-wood joint and then with the grain of the jointed stile or rail, as the case may be. Of course the result of the operation depends on the operator's skill, but an exceedingly neat job can be done with a little care.

Ash is, perhaps, the most difficult of all the woods to clean, as the grain is of an open and straight nature, varied with a frequently recurring tough cross spot. Like cherry wood after going through similar treatment, it shows a beautiful surface, which, being filled and varnished or polished, looks rich and glossy, the one dark and warm and the other light and elegant. After sandpapering, rough spots are seen by white blotches, and they can be easily scraped out as before. In these days, when pine is almost obsolete and the hardwoods growing in favor, it is essential that their treatment be understood.—*Owen B. Maginnis in Milling News.*

LONDE'S METHOD OF TIMING PHOTOGRAPHIC EXPOSURES.

The process illustrated in the cuts is a development or improvement by M. A. Londe of M. Vidal's method. To make it perfectly accurate, a tuning fork is used to determine the absolute time. The tuning fork, as a measurer of time, is the only one whose accuracy cannot be questioned, and we believe that, instead of its being restricted to the hands of scientists, it should

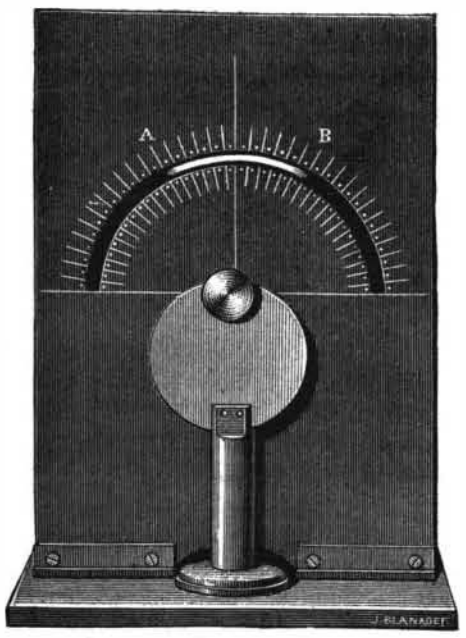


3.—REPRODUCTION OF THE SINOIDAL CURVE IN LONDE'S METHOD.

A.—Beginning of the Impression.
B.—End of the Impression.

be used for our advantage in the interest of our researches.

It will probably be objected that such methods as here described cannot be used by every one. This is indisputable, but it seems clear that to measure hundredths and thousandths of a second requires instruments of great precision, or else it is useless to occupy one's self with such work. To measure such small fractions of seconds by approximate methods appears to us as

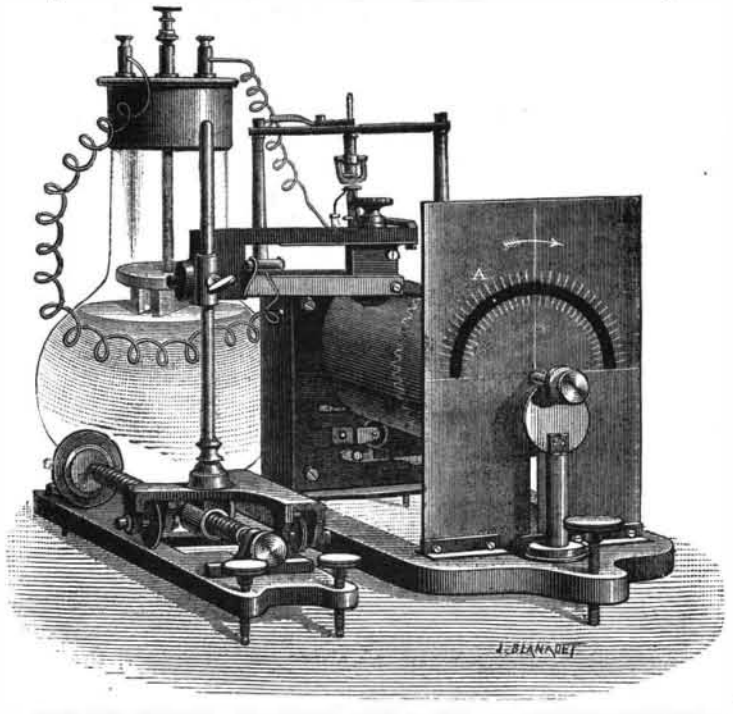


2.—REPRODUCTION OF A PROOF OBTAINED BY LONDE'S METHOD.

A.—Beginning of the Luminous Impression.
B.—End of the Luminous Impression.

of the same nature as weighing milligrammes with gramme weights. As soon as these problems are attacked, the utmost precision is required. In this order of ideas, we have devised the following apparatus:

A registering cylinder is governed by a Foucault regulator. On its end is placed a bright point, a nickel plated head of a nail, for example. The point and cylinder move together. It is its displacement that we photograph. It moves behind a graduated screen pierced with a segmental opening (Fig. 1). The screen is black; the divisions are white. The cylinder is covered with smoked paper, over which an electric tuning fork carrying a light needle point vibrates. A photographic apparatus is focused upon the dial. The regulator is started, the stylus of the tuning fork is made to touch the paper, and the shutter is released.



1.—LONDE'S METHOD OF TIMING EXPOSURES.—A, BRILLIANT POINT.

The result of an experiment is here reproduced (Fig. 2). The divisions of the dial and the trace, A B, left by the brilliant point are shown clearly. The light began to act at A, and ceased at B. On our sinoidal curve we now must determine to which places these two points correspond, and what time passed between A and B. Nothing is simpler. The cylinder is turned by hand until the point is at A. Here the impression begins. We trace therefore a line which cuts the sinoidal curve, by moving the tuning fork along on its car. The point, A, is referred to the point of intersection of this line and of the curve of sines. The cylinder is rotated until the point reaches B. We trace a second sine, which gives the point corresponding to B. The number of vibrations comprised between A and B must now be counted, to ascertain for what period the light has acted, to know the value of the time of exposure. In the experiment illustrated 10 vibrations took place; the tuning fork gave 250 per second; the time of exposure was 10 250 of a second, or 1-25 (Fig. 3).

In this method, combining graphic and registration methods, regulated movement is not required, as the law of movement of the cylinder is always known. The dial need not be divided with accuracy, as its graduation is only used to establish the positions. The method is really a simplification, while giving most accurate results.—*La Photographie Instantanée, by Albert Londe.*

Protection of Iron.

M. De Meritens, in continuing his experiments upon the protection of iron, has obtained some further results, which seem likely to be of practical importance. The method of protecting an iron or steel surface by the electrolytic formation of a coating of the black magnetic oxide has already been taken up in France as a commercial process. Experiments in this direction have also been undertaken by the French arsenals, and are understood to have led to satisfactory results. M. De Meritens describes his later researches in a note presented to the French Academy, as follows:

"When we submit a piece of iron to the action of the current in a bath of cold water, the formation of magnetic oxide does not immediately take place. The surface of the metal is in the first place coated with a layer of the protoxide of iron. This is a body of which little is known at present. It has not been completely studied by any chemist. Berzelius undertook a prolonged investigation of the substance, but he has never completed the work. The protoxide is the least stable of the oxides of iron. If it is produced by precipitation from a salt of iron, it is immediately converted into the sesquioxide. A similar conversion into the higher oxide takes place when the protoxide formed upon the surface of the metal by electrolysis is exposed to the air, or if the electrode is allowed to remain in the bath after the cessation of the current. If, however, the sheet of iron coated with the protoxide is immediately transferred to a bath containing a solution of a suitable salt of some other metal, such as copper, silver, gold, or aluminum, a perfectly adherent layer of this metal is immediately formed upon the iron. It is probable that the action is due to a partial reduction of the protoxide by hydrogen and the formation of an actual alloy between the two metals, both of which are at the moment in the nascent condition."

M. De Meritens exhibited specimens of iron coated by this process with the several metals named above.

A Candy Temperance Society.

At a recent meeting of the Nineteenth Century Club, of New York City, Dr. Hammond addressed the audience on the subject of "Brain Forcing in the Education of Children." Miss Tate, the principal of one of the city public schools, refuted the idea of any brain injury resulting from the ordinary education, according to the school system. Candy she affirmed to be the evil in the daily life of a large proportion of the youthful maidens of the country. The *Hour* thinks the formation of a temperance society for controlling this particular vice would seem to be as essential to the progress of the country as the suppression of whisky where men are concerned. In fact, cream caramels have never before been presented to the public under so fatal an aspect. A large gathering listened with evident satisfaction to the speakers of the evening. Among those present were Mr. and Mrs. Wm. Hamilton, Mr. and Mrs. Stickney, Professor and Mrs. Boyesen, and Mrs. Bernard. The Marquise De Lanza and Mrs. Charles H. Stebbins received the guests.

IT is reported from Maine that the English sparrows are becoming acclimated, and growing white.