shunt across the terminals of the battery, this shunt can be so adjusted that the reading of the galvanometer shall return to the same position as in the first observation. When this is the case, the resistance of the shunt is equal to the internal resistance of the battery."

Lieutenant Couden conceived the idea that if the two changes, viz., shortening the resistance and applying the shunt, were made simultaneously, there would be at the first instant no movement of the needle, if the proper shunt were first chosen. He availed himself of the two keys used in manipulating the Wheatstone bridge to carry out the idea. The results were quite satisfactory, but the two keys being independent of each other and far apart required two fingers to press them, and sometimes failed to operate with complete simultaneity. To remedy this Professor Farmer had made for Lieutenant Couden a key with a single finger piece, but with two independent contact closers, which admitted of such adjustment as to secure the required simultaneous closing of the two circuits when the key was depressed. The apparatus as thus constructed operates with entire satisfaction.

Improvements have also been made in the method of splicing the torpedo cables and leading-wires now issued to ships. Mr. Farmer says that in all insulated wire now issued to ships for permanent wires, for spar leading-wires, and torpedo cables, the conductor consists of seven strands of small copper wire, and is therefore very flexible. Should it become necessary to join two pieces of cable together, it can now be done by knotting the wire by, first, a sheet bend; second, a reef knot; third, a carrick bend. The advantages over the earlier form of splicing are fourfold, viz., first, the splicing nippers and splicers in the supply box are abolished; second, instruction to the sailor is unnecessary, and the operation is more quickly performed; third, it is the strongest way of joining two pieces of wire; fourth, the electrical properties are all that can be desired.

The modification and improvements in the electric primer are as follows: In putting in the bridge great uniformity in length and consequently in the electrical resistance is obtained; rounding up the quills so that the primers will enter the vent guns freely; a method of "choking in" the quills and securing them firmly to the wires.

The United States steamer Trenton's electrical apparatus is a noteworthy result of discoveries at the torpedo station. A full description of it would occupy too much space, but it may be stated that it is for two distinct purposes—firing of guns and torpedoes, and calls and automatic fire alarms. That intended for guns and torpedoes is designed to place the firing under the control of a single officer stationed at some central point, who shall be able to fire any gun when it is ready, or either or both broadsides, or as much of a broadside as may be ready.

Professor Walter N. Hill has made a variety of experiments in chemistry, as pertaining to torpedo construction and firing, and below are given a few opinions he gives as a result of them. He states that liquid nitro-glycerine is readily exploded, as is well known to scientists, by five to ten grains of fulminating mercury, but when frozen he has never been able to fire it. When dynamite freezes to a loose, fine powder, he finds it may be exploded with tolerable certainty by the ordinary detonating fuse (fifteen to twenty grains of fulminate). In a large number of experiments with small amounts he found but very few cases when explosion did not occur. But in proportion as it is solidly frozen, that is compacted together, the explosion is less sure. It would be uninteresting to give particulars in detail of the experiments. It is sufficient to state that the conclusions arrived at are that an exploder containing fulminating mercury only will not fire frozen dynamite with any degree of certainty. In the experiments it did so twice, but in one instance it is doubtful if the charge was well frozen.

The present service torpedo has proved objectionable for several reasons, principally on account of its weight, lack of strength, and the great surface offered for resistance in being towed through the water, whether ahead or abeam. A new design has been perfected; it is of steel, and possesses decided advantages over the present service pattern, being stronger, lighter, and offering less surface for resistance. The cost of each steel torpedo is about $60, and as even ten would be a very small number to experiment with it has been found impossible to make much progress. Their general shape is very nearly that of a sphere. Another feature they possess, an advantage over the service pattern, is the mode of attaching them to a spar or outrigger; the center of the torpedo case lies in a prolongation of the axis of the spar, and is secured to it by a conical cap permanently attached to the torpedo case, and also of steel, which is keyed to a metal cone rigidly secured to the end of the spar; this mode of attachment reduces the surface of the spar exposed to the effect of explosion, and the force is exerted in the direction of the length of the spar, the most advantageous for the spar and the boat. Further trials have been had with the improved spar, fitted with the attachments of spars to the forward guy and topping lift, and it continues to give good results, tows well, preserves its immersion, vibrates but little, and has stood the fire of twelve service 100-pounder torpedoes without any material injury. It has been found that, in the case of boat spars, if the spar is left free to recoil, the effect upon the boat and spar is reduced; the spar recoils usually from 10 to 15 feet, but not past the balancing point, therefore not coming into the boat. A ready man at the heel rope can easily, at this time, rig the spar in by a pull on the heel rope, leaving the launch free to steam without the drag of the spar. Spars have been very successfully worked in this way at the station, and a number of spars have each withstood the explosions of six service boat torpedoes without any considerable damage. By this precaution the lifetime of the spar is prolonged.

A towing torpedo, capable of being towed on either quarter or shifted from one quarter to the other while being towed, has been designed, and the trials had with a little working model give promise of success with a larger and more practicable one.

Experiments have also been made with the fittings designed for fast torpedo launches, with a view to determine the requisite strength for a beam spar. The results have been satisfactory.

A small non-automatic hand lamp, constructed by Mr. Farmer, for use on the torpedo boat Lightning, has proved very advantageous as a means of signaling when its beams have been waved in the sky in a manner somewhat similar to the usual method of waving a signal flag. In dark and cloudy nights this method of signaling has some advantages, since the position of the lamp can be screened, as, for instance, by being sunk in a rifle pit, so that its exact location could not be determined at a distance.

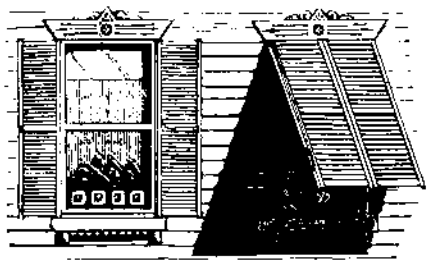
Some experiments have been tried with parallel carbons arranged somewhat after the plan of the carbons in the electric candle of M. Jablochkoff, but a sufficient number have not yet been tried to warrant an expression of opinion as to the serviceableness of carbons used in that manner.

Experiments have also been made with the telephone in order to ascertain its suitableness for communication between the bridge and the powder magazine, as well as between other parts of the ship. It has been found possible to communicate over a circuit of 22,000 ohms, having a stated capacity of eight microfarads, whence it is easy to see that it would be entirely feasible to communicate through an ocean cable between two stations that should be at least 500 miles apart. The rapidity of communication, too, is astonishing, since 145 words in 17 seconds were distinctly heard over a short circuit. This is at the rate of 512 words per minute. The possibility of communicating with way stations at a distance from the direct line, and without a loop, has been satisfactorily demonstrated by Professor Farmer and his assistants.

Captain F. M. Ramsey, United States Navy, is now in charge of the station, having succeeded Captain K. R. Breeze, who is now preparing a *résumé* of all the work that has been done at the torpedo station.

IMPROVED WINDOW AWNING.

With the ordinary wooden blinds placed on the exterior of windows it is only possible to open and close them one way. The annexed illustration represents an improved form



WINDOW AWNING.

of blind, window screen, or awning applicable to all windows in brick and wooden buildings where ordinary blinds are in use, and also to bay windows where there is little or no chance to swing blinds back. The improvement consists in constructing the blind so that it will swing on hinges as usual, and in addition to this the two halves can be drawn and fastened together to form one entire blind, and then quickly and easily adjusted to swing from a top horizontal hinge, instead of the vertical ones.

The blind can be used both ways, as shown in the cut, and the improvement may be applied to either old or new blinds; it is an economical and effective way of shading a window; it makes a perfect screen from outside observation; and it allows a free circulation of air. The view from the inside is not obstructed; blind fasteners are dispensed with, a bolt being used to hold the blinds together, and arms are provided which hold them open against the house. This kind of blind can be used in fall or winter, when a cloth awning has to be taken down to preserve it. Further information may be had from the Boston Blower Co., 2 Foster's Wharf, Atlantic avenue, Boston, Mass.

Carbolate of Soda for Whooping Cough.

Dr. Pernot describes in the *Lyons Medical Record* a very successful treatment of whooping cough with carbolate of soda. He places the carbolate of soda in a small porcelain crucible held above the flame of a spirit lamp, which keeps it in an unvarying temperature as long as wished. As the carbolate of soda becomes volatilized, the atmosphere of the sick room is impregnated with the vapor of carbolic acid.

When the crucible and lamp are not at hand, a satisfactory substitute is found in a fire brick heated enough to vaporize the carbolate. In numerous cases the following results have been obtained:

1. A notable diminution of the paroxysms of coughing after from two to ten days' treatment. 2. Less labored and painful respiration. 3. Shorter duration of the paroxysms of coughing. 4. The most confirmed attack of whooping cough remains *in statu quo* from the commencement of the treatment, and it always appeared to him to diminish more or less rapidly, but always in a time relatively short to its usual duration.

The vapors of carbolate of soda have valuable disinfecting and antiseptic properties.

It is worthy of note in this connection that the fungoid origin of whooping cough, asserted some years since by M. Svetzerich, seems to be confirmed by the recent researches of M. Yschamer, who says he has found certain lower organisms in the spittle of whooping cough patients—organisms not met with in any other disease accompanied by cough and expectoration. He claims, further, that the organisms in question are identical with those which, by their agglomeration, form the black points on the skins of oranges and the parings of certain fruits, especially apples. Thus, M. Yschamer, by inoculating rabbits with this dark matter, or even causing it to be inhaled by men, produced fits of coughing several days in duration, and presenting all the characters of the convulsive whooping cough.

How Roquefort Cheese is Made.

In an address on "Dairy Interests Abroad," at the International Dairy Fair, Mr. F. B. Thurber gave the following account of the manufacture of this variety of cheese:

The French Roquefort is made from the milk of sheep and goats, principally from that of the former. In 1866 250,000 out of a flock of 400,000 supplied the milk for 7,150,000 lbs. of cheese. The fertile pasturage of these animals is an immense plain, 8 or 10 leagues across. In the evening, after the return of the sheep from the pastures, they are allowed to rest for an hour before being milked, after which they will yield the milk more readily, and are milked as rapidly as possible. From May 1 to the middle of July the yield of milk is the largest, and each animal gives nearly a pint.

The Larzac breed of sheep, from the milk of which the cheese is made, have large udders, made so by beating them with the hand as soon as the milk ceases to flow. The evening's milk is heated almost to boiling and set aside. In the morning it is skimmed, heated to 98°, and mixed with the morning's milk for coagulation. After the curd has been divided by stirring with a paddle and the whey drawn off, it is kneaded with the hands and pressed in layers into moulds with perforated bottoms, and usually a thin layer of mouldy bread made of summer and winter barley, sour dough and vinegar, is put between the layers of curd to hasten the ripening of the cheese by supplying the germs of the green mould peculiar to cheese. The curd remains under pressure for three or four days, after which the cheeses are wrapped in linen and put to dry. After drying for three or four days they are taken to the village of Roquefort, where the ripening is completed in a peculiar manner.

The village is situated in a deep, narrow gorge, with high precipitous walls of limestone rock overhanging. These walls are full of caves and fissures, from which currents of cold air issue at a temperature, in the hottest weather, of from 41° to 44°. The air currents flow from south to north, and are believed to yield the best cheese. The proprietors of the vaults purchase cheeses at all seasons from the shepherds. They are carefully examined and classified. Salt is then sprinkled over them, and they are piled up for two or three days; then the piles are taken down, the salt and brine rubbed in, and they are piled up again. After a week in the vaults, they are scraped and pared, pricked through with needles, driven by machinery, to accelerate the moulding, and again kept in piles for fifteen days, or until they become dry and firm in texture, and become covered with a white mould, with filaments sometimes five or six inches long. Its succulency and thickness indicate the quality of the cheese.

New Agricultural Inventions.

Mr. Slaughter G. Major, of Haynesville, Mo., has patented an improved device for use in Milking Cows, which is convenient and may be easily and quickly applied, and will not injure the cow.

Mr. William J. Klaunig, of Richmond, Va., has patented an improved Mower, having a wave wheel of peculiar form which imparts to the knives a scythe-like cutting action, that prevents the dropping of the grain from the ears, which is likely to occur in the ordinary machine from the rapidly reciprocating motion of the knives, which motion shakes out the grain, and compels, therefore, the cutting of the grain before it has become entirely ripe.

PARAFFINE AS A LUBRICANT.—A correspondent of the *Railroad Gazette* announces that the Erie railway has reduced its oiling expenses from $5,000 to $1,000 a year by using paraffine on passenger car journals, and has reduced the number of hot journals from 535 to 332. It is now used during the winter months, without the addition of any other oil, but it is found that in summer it becomes so limpid that it is hard to keep it in the axle boxes. During the summer months it is therefore mixed with some other lubricant to give it more "body."

ERRATUM.—In our issue of January 18, p. 35, in the article on the Columbia bicycle, the description should read: "The front wheel bearings are conical and well hardened, and fitted with coned fastenings. The India-rubber is 1 inch on the front and ¾ inch diameter on the back wheel."

Accuracy a Path to Wealth.

In this age of guesswork it is refreshing to read an article on the following, contributed to the *Methodist* by John D. Knox, of Topeka, Kansas, on the importance of exactness. The author commences with the importance of accuracy in the value of testimony, all depending on its exactness, and proceeds to say: The professed end of logic is to teach men to think, to judge and reason with precision and accuracy. S. Martin asks: "What makes the scholar? Exactness. What is most likely to secure success in the learned professions? Exactness. What raises men of various callings to the highest position attainable by persons in their occupations? Exactness. What makes a man's word pass current as gold? His known exactness. What, above all things, is essential in the laboratory? Exactness."

Mr. Martin is right. Exactness, accuracy, perfection in all the work you undertake will bring you a sure reward. And the record of a noted man is found in these words: "He became an honorable man, successful merchant, and bank president." His splendid career commenced in blacking a pair of boots well when a boy; and he continued "doing well" all through life, whether blacking boots or managing finance. What he did he did accurately, and, of course, it did not have to be done over or improved or mended, but always gave satisfaction and secured commendation.

President Tuttle, on "How to Get the Best Place," gives us this instance: "I saw a young man in the office of a Western railway superintendent. He was occupying a position that four hundred boys in the city would have wished to get. It was honorable and 'it paid well,' besides being in the line of promotion. How did he get it? Not by having a rich father, for he was the son of a laborer. The secret was, his beautiful accuracy. He began as an errand boy, and did his work accurately. His leisure time he used in perfecting his writing and arithmetic. After a while he learned to telegraph. At each step his employer commended his accuracy, and relied on what he did because he was sure it was just right.'

And it is thus with every occupation. The accurate boy is the favored one. Those who employ men do not wish to be on the constant lookout, as though they were rogues or fools. If a carpenter must stand at his journeyman's elbow to be sure his work is right, or if a cashier must run over his book-keeper's columns, he might as well do the work himself as to employ another one to do it in that way; and it is very certain that the employer will get rid of such an inaccurate workman as soon as possible.

I knew such a young man. He had a good chance to do well, but he was so inaccurate and unreliable that people were afraid to trust him. If he wrote a deed or mortgage or a contract, he was sure to leave out something or put in something to make it an imperfect paper. He was a lawyer without business, because he lacked the noble quality of accuracy.

Just across the street from him was another young lawyer, who was proverbial for accuracy. He was famous for searching titles, and when he wrote out the history of a title to a piece of property, it was taken for granted as just so. His aim was absolute accuracy in everything. If he copied a conveyance or cited a legal authority or made a statement, he aimed to do it exactly. The consequence is, he is having a valuable practice at the bar and is universally esteemed.

"But," says some boy, "when I become a man that is the way I shall do. I mean to be very accurate." Perhaps so; I could tell better if I knew just how you do your work now. There are several ways of getting a lesson. One is to get it "tolerably well," which does not cost much labor; the other is to get it faultlessly well, which costs a great deal of labor. A boy can get a general idea of his lesson "in a jiffy;" but to get it accurately is very hard, and requires both time and industry. If you, my boy, to-day are getting your lesson in the slipshod way, you will grow up a slipshod man; but if to-day your habit is to get every lesson with perfect accuracy, I will warrant you will do that way when you become a man. How is it?

Millions of persons in the world are clamoring for work, and work is abundant; but they are careless, inaccurate, unreliable, untrustworthy. Shake off your stupidity, idle one; get wide awake and do your work well. Accurate, perfect, for even a dot or point may shelter you or turn you out of doors.

To illustrate the importance of accuracy and careful, honest work, take this instance of loss by bad penmanship: "A decision was rendered by Judge Van Brunt, of New York, which may be of interest to those who are careless in preparing manuscript, and think anything in the guise of handwriting will do that can either be deciphered or guessed at. It was a suit brought to recover damages from a telegraph company for errors committed in transmitting a message, by which the party suing suffered pecuniary loss. On the trial the original message, as written and handed to the operator, was offered in evidence, and was so illegibly written that no two persons could agree from the marks submitted what it actually did contain. Whereupon the judge instructed the jury that if people wrote their dispatches in such a hand that the contents are uncertain, they have no right to recover damages from the dispatcher because he failed to read it correctly, and that if damages do result from such causes, the sender and not the company should bear the loss. This was good common sense, which is the essence of common law."

Some persons take no care at all in anything they do, forgetting that the interests of others, as well as themselves, depend upon the character of their work. It is not only a matter of cents and dollars, but it is a matter of morals.

DESIGNS FOR VASES.

The engraving on this page shows three elegant designs for vases in metal or ceramics. These designs are from the firm of Villeroy, of Mettlach.

DESIGNS FOR VASES IN METAL OR CERAMIC.

Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although only approximate, they will enable the ordinary observer to find the planets.

M. M.

Positions of Planets for February, 1879.

Mercury.

February 1, Mercury rises at 6h. 18m. A.M., and sets at 3h. 25m. P.M. February 28, Mercury rises at 6h. 43m. A.M., and sets at 5h. 24m. P.M.

Mercury is far south in declination, and if seen at all, it will be during the first few days of February, some degrees south of the point of sunrise.

Venus.

February 1, Venus rises at 8h. 2m. A.M., and sets at 6h. 18m. P.M. February 28, Venus rises at 7h. 33m. A.M., and sets at 7h. 26m. P.M.

Venus will be seen after sunset, and will set farther and farther north of the point of sunset, through the month. February 22, the moon and Venus will be in conjunction.

Mars.

February 1, Mars rises at 4h. 35m. A.M., and sets at 1h. 31m. P.M. February 28, Mars rises at 4h. 10m. A.M., and sets at 1h. 11m. P.M.

Mars will be seen only in the early morning, it is far south in declination, among the small stars of Sagittarius

Jupiter.

Jupiter sets in the early part of the month soon after the sun, and in the latter part before the sun; it will probably not be observed at all.

Saturn.

Although we are more distant from Saturn than in January, the planet can be seen in the February evenings. February 1 Saturn sets at 9h. 7m. P.M., and on the 28th, at 7h. 36m. P.M. The planet passes the meridian in daylight, and the smaller moons are more and more difficult to be seen. The ring of Saturn is so tipped relatively to the earth, as to be seen nearly edgewise, and to extend as a line across and beyond the planet's disk. On the evening of January 10, Titan was seen (in the large telescope of Vassar College) on the west of Saturn. Rhea, which is much smaller than Titan, and shines with a bluish light, on the east, while Dione and Enceladus could just be seen as tiny points of light above and below the extreme eastern point of the ring. January 13, four of the small moons clustered in a group about the western extension of the ring, while Titan and Enceladus were on the east.

Saturn can be found, February 23, by its nearness to the crescent moon.

Uranus.

Uranus is the only planet which is well situated for observation in February. It is sometimes seen with the eye, and a small telescope will show a disk, and thereby enable one to distinguish it from a star. Uranus rises on February 1 at 6h. 56m. P.M., and sets at 8h. 16m. A.M. of the next day. On February 28, Uranus rises at 5 P.M., and sets at 6h. 24m. A.M. of the next day.

Uranus will be in conjunction with the moon (according to the American Ephemeris) at 11h. 40m., Washington time, on February 7; the planet will be a few degrees above the moon.

Uranus can also be found by its nearness to the star Rho Leonis.

Neptune.

Neptune cannot be seen except by very powerful telescopes. It sets February 1 a little after midnight, and on February 28 as early as 10h. 35m. P.M.

Care of the Eyes.

From the great demand for the eight numbers of the SUPPLEMENT to the SCIENTIFIC AMERICAN, in which appeared a series of articles on the preservation of the eyesight, it is evidently a subject in which most persons are more than ordinarily interested. As a writer on the care of the eyes, in an English paper, recently said: "All are anxious to do this, but few know how effectually to do so, and many never think of the matter till failing eyesight warns them that it is absolutely necessary. By the latter," says the same writer, "the following suggestions will be read with interest:

"The sight in most persons begins to fail from forty to fifty years of age, as is evidenced by an instinctive preference for large print; a seat near the window for reading is selected; there is an effort to place the paper at a convenient distance from the eye, or to turn it so as to get a particular reflection of the light; next the finger begins to be placed under the line read, and there is a winking of the eye as if to clear it, or a looking away at some distant object to rest it; or the fingers are pressed over the closed lids in the direction of the nose, to remove the tears caused by straining.

"Favor the failing sight as much as possible. Looking into a bright fire, especially a coal fire, is very injurious to the eyes. Looking at molten iron will soon destroy the sight; reading in the twilight is injurious to the eyes, as they are obliged to make great exertion. Reading or sewing with a side light injures the eyes, as both eyes should be exposed to an equal degree of light. The reason is, the sympathy between the eyes is so great that if the pupil of one is dilated by being kept partially in the shade, the one that is most exposed cannot contract itself sufficiently for protection, and will ultimately be injured. Those who wish to preserve their sight should observe the following rules, and preserve their general health by correct habit:

"1st. By sitting in such a position as will allow the light to fall obliquely over the shoulder upon the page or sewing.

"2d. By not using the eyes for such purposes by any artificial light.

"3d. By avoiding the special use of the eyes in the morning before breakfast.

"4th. By resting them for a half minute or so while reading or sewing or looking at small objects; and by looking at things at a distance, or up to the sky; relief is immediately felt by so doing.

"5th. Never pick any collected matter from the eyelashes or corners of the eyes with the finger-nails; rather moisten it with the saliva and rub it away with the ball of the finger.

"6th. Frequently pass the ball of the finger over the closed eyelids toward the nose; this carries off an excess of water into the nose itself by means of the little canal which leads into the nostril from each inner corner of the eye, this canal having a tendency to close up in consequence of the slight inflammation which attends weakness of eyes.

"7th. Keep the feet always dry and warm, so as to draw any excess of blood from the other end of the body.

8th. Use eyeglasses at first carried in the vest pocket attached to a guard, for they are instantly adjusted to the eye with very little trouble, whereas, if common spectacles are used such a process is required to get them ready that to save trouble the eyes are often strained to answer a purpose.

"9th. Wash the eyes abundantly every morning. If cold water is used let it be flapped against the closed eyes with the fingers, not striking hard against the balls of the eyes.

"10th. The moment the eyes feel tired, the very moment you are conscious of an effort to read or sew, lay aside the book or needle, and take a walk for an hour, or employ yourself in some active exercise not requiring the close use of the eyes."*

*The following are the numbers of the SUPPLEMENT containing the series of articles on preserving the eyesight: 125, 127, 130, 136, 139, 142, 144, 147. They will be mailed from this office on receipt of 80 cents.