shape of prevalent opposing winds and currents, combine on shallow water that rollers of the exceptional hight, first noted, are generated.

Sufficient has now been explained to make it clear that, if a hollow cylinder be immersed in water agitated by waves to a depth greater than the hight of the waves, the water entering that cylinder will seek not the level of the waves, but the mean average level located at half the hight of the waves. Consequently, while the heaviest billows may roll past the cylinder, the surface of the liquid therein will be unmoved, and will not rise and fall with the varying depression or elevation of the sea surface immediately adjoining: that is to say, referring to the engraving, let A, Fig. 1, be the long hollow cylinder which extends in the water to a depth exceeding the hight of the wave indicated by the sinuous line. Disregard the rest of the drawing, and consider that cylinder as fixed; then the water level will remain constant at the point, B, and the lower end of the cylinder will be in still water. Waves will produce no effect on the enclosed column of water. But now consider the cylinder attached, as it is, to the bottom of a float, C, which rests on the surface of the water and which must rise and fall with every undulation. Then we have the conditions of a fixed immovable column, encompassed by a rising and falling envelope: in other words, we have a moving cylinder and a fixed piston, by which we can compress air by wave power.

The tube, A, it will be observed, extends up to the top of the buoy. There a powerful whistle is placed. D is a diaphragm, in A, between which and the plate on top of the buoy extend two tubes, E, open above, and having at their lower extremities ball valves, as shown. A central open tube, F, leads from diaphragm to whistle. Suppose the apparatus to be carried from the position where the diaphragm, D, comes just above mean water level, Fig. 1, to the summit of the wave as in Fig. 2. Then the space between the constant water level, B, and said diaphragm will have been greatly enlarged, and air must have been drawn in through the tubes, E, to fill it. Now as the instrument descends to the trough of the wave, the diaphragm must descend upon the water piston; and the air compressed, being prevented by the ball valves from escaping through the tubes, E, is driven out through the central tube, F, and so sounds the whistle.

It is obvious that any disturbance of the surface of the water must produce this effect. Long low ground swells must do it as well as short chopping waves; but, of course, the higher the waves the longer is each sound given. Thus, where waves are 8 feet high and average, as they do, 8 in a minute, the sounds afforded would be similar in number. Where they are 20 feet high they run at but 4 per minute, and there would be but 4 sounds in this period. There will clearly be a difference in the intervals; but in all cases the force of the blast is the same, since that depends first on the weight of the buoy and length of the tube. We thus have a means of determining, mathematically, exactly the size and proportions of the instrument required to produce a given effect. On one hand, the resistance offered by the water piston equals the pressure of a column of water of similar depth. Knowing the pressure, per square inch, required to blow the whistle, the tube is lengthened in accordance, about 32 feet giving resistance equal to a pressure of one atmosphere. Now to compress the air, we have the whole weight of the apparatus applied to the area of the diaphragm. The water in the tube is the gage of pressure; for should the expansive force of the air exceed the resistance of the column, the water would, of course, be forced out at the bottom. Having fixed the desired pressure, a simple calculation, based on the laws of specific gravity, determines the weight and proportions of the apparatus, as well as the pressure which may be obtained.

The buoy is fastened by a suitable anchor and chain off the reef or shoal, and is kept from the whirling motion which might interfere with the proper effect of the waves by the rudder, G. Its design is such that it stands vertical in any sea. By proper anchoring, it may be placed in mid ocean to mark a latitude and longitude point, as well as in a roadway to warn vessels off bars and sands. It may be located from 10 to 15 miles from the reef or other danger to be avoided, so as to warn a ship of her position, and enable her to continue her course in safety. It may be used whenever an undulation of 12 inches in hight exists; so that practically it is as efficient in rivers, where waves are comparatively little more than ripples, as at sea, where the highest billows may occur. The sound of the whistle of a buoy, located near a harbor of this city, has been heard 9 miles to leeward, 3 miles to windward, and 6 miles across the wind, or everywhere over a radius of 3¾ miles. In a dangerous locality, reefs or sands may be provided with buoys having whistles tuned to different notes, so that, merely by the locality of the various sounds, the masters of vessels can recognize their positions, or pilots direct the helm.

The invention seems to us of unusual importance and value. It is scientifically correct in principle, mechanically simple, and in action, automatic. It remains for the test of actual and continued experiment to demonstrate practically its complete efficiency.

Patented in foreign countries and in the United States, through the Scientific American Patent Agency. For further information, address the inventor, Mr. J. M. Courtenay, of Idlewild, Cornwall-on-Hudson, N. Y., or Mr. James Bigler, Newburgh, N. Y.

Plating Articles with German Silver.

Many unsuccessful attempts have been made to nickel small articles by boiling, just as pins, hooks and eyes, etc., are silvered or tinned. A Nuremberg chemist, named Dr. Kayser, has succeeded in coating metals with an alloy resembling German silver, thus giving them a handsome finish, and making the surface more durable and permanent than that of tin or silver. He first melts together 1 part copper and 5 parts pure tin—preferably the Australian, which has recently come into commerce, almost absolutely pure, yet cheaper than Banca tin. The alloy is granulated as usual, but too not fine, and then mixed with water and tartar as free from lime as possible, into a paste. To each 200 parts of the granulated alloy is added 1 part ignited oxide of nickel, and the articles are laid in it. After boiling a short time, they become beautifully silvered. Some fresh oxide of nickel must, of course, be added from time to time. Brass and copper articles can easily be silvered in this manner without previous preparation; those of iron must first be copper-plated. By adding some carbonate of nickel to the above bath, or to a common white bath, and boiling, a coating richer in nickel is obtained, and darker, varying in color from that of platinum to a blue black, according to the amount of nickel salt added.

Infusorial Earth.

The numerous uses which the silicious remains of the microscopic animals, known as diatoms or infusoria, have found is illustrated by the following list given by Gruene and Hagemann, the proprietors of the large German mines at Oberohe and Hutzel:

1. As pure silica in the finest state of division, it is employed in the manufacture of water glass, water glass soap, artificial stone, cements, fatty lute, and ultramarine.

2. Because it is a poor conductor of heat, it is employed for packing steam and hot air apparatus and pipes, where it excels every other material in lightness, for isolating fire boxes and catching radiant heat by protecting shields filled with the earth, etc., for filling the space around money safes and ice chests, for lining and encasing the conduits for melted metals in founderies, and in laboratories as a support for heating vessels that break easily.

3. Because of its property of absorbing liquids, in which it surpasses that of any other material previously known, it is employed for rapid filtration, making precipitates solid, making dynamite and other explosives, and making cheap colors, because the infusoria take colors like cotton. In surgery it is used for absorptive bandages and supports.

The ability of infusorial earth to take up five times its own weight of liquid, and to suck it up rapidly without becoming fluid, enables it to replace the filter press. It is simply necessary to surround the filter with a layer of dry infusoria, in order to obtain in a very short space of time the same result that is attained by ordinary filtration in days or even weeks. Simple drying restores to the infusorial earth its absorptive power.

4. Owing to its great volume and slight weight, it is employed for packing very fragile objects and glass apparatus, etc., and mixing with plaster of Paris for making light casts.

5. Owing to its fineness, it is used as a cheap polish for glass and metal, and is an excellent material for cleaning greasy vessels and pieces of machinery.

The Civil Engineers' Convention.

The papers read before this body during its recent session in Philadelphia, besides those noted last week, included one by Mr. Charles McDonald on the general arrangement and intermediate spans on the Portage viaduct of the Erie railway, and another by Mr. L. L. Buck, on the erection of Virragus bridge in Peru, of which brief abstracts cannot be satisfactorily made. Mr. T. G. Ellis, from the committee appointed to report upon a uniform method of gaging streams in connection with the observation of the rainfall, stated that no uniform method would be applicable to streams of all sizes and characters. The committee recommended a permanent and continuous record of the hights and discharges of such streams as come under observation, and suggested that members be requested to exert themselves to procure the establishment of permanent gages: also that engineers of cities be requested to keep a record of the hight of water daily, so that by suitable means the approximate discharge could be obtained. In this way a vast amount of valuable material might be gained, which could be worked up when occasion demanded.

Mr. J. J. Croes criticised the Croton waterworks, and asserted that the masonry in the aqueducts had not been built strong enough to withstand the pressure of water without being upheld by earth embankments.

Mr. Corthill, chief assistant engineer of the Mississippi Jetty Works, stated that the shallowest point on the bar is now 17½ feet. Formerly there was but 9 feet of water at average flood tide, for a distance of nearly 3,000 feet. At this day there is only 200 feet distance between the 20 feet of water inside the bar and the same depth outside it, and at many points there is now 30 feet. There has been excavated by the river current thus confined more than 3,000,000 cubic yards of material.

General W. Sooy Smith, chairman of the committee on tests of American iron and steel, made a brief report, urging the importance and necessity of securing the necessary appropriation by the government for carrying to completion the work already accomplished by the board appointed by the government to test iron, steel, and other metals. As an instance of value of the board to the government itself, as a consumer of the metals to be tested, the fact was stated that, in the columns of one government building now in course of construction, and in the beams of another recently built, more money has been wasted than would be required to defray the expenses in making tests for a year to come; and this waste, in a greater or less degree, is believed to run throughout the iron architecture of the country, both public and private. The metal parts of the buildings, public and private, are alarmingly waste. The report was accepted, with a request to the board to prepare an appeal to Congress.

Mr. Clemens Herschel, of Boston, submitted a paper commendatory of the introduction into the United States of a metric system of weights and measures, which he supported. Mr. Coleman Sellers, of Philadelphia, suggested various objections to the introduction of the system—among others the very large cost entailed by the change, an estimate of this in the workshops of Sellers & Co. amounting to $150,000. He remarked that we have already the advantages of the decimal system, which the German people did not have, and other advantages, to secure which the introduction of the metric system was mainly predicated. The subject was finally disposed of by its reference to a committee of five, to report upon it at the next annual meeting, in November.

A paper, by Mr. William P. Shinn, of Pittsburgh, on railroad accounts and returns, was next read and discussed. Sundry reports from special committees were then read, after which the convention adjoined *sine die*.

The Value of a Trade.

The old story of the uncertainty of riches and the importance of learning a trade is brought to mind by the following, which appeared in a recent number of the New York *Ledger*: Karl Frostern, the old nailmaker of Luben, in Silesia, was a jolly, story-telling man, who sang at his work, and whose busy hammer made merry music.

Not far away lived Herr von Koben, a wealthy land owner, whose only son, when not at school, was wont to come to the nailer's, where he would sit by the hour and watch the bright sparks as they flew in showers from the ringing anvil.

"Come, Master Conrad," said the nailer, one day in a jolly mood; "why not set the world an example? Show them that the son of a rich man can learn a trade. Who knows but that it may profit you one of these days?"

The youth fell in with the humor of the thing; and pulling off his fine jacket, he donned a leathern apron, and went to the anvil. He was a bright quick lad, and, when he had once attempted to make a nail, he had a pride to make it well; and so it came to pass that ere long he could make shoe nails as deftly and as well as could old Karl.

Time passed on, and Herr von Koben died, leaving his great wealth to his son Conrad. A few years thereafter the armies of Frederick came sweeping through Silesia, and Conrad's inheritance was lost. In poverty he wandered away towards the mountains of Bohemia, until he came to a town where a host of shoemakers were at a stand for want of nails. Shoes were in great demand for the soldiers, and a great price was offered for nails. "Here," thought Conrad, "is my opportunity. Let us see how my trade will serve me."

And he told the shoemakers if they would help him to a shop and a forge, he would make nails for them. They furnished him what was required, and he went at the work in earnest. He made better nails than had ever before been seen in that section. He took apprentices, and enlarged his shop, and in time Von Koben's nails were demanded on both sides of the mountains. By slow but sure degrees he arose to opulence as a manufacturer, honored and respected as the founder of his own fortune. And it all came, as he was proud to tell his children in the after years, from his having learned a trade in his youth.

Correspondence.

The Vicksburg Cut-Off.

To the Editor of the Scientific American:

In your issue of June 17, I find an article over the signature of C. G. Dahlgren, evidently intended for a correction of errors in a former number, by some other party; but in which Major D. has himself fallen into grave errors, which those who have read his article will readily perceive from reading the following correct statement of the situations before and since the cut-off.

Before the cut-off from Young's Point, the Mississippi river ran a little east of south about four miles, thence nearly northeast six miles, to the United States Cemetery, thence about southwest, half south, to Vicksburg and the landing two miles: in all, from Young's Point, twelve miles. The river continues in this last direction about six miles below Vicksburg, to Brown and Johnson's plantation, thence a little south of east to Warrenton, about three miles. The upper edge of the cut-off and foot of the island made thereby is immediately opposite the foot of Crawford street, a street running east and west from the river, and about the center of our city, the wharf, boat, and general steamboat landing being immediately above, and the Mississippi River Elevator Company's magnificent elevator, and the landing for the St. Louis, Memphis, and Vicksburg Anchor line of packets, below it. The island itself, made by the cut-off, is about one and one half miles long. The present distance to Young's Point by the cut-off is about seven miles; hence you will see that the distance cut off is about five miles, nearly all of which is north of the center of our city, measuring from the head of the cut-off around the island to Vicksburg. From the above you will readily see that Vicksburg has not as yet suffered anything from the cut-off. I am not aware of any steamboat having passed our city, going up or down, since the cut-off, without landing, except coal tow boats with heavy tows; nor do I believe that one has so passed. The damage resulting from the cut-off, if any, will exhibit its effects years hence. Indeed many affect to believe that no injury will result to our city from it, while others fear its final effects upon Vicksburg, its commerce, etc. By giving the above a place in your columns, you will do a simple act of justice to our city, and oblige a thirty-eight years' Vicksburger. G. L. RECORD.

Vicksburg, Miss.