

the more easily worked magnesian lime of Philadelphia, because it requires a different manipulation. Such are the prejudices formed under the influence of local habit.

#### NOVEL APPLICATIONS OF DYNAMITE.

From a long article on trials with dynamite in one of our London exchanges, we condense the following valuable report of its use in breaking up a wrecked iron ship and otherwise:

The wreck was that of the steamship Oscar, of Leith, which ran ashore at Whitby; she was of 1,258 tons gross, 824 tons net register, 261 feet long, 31 feet beam, 23 feet depth of hold, and 110 horse power. A futile attempt was made to break her up with gunpowder; subsequently dynamite was tried.

A charge was made up in a common canvas hose from 9 to 10 feet long, consisting of 30 pounds of dynamite, with an extra 10 pounds in a lump fixed firmly to the end. The diver took this charge and placed it in the lazarette, the heavy end being fixed against the stern frame and the tail part trailing forward along the starboard side as the wreck lay on that side. After the diver cleared out the charge was exploded, the result being that the stern frame and all the steering gear were smashed out and lay on the rocks, and the starboard quarter was parted right away. The next charge, placed in the port bow close to the fore foot, blew the fore foot away and ripped the port bow plates through, and the wreck fell over separated from the keel upward.

Several small charges were then exploded in the cylinders and on the condenser, breaking them up. A five pound charge, lowered into the crank pit, blew down the remaining part of the engines and condenser in such an effectual manner that the diver was enabled to send up the condenser and about two tons of brass in half an hour the next day.

The charges were fired by the ordinary "time sea fuse," a long length of which takes as much as a quarter of an hour or twenty minutes to burn to the charge. This is a great loss of time in a tide, and in future electricity will be applied.

No trouble was taken to make the canvas hose that inclosed the charges waterproof, though dynamite is practically unaffected by water for several hours. Put in India rubber hose it would remain for a long time under water without being injuriously affected. In work of this character it is completely successful where gunpowder and gun cotton have failed, and being of a plastic nature, it possesses the advantage of being moulded and pressed into any shape, such as angles, square holes, etc.

Iron masts, beams, chains, and wire rope are cut off by tying small canvas hose containing dynamite round them, and then exploding it.

In the instance of the iron steamship City of Venice, which went ashore on the rocks, after every other plan to raise and haul her off had failed—she had rocks through her bottom in some places four feet high—dynamite was tried. The rocks protruding through the vessel were first removed by use of small charges; the tops of the rocks outside of the vessel were then blasted away, and the vessel was got off without further injury, and saved.

So powerful and effective an agent should be better understood and applied to more purposes than it is. Not only can it be used to remove rocks surrounding a vessel, but in the case of a vessel stranded on a sand or mud bank a channel could be excavated, it seems to us, by the use of long tubes filled with the dynamite; and for open cuttings for roads such tubes could be laid in furrows made by machines like those in use for excavating for drain tiles, and fired with good and economical results.

#### PROGRESS OF WESTERN MINING OPERATIONS.

The action of the Committee of Security of the New York Mining Exchange, in sending their chairman to Colorado for the purpose of obtaining, by personal observation and in other ways, more accurate knowledge of certain mining properties which are offered in this market, is worthy of high commendation. In a two months' investigation he has found that actual frauds have, in some cases, been forced upon the market here, and that most of the other mines have been overrated.

The dishonest and speculative element, though much weakened by the many successful legitimate enterprises that have been established there within the past two or three years, is, in fact, still powerful, and will finally yield only to the persistent force of public opinion as represented by the scientific and mining press and the various mining exchanges of the Eastern cities, whose aim it should be to discover and explode all mining bubbles.

Our opinion, that if the truth concerning the mining interests there were generally known, a large amount of Eastern capital would be invested there, is fully indorsed by this gentleman, as it must be by all conversant with the conditions.

Intensified by the severe lessons of the past the conservatism of Eastern capital must, ere long, remove the reproach of speculative mining which has so retarded the growth of Colorado, and which is still the curse of the mining regions farther West.

We do not by any means wish to imply by this that intelligent observation and good judgment cannot find as many opportunities for profitable mining on the Pacific slope and elsewhere as in Colorado, but simply that the elements op-

posed to legitimate and favoring speculative mining exist there in fuller life and vigor, and apparently control nearly all operations. In evidence we quote from a late San Francisco exchange: "The mining share market is now being flooded with outside stocks, every day witnessing the placement of some new wildcat, which seemingly is selling like hot cakes, but for the genuineness of which we would not vouch. Under the present buoyancy many shares may be sold at reported prices, but the advance is altogether too sudden to be fully real, and in this respect we would caution parties about being over-anxious to invest, for this is the opportunity for the free manipulation of all those claims that have no merit whatever."

The mainsprings of these conditions are the continued remarkable output of some of the Bodie District mines, and the new lease of life which it is supposed the Sutro tunnel will give to the mines of the Comstock lode, the output of the Bodie mine alone, for the month of August, being estimated at \$700,000.

From the Black Hills there are encouraging reports of the quality and abundance of the gold and silver ores and of the activity of the mining business; already 135 stamps are at work on ore from one mine there, and 80 at another, from which last \$40,000 in gold was cleared up in about a two weeks' run.

From Utah, too, and Montana further valuable discoveries are reported, and an instance in Montana of important gold diggings, from which three men took out over 300 pounds of gold in less than four months, using only a hollow log for a sluice box.

The establishment, in all the mining districts, of concentrating and smelting works, which purchase ores from those miners who have not the means for erecting reduction works of their own, or whose knowledge of the art is imperfect, has everywhere given great impetus to the mining interests; and as the system grows in favor and the interests are better understood and adjusted, as they must soon be under competition, it will be found, we think, that this division of labor will add profit and safety to mining operations.

#### THE BOSTON WHITTLING SCHOOLS.

Formerly all American schools were whittling schools; but the art was practiced surreptitiously, the soft pine desks and benches furnishing the only whittling material. With the advent of highly finished hard wood school furniture, all jackknife practice in school was rigorously suppressed; and for a generation or so the art has fallen into decadence. It has revived, however, under improved conditions, the natural spirit of constructiveness—usually called destructiveness—incident to boyhood, being made the basis of systematic training of the most enjoyable and useful sort.

The pioneer institution is the Boston Whittling School, a private enterprise housed by the city. The school-room has been fitted up with work benches, divided into four foot sections, and each boy is furnished with such tools as he may need. Thirty two were admitted the first year, their ages ranging from twelve to sixteen. The school report says that perhaps twelve of them had received some instruction in the use of the jig saw and knife, but none had had any previous training in wood carving or the use of the chisel. There were more applicants for admission to the school than could be received. If any boy was absent two successive evenings, his place was taken by another. A rank list was kept and pasted on the wall, and each boy knew how his work was estimated by consulting the list. A course of twenty-four lessons in wood carving was prepared with special reference to secure the greatest amount of instruction with the least expenditure for tools and material. It was not designed to make finished workmen in wood carving, but to take advantage of the natural inclination toward handicraft, the Yankee taste for whittling which belongs to most boys, and to develop it and guide it to useful applications.

The experience of the founders leads them to the belief "that it would be easy to establish, in connection with all our grammar schools for boys, an annex for elementary instruction in the use of the half dozen universal tools, *i. e.*, the hammer, plane, saw, chisel, file, and square. Three or four hours a week for one year only of the grammar school course would be enough to give the boys that intimacy with tools and that encouragement to the inborn inclination to handicraft, and that guidance in its use, for want of which so many young men now drift into overcrowded and uncongenial occupations, or lapse into idleness and vice."

Northern and Central Europe have been doing this or similar work for years; and such teaching has done very much to hasten the industrial development of the countries that have tried it.

#### THE RESTORATION OF CUBA.

An official decree, dated September 21, provides that, from the date named, "All mules, horses, cows, and oxen, and all machinery and implements for agricultural purposes, comprised in articles 231 and 614 of the Custom-house tariff sheet, imported into ports of the provinces of Puerto-Principe and Santiago de Cuba, shall enter duty free for the term of one year. The term may be extended to another year according to circumstances. Said animals and goods can be imported from any country, and under any flag."

The ports designated for importation are Nuevitas, Gibara, Baracoa, Santiago de Cuba, Guantanamo, Manzanillo, and Santa Cruz. The franchise is accorded only to the provinces mentioned, with the object of repairing the dam-

age inflicted by the late insurrection. A provision of the decree prohibits the introduction of the animals and goods referred to into the other provinces of the island either by sea or land.

This decree gives signal emphasis to our recent remarks with regard to the present importance of Cuba as a field for American enterprise. Now that the new patent law of Spain offers abundant protection for novelties and new inventions on terms of great liberality to inventors and introducers, there is no reason why the United States should not secure and hold a large share of the growing Cuban trade. It will pay our inventors and manufacturers to occupy the field promptly.

#### OUR SEPTEMBER EXPORT EDITION.

The September issue of the SCIENTIFIC AMERICAN Export Edition presents by far the most comprehensive and varied array of valuable information and important trade announcements ever brought together in a trade journal. The table of contents embraces upward of two hundred articles bearing upon recent advances in the several departments of pure and applied science, notable events, productive industry and commercial enterprise; and is illustrated by upward of one hundred engravings. The advertising pages are not less instructive and valuable, including as they do the business announcements of nearly one hundred and fifty of our leading mercantile and manufacturing establishments, with two hundred and twenty-five engravings of approved machinery and the like.

The influence of such a periodical on the foreign trade of the country can scarcely be overestimated. The high value of its general contents, and its convenient and substantial form, insure its careful perusal and preservation; and its wide circulation makes it an efficient as well as worthy exponent of American industrial and commercial progress. It goes to every American Consulate, the natural resort of all in search of information in regard to American affairs. It also goes to, and is on file in, a multitude of foreign libraries and reading rooms, and the assembly rooms of scientific and industrial societies and boards of trade. And every steamer sailing from this port is furnished with copies for the instruction and entertainment of the passengers. The liberal use of its advertising pages by our enterprising manufacturers is sufficient proof of their appreciation of the facilities thus offered for reaching and interesting foreign buyers.

#### A REMARKABLE WASPS' NEST.

A few days ago the time ball on the Western Union Telegraph building in this city had to be replaced by a new one. The workmen, who went up to remove the old ball had no sooner begun their work when they suspended operations with surprising abruptness and unanimity. A colony of wasps had taken possession of the ball, and were quite unwilling to surrender their airy quarters. Indeed, it was with considerable difficulty that they were finally smoked out.

The surprising feature of the affair was not so much the unwillingness of the wasps to surrender their home as their taking up with it in the first place. When in position for its noon fall the ball rests at the top of a pole, 255 feet above the sidewalk; and, at the tick of twelve, drops 20 feet. That the wasps should have borne with this daily disturbance of their dwelling place is proof of their tenacity of purpose, to say the least. Whether their persistence was due to practical wisdom or to inherent stupidity is a question for Sir John Lubbock or Prof. Riley to decide.

#### THE AMERICAN PRIZES AT PARIS.

Although the American exhibitors at Paris were far too few in number to do complete justice to our country's industrial achievements, the proportion of prizes announced shows the display to have been fairly creditable so far as it went. Just how many those prizes are it will be impossible to say positively until the official list is published. The (Paris) *Continental Gazette*, of September 12, however, gives a classified list of American prizes—"unofficial, but to be depended on so far as it goes"—which contains the names of five hundred and twenty exhibitors. Eight of these were awarded grand prizes; ninety-seven received gold medals; one hundred and thirty, silver medals; one hundred and seventy-six, bronze medals; one hundred and eight were honorably mentioned; and three—the Pacific Coast Mineral Exhibit, the Oregon State Commission, and the United States Department of Agriculture—got diplomas of honor.

The full significance of these awards cannot be appreciated without a comparison of the numbers of American and other exhibitors in the several departments, so as to show the percentage of prize takers among them. That cannot yet be done; enough is known, however, to show that there has been no serious falling off in American progress, notwithstanding adverse times.

#### A New White Paint.

After some ten years of laborious and costly experiments, Mr. T. Griffiths, of Liverpool, has succeeded in producing a new mineral white by the aid of sulphide of zinc, which entirely eclipses white lead and the old zinc white (oxide of zinc), by having much more "body" or covering power and more permanent qualities than either of these, and, moreover, not being of a poisonous nature like white lead, does not affect the health of those who manufacture or those who use it. The white sulphide of zinc is precipitated, washed, calcined, levigated and dried, the product being the most perfect white pigment hitherto obtained.

**Co-operative Homes.**

Mr. Joel A. H. Ellis, superintendent of a co-operative household in Ionia, Fairfax Co., Va., offers in the *American Socialist*, the following argument in favor of that style of economizing expenses. The one fatal defect in the plan would appear to be the impossibility of getting ordinary men and women to live together peaceably under such relations for any length of time. However, the experiment may be well worth trying to those who care to make it. Mr. Ellis says:

"The very large saving that may be made in supplying people with homes and a livelihood by means of co-operation is not well understood. It can be made to reduce the cost of a home and the expenses of living fully one half. To illustrate how this may be done, suppose we have three hundred people to provide with a home. If we divide them into families of five persons each, we shall have sixty families, and each of them will require a dwelling, a set of furniture, and a housekeeper. If we keep them in one large family, they will require only one large dwelling instead of sixty small ones. This large house will cost twenty thousand dollars. Sixty small ones of similar quality would cost one thousand dollars each, or sixty thousand in all. The small families would require sixty cooking stoves with furniture at a cost of twenty-five dollars each—fifteen hundred dollars in all; while the large family would do their cooking with two large ranges and a brick oven that cost only five hundred dollars. The furniture in each of the sixty small parlors would cost at least one hundred dollars—six thousand dollars for them all. The large family would need only three parlors, which could be suitably furnished for one thousand dollars. A sewing machine for each small family at thirty dollars each would cost eighteen hundred dollars. Six such machines would do all the work for the large family, and would cost only one hundred and eighty dollars. To furnish each of the small dwellings with a piano, if they should indulge in such a luxury, would cost, at three hundred dollars each, eighteen thousand dollars; while a piano, an organ, and the instruments for a band would supply the large family with all the music they would desire at a cost not exceeding eighteen hundred dollars. To supply each of the small families with a single weekly newspaper, at two dollars each, would cost one hundred and twenty dollars. This sum would place in the reading-room of the large family, five daily papers, twenty weeklies, and ten monthly magazines. The money required to supply the small families with the fixtures with which to do their family washing would furnish the large family with a well-appointed steam laundry, in which their work of this kind could be done with one fourth the labor required to do it by hand. The time of the sixty housekeepers for the small families would be worth, including board, \$4 per week—\$208 a year for each family, or \$12,480 for them all; while in the large family, with their superior facilities for doing their housework, thirty women would be able to do it much better and easier than sixty could do that of the small families, and we should save \$6,240 a year in the expense of doing our housekeeping, and have it much better done. The large family, by buying their supplies at wholesale in quantities, would save at least fifteen per cent of their cost when bought at retail by the small families.

"These examples are sufficient to convince any practical, thinking person that the saving which may be made by living in well organized co-operative homes is so large that none but the rich can afford to live in any other in times like these; that the amount which may be saved by introducing this style of living is so large that it would soon make the poor rich—so large that those who did not adopt it could not compete successfully in any business with those who did, because their expenses would be so much larger. The time has arrived when this method of living must be adopted to relieve the working class from their present distress."

Mr. Ellis says that a co-operative home has been organized at Ionia on this plan; but he gives no particulars with regard to its inner life and organization. If it comprises a congress of distinct monogamic families in one household, and is harmonious and flourishing, the experiment is a valuable one.

**Keep Your Cement in the Dark.**

Dr. Heintzel thinks that the influence of light upon cement has not hitherto been sufficiently considered. He instituted some experiments upon a quantity of cement, which he divided into three parcels, exposing parcel A to the air and full light; B to the air and diffused light; and secluding C in darkness from the air.

After six months he found that A made a weak mortar by absorbing 38 per cent of its weight in water, and it had become crumbly; B, with 33 1-3 per cent of water, made a mortar which was too adhesive to the trowel, and it yielded up none of its water; C, with 33 1-3 per cent of water, made an excellent mortar, easily stirred and flowing, and it relinquished some of its water. After setting for twenty-eight days the relative strength was: A, 3; B, 37.9; C, 44.6.

**Remedy for Trichina.**

Dr. Rohde relates, in the *Berliner Klin. Woch.*, a case of trichinosis in which severe bleeding of the nose occurred, and in which he prescribed extract of *secale cornutum* as a styptic. The hemorrhage was immediately arrested, and with this rapid improvement of the general symptoms also occurred. This result led him to prescribe ergot in other cases of the disease; and in all instances distinct improve-

ment followed. He believes, therefore, that we have, perhaps, in ergotin, a means of treatment which, without having any marked effect on the human economy, may prove fatal to trichina and their offspring.

**NEW ELECTRICAL DIAPASON.**

[Continued from first page.]

the spring connecting pieces that project from the back of the vibratory tongues.

The holes in the spring connecting pieces are made larger than the needle, and pieces of thin leather are attached to the connecting pieces to form a yielding bearing for the needle. To the outer end of the needle is secured a small concave mirror, in front of which a small plano-convex lens is supported by a jointed arm projecting from the main frame of the instrument.

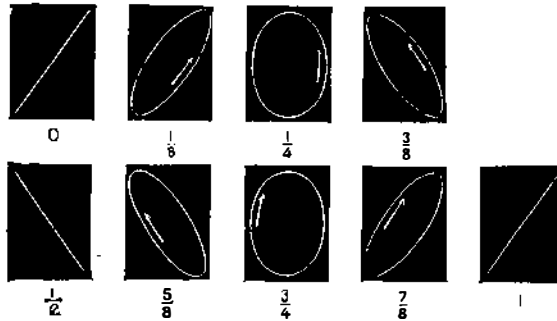


FIG. 3.

A beam of parallel rays being thrown on the concave mirror from a lantern or *portelumiere*, and the vibratory tongues being set in operation, a figure will appear upon the screen on which the instrument is focused, which will be the resultant of the two rectangular vibratory motions. This figure depends on the persistence of visual sensations on the retina, for it is really due to the rapid movement of the light spot which is seen when the tongues are at rest. The figure may be varied by moving the slide so that any possible combination of tones within the compass of one and one half octave may be produced. It is interesting to observe the change of figure resulting from the slightest alteration in the adjustment of the slides, or from the change of phase resulting from an alteration in the adjustment of the contact screws. The tones that accompany the figures are full

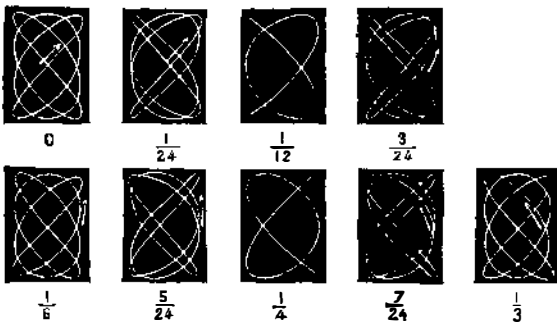


FIG. 5.

and deep, especially if the instrument be mounted on a sounding board. The effect known to musicians by the name of "beat" can be produced by this instrument, so that they may not only be heard with distinctness, but may also be seen.

If only one tongue vibrates a straight line will appear on the screen, which will be inclined at an angle of 45° from the horizontal. The line produced by one of the tongues forms a right angle with the line produced by the other, and when both tongues vibrate simultaneously the two motions combine, and the reflected pencil describes a more or less complex curve, the form of which depends on the number of vibrations of the two tuning forks in a given time.

Fig. 3 shows the luminous image on the screen when the tongues vibrate in unison, and the fractions below each fig-

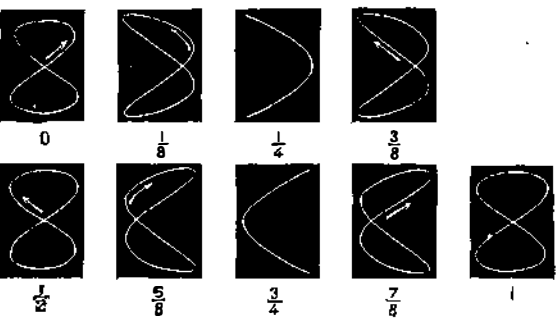


FIG. 4.

ure indicate the difference of phase between them. The curve retains its form when the tongues are in unison, but when they are not quite in unison the initial difference of phase is not preserved, and the curve passes through all its variations. Fig. 4 represents the different appearances of the luminous image when the difference between the vibratory tongues is an octave; and Fig. 5 represents curves when the number of vibrations are as 3 : 4. The loops along the vertical and horizontal edges express the ratio of the combined vibrations. The variety of figures that may be produced by this instrument is endless.

When sunlight is employed to project the figures the mirror may be plain and very small, and the lens may be dis-

pensed with. The figures, when viewed directly in a plain mirror of one inch diameter, appear as wires of burnished gold interwoven in a most complicated and beautiful manner.

**LAMPBLACK.**

One of the largest establishments for the manufacture of lampblack is at Petrolia, Pa. The method of production is remarkable. The flames of several thousands of gas jets are made to impinge against sheets of slate, on which the smoke or fine carbon is deposited, just as a piece of glass is smoked when held over a candle flame. When a sufficient deposit of the smoke has formed on the slates, it is scraped off, packed, and sent to market.

The gas which supplies this lampblack comes from the ground near the works. Besides its oil wells, Petrolia is celebrated for its wonderful gas wells, which furnish inexhaustible supplies of fuel for steam engines, heating, cooking, etc.

From Petrolia to Pittsburg there is an oil pipe line by which oil is driven to market by force pumps, operated by steam power; the boilers being heated by gas supplied by one of the gas wells. We almost wonder that the Petrolia people do not introduce the use of gas engines and thus dispense with the use of steam boilers.

**Improvement in Rifle Shooting.**

The scores made at Creedmoor, Saturday, September 21, in the long-range match for the Wimbledon Cup, seem to show that the limit of skill in shooting and rifle making is not yet reached. Before many years, an unbroken score of thirty bull's eyes at 1,000 yards will have to be credited to some American rifleman.

The Wimbledon Cup was won in England by Major Fulton with a score of 133 out of 150, and subsequently carried off at Creedmoor, by Allen and Dudley Selph, with scores of 139 and 137. This year Frank Hyde has it with a wonderful score—143 out of 150 at 1,000 yards; while Sumner and Gray, with scores of 142 and 141 respectively, repeat Miller's famous exploit of 15 consecutive bull's eyes at the long range, and ten riflemen run over Fulton's English score. When it comes to team shooting, fours from Massachusetts and New York make a total score of 1,681, which is 52 points ahead of the best score made by the British eight in the International match.

**Diamonds in China.**

Mr. Fauvel, of Chefoo, communicates in the *North China Herald* some interesting facts concerning his researches into the mineral wealth of the district of Shantung and the curious means of collecting small diamonds by the natives.

"These diamonds," he says, "varying in size from a millet seed to a pin's head, are procured from the glaziers, who buy them at the large fairs held every year at Chü-chow, Laichow-fu, and Hwang-hsien. They are not to be found in shops, and are packed in quills. The manner of finding these stones is very curious. Men with thick straw shoes on go walking about in the diamantiferous sands of the valleys and streams of the diamond mountains, Chinkang-ling, some fifteen miles south-east of Yichow-fu. The diamonds, which are ragged and pointed, penetrate the straw and remain there. The shoes are then collected in great numbers and burnt, the diamonds being searched for in the ashes. As is the case with amethysts and rock crystal in the Lao Shan, the priests of the temples in the Chinkang-ling are the principal dealers."

Mr. Fauvel further mentions that a diamond as large as a pea had been brought to Chefoo, and sold to a mandarin there.

**The Grand Canal of China.**

FOR six or eight hundred years the Grand Canal, crossing the great plain of Northern China, from Peking, in the north, to Hangchow, in the south, has been the chief line of communication and commerce between the capital and the southern portions of the Chinese Empire. The canal proper is more than six hundred miles long, and, with its branches, is said to supply two thousand miles of water-way and the means for irrigating and reclaiming many thousand square miles of thickly peopled country. During recent years, however, the vast sums appropriated for the management and repair of the Grand Canal have been so largely absorbed by dishonest officials that the canal has become practically unfit for commerce in many parts; while the estimated cost of putting it in good condition is so hopelessly beyond the capacity of an empire impoverished by war, famine, and official rapacity, that the Imperial Government are seriously considering the propriety of abandoning the canal entirely. For the first time since the canal was built the food supplies from the south for the support of the capital (and for the relief of the famished-stricken regions to the north and west) have this year been forwarded by sea—a much speedier and more economical route, no doubt; still, for the great plain and its millions of inhabitants, the canal is a practical necessity, and, to let it go to further destruction, will seriously endanger their prosperity, if not their lives.

Punch says that a Yankee baby will crawl out of his cradle, take a survey of it, invent an improvement, and apply for a patent before he is six months old.