SCIENTIFIC MEMORANDA.

NEW PROPERTIES OF SULPHUR.—A small quantity of iodine, bromine or chlorine modifies the physical and chemical properties of sulphur in a remarkable manner. It becomes soft and malleable at the ordinary temperature and maintains this form for a considerable period of time. By heating a mixture of 400 parts of sulphur and 1 part of iodine to about 180°, and then cooling it, the sulphur becomes quite elastic. The iodide of potassium acts in the same manner as iodine. The iodide of sulphur thus obtained is insoluble in the sulphide of carbon. The action of bromine on sulphur is analogous to that of iodine; the color is yellow like wax and the sulphur remains quite soft. About 1 per cent of bromine is used and the compound submitted to 200° (Fah.) of heat. By passing a current of chlorine on sulphur heated to about 240° Fah., the sulphur becomes very soft and may be drawn out like gutta-percha. If soft sulphur thus heated is worked like dough, for about one hour, it suddenly becomes quite hard. These statements were lately made in a note presented to the Academy of Sciences at Paris, by M. H. Sainte-Claire Deville.

FINELY-POWDERED COPPER.—To obtain metallic copper in powder, mix a saturated solution of the sulphate of copper, add some granular zinc to the solution, and shake the mixture. The metallic zinc decomposes the copper solution and the sulphuric acid unites with the zinc, leaving the copper in the form of finely-subdivided powder. Large quantities of metallic copper in powder may thus be obtained. The clear solution of sulphate of zinc is poured off, washed well and dried for use.

THE SOURCE OF PENNSYLVANIA PETROLEUM.—The *Journal of the Franklin Institute* contains a report on the oil district of Oil Creek, by T. S. Ridgeway, geologist and mining engineer, who has surveyed the whole oil region and made a most careful examination of it. He states that at one place there is a mass of oil-bearing strata 1,200 feet in thickness. The oil-bearing strata is broken up in huge cakes of sandstones and shales, having fissures between the strata extending to a great depth, and these are generally filled with gravel and pebbles. These openings are numerous in Oil Creek, and are the cause of much perplexity to drillers in search of oil. In one case a pipe was sunk 160 feet below the surface before the permanent rock was reached, while at a few yards distant the rock was struck at a depth of 80 feet. In one place there is one of these vertical fissures in the strata where a man may walk under ground for the distance of 170 feet and look up into a vault 100 feet in hight. At a distance of about 530 feet from the surface there appears to be a great oil pool below, and for a distance of seven miles down to the mouth of Oil Creek the flowing wells rise from it. Stones taken out of the oil-bearing rocks are employed in several places for buildings, and the Academy at Waterford, Erie county, Pa., was built of such stones, about 41 years ago. The petroleum may still be noticed sometimes trickling from their surfaces. Mr. Ridgeway, from his examinations, is convinced that the petroleum is not produced from the coal-fields, because in that case it would have had to flow up hill into the oil basin. He says:—"Petroleum found in bituminous coal basins, no doubt, originates from beds of coal, but it is my opinion that the petroleum of the Oil Creek valley is the result of the decomposition of marine plants. The plants which produced the oil in the rock existed and flourished at a long period of time before the vegetation, which now forms coal-beds; they are unlike the vegetable impressions found in the accompanying shales and clays associated with beds of coal; and they grew where the flag-stones and shales of Oil Creek were laid down by salt water currents. The climate was so hot, during this age of marine vegetation, and the growth of plants so rapid and rank, caused by the supposed large amount of carbonic acid and hydrogen then composing the atmosphere, that these conditions on the face of the earth produced plants containing more hydrogen and less carbon than the plants which produced coal-beds, and hence their fermentation produced the petroleum."

THE ANTIQUITY OF MAN.—Sir Charles Lyell, the distinguished geologist, has lately produced a treatise on the antiquity of man. He infers from recent researches and discoveries of implements in various parts of Europe, that man may have lived on the earth thousands of centuries before the era of his advent according to common belief. France, England, Denmark and Switzerland, were once peopled by a race which used flint hatchets and arrow heads, like the old North American Indians. After them came a race which used implements of bronze; and again these were succeeded by a race which used implements of iron. The relics of the old races found in Switzerland are similar in most respects to those found in our Indian mounds. In one case Sir Charles Lyell shows the section of an ancient hut which had been built on the Scottish seacoast. It had been submerged by the sea for so long a period that sixty feet of marine strata had formed over it, and after this, by some convulsion or gradual upheaval of the earth, it was elevated to its former position out of the sea. This hut affords evidence of having been erected in a far remote pre-historic period; subsequent discoveries, however, may modify this conclusion. It is supposed by many persons that at a remote period America and Europe were connected by land. Professor Agassiz has arranged a collection of the weapons and relics obtained from Switzerland in the museum at Cambridge, Mass. They are similar to the stone arrow and spear heads and pottery so frequently found imbedded among oyster shells in Jersey City and Hoboken, N. J.

Flax Seed.

Too much pains cannot be taken to get seed which is fully matured and perfectly clean—free from all foul seed—both to secure a good merchantable crop, and to preserve the land on which it is sown from troublesome weeds. Farmers often experience great difficulty in procuring such seed, as no ordinary fanning mill will remove some of the worst enemies of the farmer and good flax. It was this fact, more than any other, that led to the system of "loaning seed and contracting the crop," which has been so long practiced in Ohio, Indiana and elsewhere. The linseed-oil manufacturer who receives the crop of a large section of country is enabled to select choice lots of seed, and reserve them for sowing, and then, by machinery too expensive and cumbrous for ordinary use, to clean it so thoroughly that he can gin out each year an almost perfect article of sowing seed. Of the superiority of such seed over what can ordinarily be obtained in the market, and even in seed stores, we are convinced by examining a sample of that seed which E. W. Blatchford, Esq., proprietor of the "Chicago Lead and Oil Works," is preparing for his customers for sowing in the coming spring. Of course, when a manufacturer furnishes such seed year after year, requiring for it the return of only an equal amount of merchantable quality, he cannot be expected to stipulate a price for the balance of the crop, beyond the ordinary average, taking a series of years into the account; and it is upon this basis that the business has been conducted hitherto, and it is still continued to the acceptance of a majority of the farmers in the largest flax-growing districts. In this connection we would add that, with good seed to sow, there is nothing like flax as a preparatory crop for wheat. The testimony of Ohio farmers, where flax has been extensively grown for over a quarter of a century, is explicit on this point, and to this fact we would call the especial attention of our Illinois and Wisconsin farmers, whose wheat-growing for some time has been so discouraging.—*Chicago Tribune.*

LITERATURE FOR ALL USES.—Literature has furnished an acceptable instrument for every struggle of the age. In her golden book every one has registered his vote. She is a shield to righteousness and virtue, a temple to wisdom, a paradise to innocency, a cup of delight to love, a Jacob's ladder to the poet, but also a fierce weapon to party spirit, a plaything for trifling, a stimulant to wantonness, an easy chair to laziness, a spring-wheel to gossip, a fashion to vanity, a merchandise to the spirit of gain, and has served like a handmaid, all the great and little, pernicious and useful, noble and mean interests of the time.—*Marsh.*

A New Spanish Newspaper.

El Porvenir ("The Future") is the title of a new weekly newspaper printed in the Spanish language at No. 109 Pearl street, New York. It is chiefly devoted to "Politics and Agriculture." Senor Porfirio Valiente is the editor and director. The first number presents a very creditable typographical appearance. The publication is divided into two separate sheets, one of which is denominated the agricultural section; this part contains an illustration of "Colvin's Milking Machine" (published on page 49, current volume of the SCIENTIFIC AMERICAN), together with several articles relating to agricultural subjects, designed to interest the Spanish reader. The political section of *El Porvenir* opens with a long editorial article upon the state of the country, as seen through "Copperhead" spectacles. The nature of these views will, therefore, be easily understood. The rights of the rebels and the rebellion are discussed with great respect; the "secesh" idea of State rights, and its champions in New York, New Jersey, and elsewhere at the North, are highly applauded; while censure is alone reserved for the men and parties who, with the pledge of their lives and property, are heroically standing in defense of the Union and the Constitution.

Barometrical Oddities.

A large barometer has been lately erected in the National Astronomical Observatory of Santiago de Chili. By this instrument a singular phenomenon has been observed. Humboldt had observed that the barometer rises and falls during the day in a peculiar manner, being at its maximum hight at 10 A.M. and at 2 P.M., whilst the lowest readings are between 4 P.M. and 4 A.M. The regularity of this periodical movement within the tropics is such during the year, that Humboldt could tell the time within fifteen minutes. This movement has been observed with much regularity in Santiago de Chili during the winter and summer months; but in the month of February the movement entirely ceases, showing then only the ordinary maximum and minimum hights in the twenty-four hours. Senor Moesta (of the Observatory) states that the oscillatory movement of the barometer is produced by the sun's power, analogous to that of gravitation, and that the said movement ought to disappear in the month of February, in consequence of the great variation of temperature during the course of the day. Thus the interesting result has been arrived at that, by virtue of the sun's power, a movement is manifested in the atmosphere analogous to the action of the tides; and it is this that causes the rise and fall of the barometrical column in Santiago.

Manufacturing Items.

The *Commercial Bulletin* (Boston) says:—"At the New Bedford boot and shoe manufactory, a machine for sewing together the soles and uppers of shoes has recently been put in operation, and is capable of turning out 125 pairs per day. It is a new article for that neighborhood, and those familiar with the common family sewing-machines would almost as soon take it for a saw-mill. A pegging machine is also in operation at the factory."

The machinery is now being placed in the new buildings of the print-works of O. Arnold & Co, at North Adams, Mass., and it is expected the factory will be ready for occupancy and use this month. The machinery is all of the latest and most approved patterns, and among the rest are two engraving machines, which perform the most difficult engraving on copper, equally as well as when done by hand, while in rapidity of execution there can hardly be a comparison. The cost of the buildings and machinery in complete running order will not be far from $100,000, and the capacity of the works is double that of the old print-works of that company.

IN London, at present, 110 mails pass through the pneumatic despatch tube from the station to the district post-office during the day; and not only letters but trucks of iron of the weight of five tuns have passed, and adventurous visitors now and then perform the journey with great delight.

WHEN the Prince of Wales ascends the throne of England his title will be Edward VII.

The Gunpowder of the Confederates.

A special correspondent of the London *Times*, writing from Augusta, Ga., gives the following interesting particulars respecting the development of a most essential manufacture in the South :—"When upon the 13th of April, 1861, Fort Sumter surrendered to General Beauregard and the Confederates, not one single pound of gunpowder was anywhere manufactured in the Confederacy. A rigorous blockade of the seaports of the South was immediately commenced, through which the principal ingredient of gunpowder (saltpeter) had to be largely sucked in. At this juncture it seemed advisable to President Davis to intrust to Colonel G. W. Rains, formerly an officer of the United States Army, the responsibility of planning and building a large Government mill for the manufacture of gunpowder. For this post Colonel Rains possessed eminent qualifications. He had been professor of chemistry at West Point, and, for some years since leaving the army, he has been at the head of some large iron-works at Newburgh, on the Hudson. Augusta, in Georgia, was selected as the site of the intended mill; and never, both as regards the person and the situation pitched upon, was a happier sagacity evinced by the President. Following, so far as he was acquainted with it, the plan upon which the gunpowder mill at Waltham Abbey (belonging to the English Government) is built, Colonel Rains proceeded to construct the works necessary for his purpose; and the success which has attended his efforts has been such as could never have been believed before the pressure of war and privation had awakened Southern ingenuity and enterprise. The result is that, at the cost of about £20,000, one of the most perfect gunpowder mills in the world has been produced, which turns out 5,000 pounds of powder a day, and could produce double that quantity if worked day and night, and much more if worked under the exigency of a pressing demand. The cost of this powder, in spite of the costliness of the saltpeter which has been introduced through the blockade, is about 4 cents a pound, which is believed to be about the same as its cost in England. The mill has now been constantly at work for many months; and, consequently, more powder than the Confederacy is likely to require for years to come has already been produced. There is another Government powder mill at Columbia, in South Carolina, working, I believe, to supply the wants (not very large as yet) of the Confederate navy. But all the gunpowder issued for the service of the Confederate armies of Virginia and the West, and also for the defense of Charleston and Vicksburgh, has come out of the mill at Augusta; and it was stated to me by an ordnance officer in Charleston, that the powder which he had recently received there and tested was very nearly, if not entirely, up to the standard of the finest English manufacture."

[The Colonel Rains above referred to, is an old patron of the SCIENTIFIC AMERICAN, and has had frequent occasion to employ our services in prosecuting applications for patents in this country and Europe. He was for a long time one of the proprietors of the Washington Iron-works, at Newburgh, N. Y., and was possessed of considerable scientific and mechanical information. He bears the honored Christian name of the "father of his country," and is a gentleman in bearing and manners. We regret and are exceedingly surprised that, having been educated under the paternal care and at the expense of the United States, he should thus employ his talents for the benefit of those who are doing their utmost to overthrow the Government. We have no confidence, however, in the statement that he has succeeded in making gunpowder at 4 cents per pound. John Bull may believe it if he chooses, but we decline to accept the statement as true.—EDS.

Why Hens do not Lay.

A correspondent of the *Country Gentleman* suggests the following reasons for the non-productive qualities of hens. His experience is worth noting :—

"I am not in the habit of writing for publication, but I have a few remarks to make from my own experience. Last spring I had sixteen hens of the Dorking breed, and they did not lay. I did all in my power to make them do so, but nothing effected a cure. I gave a great variety of feed—burnt bones, shell, &c.; also tried many things recommended in your valuable paper for that purpose, but all were of no use. I did not like to part with them, as they were favorite fowls of mine, and highly esteemed for the breed. Lastly, I gave up in despair—thought there was no use of keeping hens to look at, and receive no profit. I then commenced to kill them, took the poorest first, and dressed one, and it was the fattest fowl I ever saw, and no signs of any eggs. I then made up my mind that the hens were too fat to lay, and commenced immediately to starve them a little, which caused them to lose some of their flesh, and in due time they commenced to lay. Since then they have done well."

Our Specie.

The following is from the San Francisco *Mercantile Gazette and Prices Current* :—

The total treasure export of the United States to foreign countries last year, including our own, was not less than $95,000,000, and probably exceeded $100,000,000. Estimating the total products and imports to be $70,000,000, which, however, is admitted to be a full figure, and we have a reduction of but $30,000,000 from the amount existing in the country on the 1st of January, 1862; this, after the most careful investigation, we judge to have been little short of $500,000,000, in one form or another. We are aware that these figures exceed official estimates, and a portion of our data is imperfect; but they are chiefly drawn from public documents.

The total amount of specie on hand in the United States in 1820 was estimated at..	$32,000,000
Total imports since that date and up to June 30, 1861, in round number.....	405,000,000
Total product from all domestic sources, except California, up to June 30, 1861.....	20,900,000
Total product of California mines up to the above date, including amount received at the Mint and branches and amounts received and exported in dust and bullion, without passing through the Mint.....	753,000,000
Total receipts.....	$1,210,900,000
Total amount of exports up to June 30, 1861	723,300,000
Balance in the country on June 30, 1861....	$487,600,000

The foregoing is a brief abstract of calculations made by us in August, 1861, and predicated upon the most reliable information within our reach at that time. Subsequent examinations tend to confirm it in all material points. The statistics must be very nearly correct.

The total value of manufactures from the precious metals during the year ending June 30, 1860, was in round numbers $20,000,000, of which, however, the mechanical labor constituted the greater portion, probably not less than two-thirds. But these manufactures have not long been in progress upon so extensive a scale, nor anything like it; and taking an average of the forty years embraced in our calculation, the consumption of gold and silver for these purposes would not probably exceed two and a half or three millions per annum. The total immigration from foreign countries since 1820 has been about 5,000,000 souls, embracing large numbers possessed of abundant wealth. It can hardly be deemed credulous, therefore, to believe that this vast multitude have brought with them a much larger amount of gold and silver, in one form or another, than has been carried away in private hands during the same period.

But while our figures exceed those of Secretary Chase, they fall far short of the estimate of S. Hallet & Co., bankers, of New York, who place the total amount of treasure in the hands of the people and on deposit at nearly $800,000,000, which is in keeping with other portions of the circular in which we find it. The old adage that figures will not lie has been long since exploded.

Rhode Island Statistics.

The following interesting statistics are taken from the "Transactions of the Rhode Island Society for the Encouragement of Domestic Industry, in the year 1862"—

"The population of the State, in 1860, was 170,688 whites, 3,952 free colored; total, 174,620. The rate of increase from 1850 to 1860, was 18.35 per cent., and larger than for any other period except from 1840 to 1850. The area of the State is less than any other State in the Union, being only 1,306 square miles. The population per square mile is 138.71, and larger than any other State except Massachusetts. Though small in size and population, Rhode Island compares well with her sister States, in the products of industry, for the year ending June 1, 1860; as instance the following :—The value of steam engines and machinery produced, was $1,068,825, larger than any of the New England States except Massachusetts and Connecticut, and the eleventh of all the States. Boots and shoes, $315,959, the smallest of the New England States, and the twenty-first of all the States. But then the rate of increase for the last ten years was 327.2 per cent., and larger than any State except Iowa. Jewelry, silver ware, &c., $3,006,678, larger than any of the New England States and the third in the United States. Woolen goods, $6,599,280, the second of the New England States and the fourth in the United States. Cotton goods, $12,258,657, the third in New England and in the United States. The whole of the products of industry, as distinct from agriculture, were $47,500,000, the third in New England and the tenth in the United States.

"With an area of only 1,306 square miles, this State cannot compete with her sister States in the products of agriculture. Her whole area will not equal the improved acres of many of them. Neither industry nor enterprise can supply her with land, the raw material for agriculture. There is no such limit set to manufacturing industry; it was supposed to be limited in a given territory, in some degree, by the water power in that territory; then came the steam engine, and the supposed limit was found to be no limit at all. Then, again, it was said that the steam engine could be employed only in certain localities and for a definite period, as fuel would be exhausted. The unlimited coal beds of this country at once removed this difficulty, and the only bounds now admitted are human wants and human ingenuity, and when the first are fully supplied and the other overtasked, we may look for a great falling-off in the products of industry."

Sterro-metal.

Bronze is a term applied to compounds of tin and copper; while compounds of zinc and copper are called brass. These metals in varying proportions form the most common alloys; still there are many others, and the numbers of such is always on the increase. As various metals may be mixed in different proportions, and as a slight variation in the quantity of any one component produces a new alloy of a different character, the number and quality of alloys may be extended indefinitely. The new alloy called "sterro-metal," is composed of pure American copper 57.63 parts by weight, spelter (block zinc), 40.22 parts, iron 1.86, tin 0.15. It has a brass-yellow color, a close grain, and is susceptible of a fine polish. This alloy is stated to possess great strength, a square inch of it after being forged while red hot, sustained a strain of 28 tuns before it broke. It can be drawn cold and forged like iron. The tensile strength of common gun metal is only 17 tuns per square inch, which is but little more than half the strength of sterro-metal.

SEA-WEEDS FOR MANURE.—Vast quantities of sea weed are sometimes driven upon shore along the Atlantic coast and used by farmers as manure by applying it direct to the soil; but the Irish *Agricultural Review* states that a method of preparing it has recently been patented and introduced into Ireland by Mr. J. McArdle, which is a great improvement over the old method. It consists in the fermentation of the weeds, by which a portion of the organic constituents is eliminated, and the rest forms a kind of mucilaginous matter, which dissolves easily in water. From this solution or rather semi-solution of the altered weeds, all the saline matters are separated by crystallization, and without undergoing any change whatever in their nature.

EXPORT OF WESTERN GRAIN.—In the year 1860 New Orleans exported, of North-west grains, 226,000 bushels; and New York 3,500,000 bushels; flour, New Orleans 80,000, New York 1,250,000 barrels; provisions, New Orleans 15,500,000, and New York 98,500,000! Thus it will be seen that, in ordinary times, more than ten times as much grain found its way to the seaboard by way of New York as by way of New Orleans, and since the war broke out it has all been sent by way of the East.

The Effect of Shot on the "New Ironsides."

Through the attention of an officer on board the *New Ironsides* we are enabled to present our readers with a diagram of the effects of the rebel shots which were fired at that vessel during the recent attack on Fort Sumter. The injuries were very slight; the vessel was struck in all about ninety times, we are told, but the most serious damage she received is here depicted. Previous to describing the diagram we will let our correspondent tell his story in his own way:—

MESSRS. EDITORS:—We have had a fight with Forts Sumter and Moultrie, but as there was a reporter for one of the New York papers on board, I will not go into a description of it, except to speak of the effect of the shot on our plating. In reference to the *Keokuk* I will state, primarily, that I was informed by one of her crew that she received eighty-nine shots through her plating, fifteen of which were below the water line, also that a 32-pounder pierced her bow. The *New Ironsides* received very little injury; the worst being the loss of one of the iron port-lids; it was knocked off by a rifle shot supposed to have been fired from Fort Moultrie. I examined the iron, and it appears to be crystallized, as the break was short off, although it was in the weakest part. Our plating stood the test very well, as the shot that struck seem to have broken into pieces. There was a rifle shot taken out of our stem, where it had buried itself in the wood. Enclosed please find a rough sketch of some of the marks which the *New Ironsides* received.

Fig. 1 is a representation of a spent rifle shot found in the wooden stem of the ship after the engagement. The body of the shot is 6 inches in diameter and 10 inches in length, and is, as the reader will discover, a most formidable instrument for offense. The bands at the base and the forward end produce—the one—the necessary rotation to the missiles by expanding into the grooves, the other centers the shot in the bore of the gun so that its flight will be true after leaving it. The piercing end of the missile is rounded, and it is in all respects the very counterpart of those projectiles which inventors at the North have experimented with and proved to be the most effectual against armor; thus showing conclusively that the rebels have full and early intelligence of every mechanical novelty of merit. Fig. 2 is a section of the inclined armor of the *New Ironsides*, showing the indentation of the shot at A, and also the wooden backing of the plates at C and D. The shot broke in pieces and flew off without penetrating or disturbing the backing, although it came very near it. Fig. 3 is a view of the broadside of the ship, and shows several scars. The port-lid, A, was broken off and lost overboard, by being struck at B, near the point of support, by a rifle shot. The plate, E, was struck by a round shot at D, which cracked the armor in the line, C; the shot made an indentation one inch deep by actual measurement. The fractured port-lid was also struck, before it was finally detached, by a round shot at F. The shot carried away the edge of the lid, and, striking the main armor, glanced off and made the long "blaze" at G. The plate, H, was struck at J by a rifled shot, which glanced off after breaking the plate on the line, K, also scarring the timber backing; the armor ends at that point. One rifle shot also struck on one of the bolts that hold the plating to the ship, and made an impression two and a half inches in depth. Some of the rifled shell of the enemy entered the *New Ironsides'* bow, but were prevented from doing any damage by the precaution of the commander in placing sand bags at that point. Without this protection the shells would undoubtedly have done considerable damage. The ship ought to be as completely iron-clad as the *Roanoke* is. She would then be more effective against an enemy than in her present condition.

The *New Ironsides* is not completely iron-clad, but only on those points covering her broadsides; the bow and stern are left undefended, as in some of the English vessels. She took an active part in the fight at first, but afterward fell back out of range, being unmanageable. The channel is tortuous at that point, we are given to understand, and the ship could not obtain sufficient momentum to get steerage way on her. We are unable to say at what range the rebel shot took effect on the *New Ironsides*, nor do we know what charges of powder propelled them. That they struck at a low velocity, however, must be inferred from the fact of the rifle shot sticking in the wood work. The ship was also unable to deliver her broadsides with good effect, and fell back as before stated. When all things are more propitious than on the last occasion, we do not doubt that the ship and the brave fellows who command and man her will give a good account of themselves.

Fig. 1.

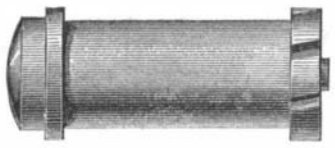


Fig. 2.

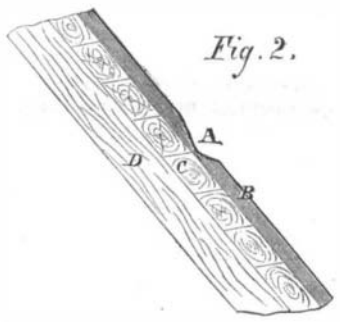
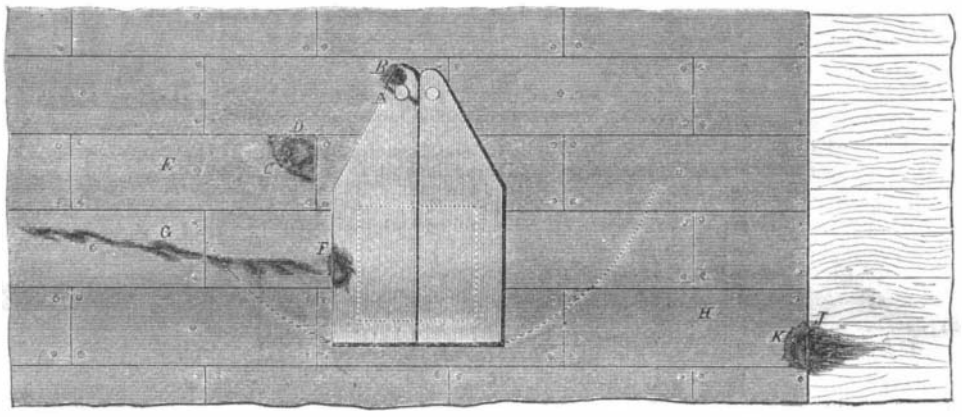


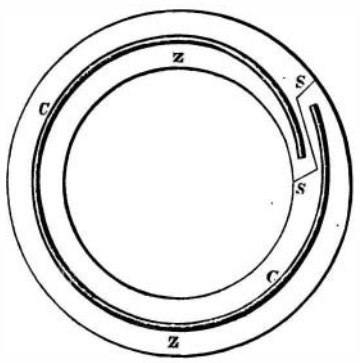
Fig. 3.



THE SHOT-MARKS ON THE "NEW IRONSIDES."

GALVANIC SLUG AND SNAIL SHOCKER.

"Having a few pet plants which slugs and snails are particularly fond of as food, I have devised the following simple and efficacious mode of protecting them against their and my enemies; and as this plan may be useful to some of your readers, I herewith send you a description of my galvanic circle. Procure a



flat ring of zinc, large enough to encircle the plant; make a slit in the ring after the manner of a key-ring, so that it can be put round the stem of the plant and then rest upon the ground. Now twist a copper wire into a ring very nearly of the same circumference as the flat zinc ring, and putting it round the plant, let it rest upon the zinc, as in the illustration. No slug or snail will cross that magic circle; they can drag their slimy way upon the zinc well enough, but let them but touch the copper at the same time and they will receive a galvanic shock sufficient to induce them at once to recoil from the barrier. It will, of course, become evident that mural fruit can in a similar way be protected by fastening along the wall two narrow ribbons of the metals mentioned. Other applications of this principle will doubtless be made in many gardens as the occasion arises. In the illustration Z Z is the zinc, S the slit in it, and C C the copper wire."—*Septimus Piesse, Chiswick, London.*

Science of Smelling.

It is evident to thinking persons that the influence of odors upon the olfactory nerve are not of chance or accident—in truth, all the physical faculties of man are alike governed by immutable laws in harmony and in analogy with each other. Experiments are being prosecuted with earnestness, and gratifying results are obtained, establishing the fact of the perfect analogy between the laws of vision, smelling and hearing.

As there are primitive sounds and primitive colors so there are primitive odors. The primitive colors are now well known to be violet, indigo, blue, green, yellow, orange and red—seven in number, as established by Newton. The primitive sounds are indicated in music by the signs E, G, B, D, F, A, C—also seven in number. The primitive odors, as evolved from plants, appear also to be seven; these are camphor, lemon, jessamine, rose, almond, clove and santal. All perfumes from flowers are either analogies of these primitive odors or are harmonious combinations. As there are various shades of one color and various pitches of one note, so there are definite octaves of the primitive odors. Actual experiment establishes that there are several octaves of lemon, also of the almond and camphor. To the present I have discovered but two octaves of the rose and one only of the jessamine. Experiments are in actual course with clove and with santal, of which there does exist known analogies, or octaves, or shades, but their number is not yet defined, but certainly exceeds six.

The relative volatility of odors has an important bearing as to their influence upon the olfactory nerve, as also does the action of oxygen upon them. Rapid volatility may be likened to the high vibrations of a string. The action of the atmosphere destroys all color-producing colorless compounds; so with the strongest odors, they eventually succumb and become inert.

Though a great deal has been done to the several parts wherewith eventually I hope to construct a true theory of odor, yet there is much more to do. Light, heat, electricity—immaterial agents—are best explained by assuming their materiality; sound can only exist in connection with a material body. Assuming odor to be an immaterial agent, then we can explain many of its phenomena without difficulty.

A correspondent of the SCIENTIFIC AMERICAN, in a letter published on page 166, current volume of that journal, speaks of me as "*M.* Piesse." I claim my birthright; I am an Englishman, and have nothing in common with Frenchmen, but that my ancestors came to this true land of liberty at the revocation of the edict of Nantes.—*Septimus Piesse.*

MR. FAIRBAIRN states that of two tubes of the same diameter and quality of metal, but one twice the length of the other, the shortest will resist double the pressure of the other. The collapsing pressure, other things being the same, varies inversely as their lengths, and inversely as their diameters. Experiments made with elliptical tubes showed that in every construction where tubes have to sustain a uniform external pressure, the cylindrical is the only form to be relied upon, and that any departure from the true circle is attended with danger.