

gas, take a small soft iron wire, twist its lower end into a spiral, dip it into turpentine, ignite it and then insert the upper end of the wire in the cup of a glass jar containing oxygen, and drop the wire into the jar. The flame of the turpentine is communicated to the wire, and it burns with great brilliancy throwing out beautiful sparks which fall down to the bottom of the jar. In this experiment the iron and oxygen combine and form a solid—the oxide of iron, which weighs more than the original wire. When carbon and oxygen unite under combustion they form a gas.

PHOSPHORUS AND OXYGEN.—Place a piece of phosphorus, about the size of a pea, in a little copper gauze cup suspended by a wire, and insert in it a jar containing oxygen gas. The phosphorus will burn with great brilliancy producing phosphoric acid, which falls in white flakes. The light of the burning phosphorus is like that of a miniature sun—it is impossible for the eyes to bear it.

SULPHUR AND OXYGEN.—A piece of ignited sulphur placed in a cup of iron wire and inserted by a wire into a jar of oxygen gas, burns with a beautiful violet-colored scintillating flame. The turnings of zinc, when heated, burn in oxygen gas with a beautiful white light. All these interesting experiments may be performed with very simple apparatus and involve but a trifling expense.

FOREIGN SCIENTIFIC ITEMS.

LONG PISTONS FOR PUMPS.—At a late meeting of the Manchester Literary Society, Dr. J. P. Joule read a paper on a compressing air-pump which was exhibited; in doing so he referred to the difficulties of realizing in practice the theoretical advantages of hot air and superheated steam in engines, owing to the difficulty of using a lubricating agent. His remarks singularly agree with those expressed on page 314 current volume of the SCIENTIFIC AMERICAN, on the velocity of steam under pressure. Dr. Joule believed, however, that the air-pump he described embraced a mechanical feature which, in a great measure, obviated those disadvantages. Its principle consisted in the use of a very long solid piston, not requiring elastic packing. The cylinders of the pump were two in number, twenty inches long and two in diameter. The pistons were solid, ten inches long, and fitted as accurately to the cylinders as was consistent with freedom of motion. The depth of each piston, as compared with its diameter, rendered the usual guide unnecessary; the connecting rod was therefore jointed to the top of the piston. Air was compressed in the pump to sixteen atmospheres, the quantity passing the sides of the pistons being very trifling.

WILL-O'-THE-WISP.—A work has lately been published in London by Dr. Phipson, on the phosphorescence of animals, plants and minerals, which contains some remarks about famous old "Will-o'-the-Wisp," alias "Jack-o'-Lantern," "Spunkie" and *ignis fatuus*. After discussing various theories brought forward to explain it, Dr. Phipson states that in England it is a light which flickers in boggy lands, and is evidently ignited marsh gas (carbureted hydrogen). This gas sometimes spontaneously inflames in coal mines, and its specific gravity is about half that of air. Its faint flame is always invisible in daylight, but becomes visible at night, and sometimes burns wildly because it is bluish in color. A piece of paper has been ignited by a "Will-o'-the-Wisp."

EFFECT OF TOBACCO UPON PULSATION.—Dr. A. Smith, of Manchester, states that tobacco-smoking increases the rate of pulsation in some persons and decreases it in others, hence there is a diversity in the action of tobacco upon different constitutions. He experimented with tobacco upon Dr. Dale, at Scarborough, and found that the effect of tobacco upon him was as follows:—During the first six minutes of smoking there was only an increase in the heat of his pulse of four beats per second, but after that there was a steady increase, and after smoking twenty-one minutes the beats increased to 37½ per minute. After smoking had ceased, the pulsations rapidly decreased. Dr. Smith states that tobacco-smoking acts as a stimulant like alcohol, upon those persons whose pulse is excited. When the body is of full habit, the use of tobacco, he believes, leads to disturbed sleep, and in some cases may end in apoplexy.

SIR DAVID BREWSTER ON THE PATENT LAWS.

We would direct attention to the elegant address of the venerable Scottish philosopher, Sir David Brewster, on another page. He points out in a graphic manner the absurdities of Sir William Armstrong in advocating free trade in inventions as compared with free trade in manufactures and natural products. The latter is free trade with the consent of the producers, the former is trading in the products of others against their consent. The one principle may be in perfect accordance with equity, the other certainly is not. The scientific attainments of Sir David Brewster have gained for him a world-wide reputation. He has always been a friend of the mechanic and inventor, and his object in bringing this subject before the University of Edinburgh was to enlist the judgment of educated persons on the side of right. He informed his audience that it was his firm belief that "every educated man has a substantial interest in a due protection to inventors. This sentence deserves to be written in 'letters of gold.'"

MISCELLANEOUS SUMMARY.

EXTRAORDINARY LUSUS NATURÆ.—J. Way, Jr., of Sewicklyville, Pa., sends us an account of two rainbows which he witnessed during a recent rain storm in his vicinity. He says that the principal bow was of a very brilliant appearance, and that when he observed the two they were parallel, with their extremities nearly perpendicular to the earth, but that they subsequently so modified these positions that the greater arch was crossed by the less, at an angle of 20°. This was again changed by the primary rainbow fading away and the secondary one remaining invested with all its lost radiance. Mr. Way thinks this is most extraordinary, and desires to know if any similar phenomenon has ever occurred.

COARSE BREAD.—Dr. Tucker, in the Maryland *Medical Journal*, denies that coarse bread is useful in dyspepsia. On the contrary, he says, it relieves the constipation at the risk of aggravating the real difficulty. He believes cold and stale bread to be most digestible, and therefore the best for dyspeptics. We can endorse the doctor's opinion from our own experience. It is as he says; the alleviation is but temporary and the distress from its presence in the stomach is very great. Peach pits have been recommended for this tedious complaint, on account of some fabulous virtues which are supposed to emanate from the prussic acid which is one of their constituents, but we have never found in our own case the slightest relief from any physician, medicine or nostrum whatever.

NEW YORK EXPORTS.—A table of exports furnished by the New York Custom House exhibits the following comparison for the month of October, during the last five years:—

Exports in October, 1858.....	\$8,782,000
do 1859.....	10,832,300
do 1860.....	12,682,700
do 1861.....	13,172,500
do 1862.....	26,797,100

This is a very healthy and cheering exhibit. It shows that the loss of the cotton exports, which "our misguided Southern brethren" supposed would result in utter paralysis of all Northern trade, is not without its munificent compensations.

A NEW PHILADELPHIA STEAMSHIP.—The new steamship *Continental*, built by J. Lynn, and the machinery by Merrick & Sons, Philadelphia, lately made her trial trip. She is 242 feet in length, and 38 feet beams. Her timbers are the best Delaware oak, her bracings are double angle iron, and she is copper fastened. Her propeller is a four-bladed screw 24½ feet in diameter with a pitch of 25 feet. The screw shaft is driven by a direct-acting inverted engine, the cylinder of which is 50 inches bore, stroke 45 inches. A surface condenser is used. She made 11 knots per hour on the trial trip.

UNITED STATES SILVER COIN IN CANADA.—The Montreal *Gazette* mentions that upwards of \$50,000 in United States silver coin were imported lately by the American Express Company. During the past two months the average daily receipt has been \$30,000 worth a day. At first the silver was easily worked off into the country in grain purchases, but now the farmers are returning it, and the market has become so glutted that the brokers are buying it at 2 to 2½ per cent discount.

A BRAVE OFFICER.—Colonel Bartlett, who commands the Forty-seventh Massachusetts Regiment, was once a captain in the Twentieth Massachusetts. In one of the early battles of the war he lost a leg, but its place has been supplied with a wooden substitute. He now marches with comparatively little difficulty, and rides with perfect ease. This brave officer lately arrived in this city on his way to the seat of war. His conduct is a stinging rebuke to those "brave" shoulder-strapped sons of Mars who invalidate themselves on the slightest pretence.

IRON-LINED BARRELS FOR KEROSENE OIL.—A lot of kerosene oil, in iron barrels encased with wood, was stored in a building lately burned in Boston. Some of the oil was saved. The wood was completely burned, leaving the iron lining and the oil highly heated, but not ignited. This test is important to insurance companies and oil dealers, showing there is but little risk from fire when the oil is properly refined and placed in suitable barrels.

A TREMENDOUS GUN IN ENGLAND.—A rifled 600-pounder gun is said to be rapidly approaching completion at Elswick, England. Its weight, when finished, will be 22½ tons, and its length 14 feet 10 inches. The outer diameter is to be 4 feet 4 inches at the breech, and 1 foot 9½ inches at the muzzle. The bore of the gun will be rather more than 13 inches, and the greatest thickness of metal at the breech, about 19 inches; at the muzzle, 4½ inches.

A CASE OF FATAL POISONING FROM CHLOROFORM. taken internally, is reported in a late number of the London *Times and Medical Gazette*. The quantity taken could not be ascertained. The patient was at first, for several hours, insensible, and as though under the ordinary effects of the anæsthetic when inhaled. He then recovered his sensibility, but died under the violent re-action which ensued. The chloroform was swallowed as a remedy for sleeplessness, and was effectual.

DEAD LETTERS.—It has been the habit of the Dead Letter Office to send back only those letters containing matters of value, but for the past year the experiment has been tried of sending all letters, and the result has proved very satisfactory. Not more than sixteen per cent of the letters sent back have been returned to the Department a second time, and the double postage that is charged has realized a surplus over the expense.

ENGLISH IRON-CLADS.—The London *Court Journal* concludes an article on English steam rams as follows: "We have three facts with regard to these iron-clads—first, they are unseaworthy; second, they are uninhabitable; and third, they are as vulnerable in vital parts as wooden ones." Very slight objections!

The cotton mills at Manyunk, near Philadelphia, are now stopped, but all the woolen mills in that manufacturing locality are running day and night, mostly making Government kerseys and flannels. If the machinery of the cotton mills was so altered as to weave woolen yarn, every one of them would be running.

The *United States Gazette* states that Thomas's flour mills in Willow street, Philadelphia, have been enlarged by the addition of a building, 80 ft. by 120, four stories high. This has increased the capacity of the mill to 1,400 barrels of flour daily. The motive power is an engine of 300 horses' power. The mill is the largest of the kind in the country.

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