PROGRESS OF INVENTION ABROAD.

In a paper read before the British Association for the Advancement of Science, Mr. J. W. Cooper, who has given much attention to the

WATERING OF STREETS BY CHEMICALS,

states that three streets in the city of Liverpool were watered with salts during the month of July, 1869, with very favorable results, so much so, that the experiments were continued this year. It was difficult to prove the economy resulting from the use of chloride over a limited area; and the Westminster Board of Works, after observing the effect produced at Whitehall and Knightsbridge, resolved to extend the experiment throughout their entire district, comprising an area of 250,000 square yards. As soon as the area was extended, the economy in labor and water was at once made evident. By using one tun and a half of chlorides per day, costing £3 15s., the labor of ten cart horses and men, costing £4 10s. (at 9s. per horse, cart, and man), can be dispensed with, and, consequently, the quantity of water they would spread is saved also, viz., 350 loads of 250 gallons each, which, at 10d. per 1,000 gallons (a fair average price for water in London) would amount to £3 12s. 11d. in addition to the 15s. per day saved in labor; thus showing a clear gain of £4 7s. 11d., after paying for the salts. An effective method of remedying the evils arising from organic matter deposited on public thoroughfares is becoming daily a serious matter for consideration with sanitary authorities, as much sickness is believed to arise from the malaria emanating from this source. The disgusting odor and dangerous nature of some of the deodorizing agents used were strong evidence that they would not be used at all if the necessity for some determined action to prevent the spread of contagion and disease was not fully recognised. The deliquescent chloride of aluminum, recently introduced to public notice by Professor Gamgee, seemed to meet all the requirements needed in the antiseptic of the future. It was non-poisonous and free from any odor; it prevented decomposition, and arrested it when commenced. It absorbed noxious gases resulting from putrefaction, and destroyed parasites and germs. It was also not to be surpassed as a precipitant and deodorizer of sewage, and was only one-third the cost of carbolic acid. Mr. Cooper proposed to add a sufficient percentage of this chloride to the salts for street watering, and thereby afford a means of thoroughly and effectually purifying public thoroughfares without additional cost to the ratepayers, the value of the water and labor saved being more than sufficient to pay for the use of the chlorides.

A very ingenious automatic device for

FLUSHING SEWERS

has been produced by a London inventor. In this device, the flood-gate is hinged, opening upward and outward upon the release of a hook bolt by the buoyant power of a large copper float. Many lives have been lost through the action of poisonous gases, in flushing sewers, which flushing this simple device does whenever it is required. The rush of accumulated water swings the gate outward, and, also, carries off accumulations of sewage. As soon as the flood current subsides, the gate swings back to its original position, and is automatically locked.

A machine for

HACKLING LONG VEGETABLE FIBERS,

such as aloe, manilla, hemp, etc., consists of a drum, revolving on a horizontal axis, and armed with teeth or spikes pointed at the end, and having sharp, annular edges in front, or at the front and back. This drum is of such a size that the fiber upon the machine shall not be able to lap more than about half way round it. This is an English invention.

A French invention, in the same line as the above, is a machine for

COMBING FLAX.

Two endless chains, consisting of flat links, are caused to travel together over flat-sided pulleys, and disposed, one above the other; the two adjoining or opposing surfaces of the two chains being held in contact with each other by passing between guides. These surfaces form nippers for holding the tufts of fibers while being combed or straightened, and serve to carry them along, at the same time, to a receiving trough, wherein each tuft is deposited in succession, the one overlapping slightly the other. The bottom of the receiving trough consists of an endless traveling band, which continuously conveys away the combed tufts in the form of a ribbon or sliver. A vibrating arm, worked by a crank and provided with a crosshead or rake, serves to take each tuft as it is released from the nippers, and draw it into the receiving trough.

A Swedish inventor has patented a process for making

ARTIFICIAL LEATHER.

He takes leather wastes, leather cuttings, leather shavings, or other small bits of leather, either new or old, and reduces them to a kind of fibrous pulp, by hand labor, or by a machine or mill (either by grinding, pounding, cutting, rasping, carding, or grating); if old waste is used it should first be cleaned thoroughly. This matter or pulp is then kneaded with india-rubber, which is rendered fluid, or dissolved in oils or spirits, and treated with ammonia. He prefers to dissolve the india-rubber in oil of turpentine To effect this, the inventor cuts the india-rubber into pieces and mixes it with the oil, after which he lets it remain quiet in a closed vessel until it is dissolved. When the india-rubber is dissolved, he adds ammonia, of a strength of 30 per cent, in the proportion of about equal parts by weight, of ammonia to the india-rubber contained in the solution; when the mass has become of a grayish white color it is ready to be mixed with the pulp.

A Liverpool inventor has patented a taper or

FRICTION LIGHT,

which is made after the following formula: He takes one ounce saltpeter, one half ounce powdered orris root, one eighth-ounce of minium, and one ounce of phosphorus, or any other convenient friction match composition. To these ingredients, the phosphorus being dissolved, he adds one to two ounces of oil, preferably castor oil, varying the quantity according to the nature of the oil and the resultant tenacity or flexibility required. After all the ingredients are well incorporated, the inventor adds thereto chloride of sulphur, in the proportion of from ten to fifteen parts of liquid chloride of sulphur to every hundred parts of oil, agitates quickly, and shapes into the form required, either by molding, cutting, pressing, or drawing.

A new method of

PAVING STREETS,

—French—consists, first, in the employment of wood disintegrated into fragments, of as great a length as possible, in the construction of rides and bridle paths, carriage drives, riding schools, and training grounds, streets and roads of all kinds. Second, in the employment of disintegrated wood of shorter length than the preceding, in the construction of foot paths of all kinds for promenades and gardens. Third, in the employment of disintegrated wood mixed or not with pitch or with antiseptic material, or both, as a cushion for supporting the sleepers of railways. Fourth, in the employment of this disintegrated wood mixed with pitch obtained from gas tar or otherwise, or with natural asphalte or bitumen in the construction of roads, footways of streets, public drives, and any description of works in which asphalte is ordinarily employed.

Sir William Fairbairn, of Manchester, England, has invented an improvement in

STEAM BOILERS,

in which he combines together three cylindrical shells of boiler plate. He arranges them parallel, the one to the other, and horizontally, or nearly so. Two of the cylinders, which are set side by side, are each traversed from end to end by an internal tube in which are the furnaces, and these cylinders each communicate with the third cylinder, which is placed over and between them by three or other number of pipes or passages, of sufficient size to allow the steam generated in the lower cylinders to escape freely into the upper, and to allow the water freely to circulate.

SCIENTIFIC INTELLIGENCE.

THE REDUCING PROPERTIES OF METALLIC ALUMINUM.

In reference to the action of aluminous upon metallic solutions there exists a diversity of information in our books, and to settle the point an Italian chemist, Professor Cossa, has instituted a number of experiments, an account of which we find in the journal *Nuovo Cimento.*

SALTS OF SILVER.—The metal is thrown down in dendritic form from weakly acid and neutral solutions of nitrate of silver. The precipitation of the silver begins in the concentrated as well as in the dilute solution of the nitrate six hours after the immersion of the aluminum. Silver is immediately precipitated from an ammoniacal solution of the chloride of silver in granular form, and also from ammonia—chromate of silver.

COPPER SALTS.—At first aluminum has no action upon solutions of sulphate or nitrate of copper, but after the lapse of two days small crystals collect on the sheet, and gradually increase in size, partly dendritic, but chiefly octahedra. Copper is at once thrown down from a solution of the chloride and also from the acetate, and if to the sulphate or nitrate a little chloride of potassium be added, the precipitation of the copper is greatly accelerated.

SALTS OF MERCURY.—Aluminum at first throws down metallic mercury from solutions of the chloride, cyanide, and nitrate, but this soon forms an amalgam with a second portion of the aluminum and produces a compound that decomposes water rapidly and also oxidizes quickly in the air. If an amalgan of aluminum and mercury be produced by heating the two metals in an atmosphere of carbonic acid, it exhibits similar properties to those mentioned above. Professor Wurtz, of New York, was the first to call attention to the remarkable properties of the amalgam of aluminum and mercury at a meeting of the Lyceum of Natural History more than a year ago. He prepared it by rubbing aluminum foil and mercury together.

SALTS OF LEAD.—Aluminum separates lead in crystals slowly from solutions of the nitrate and acetate and rapidly from the chloride. Also an alkaline solution of chromate of lead is decomposed by aluminum into metallic lead and oxide of chromium.

SALTS OF THILLIUM.—Regular octehedra crystals of thallium alum formed upon the aluminum foil from a solution of the sulphate after the lapse of ten days. Metallic thallium was immediately thrown down from a hot solution of the chloride.

SALTS OF ZINC.—Aluminum immediately precipitates metallic zinc from alkaline solutions.

The aluminum employed in the above experiments was free from every trace of sodium, and applied in the form of thin sheets after having been cleaned in nitric acid.

ACTION OF ELECTRICITY UPON AIR AND OXYGEN IN THE FORMATION OF OZONE.

A. Houzeau, after a series of 400 ozone determinations of the action of electricity on air and oxygen, comes to the following conclusions:

1. The production of ozone is greater in renewed than in confined air.

2. It is greater at the negative than at the positive pole.

3. It increases only up to certain limits with the duration of the electric action.

4. The intensity of the electricity adds to the amount.

5. It diminishes when the distance of the electrodes is increased.

6. It varies with the length or surface of the electrodes.

7. Under otherwise analogous circumstances more ozone is produced when the effect of both electrodes are employed.

8. The formation of ozone takes place when the air is not in direct contact with the electrodes, as when the points are isolated in a thin glass tube, but the effect is greater when the air is in contact with the poles of the battery, and it varies in proportion to the length and superficial area of the metallic electrodes.

9. The production of ozone increases as the temperature of the air diminishes.

10. Under like circumstances a given volume of oxygen yields far more (8 to 10 times) ozone than the same quantity of air.

11. Besides ozone there is always some nitrous oxide produced in the air, whereas in pure oxygen there is none.

After the author had ascertained these results, he was able to invent an apparatus by aid of which he could at any time prepare ozone in any quantity from the air or oxygen. Unfortunately the description of the apparatus is wanting, but the experiments made by Houzeau, and the results at which he has arrived, will be of value to future experimenters. We need a cheap and practical invention for producing ozone at pleasure, as its powerful chemical properties render it of great value in the arts.

ICE PAPER.

Paper may be made to resemble the figures produced by the flakes of snow or the freezing of water on a window pane by allowing a salt to crystallize upon its surface. During the Paris Exposition card paper thus prepared from sugar of lead was very popular, but it was discovered that the lead salt turned black, and its poisonous character soon brought it into disrepute. A new mixture without lead has been suggested by Puscher—it is prepared as follows: Dissolve 6 ounces sulphate of magnesia in 6 ounces of water and add 6 ounces dextrine mucilage paste. The solution is boiled, a little glycerin dropped in, and the whole allowed to cool. The paper, after having been previously glazed with a coating of glue and gelatin must be uniformly covered with the solution and left to dry in a warm place. After 10 or 15 minutes the surface of the paper will be covered with a uniform cluster of crystals, the size and number of which will be dependent upon the concentration and temperature of the bath and also of the heat at which it is dried. If the paper be glazed with a solution of egg albumen instead of glue and gelatin, it can be beautifully dyed with aniline colors previous to immersion in the solution of sulphate of magnesia. This kind of ice paper does not undergo any change in sulphureted hydrogen gas, and is not poisonous.

ACTION OF HEAT UPON COAL.

If powdered coal, after having been dried until its weight remained constant, be heated in a drying oven from 356° to 360° F., it has been found by Dr. Richter that there is a constant increase of weight up to a certain point, after which it begins to diminish. After twelve hours heating the increase amounts to several per cent of the original coal—after twenty hours it reaches its maximum and further heating causes it to lose weight. Coal which has thus been heated has simply its external appearance in common with the original sample. It has a higher specific gravity, in one instance going up from 1·275 to 1·453, and its chemical constitution is different. If we compare the composition of dry coal with the heated, the latter shows much less carbon and hydrogen, and a considerable increase of oxygen and nitrogen. An accurate analysis demonstrated the loss of hydrogen to be 0·74 per cent, and of carbon 1·17 per cent, while the increase of oxygen and nitrogen occasioned by the next was 6·07 per cent. If the heated coal be made red hot, it no longer yields coke, and does not materially change in appearance. If it be heated rapidly, an exceeding great swelling up takes place, and the escaping gases which carry off the carbon in powder, burn with a non-illuminating and not smoking flame. Finally the heated coal absorbs water from the air more rapidly than the dry coal.

Bessemer on Steam Artillery.

Mr. H. Bessemer has lately aired his ignorance of military and steam engineering in a proposition to use steam as a projectile agent in artillery. His plan, which he attempts to support by a string of absurdities, is briefly as follows: He proposes to apply the principle of the steam fire engine to the projection of bullets. He calculates that, with a pressure of 150 pounds of steam, one ounce and two ounce bullets might be projected with an initial velocity of 1,600 feet or 1,800 feet per second, at the rate of 2,000 per minute of the smaller and 1,000 per minute of the larger missiles. Mr. Bessemer proposes to submit details to the War Office; but he seems confident of the practicability of combining the bullet projector with the traction engine, and of so producing a warlike machine of most formidable and deadly character.

AN ICE LENS.—It is interesting to observe that radiant heat from the sun may be collected into a focus by means of an ice lens, and yet produce all the effects of an ordinary burning-glass. Such a lens, for experiment, may easily be made by placing a flat cake of ice upon a warm concave surface of metal or porcelain dish, such as an evaporating dish used by chemists; as soon as one side has assumed the proper form, the ice must be turned to make both sides alike. Any sunny, crisp, frosty morning will be suitable for this experiment; from which we learn that in Northern regions it would be quite possible to raise a fire without matches—a fact not altogether unworthy of being known.