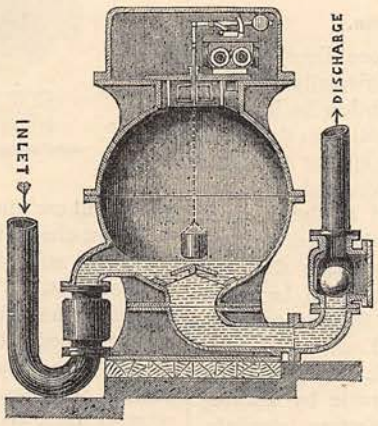
THE GATHERER.

Flax Silk.

A chemical process for giving a silken appearance to flax fibres has been brought out at Lyons, and if it should prove to be a thorough practical success it will materially alter the relations of the silk and flax industries. Part of the process consists in chemically treating the flax yarn, and then dipping it into a liquid which is prepared from silk waste, and leaves a silken sheen upon it which transforms the yarn into a fine, bright, flossy material, resembling silk. The cost of this imitation silk would only be one-fourth of the real article; and a limited company has been formed to work the process.

Shone's Sewerage System.

One of the most successful plans of dealing with sewage is the pneumatic system of Mr. Isaac Shone, of Wrexham, North Wales, where it has been tried for some time. It consists of the usual web of sewers for collecting the sewage from houses, converging in a central station, where their contents are discharged by a pneumatic ejector—which is the special feature of the system—into main pipes, which are sealed, then carried away to the sea or any other convenient outfall. The pneumatic ejector is illustrated in the figure, which represents a vertical section through it. It consists of a spherical chamber with an opening into the inlet sewer on the one hand, and the outlet or discharge pipe on the other. Inside the chamber a cup hangs from a bell at the top, and this bell is connected, by means of a chain and rod, passing through a stuffing box, to a system of levers seen in a small chest on the top of the spherical chamber. These levers open and close a set of valves that admit compressed air into the chamber. The ejector is placed so that the top of the chamber is at least as low as the level of the main inlet, and as the sewage flows into the chamber it submerges the cup, thereby neutralising its pull upon the bell from which it is suspended; and ultimately it rises above the open mouth of the bell, compressing the air within it. This has the effect of opening a slide valve by means of the levers, and admitting compressed air into the chamber. The compressed air then forces out the sewage through the discharge pipe until the level of it within the chamber sinks lower than the suspended cup, when the dead weight of the latter again comes into play, pulls down the bell, and, closing the slide valve, shuts off the compressed air. The sewage thereupon begins to flow in from the inlet pipe as before, and the above process is repeated. The discharge pipe passes vertically up from the ejector into the sealed main above.



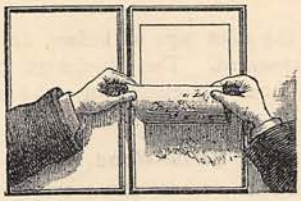
Straw-Wood.

To make bricks without straw was in times past deemed an equivalent for an impossibility. But to build a house without wood very nearly approaches to the ancient puzzle. In Illinois, U.S., some ingenious person has discovered a method by which straw can be used for wood as a building material, and the invention has already attracted attention. Several sheets of the ordinary straw-board, as produced in paper-mills, are passed through a chemical solution which softens the fibre. These sheets are then rolled, dried, and when hardened come out in a block impervious to water, and capable of taking a high polish. It is stated that when properly and carefully produced this straw is so like natural wood that it can with difficulty be distinguished from it. The continuous demand for timber in America will be probably lessened should this ingenious plan become generally adopted.

The Chromograph.

The electric pen of Mr. Edison, for multiplying copies of manuscripts, diagrams, and musical scores, by means of a paper stencil plate punctured by a fine needle worked by electricity, has given rise to a number of similar contrivances, in which the needle is driven by clockwork and compressed air; but all these ingenious tools have recently encountered a powerful rival in the Chromograph, a simple copying machine invented by Herr Albert Ungerer, of Vienna, and patented over the whole of Europe and America. The apparatus consists of two flat zinc trays, each half an inch deep, as shown in the figure, and containing an elastic composition or paste of a white colour, and similar to caoutchouc. These two trays are separable, so that both of them can be used for making separate copies, and then each takes the place of a lithographic stone in the process of printing. The writing to be copied is first written on the paper, which may be of any kind, with a specially prepared aniline ink. The ink is allowed to dry without blotting, and then the paper is pressed face downwards on the composition, and the hand passed lightly over it. At the end of about a minute the paper may be taken away, and it will be found that the writing has adhered to the paste, as a negative from which in ten minutes as many as fifty positive copies may be obtained, by

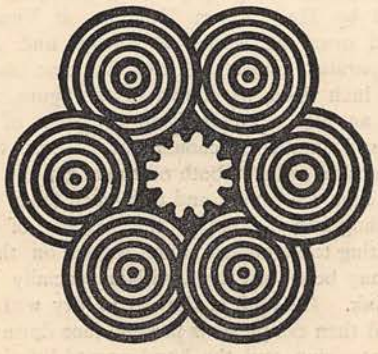
simply laying fresh sheets of paper on it, one after another, and pressing them gently and smoothly with



the hand. When all the required copies have been taken, the ink must be carefully washed off the surface of the composition with a soft sponge and clear water immediately after, and the apparatus is then ready for another time. These machines, with bottle of ink included, cost from 12s. to 40s., according as the size ranges from 10 inches long by 6 inches wide, to 19 inches long by 12 inches wide; and composition is supplied at the rate of 4s. per pound.

A New Optical Illusion.

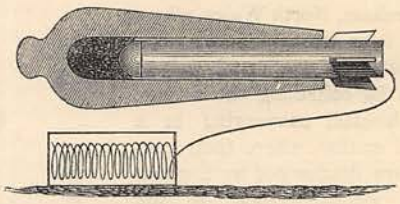
A curious new optical effect has been discovered by Prof. Sylvanus P. Thompson, of University College, Bristol. If the figure represented below be laid flat on the table, and given a circular motion in the plane of the table, the outer whorls will appear to rotate independently, in the same direction and with the same velocity as the motion imparted to the diagram as a whole, while at the same time the inner toothed figure will seem to turn in the opposite direction with an equal velocity. The figure can be made by forming the whorls and central figure separately, and then putting them together. Each whorl, as is shown, consists of a set of concentric circles in white and black, and the centre device is made by drawing a black circle with black teeth projecting interiorly. Each of these elementary figures if treated in a similar way will give a similar effect. The explanation of the



phenomenon is considered by Dr. Thompson to lie in the fact that there is a compensating power in the eye, whereby an impression is supplemented by its opposite. This power reveals itself when we look at a waterfall, then suddenly shift the gaze to the stationary rocks around; for the latter will appear to move upward with the velocity of the falling water.

Distress Signals.

The want of an efficient signal of distress—that is, one giving out both light and sound—has long been felt by the mercantile marine; and it is satisfactory to know that a very promising one was recently tried at Woolwich. It is seven inches long, and two in diameter, and is fired from a small cannon eight inches deep and two and a half in bore, which is securely fixed to the bulwarks or the deck of the endangered vessel. The charge is cotton, powder, or tonite, and the firing is done by means of a friction-tube and lanyard, so that no match, port-fire, or light is required to set it off. When launched it rises to a height of 600 feet and bursts like a rocket, shedding a bright light in the air which can be seen for seven



miles, and emitting a shrill report which can be heard at almost double that distance.

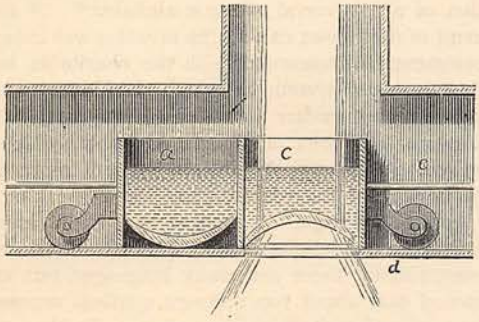
Hunt's safety-line projectile has also been tried with success. This consists of a tubical cartridge enclosing the safety-line, which unwinds itself as the missile speeds through the air. The cartridge is placed in a small cannon with its head next the charge, as shown in the figure; but when fired it reverses itself, and the fan on the tail directs its flight. The shore end of the life-line is, of course, provided with a coil of slack.

Conveying Electric Light.

The distribution of the electric current for the production of light is, as is well known, a serious difficulty in the way of general illumination by means of electricity. When the current is conveyed in metal conductors to the electric lamps where it is transmuted into light, there is a great loss of effective power in overcoming the resistance of the wires employed, and in splitting up the current into branch circuits. The electric light is found to serve best and be most economical when it is produced from single sources of great power, and is not generated by a number of small lamps.

Bearing this fact in mind, we cannot but regard as at least very ingenious the plan devised by Messrs. Molera and Cebrian, of New York, for distributing, not the electric current, but the electric light itself to a number of light centres. This is done by means of a

system of pipes, prisms, and reflectors. The total light required to supply a building with it, both out



and in, is produced by a single electric lamp of large and economical size, fed by a dynamo-electric machine or thermo-pile (see the Gatherer for August), and it is reflected into a straight service pipe running to the nearest point at which light is required. Here a lamp-post or chandelier, fitted with a globe or globes as if it were a real lamp, is connected to the pipe, and by means of a prism or lens inserted in its path, a part of the travelling beam is bent aside so as to issue from the globe, and illumine the surrounding street or room, the rest of the beam being allowed to proceed on its way until robbed of a further portion of its strength by other prisms and reflectors placed at suitable points and angles. Rooms can be lit in this way by running the service pipe along the ceiling, and diverting a share of the general beam down into the interior, say over the centre table. This is effected by a sliding lens, shown in the accompanying figure, which represents a section through the service pipe and slider. The latter consists of a box which runs on castors, *d*, inside the service pipe, and is formed of two tubes, *a* and *c*, each fitted with a glass lens ; that in *a* being capable of *converging* the beam falling on it down the vertical tube, while *c* is able to *diverge* it so as to send a wide cone of light into the room beneath. The box can be shifted by a cord (shown) at will, so as to obtain either the divergent or convergent beam. Occupants of the house have thus the power to control the supply of light which they obtain, and by suitable screens of coloured glass they may receive it of any desired tint. It will be interesting to see how this novel plan will succeed in practice ; and it may be mentioned that the inventors claim that the cost of lighting by this means will not exceed one-twentieth of the cost of gas.

Small Tourist Maps.

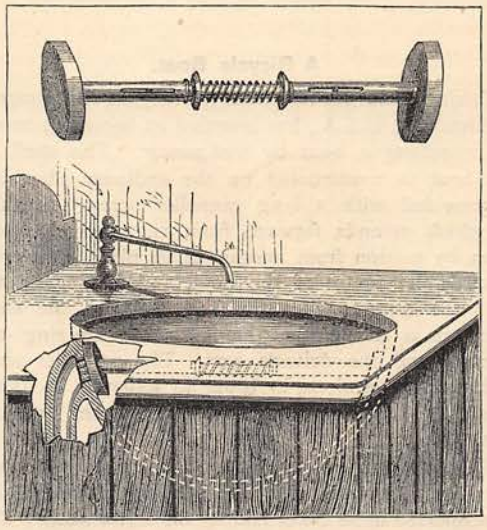
Those tourists who have endeavoured to trace their way through a strange city by help of a map must have again and again experienced the inconvenience of the ordinary guide maps published for the purpose. In general these are so large as to require repeated unfolding, which is a difficult and conspicuous operation in the open streets, especially in windy weather ; and they do not show all the minor streets and short cuts leading to public places. The use of microscopic maps, suggested to us by "A Constant Reader," is therefore worthy of consideration. He proposes to reduce one type of Ordnance Survey Maps, say the six-inch scale, by photography to a handy pocket size, and to magnify it to the sight by means of a glass lens when it is desired to consult it. Perhaps some of our enterprising map-makers will adopt the suggestion, if they have not already done so.

Silk from the Sea.

The sea yields many precious things—coral, amber, and pearls—but it is not generally known that in certain parts of the Mediterranean a species of mussel is found, of which the shells contain one of the most beautiful textile materials known. These shells are about seven inches long and three inches broad, and each of them contains a hank or byssus of the fibre, weighing half a drachm, and at first it presents nothing particular to the eye, being soiled with mud and the remains of marine plants. But when washed and combed the fibres are seen to be extremely lustrous, glistening in the sunshine in shades varying from a golden yellow to olive brown. Spun and woven in the ordinary manner, stockings, gloves, neckties, and similar articles can be manufactured from them, and they are likewise specially suited for making the finest lace. At present the production of these fibres hardly exceeds 200 kilogrammes (3 cwt. 3 qrs.) a year. Specimens of these curious mussels and their finished products were exhibited at the recent Paris Exhibition, but they appear to have been overlooked.

A Gas Sewer Stopper.

A simple American contrivance for preventing sewer-gas from escaping into a house through the



overflow-pipe of a wash-basin, can be made and applied as we have illustrated. The upper part of

the engraving represents the stopper itself, and the lower part shows how it is to be fitted into the wash-basin.

The stopper is composed of two metal or wooden tubes slotted lengthwise, each carrying at its outer end a flat circular pad, and at its inner a small solid flange. These are fitted on a rod, along which they are free to slide as far as pins working in the slots will allow, and a spiral spring inserted between them, so that it sends bear on the flanges, keeps them apart. The stopper is applied to the basin by pressing the two tubes towards each other, placing one pad over the other overflow-holes, and then allowing the spring to force the other against the opposite wall of the vessel.

Imitation Amber.

Natural amber is a very useful as well as ornamental substance; but owing to the scanty nature of the supply cast up by the sea, it is very high-priced, owing chiefly to the large demand for it. Attempts have consequently been made more than once to make an artificial substitute, and it must be confessed that as far as the general appearance is concerned these attempts have succeeded admirably. By a judicious mixture of camphor, resin, and certain colouring matters, a material is produced which so closely resembles real amber as to defy detection; especially as it possesses, in common with the genuine fossil gum, the property of becoming electrified by friction in a marked degree. There are, however, two simple tests by which it can be told. Imitation amber softens easily when placed upon a heated iron plate, whereas real amber requires a very high temperature to alter its hardness. Again, ether attacks the sham article, but does not affect the real. The former can be sold at one-fifth the price of the latter.

A Bicycle Boat.

Taking a hint perhaps from the bicycle, Mr. Tangen, of Bismarck, U.S.A., has invented an ingenious mode of propelling a boat by foot-power. The shell of the boat is constructed on the ordinary plan, but is provided with a long propeller screw, the shaft of which extends forward from the stern, and derives its motion from another shaft placed crosswise towards the centre of the boat, and having cranks that are actuated by the foot. Above the shaft there is a frame that supports the steering apparatus and the driver's seat. The propeller shaft is formed in sections, in order to allow of its being shortened or lengthened as circumstances may require.

The tiller ropes run along the gunwale through suitable guides and are attached to the rudder, which is supported at its lower end by the screw-shaft. The invention is certainly ingenious, although in "dirty weather" it would seem to leave the navigator at the mercy of wind and wave.

Visible Speech.

We are indebted to the father of the well-known inventor of the telephone—Professor Bell—for the perfection of a "universal phonetic alphabet." A short account of this shows us that the inventor was induced to commence his researches with the charitable hope of devising some system by which deaf-mutes might be able to communicate their ideas. The result of his application has been a Sound Alphabet, which is managed as follows:—A pictorial symbol represents every position of the vocal organs when speaking in any known language. At first sight it would appear that an almost indefinite number of illustrations would be requisite, for there are many languages, but as a matter of fact about 100 different symbols represent conversation in all known tongues. Furthermore, when these are once acquired, the possessor can translate sounds from any language into his native tongue, and this has been proved by experiment. On one occasion a Japanese translated a sentence dictated by an American in English, and repeated it in Japanese, and the Principal of the Boston School of Oratory wrote it in visible symbols upon a board. This was then proved by a Mr. Osgood and the Japanese Commissioner of Education, who had not been in the room when the sentence was pronounced. It would be well if the experiment were tried in this country, as such a trial would be of the greatest interest to all concerned in the welfare of those afflicted with deafness and the want of speech.

A Self-recording Thermograph.

A mechanical arrangement for keeping a record of changes of temperature has been lately invented by Mr. Bowkett, of Leeds Hospital. A tube filled with a certain liquid is sealed hermetically, and bent into a semicircular form. One end carries a pencil which presses upon a cylinder covered with white paper and moved by clockwork. The tube expands or contracts according to the temperature; consequently the pencil is moved upon the paper cylinder, and marks it accordingly. The cylinder revolves once in the twenty-four hours, and by examining the pencil-marks, the variation, in the form of a curved line, of the temperature during that period can be immediately ascertained. Thus the slightest rise or fall of temperature can be seen at a glance, and in fever cases such an adjunct may prove to be very useful.

The Cyclops Fan.

This powerful little fan, which the inventors, Messrs. Rownson and Drew, have named after the fabled giants of Sicily, is in truth a valuable appliance for a great variety of purposes. It not only takes the place of the smith's bellows in fostering his roaring fire, but it is used for forcing fresh air into deep wells or the galleries of coal mines; and it is even employed for the blowing of church organs. The apparatus consists of a revolving fan, driven by hand or steam power, and enclosed in a small box. Such are its capacities for work, that one fifteen inches in diameter will keep

eight large forges going; combined with a portable forge, it may be taken to any part of an estate or railway where blacksmiths' work is to be done, and the expense of building a smithy is thereby saved.

Life-saving Beds.

A new life-saving bed for the use of passengers on board ship has been recently approved and adopted by the United States Naval Department for use in the American Navy. These mattresses possess a remarkable power of buoyancy. They are made of elastic felt, and one measuring 6 feet 6 inches long by 2 feet 9 inches wide, and 5 inches thick, of which the entire weight is only 25 lbs., floated a man weighing 150 lbs., in addition to an iron grate weighing 50 lbs. more. To sink it so that its upper surface was level with the water, a dead weight of 300 lbs. was required. An average steerage bed of this material would cost only 13s. 4d., and would be capable of sustaining 65 lbs., which is equivalent to the weight of three men under water, or in other words, when swimming. Several lines of steamers running to the West Indies now employ these buoyant beds, and they are, we hear, about to be tried for adoption into the Royal Navy.

Incombustible Wood.

A method of petrifying wood so as to render it incombustible without altering its look has been discovered by M. Folbarri, and though intense heat chars the surface no flame proceeds from it, and the internal fibres are left intact; so that were the joists, lining, staircases, and ceilings of houses made of the prepared timber, danger from fire would be materially reduced. The wood is prepared by boiling it for several hours in a chemical solution, consisting of 55 parts (by weight) of sulphate of zinc, 22 parts of American potash, 44 parts of American alum, 22 parts of oxide of manganese, 22 parts of sulphuric acid, 60° strength, and 54 parts of water. All the solid ingredients are to be put into a boiler containing the water, and brought to a temperature of 113° Fahr.; and as soon as they are dissolved the sulphuric acid is to be poured in little by little until the whole is thoroughly blended together. After being boiled for some three hours in this preservative solution, the wood is allowed to dry in the open air on a wooden grating, so that the non-combustible salts may crystallise in the grain.

Chlorine not an Element.

The tendency of chemical thought at present is towards the belief that the bodies which we have hitherto been taught to call elements are not really elementary, but compounds or aggregations of some primal element. Prout, Norman Lockyer, and others regard hydrogen, the lightest substance known, as this primal element. Without going so far as this, it is remarkable that another of the so-called elements, chlorine, has just been decomposed by two German chemists, Herr Victor and Herr Carl Meyer, at the Polytechnic School, Zurich. They have determined that chlorine is an oxide of some new metal, which they have termed *Murium*, but have not as yet succeeded in isolating. In connection with this important fact it is curious to note that Sir Humphrey Davy, the great Cornish philosopher, after his celebrated discovery of the compound nature of soda and potash, surmised that chlorine, as well as iodine and bromine, was an oxide.

Portable Railways.

Those of our readers who visited the recent Royal Agricultural Show at Kilburn may have seen the pretty miniature railway exhibited there. The gauge, or width between the rails, was only 20 inches, and the light steel rails themselves weighed only 18 lbs. per yard. These were secured to corrugated iron sleepers by means of bolts, which could be readily disconnected, and the whole line could be lifted or laid down at short notice. Besides the straight lengths, there were curves, points, crossings, and all the necessary details of a line, so constructed as to be conveniently portable; and a variety of little waggons adapted for different kinds of traffic, together with tank locomotives, were also provided. This diminutive railway was originally designed by a Frenchman, M. Decauville, of Petit-Bourg, but Messrs. Fowler and Co. have slightly modified it in practice. After being on view at the Kilburn Show, it was subsequently laid down in the garden of Stafford House, by kind permission of the Duke of Sutherland, where it has been inspected by some of our leading military authorities, who are all agreed on its advantages as a means of transport in wild countries.

A New Megascope.

In legal contests it is often necessary for the jury to scrutinise and compare two notes or documents very closely, in order to determine which is genuine and which is false. This is especially necessary in cases of bank forgery or alteration of signature. In order to enable a jury the better to do this, Dr. Cresson, an American, has designed a new and very effective megascope, or microscope showing a large image. In this apparatus the object to be examined is firmly fixed in a sliding frame and illuminated on its front by two oxy-calcium or electric lights, whose rays are concentrated on it by means of compound lenses. A third light is in certain cases employed to light up the back, and to shine through it if the transparency of the material will permit it. A magnified image of the object is then projected upon a screen of ground glass by a powerful compound achromatic lens, over seven inches in diameter. The peculiar arrangement of lights and screen enables the examiner to detect the surface of the paper through the ink, so that erasures, shading, or painting of letters can be exposed.

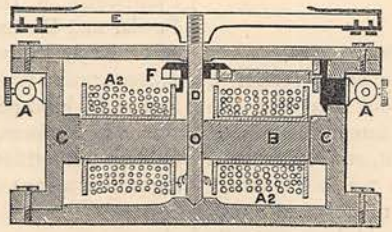
New Metals.

Two new metals have recently been discovered, one of which, however, has not been isolated from the other elements with which it is combined. These metals are named respectively Samarium and Nor-

wegium. The former is so called because it was discovered while M. Lecoq de Boisbaudran was examining a mineral named Samarkite by means of the spectrum analysis, and it has not yet been isolated. The other (Norwegium), named by its discoverer, Professor Tellef-Dahll, of Norway University, is a metallic compound of arsenic and nickel. It is white, slightly malleable, about as hard as copper, and fusible at a dull red heat. Its chemical equivalent is 145, and its density 9·44.

An Electrical Mounting Table.

This little instrument is intended to supply a want which every user of the microscope must have felt. According to the old method, the rings of varnish are put upon the slide holding the object by touching the slide with a camel-hair pencil steeped in varnish, and rotating the table on which the slide lies by means of the hand. This clumsy plan gives, however, an ever-varying speed to the table, and the varnish is consequently put on unevenly. Mr. Rogers causes the table to rotate by means of electricity, as will be seen from the figure, which represents the table in question. Two wires coming from a small bichromate of potash battery are fixed to the terminals marked A. The table, E, is mounted on a spindle, D, which also carries two bobbins of insulated wire, A_2, A_2, surrounding an iron core, B. The projections, C C, are cast into the wall of the iron box containing the electrical mechanism. A spring contact-breaker, F, is connected to the right-hand terminal, A. Its function is to open and close the electric circuit through the bobbins, A_2, A_2, so as to make the iron core, B, a magnet, and unmake it alternately. When a magnet, the ends of the core are attracted to the nearest iron projections, C C, and hence it is pulled round, carrying the spindle and mounting board, E, along with it.



Novel Treatment of Sciatica.

All who suffer from sciatica and neuralgic pains may, at any rate, try the extremely simple treatment devised by Dr. Ebrard, of Nîmes, who has employed it for many years, for the experiment will cost nothing, may possibly effect a cure, and, at all events, can do no harm. The apparatus to be used consists merely of a flat-iron and vinegar. The iron is heated until it is hot enough to evaporate the vinegar, next covered with some woollen material moistened with vinegar, and then applied at once to the painful spot. The application may be made twice or thrice a day. It is stated that the pain disappears in twenty-four hours, and recovery follows immediately.

Locomotives on the Tow-Path.

A recent experiment in France enables us to form an opinion of the relative value of a horse and locomotive in towing vessels on canals. The line of rail was laid down on the path, about three feet from the water's edge, and the locomotives were of four tons and upwards, according to the weight to be pulled, and were readily managed by one man. The rope was about 250 feet long. In one trial in which the locomotive weighed 4½ tons including water and coal, and the weight carried amounted to 468 tons excluding the weight of the vessel's iron hull, the average speed attained was nearly two miles per hour. A "returned empty" could be driven at the rate of over six miles an hour, though such speed would undoubtedly injure the canal-banks. As the average speed of a horse on the towing-path is somewhat under one mile per hour, it is clear "to demonstration" that steam power would be employed with decided advantage, while "cruelty to animals" would be an unheard-of crime on canal-banks.

The Electric Light in the Photographer's Studio.

Though the electric light when it was first applied to photography was found to render shadows too sharp and contrasts too great, a means has been discovered for making it soft and mellow and better adapted for the purpose in question. The light used is that of the voltaic arc, the lamp being placed in a large concave reflector suspended from the roof by pulleys, levers, and counter-weights, so that it can easily be turned in any direction. The reflector consists of opaque porcelain, lined with paper stucco tinted blue. The carbon pencils, between which the voltaic arc is formed, are set nearly at right angles to each other. The light from the arc is twice reflected. A small reflector stationed in front of the lamp projects the light on the interior of the great reflector, whence the operator throws it where he wills. The carbons being adjustable by means of screws, the maximum power of the current may be attained and the flickering motion of the light prevented.

Electrical Letter-Boxes.

A novel, but perhaps not impracticable, application of electricity has recently been suggested. Attempts have been occasionally made to force pillar letter-boxes, and it is rightly enough considered that if they were supplied with appropriate electrical machinery connecting each with the nearest police station, an alarm of burglary could be at once communicated to the guardians of property and the peace, who would, thanks to the silent monitor, probably be able to effect a red-handed capture. The apparatus might also be utilised as a check upon the punctual collection of letters, as the appliance would warn the police authorities of the arrival of the postal visitor. For instance, an alarm at three o'clock in the morning would indicate, not that a robber was at his nefarious work, but that a collector was conscientiously discharging his duties.