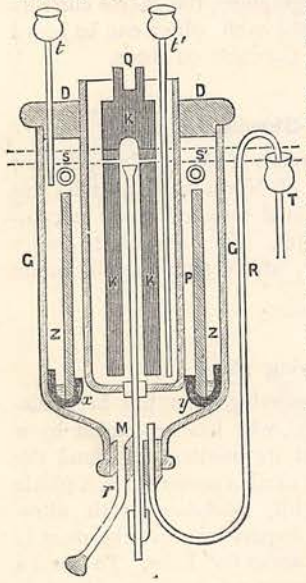
# THE GATHERER.

### A Constant Voltaic Battery.

A very constant battery has been devised by Dr. E. Obach. It consists of a bottle, G (see the figure), placed on a suitable support in an inverted position. The bottom is cut off and replaced by a wooden cover, D. A porous pot, P, of red earthenware is supported by a cork ring and closed by a plug of cork saturated with paraffin, through which penetrates the square end of a carbon plate, K. This plate is perforated through the heart by a hole. A glass tube, M, of which the extremity is slightly funnel-shaped, reaches to the top of the carbon and penetrates the porous pot and plug of the bottle. The bottom of the porous pot is paraffined as well as its upper part and the head of the carbon. Upon the bottom of the bottle rests a gutta-percha ring, *x y*, in the form of a trough filled with mercury, in which dips the lower portion of the zinc cylinder. Two tubes, R and *r*, pass through the plug at the lower part of the bottle; and of the two cupped tubes in the cover—*t* and *t'*—*t* reaches to the upper part of the zinc, and *t'* to the bottom of the porous pot. The liquids circulate as follows:—Fresh nitric acid enters at the bottom of the porous pot by the tube *t'* whilst the spent acid runs off by the radiating holes at the top of the carbon into the central tube, M, and into a receptacle below. Fresh sulphuric acid solution enters at the upper part by *t*, and flows by the siphon, R, into the tube, T. The surfaces of the liquids are nearly even, as shown by the dotted lines in the figure, the sulphuric acid solution being at the highest level. A glass tube, S S', is traversed by a current of cold water to keep the liquids at constant temperature.




### Two New Knives.

Novelties may always be looked for from the head-quarters of the cutlery trade, and in the two new knives under notice we find very good specimens of Sheffield workmanship. One of them is a knife specially designed for peeling. The end of the blade for about one-third of its length is the knife proper, with which the incisions, &c., are to be made, while the remaining two-thirds of the blade are occupied with an ingenious appliance for peeling purposes. The "Wheatsheaf Peeler"—as it is called—peels so closely and evenly as to effect a considerable saving by the prevention of waste. The other novelty is a cement-hafted table-knife. This particular kind may be allowed to remain in boiling water for any length of time without the blade becoming loosened. Nor does the cement itself dissolve, a common source of discolouration being thus avoided. As is well known, the blades of table-knives often get loose, or the handles discoloured, but these evils are successfully prevented by the use of cement for securing, as in the "Wheat-sheaf" knives. the blade to the handle.

### A Diffusion Motor.

At a recent meeting of the London Physical Society, Mr. Woodward described an experiment illustrating motion produced by diffusion. A porous reservoir of clay containing air was suspended from one end of a weighted balance beam. A glass tube projected from it below and dipped into a vessel of water. A jet of hydrogen was allowed to play on the outside of the reservoir, and the balance beam began to oscillate. The oscillation kept up and the device became in fact a diffusion engine. The action is explained by the variation of pressure in the reservoir set up by diffusion.

### A Monster Spring.

The largest steel spring known to exist was recently made at Pittsburg, U.S., in the Superior Iron and Steel Works. The ingot for the spring was cast 14 inches square and 7 feet long. This was subsequently rolled down to 6 inches by 4, and 24 feet long. To properly heat this bloom a special furnace 30 feet long was built, and after heating it was rolled down to a band 310 feet long, 6 inches wide, and ¼ inch thick. Its weight was 1,700 pounds. The spring is to be used by the United States Spring Car Motor Company, in order to drive tram-cars by the force of a coiled-up spring.

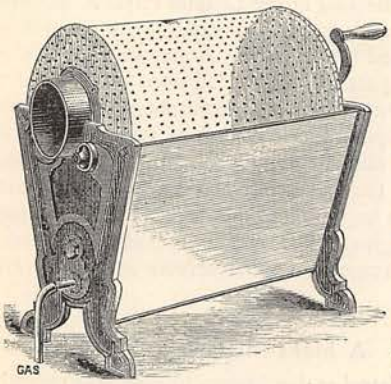
### A New Rubber-Plant.

In the annals of discovery it is by no means unusual to find that things believed for long years to be utterly worthless all of a sudden acquire considerable value. The vegetable world supplies one of the most recent "cases in point" in a creeper which rejoices in the scientific name of *Cryptostegia grandiflora*. The plant was noticed by a gentleman in South India to flourish luxuriantly in poor sandy soil near the sea, and to spread so quickly as to make it difficult to keep it within limits. Doubtless he thought it a weed and, therefore, a nuisance, in spite of its beautiful flower, but he happened to identify it some time afterwards in Mr. Christy's hot-house in London, and learned that it possessed an economic value. Mr. Christy having informed him of the mode of collecting its juice, experiments were at once undertaken with the most

promising results. Samples of the rubber were declared by experts to be clean, of firm texture, and good in quality. As there are thousands of acres of waste land in the low country of South India and Ceylon, it is possible that the cultivation of this rubber-yielding creeper may be taken up on an extensive scale. The plant needs scarcely any looking after, beyond a fence up which it may climb, and probably the labour of gathering the juice could be easily done by natives. Consequently there is every reason to expect that these rubber "plantations" may be made to yield a handsome return for the capital and labour employed in their development.

### New Coffee-Roaster.

The illustration represents a coffee-roaster which is capable of roasting a pound of beans in eight minutes, or a quarter of a pound in three minutes, and is remarkably cheap. Being a quick roaster it produces finer coffee than the slower roasters in the trade. The cylinder containing the coffee is turned by the handle shown, and the heat is supplied by gas-jets below: the gas being carried by a flexible rubber pipe. We may add that coffee can be very well roasted in a cast-iron frying-pan over a small gas-burner, a plan frequently followed on the Continent.




### New Inks.

An endorsing ink which does not dry rapidly on the pad, and is quickly taken up by the paper, is made by taking aniline colour in solid form 16 parts, 80 parts of boiling distilled water, 7 parts of glycerine, and 3 parts of syrup. The colour is dissolved in hot water, and the other ingredients added whilst agitating the liquid. Syrup added increases the good qualities of the ink. A new invisible ink, which shows when the paper is dipped in water, is made by mixing linseed oil 1 part, water of ammonia 20 parts, water 100 parts. The mixture is to be agitated each time before using, as the oil may separate out and stain the paper.

### Mid-Ocean Telegraphy.

The idea of telegraphing from ships out at sea is not a new one, and crops up from time to time. Mid-ocean telegraph stations have been proposed, and may possibly be carried out some day. The chief difficulty in the way of their adoption is the necessity of keeping the ship anchored and connected to the cable on the bottom by a fixed branch cable or conductor, in all sorts of weather. Professor A. E. Dolbear has proposed a plan which may render this communication unnecessary. A large metal plate attached to an insulated conductor is lowered from the ship to the bottom on the track of the cable, and another plate is merely submerged. Between these two plates is a battery and Morse key. On working the key as in the ordinary mode of telegraphing, the Morse currents induce other currents in the cable, which can be heard in telephones attached to the cable on shore.

### Dust-Storms.

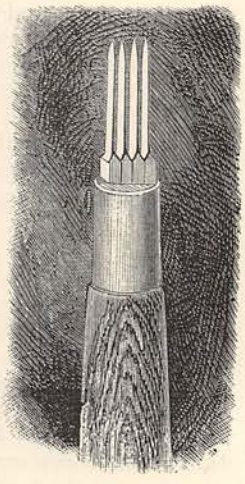
According to the researches of Dr. H. Cook, the hot simooms or dust-storms of North-western India are produced by a concentrated form of ozone accompanied by electrical changes. They are due to excess of atmospheric electricity, which generates the ozone in large quantities.

### Preserving Meat.

A new process for preserving meat has been discovered by Signor Pavesi, who has kept meat by it for a year or two to test its merits, and found the flavour still retained. The meat is preserved in a pickle consisting of water slightly acidulated with nitro-muriatic acid, and when required for use the meat is dried at a temperature of about 60° Fahr. To avoid a slightly brown colour the meat may be steeped in plain water before being dried.

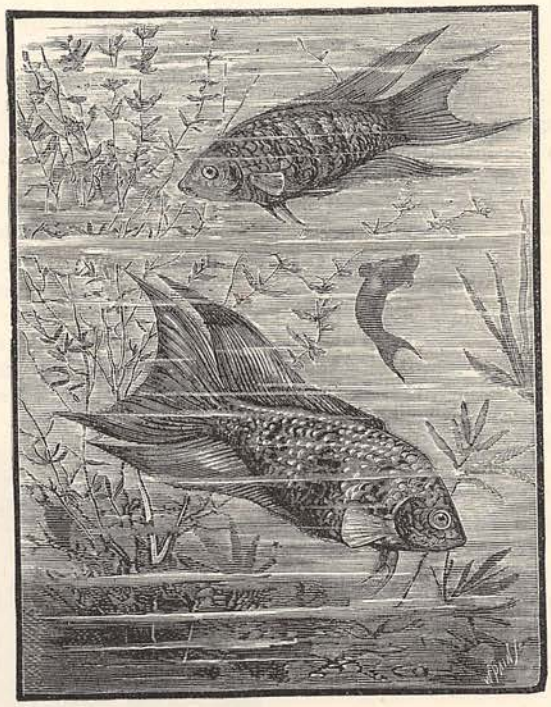
### A Polyblade Knife.

In the accompanying woodcut is represented a thoroughly useful article for the kitchen. As its hybrid name will have suggested, it is a knife with many blades. It has been devised for the purpose of enabling certain stages of cooking to be much more rapidly passed than is ordinarily the case. For instance, the operations of slicing French beans, cutting up into pieces orange-peel for marmalade, chipping potatoes, all entail the consumption of much time. By using the polyblade knife these operations can be performed in a very smart manner. Indeed, it is said that it will cut enough French beans for a family in five minutes! Whenever the blades need cleaning or sharpening, they can be removed from the handle without delay by simply unfastening the screw at the side, by which they can as easily and speedily be tightened up into position again. This invention seems to be as really useful as it is ingenious.



### The Paradise Fish.

This beautiful fish, perhaps the most beautiful of all fishes, is a member of the *macropus* family. The length is about ten centimètres, and the back is brown, changing to greenish-grey on the belly, but marked with changeable yellowish-green and blue and red cross-lines. The fins are large in proportion to the body, but are less in the females. They are natives of China, where they are usually kept as ornamental creatures ; but little is known about them in a wild state. They are peculiarly adapted for being household pets, as they live in a very little water, and can be kept out of the water for twenty minutes at a time without injury. They feed on crawfish, insect larvæ, worms, mussels, flies, and so on. Their nest consists of a congeries of small air-bubbles in which they deposit the sperm. At first the young live on the nest of foam, and afterwards upon larvæ.



### A New Lily.

A new lily with a very large snowy corolla and exquisite perfume has been imported from Bermuda, where it was found wild. The lily is believed to be a descendant of some *Lilium eximium* or *longiflorum* strayed from some old garden in the island, but it differs from these species. It is called the *Lilium Harisii*, and its peculiar merit is its power of producing a succession of flowers. Soon as one stem is in blossom, fresh floral stems are given forth, and thus an uninterrupted series of flowers are exhibited during the season. It is easily cultivated and small first-year bulbs will produce flowers.

### Sulphur in Shot Rubbish.

Recent excavations for public works in Paris have laid bare a store of native sulphur in an accumulation of old shot rubbish. The crystallisation is evident to the eye, and under the microscope the crystals are seen to be octahedral. M. Daubrée explains its presence by supposing that sulphate of lime and organic matters, such as manure, shoe-leather, bones, and vegetables, associated with it in the heap have acted chemically on each other. In some places the sulphur is rich enough to pay for its extraction. It usually shows in a "breccia" of small pieces thickly incrusted with crystals of sulphur. When the bed was opened by the diggers it exhaled a powerful odour resembling that of phosphorus, and probably due to phosphuretted hydrogen gas. Sulphur crystals are sometimes found between the layers of decaying trees.

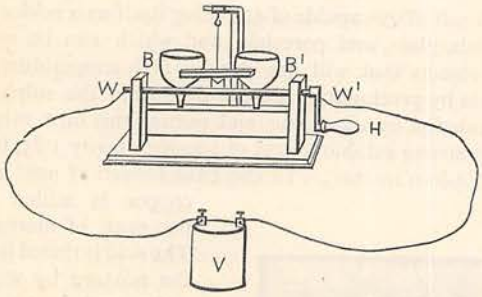
### A Useful Solder.

A soft alloy capable of attaching itself as a solder to metals, glass, and porcelain, and which can be used on objects that will not stand a high temperature, is made by precipitating copper-dust from the sulphate in solution by scrap zinc, and putting this dust, mixed with strong sulphuric acid of specific gravity 1·85, into a cast-iron mortar.. To the cake formed of acid and copper is added 70 per cent. of mercury. The acid is rinsed from the mixture by warm water, and in ten or twelve hours the alloy is hard enough to scratch tin. If to be used now the alloy must be heated so hot that when brayed in an iron mortar it becomes soft as wax. In this ductile form it can be spread out on any surface, to which it adheres with great tenacity when it gets cold and hard.

### A Magnetic Chime.

Professor D. E. Hughes, the well-known electrician, has been making some remarkable researches into the nature of magnetism by aid of his induction balance, which we have illustrated in a former page of the GATHERER. He has come to the conclusion that a magnetic body such as iron, nickel, or aluminium, is composed of molecules every one of which is a separate magnet, with two poles of "north" and "south" polarity. When the body, let us say an iron bar, is in a neutral state, and shows no signs of magnetism as a whole, it is because these molecules are arranged so that they satisfy their mutual attractions amongst themselves, the north poles being bound as it were by the south poles amongst them. When, on the contrary, the body becomes a magnet by being magnetised with another magnet, the molecules are directed so that all the molecular poles of one kind point in one direction. The neutral state is produced by jarring the bar, so that the molecules fall into their places ; but even in soft iron the particular direction

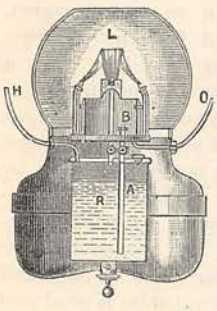
given to the molecules can be preserved by torsion, and tempering. When iron is tempered so as to become like steel, the molecules do not move so freely, and hence the magnetic direction given to them is not so easily disturbed by heat or mechanical vibration. A curious effect is that when a current of electricity is




sent through an iron wire, the magnetism of the wire can be reversed by reversing the twist given to the wire. This is illustrated by the little device of Professor Hughes which we have called a magnetic chime. It consists of an iron wire, W W', fixed on two supports, and clamped at one end, W, but free to turn round its axis at the other end, W'. To this end a handle, H, is fitted so that by working it backwards and forwards the torsion of the wire may be altered in direction. A magnetic needle, M, is suspended from a support in front of two wine-glass bulbs, B B', of different tone; and when a voltaic battery, V, is inserted in circuit with the wire, on working the handle, H, to and fro so as to reverse the twist of the wire, the magnet needle oscillates and hits each bulb alternately, thus producing a pleasant chime. We may add that Professor Hughes finds the magnetic molecules in a piece of iron to be capable of movement through a small range with very great freedom and rapidity, and this is the reason why the telephonic currents are able to change the magnetism of the telephone magnet so quickly. Until the telephone was invented, it was not believed that magnetism could alter so quickly in a piece of iron.

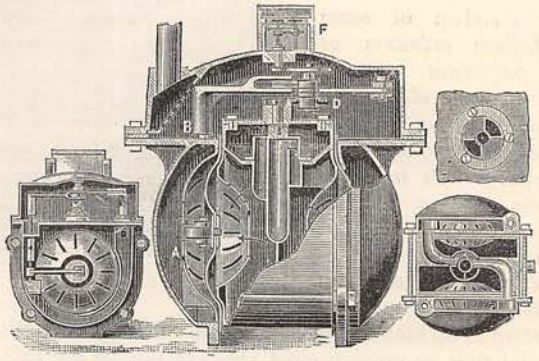
### A New Artificial Light.

The new incandescence lamp which we illustrate is an improvement on the ordinary lime-light burner, by the addition of albo-carbon gas in place of the ordinary hydrogen or coal-gas. It is well known that the lime-light is produced by causing a jet of oxygen gas to burn in conjunction with a jet of coal-gas against a piece of lime. The intense heat generated raises the lime to a white heat and causes it to emit a very brilliant light, which is chiefly used for scenic effects in theatres. Again, it is well known that if ordinary coal-gas is passed over naphthaline or lumps of solid albo-carbon, the gas is enriched and gives out a white strong light. The inventor of the new lamp, which we illustrate, M. Hélouis, has combined these two systems and produced a very powerful light. In the figure, R is a reservoir containing naphthaline. The coal-gas enters it through H, and is vapourised by the naphthaline. The liquid under the influence of the gaseous pressure rises in the plunge-tube, A, which is provided at the end with a nozzle and cock, to regulate the flow of the hydro-carburet into the chamber, B. This chamber is highly heated by a crayon or block of lime, L, which is kept in a state of incandescence by two gas-jets, one of oxygen and the other of carburetted coal-gas, impinging upon it as shown. The oxygen is brought into the lamp by the pipe, O; and the two gases do not mix before ignition at the lime, hence there is no danger of explosion. The crayons are prepared by cutting them from a block of white lime and dipping them for five minutes in a bath of melted paraffin. The paraffin drives out all the moisture and prevents the crayon from breaking in pieces. The oxygen is prepared by decomposing sulphuric acid at red heat.




### Potato-Ivory.

An artificial ivory of creamy whiteness and great hardness is now made from good potatoes washed in dilute sulphuric acid, then boiled in the same solution until they become solid and dense. They are then washed free of the acid and slowly dried. The ivory can be dyed and turned, and will be useful in many ways.




### A New Water-Meter.

The new diaphragm water-meter which we illustrate is warranted to measure correctly under the lightest as well as fullest pressure, while all other meters only register correctly when the water is passed through them at a certain pressure, and are apt to let it pass in driblets without recording it at all. The dial, F, on the top registers the water passing. The apparatus works noiselessly. It has no piston or other part liable to corrode in the water, and being made of unfinished castings, is cheaply and readily put together. A sanitary advantage of the meter is the fact that it can be set to give only as much water as is required without the need of storing it in tanks, where it is apt to become

polluted by absorption of noxious gases or dirt. The arrows show the flow of the water through the meter, and the diaphragm, A, against which it presses, actuates a train of mechanism, A, B, D, which works the hands of the recording dial, F.

### Foam-Balls.

Balls of foam blown up by the wind from the sea have recently been seen of extraordinary size. Some two feet in diameter have been observed on the North American coast after a cold, dry, windy day.

### Non-copying Ink Pencils.

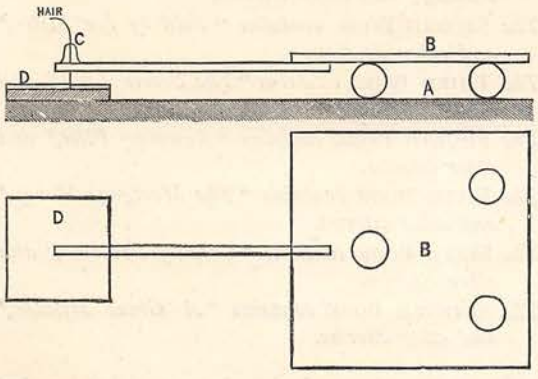
Ink pencils are useful things, but it is sometimes unfortunate that a copy of the writing can be taken from them by pressing another paper over the script. An ink pencil has now been introduced which does not lend itself to copying. What is written by it cannot be stamped off, either wet or dry.

### A Sixty-ton Crane.

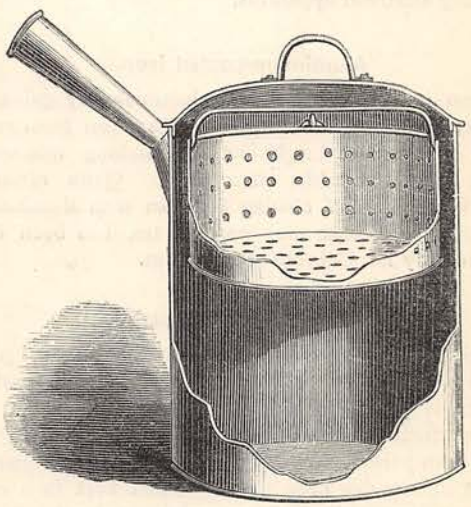
Probably the largest crane in existence is now erected at the works of Messrs. D. J. Dunlop and Co., shipbuilders, Port Glasgow. It is capable of lifting 60 tons and has a jib 60 feet in length. It is erected on a jetty at the Inch Works of the above firm, and is intended for shipping heavy boilers, engines, and so on into newly-built ships. The crane was made by Messrs. G. Russel and Co., of Motherwell, who some time ago constructed a 30-ton derrick crane, which, until the new one, was believed to be the most powerful in the world.

### A New Earthquake Detector.

A cheap form of earthquake detector would be a useful appliance, in some parts of the world at least, where buildings are apt to be damaged by earth-shakings, and the apparatus we illustrate appears to be what is required. It consists of a ground and polished glass plate, A, about five inches square,




placed level once for all. On this rest three accurately turned ivory balls about 1½ inches in diameter, and on the top of these balls is placed a plate, B, similar to the lower, but having attached to it a projecting arm with a long vertical hole pierced through it. Through this hole passes a steel needle, C, with a fine point which rests by its own weight on a lamp-black surface formed on the plate D. A hair about two inches long should be fixed to the eye of the needle to assist in adjusting it. The instrument thus becomes a pendulum of infinite length, so that when the ground, and therefore the lower plates, move, the top plate with its arm and needle remains practically steady, and the point of the needle marks on the lamp-black surface the amount of motion and the direction in which the lower plate is moved. Fixed on the gable of a house this instrument will show a shaking of the gable to $\frac{1}{8}$ of an inch.



### A New Potato Steamer.

There are some people who have gone so far as to assert that if they could only get a well-cooked potato for dinner they would leave *entrées* and expensive "made-up" dishes generally to others. Probably the difficulty of properly cooking potatoes is familiar to most readers. For instance, a common experience is that some tubers will only boil and not steam, while others behave in quite the opposite manner. These and other obstacles, however, have been successfully overcome by the new potato steamer, represented in our woodcut. It consists of two parts—a pot and an inner perforated vessel or lining. The potatoes are first laid in the latter utensil, which is then placed in the bottom of the pot with enough water to cover them. Having boiled for the requisite time (say, a quarter of an hour), the lining is raised and hooked on to a hook near the top of the pan. Here, then, they steam, and in about twelve minutes or so, according to size, will be done to a nicety. It is claimed for this patent steamer that it will cook, with certainty and precision, every kind of potato that greengrocers provide for their customers.

### Luminous Magnets.

Many years ago Baron Reichenbach, who was no relation of the famous Munchausen, made a statement

to the effect that he had observed a faint white light emanate from the poles of a magnet, after his eyes had been inured to darkness for some hours. The statement was generally discredited at the time, but Professor W. F. Barrett, of Dublin, has recently experimented with an electro-magnet excited by a battery, and two boys, who were not in the secret, declared they saw a faint conical luminosity proceeding from the poles.

### Aluminium Foil.

Thin leaves of aluminium are now sold in books just like gold or silver leaf. The foil is used instead of the latter, and also in preference to tin foil for making electrical apparatus.

### Aluminium-coated Iron.

Iron is now coated with aluminium by galvanoplasty. The aluminium prevents the iron from rusting and keeps a bright surface, making iron-work look something like silver-plate. Quite recently another process of coating the iron with aluminium, much in the same way as with tin, has been discovered by Dr. Gehring of Landshut.

### Utilising Diseased Potatoes.

Diseased potatoes are now turned into a valuable food for cattle by boiling them, draining off the water, which is poisonous, and then drying the mess on sieves, such as gravel screens. The boiled tuber is free from poison. When dry the potatoes are rammed tight into a dry cask with salt, and kept in a cool place till wanted. One copperful can be dried and packed while the next is being cooked, so that a large quantity can be cooked in a day. These facts should be known to every farmer.

### Zinc-painted Iron.

The new process of protecting iron from rust by means of a zinc paint is likely to be useful as it is so easily applied. It is the invention of MM. Neugeau and Delaite, and the paint is prepared by mixing metallic zinc in powder with oil and a siccative. This paint is applied to the iron by an ordinary paint-brush. Two coats preserve the iron from the atmosphere and sea-water. The paint is steel-grey in appearance, but may be painted over. The paint is cheap and is recommended for fences, telegraph-poles, lamp-posts, and iron structures in general. A very good mixture of ingredients for the paint is 8 parts, by weight, of zinc, 71 of oil, and 2 of a siccative. The paint is useful where galvanising, the Bower-Barff oxidising process, and others would be impracticable.

### Leather from Leather-Waste.

Artificial leather made of leather-waste mixed with five to ten per cent. of sinew, and pressed into sheets like cardboard, is now made in Germany. The two materials are separately prepared—the leather pieces washed, cut, boiled in alkaline lye, torn, neutralised with sulphuric acid and water, then freed from the acid by washing. The sinews are similarly treated, but steamed in an acid bath until they become like glue. These materials are then mixed, pressed into sheets, moistened on both sides with concentrated solution of alum, and the upper surface is finally treated with a thin coat of solution of caoutchouc in carbon bisulphide to increase its resemblance to leather.

### Firing Clothes by Sunlight.

A curious case of ignition by the solar rays was recently recorded. During a fine morning in March last, while two ladies were talking together in a drawing-room at Finchley, the dress of one was seen to give off smoke. It turned out that the solar rays, focussed on the dress by the lens of a graphoscope which stood on a table near, had set the cloth on fire. This record has elicited two others, describing similar cases in India of the wicks of carriage lamps being ignited by the sunshine concentrated on them through the glass fronts. As a serious fire might arise in this way through the merest accident, the circumstance mentioned deserves to be widely known.

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