

## THE GATHERER.

AN ILLUSTRATED RECORD OF INVENTION AND DISCOVERY.\*

### A Demonstration Microscope.

It is very difficult to show to a large class, or to a party in a drawing-room, objects under a microscope lighted by means of a reflector, and at best the operation is tedious. To obviate this, and to provide an instrument which, while enlarging sufficiently to be



of really practical use, can be readily passed from hand to hand, the new portable microscope, which we illustrate herewith, has been introduced. It is suitable alike for demonstration purposes in schools, or for drawing-room use. It has three powers, is achromatic, and magnifies 30, 100, and 150 diameters. A spring attachment securely holds the slide in front of the lens at whatever angle the instrument is held. The figure shows the method of using it. While upon this subject we may mention a new botanical microscope, which has been brought out by the same firm as the larger instrument we have just mentioned. It is provided with a spring catch for holding the slides in position, and being packed in a small leather case, easily carried in the pocket, is well adapted for its purpose.

### Valerian Dressing.

A successful lotion for dressing fresh wounds has been brought into notice by M. Arragon, a French surgeon. It is said to hasten the healing process, and at the same time remove the pain very promptly. The method of application consists in laying pads, or "compresses," wet with a decoction of 30 parts of valerian root in 1,000 parts of water. Of fifty patients treated in this way, only two failed to benefit by it. The method is useful in surface cuts and bruises, but it is of no avail in deep wounds.

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### An Electric Plant.

A German journal describes a plant termed the *Phytolacca electrica*, which possesses strong electrical properties. On breaking a twig a shock is felt, and a compass is affected at a distance of some feet from it. The direction of variation of the compass needle is reversed by reversing the direction of motion of the compass to or from the plant. The electrical influence is said to vary with the time of day, it being strongest at about two p.m. and feeblest in the night. It is also stated that birds and insects keep away from the plant.

### A Gigantic Blast.

A mass of granite, estimated to weigh some 500,000 tons, was recently displaced by a single blast on the Iron Mountain Railroad, Missouri, United States. A shaft, 65 ft. deep, with lateral chambers, was sunk, and 5 tons of powder lodged in it. An electric spark was sent through the charge from a battery half a mile distant, and the magazine thus fired.

### A Balloon Railway.

A vertical railway, on which the cars will move upward, or, in other words, be hoisted up by the levitation force of a balloon, is about to be constructed on the Gaisberg, near Salzburg, in order that visitors may be raised to the top of the mountain to enjoy the view. The balloon is to have grooved wheels on one side of its car, and will ascend a perpendicular line of rails constructed on the principle of a wire-rope railway, invented years ago for the Righi, but not carried out.

### Water Gas.

Experiments have recently been made in Paris to produce gas from water by passing steam over glowing coke, thus producing hydrogen and carbonic oxide. The latter is then mixed with steam in another red-hot retort, and changed into carbonic acid, while more hydrogen is produced. The latter is purified by means of lime-water, and used as lighting-gas. In this way it is thought that a purer and more constant illuminative gas can be obtained for domestic use than ordinary coal-gas.

### The Electric Light and Guns.

It is sometimes difficult for sportsmen to see the front sight of their guns or rifles in early morning or after dusk. The plan has therefore been introduced of fixing a small incandescent lamp on the muzzle of the gun and lighting it by a battery carried in the stock of the weapon, a key being provided whereby to put on or off the light. The lamp is enclosed in a small metal box pierced by a hole, which allows a ray

of light to reach the sportsman's eye as he is taking aim and serve as the front sight. It is also stated that a French inventor has proposed to make the light strong enough to send a ray out in the other direction, and thus illuminate the quarry. While on this subject we may mention that experiments were recently made at Woolwich Arsenal with an arc electric light placed inside the muzzle of a cannon, so that the interior was lighted and photographs taken of it in order to see if there were any signs of flaws in it.

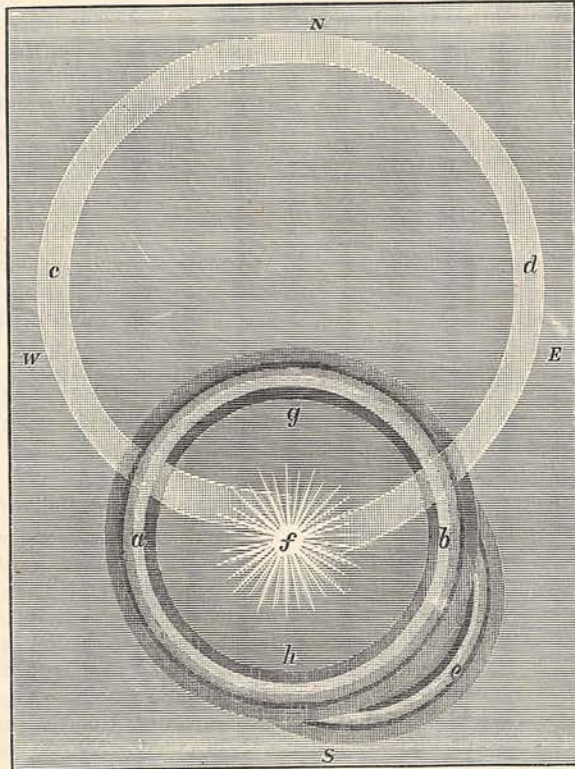
### An Iceberg Detector.

Recent experiments in Chesapeake Bay with a gun and a large stationary ear-trumpet have shown that floating ships reflect sounds and send back audible echoes even at the distance of a mile; and M. Della Torre proposes to apply the method to detecting icebergs, which, as is well known, are dangerous to vessels in thick weather, especially the rapid steamers of the North Atlantic. It is thought that the echoes of a steam-whistle or siren could be reflected as well as the report of guns. We may also mention that Mr. Symonds, F.R.S., has suggested that the difference of temperature observed between the bows and stern of a vessel approaching an iceberg might be caused to ring an electric bell by means of an arrangement of thermometers or thermostats. The subject is an interesting one, and the usual protection hitherto against these floating masses of ice has been the use of the electric light or the experienced observation of the watch.

### A Curious Halo.

On June 6th last, about half-past one in the afternoon, the halo illustrated herewith was observed on one of the Irish loughs by a gentleman engaged in fishing. The day was fine and the sky free from clouds, except a few cirrus and cirro-stratus vapours on the northern horizon. The brilliant halo, *a b*, surrounded the sun, *f*, and had a diameter of about 48°.

The space, *g h*, was filled with a dull leaden blue vapour. The halo, *a b*, showed the usual rainbow colours, the red being next the sun. About two o'clock the partial bow, *e*, bulging from the right bottom of the halo was seen to form, and also a large white ring, *c d*, of 72° diameter, crossing the halo, and apparently passing through the sun as shown. There were, however, no mock suns at the intersection of the two rings.



A CURIOUS HALO.

combine with any free hydrochloric acid so that no iron is taken up. The gold, on the other hand, is allowed to combine with the chlorine liberated at the positive electrode as the drum revolves; and the chloride of gold thus formed is deposited on the negative electrodes in the vat, whence it is removed and smelted into gold.

### Safety Wheel for Cycles.

Cyclists often experience a good deal of trouble and annoyance from the rubber tyres coming off their wheels, and they will be glad to have their attention called to a recently-patented device for obviating this inconvenience and risk. The appliance consists of a T-shaped bolt of malleable steel, which is to be secured in the inner part of the tyre. Having been so fastened it then passes through a hole drilled in the rim of the wheel, where it is held "safe and sound" by a nut. So effectually does this device act that a machine belonging to the inventor has been in constant use daily for

### Gold Extraction by Electricity.

Recent experiments have demonstrated a new process of extracting gold from ores by electrolysis. The invention is due to Mr. H. R. Cassel, and the apparatus consists of a revolving drum into which the ground ore is placed. This drum contains electrodes of carbon, and is covered with a filter of asbestos cloth. It revolves in a vat also containing electrodes of carbon. The latter are connected to the negative pole of an electric battery; the drum electrodes being connected to the positive pole. Caustic lime is added to the crushed ore to com-

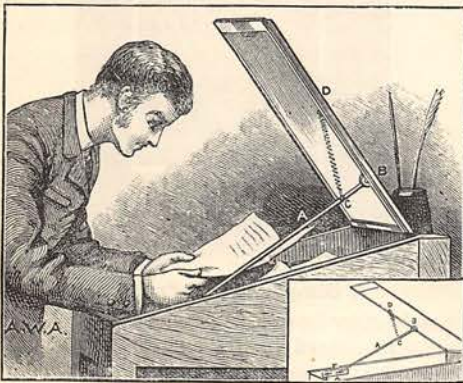
three months without any cement in the wheels, the tyre being kept perfectly secure by the bolts alone. Another important point is that any part of the tyre may be easily detached so as to enable a broken or injured spoke to be repaired. Riders who have had bad "spills" owing to the tyres of their bicycles getting loose and jamming in the fork, will be able to judge of the usefulness of this "safety" wheel, which can of course be just as readily applied to tricycles.

**Magnetising Hard Steel.**

The following method has been published as effective for magnetising hard steel, such as file steel. The bar to be magnetised is placed upright upon an iron piece between the poles of an electro-magnet. Another iron piece is placed over the free end, and to this a wire from one end of the circuit of the electro-magnet is brought. The other end of the electro-magnet wire goes to the pole of a battery; and the other pole of the battery goes to a metal hammer, with which the free end of the steel bar is struck. At every stroke on the bar the circuit of the battery is closed by the hammer; the current flows through the electro-magnet and magnetises the steel bar at the same instant that it suffers the shock of the hammer, a condition of things highly favourable to its intensity of magnetisation.

**Self-Acting Stay for Hinged Lids.**

Shopmen who have often occasion to consult show-cases, clerks and others who own desks with hinged lids, and everybody who uses a trunk, will appreciate the ingenuity of the novel kind of self-acting prop or stay of which we give a diagram in the annexed wood-cut. Briefly, the object of this device is not only to obviate the unpleasant risk of the lid slamming down upon the fingers or head, but also to enable the person examining the desk or show-case to do so with both hands free. The engraving represents a



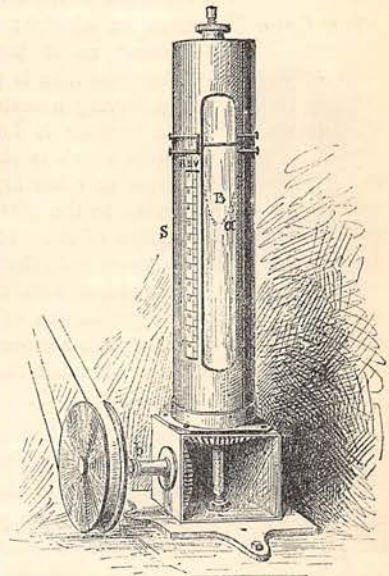
desk with the lid propped up by this new appliance. The stay comprises an arm, A, working on a pivot and furnished with a friction pulley at B, where it is in contact with the lid. A spiral spring, C, D, connects the arm with the lid, and the turning-point of the pulley is adjusted with great nicety by means of the stop-plate

E (see sectional diagram), which is provided with a flange on its upper edge to stop the arm at the requisite pitch. The flange is kept in position by a screwed stud. As the spring is slack when the lid is down—the connecting points, C, D, being so adjusted with this purpose in view—the strain on it in opening or shutting the desk is only momentary. Since this device is automatic it comes into action in lifting the lid, while in closing the pressure of the hand makes it run down, thus always leaving one hand free, though practically both hands are at liberty, as the time occupied in opening or shutting the desk is a mere trifle. The lid cannot close of itself, for it must get pressure sufficient to stretch the spring, and should the latter become weakened in any way it can still be utilised by simply altering the stop, which is fixed in slots, so that the spring will draw the pulley farther up the lid, thus giving it more direct support. Certainly the "self-acting stay" is an ingenious and useful invention.

**A Vacuum Speed Indicator.**

When a vertical tube containing liquid, say water, is rapidly rotated round its vertical axis, the liquid

rises up the sides of the tube, forming a kind of pit or whirlpool in its surface. The depth of this cup is a measure of the velocity of the revolution. The principle has recently been applied to the production of a speed indicator for telling the number of turns made by a steam-engine or dynamo in a minute. The figure shows



the actual form of the apparatus, where the bubble, B, or whirlpool is seen at a, its bottom marking on a scale, S, the speed in hundreds of revolutions per minute. A pulley, b, serves by means of a belt to connect the apparatus with the shaft of the machine whose speed is required.

**A Safety Catch for Perambulators.**

Attention has already been called in these pages to some of the risks to which perambulators are exposed. Different kinds of breaks and other appliances have been invented as safeguards, and one of the simplest, cheapest, and most effective, is a recently patented "safety catch." It is operated by a strong spring, and is fastened permanently to the coach and, therefore,

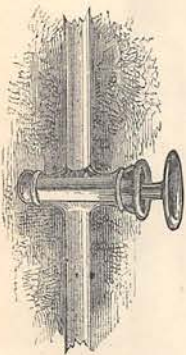
always available. It is attached by a short chain to the stay of the handle by means of a screw clip. Whenever it is desired to bring the perambulator to a standstill, all that the nurse has to do is to fix the "catch" on the rim or spokes of the wheel, which cannot possibly revolve until the catch has been removed. When not in use the catch may either swing free from the handle, or be thrown up over it. It takes up hardly any room and is small enough to escape ordinary observation, but in any case it is not unsightly.

#### A River Flame.

Near Bothwell Bridge, on the river Clyde, above Glasgow, a singular flame has been seen to play above the surface of the flowing water. Persons on shore have been able to extinguish it by throwing large stones at it, but it immediately appears again. The explanation of the phenomenon is that there is an escape of gas from some coal-workings in the vicinity, and this has caught fire probably by accident. The same thing has been observed before.

#### An Air-tight Stopper.

The figure illustrates an air-tight tap or "vacuometer" as it has been called. The glass tube is provided with a tap having a sealed bottom, and the stopper is furnished with a cup in which is placed some glycerine or other liquid, which, adhering to the glass, prevents the ingress of air. The apparatus is so contrived that when used in connection with the air-pump in the production of a vacuum, it will enable a more perfect vacuum to be obtained than the ordinary glass stop-cock.



#### Disinfectants for Cholera.

In view of the possible advent of cholera, the Pennsylvania Railroad Company have chosen a disinfectant to prevent the decay of organic substances. This is a solution of the chlorides of copper and zinc, with a little oil of tar added to give it an agreeable odour. While preventing decay these substances are absorbents of ammonia and sulphuretted hydrogen. The company distributes to its departments 8 oz. phials of the liquid containing a neutral solution of the normal chlorides of copper and zinc in the proportion of 2,400 grains of chloride of zinc to 120 grains of chloride of copper, the minimum strength of the solution being 20 per cent. by weight of zinc, 1 per cent. of copper, and 23 per cent. of chlorine. The contents of one 8 oz. phial are added to one gallon of warm water and used for washing purposes.

#### A Sulphur-Silver Cell.

Mr. Shellford Bidwell has made a cell of sulphur and silver which is sensitive to light in the same way

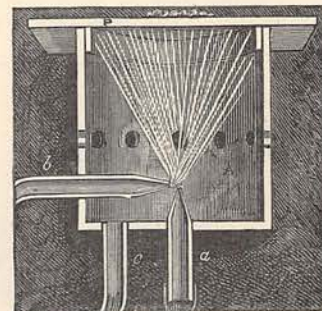
as the well-known selenium cell. It was made by coiling two silver wires side by side upon a strip of mica, and filling the spaces between the wires with prepared sulphur containing a small quantity of sulphide of silver. This prepared sulphur was made by heating sulphur and precipitated silver for some hours together and pouring off the clear liquid. The resistance of the cell can be reduced by placing a piece of silver foil over the sulphur and cooking it again. The cell thus prepared is found to be very sensitive to light. By burning a piece of magnesium near it, its electric resistance falls to one-third. The action of the cell has been supposed to be due to electrolytic decomposition of the silver sulphide formed, and it is a question whether selenium cells do not act in a similar way by decomposition of selenides of the metal electrodes.

#### Rubber Stairs.

The iron treads of the stairs to the New York elevated railways having worn so as to be smooth and slippery, a rubber covering containing rungs of iron has been adopted after trials of different covers. Similarly the slate stairs of the Brooklyn Bridge have been armoured with a mosaic of maple-wood cut against the grain. The wood is made more durable by boiling it in linseed oil under pressure until the pores are filled with the oil which dries there.

#### The Electric Light and Centipedes.

It is reported in an American electrical journal that many dead centipedes have been observed on the ground in the vicinity of electric lights. These animals are believed to thrive in dark places, but whether it is the rays of light, or electricity escaping from the wires, which kills them, has not yet been ascertained.



A Simple Ether Freezer.

A simple ether freezing apparatus for use by microscopists is illustrated in the figure. It consists of a short cylinder, A, closed by the plate, P, on which the object is placed for freezing. A metal tube, a, drawn to a fine point, penetrates the base of the cylinder, and another its side. The vertical tube is connected by rubber tubing with a small bellows, while the horizontal tube, b, is similarly connected with a glass tube which passes through the stopper of a bottle containing ether, reaching nearly to the bottom. When the

bellows is set in motion the current of air throws the ether spray against the plate, P, and the rapid evaporation thus produced soon freezes the object. The vapour and air escape by the holes in the side of the apparatus. A third tube, c, connects by another tube with the ether bottle, and provides for the entrance of air into the latter.

#### A Portable Cooking Range.

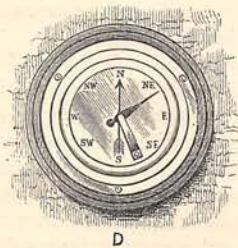
At the International Inventions Exhibition there is a cooking apparatus capable of cooking dinner, breakfast, or tea, and working either in the kitchen or the field. It is suitable for troops in camp, hospitals, soup kitchens, or other purposes where a number of people have to be catered for. It has, we believe, been adopted at the Sapeur-pompier barracks in Paris. One type of the range, termed the 250-litre apparatus, is said to boil 250 rations, heat 300 litres of water, 50 to 100 litres of tea or coffee, and roast from 20 to 30 pounds of meat, with a consumption of only 25 pounds of coal. While upon this subject we may also call attention to the useful and rapid bath heaters and cookers which are on view at the same Exhibition.

#### An Electric Glass Piercer.

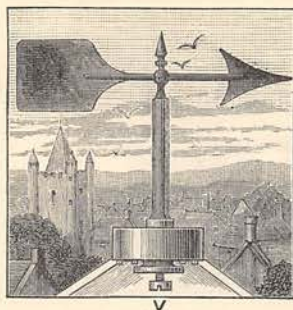
A method of piercing glass by the electric spark has been brought out by M. Fages. A rectangular plate of ebonite has a hole drilled in it, and a pointed wire put through from beneath, until the point is flush with the upper side of the plate on which the glass plate is placed. This wire is connected with one of the poles of an induction coil, giving a spark, say, of 12 centimetres in length. A few drops of olive oil are put round the point of the wire on the upper side of the ebonite plate before the glass is laid on, care being taken that no air bubbles are left in the oil. Another wire from the other pole of the induction coil is then brought over the glass plate just opposite the wire through the ebonite, and when the coil operates a spark will pass between the points of the wires, piercing the glass. In this way, by displacing the glass, a series of holes can be pierced in it.

#### An Electrical Wind-Vane.

It is often desirable to know the direction of the wind, but hitherto this has entailed going outside to look at the nearest weather-cock. To render this unnecessary an inventor has recently applied the electric current in such a manner that a corresponding needle or vane indicates on a dial within the house or office the direction of the wind. The figures illustrate the outside vane, v, and its corresponding in-door dial, D, on which the needle indicates the direction of the wind. The whole action of the apparatus has not been disclosed by the inventor,



but we may suppose that electric currents of different strengths are transmitted by the wind-vane according



to its position, and that these currents passing through coils in the indicator move the needle of the latter to a corresponding position. Only a small battery is required to work the apparatus, and the needle is said to accurately repeat the movements of the vane.

#### Luminous Paint and Earthquakes.

In the Philippine Islands and Manilla, luminous paint is said to be used to paint the inside of houses, so that when there is an earthquake alarm at night the inhabitants may readily find the doors and other exits so as to escape into the open air.

#### An Electric Scale.

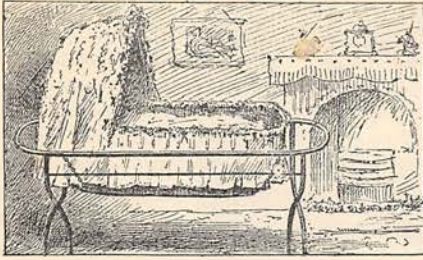
A scale, or steelyard, which records the result by means of electricity has, it is said, been invented by an American. The electric registering device can be attached to existing scales, but it is specially designed for railways to weigh the freight waggons or trains of cars in motion. On a thirty-ton steelyard it is said to weigh to within 25 lbs. of the actual weight of the car and its contents, and it records the weights of successive cars one after another while they travel over the scale. As another electric novelty which is announced, we may mention a proposed submarine boat propelled and lighted by means of electricity, and ventilated by compressed air. It is designed for placing and discharging submarine mines.

#### The Size of Atoms.

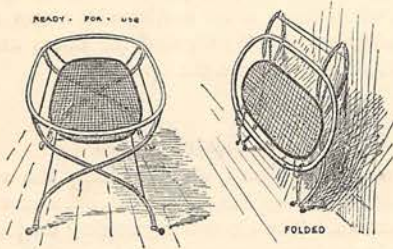
From recent researches on the thickness of soap-bubbles (which is estimated at from 10 to 12-millionths of a millimetre) Professor Rücker, F.R.S., arrives at the following speculations as to the actual size of the molecules of water. Sir William Thomson has estimated the diameter at something under 2-millionths of a millimetre; and Van der Waals has considered 0.28-millionths of a millimetre as about the diameter of the molecules of the gases composing the atmosphere. The number of molecules which could be placed side by side within the thickness of a soap-film would, according to these estimates, be 4 and 26. The smallness of the first number (4), especially in the case of a complex body like soap and water, points, according to Professor Rücker, to the conclusion that the diameter of a molecule is considerably less than 2-millionths of a millimetre. Sir William Thomson's inferior limit of size for the water molecule was 0.01-millionth of a millimetre, which would give some 720 in the thickness of a soap-film.

### A Noiseless Cradle.

The figures illustrate a silent-rocking bassinette, shown at the International Inventions Exhibition.



The frame is of iron or brass, and painted or enamelled, and is so fitted together that the easy and silent motion is very agreeable. When not in use the



cradle folds into a small compass. It may be added that the balance is so good that a slight movement of the child occasions an undulation of the cradle.

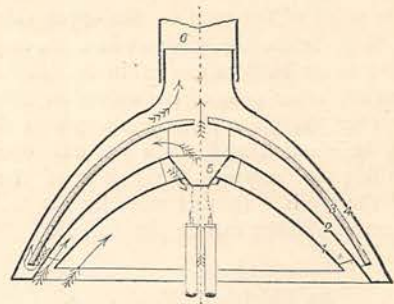
### Freeing Water from Microbes.

Professor Frankland, F.C.S., has been investigating the merits of filtration, agitation, and precipitation for removing micro-organisms from water. The filtering materials tried were green-sand, silver-sand, powdered glass, brick-dust, coke, animal charcoal, and spongy iron. These materials were all used in the same state of division, they being made to pass through a sieve of 40 meshes to the inch, and formed filtering columns of 6 inches in depth. It was found that only green-sand, coke, animal charcoal, and spongy iron wholly remove the micro-organisms from water filtering through them, and this power was in every case lost after the filters had been in operation for a month. With the exception of the animal charcoal, however, all these materials, even after being in action for a month, continued to remove a very considerable proportion of the micro-organisms present in the unfiltered water, and in this respect coke and spongy iron occupy the first place on the list. With regard to agitation, the water was agitated for fifteen minutes with the materials in the same state of division as that given above in the case of filtration. One gramme of material was shaken with 50 cubic centimetres of water, and the water allowed to clear by subsidence of the particles, a process requiring varying times. The results showed that a very great reduction in the number of

suspended organisms could be effected by this mode of treatment; and coke was found to have completely removed the micro-organisms after fifteen minutes' agitation and 48 hours of subsidence. Again, by Clark's well-known process of precipitation the number of micro-organisms in water was greatly reduced. Thus, although the production of potable water in large quantities is a difficult matter, involving the continual renewal of the filtering materials, there are many simple methods of securing a large reduction in the number of organisms present in water.

### A Ventilating Gas-Lamp.

The new regenerative gas-lamp of Mr. Frederick Siemens is designed to prevent the stifling atmosphere usually produced by open gas-burners, by ventilating the apartment, and at the same time to protect the eyesight from the direct action of the rays. As shown in the accompanying figure, it consists of four sheet-iron hoods, 1, 2, 3, 4, arranged within one another in such a manner that the fumes of the flame pass downward between 2 and 3 and upward between 3 and 4, while the air to be heated for feeding the flame passes upward between 1 and 2. On the uppermost hood, 4, a chimney, 6, is provided, while the hood, 3, is shortened below so as to allow a clear passage for the products of combustion from the space between 2 and 3 to that between 3 and 4, and thus to the chimney. The hood, 2, carries a projecting outlet, 5, allowing the fumes or products of combustion to pass through the passages provided for it to the



chimney. The lowest or innermost hood, 1, is open, so that the air may pass between the hoods 1 and 2, as shown by the arrows, to fill the inner space of the hood with heated air. The inner surface of this hood acts as a reflector, and in its focus are placed one or more fishtail burners of the usual type. As soon as the hood, 2, becomes sufficiently heated by the products of combustion passing between it and 3, the air between 1 and 2 becomes heated and rises to fill the upper portion of the cone inside the hood, 1. By this plan the gas-jets burn in an atmosphere of heated air, and consequently produce a brighter light. No glass partition is required to exclude the cold air, and the flame reflects its light downward on the room below from the inner surface of the hood.