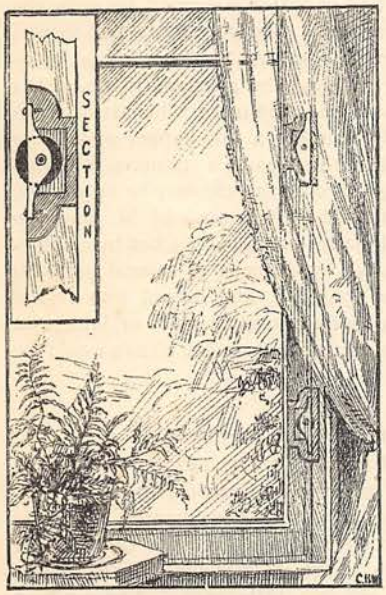
THE GATHERER.

Window-Sash Holder.

This device is intended as a substitute for the common window-weights. One of the edges of the sash carries recesses in which are fitted casings, consisting of a plate with a slot or opening, with wings projecting from the side edges of the plate opposite the slot. Each of the wings is bent under and against the plate as far as the side edge of the slot, and thence it extends straight from the main plate, each of the parallel straight portions having a perforation through which a pin is passed. On this cross-pin is journalled an elastic roller that turns between the parallel portions and projects slightly above the surface of the plate through the slot. When the sash is in its place, these rollers bear against the window-frame and keep the sash in any position to which it may have been adjusted. The casings are strong and durable, and can easily be removed from the sash for the insertion of new rollers or for any other purpose.



New Electric Boats.

A private resident on Lake Windermere has started a launch on that beautiful sheet of water, which moves without noise or smoke by the aid of electricity. A very successful trip was also made recently on the canal from Bolton to Bury by Mr. Banks, an electrician, in a launch 21 feet long by 4 feet 6 inches in beam. The current was derived from Faure-Sellon-Volckmar accumulators of the half horse-power size. The propeller is 12 inches in diameter and 11-inch pitch. It made 450 revolutions per minute. The speed attained was about six miles per hour. The current used was about 31 amperes, and had an electro-motive force varying from 45 to 35 volts. The boat itself weighed 7 cwt. ; the accumulators also weighed 7 cwt., and the dynamo which turned the propeller, by means of the current from the accumulators, weighed 1 cwt. The apparatus was controlled by a switch, or current-changer, within reach of the man who held the rudder.

Vulcoleine.

Vulcoleine is the name given to a new substance extracted from petroleum by Mr. Typke King and Mr. T. P. Bruce Warren. To obtain it they take the distillate of petroleum which is given off between temperatures of 100° and 212° Fahrenheit, and which is commonly called spirit of naphtha. This is treated with two or three per cent. of sulphuric acid, agitated, then allowed to subside, and the liquor decanted from the sediment. This liquor is run into a still with one or two per cent. of lime, or calcium carbonate, to remove the sulpho-oils. They then distil the liquor and obtain the vulcoleine, a liquid which is a substitute for bisulphide of carbon, and which can be used for extracting oils, anthracine, for dissolving gums or resins, and for vulcanising india-rubber in conjunction with chloride of sulphur.

New Table-Knife.

With a view to secure greater symmetry and better distribution of material than the present form of table-knife possesses, an American inventor has introduced certain modifications in this indispensable implement. First, as regards the blade. The ordinary blade, he contends, furnishes two or three times more surface than is really required ; and by doing away with the superfluous metal, the cost and labour of manufacture are expected to be reduced. Then, with regard to the handle, near the forward end its width is lessened, but by widening it sidewise a finger-rest is obtained, by which a cutting force can be comfortably applied without involving the tight grasp needed in the ordinary handles. The rest being made on both sides, the handle can be employed with a double-edged blade. The handle gradually narrows in front of the finger-rest, and the tang of the blade is inserted into this neck.

An Improved Bird-Cage.

Those who keep birds know how necessary it is to have the cage always sweet and wholesome. This work, of course, entails a certain amount of trouble. In order, however, to get rid of this bother altogether, a bird-cage has recently been patented, containing a very simple but a very useful improvement. The body of the cage is constructed in the usual way, but at the level of the floor there are side guides, and a roll of waterproof paper stretched across the floor and through the guides. Every morning the soiled paper is pulled out at the opposite end of the cage and torn off, a fresh sheet of paper having meanwhile unwound itself from the roller, and becoming the new floor. The paper may be either plain or coloured, and ornamented in a variety of designs.

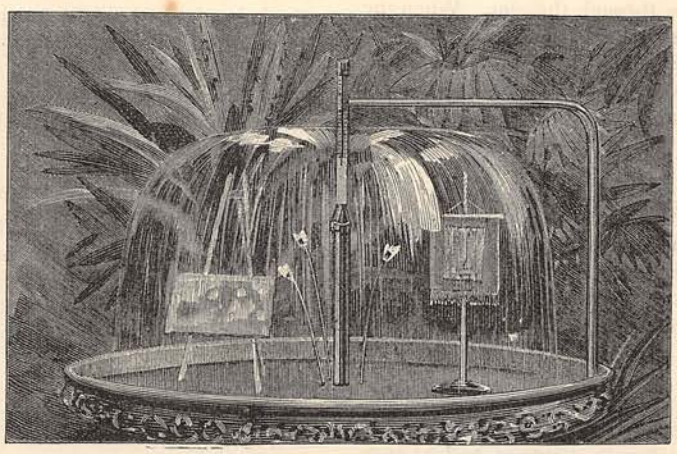
A New Gas-making Process.

Sulphur fumes are very obnoxious in gas burned in houses ; and in order to reduce them to a minimum,

the gas after it is made is usually purified by passing it over lime, which absorbs the sulphur. This lime is thereby rendered very offensive, and hence gas-works are sometimes a nuisance to the neighbourhood when the purifiers are being cleaned out. To get rid of this nuisance, Mr. W. F. Cooper has introduced the process of mixing the lime with the coal before the latter is put into the retorts and the gas distilled from it. The process has been working satisfactorily for about a year at the Tunbridge Wells Gas Works, and yields a very pure gas. The coal is mixed with 2½ per cent. of lime which has absorbed 2½ per cent. of water: the slaked lime forming 5 per cent. by weight of the coal to be distilled. The coal used at Tunbridge is New Pelton with 2½ per cent. of Cannel. It is mixed with the lime, and both ground together in a mill between toothed rollers. The limed coal is then fed to the retorts by West's charging machine. The gas from the retorts is passed through St. John's carburetting apparatus, then condensed, washed to extract the ammonia, and then purified with oxide of iron, and stored in the gas-holders. The process causes these purifiers to last much longer than by the old lime process, as well as producing more ammonia and tar; moreover the coke is better, being free from sulphur, and therefore good for household fires. In fact the process is a gain both from a monetary and a sanitary point of view.

A Water-Bell.

Water-bells have hitherto generally been made by allowing water to issue from a small circular orifice, or by shooting the liquid jet against a disc of polished metal having a slightly elliptic rim. The bells thus produced are, however, lacking in transparency, and the form we illustrate is a great improvement on them. It is the device of M. Bourdon, and the bell is formed by two opposing jets of water. The pipe conducting the water from the reservoir ends in a truncated nozzle of 12 degrees angular opening, and causing all the streams of water to converge towards the middle of the jet. Over this is placed, concentrically to the truncated nozzle, a glass tube of about 20 centimetres in length, and the same interior diameter as the orifice by which the water rises from the reservoir. This antagonistic tube is supported by a copper rod fixed either against a wall or on the margin of the basin, at a distance of two centimetres between its lower end and the truncated appendage. The reservoir must be kept at a constant level by means of a water-gauge cock. The water-height above the jet is about 60 centimetres. The flow of the water is regulated by a stop-cock. To produce the bell, the basin is filled to the level of overflow with water, the cock is gently opened, when a ball of water is formed between the pipes, and then gradually enlarges into the bell-shaped fountain of the engraving. At first the bell is hemispherical, but, by reducing the aperture of the cock a little, the shape will change into that illustrated. The bell may be slit by pointing a thin copper wire to its top; and by the hole thus made, a statuette, a lighted candle, a bird-cage, or other article may be introduced without wetting it. The tubes used by M. Bourdon have been 20 millimetres in diameter; but by employing larger apparatus, water-bells of several yards in diameter may be produced, and turned into crystal tents, under which persons might walk or lounge at pleasure. In a hot summer such an alcove would be quite refreshing.



A WATER-BELL.

Chinese Garden Plants.

The fashion of importing and cultivating Chinese garden plants is growing in America, and will probably extend to this country. For example, American agriculturists are introducing the water-caltrap (ling chiaco in Chinese), a sort of water-chestnut that grows in marshes and requires little care. The Chinese water-lily (*Nelumbium speciosum*), which furnishes a kind of bean, good for food, is also engaging attention. Its leaves make an excellent wrapping like paper, and while its roots and seeds are edible, its flowers are very brilliant. The chiao-pai and the chintsai are varieties of water-celery that are planted on bamboo rafts covered with mud, and form a sort of floating garden like those of ancient Mexico and modern Kashgar. The iron-tree (t'ieth-shu) has the property of absorbing iron, and the Chinese drive nails into it when it shows signs of drooping, and requires a mild tonic. The tiao-lan is a plant which flowers when it is taken off the ground and suspended from the ceiling. The chi-shu is a tree furnishing a beautiful "golden varnish," which is much used for decorating sign-boards in China. The varnish has a drawback, in the form of a poisonous element, causing acute inflammation of the

skin; but a remedy is said to exist in the application of crab's liver and a decoction of pine-shavings!

Glass Bearings.

Glass bearings for wheels are now being tried on some of the American railway trains. The advantage expected from them is absence of friction. The glass employed is of peculiar quality, very hard and strong. What the result of the trials is likely to be, is not stated; but the idea of using glass for bearings, if not on a large, at least on a small scale, and in small apparatus, appears to be worth trying, provided a suitable glass can be manufactured.

A Solar Pyrometer.

Captain Ericsson has erected, at New York, an ingenious solar pyrometer, with which he has measured the temperature of the solar surface. It is shown in our engraving (Fig. 1), and consists of a polygonal reflector composed of a series of inclined mirrors, A, and provided with a central heater of conical form, B, acted upon by the reflected radiation of the sun in such a way that each point of its surface receives an equal amount of radiant heat in a given time. When the reflector faces the sun at right angles, each mirror catches a pencil of rays 32·61 square inches in section, and the entire reflecting surface receives the radiant heat of a tubular sunbeam of $32{\cdot}61 \times 96 = 3{,}130$ square inches sectional area. Fig. 2 represents a transverse section of the instrument as it appears when facing the sun; the direct and reflected rays being indicated by dotted lines. The heater is composed of rolled plate-iron 0·017 inch thick, with head and bottom of non-conducting material. It can be put in its place and removed in a very few minutes. The proportions of the end of the conical heater correspond with the perimeters of the reflector, and the diameter of the upper end at the intersection of the polygonal plane is to that of the lower as 8 to 6, in order that every part may be acted on by rays of equal density. With this apparatus, which gave him the amount of heat intercepted by a reflecting surface of given area, Captain Ericsson has estimated that the temperature of the solar surface cannot be less than 3,060,7278 Fahrenheit. This is a result enormously higher than former estimates of Siemens, Rosetti, and others, who placed it at from 3,000° to 10,000° Centigrade, or not much more than the temperature of the voltaic arc.

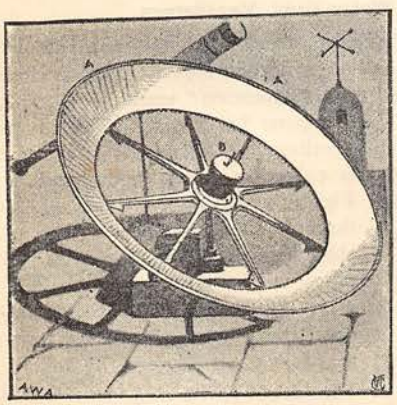


FIG. 1.

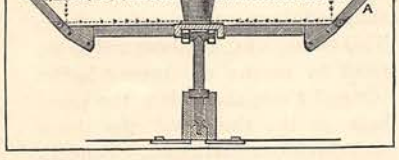
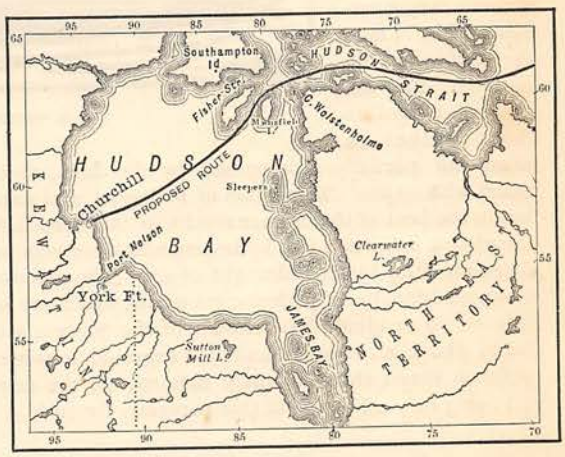


FIG. 2.

A Proposed New Route to Montreal.

Our kindred in Canada are about to survey a new route, *viâ* Hudson Bay, from England to their capital, Montreal. The present traffic is carried either by way of New York from Liverpool, or by the



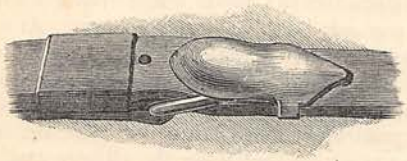
Dominion Line and other steamers, which ply to Halifax and other places. But the suggested route from Liverpool will, if arranged, permit of steamers proceeding through Hudson Straits into the great Bay of Hudson—the vast inland sea of North America, easily accessible from the ocean. On the western side, and rather to the southward of the Bay, stands Fort Churchill, which is distant from Liverpool only 2,900 miles. Once at Churchill, the merchandise can be conveyed quickly to Montreal—much more rapidly than by either Cape Race or New York. As an emigrant route, this new way would be an improvement on the existing passages; but—and here comes the difficulty—the sea so far north is only navigable about three months in the year. Whether, under such circumstances, a line of steamers *viâ* Hudson Bay to Canada would "pay," is a question which can only be solved by experiment. At any rate, a vessel has been despatched from Halifax to make soundings and take observations in the Straits; but we imagine that the difficulties of the transit will not depend upon the depth of water, or the intricacy of the navigation, but upon the climate and the ice, which render any long period of navigation in those waters out of the question, and thus indirectly preclude cheapness during such a necessarily short season.

Shale-Oil for Fuel.

Highly successful trials of crude shale-oil as a substitute for coal in engine furnaces were recently made at the Forth Bridge Works. The engines are used there for pumping air into the pneumatic chambers in which the workmen excavate the foundations for the bridge-piers on the bed of the river Forth. The crude oil is obtained from the Dalmeny Shale Oil Works close at hand, and in appearance is like coarse butter. It is almost a waste product, and is, in fact, the residue left on distilling the oil. The oil is fed to the furnaces in pipes and partially decomposed by the heat, then mixed with steam. This union of hydrogen and carbon in the heat of the furnace results in the formation of carbonic oxide and free hydrogen, which are kept in a flaming state by an indraught of air. The process is attended by almost perfect combustion, and there is little or no residue. The details of the process are due to Mr. E. C. Burgess, and it is expected to prove useful on board ship, the space required for the new fuel being only a fraction of that necessary for coal.

Improved Carriage Harness.

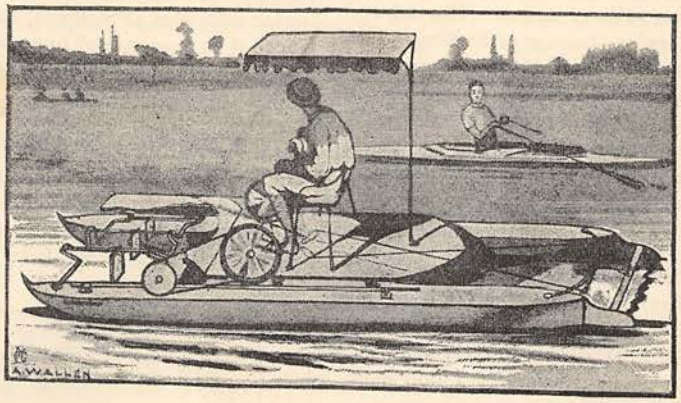
When a horse switches his tail, it is often found that the hairs become entangled in the buckle or between it and the strap, and so get broken or detached. The accompanying woodcut shows an appliance which has been invented for the purpose of preventing this by providing the breeching supporter with a deflecting shield. The shield is a metal plate bent, and furnished with a loop to receive the strap, and a hook enters a hole in the strap. When in position over the buckle, the shield covers the upper part of it and of the tongue, over which it is curved. The shield is prevented from accidentally slipping upward on the strap by the hook and the hole for the reception of its curved part, while by bending the strap so as to throw the hook out of it, the shield can be moved upward in order to allow the strap to be connected or otherwise with the buckle.



In the case of harness furnished with this device, when the horse switches his tail, the hairs strike upon the shield and are thus deflected and prevented from being caught in the buckle.

Water-Velocipede.

A new form of water-velocipede is represented in the accompanying engraving. The deck, it will be seen, is raised above the twin hulls, and the machine is propelled by a double-crank driving shaft. In front of this shaft is a triple crank with pulley at each end, and a bolt passes round this and a similar pulley on the driving shaft. In front of and parallel with the crank shaft is another triple-crank shaft, both cranks being connected by a rod. On each rod is adjusted a vertical paddle-blade. When the crank shaft is revolved, the motion imparts to the blades a downward and backward action through the water, and an upward and forward movement out of the water, the circular motion being the same as that of the cranks. By the use of the triple-crank shafts, one blade is always in the water.



A WATER-VELOCIPEDE.

Water-tight Ventilators.

It is important for ships' ventilators to avoid letting in water, and the condition appears to be attained by the "upcast" and "downcast" ventilators of Mr. Sampson Low, B.A. The upcast ventilator or "Crown Ejector," as it is called, is shown in principle by Fig. 1, which represents a section through the appliance. A dome-shaped chamber or wind-chest contains within it a "water-baffler," A B C, which, on the sea breaking over the dome, deflects any water that may enter between the dome D, and the covering cap E, into the bottom of the dome, where it escapes by exits at E E. The shape of the dome and the position of the cap are so regulated that, at whatever angle the wind strikes the ventilator, a partial vacuum is set up in the wind-chest, and an upward current of air thereby induced.

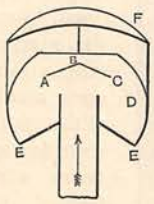


FIG. 1.

The downcast ventilator consists, as shown in Fig. 2, of a shaft surmounted by a hollow dome of the shape of three-quarters of a sphere. This dome, A B C, is connected to the shaft by means of three "baffle-plates," F F G, that divide the space between the shaft and the dome into three compartments. Beneath the dome is fixed a "wind-guide," D E, which surrounds the shaft as a collar, and is attached to both shaft and dome. This conducts the air into the dome, whence, owing to accumulated pres-

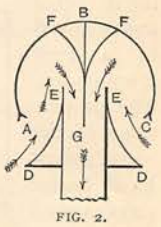


FIG. 2.

sure, it escapes in the direction of least resistance, that is to say, down the shaft of the ventilator. Owing to the angle at which the dome and wind-guides are set, all water is excluded from the interior of the ventilator. These ventilators, while evidently well adapted for use on board ship, are also applicable to houses, public halls, drains, and so on. The upcast ventilator, owing to its rapidity of exhaust action, very quickly ejects sewer-gas.

A Portable Accumulator.

Microscopists and photo-micrographists using small electric lamps for their studies and photographs of objects, will find the following method of constructing a small and portable accumulator, as given by Dr. F. W. Mercer, of some practical value. The accumulator is a small model of the Faure-Sellon-Volckmar type. It consists of a $\frac{3}{4}$-inch thick wooden box 12 inches long, 6 inches wide, and 7 inches deep, outside measure. A partition divides it in the centre, forming two cells. The joints of the box should be halved into each other, and well smeared with Canada balsam in benzol before closing. When completed, the interior of the cells should receive four or five coats of asphalte varnish, each coat being allowed to dry before applying another. The lead plates for use in the cells should be formed as shown in Fig. 1. Each plate is made by casting the lead in a mould fashioned with a wooden pattern. The edges and ears, A B, should be about $\frac{3}{16}$ inch thick; the surface of the plate, excepting $\frac{1}{4}$ inch of border all round, should be less than $\frac{1}{8}$ inch thick, and pierced with holes $\frac{5}{16}$ inch diameter, and about the same distance apart. The ear or tag, A, is for connecting the plates of the same sign electrically by means of a metal rod passed through the hole; a boss of lead $\frac{3}{8}$ inch thick, formed of small lead plate, is inserted between to keep each plate apart; and the whole, say eight "negative" or eight "positive" plates, are thus secured by a screw-nut on the end of the rod. The smaller ear, B, is to secure the plate to the battery cover, through which it passes, the weight being carried by a small wooden peg passed through the whole. The sixteen plates (eight + and eight —, or four + and four — for each cell) are thus secured to the cover $\frac{3}{8}$ inch apart, and held $\frac{1}{2}$ inch clear of the bottom of the cell, to prevent their being "short-circuited" through deposits formed. Plates that rest on any portion of the bottom of the cells are apt to fail in time. The holes in the lead plates are filled with a paste made by kneading the best red lead with dilute sulphuric acid (two parts acid to five parts water). As soon as the paste has set in the holes, the battery is ready for forming. A solution of one part sulphuric acid to ten or twelve parts water is poured into the cells; and the current from a dynamo is passed through the battery, for a few days, the current being reversed several times a day. Once formed, the accumulator can be stored for use with the current from four large Bunsen cells, and this will cause it to discharge sufficient current to keep a small incandescent lamp lit for three hours. The battery should be kept clean by occasionally washing the plates in a gentle stream of water from the tap. If out of use for a week or longer, the cells should be emptied and the parts washed. Fig. 2 illustrates the kind of lamp to use with the accumulator. It is made by the Edison Company for work of this kind; and the current is started in the filament by simply sliding the lamp into its socket.

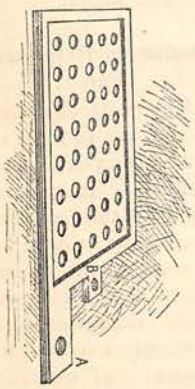


FIG. 1.

FIG. 2.

A Curious Flower.

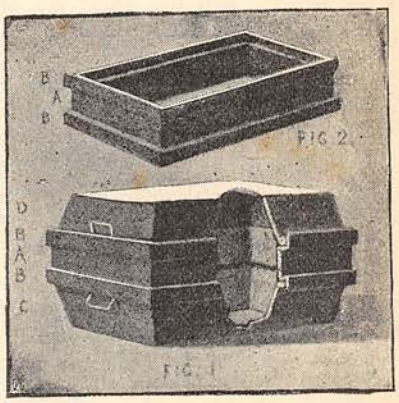
In South America a shrub of the Cactus family has been discovered whose flowers are visible only when the wind blows. The plant is about three feet in height, and on the stalk are a number of little lumps from which the flowers protrude when the wind blows upon them.

Blasting-Paper.

A paper for use as a blasting agent has been prepared by M. I. Petry, of Vienna. Unsized paper, or ordinary blotting-paper, is coated with a hot mixture of 17 parts of yellow prussiate of potash, 17 of charcoal, 35 of refined saltpetre, 70 of potassium chlorate, 10 of wheat-starch, and 1,500 of water. When dried it is cut into strips, which are rolled into cartridges.

An Oven within an Oven.

The double baking-pan illustrated in the accompanying woodcut is the invention of a lady. The design offers a convenient means of making an oven within an oven, so to speak, so that anything which is being baked can be entirely enclosed, or the top of it protected from excessive heat. In this appliance two ordinary pans are used, united by a rim or frame placed between them, the rim having angular flanges on the top and bottom edges, to receive the pans. The lower pan is placed right side up, the upper one being turned upside down. Fig. 1 represents the apparatus complete, with part removed to show the interior, the bottom pan C, and the top pan D, these last being connected by the frame or rim A, and held securely by the flanges B. The rim and its flanges are shown apart in Fig. 2.

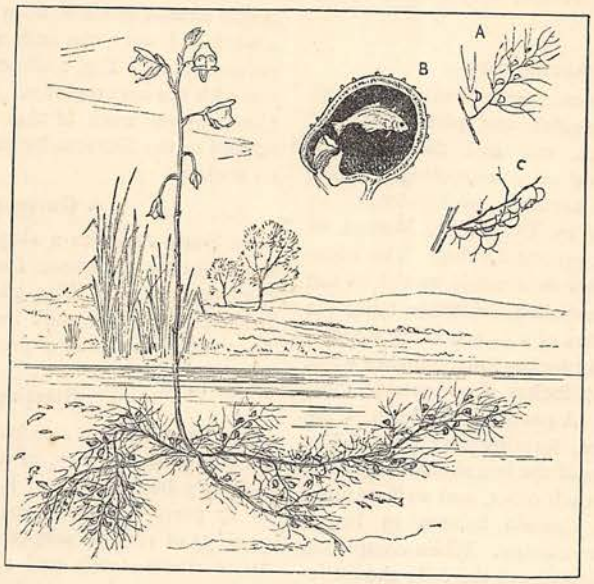


A Combined Broom and Hose.

A broom for cleansing pavements, door-steps, &c., has recently been patented in the United States. The place of the broomstick is taken by a metal tube, which terminates in a jet over the broom, and communicates by a flexible rubber pipe with the water supply. When the broom is in use the water is allowed to run through the tubing, and thus the labour of first flooding the pavement, &c., with a pail of water is done away with.

A Fish-eating Plant.

The common bladder-wort of our ponds, or *Utricularia*, has long been distinguished for the peculiar tiny bladders on its leaves. These were supposed to serve as floats to the plant, which is usually found floating half submerged as shown in the figure. They are now, however, known to also serve as stomachs or digestive organs for the plant, and are so constructed as to catch and trap food for the latter, consisting of carp's eggs, insects, and even small fishes, such as tittlebats. The animal matter is allowed to decay in the bladder, and the juices are absorbed into the plant. The small figures A, B, and C, serve to illustrate the apparatus in question; B showing a tiny fish in the closed bladder. The bladder is closed by a valve, which the fish prises open in order to enter the fatal trap. Thus caught, the captive swims about seeking an outlet, until it dies of want of oxygen. This property of the *Utricularia* has recently attracted the serious attention of American carp-breeders, who are waging war against it as a destroyer of carp-eggs and young fish.



A FISH-EATING PLANT.

An Ingenious Manifold Writer.

A new mode of taking two duplicates of an invoice, inventory, or receipt form has recently been introduced, which obviates much of the inconvenience caused by the use of two sheets of carbonised paper and three leaves of the book. Each leaf of the book is divided by perforations into three equal portions (A, B, and C), on which the printed matter is so arranged as exactly to register. The printing on A and C is on one side of the paper, on the other side on B. In use, a sheet of carbonised paper is placed over A and the reverse side of B, and C is folded over to the left at the first perforation; B and C together are then folded over A. The printed side of B will now be uppermost, and on this the writing may be made, and it will be found reproduced on A and C. This device will save merchants' clerks and others much trouble and labour.

A Simple Reservoir Pen.

The great objection to the use of most of the reservoir pens hitherto introduced has been the fact that the writing is done by a pencil-point, round which the ink flows. This necessitates a somewhat different manner of writing than in the case of an ordinary pen and holder. A new reservoir pen has recently been brought out, which combines the advantage of the reservoir pen with "nibs" of the ordinary kind. These "reservoir" pens, as they are called, cannot easily get out of order, and are readily cleaned or refilled.

1884 STORY COMPETITION.—AWARD.

A large number of competitors responded as usual to the Editor's offer of a prize for the best Domestic Story illustrating the Evils of Vacillation, and after careful consideration of all the MSS., the judges have awarded the PRIZE OF FIVE POUNDS *to*

STELLA ST. JOHN GARD, Stucklow, Fordingbridge, by Salisbury.

Honourable Mention is given to the stories by the following competitors, in order of merit:—

WILLIAM J. LACEY, Chesham, Bucks.
H. ELRINGTON, Youghal, Co. Cork.
M. A. WHITBY, Yeovil.
ALICE M. DALE, Sheffield.
GEORGE B. BURGIN, High Barnet, Herts.

The Editor hopes to find a place for the successful story in an early number of the Magazine.

SHORT SPEECH COMPETITION.—*Intending competitors are reminded that December 1st, 1884, is the latest day for receiving MSS. for this competition. Full particulars respecting this and other competitions will be found in our June* (1884) *number.*