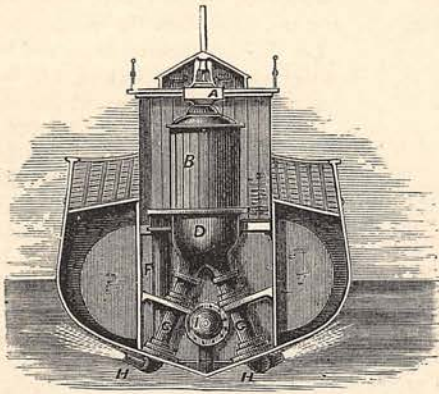


## THE GATHERER.

### The Hydromotor.

A steamer without engines, screw, or paddles has just been built at Kiel, Germany, after the designs of Dr. Fleischer. She is propelled by an apparatus termed an hydromotor, which forces jets of steam out against the surface of the water risen in pipes within the vessel, and thereby propels her forward. The steam is generated by an ordinary ship's boiler, and passes by pipes to the hydromotor. This consists of a pair of cylinders, each fitted with two pressure-pipes communicating with the water by discharge-nozzles. In the figure, which represents one-half of the hydromotor and a section across the ship's hull, B is the



cylinder, with its pressure-pipes G G, and discharging-nozzles H H, which are provided with a valve D, not visible; A is a valve controlling the steam supply admitted into the cylinder; I is a condenser connected with an air or feed pump; and F is a suction-pipe. The steam, let into the upper part of each cylinder by the valve A, forces the water out through the discharge-nozzles with considerable velocity, and the reaction shoots the boat forward. It is cut off at the beginning of the stroke, and its expansive power completes the work. When its energy is spent, the water re-enters the discharge-nozzle, and on reaching the prescribed level it opens the exhaust-valve communicating with the condenser I; then, on the vacuum being formed, the stroke is repeated. The *Pellworm*, as this novel vessel is called, is 75 feet long by 12 feet beam, and is capable of steaming six knots an hour.

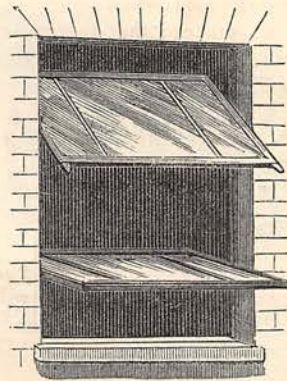
### Window-cleaning and Ventilation.

The boldest man shudders to see a servant cleaning the outside of a window two or three storeys high. There seems to be little support but the grip of her hand upon the lower part of the window as she sways her body backwards and forwards, cleaning

the glass with the one disengaged hand. Many terrible deaths happen in the course of a year from this dangerous occupation, and so, with the inventive instinct peculiar to a man of business, an in-



ventor has contrived to abolish the existing evil by substituting a new patent reversible sash arrangement for the present up-and-down lifting motion of our ordinary window. The accompanying diagram will serve to show the nature and the working of the arrangement. A late member of Parliament used annually to bring before the House a bill for the abolition of window-cleaning by women. No such Act of Parliament would now be required if every one were to attach this simple and inexpensive contrivance to their windows. Besides the life-saving virtues of this invention, there is a virtue connected with it which, although not charged for, is of great value to a



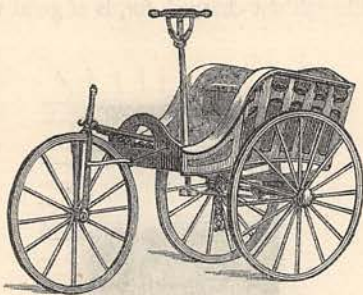
would-be healthy family—it affords perfect ventilation to the rooms by its sloping arrangement. A reference to the illustration will prove that ventilation can be regulated to a nicety by inclining the slope of the sash as currents of air are required.

### An Inexpensive Ventilating System.

Amongst the exhibits at the recent Sanitary Congress at Croydon were the plans, elevations, and sections of a small country house just built at Addlestone, Surrey, by Mr. Henry G. Brace, A.R.I.B.A., of Lordship Lane, for Mr. John Crowdy, the whole being designed to show that not only a pleasing architectural effect, but also the securing of modern sanitary requirements, may be combined with economy. The principal feature was a plan for ventilation, which is almost absolutely costless, and the chief novelty of which consists in the admission of fresh air, slightly warmed, into the several apartments (all bed-rooms included) through a diagonal slit in the door-lintels pointing upwards. The original cost of this is represented by the value of the carpenter's time in cutting the slits in the beams of deal which form the door-lintels; the cost of maintenance is *nil*. The slight warming of the air is effected by passing it, immediately upon entry from the outside, over a coil of hot-water pipes in the hall, the said coil being a part of the apparatus attached, in the usual way, to the kitchen boiler for supplying warm water up-stairs. Thus, whenever the weather is cold enough to require the kitchen fire being kept in, the air which comes into the house is warmed without being burnt; and a few coals put on the kitchen fire the last thing will insure every bed-room being supplied all night with air for the sleeper, fresh from the outside, but with the chill taken off.

### A New Self-acting Invalid Carriage.

For invalids afflicted with paralysis or some other ailment which prevents them from walking, a handy little carriage has been invented by Mr. George King, of Madras Place, Holloway Road, London. It can be propelled by the person sitting in it, by hand, without



requiring any assistance from his feet, at a rate of four or five miles per hour. The accompanying figure illustrates the vehicle, which is propelled by the vertical double-handed lever shown.

### Ailanthus-Wood.

The ailanthus-tree which has found its way from Paris and New York into many of our own gardens is proving itself to be not only ornamental but useful.

Its wood is found to be strong, durable, easily worked, and capable of receiving a high finish. The tree grows rapidly on poor as well as good soils, and in exposed as well as sheltered situations. It likewise seasons readily, and burns exceptionally well. As for its strength, experiments made in the French dockyard at Toulon showed that ailanthus-wood broke under a weight of 72,186 lbs., whereas elm failed under 54,707 lbs., and oak yielded to 43,434 lbs. Furniture made of it possesses a rich satin lustre and takes on a high polish. In the matter of shrinkage, some cabinet-makers regard it as equal to mahogany, and superior to black walnut. For stair-treads and flooring it is better than most of those timbers that are now employed; and it is likely to become a favourite material for wainscots.

### Watching the Circulation of Blood.

Dr. Hüter, of Greifswald, has invented a simple but ingenious plan for observing the blood circulating in the blood-vessels of another person. The head of the patient is adjusted, *à la* photographer, to a frame which carries a support for a lamp and microscope. Next, the lower lip is drawn out and, with the inner surface upwards, is fastened by clips to the table of the microscope; upon the exposed lip-surface a strong light is thrown by a condenser, when the fine net-work of vessels can be examined by the microscope fitted with a low-power objective. At first sight the vessels seem to be filled with a red injection, but on focussing a small surface vessel the movement of the current is soon detected, being made apparent from the red corpuscles. White corpuscles are met with now and again as specks in the blood-stream. In addition to the interesting features of the circulation itself, the examiner may also take note of the cells of the lip-lining and their nuclei, and of the openings of the mucous glands. By a slight pressure, stagnation of the blood and the gradual change in the colour from bright red to purple may also be observed. Dr. Hüter claims that his invention will be found of very great service in medical practice, as it is capable of indicating with sufficient accuracy any irregularity or abnormality in the circulation of the blood.

### Self-acting Bed-Rest for Invalids.

A few years ago directions were given for the construction of a bed which should present certain peculiar features, one of which was that patients (suffering, for instance, from paralysis, dropsy, heart disease, or gout) might be able to alter the position of their couch without assistance, or, in the case of utter helplessness, with the aid of one person. The result of this application was the invention of what is called the "Clifton Rest." In appearance it is simply a frame of wooden laths which lie upon the bedstead under the mattress. This frame is hinged towards the top (and if need be towards the foot as well), to permit of the raising of the upper (and also of the lower) part of the invalid's body, the patient lying as it were

upon two parallel inclined planes. The "Rest" is worked on the principle of screw leverage, a screw-shaped spindle turning a wheel which raises two strong iron supports that remain perfectly firm at any angle, and that cannot possibly slip without the handle being re-turned in the opposite direction. The handle (or wheel) may be placed at the head of the bed, so that the patient may turn it himself and thus raise the couch without aid; but if help be necessary, so simple and easy is the action of the apparatus, that a child of tenderest years can render the required assistance. The frame can be adjusted to a sofa as well as to a bed, and it can be removed from the bed bodily with the invalid upon it, and placed in a room to stand on its own folded legs; and it can be placed upon wheels for open-air use.

#### The Flexible Shaft.

The flexible shaft is an American invention which has recently been put to a great many useful purposes, such as drilling, grinding, and polishing metal work with emery-wheels, and boring stone. Although flexible like a rope, it transmits rotary power communicated to it at one end, and delivers it at the other end just as if it were a straight rigid shaft. As now constructed, it consists of a *core* made of a series of concentric spirals of steel wire of contrary pitch, encased in a hollow spiral of square wire covered with leather. The ends are fitted with iron ferrules to receive the driving-pulley, and the hand-piece carrying the working-tool.

#### Cutting Glass with Scissors.

It is not generally known that panes of glass can be cut under water with ease to almost any shape by means of a pair of scissors. Two things, however, are necessary for success: first, the glass must be kept quite level in the water while the scissors are applied; and, secondly, to avoid risk, it is better to perform the cutting by cropping off small pieces at the corners and along the edges, thus reducing the form gradually to that required—for if any attempt be made to cut the glass at once to the proper shape, as one would cut a cardboard, it will most likely fracture where it is not wanted. The softer glasses cut best; and the scissors need not be very sharp. When the operation goes on well, the glass breaks away from the scissors in small pieces in a straight line with the blades.

#### Molecular Electric Light.

It is generally believed by physicists that the molecules of gas confined in a vessel are flying hither and thither, and striking against each other and the sides of the vessel in the wildest confusion; but Mr. William Crookes, F.R.S., has shown that if a great part of the gas be pumped away, the remaining molecules are far less liable to knock against each other, and, under the influence of the electric discharge, will seem to move in straight lines. In short, if the

negative pole of an electric induction apparatus be made concave and sealed into the vacuum, the molecules electrified negatively by contact with this pole will fly across the vacuum at right angles to the surface of the pole, and their path will be rendered visible by the luminous effect they produce when they strike on a fluorescent body like glass, or by the incandescence they give rise to on meeting a metal. The figure herewith illustrates this heating and lighting action. A glass vacuum bulb mounted on a stand has a negative pole N, in the form of a metal cup *a*, sealed into its lower end, and a positive pole P, shaped like a button, sealed into its upper part. The electrified molecules bound off the cup *a*, and meet in a focus in the centre of the bulb, as shown by dotted lines. Here a piece of platinum or platinum-iridium is held, and in a few moments is seen to glow with insufferable brilliancy until it melts with the intense heat.



It is rumoured that Mr. Crookes has applied this phenomenon to the production of an electric vacuum light of such illuminating power that, in the present stage of the development, as many as thirty three-candle lamps can be maintained by the expenditure of  $1\frac{1}{4}$  horse-power, at a cost of about 1d. per hour. It will be seen that this result is hardly so good as that obtained by Mr. Edison with his tempered metals.

#### The Pottery-Tree.

One of the most remarkable of those trees which bear a stony or silicious bark is the "pottery-tree" of Para, on the Amazon, termed "Caraipa" by the Brazilians, and known to botanists as the *Moquilea utilis*. It is a magnificent tree, and sometimes rises to a hundred feet before branching. The wood is exceedingly durable, being largely impregnated with flint; but the principal value of the tree lies in its bark, which is used by the Indians for furnishing the raw material of pottery. It is not that vessels are made from the bark itself, as they are sometimes made from gourds and calabashes; but the bark is burned, and the silicious ashes, mixed with a proportion of river-clay, make a strong and serviceable ware.

#### Fresh-painted Rooms.

The popular impression that those who inhabit fresh-painted rooms are in danger of lead-poisoning is, according to an American man of science—Dr. Clement Biddle—quite unfounded. He bases his conclusion on the result of the following experiment:—A number of sheets of paper, saturated with white lead paint, were enclosed in a box, together with a dish of pure distilled water. The water was left thus exposed to the vapour of the paint for three days, and then analysed; but no trace of lead precipitate was found in it. Dr. Biddle therefore attributes the colds and other well-known unpleasant consequences ex-

perceived on sleeping in fresh-painted rooms, not to lead-poisoning, but to the irritating effects of the vapours of turpentine and oil on the lining of the air-passages in the throat.

#### Postal Certificates for Letters.

It would be convenient for many purposes if, in return for a small fee, the Post Office should give the sender of any particular letter a document or receipt to prove that it had been posted. There are cases in which the law admits the proof of posting a letter as equivalent to a proof of its delivery; tradesmen in cities sending small consignments by post into the country often have no check upon the fidelity of their messengers, and no assurance that their goods have been duly posted; and private or business people frequently have their letters and circulars destroyed by servants for the mere sake of the clean stamps upon them. In all these instances a stamped postal receipt would be an efficient surety, and an advantageous supplement to the existing practice of registering letters containing valuables. In November, 1877, representations were made to the Postmaster-General recommending a trial of this plan; and such a trial has, we believe, been made; but from the local manner in which it has been carried out, it has not proved a success. In our opinion the scheme is worthy of a comprehensive public test. We think that it would supply a growing want; and the additional revenue of some £200,000 likely to accrue from it would make it well worth the encouragement of the Postal Department. Such a trial is being advocated by Mr. A. Clifford Eskell, and we trust his efforts will be successful.

#### Water for Nothing.

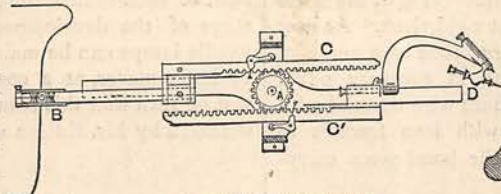
Rain-water from the skies is well known to be purer than either spring, well, or river-water. It has not been contaminated with the salts or decaying matter of the earth, and all the impurities it can possibly contain are the gases and floating dust of the atmosphere. Nevertheless we seek our water rather in the ground than in the air, and allow the natural provision of nature to pollute itself by filth and minerals before we make use of it for drinking and cooking. Rain-water is insipid compared to soil-water, and is therefore slightly unpleasant; but this is probably a matter of habit, and were we accustomed to drink pure rain-water instead of the other we should probably come to prefer it. It is certain that unadulterated rain-water, or water pure and simple, is naturally the best for all ordinary purposes of drinking, cooking, and washing; and Mr. Shirley Hibberd has done good service by impressing this fact on the popular mind in his recent observations on water supply for houses. His plan is to render every home in the country, and even in the suburbs, independent of springs, wells, rivers, or pipes

for its water, by fitting it with a proper roof of tile, slate, or glass, and storage tanks of slate, wood, brick, and Portland cement, or galvanised iron, according to the locality and means of obtaining these materials. These tanks would be placed underground and a handy pump employed in lifting the water from them as required, the practice of dipping being both wasteful and slovenly. For this latter purpose he recommends the Abyssinian Tube Well. The use of a filter for drinking-water would, of course, be an additional benefit, especially in the neighbourhood of cities where the air is impregnated with smut and foul vapours.

#### Electricity and Plants.

In a former issue we recorded the interesting fact demonstrated by the experiments of M. Grandeau at Nancy, and M. Leclerc at Mettray (Indre-et-Loire), that the electricity of the atmosphere has a fostering effect on plants, such as maize, &c. Another experimenter—M. Ch. Naudin—has taken up the same line of inquiry, and he finds, from observations made on other species of plants in another district of France, that the declaration of the foregoing

gentlemen is too general in its character, and that although electricity in the atmosphere is necessary for vegetable growth—just as heat, light, and other agents are necessary—different plants behave themselves in its presence in different ways. His studies were made



NAPOLI'S PANTOGRAPH.

at Antilles, in the large botanic garden there, and he found that plants of bean, lettuce, cotton, and tomato, grown under a metal case which screened them from the electricity of the air, grew faster than similar plants grown in the open air—a result in direct contradiction to those obtained by MM. Grandeau and Leclerc.

#### Napoli's Pantograph.

The pantograph recently designed by M. Napoli is an instrument for copying upon a sheet of paper the exact outlines of any solid body whatever, in their true dimensions. As will be seen from the accompanying illustration, it consists of two parallel toothed arms *CC'*, gearing with the toothed centre-piece *A*. The arm *C'* carries the tracing point or stylus *D*, which is applied to the body and traces out its contour along a given line; while the opposite arm, *C*, carries the corresponding marking point or pencil *B*, which reproduces the contour on the paper. By this means all the outs and ins of the object can be faithfully recorded, the up and down strokes being rendered by the bodily shifting of the instrument and the sidelong ones by the travel of the arms. In the latter operation the movement of the arm *C'*, say from right to left, is attended by a left-to-right movement of the arm *C*, by reason of the rotation of the toothed centre *A*, which connects them, so that the copy made by the marking point *B* is reversed.