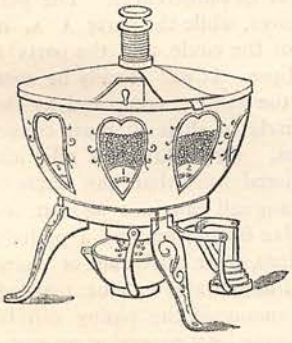
THE GATHERER.

Removing Ink-Stains.

The *Journal de Pharmacie* of Antwerp recommends the pyrophosphate of sodium for removing stains of ink, because it does not destroy the cellulose of the cloth, and yields colourless compounds with oxide of iron. Before treating the stain with this salt, a few drops of tallow from a candle should be allowed to fall on the spot, and the whole washed in a solution of the pyrophosphate until both stain and grease have disappeared. If necessary, the operation is to be repeated. If the ink is aniline, the spot should simply be moistened with strong alcohol mixed with acetic acid. Eosine is the only aniline dye which does not readily disappear under this lotion.

A Shot-Case and Weighing Machine.

The accompanying woodcut represents a box for holding different kinds of shot, keeping them separate from each other, and preventing them from spilling when being sold. It is made of cast-iron, japanned, ornamented, and furnished with glass windows for displaying the various sorts of shot. The case contains as many compartments as there are windows; each division has an opening in the bottom communicating with a hollow cylinder in the centre, through which a vertically adjustable valve-tube works. The lid fitted to the top of the box may be turned independently of the case. As the lid controls and rotates the tube, whenever the index knob of the lid is moved to the middle of a compartment, the contents of that division may be withdrawn by pressing down the tube, and as soon as the pressure is removed the drawing will cease at once. Under the outflow tube there swings to receive the shot a scale-pan, with beam and weights, the whole vessel resting or rotating upon a circular stand. A revolving disc shows the quantity of shot in any compartment, and the box may always be filled through an aperture in the lid, which is provided with a cover that swings round automatically and closes the opening, thus excluding the dust.

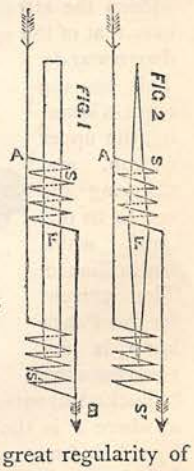


The Electric Light in Aquaria.

One of the most interesting and novel applications of the electric light to practical purposes is its introduction into aquaria, with the object of illuminating the tanks. By night and with the aid of gas only it is very difficult to inspect an aquarium, and a good deal of the utility of such exhibitions is lost on that account. Not long ago, the experiment of using the electric light, by means of a Faure battery, was tried successfully. Six lights were submerged in one of the tanks in a public aquarium, with the result that every fish and plant was shown up with great distinctness. The fishes did not, apparently, pay any attention to the lamps, nor was their health injuriously affected, seeing that noxious products, such as those yielded by the combustion of gas, do not accompany the use of the electric lamps. The light may be made more or less intense as required, and may be run for a longer or shorter time according to the engines employed for storing the electric energy.

The Pilsen Electric Lamp.

One of the best electric lights exhibited at the Paris Electrical Exhibition is that known as the Pilsen lamp, from the fact of its being invented at Pilsen, in Bohemia. It is the invention of Messrs. Piette and Krizik. Its great merit is its simplicity and freedom from complicated mechanism, combined with its remarkable steadiness of action. It is, perhaps, the steadiest of all "arc" lamps yet invented. The current in the luminous arc is made to regulate itself by the use of two solenoids or helices of wire, which, when traversed by the current, exert an attractive force on a core of soft iron placed in their hollow interiors. This is an old device, but it has never been so well applied before. Ordinarily a cylindrical core is used, but in the Pilsen lamp a core tapering at both ends is employed instead with great advantage. Fig. 1 represents the usual cylindrical core, F, enclosed by two helices of wire, S S′, through which the electric current is made to pass in the direction of the arrows. When the current arrives at the point A, it splits up, and part passes through the helix S, and part goes on to the helix S′, both parts reuniting at the point B. Now, in this case the attraction or pulling force of the two helices on the core is strongest when one end of the core, F, is in the middle of a helix, than when the middle of the core is in the middle of a coil; and therefore the coil, S′, exerts more attraction on the core than the coil, S, in the case illustrated in Fig. 1. When, however, the mass of the core is tapered, as in Fig. 2, the attraction of each of the two coils upon it may be made exactly the same, whatever position it occupies between them. It is by the application of this principle that the inventors have secured a great regularity of action in their lamp. Fig. 3 shows a lamp in which this bi-conical core, F, has been adopted. It is contained in a brass tube, to the lower end of which is



attached the positive or upper carbon of the arc. The tube, which guides the carbon downwards to the arc as it is needed, is held by cords passing over the rollers, R R, at the top of the lamp, and attached to the lower carbon holders, BB. The upper and lower carbons, E E, are thus connected in one mechanical system by these cords, and the weight of the lower carbons and holder counterbalances the weight of the upper carbon and the tube with its core inside. The upper solenoid or coil, S, is joined up in the same electric circuit with the carbons and the arc, while the other coil, S′, which has a much higher resistance than the other, is connected to the arc circuit as a "shunt" or by-path for the current. Now, as the lamp burns, and the upper carbon is consumed away, the arc tends to widen, but in widening its resistance increases, and hence the current in the main circuit diminishes. But the upper solenoid, S, forms part of this circuit, and consequently its upward attracting force on the core diminishes, while, on the other hand, the downward attracting force of the lower solenoid, S′, increases. For the higher resistance of the main or arc circuit causes relatively more current to pass through the lower coil than before, and increases the attractive power of that coil. The result is that as the arc widens the attraction of the lower coil predominates over that of the upper coil, and the core moves slowly downwards. This has the effect of lowering the upper carbon, and restoring the arc to its original width and brilliance. The current for the Pilsen lamp is derived from the Schuckert dynamo-electric machine illustrated in Fig. 4, where P is the driving pulley, which, when driven by a belt from a steam or other motor, revolves the bobbin or armature, A, between the poles of four electro-magnets, M M M M, and thereby generates a continuous electric current, which is drawn off by the brushes of the commutator, C, and led away by means of insulated wires to the lamps. Such a machine can feed six Pilsen lamps with current at an expenditure of about 5½ horse-power.

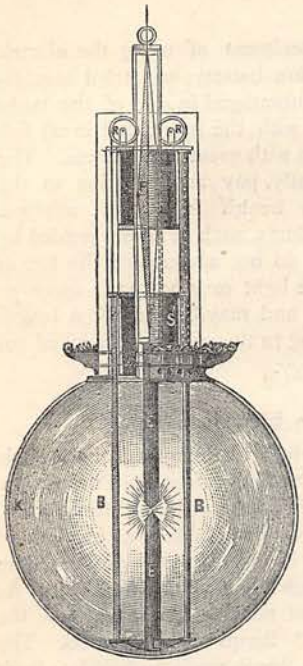


Fig. 3.

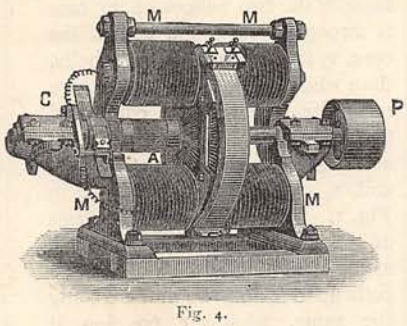
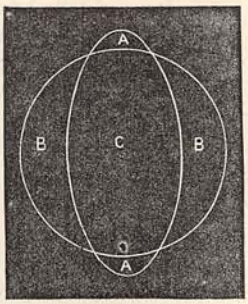


Fig. 4.

Elliptical Piping.

Water-pipes are usually made of a circular cross-section, and the consequence is that when the frost freezes the water and thereby expands it, the pipe is liable to burst, because it is stretched thinner and the weaker parts give way. Mr. Mangnall, of Manchester, has, however, introduced a form of pipe having an elliptical cross-section, which is very much stronger, theoretically and practically. The action of the expanding water is simply to force the pipe into a more circular shape, and as the circular shape has more capacity than the elliptical form, for the same circumference, the pipe is better able to contain the expanded mass and relieve the extra pressure. This is illustrated by the accompanying diagram, which represents an ellipse, A C A, and a circle, B C B, both having equal perimeters or circumferences. The part C, is common to both figures, while the parts A A, in the ellipse are in excess of the circle, and the parts B B, are in excess of the ellipse. It will readily be seen that the circle contains the largest area, and as the ellipse approaches the circle in shape it must consequently increase in area. By making his elliptical pipes of a smaller sectional area than the circle of equal perimeter, Mr. Mangnall provides against the effects of several successive frosts; and by a periodical inspection of the pipes, their alteration of shape under pressure of the frozen water can be marked. Should it become too pronounced, the piping can be restored to its original shape by a squeezing pressure, and bursting prevented. So long as the pipe does not take the circular form its bursting cannot happen.



An Elastic Lacquer.

A patent has been taken out in Germany for a new kind of elastic lacquer, which will not peel off, and is suitable for coating carriage cloths, plans, and other articles to be folded up, as well as for walls, and wood, ironwork, or waterproofing. It is made by heating 50 kilogrammes of linseed-oil varnish to the boiling point in one pot; in another pot 15 kilogrammes of lime are slaked in 20 kilogrammes of water. As soon as the lime boils, about 50 kilogrammes of hot melted raw caoutchouc are added to the lime-water, and the whole is then stirred until thoroughly mixed. This composition is poured into the boiling varnish, the whole being stirred all the time. Further stirring produces a homogeneous mass, which is strained and allowed to cool. This lacquer is applied by diluting with varnish and painting on with a brush either while

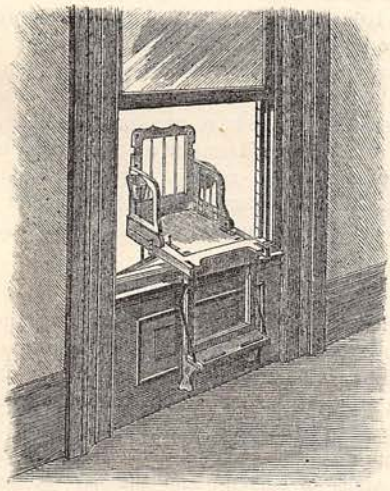
it is warm or cold; but it is preferable to apply it warm, as no varnish is then required to dilute it. Cloth or paper is rendered waterproof by treating it in this way.

Water-power for the Electric Light.

In addition to its cheapness, water-power is found preferable to steam for driving the dynamo-electric machines which furnish the currents to electric lamps, on account of the equable nature of the source. Steam-engines do not run so smoothly as a turbine placed in a race, or a water-wheel fed by a small waterfall. The result is that the light is apt to "blink" when the machine is driven by steam. At Godalming recent experiments have demonstrated that the numberless lyns and waterfalls in these islands can be turned to good use for this purpose; and an old water-wheel on the Hatfield estate of Lord Salisbury has been utilised to light the whole of that fine mansion. Moreover, it is under consideration to light the town of Bristol by means of the tidal rise in a backwater at that place.

The Window-Cleaner's Chair.

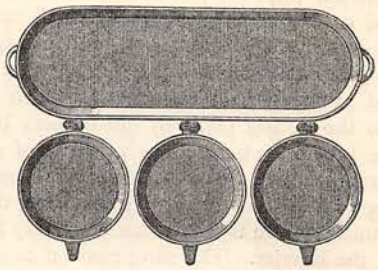
The apparatus represented in the accompanying woodcut has been invented with a view to making the cleaning of windows an absolutely safe occupation.



It is therefore an appliance of an eminently useful character, and, so far as we know, supplies a generally-felt want. Moreover, besides affording a secure seat or foothold to servants, it may be used as a platform when any glazing or painting is required, or when it is necessary to put up awning or decorations outside a window. It contains on either side cups for the water or other cleaning mixture and the cloths, as well as supports for paint-pots and brushes. The chair can be fastened or detached in a minute; it occupies little space, and will fit any window of ordinary size. The construction, as the engraving shows, is very simple, and the whole chair is so light that it can be carried from room to room without effort.

A Cake Griddle.

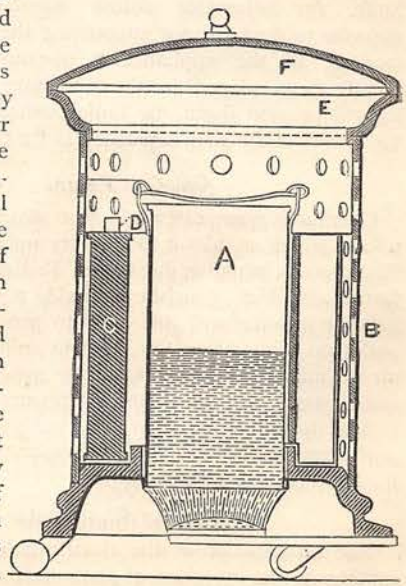
An ingenious form of griddle for baking cakes is shown in the annexed woodcut. It consists of one long flat pan of cast-iron, to which are hinged three round pans of the same metal but of smaller size. When the griddle is hung over the fire, a cake is



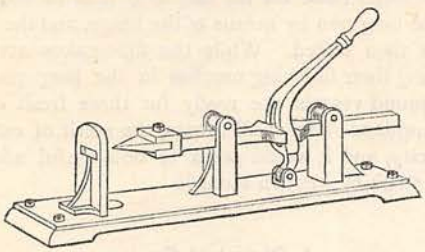
placed in each of the round pans, and as soon as it is sufficiently done on the one side it is turned over into the long pan by means of the hinge, and the other side is then baked. While the first cakes are thus receiving their finishing touches in the long pan, the three round vessels are ready for three fresh cakes. This appliance has, at all events, the merit of extreme simplicity, and it would seem to be a useful addition to the stock of kitchen utensils.

A Chemical Stove.

We have already mentioned in the GATHERER that fused acetate of soda is used to heat the foot-warmers on some Swedish railways; and the plan, which was recently adopted by the London and North-Western Railway Company, has been improved upon by Herr Nieske, a German chemist. Acetate of soda, when melted and allowed to crystallise, gives out its heat very slowly, and Herr Nieske finds that if hyposulphite of soda is added to the acetate the cooling is considerably retarded. Herr Nieske fills the warmers three-quarters full with a mixture of one part of acetate to ten parts of hypo-sulphite, and places them in hot water until the salts are fused, a result indicated by the cessation of all sounds from the crystals within. Such a



warmer will keep equally warm for ten or fifteen hours, a period which is sufficient to make the best water-filled warmers cold. The same inventor has also devised a stove for rooms, based upon the same principle. It consists, as shown in the sectional figure, of an inner, A, and an outer enclosing cylinder, B, the latter being perforated with numerous little holes. In the space between these are placed three or more of the flat metal cases or foot-warmers, C, which can easily be lifted out by their handles, D, and placed in hot water to be re-stored with heat. This water can be contained in the central cylinder, A, which may be heated to the boiling point by gas-burners below, or it can be kept elsewhere. The presence of water in the central cylinder, however, has the advantage of supplying a wholesome degree of moisture to the air of the apartment. The top, F E, can be readily lifted off to get at the interior. The stove runs on castors, and is made after several ornamental patterns by a Dresden firm. It is well adapted for sick-rooms, as it gives off no fumes and can be readily moved from place to place.



An Oyster-Opener.

One would have thought that oyster-opening afforded little scope for the exercise of the inventor's ingenuity. That toothsome "shell-fish," before Pistol's time and since, has ordinarily been extracted rapidly enough by knife, but the engraving shows a machine specially devised for opening oysters, clams, *et hoc genus omne*. It consists of a sliding-bar actuated by a lever-handle, and carrying an opening-point or knife. An adjustable slotted standard is placed opposite to the knife for supporting the oyster. The working of the appliance is obvious. A mollusc having been placed in the necessary position, the lever is pressed down, the knife pushed forward, and the valves of the shell separated in "a twinkling."

Gelatine Foam.

Gelatine is now preserved in the state of dry foam, a form which enables it to be very quickly dissolved. The process, which is due to Mr. R. Brooks, of Rockfort, Mass., U.S., consists in mixing a solution of the gelatine in water with air so as to produce the foam, and then evaporating the foam in cold dry air. The air is mixed with the water by means of air currents passed through it under pressure, and cold air is used to dehydrate it in order to chill the gelatine and preserve the vesicles. The spongy gelatine thus obtained is packed for transport.

A Balance Photometer.

The introduction of the electric light has given an impetus to the invention of photometers for measuring the intensity of lights. The Electrical Congress recently held at Paris have condemned the existing standards of light, namely, the standard candles of England and Germany and the Carcel lamp of France. But they have not arrived at a fitting substitute thus far, and meanwhile these standards are to continue in use. An ingenious apparatus for comparing any light with the standard has been invented by M. Coulon. It is based on the principle that the radiometer of Mr. Crookes is sensitive to light-rays only, and not to heat-rays, when kept at a constant temperature. This instrument, it will be remembered, consists of a small vane or windmill turning in a vacuous bulb under the impact of the rays of light. M. Coulon places a radiometer bulb inside a square metal case having slits cut in the four sides, and closed with glass. This case is filled with water kept at a temperature of 100° C. The bulb contains a single disc, movable round a vertical axis, the half-disc on one side of the axis being black on its two faces, and the other white. If now we suppose a single source of light to act on the bulb from one side, it attracts the white half and repels the black, so that the disc turns edgewise to the light, and presents one side to the observer. But if another equal light acts simultaneously on the other side, and at the same distance as the first, the counter-action results in the disc presenting its sides to the light and its edge to the observer. When unequal lights are compared the stronger has to be shifted further back, until the balance is effected. The relative intensities of the two lights will then be inversely proportional to the squares of their distances from the photometer disc. We may add that the Photometric Committee of the Board of Trade have recommended the air-gas flame of Mr. Vernon Harcourt as a standard of light instead of the sperm candle. This is produced by burning a definite mixture of air and petroleum vapour under a definite pressure in a brass burner with ¼-in. orifice.

An Electric Omnibus.

Electricity stored up in the Faure accumulating battery has been tried in Paris for the propulsion of an omnibus, with considerable success. An omnibus, unlike a tramcar, is not confined to one track, and therefore cannot have its electricity supplied to it by wires from a stationary generator. It requires to carry its own stock of current, and the new secondary or storage batteries are useful for this purpose. The Paris trials have resulted in the company working the Faure patents getting permission to run carriages in a certain quarter of the city. While upon this subject, we may mention that it is proposed to establish a system of electric railways in Paris. The project has emanated from M. Chrétien, a French engineer, and consists in establishing a main line 14,660 feet long, running from the Madeleine to the Bastille, with two branches, one from the Place de la République to the Place du Trône, about 3,200 yards, and the second a little longer, following the Boulevard Haussmann and the Avenue Friedland as far as the Arc de Triomphe. The rails would be carried on pillars running near the pavements, and the permanent way would to a certain

extent spoil the appearance of the streets, however ornamental it may be, so that it is probable that the scheme will be objected to as far as the chief boulevards are concerned, at least until it has been tried in the Boulevard Voltaire, and the general effect observed. No objection of the kind is offered against the electrical tramway from Portrush to the Giant's Causeway. The works have been begun, and water-power will be employed to drive the machines which generate the electricity.

Musk from the Musk-Rat.

True musk, which is used so largely as a perfume, and more sparingly as an anti-spasmodic medicine, is taken from certain glands in the musk-deer; but its high price has caused Mr. Fairthorne, an American pharmacist, to substitute the similar secretion found under the skin of the musquash or musk-rat. For a long time the Russians have used these skins to scent and preserve their garments; but no attempt has hitherto been made, we believe, to extract the perfume in a serviceable form. Mr. Fairthorne takes ten or twelve musk-rat skins, which can be bought in New England for ten or fifteen cents a pair, and cuts them into small slips. These are allowed to macerate for a week or two in a pint of alcohol with the addition of two drachms of slaked lime. On filtering the liquid a very fragrant tincture, having a musky smell three times stronger than the ordinary extract of musk, is obtained. Mr. Fairthorne employs it instead of the real tincture of musk for the manufacture of eau de Cologne.

New Insulating Materials.

In the Paris Electrical Exhibition there were exhibited several new kinds of insulating material for submarine cables, and conductors for telephone and electric lighting wires. One of these was the paraffined india-rubber core of Mr. W. T. Henley, of North Woolwich. This consists of an india-rubber-coated copper wire prepared in the ordinary way, then boiled in melted ozokerit until it has absorbed thirty per cent. by weight of the latter. Ozokerit is a black earth-wax, chiefly found in Galicia, and has hitherto been mainly used for manufacturing candles. But its high insulating properties have at length brought it into the service of electricity. The permeation of the ozokerit into the rubber raises the insulation resistance very considerably, and at the same time diminishes the "inductive capacity," which retards the speed of electric signals so much in a submarine cable. The new cable soon to be laid between Cuba and Belize in British Honduras is made of this insulator, and the results of the trial will be awaited with interest by electricians. A more complete union of ozokerit and india-rubber is, however, to be found in the "Nigrite" core of Mr. Field. This consists of two parts of ozokerit and one part of india-rubber (or it may be gutta-percha) macerated at a moderately high temperature, until they form a black compound, which can be applied to wires in the same way as gutta-percha. The mixture has a higher insulation resistance than india-rubber, and a lower inductive capacity, while it is considerably cheaper than even gutta-percha. It is now used chiefly for connecting wires in telephone offices, but when it can be prepared of a tougher quality it will doubtless come into use as a cable insulator, as it has the property of resisting water in a high degree.

A New Fibre.

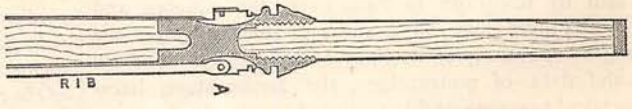
A textile fibre capable of replacing silk to a certain extent has been discovered by M. Bordier in the stem of a plant which is found wild in some parts of France, where it is called *Fafetone*, and in South America. It belongs to the Ascelepias, and the flower, which is formed of two oblong petals enclosing the seed, is crowned by an aigrette of white silky hair. In Italy, where the plant also grows, attempts have been made to utilise these hairs, but they are too short and brittle to be woven alone, and when mixed with other fibres they weaken the stuff. The stem, however, is found by M. Bordier to contain an excellent white tough fibre, superior to jute, and similar to silk in appearance, and incorruptible in water.

Air-Motors on Railways.

The elevated railroad, as our readers are aware, is one of the features of New York city, running overhead instead of underground, as in the English metropolis. Complaints of the smoke nuisance having repeatedly been published, an experiment has been made on a portion of the line in which a compressed air-motor was employed instead of the ordinary locomotive. The air was stored in four tanks, under a pressure of 580 pounds. After running between the trial stations and back, making the usual stoppages, the pressure was reduced to 125 pounds. With proper appliances at each end of the journey, the motor, it was found, could be charged in two or three minutes. It may be added that compressed air has been successfully applied as motive-power in this country, by Mr. W. D. Scott-Moncrieff and other inventors.

An Improved Umbrella.

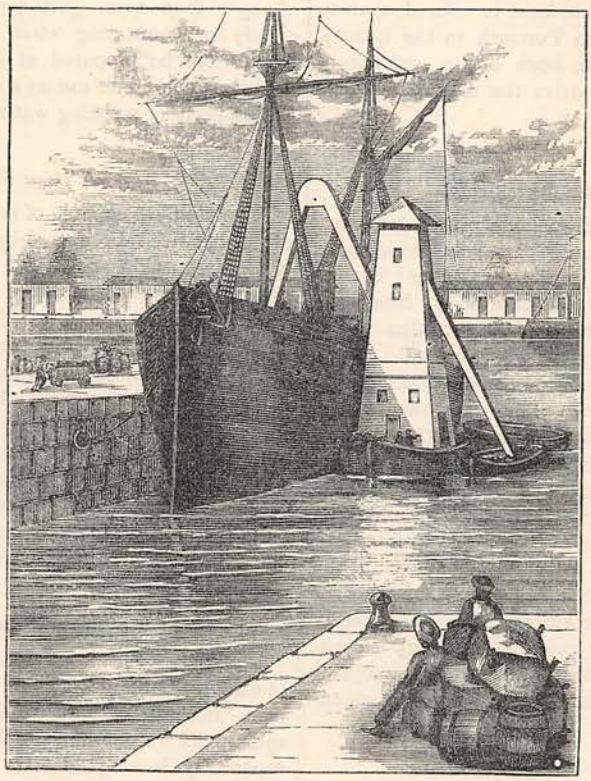
Neatness in an umbrella is a thing to be desired, and the improvement recently made in discarding



the notched ring to which the ribs of the shade are ordinarily jointed, and substituting the counter-sunk device shown at A in the figure, certainly conduces to compactness. There is less fear of the silk wearing at the foot in the new plan, and it folds much more closely to the shaft.

Floating Grain Elevators.

So vast a trade is now done in grain between the United States and this and other countries, and so much capital is invested in it, that all that enterprise can accomplish to facilitate and cheapen transit has hitherto been successfully effected. Railways and canals have multiplied to a remarkable extent, and mechanical appliances are made use of wherever they can be possibly employed. Our illustration shows a floating elevator at work. A very large proportion of the grain sent to Chicago and New York for shipment is loaded direct from the canal-boats into the ocean steamers. Usually the loading and unloading are simultaneous processes, a floating elevator hauling alongside a vessel lying at her berth, and pouring in the grain as rapidly as the out-going freight is removed. The canal-boats generally carry from five to seven thousand bushels or more, four of them sufficing to load a sailing ship, and eight to ten a large steamer. This will give an indication of the businesslike way in which this enormous traffic is conducted.



A FLOATING GRAIN ELEVATOR.

The Telemeteorograph.

Perhaps the most novel and remarkable piece of apparatus in the recent Electrical Exhibition of Paris is the electrical meteorograph of M. Van Rysselberghe, of Brussels. This wonderful contrivance actually records the state of the weather at Brussels every ten minutes, at Paris, without any attention being paid to it. That is to say, it takes the observations of the meteorological instruments at Brussels, and transmits them by telegraph to Paris every ten minutes, and records them there on a sheet of zinc ready for the engraver, entirely of itself, or automatically. The six chief data of meteorology, the temperature, barometrical pressure, and humidity of the air, the direction and velocity of the wind, and mean amount of rain or snow which has fallen, are thus observed at one place, and registered at any other, however distant, provided a land telegraph line exists between the two places; and the idea of M. Van Rysselberghe is to have ten or a dozen different stations in Europe, say at John o' Groats, Land's End, Anglesea, Kerry, Christiania, Paris, Madrid, Constantinople, St. Petersburg, Rome, and so on, all sending their periodic reports by the "telemeteorograph" to a central observatory at London or Berlin as the case may be, so as to get a better hold upon the process of the atmosphere, and enable our meteorologists to predict the weather much in the same way as they do now in America by aid of the U.S. Weather Signal Corps. The expense of instituting this scheme would not be very large, because most of these places are already connected by telegraph lines. The apparatus, though simple in its parts, is necessarily complicated, and would require an article by itself in order to make its action understood. It was kept going all night while in Paris, and seemed to operate most satisfactorily.

SONG COMPETITION.

We have received a large number of musical settings in competition for the Prize of Five Pounds for the best rendering of Longfellow's "The Arrow and the Song." After careful consideration the prize has been awarded to

BLANCHE GORE, Poona, India.

HONOURABLE MENTION *has been accorded to the following, in order of merit:—*

W. CLAXTON, St. Michael's College, Tenbury.
F. E. SCHLESINGER, Gotha, Germany.
W. H. HUNT, B.Mus., Birkenhead.
W. CRESER, D.Mus., Leeds.
J. P. HARDING, Islington, N.

In making the award the adjudicators have been guided by the principle of a due interpretation of the sentiment of the poem. Many of the musical settings submitted are far too elaborate to be suitable, and appear as though intended to exhibit the scholarship of the composer at the expense of simplicity and genuine feeling.

PRIZE POEM ON DOMESTIC AFFECTION.—*Our readers are reminded that February 1st is the last day for receiving MSS. in competition for the Prize of Five Pounds offered for the best poem on the subject of Domestic Affection.*