

but fine bunting and cotton handkerchiefs are made up in a similar manner. The Byron collar is completed with a sailor tie of handkerchief ends. The skirt is covered with three plaitings, and the back of the pointed tunic is draped short. For French seaside resorts, costumes of cream foulard handkerchiefs with gay Persian borderings are in great demand—fantastic to the last degree they look, but stylish when “well worn” by those who can indulge in constant change in their attire.

Fig. 3 displays the smock-frock which is quite a *furor* for little girls' wear. The plastron in front is laid in tiny kiltings, and worked with some bright-hued silk in honeycomb stitch, which stretches at will, consequently differs considerably from the honeycombing in vogue some thirty years ago. The pattern from which our drawing is copied is dark green summer serge, the stitching being carried out in orange silk.

The group of figures offers suggestions for toilettes of a more important description. The figure on the right is dressed for a garden party, in heliotrope satin and Pekin, the Pekin being in this instance striped velvet on a satin ground. The coat has a Medici collar and a sulphur-coloured tie of Languedoc lace in front. The Swedish gloves are buttonless, and of that peculiar shade of cinnamon or brown paper so much affected by our *élégantes*.

The figure on the left wears a blue silk costume shot

with red, and trimmed with loops of satin ribbon and beaded lace. The plastron is entirely of beads that have the effect of gems, and are known as “rainbow,” or “iridescent;” they have been marked features in this season's dresses. They are effective and costly, and now that they are finely cut, full of subdued colour, and the gold is banished, much of the tinsel look they presented when first introduced has disappeared.

Number three is a dressy *fête toilette* of pale salmon gauze and satin; the pointed plastron is gathered, and the muslin hat is also gathered, for gaugings or gatherings have now definitely asserted themselves in the make of a fashionable dress.

The second figure wears a black lace and jet mantelet, a dark olive-green dress with Persian bordering; the bonnet, and likewise the parasol, correspond in colouring with the dress. The parasol, of which we give a drawing, is an inspiration from Japan much appreciated this season in both Paris and London. The cover is black satin, and the lining is satin to match the trimmings of the dress worn at the time. The frame is made with sixteen ribs, and these are visible, the lining being beneath them. The handle is from Algeria, and is the rooting portion of a large reed (*Arundo donax*) golden yellow in colour, and marked with ring-like ridges of dark brown. The knob at the top is of the same wood.

## THE GATHERER.

### A Pocket Life-belt.

Ordinary life-belts are so clumsy that we welcome the new variety illustrated in the accompanying figures. It is the invention of an American, Mr. R. E. Rose, of Gretna, Louisiana, and is so light and convenient that it may be strapped on the person in combination

with the usual dress, or folded up and carried in the pocket like a diary. The belt consists of several air-cells, A, of the section shown in Fig. 3. These cells are provided with air-valves, C, which open inwardly. An air-supply-pipe, B, running round the belt and communicating with each of the cells by a second air-valve, B, completes the whole, if we except the shoulder and



FIG. 1.

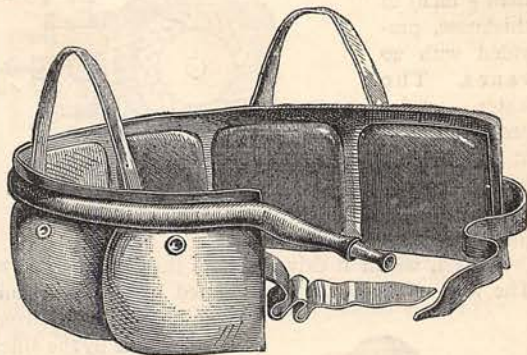


FIG. 2.

other straps for fastening the belt about the body. The chambers are inflated by blowing through the supply-pipe, which is provided with a suitable mouthpiece, and they may be discharged by means of the valves, C. One great advantage of this kind of life-belt resides in the separate chambers, two or three of which may be accidentally punctured and discharged without destroying the floating efficiency of the remaining chambers.

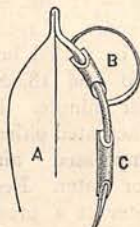


FIG. 3.

**A Simple Test-Paper.**

A very good and homely substitute for the litmus paper used by the chemist in testing whether solutions are acid or alkaline, is made by boiling 1 lb. of red cabbage leaves in a pint of water for some time, then straining the blue liquor through muslin. After straining, the infusion is to be evaporated to half its original bulk, and sheets of thin blotting-paper are then to be steeped in it, and hung up to dry. On dipping a slip of this paper into an acid liquid its colour is changed from blue to red; and when the liquid is alkaline the colour turns from blue to green.

**Domestic Water Motors.**

Pigmy motors of small power for domestic purposes, such as driving a sewing machine, or coffee mill, have been very ably developed by the French. Two of the best of these are illustrated in the accompanying diagrams. Fig. 1 represents the hydraulic motor of M. Dufort as seen exteriorly, and Fig. 2 shows its interior arrangement, at one-

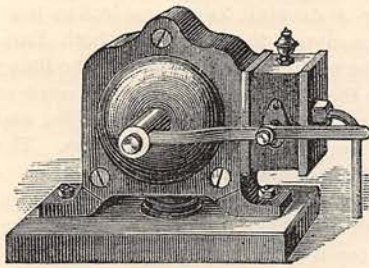


FIG. 1.

third of the natural size. It is simply a tiny water-wheel or turbine, 6 centimetres in diameter, and 1 centimetre (rather less than 1/2 inch) in thickness, provided with 20 vanes. The water under pressure enters at A, as shown by the arrow, and passes by the pipe C to the wheel, which it drives round, then escapes at E. The flow of the water is regulated by the rack and pinion B, worked from the outside by the side-lever (Fig. 1) which starts or stops the machine. The motor hardly weighs 5 kilogrammes — 11 lbs. — and its speed of rotation can be varied between 60 and 18,000 turns per minute. It can be actuated either by compressed air, steam, or water. Fed with water at a pressure of 36 mètres, it

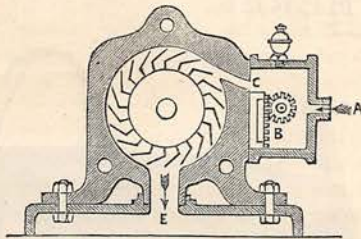


FIG. 2.

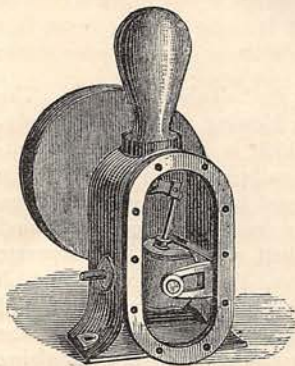


FIG. 3.

will expend 250 litres of the same, thereby performing a kilogrammètre of work per second, which is power enough to work a sewing machine or a small lathe.

Fig. 3 represents a motor designed for sewing machines by Herr Schmid, of Zurich. It is a piston machine with an oscillating cylinder, and acts like a steam-engine, but with water under pressure instead of steam. An air reservoir serves to regulate the working. Fig. 4 shows it installed to drive a sewing machine, A being the stop-cock for letting on the water, B the inflow pipe, C the outflow pipe, E the brake put in action by the pedal or footboard of the machine, F the belts or cords for transmitting the motion, and G the fly-wheel. With a water pressure of 25 mètres, and an expenditure of 150 to 450 litres, it can drive two machines at a speed of from 100 to 300 turns per minute. Its weight does not exceed 7 kilogrammes.

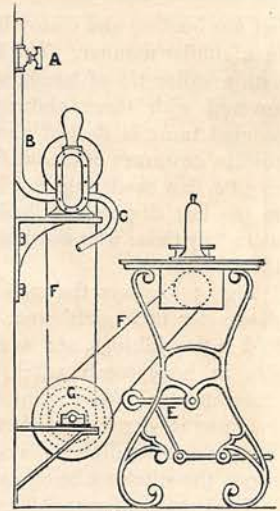


FIG. 4.

**Driving a Sewing Machine by Dog-Power.**

It is by no means a new idea to employ dogs besides other animals in turning or driving machinery, but the most recent application of canine power is so ingenious as to call for special mention. The two

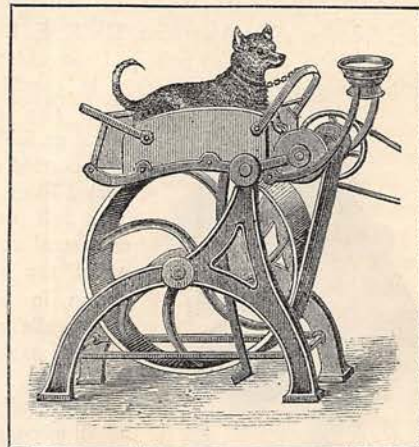


FIG. 1.

illustrations almost explain themselves. In Fig. 1 the animal is represented at rest, and in this position, its centre of gravity being maintained, it does not act upon the machine. However, as soon as the box that holds the dog is placed in the situation marked in Fig. 2 by dotted lines, the creature's weight is enough

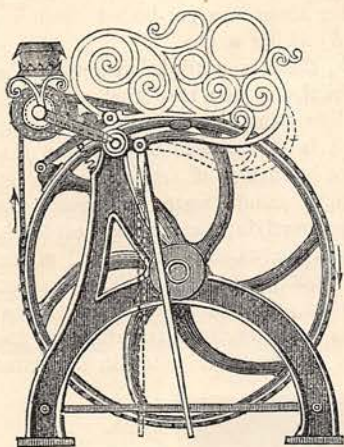
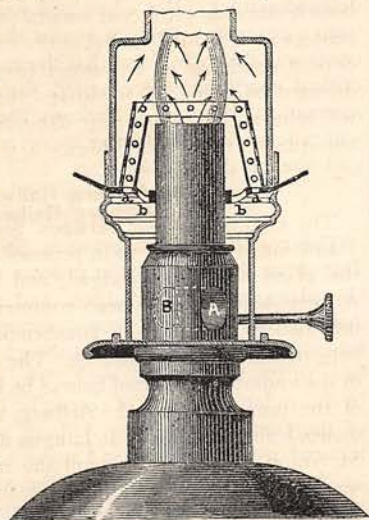


FIG. 2.

of water is placed in front of the box for his convenience. Mr. Richard, the inventor, is a maker of military uniforms, and he drives a large number of his sewing machines by means of his four-footed motor. There can be no positive objection to this employment of dog-power, provided the animals are well looked after and are not over-worked, though we think inanimate motive-power is far preferable.

#### A New Petroleum Lamp.

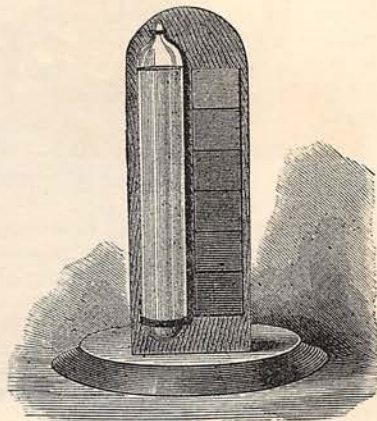
Our engraving represents an improved household lamp for burning petroleum, gasoline, or naphtha, which has been invented by M. Charlot, of Paris. Its chief merit lies in the fact that it does not generate any noxious fumes, and gives a most brilliant light. Both of these conditions are secured by making the combustion of the oil very complete, and this is effected by the special manner in which the air is supplied to the flame. The air designed to feed the flame from below enters by the orifice A B, and passes upwards in four separate currents divided from each other by inner partitions. It then passes by three concentric passages, and each of the three blasts thereby produced is made to converge at a different angle on the flame. The air intended to supply the outer surface of the flame is admitted by the apertures *a b*, and passes upward by the concentric funnels, as shown by the arrows. The flame is thus blown upon by



several distinct currents of air at different parts, as indicated by the arrows, and it is therefore thoroughly served with the oxygen necessary for entire combustion. Any kind of chimney will suit the lamp—a matter of some importance in country districts. Risk of explosion in filling the reservoir is also avoided, for to do this it is necessary to unscrew the burner, and therefore to extinguish the light.

#### A Novel Thermoscope.

It has been discovered that chloride of cobalt dissolved in alcohol yields a solution which changes colour according to the temperature of the surrounding air, and the fact has been happily applied to the construction of a very simple thermoscope, or heat detector. The best solution is made by dissolving a few crystals of pure chloride of cobalt in two or three drachms of warm water, then adding strong alcohol, until when exposed to a temperature of about 70° Fahr. the liquid presents a slaty colour, intermediate between pink and blue. The proportions of ingredients are then about twenty grains of the salt to each fluid ounce of alcohol. When too blue, a little more alcohol, or a drop of water, has to be added to the solution; when too pink,



a few more grains of the salt are to be added. The liquor may be poured into a long narrow test-tube, so as to leave the upper part of the tube empty for sealing by the blowpipe.

When exposed to cold air, the solution becomes a lively pink colour, which, as the temperature of the air increases, passes through various shades of colour, until at last, when quite warm, it has taken a blue or violet tint. These colour changes are due to the fact that in the cold alcoholic solution the salt appropriates a portion of the water, and when heated parts with this water of crystallisation. When provided with a scale of tints for comparison, such as that gummed alongside the tube in our engraving, the changes in the hue of the liquid become a rough index of the temperature of the atmosphere, or of neighbouring bodies.

While upon this subject we may mention that Professor Langley, an American, has discovered that very thin sheets or flakes of iron are extremely sensitive to heat. At the recent meeting of the United States National Academy of Science, he exhibited some iron foil rolled by the Pittsburg Mills, so thin that it took from 10,000 to 12,000 of them laid one above

another to build up an inch in thickness. From these he has produced an apparatus which has to radiant heat almost as prompt an action as the human eye has to light, and which has far greater sensitiveness than any kind of thermo-pile known. The true construction of the apparatus is, however, still a secret.

#### A Volcano in a Lake.

A grand and novel geological effect, the sudden outburst of a volcano in the midst of a tranquil lake, took place in January at Ilopango, in the Republican State of San Salvador, Central America. Submarine volcanoes are by no means rare; and, although not generally known, it is hardly a secret that the delay

the lake were floating about in a par-boiled condition on the surface of the reeking waters.

Curiously enough, there is a tradition among the Spaniards on the banks of the lake that when the waters rise above their usual level, earthquakes may be expected, and it is the custom to help the discharging of the lake by means of artificial channels. This year, these aids would seem to have been insufficient, and the overlying water has evidently forced its way through the crannies in the bed of the lake down to the underground fires. The sudden evolution of steam thus produced would thus account for the earthquakes and eruption, according to the received hypothesis. Like other lakes in the same



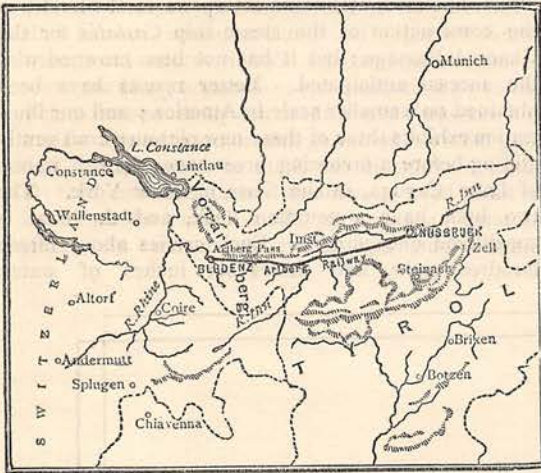
A VOLCANO IN A LAKE.

in laying the telegraph cable to the Cape, recently, was partly due to the outbreak of a volcano on the seabed near where the cable was deposited, somewhere off the coast of South Africa. The sudden upstart of volcanic fires from the quiet bosom of an inland lake is, however, a more unusual occurrence. The event was preceded by three shocks of earthquake, not sufficiently violent to damage the houses of the district. They were most severe in the environs of Lake Ilopango, near the town of San Salvador, and three volcanic vents belching great volumes of steam, sulphurous gases, dust, and stones high into the air, suddenly arose in the middle of the lake. After a time, the three vents merged into one, and the showers of fiery cinders built up a small island round the crater. Our illustration is from a photograph of the volcano, taken by the French Consul at San Salvador. Attempts were made to reach the islet, but owing to the suffocating vapours, and the boiling waters of the lake surrounding its heated shores, they were all frustrated; and, according to the latest news, the dead bodies of the fish and other aquatic denizens of

district, Ilopango probably occupies the crater of an extinct volcano, or rather a volcano which has been deemed extinct. For a hundred years, at least, it has been quiescent, yet recent events show that the quiescence was deceptive, and that the mountain was in the critical condition of a charged firelock which at any moment might go off. Perhaps the recent explosion will relieve the slumbering dangers of the situation, and quench the residual fires.

#### The Arlberg Railway.

The connecting-link between Switzerland and the Danubian Provinces is in process of formation. All the plans have been lodged, and the works for the Arlberg Railway have been commenced. The line is intended to extend from Innsbruck through the Arlberg to Bludenz, *via* Landeck. The greatest difficulties in the undertaking will of course be in the construction of the tunnel through the Arlberg, which will be commenced simultaneously at Langen on one side and at St. Anton on the other side of the mountain. Should water-power not be available, steam will be resorted



to for rock-drilling and other purposes. The Austrian Government will provide all the machinery. The viaducts and bridges will be commenced next year, and it is anticipated that the portion of the line between Landeck and Innsbruck will be ready for traffic in 1882. In 1884 all the approaches to the tunnel will be ready, and meantime the passengers and merchandise will be specially conveyed over the mountain in waggons. The boring of the tunnel will be done by double galleries, but it is not expected that the tunnel will be actually ready for through traffic before 1885, although the opening of the passage is fixed for August 20th, 1883. The progress of the drills is estimated to be three mètres a day. When the line is complete travellers will be able to go from Calais to the Danube without change of carriage.

#### The Cleansing of Sponges.

We have received the following communication :—  
 “A correspondent of the *Gatherer* recommends the use of spirit of salt for cleaning sponges. As this is one of the most dangerous and deadly poisons known, I scarcely think it ought to be recommended for domestic use without a word of warning, especially as there are several perfectly innocent remedies for the evil Mr. Marsden complains of. A tea-spoonful of liquid ammonia in a pint of water will cleanse a small sponge from any grease; the juice of a lemon, or equal parts of vinegar and water, will effect the same. Personally I have found that simply rinsing the sponge and drying it daily in the open air keeps it perfectly sweet and clean.”

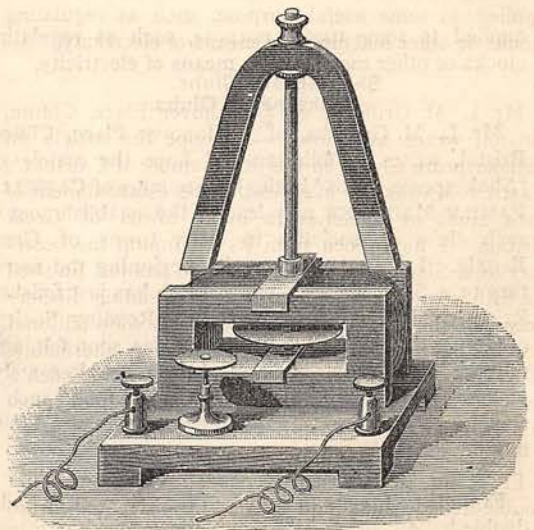
Another correspondent writes :—“Several recipes for cleaning sponges have recently been brought before the public, each more or less expensive; but none of them, I think, are more effectual, and certainly none as cheap as a strong solution of common salt and water, in which the sponges should be allowed to soak for a few hours.”

“An Anglo-African” writes :—“I have always found,

after many years' use of the same in the tropics, that exposure to the hot sun for a few hours, until *thoroughly* dried, would cleanse it from sliminess; and in England, drying before a clear fire or in an oven has the same effect. In each case, however, care must be taken that the sponge is *dried to the core*, which can be easily ascertained by inserting the point of the finger in the holes to ascertain that no sliminess remains in the centre. This sliminess, I have found, has always proceeded from the sponge not being *immediately after use wrung quite dry*, and also from letting it lie some time in the water before wringing. But when the sliminess has once commenced to form, in ever so little a degree, a *thorough* drying alone will prevent its increasing. I may also say that sponges should never be left in a sponge-dish; they should be kept suspended, or in a rack, where the air can circulate freely around them. In a wind, or draught, would be better. Either way will greatly tend to keep them in a proper state. *Quick evaporation* of the dampness is the *main thing*.”

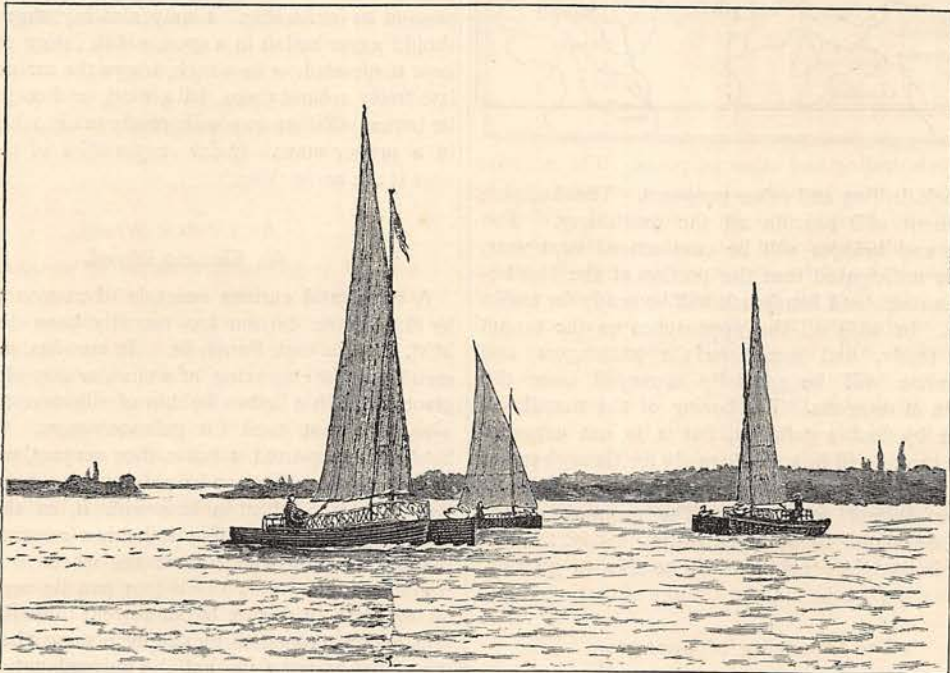
#### An Electric Wheel.

A novel and curious example of motion produced by the electric current has recently been devised by MM. Lontin and Fonvielle. It consists, as will be seen from our engraving, of a circular disc of soft iron pivoted within a hollow bobbin of silk-covered copper wire, like that used for galvanometers. Over the bobbin is supported a horse-shoe magnet, which can be turned so as to place its poles across the coil or in line with it. When in line with it, as shown, the passage of an intermittent induction current through the coil is sufficient to start the wheel or disc into rapid rotation. This movement can be reversed by changing the direction of the current through the coil, or stopped altogether by simply placing the poles of the magnet *across* the coil. The explanation of the effect lies in the fact that the induced current in the



secondary circuit of the induction coil is always stronger when due to rupture than when due to closure of the primary circuit. Hence, as the disc is magnetised by the influence of the horse-shoe magnet, and therefore tends to rotate in opposite directions under the action of the opposite momentary currents in the coil, the stronger set of momentary currents (due to rupture) will overbear the closure currents, and drive the disc continuously round in one direction. There is no new law involved in the apparatus, but it is interesting as a scientific toy and lecture illustration, even if it should not ultimately be

greater stability than can be obtained from a single hull. The most ambitious enterprise of the kind was the construction of the steam-ship *Castalia* for the Channel Passage; but it has not been crowned with the success anticipated. Better results have been obtained on a smaller scale in America; and our illustration exhibits three of these new pleasure-craft gently gliding before a favouring breeze over the still waters of Lake Cayuga, in the State of New York. The two hulls have a common deck, and the boat is considered uncapsizable. Each carries about fifteen hundredweight, and draws six inches of water.



DOUBLE BOATS.

applied to some useful purpose, such as regulating clocks or other machines by means of electricity.

#### Shakespeare Clubs.

Mr. L. M. Griffiths, of 3, Hanover Place, Clifton, Bristol, writes as follows:—"I hope the article on 'Shakespeare Clubs' in the June number of CASSELL'S FAMILY MAGAZINE may lead to the establishment of such clubs or societies in many towns of Great Britain. I have been from its beginning the secretary to a Shakespeare Society which has just finished its fifth session. We began as a Reading Society only, but the need of critical work was soon felt, and now we have reading and critical meetings alternately. If any of your readers are intending to found such a society, I shall be most glad to give any help or information I can."

#### Double Boats.

From time to time there have been attempts to build double-hulled ships and boats, in order to insure

Thanks to the twin keels, it answers the helm more quickly than an ordinary boat, and moreover is swifter in a race; but its main advantage for pleasure purposes lies in its great safety.

#### THE "HOME MANAGEMENT" ESSAY PRIZE.

*Our readers will be interested to hear that we have received a large number of Essays for this competition; and as it will accordingly take some time to weigh carefully the relative merits of each MS., we can hardly hope to publish our award until September or October next. Meantime we may remind Competitors that the DOUBLE ACROSTICS, for the best set of which a similar Prize of Five Pounds was offered in our April number, must be in the Editor's hands not later than September 1st, 1880.*