THE GATHERER.

Sanitary Paint.

The lead base of ordinary house-paints is known to be unhealthy, and it is satisfactory to find that a London firm have introduced a new class of pigments, prepared from sulphate of zinc and sulphide of barium. Both of these bases are harmless, and at the same time produce a more imperishable paint than lead. The sulphate of zinc is prepared by dissolving scrap zinc in dilute sulphuric acid, and the sulphide of barium is made by a secret process of the inventors. The two solutions are mixed in tanks, and a white precipitate is thus formed. This is calcined at a temperature of 1,000° Fahr., and then thrown hot into cold water. By this means a very fine powder is obtained, and sold under the name of "Griffith's white."

Silicate paint of a very superior kind is also manufactured; its quality being due to the purity of the silica employed in its preparation. This pigment is particularly adapted for painting ironwork, as it exerts no chemical action upon it, and has excellent weather-proof properties.

An Iron Lightning Conductor.

At a recent lecture delivered at the Royal United Service Institution, Captain James Bucknill, R.E., who has been employed for some time past in testing and inspecting the Government lightning conductors placed on powder magazines, strongly advocated the use of iron conductors in preference to the usual copper ones. The advantages of iron over copper chiefly consist in their comparative cheapness, and lesser likelihood of being stolen or injured, their higher fusing point, and greater mass. A wire rope without any joints, except what are carefully soldered or welded, is preferable to a rod, pipe, or band; and for ordinary purposes Captain Bucknill recommends an iron rope weighing 6 lbs. per yard, or a good copper rope weighing at least 1 lb. per yard. When, however, the conductor is led up one side of the building, over the roof, and down the other side, with an earth connection at both ends, the iron rope need not weigh more than 3 lbs. per yard. Captain Bucknill does not advocate lofty rods reaching a good way above the building, but he recommends that they should be terminated with a set of discharging points.

While upon this subject we may mention that the French Minister of Posts and Telegraphs, M. Cochery, has given orders that all thunderstorms shall in future be recorded in detail at all the telegraph offices in that country. Printed forms of queries to be answered are provided for this purpose, and the plan is so promising, that if it were extended to the general public our knowledge of thunderstorms might be largely increased.

Plastic Metal.

A very useful material which may be described as a metal paste has recently been invented. It resembles ordinary white metal in appearance, such as is used for lining the bearings of axles in railway carriages or machinery, and it has a hard close texture, capable of taking on a high polish. Nevertheless, it can be readily pasted on and spread over another metal by means of a hot soldering-iron, and it adheres to its base with great tenacity. It fuses at a temperature of 450° Fahr., and can therefore be readily melted over an ordinary fire. Containing, as it does, neither lead nor spelter zinc, it may be melted over and over again without deteriorating in quality, and this combination of useful properties must render it a very serviceable article in the colonies, where casting furnaces or other foundry appliances are few and far between.

The Telegraph in Arctic Travel.

An ingenious hint for the use of future explorers in the Arctic regions has been given by Mr. James Gamble, General Superintendent of the Western Union Telegraph Company at San Francisco. He suggests that sledge parties making a dash at the Pole, or striking out across the ice for geographical purposes, should take with them a light telegraph wire coiled on reels, and pay it out along the ice as they proceed. Ice is a good non-conductor, and the wire need not be insulated with any such material as cotton, thread, or gutta percha. A bare steel wire weighing about twenty pounds to the mile will serve the purpose, and as a hundred miles of it would only weigh 2,000 lbs., it need not form a serious drawback to the progress of the party, seeing that it would be paid out as they go. A battery at the ship or starting-point would serve to work the line, and the sea would form the return wire, provided the ice were bored through, and a good "earth" contact for the wire obtained in the water underneath. Mr. Gamble proposes to employ a Morse apparatus to receive the messages, but in our opinion a telephone would answer very well. If the messages were transmitted by the ingenious instrument known as the Theiler Sounder, which transmits musical notes, these could be received on a telephone; and recent experiments at Aldershot have proved that such a message can be transmitted through a bare copper wire laid on the ground. The metal line would be a guide to the explorers on their journey back, and communication with their shipmates would encourage them to penetrate as far as possible.

A New Life-Buoy.

The sketch on the next page illustrates an improved life-buoy, invented by Mr. Whitby, late of H.M.S.

Excellent, and recently tried at Erith with success. Like most buoys it is formed of a hollow ring, divided into air-tight compartments; but it is provided with

a chain on which the floating sailor can rest his feet, as shown in the figure. By resting his back on the inside of the ring, the person can hail a ship by means of an extemporised flag or lights. The latter are attached to the ring, and the largest of them fires itself the moment the buoy alights on the water, so that its whereabouts may be seen. For foggy weather, too, a shrill whistle is added to the equipment; and the buoy can be hoisted on board a passing vessel by throwing out a "whip" from the yard-arm, thus avoiding the necessity of lowering a boat in rough weather. It should also be added that the new buoy packs in less bulk, is more buoyant and less expensive than the ordinary service buoy.

Straw and Hay Fuel: a Suggestion.

An American farmer has issued an earnest appeal to inventors for a machine to compress straw and hay with a view to the use of these articles as fuel. He says that over a great part of the West, immense quantities of straw are allowed to rot in the field or are burned in the stack, as in that portion of the continent it is practically worthless. Thousands of tons of wheat-straw are burned every year as soon as it is thrashed, merely to get it out of the way, and prairie hay that costs only the cutting and stacking is simply permitted to rot; and while all this sad but unavoidable waste goes on, fuel is scarce and high-priced. Why, he urges, cannot this vast amount of hay and straw be compressed, by specially-devised machinery, into bricks of convenient size for burning in ordinary stoves? If machines of this description could be turned out at a moderate price and to work effectually, the Western farmers would largely patronise them and save thousands of dollars annually. Hay stoves are in use in some localities, but are objectionable for two solid reasons. In the first place, a great amount of valuable time is spent in twisting up the hay by hand to feed the stoves. Secondly, the room is kept constantly littered with loose hay. If the recommendations of this American farmer are impracticable in the particular manner indicated by him, it has been suggested that the hay might be utilised in the manufacture of paper and in other industries.

Map Rack for Schools.

The maps used in schoolrooms are usually suspended on the walls, and frequently allowed to remain there throughout the session. Consequently they deteriorate rapidly. The colour fades, and the dust makes them dirty. The appliance represented in the accompanying woodcut has for its object the proper

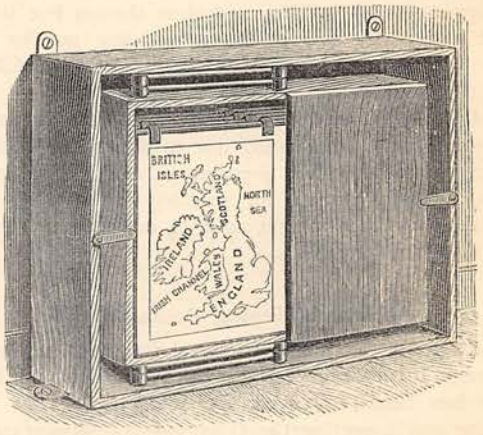


FIG. 1.

exhibition of maps, and also the protection of them when not in use. A reversible frame is supported top and bottom by two jointed arms in a stationary frame fastened to the wall. One half of the reversible frame is covered to form a recess, into which the maps may be pushed when not in use. The maps slide upon rods, and as the frame is reversible they may be viewed from either side merely by turning it. The outer frame may be screwed to the wall or supported upon an easel or other stand. Although the rack will be found particularly serviceable in the schoolroom for the reasons already stated, it is obvious that it can be used in shops or warehouses for the display of large business placards and advertisements. Fig. 1 shows the rack in

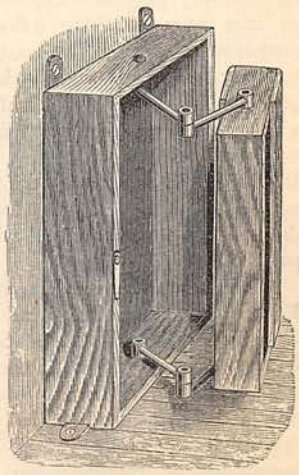
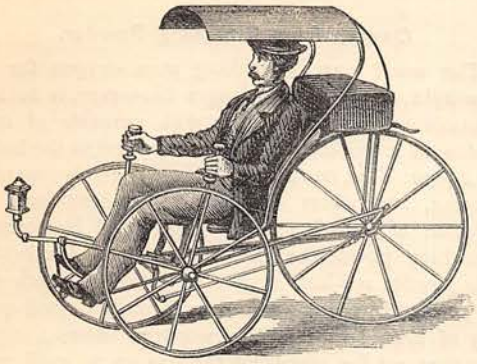


FIG. 2.

proper position during a lesson in geography. Fig. 2 explains the action of the jointed arms in reversing the frame.

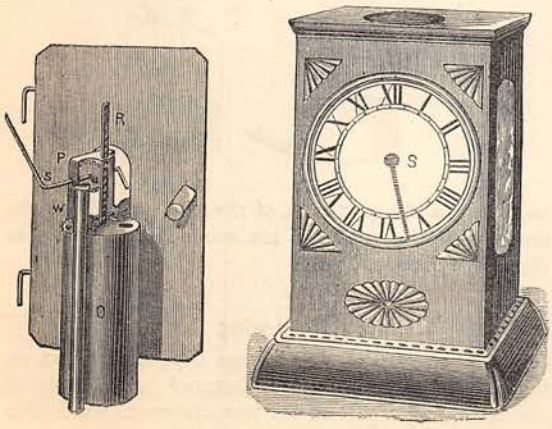


A Tricycle Carriage.

The velocipede represented in the engraving presents, so far as the machine is concerned, similar features to many of the vehicles now coming into extensive use. It contains, however, certain additions which render it a very suitable means of transport to those who are obliged to travel a great deal, the adaptation to such requirements having been suggested by the absence in most, if not all, of the ordinary bicycles and tricycles of a protection against weather. The rider sits in a comfortable chair above the forward axle, and holds the guiding handles attached to this axle, the feet resting upon pedals connected by rods with cranks on the rear axle, and the carriage being driven by the alternate movement of the pedals. The lantern is carried well in front, a canopy protects the rider from rain or sun, while light baggage such as most travellers require is supported behind. The idea of the canopy must be considered as a happy thought, as the want of such a covering has often been severely felt by 'cyclists in the open country when visited by a sudden rain-storm.

A Night-Light Clock.

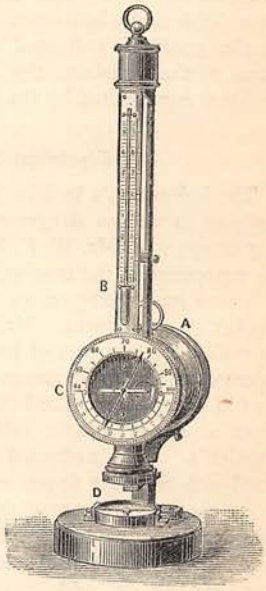
A noiseless clock, which also performs the function of a night-light, has been devised by Mr. Robertson.



In it the sinking level of the oil is caused to actuate the wheelwork by means of a float. This will be understood from the figure, where O is the oil cylinder, in which is a float carrying a vertical rack, R, which gears with a pinion, P, and turns a spindle, S, on which the clock-hand is fixed. The wick is contained in a suitable tube, W, connected with the oil; and as the latter is consumed, the sinking float actuates the hand of the clock. The light of the wick is allowed to escape by glass windows in the sides of the case, and also by the transparent face of the dial.

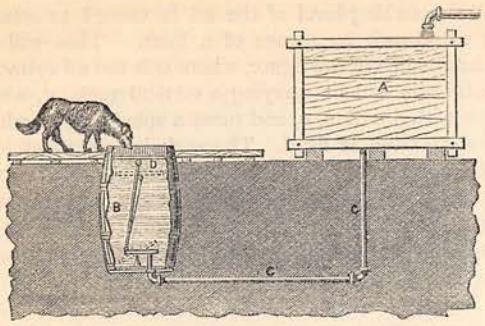
A Portable Meteorological Station.

Amateurs in meteorology will be interested in the apparatus which is illustrated below. It is the invention of M. Georges Sire, and is designed to enable tourists or private individuals to observe the three chief meteorological data, viz., the pressure, temperature, and humidity of the air. For this purpose, a barometer, A, thermometer, B, and hygrometer, C, are combined in one instrument, while a magnetic compass, D, is added for convenience. The barometer is an aneroid of portable construction; the thermometer is a mercury one, fixed upon a metal stem which forms the handle of the apparatus. It is graduated from 25 deg. below to 40 deg. above zero of the Centigrade scale. A hair hygrometer is employed, because it is sufficiently exact for general meteorological observations, and is the only one which will act at altitudes where the temperature is below zero. A scale, C, is attached to the face of the barometer, in order to show at a glance the moistness of the air corresponding to the reading of the hygrometer.



A Fresh Water Supply for Animals.

People are, very naturally, much interested in the question of a constant supply of fresh water for household use, and they will doubtless be glad to learn about a new device for securing the same benefits to domesticated animals. The woodcut on the next page gives a good idea of the working of the appliance, of which the chief recommendation is that it provides a regular supply of clean water, and prevents its waste. A barrel, B, is placed in the ground, and by means of a pipe, C, is connected with a tank, water-main, or stream. Upon the end of this pipe, which projects a



few inches into the bottom of the barrel, rests a pivoted valve, which also communicates with a float, D. This float is so arranged that when the barrel is filled it acts upon the valve so as to close the pipe C. When the animal drinks the level of the water falls, and the float sinking with the water, the valve is tilted up, and the pipe C once more admits the water until the barrel is again filled. By this means the water is always kept fresh and wholesome. When the float has sunk to the position indicated by the horizontal dotted lines in the woodcut, the valve then occupies the position represented by the diagonal dotted lines.

Electrical Steering.

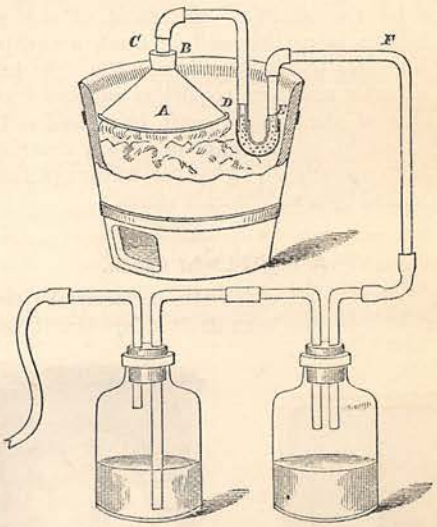
The helmsman's task in rough weather is often an arduous as well as dangerous one ; and the self-steering compass of Mr. W. F. King is therefore likely to be welcomed in the marine, should the practical trial it is now undergoing on an ocean steamer endorse the verdict of experiment. Mr. King employs electricity to enable the compass of itself to steer the ship. He operates the helm by means of a hydraulic apparatus, and in turn actuates the latter by the electric current from a single voltaic cell of the kind known as Daniell's. This is effected by providing the compass-card with an index tipped with metal, and this index is set to the true course the ship has to follow. At one degree on each side of the true course, however, a small metal pin projects through the side of the compass-box in such a manner, that if the ship deviates a degree from the true course, to right or left, the metal point of the index will come into contact with the right or left metal pin, and this contact will complete the circuit of the battery, and send the current flowing to work the hydraulic apparatus which moves the helm. According to the direction of deviation, the helm will be shifted to port or starboard until the true course is recovered. The accuracy of the steering is even greater than that of a practised helmsman ; but as all electric apparatus is liable to fail without warning, it will be necessary to provide a helmsman in case of accident.

A Scented Camellia.

The wax-like flower of the camellia has long been a rival of the rose in point of beauty, but it has hitherto lacked the delightful perfume of the latter. After years of fruitless effort, however, a gardener of the Palazzo Ferentino, at Naples, has indued a rose-tinted camellia with a faint sweet fragrance, resembling the scent of jonquil. Having succeeded thus far, he hopes to endow the white camellia with the like fragrance.

Oxygen from Bleaching Powder.

The usual way of making pure oxygen for the lime-light, or the oxy-hydrogen blow-pipe, is to heat potassium chlorate together with peroxide of manganese in a cast-iron crucible connected to the holder by a pipe. This, however, is a comparatively expensive process, and where cost has to be considered the chlorate of potash may be superseded by common bleaching powder or chlorinated lime. On heating this powder red-hot, oxygen is given off, which may be purified by passing it over or through a small quantity of heated lime. The woodcut shows a simple arrangement for preparing the gas on a small scale, say a few cubic feet at a time. A retort, A, made of sheet-iron, doubly lapped and riveted, is fitted at the neck, B, with a piece of one-inch steam-pipe, C, which is connected by an elbow to a longer piece of pipe, bent downwards below the bottom of the retort, then connected by a second elbow to another pipe bent upwards above the bottom of the retort and leading, by the pipe F, to a condenser and wash-bottle as shown. The space from D to E is filled with granules of quick-lime, each a little bigger than a pea. Two or three pounds of the bleaching powder having been put in the retort, the pipe is cemented at B, with clay or plaster of Paris, and a charcoal fire is applied so as

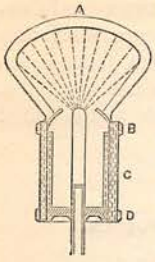


to surround the part D, E, of the pipe as well as the retort. With a good fire ten minutes will suffice to disengage the gas.

Siemens' Bat's-wing Burner.

The luminosity of a gas-flame depends in part on the quantity of solid carbon liberated in the body of the flame, and in part on the temperature to which this

is raised. To elevate this temperature, Dr. C. W. Siemens has contrived the bat's-wing burner shown in the figure. A copper rod, A, is bent so as to gird the edge of the flame, and supported by a hollow cone, B, which directs the air to the flame. This cone is the cap of a series of concentric cylinders of wire gauze, C, carried by a disc, D, attached to the gas-pipe; and these, being heated by conduction from the copper arch, in turn heat the air as it rushes through their meshes to feed the flame. Thus the waste heat of the flame itself is made to heat the blast, and the result is a considerable increase in the illuminating effect of the flame, due to its higher temperature. For in the simple bat's-wing or other burner the inrush of cold air cools the flame unnecessarily.



A Glove Fastener.

Buttons on gloves may be all very well for ornamental purposes, but they are not by any means useful as fasteners. They are either always coming off, or generally cause the gloves to be torn. A new fastener has been invented, which is said to be durable and effective and does not tear the glove. It consists of a hollow stud containing a spring that projects through slots in the sides of the stud and catches on the shoulder of an eyelet as the stud is passed through or into it, thus locking the two together, the eyelet and stud being fastened to the opposite lapels of the glove.

A New Telephone.

A speaking telephone of a new description has been invented by Professor Dolbear, of America. The peculiarity of it lies in the absence of magnets from its construction. As illustrated in Fig. 1, which exhibits a section through the heart of the instrument, it consists of two metal plates or diaphragms, C D, electrically insulated from one another and fixed in a wooden frame. These plates are free to vibrate under the influence of the telephonic message, and the frame is hollowed out so that it can be applied to the ear. The back plate, D, is pressed against at its middle by an adjusting screw, which regulates its distance from the front plate and prevents its vibrating. Only the front plate is thus free to vibrate. Now the current from the telephone line is connected to one plate, while the other is connected to the "earth," or return wire, and the result is that both plates, being insulated from one another and oppositely charged, attract each other. The undulating vocal currents of the message, therefore, set up a vibration in the front plate, which is heard as an audible sound—speech or music as the case may be. The transmitter employed to send the vocal currents is a form of microphone, and the whole arrangement of the circuit is shown in Fig. 2, where T is the transmitter; B, the battery generating the current; and I, an induction coil having its primary

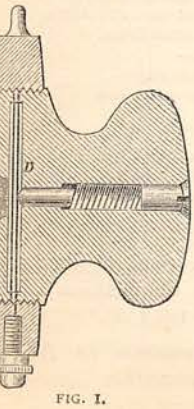


FIG. 1.

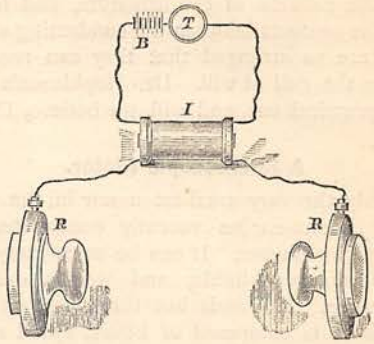


FIG. 2.

circuit connected to the battery and transmitter, while its secondary circuit is connected to the line and the receiving telephones, R R. Only one wire is shown connected to the telephones because, being an induction telephone, a return wire is not absolutely necessary. For if the line be connected to one metal plate, say C, by the screw A (Fig. 1), and the body of the operator, standing on the ground, be connected to the other plate, D, by touching the outer end of the adjusting screw in the case, the two plates will act inductively on each other, and the telephone will speak almost as well as if it had a return wire.

A Cold Light.

A lamp for giving light without heat, and hence termed the psychrophor or cold light, has been brought out by Dr. Michael, of Hamburg. It consists of a glass globe exhausted of air and containing phosphorescent substances in the form of powder. This powder is rendered luminous by electrifying it from a wire or electrode of aluminium, connected to the pole of a Ruhmkorff induction coil. This is performed at will in holding the electrode to the powder by means of an ebonite handle. The intensity of the light is regulated by regulating the strength of the current from the Ruhmkorff coil; but with a weak apparatus it is intense enough to enable a person to read small print when held near the eye. This contrivance will have its use in surgery, where the heat of incandescent electric lamps or other lights is against their use.

An Electric Hoist.

Dr. John Hopkinson, F.R.S., has successfully applied the current from a dynamo-electric machine to the operation of a hoist for lifting boxes and other weights to a height. The hoist consists of a metal

frame, carrying a small dynamo-electric machine within it; and the coil of this machine is connected by means of wheelwork to the pulley which winds up the chain in lifting the weight. An electric current is conveyed by wires to the armature coil of the dynamo-electric machine on the hoist, from the stationary machine which generates it; and as soon as the current flows, the coil revolves and the weight is raised. To reverse the rotation of the armature, and lower the weight, the contacts between the conducting wires and the coil are so arranged that they can reverse the current in the coil at will. Dr. Hopkinson's hoist is now in practical use, and will, we believe, lift half a ton.

A Microscopic Motor.

Probably the very smallest motor in the world is the tiny steam-engine recently constructed by an American clockmaker. It can be completely covered by an ordinary thimble, and weighs only about fifteen grains. It stands but three-fifths of an inch high, yet it is composed of boiler, speed regulator, and cylinder, all complete. No less than 140 distinct pieces have gone to build it up, and these are connected by fifty-two screw-nails. The stroke of the piston is about one-twelfth of an inch, and two drops of water serve to fill the boiler.

A New Water Elevator.

Rotary machines have been employed for raising water during many years, but hitherto they generally consisted of an immovable cylinder, in which the water is circulated by rotating paddles until it acquires sufficient centrifugal force to elevate it through a pipe. The highest lift attained in this way has been 130 feet, but a recent invention of a young French engineer, M. de Romilly, enables water to be raised 500 feet or more. The new elevator consists of a flat horizontal cylinder or pan, fed with the water to be lifted, and rapidly rotated round a vertical axis by means of a pulley. The motion of the pan causes the water to circulate round its internal walls, and a tube reaching down from the height to which the water is to be raised is brought into the pan, and terminated in a curved nozzle turned towards the circulating liquid. The swirling water, by virtue of its momentum, rushes into the nozzle and ascends the tube.

Coir Soles.

The outside fibre of the cocoa-nut, or "coir," as it is called, is now employed in Jamaica for making the soles of boots and shoes. The fibre is incorporated with a glutinous cement under heavy pressure, and then stamped into form. The result is a material similar to leather, and capable of resisting both damp and wear. While upon this subject, we may mention the "Eisoleon," or smooth-soled foot-gear, recently introduced into London. By revolutionising the immemorial practice of fastening the soles with pointed pegs driven inwards, the inventor has obviated all the discomfort which frequently arises from the protruding pegs.

A Family Balance.

In a recent number of the GATHERER we illustrated a handy balance for domestic use which has been brought out in France. It proves, however, to be almost identical with an English balance introduced by Mr. Salter, of West Bromwich, and invented by Mr. Silvester.

Prize Answers to Prize Acrostics.

BY CHARLOTTE P. MITCHELL.

V.

Upon the fifth the potent word I breathed,
And lo! a *Frith* whose waves in tempest seethed;
And, bluff as breeze that blows across the tide,
England's eighth *Henry*, laughing, stood beside.
But as I gazed this frith, the *Forth*, was gone,
And nigh the rapid *Rhine* I stood alone.
Yet not alone; for in the mystic deeps
An unseen spirit sings with voice that creeps
Thrilling through all my being; 'tis a song
Whose verses all dwell lovingly and long
On many a stirring tale of fiercy fight
From *Inkerman* back to the old time when
The lion-hearted Barak with his men
Swept down on Sisera from old *Tabor's* height.
But while I listened came there to my side
Henry once more, who in the rapid tide
Gazed absently! I turned and spoke him there,
But at my voice all swift dissolved in air!

VI.

Oped the last mystic vessel; then—ah, sweet!—
I knelt in rapture at the beauteous feet
Of her, my *Sarah*, loveliest maid on earth,
Of whose sweet smile love in my heart had birth!
But as I gazed she faded, and there stole
Thoughts of *Annette* across my troubled soul;
Maid whom I one time loved; then *Rosabel*,
And *Adeline*, one time beloved as well,
But now almost forgotten. Then said I
Bitterly, "Love is but a butterfly!"
But, ah! a maid more beauteous than the rest
Comes to my soul, a pale unbidden guest—
Helen! oh, anguish! she, the queenly child
Whom, from my arms, a fairer youth beguiled!
I reached my yearning arms and bade her stay,
But she too vanished like the rest away;
Then came a wraith upon whose face was shown
Somewhat of every love my heart had known;
And now 'twas *Sarah* that stood weeping there,
And now 'twas *Helen*, tall and queenly fair.
I started forward, reached my arms and spoke—
But hark! an anguished moan,
And I am turned as 'twere to marble stone;
For lo! the Sphinx hath spread its mighty wings
And o'er the cave a shade of horror flings!
Up through the roof it soars—
A deadly chill across my bosom creeps—
Rent is the roof and the vast ocean roars
Through all its deeps!
Far up the vaulted sea
Hovered the Sphinx a moment over me,
Cleaving the wave with agonised stroke,
Then came a hideous fall—and I awoke!

Chess Problem Competition.—Our readers are reminded that Problems for this Competition cannot be received later than September 1st, 1881.

Prize Essay on True Economies in Household Management.—We hope to announce the award in this Competition in our next issue.