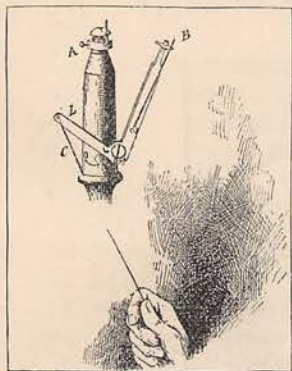


THE GATHERER: AN ILLUSTRATED RECORD OF INVENTION AND DISCOVERY.

Correspondents are requested, when applying to the Editor for the names and addresses of the persons from whom further particulars respecting the articles in the GATHERER may be obtained, to forward a stamped and addressed envelope for reply, and in the case of inventors submitting specimens for notice, to prepay the carriage. The Editor cannot in any case guarantee absolute certainty of information, nor can he pledge himself to notice every article submitted.

An Electric Gas-Lighter.



The figure illustrates a new device for lighting gas by the electric spark. The spark is produced by a small induction coil, not shown, but the illustration shows how it is applied to the gas-jet when required. A metal collar, A, is insulated from the tip of the burner, and has a small binding screw on it which connects

it in circuit with the secondary or sparking wire of the induction coil. It also carries a point projecting upwards, as shown. A crank lever, L, is fixed to the side of the burner-holder, so that when the cord, C, is pulled the other arm of the lever, B, is brought up close to the projecting point of the collar, A. This arm, B, is also the circuit of the sparking wire of the coil, and when it nears the projecting point a spark passes which ignites the gas of the jet. Other forms of the device are made, the idea being to render gas-lighting automatic.

Echoes and Icebergs.

The captain of the ss. *Kaipoura* recently tried an interesting experiment in detecting icebergs in foggy weather by the echoes which they give back. He was surprised to find echoes returned of remarkable distinctness, and it is to be hoped that other mariners will test the method when they have an opportunity.

Artificial Whetstones.

A French scientific review gives the following method of making whetstones artificially:—Dissolve good gelatine in its own weight of water, the operation being performed in a dark room. To the solution add one and a half per cent. of bichromate of potash, previously dissolved in a little water. A quantity of very fine emery, equal in weight to the gelatine used, is to be intimately mixed with the gelatine solution; or, in default of emery, use powdered flint. The mass is to be moulded into the desired shape, then consolidated by a heavy pressure. It is afterwards dried by exposure to strong sunlight for several hours.

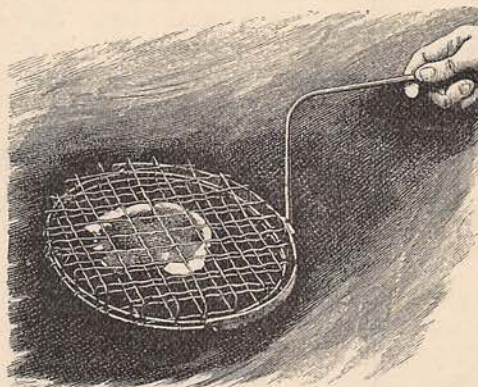
Panics and Exits.

The recent burning of the Opéra Comique Theatre in Paris has given rise to several suggestions, which

are well worthy of consideration, as means of preventing loss of life during a panic in such public buildings. One of these is given by a gentleman signing himself "B. M.," Norwood, and is to the effect that the exits provided should be not locked doors, as now, but thin partitions of plank which would stand a moderate pressure on ordinary occasions, but break down easily under forcible pressure. They might be inscribed with the notice, "In case of panic, break through." Another suggestion is that attendants should always be stationed at the exit doors to open them and let out the people. A third suggestion, which comes from Germany, is that luminous paint should be used to mark the exits in case of darkness.

An International Hydrometer.

Mr. Frank Spence has devised a hydrometer for measuring the strength and specific gravity of a solution, which can be used in all countries alike. In this instrument the scale is not arbitrary, as in existing instruments, such as Baume's or Beels's. The International Hydrometer is based on the simple principle of subtracting from the specific gravity scale the figure 1.00 for the constant—water—and leaving the remaining figures to indicate the regularly increasing or decreasing strength of a solution. To get the specific gravity from these figures it is only necessary to add 1. In the same way, for liquids lighter than water, the specific gravity is got by deducting it from the progressive figures on the scale.



A Revolving Toaster.

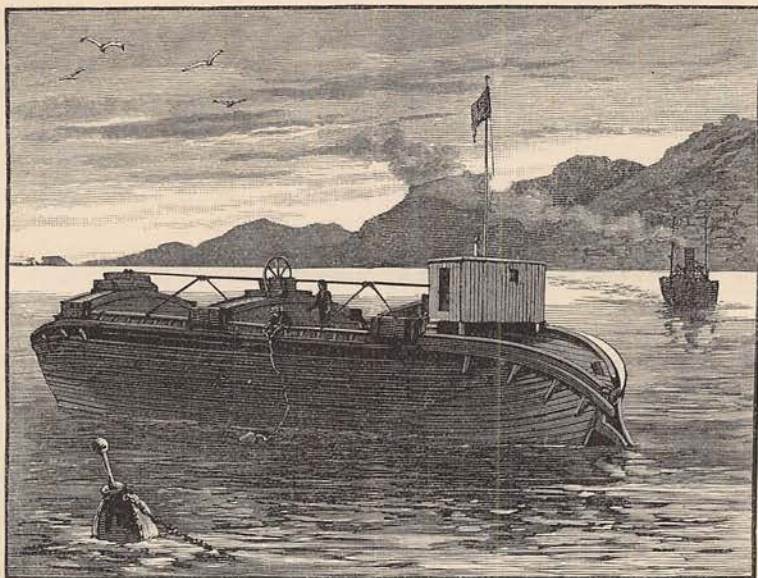
The revolving toaster and fryer which we illustrate is designed to cook fish and other things with ease in turning, and the preservation of the fish in a whole condition. It consists, as will be seen, of two flat wire cases which close together over the fish, and are

hinged so as to turn over in a half-hoop, which is provided with a long handle. It can be used in connection with an ordinary frying-pan.

A Dumping Barge.

A barge or boat for discharging or "dumping" mud or other refuse in deep water automatically has been introduced into England from America. It is shown

them, has been brought out in France. Copper, silver, and gold are the chief metals electro-deposited on their fragile bodies; but in order to do so it is necessary to have a conducting skin or coating on the body itself, to which the metal will adhere when reduced from its salt by the electric current. This coating is by the new process produced as follows:—A quantity of snails or slugs are washed in ordinary water to free them from all earthy or calcareous



DUMPING BARGE.

in our illustration, and with it two men are said to be able to discharge 500 tons and wash the boat besides in five minutes. It is built in two longitudinal airtight compartments, hinged at the top so as to open outwards below and discharge the cargo. The compartments can be held open or closed by simple means. The boat is of use at seaports, and can discharge sewage if need be. As the outlet is under the surface, the refuse is not so likely to float on the surface as if it were simply thrown overboard. New York is stated to have thirteen of these boats at work. They can be repaired without being docked.

Cream by Parcel Post.

Pure cream can be sent direct to consumers from the country by parcel post. If put up in tin cylinders tightly corked it will keep fresh for many days, and so can be brought from a considerable distance. Country farmers would doubtless be only too glad to despatch their cream in this manner if arrangements were entered into with them.

Electroplating Flowers.

A new process for electroplating delicate organic things, such as flowers and insects, and so preserving

matter. They are then placed in a vessel containing distilled water, and are left in it a sufficient time to enable them to give off the albuminous matter they secrete. This matter is then filtered and boiled for about an hour. After boiling, a quantity of distilled water, sufficient to replace that lost by the boiling, is added, with about 3 per cent. of nitrate of silver. This solution is then placed in bottles, which are sealed, and kept in the dark. To use this liquid for the preparation of specimens to be electroplated, about 30 grammes of it are dissolved in about 100 grammes of distilled water, and the objects are immersed in this solution for a few moments. They are then placed in a bath consisting of distilled water with about 20 per cent. of nitrate of silver in solution, and afterwards submitted to the action of sulphuretted hydrogen gas, which decomposes the nitrate of silver adhering to the albumen-coated surface of the object. The silver reduced fits the object to receive the metallic deposit produced by galvano-plasty.

A Test for Olive Oil.

Since, according to our Consul at Leghorn, olive oil in Florence flasks is now largely adulterated with cotton-seed oil, the following test for detecting the adulteration in question may be useful. We may

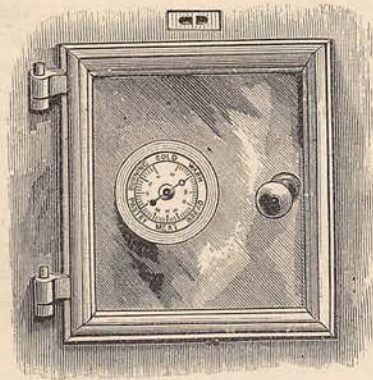
state, moreover, that Mr. Inglis, the Consul, advises persons wishing to get good pure Tuscan or Lucca oil, to order it from firms of good standing and repute, by whom the genuine oil has been imported and bottled, otherwise the Florence oil is likely to be impure. The test consists in taking $\frac{1}{2}$ to $\frac{1}{3}$ ounce of nitrate protoxide of mercury (the yellow simple salt $2\text{H}_2\text{O}_1\text{NO}_5\text{HO}$) and dissolving it in a test-tube with from $\frac{1}{8}$ to $\frac{1}{5}$ ounce of nitric acid. On this solution the oil to be tested is poured, until the test-glass is two-thirds full. The two fluids are then shaken up together for five or six seconds, and the change of colour noted. Cotton-seed oil becomes dark brown, or almost black; but after a short time the solution becomes colourless and clear. Pure olive oil has a greenish or light yellowish tinge, while the solution under the layer of oil takes a dark red or brown colour. Olive oil mixed with 50 per cent. of cotton-seed oil assumes a brick-red to brownish tinge. When mixed with 25 per cent. of cotton-seed oil it becomes orange-yellow to red-yellow. The solution of the mercurial preparation remains for the most part colourless when mixed with olive oils, as well as pure cotton-seed oils. Pure olive oils ought not to acquire a reddish tint under the test; the redder or browner the oil is, the more cotton-seed oil it contains. The test, with some practice, is capable of showing even 5 per cent. of cotton-seed oil.

A New Sleeping-Berth.

A berth for emigrant vessels, which is constructed of iron, and is capable of being taken to pieces and folded up, has recently been brought out. It is put together in a few minutes, like an iron bedstead, and, when taken down, can be stowed away in the compass of a few rods of iron.

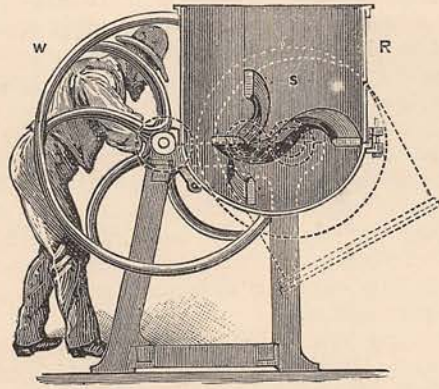
An Oven Heat Indicator.

A heat indicator for domestic ovens is shown in our engraving. It resembles a watch-dial, and is marked "cold," "warm," "bread," "meat," "pastry," and "burning," while it also tells the temperature in Fahrenheit's scale up to 600° . It is attached to the oven-door, so that it is not necessary to open the latter to tell how hot the oven is. It can be fixed to any



oven-door, by drilling a small hole through it, passing the spindle of the indicator through, and fixing it by means of brass screws provided for the purpose.

The indicator must be applied to the oven-door when cold. It is best, however, to cook with it once, in order to see what particular degree of heat on the scale is suitable to the particular oven, as ovens vary in their "cooking" temperatures.



A Mixing Machine.

Our figure shows the interior of a mixing machine for paint, cement, and such-like materials. As will be readily understood, the materials are put into the receptacle, R, and the wheel, W, is turned. This revolves the curved stirrers, S, inside, and mixes them. The dotted lines show how the receptacle is turned to empty the mixture afterwards.

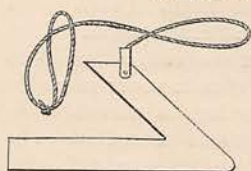
A Pocket Accumulator.

The following instructions have been given by an electrician for making a pocket accumulator:—An ebonite box, with a partition down the middle so as to form two compartments, is varnished with shellac or elastic glue to make the partition watertight at the edges. The plates are made from sheet lead $\frac{1}{16}$ inch thick, cut into six strips, an inch wide, so as to go easily into the two cells or compartments, three in each, side by side. The usual length of such strips is 3 inches, but this depends on circumstances. Each strip should have a "lug" at one end, cut so as to project beyond the cell. The ebonite cover is cut in two, and holes are made for the lugs to pass through, as well as pents for the acid to be poured in. The set of three plates are put together into each cell, with two india-rubber bands round the middle one, vertically, to separate the plates from each other. The tops are then put on and glued carefully to prevent leakage of the acid. There are now six lugs of lead projecting from the cover, three in each cell. The two outer lugs of one cell are now to be joined to the middle or inner lug of the other cell, and the inner lug of the first cell fixed to a binding screw. The two outer lugs of the second cell are similarly fixed to another binding screw. These screws are to be fastened to their respective sides of the top. A small glass tube about $\frac{3}{4}$ inch long is then placed in the two remaining holes. A layer of glue is put all over the cover, so that only the ends of the tubes and

binding screws are clear of it. The binding screw connected to the middle of the first cell is marked +, and the other —, as the centre plates in each cell will be the + plates. Acid is then run into the cells in the proportion of 1 part of sulphuric acid to 6 of water. The cells are then "formed" by charging with electricity and discharging them many times over. When carried in the pocket the glass tubes should be closed with gutta-percha stoppers. This accumulator may be used before the plates are fully formed, but the forming process should continue until it has a capacity of two ampere-hours, that is to say, until the output is two amperes of current for an hour. The electro-motive force of the cells is 4 volts. Their total cost is only a few shillings, and they are useful for giving tiny electric lights from miniature lamps and other purposes. It is advisable to further enclose the cell in an outer case, to prevent damage to it or the wearer's clothes.

While upon this subject we may mention a tubular accumulator designed by Mr. J. J. Van Gestel, of New York. It is chiefly intended for lighting railway carriages and for propelling tram-cars. Mr. Van Gestel takes a lead-covered copper wire and surrounds it by a lead tube, the space between being filled with red lead. This compound tube is then bent on itself to form a flat rectangular spiral. The plates thus formed are perforated with numerous holes, and crushed glass is filled into the cell to prevent the spilling of the solution. We may add that the Elison accumulator which is being made for the new electric vessel *Victoria* has the lead plates perforated with holes, in which a spiral tape of lead is coiled, the layers of the tape being separated by asbestos. The *Victoria* will be the largest electrically-driven vessel yet built. She is 90 feet long by about 11 feet wide, and will carry a dynamo on board to charge the accumulators with the electricity necessary to propel her. She is expected to cross the Channel when ready.

An Artist's Clinometer.



An artist sometimes uses the plummet to get the relation of objects to the vertical; but usually he trusts to his pencil, held as horizontally as he can, to get their relations to the horizontal. The "Artist's Clinometer" shown in the accompanying engraving is intended to assist him in this matter. It also shows the angle of 45° , useful for getting the pitch of inclined lines, such as the slope of roofs, and in addition it gives the vertical. The Clinometer is simply hung by the cord which is attached to it by a pivot, allowing it to hang by gravity and give the horizontal and other lines.

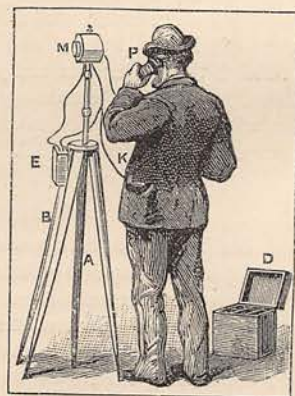
A Paint Current Indicator.

Mr. H. Crookes, who recently brought out a heat-indicating paint, mentioned in the GATHERER, has applied it to indicating the strength of an electric

current in electric lighting or other circuits. It is well known that a current flowing in a wire tends to heat it, and the temperature produced increases with the strength of the current. If, therefore, the wire be coated with the heat-indicating paint, the latter can be made to tell approximately the strength of current in the wire. Mr. Crookes uses a thin ribbon of copper coated with his paint instead of a wire coated with it. The paint is red, but becomes darker by degrees as the temperature of the ribbon rises with the strength of current flowing in it. The better to distinguish the change of colour in the paint, the ribbon is surrounded by a screen painted the same red hue as the fresh paint. When the ribbon becomes black the current in the wire is too strong, and it is necessary to cut off some of it. Thus by inspection of the painted ribbon it can be seen whether the current in a circuit is too great or not. It will, of course, be understood that the painted copper ribbon is joined up in circuit with the electric lighting or power apparatus.

The Hydrophone.

Our figure represents a contrivance devised by Mr. A. Pares, of Altona, for detecting leakage in water-mains. A rod, A, made of wood which conducts sound well, is held in a vertical position by a tripod, B; and to its upper extremity is attached a metal box containing a microphone, M. The apparatus is completed by a regenerative dry battery, E; a telephone receiver, P; a contact-maker, K, to close the circuit of the battery when an observation is to be made; and a box, D, to hold the parts. On moving the rod, A, over the water-pipe, the sound of the leaking water causes the rod to vibrate. These sonorous vibrations are transmitted by the rod to the microphone, and so heard in the telephone, when the key is closed and the electric circuit complete. When there are extraneous noises it is well to use two telephones, one for each ear, or to close the free ear by a small "Antiphone," which Mr. Pares has contrived.



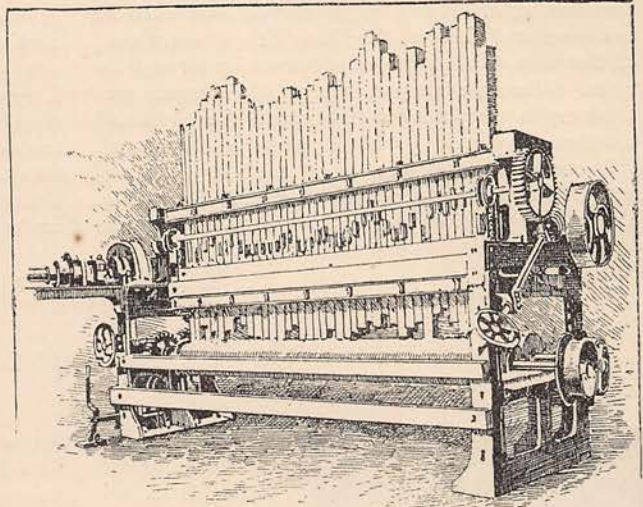
Pure Air.

The purity of mid-Atlantic air has been demonstrated by Professor F. S. Dennis, of New York, by means of capsules of sterilised gelatine, which were exposed to it on the promenade deck, where there was free circulation of the atmosphere. In ten days a few points of infection were developed. When exposed in one of the state-rooms, over 500 points of infection were developed within eighteen hours. But when a capsule was exposed over the bow of the ship it was found to be entirely untouched. The experiments show how pure was the mid-ocean air

outside the enclosed spaces of the vessel. While upon this subject we may mention the recent investigations made by Professor Carnelley, Mr. J. S. Haldane, M.B., and Dr. A. M. Anderson, M.D., on the carbonic acid, organic matter, and micro-organisms in air. These gentlemen make the following remarks on the subject of pure air in dwellings and schools. They infer that the defective ventilation of many Board schools hurts the child's health, and the result may sometimes be ascribed to "over-pressure" of education when due to bad air. Mechanical ventilation is required for schools, because the windows cannot be kept open in winter. In mechanical ventilation it is better to blow air into a room and let it find its way out up chimneys, and so on, than to ventilate by extraction. The former plan avoids draughts better, and the latter is apt to create a suction, drawing in sewer-gas, if there is any in the vicinity. Warm air is recommended to be blown in at low velocity through large upright shafts. In regard to houses, mechanical ventilation is not suited to houses as a rule; but in large blocks, let in flats, a large open space on each landing provided with wire-grated but unglazed windows, to allow a circulation of air in the passages, is recommended by the authors. The practice of keeping a lamp burning during the night in small houses is condemned as vitiating the air. Cleanliness is of much importance in keeping the air pure of micro-organisms. The frequency with which the air of a room is changed is, in the authors' opinion, more important than the providing of abundant air-space, though this too is advantageous. Ventilation by mere diffusion should never be depended on, for though it may help to remove carbonic acid, it has probably little effect in reducing organic matter and micro-organisms. The windows of houses and schools should be made to open widely, so that currents of air at intervals can be sent through the rooms. With fires the carbonic acid and organic matter appear to be less, and the number of micro-organisms more, than with hot-water pipes.

A Beetling Machine.

A beetling machine for cloth is being exhibited at the Manchester Exhibition, and is illustrated herewith. The cotton cloth to be beetled is wound on a long roller, several pieces being wound side by side with a space between. The roller is placed under the beetles of beech-wood, which have a stroke of 11 inches. By means of a series of cams, not shown in our engraving, the beetles are alternately raised and let fall on the cloth while the roller is slowly revolved. Cloth shrinks in the weaving, and the beetling restores it to its proper width, while giving a finish to the fabric. It is only with the finer goods that beetling is resorted to; for commoner goods the calender is employed.



A BEETLING MACHINE.

The engraving shows two rollers, one of which is beetled while the other is being stripped of the beetled cloth and supplied with unbeetled.

Fish-Leather.

The skin of the cat-fish is now tanned into leather in Germany. The new leather is tough, supple, and of good appearance. It is made into purses and shoe-laces. Tanned salmon-skins are used as robes by the women of Castrie's Bay.

New Inventions for Home Use.

An imitation of chamois leather has recently been invented for domestic use. The new fabric, which is woven, is in feel and appearance much like the true leather; but, unlike the latter, it keeps its softness after being wet, or used for cleaning windows, and washes well. For cleaning and polishing silver and plate, as well as for window-cleaning, this new fabric should be very useful.

A safety feeding bottle for infants is one of the latest devices. The dipping tube is non-porous, and will neither break nor chip, and on the flexible tube there is a light clip which is used to regulate or stop the supply of milk, but which will not cut or damage the tube. Glass is used only for the bottle itself, all the fittings being of other materials and unbreakable.

A Watchman's Tell-Tale.

An ingenious plan for checking the fidelity of watchmen on their beat in guarding premises has been successfully introduced. It consists in arranging a series of posts or "boxes" in an electric circuit. The posts are placed at convenient points of the watchman's beat, and each comprises a key-hole into which the watchman, as he goes along, inserts a "key." This has the effect of establishing electric connection inside the post between the wire coming to it and the

wire leaving it. It will be understood that when he has completed his beat, if he has "keyed" every post, all the posts will be in metallic connection through the wires. When the last post is keyed, the current from a battery in circuit flows through all the posts and completes its circuit by "earth plates" in the ground, only one connecting wire being required. The current also actuates a pencil which records the fact on a strip of paper rotated by clockwork. Thus the time

at which the beat is concluded is indicated. The recording clock may be placed in the manager's office or any other convenient place in the metallic circuit. A further operation of the watchman with his key reverses the current and sets all the posts and apparatus as they were before, thus allowing the watchman to repeat the process when on his second turn. Every post must be called at, and every journey is marked.

LETTER COMPETITION.



G. B. BURGIN, 7, Dryden Road, Bush Hill Park, Enfield, Middlesex,

whose Letter is given below.

High Commendation is awarded to the work of

Eliza J. Adair, Belfast ;
 Edith A. Stokes, Acton, W. ;
 Elizabeth M. Brant, Ilkeston ;
 Lucy Gibbs, Sheffield ;
 S. E. Wargent, Hereford ;
 John C. Hudson, Calverton, Bucks ;
 F. Clifton, Aldershot.

The following is the Prize Letter :—

MY DEAR ALPHA,—Beta is out calling on the Standishes this afternoon—she says they are so dark that she thinks the first Standish must have been called Ink-Standish—and as it is just that kind of weather when one feels inclined to sit down and write, I am inflicting myself on you.

A robin is piping by the window in the pertest possible manner, and every flirt of his tiny tail indicates how thoroughly he enjoys existence. By the most natural transition in the world, I reflect that we are not particularly enjoying existence just now. I found Beta in tears last night, and, without forcing her confidence, could easily see that something very serious had happened to disturb the friendship which has existed between you for so long. I dare say, if I could interrogate that robin, I should find that he does have little differences of opinion with his fellow-robins, and

AFTER carefully considering the 221 MSS. received in response to his offer of a Prize for the best Letter written under the circumstances detailed on page 320 of the April MAGAZINE, the Editor has awarded the PRIZE OF TWO GUINEAS to—

that sometimes his outward gaiety is only assumed. Beta has been very much like the robin lately—her gaiety appears to be assumed. You know how sensitive she is, and how apt to have a fixed idea where she loves strongly. A coolness has lately arisen between her and her *sweetheart*—I hate those finicking French words which are so namby-pambily inexpressive—and as you are her most attractive girl friend, she has instituted comparisons which have finally resulted in the somewhat illogical conclusion that Guy has transferred his affections to you. I very much fear that it is a repetition of—

"Alas, they had been friends in youth,
 But whispering tongues had poisoned truth."

These things always right themselves in time ; but, my dear girl, life is so short that one cannot afford to waste any portion of it in estrangements. There is only one way to overcome them, and that is, to disregard the "whispering tongues." But then pride and prejudices crop up, and the more one is inclined to brush away these cobwebby differences, the more difficult it is to do so. There is always that horrid question of who is to make the first advances. Beta misses you constantly ; the old familiar wish for your presence rises to her lips half a dozen times a day. Then, recollection intervenes, and she looks inclined to cry. Love is such a sacred dream to a young girl that she is apt to over-estimate the value of the man who has won her, forgetting that he may not be equally fascinating in the eyes of others.

But I have probably made mountains out of mole-hills. Beta has just returned ; I put down my pen for a moment to tell her that I am writing to you ; she looks pleased. By the way, you have not yet brought me that orchid you have been growing for me. Orchids are enviable flowers ; they live on air, and yet can always keep up appearances—even in Jubilee year. If you should happen to drive over in the pony-carriage to-morrow, you will find us in our customary places. I am anxiously toiling at an Afghan for the bazaar. I always thought that an "Afghan" was a formidable ruffian ; mine is more harmless. But come and judge for yourself, and believe me, *sans adieu*—I am degenerating into French phrases, but they are expressive sometimes—yours very sincerely,

DOROTHY TEMPLETON.