PHOTOGRAPHY FOR GIRLS.

SURROUNDED as we are in these days by the charming productions of photography as a fine art, we are perhaps in danger of overlooking the services rendered by the camera to science, and only occasionally recall the fact that photographs are now used for the furtherance of justice and for the record of microscopical observations, while some of its most recent triumphs have been won in the fields of spectroscopy and astronomy.

Photography being, then, established among the useful arts of modern life, we ought to take an interest in its history; and some of our readers may be surprised to learn how far back we must go in order to find the first gleam of a discovery which now effects such great things. About the middle of the sixteenth century it was noticed that a certain complex substance—then called "horn-silver"—became black when exposed to the action of the sun's rays. But this discovery perhaps appeared insignificant enough to the worthy alchemists of those long-ago times; at any rate no use was made of it till the year 1802, when Wedgwood endeavoured to obtain pictures by placing any object of which he desired a representation upon paper or leather, which had been previously coated with a preparation of horn-silver; the sun's rays acting upon this preparation turned it dark, and on removing the object its image was seen in white upon a dark ground, making in fact what we know as a "negative."

To retain these images was another matter, and one which proved beyond the power of either Wedgwood or Davy, for as yet no one had discovered how to prevent the white part from speedily becoming as black as the background, under the influence of light. Indeed, a good many years passed before the process of "fixing," as it is called, was discovered almost at the same time and probably with equal delight by three people—Mr. Fox Talbot and two Frenchmen, named Niépce and Daguerre. The latter has given his name to the beautiful process, of which few specimens are now to be seen, although it certainly inaugurated the practice of photography on the Continent. Daguerreotype pictures were taken on plates of copper thinly coated on one side with silver; while iodine, bromine, mercury, and hyposulphite of soda were also required for the completion of the process.

Mr. Talbot's method, called Calotype or Talbotype, was patented in 1841. Silver was again employed, but the pictures were taken on paper, and great difficulty was experienced in finding any suitable, the oldest paper having generally answered the best.

The process of preparing this paper was a long and intricate one, and not much less so the after processes of "developing" and "fixing" the photographs when taken. Sometimes waxed paper was used, involving elaborate preparation but producing most beautiful and artistic results; and in another modification of Talbotype albumenised glass was employed.

Next in order came the collodion process, which for many years, in fact up to quite a recent date, was universally adopted by professional photographers. This process consisted in coating glass-plates with a solution of gun-cotton in ether, called collodion, which was then rendered sensitive to light by being immersed in a solution of nitrate of silver. The photograph having been taken on a glass-plate thus prepared was then withdrawn from the camera, and was "developed" (or rendered visible) by having poured over it a solution of sulphate of iron, while the silver salt which remained unaffected by the light was dissolved out in a solution of cyanide of potassium or one of hyposulphite of soda.

These plates either formed the negatives from which the ordinary paper photographs were reproduced, or else they were backed with a black varnish, and themselves formed the glass pictures of the past—such as are still taken by the itinerant photographers of our heaths and race-courses.

In those bygone times of many chemicals no one can wonder if photography was regarded almost as a species of "Black Art," the practice of which was supposed to involve blackened fingers and stained clothes as an almost necessary result. But "we have changed all that," and a revolution—especially in out-door photography—has been effected by the invention of gelatine plates and ready-sensitised paper.

Yet, even in its dark days, ladies were not entirely absent from the ranks of the few amateurs who exercised this interesting art-science, while now that the process can with ease and cleanliness be carried out to most beautiful results, the number of lady photographers has very greatly increased, and, what is more, the work done by some of them is of the very best quality, as may be seen on visiting one of the annual Pall Mall Photographic Exhibitions.

We have no doubt there are still many other ladies who would take up this interesting pursuit did they realise how simple the process now is, and did they also know how to set about choosing the requisite apparatus. To remove imaginary obstacles which may discourage beginners, as well as to lessen the real difficulties which lie in their path, will therefore be the aim of this series of articles.

Let us first consider what size of apparatus will best suit our requirements. The smallest size in general use is the quarter-plate; this will take negatives measuring four and a quarter by three and a quarter inches, the photographs when finished and trimmed being of the size known as carte-de-visite. This apparatus will be found to be very light and portable, so as to be easily carried in a light hand-bag, but for taking views it is of course rather small. Another size is known as half-plate, taking negatives of four and three-quarter inches by six and a half inches in size, the finished photograph being cabinet size. This is the largest apparatus we should recommend for a lady's use; but perhaps the most suitable for general purposes would be the size known as five by four inches. This last-mentioned apparatus is large enough to give a satisfactory picture, without being cumbersome or unwieldy.

Now to consider in turn the parts of which our apparatus is to be composed:

The Lens.—We strongly recommend our readers to buy the best lens they can afford. If their pockets are deep they will do well to procure a Dallmeyer or Ross lens, but if limited as to price, they must be content with one of the cheaper makes. The most usual form of single lens is the meniscus, which is concave on one side and convex on the other; such a lens in a sliding mount should cost about 5s. for the quarter-plate size, and 10s. for half-plate. The latter size must be bought if the camera is to be a five by four inch one. Superior lenses of the same description in rackwork mounts cost about 7s. 6d. and 15s. respectively, the advantage of the rackwork being that it enables the focussing to be more accurately and quickly done. For instantaneous work a quick-acting lens, fitted with instantaneous shutter, known as the instantograph lens, is to be had at 21s. for a quarter-plate, and 30s. for a half-plate camera.

These lenses will take views or portraits and groups in the open air; they are, however, unsuitable for photographing architecture, the straight lines in which are apt to be distorted and curved towards the edge of the picture by these cheap lenses. For general work and excellence of results as regards clearness of definition, &c., we recommend the following lenses, which, as well as those before-mentioned, may be obtained from almost any dealer in photographic apparatus.

1. Ross's portable symmetrical No. 1, £2 14s.
2. ,, ,, ,, No. 3, £3 3s.
1. Ross's rapid symmetrical four-and-a-half-inch focus, £3 12s.
2. Ross's rapid symmetrical seven-and-a-half-inch focus, £4 14s. 6d.
1. Dallmeyer's rapid rectilinear six-inch focus, £4 5s. 6d.
2. Dallmeyer's rapid rectilinear eight-and-a-quarter-inch focus, £5 8s.

The first named in each case is suitable for a quarter-plate, the second for a half-plate apparatus.

The Camera.—The two essential requirements in the camera or dark-box in which the photograph is to be taken, are that it shall be perfectly light-tight, and that when the plate is put into its place in the dark-slide, it shall occupy exactly the same position as that filled just before by the ground glass focussing screen.

For outdoor work, and especially for ladies' use, the camera should also be light and portable.

These last-named requisites are well fulfilled by the camera known as "Le Méritoire;" one of these, quarter-plate size, weighs only ten ounces, and costs 21s., including one dark-slide. Of course light cameras are not so strong as heavier ones, and require careful usage, but with gentle handling they will last for years. Other rather heavier and more substantial cameras may be bought at about the following prices:

A five-by-four camera, including one dark-slide and tripod-stand, at £2 18s. 6d., or the camera only at £1 8s.; and a six-and-a-half by four-and-three-quarter camera at £2 to £2 10s., according to the manner in which it is finished and fitted up.

In order to explain the uses of the different parts of a camera, we will take Lancaster's "Le Méritoire" as a typical one, that being the cheapest camera within our knowledge in which a variety of movements is obtainable.

To set up this camera, the back is attached to the base-board by the half-hinges screwed to each part. It will be seen that the body of the camera is provided with hinges on two sides, so that it may be attached to the base-board either in a vertical or a horizontal position, to suit the picture we are about to take. The front is then attached to the base by means of the two large screws, and the whole is kept rigid by the strip of brass seen at E, Fig 1. C, Fig. 1, is the focussing-screen of ground-glass, and when this is swung back upon its hinges, space is left for the dark-slide, Fig. 2, to be slipped into its place at the back of the camera.

In the front of the camera, the centre piece is the sliding front; this allows the lens, which is screwed into it, a slight horizontal movement, and it can be fixed in any desired position by means of the slot and thumb-screw B. This sliding-front is supported by another piece, called the rising-front, which in the same way allows the lens to be slightly raised, the thumb-screw by which it is fixed being shown at A. The first of these two pieces enables us to cut out any undesirable object to the right or left of the scene we wish to photograph, while the second enables us to cut away some of the foreground without tilting the camera, in cases where the foreground would otherwise bear too large a proportion to the whole of the picture.

By means of the thumb-screw at D, the back of the camera may be fixed either in a

vertical position, or it may be inclined backwards or forwards. For example, when the camera itself is level, the back should be exactly vertical; that is, it should be at right-angles with the base-board of the camera; but suppose we are taking a view of a lofty building, or suppose that the point at which our camera is placed compels us to tilt it up or down in order to get the desired picture on the focussing-glass and afterwards on the plate, then to keep the back vertical would distort the picture, the subject of which would appear to be either falling towards us, or leaning backwards, as the case may be. Therefore, in order to avoid so undesirable an effect, we tilt the back of the camera until the picture, as seen on the focussing-screen, appears in due proportion.

By means of the large screws which fasten the front to the base-board, it will be seen that this part may be fixed either parallel to the back or at an angle to it, and although the former is its usual position, it will sometimes be found useful to place it at an angle, as when taking one side of a street or long buildings in which the perspective would otherwise be much exaggerated.

Fig. 2 shows the dark-slide, which consists of a small flat case, opening in the middle for the reception of the plates. One plate must be placed on one side of the slide, with the prepared side downwards, one or two layers of black paper must be placed on the plate, then comes a second plate with the prepared side upwards, and the slide is closed. The dark-slide, in addition to opening as shown in the figure, has a sliding-shutter, A, on each side of it. In the figure, one of these shutters may be seen pulled out.

Of stands there are also many different kinds. One very convenient stand folds up into so small a space that it may be put into an ordinary umbrella-cover and used as a walking-stick. Perhaps, on the whole, the best and most practical stand is one having three legs, each of which is composed of three pieces of wood, the middle piece sliding between the other two, so that each leg may be adjusted to any required length. This stand is known as the Kennett. While on the subject of stands, I must caution my readers not to buy too small a one. The legs should be of such a length that the centre of the focussing-screen of the camera may be at least raised to the level of the operator's eyes, otherwise it is necessary to focus in a stooping position, which is very fatiguing.

A focussing cloth of black velvet about one yard square, and a lantern with a ruby-coloured glass for changing the plates and developing, will complete the apparatus required for the actual taking of the negative; and we will now proceed to consider the apparatus and chemicals necessary for the development of the picture and for the printing of the paper positives.

Two or three dishes of porcelain or ebonite will be required for developing, and these must be about half-an-inch larger than the plates we intend to use, costing, for five-by-four plates, from 8d. to 1s. each.

The chemicals at first required will be half a pound of oxalate of potash at about 1s. 6d. per pound, one pound of sulphate of iron at 3d. per pound, one pound of alum at 2d. per pound, and two pounds of hyposulphite of soda at 2d. per pound. It must be remembered that the oxalate of potash and many of the other chemicals used in photography are powerful poisons; they must therefore be used with caution, and kept under lock and key.

For printing, we must have two or three printing-frames of a size to suit that chosen for the plates; and the only additional chemicals required for this process will be two ounces of acetate of soda, at 1d. per ounce, and a 15-grain tube of chloride of gold, costing 2s.

The other materials required will be, a tolerable supply (say one dozen) of prepared plates, and three sheets of sensitised paper at about 8d. per sheet.

There is a great variety of prepared plates in the market, varying much both in price and quality, but we may mention, without recommending any particular maker, that good plates of five-by-four size are to be had at 2s. 6d. per dozen. They must be very carefully kept from white light, the faintest ray of which is sufficient to spoil them, and therefore they must only be opened and placed in the dark-slide in a deep ruby light. The paper, also, should be exposed to light as little as possible.

J. POCOCK.

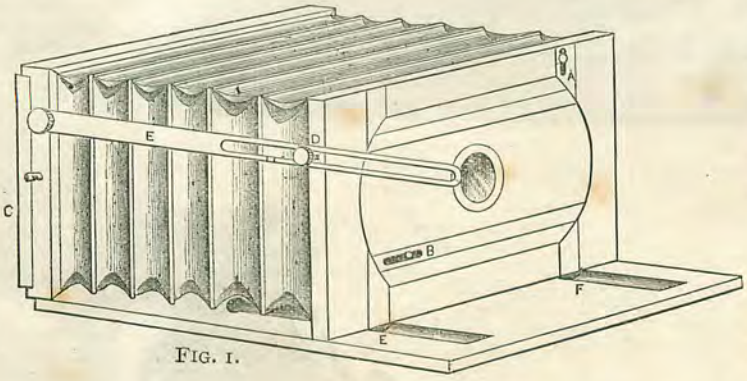

FIG. 1.

VARIETIES.

UNLUCKY MONTHS FOR MARRIAGES.—"May is said to be an unlucky month for marriages." An old bachelor says that, according to the testimony of his friends who have slipped their heads into the matrimonial noose, the other unlucky months are June, July, August, September, October, November, December, January, February, March, and April.

A TALE ON ITS TRAVELS.

How a simple statement may be twisted, turned, and magnified by the tongues of talebearers is well illustrated by the following, which is said to have actually occurred:—

"The servant of No. 1 told the servant of No. 2 that her master expected his old friends the Bayleys to pay him a visit shortly; and No. 2 told No. 3 that No. 1 expected to have the Baileys in the house every day; and No. 3 told No. 4 that it was all up with No. 1, for they couldn't keep the bailiffs out; whereupon No. 4 told No. 5 that the officers were after No. 1, and that it was as much as he could do to prevent himself being taken in execution, and that it was nearly killing his poor dear wife; and so it went on increasing and increasing until it got to No. 32, who confidently assured the last, No. 33, that the Bow-street officers had taken up the gentleman who lived at No. 1 for killing his poor, dear wife with arsenic, and that it was confidently hoped and expected that he would be executed!"

A GIRL'S EPITAPH.

The following epitaph on a girl aged sixteen is in the cemetery at Tunbridge Wells:—

"Behold this flower, so young and fair,
Called hence by early doom,
Come forth to show how sweet a flower
In Paradise might bloom."

COLDNESS OVERCOME.—Be not chilled by the coldness of those about you: the perseverance of love and patience together bring about great results.

MAN AND WOMAN.—There is not one quality that is truly amiable in a man which is not equally so in woman; and there is not one vice or folly which ought not to be equally detestable in both.

A PROFITABLE CROP.—The roots of education are bitter, but the fruit is sweet.—*Aristotle.*

THE DOUBLE-TONGUED TALKER.

"What darling little cherubs your twins are," said Mrs. Jones to Mrs. Brown, in an afternoon gathering of ladies at the house of the latter. "I really should be proud of them if they were mine: such lovely eyes, such rosy cheeks," &c., adding, "Dear darlings! come and kiss me."

Mrs. Brown smiled complacently in return, and shortly after retired from the room, when the two "little cherubs" approached their prodigious admirer with a view to make friends and impress upon her the solicited kiss. Instantly, however, she put them at arm's length from her, saying to the lady who sat next her, "What pests these little things are, treading on my dress and forcing themselves on me like this! I *do* wish Mrs. Brown had taken them out of the room with her."

ON CONVERSATION.—Be swift to hear but cautious of your tongue, lest you betray your ignorance.—*Watts.*

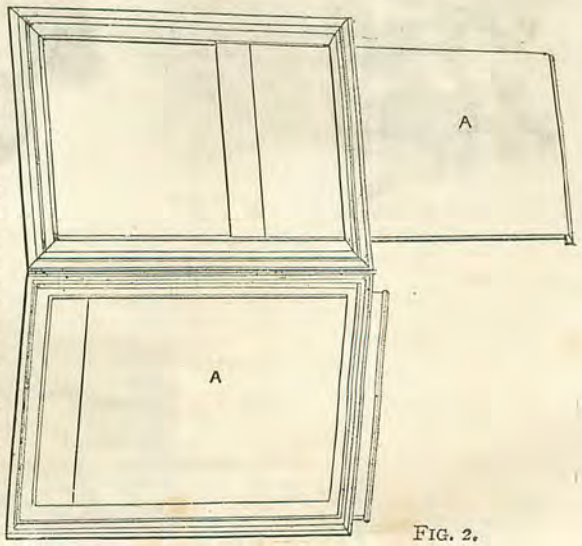

FIG. 2.

"Now, Bozy," he said, "lift that side while I put the guttapercha underneath."

"I cannot move it, Pill; it weighs tons," said Belinda, who was straining every nerve.

"Oh, I beg your pardon," politely replied Luke, "I quite forgot."

So saying, he produced out of his coat pocket a small silver case containing a twisted coil of wire *two yards in length*, composed of alternate strands of platinum, iridium, and magnetised steel.

"Take hold of that end, Bozy, and help me to draw this wire under the gold," he said.

After some difficulty they inserted the wire beneath the mass, and dragged it at least half way along underneath.

"The gold has now just lost half its weight, but not half its value," Luke said, triumphantly.

"How is that, Pill?" asked Belinda, in wonder.

"The thing is very simple," answered Luke. "The only wonder is that it was not found out before. You know, Bozy, that *weight* simply arises from an invisible force which we call gravitation drawing the body down to the earth. If we then can degravitate the body by breaking this force, it is evident the substance at once loses its weight. This 'the degravitator'* (as this wire is called) does. The mass, however, is still too heavy, Bozy. Just move the wire forward a little further."

This was done. It was then withdrawn.

"Now try and lift it," said Luke.

"Why, it's not much heavier than a bonnet-box," said Belinda, raising it in both arms.

"That will do nicely," said Luke, "and whenever we wish we can restore its weight again."

The second pile having also been degravitated, he then proceeded to wrap both the masses up in the guttapercha, and secure them with wire rope.

"I cannot see," said Belinda, "when you can do such wonders, why you should have doubted the power of the 'gateaux évanouissants.'"

"*My* wonders," said Luke, "are purely scientific, and based on well-known laws; not so with those vile sweets."

"Now, Pill, show me some of the sights," said Belinda. "I'm quite tired of working; perhaps after all I don't know everything that's in my mouth."

At that moment the cavern opened a little, and admitted the daylight and fresh air. As it remained so Luke thought it a favourable opportunity for showing that his M.R.C.S. had been fairly earned. "Come and sit here, Bozy," he said, seating himself at the mouth of the cave. "Just count these hanging columns. How many are there?"

"Sixteen, including the one we are in."

"And the same number of pillars below?"

"Makes thirty-two. I didn't know I had thirty-two teeth before," said Belinda.

"That's just like a girl. Always rushing to conclusions. *You* have not got thirty-two teeth. Your wisdom teeth certainly are not cut, and I have some doubts about your back double teeth, so that you have only twelve or fourteen teeth at most in each row."

"Quite right, Pill, I've got fourteen," said Belinda, who had been feeling in her mouth. "Go on."

"Well, just take the upper row. You see those four front teeth (called *incisors*) have a thin sharp edge. They are like chisels, and are for cutting the food. In animals which live by gnawing, such as rats, hares, and guinea pigs, these teeth are of enormous size. The pointed one *(canine)* on each side of them is very strong, and is for tearing. In lions, tigers, dogs, and all carnivora (or flesh-eating animals) whose food is torn, these teeth are huge fangs. The two next on each side *(bicuspids)* are broader, and are used for cutting and grinding. These three behind on each side (you see our cave is in the middle one) are for grinding and pounding the food *(molars)*. These, again, in cows and horses, which grind all their food, are of enormous size. Now, Bozy, this great variety of teeth shows that we are adapted for a great variety of food, and are certainly not intended for vegetarians, and also that the food is meant to be thoroughly cut up and ground before it is swallowed."

"We're not intended to live on H. F. D. pills, Luke, that's evident. But go on, I'm getting quite interested."

"Our incisors and canines are small, as the principal part of their work is done with a knife and fork, and even our molars are degenerating from having too little to grind, while wisdom teeth will soon be a thing of the past. But just notice this tooth closely, Bozy," said Luke, warming up, as he gave the column in front a smart tap with his iron-pointed stick that he had retained through all his adventures. "You see how hard that is. That is enamel. It is far harder and whiter than ivory, and covers the whole of the tooth outside the gum. The ivory (or *dentine*) forms the substance of the tooth, and the part that is inside the gum. Ivory is merely firm, hard bone, and would soon wear away were it not for this coating of enamel, like porcelain. This enamel itself is covered with a fine hard glaze that has great power of resisting acids. Inside the dentine is a cavity somewhat the shape of the tooth, and filled with a soft pulp full of fine nerves which enter by the fangs Once the enamel-covering of this pillar gets worn away it is never replaced, and the rest will soon go, as you will see from this cave. Just come to the edge, Bozy, and look here. You can see distinctly the enamel outside and the ivory within, and, if you look through my telomicric, you see all the ends of the hexagonal rods of which the enamel is composed, looking like a honeycomb. In decay, first of all a small hole gets worn in the enamel, exposing the dentine inside; this soon softens, and eventually air gets to the pulp, and the tooth begins to ache. It is then generally too late to have it 'stopped.' If it is left alone the decay goes on, and probably the nerve dies, and the tooth does not ache for a while. Presently it begins again, worse than ever, from the inflammation set up by the dead nerve; and the tooth feels as if it was raised, and a gumboil forms at the base. The nerve inside the tooth is very sensitive to cold and heat. Ices make bad teeth ache dreadfully, and in some hot coffee does the same.

"What destroys the enamel, Pill?"

"Any sort of acid (if the glazing is worn off), and of course at the surface continual wear and tear, especially from eating anything gritty or sandy. A common cause of its destruction is the lodging of particles of food at the bases, and between the teeth, where they not only form a chalky deposit (called 'tartar'), but produce an acid that eats away the enamel just above the gum, where it is thinnest. Another common cause is from the gum getting unhealthy, and receding, leaving the ivory part bare. This soon decays and destroys the enamel above. Uncle, you observe, has splendid teeth. I think this is the only one gone at all, and it is just an illustration of what I have said. This hole has been formed in the side of the tooth near the gum, leaving the crown quite sound."

"Yes, dear, go on."

"That's all, I think, Bozy, except that of course you now see how necessary it is to take away with a brush every particle of food from the base of the teeth inside as well as outside, to keep the gums sound and healthy, and not to use any gritty and wearing substance for tooth-powder. You also see why camphorated chalk is so popular; the chalk at once counteracting the acid deposits round the teeth. If people only cleaned their teeth at night with some such powder (to *prevent* the mischief) instead of in the morning (after the food has lodged there all night) there would be less work for dentists to do."

"Well done, you old quack, you know a great deal. I suppose you want me to try a box of Courteney's tooth-powder, warranted free from grit. But look down below, that tongue is going to move. Supposing it comes up here, we shall get all wet."

(To be continued.)

* We not only cannot hear of this invention, but we do not believe that it is possible to alter the gravity of any substance. If Mr. Courteney should see this note, we should like him to call and say where these inventions are to be bought. They were not at the "Inventories."

PHOTOGRAPHY FOR GIRLS.

PART III.

OUR first plate exposed in the camera, we will now consider the next step necessary to the production of our photograph. At present, if we were to inspect the plate, we should find it to all appearance just as it was before exposure, and should not be able to trace the slightest impression of the object photographed upon it; but the latent image is there, nevertheless; that is to say, the light has so acted upon the molecules of the silver salts incorporated with the gelatine with which the plate is covered as to make those salts capable of certain reactions when brought into connection with certain other chemical substances. The rendering visible of the latent image, or, in other words, the reduction of the silver salts acted upon by the light, is the next process, and is known as the development of the photograph.

There are several different methods of development, but all those which are likely to be of any practical use to our readers may be grouped under the two heads—oxalate or iron development, and alkaline development.

The first process we shall describe is that known as the ordinary iron development, this being, we consider, the most simple for a beginner; and if the instructions given in the first paper of this series have been followed by our readers, they have now at hand a supply of all the chemicals necessary for this purpose; but whichever method of development is adopted, it is equally necessary to use the utmost precautions against the exposure of the plate to any but a deep ruby-coloured light. Either we must shut out all white light from the room in which we work by means of a shutter in which is an opening filled by a piece of ruby glass of about eight or nine inches square, or we must wait till after dark and then proceed with our development with the aid of a lantern—such as may be bought of any dealer in photographic apparatus—the light of which shines only through glass of a deep ruby colour. Probably the latter is the more convenient plan when photography is only an

occasional amusement, but when many photographs are taken it will be much better if we can contrive a proper dark room; even a good-sized cupboard will often answer the purpose, and will at least prevent our having to wait till nine or ten o'clock at night, as we should otherwise be compelled to do in the middle of summer, before we could commence our development and satisfy ourselves that our negatives were all that we desired them to be.

In either case it is imperative to stop up every chink and crack which could possibly admit any other light than that which comes through the ruby-coloured window or lantern, and if we have a proper dark room it will be well to have also a blind or curtain of ruby-coloured cloth to draw across the window when the light is very strong, especially during the earlier stages of the development.

If our dark room should happen to have water laid on in it, so much the better; indeed, a good temporary dark room may often be made out of a bathroom or back kitchen; but if a water-supply cannot be obtained, a large jug of water and a pail must be provided. The developing dishes should be placed on a table near the window. Of these dishes it is best to have three, one for each solution, and to keep each for its separate purpose.

Now we have to make our developing solution, and we take for this purpose 6 ounces of oxalate of potash and dissolve it in one pint of warm water. This is to be put in a bottle which should be carefully labelled, and, being a poison, this fact should also be notified. It will keep for an indefinite period. In another bottle dissolve 3 ounces of sulphate of iron in half a pint (10 ounces) of water. This solution will keep good for a few days, and may be used so long as it retains its bright green colour, which it is most likely to do if kept in a stoppered bottle just large enough to hold it. In a third bottle, which should be tolerably large (say a wine bottle), make a saturated solution of alum, that is to say, as much alum is to be dissolved in water as the water will take up. Another solution is to be made up of 5 ounces of hyposulphite of soda to one pint of water; this is called the "fixing" or "clearing" solution. All these solutions should be made up some little time before they are required, as the salts ought to be completely dissolved, and the solutions quite cold when they are used.

Now, into dish No. 1 pour three parts of the oxalate of potash to one part of the sulphate of iron solution; say, for instance, that we have three half-plates to develop, 6 ounces of the former solution and 2 ounces of the latter.

Into dish No. 2 pour sufficient of the alum solution to well cover a single plate when placed in it.

Into dish No. 3 pour about half a pint of the fixing solution.

Our solutions being now ready, and the water and pail close at hand, we must carefully exclude all white light, and may then take the first plate and place it in dish No. 1, giving the dish a slight rocking movement, so that the solution may flow quickly and evenly all over the plate. Now examine carefully, and see if there are any air-bubbles sticking to the plate; if so, they must be quickly removed by touching them with a small paint-brush kept for this purpose, otherwise each bubble will show as a black spot in the finished picture, and as the same undesirable effect is produced by particles of dust, it is as well to dust the plate before commencing its development with a soft camel's hair brush. All the time the plate remains in this developing solution (dish No. 1) the dish should be gently rocked, in order that the development may proceed equally all over the plate.

The time occupied in development varies considerably according to the subject, season of the year, and so on; but the image should begin to appear when the plate has been in the solution about two minutes. If it flashes out almost immediately after the plate is placed in the solution, it has probably been exposed too long in the camera. The high lights will be the first to appear—that is (supposing the subject photographed is an engraving), the white parts of the paper, which on the negative will of course appear black; the half tones will next be seen; and lastly, the shadows will begin to darken. As soon as this happens, the plate must be removed from the developing solution and a little cold water poured over it, after which it must be left for three or four minutes in dish No. 2. No change will appear while it remains in this solution, the use of which is simply to harden the gelatine film and prevent its slipping off the plate in the subsequent washing. With some plates it answers better to place them in the alum bath immediately after development, without any washing between.

On leaving the alum bath, the plate must be well washed and then placed in the fixing solution (dish No. 3), in which it is to remain until the unused silver salts are dissolved out, which will be shown by the disappearance of the yellow tint from the shadows when the negative is viewed on the glass side by reflected light. When this yellow colour has entirely disappeared, white light may freely be readmitted to the room. The negative has now only to be washed and dried; but the washing must be very thoroughly done. It is best to first wash well under a tap, then to leave the negative standing in water for about half an hour, changing the water two or three times, and then again wash under the tap. After this, it should be stood on edge to dry, with the film side towards the object against which it leans, so that the dust may not settle on it. It will be dry in a few hours.

If we require only a few prints, the negative may now be considered complete; but if we wish to preserve it, we had better protect the surface of the plate so that it may not be so easily scratched or affected by damp. To do this we must varnish the plate with negative varnish. First make the plate as warm as the back of the hand will comfortably bear, then hold it by one corner with the left hand—or it is still better held by a proper plate-holder. Now pour a little of the varnish in a pool on the lower end of the plate, and then, by gently tilting it round, the varnish is to be made to flow evenly all over the plate, and this may be done after little practice without spilling a single drop. Lastly, the surplus varnish must be poured back into the bottle from the corner opposite to that by which the plate is held. The plate must now be rocked from side to side for a few minutes to prevent the varnish from drying in ridges; it dries very quickly, but it is best to leave it to harden for some hours before attempting to print from the negative.

The following is another formula for making the iron developer: Dissolve 2 ounces of oxalate of potash in 8 ounces of warm water, and, when dissolved, add half an ounce of oxalate of iron (ferrous oxalate). Pour off the clear liquid, which should be used in a dish in the same way as the developer first given; it should be kept in a stoppered bottle with a few pieces of clean iron wire in it. It will keep good a long while, and may be used several times over, if it is occasionally strengthened by the addition of a little more ferrous oxalate.

The fixing solution must be thrown away after use, and a fresh one made for each batch of plates. Care must be taken to rinse the hands well after fixing one plate before touching another, otherwise brown, metallic-looking stains will appear on the finished negative wherever the hyposulphite solution has touched it before development.

If there is any reason to think that the plates have had too long an exposure in the camera, it will be well to add to the developing solution 1 to 2 grains of bromide of potassium or bromide of ammonium for every ounce of the solution; this restrains the development from proceeding too quickly.

What is known as the alkaline development will not appear quite so simple to the beginner as the above, but in practice it will be found to present no real difficulty. We will first take the most simple form of the alkaline developer. Make a solution as follows:—Water, 1 ounce; citric acid, ½ grain; sulphite of soda, 8 grains; bromide of potassium, 1½ grains; liquor ammonia, 3 minims; pyrogallic acid, 2 grains.

Leaving out the pyrogallic acid, this solution may be mixed some time before it is wanted, but the pyrogallic acid must be added only just before it is used, as the solution will not keep after this acid has been added. If the negatives are found to come out too dense with this solution, the quantity of pyrogallic acid should be decreased to 1 or 1½ grains per ounce; if not dense enough, slightly increase the quantity. If the plates develop too quickly, and come out hard with little or no half tone, increase the quantity of bromide, and if they develop too slowly, increase the ammonia very cautiously and decrease the bromide.

This solution is to be used in the same way as the iron solution, and followed by the alum bath.

All the developing solutions given above, while they have the advantage that one mixing will do for a whole batch of six or seven plates, which can be developed one after another in the same solution, have this disadvantage, that they do not admit of the development being varied to suit each individual plate. We now give a formula which allows this to be done.

Make a solution of bromide of ammonium, 1 drachm; liquor ammonia (·880 specific gravity), 1 drachm; water, 10 ounces, and call this solution No. 1. Take also of pyrogallic acid, 30 grains; sulphite of soda, 1½ drachms; water, 10 ounces, and label this solution No. 2.

No. 1 may be made up in any quantity, as it will keep well; but No. 2 should only be made up a short time before use. When developing, two other bottles should be at hand, one containing a solution of 1 drachm of liquor ammonia in 1 ounce of water, and the other containing 1 drachm of bromide of potassium in 1 ounce of water.

Now, in order to commence the development, place the plate in a dish and pour over it a sufficient quantity of solution No. 2 to cover it; then pour this back off the plate into a measure and add to it an equal quantity of solution No. 1; now pour the whole again on the plate. Should the image flash out too quickly, the developer must be immediately poured off the plate back into the measure and a few drops of the bromide solution added to it; but should the development proceed too slowly, a little of the ammonia solution may be added, one drop at a time; and again, should there be a want of density in the negative, add a little more of the pyrogallic solution. Thus it will be seen that we can, with this preparation, suit the development to each particular negative, and thus save many a plate which has been over or under exposed.

The possible variations in the above formulæ are almost numberless, but the way to work with the solutions once learned, no difficulty will be experienced, and with most of the plates sold the exact formula is given which has been found to suit that particular make the best.

Supposing the exposure to have been rightly timed, and the development correctly carried out, our negative will, after fixing, be ready for varnishing according to the directions already given; but it is sometimes found after fixing that the negative is not sufficiently dense to give good prints. To remedy this we must intensify with a solution of pyrogallic acid, 3 grains; acetic acid, 6 drops; citric acid, 1 grain; water, 1 ounce. Take also of nitrate of silver, 20 grains; water, 1 ounce.

After the negative has been thoroughly washed, pour over it a little of the first of these two solutions, which must then be retured to a measure, and a few drops of the silver solution added to it. Let the mixture then flow over the plate till the latter is sufficiently dense, then wash again thoroughly and dry.

Another intensifying solution preferred by many consists of a saturated solution of bichloride of mercury, in which the plate is immersed until it turns white; thence, after being well washed, it is transferred to a solution of liquor of ammonia (one minim to each ounce of water) until sufficiently dark; with this intensification the negative will be of a brownish colour, and should not be made too dark.

The bichloride of mercury solution is very poisonous, and great care must be exercised in using it, guarding especially against its coming in contact with any cut or crack in the skin. It may be put back into its bottle after use, and used again and again, but the ammonia solution must be made up afresh for each lot of plates.

Before leaving this part of the subject, we again strongly urge upon our readers the necessity of carefully labelling all the solutions used, so that no mistake may at any time occur in consequence of their being put out of the way for some time and so forgotten.

(To be continued.)

ANSWERS TO CORRESPONDENTS.

EDUCATIONAL.

CLEMATIS.—There is no preliminary examination for a correspondence class. The St. George's Hall classes are excellent, but we think you would do better, perhaps, with those of Miss Roberts, Florence Villas, Torquay, Devon; or the Society for the Encouragement of Home Study, secretary, Miss A. C. Moore, Oakfield, Eltham; subscription one guinea. Papers are reviewed and prizes given.

A WILD GIRL.—The University of St. Andrew's grants higher women's certificate (two guineas) and the title of *LL.A.* The examination is in April. Secretary, Professor Knight, University of St. Andrew's, N.B. The standard of this examination is the same for pass and honours as that of the St. Andrew's M.A. degree in the same subjects. It is held at several centres in England—London, Halifax, Bristol, Leicester, and Birmingham.

TROUBLED WIDOW.—We do not see how your daughter can sit for her certificate if she has not passed her scholarship examination successfully. She must, we think, go up again next July.

FANNY OF JAMAICA.—Read our article on "How to Improve the Education," pages 637 and 794, vol. ii. You could join a correspondence class.

LADY G.—You do not name the profession of the gentleman incapacitated for work. There are charitable institutions connected with the several professions and trades, from which grants are sometimes to be had to assist in the expenses of a child's education—as, for instance, the Sons of the Clergy Corporation, who help the poor clergy in the education of their children, and the Solicitors' Benevolent Association, for the relief of necessitous solicitors and their families (secretary, Mr. James T. Scott, 9, Clifford's Inn, E.C.). There is also the Universal Beneficent Society, to assist those in necessity, of good character, without distinction of class or nationality; secretary, G. Stormont Murphy, Esq.

V. G.—We have not published any serial story by Mrs. Molesworth.

ART.

NELLO.—Mirror painting is not a modern form of colouring. It is a revival of a description of painting well known in the eighteenth century.

ENQUIRING BEE.—Fire screens can be decorated with paintings upon china, glass, or other materials. One of the newest shapes for the screen are low two-fold screens, with a ledge placed across the middle large enough to hold a teacup. The spaces above this ledge are decorated with flower or fruit designs, painted upon pale-coloured satin or upon gold canvas. The spaces below the ledge are filled with stamped leather or plain dark velvets.

IGNORANT.—You cannot use the same brushes for oil or water-colour and lustra painting. Your own common sense should have shown you that cleaning a brush in turpentine and soaking it in oil is not a good preparation for laying on successfully the delicate washes required in water-colour work.

BABY.—Crewel painting, Kensington painting, and pen painting are the same description of painting, christened anew by the firms who sell them. It is oil-painting upon velveteen or satin that appears like coarse crewel-work. The oils are mixed with mastic varnish and laid thickly on the material, and stroked down in short ridges with a fine steel pen.

ETTA.—For large fully-coloured terra-cotta plaques, varnish with the best copal varnish. For a little painted spray on a small article, use white, hard spirit varnish.

M. B.—You can frost evergreens by dipping the leaves in gum-water and dusting crystallised Epsom salts or plain flour over them.

WORK.

S. A. WRIGHT.—There will be no discontinuance of the articles by a "Lady Dressmaker," as we are well aware of the value of such instructions as hers to multitudes who have to ply their own needles and economise both money and materials.

NELLIE.—You asked what could not be expected. In the first place, we do not write to order; we supply our readers with what we think generally desirable, and do not put in long recipes for knitting or crochet, which would occupy too much space for the interest thereby supplied to all. The majority of readers must be considered before two or three. Procure a sixpenny knitting manual for the petticoat you require, and the gloves.

MOSS ROSEBUD.—Patterns of crochet edgings are sold, we think, in little books in the workshops, at a penny or twopence each.

A VILLAGE LASS.—Put a little glycerine on the tea-stain before sending the counterpane to the wash.

NESTA.—Instead of washing knitted woollen shawls, many people clean them by rubbing them in flour, bran, or oatmeal, which cleans them equally well without otherwise spoiling them. Great care is needed to get all the flour or bran out, and the person who undertakes to do them should be well covered up.

MYRTLE.—Half-a-dozen of each article is the usual number for a plain trousseau (not trouserou); one plain, warm dress for everyday wear, one for best, and, perhaps, two common dresses would be sufficient. If you had given us any idea of how much you had to spend, we should have known how to advise.

SUNFLOWER must advertise for such a situation if she cannot find it by inquiries amongst her friends. The salary of a companion would vary with her duties, from £20 to £50.

MISCELLANEOUS.

CHUMPY DRAYMEA.—Copper and bronze coins have been in use from the earliest ages. You can use up the pieces of short wool by purchasing a piece of coarse canvas large enough for a rug or mat, and then double the pieces of wool in the centre; pull the doubled end through each alternative hole of the canvas, and then back again through the next, and lastly put the two ends through the loop. In this way you can make a handsome mat. You will need a crochet hook to work with. We are much grieved to hear of your suffering state, and hope you may be given patience and grace and faith to trust in God's goodness and mercy.

AN ANXIOUS GIRL.—The bit of flower you sent us was too much spoilt to be useful. We have given the fullest information possible in our articles last year on "Work for All," and must beg you and all our readers to refer to them.

EMU (Belmont House).—We imagine the goldfish probably enjoy the tub and the fresh air; but we think you would obtain more pleasure from them by having them in the glass globe. In either case, the water must absolutely be changed.

A CONSTANT SUBSCRIBER.—We do not know what you could do to revive writing in ink on wood; but you might try the solution of prussiate of potash in water, applied with a hair pencil, which is recommended for renewing manuscripts. There is a life of Pitt by Gifford, by Tomline, and by Earl Stanhope; and in Jesse's "Memoirs of the Life and Reign of George III.," 1867, you will find much about him.

TABLE MOUNTAIN LILY.—The 9th December, 1867, was a Monday. We have read your account of the earthquake with much interest, though from being written on such thin paper your letter was most difficult to decipher.

MAY.—No nation speaks Latin now; it is, like Greek, a dead language. As early as the sixth century B.C. it had become thoroughly corrupted by the admixture of foreign tongues, and exhibited symptoms of decay. The sources of Italian and the other Romance languages must be sought for in the popular dialects of Italy, not in the classical literature of Rome. We think that if the plush be good, and worth it, you had better send it to a cleaner.

MARQUIS POFFWHISKER.—The fact of Daniel's silence during the erection of the gelden image on the plains of Dura, and the subsequent punishment of Shadrach, Meshach, and Abednego, appears to prove that he was not acting as prime minister during the whole of the thirty years between Nebuchadnezzar's two dreams. Read chapter iv. 7, 8, where the language and conduct of Nebuchadnezzar appear to indicate plainly that Daniel was not present daily to guide the councils of the king. We are glad to hear that you remember the poor children in the workhouses, and make them balls, dolls, and animals. You might also make reins, bags of empty cotton reels for crawling babies, pillboxes for rattles, and mount the fashion figures of the *Queen*, and other papers, on cardboard, to play with.

HIBERNIA.—We cannot help you about the composition, but we think that if you wrote to Messrs. Parkins and Gotto, Oxford-street, and got one of their copying machines, which are not very expensive, you could copy your magazine very easily, cheaply, and successfully.

ROSA ALPINA.—The quotation, "Come like shadows, so depart," is from *Macbeth*, act iv. scene i. "In durance vile" is from "Esopus to Maria," by Burns.

DENNIS DUVAL is the name of an unfinished novel by Thackeray. The last chapter appeared in the "Cornhill Magazine" in June, 1864.

ELLA LUCY M.—"De talagio" is called in English "tallage," or taillage (from the French word *taille*, or the low Latin *tallagium*, from *talea*, "a tally of wood," on which the amount of tax was scored). According to Coke it is a general term, including all subsidies, taxes, tenths, etc., but it was generally restricted to denote the taxes received by the king. "Tallage" in old English law meant a certain rate or tax paid by barons, knights, and inferior tenants towards the public expenses. When paid out of knights' fees it was called "sentage," when by cities and burghs, "talliage," and when upon lands not held by military tenure, "hidage:" so says Blackstone. The title of Lord Bacon is an improper one. Sir Francis Bacon, knighted in 1603, became Lord Chancellor in 1619, with the title of Lord Verulam. In 1620 he was created Viscount St. Albans. The misnomer, Lord Bacon, has probably arisen from the fact that as Sir Francis Bacon he was better known than as Lord Verulam. So the title lord was tacked on to his surname.

YUM-YUM.—Perhaps the engagement of a conjuror would not cost you much; and the friends invited might be willing to pay a shilling each, knowing that the proceeds will be devoted to the chapel you name. But of course the success of this plan must depend on the number of people invited to the *soirée*, as the expense of hiring the performer must be covered first of all. We should think that your friends would be very glad to pay a trifle for a sitting-down entertainment after a "two hours' promenade" while listening to a band.

ZANTHO.—You appear, from the tone of your letter, to imagine that answers are due to correspondents, numbering thousands, at a very early date on receipt of their letters. This is an error which readers of the "Answers to Correspondents" have seen corrected very many times. The trouble we take is given gratis; it is not remunerated by the monthly sixpence paid for all the other matter—the paper, printing, illustrations, and postage. If you use your common sense you will not need further explanation. As a rule, letters from a great distance should be answered first, as well as those from persons in exceptional trouble, and from chronic invalids, for whom we feel much sympathy. But amidst heaps of letters, such as we have described do not always appear on the surface. Accept our regret if answers to your last-written queries have not yet appeared. They may be awaiting space, in the printers' hands.

PINK PEARL asks "Why Naaman, the Syrian leper, was allowed to go amongst his people"? We do not understand the question. If on account of the complaint he suffered, some kinds of leprosy were not so contagious as others. If because his people were heathen, we can only say that God placed him amongst them, and did not choose to remove him from his natural duties, and his duty towards his sovereign and his country.

M. S. A.—The proper form of address would be "Dear madam," ending with "Yours respectfully and gratefully." We have read your letter with much interest.

DAMARIS.—We suppose you are really English colonists in Africa, and as such are really English in nationality. "African" means a native of Africa, and we have always understood that the term "Africander" was applied to the Dutch settlers at the Cape only.

L. F.—Stephens's oak-stain would answer for your wood. Real oak should never be stained black, but after years of wear and polishing with turpentine and beeswax it naturally comes a rich dark brown.

ROYAL READER.—We know of nothing save the nose machine, so often advertised; and you might try that if you liked. Use carbolic soap to the skin, and consult a doctor

PHOTOGRAPHY FOR GIRLS.

PART IV.

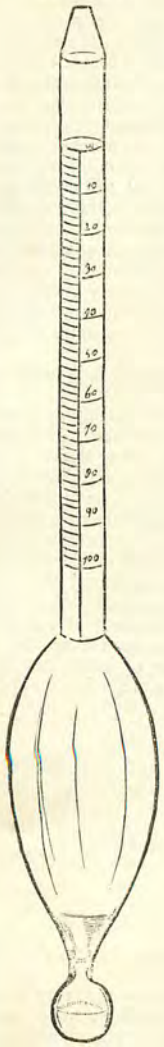

FIG. I.

OUR negative being successfully completed, we now turn our attention to producing from it as many paper positives as we may require. The four processes involved in this are known as printing, toning, fixing, and washing.

The paper on which the photographs are to be printed is specially prepared for the purpose by being coated with a layer of albumen, more or less thick, according to the quality of print required. It will be impossible for our readers to prepare their own paper in this respect, and they must therefore buy it ready "albumenised;" indeed, it proves in the end more economical, and also far more convenient, to buy it ready sensitised as well. But in case any of our readers should like to sensitise their own paper, we give the following instructions.

Select your largest dish, and pour into it water to a depth of at least half an inch. Measure this quantity, and add 40 grains of nitrate of silver for each ounce of water; when this has quite dissolved the solution will be ready for use. As this solution gets weaker with use, and it is important to have it of the right strength, it should be tested each time with an instrument called an argentometer, of which we give an illustration (fig. 1). This little instrument is floated in the solution, and the figure at which it stands shows the number of grains of silver to each ounce of the solution; thus, if the argentometer stands at 35, we must add 5 grains of nitrate of silver for each ounce of the solution. Some papers print better with a stronger, and some with a weaker sensitising solution than 40 grains; but this will be found a good average strength. If the solution becomes brown after a little use, an ounce or two of kaolin may be put into the bottle in which it is kept; and if it is shaken up from time to time it will be found, on the subsidence of the kaolin, to have become again clear and colourless.

The silver solution being ready, the paper must be cut to such a size as to easily lie flat in the dish. A piece of the paper must then be taken up by two opposite corners and dropped, albumenised side downwards, upon the silver solution. The middle of the paper should touch the solution first, the two corners being gradually lowered till the piece is left floating. After it has remained thus for a few seconds it should be gently lifted first by one corner and then by another, and should any air-bubbles be found adhering to the paper they must be removed, care being taken that the solution does not run on to the back of the paper. Leave the paper thus floating on the silver solution for three or four minutes, then one end may be lifted up, and the sheet drawn carefully off over the edge of the dish in such a manner that the surplus solution may be as it were scraped off, and flow back into the dish. The paper is now to be hung up by one corner to dry in a dark place. The sensitising need not be performed in a dark room, but strong white light should be avoided.

No more paper than is required for the day's use should be sensitised by the above process, for the keeping qualities of the ready-sensitised paper sold at the shops are obtained by a secret method, and that prepared at home will not keep well. A paper with rather better keeping qualities may, however, be prepared at home by floating the back of the sheet, when it comes out of the sensitising bath, upon a solution of citrate of potash one ounce, water thirty ounces. After which the paper should be dipped in rain or distilled water before drying.

Should any of the sensitised paper be unavoidably left unused, it may sometimes be kept good for a few days by keeping it pressed between sheets of *blotting*-paper which have been soaked in a saturated solution of carbonate of potash or soda, and dried.

The albumenised paper will cost about 5s. per quire, or if doubly albumenised, about 6s. per quire, and the ready sensitised 8d. to 1s. per sheet, or 3s. 3d. to 4s. per quarter quire; this latter should be kept in one of the tin cases sold for the purpose at 9d. each, and it will then remain fit for use for some months.

After sensitising and drying, the paper may be fumed. This is not indeed a necessary process, but it certainly adds to the beauty of the points and involves very little trouble, since we have only to hang the paper round the inner sides of a box, at the bottom of which is placed a saucer containing a little liquor ammonia, and then keep the lid shut as closely as possible for a short time.

Turning at length to the actual process of printing, we require for this a printing-frame, which will cost from 4d. upwards, according to the size and make. It is well to have half a dozen or so of these frames, so as to be able to print several photographs at the same time. The negative is first placed in the frame-glass, side downwards, then upon it is placed the sensitised paper. This is to be covered with a pad of either cloth or indiarubber, and the back of the printing-frame on the top of all; the springs are then closed, and the whole turned over and placed in the light. It is needless to say that there should be no dust between the negative and the sensitised paper. Some negatives will print best in the sun and others best in the shade; but as a rule a good light—as, for instance, that which is reflected by a white cloud, not the direct sunlight—will give the softest and most pleasing prints.

From time to time the printing-frame must be taken into a shady place and the print examined. This is managed by undoing the fastenings on one side of the back and turning it up on its hinges, when one side of the paper may be turned back and examined while the

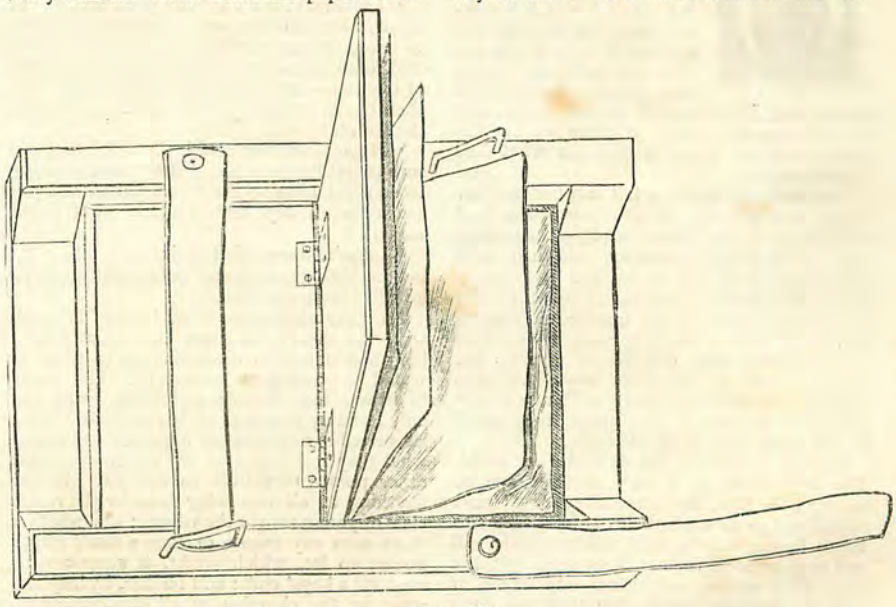

FIG. II.

other side will still be held fast in the printing-frame, as shown in fig. 2.

The extent to which the printing must be carried can only be learnt by practice, but it should be continued until the picture is rather darker than it is to be when quite finished, as it will turn rather lighter under the subsequent necessary processes.

The prints may now be trimmed to size with a sharp knife, or this may be left till they are quite finished; but it will be found rather easier to trim them at this stage, and will save the toning solution. Glass shapes are sold for trimming the prints by, to certain standard sizes that suit the mounts usually sold. Care must be taken not to touch the face of the print with the fingers, but the glass shape is to be placed on it and a sharp knife run round the edges.

When the day's printing is finished, the prints, which in the meantime should have been kept in a drawer or box away from the light, must be placed in a dish of water; all air-bubbles must be removed, and the prints kept moving about for five minutes. The water must then be changed and the prints again washed for another five minutes, and this washing must be continued until the water turns only very slightly milky; generally three changes of water will be found to be sufficient.

The next process—toning—consists in depositing a thin layer of gold upon the prints, during which process the prints change from reddish-brown to a chestnut, and afterwards to purple and purple-black, the toning being stopped when the print has reached the desired tint.

There are many formulæ for making up toning solutions, but the following can be recommended as excellent:—Chloride of gold, four grains; acetate of soda, quarter of an ounce; water, twenty ounces.

The chloride of gold is sold in glass tubes containing fifteen grains each; the tube should be broken, and fifteen drachms of water poured upon it, and when the salt is quite dissolved the solution may be put away in a stoppered bottle, and will, of course, be of the strength of one grain to a drachm, so that for the above formula we must take half an ounce of the chloride of gold solution. This toning solution will keep good for some months, but it must be made up two or three days at least before it is required, as it will not act well when quite new. The prints are placed in the toning solution a few at a time from the last washing water, and must be closely watched. Only experience can teach what is the most suitable tone to give to any particular print, but the colour is best judged by holding up the print and looking at it by transmitted light. It should be allowed to remain in the toning solution for a short time after it has reached the desired colour, as the fixing process tends to reduce it.

When the right tone has been thus obtained, the prints are removed into another dish in which a little common salt has been dissolved; this will stop the further action of the toning solution with which the prints are saturated, and they may remain in it until all are ready for the next process of "fixing."

After use the toning solution should be returned to its bottle, and shortly before using it again a few drops, say from ten to twenty, of chloride of gold solution should be added.

The fixing solution is made by dissolving two ounces of hyposulphite of soda in sixteen ounces of water. Great care must be taken that this solution does not come in contact with any of the others, which would thereby be inevitably spoilt; and it must be made fresh for each batch of prints. Sufficient should be prepared to allow the prints to float freely about in it, and it must be just so warm as not to feel cold to the hand.

We have no guide with the paper prints, as we had with the negatives, by which we may know when they are properly fixed. They must be kept constantly moving about, free of one another, ten minutes, and care must be taken that no air-bubbles adhere to the prints while they are in the fixing solution. From the fixing solution the prints must be removed into a dish of cold water, in which they must be well washed with several changes of the water, so as to get rid of the greater part of the hyposulphite of soda as quickly as possible. They should then be left under a running tap, if practicable, for six or seven hours, the dish which contains them being every now and then emptied to completely change the water, for upon the thoroughness of this last washing depends in a great measure the permanency of the photographs.

The fixing operation is better performed in the dark room.

The prints will curl up as they dry, but may be flattened by ironing on the back with a warm flat-iron. They should be mounted with white starch boiled and allowed to cool before use. If many are to be mounted, it saves time to mount them while wet, when they may be placed in a pile, backs upwards, upon a sheet of glass; the back of the top one is brushed over with the starch and then placed on the mount and smoothed down, and so on with the rest of the pile. If the mounted photographs are pressed before they are quite dry against a plate of glass, it will give them a smoother and more finished appearance.

J. POCOCK.

"THE BOYS' CLUB."

By DORA HOPE.

STAY-AT-HOME GIRLS.

ONE night when Ronald came home, instead of being greeted by Jeannette with her usual lively welcome, he found her in very low spirits—in fact, it was evident she had been crying. The patient invalid sister was a great favourite with all the family, and Ronald instantly drew a chair up to her couch, and sat down to find out what had distressed her.

She was very ready to tell him her trouble, which was that one of the boys, who had been for some time in her Sunday-school class, had got into bad company, and had sunk lower and lower, till, as she had just heard, he had been sent to prison for six months; and Jeannette felt that all her trouble and anxiety had been thrown away, for she feared that since she had been obliged to give up her class, several of the other boys had been getting into bad ways, and were likely to get into the same trouble, too, unless they could be got under some good influence.

Ronald comforted her as well as he could. The boys were at a very difficult age to manage, he said, for when they first leave school and go to work their one aim seems to be to appear manly, and, unfortunately, all evil appears so to them. They seem to think they must smoke, and drink, and swear, if only to show the world that they are quite grown up and can do all their elders do.; and as they generally have their evenings to themselves, they soon get into the way of loafing about and standing in groups at the street-corners, and picking up all manner of evil.

"Lethbridge is an awfully good fellow, you know," Ronald went on, "and he was saying to me only yesterday that he wished he could find some amusement for all those great louts of boys who are always slouching about with their hands in their pockets at the corner of the street."

"How I wish we could, Ronald! they are sure to get into mischief if they have nothing to do; but I am no use for anything, and you are away all day, and, besides, what could we do?"

"I don't know: that is just the difficulty; but Lethbridge is coming in to-night, perhaps he will have some ideas."

Mr. Lethbridge came in, and he and Ronald, with the three girls, spent the evening in a long and animated discussion as to what it would be possible to undertake. The result of it was that Nannie and Elsie, being the only leisurely members of the company, were instructed to make certain inquiries, and report what they had done that day week. Amongst other points, they were to find out whether anything at all was being done for the rough class of young men in the village; also whether there were any rooms, or even a small empty house, to let, which might, if necessary, be used for a boys' club; and further, by inquiries amongst the churches of all denominations, whether any helpers could be looked for from each congregation in case the thing could be started.

Their report was not very cheering. Very few helpers could promise to come; they might join later, if the plan came to anything, but they were sure it would not succeed; young men of that class were too fond of their liberty to come to meetings, and so on; and, worse than all, no landlord was willing to let his rooms when he heard the purpose for which they were wanted. Miss Massingham, too, their unfailing adviser in all benevolent projects, was going abroad immediately, so could give no assistance; but she came to their next conference on the subject, and gave them a good deal of valuable advice.

In the first place, she laughed at Nannie and Elsie for being discouraged by the predictions of failure from those who refused to help them. New schemes, she said, were nearly always received in that way, and generally prospered much better than those which began with a flourish of trumpets. But at the same time she warned them that it was quite true that youths of the sort who frequent street-corners are very fond of liberty, and very much resent anything that appears like interfering with it; and in order to avoid this, she advised them to consult the boys themselves as much as possible about the arrangements; and by all means to call the meeting a "club" or "institute," rather than a "school."

The place of meeting was a great difficulty, but Jack, who displayed an unexpected interest in the proceedings, suggested that for a be-

PHOTOGRAPHY FOR GIRLS.

PART V.

BEFORE leaving the subject of silver-printing, we will mention a few of the defects most commonly met with, and their causes.

The prints have a hard black and white appearance, with no roundness of outline, and but little half-tone. In this case the negative is at fault, and has probably been under-exposed. A good print can never be made from a bad negative. The prints are weak, and of a cold, slaty colour. They are under-printed and overtoned, or may have been left in the fixing solution too long, or possibly the negative is again at fault—over-exposed. The white parts of the print, after a short time, turn yellow, indicating insufficient washing after the fixing process.

Opaque brownish patches appear in the print. The fixing has not been properly carried out, and there has been too little of the solution used for the number of prints fixed, or the prints have not been kept long enough in it.

Red spots, which do not change colour in the toning bath, show defects in the paper or grease-spots, caused perhaps by touching the face of the paper with the fingers.

The prints do not tone, but will only take a brown leathery colour. The toning bath too old or deficient in chloride of gold, the paper kept too long before being printed on, or too long between printing and toning.

Metallic-looking spots, smears, etc. Metallic particles lodged on the paper, or the paper has been in contact with hyposulphite of soda at some time previous to the completion of the toning. Ebonite pincers are sold for taking the prints out of the washing water after printing, and out of the toning bath. They should be kept for these purposes, and be carefully put away before the hyposulphite of soda is taken out.

Photographs are sometimes printed on what is known as plain paper. This paper is not albumenised, but is prepared with a solution of the chlorides of ammonium and barium, and sensitised, toned, etc., in the same way as the albumenised paper. It has not the glaze of the latter, and is best adapted to rather large pictures with considerable breadth of subject.

Perhaps the most beautiful photographic process within the reach of an amateur is that known as the platinotype process, the pictures produced by which are far more artistic and pleasing than those produced by the silver process we have till now been describing; and we venture to predict that those who have followed us thus far will, if they try the platinotype process, find their former interest and pleasure in the art of photography at least doubled. Moreover, platinotype photographs have the great merit of not fading, as do all silver prints sooner or later; also, they can as easily be printed upon muslin, linen, silk, or satin, as upon paper, and thus this process lends itself to many decorative purposes, for which the silver process is not suitable. It is a patented process, and the patent is in the hands of a company, who make a charge of 5s. for the licence to use the process, and issue this licence on condition that all the chemicals required shall be purchased from them. The materials required are the sensitised paper or other fabric, which is best obtained ready cut to the sizes required, as half-plate, quarter-plate, etc. The paper costs 5s. 6d. and 6s. 3d. per ¼ quire for "smooth" and "thick rough" paper respectively. For general purposes we recommend the latter quality. Sensitised nainsook may be obtained at 1s., and sateen at 1s. 6d. per square foot.

As it is most imperative that these materials should be kept perfectly dry, it is necessary to have a special tin in which to keep them, which has a receptacle in it for a small quantity of chloride of calcium; this will absorb any moisture within the tin, and must itself be dried over the fire from time to time. The cost of such a tin, 4 inches in diameter by 10½ in length, is 3s. 4d. An iron developing dish, 8½ by 6½ inches, will cost 1s. 4d, and half-a-dozen sheets of vulcanised rubber 1s. 2d.

The only chemicals required are oxalate of potash and hydrochloric acid.

The printing process is the same as with silver paper, except that a sheet of rubber must be placed at the back of the paper, and all pads, printing frames, etc., must be well dried, and every precaution taken against the least trace of damp getting to the paper or other material.

The photographs do not come out clearly in printing as in the silver process; but the paper, which is of a lemon yellow colour previous to exposure to light, becomes during exposure first of a greyish and then of an orange colour. The printing should be stopped before the shadows assume this latter colour; but, as in silver printing, experience alone can teach us to what depth of colour to print.

After printing, the paper should be at once returned to the calcium tin. When the whole batch of prints is ready they must be developed in a solution of oxalate of potash—five and a half ounces to the pint of water. A quantity of this solution may be made up, as it keeps indefinitely. Some of the developing solution must be poured into the iron dish, and the latter placed over a gas or lamp flame until its contents reach a heat of between 170° and 180° Fahrenheit; at this point it should be kept while the prints are developed, which is effected by floating them face downwards on the hot solution, taking care that there are no air bubbles imprisoned between the paper and the solution. In a few seconds the photograph will be found to have developed in black upon a yellowish ground.

The prints, directly they come from the developing solution, must be immersed in a bath composed of one drachm of hydrochloric acid to seven and a half ounces of water, and washed in three or four changes of this solution, and on no account be placed in plain water so long as they communicate the least colour to the acid bath. When, however, this latter is left quite clear and colourless, the prints are to be placed in clean water, which must be changed three or four times to get rid of the acid, after which the prints may be dried and trimmed.

It will be seen that the prints are by this process completed much more quickly than in the silver process, there being neither the toning nor the tedious washings necessary in the older process, while the final result is undoubtedly far more satisfactory.

In concluding our instructions on the art of photography, we must beg our readers not to be alarmed by the number of chemicals required or the intricate details of the various processes described. The art is far more simple and easy in practice than it can be made to appear in a few short pages, in which many processes and many formulæ are necessarily brought before the mind in so short a space of time that they appear far more confusing than when they are, so to say, "spread out" in practice.

J. POCOCK.

A PERILOUS ROAD.

CHAPTER II.

THE PROFESSOR.

SOME six months before this last conversation with Marietta, Leonardo Sodini had been the means of saving the youngest child of his employer from an accident which, in all probability, would have resulted in death. The houses in Italy are very high, and the Benoni dwelt in some rooms in the same building as their music and instrument shop at Pistoia, but on the upper floor. The little girl, though she had been forbidden to do so, leant out of the window, overbalanced herself, and would have fallen out had not Leonardo sprung up from his chair and dragged her back in time. Signora Benoni, the mother, was there too; she also at the same moment tried to save the child but failed, and before she realised what Leonardo had done, fell fainting on the floor.

The gratitude of the parents was boundless. They raised the lad's salary and his position in the shop. They treated him as if he were a son of the family, but they were never satisfied, and begged Leonardo again and again to let them materially help to push him on in whatever manner he should prefer. Leonardo, however, asked for nothing more for himself, but little by little a plan came into his mind, and, though reluctantly, he did beg a great favour of the Benoni. He told them about his old friends the Stefanis; about their reverse of fortune; of the old man's breaking down; of Marietta's voice and talent: and asked them if they could help the girl to get proper training.

"For myself," said Leonardo, in some confusion, "I should never have done this. I consider that I did nothing but the barest duty which accident placed before me; but for the *vecchio* and the little Marietta—I——"

"My dear lad, my dear Leonardo, not another word," broke in father and mother together, as they grasped his hands in delight that he should have come to them in his trouble.

"And," continued Signor Benoni, "my wife and I know the very man for you—Professore Barbarelli. He is an enthusiast, and he has done much for music—vocalism particularly. His wife was also a teacher, and a celebrated concert singer in her day; and though both have now retired from the profession, nothing enchants them so much as, in some way or other, occupying themselves with music. By the way, has your friend any dramatic talent, for if so—— ?"

Leonardo interrupted eagerly—

"I don't know at all; but that is not what

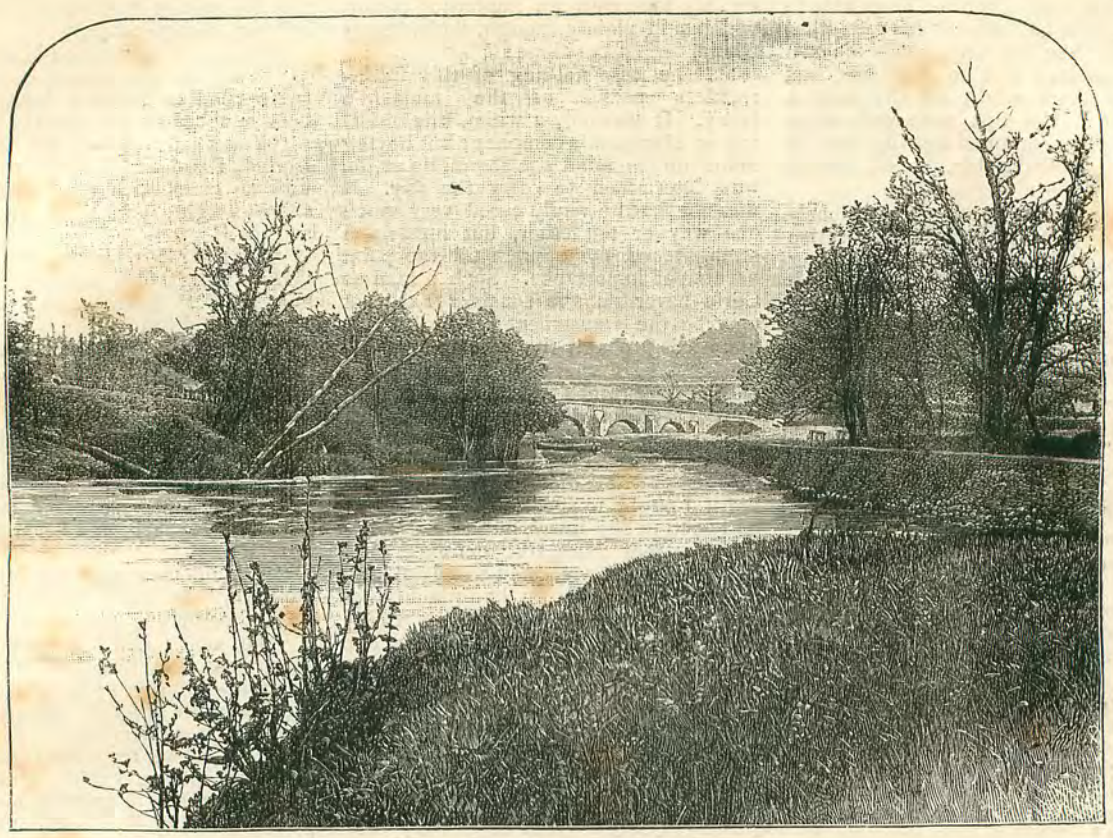

FIG. I.

PHOTOGRAPHY FOR GIRLS.

PART II.

THE necessary apparatus duly obtained, we will suppose our readers to be now in search of subjects upon which to exercise their art.

Portraiture, although it is usually the earliest ambition of tyros in photography, can be by no means recommended as a commencement.

We may be strongly inclined to attempt the portraits of the friends by whom we are surrounded, but the difficulty of properly lighting the subject so as to obtain the due proportions of light and shade usually turns these attempts into failures. This is far more disheartening than a failure in taking a view would be, because in the first place it requires a greater amount of good temper than many people possess to betray no annoyance at sight of the extraordinary images frequently produced as "portraits" by the amateur photographer, and, in the second place, a very slight mismanagement of the amount of light and shade allowed to fall on a sitter, or even an error in the length of time the plate is exposed in the camera, will so exaggerate some features and so modify others that the resulting photograph may very well be unrecognisable as a "likeness" of the sitter.

All this is very different when we come to deal with Dame Nature. Though we may render scanty justice to her loveliness, we rejoice to know that she will smile as brightly as ever, and better still is the consideration that if we do but carry out correctly the chemical processes, and carefully protect the plate until finished from any exposure to white light, the resulting picture must bear at least a perfectly recognisable resemblance to the scene we have desired to represent.

Under these circumstances we say, therefore, not only leave portraiture entirely on one side in all earlier attempts, but, if taken up at all, let it not be before the amateur finds herself proficient in all the other branches of the art.

For home work, with the object of becoming expert in the manipulative part of photography, we recommend the copying of engravings. These are easy to light and focus, and, moreover, they show at once any faults which may have been committed. For instance, if one side of the picture is more distinct than the other, we shall know that the objects at the front and back of the camera are not in parallel planes, as they should be. If the lines of the engraving do not show up clearly and sharply in the photograph, we shall see that the focussing has not been perfectly attended to; if those towards the edges of the picture are curved we shall know that our lens is at fault, not having been sufficiently corrected for spherical aberration. A certain hard, black-and-white effect will probably point to undue exposure; and a muddy, indistinct look, with a lack of density in the dark portions of the negative (the high lights of the object) will show us there has been over-exposure; while a want of purity and clearness in what should be the more transparent parts of the negative (the deep shadows in the object) is what is usually called fog, and may be owing to the exposure of the plate to white light at some time previous to the final fixing of the picture, or to some error in the chemical manipulations, or some impurity in the chemicals themselves.

Supposing an engraving has been chosen for the first attempt, it must be fixed to a board with drawing-pins—a drawing-board will be just the thing—and placed exactly upright facing a good and uninterrupted north light. The centre of the engraving should be on a level with the lens of the camera, and the camera should be placed some nine or ten feet away from, and exactly parallel to, the picture. The focussing-cloth is then thrown over the back of the camera, and the picture focussed upon the ground glass by means of the rackwork adjustments. It will be found a great help in focussing to examine through a magnifying-glass the representation thrown upon the ground glass. Having brought our subject to a sharp focus, we turn back the focussing-glass, and insert one of the dark slides, in which we placed two sensitive plates before bringing it from the dark room. The lens being covered by its cap, the shutter of the dark slide may be now drawn out, but it is a good plan to throw the focussing cloth over the back of the camera and to draw out the shutter with the hand under the cloth, this being an additional safeguard against the entrance of stray light.

The exposure is now to be made. This is effected by deftly taking off the lens with the right hand, the utmost care being of course taken that there shall be no vibration of the camera and stand. The duration of the exposure is a delicate point which can only be taught by experience, for it depends on so many varying circumstances, as the colouring

FIG. 2.

of the object, the stop used with the lens, and the state of the atmosphere. We will, however, suppose that an exposure of two seconds is the right time for the subject in hand. The best way to time short exposures like this is to gauge for ourselves the rate at which we count, by repeating the consecutive numbers as fast as we can say them for fifteen seconds; then, if we find we have counted up to seventy-five, we shall know that we count five to a second, and thus, after a little practice, we shall be able to time our exposures to within half a second.

Before proceeding to the next stage of the process—the development of the negative—we will further consider what subjects we had better choose for the exercise of our art, after we have attained, by means of home practice, to such proficiency in the mechanical and chemical manipulations as shall make it worth our while to carry forth our camera into the fields and lanes, in search, like Dr. Syntax, of the picturesque and beautiful.

I know that it will seem to most of my readers that when they have found the landscape or the object which they desire to photograph, there is nothing to be done but to set up the camera in some convenient spot and to go through the various processes necessary to produce a photograph. By these means a photograph will undoubtedly be produced, but whether that photograph will be artistic and pleasing—whether, in short, it can be rightly called a picture, is quite another question.

As a matter of fact, where one photographer will obtain only a flat and uninteresting representation of his subject, another, by selecting a slightly different point of view or time of day, or by retaining in his photograph a different proportion of sky and foreground, will make from the same materials an artistic picture that shall give true pleasure and refreshment to all who see it.

Perhaps the simplest illustration of our meaning will be to suppose that our subject is some picturesque building—for example, a thatched cottage covered with ivy. How different would be a flat elevation of the front of the cottage—taken "full face," so to speak—to a picture produced by placing the camera in such a position as to bring out one side or end of the cottage, thus giving relief and a sense of

FIG. 3.

solidity to the whole. Or again, suppose the cottage has a southerly aspect, and its east end is the one we desire to photograph, how much more contrast and effect we shall obtain by taking our photograph in the afternoon than if we went to work in the morning. Yet we must remember there is danger in the afternoon of having too much shadow in our picture; and then we see the advantage of having some light object, such as a figure, a cart, or even a large stone, which may be so brought into the picture as to balance and act as a contrast to the darker portions.

It may be stated as a general rule that a photograph to be pleasing should not be composed mainly of straight lines—that the principal lines should neither run parallel nor be at right angles to each other; that the chief object in the picture should be neither quite in the centre nor too much at one side, and that a nice balance of light and shade should be carefully preserved. It is also highly important to have some prominent object in the foreground — a gate, a post, or even an old basket, will often answer this purpose; but something there must be, or the more distant portions of the scene will probably appear flat and uninteresting. Sometimes a kind of secondary object is needed to balance the chief feature of our picture; this should, of course, follow the broad rule for details in the foreground, and be placed at one side of the photograph, and not just between the main object and the camera. Several of the points just touched on will be illustrated, and perhaps become clearer to the reader, if we imagine that the subject of our photograph is a street with a church at the further end of it, and a cart in the foreground to act as a secondary object. Now if the camera be pitched in the middle of the street, the resulting photograph will have the church in its exact centre; the rows of houses on either side will give straight lines leading up to it, while the cart, perhaps in the middle of the street, is in a direct line between the camera and the church—thus producing a stiff and disagreeable picture. But by placing the camera judiciously on one side of the street, we shall have the church slightly on one side of the centre; the two sides of the street will look so different from each other as to give us the pleasure of variety, and the cart, instead of spoiling the whole, will appear as a very pretty and suitable addition.

In photographs the horizon is usually placed higher than in paintings, but this may possibly be on account of the additional time and trouble required for the printing in of clouds from a separate negative.

After all, we may learn more of artistic arrangement in half an hour's careful study of good paintings than can be taught by pages of written instruction; and our readers will also find it excellent practice to criticise any photographs they may chance to see, finding out for themselves what are the points which add to the beauty and pleasing effect of the picture, and what are the defects which detract from the same.

We give two or three examples of actual photographs taken by the writer. A glance or two at these in passing may render still more clear the foregoing remarks.

No. 1 is a view on the Medway. The bush towards the right is an object which gives relief to the distance; the dark foreground and light river form a striking contrast, while the eye is naturally led up by the river to West Farleigh Bridge in the background; and the trees, some of them leaning over, and one falling to the ground, add to the diversity of the lines of the picture. There is, perhaps, a little too much of the dark foreground in this example, but that could not well be avoided, as it was necessary to bring in the bush on the right; and the flat effect given to the distance by cutting out the foreground will be at once observed on placing the hand across the lower part of the picture, so that only the distance is seen.

No. 2, an old hulk lying in Falmouth Harbour, is an example of a case where it was especially desirable to have something in the picture which might act as a sort of balance to the main object. This balance is found in the post and stone on the right, and on covering it from sight one can easily see how greatly it adds to the good effect of the whole, and prevents the photograph from having a one-sided appearance.

No. 3 is given rather to show how very easily subjects for photography may be found. It is merely the corner of a field—such a corner as we may light upon in any country place—taken in the early spring-time before the leaves are out. Indeed, the photographer need never be at a loss for subjects. With due care as to the position of the camera, the introduction of figures where necessary, and only where necessary, an old post, a rock, a wicket gate, or an old stile, may all be made to look well and pleasing.

J. POCOCK.

THE ART OF TRAVELLING.

PART II.

IN our first chapter we dealt, as our readers will remember, with the general aspect of travelling—its origin, and its developments; and also entered at some length on the highly important subject of expenses. But before we can proceed further, before we can start with any of our home or foreign tours—tours on paper at least—we must deal with a question which is of very great importance for us to consider, and which approaches very near to the cost of a tour. I mean equipment.

In the science and art of travelling, this must occupy no small or unimportant place, and the professors of that fine art must, we are sure, have need to deliver many weighty lectures under this head. It is a subject which, I think, may be discussed with special appropriateness in the pages of THE GIRL'S OWN PAPER, because it is one which concerns ladies perhaps more than gentlemen; they—be it said with all respect—are generally, but not always, the worse offenders in this respect.

By equipment, I mean both what you bring with you and what you bring it in. Roughly speaking, luggage, baggage, *gepäck*, *impedimenta*—whichever word you please.

To be guided in this respect, you must use to a great extent the directions given by common sense, and some small amount of geographical knowledge. It does not require much of either of these to tell you not to bring skates with you to Jamaica, or zephyr garments to Labrador. But still people are often strangely misinformed as to what they should bring with them to different places and countries. I remember once, on an intensely hot day in Norway, meeting a poor lady who was quite overcome with the heat. Her friends had warned her that before she adventured herself into those icy realms, she had best lay in a stock of the very warmest clothing. Accordingly, she had had a dress made of thick cloth, which was well padded and lined, to keep out the cold. The result was the reverse of pleasant when she found herself in a country which in summer is generally very warm, except, of course, in the high-lying parts.

I would not for a moment dare, in this paper, to enter upon such a profound, mysterious, and inexplicable subject as ladies' dress, especially as it is dealt with so fully, and I believe practically, by those who can speak with authority, in the pages of THE GIRL'S OWN PAPER. But without trenching upon their province, I might give, perhaps, a few general hints which may be useful, not merely to ladies but to travellers of the sterner sex as well.

In selecting the best kind of clothing to take when proceeding upon a tour, it is, of course, first of all necessary to think of the climate you will meet with. Those who are going to a mountainous part of the country will have to bring things different from those who go to the sea, as the extremes of temperature are much greater there than that at the seaside, where the presence of the ocean generally secures a more even temperature.

In countries such as Switzerland, Norway, &c., one must be prepared to meet with considerable varieties of temperature in the course of a day. In the valleys you will find the heat often oppressive and overpowering; when you ascend a little, it becomes pleasant and bracing, higher still, and it is bitterly cold. As an illustration of this, take, say, the Rhone Valley in the Swiss canton of Valais. Suppose, for example, you find yourself in the morning at Martigny. There you may be half roasted. But take the train and proceed to Visp, and up the valley towards Zermatt, soon existence becomes a pleasure, and you enjoy the bracing air. Reach Zermatt and ascend to the Rifelberg, and you will find the stove the pleasantest companion after you have feasted your eyes on the magnificent panorama which surrounds you. Now all this might be accomplished in a single day, and yet what variety must be met with in such a journey. We might lay down, then, as a canon that for a country like Switzerland clothing should be light, yet warm, and that you should always have ready at hand something extra to put on or take off if extremes of cold or heat are met with. In countries flat or undulating, like Holland and parts of Germany, the same precautions need not be taken. There you have it generally warm enough or cold enough during the day, according to the season of the year, to guide you in the selection of clothing; except it be in places which are noted for becoming suddenly cold in the evenings, like some towns on the banks of large rivers from which, after sundown, a cold wind often sweeps up. Dresden is an example of this. Long railway journeys require also a special dress. In summer the dust is often