FRETWORK.

Of all the different varieties of wood-work, none perhaps is more generally fascinating than fretwork. True, carving has a greater charm for the skilled artistic worker, but we cannot all be carvers, while anyone with care and patience may turn out good results with

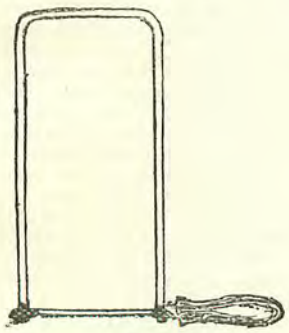

FIG. 1.

the fret-saw, if she only knows how to set about it; and we believe that those of our readers who are not yet adepts at this pretty employment will easily become so if they will give attention to the following directions, and carry them carefully out.

The tools and materials required for fretwork are not necessarily expensive; their cost depends chiefly upon whether we are content to work with a hand-saw or whether we intend to use a machine, the chief advantage of the latter being that a great deal more work can be done with it in a certain time than can be accomplished by means of the hand-saw.

Hand fret-saw frames similar to fig. 1, and 12 inches in depth, may be had from 1s. upwards, but better quality frames of bright steel, and with tension screws, cost from about 3s. for a frame 9 inches deep, up to about 7s. for a frame 18 inches deep. The advantages of greater depth in the frame become obvious after a very slight experience of the work of fret-cutting. Not only can larger pieces of ornamental work be taken in hand, but even the smaller pieces can be pierced with fewer changes of position, and it is very tiresome, in cutting one small hole, to have to adjust the saw in the frame twice, merely because there is not room allowed in the latter for turning the work round.

As the various other tools required will be wanted, whether we use a hand-saw or a machine, we will next mention one or two of the many machines in the market, not that we recommend these machines in any way, but as indicating the limits of prices.

If the purchaser goes to a respectable shop, he or she may rely upon it that the quality of a machine will be in proportion to its price, and that however many adjuncts in the way of drills, circular saw, etc., a cheap machine may have, it will not be so good and serviceable as a more expensive implement, although the latter may perhaps have a plainer appearance.

A machine, like a man, may easily be made to do one thing well—say fret-sawing—but if the same machine is to fret-saw, drill, and work a circular saw and a lathe, it is hardly likely to do either one of them so well as it would have done one alone. So much for combination tools!

There are sundry small machines made, known as hand machines, varying in price from 3s. up to 9s. 6d. These are clamped to any firm bench or table, and are worked either by an up and down or by a rotary motion of the hand. They have, however, no real advantage over the hand-saw, and we shall not consider them further.

The cheapest treadle machine we know is one called "The Cricket," the price of which is 13s. It is a light little machine, and with careful usage will doubtless do all that many workers would require from it. This machine is provided with an adjustable table, the use of which will be alluded to later on.

Another cheap machine to be obtained through any tool shop is "The Windsor," made by the Britannia Company of Colchester. This machine, sold at 17s. 6d., is provided, in addition to the adjustable table, with an automatic blower and drill—the blower blows away the sawdust formed at each stroke of the saw, thus leaving the lines of the pattern clearly visible, and saving the worker's breath, which must otherwise be used for the same purpose; the drill is also an acquisition, as it does not interfere with the working of the machine, and it is in our opinion the only accessory which it is well to add to a fret machine.

A more expensive machine is "The Britannia," fig. 2, price £2 15s. This machine, besides adjustable table, blower and drill, has the following advantages:—

First.—The table extends the whole distance under the arm of the saw, thus giving more support to pieces of work of large size.

Secondly.—The saw gives a vertical stroke instead of cutting with a circular sweep; this makes it easier to follow the pattern exactly and smoothly.

Thirdly.—There is a presser, similar to the presser-foot of a sewing machine, which keeps the wood down on the table, and prevents it from jerking up with the upward stroke of the saw—an unpleasant incident, which frequently leads to the breaking of both saw and work.

The higher priced machines have in general either more accessories which would be better placed on separate machines, or are fitted with electro-plated tables or frames, which, as need scarcely be pointed out, do not in any way add to their efficiency.

The other tools necessary will be, say, one dozen fretwork files of assorted shapes—they are made flat, half-round, square, triangular, and round; these should cost from 1s. 3d. per dozen for four-inch lengths, up to 2s. per dozen for six-inch files, and of these the six-inch ones will be found the best.

Two or three bradawls of medium and small sizes.

A small six-inch rasp, costing about 6d.

A few sheets of medium and fine sand-paper, down to the finest obtainable.

If a hand-saw is to be used, a sawing-board and clamp will be necessary in addition.

The board, Fig. 3, may be easily made at home. It consists of a piece of deal about three-quarters of an inch thick, and 18 inches long by 12 or 15 inches broad; in one end a V shaped opening, 4 or 5 inches deep, and tapering down from 2 or 3 inches wide, is to be cut. Another opening, for smaller work, of the same shape, but only half the width and depth, is to be cut in the other end. This board is to be clamped to a table with an iron clamp, costing about sixpence or eightpence, and serves to support the work while being sawn, or the cutting board and a wooden clamp all in one piece may be purchased at from 1s. to 2s.

Last, but not least, a good supply of saws must be provided, for a good many may be broken over the first attempt; luckily, they are not expensive.

The ordinary saws are numbered, the finest 00, and the largest No. 8, and cost, the finest about 3d. per dozen, and the largest 1s. per dozen.

Griffin's patent saws have their teeth formed somewhat like the barb of a fish-hook. These saws are generally preferred to the ordinary

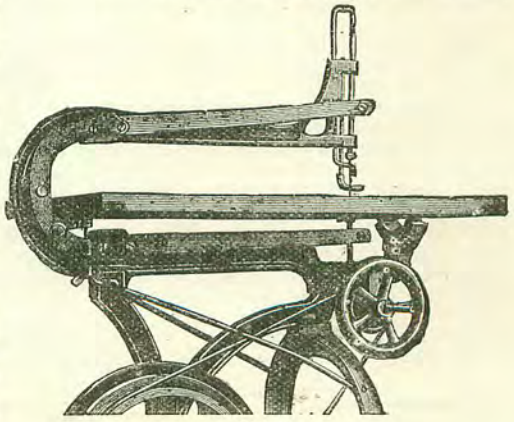

FIG. 2.

ones; the finest, numbered from 000 to 6, cost 5d. per dozen, and Nos. 7 to 10 6d. per dozen.

Another brand of saw, known as the "American Star," is a favourite with some fret-cutters; it is intermediate in price between the ordinary saws and Griffin's saws.

The medium and finest saws will be of the most service, and at the outset one dozen each of Griffin's Nos. 00, 0, 1 and 3 will be found useful.

If the work when cut is to be polished and put together at home, polishing materials, and

FIG. 3.

ordinary light carpenters' tools, nails, and glue-pot will be required; but for fretwork itself we may tabulate the cheapest practical outfit as follows:—

	s.	d.
Common saw frame ..	1	0
One dozen 6-inch files ..	2	0
Bradawls	0	3
Rasp	0	6
Sandpaper	0	6
Clamp	0	8
Four dozen saws	1	8
Total	6	7

We have next to consider the material in which to work. Many sorts of wood are now in the market, ready cut to the proper thicknesses for fretcutting, and in addition to ordinary fretwood, what is known as three-ply wood is sold; this consists of three thin layers of wood glued together, the grain of the middle piece running in a direction at right angles to that of the grain of the two outside pieces. The advantage of this three-ply wood is that it is stronger, and less liable to split. The prices of the various sorts of fretwood will vary in different places, but where only small quantities are required they may easily be obtained by post, should local prices be very exorbitant. The prices given in the following list are those charged by some of the best-known dealers, for wood from $\frac{1}{8}$ to $\frac{1}{4}$ inch in thickness.

Horse chestnut is a soft, white wood, and is easy to cut; price 4d. per square foot, or for three-ply wood 6d. per square foot.

Lime is a very light-coloured wood, soft and easy to cut; from its even texture it is particularly suitable for fretwork upon which any carving is to be executed. Lime is sold at 4d., or three-ply wood at 6d. per square foot.

Sycamore, a white or light-brown wood, and cherry, a harder wood, also of a light-brown colour, are sold at the same price as lime.

Holly is a hard, white wood, with so fine a grain that when polished it resembles ivory; price 7d. per square foot.

Mahogany, dark oak, and walnut are woods too well known to need description; they are all sold at 5d., or in three-ply wood at about 7d. per square foot. Walnut is rather apt to split in sawing, and, consequently, should the pattern be a delicate one, three-ply wood will be the best to use.

Satinwood has, when polished, a lustre resembling satin; it is of a pale orange colour, and costs 1s. 2d. per square foot, or three-ply (the centre wood being of a cheaper kind), 9d. per square foot.

The three-ply woods are sent out smooth

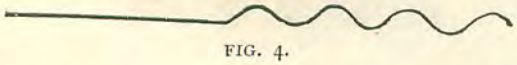

FIG. 4.

and ready for use; but if the ordinary solid fretwood is required ready planed, an additional charge is made of $\frac{3}{4}$d. per square foot.

There are several other woods which may be obtained from the dealers, and are sometimes used for fretwork; these are canary (light yellow), tulip (red and yellow), ebony (black), cedar (red), plain and birdseye maple (yellow), sequoia (light brown), and tasso (red).

Besides wood, ivory, bone, horn, tortoise-shell, mother-of-pearl, brass, nickel-plated zinc, and even marble are used for fretcutting. These materials can mostly be obtained in plates about 6 by 4 inches square, at from 2s. to 2s. 6d. per plate.

The tools and materials obtained, we will now consider the use to be made of them. It will usually be found well to practise first a few straight lines, turns, and curves before commencing upon any special design. If a hand-saw is used, the saw must be inserted in the frame with its teeth pointing towards the handle, and if there are no tension screws to the frame, after one end of the saw has been tightly fastened in place by means of the clamping screw, the other end of the frame must be pressed a little inwards, while the end of the saw is securely fastened in it, so

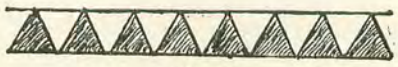

FIG. 5.

that the saw may be well stretched. If the frame has a tension screw, the saw may be tightened by a few turns of the screw, after both ends of the saw have been firmly secured in the clamps.

The same directions also apply to the insertion of a saw in a machine, the teeth of the saw in this latter case pointing downwards.

If a hand-saw is used, the cutting-board must now be clamped to a table, and the wood, which must have the design to be cut marked on it, is to be placed over the V shaped opening in the board; the saw should be held with the handle downwards, the cut being made on the downward stroke of the saw. The first attempt may be made on first a straight, then a curved line, fig. 4. Care must be taken to keep the saw perpendicular in the case of a hand-saw, so that both sides of the fretwork may be according to the pattern, and not to press the wood sideways against the saw in the case of a machine saw, otherwise the saw will be broken. When fig. 4 can be sawn out exactly to the line drawn, figs. 5 and 6 may be attempted; the chief difficulty in these patterns will be found in turning the angles; to do this well it is necessary to move the saw rapidly up and down, but to turn it slowly; of course if a machine is used it is the wood that must be turned slowly round while

FIG. 6.

the saw is kept in rapid motion. In turning, care must be taken not at the same time to advance the saw, or the sharpness of the angle will be spoilt.

Next a simple design like fig. 7 may be cut out; a hole must be made with a bradawl in some part of the piece to be cut away, and one end of the saw unclamped and passed through it and again securely clamped; the whole of the design shown in fig. 7 can then be cut out without again removing the saw.

In making saw holes with a bradawl, always be careful to place the tool with its blade across the grain of the wood; if it is then twisted backwards and forwards, as it is thrust through, it will cut the fibres of the wood; whereas if the awl is placed with its edge parallel to the grain of the wood, and pushed through between the fibres, it will probably split the wood.

Another experiment may now be tried. Fasten a piece of dark wood on a piece of light wood, either with small screws round the edge, or by pasting a piece of newspaper on one side of each piece, and then cementing the two paper-covered sides together with paste, and leaving the whole, under a weight, to

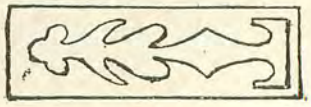

FIG. 7.

dry; pieces of wood so fastened together may, when required, be easily separated again by passing the blade of a knife between them, and thus splitting the paper.

The table of the fretwork machine is now to be fastened at an angle, or if a hand-saw is used, the saw must be held at an angle; but this work is not easy to do in a satisfactory manner with a hand-saw. The hole through which the saw is to be passed must be made through the double wood on the line of the design, and the smallest bradawl must be used that will allow the saw (which should be a fine one) to pass through the hole it makes. It will be easily seen that the effect of tilting the machine-table will be to give the fret the section shown in fig. 8, consequently the piece cut out of the top layer of wood will be slightly larger than the piece cut out of the lower layer; this will make up for the space of the saw cut, and if the table has been tilted to the right angle for the thickness of wood and size of saw used, the centre piece of the top layer of wood will exactly fit into the space left by the centre piece cut out from the lower layer; and if the top layer is hollywood and the lower walnut, the result will be a white inlay on a brown ground.

Some larger objects may now be attempted, as brackets, boxes, picture frames, etc., for which designs may be drawn, or they may be purchased at very low prices from all dealers in fretwork materials. Fig. 9 is a design for the top of a workbox, of which only one quarter is shown. No difficulty will be found in obtaining the reversed patterns, as they have only to be taken on tracing paper and turned over. The four patterns must be pasted on to the wood, their joins being neatly fitted together before commencing to cut.

Most people like to keep any designs they purchase for further use, and it is at the same time necessary to transfer the design to the wood before it can be cut out. Several different methods are therefore adopted to secure both these desiderata.

One method is to paste the design on to the wood, cut it out with the fret-saw, and then take as many duplicates as required direct from the fretwork, by placing rather thin paper over it, and rubbing with heel-ball. The objection to this method is that any faults or irregularities in the cutting are reproduced in each of the duplicates.

Another plan is to place a piece of the carbonised transfer paper, if the wood be light coloured, or of red transfer paper if the wood be dark, between the wood and the design. The lines of the design are then gone over with a hard point, and thus transferred to the wood, the pattern being kept intact; but the best method of all is to carefully copy the

FIG. 8.

design on tracing paper, and then paste the latter on the wood to be cut, preserving the original design for future use.

The interior portions of the pattern should be cut away first, whenever possible, the

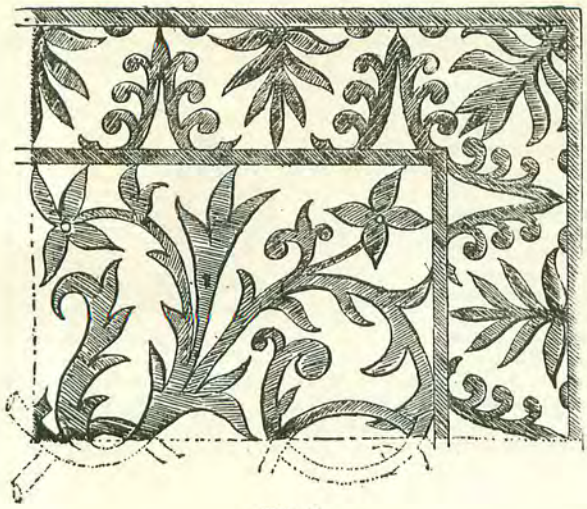

FIG. 9.

exterior lines being cut only after the interior is finished. All the holes required for passing the saw through may be made before the sawing is commenced. If a machine with a drill attachment is used, the holes will be quickly made with the drill.

In feeding up the wood to a machine-saw, care must be taken not to feed too fast, otherwise the saw may easily run beyond the lines, and spoil the whole work.

Besides inlaying, very nice effects may be obtained by what is known as overlaying, or overlaying and inlaying may be combined.

In overlaying, two separate pieces of fretwork are cut out, of different design, care being taken that the designs are in the same style, and will not interfere the one with the other; one is then fastened on the top of the other, usually by gluing and drying them under pressure. Fig. 10 shows an original design for the top of a box in over-lay; the light parts are in cherrywood, the darker in walnut, and these are backed with cedar to prevent dust from finding its way through the open work into the box, or instead of cedar the box may be lined when finished with silk or velvet of a suitable colour.

When the design has been fully cut out, any roughness in the cutting must be smoothed down with the rasp and files, and the work must be laid on a flat board and sand-papered until all trace of the paper and paste is gone, and the wood is perfectly smooth; the finest sand-paper must be used to finish with, and it should be laid over a flat block of wood about four inches long by three inches wide, and three-quarters or one inch thick; this block with the sand-paper strained tightly over it is then to be rubbed over the work. Sand-papering blocks of cork may be purchased at the tool shops, and these are better than the wooden blocks; but the latter have the one advantage that they can be made at home.

The next operation will be oiling, varnishing, or polishing.

To oil the work it is only necessary to apply boiled linseed oil to the wood with a brush or a tuft of cotton-wool; place the work on one side for a time, then wipe off any surplus oil, and polish with a stiff painter's brush.

Varnish is applied with a brush; it should be used in a warm room and applied quickly and lightly, using a clear transparent varnish for light woods. Varnishing does not give such a good appearance to the work as that produced by oiling or polishing.

Before varnishing it is best to give the work a coating or two of size; this may be purchased at the oil and colourman's. Equal quantities of size and water should be placed in a gallipot, and the latter put into a saucepan of water over the fire; when the size is melted it must be brushed quickly over the work, taking care not to work the brush backwards and forwards so as to create air-bubbles, and the size must be thoroughly dry before the varnish is applied.

Polishing is more difficult than oiling or varnishing, and requires considerable practice before it can be done properly, but it is proportionately more satisfactory when done. There is no difficulty in getting fretwork polished, as a little inquiry will soon lead to the discovery of a professional polisher in any town of moderate size; but with care and patience it may also be done at home.

For dark woods ordinary French polish is used, but for light woods white polish must be obtained. Either kind may be purchased by the pint at the oilman's, or in country towns at the ironmonger's, and sometimes at the chemist's.

The wood must be made very smooth with sand-paper, and if the grain is open and porous, it must be "filled." There are several patent fillings of colours to suit different woods, which may be purchased, or a filling may be made of plaster of paris and water, coloured with wood stain to match the wood. This must be used immediately after it is mixed; or a filling may be made by mixing plaster of paris and dry colour with tallow, and this latter mixture will keep.

The "filling" is to be rubbed over the wood until the pores are filled up, when any surplus must be rubbed off, and the wood placed on one side for a few hours. To lay on the first coat of polish, soak some cotton wool with polish, and screw it up in a piece of linen rag. Now rub this over the work, making circular strokes wherever the shape of the work will permit it, and when an even coating of polish has been laid on, the work must again be put aside in a warm room for a few hours. At the end of that time the polish will be found to have sunk into the wood; it must now be lightly sand-papered with the finest sand-paper, spread over a block, and re-polished; and these operations must be repeated till the polish ceases to sink in. Some woods absorb a great deal more polish than others. When the wood still shows a polish after standing by, it must be lightly sand-papered as before, and the cotton wool having been wetted with polish and wrapped in the linen, it is to be rubbed over the work with light, quick strokes. As the polish works out, and the rubber becomes dry, one drop of linseed oil (not boiled linseed oil) is to be put on the outside of the rubber. The cotton wool must from time to time be supplied with fresh polish, and always when the rubber begins to get dry a drop of linseed oil must be put on it, and so the process must go on until a good body of polish is obtained on the work. If too much oil is used the work will be easily polished, and look well when just finished, but in a few days the oil will have sunk into the wood, carrying the polish with it, and leaving the wood quite dull. If too little oil is used the rubber will stick to the work, dragging up the polish already put on; the only thing then to be done is to sand-paper the work and begin afresh. Remember the oil is not meant to polish with, it is only to serve as a lubricant between the rubber and the polish.

All polishing must be done in a warm room; it is perfectly useless to attempt to polish in a cold room.

Some articles, as boxes, picture frames, etc., may be put together before they are polished; others, such as brackets, letter-racks, etc., must be polished before they are put together.

Brackets, boxes, corner and other small cupboards, bookshelves and such like articles, should be put together with small screws; or where no weight is to be carried, brads or brads and glue may be used, holes being made for the brads with a bradawl a little smaller than the brads to be inserted, and with due attention to the caution already given as to the manner in which the bradawl is to be used.

In the case of light articles, as picture-frames and letter-racks, glue alone will usually suffice, but it must not be the hard, burnt mass generally found in the household glue-pot. The best glue must be purchased; it should be clear and semi-transparent, and must be broken up, put into the glue-pot, and well covered with cold water; after soaking for twelve hours, sufficient water to cover it should be again added, and it may then be placed on the fire to melt. As soon as it is quite melted, it must be taken off the fire, and when cold it should be a firm jelly. If a drop or two of creosote is added to the glue while it is warm it will be found to keep well; more water must be added to it each time it is to be re-melted. As little glue as possible should be left between the parts to be joined, and these should be rubbed together to get rid of any surplus. If the parts are polished, the polish must be scraped away from the places to which the glue is to be applied.

In sawing such materials as metal, vulcanised rubber, or even very hard woods, it will be found advisable to apply a little oil to the blade of the saw at frequent intervals in order to reduce the friction. In cutting such brittle materials as mother-o'-pearl, or in cutting

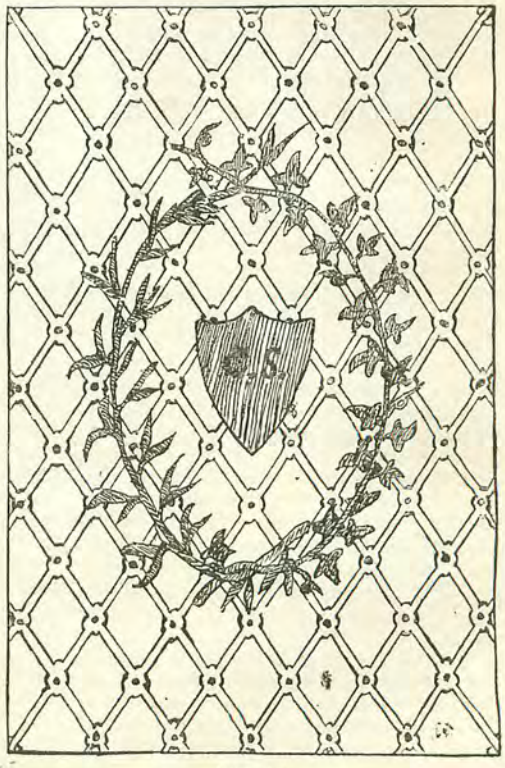

FIG. 10.

very thin metal, it will be found best to enclose the material between two thin pieces of wood, on one of which the required design may be traced.

The fret-saw may be also used for cutting

FIG. 11.

out fancy hinges, corner pieces, and escutcheons required in fitting up the various articles made in wood. Fig. 11 is a design for an escutcheon for the lock of a box or hanging cupboard, and Fig. 12 is a small metal plate for fastening a bracket or cupboard to the wall.

Other uses for the fret-saw will readily suggest themselves; for instance, pretty boxes may be made in the following manner:—Take a wooden box of any convenient size and shape, collect some small branches from any tree (preferably one which has not a white or very light-coloured wood), about ½ inch in diameter; leaving the bark on them, saw these small branches across with the fret-saw, into slices of from $\frac{1}{16}$ to ⅛ of an inch in thickness, but all of the same thickness. These sections are then to be glued on all over the box, as close together as possible, and afterwards sand-papered down level and varnished; or the sides of the box may be ornamented in this way, and the top with twigs sawn in half, lengthwise, a forked twig being glued on as a handle.

Some sorts of fretwork, representing ivy or similar leaves, may be much improved by a little simple carving, such as the addition of veinings to the leaves, and hollows in the centre of scrolls and turns.

FIG. 12.

A set of six carving tools in a box, suitable for the fret-worker, may be obtained for five shillings.

J. POCOCK.

KATHLEEN'S "HANDFUL."

By the Author of "L'Atelier du Lys," "In the Olden Time," "A Little Stepdaughter," etc., etc.

CHAPTER XIV.

PHYLLIS and Una were not a little excited at hearing of Kathleen's being summoned by Lady Dacre.

"I think she is not like the Blatant Beast, but the Titaness Mutabilitie," Una said, with one of her frequent reminiscences of Spenser. Kathleen had passed on to the little one her love of the Elizabethan poet, whose verse contains so many allusions to her own country. The "Faerie Queen" had been a storehouse of stories for the children as long as they could remember, and she herself owed far more than she knew to the deep suggestiveness and the noble tone of the great poem, whose "lofty line" has been such a source of inspiration ever since its twelve books, and the priceless fragment of another, were given to the world.

"Sister is arming herself for a quest," Una added, as she saw Kathleen put on her long white apron in preparation for going up to Lady Dacre's room, to which Phyllis, the matter-of-fact, replied—

"I don't see that a white apron is much like armour."

Like most unimaginative people, Phyllis was inclined to condemn what was fanciful as necessarily foolish. Una was undaunted by the snub.

"It is a quest all the same," she persisted. "Sister is fighting our enemy, Poverty, and when she hears our lessons she does battle with the giant Ignorance, a big, ungracious monster, who holds us in wretched thraldom."

Una's phraseology was a vast amusement to Kathleen, and Phyllis was always impressed by it, secretly holding it as a fresh proof of Una's unbounded cleverness, so that she did not attempt to controvert her assertion. Phyllis was not clever, and long words had a great effect on her.

Kathleen went upstairs at the appointed hour, entering the bedroom with a sharp heart pang, for it had been Mrs. O'Kelly's, and the last time she had been there it was to stand by a coffin. The pain had to be met and conquered, but she was paler than usual, and her voice was not quite steady as she asked a few necessary questions.

"Either she is afraid of me or out of temper—out of temper probably," thought Lady Dacre, with inward amusement, getting about as near the truth as people generally do who think they read what is passing in the mind of another. Kathleen resolutely kept her thoughts on the work in hand. If she let them go, she knew that it would be impossible to keep the tears out of her eyes, and on the whole she was glad that her patient was so fidgety and hard to satisfy; it employed her the more fully.

"I hate being handled and touched," Lady Dacre exclaimed, swerving out of Kathleen's hands.

"I hardly see how to help it with this treatment," Kathleen replied, with due gravity, but a flicker of amusement in her eyes, which Lady Dacre caught directly.

"Well, I suppose it can't be helped. You have a pleasant hand, if one must be pawed about," she admitted.

After that they got on better. That inward laugh helped Kathleen, and she took a good look at her patient, and discovered how handsome she was, with her magnificent black hair and scarlet lips, and the brilliant eyes which a touch of fever rendered even brighter than usual. It was not a happy face—eager, passionate, sad, Kathleen thought, stormy and wilful too, yet with some kindness in it—the face of a woman who suffered and made others suffer; who alienated, perhaps consciously, yet who would have liked to be loved, and who, above all, could not endure to be thwarted.

She remained still after a while, apparently soothed by Kathleen's skilful touch; then she said, quite suddenly—

"Cannot you say anything amusing? I am bored to death."

Kathleen, however, had no intention of providing pastime for Lady Dacre. She had come reluctantly, and with a strong resolve to be the masseuse and nothing else, but her sense of humour betrayed her.

"I always charge double if I am expected to be amusing," she answered, with gravity.

Lady Dacre looked quickly up and caught her eyes.

"Lovely Irish eyes they are," she said to herself, and then, shaking her head, "You provide your patients with sauce gratis, however. But after all, amusement is so scarce that anyone who has it may well sell at famine price. I envy you all when I hear how you laugh downstairs. You seem a merry party."

As Kathleen made no response, Lady Dacre tried another tack.

"That little one — Una — will be a