THE PRINCIPLE OF THE LOOM.

When a loom is seen in operation, the ingenious mechanism that causes it to act is admired, but it is difficult at first to grasp the fundamental principle involved. We shall therefore give a demonstration of the apparatus by one of the best methods imaginable, and this consists in the manufacture of a loom by ourselves and then weaving with it. Two lead pencils, a visiting or playing card, some thread, a good penknife, and a wooden paper-cutter are all the objects needed. The loom consists of two pencils to serve as warp beams, and of a heddle cut out of a piece of cardboard with a penknife. The outfit is completed by cutting one or two shuttles out of the same cardboard, and winding thereon the weft that is to be passed through the threads of the chain. The pencils having been placed on the edge of the table, and held in position by means of a heavy book, as shown in Fig. 2, we begin the operation of warping. This is done as follows: To one of the pencils we attach one of the extremities of the chain, and, by means of a large needle, pass the other extremity through the first slit in the heddle, then pass the thread around the other pencil and through the first aperture, then around the first pencil, and so on, until the last slit in the heddle is reached. After this, in order to weave, it is only necessary to raise and lower the heddle alternately, when, as may be easily seen, the only threads carried along will be those that run through the apertures. At each of these motions the shuttle must be passed between the two series of warp threads situated at different levels. A paper cutter may be used in lieu of a batten to push the weft home to the web.

This little apparatus, which may be easily and quickly constructed, will allow the mechanism of weaving to be perfectly understood, and may be considered both as an object of amusement and instruction. We got the idea of it from an analogous apparatus which is used on the government vessels for manufacturing what sailors call "sangle."—*La Nature.*

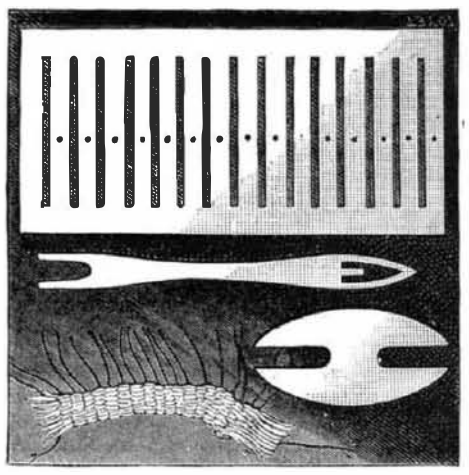


Fig. 1.—SHUTTLES AND HEDDLE MADE OF CARDBOARD.

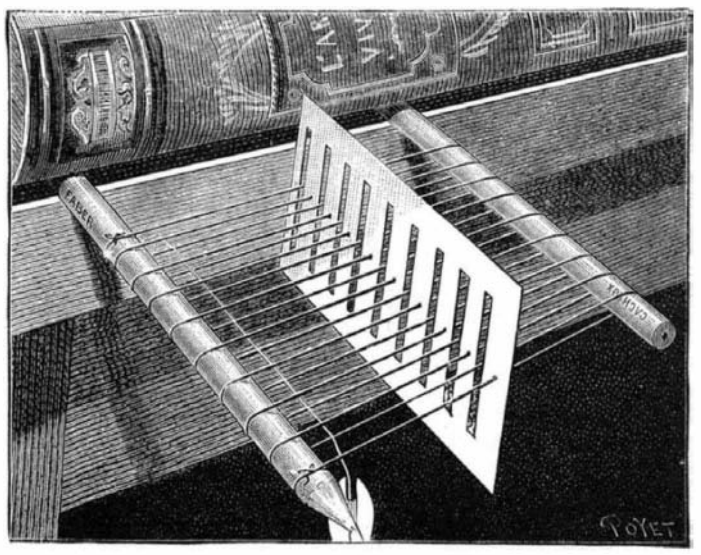


Fig. 2.—A SIMPLE LOOM.

BRICKWORK.

Although the strength of a wall or piece of brickwork largely depends upon the bonding of the bricks, little importance seems to be attached to it by builders in general. The essential requirements of good bonding in brickwork are mainly that no two vertical mortar joints shall come over one another, and that there shall be little or no cutting of bricks. The method of setting bricks here, which is very largely in use, is to lay the brick stretchers with a course of headers in every sixth course, so that we have in five courses the vertical joints over one another, thus violating the most important rule of bonding. In external walls, where the header course would injure the appearance, the custom is to run the stretcher courses right on at the face, the back being bonded in by cutting. Little can be said in favor of this method. It is supposed to be a "quick" bond, or one which can be quickly laid; but it is very doubtful whether the time saved is anything appreciable. The appearance is certainly not equal to the bond largely used in England, and known as the "Flemish," in which the bricks are laid header and stretcher alternately in the same course, and for strength it is decidedly inferior.

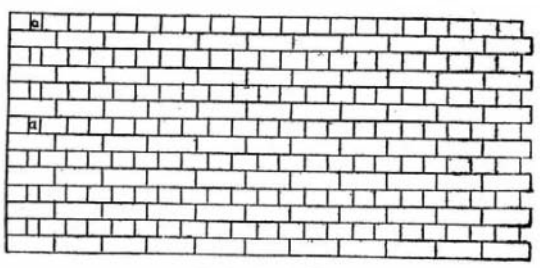
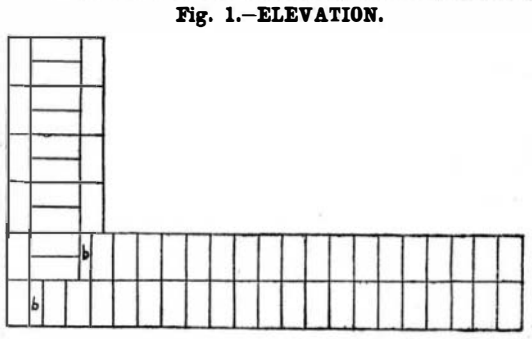
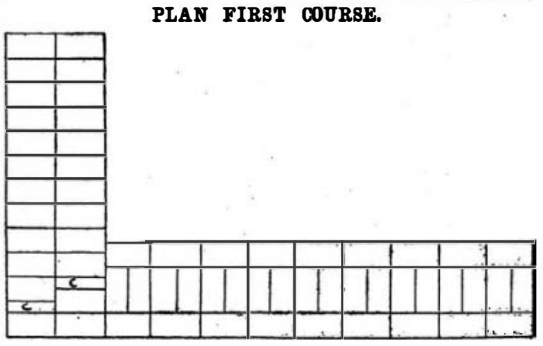


Fig. 1.—ELEVATION.



PLAN FIRST COURSE.



PLAN SECOND COURSE.

Probably the strongest and most convenient bond in use is that of which an example is shown in Fig. 1. In this we arrive as nearly as possible at the requirements of a good bond. There is little or no cutting required, excepting at the quoins, where a half brick or "closer" is used to close the course, as shown in the sketch, at *a a*, *b b*, and *c c*. There are no two vertical joints over one another throughout the wall, and there are a larger number of headers than in any other bond. It is in this fact of the large number of headers that the superiority of the bond mainly depends. A brick wall requires greater strength in the direction of its thickness than it does in the direction of its length. Most of the weight carried by the wall, such as the floor joists, roof timbers, etc., rests upon the inner portion, and the headers will have the effect of throwing this weight over the whole thickness of the wall. In building upon loose or soft foundations, artificial bond, such as hoop iron bond, is often introduced between the mortar joints to strengthen a wall longitudinally; but this could not conveniently be applied in the direction of the thickness.

The only possible objection to English bond that can be taken is in its appearance. It may be granted that, when compared to the Flemish bond, it is someway heavy, but certainly it is in every way equal to the running bond, while its strength is greatly superior.

WINDOW AND DOOR HEADS.

A very graceful and ornamental arch is that known as the Gothic elliptical, which is shown in Figs. 2 and 3. It looks equally well if carried out in brick or applied to stone for window or door heads, and is largely used in red brick and other buildings with a very excellent effect. In order that the appearance may be maintained, the curve should be carefully set out by rule. The following is the usual method: Divide the span, A B, into three equal parts at C and D. From A as center with radius A D describe the arc, D E. Then from C, D, and B, with the same radius, describe similar arcs. Draw lines from F and E, through C and D respectively, to G and H. Bisect the span at K, and raise a perpendicular, K J. Then the curve may be set out from center, C, for curve A to G, from D for curve B to H, from E for H to J, and from F for the portion of the curve from A to G, which will complete the curve of the arch. The bricks are rubbed in order that the mortar joints may radiate to the center from which each curve was struck, excepting at the crown of the arch, where they must be eased somewhat, the key brick radiating to K, and the following few joints to points between K and F and K and E respectively.

A. S. J.

Beer Brewing in New York and Brooklyn.

At the recent meeting of the American Society of Public Analysts, a paper was read by Dr. Otto Grothe on the brewing of beer as practiced in New York and Brooklyn.

Dr. Grothe had visited different breweries in both cities, and had analyzed different beers. As a result of his visits, he stated that bicarbonate of sodium was in extensive use by the brewers for neutralizing the acid, this substance being added in quantities varying from two to nine ounces to the barrel of 32 gallons. Grape sugar, glucose, and corn meal were extensively used as substitutes for malt, while hop substitutes could not be detected. Other substances found in breweries were juniper berries, isinglass, Iceland moss, cream of tartar, tartaric acid, salicylic acid, bisulphite of calcium, and glycerine. Licorice also is often sold to breweries, but it is not in general use. The beer is generally manufactured in much shorter time than in European breweries, and this is made possible by artificial clearing, done by adding a solution of isinglass and cream of tartar in water in the storing, *i. e.*, pressure barrel.

Large breweries effect the cooling of their cellars by ammonia ice machines, and they have done away with the cooling pan altogether. Smaller concerns work with natural ice, which is considered as disadvantageous in every respect. While some breweries are kept scrupulously clean, others are sometimes very dirty, mucor and fungi growing on the walls and tubs.

The beer often contains bacteria and bacilli, and the lactic ferment is very frequently found in the product from breweries where ice is used. *Saccharomyces apiculatus* often occurs, to the detriment of the stock. The only means for preventing loss are constant watchfulness and frequent examinations with the microscope. An entire change of the yeast may be necessary in some cases to avoid some hurtful ferment, which will make the beer "sick." As the salary of an expert master brewer is high, some dispense with such a superintendent, and, as occasion demands, call in a "beer doctor."

In beer, as at present manufactured, Dr. Grothe believes that danger to health may exist in the use of large quantities of sodium bicarbonate and in the excessive quantities of substances for cleaning the product, and he recommended that some legal limit should be put on the amount to be used. Dr. Bartley expressed the opinion that excess of bicarbonate of soda, or the presence of such ferments as would cause the beer to be technically called "sick," were the points calling for the special attention of officers of health.—*The Analyst.*

Cotton Batting for Water Pipes.

At the suggestion of Professor J. M. Ordway, a gentleman connected with the Boston *Herald*, during the last cold spell, took two pieces of water pipe, which he filled with water, and exposed to the weather, with the thermometer at 22°. One of these he covered with cotton batting, the glazed kind being the best, and the other he did not protect. At the end of two hours, the water in the unprotected pipe was frozen, while after an exposure of six hours the water in the protected pipe was still liquid. He says batting is easily applied, and should be put on to the thickness of from one to three inches, according to exposure. It can be held to the pipe by being wound loosely with twine, but should not be wound tightly.

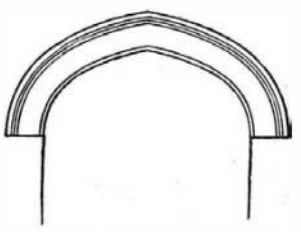


Fig. 2.—STONE WINDOW HEAD.

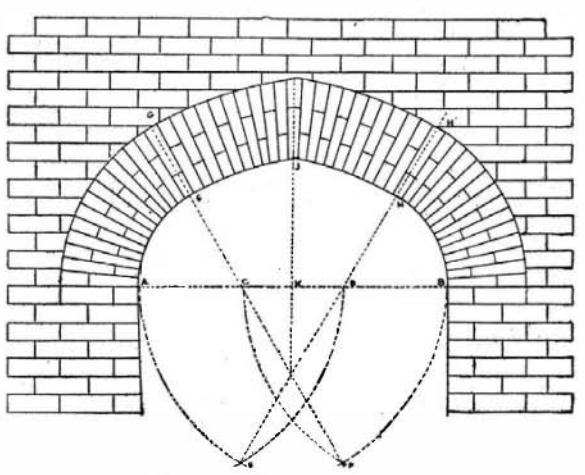


Fig. 3.—THE GOTHIC ELLIPTICAL ARCH.