WEAVING.

Fig. 1.

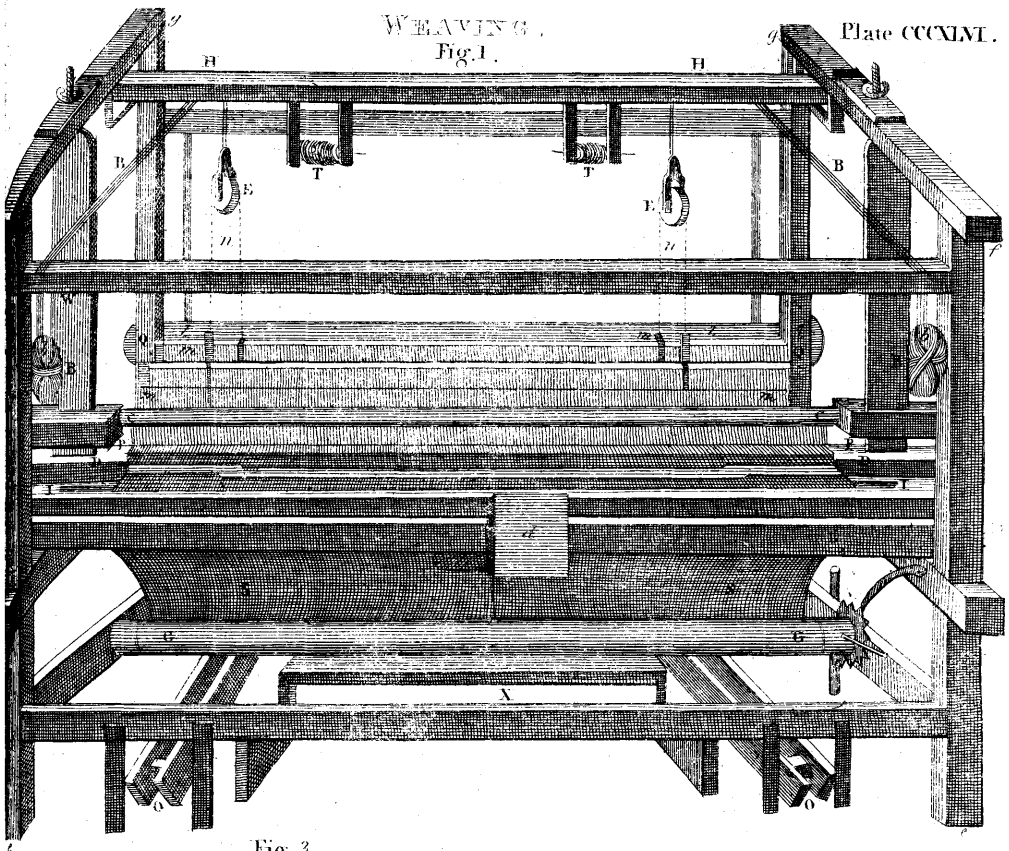


Fig. 3.

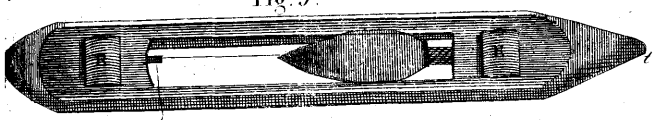
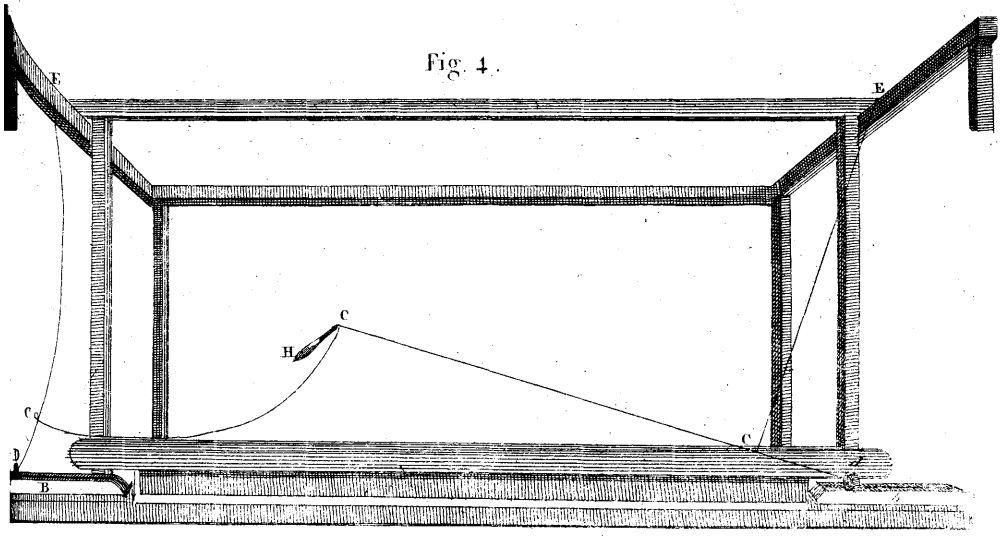


Fig. 2.

Fig. 4.



DEFINITION.

WEAVING, *part. n. f.* is the art of forming cloth of YARNS. It is performed on a loom, by making the WOOF or WEFT infert itſelf rectangularly above and below the alternate threads of the WARP. (See LOOM.) To leſſen the expence, it has been attempted, of late years, to weave, as well as to execute the previous preparations of yarn, by machinery; but we believe the advantage thus derived is more by cheapening the expence of the operations of winding, warping, and dreſſing, than on weaving; the loom, with all the modern improvements, being ſo complex a machine, as to require the conſtant attention of a workman.

SECT. I. *Of the* WEAVING LOOM.

THE WEAVING LOOM is a machine for weaving cloth, ſilk, &c. by raiſing the threads of the warp in order to throw in the ſhoot, and ſtrike it cloſe. Of theſe there are various kinds, diſtinguiſhed by the different ſorts of cloths, ſtuffs, ſilks, &c. in which they are employed; and which are chiefly diſtinguiſhed by the number and variety of the threads they raiſe in order to work the warp, either plain or in figures, by making more or leſs of the woof or ſhoot appear through the warp. In order to give a general idea of weaving, we ſhall here deſcribe the parts of the common weaver's loom. See *Plate* 346. *fig.* 1. in which *e f*, *e f* are the front poſts, and *g*, *g* the back poſts of the loom; *l l*, *m m*, *m m* are the *lams* in their place at Q, or, as they are called in ſome parts of Scotland, the *hiddles*, and in others the *ſlaves*. They are compoſed of ſtrong threads, ſtretched between two horizontal bars, an upper and a lower. The threads of one lam are ſo diſpoſed as to paſs between the upper threads of the warp, while they admit the lower threads to paſs through loops or ſmall holes in them, and the diſpoſition of the threads of the other lam is ſuch, that while they paſs between the lower threads of the warp, they admit the upper threads to paſs through the ſmall holes juſt mentioned. The lams are ſuſpended from the croſs bar or *lam-bearer* HH, by means of ropes *n*, *n* paſſing from the upper bars of the *lams* over the pulleys at EE, and balanced by weights at the other ends. From the lower bar of each *lam* or *hiddle* a rope paſſes to the *treadles* or moveable bars at O O; ſo that when a foot preſſes a treadle, the lam faſtened to it ſinks, while the other riſes by means of the balancing weight ſuſpended from the pulley at E. The workman then throws in the woof by means of the ſhuttle, and cloſes it by one or two ſtrokes of the *lay* or *batten*, of which WB, WB are called the *ſwords*, CC the *cap*, or in Scotland the upper *ſhell*, DD the *block* or under *ſhell*, and PP the *reed* or *comb* contained between theſe ſhells. LL is the bench on which the workmen ſit; for the loom which our figure repreſents is conſtructed for weaving cloth of ſuch a breadth as to require two workmen, who have their quills in a box *d* on the middle of the bench on which they ſit. Between the workmens bench and the *batten* or *lay* is the *breaſt-bar* I, I, a ſmooth ſquare beam, in which there is an opening to let the web through as it is wove. From this opening the web SS paſſes to the *knee roll* or *web beam* GG, round which it is rolled by means of the ſpokes, viſible in the figure, and kept from being unrolled by a wheel with teeth and clench, viſible likewiſe in the figure. In ſome looms the web paſſes from the knee-roll to the wooden frame X, to be dried as it is wove. Oppoſite to the breaſt-bar, and on the other ſide of the *batten* or *lay*, is the *cane-roll* or *yarn-beam*, on which the warp is rolled when put into the loom, and from which it is gradually unrolled as the work proceeds. TT are bobbins filled with yarn of the warp to mend ſuch threads of it as may be broke in the weaving; and B *b*, B *b* are clues of the ſame kind of yarn with the borders of the warp, to mend ſuch threads as may there be broken.

SECT. II. *Of the* FLYING SHUTTLE.

FIG. 2. repreſents the common ſhuttle with the vacuity in the middle, in which the quill with the woof is placed on a ſpindle or axis. As this ſhuttle is thrown with one hand in at one ſide of the warp, and received with the other hand at the other ſide, it is obvious, that when the web is of a breadth too great for a man to reach from one ſide of it to the other, two workmen muſt be employed, and much time loſt. To remedy this inconveniency, a new ſhuttle has, in this country, been brought into very general uſe, and called the *flying ſhuttle*, or *fly ſhuttle*, becauſe it flies through the warp with wonderful rapidity on two ſteel rollers RR (*fig.* 3.) This ſhuttle is not thrown with the hand, but moved backwards and forwards by a very ſimple piece of machinery, of which *fig.* 4. will give the reader a ſufficiently accurate conception. To each end of the *batten* or *lay* L is faſtened a kind of open box B, *b*, with the bottom or horizontal ſide exactly on a level with the threads of the warp of the intended web. In each of theſe boxes is a vertical piece of wood D, *d*, of conſiderable thickneſs, called a *driver*. This driver is moved eaſily on an iron ſpindle or axis from one end of the box to the other, by means of a ſlender rope CCCD, and a handle H is ſeen in the figure. When the weaver is to begin his work, he lays the ſhuttle on its rollers in the box B with the iron tip T (*fig.* 3.) touching, or almoſt touching, the driver D (*fig.* 4.) Then moving the handle H, with a ſudden jerk, towards the box *b*, the driver D forces the ſhuttle with a rapid motion through the warp, till it ſtrikes *d*, which is impelled by the ſtroke to the further end of the box *b*. The two drivers D and *d* have now changed their poſitions in their reſpective boxes; ſo that the driver which was at the front of its box before, is now at the farther end of it, and *vice verſa*. Then by a ſudden jerk of the hand towards B, the ſhuttle is driven back till it ſtrike D; and thus is the work continued without the weaver having occaſion ever to ſtretch his arms from one margin of the web to the other. That the ſhuttle may not, by the unſteadineſs of the workman's hand, be driven *zig-zag* through the warp or out of the place in which it ought to move, the guiding or driving rope CCCD is made

to paſs through ſmooth holes or loops C, C, at the ends of the ropes EC, EC, ſuſpended either from the croſs bar on the top of the loom or from the ſwords of the batten. This ſhuttle is allowed by almoſt all operative weavers to be a great improvement in every kind of weaving loom; yet ſome of the older tradeſmen contend, that it is valuable only in what they call *light-work*, ſuch as cotton or linen cloth, or when the web, if woollen, is very broad.

SECT. III. *Of the* WEAVING *of* COTTON.

COTTON GOODS are divided into 7 different claſſes, each proportionally lighter than the other. The heavieſt of theſe are, 1ſt. *Skirtings*, 2d. *Cambrics*, 3d. *Coſſeas*, 4th. *Jaconetts*, 5th. *Lawn grounds*, 6th. *Mulls*, 7th. *Books*.

COTTON YARN is reeled in numbers, 10 of each make a ſpyndle, and according to the N° of the yarn the quality is aſcertained; for example, N° 90, that is, 90 in a pound weight, is 5 ſpyndle yarn, N° 180 is 10 ſpyndle yarn, &c. Each N° gives, or ought to give, 16 warp or porters to an ell in length, but an allowance muſt be made of about one 36th part for incidents, ſuch as bad reeling, loſs in winding, &c. Each porter is 20 ſplits, or 40 ſingle threads. Let us ſuppoſe that N° 73 will make a good ſhirting in a 2000 an ell, the reader may eaſily find, by the following ſimple rule, what N°s any ſett will take to produce the ſame quality of cloth. If 20 : 73 :: 15

20	15
400	75
	15
	225
	73
	675
	1575

4|00)164|25

41|400

By this method the reader will ſee that N° 41 will produce the ſame fabric in a 1500 reed that 73 will do in a 2000. The fraction being thrown away in real practice. Let us again ſuppoſe that N° 100 is wove in a 2000 reed to produce a good cambric, What N° will give a 2600?

If 20 : 100 :: 26

20	26
400	156
	52
	676
	100

4|00)676|00

N° 169 is the real quality of yarn.

There is $3\frac{1}{2}$ ſetts or hundreds difference in caaming betwixt a cambric and coſſea, 2 ſetts betwixt coſſea and jaconett, $2\frac{1}{2}$ betwixt jaconet and lawn ground, 1 ſett betwixt lawn ground and mull, and 1 ſet betwixt mull and book; ſo that they will ſtand as follows. The yarn that is wove in a 2000 cambric will make a 1650 coſſea, 1450 jaconet, 1200 lawn ground, 1000 mull, and 1000 book.

SECT. IV. *Of the* WEAVING *of* LINEN.

IN the linen manufacture the yarn is reeled in hanks or heſps, each hank contains 12 cutts, 4 hanks making a ſpyndle. In Scotland the reel is by law 90 inches in circumference, and each cutt contains 120 threads or rounds of the reel, ſo that each cutt ſhould produce 120 double threads or ſplitfuls, 45 inches in length, which is the length of what weavers call a "*mill ell*;" and indeed theſe 45 inches do not produce much more in heavy linens than 37 inches of finiſhed cloth. As there is commonly a deficiency in the reeling of linen yarn all manufacturers make an allowance of one 16th. Were a hank well reeled it ſhould give 72 ſcore of double threads; but the method now taken is to allow only 70 warp, or 1400, to each hank, which in moſt caſes comes near the truth.

As to the caaming or ſetting of linens it is as eaſily done as it is with cottons. It is only neceſſary to fix a ſtandard, and apply the foregoing rule. For example, ſuppoſe yarn 4 oz. in the hank, wove in a 1200 reed, what quality would you weave in a 2400. If 12 : 4 :: 24

12	24
144	96
4	48
576	)576(1 oz. Anſwer.

Or, What quality in an 800: again

If 12 : 4 : 8

12	8
144	64
4	

64)576(9 oz. Anſwer.

The caaming or ſetting of yarn may be thus varied ſo as to anſwer every fabric, by fixing a common ſtandard for every denomination of cloth. The above ſtandard of 4 oz. yarn to a 1200 will do very well as a ſtandard for Iriſh linens. The ſame yarn wrought in a 1300 will make good Holland ſhirting, and in a 1400 will make capital ſheeting. So that any workman may, by adhering to this rule, have an uniform fabric of cloth of any kind whatever. If he ſhould find his cloth a little too thick in the warp, he has only to alter his common ſtandard and proceed as formerly.

If a Weaver wiſhes to know how much cloth any given quantity of yarn will make having ſo much warp, he has only to do as follows:

Required how much cloth, having 2500 warp will be in 70 ſpindles yarn?

70 ſpyndles

	4
	280
20)2500	70
125	)13600(156$\frac{4}{5}$ Anſwer
	125
	710
	625
	850
	750
	100

125 or $\frac{4}{5}$

Multiply 70 ſpindles by 4 to bring it to hanks, and by 70 again to bring it to warps or porters; then take the number of warp in an ell, and divide by 20 to bring it alſo to porters, and make the product the diviſor.

Or

Or if it ſhould be required how much yarn it will take to weave any quantity of cloth, it can eaſily be known by the following method:

How much yarn will it take to make 116 ells, having 1700 warp?

```
2|0)170|0        116
   85             85
                 580
                928
              7|0)986|0
                4)140  60
                 35 : 0 : 60.
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The anſwer is 35 ſpyndles and ſix 7ths of a hank or 60 warp; but where there is a heavy remainder of this kind the whole hank muſt be given, as it is to be conſidered that the yarn is generally deficient in the proper quantity.

In the foregoing example it will be obſerved, that the number of ells is multiplied by 85, the number of warps or porters; and this 85 is the product of the 1700 divided by 20. The total product is divided by 70 to bring it to hanks, and by 4 to bring it to ſpyndles. It is to be remarked, that the above is only the quantity of warp. By multiplying the number of warp by the number of ells, and dividing by 70 to bring it to hanks, and 4 to bring it to ſpyndles, it can eaſily be known what quantity any web requires. Beſides thoſe above mentioned, there are other kinds of linen cloth in endleſs variety. We ſhall therefore content ourſelves by giving the reader an idea of the ſetting or caaming of the kinds manufactured in this country.

BED TYKE, or TICK, is commonly made of linen yarn, and is ſometimes wrought with a 3 and ſometimes a 4 leafed tweel. The 3 leaf has of late years come into more general uſe, and it is indeed the moſt beautiful when well weaved, but we will not take upon us to ſay it is the moſt durable. The beſt mode of ſetting tick, is nearly in the ſame reed as Iriſh linen that is 4oz. yarn, in a 1200, 4 threads in the reed when done in 4 leaves, which makes it double the thickneſs of Iriſh linen; and when done in a 3 leaf tweel we would rather recommend ſetting it in the manner of Holland ſhirting, that is, 4oz. to a 1300, 3 threads in the reed.

DAMASK TABLE LINEN, which is wove in an 8 leafed tweel, is commonly ſett in the manner of 4oz. to a 1100, 4 in the reed, and produces the the ſtrongeſt, the moſt beautiful and durable cloth of any that has ever been invented. The method of producing the patterns, on this beautiful cloth, is, by raiſing $\frac{7}{8}$ths of the warp in thoſe places where the figures are wanted. But our limits will not allow us to give a minute deſcription of this ingenious operation. The Damaſk Weaver will execute any pattern that can be drawn on deſign paper; only, it muſt appear evident that it has a very material diſadvantage, as there is no poſſibility of producing light and ſhade.

DIAPER is another kind of table linen of an inferior quality to damaſk; but owing to the many improvements made in the machinery uſed in its manufacture, by the ingenious artiſts in Dunfermline of late years, it is brought to a degree of perfection truly aſtoniſhing. They can now produce patterns on diaper, which but a few years ago could not have been done but by the help of a damaſk ſimple, and one man can produce this ſuperior work now, whereas it formerly took 3 men to execute a very inferior article. Diaper is commonly done in a 5 leafed tweel, but ſometimes in a 6 and ſometimes a 7 leafed tweel. It is ſometimes wrought 3 and ſometimes 4 in the reed. We would adviſe ſetting it in proportion to 3 in a 1100 reed, 4 oz. per hank. The figures are raiſed in diaper on the ſame principles as on damaſk, only the machinery being leſs extenſive, it cannot produce the ſame variety.

COMMON TWEELS are ſett nearly on the ſame principles as Iriſh linen, only, they are all done 3 in the reed, which makes them one third heavier.

It is to be obſerved, that all plain cloth muſt be ſett $\frac{1}{10}$ broader in the loom, than it is intended to be in finiſhed cloth. If you want cloth, for example, to ſtand 36 inches, it muſt be ſett 40.

There can be no poſitive rule laid down for ſizing weft; but in general weft one tenth lighter than the warp is the beſt method we have ſeen adopted. By this method you will always procure a beautiful fabric, but if you have the weft coarſe the web will look rough and uneven. In heavy ſett goods, whether linen or cotton, it is impoſſible to put on the ſame quantity of weft as on light goods. In moſt caſes however, the beauty of the work depends on the quantity of weft, and in all upon the regularity with which it is put on.

SECT. V. *Of* OTHER KINDS *of* WEAVING.

SUCH is the preſent ſtate of the art of weaving linens and cottons. See alſo COTTON, N° vii, § 1—4. SPINNING, &c.

But the greateſt and moſt important ſtaple manufacture of England is that of woollen cloth of all kinds, broad, narrow, &c. See CLOTH, § 5 and 6; alſo WOOL, WOOL-COMBING, &c.

The WEAVING of SILK is carried on much in the ſame way with that of linen and cotton. But an improved loom for the weaving of ſilk has been invented lately by Mr Sholl. See SILK, § 14.

For the WEAVING of TAPESTRY. See TAPESTRY, § 5, 6.