

THE
LINEN
MANUFACTURER,
WEAVER, AND WARPERS
ASSISTANT,
CONTAINING
A NEW AND CORRECT SET OF
TABLES, DRAFTS, CORDINGS,
ARITHMETICAL RULES AND EXAMPLES,
ADAPTED TO THE
PRESENT STATE
OF
THE WOOLEN AND LINEN
MANUFACTURE,
AND
HOUSEHOLD CUSTOMARY WEAVING.
*With a Description of the Sliding Rule,
And the application of it to the Art of Weaving.*

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Illustrated with Engravings.

GLASGOW

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OF HOUSEHOLD

Fancy Customary Weaving.


AFTER having gone through all the Tables, calculations, and useful observations which I considered absolutely necessary to the Linen Manufacturer and Household Customary Weaver, and also, abstracts of the various Acts of Parliament relating to the linen trade, I shall endeavour to lay down, in a plain and simple manner, the general principles of Household Customary Fancy Weaving so as to be easily comprehended by those who may have the inclination and curiosity to follow after the Fancy Weaving department; and although it is impossible to enter into a minute detail of the vast multiplicity of figures which can be made in the weaving loom by a judicious and well regulated combination of mountings, the Operative, when he understands the first principles, can easily vary or extend any pattern as his curiosity or his inclination leads him.

Linen not being of so soft and flexible a nature as woollen, silk, or cotton, will not admit (except in tweeling) of such an infinite variety of fanciful decoration, but when tweeled, is particularly adapted for the ornamenting of thick household customary work, table napery, &c. Surely none will be so foolish as to imagine that this work can

treat upon all the complicated variety of figures that may be produced, even bordering on infinity; for example, if 12 leaves were required for one spot, the number of changes that can be produced by the same leaves will amount to 479,001,600, a number of changes almost incredible for such a small number of leaves.

But as it would be impossible to weave extensive patterns by leaves, a machine has been invented, called the draw loom, the use of which is to combine much mouting into a small space. But previous to a description of this apparatus, it may be proper to explain the nature of drawing warps through the heddles, and the application of the cords by which the heddles are moved in succession, as required for the forming any particular pattern, which is termed among weavers

DRAFT AND CORDING.

It is not very easy to draw plans of draft and cording, so that it may be easily understood; but the only simple method is to lay it down horizontally, for the purpose of showing the heddles and treadles more perfectly, the treadles under the loom are placed directly under the heddles, but it is usual to represent them at one side upon paper, for the purpose that the reference may be the easier made from the one to the other, fig. 1, plate 12th, is a representation of a common four leaf twell, the four leaves of the heddles are represented betwixt the strokes at A, B, C, D, and numbered 1, 2, 3, 4, the treadles are represented betwixt the strokes at E, F, G, H, and are numbered in the same order that the weaver treads them, 1, 2, 3, 4. Each thread of the warp as it passes through

the heddles from the back to the front leaf is represented at I, and is numbered 1st, 2d, 3d, and 4th threads; the black dots in a diagonal line from K to L, upon the squares where the treadles and leaves intersect each other, signify that these leaves are sunk when the foot is trode: either the black dots or the blank intersections (or squares) may be made sinking cords; if the black dots are made sinking cords, $\frac{1}{4}$ th of the warp over the draft is sunk and $\frac{3}{4}$ ths raised, which throws the weft to the under side of the web, and if the blank squares are made sinking cords, the cloth is exactly the reverse; for example, where treadle 1st crosses the back leaf there is a black mark, a cord is therefore put upon the short march attached to that leaf, which sinks that leaf and raises the other three when the treadle is pressed down, treadle 2 sinks the second leaf and raises the others; treadle 3 sinks the third leaf and raises the others; and treadle 4th sinks the front leaf and raises the three backmost; every cording is the same whatever extent it may be, only it must be observed, to put either all the black dots or blank squares at the intersections upon the short marches, and not part of both on the same branches, as in that case the one cord would be pulling against the other when the treadles are pressed down; in customary work blocks and pullies are used in various forms, which answer the end of long marches, in keeping up the leaves that are raised by the revolving of the pullies when the sinking leaves are pressed down.

In slight fabrics there are two sets of marches used, short and long; the sinking cords are put

upon the short marches, and the raising cords upon the long, and the leaves of the camb are suspended from the point of the levers or coupars. The short marches are placed above the long in the loom, a short and a long march for each leaf of the heddles, and the cords that go betwixt the short marches and treadles, are taken up betwixt the long marches; suppose fig. 1. plate 12, where the treadle No. 1 crosses the back leaf, the black mark is a sinking cord, and is put upon the backmost short march, the other three blank squares are raising cords, and are put upon the long marches, therefore, when the treadle is pressed down, the back leaf is sunk and the other three raised. Fig. 3, plate 12, is a representation of the mounting of two leaves with long and short marches, and whatever number there are, the principle is the same. In this figure the leaves of the heddles are represented at A, above which are the coupars or levers moving upon centres at B, from which the leaves of the heddles are suspended by oblique cords; however, in the figure below, the heddles are the spring staves at C. the long and short marches moveable at the centres A, D, E, the treadles at F will be clearly seen from the figure, where all the parts of the apparatus are connected by the cords, and when the foot is trode, the short marches sink the leaves to which they are connected, and the long marches raise the leaves to which they are connected, and are particularly adapted for light fabrics. It will be seen by fig. 1, plate 12, the way that the treadles are placed, but it will have all to be trode with one foot, which would be

very inconvenient. It may, therefore, be proper to make a few observations upon the

ARRANGEMENT OF TREADLES,

in order to represent the uniformity of the plan of cording. When drawing a cording upon paper, it is the best way to place the treadles in regular succession from right to left in the following order, 8, 7, 6, 5, 4, 3, 2, 1, but in practice the treadles may be arranged in such order, that the right and left foot may be applied alternately in a way that may be most suitable for the weaver; suppose 8 treadles to be placed that they may be trode with both feet; without the feet crossing each other, they will be placed thus, 8, 6, 4, 2, 7, 5, 3, 1; or thus, 8, 6, 4, 1, 2, 3, 5, 7; or thus, 2, 4, 6, 8, 7, 5, 3, 1; in the first of these the whole treadles are trode with the right foot; in the second the right foot treads the right treadle, and the left foot the 4th from the left side; in the third, the two feet begin at the centre and tread alternately to the outside; in the fourth example the right foot begins at the right, and the left foot at the left of the treadles, and tread alternately in to the centre; also see fig. 2, and 3, plate 12, both of which produce the same effect, the only difference is, that the treadles are arranged in a different order, fig. 1, being in the order 4, 3, 2, 1, and fig. 2d 4, 2, 3, 1. When plain cloth is wanted, two additional treadles must be added, to enable the Operative to weave the whole web plain if required, and if not required, they may be omitted, when this is the case, for the sake of distinction, when drawing a cording, the plain treadles should be marked P. T. as in the following example.

			0	0		1
	0	0				2
			0	0		3
0		0				4
4	2	P	T	3	1	

I think that the foregoing examples are sufficient to illustrate the plan of arranging treadles, in order that it may be easy to go over the tread, and if attended to a little, is fully sufficient for the illustration of the nature and plan of arrangement of treadles, cordings, &c. &c.

When tweels do not exceed four leaves, the threads of the warp are taken and raised generally in regular succession, but where a greater number of leaves are employed, alternate succession will be found to answer the purpose much better, as the flushing of the warp and weft will not be so far distant betwixt the points at which the threads are interwoven, which makes the fabric more equal, and not so flimsy and soft to the feel, and will add greatly to its strength, durability, and display of colour, if colours are used. A web of tweeled cloth and a web of plain weaved in the same set of a reed, having the same quantity of warp, and the same grist of yarn each, the two fabrics if equally used, will not wear for the same length of time, the tweeled cloth will be completely worn out in one-third less time than the plain;

from this it is clear, that the principal cause of the strength of tweels, is that more warp can be crowded in less space, without any inconveniency to the weaver, and from the particular structure and elastic nature of the fabric, is less liable to cut in the wearing, and the plan that is adopted, when the tweel is long, for to give the cloth some degree of more strength is termed

BREAKING THE TWEEL.

When a tweel is to be broken, the same mounting which is employed in the weaving of a regular tweel will answer the end, all the difference is in placing the cords upon the treadles and marches, as will be seen by the following examples :

5 LEAVES.

					0	1
					0	2
			0			3
		0				4
	0					5
R	5	4	3	2	1	

					0	1
		0				2
				0		3
		0				4
			0			5
B	5	4	3	2	1	

These two examples will plainly shew the different ways of tweeling, which can be carried to any length; it is easy to observe, that all the difference lies in the cording.

6 LEAVES.
REGULAR TWEEL.

						0		1
					0			2
			0					3
			0					4
		0						5
	0							6
R	6	5	4	3	2	1		

BROKEN TWEEL.

						0		1
			0					2
					0			3
		0						4
			0					5
	0							6
B	6	5	4	3	2	1		

Also any tweel may either be tweeled broken or regular, by the treading, as in the following example of.

8 LEAVES.

								0		1
							0			2
		0								3
							0			4
				0						5
	0									6
							0			7
			0							8
Broken B	8	7	6	5	4	3	2	1		
Regular	6	3	8	5	2	7	4	1		

These examples are fully sufficient to show the manner of weaving broken and alternate tweels, and they may be broke in various forms, besides these I have pointed out only regularity as near as possible ought to be observed. But there is sometimes the leaves will not admit of equal division, in the successive taking down of the warp; for example, a tweel having six leaves will not admit to be broken in a regular manner; the first treadle treads the back leaf, the second passes over one leaf and takes down the third from the backside, and so on the sixth, which takes down the foremost leaf; now it will be observed, that after treading the sixth treadle, the foot returns to the first treadle, which being the leaf which follows the sixth upon the draft, leaves no interval, and the effect of these two leaves is the same as that of a regular tweel, while the effect of the other leaves is that of a broken tweel, passing a leaf between each, and also two leaves of interval betwixt the intersections of the weft and warp, produced by the third and fourth treadle; it is impossible, however, to avoid this with six leaves, although I have given it here, for the illustration of the principles of breaking the tweel, also the five leaves do not divide the tweel at regular intervals; there is two leaves of an interval betwixt the third and fourth treadles, but is not so much known in the weaving as that done with six, but of a small number of leaves, the eight leaves when employed for breaking the tweel at regular intervals, as will be seen by the example in the eight leaf tweel, two leaves are omitted, and the third sunk. It is superfluous to give a draft of a regular

eight leaf tweel, as it is the same as the others, and the cords run diagonally from A to B, as on the example, besides, regular tweels are seldom used with so many leaves, as it would make the cloth soft and flimsy; silks are tweeled with from 12 to 20 leaves, and are broken at regular intervals; for example, a 16 leaf tweel may be broken by passing four leaves, and sinking the fifth and otherwise.

As all tweeling is upon the same principles, whatever number of leaves may be employed, I think the foregoing examples are sufficient to convey a sufficient knowledge of the principles of common tweeling, and after that is obtained by the Operative, may be varied as his fancy leads him, into the vast labyrinth of which, it is susceptible, such as Dimity or

TWEELED STRIPES.

Tweeled stripes are different from plain tweeling all over the web; as one or more intervals of the reed is tweeled by the warp on the one side, and the weft on the other side, alternately, to effect this, two sets of a single tweel are employed, and if the cording is put upon the one set to throw the warp to the upper side of the cloth, the cording upon the other set is exactly reversed, which throws the warp down through that set to the under side of the web; which may be seen by the following example of a three leaf tweeled stripe, or two sets of a three leaf tweeling combined together, or

DIMITY CORD.						
	0			0		1.1.1
	0		0			2.2.2
		0				3.3.3
	0		0	0		1.1.1
		0	0		0	2.2.2
	0	0		0	0	3.3.3
	1		2			
		3			4	
5		6				

The above is an example of a stripe formed by six leaves, three of which flush the warp, and three the weft, the cording upon the back set is exactly the reverse of the fore set, see the first treadle takes down the back leaf of the back set and raises the two fore leaves, while at the same time it raises the back leaf of the fore set, and sinks the two fore leaves, and so of all the other treadles; which shews, that the cording of the one set must always be the reverse of the other. The stripe is formed by drawing any portion of the warp upon the one set, and another portion upon the other set, according to the pattern of the stripe that is intended; the following is a tweeled stripe upon eight leaves, or two sets of a four leaf tweel, or

DAMBOARD.

		0	0		0	0			1	
		0	0			0	0		2	
			0	0	0			0	3	
	0			0			0	0	4	
	0	0			0			0	1	
	0			0	0				2	
	0	0				0	0		3	
		0	0		0	0			4	
			4	2				3	1	A
B	4	2			3	1				

Four treadles will be sufficient to weave the above if it is only to be striped by treading the four treadles, numbered opposite to A, successively, but when the cloth is to be chequered, eight treadles are employed, and the treadles opposite to A and B are trode alternately, if a broken tweel is preferred, the following is an example of a

BROKEN TWEELLED STRIPE.

					0				1
		0							2
				0					3
	0								4
			0						5
		0	0	0	0				1
	0	0	0			0			2
	0		0	0	0				3
	0	0	0	0					4
	0	0		0	0				5
	5	4	3	2	1				

As all tweels and tweeled stripes are mounted upon the same principles, any number of leaves may be employed, the patterns depend entirely upon the repetition in various ways of the draught upon each set of the leaves; stripes may be varied still farther, plain and tweeled may be interspersed alternately, also the web may be tweeled across at the one time and plained the other, of which I shall give the following example of a

TWEELING AND PLAIN STRIPE.

				0	0	0	1
	0	0	0				2
		0				0	1
			0	0			2
	0				0		
			2			1	
		4			3		
	6			5			

It will be seen here that the three front leaves are employed for the tweeling, and the two back leaves for the plain, and six treadles are necessary, but if four leaves are employed for the tweeling, four treadles will do, as in the following example of

TWEELING AND PLAIN WITH
4 LEAVES.

			0	0		1
	0	0				2
				0		1
		0				2
			0			3
	0					4
	4	2		1		
			3			

A beautiful variety may be made for stripe gowns, and petticoats, by having the ground of the web dark, and putting on dark weft of the same colour, and light colour, such as red, yellow, light green, white, &c. put in for the tweeling across the web; by treading the tread at A, makes the tweel regular, and by treading the tread at B, makes the tweel to imitate the back bone of a herring, the following is an example of

CROSS TWEELING AND PLAIN.

		0	0	0	0	0	1
		0		0	0	0	3
		0	0	0		0	2
		0		0	0		4
Plain	2						1
			2		1		A
	4		3				
	4	2	3	1			B
		6	5				
				1			

Tweeling in this way may either be broken or regular, and any number of leaves may be employed; if the tweel is required to be long, more leaves are required, as in the following example of

6 LEAVES.

	0	0	0		0	0	0		1
	0	0		0		0	0	0	2
	0	0	0		0	0		0	3
	0		0	0		0	0	0	4
	0	0	0		0		0	0	5
		0	0	0		0	0	0	6
Plain				2	1				
	6	4	2			5	3	1	

Also, the tweel may be made long by the warp, but it requires double the quantity of treadles, as in the following example of a

LONG TWEEL STRIPE.

				0	0	0	0		1
	0	0	0	0					2
			0				0		1
		0				0			2
	0				0				3
	0			0					4
			2					1	
			4					3	
		2				1			A
		4				3			
	2				1				B
	4				3				

The tweel may also be broken, as in the examples, page 411. The variety in stripes is so great, that I must leave it to the ingenuity of the Operative to choose for himself; but in the making of stripes, of whatever kind, neither less nor more than two sets of mounting are classed together; it requires the treads opposite to A and B before the succession of the tweel over the leaves is completed, fig. 2d, plate 7th, and the tweeling and plain stripe cording, page 416, are the same, only the form is a little different; and there is an error in the cording upon the plate, treadle No. 1; let the Operative compare the two figures, and find out the error, which is the only way to come to the proper understanding of draft and cording; for example, when the treadle No. 1, page 416, is trode, the back leaf of the plain, and the back leaf of the tweeling part are taken down, while the fore leaf of the plain, and the two fore leaves of the tweel are raised, fig. 2d, plate 7th, the treadle No. 1 being trode, takes down the plain and raises the tweel, so that when the shuttle is thrown, passes the web betwixt the plain and tweeled yarn, which will make no cloth at all, but treads the web in stripes, however, although the effect upon the cloth be great, the cure is very easy, for the lifting merely of the sinking cord upon the foremost plain leaf, and placing it upon the backmost tweel leaf will effect the purpose, and set it to rights; this although it may appear trifling, if understood, shews completely the effect that a single cord has when not in its proper place; and as all tweeled stripes are upon the same principles, the patterns depend entirely upon

the mode of drawing the warp through the heddles; but before drawing through the heddles, the pattern is generally drawn upon a kind of paper called

DESIGN PAPER.

Design paper is ruled with parallel lines at equal distances, and these lines crossed at right angles, with other lines similar, exhibiting on the surface of the paper a number of small squares; the intervals betwixt the lines from top to bottom, may be supposed to represent the warp, and the intervals betwixt the cross lines the weft of the web; generally the tenth line both ways is drawn bolder than the others, which renders the counting by tens more easy, and the space betwixt the bold drawn lines is termed a design; the whole surface of plate 4th is paper of this kind; and when any figure is correctly drawn on paper of this kind, shows nearly the size of the figure upon the cloth, if the yarn is properly proportioned. In drawing any pattern upon design paper, one or more threads may be represented by the intervals betwixt the small lines, either of warp or weft, but generally Table Cloth and Dornick patterns, in the Household Customary line, are represented by 5 threads betwixt each interval, because the tweel formed is produced by five leaves, which is termed a set of the tweel. Fig. 1st, plate 5d, is effected with two sets or 10 leaves, and also fig. 1st, plate 6th, upon that side of the figure at A of fig. 1st, plate 5d, let the black upon the squares represent the part of web where the greatest portion of the warp is uppermost on the cloth, which I will sup-

pose to be the back set, and the squares which are left blank, to represent that part of the cloth where the greatest portion of the weft is uppermost, and the same of fig. 2d, plate 6th; for two sets five leaves, draw two parallel lines, begin at the right side of the pattern at the top, and mark the black upon the one set, and the blank intervals upon the other, till the pattern is completed, and let each unit upon the lines represent 5 threads. The treadles may either be trode in the order of the draft, or varied to any other according to fancy; to illustrate which, I shall give the examples of fig. 1st, plate 3d, and fig. 1st of plate 6th, the drafts are as follows, but both patterns are the same.

Fig. 1st, Plate 6th,					Fig. 1st, Plate 3d.	
1	2	2	1	8	2	2
2	1	8	1	2	2	8

Both these drafts weave the same pattern, it is the order of treading makes the difference; fig. 1st, plate 6th, is begun to draw in the pattern upon the right hand at the top, opposite to B, the black upon the pattern is drawn upon the back set, and the blank squares upon the fore set; for example, by examining the draft it will easily appear, that by treading according to the order of the draft of the one pattern, will form the pattern of the other and the reverse. I shall here give a number of drafts which require two sets or 10 leaves, which the weaver may draw upon design paper for practice.

DRAFTS OF 2 SETS.

	No. 1.		No. 2.		
2d Set,	40	40	8	10	56
1st Set,	40	40	8	56	10

No. 5.				No. 4.							
10	5	10	10	5	8	40		12	44	12	44
10	5	10	40	10	5	8		12	44	12	44
No. 5.				No. 6.							
18	5	20	6	6	6	6	6	36	5	5	5
18	5	5	20	6	6	6		26	26	5	5
Fig. 1st, Plate 5th.				No. 8.							
8	3	4	1	1	4			40	5	5	20
8	1	3	1	1	1			20	20	5	5
No. 9.				No. 10.							
6	30	10	10	30	6	6		25	20	5	5
30	10	6	20	6	8	30		25	5	20	5
No. 11.				No. 12.							
25	5	25	5	5	5	5	25	5	5	25	5
25	5	5	25	5	5	5	25	5	25	5	5
No. 13.				No. 14.							
6	6	10	6	6	5	5	5	10	6	6	5
6	6	10	10	6	20	20	5	10	10	6	20
No. 15.				No. 16.							
5	50	5	10	10	5	5	30	6	6	10	5
50	5	5	50	10	30	30	5	6	6	10	10
No. 17.				No. 18.							
5	5	15	5	15	5	30	10	30	5	15	5
30	15	30	5	15	5	5	5	15	5	15	5
No. 19.				No. 20.							
15	15	6	6	6	6	10	25	5	5	5	
15	30	15	6	6	6	10	10	5	5		
No. 21.				No. 22.							
30	10	10	10	20	20	10	10	10			
20	20	10	10	10	30	10	10	10			

No. 17.										
15	6	6	5	15	5	5	15	10	30	
5	15	6	30	5	15	5	15	6	6	
No. 18.										
30	30	30	30	10	10	10	10			
30	30	30	30	10	10	10	10			
No. 19.										
10	10	20	5	20	10	10	20	5	20	
30	5	30	10	10	30	5	30	10	10	
No. 20.										
6	6	5	15	15	13	10	10	2	5	5
30	6	5	5	15	10	10	30	5	5	2

When the weaver is to draw any draft upon design paper, he will observe the following explanation of Nos. 1 and 2; in drawing of the pattern of No. 1, 40 times over the draft is drawn, upon the backmost five leaves or back set, and 40 times over the draft upon the foremost five leaves or fore set, alternately, till the whole web is drawn through the heddles; and No. 2 is drawn 36 times over the draft on the back set, 10 on the fore, 10 on the back set, 36 on the fore, 8 on the back set, and 8 on the fore, which completes the draft; and if these or any other pattern is wanted, uniform on all sides, the treadles must be trode according to the order of the draft.

When a variety of more patterns is wanted than can be done by ten leaves or two sets of mounting, an additional set or sets become necessary, and may be added to any extent, according to the pattern required; figs. 2d, plates 5th and 6th, are examples of patterns wrought with three sets of

mounting; these patterns are not selected for any beauty they may possess, but merely to shew that the other patterns on the same plates look equally as well as them, although done with five leaves less, and might be made to look still better, if varied more both in the draught and the order of the treading, also to prevent the encumbrance of a great number of leaves, three or four leaves may be put in the set, and the cordings to be applied either broken or regular, are the very same as in the examples pages 409, 410, and 411, and also figs. 1st and 2d, plate 12th. The following are the draughts of fig. 2d, plate 5th and 6th, wrought with 5 sets of twel mounting as follows:

	Fig. 2d, Plate 6th.					Fig. 2d, Plate 5th.						
5d Set,			6	6				4		4		
2d Set,	3	2	3	3	3	3	1	1	3	1	1	1
1st Set,	3	3	3	2	3		1	1	1	1	1	1

By tracing the draught and pattern, it will be seen that what is done with three sets, is equally as simple and easy to understand as that of two sets; in the draught of fig. 2d, plate 5th, 4 draughts are drawn on the back set, 1 draught on the middle set, and 1 draught on the fore set, 1 on the mid, 1 on the fore, 1 on the mid, 4 on the back, 3 on the mid, 1 on the fore, 1 on the mid, 1 on the fore, 1 on the mid, 1 on the fore, and 3 on the middle set, which completes the draught; and the same is repeated over again during the drawing of the web, and it should be observed, that while the web is drawing, the weaver should look frequently at the draught, to prevent mistakes, as should such occur, the figure on the cloth would be completely marred.

No. 9.						No. 10.					
6			6			6			6		
4	4	4	4	4	4	3	1	3	1	1	1
3	1	3	3	1	3	3	3		1	1	
No. 11.											
8		8		8		2		2		2	
8	8	2	2	2	2	8	8	2	2	2	2
8	8	2	2	2	2	8	8				
No. 12.											
1		1		5		1		1		5	
1	1	3	1	1	1	1	1	1	1	3	1
1	3	3	1	3		3	1	3	3	1	3
No. 13.											
1				1				6			
1	1	3	3	1	3	1	1	3	1	3	3
1	1	3	1	1		1	1	3	1	1	
No. 14.											
3		3		2		1		1		8	
3	3	1	1	1	1	3	3	1	1	1	1
8	1	1	2	3	3	3	2	1	1		

As I formerly observed, those who wish to follow after, in order to obtain a complete and thorough knowledge of the different branches of Ornamental Customary Weaving, must carefully draw the draughts upon design paper; the plan is very simple, and only requires a little practice; choose any pattern and begin at the right hand of the draught, and suppose every unit in the figures

upon the draught to be comprehended in one of the small squares of the design paper, draw the whole design of the first set selected across the paper, from the right to the left, marking the largest draughts upon the set; square by the weft; continue the pattern across the paper, until all the sets of which the pattern consists are inserted, when the draught of the pattern will be complete, and you will have a complete view of all the parts of which the pattern consists; draw it the same as directed above, down the sides, across the bottom, and fill up the heart of the pattern, which completes the figure on all sides, if trode in the order of the draught; by a careful comparison of the figures formerly alluded to, upon the plate, with the draughts, they will be of great benefit in rendering the system familiar: also the above principles may be carried to any extent, for as the patterns increase in their variety, it is only requisite to increase the number of leaves; but when a great number of leaves are necessary, they occupy too much space, and it is very inconvenient, and almost impracticable to work with more leaves than fifteen; to obviate this, when the pattern to be weaved is extensive, an ingenious, and at the same time, a simple apparatus is applied, called the Back Harness, of which we shall treat afterwards.

PATTERNS OF 4 SETS.

Fig. 2d, Plate 3d.

No. 2.

	1	1		2	1	2		2	1	2
4		2			2	2		1	2	2
	2	4		1	2	2	1		1	1
	1	1		3	1	1	1	3	1	1

No. 5.				No. 4.			
2	4	4	1	5	5		
1	1 1	1 1	1	3	1	1	3 1
1 1	1 1	1 1		3	1 1	3	
4	4	4		3	1	3	
No. 5.				No. 6.			
	6	6	3	3			
1	1	4	1 4	2	1 1	2	
3	1 1	4		1	3 1	1	2 1
3	1	4				3	1 1 3
No. 7.				No. 8.			
2	2	2 2	1	3		3	
1	2	1	1 1	2	1 1	2	1 1
2	2	1	1 1	2		2	1 1
2	2	3	3	1	2	1	4
No. 9.							
	1	1	1	2	1 1	2	
1	1	1	1	1	2	2	
2	1 2	1 1	1 1	3	1 3		
1	1	1	2 1 2	1	1 1		
No. 10.							
3	3	1	2	1			
3	1	1 3	1 1	1 1	1 1	1	
3	1 1	3 1	1 1	1 1			
3	1	1	1	1			
No. 11.							
1	1 1	1 1	1 3	1	1	3	
1 1	1 1	1 1	3	1 1	3		
1	1	1	3	1	3		
4	4	4	4				

ASSISTANT.

No. 12.				No. 13.			
2	1	1	9	3	1	1	3
1	2	1		1	2	1	
1	1	1	1	3	3	1	1
1	1	1	1	1	1	2	1
1	1	1	1	1	1	2	1
1	1	1	1	1	1	3	1
1	1	1	1	1	1	3	1
1	1	1	1	1	1	3	1
1	1	1	1	1	1	3	1

No. 14.				No. 15.			
3	3	5	9	4	4	4	4
1	3	1	1	9	1	3	1
3	3	1	1	3	3	1	1
3	3	2	2	1	2	1	3

No. 16.			
1	4	1	4
3	1	8	1
5	5	5	
1	1	5	1

No. 20.

1	1	2	2	1	2	2
1	1	5	1	5	5	1
5	1	5	1	5	1	1
2	2	1	2	2	1	1

No. 21.

1	1	1	1	1	1	1
1	1	3	1	8	1	1
10	2	2	1	1	1	1
15	1	1	1	3	1	8

PATTERNS OF 5 SETS.

No. 1.

5	1	1	1	5
1	3	3	3	3
3	3	3	3	3
3	3	3	3	3
3	3	4	4	4

		No. 2.			
		1	2	3	4
1	2	1	1	1	1
2	3	1	1	1	1
3	4	1	1	1	1
4	5	1	1	1	1
5	6	1	1	1	1
6	7	1	1	1	1
7	8	1	1	1	1
8	9	1	1	1	1
9	10	1	1	1	1
10	11	1	1	1	1
11	12	1	1	1	1
12	13	1	1	1	1
13	14	1	1	1	1
14	15	1	1	1	1
15	16	1	1	1	1
16	17	1	1	1	1
17	18	1	1	1	1
18	19	1	1	1	1
19	20	1	1	1	1
20	21	1	1	1	1
21	22	1	1	1	1
22	23	1	1	1	1
23	24	1	1	1	1
24	25	1	1	1	1
25	26	1	1	1	1
26	27	1	1	1	1
27	28	1	1	1	1
28	29	1	1	1	1
29	30	1	1	1	1
30	31	1	1	1	1
31	32	1	1	1	1
32	33	1	1	1	1
33	34	1	1	1	1
34	35	1	1	1	1
35	36	1	1	1	1
36	37	1	1	1	1
37	38	1	1	1	1
38	39	1	1	1	1
39	40	1	1	1	1
40	41	1	1	1	1
41	42	1	1	1	1
42	43	1	1	1	1
43	44	1	1	1	1
44	45	1	1	1	1
45	46	1	1	1	1
46	47	1	1	1	1
47	48	1	1	1	1
48	49	1	1	1	1
49	50	1	1	1	1
50	51	1	1	1	1
51	52	1	1	1	1
52	53	1	1	1	1
53	54	1	1	1	1
54	55	1	1	1	1
55	56	1	1	1	1
56	57	1	1	1	1
57	58	1	1	1	1
58	59	1	1	1	1
59	60	1	1	1	1
60	61	1	1	1	1
61	62	1	1	1	1
62	63	1	1	1	1
63	64	1	1	1	1
64	65	1	1	1	1
65	66	1	1	1	1
66	67	1	1	1	1
67	68	1	1	1	1
68	69	1	1	1	1
69	70	1	1	1	1
70	71	1	1	1	1
71	72	1	1	1	1
72	73	1	1	1	1
73	74	1	1	1	1
74	75	1	1	1	1
75	76	1	1	1	1
76	77	1	1	1	1
77	78	1	1	1	1
78	79	1	1	1	1
79	80	1	1	1	1
80	81	1	1	1	1
81	82	1	1	1	1
82	83	1	1	1	1
83	84	1	1	1	1
84	85	1	1	1	1
85	86	1	1	1	1
86	87	1	1	1	1
87	88	1	1	1	1
88	89	1	1	1	1
89	90	1	1	1	1
90	91	1	1	1	1
91	92	1	1	1	1
92	93	1	1	1	1
93	94	1	1	1	1
94	95	1	1	1	1
95	96	1	1	1	1
96	97	1	1	1	1
97	98	1	1	1	1
98	99	1	1	1	1
99	100	1	1	1	1

No. 2.

No. 4.

No. 9.

3	1	1	3			1	1	
3	1	1	3			1	1	
3	1	3					1	
1	1					1	1	
1	2	1				1	2	1

No. 10.

2		2		5				
3		3	3	3	3	3		
3		3	3	3	3	1	1	
3	1	3		3	3	2	2	
1	1			1		2	2	

PATTERNS OF 6 SETS.

No. 1.

1	1	1				1	1	1	
2	2					2	2		
			2				4	2	
			1	1			4	1	1
			1	1			4	1	1
			1	1	1		4	1	1

No. 1. Continued.

1			2			1		
1			1	1		1		
3		1		1	1	1		
3		1		1	1	1		
3		1	1			1	1	
3		2				2		

No. 2.

4	1	1	4
4		4	
1	1	1	1 3 1
	3	3	1 3 1 1
	3	1 2 2 3	
	2 2	2	

No. 2. Continued.

			4 1 1 4
			4 1 1 1 4
4	1		
1	1	3 1 3 1 3	
	3	2 2 3	
	2 2	2 2	

No. 3.

3	2 2 3	2 2 2
3	2 3	2 2 2
3	3	2 2 2
3	3 2 2 2	2 2
3	3 2 2 2	2 2 2
3	3 2 2 2	2 2 2

No. 3. Continued.

2	3	2 2 2	2 2 2
2	3	2 2 2	2 2 2
2	3	2 2 2	2 2 2
2	3	2	2 2 2
	3	2	2 2 2
	3	2	2 2 2

No. 4.

3	3	3	3	3	3	3
1	1	1	1	1	1	1
1	1	1	1	1	1	1

No. 4. Continued.

1	4	4	1
5	5	5	5
2	1	2	2
2	1	1	2

No. 5.

5	5	5	5
5	5	5	5
5	5	5	5
5	5	5	5
5	5	5	5
5	5	5	5

No. 5. Continued.

2	1	4	4
2	1	5	4
2	1	5	4
2	1	5	4
1	1	1	1

No. 6.									
5	2					1			2
5	8	8				2	1		8 8
5		2				2	1		8 8
5		8	8			2	1		2
5			8	8	2		1	2	
5			2	2				8	8
No. 6. Continued.									
5							3	3	3
5								6	6
5	1	1	1	1	1				
5	5	5	5	5					
5							6	6	
5							3	3	3

As the range of the patterns now to be given are too extensive, for being trode by the feet in the common way, the application of that ingenious and simple apparatus is necessary, termed by weavers a

BACK HARNESS.

The great superiority of the Back Harness for patterns of an extensive range, is, that less mounting answers the end, as only one set of treadles are necessary, or, a treadle for each leaf of which the Tweel is composed; the simplest back Harness that possibly can be mounted, consists of five back or harness leaves, and five front or plain leaves, for throwing the tweel upon the cloth, either above or below, as required in the pattern. From the construction of this harness, each leaf produces an effect equal to that of five leaves upon the former plan, therefore, although this mounting consists only of five front, and five back or harness

leaves, it possesses the means of producing any pattern consisting of twenty-five leaves or five sets, and I consider this to be the harness best suited for those in the customary weaving line, as it is neither so expensive, nor so difficult to change from one pattern to another, as the draw-loom, which is employed in the more extensive Patterns.

The Back Harness consists only of five leaves, and each heddle contains an eye about half an inch long, generally made of tin, and through each of the eyes five threads of warp are drawn. Thus, supposing a web to have 2000 warp, 4000 threads, eyes, or mails, will be required for $\frac{1}{5}$ of the whole warp or 800 mails. The harness leaves are lifted as may be required, by means of levers or coupers across on the top of the loom, exactly above the back harness; a set of five, two for each leaf, for the sake of lifting equally upon each side, with their points nearly touching in the centre, to which there is another set, or 5 coupers fixed to the other coupers, exactly as the back leaves are required to be raised or sunk, these come across above the weaver's head, from each of which hangs a cord with a bob at it, this cord passes through a hole in a square board, with a notch upon the one side of the hole: when the weaver is to raise any of the leaves required according as the pattern directs, he draws one of the bobs until a knot which is upon the cord comes into the notch, by means of which, the leaves necessary to be raised at the time are held at their proper height for the shuttle passing through the shed of the web: the figure of the hole, bobs, and cord, may be seen Plate 11. at B. The front mounting consists of five leaves, as in a common

five leaf tweel, and is worked by treadles and marches, exactly in the same way. The five threads which are drawn through each eye in the back harness, are drawn in succession one by one from the back to the front leaf, as in the examples of the draught page 410. The eyes of the front leaves, are a little longer than the depth of the shed. Of the application of this apparatus I shall treat afterwards when I come to give the cordings of Fancy Tweeling, viz. *Of Flushing by the Warp or by the Weft; and reversing the Flushing or Tweeling at pleasure*, which mode of cording must be applied to the front leaves, so that one leaf may rise and one sink each tread of the foot, while the other three remain stationary, the order of the tweel may either be broken or regular, viz. the leaf that rises, may rise either in the broken or regular order, as also the leaf that sinks, may sink in the broken or regular order, as is required; these are exceptions from the general rule of tweeling, in which, when the foot is trode, and any number of leaves taken down, all the rest are raised. I shall give a cording or two upon this plan; all the difference is, that the crosses are the raising cords on the leaves, the blanks the stationary leaves, and the cyphers on the squares the sinking cords, as follows of a

FOUR LEAF DAMASK, TWEEL.

		X	0	1
	X	0		2
X	0			3
0			X	4
4	3	2	1	

FIVE LEAF DAMASK TWEEL.

			×	0		1
		×	0			2
	×	0				3
×	0					4
0				×		5
5	4	3	2	1		

SIX LEAF DAMASK TWEEL.

		0	×			0	1
			0	×			2
				0	×		3
		×			0	×	4
×					0		5
0	×					×	6
6	4	2	5	3	1		

SEVEN LEAF DAMASK TWEEL.

			×				0	1
			0			×		2
		×				0		3
		0		×				4
×				0				5
0			×					6
			0			×		7
7	6	5	4	3	2	1		

The first two of the foregoing are the regular tweel, the other two the broken; but as I before hinted, it makes little matter how the tweel is disposed of, provided the succession be at regular intervals; but when the eight leaves are employed, which is generally the number used for weaving the proper or double Damask, the succession is more regular in the break, as there is always two leaves omitted, and the third either raised or sunk, according as the cords are applied; the following is an example of an

EIGHT LEAF DAMASK TWEEL.

0					X			1
	X			0				2
			0			X		3
		X		0				4
		0		X				5
			X				0	6
	0				X			7
X						0		8
			2				1	
		4				3		
	6				5			
8				7				

When it takes a greater number of threads than five to complete the draught over the heddles, a full draught would be too much to put in one eye of the back harness, therefore, when six leaves are employed as a fore camb, three threads may be put in each mail; when seven threads complete the draught, four may be put in the eye the one time, and three the other; and when eight are employed, four in each mail, &c. it only requires

more mails, and a finer holeboard, and the fewer that are in the mail, the figure will have the finer turn, but in linen there is no utility in putting fewer than three, it would only increase mounting for no end.

If five leaves are used for the fore camb, five threads are put in each eye of the mails in the back mounting, and suppose the fore leaf of the back harness to be raised, all the threads upon that leaf are raised above the shuttle, except one-fifth, which is taken down by the leaf which is sunk of the fore camb when the foot is trode; or four threads are above the shuttle, and one below, of each mail, upon the leaf raised of the back harness, and so of any number of leaves; and the other leaves of the back harness which remain stationary, all the threads are under the shuttle, except those raised by the rising leaf of the fore camb, or four threads below, and one above the shuttle, of each mail, upon all the stationary leaves of the back harness. The consequence is, that the first produces the figure above by the warp, and the other by the weft; and the tweeling may be reversed at pleasure, by the raising and lowering the harness leaves, as the pattern requires to be done.

The length of the eyes of the heddles on the front leaves being rather more than the depth of the shed, produces no effect upon the stationary leaves; but the leaf which is sunk, takes down one-fifth of all which is raised by the harness, and the leaf which rises raises one-fifth of all that is sunk. The patterns that I have given, answer equally well with the harness as with leaves, and require far less mounting; as upon this plan, five leaves of a back harness, five in the mail, will make a pattern to the same extent as twenty-five leaves, if a

single thread were drawn into each heddle on the leaves.

Besides all the specimens of tweels given, there is another kind of fancy tweeling, much used in the customary weaving line, which from five leaves may be carried to any extent; for the making of bed-covers, table-cloths, towels, &c. A specimen of the cording and upper mounting may be seen, plate 8th, fig. 2d. At A there is a block with three pulleys in it, suspended from the bearer above; round the pulleys are the cords by which the leaves of the heddles are hung, the ends of the cords come exactly to the middle of the leaves to which they are attached. In the weaving of this figure the treadles are trode backwards and forwards, in continual succession, which forms the bird eye, or barley corn, and is much used for fine kitchen towels, &c. Also plate 7th, fig. 1st, is a figure nearly of the same kind, done with 8 leaves, the cording of this produces a double eye with a stitch in the centre, and applied to the same purpose; the mounting of this requires 14 pulleys, as at A; two large pulleys are hung from the bearer, over which at each side, at B, six smaller ones are hung; this is a free mounting, and whatever way the leaves are raised and sunk, the upper mounting will suit with the same number of leaves. The draft is upon the right, and is backwards and forwards, the same as the tread. Figures of this kind trode from right to left, and from left to right, in continual succession will form a wave; or twice one way and twice another, makes a double wave, &c. In fact, the variety produced by this kind of fancy tweeling is almost infinite, and the understanding of it properly is of the utmost importance to a customary weaver, as every change of the draught in the heddles, or the tread, produces a new figure, of which

there are some very beautiful. I shall give a few specimens as follows :

FIVE LEAVES.

Cording.					Draft.	
0			0	0		1
		0	0	0		8 2
	0	0	0			7 3
0	0	0				6 4
0	0			0		5
5	4	3	2	1		
	6	&c.				

At the draught you begin at 1 upon the back leaf, and go on to 5 on the fore leaf, and follow the numbers to 8, which finishes the draught; and begin at 1 on the back leaf again, and so on in succession, until the drawing of the web is finished; and if a wave is wanted in the warp, end your draught always at 5, and begin at 1 again.

Excepting in a few cases, I have placed the cording upon the treadles, in a regular diagonal line, from right to left, or from left to right, so that they can only be trode with one foot, but it serves the purpose of showing the cording in its regular order, more perfectly to the weaver; and I leave it to himself to arrange the treadles, so that they may be easily trode with both feet, according to the examples given in pages 408 and 409, also the two following examples of a bird eye, done with six leaves, will fully illustrate the plan of inverting the treadles, also the sea-wave draught and tread.

SIX LEAVES TRODE WITH ONE FOOT.

Cording.						Eye.						Sea Wave.					
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
0	0	0	0	0	0	9	9	9	9	9	9	9	9	9	9	9	9
0	0	0	0	0	0	8	8	8	8	8	8	8	8	8	8	8	8
0	0	0	0	0	0	7	7	7	7	7	7	7	7	7	7	7	7
0	0	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6
6	5	4	3	2	1	Eye tread.						6	5	4	3	2	1
6	5	4	3	2	1	Wave tread.						6	5	4	3	2	1

SIX LEAVES TRODE WITH BOTH FEET.

Cording.						Eye.	Sea Wave.
		0		0		1	1
	0	0		0	0	2	2
		0	0		0	3	3
		0		0		4	4
	0	0		0	0	5	5
		0	0			6	6
		0		0			
	6	4	2	5	3	1	Eye tread.
		&c.	7				Wave tread.
	6	4	2	5	3	1	

I think these and the former examples, are fully sufficient to show those of an ordinary capacity, how to place any number of treadles, also the draught and tread of the sea wave; I shall give more extensive examples, upon the same principles, and also how to form the eye double, treble, &c.

SEVEN LEAVES.

Double Draught.						
0	0	0	0	0	0	0
0	0	0	0	0	0	0
		0	0	0	33	27
		0	0	0	25	26
	0	0	0		18	19
					10	9
	0	0	0		31	24
					17	11
	0	0	0		30	23
					16	12
	0	0	0	0	29	22
					15	13
	0	0	0		28	21
					14	7
	0	0				
	7	6	5	4	3	2
		8	&c.			1

Note.—If the draught is double, you must tread twice over the treads one way, and twice the other; and if treble, thrice one way, and thrice the other, &c. also sometimes a treadle more may be added, than one for every leaf, for the purpose of making a particular turn on the figure, but this is seldom necessary.

NINE LEAVES.

0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0			15		2
0	0	0	0	0	0	0	0			15		3
0	0	0	0	0	0	0	0			14		4
0	0	0	0	0	0	0	0			13		5
	0	0	0	0	0	0	0			12		6
	0	0	0	0	0	0	0			11		7
0	0	0	0	0	0	0	0			10		8
0	0	0	0	0	0	0	0			9		9
9	8	7	6	5	4	3	2	1				
10	8	7	6	5	4	3	2	1				
	8	7	6	5	4	3	2	1				
	10	8	7	6	5	4	3	2	1			

TEN LEAVES.
Half of the Double Draft.

	0	0	0	0	0	0	0	0	0	39	29	11	1
	0	0	0	0	0	0	0	0	48	38	28	12	2
	0	0	0	0	0	0	0	0	47	37	27	13	3
	0	0	0	0	0	0	0	0	46	36	26	14	4
	0	0	0	0	0	0	0	0	45	35	25	15	5
	0	0	0	0	0	0	0	0	44	34	24	16	6
	0	0	0	0	0	0	0	0	43	33	23	17	7
	0	0	0	0	0	0	0	0	42	32	22	18	8
	0	0	0	0	0	0	0	0	41	31	21	19	9
	0	0	0	0	0	0	0	0	40	30	20	10	10

Note.—The other half of the draught is just reversed upon the leaves.

Besides the specimens of tweels given, there is another kind of tweel used in the weaving of some goods, which is an exception to all the examples given, in which the flushing, or tweel, is by the warp upon the one side of the cloth, and upon the weft by the other; but here the warp and weft are equally flushed, and the appearance of the cloth is upon both sides alike; the following are specimens of the draught and cording employed to effect this: the first is trode in regular succession, and the second is trode alternately, with both feet, and is termed by Customary Weavers, the Serge Tweel, and is used in making plaiding, blankets, &c.

No. 1.				No. 2.			
0	0	0	1	0	0	0	1
0	0	0	3	0	0	0	3
0	0	0	2	0	0	0	2
0	0	0	4	0	0	0	4
4	3	2	1	4	2	3	1

In these examples one foot takes down two leaves at a time, but in the treading of woollen, both plain and tweeled, only one-fourth of the warp is raised and sunk by one treadle at a time, and a second is pressed down to complete the shed, before every shot of weft is thrown across the web, the reason is, that obstructions may be prevented, arising from the closeness of the set, and roughness of the fibres of which woollen yarn is composed. Plate 9th. fig. 1st. is a representation of the upper mounting for this kind of tweel, and also for ticking; the roller is represented at A, and the bearer from which the roller is suspended at C; the tread for ticking is at B, if trode with one foot; but the tread may be inverted to

tread with both feet, as above, in the serge tweeling tread, No. 2.

Every Linen Manufacturer and Household Customary weaver, should have a pair of compasses for the purpose of ascertaining the exact dimensions of any stripe, check, or figure, before throwing it upon cloth, which will prevent a great many mistakes, as by applying the compasses upon the scale, plate 1st, to any number of splits that your stripe, check or figure is to occupy of the reed, the web is intended to be weaved into, and committing the same to paper, will show the Manufacturer or Operative, exactly what appearance any stripe, check, or figure, will have upon cloth after it is weaved; and if he thinks any alteration which can be made will have a better effect, the alteration may be made before warping the web; for example, if a country housewife was giving in a quantity of yarn for a web of bed tick, and could not exactly inform you what pattern she would wish, you could in a few minutes draw out one, with which if she was satisfied, it would prevent any reflections afterwards, which otherwise might be made; from this, I think, that every customary weaver should see the propriety of the application of the compasses in the making out of stripes, checks, and figures of every description; the scale is divided into porters, on every set, from a 5 to a 20 hundred, and a porter of each set is divided into splits upon the left of the scale, for the purpose of ascertaining the odd splits upon any pattern, &c.

Having formerly given a short description of the simplest mode of raising figures upon the cloth by a back harness, it may not be improper to give a short description of the most approved mode of raising the patterns upon the cloth which are more

extensive in linen, diaper, and damask weaving, by the

DRAW LOOM.

On account of the vast multiplicity of cords which are necessarily placed close together to save room, it is impossible to delineate every part in such a manner plain enough to be understood. I have, therefore, given a skeleton plan of the working parts in plate 10th and 11th, and the most extensive mountings are only a continuation in regular succession, until a full mounting is completed; and when the Operative obtains a knowledge of the principle and theory, he may vary into any different way which he may conceive to be the most proper for effecting the intended purpose. It is almost needless to say that the use of the draw loom is to combine much mounting into a small space, as the moving apparatus consists entirely of cordage, and consequently, the great multiplicity of shafts which otherwise would be needed are avoided; that part of the mounting which serves in place of heddles in other looms, is called the harness, and passes through a flat board containing as many holes as there are mails in the harness; the holes are arranged sometimes 5, 6, or 10, across the hole board, in a diagonal line; the edge of the board is represented at L; plate 10th the mails are represented at M, and are generally made of copper or tin, each is kept tight by a small bit of lead hung to the bottom at N, the moving part of the harness is opposite to K, and the neck of the harness at E, where it is tied to the cords upon which the knots are, which go into the teeth of the comb at D, these cords are fastened to the roof of the shop at B, to these cords are other cords fixed opposite to C, which run across

above the weaver's head, and are fastened to a piece of wood on the wall, or otherwise at A; these cords are termed in this way of mounting the simple, but upon another plan of mounting the tail; the lashes are attached to these cords at F, and taken down a considerable way from the cords to make them free in the drawing, then the number to be included in each pull, are joined to one of the knot cords at G, to which cord a bob or handle is hung at I, for the purpose of the weaver pulling the knot into the notch in the board at H, which takes down the simple, and brings the knots into the teeth of the comb. Plate 11th is a side view of a harness with the figure of the comb, and one knot pulled into the teeth; A is the back end of the simple, B a board with a hole and notch for holding up the comb, at the knot when the harness is raised, C the back end of the lever to which the pulling cord is fixed, D the pivot on which the lever moves, E the knot pulled into the teeth of the comb, F the joining of the knot cords to the roof, G the joining of the simple to the knot cords, H an end view of the hole board; the plan of the harness given plate 10th is supposed to be divided into 4 parts, and into each part there are five cords of lacing, as you will see across the hole board, from L to the left side of it, and to each of the five knot cords, at the neck there is 4 of the lacing cords attached, which make 20 lacing cords in all, now supposing you were to tie up the harness part of plate 10th, begin at L upon the hole board, and take up the 1st, 6th, 11th, and 16th, and tie them to the first knot cord at E; then the 2d, 7th, 12th, and 17th, and tie them to the next knot cord; then the 3d, 8th, 13th, and 18th, and tie them to the next; then the 4th, 9th, 14th, and 19th, and tie them to the next; then

the 5th, 10th, 15th, and 20th, and tie them to the left hand knot cord at D, which finishes the tying up; and whatever number of knot cords are drawn into the teeth of the comb, pulls up a lacing cord out of each part into which the harness is divided. If the connexion betwixt all the parts be traced, it will be seen that when one of the bobs are drawn down, the cord above the weaver's head yields also; consequently the knots upon the cords at the neck are drawn into the teeth of the comb; when the back end of the lever to which the comb is fixed is pulled, this pulls up the knot cords and all connected thereto, which raises all the twines and mails connected therewith; although this is but a small sketch, the principle and plan is the same, whatever extent it may be carried to. And although I have given this small sketch of a harness, partly upon the carpet, by the use of the bobs, and partly the Diaper and Damask plan, by more threads being in the mail than one, it cannot be used so properly in practice, but by a careful study may lead into the theory, and the weaver can vary to any plan which he may think superior, according to particular circumstances, rather than by any particular rules given by any representation whatever.

The weaving of double cloth, which is mostly confined to the carpet manufacture, and sometimes on a small scale by the customary weavers for bed-covers, is a thing which necessarily claims our attention. This branch of manufacture is composed of two separate webs, each having its own separate warp and weft, which are mounted upon such a plan so as to intersect each other, and form a junction at certain intervals, as the figure occasionally requires, the material employed is in general woollen yarn, of different colours, and all pat-

terns upon carpets are alike on both sides, but the colours are reversed. A variety of colours are introduced into carpets, but those in the customary weaving line generally confine themselves to two colours, which being the simplest, we shall confine ourselves to it for the illustration of the principle of

CARPETS OF TWO COLOURS.

The fancy tweeling of which we formerly treated, has a very good effect for country bed-covers, if the warp be white and the weft black, or other colours, but two webs of different colours woven in the carpet or double cloth style, has a better effect, and much stronger; eight leaves will answer completely for a checker or damboard pattern, exactly the same as the tweeled damboard pattern page 415, but the cloth is plain, and the colours unmixed, the draught and application of the cords are as follow :

In the foregoing draught and cording, it will be seen upon examination, that the two back leaves of the back set contain the black warp, and the two fore leaves the white, and also the two back leaves of the fore set the black, and the two fore the white, the web is also wadded by throwing in a shot of black and a shot of white across, time about.

Let it be supposed that all the white warp upon the fore front leaves be wrought above, and the black warp below, and the four backmost leaves raised and sunk exactly the reverse, and next in order examine what effect each treadle has as we go along. If treadle No. 1, on the right hand, be pressed down, and a shot of black weft thrown across the cords which connect the treadle with the black leaves, No. 1 and 5 raises these leaves, and sinks the leaves marked 2 and 6; by this tread one half of the black warp is raised, and the other half sunk, which by the draught being alternate, produces plain black cloth; but it will be observed, that by this tread the white warp is not interwoven at all, as the two white leaves No 3 and 4, of the back set are sunk, and in the front set, the two white leaves No. 7 and 8 are raised, which reverses the operation; the black weft, therefore, passes over the former and under the latter, quite clear of either, which operation repeat shot about to treadle No 4, and so long as the operation is repeated in continual succession upon these four treadles, the effect will be as in the cording, page 415, the web will have the appearance of a black and white stripe. But to produce the checker or damboard pattern, when one set of squares are completed upon the right hand treadles 1, 2, 3, 4, the weaver shifts to the four left hand treadles, 1, 2, 3, 4, which entirely reverses the effect, rais-

ing the whole which was formerly sunk, and sinking that which was formerly raised, and the same with the black. These are the first principles of double cloth weaving, and its application to fanciful decoration is the only variety formed in the mounting of the loom; carpeting is seldom wrought with treadles on account of the coarseness of the materials, broadness of the webs, and extensive range of pattern, that there would neither be room for the leaves necessary, nor for the exertion requisite for treading.

Although carpets are generally weaved in full mounted draw looms, the application of a very simple apparatus similar to that used in the weaving of table cloths, is the only thing suitable for Household Customary weavers, as the range of their pattern seldom is to the extent so as to make the application of the full draw loom necessary: for the illustration of which, we shall have recourse to the foregoing pattern, and compare the explanation given of mounting it with leaves, and the effect of weaving it by the

BACK HARNESS.

1 Harness Leat,		B	B	B	B	B	B	W	W	W	W	W
2 Harness Leat,		W	W	W	W	W	W	B	B	B	B	B
2	White Shot.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	Black Shot.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	White Shot.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	Black Shot.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	0	X	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	X	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
0	0	X	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
X	0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	3	2	1	8	5	4	2	8	6	4	2	1

Back 1
 Black 2
 White 3
 White 4

This mounting will produce the same effect as the former, and is very convenient for Customary Weavers in the weaving of bed-covers. The two back leaves are the harness leaves, and are raised by coupers, as explained page 438: two threads are drawn through each eye of the harness; W and B represent the black and white yarn as drawn through the harness; and the draught is shewn by figures on the fore camb; the cording is put up the same as explained page 439. When one of the harness leaves is raised, a shot of white and a shot of black is put in alternately, until a checker is completed, when that leaf is lowered and the other raised, which reverses the colours, and so on alternately, &c. &c.

READING ON THE DESIGN

Is on account of the accuracy necessary, a very particular part, and upon which depends the proper formation of every pattern. When this is to be done, the simple is put into a reed with a vacancy for every heavy line upon the paper the pattern is drawn upon; see page 420 for the description of design paper; let plate 2d represent a flower which if woven by the length, the extent is 41 mails, by the breadth; and if woven across the web, the extent is 83 mails, so that the one way the figure is repeated as often as there is 41 mails or 82 splits, and the other as often as there is 83 mails or 166 splits in the warp of the web; the first requires 41, and the second 83 simple cords; the first also requires the harness to be changed 83 times, and the second 41 times in working the pattern. The instructions for reading on are, beginning at the bottom of the flower on the right hand, taking up the black and passing the white; say pass 8 and

take 4, pass 7, and take 7, pass 5 and take 7; and if the flower is to be woven across the web begin upon the right and say pass 3 and take 5, pass 10, and take 4, pass 9 and take 2, pass 6 and take 5, pass 2 and take 5, pass 2 and take 10, pass 14 and take 1, pass 4 and take 1, &c. until the whole is put on. The operation is very simple, a lash is passed round each tack that is marked out upon the pattern, and until one line. The pattern is completed when they are all uniformly tied together, at a convenient distance from the simples, so as not to impede the freedom of the draught, see plate 10th, at G. Another thing requisite is, that every pattern must be made to correspond or join at the extremity of the extent, on each side of the simple. In the flower, plate 2d, what is wanting of the hanging leaf at the bottom is at the top, and when woven either length ways or across will exactly join; also plate 4th, of a sprig, what is wanting of the sprig at the middle of the page is at the bottom, and makes a whole, and so of every pattern of whatever extent. But to enter into these things minutely would take up volumes, I therefore recommend study and practice, which will render the thing familiar and easy. There is also another kind of cloth greatly in use for towels, called Huckabag, of which I shall give a cording or two.

DARLINGTON.

		0			4 2				0
	0	0			5 3 1	0	0	0	0
	0	0			5 3 1		0	0	0
	0	0			4 2	0			
1	2				By either tread- ing the two out- side or middle treadles works plain.		2		1
3	4						4		3
5									5
		2	1				1		2
		4	3				3		4
		5				5			

PENNY DORNICK.

0			0		3 1		3 1
		0	0		7 5		4 2
0	0				4 2	7 5	
	0	0			8 6	8 6	
	1		2		If the knot is wanted double repeat each part of the draught twice.		
	3		4				
	5		6				
	7		8				
1		2					
3		4					
5		6					
7		8					

DOUBLE DRAUGHT OF NETTED KING'S HOOD.

				4 2	4 2	4 2
	6	6	5 3 1	5 3 1	5 3 1	
5 3 1	5 3 1	5 3 1	6	6		
4 2	4 2	4 2				

Note.—Plate 8th, fig. 1st. is the Cording and Single Draught.

It surely will not be thought that I could in this work treat minutely on every particular part in the Fancy Customary Weaving line; certainly not, as that would be an endless labyrinth: but I have given a short sketch of that which I considered absolutely essential and necessary. Some will, no doubt, approve, and some disapprove of the work, because they imagine nothing right but what they do themselves, although they can do nothing right; but this gives me no concern, as I am fully convinced it will answer the end for which it is intended, and the arrangements are, as near as possible, made so as to be easily understood by any of an ordinary capacity.



TO THE PUBLISHERS.

GENTLEMEN,

WE, the undersigned, having carefully inspected the Work published by you, entitled the *Linen Manufacturer, Household Customary Weaver and Warper's Assistant*, highly approve of the plan and arrangement of the same, and recommend it to all those engaged in the Linen Manufacture and Household Customary Weaving department, as the most complete Work of the kind ever published. It appears to us to supersede the use of any other publication upon the same subject, (except a complete and total change in the Linen Manufacture of the country take place, which for centuries is not likely,) as it embraces every thing of utility from the building of the heddles to the finishing of the cloth, either plain or figured, among which are a great variety of things entirely new. We think it a Work highly creditable both to the Author and Publishers.

(Signed,)

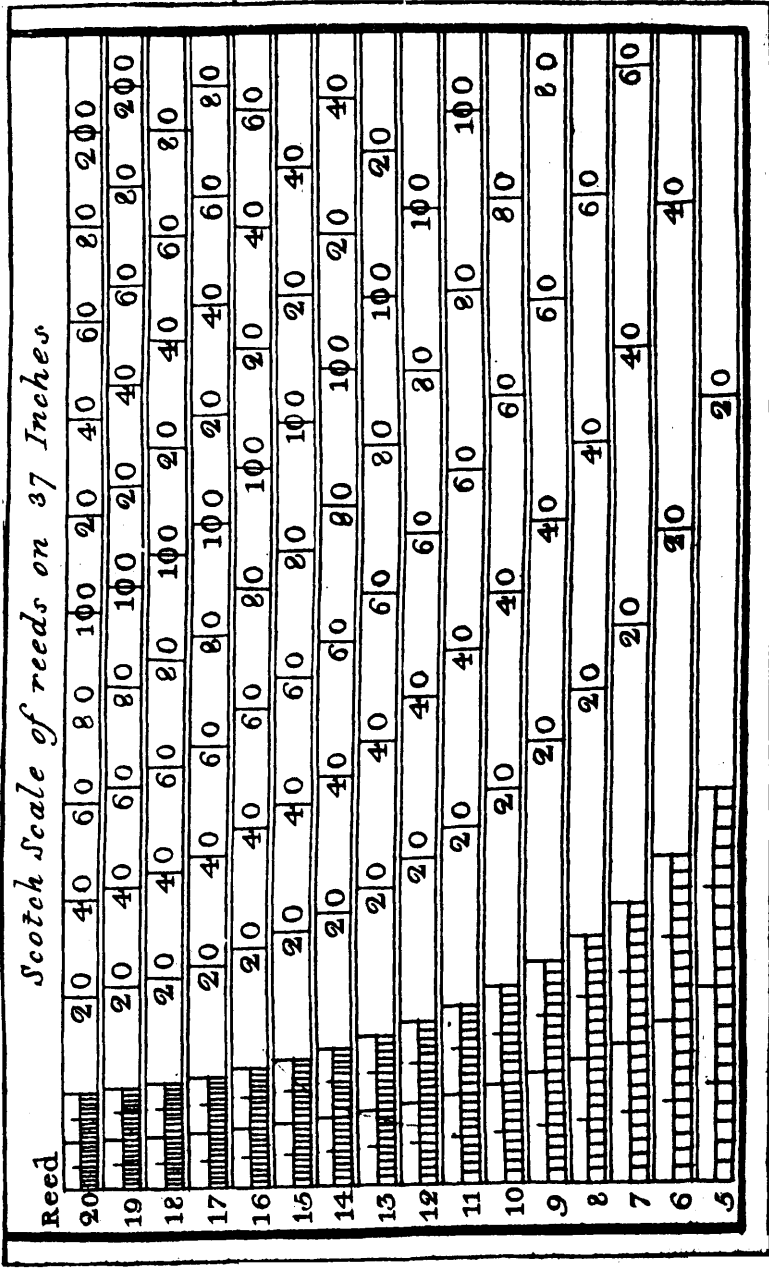
CHARLES MALLOCH, *Manufacturer.*

JOHN HOGG, *Manufacturer.*

JOHN STEWART, *Customary Weaver.*

DANIEL ROBERTSON, *Customary Weaver.*

PERTH, }
June 1th, 1819. }



Plt 2

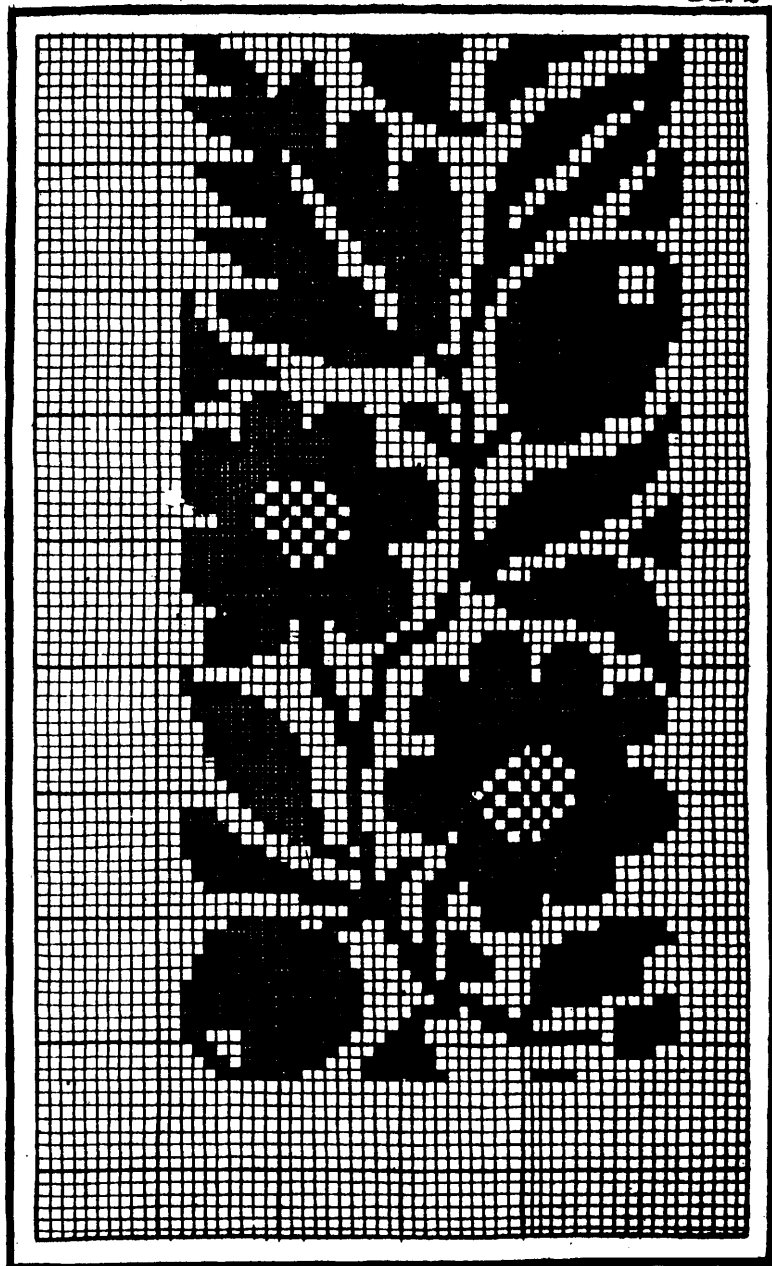


Fig 2

Pl^t 3

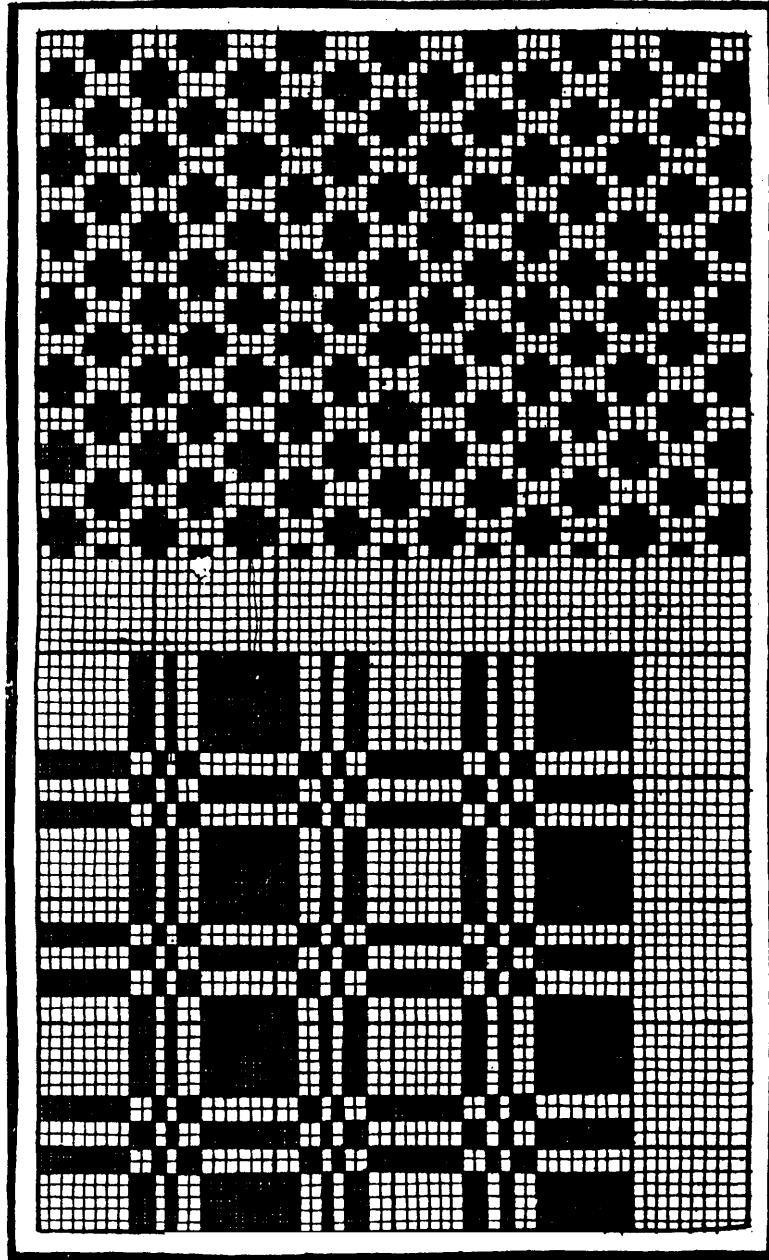


Fig. 1

Plt 4

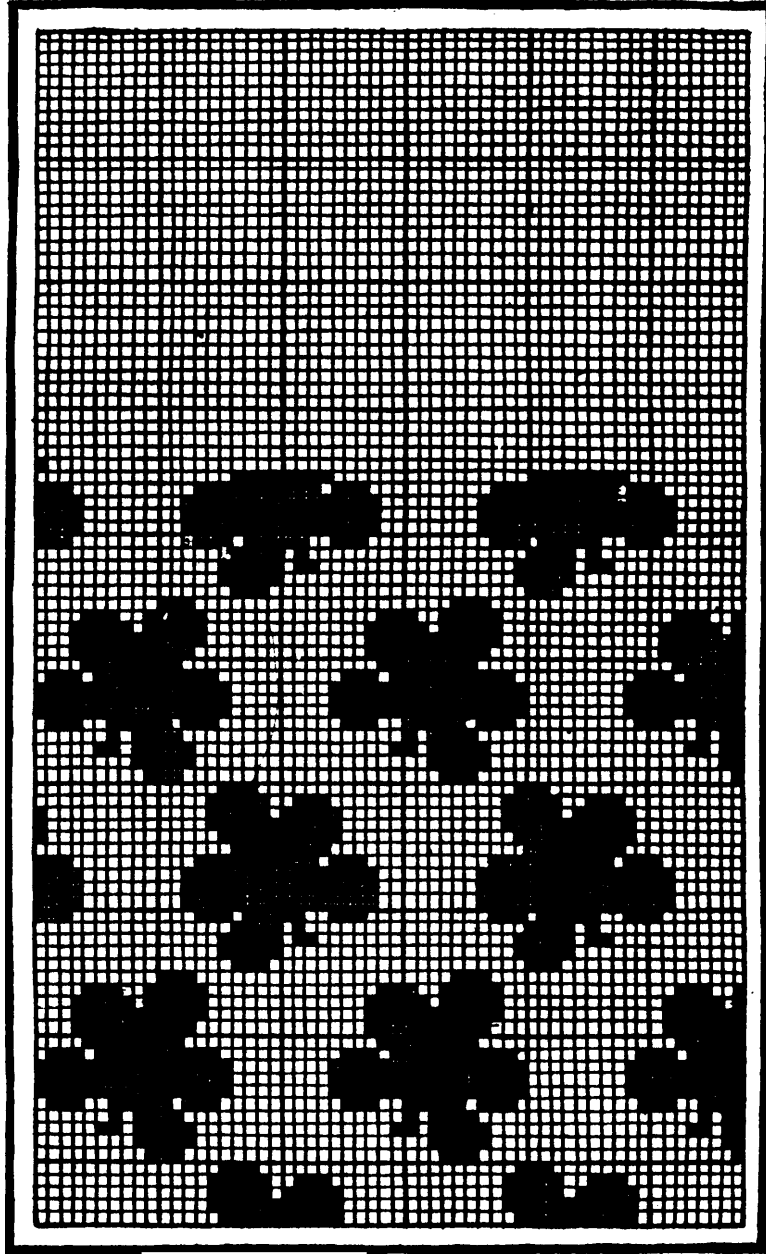


Fig. 1

Plt 5

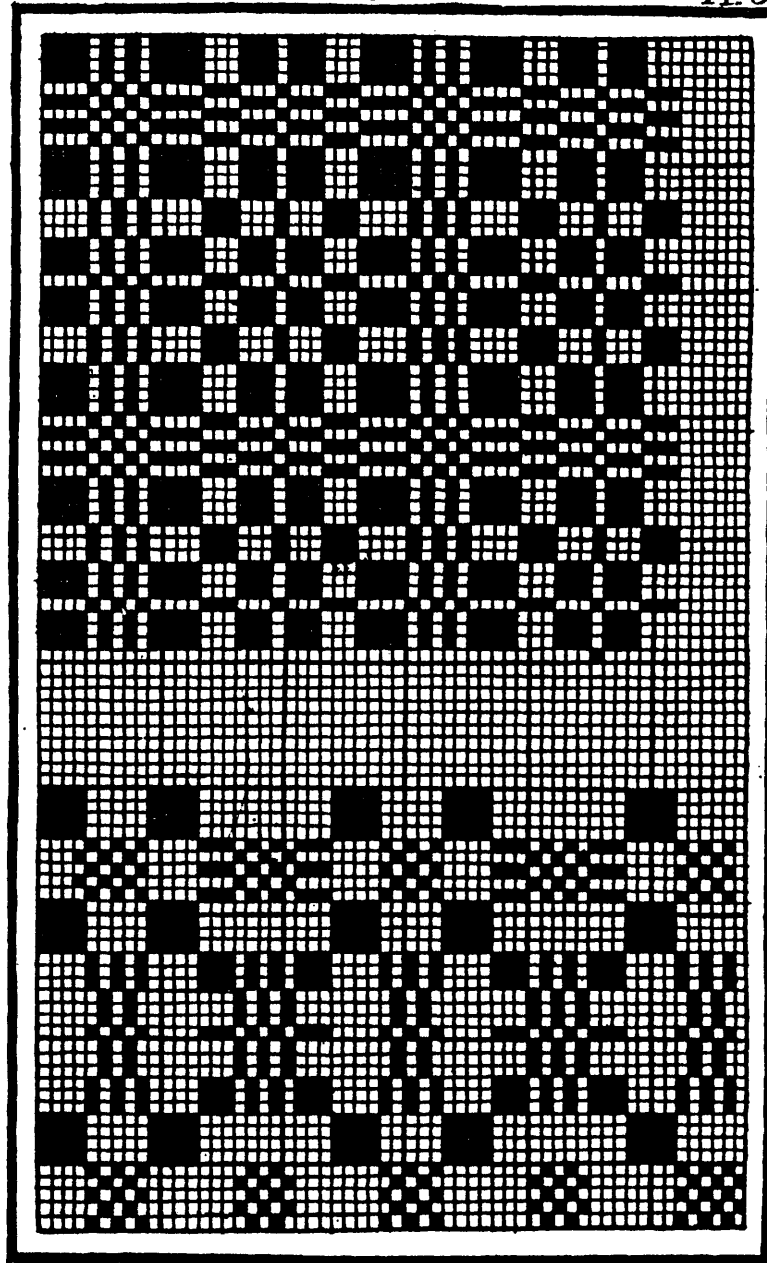


Fig. 2

Fig.1

Plt 6

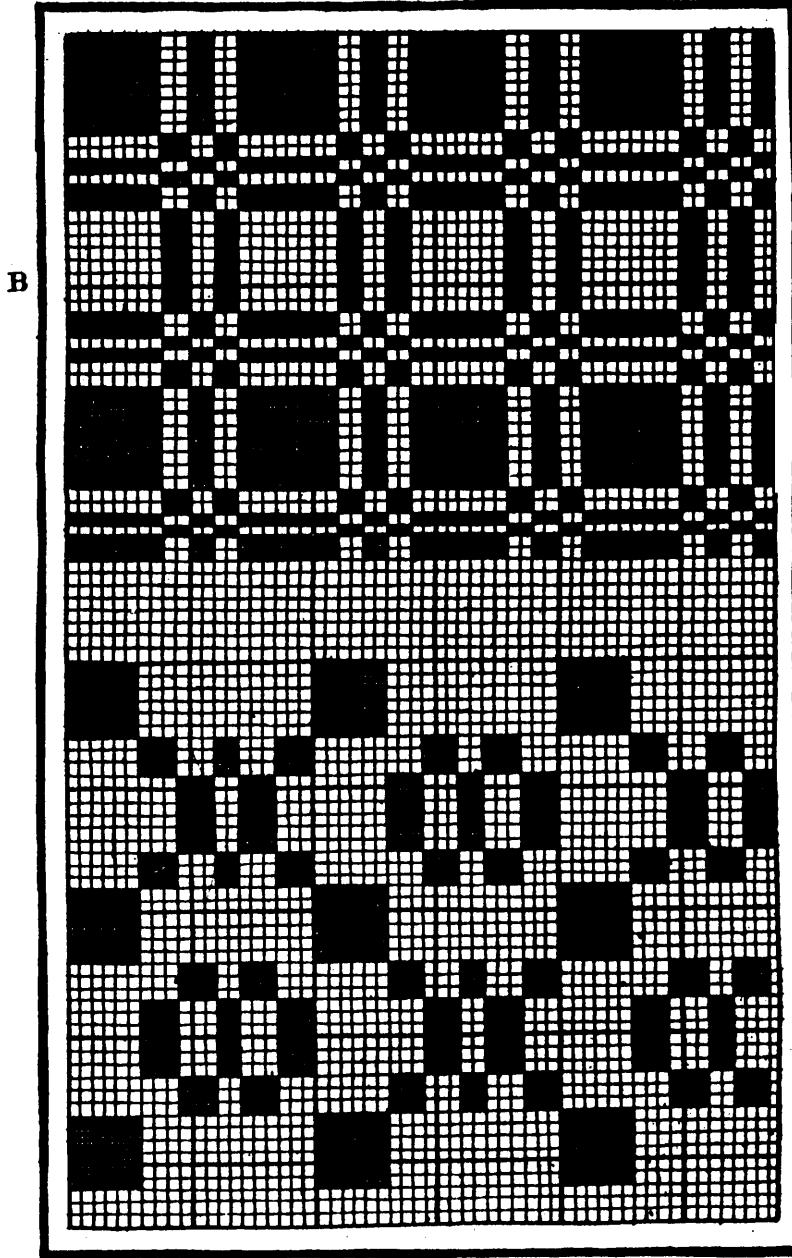
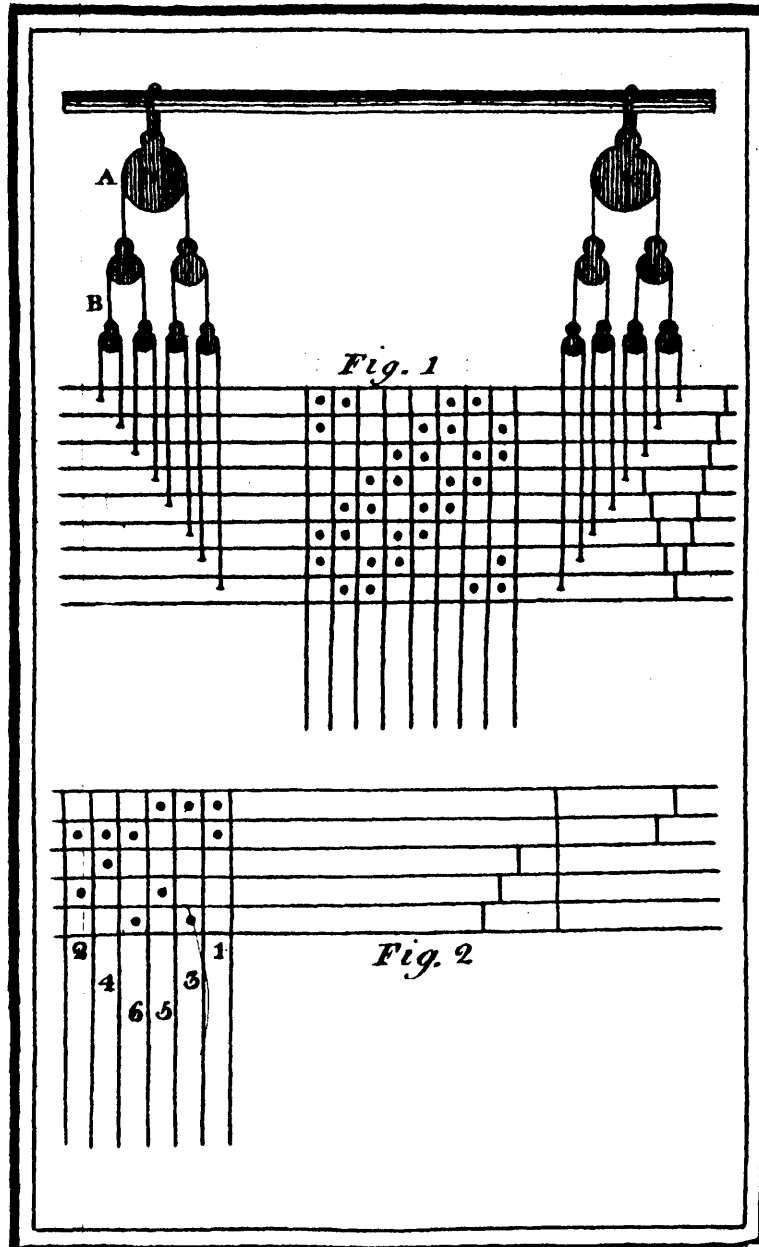


Fig. 2



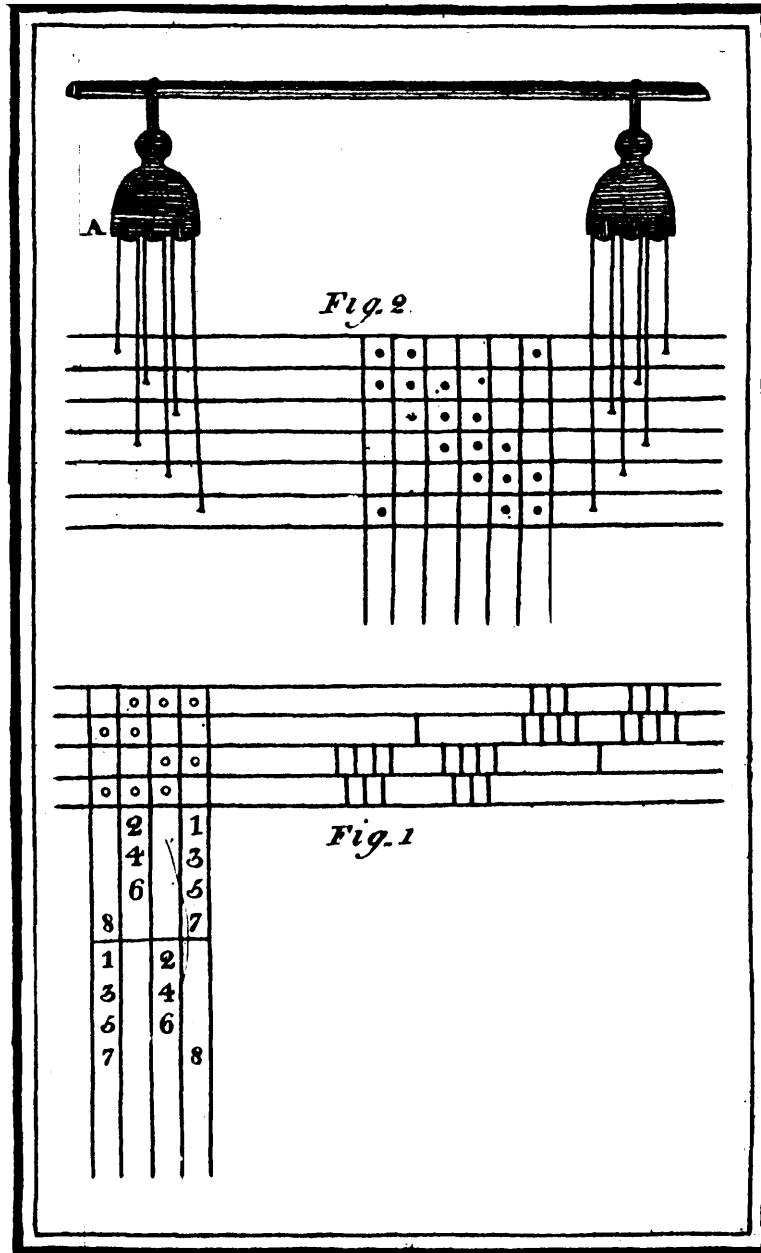


Fig. 2

Fig. 1

