AN ALBUM OF TEXTILE DESIGNS

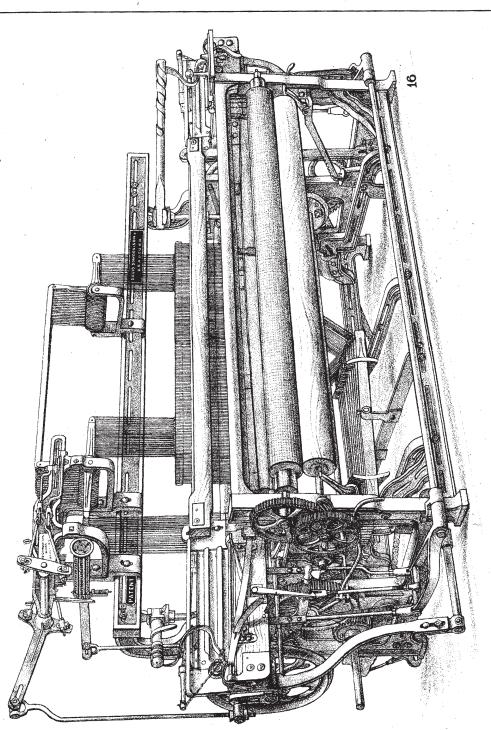
THOS. R. ASHENHURST

BRADFORD, ENGLAND. DAVID SOWDEN & SONS

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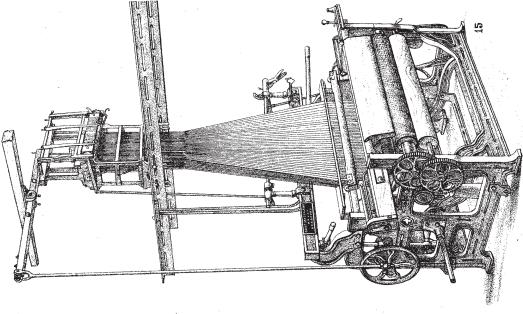
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AN ALBUM

OF

TEXTILE DESIGNS

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7,000 PATTERNS,

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 $\mathbf{B}\mathbf{Y}$

THOS. R. ASHENHURST,

(Head Master of the Bradford Technical School, Author of a "Practical Treatise on Weaving and Designing of Textile Fabrics," etc.,)

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BRADFORD:—THOS. R. ASHENHURST, 5, Ashgrove.

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HUDDERSFIELD:



PREFACE.

In bringing this Work before the public, the Author feels that it is scarcely necessary to make any lengthened observations on the reasons which have induced him to prepare it. Everybody is familiar with the great value of "ready reckoners" in commercial life, in the saving of time, and the relief of the mind, enabling one to see at a glance results which in many instances would involve a considerable amount of work, and necessarily mental labour to obtain. Such a one is the present Work, though differing very materially in character from an ordinary commercial "ready reckoner." The chief object here is to place before the Textile Manufacturer and Designer a collection of patterns arranged, classified, and indexed in such a manner that the Work will be to him not merely what the "ready reckoner" is to the merchant or clerk, but a constant book of reference, from which he can extract matter, and by rearrangement and combinations produce a never-ending variety of patterns, and apply them to the fabrics he is manufacturing.

The Author is not so vain as to suppose that in this Work he is placing before the Manufacturers or Designers of Textile Fabrics any patterns which they could not produce equally as well, but he has some hopes that the arrangement, classification, and indexing of the designs, as well as the exposition of the principles upon which they are made, will effect such a saving of time and mental labour as will repay the purchaser for the small outlay. Of the value of those principles it need only be said with reference to the present Work, that from the first conception of such a book in the mind of the Author to the date of issue to the public, less than eight months have elapsed, although the Author has during the greater part of that time had to attend to his official duties in the school with which he has the honour to be connected.

In going through the press a few mistakes have crept into the Work, but these are of the almost inevitable kind, and such as any practical man will detect at sight, and the Author feels bound to express to the printers his satisfaction at the great care they have taken to avoid them.

In conclusion, the Author must express his gratitude to the large body of subscribers, which includes nearly all the leading firms in every branch of Textile Manufactures in the United Kingdom, for the liberal manner in which they have come forward, and before the Work is ready for issue placed it almost beyond financial risk.

That all subscribers and future purchasers of this Work may find that their confidence has not been misplaced, is the earnest wish of

THOS. R. ASHENHURST.

BRADFORD,

August 20th, 1881.

CONTENTS.

Introduction			•••		•••	•••	•••		Page 5
Patterns upor	n 3	ends	commence	at	•••	•••	•••	•••	13
Ditto	4	,,	,,	•••	•••	•••	•••	•••	13
Ditto	5	.,,	,,	•••	•••	•••	•••	•••	13
Ditto	6	,,	,,		•••	•••	•••	•••	14
Ditto	7	,,	,,		•••	•••	• • •	• • •	16
Ditto	8	,,	,,		•••	•••	•••	•••	18
Ditto	9	"	,,		•••	•••	•••	•••	24
Ditto	10	,,	,,	•••	•••	•••	•••	•••	39
Ditto	11	,,	,,		• • •	•••	•••	•••	63
Ditto	12	,,	,,		•••	•••	•••	•••	93
Ditto	14	,,	. ,,	• • •		•••	•••	O to .	126
Ditto	16	,,	,,		•••		•••	•••	155

INTRODUCTION.

them upon design or point paper, is so well understood, and as the subject of previous treatises has been so fully dealt with, that it will not be necessary to deal with it here. But as this work may probably fall into the hands of young men who have not had the advantage of a thorough training, it will be necessary to explain, not only upon what method the designs are arranged in the work, but the general principles upon which they are produced. This will be best and easiest done if we proceed upon what is known as the doctrine of combinations.

Combinations are generally taken as denoting the alterations or variations of any number of objects, quantities, sounds, &c., in all possible ways. Thus, one object will admit of no combinations, and two objects will admit of one combination only, provided they are simple objects, but it has been shown that two square objects, each divided diagonally into two colours, may be arranged in sixty-four different ways, these sixty-four ways meaning of course that they are placed in sixty-four different positions in relation to each other.

As we increase the number of objects we increase, not only the number of combinations capable of being produced, but also the number of modes in which the combinations may be made, and the number of positions in which they may be placed in relation to each other; thus, of a series of objects given for combination we may combine them in twos, threes, or any number together.

Assuming, first, that we are combining the objects in twos, it has already been said that two objects admit of but one combination. Three objects will admit of three combinations: thus, a b, a c, b c. Four objects will admit of six combinations: thus, a b, a c, a d, b c, b d, and c d. In the same manner five objects will admit of ten combinations; six objects of fifteen combinations, and so on. From this it appears that the number of combinations of two objects together proceeds according to

the triangular numbers, 1, 3, 6, 10, 15, 21, 28, 36, &c., which will be produced by the continued addition of the arithmetical series, 0, 1, 2, 3, 4, 5, 6, 7, 8, &c.; or, to put it in a general formula, if n be the number of objects, and the combinations are in twos it will $\frac{be \ n \times (n-1)}{2}$

thus, if
$$n = 2$$
 it will be $\frac{2 \times 1}{2} = 1$, and if $n = 4$ it will be $\frac{4 \times 3}{2} = 6$, and if $n = 6$ it will be $\frac{6 \times 5}{2} = 15$, and so on.

We may go a great deal further, because the combination of twos is the very simplest form, we may combine in threes, fours, fives, or any number.

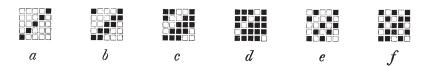
We will suppose we are about to combine in threes. Three objects will admit of but one order of combination as $a \ b \ c$. Four objects will admit of four orders of combination, as $a \ b \ c$, $a \ b \ d$, $a \ c \ d$, $a \ d \ d$, $a \ c \ d$, $a \ c \ d$, $a \ d \ d$, $a \$

Again assuming n to be the number of objects to be combined in threes, the general formula will be $\frac{n}{1} \times \frac{n-1}{2} \times \frac{n-2}{3}$ or put in a more simple manner, say if n=3 it will be $\frac{3 \times 2 \times 1}{1 \times 2 \times 3} = 1$, or if n=4 it will be $\frac{4 \times 3 \times 2 \times 1}{1 \times 2 \times 3} = 4$ or $\frac{4 \times 3 \times 2}{6} = 4$ and if n=5 it will be $\frac{5 \times 4 \times 3}{6} = 10$, and if n=6 $\frac{6 \times 5 \times 4}{6} = 20$.

In the same manner we may proceed to lay down a formula for any number of objects combined . by any number at one time. Thus, if we wish to combine in fours, and the number of objects n=6, it will be $\frac{6 \times 5 \times 4 \times 3}{1 \times 2 \times 3 \times 4} = 15$. Or if we wish to proceed still further and ascertain the number of combinations we can produce from a given number of objects in series of 2, 3, 4, &c, find the number of combinations which can be produced in each series by these formulæ, and add all the series together. For example, taking six objects to find the total number of possible combinations in series of 2, 3 and 4, first, to combine in twos $\frac{6 \times 5}{2} = 15$, second, in threes $\frac{6 \times 5 \times 4}{6} = 20$, third, in fours $\frac{6 \times 5 \times 4 \times 3}{2 \times 3 \times 4} = 15$, and 15+20+15 = 50 combinations capable of being produced with six objects.

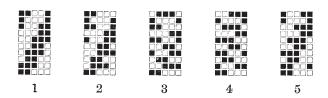
So far we are dealing with combinations of simple objects, but we may now begin to apply it to textile patterns, and we shall find that although the combination of simple objects gives a wide, scope, the combination of patterns gives a much wider.

We will take a limited number of ends, say five, find how many of the patterns known as simple twills can be produced upon that number, and enter into the combination of these simple patterns with each other. With those five ends we could produce the following simple twills.



which are six in number. Then with those six combined in twos, we can produce $\frac{6 \times 5}{2} = 15$ new patterns, and combined in threes, we can produce $\frac{6 \times 5 \times 4}{6} = 20$ more new patterns, or combined in fours we can produce $\frac{6 \times 5 \times 4 \times 3}{2 \times 3 \times 4} = 15$ more again.

But it is very obvious that this does not represent all the patterns we can produce, because those six patterns are not only capable of being combined together, but they are capable of being combined in five different positions in relation to each other. For example, we will select two from the six, say b and c, and combine them together in those five different positions, thus



then, if in the combination of those five designs in twos we can produce fifteen new designs; and we can again combine them in five different positions in relation to each other, we can produce seventy-five new patterns from those six by combination in twos. And, further, if we combine them in threes we can place each of the three in five different positions in relation to the other two, and so multiply the number of combinations of three by five times, and so on.

Up to this point we have seen that we can produce a vast number of new patterns, but we need not stop here; in fact, we are only just entering the field. Hitherto we have been dealing with them as simple twills, but each of those twills is capable of re-arrangement; that is, each of the five ends may be placed in a different position in relation to the rest, or, upon the principle of permutation.

We may look at this principle of permutation, and see how far it will carry us. Without entering too deeply into subject, we may proceed upon the general theorem that the number of changes that can be made with any number of objects taken together, without considering them as taken a certain number at a time, will be expressed by the continuous product $n \times (n-1) \times (n-2) \times (n-3) \times (n-4)$, and so on; or, if we take a certain number of objects of one kind and a certain number of another kind to find the number of changes which can be made, it will be found by the series $1 \times 2 \times 3 \times 4 \times 5 \times 6$, &c., up to the number of objects given.

From this it will be seen that by the doctrine of combination and permutation an infinite number of patterns may be produced, because not only may we combine together the simple twills which form the first basis, as it may be termed, but we may combine the rearranged twills with one another, and with each separate set of rearrangements. For example, if we again take the same two patterns as before, rearrange each one in what is commonly known as satin order, and then combine them, we produce patterns which bear no resemblance whatever to the previous combinations, thus



Although we have now gone a considerable length in the production of new patterns by rearrangement and combination,—and it must be distinctly understood that each rearrangement, apart from any combination, produces a new pattern in itself,—yet we have not reached the limit. Instead of combining two complete patterns we may combine certain portions of each, and so again produce new effects. For example, we may take any two patterns and take either alternate ends of each, or alternate picks of each, and combine them together; and we may so combine them, not only in one position in relation to each other, but in as many positions as the pattern contains ends or picks.

Such is the principle upon which patterns may be produced, and, practically, there is no limit to the extent and variety which may be produced upon a given number of ends. We must now look at the other side of the subject. It will be obvious that, if these principles be carried out in their entirety, a great many of the patterns would be similar to each other, or, in fact, the same pattern inverted. Such is the case in the patterns here given: they have been selected for that purpose. If we look at the two series of five each just given, it will be seen that in reality there are only three different patterns; the other two are simply inverted ones, so that some judgment and discrimination must be used to prevent repetition.

Such is the principle upon which the patterns in this work have been produced. We must now look at the arrangement of them, the mode of indexing, and consider its utility in practice.

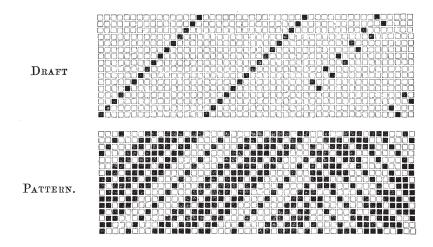
On turning to the commencement of the patterns upon any given number of ends,—say twelve ends, page 93,—it will be seen that, first comes a series of ordinary twills; these are the basis of all that follow upon that number of ends. Following this series are others, each series commencing with a given draft. The whole of these are simply rearrangements of the first series, and the draft is the indication of the order of rearrangement. Attached to each design are the numbers of all the designs which are rearrangements of the same thing; for instance, taking the pattern No. 3461, all the numbers accompanying that design, viz., 3516, 3561, 3664, 3715, and 3863, are rearrangements of the design 3516, and consequently will work in the same healds as that design; and, as the draft at the commencement of each series is the indication of the order of rearrangement, it necessarily follows that if the warp threads be drawn through the healds in the order shown in that draft, and the healds be made to work in such order as would produce the pattern from which the required pattern is formed, that the desired result would be obtained.

It is not necessary here to enter into the details of the arrangement and meaning of the drafts further than has already been done, as the whole subject is fully explained in my "Treatise on Weaving and Designing of Textile Fabrics," pages 166 to 174 (2nd Edition). Only one little matter needs to be explained, viz., that in many instances the reference numbers are placed at the side instead of at the foot of the design, in such cases, when used for purposes of combination, the side at which the numbers are placed becomes the foot of the design, or, in other words, the ends become the picks and vice versa.

Now as to the production of other patterns from those given in the Work. In addition to the combinations of which we have been speaking, patterns may be combined so as to form stripe, check, or other effects, and it is to facilitate this combination that the method of indexing the designs in this work

has been adopted. Suppose it is desired to produce a stripe pattern upon 16 healds, and it is desired that pattern 5670 shall form the ground, and some other pattern shall form the stripe, say, for instance, pattern 6074, and it is determined that the size of the stripe shall be as under, viz.: 32 ends of pattern 5670, and 16 ends of pattern 6074, as shown below.

Then all we have to do is to draw the warp which is to form pattern 5670 through the healds in straight order from front to back, and that portion which is to form pattern 6074 through the healds in the order given in the draft at the commencement of the series to which number 6074 belongs. Cut the cards, or arrange in whatever way may be necessary to raise the healds, in such order as with the straight draft will produce the pattern 5670, and the mere arrangement of the draft will cause the pattern 6074 to be produced where it is required; or, to use the language of the trade, the draft is a combination of straight and broken draft, as given at the commencement of the series to which the broken pattern belongs, and the straight twill is the card cutting, pegging, or heald-raising plan



It will be at once seen that the stripes may be varied to an unlimited extent, and not merely two different patterns used, but immense variety may be produced by combining more than two patterns in the same design, and at the same time not increase the number of healds employed.

We now come to deal with another and very important branch of the subject, viz., the application of the patterns to fabrics. As has been shown, the mere making of a large number of designs is not a difficult matter; in fact, the greatest difficulty may be more truly said to be the selection of the best for the fabric, and the purposes to which they are to be applied. The skill of the designer or manufacturer is not proved by the number of different patterns or designs he can produce, but more by his application of them to the fabric, so as to produce the best effect, and a fabric most suitable for the purpose to which it is to be applied. The question may be asked: What are the principles by which we must be

guided so as to do this most efficiently? That is a question not easily answered. It is not easy to lay down rules which will meet the circumstances of every case, and it is a very difficult matter to lay down general rules which may not in some cases be very misleading. Experience is the best teacher, and whatever rules may be laid down before they can be acted upon with any amount of success must be verified by experience, and that experience frequently brought to bear in the modification of the rule.

The subject of slaying or setting of fabrics, which is dealt with in my Treatise before named, is one which is very closely connected with the application of designs, and their suitability for the fabrics to which they are applied; in fact, they are inseparable from each other. A design when applied to one fabric may be perfect, the same design when applied to another fabric may produce a most unsatisfactory effect, and the difference may be brought about, not only by the difference in the material of which the fabrics are formed, but with the same material it may be brought about by the difference in the relative proportions of warp and weft. We will take for example, a twill which runs at an angle of 45 degrees across the design paper, and in which about equal quantities of warp and weft appear on the surface. In all probability the best effect would be produced if warp and weft are nearly equal in quantity, though in many cases increasing the quantity of either one or the other would not have a detrimental effect.

If we take another in which the twill runs at an angle of, say, 60 degrees up the piece, the best effect would almost certainly be produced by letting the warp preponderate over the weft, and the higher the angle at which the twill runs, the greater (in most cases) will the preponderance of warp over weft require to be.

On the other hand, if the twill runs at an angle of 30 degrees across the piece, the best effect would be produced by having a preponderance of weft, and the lower the angle at which the twill runs the greater must be the preponderance of the weft. The consideration of this subject raises another question when the class of twills of which we are speaking are used in combination; that is, when a stripe or check effect is produced by combining two twills which run at different angles. Whenever that is the case the only safe plan,—and certainly the one which would be most likely to produce the best possible results,—is to construct the fabric as if it was for a twill at an angle of 45 degrees, and let warp and weft be equal in quantity. This, of course, applies more especially to cases where the two twills are very widely different; as, for instance, when one runs nearly vertically and the other nearly horizontally, or say at angles respectively of 60 and 30 degrees. If we are producing stripe effects, where one portion of the twill runs at an angle of 45 degrees and another portion runs nearly vertically,

we may make a variation in the number of ends per inch in each portion by increasing the quantity in that portion which forms the vertical twill. The same expedient may also be resorted to in the case of twills where there is a greater difference in the angle, but the greater the difference and the greater the difficulty of dealing with them.

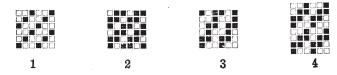
We have again to consider the character of the fabric which it is desired to produce, and the purpose to which it is to be applied; whether it is to be useful, to withstand a great amount of friction, or wear and tear; whether it is required to be purely ornamental, or whether it is to serve some useful purpose, and at the same time to be ornamented in a pleasing manner. Whatever purpose it is intended to serve attention should be paid to the suitability of the design for that purpose; if strength is required, a pattern must be selected in which the threads are interwoven sufficiently to give the requisite strength If bulk and weight are required, a pattern must be selected which will permit the warp and weft to embed into each other sufficiently. If only ornament is required, without any of the other conditions being necessarily present, then patterns with just sufficient elaboration and character may be selected. Again, in many cases it is of the utmost importance to have regard to the processes of finishing the fabric will have to go through after being woven, as the effect may be improved or marred considerably by those processes; more especially is this the case in fabrics made from wool. If the pattern is required to be much seen, then it must be of a very clear decided character, otherwise it may be lost in milling-up of the material in finishing; but if decision of character in the pattern is not of great importance, then the object must be to select patterns which will facilitate the interlocking of the fibres in the process of milling.

Nothing but great care and strict attention will enable the designer or manufacturer to overcome all the difficulties he has to contend with, but care and attention, combined with the teachings of experience, will enable him at all times to select those patterns which will best answer the purposes to which they are to be applied.

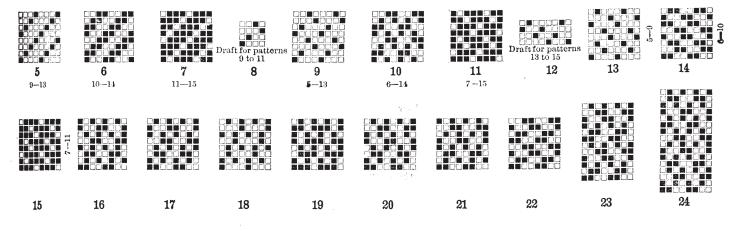
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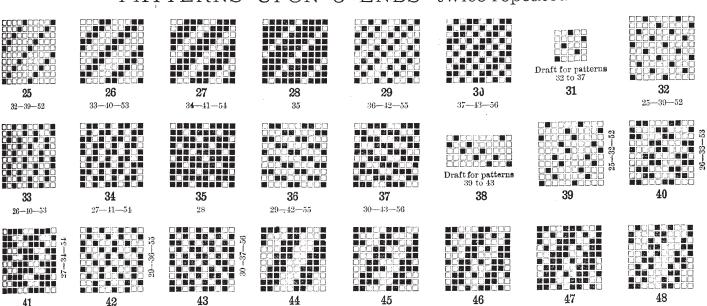
PATTERNS UPON 3 ENDS—twice repeated



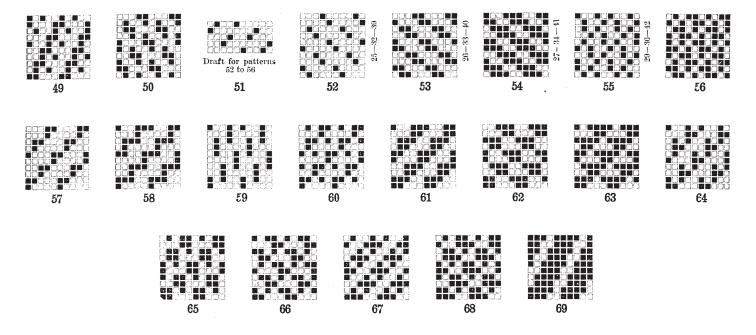
PATTERNS UPON 4 ENDS-twice repeated



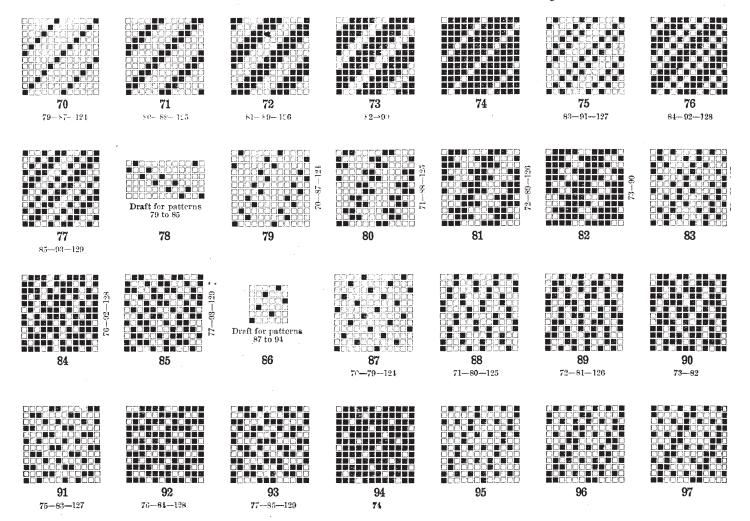
PATTERNS UPON 5 ENDS—twice repeated



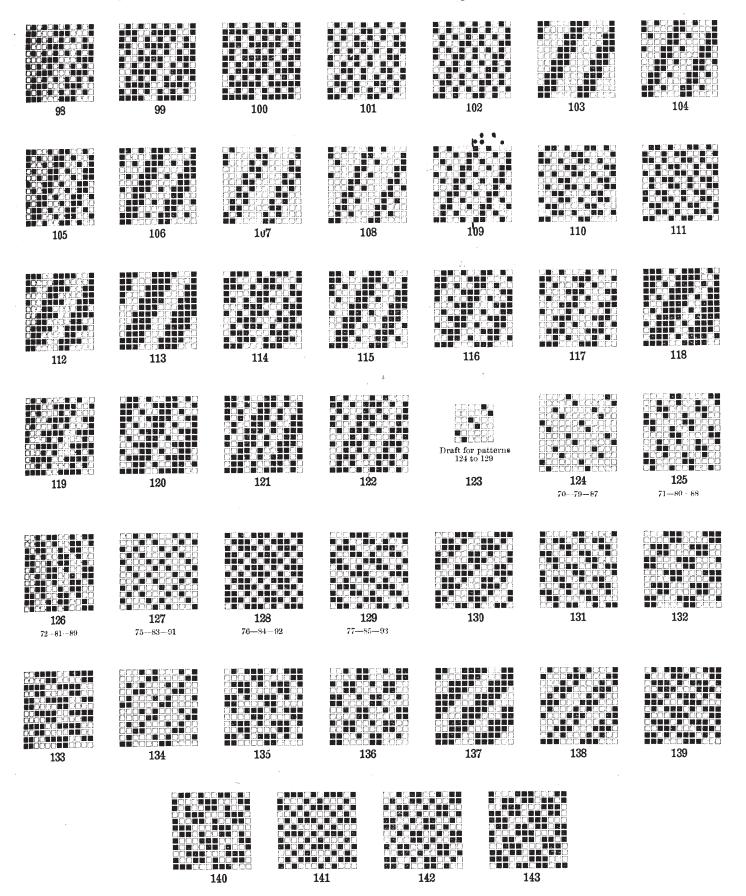
PATTERNS UPON 5 ENDS-twice repeated. - (continued)



PATTERNS UPON 6 ENDS—twice repeated.



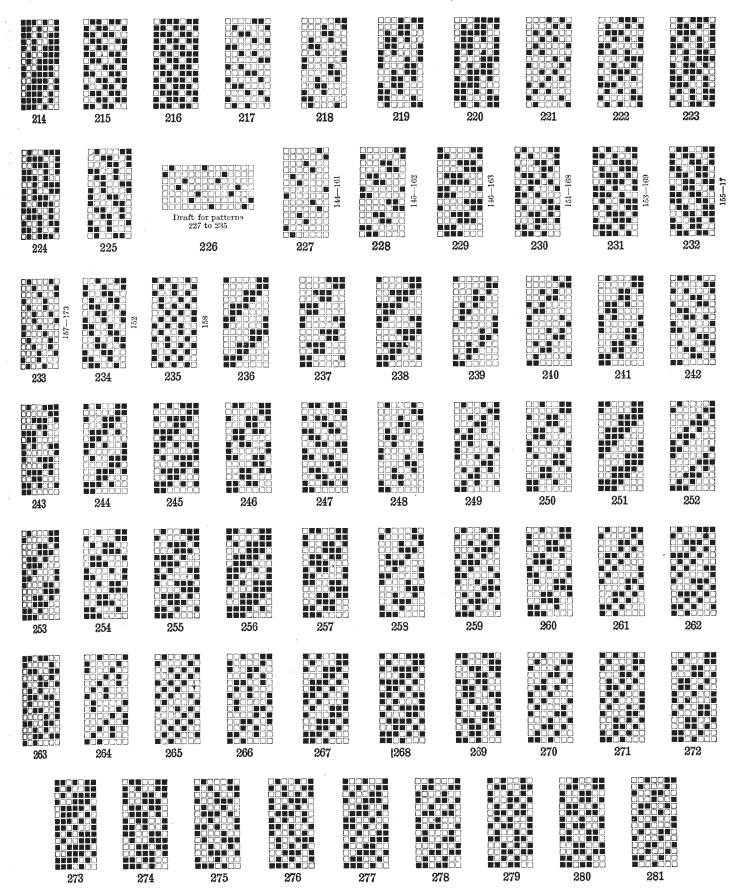
PATTERNS UPON 6 ENDS-twice repeated.-(continued)



PATTERNS UPON 7 ENDS

144 161—227	145 162 –22 \$	146 163—229	147	148 165	149 166	150 167	151 168-230	152 231	153 169 –231
154 170	155 171-2)2	156 172	157 173—233	158 235	159	Draft for patterns 161 to 173	161	162	163
164	165	163	167	163	169	170	887—991 171	172	173
174	175	176	177	178	179	180	181	182	183
184	185	186	187	183	189	190	191	192	193
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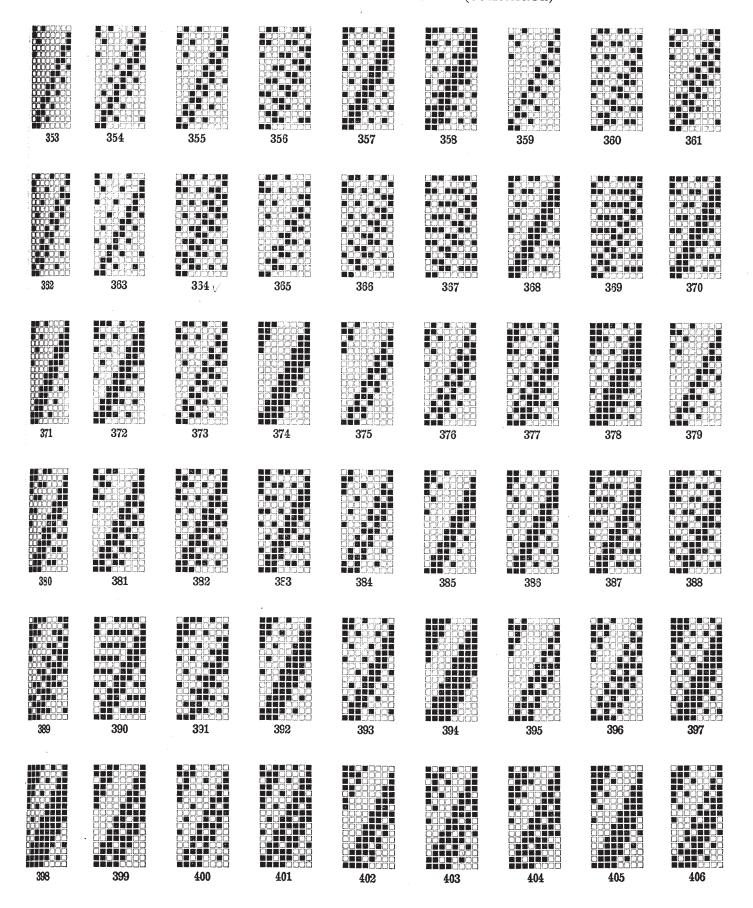
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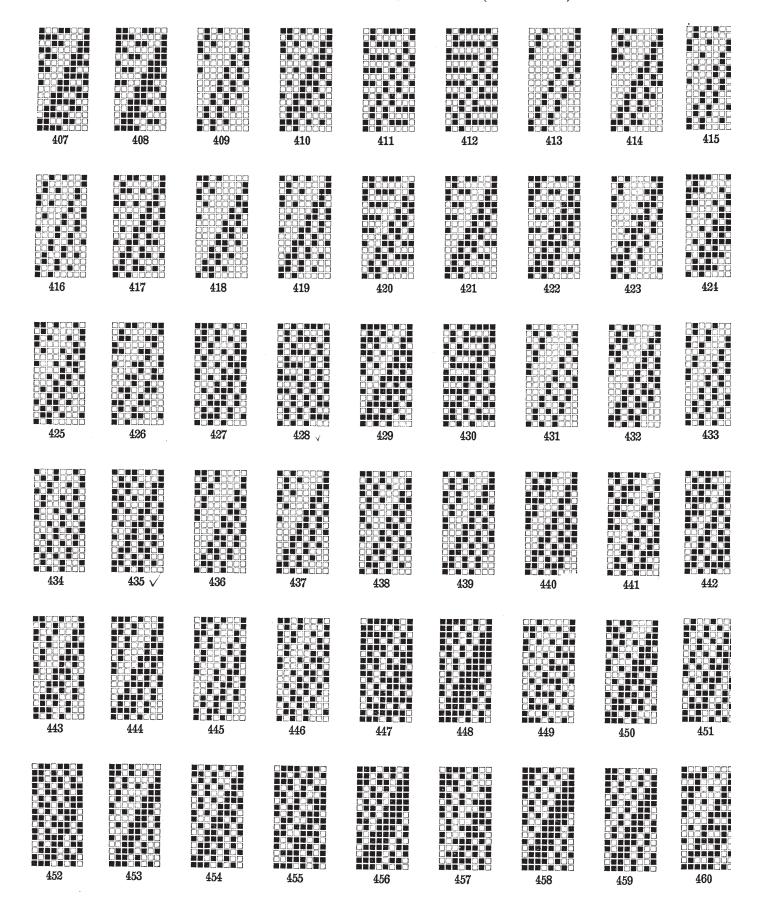


PATTERNS UPON 8 ENDS

282	233	284	285	236	287	238	289-	290
307—326—530	308-327531	3/9-325-532	310—329—533	311—330	312 -331	32 1332	313-333-534	311-334-535
291	232	293	291	295	293	297	298	299
315—335—536	336 -537	316-337-533	317—338—53)	318—339—540	340—541	319-341-512	321-342-543	322~343~545
300 345544	301 323—316—516	302 347—547	303 321–348–548	304	305 314	306 Draft for patterns .	307 282–326–530	308 283-327-531
309	310	311	312	313	314	315	316	317
	285—329—533	286 – 33)	267—311	289-333-534	290—334—535	291335536	293—337—533	204—338—539
318	319	320	321	322	323	324		325
295—339—540	297—341—542	288-332	298-34:-513	299-343-545	301-316-516	303-348-548		tterns 326 to 348
326	180 908 587 327	785.—605.—188 328	329	330	331	332	182-8E2	\$59-F18-067
335	333	337	338	339	310	341	342	343
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19



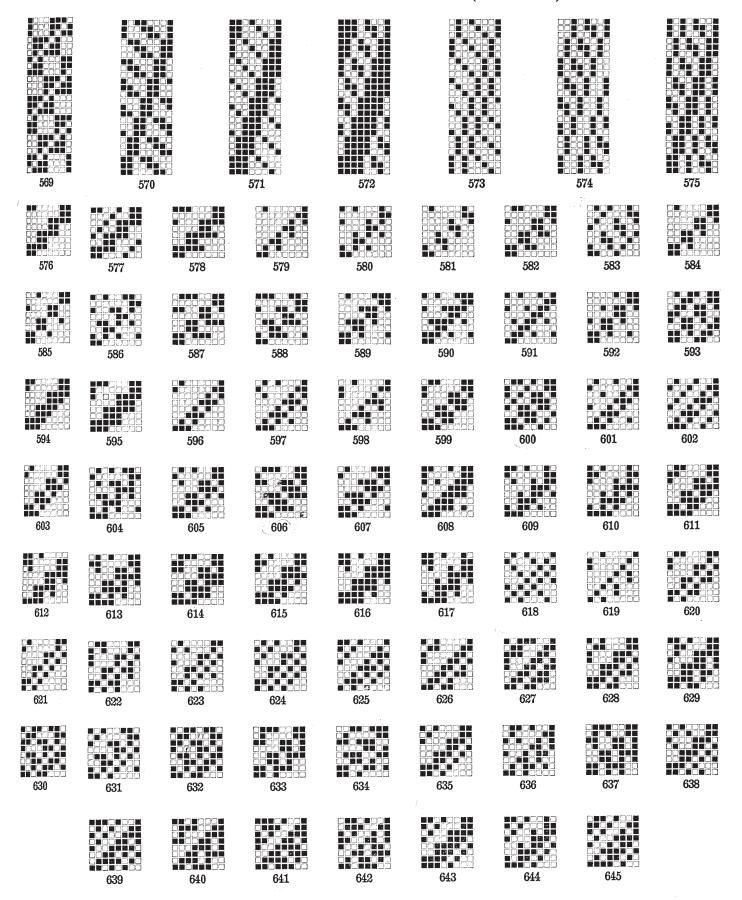


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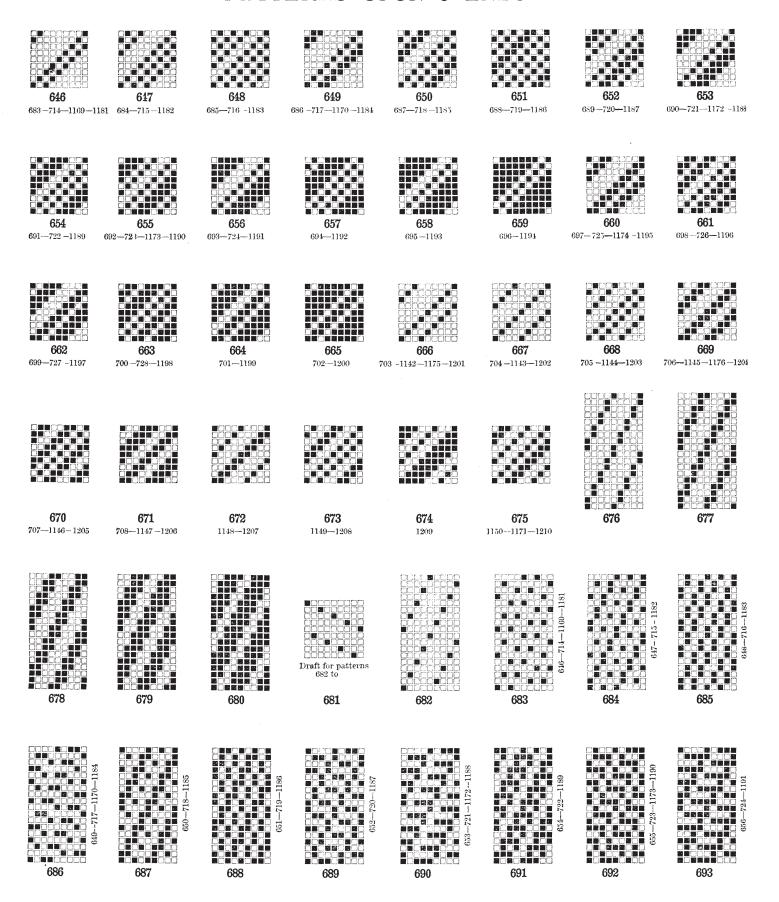
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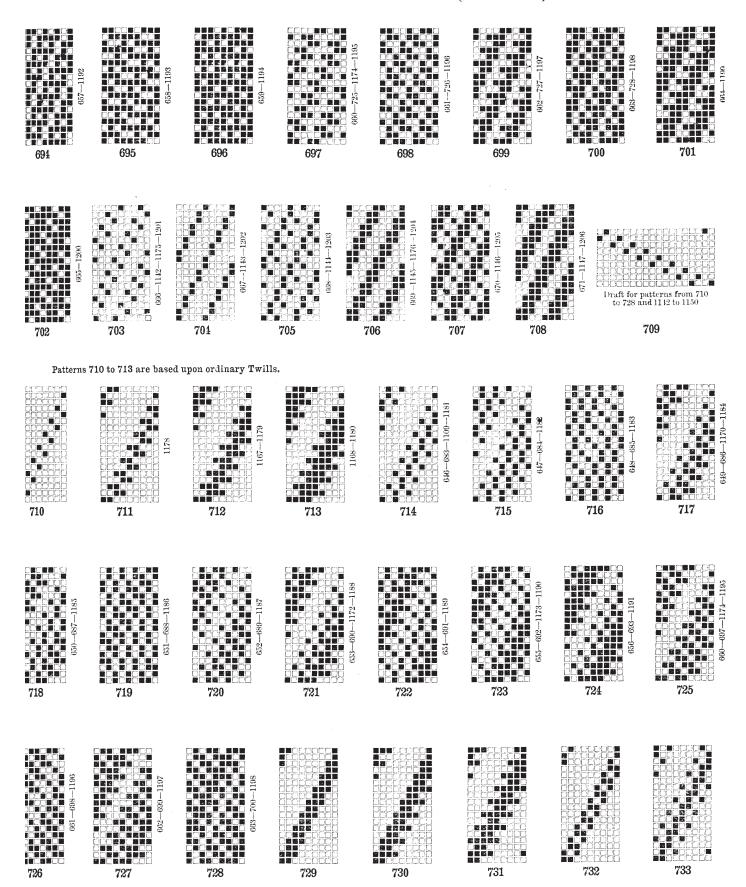
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533 285—310—329	534 289-313-333	535 290-314-334	536 291—315—335	537 202—336	538 293—316—337	539 294—317—338	540 295—318—339	541 296—340
542 297—319—341	513 298-321-342	544 300—345	545 290—322—343	546 301–323–346	547 302—347	548 303–324–348	549	550
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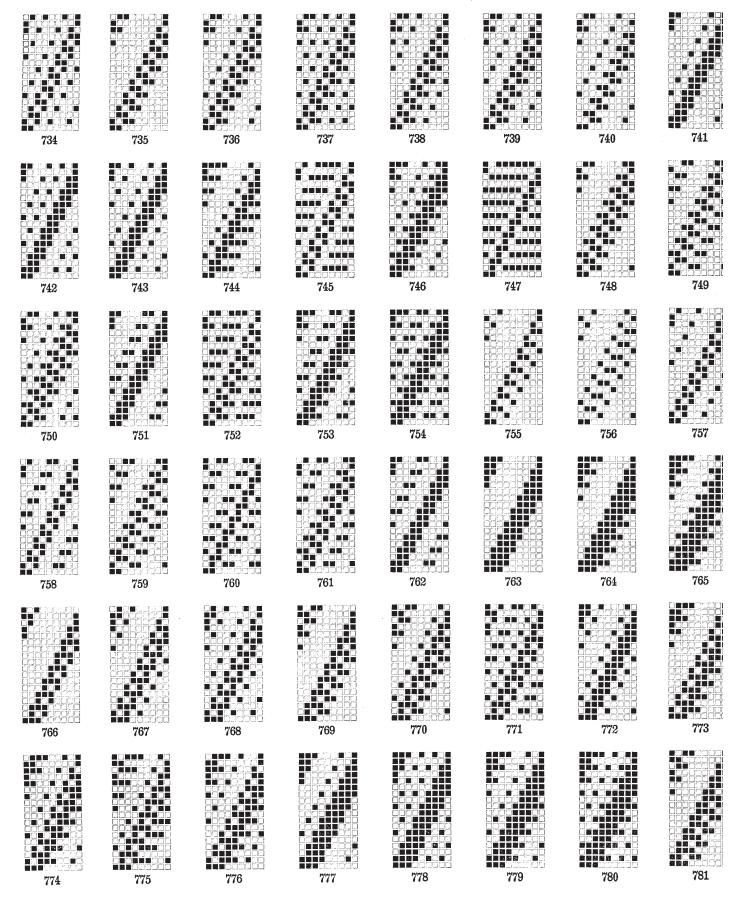
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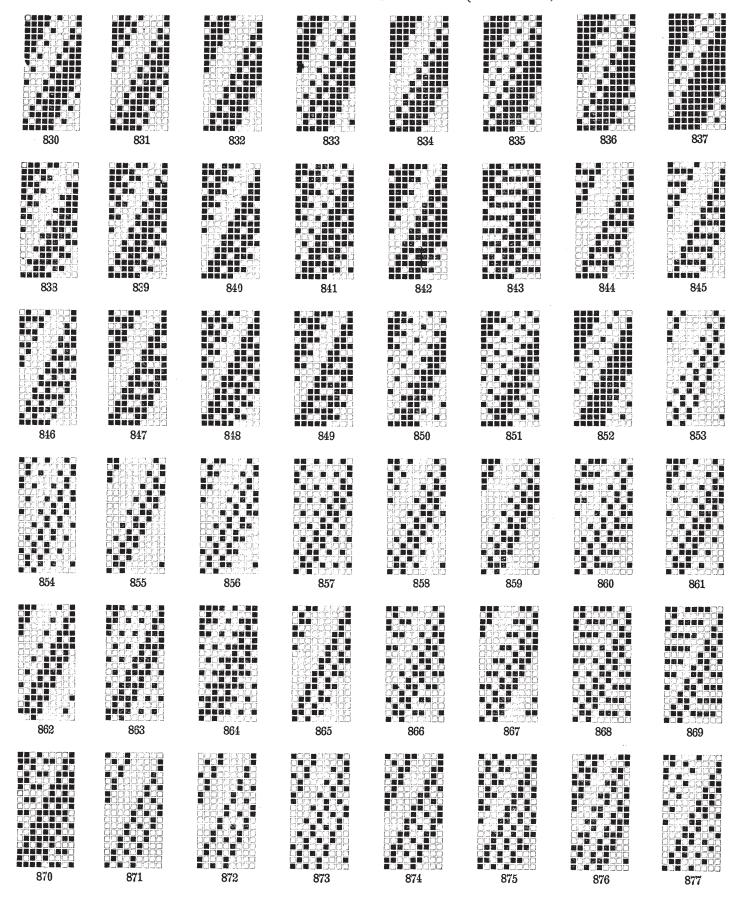
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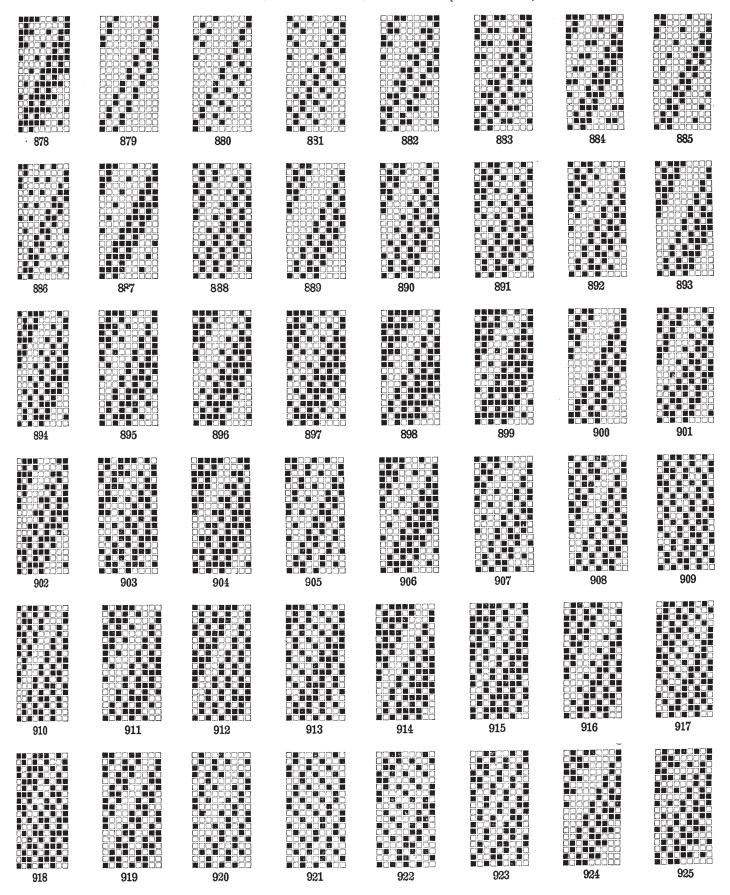






782	783	784	785	786	787	788	789
790	791	792	793	794	795	796	797
798		800		802	803	804	805
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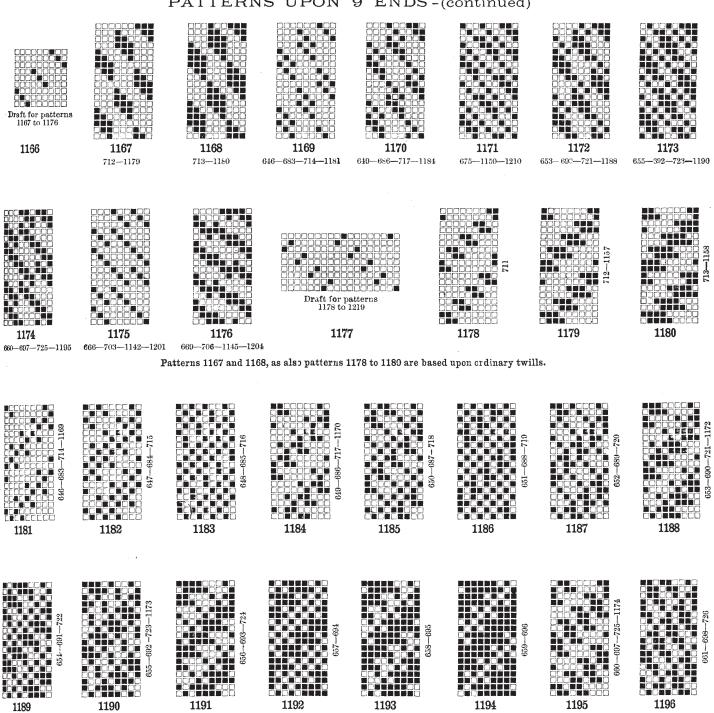
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950		952	953	954	955	956	957
958	959	960	961	962	963	964	965
966	967	968	969	970	971	972	973

974	975	976	977	978	979	980	981
982	983	984	985	986	987	988	989
990	991	992	993	994	995	996	997
998	999	1000	1001	1002	1003	1004	1005
1006	1007	1008	1009	1010	1011	1012	1013
1014	1015	1016	1017	1018	1019	1020	1021

1022	1023	1024	1025	1026	1027	1023	1029
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1038	1039	1040	1041	1042	1043	1044	1045
1046	1047	1048	1049	1050	1051	1052	1053
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1086	1087		1089	1090	1091	1092	1093
1094	1095	1096	1097	1098	1099	1100	1101
1102	1103	1104		1106	1107	1108	1109
1110		1112			1115	1116	1117

1118	1119	1120	1121	1122	1123	1124	1125
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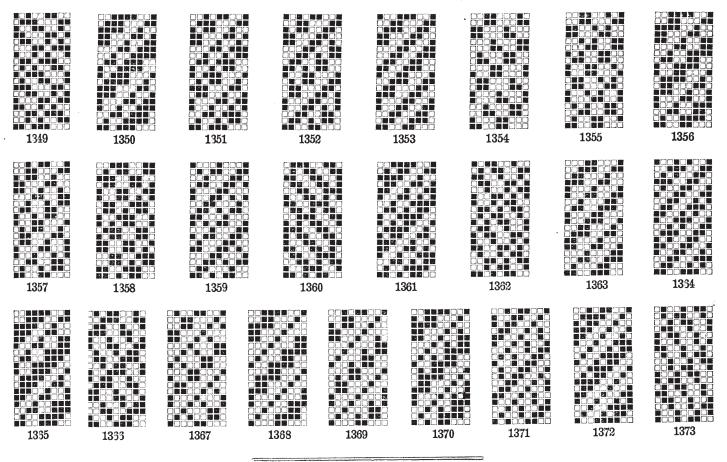


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1253	1254	1255	1256	1257	1258	1259	1260
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1333	1334	1335	1336	1337	1338	1339	1340
1341		1343				1347	1348



PATTERNS UPON 10 ENDS

