April 27, 1937. L. R. TREINIS 2,078,646

KNITTING MACHINE DESIGN GUIDE

Filed Oct. 11, 1929 2 Sheets-Sheet 1

Fig. 1.

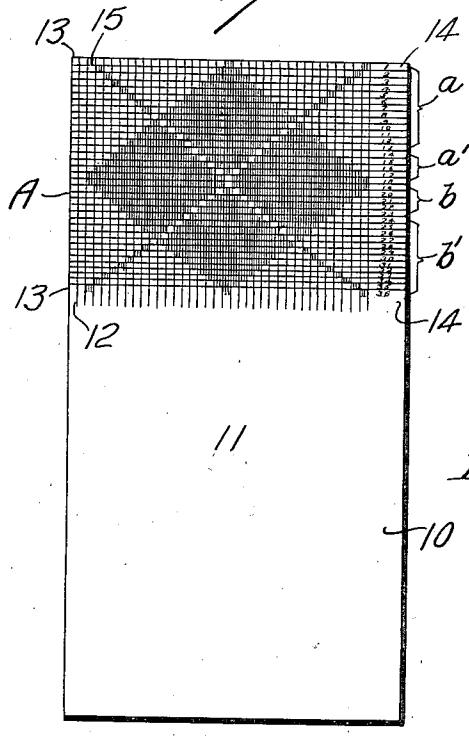
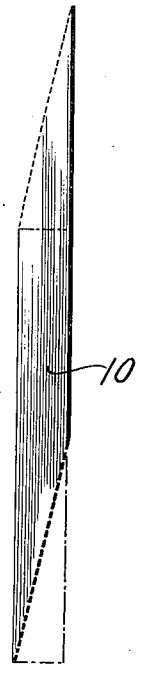


Fig. 2.



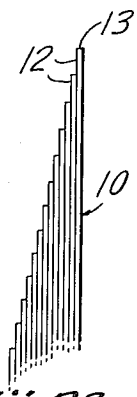


Fig. 2a

Fig. 4

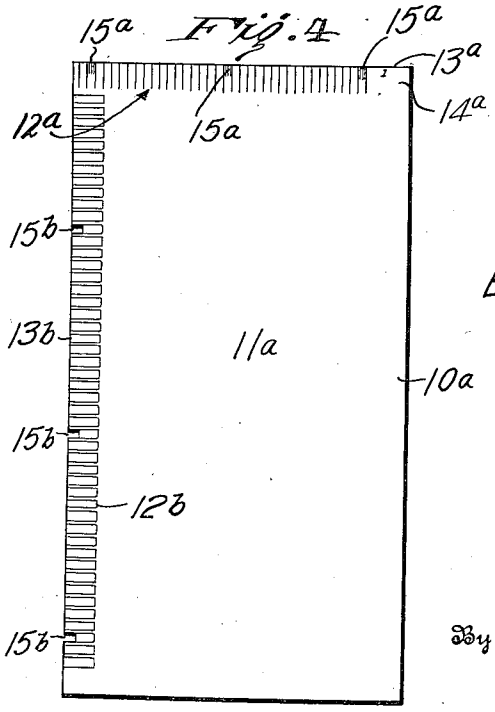
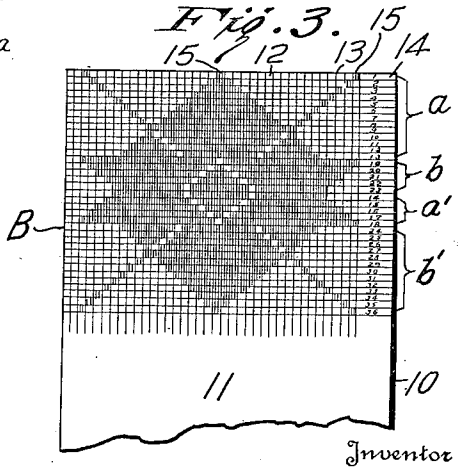


Fig. 3.



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Fig. 5.

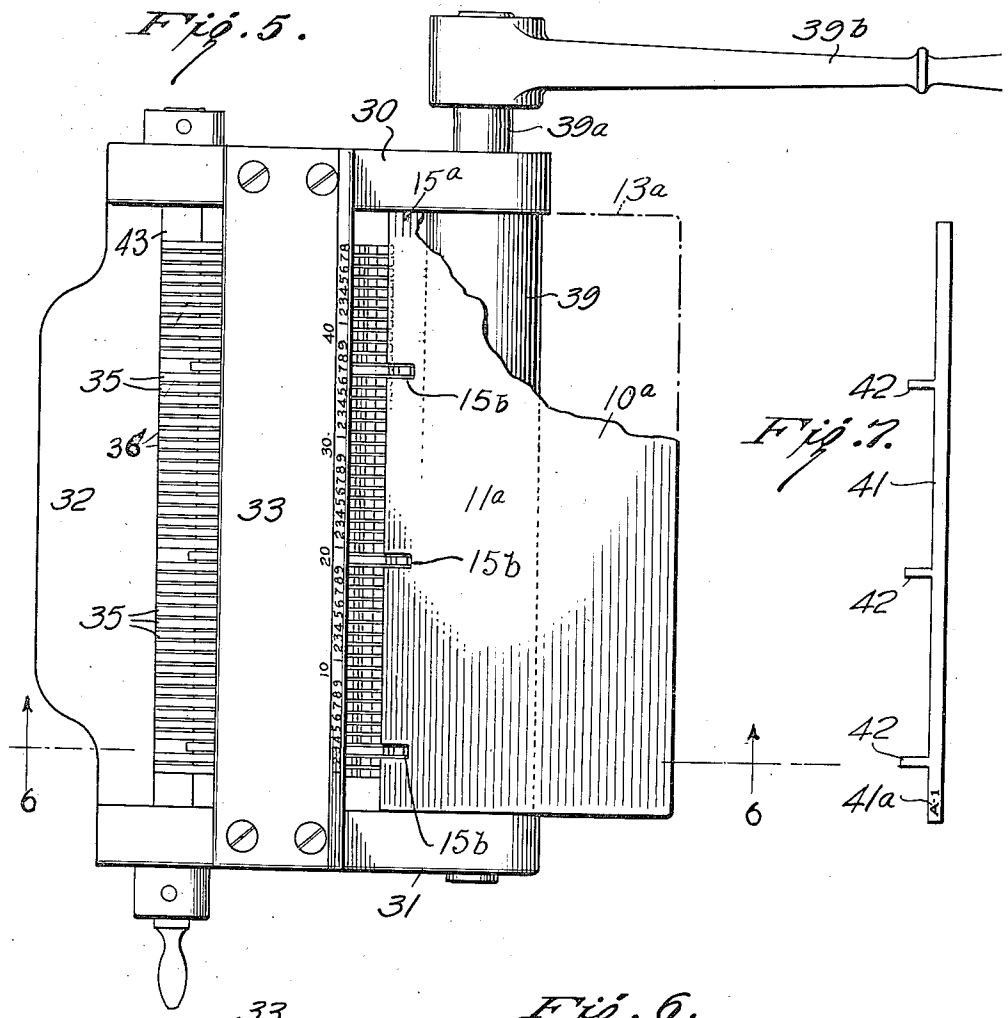
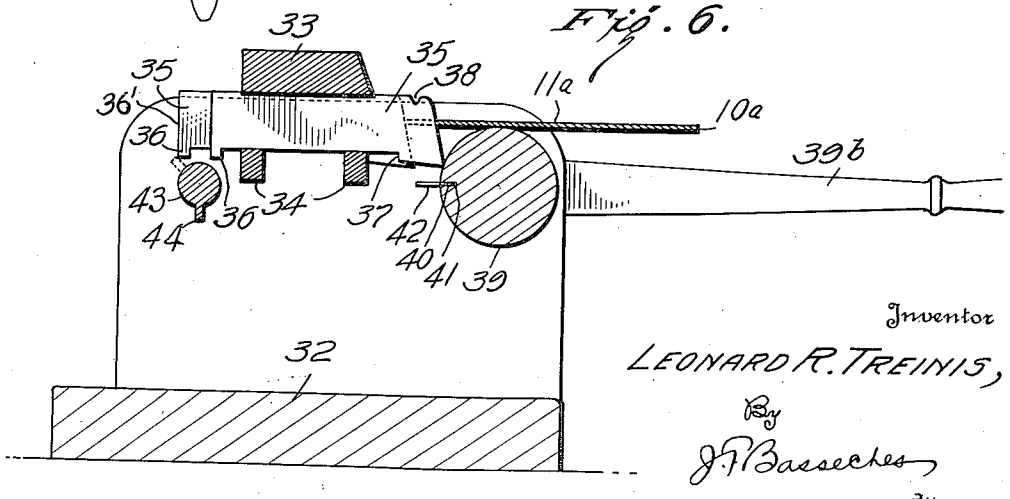


Fig. 7.

Fig. 6.



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2,078,646

KNITTING MACHINE DESIGN GUIDE

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Application October 11, 1929, Serial No. 398,936

9 Claims. (Cl. 35—15)

This invention relates to pattern guides or design cards for use with textile machinery; more particularly, to a pattern guide or design cards for textile operations in connection with knitting machines.

It is an object of my invention to provide a pattern guide or design cards which outline designs or patterns corresponding to some unit to be repeated in ornamental textile fabrics, as by knitting operations, wherein the fabric design is progressively built up by interweaving contrasting colored threads as each course is added to the other, in making up a length of material.

It is contemplated by my invention, in its preferred form, to provide a series of pattern cards and design guides which outline the design in fragmentary form, the fragments corresponding to some group of needles of a Jacquard knitting machine and outlining along predetermined sectors corresponding to the courses of the knitting machine, the color change which will constitute the completed unit of design. Thus, in accordance with the preferred form of my invention wherein patterns or designs are normally arranged upon so-called graph paper, to indicate to the operator of the Jacquard machines the color changes of the thread as each course is built up, the pattern or design is outlined in fragmentary form upon a series of cards which, together, constitute the pattern or design heretofore outlined upon graph paper, serving on the one hand as a means to readily visualize the completed design, as has been previously done on graph paper, and on the other hand, to permit reallocation of these fragments to assist in the formulation of new designs, due to the relative variation in position of the fragments as they may be changed by the various positioning of the card elements on which they are shown. It is still further contemplated by my invention to provide a series of designs or patterns, outlined in fragmentary form, corresponding to either the horizontals or verticals of graph paper used in formulating designs, to act as a guide for the color change of a textile machine whereby by an interchange of the cards upon which the fragments are mounted, a master design may be changed to create innumerable new designs.

It is still further contemplated by my invention to have the cards upon which fragments of a design are mounted, the series of which serves as a unitary design, utilized as a guide for laying out or arranging the mechanism of the textile machine, such as a knitting machine and the pattern control mechanism thereof, to thereby facilitate and expedite the setting of the machine for fabricating textile material with ornamental patterns.

Still further objects of my invention reside in the provision of a series of cards, which may be arranged to positions corresponding to the verticals or horizontals of graph or section paper utilized by designers for laying out patterns for textile ornamentation, by arranging the cards to expose an edge of a width substantially equal to that of the sections of the graph or section paper and provided with cross lines corresponding to the verticals or horizontals of graph or section paper to thus assemble, in fragmentary form, the equivalent of the graph or section paper, and upon this composite outline some master design, preferably of a geometrical configuration, and after predeterminedly positioning these cards in the series, indiscriminately rearrange the cards to thereby create innumerable designs ordinarily beyond the imagination of the designer.

It is another object of my invention to provide a series of units in the form of cards, corresponding in number to the needles of a single repeat of a Jacquard knitting machine and having at the edge portion of the units or the cards transverse markings whereby the units may be spaced in edge over-lapping position to constitute, with the transverse markings, the equivalent of graph or section paper used for outlining a design and upon the exposed edge of the cards so spaced and provided with transverse markings, illustrate a master design, preferably of some geometrical configuration, which will then serve, on the one hand, as a guide to arrange the machine mechanism for duplicating this design and, on the other hand, permit the interchange of position of the units in some orderly manner or irregular manner, to thereby create designs which will permit the machine mechanism to be reused without incurring any additional expense in providing the parts necessary for the textile machine to reproduce the newly created pattern or design.

Other objects of my invention reside in the provision of design cards, particularly useful for textile workers, which will, upon the outlining of an original design, permit the ready creation of other new and original designs without resort to the artistic, creative power of the designer but by accidental or predetermined rearrangement of fragmentary portions of the design, in relation to each other.

To attain these objects and such further objects as may appear herein or be hereinafter pointed

out, I make reference to the accompanying drawings forming a part hereof, in which—

Figure 1 is a plan view of a series of cards embodying one form of my invention;

Figure 2 is an end elevation thereof; Figure 2a is a fragmentary enlargement of Figure 2;

Figure 3 is a fragmentary plan view of the cards shown in Figure 1 rearranged to illustrate another design;

Figure 4 is a plan view of a unit of the series of cards embodying another form of my invention;

Figure 5 is a fragmentary plan view showing my invention as applied as a guide for a butt cutting mechanism for a Jacquard knitting machine;

Figure 6 is a section taken on the line 6—6 of Figure 5;

Figure 7 is a plan view of a butt element cut by the mechanism shown in Figures 5 and 6.

Making reference to the drawings, in its simplest form, I provide a series of cards 10, in number, as will appear more clearly as this description proceeds, depending upon the application of my device to the particular field, such as the textile field and such branches of the textile field utilizing knitting machines or the like. In the embodiment illustrated, thirty six cards are provided, on one face whereof 11 there are provided transverse lines 12, equi-distantly arranged and extending to the edge 13 of each card. This face also includes a portion 14 which is devoted to indicia outlining the number of the card in the series. In the form illustrated, where I utilize thirty six cards, the space 14 on each of the cards has indicia affixed thereto to identify the number of the card in the series. Ordinarily the cards are of equal size, as shown more clearly by the outline in Figure 2.

For purposes of reference, in my preferred form, the cards are stacked diagonally, to have the edges 13 of one card successively hide the card immediately below and expose only a portion or strip 15. It is preferred that this strip 15 so exposed be equal in width to the transverse or vertical section lines 12, previously referred to. It will be observed that in this position the spaces 15 and the lines 12 are in a position to make up the horizontals and verticals corresponding to those of graph or section paper and thereby define a number of sections equal thereto. It is preferred that the section lines 12 be equivalent in number to the number of cards, thereby providing a square unit when the cards are stacked as shown in Figures 1 and 2.

Upon the sectioned area formed by the exposed edges of the cards and the section lines 12, I may outline a master design A, preferably of simple geometric configuration, and this is only so made for purposes of illustrating the present invention. Here the shaded portions which are sectioned to represent colors (and in the present instance the red shading is represented) define a design or pattern, each card, particularly at the space 15 thereof, carrying a fragment of the entire design. The master design A, as now made, may be changed at will by rearranging the cards, not in the order outlined by the indicia in the portion 14, but in irregular arrangement. In Figure 3 I have illustrated a rearrangement of these cards.

For purposes of reference, in Figure 1 the cards identified as 1—13 have been grouped as *a*; cards 14—18 have been identified as *a'*. The next group of cards, numbered from 19—23 have been identified as group *b* and the group numbered from 24—36 have been identified as *b'*. Instead of retaining the original order of the groups as *a*, *a'*, *b*, *b'*, the cards in Figure 3 have been rearranged so that the groups now lie in position as follows:—*a*, *b*, *a'*, *b'*.

When so grouped and the cards have been again stacked in echelon to expose a small portion of the card corresponding to the width of the sections 12, a new design B will be obtained, all from the same elements and fragmentary designs outlined upon the cards illustrated in Figure 1.

Other changes may be made at will and new and original patterns created merely by rearranging the relative position of the series of cards. Any number of groups of cards may be rearranged to get a multitude of new designs and these will have a general symmetrical form if the progressive series be rearranged according to some definite division of the entire number of the cards in the series. Thus, symmetrical cards will be obtained if the cards in the example illustrated, having thirty six elements, be divided up in groups of six or four or three and each group of such cards be rearranged so that the groups of six be alternated to have groups 1, 3 and 5 followed by groups 2, 4 and 6, or the groups of six cards arranged so as to have them appear in the order of 1, 3, 4, 6, 5, 2.

The same may be done with the division of the groups into four cards, nine cards or the like or as in the form illustrated in Figure 3, an unequal alternation of symmetrical portions of the design. The rearrangement is without limitation and when symmetrically arranged, will form a single repeat readily applicable for all manner of textile operations and particularly knitting operations, as will be readily understood by those skilled in the art. Irregular rearrangement of the cards will also form new designs which, in their entirety, may be used as a single repeat for patterns in manufacturing, or which may suggest fragmentary portions which may be utilized, in which event, the remainder of the design may be discarded and the single fragmentary portion repeated in accordance with the nature of the fabric that is manufactured.

In my preferred form, the size of the spaced portions 12 and accordingly, also, the arrangement of the cards in echelon, is such so that when the design is affixed thereon, it will be small enough to blend the various fragments thereon. However, the spacings 12 and the overlap portions of the card may be enlarged to any desired degree to have instead of a 16 or 32 spacing to the inch, a smaller number or a larger number.

The edge of the card 13, carrying the fragmentary design, may be used directly as a guide for cutting out or arranging the mechanism of the textile machine, in accordance with the means employed for weaving, plaiting or otherwise producing the color ornamented fabric with the pattern previously arranged. In this respect, my invention has particular utility with Jacquard knitting machines, particularly the circular type for making fancy hosiery employing diagonal pattern mechanism and one which will produce any stripe, vertical or diagonal, or any figure where reverse plaiting is controlled by a pattern jack upon a patterning drum. The pattern drum includes a number of butts corresponding to the number of needles of the knitting machine bed. These butts control the dial jacks which, in turn, control the sinkers in the sinker head, reversing the yarn. In this form of knitting machine, one revolution of the Jacquard pattern drum corre-

sponds to one knitted course on the cylinder of the needle bed. Machines of this type have been introduced on the market by the Hemphill Company and is particularly applicable to the "Banner" type of Jacquard knitting machine.

In Figure 7, a butt of the character used in connection with the above described knitting machine is illustrated, and Figures 5 and 6 disclose a butt cutting machine. The cards heretofore described, which constitute the essential features of my invention, are particularly applicable as a guide for arranging the cutters of a butt cutting machine so that the tines remaining on the butts correspond substantially to the points on the design paper or on the finished goods representing the colored thread.

The butt cutting machine illustrated in Figures 5 and 6 comprises two spaced end plates **30** and **31**, connected with a base **32**, bridged by guides **33** and **34**, between which are arranged cutters **35** for slidable movement. A rear lug **36** limits the forward movement whereas a front lug **37** limits the backward movement. In the normal position, the cutters are all moved back against the upper guide **33**, until the front lug **37** engages the lower frontal guide **34**. These cutters are arranged in number corresponding to the tines on the butts and in accordance with the present capacity of the machine, these butts may be provided with tines running up to 48 in number, as at present designed.

Though the notches **15***b* as formed in the card **11***a* may serve as guides in arranging the butt cutting machine, to pull out all of the cutters from the normal position except those corresponding to the notches **15***b*, I may automatically arrange the cutters by pressing the card to the reverse end of the cutters adjacent the end **36'**, and pressing all of the cutters from the normal position, which operation will forwardly press all of the cutters except those falling in the notches **15***b*. The illustration as used shows this form of adjusting the cutters reverse to the actual desired position merely for illustration of this latter described method of adjusting the cutters and has been done in order to simplify the illustration.

It has been the practice heretofore to provide each of these cutters at the upper edge with a finger engaging notch **38** and pull the same forwardly, as shown in Figure 6, for positioning the same in close proximity to a butt holding roll **39**, mounted between the end plates **30** and **31**, immediately in front of the cutters. This roller has a slot **40** into which there may be mounted the rear edge **41** of a butt strip, exposing only the tines **42** thereof. The roll **39** is provided at one end **39***a* with an operating lever **39***b* whereby proper turning leverage may be exerted upon the roller **39**. It will be observed that any number of cutters **35** may be drawn out of the normal aligned position and in close proximity to the roller **39**, these cutters being arranged in accordance with the tines to be left remaining to constitute thereby control elements of some colored thread plaiting operation, modifying the operation of the machine for plaiting the threads as each course is knitted upon the machine, as will be readily understood by those skilled in the art. After a proper arrangement of the cutters, the roll **39** is rotated in reference to the cutters **35**, which serve to sever the tines from the butt strip.

In accordance with the practice heretofore adopted, these cutters are arranged from a numerical value derived from a design paper. In accordance with my present invention, each card constitutes a guide for outlining the butt or any number of repeats thereof, in accordance with the number of repeats in the pattern of this card, and instead of resorting to the heretofore laborious process of transferring from design paper the relative position of the cutters, the edge of the card **13**, including the fragmentary design may be affixed in close proximity to the butt cutting machine and thereby quickly and conveniently pull out the desired cutters.

In the device illustrated, a shaft **43**, mounted between the end plates **30** and **31**, carrying a lug **44**, along the length thereof serves to engage the rear lug **36** of any forwardly projecting cutter and when revolved in a counter-clockwise direction, reposition the cutters out of cutting position. Where the cards containing the fragmentary portions of the design or pattern are to be used as guides in connection with the butt cutting machine for a Jacquard knitting machine of the character above described, the relative size of the cards may be such as to correspond substantially to the width of the butt cutting machine. However, in order to retain the blending effect due to small sectional lines, corresponding to cross section paper of sixteen or less to the inch, in another embodiment of my invention the card elements **10***a* have one edge **13***a* of the size heretofore referred to, which will give the blending effect by providing the section lines **12***a* of a number to the inch which will give the blending effect. A transverse edge of the card **13***b* is enlarged to the size corresponding substantially to the general spacings of the cutters of the butt cutting machine, as shown at **12***b*, and along the spacings **12***b* there is affixed the identical fragmentary design as has been affixed upon the edge **13***a* between the section lines **12***a*. The increase in size of the section **12***b* affords a direct guide for the butt cutting machine whereas the diminished section lines at **12***a* are useful when the cards are arranged in echelon, as illustrated in Figures 1, 2 and 3, in that the diminished size more perfectly blends the fragmentary portions into a complete, unitary design.

Though I may mark the portion **12***b* of the edge **13***b* to correspond to the section **12***a* of the edge **13***a*, I may, as an alternative, cut notches **15***b* to indicate the corresponding point marked between the sections **12***a* and the edge **13***a*. While this may also serve as an index, where the cards are made of relatively stiff material, such as sheet metal, celluloid or the like, they may be used directly to push back all but the desired cutters in the butt cutting machine, as more clearly shown in Figures 5 and 6. In this manner, the fragmentary design appearing on one edge of the card not only acts as a guide for arrangement of the cutters or the mechanism of the textile machinery used for duplicating the pattern, but actually serves as a positive template for arranging this mechanism.

Although I have described my invention in connection with a Jacquard knitting machine and illustrated its use by providing as many cards as there may be needles in a single repeat and sections corresponding to the courses of a single repeat, the section lines and cards may be equally utilized, not only to outline the operation of the needles for plaiting as the various courses of the knitting machine are knitted but they may correspondingly be used to arrange the warp and weft of a weaving machine, or the various mechanism for effecting the color change

in any textile machine may be adjusted in accordance with the fragmentary design on the card and the number of cards constituting a single repeat and though I have described and illustrated my pattern guides or design by the number of sections and cards corresponding to either the courses and needles of a knitting machine, or warp and weft of a textile fabric, I consider my invention having broader application where it is desired, from a master design, particularly of geometric configuration, to create innumerable new designs beyond the imagination of the designer, but merely by the rearrangement of the cards from the predetermined sequence, which will outline the designs when they are again arranged in echelon.

In a practical form of my invention, it is contemplated after designating each card by a numeral as shown at the space 14 and 14*a* in the embodiment illustrated in Figures 1 and 4, that a corresponding indicia be affixed upon the butt or butt strip as shown at 41*a*. In this way the butt may be identified by giving it a corresponding number, such as A1 which identifies it with the master design A and card 1 of this series. The same is done for every corresponding butt strip that is cut with the cards as a guide. After these butt strips are arranged upon the pattern drum in the Jacquard knitting machine above referred to, they may be reused by an arrangement in accordance with a new series, without the additional expense of new butt strips. Thus it will be seen that in making butts for the design shown in Figure 1, and termed Master Pattern A, the same butt strips may be arranged to correspond to the order of position of the cards shown in Figure 3, utilizing the very same butt strips as were used to make the pattern illustrated in Figure 1, and also, after rearrangement of the cards to obtain a still further variation of the master design, the corresponding butt strips may be rearranged to immediately, without any further cutting operation, obtain an arrangement of the butts to reproduce this design, merely sorting the butts out and arranging them into the order of the new series.

In this manner not only have I devised a means for creating any number of designs from a master pattern but I also facilitate the adjustment of the mechanism of the textile machinery necessary to reproduce these designs upon some textile fabric and in addition thereto, particularly in connection with a knitting machine of the character referred to, effect a great economy in the elements used for setting into operation the color changing threads of a knitting machine.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent, is—

1. Design or pattern guides for the use described comprising a series of cards adapted to be stacked and arranged in echelon thereby exposing a surface strip portion, a fragment of a design repeat on each of said surface strip portions of said cards, the assembly of which cards is adapted to be arranged to expose the strips on said cards and represent a surface design repeat and the cards being adapted to be re-arranged and with the strips exposed whereby a new design may be created.

2. Design or pattern guides for the use described comprising a series of sheet card elements having design fragments formed upon the respective elements of the series, the ensemble of which fragments constitutes a surface design which when the fragments are continuously arranged as by stacking in echelon represents part of a composite design structure which may fit in continuous arrangement upon a web of fabric as a repeat in an ornamenting process, said fragments of the design impressed upon the respective sheet elements of the series including complete transverse subdivisions of said design repeat on each of said elements, the elements of the series being adapted to be re-arranged whereby new design repeats may be created.

3. Design or pattern guides for the use described comprising a series of sheet elements having design fragments upon the respective elements of the series each sheet element having indicia impressed thereon, whereby the sheet elements may be stacked in desired progression, the ensemble of which fragments constitutes a surface design which when the fragments are continuously arranged as by stacking in echelon represents part of a composite design structure which may fit in continuous arrangement upon a web of fabric as a repeat in an ornamenting process, said fragments of the design impressed upon the respective sheet elements of the series including complete transverse subdivisions of said design repeat on each of said elements, the elements of the series being adapted to be rearranged whereby new design repeats may be created.

4. Design or pattern guides for the use described, comprising a series of sheet card elements corresponding to design control elements of a knitting machine, said card elements having design fragments thereon, the ensemble of which fragments of the series of card elements represents a surface design repeat, the elements including a substantially full transverse fragment of the design repeat printed upon each of the elements of the series, the elements of the series being adapted to be used as guides for arranging the design control elements of the knitting machines.

5. Design or pattern guides for the use described, comprising a series of cards in number substantially equivalent to the needles of a single repeat of a knitting operation and having along an edge of each card lines impressed on said card defining sectional portions corresponding to the respective courses which are knitted into a single repeat, the cards including along said sectional portions transverse fragmental portions of a surface design distributed over the respective cards of the series, the ensemble of which fragmental portions on said series of cards represents a single repeat of a design, said cards being adapted to be rearranged whereby to compose a different design.

6. Design or pattern guides for the use described, comprising a series of cards adapted to be stacked in echelon, in number substantially equivalent to the needles of a single repeat of a knitting operation and having along an edge of each respective card markings outlining sectional portions corresponding to the courses which are knitted into a single repeat, the respective cards including along said sectional portions, fragmental portions of a design, the ensemble of which portions on said strips represents a single repeat of a design, said cards of the series each including an indicium identifying the order of the cards in the series whereby they may be stacked in desired progression, whereby correspondingly provided parts of a design controlling mechanism of a machine arranged to

reproduce a similar design, and which parts are similarly identified may be arranged in corresponding progression, the cards thus grouped being adapted to be rearranged in echelon whereby a new design may be assembled.

7. Design or pattern guides for use in connection with a machine capable of producing fabrics with designs thereon, said machine including as part of a fabricating assembly a plurality of control elements, said guides comprising a series of cards in number substantially equivalent to the element of a single repeat of the transverse element of a textile fabric, indicia on said cards to identify them with a transverse design control element of said fabric-forming machine, whereby the cards may be arranged in a desired progression, the respective cards including along edges thereof fragmental portions of a design along a transverse section of said design, said portions being spaced substantially to correspond to the spacing of the respective transverse design control elements of the fabric forming machine, the cards being adapted to be stacked and arranged in echelon to expose an assembled design repeat and whereby the cards may then be rearranged in different order of progression, to represent a new design, the indicia serving to identify the design control elements, whereby they may be rearranged to fabricate a fabric having a design corresponding to the new arrangement of cards.

8. The new article of manufacture comprising a design control element constituting a design control guide for the design operating mechanism and associated elements of a knitting machine, each element including a portion thereof marked with an indicium corresponding to an indicium formed on a series of cards adapted to be stacked, each of which of said cards of said series includes on an edge thereof, a full transverse section of a design, the series of the respective cards constituting a composite design when stacked in echelon, the respective sections being arranged in position corresponding to the design control elements of the knitting machine, whereby upon rearrangement of the cards, a new surface design repeats may be created in the assembled cards from the transverse section of a design carried thereby and the design control elements may be correspondingly rearranged as indicated by the indicia on the cards of the series to have the design operating mechanism and associated elements of the knitting machine arranged to produce the new surface design repeat on the fabric produced by said knitting machine.

9. The new article of manufacture comprising a series of design control butts constituting design control guides for dial jacks of a knitting machine for forming a design repeat, each butt of the series including a portion thereof marked with an indicium corresponding to an indicium formed on a series of design or pattern guides set forth in claim 3, whereby upon rearrangement of said series of butts in the knitting machine assembly, the new design repeat may be incorporated in the fabric produced by the knitting machine.

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