No. 885,407. PATENTED APR. 21. 1908.

C. VORWERK.

PATTERN FOR JACQUARD WEAVING.

APPLICATION FILED OCT. 3, 1903.

Fig. 1.

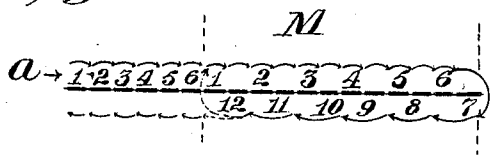


Fig. 2.

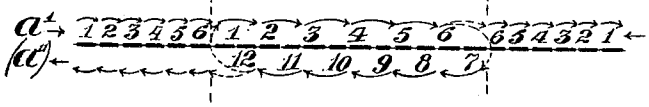
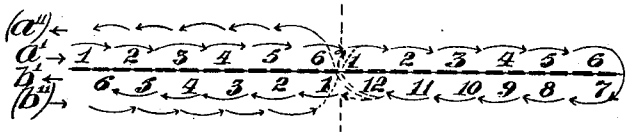


Fig. 3.



Attest:
Com Schell
A. L. O'Brien

Inventor:
CARL VORWERK
by Dickerson, Brown, Raegener & Bunn
Attys.

THE NORRIS PETERS CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CARL VORWERK, OF BARMEN, GERMANY.

PATTERN FOR JACQUARD-WEAVING.

No. 885,407. Specification of Letters Patent. Patented April 21, 1908.

Application filed October 3, 1903. Serial No. 175,547.

To all whom it may concern:

Be it known that I, CARL VORWERK, a subject of the Emperor of Germany, and resident of Barmen, in the Rhine Province, Prussia, Germany, have invented certain new and useful Improvements in Patterns for Jacquard-Weaving, of which the following is a specification, accompanied by drawings.

My invention relates to jacquard-weaving and to dobby-weaving, particularly to a pattern-chain or strip enabling cross-divisions of patterns even in the cases of unequal lengths to be repeated in the fabric as many times as desired, with an ordinary jacquard or ordinary dobby-machine in a continuous course without necessitating specific cards for the repeats.

If paper cards are used my invention involves moreover the great advantage that these can be rolled and unrolled by means of two rollers, instead of being folded, and this advantage can be utilized even in all other cases of employing paper cards.

Referring to the accompanying drawings, Figures 1 to 3 illustrate by diagrammatical side-views the nature of the most important cases of card-arrangements and operations according to my present invention.

Formerly in weaving patterns with a body part and cross-border or borders, or with any other cross-divisions, as usual with carpets, rugs, blankets or coverlets, curtains, lace-curtains, table-covers, table-cloths, towels, bath-cloths, shawls, neck-cloths, robes, and the like, with ordinary jacquard or ordinary dobby-machines it was necessary to provide cards for the whole length of the complete pattern in order to afford provision for a continuous working through. In most cases, however, the body part or other cross-division of the pattern is to be repeated in the fabric so many times, or the cross-division to be repeated requires so many cards, that it proved less expensive to provide no full set of cards but only the fewest possible number of cards for each cross-division and to form separate chains thereof and operate each as long as required, though this proceeding involves the necessity of stopping the loom and climbing up it every time a card chain is to be changed. In order to obviate these troubles and the great loss of time caused thereby special compound or cross-border jacquard and dobbies have been constructed, but these are rather expensive and do not work satisfactorily, and in many cases they cannot be used at all.

In cases the cross-divisions of the pattern, or two different patterns, being of the same length, the cards can be alternately disposed, that is to say, interchanged one by one in regular succession, so that either pattern or cross-division can be woven as many times as required while in either case skipping the cards for the respective other pattern or cross-division. This method does not require a special construction of the jacquard or of the dobby; the cases, however, in which this method can be used are very infrequent. In the great majority of the cases the body pattern requires more cards than the cross-border or one of the cross-borders.

My present invention enables particularly patterns of this kind to be woven also with simple jacquards or simple dobbies in a continuous course simply by means of a special disposition and corresponding operation of the cards; the cards for the first half of a pattern or division having alternated between them in reverse order the cards for the second half of such pattern or division. In operating the loom with such a pattern chain, for weaving the first half of the pattern or division, the cards are fed forward by twos, so that only the cards for the first half of the series control the weaving; when the last card of the first half has acted, the chain is fed onward one space only so as to bring the first card of the second half of the series into operative position; after which the cards are fed backward by twos so that only the cards of the first half of the series effect the weaving, until the last card of such second half has operated; after which the chain is fed backward one step only so as to bring the first card of the first series into operative position again; after which the cards are fed forward by groups of twos, as before, repeating the cycle of operations as many times as is required. To such a chain of cards I may add another chain for weaving another pattern, such for example as cards for a border which is to be woven at the beginning, and then repeated in reverse order at the end. In such case the cards for the border are first fed forward one by one until the border is woven and the first card for the main pattern is reached. The cards for the main pattern are then fed forward in the manner previously described, this part of the chain being fed forward and

backward as described, as many times as there are repeats of the pattern in the strip to be woven; and after the last repeat has been woven, the cards are fed backward so as to bring the last card of the border into operative position and after such card has operated the cards are fed backward one by one until the border has been woven.

Referring for example to Fig. 1, there are six cards *a* for a cross-border, and twelve cards M for a body; the former are disposed in regular succession, whereas the latter are so disposed that card 12 is adjacent to card 1, card 11 adjacent to card 2, and so on, that is to say, the cards for the second half of the body are interchanged with the cards for the first half of the body in opposite succession.

In order to better illustrate the interchangement, I have not placed the numerals for the cards for the second half of the body in alinement with the others, but below the lines representing the cards. Now, it will be readily understood by regarding the directions of the arrows, that after the border having been woven by feeding the card-chain one by one cards from 1 to 6, the body cards can be continuously operated as many times as desired, by feeding the card-chain two by two cards from 1 to 6, skipping thus the intervening cards, then working card 7 and backward two by two cards to card 12, skipping thus the intervening cards, then proceeding to card 1 to begin the next repeat. Consequently the direction of the revolution of the card cylinder is to be reversed each time the end of the card chain (that is the middle of the respective pattern or cross-division) is reached, and again before beginning a further repeat. After the body cards have thus been operated as many times as required, the border cards are operated backward one by one, that is, according to said Fig. 1, from 6 to 1. Of course, the reversed operating of the cards for the second half of the pattern or cross-division will not effect a reverse of this half in the fabric, for said cards are, as set forth, reversely disposed, that is to say, in opposite succession to the cards for the first half of the pattern or division.

In many cases it is very convenient to be enabled to end the body part of the fabric not only with the end of a repeat of the pattern but at will also midway such a repeat. To this end it is necessary to provide also cards for the repeat of the border, that is for the end-border, in regular order, but opposite to the order of the cards for the first border, as illustrated by Fig. 2. The dotted arrow from card 6 of M to card 7, and the dotted arrow from this same card 6 to card 6 of *a''* show that the operation of the cards can be changed after and from card 6 of M (that is from the middle of the body pattern) not only to card 7 of M but also to card 6 of *a''*, that is to the end-border. Of course, if desired, the end-border cards can have another pattern also instead of the reverse of the first border, so that two entirely different borders can be woven. This case, however, permits the ending of the body-part of the fabric only midway of the body design.

If it is desired that two different borders be woven, the body, however, to be ended with the end of a repeat, the cards for the second border pattern are so to be disposed that they are revertibly interchanged with the cards for the first border, as illustrated by Fig. 3. There are six cards for a border *a'* and, interchanged with them one by one, six cards for a border *b'* in opposite order, and then twelve cards for a body M, the second six cards of which are interchanged with the first six cards thereof one by one but in opposite order, just as in the preceding cases. Now, by regarding the arrows, it will be readily understood that this disposition enables the following three combinations to be woven:

a', M (any number of repeats), *a''*
a', M (" " " "), *b'*
b'', M (" " " "), *b'*

skipping in these cases the cards *b'* while operating the intervening cards *a'*, and vice-versa, and skipping cards 12 to 7 of M while operating the intervening cards 1 to 6, and vice-versa.

The changing from one pattern or cross-division to the other can be effected by self or automatically acting devices. For fabrics necessitating two or more cards per card-line of the design, the cards are interchanged by groups of two or more, instead of one by one.

Of course, I do not wish to be limited to the cases of combinations set forth, but

What I claim is:

1. A pattern chain for Jacquard looms, comprising a series of cards for a single pattern or division thereof, the cards of the second half of such series alternated in reverse order between the cards for the first half of such series.

2. A pattern chain for Jacquard looms, comprising two series of cards, the cards of each series connected and the two series connected, the cards for the second half of one of said series alternated in reverse order between the cards for the first half of such series.

3. A pattern chain for Jacquard looms, comprising three series of cards, the cards of each series connected and the three series connected, the cards for the second half of one of said series alternated in reverse order between the cards for the first half of said series, such series having secured to one of its ends one of the other series and having secured to its other end the third series, the cards of

said second and third series arranged in opposite order relatively to each other.

4. A pattern chain for Jacquard looms, comprising three series of cards, the cards of each series connected and the three series connected, the cards for the second half of one of said series alternated in reverse order between the cards of the first half of such series, the other two series of cards corresponding to the same pattern and having their cards arranged in opposite order, one of such series connected to one end of the first mentioned series, and the third of such series connected to the opposite end of such first mentioned series.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CARL VORWERK.

Witnesses:
OTTO KÖNIG,
J. A. RITTERSHAUS.