J. F. WICKS.

PATTERN-CHAINS FOR LOOMS.

No. 169,608. Patented Nov. 2. 1875.

Fig. 1.

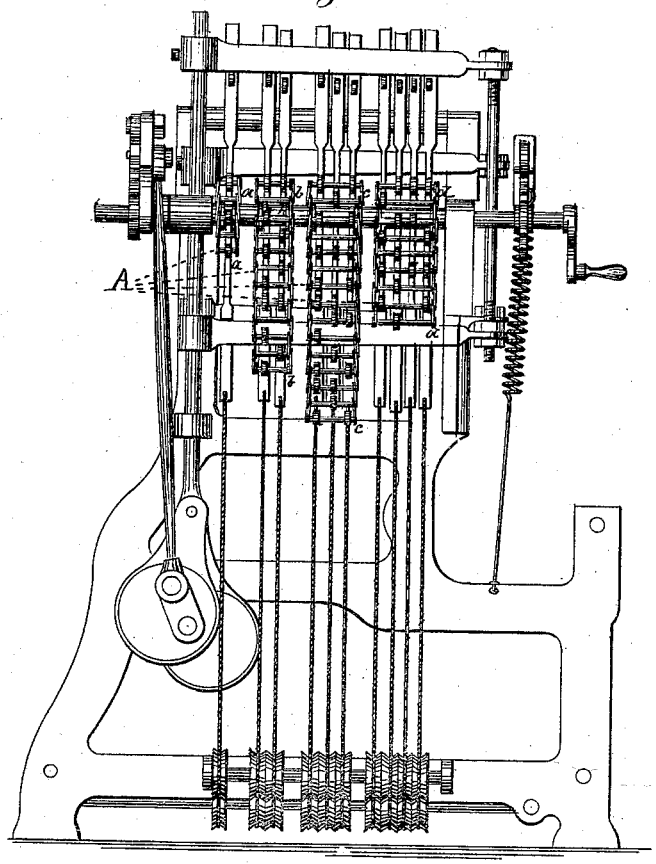


Fig. 2.

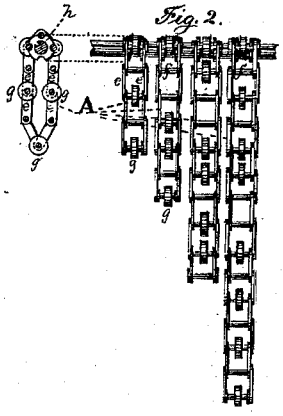


Fig. 3.

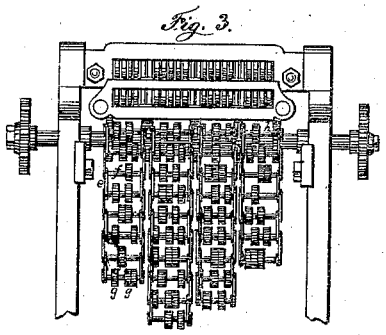


Fig. 4.

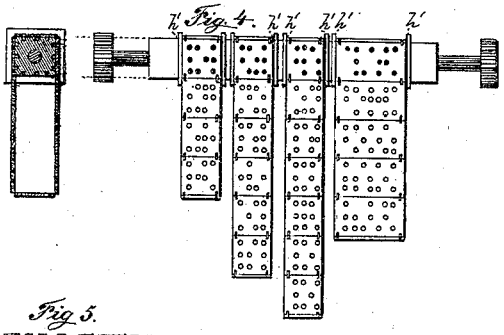
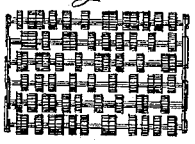


Fig. 5.



WITNESSES:

Herm. Lauten

Philip F. Lagner

INVENTOR:

Joseph F. Wicks,

By Wm. C. Wood

Attorney.

UNITED STATES PATENT OFFICE.

JOSEPH F. WICKS, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF PART OF HIS RIGHT TO EDWARD P. CHAPIN, OF SAME PLACE.

IMPROVEMENT IN PATTERN-CHAINS FOR LOOMS.

Specification forming part of Letters Patent No. **169,608**, dated November 2, 1875; application filed February 24, 1875.

To all whom it may concern:

Be it known that I, JOSEPH F. WICKS, of the city and county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Pattern-Chains for Looms; and I do hereby declare that the following specification, taken in connection with the drawings furnished, and forming a part of the same, is a clear, true, and complete description of my invention and several embodiments thereof.

It is well known to weavers of fancy goods that a harness-controlling chain, as heretofore constructed and operated on fancy looms, when made up for producing any pattern composed of several distinct figures consecutively repeated, must of necessity have one bar of the chain which is the beginning and the ending of a series of perfect patterns.

To illustrate, I will assume that a sixteen-heddle loom is expected to produce a pattern of three figures; that one of these figures required four harnesses and nine bars of chain; another five harnesses and eleven bars of chain; and the last figure seven harnesses and seven bars of chain; and that all the figures were commenced on the first bar of the chain. Under these circumstances the chain would of necessity be at least six hundred and ninety-three bars long—that is to say, before the initial bar of the chain could be also the terminal bar, and so permit it to be an endless chain, the nine-bar figure must be repeated seventy-seven times, the eleven-bar figure sixty-three times, and the seven-bar figure ninety-nine times.

I seek by my present invention the production of patterns, whether simple or complex in their styles, by the employment of the least possible number of chain-bars, and, as an instance of what may be effected thereby, I will state that, instead of using six hundred and ninety-three bars of chain, heretofore necessary for working a pattern like that already described, I can produce the same pattern by using but twenty-seven bars. It will be seen that this great difference in the number of bars employed for producing the same result practically involves a saving, approximately represented by the difference in time requisite for building up a chain of six hundred and ninety-three bars and the time required for building up a chain of but twenty seven bars. In addition to this advantage it will also be seen that, if a pattern were too complex for its production heretofore on an ordinary fancy loom, by reason of the great length of chain required for the purpose, through my invention it could be readily produced, as only a small number of bars may be made to perform the same service heretofore performed by a much larger number of bars.

My invention consists in the combination of a harness-controlling chain, constructed in independent longitudinal sections, with a chain shaft or cylinder, which is provided with engaging surfaces for rotating all the sections simultaneously with the cylinder, and with guides which confine each section to its proper space on the cylinder.

But more particularly to describe my invention I will refer to the drawings, in which Figure 1 represents in end view a loom provided with my harness-chain and cylinder. Figs. 2, 3, and 4 represent different styles of harness-chains mounted on chain-cylinders. Fig. 5 represents a chain, as formerly constructed, for operating as in Fig. 3.

The loom shown in Fig. 1 belongs to a well-known class of looms, which are largely employed in weaving fancy cassimeres, and which are frequently operated with as many as twenty heddles, and sometimes a greater number. Ten heddles are shown therein in this instance.

A denotes the harness-chain. It is composed of four sections. Sections *a b c d* control, respectively, one, two, three, and four harnesses each. Each section has its particular part to perform in producing the fabric, and they are shown to have ten, twenty-five, thirty, and seventeen bars respectively, giving an aggregate length in all of eighty-two bars. Should this same service be sought in a chain constructed as formerly, and not in sections, said chain would of necessity be two thousand five hundred and fifty bars long—that is to say, the ten bars would have to be repeated in the chain two hundred and fifty.

five times, the twenty-five bars one hundred and two times, the thirty bars eighty-five times, and the seventeen bars one hundred and fifty times before the two ends of the chain could be united, and make a perfect endless chain for producing perfect results.

In Fig. 2 I show a sectional chain, in which each section is arranged to control but one harness.

In Fig. 3 I show partial end view of a loom, in which the harnesses are actuated by duplicated horizontal sliding jacks, which in turn are operated by a laterally-reciprocating "knife-bar" and "evener." In this instance eighteen "jacks" for operating eighteen harnesses are shown. The chain is made in four sections. The two outer sections control four harnesses each, and the two inner ones control five each.

In Fig. 5 I show a chain of the construction and width heretofore employed on such a loom, as indicated in Fig. 3.

In Fig. 4 I show a sectional chain of the "pattern card" system, in which the same advantages may accrue by reason of its sectional construction, as in the instances previously cited. The operative functions of both systems of chains are the same, in that they are the controllers of the warp-opening or shed-forming devices. It is not to be understood that any particular number of sections constitutes my invention, provided that the chain for controlling the heddles be constructed in two or more longitudinal sections, each of which is complete in itself, and all of which, mounted on the same cylinder, operate in producing the desired pattern, as one single chain has heretofore been operated.

It is, however, to be distinctly understood that I do not herein claim as my invention a harness-controlling chain of the character described, except in combination with a chain-shaft or cylinder, which is provided with engaging surfaces for rotatively connecting all of the sections with the cylinder, and also with guides which prevent each section from lateral movement on the cylinder while it rotates.

It is well known that chains are variously constructed, and that the chain-cylinder is always provided with rotatively-engaging surfaces, adapted to the character of the chain; as, for instance, in Fig. 2, the sections of chain are composed of side pieces, as at *e*, and cross-bars, as at *f*, on which the rollers *g* are axially mounted. For this class of chain the shaft or cylinder is provided with fixed collars, as at *h*, which have concave recesses in their peripheries, for receiving the bars *f*, and thereby secure the rotation of the chain with the cylinder. These concave recesses in the collars, therefore, constitute, in this instance, the engaging surfaces of the chain-shaft, whereby it maintains control of the chain when rotated. Another kind of chain is shown in Fig. 4, in which the sections are composed of flat pattern-cards. The chain shaft or cylinder, with which such chains are used, is square, as shown, and its flat surfaces enable it to engage with the cards, and rotatively control the chain. In this connection the flat sides or surfaces of the chain-shaft perform the same function as the recesses in the collars *h* previously described. Now, in order that the sections may be prevented from having any lateral movement on the cylinder, each section of chain is provided with guides on the cylinder or chain shaft, and these guides also vary in form according to the construction of the chain; as, for instance, with the chain shown in Fig. 2 the collars *h* are provided, two for each section of chain, and they are so located on the shaft with relation to each other and to their particular section of chain, that the outer side of each collar will be in close proximity to the adjacent inner surface of the side pieces *e* when the bars *f* occupy the recesses, and therefore these collars serve as guides for this class of chain, and prevent each section from having any lateral movement on the cylinder.

For convenience of adjustment I prefer to have the chain-shaft longitudinally slotted, and the collars *h* provided at their eyes with lugs for entering the slot, and with means for securing them to the shaft, for preventing longitudinal movement thereon.

With the pattern-card chain shown in Fig. 4 the recessed collars cannot be used for performing the function of guides, because the flat surfaces of the chain-shaft perform the same service as the recesses in the collar *h* of Fig. 2, and therefore I use on that kind of shaft guides, as at *h'*, which may be narrow straight strips of wood or metal, secured to each of the four sides of the shaft, thus separating it into divisions, each of which is occupied by a section of chain.

To still further illustrate the value of my invention I will assume that for producing a certain pattern I require twenty heddles; that said pattern involved three separate figures; that for these figures I required five, seven, and eight heddles, respectively, and sections of chain of nine, eleven, and fifteen bars, respectively. For preparing for weaving this figure by means of chains, constructed as heretofore, said chain would have to be built up, bar after bar, until the initial bar would also constitute the terminal bar, and so form an endless chain. In other words, it appears from mathematical calculation that, in said chain, the nine-bar figure would have to be duplicated fifty-five times, the eleven-bar forty-five times, and the fifteen-bar pattern thirty-three times, thus making, in the aggregate, a chain of four hundred and ninety-five bars in length, while, with my sectional chain, the same service would be performed with an aggregate length of chain of thirty-five bars.

To show to what an extent the addition of a single bar to one of these patterns would affect the length of the chain, I will suppose that the fifteen-bar figure be changed to a six-

teen-bar figure, other figures remaining as before. In this case the chain would necessarily be increased ninety-seven bars, or, in other words, have seven hundred and ninety-two bars before the initial and terminal bar would be united in one bar, while, with my sectional chain, an aggregate length of but thirty-six bars would be required for same service.

Now, as an instance of further value, let it be supposed that two of the figures last referred to were desired in another pattern, in combination with a different figure, to take the place of the third in the figure previously stated. With chains as formerly constructed the entire chain structure must be taken apart and rebuilt. With my improved sectional chains the retained figure-sections remain intact, and only a new section will be required for the new figure. By this means, and by reason of the fact that the changed section only requires the precise number of bars to produce the new figure, a change of pattern involves only the labor of a few minutes, while heretofore it has always only been accomplished in several hours.

It will be seen that, by reason of my invention, there is not only great economy attained in the greatly lessened quantity of chain material requisite, but the labor heretofore requisite in building up the chain is so far lessened as to cause the cost in time of making up entirely new patterns with my sectional chain a matter of trifling consequence; whereas with chains as heretofore constructed said labor and expense constituted a heavy item in production of goods. It will also be seen that the side bars and pulley-bars of the sectional chain may be made much lighter than heretofore, and therefore several sections may readily be constructed so as to occupy no more space than the old style of chain of full width.

Moreover, by means of my novel sectional chain I am enabled to produce what I term "kaleidoscopic" effects, whereby varieties of irregular and sometimes beautifully-regular figures may be produced as irregular patterns by the employment of no more skill or thought than is requisite for displaying the changeable figures in a kaleidoscope. To illustrate, I will refer to that always marketable style of cassimeres known as "pepper and salt," and assume that I was working a loom with ten harnesses (for instance) in the production of those goods, and that a chain constructed in five sections was employed for controlling the harnesses. For producing a kaleidoscopic effect I would advance one chain a bar or two, perhaps withdraw another, or in other words I would mix them up at random as I would turn a kaleidoscope. As I would be seeking irregular patterns I would not, of course, be disappointed if the result was of that order; but I would be as liable to produce beautiful effects with more or less approximate regularity of figure as any other, and as there always exists a demand for novelties in pattern and styles, regardless of their special combinations in figure, the products of the loom would seldom, if ever, fail of a prompt market. It will be advisable in large mills to have one or two looms at work on waste or poor stock, for the express purpose of developing styles. The sections having each bar numbered or otherwise marked will admit of a chain record being kept with each pattern developed, so that whenever a desirable style is to be reproduced it may be set up at short notice. Although I have herein given but a partial enumeration of the advantages accruing by reason of my invention, it will be obvious to persons skilled in the art, that styles of weaving, which have heretofore been deemed as capable of being performed only in a Jacquard loom, are, by reason of my invention, brought within the capacity of ordinary pattern-chain looms, and that operations with a Jacquard loom may be greatly simplified, so far as labor and expense is concerned, in the necessary preparation and construction of card-chains. In connection with the Jacquard looms, it is only necessary further to say, that with a general assortment of card-chain sections, each adapted to produce an isolated figure, a complex pattern involving any desired number of figures selected from the assortment may be promptly provided for.

It is not to be understood that each section of the chain need be confined to the execution of a single perfect figure or series of figures, because any one section of chain may, under some circumstances, be made to assist adjacent sections in completing a figure, when the several sections thus coacting are of equal length, or when the coacting bars in the assisting sections may be located at perfectly regular intervals therein.

I am well aware that harness-controlling chains, as illustrated in Fig. 5, and not constructed in independent longitudinal sections, have heretofore been used on chain-shafts, provided with recessed collars for engaging with the long bars at each end thereof, and adjacent to the inner surfaces of the side pieces, so as to prevent lateral movement of the chain on the shaft, and also that card-pattern chains, not constructed in independent longitudinal sections, have heretofore been used on chain-shafts provided with guides, one on each side (or at each edge) of the wide chain, for preventing it from moving laterally on the shaft.

As before stated, I do not broadly claim herein a harness-controlling chain constructed in longitudinal sections, but only claim such a chain in combination with a chain-shaft or cylinder, which operates all the sections as one chain, is provided with engaging surfaces which enable it to rotatively control all of the sections, and with guides, which confine or limit each section to its precise proper position on the shaft.

I deem it proper to state in this connection, with relation to the pre-existing state of the art, that I well know that it is not new

to divide the harness-controlling chain into two longitudinal sections, and to operate these sections alternately as independent chains; also, that it is not new to mount upon the same shaft a harness controlling chain and a box-controlling chain, and to operate them together as one chain by means of a chain-shaft provided with engaging surfaces for rotating the chains, and also with guides for keeping the two chains from having any lateral movement on the shaft. Neither is it new to divide the harness-controlling chain into longitudinal sections of equal length, and to connect them by bars or rods, so as to render them in operation the same as one wide chain.

The combination of the harness-controlling chain, constructed in independent longitudinal sections, with a chain-shaft or cylinder provided with engaging surfaces and guides, and arranged to rotate the several sections as if they were one wide chain, as herein described and claimed by me, constitutes a novel combination, the practical application of which, on fancy looms, involves an improvement in the art of setting up and operating pattern-chains for controlling the heddles, which may properly be stated to consist in the assignment of divisible portions of the pattern to be produced to several independent longitudinal sections of the heddle-controlling pattern-chain, whereby the pattern to be woven may be produced with an aggregate number of bars in all the sections which equals the sum or aggregate, or never exceeds the aggregate, of the bars actually requisite for producing the pattern, or the several figures thereof.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The combination of a harness-controlling chain, constructed in independent longitudinal sections, with a chain-shaft or cylinder which is provided with engaging surfaces for rotating all the sections simultaneously with the cylinder, and with guides which confine each section to its proper space on the cylinder, substantially as and for the purposes specified.

JOSEPH F. WICKS.

Witnesses:
WALTER B. VINCENT,
JOS. T. RICH.