

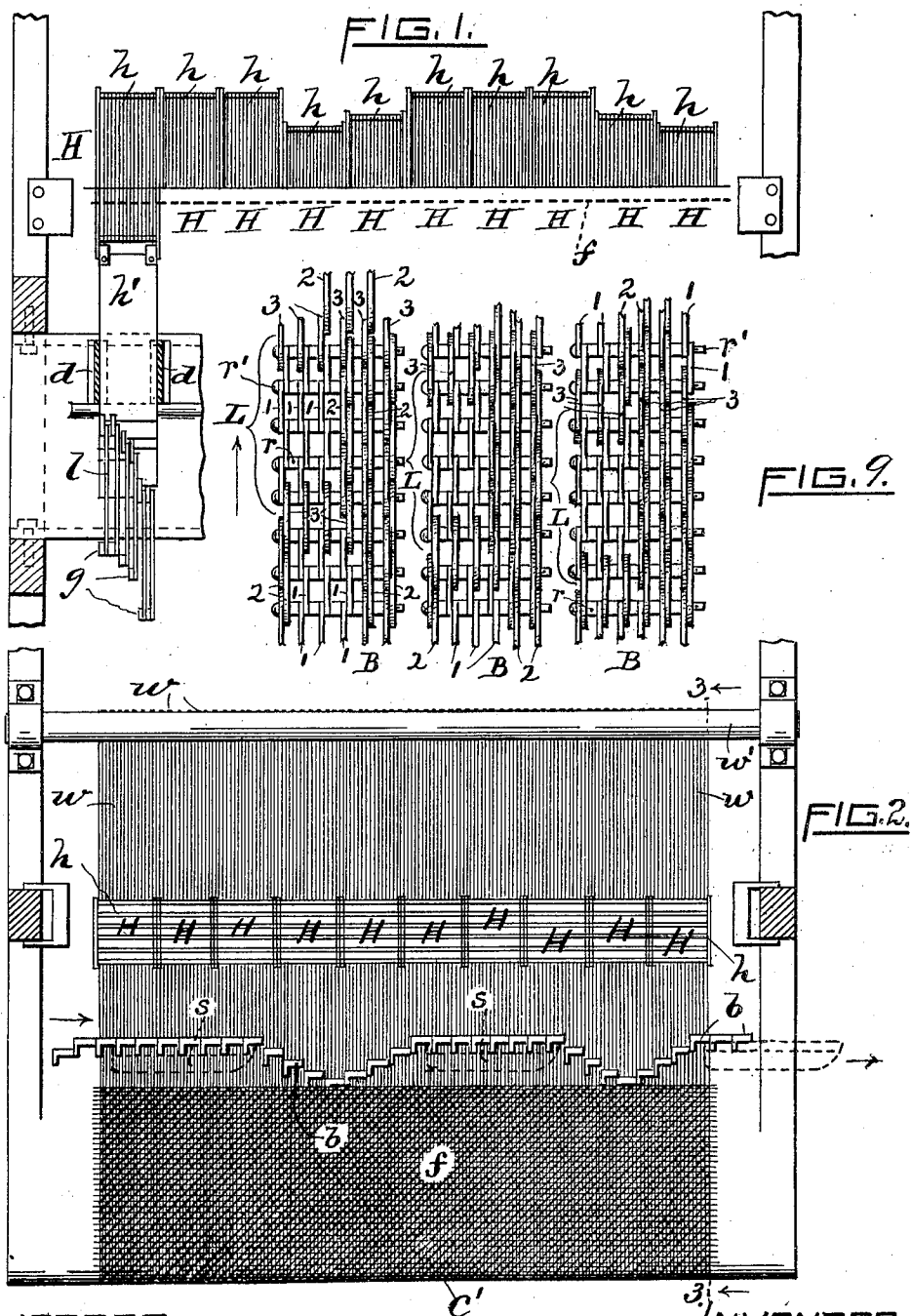
No. 889,971.

PATENTED JUNE 9, 1908.

L. E. SALISBURY.
HARNESS MOTION DEVICE FOR LOOMS.

APPLICATION FILED JUNE 8, 1907.

3 SHEETS—SHEET 1.



WITNESSES.

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FIG. 4.

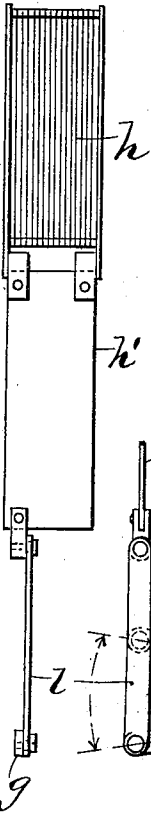


FIG. 3.

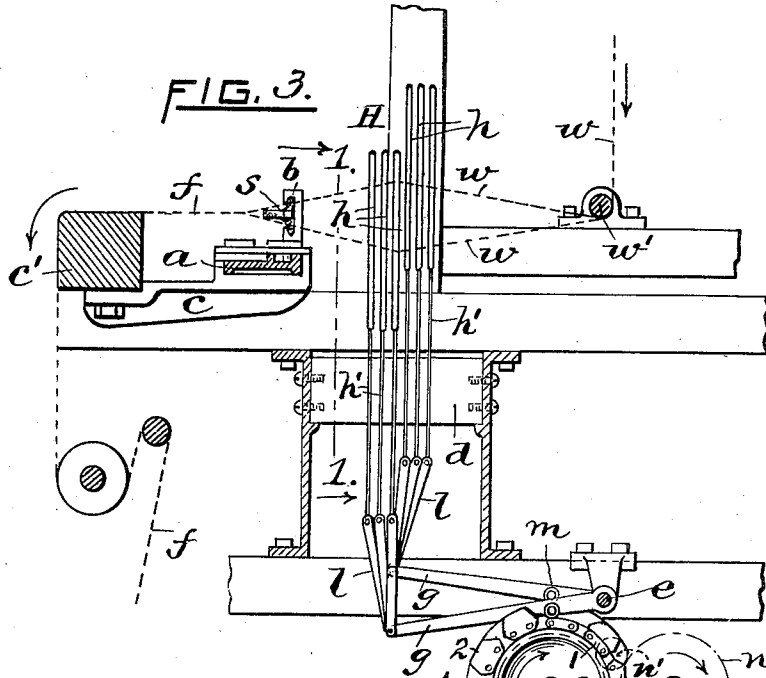


FIG. 5.

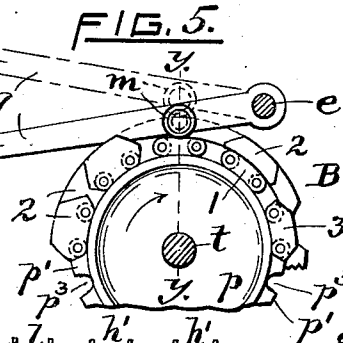


FIG. 6.

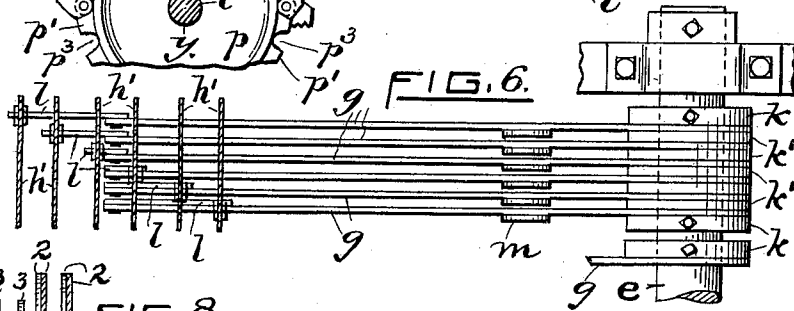


FIG. 8.

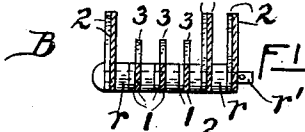
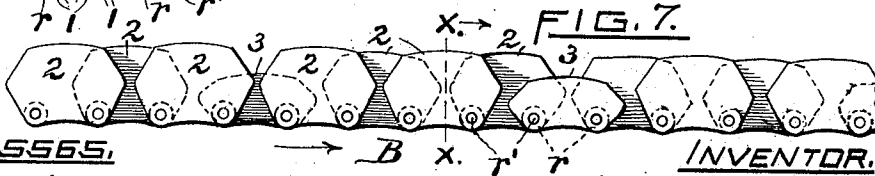


FIG. 7.



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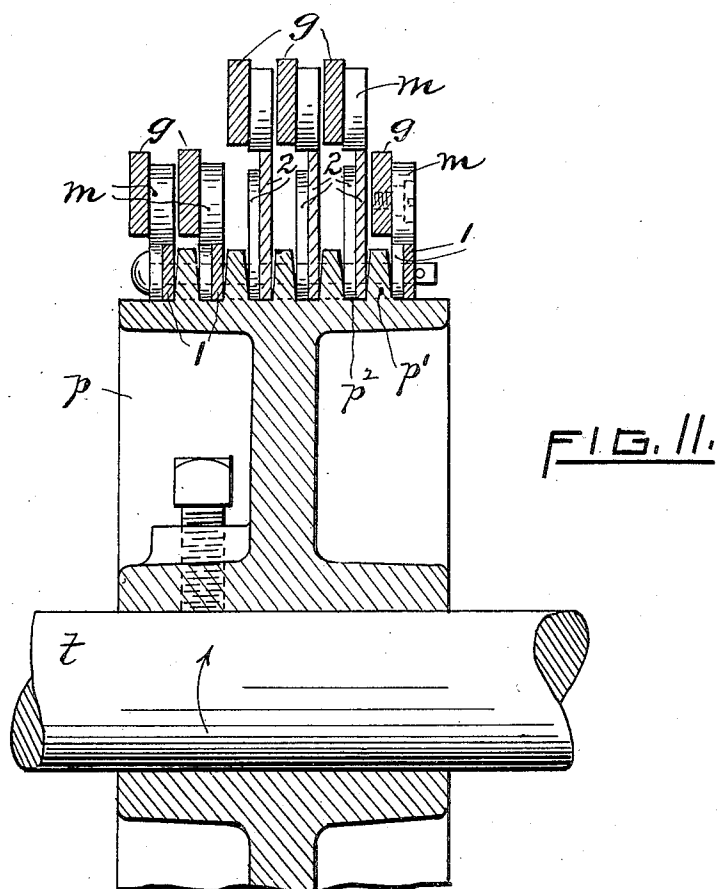
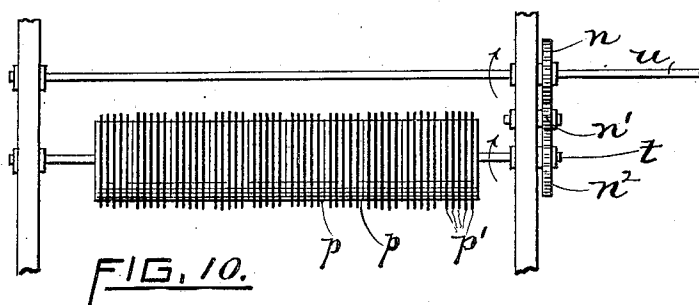
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3 SHEETS—SHEET 3.



WITNESSES.

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UNITED STATES PATENT OFFICE.

LEVI E. SALISBURY, OF PROVIDENCE, RHODE ISLAND.

HARNESS-MOTION DEVICE FOR LOOMS.

No. 889,971.

Specification of Letters Patent.

Patented June 9, 1908.

Application filed June 8, 1907. Serial No. 377,897.

To all whom it may concern:

Be it known that I, LEVI E. SALISBURY, a citizen of the United States of America, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Harness-Motion Devices for Looms, of which the following is a specification.

This invention relates to improvements in looms for weaving textile fabrics; the type of loom being of the class in which the harnesses, carrying the heddles, are mechanically actuated in a predetermined order or sequence so as to correspondingly "shed" the warp-yarns for the passage therebetween of shuttles carrying the respective weft-yarns, as in the production of plain or "fancy" dress goods, suitings, &c. The harness-changing mechanism usually employed is capable of being set or positioned so as to produce a diagonally ribbed or twilled effect in the surface of the fabric.

While the harness-motion device forming the subject of this invention is or may be adapted to looms in general it is especially adapted to be employed in looms using harnesses divided into comparatively short sections. In the multiple-shuttle loom patented to me February 10, 1903, No. 720,181, is shown harnesses thus characterized. That is to say, in the harness-actuating mechanism illustrated in said patent a continuously traveling chain is used having cam-grooved links with which the several vertically guided harness sections engage, combined with switches whose movements are controlled by a revoluble endless pattern-chain so as to correspondingly change or vary the positions of the harness sections in an intermittent manner, as determined by the relative arrangement of the members or units comprising the pattern-chain. In this as in other analogous devices the harnesses are actuated in an indirect manner.

The objects sought to be obtained in the invention herewith are to provide looms with a novel harness-actuating device possessing a greater degree of simplicity and efficiency, while at the same time being comparatively inexpensive to manufacture, readily accessible and not liable to become accidentally

inoperative, all as more fully hereinafter set forth and claimed.

In the accompanying three sheets of drawings illustrating an embodiment of the invention as adapted to the said patented loom, Figure 1 represents a partial front elevation, partly in section, taken substantially on the line 1 1 of Fig. 3, many of the details of the loom which are deemed non-essential to this invention being omitted. Fig. 2 represents a corresponding top plan view. Fig. 3 represents a transverse section of the loom taken substantially on the line 3 3 of Fig. 2. Fig. 4 is a front elevation, in enlarged scale, showing one of the harness sections and its connections. Fig. 5 is a transverse or end elevation showing the relative arrangement of the pattern-chain, levers, &c., corresponding say with the section of harness shown in Fig. 4. Fig. 6 is a plan view, considerably enlarged, showing one section of chain-actuated levers, the corresponding links and the lower members of the cooperating harness section. Fig. 7 shows a portion of the harness-controlling chain, in enlarged scale. Fig. 8 is a transverse sectional view taken on line *x x* of Fig. 7. Fig. 9 is a front elevation showing portions of three of the chains and the relative arrangement of the links for controlling the movements of three of the main harness sections. All the chains travel continuously in unison. Fig. 10 is a plan view in reduced scale, showing means for actuating the chain-carrying shaft, the chains being omitted, and Fig. 11 is a cross-sectional view, enlarged, taken substantially on line *y y* of Fig. 5, showing one of the chain-wheels or carriers and the corresponding chain and its levers. It may be stated that in general the units comprising the links are arranged or disposed in the drawings so as to produce in the fabric a "six-harness twill" effect.

That portion of the loom represented in the drawings herewith, except the harness-motion device, is constructed, arranged and adapted for operation substantially as set forth in my said patented loom, and to which reference may be had for a more detailed description.

In the present application *a*, Fig. 3, indicates a cross-section of one of the links of the

chain for propelling the weft-carrying shuttles *s*, guided in the successively reciprocating reed sections *b*; the chain itself being supported in brackets *c* secured to the underside of the breast-beam *c*¹.

The row of warp-yarns *w* pass downwardly from a suitably positioned beam or source of supply, under a guide-roll *w*¹ and through the heddles of the several harness-sections *h*, and thence through the "dents" of the respective reed-sections in a well-known way. The resulting woven web or fabric *f* passes over the said beam *c*¹, beam-rolls, &c., substantially as usual. As drawn, the said harnesses (six in number and mounted in vertical planes parallel with one another) are divided each into ten independent sections *H*, thus making sixty harness members in all. Each of the latter comprises a frame for supporting the heddles, this is secured to a thin flat sheet-metal bottom member *h*¹ vertically movable in grooves formed in suitably mounted stationary guide-bars *d*. At a suitable distance below and at the rear of the harnesses is located a stationary rod or shaft *e*; on this rod is mounted a number of laterally separated thin vibrating levers *g* placed edgewise, each having its free or front end jointed to a vertically extending link *l*, in turn jointed to the guided member *h*¹ of the corresponding harness-section *h*. Each lever *g* carries a freely turning truck-roll *m* adapted and arranged to rest upon and be actuated by the links of a suitably mounted continuously traveling endless chain *B*, about to be described. The respective members (*h*, *h*¹, *l* and *g*) comprising each of the sub-sections of a main section *H* of the harness are alike or duplicates of one another and are practically interchangeable.

The chains, *B*, ten in number, one for each main harness section *H*, are mounted on and carried by a corresponding number of alining sprocket-wheels *p* adjustably secured to a suitably supported slowly and positively revoluble shaft *t*, see also Fig. 10. Each wheel (Fig. 11) is provided with a series of roundabout alternately arranged parallel ribs *p*¹ and grooves *p*², the former being cut away transversely at regular intervals (at *p*³ Fig. 5) to receive the space collars *r* located between the chain links. The top of the low links normally extend slightly above the ribs. Each chain, as drawn, consists of six series of parallel links mounted on joint pins *n*¹; small rolls or space collars *r* being interposed between the links for keeping the latter normally separated transversely, thereby when in use insuring that each series of links will travel in a true continuous path. Three sizes of suitably shaped links are employed, viz., low, high and intermediate, 1, 2 and 3, respectively.

The assembling or positioning of the links

is determined by the style or class of goods to be produced and is effected by or under the supervision of the expert weaver or designer. In the present case the shuttles are assumed to follow one another uniformly and continuously, say fifteen inches apart, the chains *B* having a relative forward movement so as to shed the warps in advance of the placing of the respective weft-yarns; the arrangement of the links or "pattern" *L* (Fig. 9) being such that the latter is repeated every five inches (being five links, or one inch travel per three inches movement of the shuttles), thereby through the medium of the thus actuated levers *g*, &c., properly shedding the warp-yarns carried by the corresponding six sub-sections *h* of the main sections *H* of the harnesses.

It will be obvious that each joint-pin throughout the chain passes transversely through the adjacent ends of three pairs of low links, 1, and three pairs of high links, 2, except at the commencement of each pattern, at which point all the six connecting links lying in a row are uniform in height, these being the intermediate units 3, as indicated in Fig. 9. In order to produce the desired twilled effect each of the said pattern sections is successively offset laterally one-sixth of its width throughout the length of the chain, the total length, as drawn, being equal to six full patterns. Or, in other words, the first pin of each pattern section *L* of the chain *B* carries six tie-links 3 while each of the other four pins of the section carries three working links 1 and three working links 2. Assuming now that each of the said four pins of one section have the working links arranged thereon successively, from left to right, as follows: three links 1 and three links 2, the working links of the corresponding pins of the next succeeding pattern section would be disposed or laterally spaced thus,—one link 2, three links 1 and two links 2; the next section, two links 2, three links 1 and one link 2, and so on in a continuous manner. Thus it is clear that while the series of links 1 of the several sections of the chain follow one another successively they do not follow in a true or concentric path, since the links of one section are mounted with respect to those of the following or fellow section to produce a staggered effect laterally, the distance or offset being equal to the combined thickness of a link and space-collar *r*. It may be added that to continuously produce said twilled effect throughout the entire surface of the fabric *f* all the chains *B* are made up alike and are adapted to be interchangeable on the sprocket-wheels, but in positioning them, however, they are placed so that each pattern series *L* (Fig. 9), say of the advancing first chain, will be followed a distance

of one link apart successively and respectively by the other chains; only portions of three of the chains being indicated in said figure.

5 The chain-actuating horizontal shaft *t* is driven by a positively revoluble shaft *u* timed with respect to the speed of the shuttles; power being transmitted from a gear *n* secured to said shaft *u*, and an intermediate gear *n*¹ to a fellow gear *n*² secured to the chain-carrying shaft *t*, see also Fig. 10.

10 In the loom mechanism represented here-with the placing of the weft yarn or pick between the open warps by the continuously traveling shuttle, the immediately succeeding shedding of the warps to inclose the pick and the reed action for beating up the pick into the web follow one another in a consecutive order across the loom. The
15 next succeeding shuttle enters between the then positioned warps to deliver its pick, followed by the said warp and reed movements; the shuttles succeeding one another at regular intervals, say of fifteen inches as
20 before stated, and irrespective of the width of the fabric being produced.

The several vibrating levers *g* are, as drawn, uniform in length and movable independently on the stationary shaft *e*, each series of levers being kept in position laterally thereon by fixed end collars *k* and space collars *k*¹, see Fig. 6. The location of the rolls
30 *m* upon the levers is such that a comparatively short vertical movement produced by the frictional contact of the rolls with the traveling links at that point elevates the free ends of the levers, and the harness-sections *h* connected therewith, an increased distance, as determined by the relative arrangement of
40 the shaft, rolls, and the outer end of the lever to one another. The medium height links 3 of the chain are used only at the commencement of each "pattern" *L*, as before stated. At said point and as thus arranged
45 all the individual or sub-sections *h* of the corresponding main harness-sections *H* are thereby placed in the level or mid-position. In order to lessen the working friction the ends of links 2 and 3 are beveled or cam-shaped thus permitting the links to easily engage and pass under the rolls to actuate the
50 levers and the respective harness sections *h* connected therewith for shedding the warps a corresponding extent.

55 In the device illustrated the construction and arrangement are such that the harness sections are self-dropping, that is the gravity or weight of the members alone insures the continuous frictional contact of the lever-rolls *m* upon the successive links of the corresponding portion of the traveling chain. The loose rod *i*, indicated in Fig. 3, resting on the lower bend of the chains *B* is employed
60 simply as a weight for maintaining the chain

in the normal working position so that the links will properly engage the sprocket-wheels *p*.

By varying the number of heddle-sections *h* in each harness-section *H* and correspondingly changing the number of links transversely of the chain different styles of
70 "weave" may be produced in the fabric.

I claim as my invention and desire to secure by U. S. Letters Patent:—

1. In an automatic textile loom having a plurality of warp-carrying harness sections, and shuttles for placing weft-yarns or threads between the warps, the combination there-with of a plurality of traveling endless pattern-chains arranged contiguous to one
75 another and extending substantially the length of the harness, each chain being composed of units varying in height arranged and linked together in a predetermined order, swinging levers actuated and controlled
80 by said chains and jointed to the harness-sections for intermittingly moving the latter to shed the warp-yarns, and movable reed sections for forcing or beating the shuttle-delivered weft-threads into the fabric.

2. In a loom of the character described, a harness-motion device consisting of a plurality of suitably guided alining main harness-sections divided transversely into individual sub-sections, a mechanically actuated
90 endless pattern-chain for each set of sub-sections of the main harnesses comprising a series of transversely arranged parallel units varying in height and linked together in a predetermined order, and suitably supported
100 laterally separated self-dropping vibrating levers in continuous frictional engagement with the units of said chain and operatively connected with the corresponding sub-sections of the harnesses.

3. In a harness-motion device for looms of the character described, the combination of a plurality of vertically guided harness sections extending transversely of the loom, a corresponding number of suitably supported alining
110 endless pattern-chains located below said harnesses having the links of each chain constructed and arranged to form a connected series, the several chains being positioned so that the corresponding members thereof are
115 adapted to follow one another circumferentially in true paths, means for actuating the several chains in unison, and pivoted levers operatively connected with the harness-sections and being in frictional engagement
120 with the chain-links whereby vibratory movements are imparted to the levers and harnesses.

4. In a harness-motion device for looms of the character described, the combination
125 with a plurality of vertically guided parallel heddle-carrying harness sections, *h h'*, links 1 jointed thereto and suitably mounted hori-

zontally disposed laterally separated swinging levers *g* jointed to the lower ends of said links, of a positively revoluble sprocket-wheel, and an endless compound or multiple
5 pattern-chain B mounted on said wheel, said chain consisting of a plurality of series of suitably arranged connected thin units or links varying in height having said levers

normally resting upon and adapted to be vibrated by the links of the moving chain. 10

Signed at Providence, R. I., this 6th day of June, 1907.

LEVI E. SALISBURY.

Witnesses:

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CHARLES C. REMINGTON.