

No. 875,792.

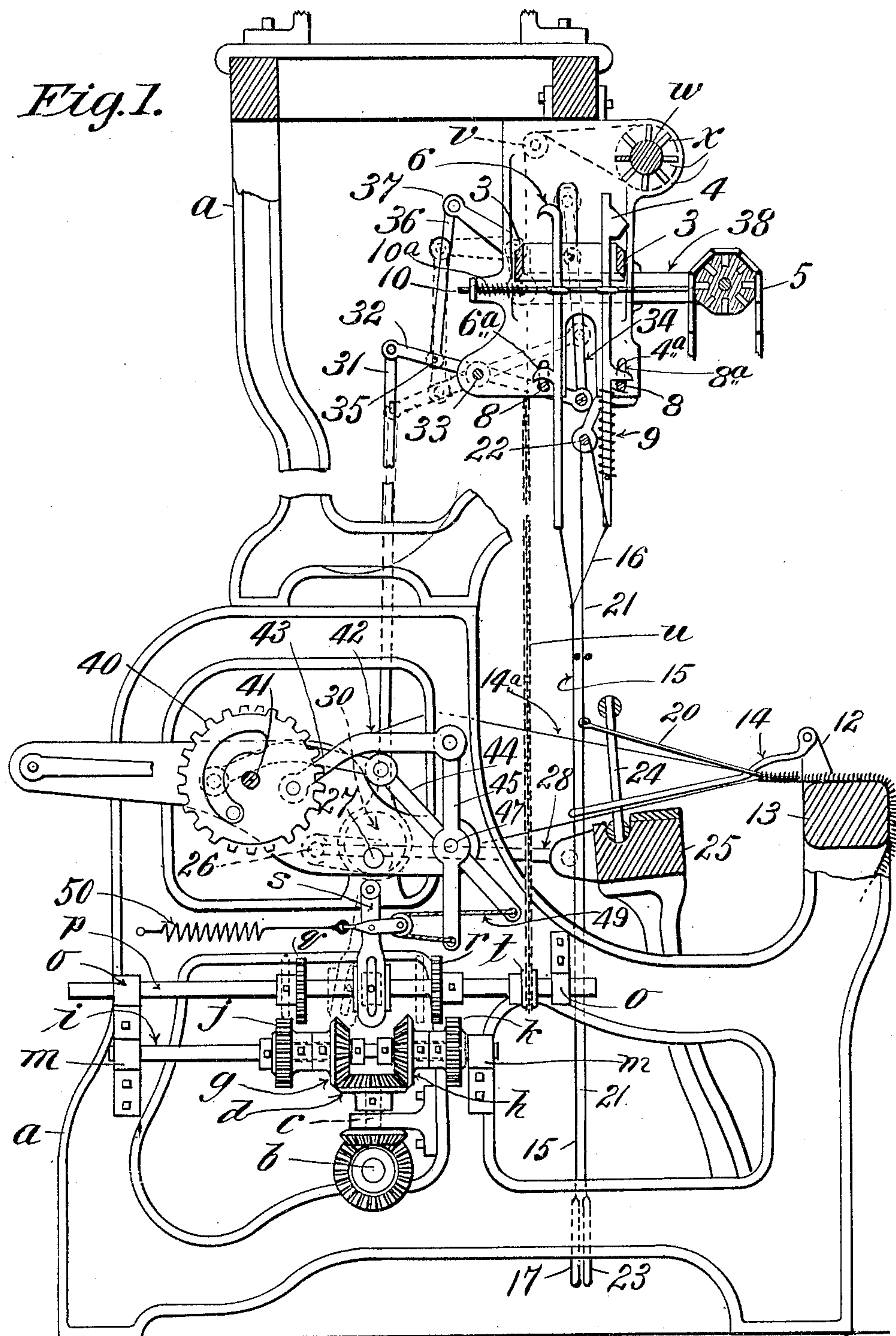
PATENTED JAN. 7, 1908.

J. F. DUSTIN.
PILE FABRIC LOOM.

APPLICATION FILED SEPT. 3, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Chas. Garfield
M. S. Durran

Inventor:
John F. Dustin
by *Chapman & Co.*
Attorneys;

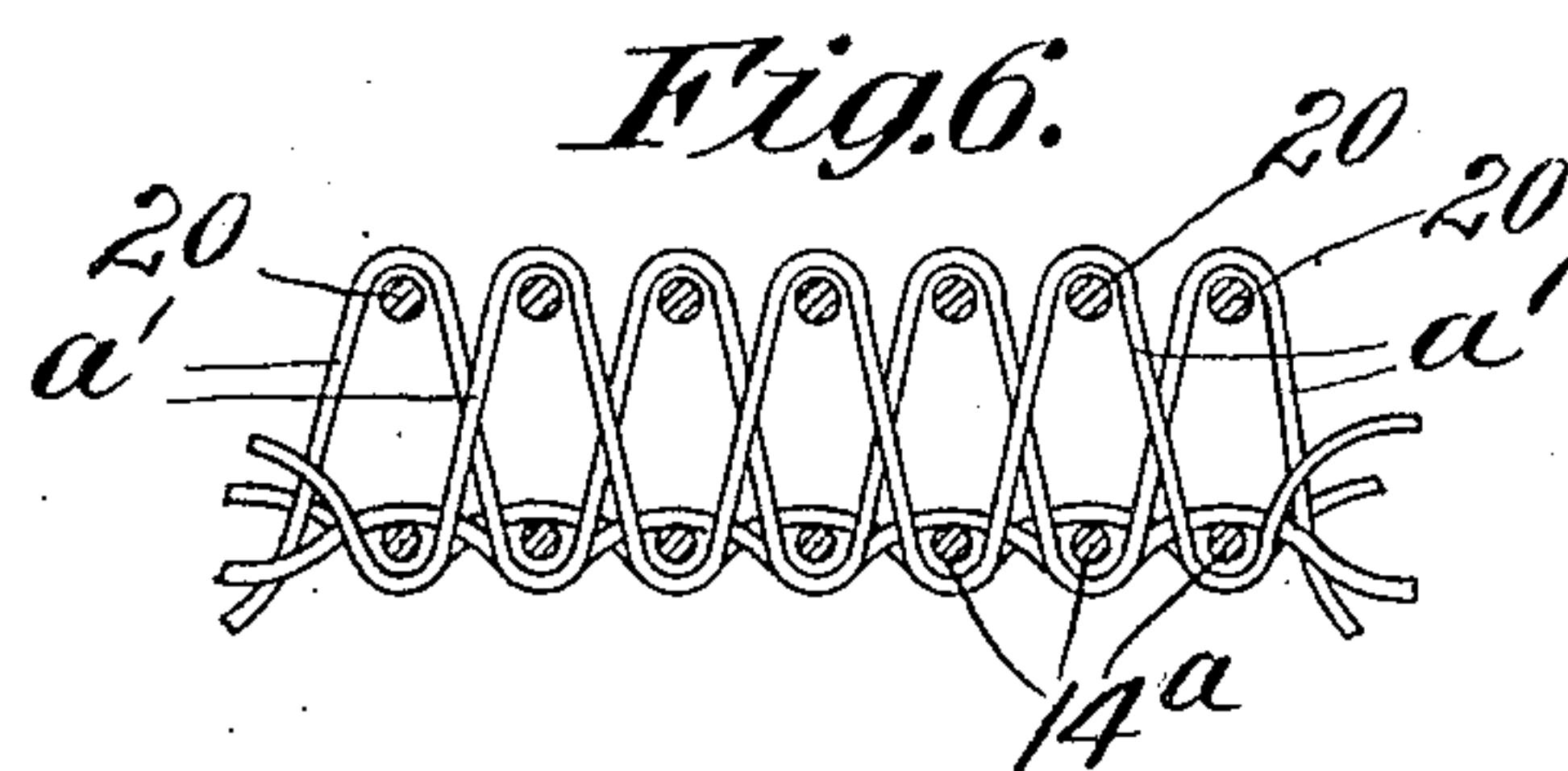
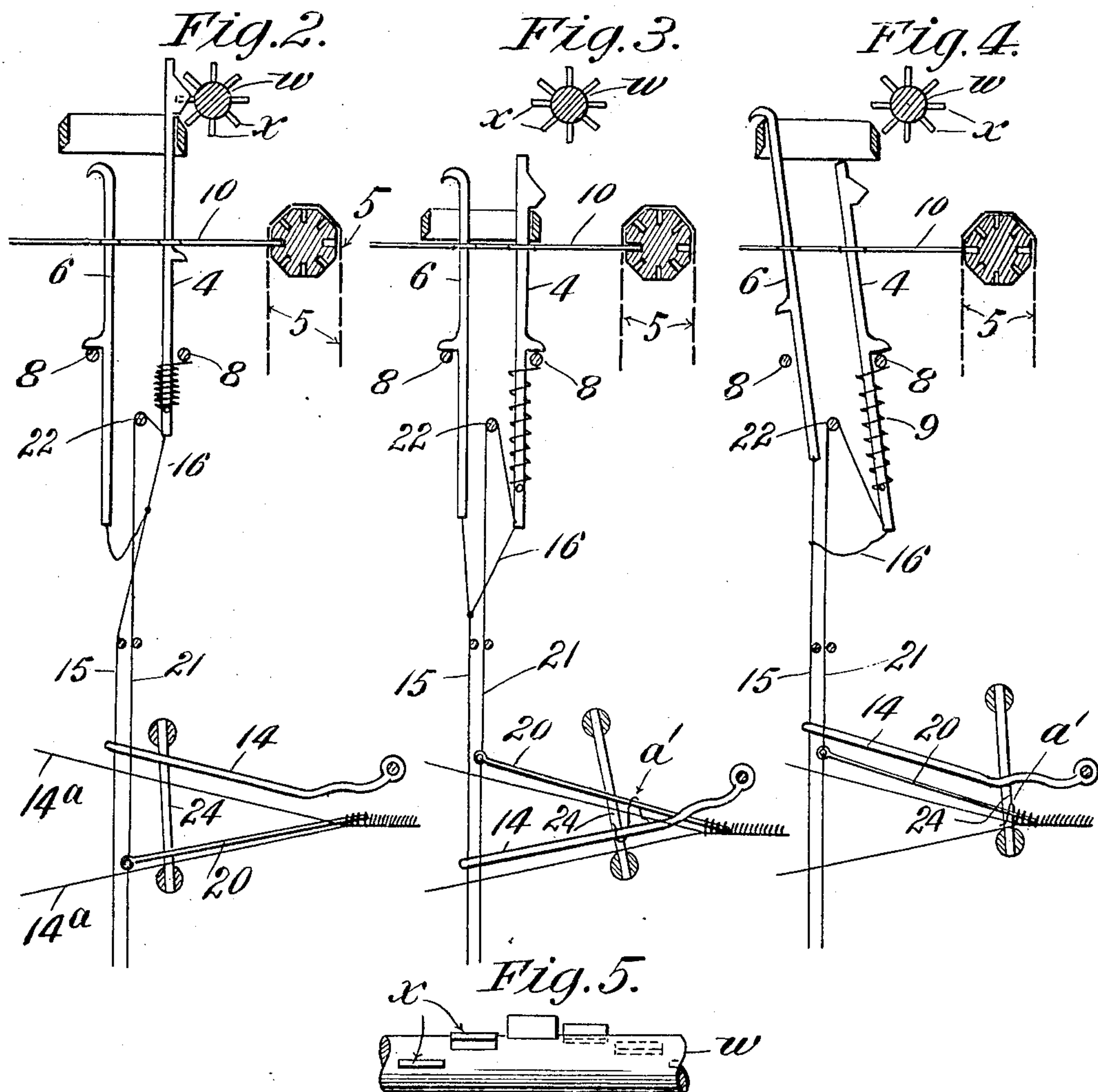
No. 875,792.

PATENTED JAN. 7, 1908.

J. F. DUSTIN.
PILE FABRIC LOOM.

APPLICATION FILED SEPT. 3, 1904.

2 SHEETS—SHEET 2.



Witnesses:
J. H. Garfield
M. L. Duran.

Inventor:
John F Ducter
by *Chapman & Co*
Attorneys:

UNITED STATES PATENT OFFICE.

JOHN F. DUSTIN, OF SPRINGFIELD, MASSACHUSETTS.

PILE-FABRIC LOOM.

No. 875,792.

Specification of Letters Patent.

Patented Jan. 7, 1908

Application filed September 3, 1904. Serial No. 223,216.

To all whom it may concern:

Be it known that I, JOHN F. DUSTIN, a citizen of the United States of America, residing at Springfield, Indian Orchard, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Pile-Fabric Looms, of which the following is a specification.

This invention relates to looms and particularly to pile fabric looms, the object of the invention being to provide an improved machine for weaving plain or figured pile-fabrics by means of the ordinary Jacquard pattern loom, the pile being formed from the weft-thread.

A further object of the invention is to provide means whereby the pile-loops on the weft-threads may be formed by the depression of a series of loop-formers between the pile-wires proper, over which the weft-thread has been shot, and the simultaneous elevation of the rear ends of the pile-wires, the latter and formers moving in opposite directions, means being provided to operate the wires and loop-formers successively.

A further object of the invention is to provide improved means to operate the loop-formers and the pile-wires simultaneously in opposite directions.

Still another object of the invention lies in the provision of means whereby the pile-wires and the loop-formers may be rendered inoperative whereby an ordinary close-pile fabric may be woven to constitute the body or ground for the raised pile pattern-figures.

A still further object of the invention lies in the provision of means whereby the length of the pile-loops may be adjusted.

In the drawings accompanying this application,—Figure 1 is a sectional elevation of a portion of a loom embodying this invention, the section being taken at right angles to the breast-beam. Figs. 2, 3, and 4 illustrate in three different positions certain parts of the jacquard mechanism and the connection from said parts extending through the pile-wires and the loop-formers. Fig. 5 is a side elevation of a portion of the knock-off roll showing the flat, spirally arranged ribs thereon. Fig. 6 is a sectional view of a raised pile-fabric which may be woven on this machine.

Referring now to these drawings, the frame of the machine is indicated by *a*, and there is a driving-shaft *b*, located in the lower part of the frame and having a beveled gear connection with the short vertical shaft *c*, on the upper end of which is a beveled gear *d* in mesh with two oppositely placed beveled gears *g* and *h* loosely mounted on a shaft *i*, these gears being connected with the gears *j* and *k* respectively, in any suitable manner to rotate therewith.

The shaft *i* is supported in suitable bearings *m* in the frame of the machine, and these gears *j* and *k* turn freely thereon in opposite directions by reason of the described connection thereof with the driving-shaft.

In other bearings *o* is a shaft *p* parallel with, and above the shaft *i*, which shaft *p* is slidable in its bearings. On this shaft are two gears *q* and *r* and connected with the shaft is the depending lever *s* which, by means of suitable mechanism to be described, may be held stationary midway between the gears *j* and *k*, as shown in Fig. 1, or which may be swung to the right or to the left, whereby either the gear *q* will engage with the gear *j* by meshing therewith, or the gear *r* with the gear *k*, in which case the shaft *p* would be rotated either to the right or to the left, it being understood that the gears *q* and *r* are fast on the shaft *p*.

On the latter is a sprocket-wheel *t* over which an endless chain *u* runs and which extends up over a suitable sheave *v* and around another sprocket-wheel on the end of the knock-off shaft *w*, of the well known jacquard pattern mechanism, all clearly shown in Fig. 1. This shaft is mounted in the upper end of the frame *a* and is provided with short, spirally arranged ribs or projections *x* whose arrangement is clearly shown in Fig. 5, this shaft being so arranged relative to the knife-bar 3 of said pattern mechanism that when the latter is raised, carrying with it such of the hooks 4 as have been selected by the cards 5 of the pattern mechanism, these hooks will be knocked off the knife-bar 3 in succession.

As stated, the shaft *w*, by means of its connection with the shaft *p*, is rotated first in one direction and then in the opposite direction, there being a dwell between these rotative movements, and it is while the shaft *w* is at rest that the knife-bar rises carrying with it such of the hooks 4 as are to be knocked off. Consequently these hooks will be thrown off the knife-bars in succession from one end thereof to the other, beginning alternately at opposite ends.

There are two sets of hooks used in con-

nection with this device, viz.,—the hooks already referred to numbered 4 and the hooks adapted to be engaged by the rear side of the knife-bar 3 and numbered 6. Both of these hooks are provided with projections 4^a and 6^a which engage rods 8 in the head of the loom, whereby their downward movement is limited. These rods may be supported adjustably whereby the drop of the hooks 4 and 6 may be regulated to produce pile-loops of different lengths.

To accelerate the downward movement of the hooks 4, a spiral spring 9 is applied thereto below the pin 8 which spring is arranged to be compressed when the hook is raised. The hooks pass through eyes in a wire 10 in the usual manner, which wire, when it is shot into a perforation in one of the cards 5 by its spring 10^a, carries the hook 4 over the knife-bar in position to be engaged thereby, and the hooks 6 on the wires so moved will be moved out of a position of engagement with the rear edge of the knife-bar.

Endwise movements will be imparted to such of the wires 10 as are required in the pattern in the usual manner by means of the pattern-card, when the knife-bar is down, and when the knife-bar rises the hooks 4, selected by the card, will be moved over in position to be raised by the knife-bar, as shown in Fig. 2.

The reciprocating vertical movements of the knife-bar may be imparted thereto in any desired way, and the reciprocatory movements of the roll carrying the cards 5 may be imparted thereto in any desirable way which will time its movements with the rest of the mechanism.

As usual in this class of machines, when one of the hooks 4 is not selected by the pattern-card, the hook 6 associated therewith on the same wire 10 will be in position to engage the rear edge of the knife-bar when it rises, and thus be elevated to the position shown in Fig. 4, the hook 4 remaining down. All this is well known in the art, save only the method herein described of knocking off the hooks 4 in succession, and their association with the pile-wires and loop-formers. The well known operation of the hooks has been referred to only because these parts of the machine are used to actuate the loop-former and the pile-wires to move them as desired in vertical planes.

On a rod supported in brackets 12 on the breast-beam 13 are located the above referred to loop-formers 14 which are wire fingers, preferably flat, that may swing freely on their support vertically, and which extend back through the dents of the reed parallel with the warps 14^a, at which point they are connected by cords 15 with the lower end of the hooks 6, there being a second cord 16 extending from the lower end of the hook 4 to a point on the cord 16 below the end of the

hook 6, as shown in the various figures, and clearly in Fig. 1, to which reference should be had as it is shown therein that when both of the hooks 4 and 6 are down on the pins 8, the cord 16 is of such length as to allow the cord 15 to hang in a substantially perpendicular position.

The cord 15 extends below the point of its attachment to the loop-former 14 and there is a weight 17 attached to the lower end thereof.

The pile-wires are indicated by 20 and have attached to their rear ends (which also extend through the dents of the reed,) cords 21 which extend upwardly over a rod 22 and from thence downwardly to the lower end of the hook 4. The rod 22 is preferably of glass or some smooth, hard substance suitably supported in the frame of the machine in proper position. As shown in Fig. 1, the cord 21 also extends beyond the end of the pile-wire to which it is attached, and is also provided with a weight 23 at its lower end.

The reed, indicated herein by 24, is mounted in the lay-beam 25, as usual, and the latter has the usual reciprocating movements imparted thereto by means of a crank 26 on the shaft 27 between which crank and the lay-beam is a connecting-rod 28.

Any suitable means may be employed to impart to the knife-board reciprocating vertical movements. A suitable way consists in locating an eccentric 30 on a rotating shaft, as 27, and extending the rod 31 upwardly to connect with another rod 32 pivoted at some suitable point, as 33, in the upper part of the frame. The end of this rod 32 is suitably connected with a vertically disposed rod 34, which is connected with the knife-bar.

The pattern-roll is reciprocatingly moved at right angles to the movement of the knife-bar by means of the same eccentric 30, and the rods 31 and 32 which actuate the knife-bar, there being attached to the rod 32 at 35 an upstanding arm 36 connected at its upper end with the crank-lever 37 which is arranged to engage the sliding frame 38 in which the pattern-card roll is supported.

To impart requisite swinging movements to the lever *s* whereby the knocking-off shaft *w* may be rotated first in one direction and then in the other, I prefer to employ a portion of the well known shuttle-box shifting mechanism which comprises gears which are partially rotatable, first in one direction and then in the other, one of such gears being shown in Fig. 1 and indicated by 40. This gear is fixed on a shaft 41 on which two or more of such gears are mounted, and to one side of each gear the arms 42 and 43 are pivotally connected at such points thereon as will locate these points of connection diametrically opposite each other, as shown in Fig. 1. Each of the arms 42 and 43 is pivotally connected to two arms 44 and 45 piv-

otally supported on the frame at 47. The lower ends of these arms 44 and 45 are connected together by a cord 49 which cord runs over a suitable pulley in a strap which is secured to the lever *s*, and from the opposite side of the latter a spiral spring 50 extends to some point on the frame where it is fixed. While this gives the requisite movement to the shaft *p* whereby first one or the other of the gears *r* or *q* may be thrown into mesh with the gears *k* or *j*, any other mechanism, whereby this same result may be accomplished, may be substituted for that shown and described herein, and the same is true of the knife-board and pattern-card actuating devices.

If it is desired to vary the height of the pile-loop, this may be effected by raising or lowering the rods 8, upon which the hooks 4 are caught, as they are knocked off the knife-board by the roll *w*. The adjustment of the rods 8 may be effected in any desirable way, the rods being supported as in slots 8^a, indicated in dotted lines in Figs. 2, 3, and 4, a suitable mechanism being provided on the rods to secure the latter in these slots in any adjusted position.

It is apparent from the foregoing description that by means of the operation of the loop-formers 14 and the pile-wires 20, by the hooks 4 and 6, that in the regular order of weaving, the loop-formers and the pile-wires may be made to assume the desired position whereby either a close-woven pile-fabric may be woven or a raised figure of any design woven thereon.

It is evident that if after the weft-thread has been thrown across the pile-wires the latter be raised only far enough to allow the binding shot of the shuttle to be made under the wire, the pile-loop will be relatively short. Therefore, by providing means to allow the hooks 4 to drop a greater distance the pile-wires would be raised to a greater height, thereby increasing the length of the pile-loop.

Fig. 2 shows the position of the parts as the weft-thread is about to be thrown and as the shuttle starts the mechanism is arranged to knock the hooks 4 off the knife-board one after the other and the springs 9 together with weights 23 on the hooks will carry the latter downward and thus raise the rear ends of the pile-wires 20 to the position shown in Fig. 3, this upward movement of the pile-wires taking place simultaneously with the downward movement of the loop-formers 14 which are actuated by the release of the weight 17. The loop-formers and the pile-wires thus cross each other and draw the loops out to the desired length. The loop-formers are then immediately raised to the position shown in Fig. 4, by the engagement of the hooks 6 with the knife-board, and the beating up movement then takes place. It

is thus apparent that the function of the loop-formers is to form the loop by carrying the weft-thread down each side of the pile-wires, the loops being formed in succession of the slack of the weft-thread in the wake of the shuttle.

It is well understood that proper binders and such other threads and stuffers may be used as desired to complete the body of the fabric in the usual manner.

Fig. 6 of the drawing shows a somewhat enlarged and exaggerated sectional view of a raised-pile fabric showing the loops in extended position as held by the wires 20 at the moment of beating up, the loop-formers having been raised up out of the way, as shown in Fig. 4.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. The combination in a pile-fabric loom, of pile wires and loop-formers, and a suitable pattern-mechanism with which said pile-wires and loop-formers are connected, and means whereby said wires and formers may be moved in a plane transverse to the weft threads and in opposite directions, to draw out the pile loops.

2. The combination in a pile-fabric loom, of pile-wires and loop-formers, and a suitable pattern-mechanism with which said pile-wires and loop-formers are connected, and means whereby said wires and formers may be moved transversely of the fabric, and in succession, from one side of the fabric to the other, in a plane transverse to the weft threads and in opposite directions.

3. The combination in a pile-fabric loom, of the hooks and knife-board of a jacquard pattern mechanism; pile-wires and loop-formers parallel with the warps, and flexible connections extending from the rear ends of the wires and formers to and connected with one end of said hooks, and means for causing the cords to move in opposite directions to effect the upward movement of the pile-wire and the downward movement of the loop-former by the downward movement of the hook.

4. The combination in a pile-fabric loom, of a jacquard pattern-mechanism comprising a series of hooks, a knife-board, and a rotatable knock off roll for the hooks, said roll having spirally disposed ribs thereon, to effect the disengagement of hooks from the knife-board, and means to rotate the knock off roll in succession in opposite directions, to release the hooks from the knife-board one after the other, beginning alternately from opposite ends of the board.

5. In a pile-fabric loom, a series of pile-wires parallel with the warps, a suitable pattern mechanism comprising a knife-board, a knock-off roll and hooks; means of connection between said hooks and the pile-wires

to effect the raising of the wires selectively, together with means on the knock-off roll to disengage the hooks from the knife-board one after the other.

5 6. In a pile-fabric loom, a series of pile-wires parallel with the warps, a suitable pattern mechanism comprising a knife-board, a knock-off roll and hooks; means of connection between said hooks and the pile-wires
10 to effect the raising of the wires selectively, together with means on the knock-off roll to disengage the hooks from the knife-board one after the other, commencing alternately at opposite ends of the knife-board.

15 7. In a pile-fabric loom, a series of pile-wires parallel with the warps, a suitable pattern mechanism comprising a knife-board, a knock-off roll and hooks; means of connection between said hooks and the pile-wires
20 to effect the raising of the wires selectively, and means to adjust the operative movement of the pile-wires to make a longer or shorter loop.

8. In a pile-fabric loom, a series of pile-

wires parallel with the warps, a suitable pattern mechanism comprising a knife-board, a knock-off roll and hooks; means of connection between said hooks and the pile-wires to effect the raising of the wires selectively, and means to adjust the operative movement
25 of the pile-wires to make a longer or shorter loop, together with means on the knock-off roll to disengage the hooks from the knife-board one after the other.

9. In a pile-fabric loom, a suitable pattern mechanism comprising a knife-board, a plurality of hooks therefor, and means to disengage the hooks from the knife-board at the proper time; pile-wires and loop-formers
35 operatively connected by one end with said hooks, and means to adjust the falling movement of the hooks to vary the operative movement of the pile-wires.
40

JOHN F. DUSTIN.

Witnesses:

WM. H. CHAPIN.

M. L. DONOVAN.