(No Model.) 3 Sheets—Sheet 1.

A. WEBB.

PILE FABRIC LOOM.

No. 575,818. Patented Jan. 26, 1897.

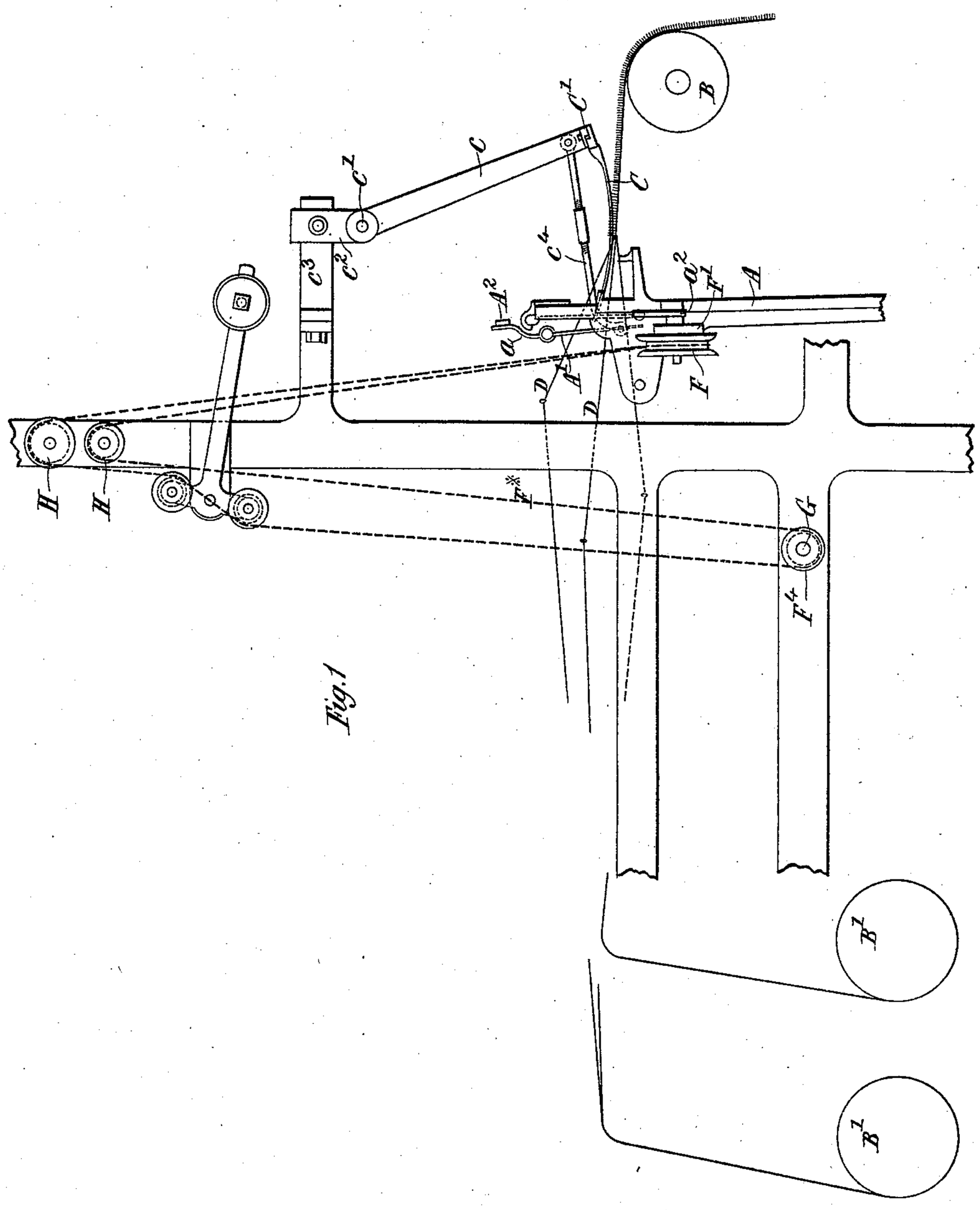

Fig. 1

Witnesses:-
Fred T Haynes
George Barry Jr.

Inventor:-
Albert Webb
by attorneys
Brown & Seward

(No Model.)

3 Sheets—Sheet 2.

A. WEBB.

PILE FABRIC LOOM.

No. 575,818. Patented Jan. 26, 1897.

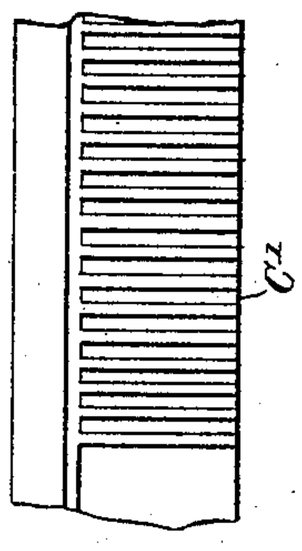

Fig. 5.

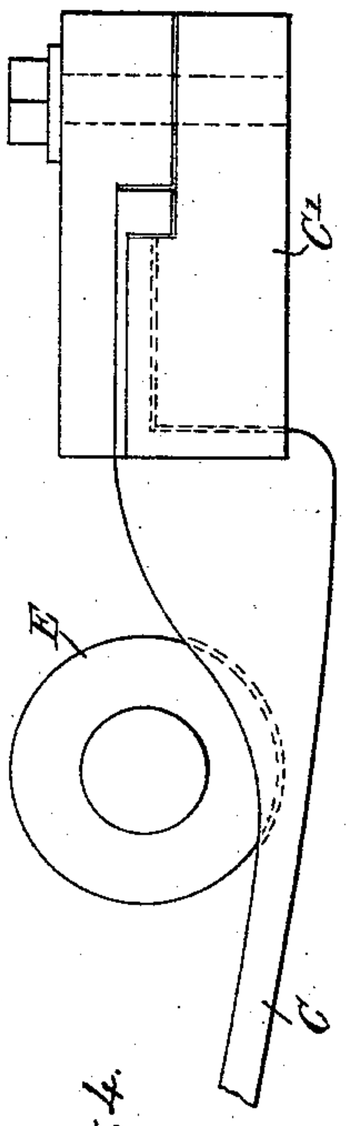

Fig. 4.

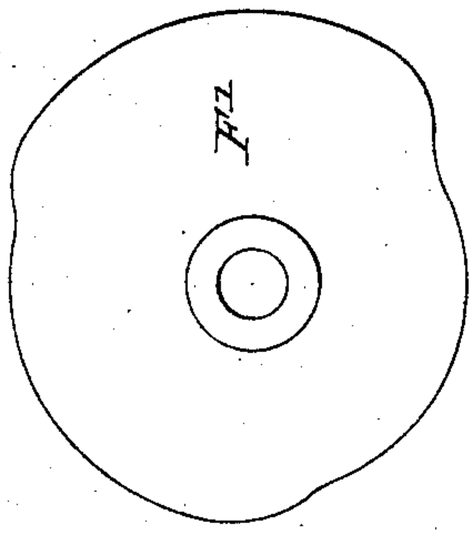

Fig. 6.

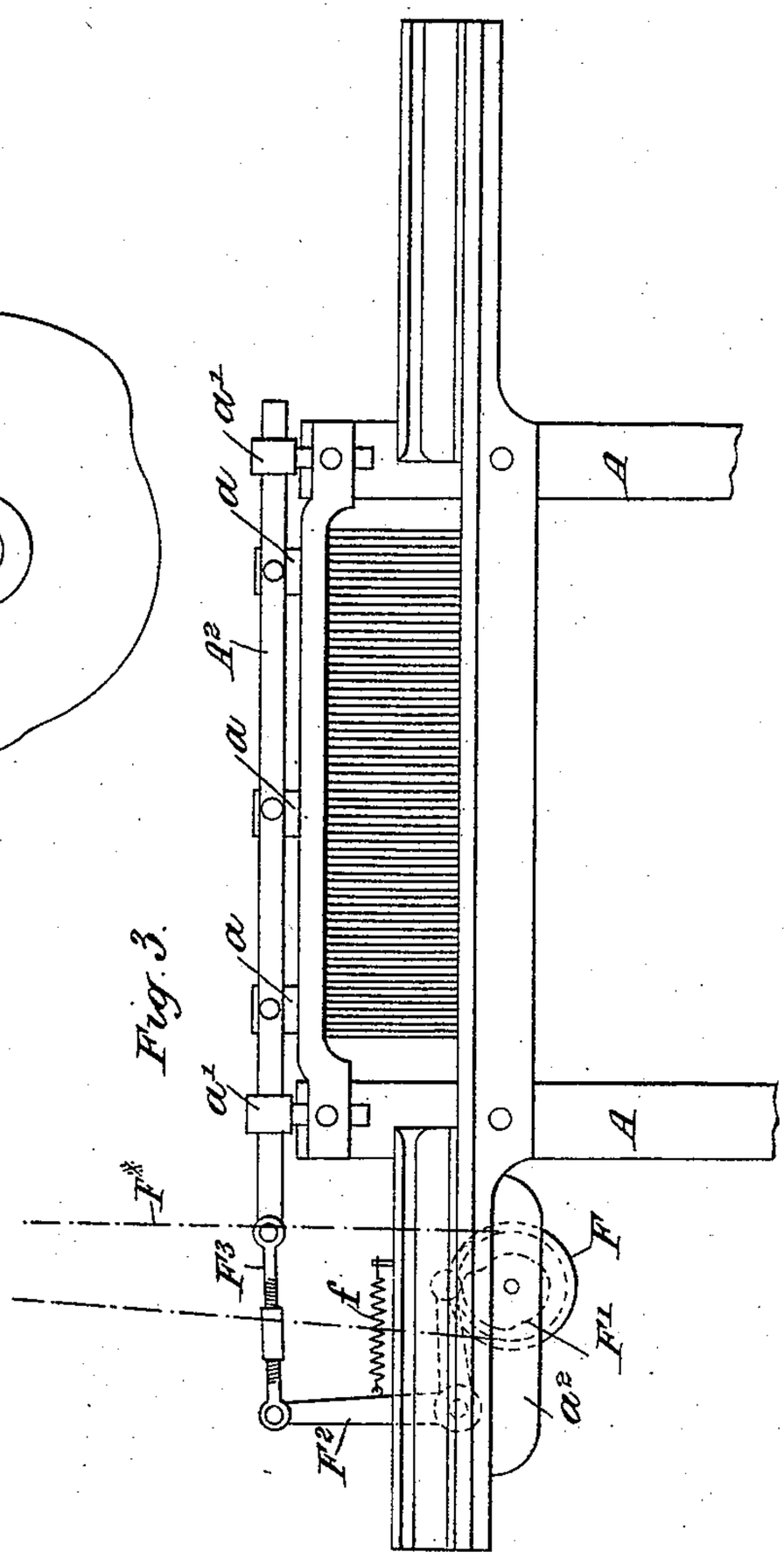

Fig. 3.

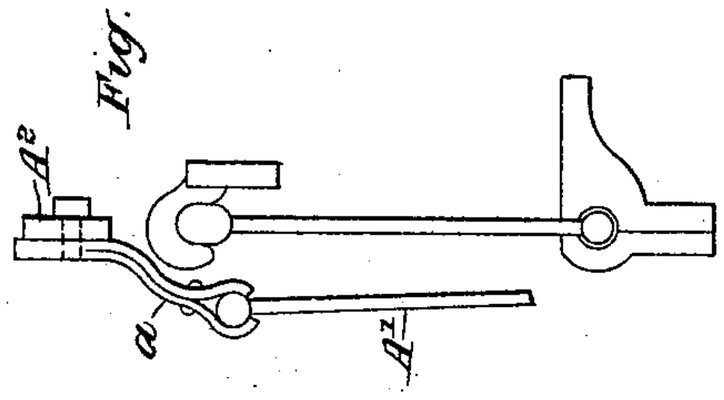

Fig. 2.

Witnesses:
Fred't Haynes
George Barry Jr.

Inventor:—
Albert Webb
by attorneys
Fromont & Coward

(No Model.) 3 Sheets—Sheet 3.

A. WEBB.

PILE FABRIC LOOM.

No. 575,818. Patented Jan. 26, 1897.

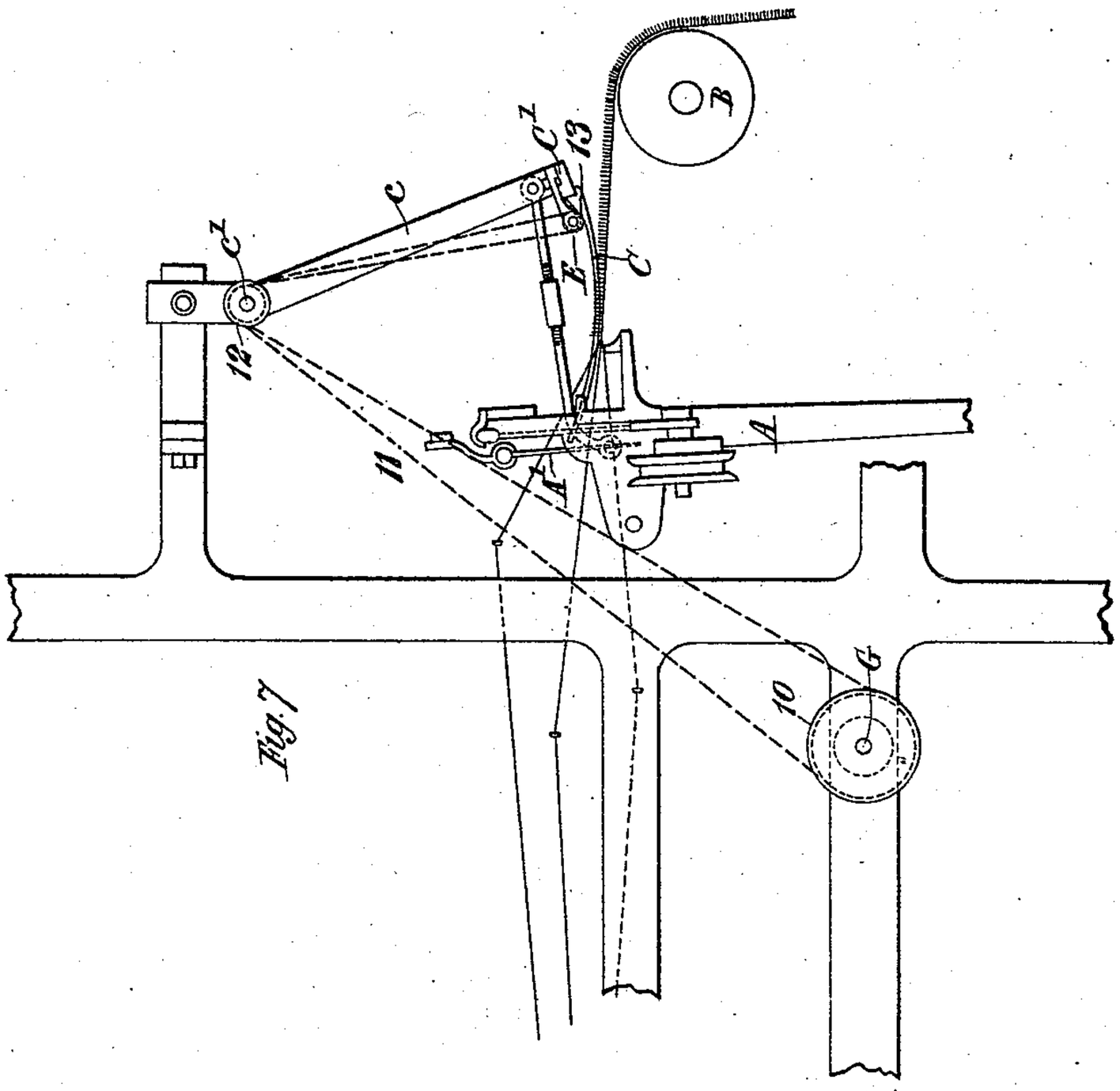

Fig. 7

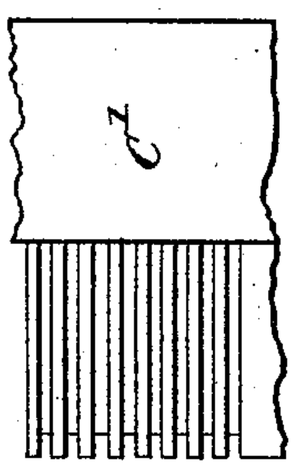

Fig. 5a

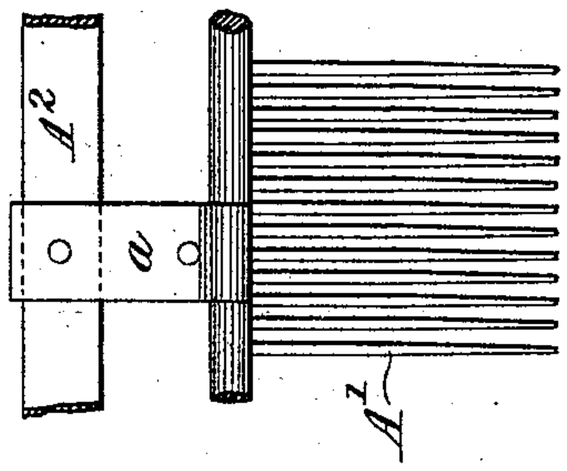

Fig. 8

Witnesses:-
Fred. Haynes
George Barry Jr.

Inventor:-
Albert Webb
by attorneys
Brown & Seward

UNITED STATES PATENT OFFICE.

ALBERT WEBB, OF WORCESTER, ENGLAND.

PILE-FABRIC LOOM.

SPECIFICATION forming part of Letters Patent No. 575,818, dated January 26, 1897.

Application filed February 8, 1896. Serial No. 578,510. (No model.)

To all whom it may concern:

Be it known that I, ALBERT WEBB, horse-hair-carpet manufacturer, of Copenhagen Street, Worcester, England, have invented certain new and useful Improvements in Pile-Fabric Looms, of which the following is a specification.

In the manufacture of pile carpets and other fabrics of a similar construction, where one thread out of several in each split or division of the reed is raised to form the pile or design, it has hitherto been the practice to give all the threads in each split which may eventually be required to form the pile the same thickness, each being of sufficient size to adequately fill the space in the fabric allotted to one split. Thus in a carpet known as a "five-frame" Brussels or Wilton there are five face-threads, all of equal or approximately equal size, in each split of the reed, one of which threads is raised at each lift of the jacquard to form the pile, while four remain below the surface, forming the backing.

Now one object of this invention is to reduce the weight of the face-yarn lying below the surface by, say, one-half, while providing that the quantity of yarn forming the face shall be as great as in fabrics woven by the ordinary process.

Another object of the invention is to weave fabrics of greater width than heretofore.

The width of the fabric hitherto produced has been limited, as is well known, by the length of pile-wires available without encountering the following disadvantages, namely: (*a*) liability of the wires to buckle or bend in passing into or through the shed; (*b*) necessity for running the body of the loom at a slow rate, in order to give time for the long wire to enter the shed before the slay closes it up; (*c*) heavy strain on the wire in drawing out, as a result of the greater number of threads tightly bound over it, and consequent breakage of wire-head or drawing-out mechanism; (*d*) liability of the long wire to turn on its side as figure-threads are drawn down over it, and (*e*) excessive width of space for the loom, owing to the necessity of providing at the side of the loom space for the manipulation of the elongated wires.

In my improved loom instead of using transverse pile-wires I arrange the pile-wires parallel to the warp-threads and attach them to the slay in numbers proportionate to the greatest width of fabric desired to be woven. I effect an economy in the weight of yarn by using face or figure yarns of one-half the weight required by the ordinary process, and raise one of these yarns two or more times to form each pile loop or stitch of the design, by which means I fill up the lateral space allotted to the stitch in the fabric. This result is due to both loops being formed on the same wire, which passes through them in the direction of the warp, and thus a tendency is given to the two loops to form one compact loop or stitch when the pile is cut and fill the allotted space in the fabric better than the single loop of yarn of ordinary thickness when woven by the usual process. The method by which this is to be accomplished will be understood when I have described the novel mechanism which I adapt to a Brussels or Wilton carpet loom, from which the whole of the ordinary wire-motion used to insert the pile-wires is discarded as unnecessary.

In the accompanying drawings, Figure 1 shows in side elevation so much of a carpet-loom with my improvements applied thereto as will serve to explain the nature and operation of my invention. Fig. 2 shows the reed, on an enlarged scale, detached from the slay and having adjacent to and in rear of it a hanging comb or false reed. Fig. 3 is a front view of the slay, showing the means whereby the false reed is secured thereto. Fig. 4 shows, on an enlarged scale, the form of the pile-wires employed and the means for carrying the same. Figs. 5 and 5ª are detail views of the bar in which the wires are held in position for receiving the loops of warp. Fig. 6 shows, on an enlarged scale, the cam employed for giving the false reed an endwise reciprocating motion. Fig. 7 is a side view illustrating the means of driving rotary cutters for cutting the pile-loops. Fig. 8 is a front view of part of the reciprocating false reed.

Referring to Fig. 1, A is the ordinary slay or lathe. B is the breast-roller or work-beam. B′ are the warp-beams, and C indicates the series of pile-wires which are arranged lengthwise of the loom to lie parallel to the warp-threads D.

In front of the slay, looking from the work-beam, is suspended a horizontal bar of iron C′ by its ends, such bar extending about three inches beyond each side of the work to be produced. This bar is secured by bolts at its ends to two arms, one of which is shown at *c* as fixed on a shaft *c′*, mounted in fixed bearings c^2, attached to arms c^3, which are bolted to the ordinary framing of the loom. The bearings c^2 should stand immediately over the line to which the slay will beat up when fully forward. The arms *c*, which should not exceed three feet nor be less than two feet in length, are connected to the lathe by a pair of adjustable links c^4, which should be fixed as low down on the arms *c* as possible. The ends of the links c^4 which are attached to the lathe or slay are cranked downward, so that the pins on which they work may be as near the level of the lathe-bed as can be arranged, the object being that the motion to be communicated to the bar C′ should correspond as nearly as possible with that of the middle of the slay.

In the bar C′ grooves are formed (see Fig. 5) corresponding exactly with the dents in the reed or slay and of such width as to allow the ends of the pile-wires to fit in them firmly, the number and pitch of the grooves being regulated by the pitch of the reed.

The bar C′ is composed of two parts, the lower part being grooved to receive the wires and the upper part or cap-piece (screwed to the lower) serving to clamp the wires in their place. The lower part of this compound bar is planed down for about half its width to a depth somewhat exceeding the depth of the horizontal grooves in which the wires are inserted. Thus a shoulder is formed for the bent-down rear extremities of the wires to bear against. The horizontal grooves extend downward over the face of the lower part of the bar, (see Figs. 5 and 5^a,) and interlocking with these recesses is a shoulder formed by a wedge-shaped portion of the wires. The cap-piece is made to correspond so far with the rabbeted under part of the bar as to clamp the wires firmly when the cap-piece is fixed in place.

The wires when in position in the loom must project below the bottom of the bar to the full extent of their pile height, so that the tufts of yarn formed by them may pass freely under the bar. The wedge-shaped portion of the wire may be sharpened to a knife-edge, so that as it is brought forward in working the knife-edge will cut the loops formed on the wire and make them into tufts. Other classes of yarn require circular cutters revolving on a steel shaft, as indicated at E, Fig. 4. The lower edges of these cutters run in fine grooves cut in the upper face of the pile-wires, and a rapid rotary motion is given thereto by suitable means, as, for example, those shown in Fig. 7, in which 10 is a pulley on the crank-shaft of the loom, and 11 is a band passing over idler-pulleys 12, loose on the shaft *c′*, and running on a pulley 13 on the shaft of the cutters. When these rotary cutters are employed, the pile-wires will not be furnished with cutting edges, as above explained.

The pile-wires should be of sufficient length to reach from the bar C′ to about half an inch behind the reed and should be curved to correspond to the arc described by the bar in swinging backward and forward with the motion of the slay. The pile-wires may be reduced in pile height from a point about half an inch in front of the wedge to about an inch from the termination of the wire to facilitate passing to and fro through the loops, which are finally formed near the termination of the wire. The bar and its knives should be so set that not more than four or five loops remain uncut over the wire when the slay is fully back.

The ends of the wires which project through the reed terminate in a flat head, taking somewhat the form of a fish-tail. (See Fig. 4.)

The flat heads of the wires should be nearly in the middle of the shed formed by the figure-warp when raised for the design and the upper chain-warp when raised for the shuttle to pass under it.

For the purpose of laying the loops upon the wires a reciprocating false reed A′ (shown best at Fig. 2) is employed. This second or false reed is placed about an inch behind the true reed carried by the slay A. The mode of attaching the false reed to the slay and the means for giving it an endwise reciprocating motion are clearly shown at Fig. 3 and its form and position with respect to the true reed, on an enlarged scale, at Fig. 2. The pitch of this false reed, it should be remarked, corresponds with that of the true reed.

The false reed A′ is best made with one rib only, and it will then resemble a comb, and it is further preferable that the teeth composing it should taper or be reduced in thickness from their middle to their lower or free end to about half that of their upper or rib ends, as illustrated in Fig. 8, but this is not essential. The rib of the false reed A′ is gripped by three or more clips of thin steel *a*, about three inches wide and one-sixteenth of an inch thick, shaped to fit the rib and curved to pass as close as possible over the cap which secures the true reed in position. The clips are riveted together, so as to firmly clasp the rib, and are bolted to a bar A^2, which slides in bracket-guides *a′*, attached to the ends of the lathe-swords. These guides are so formed as to allow the bar A^2 to move freely just clear of the cap of the reed.

All the threads are put through both the true and the false reeds in the same order, though the order may be varied as regards the chain-warps, if desired.

In weaving, the threads of the figure-warp which are required to form the pile are raised by the jacquard in the ordinary way, but when the threads to form the pile are about

to be raised the false reed is traversed laterally, say to the right, rather more than the width of one division or split of the reed. Consequently as the figure-threads rise they are deflected to the right and pass upward on the right-hand side of the pile-wires. When they have passed the wires in their upward movement, the back or false reed is traversed rather more than the width of two splits to the left, whereby the figure-threads are pushed against the left side of the front-reed splits and in descending pass downward on the left side of the pile-wires, thus giving them a turn over the wires from right to left. When the threads have passed the wires in their downward movement, the back or false reed is traversed about the width of one split of the front reed to the right and thereby returned to its original position. When the figure warp-threads have fallen to their lowest point, one or more wefts is shot over them and beaten up, as usual. This forms the first loop of half-thickness yarn, of which two are required to make one complete stitch of the design, and the second loop is formed in a similar manner by raising the same threads (or others, if a mottled effect is desired) and binding with a second or more wefts.

From the foregoing description it will be understood that the means for forming the terry-loops is equally applicable to face-warps of the ordinary or half the ordinary thickness.

Where yarns of the full thickness are used, the threads forming the figure may be changed at each lift of the jacquard, but in this case no saving in the weight of yarn is effected, the advantage being limited to the power to produce wide carpet and the reduction in the width of the loom in consequence of the discarding of the ordinary wire-motion. When a sufficient number of loops is formed on the wires, they will come in contact with the cutters or cutting edges of the wires by the automatic "take-up" motion of the loom and be cut through, thus releasing the wires and forming the cut-pile surface.

The actual amount of traverse of the false reed to lay the loops upon the wires, as above explained, will depend upon the distance between the true and false reed, a greater traverse being required as the distance between them is increased. To accomplish this traversing of the false reed, a plate of iron a^2 is attached to the back of the shuttle-box, (see Figs. 1 and 3,) to which is fixed a stud bearing a chain-wheel F. This chain-wheel carries on its inner side a cam F′, the approximate shape of which is indicated, (on an enlarged scale,) detached, at Fig. 6.

Referring to Fig. 3, an angle-lever F^2 will be seen working on another stud on the plate a^2, carrying on its horizontal arm a bowl which bears on the cam F′ and is kept down on it by the pressure of a spring *f*. The vertical arm of the lever F^2 is connected by an adjustable link F^3 to the bar A^2 and communicates to it a reciprocating motion derived from the cam F′. The chain-wheel F receives its motion, through a chain F*, from a similar wheel F^4, (but containing half the number of teeth,) keyed on the crank-shaft G of the loom, and it therefore makes one complete revolution in two beats of the slay. This chain F* is shown in Fig. 1 as passing over two deeply-flanged pulleys H H, attached to the frame of the loom at a convenient height. As the to-and-fro movement of the slay alternately slackens and tightens the chain, a compensation double pulley and lever arrangement (of a well-known type) may be applied to the chain, as indicated in Fig. 1, or any other convenient means of counterbalance or spring may be used. The chain-wheels should have wide and deep flanges to direct the chain correctly onto the studs on the wheels.

What I claim is—

1. In a loom for weaving cut-pile fabrics, the combination with the slay and harness, of a set of pile-wires arranged lengthwise of the loom, a bar carrying said wires and connected with and deriving motion from the slay, a false reed carried by the slay and means of giving a transverse reciprocating motion to said reed relatively to the slay for deflecting the face warp-threads as actuated by the harness to the right and left of said wires to lay pile-loops thereon, and an automatic cutting device for disengaging the woven fabric from the pile-wires; substantially as herein described.

2. The combination with the slay, of the rock-shaft *c*′ arranged transversely in the loom and fixed bearings c^2 for said rock-shaft, the arms *c* attached to said rock-shaft, the clamping-bar C′ carried by said arms, the pile-wires C carried by said bar, and links connecting said arms with the slay to give motion to said bar and the pile-wires; substantially as herein described.

ALBERT WEBB.

Witnesses:
W. EDW. WILLIAMS,
THOMAS HOLDS.