

No. 743,943.

PATENTED NOV. 10, 1903.

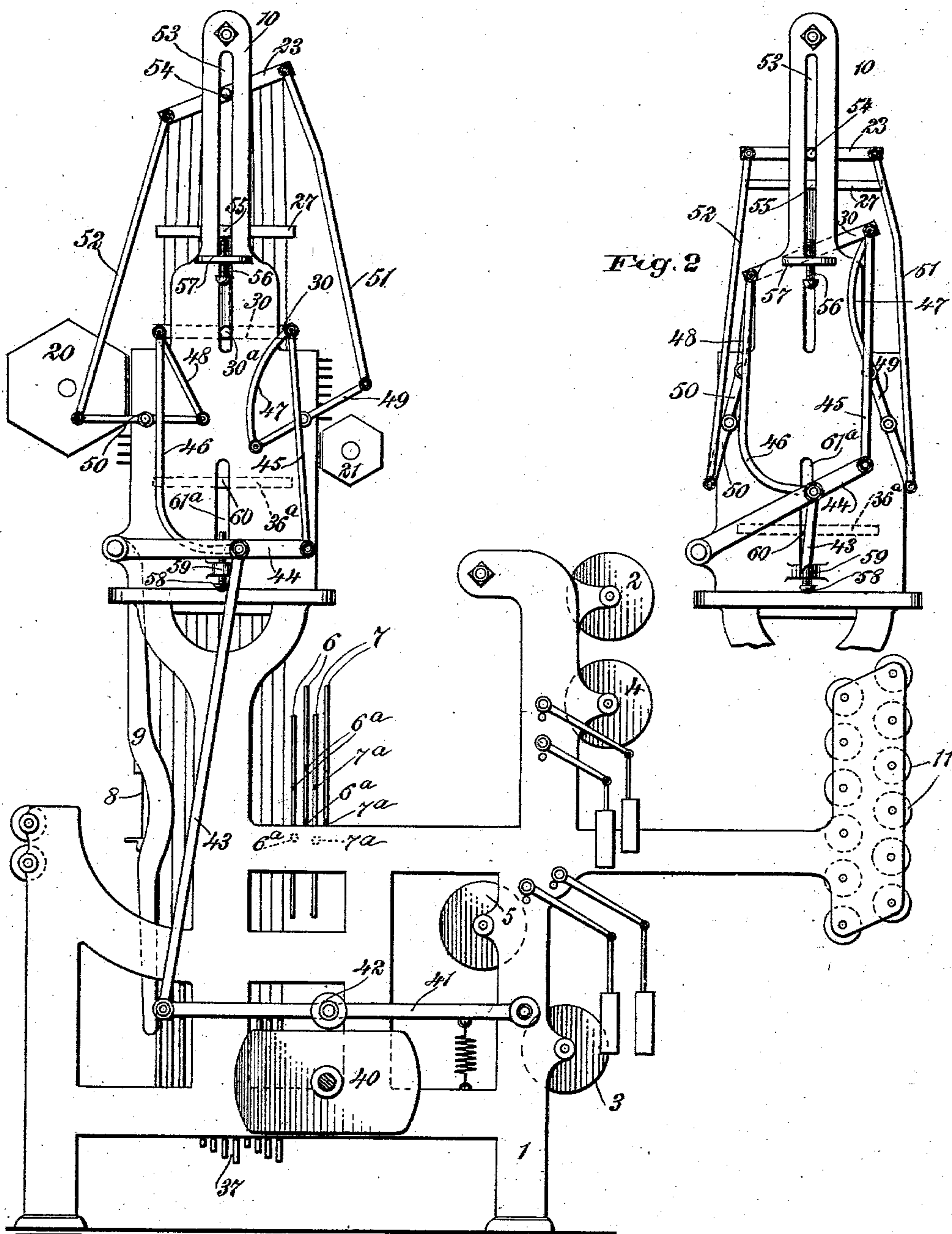
J. W. SMITH.

LOOM FOR WEAVING FIGURED DOUBLE PILE FABRICS.

APPLICATION FILED JAN. 4, 1902.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

John W. Smith
Walton Harrison

Fig. 1

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BY

Mum

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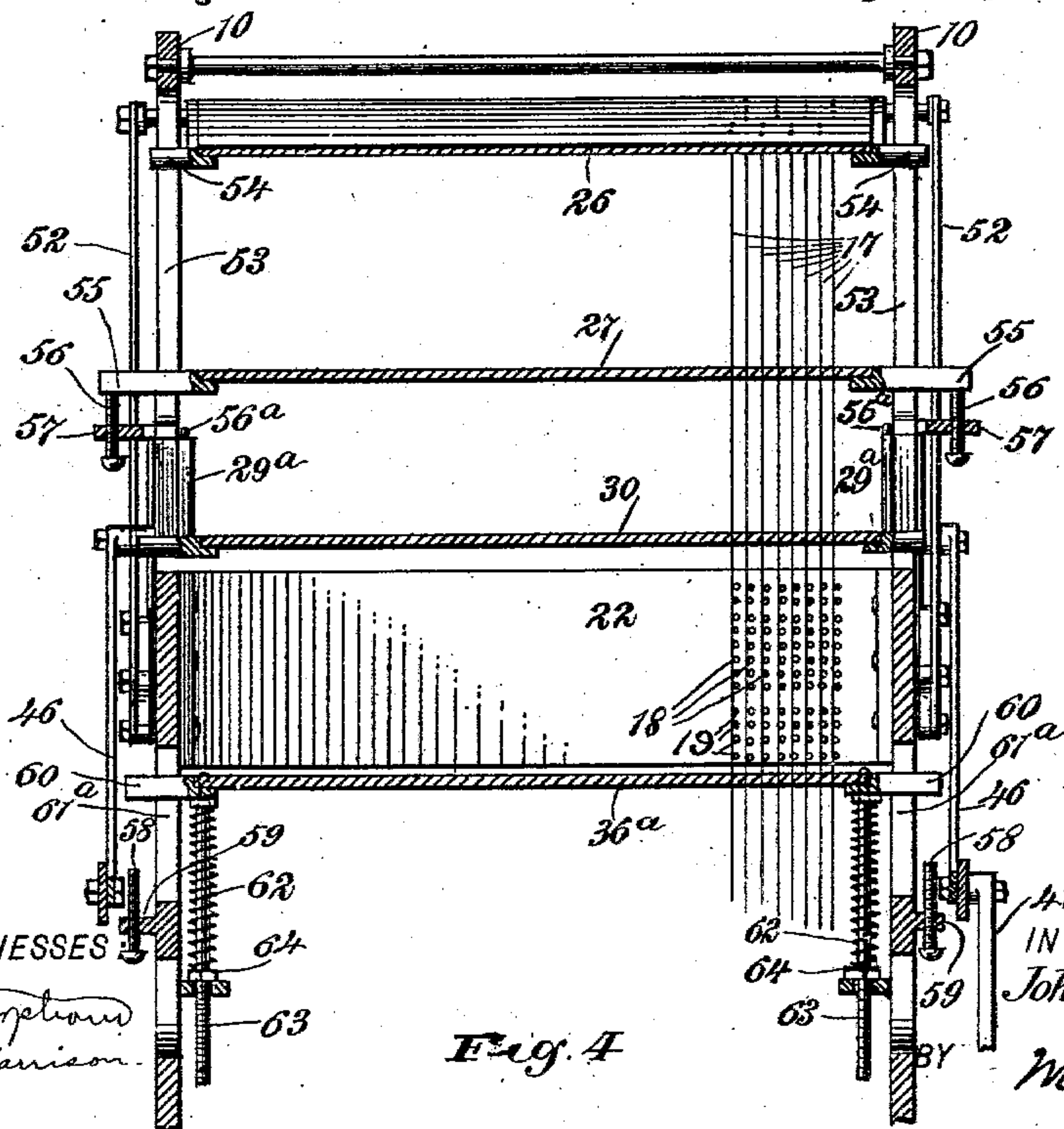
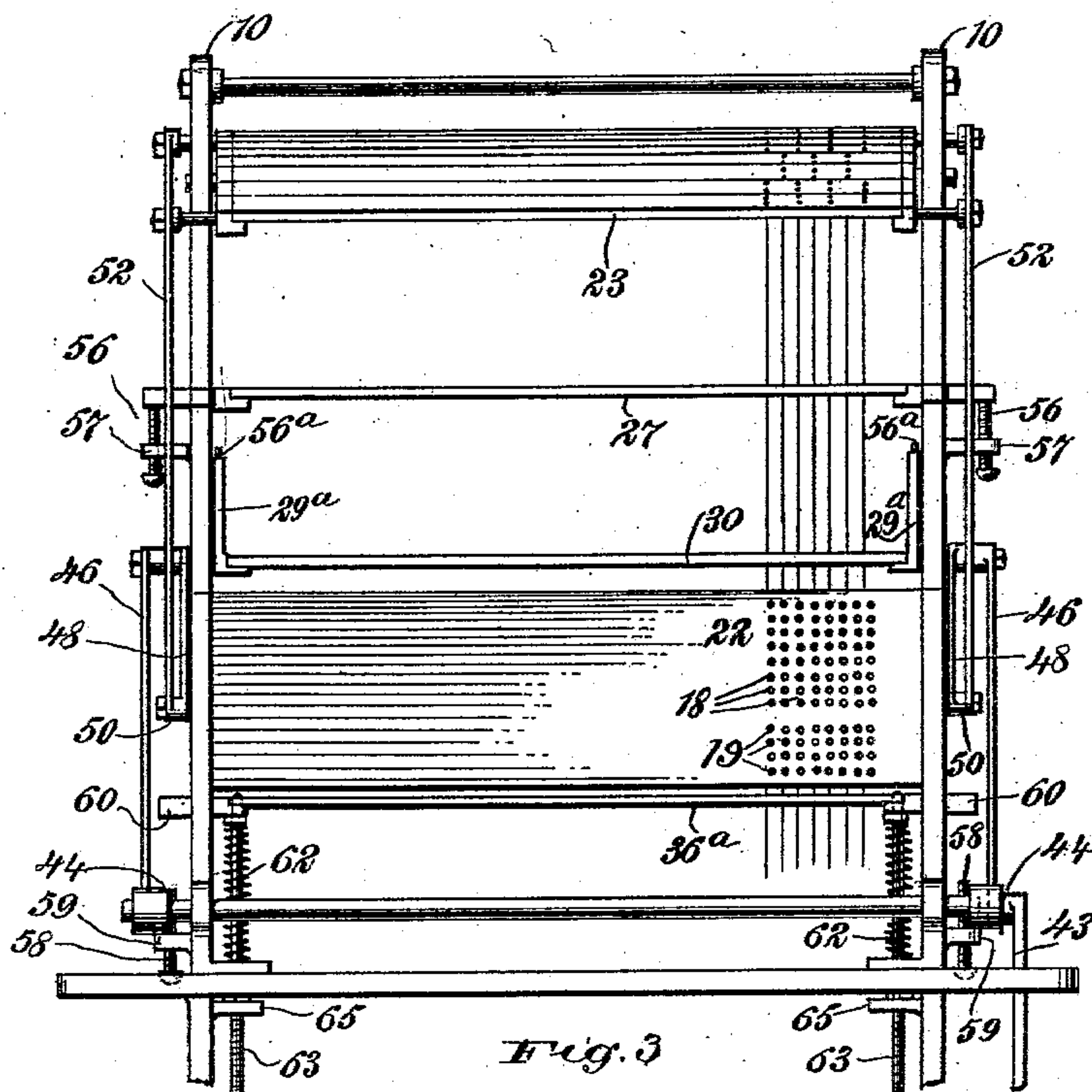
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NO MODEL.

5 SHEETS—SHEET 2.



WITNESSES

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Fig. 4

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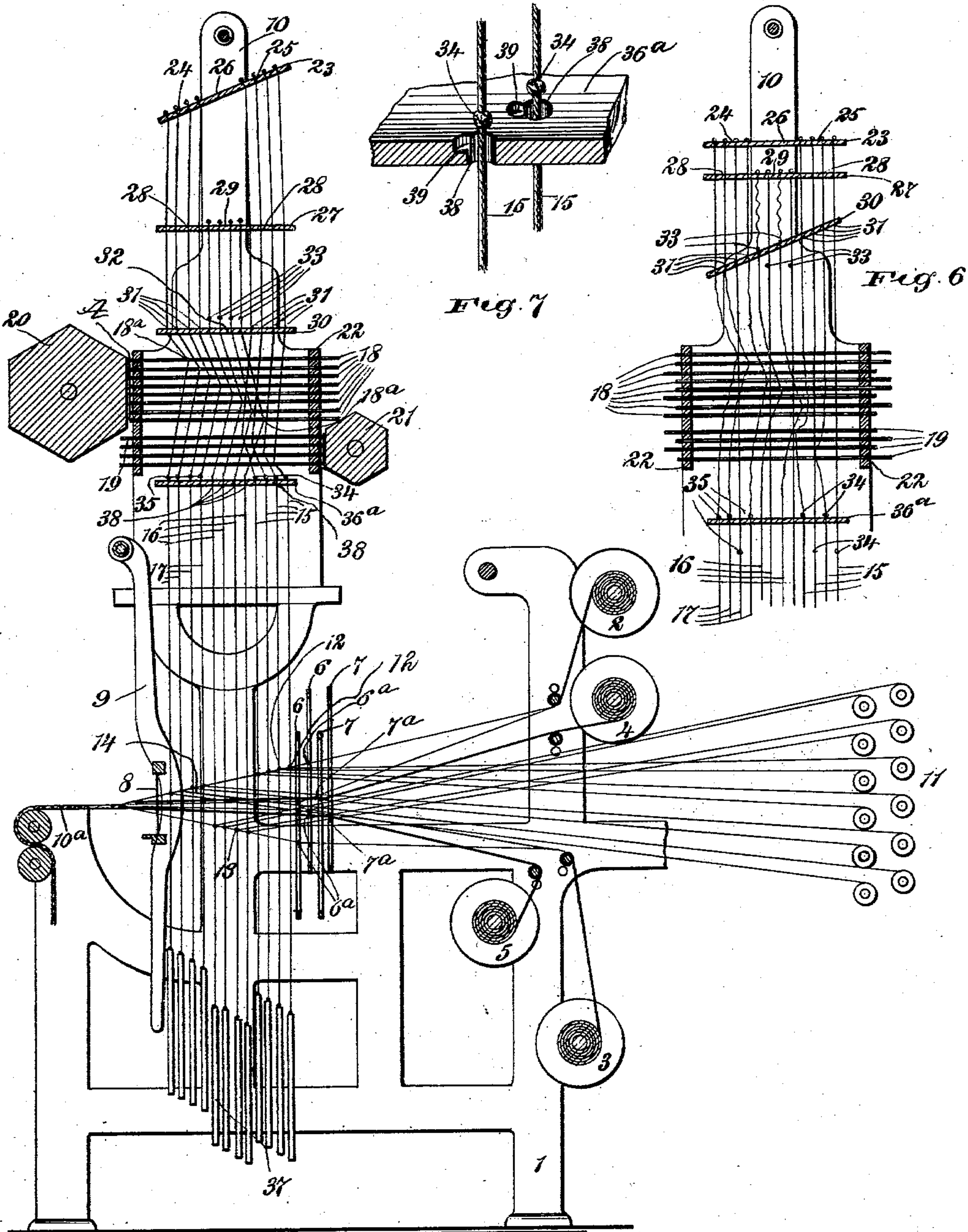
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NO MODEL.

5 SHEETS—SHEET 3.



WITNESSES:

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Fig. 5

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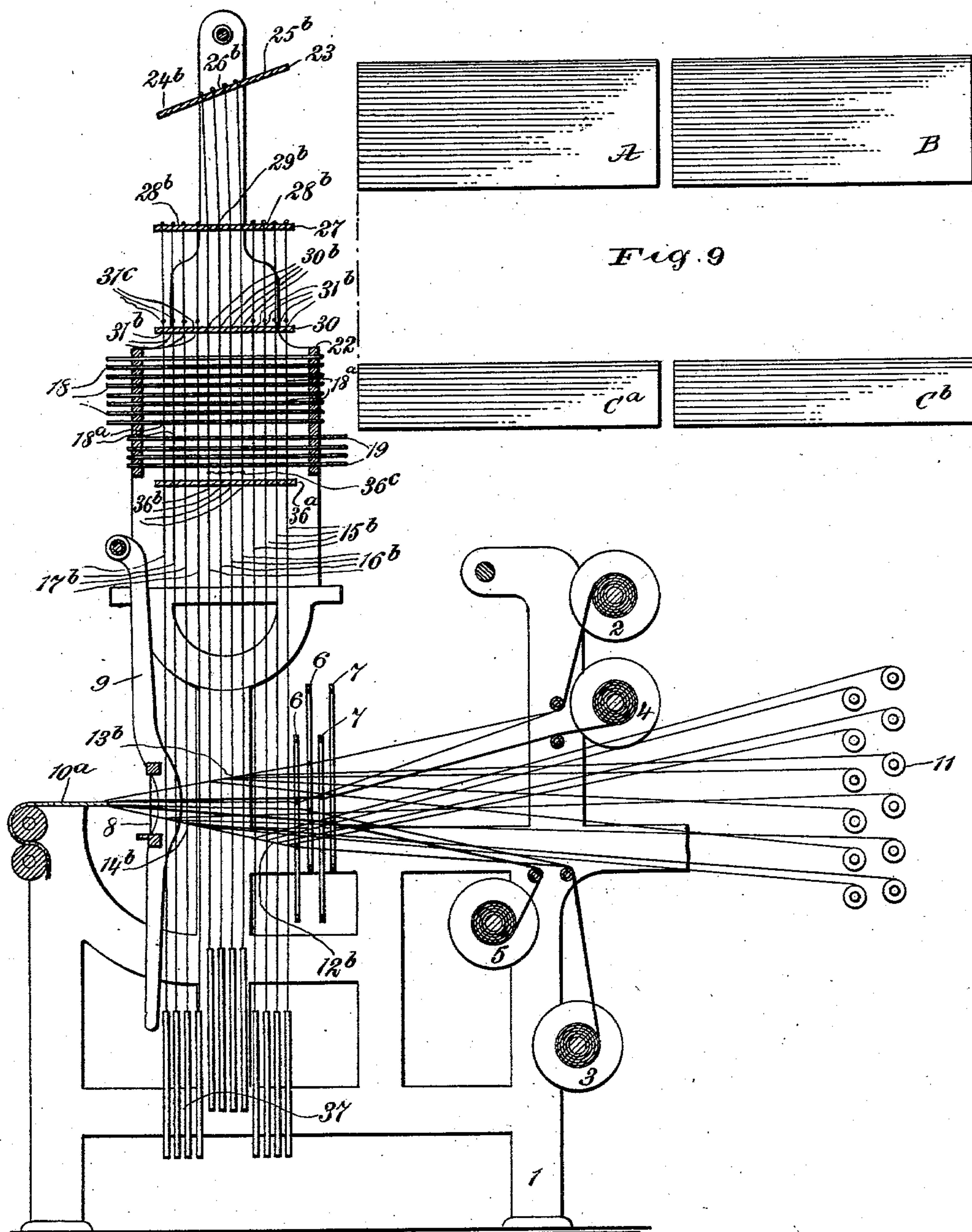
J. W. SMITH.

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APPLICATION FILED JAN. 4, 1902.

NO MODEL.

5 SHEETS—SHEET 4.



WITNESSES:

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Fig. 8

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5 SHEETS—SHEET 5.

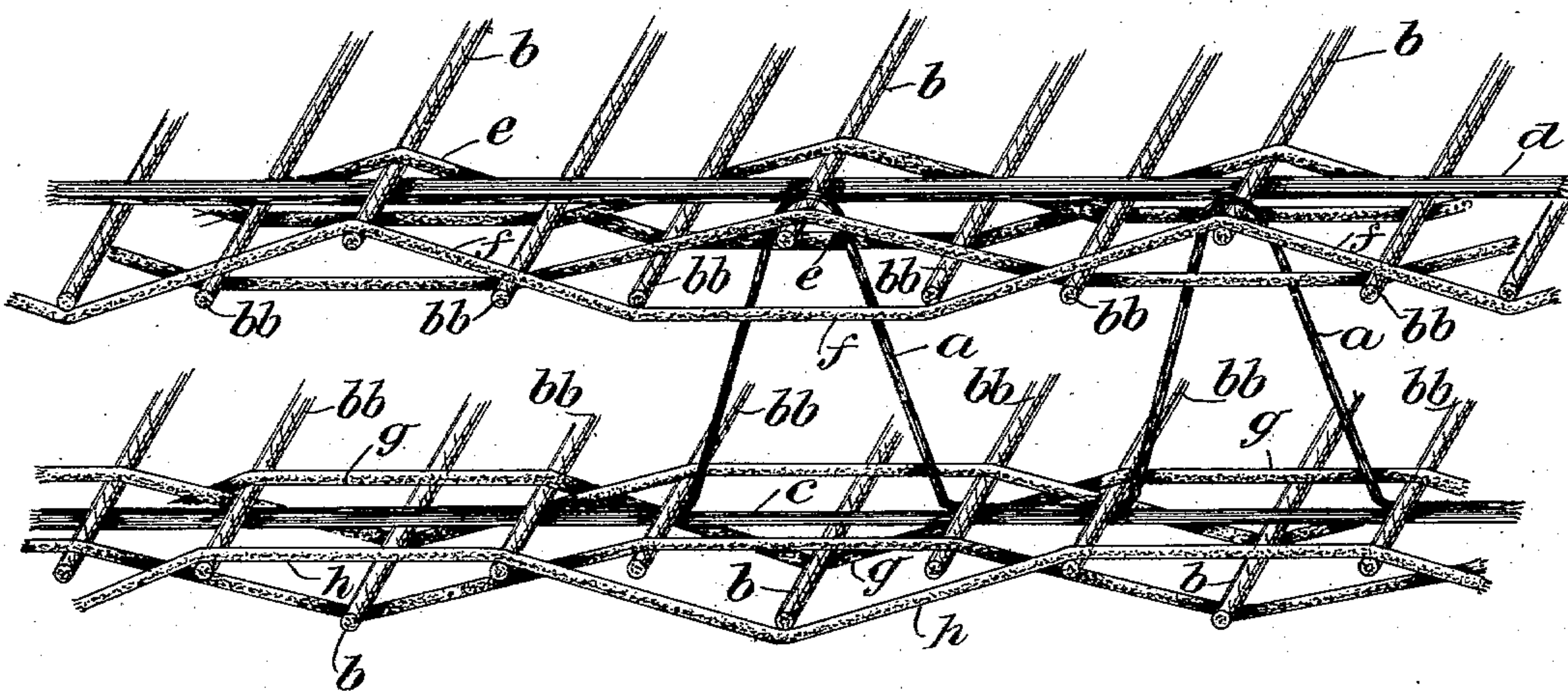


Fig. 10

WITNESSES:

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BY

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ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN W. SMITH, OF AMSTERDAM, NEW YORK.

LOOM FOR WEAVING FIGURED DOUBLE-PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 743,943, dated November 10, 1903.

Application filed January 4, 1902. Serial No. 88,397. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. SMITH, a citizen of the United States, and a resident of Amsterdam, in the county of Montgomery and State of New York, have invented a new and Improved Loom for Weaving Figured Double-Pile Fabrics, of which the following is a full, clear, and exact description.

My invention relates to looms of the type used in weaving figured double-pile fabrics, and embodies improvements upon looms of a class of which Patent No. 354,358 to T. I. Shuttleworth is an example.

My loom admits of general use for the purpose stated, and is peculiarly appropriate for weaving figured three-shot velvets.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of my complete loom. Fig. 2 is a fragmentary elevation of a part of the jacquard mechanism. Fig. 3 is a fragmentary elevation of the parts shown in Fig. 2, but taken from the left at right angles to said figure. Fig. 4 is a fragmentary section showing the same parts that are shown in Fig. 3. Fig. 5 is a section, partly in elevation, of my complete device, showing the first or end row of harness-threads. Fig. 6 is a fragmentary section of the jacquard apparatus. Fig. 7 is a fragmentary view of one of the lifting-boards. Fig. 8 is a view somewhat similar to Fig. 5, but showing the second row of harness-threads. Fig. 9 shows the arrangement of the kind of card-sections used upon the jacquard-cylinders; and Fig. 10 represents a double-pile fabric—that is, two carpets face to face—to be cut apart so as to leave a velvet surface three-shot velvet.

Upon the frame 1 are revolubly mounted the beams 2 and 3, carrying the upper and lower ground-warps, and the beams 4 and 5, carrying the filling-warps. The heddles for the ground-warp threads are shown at 6 and are provided with two mails 6^a, while the heddles 7 for the filling-warps have a single mail 7^a, as usual. The reed is shown at 8 and is movable by the pendulous lay-swords 9 in the usual manner.

Upon the upper portion 10 of the frame is mounted the jacquard apparatus or device

for producing figures in the fabric to be woven. The pile-threads are fed from the spools 11 for this purpose.

The finished fabric is shown at 10^a and represents two carpets woven together and ready to be cut apart. The harness-threads all pass through eyes 18^a of the jacquard-needles 18 19.

Instead of using one long jacquard-cylinder provided with three sets of card-sections arranged end to end and converging the harness-threads to a focus, as in the old system, so as to compensate for the length of the cylinder, I use two cylinders—a large one, 20, at the front and a small one, 21, at the back of the jacquard apparatus—and I make these cylinders just two-thirds of the usual length. By this means I avoid any necessity for converging the harness-threads and can arrange the latter perpendicularly. There being no convergence of the harness-threads, the jacquard apparatus can be lowered considerably, thus shortening the harness-threads proportionately. Heretofore this proposed lowering of the jacquard, though much desired, has not been found practicable, for the reason that the great length of the cylinder, and consequent great width of the entire jacquard apparatus, has made the converging angles of the harness-threads so great that the jacquard apparatus could not be lowered without causing some of the harness-threads to deviate too far from the perpendicular. In order to accomplish this purpose instead of using three sets of card-sections employing cards all of the same size and denominated A, B, and C, I use sections A and B of the same size, and I make two other sections C^a C^b, employing cards of just one-half the usual width, as indicated in Fig. 9. The narrow cards run upon the smaller cylinder 21, and the larger cards run upon the larger cylinder 20. The larger cylinder operates upon the eight upper rows of jacquard-needles 18, while the smaller cylinder operates upon the four lower rows 19. The cylinders actuate the needles in opposite directions.

By the above-described arrangements the number of harness-threads may be the same as in the old system, and yet the harness-threads may be shortened, and that, too, without occasioning the use of any cards larger than those heretofore employed. Large cards

are easy to break and hard to handle and also harder to replace when damaged. Of course the holes in the cards are arranged in the form of new designs suitable to the new system.

5 Movably mounted in the extreme upper portion of the frame 10 is a board 23, which takes the place of both a lifter-board and a rest-board. This board is provided with rows of holes, the odd-numbered rows comprising
10 holes 24 25 for accommodating the groups of harness-threads 15 and 17 and also provided with a blank space 26, corresponding to the space occupied by the middle group of threads 16, while the even-numbered rows comprise
15 holes 26^b between spaces 24^b 25^b. Immediately below this board is another board 27, which takes the place of both a comb-board and a guide-board and has a combined function equal to that heretofore exercised by said
20 boards. This board 27 is provided in the said odd-numbered rows with two blank spaces 28, corresponding to the groups 15 and 17 of harness-threads, and with a centrally-disposed group of holes 29, in which the middle group of harness-threads 16 is secured,
25 and in said even-numbered rows is provided with two groups of holes 28^b, engaging groups of harness-threads 15^b 17^b, between which is a central group 29^b, engaging the group of
30 harness-threads 16^b. Below this board is a third board 30, provided in the even-numbered rows with groups of holes 31 32, through which the groups 15 and 17 of the harness-threads pass, and also with a central group
35 of holes for engaging the knots 33 upon the central group of threads 16, and in the odd-numbered rows provided with two groups of holes 31^b for engaging the groups 15^b 17^b of harness-threads, for which the knots 31^c are
40 provided, and with a central group 30^b for engaging the harness-threads of group 16^b. Below the jacquard-needles is a fourth board 36^a, provided also with three groups of holes 36^b, the central group being adapted to en-
45 gage the knots 36^c upon harness 16^b.

Adjacent to the holes 38 in the board 36^a there are provided notches 39 for the purpose of engaging the knots 34 35 in the harness-threads 15 and 17. Somewhat similarly the
50 knots 33 of the group 16 of harness-threads engage the notched eyes in the center of the board 30. In Fig. 7 the notches of the eyes are shown as upon the left of the threads. This would be the case at the lower right-hand
55 side of the board 36^a, where said board engages the groups of threads 15. At the left of said board, however, where the notches 35 engage the group of threads 17, the position of the notches will be reversed, so that the notches
60 39 will be at the right of the threads instead of at the left thereof. In the board 30 the notched eyes engaging the knots 33 are at the right of the threads. The reason of this arrangement is that the large cylinder 20 moves
65 the needles actuated by it to the right, whereas the cylinder 21 moves the needles actuated by it to the left, and as this last-mentioned

cylinder only actuates four needles it is obvious that the four threads controlled by said four needles must engage eyes in which the
70 notch is upon the left of the threads. It is for this reason that Fig. 7 is shown with its notches upon the left of the threads. The usual structure having the notches at the right of the threads it is not deemed neces-
75 sary to show as embodying the ordinary method of notching the board.

The above-described action takes place in the odd-numbered rows of holes and threads shown in Fig. 5. In the even-numbered rows
80 (shown in Fig. 8) the action is nearly the same, except that the position of the knots relatively to the boards is reversed—that is to say, board 23 has a group of holes 26^b between two blank spaces 24^b 25^b, board 27 has
85 two groups of holes 28^b for engaging knots upon the harness-threads and an intermediate group 29^b for guiding the plain harness-threads 16^b, board 30 has groups of holes 31^b for engaging knots 31^c and a central group 30^b
90 for guiding the plain threads 16^b, while board 36^a has holes 36^b, provided with notches, for engaging the knots 36^c.

It is desirable to so actuate the several boards that the boards 23 and 30 shall not only
95 move vertically, but shall also tilt obliquely to their normal positions, as indicated in Figs. 5 and 6, respectively. The reason of this arrangement is that the harness-threads when raised may depend from supports which have
100 substantially the same shape as the shed. By this arrangement the threads can be made several inches shorter than if the boards move in horizontal positions only. The advantage
105 of making the harness-threads shorter may not be obvious at the first glance; but its importance should not be underestimated. It should be remembered that there are, perhaps, thirteen hundred of these harness-threads and that each of them undergoes constant wear
110 and tear. When one of these threads breaks, it must be replaced, and the continual replacing of such threads occasions a great waste of time. If the threads can be shortened even
115 a distance represented by a few inches, the saving in the time of the operatives is considerable, for the reason that every superfluous inch of length in these threads offers unnecessary opportunity for the threads to break.
120

The loom in its normal position is shown in Fig. 5, the weights 37 keeping the harness-threads taut. In Fig. 6 the mechanism is shown in a slightly-different position, representing the changes wrought by a stroke of
12 the machine. From the position shown in Fig. 1 the board 23 becomes horizontal and is slightly lowered. The board 27 being already horizontal, moves upward tolerably close to the board 23 and for an instant pauses in a
130 position parallel therewith. The board 30 moves upward a slight distance and assumes the position shown in Fig. 6, being substantially parallel with the position shortly before

occupied by the board 23. The board 36^a is simply lowered, it being always parallel with the board 27. All of the parts next revert to their original positions. The mechanism for accomplishing these movements of the boards can perhaps be more clearly seen in Figs. 1 to 4, inclusive. The cam 40, which is revolvably mounted upon the frame, actuates the lever 41 by means of the roller 42. The pitman 43 is thereupon reciprocated vertically and causes the lever 44 to be rocked. Upon the outer or free end of this lever is pivoted a straight rod 45 and a curved rod 46, which are pivoted to the board 30 and to the two links 47 48, which actuate the levers 49 50. From these levers there extend pitmen 51 52, connected to opposite sides of the board 23. The board 30 is supported directly upon the links 47 48 and is actuated thereby. The board 27 is not directly connected with any of the levers, but is actuated by means of the dollies 29^a, carried by the board 30 and upon the ends of which are provided adjusting-screws 56^a. The board 30 by moving upward causes the dollies to engage the under side of the board 27 and simply lift the same bodily. The dollies 29^a move in slots 53 in the portions 10 of the frame, and thereby keep the board 27 in horizontal position, notwithstanding the oblique position of the board 30. The dollies 29^a are loosely pivoted to the board 30 for this purpose. The slots 53 also act as guides for the bosses 54, 55, and 30^a on the boards 23, 27, and 30. Adjusting-screws 56 and 58 are mounted in lugs 57 and 59 for the purpose of limiting the downward movement of the boards 27 and 36^a. By adjusting these screws the play of the boards can be regulated within certain limits. Slots 61^a serve as guides for the board 36^a by engaging the bosses 60, which slide therein. Springs 62 engage the lower surface of the board 36^a and normally press the same upward. Through these springs there pass rods 63, upon which the nuts 64 are adjustably screwed, for the purpose of regulating the tension thereof. The upper ends of the rods 63 extend into openings in the board 36^a, so as to permit the said board to be lowered, and when lowered the ends of the rods project above said board. This lower board 36^a is normally pressed upward by these springs and is carried downward solely by the tension of the threads which engage it by means of the knots, as indicated in the lower part of Fig. 6.

The operation of my device is as follows: Supposing the apparatus and threads to be arranged in the position shown in Fig. 5 and that the cam 40 is being rotated, the weaving is accomplished as follows: The upper and lower ground-warps and the filling-warps are successively crossed by the heddles, forming oppositely-disposed sheds, through which the shuttle passes in the usual manner. The pile-threads being threaded through the eyes of the harness-threads will of course enter the fabric according to the relation in which the

harness-threads are raised and lowered. A composite design or pattern having been placed upon the two jacquard-cylinders, as above described, the successive lifting of the individual harness-threads controlling the different pile-threads disposes the figure throughout the fabric as desired. As indicated in Fig. 6, for instance, the upper cylinder has pressed five of the upper eight needles to the right and the lower cylinder has pressed two of the lower four needles to the left. The result is that seven of the harness-threads are in position to be raised and lowered, five of them by the board 36^a and two of them by the board 30. Of course any desired designs may be placed upon the cards to be used and any amount of variation may be given to the apparatus as a whole. Various applications of the mechanism will suggest themselves to persons skilled in the art of weaving.

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

1. A loom for weaving figured double-pile fabrics, comprising heddles provided with mails for engaging ground-warp and filling-warp threads, harness-threads provided with eyes for engaging the pile-threads, means for actuating said harness-threads, a series of jacquard-needles provided with eyes for engaging said harness-threads and arranged in two groups free to move in opposite directions for the purpose of individually selecting said harness-threads, and separate cylinders for actuating the groups of needles.

2. A loom for weaving figured double-pile fabrics, comprising heddles provided with mails for engaging ground and filling warp threads, harness-threads provided with eyes for engaging pile-threads, means for actuating said harness-threads collectively, a series of jacquard-needles provided with eyes for engaging said harness-threads and arranged in two groups free to move in opposite directions for the purpose of selecting said harness-threads individually, and means independent of said harness-threads for positively actuating the groups of needles in opposite directions.

3. A loom for weaving figured double-pile fabrics, comprising heddles provided with mails for engaging the warp-threads, harness-threads provided with eyes for engaging the pile-threads, means for actuating said harness-threads, a series of jacquard-needles provided with eyes for engaging said harness-threads, said needles being arranged in two groups free to move in opposite directions and a plurality of jacquard-cylinders of unequal size and located upon opposite sides of said group of needles, for actuating the groups of needles in opposite directions.

4. A loom for weaving figured double-pile fabrics, comprising heddles provided with mails for engaging the ground and filling warp threads, movable and horizontally-disposed boards each serving as a combined

comber-board and guide-board, other movable boards disposed alternately therewith and each serving as a combined rest-board and lifter-board, said last-named boards being
5 mounted to tilt harness-threads engaging said boards and provided with eyes for engaging pile-threads, and means for actuating all of said boards.

5. A loom for weaving figured double-pile
10 fabrics, comprising heddles provided with mails for engaging the ground and filling warp threads, vertically-movable boards each serving as a combined comber and guide board, means for maintaining said boards in
15 horizontal positions at all times, vertically-movable boards each serving as a combined lifter and rester board, said movable boards being normally horizontal and parallel with the other boards but free to tilt obliquely
20 thereto, harness-threads engaging all of the said boards and provided with eyes for engaging warp-threads, and means for actuating all of said boards.

6. A loom for weaving figured double-pile
25 fabrics, comprising heddles provided with mails for engaging ground and filling warp threads, harness-threads provided with eyes for engaging pile-threads, and also provided with knots, boards for engaging said harness-
30 threads and free to move vertically for the purpose of raising and lowering said harness-threads, other boards arranged alternately with the first-named boards and provided with notched eyes for engaging said knots upon
35 said harness-threads, mechanism for causing all of the said boards to reciprocate vertically, and means for causing sundry of said boards to intermittently tilt obliquely relatively to other boards.

40 7. A loom for weaving figured double-pile fabrics, comprising a frame, heddles provided with mails for engaging ground and filling warp threads, harness-threads provided with eyes for engaging pile-threads, a plurality of
45 vertically-movable and horizontally-disposed boards each serving as a combined comber-board and guide-board, other vertically-mov-

able boards disposed alternately therewith and each serving as a combined rest-board and lifter-board, the last-named boards being
50 mounted to tilt, harness-threads engaging all of said boards, stops for limiting the movements of sundry of said boards, and means controllable at will for adjusting the position of said limiting-stops relatively to the frame. 55

8. In a loom, the combination of a plurality of slidably-mounted boards, the alternate boards being mounted to tilt, means for tilting the said alternate boards, and means for
60 sliding one of the other boards from one of the tilting boards, as set forth.

9. In a loom, the combination of horizontally-arranged and sliding boards, boards arranged alternately with the horizontal boards and mounted to slide and tilt, means for
65 operating the tilting boards, and an adjustable device carried by one of the tilting boards for engaging one of the horizontally-arranged boards to move it vertically, as set forth.

10. In a loom, the combination of vertically-
70 movable and tilting boards, horizontally-sliding boards arranged alternately with the tilting boards, means for tilting said boards, means carried by one of the tilting boards for engaging the upper horizontal board to move
75 it vertically, and a spring-pressed support for the lower horizontal board, as set forth.

11. In a loom, the combination with a plurality of vertically-slidable boards, the alternate boards being mounted to tilt, of a piv-
80 oted lever, means for rocking the lever, rods pivoted to the lever and to the lower tilting board, levers pivoted between their ends, pitmen connecting one end of each lever with the upper tilting board, and links pivoted to
85 the upper ends of the said rods and to the other ends of the levers, as set forth.

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

JOHN W. SMITH.

Witnesses:

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NELSON PEEK.