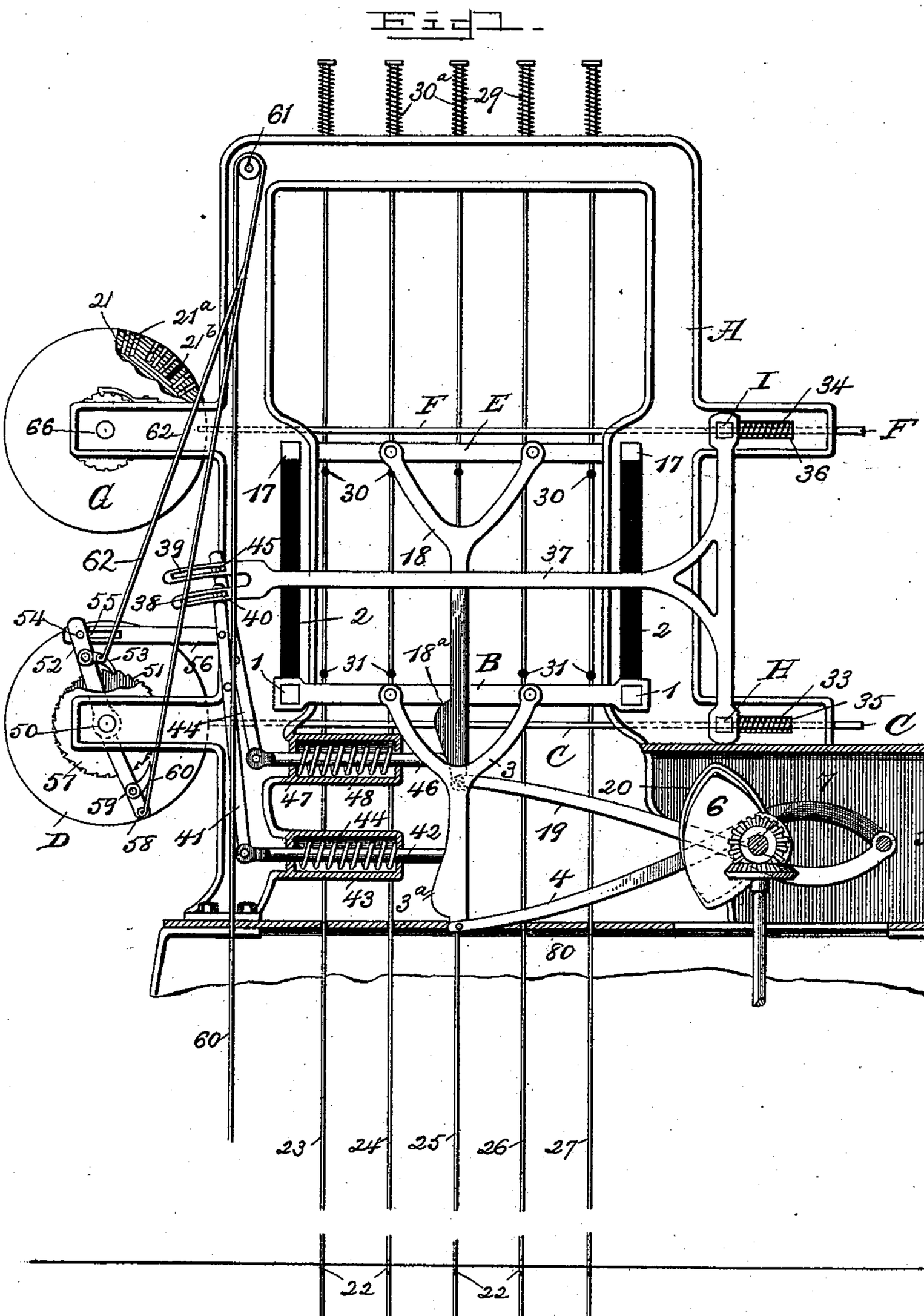
(No Model.) 6 Sheets—Sheet 1.

W. WEAVER.

JACQUARD MECHANISM FOR WEAVING DOUBLE FACED FABRICS.

No. 541,643. Patented June 25, 1895.



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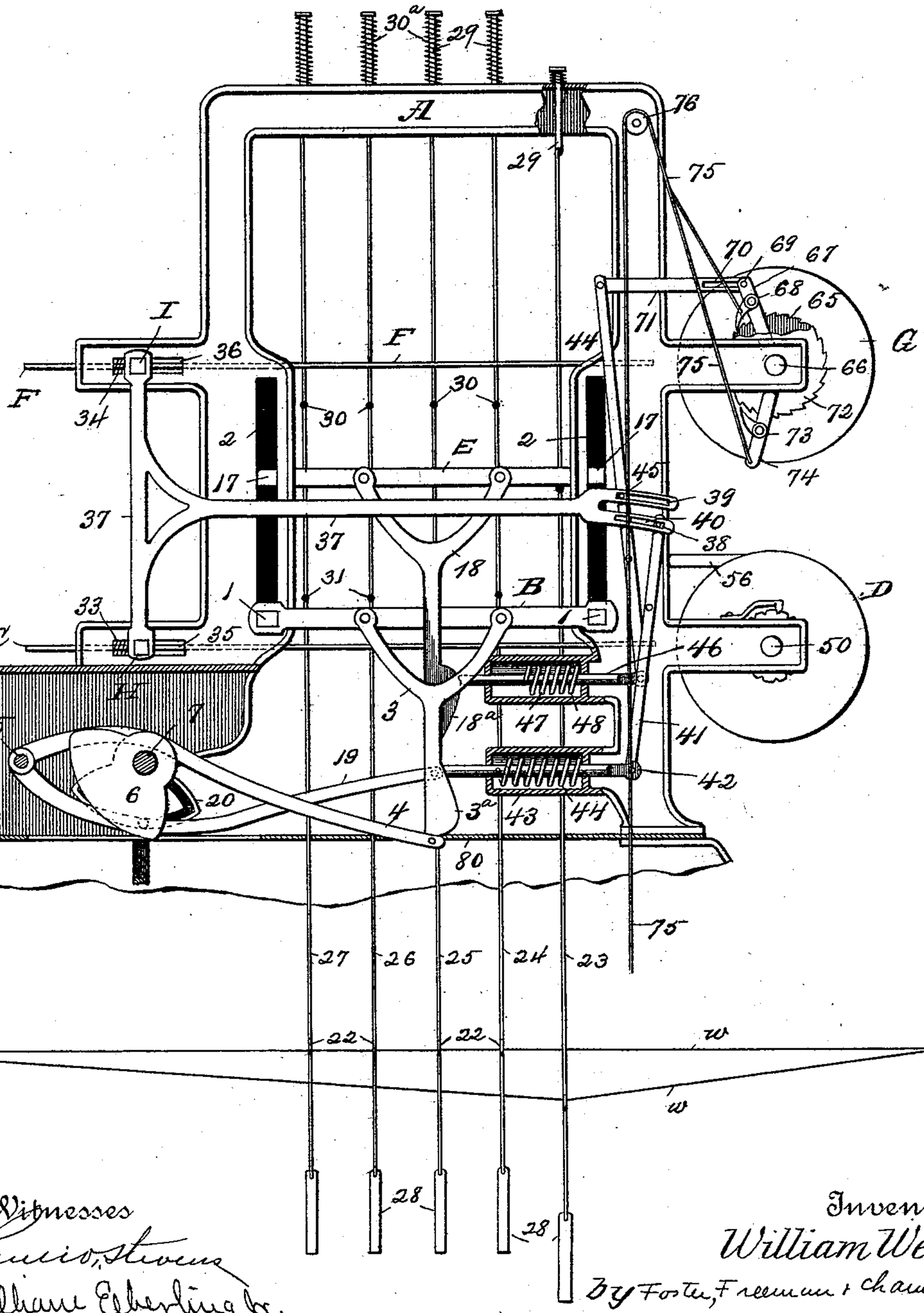
(No Model.) 6 Sheets—Sheet 2.

W. WEAVER.

JACQUARD MECHANISM FOR WEAVING DOUBLE FACED FABRICS.

No. 541,643. Patented June 25, 1895.

Fig 2.



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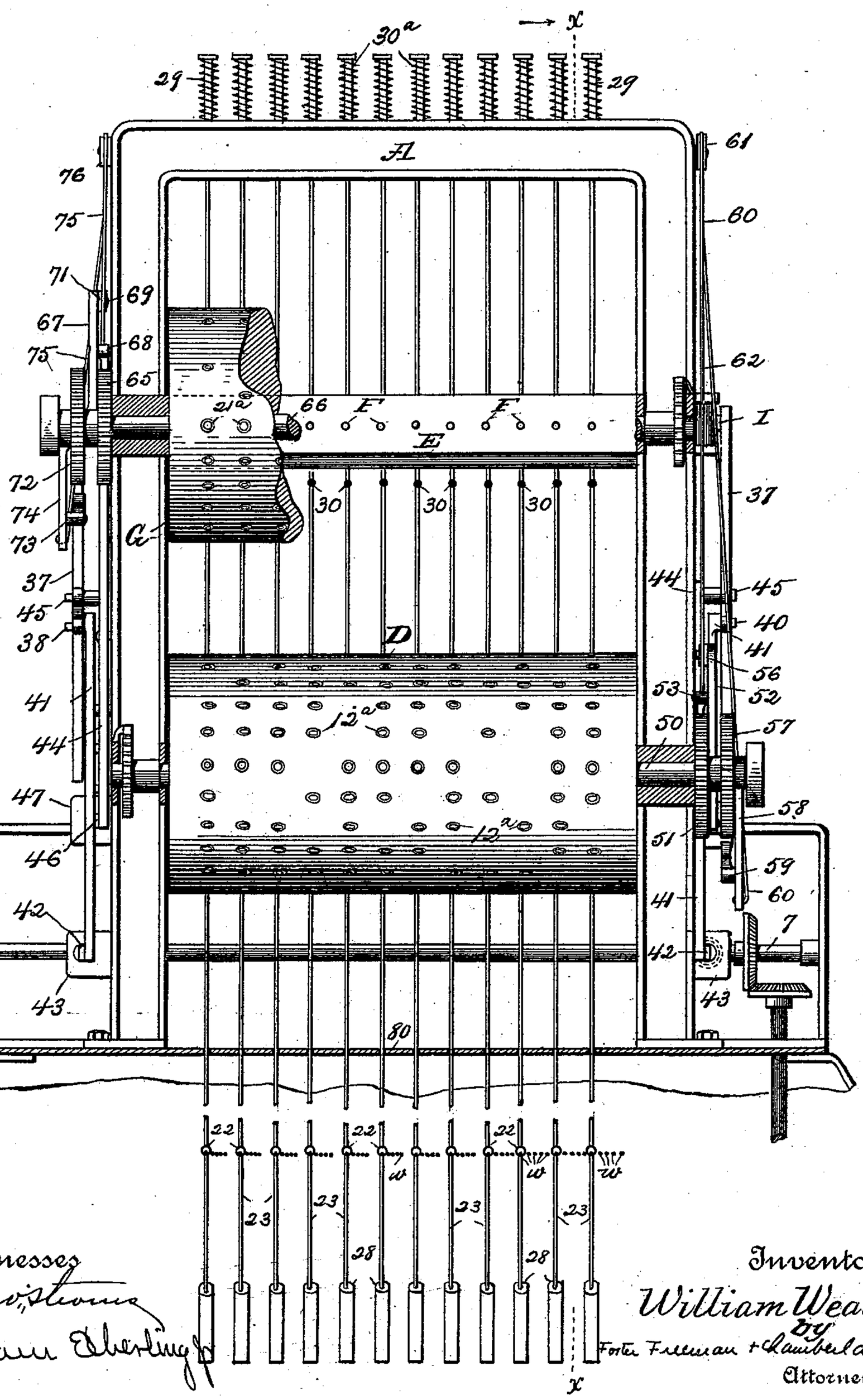
(No Model.) 6 Sheets—Sheet 3.

W. WEAVER.

JACQUARD MECHANISM FOR WEAVING DOUBLE FACED FABRICS.

No. 541,643. Patented June 25, 1895.

FIG 3.



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(No Model.) 6 Sheets—Sheet 4.

W. WEAVER.

JACQUARD MECHANISM FOR WEAVING DOUBLE FACED FABRICS.

No. 541,643. Patented June 25, 1895.

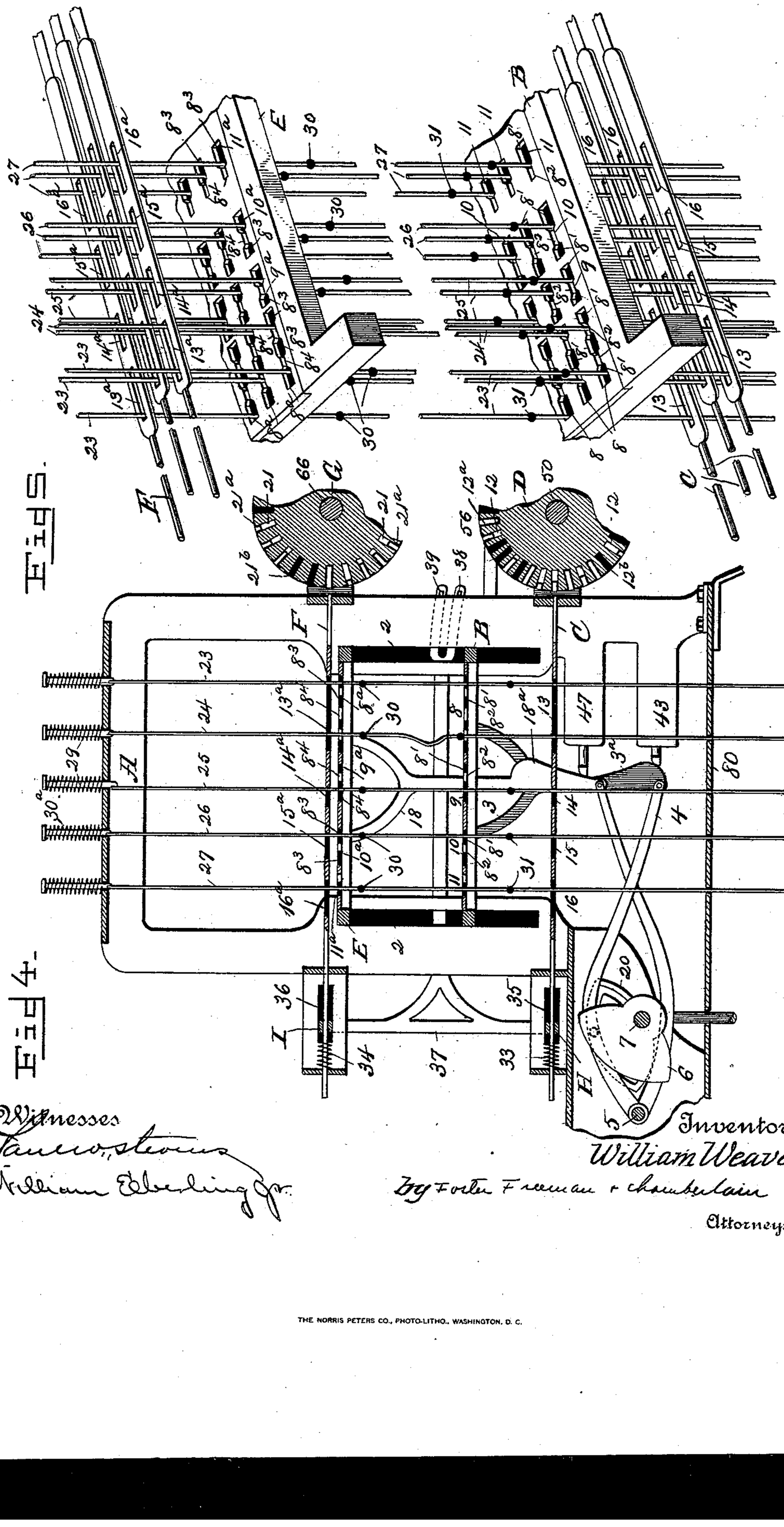

FIG. 4.

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(No Model.) 6 Sheets—Sheet 5.

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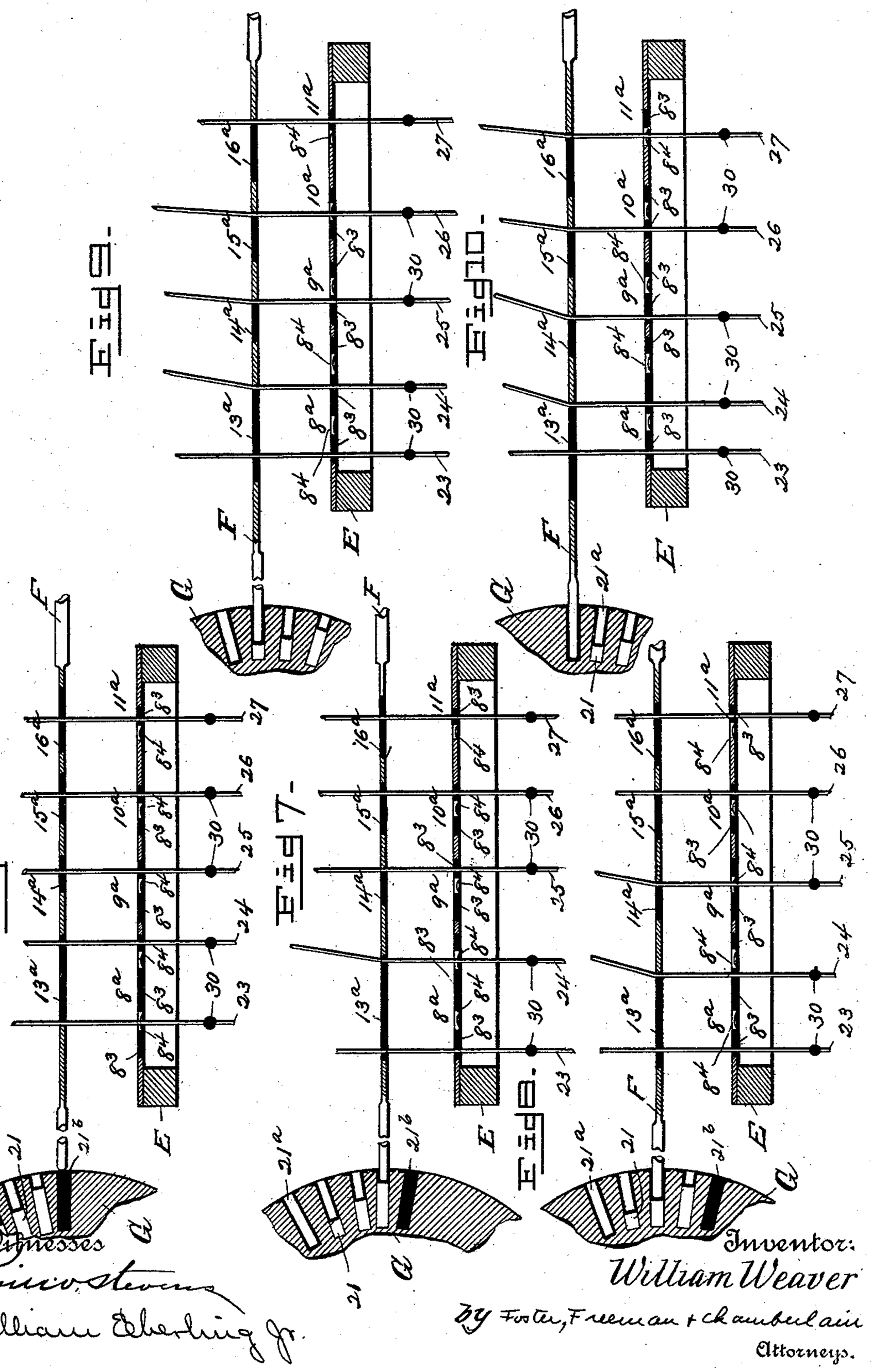
JACQUARD MECHANISM FOR WEAVING DOUBLE FACED FABRICS.

No. 541,643. Patented June 25, 1895.



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(No Model.) 6 Sheets—Sheet 6.

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JACQUARD MECHANISM FOR WEAVING DOUBLE FACED FABRICS.

No. 541,643. Patented June 25, 1895.

Fig 1.

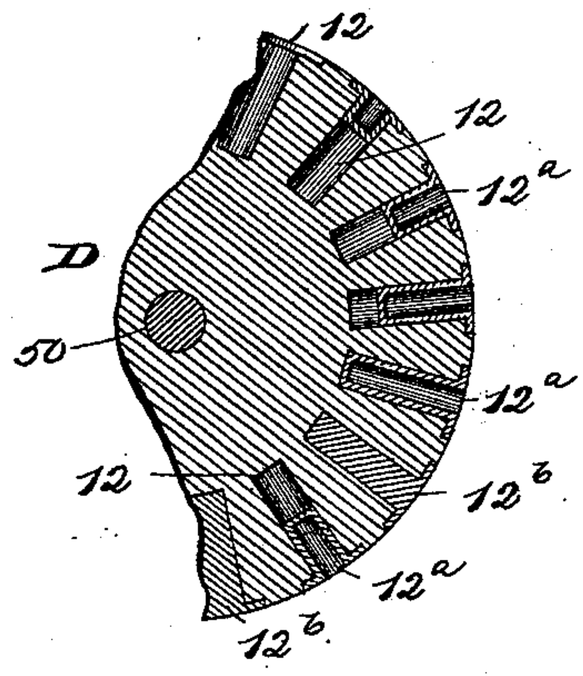
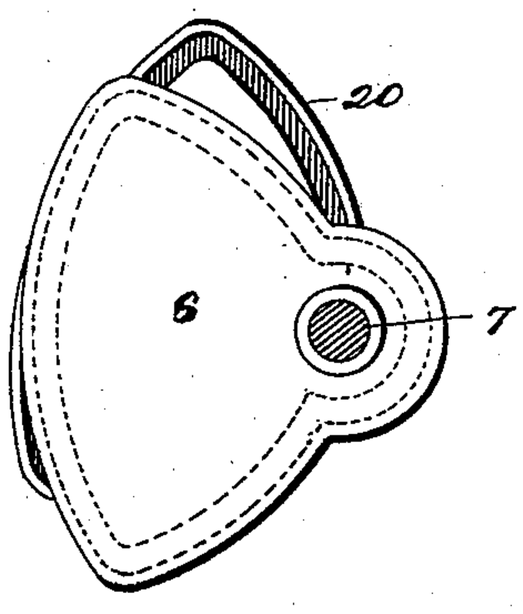


Fig 2.



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UNITED STATES PATENT OFFICE.

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JACQUARD MECHANISM FOR WEAVING DOUBLE-FACED FABRICS.

SPECIFICATION forming part of Letters Patent No. 541,643, dated June 25, 1895.

Application filed July 19, 1894. Serial No. 518,046. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WEAVER, a citizen of the United States, residing at Norwalk, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Jacquard Mechanism for Weaving Double-Faced Fabrics; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in Jacquard mechanism for looms.

It has for its object to provide mechanism of the character described, which may be applied to any loom of approved construction, and by the use of which a double-faced fabric may be woven, the patterns on each side of the fabric being totally different in design.

In the accompanying drawings, forming a part of this specification, and in which like letters and figures of reference indicate corresponding parts, Figure 1 is a side elevation, parts being in section, illustrating the position of the parts when the depressing and lifting boards, respectively, are in their normal elevated and lowered positions. Fig. 2 is a similar view of the opposite side of the invention, illustrating the position of the parts when the depressing board is lowered. Fig. 3 is a front elevation of the invention, parts of the upper pattern cylinder being partially removed to illustrate the position of the needles. Fig. 4 is a vertical sectional view taken on the line $x\,x$ of Fig. 3, the lifting board being shown in its elevated position. Fig. 5 is a detail perspective view, parts being broken away, illustrating the construction and arrangement of the slots in the needles and the lifting and depressing boards and their relative arrangement with respect to each other. Fig. 6 is a vertical sectional view taken longitudinally through one of the needles and the depressing board, illustrating more particularly the position of the cords and needles with respect to the pattern roll just previous to the depression of the first cord of the series, parts of the needles and pattern cylinder being broken away. Fig. 7 is a similar view showing the position of the second cord just previous to its being lowered by the depressing board. Fig. 8 is a similar view showing the position of the third cord just previous to its being lowered by the depressing board. Fig. 9 is a similar view illustrating the position of the fourth cord just previous to its being lowered by the depressing board. Fig. 10 is a similar view showing the position of the fifth cord just previous to its being lowered by the depressing board. Fig. 11 is a detail sectional view, parts being broken away, of one of the pattern cylinders; and Fig. 12 is a detail side elevation of the cams which operate the lifting and depressing boards, said cams being shown in their initial position.

I am aware that, heretofore, Jacquard mechanism has been devised for weaving double-faced fabric, the pattern on both sides being identical in design, but different in color. This may be accomplished with my invention, but in addition to this, a double-faced fabric may be woven with my machine, the patterns on the two faces of which are entirely distinct as to design, although the same number of colors may be used in each pattern, or each pattern may be woven of different colors.

With these ends in view my invention consists of a slotted depressing board and a similar lifting board vertically aligned with, and designed to be operated alternately with the depressing board, to lower and elevate the warp-supporting cords respectively.

It further consists in a series of needles which engage and are regulated in their movement by pattern cylinders, for automatically determining the proper warp-supporting cords to be elevated or lowered; and finally it consists in the general construction and arrangement of the parts as claimed for accomplishing the purposes of my invention.

In the accompanying drawings: A represents the frame adapted to be secured upon or adjacent to any ordinary loom. (Not shown.)

B is a vertically reciprocating lifting board guided in its movement by means of projections 1 which engage vertical slots 2 in each side of the frame A. Connected to the lifting board, on opposite sides thereof, are Y-shaped arms 3, which project vertically downward therefrom and are pivotally connected to the ends of lever-arms 4 which are in turn pivoted at 5 to the frame. The lower ends of the Y-shaped arms 3 are provided with cam faces 3^a, the purpose of which will be described farther on.

A reciprocating movement is imparted to the lever-arms 4 and from them to the Y-shaped arms 3 and lifting board B, by means of cams 6, which are secured at each side of the machine upon a transverse shaft 7. The cams 6 are so constructed as to lift the lifting board B and return it to its normally lowered position, where it is allowed to dwell while a depressing board E (hereinafter referred to) is being lowered and returned to its normal position.

The lifting board B is provided with transverse series of slots 8, 9, 10, and 11 of different relative lengths. These series of slots are duplicated across the lifting board to correspond to the number of spaces in the reed of the loom. (Not shown.)

The slots 8, 9, 10, and 11 are each formed with enlargements 8′ and with narrower portions 8^2, which merge into said enlarged portions to form a continuous and unobstructed passage between them. The slots 8 are each formed with three enlargements 8′ equally spaced apart, and connected together to form a continuous and unobstructed passage from one to the other, by two narrower portions 8^2. The slots 9 consist of two enlarged portions 8′ connected by a narrower portion 8^2 formed intermediate of said enlargements. The slots 10 are of the same shape as the slots 9. The slot 11 is formed with an enlargement 8′ and a narrower portion 8^2 merging with said enlargement. These slots 8, 9, 10, and 11 are arranged transversely across the lifting board in line with one another.

Arranged below and parallel to the lifting board are a series of slotted needles C, one needle being provided for each series of slots 8, 9, 10, and 11. These needles are supported near their front and rear ends in the frame A and are adapted to move independently toward a pattern cylinder D, journaled in the frame A. This pattern cylinder D is provided in its face with annular series of recesses 12, each recess being of the same diameter and depth. One of these annular series of recesses 12 is provided for each needle C and each recess of a series is designed to be successively brought into alignment with the point of its needle.

In order to vary the extent of the forward movement of the needles C, thimbles 12^a of different depths are used. Said thimbles are adapted to be inserted into the recesses 12 and the inside diameter of said thimbles is sufficiently large to permit the ready insertion and withdrawal of the needles C. When it is desired to prevent the forward movement of the needles C a solid plug 12^b of the same size and shape of the thimbles 12^a may be inserted into the proper recess 12 and thus the forward movement of the needle is prevented. The depth of the thimble 12^a which a needle engages determines the extent of the forward movement of said needle, and the extent of the forward movement of the needle determines the color or character of the warp thread to be next raised at the next elevation of the lifting board B, as will appear farther on.

By the employment of a thickly recessed pattern cylinder C and of the thimbles 12^a of varying depths which may be inserted into the recesses 12 of said cylinder, it will be evident that the pattern of the fabric being woven may be readily changed by shifting the relative positions of the thimbles in the cylinder, and thus the necessity and expense of making new pattern devices, whenever it is desired to change the design or pattern of a fabric, is obviated. The construction of the pattern cylinder is best illustrated in Fig. 11 of the drawings.

A step by step rotary motion is imparted to the pattern cylinder D by mechanism described farther on, to bring the recesses 12 in the face thereof into alignment with the needles C, to be engaged successively thereby.

As stated above, the needles C are each provided with a series of slots or bearings 13, 14, 15, and 16, of different relative lengths, which normally coincide with the slots 8, 9, 10, and 11 in the lifting board. (See Fig. 6.) Of the slots 13, 14, 15, and 16 the slot 13 is the longest, and the slot 14 the shortest, the slot 15 being longer than the slot 14 and the slot 16 longer than the slot 15.

A vertically reciprocating depressing-board E, identical in construction with the lifting-board B, is arranged within the frame A, in vertical alignment with the said lifting-board, and is guided in its movement by projections 17 on each side thereof, which engage the vertical slots 2 in the said frame. To opposite sides of the depressing-board E Y-shaped arms 18 are connected, which arms project downward therefrom and are pivotally connected to the ends of pivoted lever-arms 19. A vertically reciprocating movement is imparted to these lever-arms 19 and from them, through the Y-shaped arms 18, to the depressing-board E, by means of cams 20 located at opposite sides of the frame upon the transverse shaft 7. The lower ends of the Y-shaped arms 18 are formed with cam faces 18^a, the purpose of which will presently appear.

The cams 20 and 6, which reciprocate the depressing-board and lifting-board respectively, are arranged upon their shaft 7, to operate said boards alternately, as follows: When the lifting-board B is lifted, as shown in Fig. 4, the depressing-board E will remain in its normally elevated position until the lifting board B is returned to its initial lowered position, whereupon the depressing-board E will be lowered and returned to its normally elevated position, during which movement the lifting-board B will remain stationary, and so on, this alternate movement of the boards B and E being repeated.

The depressing board E is provided with transverse series of slots 8^a, 9^a, 10^a and 11^a, which slots or bearings are of different relative lengths. Each of these series of slots is duplicated across the depressing-board to cor-

respond to the number of spaces in the reed of the loom. (Not shown.) The slots 8^a, 9^a, 10^a and 11^a are formed with enlargements 8^3, and with narrower portions 8^4, which merge into the enlarged portions 8^3 to form a continuous and unobstructed passage between them, and the said slots 8^a, 9^a, 10^a and 11^a are identical in construction with the slots 8, 9, 10, and 11 respectively of the lifter B.

Arranged above the depressing board E and extending parallel thereto are a series of slotted needles F which are supported near their opposite ends in the frame A. One of these needles is provided for each series of slots 8^a, 9^a, 10^a and 11^a, and each needle has a series of slots or bearings 13^a, 14^a, 15^a and 16^a of different relative lengths formed therein, which normally coincide with the slots 8^a, 9^a, 10^a and 11^a in the depressing board E. The needles F are adapted to reciprocate horizontally and to move independently toward a pattern cylinder G journaled in the frame A. A step by step rotary movement is imparted to the pattern cylinder G by mechanism which will be presently described.

The pattern cylinder G is provided in its face with an annular series of recesses 21, all of which are the same in depth. One of these series of recesses is provided for each of the needles F and each recess in a series is rotated successively into alignment with the points of said needles. Thimbles 21^a varying in depth, are adapted to be inserted into the recesses 21 to limit the forward movement of the needles F, which engage the holes in said thimbles. When it is desired to prevent the needles F from moving forward solid plugs 21^b of the same shape and size of the thimbles 21^a are inserted into the recesses 21. It will be evident from this that the needles F will be permitted to move forward a distance corresponding to the depth of the thimbles 21^a which they engage, and the extent of the forward movement of the needles determines the color or character of the warp thread to be lowered at the next depression of the depressing board E, as will presently appear.

From the above it will be noted that the lifting and depressing boards B and E and their operating mechanism and the pattern devices adjacent to said lifting and depressing boards, are identical in construction and operation.

I have illustrated my machine as being adapted for weaving a fabric of five colors, although it will be understood that any number of colors may be used. In weaving a fabric of five colors the warps are separated into bunches, each of which contains one thread of each color used, and the five different threads are passed through one space in the reed. Each of the warp threads, however, is threaded through an eye 22 of warp-supporting or tail cords 23, 24, 25, 26 and 27. (See Figs. 2 and 3.) These cords are elevated and lowered to open the shed, by the action of the lifting and depressing boards in the manner described farther on. Upon the lower ends of each of the warp-supporting or tail cords 23, 24, 25, 26 and 27 lingoes 28 are secured, as is usual. The warp-supporting or tail cords 23, 24, 25, 26 and 27 are secured at their upper ends to rods 29, each of which is encircled by a spring 30^a, against the action of which springs the rods are pulled downward by the cords 23, 24, 25, 26 and 27. Each of these cords extends vertically downward from the rods 29 and is provided with knots 30 and 31, the former of which is located below the depressing-board E, and the latter above the lifting-board B. These knots 30 and 31 are sufficiently small to permit their easy passage through the enlargements 8′ and 8^3 of the slots in the lifting and depressing boards, respectively, while they are too large to pass through the narrower portions 8^2 and 8^4 of said slots. The warp-supporting or tail cords 23 and 24 pass through the slot 13^a in the needles F, the slot 8^a in the depressing board E, the slot 8 in the lifting-board B and the slot 13 in the needles C, respectively. The warp-supporting or tail cords 25 pass through the slot 14^a in the needles F, the slot 9^a in the depressing-board E, the slot 9 in the lifting-board and the slot 14 in the needles C, respectively. The warp-supporting or tail cords 26 pass through the slot 15^a in the needles F, the slot 10^a in the depressing-board E, the slot 10 in the lifting-board B, and the slot 15 in the needles C, respectively; and the warp-supporting or tail cords 27 pass through the slot 16^a in the needles F, the slot 11^a in the depressing-board E, the slot 11 in the lifting-board B, and through the slot 16 in the needles C, respectively.

The relative arrangement of the warp-supporting or tail cords 23, 24, 25, 26 and 27, the needles C and F, and the lifting and depressing boards B and E, is best illustrated in Figs. 4 and 5 of the drawings.

The position of the warp-supporting or tail cords 23, 24, 25, 26 and 27 in the slots 8, 9, 10 and 11 of the lifting-board B, determines which one is to be lifted at the next elevation of the said board B, and the position of said cords in the slots 8^a, 9^a, 10^a and 11^a determines which cord of the series is to be lowered at the next depression of the depressing-board E; it being understood, of course, that only one cord of each of the series 23, 24, 25, 26 and 27 may be lifted or depressed at one time, but different cords in the duplicate series of the warp-supporting or tail cords 23, 24, 25, 26 and 27 may be so lifted at the same time or depressed at the same time.

The shifting of the cords is performed by the series of needles C and F and the warp-supporting or tail cord of each series 23, 24, 25, 26 and 27 to be elevated or depressed is determined by the depth of the holes in the thimbles 12^a and 21^a in the pattern-cylinders D and G, respectively, which the needles C and F are engaging.

In illustrating the positions assumed by the

needles F to shift the warp-supporting or tail cords 23, 24, 25, 26 and 27, (see Figs. 6, 7, 8, 9, and 10,) only the depressing board E, the needles F and portions of the pattern cylinder G are shown, as the positions of the warp-supporting or tail cords 23, 24, 25, 26 and 27 in the slots 8, 9, 10 and 11 of the lifting-board B are identical with those which they assume in the corresponding slots of the depressing-board E, and it is not considered necessary to illustrate both the lifting and depressing boards in each of said figures. So in the description which immediately follows, of the position of the warp-supporting or tail cords 23, 24, 25, 26 and 27 in the slots of the depressing board E, it will be borne in mind that they occupy the same position in the slots of the lifting board B.

When the points of the needles are bearing upon a plug 21^b of the pattern cylinder G, they are in their initial position, and when in this position the warp-supporting or tail cords 23 are moved into the narrow portions 8^4 of the slots 8^a of the depressing board E, as shown in Fig. 6, in order that when the depressing-board is depressed the knots 31 of the cords 23 will be engaged at the next movement of the depressing-board and the cords and their corresponding warp threads will be lowered.

When the needles E engage the thimbles 21^a of the least depth, the needles will move forward a distance corresponding to the depth of the holes in said thimbles, and the warp supporting or tail cords 24 will be moved into the narrow portions 8^4 of the slots 8^a, in order that the knots 31 may be engaged, at the next lowering of the said depressing-board, to move the warp-supporting or tail cords and their warp threads correspondingly. (See Fig. 7.)

In Fig. 8 of the drawings one of the needles F is shown as engaging the hole in a thimble 21^a of greater depth than that shown in Fig. 7, to move the cord 25 into engagement with the narrow portion 8^4 of the slot 9^a. Consequently when the depressing-board is lowered the knot 31 on said cord will be engaged by the depressing-board and the cord 25 moved correspondingly.

Fig. 9 illustrates one of the needles F engaging the hole of a thimble 21^a of the second greatest depth, to throw the warp-supporting or tail cord 26 into the narrower portion 8^4 of its slot 10^a, to be lowered at the next movement of the depressing-board E.

Fig. 10 illustrates one of the needles F engaging the hole of a thimble 21^a of the greatest depth, to move the warp-supporting or tail cord 27 into engagement with the narrow portion 8^4 of its slot 11^a to be lowered by the depressing-board at its next movement.

Whenever one of the warp-supporting or tail cords 23, 24, 25, 26 or 27 is moved by the needle C or F into the narrow portion 8^2, or 8^4, of one of the slots 8, 9, 10, and 11 or 8^a, 9^a, 10^a and 11^a of the lifting and depressing boards, respectively, the remaining cords will be shifted into the enlarged portions $8'$, or 8^3, of said slots, in order that the knots 30, or 31, in said remaining cords may pass freely therethrough at the next movement of the lifting or depressing boards. From this it will be seen that only one of each series of cords 23, 24, 25, 26 and 27 may be raised or lowered at the same time.

Both series of needles C and F are withdrawn from engagement with their respective pattern-cylinders D and G shortly after the lifting or depressing boards B, E, start on their respective upward and downward movements, and the pattern-cylinder of whichever board B, E, being operated is rotated one step forward to bring a different line of recesses in front of the needles C, F, while the other cylinder remains stationary. This may be accomplished by various means, but I will now describe that which in practice I have found to be the most effective.

The needles C and F, pass through the cross-heads H and I respectively, near their rear ends and are permitted to move independently of said cross-heads. Springs 33, 34 are interposed between the cross-heads H, I, and the frame A and encircle each of the needles of the series C, F, respectively. These springs bear against the frame A at their rear ends and are connected to the needles at their forward ends. The cross-heads are guided in slots 35, 36 in each side of the frame A and are secured to horizontal frames 37 arranged on each side of the frame A and extend parallel therewith to the front thereof. The forward ends of these frames 37 are bifurcated, and have slots 38, and 39, formed therein. The slots 38 in said frames are engaged by pins 40, from the upper ends of levers 41, which are arranged on each side of the frame A said pins resting normally in the rear ends of said slots. (See Fig. 1.) The levers 41 are pivoted near their centers to the frame A and at their lower ends to transverse rods 42, the forward ends of which rods engage the cam faces 3^a of the Y-shaped arms 3. These rods 42 are guided in boxes 43 of the frame A, and are encircled by springs 44, which tend to keep them into engagement with the cam faces 3^a of the arms 3. From this it will be seen that at each elevation of the Y-shaped arms 3 and their lifting board B, the rods 42 will be pressed forward by the action of the cams 3^a thereon, and the upper ends of the levers 41 thrown rearwardly, which action will cause the horizontal frame 37 to be moved correspondingly to operate the cross-heads H and I and withdraw the needles C and F simultaneously from engagement with their respective pattern-cylinders D and G.

Levers 44 constructed similarly to levers 41 are likewise arranged on each side of the machine adjacent to said levers 41, and are provided at their upper ends with pins 45 which engage the rear ends of the slots 39 of the horizontal frames 37. These levers 44 are pivoted at about their centers to the frame A, extend downwardly at the side thereof and

are pivoted at their lower ends to transverse rods 46. These rods are guided in boxes 47 of the frame A, and have their forward ends pressed into engagement with the cam faces 18ª of the Y-shaped arms 18, by means of springs 48 arranged in the guide boxes 47 and encircling the rods 46. From this it will appear that whenever the Y-shaped arms 18 are depressed the rods 46 will be moved forward and the upper ends of the levers 44 rearwardly. The rearward movement of the levers 44 will move the horizontal frames 37 and their attached cross-heads H and I correspondingly and thus the withdrawal of the needles C and F simultaneously from engagement with their respective pattern-cylinders D, G, will be effected.

By means of the mechanism described above it will be obvious that at each elevation of the lifting-board B and lowering of the depressing-board E, both series of needles C, F, will be withdrawn from engagement with the pattern cylinders D and G, and only upon the return of said boards to their normally lowered and elevated positions will the needles be again moved by the springs 33, 34 into engagement with their pattern cylinders.

Secured upon one end of the shaft 50 of the pattern-cylinder D is a ratchet wheel 51. A lever 52 is journaled upon said shaft adjacent to the ratchet-wheel, and carries a pawl 53, which engages said ratchet-wheel. The end of the lever 52 is provided with a pin 54 which engages a slot 55 in one end of a horizontal lever 56. This lever 56 is pivoted at its other end to one of the levers 41, in order that when this latter lever is moved rearwardly the lever 52 will be moved correspondingly and its pawl 53 move the ratchet-wheel 51 and the pattern-cylinder D one step.

As it may sometimes be desired to turn the pattern cylinder D backward I have provided mechanism for accomplishing this. This mechanism consists of a ratchet-wheel 57 journaled upon one end of the shaft 50 and designed to be rotated in an opposite direction to the ratchet-wheel 51, adjacent to which it is secured. A lever 58 is journaled upon the shaft 50 adjacent to the ratchet-wheel 57 and is arranged diametrically opposite to the lever 52. This lever 58 is provided with a pawl 59 which normally hangs out of engagement with the ratchet-wheel 57 and is designed to be drawn up into engagement with it by means of a cord 60 passing over a pulley 61 and extending downward to a point within easy reach of the operator. At the same time the pawl 59 is thrown into engagement with its ratchet-wheel 57 to move it, the pawl 53 is lifted from its ratchet-wheel 51 by means of a branch 62 of the cord 60, to allow the pattern cylinder to be turned back. (See Fig. 1.)

The mechanism for rotating the pattern-cylinder G forward and for turning it backward is identical in construction and operation with that described for operating the pattern-cylinder D, and consists of a ratchet-wheel 65 secured upon the shaft 66 of the pattern-cylinder G. Adjacent to said ratchet-wheel on the shaft 66 is journaled a lever 67 carrying a pawl 68, which normally engages the ratchet-wheel 65. This lever 67 is provided at its upper end with a pin 69 which engages a slot 70 of a horizontal lever 71. This lever 71 is pivoted to the lever 44 and is carried rearwardly therewith to move the lever 67 and cause the pawl 68 to move the ratchet-wheel 65. A ratchet-wheel 72 is secured upon the shaft 66 and is designed to be rotated in the opposite direction to the ratchet-wheel 65 by means of a pawl 73, normally resting out of engagement with the ratchet-wheel 65 and supported upon a lever 74 which is pivoted upon and depends from the shaft 66. Cords 75, which pass over a pulley 76, are attached to the lever 74 and to the pawl 68 to lift the said lever upward and thus cause its pawl 73 to engage and move its ratchet-wheel 72, and to simultaneously lift the pawl 68 out of engagement with its ratchet-wheel 65.

The warp-supporting or tail cords 23, 24, 25, 26 and 27 are maintained in a vertical position by means of a comber-board 80 through which they pass. This board is arranged between the frame A and the loom.

The operation of the machine above described is as follows: Assuming that the lifting and depressing boards are in their normal position and the needles C and F in engagement with their respective pattern-cylinders D and G, (as shown in Fig. 1) the lifting-board B will be elevated, causing one of each series of warp-supporting or tail cords 23, 24, 25, 26 and 27 to be lifted. When these cords are lifted the warp threads, which pass through the eyes 22 thereof, will be drawn upward, thereby opening the shed to permit a thread-carrier or pile wire being passed through it. Simultaneously with the elevation of the lifting-board both series of needles C and F will be withdrawn from engagement with their pattern-cylinders and the lower one of said cylinders D will be rotated one step forward. When the lifting board is lowered the needles C and F are again permitted to engage their respective pattern-cylinders D, G. The depressing board E will then be lowered, carrying one of each series of warp-supporting or tail cords 23, 24, 25, 26 and 27 and their corresponding warp threads downward, to open the shed upon the under side of the fabric and permit the passage therethrough of a thread-carrier or pile wire. Simultaneously with the lowering of the depressing-board E the needles C and F are withdrawn from engagement with the pattern-cylinders D and G, and the pattern-cylinder G is rotated one step forward, while the pattern-cylinder D remains stationary.

The advantages of the several parts of my improvements will be appreciated by those skilled in the art to which it appertains; and within the scope of my invention as defined in the following claims, modifications may be

made in the form, construction and position of the parts, and some of the features of my invention used without others, since

What I claim is—

1. In Jacquard mechanism for looms, the combination of the lifting and depressing boards, each provided with slots of varying widths and lengths, means for operating the lifting and depressing boards, the warp-supporting cords engaging the slots of the lifting and depressing boards, and pattern controlled devices for shifting the warp supporting cords in the slots of the lifting and depressing boards, substantially as described.

2. In Jacquard mechanism for looms, the combination of the lifting and depressing boards, means for operating the same, the shifting needles arranged adjacent to said boards and provided with bearings of different lengths pattern devices for regulating the movement of the shifting needles, and the warp-supporting cords, substantially as described.

3. In Jacquard mechanism for looms, the pattern cylinder provided with recesses of uniform depth and thimbles of varying depths engaging said recesses, substantially as described.

4. In Jacquard mechanism for looms, the combination of the warp-supporting devices suitable lifting and depressing mechanism, the shifting-needles, provided with bearings, of different lengths, and needle-engaging devices of different depths, substantially as described.

5. In Jacquard mechanism for looms, the combination of the needle-engaging devices of different depths, the shifting-needles adapted to be regulated in their movement by said devices, each of said needles being provided with bearings of different lengths, the warp-supporting cords, the lifting and depressing-boards, provided with slots of varying widths and lengths, and means for operating the lifting and depressing-boards, substantially as described.

6. In Jacquard mechanism the combination of the warp-supporting cords, suitable lifting and depressing-mechanism, pattern devices, the shifting-needles adapted to be regulated in their movement by said pattern-devices, each of said needles being provided with bearings of different lengths, substantially as described.

7. In Jacquard mechanism for looms, the combination of the lifting and depressing boards provided with slots of varying widths and lengths, means for operating the lifting and depressing boards, the warp-supporting cords, the pattern-devices and the shifting-needles regulated in their movement by the pattern-devices, each of said needles being provided with bearings of different lengths, substantially as described.

8. In Jacquard mechanism, the combination of the rods 29, the springs 30^a, the warp-supporting cords connected to said rods, and means for lowering said cords and rods against the action of said springs, substantially as described.

9. In Jacquard mechanism, the combination of the warp-supporting cords, lingoes to which the lower ends of said cords are connected, the spring-controlled rods to which the upper ends of said cords are connected, and lifting and depressing mechanism for elevating and lowering said cords, substantially as described.

10. In Jacquard mechanism for looms, the combination of the lifting and depressing boards, means for operating the same, the warp-supporting cords each provided with enlargements arranged above and below the lifting and depressing boards respectively, and pattern-controlled mechanism for shifting the warp-supporting cords into engagement with the lifting and depressing boards, substantially as described.

11. In Jacquard mechanism for looms, the combination of the lifting and depressing boards provided with slots of varying widths and lengths, means for operating the lifting and depressing boards, the warp-supporting cords engaging the slots of the lifting and depressing boards each of said cords being provided with enlargements arranged above and below the lifting and depressing boards respectively, the pattern-controlled mechanism for shifting the warp-supporting cords in the slots of the lifting and depressing boards, substantially as described.

12. In Jacquard mechanism for looms, the combination of the lifting and depressing boards, means for operating the same alternately, pattern-devices arranged adjacent to the lifting and depressing boards respectively, mechanism for rotating said pattern-devices alternately as the lifting and depressing boards are elevate l and lowered, the shifting needles adapted to engage the pattern-devices, the warp-supporting cords, and means for simultaneously withdrawing the shifting needles from engagement with the pattern-devices at each elevation or depression of the lifting and depressing boards, substantially as described.

13. In Jacquard mechanism for looms, the combination of the warp-supporting devices, means for operating the same, the shifting needles provided with bearings of different lengths, and needle-engaging devices of different depths, substantially as described.

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

WILLIAM WEAVER.

Witnesses:
PAUL W. STEVENS,
ELBERT O. HULL.