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A. URBAHN.

LOOM.

No. 326,071. Patented Sept. 8, 1885.

Fig: 1

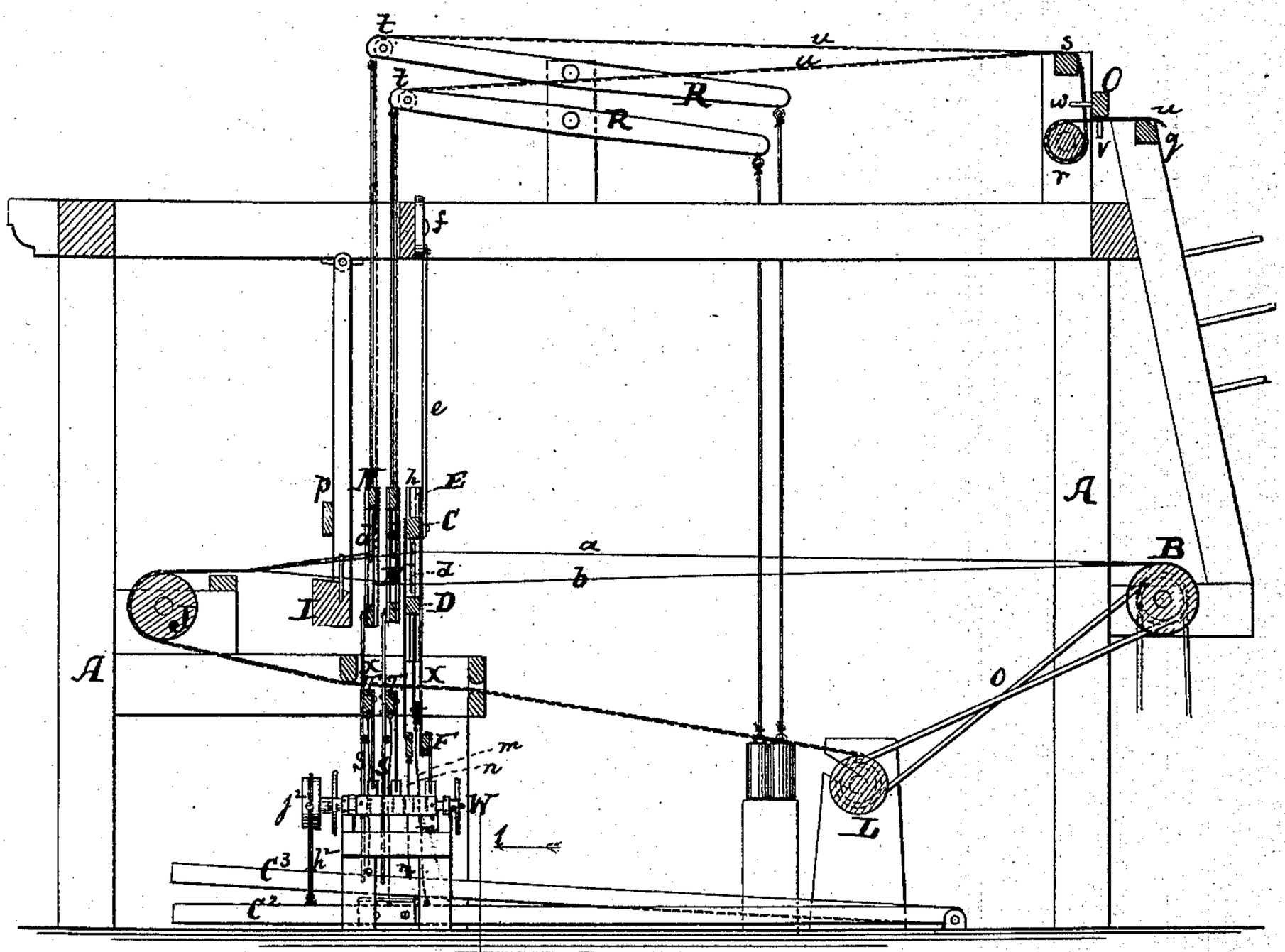
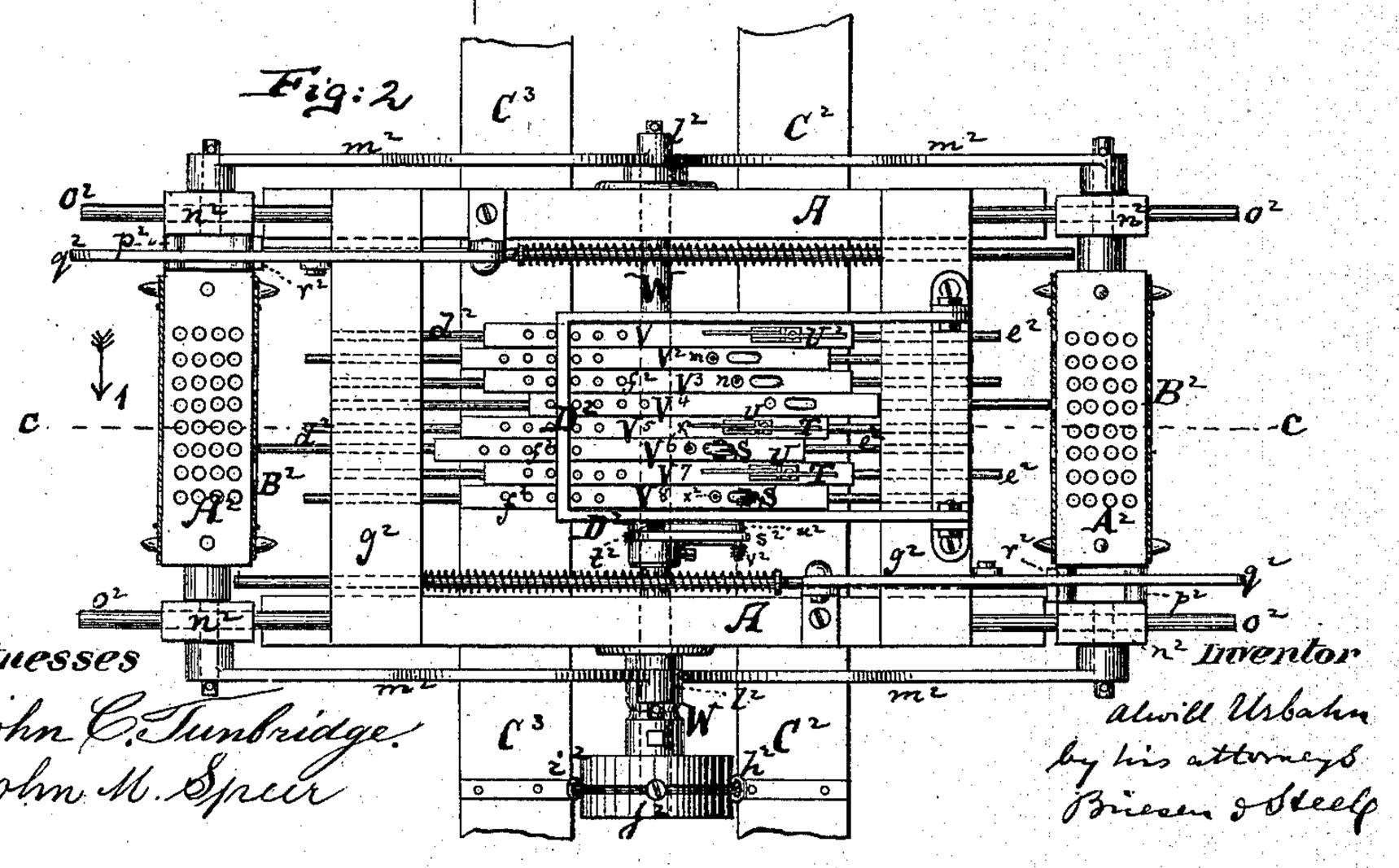


Fig: 2



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(No Model.) 4 Sheets—Sheet 2.

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Fig: 7

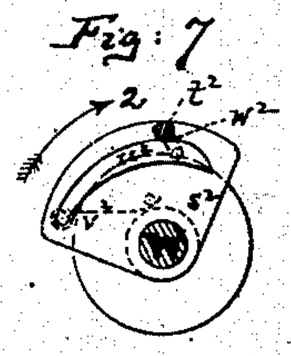

Fig: 5

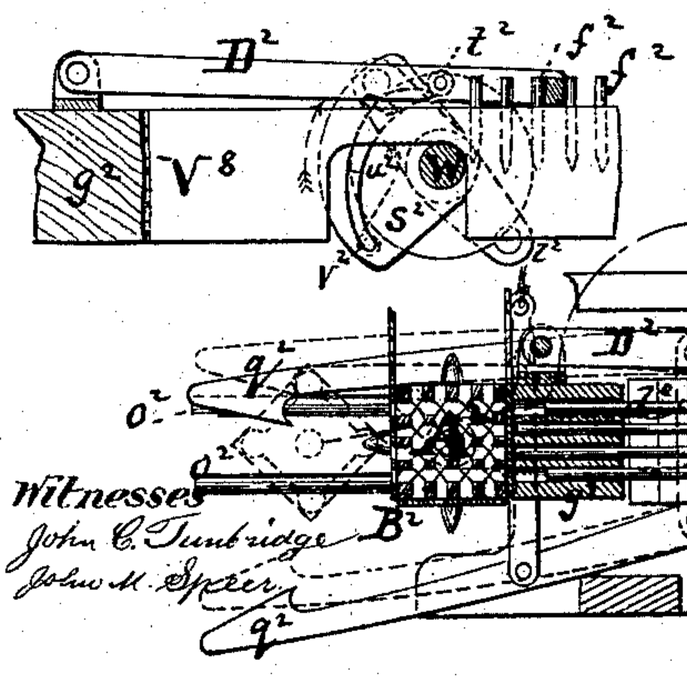

Fig: 6

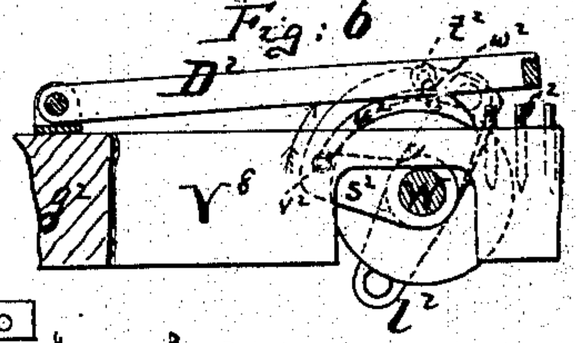

Fig: 4

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Fig: 8

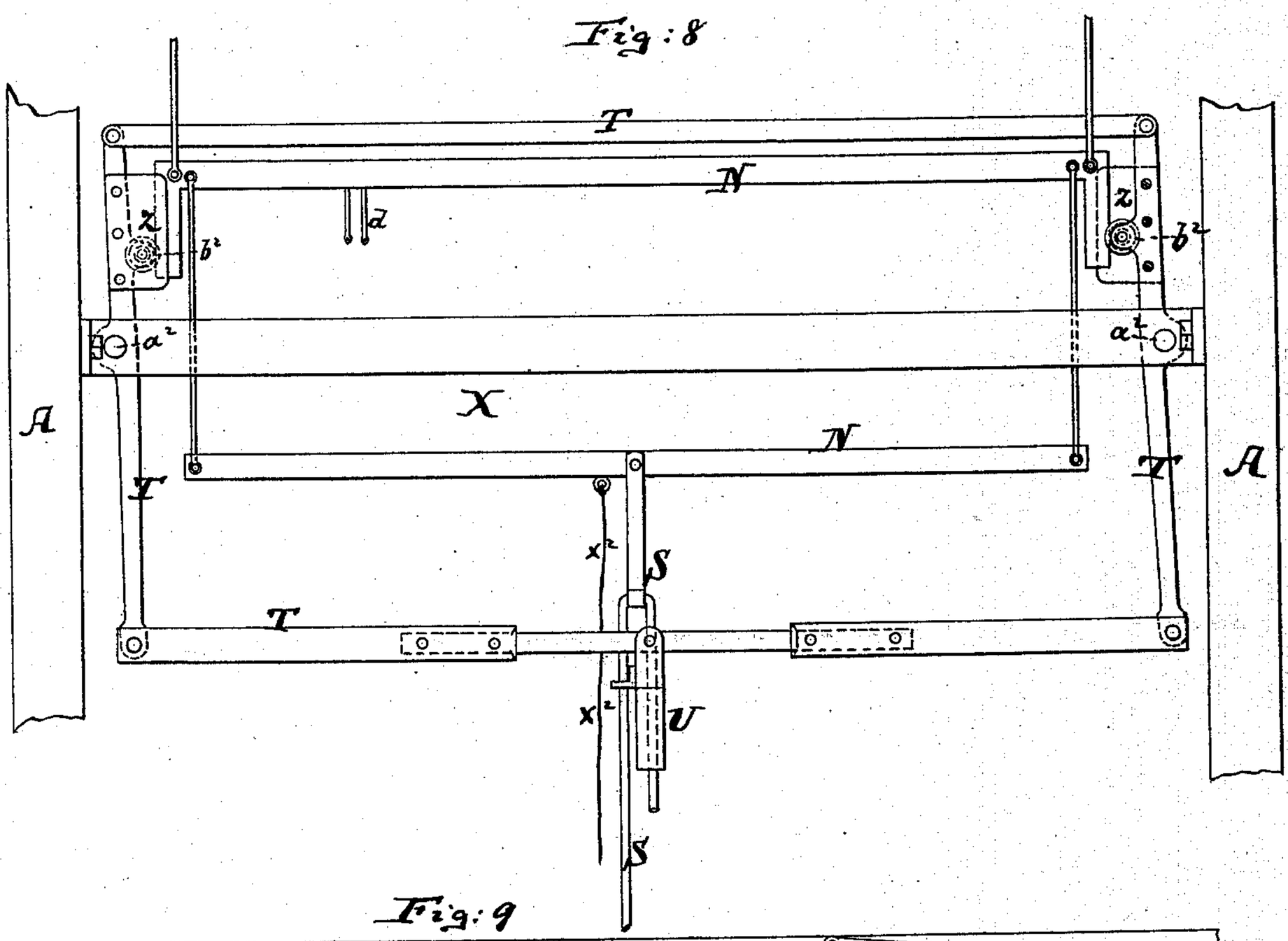
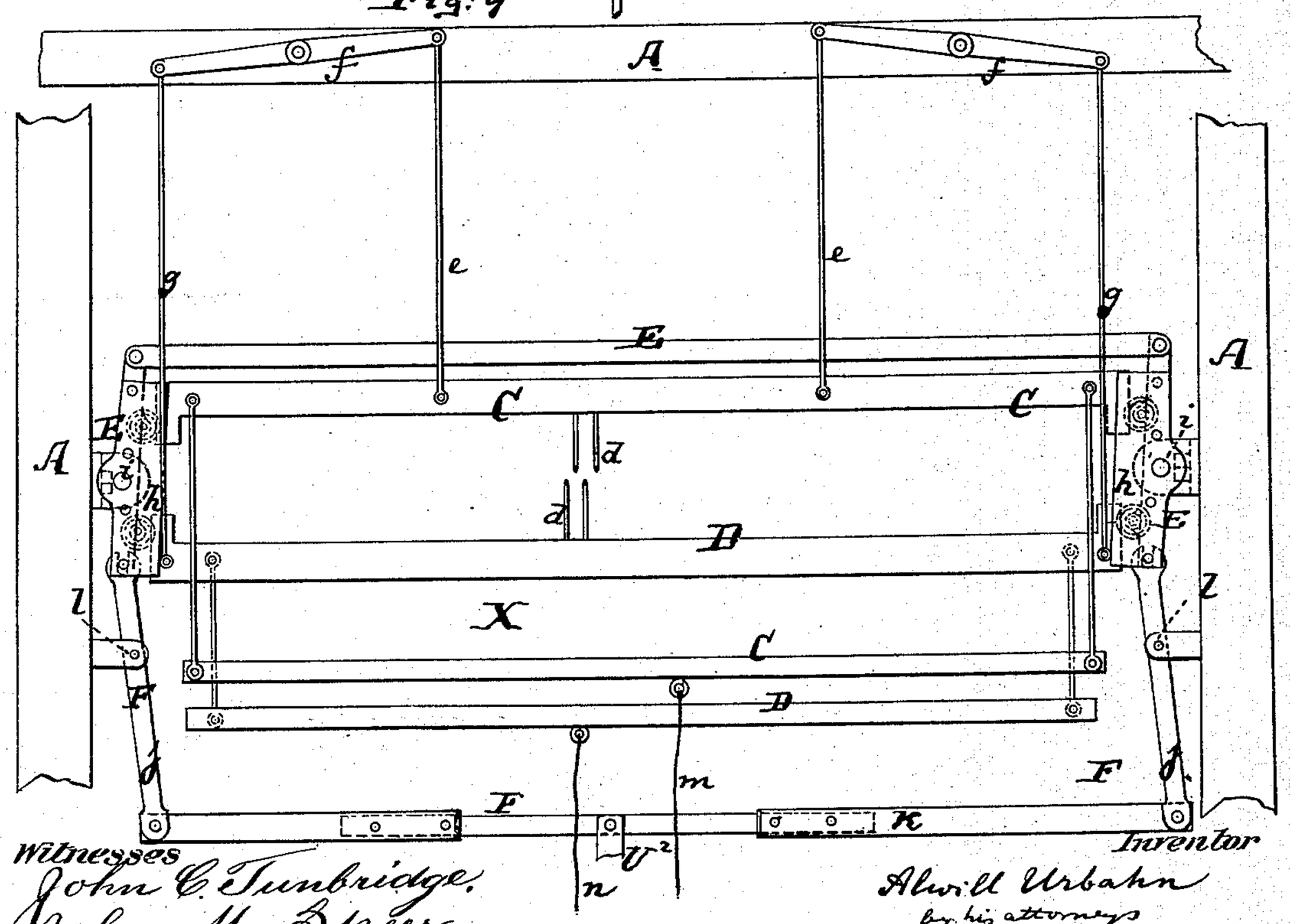


Fig: 9



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(No Model.) 4 Sheets—Sheet 4.

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Fig: 10

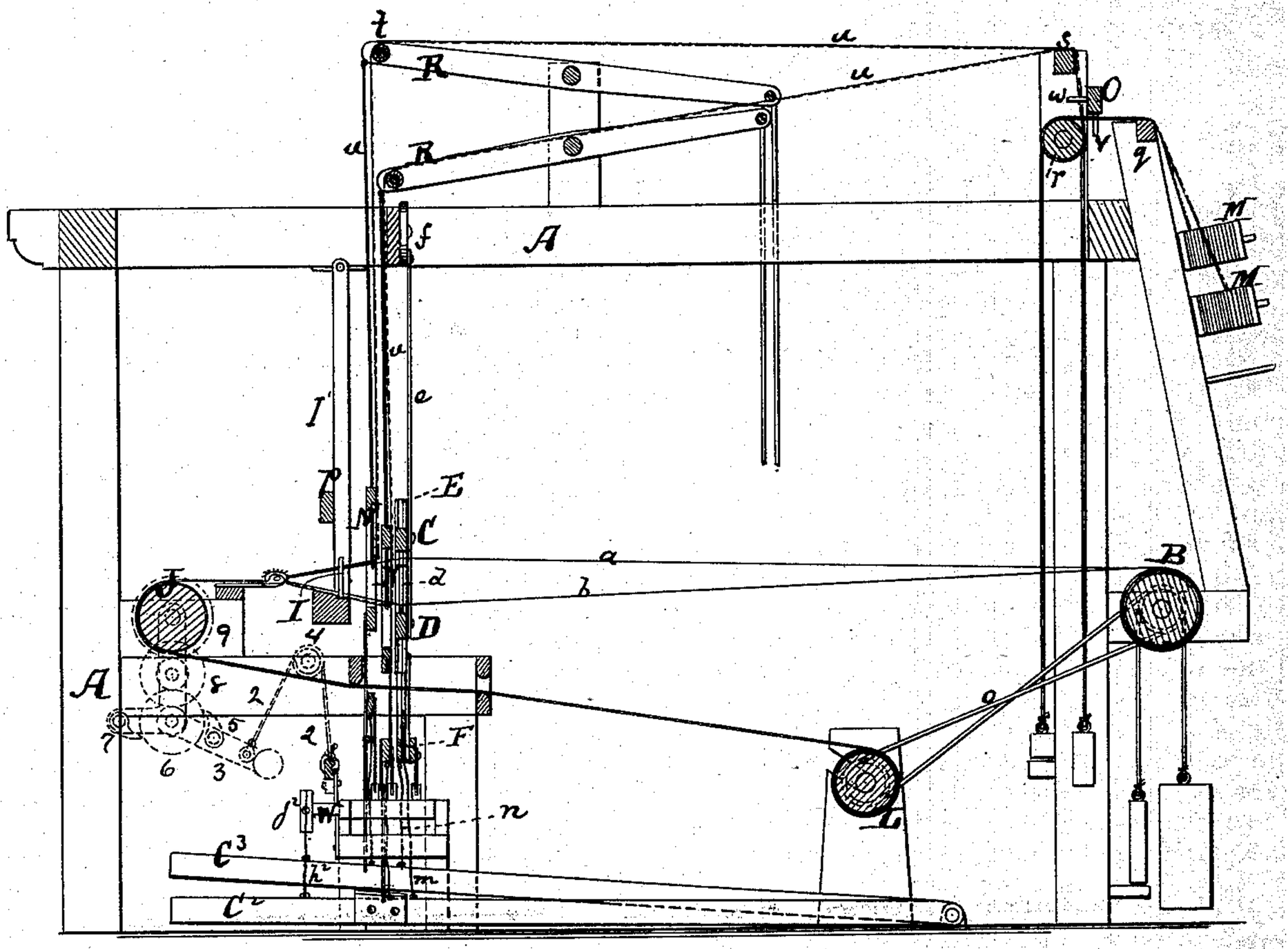
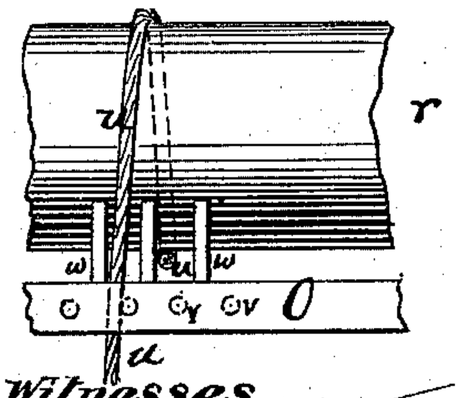
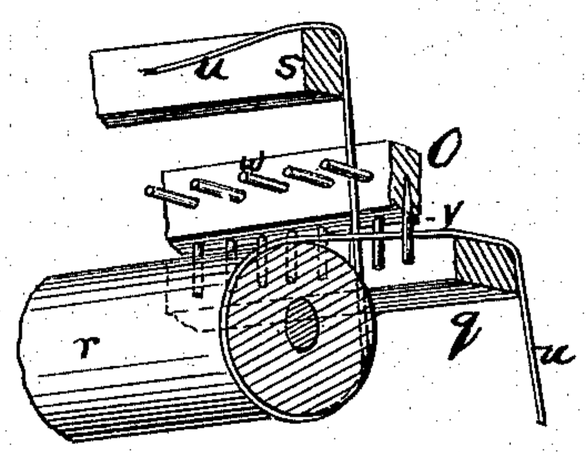


Fig: 11.

Fig: 12





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UNITED STATES PATENT OFFICE

ALWILL URBAHN, OF PATERSON, NEW JERSEY, ASSIGNOR OF ONE-HALF TO ABRAHAM G. JENNINGS, OF BROOKLYN, NEW YORK.

LOOM.

SPECIFICATION forming part of Letters Patent No. 326,071, dated September 8, 1885.

Application filed May 31, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALWILL URBAHN, a resident of Paterson, in the county of Passaic and State of New Jersey, have invented an Improvement in Looms, of which the following is a full, clear, and exact description, reference being made to the accompanying drawings, in which—

Figure 1 is a vertical central section of a loom containing my improvements. Fig. 2 is a top view, partly in section, of the Jacquard attachment, which is applied to said loom, the same being shown on an enlarged scale. Fig. 3 is a vertical section of the same, taken on the line *c c*, Fig. 2, and looking in the direction of the arrows 1, which are shown in Figs. 1 and 2, said Fig. 3 showing, also, part of the frame of the loom and part of the mechanism with which the Jacquard mechanism engages. Fig. 4 is a similar section to Fig. 3, showing the parts of the Jacquard mechanism, however, in a different position. Figs. 5, 6, and 7 are detail views of parts pertaining to said Jacquard mechanism. Fig. 7ª is a vertical cross-section taken on the line *x x*, Fig. 4. Fig. 8 is a face view of a figure-thread heddle-frame, showing, also, its connection with the frame of the loom and part of the mechanism for operating the heddle-frame. Fig. 9 is a face view of the ground-warp-thread heddle-frames, showing, also, their connection with the frame of the loom and part of the mechanism for operating the heddle-frames. Fig. 10 is a vertical central section of the loom, showing the parts in different position from that in which they are shown in Fig. 1. Fig. 11 is a detail perspective view, on an enlarged scale, of the figure-thread guide invented by me, and Fig. 12 is a detail side view of the same.

This invention comprises improvements on the loom which is described in Letters Patent No. 289,731, which were granted me December 4, 1883.

The principal object of the invention is to supply the loom with an attachment, through which the movements of the figure-thread heddles and ground-warp-thread heddles can be governed by means similar to a Jacquard attachment, so that the attendant in working the treadles will produce the requsite design without giving further attention to the details thereof.

The invention consists in combining with the treadles of the loom which is described in said patent a rock-shaft, which connects and combines with means for moving the Jacquard cards and with slides which regulate the motion of the heddles, all as hereinafter more fully described.

The invention also consists in other details of improvement, that are hereinafter more clearly pointed out.

In the drawings, the letter A represents the frame of the loom. B is the beam, from which the ground warp-threads for the foundation fabric are taken. These warp-threads are marked *a* and *b* in Figs. 1 and 10, and are carried through the heddles or needles of the heddle-frames C and D. These heddle-frames C and D are more fully shown in Fig. 9. They are quadrilateral frames, the top bars of which are at their ends guided in grooved cheek-pieces *h* of a frame, E. These heddle-frames are each provided with a series of needles or heddles, *d*, which project downward in the heddle-frame, C, and upward in the heddle-frame D, as shown in Fig. 9. The needles *d* are perforated near their points or free ends, as described in my before-mentioned Letters Patent No. 289,731. The heddle-frame C is suspended by rods *e* from beams *f*, that are pivoted to the frame A of the loom, and from which is also suspended by rods *g* the heddle-frame D, all as clearly shown in Fig. 9. The frames C and D at their ends are guided in the grooved cheek-pieces *h* of a frame, E, which cheek-pieces are pivoted at *i i* to the frame A of the loom. The frame E is connected, as appears from Fig. 9, by pivotal connections with the uprights *j* of a frame, F, which uprights are pivoted at *l* to the frame A. The lower horizontal bar of the heddle-frame C connects by a cord, *m*, with a treadle, C^2. The lower horizontal-bar of the heddle-frame D connects by a cord *n*, with another treadle, C^3. It follows that whenever the treadle C^3 is depressed, the heddle-frame D will be drawn down, and by its connection *g f e* with the heddle-frame C will cause the latter to be moved up. This will close the shed of the warp-threads, leav-

ing the frames C D in the position shown in Fig. 9. When next the lower cross-bar, *k*, of the frame F is moved sidewise, the frame E will be vibrated on the pivots *i*, and the heddle-frames C D thereby laterally displaced, so that each needle of the heddle-frame C will, during such lateral displacement, pass over a needle of the heddle-frame D and rest above a space between two needles of said heddle-frame D. When next the treadle C^2 is lowered, C^3 being let go, the cord *m* is pulled, thereby lowering the heddle-frame C and raising the heddle-frame D, thus opening the shed of the warp.

I have stated this much of the operation in order to make it clear to the reader of this specification how the mechanism should be organized, by means of which the heddle-frames C and D receive their appropriate motion. I would add that the ends of the frames C and D, where they are guided in the cheek-pieces *h* of the frame E, bear against friction-rollers, that are indicated by dotted lines in Fig. 9, so that said heddle-frames may share in the traversing movement of the frame E, and nevertheless be free to be moved up or down, as has been stated.

The ground warp-threads *a b*, after having passed through the heddle-frames C and D, are passed through the pillars of the reed I, and after having received the shuttle-threads and the figure-threads, the whole fabric is passed over the beam J, and finally wound upon a beam, L. This beam L connects by a cross-belt, *o*, with the beam B, as shown in Figs. 1 and 10.

The reed I is of the same construction as the lower reed, I, described and shown in Patent No. 289,731.

Intermittent rotary motion is imparted to the beam J by pawl-and-ratchet connection with one of the treadles C^2, and said beam J, when turned by drawing forward the warp-threads *a b*, will cause the beam B to be turned to deliver the warp-threads *a b*, and the beam B will, by its belt-connection *o*, cause the beam L to be turned in the same ratio, to wind up as much of the completed fabric as corresponds with the amount of warp-thread taken off the beam B by such motion.

The ratchet mechanism for imparting intermittent rotary motion to the beam J is of well-known construction, and is clearly indicated by dotted lines in the left-hand part of Fig. 10. It consists of a strap, 2, one end of which is attached to the treadle C^2, or to an intermediate lever operated therefrom, and the other end to a weighted lever, 3, after passing over a pulley, 4, that is attached to the frame of the loom. The lever 3 is pivoted to the frame of the loom, and carries a pawl, 5, which engages into a ratchet-wheel, 6. 7 is a detent which prevents the wheel 6 from moving backward. The axis of the wheel 6 carries a pinion that drives the cog-wheel 8. The axis of this also carries a pinion that drives a cog-wheel, 9, that is fixed to the beam J. Whenever the treadle C^2 is depressed, the pawl 5 turns the wheel 6 and thereby the beam J to the desired extent and in the desired direction.

The reed I is mounted in a lay or batten, I′, which is pivoted to the frame A, as shown in Fig. 1, and is moved by hand, being provided with a handle or cross-bar, *p*, for that purpose.

The figure cords or threads *u* for ornamenting the face of the fabric are taken from spools M M and carried over a fixed rod, *q*, around a friction-roller, *r*, thence over another rod, *s*, thence over rollers *t* that are hung in levers or beams R, as shown, and finally through the heddle-frames N N, which in this machine are capable of up and down and also of lateral movement, as will be hereinafter more fully described. Each of the heddle-frames N N is a quadrilateral frame, and has a series of downwardly-projecting needles, *d*, like the needles of the heddle-frames C D, and the figure-threads are drawn through the holes which are near the free ends of these needles. By so arranging the heddle-frames N N that they can be moved laterally as well as vertically I do away with the use of the upper reed, which has been described as "the reed P" in my above-mentioned Patent No. 289,731.

In order to prevent the figure-threads from becoming entangled with one another as they pass around the roller *r*, I attach to the frame A a bar, O, in such a position (see Figs. 10, 11, 12) that pins *v*, which are secured in said bar, will pass between the several figure-cords that reach from the bar *q* to the roller *r*, while other pins, *w*, which also project from the bar O, pass between the figure-threads, where they extend from the roller *r* to the bar *s*. By thus winding the figure-threads around the drum or roller *r* and combining therewith the bar O, having the pins *v* and *w*, I keep the figure-threads in proper tension, and absolutely prevent entanglement thereof.

The heddle-frames N N are suspended from weighted beams R R, which are hung in the frame A, and which have a tendency to hold said heddle-frames in the raised position. Each heddle-frame N is connected with a downwardly-projecting jointed rod, S, which at its lower end forms a hook, *x*. (See Fig. 3.) This hook can be aligned, as will be hereinafter more fully shown, with a hook-like projection, *y*, of the treadle C^2, so that upon depressing such treadle C^2 the hook *x*, which is aligned with it, will be engaged and the corresponding heddle-frame N drawn down.

Each heddle-frame N enters at its ends between the cheek-pieces *z* of a larger quadrangular frame, T, the uprights of which are pivoted at a^2 (see Fig. 8) to the frame A of the loom. When the frame T is moved on said pivots a^2, the heddle-frame N will be laterally displaced, and yet the said heddle-frame is capable of up-and-down motion. Small fric-

tion-rollers b^2 are hung in the frame T between the cheek-pieces z, and against these the end of the frame N bears, so that said frame N may move up and down freely when required.

Each frame C, D, N, and T has the four bars which constitute it united by pivotal connections; hence said frames are jointed frames.

It remains to show how the heddle-frames C, D, and N are moved laterally whenever required to produce the requisite design of fabric. For this purpose I provide each frame T with a downwardly-projecting shouldered rod, U, which is pivoted to it, and likewise pivoted to each frame F a downwardly-projecting shouldered rod, U^2. Each rod U and each rod U^2 enters a cavity or socket provided for its reception in one of a series of slides, V V^2 V^3 V^4, &c., eight such slides being shown in Fig. 2, the said slides being supported in the framing A of the loom, so that they are capable of moving in the direction of their length horizontally, which is transversely to the position of the loom. The slide V, which is shown in Fig. 2, receives the shouldered rod U^2 of the frame F. The slides V^5 and V^7, that are shown in Fig. 2, receive the shouldered rods U U of two frames T. It is evident that any other number of such slides may be used in a loom, according as there are more or less heddle-frames employed in the same. The slides V^6 V^8, which do not receive any of the projections U U^2, embrace the shanks of the jointed rods S, which are connected with the figure heddle-frames N N. Some of the slides, as V^2 V^3 V^4, as herein, may not be utilized at all in the making of certain fabrics, but may be reserved so that they can be used for more complex fabrics.

Each slide has at its ends a series of projecting pins, d^2 and e^2, which, as is more fully shown in Figs. 3 and 4, are of varying lengths on the same slide and of varying lengths in the different slides, the differences in the lengths being equal to or multiples of the distances between other pins, f^2, which project upwardly from said slides. The horizontal pins d^2 and e^2 of these slides pass through perforations in cross-bars g^2 of the frame A, and serve as supports and guides for the movable slides.

In the frame A is hung a rock-shaft, W, which connects by straps h^2 and i^2 with the treadles C^2 and C^3, respectively, said straps being secured to a disk, j^2, which is mounted upon said shaft W. (See Figs. 1 and 2.) Whenever either of these treadles is depressed, the shaft W is turned in one direction. Then when the other treadle is depressed the said shaft W is turned in the opposite direction. Cranks l^2 on said shaft W connect by rods m^2 with blocks n^2, which are capable of sliding horizontally on guide-pins o^2 that project from the frame A. In these blocks n^2 are hung the two "Jacquard cylinders" A^2, so called, the same being perforated prisms of the usual kind employed in Jacquard attachments. One face of each of these Jacquard cylinders is always aligned with the ends of the end rods, d^2 e^2, which project from the slides V^2, &c.

The cards B^2 are placed around the cylinder A^2 in the usual manner, the upper parts of the chains of cards being placed around suitable drums. Whenever the treadle C^3 is depressed, the shaft W will be turned in one direction so as to cause the connecting-rods m^2 to draw the cylinders A^2 toward one another, thus bringing them into the position shown in Fig. 4. This movement of the cylinders A^2 and of the cards B^2, which they carry, will affect the slides V V^2, &c., in such manner as to move them according to the perforations in the card and lengths of pins d^2 and e^2—in other words, each slide is set so as to move the frame T or F, which may be connected therewith laterally in the desired direction, or carry the jointed hook S laterally into or out of alignment with the hook-projection on the treadle C^2. Hence by this movement of the card-cylinders, which is produced by depressing the treadle C^3, the heddle-frames are all adjusted laterally, so far as the design to be produced may require such adjustment, and at the same time the dependent hooks S of those figure heddle-frames that are to be moved vertically are brought into position for being moved by the treadle C^2. When, now, the treadle C^2 is depressed, it will lower all those figure heddle-frames N whose hooks S were brought toward said treadle by the action of the cards. Thus it is seen that by this Jacquard attachment, so far as I have already described it, I am enabled to move the warp heddle-frames and also the figure heddle-frames laterally, and also to draw down those figure heddle-frames which may be required to be lowered for the particular phase of the design to be produced.

Having thus indicated in general terms how this Jacquard attachment operates, I will proceed to describe its construction more fully, so as to show how the cylinders A^2 are turned, and how the slides V, &c., are locked and unlocked.

When the treadle C^2 is lowered, the connecting-rods m^2 push the cylinders A^2 apart into the position, finally, which is shown in Fig. 3; but on the way out a ribbed disk, p^2, on each cylinder A^2 encounters a hook, q^2, which is pivoted to the frame A, and which causes said cylinder to be turned, (see dotted lines in Fig. 4;) but this turning of the cylinders is not part of my invention, being common to all the Jacquard mechanisms. Each cylinder is held at the proper angle, so far as its working-face is concerned, by a spring-operated slide, r^2, of the kind usually employed in Jacquard mechanisms. Whenever the slides V V^2, &c., have been moved by means of the card into a new position, the pins f^2, which project upwardly from them, are transversely aligned in every new position, to receive in one of the spaces between them the cross-bar of a U-shaped anchor-frame or locking-frame, D^2, which is

pivoted to the frame A. Thus in Fig. 2 the slides are shown locked by the said frame D^2, the cross-bar of which enters the space between transverse rows of pins f^2 on said slides V V^2, &c. The difference in the lengths of the several pins d^2 and e^2 is such that no matter how the slides V may be moved by means of the cards, the pins f^2 will always form a channel for the reception of the cross-bar of this locking-frame D^2. I have stated that whenever the slides V have been moved into a new position, they are locked by said frame D, which is dropped between the pins f^2. This locking of said slides is essential, as otherwise the lateral position of the heddle-frames would not be fixed as it ought to be during the operation of the loom. When, now, the treadle C^2 is depressed, the slides V V^2, &c., remain locked by the frame D^2; but when afterward the treadle C^3 is again depressed to bring the cards together, the slides should be unlocked. For this purpose I attach to the shaft W a cam-like projection, s^2, which faces a small pin, t^2, that projects outwardly from the frame D^2. The cam-like projection s^2 has pivoted to it a curved plate, u^2, which is pivoted at one end, and at the same pivoted end connects with a spring, v^2, while its other end has a guide-pin, w^2, that passes through a guide-slot in the plate s^2. The guided end, which is the non-pivoted end, of this curved plate u^2 is rounded, as shown in Fig. 7, and normally held by the spring as near to the shaft W as the guide-slot will permit. In this position the point or free end of said curved plate is about as much nearer to the center of the shaft W than the pivoted end of said curved plate as the pin t^2 is thick. When the treadle C^3 is depressed, the free end of the curved plate u^2 enters beneath the pin t^2, the shaft W being at this time turned in the direction of the arrow 2, which is shown in Fig. 7, and by its eccentric form the said curved plate, entering as it does beneath the pin t^2, thereby lifts the locking-frame D^2, so as to clear the pins f^2 and allow the slides V V^2, &c., to be moved. The rotation imparted to the shaft W by turning the treadle C^3 is of such extent that when completed it will cause the pin t^2 to drop off the pivoted end of the plate u^2, and thereby relock the slides V V^2, &c., in the new position which by this time they have received. This locking is not to be interfered with at the time the treadle C^2 is lowered, nor will it be, because at this time the plate u^2 will travel over the pin t^2 until the free end of said plate shall have wholly passed said pin. While the shaft W is revolved in the direction opposite to that indicated by the arrow in Fig. 7, and while the pin t^2 is under the curved plate u^2, the latter yields outwardly as the motion progresses, so as to permit the pin to clear the curved plate toward the end of the motion, when the spring v^2 will again throw the curved plate with its free end as near to the shaft W as the guide-slot will permit.

Having now described the general construction of the loom, and intimated the operation of its various parts, I will recapitulate the operation.

The ground warp-threads having been wound upon the beam B and drawn through the needles of the ground-warp heddle-frames C D, and then passed around the beam J, operations may be begun. The attendant, if this is a hand-loom, depresses always first the treadle C^3 and next the treadle C^2. If this be a power-loom, the levers which would correspond to these treadles will be depressed in the same order; and I desire it to be understood that whenever I use the term "treadle" in this description I wish to have included levers, which, when turned by machinery, will perform the same function as treadles.

Whenever the treadle C^3, which should be depressed first, is depressed, its effect will be to pull on the cord *n*, thereby lowering the warp heddle-frame D and raising the warp heddle frame C. This brings the needles *d* of these warp heddle-frames into the position indicated in Fig. 9, leaving the shed closed. The same movement of the treadle C^3 displaces the slides V V^2, &c., in the Jacquard attachment already described, and moves particularly the slide V, which connects by the rod U^2 with the frame F, thereby laterally moving the warp heddle-frames C and D. This lateral motion is imparted to the warp heddle-frames at every depression of the treadle C^3, without any exception whatsoever. The downward movement of the treadle C^3 also causes those other slides V^2, &c., to be moved, which will bring the desired figure heddle-frames into a new position laterally, and which will bring the desired hook S into possible engagement with the treadle C^2, the shed being still closed; but all the heddle-frames having received their proper position laterally, and the slides V V^2, &c., having been relocked by the locking-frame D^2, the treadle C^3 is now let go, and the treadle C^2 is depressed. As soon as the treadle C^2 is depressed, it will draw by the cord *m* on the warp heddle-frame C, pulling that down, thereby raising the warp heddle-frame D, thus opening the warp-shed. Pulling down on the treadle C^2 also causes it to draw on the hook S, which may have been brought near it, and thereby to lower the figure heddle-frame, which may have to be brought into the lower part of the shed, leaving the other figure heddle-frames up. The motion of the treadle C^2 also causes the cards B^2 to be moved into position for the next stroke. The shuttle can now be thrown and the reed I moved to beat the shuttle-thread home. By depressing the treadle C^2 the beam J is also turned, so as to feed the fabric already made further ahead. All the finished fabric in this loom passes to the beam L, and for this purpose through the spaces (marked X in Figs. 8 and 9) that are formed in the respective heddle-frames. This leaves much room for winding the finished fabric onto the final beam L, while if it were

wound upon an under beam, as usual, less room, especially in a hand-loom, would be obtained, and the fabric could not be made in as long sections as it can be if wound upon a beam L.

The treadle C^2 is connected by a cord, x^2, with each of the figure heddle-frames N, for the purpose of drawing that one or those of the figure heddle-frames which are to remain in the upper part of the shed down far enough to bring its or their figure-threads between the pillars of the reed I, each cord x^2 being just long enough to cause, when the treadle C^2 is depressed, such figure-threads to be in the upper shed and yet between the pillars of the reed.

Before the treadle C^2 is depressed the weights of the beams R will raise the heddle-frames N high enough to carry the figure-threads out of the pillars of the reed I, so as to permit of the lateral adjustment of such figure-threads. When this has been accomplished, the treadle C^2 is depressed, as already described, and one of the effects of its depression is to bring the figure-threads for the upper part of the shed into the spaces between the upwardly-projecting pillars of said reed I.

I claim—

1. The combination of the spool-creel for carrying the figure-threads with the bar *q*, roller *r*, bar *s*, and bar O, said bar O having pins *v* and *w*, which enter between the figure-threads and project between the bar *q* and roller *r*, and between the bar *s* and roller *r*, respectively, as specified.

2. The combination of the jointed heddle-frame N with mechanism, substantially as described, for moving it up and down, the pivoted quadrangular frame T, which embraces the frame N, and has cheek-pieces *z*, and rollers b^2, and mechanism, substantially as described, for vibrating the frame T, as and for the purpose described.

3. The combination of the heddle-frames C D with mechanism, substantially as described, for moving them vertically at the same time, and with the pivoted frame E and with the pivoted frame F, having uprights *j*, and mechanism, substantially as described, for vibrating the frame F, as specified.

4. The combination of the slide V with the ground-warp heddle-frames C D, shouldered rod U^2, and pivoted frames E and F, and with means, substantially as described, for moving said slide V, as specified.

5. The combination of the figure heddle-frame N with the jointed hook S, treadle C^2, having projection *y*, pivoted frame T, shouldered rod U, and Jacquard slides V^6 V^5, and means, substantially as described, for operating said slides, as specified.

6. The combination of the heddle-frames C D N with outer pivoted frames, E F T, jointed hook S, rods U^2 U, slides V V^6 V^5, and means, substantially as described, for moving said slides, treadles C^2 C^3, and cords *m n*, the treadle C^2, having the projection *y*, substantially as herein shown and described.

7. The Jacquard slides V V^2 V^3 provided with the projecting pins d^2 e^2 of unequal lengths, and with the upwardly-projecting pins f^2, in combination with the locking-frame D^2, and means, substantially as described, for moving said Jacquard slides and said locking-frame, as specified.

8. The combination of the treadles C^2 C^3, straps h^2 i^2, and rock-shaft W, having cranks l^2, with the rods m^2, blocks n^2, Jacquard cylinders A^2, and Jacquard slides V V^2, substantially as and for the purpose described.

9. The combination of the oscillating shaft W, and means, substantially as described, for turning it alternately in opposite directions, with the cam-projection s^2, curved plate *u*, spring v^2, guide-pin w^2, frame D^2, and pin t^2 thereon, substantially as described.

10. The combination of the treadles C^2 C^3 with the cords *m*, *n*, and x^2, hook projection *y*, heddle-frames C D N, hooks S, and means, substantially as described, for moving said heddle-frames laterally, and controlling the position of the hooks S, as set forth.

11. The combination of the heddle-frames C D N, having perforated needle-like heddles *d*, with the single reed I and its batten, frames E, F, and T, and means for moving said heddle-frames vertically, and for moving the frames E, F, and T laterally, as specified.

ALWILL URBAHN.

Witnesses:
GUSTAV SCHNEPPÉ,
WILLY G. E. SCHULTZ.