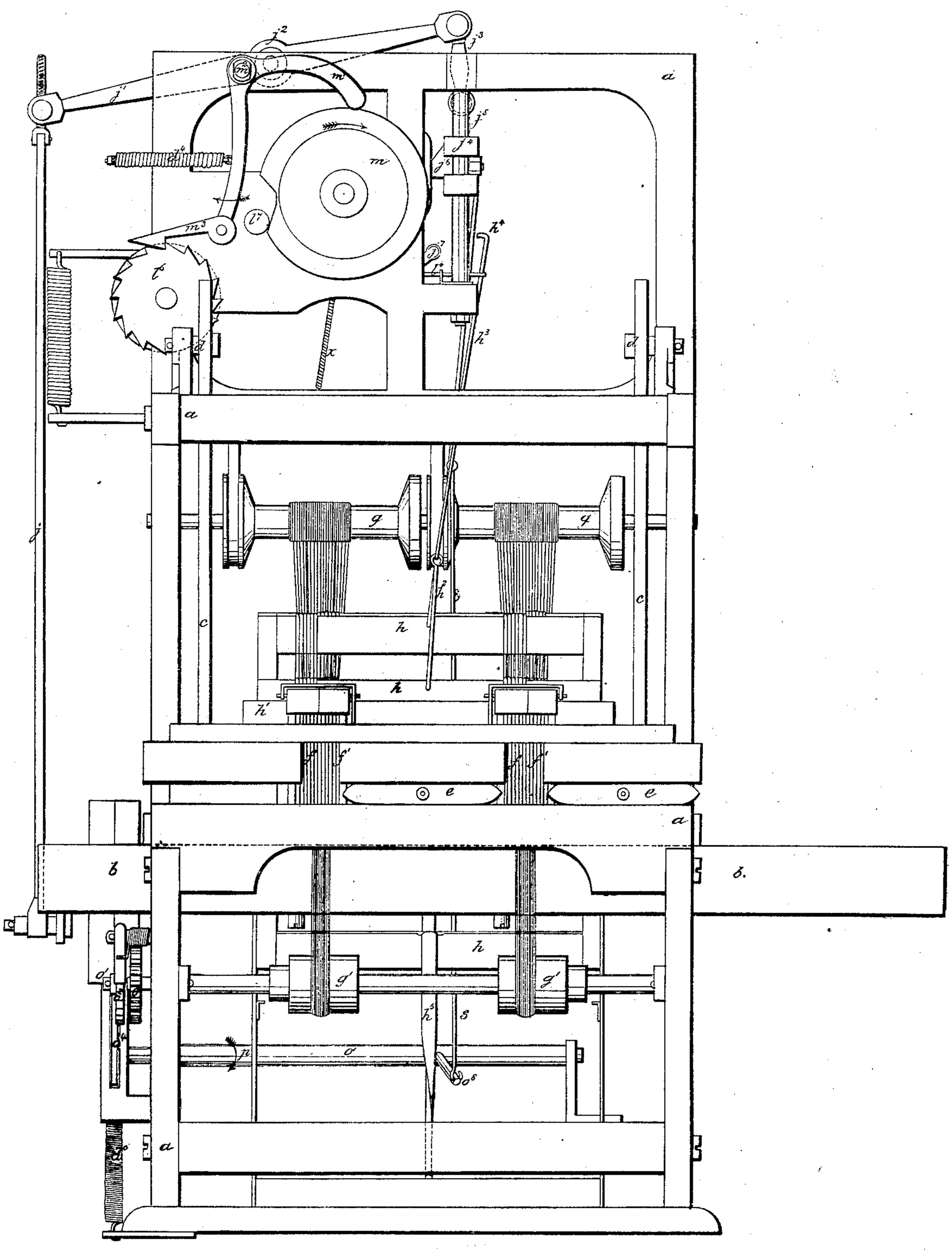
Sheet 1, 3 Sheets.

F. Painter.

Button Hole Weaving.

No. 17,404. Patented May 26, 1857.

Fig: 1.



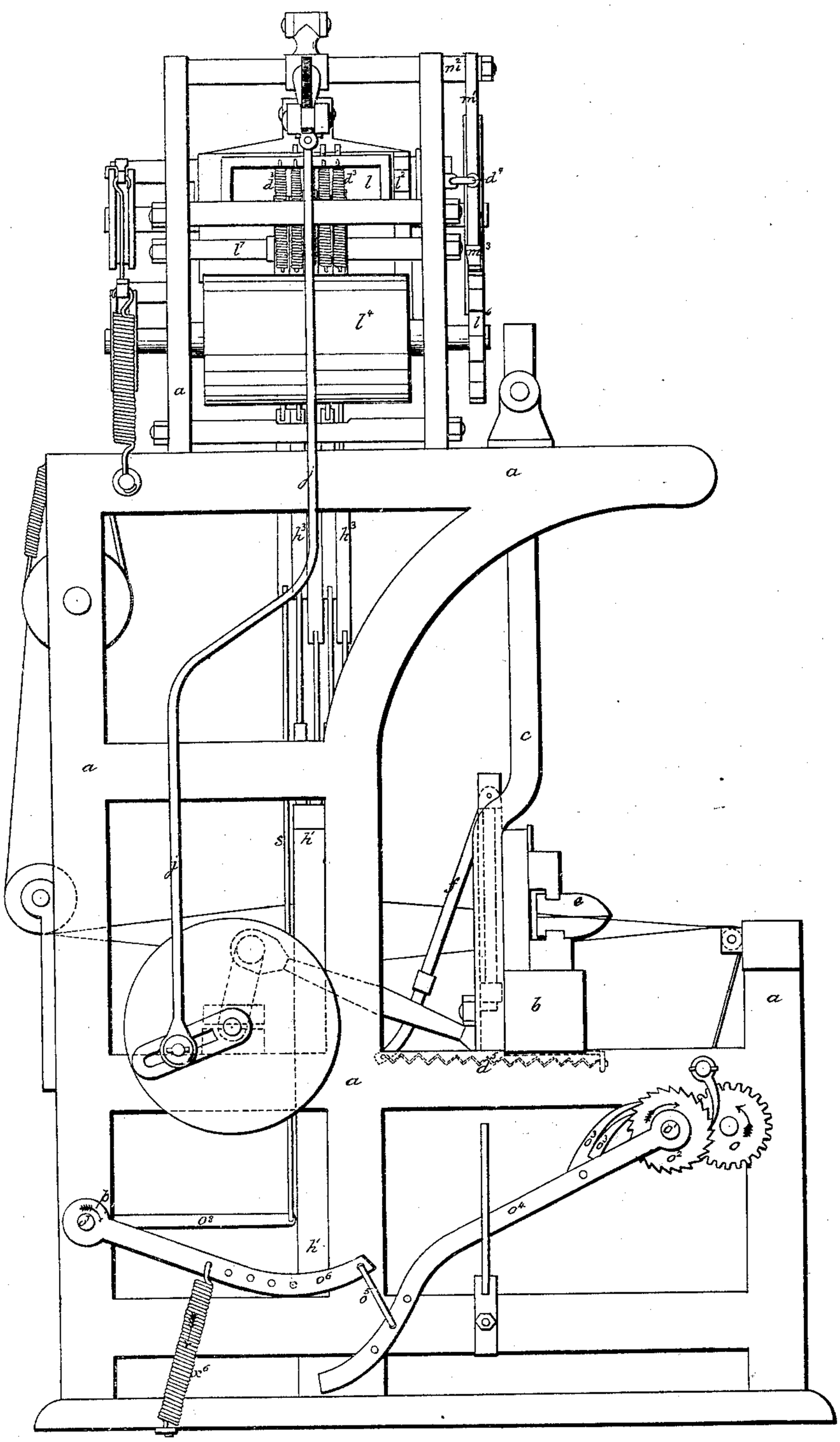
Sheets, 3 Sheets.

F. Painter.

Button Hole Weaving.

No. 17,404. Patented May 26, 1857.

Fig: 2.



Sheet 3, 3 Sheets.

F. Painter.

Button Hole Weaving.

No. 17,404. Patented May 26, 1857.

Fig: 3.

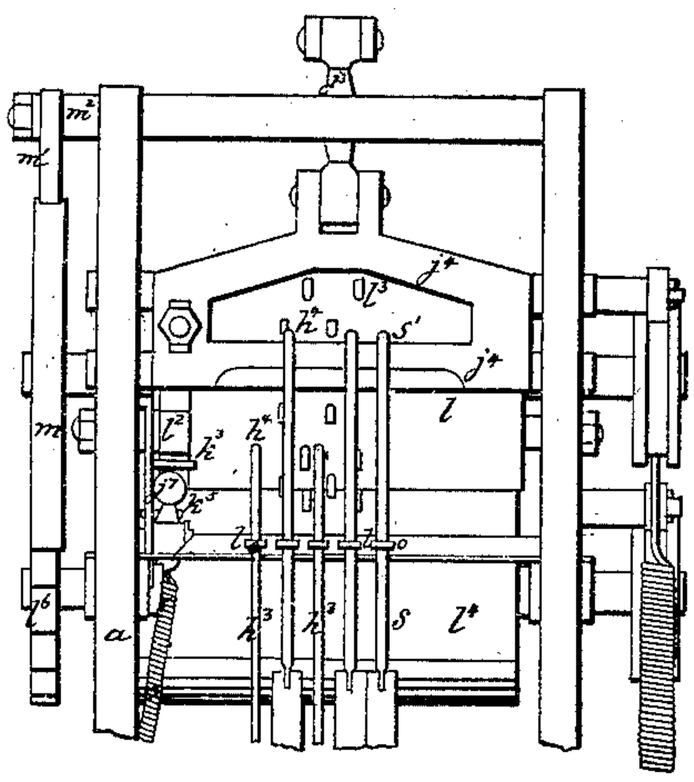


Fig: 4.

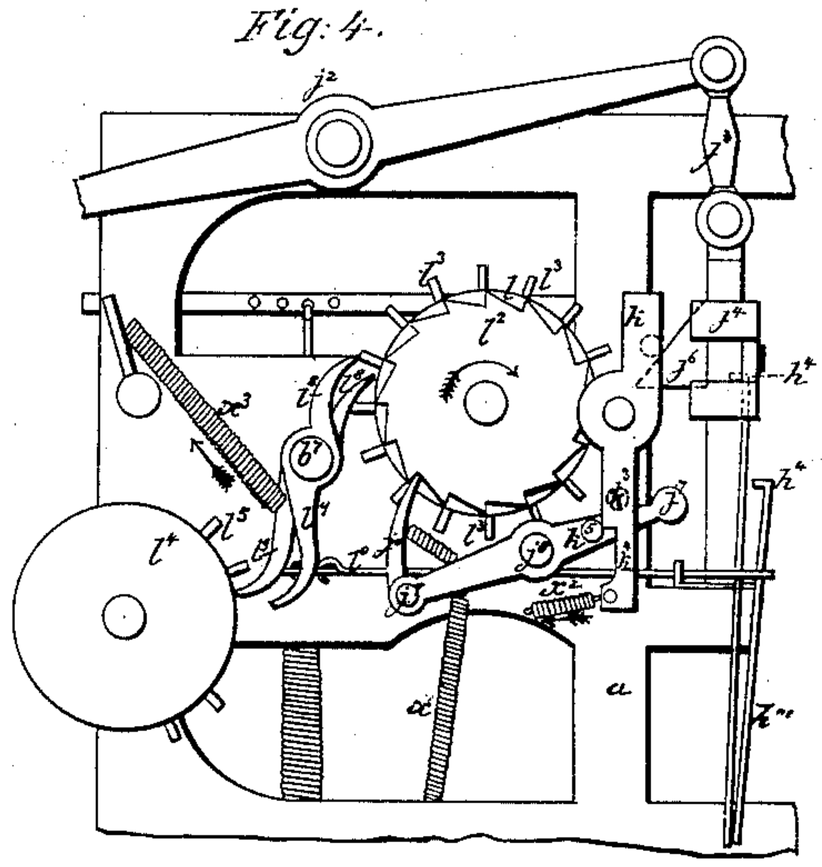


Fig: 6.

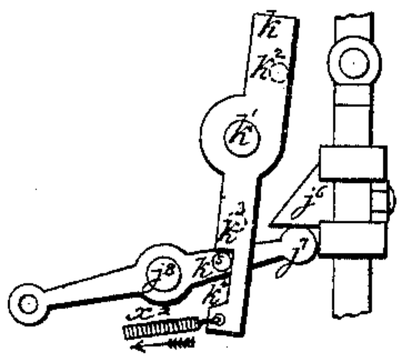
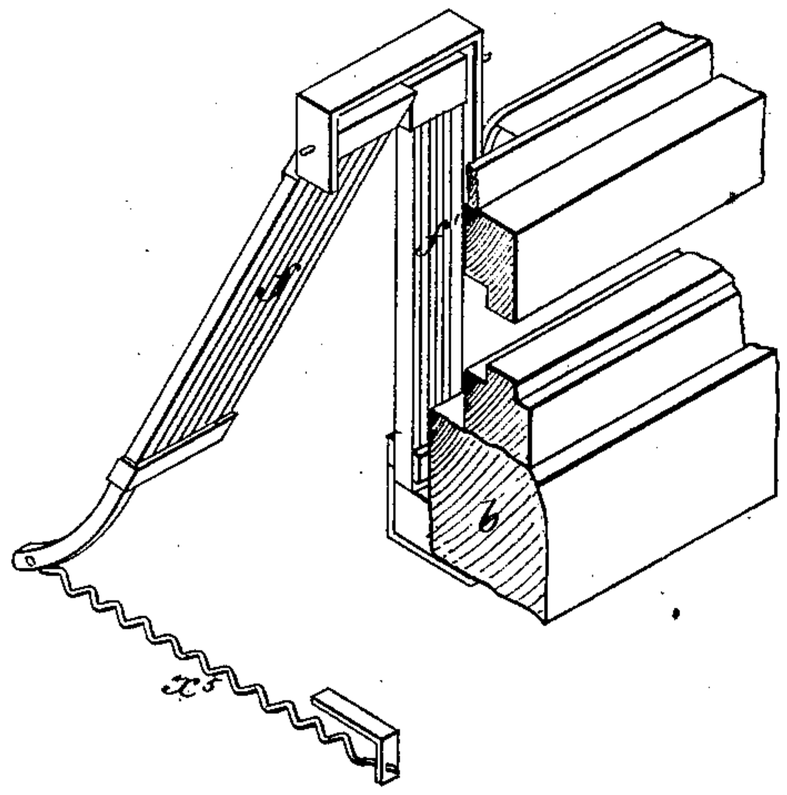


Fig: 5.



UNITED STATES PATENT OFFICE.

FRANKLIN PAINTER, OF EAST HAMPTON, MASSACHUSETTS, ASSIGNOR TO THE NASHAWANNUCK MANUFACTURING COMPANY, OF SAME PLACE.

LOOM.

Specification of Letters Patent No. 17,404, dated May 26, 1857.

To all whom it may concern:

Be it known that I, FRANKLIN PAINTER, of the town of East Hampton, county of Hampshire, and State of Massachusetts, have invented certain new and useful improvements in looms more especially applicable to the weaving of webbing with buttonholes at intervals therein, such as is used for suspenders, but also of use for weaving various sorts of goods, and that the following specification, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings Figure 1 is a front elevation of the loom. Fig. 2 is a side elevation of the same. Fig. 3 is an elevation of the mechanism for elevating the harness and actuating the take up. Fig. 4 is a section through the same apparatus. Fig. 5 is a detail view in perspective of the reed and its accessories, and Fig. 6 is a detail view of a latch.

The loom shown in the drawings is constructed and mounted for weaving two pieces of webbing at the same time, but in actual practice many pieces are woven at once in the same loom by the addition of warps, shuttle, reed, etc., for each separate piece, and it is a loom which will perform the same duty as one patented about two years since, namely, the weaving of buttonholes at such places in the webbing as may be determined by the set or construction of certain parts of the loom, and it is in certain improved apparatus for effecting the weaving of buttonholes or leaving slits in cloth with a selvage on each side thereof that my invention chiefly consists; and to this end the nature of the first part of my invention consists in a divided reed one section of which is always in the same position with regard to the lay as reeds usually are, and the other section or sections thereof are free to move away from the lay in the direction of the shed substantially in the manner and for the purposes hereinafter specified.

The nature of the second part of my invention consists in combining substantially such a reed with a proper take up motion or apparatus which shall be stopped or prevented from acting at certain proper periods substantially in the manner and for the purposes hereinafter set forth.

The nature of the third part of my invention consists in selecting such heddles as are to be lifted by the agency of a griff or its equivalent by means of a pattern barrel acting in combination with vibrating levers substantially in the manner hereafter described.

The nature of the fourth part of my invention consists in preventing the pattern barrel or any equivalent thereof that will produce the like effect from selecting such heddles as it otherwise would by tipping or preventing the action of the vibrating levers or their connection with the heddles by means of mechanism substantially such as is hereafter described, whereby a shed will be formed on one side only of a slit or buttonhole at one time and a buttonhole with a complete selvage on each side of it may be woven.

The nature of the fifth part of my invention consists in a certain latch operating in connection with a griff or its equivalent substantially in the manner and for the purposes hereinafter set forth.

The nature of the sixth part of my invention consists in combining a divided reed substantially such as is herein described with proper mechanism for lifting heddles and forming a shed on one side only of a buttonhole at one time; and the nature of the last part of my invention consists in combining together a pattern barrel for selecting the heddles, a secondary barrel, for preventing their selection at the proper time and vibrating levers acted upon by both barrels or the equivalent of any of these parts substantially in the manner and for the purposes hereafter described.

In the drawings the mechanism for giving motion to the shuttles is omitted for the purpose of avoiding complexity it being my intention to use any suitable mechanism for that purpose.

The framing of the loom is shown at *a a*, the lay at *b b* hung on rods *c c* pivoted at *d d*. This lay as usual carries a shuttle race and shuttles *e e* as also reeds *f f' f f'* specially described hereafter. In the rear of the frame are mounted on proper journals the warp spools *g g* provided with a proper drag as usual. On these spools are wound the warp threads, which pass through the eyes of ordinary heddles, thence through

the reeds, and after being filled with weft pass over breast rollers and are rolled up on the take up rollers g' g'.

The heddles are attached at top and bottom to heddle shafts which slide in a box h' and there are twice as many leaves of heddles as may be necessary for ordinary plain figures or twilled work, provided one slit or button hole is to be formed in the width of a web, if two button holes are to be formed in the width of stuff there are three times as many leaves and so in proportion for any greater number.

In mounting the loom all warp threads on one side of a buttonhole pass through one set of heddle leaves, all on the other side pass through another set of leaves, and it follows that when one set of leaves are not acted upon, then a shed will be formed by the other set only thus weaving one side of a buttonhole. In the loom shown in the drawings there are two sets only and the shafts in each set are sufficient for plain work only although it is my intention, to add more shafts, and their actuating appendages, so as to weave figured fabrics with buttonholes therein and I am now in practice weaving such stuffs. To the heddle shafts are secured wires h^2 jointed to rods h^3 hooked at h^4 and the lower shafts are held down by springs h^5. When the ends are lifted the heddle shafts and heddles are lifted by them; when the rods are lowered the springs pull the heddles down until arrested by proper stops. A rod j receives a reciprocating motion from some proper shaft on the loom, which makes one revolution for each pick, and is connected at its upper end to a lever j' pivoted at j^2; to the other end of this lever is attached by a link j^3 a griff or slide j^4 running on guide rods j^5. This griff therefore moves up and down at each beat of the lay. Upon this griff is fastened a pin or striker j^6, which when the griff is nearly at its lower point takes against the end j^7 of a lever pivoted at j^8, whose other end j^9 has attached to it a ratchet j^0. The end j^9 is held down by a spring x thereto attached. In connection with this lever a latch k is pivoted at k', having projecting from its upper end a pin k^2 and from its lower arm a pin k^3. The upper pin projects outward, so that it may at times be hit by the striker. The lower pin at times is struck by the arm j^7. This latch is also provided with a notch k^4 and there is a small pin k^5 projecting from the arm j^7. This latch is always pulled in the direction of the arrow thereon by a spring x^2. When the griff rises to its full height this striker takes the pin k^2 and throws the latch into the position seen in Fig. 4, when the spring x pulls down the lever arm j^9 permitting the ratchet to fall into position for taking a new hold. When the striker descends it comes in contact with j^7 and shoves down that end of the lever, lifting the ratchet end, which therefore moves its wheel a certain distance; but as j^7 is forced down the spring x^2 draws the latch over until pin k^5 rests in the notch k^4 (see Fig. 6) and the ratchet is thus prevented from taking a new hold until the griff has been raised again to its full height, and its striker has unlatched the latch as before described. The pin k^3 acts as a stop, preventing the lever from vibrating too far, and might as well be attached to any other convenient place. It will therefore be seen that this latch prevents the ratchet from turning its wheel until the griff and consequently the lay has made a full vibration. This contrivance therefore prevents a fault in the pattern and permits the attendant to move the lay to piece, etc., without risk of deranging the operation of the loom.

In the same frame with the latch lever, etc., is mounted a pattern barrel l having attached to it a ratchet wheel l^2 and furnished with suitable pins l^3. It receives motion from the ratchet j^0. Near this barrel is mounted a secondary pattern barrel l^4 also provided with teeth l^5 and having keyed on its shaft a ratchet wheel b^6. Between these two barrels are pivoted at l^7 a series of vibrating levers with upper arms l^8 and lower arms l^9 to which latter are fastened by hooks and eyes certain sliding wires l^0 having on their ends eyes which embrace the heddle shaft wires h^3 h^3 h^3. To each lower arm of this series of vibrating levers is secured a spring x^3 which tends to draw its lever in the direction of the arrow near the spring. Upon the pattern barrel shaft is a cam m, outside of the framing, upon which rests one end of a bell-crank m' pivoted at m^2, having attached to its other end a ratchet m^3, which at certain times acts upon the ratchet wheel l^6. This bell-crank is fitted with a spring x^4 which always tends to pull the bell-crank in direction of the arrow thereon.

This description and inspection of the drawings will show that the secondary pattern barrel must move a distance equal to one ratchet tooth at each complete revolution of the main or primary barrel l. Now by examining Figs. 3 and 4 it will be perceived that when a pin on the primary barrel strikes any of the arms l^8 that the vibrating levers thus moved will actuate the sliding wires which through their eyes will force the heddle shaft wires outwardly so that the hooks thereon cannot be engaged by the griff. The leaves of heddles thus connected cannot therefore be acted upon by the griff and lifted; but all heddle leaves whose wires are not through the levers acted upon by the pins, will have their hooks engaged by the griff and will be lifted by its motion thus

forming a shed which shed may be for any kind of stuff according to the mounting of the loom and the disposition of the pins in the pattern barrel. So far the effect is like that produced in the ordinary barrel loom or in the various varieties of Jacquard looms, but it is produced by a somewhat different agency, and it will be perceived that the revolving pattern barrel is the active agent in selecting the heddles or leaves of heddles that are to be lifted through the agency of the griff; but when buttonholes are to be made it is clear that a shed must be formed on one side of that hole only, until a length of stuff equal to that of the hole is woven, and that then this stuff must be kept out of the way of the shuttle until the stuff on the other side of the hole is woven by means of a shed formed on that side only; and that when the length of a hole is finished that the shed must again be formed across the whole width of the fabric. Now this alteration from a whole to a partial shed, thence to another partial shed and finally to a whole shed again depends upon the secondary pattern barrel, it being borne in mind that the loom is mounted for one buttonhole in a width with twice as many leaves of heddles as are necessary when no buttonholes are to be woven. The secondary barrel as before stated is moved the distance of one ratchet wheel tooth at each revolution of the primary barrel. Let it be supposed that this latter makes one revolution for a length of fabric equal to the length of a buttonhole and suppose the loom to be weaving in any part of the length of a fabric. When the main barrel has made a certain number of turns, it has brought the secondary barrel into such position, that pins properly placed thereon, strike the lower ends of some of the vibrating levers, thus forcing the sliding wires outward and preventing the heddles or leaves of heddles that they are in connection with from being lifted. While these heddles which are a whole set on one side of a buttonhole are thus prevented from being lifted the main barrel goes on forming a proper shed on the other side of the bottonhole, but when it has made one complete turn, the secondary barrel moves one notch, its pins in contact with the lower arms of the vibrating levers move out of the way, and another set of pins trip or prevent the action of the main barrel upon the set of heddles which were last in motion and permit it to select the proper leaves of that set of heddles which were formerly not moved. Another full turn of the primary barrel is now made, the remaining side of the buttonhole is woven; the secondary barrel moves one notch and then none of its pins prevent the action of the primary barrel which therefore selects heddles so that proper sheds of the whole width of stuff are formed and filled. The loom thus proceeds until it is time to form another hole, when pins in the secondary barrel again come into play, it being clear that the length of buttonholes and the distances between them can be varied at will, by proper diameters of barrels, arrangement of pins thereon, and number of teeth on the ratchet wheel l^6. Now in this way tolerable buttonholes could be made by weaving them in sections; that is, first a part of their lengths on one side, then another part on the other, and so on until the whole length was completed; or if the button or other hole was small its whole side might be woven at once. But even then the fabric would not be perfect, as the beating up would be irregular even if the take up was stopped at proper times.

In order then to perfect the fabric I have invented a split reed and its combinations now to be described. The reed $f\ f'$ is made in any usual way, except that it is formed in sections; two will answer if there is to be only one hole in the width of the stuff. One section f' is firmly attached to the lay while the other section f is pivoted at one end, while its other extremity is attached to the lay by a spring such as x^5. This spring (or equivalent therefor if employed) must have sufficient strength to hold its section of the reed so firmly to the lay that it will beat up practically when stuff of full width without a hole is being woven; and when the loom is weaving a whole width it will act like any ordinary reed. But when the loom is about to commence a buttonhole, the warp threads passing through the fast section of the reed are not lifted, the shed being found only in those threads which pass through the loose section of the reed; and the take up motion is stopped, until one side of a buttonhole is woven, the length of stuff between the take up and lay therefore increases and the loose section of the reed accommodates itself to this increase by moving away from the lay toward the shed, but it still beats up with practically the same force as when in line with the fast section. When the first side of a buttonhole is woven the warp threads of the loose section come to rest, and those of the fast section commence to form sheds, at the same time the take up is again thrown into gear, and the weaving of the second side of the hole commences. Then the fast section of the reed only beats up, but at each beat and each step of the take up, the loose section approaches the lay nearer and nearer, until the hole is completed, and then a complete shed of full width is again formed. At that time the loose section is again in line with the fast section, and both sections of the reed as a whole, beat up in the same manner as an ordinary reed. In actual

looms made according to the principles of my invention, a friction or constant take up is employed.

In the drawings for the sake of simplicity I have represented a mere shaft on which the fabric is wound as at g' g'; on the end of this shaft is a cog o driven by a pinion not seen in the drawings on a shaft o', and directly behind a ratchet wheel o^2 on the same shaft. This ratchet wheel is driven by ratchets o^3 o^3 mounted on a lever o^4 pivoted at o', and connected by a link o^5 to a rock shaft arm o^6, of a rock shaft o^7, from which projects another arm o^8. A spring x^6 tends to turn the rock shaft in direction of the arrows p p. Mere inspection will show that lifting o^8, and then permitting the spring x^6 to return the rock shaft to its original position will cause the take up shaft and rollers g' thereon to revolve. Now in order to lift o^8 there is attached to it a wire s having at its upper end a hook s' (see Fig. 3) which catches over the griff j^4. By means of this connection each stroke of the griff lifts and lowers arm o^8, and consequently causes the take up roller to turn one step. The take up would thus move constantly, but the wire s is provided with a sliding wire like l^0 l^0 connected like them to a vibrating lever mounted on the same pivot l^7 as these levers, and like them acted upon by pins on the secondary barrel. Whenever therefore a buttonhole commences to be woven such a pin strikes the lever and throws the connecting wire of the take up out of reach of the griff. The take up therefore stands still, until one side of a hole is woven, when the pin releases the tail of the lever, and allows the griff to seize the hook, and to move the connecting wire and its connections, thus putting the take up in motion again. Now there are many ways known to me for moving the take up and causing it to rest at proper times for proper intervals and I consider all of them equivalent one for the other so long as they effect the object.

The plan represented in the drawing is however a convenient and sure one. The divided reed may be constructed in various ways so long as one or more sections of it are free to move away from the lay to effect the purpose described and I contemplate so constructing it that it may slide bodily backward instead of swinging as shown on the drawings. I contemplate also the substitution for the griff of trap boards, or combs, or any equivalent therefor. I also contemplate the substitution of other kinds of latches for effecting the object attained by that represented in the drawings. The secondary barrel moreover may be moved by any convenient train of mechanism so long as its pins come into play at proper times; and the primary barrel may be actuated in any suitable manner, so long as it receives a positive motion of one step for each beat of the lay, and at times I intend to substitute for the barrel a jacquard or some equivalent therefor, when the secondary barrel is still combined therewith to prevent the selection of wires by such jacquard or its equivalent. There are many other parts of the loom and its mounting that may be variously changed and modified without affecting the operation of those parts in which my invention consists. I intend moreover to use this loom for weaving any kinds of fabrics with slits or holes therein, as also for weaving breeches pieces such as are sometimes used for suspender tabs with buttonholes therein, in fact for any purpose for which it is susceptible by changes of mounting or arrangement or adjustment of parts.

Now I do not claim to be the inventor of a pattern barrel used in connection with a loom as I know it to be an old device, but heretofore its pins or protuberances or depressions have acted directly upon sliding wires, and there was consequently great friction and consequent tendency to derangement which are obviated by interposing the vibrating levers between the wires and the pins.

I do not claim to have invented a take up motion or automatic mechanism for stopping its action, not because I know the latter to be old but because it would be useless to me unless combined with a divided reed or some equivalent thereof for beating up properly when the take up is stopped.

I do not claim to have invented a loom which will at the proper time form a shed on one side only of a buttonhole while the rest of the warp whether filled or unfilled lies out of the path of the shuttle, as a loom producing that effect has already been patented.

I claim as of my own invention and desire to have secured to me by Letters Patent—

1. A divided or sectional reed operating substantially in the manner and for the purpose herein set forth.

2. I claim in combination with such a divided or sectional reed, a take up motion or apparatus which is thrown out of action at certain proper periods substantially as herein described.

3. I claim a pattern barrel, or its equivalent in combination with vibrating levers, acting substantially in the manner and for the purposes herein specified.

4. I claim an apparatus substantially such as is herein specified viz. a pattern barrel or its equivalent, in combination with a primary pattern barrel or its equivalent, arranged in such manner substantially as specified, that the former shall at proper times prevent the selection of heddles or leaves of heddles by the latter, substantially

in the manner and for the purposes hereinbefore set forth.

5. I claim a latch substantially such as is herein described acting substantially in the manner and for the purposes herein set forth.

6. I claim, a divided reed substantially such as is herein described in combination with proper mechanism for forming a shed on one side only of a slit or buttonhole at the same time.

7. And lastly I claim a primary barrel for selecting heddles or leaves thereof in combination with a secondary pattern barrel for preventing their selection and vibrating levers acted upon by both barrels or the equivalents of these parts in combination each acting in combination with the others substantially in the manner and for the purposes herein described.

In testimony whereof I have hereunto subscribed my name in the town of East Hampton, in the State of Massachusetts, on this seventh day of March A. D. 1857.

FRANKLIN PAINTER.

In presence of—

JOHN H. WELLS,

E. FERRY.