

(No Model.)

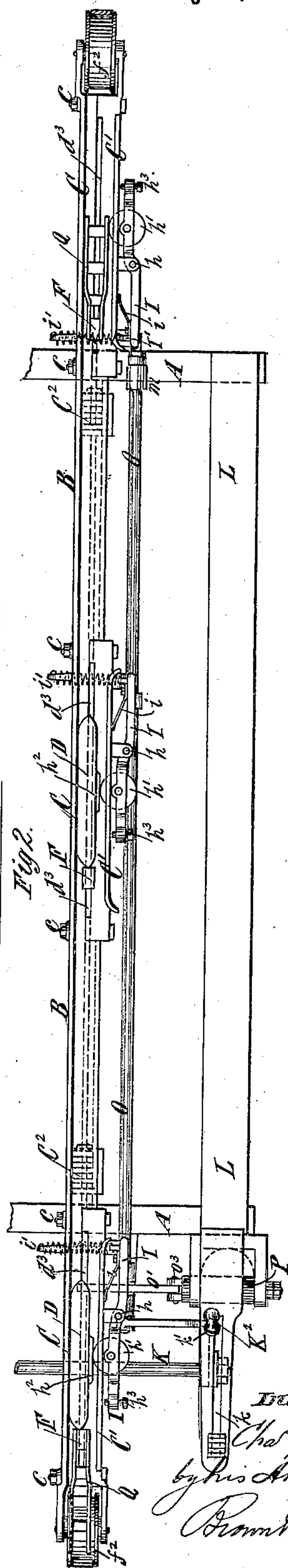
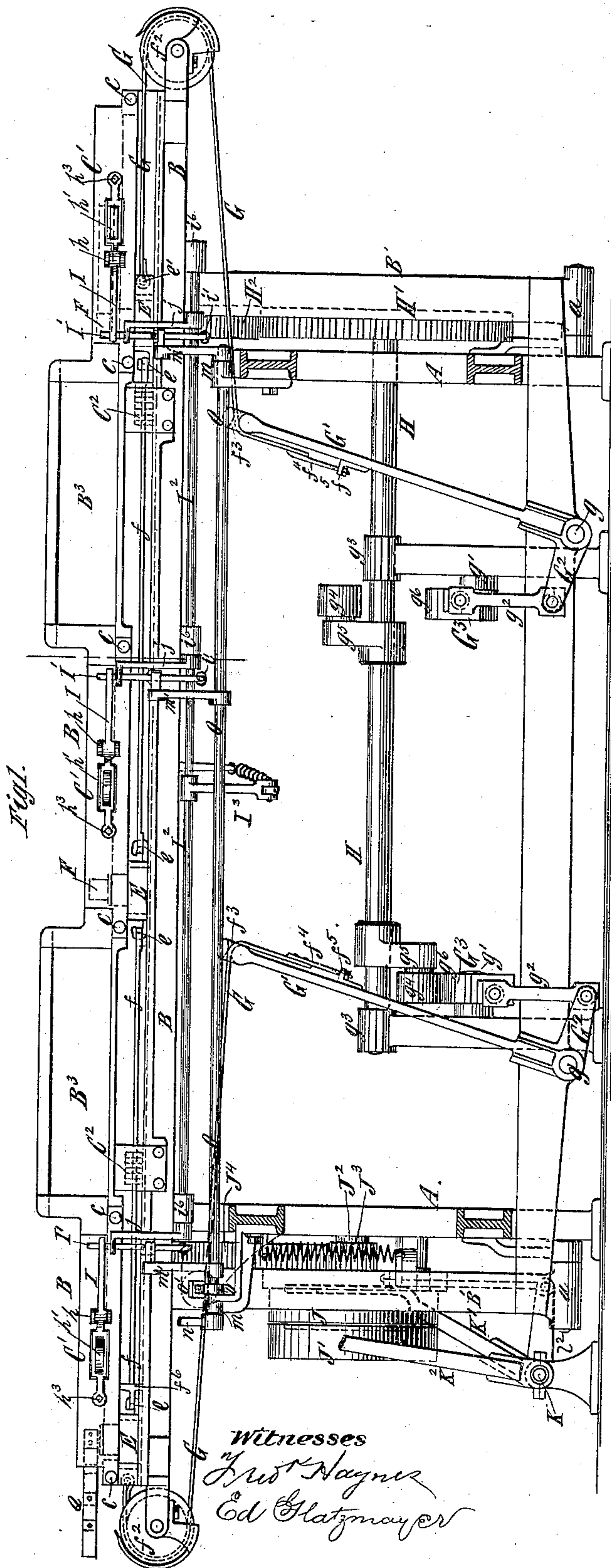
C. GAHREN.

3 Sheets—Sheet 1.

LOOM.

No. 257,310.

Patented May 2, 1882.



(No Model.)

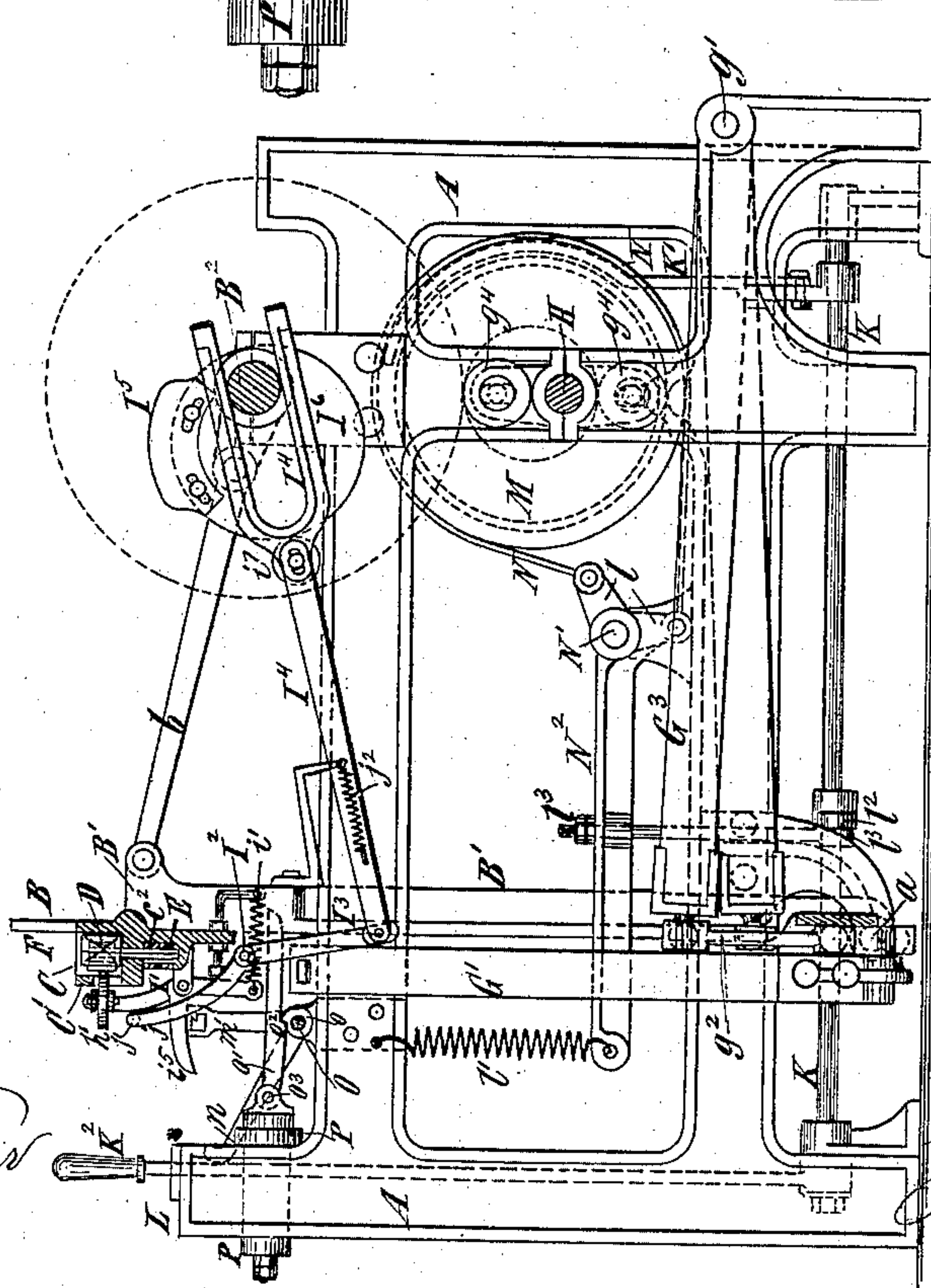
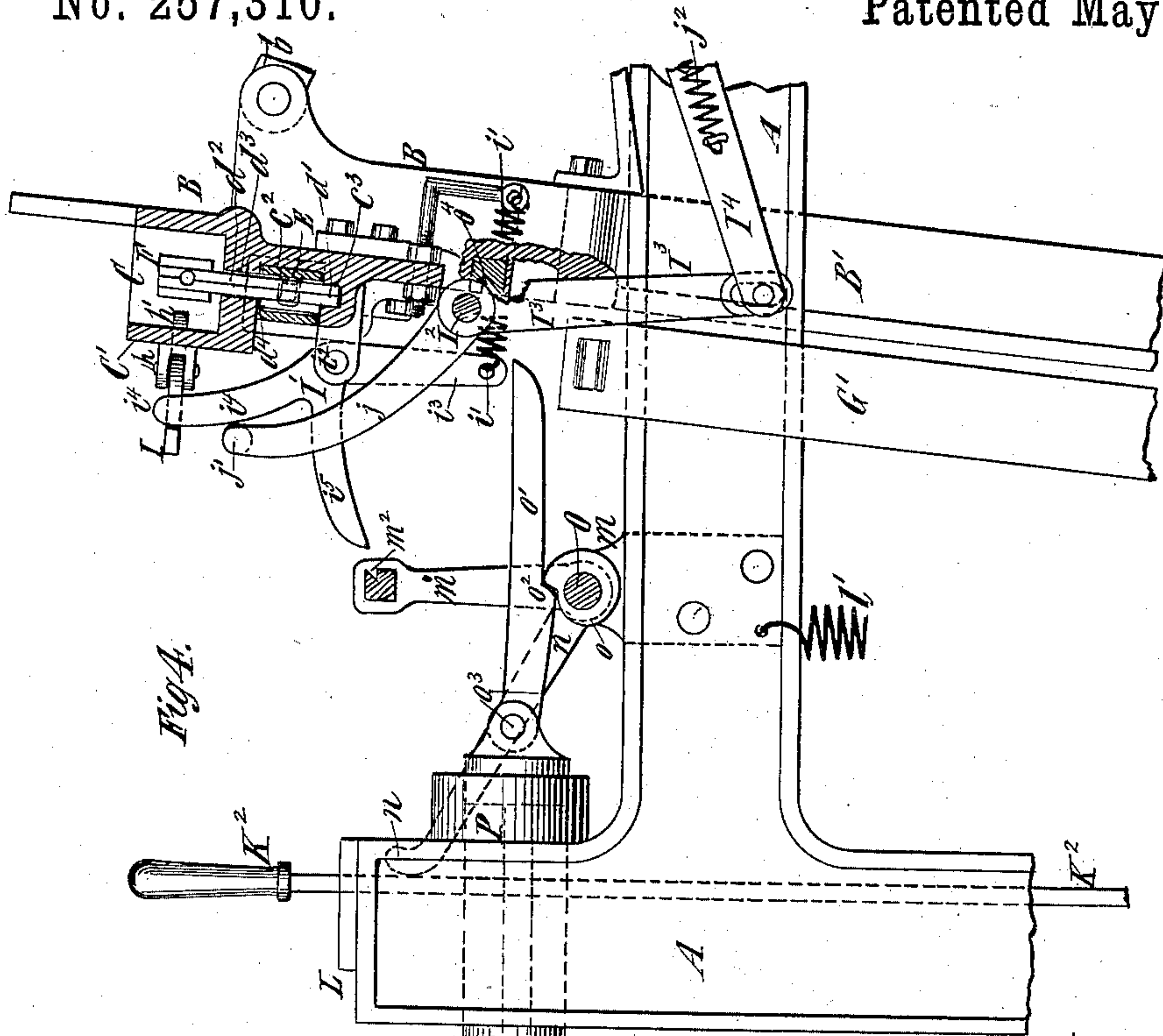
3 Sheets—Sheet 2.

C. GAHREN.

LOOM.

No. 257,310.

Patented May 2, 1882.



Witnesses

Frederick Haynes
Ed. Platzmayer

Inventor

Charles Gahren
by his Attorneys
Permut Brown

(No Model.)

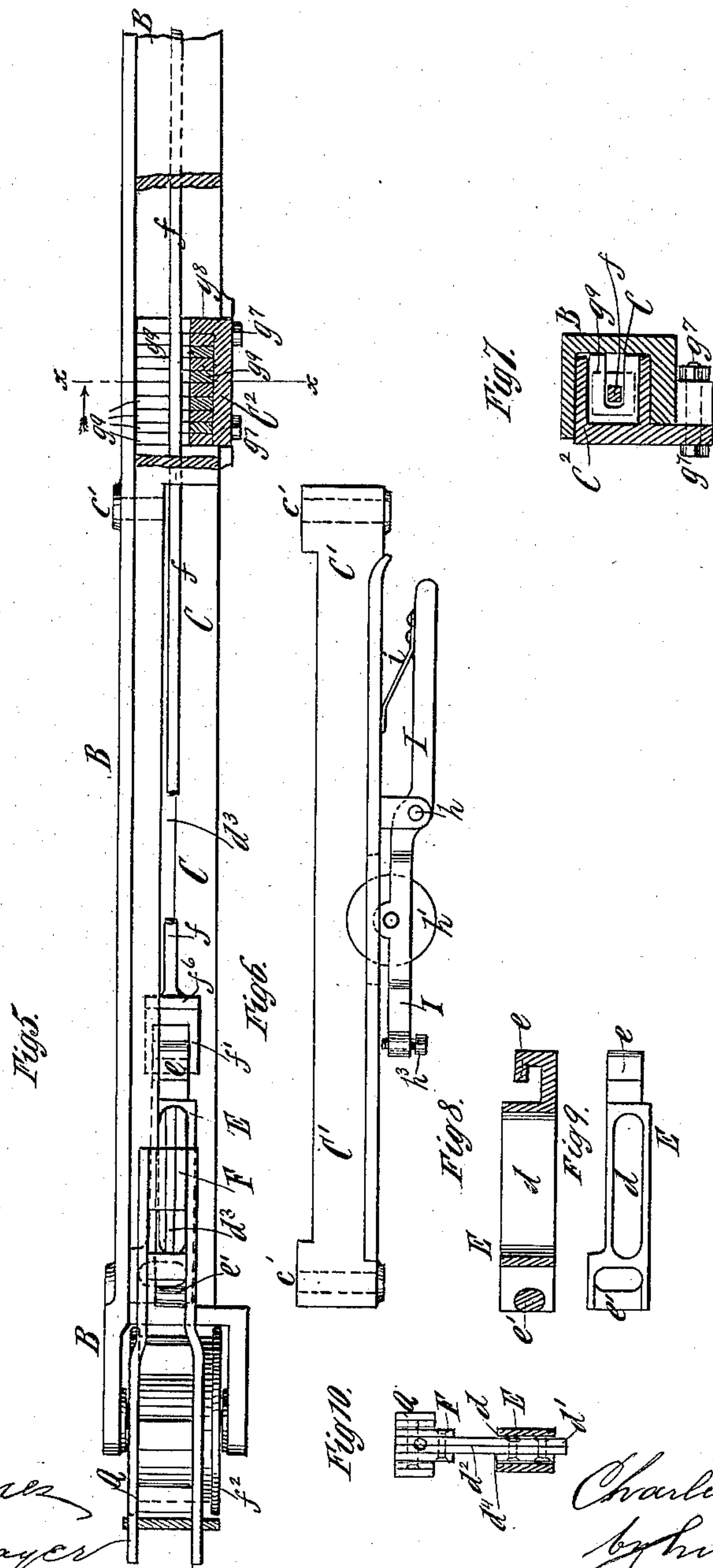
C. GAHREN.

3 Sheets—Sheet 3.

LOOM.

No. 257,310.

Patented May 2, 1882.



Witnesses
Fred Haynes
Ed. Glagmayer

Inventor
Charles Gahren
by his Attorneys
Brown & Brown

UNITED STATES PATENT OFFICE.

CHARLES GAHREN, OF NEW YORK, N. Y.

LOOM.

SPECIFICATION forming part of Letters Patent No. 257,310, dated May 2, 1882.

Application filed May 20, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES GAHREN, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Looms, of which the following is a specification.

My invention relates generally to power-looms which are employed for weaving two or more webs or fabrics side by side at the same time, such looms employing two or more shuttles and a corresponding number of shuttle drivers or pickers.

The invention consists in certain novel features in the construction of the shuttle-drivers, hereinafter particularly described and claimed, and in the means for connecting the several pickers with their drivers and the several drivers with each other and with the picker-sticks, whereby the several parts are connected together, as far as possible, without the use of screws or bolts, which are liable to become loose while the loom is in operation, and in such a manner that they may be readily disconnected from each other when desired.

The invention also consists in the combination, with a number of connected shuttle-drivers, of a novel arrangement of picker-sticks composed of bell-crank or elbow levers, straps connecting the long arms of the picker-sticks with the two end shuttle-drivers, treadles connected with the short arms of said picker-sticks, and mechanism for operating said treadles, all being so organized that the weight of the treadles tends to keep said straps constantly tight.

The invention also consists in the combination, with the lay and its operating mechanism, of a spring-cushion or elastic buffer, a pawl connected therewith, and a novel arrangement of mechanism, hereinafter particularly described, for raising said pawl in the way of the lay, so that it will transmit the striking force of the lay to the spring-cushion or buffer.

In the accompanying drawings, Figure 1 represents a front view of a loom embodying my invention, the breast-beam and certain parts which do not pertain to the invention being omitted. Fig. 2 represents a plan of the lay and appurtenances and the front part of the loom. Fig. 3 represents an end view and partial transverse section of the loom. Fig. 4

represents a transverse section and partial end view of a portion of the loom upon a larger scale. Fig. 5 represents a sectional plan of a portion of the lay, comprising one shuttle-box and appurtenances, upon a larger scale, the front of the shuttle-box being removed. Fig. 6 represents a plan of the detached front of the shuttle-box shown in Fig. 5. Fig. 7 represents a transverse section upon the dotted line xx , Fig. 5. Fig. 8 represents a vertical section of one of the shuttle-drivers detached. Fig. 9 represents a plan thereof, and Fig. 10 represents a transverse section of the shuttle-driver and an end view of the picker and a dummy shuttle attached.

Similar letters of reference designate corresponding parts in all the figures.

A designates the frame-work of the loom, and B designates the lay, which is supported in the usual way upon lay-swords B' , hinged or fulcrumed at a , so that they may readily vibrate backward and forward. The lay is operated through connecting-rods b from a crank-shaft, B^2 ; but it might be operated by any other suitable mechanism, so far as my invention is concerned.

The loom here represented is adapted for weaving two fabrics or webs simultaneously and side by side, and the lay B therefore has provision for receiving and carrying two sets of reeds at B^3 .

Upon the lay B is the usual raceway, and in the lay are formed three shuttle-boxes, C, one near each end and the third near the middle of the length of the lay. Each shuttle-box C has a separate removable front, C' , which is secured to the lay by bolts c , inserted through bolt-holes c' in the said front and in the lay, and any one of the said fronts may be removed to open the shuttle-box without disturbing the others. The shuttle-box and its removable front are clearly shown in Figs. 5 and 6.

D designates the shuttles, which may be of any suitable kind, and I will now describe how they are operated.

Beneath the raceway and the shuttle-boxes C there is formed in the lay B a longitudinal slideway, c^2 , (best shown in Fig. 4,) and E designates shuttle-drivers, here shown as three in number, and connected together so as to oper-

ate simultaneously. The shuttle-drivers E are snugly fitted in the slideway c^2 , and, so far as they themselves are considered, they can be readily removed from the open front of the said slideway. Each shuttle-driver E carries a shuttle-picker, F, the form of which is best shown in Fig. 4, and which is preferably composed of rawhide, in a manner hereinafter explained. The shuttle-driver E, which is composed of a solid piece of metal, has in it a slot, socket, or opening, d , of a form shown clearly in Figs. 8 and 9, and the picker is made to fit snugly in said slot, socket, or opening, though not so tightly as to prevent its being readily removed or replaced when desired.

In the bottom of the slideway c^2 in the lay is formed a groove, c^3 , and each of the pickers F has upon its bottom side or under surface a tongue, d' , of corresponding size, fitting and adapted to slide freely in said groove, as best seen in Fig. 4. Each picker F has above the part which fits in the slot or socket d of the driver E a contracted or narrow neck, d^2 , which fits a corresponding slot or opening, d^3 , in the bottom of the corresponding shuttle-box, C, and within said shuttle-box the picker F is widened out, so as to give it a broad head for striking or picking the shuttle.

It will be observed that when the removable front C' of the shuttle-box C is in place the picker is guided and held against lateral movement, both by the neck d^2 , fitting in the slot d^3 , and by the tongue d' , sliding in the groove c^3 ; and it will also be readily understood that as the picker is thus guided and held against lateral movement the shuttle-driver E, in which it is fitted, is held in the slideway c^2 and prevented from displacement or removal through the open front thereof.

It will also be observed that the picker F is held against vertical displacement by the wider part below the neck d^2 , forming a shoulder, d^4 , which bears upon the underside of the front C' of the shuttle-box C and prevents the picker from rising.

As here represented, the pickers are each composed of two pieces of rawhide, extending from top to bottom thereof, and a single piece upon the front to form the wide part, which fits in the slot or socket d , and single pieces upon each side of the top to form the wide and solid head. The several pieces of rawhide are all firmly secured together by riveting, and a very solid and durable picker is thus produced.

When it is desired to remove any one of the shuttle-drivers E or pickers F for any purpose the removable front C' of the corresponding shuttle-box, C, is removed and the picker F lifted upward out of the socket d in the driver, or at least sufficiently to take the tongue d' out of its groove c^3 , whereupon the shuttle-driver E may be withdrawn from the front of the slideway c^2 . The solid socket d of the shuttle-driver E, into which the picker F fits, affords a solid and reliable connection between the two, without the necessity of em-

ploying any bolts or screws, which are so objectionable in the rapidly-moving parts of looms because of their liability to become loose; and I also afford provision for the ready removal of the picker from its driver and the driver from the slideway c^2 when necessary for any purpose.

I will now describe the mechanism employed for connecting the shuttle-drivers and for actuating them.

The center or middle driver, E, has upon each end a hook, e , formed from the same piece with it, as seen in Fig. 1, and the two end drivers have similar hooks, e , upon their inner ends, and have upon their outer ends wrist-pins e' , which are also formed from the same piece as the driver, as seen best in Figs. 8 and 9. The two end drivers are connected with the middle driver by means of rods f , having at each end an eye or spade-handle, f' , which is hooked upon the solid hook e of the shuttle-driver, as shown in Fig. 5, thus forming a strong and invariable connection between the shuttle-drivers E. The construction of the drivers with their hooks e and wrist-pins e' each from a solid piece of metal is of great importance, as it reduces the liability of any accident from the parts becoming loose or detached.

To the wrist-pin e' , at the outer end of each of the end shuttle-drivers, E, is connected a strap, G, which passes around a pulley, f^2 , and thence the two straps pass inward and are connected to the upper ends of the picker-sticks G' .

In the head of each picker-stick is formed a slot or eye, f^3 , having rounded sides, through which is passed the strap G, and the end of the latter is riveted or otherwise fastened securely to a bolt, f^4 , which passes through an eye, f^5 , on the stick, and by means of a nut or nuts may be drawn down to tighten the straps G and the rods f connecting the several drivers with each other.

Each picker-stick G' consists of an elbow or bell-crank lever pivoted or fulcrumed at g , and G^2 designates the short arms of said levers. G^3 designates treadles fulcrumed at g' at the back of the loom and extending forward over the short arms G^2 of the picker-sticks, to which they are connected by short connecting rods or links g^2 , having a ball-and-socket connection at each end with the treadles G^3 and the short arms G^2 of the picker-sticks, so as to prevent any friction or binding of the joints as the treadles are operated.

H designates a shaft arranged parallel with the lay and adapted to be rotated in bearings g^3 , as best seen in Fig. 1. The said shaft derives rotary motion by means of a wheel, H^1 , and a pinion, H^2 , from the cranked lay-operating shaft B^2 . The shaft H carries tappets, which consist preferably of rollers g^4 , pivoted on crank-arms g^5 , projecting in opposite directions from the shaft H, and as said shaft is rotated the rollers g^4 come alternately in contact with and act upon shoes g^6 upon the up-

per sides of the treadles G^3 , and thus actuate the picker-sticks G' and effect the fly or picking of the shuttles D . The weight of the treadles G^3 and their connections with the picker-sticks G' are sufficient to always cause the picker-sticks to tend to move toward each other or into the position of the left-hand picker-stick in Fig. 1; but as one treadle is acted upon by the tappet g^4 the other picker-stick will be drawn quickly outward into the position of the right-hand picker-stick in Fig. 1, and even though its momentum be sufficient to carry it far enough to slacken the strap G its weight will cause it to at once move inward as far as the strap will permit it, and thus keep the strap taut, so that there will be no lost motion when it in its turn is actuated by its treadle G^3 .

It is desirable that the movement of the shuttle drivers and pickers at the termination of each pick should be cushioned in stopping, and I will now describe how this is accomplished.

At the inner end of each of the outer or end shuttle-boxes, C , is a box, C^2 , which fits therein and closes the front thereof, as best seen in Figs. 5 and 7. The box C^2 is secured to the lay by bolts g^7 , and one end of the said box is partially closed or has an inwardly-projecting flange, g^8 .

Within the box C^2 is a cushion composed of layers or pieces g^9 , of leather or other suitable material, packed tightly together and slotted upon one side, as best seen in Fig. 7, so as to admit of their being inserted laterally over the rod f into their places. Upon the two rods f on the outer sides of the boxes C^2 are flanges f^6 , which are adapted to fit into the boxes C^2 , and as the shuttle-drivers terminate their movement one or the other of the flanges f^6 is impelled against the leather cushion g^9 , and the movement of the drivers is thereby checked and cushioned.

I will now describe the swell levers or binders employed for retaining the shuttles in their shuttle-boxes and preventing their rebound, and also means which I employ for almost entirely releasing the shuttle just before the pick from its swell lever or binder, so as to enable it to be thrown with less resistance, which in a loom employing several shuttles is an important advantage.

I do not here make any claim to the construction of or means for operating said swell levers or binders.

On the removable front C' of each shuttle-box C is a swell lever or binder, I , which is pivoted or fulcrumed at h , and carries a wheel or roller, h' , which projects through a slot in the front C' into the shuttle-box, as seen clearly in Figs. 4 and 6.

Upon the front of each shuttle D is a slight projection, h^2 , (shown only in Fig. 2,) and in the end of the swell lever or binder I of each shuttle-box is a set-screw, h^3 , which may be adjusted so as to permit the wheel or roller h' to project sufficiently into the shuttle-box to bear upon the plain front of the shuttle.

The end of the swell lever or binder I which is opposite the end carrying the set-screw h^3 is pressed outward, so as to press the wheel or roller h' inward, by means of two springs, one of which, i , is a light spring and acts directly upon the binder, as best seen in Fig. 6, and the other of which is a strong spiral spring, i' , which acts upon the binder I through a three-armed lever, I' , which is pivoted at i^2 , as best seen in Fig. 4. One arm, i^3 , of each of the levers I' projects downward and has connected to it its strong spiral spring i' . Another arm, i^4 , of said lever projects upward behind the tail of the corresponding binder, I , and the third arm, i^5 , projects outward, like a pawl, as seen in Fig. 4, for a purpose hereinafter explained.

I^2 designates a rock-shaft extending longitudinally the full length of the loom, and mounted in bearings i^6 on the lay B , so that it is carried backward and forward therewith. Upon said shaft I^2 are a number of levers or arms, j , which project upward, one adjacent to each three-armed lever I' , and each lever or arm j carries at its upper end a pin or stud, j' , which bears upon the front edge of the upwardly-projecting arm i^4 of the adjacent lever I' . Upon the shaft I^2 is a downwardly-projecting arm, I^3 , to which is connected a connecting-rod, I^4 , which receives motion from the crank-shaft B^2 , which operates the lay B , as best seen in Fig. 3.

The connecting-rod I^4 is bifurcated or forked at its rear end, so as to embrace the shaft B^2 , and upon said shaft is an eccentric, I^5 , upon which is a cam-projection, I^6 . The eccentric I^6 acts upon a roller, i^7 , upon the rod I^4 to hold the rock-shaft I^2 stationary while the lay is moving, and at the proper time the cam-projection I^6 acts upon the roller i^7 , and thereby rocks or turns the shaft I^2 sufficiently to cause the studs or pins j' of all the arms j to act upon the upwardly-projecting arms i^4 of the three-armed levers I' , and thereby take the pressure of the strong springs i' off the binders I . The rear end of the rod I^4 being forked or bifurcated, it is permitted to move freely transversely to the shaft B^2 , following the movements of the lay, and receiving no independent motion until just before the shuttles are to be picked or struck, when the rod is actuated by the cam I^5 and the shaft I^2 rocked, taking the pressure of the strong springs i' off the binders I , and leaving the binders only acted upon by the weaker springs i to hold the shuttles in proper position to be struck—that is, against the back of the shuttle-boxes C .

The connecting-rod I^4 is only moved in one direction by the cam I^5 ; but it is returned to rock the shaft I^2 in the opposite direction and apply the power of the strong springs i' to the binders I by means of a spring, j^2 . (Shown in Fig. 3.)

I will now describe the devices which I may employ for stopping the loom automatically when any one of the shuttles is not properly boxed; but I do not make any claim to such

devices, except to the combination of mechanism employed to check or arrest the forward movement of the lay without violent shock.

J J' represent fast and loose driving-pulleys upon a short driving-shaft, J², which transmits rotary motion to the cranked lay-operating shaft B² by means of a pinion, J³, and spur-wheel J⁴, as shown in Fig. 1, and indicated by dotted lines in Fig. 3.

K designates a rock-shaft near the bottom of the loom, as seen in Fig. 3, and extending from front to back thereof, and upon the rear end of the said rock-shaft is fixed a belt-shipper, K', while upon the front end thereof is fixed a shipping or starting lever or handle, K², common in looms, and working in a slot, *k*, in the breast-beam L in the usual way.

Upon the same shaft as the driving-pulleys J J' is a brake wheel or pulley, M, and N designates a brake-strap surrounding said wheel or pulley, as best seen in Fig. 3, and connected at its two ends to arms *l*, projecting from a rock-shaft, N', which, by means of a lever or arm, N², may be rocked to tighten the brake-strap N upon the brake wheel or pulley M.

To the free end of the lever or arm N² is connected a spring, *l'*, which, when allowed to act, draws up said lever or arm and applies the brake-strap N upon the wheel or pulley M, and the lever or arm N² is connected with the rock-shaft K by means of an arm, *l''*, upon said rock-shaft and a rod or link, *l'''*, connecting said arm with the lever or arm N². When the shipping-lever K² is shifted into the position shown in Figs. 1 and 2 it is held in position by engaging with a shoulder, *l''*, in the end of the slot *k* in the usual way, and when held in such position the driving-belt is upon the fast pulley J and the lever or arm N² is drawn down against the force of the spring *l'* sufficiently to remove the brake-strap N from the wheel M.

In order to stop the loom it is only necessary to push the shipping-lever K² forward out of engagement with the shoulder *l''*, whereupon the spring *l'* will draw up the lever or arm N² sufficiently to apply the brake-strap N to the wheel or pulley M, and the rock-shaft K will be rocked sufficiently to shift the belt-shipper K' to carry the driving-belt from the fast pulley J onto the loose pulley J'.

In front of the lay B, and mounted in stationary bearings *m* in the frame of the loom or the breast-beam, is a second rock-shaft, O, parallel with the shaft I², and fixed to the shaft O are three upwardly-projecting arms, *m'*, on the upper ends of which are projections or studs, in which are notches *m''*, in front of the forwardly-projecting arms *i''* of the three-armed levers I', as best seen in Fig. 4.

Upon the end of the rock-shaft O directly opposite the position occupied by the shipping-lever K² when the loom is in operation is an arm, *n*, which is adapted to bear upon the lever K² when the latter is moved to set the loom in operation, as best seen in Figs. 2 and 4.

I have before described how, when the shut-

ties D are properly boxed, the binders I would be deflected or vibrated outward against the force of the strong springs *i'*, acting through the three-armed levers I'. By such vibration or deflection of the binders by the shuttles the three-armed levers I' will be moved inward sufficiently to raise their outwardly-projecting arms *i''* above the notches *m''* in the arms *m'*, so that when the lay beats forward said arms *i''* will pass directly over the arms *m'* without affecting them. If, however, any one shuttle has not been properly boxed, the binder I of the corresponding shuttle-box, C, is not deflected, and the corresponding three-armed lever, I', not having been moved inward, it is obvious that when the lay beats up the forwardly-projecting arm *i''* of said lever will be in the position shown in Fig. 4, and will engage with the notch *m''* in the adjacent arm *m'*, and thereby rock or turn the rock-shaft O sufficiently to cause the arm *n* to exert a pressure upon the shipping-lever K² sufficient to throw it forward out of its notch, thus releasing the rock-shaft K and leaving it free to be operated by the spring *l'* to shift the belt, apply the brake-strap N, and stop the loom.

Upon the rock-shaft O is a cam, *o*, having an abrupt shoulder, and above the said cam is a pawl, *o'*, which has a shoulder, *o''*, with which the shoulder on the cam *o* engages to raise the pawl *o'*. The pawl *o'* is pivoted at *o'''* to a very strong spring-cushion or buffer, P, as seen in Fig. 4, and when the rock-shaft O is rocked by the operation of the stop-motion the cam *o* acts upon the shoulder *o''* of the pawl *o'* and raises the latter sufficiently to cause its point to engage with a notch, *o''''*, in the lay, all of which mechanism is best shown in Figs. 2 and 4. By this means the lay is stopped at once and its momentum is checked gradually and its striking force on the pawl *o'* deadened by the spring-cushion or buffer P.

One or the other of the end shuttle-boxes is left empty at each pick of the loom, and it will be readily seen that if the binder I of the empty shuttle-box were not deflected or vibrated in the same manner as when a shuttle is boxed the stop-motion would be operated at each pick of the loom. To prevent this I employ two dummy or false shuttles, Q, composed simply of skeleton frames of about the width of the regular shuttles, and I attach a dummy shuttle to each of the pickers F at the end of the loom, in which case a dummy shuttle is carried into the end shuttle-boxes alternately at the same time the regular shuttle is ejected therefrom, thus keeping the binder I of that shuttle-box deflected or pushed outward, as it would be if a shuttle were in the box.

By my invention I provide a loom of very simple construction, in which the several parts are connected so as to lessen the liability of derangement while in operation, and which is therefore capable of being run at a quick speed.

I do not claim broadly shuttle-drivers pro-

vided with removable shuttle-pickers which are guided independently of the shuttle-drivers, nor a shuttle-box having a removable front, as I am aware that such devices are old. Neither
 5 do I claim, broadly, the combination, with a lay, of a stop-pawl and mechanism for raising the said pawl into the path of the lay for arresting it when the shuttle is not properly boxed.

10 What I claim as my invention, and desire to secure by Letters Patent, is—

1. The shuttle-driver constructed with an eye or socket, *d*, a hook, *e*, at one end, and a wrist-pin, *e'*, at the other end, substantially as
 15 specified.

2. The shuttle-driver constructed with an eye or socket, *d*, and a hook, *e*, at each end, substantially as specified.

3. The combination, with a number of shuttle-drivers, *E*, each having a socket or eye, *d*,
 20 of rods having eyes or spade-handles connecting said drivers, the latter having hooks fitting said eyes or spade-handles, and the two end drivers having wrist-pins at their outer
 25 ends, straps attached to the end shuttle-drivers, and mechanism connected with said straps for operating them, substantially as specified.

4. The combination of the lay *B*, having the raceway, and the slideway *c*² below the raceway, with shuttle-drivers *E*, externally fitting
 30 said slideway, and having sockets *d*, removable pickers *F*, inserted downward into said sockets, rods *f*, arranged between and in line with said shuttle-drivers and detachably connected

with the ends thereof, and mechanism for operating said shuttle-drivers, all substantially
 35 as specified.

5. The combination of the lay *B*, constructed with shuttle-boxes *C*, having removable fronts
 40 *C'*, and containing the slideway *c*² below said shuttle-boxes, and grooves *c*³, with the shuttle-drivers *E*, externally fitting said slideway, and having sockets *d*, mechanism for actuating said shuttle-drivers, and the pickers *F*, fitting said
 45 sockets and adapted to be inserted downward into them, and having tongues *d'* engaging with the grooves *c*³, substantially as specified.

6. The combination, with a number of connected shuttle-drivers, of the straps *G*, the bell-crank picker-sticks *G'* *G*², the treadles *G*³,
 50 the links *g*², having ball-and-socket joints and connecting the treadles with the picker-sticks, whereby the weight of the treadles serves to keep the said straps tight, and mechanism for operating said treadles, substantially as specified.
 55

7. The combination of the lay and mechanism for operating it with the spring-cushion or elastic buffer *P*, the rock-shaft *O* and mechanism for turning it, the cam *o*, and the pivoted pawl *o'*, adapted to be raised by said cam
 60 in the way of the lay to transmit the striking force of the lay directly to the spring-cushion or elastic buffer, substantially as specified.

CHARLES GAHREN.

Witnesses:

FREDK. HAYNES,
 A. C. WEBB.