

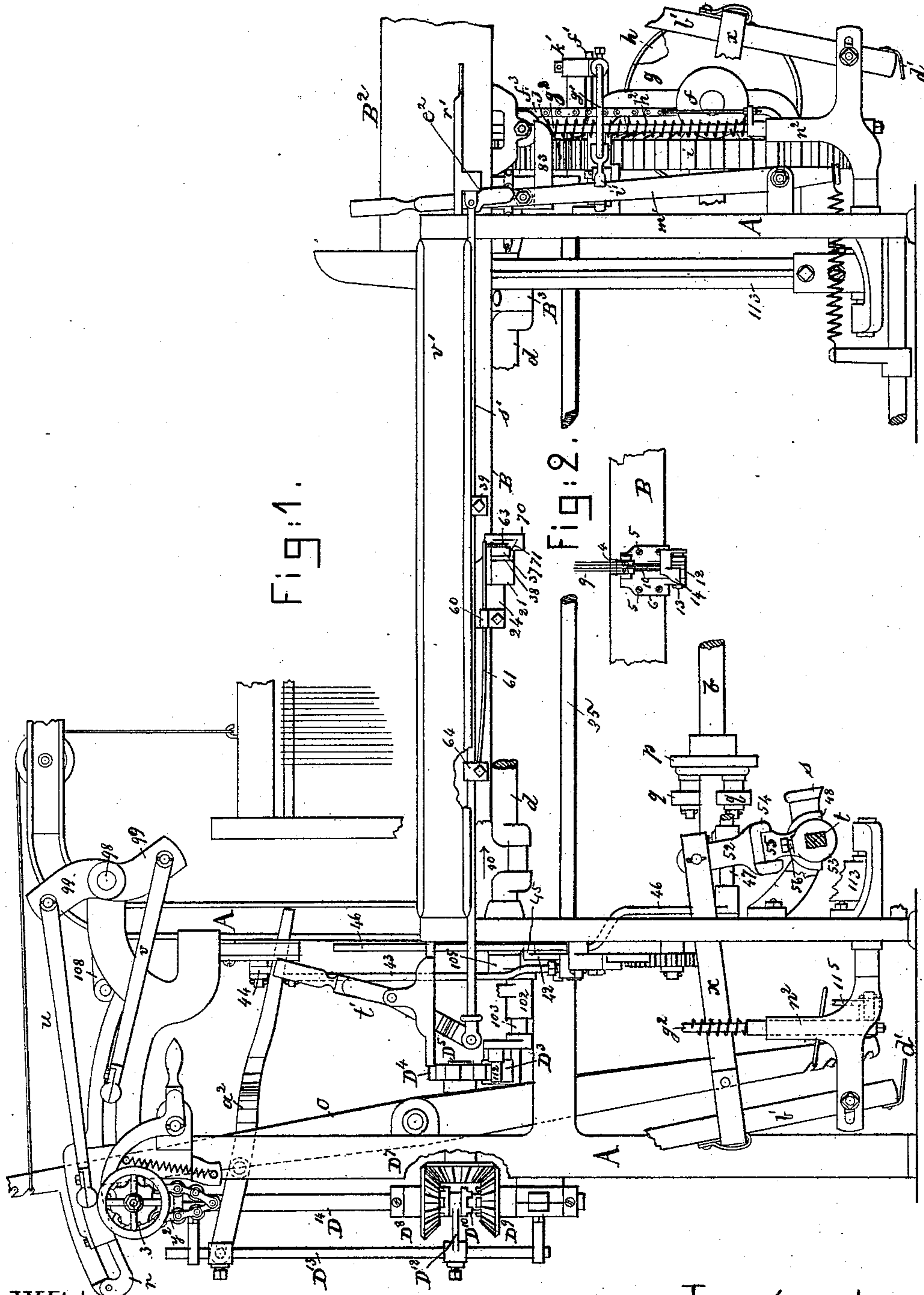
(No Model.)

3 Sheets—Sheet 1.

G. CROMPTON & H. WYMAN.  
LOOM.

No. 455,175.

Patented June 30, 1891.



Witnesses.

*R. J. Ayer.*  
*John F. C. Pringle.*

Inventors.

*George Crompton*  
*Horace Wyman*  
*by Henry J. Maynard attys.*

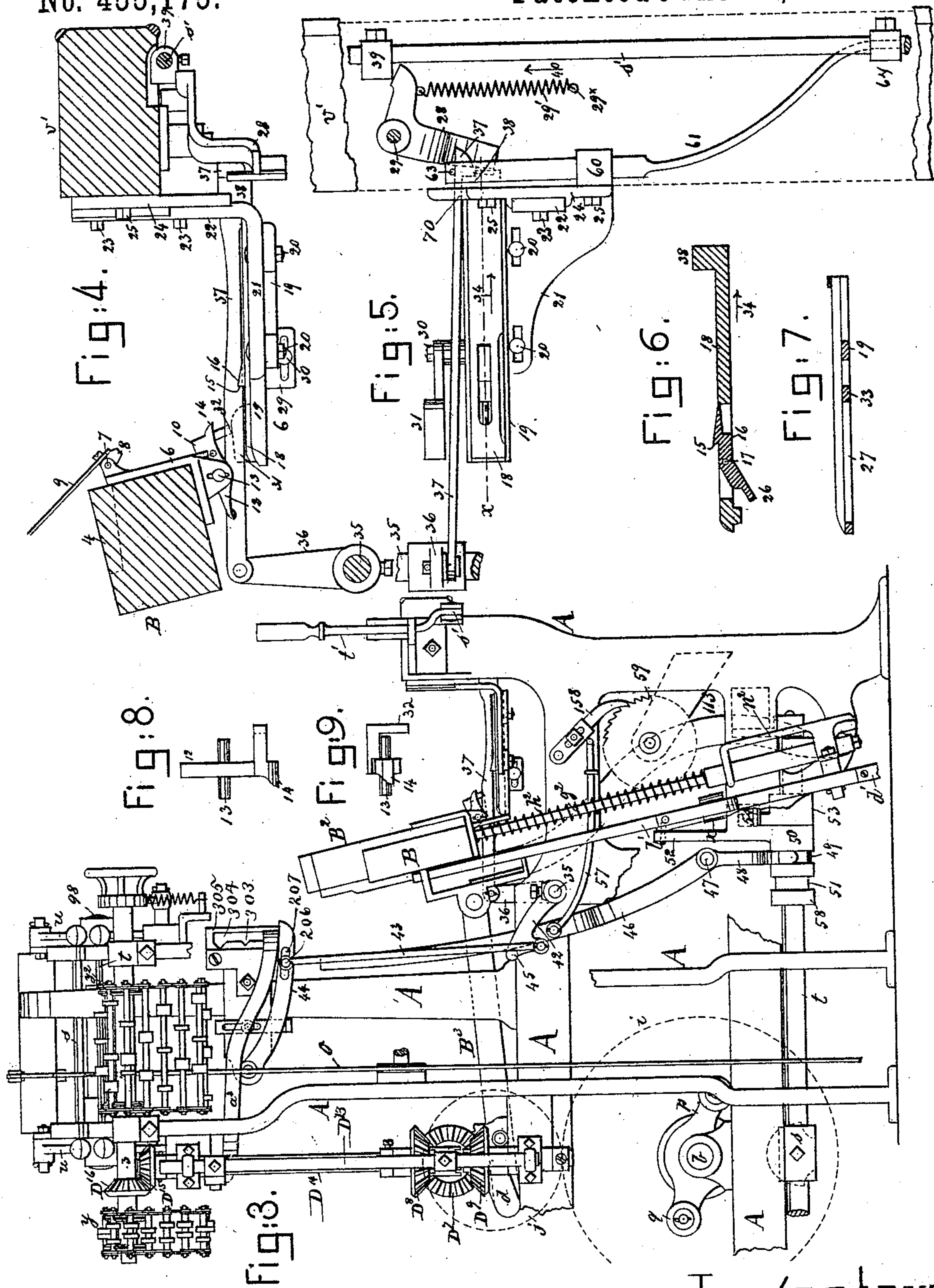
(No Model.)

3 Sheets—Sheet 2.

G. CROMPTON & H. WYMAN.  
LOOM.

No. 455,175.

Patented June 30, 1891.



Witnesses.  
D. J. Royce  
John F. C. Printz

Inventors  
George Crompton and  
Horace Wyman.  
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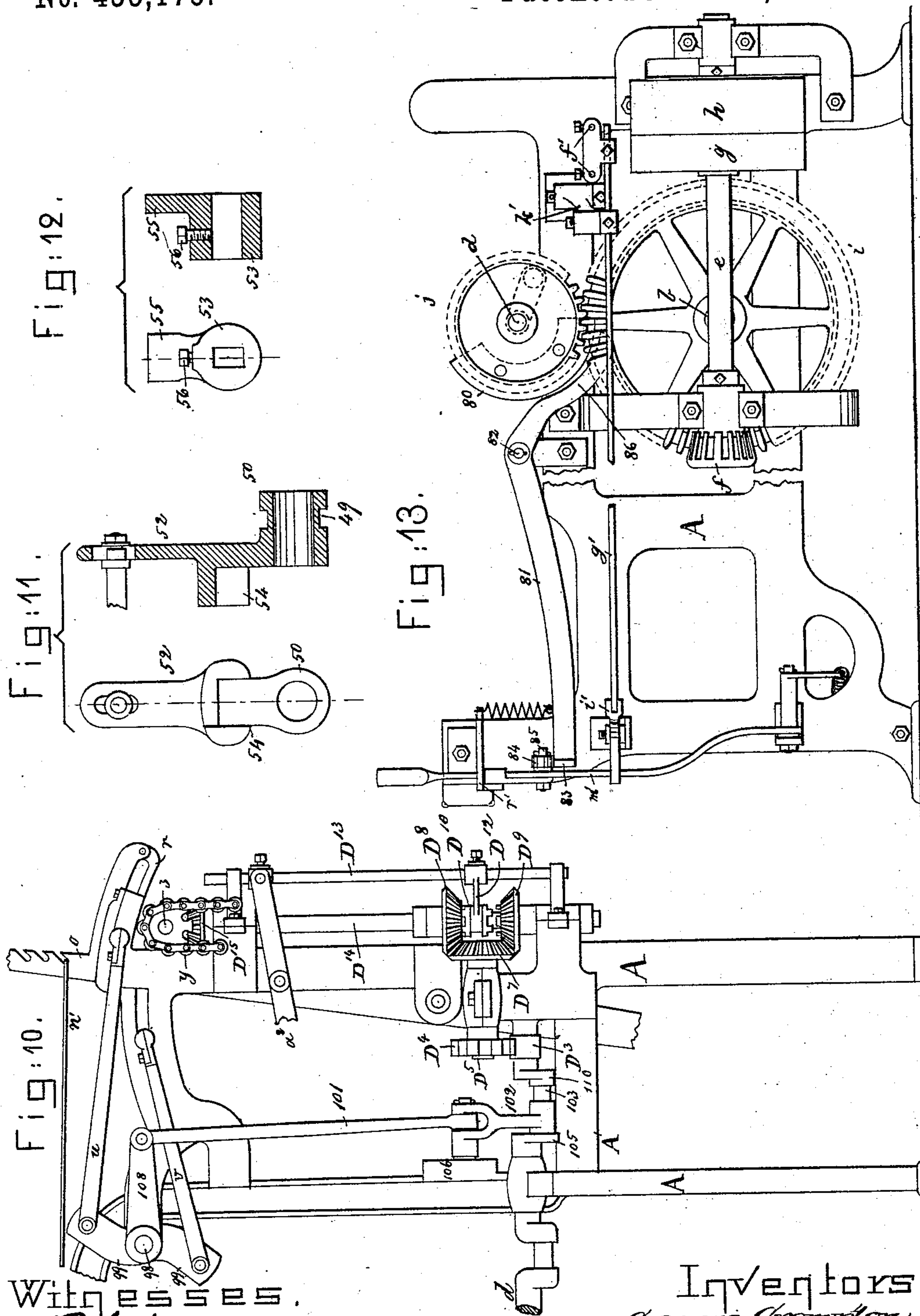
(No Model.)

3 Sheets—Sheet 3.

G. CROMPTON & H. WYMAN.  
LOOM.

No. 455,175.

Patented June 30, 1891.



Witnesses.

*T. J. Doyle.*  
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# UNITED STATES PATENT OFFICE.

GEORGE CROMPTON AND HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE CROMPTON LOOM WORKS.

## LOOM.

SPECIFICATION forming part of Letters Patent No. 455,175, dated June 30, 1891.

Application filed December 22, 1884. Serial No. 150,940. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE CROMPTON and HORACE WYMAN, both of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object to provide an improved construction of change shuttle-box looms, whereby the stop-motion on the absence or breakage of the weft will not only arrest the picking mechanism, but also stop, 15 and, if desired, automatically reverse the movement of the pattern chain or surface actuating mechanism.

One portion of this invention has for its object to provide mechanism whereby the 20 loom when the weft is broken or exhausted will be automatically stopped and the pattern-cylinder reversed to automatically reopen the shed to enable the fault in the laying of the weft to be corrected. The feeler of 25 the stop-motion in this our invention, as well as the dagger, is mounted upon and made movable with the lay in such manner that it is possible to detect a break or imperfection in the weft during the forward beat or move- 30 ment of the lay, rather than as the lay reaches its extreme forward position. Detecting the faults in the weft while the lay with its reed is moving forward in the shed in which the fault occurred enables the lay by but one forward 35 movement to actuate devices, which will be described, to effect the disengagement of the mechanism which actuates the pattern surfaces or chains, and, if desired, to arrest the latter as or just before the lay reaches its 40 forward position. The stopping of the pattern surfaces or chains is effected, as herein provided for, during or just before the lay completes its forward movement, during which time the mechanism for operating 45 the pattern surfaces or chains is disengaged from the control of the crank-shaft to thus prevent further forward rotation of the pattern surfaces or chains notwithstanding the further rotation of the crank-shaft due to mo- 50 mentum. As the pattern chains or surfaces

forming and of the shuttle-box mechanisms are connected to rotate in unison, it follows that the arrest of the pattern chain or surface for controlling the order of the sheds also 55 effects the arrest of the pattern chain or surface which controls the order of selection of the various shuttles, this unison of movement always insuring the introduction of the proper filling into the shed originally designed to receive it. To avoid the picking of the shuttles 60 in the movement of the loom due to momentum, as stated, after the disengagement of the usual shipper-lever from the usual holding-notch in the holding-plate, the picking-sticks 65 are disengaged from their actuating parts just as the shipper-lever is released, thereby preventing the throwing of a shuttle after the weft breaks. By locating the feeler of the stop-motion and its operating-dagger at or 70 near the center of the lay the operation of the parts is rendered more certain and the mechanism is greatly simplified, one feeler serving to detect faults in the weft coming from either of the change shuttle-boxes. The 75 time of operation of the brake of the other parts of the stop-motion is such that the brake when applied stops the loom with the shed open.

Figure 1 is a broken front elevation of a 80 loom embodying the invention to be herein claimed, the shuttle-boxes at the left of the loom and the lay and one of its swords and the several shafts being broken out to show the parts behind them, the parts omitted being 85 old and common. Fig. 2 is a detail showing a portion of the lay at its front side with part of the weft stop-motion devices attached. Fig. 3 is a partial left-hand end elevation of Fig. 1, the frame-work being broken out at 90 places, the said figure showing one shed-forming lever of common form. Fig. 4 is a detail to be referred to of the weft stop-motion devices, the lay and breast-beam being in section. Fig. 5 is a plan view of Fig. 4 with 95 the lay and its attached parts removed, the breast-beam being broken away to expose the parts immediately below it. Fig. 6 is a longitudinal section of the dog of the weft-stopping devices in the line  $x$ , Fig. 5. Fig. 7 is a 100 longitudinal section of part of the holder for the dog. Figs. 8 and 9 are details in plan



and front end view of the dagger detached. Fig. 10 is a detail view taken from the rear side of the loom at the left-hand side to show the connection between the crank-shaft and the mechanism for moving the pattern surfaces or chains and the lifter and depressor of the shed-forming mechanism. Fig. 11 is an elevation and section of the arm with which the picking staff or stick is connected, the said arm, as herein shown, being constructed to form one member of a clutch, which is disengaged to stop the picking. Fig. 12 shows like views of the fixed part of the picking-clutch. Fig. 13 shows in elevation a sufficient portion of the right-hand end of the loom to illustrate the brake mechanism.

Referring to the drawings, the frame-work A, the lay B, shuttle-boxes B<sup>2</sup>, shuttle-box rods g<sup>2</sup>, their guides n<sup>2</sup>, cam-shaft b, arms p thereon, rolls q q, carried thereby, the shoes s on the picking-shafts t, of which shafts one is shown, the picker-sticks b', their connected straps d' and x, the crank-shaft d, gears j i, (shown in full lines, Fig. 1, and by dotted lines, Fig. 3,) bevel-gear f on the driving-shaft e, the latter having fast and loose pulleys g and h, the link k', the belt-fork f', its controlling-rod g', lever i', with which it is connected, the shipper-lever m' to actuate it, the rod s', joined to the shipper-lever, the auxiliary shipper-handle t', connected therewith and pivoted at the opposite side of the loom, and the shipper-lever holding notched plate r', the chain f<sup>3</sup>, and spring h<sup>2</sup> are all substantially as in United States Patent No. 265,659, dated October 10, 1882, where the like parts are distinguished by like letters, so the further specific construction of such parts need not be herein further described, except to state that the cranks of the crank-shaft and the lay B are joined by usual connecting-rods B<sup>3</sup>.

The shaft 3, upon which is mounted the usual notched disks or wheels which receive the pattern-chain y for the shuttle-box-actuating mechanism, as well as the pattern-chain for the shed-forming mechanism, which will be hereinafter referred to, the gears D<sup>16</sup> D<sup>15</sup>, up-right shaft D<sup>14</sup>, gears D<sup>8</sup> D<sup>9</sup> D<sup>7</sup>, shaft D<sup>5</sup>, star-wheel D<sup>4</sup> thereon, pin-wheel D<sup>3</sup>, toothed hub D<sup>10</sup>, arm D<sup>12</sup>, slide-rod D<sup>13</sup>, and lever a<sup>2</sup> to move the said rod are all common to United States Patent No. 264,864, dated September 26, 1882, wherein like devices designated by like letters are employed to effect the reversal of the shaft D<sup>14</sup> and pattern-shaft 3 without reversing the direction of rotation of the usual crank-shaft.

Herein it has been considered unnecessary to illustrate any of the mechanical devices located between the shuttle-box rods and the pattern-chain y which controls the extent of movement of the said rods to place the proper cells of the series of shuttle-boxes (to be located, as usual, at each end of the lay) opposite the level of the race of the lay, as any

suitable well-known mechanical devices for such purposes may be used. It has also been considered unnecessary to show more than one shed-forming lever and a piece of one harness-frame to control the harnesses and effect the formation of sheds in the warps, for this invention does not require any novel form of shed-forming devices.

This invention is not limited to the employment of any particular devices for producing the movement of the shuttle-box mechanism, nor for the formation of sheds in the warps; but in practice we may use the shuttle-box-actuating mechanism substantially as represented in United States Patent No. 281,842 and shed-forming mechanism substantially such as represented in United States Patent No. 230,243, dated July 20, 1880, it being understood, however, that both the pattern chains or surfaces for determining the order of forming the sheds and of moving the shuttle-boxes will be on the same shaft as provided for in United States Patent No. 264,864.

The shuttle-box mechanism which we prefer to use, as well as the shed-forming mechanism which we prefer to use, is fully represented and described in English Patent No. 3,655, dated July 25, 1883, and in the present case we have designated by the figure 115, at the left-hand side of the loom, a link which in the said English patent is designated by the letter d<sup>9</sup>, and in the said United States patent, No. 281,842, July 24, 1883, by the letter t. These two patents are herein referred to and their links d<sup>9</sup> and t specified to enable one conversant with looms to see that to add the shuttle-box-moving mechanism to the parts represented in this application it would only be necessary to supply the shuttle-box mechanism of the said English patent, connect with it the link herein marked 115, and to provide the cam-shaft of the loom and loom-frame with gearing to turn the toothed cranks, as provided for in the said English patent. We have considered it unnecessary to illustrate all of these old parts in the drawings of this present specification.

The shedding or harness lever o herein used, but one of which is shown, is the same as that marked by like letter in United States Patent No. 230,243, dated July 20, 1880, and it will be operated positively in both directions to raise and lower its connected harness-frame, but partially shown in Fig. 1 by a lifter and depressor, all as fully described in the said patent, which engage hooked jacks pivoted upon extensions of the harness-levers. The lifter and depressor are connected to rods u and v. The rock-shaft 98, having the arms 99, to which these rods are attached, derives its movement from an arm 108 and a link 101, joined to a link 102, the lower end of which is placed loosely on a pin 103, projecting from a crank 105, attached to the usual crank-shaft d outside the loom-frame, the said links at their junction having a roller-pin



which enters an open-faced guide-box 106, suitably attached to the loom-frame, such devices being substantially shown in United States Patent No. 230,243, but designated by different characters.

In Fig. 1 the link 102 is broken off and the link 101 omitted. The crank-pin 103 is employed to communicate motion to the pin-wheel  $D^3$ , which is simply a crank having a pin 112 to engage the star-wheel  $D^4$  once during each rotation of the crank-shaft, thus moving the shaft  $D^5$  intermittently. The swords 113 of the lay B are pivoted, as usual, to studs of brackets on the loom-frame.

In Fig. 1 the lay-sword at the left is broken out, as is also the lay. The race of the lay B at or near its center is cut away or slotted transversely, as shown at 4, Fig. 2, and by dotted lines in Fig. 4. At its front side the lay has attached to it by screws 5 the stand 6, having ears to receive the pivot 7, on which turns the head 8 of the feeler-fork 9, a portion of the said head being connected by a link 10 with the dagger 12, having as its fulcrum studs 13, projected therefrom (see Figs. 8 and 9) and entering holes in the stand 6. The dagger 12 at its front end has a finger 14, which, when the weft is properly laid and the lay is being moved forward is held by the feeler and its link 10 above and so as to pass and not catch the shoulder 15 of the block 16, pivoted at 17 on the holder or bar 18, which is guided between upright flanges of a guide-plate 19, adjustably secured by bolts 20 to the horizontal shelf 21 of the bracket 22, in turn attached by bolts 23 between flanges of a plate 24, secured to the inner side of the breast-beam by suitable bolts 25.

The shouldered block 16 and the holder or bar 18 constitute what I shall denominate the "dog." The block 16 has its inner end 26 (see Fig. 6) bent downward, and that end thereof, being somewhat heavier than its other end, normally rests in the slot 27 of the plate 19 so long as the dog is kept pressed inward toward the lay by the broad end of the elbow-lever 28, pivoted on a vertical bolt 29, attached to the under side of the breast-beam  $v'$ , a spring 29' (shown only in Fig. 5) being connected with one arm of the said lever and with a stud 29<sup>x</sup> on the breast-beam, the spring and lever normally keeping the dog pressed in toward the lay.

The horizontal part 21 of the bracket, attached to the breast-beam, is provided with a slotted ear 629, with which is adjustably attached by a bolt 30 a dagger-lifter 31, the top of which is made as a cam, and against which the toe 32 of the dagger strikes and bears while the lay is reaching its backward position or preparatory to the picking, the said dagger-lifter effecting the lifting of the feeler-fork in proper position to permit a weft-thread to be laid in the shed. As the lay moves forward after the picking, should the weft be at fault—that is, broken or absent—

the feeler is free to drop under the action of the weight of the connected dagger, so that the point 14 of the dagger engages the shoulder 15 of the block 16, and, acting against the said shoulder, carries the dog outward or toward the breast-beam or in the direction of movement of the lay; but the inner bent end 26 of the block, arriving in contact with the fixed part 33 of the plate 19, turns the said block and effects the release of the shoulder 15 from the point of the dagger, such release being effected before the lay reaches its forward position.

Extended across the loom from side to side below, and at the rear of the lay when in its backward position, is a rock-shaft 35, having near the center of its length and in line with the feeler-fork an arm 36, which has joined to its upper end a latch 37, the hook of which is adapted to normally engage the outer thickened end 38 of the bar 18, as in Fig. 5. As the bar 18 is moved outward in the direction of the arrow 34 (see Fig. 5) by the point of the dagger, the thickened end of the said bar acts to turn the elbow-lever 28 far enough against the action of the spring 29' to cause the short arm of the said lever to strike the collar 39, fast on the rod  $s'$ , thus moving the said rod in the direction of the arrow 40 to effect the release of the shipper-handle  $m'$  and the movement of the usual driving-belt (not shown) from the fast to the loose pulley. While the lay is acting to move the dog outward and turn the lever 28, the said dog acts against the catch 37 and causes the shaft 35 to be rocked in its bearings, so that the arm 42, at one end of the said shaft and outside the loom-frame, (see Figs. 1 and 3,) is lifted. Lifting the arm 42 causes the link 43, connected therewith and adjustably joined to the bar 44, to raise the latter and cause it to strike and move the lever  $a^2$ , before referred to, which, through the rod  $D^{13}$ , causes the toothed clutch or hub  $D^{10}$  to be disengaged from the toothed hub of the bevel-gear  $D^8$ , thus leaving the shaft 3 of the pattern surfaces at rest, provided the movement of the lever  $a^2$  is only sufficient to carry the inwardly-bent outer end of the said lever (see Fig. 1) in position to leave it in the notch 303 (see Fig. 3) of the guide or holder 305, the extent of movement of the lever  $a^2$  depending upon the position of the bolt 206 in the slot 207. Should the connection between the rod 43 and arm 44 be such as to move the lever  $a^2$  far enough for its end to enter the notch 304, then the hub  $D^{10}$  will be moved far enough to engage the teeth at its opposite end with the toothed hub of the bevel-gear  $D^9$ , thus making the latter drive the shaft  $D^{14}$  and turn it in the reverse direction, and that instantly and while the lay is moving forward, such reversal of the shaft  $D^{14}$  enabling it through the bevel-gears  $D^{15}$   $D^{16}$  to reverse the movement of shaft 3, which actuates in unison the two pattern-chains  $y$   $y^2$ , respectively, that carry the series of indi-



cators which determine the order of movement of both the shuttle-box-actuating mechanism and the shed-forming mechanism.

The arm 42 (see Figs. 3 and 1) is provided with a laterally-projecting lug or pin 45, that as the said arm is lifted, as described, strikes against the rear side of a bent lever 46, attached to a rock-shaft 47, which in practice will extend from side frame to side frame of the loom, where it will be supported in suitable fixed bearings. Movement of the lever 46 by the arm 42 causes the rock-shaft 47 to be turned, so that a forked arm 48, attached thereto and entering an annular groove 49 of a sleeve 50 of a lever or arm 52, slides the said sleeve on the round hub 51 of a collar 58, which is secured on the picking-shaft  $t$ , the latter being oblong or other than round in cross-section. The hub 51 serves as the fulcrum for the lever or arm 52, (see Figs. 1 and 11,) which latter is provided at one side next the hub 53 with a notched projection 54 for the reception of the projecting portion 55 of the hub 53, the latter being fixed to the picking-shaft by screw 56. The upper end of the arm or lever 52 has attached to it the link or device  $x$ , which at its outer end is connected in usual manner with and so as to move the picker-stick to throw the picker and shuttle across the loom from one to the other shuttle-box.

The notched arm or lever 52 and the projecting portion 55 of the fixed hub 53 constitute a clutch to effect the stopping and starting of the picking-sticks. When the lever 46 is moved by the arm 42, as described, the lever or arm 52 is moved toward the rear side of the loom, and the notched part thereof is disengaged or unclutched from the projecting portion 55 of the hub 53, fixed on the picking-shaft, the arm 52 so released being left loose on the round hub of the collar 58, thus permitting the picking-shaft to be turned, but without vibrating the arm 52 and the picker-stick  $b'$ . The shaft  $t$  is turned in the direction to move the picker-stick by the rolls  $q$ , which strike the shoe  $s$ , the rolls being connected with the arms  $p$  of the usual cam-shaft  $b$ .

The parts of the picking mechanism are in duplicate at each side of the loom and are operated by the rock-shaft 47 and its connections. As the picking is discontinued, it is necessary to stop the action of the take-up mechanism, and to do this the lever 46 has a rod 57 attached to it, (see Fig. 3,) which is thrust forward to lift the detent 158 temporarily from engagement with the teeth of the ratchet-wheel 59, supported upon a bracket attached to the loom side and operated in any usual manner—as, for instance, as in United States Patent No. 192,514. The latch 37, joined to the arm 36, is extended forward toward the breast-beam and beyond a latch-guide 70, having an edge 71 (see Fig. 1) inclined downward and away from the bar 18. The latch-guide in this instance forms part of the plate 24, attached to the breast-beam.

When the loom is in regular operation, as described, the hook of the latch 37 is maintained in engagement with the outer end of the bar 18 by the pin 63 of the latch-holding rod 61, placed in a bearing 60, extended from the plate 24 below the breast-beam, the said rod 61 being connected with the collar 64 on the auxiliary shipper-rod  $s'$ ; but when the dagger moves the bar 18 sufficiently to knock off the shipper-lever and move the latch 37 and rock-shaft to effect the stopping and reversal of the shaft  $D^{14}$  the hook of the latch 37, the latter being released from the pressure against it of the pin 63 of the latch-holding rod 61, falls by gravity, and, sliding on the inclined edge 71, is moved laterally away from the end of the bar 18.

The pattern-chain shaft 3 and pattern-chain  $y^2$  having been stopped, as described, or stopped, turned back, or reversed, the operator by hand will restore the levers  $a^2$  and 46 to their normal condition. At this time the lay is nearly in its backward position, and in this condition, if the weft in the shed then open is perfect and is to remain therein the loom is ready to be started and the lay to be moved forward; but in the described condition of the parts it will be understood that there is not a weft in position to resist the descent of the feeler-fork, for the weft for that shed has already been beaten in. So to provide for not stopping the loom as the dagger meets and engages the dog 16 during the first forward movement of the lay, after correcting the fault in the weft, it becomes necessary to be able to move the rod  $s'$  far enough to put the belt on the fast pulley without at the same time engaging the hook of the latch 37 with the outer end of the bar 18 of the dog until after the dagger in the outward movement of the dog is disengaged therefrom. This is accomplished by attaching to the rod  $s'$  the slide-rod 61, moving in unison with it, the said slide-rod having the pin 63, that engages the latch 37 and places it in position to be engaged by the bar 18, so placed thereon as to come in contact with the said latch 37 only after the rod  $s'$  has been moved far enough to turn the shipper-lever into place to transfer the driving-belt upon the fast pulley, or, in other words, the said pin 63 will not commence to move the latch 37 to place its hook at the end of the bar 18 of the dog until in the movement of the loom and the forward movement of the lay the dagger has been released from the block 16, further movement thereafter of the rod  $s'$  in the same direction completing the movement of the shipper-lever to engage the notched plate  $r'$ , and also placing the hook of the latch 37 in engagement with the bar 18 of the dog. When the dagger in the forward movement of the lay is released from the dog, the spring 29', acting on the lever 28, causes the latter to immediately push back the bar 18 into its normal position.

The toothed gear  $j$  on the crank-shaft is



provided at its rear side with a brake-segment 80, which is secured to the said gear so as to project therefrom in a direction nearly opposite the direction of the cranks of the crank-shaft.

The lever 81, pivoted at 82 at the loom side and extended forward close to the shipper-lever, has its front end bent outward longitudinally, as shown at 83, and the said bent portion 83, located close to the rear side of the belt-shipper lever and shaped as shown in Fig. 1, is acted upon by a roll 84 on a stud 85, inserted in the shipper-lever, the said roll acting against the portion 83 after the shipper-lever has been released from the notched plate  $r'$ , causing the lever 81 to be turned on its pivot to lift the concaved brake 86 of lever 81 and place it in position to be struck by the brake-segment during the rotation of the crank-shaft, the brake and brake-segment being so placed as to insure the stoppage of the crank-shaft with the lay started a little forward.

The shipper handle or lever is knocked off when the moving lay is about two-thirds of its distance forward; but it is not desired at that time to immediately stop the crank-shaft. On the contrary, it is specially desired that the crank-shaft should be permitted to continue its rotation until the lay has been moved fully forward and returned to about its backward position or a little beyond with a shed open, and therefore the brake-segment 80 is so located that the brake-shoe will strike against it to stop the loom in the desired position of the crank-shaft with the shed open. During this movement of the lay, after the shipper-handle has been knocked off and while the momentum of the parts is sufficient to turn the crank-shaft and other parts, the pattern-surfaces will be turned back to open the shed next back of the one in which the fault in the weft occurred, provided, as before stated, the lever  $a^2$  has been moved to engage the notch 304. Should it be desired to merely stop the pattern-chain shaft 3 at the shed of the broken weft, it will only be necessary to adjust the bolt 206 in the slot 207 so as to effect the movement of the lever  $a^2$  only far enough to leave the teeth at both ends of the clutch or hub  $D^{10}$  disengaged from the teeth of the hubs of the gears  $D^8 D^9$  above and below the said hub, respectively.

The weft stop-motion consists, essentially, of the weft-feeler, its connected dagger and dog, and means actuated by the latter to release the shipper-lever.

The picking mechanism for each side of the loom consists, essentially, of the picking-shaft, the picking-stick, an arm 52, loose on the said shaft, and the hub 53, having a projection 55 and fast on the cam-shaft, the projection of the hub engaging the notched projection 54 of the arm 52, thus forming a sort of clutch.

The means to prevent the movement of

the arm 52 with the picker-shaft consists, essentially, of the lever 46.

The pattern surface or chain actuating mechanism consists, essentially, of the shaft 3 and shafts and gears between it and one of the loom-shafts, as  $d$ , to rotate the said shaft 3.

We believe ourselves to be the first inventors of a loom containing in its organization a weft-stop mechanism in which the feeler and dagger are both carried by the lay and wherein the parts of the loom are so organized and combined that when the weft breaks the shipper will be released, and also the picking mechanism and the pattern surface or surfaces will be stopped automatically; and we do not therefore desire to limit our invention to the exact mechanism herein described, but instead may employ other usual and known equivalents.

We desire it to be understood that the automatic stopping of the loom and the reversal of the pattern surface or surfaces to leave open that shed next back of that in which the broken weft occurred is considered to be within the scope of our invention whether the said loom be of the close or of the open shed variety.

We claim—

1. In combination, the pattern surface or chain  $y^2$ , the shaft 3, upon which it is mounted, stationary bearings for the said shaft, shafts and gearing to rotate the said shaft 3 positively, the lay, and weft stop-motion devices having a feeler and dagger, substantially as described, both carried by the lay, the feeler having its pivot mounted upon the front of the lay, a dog operated by the dagger to effect the release of the shipper-lever, the shipper-lever, and mechanism, substantially as described, to operatively connect the stop-motion devices with the means for rotating the said shaft 3 positively, whereby when the said stop-motion devices are actuated by fault in the filling the forward rotary motion of the said pattern surface or chain will be arrested, substantially as set forth.

2. The pattern surface or chain  $y^2$ , the shaft 3 to move it, means to rotate the said shaft, picking mechanism having a clutch, as described, the lay, and a weft stop-motion having a feeler and a dagger, both carried by the lay, combined with mechanism, substantially as described, to operate the clutch forming a part of the mechanism for actuating the shaft 3, whereby when the said stop-motion operates the forward movement of the shaft 3 is stopped, the lever 46, and means, substantially as described, operatively connecting it with the said stop-motion to effect the disengagement of the said clutch of the picking mechanism, whereby the stop-motion is also enabled to automatically effect the stopping of the picking mechanism, as and for the purpose set forth.

3. The combination, in a loom, of the following instrumentalities, viz: the pattern sur-



face or chain for the shed-forming mechanism, the shaft 3 to move it, the shipper-lever, the crank-shaft, means to rotate it and the said shaft 3, the lay, the brake-segment made movable with the said crank-shaft, the brake, a weft stop-motion having a feeler and dagger carried by the lay, and mechanism, substantially as described, whereby when the said stop-motion is operated owing to a fault in the filling the shipper-lever is released, the forward rotary movement of the said shaft 3 is stopped, and the said brake is applied to the brake-segment to arrest the loom with the shed open, substantially as set forth.

4. The shipper-lever, means to hold said lever in place to retain the belt on the driving-pulley, the breast-beam, the dog, means to support it from the breast-beam, means between the said dog and its support and the shipper-lever to release the latter, the lay, the shaft  $d$  to operate it, means to rotate shaft  $d$ , the weft-feeler and the dagger carried by the lay, means to operatively connect them, as described, the pattern surface or chain, the shaft 3, and means to operate the shaft 3 from the shaft  $d$ , combined with the shaft 35, means actuated by the dog in its forward movement to turn said shaft, means intermediate the said shaft, and a clutch forming part of the means for operating the shaft 3 to thereby unclutch the said clutch and stop the pattern-surface as the shipper-lever is released, substantially as described.

5. The lay, the breast-beam, the shipper-handle, means to hold it, a weft stop-motion, having a feeler and dagger carried by the lay and operating to release the shipper-handle, the pattern surface or chain, its shaft 3, means to actuate the said shaft 3 and the lay, the picking-stick, mechanism to move the said stick, the said mechanism having an arm 52 forming part of it, combined with the lever 46, the shaft 35, having an arm 42, intermediate devices between arms 42 and 52, a clutch forming part of the pattern-surface-actuating mechanism, devices intermediate the said arm and the said clutch, and means intermediate the dagger and the said shaft to operate the said shaft to not only unclutch the said clutch, but to also move the said arm 52, whereby the movement of the pattern-surface and of the picking-stick is arrested when the weft stop-motion acts to stop the loom, substantially as described.

6. The shipper-lever, the breast-beam, the dog, means to support it below the breast-beam and to strike the shipper-lever to release it, the lay, means to operate it, the weft-feeler and connected dagger mounted thereon and adapted when the weft breaks to drop and engage the said dog during a portion of the forward movement of the lay and when the weft is unbroken to keep the dagger lifted, as described, away from the said dog, the shed-forming pattern surface or chain, its shaft 3, and mechanism to positively operate

the said shaft, the said mechanism including gears and a clutch, as described, combined with means, substantially as described, between the support for the said dog and the clutch of the said pattern-surface-actuating mechanism, whereby the movement of the dog and its support by the dagger will set into operation devices to not only release the shipper-lever, but disengage the clutch of the pattern-surface-actuating mechanism, as described.

7. The lay, means to operate it, the weft-feeler, its connected dagger, the breast-beam, the dog operated by the dagger, means between the dog and shipper-lever to move the latter, the latch, the guide for the outer end of the latch, the rock-shaft and its arm 42, and the shipper-lever and auxiliary shipper-rod  $s'$ , combined with the rod 61, having a pin or projection, whereby the shipper-lever may be moved sufficiently to effect the starting of the loom before the latch is placed in engagement with the said dog, as and for the purposes set forth.

8. The lay, means to move it, the feeler and connected dagger attached to the lay, the breast-beam, the dog, means to support the dog below the breast-beam, the rock-shaft 35, the shaft  $d$ , the pattern surface or chain, its shaft 3, means to actuate the shaft 3 from the shaft  $d$ , the said means containing a clutch or hub, the lever  $a^2$ , means to connect it with the said hub, and means, substantially as described, between the said rock-shaft and lever to actuate the latter, combined with the latch connected with the said rock-shaft, a guide to support the outer end of the latch while the dog is moved partially backward and while the lay is first started forward in a shed already containing a weft, and with means to thereafter engage the said latch with the said dog, substantially as described.

9. The picker-stick  $b'$ , the shaft  $t$ , means to rock it, the hub 53, fast on the said shaft and provided with the projection 55, the arm 52, loose on the said shaft and provided with the notched projection 54, the strap  $x$ , the arm 48, rock-shaft 47, and lever 46, combined with the lay, means to move it, the feeler and connected dagger, the rock-shaft 35, its arms 42 and 36, the breast-beam, the latch 37, the dog, and means to support the dog on the breast-beam, all substantially as described.

10. The combination, in a loom, of the following instrumentalities, viz: the pattern surface or chain  $y^2$ , the shaft 3 to move it, means to rotate the shaft 3, the lay, a weft stop-motion in which the feeler and dagger are carried by the lay and the dagger operates a dog to effect the release of the shipper-lever, a shipper-lever, a lever to move the clutch forming a part of the means for rotating the pattern-surface, and means, substantially as described, to operate it automatically from the stop-motion to effect the disengagement of the said clutch to stop the forward rotation of the pattern-surface during that forward



movement of the lay which effects the release of the shipper-lever, substantially as described.

11. The combination, in a loom, of the following instrumentalities, viz: the pattern surface or chain  $y^2$ , the shaft 3 to move it, means to rotate the shaft 3, the lay, a weft stop-motion in which the feeler and dagger are carried by the lay and the dagger operates a dog to effect the release of the shipper-lever, a shipper-lever, a lever to move the clutch forming a part of the means for rotating the pattern-surface, means, substantially as described, to operate said lever automatically from the stop-motion to effect the disengagement of the said clutch to stop the forward rotation of the pattern-surface, picking mechanism, and means, substantially as described, under the control of the dagger to thereby automatically effect the stopping of the picking while the crank-shaft yet rotates, substantially as described.

12. The combination, in a loom, of the following instrumentalities, viz: the pattern surface or chain  $y^2$ , the shaft 3 to move it, means to rotate the shaft 3, the lay, a weft stop-motion in which the feeler and dagger are carried

by the lay and the dagger operates a dog to effect the release of the shipper-lever, a shipper-lever, a lever to move the clutch forming a part of the means for rotating the pattern-surface; the adjustable link 43, and means, substantially as described, to operate the said link and the said lever automatically from the stop-motion to effect the disengagement of the said clutch to stop the forward rotation of the pattern-surface during that forward movement of the lay which effects the release of the shipper-lever, whereby when desired after adjustment of the said link the shaft of the pattern-surface may be both stopped and reversed to place its indicators in position to effect the selection of the warp for the opening of the shed next back of that in which the weft was broken, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEO. CROMPTON.  
HORACE WYMAN.

Witnesses:

J. B. SYME,  
J. A. WARE.