

No. 631,244.

Patented Aug. 15, 1899.

H. WYMAN.
WARP STOP MOTION FOR LOOMS.

(Application filed Jan. 31, 1899.)

(No Model.)

2 Sheets—Sheet 1.

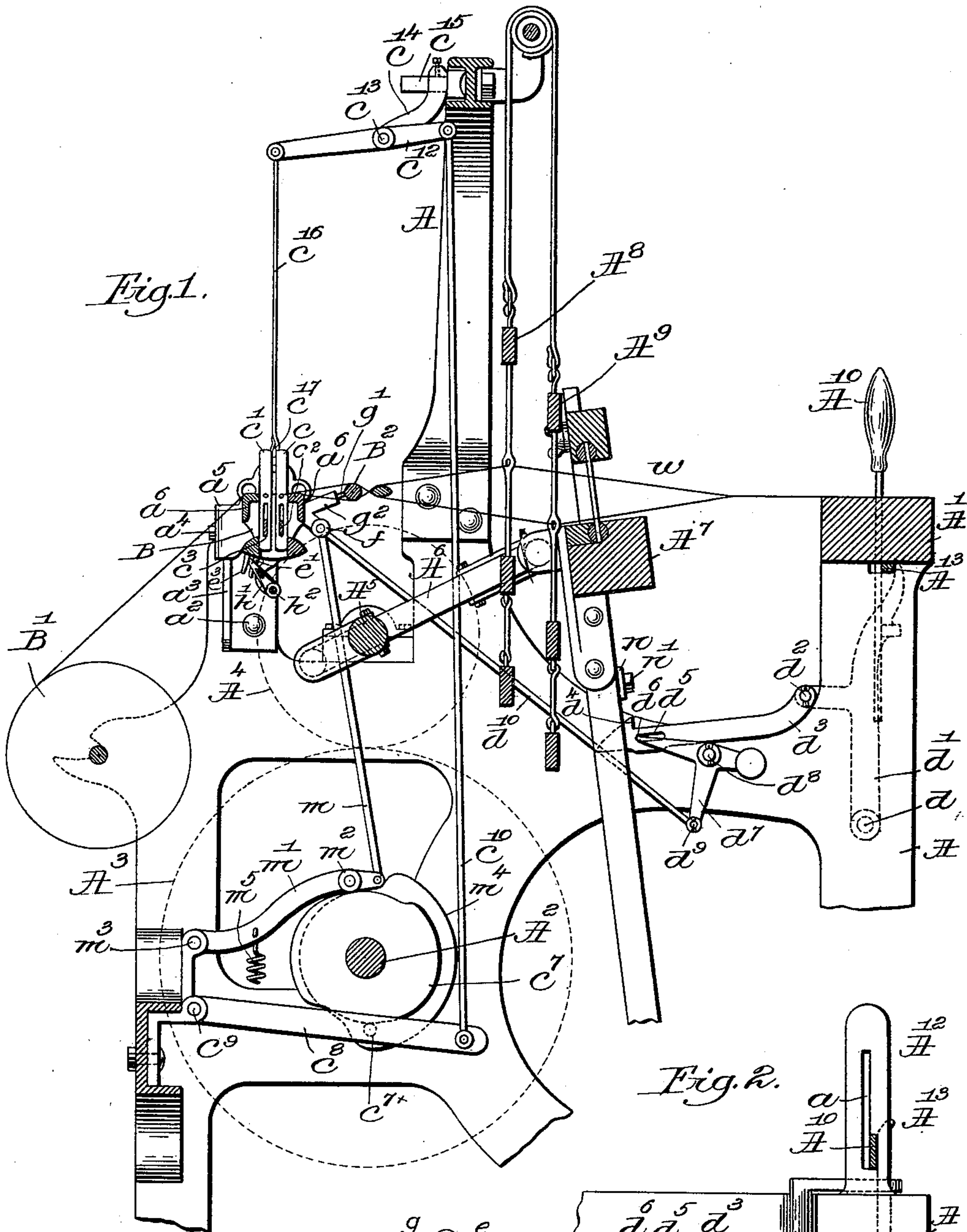
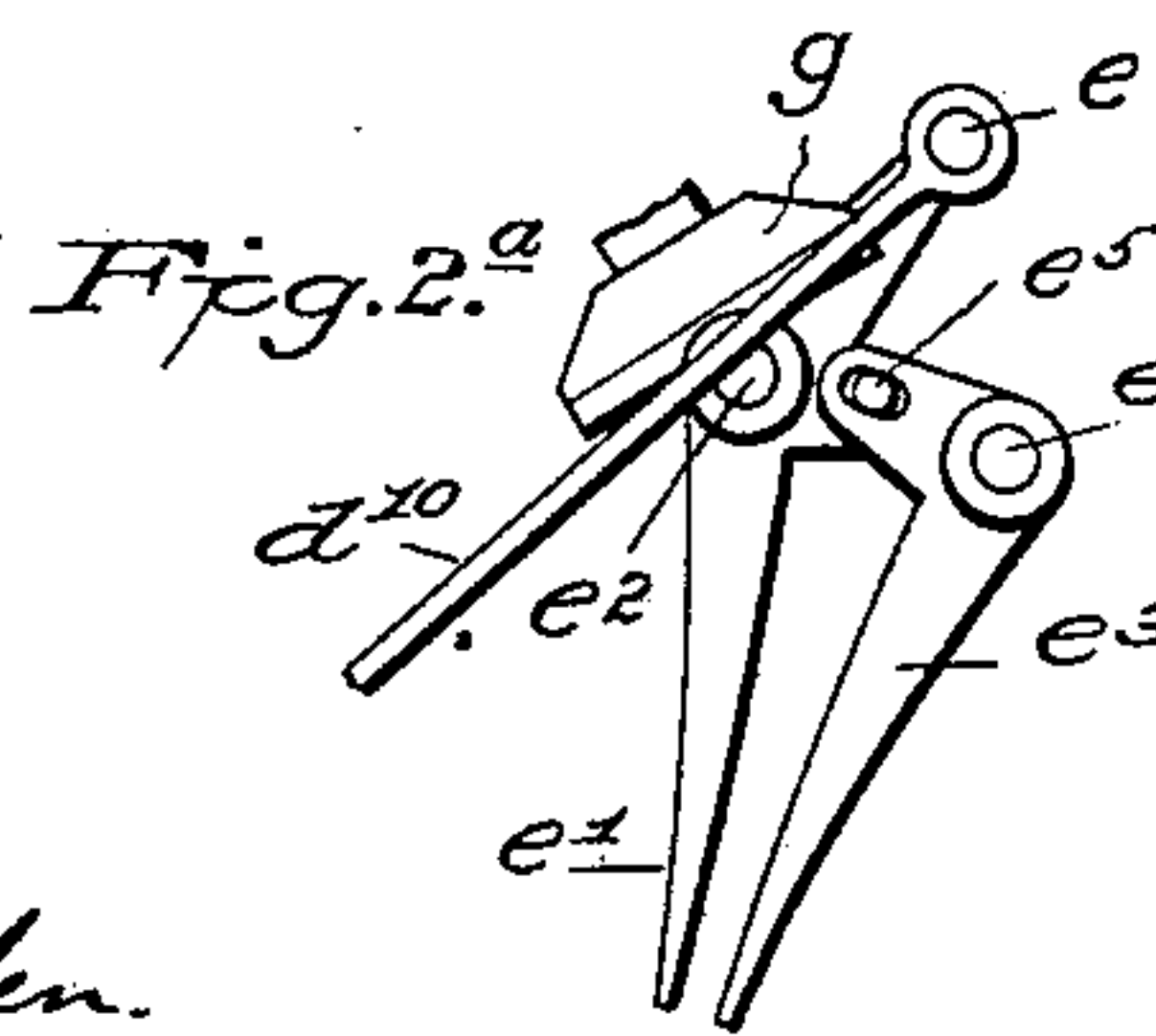
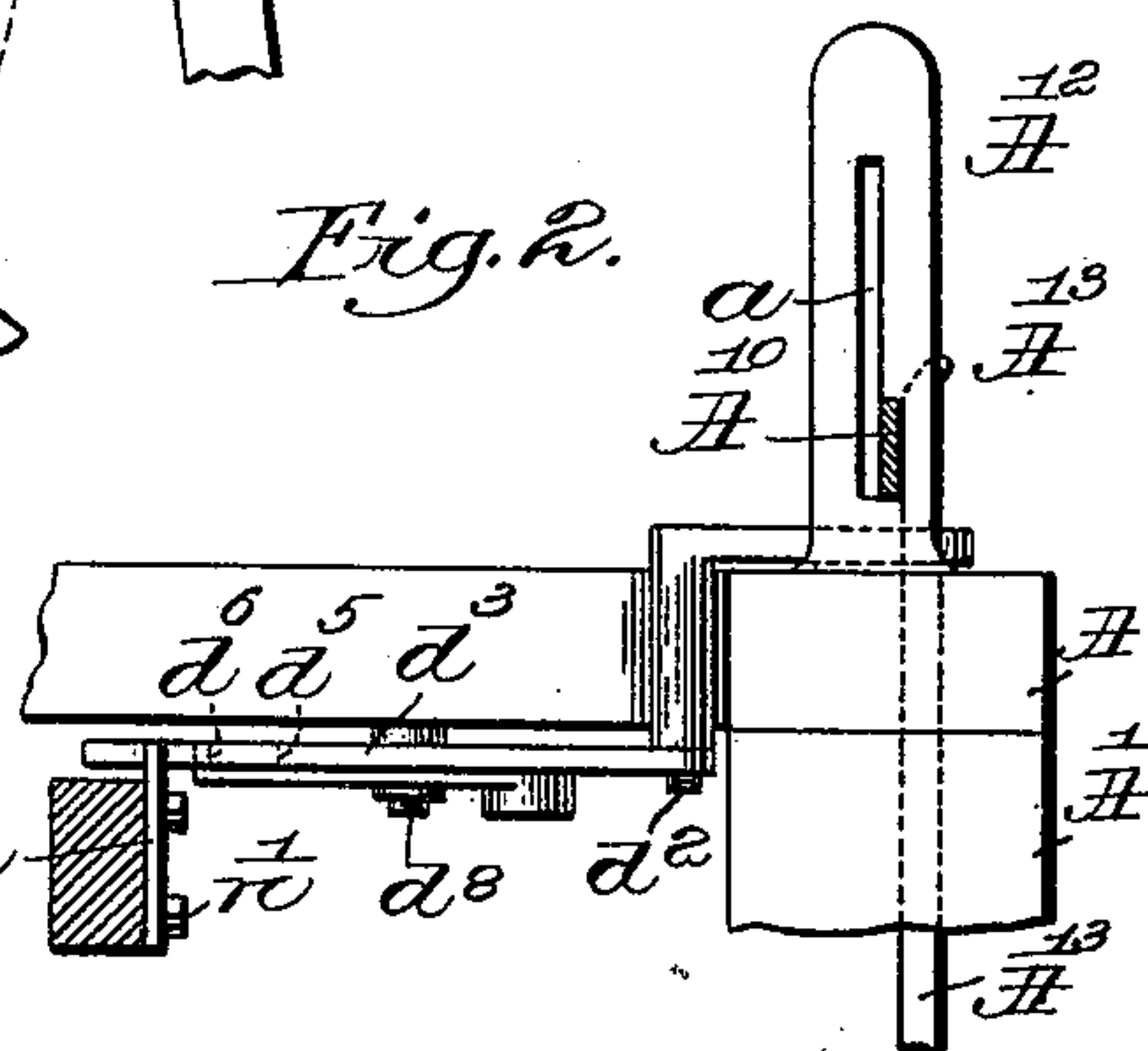


Fig. 2.



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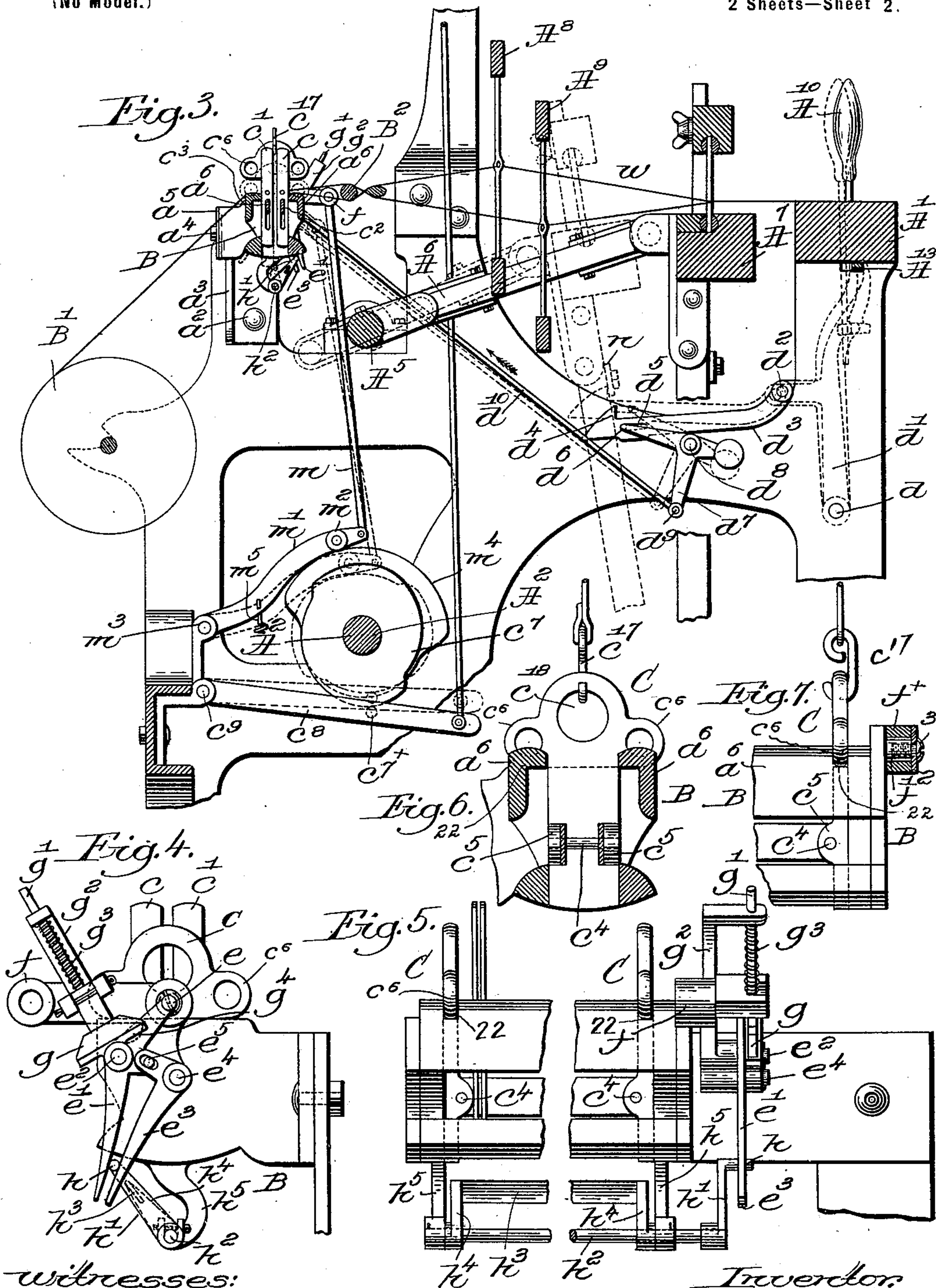
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2 Sheets—Sheet 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE
CROMPTON & KNOWLES LOOM WORKS, OF SAME PLACE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 631,244, dated August 15, 1899.

Application filed January 31, 1899. Serial No. 703,960. (No model.)

To all whom it may concern:

Be it known that I, HORACE WYMAN, of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Warp Stop-Motions for 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.

This invention has for its object to improve warp stop-motion mechanism to be used in looms, the invention herein shown being an improvement upon or tributary to the invention set forth in an application, Serial No. 703,959, filed on the 31st day of January, 1899.

In the loom to be herein described the warp-threads are led through the eyes of drop devices which are suitably guided at a point back of the harness and of the lay and independent of both said harness and lay, and preferably there is a row of drop devices for each half of the warp.

The feeler herein to be described will preferably be moved in one direction during one full forward-and-backward stroke of the lay.

The feeler-rail herein shown may contact with a drop device in one or the other row as the feeler-rail is moving backward or forward.

The rock-shaft carrying the feeler is supported in bearings below the guide in which the drop devices move, and said rock-shaft has an extended arm, with which or with a projection extended from it coöperates an initiatory device of a peculiar construction, said initiatory device being herein represented as composed of a lever of the first order and a coöperating lever, shown as of elbow shape and connected therewith, the substantially parallel parts of the arms of the said levers being capable of moving one toward the other and embracing between them the extension from the rock-shaft carrying the said feeler, said lever being hereinafter designated as a "compound" lever. The upper arm of one of the levers referred to is located substantially central with relation to the center of motion of an actuator upon which the said initiatory device is mounted.

So long as the drop devices are in their normal position and the loom is running regularly the actuator is moved to and fro uni-

formly, and the initiatory device is moved in unison with it and embracing the projection from the shaft carrying the feeler moves said feeler to and fro under the drop devices occupying their normal position; but whenever a drop device drops due to the breakage of a warp-thread and comes into its abnormal position the feeler is arrested by said drop device, and thereafter in the continued movement of the actuator the initiatory device has imparted to it a secondary motion on or about its pivots extended from said actuator, and this motion of the initiatory device causes its upper end to be put into a position eccentric with relation to the center about which the actuator turns, causing said initiatory device through a suitable intermediate connection to effect the release of the shipper-handle and start into operation usual stop-motion devices to stop the loom.

Herein the feeler in moving to and fro under the drop devices may in its movement in either direction meet a drop device in its abnormal position, and the feeler will be arrested and the initiatory device will be immediately started in its secondary movement, but the upper end of the initiatory device will always move in the same direction no matter which of the drop devices is struck by the feeler.

The initiatory device has coöperating with it a positioning device, which acts not only to normally keep the initiatory device in its normal position with its upper end located centrally with relation to the center of motion of the actuator, but also to keep both arms of the initiatory device closed upon the pin or projection extending from the arm connected with the rock-shaft of the feeler.

The drop devices each have a slot and above the slots eyes to receive warp-threads. The drop devices are applied to a carrier composed of end pieces and stringer-bars, the drop devices being strung on said bars, the ends of the bars being securely locked to two end pieces, so that the drop devices and carrier may be handled readily as an entirety and removed from or applied to the loom, said carrier and drop devices entering a single space formed in a guide crossing the loom-frame, the upper ends of said guide presenting, as

herein represented, warp-rests. The carrier and drop devices are adapted to be bodily lifted from a guide located on the loom whenever it is desired to provide the loom with a new warp.

The carrier for the drop devices is not herein broadly claimed, because it is not wholly my own invention, it being made the subject of claim in an application, Serial No. 679,181, filed April 29, 1898.

The warp-threads are supported in front of and behind the drop devices upon rests or bars, which constitute, as herein shown, the upper edge of the guide referred to, in which the carrier is loosely mounted.

Figure 1, in cross-section, shows a sufficient portion of a loom with my improvements added to enable my invention to be understood. Fig. 2 is a partial view of one end of the loom at one end of the breast-beam and part of the lay. Fig. 2^a is a detail showing part of the initiatory device and its attached rod d^{10} . Fig. 3 is a similar section to Fig. 1, the lay being shown by full lines in a different position, but said figure shows by dotted lines the positions the parts will occupy when the feeler meets a drop device in the rear row, the shipper-handle being released on the back stroke of the lay, the stroke shown by dotted lines in said figure. Fig. 4 is a right-hand end view, enlarged, of the guide containing the carrier and drop devices, the actuator pivotally mounted on said guide and provided with the initiatory device herein to be described and claimed. Fig. 5 is a detail viewing Fig. 1 from the right of the dotted line x , the figure being broken out to save space on the drawing. Fig. 6 is a detail showing one of the end pieces carrying the stringer-bars on which is mounted the drop devices and the guide sustaining said end pieces, the guide and stringer-bars being in section, the figure also showing a portion of the lifting means, not herein claimed; and Fig. 7 is a view of Fig. 6 looking at or in the direction of the arrow, Fig. 6.

The loom-frame A, its breast-beam A', the lower or cam shaft A², having a toothed gear A³, (indicated by dotted lines, Fig. 1,) engaging a toothed gear A⁴ (also indicated by dotted lines) of one-half the number of teeth fast on the crank or lay shaft A⁵, united by pitman A⁶ with the lay A⁷, the harness-frames A⁸ and A⁹, having suitable harnesses to receive the warps w and form sheds therein, the lever A¹³, pivoted at the under side of the breast-beam and contacting at its free end with the shipper-handle A¹⁰, movable back and forth in a slot a of a plate A¹², extended from the loom side, are and may be all as usual in looms, and it will be understood that the shipper-handle has cooperating with it stopping mechanism of usual construction, which when the shipper-handle is released will immediately act to transfer the driving-belt from a fast to a loose pulley or uncouple

the driving-power, so that the loom will remain at rest.

The loom-frame has secured to it by a suitable bolt or screw a^2 an upright flanged piece a^3 , to which is secured by suitable bolts a^4 ears a^5 , extended from a guide B, said guide crossing the loom-frame behind the harnesses and lay and independent of each of the same and being fixed to the loom at its opposite ends, so that it occupies a stationary position. The upper end of this guide presents two like warp-rests a^6 , over which the warp from the warp-beam B' passes on its way to the usual lease-rods B² and the heddles of the harness-frames. This guide presents a single slot or opening between the warp-rests and is notched transversely at 22 to receive loosely suitable ears or projections c^6 of the end pieces C, to be described. The drop devices c and c' are shown as arranged in two series, each series having a suitable slot to embrace one or two like stringer-bars $c^2 c^3$, and said drop devices have above said slots suitable eyes to receive the warp-threads w , one half the warp being extended through the eyes of one set of drop devices and the other half through the eyes of the other set. The stringer-bars c^2 and c^3 are united at their opposite ends to suitable end pieces C, said bars being united to said end pieces by pins or studs c^4 , extended through holes in the ends of said bars and holes in ears c^5 of said end pieces, so that the bars are substantially rigidly connected with the end piece.

The end pieces and connected stringer-bars constitute a carrier to sustain the drop devices, and the carrier and drop devices may be bodily applied to and lifted from the single space between the warp-rests of the guide whenever for any reason it is desired to remove the drop devices as an entirety to enable their warp-eyes to receive warp-threads of a new warp. The end pieces of the carrier have suitable projections, as c^6 , which rest upon and are supported by the upper part of the guide B.

Herein I have shown means whereby the carrier composed of end pieces and a stringer bar or bars carrying the drop devices may be lifted to relieve the warp-threads from the weight of the drop devices and the resulting wear of said drop devices by friction on the warp-threads.

For imparting vertical movement intermittently to these drop devices the drawings show a cam-shaft A², provided with a cam c^7 , it acting on a stud c^{7x} of a lever c^8 , pivoted at c^9 upon a stand connected with a loom-frame, said lever having at its opposite or free end a rod c^{10} , which is extended upwardly and connected with one end of a lever c^{12} , pivoted at c^{13} , the pivot being shown as carried by a bracket c^{14} , supported upon a stud c^{15} at the upper end of the loom-frame. In practice the rod c^{13} is or may be a rock-shaft, and it has two such levers c^{12} mounted upon it, one near

each end, and the longer or rear ends of these levers have jointed to them suitable lifting-rods c^{16} , having at their lower ends engaging devices, as c^{17} , (shown as hooks, see Fig. 6,) which enter the eyes c^{18} in the end pieces C of the carrier, so that as the cam-shaft is rotated the cam, acting through the devices described, imparts an intermitting vertical movement to the end pieces and stringer-bars, lifting said stringer-bars in the slots of the drop devices until the upper edges of said bars meet the tops of said slots, and thereafter by a slight further upward movement of the end pieces and stringer-bars the drop devices are lifted in such manner that they no longer bear by their weight upon the warp-threads, leaving the said warp-threads substantially free from strain. This lifting of the drop devices takes place preferably at the time that the warps are subjected to their greatest strain, and once during each complete movement of the lay the said end pieces are lowered to remove the stringer-bars from contact with the upper ends of the slots of the drop devices, letting the eyes of the drop devices settle upon and feel for the said warp-thread to ascertain if any of them are broken, and in case they are broken then the drop device descends, as commonly, into its abnormal position, where it will be struck by the feeler to be described.

I have hereinabove described one form of mechanism for lifting the drop devices; but said mechanism is not herein claimed, for the reason that it is shown in another application, Serial No. 686,660, filed by me on the 23d day of July, A. D. 1898, wherein broad claim is made for lifting said stop devices by any suitable means.

One end of the guide B has extended horizontally from it a stud f' , it occupying a position substantially central between the two rows of drop devices and above the lower ends of said drop devices when in their normal position. The stud f' forms a pivot for an actuator f , herein shown as an elbow-lever having two pivots e^2 and e^4 , and said actuator is herein represented as confined on said stud by a washer 2 and a screw 3. The actuator f has a hole in its outer end which receives a bolt by which to attach to it a rod m , jointed at its lower end to a lever m' , having a roller or other stud m^2 and pivoted at m^3 on a suitable stand connected with the loom-frame, said roller-stud being acted upon by a cam m^4 , fast on the cam-shaft A². This cam operates the actuator and moves it in one direction during one complete movement back and forth of the lay and in the other direction during another complete back-and-forth movement of the lay. The roller-stud referred to is kept in contact with the said cam by a suitable spring, as m^5 , connected to the lever m' and to some fixed part of the loom-frame.

I have pivoted on the end of the loom-frame at d a lever d' , the upper end of which normally contacts with a lever A¹³, resting at its

free end against one side of the shipper-handle, and said lever d' may have jointed to it at d^2 a suitable latch or device d^3 , it having, as herein represented, near its free end a hook d^4 . This latch or device may have a slot d^5 to receive a pin or projection d^6 at the end of a latch-controller d^7 , pivoted at d^8 , said latch-controller being represented as a three-armed lever having jointed to it at d^9 a rod d^{10} , suitably attached at its opposite end at e to the initiatory device to be described.

The initiatory device is herein shown as a lever e' of the first order, pivoted at e^2 , and having coöperating with it a second lever e^3 , pivoted at e^4 , a short arm of said lever having a slot which is entered by a pin e^5 , extended from a short projection of the lever e' . To form the connection between the upper end of the lever e' of the initiatory device and the rod d^{10} , I provide one end of the lever, as herein shown its upper end, either with a stud or with a hole, and the stud or the hole, whichever is used, is adapted to be held normally in a stationary position substantially opposite the center of the stud f' , which constitutes the center of motion of the actuator. I insure the retention of the upper end of said lever e' substantially in line with the center of the stud f' by or through a suitable positioning device g , shown as a block having extended from it a shank g' , which is free to slide in suitable guides in an arm g^2 , extended from the actuator, a suitable spring g^3 surrounding said shank and normally acting to keep the acting end of the said positioning device against a plate g^4 , connected with or forming part of the lever e' . When this positioning device occupies its normal position, Fig. 4, the initiatory device acts, as represented in said figure, to embrace between its two parts a pin or projection h , extended from an arm h' , fast on the rock-shaft h^2 , carrying the bar or feeler h^3 , said bar being shown as mounted on arms h^4 of said rock-shaft. The rock-shaft h^2 of the feeler is represented as supported in suitable bearings h^5 , fixed with relation to the guide B.

The lay has attached to it a striker or latch-operating device n , shown as a plate attached to the lay by suitable bolts or set-screws n' , said device being extended from one side of the lay-sword, as shown in Fig. 2, it meeting the latch when the latter is elevated or put into its operative position, (shown by dotted lines,) the latch following the lay and turning the lever d' , so that it acts to release the shipper-handle.

Assuming that the drop devices are in their normal position, that the warp-threads are unbroken, and that the actuator is being vibrated continuously, the initiatory device (shown in Fig. 4, it being composed of two parts, and which may therefore be designated as a "compound lever") will embrace the projection h of the arm h' and will return the rock-shaft h^2 and move the feeler to and fro under the drop devices, and in such move-

ment the initiatory device moves in unison with the actuator, and the upper end of the lever e' thereof stands substantially central with the pivot f' , about which the actuator turns, and consequently the upper end of said lever has no tendency whatever to reciprocate the rod d^{10} , and the latch d^7 or other equivalent device remains in its full-line position, and the shipper-handle remains in its locked position. Should, however, a warp-thread break and a drop device descend into its abnormal position, as represented by dotted lines in Fig. 3, the feeler will meet said drop device and be arrested thereby, and the projection h will also be stopped; but as the actuator continues to move it results that the initiatory device has imparted to it a movement about its pivots carried by said actuator, such movement of the initiatory device putting the upper end of the lever e' thereof eccentric to said stud f' , and the movement of the lever e' moves the rod d^{10} . When the feeler meets a drop device in the back row, the lever e' of the initiatory device is the one which is arrested and positively turned about its pivot e^2 by contact with the projection h , and at the same time the lever e^3 , through the pin e^5 in the slot of the lever e^3 , causes the lever e^3 to move away from the lever e' . If the feeler meets a drop device in the front row, then the lever e^3 will be the one which is first arrested by the projection h , which is stopped, and said lever by the further movement of the actuator will be turned about its pivot e^4 , causing the slotted end of said lever, acting through the pin e^5 , to turn the lever e' on its pivot e^2 and move the upper end of said lever into a position eccentric with relation to the center of motion f' of the actuator. In whichever direction of its movement the feeler is arrested the upper end of the lever e' of the initiatory device will be moved into an eccentric position and during such movement will always draw upon the rod d^{10} , moving it in the direction of the arrow, Fig. 3, causing the device d^7 to move the latch and put it into operative position with relation to the latch-moving device n , so that the latter as the lay moves back engages the latch and effects the release of the shipper-handle, as hereinbefore provided for.

The rod d^{10} , elbow-lever d^7 , latch d^3 , and lever d' constitute what will be hereinafter designated as a "suitable intermediate connection."

The connection between the rod d^{10} and the upper end of the lever e' may be made either by providing the lever with a stud, over which a hole in the rod may be fitted, or the lever may have a hole to receive the end of a rod or a screw in the rod, each operating the same, the method of connection of the rod and lever being immaterial.

This invention is not limited to the exact shape shown for the actuator, nor is it limited to mounting the feeler rock-shaft in just the bearings shown, nor is the invention limited

to the exact construction shown for the intermediate connection herein represented as employed between the initiatory device and the shipper-handle, and instead I may use any other suitable or well-known devices, there being a great number of such devices which might be used without the exercise of invention.

I have herein shown as an element of the intermediate connection between the compound lever and the shipper-handle an elbow-lever d^7 and a latch, and this latch is connected with the lever d' , and the latch is adapted to be struck by a projection carried by or moving in unison with the lay; but I desire it to be understood that this invention is not limited or intended to be limited to the employment at all times of said elbow-lever or device d^7 or to said latch, and I may employ instead any other usual or suitable moving device, which may be actuated easily and be put from its normally inoperative position into its operative position with but little strain whenever the compound lever is moved by arresting the feeler against a drop device, the initiatory device at that time having given to it its movement on or with relation to the actuator upon which it is mounted, and instead of the particular latch and elbow-lever d^7 I may employ any other usual or equivalent devices commonly employed and designated under the term "dagger" mechanism, such mechanism containing a movable member change of position of which effects the release of the shipper-handle to stop the loom.

I have shown the drop devices separated in two series; but this invention would not be departed from if all the drop devices were in one row and all on one and the same stringer.

The moving intermittingly up and down of the drop devices, that their weight may at times be removed from the warp-threads and that they may at other times be moved to contact with and feel for the warps in their eyes, is not herein claimed broadly, as the same is made the subject-matter of said application, Serial No. 686,660, filed July 23, 1898, hereinbefore referred to.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a warp stop-motion for looms, a feeler, its carrying-shaft, stationary bearings for said feeler-shaft, an actuator, means to move it, an initiatory device composed of a compound lever pivotally mounted on said actuator and operatively engaging said feeler-shaft, and a series of drop devices, said actuator in its movements while the drop devices are in their normal position moving the said compound lever in unison with it, the latter actuating the feeler, the arrest of the motion of the feeler by a drop device in its abnormal position causing the compound lever to be turned on its pivots carried by said actuator, and stop the loom, substantially as described.

2. In a warp stop-motion for looms, a feeler, its carrying-shaft, stationary bearings for said feeler-shaft, an actuator, means to move the same, and an initiatory device composed of a compound lever pivotally mounted on said actuator and operatively engaging said feeler-shaft, and a series of drop devices, said actuator in its movements while the drop devices are in their normal position moving the said compound lever in unison with it, the latter actuating the feeler, the arrest of the motion of the feeler by a drop device in its abnormal position causing the compound lever to be turned on its pivots carried by said actuator, and means moved by said compound lever when the feeler is arrested, to effect the stopping of the loom, substantially as described.

3. In a warp stop-motion for looms, a feeler mounted on arms of a rock-shaft, said rock-shaft having extended from it an arm or projection, bearings to sustain said rock-shaft, an actuator, means to move it, an initiatory device presenting a compound lever each member of which is pivoted upon said actuator, one end of one of said levers standing normally substantially in line with the center of motion of the actuator, said compound lever normally coacting with a projection from the feeler rock-shaft to control the movement of the same in its bearings, a shipper-handle, a series of drop devices adapted to be struck by the feeler when in their abnormal position, and a suitable intermediate connection between said compound lever and said shipper-handle to move it, whereby, after arresting the movement of the feeler by contact with a drop device, said compound lever has imparted to it a secondary movement about the studs supporting the same, to effect the release of the shipper-handle, substantially as described.

4. In a warp stop-motion, a shipper-handle, a guide extended across the loom-frame from end to end, a carrier having a series of drop devices provided with eyes to receive the warp-threads, an actuator, means to operate it, an initiatory device composed of two levers mounted upon said actuator, one end of one of said levers being located substantially opposite and in line with the pivot of the actuator, a feeler carried by arms of a rock-shaft, said rock-shaft having an extended arm or projection embraced between the ends of the compound lever, connections actuated by the compound lever after the arrest of the feeler by contact with a drop device in its abnormal position to stop the loom, substantially as described.

5. In a warp stop-motion, a guide, a series of drop devices located in said guide, an actuator provided substantially central with relation to the two series of drop devices and above the lower ends of the drop devices in their normal position, means to move said actuator, a feeler-rail carried by a rock-shaft, said rock-shaft having an additional arm or projection, stationary bearings for said rock-shaft, a compound lever composed of two

parts differing in length, said levers being coupled together and mounted on pivots carried by said actuator, the upper end of one of said compound levers standing normally opposite the pivot about which the said actuator turns, a shipper-handle, and an intermediate connection between the end of that member of said compound lever which is located opposite the pivot of the actuator, whereby, when the movement of the feeler is arrested by a drop device in its abnormal position, the compound lever is moved about its pivots on the moving actuator and the shipper-handle is released, substantially as described.

6. In a warp stop-motion for looms, the following instrumentalities, viz: a series of drop devices, a shipper-handle, an actuator, means to move it to and fro with relation to the series of drop devices, an initiatory device mounted on said actuator and movable in unison therewith while the drop devices are in their normal position, said initiatory device presenting two levers of differing length coupled together and mounted each on its own pivot extended from said actuator, one of said levers having its end extended upwardly opposite the center of motion of said actuator, a feeler presenting a rail carried by arms of a rock-shaft, said rock-shaft having an extended arm with which coöperates the longer arms of said compound lever, one contacting with one and the other with the opposite side of said arm, and a suitable intermediate connection between the longer lever of said compound lever and the said shipper-handle, whereby when a drop device descends into its abnormal position and the feeler is arrested thereby, the said compound levers are turned or have imparted to them a secondary motion on or with relation to the actuator to cause the longer of said compound levers to start into operation said intermediate connection to release the shipper-handle and stop the loom, substantially as described.

7. In a warp stop-motion for looms, a guide crossing the loom, two rows of devices located in said guide, and having eyes through which the warp-threads are passed, a feeler carried by a rock-shaft, said rock-shaft having an extended arm or projection, an actuator pivotally mounted between said rows of drop devices and at a point above the lower ends thereof when in their normal position, combined with an initiatory device composed of a compound lever, the two arms of which are interlocked, whereby when one of said levers is arrested in its movement with the moving actuator, both of said levers will be turned on their pivots carried by said actuator, and a positioning device coöperating with one of said levers to retain its upper end in its normal position, substantially opposite or in line with the center of motion of the actuator so long as the feeler is not arrested by a drop device in its abnormal position, substantially as described.

8. In a warp stop-motion for looms, a series of drop devices, a feeler, a pivoted actuator having mounted on it an initiatory device composed of a compound lever having its two members operatively connected, means to move said actuator and said compound lever in unison and move the feeler under the drop devices when in their normal positions, the arresting of said feeler while it is being moved in one direction by a drop device causing said compound lever to be moved in one and the same direction whatever the direction of movement of the feeler when arrested.

9. In a warp stop-motion, a pivoted actuator, means to move it, two levers pivoted thereon and connected together, the end of one of said levers standing normally in the line of the pivot of said actuator, the arrest of either of said two levers while the actuator is being moved causing both of said levers to be moved, the upper end of the lever located in the line of the pivot of said actuator being put into an eccentric position with relation to the pivotal point of the actuator and effecting the stopping of the loom.

10. In a warp stop-motion for looms, a pivoted actuator having two studs, a connected compound lever mounted on said studs, the upper end of one of said levers standing substantially opposite the pivotal point of said

actuator, a positioning device carried by said actuator and cooperating with one of said levers, a series of drop devices, and a feeler under the control of said compound lever, the arrest of the feeler by a drop device in its abnormal position causing the arrest of one of the members of said compound lever and effecting the turning of both of said levers, putting the end of that one of said levers opposite the pivotal point of said actuator eccentric to said pivotal point, substantially as described.

11. In a warp stop-motion for looms, an actuator, a compound lever carried by said actuator, a shaft carrying a feeler and having attached to it an arm; the compound lever engaging said arm, means to sustain said feeler rock-shaft, and means to move said actuator and with itsaid compound lever, whereby said feeler is moved by said compound lever during the regular operations of the loom, and while the warp-threads are unbroken, substantially as described.

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

HORACE WYMAN.

Witnesses:

JUSTIN A. WARE,

GEORGE CROMPTON.