H. W. BRACKEN.

WARP STOP MOTION FOR LOOMS.

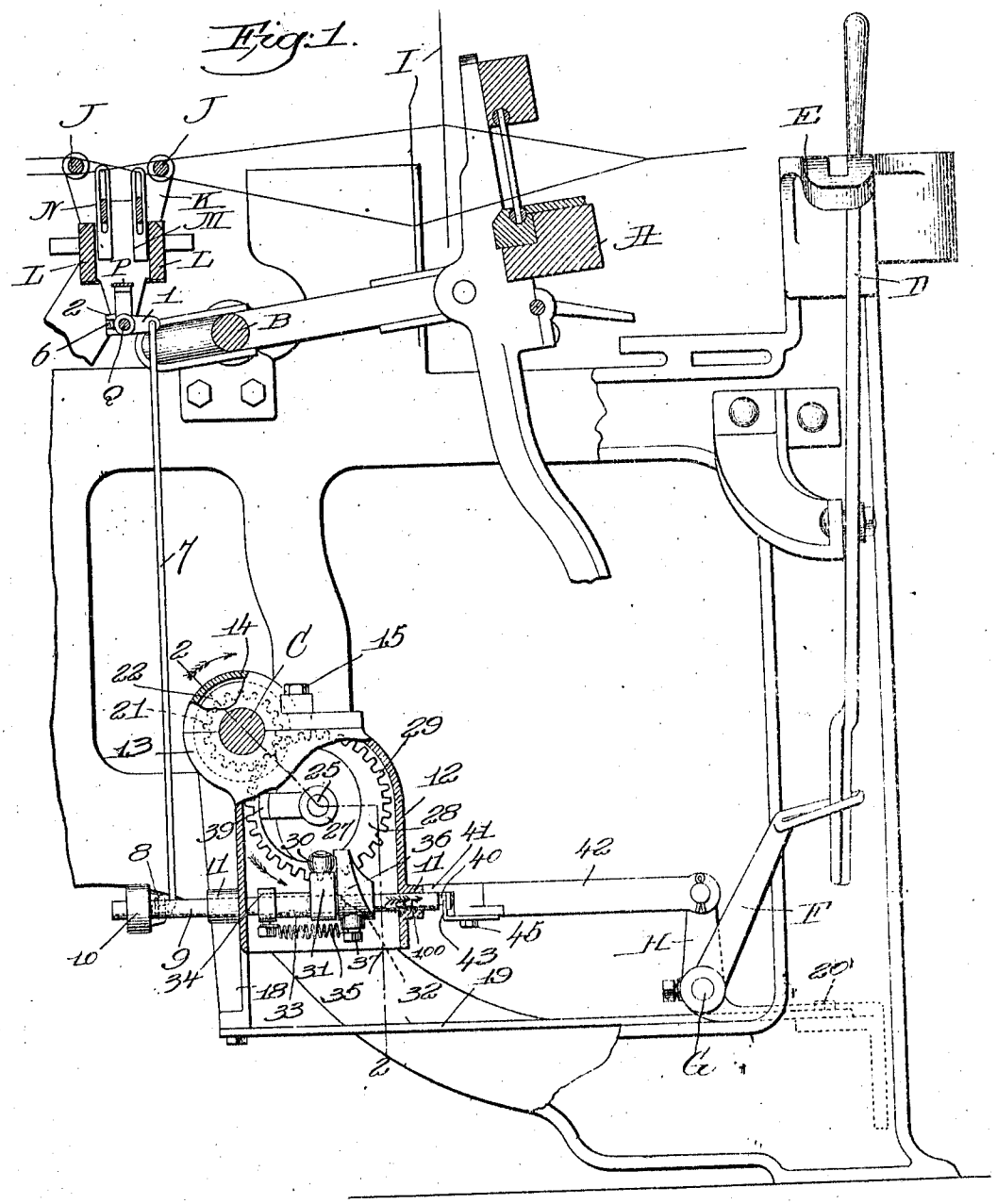
APPLICATION FILED FEB. 2, 1912.

1,031,237.

Patented July 2, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses,
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2 SHEETS—SHEET 2.

Fig: 2.

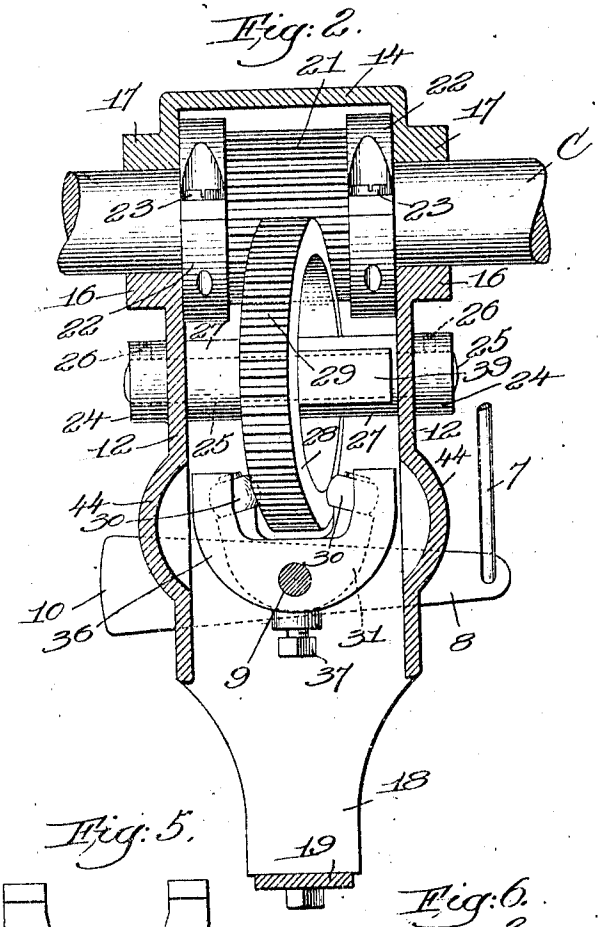

Fig: 4.

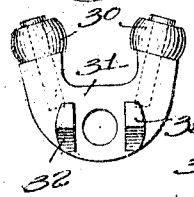

Fig: 5.

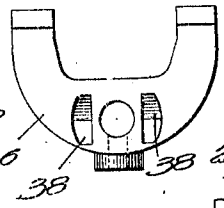

Fig: 3.

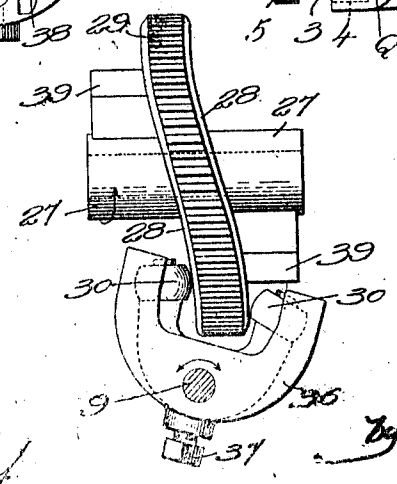

Fig: 6.

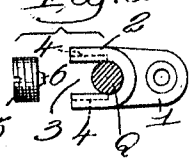

Fig: 7.

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UNITED STATES PATENT OFFICE.

HOWARD W. BRACKEN, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

WARP STOP-MOTION FOR LOOMS.

1,031,237. Specification of Letters Patent. Patented July 2, 1912.

Application filed February 3, 1912. Serial No. 674,874.

To all whom it may concern:

Be it known that I, HOWARD W. BRACKEN, a citizen of the United States, and resident of Hopedale, 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 drawing, is a specification, like characters on the drawing representing like parts.

This invention has for its object the production of a novel and simple warp stop-motion for looms, to effect automatically loom stoppage when a warp thread fails or becomes unduly slack, an abnormally positioned detector at such time engaging and arresting the movement of a normally vibrating feeler, suitable means then acting to cause the operation of the loom stopping mechanism. In the embodiment of my invention herein shown the detectors are in practice made of thin, flat metal strips, shown as arranged in two rows or banks between the lease-rods, a double-acting feeler normally vibrating below the detectors, and as said feeler is arranged to coöperate with a dropped detector in either bank it follows that each stroke of the feeler is a feeling stroke. Consequently the means which on the one hand effects normal vibration of the feeler, and which on the other hand sets in operation the stopping mechanism upon the arrest of the feeler, must be so constructed and arranged to operate irrespective of the direction of the stroke on which the feeler is arrested. In my present invention the means whereby the feeler is vibrated normally and the arrest of the feeler is caused to effect shipper release is of a novel construction, and so arranged that it can be applied readily to a loom without dismembering or taking it down. This is of material advantage in itself, for such means can be substituted for the feeler-actuating and controlled means in other forms of warp stop-motions with a minimum of expense, time and labor. These and other novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a left hand side elevation and partial transverse section of a sufficient portion of a loom, with one embodiment of my invention applied thereto, the parts being shown in normal condition, as when the loom is running; Fig. 2 is a much enlarged detail of the housing and parts contained therein, the housing being shown in section substantially on the line 2—2, Fig. 1, looking toward the rear, but for the sake of clearness all of the parts within the housing are shown in elevation; Fig. 3 is an enlarged front elevation of the feeler and tappet cams, in a different position from that shown in Fig. 1, and with the rocking bunter and the follower for the feeler cam illustrated in one of their extreme positions; Fig. 4 is a front elevation of the rocking cam follower, detached, showing the face thereof adjacent the bunter; Fig. 5 is a rear elevation of the rocking and axially movable bunter which under normal conditions is engaged by the cam follower and rocked in unison therewith to effect the vibration of the feeler; Fig. 6 is a side elevation of the detachable arm for the feeler rock-shaft and the set-screw by which it is held fast on said shaft; Fig. 7 is a left hand end elevation of the arm on the rock-shaft but with the set-screw omitted.

Referring to Fig. 1 the lay A, crank-shaft B, cam-shaft C, shipper D by means of which usual means (not shown) is caused to throw the power onto and off the loom, the shipper holding-plate E, knock-off arm F for the shipper, the rock-shaft G for said arm and provided with a second arm H, the harnesses I, and the lease-rods J, may be and are of well known or usual construction, and operate in a familiar manner, the lease-rods as herein shown being sustained by brackets, as K, erected one on each loom side and carrying parallel transverse back-stop bars L between which hang the two banks of detectors M, N suspended from the warp-threads between the lease-rods. The detectors are preferably thin, flat metal strips each longitudinally slotted for the reception of the warp-thread and for a supporting bar or rod, as O, a double-acting feeler P being

mounted on a rock-shaft Q sustained in the brackets K, in a manner well known to those skilled in the art, the feeler under normal conditions vibrating back and forth below the lower ends of the suspended detectors.

Various means have been devised heretofore for effecting the oscillation of the feeler rock-shaft under normal conditions and for effecting the release of a shipper or equivalent device when vibration of the feeler is arrested by engagement with an abnormally positioned detector, but so far as I am aware such means must be applied to the loom during the setting up thereof, or by a more or less extensive dismemberment of the loom structure. In this invention I have obviated these objections and I will now describe the novel structure shown in the accompanying drawings.

The rock-shaft Q has applied to it an arm 1, and referring to Figs. 6 and 7 said arm is made with a thickened, U-shaped hub 2 formed by first boring and tapping the thickened end longitudinally and then slotting such tapped end transversely at 3, to form the seat for the rock shaft, the slotting leaving opposed segmental tapped portions 4, 4. After the arm is applied to the rock-shaft, Fig. 6, a set-screw 5 is screwed into the tapped hub, as shown in Fig. 1, a teat 6 on the inner end of the screw bearing against the shaft and holding said arm 1 fixed thereupon, this construction of the detachable arm permitting it to be applied at any place on the shaft without removing the latter from its bearings.

The arm 1 is pivotally connected by a depending link 7 with one end of a lateral arm 8 fast on a longitudinally shiftable rock-shaft 9 at the lower part of the loom, the arm 8 being enlarged beyond the rock-shaft at 10 to substantially counterbalance the weight of the link, the shafts Q and 9 thus being positively connected and of necessity rocking together or not at all. Said rock-shaft is mounted in bearings 11, 11, Fig. 1, formed in a housing 12, in its front and rear walls, said housing being conveniently made as a casting and having a bulge 13 in the upper part of its rear wall, its open top being closed by a cap 14 secured by suitable bolts, as 15. This housing is sustained by any suitable part of the loom structure, and herein I have shown it as supported by and suspended from the cam shaft. The side walls of the housing are provided with half bearings 16, Fig. 2, to partly embrace the cam-shaft C, and the cap 14 has similar half bearings 17 which are opposed to the bearings 16, and thus the cam shaft is completely encircled when the cap is bolted to the housing. The housing is thus suspended from the cam shaft, and in a position well back in the loom frame, out of the way, and to prevent any rocking the rear wall of the housing is extended downward at 18, and has bolted to it a brace bar 19 extended frontward and bolted at 20 to a part of the loom frame. Before the housing is positioned upon the cam shaft the latter has applied to it a wide faced pinion 21, made in halves and provided with annular cheeks 22 at its ends, the halves being connected and clamped fixedly upon the cam shaft by clamping screws 23, Fig. 2, which are seated in recesses in one half of each cheek and enter suitable threaded holes in the complemental halves of the cheeks. When the housing is applied the sides thereof just receive the pinion cheeks freely between them, the sides of the cap 14 fitting in a similar manner, as clearly shown by Fig. 2, so that no sidewise movement of the housing is permitted, while the pinion and its cheeks rotate freely within the housing and its cap, the bulge or swell 13 of the housing providing ample room for the cheeks at the upper part of the housing. Hollow external bosses 24 on opposite sides of the housing have extended through them a horizontal stud 25 below and parallel to the cam shaft, fixed in position by set screws 26, Fig. 2. Upon this stud is rotatably mounted the sleeve-like hub 27 of the feeler actuating cam 28, this cam being of peculiar shape, as best shown in Figs. 2 and 3, and in practice it is a skew or wave cam, but its cylindrical rim has teeth 29 which mesh with and are driven by the pinion 21. The face of this pinion is made wide in order that it will always remain in mesh with the cam teeth 29 to effect rotation of the latter, the feeler cam 28 being wholly inclosed and protected by the housing.

It will be observed that the opposite faces of the cam 28 are the surfaces which exert a cam action, and this action is transmitted to rolls 30 carried on the arms of a yoke-like follower 31 mounted to rock on the shaft 9, the follower and its rolls being very clearly shown in Fig. 4. On its front face the follower is provided with V-shaped lugs 32 and a long hub 33 extends from its rear face, said hub having adjustably fixed upon it a collar 34, Fig. 1, to which is attached one end of a spring 35. Said spring at its other end is attached to a U-shaped bunter 36 fixedly secured by a set screw 37 onto the shaft 9, to rock therewith and also to move as a unit with the shaft when the latter is moved longitudinally, as will be explained. Normally the spring draws the follower 31 forward with its lugs 32 seated in correspondingly shaped sockets 38 in the rear face of the bunter, see Fig. 5, so that the follower and bunter will be symmetrically positioned with respect to their common support, the shaft 9, and said parts will be yieldingly connected. As the cam 28 is revolved the follower and bunter will

be oscillated or rocked, as will be obvious, mid position being shown in Fig. 2, and the extreme right hand position is shown in Fig. 3, the other extreme position being an equal distance to the left, and the shaft 9 will be rocked with said parts as long as they are connected. Consequently the arm 8, link 7, and arm 1, will transmit to the feeler rock-shaft Q an oscillatory movement to vibrate the feeler P back and forth, whenever the loom is running and the warp threads maintain the detectors M, N in normal, elevated position.

The hub 27 has formed upon it two diametrically opposite tappets so positioned with relation to the cam 28 that when the bunter 36 is in either of its extreme positions the tappet 39 on the same side of the cam 28 as the lowest arm of said bunter will clear it as the cam revolves. This is shown in Fig. 3, where the tappets at the right is just about to clear the right hand limb of the bunter. If the bunter is stopped at or near mid position, shown in Fig. 2, while the feeler cam continues to revolve one or the other of the tappets 39 will strike the rear face of a bunter limb and move said bunter frontward, bodily, thereby effecting longitudinal movement of the shaft 9 in the same direction, and positively, as will be manifest. Said shaft has its front end annularly grooved, at 40, Fig. 1, and is projected beneath the overhanging ear 41 formed on the rear end of a link 42 pivotally connected with the rocker arm H, said link having attached to it a notched keeper 43 which embraces the grooved part of the shaft. This connection or coupling between the rock-shaft 9 and link 42 permits the shaft to be rocked without affecting the link, but when the bunter 36 is moved by a tappet 39 to shift the rock-shaft 9 in the direction of arrow 100, Fig. 1, the front end of said shaft butts against the adjacent end of the link 42 and moves it longitudinally to turn the knock-off arm F and release shipper D from the usual notch in the holding plate E, thus bringing about the operation of any usual stopping mechanism. It is immaterial which tappet acts upon the bunter, and as will be manifest the engagement and arrest of the feeler P by a dropped detector, in either of the banks M or N, will hold the rock-shaft 9 very nearly in mid position so far as the bunter is concerned, so that it will be engaged and moved axially bodily with the rock-shaft, to effect shipper release. The feeler cam 28 continues to revolve, however, after the arrest of the feeler, and will rock the follower 31 upon the shaft 9, the lateral pressure thus exerted upon the follower causing its beveled lugs 32 to be withdrawn from the recesses or sockets 38 in the arrested bunter, the spring 35 yielding as the bunter and follower are separated in an axial direction. It is necessary that this yielding, separable connection be provided between the follower and the bunter, for when the latter is held in substantial mid-position to be engaged and moved axially by a tappet, one or the other of the rolls 30 on the follower must be moved below the tappet path, to avoid being struck, and the surface of the cam 28 is so disposed with relation to the tappets that the follower will always be practically in an extreme position when the bunter is in position to be engaged by a tappet. A slight longitudinal movement of the shiftable rock-shaft 9 is sufficient to operate the knock-off arm F and effect shipper release, so that the follower rolls 30 will not be disengaged from the feeler cam 28, and when the shipper is returned to running position the spring 35 will act to re-connect the follower and bunter as soon as the lugs 32 and recesses 38 come opposite each other. As soon as such connection is established the rocking of the shiftable and feeler rock-shafts 9 and Q is begun, and continued as long as the warp threads remain intact and properly taut. Suitable bends 44 are formed in the sides of the housing 12, Fig. 2, to permit the full swing of the follower and bunter. The coupling between the shiftable shaft 9 and the link 42 prevents any longitudinal movement of said shaft ordinarily, so that the follower and bunter are maintained in proper position axially of the shaft.

By detaching brace 19 and removing the cap 14 the housing can be at once disconnected from the cam shaft C, and the link 7 is readily disengaged from the arm 8, if the parts are to be taken down. Loosening of the bolt 45, Fig. 1, enables the keeper 43 to be disengaged from the grooved part 40 of the shaft 9, thereby uncoupling said shaft and the link 42.

From the foregoing description it will now be readily understood that the entire mechanism between the feeler rock-shaft Q and the rocker-arm H can be applied to or detached from the loom without in any way disturbing or disarranging the feeler, rock-shaft, cam shaft, or any other part of the loom. My novel mechanism is thus readily applicable to looms already set up, and the construction of the mechanism is simple, direct acting, and efficient.

The inclosing of the main portion of a warp stop-motion mechanism within a housing, which also directly supports such portion of the mechanism, is novel, so far as I am aware. So, too, the suspension of the main portion of such mechanism from a rotating shaft of the loom, as herein shown, is novel, I believe, the suspended housing not only sustaining the feeler and tappet cams and their adjuncts but effectually covering

and protecting them from lint, dust and dirt, irrespective of that part of the loom to which said housing is attached. At the same time the suspension of the housing from the cam shaft locates the housing and its contents in the lower part of the loom frame and out of the way of other parts of the loom instrumentality.

The spring 35 is a light spring, sufficiently strong to slightly more than overcome friction of the rock-shaft 9 in its bearings 11 and normally connect the follower and the bunter, so that when a detector arrests the vibratory movement of the feeler the engaged detector has to sustain very slight pressure at the time the bunter and follower are disconnected. Consequently there is practically no tendency to bend or strain a detector.

By locating the normally oscillating, longitudinally movable member or shaft 9 substantially at right angles to the cam shaft, and also at the lower, rear part of the loom frame it and adjacent devices of the stop-motion can be set back as close as possible to the warp beam, without interference therewith, for the occasional longitudinal or endwise movement of such member 9 to effect loom stoppage is frontward, hence away from the warp beam.

The gearing which is shown herein reduces the speed of movement of the feeler and makes it easier in its action, as will be apparent.

Various changes or modifications in details of construction and arrangement may be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the claims hereunto annexed.

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

1. In a loom warp stop-motion, a series of detectors, a feeler to engage and be arrested by a detector released by its warp thread, rotating feeler and tappet cams, a rocking follower actuated by the feeler cam, an axially movable rock-shaft on which said follower is mounted to rock, an adjacent bunter fixed on said rock-shaft, a yielding connection between the bunter and follower, whereby they and the shaft are rocked normally as a unit, positive connections between the feeler and the rock-shaft, whereby rocking of the latter oscillates the former, arrest of the feeler acting through said connections to stop the rock-shaft with the bunter in the path of the tappet cam, to be moved thereby axially of the rock-shaft and in unison with it, and means to effect loom stoppage actuated by or through such movement of the rock-shaft.

2. In a loom warp stop-motion, a series of detectors, a feeler to engage and be arrested by a released detector, and means to vibrate the feeler, including a longitudinally movable rock-shaft having a bunter fixed thereon, a follower loosely mounted to rock on the rock-shaft, a yielding connection between the follower and bunter, whereby they are rocked in unison normally, a cam coöperating with the follower to rock it, and a tappet cam to engage the bunter and move it and the rock-shaft longitudinally when movement of the feeler is arrested, combined with a shipper, a knock-off arm therefor, and actuating means for said arm operated by longitudinal movement of the rock-shaft.

3. In a loom warp stop-motion, including a series of detectors, a normally vibrating feeler to engage and be arrested by a released detector, a rotating shaft of the loom, a pinion fast thereon, a feeler cam having gear teeth in mesh with the pinion, a housing suspended from said shaft and in which the cam is rotatably mounted, a rock-shaft longitudinally movable in bearings in the housing, means actuated by the cam to effect rocking of the said rock-shaft, an operating connection between the latter and the feeler to effect vibration thereof, and means to effect longitudinal movement of the rock-shaft when the feeler is arrested, to effect the operation of a loom stopping instrumentality.

4. In a loom warp stop-motion, including a series of detectors, a normally vibrating feeler to engage and be arrested by a released detector, a rotating shaft of the loom, a pinion fast thereon, a closed housing suspended from said shaft, means actuated by the pinion, mounted in and inclosed by the housing and operatively connected with the feeler to effect vibration of the feeler, said means including a shaft normally rocked and capable of longitudinal movement when the feeler is arrested, and a tappet cam within the housing to effect longitudinal movement of the rocking shaft upon arrest of the feeler.

5. In a loom warp stop-motion, a series of detectors, a normally vibrating feeler to engage and be arrested by a released detector, a rock-shaft on which the feeler is mounted, an arm detachably connected with the rock-shaft, a second, longitudinally shiftable rock-shaft, a positive connection between it and the said arm, two revolving cams, connections between one cam and the shiftable rock-shaft to normally rock it, a bunter on said rock-shaft engaged by the other of said cams to shift said rock-shaft when movement of the feeler is arrested, and a shipper-releasing device operated by such shifting of the rock-shaft.

6. In a loom warp stop-motion, a series of detectors, a normally vibrating feeler to engage and be arrested by a released detector, a rock-shaft on which the feeler is mounted,

means to actuate said feeler rock-shaft, a transmitting link connected with said means, an arm pivotally connected with the link and having a transversely slotted and longitudinally tapped hub to embrace the feeler rock-shaft, and a set-screw adapted to be screwed into the tapped hub and bear against the rock-shaft, to detachably clamp the arm thereon, whereby the arm can be applied to the rock-shaft when the latter is in its operative position in the loom.

7. In a loom warp stop-motion, a feeler, means to effect vibration thereof normally, comprising a wave-cam having peripheral teeth, a rotating pinion meshing therewith to revolve the cam, a follower coöperating with the cam and rocked thereby, a rock-shaft on which the follower is loosely mounted, an adjacent bunter fast on the rock-shaft, said bunter having recesses and the follower having lugs, on their adjacent faces, a spring normally acting to seat the lugs in the recesses, whereby rocking of the follower effects corresponding movement of the bunter and the rock-shaft, positive connections between the latter and the feeler, arrest of the latter acting through said connections to stop the rocking motion of the rock-shaft and bunter, and a device to engage the bunter at such time and move it and the rock-shaft axially, to effect the operation of a loom stopping instrumentality.

8. In a loom, a rotating shaft, a wide faced split pinion clamped thereon, a housing inclosing the pinion and suspended from the cam shaft, a feeler cam having adjacent tappets rotatably mounted within the housing and driven by said pinion, a shaft mounted to rock and also to move longitudinally in the housing, means actuated by the feeler cam to rock the shaft, other means fast on the shaft adapted to be engaged by a tappet to effect longitudinal movement of the shaft when rocking thereof is prevented, to effect the actuation of a loom stopping instrumentality, and means rendered operative to prevent rocking of the said shaft by or through the occurrence of a warp fault, said means including a feeler normally vibrated by said feeler cam.

9. In a loom, a rotating shaft, a detachable housing suspended therefrom, feeler vibrating means carried by the housing and inclosed therein, other and normally inactive means sustained by the housing to effect the operation of a loom stopping instrumentality by or through arrest of the feeler from vibration, a feeler adapted to be arrested upon the occurrence of a warp fault, a positive connection between the feeler and the means for effecting its vibration, and a common driving member for the two means sustained by the housing, said member being detachably clamped on the rotating shaft of the loom and inclosed by the housing.

10. In a loom, a cam shaft, a feeler and a rock-shaft on which it is mounted, two series of detectors held out of the feeler path by normal warp threads, feeler vibrating mechanism, a housing for and supporting said mechanism, the housing being detachably connected with and suspended from the cam shaft, a positive connection between said mechanism and the feeler rock-shaft, to swing the feeler positively in both directions, a released detector in either series engaging and arresting the feeler and stopping rotative movement of its shaft, a driving member for the feeler vibrating mechanism clamped detachably on the cam shaft, and means brought into operating activity when the feeler is arrested to effect the operation of a loom stopping instrumentality, a portion of said means being supported by and inclosed in the housing.

11. In a loom warp stop-motion, a series of detectors, a feeler to coöperate with and be arrested by a detector released by its warp thread, a member adapted to rock and also to move axially, connections between said member and the feeler to vibrate the latter by or through rocking motion of said member, and means to effect loom stoppage by or through axial movement of said member, combined with mechanism yieldingly connected with and to rock said member periodically while the loom is in operation, other mechanism to move said rocking member axially and positively, and a device on said member brought into coöperation with said second mechanism when rocking motion of said member is interrupted by arrest of the feeler.

12. In a loom warp-stop-motion, a series of detectors, a feeler to coöperate with and be arrested by a detector released by its warp thread, a member adapted to rock and also to move axially, a positive connection between said member and the feeler to vibrate the latter in unison with and by or through rocking motion of said member, and means to effect loom stoppage by or through axial movement of said member, combined with mechanism actuated by a continuously moving part of the loom and yieldingly connected with said member to rock the same continuously while the warp threads are in normal condition, other mechanism actuated by a continuously moving part of the loom to effect positive axial movement of said rocking member when a warp fault occurs, and a device fixed on said member and moved by rocking motion thereof out of the paths of moving parts of said latter mechanism, cessation of the rocking motion of said member upon the occurrence of a warp fault positioning said device in the path of one of the parts of said mechanism, whereby such moving part engages and moves the device on the rocking member and effects its

axial movement to cause the stoppage of the loom.

13. In a loom warp stop-motion, a series of detectors, a feeler adapted to be arrested by a dectector upon the occurrence of a warp fault, a shaft adapted to rock and also to be moved axially, a connection between said shaft and feeler to vibrate the latter by or through rocking motion of the shaft, and means to effect loom stoppage by or through axial movement of said shaft, combined with actuating mechanism driven by the loom and yieldingly connected with the shaft to rock the latter periodically, said mechanism including two rotating and normally inactive members, and a bunter fixedly mounted on the shaft, rocking motion thereof moving the bunter into and out of the paths of said members and preventing coöperation of either member with the bunter, stoppage of the rocking motion of the shaft positioning the bunter to be engaged and moved positively by one of the members of the actuating mechanism, to effect thereby axial movement of the shaft and cause loom stoppage.

14. In a loom, a series of warp stop-motion detectors and a normally vibrating feeler to engage and be arrested by a detector upon the occurrence of a warp fault, a housing located within the loom frame, and mechanism mounted in and inclosed by said housing and operatively connected with the feeler to effect normal vibration of the feeler, said mechanism including a rocking and axially movable member, devices to effect rocking movement of said member about its own axis and thereby cause the feeler to vibrate, and a cam mounted independently of and to effect positive axial movement of said member upon arrest of the feeler, combined with means driven by a continuously rotating member of the loom to actuate the mechanism within the housing, the latter protecting the mechanism therein from lint and dirt, axial movement of the rocking member of said mechanism being adapted to effect loom stoppage.

15. In a loom warp stop-motion, in combination, a series of warp-fault detectors, a feeler to coöperate with a detector upon the occurrence of a warp fault, a loom stopping instrumentality, a rocking, axially movable member, a housing in which it is mounted, connections between said member and the feeler to vibrate the latter when the former is rocked, connections between said member and the stopping instrumentality to actuate it when said member is moved axially, mechanism operated by the loom and inclosed by the housing, said mechanism being yieldingly connected with and to rock said member normally to cause the feeler to vibrate, said mechanism including a device mounted independently of and to coöperate with said member to effect axial movement of said rocking member when its rocking motion is arrested by coöperation of the feeler with a detector.

16. In a loom warp stop-motion, in combination, a series of warp-fault detectors, a feeler to coöperate with a detector upon the occurrence of a warp fault, a loom stopping instrumentality, a fixedly positioned housing, a rocking, axially movable member mounted in the housing and positively connected with the feeler, to vibrate it by or through rocking motion of said member, a connection between said member and the stopping instrumentality, to actuate the latter by axial movement of the member, mechanism inclosed by the housing and operated by a rotating part of the loom and yieldingly connected with the said rocking member, to rock the latter periodically under normal conditions, a bunter fixed on said member and operatively positioned when rocking motion of said member is stopped by coöperation of the feeler with a detector, and a bunter-engaging device forming a part of said mechanism, to strike the operatively positioned bunter and effect positive axial movement of the normally rocking member, to thereby effect loom stoppage.

17. In a loom warp stop-motion, in combination, a series of warp-fault detectors, a feeler to coöperate with a detector upon the occurrence of a warp fault, a loom stopping instrumentality, a fixedly positioned housing below the warp threads, a shaft mounted in said housing and capable of rocking and axial movements and positively connected with the feeler, to vibrate the latter when the shaft is rocked, a connection between the stopping instrumentality and said shaft, to actuate the former by axial movement of the latter, a follower yieldingly connected with the shaft, a bunter fixedly mounted thereon, said follower and bunter being inclosed within the housing, a cam rotatably mounted in the housing and having adjacent tappets rotatable in unison with the cam, said cam coöperating with the follower to rock the shaft and move the bunter into and out of the paths of the tappets, coöperation of the feeler with a detector stopping rocking motion of the shaft with the bunter in position to be engaged and moved by a tappet, to thereby effect axial movement of the shaft, and driving means for the cam actuated by a continuously moving part of the loom.

18. In a loom, a series of warp-fault detectors and a feeler to coöperate therewith upon the occurrence of a warp fault, a rock-shaft located in the lower part of the loom frame and axially movable parallel to the sides thereof and toward the front of the

loom to effect the operation of a loom stopping instrumentality, connections between said shaft and feeler to vibrate the latter by rocking motion of the former, and mechanism normally operating to effect rocking motion of the shaft about its own axis and thereby cause the feeler to vibrate and adapted to effect frontward axial movement of the shaft when vibration of the feeler is arrested by coöperation with a detector and the rocking motion of the shaft is stopped thereby.

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

HOWARD W. BRACKEN.

Witnesses:

J. L. Remington, Jr.,

E. D. Osgood.