

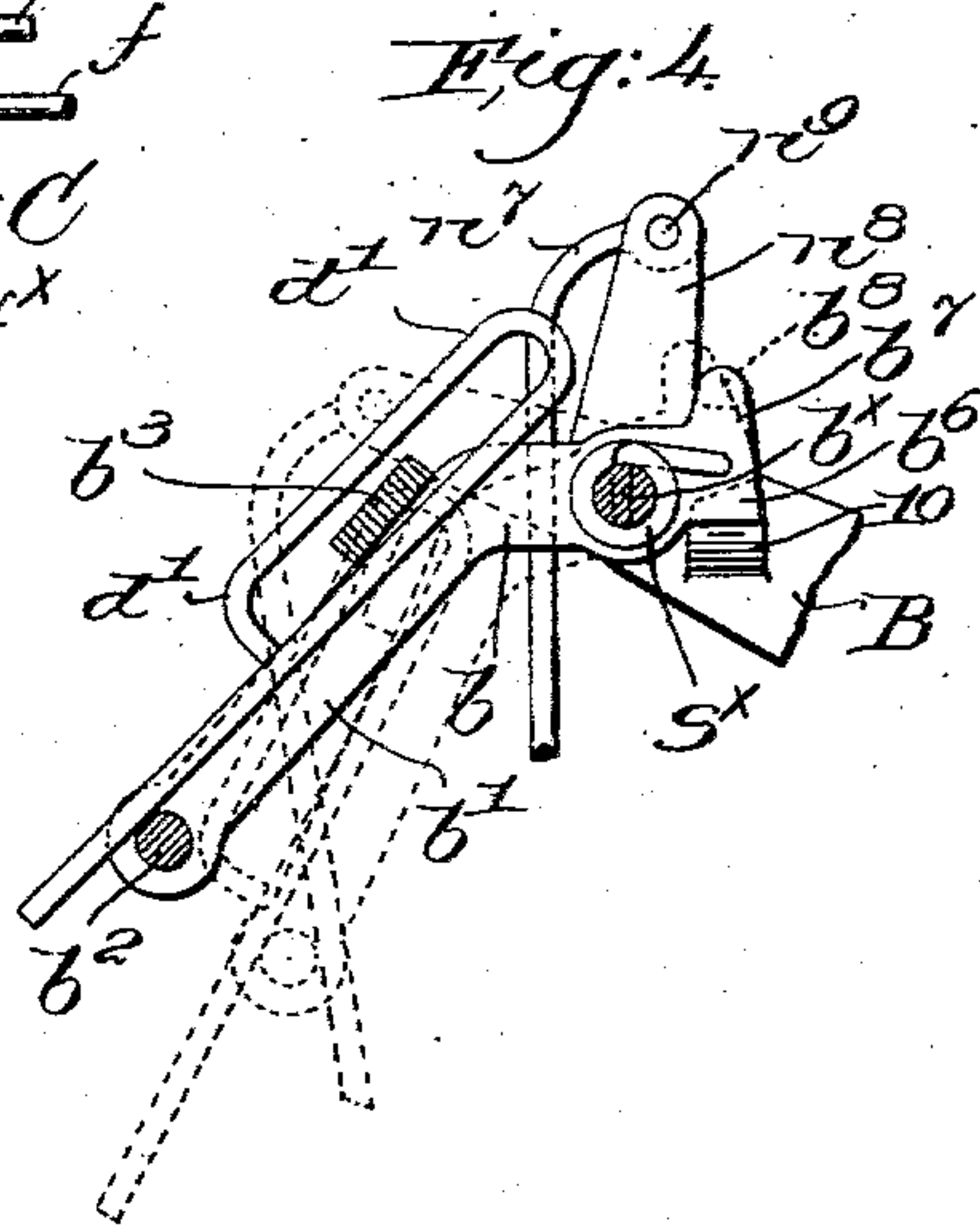
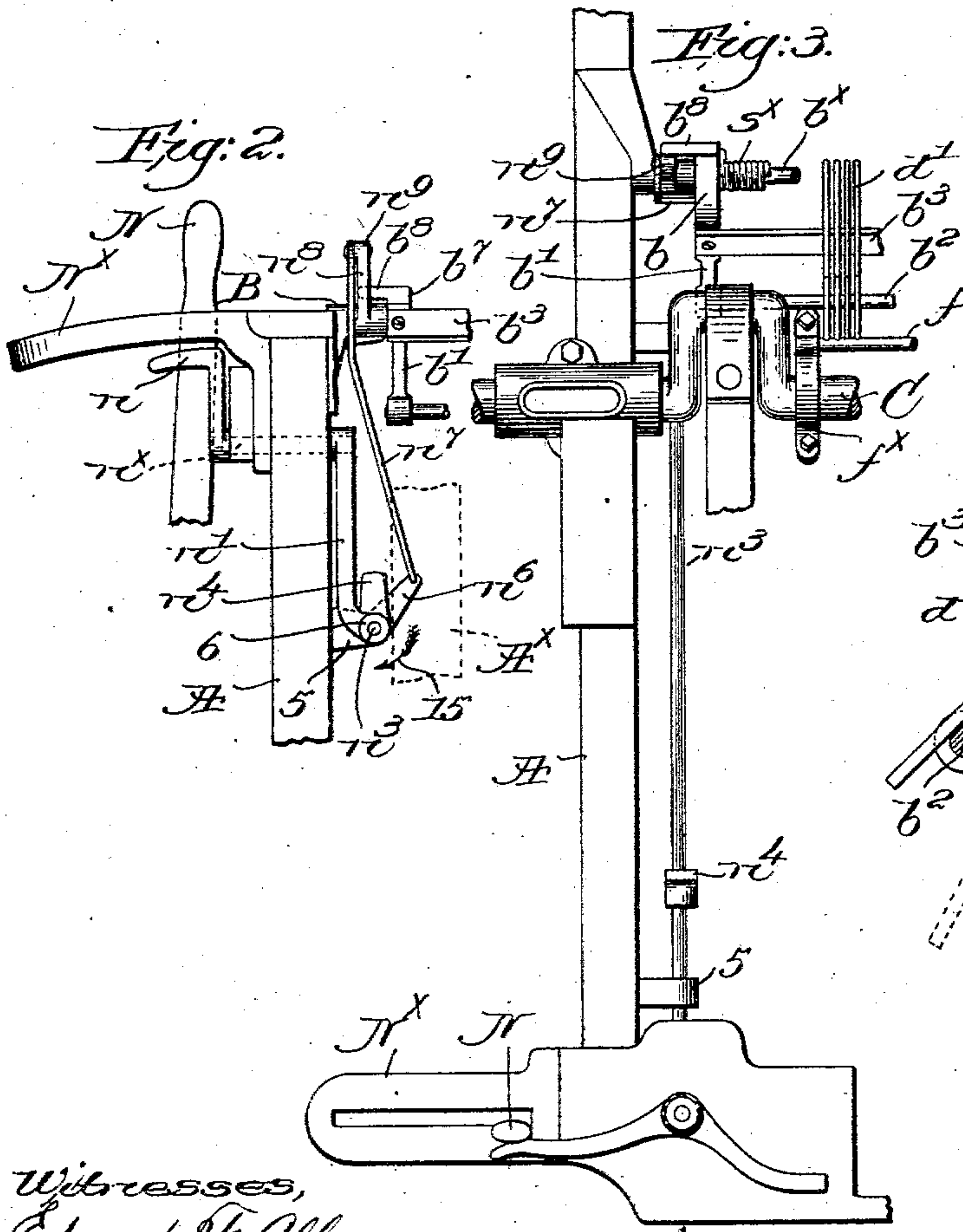
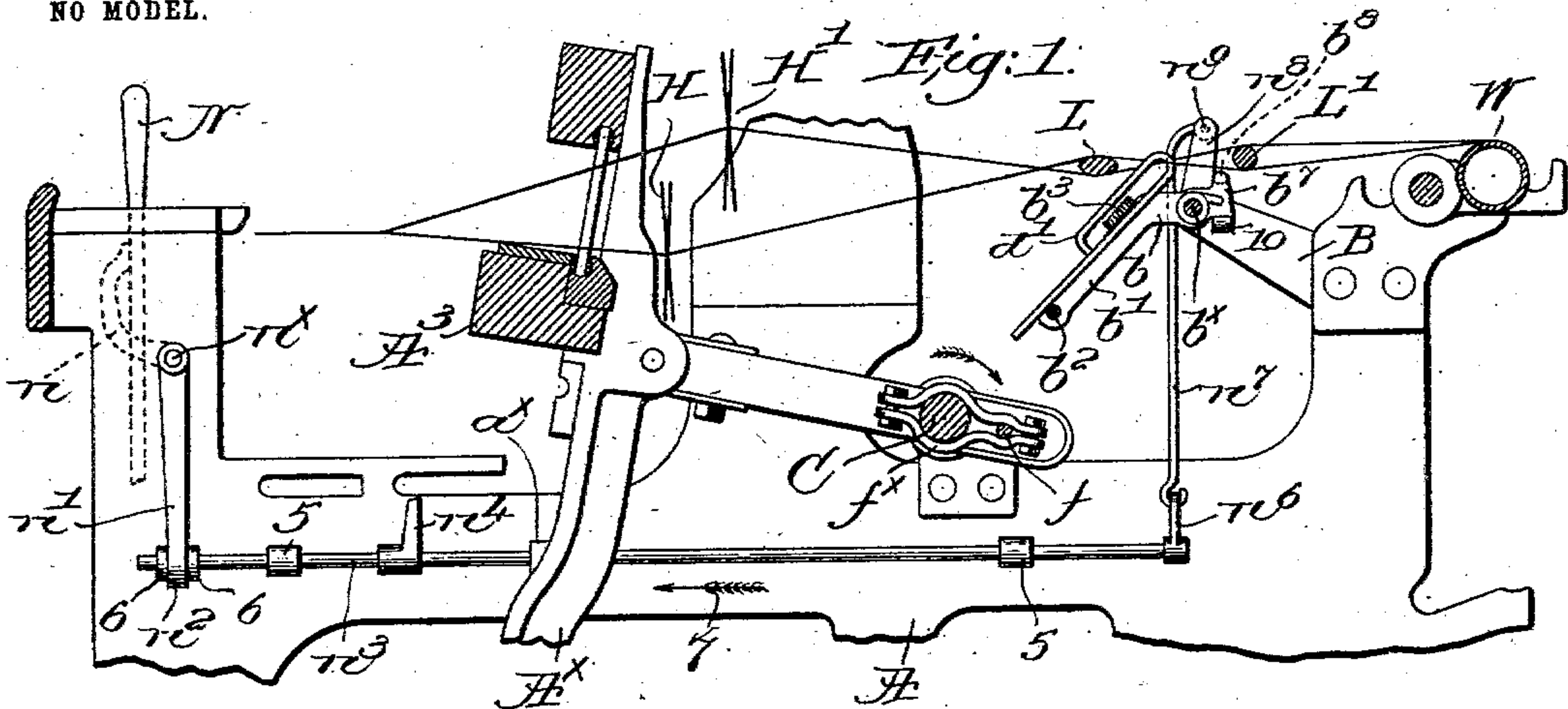
No. 743,748.

PATENTED NOV. 10, 1903.

H. W. OWEN & J. T. KIRK.  
WARP STOP MOTION APPARATUS.

APPLICATION FILED AUG. 3, 1903.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

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## WARP-STOP-MOTION APPARATUS.

SPECIFICATION forming part of Letters Patent No. 743,748, dated November 10, 1903.

Application filed August 3, 1903. Serial No. 168,009. (No model.)

*To all whom it may concern:*

Be it known that we, HERBERT W. OWEN, a resident of Dover, county of Strafford, State of New Hampshire, and JOHN T. KIRK, a resident of Pawtucket, county of Providence, State of Rhode Island, citizens of the United States, have invented an Improvement in Warp-Stop-Motion Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object the production of novel, simple, and effective warp-stop-motion apparatus particularly adapted for use in connection with looms for weaving, and we have herein shown our invention in such relation.

Our invention relates to that type of warp-stop-motion apparatus wherein failure of a warp-thread releases a detector and the latter moves into the path of a feeler. Engagement of the latter with the released detector brings about the operation of means which causes automatic stoppage of the loom or other machine to which the stop-motion apparatus is applied.

We have devised means to prevent the entire weight of the detectors from coming upon the warp-threads, a decidedly valuable feature, and we have so arranged the carrier on which the detectors are sustained that when a released detector is engaged by the feeler the carrier is changed in position, and thereby the stopping instrumentality is actuated.

The various novel features of our invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a cross-sectional view of a sufficient portion of a loom to be understood with one embodiment of our present invention applied thereto. Fig. 2 is a front elevation of the shipper and the means by which it is released when a detector is released. Fig. 3 is a top or plan view of the parts shown in Fig. 1, omitting the lay; and Fig. 4 is an enlarged detail of the detector-carrier and some of the adjacent parts.

Referring to the drawings, the loom side A,

lay A<sup>3</sup>, the lay-swords A<sup>x</sup>, only one of which is shown, the crank-shaft C, connected in usual manner by suitable pitmen with the lay-sword, the shipper N, its holding-plate N<sup>x</sup>, Fig. 2, the harness H H', Fig. 1, whip roll or bar W, and the lease-rods L L' may be and are all of usual construction and operate in usual manner.

The knock-off lever *n n'* (see Figs. 1 and 2) is fulcrumed at *n<sup>x</sup>* on the loom side, the upturned arm *n* bearing against the shipper below the holding-plate N<sup>x</sup>, as clearly shown in Fig. 2. The fulcrum-shaft *n<sup>x</sup>* passes through the loom side, and the downturned arm *n'* is provided with an eye *n<sup>2</sup>* to receive loosely a slide-rod *n<sup>3</sup>*, shown in Fig. 1 as mounted in bearings 5 on the inner face of the loom side. Collars 6 on said slide-rod on opposite sides of the eye *n<sup>2</sup>* cause the knock-off lever to be rocked when the slide-rod is longitudinally moved. Said rod has fast upon it a projection *n<sup>4</sup>*, which is normally upturned, as best shown in Fig. 2, to one side of the path of the adjacent lay-sword, the latter having an enlargement or bunter *a<sup>x</sup>* thereon to at times engage the projection *n<sup>4</sup>* on the forward stroke of the lay and move the slide-rod *n<sup>3</sup>* in the direction of the arrow 7, Fig. 1, to release the shipper. Such release of the shipper operates in a manner well known to those skilled in the art to operate a stopping instrumentality, such as a belt-shifter, to stop the loom.

Brackets B are secured one to each loom side between the harnesses and the whip-roll in the present embodiment of our invention, said brackets providing bearings for a shaft *b<sup>x</sup>*, extended transversely across the loom, said shaft supporting a movable carrier for the stop-motion controlling-detectors. The carrier comprises two bent arms *b b'*, the longer part *b'* of each arm being downwardly and forwardly inclined below the warps and being rigidly connected by a cross-rod *b<sup>2</sup>*. Near the upper bent portions of the two arms a flat bar *b<sup>3</sup>* is rigidly secured, the bar extending across from one to the other bent arm in parallelism with the rod *b<sup>2</sup>*. The parts *b* of the arms are mounted to rock on the shaft *b<sup>x</sup>* and are extended behind said shafts, as at *b<sup>6</sup>*.



(See Figs. 1 and 4.) One of these extensions  $b^6$  is upturned at  $b^7$  and provided with an in-turned laterally-extended stop  $b^8$  for a purpose to be described, and a spring  $s^x$  is wound around the shipper  $b^x$  and at one of its ends is fixedly secured thereto, the other end of the spring being secured to the rearward extension  $b^6$  of the adjacent arm. The winding of the spring is such that normally the carrier will be maintained in the position shown in Fig. 1 and in full-line position, Fig. 4, the extension  $b^6$  at such time resting against a stop 10 on the inner face of the bracket B. A series of controlling-detectors are mounted on the carrier, said detectors being herein shown as each made of a piece of wire and shaped to present a long straight shank and an elongated open head  $d'$ . The warp-threads are passed through the loop-like heads, one warp-thread through the head of each detector, and we have herein shown the detectors so located that they are engaged by the warp-threads between the lease-rods L L'. (See Fig. 1.) The flat cross-bar  $b^3$  is extended through the detector-heads and serves to prevent a released detector from dropping off the carrier, the width of the cross-bar being much less than the length of a detector-head, as clearly shown in the drawings.

It will be seen that the upper end of the detector is hung on a warp-thread and its lower end or shank rests on the cross-rod  $b^2$ , so that the detectors are supported in an inclined position on the carrier, and when a detector is released by failure of its warp-thread it will slide downward until the upper end of its head engages the top of the retaining-bar  $b^3$ . The detectors thus have a sliding connection with the carrier and a limited longitudinal movement relative thereto.

The crank-shaft C is herein shown as carrying the feeler, which in the present embodiment of our invention is shown as a transverse rod  $f$ , held at its ends in clips  $f^x$ , clamped upon the crank-shaft between the two cranks thereof, it being manifest that two clamps will be employed, one adjacent each crank. The feeler is thus moved in an angular or circular path, and normally such path is below and beyond the lower ends of the detector-shanks. When a detector is released, it slides down upon the carrier, as described, and the feeler engages the shank of the released detector, and as the feeler continues its rearward movement it will operate through the detector to rock the carrier into dotted-line position shown in Fig. 4. This movement of the carrier swings the lateral lug  $b^8$  upward and forward, and by a device now to be described the slide-rod  $n^3$  is rocked to bring the projection  $n^4$  into the path of the bunter  $a^x$ . At its rear end the slide-rod is provided with an arm  $n^6$ , inclined toward the center of the loom, (see Fig. 2,) said arm being connected by a link  $n^7$  with a rocker-arm  $n^8$ , mounted to rock on the shaft  $b^x$  outside of one of the arms of the carrier. The upper

end of the link  $n^7$  is bent rearwardly and pivoted to the rocker-arm at  $n^9$ . Normally the rocker-arm rests against the lug  $b^8$ , and at such time the rocker-arm is past its dead-center and keeps the link  $n^7$  lifted and the slide-rod  $n^3$  in the position shown in Fig. 2. When the carrier is rocked, as has been described, by engagement of the feeler with a released detector, the forward movement of the lug  $b^8$  acts to swing the rocker-arm  $n^8$  forward past its dead-center, and thereupon the weight of the link  $n^7$  causes the slide-rod  $n^3$  to turn in the direction of the arrow 15, Fig. 2, placing the projection  $n^4$  in the path of the bunter  $n^x$ .

It will be observed that the feeling stroke of the feeler is effected on the backward stroke of the lay, so that if a detector is engaged by the feeler the carrier will be moved into operative position, and the slide-rod  $n^3$  will be rocked in the direction of the arrow 15, Fig. 2, on the backward stroke of the lay. Consequently on the next and forward beat of the lay the slide-rod will be moved in the direction of the arrow 7, Fig. 1, and the shipper will be released. When a broken warp-thread has been pieced up, the parts are set by hand, the weaver throwing back the rocker-arm  $n^8$  against the lug  $b^8$ , it being understood that after the feeler has passed out of engagement with a detector the spring  $s^x$  will return the carrier to its normal position.

By supporting the detectors on the carrier the warp-threads are relieved of a great part of the weight of the detectors, thereby reducing the strain on the warp-threads, and by making the detectors of wire the surface engaged by the warp-threads is smooth and easy on the threads.

Our invention is not restricted to the precise construction and arrangement herein shown, as the same may be varied or rearranged in different particulars by those skilled in the art without departing from the spirit and scope of the invention.

Having fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In warp-stop-motion apparatus, a series of controlling-detectors maintained inoperative by intact warp-threads, a movable carrier to normally sustain a portion of the weight of and relatively to which carrier said detectors have limited longitudinal movement, and a feeler to engage a detector released by failure of its warp-thread and change the position of the carrier, such movement of the carrier being adapted to effect the operation of a stopping instrumentality.

2. In warp-stop-motion apparatus, a series of controlling-detectors maintained inoperative by intact warp-threads, a movable carrier to normally sustain the detectors in an inclined position, a released detector being movable longitudinally upon said carrier into operative position, and a feeler to engage a released detector and through it move the car-



rier, such movement of the latter being adapted to effect the operation of a stopping instrumentality.

3. In warp-stop-motion apparatus, a series of controlling-detectors maintained inoperative by intact warp-threads, a movable carrier to normally sustain the detectors in an inclined position and relatively to which carrier the detectors are movable when released by failure of their warp-threads, a rotating feeler, to engage a released detector and cause operative movement of the carrier, and a shipper released automatically by or through such movement of the carrier.

4. In warp-stop-motion apparatus, a series of controlling-detectors each governed by a warp-thread, a movable and normally quiescent detector-carrier to sustain the latter in inclined position, a sliding connection between each detector and the carrier, an angularly-movable feeler to engage a released detector and thereby to cause movement of the carrier, and means operated by such movement to effect the operation of a stopping instrumentality.

5. In warp-stop-motion apparatus, a series of controlling-detectors governed by the warp-threads and each having an elongated longitudinal opening, a movable carrier to normally sustain the detectors in inclined position, a released detector sliding longitudinally upon the carrier, a retaining-bar on the latter, extended through the openings in the detectors, and a feeler to engage a released detector and move the carrier into abnormal position.

6. In warp-stop-motion apparatus, a series of controlling-detectors governed by the warp-threads and each having an elongated longitudinal opening, a pivotally-mounted carrier to normally sustain the detectors in inclined position, a retaining-bar on the carrier, extended through the openings in the detectors, and an angularly-moving feeler to engage a detector abnormally positioned upon failure of its warp-thread, to thereby rock the carrier into abnormal, operative position.

7. In a loom, the lay, actuating means therefor, including a rotating shaft, a series of warp-stop-motion controlling-detectors, a movable carrier for and to normally sustain the detectors in inclined position and upon which carrier the detectors are slidable when released, intact warp-threads maintaining the

detectors inoperative, and a feeler mounted on said rotating shaft and adapted to engage a released detector, to thereby move the carrier into abnormal position, a shipper, and means to effect automatic release thereof by or through such movement of the carrier.

8. In a loom, the lay, its actuating crank-shaft, a feeler mounted on the latter, a series of normally inoperative warp-stop-motion controlling-detectors, a rocking carrier on which said detectors are supported in inclined position, means to slidably connect said carrier and detectors and permit limited longitudinal movement of the latter when released by failure of a warp-thread, the feeler engaging a released detector and rocking the carrier, and means actuated by such rocking of the carrier to cause the operation of a stopping instrumentality for the loom.

9. In warp-stop-motion apparatus, a series of wire controlling-detectors each having a straight shank and an elongated, loop-like head through which the warp-thread passes, a rocking carrier to support the detectors in inclined position, a retaining-bar on the carrier and passed through the heads of the detectors, and a feeler normally movable in a path beyond the shanks of the detectors, a released detector sliding downward upon the carrier to bring its shank into the path of the feeler, engagement of the latter with the detector rocking the carrier, such movement of the latter being adapted to operate a stopping instrumentality.

10. In a loom, the crank-shaft, a shipper, a series of warp-stop-motion controlling-detectors maintained inoperative by intact warp-threads, a feeler mounted on the crank-shaft and adapted to engage a released detector, and means operated automatically by or through such engagement to effect release of the shipper.

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

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