No. 726,573. PATENTED APR. 28, 1903.

C. F. ROPER.

SHUTTLE CONTROLLING MECHANISM FOR LOOMS.

APPLICATION FILED JAN. 3, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

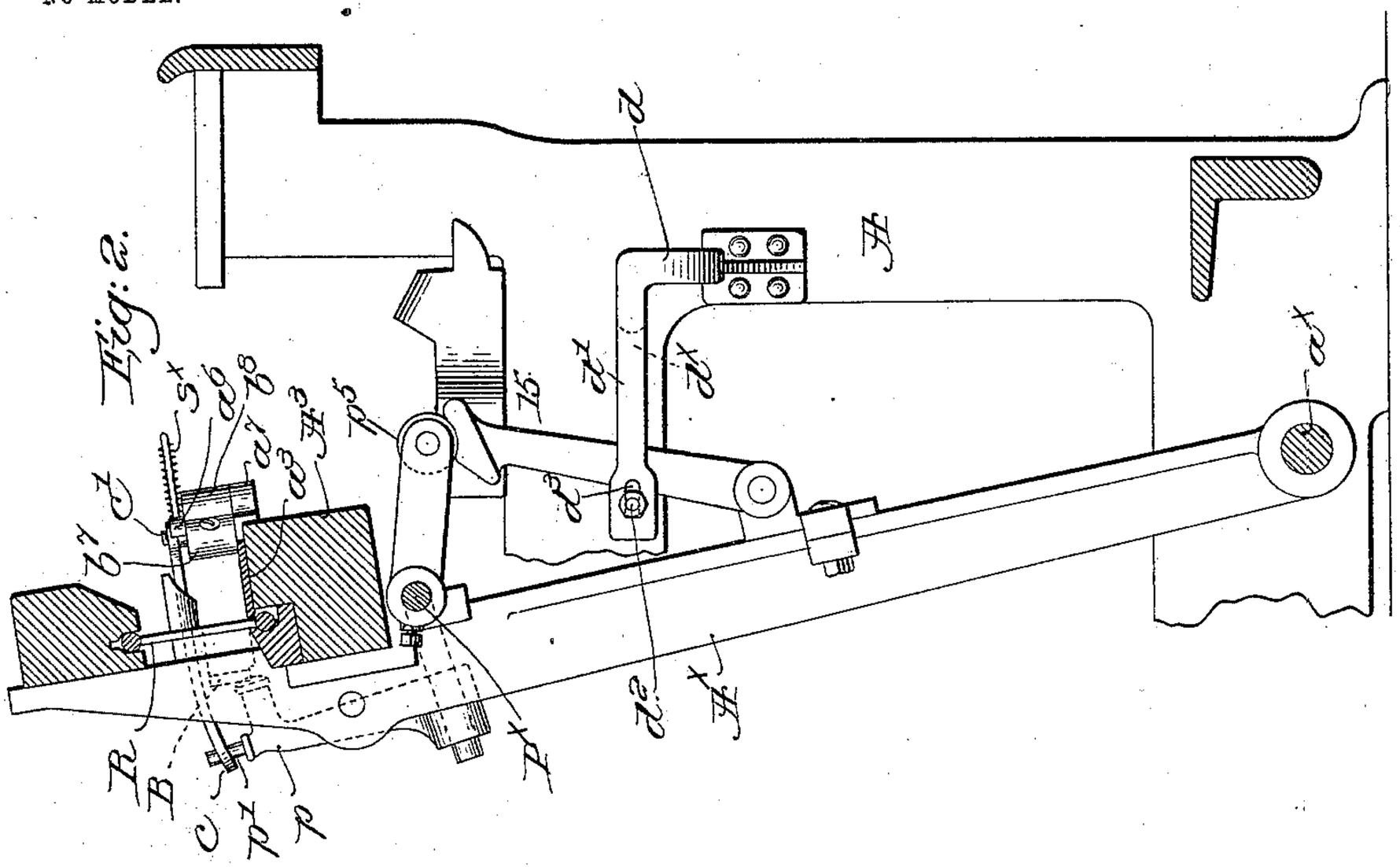
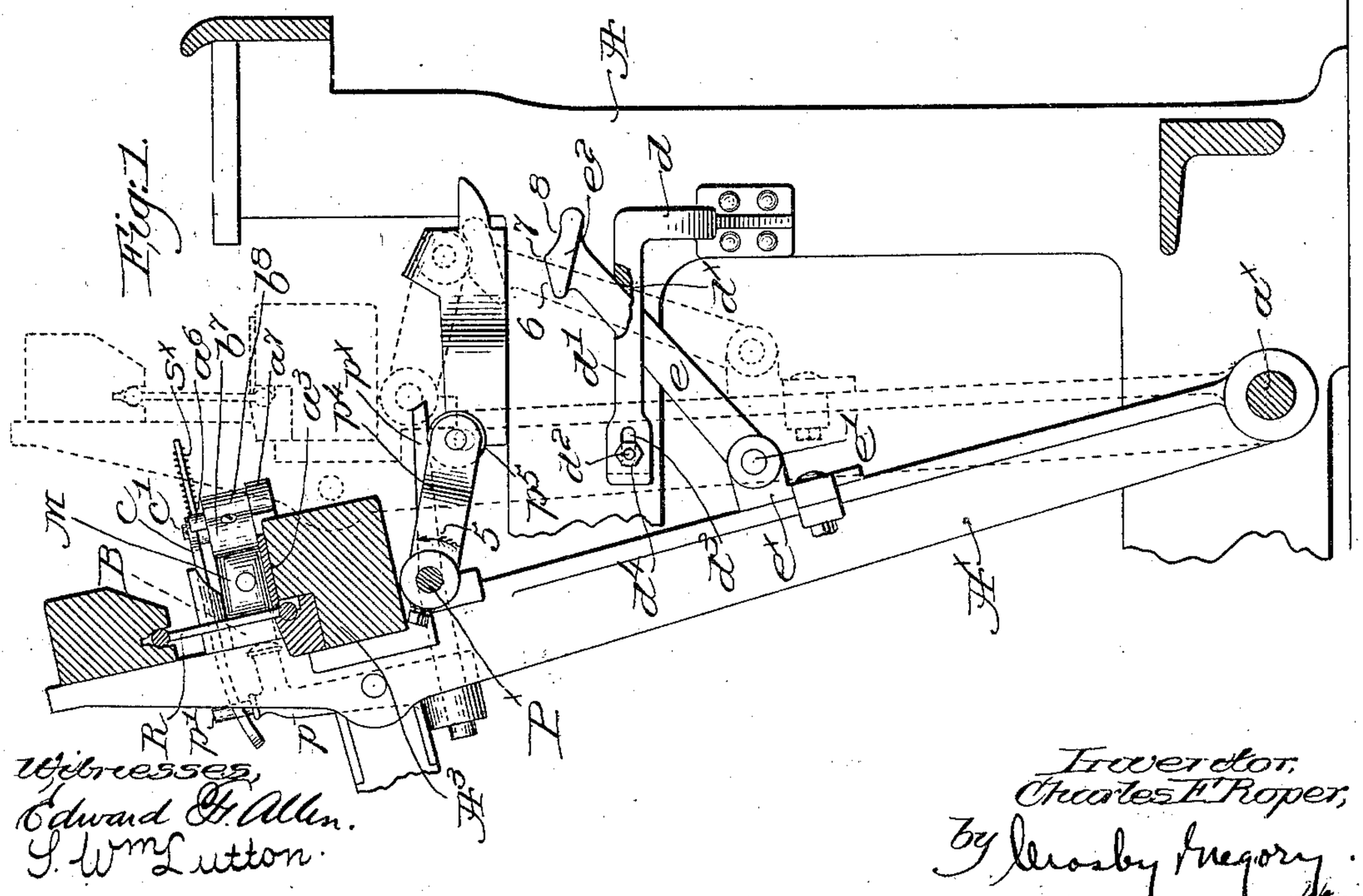


Fig. 1.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

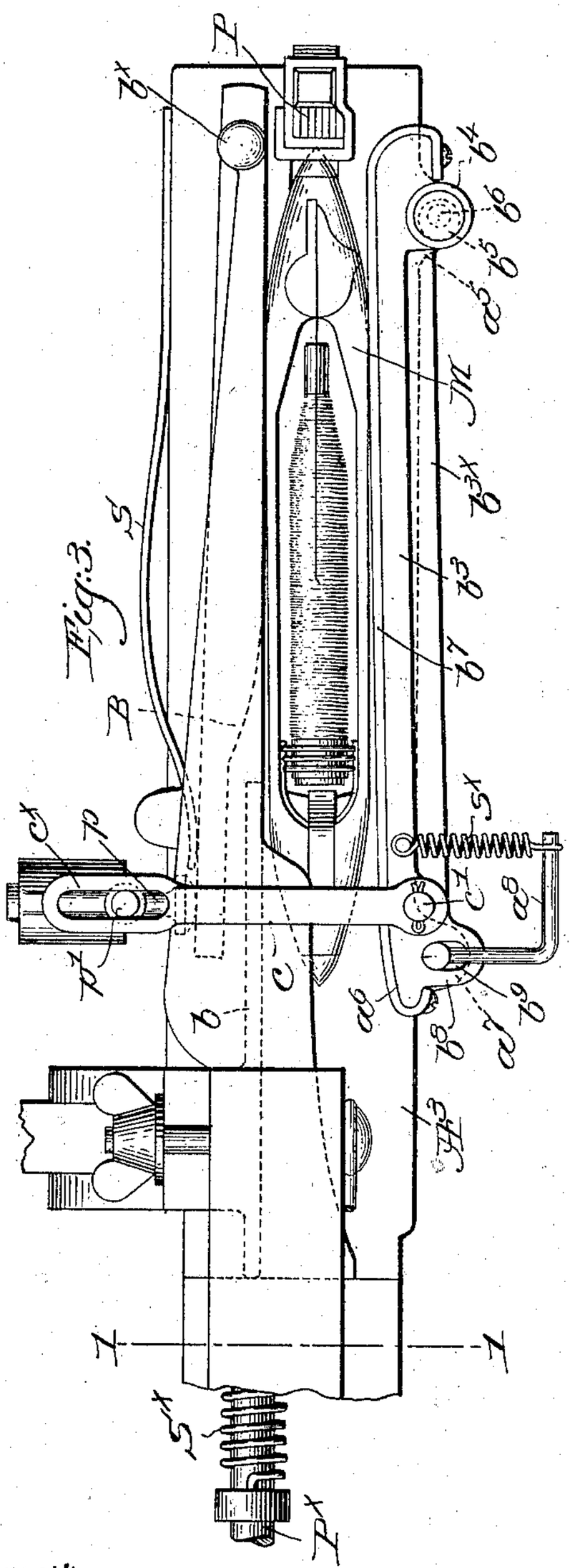
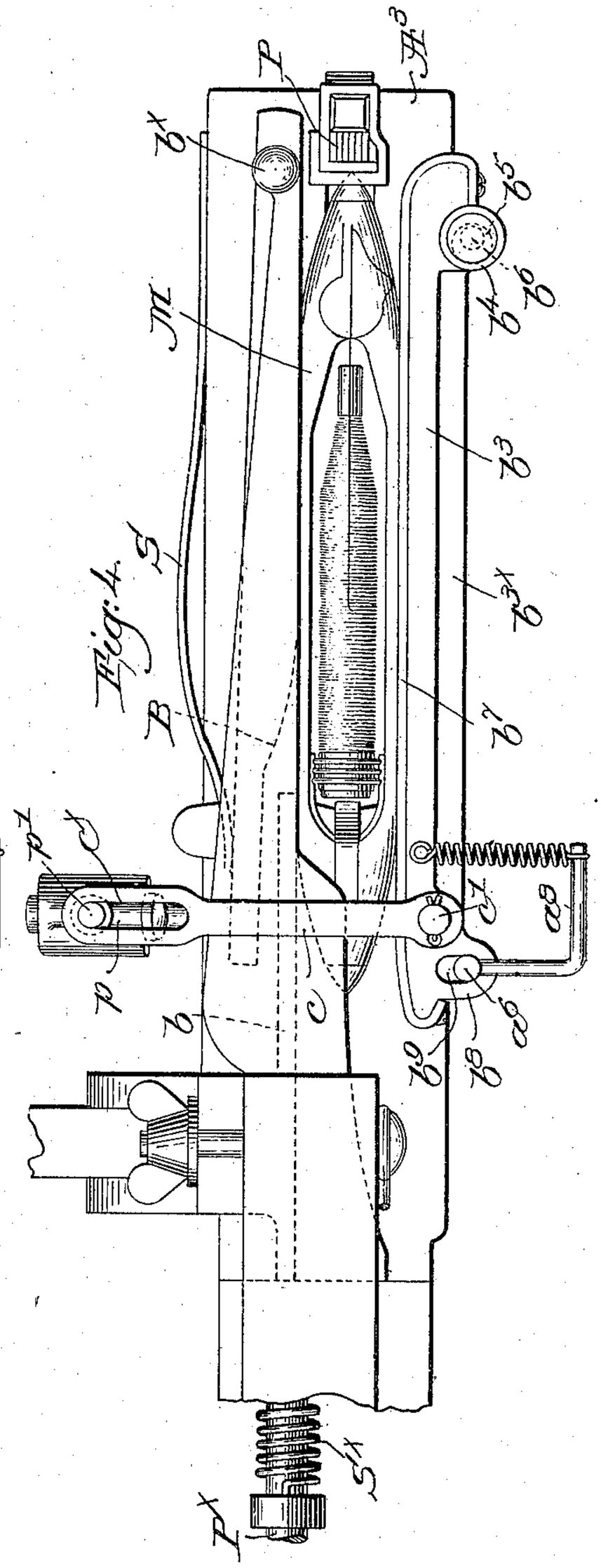


Fig. 4.



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UNITED STATES PATENT OFFICE.

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SHUTTLE-CONTROLLING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 726,573, dated April 28, 1903.

Application filed January 3, 1903. Serial No. 137,640. (No model.)

To all whom it may concern:

Be it known that I, CHARLES F. ROPER, a citizen of the United States, residing at Hopedale, in the county of Worcester and State of Massachusetts, have invented an Improvement in Shuttle-Controlling Mechanism for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

It is now the practice in the construction of looms provided with back binders to set the front walls or plates of the shuttle-boxes diagonally at such an angle that the throat or mouth of the box is the broadest in order to receive the shuttle properly. When the shuttle is shot or thrown from the box, however, the binder presses it against the diagonal front wall and the shuttle is given a direction oblique to the reed or the shuttle-raceway instead of in direct parallelism therewith, as it should be. An attempt has been made to overcome this objection by making the box-wall parallel to the reed for a part of its length and flared or diagonal at the box-mouth; but the flared part acted in practice to partially determine the direction of the shuttle flight, diverting the shuttle from the proper path. If a shuttle traveled absolutely true, it would in theory enter the shuttle-box properly if the front plate or wall should be placed absolutely parallel to the reed; but in practice it has been found impossible to use a front wall so positioned, owing to the variation in the flight of the shuttle through the shed.

This invention has for its object the production of means to widen the mouth of the shuttle-box to receive the incoming shuttle and to position the box-wall in parallelism with the reed or the shuttle-raceway when the shuttle is thrown, whereby the shuttle is given proper direction in its flight. I have also provided means to relieve the binder when the shuttle is thrown, so that less power is required to throw the shuttle and there is no tendency to interfere with the straight and accurate flight of the shuttle across the lay.

The various 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 transverse sectional view of a loom embodying one form of my invention, the section being taken substantially on the line 1 1, Fig. 3, the lay being shown in full lines as beating up and substantially in its front center position in dotted lines. Fig. 2 is a similar view, the lay being shown on its back stroke and nearing back center. Fig. 3 is an enlarged top or plan view of the right-hand end of the lay with the shuttle-box thereon, the shuttle having just entered the box; and Fig. 4 is a similar view, but showing the movable parts in position ready to guide the shuttle when it is thrown from the box, the binder-pressure being relieved.

The loom side A, lay A^3, lay-sword $A^\times$, fulcrumed at $a^\times$, the reed R, race-plate or raceway a^3, the shuttle-box back plate or wall b, Figs. 3 and 4, the binder B, fulcrumed at or near its outer end at $b^\times$ on the lay, a binder-spring S, and the picker P may be and are all substantially of well-known construction and operate in usual manner.

As best shown in Figs. 3 and 4, the front plate or wall b^3 of the shuttle-box is provided at or near its outer end with an upright hub b^4 to receive a fulcrum-stud b^5, mounted on an ear a^5 on the lay, the stud being eccentrically secured to a supporting-pin b^6, so that by rotation of the latter the fulcrum of the wall may be adjusted. The inner face of the wall is plane throughout the entire portion which contacts with the shuttle M, and I have herein shown a non-metallic facing b^7 covering the said inner face of the wall, the facing being made of leather or other suitable material. Near its inner end the base-flange $b^{3\times}$ of the wall is provided with a forwardly-projecting ear b^8, having an elongated slot b^9 to be entered by an upright pin or stop a^6, secured to an ear a^7 on the lay, said pin cooperating with the slotted ear b^8 to limit swinging movement of the wall. The upper end of the pin is bent forward and then laterally, as at a^8, and one end of a spring $s^\times$ is attached thereto, the other end of the spring being secured to the box-wall, the spring acting to move or swing the wall outward into the po-

sition shown in Fig. 3. The usual protector rock-shaft $P^{\times}$ is mounted on the lay controlled by a spring $S^{\times}$, Figs. 3 and 4, said rock-shaft having an upturned binder-finger p to coöperate with the binder B in usual manner. Herein I have shown an upward extension p' on the binder-finger to enter an elongated slot $c^{\times}$ in a link c, pivotally connected at c' with the box-wall b^3 near its inner end. The link extends over the mouth of the shuttle-box and above the shuttle, so that it will not interfere therewith in any way. When the protector rock-shaft is turned in the direction of arrow 5, Fig. 1, by the engagement of the incoming shuttle with the binder, the extension p' will not be moved to the rear end of the slot $c^{\times}$, and the link c and box-wall b^3 will remain in the position shown in Fig. 3. At such time the inner plane face of the wall is inclined with relation to the plane of the reed, so that the box-mouth is widened or flared to accommodate the incoming shuttle, permitting the latter to enter the box properly. When the shuttle is thrown, the box-wall is moved automatically into exact parallelism with the reed or the shuttle-raceway, and I have herein shown means for effecting such movement and positioning of the wall by or through the movement of the lay.

Referring to Figs. 1 and 2, the loom side has secured to it on its inner face a bracket d, having a substantially horizontal rearwardly-extended head d', bifurcated or slotted longitudinally at $d^{\times}$. At the rear end the head receives a transverse stop, shown as a bolt d^2, extended through slots d^3 and extending across the bifurcation or slot $d^{\times}$, a nut d^4 holding the stop in adjusted position. The lay-sword has secured to it a stand $e^{\times}$, having pivoted to it at e' a cam-carrier e, shown as an arm extended upward through the slot $d^{\times}$ of the head d' and supporting a cam e^2. The cam has an inclined face 6, a high point 7, and an adjacent drop or concave seat 8, the face 6 sloping down and rearwardly from the high point 7, while the seat 8 is in front of the latter. An arm p^4, secured to the protector-shaft $P^{\times}$ by a suitable set-screw 10, projects forward and has mounted upon its forward free end a suitable stud, preferably a roll p^5, the path of movement of the roll as the lay moves being such that at times it will be brought into coöperative engagement with the cam e^2.

Referring to Fig. 1, the position of the cam-carrier e is shown when the lay is back and on the beginning of its beat-up, the cam-carrier resting against the outer end of the slot $d^{\times}$. As the lay beats up, the advancing fulcrum e' moves the cam-carrier toward an upright position, and just before the dotted-line position of Fig. 1 is reached the roll p^5 meets and rides up the face 6 and passes over the high point 7 into the seat 8 as the lay reaches front center. When the roll thus travels up onto the cam, the protector-shaft $P^{\times}$ is turned in the direction of arrow 5, Fig. 1, far enough to swing the binder-finger out away from the binder, thus relieving the latter of the pressure of the spring $S^{\times}$, and at the same time the link c is pulled back and swings the wall into the position shown in Fig. 4. At such time the wall is in parallelism with the reed and in position to direct the shuttle properly for its flight across the raceway when thrown from the shuttle-box. The pin a^6 limits such inward movement of the wall, and the roll p^5 and cam e^2 remain in engagement until the shuttle is thrown, as will be described.

It will be observed that as the pressure of the spring $S^{\times}$ has been removed by the cam-induced rocking of the rock-shaft $P^{\times}$ the inward movement of the wall is resisted only by the spring $s^{\times}$ and the comparatively light leaf-spring S, which bears upon the binder. When the lay begins to move back, the cam e^2, arm p^4, and roll p^5 are in the position shown in dotted lines, Fig. 1, and such relative position of the parts is maintained while the shuttle is thrown and until the backward movement of the lay brings said parts into the position shown in Fig. 2. The cam-carrier e is shown as just having engaged the stop d^2, and as the lay continues to move back said stop acts to trip the cam-carrier so that it has to swing on its fulcrum e' in the direction of arrow 15, Fig. 2, and the cam is quickly disengaged or withdrawn from the roll p^5. Instantly the spring $S^{\times}$ is free to swing the binder-finger forward to coöperate with the binder as the shuttle enters the other shuttle-box, and at the same time the link c is released and the spring $s^{\times}$ moves the box-wall b^3 into position to receive the incoming shuttle. By adjusting the stop d^2 the time of tripping the cam-carrier is varied according to circumstances; but the tripping is not effected until after the shuttle has been thrown and started accurately on its flight. When the lay beats up, the cam e^2 does not act upon the rod p^5 until after the point of the dagger $p^{\times}$ has moved beyond the frog, so that should the shuttle fail to properly box the protector mechanism will still operate. There is no strain on the cam-carrier tending to disengage it from the roll p^5 until the tripping is effected, and the high part 7 of the cam, together with the action of the protector-spring $S^{\times}$, coöperate in holding the roll in the seat 8 of the cam on the backward stroke of the lay until tripping is effected.

So far as I am aware it is broadly new to provide a shuttle-box with a movable wall which accurately guides or directs the shuttle when thrown from the box and which is diagonally positioned to widen the box-mouth for the incoming shuttle. I believe it to be broadly novel also to combine with a shuttle positioning or directing wall means to relieve or reduce the binder-pressure when the shuttle is thrown from the box.

Accordingly my invention is not restricted to the precise construction and arrangement

shown and described in the practical embodiment of my invention herein contained, as various changes or modifications may be made by those skilled in the art without departing from the spirit and scope of my invention.

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

1. A shuttle-box having a binder and a movable wall opposite thereto, and means to move the wall to widen the box-mouth for the incoming shuttle and to move said wall into parallelism with the raceway when the shuttle is thrown and thereby impart proper direction to the shuttle.

2. A shuttle-box having a binder and a pivotally-mounted wall opposite thereto, and means to swing the wall to widen the box-mouth for the incoming shuttle and to oppositely move the wall into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

3. A shuttle-box having a back binder and a movable front wall, and means to move the wall to widen the box-mouth for the incoming shuttle and to place it in guiding position when the shuttle is thrown, to thereby direct properly the flight of the shuttle.

4. A shuttle-box having a binder and a movable wall opposite thereto, and means to simultaneously reduce the binder-pressure and move the said wall into parallelism with the shuttle-raceway when the shutile is thrown from the box.

5. A shuttle-box having a movable front wall, a picker, and means to move the wall automatically into parallelism with the shuttle-path when the shuttle is thrown by the picker, said wall thereby directing the flight of the shuttle.

6. A shuttle-box having a binder and a movable wall opposite thereto, a spring to act upon the binder, and means to relieve the latter of the control of its spring and simultaneously to move the movable wall into position to guide the shuttle properly as it is thrown from the shuttle-box.

7. A shuttle-box having a binder, a wall opposite thereto and fulcrumed at its outer end, and means to swing the wall outward in advance of the incoming shuttle, and to swing the wall inward into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

8. A shuttle-box having a binder and a movable wall opposite thereto, a spring to move the wall into position to widen the box-mouth, and means to positively move said wall against its spring into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

9. A shuttle-box having a binder and a movable wall opposite thereto, a spring to move the wall into position to widen the box-mouth, and means to relieve the binder-pressure and move the said wall positively and simultaneously into position to guide the shuttle properly when it is thrown from the box.

10. A shuttle-box having a spring-controlled binder and a swinging front wall, means to reduce the pressure on the binder and position the said wall to guide the shuttle properly when it is thrown from the box, and separate means to swing the front wall outward to widen the box-mouth for the incoming shuttle.

11. In a loom, the lay, a shuttle-box thereon having a binder and a movable wall opposite thereto, and means governed by or through the movement of the lay to reduce the binder-pressure and move the said wall into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

12. In a loom, the lay, a shuttle-box thereon having a binder and a swinging wall opposite thereto fulcrumed at its outer end, means to swing the wall outward to widen the box-mouth for the incoming shuttle, and separate means controlled by the movement of the lay to swing said wall inward into position to guide the shuttle properly when it is thrown from the box.

13. In a loom, the lay, a shuttle-box thereon having a movable front wall, a binder, a spring-controlled binder-finger to coöperate therewith, means to move the wall outward, and separate means actuated by or through the lay to retract the binder-finger and move simultaneously the wall inward into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

14. In a loom, the lay, a shuttle-box thereon having a movable front wall, a binder, protector mechanism to coöperate therewith, including a spring-controlled rock-shaft, and means operative by the movement of the lay to turn the rock-shaft and release the binder from control of the protector mechanism and simultaneously to position the front wall of the shuttle-box to properly direct the flight of the shuttle when it is thrown from the box.

15. In a loom, the lay, a shuttle-box thereon having a movable front wall, a binder, protector mechanism to coöperate therewith, including a spring-controlled rock-shaft having an arm thereon, a cam movable on the forward beat of the lay into engagement with said arm, to turn the rock-shaft against its spring and reduce the binder-pressure, means to move the front wall of the shuttle-box into parallelism with the shuttle-raceway when the shuttle is thrown from the box, and a device to disengage said cam and arm when the shuttle has left the box.

16. In a loom, the lay, a shuttle-box thereon having a binder and a swinging wall opposite thereto, protector mechanism to coöperate with the binder, a connection between said mechanism and the said wall, a spring to move the latter outward, and means governed by or through movement of the lay to act through the protector mechanism and simultaneously reduce binder-pressure and

move the wall inward into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

17. In a loom, the lay, a shuttle-box thereon having a movable front wall fulcrumed at its outer end, a spring to swing said wall outward to widen the mouth of the box, and means to swing the wall inward automatically into parallelism with the shuttle-raceway when the shuttle is thrown from the box.

18. In a loom, the lay, a shuttle-box thereon having a movable front wall, an adjustable fulcrum for the outer end of the said wall, means to move the wall inward positively into position to guide the shuttle properly when thrown from the box, and a spring to swing the wall outward.

19. A shuttle-box having a movable front wall fulcrumed at its outer end, and means to move said wall to widen the box-mouth for the incoming shuttle and to move the wall oppositely into position to direct the shuttle properly when thrown from the box.

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

CHARLES F. ROPER.

Witnesses:
GEORGE OTIS DRAPER,
ERNEST W. WOOD.