No. 724,114. PATENTED MAR. 31, 1903.

F. E. KIP.

WEFT CONTROLLING MECHANISM FOR LOOMS.

APPLICATION FILED MAY 22, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

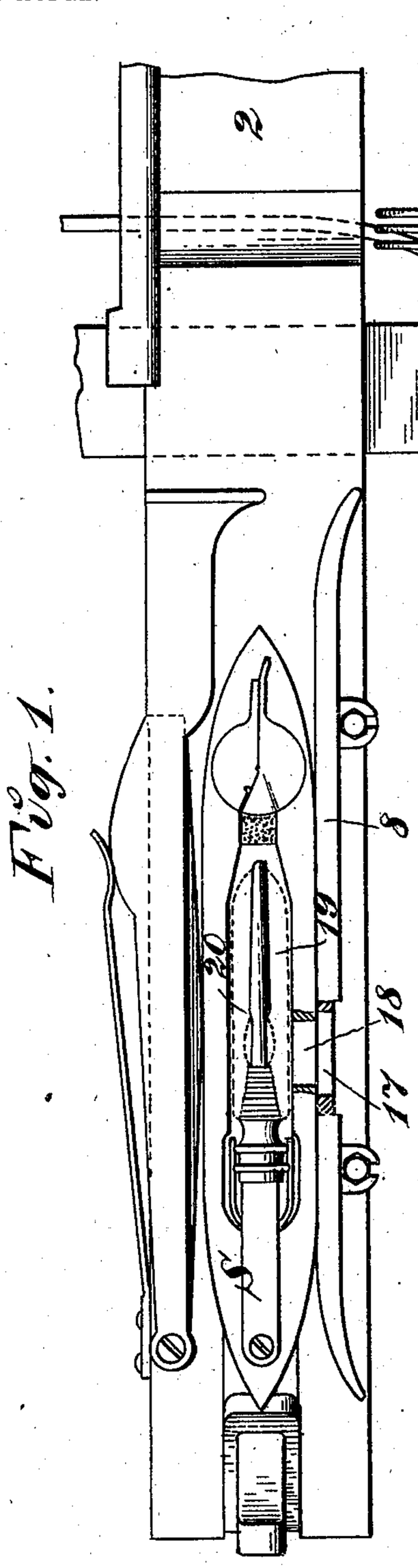

Fig. 1.

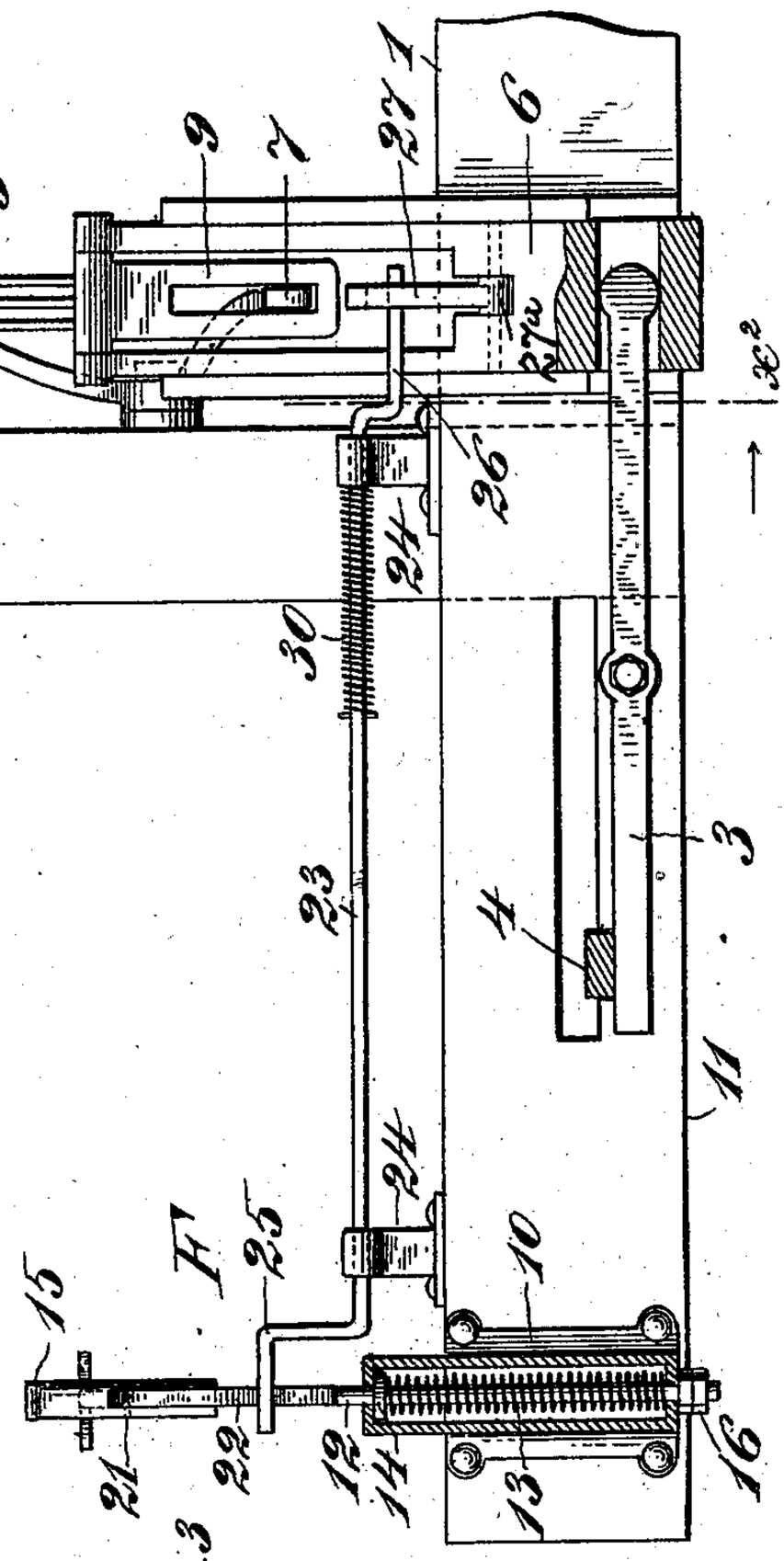

Fig. 2.

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 3.

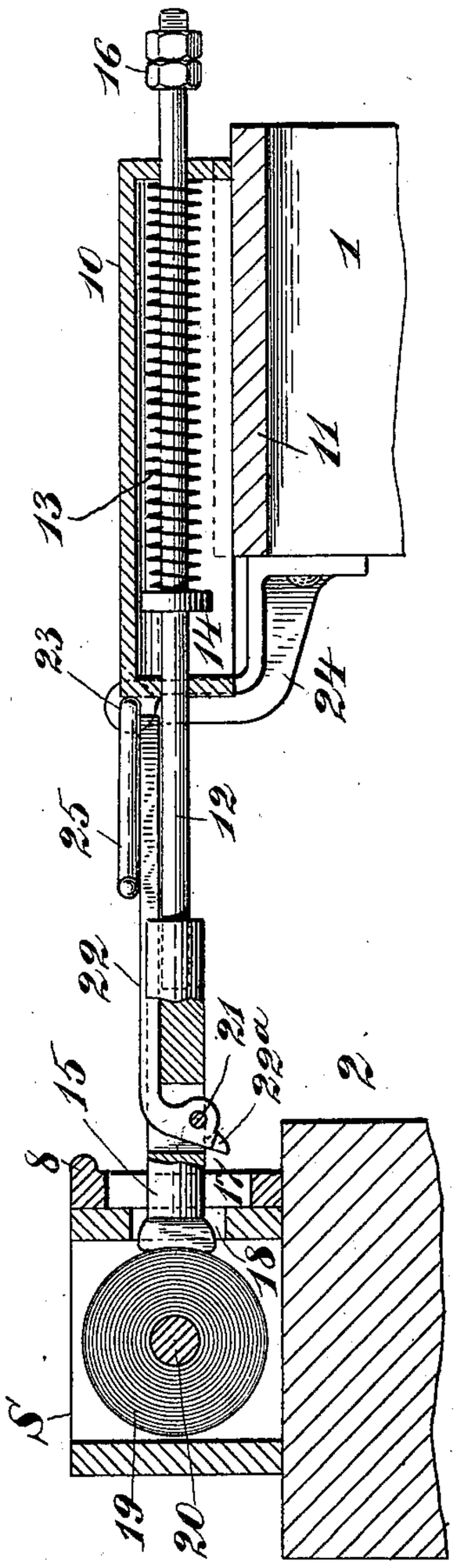
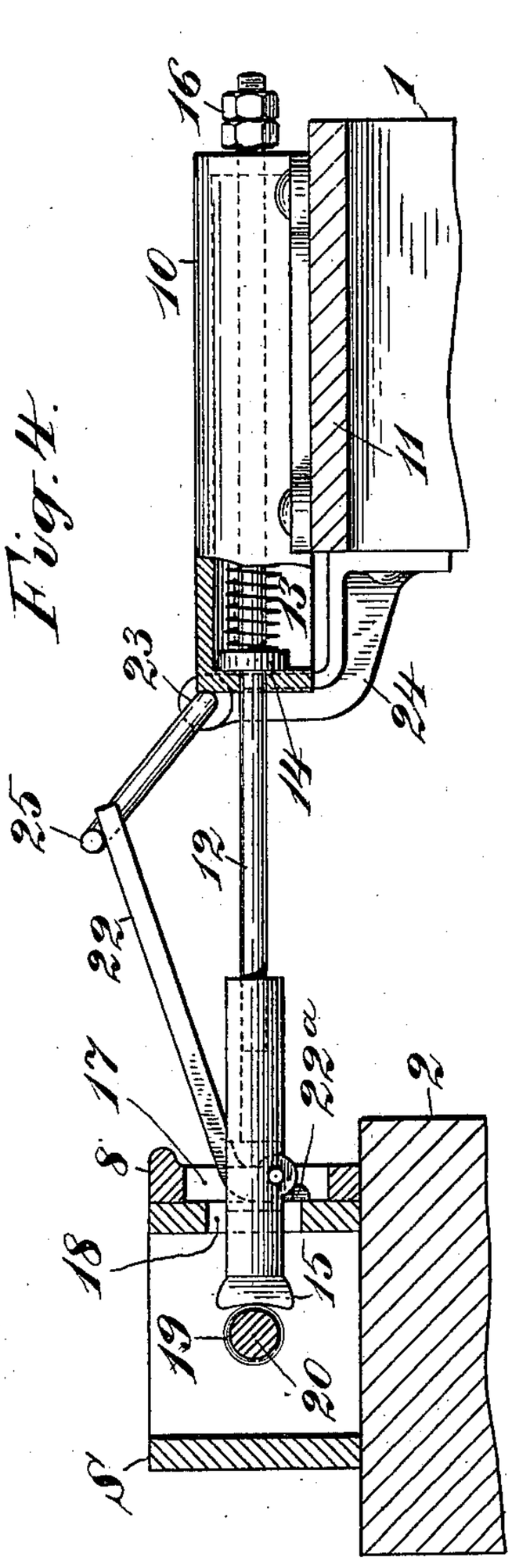


Fig. 4.



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NO MODEL. 4 SHEETS—SHEET 3.

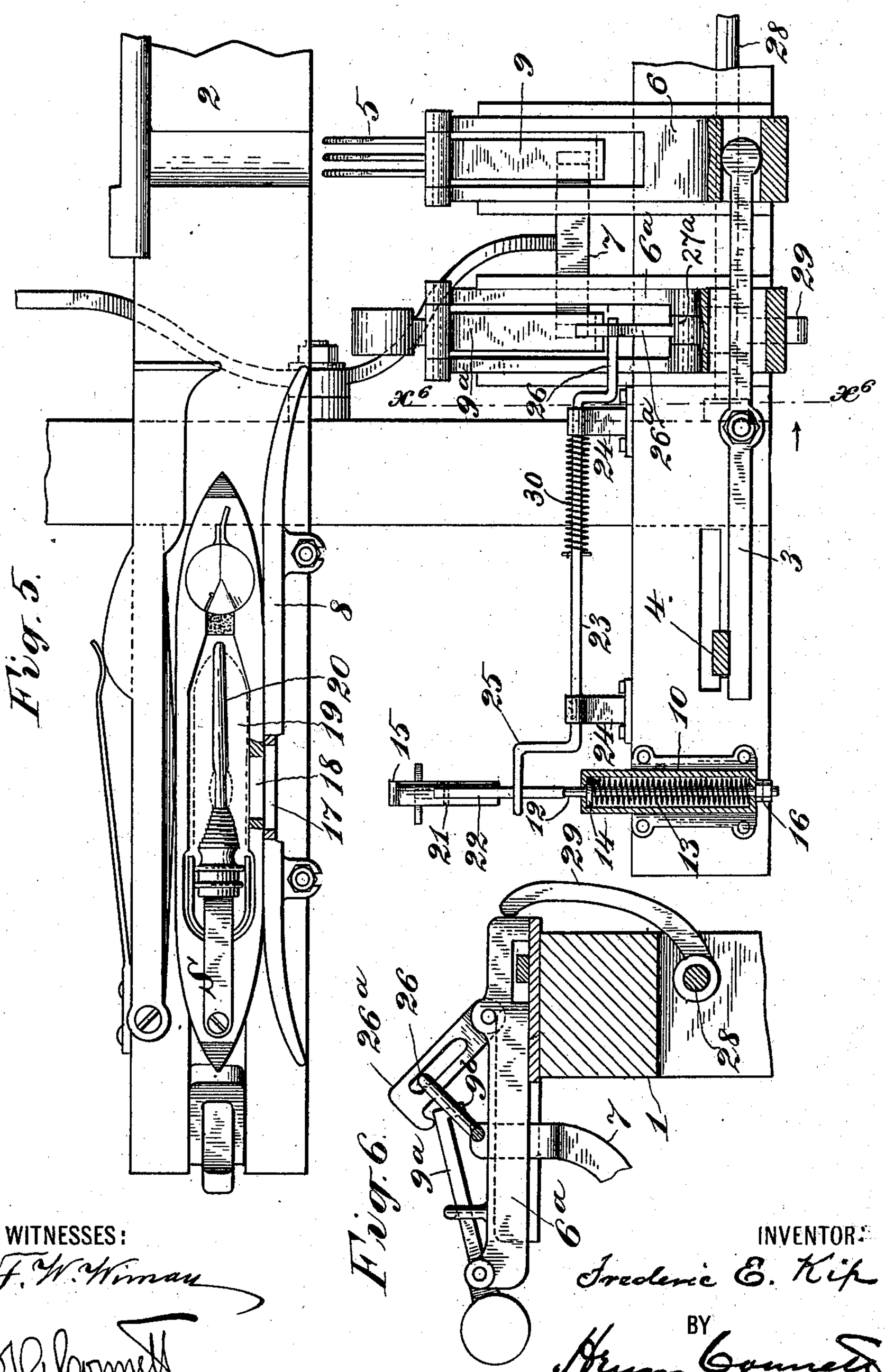

Fig. 5.

Fig. 6.

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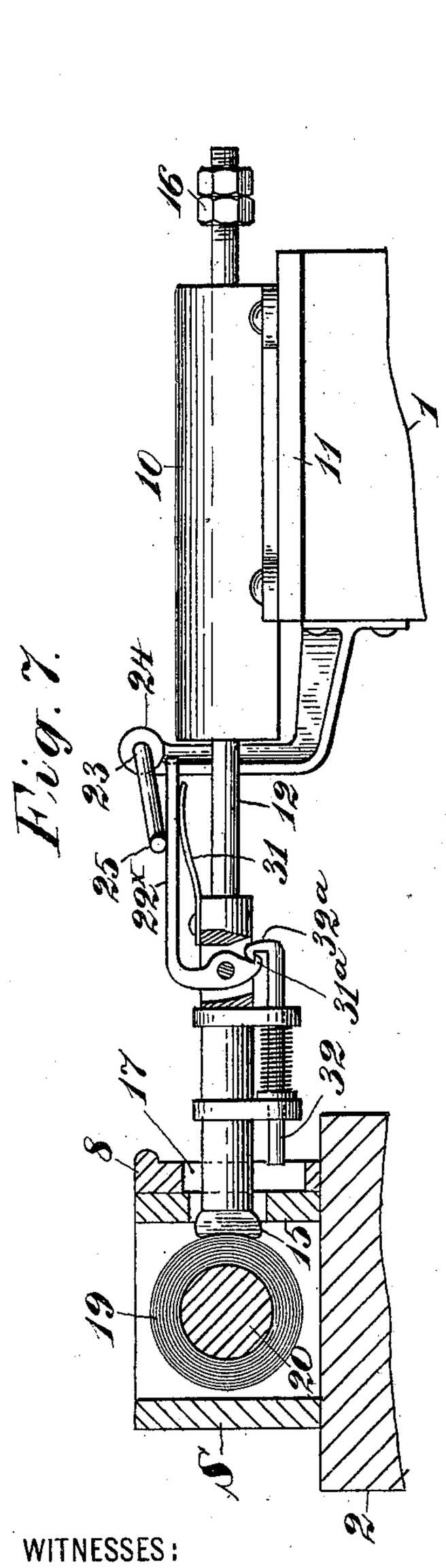

Fig. 7.

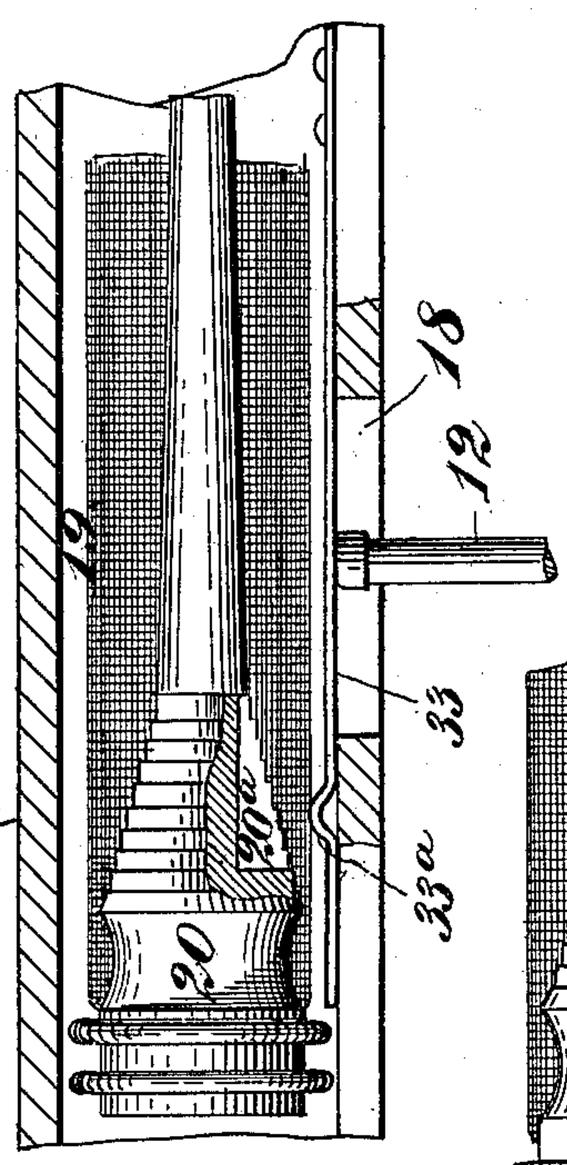

Fig. 10

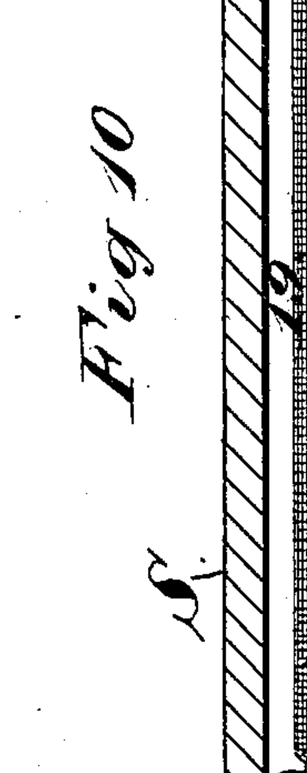

Fig. 8.

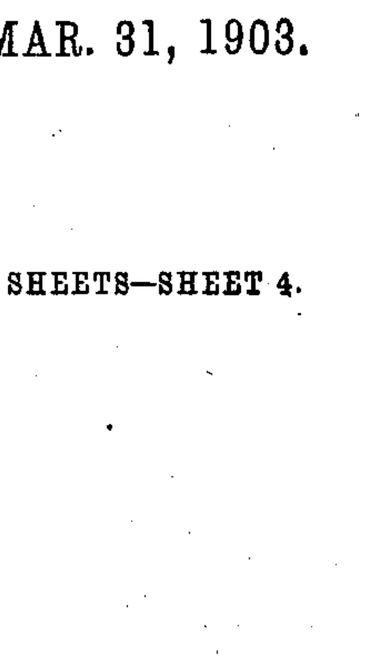

Fig. 11.

Fig. 9.

WITNESSES:

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UNITED STATES PATENT OFFICE.

FREDERIC E. KIP, OF MONTCLAIR, NEW JERSEY.

WEFT-CONTROLLING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 724,114, dated March 31, 1903.

Application filed May 22, 1902. Serial No. 108,454. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC E. KIP, a citizen of the United States, residing at Montclair, Essex county, New Jersey, have invented certain new and useful Improvements in Weft-Controlling Mechanisms for Looms, of which the following is a specification.

This invention relates to means whereby the substantial exhaustion or failure of the weft or filling in the running shuttle of a loom is detected and indicated and wherein the indicating means automatically sets in operation mechanism to stop the loom or to automatically replenish the weft or filling without stopping the loom. It may be proper to state that in some kinds of weaving it is preferred to employ means to stop the loom, so that the weaver or attendent may replenish the weft by hand, while in other kinds of weaving it is preferable to employ some form of automatic replenishing mechanism.

The object of the present invention is to provide a loom with a simple mechanical feeler or detector device which is actuated by a vibrating part of the loom and which is adapted when the weft or filling in the running shuttle is exhausted to a predetermined extent to either stop the loom—for example, through the usual knock-off mechanism—or set in operation an automatic weft or filling replenishing mechanism. Both adaptations of the feeler device are herein illustrated. Where the purpose is to stop the loom the feeler device may act through the usual weft-fork slide on the knock-off lever, and where it is the purpose to set in operation an automatic weft-replenishing mechanism the latter may be of a known kind—as, for example, that shown in the patent to M. G. Chace, No. 633,976, dated September 26, 1899.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a plan of a part of a loom at the left side, showing the application of the feeler device thereto. In this view the spring-case of the feeler is in section. Fig. 2 is a section substantially at line x^2 in Fig. 1. Figs. 3 and 4 are sectional detail views of the feeler, the first showing the operation when the bobbin is full and the latter the operation when the weft is exhausted to the predetermined extent. The above views show the device adapted for stopping the loom when the weft is substantially exhausted. Fig. 5 is a view similar to Fig. 1, but showing the feeler device adapted for setting in operation the weft-replenishing mechanism shown in the Chace patent, and Fig. 6 is a section substantially at line x^6 in Fig. 5. Fig. 7 illustrates a slightly-modified form of the feeler device shown in the principal views. Fig. 8 is a plan, and Fig. 9 is a cross-section, of a slightly-modified form of bobbin that may be employed in connection with the feeler. Fig. 10 illustrates the modified bobbin of Figs. 8 and 9 in a shuttle provided with a spring for the feeler to impinge upon. Fig. 11 illustrates another slightly-modified form of the construction seen in Fig. 10.

Referring primarily to the first four figures of the drawings, 1 designates the breast-beam of the loom, 2 the lay, 3 the knock-off lever, 4 the shipper-lever, 5 the weft-fork, 6 the weft-fork slide, engaging the knock-off lever, 7 the weft-hammer, and 8 the shuttle-box on the lay. All of these parts in some form are common in looms. When the weft-hammer, which vibrates while the loom is running, engages the slotted arm 9 of the rocking weft-fork, the slide 6 is moved toward the front of the loom and by rocking the knock-off lever sets free the shipper-lever, thereby stopping the loom.

The feeler device (designated in Fig. 1 as a whole by the letter F) will now be described with especial reference to Figs. 3 and 4. 10 is a spring-casing and guide secured to a bracket 11 on the breast-beam, and in said casing is mounted the feeler 12, which may be a rod having sliding bearings in the casing 10. Within the casing is a spring 13, which abuts at one end against the front end of the casing and at the other end against a collar or the like 14 on the feeler. This spring tends to press the feeler out or toward the lay. On the outer end of the feeler is a suitable head 15, and at the other end there may be lock-nuts 16 or the like to limit the movement. When the lay beats up and there is a shuttle S in the shuttle-box at this side of the loom, the feeler enters the box at an aperture 17 therein and also enters the shuttle at a coincident aperture 18 therein. The weft or filling 19 on the bobbin 20 in the shuttle im-

pinges on the head of the feeler and drives the latter forward or into its casing. Pivotally mounted or fulcrumed in a slot in the feeler or its head at 21 is a lever 22, the shorter arm or heel 22^a of which preferably depends below the feeler. This heel is so disposed that so long as there is a sufficient quantity of filling in the shuttle said heel is held out of contact with the shuttle or equivalent impinging means; but when the filling is exhausted to a predetermined extent, as seen in Fig. 4, the feeler enters the shuttle to a greater extent than before and permits the heel 22^a to be impinged upon by the side of the shuttle, thus throwing up the lever 22. A rock-shaft 23, mounted in suitable supports 24, has at one end a crank 25, which takes over the lever 22, whereby when said lever is thrown up it is caused to rock the shaft 23. At the other end of said rock-shaft, adjacent to the weft-fork slide 6, is another crank 26, which engages a slotted arm 27, pivotally mounted or hinged at 27^a on the weft-fork slide. Now when the shaft 23 is rocked by the lever 22 the crank 26 depresses the free end of the arm 27 into the path of the vibrating weft-hammer 7, and this has the effect to move the weft-fork slide 6 and stop the loom through the medium of the knock-off and shipper levers.

Figs. 5 and 6 sufficiently illustrate the application of the device to the operation of a weft-replenishing mechanism such as that shown in the Chace patent before mentioned. 28 is the usual rock-shaft employed in this class of replenishing mechanisms, (designated by x' in the Chace patent,) and 29 is the arm thereon for rocking same, (designated by f^7 in the Chace patent.) Mounted in guides on the breast-beam, adjacent to the weft-fork slide 6, is a slide 6^a, in which is mounted a weighted lever 9^a, with a hook 9^b, adapted to be engaged by the vibrating weft-hammer when said lever is depressed. The crank 26 on the rock-shaft 23 engages a slotted arm 26^a, hinged in the slide 6^a, this arm being adapted to depress the hooked end of the weighted lever 9^a when the shaft 23 is rocked, thus putting the hook 9^b into the path of the weft-hammer. When this takes place, the slide 6^a is moved and impinges on the arm 29, thus rocking the shaft 28 and setting the weft-replenishing mechanism at the opposite side of the loom for operation at the next beat-up movement of the lay. The operation is precisely the same as in stopping the loom. There may be a light spring 30 on the rock-shaft 23 to return the parts to their normal positions.

It will be noted that in this device the lever 22 is only actuated to an operative extent when the filling in the shuttle shall have become exhausted to a predetermined extent. Normally it remains quiescent.

In order that the mechanism carried by the feeler and which serves to operate the rock-shaft 23 when it is impinged upon may be operated by a very slight movement after the impact, the modified device illustrated in Fig. 7 may be employed. In this construction the lever $22^\times$ on the feeler 12 is adapted to be thrown up by a spring 31 for rocking the shaft 23, and said lever is held depressed, as in the figure, by a hook or shoulder 31^a thereon engaging a hook 32^a on a spring-latch 32. This latch is slidably mounted in bearings on the feeler and is so disposed as to be impinged upon in the manner described with reference to the heel 22^a of the principal views. Normally the contact of the feeler with the mass of filling in the shuttle holds the latch out of contact with the side of the shuttle, preferably when the lay beats up; but when the filling is exhausted to a predetermined extent the shuttle or equivalent means will impinge upon the latch and drive it forward slightly, thus disengaging the lever $22^\times$ and permitting its spring to throw it up forcibly, so as to rock the shaft 23. The engagement of the latch with the lever may obviously be such that a very slight movement of the latch will suffice to free the lever.

To permit the feeler 12 to enter into the shuttle to a greater extent than it otherwise would when the filling has been wholly removed from that point on the bobbin where the feeler strikes it there may be a recess in the material of the bobbin at this point. This is illustrated in Figs. 8 and 9, wherein 20^a is the recess referred to above, or, if desired, there may be a light spring in the shuttle for the feeler to impinge upon, as illustrated in Fig. 10. In this figure, 33 is the spring in the shuttle crossing the aperture 18 and provided with a head 33^a to bear on the filling. When the weft or filling is exhausted at the point where the head 33^a bears upon it, the latter may enter a recess 20^a in the bobbin. As the feeler is impinged upon by the spring 33, preferably when the lay beats up, said feeler will enter the shuttle to a greater or less extent as permitted by the inward yielding of the spring. The aperture 18 (seen in Fig. 10) is elongated, and it is not very material at what point along the aperture the feeler enters and contacts with the spring. This is the advantage of the spring, as it secures the proper result whether the shuttle is accurately placed in the box at each pick or not.

The construction of Fig. 11 is substantially the same as that of Fig. 10, but shows the part 33^a of the spring as bearing on the weft nearer the head of the bobbin.

Being the first, as I believe, to produce a feeler having operatively connected therewith a lever-like device which remains quiescent so long as there is a greater amount of filling in the shuttle and as soon as the filling in the shuttle is denuded to a predetermined extent said quiescent feeler member acts to trip into operation mechanism to ac-

tuate filling-changing or loom-stopping mechanism, I claim same broadly and do not limit myself to specific construction herein shown.

By the words "bobbin," "weft-holder," or "filling-holder" as herein employed is meant any known form of device on which weft or filling is wound—as, for example, skewers, cops, butt-cops, all cops, and the like.

The different forms of the filling-exhaustion-indicating devices herein shown are obviously adapted to control either a loom-stopping mechanism or a weft-replenishing mechanism, and by the phrase "weft or filling exhaustion indicating mechanism" is meant a device for controlling the time of operation of a weft-replenishing or loom-stopping mechanism.

I wish it understood that in all the forms of filling-exhaustion devices herein illustrated there will always be a predetermined amount of surplus filling or initial winding of filling sufficient for several picks remaining on the bobbin or filling-holder at the time of actuation of the weft-controlling devices. In Fig. 1 this surplus filling is shown on the barrel of the bobbin at point where feeler strikes. The barrel of the bobbin may advantageously be at this point recessed, as shown in Figs. 1 and 5. In Figs. 9, 10, and 11 this surplus filling may advantageously be situated, as shown, at the end of the bobbin or filling-holder.

I have illustrated herein a well-known form of weft-replenishing mechanism, wherein the bobbin is changed in the running shuttle. My filling-exhaustion devices are, however, equally well adapted to control the times of operation of a shuttle-changing or bobbin-box-changing weft-replenishing mechanism of any known kind. By "exhaustion," "substantial exhaustion," "denuded," "denudation," and like phrases, as referring to the condition of the filling in the active shuttle, I mean such degrees hereof as will permit the filling-exhaustion device to operate without making an imperfection in the cloth and still leave only a minimum amount of unused or surplus filling on the bobbin or filling-holder.

I have shown as the impinging means which actuates the lever device the body of the shuttle in the shuttle-box; but it will be obvious to those skilled in the art that other equivalent impinging means may be employed as well to produce the same result.

Certain parts of my invention may be used without other parts. For this reason,

Having described my invention, I claim—

1. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler a portion of which is adapted to pass through an aperture in the shuttle, and be impinged upon by means in the shuttle and thereby caused to recede; devices operatively connected with said feeler adapted to be impinged upon and thereby operated only when the said feeler passes a certain predetermined distance into the shuttle; and mechanism adapted to be operated by said devices operatively connected with said feeler.

2. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler a portion of which is adapted to pass through an aperture in the shuttle, and be impinged upon by means in the shuttle and thereby caused to recede; devices operatively connected with said feeler adapted to be impinged upon by the shuttle and thereby operated only when the said feeler passes a certain predetermined distance into the shuttle; and mechanism adapted to be operated by the said devices operatively connected with said feeler.

3. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler the end of which is adapted to pass into the interior of the shuttle and be impinged upon by means therein and thereby caused to recede; means operatively connected with said feeler adapted to be carried back by the same and remain inoperative when said feeler is impinged upon and recedes when it has passed a comparatively short distance into the shuttle but to be impinged upon and operated when said feeler passes a comparatively large distance into the shuttle before said feeler is impinged upon; and mechanism adapted to be operated by said means operatively connected with said feeler.

4. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler the end of which is adapted to pass into the interior of the shuttle and be impinged upon by means therein and thereby caused to recede; means operatively connected with said feeler adapted to be carried back by the same and remain inoperative when said feeler is impinged upon and recedes when it has passed a comparatively short distance into the shuttle but to be impinged upon by the shuttle and operated when said feeler passes a comparatively large distance into the shuttle before said feeler is impinged upon; and mechanism adapted to be operated by said means operatively connected with said feeler.

5. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler the end of which is adapted to pass into the interior of the shuttle and be impinged upon by means therein and thereby caused to recede; means operatively connected with said feeler adapted to be carried back by the same and remain inoperative when said feeler is impinged upon and recedes when it has passed a comparatively short distance into the shuttle but to be impinged upon by the shuttle and operated when said feeler passes a comparatively large distance into the shuttle before said feeler is impinged upon, said means comprising a lever pivotally attached to said feeler; and mechanism adapted to be operated by said lever.

6. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler the end of which is adapted to pass into the inte-

rior of the shuttle and be impinged upon by means therein and thereby caused to recede; means operatively connected with said feeler adapted to be carried back by the same and remain inoperative when said feeler is impinged upon and recedes when it has passed a comparatively short distance into the shuttle but to be operated when said feeler passes a comparatively large distance into the shuttle before said feeler is impinged upon, said means comprising a lever pivotally attached to said feeler, a spring adapted to move said lever, and a movable device adapted normally to hold said lever quiescent against the action of said spring but to recede and release said lever when said movable device is impinged upon by the shuttle when said feeler passes a certain predetermined distance into said shuttle; and mechanism adapted to be operated by said lever.

7. In a filling-exhaustion-indicating mechanism for looms, the combination with a yieldingly-mounted feeler bearing a lever-like tripping device; of means for operating said tripping devices when said feeler passes a certain predetermined distance into the shuttle; and mechanism operated by said tripping devices.

8. A mechanical weft or filling exhaustion indicating mechanism for a loom, comprising a yielding feeler adapted to be impinged upon by the means in the shuttle, a normally quiescent lever device carried by said feeler, said lever device having a heel or part which is held out of the path of the shuttle by the feeler during the normal operation of the loom, and mechanism actuated by said lever when said heel is permitted to be impinged upon by the shuttle through the exhaustion of the filling therein to a predetermined extent.

9. A mechanical weft or filling exhaustion indicating mechanism for a loom, having a controlling mechanism which is set in operation by the impingement thereon of the shuttle, and a feeler adapted to be impinged upon by means in the shuttle when said filling shall have been exhausted to a predetermined extent, said feeler serving to hold the said controlling mechanism normally out of the path of the shuttle.

10. A mechanical weft or filling exhaustion indicating mechanism, comprising a yielding feeler, a lever carried by said feeler which remains normally quiescent and having a heel, and a rock-shaft having a crank in position to be actuated by said lever for rocking the shaft whenever the lever is put into its abnormal position due to movement thereof.

11. The combination in a loom, with the vibrating lay, the apertured shuttle-box thereon, and the apertured shuttle, of the feeler mechanism, comprising the yielding feeler in position to enter the shuttle when the lay beats up, the lever 22 mounted thereon and provided with a heel 22^a, and a rock-shaft 23, having a crank in the path of the lever 22, said heel being in position with respect to the head of the feeler such that it will be impinged upon by the shuttle when the filling in the latter is substantially exhausted.

12. The combination in a loom, with the vibrating lay, the shuttle-box therein, the apertured shuttle, the vibrating weft-hammer, a slide on the loom, a movable part on said slide and adapted to be put into the path of the weft-hammer for moving the slide, and a cranked rock-shaft adapted, when rocked, to put said part on the slide in the path of the weft-hammer, of a weft or filling exhaustion indicating mechanism comprising a yielding feeler in position to be impinged upon by the filling in the running shuttle when the lay beats up, and controlling mechanism carried by said feeler for actuating said rock-shaft when said mechanism is impinged upon by the shuttle when the lay beats up, said mechanism being held out of the path of the shuttle normally by the impingement on the feeler of the filling in the shuttle.

13. A weft or filling exhaustion indicating mechanism for looms, comprising a feeler adapted to be impinged upon by means in the shuttle, a lever device operatively connected therewith and adapted to remain quiescent as long as a predetermined amount of filling remains in the shuttle, and mechanism actuated by the movement of said lever device, when the filling in the shuttle has been exhausted to a predetermined extent.

14. A weft or filling exhaustion indicating mechanism for looms, comprising a yielding feeler adapted to be impinged upon by means in the shuttle, a lever device operatively connected therewith, having a shorter arm, means whereby said lever device remains quiescent during the operation of the loom, said means consisting of the presence of a predetermined amount of filling in the shuttle, said lever device also having a longer arm, and mechanism actuated by the movement of said longer arm when the same is permitted to actuate through the predetermined exhaustion, or absence, of the filling in the shuttle.

15. A weft or filling exhaustion indicating mechanism for a loom, comprising a yielding feeler adapted to be impinged upon by means in the shuttle, a normally quiescent lever device operatively connected therewith, said lever device having a heel or short arm which is held quiescent during the normal operation of the loom, and a longer arm, and mechanism actuated by said longer arm of said lever when substantial exhaustion of the filling in the running shuttle permits said shorter arm to be impinged upon.

16. A filling-exhaustion-indicating mechanism for looms, comprising a yielding feeler the end of which is adapted to pass into the interior of the shuttle and be impinged upon by means therein and thereby caused to recede; means operatively connected with said feeler adapted to be carried back by the same and remain inoperative when said feeler is

impinged upon and recedes when it has passed a comparatively short distance into the shuttle but to be impinged upon by the shuttle and operated when said feeler passes a comparatively large distance into the shuttle before said feeler is impinged upon, said means comprising a lever pivotally attached to said feeler and having a short arm adapted to be impinged upon by the shuttle and a long arm, and mechanism adapted to be operated by said long arm.

17. In a loom, a controlling feeler device having two members adapted to be impinged upon, means for impinging first on one of said members, and means, when exhaustion of the filling permits thereof, for impinging first on the other member to thereby actuate said loom-controlling device.

In witness whereof I have hereunto signed my name, this 20th day of May, 1902, in the presence of two subscribing witnesses.

FREDERIC E. KIP.

Witnesses:
PETER A. ROSS,
WILLIAM J. FIRTH.