No. 840,958. PATENTED JAN. 8, 1907.

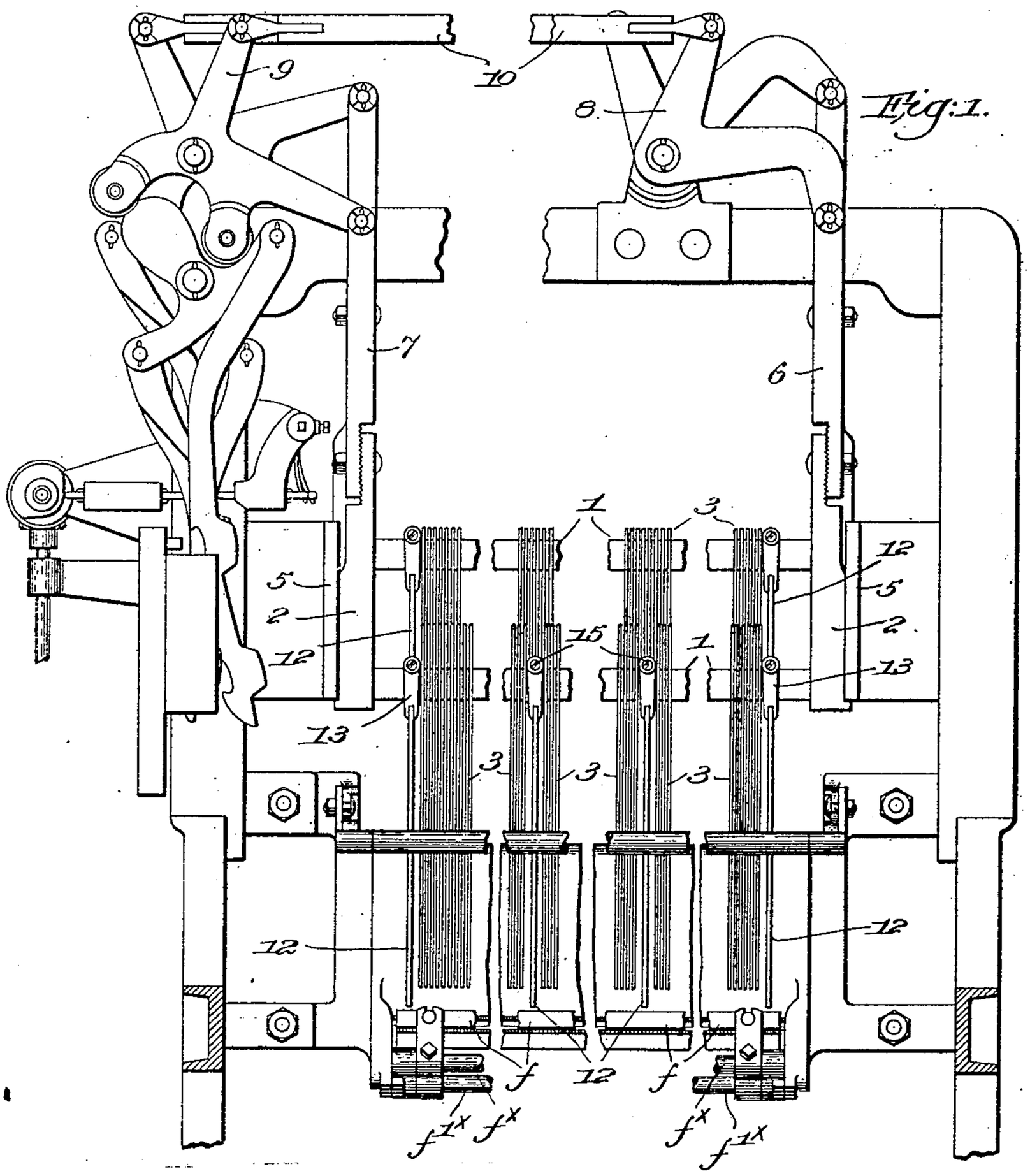
V. RAINVILLE.

HARNESS CONTROLLED STOP MOTION FOR LOOMS.

APPLICATION FILED MAY 22, 1906.

3 SHEETS—SHEET 1.

Fig. 1.



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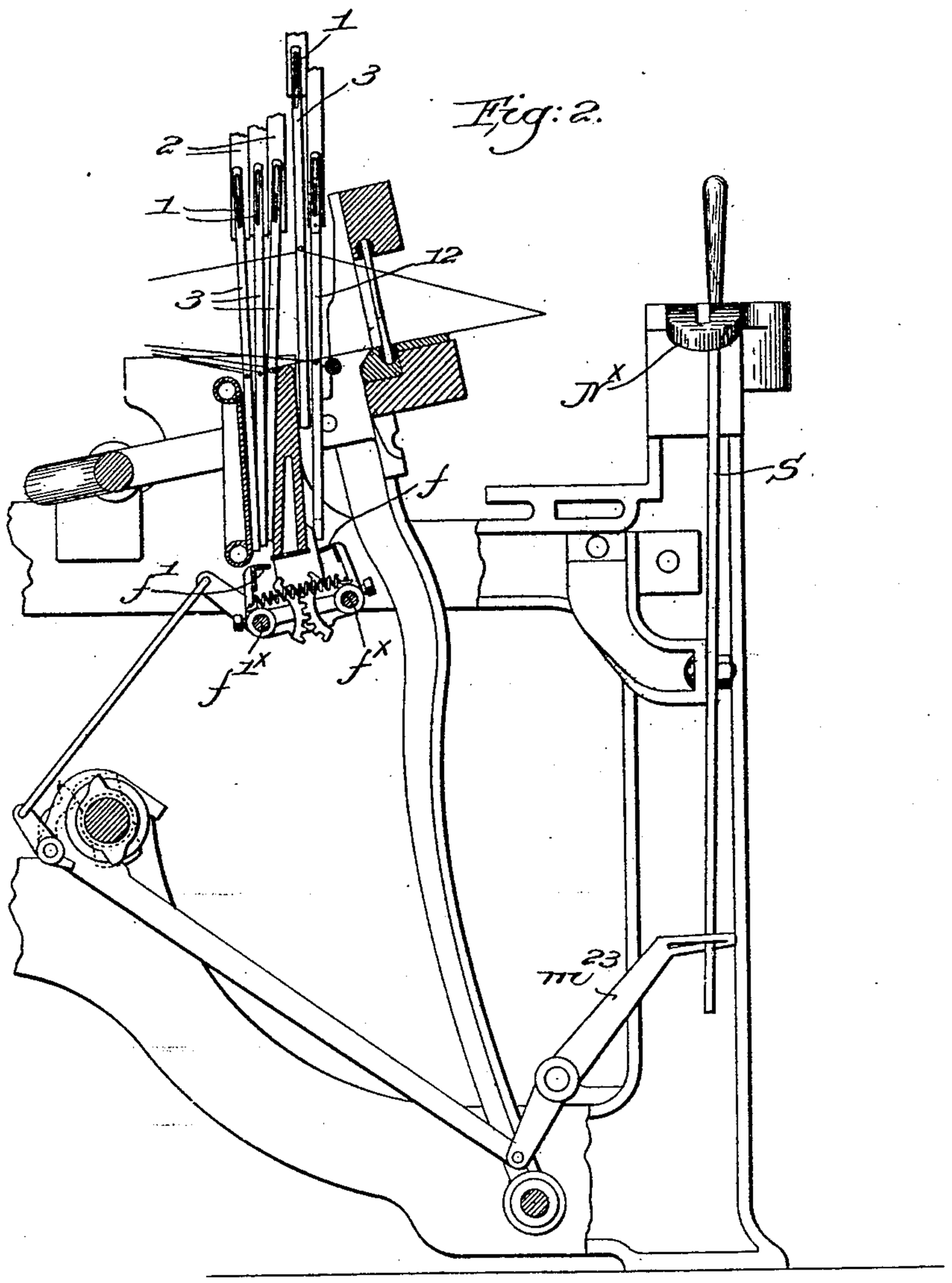
3 SHEETS—SHEET 2.

Fig: 2.



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3 SHEETS—SHEET 3.

Fig: 3.

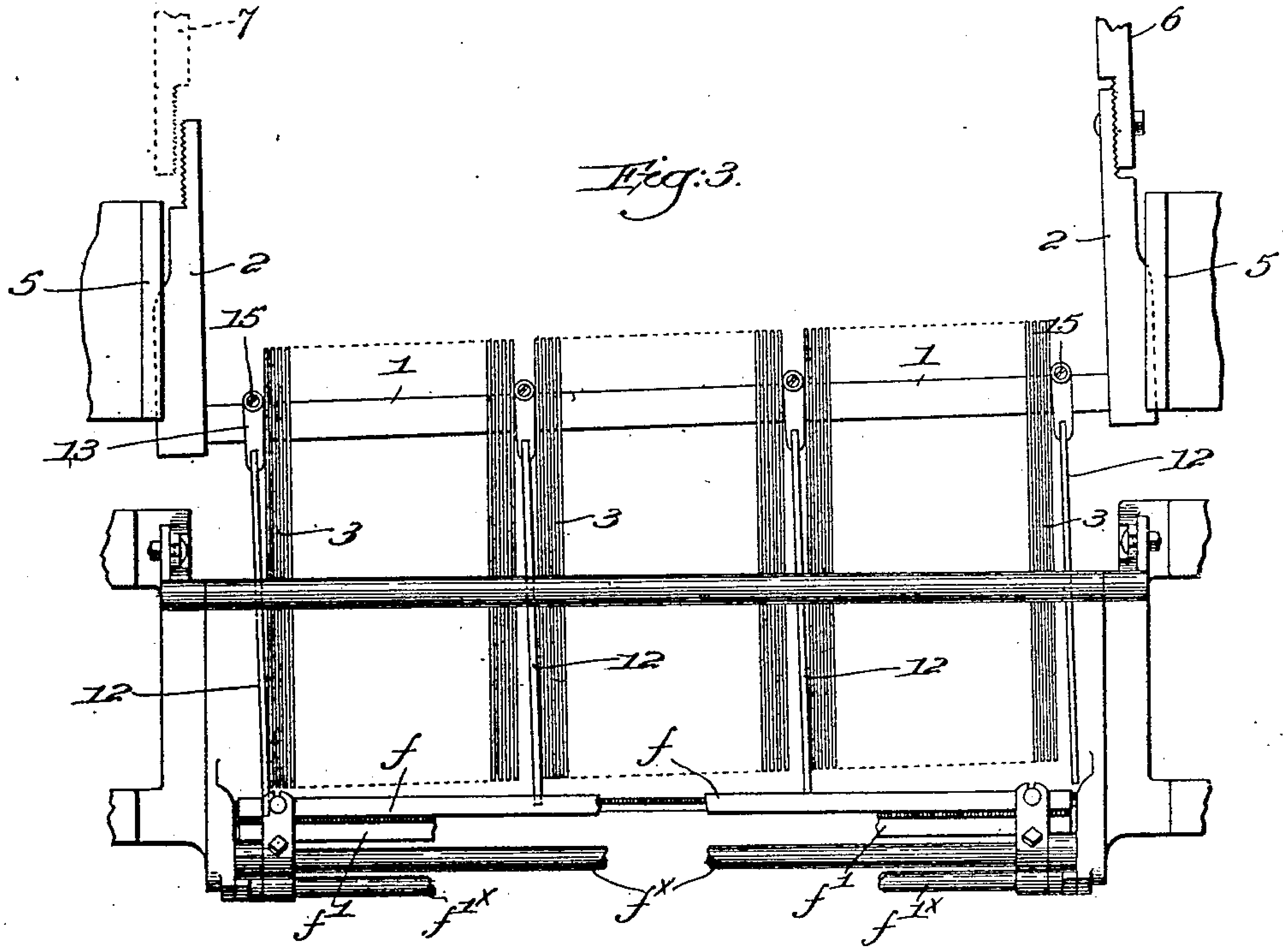


Fig: 4.

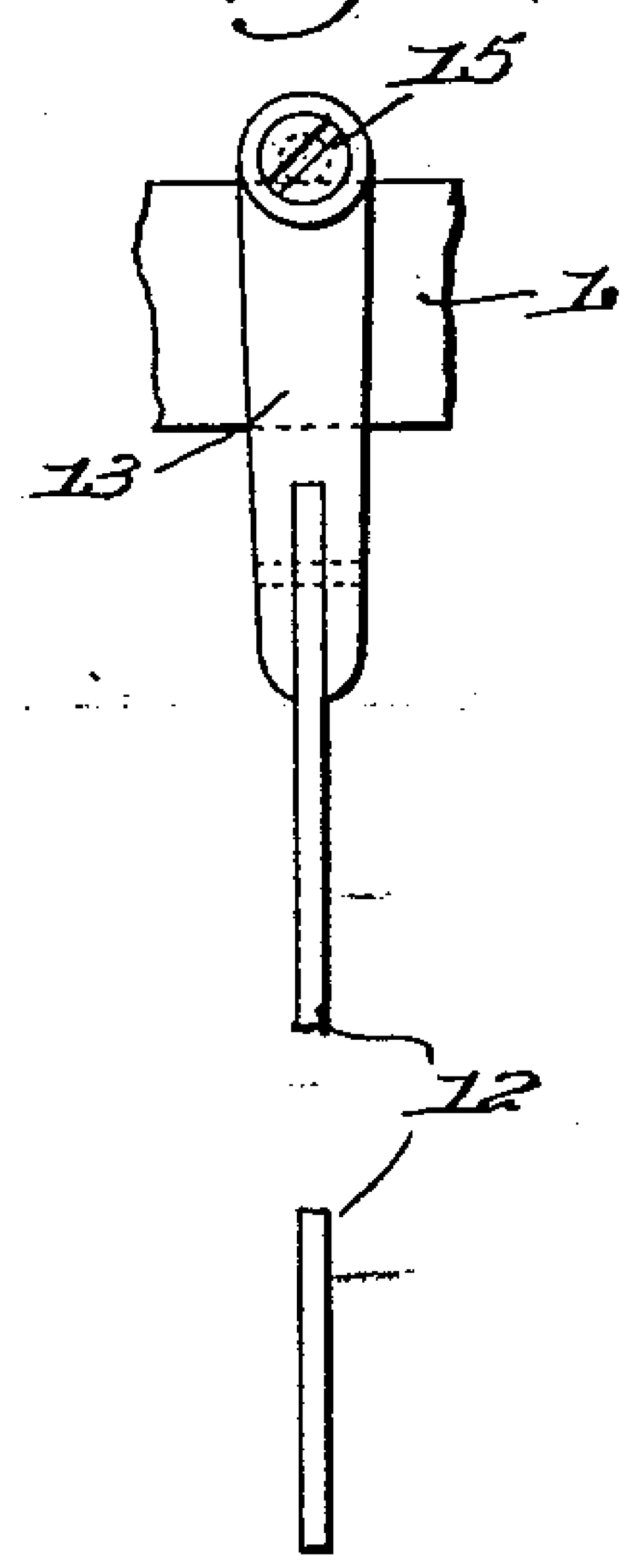


Fig: 5.

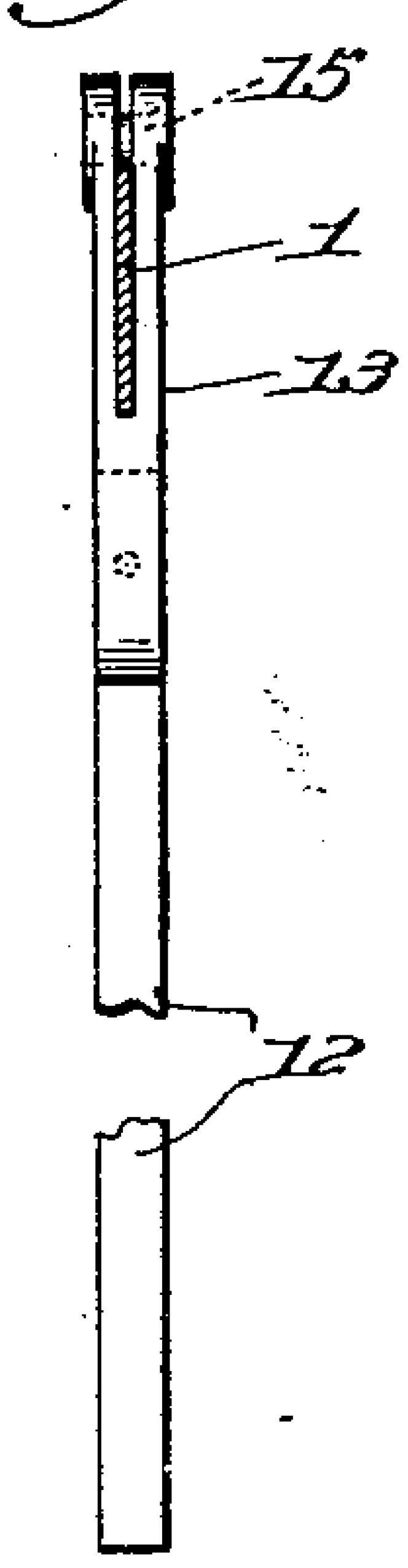
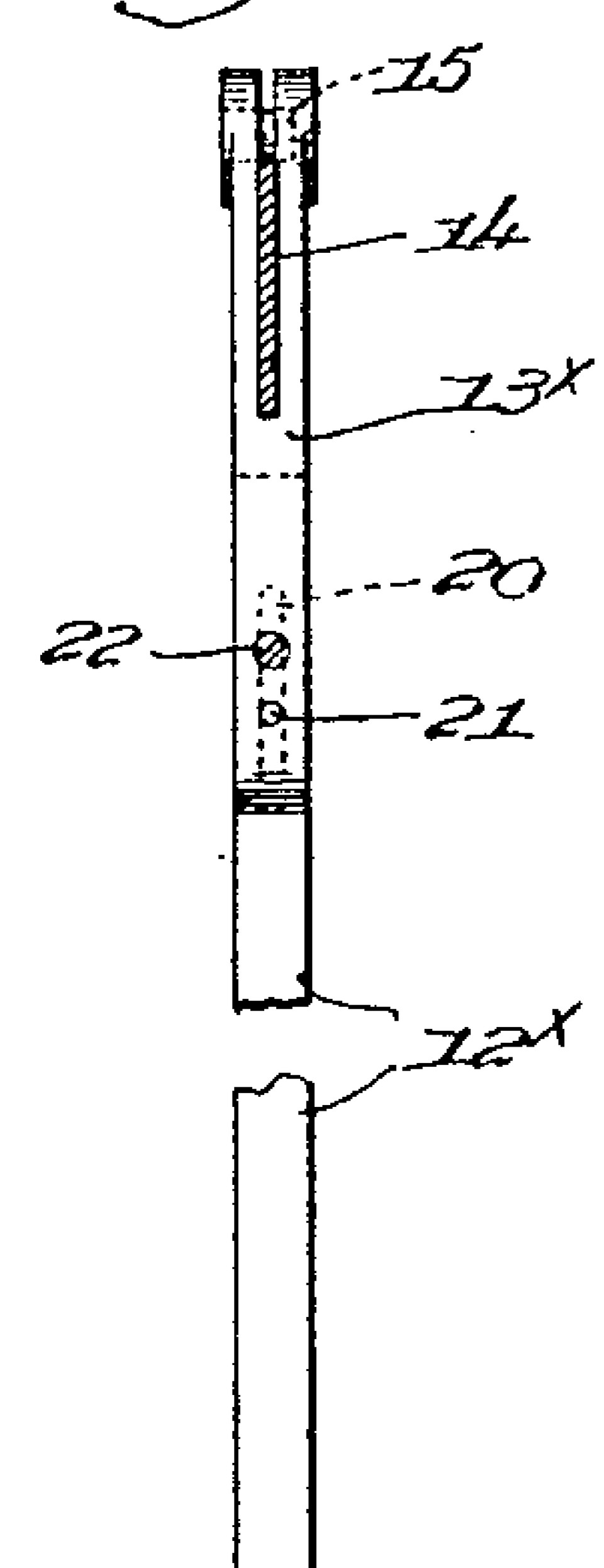


Fig: 6.



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UNITED STATES PATENT OFFICE.

VICTOR RAINVILLE, OF NASHUA, NEW HAMPSHIRE, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

HARNESS-CONTROLLED STOP-MOTION FOR LOOMS.

No. 840,958. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed May 22, 1906. Serial No. 318,198.

To all whom it may concern:

Be it known that I, VICTOR RAINVILLE, a citizen of the United States, and a resident of Nashua, county of Hillsboro, State of New Hampshire, have invented an Improvement in Harness-Controlled Stop-Motions for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to loom harness-motions, more particularly of the type wherein the reciprocating harness or heddle frames are provided with detector-heddles usually made of thin flat steel strips each provided with a warp-eye and longitudinally slotted to receive through them a support or cross-bar forming a part of the frame. As is well known to those skilled in the art, such heddles are arranged to have a limited longitudinal movement relative to the cross-bar, so that when a heddle is released by breakage of its warp-thread it will drop and by coöperation with a vibrator or feeler cause the operation of a stop-motion mechanism whereby the loom is brought to rest.

In United States Patent to Roper, No. 770,116, dated September 13, 1904, a loom harness-motion is shown wherein detector-heddles of the character referred to are used, the heddle or harness frames comprising side bars connected by a transverse cross-bar, the latter forming the heddle-support, and substantially vertical guides are provided in which the side bars slide, the reciprocating movement of the frames being effected by or through overhead actuating connections, which also serve to suspend the frames. Sometimes the overhead connection becomes broken or ruptured in such a manner that the frame will be twisted or will run improperly, so that the cross-bar is inclined instead of horizontal, as it should be, and breakage of other parts is liable to occur from the jamming of the frame in the guides. So, too, the heddle-support or cross-bar itself will sometimes break, and the heddles themselves are not long enough in either of the cases above mentioned to engage the feeler, and thereby stop the loom.

In my present invention I have provided means whereby breakage of the heddle-support itself or of the overhead connection for the heddle-frame will act through the usual stop-motion-controlling feeler to stop the loom, and such means I have also devised to separate or prevent undue lateral movement of the heddles in the reciprocation of the frame.

It is well known by those skilled in the art that the rapid and constant vertical reciprocations of the heddle-frames and the movement of the warp-threads in forming the shed cause a very marked lateral swaying of the heddles, which is highly objectionable, as the lower ends of said heddles are moved out of the path of the feeler. As a result a released heddle will not coöperate with the feeler, and the stop-motion fails to operate. Various devices have been provided to separate the heddles into relatively small groups and to prevent their lateral swaying; but so far as I am aware none of these separating devices has been constructed and arranged, as will be hereinafter described, nor has any previous heddle-separating device been adapted to effect loom stoppage upon breakage of a part of the overhead harness mechanism or of the heddle-frame itself.

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 front elevation, centrally broken out, of a portion of a loom harness-motion embodying one form of my invention, the invention being applied to a harness-motion substantially such as is shown in Patent No. 770,116, before referred to. Fig. 2 is a transverse sectional view through the heddle-frames and showing the stop-motion mechanism. Fig. 3 is a front elevation of a heddle-frame with my invention applied thereto, but showing the frame as canted or tilted, due to breakage or failure of one of its overhead connections, to illustrate the manner in which my invention causes the stoppage of the loom. Fig. 4 is an enlarged detail of one of the separators. Fig. 5 is a side elevation thereof, the heddle-support or cross-bar being shown in section; and Fig. 6 is a similar view showing a longitudinally-adjustable separator to be referred to.

The heddle-frames comprise each a cross-

bar or support 1 and two end or side bars 2 2, the detector-heddles 3 of the type hereinbefore referred to being supported on the cross-bar, the bars 2 sliding in fixed vertical guideways 5, and the upper ends of said bars are connected by links 6 and 7 to bent or locking levers 8 and 9, pivotally mounted upon the upper portion of the loom-frame. The levers 8 and 9 are connected by a link 10, so that oscillation of the lever 9 raises and lowers the connected heddle-frame, all as in Patent No. 770,116, above referred to, the actuating mechanism shown at the left, Fig. 1, being substantially as shown and described in that patent, but forming no part of my present invention. The lower ends of the heddles 3 are so arranged that if a warp-thread breaks its heddle will descend, and on the downstroke of that particular frame such released heddle will engage a normally vibrating feeler and through mechanism shown in Fig. 2 will effect loom stoppage. In said Fig. 2 the feelers $f f'$, attached to the rock-shafts $f^{\times} f'^{\times}$, are geared together to rock in opposite directions, and any suitable mechanism may be employed to normally vibrate the feelers—such, for instance, substantially as in patent to Draper, No. 754,290, dated March 8, 1904.

The shipper S is released from the usual notch in the holding-plate $N^{\times}$ by or through rocking of the knock-off lever m^{23} when the vibration of a feeler is arrested by engagement with a released detector.

Referring to Fig. 2, I have shown five heddle-frames; but my invention is not restricted to the particular number of frames.

Referring now to Fig. 3, if the overhead connection for a heddle-frame breaks or becomes disrupted, as shown at the left, Fig. 3, where it is supposed that the connecting-bolt has loosened between the side bar 2 and the link 7, it will be manifest that the released end of the heddle-frame will drop down and the cross-bar 1 will be canted or tilted, tending either to jam the frame in its guides, and hence to cause breakage, or causing an improper positioning of the heddles. If at the lower end of the inclined cross-bar, in such a case the heddles are not long enough to reach the feeler, and therefore cannot stop the loom. In accordance with my present invention I attach to the cross-bar of a heddle-frame depending fingers 12, which in practice are made of thin but relatively stiff sheet metal fixedly fastened at their upper ends into heads 13, the latter being slotted at 14 (see Fig. 5) to embrace the cross-bar, a clamp-screw 15 when set up clamping the head firmly onto the bar. The fingers 12 are of such a length that in case the overhead connection breaks the lower end of the finger will move into the path of a feeler and will then act precisely as would a released heddle, causing loom stoppage. By reference to Figs. 1 and 2 it will be seen that the fingers are of such length that they project beyond the lower ends of the heddles, and on the front heddle-frame I prefer to use a number of such fingers, according to the number of heddles and the groups into which it is desirable to divide them. These fingers extend down between adjacent heddles and, as will be seen from an inspection of Fig. 1, divide the latter into several groups. This separation or grouping of the heddles prevents the lateral swaying of the whole series of heddles, and so restricts lateral movement that the objectionable results due to such swaying are practically entirely obviated.

I prefer to employ at least two of the fingers on each heddle-frame at the ends of the series of heddles thereon and on the front heddle-frame to use as many additional fingers as may be necessary to separate the heddles into the desired number of groups.

It will be understood that by preventing the swaying of the heddles on the front frame it is unnecessary to provide the other frames with a similar number of separating devices, for the set on the front frame will act for the heddles on all of the frames.

The cross-bars will sometimes break adjacent one or the other of the side bars, and when such breakage takes place and the end of the cross-bar drops the nearest finger will coöperate with the feeler and will effect the stoppage of the loom.

While the fingers have sufficient rigidity to prevent lateral swaying of the heddles, they do not add unduly to the weight of the heddle-frame, and by means of the clamping connection they can be readily attached or detached and can be adjusted as desired.

In Fig. 6 I have shown an adjustable finger, the head $13^{\times}$ being slotted at its lower end to receive the upper end of the finger $12^{\times}$, the latter having a longitudinal slot 20, through which extends a pin 21 and a set-screw 22. By loosening the set-screw the finger can be adjusted up or down according to requirements, the pin 21 maintaining the finger straight with relation to the head.

My invention is not restricted to the precise construction and arrangement herein shown, nor is it restricted to the particular form of harness-motion in connection with which I have illustrated it, for it will be manifest that with other forms of heddle-frame the fingers depending from the cross-bar of the heddle-frame will serve as separators for the heddles and also will effect the operation of the stop-motion mechanism entirely irrespective of the particular form of actuating mechanism for the frame.

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

1. In a loom, reciprocating heddle-frames each having a transverse heddle-support, detector-heddles carried by and having limited

longitudinal movement relative to the support, one or more fingers depending from the latter below the heddles, and a stop-motion-controlling feeler adapted to coöperate with a released heddle, or with one of the fingers upon breakage or improper descent of its heddle-support.

2. In a loom, reciprocating heddle-frames each provided with detector-heddles having limited vertical movement relative to the frame, and a stop-motion-controlling feeler to coöperate with a released heddle, combined with means to separate and prevent undue lateral movement of the heddles and also adapted to coöperate with the feeler upon improper descent of the frame.

3. In a loom, reciprocating heddle-frames each having a cross-bar, and detector-heddles thereon having limited longitudinal movement relative thereto, overhead suspending and actuating connections for the frames, a stop-motion-controlling feeler to coöperate with a released heddle, and one or more fingers depending from the cross-bars below the heddles to limit lateral movement thereof and also to coöperate with the feeler upon breakage of a cross-bar or of its overhead connection.

4. A harness-motion for looms having, in combination, a heddle-frame provided with detector-heddles, an overhead actuating connection for the frame, a stop-motion-controlling feeler to engage a released heddle, and means to separate and limit lateral movement of the heddles and to coöperate with the feeler upon rupture of the overhead connection.

5. A harness-motion for looms having, in combination, a heddle-frame comprising side bars and a connecting cross-bar, substantially vertical guides for the frame, heddles carried by and having limited vertical movement relative to the cross-bar, suspending and actuating connections attached to the side bars, a stop-motion-controlling member to coöperate with a released heddle, and heddle-separating means sustained by the cross-bar and adapted to coöperate with the controlling member upon rupture of the cross-bar or the actuating connections.

6. A harness-motion for looms having, in combination, a series of overhead-supported, reciprocating heddle-frames each provided with a series of detector-heddles, a stop-motion-controlling member adapted to coöperate with a released heddle, and means to prevent undue lateral movement of the heddles and also adapted to coöperate with said controlling member upon improper descent of a heddle-frame.

7. A harness-motion for looms having, in combination, an overhead-supported, reciprocating heddle-frame having a cross-bar and a series of detector-heddles thereon, a stop-motion-controlling feeler to coöperate with a released heddle, and a plurality of depending, blade-like separators on the cross-bar to divide the heddles into groups and prevent undue lateral movement thereof, the lower ends of the separators projecting below the heddles to coöperate with the feeler, upon abnormal positioning or breakage of the cross-bar, when the heddle-frame descends.

8. In a loom, overhead supported and actuated heddle-frames each provided with detector-heddles, a stop-motion-controlling feeler to engage a released heddle, and combined heddle-separating and safety means, to normally separate the heddles and to engage the feeler upon abnormal descent of the heddle-frame.

9. A heddle-frame for looms having a cross-bar adapted to support a series of detector-heddles capable of limited longitudinal movement with relation thereto, and depending blade-like fingers rigidly attached to the cross-bar to divide the heddles into groups and restrict lateral swaying thereof.

10. A heddle-frame for looms having a cross-bar adapted to support a series of detector-heddles capable of limited longitudinal movement with relation thereto, and a plurality of depending separators carried by said cross-bar, each separator comprising a thin, flat and substantially rigid depending finger, and a head adapted to be clamped upon the cross-bar.

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

VICTOR RAINVILLE.

Witnesses:
STEPHEN L. HALLINAN,
GEORGE W. CLYDE.