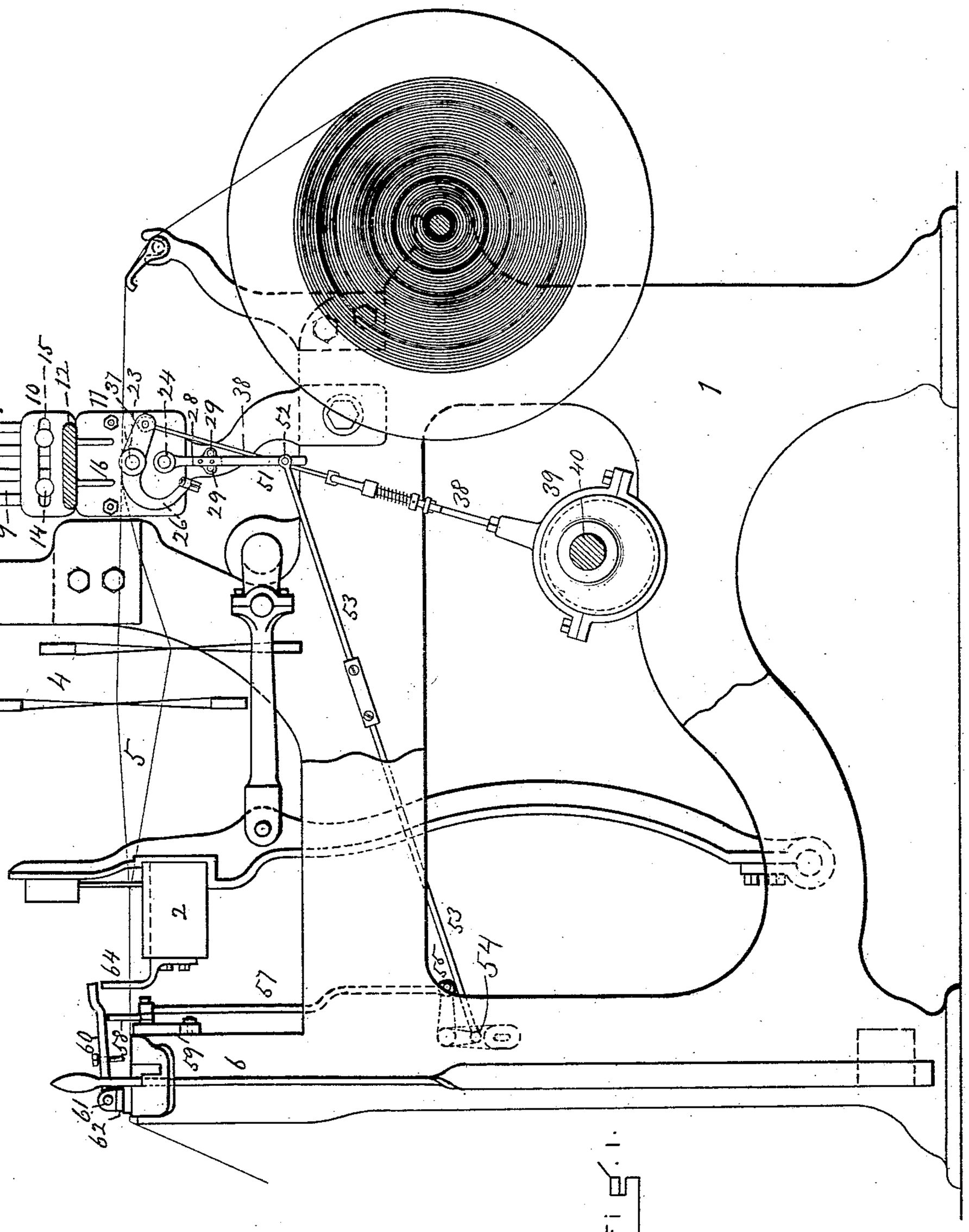
No. 713,610. Patented Nov. 18, 1902.

J. V. & E. CUNNIFF.

WARP STOP MOTION FOR LOOMS.

(Application filed Mar. 31, 1902.)

(No Model.) 5 Sheets—Sheet 1.



WITNESSES:
A. A. Bonney.
A. K. Hood.

INVENTORS:
John V. Cunniff
Edward Cunniff
By their Attys.
Bonney & Williams

No. 713,610. Patented Nov. 18, 1902.

J. V. & E. CUNNIFF.

WARP STOP MOTION FOR LOOMS.

(Application filed Mar. 31, 1902.)

(No Model.) 5 Sheets—Sheet 2.

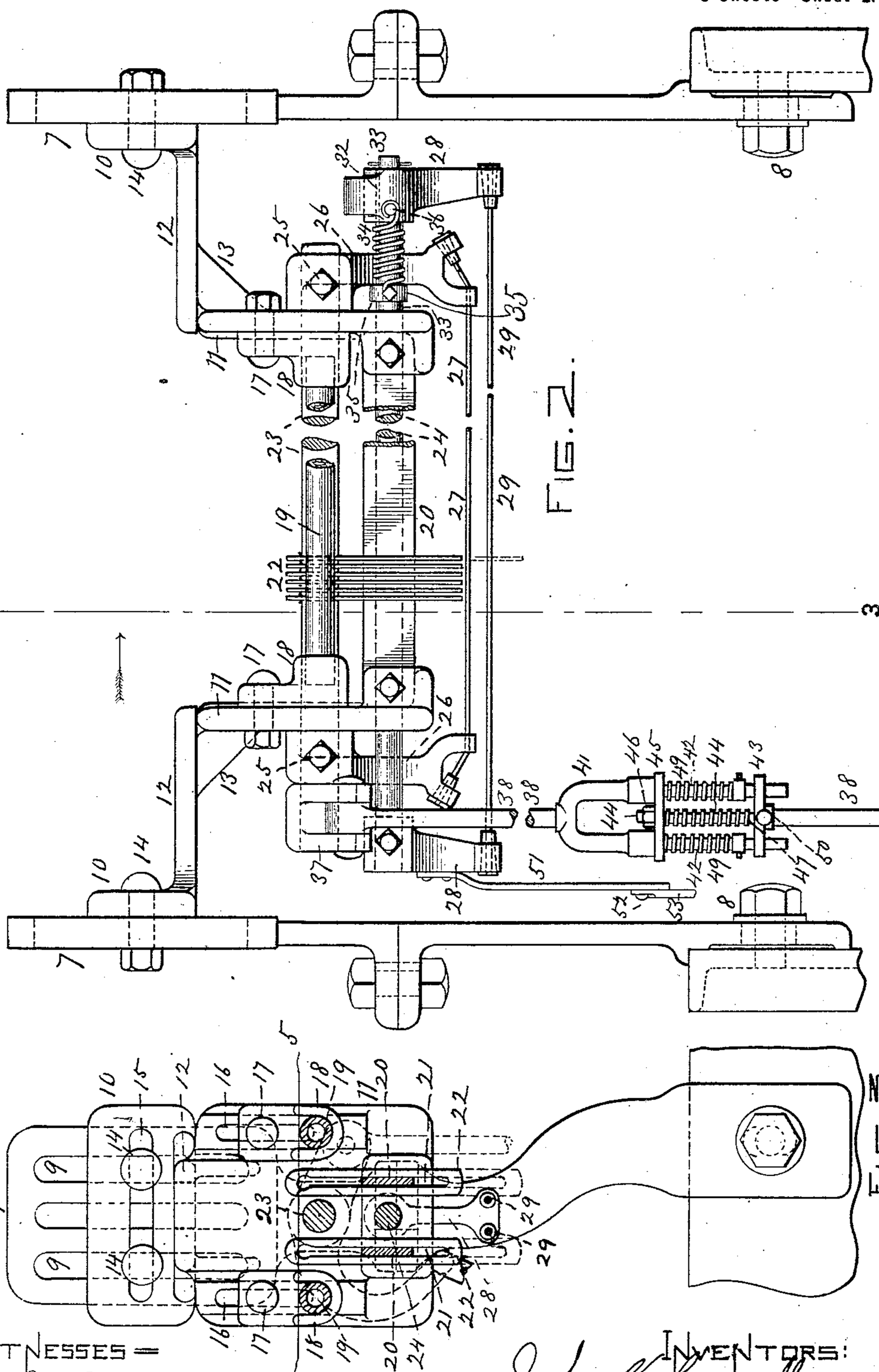


FIG. 2.

FIG. 3.

WITNESSES =
A. H. Bonney.
A. K. Hood.

INVENTORS:
John V. Cunniff
By their Atty. Edward Cunniff
Albert W. Williams

No. 713,610. Patented Nov. 18, 1902.

J. V. & E. CUNNIFF.

WARP STOP MOTION FOR LOOMS.

(Application filed Mar. 31, 1902.)

(No Model.) 5 Sheets—Sheet 3.

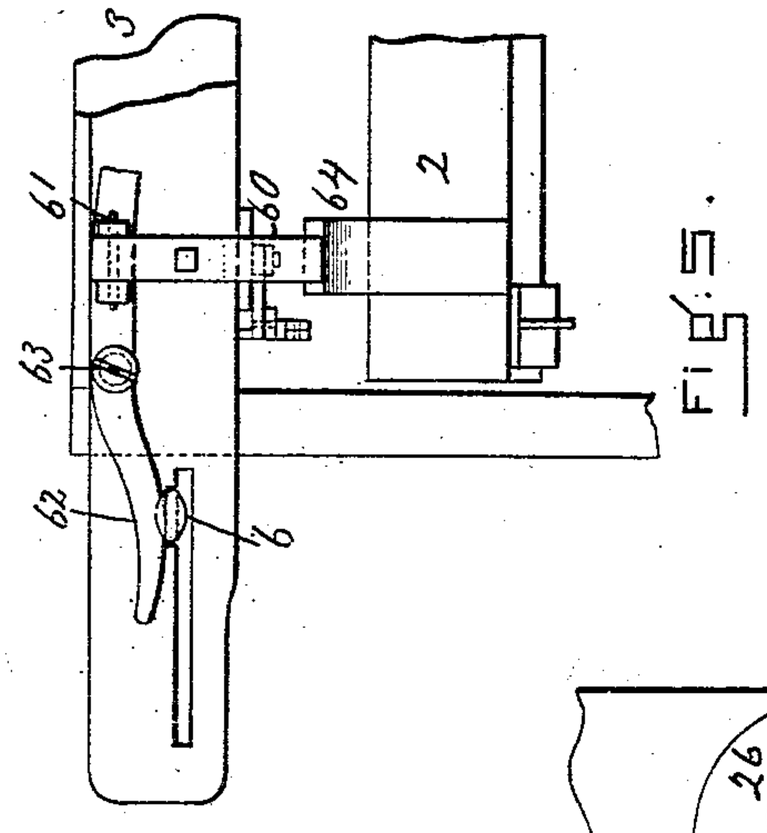


Fig. 5.

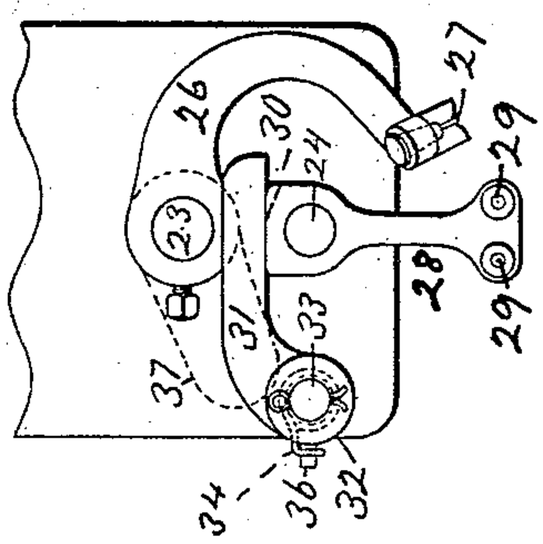


Fig. 6.

Fig. 4.

WITNESSES:
A. D. Bonney.
A. K. Hood.

INVENTORS:
John V. Cunniff
Edward Cunniff
By their Att'y.
Thomas Williams

No. 713,610. Patented Nov. 18, 1902.

J. V. & E. CUNNIFF.

WARP STOP MOTION FOR LOOMS.

(Application filed Mar. 31, 1902.)

(No Model.) 5 Sheets—Sheet 4.

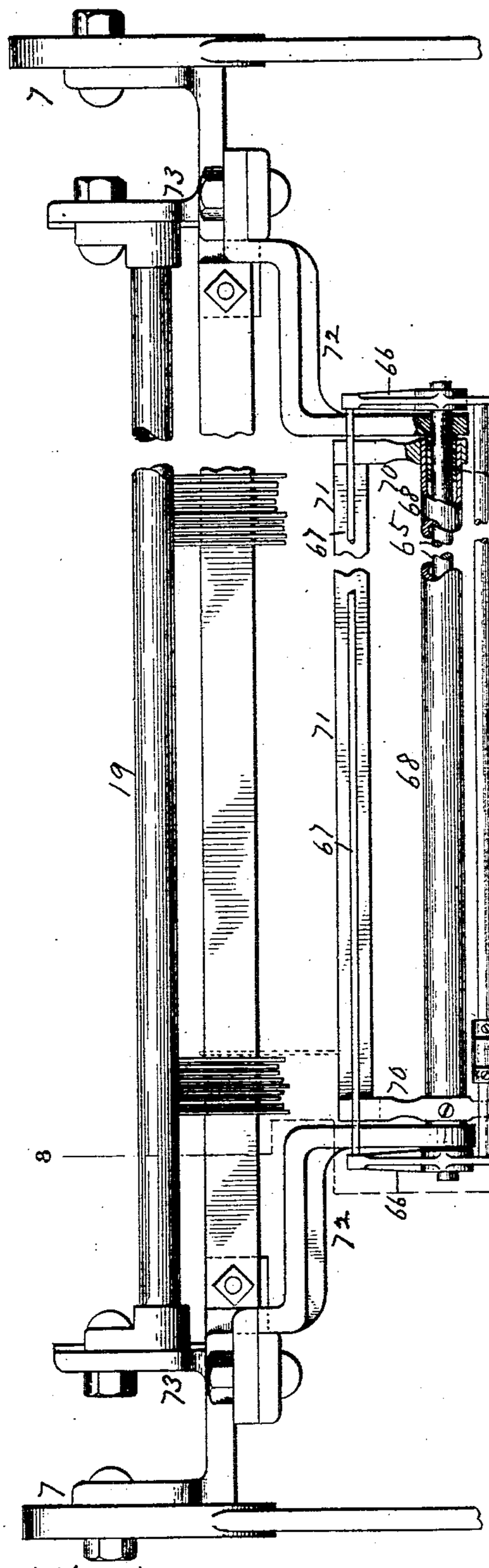


Fig. 5.

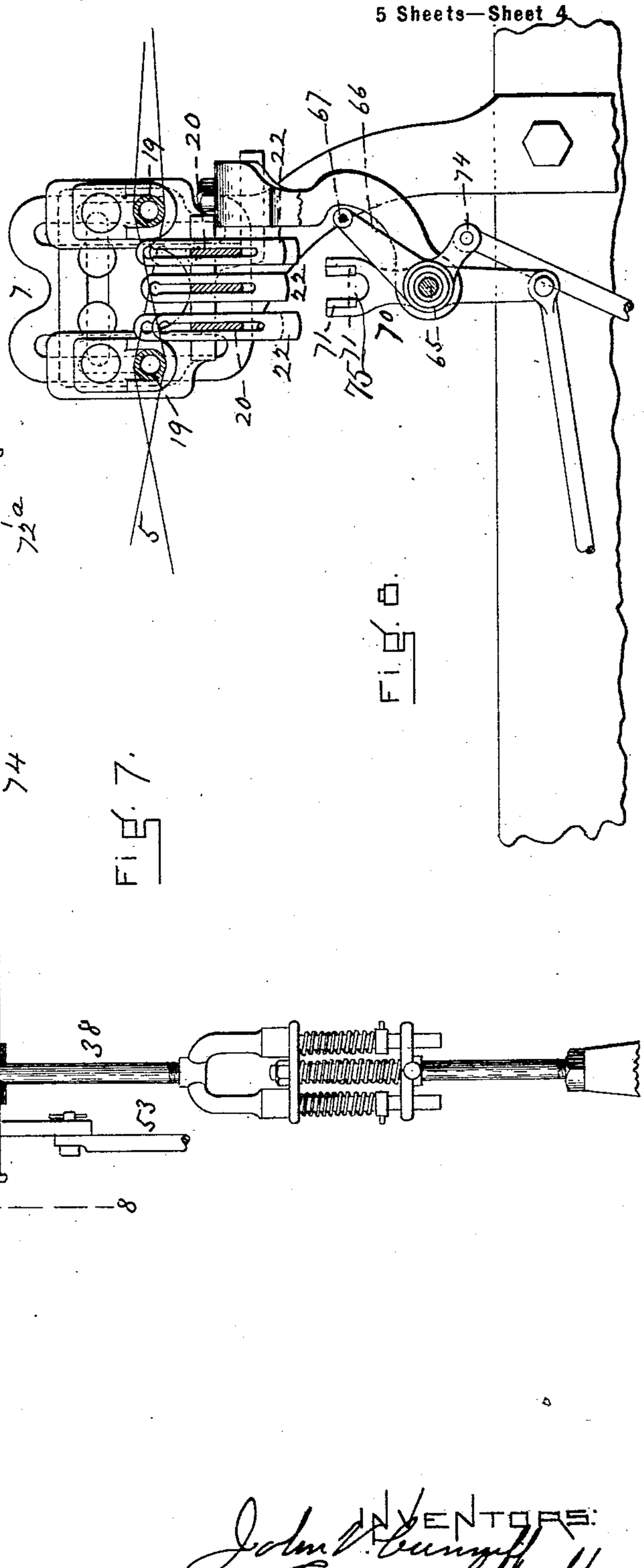


Fig. 6.

WITNESSES:
A. D. Bonney.
A. K. Hood.

INVENTORS:
John V. Cunniff
Edward Cunniff
By their Atty.
Edmund Williams

No. 713,610. Patented Nov. 18, 1902.

J. V. & E. CUNNIFF.

WARP STOP MOTION FOR LOOMS.

(Application filed Mar. 31, 1902.)

(No Model.) 5 Sheets—Sheet 5.

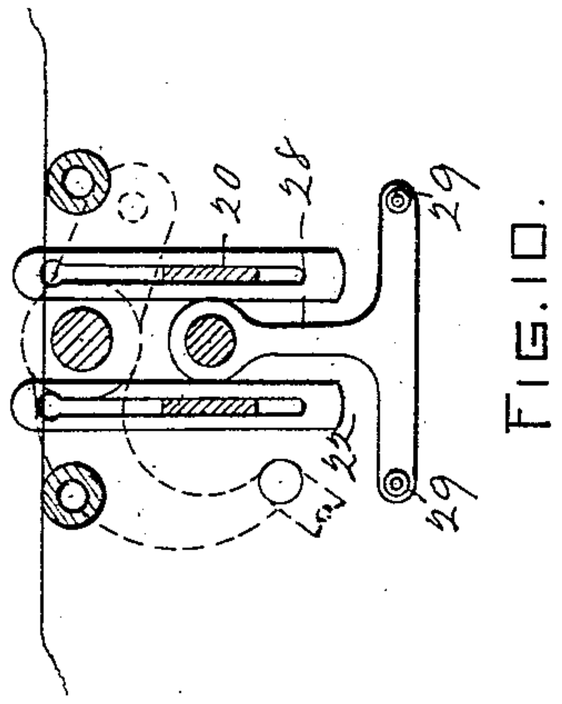


FIG. 10.

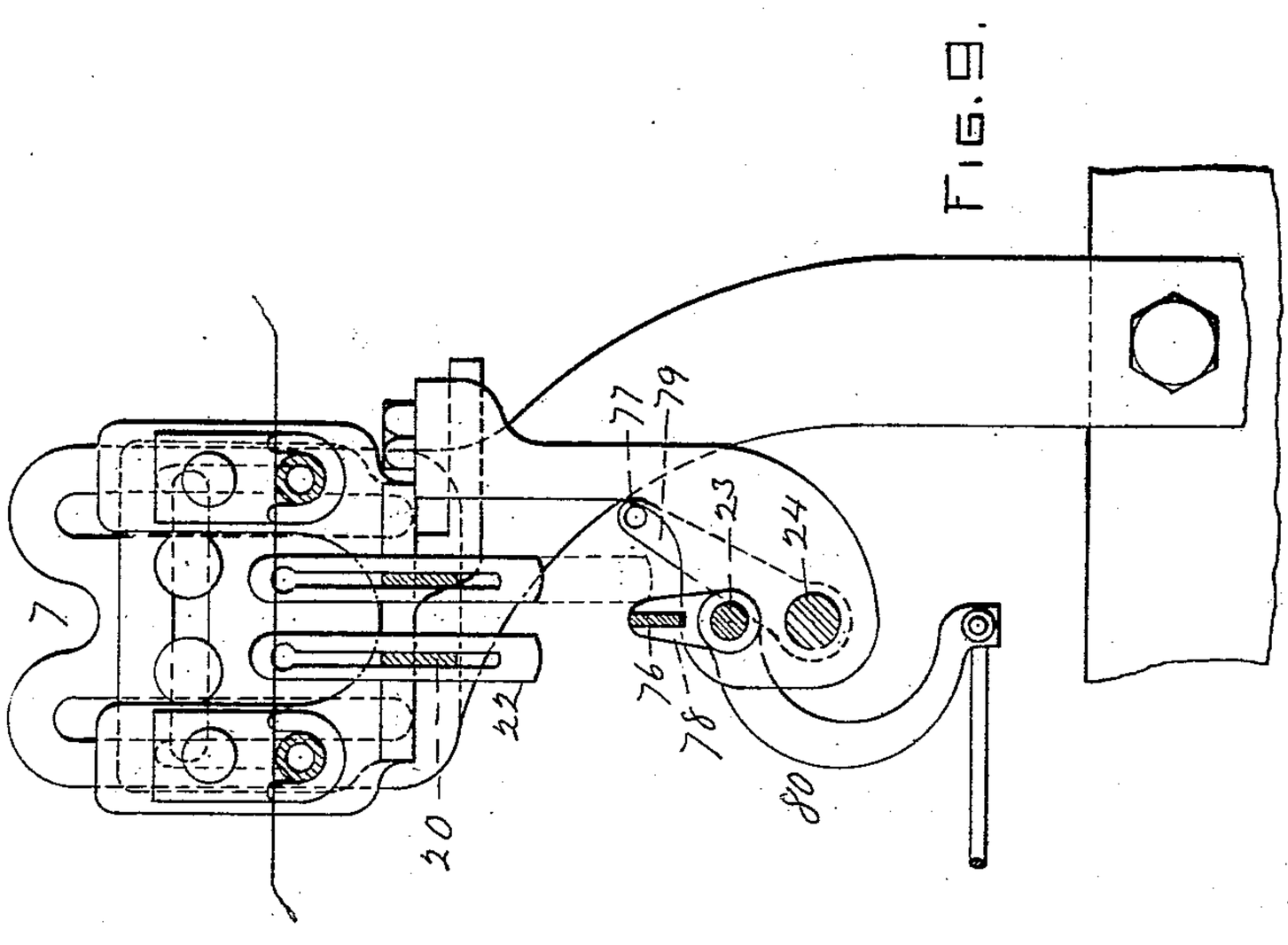


FIG. 9.

WITNESSES =
A. D. Bonney.
A. K. Hood

INVENTORS:
John V. Cunniff
Edward Cunniff
By their Attys.
Henry C. Williams

UNITED STATES PATENT OFFICE.

JOHN V. CUNNIFF AND EDWARD CUNNIFF, OF NEW BEDFORD, MASSACHUSETTS, ASSIGNORS TO AMERICAN MECHANICAL WARP STOP COMPANY, OF PAWTUCKET, RHODE ISLAND, A CORPORATION OF RHODE ISLAND.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 713,610, dated November 18, 1902.

Application filed March 31, 1902. Serial No. 100,664. (No model.)

To all whom it may concern:

Be it known that we, JOHN V. CUNNIFF and EDWARD CUNNIFF, citizens of the United States, residing in New Bedford, in the county of Bristol and State of Massachusetts, have invented new and useful Improvements in Warp Stop-Motions for Looms, of which the following is a specification.

This invention relates to that class of warp stop-motions for looms in which the mechanism connected with the shipper is operated by the dropping of one or more wires or detectors from one or more rows of detectors between an oscillator or vibrator and a deflector, whereby movement is communicated by the oscillator to mechanism intermediate thereof and the shipping mechanism.

The present invention or improvement relates to constructions or arrangements whereby separate shafts are provided for the oscillator and the deflector; whereby said separate shafts are rendered immediately independent of each other, one shaft relating solely and separately to the oscillator and the other shaft relating solely and separately to the deflector; whereby the deflector and oscillator are located below the rocker-shaft; whereby the deflector is returned to its normal position after stoppage; whereby the strain on the connection with the actuating-cam is eased, especially when several detectors fall at the same time or the whole warp slackens; whereby the deflector is adapted to operate in connection with more than two rows of detectors, and whereby in other respects the operation of the device is improved.

The nature of the invention is fully described in detail below, and illustrated in the accompanying drawings, in which—

Figure 1 is a sectional side elevation showing enough of a loom to illustrate our invention. Fig. 2 is an enlarged detail, in rear elevation, of the detecting mechanism, portions being represented as broken out. Fig. 3 is a vertical section taken on line 3, Fig. 2. Fig. 4 is a detail in elevation and section looking from the inside of the lay, showing mechanism connected with the knock-off lever. Fig. 5 is a plan view of the same. Fig. 6 is a detail in elevation illustrating the mechanism for returning the deflector. Fig. 7 is an enlarged detail, in rear elevation, of a modification of the detecting mechanism, a portion being represented as broken out. Fig. 8 is a vertical section taken on line 8, Fig. 7, illustrating the device with three series of detectors. Fig. 9 is a cross vertical section showing a second modification of the detecting mechanism. Fig. 10 is a cross vertical section in detail showing a slight modification of the deflector.

Similar characters of reference indicate corresponding parts.

Referring to Figs. 1 to 6, inclusive, in the drawings, 1 represents portions of the frame of the loom. 2 is the lay; 3, the breast-beam; 4, the harness; 5, the warp-threads, and 6 the shipping-lever. Vertical standards 7, Figs. 1, 2, and 3, are bolted at 8 to the machine at opposite ends and are each provided with vertical slots 9. Adjustably secured to these standards are brackets, each of which consists of the upper portion 10, lower portion 11, and connecting portion 12, a web 13 strengthening the same. Horizontal and vertical adjustments are secured by means of bolts 14, which extend through the vertical slots 9 in the standards and through horizontal slots 15 in the upper portions 10 of the brackets. The lower portion 11 of each bracket is vertically slotted at 16 to receive bolts 17, whereby vertical adjustment and support are secured to cup-shaped lips 18, Figs. 2 and 3, which sustain the opposite ends of the tubular lease-rods 19. By these means the lease-rods can be adjusted both vertically and horizontally and can easily be lifted off and removed from the machine. The portions 11 of the brackets are furthermore connected by two or more parallel guide-bars 20, which extend through slots 21 in a corresponding number of rows of detectors 22. These detectors are elastic, being made of spring-steel about eight one-thousandths of an inch in thickness, and they are rendered still more elastic by the length of their slots.

In the first six figures of the drawings pro-

vision is made for but two rows of detectors; but in Fig. 8 (which will be below described) provision is made for three rows of detectors.

23 represents the rocker-shaft supported and having its bearings in the lower portions 11 of the brackets, and supported and having its bearings in the same brackets below the rocker-shaft is another shaft 24, which we term the "deflector-shaft." The rocker-shaft or oscillator-shaft 23 has rigidly secured to it, near its opposite ends and outside the bracket 11 at 25, the upper ends of curved arms 26, Figs. 1, 2, and 6, said arms being thus curved in order to avoid the shaft 24 and having their lower ends support in any suitable manner and be connected by an oscillator 27, said oscillator consisting of a wire or rod, as shown. Rigidly secured to the opposite ends of the deflector-shaft 24 are arms 28, whose outer or lower ends support and are connected by rods or wires 29, preferably two in number, the lower ends of the arms 28 being of shape to receive the rods or wires 29 side by side and said wires constituting a deflector. The upper end of one of the arms 28 is flattened, as indicated at 30 in Fig. 6, and the free end of a lever or pawl 31 rests normally on said flattened end, the hub 32 of said pawl being loose on a horizontal stud 33, which is supported by the bracket 11 at that end. A spring 34 has one end secured to a collar 35, rigid on the stud, and its other end is attached to a pin 36 on the hub 32. By means of this spring the lever or pawl is held normally in the position indicated in Fig. 6, and hence the deflector is held normally in the position illustrated therein. Rigid on one end of the rocker-shaft or oscillator-shaft 23 is a crank 37, (see Figs. 1 and 2 and dotted lines in Fig. 6,) whose outer end is connected by an eccentric-rod 38 with an eccentric 39 on the driving-shaft 40. This eccentric-rod is divided to receive a spring mechanism. (Illustrated in Fig. 2.) The end of the upper portion of the eccentric-rod 38 is provided with a bifurcated frame 41, from which two parallel rods or bars 42 extend downward through a plate 43, supported by the upper end of the lower portion of the eccentric-rod 38. This end is provided with a rod or bar 44, which extends through a plate 45, supported by the bifurcated frame 41, the rod 44 being held in such position by a suitable nut 46.

Disposed on the rod 44 between the plates 43 and 45 is a spiral spring 47, and disposed on the rods 42 between the plate 45 and nuts 48 are spiral springs 49. A nut 50 is secured to the upper part of the lower portion of the eccentric-rod 38 below the plate 43. Connection between the shipping mechanism and the deflector is made by means of the arm or lever 51, which is rigidly secured at its upper end to one of the deflector-arms 28, its lower end being pivotally connected at 52, Figs. 1 and 2, with the link or rod 53, whose opposite end is pivotally connected at 54, Fig. 4, with the bell-crank 55, adjustably supported by means of a suitable frame 56 by the frame of the machine. The opposite arm of the bell-crank 55 is connected by a lifting-rod 57 with a bell-crank 58, adjustably supported by means of a suitable frame 59 by the breast-beam. The other arm of the bell-crank 58 holds normally up the knock-off lever or dagger 60, which is pivoted at 61 to the horizontal lever 62, pivoted at 63 to a suitable plate on the breast-beam.

The rocker-shaft 23 being oscillated by means of the crank 37, which is connected, as above mentioned, by the eccentric-rod 38 with the eccentric 39 on the driving-shaft 40, the oscillator 27 vibrates under the rows of detectors and also under the rocker-shaft, the oscillator-arms 26 being sufficiently curved or recessed to allow room for the throw without contact with the rocker-shaft. Should a detector fall, it must fall on one side or the other of the deflector 29 or between the two rods or wires constituting said deflector. It is then caught between the oscillator 27 and deflector 29, with the effect that the oscillator, through the medium of the detector and deflector and one of the vibrating arms 28, operates, by means of the lever 51, link 53, bell-crank 55, lifting-rod 57, and bell-crank 58, to withdraw the support from the dagger 60 and allow it to drop from its normal raised position, (indicated in Fig. 1,) so that it comes in contact with the projection 64, Fig. 1. This swings the lever 62 and operates the shipper 6, stopping the machine. When the deflector is swung in the manner above mentioned by the dropping of a detector, the flat upper surface 30 of the hub of one of the deflector-arms 28 is of course swung out of a horizontal position, lifting the lever or pawl 31 against the power of the spring 34. This spring and pawl then operate to return the deflector-arm and deflector into the original position. The spring mechanism 41 to 50, inclusive, operates to yield sufficiently to ease the strain on the eccentric-rod, especially when several detectors fall at the same time or when the warp slackens, and thus injury to the oscillator is prevented. The elasticity of the detectors, by reason of their spring, thinness, and the length of the slots formed in them, is such that a dropped detector 22 will yield to allow the oscillator 27 to pass under and beyond it in order to make a return stroke and effect the movement of a dropped detector on the other side of the deflector on said return. Thus it will be seen that the oscillator and deflector are applied to separate shafts, each being in its immediate action independent of the other, and, moreover, that both the oscillator and deflector are under the rocker-shaft, so that the oscillator-arms and deflector-arms extend down from the oscillator and deflector instead of up therefrom toward rows of overhead deflectors.

In Figs. 1 to 6, inclusive, the rocker-shaft or oscillator-shaft 23 is above the deflector-

shaft 24; but in Figs. 7 and 8 we place one of these shafts within the other and show the deflector and oscillator extending normally upward between the rocker-shaft and overhead rows of detectors. In these two figures the rocker-shaft is indicated at 65, has its bearings in the brackets 72, secured to the frame, and has rigidly extending upward from it the curved oscillator-arms 66, connected at their upper ends by the oscillator 67. 68 represents a tubular deflector-shaft separated from the rocker-shaft by the tubular extensions 72ª of the brackets 72, the deflector-shaft having secured to it the upwardly-extending deflector-arms 70, connected at their upper ends by the deflector 71. Brackets 73 support the lease-rods 19. A rod 74 connects downward extensions of the oscillator-arms 66 with the eccentric-rod 38, and one of the deflector-arms 70 is connected, substantially as before described, with the shipping mechanism. It is apparent that although in Figs. 7 and 8 the rocker-shaft is within the deflector-shaft the two shafts are as separate and independent as in Fig. 2, where one is above the other. In Fig. 8 there are shown three rows of detectors 22 and a corresponding number of parallel bars 20. In order to accommodate the three rows of detectors, the upper ends of the deflector-arms 70 are bifurcated or yoke-shaped at 75 in order to sustain two separated bars which constitute the deflector 71. Should a detector fall, it must drop on one side or the other of the deflectors 71 or between them, and hence it is caught either between the oscillator 67 and one of the deflector-bars or between the two deflector-bars, with the effect that the shipping-lever 6 is operated as above described.

In Fig. 9 the oscillator-shaft 23 and deflector-shaft 24 are located one above the other, as in Figs. 2 and 3; but the oscillator, which is indicated by the bar 76, and the deflector, which is indicated by the bar 77, are held up by arms 78 and 79, respectively, above their shafts and beneath the detectors 22. An arm 80, curved to avoid the shaft 24, extends down from one of the oscillator-arms and connects with the eccentric mechanism.

In Fig. 10 the deflector-arms 28 are as in the first six figures, except that the two deflector-wires 29 are held far enough apart to be outside the paths of movement of the rows of detectors as they drop—that is, on the opposite sides of said paths of movement from the fulcrum of the deflector which is between them. By this means the strain on the drop-wire is lessened, as the oscillator effects the stopping of the loom on the outward stroke and at the termination thereof in either direction, and hence at a time when the movement of the oscillator as governed by the eccentric is slower than when knocking off is performed at the center of its arc of vibration.

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

1. In a warp stop-motion for looms, a series of slotted drop devices or detectors adapted to be sustained by warp-threads; parallel guide-bars extending through the detectors; a rocker-shaft supported by the frame; an oscillator comprising arms rigid on said shaft and a horizontal connection between and supported by said arms; a deflector-shaft supported by the frame; a deflector independent of the guide-bars, and comprising arms supported by said shaft and a horizontal connection between and supported by said arms, the said rocker-shaft and deflector-shaft being separate and independent of each other; and mechanism whereby the descent of a drop device or detector between the deflector and the oscillator operates the mechanism connected with the shipper.

2. In a warp stop-motion for looms, a series of slotted drop devices or detectors adapted to be sustained by warp-threads; parallel guide-bars extending through the detectors; a rocker-shaft supported by the frame; an oscillator comprising arms rigid on said shaft and a horizontal connection between and supported by said arms; a deflector-shaft supported by the frame; a deflector independent of the guide-bars, and comprising arms supported by said shaft and a horizontal connection between and supported by said arms, the said rocker-shaft and deflector-shaft being separate and independent of each other, and located one above the other; and mechanism whereby the descent of a drop device or detector between the deflector and the oscillator operates the mechanism connected with the shipper.

3. In a warp stop-motion for looms, a series of drop devices or detectors adapted to be sustained by warp-threads; a deflector-shaft supported by the frame; a downwardly-extending deflector comprising arms supported by said deflector-shaft and a horizontal connection between and supported by said arms; a rocker-shaft supported by the frame independent of and above the deflector-shaft; a downwardly-extending oscillator comprising arms rigid on said rocker-shaft and a horizontal connection between and supported by said arms; and mechanism whereby the descent of a drop device or detector between the deflector and oscillator operates the shipping mechanism.

4. In a warp stop-motion for looms, a series of drop devices or detectors adapted to be sustained by warp-threads; a deflector-shaft supported by the frame; a downwardly-extending deflector comprising arms supported by said deflector-shaft and a horizontal connection between and supported by said arms; a rocker-shaft supported by the frame independent of and above the deflector-shaft; a downwardly-extending oscillator comprising arms rigid on said rocker-shaft and a horizontal connection between and supported by said arms, said arms being curved or recessed to allow vibration thereof without contact

with the deflector-shaft; and mechanism whereby the descent of a drop device or detector between the deflector and oscillator operates the shipping mechanism.

5. In a warp stop-motion for looms, a series of slotted drop devices or detectors adapted to be sustained by warp-threads; a rocker-shaft supported by the frame; a downwardly-extending oscillator having a motion uninterrupted by the descent of a drop device or detector, and comprising arms rigid on said rocker-shaft and a horizontal connection between and supported by said arms; a downwardly-extending deflector comprising a plurality of arms pivotally supported by the frame and a horizontal connection between and supported by said arms; and mechanism whereby the descent of a drop device or detector between the deflector and oscillator operates the shipping mechanism.

6. In a warp stop-motion for looms, a series of drop devices or detectors adapted to be sustained by warp-threads; a rocker-shaft supported by the frame; an oscillator comprising arms rigid on said shaft and a horizontal connection between and supported by said arms; a deflector-shaft supported by the frame; a deflector located entirely below the warp, and comprising arms supported by said shaft and a horizontal connection between and supported by said arms; spring mechanism consisting of a spring-controlled positioning-pawl connected with the deflector and deflector-shaft adapted to retain the deflector in its normal position and to return the said deflector after movement to such position; and mechanism intermediate of the deflector and shipping mechanism for operating the latter upon the dropping of a detector.

7. In a warp stop-motion for looms, more than two series of rows of drop devices or detectors adapted to be sustained by warp-threads; a rocker-shaft supported by the frame; an oscillator comprising arms rigid on said shaft and a horizontal connection between and supported by said arms; a deflector supported by a suitable shaft sustained by the frame, and comprising arms extending from said shaft, and a plurality of horizontal connections between and supported by said arms, whereby the breaking of a warp-thread causes a drop device or detector to drop either between the deflector and oscillator on either side of the former or between the two horizontal connections making a part of the deflector.

8. In a warp stop-motion for looms, a series of rows of drop devices or detectors adapted to be sustained by warp-threads; a rocker-shaft supported by the frame; an oscillator comprising arms extending from said shaft and a connection between and supported by said arms; a deflector-shaft supported by the frame; a deflector comprising arms supported by the deflector-shaft and a plurality of connecting wires or bars between and supported by said arms, said wires or bars being located on the outer sides or opposite sides of the paths of movement of the rows of detectors from the fulcrum of the deflector which is located between said paths of movement; and mechanism whereby the descent of a detector between the deflector and the oscillator operates the shipping mechanism.

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

JOHN V. CUNNIFF.
EDWARD CUNNIFF.

Witnesses:
CORNELIUS H. MURPHY,
EDMUND J. WHALLEY.