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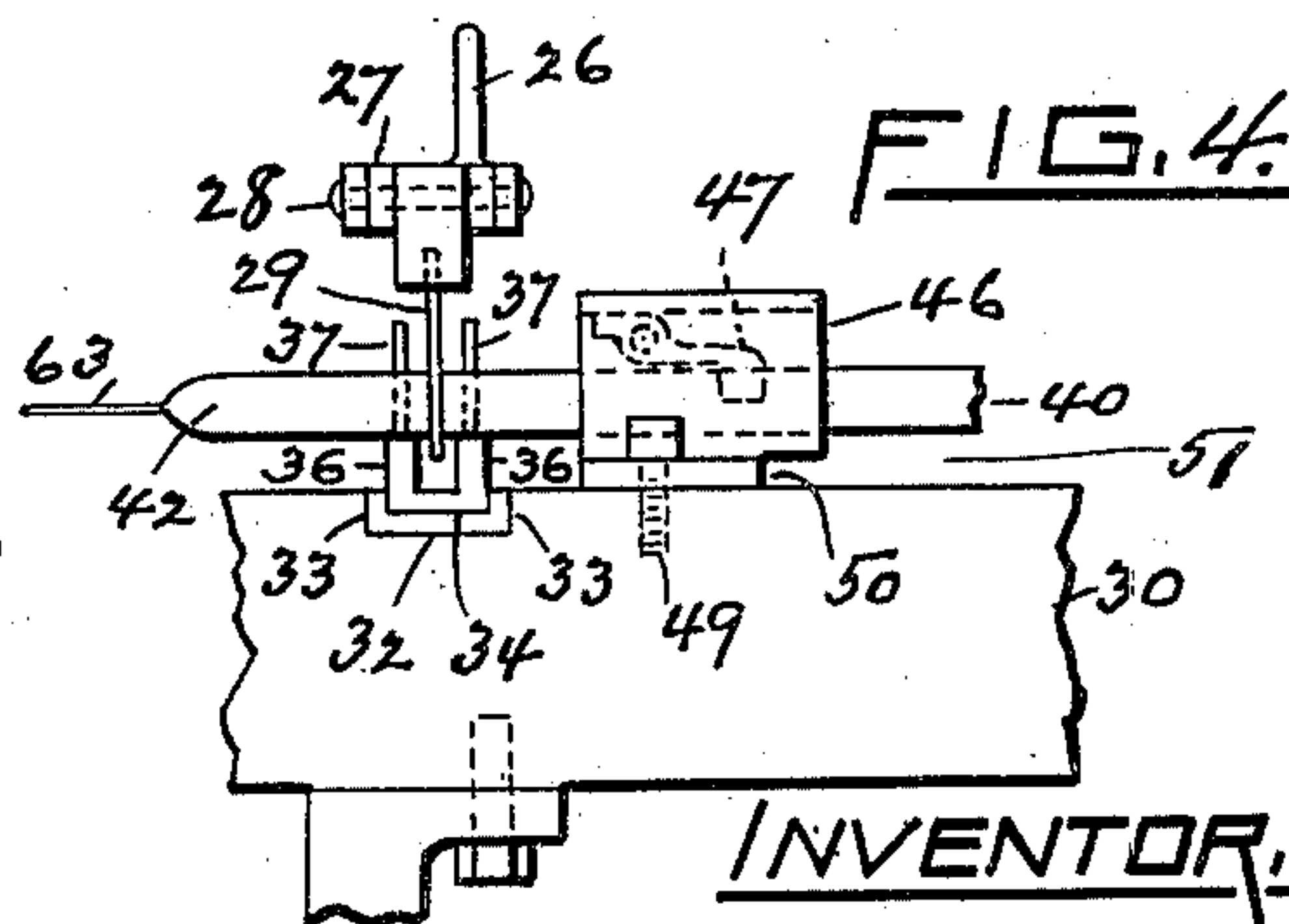
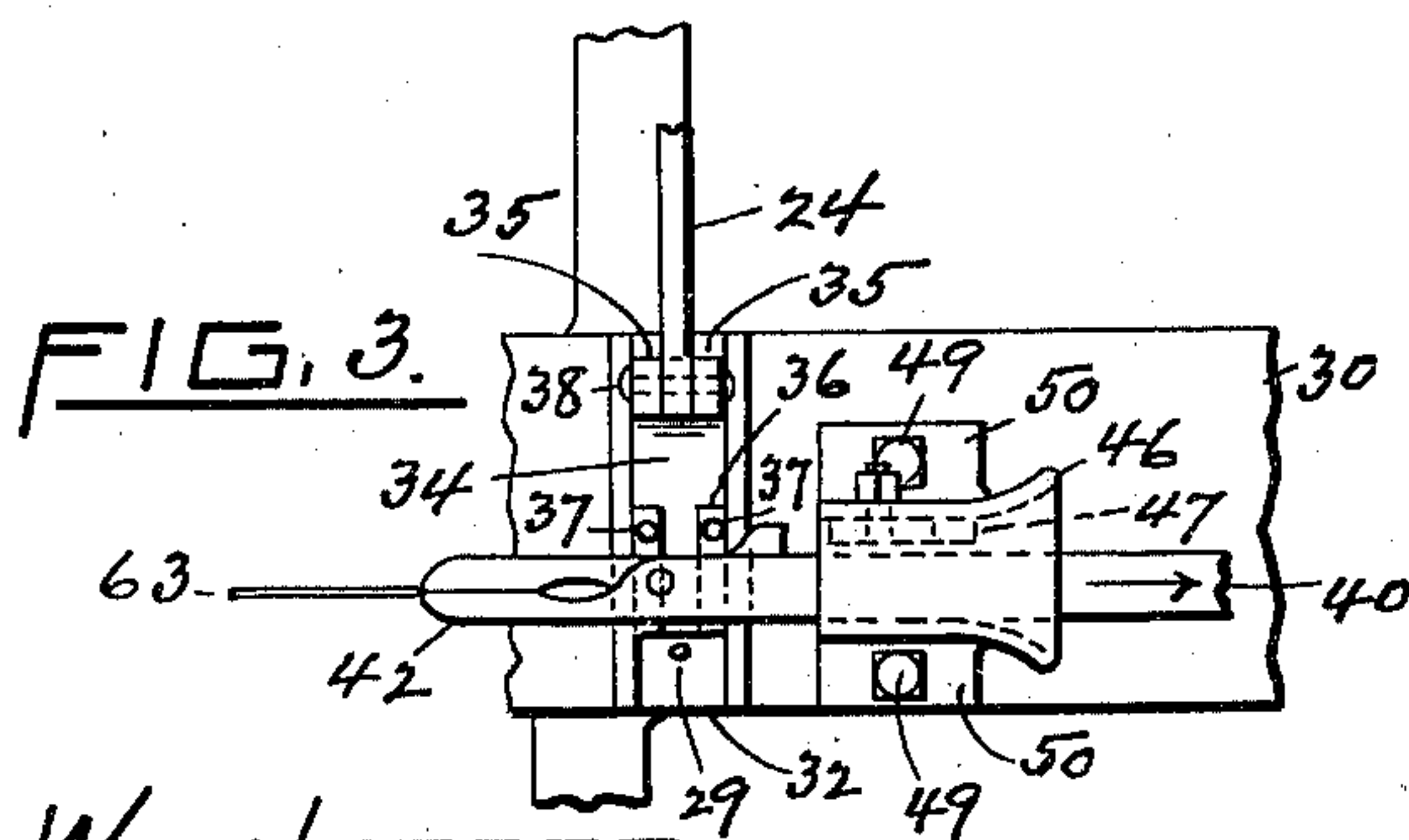
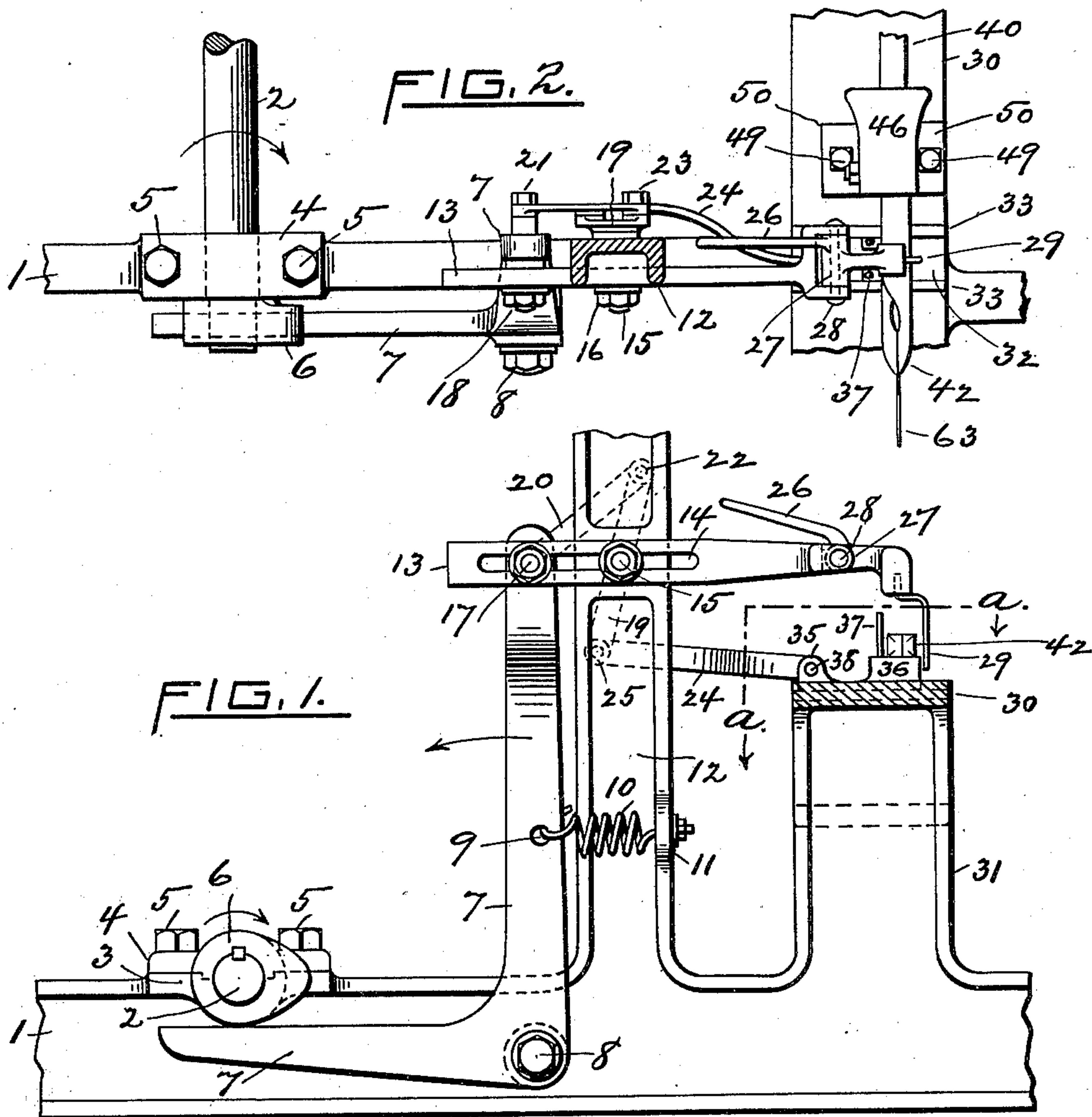
PATENTED MAR. 22, 1904.

J. B. GRAY.
HAIRCLOTH LOOM.

APPLICATION FILED APR. 21, 1903.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES.

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Elnor Walker

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John B. Gray.

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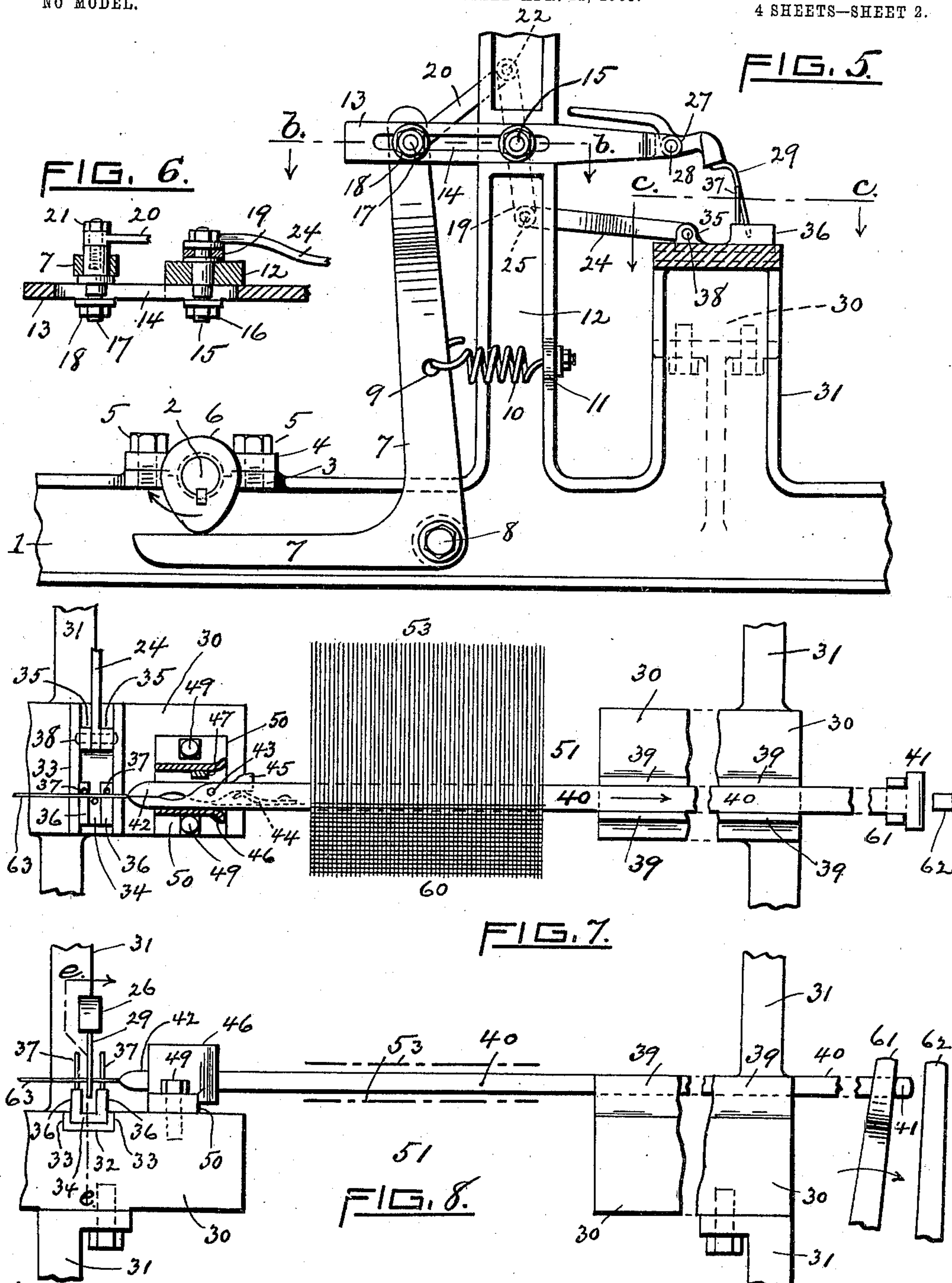
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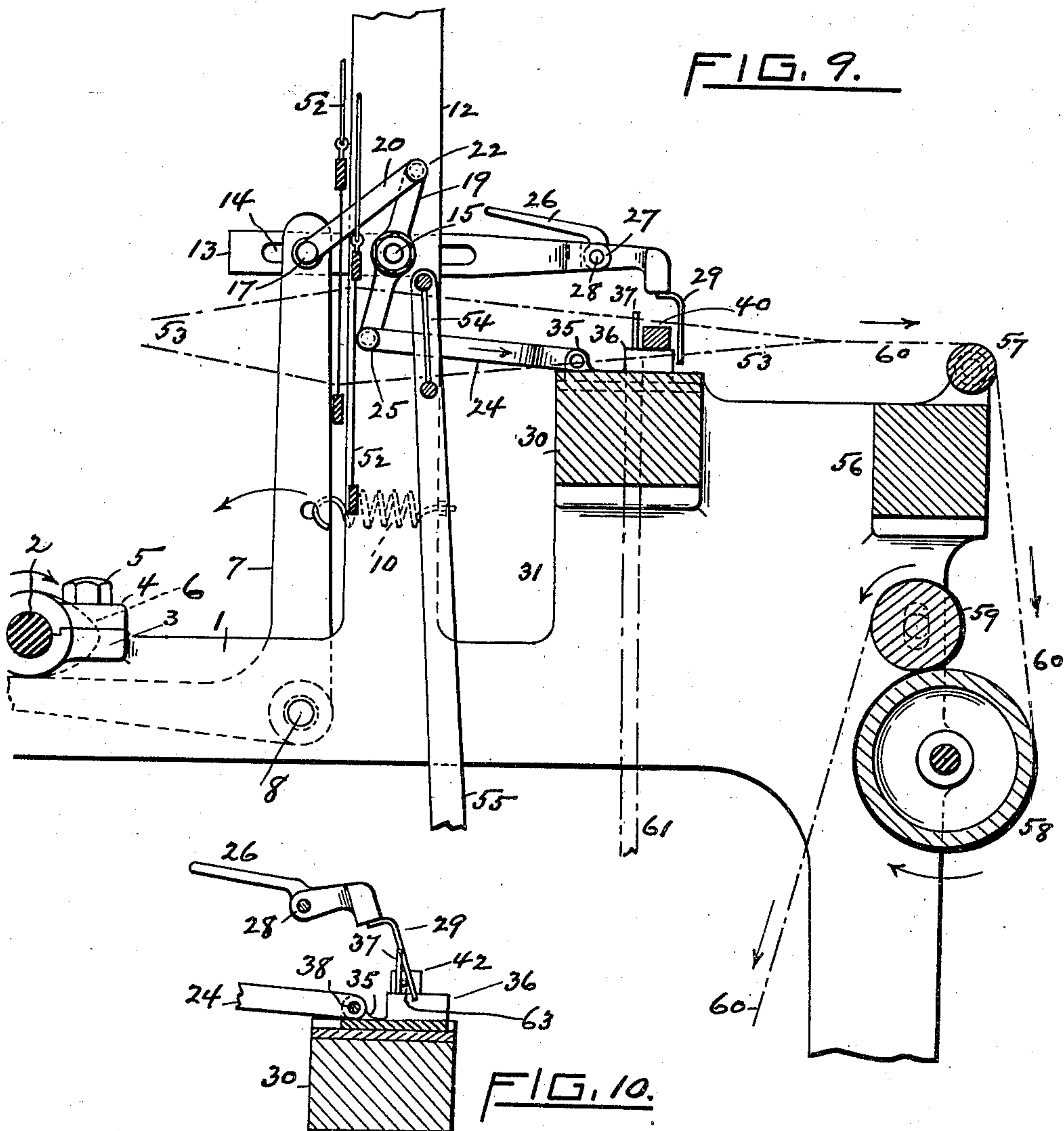
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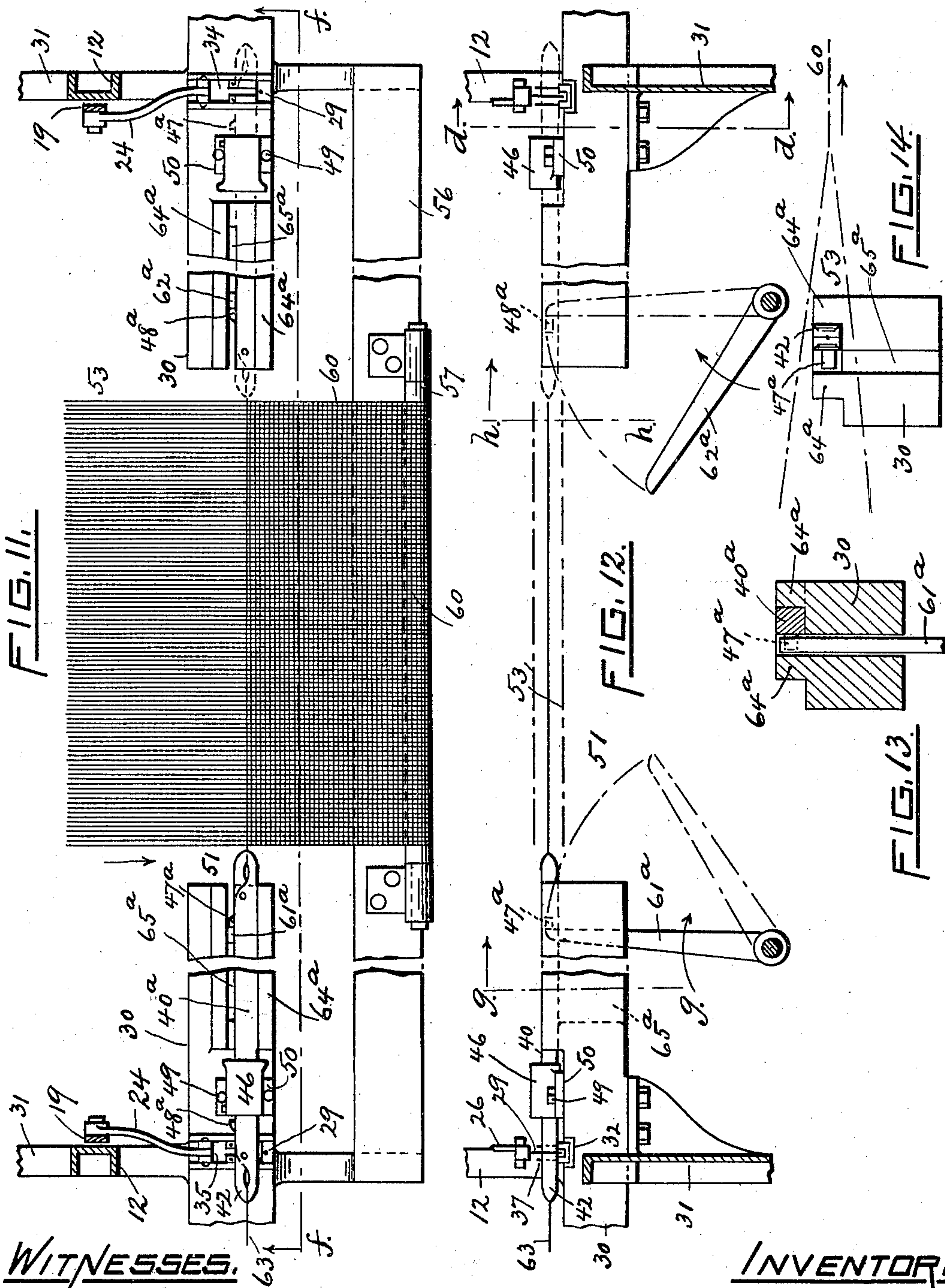
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

JOHN B. GRAY, OF CENTRAL FALLS, RHODE ISLAND.

HAIRCLOTH-LOOM.

SPECIFICATION forming part of Letters Patent No. 755,571, dated March 22, 1904.

Application filed April 21, 1903. Serial No. 153,688. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. GRAY, a citizen of the United States, residing at Central Falls, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Haircloth-Looms, of which the following is a specification.

My invention relates to looms for weaving haircloth; and it consists of the novel construction and combination of the several parts, as hereinafter described, and specifically set forth in the claims.

Like numerals indicate like parts.

Figure 1 is a side elevation of the weft tension device constituting a part of my invention as seen in its normal position. Fig. 2 is a top plan view of the same. Fig. 3 is a top plan view as seen on line *a a* of Fig. 1. Fig. 4 is a front elevation of the parts shown in Fig. 3. Fig. 5 shows in side elevation the same parts of my invention as are shown in Fig. 1, but in their operative position. Fig. 6 is a detail view as seen on line *b b* of Fig. 5. Fig. 7 is a top plan view as seen on line *c c* of Fig. 5, showing the web and cloth, the nipper and guide therefor, and the weft tension device in operation. Fig. 8 is a front elevation of the parts shown in Fig. 7. Fig. 9 is a rear side elevation of parts shown in Fig. 1 as seen on line *d d* of Fig. 12, together with the frame of the loom, the cloth-rolls and sand-roll, the picker-stick, vibrating reed, and harnesses. Fig. 10 shows in side elevation as seen in line *e e* of Fig. 8 the weft tension device. Fig. 11 is a top plan view similar to Fig. 7, but showing a double nipper and duplicate parts to operate it. Fig. 12 is a front elevation as seen on line *f f* of Fig. 11. Fig. 13 is an enlarged sectional view as seen on line *g g* of Fig. 12. Fig. 14 is an enlarged sectional view as seen on line *h h* of Fig. 12.

In the drawings, 1 represents the frame of the loom. The main shaft is shown at 2 and is mounted in the semitubular bearing 3 and covered at its end by the semitubular cap or cover 4, which is secured in place by the bolts 5. A cam 6 is fastened by a spline on the end of the shaft 2 and rotates therewith.

A bent lever 7 is pivotally mounted on a

bolt 8, which is fastened to the frame 1, and the upper edge of its horizontal portion is in contact with the cam 6. The lever 7 has in its vertical portion a hole 9, and a spring 10 is hooked at one of its ends in said hole 10 and is fastened at its opposite end in the ear 11 of the flange of an upright beam or part of the loom-frame.

A sliding bar 13, having a longitudinal slot 14, is mounted loosely on the shank of a bolt 15, which extends through the upright beam 12 of the loom-frame and is held from displacement therefrom by the nut 16, which engages the end of said bolt. A clamping-bolt 17 passes through the slot 14 of the sliding bar 13 and through a hole near the upper end of the lever 7. A nut 18 clamps the bolt 17 in position.

On the bolt 15 is mounted loosely the rocker-bar 19. A link bar 20 is loosely mounted at its lower end on the bolt 17 and is there held from displacement by the nut 21 and at its upper end is loosely connected by the bolt 22 to the upper end of the rocker-bar 19 and there held from displacement by the nut 23. A link bar 24, which is bent as seen in Fig. 2, is loosely connected at one end with the lower end of the rocker-bar 19, as illustrated at 25. The forward end of the sliding bar 13 is bifurcated, as seen in Fig. 2, and an oscillating lever 26 is there pivotally mounted by its hub 27 on a pin 28. The longer arm of this lever extends to the rear from the hub 27 of said lever and in a direction parallel to the sliding bar 13, as best seen in Fig. 2, while the shorter arm of said lever 26 extends to the front and constitutes the head, which is the heavier end. In the head of this oscillating lever 26 a wire or rod 29 is secured, which is bent and extends downwardly, as plainly shown in Figs. 1, 4, 5, 8, 9, and 10.

My improved loom for weaving haircloth does not have a vibrating lay, as heretofore common, but has two beams 30 30, each of which is rigidly secured upon each upright end frame 31 31, constituting a part of the loom-frame. One of the beams 30 has a guide-way 32 across the top thereof, and this guide-way is as long as said beam is wide and hav-

ing on its opposite sides the parallel flanges 33 33. A sliding plate 34 is mounted on said guideway 32 between the flanges 33 thereof and is provided with two ear-pieces 35 and two uprights 36 36. In these uprights 36 are two vertical stiff wires or rods 37 37. The forward end of the link bar 24 is pivotally mounted between the ear-pieces 35 on a pin 38, which passes through said link bar 24 and ear-pieces 35, as seen in Figs. 1 and 3. On the top of the other beam 30, which extends parallel with the first beam 30, are two parallel guides 39, leaving an intermediate channel or passage, in which is slidably mounted the nipper-bar 40. The bar 40 has a cross-head 41 at one end and on the opposite end the nipper 42. The nipper 42 comprises a fixed jaw and a movable jaw, as seen in Figs. 2, 3, 7, and 11. The detail of the construction of the nipper and its associated parts is best shown in Figs. 3, 4, and 7. The movable jaw is pivotally connected at 43 with the rigid jaw, and a spring 44, (see Fig. 7,) fastened to the nipper-bar 40, has its free end in forcible contact with the inner end of the movable jaw, thus normally closing the movable jaw against the rigid jaw. Said movable jaw is provided with an outwardly-extending projection 45. The nipper 42 and nipper-bar 40 have a reciprocating movement through a guide-box 46. In this box 46 is pivotally mounted a tripping-latch 47 (shown in dotted lines in Figs. 3 and 4) and which is normally in the position shown in Fig. 4. The guide-box 46 is fastened to the fixed beam 30 by bolts 49, which pass through flanges 50 of said guide-box 46.

As seen in Figs. 7, 8, 11, and 12, the beams 30 30 terminate inwardly from each of the upright end frames 31 31 for the purpose of providing an opening (designated in the drawings as 51) for the passage of the reed in order to beat up the weft.

In Fig. 9 are shown the harnesses 52, operated by the usual means (not shown) and forming the shed 53 of warp-threads in the well-known manner. The reed is seen at 54 and is mounted on vibrating arms 55, operated by cranks (not shown) in the same manner as lay-swords are commonly vibrated. The breast-beam of the loom is seen at 56, the cloth-rolls at 57 and 58, and the sand-roll at 59. The woven fabric is represented by dotted lines (marked 60) and passes over the rolls 57 and 58 to the cloth-beam, (not shown,) the tension being obtained by the sand-roll 59, as heretofore common. The nipper-bar 40 is driven through the shed 53 along the top of the fixed beams 30 30 by means of the picker-sticks 61 62, which are moved by the well-known mechanism. (Not shown.) The picker-stick 61 strikes against the cross-head 41 and has its upper end forked, so as to straddle the bar 40. This picker-stick moves the nipper-bar

in the direction indicated in Fig. 7 by the arrow when said picker-stick is moving in the direction indicated by the arrow in Fig. 8. The opposite movement of the nipper-bar 40 is caused by the blow of the picker-stick 62 against the outer surface of the cross-head 41.

Having thus specified and described the several parts of my invention, I will now explain the mode of its operation. When the parts shown in Fig. 1 are in the position there represented, the nipper 42 is approaching the left-hand fixed beam 30 and is about to seize one hair from the bunch of hair, (which is there in its usual place, but not shown in the drawings.) The upper portion of the lever 7 is then in its vertical position. The outer end of the lever 26, which carries the head thereof, extends in line with the slotted bar 13, and the wire or rod 29 is vertical and in front of the path of the nipper 42, while the two wires or rods 37 are in their most remote position from the wire or rod 29 and are to the rear of the path of the nipper 42. These parts (except the nipper 42) remain in their respective positions, while the nipper 42 advances to the bunch of hairs and seizes one (designated in the drawings as 63) and moves toward the right, as represented in Fig. 2. The movement of the cam 6 on the main shaft 2 is so timed that as soon as the nipper 42 has moved to the right of said wires or rods 29 37 37 the cam 6 in rotating with the shaft 2 depresses the horizontal arm of the lever 7, and therefore carries the upper arm of said lever in the direction indicated by the upper arrow in Fig. 1, and thereby stretches the spring 10. This rearward movement of the upper end of the lever 7 draws the slotted bar 13 to the rear by reason of its connection therewith by the clamping-bolts 17, and said bar 13 slides along the bolt 15, which passes loosely through the slot 14 of said bar, and draws, with said bar 13, the lever 26, mounted thereon. By this rearward oscillation of the upper end of the lever 7 the parts shown in Fig. 1 move from the position there illustrated to the position shown in Fig. 5—that is, the link bar 20 draws to the rear the upper end of the rocker 19 and causes the lower end of the rocker 19 to move toward the front, so that the lower end of the rocker 19 pushes the link bar 24. The forward movement of the link bar 24 slides the plate 34 across the top of the left-hand fixed beam 30 and carries therewith the wires or rods 37 to the forward position, (shown in Figs. 5 and 7,) while at the same time the rearward movement of the slotted bar 13 carries back the lever 26 and the head thereof. The wire or rod 29 thus coming toward a position midway between that of the pins 37 37 moves into contact with the hair 63, and as it can pass no farther said wire 29 is tilted by said contact as the bar 13 moves to the rear. Consequently the lever 26 is tipped or tilted to the position illustrated

in Figs. 5 and 10. The parts shown in Fig. 5 retain their positions until the cam 6 turns sufficiently with the shaft 2 to allow the contractile force of the spring 10 to pull the upper arm of the lever 7 from its angular position (shown in Fig. 5) to its perpendicular position, (shown in Fig. 1,) whereupon the parts shown in Fig. 5 return to the respective positions represented in Fig. 1. The result of the movement of these parts of the machine is that the wires or rods 29 37 37 close in and bear snugly against the hair 63 while the nipper 42 is pulling it through the shed 53, thus subjecting the hair 63 to the requisite tension and preventing it from curling or kinking as it is being laid in. When the hair 63 thus constituting the weft-thread of the fabric 60 is properly passed through the shed 53 by the nipper 42 and so laid, the reed 54 moves forward and beats it up to its proper place in the fabric in close position with the weft-hair last previously laid in and beaten up. The harnesses 52 then shift the warps as usual, and a new shed is formed for the laying in of the next weft-hair. As seen in Fig. 9, the nipper 42 moves in a line or path upon the surfaces of the fixed beams 30 30, so that it passes in and out of the shed 53 without interfering with the warps. When the weft-hair 63 has been laid in, the wires or rods 29 37 37 move apart to their former positions, as the cam 6 is so placed and timed as to allow this separation of said wires or rods while the nipper-bar 40 is moving toward the left-hand fixed beam 30. The movements of the nipper-bar 40 are caused by the picker-sticks 61 and 62, as already explained. The opening and closing of the nipper is caused as follows: Normally the movable jaw of the nipper is closed by the upward pressure of the spring 44 against the rear end thereof, as seen in Fig. 7. When the nipper-bar 40 is moving to the left, as soon as the beveled forward edge of the projecting end of the movable jaw comes into contact with the tripping-latch 47 said outward end 45 of the movable jaw is depressed, and the forward end of the movable jaw is thereby elevated, so that the nipper 42 opens. The tripping-latch 47, as seen in Fig. 4, has its forward end so shaped that it bears up against the inner surface of the top of the box 46, and thus the lower (rear) end of said latch 47 offers a rigid resistance to the projection 45 of the nipper 42 as the latter is moving through the box 46 to the left; but as soon as the nipper-bar 40 passes to the left beyond, and consequently out of engagement with, the lower end of the tripping-latch 47 the spring 44 instantly elevates the rear end of the movable jaw, thus closing the forward end of the movable jaw and holding with great force the end of the hair 63 which it has just nipped. When the nipper-bar 40 moves to the right, as indicated by the arrow in Fig. 3, the nipper

42 does not release the hair 63, because the projection 45 of the movable jaw simply tilts up the lower end of the latch 47, (which is properly beveled on its forward lower edge for the purpose,) and so the nipper 42 maintains its hold on the hair 63 till it has carried it through the shed 53, where it is released by similar means (not shown) or in any suitable manner. The bar 13 is longitudinally slotted, as shown, to enable an adjustment of the weft tension device. The nearer to the rear end of the slot 14 of the bar 13 the bolt 17 is placed and clamped by the nut 18 the nearer to the weft 63 are the wires or rods 37 37.

In Figs. 11, 12, 13, and 14 I show a modification of said invention which consists practically of a duplication of parts and changes made necessary thereby. The principal modification is that the nipper-bar 40^a has nipper-jaws at both ends and that tension devices are provided at both ends of the fixed beams 30 30. Two picker-sticks 61^a 62^a are arranged to strike upon the tripping-latches 47^a 48^a of the nipper-bar 40^a to carry the latter to either end of the fixed beams. When the nipper-bar 40^a has gripped a hair, the picker-stick 61^a will enter a slotted opening 65^a, formed in each inner end of the fixed beams 30 30 and force inwardly the tripping-latch 47^a until the said picker-stick passes the same, when its spring 44 will have pressed the latch back to its normal position again. The picker-stick 61^a is now confined to the rear of the tripping-latch, as shown in Figs. 11 and 12, and which latch acts as a lug for the said picker-stick to strike against to carry the nipper-bar 40^a through the shed 53 to the opposite or right-hand fixed beam 30, after which movement the picker-stick 62^a will operate upon the other tripping-latch, 48^a, of the nipper-bar 40^a to carry the same back again to its former position. Guide-rails 64^a 64^a maintain the proper vertical position of the nipper-bar 40^a in moving on the fixed beams 30 30.

By having two beams secured upon the end frames of the loom the weft-carrying devices are mounted on a fixed support instead of being mounted on an oscillating support, which is subjected to heavy jars and concussion, and herein the weft-carrying devices are capable of more exact and quicker action and are relieved from all dangers or injurious results caused by change of center of gravity, centrifugal force, or momentum transversely of the lay, as where the lay vibrates frequently and regularly with great force and with rapid and repeated changes in the direction of movement. The reed 54 vibrates instead of the lay and is mounted on swords or lever-arms 55 for the purpose; but being very light it moves rapidly and beats up the weft into the fabric.

The movement of the tension-rods 29 37 37,

as described, holds the hair 63 tightly drawn, yet allows the hair to slide through as it is pulled by the nipper 42, and thus the weft-hair is laid straight in the shed of warps.

5 I claim as a novel and useful invention and desire to secure by Letters Patent—

1. In a haircloth-loom, the combination of two fixed beams, a nipper-bar movable on the beams and provided with nipper-jaws, and a
10 weft tension device, arranged and operating substantially as and for the purpose specified.

2. In a haircloth-loom, the combination of two fixed beams, a nipper-bar movable on the beams and provided with nipper-jaws, and a
15 weft tension device comprising wires movable crosswise of the beams into forcible contact with the weft on opposite sides thereof, substantially as described.

3. In a haircloth-loom, the combination of
20 two fixed beams, a nipper-bar movable on the beams and provided with nipper-jaws, a guideway extending across the beams, a movable plate mounted in said guideway and having two upright posts or rods, a third post or rod
25 properly mounted, and means adapted to move said three posts or rods into forcible contact with a weft on opposite sides thereof, substantially as described.

4. In a haircloth-loom, the combination of
30 two fixed beams, a nipper-bar movable on the beams and provided with nipper-jaws, a guideway extending across the beams, a slidable plate in said guideway having two upright posts or rods, means for giving a reciprocating movement to said plate, an oscillating arm
35 properly mounted above the upper ends of said posts or rods, and a downwardly-extending rod mounted on said oscillating arm and extending in a vertical plane between said two
40 upright posts or rods and adapted to be oscillated with said arm by the contact of its lower end against the weft, substantially as specified.

5. In a haircloth-loom, the combination of
45 two fixed beams, a nipper-bar movable on the beams and provided with nipper-jaws, a guideway extending across the beams, a slidable plate in said guideway having two upright posts or rods, means for giving a reciprocating movement to said plate, a bar properly
50 mounted and adapted to slide upon a support, means adapted to impart a reciprocating movement to said sliding bar, and a lever pivotally mounted on said sliding bar and provided at its outer end with a downwardly-directed rod which extends in a vertical plane
55 between said two upright posts or rods, which downwardly-extending rod when moved into contact with the weft is capable of imparting an upward oscillation to the outer end of said lever, substantially as described.

6. In a haircloth-loom, the improved weft tension device herein described, consisting of

the combination of a sliding bar properly mounted, means adapted to give a reciprocating movement to said bar, a centrally-mounted rocker-arm, a link connecting said sliding bar and the upper end of said rocker-arm, two fixed beams, a guideway across said beams, a sliding plate in said guideway, a link connecting
65 said sliding plate and the lower end of said rocker-arm, two upright posts on the sliding plate, a tilting lever mounted at the end of the sliding bar, and a downwardly-directed rod extending from the outer end of said lever in a vertical plane between said two upright posts or rods, all operating substantially as shown and for the purpose specified.

7. In a haircloth-loom, the improved weft tension device herein described, consisting of
80 the combination of a rotatable shaft, a cam mounted on the shaft, a bent lever pivotally mounted at its bend on a proper support, with the upper edge of the horizontal portion of said bent lever in contact with said cam, a
85 spring adapted to give return movement to said bent lever, when the latter is relieved of the pressure of said cam, a slotted bar mounted movably on a fixed pivot, a rocker-arm centrally mounted on said pivot, a link connecting
90 said slotted bar with the upper end of the rocker-arm, two fixed beams, a guideway across said beams, a sliding plate in the guideway, a link connecting the sliding plate and the lower end of the rocker-arm, two upright
95 posts on the sliding plate, a tilting lever mounted at the forward end of the slotted bar, and a downwardly-directed rod extending in a vertical plane parallel with but between said two upright posts or rods, substantially as specified.

8. In a haircloth-loom, the combination of two fixed beams, a nipper-bar movable on the beams and provided with nipper-jaws, a weft tension device comprising wires movable
100 crosswise of the beams into forcible contact with the weft on opposite sides thereof, and means of adjusting said tension device in relation to the weft, substantially as shown.

9. In a haircloth-loom, the combination of a nipper-bar properly mounted, means to impart a reciprocating movement to said nipper-bar, a nipper-jaw pivotally mounted on the nipper-bar and having an outwardly-projecting rear end, a guide-box through which the nipper-bar is movable, and a pivotally-mounted latch within the guide-box adapted to contact with said projection of the nipper-jaw, substantially as and for the purpose specified.

10. In a haircloth-loom, the combination of a nipper-bar properly mounted, means to impart a reciprocating movement to said nipper-bar, a nipper-jaw pivotally mounted on the nipper-bar and having an outwardly-projecting rear end, a guide-box through which
105 the nipper-bar is movable, a pivotally-mount-

ed latch within the guide-box adapted to contact with said projection of the nipper-jaw on the outer side of said projection, and a spring properly mounted and bearing on the inner
5 side of said projection and adapted normally to close said nipper-jaw, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN B. GRAY.

Witnesses:

ELMER WALKER,
JOSEPH F. LOCKE.