No. 865,283. PATENTED SEPT. 3, 1907.

W. WATTIE.

CANE LOOM.

APPLICATION FILED FEB. 3, 1905

2 SHEETS—SHEET 1.

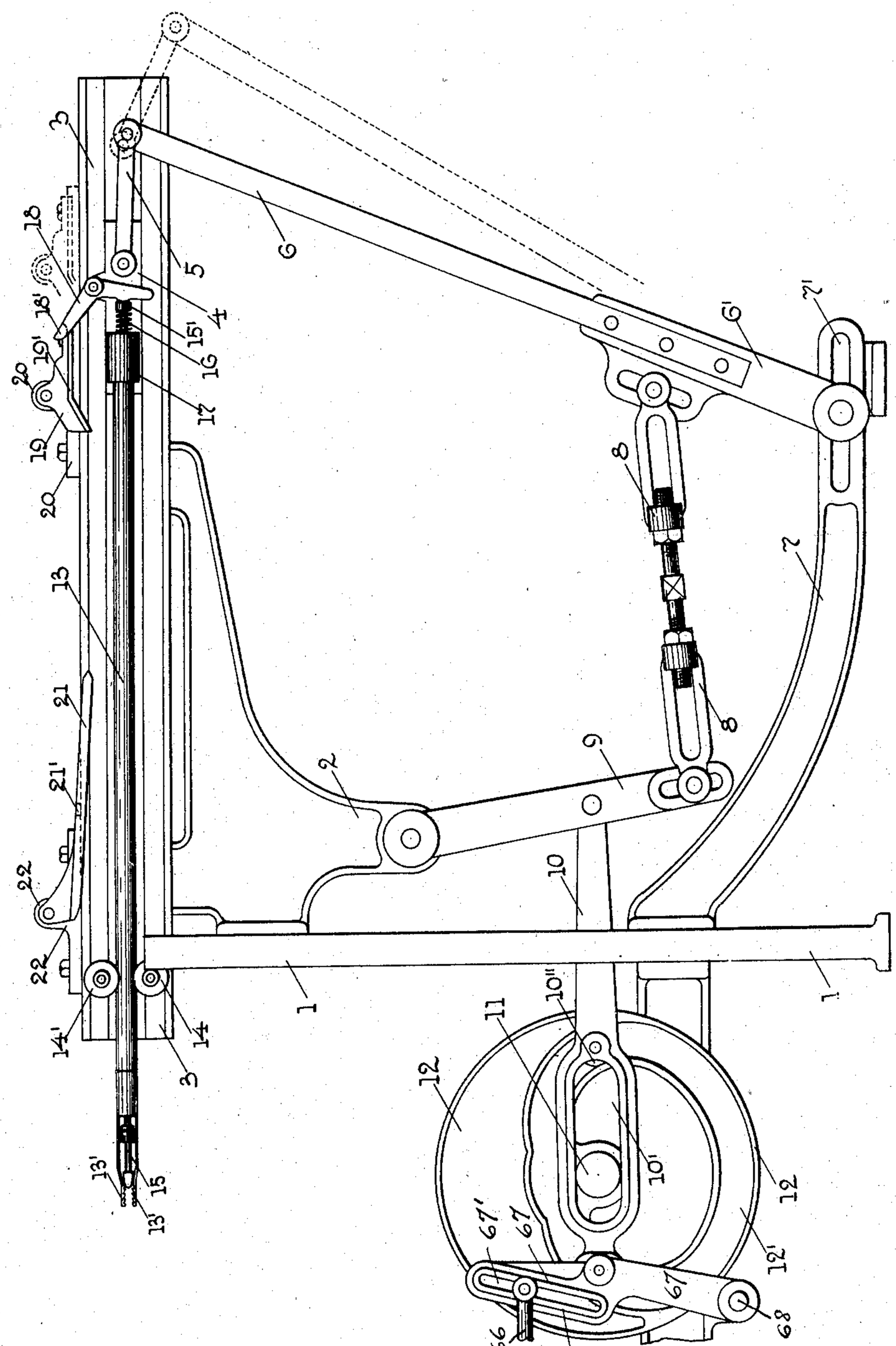


Fig. 1

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7 SHEETS—SHEET 2.

Fig. 2.

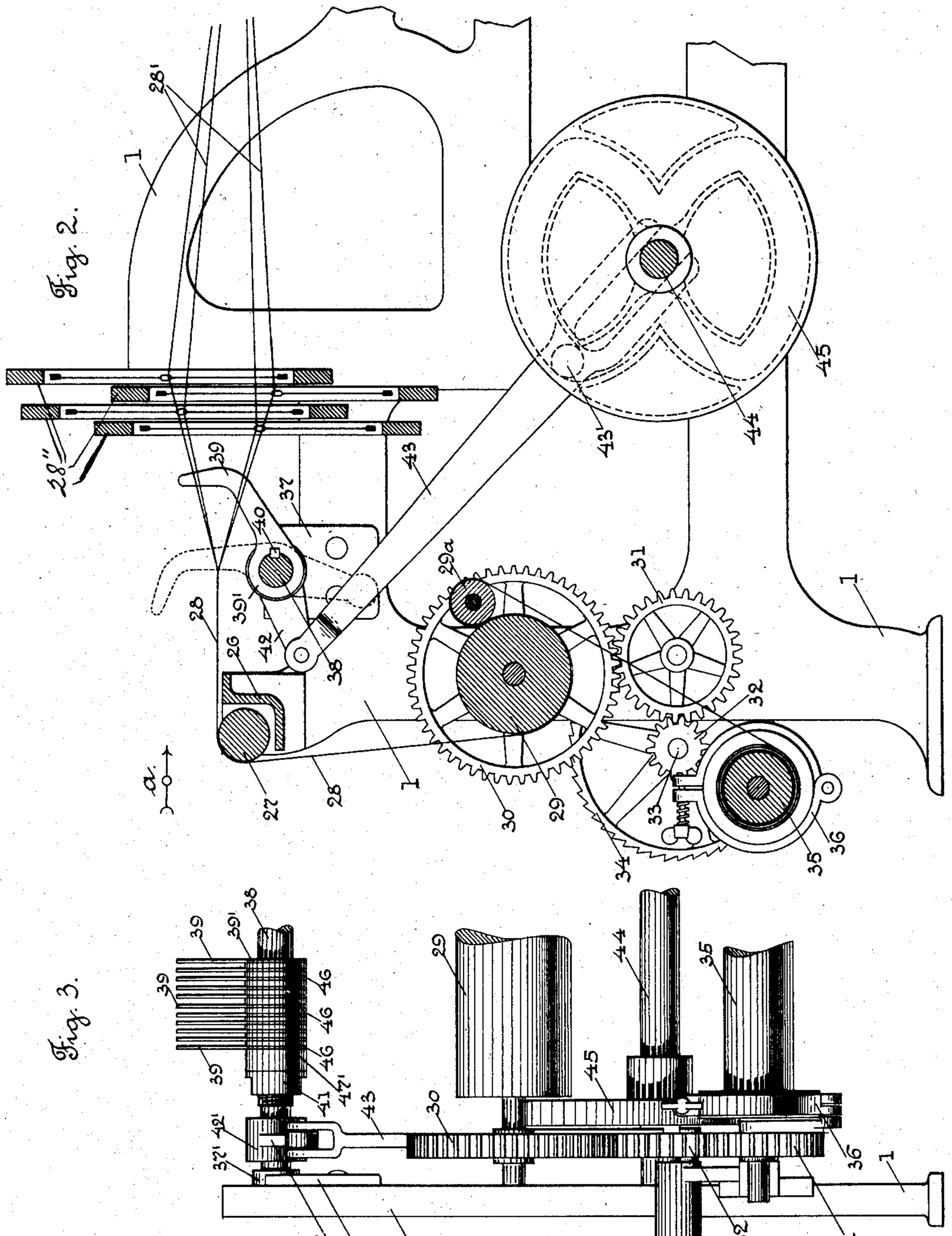


Fig. 3.




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7 SHEETS—SHEET 3.

Fig. 4.

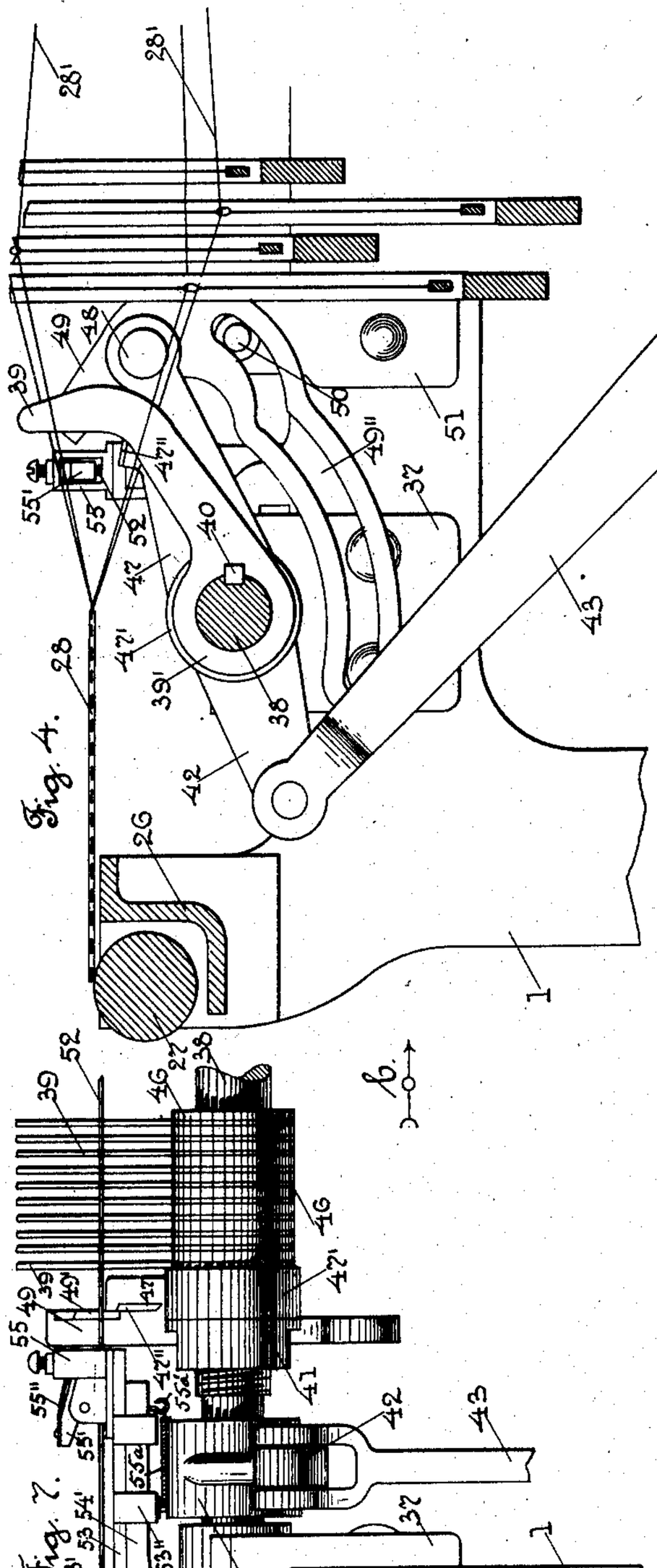


Fig. 5.

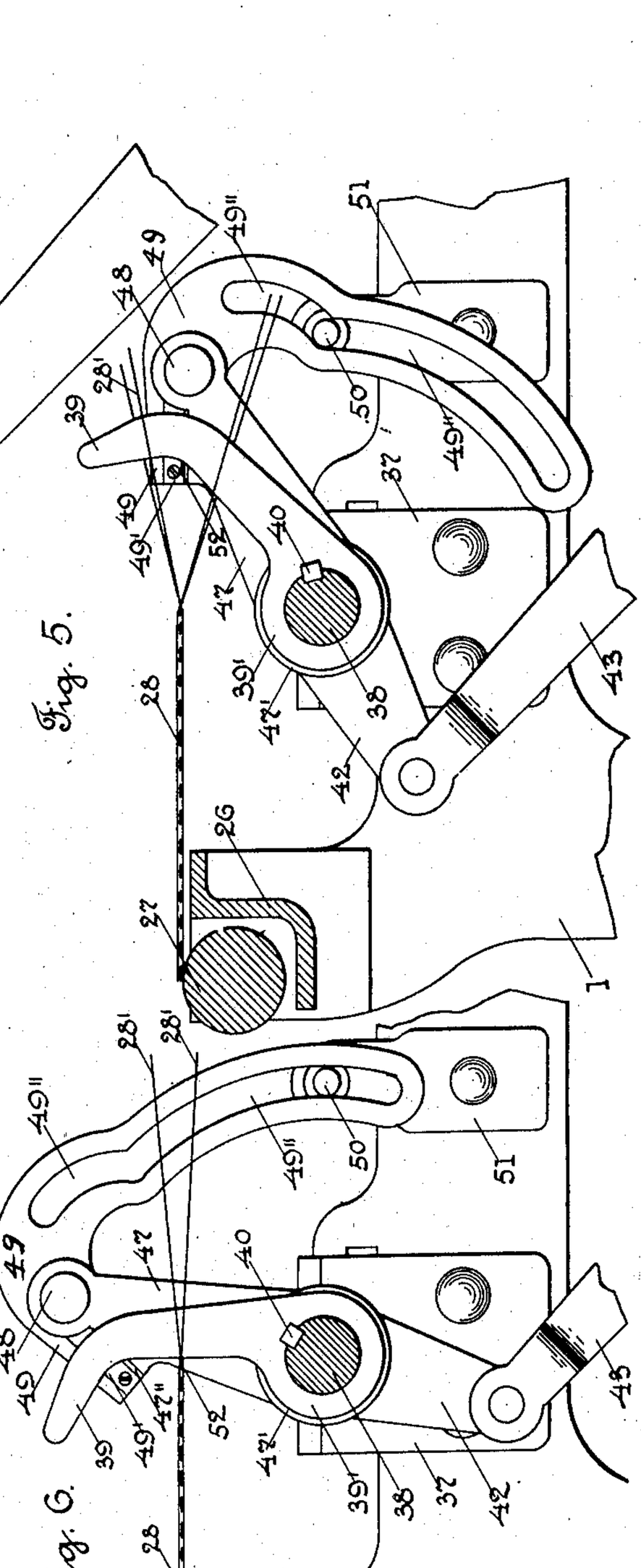


Fig. 7.




Fig. 6.




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7 SHEETS—SHEET 4.

Fig. 8.

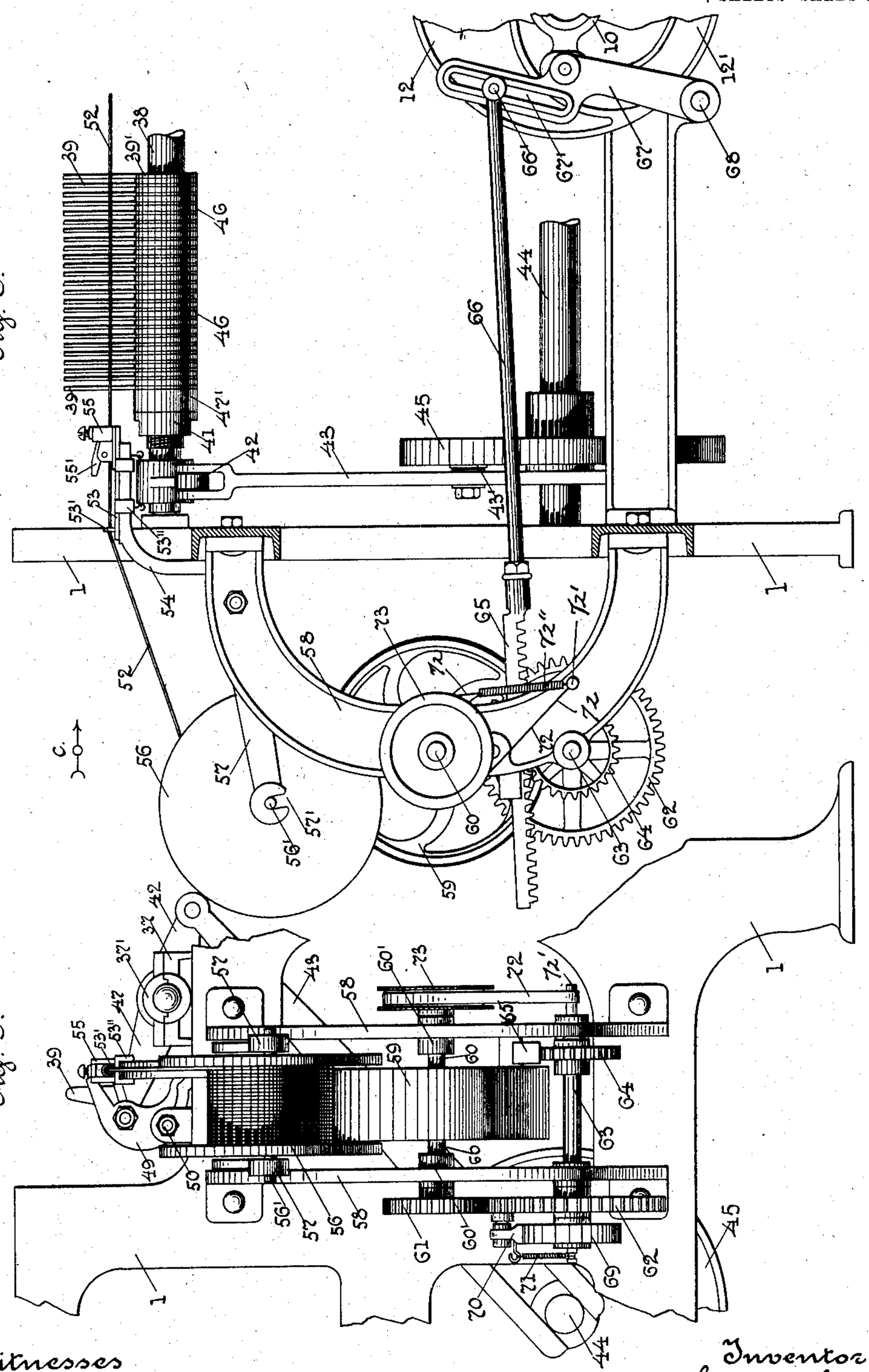


Fig. 9.




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7 SHEETS—SHEET 6.

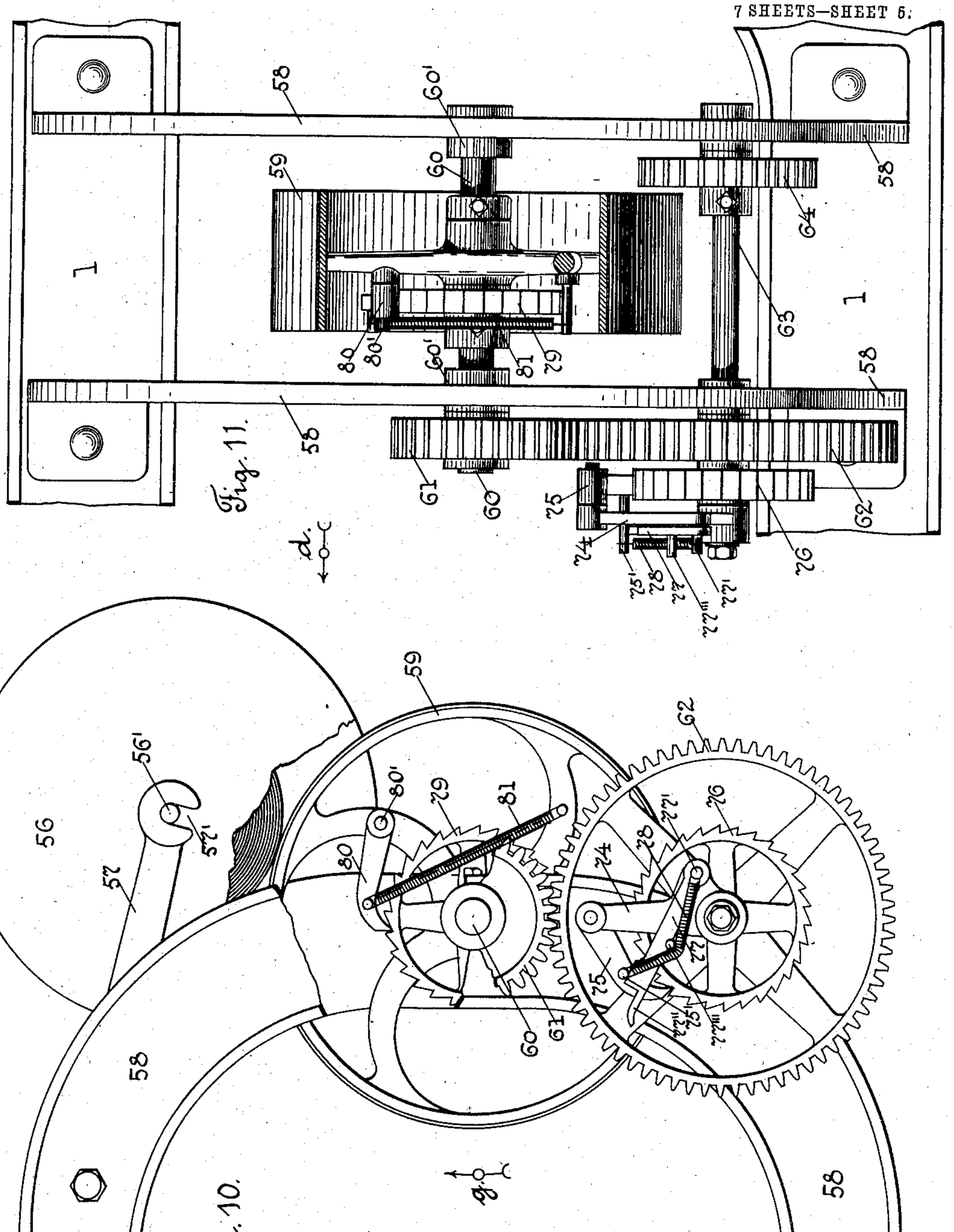
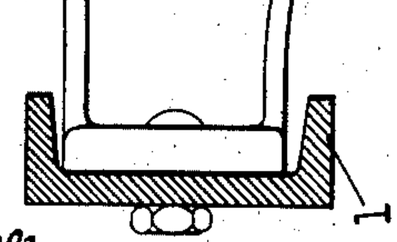
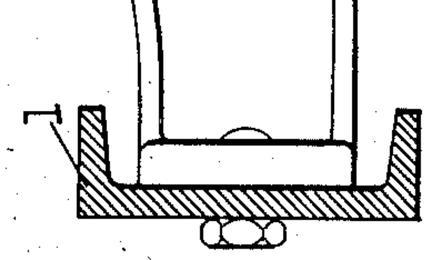



Fig. 11.




Fig. 10.

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## CANE LOOM.

APPLICATION FILED FEB. 3, 1905.

7 SHEETS—SHEET 6.

Fig. 13.

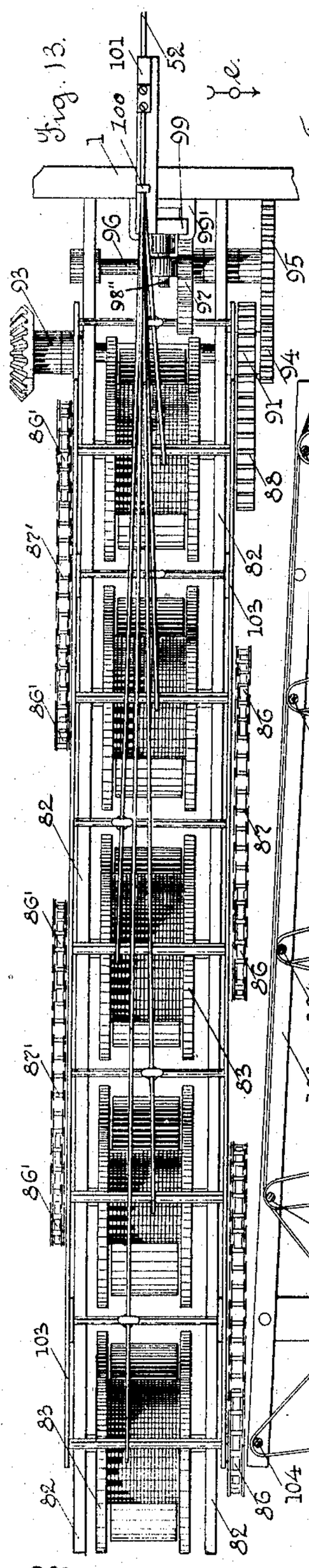
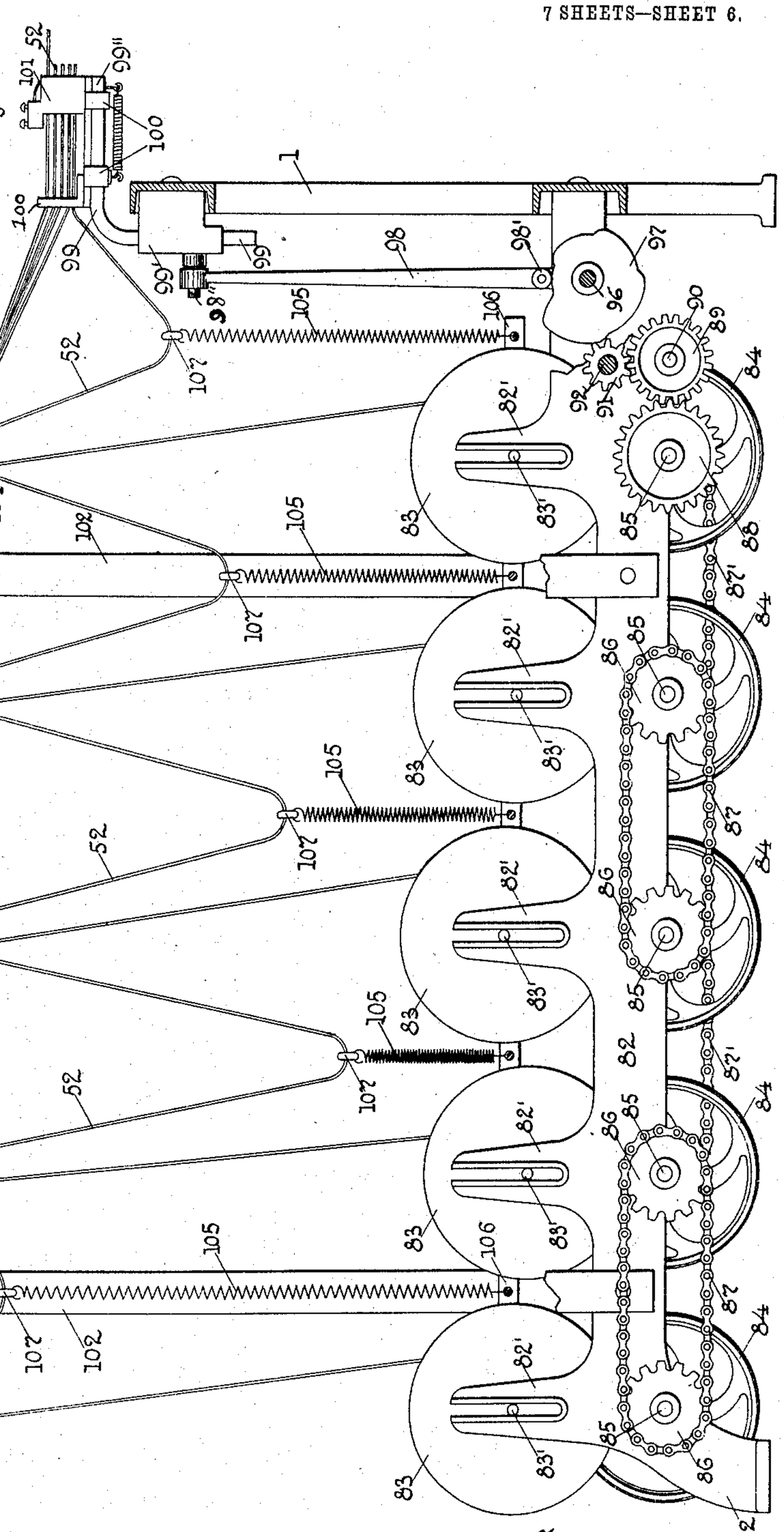



Fig. 12.

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## CANE LOOM.

APPLICATION FILED FEB. 3, 1905.

7 SHEETS—SHEET 7.

Fig. 15.

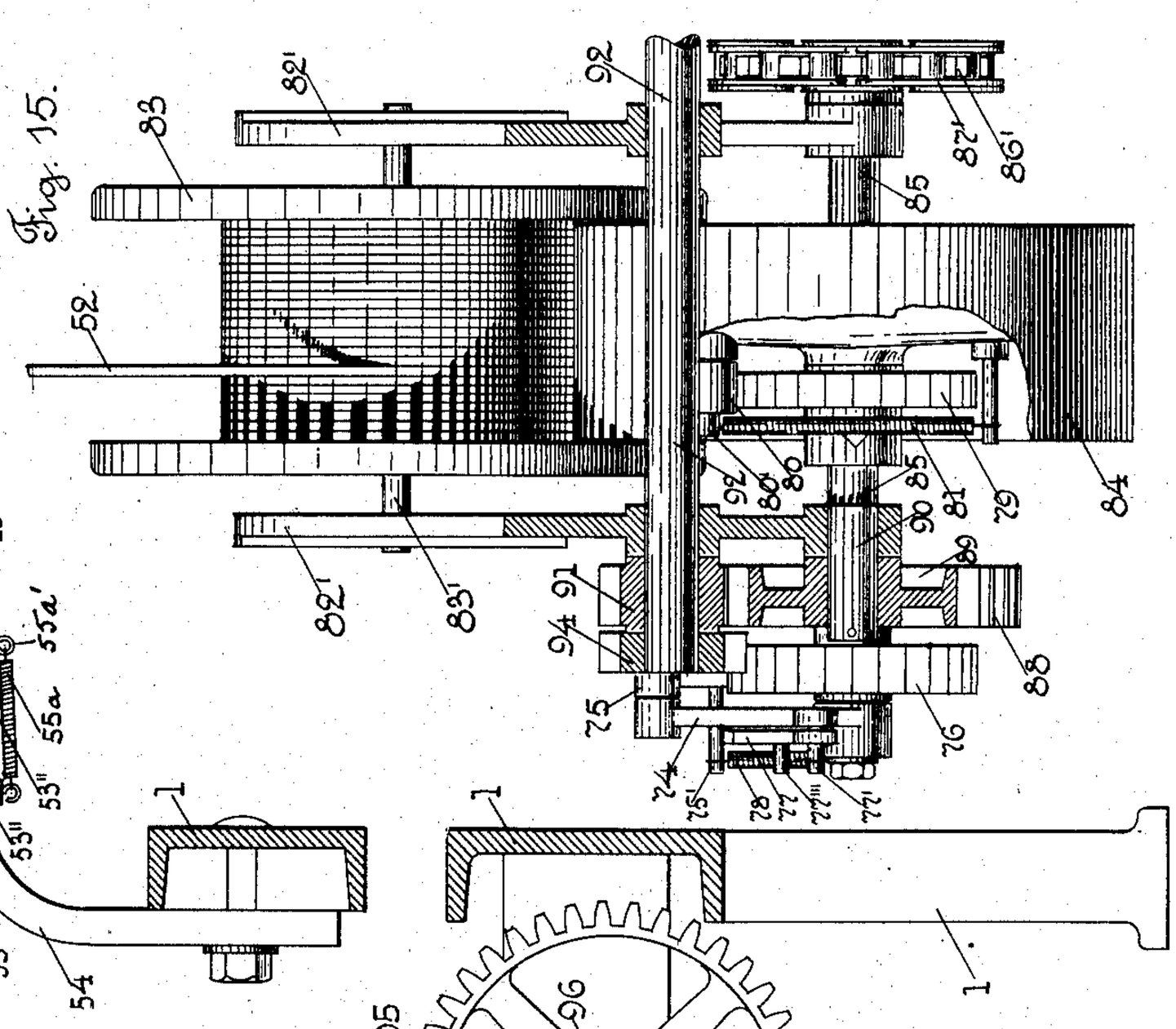
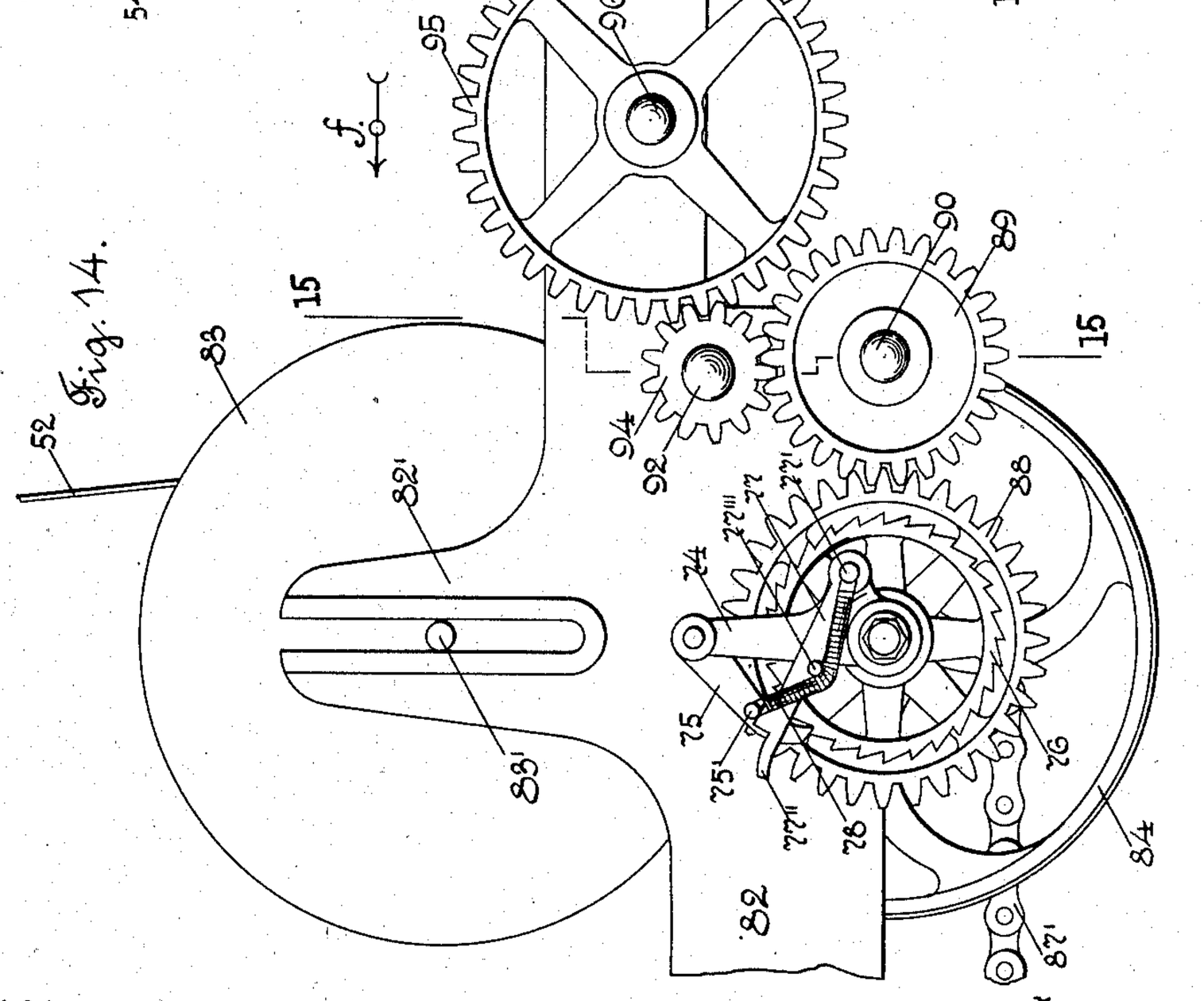



Fig. 16.

Fig. 14.

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# UNITED STATES PATENT OFFICE.

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## CANE-LOOM.

No. 865,283. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed February 3, 1905. Serial No. 243,925.

*To all whom it may concern:*

Be it known that I, WILLIAM WATTIE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Cane-Looms, of which the following is a specification.

My invention relates to cane looms, or looms for weaving cane seats, or covering for chairs, seats, lounges, etc.

My invention particularly relates to improvements in the filling needle motion, in the beating up motion, in the shearing motion, in the cane filling let-off motion, and in a multiple let-off mechanism for the cane filling.

My invention consists in certain novel features of construction of my improvements as will be hereinafter fully described.

I have only shown in the drawings sufficient parts of a cane loom, embodying my improvements, to enable those skilled in the art to understand the construction and operation thereof.

Referring to the drawings:—Figure 1 is a detached view of the cane filling needle motion embodying my improvements. Fig. 2 is a sectional elevation of the mechanism for beating up the cane filling. Fig. 3 is a front view of some of the parts shown in Fig. 2, looking in the direction of arrow *a*, same figure; the breast beam, the roll thereon, the harnesses, and some other parts shown in Fig. 2, are not shown in this figure. Fig. 4 is, on an enlarged scale, a view of a part of the motion for beating up the cane filling shown in Fig. 2, and shows the cutting off or shearing mechanism combined therewith. Fig. 5 corresponds to Fig. 4, but shows a different position of some of the parts shown in Fig. 4. Fig. 6 corresponds to Fig. 5, but shows a still different position of some of the parts shown in said figure. Fig. 7 is a front view of the parts shown in Fig. 4, looking in the direction of arrow *b*, same figure. Fig. 8 is a front view of the let-off motion for the cane filling. Fig. 9 is an end view of the parts shown in Fig. 8, looking in the direction of arrow *c*, same figure. Fig. 10 shows, on an enlarged scale, a modified construction of the cane filling let-off motion shown in Fig. 8. Fig. 11 is an end view of the parts shown in Fig. 10, looking in the direction of arrow *d*, same figure. Fig. 12 shows a multiple let-off mechanism for cane filling, of five different strands, with a portion of the gearing at the lower right hand end of the figure left off. Fig. 13 is a plan view of the parts shown in Fig. 12, looking in the direction of arrow *e*, same figure, showing the gearing left off in Fig. 12. Fig. 14 shows, on an enlarged scale, the gearing and ratchet mechanism left off in Fig. 12. Fig. 15 is a section, on line 15, 15, Fig. 14, looking in the direction of arrow *f*, same figure, with some of the parts broken away, and, Fig. 16 is a detached view of the inner end of the needle, and also of the cane filling holding device in its outward position.

I will first describe the cane filling needle motion, shown in Fig. 1. In said figure, 1 is the loom side or frame, 2 is a bracket or stand, secured upon the outer side of the frame 1, at its upper part. 3 is the horizontal support or guide way for the reciprocating needle carriage or block 4. A link or connector 5 connects the carriage 4 with the rocking lever or arm 6, attached at its lower end to a shoe 6′, which is pivotally mounted in an elongated slot 7′ in an arm or bracket 7 secured to the frame 1, and to the floor. The shoe 6′ of the lever 6 is connected, through an adjustable connector 8, with the lower end of the intermediate lever 9, pivoted at its upper end on the stand 2. The intermediate lever 9 is pivotally attached to the outer end of a cam lever 10, having an elongated slot or opening 10′ therein, through which extends the driven shaft 11, on which is fast a cam 12. The cam 12 has a cam groove 12′ in one face thereof, into which extends and travels a roll 10″ on the cam lever 10. The needle 13 is secured to the needle block or carriage 4, and has a reciprocating motion therewith in a horizontal plane, on the guide way 3. Rolls 14, and 14′, mounted on the guide way 3, guide the needle 13 at its front end. The needle 13 is provided with spring jaws 13′ on its inner end, to catch and grip the cane filling and draw it through the shed. The spring jaws 13′ are opened, as shown in Fig. 1, by means of a longitudinally sliding rod 15, which extends within the needle 13, with its outer end extending beyond the outer end of the needle, and having a compression spring 16 thereon, confined between the enlarged end 15′ on the sliding rod 15, and a boss 17 on the needle carriage 4. Pivotally mounted on the needle carriage 4 to move therewith, is an angle lever 18, one arm of which extends downwardly in the path of and adapted to be engaged by the outer end of the rod 15 within the needle 13, and the other arm of which has, in this instance a side projection 18′ thereon, which extends in the path of and is adapted to ride on a cam surface 19′ on a plate 19, in this instance pivotally mounted on a stand 20 on the upper surface of the guide way 3, at the outer end thereof, when the needle is in its outward position, as shown in Fig. 1. On the outward movement of the needle carriage 4 and the needle 13, the projection 18′ on the angle lever 18 rides up on the cam surface 19′, and causes the opposite arm of the angle lever 18 to push inwardly the rod 15 against the action of the spring 16, and open the spring jaws 13′, as shown in Fig. 1, to release the cane filling between the jaws. As the projection 18′ on the angle lever 18 passes off of the cam surface 19′, the spring 16 acts to move outwardly the rod 15, and rock the angle lever 18, allowing the jaws 13′ of the needle 13 to come together.

At the inner end of the guide way 3 is arranged a second cam surface 21, in this instance pivotally mounted at one end on a stand 22, bolted upon the upper side of the guide way 3, and having a side lug 21′ which rests upon the upper edge of the guide way 3. As the needle carriage 4 and the needle 13 move inwardly, the projection 18′ on the angle lever 18 rides up on the free end of the cam 21, and moves inwardly the other arm of the angle lever 18, to push inwardly the rod 15 and open the jaws 13′, preparatory to seizing the cane filling.

When the projection 18′ on the angle lever 18 passes off the inner end of the cam 21, the spring 16 acts to move outwardly the rod 15, and allow the jaws 13′ to close on the cane filling, as shown in Fig. 16. The end of the link 5 limits the rocking motion of the angle lever 18, between the end of said link and the outer end of the rod 15.

The operation of the angle lever 18, to positively open the spring jaws 13′, and the action of the spring 16 to close said jaws, at or near the inward and outward position of said needle, is repeated at each inward and outward movement of the needle.

In case of weaving cane of different widths, in order to regulate the time of the opening and closing of the needle jaws 13′, when the needle is in its outward position, the stand 20, carrying the cam plate 19 may be adjusted on the guide way 3, in the direction of the length of the guide way, for example in case of weaving a wider fabric, the stand 20 is moved outwardly, with the cam plate 19, as indicated by broken lines in Fig. 1, so that the needle carriage and needle will be moved outwardly a greater distance, before the angle arm 18 engages the cam surface 19′, to move the rod 15 and open the jaws 13′. The rod 8′ forming a part of the connector 8, and having a right hand thread on one end, and a left hand thread on the other end, is turned in the threaded bosses 8″ in one direction, to increase the length of the connector 8, and in the other direction to shorten the connector, in the usual and well known way.

By this construction cane of different widths may be woven on the same loom, without any waste of the cane filling.

I will now describe my improvements in the beating up motion for the cane filling, said motion being shown in Figs. 2, and 3 of the drawings. In my improvements the beating up mechanism is operated by a driven cam, so that the filling will be beaten up carefully and slowly. In said Figs. 2, and 3, 1 is the loom side or frame, 26 is the breast beam, 27 the guide roll at the front of the breast beam, over which the woven cane fabric 28 passes to the take-up mechanism, which may be of any well known construction, and which in this instance consists of the take-up roll 29 having a gear 30 thereon, driven through a gear 31, by a pinion 32 on a shaft 33, which carries a ratchet 34, operated by a pawl mechanism, not shown, in the ordinary way. The woven cane fabric 28 passes under the take-up roll 29, and over the guide and friction roll $29^a$ to the cloth roll 35, which is provided with a friction mechanism 36, in the ordinary way. The woven cane fabric 28 has in this instance four sets of cane warps 28′, each of which passes through a harness, 28″ which has a vertical reciprocating movement communicated thereto, in any ordinary and well known way, to produce the desired shed. All of the above parts may be of the ordinary and well known construction. The loom frame or side 1 has a stand 37 secured thereto, having a bearing 37′ thereon for a rocking shaft 38. The rocking shaft 38 has mounted thereon the hubs 39′ of a series of beating up blades 39. The hubs 39′ are preferably splined on the shaft 38, by a key 40, see Fig. 2, and rock with said shaft. A collar 41 on a threaded portion of the shaft 38, is screwed up to press the hubs 39′ of the beating up fingers 39 together, and bind them between said collar 41, and a similar collar, not shown, on the other end of the shaft 38. Fast on the end of the shaft 38, outside of the collar 41, is a hub 42′ of an arm 42. The arm 42 is pivotally connected with one end of a cam lever 43, the other end of the cam lever 43 has an opened end slot therein to receive a driven shaft 44. Fast on the driven shaft 44 is a cam 45, having a cam groove in one face, indicated by broken lines in Fig. 2, into which extends and travels a roll 43′ on the cam lever 43. The rotation of the cam 45 will, through roll 43′, cam lever 43 and arm 42, communicate at the proper time a rocking motion to the shaft 38, and the beating up fingers 39 fast thereon. The hubs 39′ of the beating up fingers 39 are preferably made of the same thickness as the finger portion, and separate collars 46 are mounted on the shaft 38 between the hubs 39′ of the beating up fingers 39, to hold said fingers at the proper distance apart to give a clearance for the thickness of the cane warps 28′. The beating up fingers 39 are so shaped, that in their extreme backward position, shown in Fig. 4, they extend above the cane warps 28 when in the upper plane of the shed, and act as a reed to separate and guide the warps.

I will now describe my improvements in the cutting off or shearing motion, shown in Figs. 4, 5, 6, and 7. In said figures, the same figures of reference are used for similar parts shown in the other figures. The rocking shaft 38 has fast thereon, between the collar 41 and the hub of the outer beating up finger 39, the hub 47′ of the upper shear or blade arm 47, see Fig. 7, which has a cutting blade 47″ on its outer upper part. The outer end of the arm 47 has a stud or pin 48 thereon, on which is pivotally mounted the upper end of the other shear or blade arm 49, having the cutting blade 49′ thereon. The blade arm 49 has an extension thereon, in which is a curved slot or groove 49″, and into said curved slot or groove 49″ extends a pin 50, at the upper end of a stand 51 secured to the loom frame. The rocking of the shaft 38, in the manner above described, will operate the two shears or blades 47, and 49, to move them from the position shown in Fig. 4, with their cutting surfaces open, to the position shown in Fig. 5, with their cutting surfaces closed upon the cane filling 52, as shown in Fig. 5, to cut the same. The continued rocking motion of the shaft 38, to carry the beating up fingers 39 from the position shown in Fig. 5, to the position shown in Fig. 6, will move forward the cutting shears or blades 47 and 49, from the position shown in Fig. 5 to the position shown in Fig. 6, but the position of the curved groove 49″, relative to the stud 50, is such, that there is no further closing movement of the blade arms 47 and 49, for the arc of the curve of the slot 49″ corresponds with the fulcrum or axis of the rotating rocking shaft 38. The cutting surfaces of the shears or blades 47 and 49, will be opened or moved apart, on

the return rocking motion of the shaft 38 and beating up fingers 39, from the position shown in Fig. 6 to the position shown in Fig. 4. The cane filling 52 passes from the roll on which it is wound through an eye 53′, on a longitudinally moving plate 53, which has guide lugs 53″ thereon, mounted and adapted to slide on the horizontal arm 54′ of the stand 54, see Fig. 16. The plate 53 carries a guide block 55, in which is pivotally mounted a lever 55′, actuated by a spring 55″, which lever, at its lower end, is adapted to bear on the projecting end of the cane filling 52, to hold it, preparatory to being gripped by the jaws 13′ of the needle 13, see Fig. 16. A spring 55ª is attached at one end to a hook 55ª′ on the horizontal arm 54′, and at its other end to one of the lugs 53″, and acts to hold the plate 53 and guide block 55 in their inward position, shown in Fig. 7, the engagement of the inner lugs 53″ with the hook 55ª′, limiting the inward motion of the plate 53. The object of giving the guide block 55 for the cane filling 52, a yielding longitudinal motion is, that if the inner end of the filling needle 13, in entering the shed, strikes against the guide block 55, it will push back said block, see Fig. 16. In case said guide block for the cane filling is rigidly attached, as is customary, the impact of the inner end of the filling needle thereon is liable to break the needle.

I will now describe my improvements in the let-off motion for the cane filling, shown in Figs. 8, and 9 of the drawings. In order to prevent the breaking of the cane filling, while pulling the same through the shed by the needle motion above described, it is desirable to unwind or let off the cane filling simultaneously with, and as fast as it is drawn through the shed by the needle motion, and also to keep the cane filling taut by an easy brake mechanism. In order to obtain these results, I have preferably constructed a let-off motion for the cane filling, which is connected to, and operated simultaneously with the needle motion.

Referring now to Figs. 8, and 9, in which the same figures of reference are used, to designate similar parts shown in the other figures. The spool 56 on which is wound the cane filling 52, has its projecting journals 56′ preferably mounted in open end slots 57′ in arms 57, pivotally attached at their inner end to brackets or stands 58 bolted to the loom side or frame. Extending directly below the cane filling spool 56, and between the heads of the spool, so that the cane wound on the spool will be supported thereon, and in frictional engagement therewith, is a rotatable drum 59, fast on a shaft 60. The shaft 60 is mounted in bearings 60′ on the stands 58, and has fast on one end thereof a pinion 61, which meshes with and is driven by a gear 62, loose on a shaft 63 mounted in bearings on the stands 58. The shaft 63 has a pinion 64 fast thereon, which is operated by a reciprocating rack 65 on the outer end of a rod 66. The inner end of the rod 66 has a pin 66′ thereon, which is adjustably secured in an elongated opening 67′ in the upper end of a lever 67, which is pivoted at its lower end on a pin 68 on the loom girth. The lever 67 is pivotally connected with the inner end of the cam lever 10, see Figs. 1, and 8. The movement of the cam lever 10, above described, in connection with the needle or cane filling motion, communicates, through lever 67, rod 66, and rack 65, rocking motion to the pinion 64 and the shaft 63, at the same time that the needle motion operates. On the shaft 63 is fast a ratchet wheel 69, Fig. 9, which is engaged by a pawl 70, pivotally mounted on a pin on the gear 62. A spring 71 holds the pawl 70 in engagement with the ratchet 69. The rotation of the ratchet 69 in one direction, will, through pawl 70, rotate the gear 62, and through pinion 61 in mesh therewith, rotate the shaft 60 and the drum 59 fast thereon. The drum 59 is preferably covered with sand paper, or some frictional surface, so that the rotation thereof will rotate the cane filling spool 56. A friction band or belt 72 passing around a grooved wheel 73 on the shaft 60, and attached to a pin or stud 72′ acts to prevent the drum 59 from overrunning, or rotating too much. It will be understood that as the needle motion is operated, and the needle is withdrawn from the shed, after it has entered the shed and gripped the cane filling to draw it through the shed, the rack 65 will be simultaneously operated, to operate, through the intermediate connections, the drum 59, and cause it to operate the cane filling spool 56, and let off therefrom an amount of cane filling 58, sufficient to extend through the shed the width of the fabric; the letting off of the cane filling corresponds to the movement of the needle which draws the filling through the shed.

In Figs. 10, and 11 is shown a modified construction of the cane filling let-off mechanism shown in Figs. 8, and 9. In said figures, the same figures of reference are used to designate the same parts shown in the other figures. On the rocking shaft 63, operated by the rack 65, (not shown, through pinion 64, see Fig. 11,) as above described, is fast a pawl arm 74, carrying a pawl 75 adapted to engage and operate a ratchet wheel 76, fast on the hub of the gear 62, loose on the shaft 63. A lever 77, pivoted at 77′ on the pawl arm 74, extends at its free end under a pin 75′ on the pawl 75, and has an extension 77″ thereon, by means of which said lever 77 may be raised, to disconnect the pawl 75 from the ratchet wheel 76. A spring 78, attached at one end to the pivot pin 77′ of the lever 77, and at its other end to a pin 75′ on the pawl 75, extends under a pin 77‴ on the arm 77, and acts to hold the pawl 75 in engagement with the ratchet wheel 76. When it is desired to throw the pawl 75 out of action, to leave the gear 62 free to be turned in either direction, the pawl 75 is raised, and the pin 75′ thereon moved into the notched outer end of the arm 77, to hold said pawl out of engagement with the ratchet wheel 76. The gear 62 loose on the shaft 63, meshes with the pinion 61 fast on the shaft 60. Also fast on the shaft 60 is a ratchet wheel 79, which communicates motion to the rotatable drum 59, loose on the shaft 60, through a pawl 80, pivoted at 80′ on one arm of the drum 59, and held in engagement with the teeth of the ratchet wheel 79 by a spring 81, see Fig. 10. It will be understood that the rocking of the shaft 63, through rack 65, will through pawl arm 74 fast on said shaft 63, and pawl 75 engaging the ratchet wheel 76, rotate said ratchet wheel loose on the shaft 63, and through the rotation of said ratchet wheel 76 will rotate the gear 62, and also rotate the pinion 61 fast on the shaft 60, and also the ratchet wheel 79 fast on said shaft 60, and through pawl 80 rotate the drum 59 in the direction of arrow *g*, Fig. 10, to rotate the cane filling spool 56, and let off the cane filling 52 thereon.

I will now describe the multiple let-off mechanism shown in Figs. 12, and 13. In said figures, there are five different spools of cane filling 52, each of which spools may have thereon a filling of a different color or character, if desired. At one end of the loom frame 1, and secured thereto, are two parallel stands or frames 82, each of which has an open end slotted bearing 82′ for the projecting journals 83′ on the cane filling spools 83. Extending directly below each cane filling spool 83 is a rotatable friction drum 84, fast on a rotatable shaft 85 arranged in bearings on the stands 82. The shaft 85 of the outer drum 84, shown at the left in Figs. 12, and 13, has a sprocket wheel 86 on one end, which is connected by an endless chain 87 with a sprocket wheel 86 on one end of the shaft 85 of the next rotatable drum 84. Said shaft 85 of said drum 84 has a corresponding sprocket wheel 86′ on its opposite end, see Fig. 13, which is connected by an endless chain 87′ with a sprocket wheel 86′ on one end of the shaft 85 of the adjoining drum 84. Said shaft 85 has a sprocket wheel 86 on its opposite end, which is connected by an endless chain 87 with a sprocket wheel 86 on one end of the shaft 85 of the adjoining drum 84. On the opposite end of said shaft 85 is a sprocket wheel 86′, connected by an endless chain 87′ with a sprocket wheel 86′ on one end of the shaft 85, see Fig. 13, of the adjoining drum 84, and on the opposite end of the shaft of said drum 84 is fast a pinion 88, which meshes with an intermittent gear 89 on a stud 90, and is driven by a pinion 91 fast on a driven shaft 92, which has on its opposite end a bevel gear 93, see Fig. 13, which is in mesh with and is driven by another bevel gear, not shown. The driven shaft 92 has a second pinion 94 thereon, see Fig. 13, which meshes with a gear 95, on the shaft 96, carrying a cam 97 fast thereon. A roll 98′ on a vertically moving rod 98, rides on the periphery of the cam 97, and is connected at its upper end through a stud 98″ with a vertically moving bar 99, supported and having a vertical movement in guide ways 99′, see Fig. 13, secured to the loom frame. The vertically moving bar 99 has a horizontally extending arm 99″ thereon, carrying a guide 100 for the five cane filling strands 52, and also carrying a guide block 101, and friction mechanism, corresponding to what is shown and described above in connection with the guide block 55. Extending up from the stands 82 are uprights 102, see Fig. 12, and upon the upper ends of said uprights 102 are supported two parallel bars 103. The bars 103 carry in this instance five small guide rods 104, over which the cane filling 52, from the different spools 83, passes, as shown in Fig. 12. There is preferably a spring tension on each strand of cane filling, after it passes from its spool, and before it passes to the guide plate. The spring tension in this instance consists of coil springs 105. One end of each spring 105 is connected to a fixed bar 106, secured to the uprights 102, and the other end of each spring 105 is secured to an eye or loop 107, supported on the strands of cane filling 52, as shown in Fig. 12. The action of the springs 105 on the strands of cane filling is to take up the slack in the filling as it is delivered from the spools, and when it is not drawn into the fabric.

In the operation of the multiple let-off mechanism shown in Figs. 12, and 13, the rotation of the cam 96, through the intermediate devices, raises and lowers the bar 99 and guide 100, and guide block 101, carrying the five different strands of cane filling 52, to bring each strand of filling successively into position for the gripping jaws of the needle. The cane filling spools 83 are all rotated at regular intervals to let off the cane filling, and the strands of cane filling which are not being drawn into the shed are drawn down by the springs 105, to form loops. When the strand of cane filling is being drawn into the shed, as the cane filling on the spool at the left in Fig. 12, the spring is extended, as shown at the left in Fig. 1.

The multiple let-off mechanism, shown in Figs. 12, and 13, is preferably operated through the pawl and ratchet mechanism shown in Figs. 14, and 15, which corresponds with the pawl and ratchet mechanism shown in Figs. 10, and 11, except that the inner let-off drum 84 is mounted on the same shaft as the pawl and ratchet mechanism. The same figures of reference are used in Figs. 14, and 15, as are used in Figs. 10, and 11, to designate the same parts of the ratchet and pawl mechanism. By moving the pawl 75 out of engagement with the ratchet wheel 76, and allowing the pin 75′ thereon, to extend into the notched end of the arm 77, all the let-off filling spools and all the friction drums are free to be turned in either direction, as desired. The multiple let-off mechanism shown in Figs. 12, and 13, may be operated if preferred by the rack and pinion mechanism, shown in Fig. 8, operated simultaneously with the needle motion, as above described, instead of through the driven shaft 90.

It will be understood that the details of construction of my improvements may be varied if desired.

I have particularly described my improvements herein as adapted for weaving cane, but said improvements may be adapted to weave other classes of fabrics, in which different kinds of filling, instead of cane, may be used.

I do not claim herein the needle operating mechanism shown and described as the same forms the subject-matter of another application, Serial No. 373,132, which is a division of this application.

I do not claim herein the filling beating up motion shown and described, as the same forms the subject-matter of another application, Serial, No. 369,069, which is a division of this application.

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

1. In a loom, the combination with a needle operating mechanism, a guide block and holding device for the filling, movably supported, and adapted to be moved outwardly, when engaged by the needle, of a filling let-off mechanism, and means for operating the same.

2. In a loom of the class described, the combination with the needle operating mechanism, and a guide block and holding device for the filling, movably supported and adapted to be moved outwardly when engaged by the needle, of a filling let-off mechanism, and intermediate connections to operate the filling let-off mechanism simultaneously with the needle operating mechanism, on the withdrawal of the needle through the shed.

3. In the cutting or shearing mechanism of a loom of the class described, the combination with a rocking shaft, and means for positively rocking the same, of an arm fast on said shaft and having a cutting blade thereon, a stud on said arm, a second arm having a cutting blade thereon pivotally mounted on said stud, and also having a curved slot therein, the axis of the arc of the curvature of a portion of which corresponds with the axis of the rocking shaft, and a stationary stud or pin extending into said slot to cause a pivotal motion of said arm, and the moving

together and moving apart of the cutting blades, on the rocking of said shaft.

4. In a loom of the class described, the combination with the needle operating mechanism, and the cane filling let-off mechanism, of intermediate connections, to operate the cane filling let-off mechanism simultaneously with the needle operating mechanism, on the withdrawal of the needle through the shed, substantially as shown and described.

5. In a loom of the class described, the combination with the needle operating mechanism, and the cane filling let-off mechanism, of intermediate connections, comprising a driven cam, connections therefrom to the needle carriage, and connections therefrom to a ratchet and pawl mechanism, forming a part of the filling let-off mechanism, and said ratchet and pawl mechanism.

6. In a loom of the class described, the combination with the needle operating mechanism, and the cane filling let-off mechanism, of intermediate connections, comprising a driven cam, connections therefrom to the needle carriage, and connections therefrom to a ratchet and pawl mechanism, forming a part of the filling let-off mechanism, and said ratchet and pawl mechanism, and means for making the ratchet and pawl mechanism inoperative, to allow of the moving of the let-off mechanism independently of its operating mechanism.

7. In the let-off mechanism of a loom of the class described, the combination with a friction drum loosely mounted, a pawl carried thereon, a ratchet engaging said pawl to turn said drum, said ratchet fast on a shaft, a second ratchet wheel, a gear connected therewith, a pawl carried on a pawl arm fast on said shaft and adapted to engage said ratchet, and to be held out of engagement therewith, and means for rocking said shaft, and through ratchet and pawl mechanism rotating the friction drum in one direction only.

8. In a loom of the class described, a multiple let-off mechanism for the cane filling, comprising two or more spools, friction drums for rotating the same, connections between said friction drums, and means for rotating the same, a moving guide and holding device for the cane filling, and means for moving said guide at predetermined intervals.

9. In a loom of the class described, a multiple let-off mechanism for the cane filling, comprising two or more spools, friction drums for rotating the same, connections between said friction drums, and means for rotating the same, a moving guide and holding device for the cane filling, and means for moving said guide at predetermined intervals, and means for taking up the slack in the cane filling, as it is delivered from the spools.

10. In a loom of the class described, a multiple let-off mechanism for the cane filling, comprising two or more spools, friction drums for rotating the same, connections between said friction drums, and means for rotating the same, a moving guide and holding device for the cane filling, and means for moving said guide at predetermined intervals, a ratchet and pawl mechanism for rotating the drums, the pawl being adapted to be disengaged from and held out of engagement with the ratchet wheel, to allow the free rotation of the drums, independently of the driving mechanism.

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Witnesses:
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