No. 708,282. Patented Sept. 2, 1902.

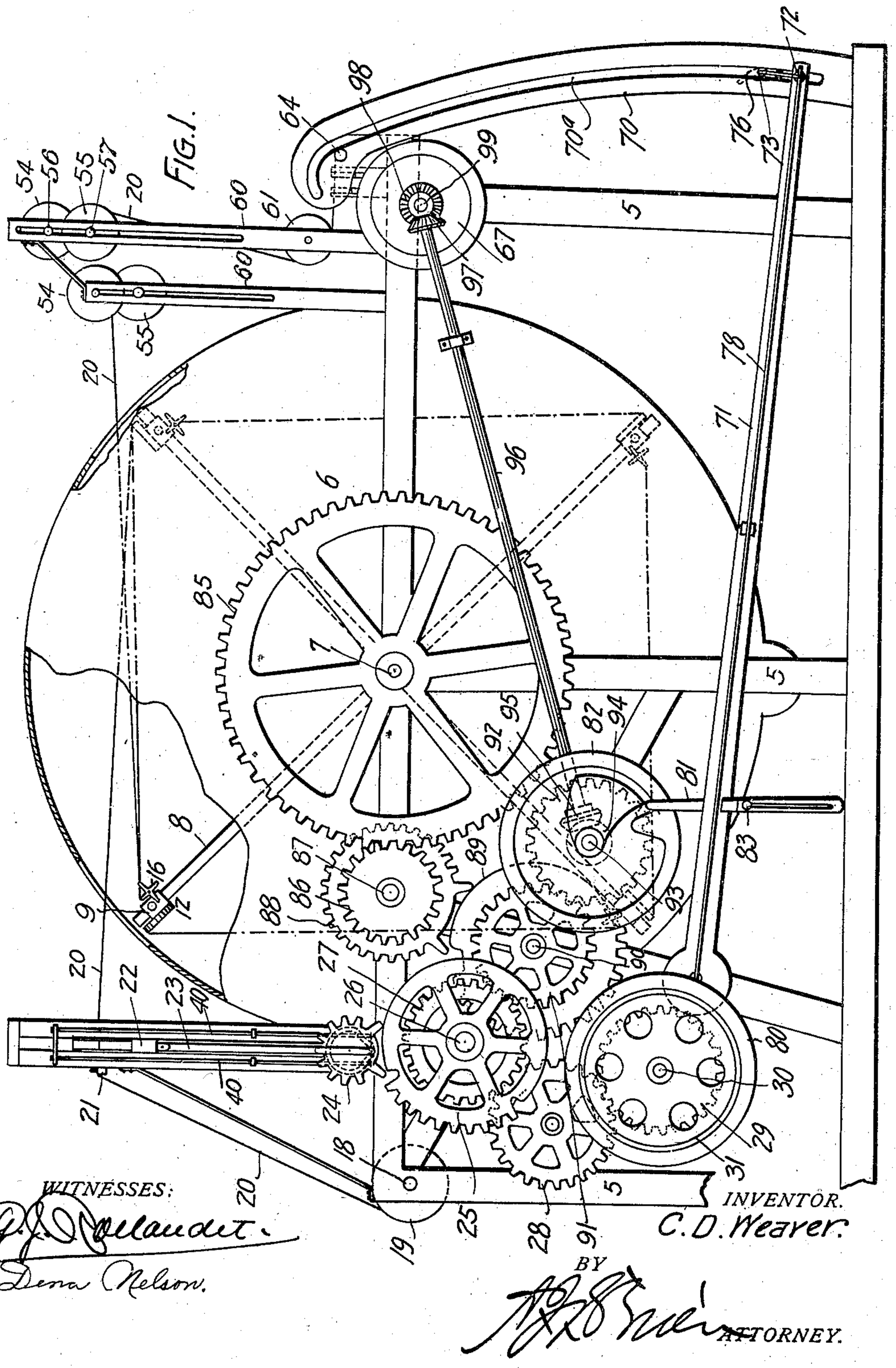
C. D. WEAVER.

SHOE LACING TIP MACHINE.

(Application filed Aug. 16, 1901.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.



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(No Model.) 4 Sheets—Sheet 2.

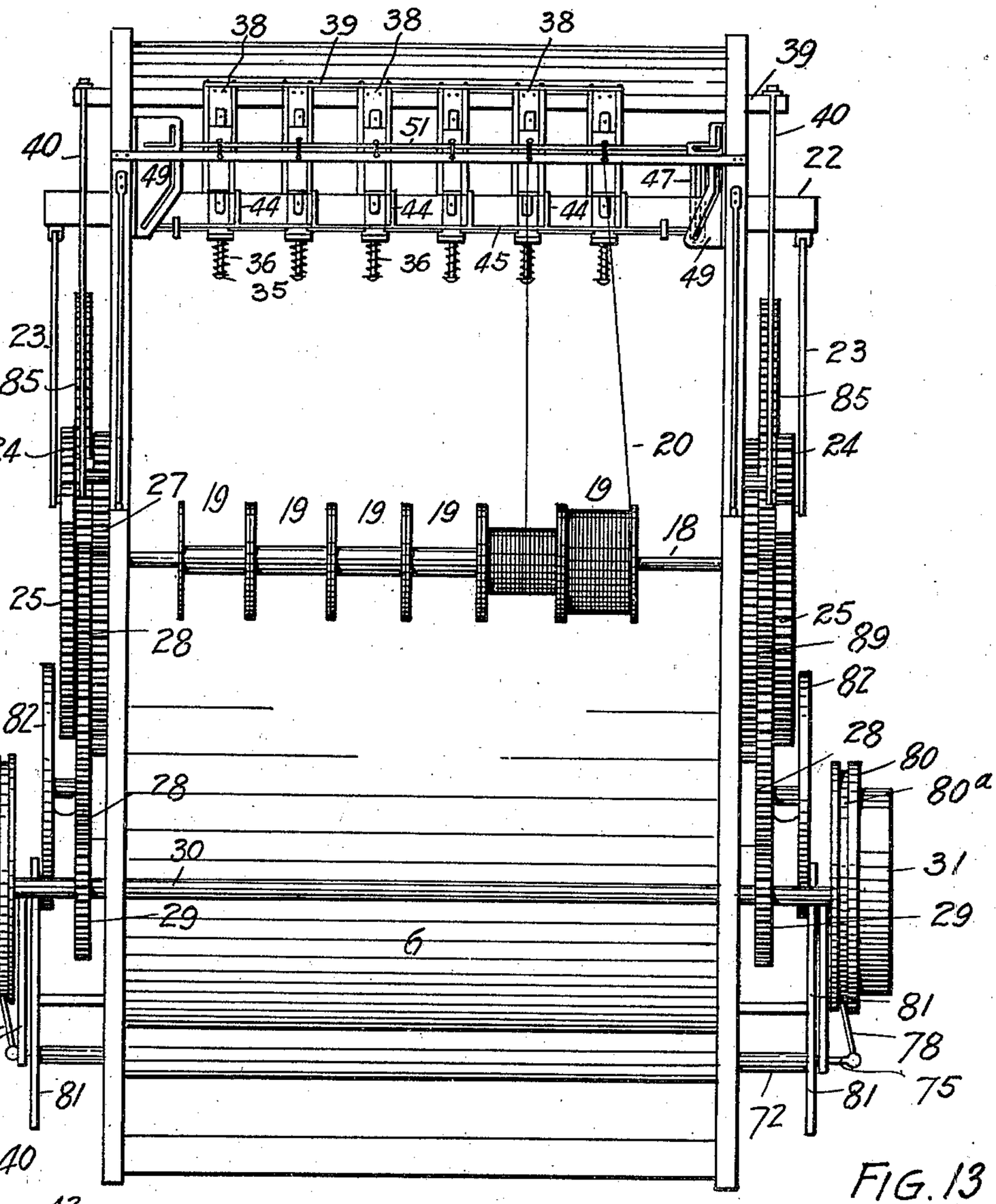

FIG. 2

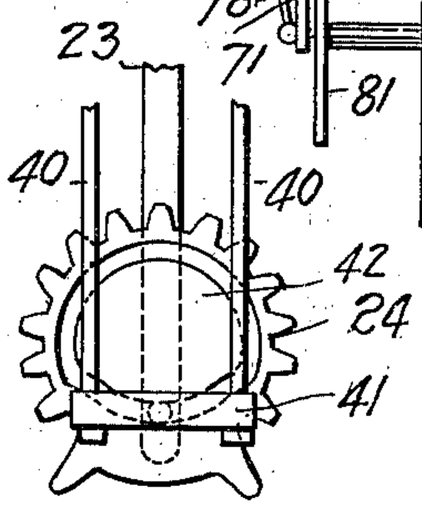

FIG. 20.

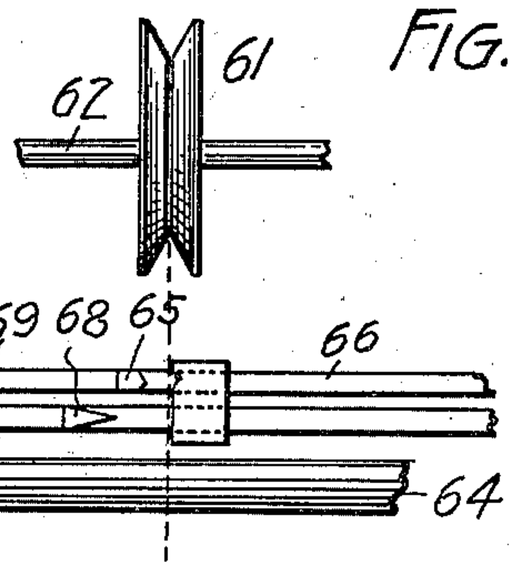

FIG. 14

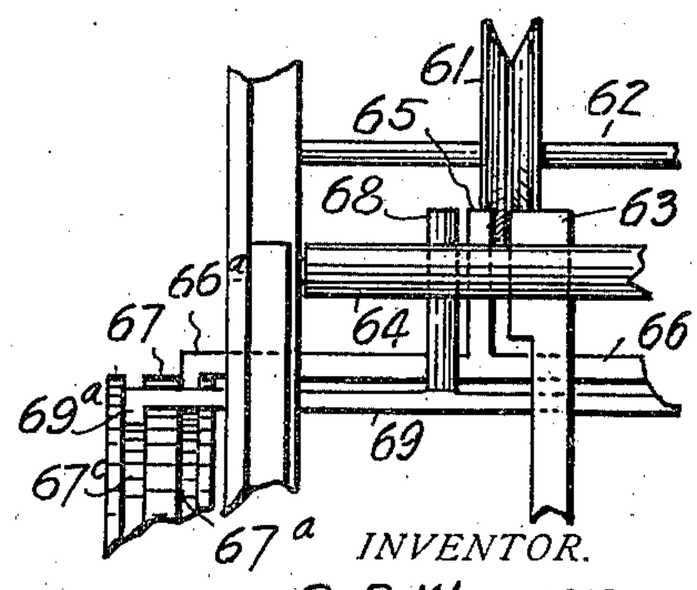

FIG. 13

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(No Model.) 4 Sheets—Sheet 3.

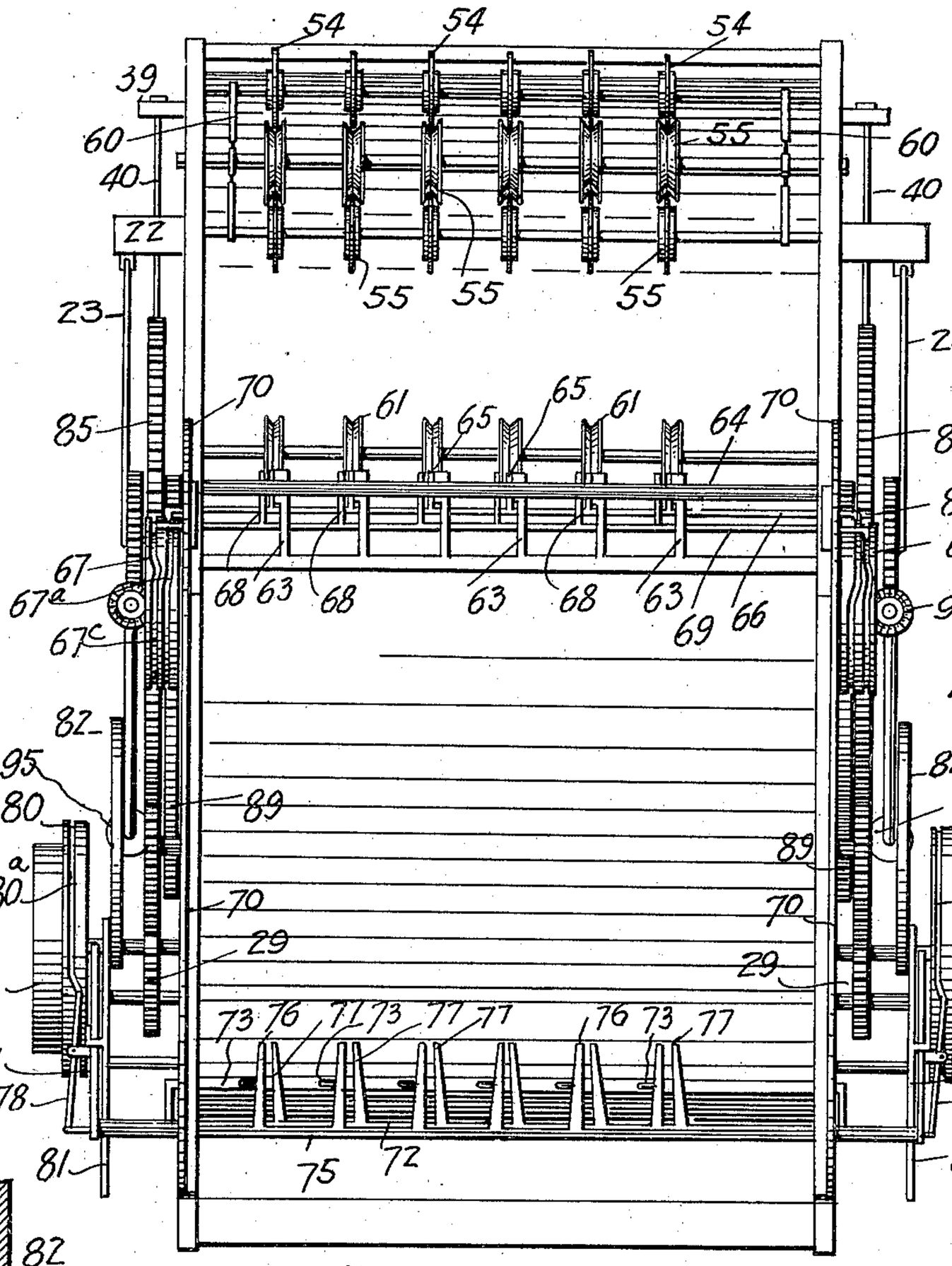

FIG. 3

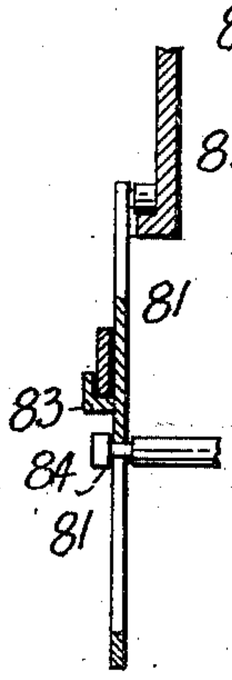

FIG. 19

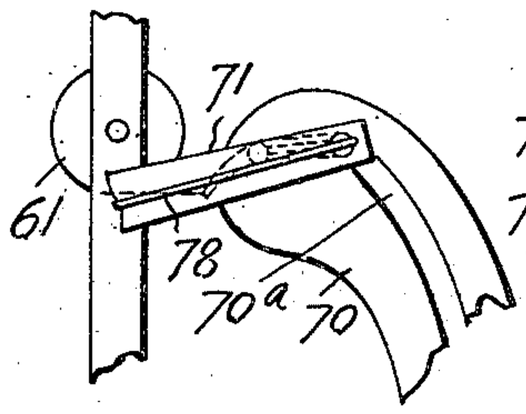

FIG. 17

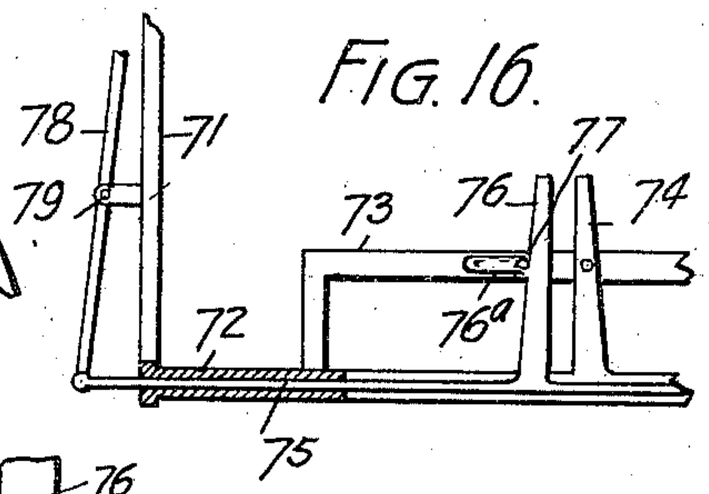

FIG. 16.

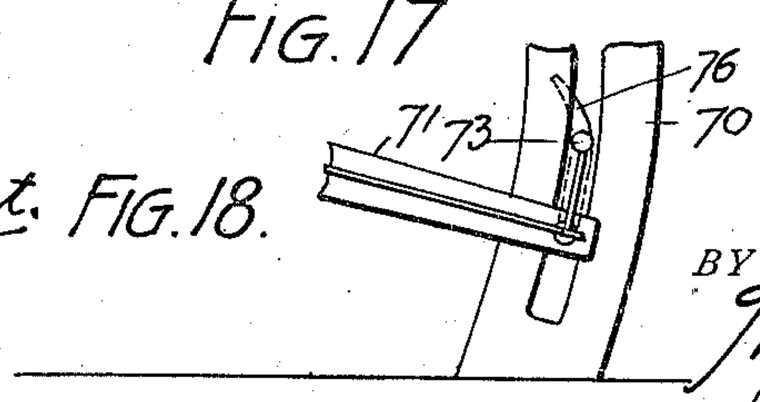

FIG. 18.

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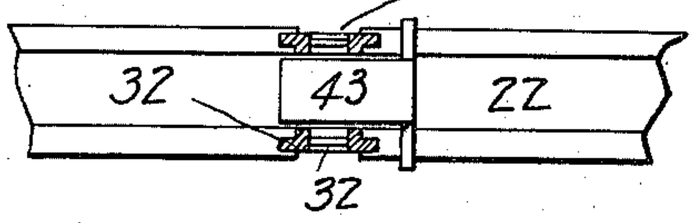
(Application filed Aug. 16, 1901.)

(No Model.) 4 Sheets—Sheet 4.

FIG. 7



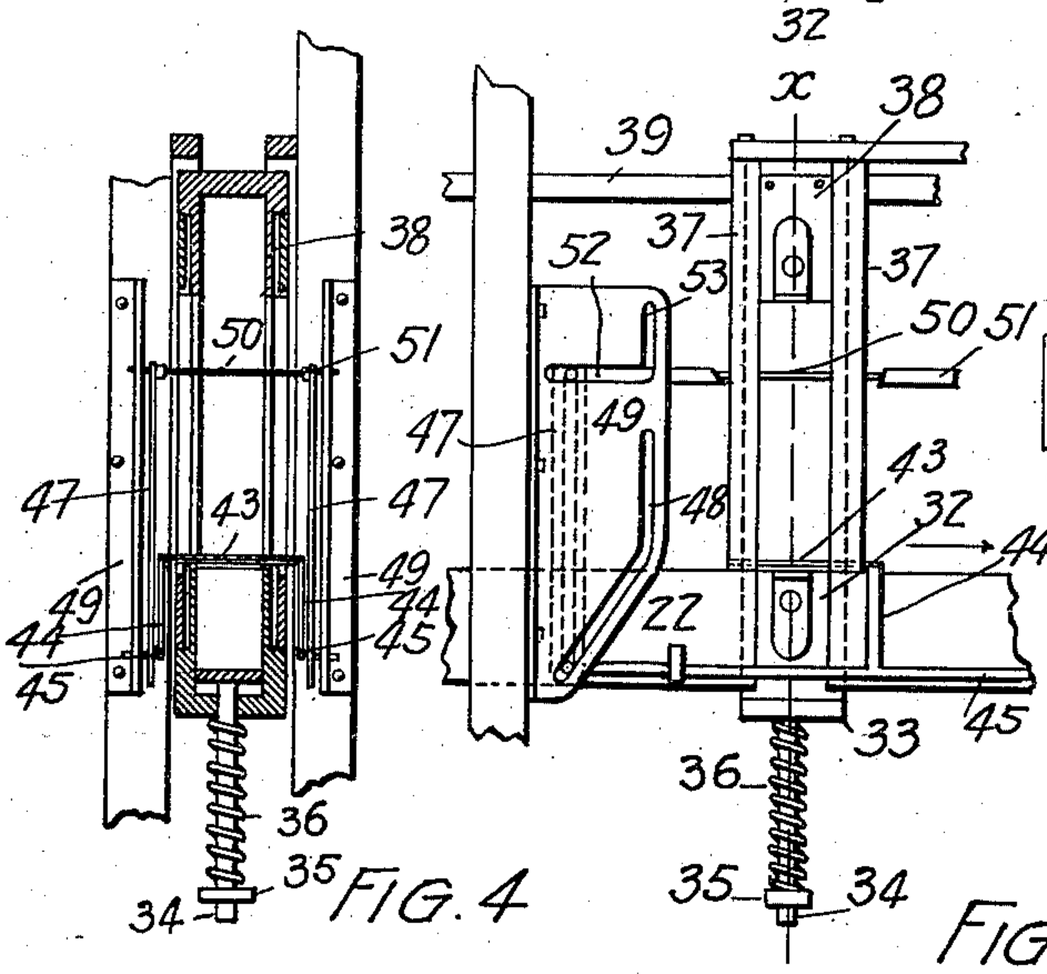


FIG. 4 FIG. 5

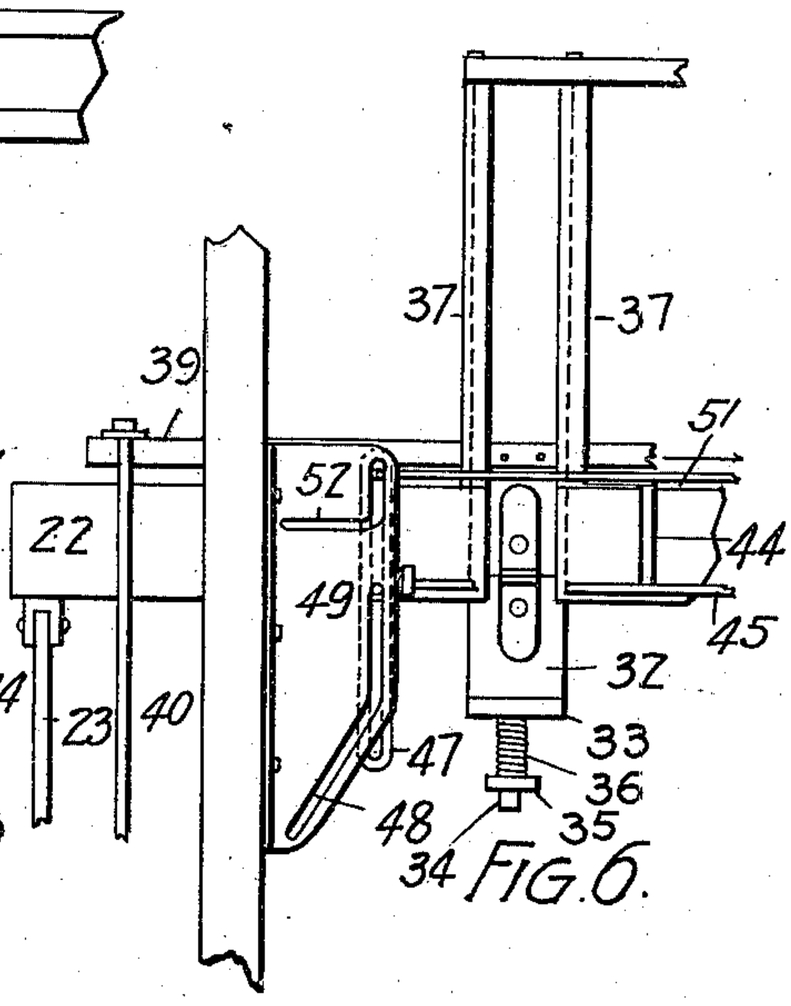


FIG. 6. FIG. 11.

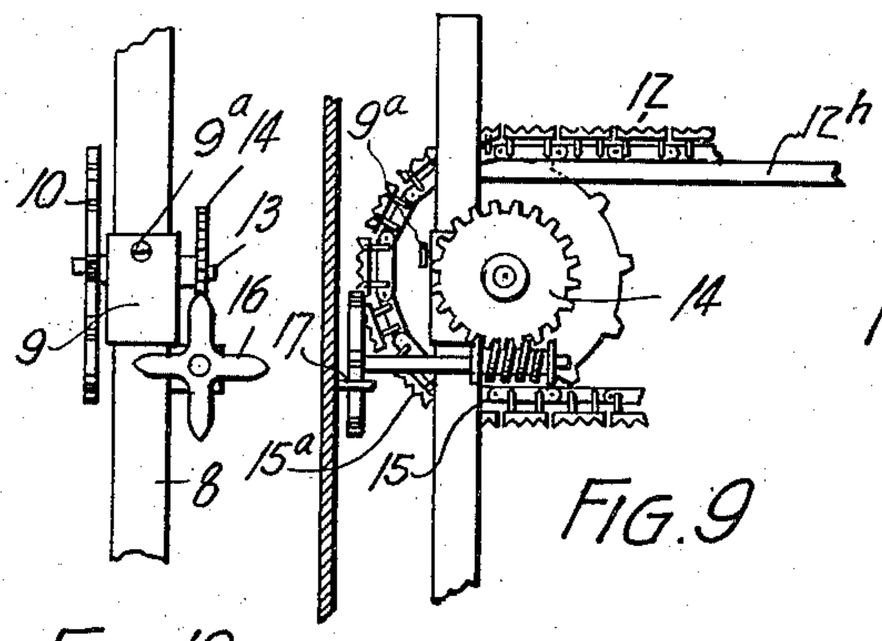


FIG. 9

FIG. 10.

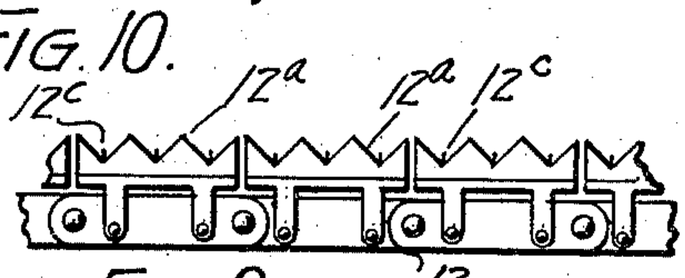
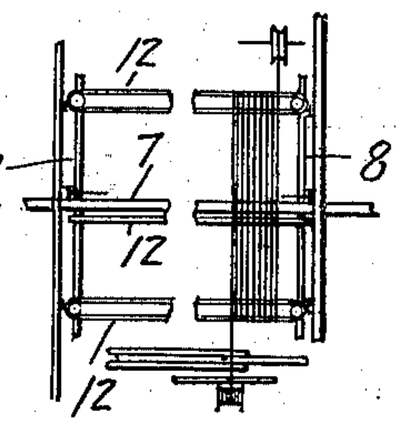


FIG. 8.



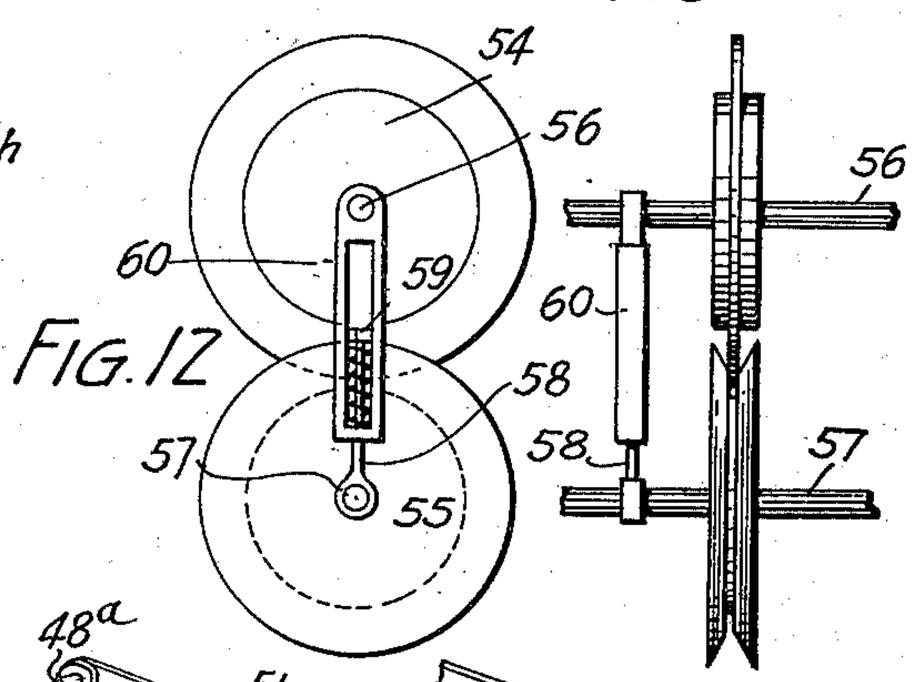


FIG. 12

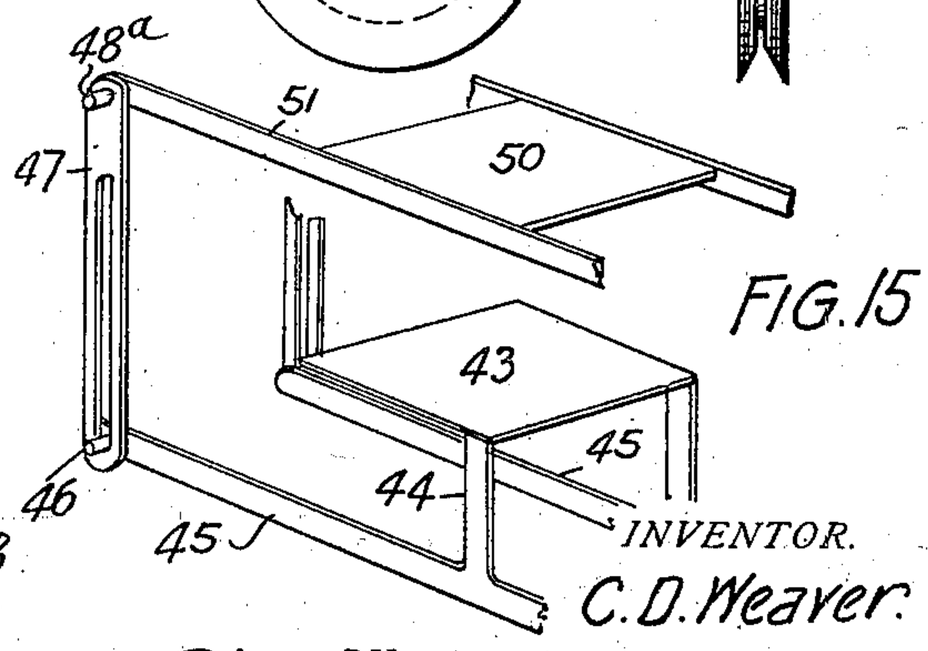


FIG. 15

FIG. 21

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UNITED STATES PATENT OFFICE.

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SHOE-LACING-TIP MACHINE.

SPECIFICATION forming part of Letters Patent No. 708,282, dated September 2, 1902.

Application filed August 16, 1901. Serial No. 72,294. (No model.)

To all whom it may concern:

Be it known that I, CHARLES D. WEAVER, a citizen of the United States of America, residing at McPherson, in the county of McPherson and State of Kansas, have invented certain new and useful Improvements in Shoe-Lacing-Tip Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in machines for applying non-metallic tips to shoe-laces, my object being to apply the tip in such a manner that it shall in reality form a part of the lace, whereby it cannot be removed or pulled off, as is the case with an ordinary metallic tip.

The apparatus comprises one or more spools from which the lacing material is unwound, a tension device, means for applying a liquid to a portion of the lace equal to the length of two tips, a reel to which the lace passes and upon which it is wound and retained long enough to partially dry the liquid, a stationary drum or casing inclosing the reel and into which heat may be introduced for drying purposes, the reel being provided with means for preventing the convolutions of the lacing material from winding more than one layer deep on the reel, means to which the lacing material passes after leaving the reel for molding the partially-dried material of the tip into suitable form, means for cutting the lacing-string at the proper place—namely, in the center of the part to which the solution is applied—and the necessary mechanism for actuating the said devices, whereby they are made to perform the aforesaid functions and whereby certain parts remain at rest while other parts are in motion, to the end that the movements of all the parts may be properly timed to harmonize with one another, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated the embodiment of the invention.

In the drawings, Figure 1 is a side elevation of my lacing-tip machine, the parts being shown in the position occupied immediately after applying the solution to the lacing material or web. Fig. 2 is a front end view of the same. Fig. 3 is a rear end view of the machine. Fig. 4 is a vertical section taken through the mechanism for applying the solution to the lacing material. This view is a section taken on the line X X, Fig. 5, the parts being shown on a larger scale than in Figs. 1, 2, and 3. Fig. 5 is a side elevation of the solution-applying mechanism shown in position when at rest or when a new length of string is being pulled through by the reel. Fig. 6 is a similar view showing the same mechanism in the position it occupies at the instant of applying the solution. Fig. 7 is a fragmentary top view of the same device. Fig. 8 illustrates a portion of the reel-chain. Fig. 9 is a fragmentary view of the reel-chain, showing the gearing for operating the same. Fig. 10 illustrates the same mechanism viewed at right angles to Fig. 9. Fig. 11 is an edge view of the tip-molding disks or wheels. Fig. 12 is a side view of the same. Fig. 13 illustrates the cutting device as viewed from the rear of the machine. Fig. 14 is a top or plan view of the same. Fig. 15 is a fragmentary perspective view illustrating the movable covers of the solution-applying mechanism. Fig. 16 is a fragmentary view, on a larger scale, illustrating in detail the mechanism for drawing the lacing-strings from the reel preparatory to cutting off the completed lace. Fig. 17 is a fragmentary side elevation, on a larger scale, illustrating the parts shown in Fig. 16 in connection with the curved upwardly-projecting guide-arm. Fig. 18 is another view showing the same parts in a different position. In Figs. 5 to 15, inclusive, the parts are shown on a larger scale than in Figs. 1 to 3. Fig. 19 is a fragmentary section taken through a cam-wheel 82, an oscillating side arm, and its lifting-link. Fig. 20 is a fragmentary view, on a larger scale, illustrating the mechanism for actuating the upper gates of the solution-applying mechanism. This view is taken from the side opposite that shown in Fig. 1 in the drawings, since in Fig. 1 the connection between the rods 40 is concealed. Fig. 21 is a diagrammatic view, on a very small scale, illustrating the reel mech-

anism and its connections. This view shows a number of convolutions of the lacing-web wound on the reel, as is necessary in order to partially dry the solution, as hereinafter explained.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the framework of the machine, which may be of any suitable construction. Upon this framework is mounted and made fast a drum or casing 6, through the center of which passes a shaft 7, to which are made fast radial reel-arms 8. The shaft is journaled in the frame. Four arms 8 are attached to each end of the shaft and located within the drum at right angles to each other. Upon each reel-arm is slidably mounted a bracket 9, which is held in place upon the arm by a set-screw 9^a, or any other suitable device or means arranged to perform the desired function. The distance between these brackets determines the length of the laces. It is evident that this distance may be regulated by adjusting the brackets on the arms. On each of these brackets is mounted a sprocket-wheel 10. The two arms, one on each end of the shaft, lying in the same radial plane form a pair. The two sprocket-wheels of each pair of arms are connected by a chain 12, provided with notches 12^a, adapted to receive the convolutions of the lacing material and keep them separated while the reel is turning. A small pin 12^c is in the bottom of each notch to catch the lacing-string and prevent it from stretching in order to insure the cutting of the lacing at the proper point, as hereinafter explained.

The sprocket-wheel 10 is fast on a spindle 13, journaled in the bracket 9. To the extremity of this spindle remote from the wheel 10 is made fast a worm-wheel 14, whose toothed periphery is engaged by a worm 15. To the spindle 15^a of the worm is made fast a star-wheel 16, adapted to engage pins 17, mounted on the drum, as the reel turns. There are four of these pins on each end of the drum on the inside. As the star-wheel engages each pin it is given one-fourth of a revolution. Hence the spindle of the star-wheel is given a complete revolution during each rotation of the reel. This movement of the spindle turns the worm mounted thereon, and the worm in turn actuates the worm-wheel spindle and the sprocket-wheel sufficiently to cause the chain 12 to travel just the distance between the notches 12^a of the chain. In this manner the convolutions of the lacing-web are kept separate as they are wound on the reel.

Mounted on the front end of the framework is a shaft or a spindle 18, upon which is mounted any desired number of spools 19 or a sleeve having any desired number of spool compartments or spaces upon which the lacing material is wound preparatory to use on the machine. As the flat lacing cord or string 20, which may be of ordinary manufacture, leaves a spool it passes through a suitable tension device 21, which gives it a form circular in cross-section, preparatory to applying the solution thereto. The string is drawn from the spool by the reel, which stops at intervals long enough for the solution to be applied to the string through the instrumentality of the mechanism therefor. This mechanism will now be described.

The horizontal trough 22, extending the entire width of the machine, (see Fig. 2,) contains the solution, which may be composed of any desired material adapted for the purpose. This trough is arranged to move vertically through the instrumentality of two pitmen 23, whose upper extremities are respectively connected to the opposite ends of the trough. The lower extremities of these pitmen are connected with gear-wheels 24, which are actuated by gears 25, fast on spindles 26, located on each side of the machine. The gears 25 are in turn operated by gears 27, fast on the spindles 26 and meshing with the gears 28, which are actuated by other gears 29, fast on a shaft 30, to which a pulley 31 is also secured. This pulley may be connected with any suitable power for operating the machine. Only a portion of the periphery of each wheel 25 is toothed, since the function of the wheel 24 requires an intermittent operation only. As shown in the drawings, the trough is of a length to apply solution to six strings at the same time, but may of course be of a length for any other desired number of strings or laces. As the solution-applying mechanism is the same for each string or lace, only one set of said mechanism need be described. The trough is provided at suitable intervals with two gates 32, one on each side, which are arranged to normally close openings in the opposite sides of the trough. The two gates are connected by a part 33, which extends under the trough, its extremities being attached to the gates. Passing through the part 33 and rigidly attached to the trough is a depending stem or rod 34, provided with a stop-shoulder 35. Between this shoulder and the part 33 is located a coil-spring 36, which is normally under sufficient tension to hold the gates at their upward limit of movement, whereby the openings at the sides of the trough are closed, preventing the escape of the solution therefrom. The gates 32 slide in grooved ways formed in the sides of the trough. Attached to and extending above the trough on each side are two uprights 37, having grooves registering with the gate-grooves in the trough sides. Slidingly mounted in each pair of uprights 37 is a gate 38. These last-named gates are attached at their upper extremities to a horizontal bar 39, whose extremities project beyond the sides of the frame. (See Fig. 2.) To each extremity of this bar are attached two rods 40, whose lower extremities are connected by a cross-piece 41, which is engaged by a cam 42 on the gear-wheel 24, whereby the gates 38 are drawn

downwardly, the gear and cam being so arranged that the trough is raised simultaneously with the downward movement of the gates 38. The gates 38 and 32 are in alinement and engage each other at the point where the lacing-strings pass between them. The trough then moves upwardly sufficiently to immerse the string in the solution, the spring-supported gates 32 being forced downwardly by the gates 38 to allow the string to enter the openings in the sides of the trough. The meeting edges of the gates 32 and 38 are faced with rubber to prevent the escape of any solution between them and also to prevent the solution from coming in contact with any more of the string than the length required for two lacing-tips. The width of the trough is just sufficient to apply the solution to this length of string, and when the string is cut, as hereinafter is explained, it is severed in the center of the part to which the solution is applied, half of it forming a tip for one lace and the other half forming a tip for the other lace. The top of the trough is permanently covered, except the space between each two gates, where a movable cover 43 is located. This cover must be moved out of the way automatically as the trough rises in order to allow the string or lacing-web to enter the trough.

The cover-operating means will now be described. The cover 43 is connected, by means of upright pieces 44, (see Figs. 5, 6, and 15,) with horizontal bars 45, whose extremities remote from the part 44 are provided with pins 46, which pass through vertical slots formed in upright parts 47 and also through the angular slots 48, formed in a stationary part 49. The shape of each slot is such that as the trough rises the cover 43 will be shifted in the direction of the arrow in Figs. 5 and 6 and the space between the gates 32 uncovered for the purpose aforesaid. Directly above the cover 43 is located a slide 50, which when the solution-applying mechanism is at rest or when the parts are in the position shown in Fig. 5 occupies a position directly below the gates 38 and prevents the solution which may adhere to the gates 38 after the first contact with the solution of the trough from dripping down upon the lacing-web as it is drawn through by the reel below the gates, it being of course desirable to prevent the solution from coming in contact with the web except where the tips are to be formed. This slide 50 is attached to horizontal bars 51, one extremity of each of which is rigidly attached to the upper end of a slotted bar 47, which is provided with a pin 48^a, which passes through a horizontal slot 52 in the stationary part 49. Now it is evident that as the cover 43 and the bars 45 move in the direction of the arrow of Figs. 5 and 6 the slide 50 will also be moved in the same direction. This movement is sufficient to get the slide out of the way of the descending gates 38 when the solution-applying mechanism is in operation. The parts are so arranged that after the slide 50 has been shifted sufficiently for the purpose stated the upward movement of the trough engages the slide and carries it upwardly, this being permitted by a vertical slot formed in the part 49, in which slot the pin 48^a moves after reaching the extremity of the slot 52. It is also evident that as the trough and gates are returned to their normal position the movement of cover and slide will be reversed. The function of the covers 43 is to prevent the evaporation of the liquid from the trough during the intervals between applying the solution to the web and also when the machine is not in use. The covers further prevent any foreign particles of matter from entering the solution.

After the solution has been applied to a portion of the web, as heretofore explained, it must be partially dried before it can be molded into shape to form the tip. For this purpose it passes through an opening in the drum or casing 6 to the reel, which has already been described. A sufficient number of convolutions are wound upon the reel before the lacing-web is allowed to leave the latter to consume the time required for this partially-drying operation. The web then passes to the molding-wheels 54 and 55. As shown in the drawings, there are two pairs of these wheels mounted on upright bars 60, which are slotted to permit the vertical adjustment of the molding-wheels when the length of the lace or the length of web between the tips is varied. These wheels are adjusted on their supports by means of suitable set-screws or other suitable devices. This adjustment of the molding-wheels is necessary in order to bring the portion of the web to which the solution is applied into the proper position to be cut by the mechanism hereinafter explained. The wheel 55 is provided with a V-shaped groove in its periphery, and at the bottom of this groove there is another groove with vertical walls in which the tip is molded in the proper form. The wheel 54 is provided with a central peripheral flange or tongue, which enters the groove of wheel 55 and cooperates therewith in performing the molding function. The two wheels are held together in operative relation by a yielding connection between their spindles 56 and 57. This construction comprises a stem 58, having an eye at one extremity through which the spindle 57 passes, a slotted upright bar 60, connected with the spindle 56, the lower extremity of the bar being open to receive the stem, whose upper extremity is provided with the shoulder 59, and a coiled spring surrounding the stem between the shoulder and the lower extremity of the bar. After leaving the molding-wheels the lacing-web 20 passes downwardly under a grooved pulley 61, mounted on a shaft 62, and thence over a roller 64. Between the pulley and the roller is located a stationary block 63, across the face of which

the lacing-web is drawn. As soon as a portion of the web to which this solution has been applied reaches the block the reel stops and a projection 65 on an endwise-movable rod 66 is actuated to press the lacing-web against the block and hold it securely in place. The endwise movement of this rod 66 is imparted by a cam-groove 67ª, formed in the periphery of a wheel 67, into which extends a projection 66ª, formed on the rod extremity. A knife 68 on a rod 69, which is then moved endwise, cuts the lacing-web in the center of the part to which the solution is applied. This rod 69 is actuated by virtue of a projection 69ª on one extremity, which engages a cam-groove 67ᶜ, formed in the periphery of the wheel 67. During this operation the reel is at rest and the solution is being applied to another part of the web. As soon as the lacing-web is cut, as aforesaid, the mechanism for pulling the web off the reel to bring the web into position to be cut again is brought into requisition and will now be described.

Two upwardly-projecting arms 70 are made fast to the rear extremity of the framework and provided with curved slots 70ª. On each side of the framework is a long arm 71, which is pivotally mounted on the frame at its forward extremity, whereby it is allowed to oscillate. In the rear extremities of these arms are journaled the extremities of a rod 72, to which is rigidly attached a parallel rod 73. To these rods 72 and 73, which are separated, are rigidly attached fingers 74. Upon the rod 72 is slidably mounted a rod 75, provided with fingers 76, rigidly attached to the rod. Each finger 76 is provided with a slotted projection 76ª, through which passes a pin 77, fast on the rod 73. The extremities of the rods 72 are tubular, and the corresponding portions of the rod 75 pass through and are slidably mounted therein. The extremities of the rods 75 project beyond the tubular ends of the rod 72 and are pivotally connected with levers 78, fulcrumed on the arms 71, as shown at 79. The forward extremities of these levers engage cam-grooves 80ª, formed in the peripheries of wheels 80, journaled on the opposite sides of the framework. The rods 72, 73, and 75 pass through the slots 70ª of the arms 70. The arms 71 and their connections are raised to cause the said rods to travel from the lower to the upper extremities of the slots 70ª by means of a lifting-link 81, connected with a cam-wheel 82 and provided with a hook 83, which engages the arm 71 from below. The lower part of this link is slotted and slides on a pin 83, fast on the frame. As the wheel 82 rotates the arms 71 are raised. During this operation the rods 72, 73, and 75 are raised to the upper extremities of the slots 70ª, which are curved forwardly abruptly, whereby the fingers 74 and 76 are placed on either side of the lace between the pulley 61 and the roller 64. The cam-wheel 80 then acts to operate the levers 78, which in turn thrust the rod 75 endwise, causing a finger 76 to move toward a finger 74, whereby the lacing is grasped between the fingers. The finger-rods and their attachments then move downwardly by gravity, carrying the lace with them. In this manner the next lace is drawn from the reel, after which the lace grasped by the fingers is cut off in the manner heretofore explained. The reel is operated by the rotation of a gear 85, fast on the reel-shaft 7. This gear meshes with a gear 86, fast on a spindle 87, to which is also made fast a gear 88, operated from a gear 89, a portion of whose periphery is plain or free from cogs, since the operation of the reel is intermittent, as heretofore explained. Fast on the spindle 90 of the gear 89 is a gear 91, which meshes with the gear 27, the latter being actuated from the gear 29, through the medium of the gear 28. The gear 91 also meshes with the gear 92, fast on the spindle 93 of the cam-wheel 82. A bevel-gear 94, also fast on the spindle 93, meshes with a similar gear 95, fast on one extremity of a shaft 96, whose opposite or rear extremity is provided with a gear 97, meshing with the gear 98, fast on the shaft or spindle 99 of the cam-wheel 67. As shown in the drawings, there is a set of gears and cam-wheels on each side of the machine, the entire mechanism being actuated from the shaft 30, which extends from one side of the machine to the other. This shaft is provided with but one pulley 32, but has a gear 29 at each extremity, from which the train of gears and the cam-wheels on each side of the machine are actuated.

From the foregoing description the operation of the mechanism will be readily understood. The lacing web or string 20 is drawn from the spools 19 by the operation of the reel, which makes a quarter-turn and stops while the mechanism for applying the solution to the string is operated. At the same time a completed lace is cut off at the rear of the machine. Attention is called to the fact that the mechanism for actuating the trough-covers 43 and the drip-slides 50 is duplicated, one set being located at each side of the machine. (See Fig. 2.) The operating-gears are so arranged that as soon as the solution is applied to the web or string the reel makes another quarter-turn, and so on. It will be understood when beginning the operation of the machine the web will not pass immediately to the molding-wheels and no laces will be cut off at the rear of the machine until a sufficient number of web convolutions have been wound on the reel to consume the time necessary to partially dry the solution on the web for the purpose heretofore explained. The lacing-web then passes from the reel to the molding-wheels 54 and 55, thence down under the roller 61, being drawn from the reel by the finger mechanism comprising the fingers 74 and 75, the rods upon which the fingers are secured, and the oscillating arms 71, all operated as heretofore explained. The holding and cutting mechanism (illustrated

in Figs. 14 and 15) is brought into requisition and the laces cut off, as heretofore explained.

It will be understood that there is a distinct set of solution-applying and molding devices, also a separate knife and block and a separate pair of fingers 74 and 76 for each lacing-web unwound by the reel from the spools at the front end of the machine. The reel-chains, if necessary, may be provided with any suitable support located between the individual members of each pair of arms in order to prevent the chain from sagging.

Any suitable means other than the pins 12^c on the reel-chains may be employed to prevent the lacing from stretching.

After evaporation of the solution in the drum the vapor may be carried through in suitable conduit to a condensing apparatus and after condensation may be reused.

In the drawings (see Fig. 9) a horizontal bar 12^h, extending from one reel-arm to the other, (one only being shown,) is illustrated. The function of this bar is to support the reel-chain 12 and prevent the latter from sagging between the individual members of each pair of reel-arms.

Having thus described my invention, what I claim is—

1. In a machine for applying non-metallic tips to shoe-laces, the combination with a framework, of a supply-spool, solution-applying mechanism, a reel for drawing the lacing-web from the supply-spool, means mounted on the reel for keeping the convolutions of the web separated and to prevent them from winding on top of one another, molding devices to which the web passes after leaving the reel, a cutting device for severing the lace from the web, and means for drawing the lacing-web from the reel to a position to be acted on by the cutting device.

2. In a machine of the class described, the combination with means for applying the solution to the lacing-web, of a drying-reel upon which the web is wound after the solution is applied, means mounted on the reel for automatically shifting the convolutions, whereby a convolution wound in one plane is moved out of the way to allow the next convolution to wind in the same plane, and so on, the arrangement being such that any desired number of convolutions may be constantly maintained on the reel, between the plane where the web is received and the plane where it passes from the reel, whereby any convolution is held in the drum a sufficient length of time for partially drying the applied solution.

3. The combination with means for applying the solution to the lacing-web, of a stationary drum or casing, a drying-reel inclosed by said casing, and means mounted on the reel for automatically shifting the convolutions of the web as they are wound on the reel, substantially as described.

4. The combination with means for applying the solution to the lacing-web, of a drying-reel and chains mounted on the reel-arms for automatically shifting the convolutions of the web in a direction parallel with the axis of the reel, for the purpose set forth.

5. In a machine of the class described, the combination with a suitable supporting-frame, of a trough for holding the solution, said trough being mounted to move vertically on the frame, spring-supported gates normally closing openings in the sides of the trough, other gates in alinement with the trough-gates, and means for raising the trough to immerse the lacing-web in the solution therein, the arrangement being such that the upper gates displace the trough-gates and prevent the escape of the solution when the trough-gates are lowered for the purpose stated.

6. In a machine of the class described, the combination of a solution-containing trough, movable gates normally closing web-openings in the opposite sides of the trough, vertically-movable gates located above and in alinement with the trough-gates, and means for simultaneously raising the trough and lowering the upper gates to immerse the lacing-web in the solution, the arrangement being such that the two sets of gates meet on the web, the trough-gates being displaced by the other gates to allow the immersion of the web in the solution and prevent the escape of the solution from the trough, the meeting edges of the gates being provided with yielding material as rubber for the purpose set forth.

7. In a machine of the class described, the combination with a suitable framework, of a solution-containing trough mounted to move vertically in the framework, a cover for said trough, means for supporting the lacing-web out of the plane of the trough, and means for raising and lowering the trough to bring it in a position to immerse a portion of the web in the solution, and means for automatically actuating the cover during the trough's vertical movement, substantially as described.

8. In a machine of the class described, the combination with a suitable framework, of a solution-containing trough mounted to move vertically therein, means for supporting the lacing-web above the plane of the trough, a movable cover normally closing an opening in the top of the trough, and means for automatically actuating said cover to open the trough to allow the immersion of the lacing-web as the trough is raised for the purpose set forth.

9. In a machine of the class described, the combination with a suitable framework, of a solution-containing trough mounted to move vertically in the framework, spring-supported gates normally closing openings in the sides of the trough, and gates mounted above the trough-gates and arranged to meet and displace the latter to allow the immersion of the web in the solution, means for simultaneously raising the trough and lowering the upper gates for the purpose, a movable cover for the trough, and a slide located below the upper

gates when the mechanism is at rest, and means for automatically actuating the cover and slide as the trough is raised for the purpose set forth.

10. In a machine of the class described, the combination with means for applying solution to the lacing-web, of a drying-reel upon which the web is wound after the solution is applied, molding devices to which the web is passed after leaving the reel, a stationary block, means for drawing the web from the reel, through the molding devices and across said block, and a reciprocating cutter device arranged to sever the web where it engages the block, so as to leave a portion of the web to which the solution is applied, on each side of the cutter.

11. In a machine of the class described, the combination with a series of web-supply spools, of a reel for drawing the web from the supply-spools, means intermediate the spools and the reel for simultaneously applying solution to all the webs, molding devices to which the series of webs pass after leaving the reel, stationary blocks, means for drawing the webs across said blocks in such a manner that the portion of each web to which the solution is applied, shall engage the blocks, and a reciprocating rod provided with cutters adapted to sever the webs where they engage the blocks, the arrangement being such that the solution-applying mechanism and the cutters act simultaneously while the reel is at rest, these devices in turn being at rest while the reel is in operation.

12. In a lacing-tip machine, the combination with spools adapted to hold a series of lacing-webs, of means for simultaneously applying solution to a portion of all the webs, an intermittently-operated reel for drawing the webs from the spools, molding devices through which the webs pass after leaving the reel, stationary blocks, means for drawing the webs across the stationary blocks, a reciprocating rod provided with projections adapted to engage the webs and to hold them in place on the blocks, and a reciprocating rod provided with cutters adapted to sever the webs at the blocks.

13. In a machine of the class described, the combination with supply-spools upon which the lacing-webs are wound, of solution-applying mechanism for all the webs, a reel upon which the webs are wound, molding devices through which the webs pass after leaving the reel, cutting devices acting on the webs after they leave the molding devices, and means for drawing the webs from the reel, through the molding devices, and into position to be acted on by the cutters, said means comprising oscillating arms and two rods connected with said arms and provided with coöperating fingers, one of the said rods being movable endwise, levers mounted on the oscillating arms and connected with the movable finger-rod to operate the latter, the arrangement being such that the fingers of the rods are raised and grasp the lacing-webs in proximity to the cutters, and then descend while holding the webs, whereby the aforesaid function is performed.

14. In a machine of the class described, the combination with supply-spools, means for applying solution to a portion of the webs, a reel for drawing the webs from the spools, molding devices, cutting devices, and means for drawing the webs after they leave the reel, through the molding devices and into position to be acted on by the cutting devices, said means comprising a pair of oscillating arms, a rod journaled in said arms, a second rod rigidly attached to the first-named rod, extending parallel therewith, and separated therefrom, upwardly-projecting stationary arms having slots in which the two rods move as the oscillating arms are raised, fingers fast on the two rods, the direction of the slots in the upper extremities of the stationary arms, being changed to cause the first-named rod to turn in the bearings of the oscillating arms, whereby the fingers of the rods are projected to one side of the stationary webs, a third rod mounted to have an endwise movement on the first-named rod, provided with fingers connected to slide on the second rod, and levers mounted on the oscillating arms and connected with the third rod for imparting the endwise movement thereto, whereby the webs are grasped between the two sets of fingers, and as the oscillating arms descend the webs are drawn downwardly for the purpose set forth.

15. The combination with means for applying the solution to the lacing-web, of a drying-reel and chains mounted on the reel-arms for automatically shifting the convolutions of the web in the direction parallel with the axis of the reel, and a support between the reel-arms to prevent the chain from sagging.

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

CHARLES D. WEAVER.

Witnesses:
H. J. HARNLY,
CHAUNCEY VANIMAN.