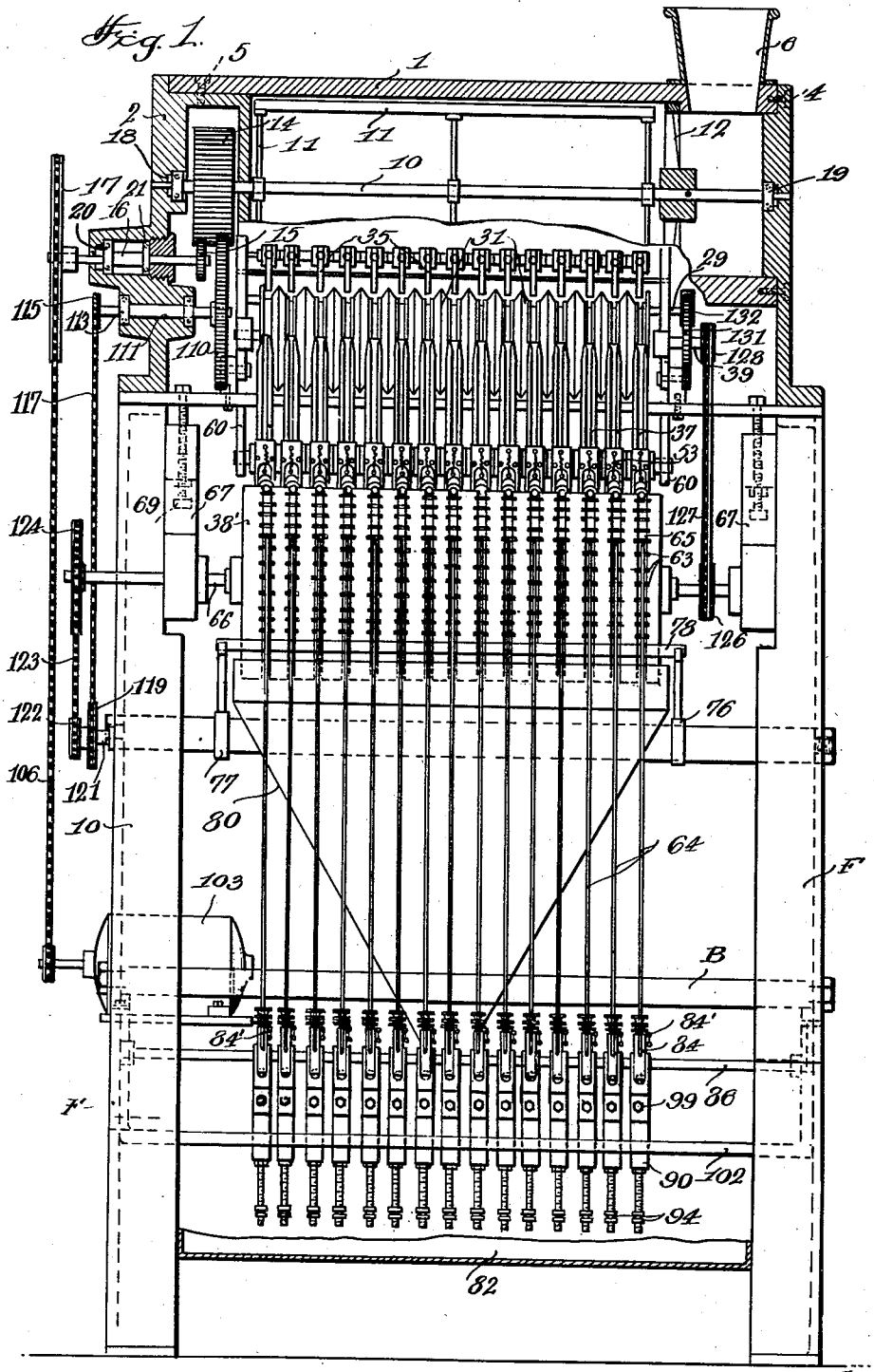
Sept. 8, 1942. C. HALL ET AL 2,295,469

AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

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Fig. 1.




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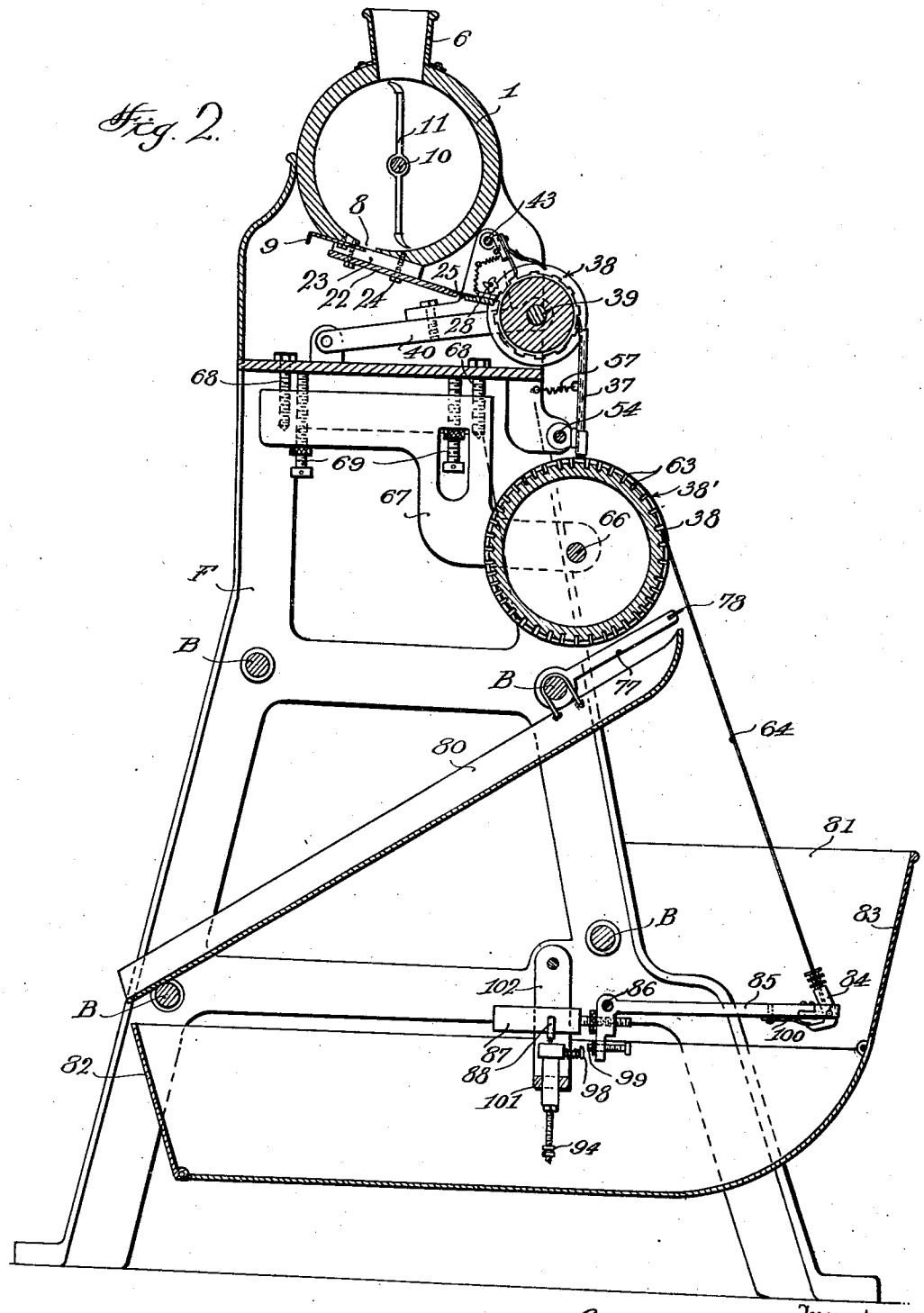
By Christian K. Nielsen Attorney

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AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

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Fig. 2.



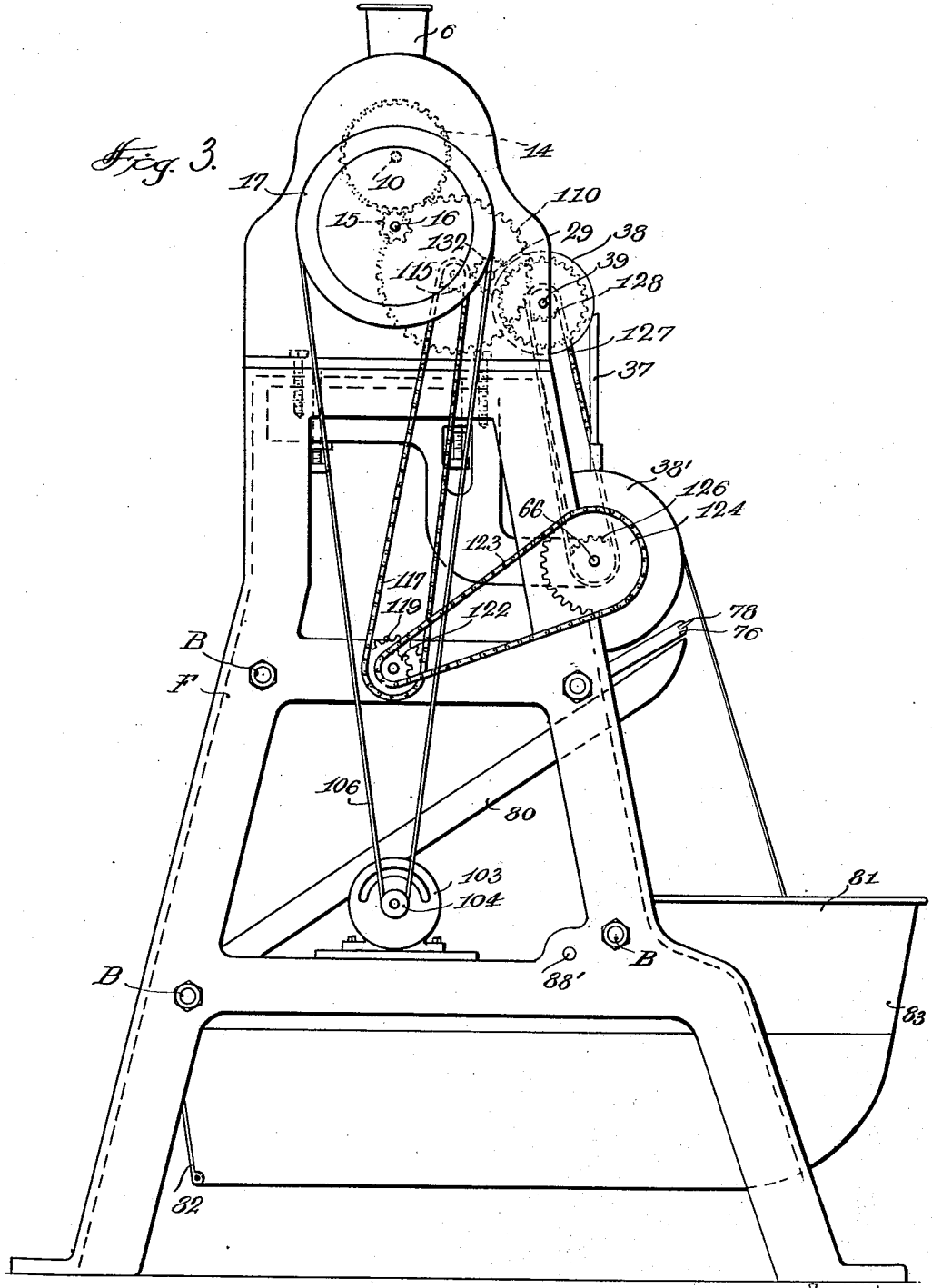

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AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

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Fig. 3.




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AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

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Fig. 4.

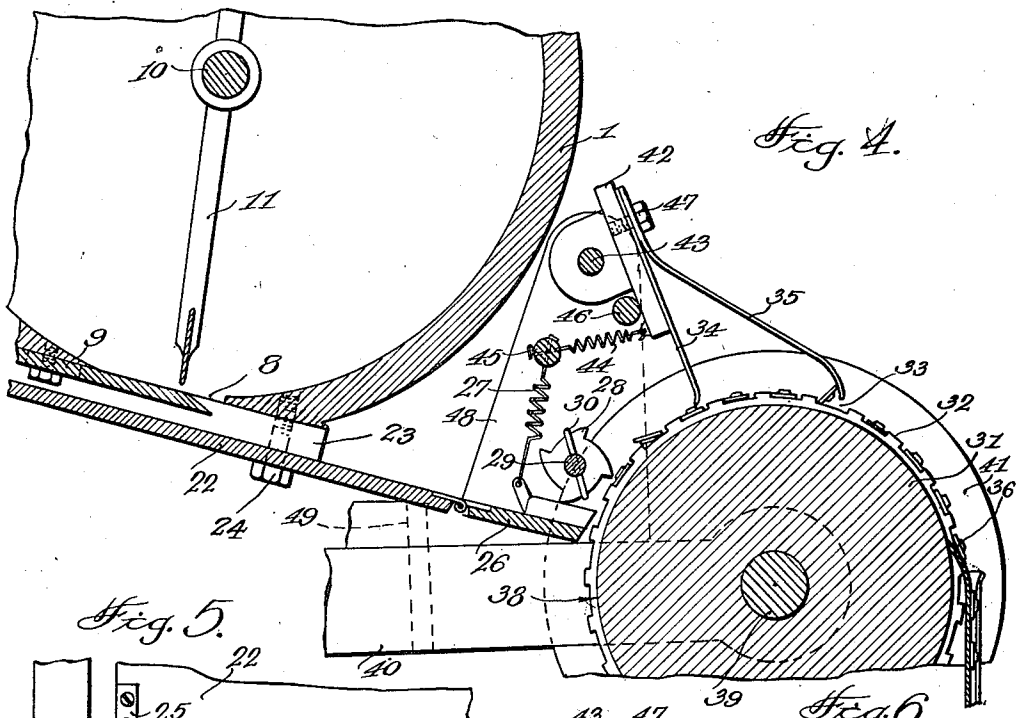



Fig. 5.

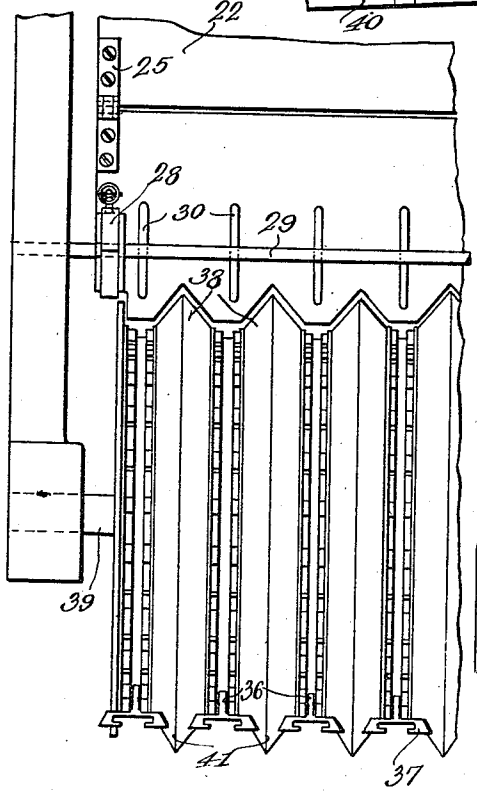
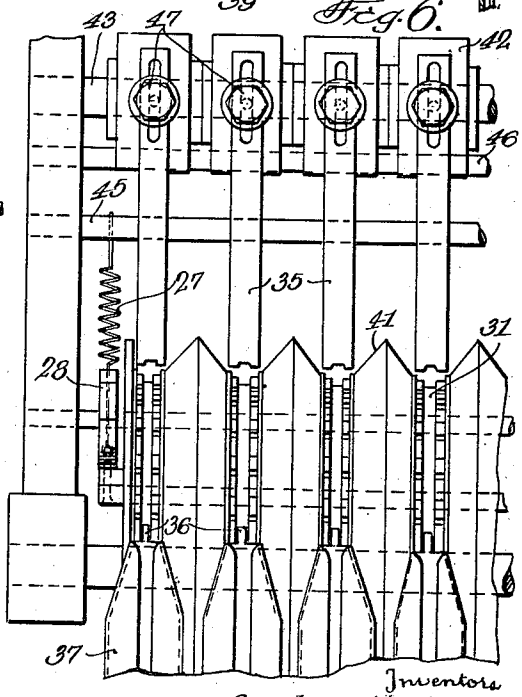



Fig. 6.




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AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

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Fig. 7.

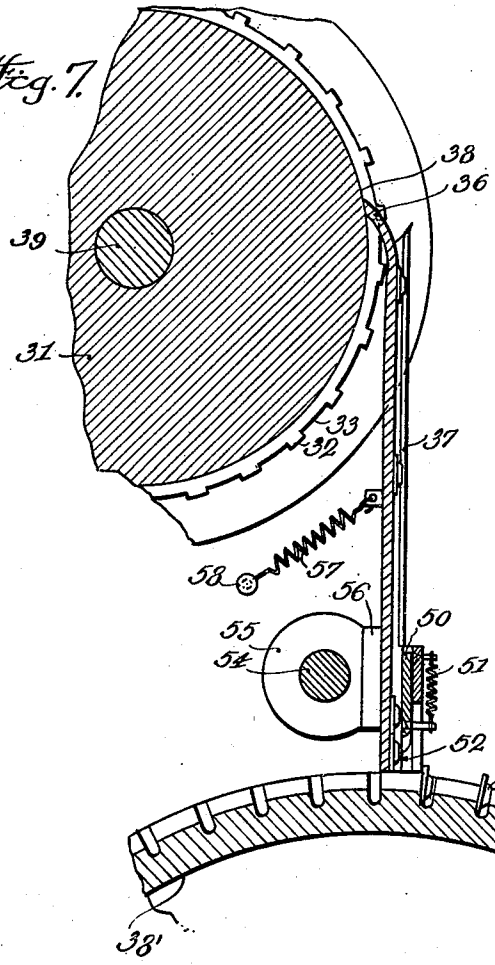



Fig. 8.

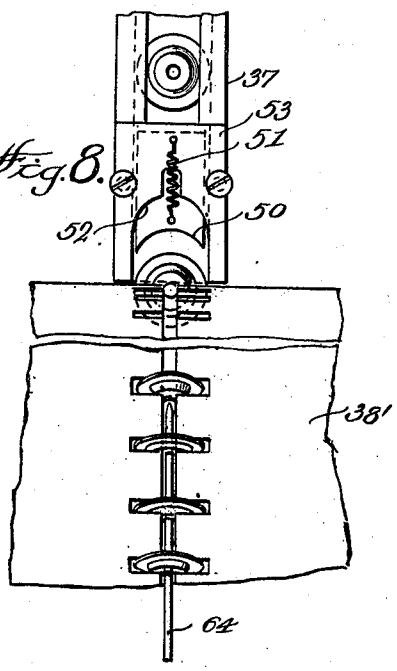
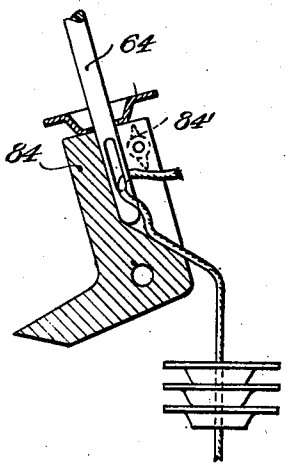



Fig. 9.







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AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

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Fig. 10

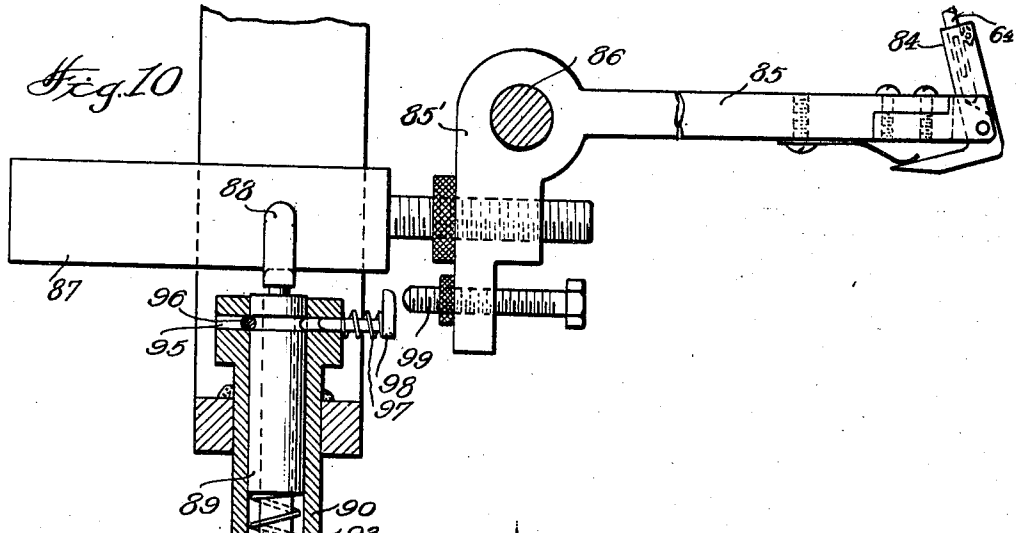



Fig. 11.

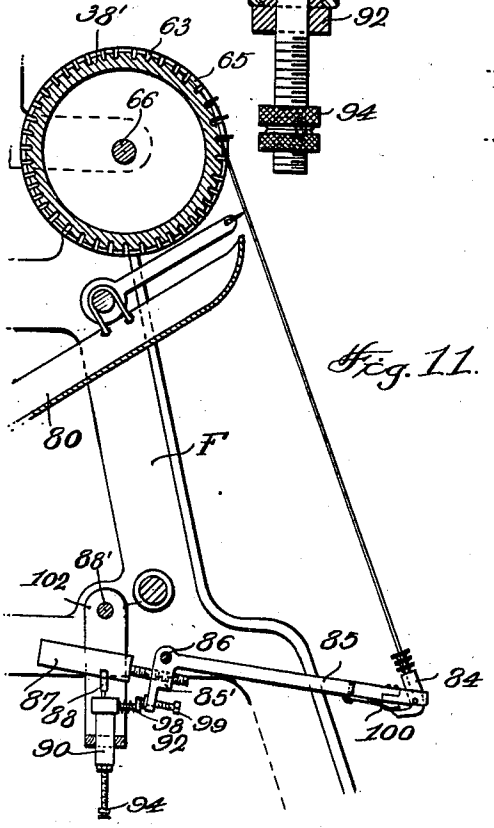
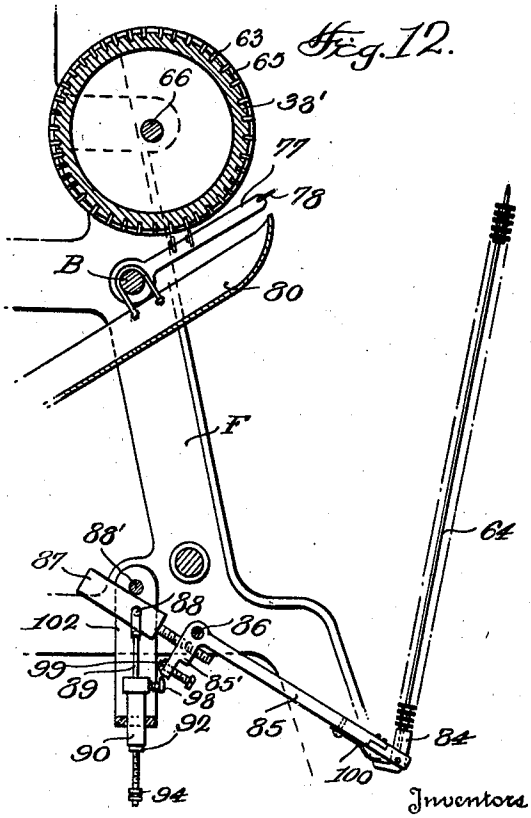



Fig. 12.




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Patented Sept. 8, 1942

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# UNITED STATES PATENT OFFICE

2,295,469

## AUTOMATIC MACHINE FOR STRINGING WASHERS AND THE LIKE

Carlos Hall and Fernando Hall, Mexico City, Mexico, assignors of twenty-five per cent to Harry Hadfield Hallatt, and twenty-five per cent to Oscar Antonio Chabrand, both of Mexico City, Mexico

Application September 11, 1941, Serial No. 410,488

12 Claims. (Cl. 209—72)

This invention relates to an automatic machine for stringing washers of the type employed in washer placing machines, during fabrication of rubber heels and the like and it consists in the constructions, arrangements and combinations herein described and claimed.

It is a particular object of the invention to provide a machine which not only automatically strings the washers but will eject any and all washers which do not have the required measurements in shape as well as thickness, or which may be otherwise defective.

It is an important object of the invention to provide a novel mounting for the stringing needles which will be automatically released from the operative position of the needles, when the needles have been filled, or in the event that a washer accidentally jams at the tip of the needles. This feature is important since it facilitates the change of needles without the need for stopping the machine and it also prevents the bending or breaking of the needles.

It is a still further object of the invention to provide means for collecting all washers which may fall from the stringer cylinders when needles are changed or where the washers may not follow a given course, thereby permitting an operator to gather the washers for re-use.

It is also an object of the invention to provide a machine of great simplicity enabling ready manufacture and assembly, and since it is automatic in operation an increase in output can be attained.

Additional objects, advantages and features of invention will be apparent from the following description, considered in conjunction with the accompanying drawings, wherein:

Figure 1 is a front elevation of the machine, partly in section,

Figure 2 is a vertical section thereof,

Figure 3 is a side elevation of the machine, illustrating the drive for the different mechanisms employed,

Figure 4 is an enlarged fragmentary sectional view illustrating the manner of feeding and placing washers upon the feeding cylinder,

Figure 5 is a fragmentary top plan of a vibrator mechanism employed in the device,

Figure 6 is a fragmentary front elevation of the elevating disks, and illustrating the washer-positioning combs and guides,

Figure 7 is a fragmentary sectional view of the elevating disk, showing the guides, stringing cylinder, and stringing needles,

Figure 8 is a fragmentary elevation illustrating one of the guides for conveying the washers to the stringing cylinder and also the automatic gate mechanism,

Figure 9 is an enlarged sectional view of the lower end of one of the stringing needles,

Figure 10 is an enlarged sectional view illustrating the mounting of the needles and automatic release for the needles,

Figure 11 is a view illustrating the position of the needles when filled with washers,

Figure 12 is a view illustrating the position of the needles and trip mechanism when the needles are released from operative position with the stringing cylinder.

Attention is first invited to Figures 1, 2 and 3 wherein a suitable base frame structure F is shown, interconnected by suitable tie bolts B to afford the necessary rigidity.

The upper portion of the frame structure has suitably mounted thereon a cylinder 1, the end portions 2 and 3 of which are detachably mounted by bolts 4 and 5. As viewed in Figure 1, the right hand end of the cylinder 1 is provided with a hopper 6 whereby washers may be deposited in the cylinder.

In the lower periphery of the cylinder 1, a longitudinal slot 8 is formed, the degree of opening of which is controlled by a sliding gate 9, for varying the discharge of washers. Revolubly mounted within the cylinder there is a shaft 10 and spaced therealong and suitably fixed thereto are agitators 11 which move the washers into the slot 8 under rotation. A spoke wheel 12 is also mounted on the shaft, positioned adjacent the discharge end of the hopper 6 and functions to move washers longitudinally of the cylinder.

The shaft 10 is rotated by a gear 14 in mesh with a gear 15 fixed to a shaft 16 suitably mounted in and extended through the end portion 2 of the cylinder. A pulley 17 is fixed to the shaft 16 exteriorly of the end portion for reception of a drive presently to be described.

For the purpose of reducing friction and provide an easy operation of the shaft, ball bearing races 18 and 19 are provided as shown in Figure 1, and the shaft 16 is similarly mounted the bearing races 20 and 21.

Attention is now invited to Figures 2 and 4, wherein a slideway 22 is shown, immediately beneath the slot 8. The slideway 22 includes supports 23 for spacing the slideway from the slot a suitable distance, and is secured by means of screws 24. The slide-way 22 is of an articulate structure, including an end portion 26 hinged as at 25 to the forward end of the slide-way. The

hinged end portion 26 is under spring tension as at 27, tending to draw the portion 26 into engagement with vibrators 28 which are secured to a shaft 29, the vibrators and shaft rotating as indicated by the arrow (see Figure 4). Also mounted on the shaft 29, and spaced suitably therealong, are agitator fingers 30. From the foregoing, it will be apparent that the end portion 26 will be given vibratory movements in a vertical plane, and such movement will insure a downward sliding movement of the washers, for a purpose as will presently appear.

A plurality of elevator disks 31 are provided mounted on a shaft 39 between supports 40, each disk being provided with spaced ribs 32, defining respective cells 33 around the periphery of the disk. As shown, the ribs 32 are of such height as to accommodate washers flush therewithin when the washers are placed with the cone portions presented upwardly.

Each of the disks 31 is formed with a circumscribing channel 38 of a depth so as to be positioned below the surface of the cells 33, adapted to receive an extractor finger 36 of a washer guide 37. As shown in Figure 5, each disk 31 is separated from one another by disks 41 having angular peripheral formation, this construction being found to cause proper centering of a washer in respective cells.

A pair of combs 34 and 35 are operatively associated with each disk 31, in the present instance, these being shown as mounted on a plate 42, which is rockably mounted on a shaft 43 carried by a frame 48 which in turn is fixed to the support 40 by means of bolts 49. A tension spring 44 is connected to the free end of the plate 42, the other end being connected to a bolt 45 of the frame 48, the spring tending to draw the combs into proper position above washers within the cells as will be explained. The rod 46 serves as a stop means for downward movement of the bar. As clearly shown in Figure 6, the combs 34 and 35 are longitudinally slotted and a bolt 47 is extended therethrough for securement of the combs. The height of the combs 34 and 35, with respect to the ribs 32 may be regulated by virtue of the slot and bolt.

As shown in detail in Figures 7 and 8, the guides 37 are in the form of a channel, of a width and thickness to slidably receive the washers, arranged vertically, so as to convey washers to a stringing cylinder 38'. Each guide 37 has a spring 51 for actuating a vertically slidable gate 50, the gate being guided by a cover plate 53, and has a cutaway portion 52, permitting ready passage of washers to the stringing cylinder. By spring-mounting the gate, liability of straining the washers is avoided. The guides 37 are mounted adjacent their lower ends to a transverse bar 56, the latter having bosses 55 for reception of a shaft 54. The guides 37 are each provided with a spring 57 anchored as at 58, tending to draw the guides toward the disks 31 so that the extractor tips 36 will be snugly positioned in the channels 38. As shown in Figure 2, the shaft 52 is supported in brackets 60 secured to the underface of the plate 62 carried by the frame structure. It will be apparent that the disks 31 will accommodate a single washer in each cell 33, with the cone portion upwards, the combs 34 and 35 insuring proper positioning of the washers. In the event that a washer is defective or advances with the cone portion presented downwardly, the comb 35 will engage the edge of the washer and brush it aside as shown in Figure 4. The properly positioned washers will advance to the guides 37 for discharge thereinto upon engagement of the extractor tips 36.

A bracket 67 is adjustably mounted beneath the plate 62 by means of bolts 68. Bolts 69 are also employed in the bracket in opposed relation to the bolts 68 thereby firmly supporting the bracket. The stringing cylinder 38' is supported on forwardly projecting arms of the brackets by means of a shaft 66, and is positioned beneath the lower ends of the guides 37.

The stringing cylinder 38' is formed with a plurality of suitably spaced circumferential grooves 65 and at spaced points along each groove vertical recesses 63 are formed, the latter being of a depth to receive a washer endwise therein, and when so positioned the hole of the washers will be centered with respect to the grooves 65.

Immediately beneath the cylinder 38' brackets 76 and 77 are pivotally mounted upon a tie bolt B. A rod 78 is connected to the ends of the brackets 76 and 77 and extends transversely beneath the needles 64, the respective needles lying in respective grooves 65 so that the points thereof may enter the hole in an advancing washer. This mechanism provides a safety feature and functions to force the needles from the grooves in the event that a defective washer is encountered.

An inclined tray 80 is positioned beneath the stringing cylinder 38' supported from the tie bolt B, and serves to collect washers that are released from the stringing cylinder when the needles are in the position shown in Figure 12. The tray is preferably of triangular form and at its lower end a discharge opening is formed permitting the washers to discharge into a suitable receptacle (not shown).

In addition to the tray 80, a further large tray 81 is provided of a size so as to extend throughout the lower part of the machine and serves to gather any and all washers that may be thrown by the elevator disks 31, which would occur when the washers are improperly placed. In order to facilitate removal of the washers the tray 81 is provided with an articulated rear wall 82 and base and front wall 83.

Reference is now made to Figures 2, 10, 11 and 12 for an understanding of the construction and mounting of the stringing needles 64 it being understood that each of the needles will embody the same construction. A rod 86 fixed in the frame and extended transversely of the machine is provided for rockably supporting a crank lever 85. The crank lever 85 includes a long arm bifurcated at its end for mounting of a foot 84, for securement of a needle, as will be described in greater detail. The foot 84 includes an angular extension positioned beneath the long arm of the lever 85 and a leaf spring 100 is positioned between the two, the spring tending to swing the needle toward and hold the same within the grooves of the stringing cylinder.

The short arm 85' of the crank lever is extended downwardly at right angles to the long arm of the crank lever, and has a threaded opening within which a threaded shank of a counterweight 87 is engaged. Thus the counter-weight may be adjusted with respect to the crank lever 85. The short arm 85' also has an adjustable trip lug 99 for a purpose presently to be explained.

A support 102 is fastened between the side members of the frame of the machine, and mounts a vertically disposed cylinder 90. A pis-

ton 89 is reciprocably mounted within the cylinder and includes a stem 91 extended through the lower end. A helical spring 93 is confined between the piston and a packing gland 92, the spring being under compression tending to force the piston upwardly in the direction of the counter-weight 87. The upper end of the piston 89 has a saddle 88 for support of the counter-weight, and the lower end of the stem is threaded for reception of adjusting nuts 94 whereby the upward movement of the piston may be varied.

As clearly shown in Figure 10, the cylinder has an enlarged head slotted transversely as at 95, the slot extending across the opening of the cylinder at one side thereof. A hook clamp 96 is reciprocably mounted in the slot, the clamp having a stem projecting in the direction of the trip lug 99 and terminating in a cam shoe 98 cooperable with the trip lug 99 at times. A helical spring 97 is interposed between the cam shoe 98 and the cylinder tending to hold the clamp hook 96 in engagement with a kerf formed in the upper end of the piston 89.

In the operation of the mechanism just described, the washers will be fed to the needles until they are filled. Some of the needles may fill sooner than others, and in any event, the needles will remain in until filled to their respective capacities. As soon as a needle is filled with its allotted washers, the weight thereof will overbalance the counter-weight 87 and the needle begins to move downwardly as shown in Figure 11, where it will be noted that the cam shoe 98 has moved the trip lug 99 to release the hook clamp 96 from engagement with the cylinder 89. The spring 93 then exerts an upward thrust to the piston 89 causing the counter-weight to move upwardly with a consequent downward movement of the crank arm 85 which will swing the needle or needles as the case may be, to the position shown in Figure 12. The upward swinging movement of the counterweight is checked by a stop rod 86. In the position shown in Figure 12, the filled needle may be readily removed by loosening the wing nut 84', or, a thread may be inserted in the eye of the needle allowing the washers to feed thereunto.

The transmission of power to the various devices is shown in Figure 3 in conjunction with Figure 1. A motor 103 is employed and by means of a pulley 104 the belt 106 is moved as indicated by the arrows, which in turn rotates pulley 17 and its associated shaft 16, thereby driving the gear 15 and consequently the intermeshed gear 14. The gear 14 being fixed to the shaft 10, the agitators 11 are motivated. The gear 14 also is in mesh with gear 110 thus driving the shaft 111 and the sprocket gear 115, transmitting motion to the chain 117, which drives the sprocket 119 and consequently its shaft 121. In order to reduce friction, the shaft 111 is preferably journalled in bearings 113. A reducing sprocket 122 drives the sprocket 124 by means of a chain 123. The sprocket 124 furnishes motion to the stringing cylinder 36' by virtue of its securement to the shaft 66. On the opposite end of the shaft 66 a sprocket 126 is secured driving the gear 128 of shaft 39 by means of a chain 127; thus the elevating disks 31 are actuated. Also secured to the shaft 39 there is a gear 131 in mesh with a gear 132 fixed to the shaft 29, the latter carrying the vibrators 28 and the agitator fingers 30.

From the foregoing it will be seen that we have provided a machine which will automatically string washers upon needles with the cone portions presented upwardly, as well as providing means for positively eliminating defective washers from passing onto the needles, and while we have specifically shown and described our preferred construction, this is by way of illustration only and we consider as our own all such modifications in construction as fairly fall within the scope of the appended claims.

We claim:

1. An automatic machine for stringing washers on needles or the like comprising a feed hopper and an inclined articulated slide-way, washer feeding means between the hopper and the slide-way, a plurality of elevating disks, each disk having a plurality of cells for accommodation of a single washer, means for removing washers other than those properly positioned within the cells, means for vibrating the articulated portion of the slide-way to effect movement of the washers to the cells of the disks, guide means cooperable with each disk for receiving washers therefrom, a stringing cylinder having means for receiving separate washers from the guide means, and stringing needles cooperable with the stringing cylinder for receiving washers thereon.

2. The structure of claim 1 in which each of said needles includes means for effecting movement away from the stringing cylinder at times.

3. The structure of claim 1 in which each of said needles includes means operable under action of weight to effect movement of the needles to a position inoperative to receive further needles thereon.

4. The structure of claim 1 in which the cells are of the same depth as the thickness of the washers, said disks having a plurality of circumferential grooves traversing the center of respective cells the grooves being deeper than the cells, and said guide means having a washer extracting finger complemental to respective grooves for discharging the washers into the guide means.

5. The structure of claim 1, in which the means for removing and properly placing the washers with their cone portions upward consists of tandem combs operative immediately above the cells of the disks.

6. The structure of claim 1, in which the guide means is so constructed and adapted to admit washers from the elevating disks with the cone portions presented upwardly.

7. The structure of claim 1 in which the lower portion of the guide means includes a resiliently mounted gate to permit the washers to pass to the stringing cylinder without strain.

8. The structure of claim 1 in which the stringing cylinder comprises a plurality of perimetrically spaced slots for accommodation of washers edgewise therein, a circumferential groove intersecting respective spaced slots, the slots being of a depth to present the opening of the washers in direct line with the needle complemental to its respective circumferential groove.

9. The structure of claim 1 in which tray means are provided beneath the elevating disks and stringing cylinders for reception of washers which may be discharged or fall from the machine.

10. In an automatic machine for stringing washers, a hopper having a discharge opening in its lower portion, means for advancing washers through the opening, a slide-way beneath the discharge opening, the slide-way having a hinged forward end, spring means for holding the forward end in normal position, a plurality of rotatable elevating disks positioned in operative posi-

tion to receive washers from the hinged forward end of the slide-way, each disk having inclined walls defining a trough for guidance of washers thereinto, a circumferential groove at the base of each trough, spaced transverse ribs in the trough defining washer receiving cells, vibrator means for agitating the forward end of the slide-way, said means including fingers for moving washers into the troughs, comb means above the cells for positioning a washer in respective cells and to eject washers improperly positioned, a channel-like guide-way having a finger positioned within the groove to eject washers for passage into the guide-way, a stringing cylinder beneath the guide-ways constructed and adapted to receive and hold washers in edgewise position, needle means positioned to pass through apertures of the washers, and counter-balance means for moving the needles from operative position with respect to the stringing cylinder.

11. An automatic needle moving means for washer stringing means comprising in combination with a stringing cylinder, a pivoted crank, a needle carried on one arm thereof, spring means holding the needle in operative position with the cylinder, a counterweight on the other arm, piston means beneath the counter-weight and having a portion supporting the counter-weight, said piston being under tension, releasable means for holding the piston under tension, a trip lug on the second named arm adapted to contact and move the releasable means under swinging movement of the crank and stop means limiting upward swinging movement of the counter-weight.

12. An automatic machine for stringing washers on needles or the like comprising a feed hopper and an inclined slide-way, washer feeding means between the hopper and the slide-way, a plurality of elevating disks adapted to receive washers from the slide-way, each disk having a plurality of cells for accommodation of a single washer, means for removing washers other than those properly positioned within the cells, guide means cooperable with each disk for receiving washers therefrom, a stringing cylinder having means for receiving separate washers from the guide means, stringing needles cooperable with the stringing cylinder for receiving washers thereon, each of the needles including means for effecting movement away from the stringing cylinder at times.

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