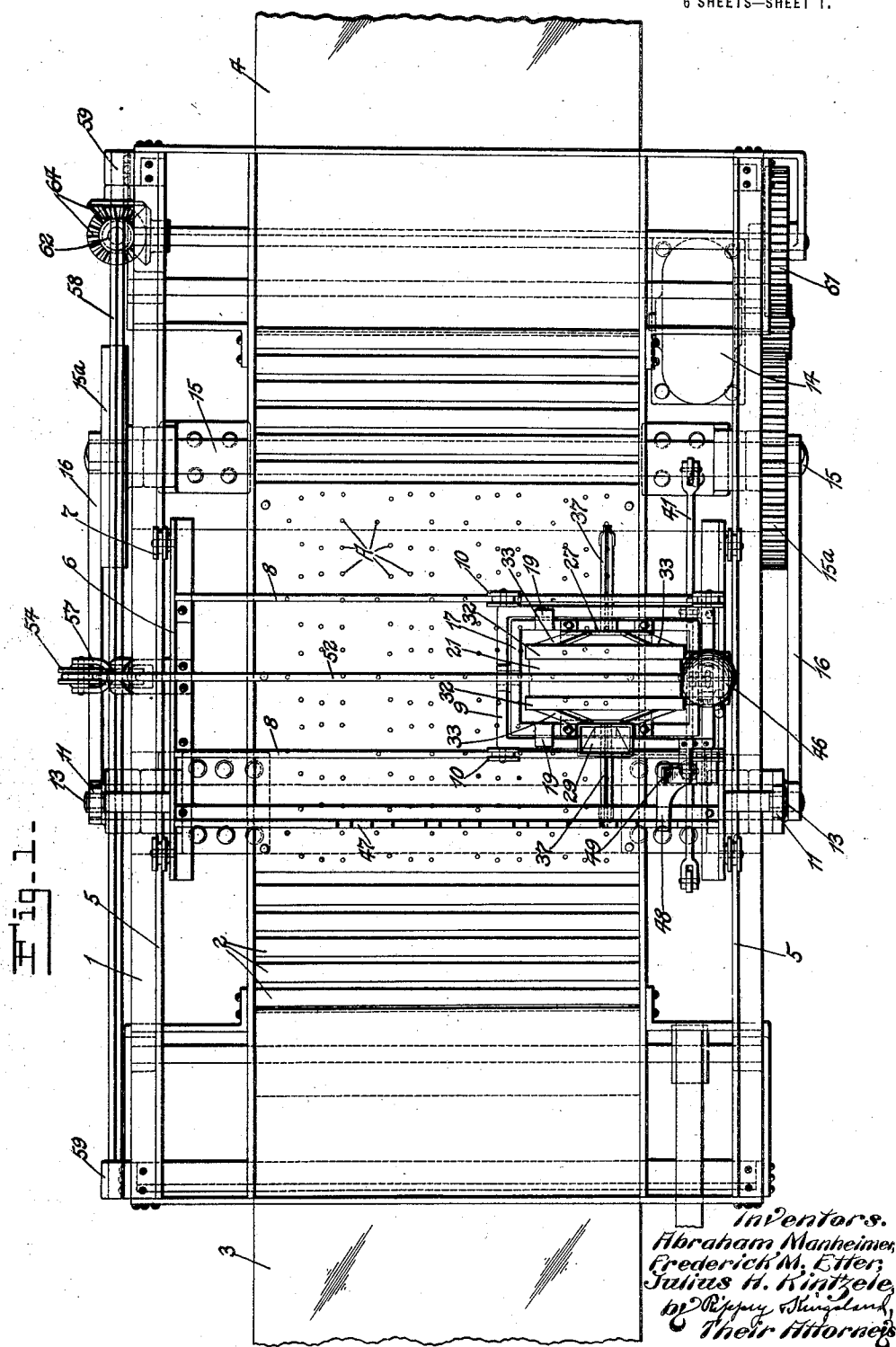


WASHER PLACING MACHINE FOR RUBBER HEEL MOLDS.

Patented Aug. 8, 1922.

6 SHEETS—SHEET 1.

1,424,920.



J. H. KINTZELE, A. MANHEIMER, AND F. M. ETTER.

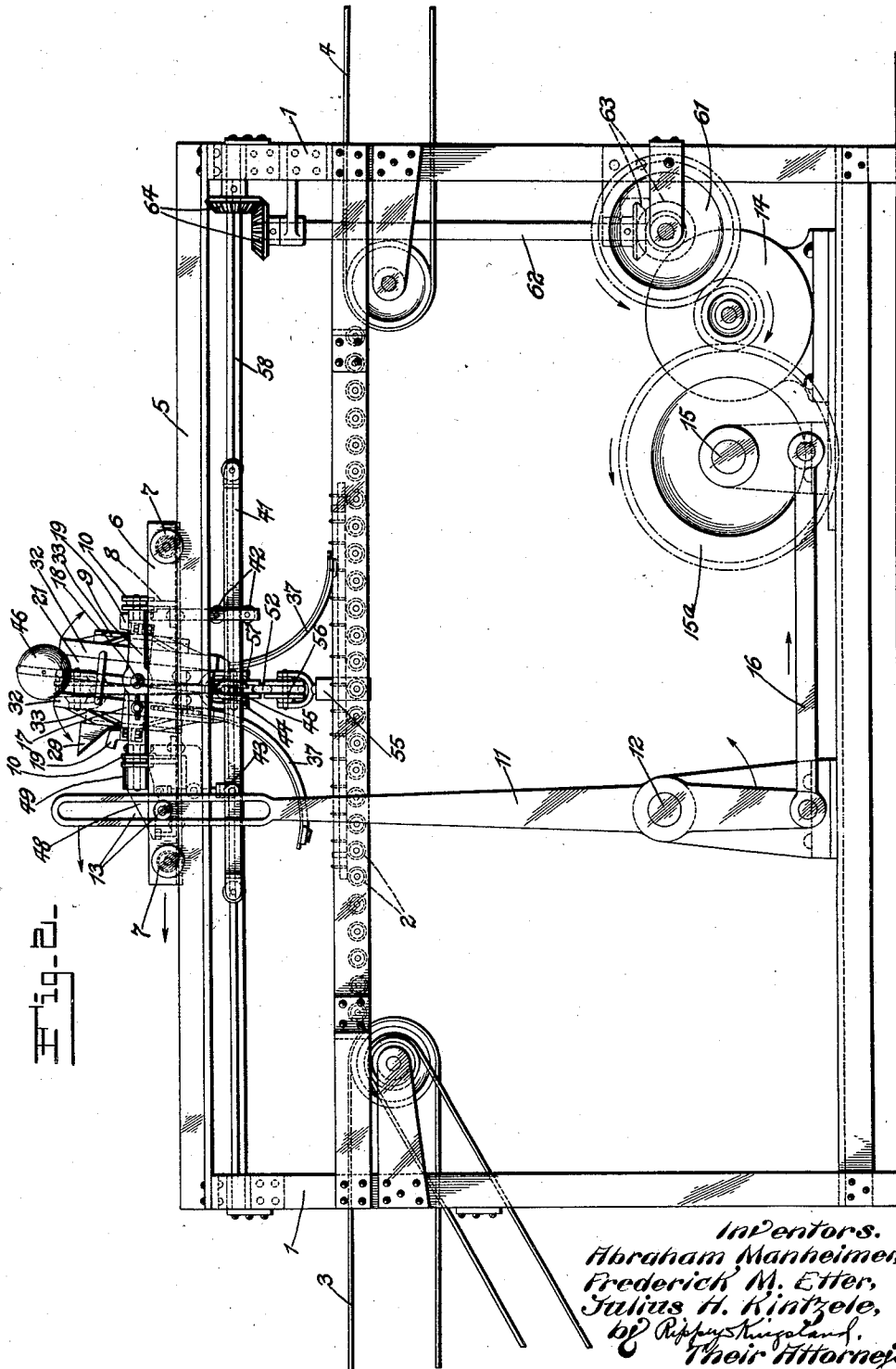
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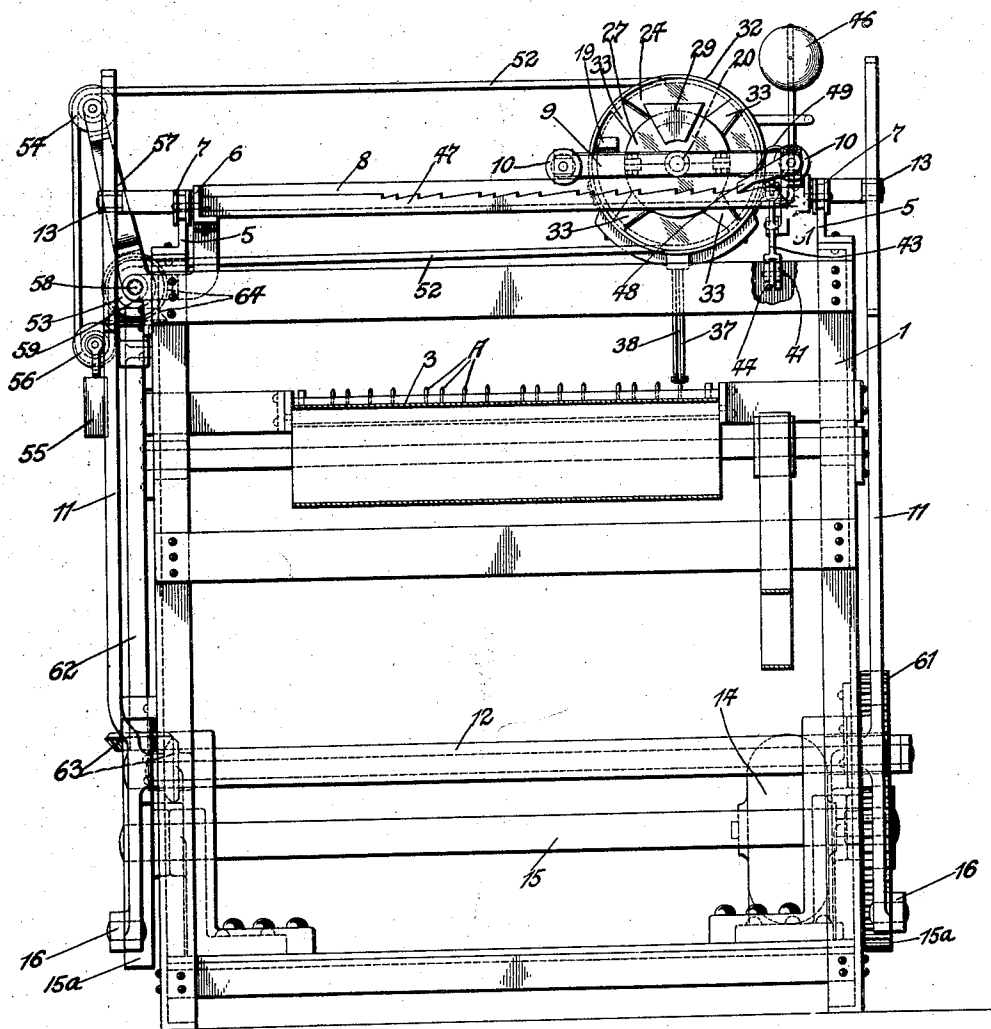
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Patented Aug. 8, 1922.

6 SHEETS--SHEET 3.

1,424,920.

Fig. 3.



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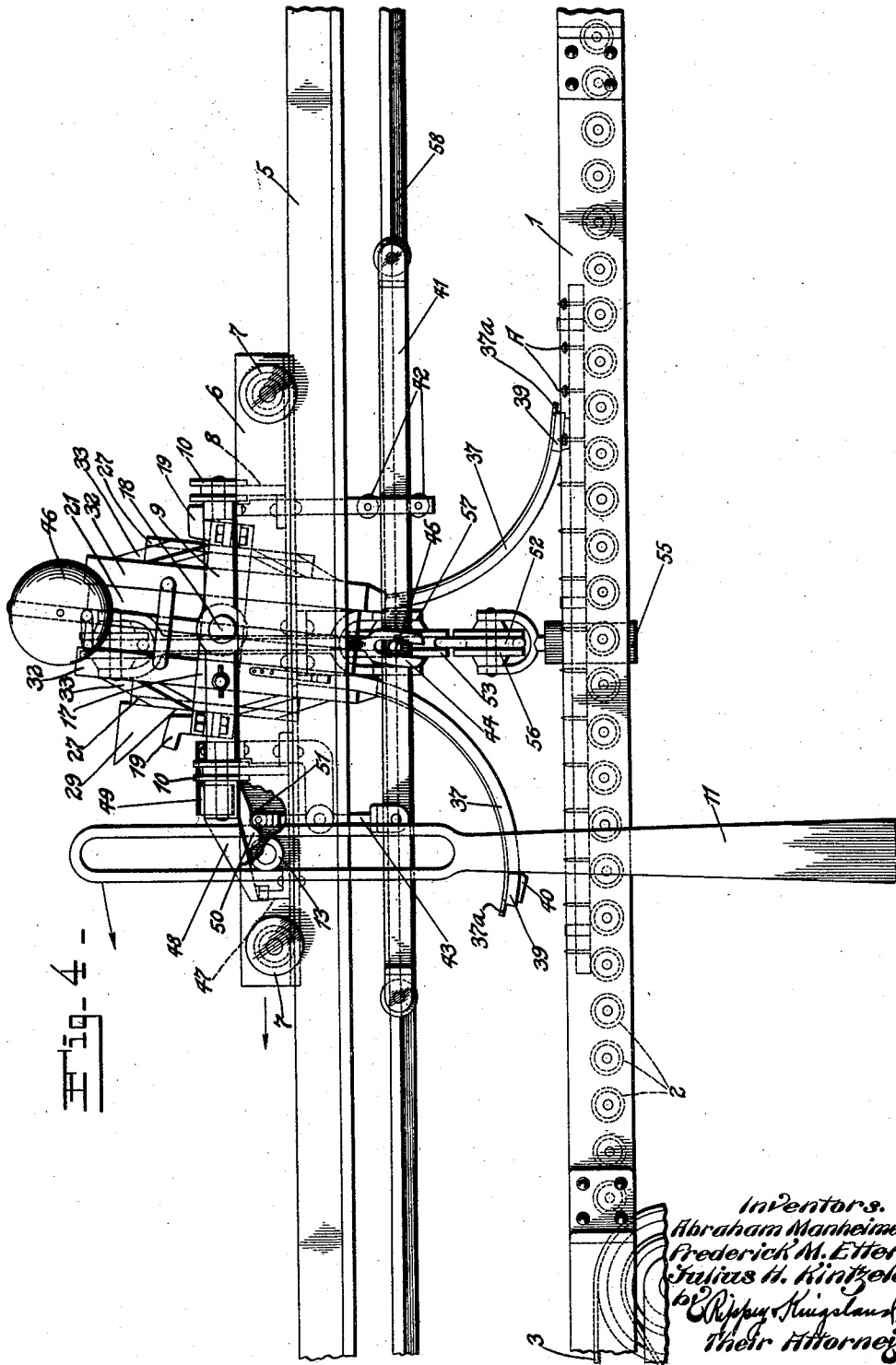
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6 SHEETS—SHEET 5.

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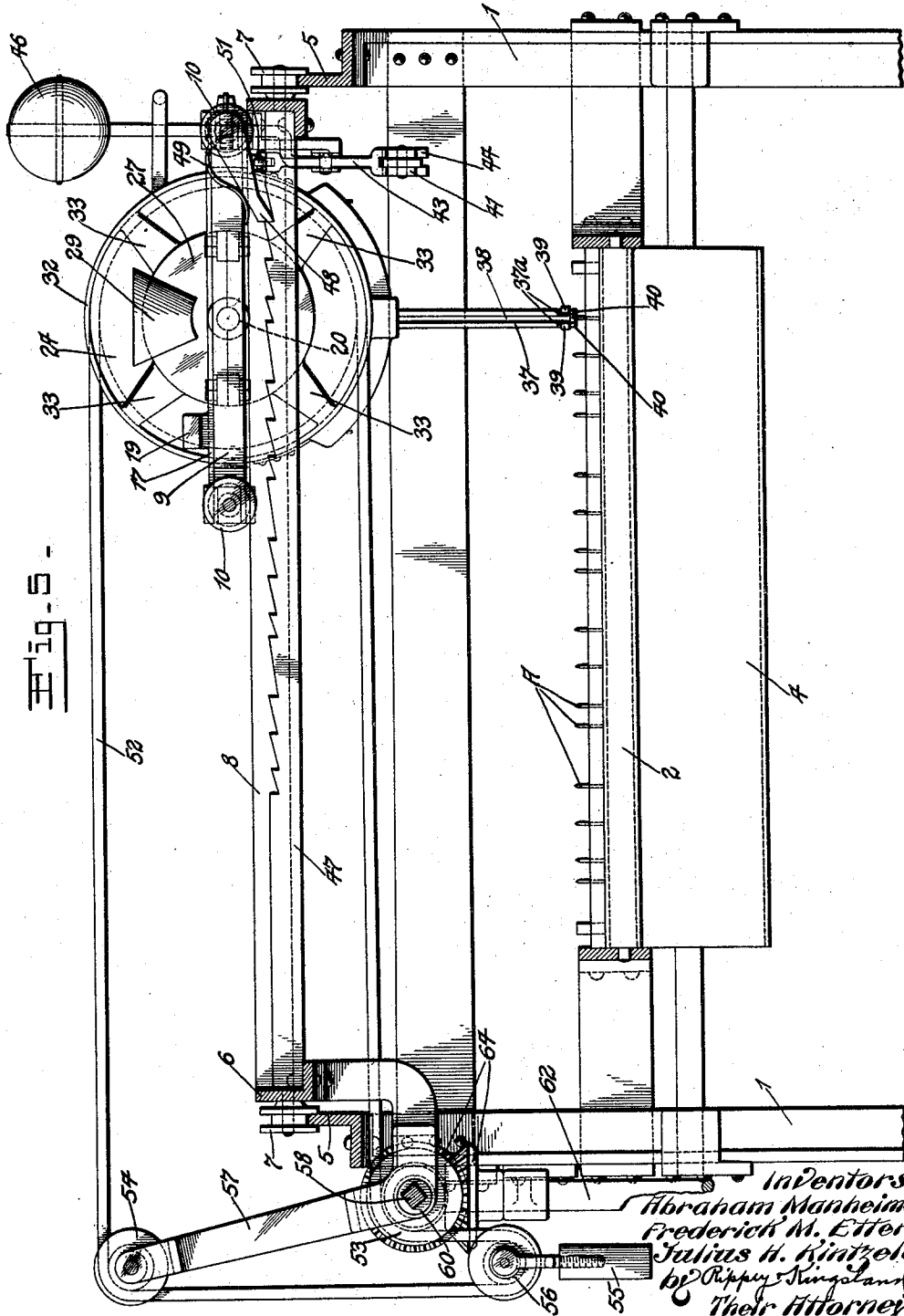


Fig. 5 -

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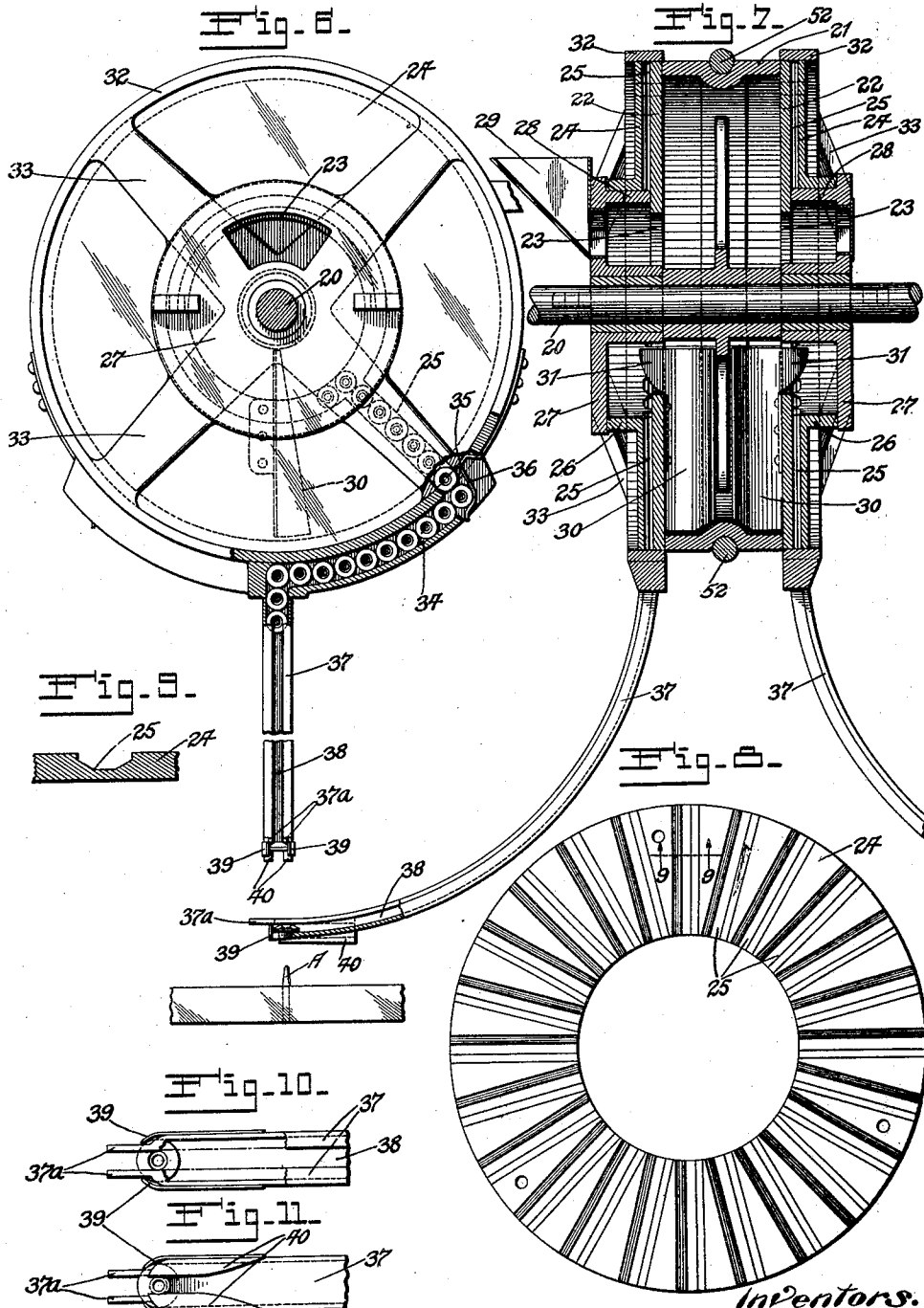
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Patented Aug. 8, 1922.

6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

JULIUS H. KINTZELE, ABRAHAM MANHEIMER, AND FREDERICK M. ETTER, OF
ST. LOUIS, MISSOURI.

WASHER-PLACING MACHINE FOR RUBBER-HEEL MOLDS.

1,424,920.

Specification of Letters Patent.

Patented Aug. 8, 1922.

Application filed August 31, 1921. Serial No. 497,299.

To all whom it may concern:

Be it known that we, JULIUS H. KINTZELE, ABRAHAM MANHEIMER, and FREDERICK M. ETTER, citizens of the United States, and residents of the city of St. Louis and State of Missouri, have invented a new and useful Washer-Placing Machine for Rubber-Heel Molds, of which the following is a specification.

This invention relates to machines for placing washers for rubber heel molds.

In the manufacture of rubber heels it is now the practice to place the washers on the pins supported by the bottom wall of the mold by hand. This requires long practice and training before the operator can acquire sufficient skill and speed to operate profitably. It is often impossible or impracticable to maintain specially trained operators continuously, and these facts and circumstances have resulted in serious difficulties in the rubber heel industry.

An object of the present invention is to provide a machine that will operate efficiently to place the washers upon the pins supported by the bottom wall of the heel mold.

Another object of the invention is to provide a machine of the character mentioned with improved means for delivering the washers to points at which they are adapted to be engaged by the pins in connection with the bottom wall of the mold.

Another object of the invention is to provide a machine of the character mentioned with improved means for operating and controlling the devices that deliver the washers to positions for engagement by the pins of the mold.

Various other objects of the invention will appear from the following description, reference being made to the accompanying drawings, in which

Fig. 1 is a plan view of a machine embodying the principles of our present invention.

Fig. 2 is a side elevation of the machine.

Fig. 3 is an end elevation of the machine.

Fig. 4 is an enlarged side elevation of the mechanism by which the washers are delivered to the pins.

Fig. 5 is a cross sectional view of the machine showing one form of a device that may be employed to control lateral movements of the carriage that supports the washer placing mechanism.

Fig. 6 is an end elevation of the washer placing device.

Fig. 7 is a vertical sectional view thereof.

Fig. 8 is a view showing the channels or passages through which the washers pass to the washer placing fingers.

Fig. 9 is a sectional view showing the construction and arrangement of the channels or passages.

Fig. 10 is a view showing details of one of the washer placing fingers by which the washers are supported in position to be engaged by the pins of the mold.

Fig. 11 is a bottom plan view thereof.

In the embodiment of the invention shown the washer placing mechanism is operatively supported by an appropriate frame 1. The pin supporting walls or members of the molds may be placed in position upon the supporting rolls 2 manually; or, they may be moved to position on said rolls by a conveyor 3. Similarly, a conveyor 4 may be employed to move the pin supporting mold members from the machine after the washers have been placed on the pins.

The frame 1 supports a pair of parallel rails 5 above the rolls 2. A carriage 6 is mounted on the rails 5, being equipped with flanged wheels or rollers 7 operating on the rails.

The carriage 6 supports a pair of rails 8 forming a track for a carriage 9 having flanged wheels or rollers 10 operating on the rails 8. The rails 8 extend transversely of the carriage 6 so that the carriage 9 may be moved to different adjusted positions upon the carriage 6, while the carriage 6 may be moved in opposite directions upon the rails 5 as required to operate the washer placing mechanism.

The carriage 6 is shuttled or reciprocated by any appropriate mechanism as by a pair of levers 11 pivoted on a support 12 and having pin-and-slot connection 13 with the carriage 6. The levers 11 may be operated by any appropriate means as by a motor 14 having its shaft geared to drive a shaft 15 having wheels 15^a thereon, the same being connected by links 16 with the lower ends of the levers 11, respectively.

A frame 17 is pivotally supported for rocking movements in the carriage 9, said frame 17 being provided with supporting members 18 journaled in the ends of the carriage 9. The frame 17 has shoulders 19

adapted to engage with the side members of the carriage 9 to limit rocking movements of the frame 17 and to support said frame in its different adjusted positions.

5 The frame 17 supports a shaft 20 upon which devices for placing the washers are supported. A cylindrical drum or magazine 21 is rotatively mounted on the shaft 20. To each end of the drum magazine 21
10 an end wall plate 22 is attached. Each end wall plate 22 has a relatively large central opening 23 through which the washers may pass into and out of the drum cylinder 21.

A plate 24 is attached to the outer side
15 of each of the plates 22. The plates 24 are provided with a number of radial channels or passages 25 conforming to the shape of the washers used in rubber heels. Such washers are dished and have openings
20 through their centers. To conform to the shape of these washers the channels or passages 25 have relatively narrow bottom walls conforming to the width of the central portions of the washers, and have sloping
25 side walls conforming to the inclination of the walls of the washers. The depth of the channels or passages 25 is just sufficient to receive a washer therein and to permit free movement of the washers when the washers
30 are properly placed. But, due to the sloping arrangement of the walls of the channels or passages 25, it is impossible for washers to enter said channels or passages in inverted positions. Accordingly, the
35 convex sides of the washers extend outwardly when the washers enter the channels or passages 25 and it is impossible for the washers to enter said passages in any different way.

40 Each plate 24 is formed with an annular flange 26. An end wall plate 27 is non-rotatively supported against the outer end of each of the flanges 26 and is provided with a semi-circular flange 28 around which the
45 flange 26 turns. The flange 28 extends to the plate 22 so that the channels or passages 25 are closed when their inner ends are lower than their outer ends. This prevents the washers from dropping out of
50 the channels or passages 25 when the inner ends of said channels or passages are lower than their outer ends.

A hopper 29 (Fig. 7) opens into the chamber formed by one of the plates 27 and constitutes convenient means for delivering the washers into the machine. From the chamber in which the washers are received from the hopper 29 some of the washers pass into the drum magazine 21 and thence into the
60 chamber formed by the other end wall 27. Within the drum magazine 21 a number of shovels 30 are supported and are provided with extensions 31 extending through the openings 23. These shovels thus constructed and arranged serve to deliver
65

washers into the end chambers as the drum magazine revolves. A ring 32 encircles each side of the plates 22-24. The rings 32 have webbed connection 33 with the plates 27 respectively. The lower portions
70 of the rings 32 are enlarged, the enlarged portion of each of said rings having a passage 34 therethrough (Fig. 6) adapted to receive washers from the channels or passages 25 as the machine operates. The
75 washers are received in the passages 34 through gates 35 with which the channels or passages 25 are successively brought into communication as the drum magazine revolves. A spring 36 may be employed in
80 each passage 34 to give initial impulse to the washers entering said passage.

The passages 34 are shaped like the channels or passages 25 so that it is impossible for the washers therein to become inverted
85 or misplaced.

From the lower end of each of the passages 34 a curved finger 37 extends downwardly and outwardly. The fingers 37 curve until their lower ends are nearly horizontal. Each finger 37 has a passage 38
90 therethrough conforming in shape to the shape of the washers, as in the case of the channels or passages 25 and the passages 34 previously described. If desired, a part of
95 the upper outer walls of the fingers 37 may be removed to leave a slot in each finger through which the washers may be observed and through which access may be had to the washers in the fingers. 100

From the foregoing it will be seen that the washers have their wide faces down. The washers are moved in this way to the lower ends of the fingers 37, where the washers are engaged and retained by
105 the pins A of the mold and withdrawn from the fingers.

The lower end of each of the fingers 37 is equipped with a pair of springs 39 serving to stop the washers passing to the ends
110 of the fingers and to retain the washers until they are engaged and held by the pins A of the mold. The springs 39 then yield to permit the washers to pass therefrom successively and to permit other washers
115 to move to position to be engaged by the pins of the mold.

The lower side of the end of each finger is provided with a pair of guide flanges 40 diverging toward their inner ends and
120 converging toward their outer ends to form a space between their outer ends having a width only slightly in excess of the width of the holes in the washers. As the carriage 6 moves over the pins A of the mold
125 the upper ends of the pins are engaged between the guides 40. The ends of the pins contact with the lower walls of the fingers 37 until the end washers are immediately above the pins. The finger 37 then drops, 130

causing the adjacent pin to engage in the hole in the washer and thereby retain and hold the washer while the carriage 6 continues to move. The washer thus engaged and held by the pin spreads the springs 39 until the washer is removed from the finger, after which the springs 39 return to their proper positions to catch the next adjacent washer. The operation is continuous until the carriage 6 travels a sufficient distance to place washers upon all of the pins in one row of pins of the mold. One of the fingers 37 places washers to all of the pins of each alternate row of pins, while the other finger 37 places washers to all of the pins of the remaining alternate rows of pins.

Each of the fingers 37 is provided with one or more extensions 37^a beyond the ends of the passages 38 and beyond the ends of the springs 39. These extensions 37^a are above the washers so that they press and slide upon the upper sides of the washers as the fingers 37 move from the pins with which the washers are respectively engaged. The pressure of the extensions 37^a upon the washers holds and presses the washers on the pins, so that the washers become positively placed. Preferably there are two extensions 37^a on the end of each finger 37, and they should be spaced apart as shown (Figs. 10 and 11) to avoid contact with the ends of the pins.

As shown in Figs. 2 and 4, the drum magazine is tilted to place the working finger 37 down near the pins A during the travel of the carriage 6. As seen in Figs. 2 and 4, the carriage 6 is travelling toward the left. The leftward movement of the carriage 6 is continued until the washer has been placed upon every pin A in the row of pins to which the washers are being applied. After washers have been placed upon all of the pins in that row movement of the carriage 6 is reversed and the drum magazine is tilted in opposite direction to lower the other finger 37 and to raise the one that had been working. Also, the carriage 9 is moved over one step on the carriage 6 so as to bring the working finger 37 in a line with the next row of pins A. As a result of these operations, washers are placed on the said next row of pins A as the carriage moves toward the opposite end of the machine. When washers have been placed on all of the said next row of pins A the drum magazine is tilted to the position shown and the carriage 9 is stepped over an additional space on the carriage 6 so that washers will be applied to an additional row of pins A when the carriage 6 moves. As previously stated, the lever 11 and its operating connections move the carriage 6 in opposite directions.

Tilting of the drum magazine to raise and to lower the fingers 37 alternately is effected by connections operated by a bar 41. As

shown the bar 41 is supported for longitudinal movements below the carriage 9, one end thereof being operatively supported between rollers 42 supported from the carriage and the other end thereof being supported by a lever 43 carried by the carriage 9. An arm 44 (Figs. 2 and 4) attached to the frame 17 is forked at its lower end and engages a projection 45 on the bar 41, so that proper movement of the bar 41 in opposite directions will tilt the frame 17 and thereby the drum magazine 21 to its different positions. An appropriate actuator may be employed to complete the final movements of the frame 17 from one inclined position to another inclined position after the initial movements have been imparted to said frame by the bar 41. In the embodiment shown the actuator is in the form of a weight 46 supported above the frame 17 to complete the final movements thereof to its different inclined positions.

The carriage 9 is retained in its different lateral positions to serve washers to the different rows of pins A by means of an escapement mechanism. As shown, the carriage 6 supports a ratchet bar 47, and the carriage 9 supports a pawl 48 cooperating with said bar to control the stepping movements of the carriage 9. The pawl 48 is yieldingly held in engagement with the ratchet bar 47 by a spring 49 (Fig. 5). The pawl 48 is pivoted to the carriage 9 and extends laterally a sufficient distance to engage the bar 47. The lower side of the pawl 48 is provided with a cam shoulder 50 against which operates a roller 51 supported by the upper end of the lever 43. Looking at Fig. 4, it is apparent that movement of the bar 41 toward the right will move the upper end of the lever 43 toward the left, thus raising the pawl 48 out of engagement with the bar 47 for a brief interval of time sufficient to permit the carriage 9 to move one step. The roller 51 moves quickly under the cam 50, permitting said cam to be re-engaged with the bar 47. The pressure of the spring 49 on the pawl 48 is sufficient to cause the cam 50 to hold the lever 43 with the roller 51 at either side of said cam. That is, the pressure of the spring 49 is sufficient to hold the lever 43 in the position shown in Fig. 4; and it is also sufficient to hold the lever 43 in an inclined position with the roller 51 at the opposite side of the cam 50. As shown in Fig. 4, the carriage 6 is moving toward the left. Therefore, when the roller on the end of the bar 41 contacts with the end of the frame 1, the lever 43 is operated to move the upper end thereof toward the left, the roller 51 operating against the cam 50 and raising the pawl 48 out of engagement with the ratchet bar 47. The lever 43 will be retained in the inclined position as described until the carriage 6 moves to the opposite end of the ma-

chine and the roller on the end of the bar 41 engages the opposite end of the frame 1, thereby again operating the lever 43.

In the embodiment of the invention shown 5 the drum magazine is rotated by a belt 52. The belt 52 passes around the drum magazine over an operating pulley 53 (Fig. 5) and over an idler pulley 54. The belt 52 functions also to move the carriage 9 laterally in one direction in the stepping move- 10 ments before described. The lateral stepping movement of the carriage 9 is effected by the belt 52 by means of a weight 55 suspended from a pulley 56 operating on the 15 belt 52 and between the pulleys 53 and 54. The weight also serves to hold the belt 52 in contact with the pulley 53 with sufficient pressure to cause operation of the belt when said pulley 53 is rotated.

20 The pulley 54 is supported by an arm 57 carried by the carriage 6. A polygonal shaft 58 is journaled for rotation in bearings 59 supported by the frame 1. The pulley 53 is mounted for sliding movement 25 on and is rotated by the shaft 58. This construction provides for the operation of the belt 52 in any position of the carriage 6. The shaft 58 extends through a bearing or bushing 60 connecting the pulley 53 with 30 the arm 57 and providing means for sliding the pulley 53 along the shaft 58 in accordance with the movement of the carriage 6.

The shaft 58 may be rotated by any appropriate mechanism. As shown, the shaft 35 of the motor 14 comprises a large gear 61 which is entrained with a shaft 62 by gearing 63. The shaft 62 is geared to the shaft 58 by gearing 64.

When the machine is in use the washers 40 are supplied to the washer placing mechanism through the hopper 29. From the hopper 29 the washers pass into the receiving chamber with which the hopper communicates. From this receiving chamber, 45 quantities of the washers pass into the drum magazine 21 and are delivered therefrom into the other receiving chamber. From the receiving chambers the washers enter the channels or passages 25. It is impossible 50 for the washers to enter the channels or passages 25 in inverted position, or otherwise than in proper position. As the drum magazine 21 revolves, the washers are prevented from dropping out of the channels 55 or passages 25 by the semi-circular flanges 28 which stop the lower ends of the channels or passages 25, as described. From the channels or passages 25 the washers pass into the passages through the fingers 37.

60 As the drum magazine rotates, it occupies an inclined position so that the working finger 37 delivers washers to the end thereof for engagement by the pins A. During this operation, the carriage 6 is 65 moving laterally upon the machine until

washers have been placed upon all of the pins A in the row of pins to which the washers are being applied. When the carriage 6 reaches the end of its movement, 70 the roller on the end of the bar 41 strikes the end of the frame 1, shifting or tilting the drum magazine in the opposite direction and releasing the pawl 48 from the ratchet bar 47. When the pawl 48 is dis- 75 engaged from the ratchet bar 47, the carriage 9 is drawn over one space or step by the belt 52 and the actuating device 55—56 in connection therewith. The carriage 6 is then moved toward the opposite end of the machine, the other finger 37 working upon 80 the proper row of pins A. The carriage 6 is thus reciprocated and the carriage 9 is stepped or spaced as described, until washers have been placed upon every pin A in all of the rows of pins. 85

From the foregoing it will be seen that our invention satisfactorily and efficiently accomplishes all of its intended objects and purposes. By use of this machine, the washers may be placed rapidly and with 90 precision upon all of the pins A. Many of the movements described are automatic in the sense that they occur at the proper time and in the proper manner as an incident to the operation of the motor. The carriage 95 9 may be returned to its initial or starting position upon the carriage 6 by any appropriate means, as by hand.

We do not restrict ourselves to unessential particulars in any respect. It is ap- 100 parent that the construction and arrangement of the machine may be widely varied without departing in the least from the nature and principle of the invention. We 105 contemplate such alterations and modifications as may be desirable to obtain maximum efficiency and as may be within the scope of the appending claims.

What we claim and desire to secure by Letters Patent is:— 110

1. A machine of the character described, comprising a carriage, a magazine supported by the carriage, a passage supported by the carriage for conducting washers from the magazine to position for engagement by 115 pins to which the washers are to be applied, means for operating the carriage to cause the washers to be engaged by the pins in one row, mechanism for moving the carriage to position to cause washers to be en- 120 gaged by the pins in another row, and means for delivering washers from the magazine into said passage.

2. A machine of the character described, comprising a carriage, mechanism for recip- 125 rocating said carriage, an additional carriage supported by the first one, a magazine supported by the additional carriage, passages for conveying washers from the magazine to positions for engagement by pins to 130

which the washers are to be applied, means for moving said additional carriage to different adjusted positions, as required to apply washers to different series of pins, and means for operating said magazine to tumble the washers into said passages.

3. A machine of the character described, comprising a magazine arranged to contain washers, and a passage from the magazine having sloping walls conforming to the sloping walls of dished washers, and preventing washers from entering the passage in inverted positions.

4. A machine of the character described, comprising a magazine arranged to contain washers, a passage from the magazine having sloping walls conforming to the sloping walls of dished washers and preventing washers from entering the passage in inverted positions, and a spring at the discharge end of said passage for supporting the washers and permitting the washers to be successfully removed.

5. A machine of the character described, comprising a magazine for containing washers, a passage from the magazine having sloping walls conforming to the sloping walls of the washers, and a curved passage arranged to receive washers from the first-named passage and to guide the washers to the work.

6. A machine of the character described, comprising a magazine for containing washers, a passage from the magazine having sloping walls conforming to the sloping walls of the washers, and mechanism for moving the magazine to tumble the washers therein and cause the washers to enter said passages.

7. A machine of the character described, comprising a magazine arranged to contain washers, a curved passage for conducting washers from the magazine to the work, and means for inclining the carriage to and from position in which said passage will conduct washers to the work.

8. A machine of the character described, comprising a magazine arranged to contain washers, and a curved passage for conducting washers from the magazine to the work and having sloping walls conforming to the sloping outer walls of convex washers.

9. A machine of the character described, comprising a magazine arranged to contain washers, a curved passage for conducting washers from the magazine to the work and having sloping walls conforming to the sloping outer walls of convex washers, and mechanism for operating the magazine to cause the washers to tumble into said passage.

10. A machine of the character described, comprising a supporting carriage, a magazine carriage mounted on the supporting

carriage for lateral movements therein, a tumbling magazine supported by the magazine carriage and arranged to contain washers, passages for conducting the washers from the tumbling magazines to the work, means for operating the tumbling magazine to tumble the washers into the passages, and means for moving the magazine carriage to different positions upon the supporting carriage.

11. A machine of the character described, comprising a tumbling magazine arranged to contain washers, receiving chambers for receiving washers from the tumbling magazine, curved passages for conducting washers to the work, passages from said receiving chambers for conducting washers therefrom for delivery into the curved passages, means for supporting the passages in position to cause the passages successively to deliver washers to the work, and means for operating the tumbling magazine to deliver washers into the passage that is in position to deliver washers to the work.

12. A machine of the character described, comprising a tumbling magazine arranged to contain washers, receiving chambers for receiving washers from the tumbling magazine, curved passages for conducting washers to the work, passages from said receiving chambers for conducting washers therefrom for delivery into the curved passages, means for supporting the passages in position to cause the passages successively to deliver washers to the work, means for operating the tumbling magazine to deliver washers into the passage that is in position to deliver washers to the work, and means for preventing washers from falling out of said passages from said receiving chambers.

13. A machine of the character described, comprising a tumbling magazine, receiving chambers communicating with the tumbling magazine, means for operating the tumbling magazine, elements in the tumbling magazine for causing the articles in the tumbling magazine to pass into said receiving chambers as an incident to the operation of the tumbling magazine, and a plurality of passages arranged to receive washers from each of said chambers.

14. A machine of the character described, comprising a tumbling magazine arranged to contain washers, receiving chambers at the sides of the tumbling magazine, means for operating the tumbling magazine, elements in the tumbling magazine for causing the washers to pass therefrom into the receiving chambers as an incident to the operation of the tumbling magazine, and a plurality of passages arranged to receive washers from each of said chambers.

15. A machine of the character described, comprising a tumbling magazine arranged to contain washers, receiving chambers at the

sides of the tumbling magazine, means for operating the tumbling magazine, elements in the tumbling magazine for causing the washers to pass therefrom into the receiving chambers as an incident to the operation of the tumbling magazine, a curved passage for each of said receiving chambers, and a plurality of passages for conducting the washers from the receiving chambers to said curved passages respectively as an incident to the operation of the tumbling magazine and the receiving chambers.

16. A machine of the character described, comprising a tumbling magazine arranged to contain washers, receiving chambers at the sides of the tumbling magazine, means for operating the tumbling magazine, elements in the tumbling magazine for causing the washers to pass therefrom into the receiving chambers as an incident to the operation of the tumbling magazine, a curved passage for each of said receiving chambers, a plurality of passages for conducting the washers from each of the receiving chambers to the corresponding curved passage as an incident to the operation of the tumbling magazine and receiving chambers, and a spring for actuating the washers into said curved passages.

17. In a machine of the character described, the combination of a curved passage arranged to conduct washers to work to which the washers are to be applied, a plurality of passages for successively delivering washers into the curved passage and mechanism for delivering the washers into said plurality of passages.

18. In a machine of the character described, the combination of a curved passage arranged to conduct washers to the work to which the washers are to be applied, a plurality of passages for successively delivering washers into said curved passage, mechanism for delivering the washers into said plurality of passages, and means for holding the washers in said passage until the washers are successfully removed therefrom by the work.

19. In a machine of the character described, the combination of a support having a passage therein, a curved finger having a passage therein opening into the passage in said support, and a rotary magazine for delivering washers into the passage in said support for delivery into the passage in said curved finger.

20. In a machine of the character described, the combination of a support having a passage therein, a curved finger having a passage therein opening into the passage in said support, a rotary magazine for delivering washers into the passage in said support for delivery into the passage in said curved finger, and springs for holding the washers in the passage in said curved finger

until the washers are engaged and removed therefrom by the work.

21. A machine of the character described, comprising a support, a passage in said support, a curved finger carried by said support, a curved passage in said finger communicating with the passage in said support, a tumbling magazine arranged to contain washers, means for rotating said magazine and passages for conducting the washers from the tumbling magazine to the passage in said support.

22. A machine of the character described, comprising a support, a curved finger carried by said support, a curved passage in said finger, a tumbling magazine arranged to contain washers, means for rotating said magazine and passages for conducting washers from the tumbling magazine for delivery into said curved passage in said finger.

23. A machine of the character described, comprising a support, a curved finger carried by said support, a curved passage in said finger, a tumbling magazine arranged to contain washers, means for rotating said magazine passages for conducting washers from the tumbling magazine for delivery into said curved passage in said finger, springs for holding the washers in said curved passage in which the washers are engaged and removed by the work, and guides for causing the work to engage the washers retained by said springs.

24. A machine of the character described, comprising a support, a carriage on which said support is mounted, a curved finger carried by said support, a curved passage in said finger, a tumbling magazine in said carriage, means for rotating said magazine passages for conducting washers from the tumbling magazine to said curved passage, and means for operating the carriage to deliver washers from the passage in said curved finger to different points on the work.

25. A machine of the character described, comprising a support, a carriage on which said support is mounted, a curved finger carried by said support, a curved passage in said finger, a tumbling magazine in said carriage, means for rotating said magazine passages for conducting washers from the tumbling magazine to said curved passage, means for operating the carriage to deliver washers from the passage in said curved finger to different points on the work, and mechanism for operating the tumbling magazine to tumble the washers therein into the passages that conduct the washers to the said curved passage.

26. A machine of the character described, comprising a tumbling magazine, passages for conducting washers from the tumbling magazine to points of use, means for operating the magazine to tumble washers therein into said passages, and means for tilting

said magazine to different inclined positions to place said passages alternately in positions for service.

27. A machine of the character described, comprising a magazine arranged to contain washers, passages from the magazine having sloping walls conforming to the outer sloping walls of dished washers and preventing washers from entering the passages in inverted positions, means for operating the magazine to tumble the washers into said passages, and means for tilting the magazine to place said passages alternately in service.

28. A machine of the character described, comprising a magazine arranged to contain washers, receiving chambers at the sides of said magazine, passages from said receiving chambers having sloping walls conforming to the sloping walls of dished washers and preventing washers from entering the passages in inverted positions, means for rotating the magazine, means for tilting the magazine to different inclined positions to place said passages alternately in service, means for moving the magazine and the passages to different positions relative to the work to which the washers are delivered, and means for retaining the washers in said passages until said washers are engaged by the work to which the washers are to be applied.

29. In a machine of the character described, a passage having sloping walls conforming to the sloping outer walls of dished washers and being of a size to prevent the washers from entering the passage otherwise than with the sloping outer walls of the washers in contact with the sloping walls of the passage.

30. In a machine of the character described, a passage having sloping walls conforming to the sloping outer walls of dished washers and being of a size to prevent the washers from entering the passage otherwise than with the sloping outer walls of the washers in contact with the sloping walls of the passage, and mechanism for delivering washers into said passage.

31. A machine of the character described,

comprising a passage having sloping walls conforming to the sloping outer walls of dished washers and preventing the washers from entering the passage in inverted positions, the cross sectional area of said passage being approximately the same as the cross sectional area of a washer.

32. A machine of the character described, comprising a passage having sloping walls conforming to the sloping outer walls of dished washers and preventing the washers from entering the passage in inverted positions, the cross sectional area of said passage being approximately the same as the cross sectional area of a washer, and mechanism for delivering washers into said passage.

33. A machine of the character described, comprising a passage having sloping walls conforming to the sloping outer walls of dished washers and preventing the washers from entering the passage in inverted positions, the cross sectional area of said passage being approximately the same as the cross sectional area of a washer, a tumbling magazine arranged to contain washers, mechanism for operating said magazine, and passages for conducting washers from said magazine into the first-named passage.

34. A machine of the character described, comprising a passage having sloping walls conforming to the sloping outer walls of dished washers and preventing the washers from entering the passage in inverted positions, the cross sectional area of said passage being approximately the same as the cross sectional area of a washer, a tumbling magazine arranged to contain washers, mechanism for operating said magazine, and passages for conducting washers from said magazine into the first-named passage, said last-named passages having sloping walls conforming to the sloping outer walls of the dished washers, and having a cross sectional area approximately the same as the cross sectional area of a washer.

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