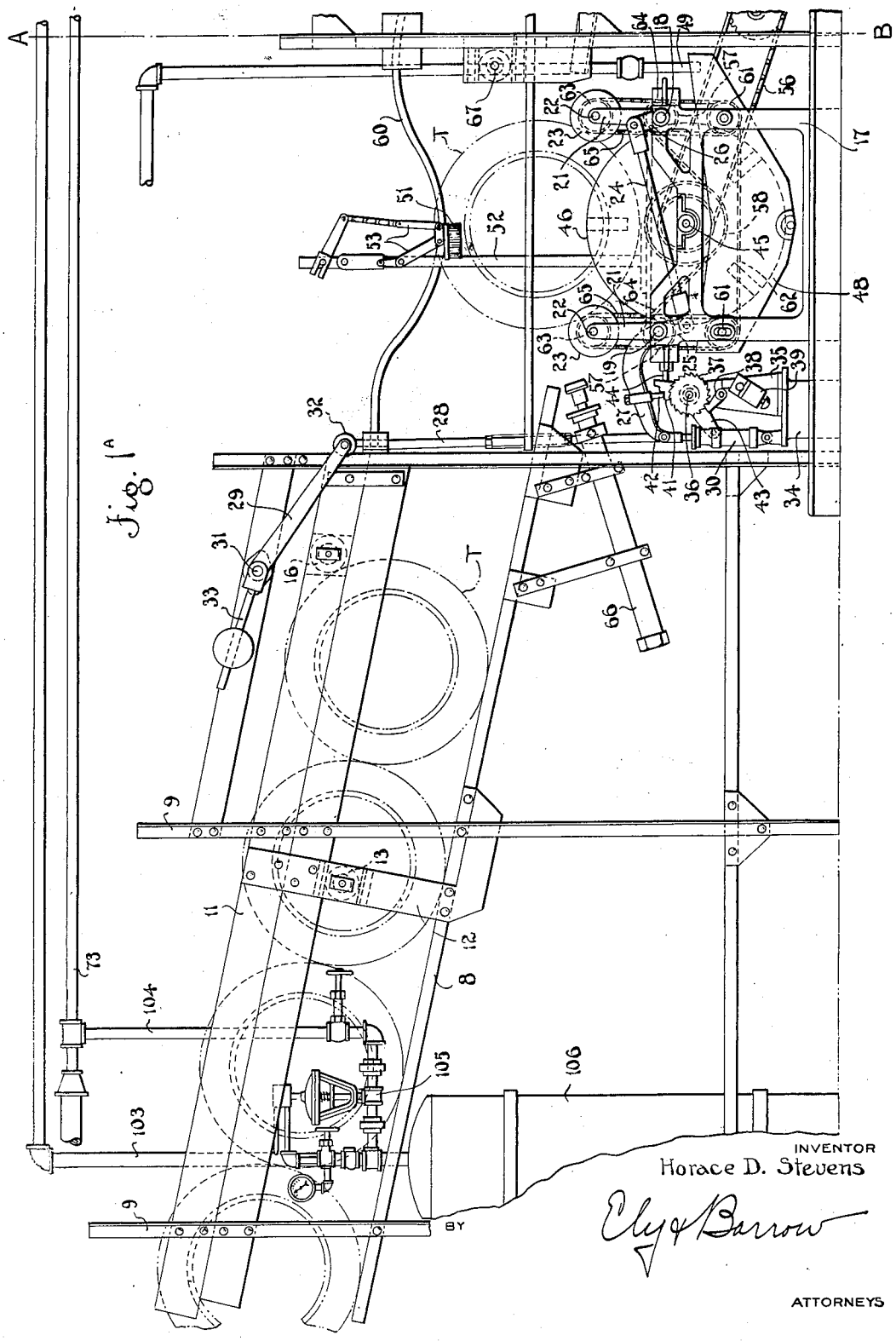
Aug. 22, 1933. H. D. STEVENS 1,924,005

WASHING MACHINE

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WASHING MACHINE

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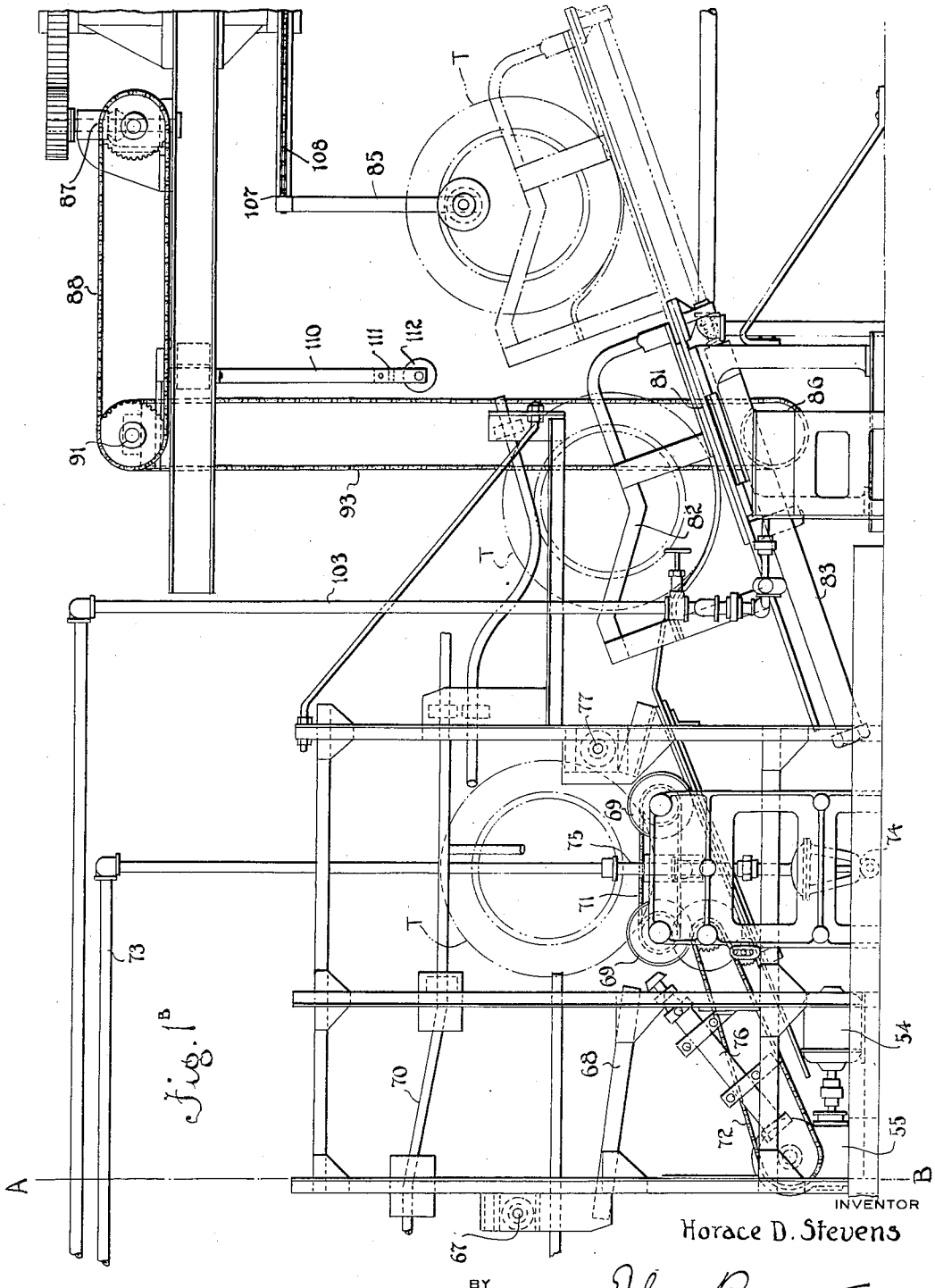


Fig. 1

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WASHING MACHINE

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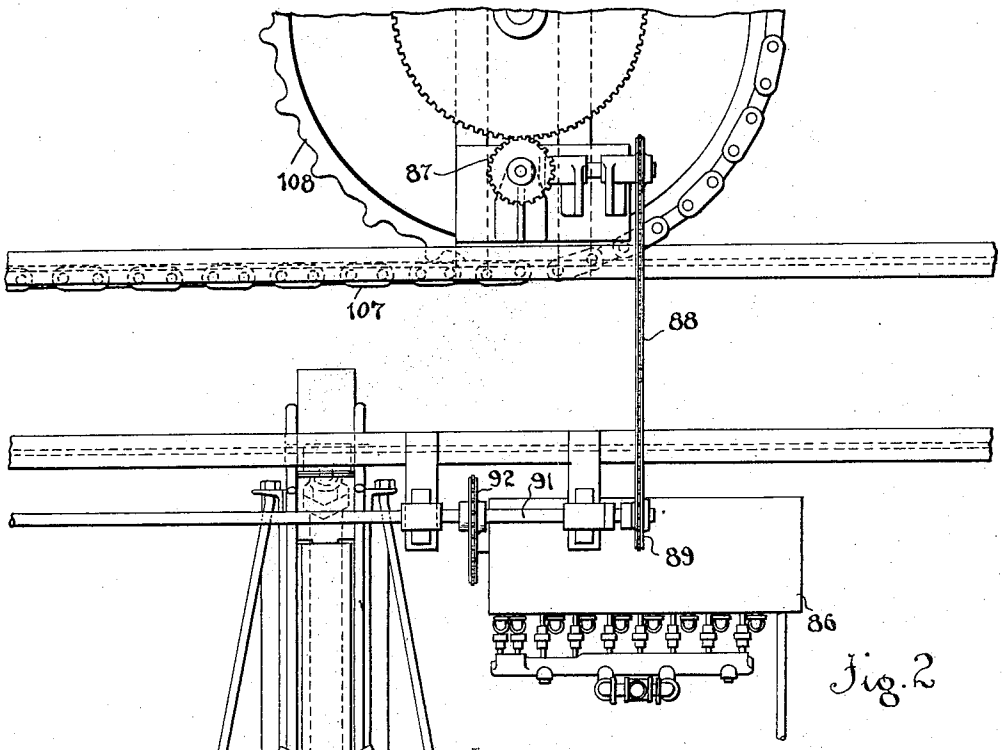


Fig. 2

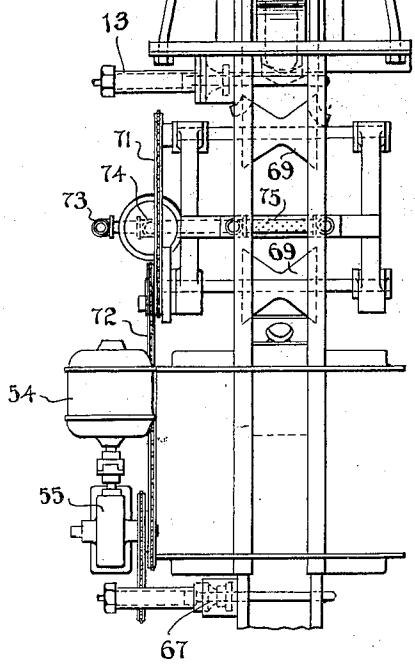
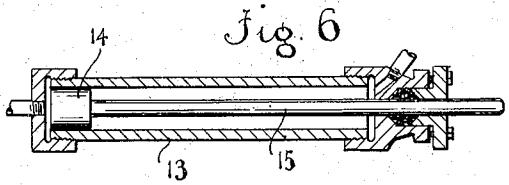


Fig. 6



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WASHING MACHINE

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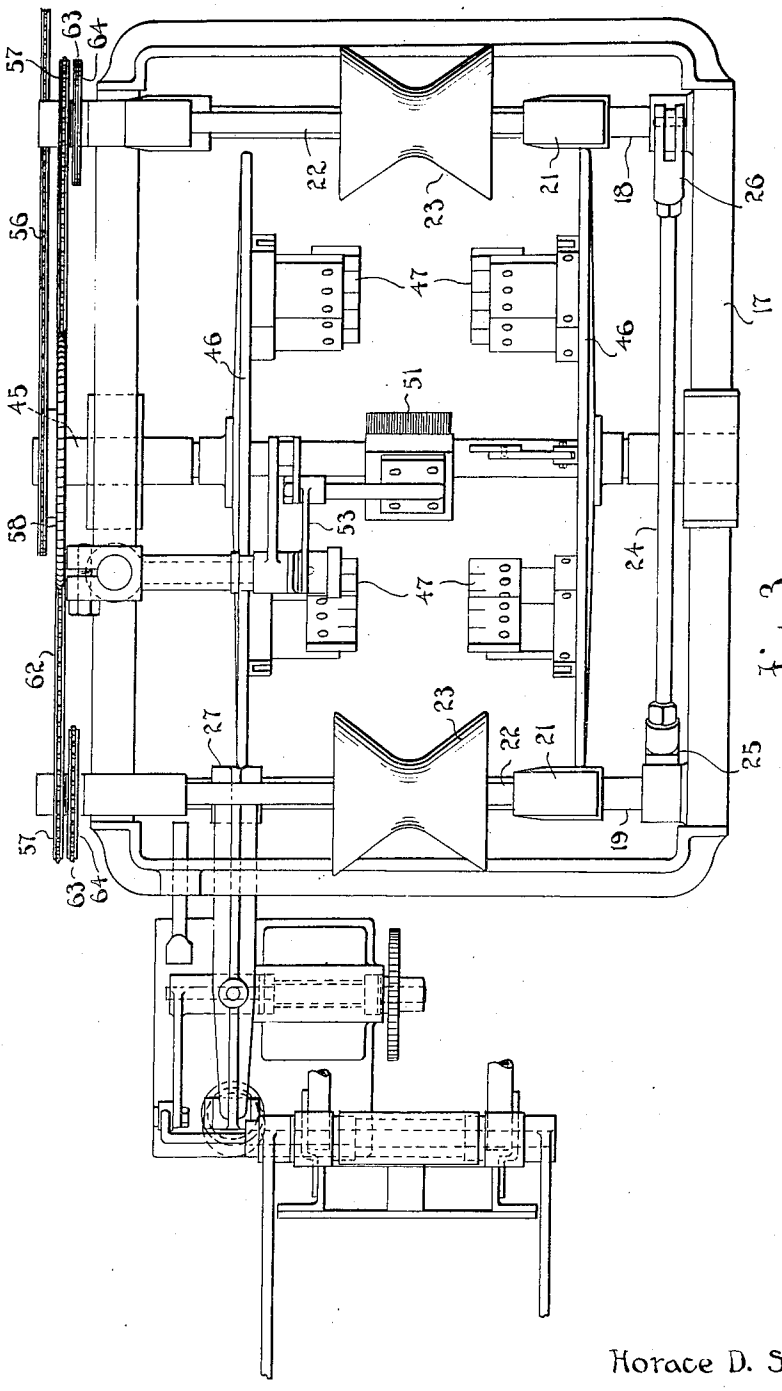


Fig. 3

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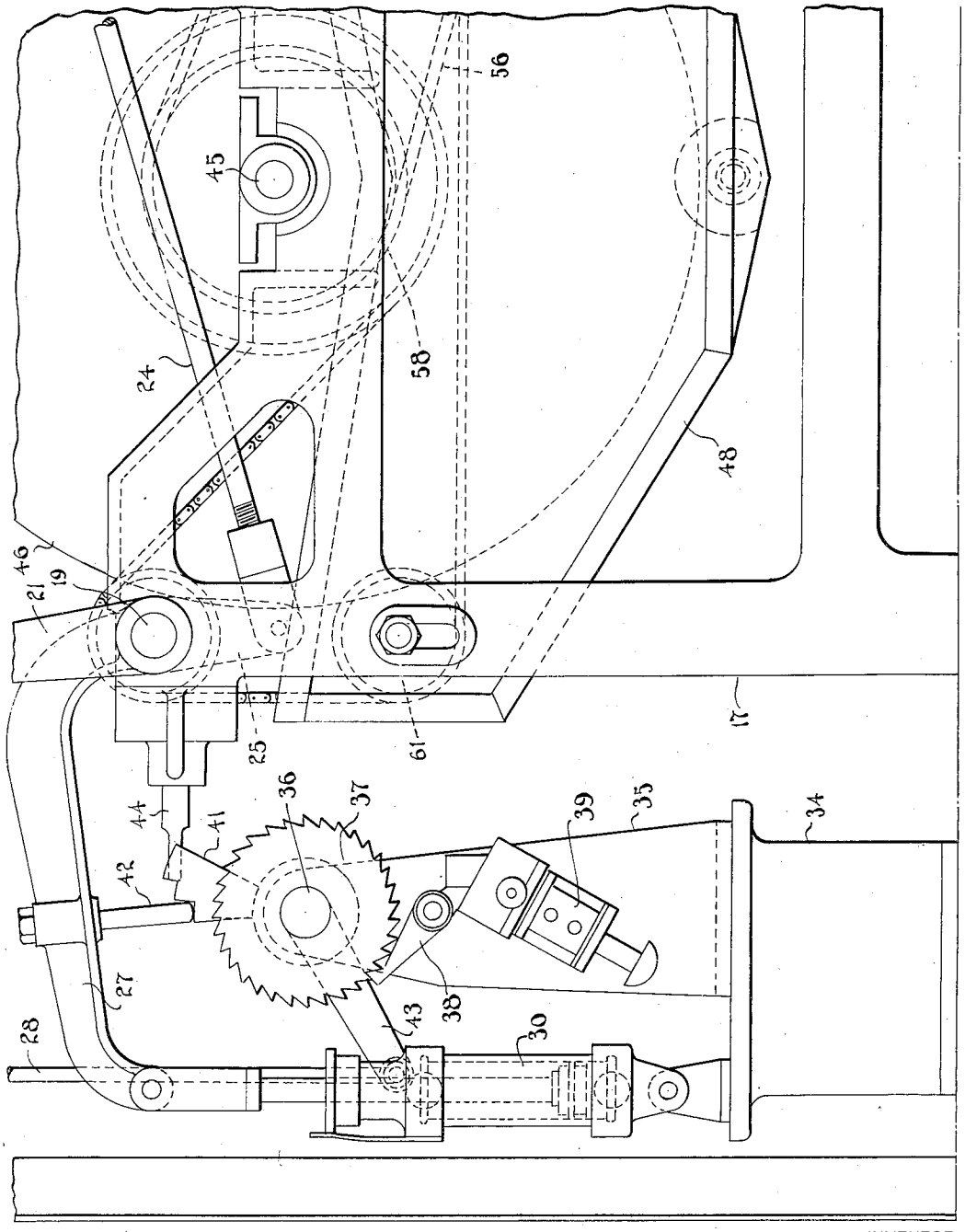


Fig. 4

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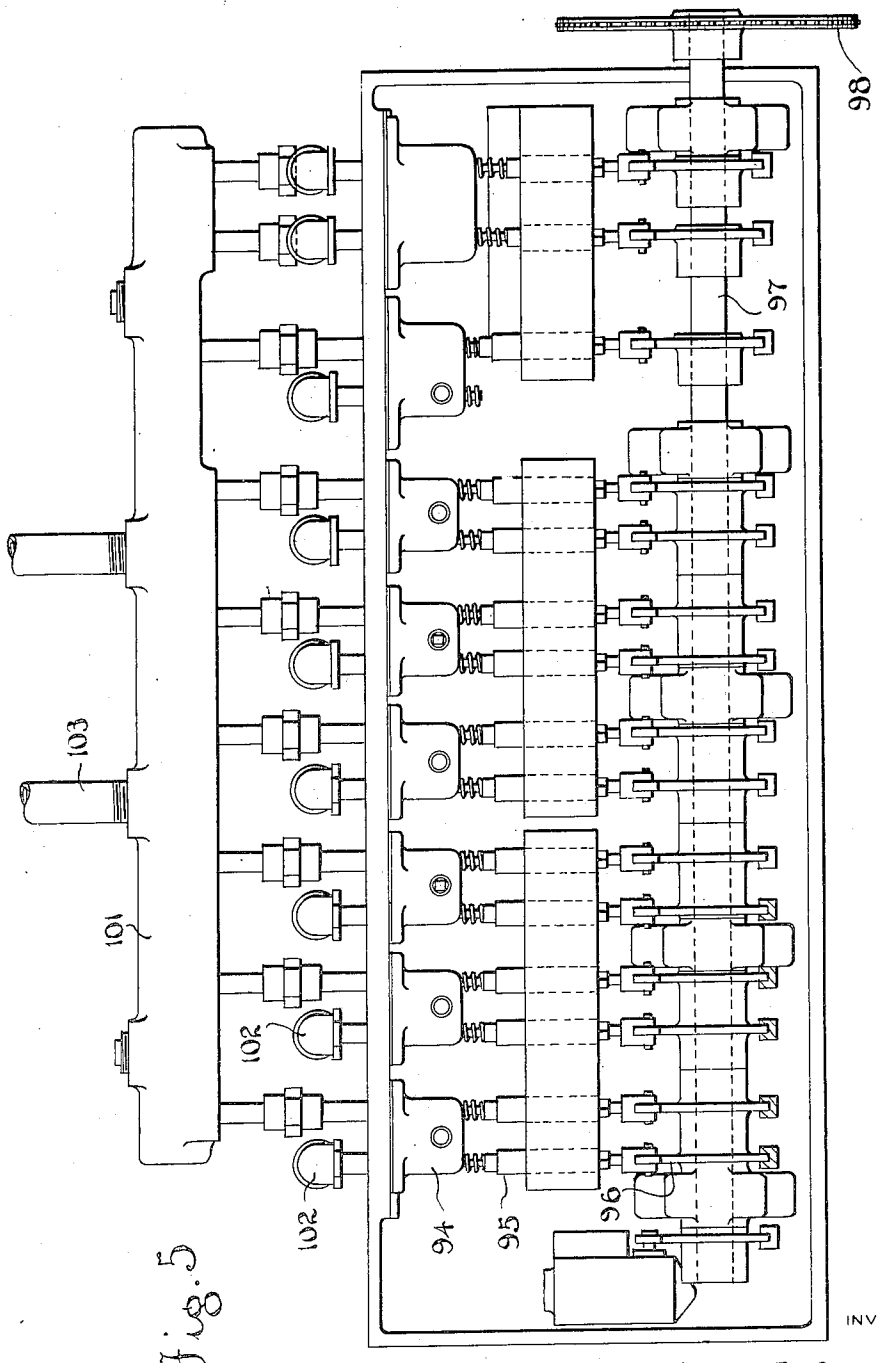


Fig. 5

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UNITED STATES PATENT OFFICE

1,924,005

WASHING MACHINE

Horace D. Stevens, Akron, Ohio, assignor to The Firestone Tire & Rubber Company, Akron, Ohio, a Corporation of Ohio

Application October 28, 1930. Serial No. 491,673

3 Claims. (Cl. 15—21)

This invention relates to machines for washing tires or similar objects.

The general purpose of the invention is to provide a fully automatic apparatus for efficiently washing rubber tires or similar articles.

A more particular object of the invention resides in synchronizing the washer with conveyor equipment so that the washed articles are automatically removed.

The above and other objects of the invention are achieved by the apparatus illustrated in the accompanying drawings and described below, it being understood that the invention is not limited to the exact details shown and described.

In the drawings:

Figure 1A is a partial view of the apparatus, being a side elevation of the stacking, feeding and washing end of the machine, the complete machine being divided on line A—B for convenience in illustrating the same.

Figure 1B is a partial view of the apparatus, it being a side elevation of the remainder of the machine showing the drying and discharging portions. The line of division from the first part of the apparatus is again A—B.

Figure 2 is a plan view of the portion of the apparatus illustrated in Figure 1B.

Figure 3 is an enlarged plan view of the washing station.

Figure 4 is an enlarged side elevation of the apparatus at the washing station.

Figure 5 is a plan view of the control unit embodied in the apparatus.

Figure 6 is a longitudinal cross sectional view of one of the air motor stops incorporated in the machine.

Referring to Figure 1A of the drawings the numeral 8 indicates an elevated, forwardly-inclined, runway which is formed with side supports 9 and side boards 11 which define a trough-like stacking and feeding space for the articles to be washed, which are automobile tires in the form of the invention described and which are indicated in dotted lines at T.

Positioned transversely of the runway or trough, on suitable supports 12, is an air motor stop 13, such as shown in detail in Figure 6. The air motor is so positioned, see by way of example Figure 2, that when its piston 14 is at one end of its travel the piston rod 15 will project across the trough to stop the passage of the tires therethrough and when the piston is at the other end of its travel the rod will be in a retracted position and the tires will be free to pass along the trough.

After leaving the stacking station and after passing the stop 13, the tires pass by gravity to a feeding station. Passage of the tires through the feeding station is controlled by an air motor stop 16 similar to the air motor stop 13 above described. As seen in Figure 1A the proportion of parts and the operation thereof is such that only one tire is held in the feeding station while the remainder are kept in the stacking station.

From the feeding station the tires enter the washing station which is preferably automatically adjustable to take care of various sized tires. To this end the washer includes a bed frame 17, at the ends of which are journaled shafts 18 and 19. Keyed to each of the shafts 18 and 19 are a pair of upwardly extending bracket arms 21, each pair journalling a shaft 22 to which are fixed drive rolls 23 which serve to support and rotate the tire during the washing operation.

The shafts 18 and 19 are linked together by a bar 24 which is pivotally secured to arms 25 and 26, fixed in oppositely extending directions to the shafts 18 and 19. The angular position of the shaft 19 and thus the distance between the rollers 23 is controlled by arm 27 which is fixed to the shaft 19 at one end. The other end of the arm 27 is connected to an air motor 30 which is pivotally secured to a base 34.

Mounted on the base 34 is a bracket 35 which journals a shaft 36. A ratchet wheel 37 is fixed to one end of the shaft 36 and cooperates with a pawl 38, controlled by an air motor 39 whereby the shaft 36 may be locked in any angular position. The shaft 36 also carries a radially stepped cam 41, a portion of which engages with a pin 42 on the U-shaped arm 27 so that the arm can be held in any one of a number of positions.

The shaft 36 is connected through an arm 43 and a link 28 to a tire follower which comprises a pair of arms 29, pivoted on a shaft 31, which arms carry a roller 32 adapted to roll over the tire as it passes into the washer. A pair of weights 33, fixed to the arms 29 as extensions thereof are provided to counterbalance the weight of the various arms and linkage so that the roller 32 does not act as a stop. A stop 44 on the frame 17 limits the upward angular movement of the arm 43.

Journaled centrally and transversely of the frame 17 is a shaft 45 to which are fixed a pair of spaced discs 46. The discs carry a plurality of

inwardly-facing, radially-extending felt brushes or wipers 47 which are adapted to contact with the sides of the tire. The frame 17 supports a tank 48 which contains soapy water or other cleaning liquid supplied through pipe 49 in which the discs 46 and felt brushes 47 dip.

In order to clean the tread portion of the tire a brush 51 is flexibly carried by a support 52 through the agency of suitable linkage 53 so that the brush will adapt itself to various sized tires.

The shaft 45 is rotated by an electric motor 54 acting through reduction gearing 55 and a chain drive 56. The motor 54 is also adapted to rotate the drive rolls 23 and to this end the shafts 18, 19 are provided with sprockets 57 in line with a sprocket 58 on the shaft 45. Idler sprockets 61 journalled in the frame 17 complete the path for a closed chain drive 62. The shafts 22 and thus the drive rolls 23 are driven from the shafts 18, 19 by chain drives between the shafts including sprockets 63 and 64 and chains 65. Guard rails 60 prevent the tire from falling sideways out of the washer.

An air motor ram 66 is provided to push the tire from the washer after the washing operation. An air motor stop 67 controls the passage of the tires from the washer.

After leaving the washer the tires pass along an inclined runway 68 having side guard rails 70 to a drier which comprises a pair of drive rolls 69 which are connected by a chain drive 71 and which are rotated by a drive chain 72 from the reduction gearing 55.

Air is blown against the tire to dry it and for this purpose an air line 73 is brought to one side of a diaphragm controlled valve 74 through which it extends to a U-shaped discharge pipe 75 whose inner periphery is pierced with a plurality of discharge holes (Figure 2).

An air motor ram 76 mounted adjacent the drier serves to push the tire from the drier after the drying operation. An air motor stop 77 controls the passage of the tire from the drier.

From the drying station the tire passes to a sliding carriage 81 formed with side supports 82, which carriage is fixed to the piston rod of an air motor 83 so that when the air motor is operated the carriage will move from the full line to the dotted line position shown in Figure 1B.

The invention contemplates synchronizing the washer with a conveyor comprising a chain 107 trained over sprocket 108 to automatically load the washed tires on the conveyor. This may be accomplished by providing an overhead conveyor having a series of downwardly extending arms 85 which are arranged to pick a tire off the carriage 81 when it is in its dotted position. The operation of the carriage 81 is synchronized with the arms 85 of the conveyor by providing a controller 86 which is driven by the conveyor through the agency of takeoff gearing 87, chain 88, sprocket 89, shaft 91, sprocket 92, and chain 93. A downwardly extending bracket 110 may be provided which pivotally carries an arm 111 upon which a guide roll 112 is journalled. The guide roll is adapted to guide the tire into proper relation with a conveyor arm 85.

The controller 86 comprises a series of valves 94 operable by plungers 95 which are controlled by a series of cams 96 mounted on a common shaft 97 driven from chain 93 by way of a sprocket 98 secured to the shaft 97. A manifold 101 supplies air to the valves and pipes 102 serve to carry air to the various air motors in the apparatus. The pipes 102 are shown only in Figure 5 and are omitted from the remaining drawings for the sake of clearness. A conduit 103 supplies air to the manifold 101 of the controller 86. The pressure of the air to the controller 86 may be kept substantially constant and water removed from the air by connecting the conduit 103 to the main air line through a conduit 104 which is valved by a diaphragm valve 105. A pressure tank 106 is preferably attached to the conduit 103 after it leaves the diaphragm valve 105.

The operation of the washer is as follows: The tires are stacked in the apparatus by hand although it is apparent that they may be fed thereto by some simple conveyor arrangement. The stop 13 is initially in a retracted position which allows the tires to roll by gravity down to and against the stop 16. The stop 13 is now moved through the center of the second tire as shown in Figure 1A after which the stop 16 is opened to allow the first tire to drop onto the drive rolls 23 of the washer.

The stop 16 is now closed and stop 13 is opened which allows the next tire to roll down against the stop 16 after which the stop 13 is closed so that all but the tire resting against the stop 16 will be held when the stop 16 is thereafter opened to feed the next tire to the washer.

The distance between the drive rolls 23 of the washer is automatically controlled by the tire itself for as it passes from the feeding station to the washer it rolls under the follower roll 32 which rocks the shaft 36 by way of link 28 and arm 43. Just prior to the rocking of the shaft 36 the pawl 38 is released by the motor 39 and the air motor 30 is energized to move the arm 27 to a raised position. When the U-shaped arm 27 is in a raised position the rocking of the shaft 36 by the tire follower 32 occurs so that the shaft is turned until the portion of the cam 41 corresponding to the size of the tire which has just passed under the follower is under the pin 42 of the U-shaped arm 27. The air motor 30 is now energized in the opposite direction to move the pin 42 carried by arm 27 down against the cam 41 at which time the pawl 38 of the ratchet is moved back into engagement with the ratchet wheel 37 fixed to the shaft 36. In this manner the arm 27 is moved to and held in a certain position by each tire which passes into the washer. The position of the arm 27 controls the angular position of the shaft 19. The shaft 18 journaled on the other end of the frame 17 is equally but oppositely moved by the rotation of the shaft 19 as the arms 25 and 26, fixed to the shafts 19 and 18 respectively, are connected by the link 24. Change in the position of the arm 27 will thus swing the arms 21, fixed to the shafts 18 and 19, towards or from each other which will change the distance between the rolls 23 so that different sized tires can be handled in the washer.

The tire is rotated in the washer by the drive rolls 23 and the sides are washed by the felt paddles 47 which are dipped by the rotation of the discs 46 into the washing liquid in the tank 48.

The tread of the tire is washed by the brush 51 whose flexible link mounting 53 allows the brush to adapt itself to the tire and which allows the tire to be moved into and out of the washer without hindrance.

After the tire has been completely washed the stop 67 is opened and the tire is pushed out of the washer by the air motor ram 66. The stop 67 is thereafter closed and the ram 66 retracted whereupon the tire held in the feeding station is dropped into the washer as will be understood.

From the washer the tire rolls down the runway 68 to the drier where the rolls 69 turn the tire past the U-shaped drier pipe 75. Air to the pipe 75 is controlled by the diaphragm valve 74 which is in turn controlled by the controller 86.

After the drying operation the stop 77 is moved to a retracted position and the ram 76 is energized to push the tire into the carriage 81. At this time the tire from the washer will also be moved into the drier and another tire will be fed into the washer as is understood. The air motor 83 will now be energized to move the carriage 81 out to the dotted line position shown in Figure 1[B] at which time an arm 85 of the conveyor will pick the tire off the carriage which will then move back to its full line position.

The operations of the various air motors, rams and stops are, of course, controlled in timed relation by the controller 86 which is synchronized with the tire removing conveyor. The operation of the washer is thus fully automatic.

The washer has been described and illustrated for treating tires but it will be apparent that with minor changes it can be readily adapted to wash a variety of articles.

As many changes could be made in the construction it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative only and not in a limiting sense. Accordingly, various modifications and applications of the invention can be resorted to without departing from the spirit of the invention or the scope of the appended claims.

What is claimed is:

1. In a washer, a pair of drive rolls for supporting and rotating an article during the washing operation, and means for adjusting the distance between said drive rolls, whereby different sized articles may be washed thereon, said means being operable by the article itself as it enters the washer.

2. In tire washing apparatus a frame, a pair of spaced parallel shafts journalled in the frame, a pair of upwardly-extending, spaced arms on each shaft, a shaft journalled between each pair of arms, drive rolls fixed to said last-named shafts, means for rotating said last-named shafts, additional oppositely extending vertical arms fixed one to each of said first-named shafts, a link connecting said arms so that rocking of one shaft will rock the other to an equal degree but in an opposite direction, a lever fixed to one of said first-named shafts, an air motor connected to the other end of said lever, a shaft journalled adjacent said lever, a tire follower, linkage connecting said follower and shaft so that various sized tires will rock the shaft to greater or less extent, a pawl and ratchet normally preventing the rocking of the shaft, means for releasing said pawl to permit rocking of the shaft, a pin on said lever, and a stepped cam carried by said shaft and engageable with the pin to position the lever and thus the drive rolls in a position corresponding to the size of the tire passed to the washer.

3. Apparatus adjustable for washing annular articles of different sizes, in combination with means operated by the article for adjusting the washing apparatus to handle the particular sized article passed thereto, said means comprising mechanism for adjustably supporting said annular articles in cooperative engagement with said washing apparatus, a rotatable cam, means engageable with the cam at different positions for adjusting said supporting mechanism, and means operable by the article for rotating said cam to a greater or lesser degree according to the size of said article for bringing different portions of said cam into contact with said cam engaging means.

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