Nov. 26, 1935. J. L. HEROLD ET AL 2,022,200

BOTTLE BRUSHING DEVICE

Filed Sept. 19, 1932 2 Sheets-Sheet 1

Fig. 1.

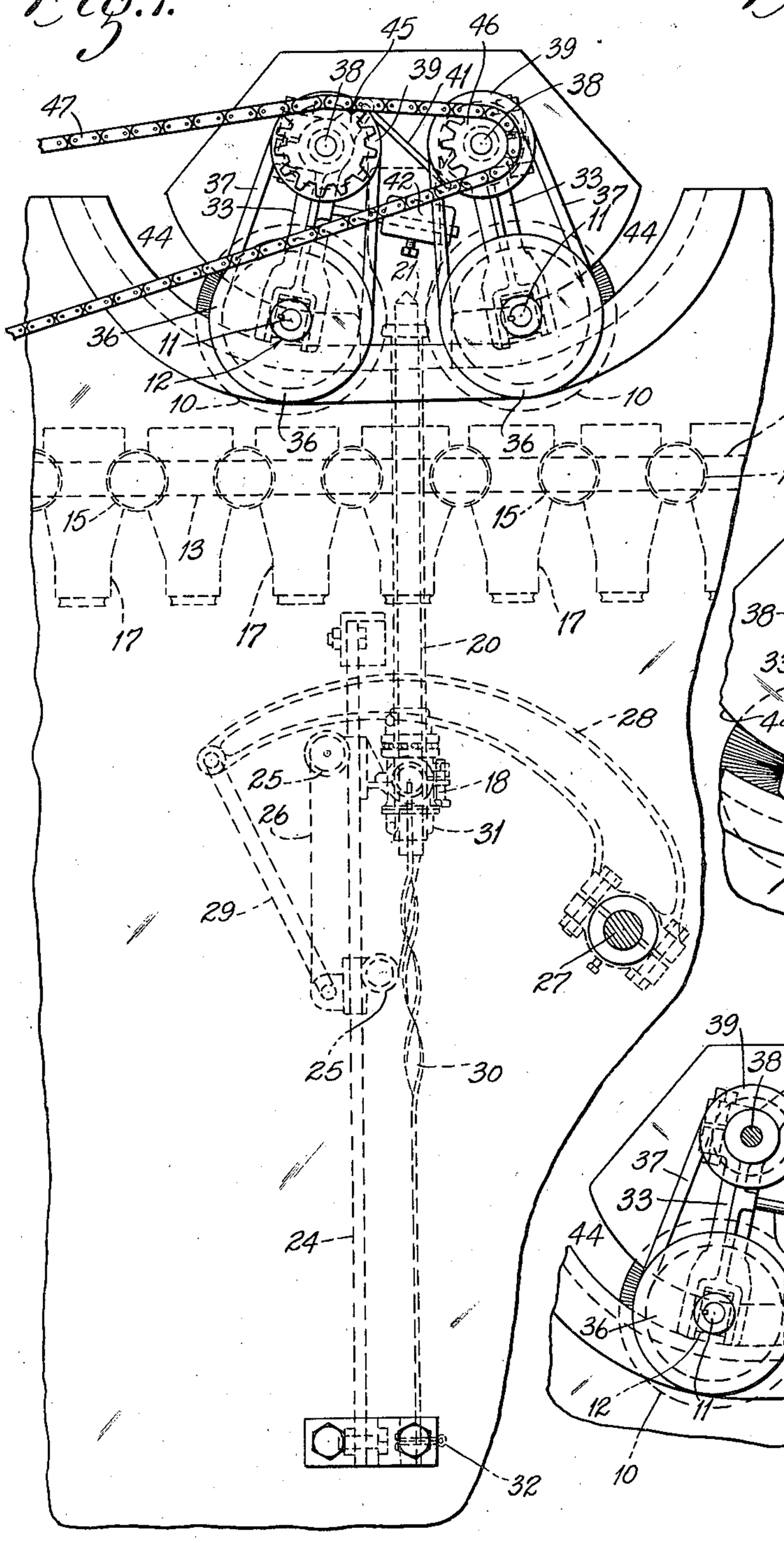


Fig. 2.

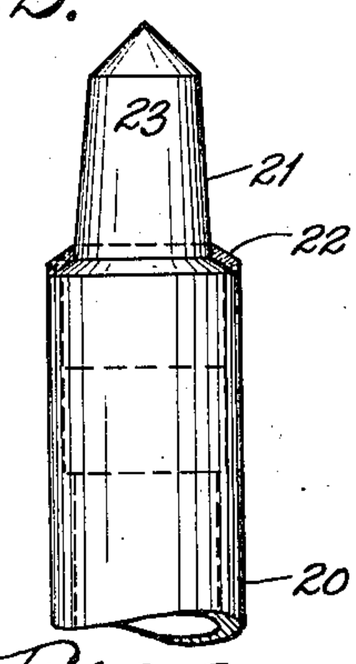


Fig. 3.

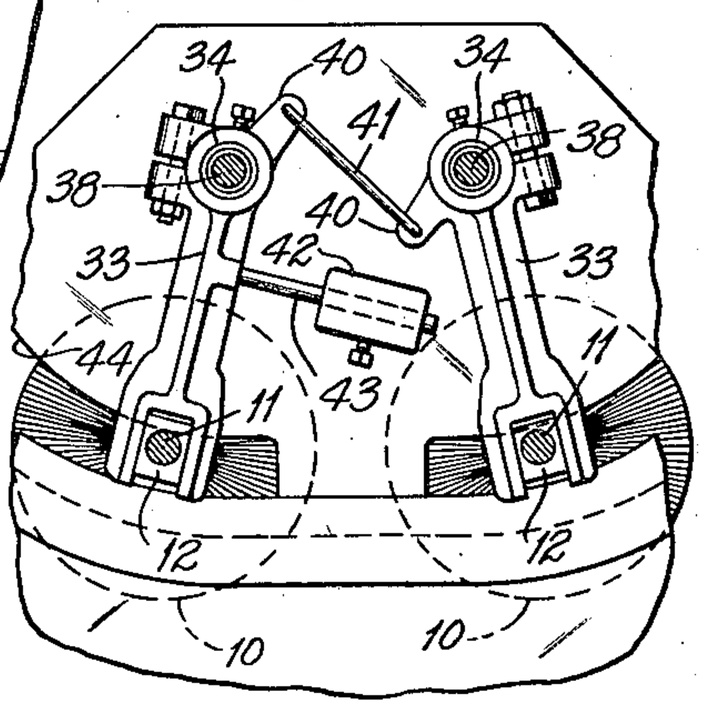
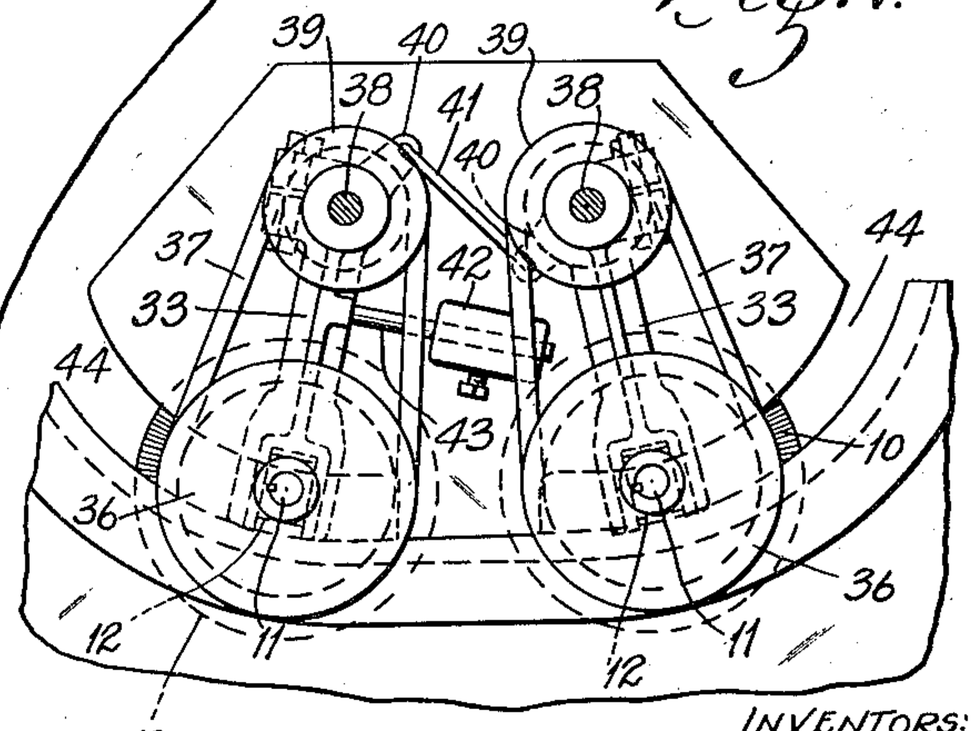


Fig. 4.



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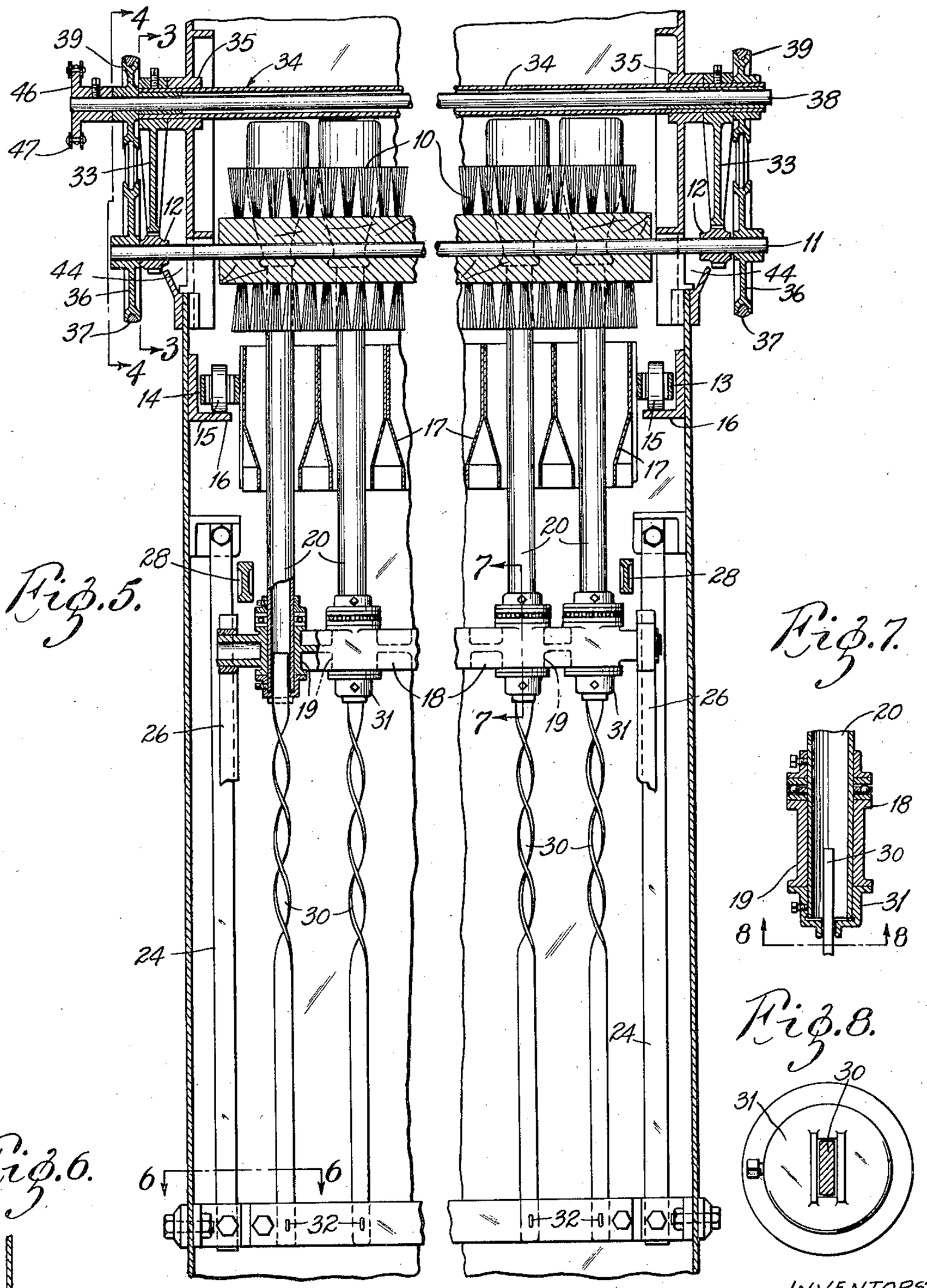

Fig. 5.

Fig. 7.

Fig. 8.

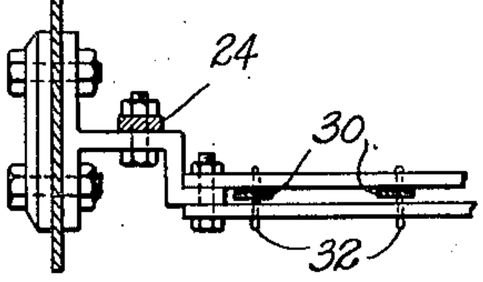

Fig. 6.

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BOTTLE BRUSHING DEVICE

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Application September 19, 1932, Serial No. 633,716

4 Claims. (Cl. 15—60)

This invention relates to devices for brushing bottles, and the like, the main object being to produce a simple and highly efficient device of this kind at a relatively low cost.

In the preferred form of the invention, the bottles are rotated and moved longitudinally between rotating brushes which act upon the outer faces of the bottles. However, the invention comprises several different features, and its scope is to be ascertained from the terms of the claims hereunto appended.

One of the objects is to produce a device wherein the desired brushing contact is maintained throughout the varying surfaces of the bottles, including the large body portions of the bottles and the smaller necks. A further object is to effectively brush the large, small and intermediate sizes of bottles, without requiring any adjustment or rearrangement of the brushing device.

These two objects are accomplished through the medium of an extremely simple combination of elements which permits the brushes to move toward and away from each other in response to the pressure and the wedge-like action of the bottles moving longitudinally between the brushes. In other words, the brushes are so mounted that they freely move in response to the pressure transmitted from the surfaces of the bottles, and the several elements are so arranged that a desirable brushing pressure can be easily obtained, and maintained substantially uniform throughout the lengths of the bottles.

This result is accomplished irrespective of variations in the surface contours of the bottles, and the same feature enables the machine to most effectively brush the various sizes and shapes of bottles, without adjusting or in any way changing the brushing device. After this device is assembled and tested, it will effectively brush the various different bottles, without requiring any attention on the part of the operator.

Another object is to thoroughly cleanse the irregular surfaces formed by projections and depressions on the bottles, and especially the more or less abrupt shoulders formed by lettering and ornamental designs on the surfaces of the bottles.

For example, on an ordinary milk bottle the name of a dairy appears in letters projecting from the surface of the bottle, and such lettering produces numerous small shoulders and corners of various shapes and angles, where dirt and other foreign matter is very likely to be confined. One of the problems in this art lies in the removal of such foreign matter from depressions, shoulders and corners beyond the reach of an ordinary, simple mechanical brushing device.

We will hereafter show how the desired results can be positively obtained in a simple and inexpensive manner through the medium of a pair of ordinary rotary brushes, having the same direction of rotation, but so arranged that the active brushing faces move in opposite directions.

More specifically stated, the bottles may be moved longitudinally between two brushes, and since these brushes rotate in the same direction, which may be either clockwise or counterclockwise, their active brushing faces will move in opposite directions at opposite sides of the bottles.

In other words, one rotary brushing element may move upwardly to cleanse the downwardly-facing lugs, recesses and corners, while the other rotary brushing element moves downwardly to cleanse the oppositely disposed faces of the lugs, recesses and corners, and the bottles may be rotated to repeatedly expose these irregular surfaces to the oppositely moving brushing elements.

Further objects are to obtain all of these important results in a simple, durable, inexpensive and entirely practicable mechanical structure wherein the bottles are automatically delivered to and removed from the brushing device, and the invention also includes certain details associated directly with the brushing elements, and other details which provide a simple and inexpensive means for rotating the bottles while they are moving longitudinally from a carrier to the brushing device and thence back into the carrier.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications which come within the scope of the claims hereunto appended.

Fig. 1 is a fragmentary side elevation of a machine equipped with a bottle brushing device conforming to this invention.

Fig. 2 is an enlarged detail view of a support for an inverted bottle.

Fig. 3 is a section taken approximately on the line 3—3 in Fig. 5, showing how the brushes may be balanced and connected to each other.

Fig. 4 is a section on the line 4—4 in Fig. 5.

Fig. 5 is a vertical section taken approximately through the middle of Fig. 1.

Fig. 6 is a horizontal section on the line 6—6 in Fig. 5.

Fig. 7 is an enlarged section on the line 7—7 in Fig. 5.

Fig. 8 is a section on the line 8—8 in Fig. 7.

To illustrate one form of the invention we have shown a pair of simple rotary brushes 10, each provided with a horizontal shaft 11 mounted in bearings 12 at opposite sides of the machine. A traveling bottle carrier 13 moves horizontally below the brushes, said carrier including sprocket chains 14 provided with rollers 15 traveling on bars 16 at opposite sides of the machine (Fig. 5), and bottle pockets 17 arranged transversely of the machine and having their ends connected to said sprocket chains. These pockets are adapted to receive rows of bottles.

This bottle carrier including its sprocket chains and bottle holders may be constructed in any suitable manner. For example, the carrier may be of a type commonly employed in bottle washing machines wherein an intermittent motion is imparted to an endless carrier to provide intervals of rest at the bottle washing elements. The present invention can be conveniently applied to a bottle-washing machine of this kind, so as to perform the brushing operations while the carrier is at rest.

To illustrate a suitable means for actuating the bottles at the brushing device, we have shown a simple reciprocating device whereby the bottles are lifted from the pockets 17 below the brushes, and then restored to said pockets. This reciprocating device comprises a horizontal member 18 arranged below the bottle carrier and provided with vertical bearings 19, tubes 20 mounted in said bearings and extending upwardly therefrom, and bottle-holders 21 at the upper ends of said tubes, each of said holders (Fig. 2) having a seat 22 for the mouth of the bottle and a projection 23 adapted to extend into the neck of the bottle.

Each side of the machine is provided with a stationary vertical guide bar 24 to receive rollers 25 on a reciprocating member 26, the latter being connected to the horizontal member 18 which carries the vertical tubes 20. The means for operating the reciprocating elements includes an oscillatory shaft 27 which may be provided at each end with an arm 28 (Fig. 1) connected by means of a link 29 to one of the reciprocating members 26. However, any other suitable means may be employed to reciprocate the vertical tubes 20, as this action merely imparts an upward and downward motion to bottles.

Attention is now directed to the means for rotating the bottles while they move longitudinally between the brushes. Stationary spiral members 30 are telescoped with the vertical tubes 20, so as to impart a rotary motion to said tubes in response to their reciprocating motion. The lower end of each tube 20 may be provided with a cap 31 having a slot to receive one of the stationary spiral members 30, thereby causing the tube to rotate as the cap moves along the spiral.

The spiral members 30 are normally stationary, but their lower ends may be loosely secured by means of pins 32, to prevent undue friction, or binding, at the points where the caps 31 contact with the spiral faces. This eliminates necessity of accurate fitting, and the spiral members may be readily made of simple flat bars, twisted to form the spirals.

In using this device, the bottles rotate in one direction as they move upwardly, and in the opposite direction as they made downwardly, thereby increasing the efficiency of the brushing device by exposing the numerous irregular shoulders, corners and recesses of lettering on the bottles to a brushing pressure in opposite direction, resulting from a reversal of the rotary motion of the bottles. Therefore, the simple means for rotating the bottles not only eliminates the expense of installing and maintaining numerous expensive driving elements at the several vertical tubes 20, but it also aids in overcoming the problem of cleansing the numerous varying projections and depressions on the faces of the bottles.

We will now describe the manner in which the rotary brushes 10 may be yieldingly mounted so as to move away from each other in response to the pressure transmitted from the reciprocating bottles. These elements are preferably so arranged that a substantially uniform brushing pressure is exerted throughout the lengths of the bottles.

The brush shafts 11 are rotatable in bearings 12 at the lower ends of guide arms, or retaining arms 33 which extend downwardly from tubes 34. These tubes extend across the machine and they are pivotally supported in bearings 35 (Fig. 5) at opposite sides of the machines.

The arms 33 are fixed to the ends of the respective tubes 34, so whenever one arm moves about the axis of a tube the companion arm on the same tube will move a corresponding distance, the object being to maintain the brush shafts 11 parallel with each other and also parallel with the tubes 34.

The bearings 12 are loosely confined in the forked lower ends of the arms 33, but said arms do not support either the bearings 12 or the brush shafts 11. The recesses at the forked lower ends of the arms 33 are open at the bottom, so the bearings 12 can be readily removed from said recesses.

The means for supporting the brushes 10 and their bearings 12 comprises circular members 36, preferably in the form of pulleys secured to the ends of the brush shafts 11, and a suspension device including driving belts 37 surrounding the respective pulleys. The means for operating the belts 37 comprises shafts 38 rotatably mounted in the oscillatory tubes 34, each shaft 38 being provided at its ends with pulleys 39 to receive the belts 37 at opposite ends of a brush shaft 11.

The brushes 10 are thus suspended by the driving belts, so the belts are retained in firm driving contact with their pulleys, and each brush is free to oscillate about the axis of a shaft 38 above the brush. The tube surrounding said shaft 38 is free to oscillate about the same axis, and the pair of retaining arms 33 rigidly secured to the ends of said tube will, therefore, retain their companion brush shaft in parallelism with its driving shaft 38. As a consequence, the brushes suspended from flexible driving belts, are free to move away from each other, without disarranging their combined driving and supporting elements.

Each oscillatory arm 33 may be provided with an extension 40, and these extended arms 40 may be connected by means of a link 41, so that the oscillatory motion is transmitted from one arm to the other.

The weight of the several oscillatory members,

including the brushes 10 and arms 33, is so disposed that the suspended brushes tend to move toward each other. If this weight is too great it may be partly balanced, or its undesirable effect at the brushes may be overcome by a suitable compensating device. For example, a compensating weight 42 is secured to a rod 43 extending from one of the arms 33, and this compensating weight may be moved along the rod 43 to vary the brushing pressure at the bottles. The effect of the weight 42 will be transmitted through the arms 40 and links 41, so as to equalize the pressure at the two brushes.

When the device is in service, the rotating bottles are moved upwardly between the brushes 10, and the pressure transmitted from the surfaces of the bottles will force the brushes away from each other. However, the rotating brushes will exert a substantially uniform predetermined brushing pressure at all points throughout the lengths of the bottles. The yielding brush-support will freely oscillate while the brushes move toward and away from each other to positively maintain this effective brushing pressure on the varying contour of the bottles.

The same desirable brushing action occurs in brushing bottles of all contours and all sizes within the capacity of the machine. It is not necessary for the operator to make any change in the brushing device when there is a change in the sizes of the bottles to be acted upon, as the yielding elements are actuated by the bottles themselves to provide substantially the same degree of brushing pressure on the relatively large body and smaller neck of a single bottle, and the same action occurs in brushing the large, small and intermediate bottles.

Aside from ordinary repairs, this simple brushing device requires no attention on the part of the user, and even in renewing the brushes, it is only necessary to remove the belts 37 and then withdraw the old brushes from the open lower ends of the oscillatory arms 33. When this is to be done, the brush-shafts 11 are withdrawn through the curved slots 44 (Fig. 1), and the new brushes are inserted while the free ends of the arms 33 are retained in elevated positions higher than said slots.

A replacement of the brushes does not involve any rearrangement in the yielding brush support, so the work can be done by an unskilled workman, without incurring a risk of changing or impairing the action of the brushes on the bottles.

The means for transmitting rotary motion to the brushes (Fig. 1) comprises sprocket wheels 45 and 46 fixed to the respective shafts 38 and a driving chain 47 passing over the upper edges of said sprocket wheels. Rotary motion is thus imparted to the belts 37 from which the brushes are suspended, and the driving elements are so arranged that the two brushes rotate in the same direction. However, owing to the relative positions of the brushes, their active brushing faces move in opposite directions. At the points of contact with the bottles, one brush moves upwardly toward the bottoms of the inverted bottles, while the other brush member moves downwardly toward the mouths of the bottles. As a consequence, the oppositely moving brushes act upon the numerous projections, depressions and corners formed by lettering or the like on the bottles, and while one brush forcibly removes the dirt from the upwardly facing portions of these irregular elements, the other brush acts upon the downwardly facing portions. The bottles are preferably rotated in opposite directions, through the medium of the spirals 30, as they move longitudinally between the brushes, so the irregular surfaces of the bottles are repeatedly exposed to the oppositely moving brush members.

The driving sprocket wheel 45 is preferably larger than its companion sprocket wheel 46, so the downwardly moving active portion of one brush will move at a speed slightly greater than the upwardly moving portion of the other brush. This differential speed of the brushes permits the bottles to freely move with the reciprocating tubes 20 when said tubes move downwardly to return the bottles to the carrier.

We claim:

1. A bottle-brushing device comprising rotatably mounted brushes at opposite sides of bottles, said brushes including a brush member having a brushing face movable lengthwise of the bottles toward the bottoms thereof and another brush member also having a brushing face movable lengthwise of the bottles but in a direction toward the mouths of said bottles, said brush members being at opposite sides of the bottles, and differential driving means including a high speed transmission member and a low speed transmission member moving in the same direction and connected to the respective brushes whereby said brushes are rotated at different speeds but in the same direction of rotation to move said brushing faces in the said opposite directions lengthwise of the bottles.

2. A bottle-brushing device comprising a pair of rotatably mounted brushes arranged horizontally and including a brush member having a brushing face movable lengthwise of bottles toward the bottoms thereof and another brush member also having a brushing face movable lengthwise of the bottles but in a direction toward the mouths thereof, said brush members being at opposite sides of the bottles, a bottle-carrier below said brushes, a reciprocating bottle-lifter including a rotatable bottle holder movable into said carrier to impart a vertical motion to the bottles and at the same time rotate them between said oppositely moving brush members, and differential driving means including a high speed transmission member and a low speed transmission member moving in the same direction and connected to the brushes having the brush member moving toward the mouths of the bottles and the brush member moving toward the bottoms of the bottles respectively, so that said brushes are rotated in the same direction of rotation to move said brushing faces in said opposite directions lengthwise of the bottles, and so that the relatively high speed is imparted to the brush member moving toward said mouths of the bottles.

3. A bottle-brushing device comprising brushing members, a bottle-carrier below said brushing members, and a rotatable lifting device whereby bottles are lifted from said carrier to said brushing device, said lifting device including a reciprocating member arranged below said carrier, bottle holders rotatably supported by said reciprocating member and extending upwardly therefrom, bottle-seats for the mouths of the bottles, said bottle seats being carried by said rotatable bottle holders to transmit the rotary motion to the bottles, relatively stationary spiral members having their upper ends telescoped with said bottle holders, so as to rotate the latter in response to their reciprocating motion, and fas-

tening means whereby said spiral members are anchored to permit rotation and reciprocation of said bottle holders.

4. A bottle-brushing device comprising brushing members, a bottle-carrier below said brushing members, and a rotatable lifting device whereby bottles are lifted from said carrier to said brushing device, said lifting device including a reciprocating member arranged below said carrier and provided with vertical bearings, tubes rotatably mounted in said bearings and extending upwardly therefrom, bottle-seats for the bottles, said bottle-seats being carried by said rotatable tubes to transmit the rotary motion to the bottles, and relatively stationary spiral bars loosely secured at their lower ends and having their upper ends telescoped with said tubes, so as to rotate the latter in opposite directions in response to their reciprocating motion, said loosely secured spiral bars being yieldable to prevent undue friction and binding at the points where the spirals cooperate with said rotatable tubes.

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