Feb. 24, 1959 J. J. HIRAK 2,874,397

FLOOR WASHING MACHINES

Filed Sept. 16, 1953 2 Sheets-Sheet 1

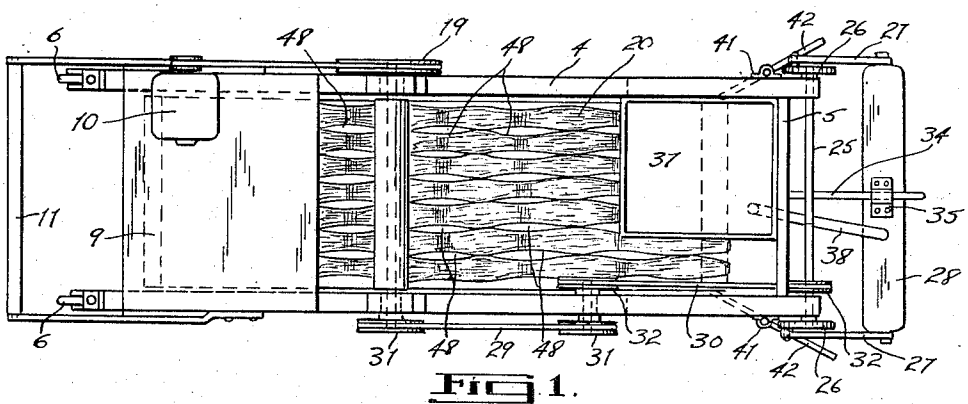


Fig. 1.

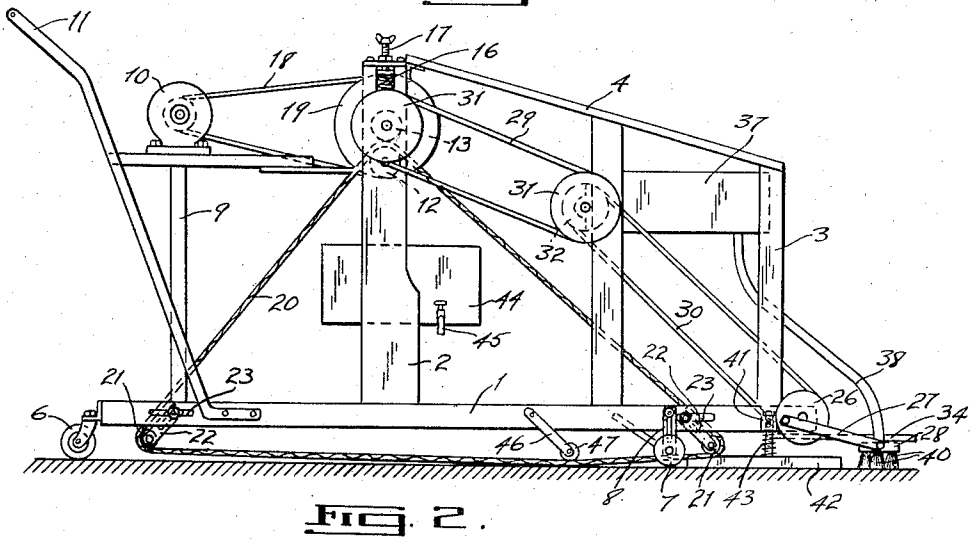


Fig. 2.

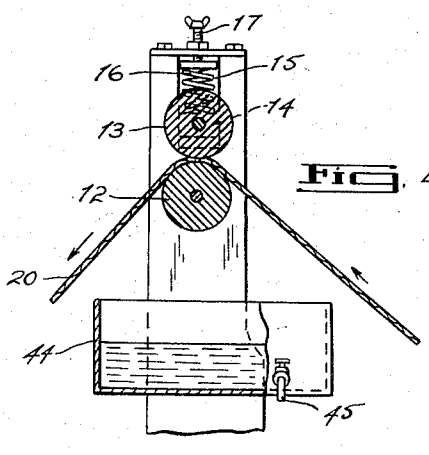


Fig. 4.

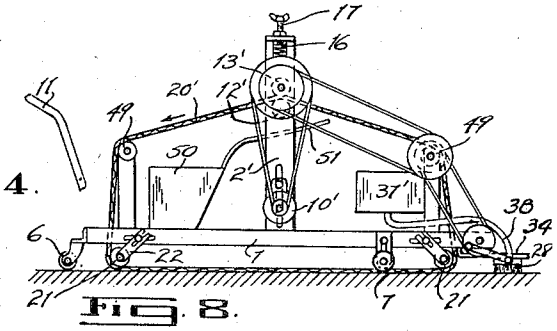


Fig. 8.

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Feb. 24, 1959 J. J. HIRAK 2,874,397

FLOOR WASHING MACHINES

Filed Sept. 16, 1953 2 Sheets-Sheet 2

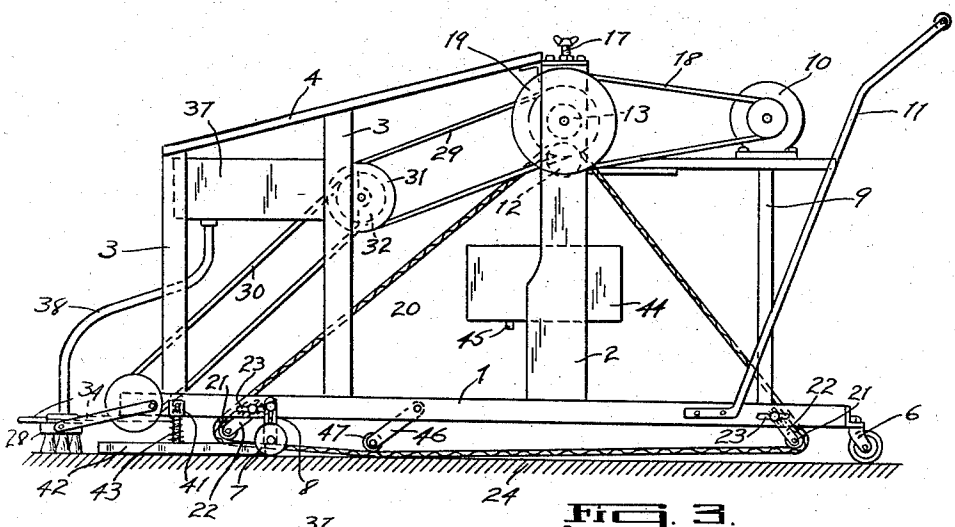


Fig. 3.

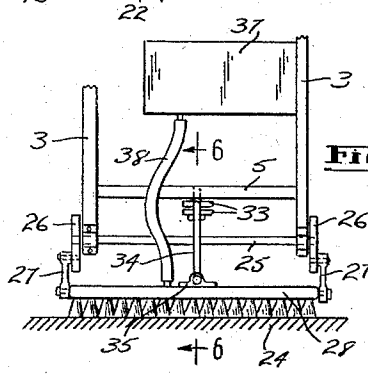


Fig. 5.

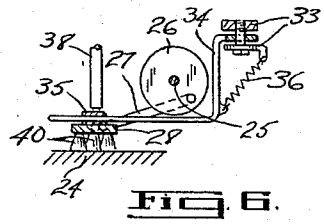


Fig. 6.

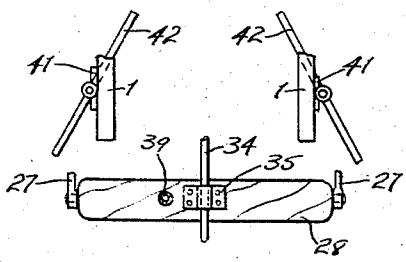


Fig. 7.

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FLOOR WASHING MACHINES

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5 Claims. (Cl. 15—51)

This invention relates to improvements in machines for washing floors, decks or like surfaces, and the principal object of the invention is to provide a machine as aforesaid which will more thoroughly clean and dry the surface over which it moves than previous machines.

A further important object is to provide a machine which will instantly and automatically accommodate itself to all variations or unevenness in the flooring or surface being cleaned and can be operated into corners to thoroughly cleanse the entire area.

Again an important object is to provide a floor washing machine which will completely preclude all dripping or splashing on the floor or surface area previously covered by the machine.

Still a further important object is to provide a machine as aforesaid of simple, sturdy and dependable construction which will be simple to maintain and which can be easily and quickly adjusted, e. g., to compensate for wear or change of dimension through shrinkage or elongation of the cleaning elements exposed to the washing water or solution.

According to the invention the machine comprises essentially a scrubbing element operating ahead of an endless drying and buffing or mopping element passing through a wringer, and one important feature of the invention resides in forming the endless drying and buffing or mopping element as an open web belt which will enable the water expelled in wringing, particularly at the upper surface of the belt, to flow freely through the belt rather than run along or be carried by the belt to provide a source of dripping or splashing on surface areas previously washed.

Another important feature resides in providing a scrubbing element extending appreciably beyond the sides of the machine and mounted in advance of the machine so that it can be manoeuvered into corners and providing behind the scrubbing element an arrangement of wipers to converge and lead water delivered to the scrubbing element back to the mopping element for pick-up and drying of the surface.

Another important feature resides in providing as the scrubbing element mounted in advance of the machine a reciprocating brush swingably supported and placed under pressure in a manner to maintain substantially constant brush pressure on the floor independent of variations therein and resiliently supporting the following wipers to also follow floor variations.

Still another feature in one important embodiment of the invention resides in providing in conjunction with the belt or mopping element a water pick-up vessel having a flange formed into a broad sloping trough or guide extending under an appreciable length of the belt to deliver water dripping therefrom over a substantial length of travel either side of the wringer to the vessel.

Again a feature of this embodiment of the invention resides in mounting the motor in a central position shielded by the broad flange to afford a compact balanced unit.

Still another feature resides in providing an adjustable roller arrangement over which the wiping belt operates to regulate both tension and floor contacting position of the belt.

These and other objects and features will become apparent from the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a plan view of a machine constructed in accordance with the invention.

Figure 2 is a side elevational view of the machine of Figure 1.

Figure 3 is a view similar to Figure 2 but taken from the opposite side.

Figure 4 is a fragmentary enlarged vertical sectional detail of the wringer arrangement.

Figure 5 is a fragmentary front elevational view of the machine.

Figure 6 is a vertical sectional detail on the line 6—6 of Figure 5.

Figure 7 is a fragmentary plan view with the frame of the machine broken away illustrating the relation of the scrubbing element and wiper elements.

Figure 8 is a side elevational view of a somewhat modified form of machine embodying the invention.

With reference to the drawings, Figures 1 to 3, the machine comprises a longitudinal frame formed with longitudinal side members **1**, centrally disposed uprights **2** and forwardly disposed uprights **3** joined by top bars **4** and suitable cross bracing **5**.

The rear of the frame is supported by castors **6**, while the forward end is carried on rollers **7** mounted on slotted arms **8** which permit the vertical adjustment as required.

Mounted at the rear of the frame is a separate frame **9** supporting the motor **10**. The machine is operated and controlled through the handle **11**.

Supported between the central uprights **2** are a pair of wringer rolls constituted by the lower roll **12** and upper roll **13**. The lower roll is carried directly by the uprights **2**, while the upper roll **13** is journalled in blocks **14**, Figure 4, operating in slots **15** in the uprights **2** and urged towards the lower roll by means of the spring **16** and operator **17**.

The wringer constituted by the rolls **12** and **13** is operated from the motor **10** by means of a belt drive **18** engaging a pulley **19** fixed to the shaft of the upper roll **13**. Operating between the rolls **12** and **13** is an endless mopping element **20** which passes over rollers **21** supported beneath the longitudinal frame members **1** by slotted arms **22** which are adapted to be clamped in slots **23** formed in the side frame members **1**.

Thus the rollers **21** are mounted for relative displacement or separation as well as displacement below the wheeled support frame bottom members **1**. Thus these rollers **21** enable the tension of the mopping element **20** to be regulated as well as positioning the mopping element for contact with the floor or other surface **24**.

Supported at the forward end of the side members **1** on an axle **25** are a pair of driven wheels **26** to which rods or pitmans **27** are eccentrically connected which in turn are pivotally connected to a brush **28**. The length of the brush, which extends transversely of the machine, is greater than the width of the longitudinal frame of the machine, as shown particularly in Figures 1 and 5. This fact, together with the advance position of the brush, enables it to be operated into corners close to objects without interference.

Driving the wheels **26** to reciprocate the brush **28** through the eccentrically mounted pitmans **27** are belt drives **29** and **30** operating on the pulleys **31** and **32** respectively.

Loosely supported between bracket plates **33** carried by the machine frame, as shown in Figure 6, is a cranked

arm or bar 34 which projects forwardly of the machine and projects through a collar 35 carried by the brush 28.

A spring 36 connected to the lower bracket plate 33 and the cranked arm 34 serves as a means to force the brush 28 downwardly against the surface 24 being cleaned, and as the brush reciprocates, under action of the fly wheels 26 and eccentrics 27, the collar 35 slides in a reciprocal motion on the arm 34.

Supported by the uprights 2 and 3 is a tank or vessel 37 from which leads a flexible hose connection 38 connected to the brush 28 which is provided with a suitable passage 39 through the backing thereof to deliver water between the bristle rows 40. The tank 37 is adapted to contain clean water mixed with soap, detergent, water softener or cleaning solution, to supply feed to the brush.

Reciprocally mounted in brackets 41 at the rear of the brush 28 are vertically disposed wiper blades or squeegee elements 42 which are urged under pressure of springs 43 into floor contact. The wipers 42 are disposed to converge rearwardly and extend from adjacent the ends of the brush 28 to adjacent the mopping element 20.

Mounted beneath the rolls 12 and 13 of the wringer device is a collector tank or vessel 44 which is adapted to collect the water squeezed from the mopping element as it passes between the rolls 12 and 13, and this tank is provided with a suitable drain 45.

Swingably supported on pivotal arms 46 from the longitudinal frame members 1 is a rotatable weight or roller 47 which is adapted to carry the mopping element 20 down against the floor surface 24 to maintain the element under gravitational force in firm wiping and buffing contact with this surface, as shown in Figures 2 and 3.

In operation the machine is pushed ahead of the operator with the reciprocating brush 28 scrubbing a swath wider than the machine and the track of the wheels constituted by castors 6 and rollers 7. The scrubbing action is accompanied with delivery of a flow of cleaning solution to the brush, and the water or liquid deposited and left behind the brush as the machine advances is guided rearwardly and inwardly by the resiliently operated wipers 42 to the mopping element 20, which element is forced into contact with the surface by the rotatable weight 47 and picks up the moisture and delivers it to the wringer constituted by the rolls 12 and 13 where the moisture is squeezed out or expressed. The moisture adjacent the underside of the mopping element or web falls freely into the collector tank 44, while water squeezed from the upper surface of the mopping element is delivered through openings 48 in the web of the element, where again it falls freely into the collector tank 44.

As shown particularly in Figure 1, the mopping element or belt 20, which is preferably a canvas-backed yarn, is provided with rows of generally diamond-shaped openings 48, and these rows may be either staggered or formed to provide openings of sufficient breadth that substantially all of the water squeezed will, in flowing down the belt on either side of the rolls 12 and 13, strike an opening and be discharged into the tank 44 which extends on either side of the wringer rolls. In this way substantially all of the free moisture in the belt has been removed by the wringer rolls when the wrung belt portion again arrives at the lower reach to provide the mopping and buffing action, eliminating drip or splashing behind the machine as the mopping belt passes over the rear roller 21.

In the modification of the invention illustrated in Figure 8, the motor frame 9 has been removed and the motor 10' mounted for vertical adjustment on central uprights 2'. Also the upper reach of the mopping element 20' is extended by passing the element over spaced rolls 49', and in place of the collector tank 44 a collector tank 50 is located at one side of the wringer constituted by rolls 12' and 13', and this collector tank is formed with a broad flange 51 which extends between the motor 10' and the wringer and is sloped to convey water dripping from the mopping element on either side of the wringer into the collector tank 50. In this way the flange 51 forms the dual function of shielding the motor and channelling the expressed water from the belt 20' into the collector. In this modification the clean water tank or reservoir 37' is shown mounted at a lower position to provide a more compact unit in which the centre of gravity is lowered and is centrally located.

As the remainder of the elements in the modification of Figure 8 correspond in part to those shown in the embodiment of the invention of Figures 1 to 7 they are identified by the same reference numerals.

It will be understood that variations in details of construction may be made within the spirit of the invention.

What I claim as my invention is:

1. In a machine for washing floors and the like, a support frame supported forwardly by vertically adjustable wheels and rearwardly by wheels each swingable about a vertical axis, a rod carried by said frame and extending forwardly thereof, a scrubbing element comprising a brush extending transversely of said frame and slidably supported intermediately of its length from said rod, said rod defining an axis about which said brush element swings, spring means carried by said rod urging said rod downwardly, flexible tubular means for delivering liquid to said scrubbing element, a continuous mopping element supported to operate behind said scrubbing element comprising an endless belt having vertically separated upper and lower reaches, a roller wringer mounted intermediately of said frame and operating on the upper reach of said continuous mopping element, a motor for reciprocating said scrubbing element and operating said roller wringer, said motor being mounted on said frame substantially vertically below said wringer between the upper and lower reaches of said mopping element, means for collecting liquid adapted to be squeezed from said mopping element by said wringer, said means comprising a vessel mounted on said frame at one side of said motor and having a wide flange extending beneath and beyond said wringer above said motor to the other side thereof.

2. In a floor washing machine, an elongated frame supported forwardly by vertically adjustable wheels and rearwardly by wheels each free to swing about a vertical axis, a rod mounted on said frame and extending forwardly thereof, a brush element extending transversely of said frame and centrally supported in advance of said frame for sliding movement on said rod, said rod defining an axis about which said brush element can swing, means for reciprocating said brush on said rod, a continuous mopping element mounted on said frame and being adapted to operate behind said brush, said mopping element comprising an endless belt having a pattern of openings extending completely therethrough, a wringer device for operating on said continuous mopping element, a flexible tubular means for feeding liquid to said brush from a receptacle carried by said frame and means for collecting liquid adapted to be squeezed from said mopping element by said wringer including liquid flowing through said pattern of openings.

3. In a floor washing machine, a support frame, a rod mounted on said frame and extending forwardly thereof, a scrubbing element centrally supported on said rod for sliding movement therealong, means for reciprocating said scrubbing element, a continuous mopping element operating behind said scrubbing element, said mopping element comprising an endless belt of absorbent material having rows of openings extending completely therethrough, a wringer device carried by said frame operating on said continuous mopping element, flexible tubular means for feeding liquid to said scrubbing element from a receptacle carried by said frame and means for collecting liquid adapted to be squeezed from said mopping element by said wringer.

4. A floor washing machine comprising an elongated

frame supported forwardly by vertically adjustable wheels and rearwardly by wheels each swingable about a vertical axis, a rod mounted on said frame and extending forwardly thereof, bias means for urging said rod downwardly, a brush supported centrally from said rod for sliding movement and extending transversely of the direction of machine advance beyond said frame, means for reciprocating said brush, a continuous mopping element comprising an endless belt of absorbent material carried by said frame, a pair of rearwardly converging wiper elements extending rearwardly from adjacent the ends of said brush to adjacent said mopping element, wringer means for operating on said mopping element, flexible tubular means for delivering cleaning solution to said brush from a receptacle carried by said frame and means for collecting cleaning solution adapted to be squeezed from said mopping element by said wringer.

5. In a machine for washing floors or the like, an elongated frame supported forwardly by vertically adjustable wheels and rearwardly by wheels each swingable about a vertical axis, a rod mounted on said frame and extending forwardly thereof, bias means urging said rod downwardly, a scrubbing element supported centrally thereof from said rod for sliding movement therealong, means for reciprocating said scrubbing element, a continuous mopping element comprising an endless belt of

absorbent material having a pattern of openings extending completely therethrough, said continuous mopping element passing over a pair of rollers located at the bottom of and extending below said frame, said rollers being mounted for relative separation and vertical displacement to control tension in said mopping element and to regulate the displacement of said mopping element below said frame, and wringer means for operating on said continuous mopping element.

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