Aug. 12, 1958 F. B. MORRILL 2,846,862

CONTINUOUS WASHER

Filed March 27, 1956 3 Sheets-Sheet 1

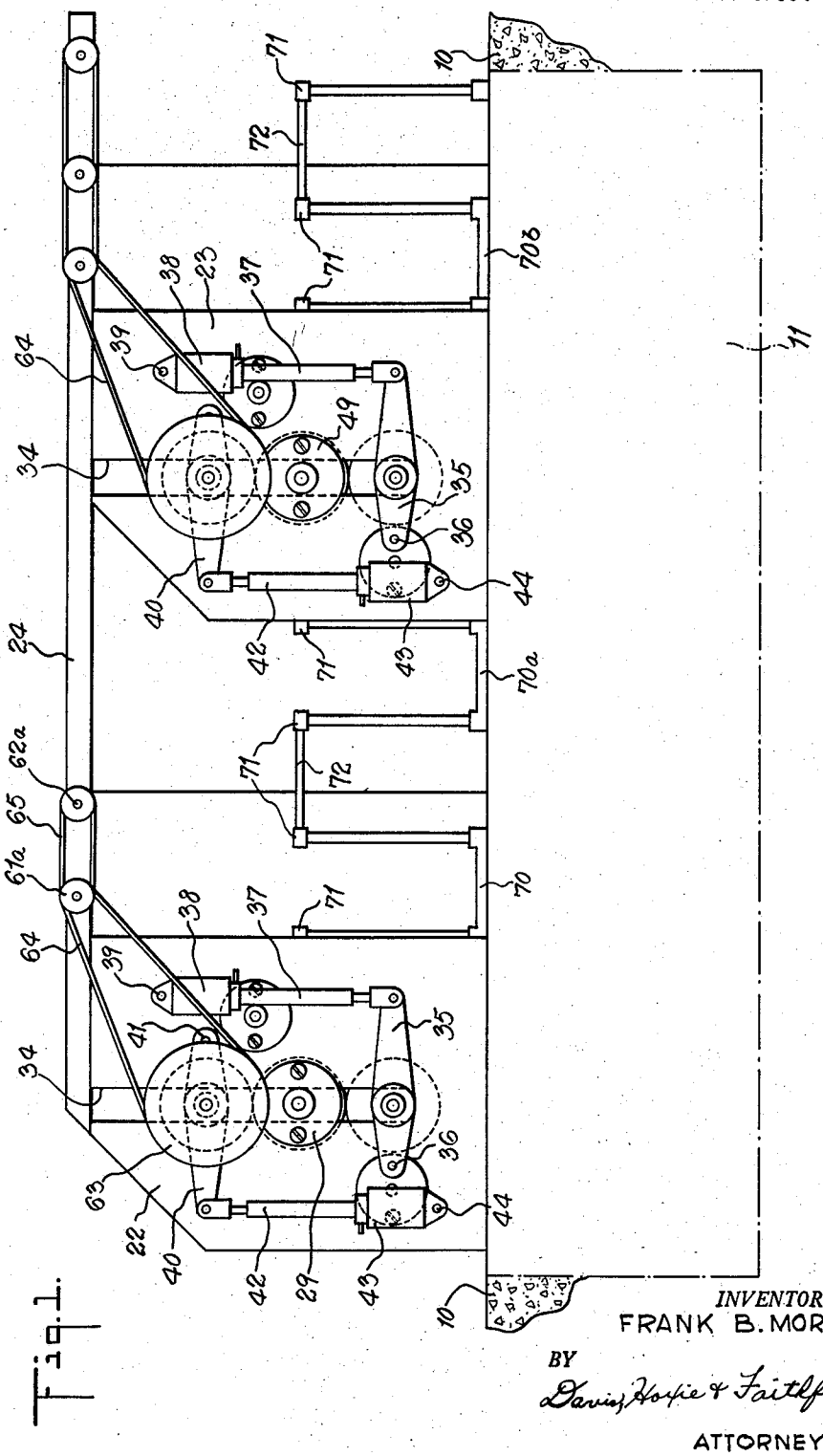


Fig. 1.

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Aug. 12, 1958 F. B. MORRILL 2,846,862

CONTINUOUS WASHER

Filed March 27, 1956 3 Sheets-Sheet 2

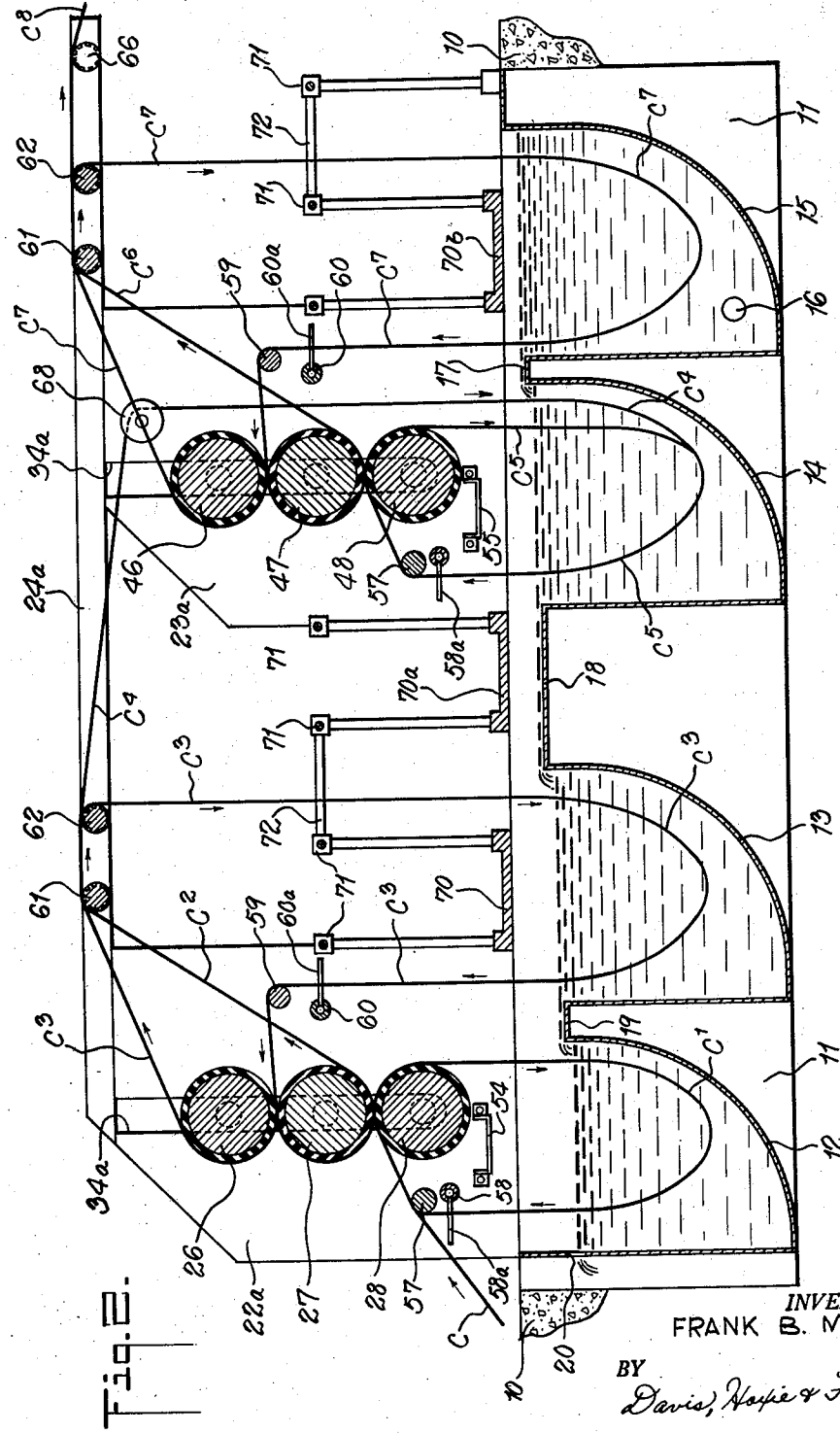


Fig. 2.

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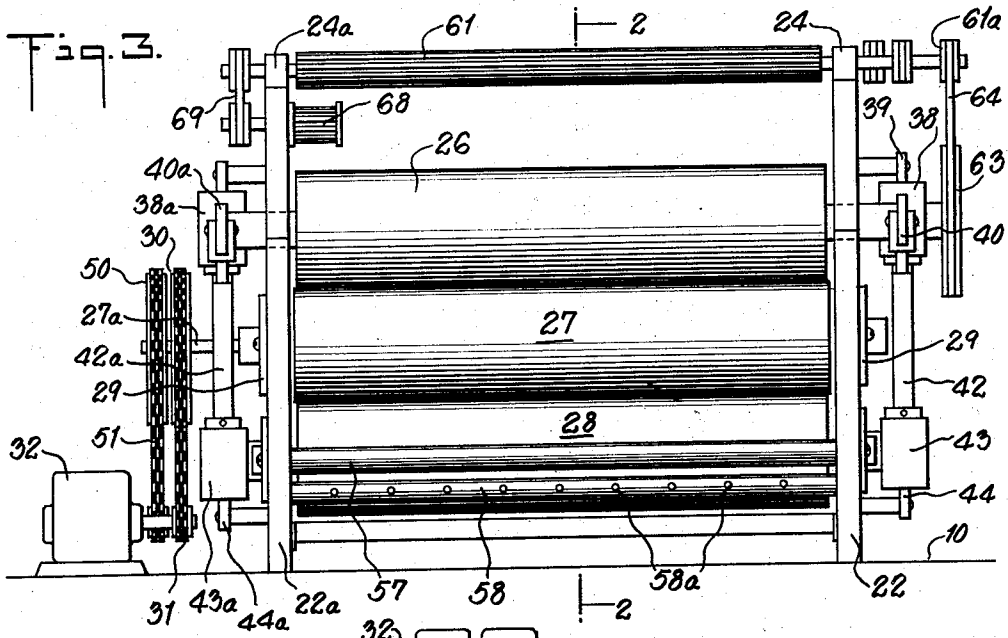
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Aug. 12, 1958 F. B. MORRILL 2,846,862

CONTINUOUS WASHER

Filed March 27, 1956 3 Sheets-Sheet 3

Fig. 3.



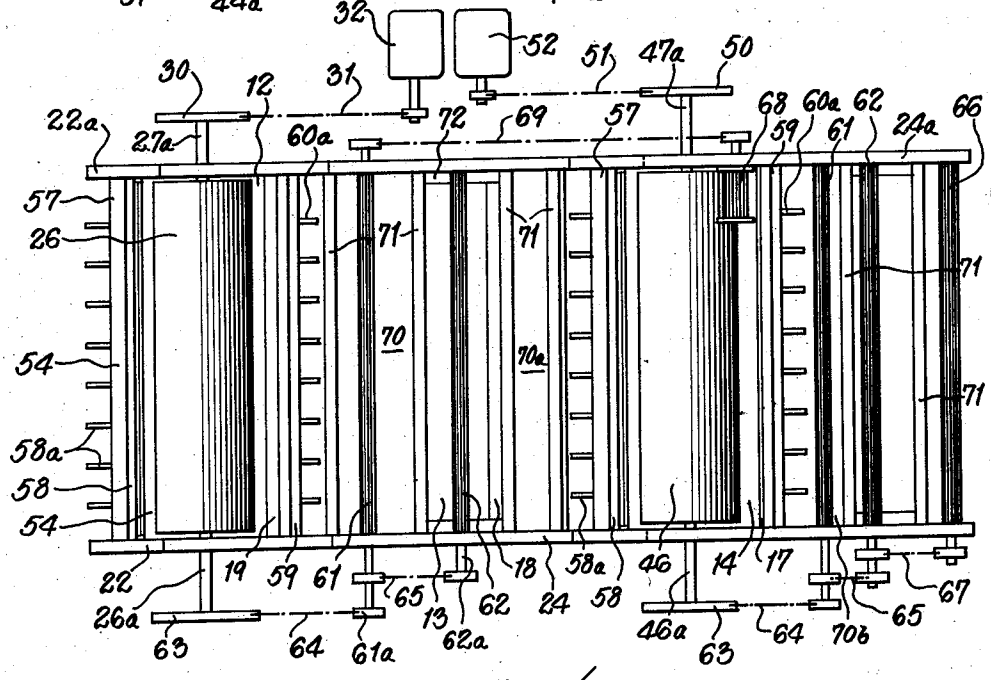


Fig. 4.

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United States Patent Office 2,846,862 Patented Aug. 12, 1958

2,846,862

CONTINUOUS WASHER

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Application March 27, 1956, Serial No. 574,184

13 Claims. (Cl. 68—22)

This invention relates to continuous textile washers of the type having a series of bowls containing a washing liquid and through which a length of cloth or other textile is passed in sequence by way of squeeze rolls for removing liquid picked up by the cloth from each bowl. The invention has particular reference to an improved continuous washer which is more compact, can be manufactured at lower cost and has superior operating characteristics, as compared with prior washers of this type.

In a conventional washer of the type described, each bowl is provided with a pair of squeeze rolls overlying the bowl, and the cloth passes through the nip of the rolls in a series of loops which hang into the corresponding bowl, whereby washing liquid is squeezed from the cloth and returned to the bowl as the cloth progresses through the loops. The cloth passes through the series of bowls one after the other by way of these loops hanging in the washing liquid of the individual bowls, and the bowls are interconnected to provide liquid flow through the bowls from the last bowl to the first, so that the cloth progresses counter-currently to the washing liquid. To permit access to the squeeze rolls by operating and service personnel, it is necessary to provide a substantial space between adjacent sets or pairs of rolls, and this in turn has required a substantial space between adjacent bowls. Consequently, not only does the washer occupy considerable space, but also it is necessary to interconnect the bowls by means of pumps or piping to provide the counterflow of liquid. The use of a pump between each pair of adjacent bowls is expensive, and the use of pipes between the bowls limits the flow rate of the washing liquid and therefore the effectiveness of the counterflow.

A further disadvantage of the conventional washer of this type is the difficulty in controlling the speed at which the squeeze rolls are driven, to prevent the cloth loops in any of the bowls from becoming too long or too short. Heretofore, it has been common practice to drive all of the squeeze rolls from a common line shaft through variable speed drives for the respective sets of rolls, so that the speed of each set can be varied relative to the speeds of the other sets. The variable speed drive for each set of rolls is controlled by the tension in the cloth between the corresponding bowl and the next bowl of the series, this control being effected through dance rolls, as by means of a range drive. The use of such speed control systems adds greatly to the complexity and cost of the washer.

The principal object of the present invention is to provide a continuous washer which overcomes the above-noted disadvantages.

A washer made according to the invention comprises a set of three parallel squeeze rolls forming two nips and including a driven intermediate roll, means for guiding a length of cloth or other textile to one of these nips in a series of loops extending through this nip and through the washing liquid in a bowl, and means for guiding the cloth length from this one nip to the second nip in a second series of loops extending through the second nip by

way of the washing liquid in a second bowl. With this arrangement, two bowls are served by three squeeze rolls disposed in a single set, instead of four squeeze rolls disposed in two sets as heretofore.

In a preferred form of the new washer, a series of four bowls is served by two of these sets of squeeze rolls, and means are provided for guiding the cloth length from the second nip of the first set of rolls to the first nip of the second set of rolls in a supply loop extending through the third bowl of the series. Thus, if the speed of the second set of squeeze rolls becomes too fast relative to that of the first set, the slack in the intervening supply loop of cloth will enable this condition to be tolerated for a substantial period of time; and the reverse condition can be tolerated so long as it does not put excessive slack into the supply loop. Preferably, the two sets of squeeze rolls are driven by separate drives, that is, independently of each other so that one set can be slowed down or stopped independently of the other. In this way, the second set can be slowed down or stopped to restore the supply loop to its normal length whenever it becomes too short, and the first set can be slowed down or stopped whenever the supply loop becomes too long. This eliminates the need for dance rolls and the complicated drives which they entail.

The new washer in its preferred form also has the series of bowls arranged in closely adjacent relation and separated from each other by overflow weirs, so that the counterflow of washing liquid is obtained by cascading of the liquid from the last to the first bowl by way of the intervening bowls. In this way, an adequate throughflow rate of the washing liquid is obtained without the use of pumps between the bowls. In addition, at least one walkway is provided between the two sets of rolls and extending over an intervening bowl or weir generally parallel to the rolls, to permit servicing, etc., of the rolls. By virtue of the fact that only one set of squeeze rolls is required for every two bowls, there is ample space for one or more walk-ways between the roll sets, in spite of the bowls being located in closely adjacent relation.

These and other features of the invention will be better understood by reference to the accompanying drawings, in which

Fig. 1 is a side elevational view of a preferred form of the new washer;

Fig. 2 is a longitudinal sectional view of the washer illustrated in Fig. 1, showing the path of the cloth through the washer, Fig. 2 being a section on the line 2—2 in Fig. 3;

Fig. 3 is an end view of the washer as seen from its front or cloth inlet end, and

Fig. 4 is a plan view of the washer, the driving connections being shown schematically and some of the external parts being omitted for the sake of clarity.

Referring to the drawings, the washer there shown is mounted on a foundation, such as a concrete floor **10**, over a pit **11**. The washer comprises a series of at least four bowls **12**, **13**, **14** and **15** located in the pit **11** (Fig. 2). The last bowl **15** of the series, reckoned in the direction of movement of the cloth, has an inlet **16** for the washing liquid and constituting a means for supplying the wash liquid. The several bowls are arranged in closely adjacent relation in the pit **11** and are separated by overflow weirs **17**, **18** and **19**. The weir **17** separating the bowls **14** and **15** is somewhat higher than the weir **18** which separates the bowls **13** and **14**; and the latter weir, in turn, is somewhat higher than the weir **19** separating the first and second bowls **12** and **13**. The first bowl **12** of the series has a horizontal slot **20** in its end wall, the lower edge of this slot forming an overflow weir which is somewhat lower than the weir **19**,

This slot constitutes a means for discharging washing liquid from the series of bowls.

It will be apparent that when the bowls are filled with the washing liquid and the liquid is continuously supplied to the last bowl **15** through the inlet **16**, the liquid will cascade over the weirs **17**, **18** and **19** from the last bowl of the series to the first bowl **12**, from which the liquid is continuously discharged through the outlet slot **20** to a suitable waste collector (not shown).

The washing apparatus also comprises a pair of opposed lateral walls **22** and **22***a* at the front end portion of the washer where the cloth to be treated is introduced to the washer, and a pair of opposed lateral walls **23** and **23***a* at the rear or outlet end portion of the washer. These walls are mounted on the foundation **10** along the sides of the pit **11** and form part of a framework for the apparatus. The framework also includes longitudinal beams **24** and **24***a* extending lengthwise of the pit **11** and mounted on top of the lateral walls **22**—**23** and **22***a*—**23***a*, respectively.

A set of three squeeze rolls **26**, **27** and **28** is mounted on the opposed lateral walls **22**—**22***a*, these rolls being mounted one above the other and extending transversely of the pit **11** above the first bowl **12**. The intermediate roll **27** is positively driven and has its end shafts journalled in bearings **29** secured to the opposed walls **22** and **22***a*, respectively. The shaft **27***a* at one end of the intermediate roll **27** (Figs. 3 and 4) extends through the corresponding bearing **29** and carries at its outer end a sprocket wheel **30** which is driven through a chain **31** from an electric motor **32**.

The frame walls **22** and **22***a* are provided with opposed vertical slots **34** and **34***a*. The end shafts of the top and bottom squeeze rolls **26** and **28** extend through these slots and are journalled in movable bearings mounted on levers. More particularly, one of the end shafts of the bottom roll **28** is journalled in a lever **35** (Fig. 1) intermediate the ends of this lever. At one end, the lever **35** is pivotally mounted on the frame wall **22** by means of a pivot pin **36**. The opposite end of the lever **35** is pivotally connected to a piston rod **37** extending downward from a piston (not shown) in a pneumatic cylinder **38**. The cylinder **38** is mounted at its upper end on a pivot **39** secured to the frame wall **22**. The corresponding end shaft of the top roll **26** is journalled in the intermediate portion of another lever **40**, the latter being mounted at one end on a pivot **41** secured to the frame wall **22**. The opposite end of the lever **40** is pivotally connected to a piston rod **42** extending upward from a piston (not shown) in a pneumatic cylinder **43**. The latter cylinder is mounted at its lower end on a pivot **44** secured to the frame wall **22**.

The opposite end shafts of the top and bottom squeeze rools **26** and **28** are similarly mounted on levers pivoted on the frame wall 22a and connected through piston rods to pneumatic cylinders, the parts of the mounting system for these ends of the rolls having the same reference numbers as the parts previously described but with the subscript "*a*" added. Thus, in Fig. 3 the pneumatic cylinders connected to the mounting levers for the bottom and top rolls **28** and **26**, are shown at **38***a* and **43***a*, respectively.

From the foregoing, it will be apparent that the intermediate roll **27** of the set of squeeze rolls is positively driven from the electric motor **32**, and the top and bottom rolls **26** and **28** are movable vertically toward and away from the intermediate roll by operation of the levers previously described. The cylinders **38**, **43**, **38***a* and **43***a* are connected in the conventional manner to a suitable source of pressure fluid (not shown) so that the fluid can be forced into or discharged from the cylinders selectively at the will of the operator. In this way, the vertically movable squeeze rolls **26** and **28** can be moved pneumatically against the intermediate roll **27** so as to maintain a pressure between the rolls during

operation of the washer, or the vertically movable rolls can be displaced pneumatically away from the intermediate roll, as will be understood by those skilled in the art.

A second set of squeeze rolls **46**, **47** and **48** is mounted on the opposed frame walls **23**—**23***a* above the third bowl **14**. The top and bottom rolls **46** and **48** of this set are mounted in the same manner as the squeeze rolls **26** and **28** of the first set, and the same reference characters have been applied to the corresponding parts of the mounting means for the rolls **46** and **48**. The end shafts of the intermediate squeeze roll **49** extend through the opposed slots **34**—**34***a* in the frame walls **23**—**23***a* and are mounted in fixed bearings, as in the case of the end shafts of the intermediate roll **27**, of the set, the fixed bearings for the roll **47** being shown at **49**. The shaft **47***a* at one end end of the intermediate roll **47** carries a sprocket wheel **50** which is driven through a chain **51** from a second electric motor **52**. The two motors **32** and **52** and their driving connections to the corresponding intermediate rolls **27** and **47** thus constitute separate drives for the intermediate rolls of the two sets of squeeze rolls, whereby these intermediate rolls can be driven independently of each other. These separate drives may be made variable as to speed as by providing variable speed motors **32** and **52**, so that the speed of each intermediate roll **27** and **47** can be varied relative to the speed of the other roll.

Directly below the two sets of squeeze rolls **26**—**27**—**28** and **46**—**47**—**48** are collecting troughs or pans **54**, **55**, respectively, these troughs being positioned to receive soap squeezed from the cloth passing through the washer. The soap collected in the troughs **54** and **55** may be discharged into a waste receptacle (not shown).

An idler roll or guide bar **57** is rotatably mounted at its ends on the opposed frame walls **22** and **22***a*, this bar extending parallel to the squeeze rolls and being located in front of the bottom roll **28**. Below the bar **57** is a rod **58** which is likewise mounted at its ends on the frame walls **22**—**22***a*. The rod **58** is provided with a series of guide pins **58***a* projecting generally horizontally away from the bottom roll **28** and toward the front end of the washer. The guide pins **58***a* are spaced from each other along the length of the rod **58**. A second idler roll or guide bar is rotatably mounted at its ends on the frame walls **22** and **22***a* and extends parallel to the squeeze rolls. This bar **59** is located to the rear of the nip between the squeeze rolls **26**—**27** and above the front end portion of the second washing bowl **13**. Below the bar **59** is a rod **60** extending between the frame walls **22** and **22***a* and having guide pins **60***a* which project generally horizontally away from the intermediate squeeze roll **27** and toward the rear end of the washer. Two rotatable bars or shafts **61** and **62** are mounted at their ends on the longitudinal beams **24** and **24***a*, the peripheries of these shafts being formed with longitudinal flutes. Rotatable shafts **61** and **62** extend parallel to the squeeze rolls and are spaced from each other in the longitudinal direction of the washer, these shafts overlying the second washing bowl **13**. A pulley **63** is mounted on the shaft **26***a* at one end of the top squeeze roll **26** and serves to drive the shaft **61** through a belt **64** and a pulley **61***a* which is mounted on a projecting end of the shaft **61**. The shaft **62** is provided at one end with an extension **62***a* which is driven from the shaft **61** through a pulley belt **65**.

In front of the second set of squeeze rolls **46**—**47**—**48** are a rotatable bar and a rod having a set of guide pins, these parts being similar to and having the same reference numerals as the parts **57**, **58** and **58***a*, respectively located in front of the first set of squeeze rolls. To the rear of the second set of squeeze rolls are a rotatable bar **59**, a rod **60** and guide fingers or pins **60***a*, which are similar to the correspondingly numbered parts located to the rear of the first set of squeeze rolls. A second pair of fluted

shafts **61** and **62** is mounted to the rear of the second set of squeeze rolls, where they are journalled in the opposed longitudinal walls **24** and **24***a*, these shafts overlying a fourth washing bowl **15**. The top squeeze roll **46** of the second set is provided at one end with a projecting end shaft **46***a* (Fig. 4), this shaft serving to drive the second pair of fluted shafts **61** and **62** through connections similar to those previously described in reference to the first pair of fluted shafts **61—62**. The connections from the end shaft **46***a* to the second pair of fluted shafts **61** and **62** are indicated by the same reference numerals **63—65**. A rotatable shaft **66** similar to the shafts **61** and **62** is mounted between the longitudinal beams **24** and **24***a* at the rear end portion of the washer and is driven from the adjacent shaft **62** through a pulley belt **67**, as indicated in Fig. 4.

A rotatable stub bar in the form of a fluted roll is mounted on the frame wall **23***a* above the squeeze roll **46**. This stub roll **68** is located above the rear portion of the third washing bowl **14** and serves as a guide roll, as will be described in greater detail presently. The stub roll **68** is driven from the fluted shaft **61** adjacent the first set of squeeze rolls through a pulley belt **69** (Figs. 3 and 4).

Between the two sets of squeeze rolls **26—27—28** and **46—47—48** are two walk-ways **70** and **70***a* extending generally parallel to the squeeze rolls. As shown, the walk-way **70** overlies the second washing bowl **13**, and the walk-way **70***a* overlies the weir **18** between the bowls **14** and **13**. These two walk-ways span the pit **11** and are supported at their opposite ends by the parts of the foundation **10** which border upon the pit. The walk-ways are provided with railings **71** extending parallel to the walk-ways at the opposite sides thereof, and the railings along the adjacent sides of the two walk-ways are interconnected by railings **72** extending lengthwise of the pit **11**. Another walk-way **70***b* is located to the rear of the second set of rolls and overlies the last bowl **15** of the series of bowls, the latter walk-way being provided with railings similar ot those described in connection with the walk-ways **70** and **70***a*.

The cloth to be treated, which is indicated at C, is supplied to the front or inlet end of the washer from any suitable source (not shown). This cloth extends over the rotatable bar **57** and through the nip between the squeeze rolls **27** and **28**, from which the cloth extends downward through the washing liquid in the first tank **12** and then upward between a pair of adjacent guide fingers **58***a* and thence over the bar **57** and back through the same nip. This looped course of the cloth is repeated to form a series of loops C1 hanging from the rotatable bar **57** and the bottom roll **28** and extending through the liquid in the first bowl **12** and through the nip between the squeeze rolls **27** and **28**, these loops being spaced from each other along the length of the rolls **27—28** by means of the guide fingers **58***a*. That is, the several loops of the series C′ extend through the spaces between different pairs of the guide fingers **58***a*. The cloth from the last loop C′ extends upward and rearward from the nip between the squeeze rolls **27—28**, as shown at C2, then over the first pair of fluted shafts **61—62**, then downward into the liquid in the second washing bowl **13**, as shown at C3, then upward between a pair of the overlying guide fingers **60***a* and over the corresponding bar **59**, then through the nip between the squeeze rolls **26** and **27**, and then back over the corresponding fluted shafts **61** and **62**. This looped course of the cloth is then repeated to form a series of loops C3 hanging from the shafts **61—62** and the bar **59** and extending through the nip between the squeeze rolls **26** and **27** by way of the liquid in the second bowl **13**. The loops of the series C3 are spaced from each other lengthwise of the rolls by means of the guide fingers **60***a*, it being understood that the several loops of this series pass through the different spaces between these guide fingers. The cloth

from the last loop in the series C3 extends rearward from the corresponding fluted shaft **62**, as shown at C4, and passes over the fluted stub roll **68** and downward into the liquid in the third bowl **14**, from which the cloth passes upward between a pair of the overlying guide fingers **58***a*, then over the overlying bar **57**, then through the nip between the squeeze rolls **47—48**, and then downward again into the bowl **14**, as shown at C5. This looped course of the cloth is repeated to form a series of loops C5 hanging from the rotatable bar **57** and the squeeze roll 48 and extending through the last mentioned nip by way of the liquid in bowl **14**. It will be understood that the loops in the series C5 are spaced from each other lengthwise of the squeeze roll by means of the guide fingers **58***a*. From the last loop of the series C5 the cloth extends upward and rearward from the nip between the rolls **47—48**, as shown at C6, then over the corresponding fluted shafts **61** and **62**. From the fluted shaft **62** to the rear of the second set of squeeze rolls, the cloth extends downward into the liquid in the fourth bowl **15**, as shown at C7, then upwardly between a pair of the overlying guide fingers **60***a*, then over the overlying bar **59**, then through the nip between the squeeze rolls **46—47**, and then back over the corresponding fluted shaft **61—62**. This looped course of the cloth is repeated to form a series of loops C7 hanging from the shaft **61—62** and the bar **59** and extending through the nip between the squeeze rolls **46—47** by way of the liquid in the last bowl **15**. From the last loop in this series C7, the cloth passes rearward from the corresponding fluted shaft **62** and over the fluted shaft **66**, from which the cloth is withdrawn from the washer as indicated at C8.

With the arrangement as described, each of the two sets of squeeze rolls **26—27—28** and **46—47—48** serves two of the washing bowls of the series **12—15**. That is, the first set of squeeze rolls **26—27—28** accommodates the two series of loops C1 and C3 which are suspended in the liquid within the first two bowls **12** and **13**, respectively. Thus, as the cloth progresses through these two series of loops C1 and C3, due to rotation of the roll **27** and the corresponding fluted shafts **61—62**, the liquid picked up by the cloth from these bowls is substantially squeezed from the cloth as it passes through the nips between the rolls **27—28** and the rolls **26—27**, respectively, the liquid thus squeezed from the cloth being collected in the trough **54**, from which it overflows into the first bowl **12**. In a similar manner, the second set of squeeze rolls **46—47—48** squeezes a substantial part of the liquid from the cloth progressing through the last two series of loops C5 and C7, this liquid being collected in the trough **55** and overflowing into the bowl **14**.

The spacing of the various loops of cloth by means of the guide fingers **58***a* and **60***a* may be effected in any desired manner so as to maintain the loops spaced from each other. For example, the loops of the first series C1 may be spaced along the rolls **27—28** from the left-hand to the right-hand ends thereof (as seen from the left or front end of the machine in Fig. 2), the cloth C being delivered initially to the left-hand ends of these rolls; and the cloth C2 from the right-hand ends of the rolls **27—28** passes to the second series of loops C3 which are spaced from right to left along the rolls **26—27**, the cloth from the last of these loops passing over the stub roll **68** and being delivered via supply loop C4 to the first loop C5 at the left-hand ends of rolls **47—48**. The spacing of the loops C5 and C7 along the corresponding rolls may be as previously described in connection with the loops C1 and C3, respectively.

The cloth passing over the stub roll **68** and into the bowl **14** from the first set of squeeze rolls forms a supply loop C4 from which the cloth is delivered to the second set of squeeze rolls **46—47—48**. This supply loop C4 serves to accommodate variations in the relative speeds of the cloth passing through the two sets of squeeze rolls.

In other words, if the cloth passes through the second set of squeeze rolls at a greater linear speed than it passes through the first set of squeeze rolls, the slack in the supply loop C4 will accommodate this condition for a substantial period of time; and conversely additional slack will be put into the supply loop C4 when the cloth passes through the first set of squeeze rolls at a greater linear speed than through the second set. If the supply loop C4 becomes too short, the motor **52** for the second set of squeeze rolls is shut off or slowed down so as to feed additional cloth into this loop until it acquires the desired length; and if the supply loop C4 becomes too long, the motor **32** for the first set of squeeze rolls is shut off or slowed down until a sufficient amount of cloth is drawn out of the supply loop C4 to restore it to the desired length. Thus, it is unnecessary to control the cloth movements by means of the usual dance rolls and associated range drives.

The washer as described and illustrated has the further advantages of compactness and simplicity in construction. The arrangement by which a single set of three squeeze rolls serves two washing bowls not only reduces the required number of squeeze rolls but also permits the washing bowls to be placed closer together while affording ample space between adjacent sets of squeeze rolls for servicing purposes. The provision of one or more walk-ways between adjacent roll sets enables easy access to the rolls while permitting the interconnection of adjacent bowls by weirs in place of the usual pipes. The walk-ways provided for this purpose do not interfere with the passage of the cloth through the washer, since the walk-ways **70** and **70***b* may be located within the two series of loops C3 and C7, respectively, and the walk-way **70***a* may be located below the length C4 of cloth passing from the first to the second roll set.

I claim:

1. In a continuous washer for textile materials, and the like, having at least two bowls adapted to contain a washing liquid and through which a length of said material is passed serially, the improvement which comprises a set of three parallel squeeze rolls forming two nips and including a driven intermediate roll, means for guiding said length to one of the nips in a series of loops extending through said one nip and the liquid in the first bowl, and means for guiding said length from said one nip to the other nip in a second series of loops extending through said other nip by way of the liquid in the second bowl.

2. The improvement according to claim 1, comprising also means for supplying wash liquid to said second bowl, and an overflow weir separating said bowls and over which the liquid is adapted to cascade from the second bowl into the first bowl.

3. The improvement according to claim 1, comprising also means for supplying wash liquid to said second bowl, an overflow weir separating said bowls and over which the liquid is adapted to cascade from the second bowl into the first bowl, and a walk-way extending over the second bowl generally parallel to said rolls and located within the loops of said second series, said set of rolls overlying the first bowl.

4. The improvement according to claim 1, in which said first guide means include pins disposed in proximity to said first nip and spaced axially of the rolls.

5. The improvement according to claim 1, in which said second guide means include bars supporting the loops of said second series.

6. The improvement according to claim 1, in which said second guide means include bars supporting the loops of said second series, and pins disposed in proximity to said second nip and spaced axially of the rolls.

7. In a continuous washer for textile materials, and the like, having a series of at least four bowls adapted to contain a washing liquid and through which a length of the material is passed in sequence, the improvement which comprises two sets of squeeze rolls, each set having three parallel rolls forming two nips and including a driven intermediate roll, means for guiding said length to one of the nips of the first set in a series of loops extending through said one nip and the liquid in the first bowl, second guide means for guiding said length from said one nip to the other nip of said first set in a second series of loops extending through said other nip by way of the liquid in the second bowl, third guide means for guiding said length from said other nip to one of the nips of the second set in a supply loop extending through the liquid in the third bowl, fourth guide means for guiding said length in a third series of loops extending from said supply loop through said one nip of the second set and the liquid in said third bowl, and fifth guide means for guiding said length from said one nip to the other nip of the second set in a fourth series of loops extending through said last nip by way of the liquid in the fourth bowl.

8. The improvement according to claim 7, comprising also means for supplying wash liquid to said fourth bowl, and overflow weirs separating adjacent bowls and over which the liquid is adapted to cascade from the fourth to the first bowl by way of the third and second bowls.

9. The improvement according to claim 7, comprising also means for supplying wash liquid to said fourth bowl, overflow weirs separating adjacent bowls and over which the liquid is adapted to cascade from the fourth to the first bowl by way of the third and second bowls, and a walk-way extending over said second bowl generally parallel to said rolls and located between said roll sets and within said second series of loops.

10. The improvement according to claim 7, in which said second, third and fifth guide means include rotatable bars for supporting the respective loops.

11. The improvement according to claim 7, comprising also separate drives for the intermediate rolls of the respective sets, whereby said intermediate rolls can be driven independently of each other.

12. The improvement according to claim 7, comprising also separate drives for the intermediate rolls of the respective sets, whereby said intermediate rolls can be driven independently of each other, said third guide means including a rotatable bar supporting said supply loop and driven from said drive for the intermediate roll of said first set.

13. The improvement according to claim 7, comprising also separate drives for the intermediate rolls of the respective sets, whereby said intermediate rolls can be driven independently of each other, said second and third guide means including rotatable bars supporting the corresponding loops and driven from said drive for the intermediate roll of said first set, said fifth guide means including a rotatable bar supporting said fourth series of loops and driven from the other of said drives.

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