March 26, 1957 P. HOFER 2,786,480

MACHINE FOR WASHING TEST TUBES, BOTTLES, RECEPTACLES, PIPETTES AND LIKE ARTICLES

Filed June 16, 1954 2 Sheets-Sheet 1

FIG. 1.

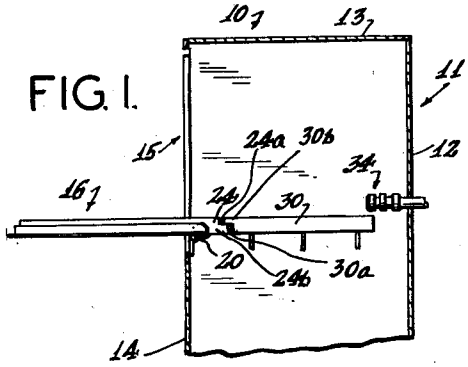


FIG. 9.

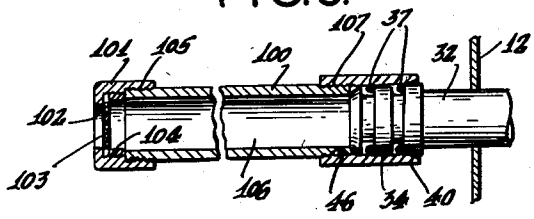


FIG. 3.

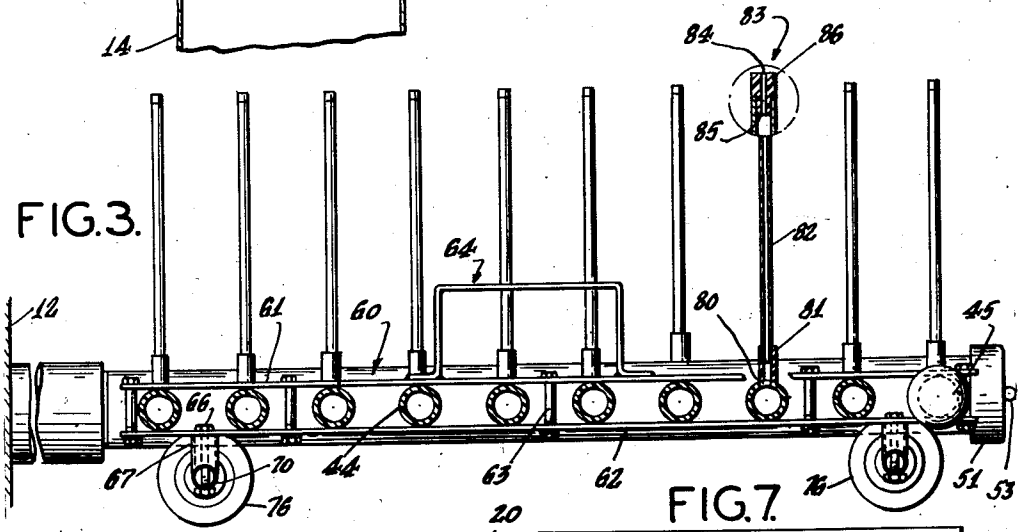
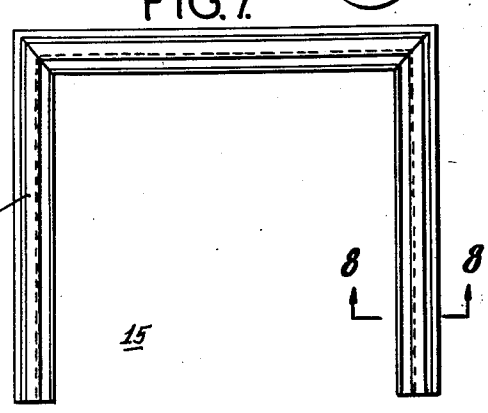


FIG. 7.



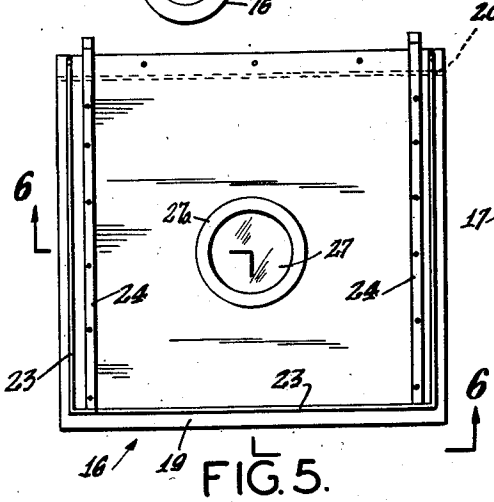


FIG. 5.

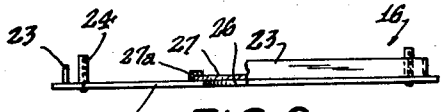


FIG. 6.

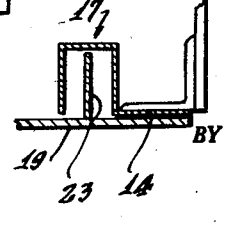


FIG. 8.

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March 26, 1957 P. HOFER 2,786,480

MACHINE FOR WASHING TEST TUBES, BOTTLES, RECEPTACLES, PIPETTES AND LIKE ARTICLES

Filed June 16, 1954 2 Sheets-Sheet 2

FIG. 2.

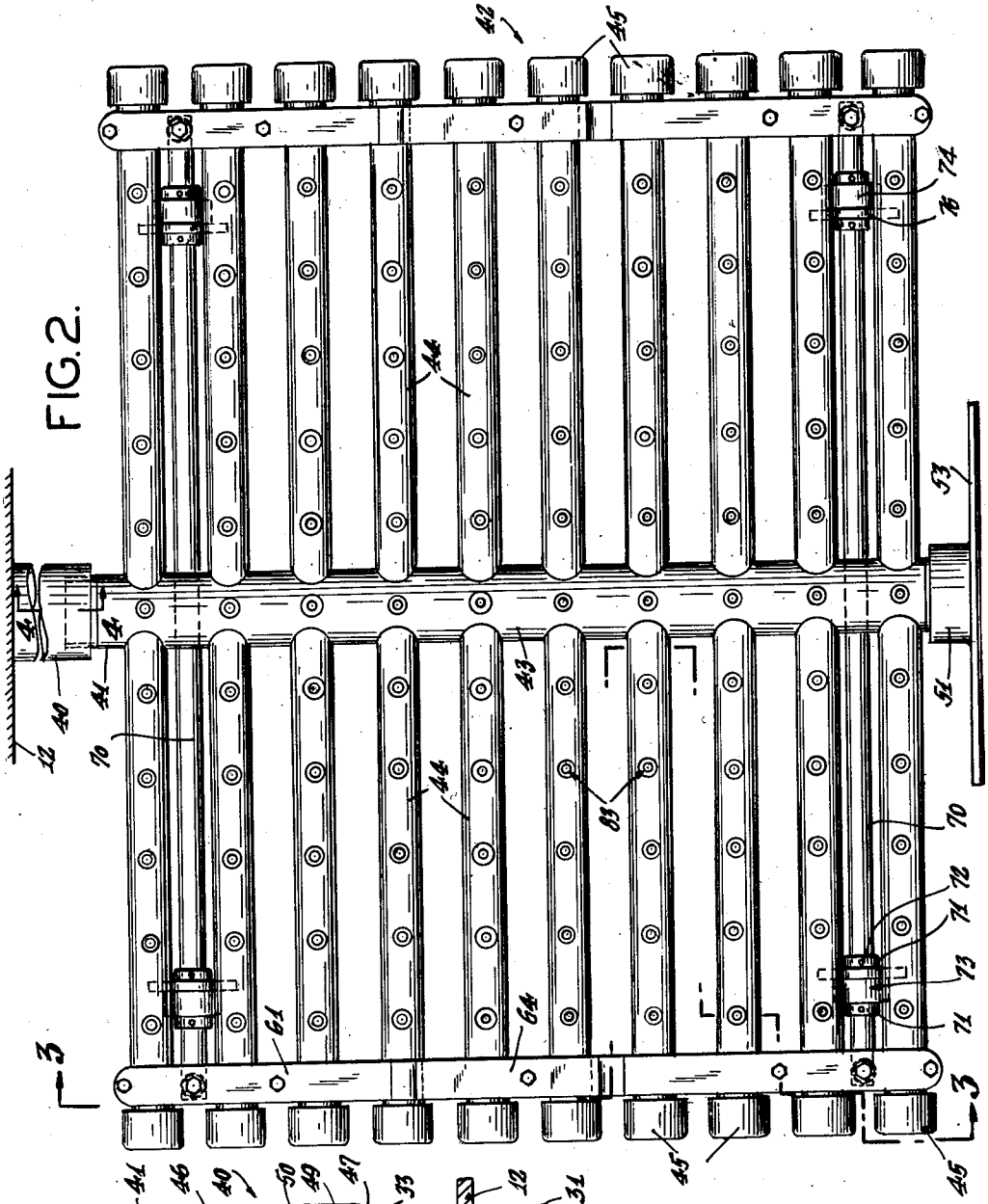
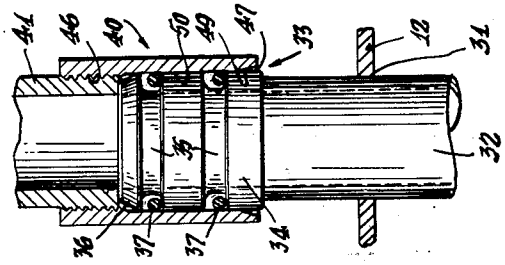


FIG. 4.



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2,786,480

MACHINE FOR WASHING TEST TUBES, BOTTLES, RECEPTACLES, PIPETTES, AND LIKE ARTICLES

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Application June 16, 1954, Serial No. 437,083

21 Claims. (Cl. 134—171)

This invention relates to machines for washing test tubes, bottles, receptacles, pipettes and the like articles.

An object of this invention is to provide in a machine of the character described, a casing provided with a front opening closed by a door pivoted adjacent its lower end to the front wall of the casing and swingable upwardly to close the casing and downwardly to horizontal position to open the casing, said door being provided with rail means, and said casing being provided with rail means, and a header placeable on the rail means on the door when the door is swung down to horizontal open position and said header being adapted to be pushed into the casing, and the casing being provided with horizontal rail means forming a continuation of the rail means on the door, to support the header as the header is pushed into the casing, said header being provided with a coupling element engageable with a fixed coupling element adjacent the back wall of the casing, the arrangement being such that as the header is pushed into the casing, the coupling elements will interengage to form a sealed coupling so that water may be passed through the coupling into the header for washing test tubes, bottles or other articles placed thereon, the construction being such, furthermore, that the header may be pulled out after the washing operation, to automatically uncouple or disengage the coupling elements after the water supply has been shut off.

Another object of this invention is to provide a highly improved header for a machine of the character described, having mounted thereon a plurality of vertical spindles, each spindle comprising a lower non-metallic tube mounted on and communicating with the header, and extending upwardly therefrom, a metallic tube of non-rusting metal attached to the non-metallic tube and projecting upwardly therefrom, and an upper tip of non-metallic, synthetic plastic or rubber-like material at the upper end of the metallic tube, whereby test tubes, bottles or the like may be placed on the spindles in inverted position so that the non-metallic tips will contact the bottoms of the inverted test tubes or bottles and hence prevent breakage and bring the water right up to the bottoms of said tubes and bottles to insure a thorough cleaning.

Yet a further object of the present invention is to provide in a machine of the character described, a header movable on rails into a washing machine and highly improved coupling means for automatically coupling the header to a water supply when the header is inserted into the machine and for disconnecting the coupling automatically when the header is pulled out of the washing machine.

Still a further object of this invention is to provide in a machine of the character described, a highly improved coupling comprising a male coupling element formed with a plurality of annular external grooves, continuous sealing rings of compressible material within said grooves having external diameters slightly larger than external diameter of said portion of the male coupling element, and a female coupling element to receive the grooved portion

of the male coupling element, with the internal diameter of the female being such that when the male and female elements are interengaged the rings are pressed against the inner surface of the female coupling element and against the male coupling element to provide a leak-proof seal for water passing through the coupling.

Still a further object of this invention is to provide in a machine of the character described, a header comprising a central pipe of synthetic plastic material and branch pipes of synthetic plastic material extending outwardly therefrom in opposite directions, spindles attached to the central pipe and to the branch pipes and projecting upwardly therefrom on which to mount test tubes, bottles and other receptacles to be washed, a pair of frames attached to the outer ends of the branch pipes, transverse shafts interconnecting said frames, and wheels on said shafts adapted to roll on rails on the door of the washing machine and on rails within the washing machine so that the header may be rolled from the door to the inside of the washing machine and to permit the door to be swung up and closed after the header is fully within the washing machine.

Still a further object of this invention is to provide in a washing machine of the character described, handles on the side frames of the header to facilitate handling of the header, and a rod fixed to the front end of the header against which the body of the operator may push when riding the header on the door, said rod also serving as handles for pulling the header out of the machine to disconnect the coupling between the header and the water supply.

Still a further object of this invention is to provide in a washing machine of the character described, a fixed coupling member and a pipe adapted to contain pipettes, said pipette container being provided with a movable coupling element engageable with the fixed coupling member to provide a water-proof seal, and said pipette container having at its forward end a screen cap so that water passing through the coupling may pass through the pipette container and out through the screen cap for washing pipettes placed therein.

In the drawings:

Fig. 1 is a side elevational view of the washing machine embodying the invention and showing the door swung down in open position;

Fig. 2 is a top plan view of the header coupled to the fixed coupling element within the casing of the washing machine;

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 2;

Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 2;

Fig. 5 is a top plan view of the door of the washing machine in downwardly swung open position;

Fig. 6 is a cross-sectional view on the line 6—6 of Fig. 5;

Fig. 7 is a front elevational view showing the frame of the opening in the casing which receives the door;

Fig. 8 is a cross-sectional view on the line 8—8 of Fig. 7; and

Fig. 9 is a horizontal cross-sectional view illustrating a modification for washing pipettes.

Referring now to the drawing in more detail, 10 designates a washing machine embodying the invention. The same comprises a casing 11 having a back wall 12, a top wall 13, and a front wall 14. The front wall 14 may be formed with an opening 15 to be closed by a door 16. At the sides and top of the opening 15 in the front wall 14 of the casing is a channel 17. The door 16 comprises a flat sheet of metal 19 which may be hinged to the inside of the casing on pintles or hinges 20 located adjacent the lower end of the door opening 15. Thus the door 16 is

swung downwardly to open horizontal position but may be swung upwardly to vertical closed position closing the opening **15** in the front wall **14** of the casing.

Attached to the inner surface of plate **19** is a flange **23** which is received in the channel **17** of the casing.

It will be noted that channels **17** extend at the sides and at the top of the door opening **15** and the flanges **23** also extend at the sides and at the top of the door when the door is closed to be received in the three corresponding sides of the channel **17**. Fixed to the inner surface of plate **19** are a pair of parallel rail members **24** extending from front to rear, when the door is swung down to open position. Plate **19** may be formed with a central opening **26** closed by glass plate **27** or in any other suitable manner so that a person may look into the inside of the machine when the door is closed. Plate **27** is held by a bezel or frame **27***a* onto the door.

It will be noted that the lower end of the door projects into the casing as shown in Fig. 1 of the drawing. It will also be noted that the rails **24** project into the casing when the door is open or in horizontal position. The rear projecting ends of rails **24** are cut away as at **24***a* to form extending lugs **24***b*.

Fixed within the casing on any suitable supports are a pair of parallel rails **30** which are in alignment with the rails **24**, thus extending from front to rear. Said rails **30** are formed at their front ends with end rails **30***a* providing extending lugs **30***b* engaging lugs **24***b* of rails **24** to hold said door **16** and the rails **24** thereon in horizontal position when the door is swung down. Thus when the door is swung down, interengaging lugs **24***b*, **30***b* provide continuity for rails **24** and **30**. The purpose of these rails will be explained hereinafter.

The back wall **12** is formed with an opening **31** and extending through said opening is a fixed pipe **32**. At the front end of the fixed pipe **32** is a male coupling element **33**. Coupling element **33** comprises a front end portion **34** of somewhat larger diameter than the pipe **32**. The portion **34** is formed with a pair of parallel spaced annular grooves **35**. The front end of portion **34** has an external forwardly and inwardly tapered surface **36**. Within the grooves **35** are continuous rings **37** of rubber-like material. Preferably the material is compressible and resilient. These rings may be of circular cross section. However, if desired, these rings may be replaced by any suitable seal rings such as pressure seals for rotary shafts. However these seals should be continuous rings and not split rings. The outer diameters of the rings **37** are normally somewhat greater than the portion **34** of the male coupling element. The purpose of the male coupling element is to be received in a female coupling element **40** attached to the forward end **41** of a header **42**.

The header **42** comprises a central pipe portion **43** which may be made of a synthetic plastic material and which extends from front to rear. Extending outwardly to opposite sides of central pipe **43** are a series of horizontal outwardly extending branch pipes **44**. Pipes **44** may also be made of synthetic plastic non-metallic material. Pipes **44** may be attached to the pipe **43** in any suitable manner. The outer ends of the pipes **44** may be capped by any suitable caps **45**. The pipes **44** are parallel to one another and the axes of pipes **43** and **44** are in a single horizontal plane. The pipe end **41** has external threads and is screwed into an internally threaded portion **46** of the female pipe element **40**. Said female pipe element **40** has a front open end **47** and it has a forwardly and outwardly tapered front end portion **49**. It also has an internal surface **50** of a diameter somewhat less than the normally external diameter of the sealing rings **37**.

It will now be understood that when the male and female coupling elements are interengaged, the inner surface **50** will compress the rings **37** and press them against the surfaces of the grooves **35** to form a water-proof seal. The tapered portion **36** engaging within the tapered opening **49** facilitates the insertion of the male coupling element with the female coupling element when the header is moved toward the fixed male coupling element, as will be seen hereinafter.

Attached to the front end of the pipe **43** is a cap **51**. Cap **51** may be of metal and attached thereto is a horizontal diametric rod **53** which extends to opposite sides of the cap. It will be noted that the pipe **32** is metal and the coupling elements are of metal. The pipes **44** may be attached to the pipe **43** by threading the inner ends of the pipes **44** into the pipe threaded openings in pipe **43**.

Attached to the outer ends of the pipes **44** are a pair of parallel, longitudinal supporting frames **60**. Each supporting frame **60** comprises a top bar **61** resting on the pipes **44** adjacent the caps **45** and parallel to the central pipe **43**. It further comprises a bottom bar **62** contacting the undersides of the pipes **44** and disposed directly below the bar **61**. The bars **61** and **62** are interconnected by a plurality of bolts **63** disposed between pipes **44** and at the outer sides of the end pipes **44**. Thus the bars **61** and **62** are clamped tightly to the outer ends of the pipes **44**. Each of the top bars **61** carries a U-shaped strap handle **64** welded thereto to facilitate handling the header. Attached to each of the lower bars **62** adjacent the front and rear ends thereof by means of central bolts **66** are vertical tubes **67** through which bolts **66** pass. The tubes **67** contact the undersides of the bar **62** and extend downwardly therefrom, their lower ends are cut away to receive the outer ends of a pair of transverse parallel tubular shafts **70**. The bolts **66** pass through suitable aligned openings in the shafts **70** to thus clamp said shafts and the tube **67** to the supporting frames **60**.

On each of the shafts **70** are pairs of spaced collars **71** fixed to the shaft by set screws **72** or in any other suitable manner. On the shaft and between each pair of collars **71** is a wheel or roller **73** which may be made of nylon or any other suitable material. Each wheel **73** comprises a cylindrical portion **74** from which extends an annular flange **76** of increased diameter. The wheels **73** ride on the rails **24**. Thus the header may be placed on the rails **24** of the door **16** when the door is swung down in horizontal position. Thereafter the header may be pushed inwardly to pass onto the fixed rails **30** within the casing. As the header is pushed towards the rear wall **12** the female coupling element **40** will be received on the male coupling element **34** to automatically effect a water seal.

The central pipe **43** and the branch pipes **44** are formed with a plurality of top spaced through-openings **80**. Fixed within openings **80** are small tubes **81** of synthetic plastic material. Received within the upper end of each tube **81** is the lower end of a stainless steel tube **82**. Fixed on the upper end of the stainless steel tube **82** is a tip **83**, likewise preferably made of non-metallic plastic or rubber-like material. Tip **83** has central through opening **84**. It is formed with a lower portion **85** of reduced diameter received within tube **82**. It has an upper portion **86** of an external diameter similar to the external diameter of the tube **82** and forming a shoulder contacting the upper end of the tube **82**.

Test tubes, bottles or other glass containers may be pliced on the spindles **81**, **82**, **83** in inverted condition. The non-metallic tip **86** contacting the bottom of the test tube or receptacle or bottle will not break it. Water passing through the tube **32** and coupling **34**, **40** will pass through pipe portion **41** to pipe **43** and through branch pipe **44** and to the spindles. The stream of water will project upwardly into the inverted test tube, bottles, or other containers and will wash them thoroughly. It will be noted that the water will reach the bottoms of the inverted test tubes and receptacles so as to insure a thorough washing.

After the header is inserted into the machine the door is of course swung up and closed. After the washing operation the water is turned off. The door may then be swung down to horizontal position. After the door

is fully opened, bar **53** may be grasped and the header pulled out so that the wheels **73** ride from the rails **30** onto the rails **24**. When the header is on the door the header may be lifted by means of the handle **64** and another header placed on the door with more test tubes and the like receptacles to be cleaned mounted thereon. Thus one header may be prepared with the dirty test tubes and bottles while another one is in the machine during the washing operation.

In Fig. 9 there is shown a back wall **12** of the casing and the fixed pipe **32** passing therethrough carrying the male coupling element **34** and the sealing rings **37**. Fitted thereon is a female coupling **40** to which is attached the cylindrical tube **100**. Screwed to the outer end of the tube **100** is a cap **101** formed with a central opening **102**. Covering the opening in the cap is a metal screen **103** held against the back flange of the cap by a collar **104**. Cap **101**, may be screwed to the pipe **100** as at **105**. Pipettes **106** may be placed in chamber **106** formed by the cylindrical tube **100**. Pipe **100** is screwed as at **107** to the internally threaded portion **46** of the female coupling member **40**. Thus pipe **100** constitutes a pipette container. Water passing through the pipe **32**, coupling members **34** and **40** passes through the pipe **100** and cleans the pipettes **106** therein. Water passes out of the pipe **100** through the screen **103**. Screen **103** is removable for replacement.

It will be noted that in the case of the pipette container likewise the said container may be coupled to the coupling member **34** by merely shoving the female coupling member **40** onto the male coupling, thus automatically forming a water-proof seal. This construction nevertheless allows the container **100** together with the female coupling member **40** to be pulled off the male coupling member when desired.

Having thus described the invention in some detail, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In a washing machine, a casing having a front wall formed with an opening, a door hinged to the front wall to close said opening, said door being swingable downwardly and forwardly from vertical closed position to horizontal open position, rails on said door extending from front to rear, fixed rails within the casing aligned with the door rails, a header on wheels adapted to ride on the door rails and onto the rails within the casing, a pipe to receive water supply within the casing, and interengageable aligned coupling elements on said header and pipe and being adapted to become interengaged when the header is pushed from the door into the casing and said coupling including a water tight seal.

2. In a washing machine, in combination, a casing, a fixed pipe in the casing, a sleeve receivable on said pipe, said pipe having a plurality of external grooves, continuous rings of compressible, rubber-like material within said grooves contacting the inner surface of the sleeve and pressed thereby against surfaces of the grooves, a second pipe attached to said sleeve and water outlet means on said second pipe, and means in said casing to guide said second pipe to cause said sleeve to telescope with said first pipe upon moving said second pipe on said guide means.

3. In a washing machine, in combination, a casing, a fixed pipe in said casing, a sleeve slidably and removably received on said fixed pipe, water seal means interposed between the outside of the pipe and the inside of the sleeve, a header attached to said sleeve, spindles attached to said pipe and extending upwardly therefrom, rails in said casing, and wheel means on said header adapted to ride said rails, said rails being located to cause said sleeve to be received on said fixed pipe when said header is moved on said rails.

4. The combination of claim 3, each spindle comprising a metal tube and a tip of non-metallic, soft material at the upper end of said tube, and said tip having

an axial through-opening and projecting above the upper end of said tube.

5. In a washing machine, a casing, having a wall formed with an opening, a door hinged to the wall adjacent the lower end of the opening and being swingable upwardly to close said opening, said door being swingable from vertical closed position downwardly to an open horizontal position, rails on said door, fixed rails within the casing aligned with the door rails, a fixed pipe within the casing adapted to receive a water supply, a pipe coupling element on said fixed pipe, a header, wheels on said header adapted to ride on the door rails and adapted to be pushed from the door rails onto the fixed rails within the casing, and a pipe coupling element on said header telescoping with the first mentioned coupling element when the header is pushed into the casing, one of said coupling elements having a groove, a continuous ring of compressible material within said groove and the other coupling element being adapted to press the ring against a surface of the groove to form a water tight seal when said coupling elements are telescoped.

6. The combination of claim 5, said header comprising a pipe of synthetic plastic material and extending horizontally, a vertical pipe attached to the horizontal pipe and extending upwardly therefrom and communicating therewith and likewise made of synthetic plastic material, a metal tube having its lower end received within said vertical pipe, and a tip fitted onto the upper end of said metal tube and extending thereabove, said tip being made of soft, rubber-like material and being formed with a through-opening.

7. The combination of claim 5, said header comprising a central horizontal pipe, branch pipes extending outwardly from and communicating with the central pipe and disposed horizontally, vertical spindles extending upwardly from the central and branch pipes, frames attached to the outer ends of the branch pipes, transverse horizontal shafts supported by said frames, and said wheels being rotatably mounted on said shafts.

8. In combination, a casing, a header comprising a central pipe, horizontal branch pipes extending from the central pipe on both sides thereof, spindles attached to said central and branch pipes and extending upwardly therefrom, frames attached to the outer ends of said branch pipes, a pair of horizontal shafts supported by said frames, wheels rotatably mounted on said shafts, a coupling element attached to one end of said central pipe, a fixed coupling element complementary to the coupling element on the central pipe and located within said casing, said coupling elements having interengageable water-seal means, and rail means in said casing engageable by said wheels.

9. In combination, a header comprising a central pipe, branch pipes extending upwardly from the central pipe, frames attached adjacent the outer ends of the branch pipes, transverse shafts carried by said frames, wheels on said shafts, and spindles fixed to said central and branch pipes and extending upwardly therefrom, and handles attached to said frames, in combination with a cap at one end of said central pipe and a bar fixed to said cap and extending to opposite sides thereof.

10. In combination, a header comprising a central pipe, branch pipes extending upwardly from the central pipe, frames attached adjacent the outer ends of the branch pipes, transverse shafts carried by said frames, wheels on said shafts, spindles fixed to said central and branch pipes and extending upwardly therefrom, handles attached to said frames, in combination with a cap at one end of said central pipe and a bar fixed to said cap and extending to opposite sides thereof, a sleeve fixed to the opposite end of said central pipe, a pipe received in said sleeve and formed with external grooves with O rings of compressible material within said grooves adapted to be pressed against surfaces of the grooves by said sleeve.

11. In combination, a casing, a pair of telescoping pipe

coupling elements, one having a groove, a continuous ring of compressible material in the groove, the other being adapted to press the ring against a surface of the groove, a horizontal header attached to one of said coupling elements and communicating therewith, vertical spindles on said header and communicating therewith, and the other of said coupling elements being fixed in said casing.

12. In combination, a casing, a pair of telescoping pipe coupling elements, one having a groove, a continuous ring of compressible material in the groove, the other being adapted to press the ring against a surface of the groove, a horizontal header attached to one of said coupling elements and communicating therewith, vertical spindles on said header and communicating therewith, and wheels rotatably mounted on said header, the other of said coupling elements being fixed in said casing, and rails in said casing engageable by said wheels.

13. In combination, a casing, a pair of telescoping pipe coupling elements, one having a groove, a continuous ring of compressible material in the groove, the other being adapted to press the ring against a surface of the groove, a horizontal header attached to one of said coupling elements and communicating therewith, vertical spindles on said header and communicating therewith, wheels rotatably mounted on said header, handles on said header, the other of said coupling elements being fixed in said casing, and rails in said casing engageable by said wheels.

14. In a washing machine, a casing having a front wall formed with an opening, a door hinged to the front wall to close said opening, said door being swingable downwardly and forwardly from vertical closed position to horizontal open position, rails on said door extending from front to rear, fixed rails within the casing aligned with the door rails, a header on wheels adapted to ride on the door rails and onto the rails within the casing, a pipe to receive water supply within the casing, and interengageable aligned coupling elements on said header and pipe and being adapted to become interengaged when the header is pushed from the door into the casing and said coupling including a water tight seal, and tubular spindles fixed to the header and extending upwardly therefrom, on which to mount vessels to be washed, in inverted position.

15. In a device as set forth in claim 14, and tubular rubber-like tips at the upper ends of said spindles.

16. In a washing machine, a casing having a front wall formed with an opening, a door hinged to the front wall to close said opening, said door being swingable downwardly and forwardly from vertical closed position to horizontal open position, rails on said door extending from front to rear, fixed rails within the casing aligned with the door rails, a header on wheels adapted to ride on the door rails and onto the rails within the casing, a pipe to receive water supply within the casing, and interengageable aligned coupling elements on said header and pipe and being adapted to become interengaged when the header is pushed from the door into the casing and said coupling including a water tight seal, and tubular spindles fixed to the header and extending upwardly therefrom, on which to mount vessels to be washed, in inverted position, said door rails and fixed rails having interengaging means to limit downward swing of the door and to provide continuity for said rails.

17. In combination, a casing having a back wall and a front wall, said front wall being formed with an opening, a door for said opening, a fixed pipe in the back wall and projecting forwardly therefrom, a pipe coupling element on the fixed pipe, a header movable into the casing through the opening in the front wall when said door is open so that the door may be closed after the header is in the casing, a complementary coupling element on the rear of the header telescopingly detachably attachable to the first coupling element, said coupling elements being so positioned that they will interengage when the header is inserted through the opening rearwardly toward the rear wall so that said header may receive water passing from the fixed pipe and through said attached coupling elements, and spindle means on the header to receive test tubes, bottles and the like for washing same.

18. In a washing machine, a casing having an opening, a door for said opening, a water pipe fixed to and projecting into said casing, a pipe coupling element on said pipe, a member having a through passage for water passing from an inlet to an outlet on said member, said member being provided with means to carry articles adapted to be washed by water passing through said member, a coupling element on said member, complementary to the coupling element on said supply pipe and detachably interengageable therewith upon moving said member through said door opening and toward and into sliding telescopic engagement with said first coupling element, to provide a water seal connection from said supply pipe to said member.

19. The combination of claim 18 in combination with rails fixed in the casing, and means on said member engageable with the rails to guide said member from the door opening toward said supply pipe so that said coupling elements may telescopically interengage.

20. In a washing machine, in combination, a casing having a back wall and a front wall, said front wall being formed with a door opening, a door for said opening, a fixed pipe adjacent the back wall and projecting forwardly therefrom, a pipe coupling element on said fixed pipe, a member movable into the casing through the opening in the front wall when said door is open so that the door may be closed after said member is in said casing, said member being formed with a through passage for water and being provided with means for carrying articles to be washed by water passing through said member, a complementary coupling element at the rear of said member telescopingly detachably attachable to the first coupling element, said coupling elements being so positioned that they will interengage upon moving said member toward the rear wall.

21. The combination of claim 20 in combination with mutually engageable rail means in the casing and on said member to guide the coupling element on said member toward the coupling member on said fixed pipe.

References Cited in the file of this patent

UNITED STATES PATENTS

1,417,162	Gagen	May 23, 1922
1,538,007	Schellin	May 19, 1925
2,222,676	Mahler	Nov. 26, 1940
2,379,789	Cozzoli	July 3, 1945
2,438,530	Woodling	Mar. 30, 1948
2,573,798	Low	Nov. 6, 1951
2,692,163	Geel	Oct. 19, 1954