July 21, 1964 M. KUPFERSCHMID 3,141,468

APPARATUS FOR USE IN SUPPORTING SYRINGE ELEMENTS AND THE LIKE WITHIN A WASHING DRUM

Filed Aug. 20, 1962 3 Sheets-Sheet 1

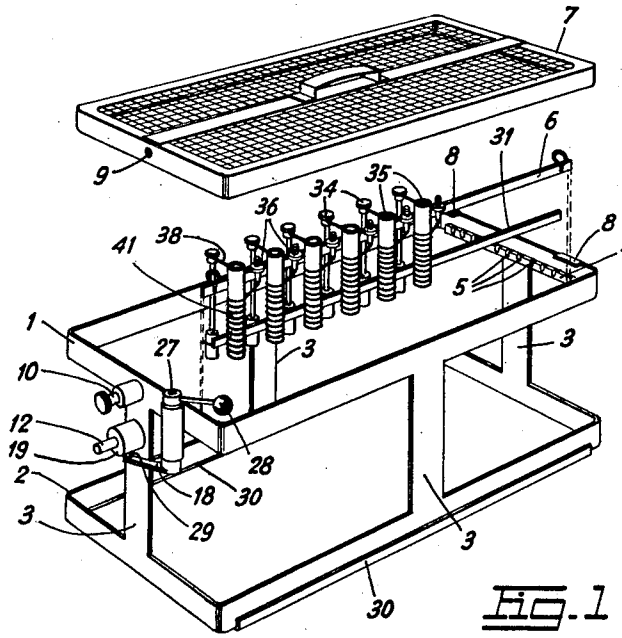


Fig. 1

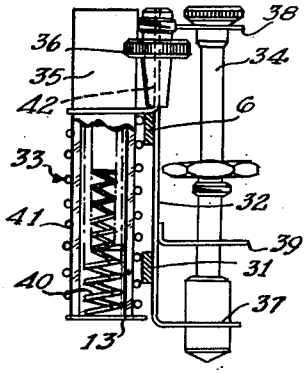


Fig. 2

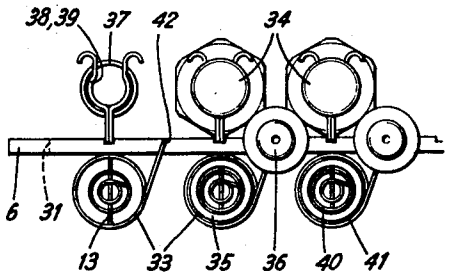


Fig. 3

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Filed Aug. 20, 1962 3 Sheets-Sheet 2

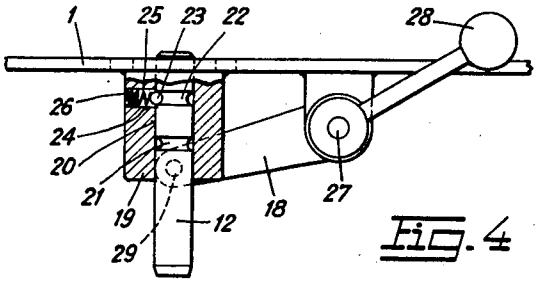


Fig. 4

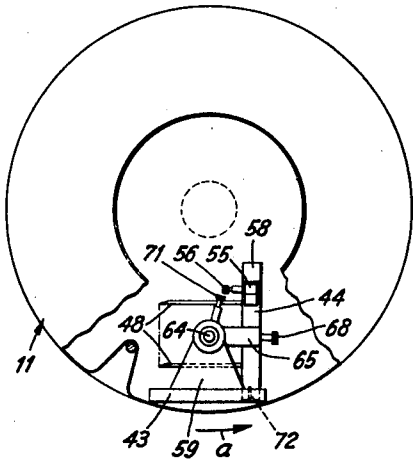


Fig. 5

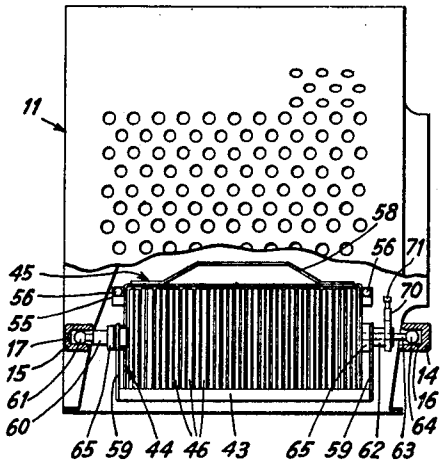


Fig. 6

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APPARATUS FOR USE IN SUPPORTING SYRINGE ELEMENTS AND THE LIKE WITHIN A WASHING DRUM

Filed Aug. 20, 1962 3 Sheets-Sheet 3

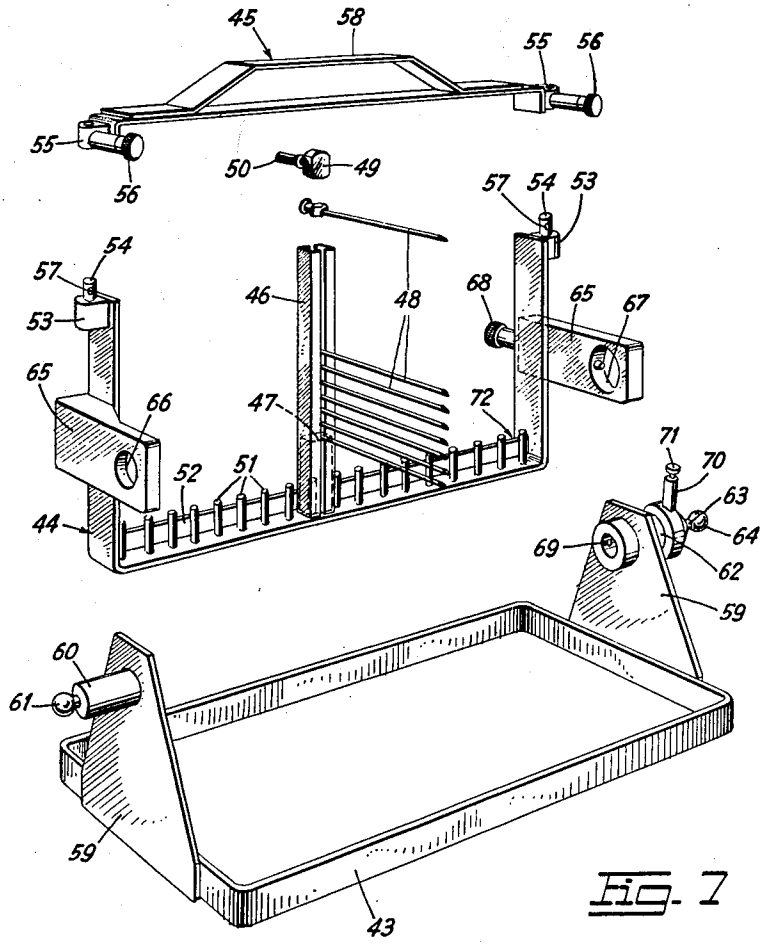


Fig. 7

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3,141,468

APPARATUS FOR USE IN SUPPORTING SYRINGE ELEMENTS AND THE LIKE WITHIN A WASHING DRUM

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11 Claims. (Cl. 134—142)

This invention relates to apparatus for use in the mechanical cleansing of the component elements of hypodermic syringes and the like.

The problem of washing hypodermic syringes is of very great importance in hospitals and in clinics, in which the number of syringes which must be washed each day may be considerable.

In some cases, syringes are washed by mechanical means, using notably washing machines comprising a rotary drum. For supporting the elements of syringes within the drum of the machine, auxiliary devices are already known, which comprise casings of rectangular form, open at both ends, and carrying securing members to which the various elements of a syringe may be fixed. These casings may be disposed within the drum of the machine. Supports fixed within the drum of the machine and capable of receiving a large number of needles have also been used.

However, these hitherto known auxiliary devices are not convenient to use.

It is an object of the present invention to obviate this disadvantage by providing apparatus for supporting syringe elements within a washing drum and which is such as to permit rotational and rapid working.

According to this invention, there is provided apparatus for use in supporting syringe elements and the like within a washing drum, such apparatus comprising an open frame having means for securement to the interior of the drum of a washing machine, a number of detachable supports for syringe elements or the like engaged in the frame, each support carrying members for guiding the said syringe elements, and a cover detachably secured to the frame, the said cover extending relatively to the supports in such a manner as to hold them in position on the frame.

In order that this invention may more readily be understood, two embodiments of apparatus according to the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIGURE 1 is an exploded perspective view of the first embodiment;

FIGURE 2 is an elevation, partly in section, of a part of the apparatus of FIGURE 1, drawn to a larger scale;

FIGURE 3 is a top plan view of the part shown in FIGURE 2;

FIGURE 4 is a plan view, partly in section, of a detail of the apparatus of FIGURE 1,

FIGURE 5 is an end elevational view, with parts broken away, of the drum of a washing machine in which is mounted the second embodiment of apparatus according to this invention;

FIGURE 6 is a side elevation, partly in section, of the drum of FIGURE 5; and

FIGURE 7 is an exploded perspective view, similar to that of FIGURE 1, but showing the second embodiment.

The apparatus illustrated in FIGURE 1 comprises an apertured cage adapted to contain a number of dismantled hypodermic syringes. The cage consists of two rectangular frame members 1 and 2 of like dimensions, connected together by uprights 3. The upper frame member 1 carries two bars 4, each secured to the inside of one of the smaller sides of the frame member and formed with rectangular recesses 5 at regular intervals. These recesses are intended to receive the ends of rails 6 which will hereinafter be described. A detachable cover 7 of open grid form is adapted to be secured to the frame member 1. For this purpose, the cover 7 is obliquely engaged in the frame 1 and rested on the bars 4. The frame member 1 has lugs 8 which extend inwardly over one of the bars 4 and to fit the cover 7, one end of the latter is engaged under the lugs 8 with the cover oblique to the frame member 1 and the cover is then pivoted downwardly until it rests on the bars 4. The end of the cover 7 remote from the lugs 8 is formed with an aperture 9 adapted to receive the end of a rod 10 carrying an operating button and mounted on the front face of the frame member so as to be axially movable against the action of a spring (not shown) which maintains the rod normally in the locked position.

In a modified form, the upper frame member 1 may, in place of the rod 10 and lugs 8 have a vertical stud at each of its ends. The cover 7 would then be provided with corresponding sleeves capable of being axially engaged over the said studs and adapted to be locked in position by pins.

The described cage is intended to be mounted in the rotary drum of a conventional automatically operated clothes-washing machine, such as the drum 11 illustrated in FIGURE 5. It is intended to be so positioned that its cover 7 faces towards the axis of the drum. However, in a modified form, this arrangement could be inversed. In this case, the cover 7 would be turned towards the inner face of the drum 11.

In order to enable the described cage to be detachably secured in the drum 11, the frame of the cage is provided with a stud 12 at each of its ends, one of the studs being fixed and the other being retractable. The studs 12 are engageable in corresponding sockets 14 and 15 which are in turn welded in the inner end faces of the drum 11. The sockets 14 and 15 are formed with recesses 16 and 17 respectively to receive the studs 12.

The fixed stud 12 on the rear end face of the cage has a rounded end in the form of a ball, which is adapted to turn within the recess 17 and around which the cage can be pivoted. The retraction of the retractable stud 12, which is mounted on the front end face of the cage, is controlled by a lever 18. As shown in detail in FIGURE 4, this stud is formed by a cylindrical member which is freely engaged, in a securing member 19 which is for this purpose formed with a cylindrical aperture 20. The member 19 is welded to the front end face of the cage. As shown, the retractable stud 12 is formed with two annular grooves 21 and 22 of approximately semicircular cross-section which are adapted to co-operate with a locking ball 23. The latter is engaged in a lateral bore 24 in the member 19 and is urged axially of the bore by a spring 25 bearing against a screw 26 which closes the outer end of the bore 24. When the stud 12 is in the active position, it is locked by the engagement of the ball 23 in the groove 22, while the engagement of the ball in the groove 21 locks it in the retracted position. In order to change from one position to the other, it is sufficient to actuate the lever 18 which is pivotally mounted at 27 on the cage, one of the arms of the lever 18 being provided with an operating button 28 and the other with a boss 29 driving the stud 12. The cage can very readily be positioned in the washing machine. It is merely necessary with the retractable stud in its retracted position, to engage the cage obliquely in the drum 11 of the machine by way of the aperture in the drum, to engage the fixed stud 12 in the recess 17 and then to pivot the said cage about the ball of this stud, so as to bring

the retractable stud to a position registering with the recess 16. In this position, the lower longitudinal edges of the cage, which are lined with rubber strips 30, bear against the inner face of the drum 11. The lever 18 is then operated to move the retractable stud into its active position in which it engages in the recess 16. The cage is then fixed to the drum 11.

In a modified form, the member 19 could alternatively be formed with a helical groove and the control lever could be directly mounted thereon, so as to be capable of turning coaxially with the stud 12 and to slide axially of the member 19. The lever would then be provided with a boss passing through the helical groove in the member 19 and penetrating into an annular groove in the stud 12 so as to shift the latter axially when the lever is operated. A locking device comprising parts similar to 23, 25 and 26 could then be arranged to act on the control lever rather than on the stud 12.

Each cage may, as shown in FIGURE 1, contain a number of syringe supports, each formed of two rails 6 and 31 of rectangular profile. The upper rail 6 is longer than the lower rail 31 and is arranged to engage at its ends in two opposed recesses 5. The rails 6 and 31 are connected by spring wires 32 and 33 (FIGURE 2), which form suspension members for syringe parts 34, 35 and 36. The parts 34 each consist of a piston with its associated rod, on which is engaged a syringe cover. The parts 35 are syringe bodies of tubular form and the parts 36 are ferrules. Each wire 32 is secured to one longitudinal face of the rails 6 and 31 and is bent to form a closed loop 37 situated below the rail 31 and a corresponding open loop 38 situated above the rail 6, and capable of engaging under the control knob of the rod of the part 34 when the piston of this part is engaged in the corresponding lower loop 37. Each of the wires 32 comprises in addition a segment 39 welded between the loops 37 and 38 and forming a third open loop, like the loop 38, and coaxial with the latter, so that syringe pistons of various lengths and various diameters may be mounted on the same wire 32. The distance between the loops 37 and 39 is greater than the length of the body of a piston of the largest dimensions intended to be mounted on the wire 32, so as to permit the passage of such a piston body between the said loops.

Each wire 33, which is secured to the opposite longitudinal face of the rails 6 and 31 to which each wire 32 is secured, forms two coaxial coils 40 and 41 disposed one within the other, the inner coil 40 comprising two adjacent portions of different diameters. The dimensions of these coils are so chosen that syring bodies of large diameter can be engaged within the coil 41 and positioned to rest against the lower end 13 of the wire 33, which end extends diametrically of the coil, while syringe bodies of smaller dimensions may be engaged on the portion of coil 40 of smaller diameter, their lower ends resting against the upper end of the portion of coil 40 of large diameter so that the upper end of such a syringe body would extend to the same level as that of a syringe body of large dimensions engaged in the coil 41.

The spring wire forming the suspension member 33 is terminated at its upper end by a rectilinear segment 42 on which a ferrule 36 can be engaged. The ferrule 36 will thus be situated at the same level as the upper end of the syringe body and the control knob of the piston rod. This level corresponds to that of the lower face of the grid of the cover 7 so that, regardless of the number and the position of the syringe supports lodged in the cage, the parts of the syringes fixed to these supports are maintained in a predetermined position by the cover 7. The segments 42 are of such dimensions that the ferrules 36 engaged thereon have some clearance. They can thus turn on themselves or move slightly axially during washing, which ensures good circulation of the water along the surface of these members. All the wires 32 and 33 mounted on the rails 6 and 31 are identical.

Since these wires are capable of carrying syringes of different dimensions, a large number of different types of syringe can be treated using a minimum number of types of syringe supports. Thus, for example, a first size of syringe support could be dimensioned to receive syringes of one, two and five cc., while a second type of support could be dimensioned to receive syringes of three, ten and twenty cc. With two types of syringe support, it is thus possible to treat six sizes of syringe. Each cage may contain, for example, three rows of syringe supports of the first type or two rows of supports of the second type. In the former case, if each pair of rails carries fifteen pairs of wires 32 and 33, forty-five syringes of one, two or five cc. could be placed in each cage.

Instead of wires 32 and 33, there could be disposed on the rails 6 and 31 suspension elements intended to receive other parts or assemblies of medical instruments for cleaning.

The apparatus illustrated in FIGURES 5, 6 and 7 is intended to receive syringe needles. This apparatus comprises a frame member 43, a support 44, a cover 45 and bars 46.

Each of the bars 46 comprises two channel sections secured to a rectangular plug 47, on which the channel sections are engaged with the open sides of the channels facing one another. Needles 48 may be engaged one above the other between the two channel sections of such bar 46 so as to extend perpendicular to the latter. The needles are retained by their heads, which are lodged between the sections and engaged one against the other by means of a member 49 formed of rubber and adapted to be forced between the sections for which purpose the member 49 has a lateral stud 50. Each plug 47 has an axial recess to enable the bar 46 to be engaged on a cylindrical stud 51 mounted on the support 44. As will be seen from the drawing, the latter comprises a flat U-shaped iron, the central portion of which carries a row of studs 51 disposed at regular intervals. The spacing between two adjacent studs 51 is such that two bars 46 engaged on these studs are adjacent and cannot turn in relation to one another. In addition, the central portion of the support 44 is provided with a guide bar 52 disposed at such a distance from the studs 51 that the bars 46 can be engaged on these studs only in a position such that the needles 48 extend in a predetermined direction. The two lateral uprights of the support 44 carry lugs 53 which are secured to the upper end of the said uprights and have studs 54 on which there can be engaged corresponding eyes 55 secured to the two ends of the cover 45. Movable locking members 56 mounted on the eyes 55 and capable of being engaged in apertures 57 in the studs 54 permit the securing of the cover 45 to the support 44 in a position such that it bears on the upper ends of the bars 46 and thus prevents them from becoming disengaged from the cylindrical studs 51. A handle 58 fixed to the cover 45 is provided for carrying the cage.

The frame member 43 is of rectangular form. Its two small sides have welded thereto lateral uprights 59 formed as plates of triangular form. One of these uprights is provided with a stud 60 terminating in a ball 61, while the other comprises a sleeve 62 in which there is mounted an axially movable stud 63 terminating in a ball 64. The sleeve 62 and the stud 60 are coaxial and each extends outwardly from the appropriate upright 59. They are intended on the one hand to enable the support 44 to be secured to the frame member 43, and on the other hand to enable the latter to be secured in the drum 11. The lateral sides of the support 44 are provided with arms 65, the ends of which are formed with coaxial apertures 66 and 67. The aperture 66 is so dimensioned as to be able to engage over the stud 60, while the aperture 67 is adapted to be engaged over a portion of the sleeve 62 which projects from the inside of the upright 59 carrying it. An axially movable locking member 68 mounted in

the arm 65 and having one end projecting into the aperture 67 and adapted to be engaged in a radial aperture 69 in the sleeve 62 enables the support 44 to be secured to the frame member 43.

For this purpose, it is merely necessary to dispose the support 44 in an oblique position in relation to the frame member 43 and to engage the apertures 66 and 67 respectively over the stud 60 and over the inner portion of the sleeve 62 by moving the support 44 axially. The locking member 68 is then brought by a rotational movement of the support 44 to a position opposite the aperture 69 in the sleeve 62 and then introduced into aperture 69. A spring (not shown) maintains the locking member 68 in engagement in the aperture 69, so that the support 44 is maintained in a fixed position in relation to the frame member 43 and cannot be involuntarily disengaged. The central portion of the support 44 is then situated at the level of the frame member 43 with the bars 46 perpendicular to the plane of the frame member as shown in FIGURE 5.

When the cage has been assembled as hereinbefore described, it is fixed to the drum 11.

In order to position a cage, it is merely necessary first to engage the ball 61 of the stud 60 in the socket 15 and then to bring the ball 64 opposite the sleeve 14 with the stud 63 engaged fully in the sleeve 62 and then partially to withdraw the stud 63 from the sleeve 62 so as to engage the ball 64 in the socket 14. A rotative control member 70 mounted on the sleeve 62 and engaged in a helical slot (not shown) in such sleeve enables the stud 63 to be axially shifted and locked by means of a movable rod 71, which engages in an aperture in the sleeve 62 under the action of a spring when the ball 64 has reached the end of its travel.

When the cage has been positioned, the longitudinal sides of the frame member 43 are in contact with the lateral wall of the drum. As in the first constructional form, these longitudinal sides may be lined with rubber strips. When the support 44 is so oriented that its plane is perpendicular to that of the frame member 43 the needles mounted thereon are tangentially directed in relation to the circle described by each point of the drum when the latter is rotated.

The drum 11 comprises six sockets 14 and six sockets 15 situated in the end walls of the drum at regular intervals around its axis. It is thus possible to secure in the drum six cages for syringe elements. It may also contain three cages carrying needles. These cages are provided with bars 46 each capable of receiving twenty needles 48, and supports 44 each capable of carrying eighteen bars 46. A drum provided with three cages of this type therefore contains 1080 syringe needles.

However, it is obvious that the drum 11, instead of being provided with three needle cages, could alternatively contain, for example, one cage of this type and two cages containing other springe parts.

The described cage has many advantages. It is simple. The parts welded together have no interstices between which dirt can accumulate. It may be constructed, for example, of stainless steel and thus undergo no deterioration under the action of water and cleaning materials. In addition, it can be taken apart and reassembled very easily and the positioning of the needles is rapid and simple. It requires no tool, since all the detachable parts are fixed by studs subject to the action of resilient means.

Finally, the fact that the needles are disposed tangentially in relation to the rotational movements of the drum ensures correct washing thereof. A water circulation is set up within the needle duct and this circulation, the direction of which changes at each alternation of the drum, ensures correct washing of the duct of the needle.

In addition, the guide bar 52 and the central portion of the support 44 form a small trough 72 which carries a little water when the drum rotates in the direction of the arrow *a* (FIGURE 5). This water flows along the bars 46 and flushes the upper orifice of the needles as soon as the trough is situated above the axis of the drum, whereby it completes the washing of the ducts of the needles.

The needles mounted in the above-described cage are all identical but the spacing between the channel sections of which the bars 46 are formed is such that needles of different diameters may be mounted on these bars.

In a modification, that portion of the sleeve 62 which projects inwardly may be formed with a second radial aperture, similar to the aperture 69, but positioned at 90° thereto, in the upward direction. Such an aperture would make it possible to secure the support 44 to the frame member 43 in a position such that the needles 48 are disposed radially in relation to the drum. This arrangement would make it possible to bring the needles into a radial position during the spinning, so as to facilitate drainage of the ducts of the needles and to avoid the danger of the needles becoming bent under the effect of centrifugal force.

The apparatus described in the foregoing greatly facilitate and accelerate the preparation of the syringe elements with a view to their washing. As is known, the syringes employed in a hospital may vary greatly in dimensions. The rails 6 and 31 of the cages for syringe elements, as also the bars 46 of the needle cages, may receive syringe elements and needles of different dimensions. It is therefore sufficient for a relatively small number of such apparatus to be near at hand. When the syringes have been used, they are brought to a position adjacent the washing machine and taken apart and their elements are immediately placed on the corresponding supports. As soon as a support is full, regardless of the type of syringe elements which it carries, it can be placed in the first cage. Thus, the cages may be filled one after the other and immediately introduced into the machine. The syringe elements are grouped in each cage so that, when the syringes are to be reassembled, the same elements are situated together. In addition, regardless of the number of syringes of the different types employed, they can be washed shortly after having been used, since the cages and the supports may be provided with syringe elements of different dimensions.

I claim:

1. Apparatus for use in supporting syringe elements and the like within a washing drum, such apparatus comprising an open frame having means for securement to the interior of the drum of a washing machine, a number of detachable supports for springe elements or the like engaged in the frame, each support carrying members for mounting the said syringe elements, and a cover detachably secured to the frame, the said cover extending relatively to the supports so as to hold them in position on the frame.

2. Apparatus according to claim 1, wherein the cover extends across said mounting members so as to maintain the said elements in position when the cover is secured to the frame.

3. Apparatus according to claim 2, wherein one of said mounting members supports syringe ferrules and the said cover extends at a distance from the one of said mounting members such that the syringe ferrules are maintained in position with axial clearance.

4. Apparatus according to claim 1, wherein the detachable supports comprise groups of mounting members, each group comprising three mounting members adjacent one another to receive respectively the piston, body and ferrule elements of a syringe, the said elements of each syringe when carried by said members thus being grouped in the neighbourhood of one another.

5. Apparatus according to claim 1, wherein each mounting member is arranged so as to receive corresponding elements of a number of types of syringe of different dimensions.

6. Apparatus according to claim 1, wherein another of

the mounting members is adapted to receive the bodies of syringes which comprise helically coiled segments of metal wire.

7. Apparatus according to claim 1, wherein one of the mounting members is adapted to receive the ferrules of syringes which comprise rectilinear segments of metal wire each adapted to engage with clearance in the axial aperture of a ferrule.

8. Apparatus according to claim 1, wherein the frame comprises two rigid parts capable of pivoting relative to one another, one of the said parts carrying the said detachable supports and the cover, and the other the members for securing the frame to the drum of a washing machine.

9. Apparatus for supporting syringe elements within a washing drum of a washing machine comprising mounting means disposed in said washing drum, frame means having engaging means for removably mounting said frame means in said mounting means, supporting means for supporting syringe elements thereon, said supporting means being removably mounted in said frame means, cover means engaging said frame means to maintain said supporting means in position in said frame means, and means for maintaining said cover means in engagement with said frame means.

10. Apparatus according to claim 9 wherein said frame means includes two rectangular frame members of like dimensions spaced from each other and being interconnected by uprights, one of said frame members having supporting elements, said supporting means supported on said supporting elements, said supporting means including rail means having mounting members mounted therealong at spaced intervals to receive the piston, body and ferrule elements of each syringe.

11. Apparatus according to claim 9 wherein said frame means include a rectangular frame member having mounting elements extending therefrom, a U-shaped support member, engaging elements disposed on the lateral sides of said U-shaped support member adapted to removably mount said support member on said mounting elements, bar means removably mounted on the base portion of said U-shaped support member, said bar means having openings to receive therein the head portions of syringe needles.

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