

[54] STOCKING PROCESSING APPARATUS

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[58] **Field of Search**34/103, 104; 223/60, 75, 76,
223/51, 79; 68/10; 239/219, 220, 223

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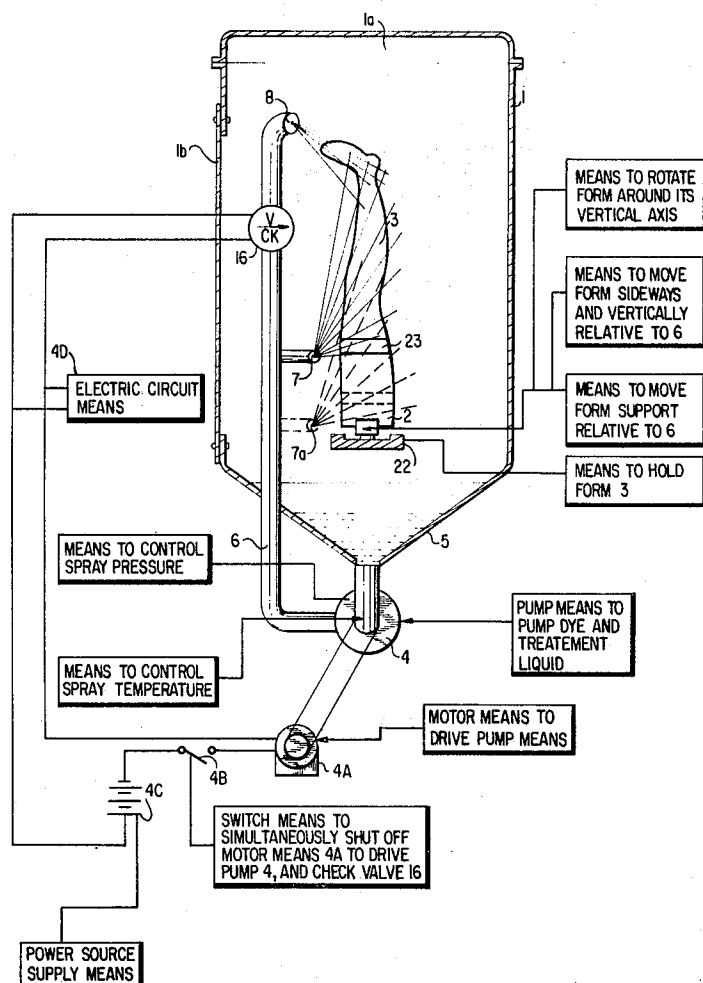
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[57] **ABSTRACT**

Stretch hosiery articles and the like are mounted on a support form, and dyeing liquid is sprayed against the form through a plurality of spray means. The spray jets are oriented to minimize shifting of the hosiery articles on the form, spraying liquid in opposing directions to the portions most likely to shift. Special spray drums are provided.

8 Claims, 4 Drawing Figures



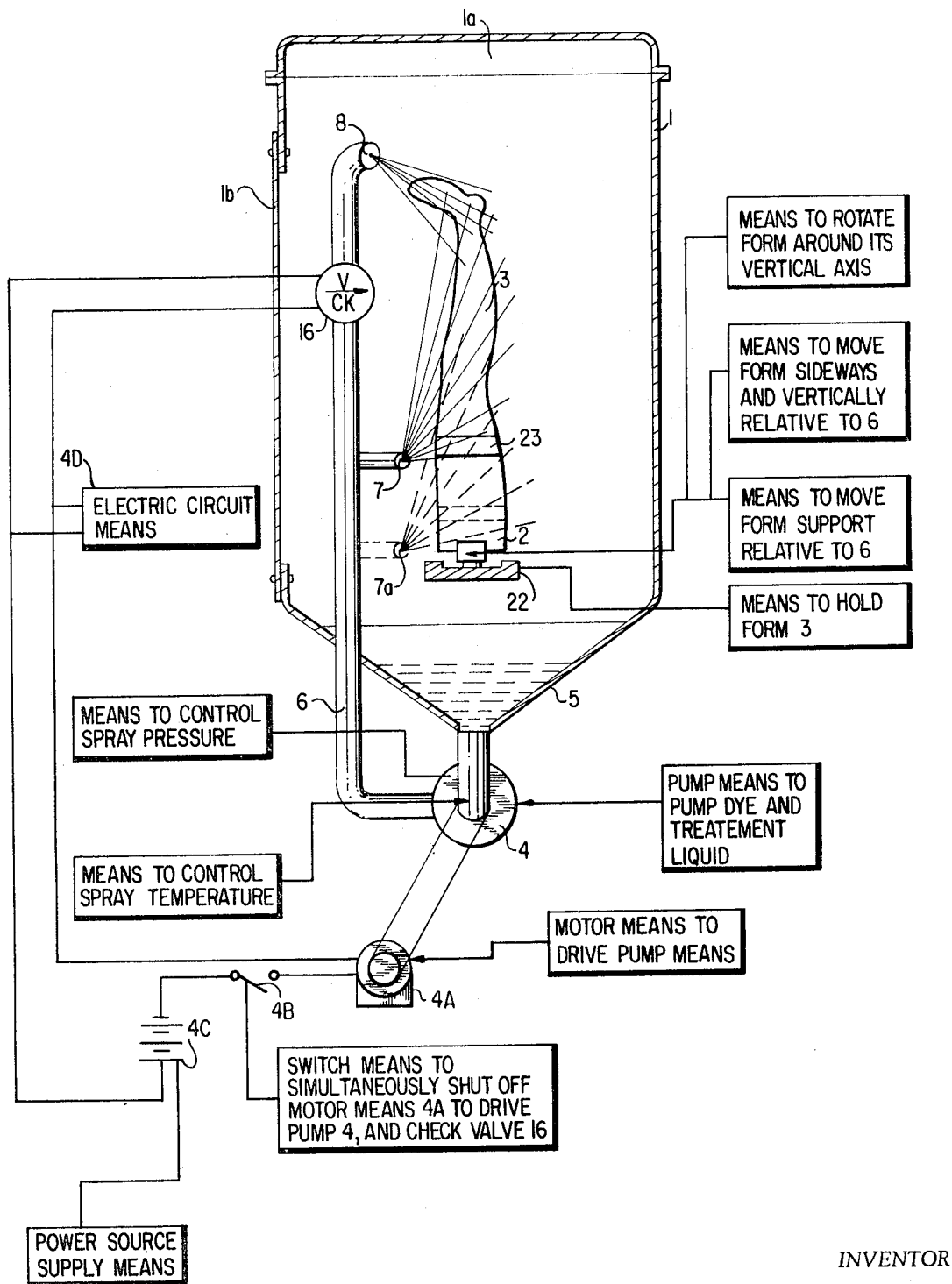


FIG. 1

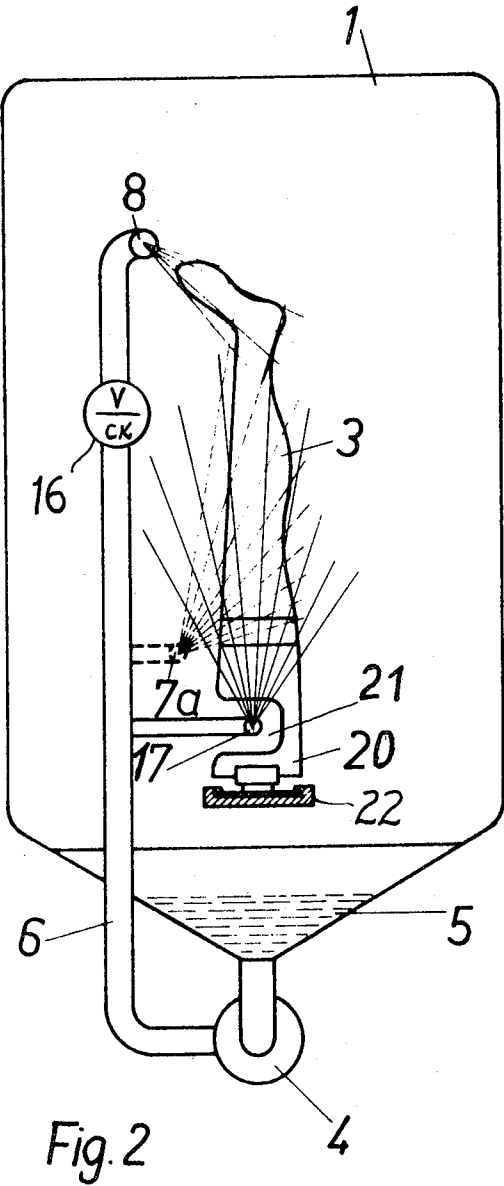
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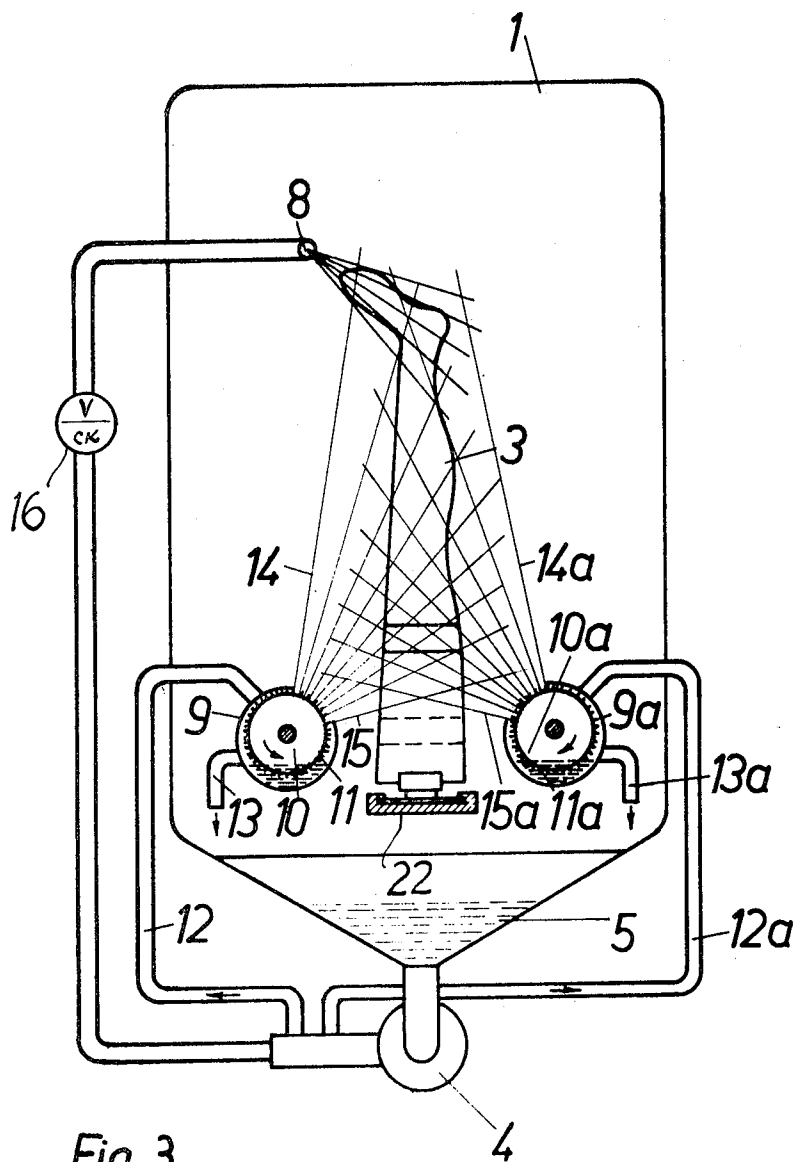


Fig. 3

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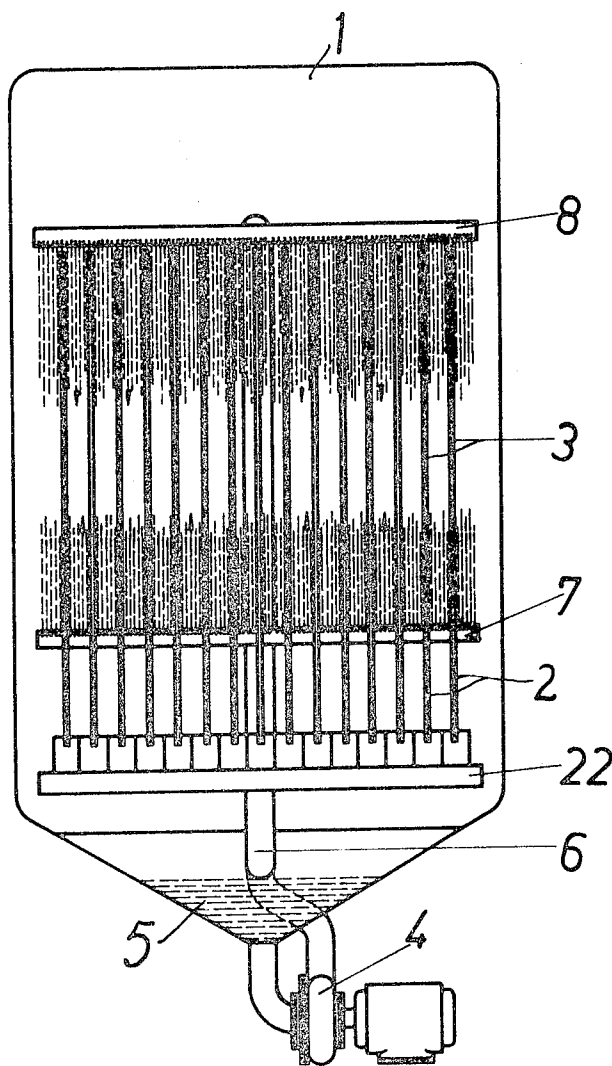


Fig. 4

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STOCKING PROCESSING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a device for the spraying of stretch hosiery articles and similar hollow, highly elastic textile articles fitted on forms, with dyeing liquid and other treatment liquids, where the spray jets of the spray means are aimed in opposing directions.

2. Prior Art

It is known to use spray means to evenly distribute the dyeing liquid on hose, and especially on ready-made panty hose manufactured from synthetic yarn, which are dyed after being fitted on a form.

Recently, however, certain kinds of yarns have been used in the manufacture of hosiery articles which possess characteristics of high elasticity, obtained through texturing, and which make it possible to manufacture hosiery in only a few sizes, sometimes even a single size only.

Hosiery articles of this kind fit without wrinkles because they take the exact shape of the leg, owing to their extremely high elasticity.

The known method of spray-dyeing, when used on this kind of hose or panty hose, has the shortcoming of stretching the hose downward over the form under the effect of the downward-aimed spray jets. And, because such dyeing is preferably done at a temperature of 100° centigrade, the stretching becomes thermally fixed. The hose thus loses the required elasticity.

The mere reversal of the spraying direction of the previously downward-aimed spray means achieves that the hose no longer stretch and distort downward over their forms, but it causes the foot portions of the hose to be distorted upward or to the side, leaving an unsatisfactory shape on the points and heels.

In addition to the above, the dye penetration on the points and heels is frequently of poor quality. It is common knowledge to those skilled in the art that the dyeing and forming of the foot portions of hose is the most difficult of their problems, and that a well-formed foot enhances the quality of the hose considerably. It is therefore a prerequisite part of the invention that the spray jets of at least one spray device are aimed downward in the direction of the foot portion.

SUMMARY OF THE INVENTION

The invention therefore proposes a device for the spraying of stretch hosiery articles and similar hollow, highly elastic textile articles fitted on forms, with dyeing liquid or other treatment liquid, where at least one spray device is aimed downward in the direction of the foot portion, and at least one additional spray device has its spray jets aimed upward in the direction of the leg portion. The orientable spray means are thereby aimed so as to minimize any shifting of the hosiery article on the form. In particular, in areas where the hosiery article is most likely to shift and stretch under the impact of oblique spray jets, the jets are oriented and aimed to impact on the article from opposing directions, pressing it against the form rather than shifting it longitudinally. For the same reasons, the end portions are sprayed from above the form, and from below the form, respectively, to hold them firmly onto the form and to assure good dye penetration. This is particularly important for the foot portions of stretch hosiery.

Depending on the length of the leg portion, there may be one or two spray devices arranged one above the other to spray the leg portion.

Equally part of the invention is the proposal to provide one or several spray drums for oblique upward spraying, where drum-shaped wheels rotate inside a housing which is open in the direction toward the hose form.

DRAWINGS

FIG. 1 is a schematic illustration of a spray device representing a first embodiment of the invention;

FIG. 2 is a schematic illustration of a spray device representing a second embodiment of the invention;

FIG. 3 is a schematic illustration of a spray device representing a third embodiment of the invention;

FIG. 4 is a side view of the embodiments shown in a schematic representation.

DESCRIPTION AND OPERATION

The embodiment of FIG. 1 includes a dyeing vessel 1, inside which is shown one of a row of metal forms 2. Onto the form is fitted a hose 3 and the form itself is mounted on an elongated form support 22. The reinforced upper end portion 23 of the hose 3, through its elasticity, holds the hose onto the form. A pump 4 pumps the dyeing liquid 5, accumulated in the tapered bottom of the vessel 1, through the pipe 6 and into the individual spray devices 7 and 8.

The spray device 8 is arranged in such a way that its spray jets are aimed downward in the direction of the foot portion of the hose 3. The spray device 7 sprays against the leg portion of hose 3 in an upward direction as shown in FIG. 1, on jets 7 and 7a the lower sides of the spray cones are directed upwardly to avoid exerting a downward strain on the hose which would cause a distortion of the hose. In cases where the hosiery articles are especially long, it is possible to add a further upward-spraying spray device 7a (shown in dotted lines). The spray devices 7 and 8 are aligned perpendicular to the plane of the drawing (see also FIG. 4).

The pipe 6 is provided with a check valve 16 in the vicinity of the spray device 8. This valve is operatively connected with the motor means 4a to drive the pump 4, for example, via an electric circuit 4d switch means 4b and power source 4c controlling an electro-magnet in the valve 16, so as to shut off the flow of dyeing liquid to the spray device 8 immediately after the motor 4a for the pump 4 is shut off.

This arrangement avoids the undesirable effect during shut-down, when the upward-oriented spray device 7 stops spraying under falling pressure, while the downward-oriented spray device 8 continues its spraying action.

FIG. 2 shows an embodiment of the invention where an upward-aiming spray device 17 reaches into a recess 21 in the lower portion of the hose form. Such an arrangement allows dyeing of the upper leg portion in this manner.

In the embodiment shown in FIG. 3, the dyeing liquid is again pumped by the pump 4 to the spray device 8 which sprays downward in the direction of the foot portion. The upward-spraying of the hose is accomplished by arranging on either side below the lower edge of the fitted hose 3 cylindrical housings 9 and 9a, inside which drum-shaped wheels 10 and 10a with roughened surfaces 11 and 11a, respectively, rotate. They are driven by a motor which is not shown.

The dyeing liquid is pumped into the housings 9 and 9a by means of the pump 4, through the pipes 12 and 12a. The excess of dyeing liquid flows back through the overflows 13 and 13a.

The rapidly rotating drums 10 and 10a spray dyeing liquid against the hose to be dyed. The sector which is sprayed by the rotating drum is delineated by the jets 14 and 15, and 14a and 15a, respectively, according to the design of the housings 9 and 9a, which are open along a corresponding sector.

In certain cases, it may be sufficient to use the spray of a single spray drum only.

The invention represents an improvement in the spraying method of stretch hosiery articles fitted on forms, by offering a more favorable spray distribution and by avoiding that concentrated jets stretch the elastic hose in an undesirable manner.

FIG. 4 shows in a side view a grouping of the flat forms prepared for dyeing. Behind these, or in the case of FIG. 2 underneath the hose to be dyed (pipe 7), are shown the perforated spray devices with the spray jets directed upwardly and at the top are shown spray jets 8 directed downward in the direction of the foot portions.

It is understood that the various means, described with reference to the various embodiments are applicable as well with the other embodiments with which they were not combined specifically.

I claim:

1. An apparatus for treating mounted stretch hosiery articles and similar highly elastic hollow textile articles, by spraying them with dyeing liquid or other sprayable treatment liquid, the apparatus comprising in combination: a row of aligned, elongated, and generally upright mounting forms on which the articles are mounted, one on each form;
means for restraining the end portions of the mounted articles against longitudinal shifting relative to their forms;
a plurality of separate spray devices arranged alongside the forms in such a manner that an upper one of these spray devices is positioned at a level above the upper end of the articles and so aimed that its spray impinges on the articles with only horizontal and downward-oriented motion components, and at least one lower one of these spray devices is positioned at a level below the lower end of the articles and so aimed that its spray impinges on the articles with only horizontal and upward-oriented motion components, so that the article length portions near the article end restraints, are urged away from the latter, whereas, in an intermediate length portion of the articles, the sprays from the upper and lower spray devices intersect one another, thereby at least partially cancelling their tendency to shift and stretch this intermediate length portion of the article in the direction of their respective vertical motion components;
a treatment enclosure accommodating the mounting forms and the spray devices;
a horizontal frame inside the treatment enclosure for supporting the mounting forms; and
means for supplying treatment liquid to the apparatus, including means for circulating the liquid through the spray devices onto the mounted articles.
2. A treatment apparatus as defined in claim 1, wherein the mounting forms are flat, substantially two-dimensional structures and so positioned on the horizontal frame that they form a straight row of parallel forms; the upper and lower spray devices being so arranged that their spray impinges on all mounted articles simultaneously and with equal intensity.
3. A treatment apparatus as defined in claim 1, wherein the plurality of spray devices includes three independent spray devices positioned at different levels relative to the article forms, with the third one of the spray devices positioned in a position above the lower spray device and so aimed that its spray has a pattern which is substantially

parallel to that of the lower spray device, thereby reinforcing the upward-oriented vertical motion component of the latter.

4. A treatment apparatus as defined in claim 1, wherein the lower end portions of the mounting forms extend substantially beyond the lower end portions of the mounted articles and include a lateral recess in their portion not covered by the articles, the lower spray device being positioned in the area of this lateral recess and so aimed that the spray from it has a substantially vertically upward-oriented median direction.
5. A treatment apparatus as defined in claim 1, wherein the lower spray device includes a rotary spray unit comprising a stationary drum casing, with a spray drum on a horizontal shaft rotating therein; the drum casing including at least one opening in its upper wall portion, and the latter being so oriented with respect to the rotating drum, that treatment liquid which is entrained by the periphery of the rotating drum is ejected through this opening in a pattern of spray which impinges on the articles with only horizontal and upward-oriented motion components; and the treatment liquid supplying means include means for maintaining a predetermined level of treatment liquid inside the drum casing.
6. A treatment apparatus as defined in claim 5, wherein the lower spray device includes a second, similar rotary spray unit, the two spray units being arranged at opposite lateral positions relative to the mounting forms, and the respective openings of their casings being so oriented that the patterns of spray ejected through them impinge on the articles with equal, but opposite horizontal motion components.
7. A treatment apparatus as defined in claim 1, wherein the treatment vessel includes, in its bottom portion, means for collecting the treatment liquid falling from the vessel walls and from the mounting forms; and the liquid circulating means include a liquid-circulating pump, a drive motor for the pump, motor switching means for starting and stopping the motor, and conduits connecting the liquid collecting means to the intake side of the pump and the separate spray devices to the outlet side of the pump.
8. A treatment apparatus as defined in claim 7, wherein the liquid-circulating means further include a conduit valve for controlling the supply of treatment liquid to the upper spray device and valve switching means for opening and closing the conduit valve; the motor switching means and valve switching means being interconnected to permit simultaneous shut-down of the liquid-circulating pump and shutoff of the liquid supply to the upper spray device.

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