

[54] **APPARATUS FOR POURING SURFACE TREATMENT LIQUIDS ONTO WORKPIECES**

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[58] Field of Search. **118/324, 300.6, DIG. 4; 38/3; 137/577; 117/105.3**

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[57] **ABSTRACT**

The invention comprises apparatus for pouring surface treatment liquids onto substantially level workpieces to enable different liquids with different viscosities to be used to good effect comprising an elongated liquid container having upper liquid feed means and walls defining a longitudinally extending pouring gap between their surfaces in the lower region of said container, characterized by an overflow device for adjusting said liquid level in said container which device is located on said container and communicates with said liquid container; the surface of said overflow device defining openings at various levels which are offset relative to one another and alternately closable whereby said liquid level may be adjusted. The overflow device is preferably a rotatable hollow cylindrical body and is laterally arranged of the liquid container, the opening(s) defined by said surface and in communication with said liquid being differently locatable with respect to the liquid surface by rotation of said cylindrical body.

7 Claims, 9 Drawing Figures

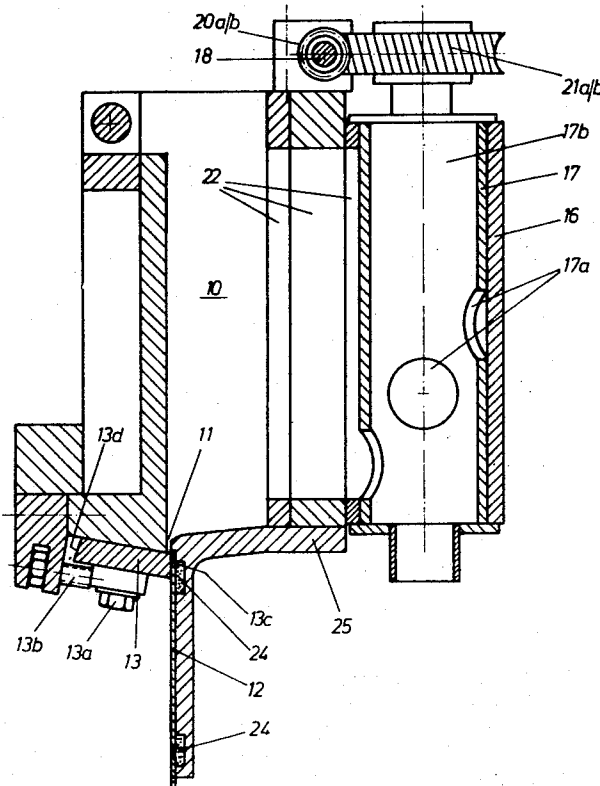
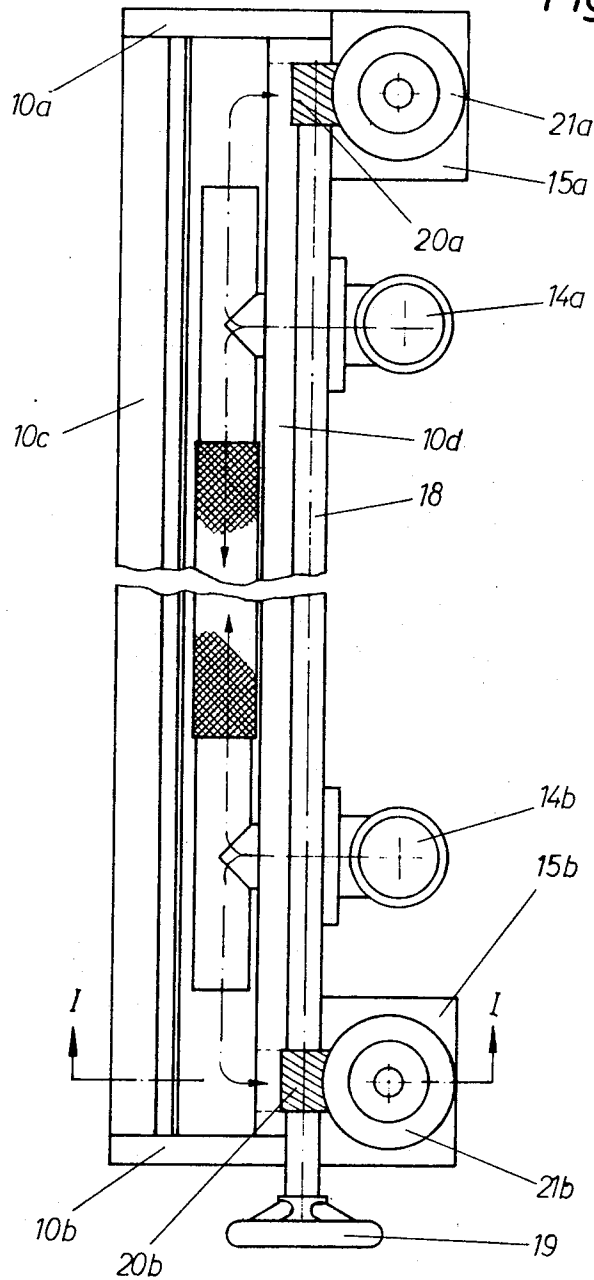


Fig. 1



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Fig.3

II ÷ II

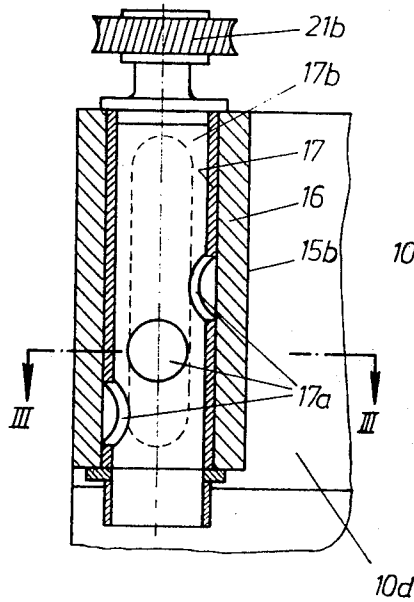


Fig.2

I ÷ I

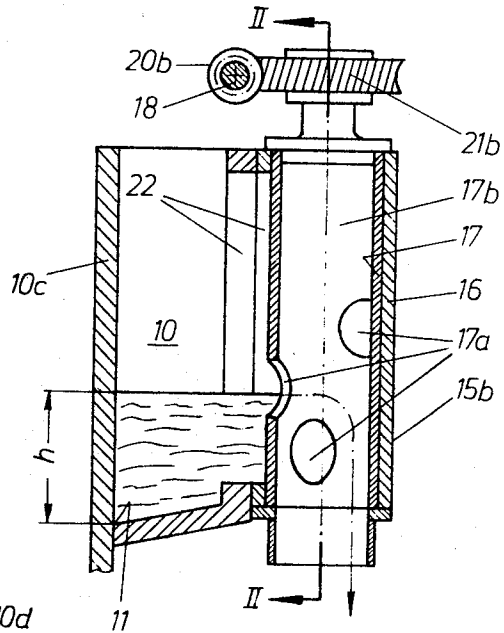


Fig.4

III ÷ III

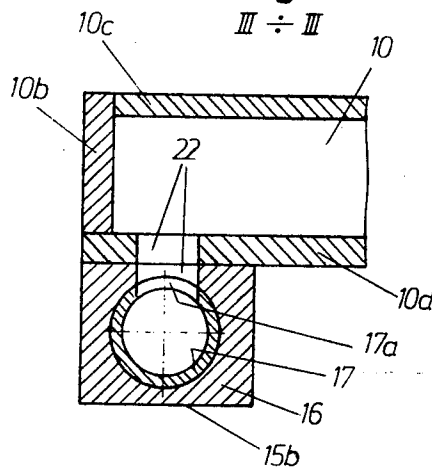
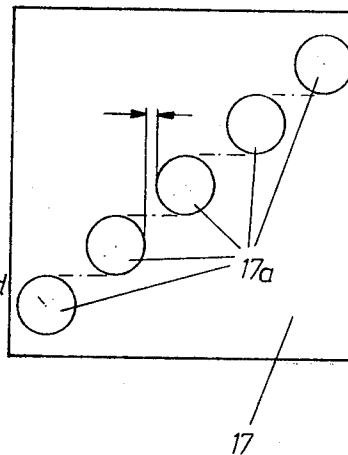


Fig.5



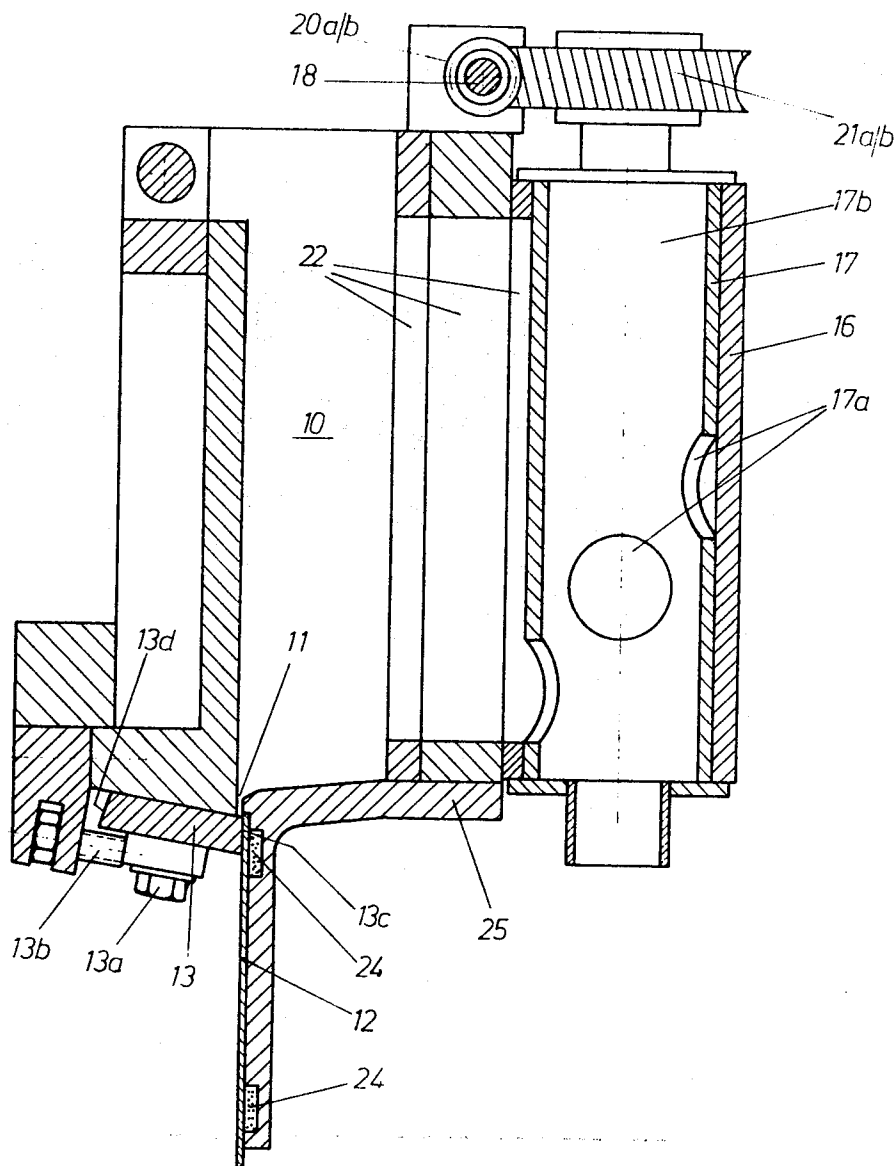
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Fig. 6

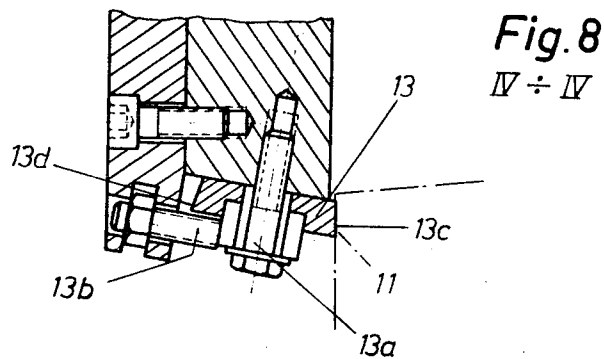
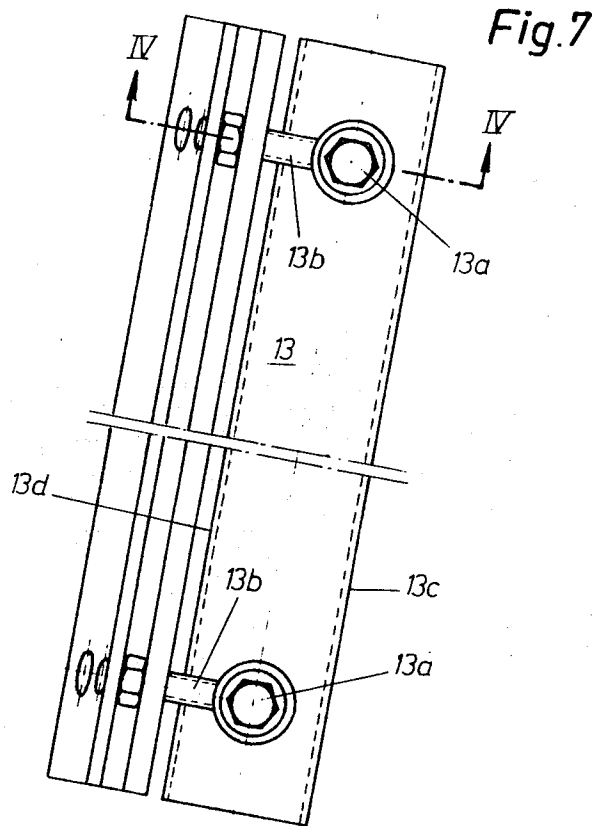


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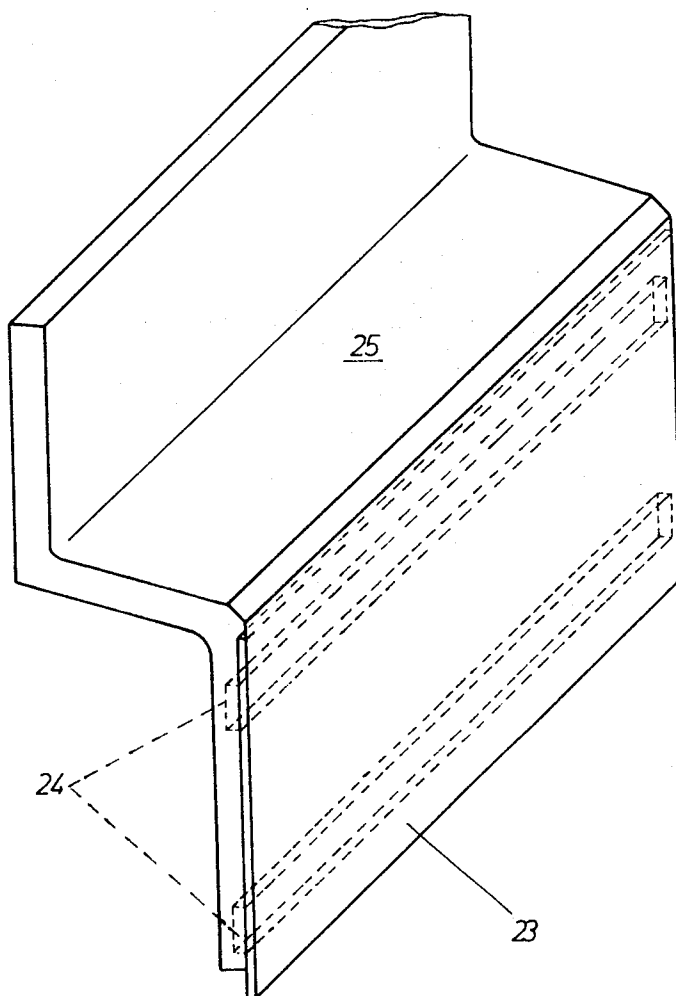


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Fig. 9



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APPARATUS FOR POURING SURFACE TREATMENT LIQUIDS ONTO WORKPIECES

The present invention concerns apparatus for pouring liquids such as varnish, mordants, pickling agents or adhesives onto workpieces such as panels, webs, plastics material foils, sheet metals or the like passing thereunder.

Such pouring apparatus are provided in known manner with an elongated liquid container and a gap or slot of variable width from which a liquid film issues and is deposited on the workpiece carried therepast. Varying film thicknesses occur accidentally even with constant gap width and affect the surface treatment in an adverse manner. Such variations occur because of differing viscosities arising out of varying materials or on account of changing temperatures etc.

Attempts have been made to overcome this disadvantage by adjustment of the gap width or by other measures such as the arrangement of film deflecting devices to adapt the film thickness to given circumstances.

It has been found favorable instead of, or additionally to, varying the width of gap or other additional mechanical devices, to vary the pressure of the liquid in the container and thereby to influence the flow velocity and hence the quantity applied. In this connection it is known to vary the flow velocity of the liquid by varying the pump pressure or the like and hence the dynamic pressure of the liquid within the container. Such variation of the dynamic pressure of the liquid can only be inaccurately effected.

It is an object of the present invention to provide simple pouring apparatus which permits the static pressure of the liquid in the container to be varied mechanically.

According to the present invention apparatus for pouring surface treatment liquids onto substantially level workpieces, comprising an elongated liquid container having upper liquid feed means and walls defining a longitudinally extending pouring gap between their surfaces in the lower region of said container, characterized by an overflow device for adjusting said liquid level in said container which device is located on said container and communicates with said liquid in said container; the surface of said overflow device defining openings at various levels which are offset relative to one another and alternately closable whereby said liquid level may be adjusted.

In a preferred embodiment of the invention, a rotatable body such as a cylinder or the like is provided or a displaceable body locatable laterally of the liquid is arranged on the container to act as an overflow device for the liquid from the container. Overflow openings of the apparatus are adapted to be partly covered by a positional change of the rotary or displaceable body. Preferably, a plurality of apertures are provided on the circumference of a cylinder which is preferably rotatable about a vertical axis. The apertures in the form of holes, slots or the like are offset relative each other and can be alternately hermetically sealed by an enclosing sleeve, when the rotatable body is rotated in the sleeve which is provided on one side or more sides with slots for the passage of overflowing liquid. Such an overflow device in the form of a rotary body is operationally reliable and permits the liquid level to be readily adjusted by suitably arranging the openings, slots or the like relative to one another.

It is within the scope of the invention to provide overflow device with a rotatable or displaceable body in a lateral or central region of the liquid container. It may, however, also be particularly advantageous in wider liquid containers to arrange two overflow devices, external of the container in order thereby to provide an improved but not necessarily uniform liquid level, variable as required, and accordingly, equal or different liquid outlet velocities over the width of the device.

The adjustability of the liquid level in the pouring head causes the liquid pressure at the outlet gap and hence the outlet velocity to be influenced. A regulating principle is thus provided which greatly improves and extends the operating ability of the pouring machine.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of a liquid pouring device in which the container has lateral overflow devices and central feeds;

FIG. 2 is a vertical section on the line I — I of FIG. 1;

FIG. 3 is a vertical section taken on the line II — II of FIG.

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FIG. 4 is a horizontal section taken on the line III — III of FIG. 3;

FIG. 5 is a development of the rotatable body shown in FIGS. 1 to 5;

FIG. 6 is a vertical section through a modified embodiment of a liquid container with overflow device;

FIG. 7 is a plan view from below of a pouring lip located in the region of the liquid container with adjusting device;

FIG. 8 is a section through the pouring lip shown in FIG. 7 having an adjusting device taken on the line IV — IV of FIG. 7; and

FIG. 9 is a perspective view of a baffle located in the lower region of the liquid container.

A liquid container 10 of a pouring apparatus for varnish or the like surface treatment liquid, extends over the whole working width of the apparatus above the panel-like or web-shaped workpieces (not shown) moved therebelow. The liquid container 10 is defined by two end walls 10a and 10b and two longitudinal walls 10c and 10d and has a gap 11 in a lower region the width of which gap is determined by a baffle 12 at one end and by an adjustable pouring lip 13 at the other end. The liquid to be poured enters through the inlets 14a and 14b. Excess liquid is discharged through the lateral overflow devices 15a and 15b, which in accordance with the invention determine the surface level of the liquid and hence the magnitude of the static pressure of the liquid at the gap 11 and thereby the outlet velocity of the liquid film therefrom.

Each overflow device 15a and 15b has a sleeve 16 in which a cylinder 17 is mounted and freely rotatable by means of an adjusting device which comprises a spindle shaft 18 with spindles 20a and 20b rotatably mounted on the liquid container wall and a lateral handwheel 19 at one end with a worm wheel 21a and 21b each mounted on the cylinder 17.

A plurality of holes 17a are formed in the cylinder 17 which are laterally and vertically so offset relative to one another (see FIG. 6) that, in the region of a vertical slot 22 provided in the longitudinal wall 10d and the sleeve 16, a certain opening surface is exposed in a position of the cylinder 17 and located at a certain height. This allows both the liquid quantity inwardly discharged (into internal space 17b) through one or two adjacent holes 17a and the level of the liquid surface to be varied in stages or continuously simply by rotating the cylinder 17. The mutual distance between the holes 17a may also be changed in different cylinders, so that by interchanging cylinders a different outlet quantity may be adjusted. Depending upon the position of one or more holes 17a in the slot 22 (see FIGS. 2 to 4), a simple turn of the handwheel 19 sets a different liquid level (height h). The sleeve 16 formed as a block hermetically seals the cylinder laterally of the slot 22.

FIGS. 6 to 8 show an alternative embodiment and mounting of a pouring lip 13 in accordance with the invention, the lateral displacement of which by means of screws 13a having lateral clearance, and screws 13b, enables the width of the gap 11 and hence the connection with the overflow device of the invention allowing the film thickness to be accurately adjusted. The pouring lip 13 has two edges 13c and 13d formed by inclined surfaces, so that by turning the pouring lip through 180°, a new edge is available.

The embodiment shown in FIG. 9 of a lower baffle plate 23 has two or more magnets 24 located on an angled member 25 partly forming the container bottom, so that this baffle 23 is readily detachable or insertable.

We claim:

1. Apparatus for pouring surface treatment liquids of varying viscosity onto substantially horizontally held panel or leaf-like workpieces, comprising a longitudinal liquid container having an upper liquid supply means and a lower, elongated pouring gap, said liquid container having at least one vertically

extending slot formed in a side wall thereof, at least one adjustable overflow device mounted on said side wall of said liquid container, said overflow device having a vertically extending slot formed in one wall thereof and said overflow slot being in register with said container slot, a hollow cylinder rotatably mounted within said overflow device and having a lower outlet and a plurality of lateral supply openings which are arranged vertically and laterally offset relative to one another, and means for rotating said cylinder to a position whereby one of said supply openings is in register with said container slot and said overflow slot so that any liquid above the lowermost periphery of said registered supply opening is discharged through said lower outlet and determines the liquid level in said container.

2. Apparatus as claimed in claim 1, wherein said means for rotating said cylinder includes a worm gear connected to said hollow cylinder, a rotating spindle to drive said worm gear, said spindle extending in a longitudinal direction parallel to said liquid container and a handwheel to operate said spindle from one end of said apparatus.

3. Apparatus as claimed in claim 1, wherein said hollow cylinder is rotatable by means of an adjustment device.

4. Apparatus as claimed in claim 1, wherein said pouring gap is defined on one side by a baffle plate and on the other side by an adjustable pouring lip, said baffle plate being bent at an angle and retained in position by permanent magnets.

5. Apparatus as claimed in claim 4, wherein said pouring lip is mounted so as to be laterally displaceable by means of screws.

6. Apparatus for pouring surface treatment liquids of vary-

ing viscosity onto substantially horizontally held panel or leaf-like workpieces, comprising an elongated liquid container having an upper liquid supply means and a lower, elongated pouring gap, said liquid container having at least one vertical slot formed in a side wall thereof, at least one adjustable overflow device mounted on said side wall of said liquid container, said overflow device having a vertical slot formed therein and being in register with said container slot, a hollow cylinder rotatably mounted within said adjustable overflow device and having a lower outflow and a plurality of supply openings which are spaced along a helical line around said hollow cylinder, said supply openings each having a maximum width corresponding to the width of said liquid container slot and said overflow device slot, and means for rotating said hollow cylinder from one end of said apparatus.

7. Apparatus for pouring liquids onto workpieces moved therebelow, comprising a container for receiving liquids, said container having a slot formed in a wall thereof and a lower pouring gap, an overflow device mounted on said wall of said liquid container, said overflow device having a slot in register with said container slot, a hollow cylinder rotatably mounted within said overflow device and having a plurality of openings offset vertically and laterally relative to each other, and means for rotating said cylinder to a position whereby one of said openings is in register with said container slot and said overflow slot so that the height of the liquid and its static pressure may be varied in order to control the flow velocity of the pouring liquid.

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