Dec. 22, 1970 J. F. WURZER ET AL 3,549,267

AUTOMATICALLY CONTROLLED COATING DEVICE

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Fig.1

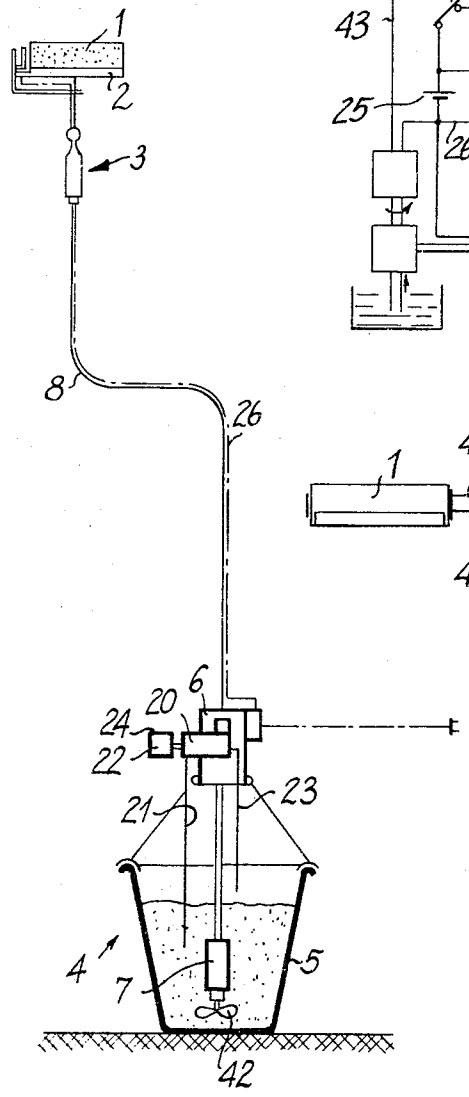
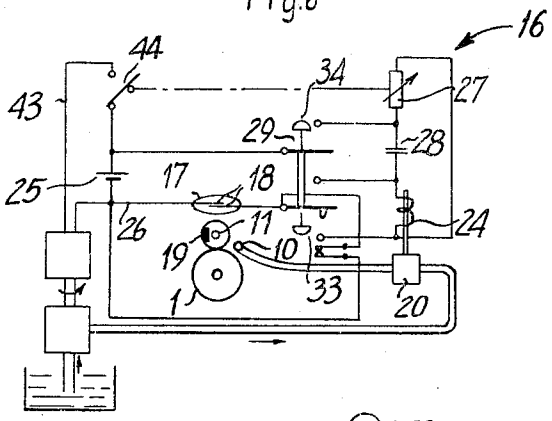


Fig.6



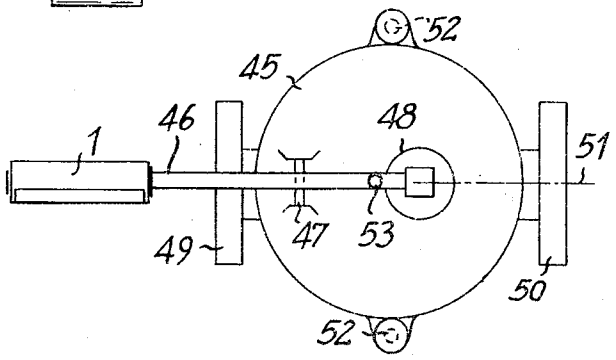


Fig.8

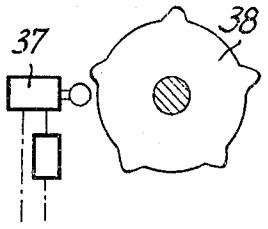


Fig.7

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Fig.2

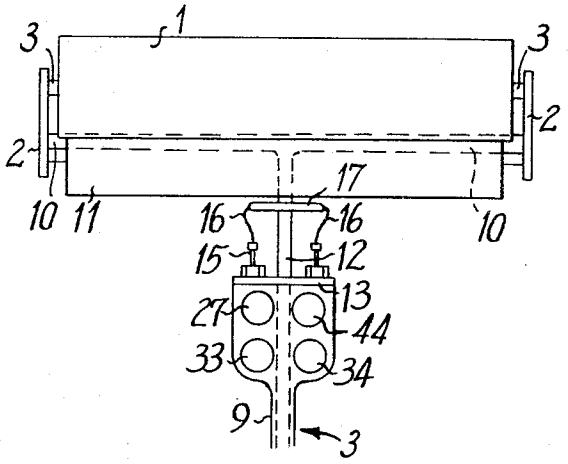
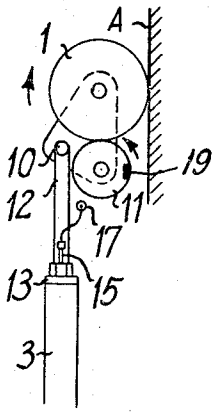


Fig.3



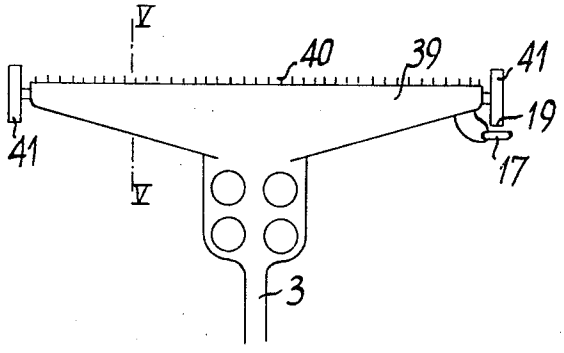


Fig.4

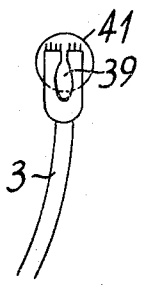


Fig.5

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AUTOMATICALLY CONTROLLED COATING DEVICE

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Int. Cl. B44d 3/28
U.S. Cl. 401—147 13 Claims

ABSTRACT OF THE DISCLOSURE

A device for coating a surface with a fluid includes a source of fluid, a roller and flexible feeding pipe between the source and roller. The device also includes means for controlling the rate of flow for fluid to the roller in response to the speed of revolution of the roller.

This invention relates to a device for coating a surface with a fluid like colours or solutions in which the feeding of the fluid from a source of fluid to a coating tool is controlled by a roller when rolling off the surface to be coated.

In the known devices of this art a painting roller is combined with a paint pot in such a manner that it will take out paint and distribute it on the surface to be coated when rolling off the surface. In these devices the quantity of paint is automatically dependent on the velocity of work. However, there is a disadvantage that when coating large surfaces the paint pot must be filled up frequently. Moreover the work is very difficult by the connection of the coating tool with the paint pot.

In German Pat. No. 1,246,480 of Wurzer et al., a flexible feeding pipe is arranged between the source of paint and the coating tool and a regulating unit for changing the flow of fluid and a control arrangement for controlling said regulating unit is provided, said control arrangement being operated by said roller when rolling off the surface to be coated. In this former device it is difficult and troublesome to start the flow of fluid through the long flexible pipe at the beginning of a working period.

The main object of the present invention is to provide a device of the art as defined above in which the fluid is fed through a flexible pipe of any length in a rapid and well proportioned manner, from beginning of the work and during the whole working period.

According to the invention this can be performed by that in a device for coating a surface as stated above a flexible feeding pipe is arranged between said source of fluid and said coating tool and a regulating unit for changing the flow of fluid from said source to said coating tool and a control arrangement for controlling said regulating unit, said control arrangement being operated by said roller when rolling off the surface to be coated in such a manner that the flow of fluid is increasing with an increase of number of revolutions of said roller, and that an additional control arrangement for said regulating unit is provided by which said flow can be regulated independent of the rolling of said roller off the surface to be coated.

In this manner it is possible to obtain a rapid feed of fluid also through a long pipe and to regulate the further flow after arrival of the fluid at the coating tool in dependence of the speed of work during the whole working period.

The regulating unit preferably may consist of a flow switch within the feeding pipe which is operated by the roller in a rhythm dependent on the number of revolutions of the roller during time intervals of predetermined length. In such a device it is possible to adjust the quantity of fluid also to other factors from which the optimal quantity of fluid may depend on. This may be simply performed by means which are provided for changing the quantity of fluid in each operation interval, for instance a time switch. In connection with such a device it is possible to choose a pump for a maximum of fluid quantity and then to adapt the flow of fluid to the speed of work and the other circumstances in as broad borders as necessary.

The additional control arrangement consists of a selector switch including means for changing over from automatic regulation of flow dependent on the working speed of the coating tool to continuous flow of fluid independent on the working speed.

If the coating tool consists of a coating roller a good distribution of fluid fed through the feeding pipe over the whole surface of said coating roller may be obtained by a distributing roller which is arranged parallel to said coating roller and driven by said coating roller whereas the outlet of the pipe is situated within the space between the coating roller and the distributing roller. By such a distributing roller it is possible to get an even distribution of the fluid in spite of the pulselike feed of the fluid to the distributing roller and to avoid dropping down of fluid from the coating tool.

The above and other objects and advantages of the invention, will be clear from the following description, taken with reference to the accompanying drawings which are given by way of example and in which.

FIG. 1 is a schematic view of a device according to the invention,

FIG. 2 is showing the coating tool of the device in a larger scale,

FIG. 3 is a side view of FIG. 2,

FIG. 4 is a partial view of a coating tool in another embodiment,

FIG. 5 is a sectional view along line V—V of FIG. 4,

FIG. 6 is a diagram of the controlling device of the device according to the invention,

FIG. 7 is another embodiment of a detail of the controlling device and

FIG. 8 is a coating tool mounted on a carriage with automatic steering.

The device shown in FIG. 1 consists in general of a coating tool with a coating element **1** with support **2** and handle **3**, a source of colour fluid **4** with a container **5** and a colour pump **7** driven by an electric motor **6** and moreover a flexible feeding pipe **8** connecting the source **4** and the coating tool.

The coating tool consists in the embodiment of FIGS. 1 to 3 of a coating roller **1** of known art which is rotatable in a support **2** about the axis **3'** and which is rotated when moved across the surface to be coated for as indicated by arrows in FIG. 3.

The colour is fed from the container **5** through pump **7**, flexible pipe **8** and a channel **9** within the handle **3** which is connected to a distributing pipe **10** arranged parallel to the coating roller **1** and provided with a group of openings at the side towards the coating roller and distributing roller. The distributing pipe **10** is fixed at its ends to the shields of the coating roller **1** thus forming part of the support **2**.

A second roller **11** of smaller diameter is arranged parallel to the coating roller **1** rotatable within the support tool and working as a distributing roller. The distributing pipe **10** will give the colour within the space between the coating roller **1** and the distributing roller **11**. Thereby a part of the colour may be fed immediately onto the surface of the coating roller **1** and another part on the surface of the distributing roller **11**. The distributing

roller 11 is driven by the coating roller 1. For this purpose the distributing roller 11 may contact the coating roller 1 with a certain pressure. However, it is possible that the distributing roller 11 may be driven by a frictional wheel or by a gear between the coating roller and the distributing roller. In the latter case the distributing roller at the side opposite to the coating roller may be a gear driven in a direction opposite to the direction of movement of the coating roller.

The coating roller is provided with an elastic and absorbent cover. In the same manner the distributing roller 11 may be absorbent for the colour so that it will deliver colour to the surface of the coating roller 1 during its rotation in an even manner.

Support 2 and handle 3 are connected detachable with one another. For this purpose the distributing pipe 10 is provided with a channel 9 arranged coaxial to the pipe socket 12 flanged to the distributing pipe 10. At the free end of said pipe socket 12 is arranged a joining plate 13 which fits to the end of handle 3 and is connected to the handle by pins and nuts 15. The pins are forming electrical contacts for connection of the two conducters 16 of a controlling circuit including a switching tube 17 arranged parallel to the distributing roller 11 within the support 2. The contacts 18 of this switching tube are connected at the passing of a magnet 19 which is embedded in the distributing roller 11. With the shown ratio of diameters of the distributing roller and coating roller the switch 17 is operated almost twice during each revolution of the coating roller 1 and will produce switching pulses within the controlling circuit 16 serving for controlling a regulating unit for changing the flow of colour from the source 4 to the coating tool.

The regulating unit consists of a flow switch 20 which is arranged within the pressure-line 21 of the pump 7 leading to the flexible pipe 8 and which is opened by an electromagnet 22 after each operation of switch 17 during a more or less long time-interval. If the flow switch 20 is closed the colour fed by pump 7 will flow back through a runback-line 23 to the container 5.

The coil 24 of the electromagnet 22 is connected with a source of current 25 and switch 17 through a cable 26.

The intervals of opening of flow switch 20 are determined by periods of current in the coil 24. These periods of current are adjustable over a broad range by a potentiometer 27 provided within the discharge circuit of a condenser 28 which is charged by a current from current source 25 at each operation of switch 17 and which immediately after each operation of switch 17 will discharge over potentiometer 27 and the coil 24 more or less rapidly according to the adjustment of potentiometer 27.

A selector switch 29 is provided at handle 3 which is arranged within the discharging circuit of condenser 28. This selector switch contains two parallel branches 30 and 31. In the first branch 30 is lying the switch 17, condenser 28 and a switch 29 including two pushbuttons 33 and 34 for switching off and on the automatic regulation of flow of colour. In the second branch 31 is lying switch 29 and which will connect the current source 25 immediately with coil 24 as long as the button 34 is pushed down.

Therefore it is possible to operate immediately after beginning without automatic regulation and with steady opened flow switch 20 until the colour will have reached the distributor pipe and only then to change over to automatic regulation by releasing the button 34 and pushing down the button 33. The quantity of colour transported to the coating tool during each operation of switch 17 by rotation of distributing roller 11 can be adjusted during the automatic regulation by adjusting potentiometer 27.

FIG. 7 shows a control switch 37 which is operated by a cam-disk 38 connected with the distributing roller 11.

The coating element may exist of another colour-dispenser whatever and may consist for instance as is shown

in FIGS. 4 and 5 of an elongated nozzle 39 combined with a brush with short bristles 40. In this case rollers 41 are arranged at both ends of the elongated nozzle 39, one of which for instance the right one is provided with a switch magnet 19 operating a switch 17 at the support of the nozzle.

The colour pump 7 is provided with an impeller 42 for circulation of the colour within container 5. The circulation operation is active as long as pump 7 is driven by electromotor 6. Moreover a steady circulation takes place within container 5 by the flow-back of colour through pipe 23.

The electromotor 6 is lying in a separated circuit 43 with a switch 44 for switching on and off the device and may be coupled with potentiometer 27.

After beginning at first the circulation operation has to be switched on by switch 44. Then by pushing down button 34 flow switch 20 is opened and will remain opened until the colour will flow out the distributing pipe 10. Then the button 34 is released and button 33 is pushed down for changing over to automatic operation during which the feeding of colour is regulated by the speed of work or rotation of control-roller 11 and during this automatic regulation may be adjusted by adjusting potentiometer 27.

FIG. 8 is showing in diagrammatic view a device in which a coating tool is mounted on a carriage 45. The coating roller 1 is supported by a lever 46 which is arranged rotatably about an axis 47 on said carriage and is pressed against the surface to be coated for instance by a spring so that the coating roller 1 will usually be in contact with the surface to be coated. By an electromagnet 48 the lever 46 may be turned about axis 47 against the force of said spring so that the coating roller 1 is lifted from the surface to be coated. This, for instance, will be necessary to bring the coating roller 1 over from one to another course. For steering the carriage this is provided with one driven wheel set 49, 50. Wheels 49 and 50 may be driven commonly or separately in the same or opposite direction for transport of the carriage on a straight-on-direction or along a curve. The carriage besides the wheels of rolls 49, 50 is supported by balls 52 on the surface to be coated. The carriage is held in contact with the surface to be coated by magnetic means (not shown) and therefore is used especially for iron walls like that of ships.

The carriage and coating tool are connected by flexible line 53 with the source of colour and a remote control for steering the carriage and operating the electromagnet 48. The carriage may be combined with an automatic control device by which it is steered in such a manner that the colour traces are joined together automatically.

It will be understood that modifications and variations may be effected without departing from the spirit and scope of this invention. Especially are that means for regulating the flow of fluid may be used for instance means for regulating the pressure within the feeding pipe or by using a pump with an element for regulation of quantity. On the other hand the regulation by changing the frequency or rhythm of openings of a flow switch dependent on the number of rotations of a control roll in connection with an additional adjustment of the length of opening intervals is advantageous on account of high efficiency and reliability. The conrtol means which are electrically operated in the shown embodiments may be operated pneumatically or hydraulically or by a control shaft. The distributing pipe may be provided with slots instead of little openings because cleaning of slots can be performed by passing along a cleaning pin. The fluid may be sprayed out the distributing pipe 10 against the coating roll or distributing roll or it may flow onto the surface of the distributing roll or coating roll dependent on the position of the coating tool.

What is claimed is:

1. Device for coating a surface with a fluid like colour or solutions in which the feeding of the fluid from a source of fluid to a coating tool is controlled by a roller when rolling off the surface to be coated, characterized in that a flexible feeding pipe is arranged between said source of fluid and said coating tool and a regulating unit for changing the flow of fluid from said source to said coating tool and a control arrangement for controlling said regulating unit, said control arrangement being operated by said roller when rolling off the surface to be coated in such a manner that the flow of fluid is increasing with an increase of number of revolutions of said roller, and that an additional control arrangement for said regulating unit is provided by which said flow can be regulated independent of the rolling of said roller off the surface to be coated.

2. Device as defined in claim 1, charatcerized in that the regulating unit consists of a flow switch within the feeding pipe which is operated by the roller in a rhythm dependent on the number of revolutions of the roller during time intervals of predetermined length.

3. Device as defined in claim 2, characterized in that means are provided for changing the quantity of fluid in each operation interval.

4. Device as defined in claim 3, characterized in that said means consist of a time switch.

5. Device as defined in claim 1, characterized in that said additional control arrangement consists of a selector switch including means for changing over from automatic regulation of flow dependent on the working speed of the coating tool to continuous flow of fluid independent of the working speed.

6. Device as defined in claim 5, characterized in that the control buttons of said selector switch are arranged at the handle of the coating tool.

7. Device as defined in calim 5, characterized in that the selector switch is provided with a position for circulation of fluid within the source of fluid at simutlaneous interrutpion of flow from the source to the coating tool.

8. Device as defined in claim 1, characterized in that said coating tool consists of a coating roller.

9. Device as defined in claim 8, characterized in that said coating tool is said roller operating said control arrangement for controlling said regulating unit.

10. Device as defined in claim 8, characterized in that a distributing roller is arranged parallel to said coating roller and driven by said coating roller.

11. Device as defined in claim 10, characterized in that the outlet of the pipe is situated within the space between the coating roller and distributing roller.

12. Device as defined in claim 1, characterized in that said coating tool consists of an elongated nozzle.

13. Device as defined in claim 1, characterized in that the coating tool is mounted at a carriage to be guided automatically or by teleautomatics across the surface to be coated and including means for being held magnetically at the surface to be coated.

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U.S. Cl. X.R.

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