April 12, 1960 E. S. BISCHOFF 2,932,043

LIQUID COATING APPLICATOR

Filed March 1, 1956

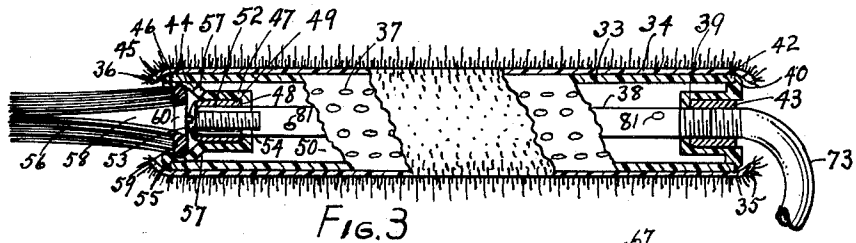

FIG. 3

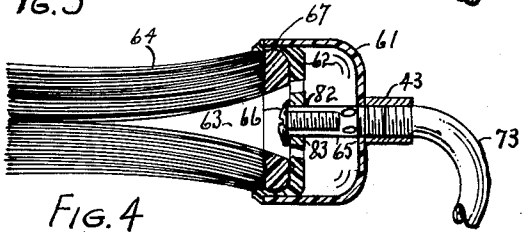

FIG. 4

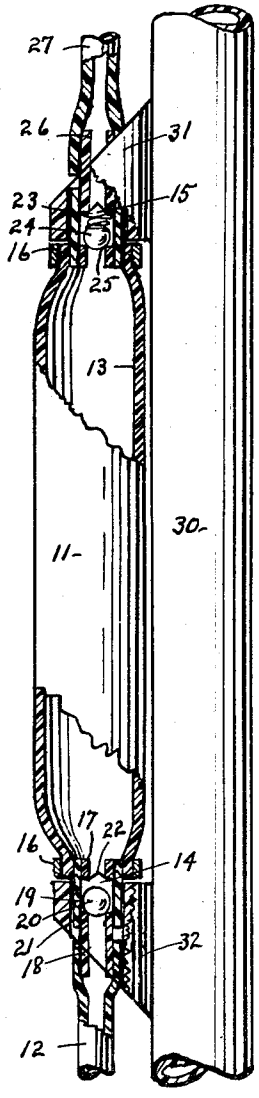

FIG 2

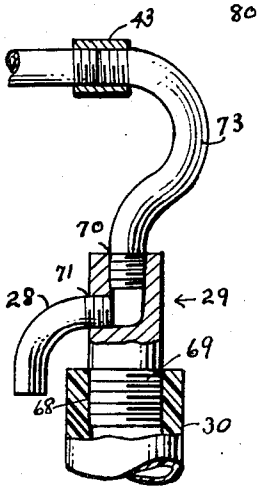

FIG. 5

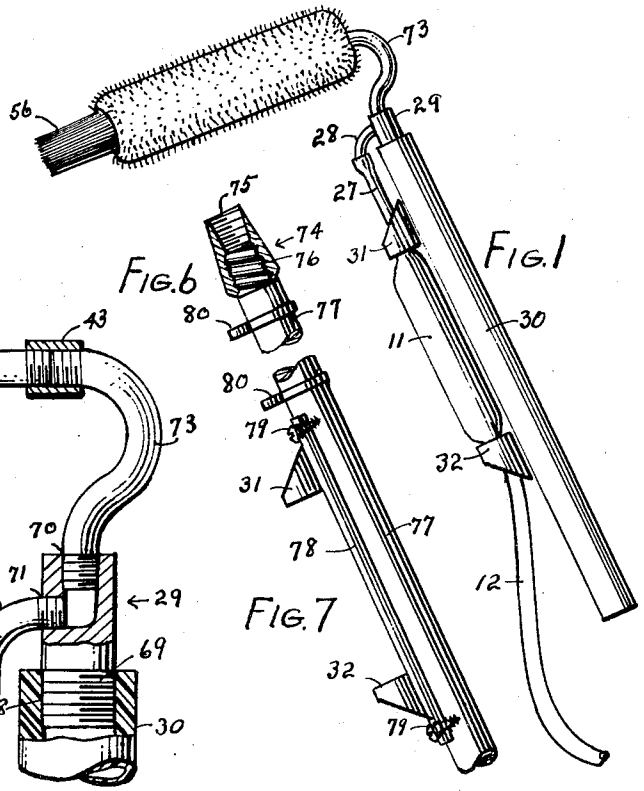

FIG. 6

FIG. 1

FIG. 7

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LIQUID COATING APPLICATOR

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5 Claims. (Cl. 15—123)

This invention relates to roller and brush pain or coating applicators and more particularly to a coating device comprising roller, brush, and a pump means for supplying fluid through a tube from a portable reservoir carried on the person of the operator.

Broadly, the invention comprehends a new system of supplying the coating fluid to roller and brush for coating application with resultant improvements in the coating process.

At the present time rollers are supplied with paint or coating fluid in five (5) principal ways as follows:

(1) Paint is hand roller onto a roller from a shallow vessel or tray. (2) Roller is dipped or immersed in a large open container of paint. (3) Paint is supplied from a self-contained reservoir within the roller. (4) Paint is supplied internally to the roller from a pressure tank, through a tube, flow being controlled by a valve. (5) Paint is supplied to the external surface of the roller from a pressure tank, through a tube, flow being controlled by a valve.

At the present time paint or coating brushes are supplied with fluid by dipping.

The new system here invented comprehends pumping the liquid from a reservoir carried on the person of the operator and injecting it into the brush-roller applicator at a precisely controlled rate and volume by the operator squeezing the bulb pump mounted on the handle as part of the unit. Thus with precise control of the supply of fluid into the applicator members, to a degree heretofore not achieved, I have now combined in a new type of applicator device the most efficient features of coating application by roller and the most efficient features of coating application by brush, and, at the same time, have overcome numerous specific limitations of conventional brush coating and roller coating applicators.

An object of the invention is to provide a surface coater of simple and economic construction and capable of being used by unskilled operators.

Another object of the invention is to provide as part of the applicator unit a simple pump means for supplying liquid to the applicatior member or members.

Another object of the invention is to provide a surface coater that utilizes the most efficient features of roller application and brush application and actually combines brush and roller into a single tool. This object makes possible roller application to smooth surfaces with intermittant brush application to uneven surfaces, grooves, corners, projections, and margins.

Another object of the invention is to provide a device that eliminates the waste motion and time of dipping either brush or roller into the paint supply.

Another object of the invention is to provide a device in which the defect of paint dripping from brush and roller and resultant waste of materials is eliminated, as well as the mess and damage caused by dripping.

Another object of the invention is to provide a device that spreads the coating film more uniformly than is possible with brush painting alone on irregular surfaces were painting with conventional rollers is impracticable.

Another object of the invention is to make practicable a portable reservoir carried on the person of the operator that does not limit his free movement, as in climbing, and yet eliminates the cumbersomeness of long hoses, pressure tanks, paint pots, and roller pans, especially in high and windy places.

Another object of the invention is to make possible the use of a reservoir of larger capacity than is possible when the roller cylinder serves as reservoir.

Another object of the invention is to make practicable a roller of smaller diameter for pressing paint into angles and lapped weatherboard and yet not sacrifice volume of paint supply.

Another object of the invention is to provide a device sufficiently light in weight when saturated with paint or coating liquid to permit ease of manipulation, with the handle being mounted at the side, so that the roller and brush can be worked effectively around, between, and behind structural irregularities such as posts, columns, beams, pipes, stanchions, and other structural members and supports.

Another object of the invention is to provide an internally supplied roller applicator from which the liquid will not leak when the tool is held idle or laid down while the operator interrupts continuous painting to prepare surfaces or shift his ladder or painting position.

Another object of the invention is to provide a device on which a long handle can be used to extend the operator's reach to high areas or places otherwise difficult of access.

A further object of the invention is to provide a coating applicator with interchangeable roller members as to length, diameter, shape, and outer texture so that the most advantageous roller as to length, diameter, shape, and texture can be selected for the work intended.

A further object of the invention is to provide for interchangeable brush members as to size, texture and length of bristles.

A further object of the invention is to provide brush members of novel design facilitating internal supply of paint or liquid to the bristles through a space in the base of the brush member.

A yet further object of the invention is to provide a coating applicator which can be readily disassembled for cleaning of its parts, the pump member of which serves as pump to circulate cleaning solvent to accomplish the washing of the pump itself, the reservoir, the tubes, and tubular frame member.

Other objects, advantages and novel details of construction of this invention will become apparent from the following description and the drawings in which:

Fig. 1 is a perspective view of the applicator device comprising pump, roller, brush and frame members;

Fig. 2 is an elevational view of the handle and pump, showing the pump partially in section;

Fig. 3 is a plan view of the roller and brush applicator members shown partially in cross section;

Fig. 4 is a cross sectional view of a brush member;

Fig. 5 is an elevational view of the tube and handle assembly;

Fig. 6 is a sectional view of the joint used to attach to the applicator a wooden extension handle, and

Fig. 7 is an elevational view of the pump holder attached to a wooden extension handle.

The brush-roller paint or coating applicator device described in this specification has four principal functional members as follows:

(1) A pump member for drawing the paint or coating liquid through a tube from a reservoir carried on the person of the operator and supplying the liquid internally at

a precisely controlled rate and volume to the roller member and the brush member of the tool;

(2) A roller member comprising a rigid or flexible cylinder which receives the liquid internally and through the perimeter of which by means of a series of holes the liquid disperses outwardly to saturate the outer fibrous cover. Upon manipulation of the tool with rolling motion, the liquid is pressed upon the surface being coated;

(3) A brush member comprising a cluster of bristles having a space in its center at its base in which is received from the roller member a supply of paint or liquid. By stroking motion or dobbing of the brush member the liquid is brushed or spread, and;

(4) A frame member comprising firstly a cylindrical handle by which the tool is manipulated and on the side of which, in retaining sockets, the pump member is mounted and secondly a tubular axle on which the roller is rotatably mounted on bearings. Through holes in the axle the liquid is admitted to the center of the roller. The brush member is mounted on the end of the axle.

A novel feature of the coating applicator system which I have developed is the operator's ability to regulate precisely the amount of paint injected inside the roller or magazine. This is made possible by the positive displacing hand pump of novel design with which the operator injects the paint in the exact quantities desired. This precise control of the paint feed cannot be achieved with the conventional air pressure feed paint supply systems.

Only a minimum amount of paint is injected by the operator into the applicator reservoir. The operator may tilt the roller brush applicator when he injects the paint, thus depositing it inside the roller predominantly at the end desired or in the brush chamber. Likewise, the operator controls the wetness or dryness of the applicator cover by regulating the injection speed and frequency. Practical use of this tool requires that there be no more than a minimal amount of paint inside the roller or magazine.

There are two features which prevent the paint flowing out of the brush end of the roller when the applicator is in use. First, as stated in the foregoing, the operator injects only a minimal amount of paint into the roller cylinder to coat the inside walls and soak outward through the openings to the outer porous roller cover. Second, the novel structure of the brush itself retains the paint inside the brush member even when the tool is tilted brush end down. The bristles are set to slope inwardly to the end of the brush, pressing together at the point to prevent the paint running out. There is a conical chamber within the brush member which is defined by the lay of the bristles, confining the paint as long as the brush is undisturbed. Paint is released from the brush by the actual manipulation of the bristles against the surface being coated.

Referring now to the drawings for more specific details of the invention, the reference numeral **11** represents the pump member to which is attached a flexible tube **12** preferably of transparent plastic material generally impervious to chemical action by paint components. The said tube, approximately 36 inches in length, connects the pump member with a portable reservoir, carried at the belt or otherwise on the operator's person, from which the paint is drawn. Said tube has a minimum inside diameter of ⅛ inch which is the minimum tube size through which fluid of the viscosity of ordinary paint can be drawn through a distance of 36 inches by a vacuum pump of the novel construction more fully described in the following paragraphs. It has been found that polyvinyl chloride tubing is impervious to paint chemicals and has the added advantage of transparency, making it possible to observe the initial progress of the liquid through the tubes as well as observe the internal cleanliness of the tubes when circulating solvent to wash the device after using.

The pump member illustrated in detail in Fig. 2 is comprised of a flexible cylindrical tube **13** and two check valves to control direction of flow of the liquid, **14** being the intake check valve and **15** being the discharge check valve. I have found that a polyvinyl chloride tube of ¾ to ⅞ inch or larger inside diameter and 3/32 inch wall thickness, having its ends constricted by means of bands **16**, to form a bulb or chamber of long cylindrical shape, has the required resiliency and will return to original form with strength sufficient to draw a viscous liquid such as paint from its reservoir at a rate that gives adequate supply to the applicator members when the pump chamber is alternately squeezed and allowed to return to original shape. No bulb of conventional material or design has been found to have the resilience and strength to create the necessary suction to draw a viscous liquid the required tubular distance to supply the applicator members satisfactorily.

Pump intake check valve **14** is comprised of three pieces of plastic tubing, pieces **17** and **18** being sleeved within tube piece **19** in such manner as to enclose a valve ball **20** which, on compression of the pump bulb **13** lodges against the valve seat **21**, namely the circular opening on the intake side of the valve, to prevent back flow of liquid. Said valve ball, when suction action of the pump occurs, moves out of the seat **21** and rests against the notched edge **22** of the valve opening through tube **17** permitting liquid to be drawn past said valve ball **20** and into the pump chamber.

Intake check valve **14** and discharge check valve **15** fit snugly, but removably for cleaning if required, into the ends of the bulbular pump body formed by constricting ends of said pump body tube **13**. The circular bands **16**, which have inside diameter measurably smaller than the outside diameter of the body tube **13**, form the polyvinyl chloride tube into a pump bulb chamber.

Discharge check valve **15** is identical with intake check valve **14** except for reversal of its parts to check the direction of liquid flow and the addition of a spring member **23**, a coil spring within the valve space to hold the discharge check valve ball **24** in a position pressed lightly against its valve seat **25**. This prevents the pump becoming air or vapor bound and prevents surging when the pump is worked with its discharge end held lower than the intake end. The tubular discharge valve end **26** is inserted into transparent plastic tube **27**, in turn communicating with the tubular metal piece **28** of the tube assembly **29**.

The pump member is mounted on the side of the handle **30** by means of upper retaining socket **31** and lower retaining socket **32**. Retaining sockets are of similar tubular shape, reversibly mounted, and having inside diameter sufficient to receive loosely the tubular valves **14** and **15** which constitute the two ends of the pump member. The retaining sockets are fused on the handle at such distance from each other that there is an outward pressure towards each end exerted by the flexible tubular pump body. Removal of the pump member from the handle sockets or replacement is accomplished by bending the flexible tube body at its center in a direction away from the handle then slipping first one end and then the other out of the retaining sockets respectively.

The tubular pump member **11** and retaining sockets **31** and **32** are so placed on the handle **30** as to serve as a hand grip when manipulating the applicator. Hand leverage around the pump and handle is achieved when compressing the pump by squeezing.

Fig. 3 illustrates the roller member comprising a cylindrical tube **33** of flexible or rigid plastic or other material and having an outside covering **34** of fibrous substance of vegetable, animal or artificial chemical composition, many varieties and textures of which are used in conventional paint rollers depending on the particular paint being used and the quality of finish desired. Covers of lamb's wool have proved efficient for the applicator here

described. The fibrous cover 34 is used or cemented to the outer periphery of the roller cylinder 33 with cover ends 35 and 36 extending a predetermined distance beyond the ends of the roller cylinder. There is a plurality of holes 37 in the wall of the roller cylinder 33 through which the liquid seeps from within the roller to saturate the fibrous outer cover of the roller and be transferred by roller action to the surface being coated.

The roller member is mounted rotatably on the tubular axle 38 of the frame member by means of, on one end, a bearing 39 situated in the center of a removable end piece 40. This end piece additionally closes the end of the roller cylinder with a lip pressing against the outer rim 42 of the roller tube, sealing same. The said end piece bearing 39 rotates with thrust against a hub 43 on the axle of the frame member preventing axial movement of the roller with respect to the frame.

The outer end of the roller is similarly mounted on the axle of the frame member by an outer end piece 44, having a lip 45 disposed against the outer rim 46 of the roller cylinder to effect a seal. Said outer end piece has at its center a bearing 47 with an inner shoulder 48 against which a sleeve bearing 49 is thrust to press both end pieces in position against the ends of the roller cylinder creating a chamber 50 within the roller. Said sleeve bearing 49 is non-rotatable on the axle shaft 54, having grooves within its inner wall which coincide with ridges 52 on the outer wall or periphery of the end of the axle shaft 54. Said sleeve bearing 49 however, is removable and axially movable along the shaft 54, under thrust of a screw 53 threaded in the end of the axle shaft to hold the roller member in assembly.

The outer end piece 44 has its cylindrical wall grooved with a lip 55 to grip and hold secure within itself the brush member 56. Grip on the brush member is increased as the screw 53 thrusting upon the sleeve bearing 49 is tightened.

The outer end piece 44 has additionally through its vertical wall, when a fountain brush member is to be used in conjunction with the roller member, several holes 57 communicating therethrough from the roller chamber 50 into the brush chamber 58, permitting flow of paint or liquid into the brush chamber when the roller end is pointed down.

I have found the bearing end pieces of the roller member can be economically and satisfactorily molded of polyethylene plastic which has the required resilience for gripping the brush member and at the same time gives the roller itself a resilient workability.

The roller member is interchangeable with rollers of varied diameter, length, texture of cover, and external design, including a roller with concave periphery for coating pipes, rods, and cables as in bridges. Size of roller end pieces is varied with the end diameters of the roller being used. An outer end piece 44 with or without holes 57 is used depending on whether or not a brush member is employed attached to the roller.

The fountain brush member used in conjunction with a roller member is illustrated in detail in Fig. 3. The brush member is comprised of a cluster of bristles 56 set in a base 59 in the form of a ring with an aperture 60 in the center of the base. Inside of the base of the brush there is a conical space or chamber 58 formed by the bristles. The base 59 of the brush member, as previously indicated, is disposed against and within the roller outer end piece 44, communicating through holes 57 with the roller chamber 50. Said conical space or brush chamber 58 serves as a means of internal paint or liquid supply to the bristle cluster as the bristles are manipulated upon or brushed over a surface.

I have found that tapered polymeric amide bristles lend themselves to this fountain brush structure. The brush is formed by setting the bristles in a mold of the desired shape with bristle ends exposed and then heat fusing the base ends to the desired form.

The fountain brush member herein described is interchangeable to effect the use of the most advantageous brush as to bristle length, bristle thickness, bristle texture, as to straight or crimped, cluster thickness, or brush form as to size or disposition internally of the space or spaces forming the liquid chamber. The fountain brush member is readily removable from its working position in the end of the roller where it is gripped within the inside wall of the roller end piece 44. Disassembly is accomplished by inserting a screwdriver into the side of the bristle cluster 56 through the brush chamber 58 and unscrewing the thrust screw 53, then withdrawing the brush member and roller end piece 44 which will release the tension holding the brush member grooved within the end piece.

The fountain brush member used alone and not in association with the roller member is illustrated in Fig. 4. In this instance there is substituted for the roller member a bowl shaped plastic piece 61 against the open side of which a plastic end piece 62 is disposed to form a chamber or reservoir communicating with the space 63 in the brush member 64. The chamber piece 61 is non-rotatably mounted on a substituted short shaft 65. The unit is held in assembly by a thrust screw 66 pressing the end piece 62 within the chamber piece 61. The brush 64 is gripped by the groove 67 within the wall of the end piece 62 as thrust of the screw 66 is increased.

Fig. 5 illustrates in part the frame member of the applicator. The handle 30 is of tubular plastic having fused thereto, in the illustrated position according to Fig. 1, a pump retaining upper socket 31 and lower socket 32, tubular pieces of corresponding material. The upper end of the tubular handle 30 according to Fig. 5, is threaded at 68 for reception of the tube joint 29. Said tube joint is a short length of metal rod externally threaded at its one end 69 for insertion in the handle 30. Piercing the other end of the tube joint 29 and the side of the tube joint are threaded holes 70 and 71 communicating internally at right angles within said tube joint 29, for reception of curved metal tube 28 from the pump member and curved metal tube 73 leading to the axle or shaft of the roller or brush member.

In order to facilitate painting on floors without stooping and on surfaces where an extended reach is desirable, means are provided for substituting a long handle. Said means comprise a handle end piece 74, according to Fig. 6, which is a tapered metal or plastic piece having a threaded hole 75 in the smaller end for reception of threaded end 69 of tube joint 29, and in the larger end of said tapered handle end piece, a hole with large size threads 76 for the reception of the threaded end of a long wooden handle 77.

For use with the long handle, a removable pump retaining socket member according to Fig. 7 is provided, comprising upper and lower pump retaining sockets 31 and 32 previously described in detail, in this instance fused to a plastic strip 78, curved for disposition against the periphery of the long wooden handle, with wood screw 79 retaining means provided. When the long handle is substituted, the appropriate length of flexible tube 27 is used to reach from the pump member to the frame member tube piece 28. Spring clamps 80 are provided to hold tube 27 against the long handle.

The curved metal tube 73 serves as part of the frame and through said tube, paint or liquid travels from the tube joint 29 to the applicator member. One end of said tube 73 is screwed into the tube joint 29 and the other end joins with shaft or axle 38 by means of the internally threaded hub joint 43.

Shaft or axle 38 has several holes 81 through which liquid is pumped into the chamber 50. Said shaft or axle is interchangeable with similar units of varying length to accommodate rollers of corresponding length, and to accommodate the brush unit when used alone without roller according to Fig. 4. The periphery of the outer end of

the shaft or axle 82 is ridged axially to prevent rotation of the part 83 disposed thereon.

To disassemble the brush, roller, and frame members of the coating applicator for cleaning or interchange of parts, a screwdriver is inserted through the side of the fountain brush bristle cluster to unscrew the end thrust screw 53 in Fig. 3.

It will be readily seen that cleaning of the several members is accomplished after disassembly by immersing and washing the brush member and the roller cylinder and its end pieces, the sleeve bearing, and the end thrust screw in solvent solution and by circulating solvent solution from the protable reservoir by means of the pump, through itself and tubes until wash liquid emerges clean and inspection shows inner walls of the transparent tubes and the pump walls to be clean.

Although the preferred embodiment of the invention is described and illustrated in this specification with relation to a paint or coating applicator device, it will be obvious to those skilled in the art that other modes of applying the principle of this invention may be employed instead of those specifically set forth above, and right is herein reserved to such modifications as fall within the scope of the following claims which I desire to secure by Letters Patent:

1. A paint or coating applicator device comprising in combination a cluster of bristles, means forming a rigid base in which said bristles are set, said base having means defining an aperture communicating with a conical chamber defined by the lay of the bristles forming the cluster, means attaching the said bristle cluster to the end of a perforated, cylindrical form having a pervious, resilient facing on its periphery, said cylindrical form being rotatably journaled on an axle of tubular material, said axle extending in the form of a goose neck with its free end engaging a handle.

2. A paint or coating applicator device comprising in combination a cluster of bristles, means forming a base in which said bristles are set, means attaching the said cluster of bristles to the end of a cylindrical form having a resilient fibrous facing on its periphery, said cylindrical form being rotatably journaled on an axle, with said axle extendedly engaging a handle.

3. A paint or coating applicator device comprising in combination: a cluster of elongated bristles, means forming a rigid base in which the ends of said bristles are set, the free ends of said bristles arranged to come together in touching contact, an enclosed chamber located within the cluster of bristles, adapted to receive a supply of paint or coating material, a perforated hollow cylindrical member, a resilient facing material attached to the outer periphery of said cylindrical member, an axle of tubular material adapted to be located within the cylindrical member, end walls located within the cylindrical member, so as to prevent unrestricted escape of paint or coating material from the ends of said cylindrical member, bearing means located between the axle and cylindrical member, adapted to permit rotation of said member relative to said axle, means defining a handle attached to one end of said axle, means for supplying paint or coating material through the interior of said axle at variable and controllable rate, means defining apertures in said axle, communicating the interior of the axle with the interior of the cylindrical member, means for attaching the base to the cylindrical member at the end opposite the means defining a handle, with the bristles extending axially, and means communicating the interior of said cylindrical member with the interior of said enclosed chamber, adapted to provide a variable and controllable amount of paint or coating material to the bristles, whereby substantially all surfaces can be coated economically and efficiently with a single applicator.

4. A paint or coating applicator device comprising in combination: a perforated hollow cylindrical paint roller, a resilient facing material attached to the outer periphery of said cylindrical roller, end walls located substantially at the ends of said cylindrical paint roller, adapted to prevent the escape of paint from the ends of said roller, an axle adapted to be located within the cylindrical roller, bearing means located between the axle and cylindrical roller, providing alignment of the cylindrical roller and permitting rotation of the cylindrical roller relative to the axle, a densely packed cluster of elongated painting bristles, means defining a base for said bristles, adapted to hold said bristles as a compact cluster in intimate contact, means for attaching said base to the paint roller at one end thereof, so that said bristles extend axially from the end of said roller, means defining a handle attached to the axle at the other end of said roller, means to supply a paint or coating material to the interior of said paint roller at a variable and controllable rate of flow, and means communicating the interior of said paint roller with the interior of said cluster of bristles, adapted to permit the transfer of paint or coating material to said bristles at a variable and controllable rate of flow, whereby substantially all surfaces can be painted or coated efficiently and economically with a single applicator.

5. A paint or coating applicator device comprising in combination: a cylindrical paint roller, a resilient facing material attached to the outer periphery of said cylindrical roller, an axle adapted to be located within the cylindrical roller, bearing means located between the axle and cylindrical roller, providing alignment of the cylindrical roller and permitting rotation of the cylindrical roller relative to the axle, a cluster of elongated painting bristles extending axially from one end of the cylindrical paint roller, in substantial alignment with the axle, and means defining a handle attached to said axle at the other end of said cylindrical paint roller, said combination being adapted to apply paint or similar material to substantially all surfaces in controlled and adequate amount as required.

References Cited in the file of this patent

UNITED STATES PATENTS

141,522	Thompson	Aug. 5, 1873
222,031	Gerike	Nov. 25, 1879
680,427	Carryl	Aug. 13, 1901
1,449,198	Rutherford	Mar. 20, 1923
2,368,091	Andersen	Jan. 30, 1945
2,478,318	Raub	Aug. 9, 1949
2,648,288	Marks	Aug. 11, 1953
2,677,839	Dean	May 11, 1954
2,774,088	Liska	Dec. 18, 1956
2,785,425	Lenk	Mar. 19, 1957

FOREIGN PATENTS

7,310	Great Britain	Apr. 10, 1893
903,913	Germany	Feb. 11, 1954