Jan. 30, 1962 W. G. BAIRD ET AL 3,018,505

STRIPING DEVICE

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Fig. 1.

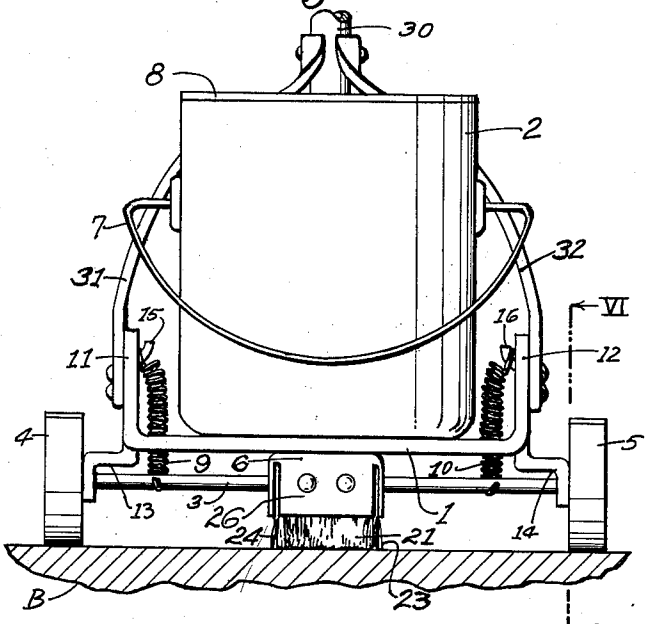


Fig. 2.

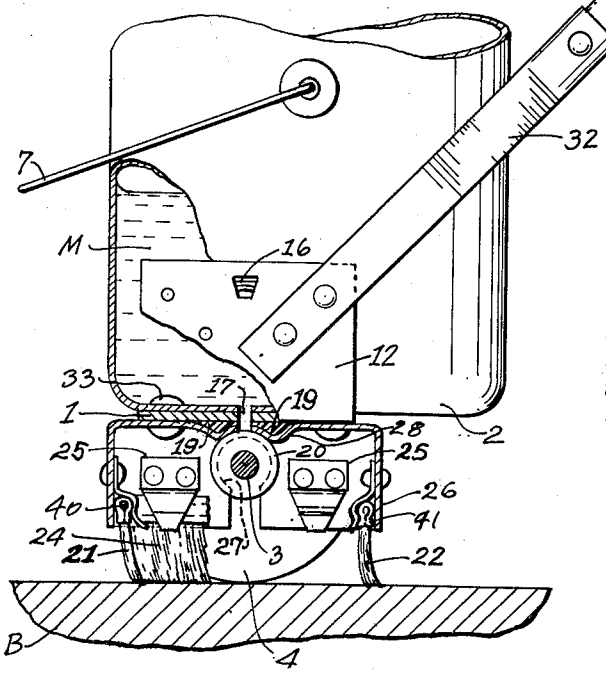
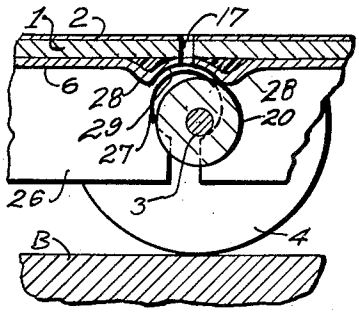


Fig. 5.



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Fig. 3.

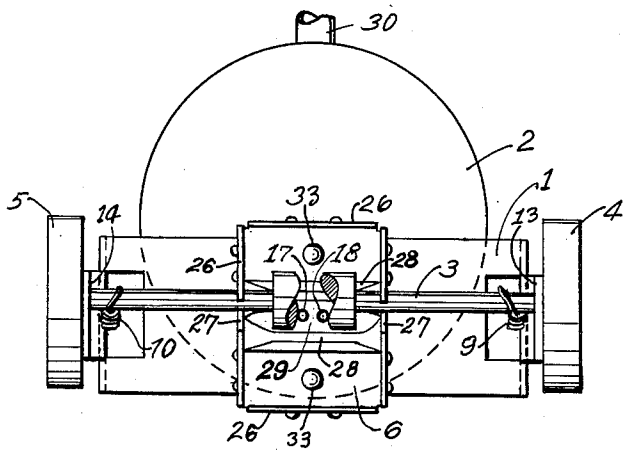
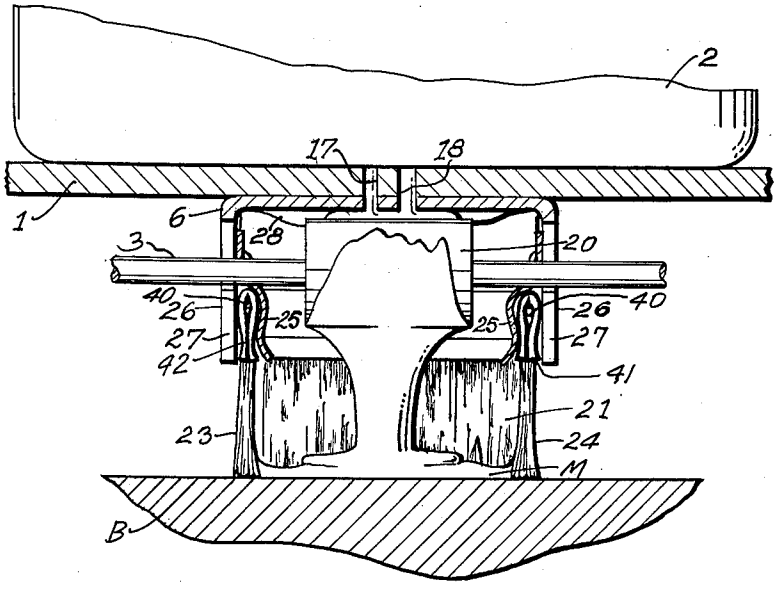


Fig. 4.



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Fig. 6.

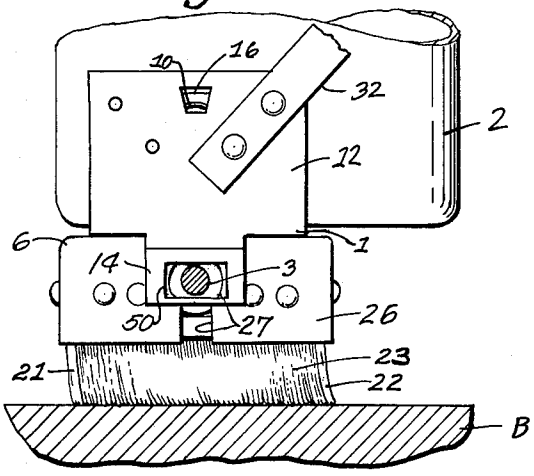
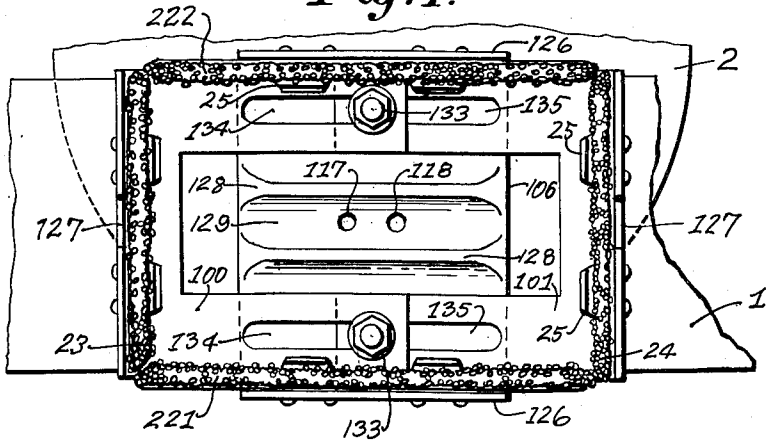


Fig. 7.



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3,018,505
STRIPING DEVICE

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Filed Sept. 29, 1958, Ser. No. 764,156
11 Claims. (Cl. 15—503)

This invention relates to a paint applicator and more particularly to a device for laying down a relatively narrow stripe of paint on a floor or road or parking lot surface for delineating lanes of traffic, or safety crossing, storage space and parking stall limit lines, and guide lines.

Devices heretofore used for the purpose have been rather complicated with manually controlled valves of either the slide, needle or other type with a tendency to stick either open or shut as the paint dries and also have a tendency to run profusely in low spots such as pits and crevices. Prior devices with rolls, such as those, for example, with a nap mounted on a foraminous sleeve, instead of adhering the paint to the surface, tend to roll the paint on the overlying dust and dirt commonly encountered and due to movement of the particles along or from the surface any stripe applied is either so short lived or so readily obliterated as to be evanescent. Other devices, such as those with a reservoir applicator formed by an assembly of brushes, lack a positive seal and during operation allow paint to flow out uncontrollably, upon occasional, but too frequent separation of the brush bristles, to form a gob. Thus when operation is completed a residual bath of paint remains that either floods out or must be sopped up somehow.

By this invention there is provided a remarkably simple but effective striping device which gives a steady and dependable performance with ready starting and stopping and freedom from the clogging and messiness of prior devices. These advantages as well as the construction of the present device will be better understood from a description of a preferred specific embodiment when read in connection with the accompanyinig drawing wherein:

FIG. 1 is a front elevational view of one embodiment with the upper part of the handle broken away;

FIG. 2 is a side view of the embodiment of FIG. 1 having parts broken away and shown in cross section with a shut valve;

FIGURE 3 is a bottom view with the brushes and part of the roller removed to better show the valve when open fully;

FIGURE 4 is an enlarged partial rear view showing the relationship of the open valve flowing paint and the brushes in operation;

FIGURE 5 is an enlarged fragmentary side view showing in cross section the open valve mechanism;

FIGURE 6 is a view on line VI—VI of FIGURE 1; and

FIGURE 7 is a fragmentary bottom view, corresponding to FIGURE 3, of another embodiment with the roll removed, but the brushes in place.

This invention contemplates a striping device having a number of novel features, and preferably of an adjustable character, which are productive of results not heretofore attained with prior devices. One of the features resides in a dispenser base **1** supported in part on roll **20**, axle **3** and wheels **4** and **5** or the like and carrying a desired size of can or reservoir **2**. Another feature includes provision on this base of a stripe forming box **6** connected preferably to a one gallon can having a bail **7** and a vented lid **8**. Another feature is in the special bristle brushes associated with the box. The box is suitably sized to carry brushes of a suitable size at a suitable position for the purpose. Still another feature lies in an enclosed array of brushes **21**, **22**, **23** and **24** of special

construction. These brushes are each constructed and mounted to provide an array of rather stiff durable bristles of a certain stiffness and length so that the ends ride on and prepare the surface for striping, to contribute uplift and to spread out the paint fed to the interior of the box with desired confinement within the boundaries of the stripe. Still another feature is the novel paint valve, including roller **20**, which is normally closed but responds to movement so as to open and permit paint to flow as needed. The whole arrangement is novel for obtaining control of flow and preferably with control of the width of stripe applied to the pavement B and is constructed to be operable by a push handle **30**.

In accordance with this invention there is provided a ground wheel operated mobile liquid coating dispenser with a novel brush stripe applicator which has its own paint reservoir with the feed from the reservoir controlled by a novel self-cleaning valve responsive to the action of the ground wheels relative to the applicator and ground surface. The device is compact enough to be portable and is manually operable for applying surface striping by the simple manipulation of a push handle.

The applicator and valve mounting is such as to hold the reservoir outlet normally but yieldably closed. The reservoir valve includes a roll closure member concentrically mounted with respect to the ground wheels and also includes a mating but perforated concavity at the discharge opening of the reservoir forming a sealing seat for the roll. The concave seat is formed with one or more outlet orifices located in the trough of the concavity and normally, when and as it fits in the trough in form fitting relationship, these are sealed shut by the roll. The applicator cooperates with this arrangement to give the desired flow control.

At the leading and trailing edges of the trough are humps up which the roll must climb when the paint striper is moved along the work surface, whether movement be forward or backward, thereby automatically opening the valve. Limit stops associated with a stripe former box prevent the roll from climbing over the hump. For this purpose both the ground wheels and the roller valve are fixed on an axle member so as to give the roll a pronounced tendency to respond to movement of the stripe applicator by frictional rolling action as well as by momentum and moments of force. Yieldability is provided not only by the lifting action of the stiff applicator bristles but also by a spring means which acts to produce a moment of valve closing force tending to snap the roll back down one of the humps into the trough when the roll is displaced from the trough. Upon cessation of travel of the stripe applicator device such roll return action occurs to automatically close the valve with concomitant wiping action.

Associated with the valve in peripherally surrounding relationship is a paint confining stripe-former box having brush holders and a peripheral array of brushes. The box is a cup shaped affair having depending sides and is preferably four sided, either square or rectangular and has four sets of brushes, one at the leading edge of the box, one at the trailing edge and one on each of the sides. These are made with a bristle socket or brush backing adapted to enable each brush to be snapped into brush holder spring clips on the box for easy removal and replacement of each brush.

Each brush contains in its backing about eight rows of smooth unflagged but rather heavy gage bristles of a stiff nature locked in at the ends of the backing and protruding therefrom by a length ranging from more than about ½ of an inch to not more than about 2 inches. For the desired bristle stiffness, a bristle length of about 1⅛ inches has been found very good together with about a ⅛ inch extension beyond the wheel-ground con-

tact line. The concomitant stiffness of the bristle array together with this extension coacts with the roll valve and its return spring to assist in giving the desired valve action. A nylon bristle of a gage of about 0.018 of an inch is desired, which is rather heavy and stiff as compared to ordinary paint brush flagged bristles, which are too limp for the purpose. Any equivalent bristle, however, is also contemplated just so it will provide about the same resistance to turnover and about the same spring-back as the nylon. The object is to provide not only sufficient stiffness but also a brush which will not hold paint but will permit it to flow freely.

All the brushes function first of all to confine the paint stream from the reservoir. The leading brush also tends to sweep the surface to remove dust and dirt which if left, makes the stripe transitory. The trailing brush also tends to wipe up the paint to a thinner stripe, more or less. By tilting the device forwardly or rearwardly so as to pitch it, this action of the leading and trailing brushes can be governed and the stripe layer can be better controlled materially in combination with the other controls available.

The laterally extending brushes are selected to be of a length to fit the width of the stripe desired and there is preferably provided an adjustable brush holder and forming box of adjustable width with a lock to hold the width selected. This arrangement (FIGURE 7) has the telescoping halves **100** and **101** mounted on backing plate **106** and releasably locked by means of the threaded nuts **133**.

The ground wheel operated roller valve **20** is mounted so as to be movable not only back and forth with respect to the two camming humps **28** but also with a lateral tilt, limited however, by clearance vertically in the slots **50** of centering ears **13** and **14** depending from the ends of base **1**, to allow the wheels to follow irregularities in the surface being striped. Slots **50** are long enough so as not to interfere with the back and forth valve controlling motion. These ears also permit use of a shorter roll. In their absence the roll is retained yieldably within limits imposed only by springs **9** and **10** acting on the axle **3** and by the key hole slotted sides of the box, and the roll **20** must be long enough to take the greatest off center lateral shift from the paint feeding holes **17** and **18** within the box opening together with tilt. Excessive tilt which might cause binding and misalignment is precluded.

In FIGURES 1–6, base **1** carries a gallon paint container **2** topside for working material M and opposite the holder or forming box **6**, with securement afforded by two fasteners **33** and fluid connection by two holes **17** and **18** each having a diameter of about $\frac{3}{16}$ of an inch. These are at the bottom of trough **29** and although two are preferred, sized for a flow rate suitable for a manual rate of stripe application, with suitable size adjustment there may be more than two. The joint around the holes between parts **1**, **2** and **6** is sealed by a plastic filler **19**. Base **1** has brackets **11** and **12** and tabs **15** and **16** for tensioning and supporting one end of the coil springs **9** and **10** the opposite ends which hook onto the axle **3**. This carries end wheels (about 3 inches in diameter) **4** and **5** and also the sealing roller **20** at the middle, all fixed tightly to stop together or roll in unison in driving and wiping relationship. An axle length of 10 and up to about 12 inches is best to avoid interference in tight quarters. The wheels drive the roll **20** up the toggle or cam hump **28** where the device is moved forward or backward manually by push handle **30**, connected by arms **31** and **32** to open the holes. Paint then flows freely. When perambulating movement stops, the toggle action of springs **9** and **10** and the humps snaps the roll back automatically into form fitting groove **29** between humps **28** and shuts off paint flow.

This permits brushing out of any excess or going over places not covered thoroughly. The rolling action helps clean the valve and also helps keep it well sealed.

Spring tension must be adequate to hold up the wheels, axle, roller plus a few inches of head of paint so as to seal the openings even when the device is picked up from the surface B and still hold the roll in the groove **29**, but not so high a tension as to interfere with convenient manual operation. A close-wound coil spring consisting of 20 gauge or #311 U.S. standard extension coil spring wire about 2 inches long and $\frac{3}{8}$ inch in diameter is quite adequate.

Box **6** has sides **26** carrying brush spring-clip **25** into which front brushes **21**, rear brush **22**, and side brushes **23** and **24** snap for easy but secure attachment and for easy detachment for replacement or cleaning. Each brush has eight rows of bristle made from four layers of strand wound together to form a coil spool and then bent on a line to a hairpin loop bend over a full length locking wire **40** and clamped securely by a U-shaped backing piece **41** strongly crimped in near the ends at **42** all along the length and swaged together in closed relationship at the opposite ends of the backing, after which the coil is cut opposite the bend to allow the bristles to form and be trimmed to a final accurate length. This is a permanently locked arrangement found adequate for securely holding the nylon bristles (0.018 inch gage) for their whole life until worn too short. Nylon bristles otherwise are too fugitive.

The device has easy cleaning and replacement because of (1) mobility of the roll and its wiping action and (2) the resilient snap type brush mounting. Wire **40** is about .060″ in diameter, while backing **41** is ordinary sheet steel about 0.030 inch in thickness.

The cylindrical roll **20** during striping cannot jump out of trough **29** beyond the crest of the camming humps **28** because of the proximity of the key hole edge **27** (FIGURE 5) even at fullest open position. Slots **50** also contribute to the best alignment and performance, but axle **3** is movable in the slot sufficiently to permit the roll to be moved aside against the pull of springs **9** and **10** and clear the paint holes **17** and **18** for inspection and so that any paint film formed across them after long disuse may be removed readily by merely poking them open.

In operation control also comes from the bear-down pressure, the speed and the tilt to which the device is subjected by the operator, the uplift from the bristles all in cooperation with the springs **9** and **10**. Main control, however, comes from the spring-loaded roller-valve mechanism. The relationship of (1) roll diameter, (2) the hump or riser elevation with respect to shape and depth of trough and (3) the roll spring tension and (4) the rigidity of the nylon bristles provides an advantageous control of the flow of paint.

For adjustment the telescoping arrangement of FIGURE 7 is preferred. Stationary box part **106** has crests **128** and the trough **129** with feed holes **117** and **118** as in the previous embodiment. To box part **106** are attached the movable left extendable part **100** and right extendable part **101** each having arms with slots **134** for reception of the releasable fasteners **133** to secure parts **100**, **101**, box part **106**, frame **1** and can **2**. These extendable parts have side walls with limiting holes or slots **127** corresponding to slots **27**. This assembly has snap clips **25** and carries the side brushes **23** and **24** together with brushes **221** and **222** of selected adjusted length.

It will be appreciated that the device of this invention offers simplicity and economy in manufacture, ease of assembly and easy maintenance.

It is to be understood the foregoing is intended by way of illustration of a preferred embodiment and not as a limitation of the scope of the present invention except as set forth in the appended claims.

What is claimed as the invention is:

1. A device for applying coating material to a surface in the form of a stripe comprising a base frame, means yieldably mounted on said frame for pivotal movement relative thereto and for positioning said frame in operative spaced relationship with respect to said surface,

means engaged with said frame for applying a force to said frame for yielding movement of said positioning means together with propelling movement of the device along the path of the stripe to be applied, means urging said positioning means against said yielding movement, a coating material reservoir mounted on the upper side of said frame, a substantially closed array of depending striping applicators mounted on the opposite side under said frame and of sufficient stiffness for acting together with said urging means against said force while maintaining wiping engagement with said surface and defining a substantially enclosed paint distributing passage between a predetermined portion of said surface and said frame, conduit means providing communication between said passage and said reservoir and defining an outlet orifice within said passage, valve means for said outlet orifice, said valve means comprising a depression having a wall including said outlet orifice and a form fitting member carried by the positioning means for closely engaging with said depression wall, said form fitting member being actuated by said positioning means for opening said outlet orifice responsive to said movements and being actuated by said urging means to close said outlet orifice on cessation of at least the first of said yielding and propelling movements.

2. The device of claim 1 wherein the striping applicators include a brush having unflagged bristles having the wear and stiffness properties of a strand of nylon of a gage of about 0.018 of an inch, said strand having sufficient stiffness to tend to assume a straight position and exert an uplifting force on the base frame.

3. The device of claim 1 including a box-like striping applicator holder open at the bottom and having front, rear and lateral side walls each carrying spring clips forming sockets for detachably mounting a plurality of brushes as the applicators and wherein each brush includes about eight rows of unflagged nylon bristles having a gage of about 0.018 of an inch and a free length of not more than about two inches extending from a U-shaped metal backing retaining said bristles, said backing having a snap action fit in said sockets.

4. The device of claim 1 wherein the frame extends transversely and has at each of its ends an upright arm, wherein the yieldably mounted positioning means is retained on the under side of the frame and consists of a transversely extending axle having end wheels fixed thereon extending outwardly beyond said arms, wherein the form fitting member is a roll fixed on the axle adjacent its midpoint, and wherein the urging means comprises a resilient member adjacent each of said ends inwardly of said arms, each said resilient member being connected to said axle and one of said arms for support of said axle and resilient member respectively.

5. The device of claim 1 wherein the frame extends transversely and has at each of its ends an upright arm, wherein the yieldably mounted positioning means is retained on the under side of the frame and consists of a transversely extending axle of a length from about 10 to about 12 inches having end wheels fixed thereon of a diameter of about 3 inches extending outwardly beyond said arms, wherein the form fitting member is a roll fixed on the axle adjacent its midpoint, wherein the urging means comprises a coil spring passing through an opening of said frame adjacent each of said ends inwardly of said arms, each said spring being hooked at one end around said axle and at the other end to one of said arms for support of said axle and each spring respectively, and wherein the closed array of applicators includes a four-sided box-like member with depending sides mounted adjacent said midpoint and carries along its four sides in dependent extension a sufficient quantity of stiff unflagged synthetic plastic bristles which extend about ⅛ of an inch beyond the ground contact line of the wheels for biasing said frame away from the surface while maintaining wiping arrangement with it.

6. A portable paint stripe applicator device for a surface to be marked comprising a transversely extending base frame having brackets uprightly extending therefrom, an axle yieldably retained on the under side of said frame for limited relative movement with respect thereto, said axle having fixed on its ends wheels for engaging said surface whereby said frame is pivotally positioned spaced from said surface, handle means attached to said frame for manually applying thereto a propelling and pivoting movement with manual force against said surface whereby back and forth movement may be imparted at will to the applicator, a container with a paint reservoir mounted on the top side of said frame, a box-like member mounted on the underside of said frame, said member having a base plate and depending side walls forming a substantially enclosed recess open at the bottom in spaced relationship with respect to said surface, a conduit formed through said frame and plate between said reservoir and recess with an outlet orifice in said recess, said member having spaced camming humps in said plate, one in front of and the other to the rear of said outlet orifice to define a depression forming a curved wall about said orifice thereby located at the base of the depression, a roller of substantially complementary curvature mounted on said axle adjacent said depression and adapted thereby to ride in said depression, tension spring members having one end connected to said brackets and the other end connected rotatably to said axle, said spring members biasing said roller into said depression to close said outlet orifice, said roller being adapted for rolling action on said wall between said humps, said side walls having side openings for receiving said axle and limiting said relative movement and rolling action at said humps so as to permit said spring members to pull the roller back to said base, said spring biased roller being responsive to said relative yielding movement together with said propelling movement to open said orifice and responsive to cessation of said movements to close said orifice, and a relatively wide thin brush having a dense array of stiff unflagged bristles detachably attached to each of said side walls and extending between said walls and said surface to form a substantially closed array of brushes and to contact the surface about said opening sufficiently forcefully during said movements to complete the paint application while exerting an uplifting bias on said frame thereby conditioning said roller to be biased by said spring members.

7. The applicator of claim 6 wherein the container has a capacity of about one gallon and the orifice consists of two holes each having a diameter of about 3/16 of an inch to provide a suitable paint flow from said container for application by the substantially closed array of brushes at a perambulating rate of propelling movement.

8. The applicator of claim 6 wherein the curved wall of the depression is arcuate and complementary to the roller and covers only a minor part of the curvature of the roller along substantially its entire length.

9. A portable applicator device for applying a paint stripe of adjustable width to a surface comprising a transversely extending base frame, an axle yieldably retained on the under side of said frame for limited relative movement with respect thereto, said axle having fixed on its ends wheels for engaging said surface whereby said frame is pivotally positioned spaced from said surface, handle means attached to said frame for manually applying thereto a propelling and pivoting movement with manual force against said surface whereby back and forth movement may be imparted at will to the applicator, a container with a paint reservoir mounted on the top side of said frame, a box-like member mounted on the underside of said frame forming a recess open at the bottom in spaced relationship with respect to said surface, said member having a base plate and depending front and rear side walls, two overlapping halves each mounted between said walls and carrying a lateral side wall depending therefrom, said halves having transversely extending slots, the slots of one half being aligned with

those of the other half in overlapping relationship, and releasable fastening means extending through the aligned overlapped slots for mounting said halves adjustably by said fastening means with respect to said plate for disposing the lateral side wall of one with adjustable transverse spacing from the wall of the other for controlling the width of the stripe, a conduit formed through said frame and plate between said reservoir and recess with an outlet orifice in said recess, said member having spaced camming humps in said plate, one in front of and the other to the rear of said orifice to define a depression forming an arcuate wall about said orifice thereby located at the base of the depression, a roller mounted on said axle adjacent said depression and adapted by having substantially the same curvature as said wall to ride a minor part of its curvature in said depression, spring members having an end connected to said frame and the other end connected rotatably to said axle, said spring members biasing said roller into said depression to close said outlet orifice, said roller being adapted for rolling action on said wall between said humps, said side walls having side openings for receiving said axle and limiting said relative movement and rolling action at said humps so as to permit said spring members to pull the roller back to said orifice, said spring biased roller being responsive to said relative yielding movement together with said propelling movement to open said orifice and responsive to cessation of said movements to close said orifice, and a relatively wide, thin, stiff-bristled brush detachably attached to each of said side walls and extending between said walls and said surface to form a substantially closed adjustable array of brushes and to contact the surface about said opening sufficiently forcefully during said movements to complete the paint application while exerting an uplifting bias on said frame thereby conditioning said roller to be biased by said spring members.

10. The device of claim 9 wherein the frame has upright brackets extending therefrom on the top side at the ends of said frame for making connection between the frame and spring members under tension and has depending ears at its ends extending down adjacent the wheels, said ears being slotted for reception of said axle to limit the sidewise, vertical, and back and forth motion of the axle with respect to the frame, said slot being dimensioned for permitting the valve action of the roller between the humps.

11. The device of claim 1 wherein the frame has ears at its ends extending adjacent the positioning means in abuttable relationship therewith, said ears being slotted for reception of part of said means coactively to limit the sidewise, vertical and back and forth motion of said means with respect to said frame, said slot being dimensioned for permitting the valve action of the formfitting member in the depression.

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