Dec. 10, 1957 J. R. HUNTER 2,815,983

HIGHWAY STRIPE PAINTING DEVICE

Filed Feb. 23, 1951

Fig. 2.

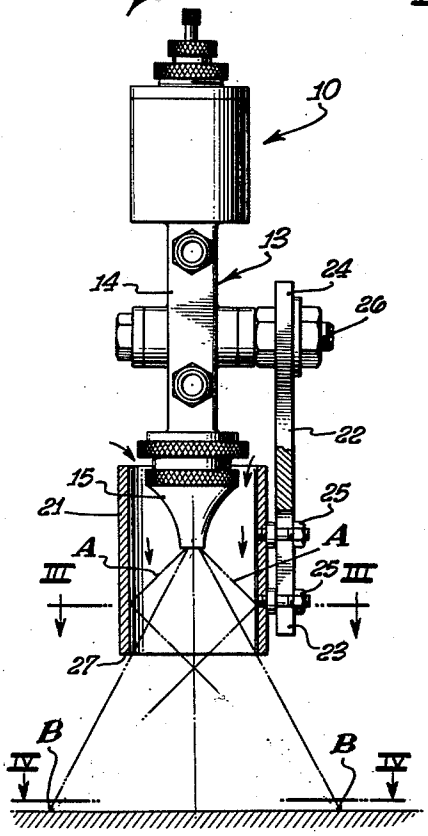


Fig. 1.

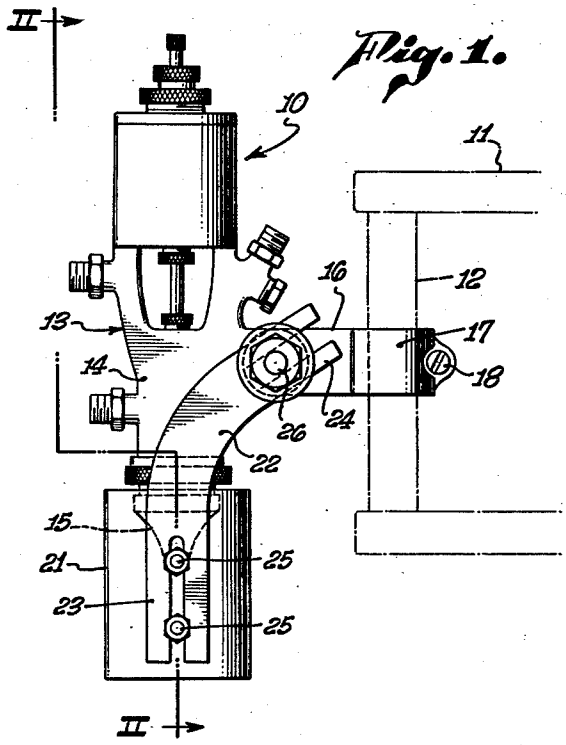


Fig. 3.

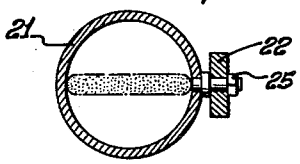


Fig. 5.

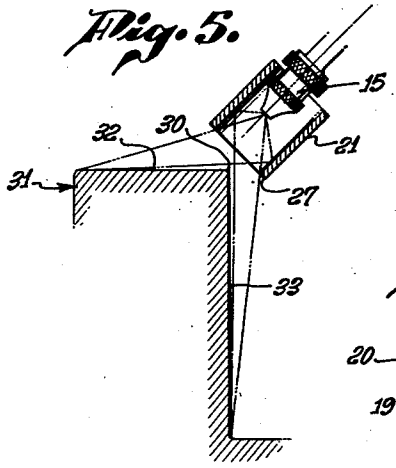
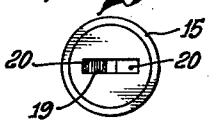


Fig. 4.



Fig. 6.



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HIGHWAY STRIPE PAINTING DEVICE

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3 Claims. (Cl. 299—28.5)

This invention relates to an improved highway stripe painting device and more particularly to a highway striping device for applying a painted stripe of selected uniform width and thickness to a surface such as a pavement.

One of the problems of present highway maintenance is that of quickly and properly marking a highway to define traffic lanes with a minimum of interference to flow of traffic over said highway. Such marking may include a center highway dividing stripe, lane-defining stripes, cross-walk zones, and various curb markings. Markings such as the highway-dividing stripe and lane stripes must be uniform in width and uniform in depth to facilitate even quick drying. Such marks must be applied at a fairly rapid rate of speed in order to cover relatively great distances. The edges of such highway markings should be sharp and accurately defined since any blurring or indistinctness considerably lessens the effectiveness of the stripe in its warning and guiding effect on the driver of the vehicle.

Prior proposed striping machines have attempted to paint stripes on highway surfaces by various means such as brushes in contact with the pavement, paint sprayed from nozzles and confined within stationary or rotating guards of various forms, the lower edges of said guards usually contacting and riding on the surface being painted, and various kinds of spray nozzles positioned between guards adjustably mounted to modify the width of the stripe being painted. Such prior devices were objectionable in that they were incapable of painting a stripe with accurately defined, parallel, longitudinal edges, of uniform width, and of uniform thickness. Generally the edges of stripes applied by prior devices were blurred and ill defined. Depth of paint deposited was variable and virtually uncontrolled so that the drying period could not be accurately estimated.

The primary object of this invention is to design and provide a highway stripe painting device wherein a painted stripe of uniform width and depth with accurately defined, sharp, longitudinal edges may be sprayed at a preselected rate of speed upon a highway surface.

An object of this invention is to provide such a highway stripe painting device which may be readily adjustable to a selected width of stripe.

A further object of this invention is to design and provide a highway stripe painting device which is virtually self-cleaning and may be used continuously for relatively long periods without detrimental effects from lack of cleaning.

Still another object of this invention is to design and provide such a highway stripe painting device wherein atomized paint spray is directed against and deflected from inner surfaces of a cylindrical, tubular, open-ended member, and wherein means are provided for preventing accumulation or buildup of paint spray which contacts the inner surfaces of the tubular member.

This invention contemplates a highway stripe painting device wherein the device may be adjustably spaced above and out of contact with the highway surface at a preselected distance for spraying of a predetermined width of stripe.

Generally speaking, this invention contemplates a striping device employing an internal atomizing nozzle having a slotted head for ejection of atomized paint spray therefrom in a fan-shaped pattern. The nozzle and head are suitably positioned within a cylindrical, tubular, open-ended, hollow member spaced from the pavement and having smooth internal surfaces and in such relation that the upper margins of the fan-shaped spray may contact the internal surfaces of the tubular member at points spaced within a zone lying between the bottom edge of the member and an upper boundary varying from said edge of .15 to .5 times the internal diameter of the tubular member. The positioning of the nozzle with respect to the tubular member in this manner provides for a plurality of zones between the nozzle and the surface wherein intermixing of the paint spray occurs so that the paint is deposited on the surface in virtually uniform thickness throughout its width and so as to define sharp, accurate, longitudinal, parallel edges of a sprayed stripe.

Other objects and advantages of this invention will be apparent from the following description of the drawings:

In the drawings:

Fig. 1 is a side elevation of a device embodying this invention.

Fig. 2 is an end view partly in section taken in the vertical planes indicated by the lines II—II of Fig. 1.

Fig. 3 is a horizontal section taken in the plane III—III of Fig. 2.

Fig. 4 is a horizontal section of the paint spray pattern taken in the plane IV—IV of Fig. 2.

Fig. 5 is a fragmentary sectional view illustrating employment of the device of Fig. 1 for painting a curb.

Fig. 6, is a fragmentary view of a slotted head which may be used with the spray gun nozzle shown in Fig. 1.

The highway stripe painting device, generally indicated at 10 in the drawings, may be mounted on any suitable driven vehicle or hand truck for travel along a highway or street. Attached to the vehicle may be a carrier means 11, shown in diagrammatic lines, of any suitable construction adapted to position device 10 over a pavement to be painted without interference from the wheels of the vehicle. Preferably, the carrier means includes a vertical member 12 for adjustably positioning the device at a selected height above the pavement. The vehicle may carry suitable paint spraying compressors and power means therefor to operate through suitable well-known connections the device 10.

The device 10 includes a paint spray gun 13 of any well-known form. The gun may be air-actuated and controlled or may be a hand trigger operated gun (not shown) in the event it is desired to use the device 10 detached from a vehicle or hand truck. The gun 13 comprises a body 14 and a nozzle head 15 disposed with its axis vertical. The body 14 is provided with a horizontally extending arm 16 having bifurcated clip means 17 at its end adapted to releasably grasp the vertical member 12 for securing the gun to the carrier means at a selected height above a pavement. A screw bolt and nut assembly 18 serves to tighten the clip means on member 12.

The nozzle head 15 is preferably of internal atomizing type so that, during operation, density of the atomized paint spray emitted from head 15 will remain virtually constant for operating pressures selected. The operating pressures for air used may be, for example, 50 pounds. The pressure applied to the paint fluid may be slightly

less than that applied to the air by about 5 to 10 pounds. An external atomizing type of nozzle head may be used but usually requires frequent cleaning in order to maintain a desired density range of paint particles emitted by the nozzle head.

The nozzle head 15 includes an elongated transverse slot 19 preferably having outwardly flaring end walls 20 and forming a relatively flat, fan-shaped spray pattern delineated by top edges A—A inclined downwardly at about 45° to the vertical (see diagrammatic lines in Fig. 2). Preferably the side walls of the slot are parallel to the axis of the head. It is understood, of course, that other types of nozzle heads may be used.

Encircling nozzle head 15 in spaced relation thereto is an open-ended tubular member 21 supported at one side by an arcuate arm 22 having straight longitudinal open-ended slotted end portions 23 and 24 lying in angular relationship. The lower end portion 23 may be suitably secured to member 21 by spaced nut and bolt assemblies 25 for selected longitudinal adjustment of member 21 with respect to the encircled nozzle head 15. The upper end portion 24 secures arm 22 by means of a suitable nut and bolt assembly 26 to the gun body 14 adjacent the horizontal arm 16, thus providing lateral adjustment of the axis of member 21 with respect to the axis of nozzle head 15 and also limited adjustment of the longitudinal relationship of member 21 with nozzle head 15.

The tubular member 21 may be of cylindrical form and of uniform internal diameter throughout its length to provide a passageway from one open end of the tubular member to the other open end for flow of atmospheric air therethrough. The member 21 may be made of any suitable metal which is capable of taking a relatively high polish on internal and external surfaces of member 21. A smooth polished surface is desired so that impingement of paint particles against said surface will not tend to cling and accumulate thereon, a condition which may result from a rough or non-polished surface. An exemplary length of member 21 may be approximately 1½ times the internal diameter of the member although other lengths may be used as desired.

The relationship of member 21 with respect to slot 19 in head 15 is such that the top edges A—A of the fan-shaped pattern may impinge on lower internal smooth surface areas of member 21 in a zone defined by the bottom edge 27 of member 21 and points spaced thereabove within a range of .125 to .50 times the internal diameter of member 21. Impingement of upper margins of the fan-shaped pattern against the internal surfaces in said zone causes the bottom edge 27 to act as a masking edge for the central non-deflected portion of the pattern in order to define accurate straight parallel edges B—B of a stripe being painted.

Such relationship also causes paint particles in the upper outer margins of the pattern to be deflected from the internal lower surfaces of member 21 for traveling along paths directed across the downward and diagonally outwardly directed path of particles in the central portion of the spray. Thus the deflected particles in the outer margins of the spray are caused to intermix and collide with particles in the central portion of the spray. Such intermixing which occurs below the bottom edge 27, provides for a substantially uniform thickness of paint to be deposited upon the pavement between longitudinal edges B—B of the stripe being painted. A painted stripe of uniform width and uniform density is thus provided.

The upper open end of member 21 provides means for admitting atmospheric air to the hollow member and the passageway defined by the member is partially closed by the spray nozzle head which restricts the effective cross-sectional area of the passageway within the tubular member 21. The pressure of the fluid ejected by the nozzle head 15 acts to aspirate or draw air into the upper end of member 21. This downwardly moving aspirated air tends to sweep along the interior smooth surfaces of member 21; and in the area where paint particles are impinging thereagainst, the air tends to flow along and sweep said surfaces to aid in preventing build-up of paint particles thereon. On opposite faces of the flat fan-shaped paint spray pattern the action of the aspirated flowing air aids in holding the paint particles within the general configuration of the pattern as illustrated in Figs. 3 and 4.

In operation, a vehicle carrying the necessary compressor and paint supply equipment may move at a preselected speed, such as 10 to 15 miles per hour. The spray gun 13 suitably mounted and controlled by an air valve may be actuated to commence spraying paint from the head 15 as the vehicle rolls along. Normally, bottom edge 27 of member 21 may be spaced approximately one and three-quarters to two inches above and out of contact with a surface being painted to provide a standard four inch stripe. Paint ejected from head 15 is deposited uniformly in depth between clean, straight, parallel edges. The fan-shaped spray pattern provides clear sharp, accurate straight transverse edges at the start and end of a stripe being painted.

The device described above is conveniently adapted for painting right angle surfaces, such as the crown and side wall of a curbing by relatively simple adjustments. In Fig. 5 a nozzle head 15 is disposed so that its axis is approximately in line with a corner 30 of a curb 31 having a crown surface 32 and a side wall surface 33. The tubular member 21 is adjustably moved by means of arm 22 and upper slotted end portion 24 so as to transversely displace the longitudinal axis of member 21 with respect to the axis of the nozzle head 15. Such eccentricity of the axes of head 15 and member 21 causes the axis of the central portion of the paint spray pattern as defined by the masking edge 27 to be offset with respect to corner 30. Thus the masking edge 27 provides a short and narrow spray portion impinging against the crown of the curb and a relatively long and wide spray portion impinging against the side wall of the curb. Adjustment is readily made so that spray does not fall beyond the defining edges of the crown and side wall.

This highway striping device is not only capable of spraying a uniform stripe on smooth surface pavements but is also capable of marking with a uniform clean cut stripe pavements having a relatively rough surface, as where the pavement binder has been worn away exposing top portions of the pavement aggregate. It should be noted that the tubular member serves as a protective shield for the spray against wind and aids in maintaining the spray pattern from nozzle head to pavement.

The uniform thickness and width of paint sprayed on a surface by this device together with the accurately defined longitudinal and transverse edges provides a highway stripe which may be applied by this device with minimum interference to traffic flow and maximum effectiveness in the results attained.

Various modifications and changes may be made in the relationship of the head and tubular member, and in the shape of the member. All such modifications coming within the scope of the appended claims are embraced thereby.

I claim:

1. In a device for spraying paint in stripes of virtually uniform width and thickness, the combination of: a support means; an open-ended hollow tubular member supported by said support means; a spray nozzle carried by said support means and adapted to eject a fan-shaped spray pattern; said nozzle being normally coaxially positioned within said tubular member and spaced from one end of said member a distance whereby outermost side portions of the spray directed toward said one end will impinge against and be inwardly deflected from internal surfaces adjacent said one end of the tubular member for intermixing with a substantial undeflected central portion of the spray and adapted to define a

stripe of greater width than the inner diameter of said one end of the tubular member; and means including a curved arm having angularly related slots at each end for adjustably connecting the tubular member with the support means.

2. In a device for spraying paint in stripes of virtually uniform width and thickness and adapted to be spaced out of contact with the surface being painted to provide a mixing zone between said device and said surface, the combination of: a support means; a nozzle means carried by the support means and having a discharge end adapted to eject along the axis of the nozzle a fan-shaped spray of generally flat elongated cross section disposed transverse to the stripe being painted; a hollow elongated member normally coaxial with the nozzle axis enclosing said discharge end and having a discharge opening aligned with said discharge end, and having inner surfaces spaced laterally from said nozzle means; and means for adjustably axially positioning the hollow member for spacing inner surface portions from the discharge end in the direction of the spray path and for enclosing the spray path proximate to the discharge end whereby side portions of ejected spray are deflected from portions of said inner surfaces of the hollow member into and across a nondeflected central portion of the spray for intermixing in said mixing zone and disposing a virtually uniform coating of spray transversely of the stripe being painted, said adjustable means including a member provided with slots at each end arranged in angular relation connected to the support means and the hollow member for laterally positioning the axes of the hollow member and the nozzle means in parallel relation.

3. In a device for spraying paint in stripes of virtually uniform width and thickness, the combination of: a support means; an open-ended hollow tubular member supported by said support means and providing a through passageway for flow of air; a spray nozzle carried by said support means and adapted to eject a fan shaped spray pattern; said nozzle being positioned within said tubular member and spaced from one open end of said member a distance whereby outermost side portions of the spray directed toward said one end will impinge against and be inwardly deflected from internal surfaces adjacent said one end of the tubular member for intermixing with a substantial undeflected central portion of the spray and adapted to define a stripe of greater width than the inner diameter of said one end of the tubular member; and means for adjustably connecting the tubular member to the support means for lateral and longitudinal movement of the tubular member with respect to the axis of the nozzle.

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