July 31, 1962 E. A. WILSON 3,046,854

PAVEMENT MARKER

Filed Dec. 14, 1954 2 Sheets-Sheet 1

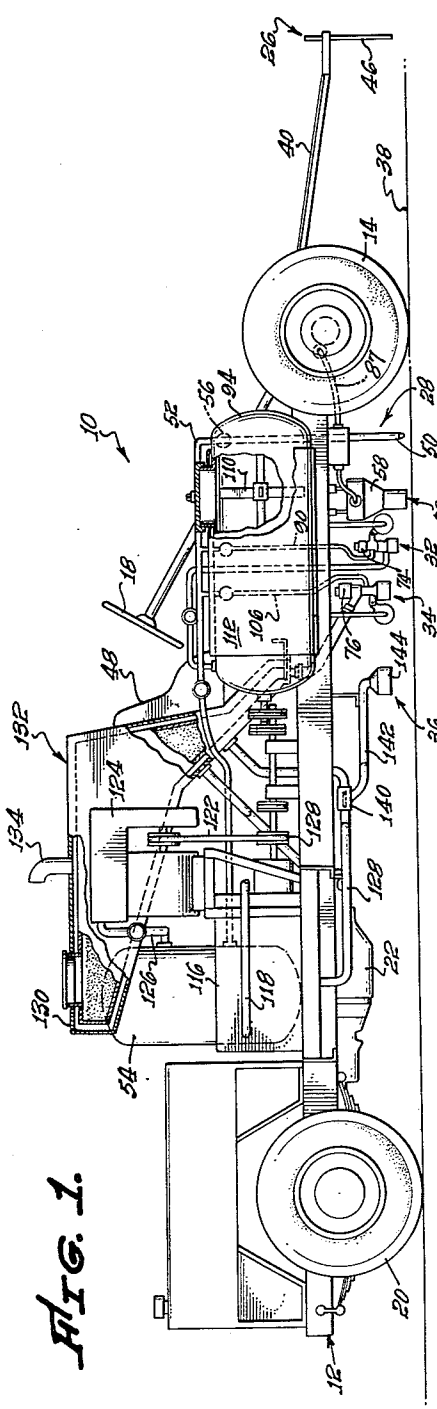


FIG. 1.

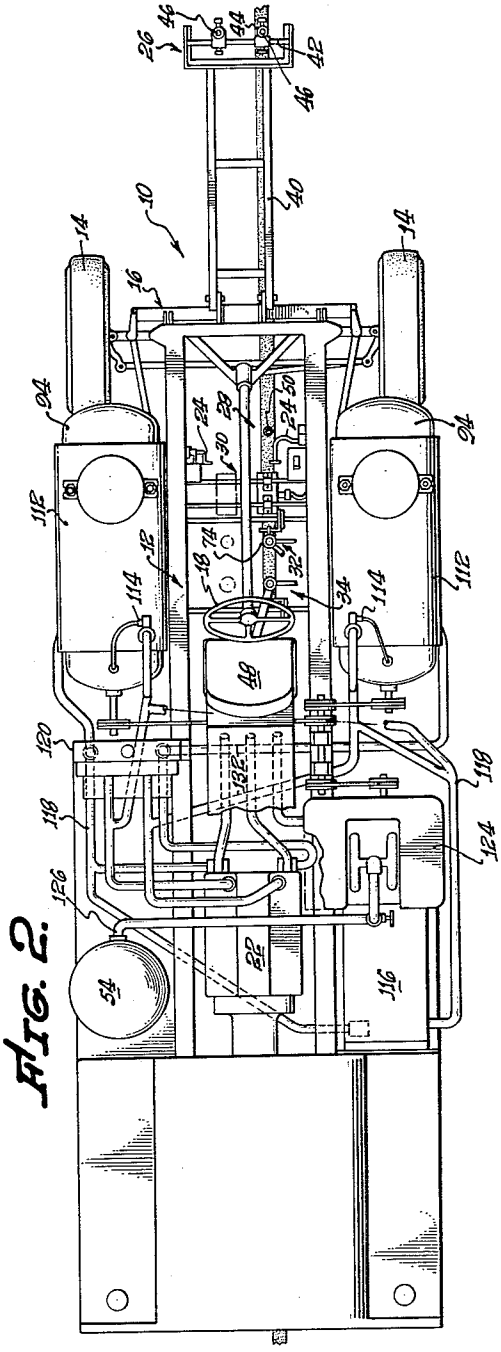


FIG. 2.

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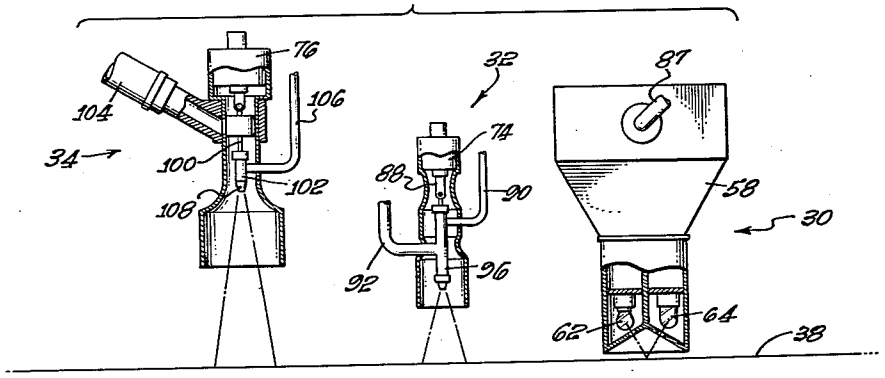
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FIG. 3.



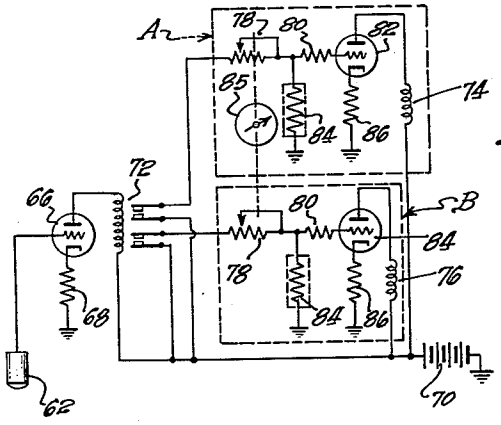


FIG. 5.

FIG. 4.

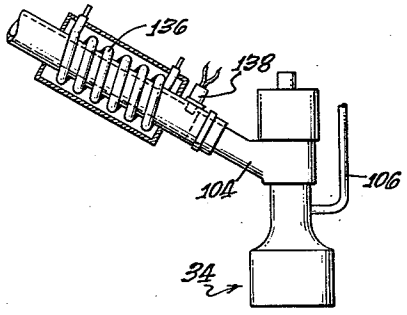
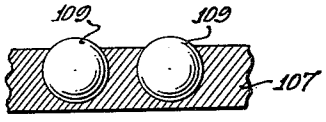


FIG. 6.



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PAVEMENT MARKER

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Filed Dec. 14, 1954, Ser. No. 475,252
4 Claims. (Cl. 94—44)

At the present time, it is customary to place stripes of paint down the center of paved roads, along paved runways, etc., in order that these stripes may serve as guides for various vehicles. Frequently extremely small glass spheres, which are highly reflective in nature, are included within such stripes in order that these stripes may be readily visible at night. A broad object of the present invention is to provide a method and apparatus for easily, conveniently and rapidly applying such marking stripes upon a paved surface.

The instant invention may be briefly summarized as being concerned with various combinations of means, such as, for example, means for applying or spraying a stripe of paint, means for applying glass beads to a newly painted stripe, means for governing the operation of said means for spraying paint and for applying said glass beads, and other means as will be more specifically indicated, and with procedures involving the use of such means. The claims forming a part of this application more specifically define this invention. The precise nature of the invention is described in detail in the remainder of this specification and the accompanying drawings, in which:

FIG. 1 is a side view of a vehicle manufactured in accordance with this disclosure, this view being partially broken away to illustrate various constructional details;

FIG. 2 is a top view of the device shown in FIG. 1, this view also being partially broken away to illustrate various constructional details;

FIG. 3 is an enlarged view showing the means used to apply paint to a paved surface and to govern the application of such paint;

FIG. 4 is a view illustrating a heating device which may be employed with the invention;

FIG. 5 is a wiring diagram of the controlling device which may be used in governing the application of paint with this invention; and

FIG. 6 is a greatly enlarged, diagrammatic, partial cross-sectional view of a paving stripe created in accordance with this disclosure.

In FIGS. 1 and 2 of the drawings there is shown an apparatus 10 of the present invention including a conventional automotive-type frame 12 to which there are attached in the conventional manner front wheels 14, a steering mechanism 16, a steering wheel 18, and rear wheels 20. These rear wheels are designed to be propelled in a conventional manner by a motor 22 acting through the usual transmission and differential (not shown) commonly found on motor vehicles. Appropriate control means 24 such as pedals are provided upon the frame 12 for governing the operation of the motor 22 and the wheels 14 and 20.

Attached to the frame 12 is a guide means 26, a cleaning means 28, a control means 30, a paint dispensing means 32, a particle dispenser means 34, and drying means 36. As is best apparent in FIG. 1 of the drawings, these various means are located in a line, one behind another, starting at the front of the apparatus 10 immediately above a paved surface 38 upon which this apparatus is operated. Thus, when the apparatus 10 is used for the intended purpose, these various means can be sequentially employed in placing a marking stripe along a paved surface 38 as the apparatus 10 is moved in a forward direction.

The construction and function of the guide means 26 are readily apparent from an examination of the initial two figures of the drawings. Here this means is shown as comprising a frame 40 supporting a horizontally disposed rod 42 upon which there are carried bushings 44 carrying guide rods 46. By adjusting the positions of these bushings 44 and the rods 46, it is possible to locate these members so that they will serve to aid an individual sitting in a seat 48 upon the frame 12 in locating a marking stripe in a predetermined location as the apparatus 10 is being moved forward.

The cleaning means 28 employed with the embodiment of the invention illustrated incorporates a simple air nozzle 50 which is designed to blow dirt from an area to be painted, and to remove moisture from this same area. Air to accomplish these purposes is supplied to the nozzle 50 through an air line 52 leading from a compressed air tank 54. The flow of air to the nozzle 50 is normally controlled by a valve 56 located in the line 52.

The control means 30 is employed to govern the operation of the paint dispensing means 32 and the particle dispensing means 34 so as to actuate both of these latter mechanisms when the apparatus 10 is driven over a previously painted surface. In order to accomplish these ends, the control means 30 is located within a housing 58 which is attached to the frame 12 immediately adjacent the bottom of the apparatus 10 so that a photocell 62 (FIG. 3) receives light emitted from a light bulb 64 and reflected off a previously painted area. This photocell 62 is connected to a grid of a common vacuum tube 66 as shown in FIG. 5. In accordance with conventional practice, the cathode of the photocell 62 is grounded directly, while the cathode of the tube 66 is grounded through a cathode resistor 68. The anode of the tube 66 is connected to a battery 70 through a relay 72. When this relay is closed by virtue of the photocell 62 receiving light, the contacts within this relay are closed allowing current to pass through each of two substantially identical circuits A and B.

The A circuit is designed to provide power to a solenoid 74 under these circumstances to operate the paint dispensing means 32; the B circuit is similarly designed to provide power to a solenoid 76 to operate the particle dispensing means 34. Since the A and B circuits are substantially identical, only the A circuit is specifically described herein. In this latter circuit, the relay 72 is connected through a potentiometer 78 and a grid resistor 80 to the grid of a vacuum tube 82. The junction of the potentiometer 78 and the resistor 80 is grounded through a thermistor 84. The cathode of the tube 82 is grounded through a cathode resistor 86; the anode is connected to the battery 70 through the solenoid 74.

The potentiometer 78, and the other potentiometer in the B circuit are connected to a speedometer mechanism 85 which, in turn, is connected by a speedometer cable 87 (FIG. 3) to a front wheel 14. This cable 87 is attached to the front wheel 14 in a conventional manner. The mechanism 85 is employed to adjust the potentiometers indicated so as to vary the speed with which the solenoids 74 and 76 are actuated, so that, regardless of the speed of the apparatus 10, the location of particles and paint supplied by the paint and particle dispensing means 32 and 34 will coincide with one another and with a previously painted area.

As is best seen in FIG. 3, when the solenoid 74 is actuated, a plunger 88 in the paint dispensing means 32 is actuated, allowing air to travel through a pipe 90 from the air line 52 so as to pull paint through a pipe 92 from paint supply tanks 94 through a spray gun 96 onto the paved surface 38. Thus, when the photocell 62 is actuated by reflected light from the bulk 64, the paint dispensing means 32 is automatically brought into operation.

When the solenoid 76 is actuated by light hitting the

photocell **62**, a plunger **100** within the particle dispensing means **34** is pulled in an upward direction from the position shown in FIG. 3, opening an air valve **102** and a particle passage **104**. When this is done air from the line **52** passes through a pipe **106** and a nozzle **108** towards the surface **38**, tending to drive particles from the passage **104** onto this surface, and embed these particles into the paint and normally into a fresh stripe of paint placed upon this surface by the paint dispensing means **32**.

The manner in which such particles are held within a painted stripe is indicated in FIG. 6 of the drawings. Here there is shown a stripe of paint **107** within which there are embedded particles **109**. These particles are normally driven into a fresh stripe of paint so as to be held within this paint as indicated in FIG. 6.

The condition of the paint and the particles dispensed by the means **32** and **34** as they are supplied to these means during normal operation of the apparatus **10** is important with respect to the quality of the marking stripe created. Generally, this paint is best kept agitated, and paddles **110** are provided within the paint tanks **94** for this purpose. Further, with traffic type paint a more lasting painted stripe is obtained if it is applied at an elevated temperature, preferably within the range of from about 75° to about 85° F. Not only is a more lasting paint stripe obtained by this expedient, but the use of such elevated temperatures aids in the removal of volatiles from the paint upon application and promotes rapid drying. In order to accomplish this end, the tanks **94** are provided with heating jackets **112** and thermostatically controlled valves **114** (FIG. 2) serving to govern the admission of heating fluid to these jackets.

The water normally circulated within these jackets **112** is the cooling water from the motor **22** and from another motor **116**, hereinafter described; this water is circulated to and from the jackets by a system of pipes **118** which serves to connect the cooling water outlets of these motors in parallel with these jackets **112** and with a conventional automotive type radiator **120**. Thus, with this construction, cooling water from the motors **22** and **116** may either go through the radiator **120** or the jackets **112** depending upon whether or not the valves **114** are open; if they are closed, all cooling water from the motors goes through the radiator **120**, otherwise only a fraction of this water goes through this radiator.

The motor **116** is used primarily to supply power to a belt and pulley system **122** connecting this motor to an air compressor **124** and to the paddles **110** within the paint tanks. This compressor **124** is employed to supply compressed air through a pipe **126** to the tank **54**; the function of the paddles is as previously indicated. The exhaust outlets from both the motors **22** and **116** are joined by pipes **128** leading to a heating jacket **130** surrounding a particle hopper **132**.

The prime function of the particle hopper **132** is to supply particles which it is desired to embed within a stripe of paint to the particle dispensing means **34** through the particle passage **104**. A wide variety of different particles may, of course, be embedded in paint for this broad purpose. The preferred particles for such use are small reflective glass spheres, preferably within the size range of from about $\frac{9}{1000}$" to about $\frac{34}{1000}$" in diameter. Such spheres are extremely hydroscopic in nature, and, if exposed to either the air or the exhaust gases, pick up sufficient moisture so that they do not readily embed or bond themselves within a paint strip. Further, they adhere most satisfactorily onto or within a paint stripe when placed upon such a stripe at a relatively high temperature under pressure. Generally, temperatures of from about 150° to 250° F. are satisfactory with the application of glass spheres of the class indicated within what is termed in the trade "traffic paint." Such use of heated particles also aids in the drying of paint.

In order to prevent the contract of particles within the hopper **132** with air from which such particles would normally absorb water vapor, the hopper **132** is, as shown in FIG. 1, closed. Further, the heating jacket **130** around this hopper is located in such a manner that at no time is there any opportunity of contact between exhaust gases in this jacket and such particles. A vent means **134** is provided at the top of the jacket **130** for the obvious purpose of removing spent exhaust gases.

On many occasions, it is desired to more precisely control the temperature of the particles supplied to the particle dispensing means **34** than can be accomplished through the use of a heating jacket **130**. For this purpose, a structure such as is shown in FIG. 4 of the drawings can be inserted around the particle passage **104**. This structure consists of an electric resistance member **136** which is controlled by means of a thermostat **138**.

It is normally not necessary with the present invention to provide any agitating means to insure a steady supply of small particles to the particle dispensing means **34** inasmuch as the particles normally employed are exceedingly small, and inasmuch as the apparatus **10** vibrates a great deal during use, preventing piling up of such particles.

The drying means **36** normally employed with the instant invention is coupled to the pipes **128** so as to be controlled by a valve **140** located at the junction of a pipe **142** forming a part of this drying means **36** and a pipe **128**. The pipe **142** merely leads to a hood **144** which is designed to convey exhaust gases directly onto the paved surface **38** so as to dry any paint placed upon such surface. The amount of drying action of the drying means **36** may be varied within wide limits. In general, however, the larger the quantity of exhaust gas supplied to this drying means, the more complete action of such means, and, therefore, the shorter the drying period for a stripe of paint applied to the paved surface **38**.

The herein described invention has proved itself to be exceedingly effective in commercial applications. It has been perfected only after very lengthy experimentation and can be used to paint marking stripes upon highways at speeds up to about 35 to 40 miles an hour. As virtually any motorist who has previously encountered painting equipment will realize, this is a very distinct improvement over the prior art. Further, marking stripes created in accordance with this disclosure are partially dried or "set" initially, and can be driven over by cars, etc. without tracking of paint in a very short period. Not only is the apparatus of the instant invention distinguished by virtue of the speed with which it may be operated, but it is also distinguished because the complete marking srtipe placed upon a paved surface with this apparatus tends to be exceedingly lasting in character when subjected to all types of wear.

It is obvious from a consideration of the foregoing description and drawings that a number of modifications may be made within the scope of the present disclosure. As an example of such modifications, it is possible to substitute a brush for the precise cleaning means **28** shown. Further, different constructions than those specifically shown in the drawings serving to dispense paint and dispense particles may be employed if desired. It is obvious that virtually any combination of the means **28**, **30**, **32**, **34** and **36**, previously described, may be useful for many specific applications. As an example of this point, it is frequently possible to place very satisfactory painted stripes upon highways and the like, omitting the use of particles. When the apparatus **10** is used for such purpose, the particle dispensing means **34** may be omitted. Also, on many occasions it is possible to omit the cleaning means, the control means, or the drying means, although an effective apparatus capable of accomplishing the function of the present invention is only obtained by using all of these means simultaneously. For many purposes, however, the essential features of the invention can be obtained by omitting one or two of the specific means described. Thus, instead of the precise control means

shown, it is possible to actuate the means 32 and 34 by manually operated valves or switches of a type known to the art. All modifications of the character indicated herein which are within the skill of the art are to be considered as part of the inventive concept insofar as they are defined by the appended claims.

I claim as my invention:

1. An apparatus for rapidly applying a stripe of paint to a surface, which comprises: a wheeled vehicle; means attached to said vehicle for depositing paint on said surface beneath said vehicle; and means responsive to the speed of said vehicle and to a stripe of paint already on said surface ahead of said means for depositing paint for actuating said means for depositing paint whereby a paint stripe is applied by said apparatus only upon said previously painted stripe as said wheeled vehicle is moved along said surface.

2. An apparatus for rapidly applying a stripe of paint to a surface, which comprises: a wheeled vehicle; means attached to said vehicle for depositing paint on said surface beneath said vehicle; means attached to said vehicle for placing reflective particles in paint which has been deposited on said surface by said means for depositing paint; and control means responsive to the speed of said vehicle and to a stripe of paint already on said surface ahead of said means for depositing paint, for actuating said means for depositing paint, and for actuating said means for placing reflective particles whereby a paint stripe and reflective particles are applied by said apparatus only when said previously painted stripe as said wheeled vehicle is moved along said surface.

3. An apparatus as defined in claim 2, in which said control means includes serially connected switch means, delay means and power means, said switch means being responsive to said stripe already on said surface for energizing said power means through said delay means, said delay means being automatically variable as a function

of the speed of said vehicle, said power means actuating said means for depositing paint and said means for placing particles.

4. An apparatus for rapidly applying a stripe of paint to a surface, which comprises: a wheeled vehicle; means attached to said vehicle for heating paint; means attached to said vehicle for depositing the heated paint on said surface; means attached to said vehicle for heating small reflective particles; means attached to said vehicle for placing the heated particles in the heated paint which has been deposited on said surface; and control means responsive to the speed of said vehicle and to a stripe of paint already on said surface ahead of said means for depositing paint, for turning said means for depositing paint off and on, and for turning said means for placing particles off and on, whereby a paint stripe and reflective particles are applied by said apparatus only upon said previously painted stripe as said wheeled vehicle is moved along said surface.

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CERTIFICATE OF CORRECTION

Patent No. 3,046,854 July 31, 1962

Ellery A. Wilson

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 75, for "contract" read -- contact --; column 5, line 30, for "when" read -- upon --.

Signed and sealed this 11th day of December 1962.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents