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G. RODLI ET AL

2,330,843

MARKER AND METHOD

Original Filed May 19, 1939

Fig. 1.

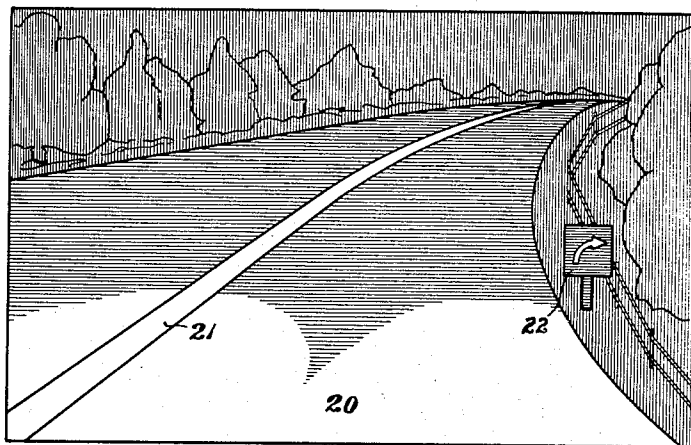


Fig. 2.

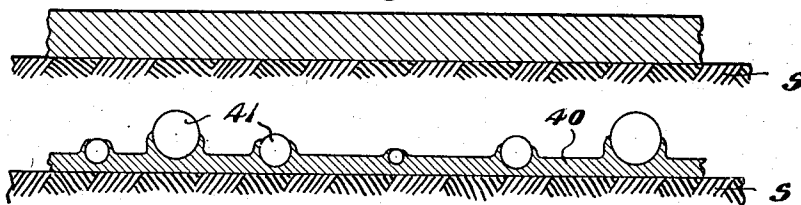


Fig. 3.

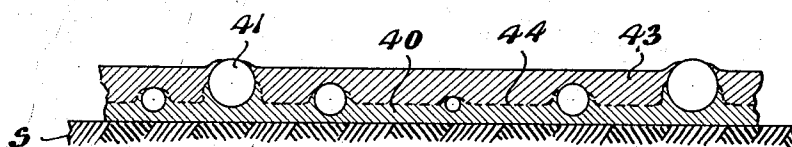


Fig. 4.

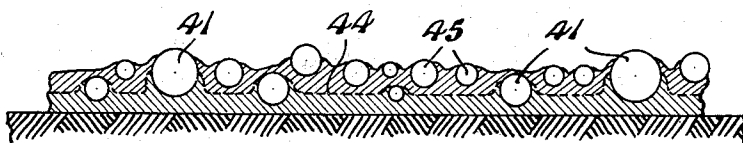


Fig. 5.

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MARKER AND METHOD

Gilbert Rodli, Huntingdon, Pa., and Leroy Shu-
ger, Baltimore, Md.Original application May 19, 1939, Serial No.
274,667. Divided and this application October
15, 1941, Serial No. 415,117

8 Claims. (Cl. 94—1.5)

This invention relates to surface markers and more particularly to markers adapted to be used as center lines and lane lines on highways and vertical signs and markers.

This application is a division of copending application Serial Number 274,667 filed May 19, 1939.

Prior to the instant invention, it has been customary to simply paint center lines and lane lines on highways but such lines have been found to be relatively short-lived; and necessary, very frequent replacement has been relatively costly. Further, the reflecting efficiency of these lines at night has not been high enough to give satisfactory results.

It has been proposed that glass spheres be incorporated in these painted lines while they were in a moist condition in order to increase the reflecting efficiency of the lines at night. While such lines have been somewhat better than the lines comprising simply paint, yet the lines incorporating the glass spheres have not been very much longer lived for the glass spheres soon become detached from the paint and the line wears away by traffic as before.

It is an object of the instant invention to provide a marker suitable for use as a center line, lane line, or vertical surface sign which will be relatively strong and long lived and comprise a plurality of layers of binding material and autocollimating units associated with each other in a novel manner.

It is another object of the instant invention to provide a marker which will appear to be one color in the light from the sky, and another color at night when artificial light from a predetermined source is applied thereto.

Other objects and the nature and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawing, wherein:

Figure 1 is a view in perspective taken at night time of a highway including surface markers in accordance with the invention;

Fig. 2 is a cross sectional view of the partially assembled marker illustrating the first step in the process;

Fig. 3 is a view similar to Figure 2, but illustrating the second step in the process;

Fig. 4 is a view similar to Figures 2 and 3, and illustrates a third step in the process; and

Fig. 5 is a view similar to Figures 2, 3 and 4, and illustrates a fourth step in the process.

Referring to Figure 1 of the drawing, a road 20 has applied thereto a center line 21 and at its side is erected a vertical marker 22. The center line 21 is fabricated as described below.

Referring to Figures 2, 3, 4 and 5, a relatively thin film of reflecting binder 40 is applied to the surface S which is to be marked and while the

same is in a wet or semi-wet condition, a relatively small quantity of autocollimating units 41 of varying sizes from say 0.005 to 0.040 of an inch in diameter are applied thereto. While the relatively thin film 40 is in the moist or dry condition, a second relatively thin film of reflecting binder 43 is applied thereto. This pigmented reflecting binder 43 may or may not contain a solvent for effecting an especially good weld 44 between the reflecting binder 40 and the reflecting binder 43. This solvent may be such as is specified in copending application Serial Number 274,666 for causing softening of the pigmented binder 40 thereby obtaining the desired bond between the two reflecting binders 40 and 43, respectively. While the second pigmented layer 43 is in a wet or semi-wet condition, a relatively small quantity of autocollimating units 45 may be applied thereto to effect a finished marker.

It has been found in practice that for optimum wear conditions and high reflecting efficiency, approximately three to seven and one-half pounds of glass sphere autocollimating units may be used in conjunction with one gallon of pigmented binder. In accordance with the invention, but approximately one and one-half to three and three-fourths pounds of glass spheres are utilized per gallon of thin film paint for the first thin layer and the second layer also comprises one and one-half to three and three-fourths pounds of glass spheres per gallon of thin film paint. In order to effect a thin layer of reflecting binder, a paint in accordance with the teachings of the copending application Serial Number 274,666, now U. S. Patent No. 2,268,537 granted December 30, 1941, having the desired characteristics should be selected. Such a paint will generally have a relatively high volatile content and low non-volatile content.

A suitable reflecting binder for holding a series of autocollimating units in accordance with the instant invention may comprise the following ingredients in the proportions set forth:

	Gallons
Pigment.....	2.0071
Oils.....	1.4010
Resins.....	0.7000
Volatile solvent.....	3.50

The following pigments or related pigments are in general suitable as ingredients for white markers: titanium pigment such as for example titanium dioxide, titanium dioxide extended with barium sulphate or calcium sulphate, or magnesium silicate; zinc sulphide; and normal or high strength lithopones. For colored markers other than white the following pigments or related pigments are suitable: lead chromates, zinc chromates, siennas, umbers, iron oxides, inorganic or

organic reds. Reinforced pigments sometimes referred to as inerts or extenders may also be used such as for example: "Asbestine" (magnesium silicate), diatomaceous silica, amorphous and crystalline silica, micaceous materials, barium sulphate, whiting and pumices.

The following natural resins and some of their glycerol esters may be utilized as ingredients of the non-volatile portions of the binder: rosin, rosin ester, Congo, Congo ester, Manila, Manila ester, dammar, sandarac, mastic, pontianac, East India, kauri, and shellac. The following synthetic resins may also be used: glycerol phthalate, ethylene glycol phthalate, pentaerythritol phthalate, vinyl acetate polymers, phenol formaldehyde condensation products, modified phenol formaldehyde, formaldehyde resins, para coumarone-indene (cumar) resin, chlorinated diphenyl resin, and cyclo hexanone formaldehyde resin.

The non-volatile proportions of the binder may also include the following drying and semi-drying oils which are of vegetable or animal origin: China-wood oil, refined linseed oil, linseed oil (kettle bodied), menhaden oil, oiticica oil, poppy seed oil, castor oil, sardine oil, soya bean oil, and sunflower oil.

The volatile proportions of the binder may comprise one or more conventional thinning agents or solvents or one or more of those selected from within a predetermined distillation range to give the required evaporation rate. Suitable aliphatic solvents are exemplified by mineral spirits, V. M. & P. naphtha, and gasoline. Suitable aromatic solvents may comprise xylol, toluol, and benzol. Other organic solvents may include acetone; ethyl acetate; butyl, ethyl, and other alcohols.

In order that the reflecting efficiency may be high while the marker be of low cost, the first layer may comprise white pigmented paint whereas the second layer may have white, yellow or any other pigment, thereby effecting high reflecting efficiency at night and a particular low cost colored effect in the day time.

The saving in cost of pigmented binder will be apparent when the cost of the pigment is an important factor. For example, if the cost of yellow pigment is more than the cost of white pigment and it is desired that the line appear white at night, then a relatively thin film of white pigmented binder is used first and the spheres which contact the white pigment will serve to reflect white light back to an artificial source of light at night. The second layer may comprise a pigment of higher cost which may be of another color such as yellow. Accordingly, it will be apparent that the invention not only serves to provide the reflection of different colored light depending upon whether or not the markers are seen at night or in the daytime, but it may serve to effect a cheaper finished marker which will operate as desired in the daytime and in the night-time.

Referring particularly to Figures 3, 4 and 5, it will be clear that the graduated sizes of the autocollimating units makes possible the immediate utilization of the lower reflecting layer as a reflecting surface because the largest spheres project through the upper pigmented layer. As the marker wears, and the binder wears correspondingly, the smallest spheres which at first may have been buried, now come into play and thereby the light reflecting efficiency of the composite marker is maintained.

It is to be understood that it is within the 75

scope of the invention to fabricate vertical markers such as the sign 22 as well as horizontal markers such as the center or lane line 21 and that the auto-collimating units may be graduated in size from say 0.005 to 0.040 inch in diameter.

It will be obvious to those skilled in the art that various changes may be made in this device without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawing and described in the specification but only as indicated in the appended claims.

What is claimed is:

1. A combined surface marker comprising a road surface, a relatively thin first film of pigmented binder applied to said surface, a first series of autocollimating units at least partially embedded in said pigmented film, said first series of units being of various sizes, the smaller and smallest of said autocollimating units being substantially or completely embedded in said first film of binder, the larger and largest of said units having a great portion of their surface areas exposed, a second pigmented film applied over said first film, a second series of autocollimating units at least partially embedded in said second film to effect a marker having great durability and involving a pigmented binder and autocollimating units which marker will when first installed efficiently serve to effect autocollimation and as it wears and the larger and largest units are lost from the marker by abrasion the marker will still serve to effect autocollimation with continued efficiency.

2. The structure recited in claim 1, said base being horizontal.

3. The structure recited in claim 1, said marker being a lane line on a road surface.

4. A combined surface marker comprising a road surface, a relatively thin film of reflecting pigmented binder on said surface, a series of autocollimating units embedded therein, some of said units being relatively greatly exposed, some of said units being substantially embedded in said thin film, a second opaque pigmented film on said first mentioned film and about said largely exposed units.

5. The structure recited in claim 4, and a second series of autocollimating units at least partially embedded in said second pigmented film.

6. The structure recited in claim 4, the first pigmented binder being of a different color than said second pigmented binder whereby said marker will appear to have the color of the first pigmented binder at night in the light of an automobile headlamp and the color of the second pigmented binder in daylight.

7. The process of fabricating a combined highway and surface marker comprising applying to a highway surface a relatively thin layer of reflecting pigmented binder, before said relatively thin film dries applying thereto a quantity of relatively small autocollimating units including some units which are relatively large in height as compared to said thin layer of reflecting pigment and some units being so small as to be substantially completely embedded in said thin film, applying a second layer of pigmented binder over said first film and about said units of relatively large height.

8. The method recited in claim 7, and partially embedding a second series of autocollimating units in said binder.

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