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G. RODLI ET AL

2,268,538

ROAD MARKER

Filed May 24, 1939

Fig. 1.

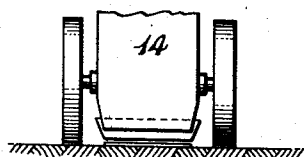
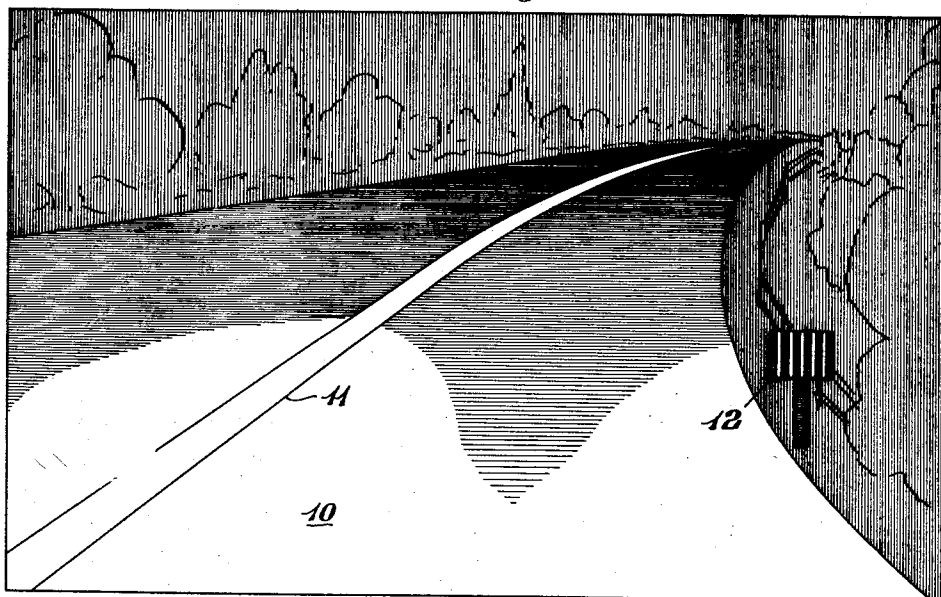


Fig. 2.

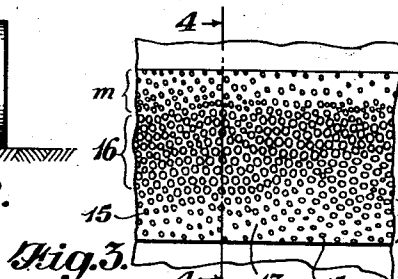


Fig. 3.

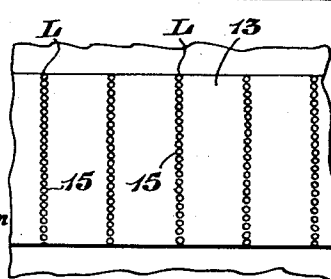


Fig. 4.

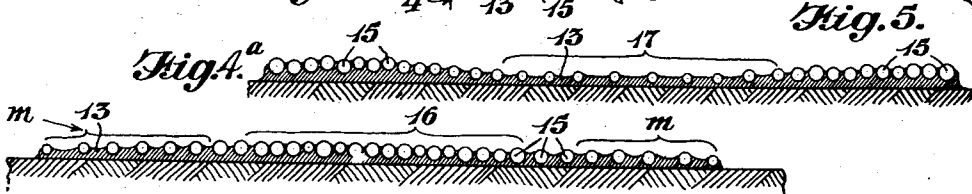


Fig. 5.

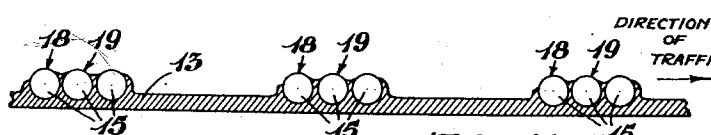


Fig. 6.

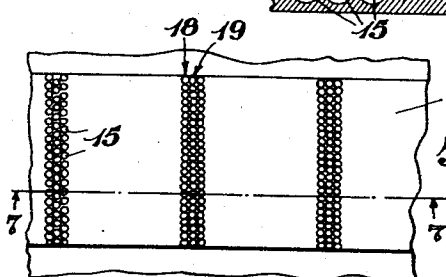


Fig. 7.
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UNITED STATES PATENT OFFICE

2,268,538

ROAD MARKER

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6 Claims. (Cl. 94—1.5)

This invention relates to surface markers and more particularly to horizontal and vertical surface highway markers incorporating reflecting binders and transparent auto-collimating units distributed in said binder in accordance with a predetermined plan or pattern.

Prior to the instant invention, it has been proposed that glass spheres be distributed in a manner to cover the entire surface of a center line road marker as taught in the Korff Patent No. 2,043,414. Whereas such total coverage of the line or marker insures great durability, we have found that the auto-collimating efficiency does not always vary in direct proportion to the number of auto-collimating units embedded in the reflecting binder.

It is an object of the instant invention to provide a surface marker comprising a pigmented reflecting binder and a plurality of auto-collimating units distributed thereover in partial embedded relation in accordance with a predetermined plan or pattern.

It is a further object of the instant invention to provide a surface marker comprising a pigmented binder and a plurality of glass spheres distributed thereover in partial embedded relation in accordance with a plan to effect optimum conditions with regard to reflection and durability.

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:

Fig. 1 is a night time view in perspective, from an automobile having lighted headlamps, of a highway illustrating two markers in accordance with the invention;

Fig. 2 is a fragmentary elevational view of an auto-collimating unit dispenser;

Fig. 3 is a plan view illustrating one system of distribution of auto-collimating units in a reflecting binder;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 3 and looking in the direction of the arrows;

Fig. 4a is a view similar to Fig. 4 but illustrating a modified system of distribution;

Fig. 5 is a view similar to Fig. 3 but illustrating a modified system of distribution;

Fig. 6 is a view similar to Figs. 3 and 5 but illustrating another system of distribution; and,

Fig. 7 is a longitudinal sectional view taken along line 7—7 of Fig. 6 and looking in the direction of the arrows.

Referring to Fig. 1, a highway 10 has been marked with a center line 11 in accordance with

the instant invention as later described and a vertical marker 12 has been erected at the side of the road 10, which marker 12 includes a vertical reflecting surface also in accordance with the invention.

The center line 11 may be fabricated by applying to the highway 10 a strip of reflecting pigmented binder material 13, see Figs. 3 and 4, and then while the said reflecting pigmented binder is in a wet or semi-wet condition passing thereover a dispensing apparatus 14 schematically illustrated in Fig. 2, which distributes thereover a plurality of auto-collimating units 15.

The reflecting binder may comprise a paint of the oleoresinous type such as taught in copending application Serial No. 274,666, filed May 19, 1940.

The auto-collimating units may take any one of the geometrical configurations depicted in the Gill Patent No. 1,902,440 and may be of uniform or graduated size from say 0.005 of an inch to 0.040 of an inch, though the drawing illustrates spherical auto-collimating units.

The auto-collimating unit dispenser 14 forms no part of the instant invention and may comprise a machine such as set forth in the copending application Serial No. 263,548.

The reflecting pigmented binder 13 may be applied to the road surface 10 or other surface to be marked in the usual manner such as by conventional road striping machines not shown.

The binder may be applied evenly to the surface to be marked or it may be thicker in some areas than in others as illustrated in Figures 4 and 4a. It is significant that where a heavier film is deposited a greater quantity of beads is distributed.

When the reflecting binder 13 is completely covered with spherical auto-collimating units, the reflecting efficiency of the marker is materially cut down as the proximity of adjacent units interferes with light rays passing to and from individual units. Accordingly, we have found it desirable to utilize less than one hundred per cent coverage in connection with the fabrication of surface markers in accordance with the invention. When the auto-collimating units are arranged in the marker with great spaces between individual units, each unit operates efficiently but the durability of the marker as a whole is materially cut down for the units do not support each other against wear by traffic passing thereover and further the relatively great spacing of the units do not prevent direct wear of the reflecting binder by vehicular traffic which preven-

tion is essential if long life of the marker is to be effected.

A center line applied to a road, said line being three hundred and twenty feet long and four inches wide, may involve the application of approximately one gallon of a reflecting pigmented binder such for example as that referred to in copending application Serial No. 274,666. The chance distribution of approximately four to seven and a half pounds of glass spheres ranging from 0.005 inch to 0.040 inch in diameter gives optimum conditions with regard to both reflection and durability. When a greater quantity of spheres is utilized the durability is not noticeably increased but the reflection efficiency is noticeably decreased, indicating that the range of from approximately four to seven and one-half pounds of glass spheres per gallon of reflecting pigmented binder is a critical relation between the quantity of auto-collimating units and the quantity of reflecting pigmented binder used or the area covered. When less than four pounds of spheres are utilized definite marked wear of the pigmented binder occurs defeating the purpose of the spheres with regard to imparting the quality of durability to the completed composition marker.

It is to be understood that ratios of pounds of glass spheres to gallons of binder are to be considered in connection with the specific binder, one gallon of which covers the area above recited. When the binder covers less than this area, a lower ratio of pounds of glass spheres per gallon of binder is used. When the binder covers more than this area, a greater ratio of glass spheres per gallon of binder is used. The ratio of unit weight of glass spheres per unit area of coverage remains substantially constant but may vary with different types of binders.

When the reflecting binding material is applied to the road surface with some types of applicators, a greater film thickness occurs at the center 16 of the line, see Figs. 3 and 4, which film thickness is capable of holding a greater number of spheres, say that corresponding to ninety per cent coverage, whereas the remainder of the line, and along the margins *m*, having a thinner film of binder, may best embed but approximately that quantity corresponding to fifty to sixty per cent coverage. A line of this type has been found to give great durability by reason of the almost complete coverage in the center and high auto-collimating efficiency especially on the margins.

When the binder applicator is of another type, a thinner film thickness occurs at the center 17 of the line and the cross sectional distribution illustrated in Fig. 4a is preferred.

These plans of distribution are economical because they effect great durability and high efficiency though involving a minimum of auto-collimating units. In effecting lines in accordance with the last two plans of distributions described, the ratio of from four to seven and one-half pounds of glass spheres per gallon is material to the invention, as hereinbefore described, and is accordingly preferred.

Another plan of distribution which has been found to give high auto-collimating efficiency and favorable durability is that which involves embedding the spheres in the paint with approximately a one hundred per cent coverage along the width of the line and with marked spacing along the axis or length of the line, resulting in the patterns illustrated in Figs. 5, 6 and 7. With

this arrangement the reflecting pigmented binding paint 13 is continuous but the reflecting spheres 15 are arranged discontinuously, being but continuous at intervals. The length of the interval may simply be one sphere, see Fig. 5, or several spheres, see Figs. 6 and 7. The spacing of the spheres along the length of the line prevent interference of the light rays and permits reflection and refraction in the desired auto-collimating manner such as illustrated by the arrows in Fig. 7.

We have found that the distributions illustrated in Figs. 5 and 6 give approximately the same high reflecting efficiency with great savings in quantity of auto-collimating units, but that the latter form makes for great durability for the line of spheres 18 are supported by the line 19 and should any of the spheres in the line 18 become dislodged after a great length of service, then the exposed corresponding sphere in line 19 will come into play and maintain the reflecting efficiency of the marker. The loss of each sphere in any of the lines *L* of spheres in the marker illustrated in Fig. 5 decreases the reflecting efficiency of the said marker correspondingly. We have found that the life of the marker illustrated in Figs. 6 and 7 is much more than three times as great even though but three times as many spheres are utilized for the particular arrangement inherently involves a backing up or supporting of the front line of spheres 18 by the lines of spheres 19 and 20. At the same time the reflecting efficiency of the marker illustrated in Figs. 6 and 7 is maintained and whereas though the initial reflecting efficiency of the marker illustrated in Fig. 5 is just as high, with the loss of spheres over a period of time its efficiency correspondingly decreases. In connection with these plans of distribution, illustrated in Figs. 5, 6, and 7, the ratio of four to seven and one-half pounds of glass balls to one gallon of binder is obviously not applicable.

It is to be understood that the above systems or plans of distribution of auto-collimating units and surface markers is applicable to vertical markers as well as to horizontal markers and that the system illustrated in Fig. 1 on the vertical surface marker 12 has been found to give very good results especially with regard to reflection of light received by the marker at a relatively small angle to its surface.

The chance use of glass spheres of varying sizes within the range from .005" to .040" in any of the distribution plans described makes for great durability especially in those lines in which the thickness of the binder varies. In those lines some of the smaller spheres may be more or less completely covered in thick areas of the binder when the binder is relatively new. As the binder wears under usual traffic conditions, after a long period of time in service, these small spheres come into play and serve to maintain the high reflecting efficiency of the marker when some of the large spheres, which were operative initially, have become dislodged because of thinning of the binder.

It will be obvious to those skilled in the art that various changes may be made in the markers described 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 highway surface and marker

comprising a road surface, a reflecting pigmented paint-like binder of the oleoresinous type and a plurality of relatively minute transparent auto-collimating units partially embedded therein, said auto-collimating units being arranged over the surface of said marker in accordance with a predetermined plan, the cross sectional thickness of said binder varying in different areas of said marker, the distribution of said units being such as to effect the location of a relatively greater number of units where the cross sectional thickness of the binder is greater and a relatively fewer number of units where the cross sectional thickness of the binder is relatively small, the preponderance in number of the auto-collimating units being spaced from and out of contact with adjacent auto-collimating units.

2. A combined highway and lane line comprising a road surface, a relatively long narrow strip of pigmented paint-like binder of the oleoresinous type and a plurality of relatively minute transparent auto-collimating units partially embedded in said strip, the transverse sectional thickness of said binder being greater at the center than at the sides, the distribution of said units being such as to effect the location of a relatively greater number of said units at the center of said strip and a relatively fewer number of units along the sides and margins of said strip, the preponderance in number of the auto-collimating units being spaced from and out of contact with adjacent auto-collimating units.

3. A combined highway and lane line comprising a road surface, a relatively long narrow strip of reflecting pigmented paint-like binder of the oleoresinous type and a plurality of relatively minute transparent auto-collimating units partially embedded therein, said auto-collimating units being arranged over the surface of said line in accordance with a predetermined plan, the transverse sectional thickness of said binder being greater at the sides and margins than in the center, the distribution of said units being such as to effect the location of a relatively

greater number of units along the sides and margins of said strip and a relatively fewer number of units in the center of said strip, the preponderance in number of the auto-collimating units being spaced from and out of contact with adjacent auto-collimating units.

4. A combined highway and surface marker comprising a road surface, a reflecting pigmented binder of the oleoresinous type and a plurality of transparent glass spheres ranging in size from approximately .005" to .040" in diameter partially embedded therein and arranged in the outer or top surface of the marker, the ratio of glass spheres to binder being less than approximately seven and one-half pounds of glass spheres to one gallon of said binder when applied with such film thickness as will be effected when said one gallon is spread over an area within a rectangle approximately four inches wide and approximately three hundred and twenty feet long, whereby the spheres will be so spaced and arranged in said binder as to be capable of efficient autocollimation.

5. A combined highway and surface marker comprising a road surface, an elongated narrow reflecting pigmented binder of the oleoresinous type and a plurality of relatively small glass spheres partially embedded therein and arranged in the outer top surface of the marker, said glass spheres being arranged in sections extending transversely of said marker with the spheres in each section being relatively close to each other; each of said sections being spaced longitudinally by a distance equal to a plurality of the diameter of said spheres, whereby said marker will be capable of efficient autocollimation.

6. The structure recited in claim 5, each of said sections comprising a plurality of closely arranged rows of spheres extending transversely of said marker, whereby said marker will be durable in nature.

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