United States Patent

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[33] **Italy**
[31] **811581**

[54] **ROADWAY SURFACE MARKING, AND MARKED ROAD**
12 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **94/1.5**
[51] **Int. Cl.** **E01c 23/16**
[50] **Field of Search** 94/1.5

[56] **References Cited**

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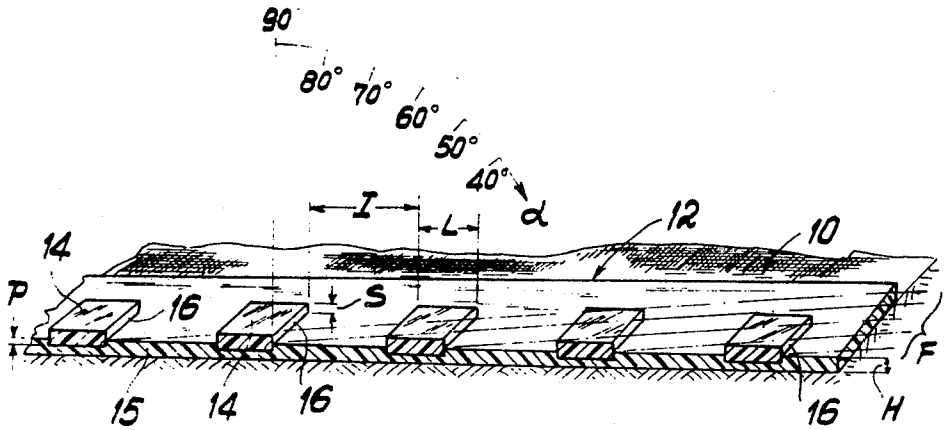
ABSTRACT: A marked road having a roadway surface for vehicles and one or more strips of marking tape joined to the upper face of said surface. Said marking tape consists, in its parts adjacent to its upper face, of a composition ensuring optimum daylight visibility and traffic endurance, forming the greatly prevailing part of the marked surface area. A plurality of spacedly located elements is evenly arranged on and partly embedded in a base strip of said composition, and consisting of a composition including a substantial amount and preferably over 20 percent and as high or even higher than 80 percent by weight of transparent glass microspheroids ensuring high light reflection efficiency to said elements when viewed at might.



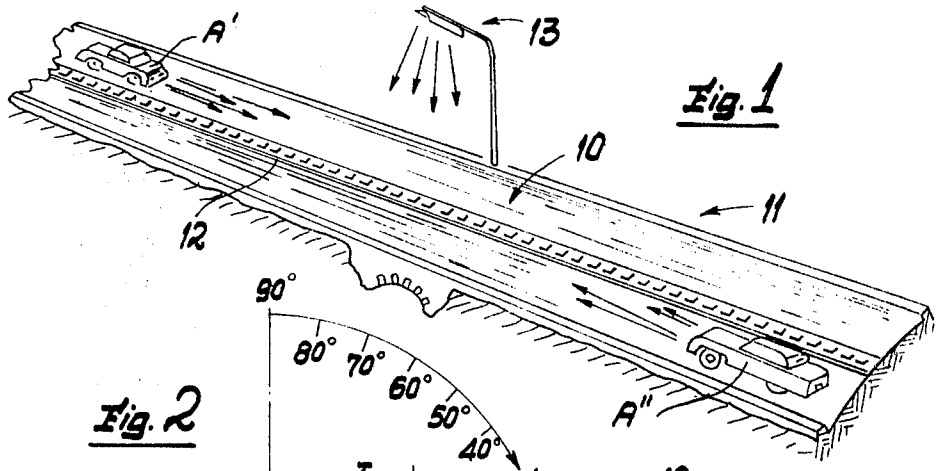
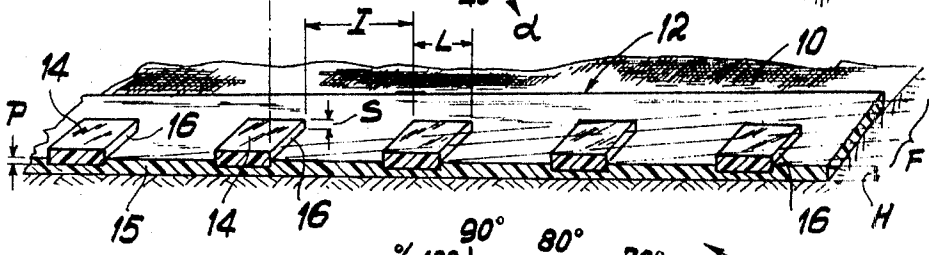


Fig. 1

Fig. 2



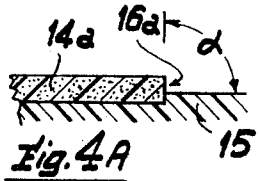


Fig. 4A

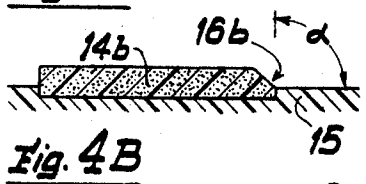


Fig. 4B

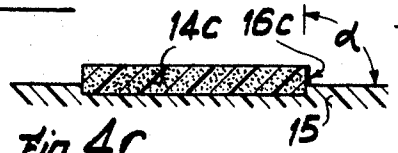


Fig. 4C

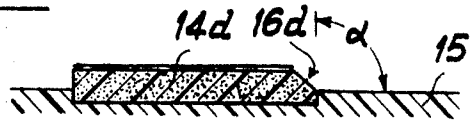


Fig. 4D

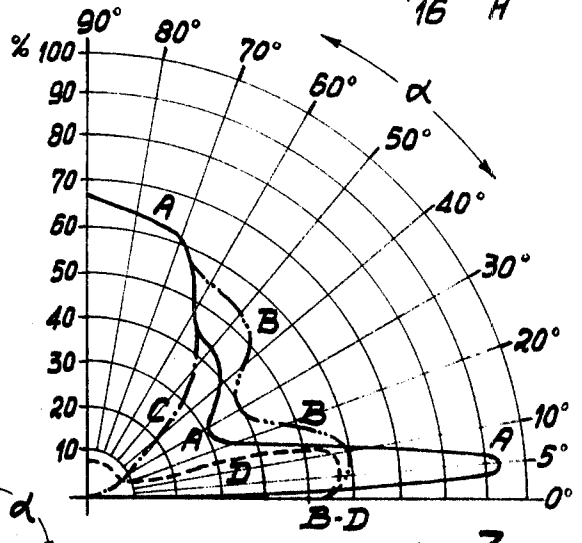


Fig. 3

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ROADWAY SURFACE MARKING, AND MARKED ROAD

BACKGROUND OF THE INVENTION

This invention is related to the art of marking a roadway surface, and more particularly to the marking of traffic lines and other directional data upon the pavement of streets and highways, by applying and securing road marking material to said pavement.

An ever extended use is nowadays made of road marking strip material to provide road-center of traffic lane dividing lines and other traffic aids. It can be applied advantageously by taking use of powerful and rapidly operating mechanical aids, such the apparatus described and shown in my prior U.S. Pat. No. 3,007,838.

From the point of view of actual service of the marking it is evident that the same should have the property of sharp and long-range visibility when viewed either at day or at night by motorists. According to conventional art, there is a tendency of producing the tape material of a composition such as to provide a smooth snow-white upper face to improve such visibility. An upper surface of such tape tends to cause skidding when wet, however, is too brilliant under bright sunlight and is rapidly spoiled by wearing off.

In my prior patent application Ser. No. 589,288, filed Oct. 25, 1967 (now U.S. Pat. No. 3,399,607), I have described and shown a new road marking tape material, including components adapted for providing upper surface portions of high visibility, namely of high reflectivity, and upper surface portions possessing nonskid properties.

It has, however, been found that even by providing the most clear and smooth upper surface, its visibility is not as effective as desirable when the road marking is illuminated and viewed under a very small angle of incidence (the angle between the direction of light and the roadway pavement), as occurs when travelling along unilluminated highways at night, the one source of light being the vehicle headlamps. Such visibility is particularly poor when motor vehicles are about to pass and use is made of lower or passing beams.

It is further known that signs and markings can be provided which have light long-range visibility when viewed at night by motorists, by making use of compositions including transparent glass microspheroids and high reflective materials. The reflective materials reflect the light and the microspheroids act as small individual light condensers. However, the angle of light incidence is still not as good as desired for long-range visibility on a flat surface.

The addition, such microspheroids are a very costly material. The reflecting effect is nearly proportional to the percentage of said material in the strip forming composition, wherein the material must be present at least for a substantial part of its thickness to provide the desired visibility even when the strip has been thinned by long service.

Also, a surface a substantial part of which consists of such glass microspheroids is dangerously apt to cause skidding when wet or covered by mud or snow. Still further, such surface is not as clear or white as desirable, and it is therefore not as visible as desirable, in cloudy daytime for example. Further, dirt is collected within the small cavities left by the unavoidable detachment of microspheroids, thus darkening the mark.

Accordingly, the marking of the present invention has been developed to overcome the above and other drawbacks and limitations, by providing a new and greatly more efficient road marking tape material, which is not subject to the above and other objections.

SUMMARY OF THE INVENTION

In practicizing the invention, there is provided a composite road marking strip or tape material essentially consisting of a base strip component, adapted to be firmly secured to the roadway surface at its lower face and to provide at its upper face good daylight visibility, and of at least one and preferably a plurality of upper components, firmly secured to the upper portion of said base component to provide a minor part of the upper face of the entire mark, said upper component or components being formed by a composition including, as a substantial part thereof, reflective-effect providing materials, in particular transparent microspheroids and reflective substances.

Specific embodiments and features will be discussed with reference to the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rather diagrammatic perspective illustration of a roadway provided with a centerline made of a road marking according to the invention;

FIG. 2 is a fragmentary longitudinal sectional view of the road marking material, including a quadrant which repeats the scale of the angle "alpha" in FIG. 3;

FIG. 3 is a graph illustrating the visibility of the marking, under different conditions; and

FIGS. 4A, 4B, 4C and 4D are fragmentary sectional views of part of the material in the different conditions for which the curves of FIG. 3 have been plotted.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown in FIGS. 1 and 2, on the surface 10 of a roadway 11 which may be lighted by lamp or lamps 13 there is applied and firmly secured at least one continuous (or interrupted) traffic aid, such a centerline 12. Such traffic aid consists of a base strip component 15 (FIG. 2) of proper composition and thickness H and of a plurality of reflective elements 14 evenly arranged and aligned, spaced from the side edges of base strip 15 and at uniform intervals I therebetween. Each element 14 is partly embedded in the base strip, at a suitable depth P, for ensuring firm connection, and protrudes above the upper face of base strip component 15 for a height S say of very few millimeters, whereby at least a part 16 of peripheral surfaces of said elements forms a substantial angle with impinging light emitted by headlamps of vehicles such as indicated at A′ and A″ in FIG. 1. The length L (as measured longitudinally of the strip) of each element 14 is determined both in view of the mechanical resistance of the element and its safe connection to the base strip, and in view of providing a substantial surface area for imparting nonskid properties to the marked surface.

The quadrant in FIG. 2 repeats, for better understanding, the scale of the angle "α" in FIG. 3 (still to be described), such as the angle at which light beams F impinge upon elements 14, especially at the edges 16 thereof.

The width of the element (as measured crosswise to the strip) is preferably proportional to that of the base strip, which is quite conventionally dimensioned. Such width is generally from one fourth to two thirds of the base strip, one third being the preferred and favorably proved relationship.

The protusion S is of height selected in view of its mechanical resistance, resistance to wearing off (it is assumed that the protruding parts will wear off at a higher rate that the adjacent surface of the base strip) and the desired light reflectivity, as discussed below. In the Tables 1 and 2 below possible and preferred ranges of dimensional values and relationships are given, said ranges having been determined upon experiments made by making use of quadrangular elements having a width one-third of the base strip width. The measures are given in millimeters.

TABLE 1

Dimension	Ranges			
	Possible		Preferred	
	From—	To—	From—	To—
Thickness H of base strip	1.0	5.0	1.8	3.0
Length L of elements	8.0	100.0	10.0	50.0
Interval I between the elements	10.0	300.0	20.0	50.0
Protrusion S of elements	1.0	5.0	1.0	3.5
Embedding P of elements	0.0	4.0	1.0	2.5
Thickness ($S+P$) of elements	1.0	9.0	2.5	6.0

TABLE 2

Relationship	Ranges of ratios			
	Possible		Preferred	
	From—	To—	From—	To—
L/I	3/1	1/5	1/1	1/4
P/H	0/1	4/5	1/8	2/3
$P/(S+P)$	0/1	2/3	1/6	5/12
$(S+P)/H$	1/2	2/1	1/1	2/1.5
$(S+P)/L$	1/100	1/10	1/20	1/40
P/L	0/1	1/25	1/50	1/30

Each element **14** is individually made of or preferably punched from a laminated strip or sheet material made of a composition the prevailing component of which consists of microspheroids of transparent glass of a diameter preferably comprised between 60 to 250 microns (a micron is a thousandth of a millimeter, that is 1/25,000 of an inch), and plurality of different diameter spheroids, within the above range. Still more preferably, such spheroids represent at least 80 percent by weight of the entire composition.

So high a microspheroids content imparts to any exposed surface of the elements an extremely brilliant long range visibility, which is not decreased by wearing out of the elements, wherein such spheroids are evenly and homogeneously dispersed.

By providing protruding elements, an astonishing improvement of the long-range visibility at night, under the illumination from vehicle headlamps only, even at low or passing light, has been experienced. Such improvement is visualized by the graph of FIG. 3, considered in conjunction with the showings of FIGS. 4A to 4D inclusive, wherein:

FIG. 4A fragmentarily shows an element **14***a* protruding two millimeters from the surface of base strip **15** and having a nearly cut and squared off uncovered edge surface **16***a*. The element **14***b* of FIG. 4B has an uncovered edge **16***b* cut at 45° corresponding to a severely worn out actual element. The edge surface **16***c* of element **14***c* of FIG. 4C has been masked by a black light absorbing coating, so that its upper reflective surface only has been left uncovered. The element **14***d* of FIG. 4D had its upper surface masked as above, while its uncovered edge **16***d* has been cut at 45°.

Samples prepared as above have been illuminated, in a photometric apparatus, by a beam of parallelized rays (corresponding to a long-range illumination by vehicle headlamps) produced by an incandescent lamp of the type currently applied to motor vehicles' headlamps. The beam has been directed to impinge on the element from various directions in the entire amplitude from 0° to 90° of angle indicated at "alpha" in FIGS. 2 and 4A to 4D. The reflected light, in the same direction of impingement, has been measured by means of a photometer giving a response levelled for the entire visibility range.

The curves of FIG. 3 indicate the amount of the light impinging on the photometer in terms of percent of the light of the beam impinging on the element. Such curves are therefore fairly indicative of the reflecting ability of the element, when impinged by light coming and when viewed from different angulations in respect to the road surface. The angles "alpha" of greatest interest are those from 2° to 5°, corresponding to the "sight" at which a motorist sees a mark from 20 to 100 meters ahead of him. A reflection over 50 percent ensures an extremely satisfying visibility, confirmed by actual road tests under the most severe conditions.

In the graph, curves A through D indicate the response of photometric measurements made in the conditions indicated with relation to FIGS. 4A through 4D, respectively. Curve A comprises a sharp peak about 5°, where the reflection is greater than about 90°. This somehow improper result was probably due to the fact that edges **16***a* has been neatly cut and exposes freshly exposed microspheroids and reflective material.

Curve B is of great interest. It demonstrates that a worn element is capable of at least 50 percent reflection either from 90° to 60° and from 15° down to 0°. The upper part of the curve indicates the regular reflection of a horizontal surface of reflective roadway surface mark. The lower part is that of true interest in view of the desired long-range visibility.

By zeroing the reflective ability of the elements' edge, such as by masking the edge **16***c* of the element **14***c* of FIG. 4C, the long-range visibility drops as indicated by curve C and decreases to zero at very small angles. Thus, the contribution of a quite efficient but horizontal reflex-reflective surface, in view of actual long-range visibility under the vehicle's headlamps illumination only, is very poor and even zero. Therefore, a horizontal surface could be viewed, at nighttime, only if a somewhat diffuse illumination exists, such as by moonlight, or by streetlamps, such as diagrammatically indicated at **13** in FIG. **1**.

Curve D confirms the above assumption. In the sample of FIG. 4D the upper face has been disactivated by masking. By comparing curves B and D, it is evident that the long-range visibility is promoted by edges **16***b* and **16***d* only, the upper surface contributing when the light impinges on the reflective material at an angle above about 15°.

It is to be considered that such contribution might be assumed to be quite unnecessary when the new road marking material of the invention is made use of. The large uncovered upper surface area of the base strip **15** ensures plenty of visibility when an even dim illumination from above exists. Therefore the elements length L can be desirably small for making use of as little as possible of the expensive material including an also desirable very high amount microspheroids. As a matter of fact, the horizontal dimensions, the position and the spacing of elements **14** can be actually chosen by taking into consideration the desired antiskid effect only.

Several example of compositions and treatments for providing the base strip, the elements and the adhesive which can be conveniently made use of (when the self-adhesive property of the material is poor) for securing the elements to the base strip as such strip to the bitumen or asphalt coated road surface, are given hereinbelow in tabulated form.

In general, the base strip forming composition comprises:

- a rubbery composition (G) including natural or synthetic rubber;
- a binder (L), if any;
- a filler (C);
- a whitening matter (I), which might be the same filler (C);
- a stabilizer (S), if any, optical stabilizers, promoters, accelerators and so on, are well within the knowledge of those skilled in the art.

A combination of components as above can be made use of for providing the reflective elements, by adding the reflex-reflective material (Ct).

Such material might consists of already prepared reflective microspheroidal pigments, such as made known in the U.S. Pat. No. 2,963,378, wherein an extensive discussion about reflex-reflection in given. For economy purpose, the material (Ct) may be made of a mixture of plain transparent glass microspheroids or spheres of diameter not over about 0.3 millimeter and of powder or tiny splinters of aluminum or an other highly reflective substance. The above described experiments and tests, from which the curves of graph of FIG. 3 have been plotted, have been making use of a composition comprising 80 percent by weight of such mixture.

As above indicated, the salient elements **14** act as efficient antiskid means. They are subject to severe stresses by traffic. To provide the most desirable hardness and resistance, their composition can advantageously be of vulcanizable and/or polymerizable and/or cross-linking character. Their compositions can therefore include also:

Vulcanizing agents or components (V)
Activators (A)
Cross-linking promoters or compounds (R)
Copolymerization promoters or compounds (Cp)
Fluxing agents (F), if any

In the following Tables, all parts are indicated by weight. In addition, certain components are followed by a numeral between parentheses. Such number is a reference for an ac-

companying listing of commercially available products, which can be made use of as the correspondingly referred component.

TABLE 3.—BASE STRIP COMPOSITIONS

Components	Examples 1	2	3
(G) Styrene-butadiene copolymer (1)	60		
(G) Polychloroprene (2)	35	15	40
(G) Butadiene-acrylonitrile copolymer (38% acrylonitrile) (3)		20	
(G) Butadiene-acrylonitrile copolymer (32% acrylonitrile) (4)			100
(G) Polybutadiene 1.4 cis (5)			10
(L) Hydrogenated resin	30		
(S) Allylarylphenol (6)			10
(I) Titanium oxide	40	10	
(I-C) Micronized kaolin	50		100
(I-C) Calcium carbonate	30	40	
(I-C) Talcum 0000 powder		30	500
(I-C) Baryte			250

See the following table.

Homogeneously mixed and worked at ° C.—	90	90	90	90	90	90
Coupled to elements at, ° C.—	80	80	80	80	90	80

TABLE 4.—REFLECTIVE ELEMENTS COMPOSITIONS

	Examples 4	5	6
Components:			
(G) Natural rubber	86	24	36
(G) Polybutadiene 1.4 cis(5)	10		10
(G) Butadiene-acrylonitrile copolymer (32% acrylonitrile) (4)	50		50
(G) Polychloroprene (2)	40		40
(L) Hydrogenated resin		0.1	
(S) Stabilized alkyl-aryl-phenol (6)	10	0.2	10
(I) Zinc oxide		0.3	
(F) Paraffin 40/42			
(Cp) Stearic acid			
(V) Sulphur		0.6	
(V) Mercapto-benzene-trazyl-bisuphite (11)		0.2	
(V) Zinc diethyldithio-carbamate (9)		0.15	
(Cp) Hexamine		0.1	
(Cp) Diethylene glycol		0.6	
(Cp) Benzoic acid		0.6	
(I) Titanium oxide	2	1	2
(C) Kaolin	2		
(I) Silica (0.015 micron (10)		1	
(Ct) Aluminum 111 (20-70) microns)		1	
(C) Asbestos			2
(Ct) Mixture of glass spheroids from 60 to 250 microns	700	82	650
(G) Chlorosulphonated polyethylene (11)			
Working temperature (in ° C.)	90	120	90

	Examples 7	8	9
Components:			
(G) Acrylonitrile-butadiene-styrene copolymer (7)			20
(R) Processed resin (*)		20.5	
(I) Titanium oxide	30	5	1
(Ct) Aluminum "stupa-8-nitro" (10 to 30 microns)			1
(Ct) Aluminum XI (2-5 millimeters)	0.65	2	
(Ct) Mixture of glass spheroids from 60 to 250 microns	225	75	79
(G) Chlorosulphonated polyethylene (14)	45		
Working temperature (in ° C.)	180	130	90

*The "processed resin" of Example 8 comprises, by weight, methyl-methacrylate prepolymer, parts 20; aluminum 10-30 microns, part 0.5; methyl-ethyl-ketone peroxide, part 0.25; naphthenate cobalt, part 0.05. Therefore, such resin is substantially a cross-linking polyester resin.

The compound of Example 5 has been caused to vulcanize at a temperature of 143° C.

It is apparent that the compositions comprise a very major amount of reflex-reflective spheroids, of the order of 80 percent by weight about. Such spherous bodies are the most costly component of the roadway surface marking material. It is known that a useful effect for good visibility at night requires at least over 30 percent by weight of reflecting beads in the reflecting composition forming the actual outer layer of the marking, if such beads consist of high efficient but very expensive reflectorized microspheroids, and over 50 percent if use in made of plain transparent glass spheroids associated with aluminum, titanium oxide or an other good light reflective substance.

Apart from any consideration about the actual long-range visibility provided by the invention, the use of a spheroid content up to 80 percent or more is obviously of great advantage for visibility. The fact that such spheroids are present only in the elements **14** makes it possible to profit from such advantage while the cost of the material is maintained quite reasonably low. For example, a base strip 3 millimeter thick can be provided with one or more rows (according to the strip width) of elements which width totals one third of that of the base strip. For traffic resistance and for good antiskidding effect, the elements are 20 millimeters long (length L, FIG. **2** and Table **1**), spaced at intervals (I) of 40 millimeters, and 4 millimeters thick (thickness S+P). Such values correspond to the most preferred mean values of the range given in Tables **1** and **2** above. The elements are sunk 1.5 millimeters deep in the strip, for example.

Now, the volume of the reflex-reflective component of the strip material is 13 percent about of that of the entire material and the spheroids content of the entire material is therefore (13 by 0.8) only about 10.4 percent. When the traffic is most excessively severe, elements **14** which are 10 millimeters long, 3 millimeters thick, protrude 1.5 millimeters and are located at intervals of 50 millimeters can be provided. In such case, the volume of the elements is less than 5.3 percent of that of the road marking tape material, whose microspheroids content, by weight, is thus less than (5.3 by 0.8) 4.24 percent. Such material therefore will cost one-tenth of a conventionally produced marking strip including 40 percent by weight of glass beads, and providing a great deal lesser long-range visibility at might.

The problem of visibility in full darkness and under illumination by vehicle headlamps only is essential. When an even dim diffuse light exists no problem can be said to exist. A good clear (white or yellow) conventional strip can be seen. Such problem exists however when motoring in a cloudy night, under rain and so on. The long-range visibility of traffic aids is therefore essential in such occurrence. In this connection, it is to be observed that a truly long-range visibility, more than about 100 meters, can be ensured by relatively low salient and widely spaced reflective elements having even worn protruding edges.

One millimeter protruding edges **16***b* (FIG. **4B**) spaced in a row at intervals of 60 millimeters can be completely viewed, by a motorist whose eyes are 1.2 meters above the roadway surface (such as in a low-bodied modern car) at a distance not greater than 60 meters. Further elements partly mask each other from the motorist is sight and under headlamps illumination. At long-range viewing, an improved strip as above appears as possessing a brilliant luminous center ribbon.

TABLE 5.—REFLECTIVE ELEMENTS TO BASE STRIP ADHESIVES

	Examples 10	11
Components:		
(G) 67% chlorinated natural rubber (16)	10	
(G) Cyclized rubber	2	
(R) Linear polyester resin		15
(P) Glyceric ester of hydrogenated resin (20)	1	
(Solv) Methyl ethyl ketone		10
(Solv) Butyl acetate		10
(Solv) Cellosolve acetate	38	10
(Solv) Dichloroethane	20	
(Dil) Benzol (benzene)	30	
(Dil) Toluol (Toluene)		70

TABLE 6.—BASE STRIP TO ASPHALT CONTAINING ROADWAY SURFACE ADHESIVES

	Example 12
Components:	
(G) Chlorinated natural rubber (16)	12
(G) Styrene-butadiene copolymer (1)	18
(Dil) Benzol	10
(Dil) Xyol	20
(Dil) Cyclohexanone	12

In the actual preparation of the compositions listed in the above Tables 3 to 6, the commercial products as listed above can be made use of as the correspondingly referenced components. Such products have been indicated by their trade names (either registered or not) and the respective Manufacturers have been indicate by the Company names, in abbreviated form as conventionally indicated by those skilled in the art.

Trade Name	Manufacturer
Reference:	
1..... "Buma 153"	Huls.
2..... "Neoprene WHV"	Dupont.
3..... "Chemigum No. 3"	Goodyear.
4..... "Chemigum No. 8"	Do.
5..... "Europrene CIS"	A.N.I.C.
6..... "Vinstay V"	Goodyear.
7..... "Polimero ABS"	Montecatini.
8..... "MBTS" Vulcanizer	(Several manufacturers).
9..... "ZDC" Accelerator	Do.
10..... "Ultrasil VN-3"	Degussa.
11..... "Hypalon 30"	Dupont.
12..... "Parlon"	Hercules.
13..... "Alloprene"	I.C.I.
14..... "Hercolyn D"	Hercules.

The firm connection between the base strip and the reflex-reflecting elements can be made by depending on the substantial self-adhesion of the compositions, and can be improved by mechanical aids, for example by dovetail-type embedding. The joining of the base strip to the roadway surface can be conventionally performed, by applying the strip on hot asphalt, for example.

The various compositions are to be combined by taking into account their chemical and physical affinities and compatibility. In the following Table 7 the most preferred and advantageous combinations of base strips, reflex-reflective elements and adhesive are tabulated, in distinct columns.

TABLE 7

Examples of—	Combinations in the columns			
Table 3 (base strip composition).....	1	2	2	3
Table 4 (elements composition).....	4	7	8	9
Table 5 (strip-element adhesive).....		10	11	-----
Table 6 (strip-roadway adhesive).....			12	12

While the new marking tape material has been described with reference to the provision of quadrangular individual reflex-reflective elements, such elements can be made with other configurations. For example nailheadlike round elements can be provided in proper arrangement in transverse or diagonal lines or rows. One or more uninterrupted elements having saw-toothed edges can be arranged lengthwise of the base strip and so on, well within the scope and range of equivalence of this invention.

I claim:

1. In a roadway surface marking tape material, a composite tape structure comprising a base strip component adapted to be superimposed and firmly secured to a roadway surface to form a traffic aid thereon and having an upper face; and a plurality of combined antiskid and light-reflective components of a composition comprising light-reflecting materials, said components being superimposed and secured to said base component at longitudinally spaced locations of the latter and having a combined surface area which is a fraction of the total area of said upper face, and a light-reflectivity which is substantially higher than that of said upper face.

2. The surface marking tape material of claim 1, wherein said reflective materials comprise transparent glass spheroids of diameter a less than 300 microns.

3. The surface marking tape material of claim 2, wherein substantially 80 percent by weight of the reflective component consists of said glass spheroids.

4. The surface marking tape material of claim 1, wherein each of said reflex-reflective components is partly embedded within said base component.

5. The surface marking tape material of claim 1, said reflective components protruding above said upper face of said base component by between substantially 1 and 5 mm. and each comprising a reflective side surface exposed above said upper face.

6. The surface marking material of claim 1, wherein said combined area is equal to less than 30 percent of said total area of said upper face.

7. The surface marking material of claim 1, said base strip component having parallel side edges and said reflecting components being located inwardly of said side edges.

8. A marked road surface for vehicles comprising a strip of road marking tape joined to the upper face of said road surface and having an upper surface of predetermined light reflectivity and side edges defining a marked area therebetween; and a plurality of components each having antiskid properties and light-reflecting properties which are substantially better than said predetermined reflectivity, said components being superimposed upon said strip and having a combined surface area equaling a fraction of the total area of said upper face, said components providing together with said strip a composite exposed surface including a major part visible under diffuse illumination and having substantially said predetermined reflectivity and a minor part having said better light-reflecting properties with concomitant brilliant visibility when viewed at night, and said components concomitantly constituting antiskid means on said strip.

9. A marked road according to claim 8, wherein the said components protrude upwardly above said strip and have exposed reflecting side surfaces to provide brilliant long-range visibility when impinged by light emitted from the headlamps of motor vehicles moving on said roadway surface.

10. A marked road according to claim 9, wherein said components protrude at most 3.5 and at least 1 millimeter above said upper surface of said strip.

11. A marked road according to claim 8, said components being spaced from said side edges and said fraction corresponding to at most 30 percent of said upper surface.

12. A marked road according to claim 8, said components being made of a composition substantially at least 80 percent by weight of which consists of transparent glass spheroids of a diameter less than 300 microns.