June 3, 1952 G. F. CARROLL 2,599,230

PAVEMENT MARKER

Filed Jan. 26, 1948 2 SHEETS—SHEET 1

Fig. 1

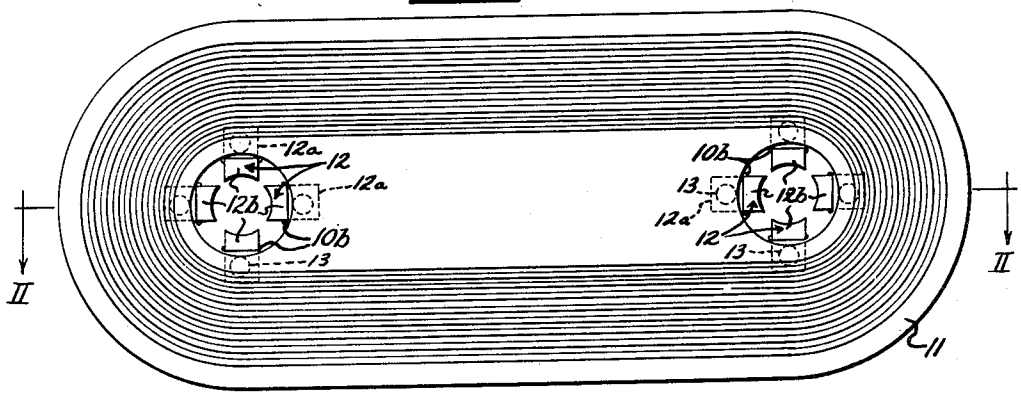


Fig. 2

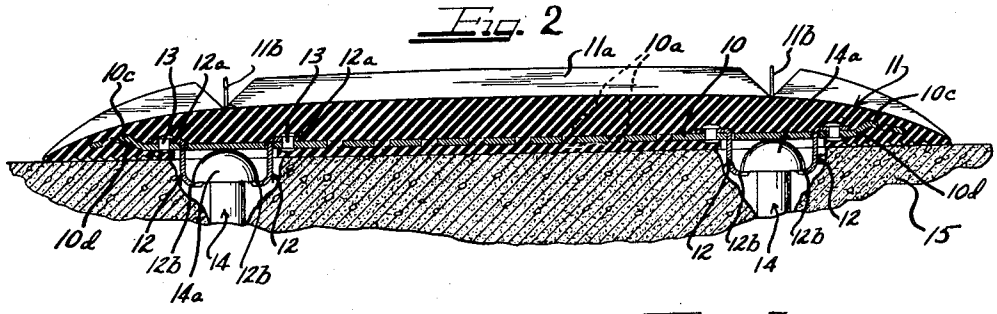


Fig. 3

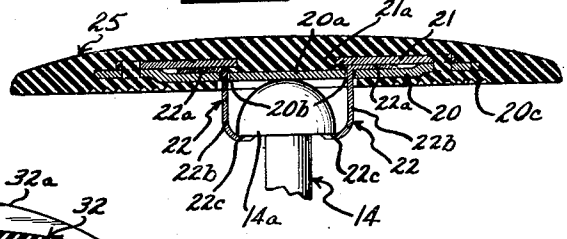


Fig. 4

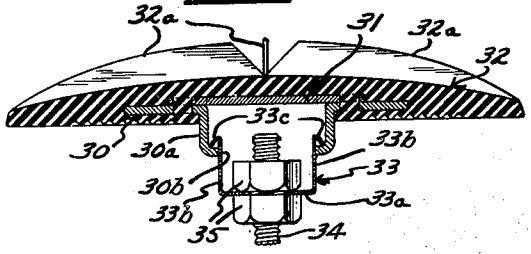
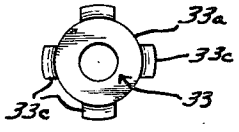


Fig. 5



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PAVEMENT MARKER

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Fig. 6

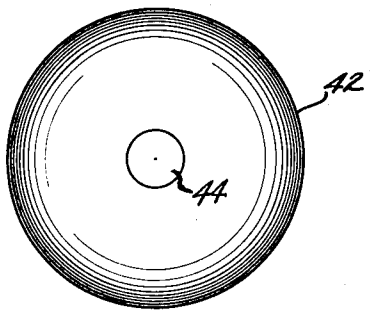


Fig. 7

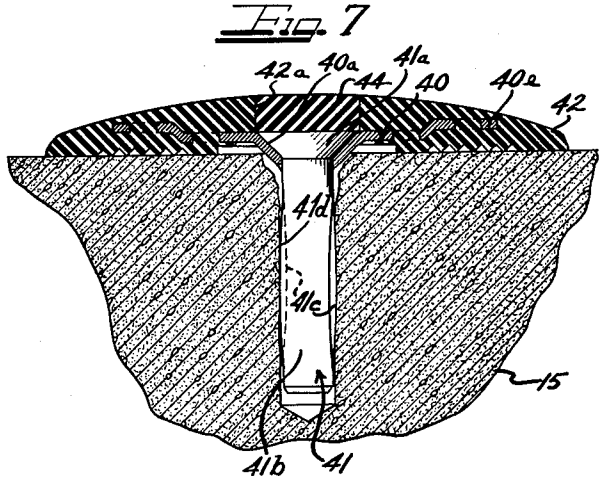


Fig. 8

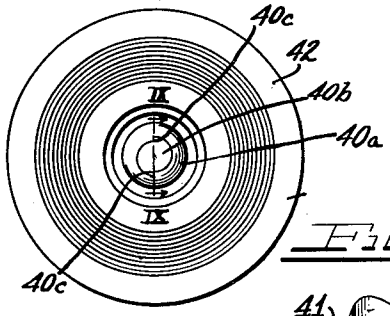


Fig. 9

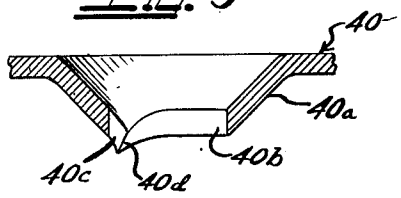


Fig. 11

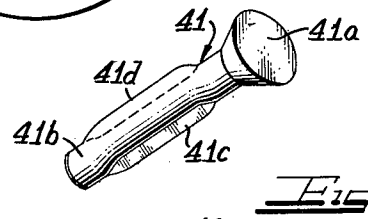
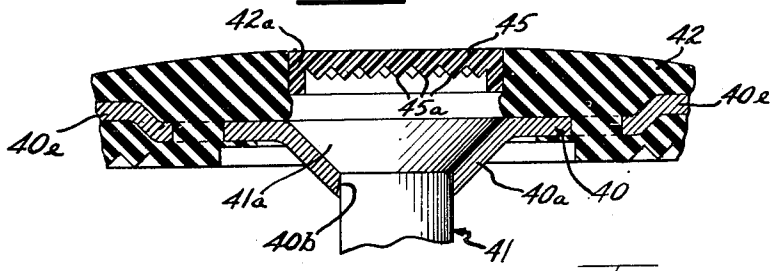


Fig. 10



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PAVEMENT MARKER

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Application January 26, 1948, Serial No. 4,249

1 Claim. (Cl. 94—1.5)

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This invention relates to improvements in pavement markers, and particularly to improved constructions of pavement markers of this type wherein a rubber or plastic element is integrally molded around a relatively rigid plate which cooperates with bolt-like anchoring devices for securing the marker in a flat position on the surface of a pavement.

Pavement markers formed of rubber or rubber-like material have been heretofore known in the art. For example, the patents to Hartzler and Romilly, Nos. 1,798,467, 1,798,468 and 1,830,319 illustrate various forms of rubber molded pavement markers of the type to which this invention relates. Such prior constructions, however, have been subjected to several well known disadvantages. In the first place, the visibility of such marker elements is not all that can be desired. Obviously, the surface of the marker element rapidly becomes discolored due to the passage of vehicles thereover and, since the surface area of the marker element is relatively small with respect to the area of the pavement in which it is disposed, and furthermore, since such marker elements are constructed with a minimum overall height above the pavement surface so as to avoid producing detectable bumps when a vehicle wheel passes thereover, it is apparent that the visibility of the marker element is relatively poor, particularly at night or under unfavorable lighting conditions. Accordingly, one object of this invention is to provide an improved pavement marker construction characterized by the incorporation of readily visible elements on the top surface of the marker so that even under adverse lighting conditions, the marker will be very apparent to the eye.

A further disadvantage of known marker constructions lies in the fact that a threaded connection was generally employed between the mounting plate, about which the rubber material was molded, and the anchoring bolt which was mounted in a vertical position in the pavement. Unless such elements were sufficiently tightened on the cooperating threads so as to jam the threads, thereby effecting permanent securement of the marker element to the anchoring bolt, the marker elements were often loosened from their anchoring bolts by virtue of the lateral force imparted to the rubber body portion of the marker by vehicle wheels which passed over one side of the marker. Obviously, a substantial twisting force would be exerted on the marker element when a vehicle wheel is either accelerating or braking as it passes over one side of the marker.

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Having once loosened, the markers were a ready prey to removal or damage by subsequent vehicles, or to removal by children and other individuals who apparently cannot resist picking up an article of this type. If the other extreme of producing sufficient tightening to jam the threads is followed, then the marker becomes permanently fastened to its anchoring bolt and could not be replaced when the rubber parts thereof were worn away. Obviously, this involved substantial maintenance expense inasmuch as not only would the old anchoring bolt have to be dug out of the pavement but the pavement would have to be repaired and a new anchoring bolt mounted therein. Since such marker elements are subjected to particularly harsh conditions of wear, it is obvious that replacement is required at relatively frequent intervals and hence any difficulties in the replacement process added materially to the overall maintenance cost.

It is an object of this invention to provide an improved pavement marker construction characterized by the fact that the pavement marker may be readily assembled to or removed from an anchoring bolt and yet is not subject to disassembly by the lateral forces exerted by vehicles passing thereover.

There are some applications of pavement markers where the conditions of wear are not so extreme but that a permanent installation of the marker may be desirable. Accordingly, it is a further object of this invention to provide an improved pavement marker anchoring construction which will not only permanently anchor the marker element to the pavement surface against vertical displacement, but will also resist any tendencies of the marker element to rotate relative to the pavement by the application of lateral forces thereto. This latter construction is particularly outstanding inasmuch as the rotational anchoring effect is achieved without any complication of the manufacturing process by which the pavement marker is produced.

The specific nature of this invention, as well as other objects and advantages thereof, will become apparent to those skilled in the art and the following detailed description of the annexed sheets of drawings which, by way of preferred example only, illustrate a plurality of specific embodiments of the invention.

On the drawings:

Figure 1 is a bottom plan view of a large marker element embodying one of the mounting constructions of the invention;

Figure 2 is a vertical sectional view taken along

the plane II—II of Figure 1 of a marker element of Figure 1 in its assembled relationship with respect to a pavement;

Figure 3 is a vertical sectional view of a modified form of mounting construction embodying this invention showing the assembly thereof in a circular disk marker unit;

Figure 4 is a vertical sectional view through a circular disk type of marker unit illustrating a still further modified construction of an anchoring element embodying this invention;

Figure 5 is a plan view of the spring catch element employed in the modification of Figure 4;

Figure 6 is a top plan view of a circular disk marker element embodying a still further modification of this invention;

Figure 7 is a vertical sectional view showing the assemblage of the marker element of Figure 6 in a pavement;

Figure 8 is a bottom plan view of the marker element of Figure 6 with the anchoring bolts removed;

Figure 9 is an enlarged scale, partial sectional view taken on the plane IX—IX of Figure 8; and

Figure 10 is a partial, vertical sectional view of a marker element utilizing an anchoring arrangement similar to that of the modification of Figures 6 through 8 but showing a manner of incorporating a light reflecting unit in the top surface thereof; and

Figure 11 is a perspective view of the anchoring bolt used in the assemblage of Figure 7.

As shown on the drawings:

In Figures 1 and 2 there is shown a detachable pavement marker construction embodying one modification of this invention. While the specific shape of the marker illustrated in Figure 2 is that of a relatively large elliptical marker employing two anchoring bolts, it is to be understood that the anchoring construction disclosed therein is equally applicable to the more common type constituting a circular disk marker. In any event, the marker element there shown comprises a mounting plate **10** which is perforated at spaced points as indicated at **10***a*, so as to facilitate the integral securement of an envelope of rubber or rubber-like plastic material **11** in surrounding relationship to substantially all of the mounting plate **10**. At any desired points on the mounting plate **10**, for example adjacent each end thereof, a plurality of circularly spaced mounting apertures **10***b* are provided in plate **10**. In each mounting aperture **10***b*, a generally Z-shaped spring finger **12** is mounted by having one end portion **12***a* thereof lying on the top of plate **10** and rigidly secured thereto as by rivets **13**. The free end portions **12***b* of the fingers **12** are thus disposed in depending relationship to the mounting plate **10** and are suitably constructed so that when applied to the round head of a vertical anchoring bolt **14** the free ends of said fingers will be outwardly displaced and then will resiliently snap into engagement behind the head portion **14***a* of the anchoring bolt **14**. The anchoring bolt **14** is, of course, rigidly anchored in the pavement **15** in any conventional manner. An identical arrangement of spring fingers and anchoring bolt are provided to cooperate with the other set of apertures **10***b* in the plate **10**. Hence both ends of the plate **10** are snugly secured to the pavement **15**, and the rubber mass **11** of the marker element is held tightly against the surface of pavement **15** against any lateral or vertical displacements.

To increase the resistance to shearing forces which are often imparted to the rubber mass **11**, the mounting plate **10** is formed with its central portion vertically depressed with respect to its peripheral portion **10***c*. Hence, a generally vertically extending shoulder **10***d* is defined at the juncture of these two portions and said shoulder substantially increases the shear resistance of the rubber mass **11**.

In accordance with this invention, the visibility of the marker element may be substantially improved by increasing the apparent height thereof through the provision of upstanding deformable ribs or flaps **11***a* and **11***b* which may be conveniently integrally formed with the rubber mass **11**. The flaps **11***a* and **11***b* are made of sufficiently thin walled construction so that they are readily flattened by the passage of a vehicle wheel thereover. Hence, the apparent visibility of the marker element is greatly increased without increasing the effective height of the marker element so far as its bump producing properties are concerned. Preferably, a plurality of such upstanding flaps are provided, including respectively, transversely spaced, longitudinally extending flaps **11***a* and longitudinally spaced, transversely extending flaps **11***b*. The flaps **11***a* and **11***b* are cut away at their juncture portions so as to eliminate the rigidifying effect of the juncture which would otherwise be produced.

With the described construction, it is apparent that the marker element will be firmly secured in the pavement **15** against all normal forces produced thereon by passing vehicles. However, the marker element may, when desired, be removed from the anchoring bolt by the insertion of a sharp-edged tool under one edge of the marker element and the application of an upward prying force thereto which will deflect the mounting plate **10** sufficiently as to permit the free end portions **12***b* of the spring fingers **12** to be disengaged from the bolt head **14**. Hence, a worn marker element may be removed and replaced by a new element without requiring the digging up of the anchoring bolt or its replacement.

A modified construction of anchoring element is illustrated in Figure 3 and, while shown in this figure as applied to a circular disk configuration of the rubber mass, it is obviously equally applicable to any shape or marker element desired. In this construction, a pair of mounting plates **20** and **21** are provided which are peripherally rigidly secured together, as by welding, and have their intermediate central portions **20***a* and **21***a* disposed in spaced relationship. Prior to the welding operations, a plurality of spring fingers **22** having horizontally extending portions **22***a* and vertically extending intermediate portions **22***b* are assembled in circumferentially spaced relationship with their horizontal portions **22***a* disposed in the space between the plates **20** and **21** and the vertically extending intermediate portions **22***b* projecting downwardly through the plate **20** through suitable apertures **20***b* provided therein. By this construction, it is found that the spring fingers **22** are permanently secured to the welded assemblage of plates **20** and **21** and yet do not require the application of individual rivets thereto.

As in the previous modification, a rubber mass **25** is cast about the plates **20** and **21** and substantially covers such plates except for the bottom central portion thereof, by which the depending portions **22***b* of the spring fingers **22** are left exposed.

The free ends of the spring fingers **22** are in-

turned as indicated at 22c and are thus arranged to snap into engagement behind the head portion 14a of the customary headed anchoring bolt 14.

The peripheral portions 20c of plate 20 are vertically displaced relative to the central portion 20a to provide reinforcement of the rubber mass 25 against shear stress.

When applied to a circular disk configuration, the marking element construction illustrated in Figure 3 has the advantage of permitting rotation of the rubber mass of the marker element with respect to the pavement without interfering with security of the connection to the anchoring bolts. Hence, the marker may freely respond to lateral forces imparted thereto by the passage of a vehicle wheel over one side of the marker element and accordingly, the life of the marker element is substantially increased.

In the modification illustrated in Figures 4 and 5, the mounting assemblage for the circular disk marking element will also permit the relative rotation of such element with respect to the pavement. In this modification, a mounting plate 30 has the central portion thereof depressed, as indicated at 30a, and the bottom of the depressed portion cut out to provide the aperture 30b. A reinforcing plate 31 may, if desired, be welded to the top of plate 30 extending across the depressed portion 30a. A rubber mass 32 is then molded about the plates 30 and 31, and substantially covers such plates except for the depressed portion 30a. Such mass may incorporate upstanding visibility flaps 32a which are disposed in generally spoke-like relationship on the top surface of the rubber mass.

To effect the detachable securement of the mounting plate 30 to an anchoring stud 34 embedded in the pavement by any conventional devices, a spring catch element 33 is employed having a circular, centrally apertured base portion 33a and a plurality of circumferentially spaced, upstanding, spring arm portions 33b with outturned free ends 33c. The spring catch 33 is secured to the mounting stud 34 by having the base portion thereof clamped between two nuts 35 which are screwed onto the threaded mounting stud 34. In this position, when the downturned apertured portion 30a of the plate 30 is pressed downwardly against the free end portions 33c of the spring catch element 33, such end portions will yield inwardly to enter the aperture 30b and will then snap outwardly into engagement with the walls defining the plate aperture 30b. Hence the marker element will be held in assembly with the anchoring stud 34.

In the modification of this invention illustrated in Figures 6 through 9 and 11, a permanent assemblage of the marker element to its anchoring bolt is contemplated. Again, the marker comprises a relatively rigid, circular mounting plate 40 having a conically shaped, apertured, downturned central portion 40a which is shaped to correspond to the head 41a of a mounting bolt 41. As best illustrated by the perspective view of bolt 41 (Figure 11), the shank portion 41b of the bolt has an axially extending slot, slit or split therethrough dividing the shank portion into two portions 41c and 41d. These portions are bowed in opposite directions parallel to the slit so that when the bolt is driven into a cylindrical hole in the pavement, the bowed portions 41c and 41d will be forced toward each other against the resiliency thereof, as illustrated in Figure 7, and the resiliency thereof will securely frictionally lock the bolt 41 in the pavement.

Once again the peripheral portions 40c of the mounting plate 40 are vertically offset with respect to the plane of the central portion thereof so as to provide reinforcement against shear forces of the rubber mass 42 cast therearound. In this modification, the rubber mass 42 is molded around the mounting plate 40 so as to expose not only the conical, downturned portion 40a on the bottom thereof but also to define a recess 42a in the top of the mass which will permit the head of the anchoring bolt 41 to pass therethrough into seating engagement with the downturned conical portion 40a of the mounting plate. I have found it to be very important to the useful life of the marker element thus constructed that the recess 42a be completely closed when the marker element is in use. Hence, according to one form of this invention, the recess 42a is closed by the pressed insertion of a disk of rubber 44. By closing the recess 42a, it is insured that little, if any, dirt, water or other corrosive material will be permitted to contact the mounting plate 40 and the anchoring bolt 41.

It has been previously mentioned that the shank portion 41b of the anchoring bolt 41 is of non-circular configuration. Accordingly, the aperture 40b in the mounting plate 40 through which such shank portion must pass must necessarily also be of non-circular configuration as is best shown in Figure 8. In accordance with this invention, advantage is taken of such non-circular configuration of the aperture 40b to provide an anchoring of the marker unit against rotational displacements relative to the pavement. Hence, the aperture 40b is purposely formed to include one or more generally radially extending wall portions 40c and such wall portions are then turned downwardly slightly in the same stamping operation in which the aperture 40b is formed, so as to produce a downwardly projecting tooth 40d as is best shown in the enlarged scale view of Figure 9. The provision of one or more of such downturned teeth 40d produces a biting engagement into the adjacent surface of the pavement 15 and hence effects a secure anchoring of the marker element against rotational displacements.

In Figure 10 I have indicated a further modified construction of a marker element which is illustrated in connection with an anchoring construction generally similar to that shown in Figures 6 through 9 but the principles thereof will be recognized to be applicable to any of the marker constructions heretofore disclosed. As in the modification of Figures 6 through 9, the rubber mass 42 is molded onto the mounting plate 40 and during such molding operation a recess 42a is formed in the top surface thereof which is aligned with the aperture 40b in the mounting plate 40. After the insertion of the mounting bolt 41 through the recess 42a, the recess 42a is closed by a disk 45 which is formed of translucent material and is constructed in such manner as to have reflecting properties. For example, the disk 45 may be formed of a translucent plastic and have the bottom surface thereof cut to define a plurality of depending pyramidal projections 45a. Such construction, which is commonly referred to as "cat's eye" reflector will insure that any light striking the top surface of the reflector disk 45 will be reflected from the bottom surface thereof. Hence, the visibility of any marker element incorporating such a reflector unit is greatly improved, particularly under adverse illumination conditions. Obviously, the reflector disk 45 may be incorporated in

any other of the other marker constructions which have been heretofore described but it is particularly adaptable for incorporation of a marker construction of the type shown in Figure 10, inasmuch as the recess 42*a* must necessarily be formed in the rubber mass 42 to permit the insertion of the mounting bolt 41 therethrough. From the foregoing description it is apparent that the various modifications of this invention provide pavement markers of greatly improved characteristics and all of such improvements are accomplished without in any way complicating the manufacturing processes by which the markers are produced or the assembly of the marker in a pavement.

It will, of course, be understood that various details of construction may be modified through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claim.

I claim as my invention:

A pavement marker comprising a relatively rigid plate, a pavement anchoring element having a non-circular shank portion and an enlarged head portion, said plate having a non-circular aperture therein with said non-circular shank portion of said element inserted therethrough, said aperture having at least one generally radially disposed wall portion, said last mentioned wall portion extending downwardly to provide a tooth adapted to engage in the pavement surface to resist rotation of said plate relative to the pavement, and an envelope of moldable material substantially surrounding all of said plate except those portions adjacent said aperture.

GEORGE F. CARROLL.

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