

R. L. WILSON
RAILROAD BRAKE SHOES

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Fig. 2

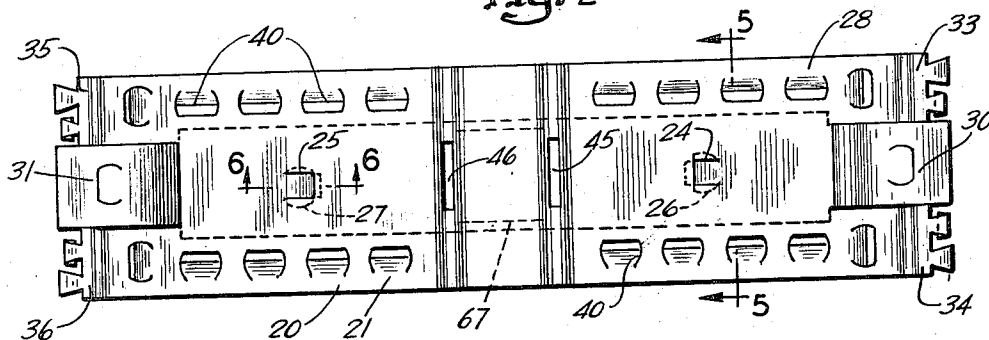


Fig. 3

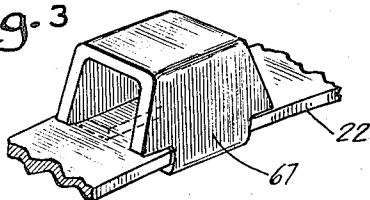


Fig. 4

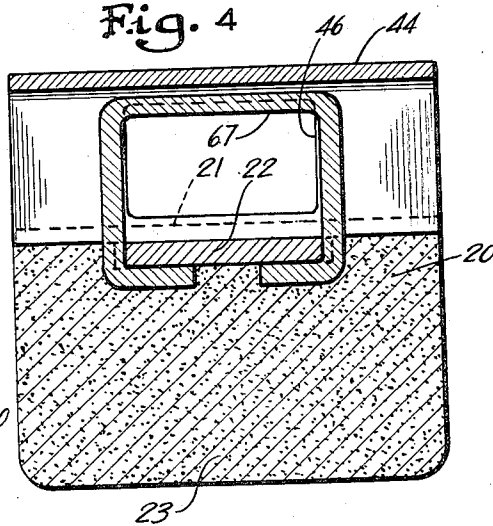


Fig. 5

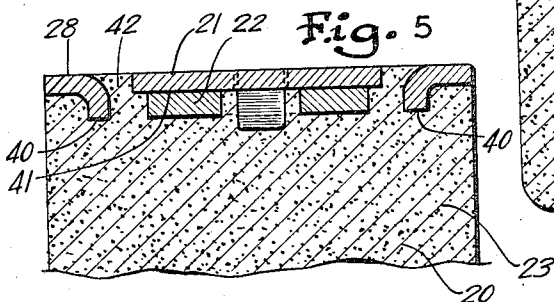
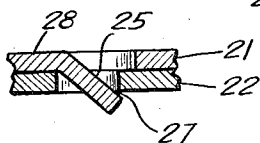


Fig. 6



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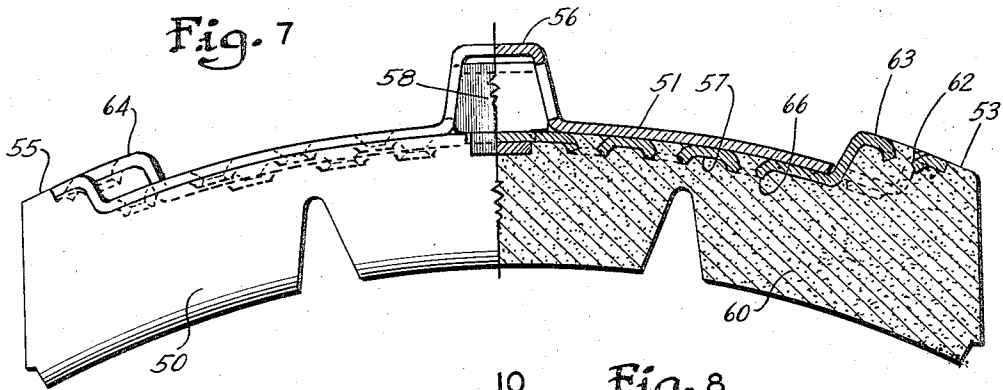
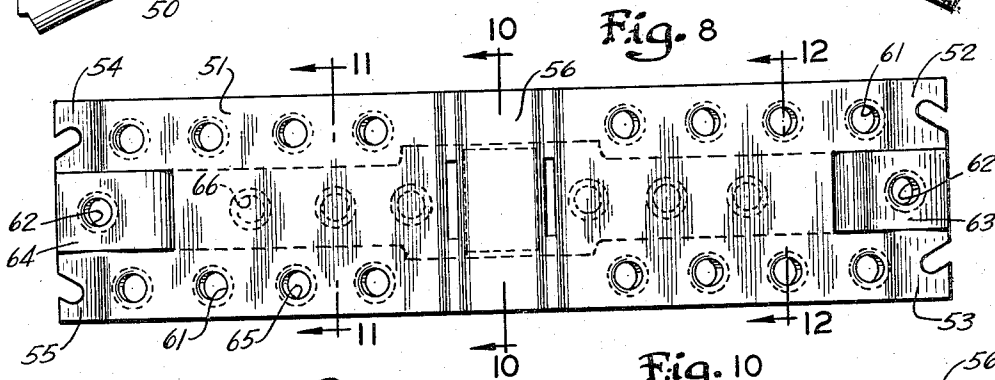
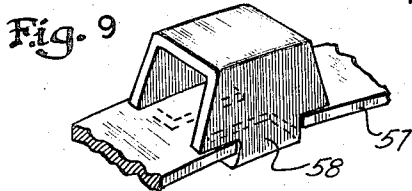
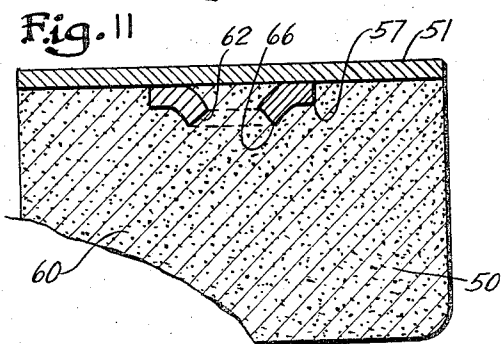
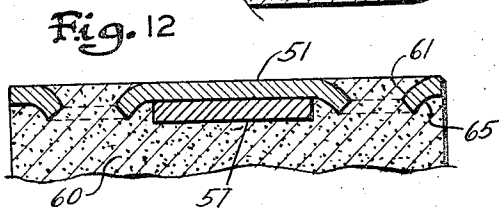
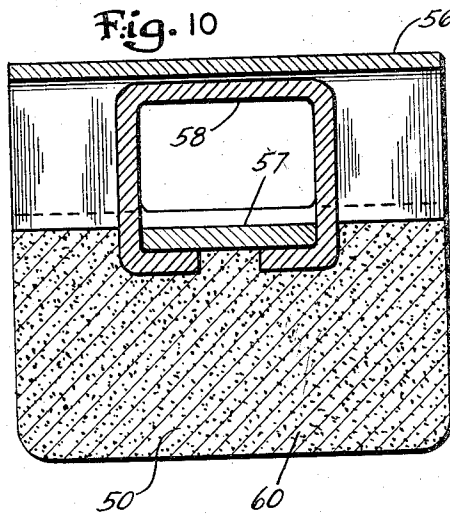
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RAILROAD BRAKE SHOES

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2 Sheets-Sheet 2



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2,885,037

RAILROAD BRAKE SHOES

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2 Claims. (Cl. 188—251)

This invention relates to a new and improved brake shoe for railway cars and locomotives and is particularly concerned with an improved back structure for supporting the brake shoe body and mounting the brake shoe upon a brake head.

The brake shoe which has long been standard in the railroad industry comprises a cast iron body of substantial thickness having a braking face curved to correspond generally to the curvature of a railroad car or locomotive wheel. The back of the cast iron brake shoe may include a supporting plate or strip formed from rolled steel around which the brake shoe body is cast; this supporting member serves to reinforce the cast iron body and, to a certain extent, to hold it together if the body becomes cracked. Another type of brake shoe which has been suggested for use on railway cars and locomotives comprises a composition body adapted to be supported upon a steel backing plate which is in some respects similar to the support member of the cast iron type of shoe. In the composition brake shoe, the support lugs and other elements for mounting the shoe upon a brake head are formed as a part of or are mounted upon the supporting back, whereas in the cast iron shoe construction, the mounting lugs, toe guides, and the like are frequently cast as a part of the brake shoe body.

There are several distinctive differences between cast iron and composition brake shoes. For example, the composition type shoe provides substantially higher retarding force per unit area, since it affords a substantially higher coefficient of friction, when brought into contact with the wheel of a car, than is obtained with a cast iron shoe. In general, it may be stated that cast iron shoes are low-friction, high-pressure devices, whereas composition shoes are high-friction low-pressure devices. Accordingly, the composition shoe may be employed at substantially lower operating pressures than the cast iron shoe. The composition type shoe, however, as known in the prior art, has exhibited several disadvantages which have precluded general adoption for railroad service. One disadvantage of early composition shoes was engendered by the difficulty in obtaining uniform curing of the composition body, which led to internal variations in the shoe and frequently caused irregular braking once the shoe had become somewhat worn. This disadvantage has to some extent been overcome by modern curing techniques. Another important difficulty mitigating against general use of composition type shoes has been the tendency of the composition body to break under severe operating conditions and to separate from the metal back structure under even mild braking conditions. Some of these difficulties may be attributed to the difference in thermal coefficient of expansion between the composition of the body and the metal back structure; in addition, the shoe body may be stressed beyond the breaking point or may be separated from its back due to forces tending to flex the brake shoe which are frequently encountered in railroad service. In addition, the relatively severe vibration frequently

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encountered in railroad operations tends to detach the composition body from the metal back and/or to break the shoe body.

It is an object of the invention, therefore, to overcome or substantially minimize the above-noted disadvantages of previously known composition shoes by resort to a specially constructed back for the composition shoe.

A further object of the invention is a new and improved back structure for a railroad brake shoe of the composition type, inherently stronger than known devices and consequently better able to withstand the vibrational forces encountered in operation.

An additional object of the invention is a new and improved railroad brake shoe of the composition type including a back structure which inherently provides for maximum adherence between the back structure and the composition body of the shoe.

It is an important object of the invention to provide a new and improved back structure for a composition-type railroad brake shoe which is substantially stronger than conventional composition brake shoe backs but which is inherently economical to manufacture.

Thus, the invention is directed to a back structure for use in a railroad brake shoe of the type comprising a composition body supported upon a metal back which is adapted to be mounted upon a brake head, the brake shoe body having a predetermined length, width, and thickness and a predetermined curvature along its length, depending upon the type of wheel with which it is to be employed. A back structure constructed in accordance with the invention comprises a metal support member having length, width, and curvature approximately corresponding to the length, width, and curvature of the brake shoe body and having a thickness substantially smaller than that of the body of the shoe. A plurality of metal lugs are affixed to the support member and extend above its convex surface to engage a brake head; preferably, these metal lugs are formed as an integral part of the support member. The back structure further comprises a metal reinforcing member positioned adjacent the inner or concave surface of the support member and extending lengthwise of the support member. At least one metal lug is affixed to the reinforcing member and extends through an aperture in the support member above the convex surface thereof to engage the brake head. As in the case of the lugs affixed to the support member, it is preferred that the mounting lugs on the reinforcing member be formed as an integral part thereof.

Other and further objects of the present invention will be apparent from the following description and claims, and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is an elevation view, partly in section, of a composition-type railroad brake shoe including a back structure constructed in accordance with one embodiment of the invention;

Figure 2 is a plan view of the back structure of the brake shoe of Fig. 1;

Fig. 3 is a detail view of the center attaching lug of the brake shoe of Fig. 1;

Fig. 4 is a sectional view of the brake shoe of Fig. 1 taken along line 4—4 therein;

Fig. 5 is a sectional view taken along line 5—5 of Fig. 2;

Fig. 6 is a detail sectional view taken along line 6—6 in Fig. 2;

Fig. 7 is an elevation view, partly in section, of another embodiment of the invention;

Fig. 8 is a plan view of the back structure of the brake shoe shown in Fig. 7;

Fig. 9 is a detail view of the center attaching lug of the brake shoe of Figs. 7 and 8;

Fig. 10 is a cross-sectional view taken along line 10—10 in Fig. 8;

Fig. 11 is a sectional view taken along line 11—11 in Fig. 8; and

Fig. 12 is a detail sectional view taken along line 12—12 in Fig. 8.

The brake shoe 20 illustrated in Figs. 1 and 2 comprises a back structure including a metal support member 21 and a metal reinforcing member 22 mounted in juxtaposition to the support member. A composition body 23 is supported from the back structure comprising members 21 and 22 in a manner to be described more completely hereinafter. The term "composition," as used throughout this specification and in the appended claims, is defined as a comminuted friction material dispersed in a heat-resistant organic binder. In the illustrated embodiment, members 21 and 22 are shown as being essentially flat in the transverse direction (see Figs. 4 and 5); it should be understood, however, that these members may be channel-shaped in cross section as described in the co-pending application of E. Ellsworth Caton et al. filed concurrently herewith, Ser. No. 603,405, or may comprise other variations in cross-sectional configuration without departing in any way from the invention, provided the back structure does not extend into or along composition body 23 to an extent sufficient to bring the metal back into contact with the wheel to which the brake shoe is applied. The reinforcing member 22 is preferably mounted on or affixed to support member 21 as by a pair of tabs 24 and 25 punched from support member 21 and forced through two apertures 26 and 27 respectively in the reinforcing member; this structure is shown in detail in Fig. 6. The back structure further includes a center attaching lug 67 which may be formed from a separate strip of steel and clinched to reinforcing strip 22 as illustrated in Figs. 3 and 4.

The brake shoe back structure illustrated in Figs. 1 and 2 also comprises a plurality of additional metal lugs affixed to the support and reinforcing members 21 and 22 and extending above the convex or outer surface 28 of support member 21. These additional lugs, which are utilized to engage portions of the brake head in mounting the brake shoe thereon, comprise a pair of toe guides 30 and 31 preferably formed as integral parts of reinforcing member 22 and extending through suitable apertures in the support member. In addition, the back structure includes four end stops 33, 34, 35 and 36 each preferably formed as an integral part of the support member 21 and extending above concave surface 28 thereof to engage the brake head.

The back structure further includes a plurality of individual anchor elements or tabs 40 which are affixed to and extended from the concave or under surface 41 of support member 21. Preferably, the anchor elements 40 are formed by punching out relatively small portions of the support member. As illustrated in Fig. 11, composition body 23 is cast around the back structure comprising support member 21 and reinforcing member 22 so that portions 42 of the composition material extend through the support member and are anchored thereto. It should be noted that these anchor tabs 40 extend only a short distance into the composition body relative to the thickness of the composition material; nevertheless, it has been found that the anchor tabs provide a very much improved degree of adherence between the composition

body and the metal back structure. Additionally, and as best shown in Figs. 1 and 4, a portion of supporting element 21 is extended above back surface 28 to form a projection 44 which forms a part of the center attaching lug. A pair of openings 45 and 46 are formed in projection 44 to permit passage of the usual key through the center attaching lug comprising projection 44 and lug 67 when the brake shoe is attached to a brake head.

The metal backing structure of the brake shoe shown in Figs. 1-6 is preferably formed from steel, either hot rolled or cold rolled, although hot rolled steel is usually preferred. Composition body 23 may be formed from any suitable composition material, depending upon the type of railroad car to which the brake shoe is to be applied. A preferred type of composition material, which exhibits superior characteristics with respect to heat and shock resistance and affords a favorable ratio of wet to dry coefficients of friction is described and claimed in the co-pending application of Ray E. Spokes et al. Ser. No. 491,510 filed March 1, 1955 and assigned to the same assignee as the present invention. This preferred composition comprises a comminuted friction material, selected from the sillimanite group and related aluminum silicates, distributed in a heat-stable rubber binder; additional friction material in the form of cast iron particles may also be included. The composition body may be provided with vents 45' and 46' (see Fig. 1) in the under surface thereof to assist in uniform curing of the composition throughout its thickness and to aid in the diffusion of heat during operation. As indicated in the drawings, support member 21 preferably has a length, width, and curvature corresponding to the length, width, and curvature of composition body 23, although it should be noted that there may be some variation in the back-structure and body dimensions without in any way affecting the invention. Similarly, reinforcing strip 22 preferably should extend approximately for the full length of the brake shoe and should have substantially the same curvature, but is preferably made substantially narrower than the brake shoe body as indicated in Figs. 2 and 4.

The embodiment of the invention illustrated in Figs. 1-6 provides several marked advantages as compared with conventional composition-type railroad brake shoe structures. The reinforcing and stiffening plate or strip 22 materially increases the stiffness of the back radius of the shoe and provides for a corresponding increase in resistance of the shoe to flexing, keeping both the back structure and composition body 23 from becoming fatigued. In addition, the reinforcing strip assists in preventing composition body 23 from breaking away from the back structure. The center lug construction, comprising lug 67 and the extension 44 of support member 21, is substantially stronger than conventional structures, thus providing longer life for the brake shoe back.

Formation of toe guides 30 and 31 as an integral part of reinforcing strip 22 rather than as separate elements or as a part of support member 21 is also highly advantageous, since it makes the punching and forming operations in the production of the back structure substantially simpler and more economical than would otherwise be possible. The presence of reinforcing strip 22 makes it possible to provide a relatively large number of anchorage points (tabs 40) between the composition body and metal back without unduly weakening the shoe back and thus affords better adherence of composition body 23 to the back structure.

Figs. 7-12 illustrate another embodiment of the invention which is in many respects quite similar to Figs. 1-6. The brake shoe 50 shown in these figures comprises a support member 51 which is generally similar to support member 21 of the previously described embodiment and which includes four integral projecting lugs 52, 53, 54, and 55 which form the end stops for mounting the brake shoe upon a standard brake head.

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An extension 56 of the support member forms a part of the center attaching lug of the brake shoe. The brake shoe of Figs. 7 and 8 further includes a reinforcing strip or plate 57 which is positioned adjacent the inner or concave surface of support member 51 and to which a separate center lug member 58 is clinched, as best shown in Figs. 9 and 10.

In this embodiment of the invention, the anchor elements for retaining the composition body 60 of the shoe in contact with the back structure comprising members 51 and 57 are formed as a series of protruding countersunk holes in the support member 51, as indicated in Figs. 8 and 12. The countersunk holes 61 provide a series of metal projections 65 which extend only a relatively short distance into the composition body 60 but serve to anchor the molded composition body securely to the brake shoe back. In addition, and to provide further anchor points, a series of countersunk holes 62 are formed in reinforcing strip 57 to provide an additional plurality of anchoring metal projections 66. Two of the countersunk holes 62 are formed in the toe guide lugs or projections 63 and 64 of the brake shoe which, as in the previously described embodiment, are formed as an integral part of the reinforcing strip.

The embodiment of the invention illustrated in Figs. 7-12 provides all of the advantages of the previously described embodiment; it affords substantially increased adherence between the back structure and composition body of the shoe as compared to previously known constructions, and at the same time affords a substantially stronger shoe back. In addition, the countersunk-hole type of anchor structure employed in the embodiment of Figs. 7-12 adds materially to the strength of the back, since the extruded portions 65 and 66 of the back and reinforcing members respectively function as stiffener ribs and resist deformation of the back structure.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a railroad brake shoe of the type comprising a composition body supported upon a metal back which is adapted to be mounted upon a brake head, said brake shoe body having a predetermined length, width, and thickness and having a predetermined curvature along said length, a back structure comprising: a metal support member having a length, width and curvature approximately corresponding to the length, width and curva-

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ture of said composition body and having an overall thickness substantially smaller than that of said body; a plurality of metal lugs formed integrally with and extending above the convex surface of said support member for engaging a brake head; a metal reinforcing member affixed to said support member adjacent the concave surface thereof and extending lengthwise of said support member, said reinforcing member having a length and curvature approximately equal to the length and curvature of said support member and having a width substantially smaller than the width of said support member; and two metal lug members formed as an integral part of said reinforcing member and extending through apertures in said support member adjacent the ends thereof above the medial portion of the convex surface of said support member, said composition body extending upwardly into and filling said lug members to form therewith toe guides at the ends of said back structure to engage said brake head.

2. In a railroad brake shoe of the type comprising a composition body supported upon a metal back which is adapted to be mounted upon a brake head, said brake shoe body having a predetermined length, width, and thickness and having a predetermined curvature along said length, a back structure comprising: a metal support member having a length, width, and curvature approximately corresponding to the length, width, and curvature of said brake shoe body and having a thickness substantially smaller than that of said body, the central portion of said support member being extended above the convex surface thereof to form a center attaching lug section; a plurality of metal lugs affixed to and extending above the convex surface of said support member for engaging the toe elements of a brake head and serving as end stops for the brake head; a metal reinforcing member positioned adjacent the concave surface of said support member and extending lengthwise of said support member; and a center lug member comprising a separate substantially C-shaped metal element clenched to the central portion of said metal reinforcing member and extending through an aperture in said support member above the convex surface thereof to define, conjointly with said center lug section of said support member, a center attaching lug for engaging said brake head.

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