April 22, 1941. C. A. SCHELL 2,239,574

BRAKE LINER

Filed Nov. 4, 1939

Fig. 2.

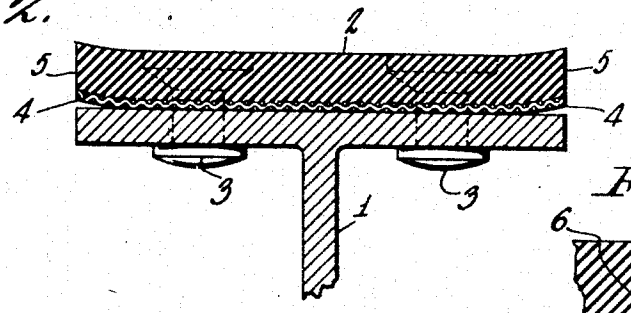


Fig. 4.

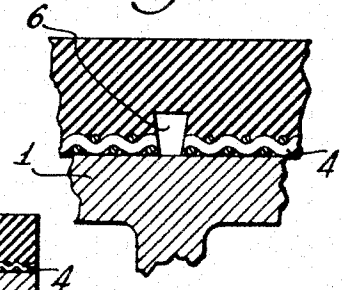


Fig. 3.

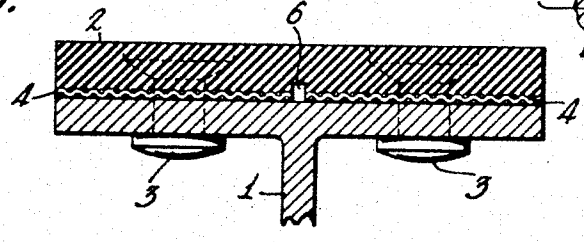


Fig. 5.

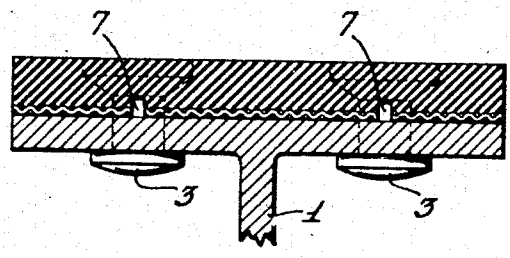


Fig. 6.

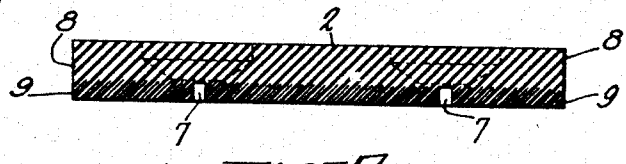


Fig. 7.

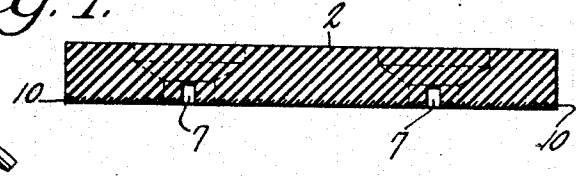
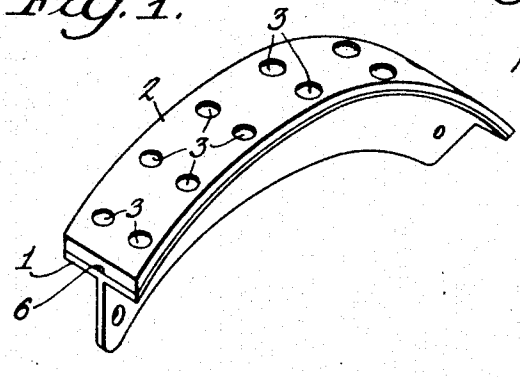


Fig. 1.



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UNITED STATES PATENT OFFICE

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BRAKE LINER

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Application November 4, 1939, Serial No. 302,923

8 Claims. (Cl. 188—250)

This invention relates to improvements in brake linings.

The principal object of the invention is to provide a liner which shall be generally more efficient in a functional respect than liners of the prior conventional form, and which shall be free from a particular inherent fault of the prior liners, as hereinafter more fully set forth.

There has been a tendency for liners of the conventional form to curl at the longitudinal edges away from the brake shoe to which the liner is attached, with the result that the normal and desirable relation between the surface of the liner and the brake drum is destroyed. In many instances this distortion of the liner is sufficient to bridge the relatively small clearance space between the liner and the drum so that there is a continuous frictional contact which interferes materially with the normal free running of the wheels and causes unnecessary wear on both the liner and the drum.

The aforedescribed tendency for liners to distort at the edges is due apparently to non-uniform heat conditions and a consequent unequal expansion in the liner itself. It is probable that after application of the brakes with resultant generation of considerable frictional heat, the outer portions of the brake liner adjoining the working surface cool more rapidly than the inner portions of the liner which lie in contact with the metallic brake shoe. This is due in part to the storage of heat in the metallic shoe which tends to maintain the adjoining portion of the liner at a relatively high temperature after the outer face portions have become relatively cool.

The curling of the liner is most acute where, by reason of the structure of the liner or the inclusion in the liner of a wire or other backing, there exists an actual difference in coefficient of expansion between the back of the liner and its outer face portion. This condition exists to a degree even in molded liners of homogeneous composition due to the fact that in such liners the working face thereof is ground in order to free it from the case-hardened shell which is formed on all faces of the liner in the manufacturing process, and which hardened shell is left intact at the back of the liner which contacts the brake shoe.

A primary object of the invention is to overcome this tendency of the liner to distort at the longitudinal edges, and to provide a liner which over its entire area will maintain its original flat relationship with the brake shoe and with the opposed brake drum.

The invention will be more readily understood by reference to the attached drawing, in which:

Figure 1 is a view in perspective of a conventional form of brake shoe with a liner attached thereto;

Fig. 2 is an enlarged fragmentary transverse sectional view showing the brake shoe with an attached liner of conventional form and illustrating the manner in which the liner tends to curl or distort at the longitudinal edges;

Fig. 3 is a corresponding fragmentary sectional view including an attached liner made in accordance with my invention;

Fig. 4 is a fragmentary enlarged sectional view illustrating the manner in which my invention operates to prevent distortion of the longitudinal edges of the liner;

Fig. 5 is a fragmentary sectional view, similar to Figs. 2 and 3, illustrating a modification within the scope of my invention, and

Figs. 6 and 7 are corresponding sectional views showing the invention as applied to liners of different forms.

With reference to Fig. 1, the reference numeral 1 indicates a brake shoe of conventional form to which is secured a liner 2 by means of the conventional rivets 3. In each of the other figures of the drawing, these principal elements of the brake shoe assembly are indicated by the same reference numerals.

The liner shown in Fig. 2 is of conventional form, this liner comprising a main body portion, of suitable friction composition, and a reinforcing backing 4, which in the present instance consists of wire mesh. In this case, the longitudinal edge portions 5 of the liner have curled outwardly away from the normal seat upon the brake shoe 1. I have discovered that this tendency of the brake liner to distort at the longitudinal edges, as shown in Fig. 2, can be avoided by forming the inner face of the liner, namely, that face which adjoins the brake shoe, with one or more longitudinal grooves or recesses of the character indicated at 6 in Fig. 3. This longitudinal recess 6 in the present instance divides the backing 4 longitudinally of the liner and extends into the body of the latter. In effect, it divides the inner face portion of the liner into two individually expansible sections, and permits expansion occurring in those sections to progress toward the center of the band after the manner illustrated in Fig. 4. As illustrated in the latter figure, the transverse expansion of the sections of the inner portion of the liner at opposite sides of the longitudinal recess 6 has resulted in a convergent displacement of the opposite side walls of the slot 6, the slot thereby taking up the expansion, which in its absence would necessarily have progressed solely toward the outer edges to produce the aforedescribed pronounced distortion of the longitudinal edge portions of the liner, as shown in Fig. 2. By incorporation of the longitudinal slot 6 in the liner as described, the outer or active face of the liner and the side edge portions are permitted to retain their normal positions, or substantially so, in the normal plane of the liner.

In a liner of the form illustrated, having a me-

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tallic backing, the slot should be as deep at least as the thickness of the backing. For molded liners of conventional thickness, say, in the neighborhood of $\frac{3}{16}$ of an inch, I have found that a slot $\frac{1}{8}$ of an inch in depth and $\frac{1}{32}$ of an inch wide is productive of the desired result and will have no undue weakening effect. Preferably the depth of the slot or slots should be at least $\frac{1}{32}$ of an inch. The permissible depth and width of the slot will, however, vary considerably with the structural character and physical properties of the liner.

If the expansion of the liner is of such an order that the desired result is not achieved by use of a single longitudinal slot, the undesirable effects of expansion can be compensated by employing a plurality of such slots, as illustrated in Fig. 5, the inner portion of the liner in this case being provided with two longitudinal grooves or recesses 7, 7 each located approximately half-way between the proximate longitudinal edge and the longitudinal center line of the liner.

As previously set forth, the invention finds useful application in various types of liners, and in Fig. 6 I have illustrated a molded liner wherein the face or wearing portion 8 is of different composition from the back or reinforcing portion 9. In a liner of this type, wherein the major expansion effect occurs in the inner reinforcing section 9, the device is highly effective in overcoming the aforedescribed distortion tendency.

In Fig. 7, I have illustrated the invention as applied to a molded liner of substantially homogeneous composition, the reference numeral 10 in this instance indicating the case-hardened shell which is produced upon the surface of the liner during the process of manufacture and which has been removed from the wearing surface in order to permit a better functioning of the liner.

In each case the presence of the slot or slots has the same general effect. They interrupt the continuity of the inner or base portion of the liner in the transverse direction and thereby prevent the accumulated expansion in the said base portion as a whole from manifesting itself solely at the outer edges of the liner. The expansion occurring in the section lying between each of the outer side edges of the liner and the proximate slot is relatively small and is permitted to progress toward both edges of said section, and the effect of the expansion upon the outer edges of the liner is correspondingly reduced. It is apparent that by judicious application of the principle in the case of any particular liner, the undesirable effects of expansion at the outer edges of the liner can be reduced to a negligible point.

I claim:

1. A brake liner having in the back thereof one or more recesses arranged so as to interrupt the continuity of the ear face portion of the liner in a transverse direction, the side walls of said recess or recesses being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

2. A brake liner consisting of a thin strip of friction materials, the continuity of the back face portion of said liner being interrupted by means of one or more recesses of substantial depth, the side walls of said recess or recesses being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

3. A brake liner consisting of a thin elongated strip of friction material, said liner having in the back thereof one or more longitudinal recesses of substantial depth, said recess or recesses interrupting the continuity of the rear face portion of the liner in the narrower transverse direction, and the side walls of said recess or recesses being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

4. A brake liner having in the back thereof a longitudinal recess of substantial depth extending continuously from one end of said liner to the other, the side walls of said recess being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

5. A brake liner having a body portion of friction material and a reinforcing backing of other composition, said backing having a coefficient of expansion greater than the coefficient of expansion of said friction material, and one or more longitudinal recesses in the back of said liner arranged to interrupt the continuity of said backing in the transverse direction, the side walls of said recess or recesses being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

6. A brake liner consisting of an elongated strip of friction material, said liner having in the back thereof a recess of substantial depth extending in parallel relation and in proximity to each of the longitudinal side edges of said strip, the side walls of each of said recesses being substantially parallel so as to permit variations in the effective widths of the recesses due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of the liner.

7. A brake shoe assembly comprising a metallic shoe and a liner attached to said shoe, the back of said liner adjoining the shoe having one or more longitudinal recesses arranged so as to interrupt the continuity of the rear face portion of the liner in the transverse direction, the side walls of said recess or recesses being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

8. A brake liner consisting of a strip of friction material having a metallic backing, and one or more longitudinal recesses in the back of said liner arranged to interrupt the continuity of said metallic backing transversely of said strip, the side walls of said recess or recesses being substantially parallel so as to permit variations in the effective width of the latter due to expansion or contraction of the body of the liner without materially affecting the normal effective thickness of said liner.

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