No. 676,489. Patented June 18, 1901.

W. A. CHAPMAN.

METALLIC INSERT FOR BRAKE SHOES.

(Application filed Feb. 21, 1900.)

(No Model.)

Fig. 1

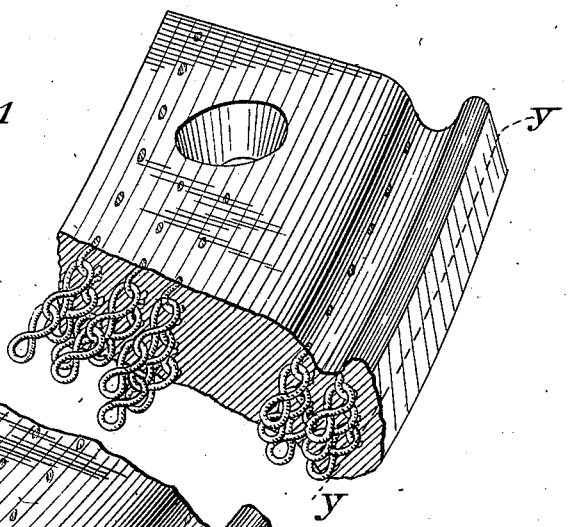


Fig. 2

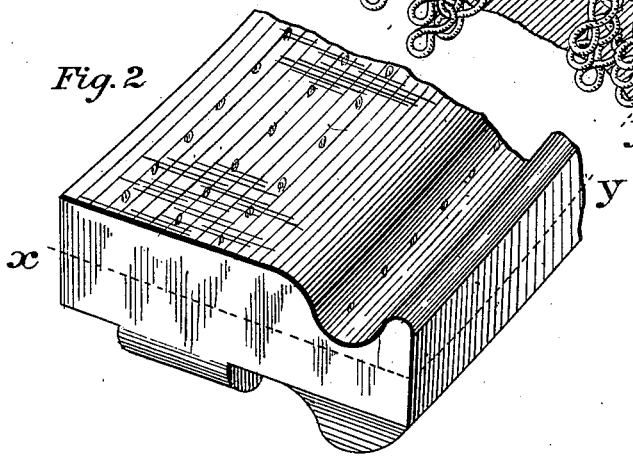
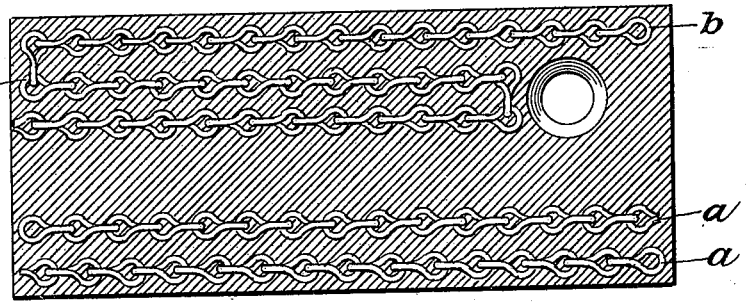


Fig. 3



WITNESSES:

P. Lowe Measures.

Fred Thos. Davies.

INVENTOR

William A. Chapman

BY

Walter Edmonds.

ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM A. CHAPMAN, OF SUFFERN, NEW YORK.

METALLIC INSERT FOR BRAKE-SHOES.

SPECIFICATION forming part of Letters Patent No. 676,489, dated June 18, 1901.

Application filed February 21, 1900. Serial No. 5,989. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. CHAPMAN, a citizen of the United States, and a resident of Suffern, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Metallic Inserts for Brake-Shoes, of which the following is a description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of an approximate half of a brake-shoe broken in two, so as to expose its interior, fragments of one style of my improved insert—viz., chains—being shown projecting toward the observer from one surface of the brake in the same position relative to that fragment or half as they should occupy in the complete shoe. Fig. 2 is the remaining half of the brake-shoe. Fig. 3 is a sectional view of the brake-shoe illustrated by Figs. 1 and 2 before the breaking open of the same and taken on a cylindrical section located as outlined by the dotted lines *x x y y* in Figs. 1 and 2, lengths of chain-shaped insert being shown in perspective lying upon the surface of said section in the same positions relative thereto as they should occupy in the complete brake-shoe, as hereinafter more fully described.

My invention relates to that class of composite brake-shoes in which are combined a metal having a comparatively soft granular structure, and hence superior braking qualities, such as cast-iron, with a metal having greater ductility and longevity under the conditions of wear, such as wrought-iron or steel. Some of this class of brake-shoes have been heretofore constructed by preliminarily assembling within a mold of the required shape a series of sheet-like comparatively inflexible so-called "foraminous" inserts of the more ductile metal, such as wrought-iron or steel, in the form known as "expanded metal," after which the brake-shoe is cast in the usual manner by filling the mold with a molten metal, such as cast-iron, which thus wholly surrounds and incorporates the inserts, the resultant product being a brake-shoe combining mechanically and permanently in itself the two grades of metal. Such methods of constructing brake-shoes have, however, proved objectionable in several particulars, viz: The necessarily attenuated form of an insert of expanded metal, "perforated sheet," or "interlaced wire" therein described, all essentially sheet-like, restricts the proportion of the mass and wearing-surface of the inserts to the mass and wearing-surface of the matrix below a value which is sometimes essential to the accomplishment of the work required—as, for instance, in the case of a "tire-dressing" shoe. Again, such will present a wearing-surface too finely divided in character for effective action. Again, this essentially-attenuated form of insert renders it liable to undesirable change of character or temper due to the initial high temperature of the molten metal cast around it. Again, the inflexibility and sheet-like character of such inserts renders necessary an undesirable amount of preliminary preparation. For instance, after the extensive sheets in which such material is commonly prepared for commerce have been procured and before they are adapted for insertion into the mold it is necessary to cut them into appropriate shapes and sizes, (involving waste of material,) bend or compress them into requisite form, (involving expenditure of power,) and arrange and confine them in similarly shaped and sized bundles, (involving time and labor.) In the manufacture of such composite brake-shoes it is, in order to insure an industrially-successful product, essentially of the essence of the problem to produce or otherwise secure preliminarily an insert possessing not only the desired quality of metal, but such other characteristics as will enable it to be brought to the mold with the least possible expense and thereafter arranged therein in such position and in such relation of its mass and wearing-surface to the mass and wearing-surface of the containing metal as shall best fit the product for the particular service for which it is designed and possessing also such qualities as shall make the process the most convenient, effective, and time-saving. Such inserts have been termed "foraminous," signifying thereby inserts the metal of which is not solid or continuous, but broken by apertures or passages through which the molten metal thereafter cast about them may find its way, so as to interlock the two metals together.

The object of my invention is to produce

an essentially foraminous insert of ductile metal adapted to overcome the objections above cited and by reason of its configuration, construction, and integral qualities to produce, in combination with the cast filling, a more efficient, available, and economical brake-shoe. I attain this object by using for my inserts an aggregation of units each consisting of a portion of the desired insert metal of longitudinally-extended and more or less bent or twisted form and preferably, though not necessarily, connected and interlocked with each other in a flexible series either partially or completely, in which latter case the extended combination might be fitly described as a chain or as of chain shape, the aggregation of units of such shape retaining necessarily the desired foraminous character, whatever may be said of any one individual unit in which the twist or bend is not so complete as to bring together its two extremities. The manufacture or production of composite brake-shoes by the use of my improved type of foraminous insert is therefore particularly economical, owing to the numerous varieties of metals, sizes, and forms of such inserts constantly being produced under the name of "chain," and thus immediately available for the purposes of my invention, and for the same reason greater facility and certainty in adapting the resultant product to the nature of the work for which it is intended is attained by the use of my type of insert.

The requisite quantity, style, and weight of my improved insert material having been secured, it is placed in position in the mold with great facility and accuracy, because the smallness of its subdivisions or units, and particularly where chain is utilized, results in great mobility and flexibility of the mass of the insert, and thus enables it to be correctly packed into the mold with very little forcing or strain of any kind. My improved insert may thus in any convenient manner be packed or positioned in the mold ready for the casting of the brake-shoe. When chain is used, it may either be cut into lengths fitting the mold, as shown in Fig. 3 at *a a*, or it may be continuously packed into the mold by bending it back upon itself indefinitely, as shown at *b b*, Fig. 3, or it may be inserted and arranged in the mold in any other convenient or desired manner. In Fig. 1 and projecting toward the observer from the broken surface of the brake-shoe are shown in perspective fragments of chain inserts sufficient to indicate one of the positions which they may be given relative to the remainder of the shoe and to each other, the projecting parts illustrating the positions of the insert-chains throughout the whole shoe.

According to the proportion of ductile metal and the extent of variation between the two metals as presented at the wearing-face of the brake-shoe my insert when chain is utilized may be either plain or twisted or made up of links whose constituent metal is of larger or smaller diameter—in other words, a coarse chain or a fine chain, a heavy chain or a light chain. Should it be required to vary the proportion of ductile as compared with granular metal at different parts of the wearing-surface of my improved brake-shoe that one portion of said wearing-surface may present the ductile metal in larger masses than any other portions, all this may be most readily, economically, and effectively accomplished by the use of my invention by merely varying accordingly the size or shape or both size and shape of the units of the insert in different parts of the mold. For instance, where wheel-dressing is desired that part of the operative face of the brake-shoe which is designed to accomplish that purpose may be readily fortified and enriched in ductile metal, while the remaining parts contain it in comparatively diminished quantities by inserting proportionately in the mold units of the insert such in thickness and weight as to insure the requisite preponderance of ductile metal in the required place.

It will be understood that the previously-known styles of foraminous insert—*e. g.*, those produced by piling together sheets of expanded metal—are, in order to secure the degree of flexibility requisite to their preparation for the mold, necessarily selected from those whose metal is so attenuated as to render the mass unduly susceptible to molecular change when subjected to the high temperature resulting from the introduction of the molten metal into the insert-filled mold. In such cases the requisite ductility is believed to be frequently lost either in whole or in such part as to deprive the insert of much of its efficiency. By my invention it is possible to produce an insert, handle, and introduce it into the mold with perfect ease, owing to its mobility or flexibility, and yet present the ductile metal in such masses as to enable it to resist efficiently the disintegrating effect of the aforesaid high temperatures of casting.

It will be observed that my improvement enables the insert to be introduced throughout the brake-shoe in every conceivable variety of position relative to the axes of the constituent metal particles or units. This will serve, if required, to produce variation in the wearing of the ductile insert in different portions of the shoe. In brief, it may be said that among its numerous other advantages my improved insert conspicuously and unprecedently presents, in relation to the brake-shoe mold, a substantially continuous foraminous insert of ductile metal in masses sufficiently important to be individually inflexible and unaffected in temper by the temperature of molten metal, but nevertheless so mobile or flexible as to be inserted with the greatest ease and variation of location and position within the mold—capable, in fact, of being practically charged into it with approxi-

mately the same facility as the subsequently-associated molten metal and also an insert of such quality as to be readily varied in mass and in detail wherever required in different portions of the brake-shoe. It will also be observed that my improved insert is capable of being conveniently and effectively associated in the mold with other previously-known forms of such inserts. It may be, for instance, interlaid between the well-known inserts of expanded metal or otherwise interspersed or associated with other forms, such as sinuous perforated sheets, wire screens, and the like.

Another notable advantage possessed by my insert is the additional cohesive strength thereby imparted to the brake-shoe. As is well understood, a constant danger incident to the use of brake-shoes arises from their brittleness and consequent liability to fracture, whereby parts thereof are sometimes left upon the track to the impediment of subsequently-passing wheels. The peculiar shape and qualities of my insert hereinbefore referred to result in its acting within the cast metal of the shoe as a binder or chain connection of comparatively ductile and unbreakable metal possessing sufficient body and tensile strength to resist the strain resulting in fracture of the cast-iron of the remainder of the shoe, and thus when the latter breaks my insert operates to effectively and safely couple and retain together the fragments until the injury is observed and the broken shoe removed.

What I claim as new, and desire to secure by Letters Patent, is the following, viz:

1. A brake-shoe composed of a body portion of one class of metal having foraminous inserts consisting of a series or chain of interlocked links of another class of metal, substantially as and for the purposes described.

2. A brake-shoe composed of a body portion of one class of metal having foraminous inserts consisting of a chain or associated portions of chains of another class of metal, substantially as and for the purposes described.

3. A brake-shoe composed of one class of metal having foraminous inserts consisting of a chain or associated portions of chains in combination with otherwise-shaped inserts of another class of metal, substantially as and for the purposes described.

4. A brake-shoe comprising a cast-metal bed having embedded therein one or more inserts of a more ductile metal consisting of a chain or portions of chains, substantially as and for the purposes described.

5. A brake-shoe comprising a cast-metal bed having embedded therein one or more inserts of a more ductile metal consisting of a chain or portions of chains of interlocked links of such more ductile metal, substantially as and for the purposes described.

6. In a multimetallic brake-shoe a foraminous metal insert consisting of one or more continuous flexible strands each consisting of associated smaller separate bodies of one of the metals substantially as and for the purposes described.

7. A brake-shoe consisting of a cast-metal body portion having inserts of a more ductile metal consisting of a plurality of interconnected units, substantially as and for the purposes described.

WM. A. CHAPMAN.

Witnesses:
GEO. G. MEASURES,
FRED T. DAVIES.