Jan. 2, 1940. E. C. RYAN 2,185,268

CURRENT COLLECTOR SHOE

Filed April 1, 1938

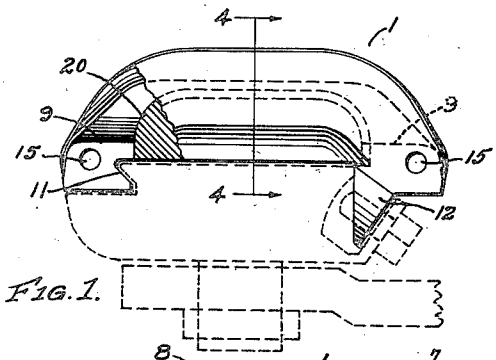


FIG. 1.

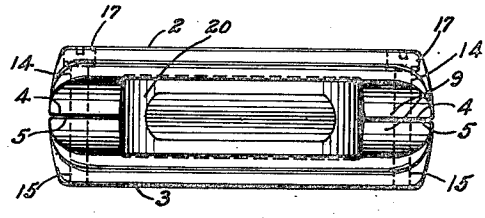


FIG. 2.

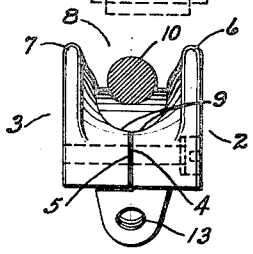


FIG. 3.

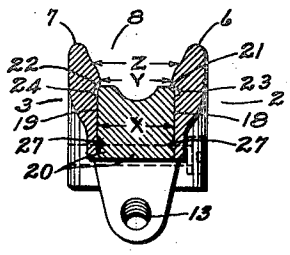


FIG. 4.

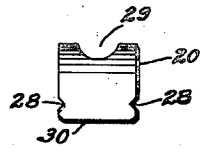


FIG. 8.

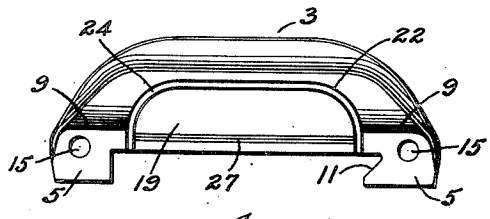


FIG. 5.

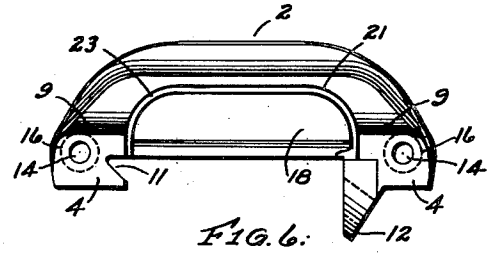


FIG. 6.

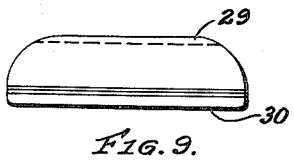


FIG. 9.

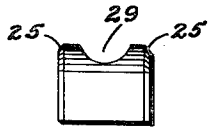


FIG. 12.

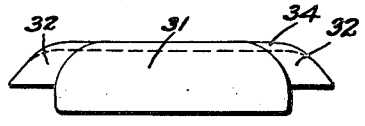


FIG. 10.

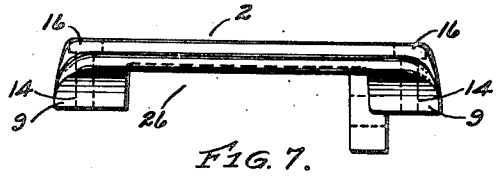


FIG. 7.

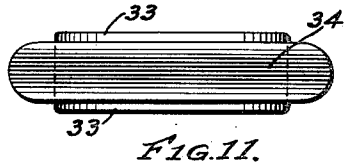


FIG. 11.

Inventor

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By

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UNITED STATES PATENT OFFICE

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CURRENT COLLECTOR SHOE

Edmund C. Ryan, Mansfield, Ohio, assignor to The Ohio Brass Company, Mansfield, Ohio, a corporation of New Jersey

Application April 1, 1938, Serial No. 199,483

9 Claims. (Cl. 191—59.1)

My invention relates to an improvement in the construction of current collector shoes or sliders used on electric vehicles receiving current from a trolley wire.

The shoe or slider moves along and in engagement with the trolley wire and both are, therefore, subject to wear through friction therebetween.

Many have devoted considerable study and experiment to improve the slider or shoe in an effort of overcoming the objections therewith.

The questions coped with have been numerous; namely, whether to make the shoe of ferrous or non-ferrous metal or a combination thereof, as for instance, the body of bronze and an insert of steel (hardened or soft) or a body of steel with a bonze insert; what grade of bronze or non-ferrous metal should be used whether to make the body of ferrous or non-ferrous metal with a carbon insert; the length of the bearing surface of the shoe with the trolley wire; the shape and depth of the groove and various other points have been considered.

While the shoe or slider, as heretofore made, meets in a general way universal satisfaction, I have given the subject close study with the idea of still further perfecting the same and have developed a device which I find by actual commercial trials to be superior to previous constructions.

One object of my invention is to provide a shoe in which the part subject to most wear may be easily renewed, thus avoiding the rejection of the entire device when worn.

Another object is to make the renewable part of a material which will offer the least amount of wear to the trolley wire and at the same time coat the surface with a lubricant and polish the surface thereof.

Another object is to so construct the body or holder that it will efficiently and positively hold and retain the insert.

A further object is to so construct the shoe that the body or holder may be made of a non-ferrous metal of high conductivity.

A still further object is to construct a device so that the holder will not normally engage with the trolley wire.

A further object is to construct the insert of carbon such that it may be conveniently and economically produced.

Other objects will be obvious and will appear hereinafter.

My invention therefore resides in the embodiment shown in the accompanying drawing and comprising the new and novel construction, combination of elements and arrangement of parts, described hereinafter and more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a side view of my improved shoe shown in partial longitudinal section and mounted upon a support as indicated by dotted lines.

Fig. 2 is a top view of my improved shoe shown in Fig. 1.

Fig. 3 is an end view of Figs. 1 and 2.

Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 1.

Fig. 5 is an inner face view of one-half of the holder which I use.

Fig. 6 is an inside face view of another part of the holder.

Fig. 7 is a top view of the holder part shown in Fig. 6.

Fig. 8 is an end view of the insert shown in Figs. 1 to 4 inclusive.

Fig. 9 is a side view of the aforesaid insert.

Figs. 10 and 11 are side and top views respectively of a modified form of insert.

Fig. 12 is an end view of a modification of the insert shown in Figs. 8 and 9.

In the preferred embodiment of my invention, I employ a holder 1 of metal either ferrous or non-ferrous. The holder comprises parts 2 and 3 having adjacent vertical longitudinally disposed faces 4 and 5 respectively.

The holder is made preferably in two parts along a vertical longitudinal plane. The parts 2 and 3 are provided with upstanding flanges 6 and 7 respectively. These flanges provide a groove 8 when the parts are in assembled relation which tends to prevent dewirement. The ends of the groove 8 have aligned surfaces 9 which, however, do not contact with the trolley wire 10.

The shoe is mounted upon a support which may be of various detailed constructions and is indicated in Fig. 1 by dotted lines.

In the preferred construction of the shoe for mounting upon a support, I provide a transverse slot 11 at one end of the parts 2 and 3, which may interlock with a counterpart hook on the support.

At the other end of the shoe I provide a downwardly projecting lug 12 which is integral with the part 2 and projects transversely beyond the longitudinal center of the holder 1 such that the axis of the threaded opening 13 is in alignment with the longitudinal center of the holder.

The threaded opening 13 is adapted to receive

a threaded screw on the support for locking the holder to the support.

The parts 2 and 3 are provided at each end with registering passages 14 and 15 respectively. The passages 14 are unthreaded and the passages 15 threaded. The passages 14 have enlarged openings 16 to receive the head of a screw 17 whereby the parts 2 and 3 are drawn together and held securely in place.

Each part 2 and 3 is provided on its inner face with a cut-out portion having a depression or pocket 18 and 19 respectively to receive an insert 20. The depressions 18 and 19 form shoulders 21 and 22 respectively against which the insert 20 rests thus preventing its displacement upwardly.

In order to aid in the economical production of the members 2 and 3, they are so designed that they may be made from cast metal and molded on their vertical face without the use of cores, thus it is possible to recess the casting where the vertical faces of the depressions 18 and 19 meet the shoulders 21 and 22 respectively, as indicated at 23 and 24. The grooves 23 and 24 will be formed in the castings at the time produced and will prevent the sand of the mould breaking away in the corners, thus preventing the insert from properly fitting the frame or acquiring any defects in the corners to be later removed at considerable expense. This is an important feature of my improved construction as it lends materially to economical production and lower cost of the device to the consumer.

If it is not deemed advisable to provide the grooves 23 and 24, then the edge of the insert should be cut away or bevelled as at 25 in Fig. 12.

The opening 26 formed by the cut-out portion in the frame for receiving the insert is shown as extending entirely through the frame in a vertical direction, that is, the opening 26 intersects the bottom face of the frame, thus the insert is free to fall out through the bottom if the screws 17 should be somewhat loose and the frame not in position on the support.

In order to insure the insert 20 being held against inadvertent removal through the bottom of the frame, I provide a longitudinal ridge 27 on the inner face of the depressions 18 and/or 19. I, also, provide the insert 20 with longitudinal depressions or grooves 28 corresponding to the ridge or ridges 27.

The proper seating and holding of the insert 20 in position in the frame is found to be extremely important especially when the insert is made of carbon or graphite or a non-metallic conductor. The insert is subject to a great amount of abuse in that it is in moving contact with the trolley wire and as it moves along the wire it is naturally subject to wear and also to more or less shocks, incident to the supports for holding the trolley wire, and it is subjected to a great deal of heat on account of the current which it must carry.

It is found that under the severe conditions of operation, the graphite may in some cases be subject to severe checking, and if the insert is not properly held in the frame the checking may be so severe that parts of the insert may be entirely loosened and fall away.

However, with the insert held in position against the shoulders 21 and 22 and interlocked with the ridges 27 and, also, securely clamped against the faces of the depressions 18 and 19, I have found that such checking takes place will not result in the loss of portions of the insert which will continue to function until renewed. Good electrical contact between the insert and the faces of the parts 2 and 3 is very important in keeping the temperature of the insert at a minimum.

One of the important features of my invention is to provide a shoe in which the holder may be used in connection with a number of replacements of the insert before it becomes necessary to replace the holder. This is accomplished to a large degree by the shallow or supplementary groove 29, which is of less width than the width Y of the holder, thus maintaining the shoe in position and the flanges 6 and 7 out of contact with the trolley wire when the insert is new and which relation will be maintained as the groove 29 wears deeper.

It will be noted that the dimension X is greater than the dimension Y, thus producing the shoulders 21 and 22.

The distance Y between the flanges 6 and 7 is increased as at Z, in order to better clear the overhead supporting devices for the trolley wire.

The groove 29 is preferably made straight and parallel with the inner faces of the flanges 6 and 7 and is, also, parallel with the lower face 30 of the insert. The cross-section of the insert is preferably rectangular except for the groove 29 although the vertical side walls may be tapered upwardly and inwardly.

The opening or recess 26 for the insert is shown as intersecting the lower face of the holder, but it is evident that this opening or recess may have a closed bottom. In this case the ridge 27 is unnecessary if the shoulders 21 and 22 are maintained.

If desired, the insert 20 may be of bronze or of a ferrous metal, but to secure the best results, I prefer the insert to be of a non-metallic conductor such as carbon or graphite.

In Figs. 10 and 11 I have shown a modification of the insert which may be of metal or non-metallic conductor, preferably the former.

In this form of the insert the central portion 31 corresponds to the insert shown in Fig. 9 and the projecting end portions 32 are added. The insert is mounted in the holder the same as the insert shown in Figs. 8 and 9, excepting that the ridge 27 is unnecessary as the portions 32 rest upon the surfaces 9 of the holder.

The projecting side parts 33 extend into the depressions 18 and 19 of the holder and contact with the shoulders 21 and 22. The groove 34 is naturally longer and gives more contact with the trolley wire.

The form of insert shown in Figs. 8 and 9 is very simple and inexpensive in construction in that the same may be extruded from a die in lengths several feet long and of the cross-section shown in Fig. 4 as desired, and then the extrusion cut up into lengths suitable for the holder and the ends shaped up as required. Such method of producing the insert is very inexpensive as compared with an insert which requires the manufacture thereof in separate molds, that is, each insert being produced individually.

The insert represented by Fig. 12 may also be produced in the same manner, but not so the insert shown in Figs. 10 and 11.

By graphite I refer to the natural form or that produced synthetically in an electric furnace, and by carbon I refer to the well known form commonly used in the manufacture of brushes for electric generators and motors; the term car-

bon applies herein to both forms, both are non-metallic conductors. I may also use an insert made of a mixture of finely pulverized carbon and metal, such as copper, pressed into shape.

Inserts composed of the above materials are naturally frangible to a considerable degree as compared with the metal alone and therefore require a holder which will properly clamp and support the insert.

The groove 29 is spaced considerably above the holder surfaces 9 and therefore considerable wear of the insert may take place before the trolley wire can contact with the surfaces 9.

Having disclosed my invention, I claim:

1. A current collector shoe to engage with a trolley wire comprising, an elongated rectangular metallic holder and an elongated insert of non-metallic current-conducting material, the holder being split lengthwise to form two parts and each part having a recess cooperating to form a single recess having a rectangular opening to receive the insert, each part of said holder having a groove at one end to register with the groove of the other part to form a single transverse groove to engage with a part on a support, a projecting lug at the other end of one part and having means to receive other means to secure the shoe to the support, spaced upstanding flanges on the holder extending along the upper longitudinal edges of the insert, a longitudinal groove in the insert, the said groove being of less width than the width of the space between the flanges at the exposed surface of the insert to receive and to guide the trolley wire and maintain it under normal operation out of contact with the flanges of the holder.

2. A current collector shoe for the purpose described comprising, an elongated holder of metal having spaced side and end walls and upstanding flanges, an elongated recess between the walls, an insert positioned in the recess, the side walls of the recess being depressed to form a shoulder to hold the insert against vertical movement in one direction, the flanges and insert forming a groove to resist dewirement of the shoe, a groove in the face of the insert to hold the flanges out of contact with the trolley wire during normal operation, a groove formed in the holder along the line of meeting of the said side faces and the shoulder to permit the insert properly seating in the recess, the holder being separated into two parts along a longitudinal and vertical plane to permit renewal of the insert when worn, means to draw the holder parts together into clamping engagement with the insert and means to secure the shoe to a support, the last said means comprising a depending hook on one end of each holder part and a projecting threaded lug on the other end of one holder part but overlapping the adjacent end of the other holder part.

3. A current collector shoe comprising, an elongated metal member having an elongated open top and open bottom recess, a separately formed member positioned in the recess, raised means on one member interlocking with depressed means on the other member to position the two members relative to each other, means associated with the first member whereby the width of the recess may be increased to permit the insertion of the said second member, means to reduce the width of the recess after the insertion of the member and means to attach the shoe to a support.

4. A current collector shoe for the purpose described comprising, an elongated member of metal having spaced flanges forming an elongated groove therebetween, an elongated opening between the flanges, an elongated member of carbon positioned in the opening, the first said member being split longitudinally through the opening to form two parts, means for drawing the parts into holding engagement with the said second member, the side walls of the opening being depressed and each forming a shoulder overlapping the adjacent edge of the second member to lock the said second member against movement in one direction, relative to the first member, a groove formed in each part of the first member along the line of meeting of the side face of the depression and the shoulder to permit the said second member properly seating in the opening, means forming a part of one member interlocked with means forming a part of the other member to lock the said second member against movement relative to the first member in a direction opposite to the aforesaid direction and means to attach the first member to a support.

5. An insert for use in a metallic holder for a current collector shoe having spaced upstanding flanges and a recess comprising, an elongated block of conducting material for positioning in said recess and having one face adapted to slidably engage with a trolley wire and to form with the flanges a groove to resist dewirement, the block also having side faces to engage with the holder, a depression in at least one side face to interlock with projecting means on the holder to secure the insert against movement relative to the holder, a longitudinal groove in the first said face of the block which is less in width than the width of the space between the flanges to receive and center the trolley wire relative to the flanges and prevent contact therewith during normal operation.

6. A metallic holder for a current collector shoe comprising, a substantially rectangular frame having spaced upstanding side walls and flanges and an intermediate recess to receive and hold an insert and having a bottom opening through which the insert may be inserted into the recess, the frame having means whereby the opening may be increased in width, the side faces of the recess being depressed thereby forming faces to contact with the side faces of the insert, a projection on the said depressed face to interlock with a depression in the insert, transverse means at each end of the holder to reduce the width of the opening and draw the sides into engagement with the insert and means on the lower face of the frame for attachment to a support.

7. A current collector shoe to engage and glide along a trolley wire comprising an elongated metallic holder having spaced upstanding flanges and provided with an elongated recess, a frangible current-conducting insert positioned in the recess and having an exposed face to engage the trolley wire, means to secure the holder to a support, the shoe provided with two parallel longitudinal grooves, one groove to resist dewirement of the shoe and formed by the spaced upstanding flanges and the exposed face of the insert and the other groove formed in the exposed face of the insert to receive the trolley wire and prevent the said flanges engaging the trolley wire under normal operating conditions, the width of the second groove being less than the width of the space between the said flanges.

8. A current collector shoe to slidably engage with a trolley wire comprising, an elongated rectangular holder and an elongated insert of current-conducting material, the holder split longitudinally to form two parts, each part having a recess cooperating to form a single open top recess in which the insert is positioned with its surface exposed in said top opening, spaced upstanding flanges on the holder extending along the upper longitudinal edges of the insert and forming with the insert a groove to receive the trolley wire and prevent dewirement, means to secure the holder parts in close contact with the insert, means to secure the shoe to a support, the said means comprising a depending hook on one end of each holder part and a projecting threaded lug on the other end of one holder part but overlapping the adjacent end of the other holder part and a supplementary groove formed in the exposed upper face of the insert parallel to the upstanding flanges, the supplementary groove being of less width than the space between the flanges to receive the trolley wire and guide the shoe along the wire under normal conditions without contacting the flanges.

9. A current collector shoe to slidably engage with a trolley wire comprising, an elongated holder of metal, an elongated recess, an insert of current-conducting material positioned in the recess with an exposed face to contact with the trolley wire, upstanding spaced longitudinal flanges from the holder and extending along the outer sides of the insert and forming with the insert a groove to receive the trolley wire and prevent dewirement of the shoe, a supplementary longitudinal groove in the contact face of the insert and of less width than the width of the space betwen the flanges to guide the shoe with the flanges out of contact with the trolley wire under normal operation, a longitudinal projecting ridge on an inner side face of the said recess interlocking with a longitudinal groove in the adjacent face of the insert to secure the holder and insert against displacement, the holder being split longitudinally to permit of insertion of the insert and means to draw the holder parts together to clamp the insert and maintain the interlock between the holder and insert.

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