March 31, 1925. 1,531,344

W. B. NELSON

COOLING BED

Filed Oct. 22, 1921

Fig. 1

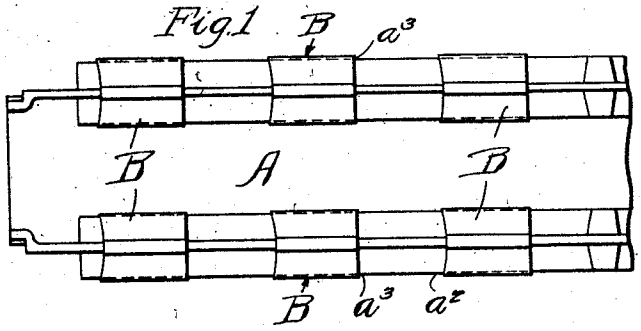


Fig. 2

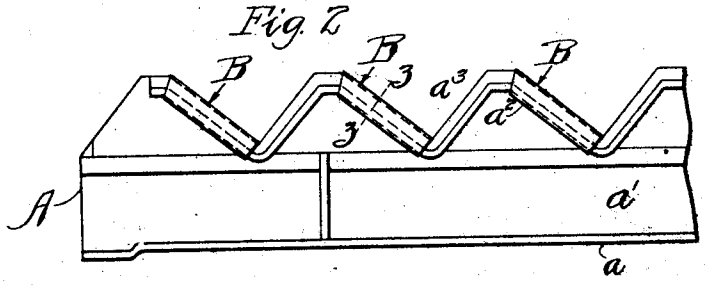


Fig. 3

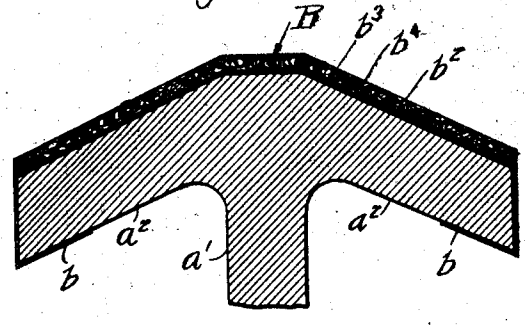
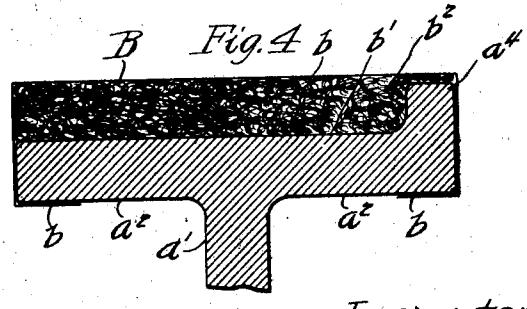


Fig. 4



Witness:
J. C. Fellman

Inventor:
William Berger Nelson
By J. McRoberts Jr. Atty.

Patented Mar. 31, 1925. 1,531,344

UNITED STATES PATENT OFFICE.

WILLIAM BERGER NELSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO INTERSTATE IRON AND STEEL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

COOLING BED.

Application filed October 22, 1921. Serial No. 509,648.

To all whom it may concern:

Be it known that I, WILLIAM BERGER NELSON, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, having invented certain new and useful Improvements in Cooling Beds, do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to cooling beds used in handling hot metal bars as they are delivered from the reducing-rolls of a rolling-mill, and consists in the novel and useful constructions herein described and then pointed out in the appended claims.

In the accompanying drawings, which illustrate a practical embodiment of the features of my invention and in which the same reference characters indicate similar parts in the different views, Fig. 1 is a top plan view of a portion of a rack for the rack-section of a cooling bed equipped with my invention, the discharge end being shown broken away for convenience of illustration; Fig. 2 is a view of the same in side elevation; Fig. 3 is a detail cross-sectional view on the line 3—3 in Fig. 2, and Fig. 4 is a similar cross-sectional view of another form of rack equipped with my invention.

The object of my invention is to provide an insulating pad for the racks used in cooling beds for hot metal bars whereby the bars are protected from being chilled by the metallic troughs or pockets. Obviously the term bar as used herein includes all elongated shapes, particularly such as may be cooled in packs.

In this class of apparatus each hot metal bar as delivered from the reducing-rolls of the mill is placed upon the skid-section of the cooling bed composed of a series of rigid inclined skids arranged in a uniform plane and moves by gravity down the skids in step-by-step travel controlled by suitable escapement devices which are arranged so that the bar will be preserved in a straight line, and the bar then passes to the rack-section of the bed which is made up of a series of parallel racks arranged usually in line with the skids and each having a series of transverse pockets arranged along its length and in parallel sets disposed in straight horizontal rows along the length of the bed to preserve the bars in straight lengths, suitable transfer mechanism being also provided to lift and move the bars from one row of pockets to the next row; furthermore, where the apparatus is used for cooling packs of bars mechanism is also provided to deliver the bars to the rack-section so that they will form a pack therein. The bed is usually long enough to accommodate bars up to 300 feet in length. All these constructions and mechanism are well-known and form no part of my invention, and so need not be here shown or described in detail.

Referring to the accompanying drawings which show the features of my invention applied to various forms of racks now in use the reference letter A designates a rack unit employed in the rack section of the cooling-bed and composed of a base a having marginal webs a' each carrying a top-flange a^2 which is provided along its length with a series of pockets a^3 in which the bars rest, either singly or in packs according to the nature of the work. In the operation of cooling beds of the general design referred to the critical temperature in cooling bars for making springs is reached when the bar is in the third series or line of pockets of the racks, and in order to prevent the cold metal of the racks from drawing and absorbing the heat of the bar I insulate the bearing face of a plurality of the pockets in the receiving end of each bar by attaching thereto an insulating pad B composed of a cover of any suitable metal by which it can be assembled in place on the rack and a filler of any suitable insulating material; in the form shown in the drawings the cover of the pad is composed of upper and lower strips of sheet iron or tin between which a filling of asbestos is retained, and the ends of the top section of the cover embrace the opposite sides of the flanges a^2. In the form of rack shown in Figs. 2 and 3 the faces of the pockets are bevelled laterally toward both sides of the flange from their central longitudinal line, and in the form shown in Fig. 4 the faces are plane with a straight vertical rib or rail a^4 extending from the top of the pocket to its bottom. In the form shown in Figs. 1 to 3 the cover of the pad is composed of upper and lower strips b and b' with asbestos b^2 between, and in the form shown in Fig. 4 the cover of the pad is composed of upper and lower strips b^3 and b^4 with asbestos b^2 between. The metal cover, besides

forming a convenient means to fasten the pad in place, protects the insulating material from the abraiding and wearing action of the bars as they slide down into the pockets. It is obvious that more or less of the pockets of the racks may be thus protected according to the nature of the work; in the form shown I insulate the first three pockets of each rack for the reason stated.

While the insulating pads are useful in protecting all forms of bars from the chilling action of the racks and so carry the cooling bars without chilling their surfaces resting on the racks until the bars have uniformly cooled throughout their length to a point below their critical temperature, they are particularly useful for cooling bars used for making vehicle springs. In cooling metal bars intended to form vehicle springs they are usually cooled in packs, each pack consisting of a plurality of superposed bars accumulated in the first longitudinal row of pockets, and the transfer mechanism advances the packs at suitable intervals step-by-step from one row of pockets to the next row across the racks to allow the heat from the center of the pack to anneal the surface, and by insulating the racks their cold metal is prevented from absorbing or pulling the heat from the bottom bar of the pack with the result ascertained from actual practice that the bottom bar of the pack is prevented from cooling faster than the others and anneals to the same degree of hardness as the others, so that when the pack is cooled all its bars are below the Brinell test which is the standard of hardness of vehicle spring makers and assemblers.

While I prefer to make the pad as shown it may be constructed in any suitable manner and of any suitable material that will ensure the desired conditions of insulation of the bar from the rack to prevent the latter from drawing the heat out of the former.

By insulating the pockets at the receiving end of the racks pack-annealing of bars and rods can be automatically done in process between the rolling-mill and shear, thus obviating the necessity of subsequently annealing them by a later and separate process. For example, bars or flats of certain alloy steels, and particularly those used for making vehicle springs, are of such analysis that they will not pass the Brinell test when cooled on an ordinary cooling bed unless they are later annealed; the bars reach the first line of pockets at varying degrees of temperature, and the critical temperature for properly annealing them is reached about the time the pack is ejected from the third line of pockets, and it was found in practice that the cold faces or surfaces of the first three lines of pockets prevented the bottom bars of the packs from annealing to the same degree as the others; these chilled bars were below the critical temperature at this point on the bed and did not meet the Brinell test which is the standard requirement of vehicle spring manufacturers. For this reason the loss in output of the mill was very considerable, amounting at times to important percentages of the metal rolled, and involved a serious financial loss as the cost of all alloy steels is very high. By my invention these objections are obviated; by using insulating pads on a plurality of pockets at the receiving ends of the racks it was demonstrated in practical use that pack-annealing can be successfully accomplished in the bed automatically between the mill and shear, that losses by improperly or unevenly annealed bars are eliminated, and that the annealing in the bed of all the bars of the packs is uniform and enables them to meet the Brinell test.

I claim:

1. In a cooling bed for metal bars, the combination of a rack provided with a series of pockets arranged lengthwise thereof, and heat-insulating pads mounted on the receiving faces of a plurality of the pockets at the receiving end of the rack.

2. In a cooling bed for metal bars, the combination of a rack provided with a series of pockets, and heat-insulating pads on the pockets each composed of a metallic cover embracing the sides of a pocket and of filler of asbestos.

3. In a cooling bed for metal bars, the combination of a rack provided with a series of pockets, and a heat-insulating pad on each of a plurality of pockets at the receiving end of the rack consisting of a cover composed of upper and lower sheets of tin and an intermediate filler of asbestos, the upper sheet of tin being longer than the lower sheet and constructed to embrace the sides of the pocket.

In testimony whereof I affix my signature

WILLIAM BERGER NELSON.