Aug. 15, 1967 D. H. PALFREYMAN 3,335,955

SHOCK-REDUCING PAD FOR TRAVELLING CRANE RAILS

Filed Aug. 26, 1965

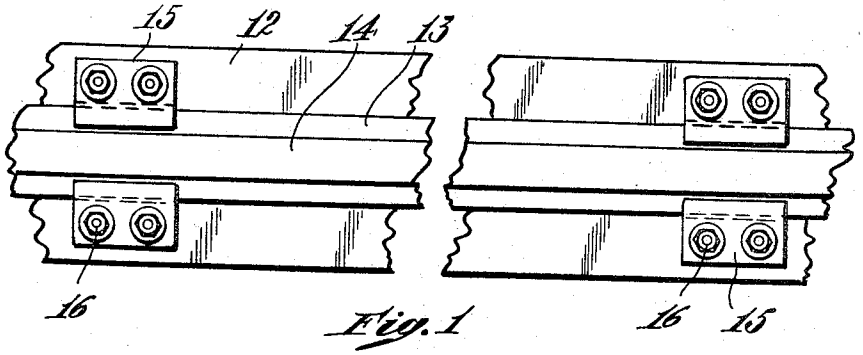


Fig. 1

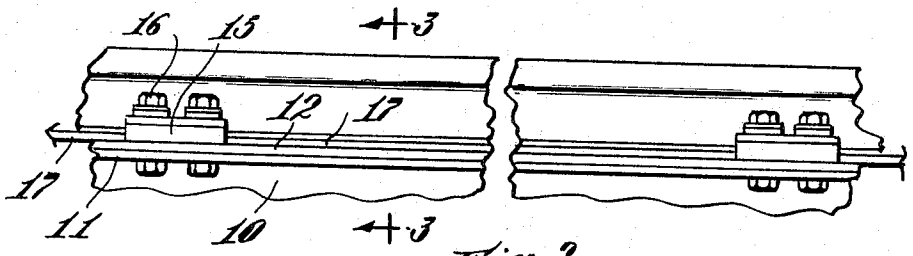


Fig. 2

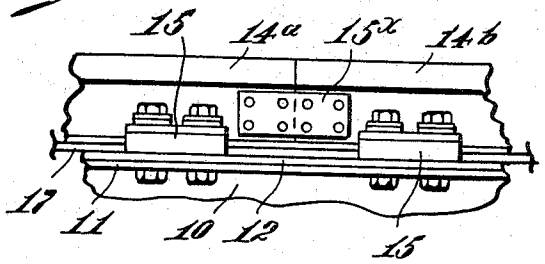


Fig. 5

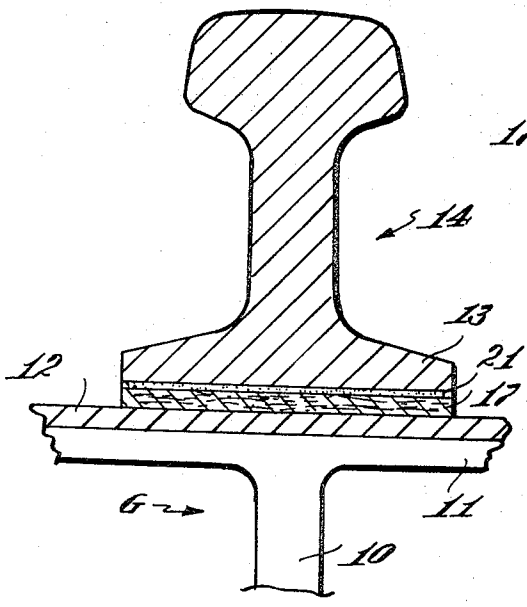


Fig. 3

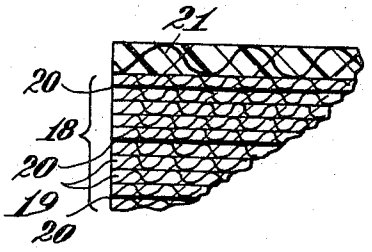


Fig. 4

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United States Patent Office 3,335,955
Patented Aug. 15, 1967

3,335,955

SHOCK-REDUCING PAD FOR TRAVELLING CRANE RAILS

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Filed Aug. 26, 1965, Ser. No. 482,866
1 Claim. (Cl. 238—283)

The invention pertains to a shock-absorbing pad for use in a travelling crane structure wherein rails, constituting a track for a travelling carriage, are supported by girders extending lengthwise of the track, and wherein the pad, when in use, extends longitudinally of the rail.

The improved pad, when used beneath a rail of a travelling crane, impedes the transmission of shocks from the crane carriage to the supporting girders which underlie the rails and, at the same time, allows slight movement of the rails in response to the forces generated by the moving carriage, thereby reducing wear of the flanges of the supporting wheels of the crane and distortion of the pad itself in response to expansion and contraction of the rail. Furthermore, the pad of the present invention acts to damp vibrations in the structure and lessen the impact upon the wear plate which is interposed between the girders of the supporting structure and the rail.

In the attainment of the above results, there is provided, in accordance with the present invention, a pad which, in use, is interposed between the lower surface of the rail and the customary steel cover plate which overlies the top flange of the girder, this shock-absorbing pad desirably being of a length at least as great as that of an individual rail and comprising a top ply of a material having a very low coefficient of friction and a body portion of organic sheet material comprising a plurality of thin plies or layers constituting a laminate which is highly resistant to deflection under load and which is operative to damp vibrations, and whose bottom surface is desirably of a material having a high coefficient of friction so that the pad will not move relatively to the part on which it rests.

In the accompanying drawing, one embodiment of the invention is illustrated, by way of example, as it is used for supporting the rail of a travelling crane.

FIG. 1 is a small scale fragmentary plan view showing a rail such as is used in a travelling crane structure;

FIG. 2 is a side elevation of the parts shown in FIG. 1;

FIG. 3 is a fragmentary vertical section on the line 3—3 of FIG. 2, showing the rail, to larger scale than in the previous views, and illustrating the arrangement of the impact deadening pad of the present invention as underlining the base of the rail and resting upon the customary girder cover plate used in such travelling crane structures;

FIG. 4 is a diagrammatic fragmentary vertical section, to larger scale than FIG. 1, showing one end of the pad, and suggesting a desirable type of vibration dampening material, and

FIG. 5 is a fragmentary side elevation, but showing a rail-joint with the pad of the present invention bridging the joint.

Referring to FIG. 3, the numeral **10** designates the vertical web of a girder G having the upper horizontal flange **11** upon which there rests the steel cover plate **12** which may, for example, be of a sufficient length to extend from one end to the other of the track on which the carriage of the traveling crane moves, and which is of a width at least as great as the lower flange **13** of the rail **14**. As shown in FIGS. 1 and 2, the rail **14** is secured to the cover plate **12** and to the upper flange **11** of the girder G by means of customary chair plates **15**, or the like, and

bolts **16**, and when the ends of two rails **14***a*, **14***b* (FIG. 5) abut, they are united by the usual fish plates **15***x*.

The pad **17**, according to the present invention, would usually be of the same width as the base flange **13** of the rail with which it is to be used, although it may be somewhat wider. Desirably, it is made in substantial lengths so that it may bridge the rail joints, and, in fact, it may be of such length that a single pad may extend continuously from end to end of the track.

Each pad or rail support **17** comprises a body portion **18** (FIG. 4) of substantially uniform thickness which is designed to rest upon the cover plate **12** which overlies the supporting girder, although the pad may be placed directly upon the upper flange **11** of the girder. The body portion **18** (FIG. 4) has some degree of flexibility so that it may readily conform itself to slight irregularities in the surface of the cover plate or girder. Desirably, the lower surface of the body **18** should be of a character such as to resist relative motion between it and the part which it contacts; for instance, the contact surface of the pad may be inherently adhesive or at least have a high coefficient of sliding friction. The body portion **18** of the pad or support may be of rubber compound; neoprene; fabric frictioned with rubber or the like, but preferably, in order that the pad may have the desired shock-absorbing, vibration eliminating and sound deadening characteristics desired, the body **18** of the pad is of a laminate material, comprising a plurality of plies or layers **19** (FIG. 4) of very thin cotton duck (for instance, plies of the order of 1/32 inch in thickness) cemented together and having a very thin layer **20** (for instance, 0.008 inch thick) of soft rubber-compound interposed, at intervals, between two layers of the fabric, the rubber layer or layers **20** being so thin as substantially to eliminate any resiliency of the lamellar material normal to its layer thickness under variable compressive stresses applied in the direction of the depth or thickness of the layers, thus reducing lateral vibrations, although the rubber acts to lessen any tendency for the fabric to become compressed and lifeless. Desirably, the layers of textile material are bonded together with an adhesive or rubber cement which remains effective for a long period of time.

The body portion **18** of the pad is, as above suggested, of lamellar material but, in accordance with the present invention, has permanently bonded to its upper face a ply **21**, which is very thin, relatively to the body portion **18**, and which has a very low coefficient of friction and which provides a hard, smooth and glossly exposed surface. One example of a material suitable to form the ply **21** may consist of cotton canvas of a weight in excess of 4 ounces per square yard and a low yarn count, for instance, having approximately 56 warp yarns and 24 double filling yarns per inch impregnated with a thermosetting plastic, in particular a phenolic resin such as a general purpose phenolic resin which is recognized as having high mechanical strength, dimensional stability in the presence of heat and moisture, corrosion-resistance, and surface smoothness and gloss. Such a resin, being thermosetting and providing a smooth and glossy surface, is particularly suitable for use in the device of the present invention where a low coefficient of friction and the ability to sustain heavy loads while exposed to high temperatures is required. While but a single ply **21** of anti-friction material is here illustrated, it is to be understood that a plurality of plies may be used, and that one or all of said plies may be of pure resin (without inclusion of fibrous material, if desired).

Another material appropriate for the purpose is that known as "Synthane Sheet Grade C" which is described at p. 400 of the "Handbook of Material Trade Names," by Zimmermann & Levine, published by Industrial Re-

search Service, Dover, N.H., 1953 edition, as being "a uniformly dense laminated thermosetting plastic made with various types of filler materials such as cotton fabrics, all impregnated with phenolic or melamine resins and then laminated under heat and pressure." It is further described in said publication as characterized, among other things, by "high tensile, compressive, flexural and impact strength," and as having a compressive strength of 37,000 p.s.i. flatwise and a Rockwell hardness of M–103.

Material such as above suggested is placed, while in uncured condition, upon the upper surface of the body **18**, the latter having previously been fully vulcanized, and the assembled parts are then subjected to heat and pressure whereby the plastic in the antifriction layer **21** is completely and permanently cured or fused and bonded to the body portion **18**.

In using a pad **17**, as above described, the lower surface of the body portion **18** is placed upon the girder cover-plate **12** or directly upon the girder flange **11** and then the crane-carrying rail **14** is placed upon the upper surface of the antifriction layer **21**, with the lateral edges of the pad registering with the edges of the bottom flange **13** of the rail and with the lower surface of the rail contacting the antifriction ply **21**. The rails are secured in position in customary fashion as shown in FIG. 2 as by means of chair plates **15** and bolts **16**. Because of the character of the cement employed in bonding together the plies comprised in the body portion **18** of the pad, the lower face of the pad has a high coefficient of friction so that the pad adheres firmly to the plate **12** and does not tend to creep during use. When the rails are thus supported, the body portion of the pad **17**, as thus described, impedes the transmission of shocks and eliminates vibration and sound as the carriage of the crane is moved along the rails. However, because of the interposition of the slippery antifriction ply or layer **21** between the body portion **18** of the pad or support and the rail, the rail is permitted to move sidewise, slightly, as the carriage wheels move along the track, and expand or contract longitudinally in response to wide variations in temperature, such as may occur when the crane is used in a steel-producing plant or like environment, and expansion and contraction of the rail has no substantial tendency to disrupt the antifriction body portion **18** of the pad or to produce permanent irregularities in thickness in said body portion.

A pad having the characteristics of that above described is readily manufactured in long strips, so that it may bridge rail joints, as shown in FIG. 5, and may even be made as long as the entire track, so that there will be

no point in the track at which a rail is not properly supported.

While a desirable embodiment of the invention has herein been disclosed by way of example, it is to be understood that any and all equivalents thereof are to be understood as within the scope of the invention as defined in the appended claim.

I claim:

In a travelling crane structure wherein a track for a travelling carriage comprises rails which are mounted upon girders extending longitudinally of the rails and wherein steel cover plates are interposed between the girders and rails, a shock-absorbing pad adapted to be interposed between the rails and plates, the pad being of a width approximating the transverse width of the bottom of a rail and of a length exceeding that of the rail so that it bridges the joint between the ends of adjacent rails, said pad having a lower face which contacts the plates, and an upper face which contacts the lower surface of the rail, the pad comprising a lamellar body portion comprising a plurality of plies of cotton duck of the order of 1/32 of an inch in thickness, said plies being cemented together by a cement having, in general, the characteristics of rubber cement, and with a layer of soft rubber compound of a thickness of the order of 0.008 inch interposed, at intervals, between two layers of the cotton fabric, the pad also comprising an upper ply which is thin, relatively to the body portion, and which has a smooth and glossy exposed surface and consisting of cotton canvas, of a weight in excess of 4 ounces per square yard and of a yarn count of approximately 56 warp yarns and 24 double filling yarns per inch, impregnated with a resin having mechanical strength and dimensional stability, corrosion-resistance and surface smoothness and gloss, and having a low coefficient of friction and the ability to sustain heavy loads when exposed to high temperatures, said upper ply contacting the lower surface of the rail and having a compressive strength of the order of 37,000 p.s.i. and a Rockwell hardness of M–103 whereby the rails are permitted to move slightly, transversely of the track, relatively to each other.

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