

June 2, 1953

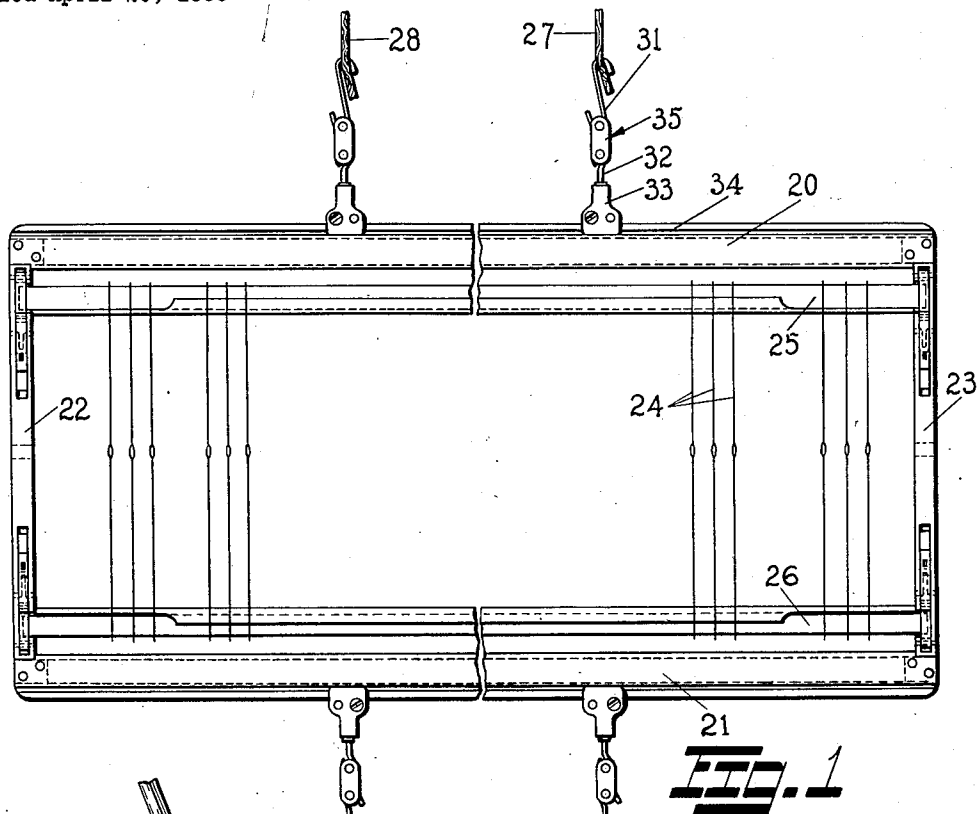
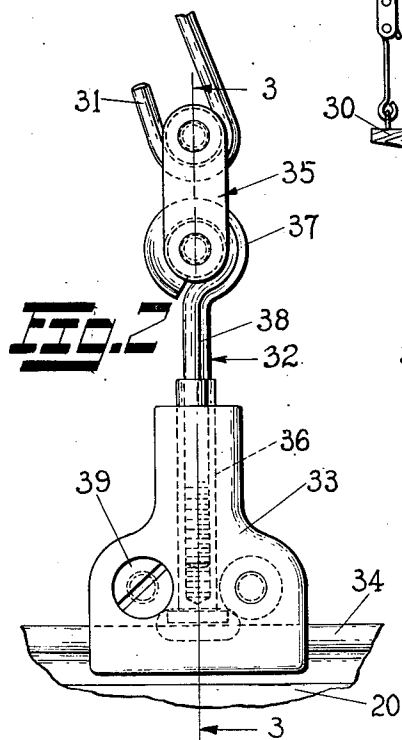
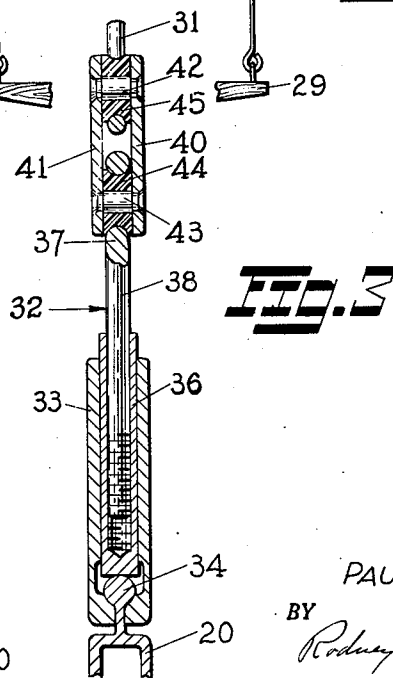
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2,640,506

HARNESS FRAME SUSPENDING DEVICE

Filed April 25, 1950

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

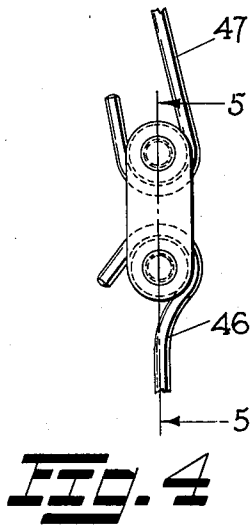
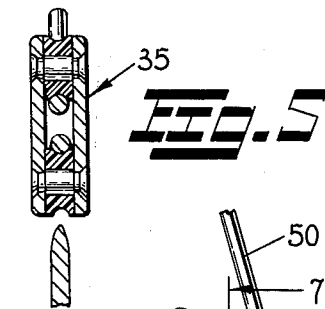
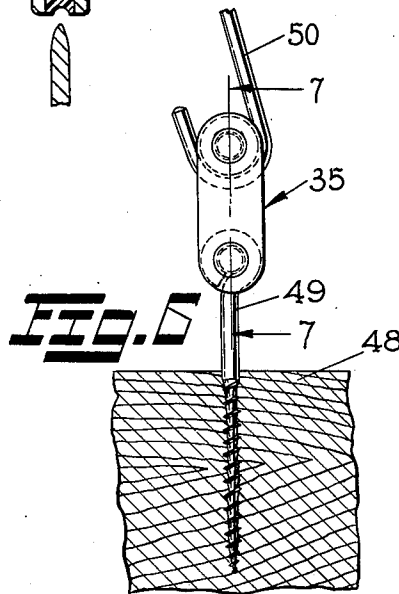
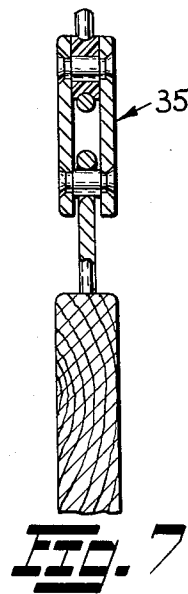
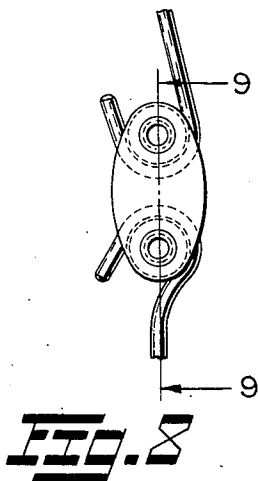
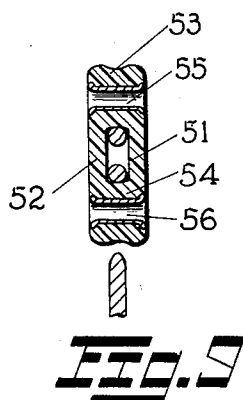


FIG. 10

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HARNESS FRAME SUSPENDING DEVICE

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11 Claims. (Cl. 139—88)

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This invention pertains to certain improvements in harness mechanisms for looms, and more particularly, to improvements in the means by which the harness frames are connected to their suspending means.

It is a general object of the invention to improve the connections by which the various straps, cords, or other suspending means for the harness frames are connected to those frames.

It is a more specific object of the invention to devise means of the type described which shall be especially adapted to function with relatively thin harness frame sections and which shall not be open to one common objection, namely, that frequently experienced when harness frames of extremely thin section are employed, and in which the suspending means, or parts thereof of greater width than the thickness of the said frames, cause damage thereto by wearing or grooving the frame rails or other parts.

Harness frames are made from various materials, for example, wood which has heretofore been the most prevalent material, and, more recently, from various metallic sections such as extruded or rolled sections of aluminum alloy or other metals. In some instances, composite frames have been employed, but in these cases the rails themselves have more frequently been of wood while the end struts have been fabricated of metal. The frames are suspended by two or more connecting means both at the top and at the bottom rails so that a positive harness motion may move them in one direction, or possibly in both directions, although it is more common to return the frame by some spring or other non-positive, resilient means.

The frames at the present time are preferably formed of as thin material as is practicable since in some looms a relatively great number of frames are to be employed, and since the weight of the frames should be kept at a minimum thereby to present less reciprocating mass, that being especially desirable in the more modern, high speed equipment. Generally the straps, cords or other suspending means by which the requisite movements are imparted to the frame have been connected thereto by hooks and eyes one of which is threaded into the frame material, or clamped thereto, as the case may be, it being obvious that the said means must be engageable in a manner to be quickly released in the event a frame is to be removed from the loom as is necessary preparatory to changing warp beams, or for various other reasons which need not be mentioned here. When these hooks and eyes are used, it is necessary that one be disposed so

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that it is generally perpendicularly directed relatively to the longitudinal center line or to the length of the frame itself and, obviously, the disposal of one of the elements is necessarily perpendicular to the other. Since these hooks, eye bolts, eye screws or other looped connectors are made from wire which is of fair cross-sectional dimension and cannot be bent too sharply, practical constructional details make it essential that the outside diameter of a loop or hook must be greater than the thickness of the frame itself, and especially of the thinner frame rails where one of the newer extruded metallic sections is utilized.

The harness frames, as is well known, are so set up in the loom that there may be a slight clearance between them, but since they are reciprocated at a relatively rapid rate and vibrational or other forces affect them to a certain extent, these frames do actually impinge against their neighbors and rub over the surfaces thereof to a considerable extent. If the suspending hooks or other looped connectors are disposed at right angles or across the length of the frame as one of them obviously must be, then, since the amplitude of movement is rather extended, these hooks or other connectors will rub against the frame rails of the neighboring harness mechanism. The result has been that some of these frames have been gouged or grooved. This undesired action is accentuated to a considerable extent since the hooks or looped connectors are preferably formed from steel and the frame rails, if extruded, are generally fabricated from one of the lighter alloys such as an aluminum alloy. Experience has shown that the wear between these two metals is extremely rapid and that the present constructions open to the disadvantages just above mentioned cannot successfully be employed for any extended period of time, that therefore obviating their general usefulness even though they have definite advantages along other lines.

In overcoming the difficulties above mentioned, the present invention has been directed toward the provision of interconnecting means between the suspending means and the frame rails which shall always be of a lesser lateral dimension than the thickness of the frame rails themselves. To that end the looped connectors such as hooks, eye bolts, etc., are interconnected through a special link so that the general direction or extent of the looped portion of the connectors is always maintained parallel rather than perpendicular to the length of the frames. The links themselves are so devised that their total thickness is not

greater than, but is preferably slightly less than the thickness of the frame rails so that as the parts reciprocate to and fro, there shall never be contact between the links and rails or between any other portion of the suspending means and the frames. Furthermore, these links have as a part thereof, or may be so integrally formed from plastic materials that the contact between metals is prevented thereby to give quieter and more satisfactory bearing conditions.

The invention will be described hereinafter in greater detail and by reference to the accompanying figures of drawings wherein:

Fig. 1 is an elevational view showing a harness frame to which the suspending means herein-after described in greater detail has been applied.

Fig. 2 is a detail view showing one form of the invention.

Fig. 3 is a section taken at line 3—3, Fig. 2.

Figs. 4 and 5 are corresponding views showing so much of the mechanism as is necessary, but of a modified form thereof.

Figs. 6 and 7 are similar views showing the invention in slightly modified form and as it is to be applied to a wooden frame rail.

Fig. 8 is a side elevation of a modified form of the invention, the link here being fabricated almost in its entirety from a plastic material.

Fig. 9 is a sectional view taken at line 9—9, Fig. 8.

Fig. 10 is an end elevational view of the link of Figs. 8 and 9.

Now referring to Fig. 1, a harness frame having top and bottom rails 20 and 21 and end struts 22 and 23 is shown by way of illustration, this frame being formed from metal, although it is to be understood that the invention is equally applicable to other frames of a wide variety of types and materials. The heddles 24 are slideable on bars 25 and 26. A suspending means by which the frame is maintained in an appropriate vertical position in the loom is also moved throughout its requisite extent by harness mechanism (not shown since such mechanisms are well known to those skilled in the art). These harness mechanisms are attachable to the frames and impart movement thereto through a series of straps, tapes, cords or other flexible connectors herein indicated by numerals 27 and 28 at the top, and to the jack stick ends 29 and 30 at the bottom of the frame. These tapes will hereinafter be referred to as "suspending straps" and it is to be understood that that term is employed to include all the various elements which are frequently employed for the purpose.

The interconnecting means between the suspending straps and the rails 20 and 21 include looped connectors such as hook 31 fixed at the end of tape 27 and a second looped connector 32 more or less permanently, although adjustably and detachably fixed within a clamp 33 which is in turn engageable about a rib 34 or the like forming a part of the rail 20. Between the looped connectors 31 and 32 and completing the attaching or suspending means is a link 35, the details of which will be described in greater particular hereafter, it being understood that at each connecting point of which there are at least four for every frame, the mechanism just enumerated is duplicated.

Now referring to Figs. 2 and 3, the parts incidental to one connecting means at one suspending strap are shown to a larger scale than that employed in Fig. 1, the clamping means 33 attached to rib 34 which is preferably beaded

having fixed therein a sleeve 36 within which is threaded an eye screw having an eye or loop 37 and a threaded shank 38. It is to be understood that the three parts incidental to this assembly are clamped together by screw means 39 or other interconnecting mechanism, these parts and the details thereof being more thoroughly described in copending application Serial No. 147,473, filed March 3, 1950.

The hook 31 connects through the intermediate link 35 to the eye 37 and it is to be observed that the eye 37 is parallelly disposed with respect to the length of the frame and, of course, hook 31 then assumes the same attitude since the link to which each is hooked or otherwise connected makes it no longer essential that they be disposed at right angles. The link itself is of a total thickness as is evident in Fig. 3, slightly less than the total thickness of the rail 20 of the frame, or of the clamping members 33 which may preferably be of substantially the same thickness as rail 20, although it should not be thicker. In theory, the link might be of exactly the same thickness as the rail 20, but to provide a factor of safety, its dimension is slightly reduced so that there is no possibility of contact and consequent wear even though the parts or the frames themselves in their movements become slightly offset or would otherwise effect undesired contact if too close dimensions were attempted to be maintained.

Preferably, the link which is generally referred to by numeral 35, is comprised of side plates 40 and 41 which are interconnected by the rivets 42 and 43 and preferably, spaced apart by bushings 44 and 45. These bushings may be made from any material which would serve satisfactorily for bearing purposes, but since no lubrication is possible, one of the plastic materials easily and cheaply fabricated and which is adapted to withstand a maximum amount of wear is to be utilized. By way of example, materials that may be employed include vulcanized fibre, thermosetting plastics and thermoplastic materials, and self-lubricating metal bushings, one of which is sold under the name "Oilite." As herein illustrated the link 35 is fixed within the loop 37 of the looped connector which is held by the clamping plates 33, although it is to be understood that the opposite may prevail as will hereinafter be described by reference to a modification. The hook 31 serves for attaching and detaching the suspending means within a very short period of time and with a minimum of effort.

Now referring to Figs. 4 and 5, a slightly modified form of the invention will be described. Here the same link 35 is employed, but the looped connector at the rail of the frame or which is connected directly to the frame, as the case may be, is open while the other connector 47 attached to the suspending or connecting strap is closed, or, at least, is so restricted as to prevent any unintended disassembly of the parts, but permits them to be detached by use of considerable force. In certain cases it is more desirable that the links be connected in this manner so that they tend to hang naturally from the suspending means above the frame and therefore may be hooked or engaged over the lower looped connectors 46 with slightly less effort. The construction herein illustrated in Figs. 4 and 5 may more preferably be used at the top of the frame while that just above described with respect to Figs. 2 and 3 may be employed at the bottom or lower rail thereof.

In Figs. 6 and 7 a wooden frame rail 48 has an

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eye screw 49 threaded into it and the link 35 is, in this case, directly or more permanently attached to form a part of the connector 49 so that a hooked member or connector 50 similar to the hook 31 is employed at the suspending strap as in Figs. 2 and 3. It is furthermore evident here that the link 35 is comprised of a pair of side plates, rivets, and a single plastic bushing, although two bushings may be employed if desired. In some instances, a shouldered rivet itself or a metallic part circumscribed about that rivet and acting to space the side plates of the link may be used. This rivet or its bushing may be of a self-lubricating metal.

Now referring to Figs. 8, 9 and 10, a still further modification is evident, this modification being adapted to be molded as a single part and from any plastic material such as those above mentioned, and having reinforcing rivets, if reinforcement is desired. Here the link comprises a solid integral plastic member which includes the side plates 51 and 52 and what may be considered intermediate bushings 53 and 54, although these bushings are not separate elements as in the forms of the invention above shown and described. The rivets or other metallic inserts 55 and 56 may be used as reinforcing members thereby to prevent sheering of the bearing or bushing portion of the links if undue strain is experienced.

It is to be observed that the outside diameter of the looped portion of the connectors is, in all instances, greater than the total thickness of the frame rails, but since they are disposed parallel with respect thereto, there can be no contacts between these looped connecting means which are preferably formed from steel and more particularly, from a stainless steel, and the wooden or metallic rails of lighter alloys, the latter of which are easily worn or grooved by the harder steel. Accordingly, it is possible to employ heavier gauge stock for the looped connectors and to make the loops or hooks therein of appreciable radius thereby obviating certain difficulties in fabrication and any tendency for the parts to fail prematurely due to the fact that they have been bent to too small an arc.

The term "suspending strap" is used to designate any and all straps, tapes or cords utilizable for the purpose, while the "looped connectors" include all hooks, eye bolts, eye screws and similar means which serve the same general purpose.

While one preferred embodiment and a number of modifications of the invention have been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. The invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped connector attached to a rail of said frame, a suspending strap and a looped connector fixed to the end thereof, and an intermediate link comprising side plates and cross members extending between said plates and engaged by the looped connectors, the total thickness of the link being less than the thickness of the harness frame rail and the link being so disposed that its side plates are parallel to the length of the frame.

2. A suspending means for a loom harness

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frame having top and bottom rails and end struts, which comprises a looped connector attached to a rail of said frame, the outside diameter of said looped connector being of greater extent than the thickness of a frame rail, a suspending strap and a second looped connector fixed to the end thereof adjacent said first connector and an intermediate link comprising side plates and cross members extending between said plates and engaged by the looped connectors, one of said connectors being irreleasably engaged with its end of said link and the other connector being quickly detachable therefrom, the said link and connectors being so oriented with respect to the frame that the link plates are parallel to the longitudinal plane of the frame and the total thickness of the link less than that of the frame rail.

3. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped connector attached to a rail of said frame, the outside diameter of said looped connector being of greater extent than the thickness of a frame rail, a suspending strap and a second looped connector fixed to the end thereof adjacent said first connector and an intermediate link comprising side plates and cross members extending between said side plates and engaged within the looped connectors, a non-metallic bushing on at least one of the cross members and extending between inner walls of the side plates forming a bearing between the connector and cross member, the total thickness of the link being less than the thickness of the harness frame rail and the link being so disposed that its side plates are parallel to the length of the frame.

4. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped connector attached to a rail of said frame, a suspending strap and a looped connector fixed to the end thereof and an intermediate link comprising side plates and cross members extending between said plates and engaged by the looped connectors in such manner as to be irreleasably attached to that at the frame rail and quick releasably attached to that at the strap, the total thickness of the link being less than the thickness of the harness frame rail and the link being so disposed that its side plates are parallel to the length of the frame.

5. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped connector attached to a rail of said frame, a suspending strap and a looped connector fixed to the end thereof, and an intermediate link comprising side plates and cross members integrally formed from a plastic material, said cross members being engaged by said looped connectors, the total thickness of said link being less than the thickness of the harness frame rail and the link being so disposed that its side plates are parallel to the length of the frame.

6. Mechanism as defined in claim 5 in which the said link is reinforced by a metallic insert passed through each cross member.

7. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped, metallic connector attached to a rail of said frame, a suspending strap and a looped metallic connector fixed to the end thereof, and an intermediate link comprising side plates and cross members extending between said side plates and engaged by the looped connectors,

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the said cross members of said links being of non-metallic material, and the total thickness of the link being less than the thickness of the harness frame rail and the link and looped connectors further being so disposed that the side plates of the former are parallel to the length of the frame.

8. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped, metallic connector attached to a rail of said frame, a suspending strap and a looped metallic connector fixed to the end thereof, said metallic connectors being formed from bent wire stock, and an intermediate link comprising side plates and cross members extending between said side plates and having a freely releasable engagement with one of said connectors and a constrictedly releasable engagement at least with the other so that unhooking of a frame shall be accomplished by disconnecting the freely releasable connector only, the total thickness of said link being less than the thickness of the harness frame rail and the link being so disposed that its side plates are parallel to the length of the frame.

9. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped, metallic connector attached to a rail of said frame, a suspending strap and a looped metallic connector fixed to the end thereof, said metallic connectors being formed from bent wire stock, and an intermediate link comprising side plates and cross members extending between said side plates and engaged by the looped connectors, the said cross members of said links being of non-metallic material, and the total thickness of the link being less than the thickness of the harness frame

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rail and the link and looped connectors further being so disposed that the side plates of the former are parallel to the length of the frame.

10. A suspending means for a loom harness frame having top and bottom rails and end struts, which comprises a looped connector of bent wire attached to a rail of said frame, a second looped connector of bent wire attached to a means from which said frame is suspended and by which movements are imparted thereto, and an intermediate link comprising metallic side plates connected by metallic cross members and having bushings of plastic material carried by said cross members and engaged by the looped connectors.

11. Mechanism as defined in claim 10 wherein one of said looped connectors is of hooked form and engages its respective plastic washer in a freely releasable manner, and the other of said connectors is formed to engage its respective plastic washer in such manner as to require the exercise of force to effect its detachment.

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