Jan. 25, 1955 E. PFARRWALLER 2,700,399

LOOM HARNESS

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Fig. 1.

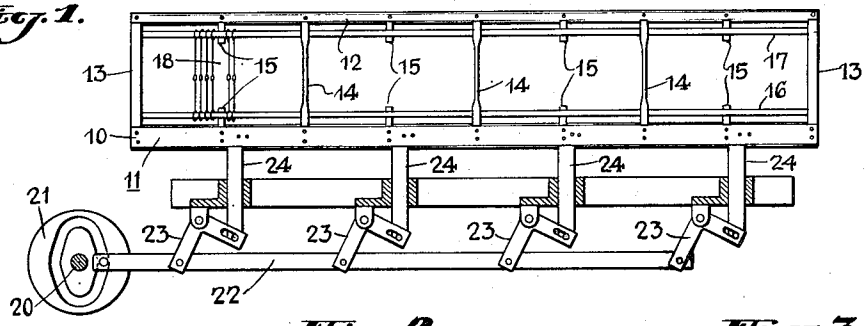


Fig. 2.

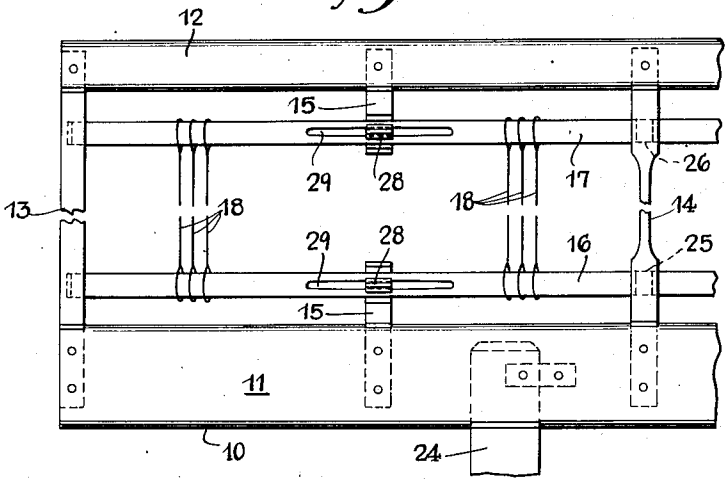


Fig. 3.

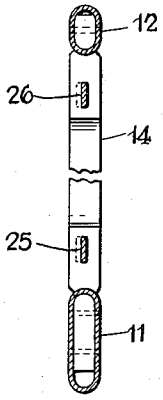


Fig. 4.

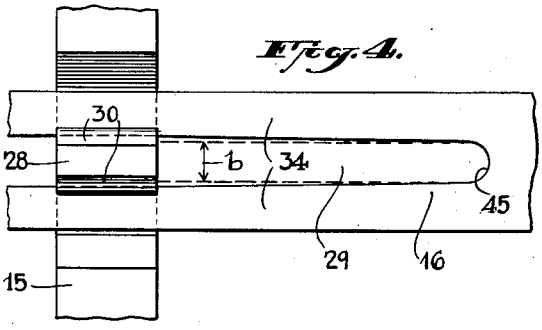


Fig. 5.

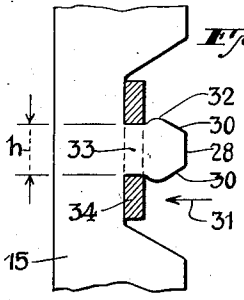


Fig. 6.

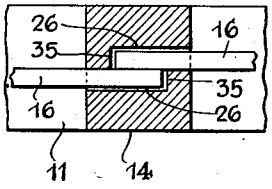


Fig. 7.

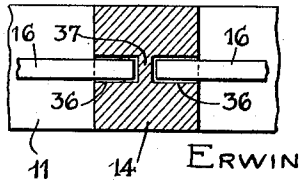
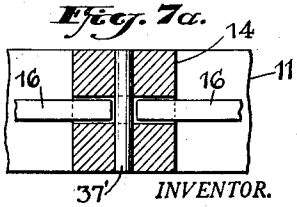


Fig. 7a.



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Fig. 8.

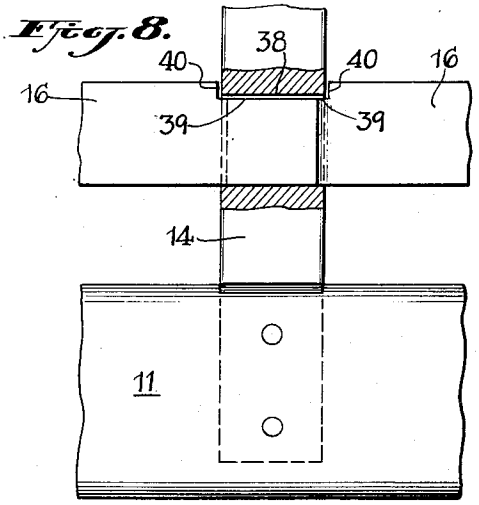


Fig. 9.

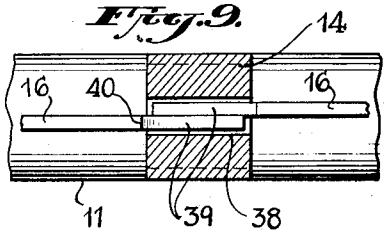


Fig. 10.

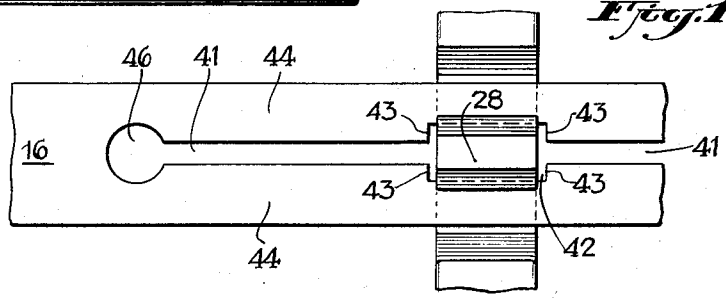


Fig. 11.

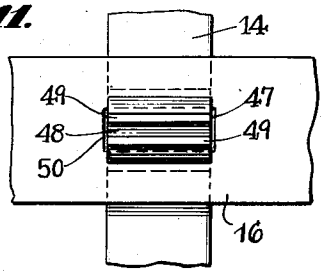


Fig. 12.

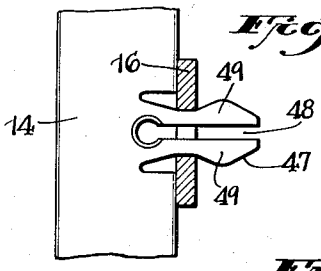


Fig. 13.

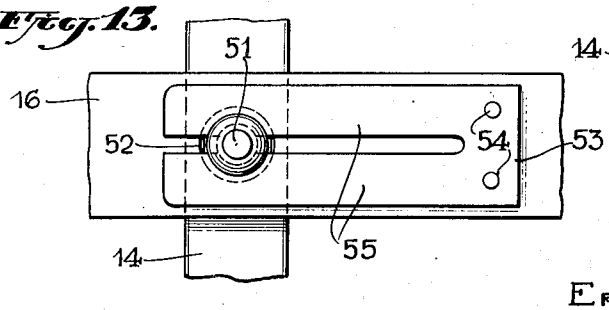
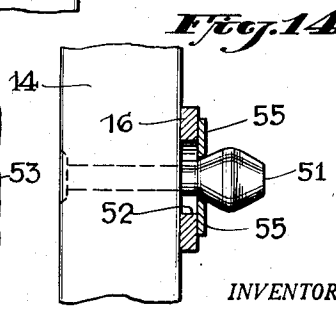


Fig. 14.



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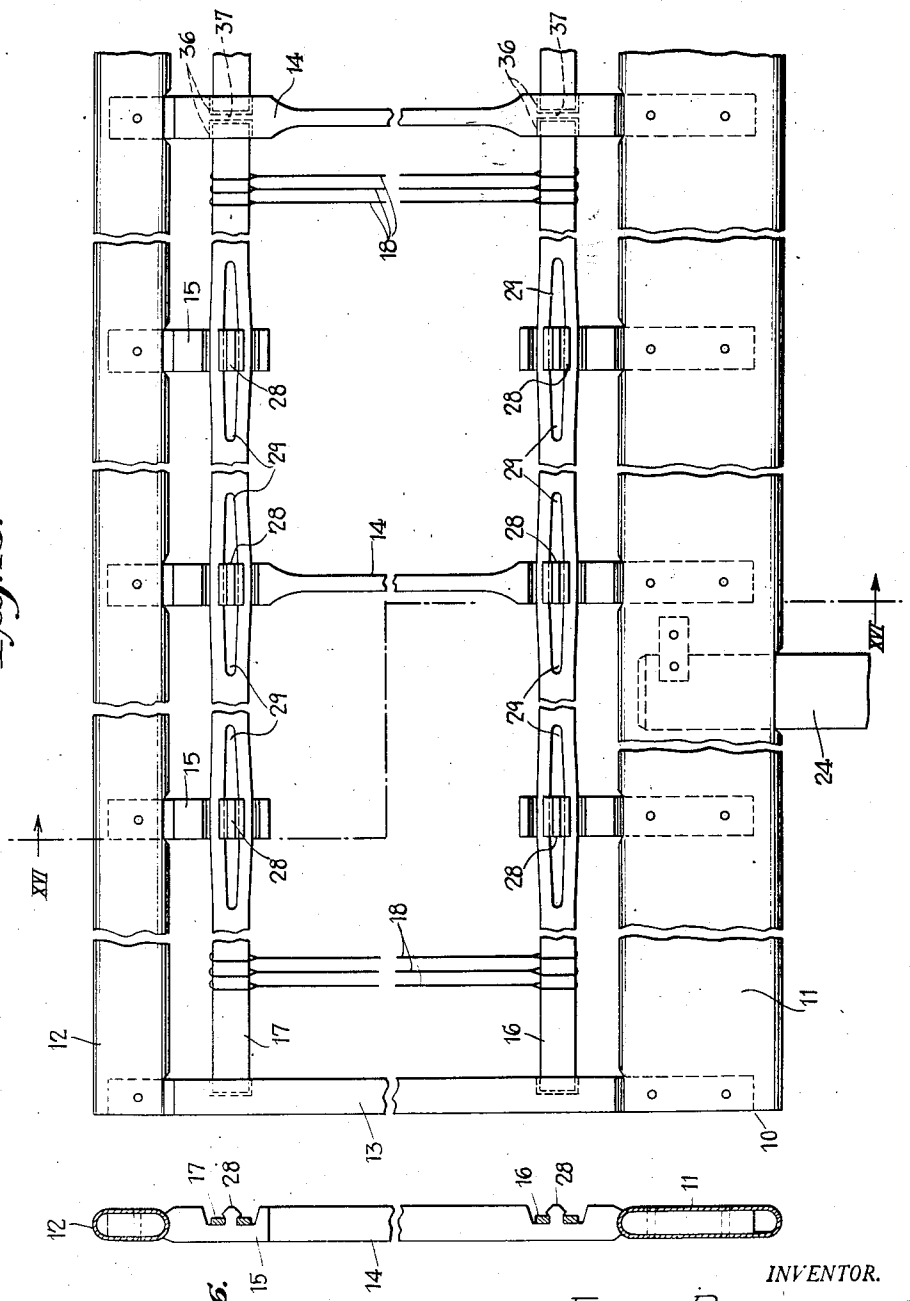


Fig. 15.

Fig. 16.

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2,700,399

LOOM HARNESS

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Application March 21, 1951, Serial No. 216,701

Claims priority, application Switzerland March 24, 1950

10 Claims. (Cl. 139—92)

The present invention relates to a harness for looms for weaving and more particularly to new and improved means for removably connecting rails supporting the heddles to the harness frame.

It is conventional to removably connect the ends of the rails on which the heddles are suspended with posts or stay members at the ends of the harness frame. To prevent bending and rattling of the rails during weaving, brackets are provided on the longitudinal top and bottom members of the frame for connecting the rails to the frame. These brackets are equally spaced and distributed over the length of the harness frame and either rigidly connected with the frame or adapted to be slid or moved along the longitudinal frame members. In harness frames for very wide looms, particularly looms having no superstructure and in which the frames are actuated from below or at the sides, one or a plurality of intermediate posts or stays are provided between the side members of the frame. These intermediate posts which may be adapted to be moved laterally or may be removably inserted in the frame are for the purpose of maintaining a predetermined distance between the upper and lower frame members over the whole length of the frame for accurately defining the position of the rails supporting the heddles.

In high-speed looms and looms in which the harnesses are actuated from below, rigid connection of the intermediate posts with the top and bottom frame bars is preferred. Movable and removable posts are likely to change their position or become disconnected, causing disturbances in the flow of the warp or damage to the harness.

In conventional harnesses with rigidly connected intermediate posts, the harness is subdivided into individual portions or fields of definite width, and the heddles cannot be moved from one field into another. When setting up the warp, a certain number of heddles must be placed in each field depending on the desired density of the warp. If errors are made or the distribution of the heddles cannot be determined exactly before weaving is started, certain warp threads may be bent at the posts causing undesired stress on the threads, breakage thereof, and weaving inaccuracies. Redistribution of the heddles in the individual fields of a harness having rigidly connected posts can be effected only by cutting out the surplus heddles in one field and inserting missing heddles in the adjacent field.

It is an object of the invention to provide a harness in which the rails on which the heddles are suspended are connected to the harness frame in such a manner that they can be applied and removed in a direction substantially at a right angle to the plane of the harness, whereby the heddles can be moved along the rails when the latter are disconnected. The connection is of the snap-on and off type and includes resilient means for resiliently pressing the rails against their supports and maintaining the resilient pressure as long as the rail is connected. This prevents rattling even if the loom operates at high speed. The snap-on connection comprises a pin means extending at a right angle to the plane of the harness from the frame posts and/or from holders connected with the top and bottom frame bars and having a head portion and a neck portion. The rails have an aperture through which the head portion is pushed for connecting the rails and which is smaller than the neck portion when the rail is disconnected for assuring tight

engagement of the neck portion and the connected rail. Resiliency is provided either by providing a slot extending from the aperture longitudinally of the rail or by making the aperture in the form of a longitudinal slot. The parts of the rail alongside the slot are resiliently deformed when the rail is snapped on. The invention also provides means for preventing longitudinal movement of the rail to assure that the pin means or knobs remain in the middle of the slot in cases where there is no aperture in the middle of the slot which is wider than the slot. Alternatively, resiliency of the snap-on connection may be produced by axially slicing the pin means or knob and neck. In this case, no slot is needed in the rail and the knob is resilient instead of the rail.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims, and shown in the drawings which, by way of illustration, show what I now consider to be preferred embodiments of my invention.

In the drawings:

Fig. 1 is a front view of a harness according to the invention, together with a drive mechanism shown partly in section;

Fig. 2 is an enlarged front view of the harness illustrated in Fig. 1;

Fig. 3 is a transverse sectional view of the harness shown in Fig. 2;

Fig. 4 is a side view of a snap-on connection used in the harness shown in Figs. 2 and 3;

Fig. 5 is a transverse sectional view of the detail shown in Fig. 4;

Fig. 6 is a large scale horizontal sectional view of a post forming part of a heddle support frame according to the invention;

Fig. 7 is a large scale horizontal sectional view of a modified post according to the invention;

Fig. 7*a* is a large scale horizontal sectional view of a further modification of a post according to the invention;

Fig. 8 is a part sectional front view of a post and heddle suspension rails according to the invention;

Fig. 9 is a horizontal section of the post and rails illustrated in Fig. 8;

Fig. 10 is a front view of a modified snap-on connection according to the invention;

Fig. 11 is a front view of a further modification of a snap-on connection according to the invention;

Fig. 12 is a transverse sectional view of the snap-on connection shown in Fig. 11;

Fig. 13 is a front view of another modification of a snap-on connection according to the invention;

Fig. 14 is a transverse sectional view of the snap-on connection shown in Fig. 13;

Fig. 15 is a front view of a modified harness frame according to the invention;

Fig. 16 is a transverse sectional view of the frame shown in Fig. 15, the section being taken along line XVI—XVI of Fig. 15.

Like parts are designated by like numerals in all figures of the drawings.

Referring more particularly to Fig. 1 of the drawings, numeral **10** designates a harness having a lower frame bar **11**, an upper frame bar **12**, lateral frame bars **13**, intermediate frame bars or posts **14**, and longitudinal heddle carrier rails or bars **16** and **17** on which the heddles **18** are filed. The rails **16** and **17** are removably connected with rail supports or holders **15** which are rigidly connected with the frame bars **11** and **12**. The harness **10** is reciprocated up and down in conventional manner by a mechanism comprising a shaft **20** rotated by the loom drive and a disc **21** rotated by said shaft and having a guide groove receiving a pin at the end of a rod **22** for axially reciprocating the latter. A plurality of elbow levers **23** are pivotally supported by a stationary part of the loom, each lever having an end swingably connected with rod **22** and another end swingably connected with the lower end of a vertical connecting member **24**. The upper ends of members **24** are connected with the lower frame bar **11**.

As seen in Figs. 2 and 3, the ends of the rails **16** and **17** extend into suitable slots **25** and **26**, respectively, in

the lateral frame bars **13** and in the intermediate posts **14**. The rails are supplementally supported by the supports or holders **15** having pin or oblong knob portions **28** individually extending into longitudinal slots **29** of the rails. The latter connection is more clearly shown in Figs. 4 and 5.

The pin portions **28** have a rectangular sectional configuration and have a neck portion **33** and a wedge-shaped head **32** having wedge surfaces **30**. The width *h* of the neck portion **33** is greater than the width *b* of the slot **29**. The latter is sufficiently long so that the rail portions **34** adjacent to the slot are resiliently pushed apart by the head **32** and not permanently deformed when the rail is pressed onto the pin portion **32** in the direction of arrow **31** in Fig. 5 with the pin extending through the slot **29**. Since the neck portion **33** is somewhat wider than the slot **29**, the rail portions **34** are permanently resiliently pressed to the neck portion and rattling of the rail on the pin is prevented. In cases where the length of the rails **16**, **17** is a multiple of the distance between two intermediate posts **14** or a post and a lateral frame bar **13**, the posts not coinciding with an end of a rail are provided with headed pins or knobs **28** of the same kind as the supports or holders **15** and as illustrated in Figs. 4 and 5.

Connection according to the invention of the rails **16** and **17** with the heddle frame by knobs **28** extending substantially at a right angle to the plane of the harness affords quick disconnection of the rails in a direction perpendicular to the plane of the harness and prevents stretching, as well as buckling, of the heddles **18**. The latter need not be moved along the rails for disconnecting the rails, as in conventional arrangements, in which the rails must be moved longitudinally for being disconnected and special locking means must be provided for holding the rails in place. No loose part or parts which must be moved are required for the connection according to the invention, although the connection of the rails to their support means **11** to **15** is rigid, rattle-proof, and can be released and connected without special tools. The heddles **18** can be conveniently moved along the rails **16**, **17** past the knobs **28** when the connection is released.

Figs. 6 and 7 illustrate two modifications of means for holding the ends of the rails in the posts **14**. In the modification according to Fig. 6, the slots **26** are arranged in staggered relation providing end abutments **35** for the rails **16**. In the modification according to Fig. 7, the slots **36** are in line and do not extend through the post. The rails are placed in the same plane and their ends abut the post portion **37** between the slots or recesses **36**. Of course, the slot **36** may extend through the post **14**, and a pin **37'** may be provided as an end abutment for the rails, as shown in Fig. 7*a*.

In the modification of the connection of the ends of two rails in a post **14** shown in Figs. 8 and 9, a slot or aperture **38** extends through the post, and the end of each rail **16** is provided with a recess **38** leaving a shoulder **40** abutting against the post **14** for preventing longitudinal displacement of the rail.

Fig. 10 illustrates a variation of the means for making a rail **16** resilient for pushing it onto the knob **28**. A narrow longitudinal slot **41** has a rectangular enlargement or aperture **42** for slipping on and off the knob **28** leaving abutments **43**, preventing longitudinal displacement of the rail. The portions **44** of the latter yield when the rail is connected to or disconnected from the post or holder. If the rail extends past several holders **15** and/or posts **14**, only one longitudinal slot need be made according to Fig. 10 for preventing longitudinal displacement of the rail; the other slots may be formed as shown in Fig. 4.

Longitudinal displacement of the rails by means such as shown in Figs. 6 to 10 must be prevented if parts **34** or **44** of the rails are made resilient for the snap-on connection according to the invention, because the distance of the knob **28** from the ends **45** or **46** of the slots **29** or **41**, respectively, must not be changed materially. If the knob is not located substantially in the center of a slot, parts **34** or **44** of the rails are bent and permanently deformed when the rail is snapped on or off a knob. Of course, the slots could be made longer to prevent this, but this is undesirable as it weakens the rail and reduces the resilient clamping effect of the connection. The rails cannot be made wider because they would

then not fit the standardized size of the eyes at the ends of the heddles.

In the modification shown in Figs. 11 and 12, the pin or knob **47** instead of the rail is made resiliently yielding by providing a slot **48** splitting the knob into two yielding legs **49** which are temporarily pressed together when the rail **16** is applied or removed and which remain under pressure as long as the rail is applied. The latter is provided with an aperture **50** conforming substantially with the knob and being narrower than the neck of the knob for compressing the latter as long as the rail is mounted on post **14** (or a holder **15**).

Figs. 13 and 14 illustrate a modification having a round knob **51** extending through an aperture **52** in rail **16** which is larger than the head of the knob. The resiliently yielding means consist of a plate spring **53** which is connected by rivets **54** or other suitable means to the rail and has two branches **55** straddling the knob. The slot between the branches **55** is so dimensioned that they remain resiliently pressed to the knob as long as the rail **16** is connected to the post **14**. The cross-section of the rail **16** with the plate **55** is smaller than the eyes at the ends of the heddles and the latter can be slipped past the portion of the rail illustrated in Figs. 13 and 14.

The connections according to the invention can be used in harnesses having rail holders **15** only and no intermediate posts **14**.

While I believe the above described embodiments of my invention to be preferred embodiments, I wish it to be understood that I do not desire to be limited to the exact details of design and construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. A loom harness comprising a frame, support means rigidly connected with said frame, heddles having eyes, a rail extending through said eyes for supporting said heddles, an aperture in said rail, knob means extending from said support means substantially at a right angle to the plane of the harness and through said aperture, said knob means having a wedge shaped front portion, a wedge shaped rear portion, and a narrow throat portion between said rear portion and said support means; said knob means or said rail adjacent to said aperture, being resiliently yielding and affording snapping said rail on and off said knob means in the direction of the longitudinal axis of the knob means and pressing the rail and knob means against one another when the rail is on the knob means for normal operation of the harness.

2. A loom harness comprising support means, heddles having eyes, a rail extending through said eyes for supporting said heddles, an aperture in said rail, knob means rigidly connected with and extending from said support means substantially at a right angle to the plane of the harness and through said aperture, said knob means being compressible and affording snapping said rail on and off said knob means in the direction of the longitudinal axis of said knob means and pressing the rail and knob means against one another when the rail is on the knob means for normal operation of the harness.

3. A loom harness comprising support means, heddles having eyes, a rail extending through said eyes for supporting said heddles, an aperture in said rail, and a resiliently yielding snap-on and off connection between said support means and said rail, said connection comprising a part rigidly connected with and extending from said support means at substantially a right angle to the plane of the harness and through said aperture, said aperture and said part having a rectangular configuration longitudinally of the rail, said part having an oblong wedge-shaped head portion, the longitudinal axis and the wedge surfaces of said head portion being parallel to the longitudinal axis of the rail.

4. A loom harness comprising a frame having intermediate posts, heddles having eyes, a rail extending through said eyes for supporting said heddles, an aperture in said rail, and a resiliently yielding snap-on and off connection between said posts and said rail and comprising a part having a neck and a head portion and extending from said posts at substantially a right angle to the plane of the harness and being adapted to be forced through said aperture in the direction of the longitudinal axis of said part.

5. A loom harness as defined in claim 4, said part being integral with and forming a portion of said posts.

6. A loom harness comprising a frame, holding means connected therewith, heddles having eyes, a heddle bar extending through said eyes for supporting said heddles, a resiliently yielding snap-on and off connection between said bar and said holding means, said frame including post means having a recess for receiving an end of said rail and an abutment abutting against the end of said bar for limiting longitudinal movement of the latter.

7. A loom harness comprising a frame, holding means connected therewith, heddles having eyes, a rail member extending through said eyes for supporting said heddles, a resiliently yielding snap-on and off connection between said rail and said holding means, said frame including post means having an aperture, said rail having a cross-section larger than said aperture and having an end portion fitting into said aperture and forming an abutment on said rail abutting against said post means for preventing longitudinal movement of said rail.

8. A loom harness comprising support means, heddles having eyes, a rail extending through said eyes for supporting said heddles, an aperture in said rail, pin means extending from said support means substantially at a right angle to the plane of the harness and through said aperture, and a slot extending from said aperture longitudinally of said rail, said pin means having a head portion and a neck portion larger than said aperture in a direction at a right angle to said slot and said rail being resilient adjacent to said slot for affording snapping said rail on and off said pin means over said head portion in the direction of the longitudinal axis of said pin means and pressing the rail to said neck portion when the rail is on the pin means, said slot being narrower than said aperture and forming an abutment therewith abutting against said neck portion when the rail is on the pin means for preventing longitudinal movement of the rail.

9. A loom harness comprising a frame, support means rigidly connected with said frame, heddles having eyes, a heddle bar extending through said eyes for supporting said heddles, a slot in said bar, connecting means extending through said slot and being rigidly connected with said support means and having a head having a wedge like front portion, a wedge like rear portion, and a neck portion between said rear portion and said support means, said slot being narrower than said neck portion when said bar is off said connecting means.

10. A loom harness comprising support means, heddles having eyes, a rail extending through said eyes for supporting said heddles, an aperture in said rail, knob means extending from said support means substantially at a right angle to the plane of the harness and through said aperture, and a slot extending from said aperture longitudinally of said rail, said knob means having a head portion and a neck portion larger than said aperture in a direction at a right angle to said slot and said rail being resilient adjacent to said slot for affording snapping said rail on and off said knob means over said head portion in the direction of the longitudinal axis of said knob means and pressing the rail to said neck portion when the rail is on the knob means, said slot being narrower than said aperture and forming an abutment therewith abutting against said neck portion when the rail is on the knob means for preventing longitudinal movement of the rail.

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