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HEDDLE FRAME

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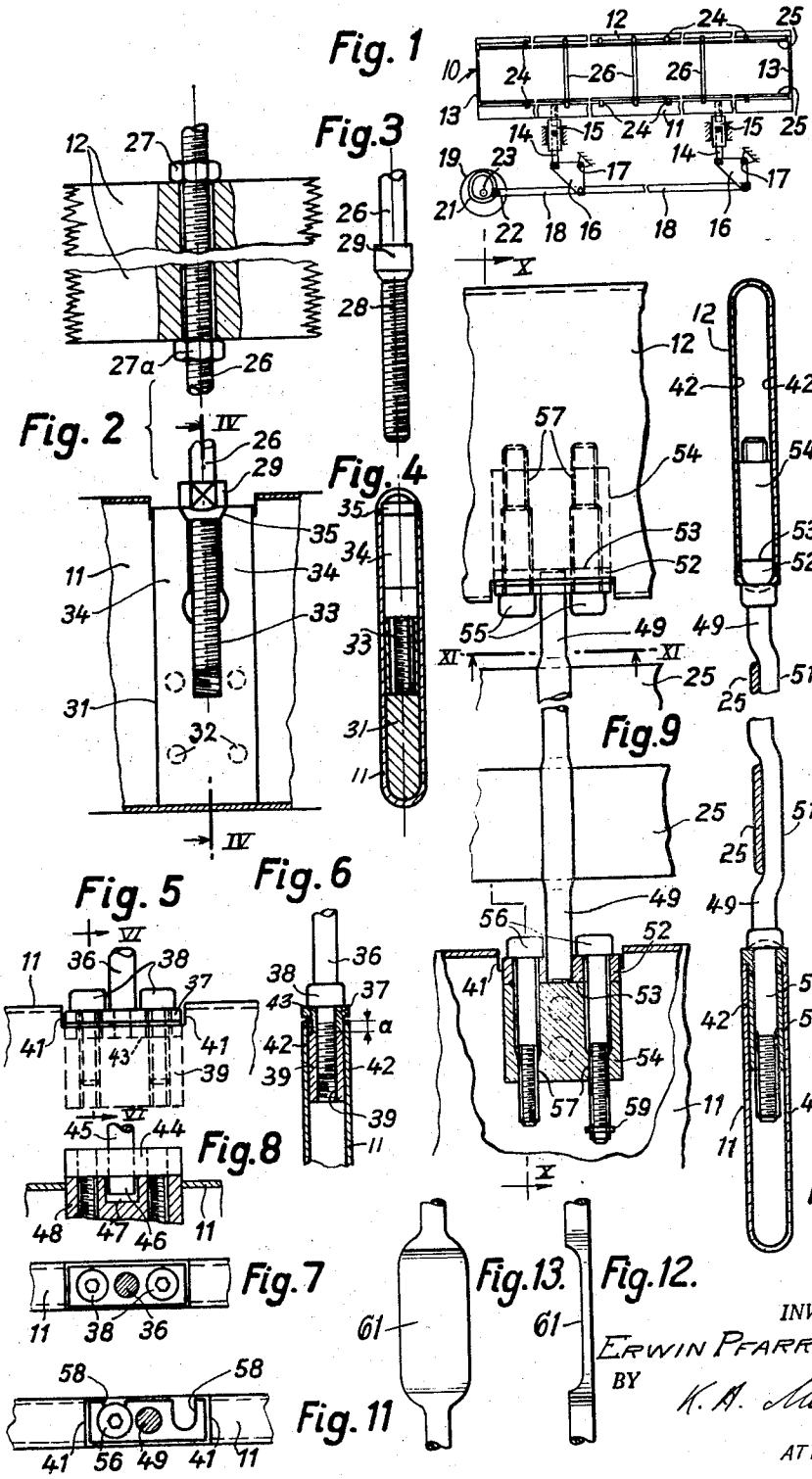

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HEDDLE FRAME

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The present invention relates to a girder-like heddle frame including an upper and a lower beam, heddles connected therewith, and a plurality of intermediate stays interconnecting said beams and being distributed over the length of the frame.

Intermediate stays which are removably connected in the conventional manner by means of hooks with the longitudinal beams contribute very little to making the heddle frame rigid and self-supporting. The hook connections act as flexible joints and cannot resist forces acting transversely or normal to the plane of the heddle frame. Conventional heddle frames having removable intermediate stays mounted in the conventional manner do not have the rigidity which can be obtained by rigidly connected stays.

It is an object of the present invention to provide a heddle frame which has disconnectable stays which are so connected with the upper and lower beams as to improve the resistance of the frame against forces acting in any direction and make the frame more rigid than stays which are connected in the conventional manner. According to the invention each stay has at least one end which is disconnectably but immovably connected with the respective beam. The stays in the heddle frame according to the invention have at least one end provided with an abutment which cooperates with an abutment provided on the beam with which the stay is immovably connected, yieldable means exerting a compression force acting in the direction of the longitudinal axes of the stays for pressing said abutments against each other.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will best be understood from the following description of embodiments thereof when read in connection with the accompanying drawing in which:

Fig. 1 is an elevation of a heddle frame and of a mechanism for actuating the heddle frame.

Fig. 2 is a part sectional view of the upper beam and of the lower beam of a heddle frame including an intermediate stay-member according to the invention.

Fig. 3 is an elevation of the lower end of the stay-member forming part of the structure shown in Fig. 2.

Fig. 4 is a cross sectional view of the lower beam of the heddle frame shown in Fig. 2, the section being taken along line IV—IV in Fig. 2, with the stay-member removed.

Fig. 5 is an elevation of a connection of a stay-member with a beam of a heddle frame.

Fig. 6 is a part sectional view of the connection shown in Fig. 5, the section being taken along line VI—VI in Fig. 5.

Fig. 7 is a top view of the connection shown in Figs. 5 and 6.

Fig. 8 is a part sectional view of a modified connection of a stay-member with a longitudinal beam of a heddle frame.

Fig. 9 is a part sectional elevation of a further modification of the connection of an intermediate stay-member with top and bottom beams of a heddle frame.

Fig. 10 is a part sectional view of the device shown in Fig. 9, the section being taken along line X—X in Fig. 9.

Fig. 11 is a sectional view of the device shown in Fig. 9, the section being taken along line XI—XI in Fig. 9.

Fig. 12 is a side view of a modified offset-portion of a stay-member for receiving a heald lath.

Fig. 13 is a front view of the portion shown in Fig. 12.

Referring more particularly to Fig. 1 of the drawing the heddle frame **10** has a lower beam **11** and an upper beam **12** whose ends are rigidly connected by means of end stays **13**. The heddle frame is supported from below by means of links **14** having ends pivoted to bars **15** which are slidable in suitable guides formed by or provided on the frame of the weaving machine. The other ends of the links **14** are pivoted to elbow levers **16** which swing on stationary pivots or shafts **17** and which are actuated by means of a rod **18**. The latter is reciprocatingly moved by means of a cam **19** having a groove **21** receiving a cam follower roller **22** mounted on the left end of the rod **18**. The cam **19** is mounted on a shaft **23** which is operatively connected with the main drive shaft of the weaving machine.

Support elements **24** for the heald laths **25** are made fast on the beams **11** and **12**, the elements **24** on the beam **11** being placed opposite to the elements **24** on the beam **12**. Disconnectable stays **26** are distributed over the length of the heddle frame and are interposed between the upper beam **12** and the lower beam **11**.

In the embodiment of the invention shown in Figs. 2 to 4 the upper end of the stay **26** is threaded and extends through the upper beam **12**, nuts **27** and **27***a* being provided for tightening the stay to the beam. The lower end of the stay **26** is provided with a thread **28** (Fig. 3) and a collar **29** above the thread. The lower shaft beam **11** is hollow, as shown in Fig. 4, an abutment element **31** being placed inside the beam and welded at **32** to the side walls of the beam.

The element **31** has a bottom part provided with a threaded bore **33** for receiving the thread **28** of the stay **26** and has yieldable portions **34** extending upwards from the bottom part of the element, laterally of the stay. The upper ends of the portions **34** have conical surface portions **35** forming a seat for a correspondingly beveled surface of the collar **29**.

When the screw connection **28**, **33** is tightened the connection is tensioned along its longitudinal axis so that the threads **28** are firmly pressed against the threads **33**, because of the abutment of the conical lower shoulder formed by the collar **29** against the seat **35**.

The connections on a heddle frame are heavily stressed and continuously subjected to blows and rattling. If the threaded lower end **28** of the stay **26** would just be screwed into the threaded bore **33**, the connection would soon become loose. The diameter of this screwed connection is necessarily relatively small, because of the limited thickness of the heddle shaft. If the screw connection is held under tension at all times by the aforedescribed means, loosening of the connection is effectively prevented.

If the stay **26** has an offset portion for accommodating a heald lath **25**, the stay must be capable of being turned, after engagement of the collar **29** with the seat **35**, through such an angle that the heald lath can be received in the offset. This may require almost a full turn of the stay and this is the reason why the portions **34** are made yieldable so that they can be spread apart until the stay **26** is in the desired position. The frictional

engagement of the collar 29 with the seat 35 prevents undesired rotation of the stay which may be caused by rattling.

When the stay 26 is inserted into the heddle frame, the upper end of the stay is passed through the beam 12 whereby the nut 27*a* is screwed so far away from the upper end of the stay that the latter can be lifted until its lower end can be inserted into the lower beam 11. After tightening of the connection of the lower end of the stay with the threaded bore 33 of the abutment element 31, the nut 27*a* is so adjusted as to effect the desired spacing of the beams 11 and 12, whereupon the nut 27 is tightened.

In the embodiment of the invention shown in Figs. 5 to 7 a transverse member 37 is rigidly connected with a stay 36. Studs 38, which have heads provided with a hexagonal recess for receiving a wrench and which extend through the element 37, are screwed into an abutment element 39 in the hollow shaft 11. The latter has a recess 41 for receiving the transverse member 37. The side walls 42 of the beam 11 project beyond the top surface 43 of the element 39 by the distance *a* for determining the elevational position of the member 37 on the beam 11 in a direction normal to the plane of the heddle frame, the position of the member 37 in the longitudinal direction of the heddle frame being defined by the recess 41. The upper part of the member 37 has the same width as the beam 11 so that this part of the member 37 rests at either side in the recess 41 on the lateral walls 42 of the beam 11.

In the modification shown in Fig. 8 centering of a transverse member 44 is effected by extending a stay 45 through a member 44 so that the lower end portion 46 of the stay projects below the member 44 and is received in a bore 47 of an abutment element 48 in the hollow beam 11. The member 44 may be connected to the stay 45 by screwing, riveting, welding, or the like.

In the embodiment of the invention illustrated in Figs. 9 to 11 a stay 49 is provided with offset portions 51 for accommodating the heald laths 25. Each end of the stay 49 is provided with a transverse member 52 corresponding to the member 37 in Figs. 5 to 7 and resting on surfaces 53 (43 in Figs. 5 to 7) of abutments 54 (39 in Figs. 5 to 7) and connected therewith by studs 55, 56 (38 in Figs. 5 to 7). The elements 54 are riveted or welded to the interior of the hollow beams 11 and 12. The studs 55, 56 are of the expansible type and have threaded ends screwed into corresponding threaded portions 57 at the far ends of bores in the elements 54 for the studs 55, 56. The portions of the studs between their heads and their threaded end portions have considerable length and are expansible.

The transverse members 52 rest in corresponding recesses 41 of the beams 11 and 12. The members 52 are provided with recesses 58 (Fig. 11) extending transversely to the longitudinal axes of the members for receiving the studs 55, 56. The stay 49 can, therefore, be removed and inserted in lateral direction after sufficient loosening of the studs. The beams 11 and 12 must be so far separated that at least one of the members 52 can be pushed beyond the portion of the wall 42 which serves for laterally centering the member 52.

In order to prevent falling out of the studs they are made longer than the distance between the heald lath and the inner ends of the threads 57 in the bores of the elements 54. Alternatively, the studs are made just so much longer than the thickness of the transverse member 52 plus the height of the abutment element 54 plus the depth of the recess 41 that a washer held by a dowel pin 59 can be placed at the end of the stud, preventing screwing the stud out of the threaded portion 57 of the bore in the element 54. The right stud 56 is constructed in this manner.

The offset portion 51 of the stay 49 can be produced

by bending the stay member without reducing its thickness, as shown in Figs. 9 and 10.

Instead of providing an offset portion a recess 61 may be provided for receiving a heald lath 25, as shown in Fig. 12. In order to avoid weakening of the stay member, the member may be laterally enlarged as shown in Fig. 13, the enlargement being longer than the recess 61.

The offset portions or recesses are provided in the stay members so that the healds can be moved on the heald laths past the stay members.

I claim:

1. A heddle frame comprising an upper beam, a lower beam, at least one intermediate stay member removably connected with and rigidly interconnecting said beams, operatively associated abutments connected with said stay member and with at least one of said beams, and yieldable means connected with said stay member and with at least one of said beams for resiliently pressing the respective abutments against each other.

2. A heddle frame as defined in claim 1 including heald laths individually connected with said beams, said stay members having offset portions accommodating said heald laths.

3. A heddle frame as defined in claim 1 in which at least one of said beams is hollow and said yieldable means are placed within said hollow beam.

4. A heddle frame as defined in claim 1 in which an abutment is connected with each end portion of said stay member and a corresponding abutment is connected with each of said beams, the last mentioned abutment on one of said beams facing the abutment on the other of said beams.

5. A heddle frame comprising an upper beam, a lower beam, at least one intermediate stay member removably connected with and rigidly interconnecting said beams and having at least one threaded end, and an abutment element rigidly connected with at least one of said beams, said abutment element having a bottom part provided with a threaded bore for receiving said threaded end, said abutment element having two portions extending from said bottom part along and adjacent to opposite sides of said stay member, said portions being laterally yieldable and having ends provided with seat surfaces flared outwards from said stay member, the latter having a collar having a beveled surface conforming with and being seated on said seat surfaces.

6. A heddle frame comprising an upper beam, a lower beam, at least one intermediate stay member removably connected with and rigidly interconnecting said beams and having at least one threaded end, an abutment element rigidly connected with at least one of said beams, a transverse member connected with at least one end of said stay members and abutting said abutment element, and yieldable means interconnecting said transverse member and said abutment element for pressing said member against said element.

7. A heddle frame according to claim 6 including positioning means provided on a least one of said beams for determining the position of said transverse member on said beam.

8. A heddle frame as defined in claim 6 in which said transverse member has an abutment surface and at least one of said beams is hollow, said abutment element being placed inside said hollow beam and having an abutment surface engaging the abutment surface of said transverse member, said abutment surfaces being placed inside of said beam and recessed from the surface of the beam, said beam having wall portions adjacent to said transverse member for determining the position of said transverse member relatively to said beam.

9. A heddle frame as defined in claim 6 in which said yieldable means include studs individually placed on opposite sides of and parallel to said stay member and extending through said transverse member and being screwed into said abutment element.

10. A heddle frame according to claim 9 in which said abutment element has a bore having a threaded end portion, said studs having expansible shafts extending through said bore and having a threaded end screwed into the threaded end portion of said bore.

11. A heddle frame according to claim 9 in which said studs have heads and hexagonal recesses in the center of the heads for receiving a wrench.

12. A heddle frame according to claim 9, including recesses in said transverse member extending transversely to the longitudinal axis of the transverse member for individually receiving one of said studs and affording insertion and removal of the stay member with the studs in position.

13. A heddle frame according to claim 12, including heald laths individually connected with said beams, said stay members having offset portions accommodating said heald laths, said studs being longer than the distance between said heald laths and the locality where said studs are screwed into said abutment element.

14. A heddle frame according to claim 12 in which said studs are longer than the extension of said transverse member and of said abutment element in the direction of the longitudinal axes of the studs, the studs having a threaded end portion projecting from said abutment element, and means connected with said end portion for preventing screwing of said end portion into said abutment element.

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