Feb. 5, 1946. S. N. McCASLIN 2,394,463

WARP BEAM

Filed May 20, 1944

Fig. 1.

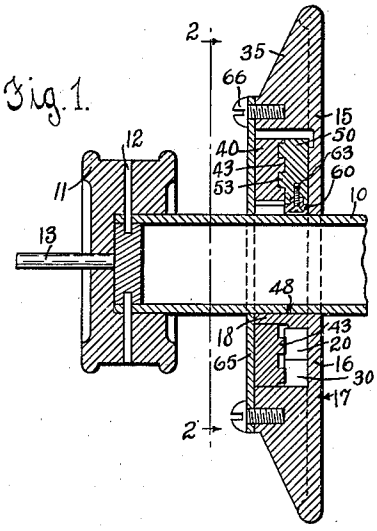


Fig. 2.

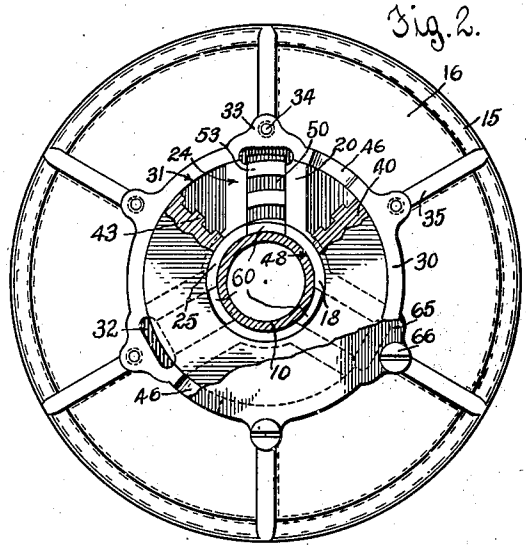
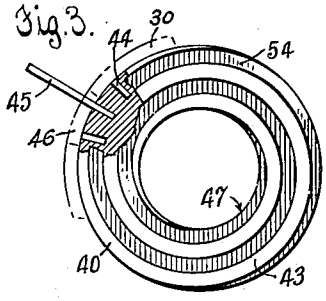


Fig. 3.



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Fig. 4.

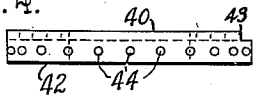


Fig. 5.

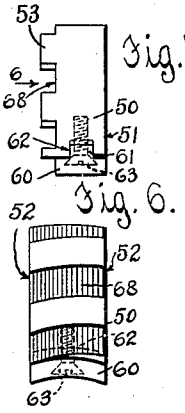


Fig. 6.

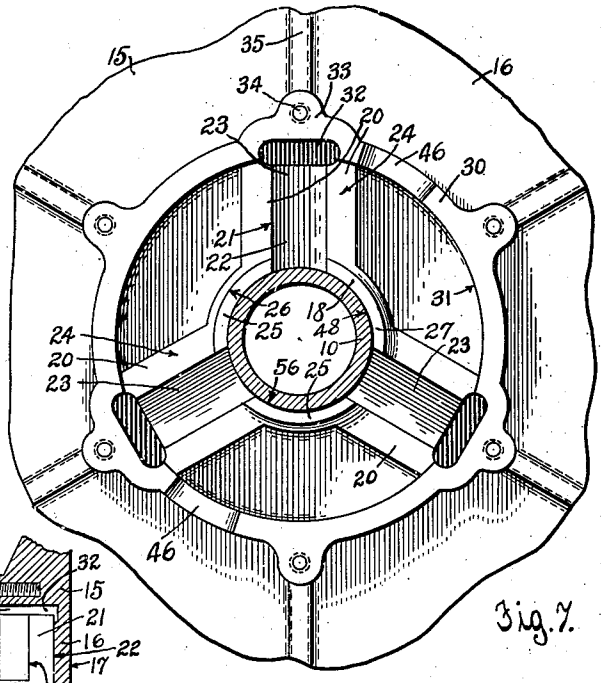


Fig. 7.

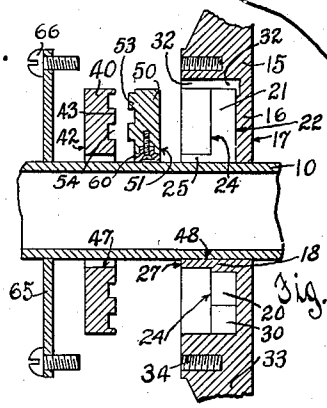


Fig. 8.

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UNITED STATES PATENT OFFICE

2,394,463

WARP BEAM

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Application May 20, 1944, Serial No. 536,533

2 Claims. (Cl. 242—124)

This is a continuation in part of my co-pending application Serial No. 504,756, filed October 2, 1943.

This invention relates to improvements in warp beams for looms and it is the general object of the invention to provide a head for a warp beam so constructed that it can be held against longitudinal movement along the beam barrel without being subjected to any twisting or deforming strains such as are commonly experienced in warp beams as made at the present time.

The present tendency in the weaving industry is to use warp beams of ever increasing diameter so that greater and greater lengths of warp can be wound on a beam at one time. When the diameter of the warp beams is large considerable difficulty is experienced in maintaining the selvage threads in proper position due primarily to twisting of the beam head with respect to the beam barrel. The greater the amount of warp between the beam heads the greater is the lateral pressure tending to slide the heads along the barrel, and in order to meet this condition it is customary to tighten the beam head clamping means as much as possible. With present beam heads, however, this practice almost always deforms the inside warp engaging surface of the head and causes it to move out of a plane perpendicular to the axis of the barrel. The result of this deformation is that certain parts of the warp space will be wider than others, and during the winding operation the selvage threads tend to pile up on each other at the narrow parts and form depressions at the wide parts of the warp space. As a result of this condition the selvage warps are alternately too tight and too loose during the unwinding which occurs as warp is let off incident to weaving.

It is an important object of my present invention to provide a warp beam head constructed with a housing or shell in which is located a clamping or holding mechanism or unit all the parts of which perform their function of preventing lateral slippage of the head without subjecting the latter to any twisting or deforming forces. One way to accomplish this result is to construct the unit so that its parts move in planes perpendicular to the barrel and parallel to the warp engaging inner surface of the head without being directly connected to the latter. By this construction no forces are brought to bear on the head which would deform it in a direction parallel to the beam barrel, and the aforesaid variation in the width of the warp space is avoided.

It is another object of the invention to provide the aforesaid housing or shell with guides certain of which are radial to receive pressure or clamping blocks and another of which is circular to receive a disk or ring cooperating with the blocks and rotatable in the housing to move the blocks into tight holding engagement with the beam barrel.

It is still another object of my present invention to provide the holding unit or mechanism which absorbs within itself all the strains incident to the clamping operation so that none of these strains are transmitted to the warp head. The clamping unit may conveniently be made of a scroll disk rotatable within the aforesaid housing and having a scroll thread engaging scroll teeth on the blocks. An important feature of this part of the invention resides in the fact that the reaction forces incident to pressing the blocks against the barrel are all absorbed by the disk and are not exerted on the beam head.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a vertical longitudinal section through one end of a warp beam having my invention applied thereto,

Fig. 2 is a vertical section on line 2—2 of Fig. 1, looking in the direction of the arrows,

Fig. 3 is a side elevation of the scroll as viewed from the center of the beam, or from the right of Fig. 1, showing part of the inclosing shell in dot and dash lines,

Fig. 4 is an end elevation of the disk looking in the direction of arrow 4, Fig. 3,

Fig. 5 is an end elevation of one of the blocks which cooperate with the scroll shown in Fig. 3,

Fig. 6 is a side elevation looking in the direction of arrow 6, Fig. 5,

Fig. 7 is an enlarged view of the shell or housing and the guide means formed therewith but with the blocks and disk removed, and

Fig. 8 is a view similar to a part of Fig. 1, but with the parts detached and suggesting the method of their assembly.

Referring particularly to Fig. 1, I have shown a beam barrel 10 which may be formed conveniently of a hollow steel tube provided with a smooth finished cylindrical surface on which the

warp is wound. It is to be understood that Fig. 1 illustrates only one end of the warp beam, and the mechanism similar to that shown in Fig. 1 will also be carried by the opposite end of the barrel. A loom let-off friction head 11 may be made in any convenient manner and is fastened to the barrel as by pins 12. A supporting gudgeon 13 extends beyond the end of the barrel 10 to provide means for supporting the latter either in the winding machine or loom.

Each end of the barrel 10 will be provided with a warp beam head 15, although in the drawing only one of these heads is shown. The head is provided with a web 16 having a smooth flat warp engaging surface 17 which is perpendicular to the barrel 10. A bearing hub 18 is formed integral with the web and perpendicular to surface 17 and has a close fit with the barrel 10. Bearing 18 holds the web 16 with surface 17 normally in a plane perpendicular to the axis of the beam and this relationship is not changed by operation of the holding or clamping unit to be described hereinafter.

As shown more particularly in Fig. 7, the web 16 has projecting laterally therefrom three pairs of parallel walls 20. Each pair of walls has the internal surfaces 21 thereof machined and parallel to provide smooth lateral guiding surfaces and that part of the web surface indicated at 22 located between the walls of each pair may also be machined in a plane perpendicular to the axis of head 15. Each pair of walls therefore provides a slot 23 which extends radially from the barrel axis and has finished side and bottom surfaces 21 and 22, respectively. The outer surface 24 of each of the walls is ground to be substantially parallel to surface 22.

The bearing 18 is formed in three arcuate parts 25 shown more clearly in Fig. 7. Each of these parts 25 joins adjacent walls 20 and has the cylindrical surface 26 thereof preferably turned concentric with the axis of the barrel. Each of the bearing parts 25 has an outer flat surface 27 which is farther from the web 16 than are the surfaces 24 of the walls 20.

Also formed integral with the web 16 is a cylindrical shell or housing 30 the interior surface 31 of which is preferably turned concentric with the bearing 18 and the surfaces 26. The shell 30 is of substantially the same height as the bearing parts 25 so that the outer surface thereof remote from the web 16 lies in the same plane as surfaces 27. The shell 30 is provided with pockets 32 which project slightly into web 16 at the ends of the slots 23, and lugs 33 formed integral with the shell 30 are provided with tapped holes 34 and are formed integral with reinforcing ribs 35 cast with the web 16.

From an inspection of Fig. 7 it will be seen that the interior of the shell 30 provides a circular ring-shaped guideway between the surfaces 26 and 31 and also between the surfaces 24 of the walls 20 and the outer ends of the bearing parts 25 and the shell 30. This space is occupied by a scroll disk 40 shown more particularly in Figs. 3 and 4. The disk has a flat bottom surface 42, see Fig. 4, and a scroll or scroll thread 43 on the opposite side thereof. The perimeter of the disk 40 is provided with a series of small holes 44 for the reception of a tool or pin 45 for the purpose of turning the disk. The shell 30 has opposite recesses 46 through which the pin 45 projects when the latter is used to turn the disk with respect to the head 15.

The scroll thread 43 rests on the surfaces 24 and the disk has a center bearing 47 which fits around the arcuate bearing surfaces 26. Bearing 47 is of larger diameter than the inner bearing surface 48 of bearing 18, and it is because of this relationship that the bearing 18 can have the arcuate extensions 25 and extend along barrel 10 for the full width of head 15, as suggested more particularly in the lower part of Fig. 1.

Each of the guide slots 23 shown in Fig. 7 receives a pressure or clamping block 50 shown particularly in Figs. 5 and 6. Each block has a smooth back surface 51 resting on surface 22 at the bottom of its slot, and has also machined side walls 52 which engage surfaces 21. That part of the block opposite the back surface 51 is provided with scroll teeth 53 which fit the groove 54 formed by the thread 43 of the scroll disk 40. Each block is slidable radially in its slot 23 and the latter extends from its pocket 32 to the inner surface 48 of the bearing 18.

Located between each block and the barrel 10 is a pressure pad 60 which may be made of any one of several materials such as bronze, hardened steel or Stellite. The latter is the trade name of a series of alloys of which the following is an example; cobalt 45%–52%, chromium 28%–32%, tungsten 10% to 15%, and carbon 2.5%. The pad is secured to its block as shown more particularly in Figs. 5 and 6, wherein a tongue 61 extending upwardly from the pad fits into a groove 62 cut in the under side of the block in a direction across the latter as viewed in Fig. 6. A screw 63 tapped into the block holds the pad to the under side of the latter. The pad is not an essential part of my invention, but when used may be considered as forming a single block member with the block 50 to which it is secured.

A positioning plate 65 may extend along the outer surface of the shell 30 and be held thereto as by screws 66 tapped into the previously described holes 34. The plate confines the blocks and disk 40 within the shell 30 and also serves to hold the scroll thread against the surfaces 24 of walls 20.

When assembling the head parts the block members are placed in their respective slots 23 in such order that their scroll teeth will be able to enter groove 54. The block backs 51 will rest against the floors or bottom surfaces 22 of the slots 23, and the teeth 53 will project above the finished surfaces 24, while the surfaces 68 on the blocks will not project beyond the surfaces 24. It is to be understood that the three blocks are not identical, since their teeth 53 must be cut to fit the groove 54 of the scroll disk. Because of the fact that the blocks are approximately 120° apart the teeth 53 will have different positions for each of the three blocks. The disk 40 is then fitted over the bearing surfaces 26 and adjusted until the teeth 53 of the block enter the groove 54. The disk is then pushed toward the web 16 until the scroll thread 43 rests on the surfaces 24, after which the plate 65 is placed as suggested in Fig. 1. After assembling, the disk 40 is rotatable within the circular or ring-shaped space previously described and located within the shell 30, and the blocks are slidable along the slots 23.

In operation, the assembled head with the clamping or holding unit or mechanisms formed by the disk and its blocks are slid along the barrel 10 to the proper point, after which the disk is turned by the pin 45 in a direction to move the blocks 50 toward the barrel and force the pads 60 against the latter. During this operation the forces which come into play are self-contained

in the clamping unit, that is, these forces are absorbed or confined to the disk **40** and the blocks **50** and do not effect the head **15**. Since the blocks **50** are uniformly spaced around the barrel the outwardly directed reaction forces which they exert when moved toward barrel **10** are distributed evenly on the disk **40**, and the latter has little or no tendency to move against the surfaces **26**. This is an important relationship of the parts and accounts for the fact that the surface **17** can remain truly perpendicular to the barrel **10** no matter how tightly the block members may be forced against the barrel. During this tightening operation the disk and the blocks move in planes which are perpendicular to the axis of the barrel, and the forces exerted between them have no appreciable component extending longitudinally of the barrel or directed against the head **15**, and the latter can therefore remain in proper position for warp winding.

It will be understood from an inspection of Figs. 1 and 8 that the disk **40** and its blocks constitute a holding unit the parts of which have mere guiding relation with the head **15** but are not positively connected to the latter in any way. Thus, after the blocks and their pads have been set up tightly against the barrel **10** the head **15** is free to slide toward the center of the beam away from the clamping unit to some such position as indicated in Fig. 8, provided the plate **65** has been removed. The blocks, however, exert such holding forces on the barrel that the warp is not able to move the head **15** in the opposite direction, that is, to the left as viewed in Fig. 1. It is thus seen that the warp head comprises two separate parts one of which comprises the warp engaging web **16**, bearing **18**, warp engaging surface **17**, plate **65** and the slots **23** and the circular compartment for the disk, while the other part includes the clamping or holding mechanism or unit which is held in position and guided by the first part, and operates in such manner as not to deform the first part.

From the foregoing it will be seen that I have provided an improved warp beam head constructed to contain a holding unit comprising a rotatable disk and blocks slidable on the warp head toward and from the barrel **10**. It will further be seen that the forces incident to tightening the block members are all self-contained within the holding unit and do not subject the head **15** to strains which would deform it. All of the guide surfaces on the head **15** for the two parts of the holding unit, that is, the scroll and the blocks, are either perpendicular to or parallel to the axis of the barrel **10** and there are no positive connections between the head **15** and either the disk or the blocks. It will be seen particularly in Fig. 1 that the blocks are between the disk and web **16** and that because of this relationship the blocks prevent the force of the warp acting on the head **15** from reaching or materially effecting the position of the disk. While this latter feature is desirable it is not essential, since it is sufficient for the purposes of my present invention if the blocks be guided on the head **15** and caused to move radially by a rotatable disk or ring mounted for turning on the head. While I have shown three blocks uniformly spaced around the axis of the head **15**, I am not necessarily thus limited, but the blocks should be placed so that the outwardly directed reaction forces which they exert against the disk **40** will be substantially balanced so that the disk will not be forced unduly against the surfaces **26**. This condition can be met if the blocks are so distributed that they will always be on opposite sides of any diameter drawn through the axis of the head. In the actual operation of my invention the ring disk is supported by the scroll teeth of the blocks rather than by the hub **18**, and the forces which come into play during the clamping operation may be thought of as starting with the disk and passing down through the blocks to the barrel. The forces tend to expand the disk slightly, and the force involving any particular block acts along a line which if extended would pass between other blocks, hence there is a distribution of the forces which tends to keep the disk central and prevent it from exerting objectionable pressure on the bearing **18**. Another way of considering the forces is that a plane passing lengthwise through the axis of the barrel and any block will pass between other blocks, with the result that the disk is subjected to forces diverging from its center and in such directions as to effect a practical balance of the strains within the disk.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. A clamp member for a warp barrel supported beam head having a scroll rotatable thereon, said member having scroll teeth thereon for engagement with the scroll, a pad on one end of the member for engagement with the barrel, and means securing the pad to the member including a tongue and groove connection between the pad and member.

2. A clamp member for a warp barrel supported beam head having a scroll rotatable thereon, said member having a body provided with scroll teeth extending from one side of said body across the latter to the opposite side thereof for engagement with the scroll, a pad at one end of the member for engagement with the barrel, and means securing the pad to the member including a tongue and groove connection between the pad and member extending from said one side of the member to said opposite side thereof.

STANLEY N. McCASLIN.