BEAM TRANSPORT DEVICE

Alvin B. Storey and Edward A. Bayers, Charlotte, N.C., assignors to Celanese Corporation of America, New York, N.Y., a corporation of Delaware

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This invention relates to supporting structures for the transport of heavy articles having projecting journals. More particularly this invention relates to an improvement in frames for holding heavy spools, such as textile warp beams for transport.

Large warp beams of yarn, weighing several hundred pounds, are usually transported by train or by truck trailer. Where a plurality of beams are to be transported, it is desirable to conserve space in the transporting vehicle, to support one beam above the other. One disadvantage in such transportation has been the expense in the manufacture, storage, maintenance and return of the structures currently available for supporting such beams during transport. It is, accordingly, an important object of this invention to provide a means for transport of such beams and similar articles which means will be light in weight, simple in construction, and efficient in use.

Another object of our invention is to provide an improved device for use in the shipping of beams of yarn and returning of the empty beams.

Further objects of this invention will be apparent from the following detailed description and claims.

The invention comprises the use of two end frames mounted on a standard beam rack. A preferred embodiment of the invention will now be described in connection with the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same;

Figure 1 is a front elevation of a double beam rack embodying our invention,

Figure 2 is a side view of the same,

Figure 3 is a top view of the same with one of the end frames side shown schematically in broken lines to indicate the relative position of elements of the upper frame when rotated about a nesting pin,

Figure 4 is an enlarged sectional view through the line 4—4 of Figure 2,

Figure 5 is a sectional view through line 5—5 of Figure 2,

Figure 6 is a sectional view through line 6—6 of Figure 2,

Figure 7 is an end view of the fastening plate and associated parts shown in Figure 4, and

Figure 8 is a sectional view through the line 8—8 of Figure 4.

A lower warp beam 12 and an upper warp beam 13 are shown supported in the double beam rack indicated generally by 14. The double beam rack 14 is composed of a lower beam rack 15 and a pair of substantially flat upper end frames, 17 and 18, which are supported on and attached to the lower rack 15 as described in detail below.

The lower warp beam 12 has flanges 19 which rest on saddle members 22 of the lower beam rack. The upper warp beam 13 is supported at the ends 26 and 27 of its shaft 28 by bearing blocks of the end frames 17 and 18.

The lower beam rack 15 is composed of rigid upright supports, 32 supported on shoes 33 and firmly held in position by rigid horizontal members 37, 38 and truss members 42, all of, for example, steel tubing, all interconnected in conventional manner, to form a rigid support for the saddle members 22. In a preferred embodiment, to support a 30-inch diameter beam rack of conventional 4 to 5 feet length the upright supports 32 would be about 2¼ to 3 feet long, their outside dimensions spaced apart by slightly more than the diameter of the supported warp beam, i.e., about 30¼ inches for a 30-inch diameter warp beam.

The end frames 17 and 18, which support the upper warp beam 13 are mirror images of each other and are composed of the bearing blocks 30 secured to rigid substantially flat panels. The bearing blocks 30 are adapted to be firmly and releasably attached to the supported warp beam shaft 28 while the lower portions of the end frames 17 and 18 are adapted to be supported by and firmly and releasably attached to the lower beam rack 15 as more fully described below.

In the preferred embodiment each end frame 17 or 18 comprises rigid spaced lateral uprights 52, 53, horizontal members 54, 55, and truss members as 56, 57, 58 and 59 (see Fig. 8), all connected by conventional means, preferably welding, so as to form a rigid strong supporting structure for the bearing blocks 30. The uprights 52, 53 may be formed of square hollow steel bars. The lower end of each upright 52 is advantageously left open to form a U-shaped section (Fig. 5), within which is fixed a connecting device for firmly and releasably attaching said upright 52 to a nesting pin 60 fixed to and projecting from the beam rack 15 therebelow. This connecting device is advantageously formed by firmly fixing within in the U-shaped section of upright 52 an opened-out tube, as 61, having an inside diameter only slightly larger than that of the nesting pin 60, and spring steel snaps 62, 63, adjacent to and below said opened-out tube 61, which snaps cooperate with said tube 61 to releasably hold said nesting pin. These snaps 62, 63 are each firmly secured to the upright 52 by rivets 64 while the opened-out tube 61 is secured to the upright 52 by a plate 65. A plate 66, may be attached to the lower end of each member 52 for reinforcement thereof, to help to fix the position of the opened tube 61, and to facilitate assembly of the double beam rack. This plate 66 is U-shaped to receive the nesting pin 60.

The lower end of each upright 53 of the end frames 17, 18 is fitted with a sleeve 67 welded thereto (Fig. 6) for receiving saugly one of another pair of nesting pins 68 projecting upward from the lower beam rack 15. The pins 68 are identical with the pins 60, the pins 60 and 68 being mounted at the four upper corners of the lower warp beam rack. A plate 69, apertured to receive one of the pins 68, may be welded to the lower end of each upright 53; the plate 69 reinforces the bottoms of the uprights 53, helps fix the position of sleeve 67 and facilitates assembly of the double beam rack by acting as a shoe to lessen friction.

Each bearing block 30 (Figures 4 and 8) is lined with a layer 70 of a relatively soft and resilient material, as rubber belling, on which the end 27 (or 26) of the warp beam shaft 28 rests and which serves to distribute the weight of the warp beam from the shaft end 26 to a steel saddle 71. This saddle is supported at one end by the truss member 59 and at the other end by a cushioning filler 72 which in turn is supported by the horizontal member 54 and the truss members 56 and 57. Each shaft end 27 (or 26) is tapped and drilled at 73 for receiving a bolt 74, which may be fitted with a washer 75. The shank of the bolt 74 is removably received in a slot 76 of a plate 77 welded to the saddle 71, and the end of the shaft may be swaged so that bolt 74 cannot be readily screwed out and removed. A relatively soft and resilient
lining as rubber covering 78 is desirably attached to the plate 77.

In the operation of the invention after a warp beam 12, has been placed in the lower beam rack 15, in the conventional manner, the sleeves of the uprights 53 of each of the end frames, 17 and 18, are engaged with the nesting pins 68, and the frames are swung about these pins from the position shown in broken lines in Fig. 3, into the position shown in solid lines in that figure, where the end frames 17, 18 are held in position by the action of the snap springs 62, 63. Thereafter the warp beam 13 may be lowered into position so that each end of the shaft 28 is supported in rack 30. This may be done by placing the frame 17 under a support, as an overhead trolley, from which warp beam 13 may be supported by a sling. The bolts 74 on each end of the warp beam shaft 28 are then screwed tight to secure the warp beam to the end frames 17, 18.

It is to be noted that the apparatus and procedure permit any single upper or lower warp beam to be placed in its rack without danger of contacting and thereby damaging any other warp beam in the process. Further, this apparatus facilitates placing a lower beam in a double beam rack by avoiding any danger or interference by an upper beam support, because such upper rack is readily removed out of the way until after the lower beam has been placed in its lower rack. Similar advantages occur in removing a lower warp beam from such device. A further advantageous feature of this invention resides in that the cost of transporting the empty beam racks is substantially reduced, due in large part, to the reduction in weight accomplished by dispensing with the heavy rigid members conventionally used to connect the end frames.

There is a further considerable convenience in using the double beam rack of this invention in that the end frames 17, 18 need not be positioned on the lower beam rack 15 simultaneously, but may be placed thereon one at a time. Furthermore, it is necessary to align only the uprights 53 of these end frames with the corresponding nesting pins 68, the other uprights 52 being brought into position by the swinging action shown in Fig. 3 and described above.

It is further noted that this double beam rack is inexpensive to construct, sturdy and readily adapted to be utilized in conventional carriers, which have various sizes of floor space, so as to obtain maximum utilization of such space.

While the above apparatus has been described for use in the transport of warp beams it is also intended that this invention may be used for the transport of other large cylindrical packages such as spools of filamentary material such as wire, sheet material such as cloth and plastic, and for the transport of other heavy articles supported by shafts.

It is to be understood that the foregoing detailed description is merely given by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. In combination, a shaft having a material wound thereabout and, as the sole contacting support for said shaft, a rack comprising a pair of independent rigid frame members, displaceable relative to one another, means for releasably connecting each frame member to a support therebelow, said means including a projection on one of said frame member and said support and a receiver for said projection on the other of said frame member and said support.

2. In combination, a shaft having a material wound thereabout and, as the sole contacting support for said shaft, a rack comprising a pair of independent rigid frame members displaceable relative to one another, means for securely and releasably connecting each frame member to a support therebelow with said frame members maintaining at a predetermined distance from each other corresponding to the length of said shaft, said means including a projection on one of said frame member and said support and a receiver for said projection on the other of said frame member and said support, and means on each frame member for securing a respective end of said shaft to said frame member.

3. A rack for supporting a plurality of shafts each of which is wound about its central portion with material and having its ends projecting, comprising a rigid lower frame including spaced means for holding the projecting ends of one shaft thereby to support said one shaft, and an upper frame including a pair of spaced frame members displaceable relative to one another and provided with means for holding the projecting ends of a second shaft thereby to support said second shaft, each of said frame members being displaceably connected to said lower frame, whereby following unloading of said second shaft, said upper frame members may be displaced to provide access to said lower frame for unhindered unloading of said one shaft.

4. A rack for supporting a plurality of shafts each of which is wound about its central portion with material and having its ends projecting, comprising a rigid lower frame including spaced means for holding the projecting ends of one shaft thereby to support said one shaft, an upper frame including a pair of spaced substantially flat members displaceable relative to one another and provided with means for holding the projecting ends of a second shaft thereby to support said second shaft, each of said frame members including spaced uprights, one upright of each frame member being displaceable relative to said lower frame so as to expose the latter, and means for releasably securing said displaceable uprights to said lower frame so as to prevent such displacement when said upper frame supports its second shaft.

5. A rack as defined in claim 4, including upwardly extending nesting pins provided on said lower frame for respective engagement with said uprights, one upright of each frame member being pivotally connected to a respective nesting pin and another upright of each frame member being displaceable relative to another nesting pin, and spring means for releasably connecting each displaceable upright to its respective nesting pin.

6. A rack as defined in claim 4, including means for securing said projecting ends of said second shaft to said upper frame members, thereby forming a rigid unit wherein said upper frame members are interconnected by said second shaft.

7. A rack for carrying a plurality of warp beams one above the other for transport thereof, each of said warp beams having a portion of its shaft projecting from each end thereof, said apparatus comprising a lower frame and an upper frame, said lower frame including a pair of supports for the projecting shaft portions of one warp beam shaft, said upper frame being adapted for supporting a second warp beam above said said lower frame and comprising a pair of rigid substantially flat upwardly extending frame members displaceable relative to one another and each including a separate support for a respective projecting shaft portion of said second warp beam, and means for releasably connecting each of said upper frame members to the lower frame.

8. A rack for carrying a plurality of warp beams above one another for transport thereof, each of said warp beams having a portion of its shaft projecting from each end thereof, said apparatus comprising a lower frame and an upper frame, said lower frame comprising a pair of supports for the projecting shaft portions of one warp beam shaft, said upper frame being adapted for supporting a second warp beam above said warp beam and comprising a pair of rigid substantially flat upwardly extending frame members displaceable relative to one another, means for securely and releasably connecting each frame member to a support therebelow with said frame members maintaining at a predetermined distance from each other corresponding to the length of said shaft, said means including a projection on one of said frame member and said support and a receiver for said projection on the other of said frame member and said support, and means on each frame member for securing a respective end of said shaft to said frame member.
extending frame members displaceable relative to one another and each including a separate support for a respective projecting shaft portion of said second warp beam, means for releasably attaching said separate supports of said upper frame members to said second shaft, and means for releasably connecting the bottoms of each of said upper frame members to the top of said lower frame at a plurality of points, one of said means for releasably connecting providing a pivotal connection between said lower frame and each upper frame member, whereby upon removing said second beam from said upper frame each upper frame member can be pivoted about its connection to the lower frame so as to permit access to said one warp beam without interference by said upper frame.

9. A rack for carrying a plurality of warp beams one above the other for transport thereof, each of said warp beams having a portion of its shaft projecting from each end thereof, said apparatus comprising a lower frame and an upper frame, said lower frame comprising a pair of supports for the projecting shaft portions of one warp beam shaft, connecting means on top of said lower frame for attachment to said upper frame, and means for supporting said upper frame, said upper frame being adapted for supporting a second warp beam above said one warp beam and comprising a pair of rigid substantially flat upwardly extending frame members displaceable relative to one another, each of said frame members including a separate support for each end of the shaft projecting from said second warp beam, means for releasably attaching said frame members to said second shaft, and means for releasably connecting each of said frame members to said connecting means on top of said lower frame, one of said releasably connecting means providing a pivotal connection between said lower frame and each upper frame member and another of said means providing a spring snap connection.

10. A rack as defined in claim 9, wherein each of said upper frame members includes a pair of hollowed uprights and wherein said connecting means on top of said lower frame comprises a plurality of nesting pins, said pins in conjunction with said hollowed uprights providing said pivotal and spring snap connections.

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