

Oct. 10, 1950

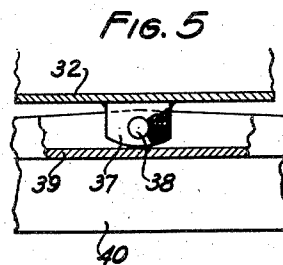
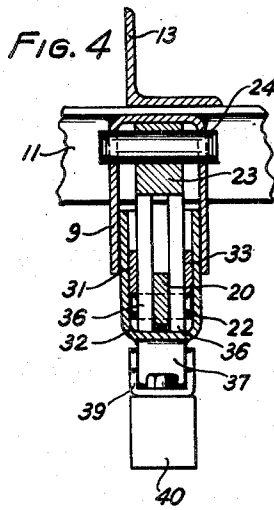
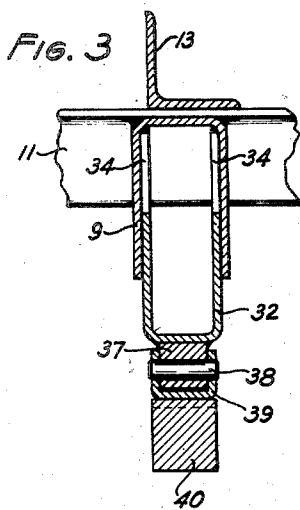
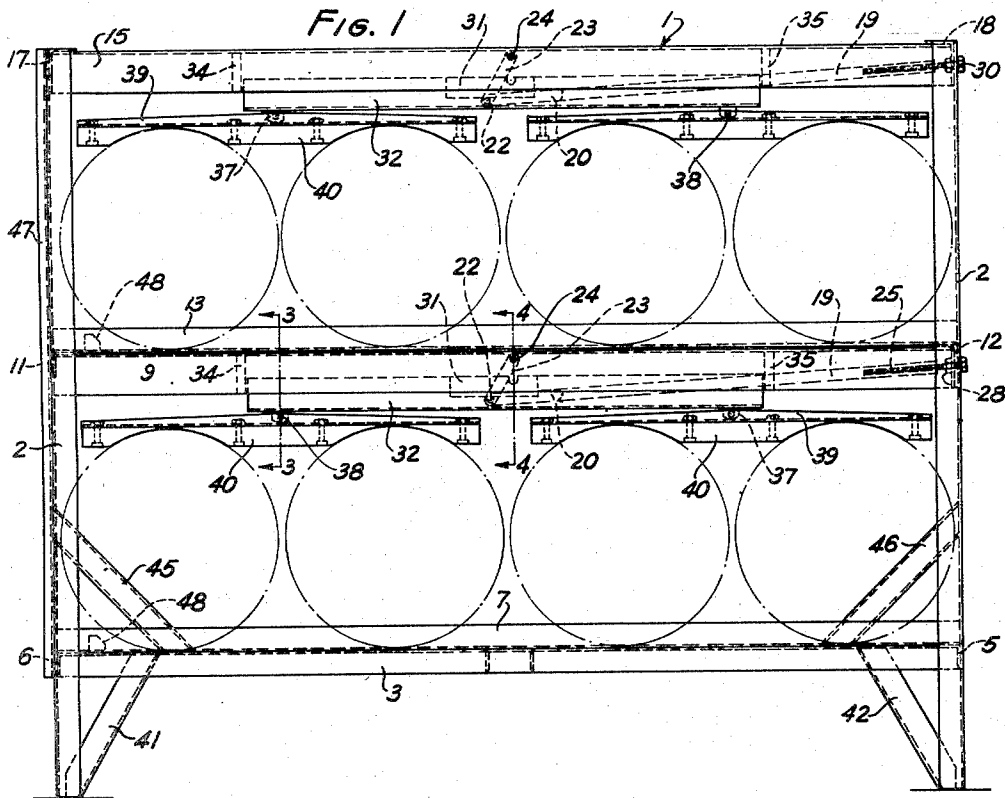
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2,525,551

LOCKING MECHANISM FOR BEAM RACKS

Filed Nov. 17, 1948

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 2

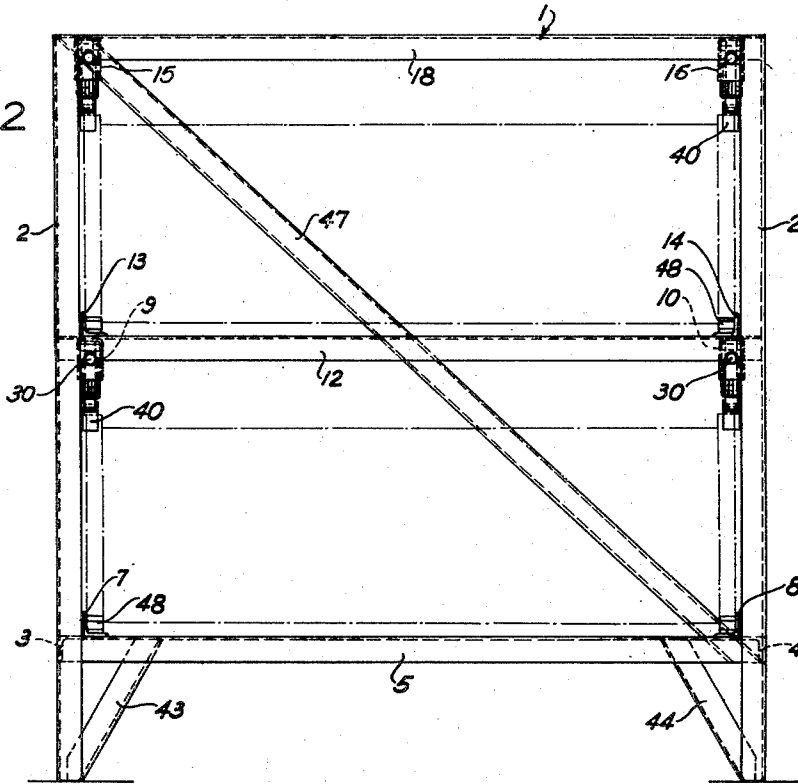


FIG. 6

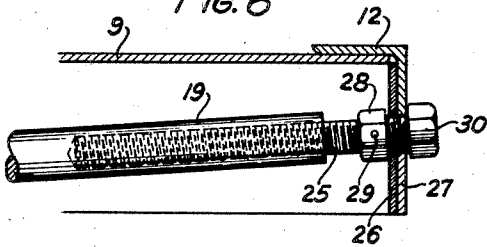


FIG. 7

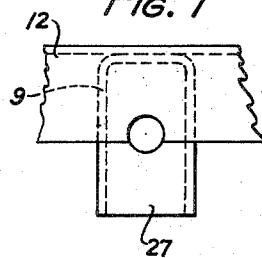


FIG. 8

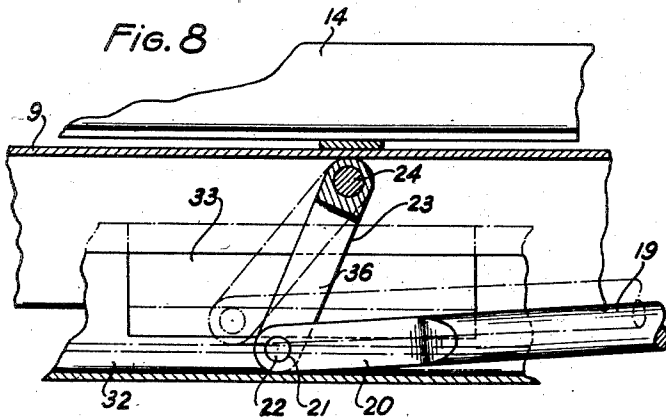
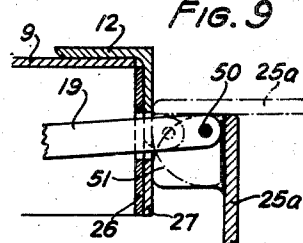


FIG. 9



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LOCKING MECHANISM FOR BEAM RACKS

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5 Claims. (Cl. 214—10.5)

1

This invention relates to the art of handling spooled strand material and more particularly to an improved apparatus or rack for loading, storing and transporting relatively large spools or beams on which yarn or filamentary material such as estron or rayon yarns or other similar textile products are wound.

As is well known, in those industries in which various types of strand materials are wound, stored and transported on spools or reels, as, for example, in the textile industries, it is customary to provide various means for handling, storing and transporting the wound material in a manner which will prevent injury to the product so far as possible. In dealing with textile yarns, particularly yarns of the synthetic variety, exemplified by such materials as estron, rayon and various others, which are to be used as warp yarns in the manufacture of fabrics, it is customary to wind this warp yarn on large spools known as beams. These beams consist essentially of a center core or shaft provided at each end with a disc-shaped wooden or metal flange of a diameter determined by the amount of yarn it is desired to place on the beam.

Some of these beams are very large, weighing, in their loaded condition, as much as a ton or more. Another type of warp beam, such as those employed for beaming yarns destined to enter into the manufacture of so-called tricot type fabrics, may be much smaller, weighing, in their loaded condition, only a few hundred pounds. Such beams will have flanges ranging anywhere from, say, thirteen inches to twenty-one inches in diameter. While not limited thereto, the present invention is concerned primarily with the provision of improved means for handling this latter type of beam.

As is well known among manufacturers and shippers of strand material which is wound on spools or reels, such, for example, as cable, wire, textile yarns and the like, these devices, loaded with the wound products, present special problems in handling, storage and shipment, not only because of the weight of the material involved, but also because of the fact that the material must be handled in a device which is normally provided with disc-like flanges at each end of a central shaft or core to enable it to be rolled from one position to another and also to permit mounting the ends of the shaft in bearings in such manner that the material may be unwound from the package by simple rotation thereof. Naturally, a spool or reel has an inherent tendency to roll from one place to another, this tendency

2

being greatly exaggerated in the case of material undergoing transport by rail, water or overland truck.

Many different devices have been suggested for the handling of beams and/or large spools in a manner which would make for a minimum of movement and thus preclude, as far as possible, injury to either the wound material or to the beam or spool structure itself. It is self-evident that some extremely secure means must be provided for adequately keeping the beams in proper spaced relation and for preventing relative movement of the beams, particularly when in transit and carrying their normal load of several hundred pounds of yarn.

One type of device for storing and shipping warp beams, for example, is a metal rack, preferably of angle iron construction, and provided with various devices for securing the beam in place. In other types of devices for handling of beams or related objects many expedients have been suggested for the locking of such objects in place in racks or similar structures, but to the best of my knowledge and belief, the improved device of my invention, to be described in detail hereinafter, has certain distinctive and outstanding advantages over all of these prior art structures.

The present invention has as an object to provide an improved rack structure for the shipment of material wound on spools, in which structure a highly efficient means is provided for locking the spools in place. A further object is to provide an improved rack for the handling, storage and shipment of warp beams of continuous filament textile yarn or of the empty beams themselves. A specific object is to provide an improved locking structure for preventing relative movement between warp beams of yarn and between the beams and the rack structure in which they are to be handled. A further specific object is to provide such a locking mechanism which will be easy to operate, rugged in construction and supplying a maximum of locking effectiveness without the use of cables, straps or elaborate mechanical contrivances. Other objects will appear hereinafter.

These objects are accomplished by the following invention which, in its broader aspects, includes the provision in a warp beam rack or similar rack structure of a screw-actuated linkage which in turn actuates a second linkage carrying a pivotally mounted locking bar provided with arcuate depressions so formed as to conform to the curvature of the flanges of the spools or

3

beams to be handled and which member permits locking and unlocking of the loaded beams by the simple expedient of actuating the screw.

My invention will be more fully understood by reference to the accompanying drawings forming part of the present specification in which,

Fig. 1 is a side elevational view of one form of spool or beam rack embodying the improved locking mechanism of my invention.

Fig. 2 is an end elevational view of the structure shown in Fig. 1.

Fig. 3 is a fragmentary sectional view, along the line 3—3 of Fig. 1 and illustrating the structure and function of the upper and lower channel members.

Fig. 4 is a fragmentary sectional view along the line 4—4 of Fig. 1 illustrating the connection between the push rod and the locking bar-carrying linkage which it actuates.

Fig. 5 is a fragmentary sectional view illustrating the method of pivotally connecting the respective locking bars to the locking bar-carrying linkage.

Fig. 6 is a fragmentary sectional view illustrating the construction and operation of the push rod-actuating screw.

Fig. 7 is an end view of the structure of Fig. 6 from which the actuating screw and push rod have been removed.

Fig. 8 is a fragmentary sectional view illustrating the structure and manner of operation of the push rod and its accompanying linkage.

Fig. 9 is a fragmentary sectional view of a clamping mechanism which may be employed in place of the push rod-actuating screw of Fig. 6.

Referring to Fig. 1, the numeral 1 designates a rack structure for the handling of warp beams or similar objects, which may be conveniently constructed of angle irons which, if desired, may be of steel or other sufficiently strong metal or metal alloy. The rack structure may be of rectangular form constructed by providing four vertically disposed corner posts 2 to which are welded lower side members 3 and 4 and corresponding end members 5 and 6. Members 3, 4, 5 and 6 are conveniently spaced six or eight inches or any other desired distance from the bottom ends of the corner posts in order to provide a space for the admission of the platform of a platform-type motor truck or similar material-handling device, as will be explained more fully hereinafter.

As shown in Figs. 1 and 2, track members 7 and 8 are welded to the upper flat surface of angle iron end members 5 and 6, these members 7 and 8 being spaced apart a sufficient distance to accommodate the beam or other cylindrical object it is desired to carry in the rack, and provided, if desired, on the upper surfaces of their horizontal portions with strips of leather, rubber or similar material which serves to prevent injury to the flanges of beams which may be rolled on and supported by these members.

An upper set of side members 9 and 10 are welded to the upper end members 11 and 12 in parallel relation to the track members 7 and 8 and spaced therefrom at a sufficient distance to provide for admission of the largest beam or spool it is desired to admit to the rack and also to provide additional space for the locking mechanism of my invention and its accompanying linkages. These upper side members differ from the track members in that they are not angle irons, but take the form of channel irons, the cross sectional shape of which is illustrated in

4

Figs. 3, 4 and 7, and welded to end members 11 and 12 as shown in Figs. 6 and 7.

As shown in Figs. 1 and 2 upper end members 11 and 12 are welded to the corner posts in proximity to the point of attachment thereto of side members 9 and 10, respectively. These end members are of angle iron construction.

While not vital to my invention, the rack structure may be constructed, as shown, in what may be referred to as duplex form, that is, a second set of upper track members 13 and 14 may be welded to upper end members 11 and 12, each of these members being disposed in parallel relationship to its corresponding counterpart in the lower section of the rack.

Likewise, a second set of channel members 15 and 16 are welded to the end members 17 and 18 in parallel relation to upper track members 13 and 14 and spaced therefrom as described above in connection with members 7, 8, 9 and 10 of the lower section. In like manner, end members 17 and 18 are welded to the top ends of posts 2, as shown, to complete the rectangular form of the upper part of the rack.

This duplex type of construction, as will be readily understood, provides for the handling of twice the number of beams as would be the case if a unitary non-duplex type of construction were employed. In this connection, it should be pointed out that, in its broader aspects, my invention is effective whether or not one is dealing with a single beam or other cylindrical object, two beams or any number of beams which it may be desired to handle in the beam rack. In other words, my invention is equally effective for holding a single beam in place during handling, storage or shipment or when applied to any desired number of beams. Ordinarily, in racks designed for handling the so-called tricot type of beams it is convenient to handle eight beams at a time, as shown.

The locking mechanism of my invention will now be described by reference to its operation in a single section of the duplex beam rack shown in Figs. 1 and 2.

The locking mechanism itself comprises a screw-actuated push rod 19 having a flattened end 20 bored at 21 to receive a pin 22 which connects the rod to a link 23. Link 23 is, in turn, pivotally mounted on and carried by channel member 9 by means of pivot pin 24 which, as shown, passes through the end of the link opposite to that which carries pin 22 and through both sides of the channel member 9 which are bored to receive it.

Referring to Fig. 6, push rod 19 is axially drilled and threaded at the end opposite the pin 22 to receive a threaded bolt 25 which functions as an actuating screw. The outer end of the bolt projects through inner plate 26 which is welded to end member 12 for re-enforcing and strengthening purposes, plate 26 and the lowermost part of the downwardly projecting portion of the angle iron member 12 being suitably bored, but not threaded, to accommodate bolt 25. A second re-enforcing or fill plate 27 is welded to plate 26 and also appropriately cut out, as shown in Fig. 7, to accommodate the bolt.

Bolt 25 is also provided with a stop nut 28 which is pinned to the bolt by a pin 29. The outer end of the bolt takes the form of a hexagonal head 30 which may be actuated by a conventional socket or other suitable type of wrench. It should be noted in passing that as one applies a wrench to the head 30 and turns

the bolt in a counterclockwise direction (assuming a standard right-hand type thread) this will cause the push rod 19 to move to the left and to move link 23 into a position illustrated in dotted lines in Fig. 8. As will be explained hereinafter, this will move the accompanying locking mechanism out of engagement with the loaded beams or other cylindrical objects. Contrariwise, turning the bolt 25 in the opposite direction will serve to draw push rod 19 to the right and thus carry the locking mechanism toward the locking position.

Referring to Figure 9, in place of the bolt 25 I may employ a snap clamp 25a having a bifurcated end, both sides of the bifurcated portion of which is drilled to loosely receive a pin 50 which, in this modification, also passes through a corresponding drilled hole in the outer end of push rod 19. The edges of the bifurcated portion are arcuate in form, thus providing for a cam action when the clamp is turned about the pin 50 as a pivot point.

The operation of this alternative clamping mechanism will be apparent from an inspection of Figure 9. When the handle of the clamp 25a is in the "up" position, as indicated by the dotted lines, the push rod 19 will be positioned as far to left as is possible and the linkage 23 will have swung to the dotted line position indicated in Fig. 8 and member 32 will have been raised to its uppermost position and the attached locking bars 40 will accordingly have been raised from contact with the flanges of the beams, the whole mechanism then being in its unlocked position. When the handle of the clamp 25a is in the "down" position shown in full lines in Figure 9 the push rod 19, by virtue of the cam action of the bifurcated portion of the clamp, will have moved as far as possible to the right, link 23 will then have assumed the full line position shown in Fig. 8, member 32 will have been lowered to its lowermost position, locking bars 40 will have been pressed firmly into contact with the flanges of the beams and the mechanism will then have assumed its locked position.

Referring now to Figs. 1, 3, 4 and 5, screw- or clamp-actuated member 19 and its accompanying link 23 serves to actuate a second linkage which carries the locking means per se, which will now be described. Referring to Fig. 4, the numeral 31 designates a small plate welded to a second channel member 32 which is of such size or outside width as to fit snugly but slidably within channel member 9 with a small clearance. A second plate 33 identical with plate 31 is welded to the opposite inner side of channel member 32, as shown. Member 32 and plate 31 are also shown in dotted outline in Fig. 1. In Fig. 1 there is also shown in dotted outline the guide plates 34 which are welded to the inside of channel member 9 at the left-hand extremity of member 32. Corresponding plates 35 are welded to the inside of channel member 9 at the right-end of inner channel member 32. These members or plates 34 and 35 operate as guide plates to provide for movement in a vertical direction only of member 32 within the upper channel member 9.

Referring to Fig. 4, it will be noted that pin 22 projects through both branches 36 of the bifurcated lower end of link 23 and almost, but not quite, into contact with the inner side walls of the member 32. When the bolt 25 (or clamp 25a) is actuated to cause push rod 19 to move toward the left, pin 22 will slide along the lower edge

of plates 31 and 33, thus carrying channel member 32, to which plates 31 and 32 are fixedly attached, in a vertical direction, the movement of this member being kept in a vertical direction because of its co-action with guide plates 34 and 35 at each end thereof.

Member 32 is provided in proximity to each end thereof with a downwardly projecting boss 37 which is appropriately bored to receive a pivot pin 38. As shown in Figs. 3, 4 and 5, this pivot pin is pinned through the upstanding sides of a member 39 which may take the form of a channel member constructed of iron or steel, to the outer or bottom flat side of which is bolted a single or duplex locking bar 40 constructed of wood, pressed fiber or other suitable material which, in contact with the beam flanges, will produce no injurious effect thereon. This locking bar has appropriate arcuate depressions for receiving the flange of a beam or for conformation with the surface of any other cylindrical object it is desired to lock into the rack structure. It will, of course, be evident that the radius of the depressions is so chosen that the arc will exactly conform to the curvature of the surface of the object it is desired to lock.

It should be noted from Fig. 1 that, while forming no part of my invention, the rack structure, shown for purposes of illustration, may be given additional stiffness and strength by provision of angle members 41, 42, 43 and 44 affixed to the various lower side and end members and to corner posts 2 as shown. Corresponding angle members 45 and 46 may be applied to the upper sides of the sections of the device, as shown in Fig. 1, for the same purpose, as desired. An additional strengthening means at one end of the rack structure may be provided in the diagonally positioned brace member 47. The other end of the rack is left open from any obstruction in order to permit loading the loaded beams or other cylindrical objects directly into the rack endwise.

The operation of the locking mechanism of my invention when handling warp beams of yarn, either of the tricot or other types, will now be described. Referring to Fig. 2, the construction therein illustrated clearly shows that the side members 7 and 8 together constitute a track upon which the beams may be rolled into the rack endwise from right to left and disposed in the rack as shown in Fig. 1. It will be noted that this is an unobstructed straight track with no depressions or obstacles to the free movement of the beams, except that at the left-hand end of the track there may be provided a single stop or chock 48, if desired.

Assume that four loaded beams have been rolled into the rack (and the same number loaded onto the corresponding upper portion of the rack), and that push rod 19 and link 23 has, in preparation for loading, previously been swung far to the left as shown in Fig. 8, thus carrying channel member 32 and its accompanying linkages and locking bars 39 and 40 to the topmost vertical position and out of the line of movement of the beams being loaded onto the rack. Once the beams are approximately in place, bolt 25 (or clamp 25a) is actuated in the opposite direction, thus drawing push rod 19 to the right and pulling inner channel member 32 downward in a vertical direction, thereby also carrying the locking bars 40 down into contact with the flanges of the beams or with the cylindrical surface of any other type of cylindrical object it

may be desired to handle. As the locking bars descend, they will automatically cause the beams to line up in their proper spaced relation in the rack, it, of course, being understood that the arcuate depressions in the locking bars are so formed that the spacing of the centers of the beams will be such as to provide an appropriate space between the beams when placed in the rack.

It will, of course, also be understood that the same type of locking mechanism which is described in Fig. 1 for the left-hand side of the rack as shown in Fig. 2 will be duplicated at the right-hand side of the rack, also as shown in Fig. 2. Likewise, the complete locking mechanism of the lower section will be duplicated in the upper section. When all of the beams are in place each one of the push rods will be appropriately actuated simply by turning the hexagonal heads of the bolts 25 in the desired direction (or pulling down the clamp 25a to the position shown in Fig. 9).

It will thus be seen that in my invention I have provided an extremely simple, mechanically rugged locking mechanism which may be easily operated simply by turning a few bolts or by snapping down a few clamps. By employing a rack of the type illustrated in Figs. 1 and 2 it is unnecessary, as in many instances in the prior art, to provide any type of arcuate or other shape depressions in the lower track members or to provide a plurality of heavy chocking members or to employ straps, cables, chains or other cumbersome elements which often are loosened in transit. All that is necessary in the operation of my invention, in comparison with the elaborate precautions required to load and secure beams and similar objects in prior art structures, is simply to roll the loaded beams of yarn onto the rack, turn the heads of the actuating screws and the beams are automatically and immovably locked in their proper spaced relation. One of the outstanding advantages of my improved beam locking mechanism is that it locks the beams into the rack from the end rather than from the side of the rack. Hence it is possible to store these racks side by side without an aisleway, thus permitting the storage of a greater number of racks in a given space.

It should be particularly noted that, as pointed out above, no special spacing mechanism or operation is involved in properly positioning the beams of yarn in the rack herein described, since, once the proper arc is determined for the depressions of the locking bars 40 and these bars are constructed accordingly, the beams will automatically fall into place and will be spaced apart from one another a predetermined distance, this distance being determined by the spacing of the centers a sufficient distance apart to provide the desired space between the flanges and the outer circumferences or surfaces of the beams. Thus when the loaded beams are locked in the rack in the manner described above, there can be no possibility of the beams becoming loosened in storage or in transit, nor any possibility of one beam interfering with another and damaging either the beam flanges or the yarn wound thereon. In addition, it will be observed that the retaining pressure is evenly distributed on one or all of the beams in the rack.

It will thus be seen that I have provided an unusually simple, effective and economical means for locking heavy beams of yarn or other cylin-

drical objects in a storage or transporting rack. I claim:

1. In a rack for handling, storing and transporting heavy substantially cylindrical objects, the combination comprising a plurality of substantially rectangular spaced frames secured to upright corner posts, support members on said frames extending lengthwise of said rack in spaced parallel relation for supporting said cylindrical objects at the extremities thereof, and a plurality of screw-actuated means pivotally mounted on said frames for engaging the extremities of said cylindrical objects for locking said objects in spaced relation on said support members, each of said locking means comprising, in combination, an upper channel guide member constituting a side of a frame, a lower channel member slidable in a vertical direction within the upper guide member, locking means pivotally attached to said lower channel member and means for causing vertical movement of said lower channel member and locking means.

2. In a rack for handling, storing and transporting heavy substantially cylindrical objects, the combination comprising a plurality of substantially rectangular spaced frames secured to upright corner posts, support members on said frames extending lengthwise of said rack in spaced parallel relation for supporting said cylindrical objects at the extremities thereof, and a plurality of screw-actuated means pivotally mounted on said frames for engaging the extremities of said cylindrical objects for locking said objects in spaced relation on said support members, each of said locking means comprising, in combination, an upper channel guide member constituting a side of a frame, a lower channel member slidable in a vertical direction within the upper guide member, locking means pivotally attached to said lower channel member and means for causing vertical movement of said lower channel member and locking means including a push rod pivotally linked at one end to said upper channel guide member and at the other end connected to an end portion of said frame.

3. In a rack for handling, storing and transporting heavy substantially cylindrical objects, the combination comprising a plurality of substantially rectangular spaced frames secured to upright corner posts, support members on said frames extending lengthwise of said rack in spaced parallel relation for supporting said cylindrical objects at the extremities thereof, and a plurality of screw-actuated means pivotally mounted on said frames for engaging the extremities of said cylindrical objects for locking said objects in spaced relation on said support members, each of said locking means comprising, in combination, an upper channel guide member constituting a side of a frame, a lower channel member slidable in a vertical direction within the upper guide member and within vertically disposed guide members fixedly attached to the inner surfaces of said upper channel guide member, locking means pivotally attached to said lower channel member and means for causing vertical movement of said lower channel member and locking means.

4. In a rack for handling, storing and transporting heavy substantially cylindrical objects, the combination comprising a plurality of substantially rectangular spaced frames secured to upright corner posts, support members on said frames extending lengthwise of said rack in spaced parallel relation for supporting said cylin-

drical objects at the extremities thereof, and a plurality of screw-actuated means pivotally mounted on said frames for engaging the extremities of said cylindrical objects for locking said objects in spaced relation on said support members, each of said locking means comprising, in combination, an upper channel guide member constituting a side of a frame, a lower channel member slidable in a vertical direction within the upper guide member and within vertically disposed guide members fixedly attached to the inner surfaces of said upper channel guide member, locking means pivotally attached to said lower channel member, means for causing vertical movement of said lower channel member and locking means including a push rod movably connected at one end to a link by means of a pin, said link being pivotally connected to said upper channel guide member and said pin being of length to project through said push rod and link and to engage inner projections on said lower channel member whereby the lower channel member is raised upon arcuate movement of said link about its pivot point.

5. In a rack for handling, storing and transporting heavy substantially cylindrical objects, the combination comprising a plurality of substantially rectangular spaced frames secured to upright corner posts, support members on said frames extending lengthwise of said rack in spaced parallel relation for supporting said cylindrical objects at the extremities thereof, and a plurality of screw-actuated means pivotally mounted on said frames for engaging the extremities of said cylindrical objects for locking said objects in spaced relation on said support members, each of said locking means comprising, in combination, an upper channel guide member

constituting a side of a frame, a lower channel member slidable in a vertical direction within the upper guide member and within vertically disposed guide members fixedly attached to the inner surfaces of said upper channel guide members, locking means pivotally attached to said lower channel member, means for causing vertical movement of said lower channel member and locking means including a push rod movably connected at one end to a link by means of a pin, said link being pivotally connected to said upper channel guide member, said pin being of a length to project through said push rod and link and to engage inner projections on said lower channel member whereby the lower channel member is raised upon arcuate movement of said link about its pivot point, said push rod having a center bore threaded opposite its point of connection to the link member and connected to a frame member through the agency of a bolt passing there-through and threaded into the push rod bore.

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