

[54] **COMBINATION LIFTING AND BRACING RODS FOR ROLLS**

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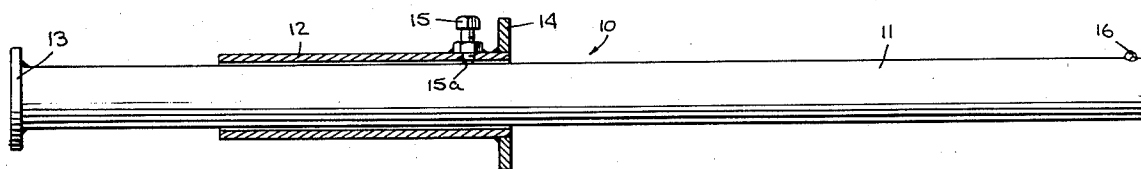
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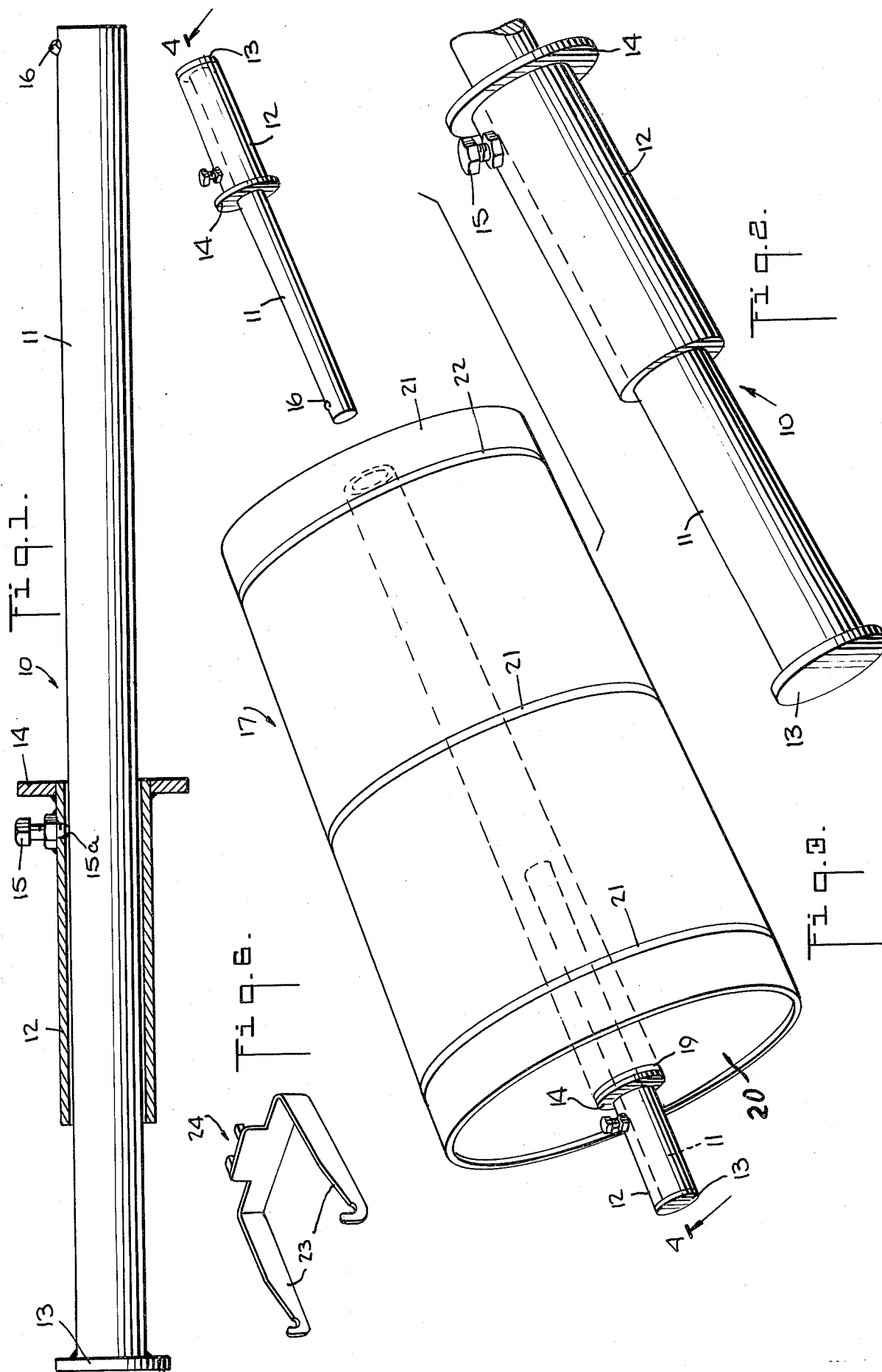
[57] **ABSTRACT**

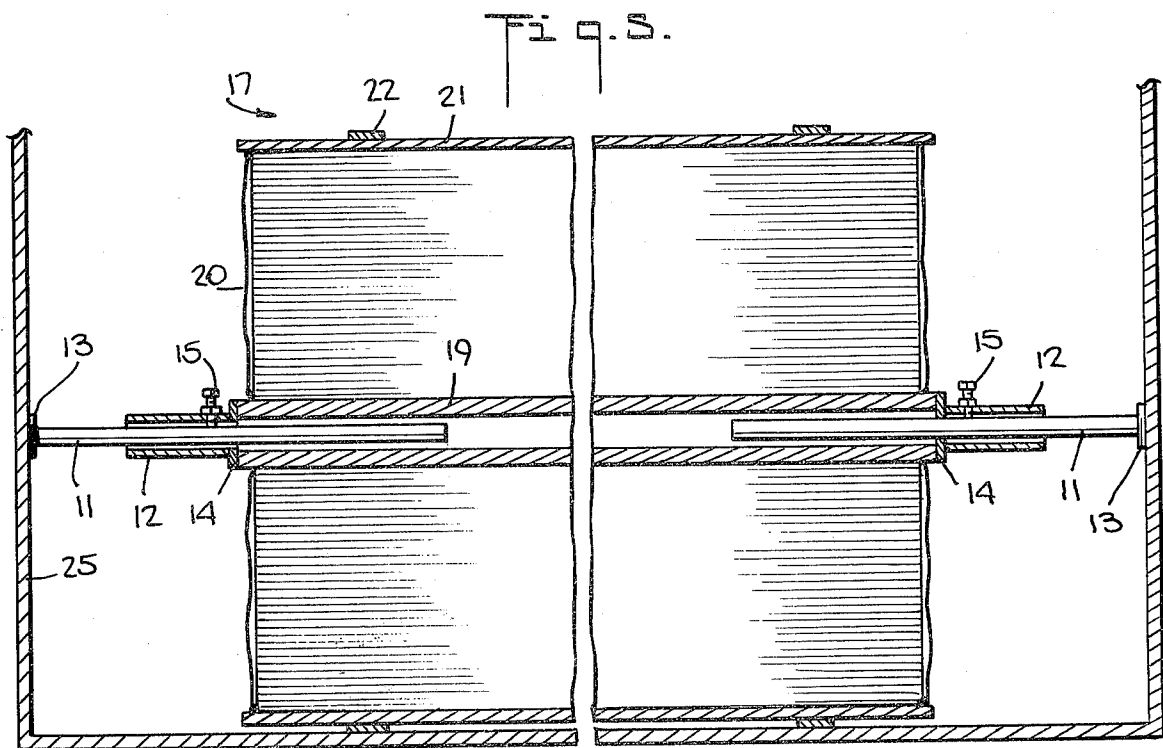
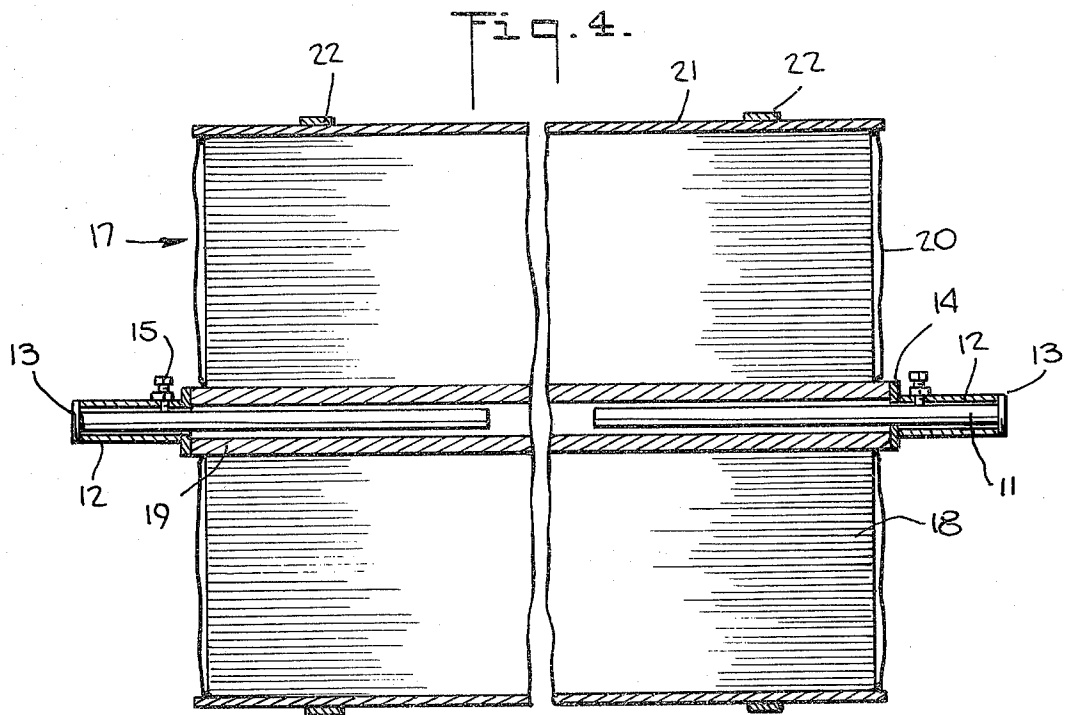
A combination lifting/bracing rod structure, for use

with heavy rolls of easily damaged material wound on tubular cores, is disclosed. Each such rod structure includes an elongated rigid bar or rod having a peripheral flange at one end, and a cylindrical sleeve slidably mounted on the rod, the sleeve having a peripheral outwardly directed flange at that end thereof facing away from the flanged end of the rod. The sleeve carries a set screw to enable it to be locked to the rod in any selected adjusted position. In use, the unflanged end of the rod of a respective rod/sleeve combination is inserted into each end of the roll core and the flanged ends of the sleeves are brought into abutting relation against the respective core ends, the rods being pushed all the way in until their flanges abut against the unflanged ends of the sleeves when the roll is to be lifted and being extracted until the flanged rod ends abut against the walls of a shipping vehicle when the roll is to be braced therein against axial displacement. This abstract is not to be taken either as a complete exposition or as a limitation of the present invention, however, the full nature and extent of the invention being discernible only by reference to and from the entire disclosure.

**10 Claims, 6 Drawing Figures**







## COMBINATION LIFTING AND BRACING RODS FOR ROLLS

This invention relates to combination lifting and bracing rods to be used in connection with the transfer, from one location to another, of heavy rolls of easily damaged material wound on tubular cores.

Although the invention is deemed to be of general applicability to the handling and transferring of rolls of various types of materials, it will in the first instance be described herein as applied to the handling and transferring of rolls of tire cord fabric.

Tire cord fabric is usually produced in the plant of the fabric manufacturer in the form of large rolls wound onto flangeless tubular cores. Each such roll, which, especially after the fabric has been dipped and hot-stretched, will normally weigh from about 1,700 to 2,000 pounds, is sealed in a polyethylene liner to protect it from moisture, ozone and other pollutants. For added protection, there is also wrapped about the liner a 0.080 inch thick Mead paper board covering which is fastened to the roll by heavy metal or nylon strapping. Until the fabric is to be used, of course, for example by a tire manufacturer, the packaging must be kept intact, to protect the fabric against damage both to its quality and to its physical properties.

The handling of rolls of tire cord fabric in the plants of both the fabric manufacturer and the tire manufacturer, as well as in transit therebetween, frequently results in damage to the rolls. In the plant of the fabric manufacturer, for example, it is a standard practice to transport the rolls by fork lift truck from the packaging station to a warehouse preparatory to shipment, with the forks of the truck engaging each of the rolls from beneath. In the warehouse, the rolls are normally stacked in tiers two or three rolls high. A transfer of the rolls from the warehouse to a shipping vehicle, for example a truck or a railway freight car, is again effected by a fork lift truck, with the forks being pushed under each roll to be moved. In this operation, if the rolls are in a multi-tier stack, it is usually the end roll of the bottom tier which is taken first, as a result of which any roll immediately above that one drops rather violently to the floor. Upon arrival at the plant of the tire manufacturer, the transfer operations by fork lift truck are again repeated, first in moving the rolls from the plural tier stack thereof in the shipping vehicle to the warehouse or storage location, and later in moving the rolls from the storage location to the calendaring station. When the rolls of fabric reach that station, of course, the protective packaging materials are removed.

The aforesaid method of handling tire cord fabric rolls has certain disadvantages, however. The forks of the lift trucks frequently gouge or tear holes in the protective wrapping, and sometimes even penetrate and cut through a number of the outermost layers of the fabric roll to a depth of as much as 4 or 5 inches into the roll. This renders substantial amounts of the fabric unfit for use in tire manufacture. Moreover, even if the forks of the lift truck do not penetrate into the fabric but merely break the polyethylene liner, at least the outer layers of the fabric are exposed to pollutants in the air and are rendered unfit for use in tire manufacture. Still further, if such a roll happens to fall off the forks of a lift truck, or when it drops as previously described during a destacking operation, the resultant impact may cause the protective covering of the roll and

occasionally also the outermost layers of the fabric to be split, with the attendant disadvantageous consequences mentioned above. Any damaged section of the cord fabric must, of course, be discarded before the remainder of the fabric in the roll can be used, and the so incurred scrap losses adversely effect the economics of tire production.

The risk of damage to rolls of tire cord fabric during shipping has also been sufficiently well known to require special attention. Tire cord fabric as produced is between about 56 and 60 inches wide and is wound on tubular cores ranging from about 63 inches in length for a roll of textile fiber cord fabric to about 66 inches in length for a roll of metal wire cord fabric. Since the rolls are loaded into a shipping vehicle in transverse relation thereto, it is necessary to prevent any axial movements of the rolls relative to one another and to the vehicle, to prevent one roll from tearing the protective wrapping of another roll, and to avoid the risk of unbalancing of the vehicle while it is in motion. To this end it has heretofore been conventional to insert a pair of disposable wooden brace sticks into the opposite ends of each tubular core. The lengths of these brace sticks are such as to leave, upon loading of the respective roll into the vehicle, a small clearance of of about 1 inch between each stick and the proximate wall of the vehicle, and a heavy nail is driven into each brace stick just outside the proximate end of the core to prevent any further entry of the stick into the core. Such brace sticks are, of course, inserted into each roll core before the same is loaded into the vehicle. Thus, the rolls are not completely braced. Moreover, the brace sticks are usually sawed off at the end of the trip to facilitate unloading of the vehicle, since they are not sufficiently strong to serve as lifting adjuncts for the rolls. This has created yet another source of waste adversely affecting the economics of tire manufacture.

It is an important object of the present invention, therefore, to provide means enabling the aforesaid drawbacks and disadvantages of the known methods of handling rolls of tire cord fabric to be efficaciously avoided.

More particularly, it is an object of the present invention to provide a novel and improved rod structure which can be used not only as an adjustable and reusable brace stick but also as an adjunct of a tire cord fabric roll to facilitate the lifting thereof by fork lift trucks without any need for the forks of the same to contact the protective outer wrapping of the roll.

Generally speaking, the combination lifting and bracing rod structure according to the present invention, by means of which the aforesaid objectives are attained, includes an elongated rigid, preferably metal, bar or rod having a peripheral flange at one end, and a concentric sleeve slidably mounted on the rod, the sleeve having a peripheral outwardly directed flange at that end thereof facing away from the rod flange. The diameter of the rod is somewhat less than the inner roll core diameter so that the unflanged end of the rod can be easily inserted into the core, and the outer diameter of the sleeve flange is somewhat greater than the inner roll diameter so that the sleeve can be abutted against the core. The sleeve carries a set screw the tip of which protrudes through a hole in the sleeve so as to be engageable with the surface of the rod to enable the sleeve to be locked to the rod in any desired adjusted position. Preferably, the rod is also provided with a radial protuberance, for example a spot weld, at its un-

flanged end, the height of which is sufficient to prevent the sleeve from falling off the rod when the latter is not inserted into a roll core, but is insufficient to interfere with the insertion of the rod into the roll core.

In use, when a roll of tire cord fabric is to be handled, two rod/sleeve combinations according to the present invention, each combination preferably having the unflanged end of its sleeve abutting against the rod flange, are inserted into the opposite ends of the roll core until the flanged ends of the sleeves abut against the respective ends of the roll core. The portions of the rod/sleeve combinations located externally of the roll core ends can then be engaged by a bifurcated adjunct of or attachment to a fork lift truck to permit the roll to be lifted without the forks engaging the roll covering or the fabric. When such a roll has been deposited in a shipping vehicle, the rods are moved axially outwardly (after loosening of the screws, if necessary) until the flanged rod ends engage the proximate vehicle walls. Concurrently, the sleeves are kept in abutting relation to the roll core. The set screws are then tightened to lock the sleeves in position against the rods. In this state, therefore, the rod/sleeve combinations serve to brace the roll fully against axial movement in the vehicle. Preparatory to unloading, of course, the rod/sleeve combinations are simply returned to their starting states by loosening the set screws and pushing the rods axially inwardly. The rod/sleeve combinations then again are able to serve the lifting function previously referred to. When no longer needed for the handling of that roll, the rod/sleeve combinations are simply removed from the roll core and can be used and reused in handling other rolls.

The foregoing and other objects, characteristics and advantages of the present invention will be more clearly understood from the following detailed description thereof when read in conjunction with the accompanying drawings, in which:

FIG. 1 is a side view, partly in elevation and partly in section, of a combination lifting/bracing rod according to the present invention;

FIG. 2 is an enlarged fragmentary perspective view of the lifting/bracing rod shown in FIG. 1;

FIG. 3 is an exploded perspective view of a roll of tire cord fabric equipped with a pair of combination lifting/bracing rods according to the present invention;

FIG. 4 is a fragmentary sectional view taken along the line 4—4 in FIG. 3 and shows the lifting/bracing rods in the lifting attitude thereof;

FIG. 5 is a sectional view similar to FIG. 4 but shows the roll in a vehicle and the lifting/bracing rods in the bracing attitude thereof; and

FIG. 6 is a perspective view of a bifurcated hook-ended lifting attachment for a conventional lift truck by means of which the latter can be rendered capable of lifting and carrying a tire cord fabric roll equipped with lifting/bracing rods according to the present invention.

Referring now to the drawings in greater detail, the combination lifting/bracing rod structure 10 (FIGS. 1 and 2) according to the currently best embodiment of the present invention includes an elongated rigid metal bar or rod 11 and a cylindrical metal sleeve 12 (for example a length of pipe) slidably mounted on the rod. When intended to be used in the handling of rolls of tire cord fabric wound on 63—66 inch long core tubes, the rod 11 is preferably about 30 inches long and the sleeve 12 about 6 inches long. A metal disc 13 is welded to the rod at one end thereof, the disc being of

somewhat greater diameter than the rod to define a peripheral flange about the latter. An annular metal disc or washer 14 is welded concentrically to the end of the sleeve 12 facing away from the flanged rod end and defines an outwardly directed peripheral flange on the sleeve. The diameter of the disc 13 exceeds that of the rod 11, preferably by an amount approximately equal to the wall thickness of the sleeve 12, and the outer diameter of the annular disc 14 is somewhat greater than the inner diameter of the roll core tube with which the rod/sleeve combination is to be used. A set screw 15 is carried by the sleeve 12 with its tip 15a extending through an opening in the sleeve, so that by tightening the screw against the rod 11, the rod and sleeve can be locked to one another in any selected relative adjusted positions. At its unflanged end, the rod 11 is further provided with a small radial protuberance 16, for example a spot weld, to prevent separation of the sleeve from the rod when the set screw 15 has been loosened to permit relative movement between the rod and the sleeve.

The manner of use of the lifting/bracing rod structure 10 of the present invention in the handling of a roll 17 of tire cord fabric 18 wound on a tubular roll core 19 and wrapped in a polyethylene liner 20 and a paper board outer cover 21 fastened by metal straps 22, is illustrated in FIGS. 3, 4 and 5.

When such a roll is to be lifted, say preparatory to being transferred by a lift truck from one location to another, the unflanged end regions of the rods 11 of two rod/sleeve combinations 10 are inserted into the respective opposite ends of the roll core tube 19 (FIGS. 3 and 4) until the flanges 14 of the sleeves 12 abut against the ends of the roll core. Although it is not absolutely essential, it is preferred that in the lifting attitude of the lifting/bracing rod structures 10, the sleeves be locked to the rods with the unflanged ends of the sleeves 12 in abutting relation to the respective flanges 13 of the rods 11, so as to maximize the stability of the system. The sleeve-covered portions of the structures 10 can then be engaged from below by a pair of hook arms or cradles 23 (FIG. 6) of a suitable adaptor 24 or similar adjunct of a conventional fork lift truck without any need for the regular forks of the latter to engage any part of the roll or the outer protective covering thereof. It will be apparent that this advantage will exist even, and especially, when the roll 17 is a part of a multi-tier stack of such rolls.

When the roll 17 is loaded into a shipping vehicle 25 (FIG. 5), say a truck or railway freight car, in which it must be braced against axial movement, i.e. transversely to the vehicle, while the same is in motion, after the roll has been deposited in its position by the fork lift truck, the screws 15 are loosened. The rods 11 are then drawn outwardly of the roll until the discs 13 abut against the walls or bulkheads of the vehicle while the sleeves 12 are retained with their flanged ends abutting against the ends of the roll core 19. The screws are then retightened to lock the rod/sleeve combinations in their bracing attitude. Upon arrival of the vehicle at the receiving location for the rolls, the rod/sleeve combinations are returned to their lifting attitudes as previously explained and the rolls can be readily unloaded without the rods having to be destroyed as has heretofore been necessary in the case of wooden brace sticks.

It will be understood that the foregoing description of a preferred embodiment of the present invention is for purposes of illustration only, and that the various struc-

tural and operational features herein disclosed are susceptible to a number of modifications and changes none of which entails any departure from the spirit and scope of the present invention as defined in the hereto appended claims. Thus, the rolled up material, the protection of which during handling is subserved by the present invention, need not be tire cord fabric but may be any other type of woven, knit or non-woven fabric, any type of sheet material other than fabrics, yarns and other filamentary strands, etc. The flange on the rod may be defined by an annular disc, ring or washer welded thereto or even by an upset portion of the rod and may even further be of less than full circumferential extend, say analogous to the protuberance formed on the other end of the rod, and other types of interlocking means than a set screw may be used to lock the rod and sleeve to one another in their adjusted relative positions. Other variants of these and other aspects of the invention will readily suggest themselves to those skilled in the art.

What is claimed is:

1. A combination lifting and bracing rod structure for a roll of sheet or strand material wound on a tubular core, comprising an elongated rod adapted to be inserted longitudinally into the roll core, a sleeve slidably mounted on said rod, said rod having transversely protruding means at one end to define an abutment or stop for said sleeve, said transversely protruding means being of sufficient height to prevent installation of said sleeve on said rod at said one end in the presence of said abutment, said sleeve having transversely outwardly protruding means at that one of its ends facing the other end of said rod to define an abutment or stop engageable with the proximate end of a roll core, and means for locking said sleeve and said rod to one another in any selected adjusted relative position thereof.

2. A structure as claimed in claim 1, wherein said locking means comprises a set screw carried by said sleeve, the latter being provided with a hole to enable the tip of said set screw to be tightened against said rod.

3. A structure as claimed in claim 1, wherein said transversely protruding means on said sleeve is an annular peripheral flange.

4. A combination lifting and bracing rod structure for a roll of sheet or strand material wound on a tubular core, comprising an elongated rod adapted to be inserted longitudinally into the roll core, a sleeve slidably mounted on said rod, said rod having transversely protruding means at one end to define an abutment or stop for said sleeve, said transversely protruding means on said rod being an annular peripheral flange, said sleeve having transversely outwardly protruding means at that one of its ends facing the other end of said rod to define an abutment or stop engageable with the proximate end of a roll core, and means for locking said sleeve and said rod to one another in any selected adjusted relative position thereof.

5. A combination lifting and bracing rod structure for a roll of sheet or strand material wound on a tubular core, comprising an elongated rod adapted to be inserted longitudinally into the roll core, a sleeve slidably mounted on said rod, said rod having transversely protruding means at one end to define an abutment or stop for said sleeve, said sleeve having transversely outwardly protruding means at that one of its ends facing the other end of said rod to define an abutment or stop engageable with the proximate end of a roll core, and means for locking said sleeve and said rod to one an-

other in any selected adjusted relative position thereof, and wherein said rod is further provided at said other end thereof with a second transversely protruding means of sufficient height to serve as a stop for said sleeve and prevent the separation of said rod and sleeve from one another but not high enough to impede insertion of said rod into said roll core.

6. A combination lifting and bracing structure for a roll of sheet or strand material wound on a hollow core comprising an elongated body member longitudinally insertable in the hollow core, said elongated body member including a first peripheral surface and a first transverse protrusion projecting away from the first peripheral surface, a sleeve member slidably mounted on said elongated body member, said sleeve member having a second peripheral surface and a second transverse protrusion projecting away from the second peripheral surface for movement toward and away from said first transverse protrusion when said sleeve member is slidably moved on said elongated body member, one of said transverse protrusions being engageable with an end of said hollow core when said elongated body member is inserted in said hollow core, means for locking said sleeve member and said elongated body member together such that said sleeve member is held in fixed position on said elongated body member to provide a predetermined spacing between said first and second transverse protrusions, an appendage to said hollow core being defined by the first and second transverse protrusions when the elongated body member is inserted into said hollow core such that said one transverse protrusion is engaged with said end of said hollow core and the other said transverse protrusion is disposed a predetermined distance from said end of the hollow core corresponding to said predetermined spacing.

7. A structure as claimed in claim 6 wherein said second transverse protrusion is engageable with said end of said hollow core when said elongated body member is inserted in said hollow core.

8. In combination with a roll of sheet or strand material wound on a hollow core having opposite ends, a pair of elongated body members each having an insertable end portion for longitudinal insertion in a respective end of said hollow core, each said elongated body member including a first peripheral surface and a first transverse protrusion projecting away from the first peripheral surface, a sleeve member slidably mounted on each said elongated body member to form a pair of body member-sleeve member sets, each said sleeve member having a second peripheral surface and a second transverse protrusion projecting away from the second peripheral surface for movement toward and away from the first transverse protrusion of each said elongated body member when each said sleeve member is slidably moved on each said elongated body member, one of the transverse protrusions of each said set being engageable with a respective said end of said hollow core when the elongated body member of each said set is inserted in said hollow core, means in each said set for locking the sleeve and body member of each said set together such that each said sleeve member is held in fixed position on each said elongated body member to provide a predetermined spacing between the first and second transverse protrusions of each said set, an appendage to each respective said end of said hollow core being defined by the first and second transverse protrusions of each said set when each said elongated

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body member is inserted into said hollow core such that said one transverse protrusion of each said set is engaged with a respective said end of said hollow core and the other said transverse protrusion of each said set is disposed a predetermined distance from the respective said end of the hollow core corresponding to the predetermined spacing.

9. The combination of claim 8 wherein said elongated body members are each of predetermined length to ensure provision of a second predetermined spacing

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between the insertable end portions when said one transverse protrusion of each said set is engaged with a respective said end of said hollow core.

10. The combination of claim 8 wherein said second transverse protrusions of each said set are engageable with said respective ends of said hollow core when said elongated body members are inserted in said hollow core.

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