March 30, 1965 H. J. STEEL 3,175,693

PIPE BUNDLING RACKS

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Fig. 1

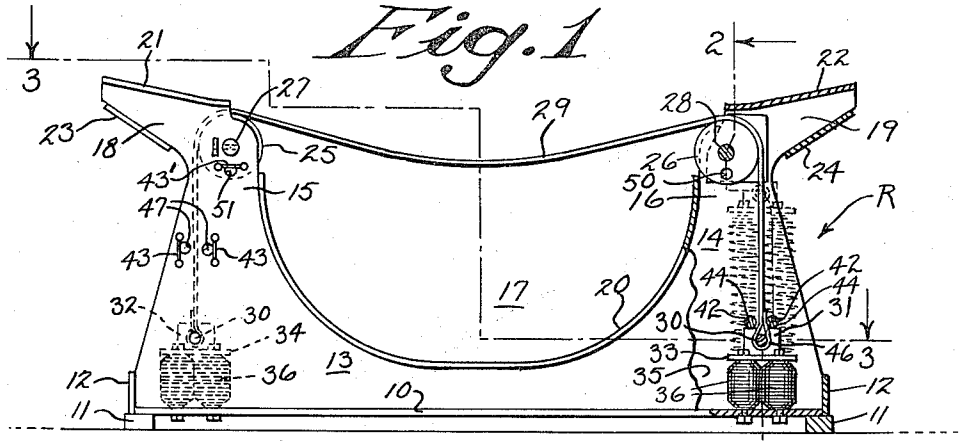


Fig. 2

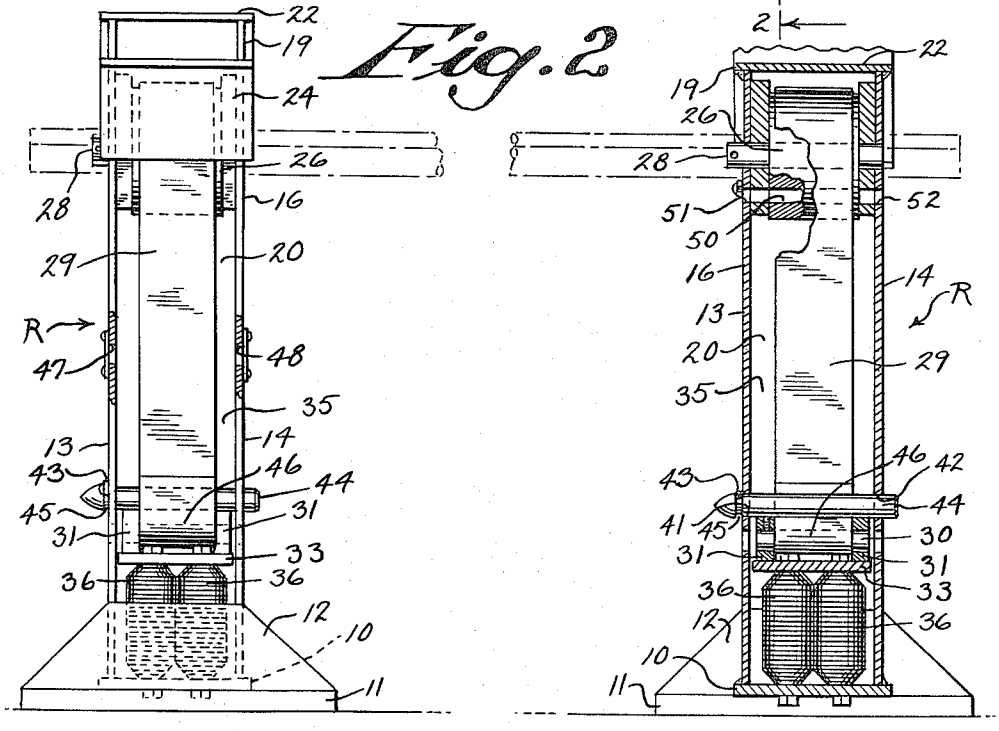
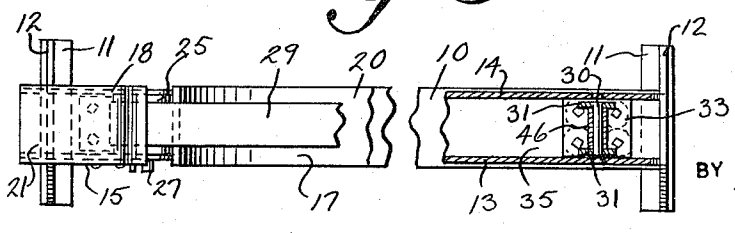


Fig. 3



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Fig. 4

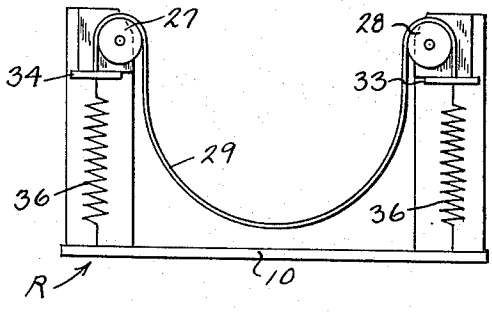


Fig. 5

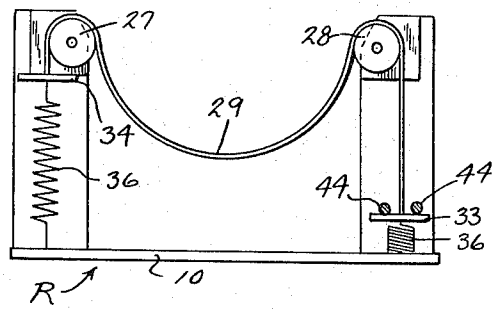


Fig. 6

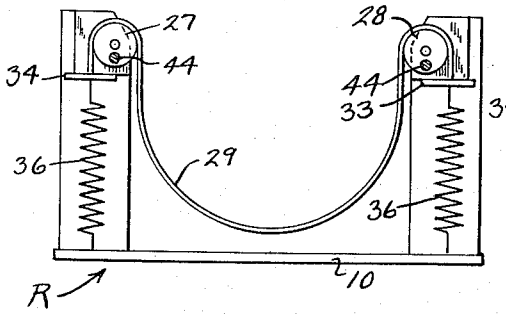


Fig. 7

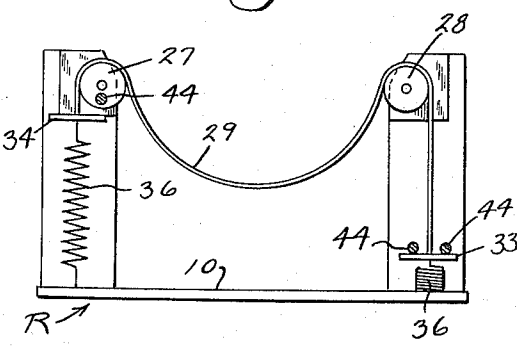
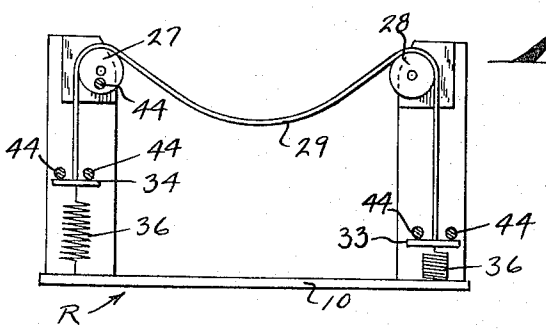


Fig. 8



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3,175,693

PIPE BUNDLING RACKS

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8 Claims. (Cl. 211—49)

This invention appertains to racks for receiving and facilitating the handling of bundles of pipes, and more particularly to new and useful improvements in load-levelling bundle racks wherein the load-carrying tensions can be adjusted to accommodate light or heavy walled pipes at a desired load level, while maintaining an even top level.

The various steps required in the production of pipes in a mill include the racking and movement of the pipes between the several operations that are performed upon them during the process of their manufacture.

It has been a common practice in the mill to deposit the pipes in racks after each operation and to transport the pipes in bundles by crane, from one operation to another during the course of their production. It has been a custom to establish a maximum bundle weight as a practical one for pipes which are transported from one operation to another and these bundles are formed in the racks by the application of a sling which is attached to a travelling crane. Usually, two slings are provided and they engage the respective end terminations of the bundles of pipe. A major problem is the waste resulting from damage to the individual pipes in the course of their dropping into open racks or bucks.

In my prior Patent No. 3,098,567 issued July 23, 1963, and entitled "Pipe Rack," I have shown and described load-levelling bundle racks which solve the above-mentioned problem in a very satisfactory manner. My prior racks had stop means to pre-select and limit the cross section area provided for a bundle of tubes, but the change in spring stiffness was limited to a range of 2 to 1 which was obtained by stopping all movement of one bank of springs.

It has been found desirable to extend the range of selection in effective spring stiffness, to more nearly match the range in wall thickness of the pipe expressed as a percentage of the O.D.

The primary object of my present invention therefore, is to provide a bundle rack which represents an improvement over the rack of my prior mentioned patent, by providing lockable roller supports for the flexible non-elastic strap such that a snubbing action may be introduced or eliminated selectively, and thereby extending the range in effective spring stiffness in a ratio roughly 2½ to 1.

Hence the overall change in effective spring tension obtainable selectively by stopping movement of a spring bank, and by snubbing the strap, becomes 5 to 1 in range.

Another object of my present invention resides in the provision of a new and improved pipe rack constructed in a manner to permit the load-levelling of the rack to remain at a substantially constant height at all times when the selected load weight has been adjusted.

A further object of my present invention resides in the use of a flexible non-elastic strap as a means for supporting the pipes and in the provision of yieldable means in the form of a plurality of calibrated tension springs disposed between the ends of the pipe supporting strap and the base of the rack to maintain the load level of the rack at a substantially constant height by permitting the deflection of the pipe supporting strap to accommodate the increased size of the bundle in response to the loading of additional pipes on the rack.

Still another object resides in the provision of selectively positionable stop means to limit the extent of deflection of the pipe supporting straps, whereby bundles of a

substantially constant weight may be assembled for separate runs of pipe having different wall thicknesses.

A further important object of my present invention is to have the flexible non-elastic strap and calibrated tension springs arranged as above mentioned and in providing rollers over which the flexible strap is trained instead of having fixed arcuate guides or supports.

A salient feature of my invention resides in providing means to lock the rollers against rotation when desired to increase greatly the number of tension adjustments that can be made and to vary the load weight within said adjustments and still maintain a substantially constant height level.

Still another object of my present invention resides in the provision of a pipe receiving rack that facilitates the ease of handling and bundling of the pipes.

A further object of my invention is to provide a simple, practical and reliable construction that is economical to manufacture, easy to assemble and positive in its operation.

With the above and other objects in view as will more readily appear as the nature of the invention is better understood, the same consists in the novel method of construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

One preferred and practical embodiment of my invention is shown in the accompanying drawings, in which,

FIGURE 1 is an end elevational view of the pipe rack constructed in accordance with the teachings of my present invention, parts of the figure being broken away and in section to illustrate structural details, and the rack being set to receive lengths of pipe of very heavy walled section;

FIGURE 2 is a side elevational view of a pair of my pipe racks with certain parts broken away and in section, the section of the right hand rack being represented by the line 2—2 of FIGURE 1 of the drawings, looking in the direction of the arrows;

FIGURE 3 is a horizontal sectional view through one of the end racks, the section being taken substantially on the line 3—3 of FIGURE 1 of the drawings, and looking in the direction of the arrows, and

FIGURES 4, 5, 6, 7 and 8 represent diagrammatic endviews illustrating the various adjustments of the pipe racks to vary the area of the same in accordance with different known load weights.

Referring now to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter R generally indicates one type of my improved rack and the apparatus of my present invention comprises a pair of such racks R disposed in a spaced, parallel relation. Each rack R is identically formed and comprises a weldment including a horizontally disposed base plate **10** supported above the floor surface by the transversely extending end feet **11**. Secured to the feet **11** and base plate **10** at the end terminations thereof are the respective side end walls **12**. Also fixedly mounted to the base plate **10** are a pair of spaced front and rear walls **13** and **14**, respectively. The front and rear walls **13** and **14** extend vertically upward substantially beyond the side end walls **12** and terminate preferably about table height. These front and rear walls are identically formed and arranged in spaced parallel relation to provide upright end portions **15** and **16** and a cut-out U-shaped central portion **17**. The walls **13** and **14** are also formed at their upper end terminations to provide outwardly extending guide members **18** and **19** respectively. These two walls together with the side walls form an open end casing for the working mechanism of the rack. To further strengthen and retain the walls **13** and **14** in spaced relation, I pro-

vide an arcuate shaped plate 20, top guide plates 21 and 22 and lower guide plates 23 and 24, all welded or otherwise secured together to provide a unitary structure.

At the inner open ends of the guide members 18 and 19 a pair of rollers 25 and 26 is secured as shown more particularly in FIGURES 1 and 2 of the drawings. The rollers are provided with axles 27 and 28 respectively which are journalled to the respective portions of the front and rear walls 13 and 14. It should be noted that the rollers are mounted for free rotation and over the rollers is trained the flexible non-elastic strap 29. The inner end terminations of the strap 29 are turned back upon themselves to form loops 46 adapted to receive the respective pins 30 carried by the ears 31 and 32 respectively of the plates 33 and 34. The plates 33 and 34 are adapted for vertical movement within the confined spaces 35 of the upright end portions 15 and 16 respectively.

A plurality of calibrated tension springs 36 are secured to each of the plates 33 and 34 in such a manner that their respective ends are anchored to the base plate 10 and the respective portions of the plates 33 and 34. The several tension springs serve to normally retain the strap 29 in a raised position, as shown.

From the description so far, it can be seen that the individual pipes may easily be moved from a suitable support, such as a table, or conveyor, and onto the strap 29 without having to drop the pipe to floor level or to the bottom of a rack. At this point attention should be directed to the outwardly extending guide members 21 and 22 which are of particular use where the pipes are moved laterally from a conveyor and rolled onto the rack. The guides enable the racks to be placed in close proximity to the conveyor so that as a pipe leaves the conveyor it immediately engages one of the guides 21 or 22. While I have shown guide members 21 and 22 identically formed on the respective portions of the upright members 15 and 16, it should be noted that one of the guides could be eliminated and the upright portion thereof be extended upwardly as indicated by the dotted lines FIG. 1, and indicated by the numeral 40. Thus, when the pipes initially are moved or rolled laterally from a conveyor and tend to roll to the far end of the rack, they then strike the padded abutment 40 and are retained therein. As is obvious, the more pipes that are added to the racks the more tension is put on the springs 36 and the strap 29 will gradually sag until the springs are extended to their ultimate length. In this position it should be noted that the strap 29 will rest just above the arcuate shaped plate 20. This position would represent the maximum area for thin walled pipes of the maximum selected weight load. Should, however, the same weight load be desired but the run of pipes is of a thicker wall variety, thus adding measurably to the per foot weight of the pipes, it is obvious that the area taken up by the heavier pipes for the same load weight would be much less. Thus, adjustments must be provided so that when the load weight has been reached, the strap will no longer move downwardly and the same approximate bundle height will be had.

In this form of the invention I provide means for varying the tension of the strap 29 and also limiting its movement.

In my present invention I can provide different set weight loads and maintain and adjust the area within the selected weight load so that pipes of different wall thicknesses can be bundled and still maintain the same height in relation to the top of the rack, even though the bundles themselves require lesser or greater height.

To give this adjustment I provide a series of spaced parallel apertures 41 in the lower portion of the upright section 16 of the front wall 13 and a pair of aligned apertures 42 in the rear wall 14. Across the pair of apertures 41 I secure a locking wire 43 and I provide

a pair of pins 44 which are adapted to extend through the apertures 41 and 42, and the inner end of each pin is formed with a groove 45 into which the wire 43 will snap, to hold the pins 44 in position. Thus, it can be seen that plate 33 with the pins 44 in place cannot move upwardly and the paritcular end termination 46 of the strap is held against movement. I also provide pairs of aligned apertures 47 and 48 on the upright end portion 15 of the device and these apertures are aligned in position approximately midway of the base 10 and upper guide 21 so that at all times the springs 36 secured to plate 34 may move upwardly at least as far as the apertures 47, since the apertures 47 and 48 may also be provided with pins 44 which extend across the space 35 to limit the upward movement of the plate 34. Now it is important to note that while each roller 25 and 26 is moutned for free rotation on its respective axles 27 and 28, I do provide a transverse opening 50 through each roller which may be aligned with corresponding apertures 51 and 52 respectively formed in the front and rear walls 13 and 14. These apertures are also provided with the resilient wire locks 43' which are similar to the wire locks 43 described in connection with the apertures 42 and thus it can be seen that if a pin 44 is inserted through apertures 51 and 52 and opening 50, the respective roller can be held against rotation and thus becomes an arcuate friction surface engaging the intermediate portion of the strap 29.

To illustrate diagrammatically the various adjustments and the results of such adjustments, attention is directed to the diagrammatic showings of FIGURES 4 to 8, inclusive.

In FIGURE 4 for example, both springs, i.e., both plates 33 and 34 are free to move to their upper limits and both rollers 27 and 28 are free to rotate. For purposes of description and illustration, I will state that the maximum area enclosed by the belt is 800 square inches, and the load required to pull the belt to this maximum area with everything free as described in FIGURE 4 will then be 500 lbs. If we now insert pins 44 over plate 33 when the same is in its retracted position, as shown in FIGURE 5 of the drawings, and leave plate 34 free for movement as well as rollers 27 and 28, we will reduce the area to 400 square inches but still accommodate a load of 500 lbs. Thus, if we start with a lighter tube of a standard O.D., we know that by reducing the area but maintaining the same load weight we can accommodate pipes of the same O.D. but having wall thicknesses almost twice that of the lighter pipes.

If I desire to increase the load capacity for the maximum 800 square inches, I can do so by inserting the pins 44 through the apertures provided in both of the rollers 27 and 28 so that they become friction members rather than free rotating members and thus both plates 33 and 34 are free to extend to their upper limits and give the 800 square inch area, the weight load required to reach this area will be 1250 lbs. Thus, it can be seen that in FIGURE 6 I can accommodate a greater weight of pipe than that shown in FIGURE 4 for the same 800 square inch area.

To provide for the same weight load of 1250 lbs., but wherein the area needed to accomplish this weight load is only 400 square inches, adjustments would be made in FIGURE 7 of the drawings, and here again the movable plate 33 would be pinned by the pins 44 at its lower limit, roller 28 would be freed, roller 27 fixed and the adjustment accomplished. In FIGURE 8 I have shown where the load can be adjusted to 625 lbs. and an area of only 200 square inches provided. In this instance, both plates 33 and 34 would be limited in their movement, plate 33 would be fixed to its lowest extremity and plate 34 would be allowed to move. Roller 27 would be fixed by the pin 44 and roller 28 would be free and thus pipes weighing 625 lbs. but needing only 200 square inches of

area could be accommodated and bundled and handled during their production.

Careful attention should be given to the fact that one of the prime features of the utilization of my rack R is to use the same in pairs and, obviously, each pair would be adjusted exactly the same to accomplish the above mentioned areas and load weights. Also it is important that as the pipes are being loaded, the uppermost pipe will always be on a level approximately even with the top portions of the rollers **27** and **28**, and thus the pipes do not have to drop for any appreciable distance, and when the desired weight is reached the bundle will be even with the rollers and can therefore be quickly and easily removed from the rack.

Again by referring to the diagrammatic illustrations of FIGURES 4 to 8, respectively, it will be obvious that with all pins **44** removed the load supporting power of the springs is the weakest. If, on the other hand, I lock both rollers, the load supported on the strap will be 2½ times as heavy (compare FIGS. 4 and 6). If I now lock the right hand plate with its attaching springs, then only the left hand plate will move and the left hand end of the strap will rise to the top of the uprights, as shown in FIGS. 5 and 7. Hence, the maximum sag, of the strap supporting the tubes, will be only half as great as before and the bundle will be half as great in cross-section area, but the corresponding bundle weight will remain at 2½ times the original. The effect on the wall of the tubes is to increase the same so that the weight per foot for each tube increases by the product 2½ multiplied by 2, which equals 5. In other words, if I start with a light bundle of tubes, each tube being 3" O.D. and weighing 3 lbs. per foot of length, then I could selectively change to a heavy bundle of tubes, in which each tube is 3" O.D. and weighs 15 lbs. per foot of length. I could make the change by inserting the pins as described above, and the action of the strap would be to support either the light bundle or heavy bundle in a similar fashion so that as the tubes accumulate to form a bundle, the top layer will remain substantially level with the top of the rollers.

While I have shown and described certain specific embodiments of my invention, it will be understood that these embodiments are merely for the purpose of illustration and description, that various other forms may be devised, and that changes may be made in the proportion and minor details of construction within the scope of my invention, as defined in the appended claims.

What I claim as new is:

1. An apparatus for recieving and bundling pipes incident to manufacturing steps, said apparatus comprising a pair of substantially identical racks disposed in spaced parallel relation, each of said racks including a base, front and rear vertically extending walls secured to said base and defining a space therebetween, said walls being so constructed and arranged as to provide a pair of end upright members, a roller rotatably carried by the upper end of each upright member, a flexible non-elastic strap trained over the tops of said rollers and supported thereby, said rollers each having a friction surface of a known characteristic relationship with said straps said strap including a pipe supporting and pipe conforming portion disposed between said rollers and upright members and having end portions lying adjacent to said upright members, yieldable strap anchoring means disposed between the ends of said strap and said base to maintain said strap in a substantially taut condition whereby the application of pipes on said pipe supporting portions of said strap results in the elongation of said yieldable anchoring means to maintain the loading level of said rack at a substantially constant height, and means for selectively locking the rollers against rotation as desired,

whereby more weight is required to lower the straps to a selected area.

2. An apparatus for receiving and bundling pipe incident to manufacturing steps, said apparatus comprising a pair of substantially identical racks disposed in spaced parallel relationship, each of said racks including a base, front and rear vertically extending walls secured to said base and defining a space therebetween, said walls being so constructed and arranged as to provide a pair of end upright members, a roller rotatably carried at the upper end of each upright member, a flexible non-elastic strap carried by each rack and trained over the top of said rollers and supported thereby, each roller having a friction surface of a known characteristic in relationship with said strap said straps including pipe supporting portions disposed between said upright members and end portions lying adjacent to said upright members, yieldable strap anchoring means disposed between the ends of said straps and said bases to maintain said straps in a substantially taut condition, stop means selectively positionable on said upright members, said stop means cooperating with said yieldable means to limit the movement thereof to pre-select the pipe capacity of said rack whereby substantially uniform weights of bundles may be obtained by separate runs of pipe having different wall thicknesses, and means for selectively locking the rollers against rotation as desired to change the basic weight selection of the bundles within the limits provided by said stop means.

3. An apparatus as set forth in claim 1, wherein said yieldable anchoring means includes a plate secured to each end of said strap, and calibrated springs having one of their ends anchored to said base and the other end secured to said plate.

4. An apparatus as set forth in claim 1, wherein said means for selectively locking the rollers against rotation includes a pair of aligned apertures in said front and rear walls adjacent said respective roller, a transverse opening through said roller adapted to be aligned with said apertures and a removable pin received in said apertures and opening.

5. An apparatus as set forth in claim 2, wherein said yieldable anchoring means includes a plate secured to each end of said strap, and calibrated springs having one of their ends anchored to said base and the other end secured to said plate.

6. An apparatus as set forth in claim 2, wherein said means for selectively locking the rollers against rotation includes a pair of aligned apertures in said front and rear walls adjacent said respective roller, a transverse opening through said roller adapted to be aligned with said apertures and a removable pin received in said apertures and opening.

7. An apparatus as set forth in claim 5, wherein said stop means cooperating with said yieldable means includes pairs of aligned apertures in the front and rear walls adjacent the path of movement of said plates, and removable pins adapted to be received through said apertures to limit the movement of said plates at pre-selected intervals.

8. An apparatus as set forth in claim 7 wherein locking means is provided for each pin to retain the same in its pre-selected position.

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CLAUDE A. LE ROY, *Primary Examiner.*