

July 23, 1963

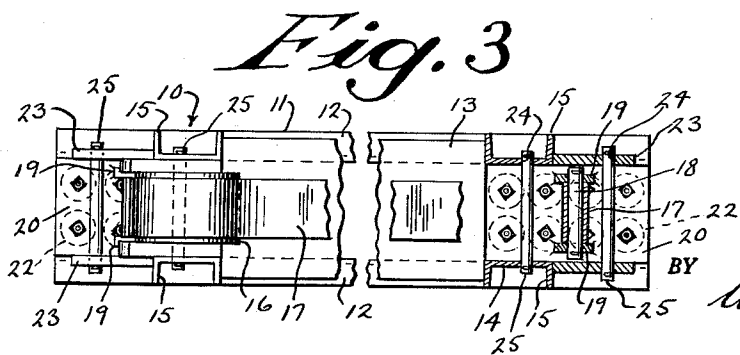
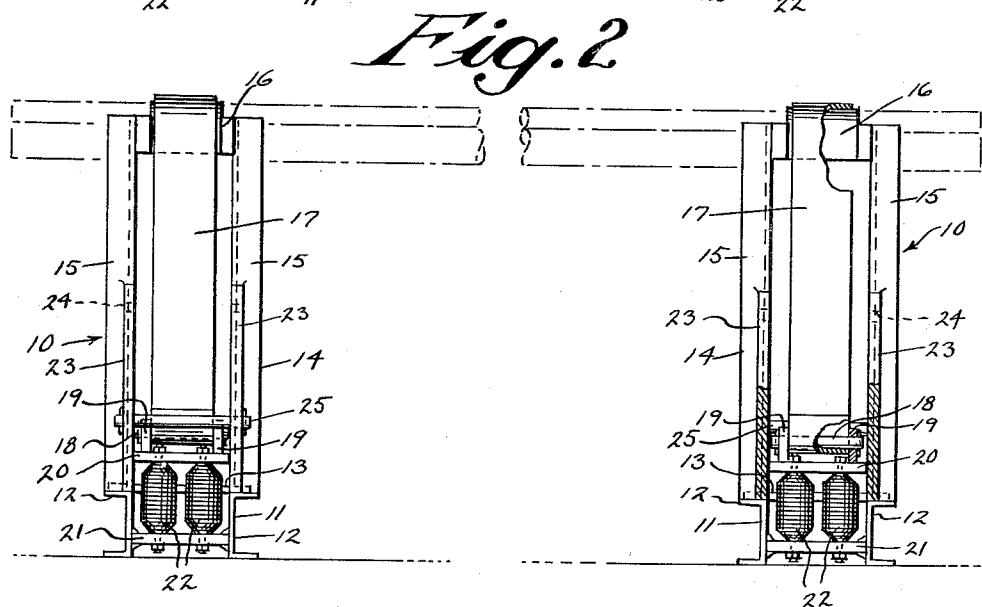
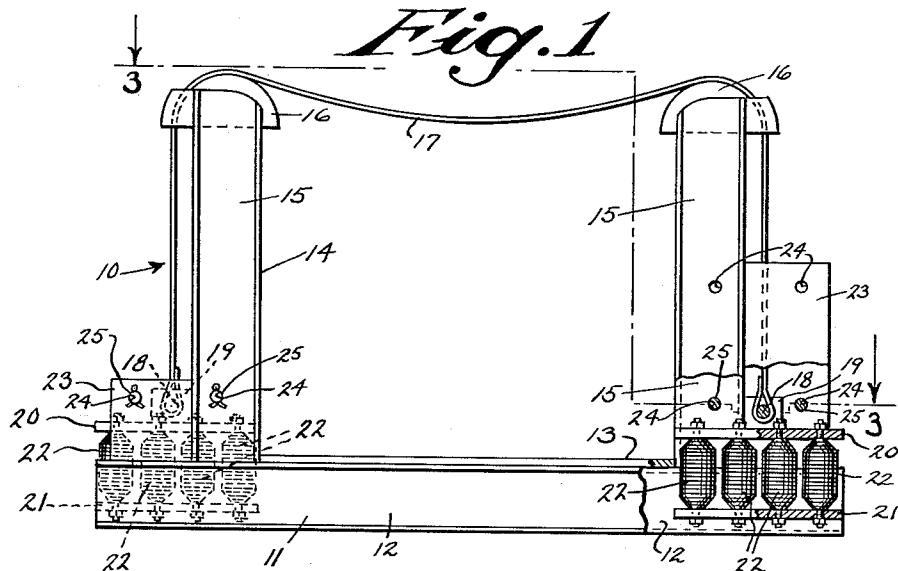
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3,098,567

PIPE RACK

Filed March 5, 1962

2 Sheets-Sheet 1



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Fig. 4

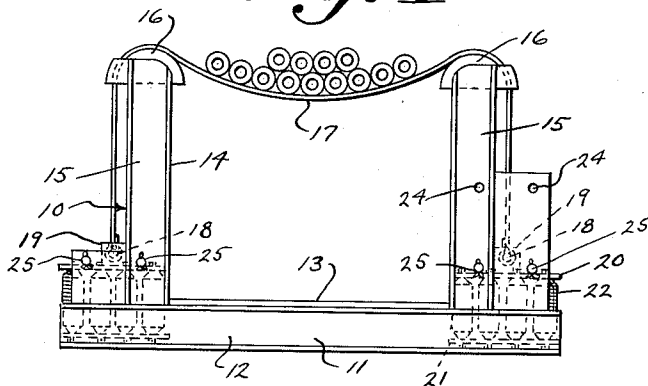


Fig. 5

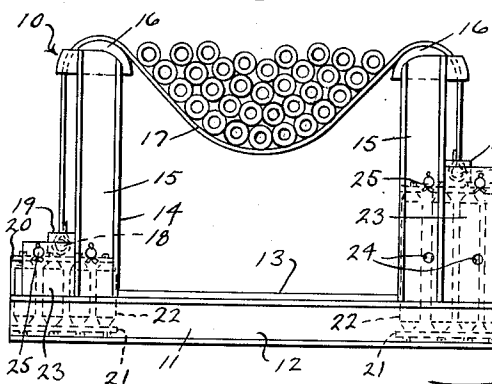


Fig. 6

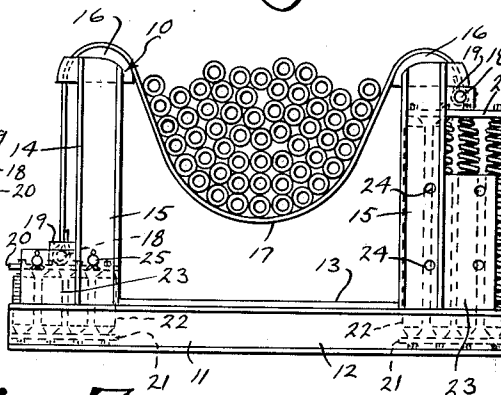
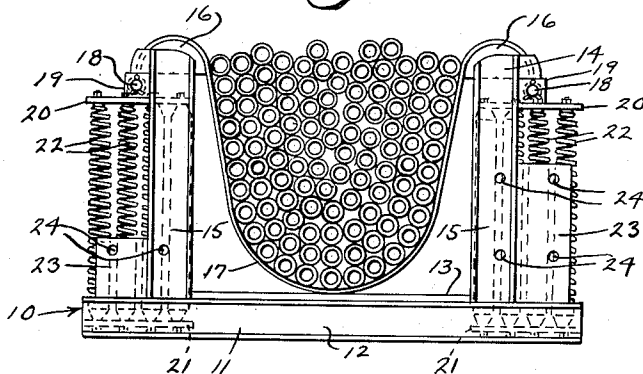


Fig. 7



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3,098,567 PIPE RACK

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This invention relates to an apparatus in the form of a rack for receiving and facilitating the handling and bundling of pipes.

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

It has been common practice in the mills to deposit the pipes in racks after each operation and to effect the transportation of the pipes in bundles, by crane, from one operation to another during the course of their production.

Custom has established a common bundle weight of approximately two tons as a practical one for the pipes which are transported from one operation to another.

These bundles are formed in the racks by the application of a sling which is attached to a traveling crane to effect the desired movement of the pipes between their several production operations.

Obviously, the dimensional sizes of these bundles vary greatly in accordance with the wall thickness and length of the pipe being produced in a particular run.

One of the serious problems encountered during the course of the production of pipes constitutes the waste resulting from damage to the individual pipes in the course of their handling and transportation between the numerous production operations.

The percentage of waste increases in inverse proportion to the wall thickness with respect to the diameter of the tube being produced. Hence, while the damage to heavy walled pipe is comparatively negligible, the damage to thin walled pipe and resultant waste is high and presents a very serious problem.

The primary object of the present invention resides in the provision of a new and improved apparatus in the form of a pipe rack constructed in a manner to materially reduce the possibility of damage to the pipe through handling between the various steps of its manufacture.

Another object resides in the provision of a new and improved pipe rack constructed in a manner to permit the loading level of the rack to remain at a substantially constant height at all times.

Another object resides in the provision of a pipe receiving rack that facilitates the bundling of the pipes.

Another object resides in the use of a flexible non-elastic strap as a means for supporting the pipes.

Another object resides in the novel means by which the desired substantially uniform weights may be effectively obtained for separate runs of pipes having different wall thicknesses.

Another object resides in the provision, in a pipe rack, 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 loading level of the rack at a substantially constant height by permitting the deflection of the pipe supporting straps to accommodate the increasing size of the bundle in response to the loading of additional pipes on the rack.

Another object resides in the provision of selectively positionable stop means on the uprights 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.

Another object resides in a new and novel combination

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of elements which form the apparatus of the present invention.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described and claimed, and illustrated in the accompanying drawings, in which drawings,

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

FIGURE 2 is a side elevational view of the pipe rack with parts thereof broken away and in section;

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;

FIGURE 4 is an end elevational view showing the rack being used for pipe of heavy walled section, with means for limiting the capacity of the rack for such use;

FIGURE 5 is a view similar to FIGURE 4 with the stop means adjusted to limit the capacity of the rack where thinner walled pipes are being handled;

FIGURE 6 is a view similar to FIGURES 4 and 5 and shows a third limiting position of the pipe supporting straps adapted to establish a bundle weight substantially equal to those accommodated in FIGURES 4 and 5 when a run of lighter walled pipe is being handled, and

FIGURE 7 is a view similar to the three preceding figures, showing the maximum capacity of the rack when a run of thin walled pipe is being handled.

The apparatus of the present invention comprises a pair of racks 10 disposed in parallel spaced relationship. Each of the racks 10 comprises a weldment including a base 11 formed of a pair of channel members 12 retained in laterally spaced relationship by means of a plate 13 and a pair of laterally spaced uprights 14. Each upright 14 includes spaced channel members 15 which are fixedly mounted on the base 11. An arcuately shaped plate 16 which is suitably secured on the top of each of the uprights 14, between each pair of the channel members 15, serves as a support for a portion of a pipe supporting strap 17 which is flexible but non-elastic. The length of the strap 17 is such that its ends are disposed above the upper surface of the base 11. Intermediate portions of the strap 17 are slidably trained over the plates 16. The respective ends of the strap 17 are turned back upon themselves to form loops adapted to receive pins 18 carried by ears 19 formed on the plates 20. These plates 20 are adapted for vertical movement between the channel members 15 of the uprights 14. A horizontally disposed anchor plate 21 is fixedly positioned between the channel members 12 of the base 11 below each of the movable plates 20. A plurality of calibrated tension springs 22 have their ends respectively anchored to the movable plates 20 and the anchor plates 21. The several tension springs 22 serve to normally retain the strap 17 in a raised condition.

It should be noted at this point that the height of the pipe supporting portion of the strap disposed between the uprights 14 is approximately at table height so that individual pipes may easily be moved from a suitable support, such as a table, onto the straps 17 without having to drop the pipe to floor level or the bottom of the rack. As the number of pipes positioned on the straps 17 respectively carried by the spaced racks 10 increases, their cumulative weight results in an extension of the springs 22 to permit the deflection of the pipe supporting portions of the straps 17 to retain the loading level for subsequent pipes at substantially the same height.

When a sufficient number of pipes have been placed

between the upright members 14 of the racks 10 to form a bundle of desired weight, suitable slings (not shown) are applied to the pipes supported by the straps 17 and the bundle may be transferred by crane to the position wherein the next manufacturing operation may be effected.

Another advantageous feature of the present invention is found in the means by which the proper bundling of runs of pipe having different wall thicknesses, but substantially the same total weight, may be facilitated. This is accomplished by the provision of means by which the capacity of the racks may be adjustably altered to afford bundles at substantially the same weight from different runs of pipe having different weights resulting from the variation in wall thicknesses of separate runs of pipe. Suitable vertically disposed parallel plates 23 project outwardly from the upright members 14 and are secured to the uprights 14 and the base 11 in any approved manner, such as by welding. The pairs of plates 23 and uprights 14 are provided with aligned apertures 24 adapted to removably receive stop pins 25 that are disposed above and in the path of travel of the plates 20 to contact the plates 20 to thereby limit the amount of deflecting movement to the pipe supporting portions of the straps 17 disposed between the upright members 14. These aligned pairs of apertures 24 in the plates 23 and uprights 14 on one side are disposed at different elevations with respect to the base 10 of the rack so that different selected positions of the stop pins 25 in the plates 23 and uprights 14 will serve to vary the capacity of the racks by limiting the deflecting movement of the pipe supporting portions of the straps.

FIGURES 4 to 7, inclusive, illustrate the selective adjustability of the capacity of the racks to accommodate a preselected bundle weight for different runs of pipe having wall thicknesses which vary from the heavy walled pipe shown in FIG. 4 to the thin walled pipe in FIG. 7.

In instances where the normal length of pipes is approximately twenty feet, two racks 10 suitably spaced will serve to provide adequate support for these pipes. In instances where pipes having a length of approximately forty feet are being handled, it may be desirable to employ a third supporting rack.

In the disclosed form of the present invention, it will be noted that sets of eight springs are employed at each end of the strap 17. These individual springs 22 are so calibrated that their combined tensions force will serve as a counterbalance for the weight of the pipes that are placed upon and supported by the straps 17. In view of the relatively large distance of expansion of the individual springs 22 to compensate for the total weight of the accumulated bundles of pipe, it is desirable to afford friction means to assist the tension force of the springs 22 in order that their size may be kept within the bounds of their supporting structures.

As previously stated, the straps 17 are trained over the arcuately shaped plates 16 positioned at the tops of the uprights 14. The surface friction afforded by the contact between the under surface of the strap and the upper surface of the plates 16 is effective to permit the use of tension springs 22 that may readily be accommodated in the structure. As the physical size of the bundles of pipe increases, it will be noted that the contacting surface area between the straps 17 and their supporting plates 16 is materially increased. The combined effect of the surface friction between the straps 17 and their supporting plates 16 and the tension force of the several tension springs 22 serve to maintain the loading level for the racks at a substantially constant height and simultaneously permit the deflection of the pipe supporting straps 17 to accommodate the increase in bundle size resulting from the deposit of additional pipes on the supporting straps 17.

When heavy walled pipes are being racked and bundled (see FIG. 4), the stop pins 25 are positioned so as to

permit the minimum vertical movement of the plates 20. When the cumulative weight of the racked heavy walled pipes extend the springs 22 to a point where further upright movement of the plates 20 is stopped by their contact with the pins 25, the loading capacity of the two racks will be such that a bundle weight of approximately two tons has been reached.

When slightly thinner walled pipes are to be racked and bundled (see FIG. 5), the stop pins 25 on one of the uprights 14 are positioned in the lowermost aligned apertures 24 in one pair of plates 23 and the pins are positioned in the upper aligned apertures 24 of the pair of plates associated with the other upright 14. With the stop pins 25 thus positioned, the amount of deflection of the pipe supporting strap 17 is increased to a point where the accurate weight of the load of pipes supported by the strap 17 affords a bundle weight substantially the same as that afforded by the heavy walled pipes shown in FIG. 4.

In FIGURE 6 I have shown pipe being handled of less wall thickness than shown in FIGURES 4 and 5. In this instance, the stop pins 25 on the right hand side are removed and the plate 20 on this side is limited in its upward movement by the top plate 16. When thinner walled pipe is being handled, as shown in FIGURE 6, then the stop pins 25 on each side are removed and both plates 20 are raised against the tension of their springs.

In all instances the top level of the pipe is kept constant and thus as the pipes roll onto the straps there will be no dropping of the pipes, and injury to the pipes is eliminated.

It is to be also observed that the pipe automatically rolls into a bundle as the straps 17 settle down under the weight of the pipe and that the pipe is at all times kept above a floor level so that the bundle of pipe can be readily engaged by transportation equipment.

Various changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

1. An apparatus for receiving and bundling pipes incident to manufacturing steps, said apparatus comprising a pair of substantially identical racks disposed in parallel spaced relationship, each of said racks including a base, a pair of upright members disposed in parallel spaced relationship on said base, a flexible non-elastic strap trained over the tops of said upright members and supported thereby, said strap including a pipe supporting and pipe conforming portion disposed between said upright members and end portions lying adjacent to said upright members, the straps carried by the racks being disposed in spaced parallel relation leaving intermediate and end portions of pipe on said straps clear for engagement by handling apparatus, and yieldable strap anchoring means disposed between the ends of said strap and said base to maintain said strap in substantially taut condition whereby the application of pipes on said pipe supporting portions of said straps resulting in the elongation of said yieldable anchoring means to maintain the loading level of said rack at a substantially constant height.

2. An apparatus for receiving and bundling pipes incident to manufacturing steps, said apparatus comprising a pair of substantially identical racks disposed in parallel spaced relationship, each of said racks including a base, a pair of upright members disposed in parallel spaced relationship on each base, and an arcuately shaped member mounted on said upper portion of each of said upright members, a flexible non-elastic strap carried by each of said racks and trained over and supported by said arcuately shaped members, a plate attached to each end of said strap, said plate being disposed for vertical movement along said upright members, and yieldable anchoring means disposed between said plates and said bases to maintain said straps in a substantially taut condition whereby the application of pipes on the pipe supporting portions of said straps results in the elongation of said yieldable anchoring means to maintain the loading level of said rack at a substantially constant height, said straps

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being disposed in spaced parallel relation leaving intermediate and end portions of pipe on said straps clear for engagement by handling apparatus.

3. An apparatus for receiving and bundling pipes incident to manufacturing steps, said apparatus comprising a pair of substantially identical racks disposed in parallel spaced relationship, each of said racks including a base, a pair of upright members disposed in parallel spaced relationship on each base, a flexible non-elastic strap carried by each rack and trained over the top of said upright members and supported thereby, 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 base to maintain said straps in a substantially taut condition, and stop means selectively positionable on said upright members, said stop means cooperating with said yieldable means to limit the movement thereof to preselect the pipe capacity of said rack whereby substantially uniform weights of bundles may be obtained by separate runs of pipes having different wall thicknesses.

4. An apparatus for receiving and bundling pipes incident to manufacturing steps, comprising a pair of substantially identical racks disposed in spaced parallel relationship, each of said racks including a base and a pair of upright members disposed in parallel spaced relationship on each base, a flexible non-elastic strap carried by

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each rack and trained over the top of said upright members and slidably supported thereby, said straps including pipe supporting portions disposed between said upright members and end portions lying adjacent to said upright members, plates slidably carried by said upright members and movable toward and away from the tops of the upright members, expansion springs arranged on opposite sides of the upright members and having their opposite ends secured respectively to the bases and plates to maintain the straps in a substantially taut condition and stop means selectively positioned on said upright members to limit the upward movement of the plates under different strap load conditions.

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