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(54) SHIPPING BUNDLE FOR NUMEROUS PIPE LENGTHS

(71) We, SEATTLE BOX COMPANY, a Corporation organised under the laws of the State of Washington, United States of America, of 23400 71st Place South, Kent, Washington 98031, United States of America do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to bundles of numerous pipe lengths for shipping and storage, and provides a bundle wherein the pipe lengths are secured in a flexible manner to accommodate the rigours of hoisting and transporting and storage on uneven supporting surfaces. The invention also includes a method of bundling numerous pipe lengths.

During recent years the increased activity in the exploration for oil in remote areas of the world and in its transmission from developed wells has involved the shipment of great quantities of pipe of a wide range of sizes and very great lengths. Some of the pipe is drill pipe, other pipe lengths are for well casing, and yet others to convey oil from the wells. In most cases the pipe lengths must arrive at their eventual points of use without bends, dents or damaged ends — all conditions that have occurred when bundles of pipe have been shipped loose or strapped together without protective structure.

In those known cases in the prior art where composite bundling has been disclosed, pipe lengths have been cradled in underlying concave shoes and then capped with like but inverted non-contacting shoes and the whole fastened together. In such cases any weight applied to a bundle, as by a second similar bundle stacked thereon, is applied directly to the pipe lengths at localized or restricted positions. The pipes may thus be crushed or otherwise deformed.

In other instances it is known to form a rack of side-by-side pipe lengths between a pair of bolsters and to surmount the first rack with a second rack of pipe lengths, a third bolster and even a third rack of pipes

not necessarily with a fourth bolster. The adjacent pipes are neither separated from each other nor are they separated from the bolsters. As a result, when such bundles are stacked, the lower bundles support with weight of upper bundles. In the case of large pipes each such bundle may weigh several tons. Damage is likely under such practices. This is particularly so when the pipes may shift within the bundle. Straps can be broken and the pipe surfaces can be gouged or protective coatings damaged.

In performing the invention a base is formed of a first plurality of transverse sleepers arranged in spaced-apart locations on a work surface or floor. The length of this base is usually less than the overall length of the pipe lengths to be bundled. A first tier of pipe lengths in side-by-side disposition is deposited on the base, each adjacent pipe pair being separated by divider blocks having concave sides to cradle the pipes. The height of the divider blocks is greater than the pipe diameter. A second plurality of sleepers is placed in overlying relation to said first set of sleepers and the divider blocks standing thereon. Then a second tier of pipe lengths, likewise separated as described, is placed on the second sleepers. This assembly is then completed by the addition of a third set of sleepers and integrated by an encircling, tightly-bound strap means at each location. The pipes are drawn into the concavities of the divider blocks and become individually suspended within the bundle. They are out of contact with each other and with the sleepers, yet, because of their great length, are free to flex and twist without harm and without relative endwise movement during handling or transshipment, or when stored on uneven surfaces.

According to one aspect of the invention a bundle of a plurality of pipe lengths of common size comprises: a base formed of a first plurality of transverse sleepers located in spaced-apart parallel arrangement; a tier of pipe lengths supported by the base, adjacent pipe lengths of the said tier being separated by blocks in transverse series, each

block having opposed concavities substantially embracing the curved sides of the adjacent pipe lengths, each series of blocks standing on one of the sleepers and being of a height greater than the thickness of the tier of pipe lengths; a second plurality of sleepers, each transversing the said tier of pipe lengths in overlying alignment with a sleeper of the first plurality, the sleepers of the second plurality being supported on the series of separating blocks; and a bundling strap tightly encircling each sleeper of the first plurality, the separating blocks resting thereon and the respective overlying sleeper.

According to another aspect of the invention a method of bundling a plurality of pipe lengths of common size comprises: forming a first bundle base by laying down a first plurality of transverse sleepers in spaced-apart parallel locations; depositing a first tier of pipe lengths on the first bundle base and chocking adjacent pipe lengths of the first tier in spaced-apart relation by means of blocks in transverse series, each block having opposed concavities substantially embracing the curved sides of adjacent pipe lengths and being of a height greater than the tier; traversing the first tier of pipe lengths with a second plurality of transverse sleepers aligned with the first plurality at each location to form a second bundle base overlying the first bundle base; depositing a second tier of pipe lengths on the second bundle base and chocking adjacent pipe lengths of the second tier in spaced-apart relation in the same manner as the pipe lengths of the first tier; tightly strapping the pipe lengths of the first and second tiers adjacent at least the outermost sleepers of the first and second bundle bases; traversing the second tier of pipe lengths with transverse sleepers aligned with the first and second pluralities at each location to form a third bundle base overlying the first and second bundle bases; depositing a third tier of pipe lengths on the third bundle base and chocking adjacent pipe lengths of the third tier in spaced-apart relation in the same manner as the pipe lengths of the first and second tiers; tightly encircling the pipe lengths of said tiers with strapping adjacent at least two of the said locations; overlying the third tier of pipe lengths with transverse sleepers aligned with the first, second and third pluralities at each location; tightly encircling the sleepers at each location with strapping extending transversely of the bundle; and passing strapping between pairs of pipe lengths in each tier at each location and about intermediate portions of the sleepers at each location with strapping extending transversely of the bundle; and passing strapping between pairs of pipe lengths in

each tier at each location and about intermediate portions of the sleepers and tightly securing this strapping.

The invention may be performed in various ways, and a specific embodiment will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a side elevation of a shipping bundle of pipe lengths;

Figure 2 is an end elevation of the bundle;

Figure 3 is a perspective view of a divider block;

Figure 4 is a fragmentary cross-section of a lower corner of the bundle;

Figure 5 is a section in the plane 5-5 of Figure 4;

Figure 6 is a side view of an end portion of a bundle;

Figure 7 is a perspective view of a bundle portion at the top of a tier of sleepers; and

Figure 8 is an end view of a bundle depicting how the bundle can rack due to its inherent flexibility.

The shipping bundle illustrated comprises a base formed of a first plurality of sleepers 10, 12 and 14 arranged parallel with each other in spaced-apart locations on a supporting surface 16. A tier of pipe lengths 18 initially lie on the sleepers in parallel relation to each other. Such pipe lengths may be twenty, thirty or even fifty or sixty feet long, and their diameters may be in the range from 2 inches to 24 inches, for example. Their ends are usually protected against damage by sleeves 20.

As can best be seen in Figures 4 and 5, adjacent pipe lengths 18 are separated by divider blocks 22. A single block 22 is shown in Figure 3 as having a bottom 24, a top 26 and opposed concave curved sides 28. Preferably the curvature of the concave sides 28 is equal to the external curvature of the pipe lengths between which the blocks 22 are disposed. The height of each block 22 is slightly greater than the pipe diameter. At the sides of each tier of pipe lengths are half-blocks 23. When the blocks 22, 23 and the pipe lengths 18 of the lowermost tier are in place on the sleepers 10, 12 and 14, a next series of sleepers 30, 32 and 34 is placed to traverse the lowermost tier in overlying alignment with sleepers of the base.

In the manner as described, a second tier of pipe lengths 36 with divider blocks 22 and end blocks 23 is formed. At this point the two lower tiers 18 and 30 may be encircled with straps 38, the ends of which each strap being overlapped as shown in Figure 6 and, under tension, tightly secured by crimped strap-anchors 39. The straps 38 are in proximity to the locations of the sleepers.

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Similarly, a third tier of sleepers 40, divider blocks 22, end blocks 23 and pipe lengths 44 is arranged to overlies the second tier. The pipe lengths 36 of the second tier and the pipe lengths 44 of the third tier may also be encircled by straps 46, the ends of each strap 46 being secured by crimped strap-anchors 48. The straps 38 and 46 draw the pipe lengths and the intervening divider blocks 22, 23 tightly together so that the pipe lengths are snugly and firmly seated or cradled in the curved sides 28 of the divider blocks. This tends to lift the pipe lengths off the sleepers and transfer the load from above to the upright columns provided by the divider blocks 22 and the sleepers.

Finally in the case of a three-tier bundle, a fourth set of sleepers 50 is disposed across the bundle, as best seen in Figures 6 and 7. At that point, the superposed sleepers 10, 30, 40 and 50 are tightly encircled intermediate their ends by one or more straps 52 which pass between two adjacent pipe lengths in each tier, the overlapping ends of these straps being secured by strap-anchors as described. The straps 52 draw the sleepers of the base, the intermediate tiers and the top set tightly to the intervening divider blocks. Straps 59 encircling all the pipe lengths in the several tiers may be applied to tighten the bundles.

Further straps 60 encircle all the sleepers at each station and, under tension from strap-anchoring apparatus, have their overlapped ends secured by crimped strap-anchors 62 as shown in Figure 7.

The application of the straps secures all the pipe lengths of the several tiers into a firm but flexible bundle that may be placed on uneven ground or other supporting surface without injury to the pipe lengths, involving bending or twisting in which the inherent flexibility of the pipe lengths is permitted to play while at the same time the pipe is protected from normal hazards.

In Figure 8 is illustrated a common hazard that a shipping bundle may be subjected to. In this end view the bundle is being supported by two hoisting bridles 70, 70 that have been placed about the bundle at spaced-apart positions which may be twenty or more feet apart. Because of its flexibility the bundle may twist materially as shown but without harm to the part sections. The pipes "work" in the opposed concavities of adjacent divider blocks without injury as the bundle twists. It has been observed that differences of several inches in the respective height of the several sleepers may easily be tolerated. Also, a large bundle may twist through several degrees between bundle ends.

WHAT WE CLAIM IS:—

65 1. A bundle of a plurality of pipe

lengths of common size, comprising: a base formed of a first plurality of transverse sleepers located in spaced-apart parallel arrangement; a tier of pipe lengths supported by the base, adjacent pipe lengths of the said tier being separated by blocks in transverse series, each block having opposed concavities substantially embracing the curved sides of the adjacent pipe lengths; each series of blocks standing on one of the sleepers and being of a height greater than the thickness of the tier of pipe lengths; a second plurality of sleepers, each traversing the said tier of pipe lengths in overlying alignment with a sleeper of the first plurality, the sleepers of the second plurality being supported on the series of separating blocks; and a bundling strap tightly encircling each sleeper of the first plurality, the separating blocks resting thereon and the respective overlying sleeper.

2. A bundle according to Claim 1 including a second tier of pipe lengths resting on the second plurality of sleepers, adjacent pipe lengths of the second tier being separated by blocks in the same manner as the pipe lengths of the first tier; a third plurality of sleepers, each traversing the second tier in overlying alignment with the sleepers of the first and second pluralities; and wherein the bundling straps tightly encircle the sleepers of the first and third pluralities and the pipe length tiers and separating blocks associated therewith.

3. A bundle according to Claim 2 including a third tier of pipe lengths resting on the third plurality of sleepers, adjacent pipe lengths of the third tier being separated by blocks in the same manner as the pipe lengths of the first and second tiers; a fourth plurality of sleepers, each traversing the third tier in overlying alignment with the sleepers of the first, second and third pluralities; and wherein the bundling straps tightly encircle the sleepers of the first and fourth pluralities, and the pipe length tiers, the separating blocks associated therewith, and the sleepers interposed between the pipe length tiers.

4. A shipping bundle according to Claim 3 including at least one additional tier of block-separated pipe lengths surmounted by a plurality of sleepers, and wherein the bundling strap tightly encircles the sleepers of the first and this plurality, and the pipe length tiers, the separating blocks associated therewith, and the sleepers interposed between the pipe length tiers.

5. A bundle according to any of Claims 2 to 4 in which a bundling strap tightly encircles the pipe lengths of two adjacent tiers in proximity to at least some of the sleeper locations.

6. A bundle according to any of the preceding Claims in which intermediate the



Similarly, a third tier of sleepers 40, divider blocks 22, end blocks 23 and pipe lengths 44 is arranged to overlies the second tier. The pipe lengths 36 of the second tier and the pipe lengths 44 of the third tier may also be encircled by straps 46, the ends of each strap 46 being secured by crimped strap-anchors 48. The straps 38 and 46 draw the pipe lengths and the intervening divider blocks 22, 23 tightly together so that the pipe lengths are snugly and firmly seated or cradled in the curved sides 28 of the divider blocks. This tends to lift the pipe lengths off the sleepers and transfer the load from above to the upright columns provided by the divider blocks 22 and the sleepers.

Finally in the case of a three-tier bundle, a fourth set of sleepers 50 is disposed across the bundle, as best seen in Figures 6 and 7. At that point, the superposed sleepers 10, 30, 40 and 50 are tightly encircled intermediate their ends by one or more straps 52 which pass between two adjacent pipe lengths in each tier, the overlapping ends of these straps being secured by strap-anchors as described. The straps 52 draw the sleepers of the base, the intermediate tiers and the top set tightly to the intervening divider blocks. Straps 59 encircling all the pipe lengths in the several tiers may be applied to tighten the bundles.

Further straps 60 encircle all the sleepers at each station and, under tension from strap-anchoring apparatus, have their overlapped ends secured by crimped strap-anchors 62 as shown in Figure 7.

The application of the straps secures all the pipe lengths of the several tiers into a firm but flexible bundle that may be placed on uneven ground or other supporting surface without injury to the pipe lengths, involving bending or twisting in which the inherent flexibility of the pipe lengths is permitted to play while at the same time the pipe is protected from normal hazards.

In Figure 8 is illustrated a common hazard that a shipping bundle may be subjected to. In this end view the bundle is being supported by two hoisting bridges 70, 70 that have been placed about the bundle at spaced-apart positions which may be twenty or more feet apart. Because of its flexibility the bundle may twist materially as shown but without harm to the part sections. The pipes "work" in the opposed concavities of adjacent divider blocks without injury as the bundle twists. It has been observed that differences of several inches in the respective height of the several sleepers may easily be tolerated. Also, a large bundle may twist through several degrees between bundle ends.

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1. A bundle of a plurality of pipe

lengths of common size, comprising: a base formed of a first plurality of transverse sleepers located in spaced-apart parallel arrangement; a tier of pipe lengths supported by the base, adjacent pipe lengths of the said tier being separated by blocks in transverse series, each block having opposed concavities substantially embracing the curved sides of the adjacent pipe lengths; each series of blocks standing on one of the sleepers and being of a height greater than the thickness of the tier of pipe lengths; a second plurality of sleepers, each traversing the said tier of pipe lengths in overlying alignment with a sleeper of the first plurality, the sleepers of the second plurality being supported on the series of separating blocks; and a bundling strap tightly encircling each sleeper of the first plurality, the separating blocks resting thereon and the respective overlying sleeper.

2. A bundle according to Claim 1 including a second tier of pipe lengths resting on the second plurality of sleepers, adjacent pipe lengths of the second tier being separated by blocks in the same manner as the pipe lengths of the first tier; a third plurality of sleepers, each traversing the second tier in overlying alignment with the sleepers of the first and second pluralities; and wherein the bundling straps tightly encircle the sleepers of the first and third pluralities and the pipe length tiers and separating blocks associated therewith.

3. A bundle according to Claim 2 including a third tier of pipe lengths resting on the third plurality of sleepers, adjacent pipe lengths of the third tier being separated by blocks in the same manner as the pipe lengths of the first and second tiers; a fourth plurality of sleepers, each traversing the third tier in overlying alignment with the sleepers of the first, second and third pluralities; and wherein the bundling straps tightly encircle the sleepers of the first and fourth pluralities, and the pipe length tiers, the separating blocks associated therewith, and the sleepers interposed between the pipe length tiers.

4. A shipping bundle according to Claim 3 including at least one additional tier of block-separated pipe lengths surmounted by a plurality of sleepers, and wherein the bundling strap tightly encircles the sleepers of the first and this plurality, and the pipe length tiers, the separating blocks associated therewith, and the sleepers interposed between the pipe length tiers.

5. A bundle according to any of Claims 2 to 4 in which a bundling strap tightly encircles the pipe lengths of two adjacent tiers in proximity to at least some of the sleeper locations.

6. A bundle according to any of the preceding Claims in which intermediate the



- ends of all the aligned sleepers at each location a strap passes between two adjacent pipe lengths in the (or each) tier and is tightly secured about these aligned sleepers.
- 5 7. A bundle according to Claim 6 when appendant to Claims 3 and 5, in which a bundling strap tightly encircles the pipe lengths of said tiers in proximity to at least two of the sleeper locations.
- 10 8. A method of bundling a plurality of pipe lengths of common size, comprising: forming a first bundle base by laying down a first plurality of transverse sleepers in spaced-apart parallel locations; depositing
15 a first tier of pipe lengths on the first bundle base and chocking adjacent pipe lengths of the first tier in spaced-apart relation by means of blocks in transverse series, each block having opposed concavities substantially embracing the curved sides of adjacent pipe lengths and being of a height greater than the tier; traversing
20 the first tier of pipe lengths with a second plurality of transverse sleepers aligned with the first plurality at each location to form
25 a second bundle base overlying the first bundle base; depositing a second tier of pipe lengths on the second bundle base and chocking adjacent pipe lengths of the second tier in spaced-apart relation in the same manner as the pipe lengths of the first tier; tightly strapping the pipe lengths
30 of the first and second tiers adjacent at least the outermost sleepers of the first and second bundle bases; traversing the second tier of pipe lengths with transverse sleepers aligned with the first and second pluralities at each location to form a third bundle base overlying the first and second bundle bases; depositing a third tier of pipe lengths on the
40 third bundle base and chocking adjacent pipe lengths of the third tier in spaced-apart relation in the same manner as the pipe lengths of the first and second tiers; tightly encircling the pipe lengths of said
45 tiers with strapping adjacent at least two of the said locations; overlaying the third tier of pipe lengths with transverse sleepers aligned with the first, second and third pluralities at each location; tightly encircling
50 the sleepers at each location with strapping extending transversely of the bundle; and passing strapping between pairs of pipe lengths in each tier at each location and about intermediate portions of the sleepers
55 and tightly securing this strapping.
9. A method according to Claim 8, substantially as described with reference to the accompanying drawings.
10. A bundle of a plurality of pipe
60 lengths which has been formed by a method as claimed in Claim 8 or Claim 9.
11. A bundle of plurality of pipe lengths substantially as described with reference to the accompanying drawings. 65
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