July 29, 1924. 1,503,094

S. W. CRAMER, JR

WARP CONDENSER

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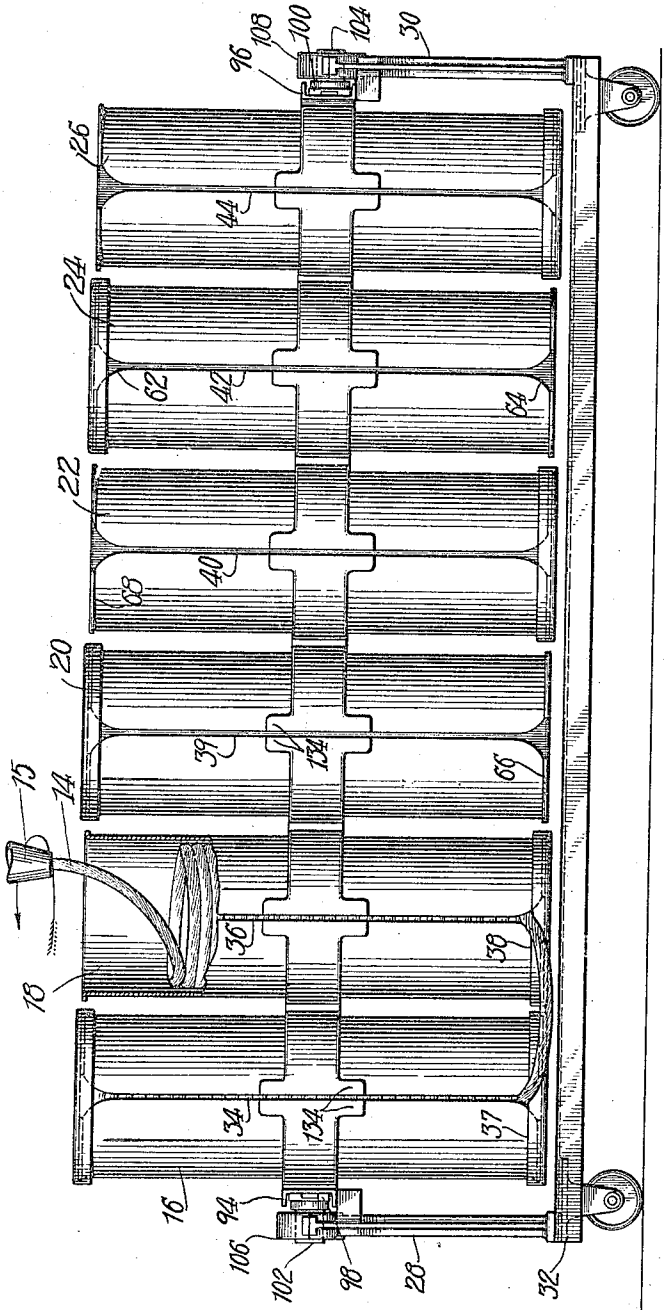


Fig. 1.

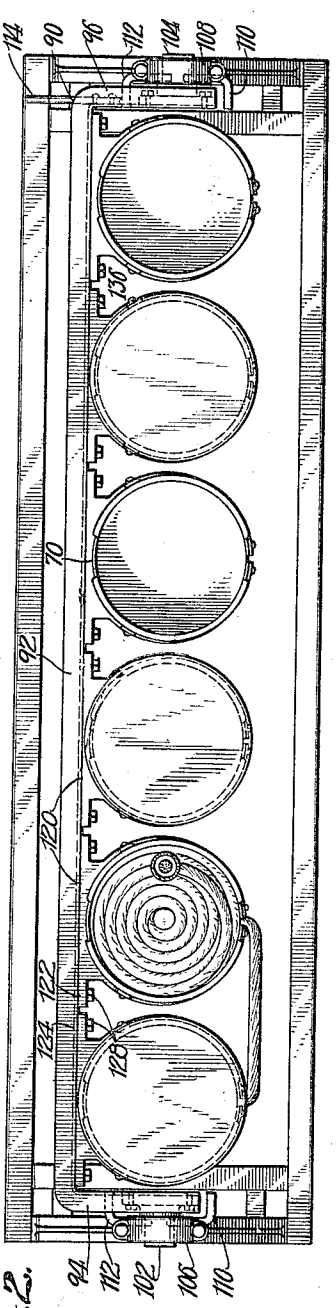


Fig. 2.

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WARP CONDENSER

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Fig. 3.

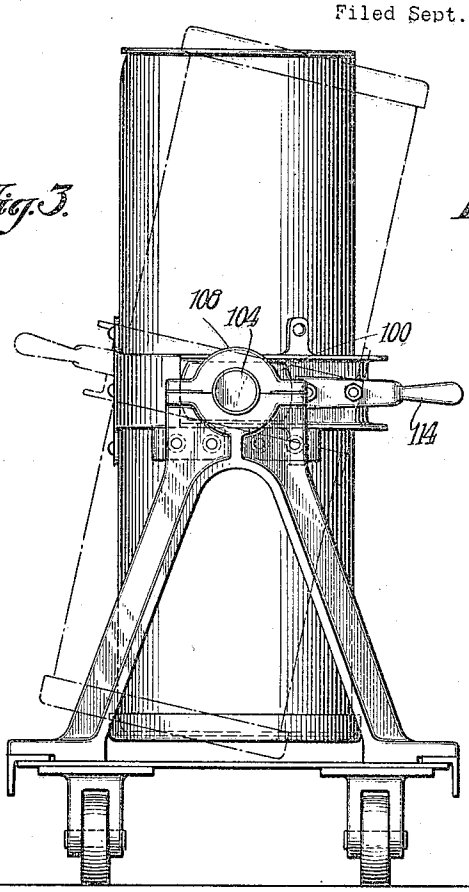


Fig. 4.

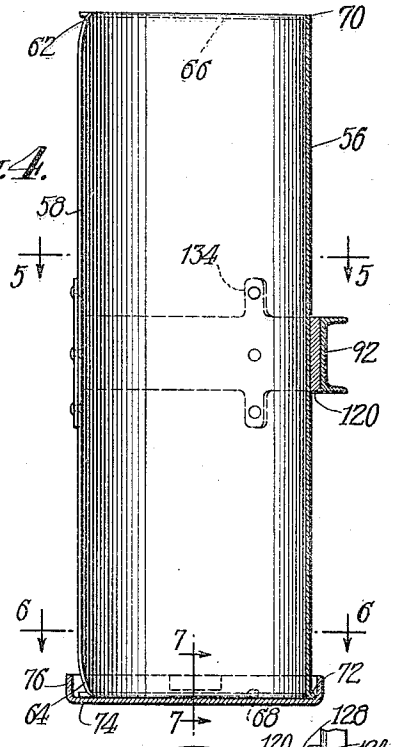


Fig. 5.

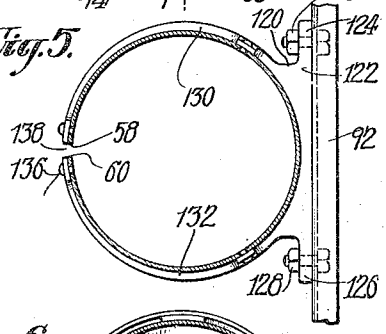


Fig. 7.

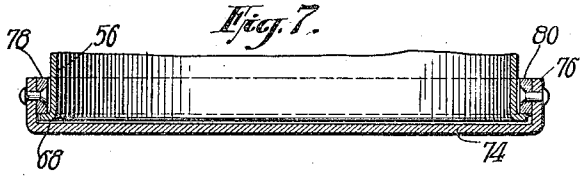


Fig. 8.

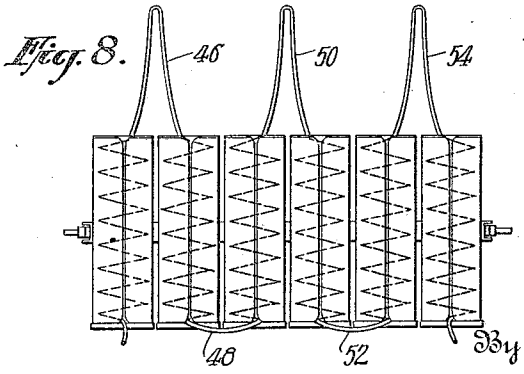
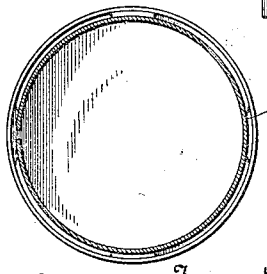


Fig. 6.



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Fig. 9.

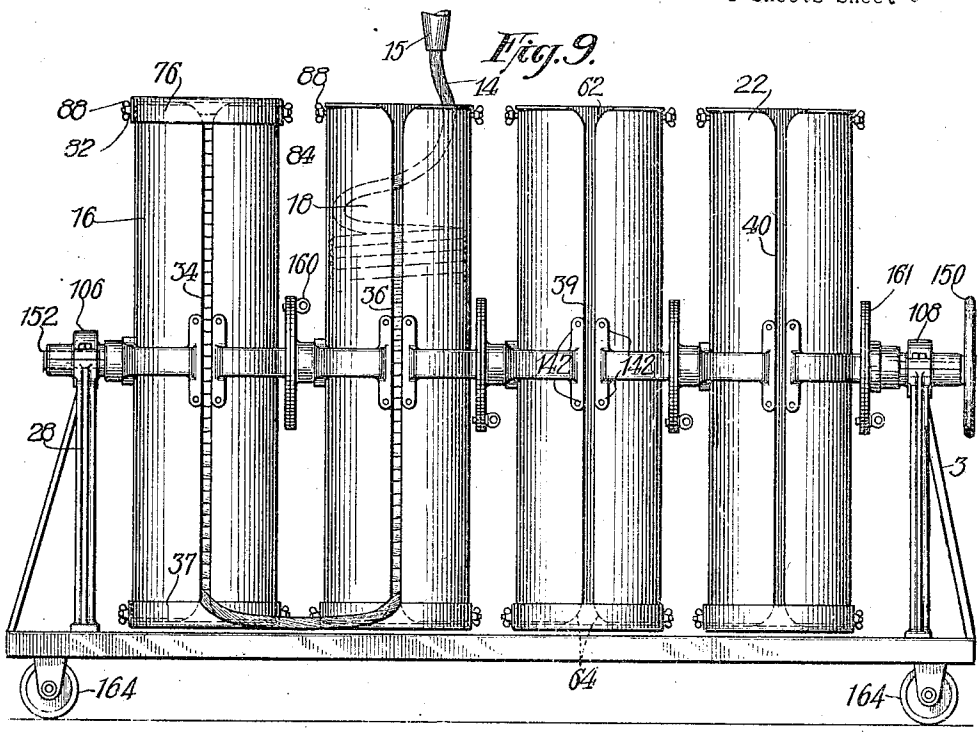


Fig. 11.

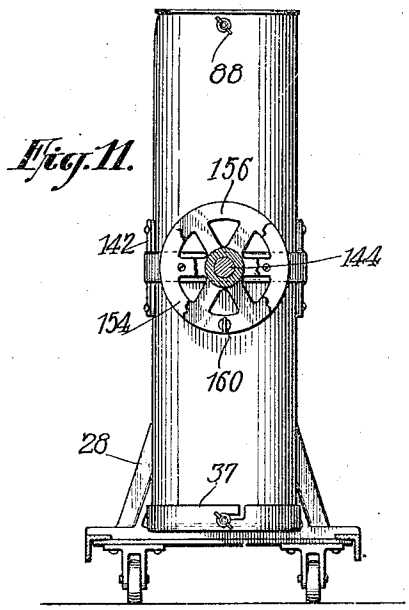


Fig. 10.

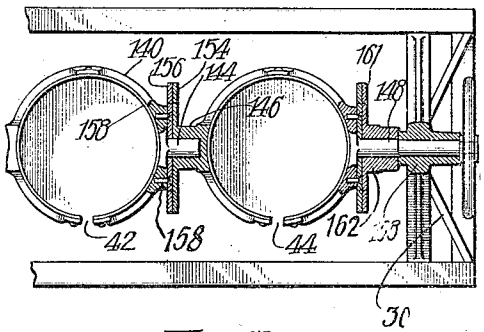
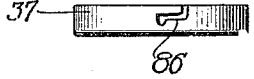


Fig. 12.



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Patented July 29, 1924. 1,503,094

UNITED STATES PATENT OFFICE.

STUART W. CRAMER, JR., OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO CRAMERTON MILLS, INCORPORATED, A CORPORATION OF NORTH CAROLINA.

WARP CONDENSER.

Application filed September 15, 1923. Serial No. 662,829.

To all whom it may concern:

Be it known that I, STUART W. CRAMER, Jr., a citizen of the United States, and a resident of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Warp Condensers, of which the following is a specification.

This invention relates to a method and apparatus for coiling yarn preparatory to dyeing it and, more particularly, to a method of and apparatus for coiling warps of yarn or thread in such a manner that a long chain or length of warp may be withdrawn from the coils in a number of connected shorter strands or loops in convenient relation to be passed through a dye vat.

The type of warp dyeing known as "long chain" dyeing provides an inexpensive method of dyeing but does not in all cases produce results of the uniformity obtainable in short chain vats owing to the large number of ends contained in a single bunch or to the exhaustion of the dye liquor towards the latter portion of the long chain.

An object of the present invention is to provide a method of handling warp so that a long chain of the warp may be dyed in a short chain vat.

Another object of the invention is to provide a method of coiling warp so that a long chain of the warp may be drawn out in a number of connected loops or strands.

A further object of the invention is to provide an apparatus in which warp may be coiled in such a manner as to be drawn out in a number of loops or strands in suitable position for passing through a dye tank or vat.

A further object of the invention is to provide an apparatus in which any rope or strand may be coiled in such a manner as to be drawn out in such form that its thickness varies with the number of coils employed, while its length will vary inversely with that number.

Further objects of the invention are to provide an apparatus in which warp may be coiled in coils alternately built up from opposite ends and connected at alternately opposite ends, to provide an apparatus having warp coil receptacles which may be rotated to be filled alternately from opposite ends and to provide warp receiving cans which may be filled from either end.

With these and other objects in view, the invention comprises the method and apparatus described and set forth in the following specification and claims.

The various features of the invention are illustrated in the accompanying drawings in which:

Fig. 1 is a side elevation of a warp receiving apparatus embodying a preferred form of the invention.

Fig. 2 is a plan view of the apparatus shown in Fig. 1.

Fig. 3 is an end elevation of the apparatus shown in Figs. 1 and 2, a warp receiving can forming part of the apparatus being shown in tilted position in dotted lines.

Fig. 4 is a vertical sectional view of one of the warp receiving cans of the preceding views.

Fig. 5 is a section on line 5—5 of Fig. 4 of the warp receiving can.

Fig. 6 is a section on line 6—6 of Fig. 4 of the warp receiving can.

Fig. 7 is a section of the bottom of a warp receiving can taken on line 7—7 of Fig. 4.

Fig. 8 is a side view of the apparatus illustrating the manner of taking the warp from the cans in a number of separate but continuous strands.

Fig. 9 is a side elevation of a modified form of embodiment of the invention.

Fig. 10 is a plan view of a portion of the apparatus shown in Fig. 9.

Fig. 11 is a vertical sectional view of the apparatus taken on line 11—11 of Fig. 9, and,

Fig. 12 is a detail view of a cover forming part of the apparatus of Figs. 9–11.

In my present invention the warp is coiled in an end can or receptacle of a series of warp receiving cans, the coil being built upwardly from the bottom of the receptacle to the top. The warp is then continued out through a longitudinal slot to the top of the next adjacent can from which the lid and bottom have been removed and is inserted in the upper part of this second can through a similar longitudinal slot. A cover is then placed on the second can and the cans are then rotated about a horizontal axis to invert them and bring the tops to the bottom or underneath position and the warp is

built up from the inverted top, which thus serves as a supporting bottom for this second coil. When the warp is built up to the inverted bottom portion of the second can a bottom cover is placed on the can and the warp is carried to the inverted bottom of the third can and inserted. The cans are then again rotated and the process repeated. All the length of the warp is completely coiled, the number of cans filled depending on the length of the warp and on the number and length of the separate coils desired. There is thus formed a continuous warp consisting of a number of separate coils alternately built up from opposite directions and connected alternately at opposite ends. When the cans are in upright position and the upper connecting portions of the warp are drawn out, the warp forms into a combined rope made up of a number of strands or loops of substantially identical length which may be easily passed through a short chain dye vat, or other apparatus in which it is desirable to have a chain of less length than the original warp, without unduly increasing its thickness.

Referring more particularly to the accompanying drawings, a warp 14 is coiled from a spout 15 into an end can 16, of a series of cans 16, 18, 20, 22, 24 and 26, rotatably supported on end members 28 and 30 of a supporting frame 32 in such a manner as to be rotatable on a horizontal axis at right angles to the central axes of the individual cans. The coil of warp is built up in the first can 16 until the top of the can is reached and is then carried through a slot 34, extending longitudinally of the surface of the can, to the top of the adjacent can 18, from which the bottom cover has been removed, and is inserted through a similar longitudinal slot 36. Covers 37 and 38 are then placed on the tops of the first and second cans respectively and the cans are rotated about the horizontal axis to invert them and bring their tops underneath, to a bottom position, this position being that shown in Figs. 7 and 9. The warp is then coiled in the second can and built up from the inverted top to the inverted bottom and is passed out through the slot 36 to the inverted bottom of the third can 20. The warp is then passed through a slot 39 in this can, the cans rotated to their upright position and the coiling continued. This coiling method is then repeated, the warp passing alternately from the top of slot 39 to the top of a slot 40 in can 22, from the bottom of the slot 40 to the bottom of a slot 42 in can 24 and from the top of slot 42 to the top of slot 44 in can 26, finally ending in the inverted bottom of the last can 26. The cans are in effect a series of receptacles having the bottoms of successive receptacles arranged alternately in reversed position but, for convenience, that end of each can which is uppermost when the first can is upright will be referred to as the top of the can.

The warp is thus formed into a number of successive coils alternately built up from opposite directions and connected, as indicated in Fig. 7, by connecting portions 46, 48, 50, 52 and 54 alternately at opposite ends of the coils. If the cans are then turned to their upright position and the upper portions 46, 50 and 54 are pulled out, the yarn follows in a uniform manner in parallel strands of the same number as the number of cans used and of a correspondingly shorter length than the length of the original chain. Any desired number of cans may be employed, six being shown in the present embodiment by way of example. In this embodiment of the invention, for example, an original warp of approximately 400 ends, 9000 yards long will come out in one warp containing about 2400 ends (6 x 400) and only 1500 yards long.

The construction of the individual cans is substantially the same with the exception that the first, third and fifth cans may have their lower ends permanently closed since the warp will always be drawn out of these cans in the same direction that it was coiled into the cans whereas in the second, fourth and sixth cans the warp is drawn out from the opposite end from which it was coiled into the cans. The cans may be constructed of a sheet 56 of metal or of plastic material bent to a cylindrical form and having the two longitudinal edges 58 and 60 brought close to each other to form the longitudinal slot. The corners of the sheet are rounded as shown at 62 and 64 to provide rounded diverging ends for the longitudinal slots. The inner lining and the edges of the cans should be very smooth and, if the cans are made of a plastic material, the edges are preferably provided with smooth metal edges, for the purpose of avoiding sharp or rough edges.

To attach the lids and bottoms to the cans the upper and lower edges of the sheet 56 are flanged slightly outwardly forming annular outwardly projecting flanges 66 and 68 at the top and bottom of the can respectively, and the portion of the flanges opposite the slots 36—44 cut away to form notches 70 and 72, to permit the insertion under the flanges 66 and 68 of retaining lugs on the covers.

The covers are formed of flat circular pieces of metal or plastic material 74 having inwardly extending circular flanges 76 and each flange having a pair of diametrically positioned lugs 78 and 80 on their inner surface positioned to be inserted one through an end of the longitudinal slots 36—44 and the other through the notches 70

or 72 respectively and rotated under the edge of the flanges 66 and 68 to hold the covers onto the cans.

In the embodiment shown in Figs. 9 to 12 the can flanges 66 and 68 are omitted and the covers are attached to the cans by means of pins 82 and 84, projecting diametrically from opposite sides of the ends of the cans in such a manner that they may be inserted through right angled slots 86 on diametrically opposite sides of the cover flanges 78 in such a manner as to form a bayonet joint with the pins 82 and 84. Thumb screws 88 may be provided on the pins 82 and 84 to secure the covers in place on the cans.

The cans may be supported in any suitable manner between the ends 28 and 30 of the frame 32. In the embodiment illustrated in Figs. 1 to 7, the cans are rigidly mounted on a yoke 90 having a supporting beam 92, preferably of channel iron, on which the cans are mounted, and having end arms 94 and 96 extending forwardly at right angles to a point beyond the center lines of the cans. Mounted on the outer faces of the arms 94 and 96, respectively, are plates 98 and 100 having gudgeons 102 and 104 which are journaled in bearings 106 and 108 in the ends 28 and 30 respectively and thus support the frame or yoke and the cans mounted thereon. Stops 110 and 112 are mounted on the ends 28 and 30 at either side of and slightly below the bearings 106 and 108 against which the arms 94 and 96 strike when the yoke is swung through 180 degrees to upright or inverted position to prevent the cans from being rotated past the vertical and preventing the warp from being thrown over the opposite edge of the cans. A handle 114 is also mounted on the arm 94 by means of which the yoke may be rotated.

In this construction, all of the cans are swung when any can is to be inverted or rotated back to upright position. The cans are therefore rigidly mounted on the beam 92 by means of brackets 120. The brackets 120 have a substantially flat base 122 provided with ears 124 and 126 through which bolts 128 may be inserted to fasten the brackets to the beam 92. The bracket also comprises a pair of semi-circular arms 130 and 132 extending forwardly from the base 122 to surround the outer surface of the can, and to which the can is directly attached. To provide a firm attachment for the cans and avoid a stress at their central portions the arms are widened at their ends and at other places in their circumference to form attachment wings to which the surfaces of the cans are attached by means of rivets 136 or other suitable means. The ends of the arms are slightly spaced as at 138 to correspond with the slots 36—44 and to permit the warp to pass therebetween.

A somewhat different manner of supporting the cans is shown in the modification of Figs. 9 to 12, in which the cans are so arranged that they may be rotated individually, four cans being shown by way of example. In this case the cans are mounted in split encircling rings 140 having their split portions coinciding with the slots 36 to 40 of the cans and having supporting wings 142 similar to those of the brackets 120. The rings are so mounted as to be rotatable relative to each other and rotatable in the end supports 28 and 30 of the supporting frame 32. For this purpose each of the intermediate rings is provided at one side with a gudgeon 144 which is journaled and supported in a projecting bearing 146 on the opposite side of the next adjacent ring so that the rings form a chain or train extending between and spanning the distance between the end supports 28 and 30. The end rings are provided with similar gudgeons and bearings but the outer gudgeon 148 of one end ring 140, shown at the right in Fig. 10, is extended through the bearing 108 and the projecting end is provided with a hand wheel 150 by means of which the gudgeon, and with it the end can, may be rotated. In a similar manner, the projecting bearing at the other end can is provided with an extension 152 through the opposite bearing 106 of the opposite end 28.

To hold the cans in straight, rigid position the end of the hollow bearings 146 is flattened outwardly to form a plate 154 which abuts and slides on a complementary plate 156 attached to a boss 158 on the adjacent side of the next can supporting ring. Each pair of plates 154 and 156 is provided with holes which are in alignment when the adjacent cans are in the same position and through which a pin 160 may be passed to lock adjacent cans together. Thus, as soon as a can is filled it is locked to the next adjacent empty can and rotated therewith as a unit. The end plate 156 of the end can also has an abutting plate 161 secured on a collar 162 on the end gudgeon 148, in such a manner as to hold the cans in position.

With this construction, the first two cans should be always locked together and the others may be independently rotatable and locked together as the cans are filled.

The supporting frame may be of any suitable construction and may when necessary have intermediate supporting posts so arranged that the yarn connecting the coils does not cross these supports as the cans are rotated. The frames may be provided with casters or wheels 164 by which they may be transferred to the dye vats or other apparatus.

By means of my invention, not only small warps but also the tenderest and most refractory of yarns may be thus treated. My

invention therefore is not only a labor saving device but in a new and novel manner achieves results in the handling of chain warps not hitherto possible.

As changes of construction could be made within the scope of my invention, it is intended that all matter contained in the above description or shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense.

Having described the invention, what I claim and desire to secure by Letters Patent is:

1. A method of handling warp which comprises, coiling said warp upwardly in a can, continuing said warp from the upper part of said can to the upper part of an adjacent can, inverting said cans and coiling said warp in said second can in the opposite direction from that of said first can.

2. A method of handling warp which comprises, coiling warp upwardly in a can, continuing said warp from the upper part of said can to the upper part of an adjacent can, inverting said cans, coiling said warp in said second can in the opposite direction from that of said first can and drawing the warp from adjacent cans from the portions connecting the upper parts of said coils.

3. A method of handling warp which comprises, coiling said warp in seperate coils, adjacent coils being built up alternately from opposite directions and having connecting portions alternately at opposite ends of said coils.

4. Apparatus of the type described which comprises, a series of cans having longitudinal slots in the forward sides of said cans and means for rotatably mounting said cans on a common axis at right angles to the center lines of the cans.

5. Apparatus of the type described which comprises, a series of cans having longitudinal slots in the forward sides of the cans, means for rotatably mounting said cans on a common axis at right angles to the center lines of the cans and removable covers for said cans.

6. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting frame for said cans, and means for rotatably mounting said cans between the ends of said supporting frame.

7. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting beam at the rear of said cans and brackets mounting said cans on said beam.

8. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting beam at the rear of said cans, and brackets mounted on said beam and having arms encircling and supporting said cans to a point short of said slots.

9. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting frame, a yoke rotatably mounted on said frame, and means for attaching said cans to said yoke to leave said slots unobstructed.

10. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting frame, a yoke rotatably mounted on said frame, means for attaching said cans to said yoke to leave said slots unobstructed, and removable covers for said cans.

11. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting frame, a yoke rotatably mounted on said frame, brackets on said yoke having arms encircling said cans to points short of said slots, removable covers for said cans and stops limiting the rotation of said yoke and cans.

12. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting frame, a yoke rotatably mounted on said frame, brackets on said yoke having arms encircling said cans to points short of said slots, removable covers for said cans, and removable bottoms for alternate cans of said series.

13. Apparatus of the type described which comprises, a series of cans having slots in their forward sides, a supporting frame, a yoke rotatably mounted on said frame, brackets on said yoke having arms encircling said cans to points short of said slots, said cans having flanged upper edges notched opposite said slot and covers for said cans having downwardly depending flanges and lugs insertable through said notches and said slot.

14. Apparatus of the type described which comprises, a supporting frame, a series of cans between the end members of said frame, and supporting members for said cans having interfitting gudgeons and bearings and pivotally mounted on a horizontal axis on said frame.

15. Apparatus of the type described which comprises, a supporting frame, a series of cans having slots in their forward sides, supporting rings for said cans, means for supporting said rings on said frame rotatable relatively to each other and to said frame and means for locking adjacent cans to rotate together.

16. Apparatus of the type described which comprises, a supporting frame, a series of cans having slots in their forward sides, supporting rings for said cans, means for supporting the end rings on said frame and

means for supporting the intermediate rings and cans between said end rings in rotatable relation to each other.

17. Apparatus of the type described which comprises, a supporting frame, a series of cans having slots in their forward sides, supporting rings for said cans having a split at said slots, each of the intermediate rings having a gudgeon at one side and a bearing at the opposite side to receive a similar gudgeon, and the end rings being supported on said frame.

18. Apparatus of the type described which comprises, a supporting frame, a series of cans having slots in their forward sides, supporting rings for said cans having a split corresponding with said slots, the intermediate rings of said series having a gudgeon at one side and a bearing at the opposite side to receive a similar gudgeon of the adjacent ring, the end rings being supported on said frame and abutting plates sliding on each other between and attached to adjacent rings.

19. Apparatus of the type described which comprises, a supporting frame, a series of cans having slots in their forward sides, supporting rings for said cans having a split corresponding with said slots, the intermediate rings of said series having a gudgeon at one side and a bearing at the opposite side to receive a similar gudgeon of the adjacent ring, the end rings being supported on said frame abutting plates slidable on each other between and attached to adjacent rings, and locking pins for adjacent plates.

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