Sept. 13, 1932. L. S. ROSENER 1,876,761

FESTOONING APPARATUS

Filed Oct. 15, 1928 2 Sheets-Sheet 1

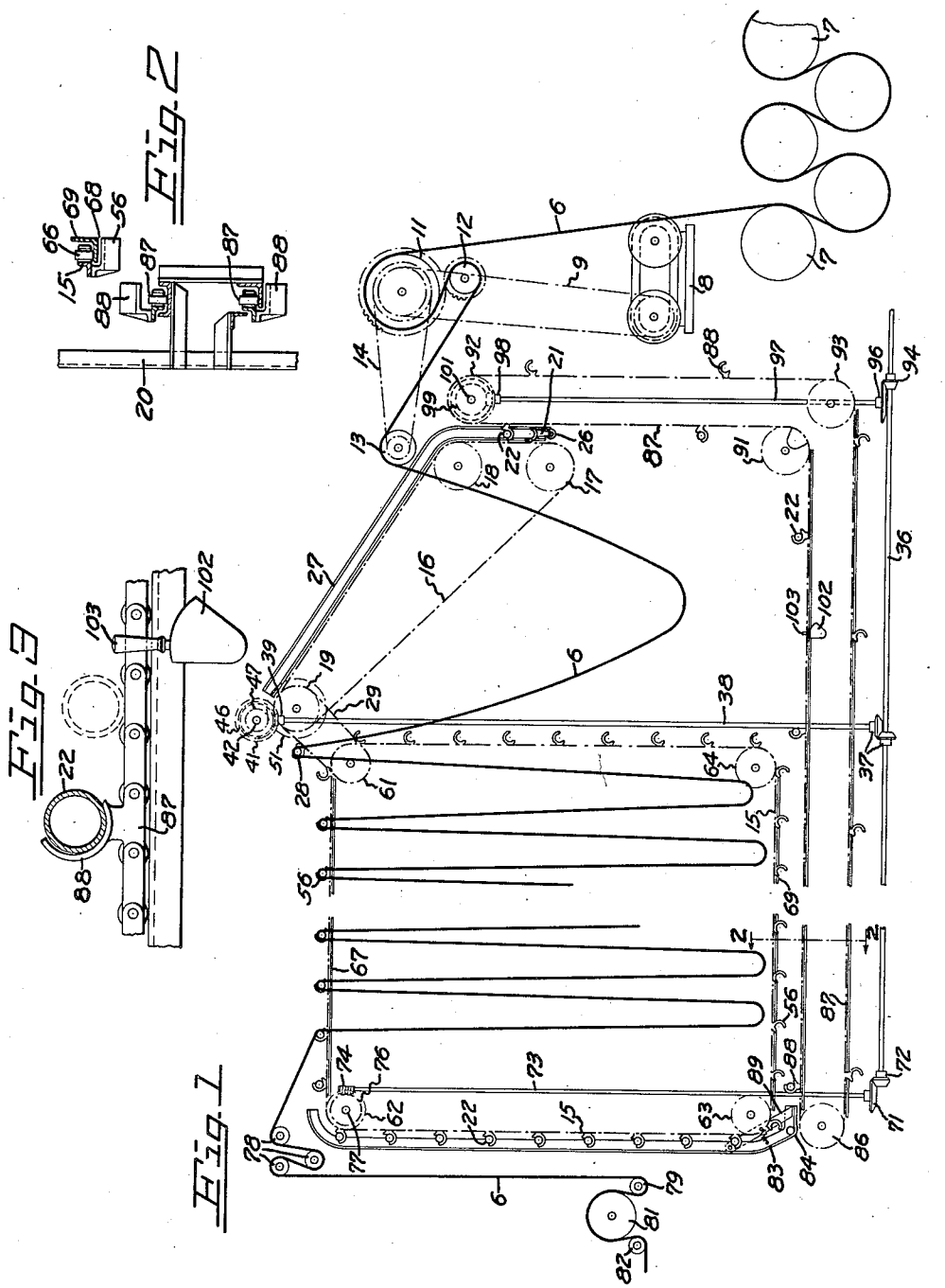


Fig. 2

Fig. 3

Fig. 1

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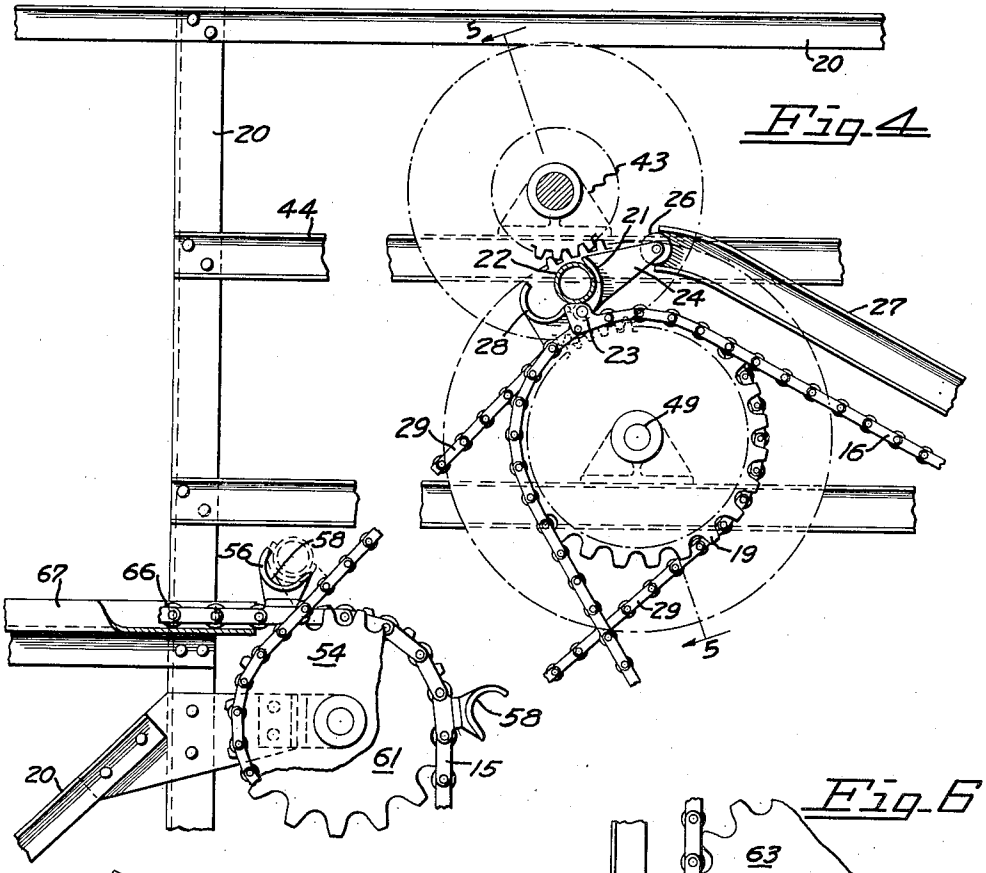


Fig. 4

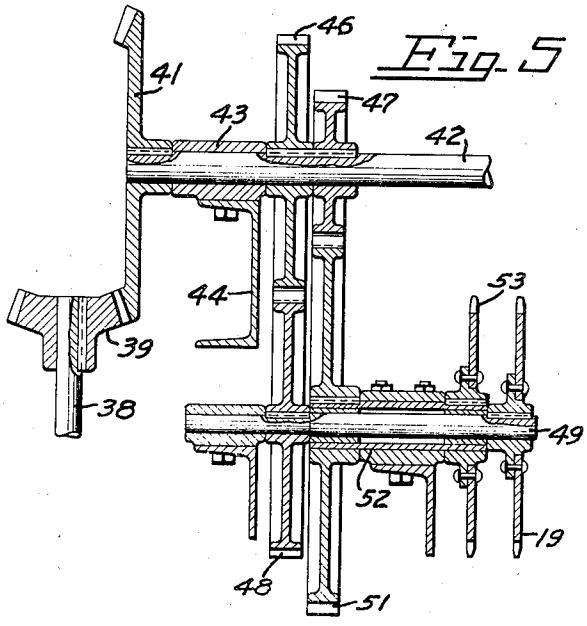


Fig. 5

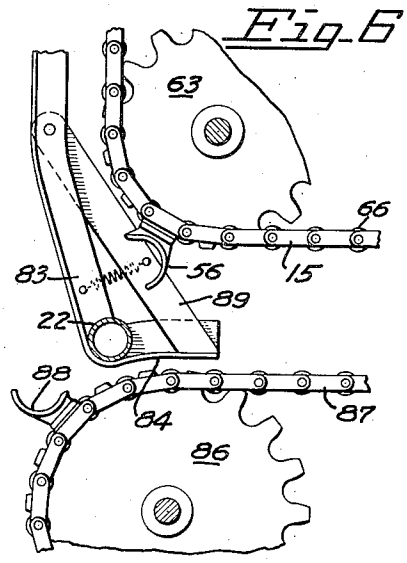


Fig. 6

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UNITED STATES PATENT OFFICE

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FESTOONING APPARATUS

Application filed October 15, 1928. Serial No. 312,481.

My invention relates to apparatus for handling, during the course of its manufacture, a web of paper, felt, or like material in loops or festoons, and particularly to machines for handling composition roofing in this manner, in order that it may cool and set before being wound into rolls.

An object of my invention is to provide an apparatus which will receive a web as it comes from the coating or other treating devices and form it into loops of definite size and spacing; and to do this with improved mechanism so that interruptions are reduced to a minimum.

Another object of my invention is the provision in an apparatus of the character described of loop holding bars which are at all times definitely positioned with respect to the rest of the mechanism.

Another object of my invention is the provision of means in the apparatus of the character described for transferring the bars between various conveyors comprising the device.

A further object of my invention is the provision of an apparatus for performing the functions described, which is compact in arrangement and which operates efficiently.

My invention possesses other objects and valuable features, some of which will be set forth in the following description of my invention which is illustrated in the drawings forming part of the specification. It is to be understood that I do not limit myself to the showing made by the said description and drawings, as I may adopt varying forms of my invention within the scope of the claims.

Referring to the drawings:

Figure 1 is a diagrammatic side elevational view of the apparatus of my invention. A portion of the apparatus is omitted to shorten the view.

Figure 2 is a sectional view taken on the line 2—2 of Figure 1, illustrating in detail the chain, cradle and track arrangement.

Figure 3 is a side elevational view of a portion of the upper horizontal reach of the return conveyor shown in Figure 1, illustrating automatic means for stopping the conveyor.

Figure 4 is a detail elevation, partly in section, of the mechanism for transferring the looped web to the loop transporting conveyor. A portion of the structure is omitted to shorten the view.

Figure 5 is a sectional view taken on the line 5—5 of Figure 4.

Figure 6 is a detail elevation, partly in section, illustrating means interposed between the web transporting conveyor and return conveyor for transferring bars.

In the manufacture of strip roofing material, paper and other allied materials, a web of the material is usually subjected to a treating process. For example, in the manufacture of roofing material, a fabric web may be first saturated and coated with a heated bituminous substance, and then surfaced with a powder such as soapstone. After the treatment, it is necessary to allow cooling thereof, so that the saturant may harden and set. To do this without interruption of the process, the treated web is slowly transported away from the treating means; and it cools during the transportation thereof.

The apparatus of my invention is designed to transport the web in loops supported on bars carried by a slow moving conveyor. Continuity of operation and uniformity of cooling are prime objects in handling a web in this manner; therefore it is desirable to have the loops on the conveyor each of uniform size and spacing so that adjacent loops do not contact. Also it is desirable to have a fixed number of bars always on the web transporting conveyor and to prevent jamming of the bars. My apparatus is constructed to perform these important functions.

Broadly, my invention comprises a conveyor adapted to transport a succession of bars while holding the web in loops. Means are provided for feeding the web so that it is looped on the bars, and transfer conveying means is provided for transporting and depositing the loop-holding bars onto the loop-transporting conveyor. The web is un-

looped by means adjacent the loop-transporting conveyor so that the bars are unloaded, and a return conveyor is provided for transporting the unloaded bars back toward the feeding means, where they are picked up by the transfer means and brought into contact with the web to hold it in loops.

Preferably, each of the conveyors is provided with cradles for definitely positioning the bars thereon. The conveyors are driven at a fixed speed ratio, and the bar holding means on the conveyors are separated by a distance directly proportional to their speeds so that bars may be transferred from one conveyor to the other in a fixed cycle.

As a specific embodiment of my invention, I have taken for illustration a festooning apparatus for transporting, during the cooling thereof, composition roofing material.

The apparatus comprises a feed mechanism which draws the continuous web 6 over a plurality of water cooled rollers 7. Preferably the web is a strip of roofing felt saturated and coated with bituminous material by well known methods and means, and then surfaced with powdered soapstone, mica, slate or other similar substance, also by well known means. Cooling rollers 7 are for effecting a preliminary cooling of the web; and to economize space the rollers are in pairs staggeredly arranged. Suitable known means are provided for journaling and driving the rollers, and for supplying them with water.

For driving the feed mechanism at various selected speeds to control the length of the loops, a "Reeves" variable speed drive 8, of well known construction, is provided. The drive is connected by a chain 9 with a large roll 11 to which is geared a smaller roll 12, positioned below and with its axis slightly behind the large roll. The rolls comprise the feeding means or mechanism for the web which passes in a tortuous path through cooling rolls 7 and is then passed up from the cooling rolls over roll 11, back between the rolls and around and under roll 12, its arc of contact with each roll being over 180°. The web 6 is then passed diagonally upward over a third feed roll 13 driven by a chain 14 from the roll 11.

The parts are so arranged that the peripheral speed of each roll is the same, and the frictional engagement of the rolls with the web pulls it up from the rolls 7 and delivers it over the roll 13 to a loop-transporting conveyor 15, which is adapted to move at a slower speed than the feeding means so that the web sags of its own weight in a loop. All of the feed rollers are journaled in suitable supports and are water cooled in a manner similar to rolls 7.

Means are provided for transferring the web in loops onto the loop-transporting conveyor. Adjacent the feeding means is a looper or transfer conveyor comprising a pair of similar endless chains 16 spaced apart a distance somewhat greater than the width of the web, which droops between them from the feed roller 13. Each chain of the conveyor passes over a pair of sprockets 17 and 18, which are preferably arranged in vertical alinement, and thence preferably diagonally upward over the driving sprocket 19 and back to the sprocket 17. The sprockets 17, 18 and 19 are journaled on a suitable metal framework for supporting all the parts of the apparatus and indicated by reference character 20 in Figures 2 and 4. Also corresponding sprockets for each chain are mounted in axial alinement.

Pivotally mounted on each chain 16 of the transfer conveyor is an arcuate cradle 21, shown in detail in Figure 4. The cradle is shaped to seat the ends of the bars or pipes 22 adapted to hold the web in loops, and is pivoted to a wing 23 on one of the chain links. Extending away from the bar seat on the cradle is an arm 24 which carries on its end a roller 26. This roller engages a track 27 which is over and parallels the chain 16 from adjacent the sprocket 17 to adjacent the sprocket 19, and prevents the cradle from turning on its pivotal mounting over this part of its travel.

The cradles are axially alined on the chains and engage the bars 22 on the vertical reach of the conveyor and bear them in sucession from below the web, which loops down over each bar, into contact with the web to hold it in loops. Each loop-holding bar is then carried up to and partly over the sprockets 19 by the cradles. At this point it is deposited onto the cradles 28 which are rigidly mounted on the spaced chains 29 of a second but shorter and more slowly moving transfer conveyor. The rollers 26 here disengage the track, leaving the cradles 21 free to turn on their pivots and so disengage the bar. The cradles 21 then pass beneath the bar after it rests in the second transfer conveyor cradles and hang freely until they reach the sprocket 17, where the rollers again engage the track 27 and the operation is repeated.

Both of the transfer conveyors are driven from a main drive shaft 36 through the bevel gears 37 and the vertical shaft 38, which carries a bevel pinion 39 at its upper end. This pinion, as shown by Figure 5 in detail, meshes with a gear 41 fixed on a horizontal shaft 42 which extends transversely across the entire mechanism, journaled in bearings 43 carried by the channels 44 which form a portion of the frame 20 of the machine. Keyed adjacent each end of the shaft are a large spur gear 46 and a smaller gear 47. The larger gear meshes with a gear 48 keyed to a short shaft 49 which carries at its other end the drive sprocket 19 of the first transfer conveyor. The smaller gear 47 meshes

with a gear 51 keyed to a hollow shaft 52, surrounding the shaft 49, and to which a sprocket 53 is fixed. The sprockets 53, on each side of the machine, are the drive sprockets for the chains of the second transfer conveyor.

The chains of the second transfer conveyor extend diagonally downward from the sprockets 53 over the sprockets 54. The bars are lowered by the conveyor into the cradles 56 fixed to the spaced endless chains of the loop-transporting conveyor 15. The loop-transporting conveyor moves at a speed slower than that of the second transfer conveyor and which bears a fixed ratio thereto. The cradles on the conveyors are spaced by a distance which is directly proportional to the conveyor speed, and the relation of the conveyors is so adjusted that as the bars reach the end of one conveyor the cradles of the next are positioned to receive them. The cradles 56 have substantially semi-circular seats 58 set at an angle of about 45° with the chains. The seats pass directly in the path of the bars on the second transfer conveyor, and therefore receive the bars while the more rapidly moving second or intermediate speed transfer conveyor cradles drop away beneath them.

It is on the loop-transporting conveyor that the actual cooling of the web takes place. The water-cooled rolls, over which the web passes before reaching the conveyor, chill the surface so that it does not stick, but many more cooling rolls would be required to cool the web completely. It has been found more satisfactory to allow the web to cool slowly and naturally on the conveyor, as this allows the bituminous saturant to "temper" and minimizes cracking as the roofing is rolled or unrolled.

The loop-transporting conveyor 15 is accordingly made large enough to hold all of the web produced in a period equal to the cooling time. The web is festooned in loops which may be thirty or forty feet long, spaced by a distance which depends upon the type of material handled, but which is conveniently of the order of about five feet. On this basis, a conveyor two hundred feet long will handle from twenty-four hundred to thirty-two hundred feet of web at one time. If desired, the conveyor may be made to hold the production of a full working day and the web may be left on the conveyor overnight, thus giving a full 24-hour cooling period.

The loop-transporting conveyor 15 comprises a pair of spaced endless chains, each of which runs over pairs of axially alined sprockets 61, 62, 63 and 64 arranged at the corners of supporting framework 20, which is preferably of rectangular shape; and sprockets 61 are journaled independently of, but in axial alignment with, the lower sprockets 54 of the second transfer conveyor, as shown clearly in Figure 4. The upper substantially horizontal reach of the conveyor carries the web and the lower substantially horizontal or return reach passes below the ends of the web loops held by the bars on the upper reach. The return reach is connected with the upper reach by substantially vertical ascending and descending reaches.

Inasmuch as the web transporting conveyor is of considerable length, the horizontal reaches of the conveyor chains are preferably supported on tracks. With specific reference to Figures 4 and 2, the rollers 66 on the upper reach of the conveyor chains run on the track 67 fixed to the framework 20. The bar-holding cradles 56 extend downwardly on the lower reach of the chain, hence they are all made of U-shaped section to provide a slot 68 for permitting the rollers 66 of the lower reach to ride on the angle track 69 fixed to the frame.

Means are provided for driving conveyor 15, preferably from common drive means for all the conveyors. Connected with the main drive shaft 36 by means of bevel gears 71 and 72 is the vertical shaft 73 having the worm 74 which meshes with a worm wheel 76. The worm wheel is keyed to a shaft 77 journaled on the frame and extending across the machine, and to which are fixed the chain sprockets 62.

Adjacent the discharge end of the conveyor is the unlooping mechanism, comprising a set of rolls 78 over which the web passes in a tortuous path. From the rolls 78, the web passes downwardly under the guide roll 79, over the large take-off roll 81, under a second guide roll 82, and so away from the apparatus. The unlooping, take-off and guide rolls are journaled in suitable supports, and the unlooping and take-off rolls are driven in any known manner; therefore they are only diagrammatically shown.

The angle of the seats of the cradles 56 holds the bars against the pull of the web passing to the unlooping means, and the bars remain in the cradles as they pass over the sprockets 62 and down the descending reach of the conveyor. As the cradles pass under the sprockets 63 into the return reach, they dump the bars, which fall into receivers 83 adjacent the descending reach of the conveyor, the upper portion of the receivers serving as guards.

This bar receiving means is merely to transfer the bars from the loop-transporting conveyor to a more rapidly moving conveyor which returns the bars toward the web feeding means. Each receiver comprises a pair of angle-irons arranged parallel to the descending reach of the conveyor chains 15 and having hooked lower ends 84 which engage the bars as they are discharged from the cradles 56. The hooked ends are substantially concentric with the sprockets 86 which carry

the spaced endless chains 87 of the bar-returning conveyor. Cradles 88, similar to the cradles 56 and mounted on the chains 87, engage the bars in the receivers and remove them therefrom, as they come around the sprockets 86. It is to be noted that the receiver does not act as a magazine, but merely as a transferring device, to pass the bars from the slow speed conveyor to the higher speed return conveyor. But one bar at a time is held in the receiver. To prevent the possibility of bars bouncing out of the receivers when they are deposited therein, a spring-held gate 89 is provided to yieldingly hold the bars.

The chains 87 pass from the sprocket 86 along a horizontal reach beneath the loops, around sprockets 91 into an ascending reach, over drive sprockets 92 at the top of this reach and down to sprockets 93, about which they turn into the lower horizontal reach which leads back to the sprockets 86. The distance between the cradles 88 bears a ratio to that of the cradles 56 which is directly proportional to the speed of the chains. The former distance bears an integral ratio to the circumference of the sprockets 91, the rims of which are notched so that the cradles, holding the bars, may pass under them and into the ascending reach of the return conveyor without interference. Both of the horizontal reaches of the return conveyor are supported on tracks, similar to the supports for the horizontal reaches of the loop-transporting conveyor 15.

It is to be noted that the upper end of the return conveyor ascending reach is parallel to the vertical reach of the looper or first transfer conveyor 16 and spaced from its plane by a little more than the diameter of the bars. When the bars reach this portion of their journey, the cradles 21 of the latter conveyor, traveling much more rapidly than those on the return conveyor, come up beneath the bars and lift them from the cradles 88 to start on another cycle of travel. The drive of the bar-returning conveyor is similar to the others, being from the bevel pinion 94 on the main power shaft 36, gear 96, vertical shaft 97 and bevel pinion 98 to the gear 99, which is keyed to the shaft 101 carrying the sprockets 92.

From the preceding description, it is seen that all the conveyors of the apparatus are driven from a single power shaft, the prime mover of which is preferably an electric motor; and in the event that a bar should be off its cradle, means are provided to stop the conveyors so as to prevent jamming. Such means is advantageously located adjacent the notched sprocket 91, because a serious jamming would occur with a possibility of breaking the return conveyor chains if a bar became unseated at this point. A switch 102 for stopping the motor is placed adjacent the return conveyor near the sprocket 91. The switch handle 103 is so positioned that if the bars are properly seated on the cradles they will pass thereover. However, if a bar should be off its holding means, it would be carried against the switch handle, which would be thus moved to open an electric circuit and stop the motor, and consequently all the conveyors of the apparatus.

It will be noted that in the machine described, the major sources of wastage and interruption have been eliminated. The fixed position of the loops on the conveyors prevents the contacting of adjacent loops, which is the principal cause of spoilage. The direct transfer of loops between the conveyors, which is only possible with fixed speed ratios and positioning, prevents jamming of the bars and service interruption. The chief danger of this system is the shock to the web as it is transferred from a fast moving cradle to a slow moving one, and this is minimized by the use of a transfer conveyor traveling at a speed intermediate between that of the looper and the loop-transporting conveyor.

Furthermore, in the apparatus of my invention the unlooping of the web is not entirely dependent upon movement of the conveyors, for if the conveyors are stopped for a short period, the unlooping is not interrupted. This is of special advantage where the web has remained in loops on the loop holding bars overnight, since in the morning the dried web may be unlooped before the apparatus is started.

I claim:

1. In an apparatus for handling a looped web, a plurality of bars adapted to hold the web, a conveyor for transporting a succession of said bars while holding the web in loops, means adjacent one end of the conveyor for feeding the web thereto, means adjacent the other end of the conveyor for unlooping the web to unload the bars, a conveyor adjacent the feeding means for conveying a succession of said unloaded bars from below the web into contact therewith to hold it in loops, and a transfer conveyor for transporting said loop-holding bars from the second mentioned conveyor and depositing them on the first mentioned conveyor.

2. In an apparatus for handling a looped web, a plurality of bars adapted to hold the web, a conveyor for transporting a succession of said bars while holding the web in loops, means adjacent one end of the conveyor for feeding the web thereto, means adjacent the other end of the conveyor for unlooping the web to unload the bars, means including a return conveyor for transporting a succession of said unloaded bars toward the feeding means to a position below the web, a transfer conveyor for transporting the unloaded bars from the return conveyor

into contact with the web to hold it in loops, and a second transfer conveyor for transporting the loopholding bars from the first transfer conveyor and depositing them on the loop-transporting conveyor.

3. In an apparatus for handling a looped web, a plurality of bars adapted to hold the web, a slow speed conveyor for transporting a succession of said bars while holding the web in loops, means adjacent one end of the conveyor for feeding the web thereto, said feeding means being adapted to move the web at a faster speed than the conveyor speed to loop the web, a transfer conveyor adapted to move at a faster speed than the web-transporting conveyor and adjacent the feeding means, means for conveying a succession of said bars from below the web onto the transfer conveyor to contact with the web and hold it in loops, and a second transfer conveyor adapted to move at a slower speed than the first transfer conveyor for transporting the loop-holding bars from the first transfer conveyor and depositing them on the loop-transporting conveyor.

4. In an apparatus for handling a looped web, a succession of bars for holding the web in loops, means for feeding the web on the bars, means for unlooping the web to unload the bars, a conveyor having a substantially horizontal reach for transporting the loop-holding bars to the unlooping means and a descending reach for transporting the unloaded bars from the unlooping means, means at the foot of the descending reach for receiving the unloaded bars, means for yieldingly holding the bars in the receiving means, and a return conveyor for transporting said bars from the receiving means toward the feeding means.

5. In an apparatus for handling a looped web, a succession of bars for holding the web in loops, means for unlooping the web to unload the bars, an endless conveyor comprising a pair of spaced chains between which the web may pass and having a substantially horizontal upper reach and a descending reach, and cradles on said conveyor shaped to hold the loop-holding bars on the upper reach and the unloaded bars on the descending reach.

6. In an apparatus for handling a looped web, a succession of bars for holding the web in loops, means for unlooping the web to unload the bars, an endless conveyor comprising a pair of spaced chains between which the web may pass and having a substantially horizontal upper reach and a descending reach, cradles on said conveyor shaped to hold the loop-holding bars on the upper reach and the unloaded bars on the descending reach, and means including a second endless conveyor having a reach lying below the first conveyor for conveying the unloaded bars from the descending reach of the first conveyor.

7. In an apparatus for handling a looped web, a succession of bars for holding the web in loops, means for feeding the web on the bars, means for unlooping the web to unload the bars, a conveyor for transporting the loop-holding bars to the unlooping means, means including a return conveyor for transporting the unloaded bars toward the feeding means, said return conveyor having a horizontal and ascending reach, a plurality of cradles on the return conveyor for holding the bars, and a sprocket for turning said return conveyor from the horizontal to the ascending reach and having a notch therein to clear said cradles.

8. In an apparatus for handling a looped web, an endless conveyor for transporting bars, cradles on said conveyor for holding the bars, a sprocket overrunning said conveyor and having a notch therein to clear said cradles, and means for stopping said conveyor should a bar be off its cradle.

9. In an apparatus for handling a looped web, an endless conveyor for transporting bars, cradles on said conveyor for holding the bars, a sprocket overrunning said conveyor and having a notch therein to clear said cradles, and means adjacent the sprocket for stopping said conveyor should a bar be off its cradle.

10. In an apparatus for handling a looped web, a conveyor for transporting bars, means on said conveyor for holding the bars, and means for stopping said conveyor should a bar be off its holding means.

11. In an apparatus for handling a looped web, a plurality of conveyors for transporting bars in a closed path, driving means for said conveyors, means on each of said conveyors for holding the bars, and means for stopping all of said conveyors should a bar be off its holding means on one of said conveyors.

12. In an apparatus for handling a looped web, an endless conveyor for transporting bars, cradles on said conveyor for holding the bars, and a sprocket overrunning said conveyor and having a notch in the rim thereof to clear said cradles, said cradles being uniformly spaced a distance bearing an integral ratio to the circumference of the sprocket.

13. In an apparatus for handling a looped web, a plurality of bars adapted to hold the web, a slow speed conveyor for transporting a succession of said bars while holding the web in loops, a high speed conveyor for transporting a succession of said bars, an intermediate speed conveyor for transferring the bars from the high speed to the low speed conveyor, and means on each conveyor for definitely positioning the bars thereon.

14. In an apparatus for handling a looped web, a plurality of bars adapted to hold the web, a slow speed conveyor for transporting a succession of said bars while holding the web in loops, a high speed conveyor for transporting a succession of said bars, means on each conveyor for definitely positioning the bars thereon, and means interposed between said conveyors for minimizing the shock of transferring the bars from the high speed to the low speed conveyor.

15. In an apparatus for handling a looped web, a plurality of bars adapted to hold the web, a loop-transporting conveyor having a horizontal and a descending reach, the horizontal reach serving to transport a succession of said bars while holding the web in loops, means adjacent one end of said horizontal reach for feeding the web thereto, means adjacent the other end of the horizontal reach for unlooping the web to unload the bars, said descending reach serving to lower the unloaded bars, a return conveyor positioned to receive the bars from said descending reach and having an ascending reach for elevating the bars, a loop-forming conveyor arranged to receive the bars from the ascending reach of said return conveyor and having an inclined ascending reach for carrying the bars from below the web into contact therewith to hold it in loops, and a transfer conveyor for conveying said loop-holding bars from the loop-forming conveyor and depositing them on the horizontal reach of the loop-transporting conveyor, all of said conveyors being provided with means for holding the bars.

In testimony whereof, I have hereunto set my hand.

LELAND S. ROSENER.