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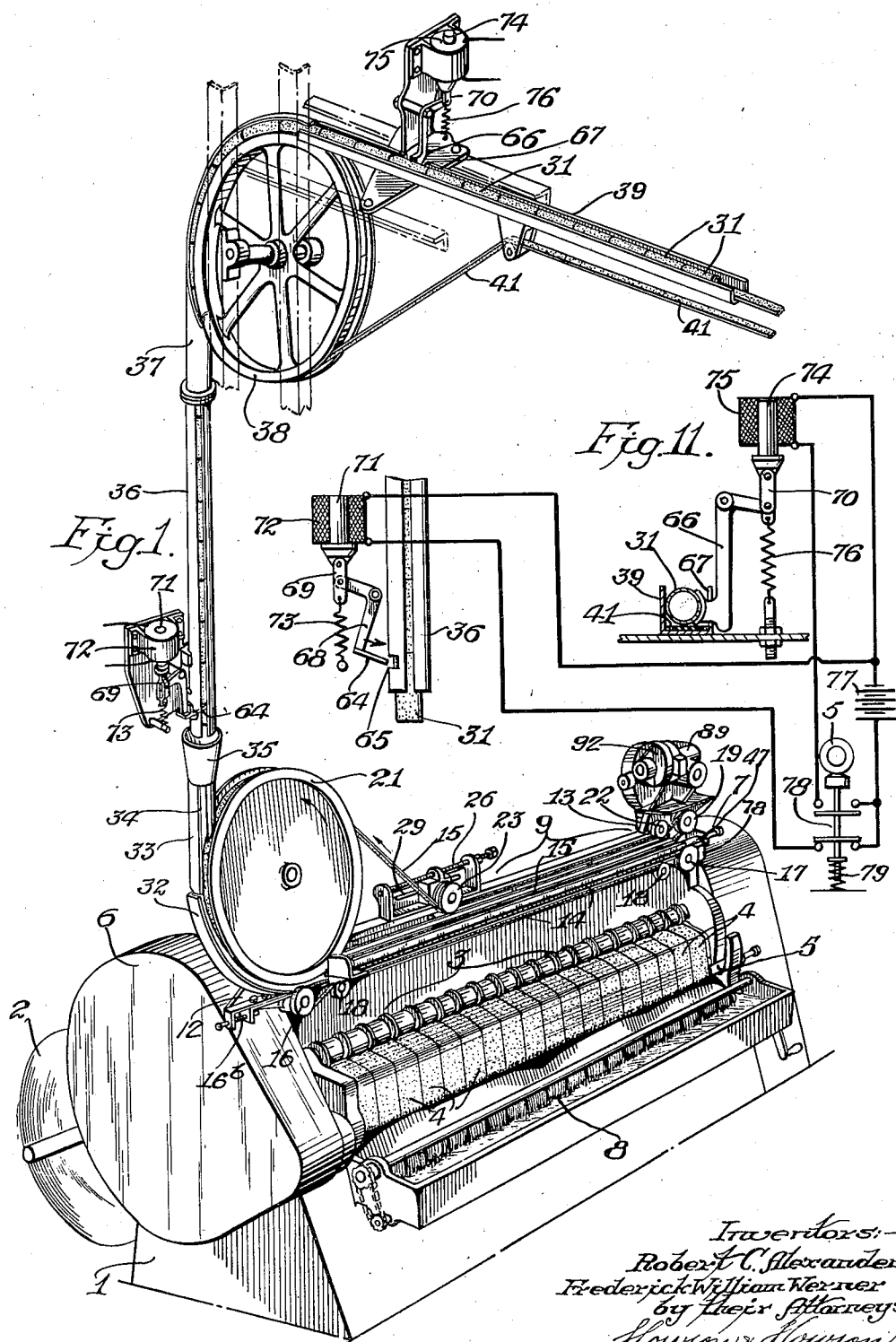
R. C. ALEXANDER ET AL

2,264,468

MECHANISM FOR LOADING TUBULAR ELEMENTS ON BARS

Filed Jan. 27, 1939

3 Sheets-Sheet 1



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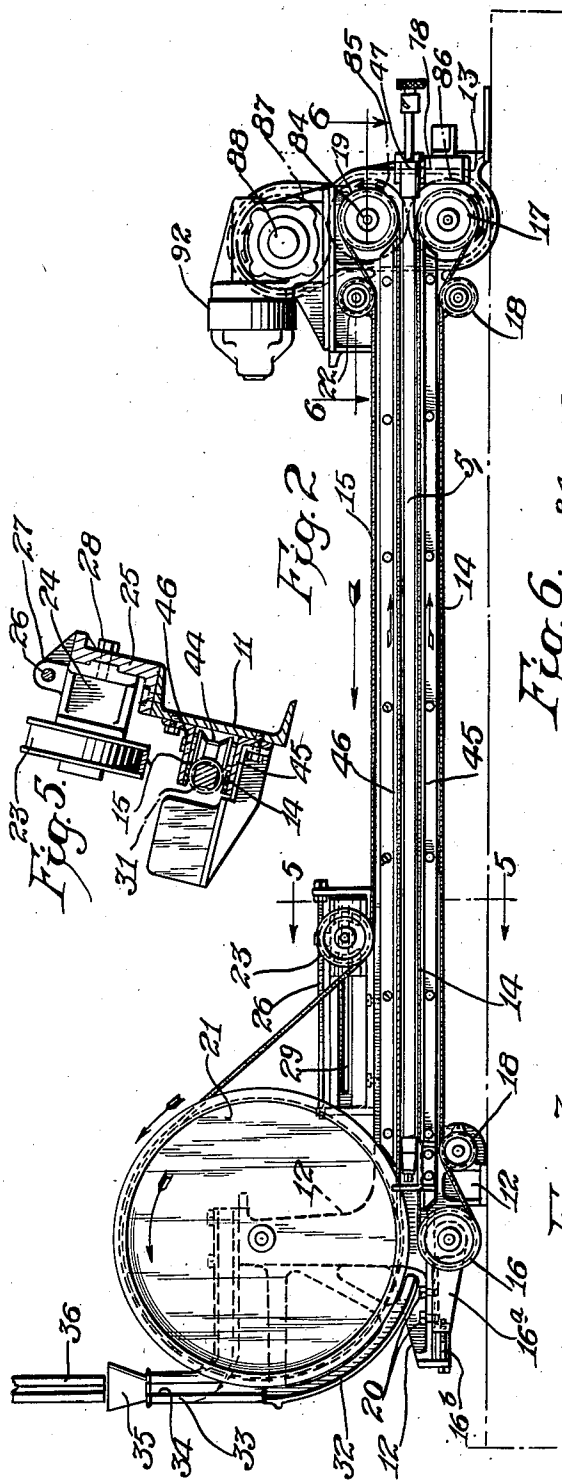
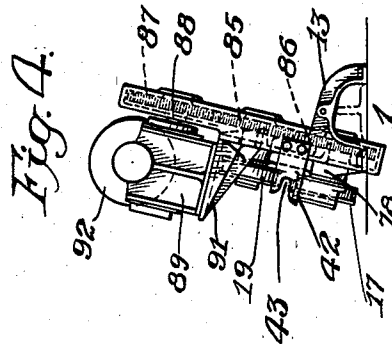
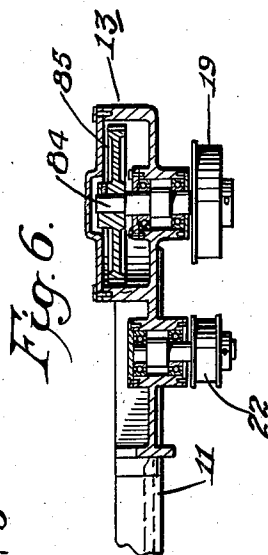
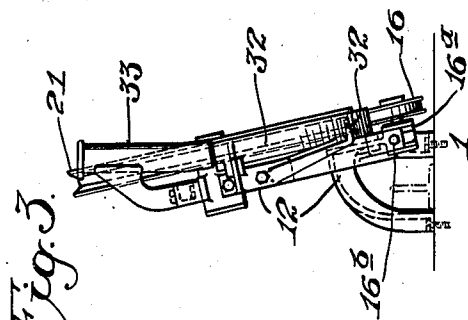
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MECHANISM FOR LOADING TUBULAR ELEMENTS ON BARS

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3 Sheets-Sheet 2



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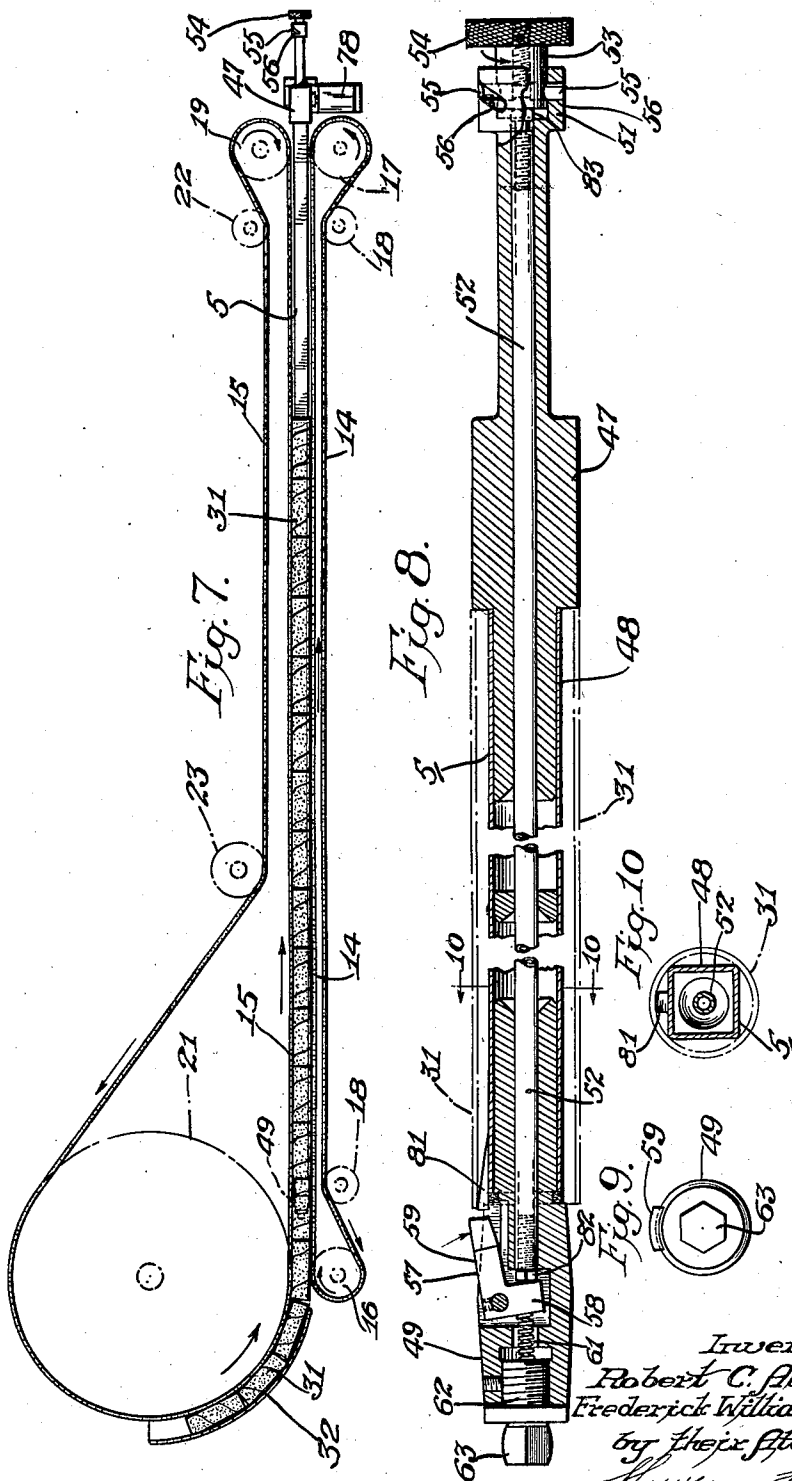
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MECHANISM FOR LOADING TUBULAR ELEMENTS ON BARS

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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MECHANISM FOR LOADING TUBULAR ELEMENTS ON BARS

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7 Claims. (Cl. 214—8)

In the manufacture of rolls of paper for toilet purposes, it is customary to wind the paper on tubular cores composed usually of cardboard. This winding operation is carried out in machines developed for that purpose, wherein a plurality of the cores are supported in end-to-end relation upon a winding bar which rotates in the machine. After formation of the plurality of rolls upon the bar, the latter is removed from the machine to be replaced by another bar carrying a new set of the tubular cores, and the winding operation is repeated.

Heretofore the practice has been to load the tubular cores on the bar by hand. The principal object of the present invention is to facilitate this operation by provision of a mechanical loading means, this mechanism preferably being mounted upon and, therefore, forming a part of the winding machine. The loading mechanism, however, may be formed as a unit for use apart from the winding machine if desired.

In the attached drawings:

Figure 1 is a view in perspective of a roll-winding machine equipped with a loading mechanism made in accordance with our invention;

Fig. 2 is an enlarged front elevational view of the loading mechanism, which in the present instance is formed as a unit for mounting upon the winding machine;

Figs. 3 and 4 are end elevational views of the unit from opposite ends of the latter respectively;

Fig. 5 is a sectional view on the line 5—5, Fig. 2;

Fig. 6 is a sectional view on the line 6—6, Fig. 2;

Fig. 7 is a skeleton view showing certain details of the loading mechanism;

Fig. 8 is a longitudinal sectional view of a winding bar made in accordance with the invention;

Fig. 9 is an end view of the winding bar as viewed from the left in Fig. 8;

Fig. 10 is a section on the line 10—10, Fig. 8, and

Fig. 11 is a diagrammatic view illustrating an electric control system forming a part of the mechanism as hereinafter set forth.

In Fig. 1, we have illustrated a winding machine of conventional type which consists essentially of a base or frame 1, means for supporting a supply roll 2 of paper, a series of rotary slitters 3 to which the paper web drawn from the roll 2 is conducted and which divides the web longitudinally into a plurality of strips 4 of required width, and means for supporting a winding bar

5 of the character previously described for rotation about its longitudinal axis. The machine also comprises mechanism within the housings 6 and 7 for actuating the slitters 3 and the winding bar 5. Means is provided, as indicated at 8, for applying glue to the tubular cores supported on the winding bar 5, or to the ends of the paper strips 4, for adhesively securing said strips to the cores at the start of the winding operation.

The loading mechanism forming the subject of the present invention is, in the present instance, mounted as a unit at the top of the winding machine, and in Fig. 1, this unit is designated generally by the reference numeral 9. The details of the mechanism are best shown in Figs. 2 to 7, inclusive. The unit consists of a longitudinal channel bar 11, the opposite ends of which are suitably secured to castings 12 and 13, respectively, which form the pedestal supports for the unit and which, with the channel 11, form the supporting frame for the operating mechanism.

The operating mechanism consists in part of two endless belts 14 and 15 arranged one over the other, as best illustrated in Fig. 7. The lower belt 14 is supported at opposite ends of the unit upon flanged pulleys, 16 and 17 respectively, and is tensioned by idlers 18, 18 engaging the under run of the belt. The pulley 16 is journaled upon a block 16a, and this block is adjustably secured to the casting 12 in a manner permitting adjustment of the pulley 16, through the medium of an adjusting screw 16b, with respect to the pulley 17. Screws 20 rigidly secure the block 16a in adjusted position on the casting 12. The upper belt 15 is supported at one end of the unit upon a flanged pulley 19, and at the opposite end upon a relatively large flanged pulley 21, and this belt in turn is tensioned by idlers 22 and 23. The idler 23, as shown in Figs. 2 and 5, is journaled upon a block 24, which is slidably supported upon a bracket 25 secured to the top of the channel 11, and adjustment of the wheel 23 longitudinally of the bracket 25 and with respect to the wheel 21 is obtained through the medium of an adjusting screw 26, which is rotatably mounted in the bracket 25 and passes through a threaded lug 27 on the member 24. Bolts 28 are provided for securing the member 24 in adjusted position to the bracket 25, these bolts passing through a longitudinal slot 29 in the bracket. The lower run of the belt 15 extends parallel to the upper run of the belt 14, and is spaced from the upper run of the latter conveyor to an extent corresponding to or slightly less than the outside di-

ameter of the cylindrical cores 31, see Figs. 5 and 7, upon which in the winding machine the paper strips 4 are wound.

Supported on the frame of the unit and embracing the lower outside quadrant of the pulley wheel 21 is a guide segment 32, the lower end of this guide lying in proximity to the adjoining end of the upper run of the conveyor 14 at the point where the two conveyers begin their parallel run. The guide 32 and the opposed portion of the flanged wheel 21 form a channel which is in effect an extension of a tubular channel 33, the latter channel extending upwardly from the guide 32. The tube 33 is split longitudinally at its forward side, as indicated at 34, and has at the top a funneled extension 35. From the mouth of this funnel a second split tube 36 extends upwardly, and has at its upper end a section 37 which forms a guide channel embracing a segmental portion of a flanged pulley 38, see Fig. 1. From the top of the pulley 38 a trough 39 extends transversely, and an endless belt 41 operates on the pulley 38 and extends in its upper run in the bottom of the trough 39. The arrangement is such that the cylindrical cores 31 carried through the trough on the upper run of the belt 41 pass into the upper end of the guide section 37, and by the action of the belt 41 and pulley 38, and by gravity, move downwardly through the tube 36, and through the funnel 35 and the tube 33 to the guide 32. At this point, the belt 15 operates upon the cores to carry them downwardly through the guide 32 to the space between the parallel runs of the belts 14 and 15. The belts 14 and 15, which travel in the directions indicated by the arrows in Fig. 7, carry the tubes longitudinally of the belts towards the right-hand end of the unit, as viewed in the several drawings.

It will be noted by reference to Figs. 3, 4 and 5, that the pulleys 16, 17, 19 and 21 upon which the belts 14 and 15 operate are mounted in a plane which is somewhat inclined to the perpendicular, and that the parallel runs of the belts 14 and 15 occupy planes which are correspondingly inclined to the horizontal. Means is provided for supporting a winder bar 5 in the space between these slightly inclined parallel runs of the conveyers 14 and 15, as shown in Figs. 2 and 7, so that as the tubular cores 31 advance toward the conveyers 14 and 15 toward the right-hand end of the unit as viewed in the various drawings, the cores will be caused to pass onto the said bar. The supporting means for the bar between the belts 14 and 15 consists in the present instance of a bracket arm 42, which as shown in Fig. 4 is secured to the frame of the unit at the right-hand end of the latter, and beyond the pulleys 17 and 19 which support the belts, said bracket extending in alignment with the space between the parallel runs of the belts and having at its outer end a socket recess 43 which receives one end of the winder bar 5 and supports that end of the bar in alignment with and centrally between the parallel runs of the belts. The other end of the bar 5 is supported, as shown in Fig. 5, upon a spool-shaped roller 44 which is journaled in and between angle brackets 45 and 46 secured to the channel 11 and between which the belts 14 and 15 run as shown.

As shown in Figs. 2 and 7, the bar 5 has towards the right-hand end, as viewed in those drawings, a collar 47 which by engagement with

the inner face of the bracket support 42 holds the bar in position against the longitudinal thrust imposed by the belts 14 and 15. The rearward inclination of the plane of the belt-supporting pulleys referred to above permits the bar to be retained by gravity in position between the belts resting against the roller 44 at one end and in the socket 43 at the other end, and precludes accidental displacement of the bar from this normal operative position.

The form of the bar itself is shown in Figs. 8 to 10, inclusive. As therein illustrated, the intermediate and main portion 48 of the bar, upon which the tubular cores 31 are supported, is rectangular in form. This rectangular form terminates at one end in the cylindrical collar 47 previously referred to, and terminates at the other end in a cylindrical tip 49, this tip tapering from its mid section in both directions, that is, towards the terminal end of the bar and towards the end of the rectangular section 48 from which the tip extends. From the outer end of the collar 47 the bar extends to the opposite terminal end portion 51.

The entire bar as described above, including the tip 49 and the terminal portion 51, is hollow to provide for reception at the center of a longitudinally extending tubular rod 52. One end of this rod, which is slidable longitudinally of the bar, is engaged by a cylindrical member 53, this member being mounted for rotary movement in the counterbored outer end of the terminal portion 51, and having on its outer end a knurled flange 54 by means of which the said member may be rotated with respect to the body of the bar. The member 53 is provided also with radial pins 55, 55 which project into slots 56 in the terminal member 51 of the bar, these slots 56 being disposed angularly with respect to the longitudinal axis of the bar so that as the member 53 is rotated about its axis, which corresponds to the longitudinal axis of the bar, the said member 53 is moved bodily in the axial direction. When the member 53 is thus moved axially to the left, as viewed in Fig. 8, the movement is necessarily accompanied by a corresponding axial movement of the rod 52 in the same direction.

The opposite end of the rod 52 engages the inner end of a pivoted latch element 57 which is mounted in a recess in the tip 49 and which takes the form of a bell crank lever one arm 58 of which extends substantially in the radial direction and is engaged by the end of the rod 52, and the other arm 59 of which extends in the axial direction and towards the adjoining end of the rectangular mid section 48 of the bar. A spring 61 is confined between the outer side of the arm 58 of this latch member and the inner end of a screw plug 62 which is threaded into the outer end of the tip 49, the spring 61 exerting pressure against the latch 57 in opposition to the thrust of the rod 52. It is apparent that when under these conditions the member 53 is turned so as to move it axially to the right, as shown in Fig. 8, thus drawing the member 53 away from the adjoining end of the rod 52, the spring 61 will act through the arm 58 of the latch 57 to move the rod 52 to the right, and will move the arm 59 of the latch 57 into the elevated or extended position, as shown in Fig. 8. When on the other hand the rod 52 is moved to the left, as previously described, the latch 57 is retracted in the direction of the arrow in Fig. 8

to the position which it occupies during the loading operation.

With the bar 5 in position between the belts 14 and 15, as previously described and as shown in Fig. 7, the tubular cores 31 under actuation of the belts 14 and 15 will pass freely over the conical tip 49 and onto the rectangular section 48 of the bar. As shown in Fig. 10, this rectangular section of the bar is so dimensioned with respect to the diameter of the tubes that the latter will fit snugly upon the four corners of this section of the bar, there being sufficient frictional engagement between the cores and the bar to insure the cores rotating with the bar when the latter is subsequently inserted in the winding machine. Rotation of the bar in the machine during the winding operation is effected through the medium of the hexagonal extension 63, which in the machine fits into a correspondingly formed chuck in the driving mechanism.

The winding bar 5 is adapted to hold a number of cylindrical cores 31 corresponding to the number of individual strips 4 formed by the slitters 3 from the paper web withdrawn from the roll 2. It is necessary, therefore, to limit the number of the core tubes 31 passing to the bar to this specified number. This is accomplished by the device illustrated in Figs. 1 and 11, said device consisting of a stop 64 which operates through an opening 65 in the side of the feed tube 36; and by a second stop 66 located at one side of the trough 39 and operative through an opening 67 in the side of the latter.

The stop 64 is carried at one end of a bell crank lever 68, the other arm of this lever being pivotally secured through a link 69 to the plunger 71 of a solenoid 72. A spring 73 attached to the bottom of the link 69 tends to draw the link downwardly so as to swing the bell crank lever 68 in the direction of the arrow in Fig. 11, thereby causing the stop 64 to enter the tube 36 through the opening 65, see Fig. 1, whereby the tube is obstructed. When the solenoid 72 is energized, the stop 64 is withdrawn from the tube, as shown in Fig. 11, so that the cores may pass freely downwardly through the tube 36 and into the underlying conical section 35.

The stop 66 takes the form of a bell crank lever the lower end of which is adapted to bear against the side of one of the tubular cores 31 and, by pressing the core against the side of the trough 39, to immobilize the core in the trough. The other end of this bell crank lever is connected through a link 70 to the lower end of the plunger 74 of a solenoid 75, and a spring 76 attached to the lower end of the link 70 tends to draw this link downward and to move the stop 66 into the operative position, as illustrated in Fig. 11. The distance longitudinally of the conveyer between the stop 64 and the stop 66 is such that the exact number of cylindrical cores 31 to constitute one full charge or loading of the bar 5 is confined between these stops. Thus with reference to Fig. 1, if the stop 66 is actuated so as to immobilize that one of the cylindrical cores 31 which lies directly opposite the stop in the trough 39 and the stop 64 is simultaneously withdrawn, the number of cores then passing down the conveyer to the belts 14 and 15 will be sufficient to form one complete load upon the bar 5 which has been positioned, as shown in Fig. 2, between the belts 14 and 15 to receive the cores. If subsequently the stop 64 is moved to the operative position and the stop 66 released, the tubu-

lar cores will then pass down the conveyer until their movement is interrupted by the stop 64, and the mechanism will be ready for a second charging operation.

The stops 64 and 66 are connected in an electrical circuit, as shown in Fig. 11, to obtain the required synchronized operation of these stops in the aforescribed operations. Both the solenoids 72 and 75 are energized from the source of current designated by the reference numeral 77, and the connection between the source and the solenoids is controlled by a double pole switch shown at 78. Normally the switch 78 is actuated by a spring 79 to close that part of the circuit which includes the solenoid 75 of the stop 66, so that this stop will be withdrawn from the operative position. Under these conditions also, the circuit of the solenoid 72 is broken so that the solenoid 72 is deenergized, with the result that the stop 64 is moved by the spring 73 into the operative or conveyer-obstructing position, as shown in Fig. 1. Under these conditions, the belt 41 and the wheel 38 will operate to advance the tubular cores 31 previously inserted in the trough 39 downwardly into the conveyer tube 36 to the point where further progress of the cores is prevented by the stop 64. This condition is shown in Fig. 1. When now the switch 78 is depressed against the pressure of the spring 79 so that, as shown in Fig. 11, the circuit of the solenoid 75 is broken and the circuit of the solenoid 72 is completed, the stop 66 will immediately be thrown into the operative position, preventing the passage of the tubular cores past that point to the conveyer, and the stop 64 will be withdrawn to permit those tubular cores 31 which at the moment lie beyond the stop 66 to pass downwardly to the belts 14 and 15 and onto the bar 5.

In order to make this synchronized operation of the stops semi-automatic and to insure that the stops will not be operated in the absence of a bar from charging position between the belts 14 and 15, the switch 78 is located so that the latter will be depressed by the bar itself when the latter is inserted in the device and occupies the normal position between the belts 14 and 15. Thus in Figs. 2, 7 and 11, the bar 5 is shown as bearing upon the upper end of the switch 78, thereby forcing the switch downwardly against the pressure of the spring 79 to an extent breaking the circuit of the solenoid 75 and closing the circuit of the solenoid 72. Immediately upon this actuation of the switch through the medium of the bar 5, the stops function to permit passage of the predetermined number of tubular cores to the bar. When the bar has been charged and is removed from the machine, the switch 78 is actuated by the spring 79 to advance the stop 64 into the operative position and to withdraw the stop 66.

Again referring to Fig. 8, it will be noted that when the arm 59 of the lever 57 is in the elevated position, as shown, it forms a stop preventing removal of the cores from the bar until the arm 59 has again been depressed. In Fig. 8, the complete charge of the tubular cores 31 is indicated by the broken lines, and it will be noted that the stop 59 by engaging the end of the terminal tube of the series will confine the cores between the said stop and the near end of the collar 47. During the charging operation and as previously set forth, the stop arm 59 is depressed by manipulation of the rod 52, so that the core tubes may pass freely over the conical tip and onto the rectangular section 48 of the bar.

When the particular charging operation is completed, the member 53 is retracted to release the rod 52 and to permit the spring 61 to elevate the stop 59. Thereafter, the rod can be removed from the device and placed in the winding machine to receive the strips 4 without danger of the cores being displaced from the tube, and with assurance also that the cores will be held upon the bar in proper relative positions to receive the ends of the paper strips 4. After or prior to completion of the winding operation, the stop 59 may again be retracted, as previously described, to permit the wound rolls to pass from the bar. It will be noted that on the rectangular portion of the bar and immediately opposite the end of the stop 59, we have provided a wedge-like elevation 81 which prevents collapse or inward distortion of the core tube at that point and which affords assurance that the rolls in discharging from the bar will pass freely over the depressed end of the stop 59. It will be noted further that the rod 52 is internally threaded at each end for reception of screws 82 and 83, through the medium of which the effective length of the rod 52 may be adjusted to fit snugly between the arm 58 of the stop lever 57 at one end and the inner end of the member 53 at the other.

In the normal operation of the winding machine, two of the bars 5 may be used so that one may be loaded during the period of winding the rolls upon the other. On the other hand, one of the loading units described above is sufficient to keep loaded the bars for several winding machines.

It will be noted by reference to Figs. 2, 4 and 6 that the spindle 84 of the pulley wheel 19 has affixed thereto a gear 85. This gear meshes with a corresponding gear 86 on the spindle of the pulley 17, and also with a gear 87 which is secured to the shaft 88 of a speed reduction unit 89. The unit 89 is mounted on a bracket 91 supported on the casting 13 and on the channel 11, and this bracket also forms a support for a motor 92 which is operatively connected with the reduction gear. Through the gear train the motor 92 drives the belts continuously in synchronized relation.

It will be apparent that there may be some modification of the mechanism as described without departure from the invention.

We claim:

1. In mechanism for loading tubular elements on a bar, the combination with a pair of laterally disposed longitudinally movable conveyer elements arranged in spaced parallel relation for frictional engagement with opposite sides of said tubular elements, said conveyer elements being arranged in superimposed parallel planes inclined to the horizontal, means for feeding said tubular elements axially between said conveyer elements, and means for supporting said bar in the space between said conveyer elements in parallel alignment with the latter for reception of said tubular elements, said supporting means comprising an element loosely engaged with one side only of the receiving end of the bar so as to provide for passage of said elements onto the latter.

2. In mechanism for loading tubular elements on a bar, the combination with a pair of longitudinally movable conveyer belts having laterally disposed longitudinal portions arranged in spaced parallel relation for frictional engagement with the opposite sides of said tubular ele-

ments, said laterally disposed portions being arranged in superimposed parallel planes inclined to the horizontal, means for feeding said tubular elements longitudinally between said belts, and means for supporting said bar in the space between the said laterally disposed portions of said belts in parallel arrangement with the latter for reception of said tubular elements, said bar-supporting means comprising a fixed support for one end of said bar, and an anti-friction bearing for the other end of said bar arranged adjacent the lower longitudinal edges of said spaced parallel portions of the belts.

3. In mechanism for loading tubular elements on a bar, the combination with a pair of longitudinally movable conveyer belts arranged in parallel spaced relation for frictional engagement with opposite sides of said tubular elements, a pulley of relatively large radius supporting an end of one of said belts, guide means for directing said tubular elements axially around a portion of the circumference of said pulley and between the parallel belts, and means for supporting said bar between and in parallel relation to said belts and in the path of said tubular elements.

4. In mechanism for loading tubular elements on a bar, the combination with bar-supporting means, of mechanism for feeding said elements onto said bar, means for conveying said elements serially to said feeding mechanism, a pair of stop devices located in spaced relation longitudinally of said conveyer, each of said stops being operative to interrupt movement of said elements with the conveyer, and control means for said stops operative normally to apply that one of the stops which lies in relative proximity to the said feeding mechanism and to release the other of said stops, and means providing for actuation of said control means automatically when a bar is placed in said support to apply the last-named of said stops and to release the said proximate stop.

5. In mechanism for loading tubular elements on bars, the combination with means for detachably supporting a bar in relatively fixed position so as to leave one end thereof free to receive said elements, of means providing a stop for said tubes adjacent the other end of the bar, mechanism for delivering a predetermined number of the tubular elements in axially disposed series to the said free end of the bar as a load for the latter, and a traveling belt operatively associated with said support so as to extend in parallel proximity to said bar, said belt having a smooth face for sliding frictional engagement with said elements and being operative to advance said elements onto the bar from the point of said delivery and to maintain the elements in serially abutting relation against said stop.

6. In mechanism for loading tubular elements on bars, the combination with a bar having at one end a shoulder forming a stop for said tubular elements, of means for detachably supporting said bar in relatively fixed position so as to leave the other end thereof free to receive said elements, mechanism for delivering a predetermined number of the tubular elements in axially disposed series to the said free end of the bar as a load for the latter, and a traveling belt operatively associated with said support so as to extend in parallel proximity to said bar, said belt having a smooth face for sliding frictional engagement with said elements and being op-

erative to advance said elements onto the bar from the point of said delivery and to maintain the elements in serially abutting relation against said stop.

7. In mechanism for loading tubular elements 5 on bars, the combination with a bar having at one end a shoulder forming a stop for said tubular elements, of means for detachably supporting said bar in relatively fixed position so as to leave the other end thereof free to re- 10 ceive said elements, mechanism for delivering a predetermined number of the tubular elements in axially disposed series to the said free

end of the bar as a load for the latter, a traveling belt operatively associated with said support so as to extend in parallel proximity to said bar, said belt having a smooth face for sliding frictional engagement with said elements and being operative to advance said elements onto the bar from the point of said delivery and to maintain the elements in serially abutting relation against said stop, and retractable means at the said free end of the bar for confining the elements on the latter.

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