Dec. 26, 1961 H. P. BILLINGS 3,014,487

APPARATUS FOR FORMING BUNDLES OF TOBACCO LEAVES

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FIG. 1.

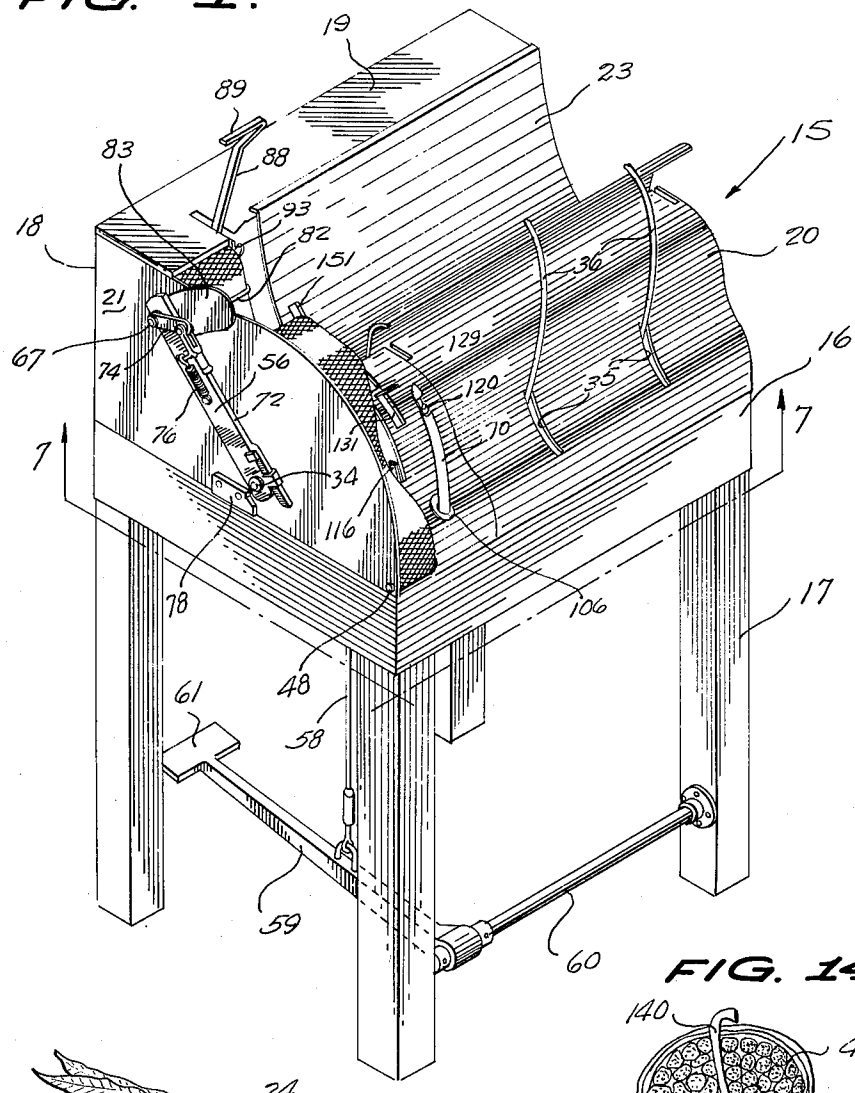
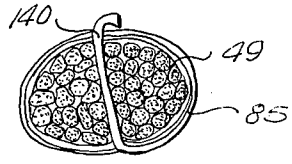


FIG. 14.



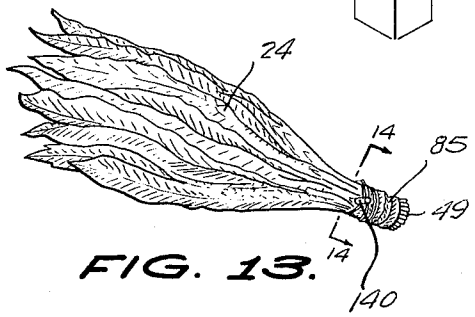


FIG. 13.

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APPARATUS FOR FORMING BUNDLES OF TOBACCO LEAVES

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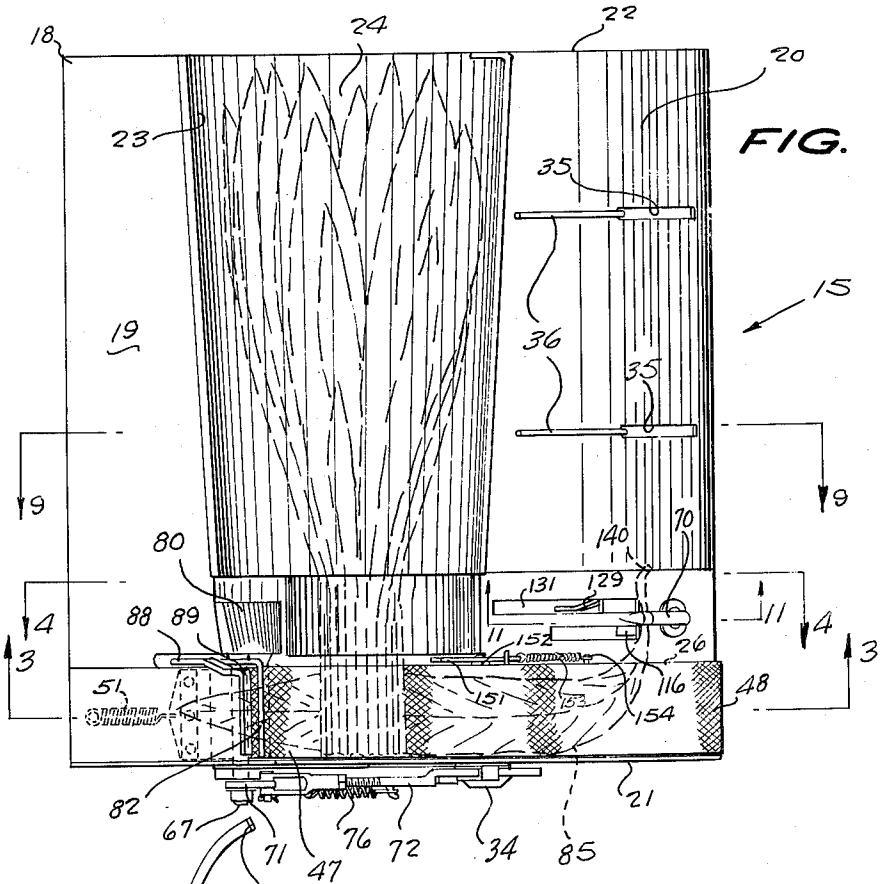


FIG. 2.

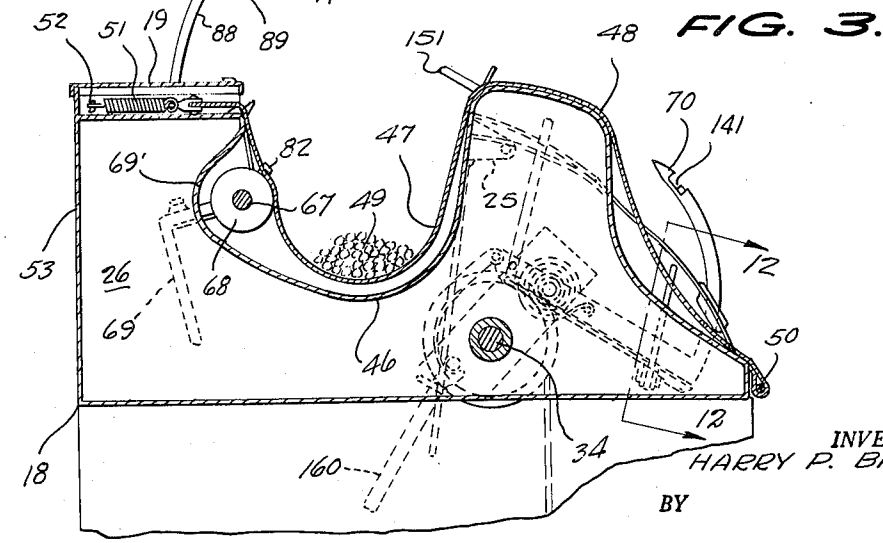


FIG. 3.

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APPARATUS FOR FORMING BUNDLES OF TOBACCO LEAVES

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FIG. 4.

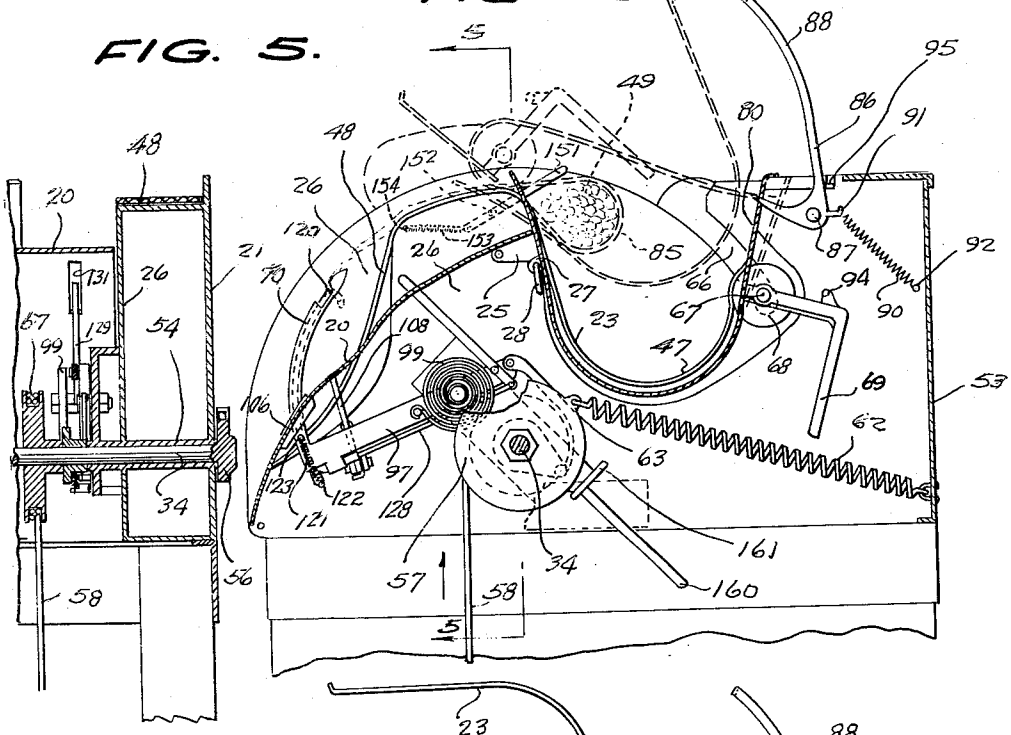
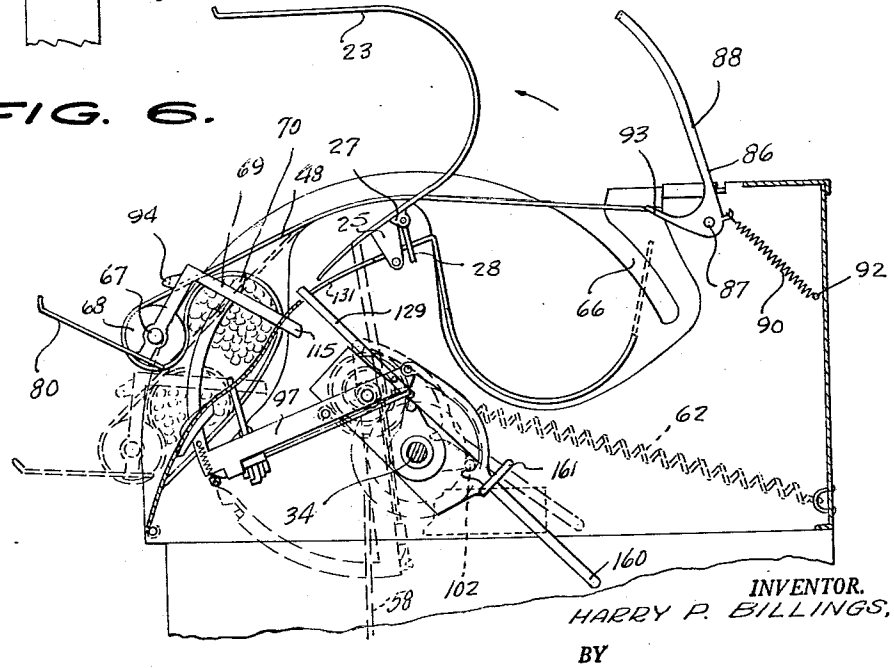


FIG. 5.

FIG. 6.



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FIG. 7.

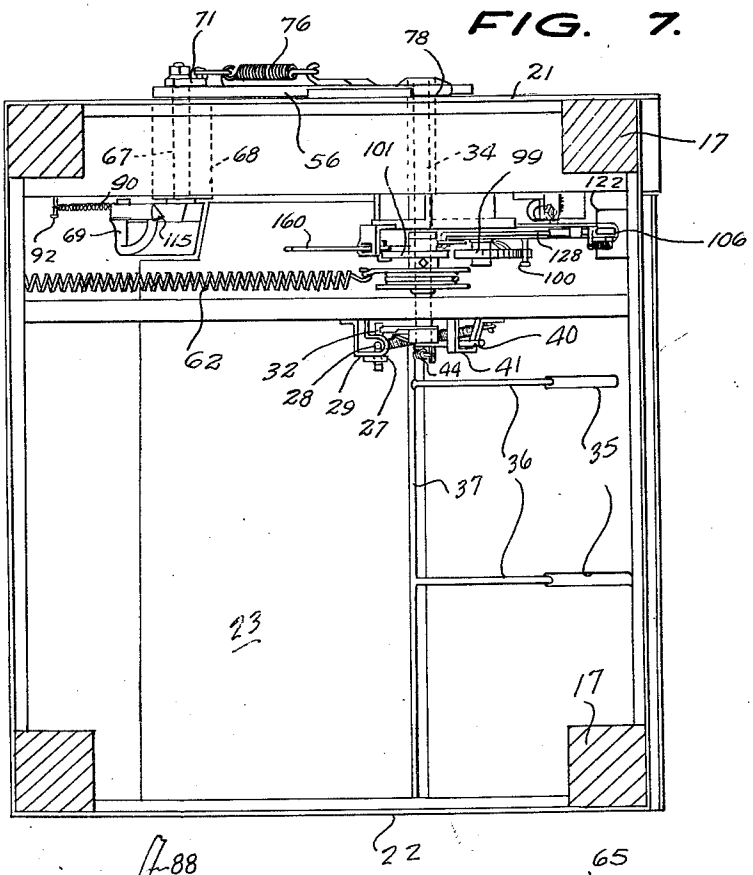
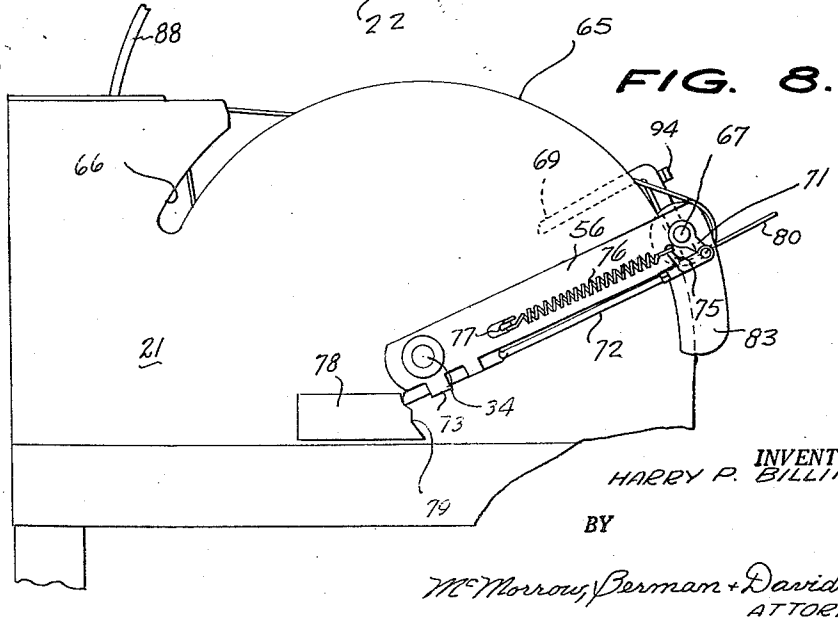


FIG. 8.



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FIG. 10.

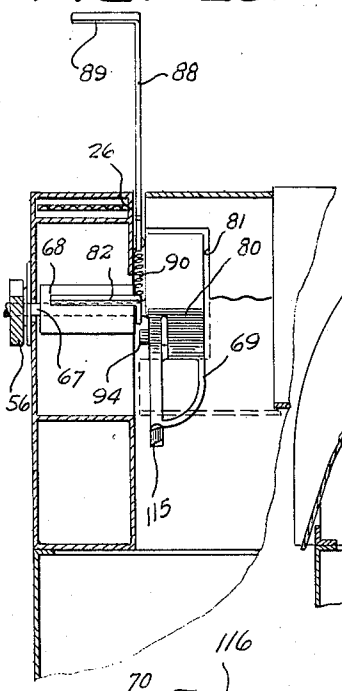


FIG. 9.

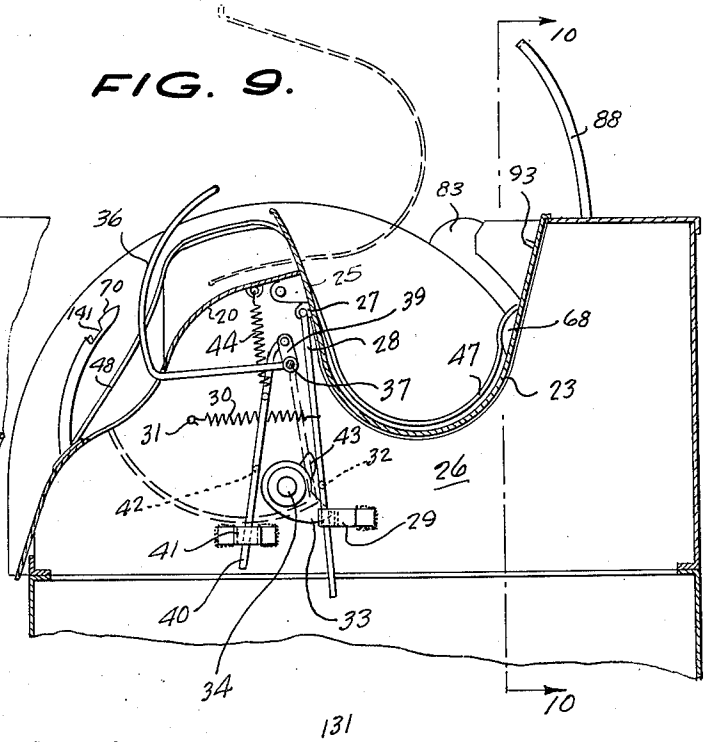
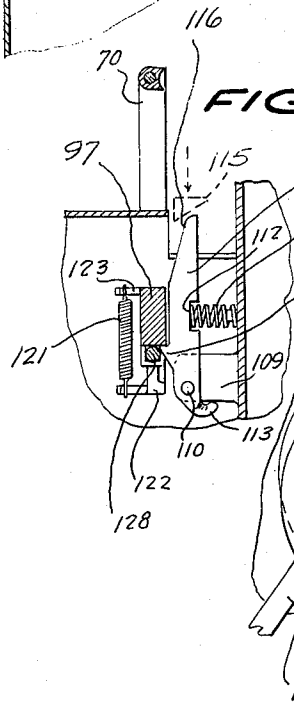


FIG. 12.



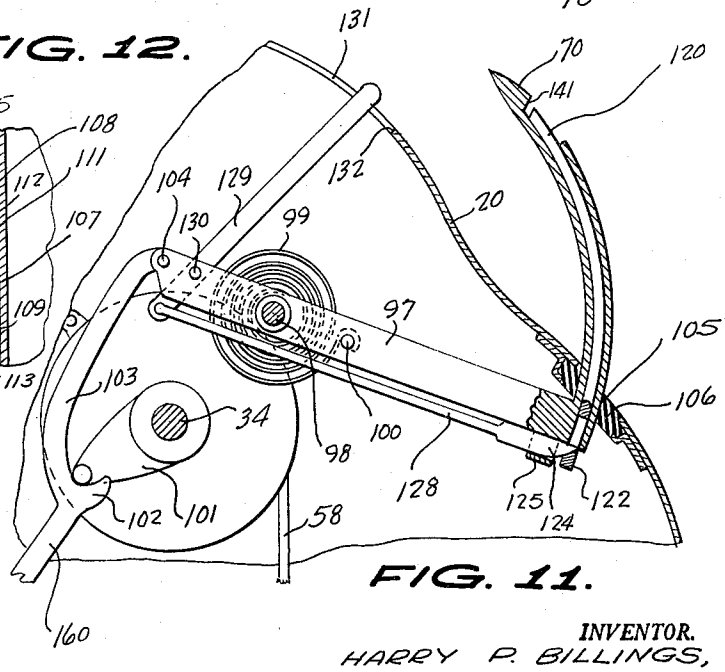


FIG. 11.

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United States Patent Office 3,014,487 Patented Dec. 26, 1961

3,014,487

APPARATUS FOR FORMING BUNDLES OF TOBACCO LEAVES

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Filed Apr. 1, 1960, Ser. No. 19,319
12 Claims. (Cl. 131—149)

This invention relates to apparatus for wrapping tobacco leaves, and more particularly to a device for forming bundles or "hands" of tobacco leaves by placing a desired number of leaves together and winding a leaf around the stems of the bundle of tobacco leaves.

A main object of the invention is to provide a novel and improved apparatus for forming bundles or "hands" of tobacco leaves, the apparatus being provided with means for automatically winding a leaf around the stems of a selected number of tobacco leaves and binding same to form a "hand" of tobacco, eliminating the necessity of fastening the winding leaf by hand, and enabling the bundles of tobacco leaves to be formed in a rapid and efficient manner.

A further object of the invention is to provide an improved apparatus for forming "hands" of tobacco leaves, the apparatus involving relatively inexpensive components, being reliable in operation, and substantially eliminating the tedious and time-consuming operations previously involved in producing bundles or "hands" of tobacco leaves.

A still further object of the invention is to provide an improved apparatus for forming "hands" of tobacco, the apparatus being relatively compact in size, being easy to operate, and accurately and securely binding the stems of the bundle of leaves after the binding leaf has been wound around the stems in a manner which involves practically no human effort and which requires a relatively short period of time as compared with the amount of time previously involved in producing a "hand" of tobacco by manual effort.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a perspective view of an improved apparatus for forming "hands" of tobacco in accordance with the present invention.

FIGURE 2 is a top plan view of the apparatus illustrated in FIGURE 1.

FIGURE 3 is a vertical cross sectional view taken substantially on the line 3—3 of FIGURE 2.

FIGURE 4 is a vertical cross sectional view taken substantially on the line 4—4 of FIGURE 2.

FIGURE 5 is a fragmentary vertical cross sectional view taken substantially on the line 5—5 of FIGURE 4.

FIGURE 6 is a view generally similar to FIGURE 4 but showing the positions of the parts when the apparatus is near the end of a cycle of operation thereof, namely, wherein the apparatus is about to release a bundle of tobacco leaves formed into a "hand" of tobacco.

FIGURE 7 is a horizontal cross sectional view taken substantially on the line 7—7 of FIGURE 1.

FIGURE 8 is a fragmentary side elevational view of the apparatus with the parts thereof substantially in the positions of FIGURE 6.

FIGURE 9 is a fragmentary vertical cross sectional view taken substantially on the line 9—9 of FIGURE 2.

FIGURE 10 is a fragmentary vertical cross sectional view taken substantially on the line 10—10 of FIGURE 9.

FIGURE 11 is an enlarged vertical cross sectional view taken substantially on the line 11—11 of FIGURE 2.

FIGURE 12 is an enlarged cross sectional detail view taken substantially on the line 12—12 of FIGURE 3.

FIGURE 13 is a perspective view of a completed bundle or "hand" of tobacco, as formed in the apparatus of FIGURES 1 to 12.

FIGURE 14 is an enlarged cross sectional view taken substantially on the line 14—14 of FIGURE 13, showing the manner in which the end of the stem of the securing leaf is engaged through the secured stems of the leaves of tobacco comprising the wrapped bundle or "hand."

Tobacco leaves are customarily formed into bundles or "hands" by the tobacco grower, and are ordinarily marketed in this form. Heretofore, the binding of the leaves of tobacco into bundles or "hands" has been performed manually and has required a considerable amount of tedious labor. In carrying out the operation manually, the desired number of tobacco leaves to form a budle or "hand" are gathered together in a bunch, with the stems located parallel and substantially coextensive with each other, and a wrapping or binding leaf is wound tightly around the stems of the bunch, producing the desired bundle or "hand" of tobacco leaves. This is not only a tedious and time-consuming job, but is quite tiring, as it involves considerable manual effort, and also requires a high degree of skill, since the operator must be able to hold the stems of the bunched leaves together tightly with one hand while winding the binding leaf around the stems and securing the end of the binding leaf to the bunched stems with his other hand.

The prime purpose of the present invention is to provide a mechanical means for quickly, easily and accurately bundling a selected quantity of tobacco leaves into "hands," thereby not only greatly reducing the labor cost involved in its operation, but also relieving the apparatus from physical discomfort and strain and speeding up the process of forming tobacco leaves into "hands" for subsequent marketing.

Referring to the drawings, 15 generally designates a tobacco bundling machine according to the present invention. The machine 15 comprises a generally rectangular frame 16 supported on legs 17 and provided with the sheet metal housing 18 which covers most of the elements of the mechanism associated with the machine. The housing 18 is provided with the horizontal front top wall portion 19 and with the generally sinuously curved, downwardly and rearwardly inclined rear top wall portion 20. The housing is provided with respective vertical side walls 21 and 22. Designated at 23 is a tray member which is generally U-shaped in cross section and which is of a width extending for the major portion of the width of the machine 15. As shown in FIGURE 2, the tray member 23 flares somewhat in width toward the side wall 22, and is of a size sufficient to receive a quantity of tobacco leaves 24 shown in dotted view in FIGURE 2 with the stem portions thereof disposed parallel and adjacent to each other and located at the side of the machine adjacent the vertical side wall 21. The tray member 23 is provided with pivot lugs 25 at its opposite ends which are pivotally connected respectively to the vertical side wall 22 and a transverse vertical inner wall 26 forming part of housing 18, the pivot lugs 25 being secured on one side wall of the tray member 23, namely, the rear side wall thereof, so that the tray member is swingable upwardly and rearwardly, as shown in dotted view in FIGURE 4, around a substantially longitudinal horizontal axis defined by the pivotal connections of the lugs 25.

The rear wall of the tray member 23 is provided with an operating lug 27 to which is connected an elevating link rod 28 which extends downwardly and which extends slidably through a guide bracket 29 secured to the transverse vertical wall member 26, the bracket 29 loosely engaging the rod 28 so that the rod is free to pivot, as required, in accordance with the rotation of the tray mem-

ber 23. A coiled spring 30 is connected between the intermediate portion of the elevating rod 28 and a pin 31 secured to the transverse wall member 26, biasing the rod 28 against the rear portion of the bracket 29, namely, in a direction toward the left, as viewed in FIGURE 9.

The elevating rod 28 is provided with a pin 32 projecting from the intermediate portion thereof, namely, the portion thereof located above the bracket member 29, the pin 32 being at times engageable by a cam lug 33 secured on the main horizontal, longitudinally extending operating shaft 34 of the machine, presently to be described. With the parts in the position thereof illustrated in FIGURE 9, when the shaft 34 rotates in a counterclockwise direction, as viewed in FIGURE 9, the lug 33 rises and engages the pin 32, lifting the elevating rod 28, which causes the tray member 23 to swing in a counterclockwise direction, as viewed in FIGURE 9, from the full line position thereof illustrated to the dotted view position thereof, whereby a bundle of tobacco leaves 24 will be elevated and dumped toward the rear of the machine, namely, to the left, as viewed in FIGURE 9, subsequently to the binding of the stem portions of the leaves, as will be presently explained. The tray member 23 drops back to the full view position thereof shown in FIGURE 9 when the lug 33 slips past the pin 32, responsive to the continued counterclockwise rotation of the shaft 34. On reverse rotation of the shaft 34, the lug 33 slips past the pin 32, the spring 30 being yieldable to allow the rod 28 to rotate, and the bracket 29 providing sufficient clearance for such rotation, whereby to allow the lug 33 to slip downwardly past the pin 32 to the starting position thereof shown in FIGURE 9.

The sinuously curved downwardly and rearwardly sloping rear wall 20 is formed with a pair of transversely extending, parallel slots 35, 35 through which extend the arcuately curved fingers 36 which are secured on a horizontal, longitudinally extending shaft 37 journaled at its ends respectively in the vertical transverse wall portion 26 and the vertical side wall 22.

As shown in FIGURE 9, the arcuately curved fingers 36 are located rearwardly adjacent the tray member 23 and are rotatable around an axis parallel to the hinge axis of the tray member. The fingers 36 are normally located to catch a bundle of tobacco leaves as the bundle is dumped by the tray member 23 in the manner above described. However, the fingers 36 are subsequently rotated downwardly from the positions thereof shown in FIGURE 9, so as to release the bundle of leaves after the bundle is tied. Thus, the shaft 37 is provided with an arm 39 to which is connected a depending link rod 40 which extends downwardly and is loosely received in a guide bracket 41 secured to the vertical wall portion 26. The rod 40 is provided at its intermediate portion with an outwardly projecting pin 42 which is engageable by an extra lug 43 on the cam member 33 as shaft 34 rotates counterclockwise, as viewed in FIGURE 9, the lug 43 being engageable with the pin 42 immediately after the tray member 23 is rotated to its dumping position, shown in dotted view, in FIGURE 9, whereby to rotate the fingers 36 downwardly in positions to release the bundle of leaves. A coiled spring 44 is connected between the upper portion of the rod 40 and the upper portion of the rear wall member 20, biasing the rod 40 rearwardly, namely, towards the left, as viewed in FIGURE 9, and simultaneously biasing the rod upwardly to urge the fingers 36 to their elevated positions, shown in FIGURES 1 and 9. Thus the fingers 36 return to their normal elevated positions when the lug 43 disengages from the pin 42, namely, when the shaft 34 reverses its direction of rotation, as will be presently described, allowing the spring 44 to return the fingers 36 to said normal elevated positions.

The top wall of housing 18 is formed adjacent the side wall 21 with a generally U-shaped depressed portion 46 in which is disposed the depending U-shaped loop 47 of a flexible belt member 48, the loop portion 47 being normally aligned with the generally U-shaped tray 23, so that the stem portions 49 of a bunch of tobacco leaves 24 may be disposed in the U-shaped portion 47 of the belt in the manner illustrated in FIGURE 3. One end of the belt is connected at 50 to the rear side of the frame 16 and the other end of the belt is connected to one end of a coiled spring 51 whose forward end is connected to a lug 52 depending from the horizontal top wall portion 19 adjacent the front wall 53 of housing 18, as shown in FIGURE 3. Shaft 34 extends rotatably through a bearing sleeve 54 rigidly secured to the vertical wall elements 21 and 26, as shown in FIGURE 5. Secured on the outer end of the shaft 34, namely, the end thereof adjacent the side wall 21 is an arm 56, and secured on the inner portion of the shaft 34 is a reel 57 on which is wound a flexible cable 58. Cable 58 extends downwardly and is secured to an intermediate portion of a foot lever 59 which is journaled on a horizontal, longitudinally extending supporting shaft 60 secured between the rear legs 17, as shown in FIGURE 1, the treadle lever 59 extending forwardly and being provided at its front end with the pedal element 61. A coiled spring 62 is connected at one end to a lug 63 projecting from the reel 57 and at its other end to the front wall 53, biasing the shaft 34 in a clockwise direction, as viewed in FIGURE 4, whereby the flexible cable element 58 is wound up on the reel 57. The shaft 34 may be rotated in a counterclockwise direction, as viewed in FIGURE 4, by exerting downward force on the pedal 61, the downward force acting against the biasing force of the coiled spring 62.

As shown in FIGURE 8, the rearward portion of the top edge of side wall 21 is arcuately curved, as shown at 65, concentrically with the axis of rotation of the shaft 34, and the wall is formed at the forward portion of the curved edge 65 with a slot 66. Journaled in the upper end portion of the arm 56 and normally extending through the slot 66 is a horizontal shaft element 67 on which is rotatably mounted a roller 68 which underlies the flexible belt portion 47, as shown in FIGURE 3. Thus, as shown in FIGURE 3, the roller 68 is normally located at the forward side of the machine and is received in an arcuately curved wall portion 69' of the trough section 46. Rigidly secured to the inner end of the shaft 67 is an eye member 69 which is controlled by the shaft 67 so as to act against the stems 49 of the tobacco leaves and to push said stems over an impaling needle 70 as the stems 49 are compressed and moved rearwardly by the action of roller 68, as will be presently described. Secured to the outer end of the shaft 67 is an arm 71 which is pivotally connected to a link rod 72 which extends slidably through a guide lug 73 provided on the edge of the arm 56, guiding the rod 72 for endwise movement parallel to the arm 56. The rod 72 is provided adjacent its pivotal connection to arm 71 with a lug 75 to which is connected one end of a biasing spring 76, the other end of the spring 76 being connected to a lug 77 provided on the arm 56, whereby to bias the rod 72 downwardly, as viewed in FIGURE 1, and to the left, as viewed in FIGURE 8, so that the bottom end of the rod is engageable with a cam 78 rigidly secured to the lower portion of the wall 21 adjacent the shaft 34. Cam 78 is provided with the suitably contoured control surface 79 which moves the rod 72 axially responsive to rotation of arm 56 and thus transmits rotation to the shaft 67, thus controlling the positioning of the pusher eye member 69 so that it acts on the bound stems 49 and exerts a force substantially parallel to the tip of the needle 70 when the stems approach the tip during the action of the machine, as will be presently explained. Thus, as shown in FIGURE 1, the bottom end of the rod 72 does not engage the camming edge 79 until the arm 56 has been rotated in a clockwise direction, as viewed in FIGURE 1, through a substantial angle, sufficient to cause the roller 68 to wrap the belt 47 around the stems 49 to securely hold same, causing the binding leaf to be wound around the stems, as will presently be described, and preparing the bound stems so that the stem of the binding leaf

may be engaged through the bound stems. As shown in FIGURE 10, the normal position of the eye member 69 is behind the plane of the forward wall of trough element 46, and the eye member 69 is provided with a cover flap 80 which substantially fits in a notch 81 formed in said forward wall portion to substantially cover same. Also rigidly secured to the eye member 69 is a horizontally extending belt guide finger 82 which overlies the flexible belt portion 47 and which retains the belt closely adjacent to the roller 68 in the different positions of arm 56. An arcuate, plate-like guard flap 83 is rigidly secured to the upper end portion of the arm 56, as viewed in FIGURE 1, the plate-like flap 83 traveling along the arcuately curved peripheral edge portion 65 of wall 21 with the arm 56 and being substantially in sliding bearing engagement with the marginal portion of wall 21 adjacent the edge 65.

As arm 56 is rotated in a clockwise direction, as viewed in FIGURE 1, the roller 68 wraps a tying leaf 85 around the stems 49 as illustrated in dotted view in FIGURE 4, looping the flexible belt portion 47 and acting against the bottom surface of said flexible belt portion to roll up the tying leaf 85 on the stems 49 and bring the bound stems into proximity to the tip of the needle member 70 so that the end of the stem of the tying leaf 85 may be forced through the bound stems of the leaves 24 to complete the binding of the leaves, as will be presently described.

As shown in FIGURE 6, the eye member 69 is rotated by the action of the cam 78 and the cam follower rod 72 to a position substantially perpendicular to the tip of the impaling needle 70 to force the needle through the bound stems of the tobacco leaves.

A bell crank lever 86 is pivoted at 87 on a horizontal longitudinal axis in the top front portion of housing 18 and is provided at the end of its upper arm 88 with a transversely extending smoothing finger 89 which is located in a position to engage the flexible belt portion 47 responsive to counterclockwise rotation of the bell crank 86, as viewed in FIGURE 4. A coiled spring 90 is connected between a forwardly projecting lug 91 formed on the lower end of the arm 88 and a pin 92 adjacent the front wall 53, biasing the bell crank lever 86 in a clockwise direction, as viewed in FIGURE 4, namely, to a position wherein the arm 88 projects upwardly. The bell crank lever 86 includes a rearwardly extending actuating bottom arm 93 which is engageable by a laterally projecting lug 94 on the eye member 69, the arm 93 being in the path of forward movement of lug 94 as the shaft 67 is rotated counterclockwise, as viewed in FIGURE 4, namely, during the operating stroke of the arm 56, but the bell crank lever 86 being yieldable to allow same to rock clockwise to permit lug 94 to slip past arm 93. On the return stroke of the arm 56, the lug 94 engages over the arm 93 and causes the bell crank lever 86 to rotate in a counterclockwise direction, as viewed in FIGURE 4, sufficiently to allow arm 93 to disengage from the lug 94. This is sufficient to cause the smoothing finger 89 to descend into engagement with the flexible belt portion 47 and to smooth the belt into the configuration substantially shown in FIGURE 3, preparing the belt for the reception of the stems of the next group of leaves to be bound.

A stop lug 95 is provided on the upper portion of the wall element 26, said lug projecting into the path of the return movement of bell crank arm 88, limiting rotation of bell crank 86 to the normal position thereof shown in FIGURE 4.

Designated at 97 is an arm which is mounted on a horizontal shaft 98 in the portion of housing 18 below the rearwardly and downwardly inclined top wall portion 20 and adjacent to the flexible belt 48. Thus, the shaft 98 extends longitudinally and the arm 97 rotates in a vertical plane parallel to the side walls 21 and 22. A spiral spring 99 has its outer end anchored to a pin 100 provided on the arm 97 and has its inner end anchored to the shaft 98, biasing the arm 97 in a clockwise direction, as viewed in FIGURE 11. A cam 101 secured on the shaft 34, which is parallel and adjacent to the shaft element 98, engages the lower hook portion 102 of an arcuately curved link arm 103 pivotally connected at 104 to the inner end portion of arm 97. The arcuately curved hollow needle member 70 is integrally formed on the end of the arm 97 and is arcuately curved concentrically with the axis of the shaft 98, the needle arm 70 extending through an aperture 105 provided in the lower portion of wall element 20. A suitable cushioning bushing 106 is provided in the opening 105 to cushion the movement of the needle member 70. Arm 97 is normally latched in the position thereof shown in FIGURE 11 by engagement with the latch lug 107 of a pivoted latch lever 108 (FIGURE 12), the arm 108 being pivoted to a lug 109 formed on the transverse intermediate vertical wall portion 26. Arm 108 is thus pivoted at 110 to the lug 109 and is biased in a counterclockwise direction, as viewed in FIGURE 12, by a coiled spring 111 acting between wall 26 and a recess or notch 112 formed in the intermediate portion of the edge of arm 108. The bottom end of arm 108 is provided with a stop lug 113 which is engageable with the bottom edge of lug 109 to limit counterclockwise rotation of arm 108 to the position thereof shown in FIGURE 12. In this position the arm 97 is lockingly engageable on the triangular latch lug 107 to support the arm 97 in the position thereof shown in FIGURE 11.

The eye member 69 is formed at its end with a release lug 115 which is located so that its path of movement intersects the inclined camming top edge portion 116 of arm 108, the lug 115 being generally triangular in shape, as shown in dotted view in FIGURE 12, and being thus formed to exert a camming action on arm 108 to rotate the arm in a clockwise direction, as viewed in FIGURE 12, responsive to the downward movement of the lug 115. This occurs when the eye member 69 has been moved substantially to the position shown in dotted view in FIGURE 6, whereupon the arm 97 is released and rotates downwardly under the force of its spiral biasing spring 99, retracting needle member 70. This occurs on the clockwise rotation of the shaft 34, as viewed in FIGURE 11, but on the return rotation of shaft 34 the cam member 101 engages with the lug 102 to again elevate the arm 97 to a position wherein it slips past the lug 107 and is thence forward latched in a position wherein the needle 70 projects substantially for its full length outside of the wall portion 20, as shown in FIGURE 11.

The needle member 70 is hollow and slidably engaged therein is an arcuate locking rod 120 which is biased upwardly by a coiled spring 121, FIGURE 4, connected between a lug 122 formed on the bottom end of the arcuate rod 120 and a lug 123 on the main body portion of the needle member 70 spaced above the bottom end lug 122, as shown in FIGURE 12. The laterally projecting lug 122 is engaged by a cam member 124 slidably supported in a guide bracket 125 secured to the arm 97 so that the cam member 124 is guided for movement parallel to the arm 97. The cam member 124 is formed on the end of a rod 128 which is pivotally connected to the bottom end of a lever 129, the lever 129 being pivoted at 130 to the arm 97. Lever 129 extends through a slot 131 formed in the top rear wall portion 20, the lever 129 being at times engageable with the end 132 of the slot 131 responsive to the rotation of the arm 97, as will be presently described. The arcuate locking rod 120 may be at times retracted, namely, moved downwardly from the position thereof shown in FIGURE 11 by exerting a manual upward force on the exposed end of the lever 129, whereby the cam element 124 cammingly engages the lug 122 and moves the rod 120 downwardly against the force of the spring 121. The same type of release action occurs when the arm 129 engages the end 132 of the slot 131.

In using the apparatus, a bunch of leaves 24, compris-

ing a desired number of selected leaves are placed in the tray member 23 with their stems extending over the intermediate portion of a tying leaf 85 which is disposed on the belt 48, as shown in dotted view in FIGURE 2. The stem end of the tying leaf, shown at 140, is engaged transversely in a notch 141 provided in the upper rearwardly facing portion of the needle member 70, being clampingly engaged in the notch by the upper end of the rod member 120. In order to insert the stem 140 the lever 129 is manually rotated in a counterclockwise direction, as viewed in FIGURE 11, to retract the rod 120, as above described, allowing the stem 140 to be engaged in the notch 141. When the lever 129 is released, the cam element 124 retracts, allowing spring 121 to act upwardly on the rod 120, clamping the stem 140 in notch 141. Thus, the tying leaf 85 is disposed in the manner illustrated in dotted view in FIGURE 2 with the stem 140 thereof held in the upper portion of needle member 70.

The operator then depresses the pedal 61 causing cable 58 to rotate the reel 57 in a counterclockwise direction, as viewed in FIGURE 4, against the force of spring 62, whereby the shaft 34 is similarly rotated counterclockwise. This causes arm 56 to rotate in a clockwise direction, as viewed in FIGURE 1, from the position therein shown toward the position illustrated in FIGURE 8. The roller 68 wraps the tying leaf 85 around the stems 49 as shown in FIGURE 4, finally reaching the position of FIGURE 6 wherein the end of the cam follower rod 72 engages the contoured edge 79 of cam 78. Arm 71 is thereafter caused to rotate with respect to arm 56, causing the eye member 69 to be moved into a position engaged against the stems 49 and substantially perpendicular to the tip of the needle member 70, as shown in FIGURE 6. The continued rotation of the arm 56 thus causes the eye member 69 to force the needle member 70 through the bunched stems, as shown in FIGURE 6, until finally the lug 115 engages and rotates the arm 108, releasing the needle arm 97, whereby the needle arm is quickly retracted by the action of its biasing spring 99. The retractile movement of the needle member 70 is accompanied by the engagement of the lever 129 with the end 132 of slot 131, which causes the rod 128 to be pushed in the direction of the lug 122, whereby the cam element 124 retracts the locking rod 120, releasing the stem 140 of the binding leaf, and allowing the bound bunch of tobacco leaves to be completely released from the machine. Thereafter, spring 62 returns shaft 34 and arm 56 to their starting positions, in the course of which the lug 94 engages the arm 93, as above described, rocking the bell crank lever 86 and causing the smoothing finger 89 to engage the flexible belt portion 47 and restore it to the proper configuration to receive the stems of the next group of leaves to be bound. As arm 56 returns to its starting position, the lug 94 disengages from the arm 93, allowing the bell crank lever 86 to resume its normal position because of the biasing action of the spring 90.

As previously mentioned, as shaft 34 rotates during the operating stroke of the machine, cam lug 33 rises and engages the tray lug 32, lifting the tray 23 to the position of FIGURE 6. As shown in FIGURE 9, the fingers 36 are normally held in positions to receive the bundle of leaves as the bundle is dumed from the tray member 23, the fingers 36 being held in elevated positions by the action of spring 44. However, when the eye member 69 forces the stems onto the needle member 70, for example, to the position illustrated in FIGURE 6, the lug 43 engages the pin 42, exerting downward force on the link rod 40 and causing the fingers 36 to be rotated downwardly through the slots 35 to release the bundle of leaves and allow the bundle to drop off the machine at the downwardly and rearwardly inclined wall 20. Simultaneously with this action, the needle member 70 is retracted, as above described, and the cam member 124 retracts the stem locking rod 120, so that the bound bundle is free to leave the machine. Upon the return stroke of the arm 56, the fingers 36 return to their normal elevated positions, shown in FIGURE 9 in full line view.

As previously stated, the tray member 23 is released as soon as cam lug 33 slips past pin 32, during the operating stroke of the arm 56, allowing the tray 23 to drop from the position shown in FIGURE 6 to its normal position, shown in FIGURE 9, by gravity. As previously stated, during return movement of the arm 56, the lug 94 rocks the member 86 causing the transverse smoothing finger 89 to engage the belt and insure that the belt is properly disposed in the trough portion 46 to receive the stems of the next group of leaves to be bound.

FIGURES 13 and 14 illustrate a "hand" of tobacco leaves secured by a tying leaf 85 in the manner above described and by the use of the apparatus 15. It will be noted that the stem 140 of the tying leaf 85 is engaged through the stems 49 of the bound leaves 24 in a manner so that it is locked, and so that the turns of the tying leaf 85 cannot become readily unfastened.

A yieldable retaining lever 151 is pivoted at 152 to the transverse vertical wall member 26 and projects into the path of movement of the leaf stems 49 as the stems are elevated by the looped belt portion 47 during the operating stroke of arm 56, the lever 151 being biased toward an upwardly and forwardly inclined position by a coiled spring 153 connected between its rear end and a securing pin 154 mounted on the wall member 26, as shown in FIGURES 2 and 4. The action of the biasing spring 153 assures that sufficient force will be exerted on the stems 49 as they rise to prevent them from jumping out of the looped band before they are firmly secured by the turns of the tying leaf 85. The lever 151 is yieldable to allow the stems 49 to move therepast toward the needle member 70.

As shown in FIGURES 4, 6 and 11, the needle arm follower link member 103 is provided with a straight guide extension 160 which is loosely received through a guide bracket 161 secured to the transverse vertical wall member 26, the bracket member 161 being provided with a sufficiently large guide aperture to allow the extension rod 160 to move freely from the full line position thereof shown in FIGURE 6 to the dotted view position thereof, in accordance with the rotary movement of the needle arm 97.

It will be noted from FIGURE 3 that the axis of arm 56, namely, the axis of shaft 34, is located beneath and parallel to the trough portion 46 containing the U-shaped stem-receiving portion of the belt, namely, the portion 47 thereof, and that said axis is rearwardly offset with respect to the trough portion 46 sufficiently to provide the desired rolling and looping action which the roller 68 provides with respect to the belt portion 47 as the arm 56 rotates through its operating stroke. It will be further noted from FIGURE 2 that the upstanding needle member 70 is located laterally adjacent the rear portion of the belt and in the path of movement of the wrapped leaf stems 49 at a position such that the stem 140 of the wrapping leaf is engaged through the stems 49 of the bound leaves adjacent the timer marginal edge of the binding leaf 85. There is clearly shown in FIGURE 13, where it is seen that the stem 140 of the binding leaf emerges adjacent the inner edge of the wrapping leaf 85, thus assuring that the stem 140 will be securely retained and that the leaf 85 will not readily become unwound.

While the device has been illustrated and described as being actuated by the foot pedal lever 59 and the cable 58, it may be actuated by any suitable means which is effective to rotate the shaft 34. Thus, the device may be actuated by manually rotating the arm 56, and if so desired, a suitable handle may be attached to said arm for this purpose.

While a specific embodiment of an improved apparatus for binding tobacco leaves into bundles has been dis-

closed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent to the forward portion of the belt disposed in said trough, a roller journaled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, an upstanding needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, means to clamp the stem of the tying leaf to the upper portion of said needle member, and means to simultaneously release said clamping means and lower said needle member responsive to the rearward rotation of said arm to a position wherein said shaft is adjacent said needle member.

2. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward portion of the belt disposed in said trough, a roller journaled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, an upstanding needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, a retaining member secured to said shaft and located to engage the stems and force the stems over the needle member, means to clamp the stem of the tying leaf to the upper portion of said needle member, and means to simultaneously release said clamping means and lower said needle member responsive to the rearward rotation of said arm to a position wherein said shaft is adjacent said needle member.

3. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward portion of the belt disposed in said trough, a roller journaled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, a needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, a retaining member secured to said shaft and located to engage the stems and force the stems over the needle member, means to clamp the stem of the tying leaf to the upper portion of said needle member, means biasing said needle member downwardly, releasable latch means supporting said needle member in an upstanding position, means on said retaining member engageable with said latch means to release same, and means releasing said clamping means responsive to the downward movement of said needle member.

4. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward portion of the belt disposed in said trough, a roller journalled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, an upstanding needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, an eye member secured to said shaft, means to rotate said shaft to move said eye member to a position to engage said stems and arranged substantially perpendicular to said needle member responsive to said rearward rotation of said arm, said eye member being located to receive the needle member and force the stems over said needle member, means to clamp the stem of the tying leaf to the upper portion of said needle member, and means to simultaneously release said clamping means and lower said needle member responsive to the rearward rotation of said arm to a position wherein said needle member extends through said eye member.

5. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward portion of the belt disposed in said trough, a roller journaled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, a needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, an eye member secured to said shaft, means to rotate said shaft to move said eye member to a position to engage said stem and arranged substantially perpendicular to said needle member responsive to said rearward rotation of said arm, said eye member being located to receive the needle member and force the stems over said needle member, means to clamp the stem of the tying leaf to the upper portion of said needle member, means biasing said needle member downwardly, releasable latch means supporting said needle member in an upstanding position, means on said eye member engageable with said latch means to release same, and means releasing said clamping

means responsive to the downward movement of said needle member.

6. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward portion of the belt disposed in said trough, a roller journaled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, an upstanding needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, a clamping rod slidably mounted in the needle member and having a top portion located to clamp the stem of the tying leaf to the upper portion of said needle member, and means to simultaneously retract said clamping rod and lower said needle member responsive to the rearward rotation of said arm to a position wherein said shaft is adjacent said needle member.

7. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis located beneath and parallel to said trough and being rearwardly offset with respect to the trough, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward portion of the belt disposed in said trough, a roller journaled on said shaft and engaging said belt, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap said tying leaf around the stems of said first-named leaves, a needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, a clamping rod slidably mounted in the needle member and having a top portion located to clamp the stem of the tying leaf to the upper portion of said needle member, means biasing said clamping rod upwardly toward clamping relation with the top portion of the needle member, means to lower said needle member responsive to the rearward rotation of said arm to a position wherein said shaft is adjacent said needle member, and means to retract said clamping rod responsive to the lowering of said needle member.

8. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a longitudinal recess adapted to receive a plurality of tobacco leaves, a trough member in said recess and pivoted transversely of said recess and being swingable upwardly and rearwardly to a dumping position, a flexible belt mounted transversely on the bed adjacent one end of the trough member and having a portion received in said recess and adapted to receive a transversely disposed tying leaf beneath the stems of the first-named leaves, an arm pivoted to the end of the bed adjacent the belt on an axis located beneath, parallel to and rearwardly offset from said recess, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward end of the portion of the belt disposed in the recess, a roller journaled on said shaft and engaging said belt, whereby the belt forward portion is moved toward its rear portion responsive to rearward rotation of said arm to form a loop and wrap the tying leaf around the stems of said first-named leaves, a needle member movably mounted on the bed adjacent the rear portion of said belt and in the bath of movement of the wrapped stems, means to clamp the stem of the tying leaf to the upper portion of said needle member, means to simultaneously elevate the trough member to said dumping position and rotate said arm rearwardly, and means to simultaneously release said clamping means and lower said needle member responsive to the rearward rotation of said arm to a position wherein said shaft is adjacent said needle member.

9. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a longitudinal recess adapted to receive a plurality of tobacco leaves, a trough member in said recess and pivoted transversely of said recess and being swingable upwardly and rearwardly to a dumping position, a flexible belt mounted transversely on the bed adjacent one end of the trough member and having a portion received in said recess and adapted to receive a transversely disposed tying leaf beneath the stems of the first-named leaves, an arm pivoted to the end of the bed adjacent the belt on an axis located beneath, parallel to and rearwardly offset from said recess, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward end of the portion of the belt disposed in the recess, a roller journaled on said shaft and engaging said belt, whereby the belt forward portion is moved toward its rear portion responsive to rearward rotation of said arm to form a loop and wrap the tying leaf around the stems of said first-named leaves, a needle member movably mounted on the bed adjacent the rear portion of said belt and in the path of movement of the wrapped stems, means to clamp the stem of the tying leaf to the upper portion of said needle member, means to simultaneously elevate the trough member to said dumping position and rotate said arm rearwardly, a plurality of spaced supporting fingers retractably mounted on said bed rearwardly of the trough member, and means to simultaneously retract said supporting fingers, release said clamping means, and lower said needle member responsive to the rearward rotation of said arm to a position wherein said shaft is adjacent said needle member.

10. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a longitudinal recess adapted to receive a plurality of tobacco leaves, a trough member in said recess and pivoted transversely of said recess and being swingable upwardly and rearwardly to a dumping position, a flexible belt mounted transversely on the bed adjacent one end of the trough member and having a portion received in said recess and adapted to receive a transversely disposed tying leaf beneath the stems of the first-named leaves, an arm pivoted to the end of the bed adjacent the belt on an axis located beneath, parallel to and rearwardly offset from said recess, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward end of the portion of the belt disposed in the recess, a roller journaled on said shaft and engaging said belt, whereby the belt forward portion is moved toward its rear portion responsive to rearward rotation of said arm to form a loop and wrap the tying leaf around the stems of said first-named leaves, a needle member movably mounted on the bed adjacent the rear portion of said belt and in the path of movement of the wrapped stems, means to clamp the stem of the tying leaf to the upper portion of said needle member, means to simultaneously elevate the trough member to said dumping position and rotate said arm rearwardly, a retaining member secured to said shaft and located to engage the stems of the first-named leaves and force the stems over the needle member, means biasing the needle member downwardly, releasable latch means supporting said needle member in an upstanding position, means on said retain-

ing member engageable with said latch means to release same, and means releasing said clamping means responsive to the downward movement of said needle member.

11. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a longitudinal recess adapted to receive a plurality of tobacco leaves, a trough member in said recess and pivoted transversely of said recess and being swingable upwardly and rearwardly to a dumping position, a flexible belt mounted transversely on the bed adjacent one end of the trough member and having a portion received in said recess and adapted to receive a transversely disposed tying leaf beneath the stems of the first-named leaves, an arm pivoted to the end of the bed adjacent the belt on an axis located beneath, parallel to and rearwardly offset from said recess, a shaft secured to said arm and extending transversely beneath said belt, said shaft being normally located subjacent the forward end of the portion of the belt disposed in the recess, a roller journaled on said shaft and engaging said belt, whereby the belt forward portion is moved toward its rear portion responsive to rearward rotation of said arm to form a loop and wrap the tying leaf around the stems of said first-named leaves, a needle member movably mounted on the bed adjacent the rear portion of said belt and in the path of movement of the wrapped stems, means to clamp the stem of the tying leaf to the upper portion of said needle member, means to simultaneously elevate the trough member to said dumping position and rotate said arm rearwardly, a plurality of spaced supporting fingers retractably mounted on said bed rearwardly of the trough member, a retaining member secured to said shaft and located to engage the stems of the first-named leaves and force the stems over the needle member, means biasing the needle member downwardly, releasable latch means supporting said needle member in an upstanding position, means on said retaining member engageable with said latch means to release same, means retracting said supporting fingers responsive to the rearward rotation of said arm to a position wherein the retaining member is adjacent the needle member, and means releasing said clamping means responsive to the downward movement of said needle member.

12. An apparatus for binding tobacco leaves into bundles comprising a bed provided with a trough adapted to receive a plurality of tobacco leaves, a flexible belt mounted transversely at one end of the bed and adapted to receive a tying leaf disposed transversely beneath the stems of the first-named leaves, an arm pivoted to said end of the bed for rotation on an axis parallel to said trough, belt-engaging means secured to said arm and extending transversely beneath said belt, said belt-engaging means being normally located subjacent to the forward portion of the belt disposed in said trough and movably engaging the belt forward portion, whereby said belt forward portion is moved toward the rear portion of the belt responsive to rearward rotation of said arm, to form a loop and to wrap the tying leaf around the stems of said first-named leaves, an upstanding needle member movably mounted on said bed laterally adjacent the rear portion of said belt and in the path of movement of the wrapped stems, means to clamp the stem of the tying leaf to the upper portion of said needle member, and means to simultaneously release said clamping means and lower said needle member responsive to the rearward rotation of said arm to a position wherein said belt-engaging means is adjacent said needle member.

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