May 1, 1951 H. KOHLER 2,550,824

BUNCH TIER

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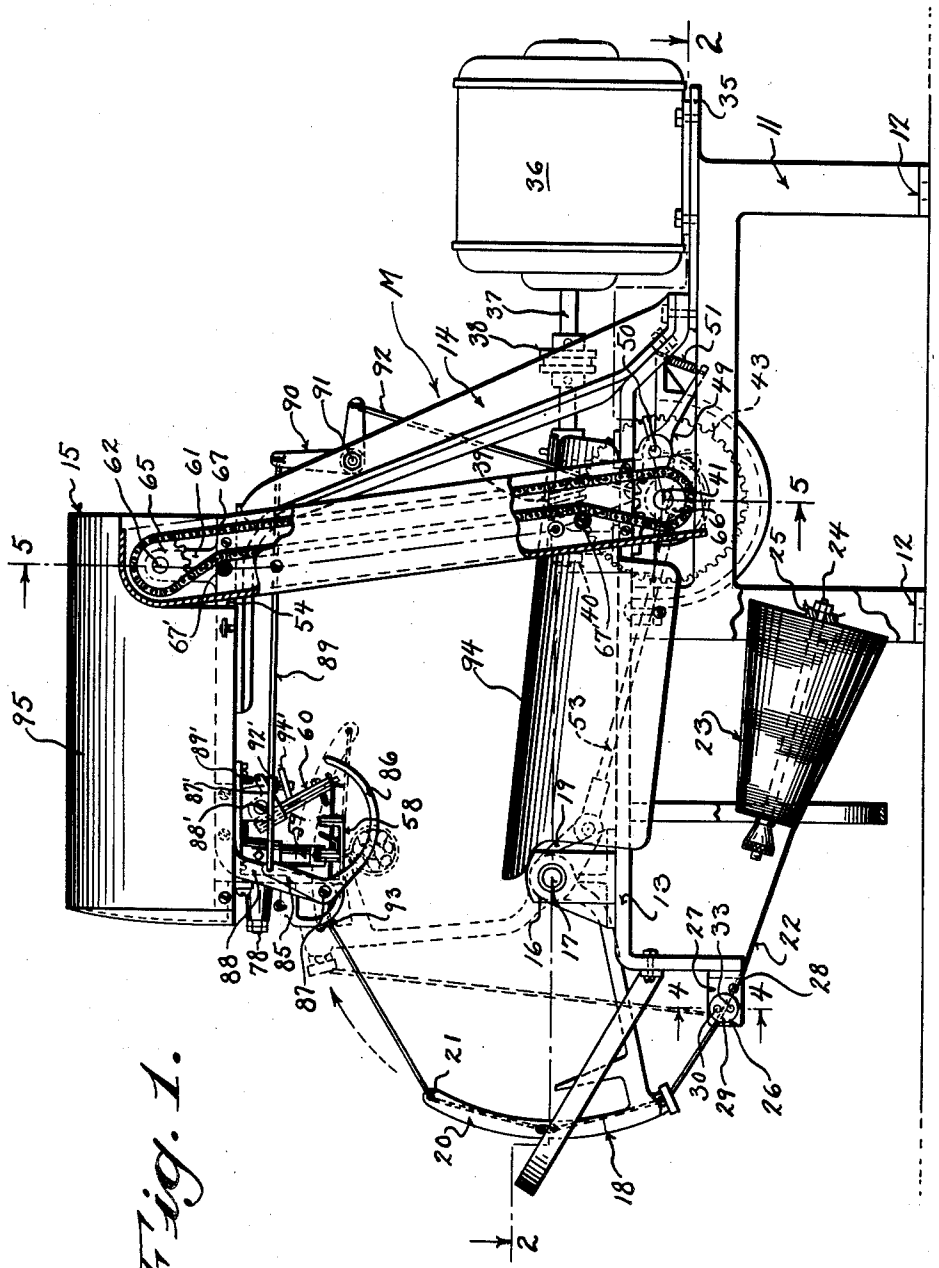


Fig. 1.

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BY Wills Wright Thomas

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BUNCH TIER

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Fig. 2.

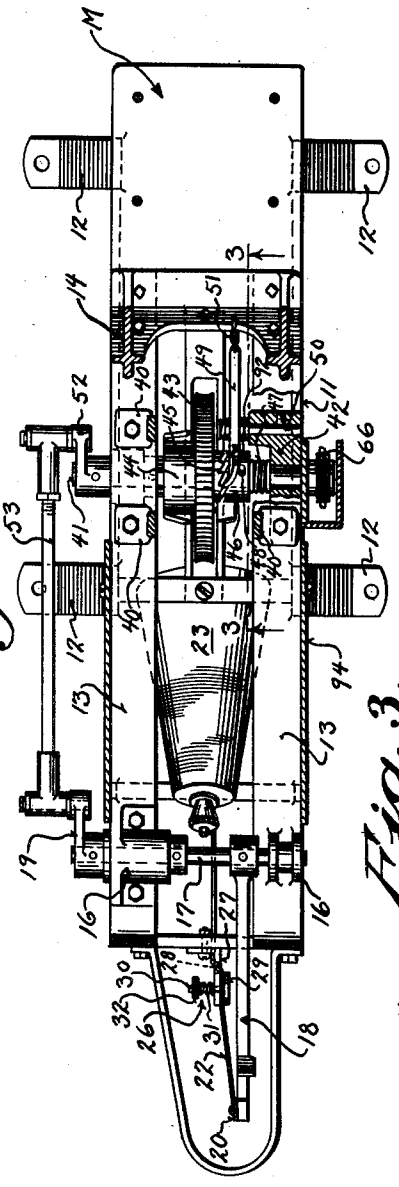


Fig. 4.

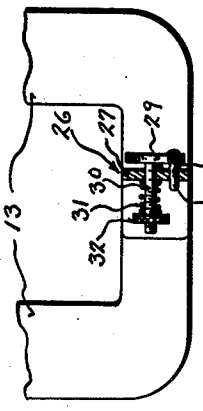
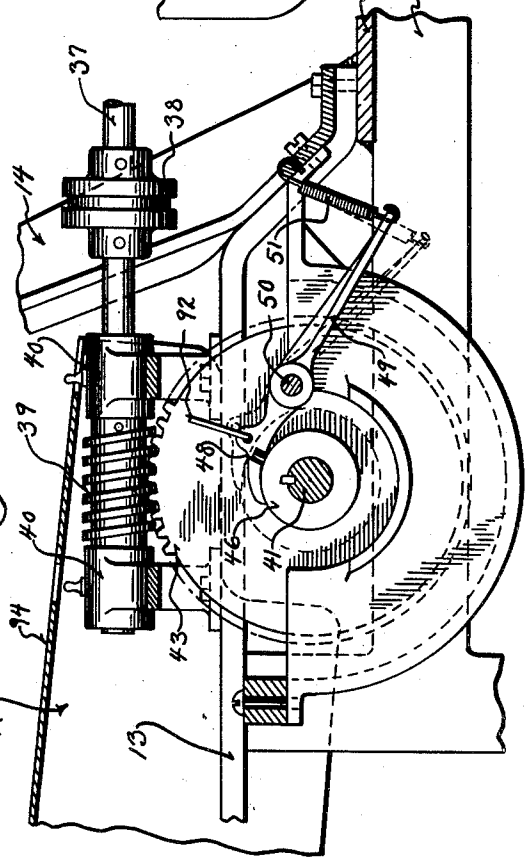


Fig. 3.



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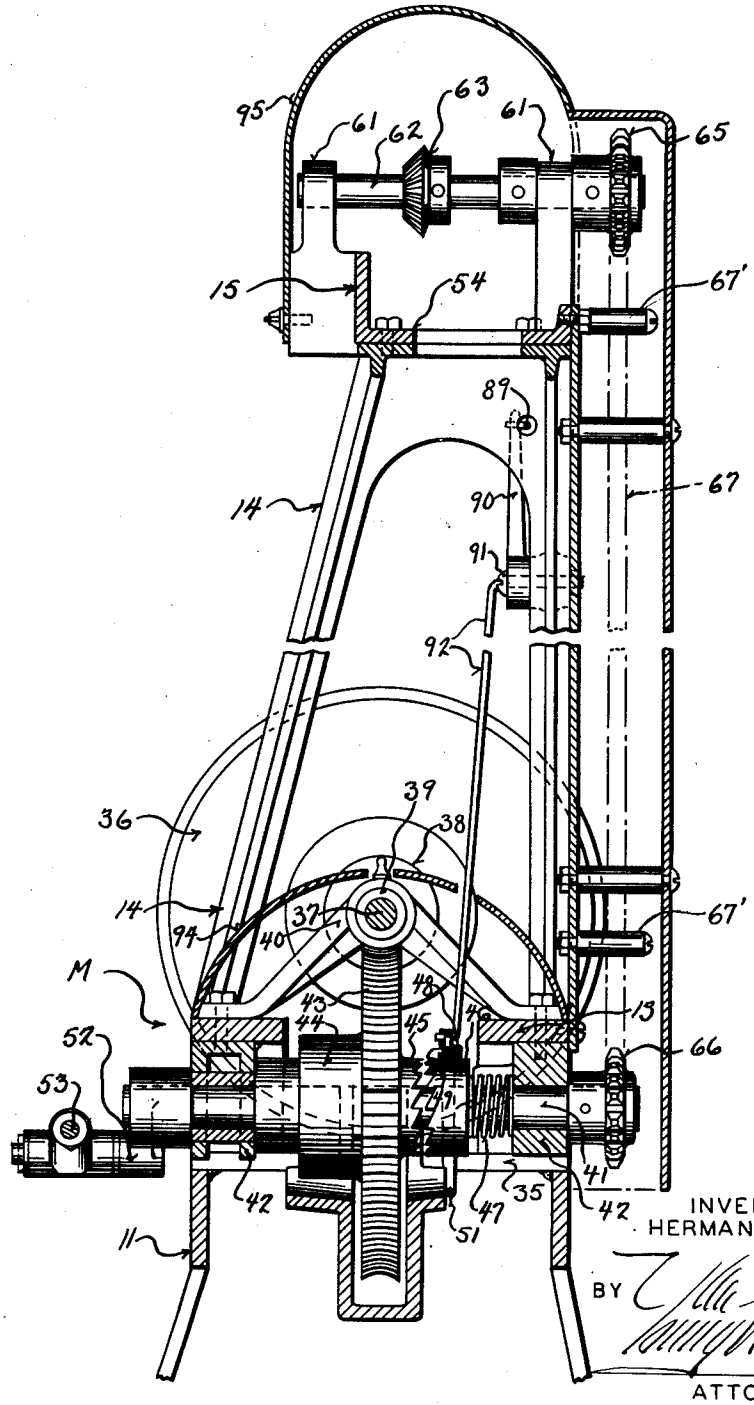
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BUNCH TIER

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Fig. 5.



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Fig. 6.

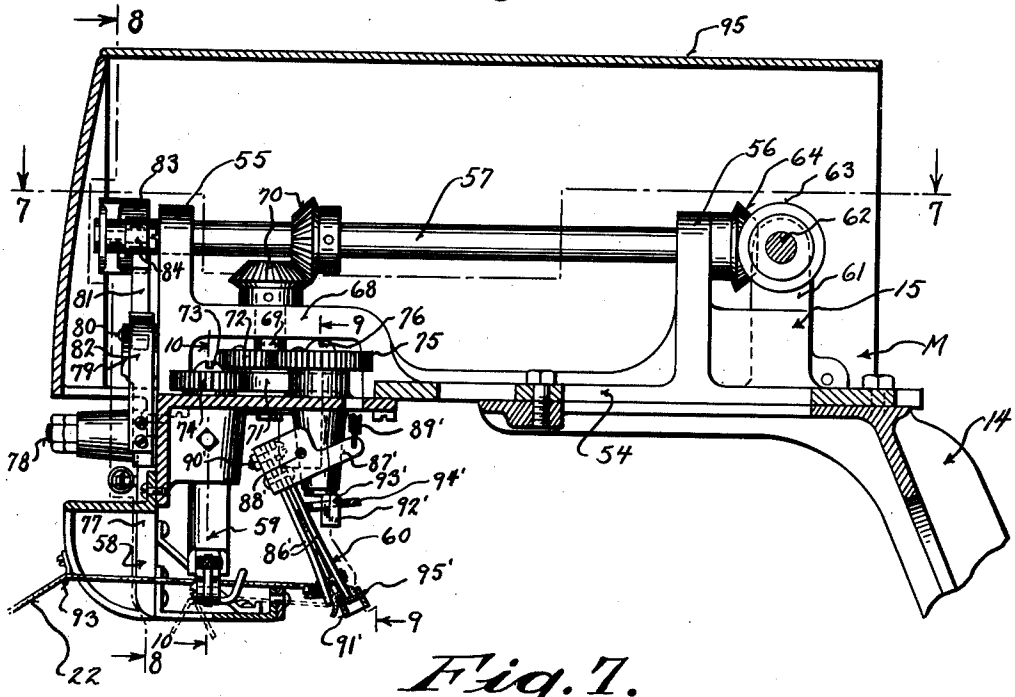
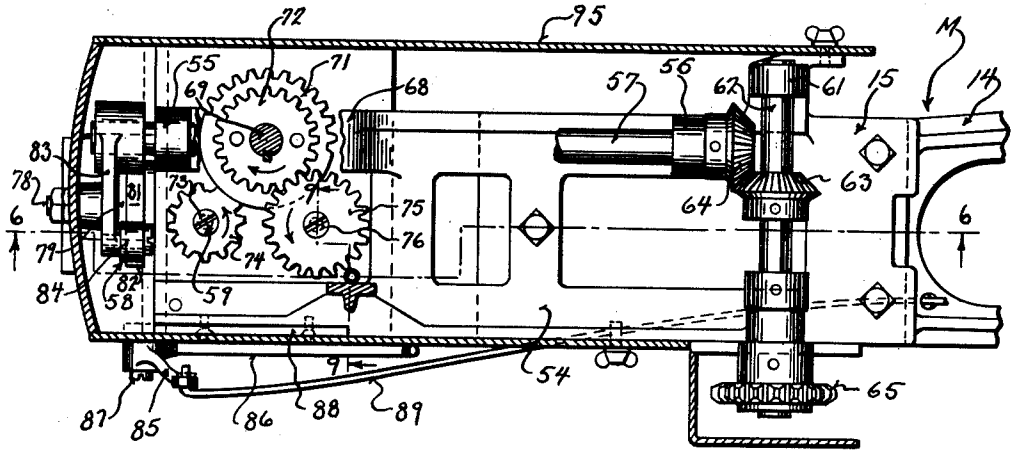


Fig. 7.



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BUNCH TIER

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Fig. 8.

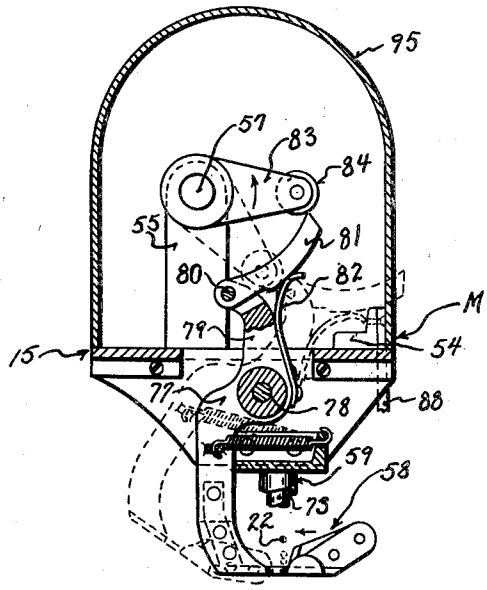


Fig. 9.

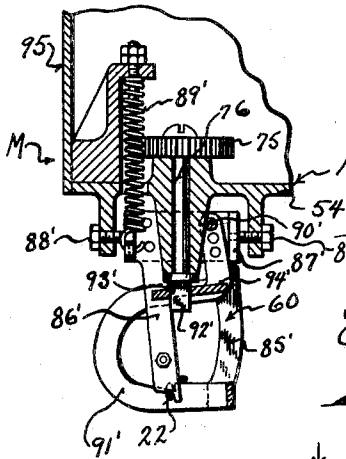


Fig. 10.

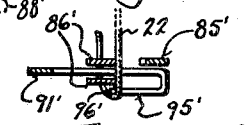


Fig. 11.

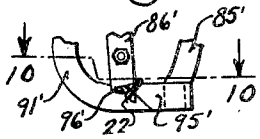
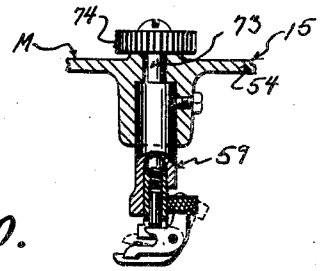


Fig. 12.



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Patented May 1, 1951

2,550,824

UNITED STATES PATENT OFFICE

2,550,824

BUNCH TIER

Herman Kohler, Milwaukee, Wis., assignor to Felins Tying Machine Company, Milwaukee, Wis., a corporation

Application January 3, 1949, Serial No. 68,992

9 Claims. (Cl. 100—31)

1

This invention appertains to tieing machines of the general type shown in Patents No. 1,407,481 issued to Frank Radechowsky, February 21, 1922 and No. 2,354,410 issued to Alfred G. Suelflow July 25, 1944, and the present invention is an improvement over the structures shown in said patents.

One of the primary objects of the present invention is to provide a novel and efficient drive for the machine, whereby a smooth running machine will be had which will be silent and effective in use and reduce noise usually associated with tieing machines.

Another salient object of my invention is to provide a power drive for bunch tieing machines in which all parts of the machine are driven in proper timing relation from a single cross shaft.

A further object of my invention is to provide novel means for operating the needle from the power driven cross shaft and for operating the main shaft of the head of the machine from the cross shaft in a continuous rotary cycle of operation.

A further important object of my invention is to provide means for actuating the stripper and string cutter from the head main shaft, whereby a silent action will be had and whereby the cutter will return to its normal position after cutting the string with a gradual, desired slow motion.

Another further object of my invention is to provide resilient means carried by the head for holding the string, as the same is brought about the article being tied by the needle, above the cutter, so that such portion of the string will not be severed by the cutter, as the cutter is severing the ends of the knot.

Another further important object of the invention is to improve the string holder whereby to insure the proper location of the string relative to the holder finger as the string is brought over the article being tied and to the string holder.

A still further object of my invention is to provide means for automatically starting the operation of the machine as an article to be tied is fed into the machine and for automatically stopping the machine's operation after the complete tieing of the article.

A still further important object of my invention is to provide an improved and simple form of string tensioning device disposed between the cone of twine and the string feeding needle.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts as will be hereinafter more specifically described and

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claimed and illustrated in the accompanying drawings, in which drawings:

Figure 1 is a side elevational view of the improved machine with parts thereof broken away and in section to illustrate structural detail.

Figure 2 is a horizontal, sectional view through the machine taken on line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is an enlarged fragmentary detail sectional longitudinal view through a part of the machine taken on the line 3—3 of Figure 2, looking in the direction of the arrows and illustrating the novel means employed for automatically operating the clutch of the power driven cross shaft.

Figure 4 is an enlarged fragmentary detail sectional view taken on the line 4—4 of Figure 1, looking in the direction of the arrows illustrating the tension device for the string as the string is fed from off of the cone by the needle.

Figure 5 is an enlarged fragmentary transverse sectional view through the machine taken on the line 5—5 of Figure 1, looking in the direction of the arrows illustrating the operating means for the clutch and the means for driving the main shaft of the head from the power driven cross shaft.

Figure 6 is a longitudinal sectional view through the head of the machine taken on the line 6—6 of Figure 7 looking in the direction of the arrows.

Figure 7 is a horizontal sectional view through the head of the machine taken on the line 7—7 of Figure 6 looking in the direction of the arrows.

Figure 8 is a transverse sectional view through the head of the machine taken on the line 8—8 of Figure 6 looking in the direction of the arrows and illustrating more particularly the novel operating mechanism for the string stripper and cutter.

Figure 9 is a detail fragmentary transverse sectional view through the head of the machine taken on the line 9—9 of Figure 6 looking in the direction of the arrows and illustrating more particularly the string holder or shuttle.

Figure 10 is a detail horizontal sectional view through the string holder or shuttle illustrating the improved means for insuring the proper position of the string relative to the string holding finger, the section being taken on the line 10—10 of Figure 11, looking in the direction of the arrows.

Figure 11 is a fragmentary detail vertical sectional view similar to Figure 9, but showing the lower end of the string holder or shuttle only

to more clearly show the position of the string.

Figure 12 is a fragmentary detail transverse sectional view taken on the line 10—10 of Figure 6 looking in the direction of the arrows, illustrating the knotter.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter M generally indicates my improved vegetable bunch tieing machine and the same includes a main frame 11, which is preferably provided with feet 12 whereby the same can be rigidly secured to a desired table or stand, not shown. Rigidly fastened to the main frame 11 are the forwardly extending supporting plates 13 on which certain operating parts of the machine are mounted. Also rigidly fastened to the main frame 11 and to the plates 13 is an upstanding standard 14 to which is rigidly secured the forwardly extending head 15.

As brought out in the objects of the invention, it is to be understood that this present invention relates more particularly to the novel drive employed for the machine and hence the present machine simulates very closely the machine illustrated in the patents heretofore mentioned and only sufficient parts of the machine will be described so that the present improvements can be clearly understood.

The forwardly extending frame plates 13 have secured to their forward ends upstanding bearing brackets 16 for rotatably supporting the cross shaft 17. Keyed, or otherwise secured, to the cross shaft is the needle 18, and this needle moves toward and away from and under the head 15. Also keyed, or otherwise secured, to the cross shaft 17 is a crank arm 19 which forms a part of the drive for the needle. The needle 18 includes the arcuate needle bar 20 having eyes 21 through which is threaded the binding twine or cord 22. In the present instance the twine or cord 22 is pulled off of a cone of twine or cord 23. This cone is mounted upon a supporting rod 24 and the rod in turn is rigidly secured to a bracket arm 25 on the main frame 11. Between the needle bar 20 and the cone 23 is a tensioning device 26 which allows the cord or twine to be pulled off of the cone without the likelihood of any objectionable slack occurring in the cord or twine between the cone and the needle. This tensioning device 26 is an improvement over the tensioning mechanism shown in the prior patents and this tensioning mechanism will now be described in detail.

Carried by the frame plates 13 is a forwardly extending angle bracket 27 having an eye 28 through which the cord or twine is threaded. Slidably mounted on the bracket 27 adjacent to the eye 28 is a friction button 29 carrying a central stud 30 slidably mounted in the bracket 27. Coiled about the stud 30 is an expansion spring 31 and this spring bears against one face of the bracket and against an adjusted thumb nut 32 threaded on the stud. By adjusting the nut 32 the tension of the spring can be regulated. The friction button or disc 29 carries an inwardly extending guide pin 33 and this pin operates through an opening 34 formed in the bracket. The string or twine 22 after being threaded through the eye 28 is placed between the stud 30 and the pin 33 and the button 29 normally bears against the string and exerts a certain tension thereon. Obviously, as the cord is pulled off of the cone the tension exerted by the friction button is such as to allow the cord to move under the button, but at the same time prevent any slack between the button and the cone.

The mechanism employed for operating the needle and the head 15 will now be described.

Mounted upon the main frame 11 is a platform 35 to which is rigidly bolted an electric drive motor 36 of the desired rating. The armature shaft 37 of the motor extends forwardly toward the frame plates 13 and has incorporated in its length a flexible coupling 38. Fastened to the armature shaft forwardly of the coupling 38 is a drive worm 39 and the shaft can be mounted in bearing brackets 40 on each side of the worm, so that the shaft will be effectively supported for rotation at its point of drive. These bearing brackets are rigidly bolted or otherwise fastened to the frame plates 13. Directly below the shaft 37 is a main drive cross shaft 41 and this shaft 41 is also adequately supported by bearing brackets 42 depending from the frame plates 13. Rotatably mounted upon the shaft 41 is a relatively large worm wheel 43 having a hub 44. One face of the hub has formed thereon a clutch section 45. Feathered on the shaft 41 for rotation therewith is a sliding clutch section 46 and when the clutch section 46 is in meshing engagement with the clutch section 45 the cross shaft 41 will be driven, due to the intermeshing of the worm 39 with the worm wheel 43. An expansion spring 47 is coiled about the cross shaft 41 and functions to normally urge the clutch section 46 into meshing engagement with the clutch section 45. Rigidly secured to the movable clutch section 46 is a radially extending pin 48, which is adapted to be engaged by a cam shoe 49. This cam shoe is rockably mounted intermediate its ends on a pivot pin 50 carried by the main frame. A light contractile coil spring 51 is connected to the shoe and to the frame and normally urges the shoe downward against the periphery of the clutch section 46. It is to be noted that as the pin 48 rides against the cam face of the shoe that the clutch section 46 will be moved laterally against tension of its spring 47 away from the clutch section 45. Means is provided, which will be later described, for lifting the cam shoe 49 from out of the path of the pin 48 so that the clutch section 46 can be moved into driving engagement with the clutch section 45.

Keyed or otherwise fastened to the cross shaft 41 for rotation therewith is a crank arm 52 and the crank arm 52 is operatively connected to the arm 19 of the needle shaft 17 by a connecting rod 53 for oscillating the shaft 17 and the needle bar 20. From the foregoing description, it can be seen that when the shaft 41 is rotated that the needle shaft 17 will be oscillated and that the needle will be moved back and forth under the head 15.

Now referring to the head 15, the same embodies a head casting 54 bolted or otherwise fastened to the upright standard 14. This casting carries front and rear bearings 55 and 56 for rotatably supporting the main head drive shaft 57. This shaft 57 extends longitudinally of the head and actuates the stripper and knife cutter 58, the knotter 59 and the string holder or shuttle 60.

The main shaft 57 is power driven from the cross shaft 41 in the following manner. Also mounted in suitable bearings 61 carried by the head casting 54 is a cross shaft 62 and this shaft has keyed or otherwise secured thereto a pinion 63 which meshes with a pinion 64 keyed or otherwise fastened to the rear end of the main

shaft 57. The cross shaft 62 extends beyond one side of the head and this extended portion of the shaft has fixed thereto a sprocket wheel 65. A similar sprocket wheel 66 is rigidly secured to the main cross shaft 41 and the sprocket wheels 41 and 65 are operatively connected together by a sprocket chain 67. Suitable roller guides 67' are provided for the chain so as to take up slack therein and to insure the proper driving of the top cross shaft 62. From the description so far, it can be seen that when the cross shaft 41 is driven in one direction from the clutch section 46 that the main head shaft 57 will be operated.

The stripper and knife cutter 58, the knotter 59 and the string holder or shuttle 60 all operate and function in the same manner as shown in Patents No. 1,407,481 and No. 2,354,410, previously mentioned, and hence these parts will not be described in detail, and only sufficiently for an understanding of the improvements to be had. It is to be noted, however, that the head casting 54 carries a bearing 68 adjacent to its forward end for a stub shaft 69. This shaft 69 is rotated from the main shaft 57 through the use of meshing beveled pinions 70. Keyed or otherwise secured to the lower end of the shaft 69 is a pair of gears 71 and 72. The bottom gear 71 is employed for operating the knotter 59 and the knotter shaft 73 has secured thereto a gear 74 which meshes with said bottom gear 71. It is to be noted that both the gears 71 and 74 have teeth for only a certain portion of their circumference. The top gear 72 has meshed therewith a spur gear 75 fastened to the shuttle or string holder shaft 76. As heretofore stated these parts are substantially the same as the mechanism shown and illustrated in the patents heretofore mentioned, with the understanding, however, that the drive shaft 57 rotates in one direction only and that upon each rotation of the drive shaft one complete cycle of operation takes place. Hence, the gears 72 and 75 have teeth around their entire peripheries.

The stripper and knife cutter 58 also is the same as shown in these patents and operates in the same manner, but novel means is employed for reducing the noise of the operation of this stripper and cutter. The stripper and cutter includes the usual rock arm 77 and the upper end of the rock arm has formed thereon above the rock arm shaft 78 an arcuate operating lever 79. The extreme upper end of this lever 79 has pivoted thereto as at 80 an arcuate lever 81 and this lever 81 is supported at an angle to the lever 79 by a leaf spring 82 which is fastened to the lever 79. Normally the spring 82 is not under tension and functions to normally hold the lever 81 in the position shown in full lines in Figure 8. The extreme forward end of the main shaft 57 has fastened thereto a crank arm 83 and the outer end of the crank arm carries an anti-friction roller 84. Normally, the upper end of the arcuate lever 79 is disposed in the path of travel of the outer end of the crank arm 83 and its anti-friction roller 84; consequently, upon rotation of the shaft 57 the crank arm 83 will engage the upper end of the arcuate operating lever 79 and will move the lever 79 to the right (see Figure 8) and the cord stripper and cutter to the left.

As the roller 84 rides off of the upper end of the operating lever, the spring pressed lever 81 will contact the roller and as this lever 81 is cushioned by the spring 82 shock will be taken up and the roller riding on the curved face of the spring pressed lever 81 will gradually return the string of cord, stripper and cutter to its normal position shown in full lines in Figure 8, in a silent and smooth manner. When the roller 84 rides off the lever 81, the lever has returned to its normal position and the spring 82 is no longer under tension. This forms one of the new features of this invention.

Attention is now directed to Figures 9, 10 and 11 and it will be noted that the string holder or shuttle 60 includes the customary depending stationary guide finger 85' and the pair of slightly spaced stationary cord retaining fingers 86'. These fingers are rigidly secured to a rock frame 87'. This rock frame 87' is carried by pivots 88' supported on the head casting 54. The frame 87' and the fingers 85' and 86' are normally urged away from the knotter by a contractile coil spring 89'. The ends of this spring are secured respectively to the rock frame 87' and head casting 54. Pivotally mounted, as at 90' is an arcuate string holding finger 91' and this finger is movable between the fingers 86' by means of a cam 92' operating in a cam slot 93' carried by a cam plate 94' secured to said movable finger 91'. The cam 92' is secured to the rotary shaft 76 of the string holder. In accordance with the present invention, the extreme outer end of the movable finger 91' is provided with a bent-back arm 95' and hence the movable finger 91' is of a substantially U-shape in plan. The free end of the arm 95' is beveled so as to provide a leading terminal 96'. Great stress is laid on the bent-back arm 95', as the arm functions to insure the placing of the string in proper position in front of the stationary fingers 86' upon the return of the needle to its lowered, inoperative position. At this time, it is to be noted that as the needle moves forwardly between the stationary finger 85' and the pair of stationary fingers 86', that the cord is placed between these fingers and that upon the return stroke of the needle the point 96' is directly in front of the returning cord and catches the cord so as to hold the cord in position to be grasped by the string holder.

In order to bring about automatic starting and stopping of the machine, a trip 85 is provided. This trip is in the nature of a bell crank and includes an arcuate operating arm 86. The trip lever 85 is rockably mounted at its angle on a pivot pin 87 which is carried by a bracket 88 fastened to the head casting 54. The arcuate operating arm 86 is disposed directly below the knotter 59 for a purpose which will be later set forth. The upper arm of the trip lever 85 has operatively connected thereto a pull link or rod 89 and the rear end of this link is operatively connected to one arm of a bell crank lever 90. The lever 90 is rockably mounted at its angle on a stub shaft 91 carried by the upright standard 14. The other arm of the bell crank 90 has operatively connected thereto a pull rod or link 92, which in turn is operatively connected to the cam shoe 49 forwardly of its pivot 50.

Considering that the motor 36 is in operation and the cord or twine 22 is held by the string holder 60 and the machine is ready for operation, the operator moves the bunch of vegetables or other article to be tied (see Figure 1) over the string and under the knotter. At this time, the bunch of vegetables will strike the curved arm 86 of the trip and the arm will be raised rocking the trip lever 85 on its pivot 87. Through the

medium of the links 89 and 92 of the bell crank 90, the cam shoe 49 will be raised above the pin 48 carried by the clutch section 46. The clutch section will now move under the influence of its spring 47 into meshing engagement with the clutch section 45. Consequently, the main cross shaft 41 will be driven. This will set in operation the needle 18 and the main head drive shaft 57 and the machine will then function as shown and described in said mentioned patents.

When the knotting and tieing of the vegetables has been accomplished and the string has been cut, the bunch of vegetables is immediately lowered and removed from the machine. This will permit the lowering of the trip to its normal position under influence of the cam shoe spring 51. The cam shoe itself will lower and will engage the hub of the clutch section 46. The machine will continue to operate momentarily until the pin 48 on said clutch section travels to the high point of the cam shoe (see Figure 2) at which time the clutch section 46 will be moved laterally away from the clutch section 45 and out of driving contact therewith. The machine will instantly stop and will be ready to tie the next bunch of vegetables.

Great stress is laid on the novel means employed for operating the main cross shaft 41 from the motor 36 and the means employed for operating the head shaft 57 and the needle 18 from the cross shaft. This drive will effectively speed up the operation of the machine and reduce noise usual with the operation thereof.

It is to be noted that the front of the head of the machine in advance of the cutter and stripper 58, the knotter 59 and the string holder or shuttle 60, is provided with a resilient string supporting finger 93. This resilient finger is so disposed that that part of the cord which is to be held by the holder or shuttle 60 is disposed above the cutter 58 so that this string will not be severed by the cutter as the same severs the cord ends at the knot. Briefly, as the bunch of vegetables or other article to be tied is placed in the machine against the cord, the cord is pulled off of the resilient finger and when the needle moves toward the bunch of vegetables the string is carried over the resilient finger 93 which will hold this part of the string in its proper elevated position away from the cutter until the string is severed at the knot and until a new bunch of vegetables is placed in position to be tied.

Shields can be provided for the operating parts of the machine and hence I have shown a removable shield 94 for the body of the machine and a removable shield 95 for the head of the machine. Other safeguards for the operator can be employed.

Changes in details may be made without departing from the spirit or the scope of this invention, but what I claim as new is:

1. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter, and a string holder all operatively connected to the forward end of said operating shaft, and a needle bar rockably mounted upon the support; a main drive cross shaft on said support, a motor for driving said main cross shaft, a cross shaft carried by said head, intermeshing gears carried by the head cross shaft and the longitudinally extending operating shaft, a chain drive operatively connecting the main cross shaft and the head cross shaft together, and means for operating the needle bar from said main cross shaft.

2. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter and a string holder all operatively connected to the forward end of said operating shaft, and a needle bar rockably mounted upon the support; a main cross shaft, a drive motor, means operatively connecting the motor to said cross shaft, a rock shaft supporting the needle bar, a crank arm on said rock shaft, a crank arm on the cross shaft, a connecting rod operatively connecting said crank arms together, and means including a sprocket chain operatively connecting the cross shaft and the operating shaft together.

3. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter and a string holder all operatively connected to the forward end of said operating shaft, and a needle bar rockably mounted upon the support; a drive motor upon the support, a main cross shaft, means operatively connecting the motor to the cross shaft, a rock shaft on the support for the needle bar, a crank arm secured to the rock shaft, a crank arm secured to the cross shaft, a connecting rod operatively connecting said crank arms together, a cross shaft on said head, intermeshing pinions connecting the cross shaft on the head to the operating shaft, said cross shafts having sprocket wheels secured thereto, and a sprocket chain connecting said sprocket wheels together.

4. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter and a string holder all operatively connected to the forward end of said operating shaft, and a needle bar rockably mounted upon the support; a main cross shaft rotatably mounted on the support, a drive motor on said support, means operatively connecting the cross shaft to the needle bar, means operatively connecting the cross shaft to the longitudinally extending rotatable operating shaft of the head, a worm wheel rotatably mounted on the cross shaft having a clutch section secured thereto, a clutch section feathered to said cross shaft for sliding movement toward and away from the first mentioned clutch section, spring means normally urging said last mentioned clutch section on the shaft toward the first mentioned clutch section, a radially extending pin on the last named clutch section, a pivot cam shoe carried by the support normally urged into engagement with the last mentioned clutch section and in the path of the pin carried thereby, a pivot trip lever carried by the head and disposed adjacent to the motor and in the path of the bunch of vegetables to be tied by the machine, and means operatively connecting the cam shoe and said trip lever.

5. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter and a string holder all operatively connected to the forward end of said operating shaft, and a needle bar

rockably mounted upon the support; and means for operating the string stripper and cutter including a crank arm on said operating shaft, a pivoted arcuate lever carried by the string cutter disposed in the path of said crank arm, and a spring support for said lever.

6. In a machine for tieing bunches of vegetables and the like of the type including a support for a cone of twine, a head carried by the support, having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter, and a string holder all operatively connected to the forward end of said operating shaft, a needle bar rockably mounted upon the support; a tensioning device for the twine located between the cone of twine and said needle including a supporting bracket, a friction button, a stud on said friction button slidably mounted in said bracket, spring means normally urging the friction button toward the bracket and a guide pin carried by the friction button slidably extending through the bracket, the twine being adapted to be placed between the friction button and the bracket and between the stud and the said guide pin.

7. In a machine for tieing bunches of vegetables and the like of the type including a support for a cone of twine, a head carried by the support, having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter, and a string holder all operatively connected to the forward end of said operating shaft, a needle bar rockably mounted upon the support; a tensioning device for the twine located between the cone of twine and said needle including a supporting bracket, a friction button, a stud on said friction button slidably mounted in said bracket, spring means normally urging the friction button toward the bracket, a guide pin carried by the friction button slidably extending through the bracket, the twine being adapted to be placed between the friction button and the bracket and between the stud and the said guide pin, and means for regulating the tension of the spring.

8. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter, and a string

holder all operatively connected to the forward end of said operating shaft, and a needle bar rockably mounted upon the support; a main drive cross shaft on said support, a motor for driving said main cross shaft, a cross shaft carried by said head, intermeshing gears carried by the head cross shaft and the longitudinally extending operating shaft, a chain drive operatively connecting the main cross shaft and the head cross shaft together, means for operating the needle bar from said main cross shaft, and a resilient finger carried by the head in front of the knotter, string stripper and cutter, and string holder for receiving and holding the string when the needle bar travels over said finger toward the knotter.

9. In a machine for tieing bunches of vegetables and the like of the type including a support, a head carried by the support having a longitudinally extending rotatable operating shaft, a knotter, a string stripper and cutter and a string holder all operatively connected to the forward end of said operating shaft, and a needle bar rockably mounted upon the support for movement toward and away from the knotter, string stripper and cutter and the string holder; said string holder including a rock frame, a depending stationary guide finger on said frame, a pair of slightly spaced depending string holding fingers on said frame, an arcuate string holding finger pivotally secured to said rock frame and movable between the stationary fingers for cooperation therewith to grip the string, and a bent-back arm on said movable finger having a pointed terminal ending in close proximity to the pair of stationary fingers and disposed in the path of the string carried by the needle upon the return movement of said needle.

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