A. H. SAXTON & J. J. BACHMAYER.

BUNDLE TIER.

APPLICATION FILED MAR. 10, 1912.

1,105,703.

Patented Aug. 4, 1914

4 SHEETS—SHEET 1.

Fig. 1.

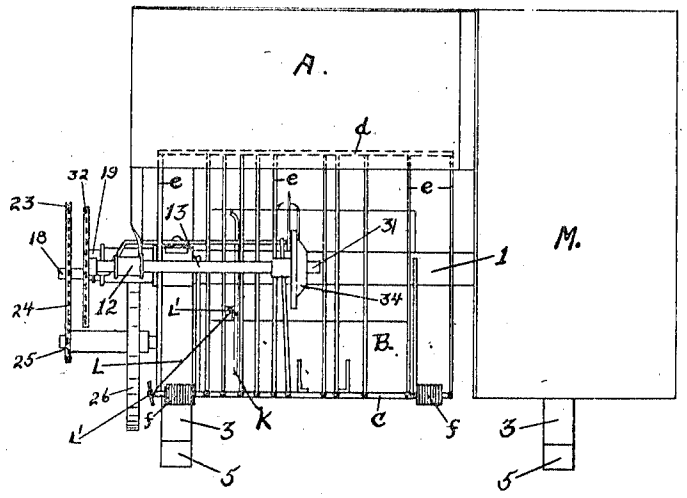
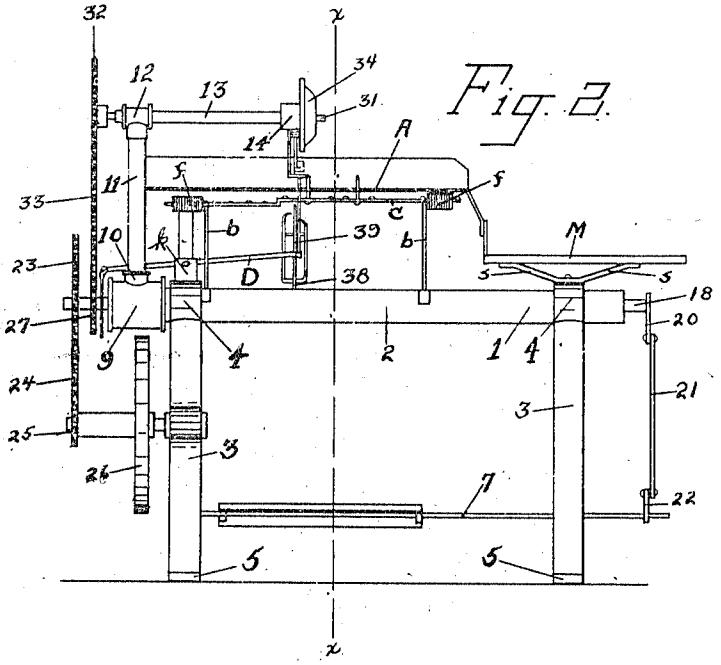



Fig. 2.




WITNESSES.

C. H. Wilson

M. S. Smith

INVENTORS

Albert H. Saxton and

Joseph J. Bachmayer

by Robt. B. Wilson

Attorney

A. H. SAXTON & J. J. BACHMAYER.

BUNDLE TIER.

APPLICATION FILED MAR. 19, 1912.

**1,105,703.** **Patented Aug. 4, 1914.**

4 SHEETS—SHEET 2.

Fig. 3.

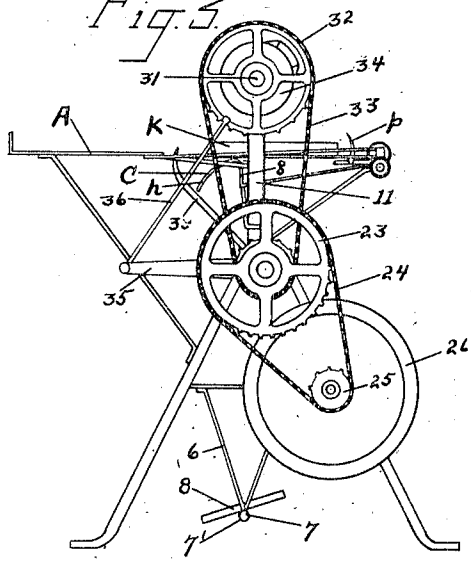



Fig. 4.

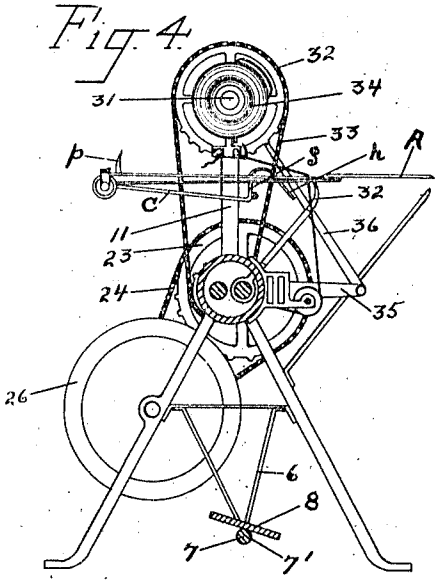



Fig. 5.

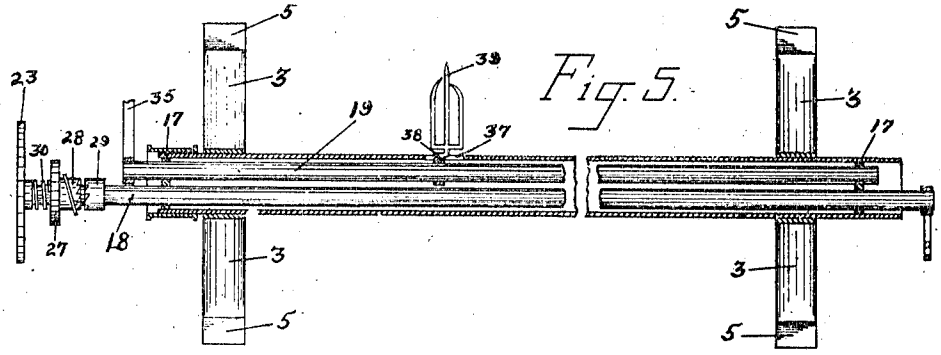



Fig. 7.

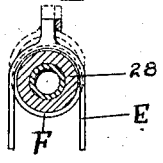
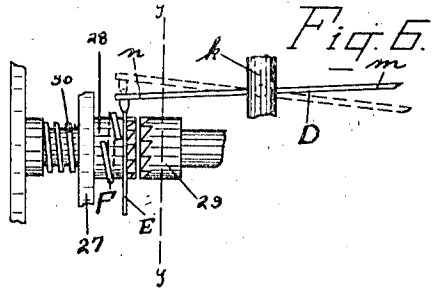



Fig. 6.




WITNESSES.

C. H. Wilson

M. S. Smith.

INVENTORS

Albert H. Saxton and

Joseph J. Bachmayer

by Robt. B. Wilson

Attorney

A. H. SAXTON & J. J. BACHMAYER.

BUNDLE TIER.

APPLICATION FILED MAR. 19, 1912.

1,105,703.

Patented Aug. 4, 1914.

4 SHEETS—SHEET 3.

Fig. 8

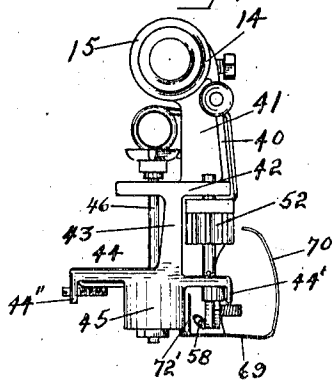



Fig. 9.

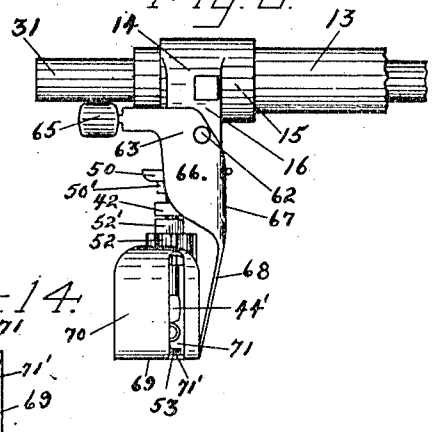



Fig. 14.

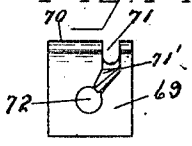



Fig. 11.

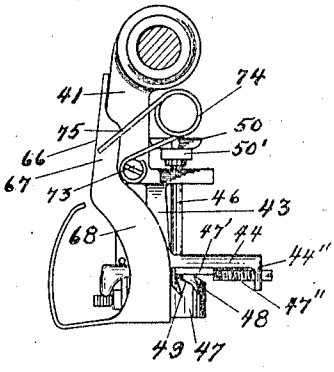



Fig. 10.

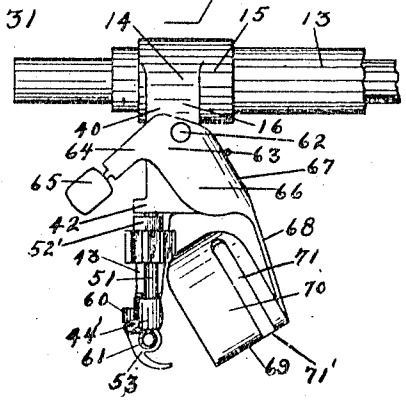
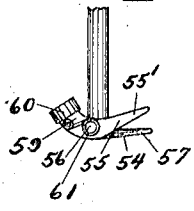



Fig. 13.



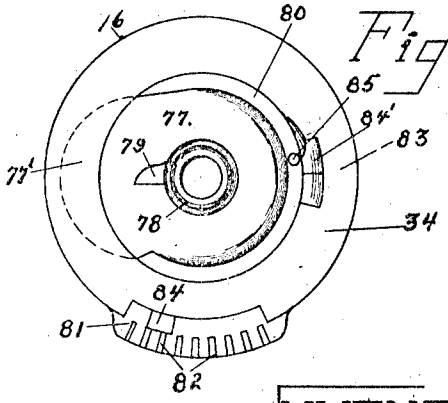




Fig. 12.

WITNESSES.

C. N. Wilson

M. S. Smith

INVENTORS

Albert H. Saxton and

Joseph J. Bachmayer

by Robt. C. Wilson

Attorney

A. H. SAXTON & J. J. BACHMAYER.

BUNDLE TIER.

APPLICATION FILED MAR. 19, 1912.

1,105,703.

Patented Aug. 4, 1914.

4 SHEETS—SHEET 4.

Fig. 18.

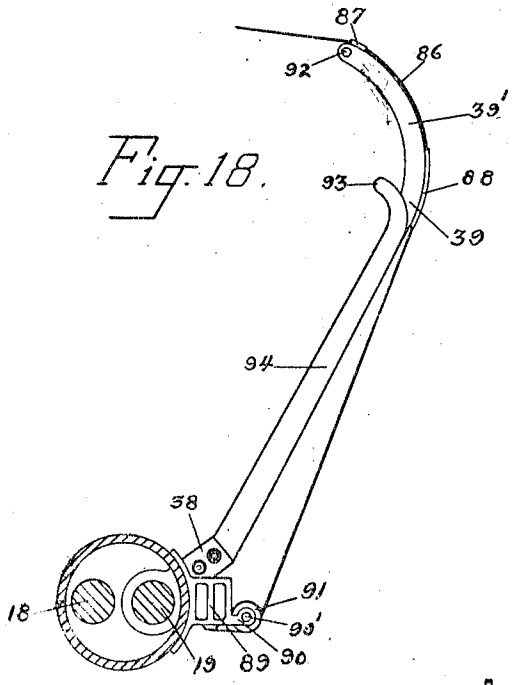



Fig. 16.

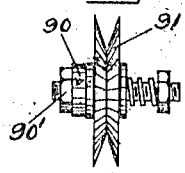



Fig. 15.

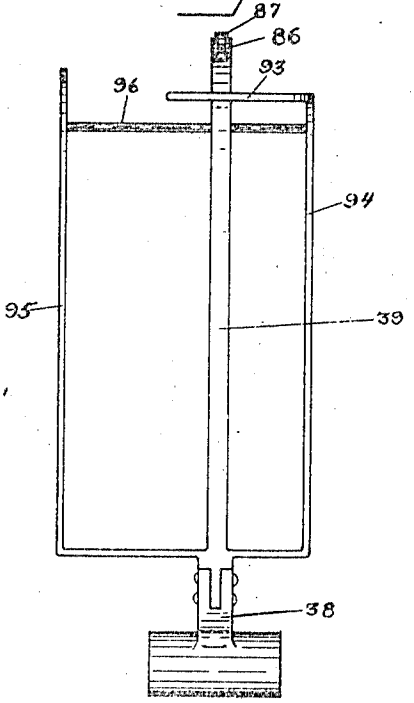
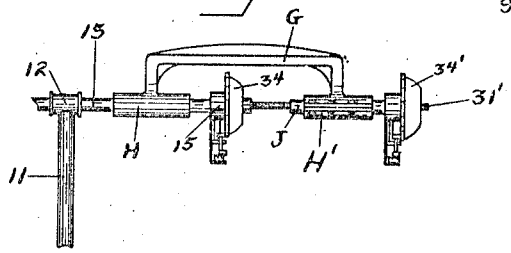



Fig. 17.




WITNESSES.

C. H. Wilson

M. S. Smith

INVENTORS

Albert H. Saxton and

Joseph J. Bachmayer

by Rob't C. Wilson

Attorney

# UNITED STATES PATENT OFFICE.

ALBERT H. SAXTON, OF DEERFIELD, MICHIGAN, AND JOSEPH J. BACHMAYER, OF TRILBY, OHIO, ASSIGNORS OF ONE-THIRD TO FRANK S. SAXTON, OF BLISSFIELD, MICHIGAN.

## BUNDLE-TIER.

1,105,703. Specification of Letters Patent. Patented Aug. 4, 1914.

Application filed March 19, 1912. Serial No. 684,727.

*To all whom it may concern:*

Be it known that we, ALBERT H. SAXTON and JOSEPH J. BACHMAYER, citizens of the United States, and residents, respectively, of Deerfield, Lenawee county, Michigan, and Trilby, Lucas county, State of Ohio, have invented a new and useful Improvement in Bundle-Tiers, of which the following is a specification.

Our invention relates to a machine for tying bundles of vegetables and the like, and has for its object to provide an efficient machine of the kind that is adapted to quickly and securely tie together vegetables of various kinds, when assembled in numbers or quantities as sold on the market, and in bundles varying in size, as required or desired.

A further object is to provide a machine that is adapted to tie bundles of things of like kind, varying in numbers and sizes as may be desired, and that is adapted to tie together a number of small bundles assembled in one large bundle.

We accomplish these objects by the construction and combination of parts as hereinafter described, and illustrated in the drawings, in which—

Figure 1 is a top plan view of a bundle tying machine constructed in accordance with our invention. Fig. 2 is a rear elevation of the same. Fig. 3 is an end elevation of the same. Fig. 4 is a section on line *x*—*x* of Fig. 2. Fig. 5 is a horizontal, longitudinal section through the main shaft bearing member of the main frame. Fig. 6 is an enlarged detail of the trip clutch, in side elevation. Fig. 7 is a cross section of the same on line *y*—*y*. Fig. 8 is an end view of the knotter brackets with the knotter disk removed. Fig. 9 is a side elevation of the same with the knife lever in its normal position. Fig. 10 is a similar view with the knife lever in position after securing the string and releasing the knot from the knotter bill. Fig. 11 is an end view of the knotter bracket opposite to that shown in Fig. 8. Fig. 12 shows the face of the knotter disk abutting the knotter bracket. Fig. 13 is a detail showing the knotter bill open. Fig. 14 is a bottom view of the knife bearing guard lever. Fig. 15 is a front view of the needle. Fig. 16 is an enlarged view of the tension wheel. Fig. 17 is a side view of a detachable auxiliary knotter mechanism, and Fig. 18 is an enlarged side view of the needle, twine cage, and tension wheel.

In the drawings 1 designates the main frame supporting the several parts. The frame comprises the tube 2 mounted at each end portion upon a pair of diverging legs 3, preferably for lightness and strength formed of a piece of tubing of suitable length having its central portion collapsed and forged into a collar 4, adapted to fit around the tube 2, and having the end portions of the tube flattened and angled into a common plane to form feet 5. Between each pair of legs 3 is pendently secured a triangular truss frame 6 central of the apex of which is provided a bearing 7, in which is journaled one end of a treadle shaft 7′ having fixedly mounted thereon a foot treadle 8 adapted to rock the treadle shaft.

On one end portion of the tube 2 is fixedly mounted a T 9 having a nipple 10 in which is threaded a tubular standard 11, on the upper end of which is threaded the T 12, into which is threaded, in line parallel with the tube 2, the tube 13, having mounted on the outer end portion the knotter bracket 14, comprising the collar portion 15 and the hanger arm 16. The ends of the tube 2 of the main frame are provided with suitable bearings 17 in which are journaled parallel the main shaft 18 and the rock shaft 19.

The main shaft 18, at one end has fixedly mounted thereon a crank 20, which is connected by a pitman rod with a rock arm 22 on the end of the treadle shaft 7. On the opposite end of the shaft 18 is fixedly mounted a sprocket wheel 23 which is connected by a sprocket belt 24 with a sprocket wheel 25 of reduced diameter fixedly mounted on the hub of the fly wheel 26, the fly wheel being mounted on a stud journal secured to and projecting from a leg 3 in line parallel with the main shaft 18.

On the main shaft 18 adjacent to the hub of the sprocket wheel 23 is loosely mounted a sprocket wheel 27 of smaller diameter, the inner end of the hub 28 of which is incut to form the hub as one member of a clutch, the other member being a collar 29 fixedly mounted on the main shaft 18 and having the end adjacent to the hub 28 provided with incuts complementary to the ratchet teeth formed by the incuts in the end of the hub, whereby when the shaft 18 is rotated

in one direction the hub will be moved outward on the shaft by the ratchet teeth and if rotated in the opposite direction, a spring 30 mounted on the shaft between the wheels 23 and 27 will cause the clutch members 28 and 29 to intermesh, whereby the sprocket wheel 27 will be rotated with the shaft 18.

In the tube 13 is journaled the shaft 31, on one end of which is fixedly mounted a sprocket wheel 32, which is connected by a sprocket chain belt 33 with the lower sprocket wheel 27. On the opposite end of the shaft 31 is fixedly mounted the knotter disk 34.

The outer end of the rock shaft 19 is provided with a rock arm 35 which is connected by a pitman 36 to the sprocket wheel 32 whereby one revolution of the wheel rocks the shaft 19 through 90°, more or less according to the point of connection of the pitman to the rock arm.

Vertically below the hanger arm of the knotter bracket 14 the tube 2 is provided with a segmental slot 37, and opposite the slot the rock shaft 19 has mounted thereon a rock arm 38 which projects through the slot 37 and has secured thereto as an extension a needle arm 39.

The hanger arm 16 of the knotter bracket 14 is integral with the collar portion 15, and has a web 40 tangential to the collar, and the side of the body portion 41 opposite the web 40 is substantially in the vertical plane of the axis of the collar, and at the lower end of the arm 16 is a cross web 42, central of which is an extension arm 43 at the lower end of which and integral therewith is a cross bar 44 having integral therewith on its lower side a semi-cylindrical boss 45, and the downward projecting end portions 44′ and 44″.

In alinement axial to the semi-cylindrical boss 45, the cross web 42 and the cross bar 44 are provided with alined bores in which are journaled the stem 46 of the cylindrical shuttle cup 47, having at 90° points of its rim diagonal incuts 48 therein, through the rim toward the bottom of the cup, and forming the catch teeth 49, and adapted when a string is drawn over the rim of the cup at one side of the stem, to catch the string as the cup is revolved in one direction, and carry the string toward the bottom of an incut 48 and thence around the rim wall between the rim and the inner face of the semi-cylindrical boss 45. The upper end portion of the stem 46 above the cross web 42, has fixedly mounted thereon the four arm capstan lever 50 having the square faced hub 50′ below the lever arms. In the projection 44″ is secured a spring 47′ that bears against the cup 47, and a screw 47″ bearing against the spring and adapted to adjustably press the cup against the inner wall of the boss 45.

On the opposite side of the extension arm 43 the cross web 42 and the cross bar 44 are provided with alined bores in which are journaled the arbor 51 on which, between the cross web 42 and the cross bar 44 is fixedly mounted the pinion 52, and below the cross bar the knotter bill 53, comprising the fixed member 54 and the movable member 55 pivoted by the pivot 56 to the fixed member 54. The pinion 52 is provided on its upper side with a triangular hub 52′.

The fixed member 54 has a bill portion 57 projecting to one side and at substantially a right angle to the arbor 51, and at a right angle thereto the enlarged cam portion 58 curved upward from the plane of the bill portion 57. The movable member 55 has a bill portion 55′ complementary to the bill portion 57 of the fixed member 54, and opposite to the bill portion 55′ a portion 59 which is bent upward at substantially a right angle, and is provided with a spindle on which is mounted a roller 60. The adjacent end portion 44′ of the bar 44 is formed as a cam, which, as the bill member is revolved by the pinion 52, is engaged by the roller 60, which causes the roller to be depressed and to move around the cam face of the end 44′ of the bar 44, whereby the bill portion 55′ is opened from the bill portion 57 of the fixed member 54. On the pivot 56 is mounted a helical spring 61, having an end portion in engagement with the movable member 55, whereby when the roller 60 has passed the cam 44′, the spring 61 causes the bill portion 55′ to close beside the bill portion 57 of the fixed member 54, preferably as one shear blade opens and closes beside its companion shear blade.

To the outer face of the hanger arm 16, which is broadened by the web 40 is pivoted by a stud screw 62, a knife bearing plate 63 which is also a guide for the point portion 64 of the needle arm 39, a guard for the knotter bill, and also performs the function of tightening the knot formed on the knotter bill as it removes it therefrom and cuts the twine. It also forms a bearing plate for the top of a bundle in position for tying.

The plate 63 has an upper arm portion 64, which extends toward the knotter disk 34, and has mounted on a spindle on its outer end portion a roller 65, a portion 66 which extends parallel with and against the web 40, a portion 67 which is angled and shouldered against the face of the arm 16 opposite the face nearest the disk 34 and has a curved portion 68 which extends downward and slightly inward toward the knotter bill opposite the pinion 52 and the arbor 51, to and slightly below the level of the knotter bill and the lower end of the shuttle cup, and has integral therewith and at a right angle thereto a portion 69 which extends underneath the knotter bill, and a portion 70

which is curved slightly downward and then upward from the portion 69, in front of the knotter bill and near one side is provided with a slot 71 which extends from near the top of the portion 70 to the portion 69 and diagonally in the portion 69 between the converging sides of the slot 71′ to a central orifice 72 directly beneath the knotter bill. At one side of the orifice 72 between the orifice and the cylindrical boss 45 there is secured to the inner face of the portion 69 of the lever plate 63 a knife blade 72′ which extends upward to a point below the level of the rim of the shuttle cup 47.

On the same side of the arm 16 as the portion 67 of the plate 63 is secured by a screw 73 a spring 74 which has an arm 75 that engages the portion 67 and normally and yieldingly holds the portion 67 engaged with the web 40, but which yields under pressure on the roller 65 to move the lower end portion 69 sidewise in an arc as shown in Fig. 10.

The knotter disk 34 has an annular disk rim 76 concentric to a central portion convex to one side and having an annular cavity 77 around a hub 78 which extends into the cavity, and has a lug 79 projecting radially from one side of the hub. Opposite the lug is a side extension 77′ of the cavity 77, and the cavity is enlarged circumferentially as to its outer portion by a counterbore forming a ledge 80 which is partly cut away by the side cavity 77′: The disk rim 76 is provided with a radial segmental extension 81 on which are formed the rack teeth 82, the center tooth being radially 90° forward of the lug 79 in the direction of revolution of the disk 34, and which as the disk 34 revolves engages the pinion 52 and revolves the pinion one revolution.

Between the rack teeth 82 and the cavity 77 the face 83 of the disk rim 76 is provided with an incut 84 which prevents the triangular hub 52′ of the pinion 52 from engaging with the face 83 while the pinion is revolved by the rack teeth.

Diametrically opposite the lug 79 the ledge 80 is bored and tapped to receive a pin 85, which once each revolution of the disk comes into engagement with one of the arms of the capstan lever 50 and revolves the shuttle cup 47 one fourth of a revolution.

Opposite the pin 85 there is provided a V shaped incut 84′ in the plane face 83 of the disk rim 76 which as the lever 50 is revolved by the pin permits the square hub 50′, to revolve with it, without engaging the face 83 of the disk rim, and is also adapted to prevent the pin 85 from turning the shuttle cup 47 either more or less than a quarter revolution.

Before mounting the knotter disk on the end portion of the shaft 31 projecting beyond the end of the tube 13, a squared face of the hub 50′ of the lever wheel 50 and the face of the triangular hub 52′ of the pinion 52, which is opposite to the knotter bill 53, are adjusted to position flush with the cross web 42 and parallel with the plane face 83 of the disk rim, and the disk is secured to the shaft with the face 83 of the disk in close proximity to the cross web 42, whereby both the shuttle cap and the knotter bill are held during periods of rest in proper position to receive the twine.

When the knotter disk 34 is secured in position on the shaft 31, the roller 65 on the arm 64 of the plate 63, extends into the inner cavity of the disk and as the disk revolves the lug 79 comes into contact with the roller which forces it downward into the side extension 77′ of the cavity 77, thereby moving the portion 69 of the plate 63 outward and upward through an arc. After the roller 65 passes the lug 79 the spring 74 quickly returns the plate 63 and its portion 69 to the normal positions.

In the normal position of the portion 70 of the lever plate 63, its slot 71 extends transverse the plane of the arc of movement of the point portion 39′ of the needle 39. The point portion 39′ of the needle extends by a curve forward of the body portion of the needle arm in the direction of its upward movement to near a right angle from the body portion, and at near the completion of the upward movement of the needle point the point enters the slot 71 and at the end of its upward stroke is extended over the shuttle cup 47. In the upper side of the point portion 39′ of the needle a groove 86 extends between an eye 87 in the point to an eyelet 88 extending outward from the bend of the point.

To the tube 2 beside the slot 37 is suitably secured a twine cage 89 adapted to receive and retain a ball of twine, and integral with the cage is an arm 90 which at its outer end is provided with a stud pivot 90′ which has pivotally mounted thereon the tension wheel 91 having a V groove in its periphery around which the end portions of the twine of the ball is rove and then carried first to the eyelet 88, then through the groove 86 and then through the eye 87 in the point of the needle with a portion of the twine of suitable length extending pendent from the eye. Preferably below and rearward of the eye 87 is provided a small roller 92, and transversely across the front side of the bend of the point portion of the needle is the end portion 93 of a packer arm 94 which is connected at its inner end to the arm 39 and extends parallel therewith to the bend of the needle arm and has the portion 93 bent therefrom across the needle band in front thereof, and below the point portion 39′. On the opposite side of the needle arm 39 and parallel therewith is a packer arm 95,

which is also connected at its inner end to the arm 39 and near to and below the bends of the arms, the arms 39, 94 and 95 are connected by a cross bar 96.

At one side and slightly below the level of the portion 69 of the lever 63 is supported by suitable truss supports *a* (and others not shown) on the main frame, a table A, and at the opposite side and at a level slightly below the level of the table A and journaled in supports *b* by a hinge rod *c* is a frame comprising the hinge rod *c*, the bar *d* parallel with the hinge rod and the parallel rods *e* cross connecting the rod *c* and the bar *d* and together forming the open table B. On the end portions of the hinge rod *c* are mounted the helical springs *f* the inner ends of which are secured in the supports *b* and the outer ends in the hinge rod, whereby the table B is normally held in a substantially level position with the bar *d* engaging the under side of the inner side of the table A, and is made adapted to yield downward by a number of objects collected together and pushed under the portion 69 of the lever 63 of the knotter mechanism, according to the diametric thickness of the collection.

Hinged to the hinge rod *c* by one end between two of the rods and extending parallel therewith directly underneath the knotter mechanism is a trip rod C having formed on the free end thereof an upward bend *g* and a downward and forwardly inclined end portion *h*. To a standard *k* mounted on the main frame is pivoted a lever D, the long arm *m* is pivoted to the upward bend *g* of the trip rod C and on the end of the opposite arm *n* is secured a trip fork E which extends downward on opposite sides of the hub 28 of the sprocket wheel 27, and which engages a spiral shoulder F on the hub and operates, when the fork is pushed downward to move the hub 28 outward and release it from engagement with the fixed collar 29, and when the fork E is raised, the spring 30 moves the hub 28 inward to engagement with the clutch collar 29, whereby the sprocket wheel 27 is set in motion and operates the sprocket wheel 32, which both revolves the knotter disk 34 and through the pitman 36 rocks the shaft 19 to move the needle 39 forward and back through its arc. Thus constructed and connected it will be seen that the main shaft and the fly wheel may be operated by the treadle continuously independent of the knotter mechanism, and that by depressing the trip bar C the knotter mechanism will be operated only while the trip bar is depressed.

In mounting the knotter disk on the shaft 31, its pin 85 is so adjusted relative to the crank pin of the sprocket wheel 32 that when the needle 39 is at the end of its upward movement, with its point portion extending over the shuttle cup 47 the pin 85 of the knotter disk 34 is in engagement with an arm of the capstan lever 50 which turns the shuttle, which engages the twine extending from the end of the needle point and carries it around and between the cup 47 and the cylindrical boss 45 and wedges it between the boss and the cup, as the needle is moved backward and downward.

As the needle travels backward and downward, the point of the needle travels backward along the portion *o* of the twine that was carried up by the needle on its upward stroke and which was caught and held by the shuttle, and this portion *o* of the twine between the point of the needle and the shuttle passes downward through the open table toward the table A in front of the free end of the trip bar. This initial upward and downward movement of the needle completes the attachment of the twine from the ball around the tension wheel through the needle to the shuttle for the tying of bundles, and being so attached, the machine is in readiness to tie bundles of vegetables or other things. An operator seated at the table A operates the treadle to set the shaft 18 and the fly wheel in motion, and holding in his hands a desired number of similar collected things in form to be tied together in a bundle, the operator pushes them from the table A along the rods *e* of the open table B until the collection first engages the twine *o* and pushes it forward around the front side of and underneath the collection, drawing with it through the needle a length of twine equal to half the circumference of the bundle. As the collection is pushed forward it also engages the trip C and depresses it, which sets the knotter mechanism in operation. It also engages the portion 70 of the lever 63, which causes the table B to be depressed as the collection is pushed underneath the portion 69 of the lever 63. As the collection passes under the portion 69, the end portion of the portion *o* of the twine that is next to the shuttle is drawn downward through the slot 71 over the top of the knotter bill and then diagonally through the converging slot 71′ into the central orifice 72 of the portion 69. At the same time, the needle is moved upward and carries the twine around the rear side of the collection, and through the slot 71 of the portion 70 of the lever 63, over the knotter bill, and then over the shuttle, which being turned by the pin 85 of the knotted disk as the needle reaches the end of its upward movement, engages the portion of the twine extending downward from the needle point, and secures it between the shuttle and the boss 45, and at the same time the twine is pushed forward underneath the portion 69 through the slot 71 and the converging slot 71′ by the end portion 93 of the packer arm 94 of the needle, which completes the looping of

the twine around the collection with the end portions of the loop secured between the shuttle and the boss, immediately following which, the teeth of the knotter disk operate the pinion 52 to revolve the knotter bill, the point of which, (by reason of the two end portions of the twine thus drawn around the collection both passing over the knotter bill and down through the orifice 72 of the portion 69 of the lever 63 from the shuttle), passes above the portions extending downward through the orifice 72 in the first quarter turn of the bill. In the next quarter turn of the knotter bill the cam portion 58 of the member 54 of the bill passes over the portion of the twine extending from the bill to the shuttle and depresses them downward around the bill. In the third quarter turn of the bill the roller 60 of the member 55 of the bill engages the cam 44′ and opens the bill, and holds the bill open until the portions of the twine extending between the bill and the shuttle passes between the points of the members. On the fourth quarter turn of the bill, the roller 60 is disengaged from the cam 44′ and the spring 61 closes the bill on the twine. Immediately following this operation of the bill, the lug 79 of the knotter disk engages the roller 65 of the arm 64 of the lever 63 and moves the guard portions 69 of the lever outward and upward through an arc, whereby, first, the knife 72′ engages the end portions of the loop around the collection, extending between the knotter bill and the shuttle, and severs them; second, the portion 69 engages the same portions of the loop extending through the orifice 72 below the bill, and pulls the portions of the same looped around the bill, off of the end of the bill around the portions held between the two members of the bill, and lastly pulls the single bow thus formed, from the bill, the resistance to which tightens the single bow knot thus formed and completes the tying of the bundle.

It will be seen that all of the operations of tying a bundle are completed during the downward and upward strokes of the needle, the bundle to be tied being pushed forward beneath the knotter during the downward stroke of the needle, after it has passed below the table B, by which time all of the operations of tying a bundle during the next preceding downward and upward stroke of the needle are completed, and as the bundle to be tied is pushed into position under the knotter mechanism it pushes the preceding tied bundles forward until in their turn they are pushed from the table B into a suitable receptacle placed in position to receive them.

The portion $g$ of the top rod $e$ extends upward rearward of the portion 70 of the lever 63 of the knotter, so that after an untied bundle has been pushed past the portion $g$ under the portion 69 of the lever 63 of the knotter, the trip bar would raise to its normal position and disconnect the knotter mechanism from the main shaft but for the engagement of the inclined end portion $h$ of the trip bar by the rod 96 cross connecting the needle and packer bars, which continue to hold the trip bar depressed while the needle arm 39 is at the upper part of its stroke and the operation of tying the bundle is being performed. But when the needle is approaching the end of its downward stroke, unless another untied bundle is being pushed into the path of upward movement of the inclined end portion $h$ of the trip bar, the trip bar will rise and the needle arm will come to a rest at the end of its downward stroke thereby preventing any of the operation of the knotter mechanism being performed except while an untied bundle is being pushed into position to be tied, or is being tied, or the trip bar is manually depressed while the main shaft is in motion. In order that the needle arm 39 will stop at the end of its downward stroke when the trip bar is released after being depressed, the hub 28 of the sprocket wheel 27 is adjusted with the outermost part of its spiral shoulder F uppermost, and the rock arm 35 of the rock shaft 19 is adjusted to bring the needle arm 39 at the end of its downward stroke before the sprocket belt 33 is connected around the two sprocket wheels 27 and 32 which insures that whenever the trip bar is in its normal position the needle arm will be standing still at the end of its downward stroke, and if the trip bar is depressed to start the knotter mechanism and then released, the upward movement of the needle arm will hold the trip bar depressed until it releases the trip bar on the downward stroke, as hereinbefore described, and the needle bar will come to rest at the end of the stroke, and will remain at rest in that position until a bundle is pushed forward and again depresses the trip bar, and releases the clutch member 28, and starts the knotter mechanism.

When it is desired to tie a number of smaller bundles together into one bundle the stops $p$ are mounted on rods $e$ which retain the bundles until the desired number is accumulated. The operator then reaches forward and grasping the collection of bundles pushes them under the knotter, and the machine ties them together in one bundle. This capacity of our machine to tie bundles of varying sizes and of tying a number of small bundles into one, especially adapts it for use by market gardeners in tying in separate bundles, onions, radishes, beets and the like in such numbers or quantities as they are usually sold, which operation our machine greatly facilitates.

To adapt the machine for tying bundles at each end, the tube 13 has mounted thereon

between the collar portion 15 of the knotter bracket 14 and the T 12 of the standard 11, the sleeve portion H of the extension bracket arm G arched over the knotter disk 34, and having at its outer end a split sleeve H′ in alinement with the sleeve H. In the sleeve H′ is fixedly secured the tube J on the outer end of which is a duplicate knotter mechanism and to the end of the shaft 31 is coupled an extension shaft 31′ which extends through the tube J, and has mounted on the outer end the knotter disk 34′. The shaft 19 is provided with a needle 39 opposite the auxiliary knotter disk 34′. Thus equipped the machine is made adapted for tying bundles of celery, pie plant stalks and the like, at each end.

In order to tie bundles at a uniform distance from one end, the table B is preferably provided with an adjustable gage bar K which is pivoted to swing horizontally on the bent up end portion of a rod L, which is pivoted at the opposite end in an eye formed in the end of the hinge rod *c* of the frame B to swing horizontally above the frame B, and has its pivots threaded at their end portions and provided with thumb nuts L′ whereby the rod L and the adjuster gage K are fixed in any position to which they are adjusted.

The main frame I is preferably also provided with a table M which is supported transversely above one end portion of the main tube 2 by supports *s* (and other suitable supports, not shown) at which an assistant operator may assemble collections of the articles to be tied in desired numbers and place them on table A convenient for the operator at the latter table to feed them to the tier.

What we claim to be new is—

1. In a bundle tying machine, the combination with a main shaft and means to rotate the shaft, of bundle tying mechanism comprising a twine carrying needle and a knotter adapted to be operated by the main shaft and normally disconnected therefrom, a downwardly yielding spring supported table frame below the knotter and adapted to be depressed below its normal position by a collection of things moved thereon into position to be tied into a bundle by the knotter and the needle, and to support the bundle while it is being tied, and means to operatively connect the tying mechanism with and disconnect it from the main shaft, said means adapted to be operated to connect by a bundle being moved over the table frame into position to be tied, and to automatically disconnect said mechanism therefrom when the bundle is tied, unless connection is maintained by a following bundle or bundles.

2. In a bundle tying machine, the combination with a main shaft, and means to rotate the shaft, of bundle tying mechanism normally disconnected from the main shaft and comprising a twine carrying needle and a knotter adapted when connected to the main shaft to be conjointly operated thereby to form and tie a twine loop around a bundle beneath the knotter, a downwardly yielding spring supported table frame below the knotter, and adapted to yield to admit a bundle of things pushed along the table between the knotter, and the table, spring pressed means adapted to operatively and automatically connect the tying mechanism with the main shaft, means to hold the connecting means normally disconnected, and a trip bar held normally raised by the disconnecting means, and adapted when depressed to operate the disconnecting means to release the connecting means, whereby the tying mechanism is operated only when the trip bar is depressed and held depressed, said trip bar being adapted to be depressed by a bundle being moved on the depressible table into position for tying, and to be held depressed by the needle until the operation of tying is completed.

3. In a machine for tying bundles, the combination with a main shaft and means to revolve the shaft, of bundle tying mechanism, means mounted on the main shaft to operatively connect the tying mechanism with the main shaft, comprising a fixed clutch member and a spring pressed movable clutch member normally disconnected from the fixed clutch member, comprising a separating member, a spring pressed lever connected to the separating member at one end and adapted to hold the separating member in position normally separating the clutch members, and a trip bar connected to the opposite end of the lever adapted to be normally held in a raised position by the spring pressed lever, and when depressed to operate the lever to release the movable clutch member, said trip bar being in position to be engaged and depressed by a bundle while being moved into position for tying by the tying mechanism.

4. In a bundle tier, the combination of a main frame, a driving shaft journaled in the frame, a rock shaft journaled in the frame parallel with the driving shaft, means to revolve the drifting shaft, a countershaft journaled in the frame above and parallel with the rock shaft, clutch members mounted on the main shaft, one member fixedly and the other loosely mounted thereon, means connecting the loose member with the counter-shaft adapted to rotate the counter-shaft when the loose member is engaged with the fixed member of the clutch, means connecting the counter-shaft to the rock shaft adapting the counter-shaft to rock the rock shaft through an arc, a twine carrying needle mounted on the rock shaft, a

knotter mechanism mounted on the frame above and in the path of the needle, means mounted on the counter-shaft and connected to the knotter mechanism adapted to operate the knotter mechanism in coöperation with the needle as set forth, a depressible bundle supporting frame, means to yieldingly and normally support the frame horizontally below the knotter mechanism and above the needle, a trip arm carried by the bundle supporting frame, and adapted to be depressed therewith, and independently thereof, and means connecting the trip arm with the loose clutch member adapted to normally hold the trip arm raised and the loose clutch member disconnected from the fixed clutch member, and when the trip arm is depressed, to connect the clutch members, said trip arm being adapted to be depressed by a bundle being moved into position to be tied, to be held depressed by the needle while the bundle is being tied, and to automatically raise the trip arm and disconnect the clutch members when the trip arm is released from engagement with a bundle or the needle.

5. In a bundle tying machine, the combination with a knotter bill and a shuttle, of a guard plate extending horizontally beneath, and having a portion curved up beside the knotter bill, said guard plate having a slot extending vertically in the curved up portion and convergingly to the center of the horizontal portion beneath the knotter bill, and a knife blade secured to the upper side of the horizontal portion between the knotter bill and the shuttle, a rocker needle arm having a twine bearing point portion curved forward and movable by the arm through an arc of 90 degrees or less, upward and forward into the slot of the guard, over the knotter bill and the shuttle, and then backward and downward out of the slot, said needle arm having a pusher arm extending horizontally and transversely forward of the arm below the point portion, and means to relatively operate the several parts, substantially as set forth.

6. In a bundle tying machine the combination with a needle having a twine carrying point portion movable back and forth through an arc in a vertical plane between horizontal and vertical radial points, of a knotter mechanism comprising a knotter bill revoluble in a horizontal plane transverse the plane of the needle arc, near the upper end of the arc, a shuttle beside the knotter bill and revoluble transverse said vertical plane below the upper end of the needle arc, a bell crank lever having one arm provided with a guard plate having a portion normally extending horizontally underneath the knotter bill, and a portion curved upward transverse the arc of movement of the needle point, said guard plate being provided with a slot extending from below the knotter mechanism comprising a knotter bill adapted to permit the point portion of the needle and twine carried by the needle to pass through the guard plate above the knotter bill and the shuttle, and engage the twine with the shuttle, and a knife mounted on the horizontal portion between the knotter bill and the shuttle, a packer arm carried by the needle, and having an end portion extending forward of and transverse the needle below the guard plate, and adapted to push the twine extending below the guard plate forward into the end of the slot below the knotter bill, and means to relatively operate the parts described, substantially as set forth.

7. In a bundle tying machine, the combination of a main frame, a table supported on the frame, a knotter mechanism supported on the frame above the table, said knotter mechanism comprising a rotatable shuttle adapted when rotated to engage and hold twine carried over and across it, a rotatable knotter bill adapted to form a knot in the twine, and a movable guard plate below the knotter bill, said guard plate having a knife blade extending upward between the knotter bill and the shuttle, a central opening and a slot intersecting the opening, a rocker needle below the table, said needle having a twine carrying point portion adapted to move upward and downward in an arc through the table and the slot of the guard plate, and on its upward stroke carry therewith twine and cause a portion of the twine extending from the point to be extended through the central opening of the guard plate in position to be engaged and secured by the shuttle, and on the downward stroke leave the twine extending between the point and the shuttle in position to be engaged by a bundle pushed over the table under the guard plate, and to be carried by the bundle around its front portion, and by the needle point on the next upward stroke of the needle upward around the rear portion of the bundle through the slot and central opening of the guard plate, over the knotter bill and the shuttle in position to be again engaged and held by the shuttle, and whereby a twine loop is formed around the bundle and secured by the shuttle, means to rotate the shuttle simultaneous with the ending of the upward strokes of the needle point, means to rotate the knotter bill immediately following the rotation of the shuttle, whereby the end portions of the loop extending between the shuttle and the guard plate are engaged by the knotter bill and formed into a knot, and means to move the knife bearing guard plate immediately following the for-

mation of the knot, whereby the twine is severed between the knot and the shuttle and released from the knotter bill.

8. In a bundle tying machine, the combination with a main shaft and means to rotate the shaft, of tying mechanism, comprising a twine carrying needle, a knotter and means to conjointly and relatively operate the needle and the knotter to form a loop of the twine around a collection of things interposed between the knotter and the needle and tie the portion of the loop together, means adapted to automatically and operatively connect the needle and knotter operating means with the main shaft, means to normally and automatically disconnect the connecting means, a downwardly yielding spring supported table frame below the knotter, and adapted to yieldingly support a bundle of things pushed over the table frame under the knotter into position for tying, and a trip bar normally held by the disconnecting means in position to be engaged and operated by a bundle being pushed over the table frame, and when so engaged, to operate the disconnecting means to release the connecting means, whereby the tying mechanism, normally disconnected, is operatively connected to the main shaft by placing a bundle in position to be tied.

9. In a bundle tier, in combination in a tying mechanism, a rotatable shuttle, a rotatable knotter bill, a movable guard plate below the knotter bill, said guard plate having a central opening below the knotter bill, a slot converging to the opening, and a knife blade extending upward between the shuttle and the knotter bill, a rocker needle having a twine carrying point portion adapted to carry twine through the slot of the guard plate over the knotter bill to the shuttle, and means to relatively operate the needle, the shuttle, the knotter bill and the guard plate, substantially as set forth.

10. In a bundle tier, the combination with tying mechanism adapted to loop and tie twine around a bundle, and means to operate the tying mechanism, of a rotatable driving member adapted to be continuously rotated, and means to connect and transmit the motion of the driving member to the tying mechanism operating means, said connecting means being normally disconnected from the driving member, and means to connect said connecting means with the driving member, and adapted to be operated to effect such connection by a bundle being pushed into position to be tied by the tying mechanism, and to automatically disconnect the connecting means when the operation of tying the bundle is completed, whereby the operation of the tying mechanism is made intermittent and concurrent with the placing of a bundle in position to be tied.

11. In combination in a bundle tier, a main frame, a table mounted on the frame, tying mechanism comprising a knotter mechanism supported by the frame above the table, and a twine carrying rocker needle below the table, means to relatively operate the needle and the knotter mechanism to loop and tie twine around a bundle interposed between the table and the knotter mechanism, a rotatable driving member supported on the frame, means to rotate the driving member continuously, means to operatively and automatically connect the means for operating the tying mechanism with the driving member, means to automatically disconnect and hold the connecting means normally disconnected from the driving member, and a depressible trip adapted when depressed to actuate the holding means to release the connecting means, and to be automatically raised by the holding means when released, said trip adapted to be depressed and released by a bundle moved over the table into position for tying.

12. In combination in a bundle tier, a main frame, a depressible table mounted on the frame, springs yieldingly holding the table in a normally raised position, tying mechanism comprising a knotter mechanism supported by the frame above the table, and a twine carrying rocker needle below the table, means to relatively operate the needle and the knotter mechanism to loop and tie twine around a bundle interposed between the table and the knotter mechanism, a rotatable driving member supported on the frame, means to rotate the driving member continuously, means to operatively and automatically connect the means for operating the tying mechanism with the driving member, means to automatically disconnect and hold the connecting means normally disconnected from the driving member, and a depressible trip adapted when depressed to actuate the holding means to release the connecting means and to be automatically raised by the holding means when released, said trip adapted to be depressed and released by a bundle moved over the table into position for tying.

13. In a bundle tying machine, the combination of a main frame, a depressible table supported on the main frame and having springs adapted to yieldingly hold the table normally raised, a knotter mechanism supported on the main frame above the table, a rocker needle below the table, said needle having a twine carrying point portion adapted to move upward and downward in an arc through the table to and from the knotter mechanism and conjointly with the knotter mechanism form and tie a twine loop around a bundle in position on the table between the table and the knotter mechanism, said table being adapted to yield to permit bundles of different sizes being

pushed forward thereon between the knotter mechanism and the table.

14. In a bundle tier, the combination of tying mechanism comprising a knotter mechanism and a twine carrying needle adapted conjointly with the knotter mechanism to form and tie a twine loop around a bundle, a table interposed between the knotter mechanism and the needle, adapted to receive and support a bundle in position to be tied by the tying mechanism, means to operate the tying mechanism, a driving member adapted to be operated continuously and normally disconnected from the means to operate the tying mechanism, and means to connect the tying mechanism operating means with the driving member, said connecting means adapted to be operated to form such connection by a bundle being moved over the table into position to be tied by the tying mechanism.

In witness whereof, we have hereunto set our hands this 27th day of February, 1912, in the presence of two subscribing witnesses.

ALBERT H. SAXTON.
JOSEPH J. BACHMAYER.

In presence of—
MARK WINCHESTER,
M. S. SMITH.