

R. C. LOWRY & F. EMMERICH.

BUNDLING MACHINE.

APPLICATION FILED MAR. 16, 1911.

1,026,754.

Patented May 21, 1912.

3 SHEETS—SHEET 1.

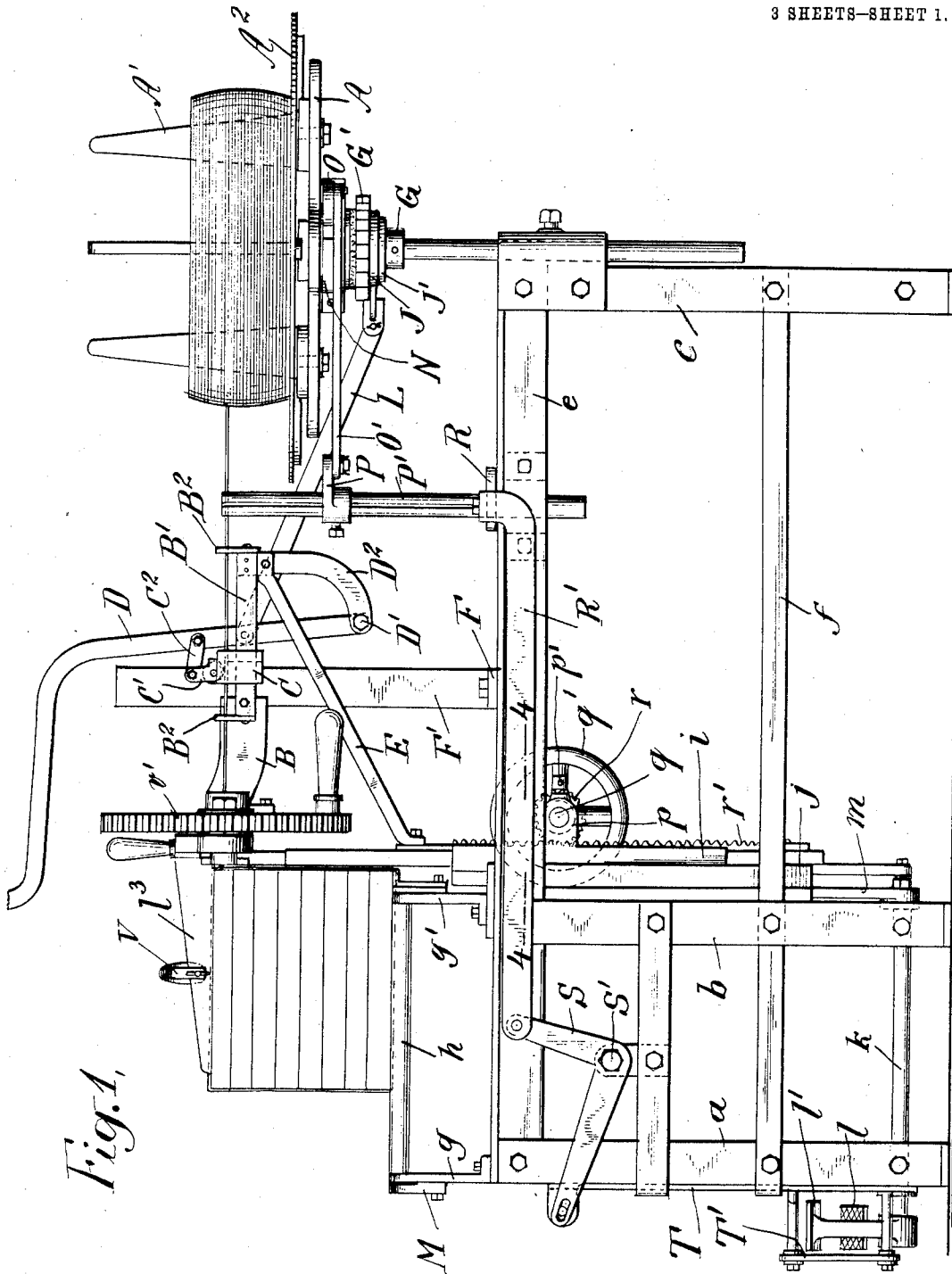


Fig. 1.

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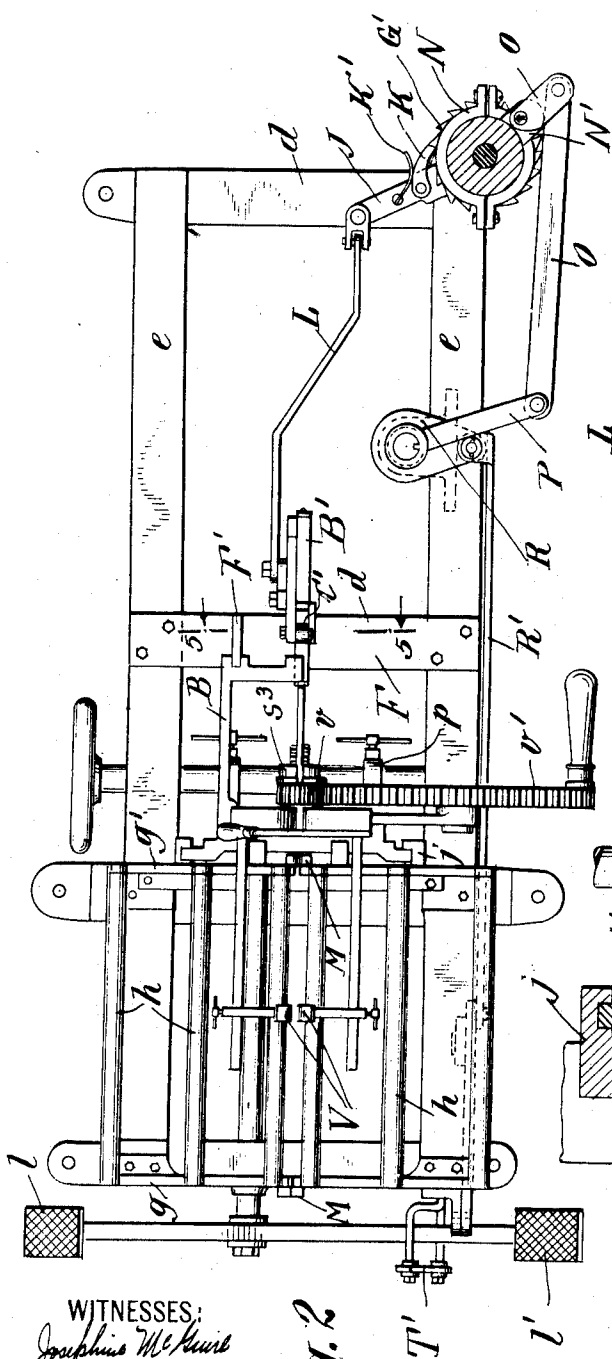


Fig. 2

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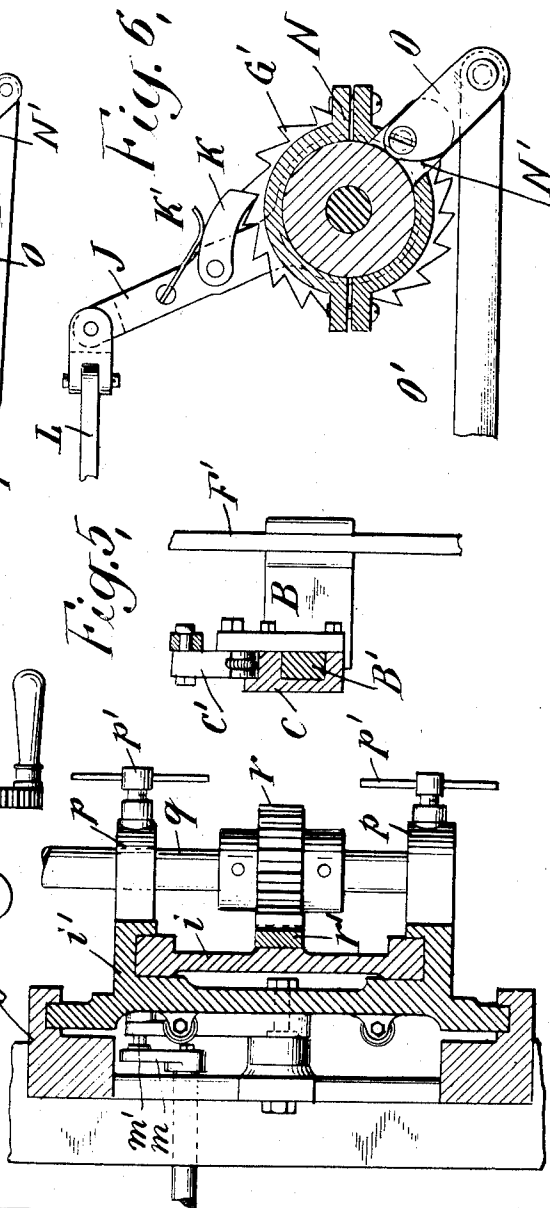


Fig. 4,

Fig. 5,

Fig. 6,

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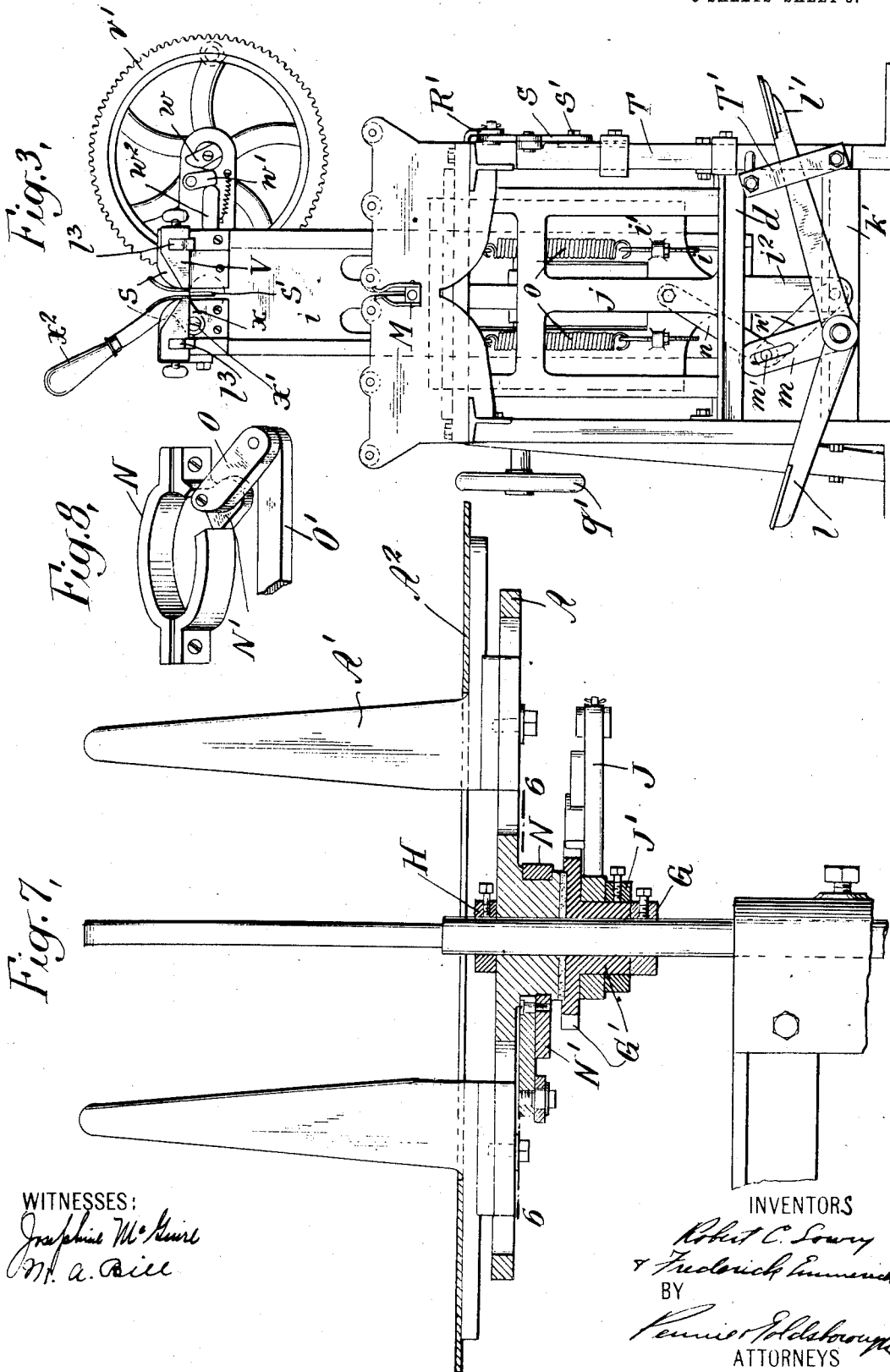
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3 SHEETS-SHEET 3.



UNITED STATES PATENT OFFICE.

ROBERT C. LOWRY, OF NEW YORK, AND FREDERICK EMMERICH, OF BROOKLYN, NEW YORK.

BUNDLING-MACHINE.

1,026,754.

Specification of Letters Patent.

Patented May 21, 1912.

Application filed March 16, 1911. Serial No. 614,820.

To all whom it may concern:

Be it known that we, ROBERT C. LOWRY and FREDERICK EMMERICH, citizens of the United States, residing in New York city and Brooklyn, New York, respectively, have invented certain new and useful Improvements in Bundling-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to machines for binding or tying with wire articles such as shipping boxes, whereby the unauthorized and undetected opening of such boxes during shipment is prevented, or for binding or tying with wire bundles of laths, box-shooks, loose stock in the form of strips or blanks, and the like. It is described and illustrated herein as applied particularly to improvements in machines of the type shown and described in United States Letters Patent to Lowry and Reynolds No. 799174 of September 12, 1905; and Lowry and Winter No. 972389 of October 11, 1910; and in United States application for Letters Patent of Lowry and Winter, Ser. No. 582169 filed September 15, 1910, but the improvements herein described are to some extent applicable generally to bundling machines of other types.

The bundling machines of the particular type referred to are provided with a bundling table suitably supported on legs, a vertically reciprocating head-plate carrying presser-arms adapted to clamp the bundle on the table within a loop of binding wire, a twister adapted to twist together the end of the loop to complete the tie, and a rotatable wire reel from which the wire is drawn to form the binding loop. The machine described in the application above referred to is also provided with gripper mechanism for gripping the wire and forcing it back to tightly draw the wire about the bundle, with mechanism to prevent overrunning of the wire reel, and with mechanism associated with the gripper for winding up on the reel the wire as it is drawn back. In forming the binding loop which is to surround the

bundle it is convenient to make the loop considerably larger than the bundle so that the bundle may be easily passed through it, and that involves drawing off from the reel considerably more wire than is necessary to form the loop, so that in the apparatus of the before-mentioned application the gripper mechanism had to be repeatedly actuated to draw this wire back on to the reel before the actual tightening operation to which the gripper mechanism is best adapted was performed. The present invention provides means for automatically taking up on to the wire reel this excess of wire which was drawn off to form the loop, so that in the particular combination with the mechanism of the said application the use of the gripper mechanism is substantially confined to the actual operation of drawing the wire tight about the bundle, and is not relied upon for the purpose of winding up the wire on the reel to any great extent. Where the operation of rewinding this excess wire is so made automatic it becomes increasingly important to so guide the wire about the bundle that it will always lie at right angle to the axis thereof. In the prior patents and applications referred to arrangements were shown for guiding the part of the wire which underlies the bundle, and the hand of the operator was to a great extent relied upon to guide the wire straight at the front upper edge of the bundle and across its top. In accordance with the present invention and in association with the automatic means for drawing back the excess wire, there is provided supplemental means for guiding the wire across the top of the bundle.

The drawings accompanying this specification illustrate the improvements referred to as applied to the machine of the Lowry and Winter application Serial No. 582169.

In these drawings—Figure 1, is a side elevation of the complete machine with a bundle in place and the wire drawn tightly about it; Fig. 2 is a plan view of the same with the wire reel removed and its supporting mechanism shown in section; Fig. 3 is a front end elevation; Fig. 4 is a sectional plan on a larger scale at the point indicated by the section lines 4—4 on Fig. 1; Fig. 5 is

a sectional elevation of the gripper mechanism on the line 5—5 of Fig. 2; Fig. 6 is a sectional plan of the mechanism for engaging the wire reel support to rewind the wire, the section being taken on the line 6—6 of Fig. 7; Fig. 7 is an elevation partly in section of the wire reel and its supporting and actuating mechanism; and Fig. 8 is a detail perspective view of the lever for throwing back the reel, and its associated collar.

For the purpose of making the present description complete in itself we will first describe the bundling machine as it is disclosed in the above-mentioned application of Lowry and Winter, though it will be understood that the improvements which will be afterward described and claimed are to some extent applicable to quite different machines, and that in so far as they are specifically combined with the apparatus of the Lowry and Winter machine their structural embodiment, as well as the structural embodiment of that machine, may be considerably varied. The machine has a framework which may conveniently be made of suitably shaped and assembled lengths of angle iron. Thus, as illustrated in the drawing, there are three pairs of standards, *a*, *b* and *c*, the two standards of each pair being tied together transversely of the machine by angle iron cross-braces *d*, and the sets of standards together longitudinally of the machine by the upper T-irons *e* which overlie the tops of the standards and form the upper surface of the framework, and by the intermediate angle irons *f* which constitute braces. The bundle table is formed of two heavy castings *g* and *g'*, extending transversely of the machine and bolted to the upper flanges of the T-irons *e*. Between these castings at the upper edges thereof, extend a series of rollers *h*. Six are shown in the drawing, though more or less may be employed. These rollers constitute the bundling table and, by reason of the fact that they are rotatably mounted, it becomes easy to roll a bundle into position beneath the twister. For the purpose of securely clamping the bundle in position on the table during the twisting operation, the head-plate *i* which carries the twister and which is so mounted that it may be reciprocated vertically, also carries forwardly projecting pressure arms *l*^s to press down upon the bundle when it is in position on the table and clamp it thereon.

The manner of mounting and mode of operation of the head-plate *i* will be understood from Figs. 1, 2, 3 and 4, from which it will be seen that the plate is adjustably mounted in a frame *i'*, which is capable of moving vertically in guide-ways in a casting *j*, which may be made integral with, or supported on, the cross-bar *d* which joins the standards *b* *b*. The frame *i'* has a de-

pending tongue *i*², by which it is reciprocated vertically through the foot levers and connecting mechanism shown best in Figs. 1, 2 and 3. From these figures it will be seen that there is a shaft *k* journaled in bearings in cross-bars *k'* extending between the standards *a* *a* and *b* *b*. Fixed to this shaft, at the forward end, are two foot levers or treadles *l* *l'*, and fixed to the shaft at its rear end is a lever arm *m* having a slot which receives a pivot pin *m'* of the toggle mechanism comprising the two arms *n* and *n'*, of which the arm *n* is fastened at its upper end to the stationary casting *j* and the arm *n'* is fastened at its lower end to the lower extremity of the tongue *i*². When the short treadle *l* is pressed down, the toggle is turned to the left, as shown in Fig. 3, and the frame *i'* carrying with it the head plate *i* and the twister mounted on the upper end thereof, is elevated by the springs *o* which are fastened at their lower end to the frame *i'* and at their upper ends to a cross bar of the machine. When the long treadle *l'* is pressed down, the toggle is thrown to the other side of the center, thereby depressing the frame *i'* of the head-plate *i* and twister, and by contact of the end of treadle *l'* with the floor, the toggle is stopped just beyond the center and the head-plate is retained in depressed position. Extending forwardly from the upper end of the slide *i* are the presser arms *l*^s which come down upon the bundle to clamp it in place, as illustrated in Fig. 1. The range of movement of these parts is such as to permit the ready placing of a bundle of predetermined size beneath the presser arms *l*^s, when the head-plate is in its elevated position, but to clamp the bundle firmly on the table when the head-plate is depressed. By virtue of the toggle arrangement the parts stay in the position to which they have been brought, and it is not necessary that the operator should keep his foot upon the treadle or otherwise lock it in depressed position.

If the size of the bundle to be tied is materially changed, it is necessary to adjust the position of the slide *i* in the frame *i'*. For this purpose there are provided journal bearings *p*, with lock pins *p'*, extending from the frame *i'*, and in these bearings is journaled a shaft *q* having outside of the frame of the machine a hand-wheel *q'* and carrying a pinion *r* which meshes with a rack *r'* on the slide *i*. When the slide *i* is to be adjusted in the frame *i'*, the locking pins *p'* are loosened and the hand-wheel *q'* turned so that, by the turning of the pinion *r* in engagement with the rack *r'* proper adjustment is made. The locking pins *p'* are then re-set to lock the parts in adjusted position.

For the purpose of twisting together the two ends of the wire loop after it has been

placed about the bundle and for cutting the two ends to complete the tie, there is provided a twister which is fully illustrated in Figs. 1, 2 and 3. From these figures it will be seen that at the center of the upper extremity of the head-plate i the head-plate is cut away to form lips s which are continued into register with a slot s' in a rotatable twister head s^3 . This twister head is journaled in the head-plate i and has on its periphery gear teeth v which mesh with corresponding teeth on a large hand-wheel v' so that for each revolution of the hand-wheel, a number of revolutions are imparted to the twister-head, and since the two ends of the wire lie in the slot s' the ends will be twisted together, as will be understood.

The mechanism for cutting off the wire comprises a blade w^2 actuated by a swinging dog w' , which is in turn actuated by a cam w on the front end of the hand-wheel shaft, so that at the end of the rotation the blade is advanced to cut off the wire. The hand-wheel v' is then turned in the reverse direction until the straight side of the cam w lies against the lower end of dog w' in which position the slot s' will register with the opening between the lips s . It will be seen that, as shown in Fig. 1, the bottom of the slot s' is well below the under surface of the presser arms l^2 so that the twist is brought well below the edge of the bundle and the clamping dog x (best seen in Fig. 3) which is pivoted at x' at one side of the slot in the twister and is provided with a handle x^2 whereby it may be turned on its pivot to force the upper strand of the binding wire down below the edge of the bundle into the twisting position.

The reel for the binding wire is adjustably mounted on an upright rod or post in a bracket at the rear end of the machine, as shown in Fig. 1. It comprises a base plate A having four slots in which are arranged four upright tapering posts A' having laterally extending feet, as shown, and provided with locking nuts to hold them in adjusted position, as best seen in Fig. 7. To provide a level support for the wire in which it will not catch, it is advisable to drop down over the posts A' , so as to rest on the feet, an annular thin metal plate A^2 , as shown. On this plate the wire will rest smoothly and in conjunction with the apparatus about to be described, the plate assists in preventing overrunning and tangling of the wire.

Extending from the head plate i and moving up and down therewith, is a bracket arm B carrying a horizontal bar B' having upstanding end pieces B^2 provided with guiding eyes for the binding wire. Sliding on the bar B' is a gripping device made up of a sliding block C , with which co-acts to

bind the wire, a pivoted gripping cam C' connected by the link C^2 to the lever D which has a forwardly extending handle, as shown in Fig. 1, so that it may be within the reach of an operator at the front end of the machine. This lever is pivoted at D' to a depending arm D^2 attached to the outer end of the bar B , and this bar and the depending arm are braced and stayed by a diagonally extending brace E , as shown in Fig. 1. For the purpose of further stiffening these parts and bracing the reciprocating head-plate i , the transverse bar F is bolted to the top surfaces of the longitudinal frame members e , and this bar carries a heavy upright F' which engages with and braces the bracket arm B , which is provided with a guiding groove which receives the upright, as shown in Fig. 2. It will be understood at once, that this construction is such that when the lever D is drawn forward the gripping cam D is turned into such a position that it does not grip the wire, and the block C slides freely forward on the bar B' . On the backward movement of the lever D the gripping cam is turned into such a position as to grip the wire and it pulls the wire backward toward the wire reel, thereby tightening it about the bundle. When the wire has been drawn as tight as possible, the clamp C' still retains its gripping position, so that when the handle x^2 is thrown down to cause the clamping dog x to force the upper strand of the wire down below the upper edge of the bundle, the loop of binding wire about the bundle is still further tightened, as will be understood.

It is important in a machine of this type, to provide means to prevent overrunning of the wire reel and the unwinding of an undue amount of wire which would become tangled and would interfere with the next binding operation. This is particularly important in view of the fact that in the normal operation of the machine, it is necessary for each bond or tie to draw off in the first instance a greater quantity of wire than is actually employed in making the bond or tie after the wire has been tightened about the bundle. In the machine of the above mentioned application, this is provided for in the following manner: On the upright post which supports the wire reel there is a retaining collar on which rests the hub of a ratchet disk G' which is free to turn upon the post. The upper face of this ratchet disk G' is provided with a friction disk of rubber, leather or the like, as seen in Fig. 7, and upon this rests the hub of the wire reel A . Above the upper face of the base plate of the wire reel is a second retaining collar H , which is pressed down before it is fastened in place, sufficiently to give the necessary friction. Turning loosely on the

hub of the ratchet disk G' and supported on a collar J' is a lever arm J which is connected by link L to lever D. The arm J carries a pawl K pressed by spring K' into engagement with the teeth of the ratchet disk G'. The object of this connection is to turn the wire reel to wind up the wire as it is drawn back by the manipulation of handle D.

It is of great importance that the loop of wire which is to bind the bundle should be held exactly at right angles to the axis of the bundle during the bundling operation and for this purpose the rollers *h* of the roller table are arranged in the supporting castings *g* and *g'* in such manner that the middle rollers have an open slot or space between them, and at one or both ends of this slot, exactly in line with the axis of the twister (see Fig. 2) is a spring clip M which grips the loop and holds the lower part of it in the proper position. These clips also have the additional advantage that they hold the loop open out of the way of the advancing bundle and enable the operator by pulling the wire with a jerk out of the clips, to draw it more tightly about the bundle than would otherwise be possible. These clips add very greatly to the successful operation of the machine in practice.

The machine, as above described, with the exception of certain modifications in the support for the wire reel, corresponds to the machine illustrated and described in the application of Lowry and Winter, above referred to, and with that machine the operation of tying bundles is as follows: The hand-wheel *v'* having been brought to such position that the radial slot *s'* in the twister registers with the lips *s*, a loop of the binding wire is formed by grasping the end of the wire in front of the forward guide B² and drawing from the reel enough wire to form a large open loop. The end of the wire is then laid in the slot *s'* with its extremity projecting out of the back end thereof and bent laterally. The loop is then pressed down to the bottom of the slot and between the jaws of the spring clamp M which is next to the head-plate. In this way that side of the loop is kept out of the path of the oncoming bundle. The other side of the loop may also be forced into the spring clamp M at the front of the bundling table, if such a clamp is provided, thereby further insuring the proper position of the loop and its freedom from interference with the bundle. The bundle is then run onto the table through the loop, is pressed back against the face of the head-plate as shown in Fig. 1, and the treadle *l'* is thrown down to depress the head-plate and bring the presser arms *l*³ into clamping engagement with the top of the bundle. The operator

then grasps the front side of the wire loop and pulls it with a short jerk, tightly about the back of the bundle and at the same time manipulates the lever D several times to draw the wire tightly over the top of the bundle and wind it back upon the reel. This operation is usually completed by a series of short, quick movements of the lever D, resulting in jerks on the binding wire to draw out all the kinks and bends. While the wire is still gripped by cam C' and with the operator still pushing back on the lever D, the clamping dog *x* is thrown down to press the upper strand of the wire down to the twisting position. This further tightens the wire, as will be readily understood. The hand-wheel *v'* is then sharply rotated to twist the two ends of the loop and cut the wire off. At each backward movement of the lever D, the link L imparts a backward throw to the arm J and through the pawl K turns the ratchet disk G'. The friction between the friction disk and the hub of the wire reel is sufficient to cause this operation to wind up the wire.

It will be observed that in the machine described, it is necessary to manipulate the lever D a sufficient number of times to wind back upon the reel all of the wire which has been drawn off to make a large loop through which the bundle has been passed, and this means that the lever must be manipulated quite a number of times. If such a lever is not provided, as in the earlier patents to Lowry and Winter, above referred to, this wire had to be wound back upon the reel by turning the reel by hand, and this, as a practical matter, necessitated the attendance of an extra workman or a great reduction in the speed of the operation. One object of the present invention is to provide mechanism for automatically taking up on to the wire reel this excess of wire which was drawn off to form the loop, and this improvement is applicable generally to bundling machines of different types, and dispenses in every case with the necessity of turning the wire reel back by hand or by hand actuated mechanism provided for the purpose. In conjunction with the machine of the Lowry and Winter application referred to, it dispenses with the necessity of repeatedly manipulating the lever D' and substantially confines the use of the gripper mechanism to the actual operation of drawing the wire tight about the bundle. The mechanism provided for this purpose comprises, in the specific embodiment illustrated in the drawings, a two-part collar N surrounding the hub of the wire reel, and having an off-set bracket arm N' on which is pivoted a cam lever O (see Figs. 6 and 8). The outer end of this cam lever is connected by a link O' to an actuating lever P splined on an upright rotatably mounted shaft P',

to which is also splined a lever arm R connected by link R' to a bell-crank lever S pivoted at S' and connected at its other end to a vertically reciprocating actuating bar T mounted on the front upright of the machine in a suitable guideway. This actuating bar has a projecting stirrup frame T', through which passes the long foot treadle Z' so that when the treadle is thrown down to depress the plate Z and the presser-arms, a downward movement is imparted to the bar T, and this movement is transmitted through the connections described to the cam lever O, turning it in such a direction as to lock the cam against the hub of the wire reel and turn the wire reel to wind up the wire. On the upward movement of the treadle, the upper portion of the stirrup frame T' is struck forcibly by the treadle and thrown into the elevated position moving the cam lever O in the other direction, during which movement the cam is turned away from the hub of the reel so that the reel is not turned. It will, of course, be understood that these specific mechanical connections for imparting the turning movement to the wire reel are illustrated merely as a convenient arrangement, and may be embodied in many different forms within the spirit of the invention. With this arrangement the wire is drawn more suddenly about the bundle, and its positioning is not so completely within the control of the operator as to insure the proper placing of the wire. Above the upper portion of the bundle, under these circumstances, we provide the guiding lips V adjustably mounted upon the presser bars B, as shown in Figs. 1, 2 and 3, from which it will be observed that these lips approach one another closely over the upper portion of the bundle and compel the straight positioning of the wire with respect thereto. Though this arrangement is particularly advantageous in connection with mechanism whereby the wire is automatically and quickly drawn about the upper side of the bundle, yet, as will be obvious, it is of advantage in other types of bundling machines. In view of the fact that in this improved combination, the arrangement may be such as to rewind practically all of the excess wire upon the reel, it becomes less important to have the re-winding mechanism comprising the link L and the parts actuated thereby, and these parts may therefore be omitted, though we still prefer to use them for the purpose of taking up even that portion of wire which is drawn back by the manipulation of the handle D.

What we claim is:

1. A bundling-machine having a bundle-support, a wire reel, and mechanism for forming a tie of binding wire about a bundle on the support, said mechanism including an actuating lever and connections for re-

winding upon the reel excess wire drawn off during the bundling operation, said actuating lever being in convenient proximity to the bundle-support; substantially as described.

2. A bundling-machine having a bundle-support, a wire reel, and mechanism for forming a tie of binding wire about a bundle on the support, said mechanism including an actuating lever and connections for re-winding upon the reel excess wire drawn off during the bundling operation, and an actuating lever and connections for gripping the wire and drawing it tightly about the bundle, both of said levers being in convenient proximity to the bundle-support; substantially as described.

3. A bundling-machine having a bundle-support, a wire reel, mechanism for turning the reel to re-wind upon it excess wire drawn off in the bundling operation, and an actuating connection for said mechanism extending into convenient proximity to the bundle-support; substantially as described.

4. A bundling-machine having a bundle-support, a wire-reel, mechanism for resisting the rotation of the reel to prevent over-running thereof, mechanism for turning the reel to re-wind upon it excess wire drawn off in the bundling operation, and an actuating connection for said mechanism extending into convenient proximity to the bundle-support; substantially as described.

5. A bundling-machine having a bundle-support, a wire-reel, mechanism for resisting the rotation of the reel to prevent over-running thereof, mechanism for turning the reel to rewind upon it excess wire drawn off in the bundling operation, an actuating connection for said mechanism extending into convenient proximity to the bundle-support, and gripper-mechanism including an actuating lever for gripping the wire and drawing it tightly about the bundle, said actuating lever also being in convenient proximity to the bundle-support; substantially as described.

6. A bundling-machine having a bundle-support and presser-arms movable into engagement with a bundle on the support to hold it during the bundling operation, mechanism for actuating the presser arms, a wire-reel from which wire may be drawn to form a tie of binding wire about the bundle, and connections between the presser-arm actuating mechanism and the wire-reel whereby the excess wire is rewound upon the reel when the presser-arms are moved into the bundle-holding position; substantially as described.

7. A bundling-machine having a bundle-support and means for applying a binding wire to a bundle on the support, said means including a twister head mounted for re-

reciprocation in proximity to the support mechanism for reciprocating the head, a wire-reel, and connections between the said mechanism and the wire-reel for turning the reel to rewind upon it excess wire drawn off in the binding operation; substantially as described.

8. A bundling-machine having a bundle support, a wire reel, mechanism for turning the reel to rewind upon it excess wire drawn off in the bundling operation, and an actuating connection for said mechanism including a treadle in convenient proximity to the bundle-support; substantially as described.

9. A bundling-machine having a bundle-support and presser-arms movable into engagement with a bundle on the support, a wire reel, an actuating lever and connections for turning the reel to rewind upon it excess wire drawn off in the bundling operation, and a wire guide carried by the presser-arms for guiding the wire across the bundle between the arms as it is wound upon the reel; substantially as described.

10. A bundling-machine having a bundle-support and presser-arms movable into engagement with a bundle on the support, in combination with a wire guide carried by the presser-arms and adapted to guide the

binding wire across the bundle between the arms; substantially as described.

11. A bundling-machine having a twister, a bundle-table, a transverse slot in the table in line with the twister, presser-arms movable into engagement with a bundle on the table, means for positioning the binding-wire in the slot and in line with the axis of the twister, and a wire guide carried by the presser-arm and adapted to guide the wire across the top of the bundle in line with the axis of the twister; substantially as described.

12. A bundling-machine having a twister, a bundle-support, presser-arms movable into engagement with a bundle on the table, means on the support for positioning a loop of the binding wire in line with the axis of the twister, and a wire guide carried by the presser-arms and having a flaring mouth converging to a narrow throat in line with the axis of the twister; substantially as described.

In testimony whereof we affix our signatures, in presence of two witnesses.

ROBERT C. LOWRY.

FREDERICK EMMERICH.

Witnesses:

JOSEPHINE MCGUIRE,

WILLIAM H. DAVIS.