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Patented Oct. 3, 1899.

C. L. CURTIS & G. LISPENARD.
MACHINE FOR MAKING TUBES FOR FIRE CRACKER BODIES.

(Application filed Feb. 28, 1898.)

(No Model.)

4 Sheets—Sheet 2.

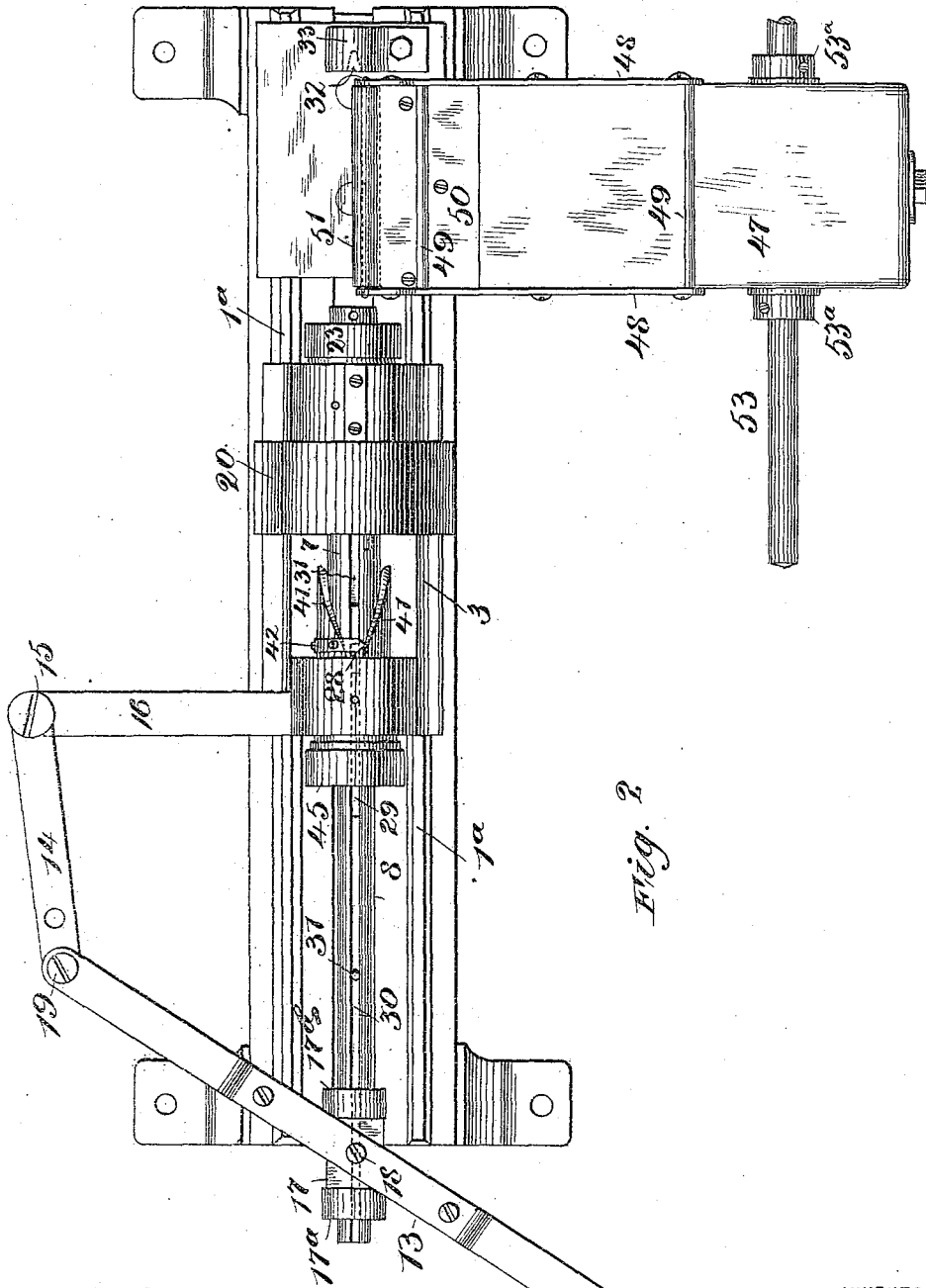


Fig. 2

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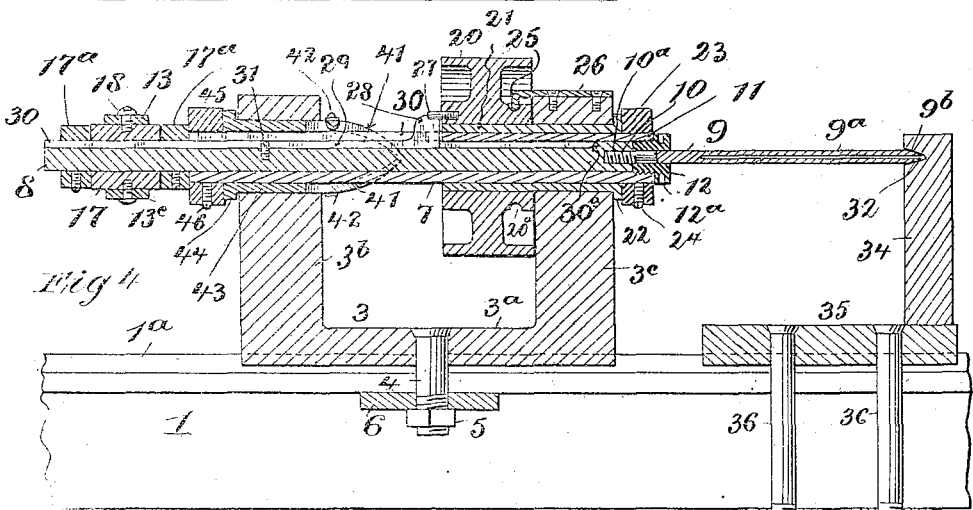
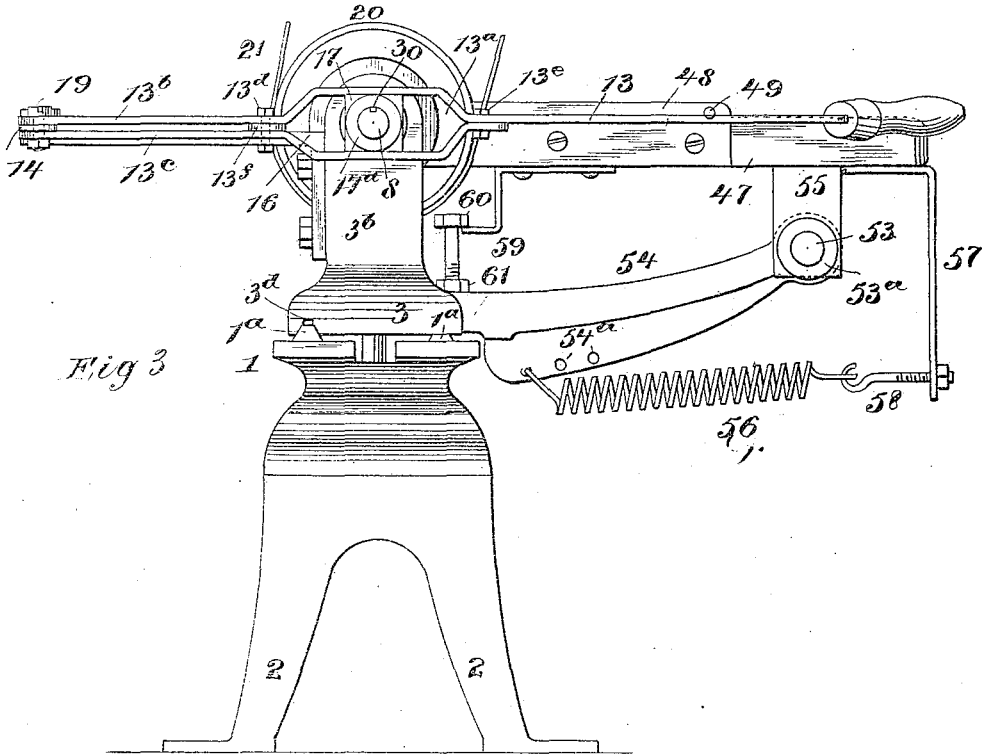
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4 Sheets—Sheet 3.



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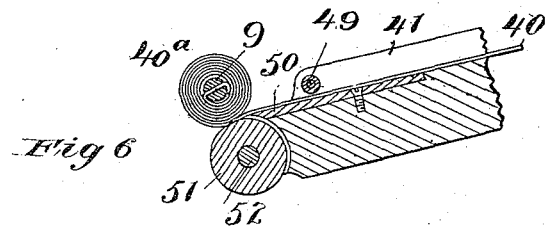
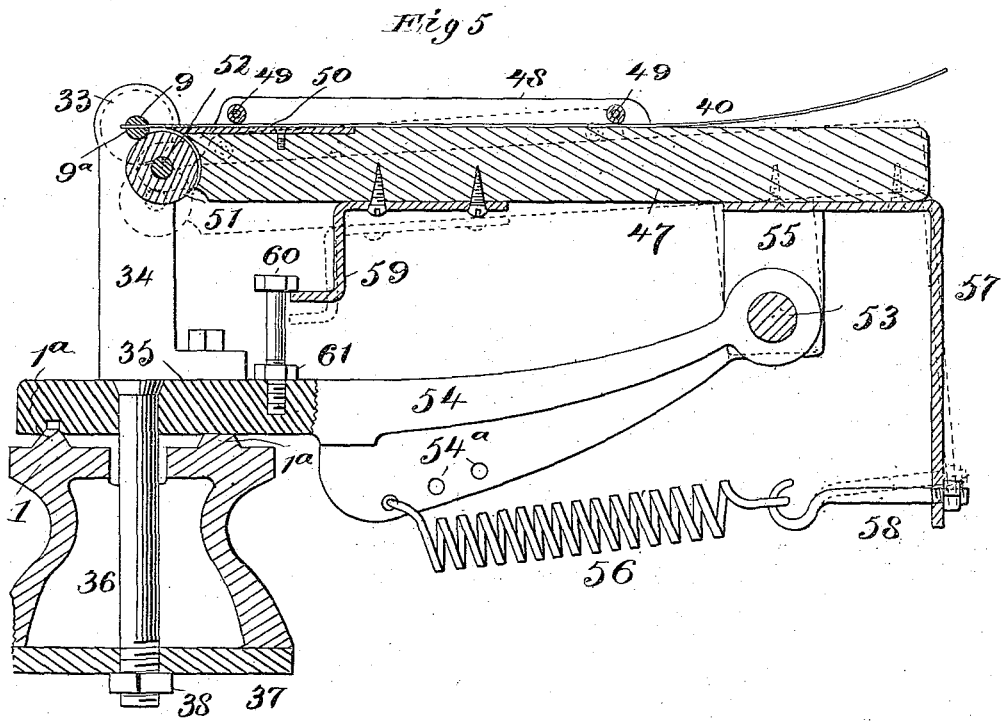
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

CHARLES L. CURTIS AND GEORGE LISPENARD, OF NEW YORK, N. Y.,
ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE NORDLINGER-CHARL-
TON FIREWORKS COMPANY, OF SAME PLACE.

MACHINE FOR MAKING TUBES FOR FIRE-CRACKER BODIES.

SPECIFICATION forming part of Letters Patent No. 634,202, dated October 3, 1899.

Application filed February 23, 1898. Serial No. 671,880. (No model.)

To all whom it may concern:

Be it known that we, CHARLES L. CURTIS and GEORGE LISPENARD, citizens of the United States, residing at New York, (Brooklyn,) county of Kings, and State of New York, have invented certain new and useful Improvements in Machines for Making Tubes for Fire-Cracker Bodies, of which the following is a specification.

10 This invention relates to improvements in machines adapted to wind or roll paper or other analogous material into tubular form, and particularly for the purpose of winding strips of paper to produce bodies for fire-crackers, fireworks, and analogous articles, although it is not limited in its capacity to winding strips for the articles mentioned.

15 One object of this invention is to enable strips of paper or analogous material to be wound upon a mandrel and to permit the mandrel to be withdrawn without injury to or disturbance of the articles so formed.

20 Another object of the invention is to cause the mandrel when presented to the paper-receiving guide to always be adjusted in position to receive the end of the strip of paper to be wound and in such manner that the mandrel may grasp the same.

25 Another object of the invention is to cause a tension to be applied to the strip that is being wound during the entire time of its winding, and, furthermore, to provide such an arrangement that more or less pressure may be brought to bear upon the article being wound or rolled, so that the same shall be wound with the desired degree of tightness.

30 Another object of the invention is to so arrange the parts of the machine that they may be adjusted so as to enable articles of varying length to be produced without a material alteration of the device.

35 The invention consists in a winding or rolling machine comprising a longitudinally-movable mandrel, means for causing the same to rotate upon its being placed in its normal operative position, and means for guiding strips of paper or analogous material to such mandrel to enable such strips to be wound upon the mandrel.

The invention also consists in a winding or rolling machine comprising a longitudinally-movable mandrel, means for rotating the same, and means for causing the mandrel to return to a normal paper-receiving position after it has stopped rotating. This portion of the invention comprises a longitudinally-movable rod or bar carrying the mandrel, a rotative wheel, a clutch having one portion carried by said wheel and the other portion connected with the rod that carries the mandrel, and a jaw or cam adapted to cause the second-mentioned portion of said clutch to come to a normal position after being disengaged from the complementary part of the clutch ready to permit the mandrel to be moved forward again to the paper-receiving position.

40 The invention further consists in a winding and rolling machine comprising a mandrel adapted to wind strips of paper upon it, a guide adapted to present the strips of paper to the mandrel, and means for causing the guide to bear upon the strip being rolled upon the mandrel with more or less pressure, so as to cause the convolutions of the strip to be drawn more or less closely together.

45 The invention also consists in a winding or rolling machine comprising a bed, a mandrel, means for rotating the same, means for moving the mandrel longitudinally in either direction, a support for the mandrel and the parts that operate it, said support being adjustably connected with said bed, and a paper-receiving guide to present strips of paper to the mandrel.

50 The invention further consists in the novel details of improvement and the combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

55 Reference is to be had to the accompanying drawings, forming part hereof, wherein—

60 Figure 1 is a plan view of a winding or rolling machine embodying our invention, showing the mandrel in position for winding a strip thereon. Fig. 2 is a similar view showing the mandrel withdrawn to enable the article that has been wound thereon to pass therefrom. Fig. 3 is an end elevation of the

machine, looking from the left in Fig. 1. Fig. 4 is an enlarged detail longitudinal section through the mandrel and the parts that coact therewith in operating the same. Fig. 5 is a vertical cross-section, enlarged, on the plane of the line 5 5 in Fig. 1, showing the mandrel in section and a strip of paper connected therewith ready to be wound; and Fig. 6 is a detail sectional view of the mandrel and paper-receiving guide, showing the strip as partially wound upon said mandrel.

In the accompanying drawings, in which similar numerals of reference indicate corresponding parts in the several views, 1 indicates a bed or support which is shown provided with legs 2. The bed is shown provided with ways 1^a, substantially in the form of the bed of a lathe. Upon the bed 1 is mounted a stock or support 3, which is shown composed of a base 3^a and uprights 3^b 3^c. (See Fig. 4.) The stock 3 is shown provided with a bolt 4, having a nut 5 to pass through an opening 1^b in the bed 1, and 6 is an apertured plate or washer whereby the stock 3 can be held firmly upon the bed 1 and can be adjusted lengthwise thereof. The stock 3 is shown provided with a recess 3^d to receive the way 1^a to keep the stock properly centered upon the bed.

7 is a tube shown extending between and located in suitable apertures in the uprights 3^b 3^c of the stock 3, (see Fig. 4,) and said tube may be supported in said uprights in any suitable manner. Within the tube 7 is a longitudinally-movable rod 8, that carries a mandrel 9, upon which the strips of paper or other analogous material are to be wound. The mandrel 9 is shown provided with screw-threads 10, that mesh with corresponding threads in a socket 10^a in rod 8. At the inner end of tube 7 are screw-threads 11, that mesh with corresponding external threads on a plug 12, that is provided with a bore to receive the mandrel 9, and said plug is shown provided with holes 12^a to receive a spanner or other tool for adjusting the same. This plug 12 serves as a guide for the mandrel 9 as the latter is reciprocated. The mandrel 9 is adapted to have forward and back movement for placing it in position to receive the strip to be wound and for disconnecting it from the article when wound, and it is also adapted to have rotary motion for winding such strip. The means we have shown for reciprocating the mandrel 9 consists of lever 13, that is pivotally connected with rod 8 and also pivotally connected with a link 14, that is pivoted at 15 to a support 16, that extends from the stock 3 or its upright 3^b. We have shown the lever 13 as provided with an opening 13^a, (see Fig. 3,) that embraces a block 17, that is loosely mounted upon rod 8, the lever 13 being pivoted to such block by screws or similar pivotal device 18. 17^a are collars secured upon rod 8 on either side of block 17 to enable said rod to rotate within said block, while said collars serve to enable block 17 to reciprocate

rod 8. The lever 13 is shown comprised in two parts consisting of a main arm 13^b and an auxiliary arm 13^c, the arms 13^b 13^c being suitably bent to form the opening 13^a and secured together by screws or bolts, as at 13^d 13^e, a washer 13^f being shown interposed between the parts 13^b 13^c, and the link 14 being also shown interposed between parts 13^b 13^c and pivotally hung upon a bolt or screw 19, which holds the parts 13^b 13^c 14 together. By means of the above-described device the lever 13 can be shifted to move rod 8 and mandrel 9 longitudinally back and forth. It is evident, however, that other means may be provided for reciprocating said rod and mandrel.

The means we have shown for rotating the rod 8 and mandrel 9 consist of a pulley 20, adapted to be driven by a belt 21 or otherwise, and a clutch that is adapted to permit rod 8 and mandrel 9 to be rotated intermittently. We have shown the pulley 20 as mounted upon a sleeve or tube 21, that surrounds the tube 7 and is located at one part in upright 3^c, being suitably held therein, and projects inwardly therefrom between the uprights 3^b 3^c. The sleeve or tube 21 at its outer end is shown provided with a flange or extension 22, adapted to abut against the upright 3^c, and 23 is a collar fitting on tube 7 and serving to press flange 22 against upright 3^c, and 24 is a screw threaded in an aperture in collar 23 and impinging against tube 7 to hold said collar firmly in place thereon. The hub of pulley 20 is shown provided with an annular groove 20^a, that receives a finger 25, that projects from a plate 26, secured upon upright 3^c. By this means pulley 20 is enabled to rotate freely, but is prevented from having longitudinal movement on sleeve 21. It is evident, however, that pulley 20 and sleeve 21 may be otherwise guided and held, if desired.

The clutch for rotating rod 8 and mandrel 9 through the medium of pulley 20 is as follows: 27 is a pin projecting from pulley 20, and 28 is a projection or wing projecting from a bar 29, which bar is located in a longitudinal groove 30 in the rod 8. The wing 28 also passes through a groove in tube 7, and the arrangement is such that when pin 27 engages wing 28 it will cause said wing to rotate tube 7 and rod 8, and thereby rotate the mandrel 9 and plug 12. It is designed that rod 8 shall have a certain amount of longitudinal movement independent of wing 28, and for this purpose we have shown the groove 30 as extending near to the inner end of mandrel 9, at which point the groove stops, thus forming an abutment 30^a, which abutment serves to engage bar 29 or wing 28 to move the latter out of engagement with pin 27. Within groove 30 is also located a stop or pin 31, that is adapted to engage the end of bar 29 to push wing 28 into engagement with pin 27 at the proper time. This stop 31 can be adjusted lengthwise of rod 8 when it is de-

sired to cause wing 28 to engage pin 27, sooner or later, during the longitudinal movement of rod 8.

The mandrel 9 at its outer end is shown 5 tapered, as at 9^b, and adapted to fit within a corresponding socket 32 in a tailpiece 33, carried by a stock 34, secured upon bed 1. We have shown the stock 34 as projecting from a plate 35, that is supported upon bed 1 10 and shown provided with bolts 36, that pass through said bed and through washers or plates 37 and have nuts 38, whereby said plate 35 may be adjusted upon said bed and securely held in position. In order to grasp 15 a strip 40 of paper or other suitable material to be wound or rolled, the mandrel 9 is shown bifurcated or slotted toward its outer part, as at 9^a, and the strip 40 is adapted to be 20 passed into said slot and between the arms of the mandrel, as shown clearly in Figs. 5 and 6, so that when the mandrel is rotated it will cause the strip 40 to be wound in parallel convolutions, as indicated in Fig. 6. It is desired that the slot 9^a, when the mandrel is 25 presented in position to receive the strip 40, shall be automatically brought to the proper position for receiving such strip. For this purpose we have shown a pair of cam-like jaws 41, which extend above and below and in alignment with the slots in rod 8 and tube 7, respectively. These jaws above and below 30 incline from their outer ends rearwardly to a central point and are located in such position that the wing 28 will engage them when drawn backwardly, if such wing is not 35 in the proper position to cause the slot 9^a in mandrel 9 to be brought into position to receive the strip 40. Suppose that when the mandrel 9 comes to rest by the disengagement 40 of clutch 27 28 the wing 28 is out of the normal position for presenting the slot 9^a to strip 40. A continued rearward movement of said wing, produced by the engagement of abutment 30^a therewith, will cause said wing 45 to engage one of the cam-faces 41, and as the wing rides against such face the wing will be moved to its normal position at the inner end of said cam-face, and during such movement of wing 28 the rod 8 and tube 7 will be brought 50 to their normal positions, thus causing mandrel 9 to present its slot 9^a in position to receive strip 40, as indicated in dotted lines in Fig. 1, where the wing 28 is shown as having been drawn into the recess produced by 55 two cam-faces 41.

42 is a spring-finger that passes across the cam-jaws 41 near their inner ends and in such position as to lie upon or in front of the wing 28, so as to retard the advance of such wing, 60 which might occur through the frictional engagement of the parts, until the stop 31 abuts against the end of bar 29, in which event such bar and wing 28 will be pushed forward against the tension of spring 42, and the wing 65 will thus pass therefrom. It will be seen that there are a pair of cam-jaws 41 on opposite sides of tube 7 and a spring 42 for each

of such pair of cams, whereby the wing 28 will be brought to a normal central position, either above or below, to always present the 70 slot 9^a to mandrel 9 in position to receive strip 40. The cam-jaws 41 extend from a sleeve 43, that is located in the bore of upright 3^b and surrounds tube 7, and said sleeve may be held upon said upright by means 75 of a screw or otherwise. The sleeve 43 is shown provided with a flange 44, that abuts against upright 3^b, and upon the tube 7 is a collar 45, secured thereto by a screw 46, the collars 23 and 45 thus serving to keep tube 7 80 in proper position in uprights 3^b 3^c, while permitting such tube to rotate.

The means we have shown for guiding the strips 40 to the mandrel 9 are as follows: 47 85 is a table or guide-plate having one end alined with mandrel 9, upon which table the strips 40 are to be laid and fed to said mandrel. (See Fig. 5.) By preference the table 47 has 90 walls 48 on opposite sides, and by preference these walls are connected by cross-bars 49, that overlie the table 47 at suitable distances to allow the strips 40 to pass thereunder. 95 The inner end of table 47 lies adjacent to the mandrel 9 and preferably in the normal position on the same plane as the slot 9^a in said mandrel, so that the strip 40 can pass directly into said slot. (See Fig. 5.) By preference 100 the inner end of said table is provided with a plate 50. In order to permit free rolling of the strip 40, the inner end of table 47 is provided with a roller 51, that is adapted 105 to abut against the mandrel 9 and also against the roll or tube 40^a as the strip 40 is being wound. (See Fig. 6.) The roller 51 is shown journaled upon a shaft 52, that is carried 110 by extensions from the walls 48 or otherwise. In order to permit of the gradual increase in diameter of the roll or tube 40^a as it is being wound by mandrel 9, the table 47 is arranged to tilt, and for this purpose we 115 have shown the table as pivotally supported by a rod 53, that is carried or journaled upon a bracket 54, that projects from plate 35, the table 47 being shown provided with ears 55, 120 that are secured or otherwise mounted upon rod 53. The parts 53 54 55 are detachably connected together, so as to permit of the ready interchange of tables 47 of different widths, 125 collars 53^a being shown secured upon rod 53 to keep the table 47 in the proper position laterally relatively to the mandrel 9. The table is preferably held in its normal position—that is to say, the roller 51 is in engagement with 130 mandrel 9—by a spring 56, which is shown connected with bracket 54 and with an arm 57, depending from table 47. We have shown the bracket 54 as provided with a number of holes 54^a to receive the hook end of spring 56, and we have shown the opposite end of said spring as connected with a hook 58, that is carried by arm 57. By this means the tension of spring 56 can be readily adjusted; but it is evident that other means may be provided for this purpose. We also preferably

provide a suitable stop to limit the upward movement of table 47, and for this purpose we have shown a finger 59, carried by table 47 and adapted to abut against a stop 60, carried by plate 35. This stop is preferably vertically adjustable and is shown in the form of a headed bolt screwed into a threaded aperture in plate 35 and provided with a lock-nut 61 to hold it in position. By this means we are enabled to adjust the roller 51 in normal position relatively to mandrel 9, so as to limit the amount of pressure that such roller can apply to said mandrel.

The complete operation of rolling a strip in convolute or tubular form upon the machine above described is as follows: Lever 13 is first moved to its extreme outward position, as shown in Fig. 2, which causes the wing 28 to bring the slot 9^a in mandrel 9 in position to receive the strip 40 from table 47. Lever 13 is then moved in the opposite direction or inwardly, which causes mandrel 9 to advance across in front of roller 51, and after said lever has been moved a certain distance the stop 31 will encounter bar 29, thus moving wing 28 forwardly, and just before said wing comes in line with pin 27 on pulley 20 (it being understood that said pulley is continuously rotated) the movement of lever 13 is stopped, and then the end of strip 40 is passed through or into slot 9^a in mandrel 9, being so pushed by the operator, it being understood that the outer upper end of said strip 40 is first supplied with a suitable gum. Lever 13 is next moved inwardly until the end 9^b of mandrel 9 enters recess 32, during which time wing 28 is brought into line with pin 27 of pulley 20, whereupon said pin causes said wing to rotate the tube 7, rod 8, and mandrel 9. As mandrel 9 thus rotates it winds the strip 40 upon itself in the form of a coil, as shown at 40^a in Fig. 6, and as such coil increases in diameter the table 47 will be tilted, as shown by dotted lines in Fig. 5, the spring 56 keeping a tension or pressure of roller 51 upon the coil. After the strip 40 is completely wound and as its gummed end passes over roller 51 the gum will cause the outer end of the strip to adhere to the next inner layer. Lever 13 is next moved outwardly or to the left in Fig. 2, which withdraws the wing 28 from pin 27, thus causing the mandrel 9 to come to rest, and during this movement of the lever said mandrel is withdrawn from the roller 40^a, which falls away, and the wing 28 by engaging one of the cam-faces 41 causes the mandrel to be so turned as to bring the slot 9^a again in line with the upper surface of table 47 ready to receive another strip. Thus it will be seen that the operator merely has to move the lever 13 back and forth and feed the strips 40 into the slot of the mandrel 9 in order to effect the rolling of the articles desired. It will be understood that the length of the article or tube thus formed will be determined by the width of the strip 40 that is supplied, and in this connection mandrels 9

of different lengths and tables 47 of different widths will be substituted and the stock or head 3 will be adjusted along the bed 1 in accordance with the length of mandrel to be used.

We do not limit our invention to the precise details of construction shown and described, as they may be varied without departing from the spirit thereof.

Having now described our invention, what we claim is—

1. A winding or rolling machine comprising a longitudinally-movable mandrel, means for rotating the same intermittently, means to rotate the mandrel to its normal position as it is moved longitudinally, and means for guiding strips to such mandrel, said mandrel being adapted to grasp such strips, substantially as described.

2. A winding or rolling machine comprising a longitudinally-movable mandrel having a slot, means for intermittently rotating the same, means to rotate the mandrel as it is moved longitudinally to bring its slot to a normal strip-receiving position, and means for guiding strips to the slot in said mandrel, substantially as described.

3. A winding or rolling machine comprising a longitudinally-movable mandrel, a support for the outer end of said mandrel, means for intermittently rotating said mandrel, means to rotate the mandrel as it is moved longitudinally to bring its slot to a normal strip-receiving position, and means for guiding strips to said mandrel, said mandrel being adapted to grasp and wind such strips, substantially as described.

4. A winding and rolling machine comprising a longitudinally-movable bifurcated mandrel adapted to receive a strip between its arms, means for intermittently rotating the same, means to rotate the mandrel as it is moved longitudinally to bring its arms into position to receive strips between them, and means for guiding strips to said mandrel, substantially as described.

5. The combination of a longitudinally-movable mandrel, a support for the same, a driving part, and a clutch adapted to intermittently connect said driving part with the support for said mandrel, said mandrel having means for grasping a strip to wind the same, and means to rotate the mandrel to a normal strip-receiving position after the clutch is disengaged, substantially as described.

6. The combination of a longitudinally-movable rod, a mandrel to be carried thereby, a rotative part, means for intermittently rotating said rod by said part, means to rotate the mandrel to a normal strip-receiving position and means for guiding a strip to said mandrel, said mandrel being adapted to grasp said strip, substantially as described.

7. The combination of a longitudinally-movable rod, a mandrel to be carried thereby and adapted to grasp a strip, a rotative

part, and a clutch adapted to connect said part with said rod, and means to rotate the mandrel to a normal position after the clutch is disengaged, substantially as described.

5 8. The combination of a longitudinally-movable rod, means for operating the same, a mandrel to be carried by the rod and adapted to grasp a strip, a rotative part carrying a projection, a projection or wing connected
10 with said rod to engage the projection of the rotative part by the longitudinal movement of the rod, and means for guiding a strip to said mandrel, substantially as described.

15 9. The combination of a longitudinally-movable rod, a mandrel to be carried thereby and adapted to grasp a strip, a rotative part carrying a projection, a projection or wing carried by said rod and adapted to have movement independently thereof and to engage
20 the projection carried by the driving part by the longitudinal movement of the rod, and means for guiding a strip to said mandrel, substantially as described.

25 10. The combination of a longitudinally-movable rod, a mandrel to be carried thereby and adapted to grasp a strip, said rod having a slot, a projection or wing located in said slot, a driving part having a projection to engage the first-mentioned projection or wing
30 by the longitudinal movement of the rod, and means for guiding a strip to the mandrel, substantially as described.

35 11. The combination of a longitudinally-movable rod, a mandrel adapted to grasp a strip, said rod having a slot, stops in said slot at distances apart, a projection or wing located in said slot, a driving part, a projection carried thereby to engage the first-mentioned projection or wing, and means for
40 guiding a strip to said mandrel, substantially as described.

45 12. The combination of a longitudinally-movable rod, a mandrel adapted to grasp a strip, said rod having a slot, stops or abutments in said slot at distances apart, a bar located in said slot and having a projection or wing, a driving part having a projection adapted to engage the first-mentioned projection or wing, and means for guiding a strip
50 to said mandrel, substantially as described.

55 13. The combination of a longitudinally-movable mandrel adapted to grasp a strip, means for rotating the same, means for rotating said mandrel to its normal position while it is being moved longitudinally, and means for guiding a strip to said mandrel, substantially as described.

60 14. The combination of a longitudinally-movable mandrel adapted to grasp a strip, means for rotating the mandrel, a projection or wing connected with said mandrel, cam-jaws adapted to engage said projection to return the mandrel to a normal position, and means for guiding a strip to said mandrel,
65 substantially as described.

15. The combination of a longitudinally-movable rod, a mandrel carried thereby and

adapted to grasp a strip, a projection carried by said rod, cam-jaws adapted to engage said rod to return the mandrel to a normal position, means for rotating said mandrel, and means for guiding a strip to said mandrel, substantially as described. 70

16. The combination of a longitudinally-movable rod, a mandrel to be carried thereby and adapted to grasp a strip, an independently-movable projection or wing connected with said rod, cam-jaws to engage said projection or wing, means for rotating said rod, and means for guiding a strip to the mandrel, substantially as described. 75

17. The combination of a longitudinally-movable rod, a mandrel adapted to be carried thereby and adapted to grasp a strip, an independently-movable projection connected with said rod, a stop to engage said projection, cam-jaws to engage said projection, a spring to engage said projection, means for rotating said rod, and means for guiding a strip to said mandrel, substantially as described. 80

18. The combination of a longitudinally-movable rod, a mandrel to be carried thereby, a tube surrounding said rod, an apertured plug carried by said tube to receive said mandrel, means for rotating said rod and tube, and means for guiding a strip to said mandrel, substantially as described. 85

19. The combination of a reciprocative rod, a mandrel to be carried thereby and adapted to grasp a strip, a tube surrounding said rod, said tube having an apertured plug to receive said mandrel, said rod and tube having aligned slots, a projection or wing extending from said rod through said slots, means to engage said projection or wing to rotate said rod and tube, and means for guiding a strip to said mandrel, substantially as described. 90

20. The combination of a reciprocative rod, a mandrel to be carried thereby and adapted to grasp a strip, a tube surrounding said rod, said tube having an apertured plug to receive said mandrel, said tube and rod having aligned slots, a projection or wing extending from said rod through said slots, a driving part having a projection to engage the first-mentioned projection or wing, and means for guiding a strip to said mandrel, substantially as described. 95

21. The combination of a reciprocative rod, a mandrel adjustably connected therewith, a tube surrounding said rod, an apertured plug carried by said tube, means for rotating said rod and tube, and means for guiding a strip to said mandrel, said mandrel being adapted to grasp said strip, substantially as described. 100

22. The combination of a reciprocative rod, a mandrel to be carried thereby adapted to grasp a strip, a tube surrounding said rod, said tube and rod having a slot, a projection extending from said rod through said slots, a rotative part having a projection to engage the first-mentioned projection, cam-jaws to engage the first-mentioned projection, and
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means for guiding a strip to said mandrel, substantially as described.

23. The combination of a reciprocative rod, a mandrel to be carried thereby, a tube surrounding said rod, a sleeve surrounding said tube, supports for said parts, a pulley journaled on said sleeve, means to hold the pulley in position, and a clutch between said rod and said pulley and means for guiding a strip to said mandrel, substantially as described.

24. The combination of a reciprocative rod, a mandrel to be carried thereby, a tube surrounding said rod, means for rotating said rod and tube, a sleeve surrounding said tube, a pulley mounted on said sleeve, means for guiding said pulley, a clutch for rotating said rod and tube by said pulley, a sleeve having cam-jaws surrounding said tube, collars on said tube for confining said sleeves in position, and means for guiding a strip to said mandrel, substantially as described.

25. The combination of a reciprocative rod, a mandrel to be carried thereby and adapted to grasp a strip, a lever for operating said rod, a block carried by said rod and connected with said lever and adapted to permit the rod to rotate therein, means for rotating said rod, and means for guiding a strip to said mandrel, substantially as described.

26. The combination of a reciprocative rod, a mandrel to be carried thereby, said mandrel being adapted to grasp a strip, a lever to operate said rod, a block connected with said lever and having an aperture in which said rod can rotate, collars on said rod on opposite sides of said block, means for rotating said rod, and means for guiding a strip to said mandrel, substantially as described.

27. The combination of a bed, a stock adjustably carried thereby, a reciprocative rod carried by said stock, a mandrel to be carried by said rod and adapted to grasp a strip, means for rotating said rod, and means for guiding a strip to said mandrel, substantially as described.

28. The combination of a reciprocative mandrel adapted to grasp a strip, and means for supporting and operating the same, with a tilting table adapted to guide a strip to said mandrel, substantially as described.

29. The combination of a reciprocative mandrel adapted to grasp a strip, and means for supporting and operating the same, with a spring-actuated tilting table adapted to guide a strip to said mandrel, substantially as described.

30. The combination of a reciprocative mandrel adapted to grasp a strip, and means for supporting and operating the same, with a table adapted to guide a strip to the mandrel, and a roller at the inner end of said table adapted to coact with the strip to be wound upon the mandrel, substantially as described.

31. The combination of a reciprocative man-

drel adapted to grasp a strip, and means for supporting and operating the same, with a table adapted to guide a strip to the mandrel, said table being pivotally supported, and a spring adapted to hold said table in the normal operative position, substantially as described.

32. The combination of a reciprocative mandrel adapted to grasp a strip and means for supporting and operating the same, with a table adapted to guide a strip to the mandrel, said table being pivotally supported, and a spring adapted to hold said table in the normal operative position, and with a stop to limit the upward movement of said table, substantially as described.

33. The combination of a reciprocative mandrel adapted to grasp a strip, and means for supporting and operating the same, a bracket, a support for the same, a table for guiding a strip to the mandrel pivotally connected with said bracket, and a spring for holding said table in the normal position, substantially as described.

34. The combination of a reciprocative mandrel adapted to grasp a strip, and means for supporting and operating the same, a bracket, means for supporting the same, a rod carried by said bracket, a table having ears supported upon said rod, and a spring for holding said table in the normal position, substantially as described.

35. The combination of a reciprocative mandrel adapted to grasp a strip and means for operating and supporting the same, a bracket, means for supporting the same, a table pivotally connected with said bracket, a spring for holding said table in the normal position, and a stop to limit the movement of said table by said spring, substantially as described.

36. The combination of a reciprocative mandrel adapted to grasp a strip and means for supporting and operating the same, a bracket, a table pivotally supported thereby and adapted to guide a strip to the mandrel, a spring for holding said table in its normal position, a finger carried by said table, and a stop adapted to engage said finger, substantially as described.

37. The combination of a reciprocative mandrel adapted to grasp a strip and means for supporting and operating the same, a bracket, means for supporting the same, a table pivotally carried by said bracket and adapted to guide a strip to the mandrel, and a spring adjustably connected with said table, substantially as described.

Signed at the city, county, and State of New York this 26th day of February, 1898.

CHARLES L. CURTIS.
GEORGE LISPENARD.

Witnesses:

JOSEPH L. LEVY,
WM. JACOBSEN.