No. 740,422. PATENTED OCT. 6, 1903.

J. S. GOLDBERG.

SPOOL MAKING MACHINERY.

APPLICATION FILED APR. 30, 1903.

NO MODEL. 6 SHEETS—SHEET 1.

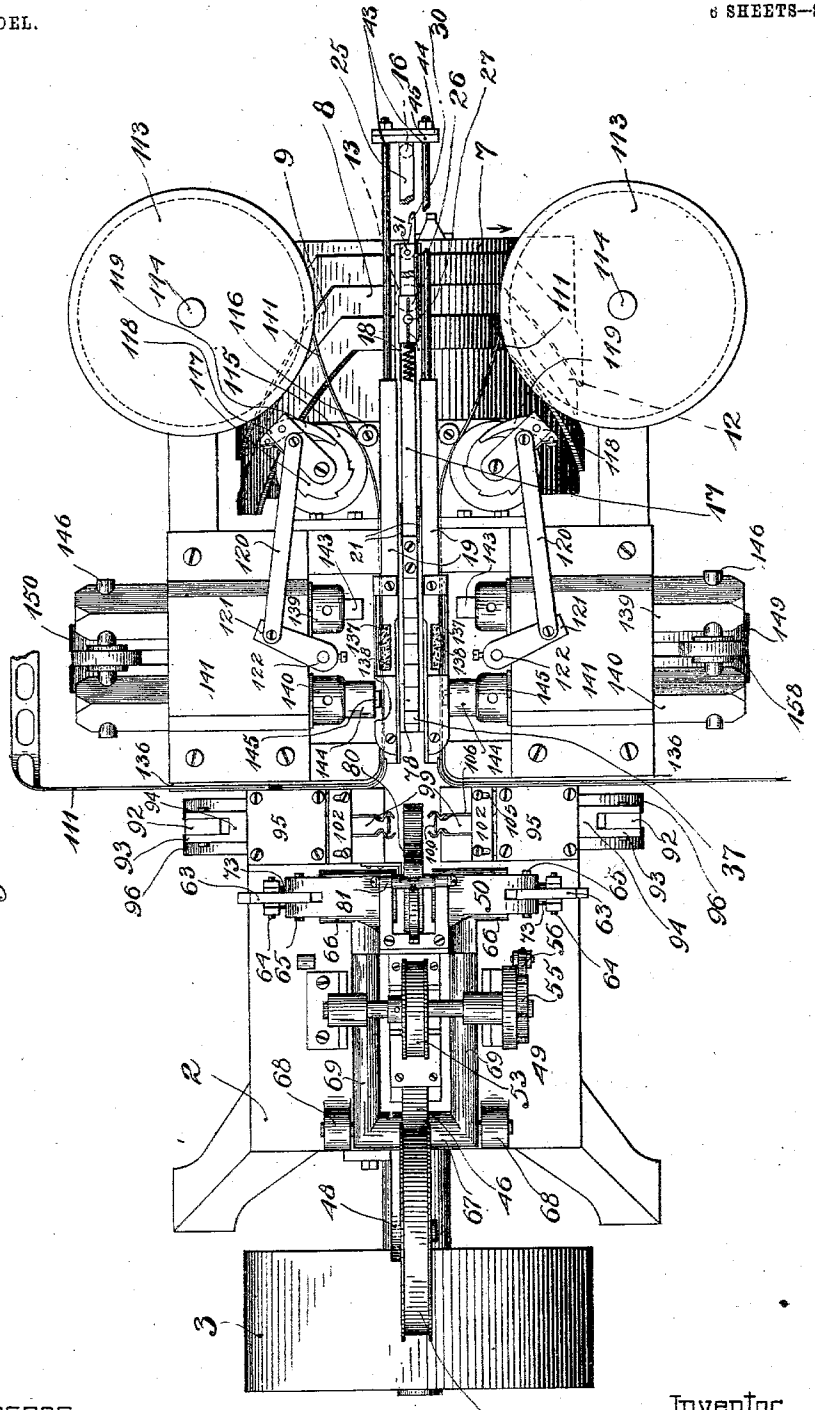


Fig. 1.

Witnesses,
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Charles J. Schmidt.

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Attorney

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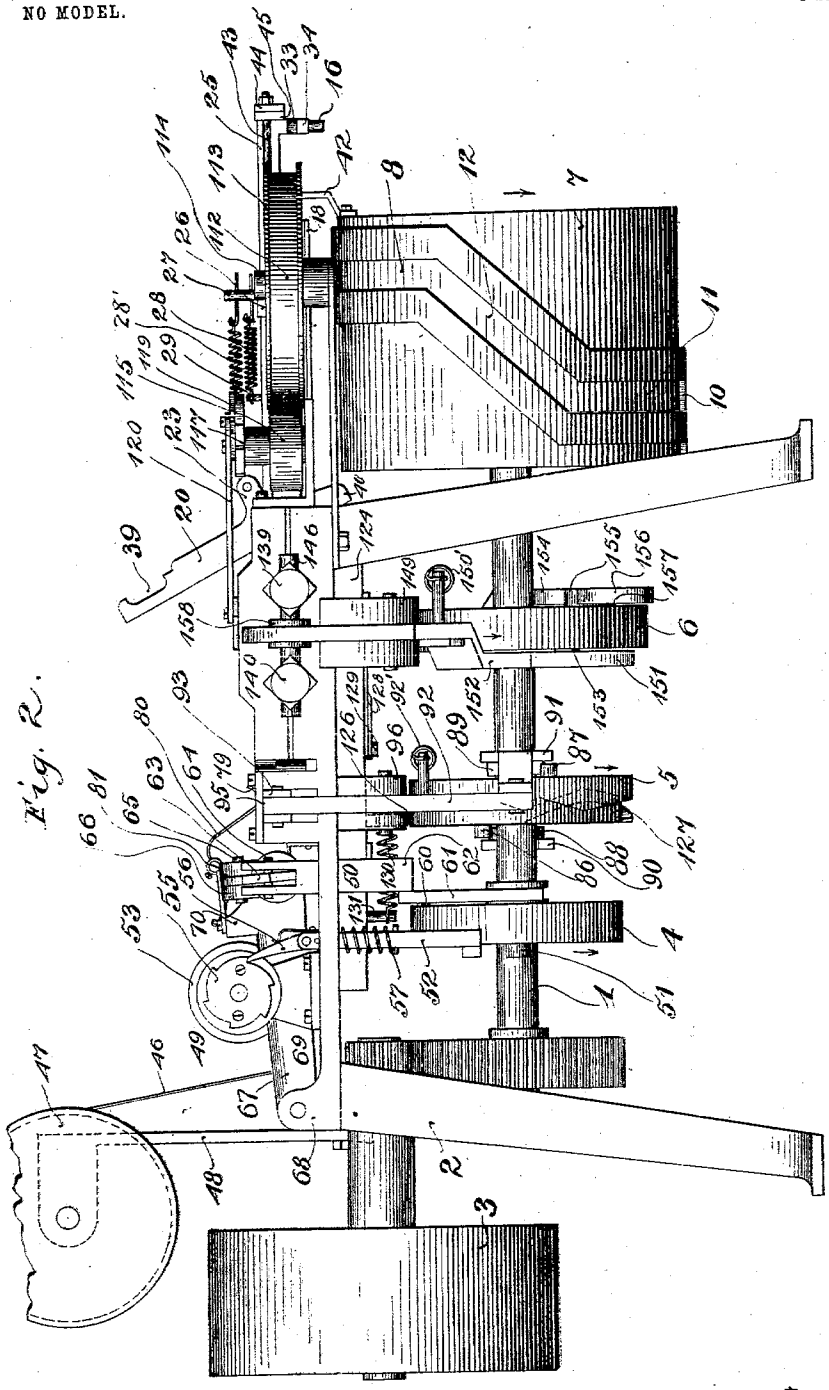


Fig. 2.

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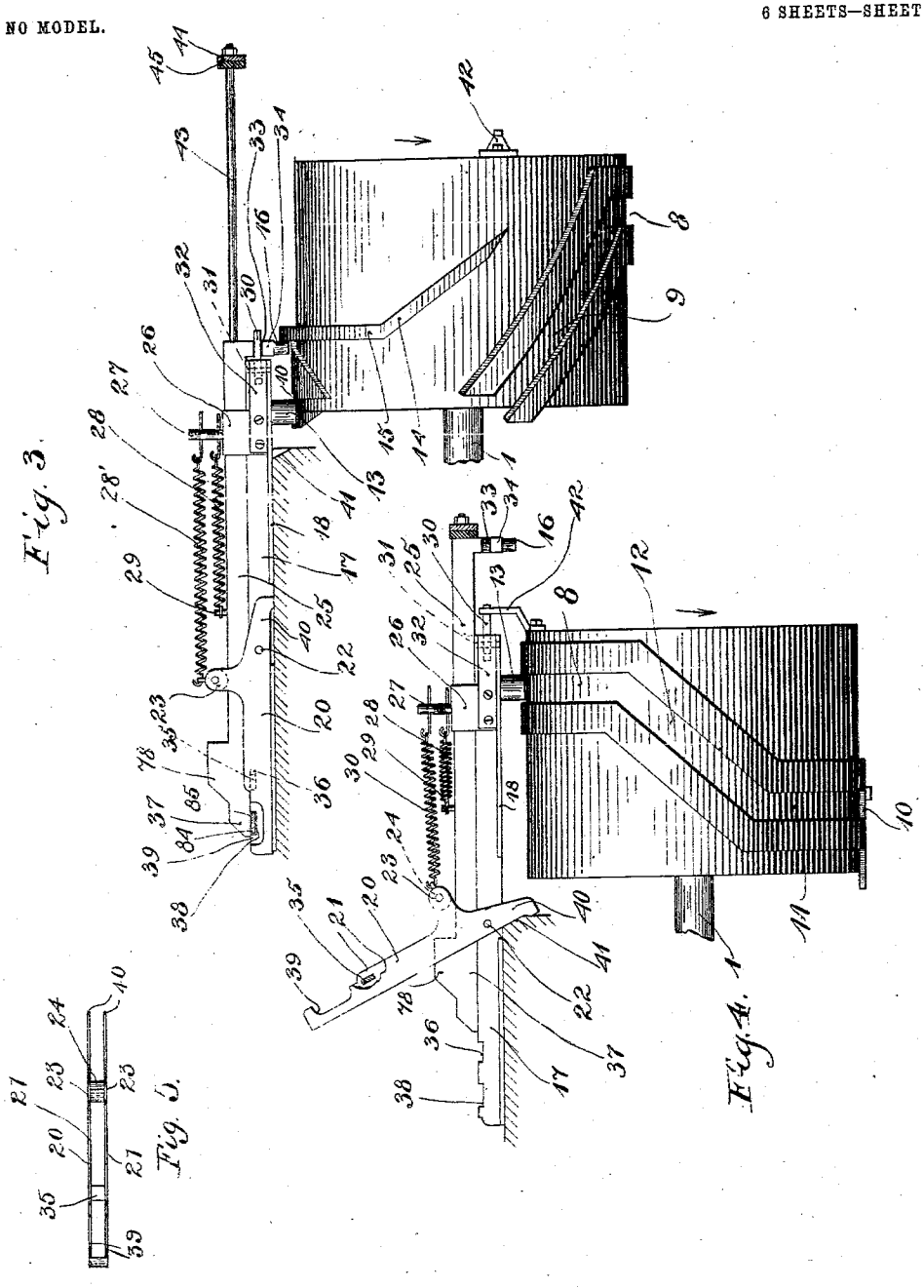


Fig. 3.

Fig. 5.

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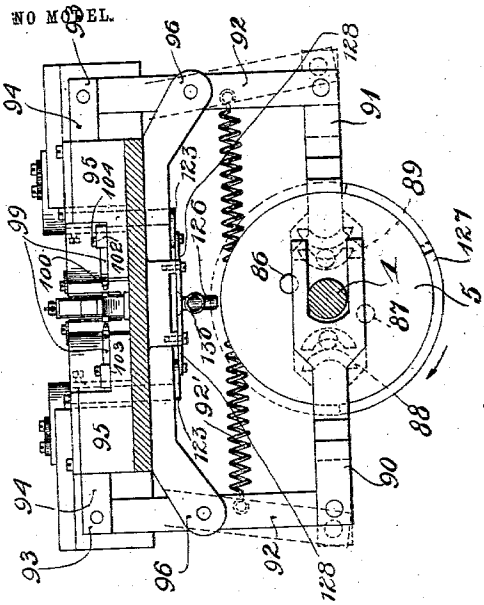


Fig. 12.

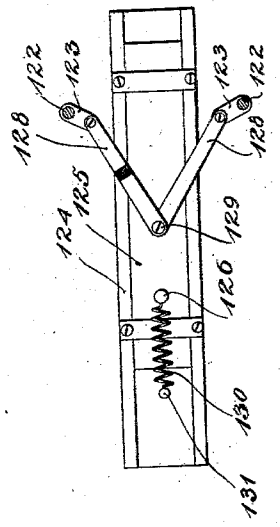


Fig. 16.

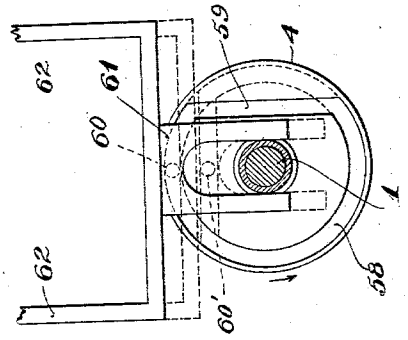


Fig. 7.

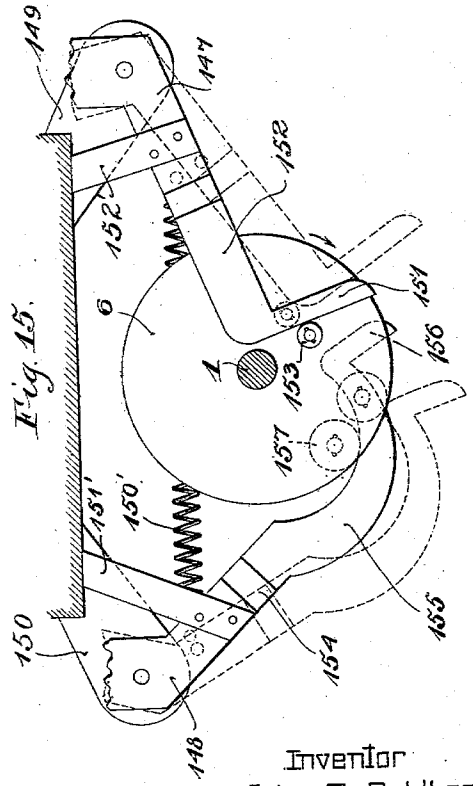


Fig. 15.

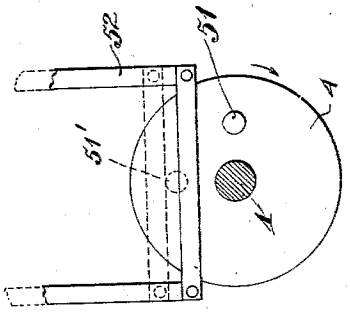


Fig. 6.

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NO MODEL. 6 SHEETS—SHEET 5.

Fig. 10.

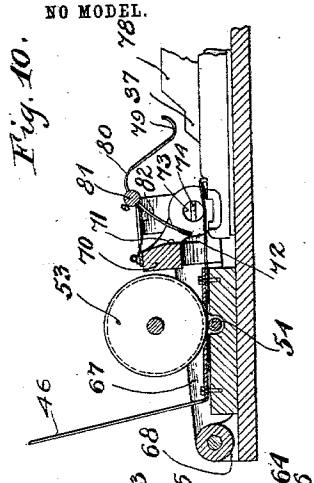


Fig. 11.

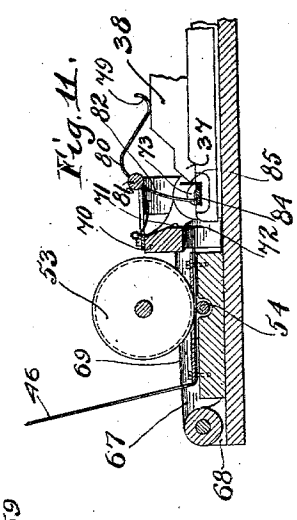


Fig. 9.

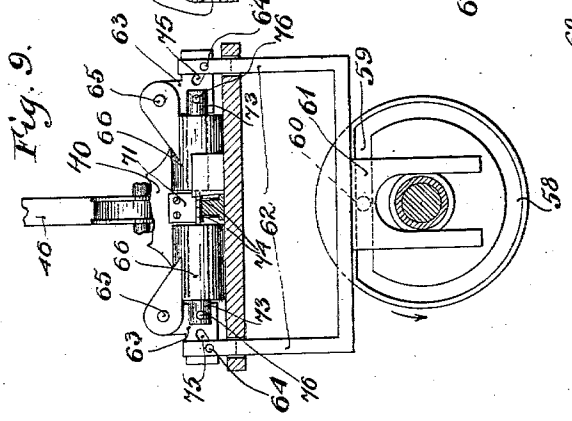


Fig. 18.

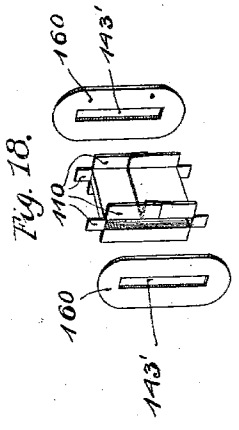


Fig. 8.

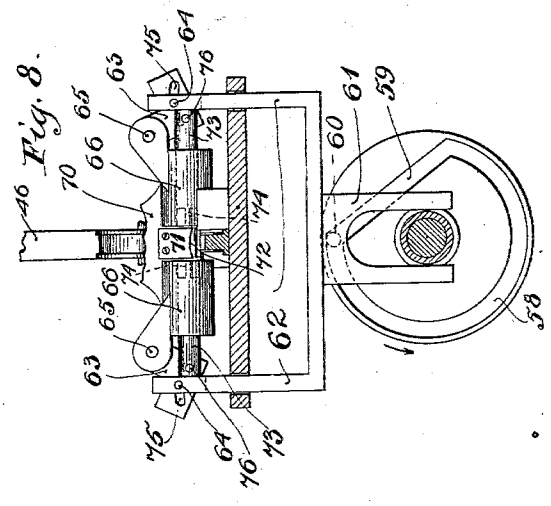
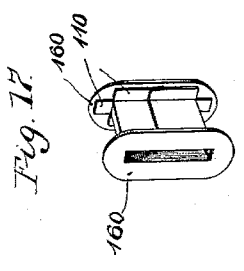


Fig. 12.



Witnesses

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APPLICATION FILED APR. 30, 1903.

NO MODEL. 6 SHEETS—SHEET 6.

Fig. 14.

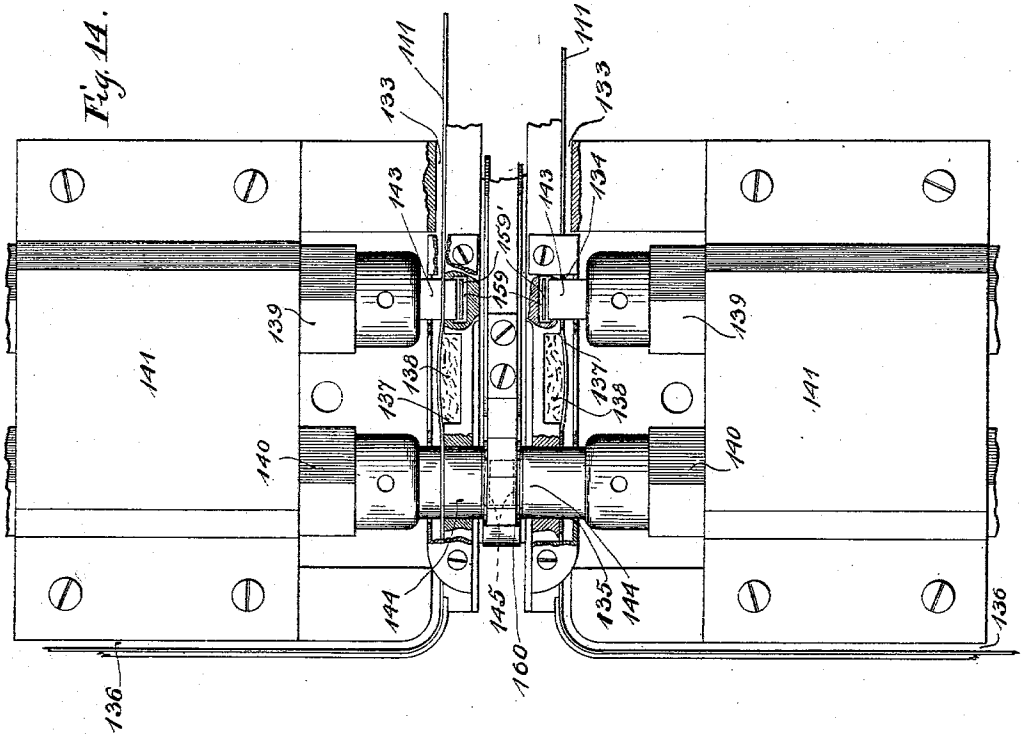
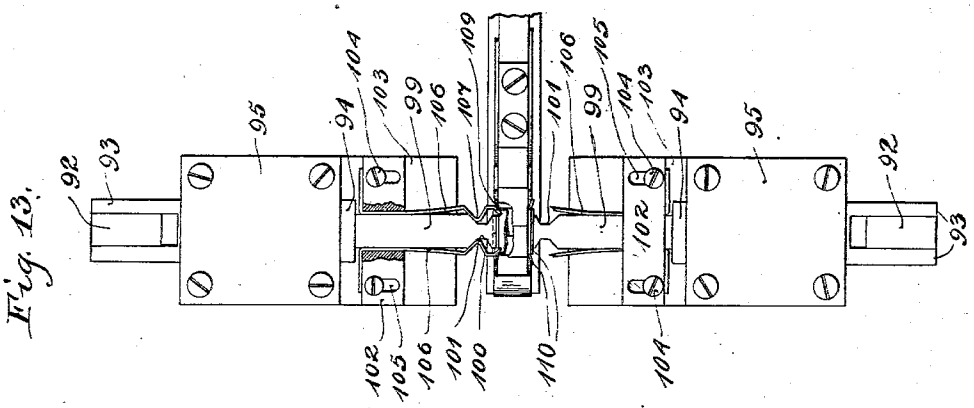


Fig. 13.



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No. 740,422. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

JOHN S. GOLDBERG, OF CHICAGO, ILLINOIS, ASSIGNOR TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

SPOOL-MAKING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 740,422, dated October 6, 1903.

Application filed April 30, 1903. Serial No. 154,966. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. GOLDBERG, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Spool-Making Machinery, (Case No. 8,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to spool-making machinery, and has for its object the provision of a machine for automatically manufacturing spools, particularly such spools as are adapted to have wire wound upon them and then to be slipped over the core of an electromagnet, the material of the spool serving at the same time as an insulating medium between the wire and the electromagnet-core.

I shall describe my invention as applied to a machine particularly adapted to automatically manufacture out of paper, fiber, or other insulating material spools, such as are described in my copending application, Serial No. 143,284, filed February 14, 1903. I do not wish to be limited to this construction, however, as my invention may readily be applied to machines for manufacturing articles similar to such spools.

In accordance with my invention the machine consists, primarily, of a suitable support, upon which is mounted a horizontal shaft driven from any source of power. A plurality of cam-pulleys are mounted upon this shaft, one of said cam-pulleys serving to reciprocate longitudinally a shuttle-bar across the top surface of the machine. Each of the other cam-pulleys mounted upon the horizontal shaft serves to produce vertical and lateral motion of mechanism which performs one or more of the steps of manufacture of a spool. A shuttle in conjunction with the shuttle-bar serves to carry the material, such as paper, from which the spool is made from a position to be operated upon by the mechanism of the first stages and thence to each of the other mechanisms to pass through the other stages of manufacture, a finished spool being delivered at the end of each stroke of the reciprocating shuttle. The paper, which eventually composes the core of the spool, is fed into the machine—for instance, from the left thereof—by feeding mechanism operated by the first cam of the series of cams, whereupon a suitable length thereof is sheared off and folded into a rectangular tube having the shape of the core. This folding action is accomplished by mechanism also operated in conjunction with the first cam, as will be hereinafter more fully described. This tube is now carried by the shuttle-bar to be operated upon by flaring mechanism controlled by the second cam. This flaring mechanism engages the edges of the tube and flares out the ends of the walls of the tube to form flaps, against which the flange-pieces of the spool are eventually glued. The flange-pieces are punched out of paper which is fed from the right of the machine, the paper being in the shape of a narrow band, one of said bands being fed from each side of the machine for supplying flange-pieces for each end of the core portions. The paper is fed by punch-openings adapted to receive two sets of punches operated and controlled by the third cam on the horizontal shaft. These sets of punches are symmetrical, one of said sets cutting pieces out of the paper to leave openings having the size of the opening in the core portion. The other set of punches cuts from the paper finished flanges, as will hereinafter be more fully described, and carries the flanges and presses them against the flaps on the core portion, which portion by this time is disposed in alinement with this set of punches. A wet sponge is disposed in the path of the paper between the punch-openings and moistens the inner face of the paper. The paper from which the core is made is preferably gummed on the top face thereof, so that the gummed surface will be outward on the flaps on the core portion. The flange parts previous to being punched out of the paper have been moistened by the sponge and upon being pressed against the gummed surface of the flaps adhere thereto. The spool is now finished and by a subsequent operation is snapped backward by the shuttle into a receptacle.

I shall describe my invention more clearly and in detail with reference to the accompanying drawings, in which—

Figure 1 is a plan view thereof. Fig. 2 is an elevation thereof. Fig. 3 is a detail view of the shuttle mechanism, showing the position thereof just after the core portion has been folded. Fig. 4 is a detail view of the shuttle mechanism, showing the disposition thereof just after a finished spool has been delivered. Fig. 5 is a plan view of the shuttle. Fig. 6 is a detail view of one side of the first cam and the cam-post operated thereby, showing the operative positions thereof. Fig. 7 is a detail view of the other side of the first cam and a cam-post operated thereby, showing the operative positions thereof. Figs. 8, 9, 10, and 11 show the successive stages of operation of part of the mechanism controlled by the first cam-pulley. Figs. 12 and 13 are detail views of the second cam-pulley and the flaring mechanism operated thereby. Fig. 14 is an enlarged view of the punching mechanism. Fig. 15 is a detail view of the third cam and mechanism for operating the punches. Fig. 16 is a detail view of mechanism for operating the feeding devices. Fig. 17 shows a completed spool. Fig. 18 shows the parts thereof disassembled.

A horizontal shaft 1 is disposed in suitable bearings carried upon the machine-support 2 and may be driven from any source of power by means of a belt-pulley 3. A plurality of cam-pulleys 4, 5, 6, and 7 are rigidly mounted upon said shaft, the cam-pulley 7 being preferably disposed at the right end of said shaft, the periphery thereof being provided with a series of camways 8, 9, 10, 11, and 12, in which ways a cam-roller 13 is adapted to travel. Camways 14 and 15 are also disposed upon the periphery of the cam-pulley 7 and are adapted to guide a cam-roller 16. The cam-roller 13 is journaled to the rear end of a shuttle-bar 17, provided with flanges 18 18, which fit in guideways 19 19, in which said shuttle-bar is reciprocated as said cam-roller travels through said camways. A shuttle 20 is composed of side walls 21 21, disposed one on each side of the shuttle-bar and pivoted thereto at 22 22. Upwardly-extending arms 23 23 on said side walls are connected by a bridge-piece 24. A lock-bar 25 is disposed above said shuttle-bar and is adapted to move longitudinally thereon, being retained against said shuttle-bar by means of a bridge 26, secured to said shuttle-bar, and by the bridge-piece 24. A post 27 is secured to the top of bridge 26, a spring 28 intervening between said post and another post 29, secured to the locking-bar. A spring 28′ is interposed between said post 27 and the bridge 24. In the working position the shuttle-bar, shuttle, and locking-bar are disposed as shown in Fig. 3, the locking-bar being held in a forward position against said shuttle-bar by means of latching mechanism consisting of a latch 30, mounted upon a pivot 31 at the rear end of the shuttle-bar. A spring 32, secured to bridge 26, tends to retain said latch in engagement with a detent 33 in the depending end 34 of the locking-bar against the tension of the spring 28. Spring 30 is also under tension. A bridge-bar 35 extends between the side walls 21 at the forward end of the shuttle, and when said shuttle is depressed, as shown in Fig. 3, said bar rests in a notch 36 in the shuttle-bar, the nose portion 37 at the forward end of the locking-bar being in position above said bar, thereby locking the shuttle in place against the tension of the spring 30. Another notch 38 in the forward end of the shuttle-bar is cut large enough to accommodate the core portion of the spool. A notch 39 is cut in the forward end of each of said side walls, the contour of said notch being such as to receive the flange portion of the spool.

In the idle position the shuttle-mechanism parts are arranged as shown in Fig. 4, having reached the extreme right of the machine, the rear end 40 of the shuttle having passed beyond the rear edge 41 of the machine-bed. As shown, a finger 42, projecting from the periphery of the cam-pulley 7, which travels in the direction shown by the arrow, has just passed out of engagement with the latch 30, disengaging said latch from the detent 33, whereby the locking-bar is released and drawn back by spring 28. The nose 37 in this position has retreated beyond bar 35, thus allowing the shuttle to be snapped upward by the spring 30, the rear end 40 of the shuttle depending over the edge 41 of the machine-bed. To cushion the locking-bar as it is drawn suddenly backward, I provide bars 43 43, said bars being secured or otherwise fastened to the rear of guide-walls 19, extending rearwardly therefrom. A cross-piece 44 at the end of said rods is faced with a rubber cushion 45, which receives the impact of the locking-bar.

Having thus described the shuttle mechanism which carries the spool material from one stage of operation to the other to be acted upon by the various mechanisms in said stages, I shall now describe such mechanisms.

The paper 46, from which the core portion is formed is fed, from a roll 47, rotatably mounted upon an arm 48, extending upwardly at the left of the machine. In Figs. 1 and 2 I have shown the mechanisms in position just after a completed spool has been delivered, the cam-pulleys traveling in the direction indicated by the arrows. Cam-pulley 4 is adapted to actuate the feeding mechanism 49 and the cutting-off and folding mechanism 50. As seen in Fig. 6, said cam-pulley has secured to its left face a cam-roller 51, adapted as said pulley revolves to raise a cam-post 52, which actuates the feeding mechanism. This feeding mechanism consists of a large feed-wheel 53 and a smaller wheel 54, between which wheels the paper is fed. A ratchet-wheel 55 is secured to feed-wheel 53 and is engaged by a pawl 56, pivoted at the upward end of cam-

post 52. This feeding mechanism is adjusted to feed a certain length of paper during each revolution of the cam-pulley. A spring 57, sleeved on said cam-post, serves to restore said cam-post after actuation thereof. As best seen in Fig. 7, cam-pulley 4 is provided on its right face with a camway 58, which camway is circular preferably within an arc of one hundred and thirty-five degrees, the remaining portion 59 thereof being straight and disposed at right angles to the axis of the pulley. A cam-roller 60, secured to a cam-post 61, is adapted to travel in said camway. Arms 62 62 extend symmetrically upward from said cam-post, one at each side of the machine, the ends thereof being bifurcated. As best seen in Figs. 8, 9, 10, and 11, pitman-lever members 63 63 are mounted at one elbow end thereof upon pivot-pins 64 64, extending across the bifurcated ends of the arms 62. The other elbows of said pitman-levers are pivoted at 65 65 to the forward end of bearings 66 66, which bearings form the forward part of a hinged frame 67. The hinged member is hinged at the left of the machine-frame in bearings 68 and has forwardly-extending arms 69 69, each arm terminating in one of the bearings 66, a space intervening between said bearings. A bridge-piece 70 extends between legs 69 69 to the rear of the bearings 66 and a distance above them. Secured to the front face of said bridge is a blade 71, the edge 72 of which extends transversely across the opening between said bearings. At their elbows said pitman-levers are pivoted to horizontal rods 73 73, adapted to reciprocate within the bearings 66 and shaped at their forward end into flat bars 74 74. The bearings engaging pivots 64 are in the shape of diagonal slots 75, and the bearings engaging the elbow-pivots 76 76 are also slotted to prevent binding. As the cam-post 61 and pivot-arms 62 are pulled downward as cam-roller 4 rotates in the direction of the arrow the first operation caused thereby will be to pull the pitman-levers downward by virtue of slots 75, thus to force rods 73 73 inward to bring the flat bars 74 together. When the pivots 64 reach the bottom edge of the slots 75, the hinged frame 67 will be brought downward, carrying with it blade 71 and the flat forming-bars 74. This position is shown in Fig. 9. Just prior to this position assumed by the forming-bars the forward end of the shuttle-bar and shuttle will be at the beginning of a stroke, as shown in Fig. 10, the groove 38 in the shuttle-bar being disposed directly below the forming-bars to register therewith. The blade 71 is disposed in advance of the forming-bars, and as the hinged frame is brought down by the cam-pulley the paper which has been fed to the proper distance beyond the blade is sheared off, whereupon the forming-bars press said paper into the groove 38, the edges of said paper sticking upward. While the paper is being pressed into the groove by the forming-bars the locking-bar will have become engaged by cam-guides 14 and 15 to be carried into latching engagement with the shuttle-bar. The nose 37 of said locking-bar is provided with a ridge 78, which in its forward travel engages the curved end 79 of an inverted-V-shaped spring 80, secured at its bend to a pivot 81, one leg 82 thereof extending downward to the left of the forming-bars, the other leg extending downward to the right thereof and terminating in the curved end 79. As the curved end 79 is carried upward by the ridge 78 leg 82 is carried forward against the left upwardly-projecting end of the paper held in the groove 38, and the nose 37 of the locking-bar folds the other upwardly-extending end 85 of the paper over the end 84 turned down by the leg 82, the nose remaining in this position with respect to the paper carried in groove 38 of the shuttle-bar throughout the various stages. This position is best shown in Fig. 3. The edges of the paper as thus folded extend a distance beyond the sides of the shuttle-bar, and during the next stage in the manufacture of the spool these extending edges are flared outwardly to form flaps against which the flange parts are to be secured, as will be outlined in a subsequent stage of operation. The flaring mechanism is operated and controlled by cam-pulley 5, which revolves in the direction shown by the arrow. As best seen in Figs. 12 and 13, this cam-pulley is provided with cam-rollers 86 and 87, one on each side of the cam-roller and diametrically disposed. These cam-rollers are adapted during revolution of cam-roller 5 to respectively engage the cam ends 88 and 89 of cam-arms 90 and 91 to cause longitudinal motion thereof. Symmetrical arms 92 92, pivoted at their lower end to the cam-arms and at their upper end to the bifurcated ends 93 93 of sliding bars 94 94, adapted to reciprocate in bearings 95 95, are fulcrumed at an intermediate point to bearings 96 96, projecting from the frame of the machine. The tension-spring 92′, disposed between arms 92 below the bearings 96, tends to retain said arms in a closed position. The bars 94 terminate in flaring-bars 99 99, the thickness of said bars being slightly greater than the height of the opening of the folded paper core. The ends of said flaring-bars are provided with wedge-shaped edges 100 100, and V-shaped slots 101 101 are cut into the edges near the end thereof. Transverse members 102 102 bridge over the flaring-bars and are secured to the bearing-beds 103 103 by means of screws 104 passing through slots 105 105, whereby said transverse members are allowed slight transverse travel. Flaring-springs 106 106 are secured to said transverse members and pass forward between the bridging-walls of said members and the sides of the flaring-bars, having at their forward end V-shaped indentations 107 107, which register with and normally lie in the V-shaped slots in the forward end of the flaring-bars. The spring-points 109 109 are bent inwardly and are cut to a

V-shaped point. In the idle position the flaring-bars and flaring-springs are disposed as shown in Fig. 1. Upon rotation of cam-pulley 5 arms 92 are spread and cam-bars 99 brought forward and toward each other. When the bridging members have reached the end of their transverse travel the flaring-springs are stopped; but the flaring-bars continue in a forward direction, the wedge-shaped ends thereof engaging the projecting ends of the folded paper carried by the shuttle-bar. The spreading action of the springs does not take place until the points of the springs have entered a slight distance into the opening of the folded paper. As they are now spread outwardly by the further forward travel of the flaring-bars the points of the springs engage the side walls of the projecting folded paper, flaring them out, while at the same time the wedge-shaped ends of the flaring-bars engage the ends of the top and lower walls of the folded paper to flare them outward, thus forming flaps 110 at either end of the folded paper core against which the flanges are to be glued during a subsequent operation. The paper from which the flange portions are formed is fed in the shape of bands 111 from rolls 112, carried upon spools 113, mounted upon pivots 114, extending upward from the rear part of the machine-frame. One of these spools is mounted at either side of the shuttle mechanism, the paper being fed by feeding mechanism between feed-rollers 115 and guide-rollers 116. Ratchet-wheels 117 are secured to feed-wheel 115, and pawl-cranks 118 are provided at their ends with pawls 119, adapted to engage the ratchet-wheels. Connecting-rods 120 lead from the pawl-cranks to crank-arms 121, secured to the top end of vertical and downwardly extending shafts 122, which terminate at their lower ends in crank-arms 123. As best seen in Figs. 2 and 16, the crank-arms 123 are actuated by means of cam mechanism associated with cam-pulley 5. A guideway 124 is secured to the bottom of the bed-plate of the machine, and a sliding bar 125 is adapted to reciprocate therein. A cam-post 126 extends downwardly from said slide-bar and engages camway 127, disposed on the periphery of cam-pulley 5. This camway extends diagonally across the periphery of the cam-pulley 5 and back again toward the left thereof, and as the cam-pulley revolves, as indicated by the arrow, the cam-post 126 travels in said camway and the slide-bar 125 is reciprocated longitudinally. Toggle-limbs 128 are pivoted at 129 to the slide-bar, the free ends thereof engaging the ends of the crank-arms 123. A tension-spring 130 is interposed between cam-post 126 and a post 131, secured to the frame of the machine. This spring tends to retain the slide-bar in its normal position to the left of the machine, and as the cam-post is engaged by camway 127 the toggle members are actuated to rotate the vertical shaft 122 to actuate the feeding mechanism. The paper after leaving the feeding mechanisms passes through guide-slots 133 and adjacent to the guideways 19 19, passing by punch-openings 134 and 135 through said guideways, the paper emerging from transverse guide-slots 136. Pockets 137 are cut into the walls of said guideways 19 between punch-openings 134 and 135 to hold sponges 138, which may be kept properly moistened, these sponges projecting forward into the path of the paper, moistening said paper on the inside face thereof. Punch-rods 139 and 140 are mounted in bearings 141. Punch-rods 139 terminate in rectangular punches 143, the cross-section having the shape and size of the opening in the core portion of the spool. Punch-rods 140 terminate in punches 144, a cross-section thereof having the shape of a flange portion. Projecting forwardly from the forward faces of said punches 144 are ledges 145, having the same shape as the punches 143. A shaft 146 connects the outer ends of the punch-rods, which are associated with cam-pulley 6, as best shown in Fig. 15. Levers 147 and 148 are fulcrumed in bearings 149 and 150, respectively, depending from the frame of the machine. A cam-shoe 151 extends vertically and downwardly from the arm 152 of lever 147. The top face at the inner end of arm 152 and the surface of the shoe 151 form cam-surfaces which are engaged by a cam-roller 153, mounted upon one side of cam-pulley 6. The arm 154 of lever 148 terminates at its end in a hook-shaped part 155, the end of which terminates in a cam-shoe 156, extending vertically and downwardly therefrom. The inner surface of said hook-shaped part may be circular and forms, with the surface of the shoe 156, a cam-bearing adapted to be engaged by a cam-roller 157, suitably disposed upon the opposite side of cam-pulley 6. As cam-pulley 6 rotates in the direction as indicated by the arrow the cam-rollers engage their respective cam-surfaces and separate the lever-arms 152 and 154, which terminate at their other ends in bearings 158, engaging shafts 146. A tension-spring 150′ connects lever-arms 154 and 152 to return them to their former position after actuation thereof, stop-posts 151′ and 152′, secured to said arms, serving to limit said spring to retain the camways upon said arms in a suitable position to be engaged by the cam-rollers. As the lever-arms are thus spread punches 143 and 144 are carried toward each other and pass through their respective punch-openings. Punches 143, which are disposed in advance of punches 144, punch pieces 159′ out of the paper, leaving an opening 143′ in the paper having the size of the core-opening, said pieces falling through escape-openings 159. The length of paper fed by the feeding mechanism during each revolution is equal to the distance between the centers of punches 143 and 144, and the openings cut into the paper by punches 143 are carried to aline with the center of punches

145 after the feeding mechanism has been actuated. As the punches 144 now travel forward toward each other the ledges 145 on the front face thereof enter the openings in the paper which have been cut into the paper by punches 143 and which have been carried to aline with said ledges by an actuation of the feeding mechanism. As the punches 144 still travel forward the flanges 160 are punched out of the paper and supported upon the ledges 145, which ledges enter the openings 143′ of the core portion, which by this time has been carried by the shuttle mechanism to aline with said punches. The ledges thus entering a slight distance into the core-opening prevent buckling or distortion of the flaps as the flange portions are pressed against them, the sides of the shuttle-bar and the nose 37 of the lock-bar serving as an abutment for the punches. The paper 46, from which the core portion has been formed, may have its top face gummed, which causes the outer faces of the flaps to be gummed after they have been formed. The paper from which the flanges have just been cut has been moistened by the sponges 138, and as the flanges are cut therefrom and pressed against the gummed faces of the flaps they are caused to adhere thereto, and the spool is now completed. The punches are now withdrawn, and the finished spool is supported upon the forward end of the shuttle-bar, which now approaches the end of its stroke to assume the position as shown in Fig. 4, the cam-roller 7 having carried the finger 42 thereon to trip the latch 30, thus releasing the lock-bar, which is pulled back by the spring 28 away from the bridge 35 on the shuttle. The shuttle thus being released is snapped backward over the edge of the bed-plate by the spring 30, and the finished spool carried upon the end thereof is delivered into a suitable receptacle.

The disposition of the camways which causes interrupted reciprocation of the shuttle mechanism across the face of the machine is shown on Figs. 1, 2, 3, and 4, Figs. 1, 2, and 4 showing the mechanism at the extreme right of its stroke and Fig. 3 showing said shuttle mechanism at the left of its stroke. As the shaft rotates in the direction of the arrow the cam-roller 13 travels in camway 8, which is disposed circumferentially along the periphery of cam-wheel 7 and along the diagonally-disposed camway 9. As said cam-roller travels in camway 8 there is no motion of the shuttle-bar; but as said roller enters the diagonal camway 9 the shuttle-bar is carried toward the forward end of its stroke. During this forward travel of the shuttle-bar cam-pulley 4 rotates to actuate the feeding mechanism, cam-post 51 being carried to the dotted position 51′. (Shown in Fig. 6.) The cam-roller 60 will have assumed the position 60′, (shown in Figs. 7 and 9,) and upon further rotation of cam-pulley 4 the folding mechanism is brought into play, the groove 38 in the forward end of the shuttle-bar having become disposed to receive the forming-bars, the cam-roller 13 having been carried to the forward end of camway 9. Upon further rotation of the shaft the forming-bars are withdrawn from the folded core portion, the cam-roller 16 during this time having become engaged by cam-guides 14 and 15 to bring the lock-bar to its forward position to assist in the folding operation. Cam-roller 13 now enters the diagonal camway 10, disposed on the periphery of cam-pulley 7, to carry the shuttle mechanism backward to bring the folded core portion carried thereby into alinement with the flaring mechanism to be treated as hereinbefore outlined. After having been carried to the flaring position cam-roller 13 enters the circumferential camway 11, the shuttle mechanism remaining at rest, while the cam-roller travels in said camway, during which travel the flaring mechanism is operated as shown in Fig. 12, cam-rollers 86 and 87 engaging their respective cam-posts 90 and 91 to cause the operation of the flaring mechanism. The core portion of the spool is now completed, and cam-roller 13 entering the diagonal slot 12 carries the shuttle mechanism and the core portion carried thereby backward to a position where said core portion may receive the flange portions. Cam-roller 13 after leaving the diagonal camway 12 reënters camway 8, and during its travel in said camway 8 the punches are operated as hereinbefore described to provide the core portion with flanges, whereupon the finger 42 trips latch 30 to release the lock-bar to allow the shuttle to be snapped backward to deliver the finished spool, as before described.

Although I have described my invention as applied to a machine for automatically manufacturing paper spools, I do not wish to limit it to such use thereof, as by the mechanism employed similar articles may be readily manufactured. Changes may also readily be made in the construction of the various mechanisms without departing from the spirit of the invention.

I claim as new, however, and desire to secure by Letters Patent—

1. In a machine for making paper spools, the combination with means for feeding the material from which the spool is to be made, of folding mechanism for folding the material into tubes to form the core portions of the spools, and means for applying flanges to said core portions to form finished spools, substantially as described.

2. In a machine for making paper spools, the combination with means for feeding the material from which the spool is to be made, of means for cutting the material into lengths, folding mechanism for folding the lengths into tubes to form the core portions of the spools, and means for applying flanges to said core portions to form finished spools, substantially as described.

3. In a machine for making paper spools,

the combination with means for feeding the material from which the spool is to be made, of folding mechanism for folding the material into tubes to form the core portions of the spools, means for applying flanges to said core portions to form finished spools, and means for throwing the finished spools from the machine, substantially as described.

4. In a machine for making paper spools, the combination with means for feeding the material from which the spools are to be made, of folding mechanism for folding the material into tubes to form the core portion of the spools, means for flaring out the ends of the core portions to form flaps, and means for applying flanges to said flaps to form finished spools, substantially as described.

5. In a machine of the class described, the combination with a supporting-frame, of shuttle mechanism adapted to reciprocate longitudinally across the top of said frame, a forming-bar adapted to extend transversely across the top of said frame, means for feeding the material in the shape of a band, means associated with said shuttle mechanism for folding said material about said bar to form tubes, and means for applying flanges to said tubes to form finished spools, substantially as described.

6. In a machine of the class described, the combination with a supporting-frame, of a shuttle-bar adapted to reciprocate longitudinally across the top of said frame, a forming-bar adapted to extend transversely across the top of said frame, means for feeding material in the shape of a band, means associated in said shuttle-bar and acting in conjunction with said forming-bar to fold said material about said forming-bar to form tubes, and means for applying flange portions to the ends of said tubes to form finished spools, substantially as described.

7. In a machine of the class described, the combination with a supporting-frame, of a series of cam-pulleys mounted thereon, shuttle mechanism associated with one of said cam-pulleys to be reciprocated thereby longitudinally across the top of said supporting-frame, feeding mechanism for feeding material to be acted upon, folding mechanism acting in conjunction with said shuttle mechanism for folding into a rectangular tube the material fed by said feeding mechanism, and means for flaring out the ends of said tube to form flaps, substantially as described.

8. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a series of cam-pulleys mounted on said frame, shuttle mechanism associated with one of said cam-pulleys to be reciprocated longitudinally across the top of said bed-plate, a shuttle-bar for said shuttle mechanism, a shuttle pivotally mounted thereon, and a lock-bar associated with said shuttle-bar for locking said shuttle to said shuttle-bar and for carrying with said shuttle-bar and shuttle the material to be acted upon, substantially as described.

9. In a machine of the class described, the combination with a supporting-frame therefor, of a bed-plate for said frame, cam-pulleys mounted upon said frame, means for driving said cam-pulleys, shuttle mechanism associated with one of said cam-pulleys to be reciprocated longitudinally across the top of said bed-plate, a shuttle-bar for said mechanism, a shuttle pivotally mounted thereon, a lock-bar associated with said shuttle-bar for locking said shuttle to said shuttle-bar and for carrying with said shuttle-bar and said shuttle the material to be acted upon, and means for locking said bar to said shuttle-bar, substantially as described.

10. In a machine of the class described, the combination with a supportiug-frame, of a bed-plate therefor, cam-pulleys rotatably mounted thereon, means for driving said cam-pulleys, shuttle mechanism associated with one of said cam-pulleys to be reciprocated thereby across the top of said bed-plate, a shuttle-bar for said shuttle mechanism, a shuttle pivotally mounted thereon, a lock-bar associated with said shuttle-bar and adapted to travel longitudinally thereon to lock said shuttle to said shuttle-bar and to carry with said shuttle-bar and said shuttle the material to be acted on, latch mechanism on said shuttle-bar for locking said lock-bar thereto, and means associated with said cam-pulley for bringing said lock-bar into latching engagement with said latch mechanism, substantially as described.

11. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, cam-pulleys rotatably mounted thereon, means for driving said cam-pulleys, shuttle mechanism associated with one of said cam-pulleys to be reciprocated thereby across the top of said bed-plate, a shuttle-bar for said shuttle mechanism, a shuttle pivotally mounted thereon, a lock-bar associated with said shuttle-bar and adapted to travel longitudinally thereon to lock said shuttle to said shuttle-bar and to carry with said shuttle-bar and said shuttle the material to be acted on, latch mechanism on said shuttle-bar for locking said lock-bar thereto and means associated with said cam-pulley for tripping said latch to release said lock-bar, substantially as described.

12. In a machine of the class described, the combination with a supporting-frame, cam-pulleys rotatably mounted thereon, shuttle mechanism associated with one of said cam-pulleys to be reciprocated longitudinally across the top of said frame, a shuttle-bar for said shuttle mechanism, a shuttle pivotally mounted upon said shuttle-bar, a lock-bar associated with said shuttle-bar adapted to travel longitudinally thereon, means associated with said cam-pulley for causing said lock-bar to travel forward on said shuttle-bar

when said shuttle-bar is in its forward position, latching means associated with said shuttle-bar for holding said lock-bar while in said forward position, and means for releasing said lock-bar from said shuttle-bar when said shuttle-bar is at the rear end of its stroke, substantially as described.

13. In a machine of the class described, the combination with a supporting-frame, of a horizontal shaft rotatably mounted thereon, a series of cam-pulleys rigidly secured to said shaft, means for driving said shaft, a shuttle-bar, a cam-roller on said shuttle-bar, camways on one of said cam-pulleys for engaging said cam-roller whereby said shuttle-bar is interruptedly reciprocated across the top of said frame, a shuttle consisting of side walls pivotally mounted upon said shuttle-bar, a bridge-bar connecting said sides, a groove in said shuttle-bar adapted to receive said bridge-bar when said shuttle is depressed, a lock-bar associated with said shuttle-bar and adapted to travel longitudinally thereon, camways upon said cam-pulley adapted to cause forward travel of said lock-bar upon said shuttle-bar, whereby said lock-bar is disposed above said bridge-bar to lock the shuttle to the shuttle-bar, and latching mechanism associated with said shuttle-bar for locking said lock-bar to said shuttle-bar when said lock-bar is in its forward position on said shuttle-bar, and means associated with said cam-pulley for releasing said latching mechanism to allow said lock-bar to be returned to its normal position, substantially as described.

14. In a machine of the class described, the combination with a supporting-frame, of a horizontal shaft rotatably mounted thereon, a series of cam-pulleys rigidly secured to said shaft, means for driving said shaft, a shuttle-bar, a cam-roller on said shuttle-bar, camways on one of said cam-pulleys for engaging said cam-roller whereby said shuttle-bar is interruptedly reciprocated across the top of said frame, a shuttle consisting of side walls pivotally mounted upon said shuttle-bar, a bridge-bar connecting said sides, a groove in said shuttle-bar adapted to receive said bridge-bar when said shuttle is depressed, a lock-bar associated with said shuttle-bar and adapted to travel longitudinally thereon, camways upon said cam-pulley adapted to cause forward travel of said lock-bar upon said shuttle-bar, whereby said lock-bar is disposed above said bridge-bar to lock the shuttle to the shuttle-bar, and a spring for returning said lock-bar to its normal position after being released from said shuttle-bar, substantially as described.

15. In a machine of the class described, the combination with a supporting-frame, of a horizontal shaft rotatably mounted thereon, a series of cam-pulleys rigidly secured to said shaft, means for driving said shaft, a shuttle-bar, a cam-roller on said shuttle-bar, camways on one of said cam-pulleys for engaging said cam-roller whereby said shuttle-bar is interruptedly reciprocated across the top of said frame, a shuttle consisting of side walls pivotally mounted upon said shuttle-bar, a bridge-bar connecting said sides, a groove in said shuttle-bar adapted to receive said bridge-bar when said shuttle is depressed, a lock-bar associated with said shuttle-bar and adapted to travel longitudinally thereon, camways upon said cam-pulley adapted to cause forward travel of said lock-bar upon said shuttle-bar, whereby said lock-bar is disposed above said bridge-bar to lock the shuttle to the shuttle-bar and means for causing said shuttle to be tipped upward about its pivot upon release of said lock-bar, substantially as described.

16. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, forming-bars adapted to reciprocate transversely over said bed-plate, means for causing said bars to meet and to aline, a notch adapted to receive said bars after meeting, means for feeding between said bars and said notch the material to be folded, means for causing downward vertical travel of the bars into said notch to arrange the material therein so that the free ends thereof extend upward along the sides of said bars, and means for folding said free ends over said bars whereby the material is folded into a tube, substantially as described.

17. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a frame extending longitudinally over said bed-plate and hinged at one end thereto, transverse bearings at the forward end of said hinged frame, rods adapted to reciprocate within said bearings, forming-bars terminating the inner ends of said rods, a cam-post, arms extending upwardly from said cam-post, levers intervening between the ends of said arms and said reciprocating rods, cam mechanism for causing downward travel of said arms whereby said rods are brought toward each other to cause the forming-bars to meet and whereby after such meeting said hinged frame is caused to travel downward, a notch adapted to receive said forming-bars, means for feeding between said bars and said notch the material to be folded, said notch receiving said bars upon the downward travel thereof, whereby said material is disposed within said notch so that the free ends thereof extend upwardly and along the sides of said bars, and means for folding over the tops of said bars said free ends, whereby the material is folded into a tube, substantially as described.

18. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a frame extending longitudinally above said bed-plate and hinged at one end thereto, transverse bearings at the forward end of said hinged frame, rods adapted to reciprocate with said bearings, forming-plates terminating the inner ends of said rods, a cam-post, arms extending upwardly from

said cam-post, pitman-levers intervening between said arms and said reciprocating rods, said levers being pivoted at their elbows to the outer ends of said rods and pivoted at one end thereof to said bearings, diagonal slots at the other ends of said levers, pivots engaging said slots with the ends of said arms, and cam mechanism for causing a downward travel of said arms whereby said pivots engage said slots in the pitman-levers to cause said forming-bars to meet and to travel downward with said hinged frame upon further downward travel of said arms after said pivots have engaged the lower ends of said slots, a notch adapted to receive said forming-bars, feeding mechanism for feeding between said bars and said slots the material to be folded, said material being arranged within said slots so that the free ends thereof extend upward along the sides of said bars after said bars have been received by said slots, and means for folding said free ends over said bars, whereby the material is folded into a tube, substantially as described.

19. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a frame extending longitudinally above said bed-plate and hinged at one end thereto, transverse bearings at the forward end of said hinged frame, rods adapted to reciprocate with said bearings, forming-plates terminating the inner ends of said rods, a cam-post, arms extending upwardly from said cam-post, pitman-levers intervening between said arms and said reciprocating rods, said levers being pivoted at their elbows to the outer ends of said rods and pivoted at one end thereof to said bearings, diagonal slots at the other ends of said levers, pivots engaging said slots with the ends of said arms, and cam mechanism for causing a downward travel of said arms whereby said pivots engage said slots in the pitman-levers to cause said forming-bars to meet and to travel downward with said hinged frame upon further downward travel of said arms after said pivots have engaged the lower ends of said slots, a notch adapted to receive said forming-bars, feeding mechanism for feeding in the shape of a band and between said notch and said bars the material to be folded, a blade attached to said hinged frame adapted upon downward travel of said frame to cut from said band the section to be folded, said section being disposed within said notch so that the free ends thereof extend upwardly and along the sides of said bars after said material has been carried into said notch by said forming-bars, and means for folding over the tops of said bars said free ends, whereby the material is folded into a tube, substantially as described.

20. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a forming-bar having vertical travel, a shuttle-bar adapted to be reciprocated longitudinally across the top of said bed-plate and below said forming-bar, a transverse notch at the top of the forward end of said shuttle-bar adapted to receive said forming-bar, a lock-bar adapted to travel longitudinally over said shuttle-bar, a ledge extending upwardly from the forward part of said lock-bar, a feeding mechanism for feeding between said notch and said forming-bar the material to be folded, means for causing downward travel of said forming-bar to carry said material into said notch, whereby the free ends of said material extend upwardly along the sides of said forming-bar, a V-shaped spring pivoted at its bend above said forming-bar, one leg thereof being engaged by the ridge on said lock-bar as said lock-bar travels forward upon said shuttle-bar, whereby the other leg is adapted to engage one of said upwardly-extending ends to fold it over said forming-bar, the other upwardly-extending end of the material being engaged by the forward end of said lock-bar to be folded over said folding-bar, whereby said material is folded into a tube, substantially as described.

21. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a frame disposed longitudinally at the top thereof and hinged at one end thereto, transverse bearings at the forward end of said frame, rods adapted to reciprocate within said bearing, forming-bars terminating the inner ends of said rods, a cam-post, arms extending upwardly from said cam-post, levers intervening between the outer ends of said reciprocating rods and said upwardly-extending arms, means for causing a downward travel of said arms, whereby said rods are first caused to bring said forming-bars together, whereupon the hinged frame with said forming-bars is carried downward, a shuttle-bar adapted to reciprocate longitudinally across the top of said bed-plate, a transverse notch in the top of the forward end of said shuttle-bar, adapted to receive said forming-bars, a locking-bar adapted to travel longitudinally over the top face of said shuttle-bar, a ridge at the forward end of said locking-bar, feeding mechanism for feeding between said notch in the shuttle-bar and said forming-bars the material to be folded, said material upon the downward travel of said forming-bars being disposed within said notch so that the free ends thereof extend upward, an inverted-V-shaped spring pivoted to said hinged frame above said forming-bars, one leg of said spring being engaged by said ridge on the locking-bar as said locking-bar is brought forward, whereby the other end of said spring engages one of the upwardly-extending ends of the material to fold this end over the forming-bars, the forward end of the locking-bars engaging the other upwardly-extending end of said material to also fold this end over the locking-bar, whereby the material is folded into a tube, substantially as described.

22. In a machine of the class described, the combination with a supporting-frame, of a bed-plate therefor, a frame disposed longitudinally at the top thereof and hinged at one end thereto, transverse bearings at the forward end of said frame, rods adapted to reciprocate within said bearings, forming-bars terminating the forward ends of said rods, a cam-post, arms extending upwardly from said cam-post, levers intervening between the outer ends of said reciprocating rods and said upwardly-extending arms, means for causing a downward travel of said arms, whereby said rods are first caused to bring said forming-bars together, whereupon the hinged frame with said forming-bars is carried downward, a shuttle-bar adapted to reciprocate longitudinally across the top of said bed-plate, a transverse notch in the top of the forward end of said shuttle-bar, adapted to receive said forming-bars, a locking-bar adapted to travel longitudinally over the top face of said shuttle-bar, a ridge at the forward end of said locking-bar, feeding mechanism, for feeding in the shape of a band and between said notch in the shuttle-bar and said forming-bars the material to be folded, a blade disposed at the forward end of said hinged member in advance of said forming-bars, adapted upon downward travel of said frame to cut off a portion of the material to be folded, said material upon the downward travel of said forming-bars being disposed within said notch so that the free ends thereof extend upward, an inverted-V-shaped spring pivoted to said hinged frame above said forming-bars, one leg of said spring being engaged by said ridge on the locking-bar as said locking-bar is brought forward, whereby the other end of said spring engages one of the upwardly-extending ends of the material to fold this end over the forming-bars, the forward end of the locking-bars engaging the other upwardly-extending end of said material to also fold this end over the locking-bar, whereby the material is folded into a tube, substantially as described.

23. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of means for folding said material into a tube, and means for flaring out the ends of said tube to form flaps, substantially as described.

24. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of means for folding said material into a tube, and bars and springs for flaring out the ends of said tube to form flaps, substantially as described.

25. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of means for folding said material into a tube, bars having a wedge-shaped end, and springs having a V-shaped end, said ends being adapted to engage the ends of said tube to flare them out to form flaps, substantially as described.

26. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of means for folding said material into a tube, bars having a wedge-shaped end, springs having a V-shaped end, and cam mechanism for actuating said bars and springs, whereby the ends thereof engage the ends of said tube to flare them out to form flaps, substantially as described.

27. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of means for folding said material into a tube, horizontal bars having a wedge-shaped end, lateral notches near the ends of said bars, springs associated with each of said bars having V-shaped ends bent inwardly, indentations near the ends of said springs adapted to lie in the notches in said bars, and means for engaging the ends of said bars and said springs with the ends of said tube, whereby said tube ends are flared out to form flaps, substantially as described.

28. In a machine for making spools, the combination of feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube, horizontal bars having a wedge-shaped end, lateral notches near the ends of said bars, springs associated with each of said bars, having V-shaped ends bent inwardly, indentations near the ends of said springs adapted to register with and lie in the notches in said bars, and means for causing longitudinal motion of said bars and the springs associated therewith, whereby the ends of said tube are engaged and flared out to form flaps, substantially as described.

29. In a machine for making spools, the combination of feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube, horizontal bars having a wedge-shaped end, lateral notches near the ends of said bars, springs associated with each of said bars, having V-shaped ends bent inwardly, indentations near the ends of said springs adapted to register with and lie in the notches in said bars, cam mechanism for causing said bars and the springs associated therewith to travel longitudinally together to engage the ends of said tube, and means for detaining said springs when in such engagement, whereupon by further travel of said bars, said springs are spread, whereby the ends of said tube are flared out to form flaps, substantially as described.

30. In a machine for making spools, the combination with a supporting-frame, of feeding mechanism mounted thereon for feeding the material from which the spool is to be made, forming-bars, shuttle mechanism serving in conjunction with said forming-bars to

fold the material into a tube, means for flaring out the ends of said tube to form flaps, and means for causing said shuttle mechanism to carry said tube from the folding position to the flaring position, substantially as described.

31. In a machine for making spools, the combination with a supporting-frame, of feeding mechanism mounted thereon for feeding the material from which the spool is to be made, a forming-bar, shuttle mechanism serving in conjunction with said forming-bar to fold the material into a tube, bars and springs, means for causing said bars and springs to flare out the ends of said tube to form flaps, and means for causing said shuttle mechanism to carry said tube from the folding position to the flaring position, substantially as described.

32. In a machine for making spools, the combination of a supporting-frame, feeding mechanism for feeding in the shape of a band the material from which the spool is to be made, a forming-bar having vertical travel, a shuttle-bar adapted to be reciprocated longitudinally across the top of said frame and below said forming-bar, a notch in the top of the forward end of said shuttle-bar adapted to receive said forming-bar as it travels downward, means acting in conjunction with said shuttle-bar for folding said material into a tube about said forming-bar, means for retaining said tube upon said shuttle-bar to be carried thereby, and flaring mechanism having flaring bars and springs for engaging the ends of said tube to flare them outwardly to form flaps, substantially as described.

33. In a machine of the class described, the combination with a supporting-frame, of a series of cam-pulleys mounted thereon, shuttle mechanism associated with one of said cam-pulleys to be reciprocated thereby longitudinally across the top of said supporting-frame, feeding mechanism for feeding the material to be acted upon, folding mechanism acting in conjunction with said shuttle mechanism for folding into a rectangular tube the material fed by said feeding mechanism, said shuttle mechanism serving to carry said tube from said folding position, to be further acted upon by flaring mechanism, horizontal bars for said flaring mechanism having a wedge-shaped end, springs associated with said bars having V-shaped ends, and means for causing longitudinal travel of said bars toward each other to engage the ends of said tube carried by said shuttle mechanism, whereby said ends are flared out to form flaps, substantially as described.

34. In a machine of the class described, the combination with a supporting-frame, of feeding mechanism mounted upon said frame for feeding the material to be acted upon, a shuttle-bar adapted to be reciprocated longitudinally across the top of said frame, a notch in the top of the forward end of said shuttle-bar, a forming-bar having vertical travel and adapted to engage said notch when said shuttle-bar is at the forward end of its stroke, to dispose therein the material to be folded, a lock-bar associated with said shuttle-bar adapted to travel longitudinally thereon, a folding-spring acting in conjunction with said lock-bar to fold the material over said forming-bar into the shape of a tube, means for withdrawing said forming-bar from said tube, means for causing said shuttle mechanism to carry said tube to another position on said frame, flaring mechanism adapted to act upon said tube when in such other position, horizontal bars for said flaring mechanism having wedge-shaped ends, springs associated with said bars, cam mechanism for causing said bars with said springs to travel longitudinally to engage the ends of said tube carried by said shuttle mechanism, and means for causing said springs to be spread, whereby the ends of said tube are flared outwardly to form flaps, substantially as described.

35. In a machine for making spools, the combination with a supporting-frame, of feeding mechanism mounted thereon for feeding the material from which the spool is to be made, shuttle mechanism adapted to be reciprocated longitudinally across the top of said frame to carry the material to be acted upon, folding mechanism acting in conjunction with said shuttle mechanism for folding said material into a tube, flaring mechanism for flaring out the ends of said tube to form flaps, and means for securing flange portions to said flaps, substantially as described.

36. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube, flaring mechanism for flaring out the ends of said tube to form flaps, punch mechanism for punching from said material the flange portions of said spool, and means for causing said flange portions to be secured to said flaps, substantially as described.

37. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of folding mechanism for folding said material into a tube, flaring mechanism for flaring out the ends of said tube to form flaps, punching mechanism for punching from said material the flange portions of said spool, means for securing said flange portions to said flaps to form the completed spool, and means for causing said finished spool to be thrown from the machine, substantially as described.

38. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube to form the core portion of said spool, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of said spool, a set of punches adapted to cut portions out of said

material to leave openings having the size of the opening in said core portion, another set of punches adapted to cut from said material the finished flange portion, and means for causing said other set of punches to carry said finished flange portions into engagement with the flaps of said core portions, substantially as described.

39. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, of folding mechanism for folding said material into a tube to form the core portion of said spool, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of said spool, punch mechanism for forming the flange portions of said spool, shuttle mechanism adapted to be reciprocated longitudinally across the top of said machine to act in conjunction with said folding, flaring and punching mechanisms and to carry the material to be acted upon to each of these mechanisms, guide-walls in which said shuttle mechanism is adapted to travel, punch-openings in said guide-walls, one of said openings having the shape of the opening in the core portion of a spool, the other having the shape of the flange portion of said spool, means for feeding the material for said flanges to pass by said punch-openings, punches adapted to enter said openings and to cut from said material passing thereby the finished flange portions, and means for securing the finished flange portions to said core portion, substantially as described.

40. In a machine for making spools, the combination with feeding mechanism for feeding the material from which a spool is to be made, folding mechanism for folding said material into a tube to form the core portion for said spool, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of said spool, punching mechanism for punching from said material the flange portions for said spool, shuttle mechanism adapted to be reciprocated longitudinally across the top of said machine, and acting in conjunction with said folding mechanism, flaring mechanism and punching mechanism, guide-walls between which said shuttle mechanism is adapted to travel, punch-openings through said guide-walls, means for feeding the material for said flanges adjacent to the outside of said guide-walls and by said punch-openings, punches for said punch mechanism adapted to pass through said openings to cut the finished flanges from said material, means associated with said punches for securing said flange portions to said core portions, whereby a finished spool is formed, and means associated with said shuttle mechanism for causing said finished spool to be thrown from the machine, substantially as described.

41. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube to form the core portion of said spool, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of said spool, a set of punches adapted to cut openings in said material having the size of the opening in said core portion, a second set of punches adapted to cut flange portions around said openings cut by said first set of punches, means associated with said second set of punches for carrying said flange portions into engagement with said core portions, and means for causing said flange portions to adhere to said core portions whereby a finished spool is formed, substantially as described.

42. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube for forming the core portion of said spool, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of said spool, a set of punches adapted to cut openings in said material having the size of the opening in said core portion, a second set of punches adapted to cut the finished flange portions around said openings cut by the first set of punches, means associated with said second set of punches for carrying the flange portions into engagement with said core portions, means for applying adhesive material to the outside of said flaps, and means for moistening said flange portions, whereby said flange portions adhere to said flaps as said flange portions are brought into engagement with said core portions, substantially as described.

43. In a machine for making spools, the combination with feeding mechanism for feeding the material from which the spool is to be made, folding mechanism for folding said material into a tube to form the core portion of said spool, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of said spool, a set of punches adapted to cut openings in said material having the size of the opening in said core portion, a second set of punches adapted to cut finished flange portions around said opening cut by the first set of punches, means for causing said second set of punches to carry the finished flange portions into engagement with the flaps of said core portions, and means for applying adhesive material between said core and said flange portions, whereby said portions are secured together to form a finished spool.

44. In a machine for making spools, the combination with folding mechanism for folding material into a tube to form the core portion of the spool, feeding mechanism for feeding the material to said folding mechanism, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of the spool, said material being

gummed on the inside, whereby the outside of the flaps is gummed, punch mechanism for forming the flange portions of the spool, feeding mechanism for feeding material from which the flange portions are to be made, a set of punches adapted to cut openings through said flange material having the size of the opening in said core portion, a second set of punches adapted to cut finished flanges about said opening cut by the first set of punches, sponges disposed in the path of the material fed to the punching mechanism, whereby the flange portions are moistened, and means whereby said second set of punches are caused to press the moistened flange portions against the gummed surface of the flaps, whereby a finished spool is formed, substantially as described.

45. In a machine for making spools, the combination with folding mechanism for folding material into a tube to form the core portion of the spool, feeding mechanism for feeding the material to said folding mechanism, flaring mechanism for flaring out the ends of said tube to form flaps for receiving the flange portions of the spool, said material being gummed on the inside, whereby the outside of the flaps is gummed, punch mechanism for forming the flange portions of the spool, feeding mechanism for feeding material from which the flange portions are to be made, a set of punches adapted to cut openings through said flange material having the size of the opening in said core portion, a second set of punches adapted to cut finished flanges about said opening cut by the first set of punches, sponges disposed in the path of the material fed to the punching mechanism, whereby the flange portions are moistened, means whereby said second set of punches are caused to press the moistened flange portions against the gummed surfaces of the flaps, whereby a finished spool is formed, and means for causing said finished spool to be thrown from the machine, substantially as described.

46. In a machine of the class described, the combination with a supporting-frame, of a forming-bar adapted to reciprocate transversely across the top of said supporting-frame, shuttle mechanism adapted to reciprocate longitudinally across the top of said supporting-frame, and means for feeding below said bar material to be folded, said shuttle mechanism acting in conjunction with said forming-bar to fold said material into a tube, substantially as described.

47. In a machine of the class described, the combination with a supporting-frame, of forming-bars adapted to reciprocate transversely over the top of said supporting-frame from opposite sides thereof, means for causing said bars to meet and to aline, shuttle mechanism adapted to be reciprocated longitudinally across the top of said supporting-frame, and means for feeding below said forming-bars material to be folded, said shuttle mechanism operating in conjunction with said forming-bars to fold said material into a tube, substantially as described.

48. In a machine of the class described, the combination with a supporting-frame, of forming-bars adapted to reciprocate transversely over the top of said supporting-frame from opposite sides thereof, means for causing said bars to meet and to aline, shuttle mechanism adapted to be reciprocated longitudinally across the top of said supporting-frame, means for feeding below said forming-bars material to be folded, said shuttle mechanism operating in conjunction with said forming-bars to fold said material into a tube, and means for withdrawing said forming-bars from the folded tube, substantially as described.

49. In a machine of the class described, the combination with a supporting-frame, of a forming-bar adapted to reciprocate transversely over the top of said frame, a shuttle-bar adapted to be reciprocated longitudinally across the top of said frame, means for feeding material below said forming-bar, said shuttle-bar operating in conjunction with said forming-bar to fold said material into a tube, means for withdrawing the forming-bar from the folded tube, and a lock-bar for holding the folded tube in place on said shuttle-bar, substantially as described.

50. In a machine of the class described, the combination with a supporting-frame, of forming-bars adapted to reciprocate transversely over the top of said supporting-frame from opposite sides thereof, means for causing said bars to meet and to aline, a shuttle-bar adapted to be reciprocated longitudinally across the top of said supporting-frame, means for feeding below said forming-bars material to be folded, said shuttle-bar operating in conjunction with said forming-bars to fold said material into a tube, means for withdrawing the bars from the folded tube, and means for holding the folded tube in place on the shuttle-bar, substantially as described.

51. In a machine of the class described, the combination with a supporting-frame, of a forming-bar adapted to reciprocate transversely across the top of said supporting-frame, shuttle mechanism adapted to reciprocate longitudinally across the top of said supporting-frame, means for feeding below said bar material to be folded, said shuttle mechanism acting in conjunction with said forming-bar to fold said material into a tube, and means for applying a flange to either end of said folded tube whereby a finished spool is formed, substantially as described.

52. In a machine of the class described, the combination with a supporting-frame, of a forming-bar adapted to reciprocate transversely across the top of said supporting-frame, shuttle mechanism adapted to reciprocate longitudinally across the top of said supporting-frame, means for feeding below said bar material to be folded, said shuttle mechanism acting in conjunction with said

forming-bar to fold said material into a tube, means for applying a flange portion to either end of said folded tube whereby a finished spool is formed, and means for throwing the finished spool from the machine, substantially as described.

53. In a machine of the class described, the combination with a supporting-frame, of a forming-bar adapted to reciprocate transversely over the top of said frame, a shuttle-bar adapted to be reciprocated longitudinally across the top of said frame, means for feeding material below said forming-bar, said shuttle-bar operating in conjunction with said forming-bar to fold said material into a tube, means for withdrawing the forming-bar from the folded tube, a lock-bar for holding the folded tube in place on said shuttle-bar, and means for applying a flange portion to either end of said folded tube whereby a finished spool is formed, substantially as described.

54. In a machine of the class described, the combination with a supporting-frame, of a forming-bar adapted to reciprocate transversely over the top of said frame, a shuttle-bar adapted to be reciprocated longitudinally across the top of said frame, means for feeding material below said forming-bar, said shuttle-bar operating in conjunction with said forming-bar to fold said material into a tube, means for withdrawing the forming-bar from the folded tube, a lock-bar for holding the folded tube in place on said shuttle-bar, means for applying a flange portion to either end of said folded tube whereby a finished spool is formed, and means for releasing the finished spool from said shuttle-bar, substantially as described.

In witness whereof I hereunto subscribe my name this 24th day of April, A. D. 1903.

JOHN S. GOLDBERG.

Witnesses:
LYNN A. WILLIAMS,
CHARLES J. SCHMIDT.