

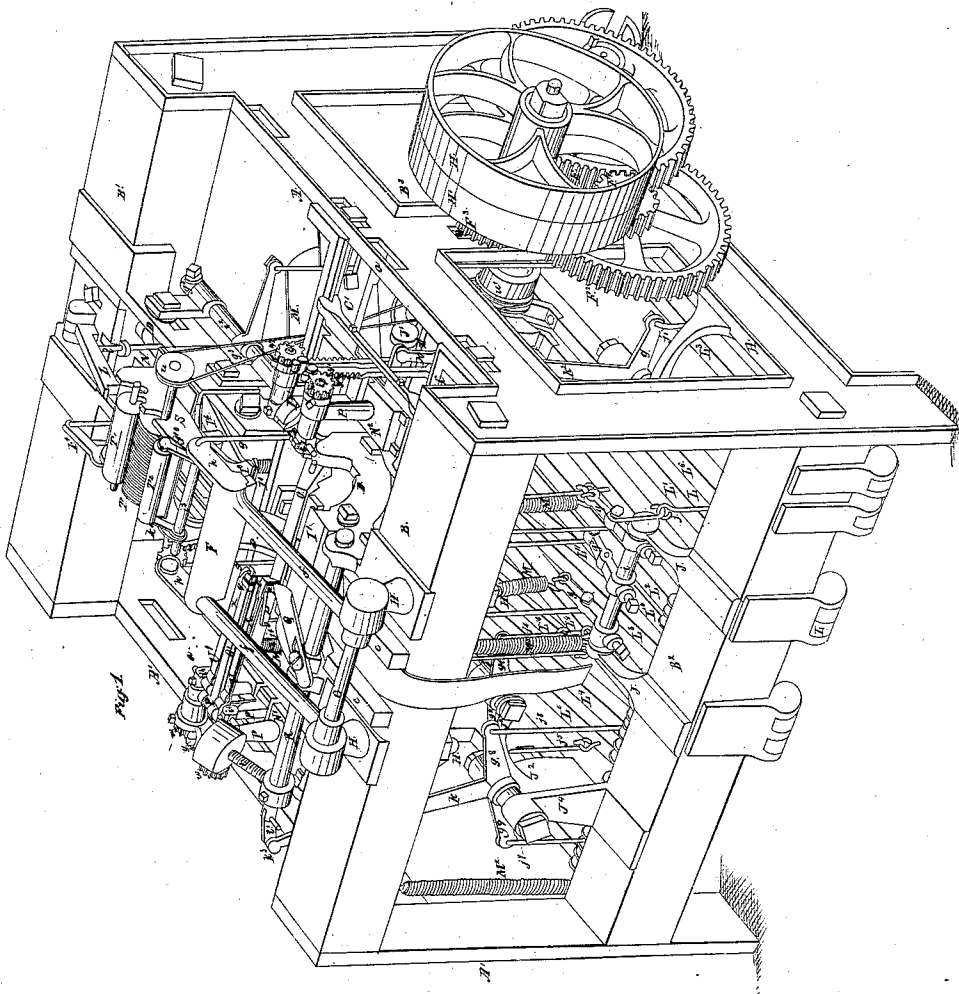
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N. Wyllys

Making Leather Tubing

N^o 8,604.

Patented Dec. 23, 1851.



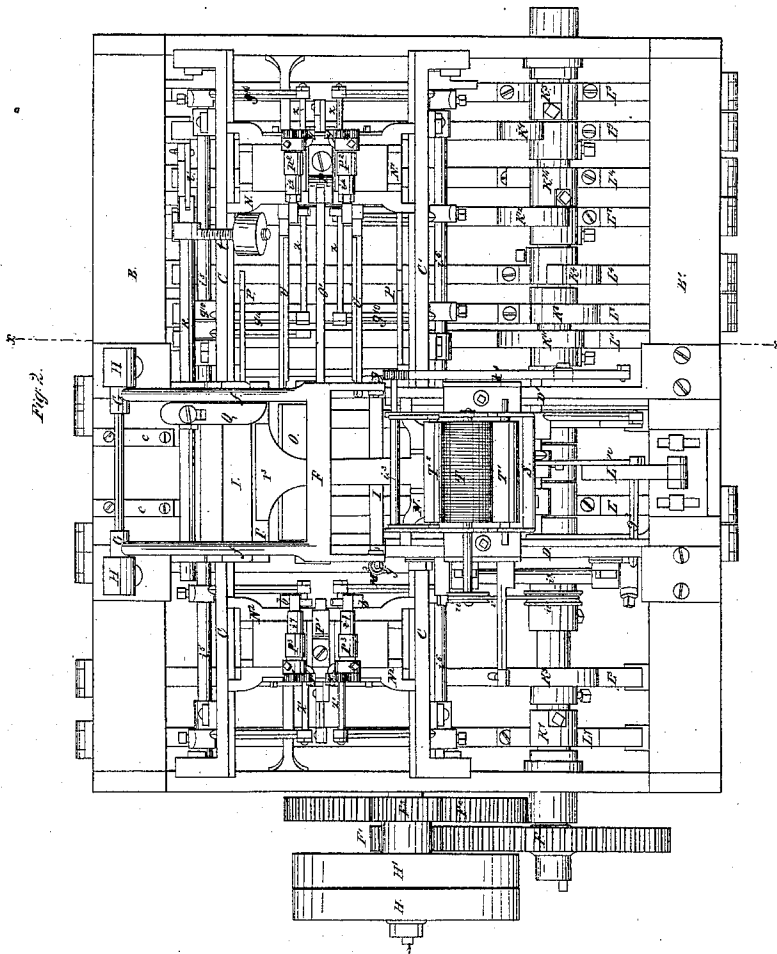
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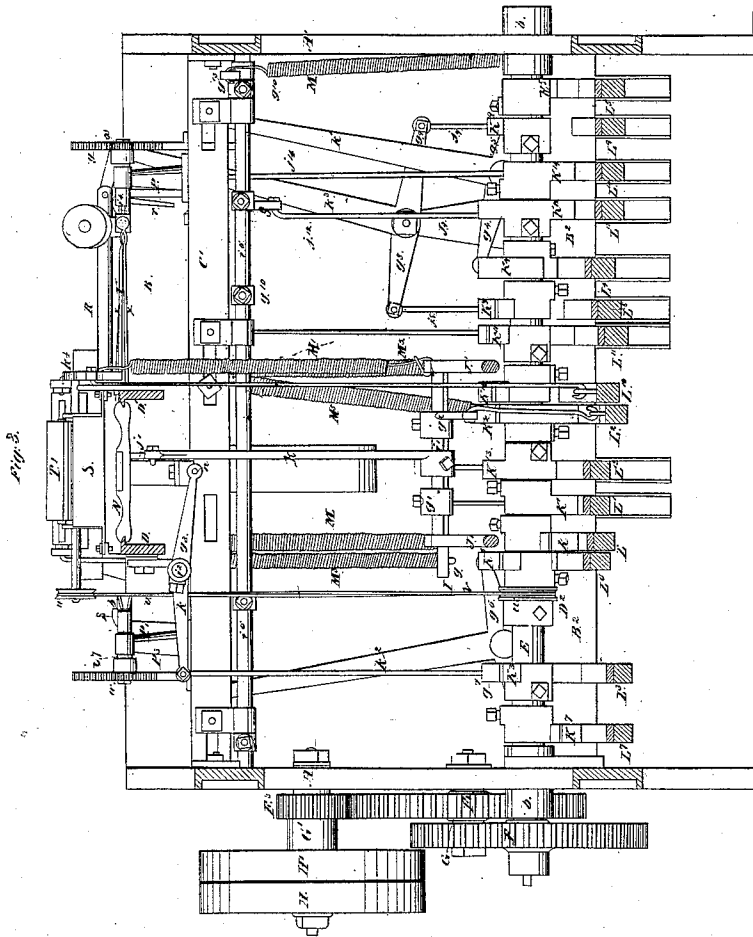


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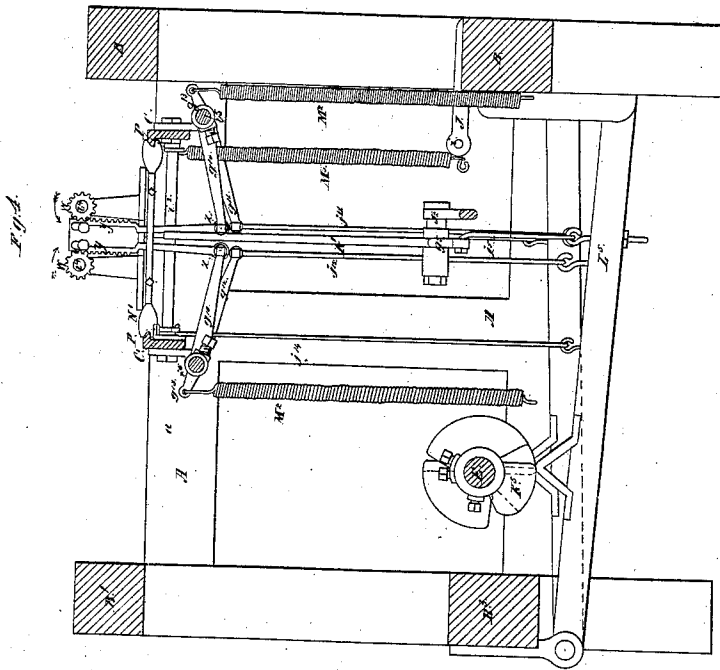
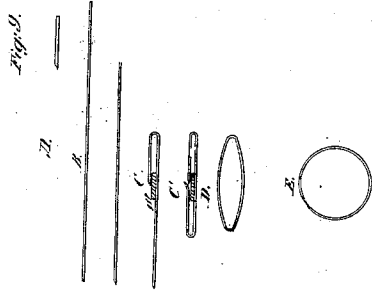
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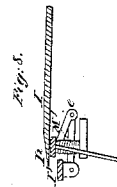
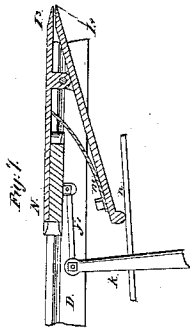
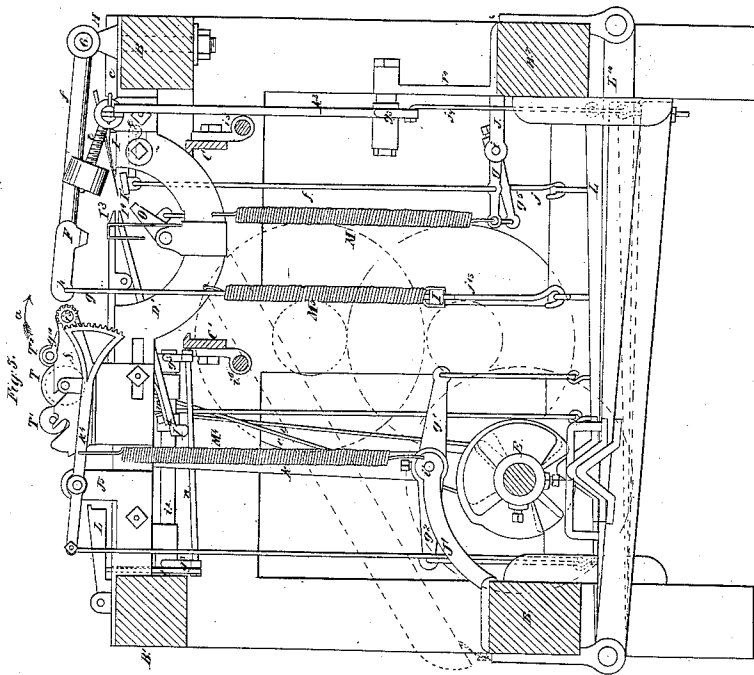
Sheet 5-5 Sheets.

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Patented Dec. 23, 1851.



UNITED STATES PATENT OFFICE.

N. WYLLYS, OF SOUTH GLASTONBURY, CONNECTICUT, ASSIGNOR TO CHARLES COLLINS AND NEWELL WYLLYS.

MACHINE FOR MAKING LEATHER TUBES.

Specification of Letters Patent No. 8,604, dated December 23, 1851.

To all whom it may concern:

Be it known that I, NEWELL WYLLYS, of South Glastonbury, in the county of Hartford and State of Connecticut, have invented a new and useful Machine for Manufacturing Automatically Flexible Tubes for Covering the Drawing-Rollers of Spinning Machinery and for other Purposes; and I do hereby declare that the following is a full, clear, and exact description of my invention, reference being had to the accompanying drawings, which form part of this specification, and in which—

Figure 1 represents a view in perspective of my said machine, Fig. 2 is a plan of the same, Fig. 3 is a back elevation, Fig. 4 is an end elevation, and Fig. 5 is a vertical transverse section of the same at the line *x x* of Fig. 2.

The cots or covers of the rollers of drawing frames have hitherto, as far as I can ascertain, been manufactured by hand. In this hand process the leather of which the covers are made is cut into pieces of the proper size and of rectangular shape, the edges of the pieces are then beveled and cemented together, so as to form a cylindrical tube of a size suitable for covering the barrel of a roller. This system of manufacturing, like other hand processes, is defective as the quality of the product and the cost of manufacture depend upon the skill of the workman. The object of my invention is to produce an article of uniform quality by means of automatic machinery, which receives the leather or other material in strips, and the cement in bulk, combines the two and delivers them in the form of finished tubes. In the machine I have devised for this purpose, the mechanical devices by which the cutting, shaping, bending, and cementing of the leather or other material are effected are all caused to perform their proper functions in their proper order by the revolution of a cam shaft to which motion is imparted by any convenient prime mover.

The various operations effected by the machine are as follows: First gripping the extremity of the strip of leather presented to it; second measuring off a piece of the proper length to form a tube; third, seizing the piece measured off; fourth severing it from the rest of the strip by an oblique cut which leaves the edges beveled; fifth

applying the cement to its beveled edges; sixth bringing the opposite beveled edges in contact with each other; seventh, pressing them with a heated iron to dry the cement and compress the seam; eighth releasing the tube thus formed and allowing it to drop from the machine, when the latter commences the construction of another tube.

The frame of the machine consists as represented in the accompanying drawings of two cast metal end frames *A A'* and of the rails *B, B¹, B², B³*, which connect them together. The upper rails *a, a*, of the end frames are also connected by a pair of longitudinal bearers *C, C'*, and the upper front and back rails *B, B'* are connected by a similar pair of transverses bearers *D D'* at right angles with the first pair *C C'*. The cam shaft *E* which communicates movement to the various acting members of the machine extends from one end of the main frame to the other, its journals being supported in suitable boxes *b b* on the lower end rails, one of its extremities is fitted with a cog wheel *F* which gears into a pinion *F'* secured to a sleeve *G*. The latter turns upon an axle secured to the adjacent end plate *A* and is fitted with a cog wheel *F²* which gears into a pinion, *F³*, on a second sleeve *G'*, to which a loose pulley *H* and a fast pulley *H'* are secured, that are put in motion by a belt from the prime mover.

A pair of guides *c c* are secured to the upper face of the upper front rail *B* at such a distance apart as will admit and guide the strip of leather of which the tubes are to be made. Immediately behind these guides is a stationary pair of nippers, by which the leather is held firmly while a measured portion sufficient to form a cover is severed from the strip. This pair of nippers is composed of two jaws the upper (*I*) being immovably secured to the bearers *D D'* while the lower *I'* is hinged to a cross bar *e* on which it turns as an axis from and toward the upper. This movable jaw is connected by a pair of rods *f* with a pair of arms *g* projected from a short rock shaft *i* beneath, whose journals are supported by brackets *J, J*, secured to the rail *B²* and which is caused to rock by means of a cam *k* on the cam shaft acting through the intervention of a treadle *L* rod *j* and arm *g*. The operation of these devices being such that

as the cam K is turned with the cam shaft E, the movable jaw is alternately depressed and allowed to rise, which latter movement is effected by a pair of helical springs M M acting upon the arms g .

In order to prevent the strip of leather from dropping from the machine when the lower jaw I' is depressed, a false jaw or clamp plate I² (Fig. 8) is hinged beneath the stationary jaw I a little in advance of the movable jaw; this plate is pressed by a spring M' toward the under face of the plate of the stationary jaw with sufficient force to prevent the leather strip from dropping by its weight from the machine when the movable jaw I' is depressed.

Immediately opposite the stationary nippers are the movable nippers. These consist of two jaws I³ I⁴ the upper of which is secured to a carriage N which is caused to slide toward and from the stationary nippers on guides secured to the bearers D D'. In order to effect this movement the carriage is connected by a rod j' (Fig. 7) with an upright arm k which is projected from a short shaft i' beneath, whose journals are supported by brackets J' projected from the hinder rail B³. This shaft is also fitted with a pair of arms g^1 g^2 which extend from it in opposite directions and are connected by rods with treadles L¹, L² each of which is moved by a separate cam on the cam shaft E. The one cam K' acting on the treadle L' moves the arm k and the nipper carriage forward, or toward the stationary nippers, the other cam K² moves the two backward or from the stationary nippers.

The upper nipper jaw I³ (Fig. 7,) is fixed to the carriage N while the lower I⁴ is pivoted to the upper and is pressed toward it by a spring m acting on its shank. This spring tends to keep the lower jaw in contact with the upper and thus to enable the two to seize the extremity of the strip of leather. The lower jaw is moved from the upper by a bar n on which the shank of this jaw traverses in moving forward. This bar is supported in an inclined position by two arms g^3 which project from a short shaft i^2 whose journals turn in hangers secured to the bearer D; this shaft has a third arm k projected from it which is connected with a treadle L³ to which motion is imparted by a cam K³ on the cam shaft; this cam acting through the treadle upon the rock shaft i^2 holds the inclined bar n in such a position, when the carriage is moving forward, that the shank of the movable nipper jaw I⁴ traversing its inclined surface is raised to depress the jaw. When the nipper carriage has reached its most forward position the cam passing the shoe on the treadle allows the traverse bar n to be depressed by the action of the nipper spring m and consequently permits the lower jaw to close.

In order to hold the portion of the leather strip measured out by the action of the movable nippers, it is secured by means of two clamps which act in conjunction, the one on its under and the other on its upper surface. The lower clamp O has the form of a thick plate which is pivoted to the bearers D D' at the extremities of its lower edge, it is moved into an erect position to hold the leather by means of a rod which connects it with an arm g^5 on the rock shaft i . The other clamp consists of a strip of metal O' whose butt p is pivoted to a standard P on a movable carriage N while its other extremity is passed through a stationary guide q secured to the adjacent bearer. The butt p of this clamp has an arm r depending from it which is pressed outward to raise the clamp, by a spring inserted between it and the adjacent face of the standard P. The upward movement of the clamp by the action of this spring is limited by the stationary guide q through which it is passed. In order to bring this clamp in a position to act with the lower clamp O, and to remove it when its action is completed the carriage N to which the clamp standard is secured is constructed to slide on guides secured to the bearers C, C', and is caused to move alternately toward and from the bearer D'. This alternate movement of the carriage is effected in a manner similar to that of the nipper carriage before described, by means of two cams K⁴ K⁵ which act upon treadles L⁴, L⁵, the latter are connected by rods j^4 j^5 with the opposite short arms g^4 g^5 of a three armed or \perp shaped lever which is pivoted at the junction of its arms to a bracket J² secured to the end rail, its longest arm k' projects upward and is connected by a rod with the carriage N' so that as the treadles L⁴ and L⁵ are alternately depressed by the revolution of their respective cams K⁴ and K⁵ the upper arm of the three armed lever and the carriage connected therewith is moved alternately toward and from the adjacent bearer D'.

When the carriage N is nearest to the bearer the upper clamp is directly over the lower, but by the action of the clamp spring is separated a short distance therefrom. In order to press it down toward the lower a second carriage N² similar to the first one (N') is constructed to slide on guides alternately to and from the other bearer D. This carriage is moved by two cams K⁶ K⁷ which act upon treadles L⁶ L⁷ and the latter are connected by rods j^6 j^7 , only one j^7 of which is seen in the drawing, with a three armed lever, whose upper arm k^2 is connected with the carriage N² so that as these cams (K⁶ K⁷) alternately depress their respective treadles (L⁶ L⁷) this three armed lever, and the carriage N² connected therewith, is moved alternately toward and from

the adjacent bearer D. This carriage has a standard P' secured to it immediately opposite the clamp standard of the other carriage; and an inclined block *s* is secured to this standard whose inclined face as the carriage is moved toward the bearer D passes over and depresses the outer extremity of the clamp O' thus forcing it toward the face of the other clamp O beneath.

The inclined block, *s*, in passing over the extremity of the movable clamp, tends to force it, and the carriage (N') from which it projects, backward or away from the bearer D'. In order to prevent this backward movement the carriage (N'), when it arrives at its most forward position, is held there by a pair of hooks P, P, which are projected from a rock shaft *i*³, secured to the bearers C, C', and which hold the clamp carriage until it is to be moved backward by the operation of the appropriate cam. The hooks are moved upward to catch upon the hinger extremity of the clamp carriage by means of a helical spring M⁵ which acts upon a shoft arm projected from the rock shaft *i*³; they are depressed to release the clamp carriage and are retained in their depressed positions until the clamp carriage is again moved forward, by means of a cam K¹⁴ upon the cam shaft, acting through the intervention of a suitable treadle L¹⁴ and rod *j*¹⁴; the last of which is attached to the outer extremity of one of the hooks.

The portion of the strip which has been measured out by the movable nippers and secured by the clamps is severed from the rest of the strip by a knife. This knife, Q, is secured to a round bar R which is constructed to slide in standards secured to the two bearers D and D'; its projecting edge lays upon the upper face of the stationary nipper jaw I and is pressed thereon by means of a weighted arm *t* extending from the knife bar R. When the knife is not operating it occupies the position in which it is represented at Fig. 1, at one extremity of the nipper jaws; whence it is moved toward the opposite extremity of the jaws, after which it is returned to its first position. In order to effect this movement and at the same time to permit the weighted arm *t* to press the knife edge downward, the knife bar is connected by a loose shackle *t'* with the upper arm *h*³ of a three armed lever, which being pivoted at the center of its arms to a standard J⁴ on the lower front rail B² is moved alternately in opposite directions by means of two cams K⁸ K⁹ which act upon the short arms *g*⁸ *g*⁹ of the lever through the intervention of treadles L⁸ L⁹ and rods *j*⁸ *j*⁹ so that as the cams K⁸ and K⁹ alternately depress their respective treadles, the upper arm of the lever, and the knife bar connected therewith, are moved alternately in opposite directions to move the

knife along the nipper jaws and to return it to the position whence it started.

The cement by which the edges of the portion severed by the knife, are secured to each other, is placed in a cistern S which is mounted upon the bearers D D', the sides of this cistern are slotted to admit and support the journals of two rolls T T'. The larger (T) of these rolls has a pulley *u* secured to its axle which is encircled by a cord *v* leading from a similar pulley *u'* on the cam shaft; so that as the latter revolves, the roll is caused to turn upon its journals. The barrel of this roll dips into the cement in the cistern beneath and is grooved to enable it to retain more effectually the cement which adheres to it in revolving. The barrel of the other roll (T') bears against that of the first one (T) its office being to spread the cement equally upon the latter and to detach any superfluity. The sides of the cement cistern extend beyond its front to support a shaft *i*³ to which a pair of arms *g*¹⁰ are secured, the latter support the journals of a roll (T²) which, by the rocking of the shaft *i*³, is caused to bear alternately upon the roll T and upon the adjacent beveled edge of that portion of the strip severed by the knife. In order to effect this rocking or vibration of the shaft *i*³, it is fitted with a pinion whose teeth engage with corresponding teeth on the front arm of a lever *h*⁴; the latter is pivoted to a standard J⁵ secured to the bearer D', and its hinder arm is connected by a rod with a treadle L¹⁰, which is depressed by a cam K¹⁰ on the cam shaft E. The cam acts to depress the lever and to turn the roll forward (or in the direction indicated by the arrow *a*), by which movement its barrel is brought in contact with the adjacent edge of the strip held by the clamps. The roll is then returned to its first position, or in contact with the cistern roll T, by means of a spring M' which acts in opposition to the cam.

The opposite edges of the piece severed from the strip by the knife are brought into contact with each other by means of two pairs of fingers U, U', the one pair seizing the piece in front and the other pair behind the clamp O O'. Each pair consists of two thin prongs *x x* which tend naturally to diverge from each other and are secured by their butts to one extremity of a spindle (*i*⁴) which is supported in a standard upon the clamp carriage. The opposite extremity of each spindle is fitted with a pinion *w*, whose teeth engage with those of a rack *y*, on the upper extremity of a rod, whose lower extremity is perforated to traverse upon a bar *z* beneath. Each of these traverse bars *z* is supported by a pair of arms, *g*¹⁰, *g*¹⁰, which project from a rock shaft, *i*⁵ *i*⁶; these rock shafts (*i*⁵ *i*⁶) extend from one end of the machine to the other, and are supported

in suitable hangers by the adjacent bearers $c c'$. The one, i^5 , nearer the front of the machine, is fitted with an arm g^{11} that is connected by a rod j with a treadle L'' beneath, which is depressed by means of a cam K'' on the cam shaft; the other rock shaft, i^6 is fitted with a similar arm g^{12} , which is operated by an appropriate cam K^{12} and treadle L^{12} . The cams act to depress the traverse bars $z z$ which when the cams have ceased to act are returned to their upper positions by means of springs $M^2 M^2$ acting upon appropriate arms g^{13} , secured to the respective rock shafts i^5, i^6 . Whenever the traverse bars $z z$ are depressed the racks $y y$ are drawn downward, to turn their spindles and the fingers connected therewith, in the directions indicated by the arrows in Fig. 4, to the positions in which they are there represented; when the cams have ceased to act the traverse bars are raised by the action of their respective springs, and the racks, being turned in directions the reverse of those indicated by the arrows, are moved to the positions in which they are drawn in Fig. 3. By these movements the pinions on which the racks act, the pinion spindles, and the pairs of fingers connected therewith, are made to describe, in alternately opposite directions, half circles of which the axes of the pinion spindles are the centers. As the finger spindle standards are secured to the clamp carriage N' , they are caused to move alternately from and toward the adjacent bearer D' . When the carriage is advancing toward the bearer the fingers occupy the positions in which they are represented at Fig. 3, and when the carriage has attained its nearest position to the bearer the cams $K^{11} K^{12}$ act to turn the finger spindles, and consequently the fingers, to the positions in which they are represented at Fig. 1. By this operation the opposite sides of the portion of the strip severed by the knife, and embraced between the fingers, are turned over and inward toward each other; as the front pair of fingers U is moved a little before the other, the opposite edges of the severed piece are made to overlap each other upon the upper face of the upper clamp as shown at C' Fig. 9.

In order that the fingers (which as before stated naturally diverge from each other) shall hold the severed piece with sufficient firmness to enable them to turn-up its edges, the carriage N^2 is provided with two standards $P^3 P^3$ immediately opposite the finger spindle standards on the clamp carriage N . Each of these secondary standards $P^3 P^3$ supports a spindle i^7 , whose axis is in line with that of the opposite finger spindle; and each of these secondary spindles i^7 is fitted with a pinion w' , whose teeth engage with

an appropriate rack y' , similar in every respect to those w, y , described for actuating the finger spindle pinions, and actuated in the same manner and at the same moment by traverse bars z' secured to the same rock shafts which actuate the opposite finger-spindle racks. These secondary spindles therefore turn simultaneously with the finger spindles opposite them; each is fitted at its inner extremity with a pair of plates b having a wedge shaped space between them, within which the diverging extremities of the opposite pair of fingers are received as the carriage N^2 nears the bearer D ; while as this carriage N continues to approach the bearer, the inclined faces of the plates b , sliding over the extremities of the fingers, force the latter toward each other with sufficient force to enable them to pinch the severed piece between them. As the spindles i^7 are moved simultaneously with the finger spindles, they aid the latter in turning the fingers and the severed piece pinched between them.

The cement, by which the edge of the severed piece is coated by the roller T^2 , is in a liquid form which requires the aid of heat and pressure to make it set or adhere; these two agents are made to act simultaneously by means of a pressing iron, F , which is connected by two equal arms $f f$ with a shaft G whose journals are supported in standards, H , on the front rail B . (The pressing iron, F , is hollow; the arms f, f , the journals of the shaft G , and the standards, $H H$, are also hollow; a current of steam is passed through this hollow pressing iron, F , by connecting with one of the hollow standards, H , a steam pipe which conducts steam from any convenient or suitable steam generator.) Two arms h, h , are projected from the extremities of the pressing iron toward the back of the machine; these are connected by rods g, g , with a cross head, I , beneath, which is depressed by means of a cam K^{13} on the cam shaft, acting through the intervention of a suitable treadle L^{13} and rod j^{13} . The cam acts to depress the pressing iron F upon the overlapping beveled edges of the severed piece, and to squeeze the latter between its face and the adjacent face of the clamp O' beneath. This cam is of such form that the pressing iron F is held for some time in contact with the seam to enable the heat of the pressing iron to dry the cement. When the cam has ceased to act, the pressing iron is elevated to its first position, as shown at Fig. 1, by means of a pair of springs M^3 , which are coiled upon the rods g, g , and act upon the cross head.

In order to manufacture tubes, such for example as the covers of drawing rolls, with this machine the cement, which may consist of a solution of isinglass in alcohol prepared

in the usual manner, is placed in the cistern (S); a current of steam from one convenient source is passed by means of a pipe under the cistern and through the hollow pressing iron (F); the cam shaft (E) is caused to revolve by means of a driving belt, which imparts motion to the fast pulley (H) from some convenient driving shaft, and the cistern roll (T) is caused to revolve by the cord V, which encircles its sheave (u) and a corresponding sheave upon the cam shaft. A strip of some suitable material, leather for example, whose breadth is equal to the length of the tubes to be made, is introduced between the lower face of the fixed jaw (I) of the stationary nippers, and the upper face of the clamp plate (I²) beneath, which latter is depressed by the hand of the attendant. As the cam shaft revolves, and the lower jaw (I') of the stationary nippers is depressed by the action of its appropriate cam (K), the strip of leather is pushed forward by the attendant until its end projects about a quarter of an inch beyond the face of the stationary nipper jaw. As the cam shaft continues to revolve, the movable nippers are moved forward, and, opening as they advance by the action of the inclined traverse bar (n) upon the shank of the lower jaw, receive the projecting extremity of the strip of leather between their open jaws; as soon as this operation is effected the traverse bar (n) is depressed, by the action of its appropriate cam K³, to allow the lower spring jaw of the movable nippers to seize the extremity of the leather strip between it and the upper jaw; the movable nippers are now moved backward by the action of the appropriate cam (K²), and draw the leather strip with them until the further backward motion of the nipper carriage (N) is arrested by a stop (L), which, being hinged to the back rail (B') of the frame, and connected by a rod (l) with the hinder arm of the traverse bar (n), was depressed within the range of the carriage when the traverse bar (n) was depressed.

When the nippers have been stopped at the position which they have now reached, the portion of leather (B' Fig. 9) drawn out from the stationary nippers (and which I shall hereafter call the sheet) is of just sufficient length to form one tubular cover. As the cam shaft continues to revolve, the clamp carriage (N') begins to advance by the action of its appropriate cam (K⁴); as it advances, the upper clamp is moved over the upper surface of the sheet measured out by the movable nippers, and the two pairs of diverging fingers (U U'), being advanced with the clamp carriage, the one pair (U) in front and the other pair (U') behind the clamp, embrace the corresponding portions of the leather sheet between their

upper and under fingers respectively. Simultaneously with this movement of the clamp carriage, the under jaw (I') of the stationary nippers is permitted to rise and clamp the strip of leather, as the cam (K³) by which it was depressed passes the shoe of its appropriate treadle (L³); and by the same operation the lower clamp (O) is also raised to an erect position. As soon as the clamp carriage (N') reaches its most forward position, the hooks, P P, are permitted to rise, by the movement of their appropriate cam (K⁴), and hold the carriage in its place. The carriage is now advanced by the action of its appropriate cam (K⁵); as it nears the adjacent bearer (D) the inclined block (S) passes over the extremity of the upper clamp (O') and depresses it upon the face of the leather sheet, which being supported beneath by the lower clamp (O) is firmly held between the two. Simultaneously with this clamping of the sheet the pairs of converging plates (b b) passing over the diverging extremities of their respective pairs of fingers (U U'), force the fingers of each pair to approach each other and pinch the portions of the sheet which they have taken in between them. As the cam shaft still continues to revolve, the knife (Q) is moved forward by the action of its appropriate cam (K⁸), and advancing in an inclined position along the faces of the stationary nipper jaws, severs the sheet from the rest of the strip; as the knife is greatly inclined to the face of the leather, the cut made by it is at an acute angle therewith, and the edges produced by its action are beveled. Simultaneously with this movement of the knife, the traverse bar (n) begins to rise, thus opening the jaws of the movable nippers. As this traverse bar rises the stop (L), which is connected therewith, is correspondingly raised, and the nipper carriage is moved farther backward, by the continued action of its appropriate cam (K²), to draw the nipper jaws out of the range of the vibrating cement roll (T²). The latter, which has received a coating of cement by laying in contact with the revolving cistern roll (T) is now moved forward by the action of its appropriate cam (K¹⁰), and rolling over the adjacent or hinder edge of the sheet of leather, covers it with a thin coating of cement. As this operation is being effected upon the hinder edge of the leather sheet, the front rock shaft (i⁵), which by means of the traverse bars (z z), racks y y, and pinions w, w, turns the finger spindles i⁴ i⁴, is depressed by the action of its appropriate cam to turn inward the front fingers with the front portion of the sheet inclosed between them. By this movement the front edge of the sheet is turned over upon the upper face of the upper clamp

O', the sheet being thus bent into the form represented at C, Fig. 9. As soon as this operation is effected, the hinder rock shaft i^6 begins to move in a corresponding manner, thus moving the hinder pair of fingers, which turn the hinder cemented edge of the sheet over upon the front edge already laying upon the upper clamp; by this movement the sheet is bent into the form represented at C' Fig. 9. As now the cam shaft still moves onward, the heated pressing iron F is depressed by the action of its appropriate cams K¹³, upon the overlapping edges of the sheet beneath, thus compressing the two together and at the same time drying the cement. The leather cover is now completed, and, as the cam shaft continues to revolve, the knife Q is moved back by the action of the cam K⁹ to its first position; and, as the cement roll cam passes its appropriate treadle shoe, the vibrating roll is moved back by the spring until its barrel bears against the cistern roll T from which it receives a fresh coating of cement. The pressing iron cam K¹³ now passes its appropriate treadle shoe, and the iron is raised by the springs. As the pressing iron rises, the two clamp carriages N' and N² are moved back to their first position, and the lower clamp O is depressed by the action of the cam K, which also depresses the movable jaw I' of the stationary nippers. By these movements the finished cover, which has the form represented at D, Fig. 9, is released, and is permitted to drop into a spout M by which it is discharged at the back of the machine. As the finished cover drops, the movable nippers are advanced by the action of the cam K' to seize the newly beveled extremity of the leather strip projecting from the stationary nippers, while at the same time the rock shafts i^5 and i^6 are moved by the cams K¹¹ and K¹² to turn back the two pairs of fingers U and U', to their first positions. The several members of the machine are now in the proper positions to commence the construction of a new cover, which is effected by the repetition of the above described operations. The several cams by which the different members of the machine are operated all effect their proper duties in the formation of a cover, during a single revolution of the cam shaft; hence at every revolution of the latter, a complete cover is formed; and as the several members of the machine perform their duties with mechanical precision all the covers formed will be symmetrical and uniform.

It is obvious that almost endless modifications may be made in the construction and arrangement of the machine hereinbefore described without changing the principle upon which it operates. I have contrived

numerous equivalent and analogous devices for almost every one contained in the machine I have described, and as some of these equivalent devices may be deemed by certain constructors better suited to accomplish the desired result, I will mention such of them as in my opinion are most likely to be adopted.

In the above described machine the treadles are all placed beneath the cam shaft and are depressed by the rotation of the cams; this arrangement of the treadles may in some cases be reversed, and a portion of them may be arranged above the cam shaft and be raised by the rotation of the cams. The movable jaw of the stationary nippers may, if deemed best, be operated by such a treadle, and may be guided in its movement by stationary guide rods which depend from the fixed jaw and pass through suitable perforations or eyes in the extremities of the movable jaw. In this case the rods upon which the movable jaw is supported, and which will project upward from the treadles or from the crosshead moved thereby, should be arranged in such manner as to allow the jaw to rock upon their extremities to accommodate itself to variations in the thickness of the leather.

The lower jaw of the traveling nippers may have a friction wheel pivoted to its shank, to enable it to move with less friction upon its appropriate traverse bar; and this traverse bar may be replaced by a rising and falling arm, which may be projected from a rock shaft at the back of the machine, and may be raised and lowered by the action of a suitable cam.

The stationary clamp I have described may be replaced by a bar clamp fixed to the clamp carriage, so that it is moved beneath the sheet of leather simultaneously with the movement of the present upper clamp above the sheet. In order to prevent the yielding of this bar clamp to the pressure of the pressing iron, it may be made to move over fixed rests secured to the transverse bearers of the frame.

In the practical operation of a machine for operating upon heavy leather, a weighted lever may not be sufficient to hold the knife in its proper position. In such cases I secure an arm to the knife rod and to the extremity of this arm I fit a friction wheel which as the arm moves runs upon an adjustable rail secured to the front rail of the main frame. By adjusting this traverse rail, I am enabled to force the knife downward upon the nipper jaws with any required degree of pressure.

In the machine I have described the spindles of the fingers which turn the edges of the leather sheet are operated by racks acting upon the adjacent faces of their respec-

tive pinions, and these racks are connected with treadles placed beneath the cam shaft. This arrangement may be reversed, the treadles may be arranged above the cam shaft, and the racks may be made to act upon the opposite or outer faces of their respective pinions.

In some cases the continued pressure of the pressing iron may be replaced with advantage by a series of blows struck in quick succession upon the seam, and this hammering motion may be readily imparted to the pressing iron by altering the shape of the cam which depresses it.

In the foregoing description I have stated that the steam is conducted beneath the cement cistern, this has been found advisable in order to keep the cement warm and to prepare it for drying rapidly by the action of the pressing iron. I have also found it advisable to cover the cistern as far as practicable, both to prevent evaporation and to keep out dust.

In order to construct drawing roll covers of different dimensions with this machine its several members may be made adjustable in any of the well known modes employed in the construction of machinery; parts of the machinery I have described may also be employed separate from the others for the purpose of preparing the leather for this machine or for other purposes; thus for example, one of these parts or machines, consisting of two forceps and the knife, may be employed to sever the material into sheets or blanks ready for bending and cementing; while another, consisting of the clamps, fingers, and cementing apparatus, may be employed to receive prepared sheets or blanks and to unite their edges; the first machine may also be adapted to dividing skins or other material into strips of a suitable breadth for forming tubes, by increasing the breadth of the forceps and giving a greater stroke to the knife. It is also obvious that the mechanism described may be modified to form two or more tubes simultaneously by increasing the dimensions of the several parts sufficiently to admit and act upon two or more strips of material which are fed to the machine side by side.

Having thus described the construction and operation of my machinery for forming flexible tubes, what I claim as my in-

vention and desire to secure by Letters Patent is—

1. The method of forming tube blanks, or sheets of the proper size and form for tubes, from leather or other suitable material by means of the movable and stationary nippers and inclined knife or the equivalents thereof operating automatically substantially as herein set forth.

2. I claim the method of forming flexible tubes from prepared sheets or blanks by means of fingers, clamps, and cement, or their equivalents acting substantially as herein set forth to bring the edges of the sheet into contact and to unite the same.

3. I claim combining in a single machine the operations of forming the leather or other material into blanks, bringing the edges of the same into contact, and uniting them, so as to form a tube at a single operation substantially as herein set forth.

4. I claim the clamp, by means of which the material is held and upon which it is formed into a tube, constructed and operating in such manner that it shall, in addition to its movement toward the other clamp, also have a longitudinal movement to withdraw from the finished tube substantially as described.

5. I claim the combination of the reciprocating diverging fingers with the reciprocating converging plates or their equivalents by whose action the fingers are made to seize the sheet of material substantially as herein set forth.

6. I claim the method of coating the edge of the sheet with cement by means of a roller or its equivalent which receives the cement and applies it to the edge to be cemented substantially in the manner and for the purpose herein set forth.

7. In combination with a clamp or its equivalent for supporting the edges of the sheet of material to be united I claim a reciprocating pressing iron actuated substantially as herein set forth to press the edges together and to set the cement.

In testimony whereof I have hereunto subscribed my name.

NEWELL WYLLYS.

Witnesses:

P. A. WATSON,
WM. D. WASHINGTON.