No. 711,180. Patented Oct. 14, 1902.

W. S. SEYMOUR.

MANUFACTURE OF TUBES.

(Application filed July 17, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

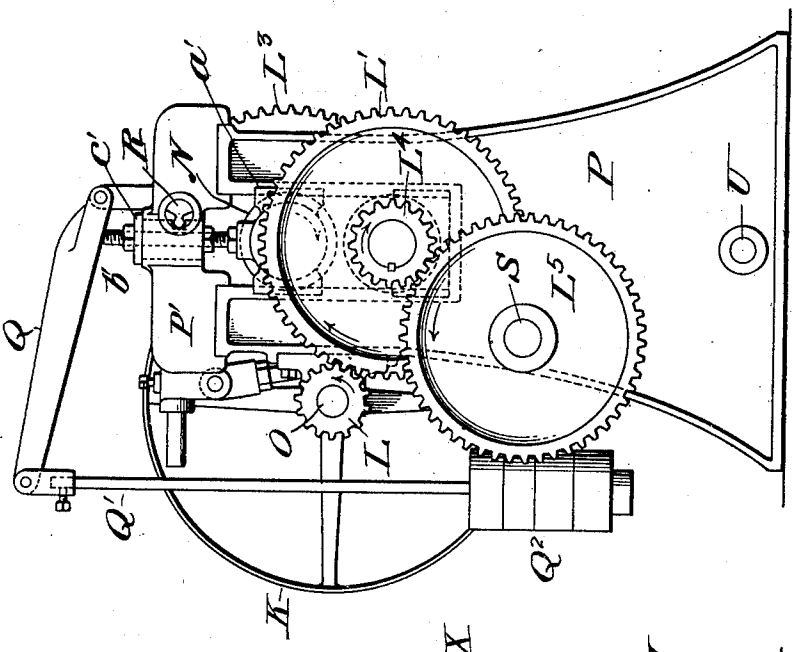
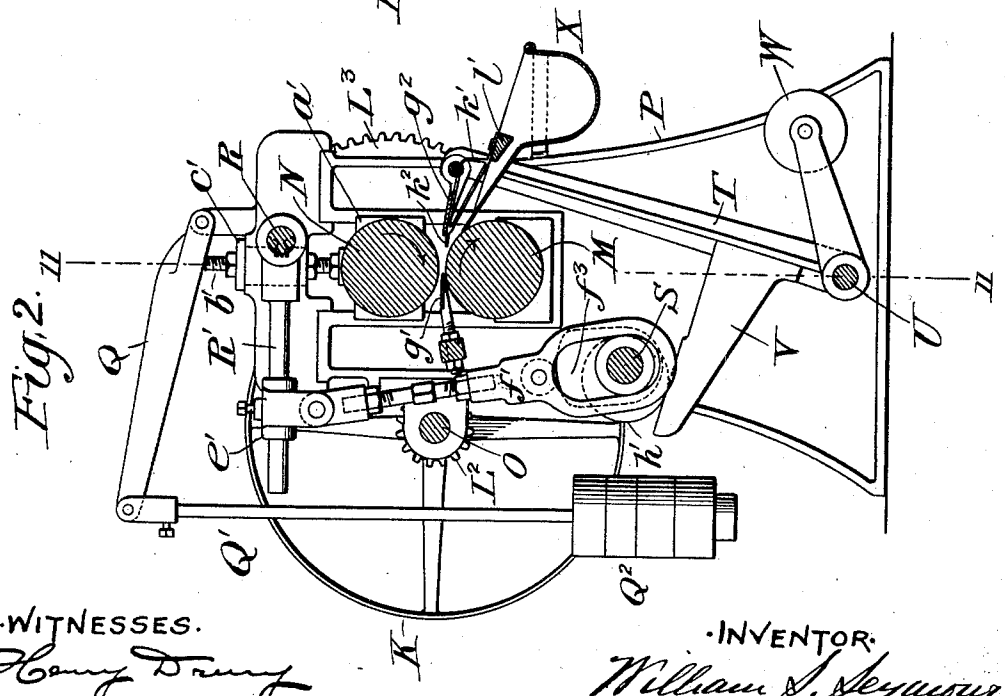


Fig. 2.



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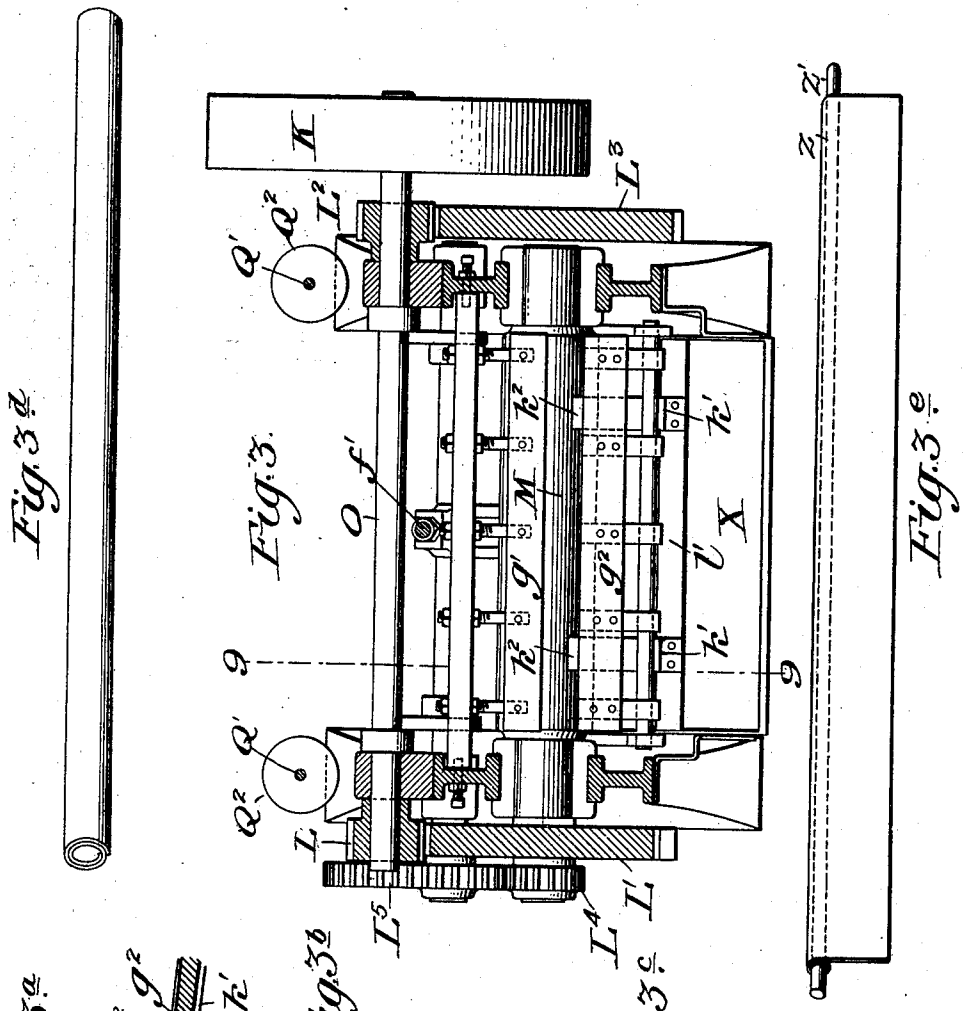
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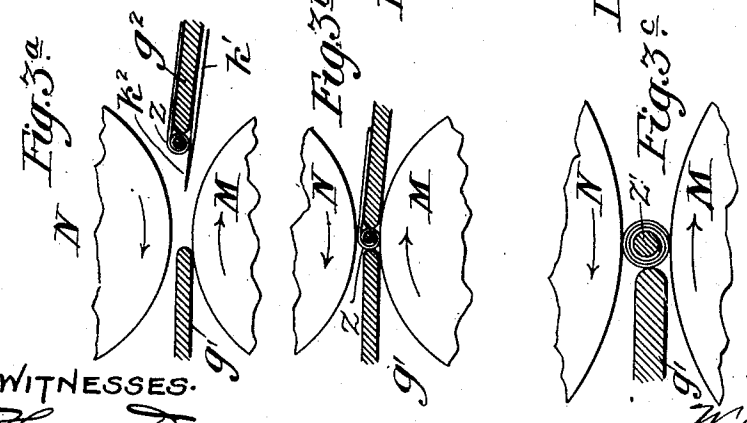
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MANUFACTURE OF TUBES.

(Application filed July 17, 1900.)

(No Model.) 3 Sheets—Sheet 2.





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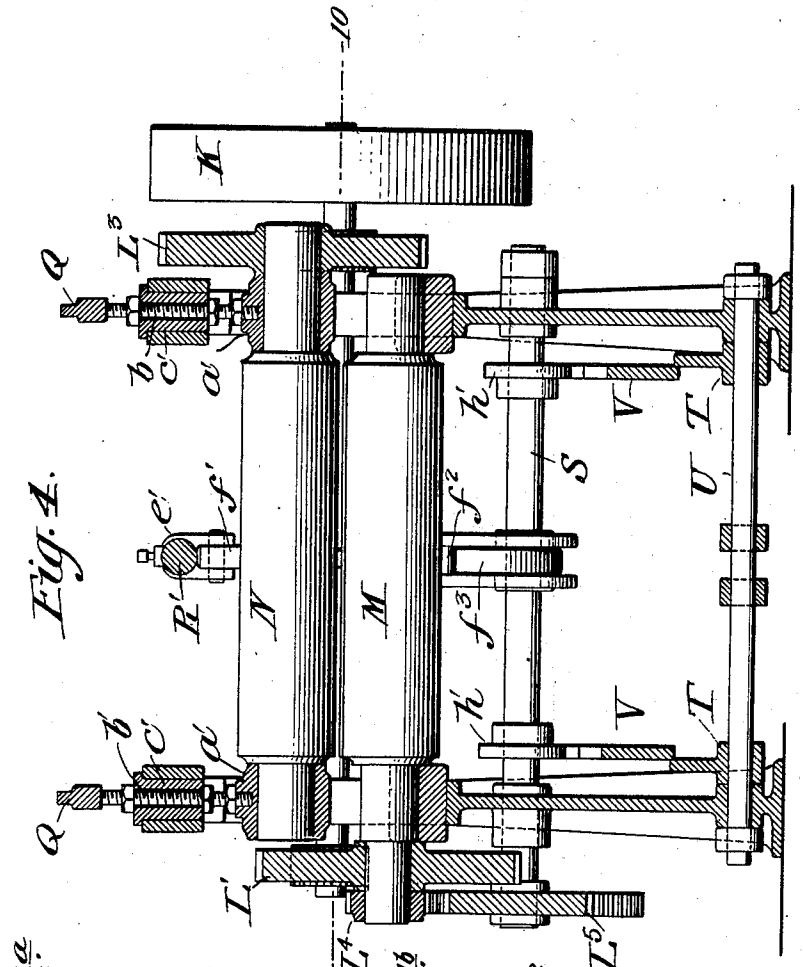
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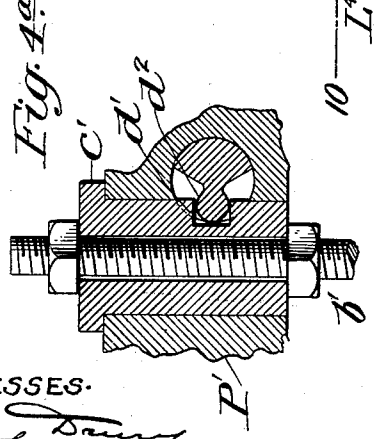
W. S. SEYMOUR.

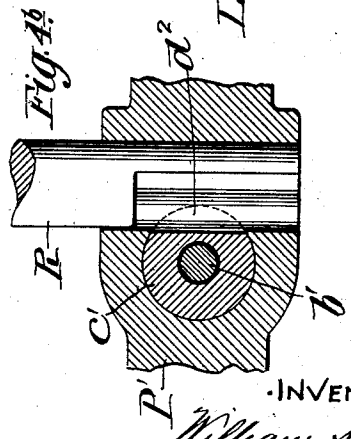
MANUFACTURE OF TUBES.

(Application filed July 17, 1900.)

(No Model.) 3 Sheets—Sheet 3.







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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF TUBES.

SPECIFICATION forming part of Letters Patent No. 711,180, dated October 14, 1902.

Application filed July 17, 1900. Serial No. 23,928. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. SEYMOUR, a citizen of the United States, residing at Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Tubes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to certain new and useful improvements in the manufacture of sheet-metal tubes, and particularly to the production of tubes of relatively small diameter from sheet metal—as, for instance, umbrella-sticks and the like—wherein it is desirable to combine considerable strength and rigidity in the resultant product.

In the practice of my invention I first produce from a flat blank or strip of metal a preliminary structure consisting of said blank, having one of its edges rolled into the form of a cylinder of an internal diameter approximating that of the finished stick or tube. A machine for producing this preliminary structure forms the subject-matter of my copending application, filed March 11, 1901, Serial No. 50,684. I thereupon introduce this cylindrical edge portion of the blank into the pass of a two-high rolling-mill, wherein, while subjecting the blank to a graduated pressure, it is rolled into the finished form. The rolls of the mill are geared to rotate in the same direction, so that when the blank is introduced between them their working surfaces act in opposite directions thereon, with the resultant effect not only of promptly winding the flat portion of the blank upon the cylindrical edge portion, but also of spinning the sheet metal, so that the number of turns or convolutions of the finished article will be correspondingly increased, thereby adding to its inherent strength and stability. During the rolling operation I insert a mandrel within the tube, so as to oppose the necessary resistance to the crushing action of the rolls.

In the accompanying drawings, Figure 1 represents in end elevation a view of my present invention, comprising a two-high rolling-mill for completing the formation of the tube or stick. Fig. 2 represents a sectional elevation thereof on a plane indicated by the line 9 9 of Fig. 3. Fig. 3 represents a sectional plan view taken on a plane indicated by the line 10 10 of Fig. 4. Figs. 3^a, 3^b, 3^c indicate various steps in the formation of the finished article. Fig. 3^d represents in perspective the finished article. Fig. 3^e represents a preliminary blank structure formed in the apparatus shown in the drawings and with the mandrel in place. Fig. 4 represents a sectional elevation on line 11 11 of Fig. 2. Figs. 4^a and 4^b represent, respectively, sectional views taken at right angles to each other of the adjustable housing for the upper roll.

Similar letters of reference indicate similar parts throughout the several views.

The preliminary structure is formed from a flat blank or strip of metal having one of its edges rolled into the form of a cylinder of an internal diameter approximating that of the finished stick or tube. This rolled edge constitutes the base or foundation upon which the additional convolutions are formed by the machine for completing the tube.

Referring to the apparatus illustrated in the accompanying drawings, the machine for completing the tube from the partially-formed blank derives its motion from a pulley-wheel K, whose power-shaft O is provided with a pinion L, intermeshing with a gear L′, fixed upon the shaft of the roll M. In like manner a pinion L^2 upon the power-shaft O intermeshes with a gear L^3 upon the roll N. It will be noted that, as indicated by the arrows, the rolls M N rotate in the same direction, so that their working surfaces are adapted to act in opposite directions upon any blank subjected to them. The upper roll N is located in sliding bearings a', guided in the framework P of the machine. The sliding bearings a' receive the screw-bolts b', which pass loosely through the thimbles c', which rest in appropriate recesses in the cross-saddles P′ of the frame P, and by means of nuts, as shown, the extent of downward movement of the sliding bearings is accurately adjusted, so as to determine the height of the normal pass between the two rolls. The sliding bearings a', and consequently the roll N, are weighted by means of pivoted arms or levers Q, which rest upon the ends of the screws b' and which bear at their outer or free ends depending arms Q′,

carrying adjustable weights Q^2, which may be varied to obtain the desired pressure.

As shown more fully in Figs. 4^a and 4^b, the thimbles c' are slotted at d', and in these slots engage corresponding projections d^2 of a rock-shaft R, bearing an arm R', which is connected by an adjustable sleeve e' to an eccentric-rod f', carrying an antifriction-roller f^2 and actuated by an eccentric f^3 upon the shaft S. The purpose of this mechanism is to raise the upper roll N, so as to release the formed tube at the completion of the operation, as will hereinafter more fully appear.

At the rear of the pass between the rolls is located a fixed ledge or abutment g', adjustable, as shown, and which serves to prevent the tube during its formation from passing out between the rolls in consequence of any slight difference in surface travel thereof. A corresponding abutment g^2 is located in front of the roll-pass and likewise serves as a support for the partially-formed blank, as shown in Figs. 3^a and 3^b. The abutment or table g^2 is mounted in bearings between the arms T, which are fixed upon a rock-shaft U and which bear the arms V, this organization being provided with a counterbalance-weight W and being rocked by means of cams or eccentrics h' upon the shaft S making contact with the arms V. The rocking table or abutment g^2 rests upon spring-supports k', whose forward ends k^2 project somewhat in advance of said table or abutment, as indicated in Figs. 2 and 3^a. The spring-supports k' are fixed to a cross-piece l', attached to the frame of the machine and located immediately above a receptacle X for the finished tubes, which receptacle has a forwardly-extending lip making contact with the periphery of the lower roll and serving to guide the finished tubes into the receptacle when released from the roll-pass.

The parts of the apparatus being in the adjustment indicated in Figs. 1, 2, 3^a, and 4, the rolls find themselves separated to form a pass of the desired height to admit the folded front edge of the preliminarily-formed blank. The said blank is accordingly placed upon the table g^2 by the operator in the position indicated in Fig. 3^a, a loose mandrel z' being first inserted therein to prevent the tube from being crushed during the subsequent operation. The operator of the machine thereupon advances the table g^2 and places the fold z of the blank within the pass of the rolls and against the abutment g'. Thereupon the eccentric f^3 permits the full force of the weights Q^2 to rest upon the upper roll N, thereby exerting a corresponding pressure upon the forming tube. The revolution of the rolls M N thereupon winds the flat portion of the blank upon the partially-formed cylindrical edge portion and under the influence of the pressure of the upper roll and the spinning action of both rolls simultaneously lengthens the blank, so that, for instance, the walls of the formed tube will be made up of, say, three complete convolutions instead of two and one-half. This action is accompanied with the development of more or less heat and has an effect similar to case-hardening of the metal surfaces, largely increasing the rigidity and strength of the resultant product. At the formation of the tube in the manner described the eccentric f^3 rocks the rock-shaft r, so as to raise the upper roll N from contact with the tube. At the same time the table or abutment g^2 recedes and permits the forward ends k^2 of the springs k' to rise and to come in contact with the periphery of the roll N. Thereupon the released tube falls down the incline of the roll M into the receptacle X.

It is evident that the machine as above described is adapted to complete the formation of tubes having the preliminary form referred to in whatever way that preliminary form may be produced; but I find it particularly advantageous to employ in the preliminary manipulation of the blank the apparatus described and claimed in the division of this application, Serial No. 50,684, hereinbefore referred to.

Having thus described my invention, what I claim is—

1. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction whereby the material of the blank is spun in the direction of the convolutions of the tube; substantially as described.

2. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, and abutments on opposite sides of the roll-pass for retaining the tube within the pass during the operation whereby the material of the blank is spun in the direction of the convolutions of the tube; substantially as described.

3. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, and abutments on opposite sides of the roll-pass for retaining the tube within the pass during the operation, one of said abutments constituting a feed-table for the blank; substantially as described.

4. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, and abutments on opposite sides of the roll-pass for retaining the tube within the pass during the operation, one of said abutments constituting a feed-table for the blank, and being mounted upon a swinging frame; substantially as described.

5. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, pro-

vided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, and abutments on opposite sides of the roll-pass for retaining the tube within the pass during the operation, one of said abutments constituting a feed-table for the blank, and being mounted upon a swinging frame, and cams for rocking said frame; substantially as described.

6. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, and abutments on opposite sides of the roll-pass for retaining the tube within the pass during the operation, one of said abutments constituting a feed-table for the blank, and being mounted upon a swinging frame, in combination with spring leaves or guides located beneath the table and projecting beyond its forward edge, and a receiving-hopper having a forwardly-extending lip arranged below the spring; substantially as described.

7. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, one of said rolls being arranged in sliding bearings, so as to exert pressure upon the forming tube, all so arranged that the blank is wound in successive convolutions upon itself and the material thereof is spun in the direction of said convolutions; substantially as described.

8. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, and weighted levers for adjustably increasing said pressure, all so arranged that the blank is wound in successive convolutions upon itself and the material thereof is spun in the direction of said convolutions; substantially as described.

9. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, one of said rolls being arranged to exert pressure upon the forming tube whereby the material of the blank is spun in the direction of the convolutions of the tube, a lifting-lever for said pressure-roll, and connections for operating the lever to lift the roll and release the tube at the termination of forming operation; substantially as described.

10. The apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, one of said rolls being arranged to exert pressure upon the forming tube, a lifting-lever for said pressure-roll, and connections operating the lever to lift the roll and release the tube at the termination of the forming operation, said connections consisting of an eccentric, an eccentric-rod and power-shaft; substantially as described.

11. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, one of said rolls being arranged in sliding bearings, so as to exert pressure upon the forming tube, thimbles arranged in cross-saddles of the roll-housings and supporting the sliding bearings, and a rock-shaft for raising the thimbles; substantially as described.

12. In apparatus for making tubes from sheet-metal blanks, a finishing-machine, provided with two-high rolls, and gearing arranged to impart to said rolls a rotation in the same direction, one of said rolls being arranged in sliding bearings, so as to exert pressure upon the forming tube, thimbles arranged in cross-saddles of the roll-housings and supporting the sliding bearings through the intermediacy of screw-rods and set-nuts, and a rock-shaft for raising the thimbles; substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM S. SEYMOUR.

Witnesses:
MILTON WOLF,
JOHN LITTLE.