3 Sheets—Sheet 1.

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Making Cop Tubes.

No. 5,157. Patented June 12, 1847.

Fig. 1,

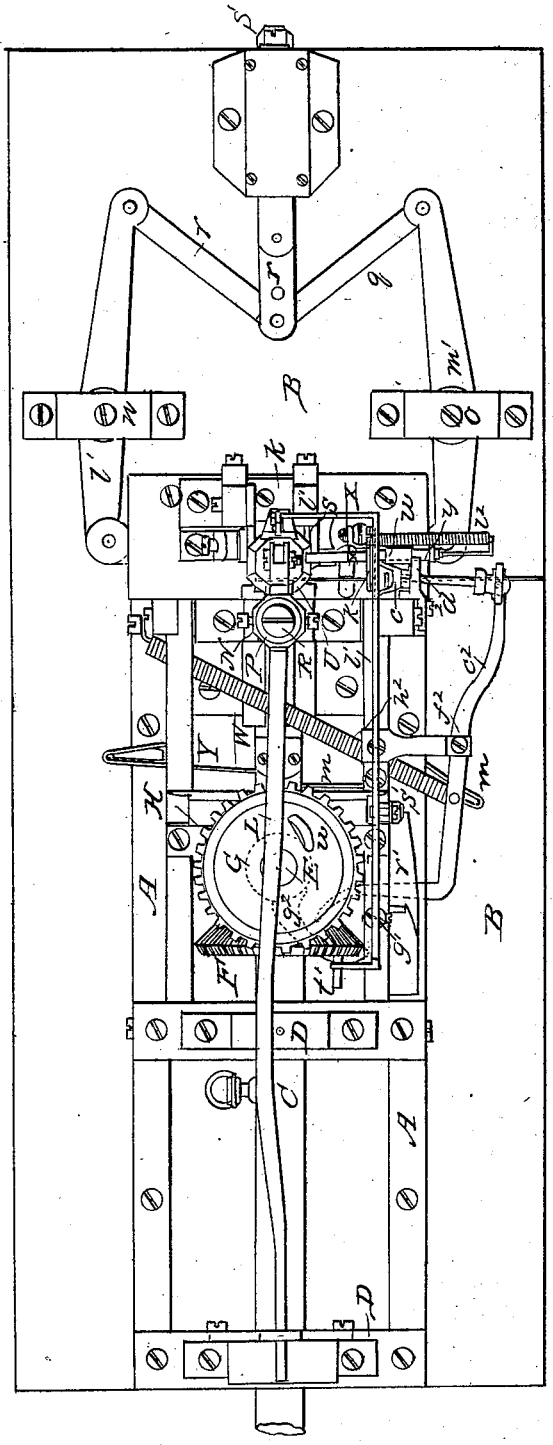
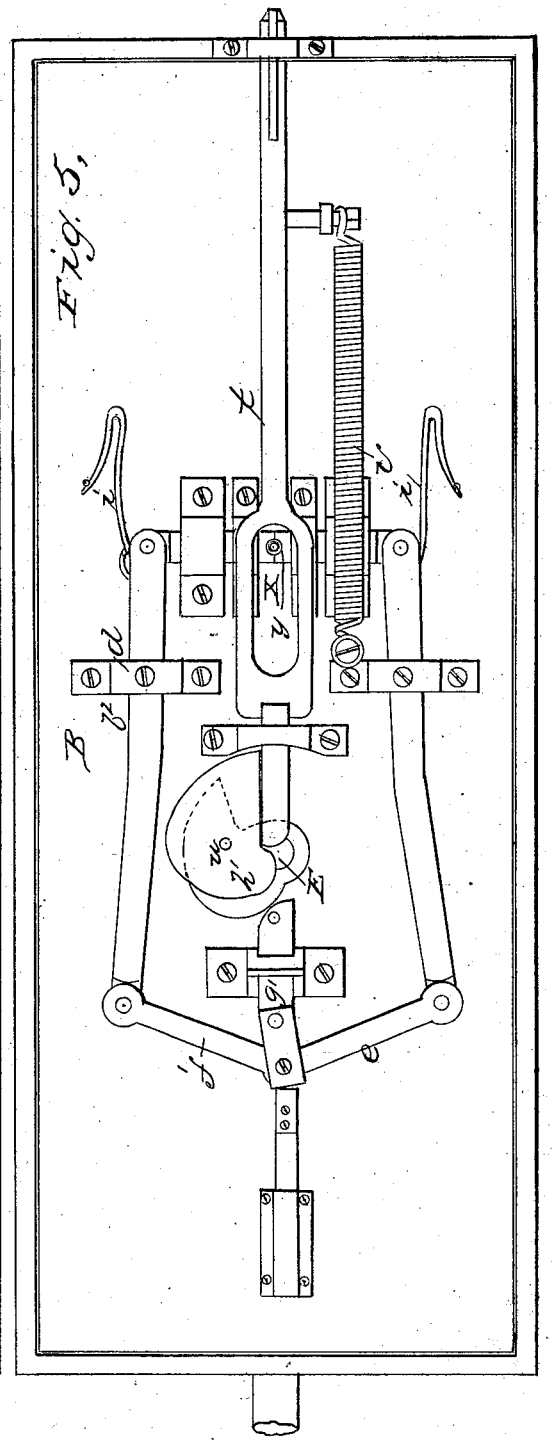


Fig. 5,



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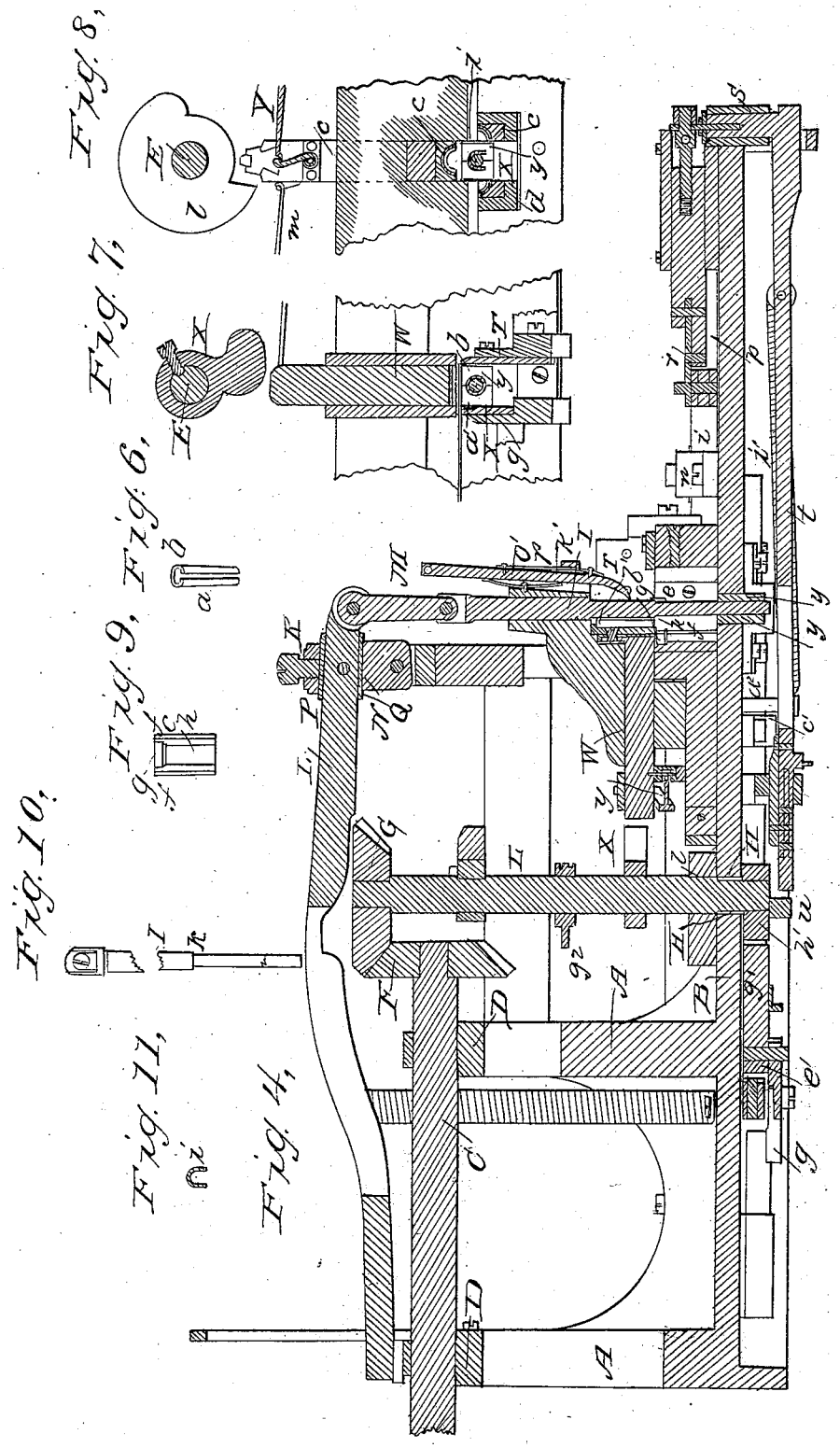

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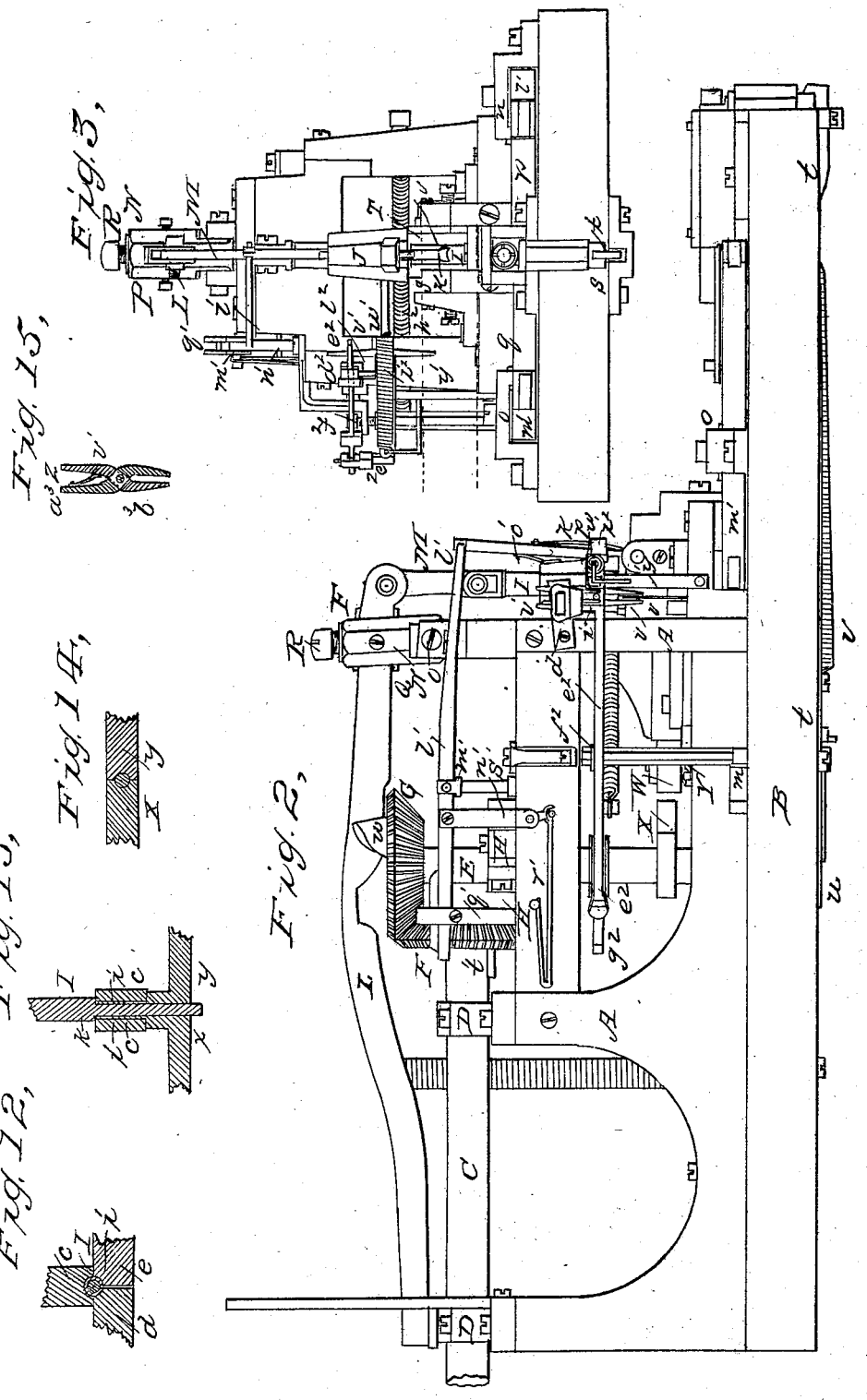

UNITED STATES PATENT OFFICE.

NATHANIEL WHITMORE, OF LYNN, MASSACHUSETTS.

MACHINERY FOR MAKING COP-TUBES.

Specification of Letters Patent No. 5,157, dated June 12, 1847.

To all whom it may concern:

Be it known that I, NATHANIEL WHITMORE, of Lynn, in the county of Essex and State of Massachusetts, have invented a new and useful Machine for Making Cop-Tubes; and I do hereby declare that the same is fully described and represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Of said drawings Figure 1 denotes a top view or plan of the aforesaid machine. Fig. 2 is an elevation of one side of it. Fig. 3 is an elevation of one or the front end of it. Fig. 4 is a vertical, central and longitudinal section of it. Fig. 5 is a plan or view of the machinery attached to the underside of the bed plate of the frame.

Such other figures as may be necessary to fully exhibit the various parts of the mechanism will be hereinafter mentioned and described.

The article which my machine is intended to make is exhibited in elevation in Fig. 6 which denotes a perspective view of it. It consists of a small tube *a* of metal having a projecting rim *b*. When used it is placed on the spindle on which a cop is to be spun (the spindle being passed through it) and the cop is formed or wound on the tube. It serves to support the cop when removed from the spindle.

The machine aforementioned manufactures the said tubes successively from a long strip or plate of metal which is fed into the dies by means which will be hereinafter explained. The elements of the machine are: First, the dies or shears for cutting a portion from the strip of metal sufficient in length to be made into a tube. Second, the mechanism by which the strip is partly bent into a tubular shape. Third, the mechanism by which the said tubular shape is further produced and completed. Fourth, the mechanism by which the head or lip *b* is made. Fifth, the mechanism by which the lower edge or end of the tube is supported while the head or lip *b* is being made. Sixth, the mechanism by which the tube is ejected or forced out of the machine after being made. Seventh, the apparatus by which the strip of metal is fed into the dies as fast as may be necessary.

The main parts of the said machinery are sustained in their proper positions by means of a suitable metallic frame A raised upon a bed or plate B. A horizontal driving shaft C is sustained in boxes or bearings D, D, and gives motion to a vertical shaft E by means of two beveled gears F, G, applied to them as seen in the drawings. The shaft E is sustained and rotates in boxes or bearings H, H, and is put in motion by any proper power suitably applied to it. The tube during the process of being formed is bent around a vertical spindle or punch I, which passes down and moves through and is sustained in position by a stationary strut or bearing J which projects over the dies. The said spindle I is connected with one end of a long lever L by means of a link M which is jointed both to the upper end of the spindle and to one end of the lever. The said lever passes through an adjusting block or piece of metal N which vibrates at its lower end upon a pin O as a fulcrum for the lever. The passage way through the said block N is provided with wedges P, Q, and a set screw R arranged with respect to the lever as seen in the drawings, the same being for the purpose of adjusting the spindle to its true position with respect to the dies so as to enable it to turn over or form the lip *b* of the cop tube at the proper time.

The first element of the mechanism to be described is that by which a portion of the strip of metal sufficient in length to be formed into a tube is severed or cut from the said strip. The same consists of three dies or cutting plates S, T, U, a horizontal section of which is exhibited in Fig. 7, which also shows the cam by which the central or movable die is thrown forward between the two other dies S, and T. V denotes the strip of metal from which the tubes are to be made. The two dies S, and T consist of two parallel and vertical plates made stationary in position and placed at a distance apart corresponding to the length of the piece of metal to be severed from the strip and having suitable adjustments, applied to them by which they may sit in their required positions. The movable die U, is placed at right angles to the stationary dies S and T and is made to pass in between them and afterward to recede and depart from their cutting edges a sufficient distance to allow of the strip V, to be passed or moved between its (the die U's) face and

the said cutting edges as seen in Fig. 7. The horizontal width of the die U, corresponds to the distance between the two plates or dies S, T. The die U is secured to the end of a slide bar W, which is sustained in a proper manner and made to move forward and backward in a longitudinal direction. It is thrown forward, in order to cause the die U to pass between the dies S and T by a cam X placed upon the shaft E and is afterward retroceded by a spring Y. A small groove a', is made vertically in and through the inner face of the die S. A similar groove b' is made in the inner face of the die T as seen in the drawings. The die U is caused to advance far enough to force the piece of metal severed from the strip V, into the space between the said grooves a', b', so that on the recession of the first bending die from under the said piece it may drop downward between the said bending die and the spindle I.

Fig. 8 exhibits a horizontal section of the bending dies which constitute the next two elements of my machine. The said figure also represents in part the mechanism by which motion is given to the said dies. The central or first bending die which is denoted by the letter *c*, is placed with respect to the spindle I and the two other dies *d*, *e*, as represented in Fig. 8. It consists of a block or bar of metal having its front end hollowed out in a semi-circular shape.

A front elevation of the hollowed end of the die is given in Fig. 9. At a short distance below the top surface or edge of the said die the semicircular hollow is suddenly contracted as seen at *f*, *f*, and then continues downward somewhat smaller, than it is above the shoulder or part *f*, *f*, the same being exhibited in the drawings.

The radius of the semicircular part *g* corresponds to that of the exterior curve of the lip *b* of the tube, while the radius of the part *h*, is equal to that of the exterior surface of the said tube. The diameter of that part of the spindle I, against which the die *c* forces the piece *i* severed from the strip V, should be made equal to that of the interior of the tube, while that part of the spindle which is above the die, should be made of a diameter equal to that of the part *g*, of the hollow of the die, the said spindle being made with a shoulder *k*, and in other respects as seen in the elevation of it in Fig. 10. The bending die *c*, is thrown forward at the proper time by a cam *l* fixed upon the shaft E and is retracted by a spring *m*. The forward movement of the die *c* toward the spindle I bends the piece of metal *i* into the shape denoted in Fig. 11. As soon as this is effected, the other dies *d*, *e*, are moved toward the spindle I, and complete the bending of the piece into a tubular shape around the spindle. The inner corner of each of said dies *d*, *e*, is hollowed out into a quadrant of a circle and in other respects like the die *c*.

Fig. 12 denotes a horizontal section of the three dies *c*, *d*, and *e*, as they appear when forced against the piece *i*. The lateral dies *d* and *e*, are properly supported so as to freely slide toward and from each other in rectilinear directions. They are respectively jointed to levers l', m', having their fulcrum at *n*, *o*, and being jointed to two toggles or progressional levers *p*, *q*. The said toggles are jointed to a pitman or slide *r*. The front end of the said pitman is attached to a projection *s*, which extends upward from a slide bar *t*, see Figs. 4 and 5, which slide bar is thrown forward, at a proper time (in order to cause the mechanism intervening between it and the dies *d*, *e* to operate and force the dies toward each other) by a cam *u* fixed on the lower end of the shaft E. The retraction of the slide bar *t*, is effected by a spring *v* connected to it and the bed plate of the frame.

The dies *c*, *d*, *e*, being closed upon the spindle I, the next operation is to force the latter downward, in such manner as to introduce its shoulder *k*, into the hollow *g*, of the die *c* and corresponding hollows of the other dies *d*, *e*, and force it (the shoulder) toward the offset *f*, *f*, in such manner as to turn or bend over or form the lip *b*, of the tube. This is effected at the proper time by a cam or inclined plane *w*, which is made to project from the top of the beveled gear G, which passes under and in contact with the lower edge of the lever L, and elevates the rear arm of the said lever, and by so doing depresses the front arm and the spindle I, connected therewith.

The next portion of the mechanism to be described, is that by which the lower edge or end of the tube or piece *i* is supported, or upon which it rests while the spindle descends and makes the lip *b* of the tube. The said mechanism consists of two slide bars seen more particularly in Figs. 13 and 14, the former being a vertical section of the spindle I, and said slides, and the latter being a horizontal section through them. The said bars are placed directly beneath the dies, *c*, *d*, and *e*, and are moved up laterally against the lower part of the spindle I. The inner ends of the bars are respectively hollowed out in a semicircular form to fit closely against the spindle, and when brought together the tube piece *i*, rests upon them as seen in Fig. 13. They are kept closed upon the spindle during the time the tube is being made and as soon as this is effected, they should be caused to diverge from each other and the spindle in such manner as to allow the tube to be forced

from the spindle or expelled from the machine by the mechanism, which effects its expulsion. The said slide bars x, y, should be properly supported so as to slide freely back and forth longitudinally. They are respectively jointed at their outer ends to two levers, a^2, b^2 whose fulcra are at c', d'. The said levers are jointed to two toggles e', f', which are themselves jointed to a slide bar or pitman g' whose front end is placed against a cam h' fixed upon the shaft E. When the slide pitman is forced rearward by the cam it draws the outer ends of the toggles toward each other and by so doing acts upon the levers a^2, b^2 in such manner as to cause the supporting slides x, y, to depart from one another and the spindle I, in the manner and for the purpose as before described. Each lever a^2, b^2 has a spring i', applied to it in such manner as to cause the levers and slides x, y, to return to their former positions, after the cam h' has ceased to act on or force back the pitman slide g', and the expulsion of the tube has been effected.

The next portion of the mechanism to be explained is that by which the tube is ejected or forced out of the machine after it is made. This consists of a small finger or rod of metal k', having its lower end curved and made sharp or angular as seen in Fig. 4. It is jointed at its upper end to the front end of a bent lever l' whose fulcrum is at m',—in the top of a small post n'. The said finger k', is forced against the spindle I by two springs o', p'. The rear end of the lever l' rests in the crotch of a forked post q', and upon the bottom of said crotch, and is drawn down thereupon by a spring r' which is connected to this lever by a jointed link s'. A stud or pin t' is inserted in and projects from the side of the beveled gear E, and at a proper time during the revolution of said gear, it meets the underside of the rear bent end of the lever l' and lifts it up, and by so doing causes a depression of the front end of said lever, and the finger attached thereto. When said finger descends it comes in contact with the tube just previously made on the spindle and forces it off the spindle and causes it to drop out of the machine.

The succeeding and last portion of the mechanism to be described is that by which the strip of metal is fed into the machine as fast as may be necessary. v is a pair of pincers supported upon and by a small carriage w' which slides upon a fixed horizontal square or other proper shaped bar or rod x' extending from a post y' to the strut which supports the spindle I. A section of the said pincers is represented in Fig. 15. Their jaws are forced asunder by a spring z' placed between their arms a^3, b^3. A forked pitman c^2 made as seen in the drawings receives into its fork the upper ends of the pincers and acts upon them in such manner that when forced against them it will press the arms a^3, b^3 toward each other and thereby cause the jaws of the pincers to grip the strip of metal V, which is inserted between them. The forked pitman c^2 passes and moves through a bearing d^2 (projecting from the frame) and is jointed at its rear end to one end of a lever, e^2 whose fulcrum is at f^2. A cam g^2 is placed upon the shaft E, the shape of said cam and that of the rear part of the lever e^2 being represented in Fig. 1, by dotted lines. At a proper time during the revolution of the shaft E the cam g^2 meets the rear end of the lever e^2 and forces it outward thus causing the lever to turn on its fulcrum and press the forked pitman against the pincers so as to close them tightly upon the strip V. At the same time an arm l^2 projecting down from the pitman meets or comes in contact with the carriage which supports the pincers and causes it and them to advance toward the dies, and carry or move forward the strip of metal the distance required for the cutting dies to remove from it a piece of metal sufficient in length to make a tube. The carriage and pincers are afterward retracted by the contractile power of two springs h^2, i^2 the former being connected to the lever e^2 and the frame A, and the latter to the carriage of the pincers or to an arm k^2 projecting therefrom.

Although I have described the mechanism which I employ to operate the various elementary parts of my machine for making cop tubes, I do not intend to confine myself strictly to the employment of such nor do I intend to limit myself to the precise forms or shapes of the parts above represented and explained, but I mean to avail myself of such modes of operating the said elements as occasion may require, while I do not change the combinations I herein consider as of my invention. And having set forth the nature of my machine and the manner in which it operates I shall now proceed to specify that which I claim therein.

I claim—

1. The bending dies c, d, and e, in combination with the spindle I, and the cutting dies or mechanism S, T, U; as arranged and operating substantially as above described.

2. I also claim the supporting slides or bars x, y, in combination with the bending dies, lip dies and spindle, the same being arranged and made to operate substantially as specified.

3. I also claim an automatic combination of a feeding apparatus, cutting dies, bending and heading or lip dies, and spindle,

either with or without the supporting slides *x*, *y*, or with or without the expelling apparatus or finger, the whole being arranged and made to operate together in the manner and for the purpose substantially as above specified.

In testimony whereof I have hereto set my signature this second day of January, A. D. 1847.

NATHANIEL WHITMORE.

Witnesses:
R. H. EDDY,
S. W. WALDRON, Jr.