(No Model.) 2 Sheets—Sheet 1.

W. D. GRIMSHAW.

MACHINE FOR COVERING WIRE.

No. 342,085. Patented May 18, 1886.

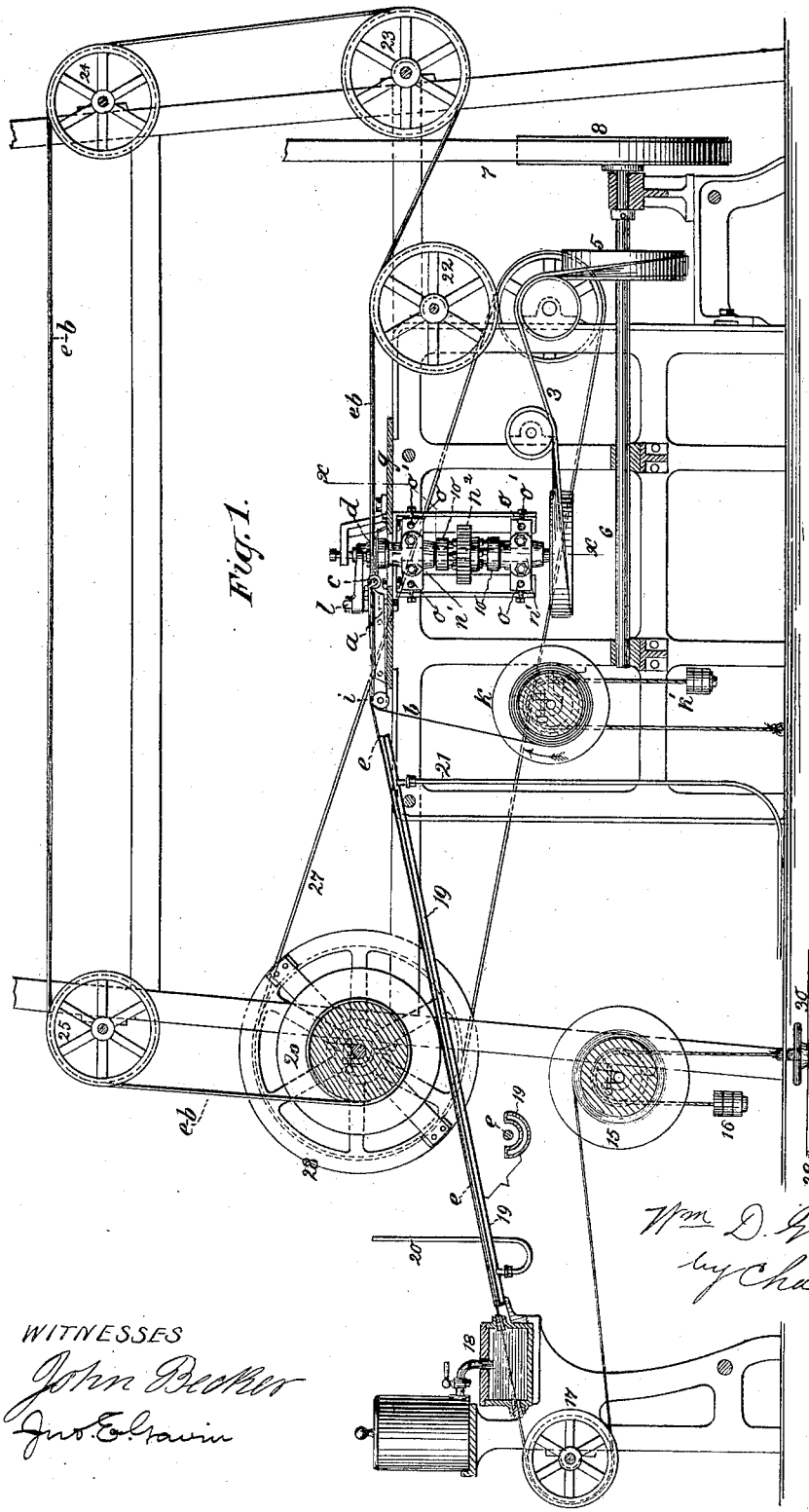

Fig. 1.

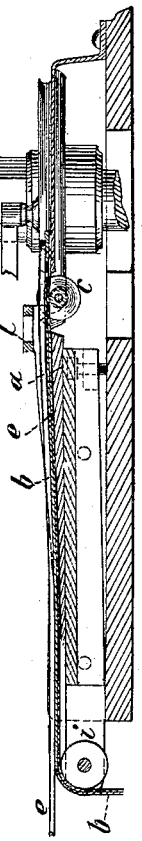

Fig. 2.

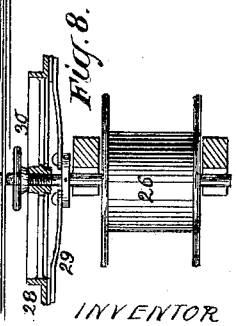

Fig. 8.

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Fig. 3.

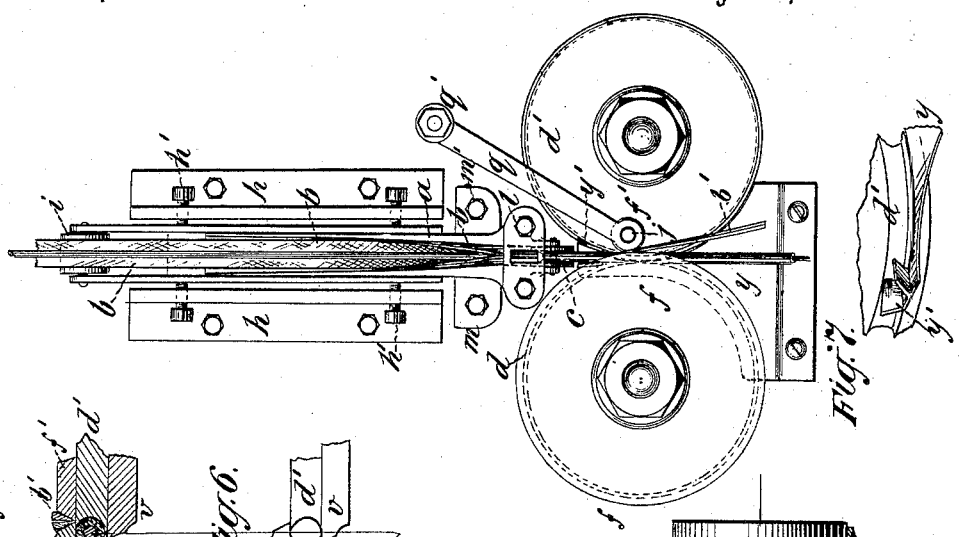
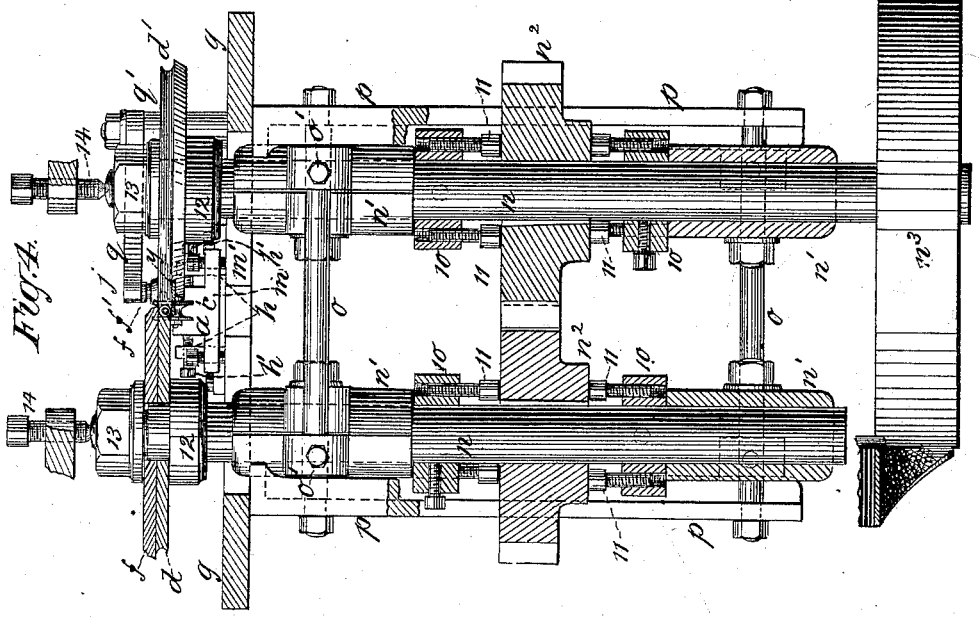


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM D. GRIMSHAW, OF NEW YORK, ASSIGNOR TO JOHN L. ARTS, OF TROY, N. Y.

MACHINE FOR COVERING WIRE.

SPECIFICATION forming part of Letters Patent No. 342,085, dated May 18, 1886.

Application filed May 7, 1885. Serial No. 164,733. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. GRIMSHAW, a citizen of the United States, now residing in New York city, New York, have invented certain new and useful Improvements in Machines for Covering Wire, of which the following is a specification.

This machine is designed to take a flat strip of unvulcanized rubber or other material of any desired length and of a width equal to or a little greater than the circumference of the desired tube to be made or the particular wire to be covered, and the machine will bend or curve said strip into the form of a tube, and unite the edges together and trim off the joint smoothly. In this way continuous tubes may be made of strips of rubber, lead, or other material; or these tubes may be formed around wires fed in with said strips, thereby covering the wires with a complete insulating-coating.

My present invention relates to that class of machines in which the covering-strip is guided, with the wire, through a tapering guide tube or trough, and thence into a pair of feed-rollers, whereby the flat strip is first curved up around the wire, and thence compressed thereon by the rolls, which unite the edges of the strip about the wire and cut off the excess at the joint.

My improvements lie, chiefly, in the particular construction of the rollers and their cutting and guiding devices, and also in the adjusting devices of the rollers, as hereinafter fully set forth.

In the annexed drawings, Figure 1 presents a general side elevation of my complete machine. Fig. 2 is an enlarged longitudinal section taken through the center of the guide-trough through the junction of the rollers. Fig. 3 is an enlarged plan view of the guiding-trough and rollers, with their adjuncts. Fig. 4 is an enlarged cross-section on line *x x* of Fig. 1, showing a front view of the rollers, with their adjuncts, and their adjusting and driving mechanism. Fig. 5 is an enlarged fragmentary section at the junction of the rollers showing the covering and cutting action thereof and Fig. 6 is a similar view in elevation. Fig. 7 is a fragmentary perspective view of one of the rollers, with one of its guides. Fig. 8 is a plan view of the drum on which the covered wire is wound, with the friction driving-wheel which turns the drum.

Referring to the drawings, the machine consists, briefly, of the following chief elements: first, a trough, *a*, through which the flat strip *b*, of rubber or other material, with the overlying wire *e*, is guided, and which trough is slightly curved up at the end to help in curving up the flat strip about the wire; second, a deeply-flanged guide-roller, *c*, at the end of the trough, which bends up the strip in U form about the wire and makes a rolling contact therewith; third, a pair of grooved feed-rollers, *d d'*, which next seize the bent strip and its inclosed wire *e*, which rollers draw in the strip and the wire and feed the same forward, and thus completely curve the strip around the wire, and press the edges in contact, thereby forming a complete tubular coating about the wire; fourth, a pair of cutting or trimming rollers or cutting-disks, *f f'*, which trim off the surplus at the joint of the strip.

Referring to Figs. 1, 2, 3, 4, it will be seen that the rollers *d d'* and the trough *a* are mounted over the top of the table *g* of the machine. The trough *a* is embraced between fixed flanges *h* on the table and held and adjusted in place by set-screws *h'*, as seen best in Figs. 3 and 4, the trough being thus removable, so that troughs of different widths and sizes may be put in place, according to the width of covering-strip and the size of the wire to be covered, as will be understood. On the end of the trough farthest from the rolls *d d'* is a flat guide-roller, *i*, over which the covering-strip *b* is guided into the trough from the drum *k*, on which a suitable tension, *k'*, acts. Over the end of the trough nearest the rollers is placed a cap or bridge piece, *l*, which prevents the rising up of the curved strip. The front end of the trough rests on a base, *m*, which is held by screws *m'* to the table *g*, and may therefore be adjusted up or down to adjust it in relation with the rolls. The deeply-flanged guide-roller *c* is hung in ears on the front end of the trough as close as possible to the rolls *d d'*, as shown best in Figs. 2, 3, and 4. The rolls *d d'* are fixed, as shown best in Fig. 4, to the tops of vertical shafts *n n*, which project above the table *g*. These

shafts are supported in the bearings or boxes n' below the table, which boxes are mounted on the horizontal guide-rods o, secured in the fixed frame p, so that by this means the boxes are capable of being slid or adjusted to or from each other on the said guide-rods, and may be held in place by the binding-screws o', thus enabling the rollers to be adjusted to or from each other. On the roller-shafts are fixed the gear-wheels n^2, which mesh together, and on one of the shafts is fixed the driving-pulley n^3. The pulley n^3 is driven by a belt, 3, as seen in Fig. 1, from a pulley, 5, on a driving-shaft, 6, which is driven by a belt, 7, on the pulley 8.

Referring to Fig. 4, it will be seen that collars 10 are fixed to the roll-shafts n above and below the gears n^2, and these collars are provided with adjusting-screws 11, whose heads rest on the gears, so that by adjusting the said screws on either set of collars the rolls d d' may be set higher or lower or adjusted vertically with relation to each other. The rolls d d' are held on the shafts n between the collars and nuts 12 13, and the countersunk top ends of the shafts abut and revolve against the center screws, 14, which project from fixed overhanging brackets on the table g, thereby steadying the top ends of the shafts.

Referring again to Fig. 1, the naked wire e is drawn from a drum, 15, on which a tension, 16, acts, and the wire thence passes around a sheave, 17, and through a bath, 18, of pure rubber cement, and thence over a drier, 19, and finally into the trough a, with the underlying strip b. The drier is sufficiently long, so that the wire passes through the warm air a sufficient distance to render the cement film sufficiently dry to be tenacious on the wire, yet tacky or adhesive when it reaches the rubber strip b, so as to adhere firmly thereto. The drier 19 is preferably a jacketed trough-shaped tube or semi-tube, as seen at 19 in Fig. 1, and is heated by steam, admitted through pipe 20 and exhausted at pipe 21. The covered wire e b, in issuing from the rollers, passes forward and upward over the sheaves 22, 23, and 24, and thence back to the front of the machine over the sheave 25, and downward to the winding-drum 26, on which it is reeled up preparatory to being placed in the vulcanizers for vulcanizing the coating on the wire in the usual way. The winding-drum 26 is driven by a belt, 27, on the large pulley 28, which pulley 28 is loose on the shaft of the drum, but has a friction-rim which presses against friction-springs 29, fastened to the shaft, while a hand-wheel, 30, screwing on a thread on the end of the shaft, will enable the pulley to be pressed against the friction-springs with any desired pressure. In this way the winding-drum is driven in a yielding or frictional manner, so that any desired tension may be put upon the wire to wind it up taut without keeping a positive or undue strain on the wire. It will also be seen that by having the winding-drum at the entering end of the machine and carrying the wire back from the issuing to the entering end the operator at one end is enabled to closely watch all the operations of the machine at one point of observation, or nearly so.

Referring now to Figs. 3, 4, 5, and 6, the special construction of the rollers, with their cutting and guiding devices, in which the most important novelty of my invention lies, will be now more fully described.

Referring to Figs. 4, 5, and 6, it will be seen that the rollers proper, d d', are but little or no thicker than the diameter of the forming-grooves in their peripheries, so that the rollers meet together on very narrow edges, as best seen in Figs. 5 and 6, which are, however, dulled, so as not to be cutting in their action. On the top of the roller d is fixed a cutting or shearing plate, f, which is a little larger in diameter than the roller d, and is formed with an acute cutting-edge, which projects a little beyond the junction-line of the rollers d d', as best seen in Figs. 5 and 6, and thus presents a cutting-edge to trim off any excess at the joint of the strip b when pressed around the wire in passing between the rollers, as shown in Figs. 3 and 5. Against the bottom of the roller d' is fixed a guard-plate, v, which is larger in diameter than the roller d', so that the edge of said plate, which is dull and smooth, projects out below the junction-line of the rollers, as seen best in Figs. 5 and 6, and thus not only supports the narrow edges of the grooved rollers d d', but also forms a smooth base or abutment, over which the bent or curved side of the strip b can easily glide in entering the grasp of the rollers without being liable to be cut or marred, as will be readily understood from Figs. 3, 5, and 6. In order to still better guide the under or curved side of the strip into the rollers, an additional guide-plate, y, (best shown in Fig. 3,) is employed, one edge of which underlies the roller d, while the other edge is concavely curved to fit close to the edge of the guard-plate v, and on the front end of the guide-plate are formed converging V-shaped lips or flanges y', (see Figs. 3 and 7,) which closely approach the entrance of the rollers spanning the space between the flanged roller c and the entrance of the rollers d d', and thus guiding the curved strip, with its inclosed wire, smoothly from the roller c into the grasp of the rollers d d', as well shown in Fig. 3.

In order to enable the cutter f to cut or trim off the joint of the strip effectually, it acts in conjunction with a small cutting-roller, f', which has a beveled or cutting edge which is pressed up against the cutter f and down against the roller d', and revolves by frictional contact with said cutter, as will be understood from Figs. 3, 4, and 5. This small roller f' revolves on a stud, j, depending from a bracket-arm, q, which is adjustably fixed to a post, q', on the table g, so that the roller f' may be adjusted up properly to the cutter f, as will be understood from Figs. 3 and 4.

The plates forming the roller d and the cut-

ter *f* and the roller *d'* and the guard-plate *v* are simply placed one over the other and secured firmly on the roller-shafts *n* by being clamped between the collars 12 and nuts 13, which arrangement thus admits of easy displacement or replacement to change the rollers for different sizes of wire. It may therefore now be seen that by the described manner of constructing the rollers the grooved part of the rollers and the cutting part are formed in separate plates, and hence the same cutter-plate may be used with different roller-plates having grooves of different sizes for different wires, and this will be much simpler and less expensive than would be the case if a separate cutter had to be employed for every grooved size of roller. Furthermore, as the cutter is separate from the rollers, and of somewhat greater diameter to overlap the junction of the rollers, it will be seen that the cutter has a considerable range for wear or regrinding before it will be worn out; and, furthermore, if any injury occurs to any part of the edge of the cutter, it may be repaired by being trued or turned down, which range of use or wear would not be possible if the cutting-edges were of the same diameter as the edge of the rollers and junctioned directly together, as has been the case heretofore in machines of this class. For the same reason, it will be seen that in case the grooved roller-plates become in any way injured at the edges they may be trued by turning off, and they will still operate perfectly with the separate overlapping cutter-plate, whereas, if the cutter and roller were formed in one piece, any injury to either part would necessitate in most cases the abandonment of the piece, so that the construction described is of the greatest importance for the purpose of this machine. It will therefore be now understood that after the wire issues from the rollers, as seen in Figs. 3 and 1, it will be provided with a perfectly smooth and uniform tubular coating, and the trimmings *b'* (see Fig. 3) cut from the joint will be guided to one side off the top of the roller *b* and allowed to fall off one side of the table *g* into a suitable receptacle to receive them.

The strip *b* with which the wire is covered may be formed of rubber, gutta-percha, sheet-lead, or any other suitable or desirable material, as the machine will act similarly and efficiently with either material.

In some cases the wire, after being covered with rubber and vulcanized, may be put a second time through the machine, and covered the second time with an outer envelope of lead by feeding a flat strip of lead in with the wire, which lead will become curved around the wire, and united at the joint in the same manner as was the first rubber coat, as already described. In other cases a strip of sheet-lead and a strip of rubber, one under the other, may be fed in together with the wire, so as to cover the wire at the same time with an inner coat of rubber and an outer sheath of lead.

What I claim is—

1. The grooved cutting-rollers having the grooved part and the cutting part made in separate overlying plates secured together, the grooved plates being of the same width only as the groove therein, and meeting together at the diameter of the groove in acute-angled edges of no appreciable thickness, while the edge of the cutter-plate overlaps the said acute junction.

2. The combination, with grooved rollers, of the cutter-plate *f* and auxiliary cutter-roller *f'*, arranged and operating substantially as and for the purpose set forth.

3. The combination, with the grooved feed-rollers *d d'*, of the guard-plate *v*, underlying one of the rollers and overlapping the junction of the rollers, substantially as set forth.

4. The combination, with narrow grooved rollers *d d'*, made of the same width as their grooves, or nearly so, of the overlapping plate *v* on one side and the overlapping plate *f* on the other side of the rollers, substantially as shown and described.

5. The combination, with the grooved rollers *d d'*, of the guard-plate *v*, cutter-plate *f*, and cutter-roller *f'*, arranged and operating substantially as and for the purpose set forth.

6. In a wire-covering or tube-forming machine, the combination, with a pair of grooved feed-rollers, of the deeply-flanged guide-roller *c*, arranged at the entrance of the rollers, substantially as and for the purpose set forth.

7. In a wire-covering or tube-forming machine, the combination, with a pair of grooved feed-rollers, of a guiding-trough arranged at and directed toward the entrance of the rollers, and a deeply-flanged guide-roller between the mouth of said trough and the entrance of the rollers, substantially as and for the purpose set forth.

8. The combination, with the grooved feed-rollers, of the convergent guide *y'* and flanged roller *c*, arranged and operating substantially as set forth.

9. The combination, with the grooved feed-rollers, of the convergent guide *y'*, roller *c*, and trough *a*, arranged and operating substantially as shown and described.

10. The combination, with grooved feed-rollers and the cutter *f*, of the cutter-roller *f'* and its adjustable or swinging arm *q*, arranged and operating substantially as shown and described.

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