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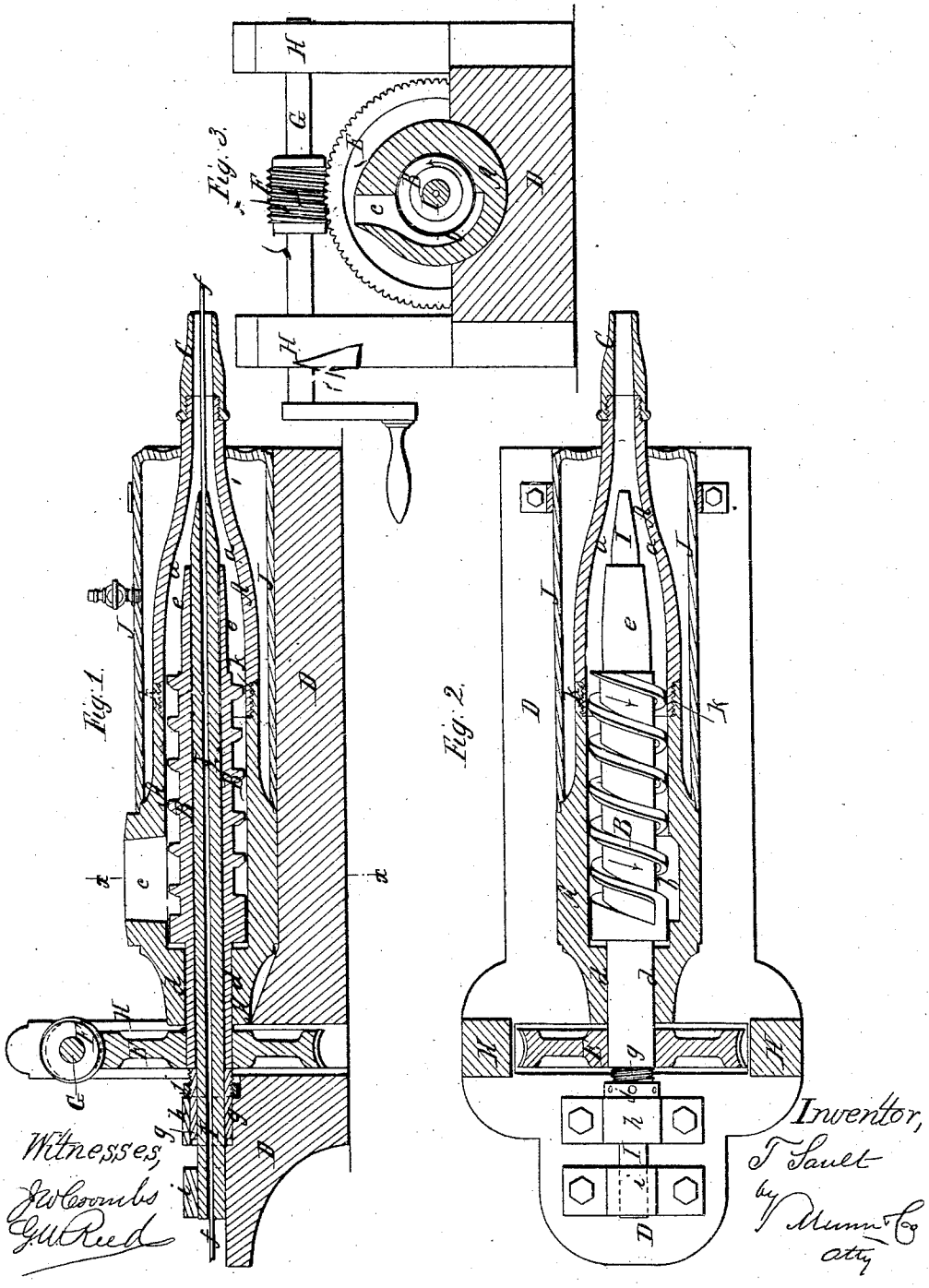
T. SAULT.

MACHINE FOR COVERING WIRE WITH GUTTA PERCHA, RUBBER, &c.



UNITED STATES PATENT OFFICE.

THOMAS SAULT, OF SEYMOUR, CONNECTICUT.

IMPROVED MACHINE FOR COVERING WIRE WITH GUTTA-PERCHA, RUBBER, &c.

Specification forming part of Letters Patent No. **37,112**, dated December 9, 1862.

To all whom it may concern:

Be it known that I, THOMAS SAULT, of Seymour, in the county of New Haven and State of Connecticut, have invented certain new and useful improvements in machinery for covering wire with caoutchouc, gutta-percha, or compounds thereof, and for manufacturing other articles of such gums or compounds; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central longitudinal vertical section of a machine for covering telegraph-wire, having my improvements. Fig. 2 is a horizontal section of the same. Fig. 3 is a transverse section of the same in the plane indicated by the line *x x*, Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

The main object of these improvements is to effect the covering of wire of any length with caoutchouc, gutta-percha, or their allied gums, or compounds thereof, or the manufacture of tubing of any length of such gums or compounds by an uninterrupted operation.

The principal portion of the machinery to which the improvements relate consists of a screw working in the bore of a cylinder, into which the gum is fed, and from which it is forced by the screw through or into a die of the necessary size and form to produce the exterior of the covering, tube, or other article to be manufactured. For the covering of wire or the manufacture of tubing the screw is made hollow for the reception of a mandrel, through which the wire to be covered passes, or upon which the interior of the tubing is formed, and it is the combination of the mandrel with the so-applied screw and cylinder that one part of the invention consists.

Another improvement consists in a peculiar construction of the cylinder, whereby it is enabled to be supplied with gum without stopping the operation of the screw, and thereby enabled to operate continuously to make a tube or cover a wire of any length, or to fill a mold of any size.

A further improvement consists in feeding the wire to be covered with the gum by the action of the aforesaid screw or other forcing apparatus upon the gum itself.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the cylinder, and B is the screw which works within it. The said cylinder, which is arranged horizontally and secured on a suitable bed, D, should be made of wrought-iron, or of other metal of sufficient thickness to give it the requisite strength to sustain a heavy pressure. Its front portion, to which the die C is attached, is constructed of a form somewhat resembling a syringe, as shown at *a a* in Figs. 1 and 2; but the remainder of its interior is parallel-sided and truly cylindrical, except that in one side, near its rear end, there is formed a cavity, *b*, which communicates with a throat, *c*, in the upper part. This cavity *b* is nearly concentric with the axis of the cylinder, and extends about one-third of the distance around it.

The screw B is of such circumference that the tops of its threads will fit snugly but easily within the parallel portion of the cylinder, and its shaft or core is extended through a bearing, *d*, in the rear end of the cylinder and is continued some distance in front of the thread and there tapered, as shown at *e* in Figs. 1 and 2, to correspond or nearly correspond with the taper of the portion *a a* of the cylinder, having no bearing at its front end, but having a clear space all around it for the passage of the gum. The profile of the front face of the screw-thread is perpendicular to the axis of the screw, like that of any ordinary square-threaded screw; but the back of the said thread is beveled. The shaft of the said screw has firmly secured on its rear end a worm-gear, E, which gears with an endless gear, F, on a horizontal shaft, G, which works above the said gear in bearings in standards H H, erected upon the bed D, the said shaft serving for the application of the power necessary to turn the screw B to make it force the gum through the cylinder A and die C. The cylinder is made of two pieces screwed together, as shown at *k k*, to enable it to be taken apart for the introduction of the screw B.

I is the mandrel, made hollow for the pas-

sage through it of the wire *f*, which is shown in red color in Figs. 1 and 2. This mandrel extends right through the screw B, which is bored concentrically for its reception, and protrudes some distance through each end thereof. The front portion of the said mandrel is tapered to correspond or nearly correspond with the surrounding part of the taper portion *a a* of the cylinder. The portion of the said mandrel which protrudes through the rear end of the shaft of the screw B is partly filled with a sleeve, *g*, which is fitted into a box, *h*, bolted to the bed-plate, and behind the said sleeve the said mandrel is clamped in a box, *i*, and by those means it is held securely in a position concentric with the cylinder A. The front end of the sleeve *g* serves as a bearing for the rear end of the shaft of the screw B, to receive the thrust thereof, and in order to provide for the proper adjustment of the said bearing the front portion of the said sleeve has cut upon it a screw-thread, which receives a nut, *j*, which is held back against the box *h* by the thrust of the screw B against the sleeve.

The portion of the cylinder A in front of the throat *c* and cavity B is surrounded with a jacket, J, for the reception of steam or hot water, by which to heat the gum contained in the cylinder to a desirable temperature for working. The die C at the end of the cylinder is of the same size internally as the intended size of the exterior of the covering of the wire, and the said die is capable of being unscrewed from the cylinder to permit the substitution of others of different sizes, according to the desired size of the exterior of the gum covering.

Wire to be covered with vulcanized gum by this machinery, if of copper, should be previously tinned or coated with some substance upon which sulphur does not act, to protect it against the action of the sulphur employed in vulcanization. The wire is to be supplied to the machine from a reel and led over a guide-pulley, on which is placed a friction-brake to regulate the proper degree of tension with which it enters the machine. The mandrel I is adjusted with its taper point in such relation to the taper part *a* of the cylinder as to leave a space between them for the passage of the gum in proportion to the size of the die C and of the wire and the thickness of the covering of gum required.

The operation of covering wire by this machinery is as follows: The gum, having been first ground and either composted with sulphur or not, according as it is to be vulcanized or not, by means of the ordinary heated rollers or grinders, in the manner commonly practiced in the india-rubber manufacture, and while yet warm, is rolled up into rolls of suitable size to enter the throat *c*, and so introduced into the cylinder, which is heated to a desirable temperature by means of the steam or water in the jacket J. When the cylinder has been filled by turning the screw B in the direction of the arrows shown in Fig. 2, and so causing the said screw to feed the gum forward as fast as it is introduced thereinto, the end of the wire is introduced through the hollow mandrel I, through the rear end thereof, until it is seen to protrude through the die C, when a continuous rotary motion at a suitable speed is given to the shaft G, which, by means of the endless screw F and worm-gear E, gives a corresponding motion to the screw B, which is thus made to compress and feed the gum steadily forward in the cylinder and around the end of the mandrel, and force it into and through the die C, causing it in its passage to envelope and carry forward the wire, which issues from the die properly covered. The covered wire may be received upon an endless apron or band, which, if the covering is to be vulcanized, carries it to a cylinder, around which there is formed a series of half tubes or molds, arranged spirally or in screw-form, which cylinder, when filled, has the wire upon it cut off, and is placed in the heater in which the vulcanizing process is completed. During the operation of the machine gum may be introduced to the cylinder through the throat *c* and into the cavity *b* as often as may be necessary without stopping the operation of the machine, as the gum so introduced is caught by the thread of the screw, as it passes the cavity *b*, and carried forward through the cylinder, and hence the operation is made perfectly continuous, and a piece of wire of any length may be covered.

When it is desired to make tubes or hoes a die, C, of proper size, is placed on the machine, and a mandrel slightly larger than the hole required in the tube is run through the hollow mandrel I and allowed to project, say, one-quarter of an inch beyond the end or external orifice of the die, and there held central and stationary while the gum is forced through the annular space between it and the die to form the tube or hose. I find in the case of gum which requires vulcanizing it is best to charge or fill the tube or hose with pulverized soapstone, plumbago, or any other substance that will distend it, and so keep it in shape during the period of vulcanization. If it is required to line the tube with cloth, it requires the hollow mandrel to be of an internal diameter as much larger than the exterior of the inner mandrel above mentioned as the thickness of the cloth, and the cloth in the form of a ribbon is passed between the two mandrels at the rear of the cylinder, where the mandrel is secured in the same manner as the hollow one at a point in rear of the latter, leaving the space between them open. Articles of any other form may be used by substituting dies of suitable form for the dies C; and in making some articles the mandrel may not be necessary.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a cylinder, A, a hol-

low screw, B, and a central mandrel, C, passing through the hollow screw, substantially as herein specified.

2. The construction of the cylinder A, containing the screw B, with a throat, *c*, and internal cavity, *b*, arranged substantially as and for the purpose specified.

3. Feeding the wire to be covered with the gum by the movement of the gum itself, produced by the screw B or other device for forcing it through the forming-die, substantially as herein specified.

THOMAS SAULT.

Witnesses:

AUSTIN G. DAY,

HENRY BRADLEY.