(No Model.)

T. J. HOLMES.

MANUFACTURE OF COMPOUND TUBES.

No. 275,826. Patented Apr. 17, 1883.

Fig. 1.

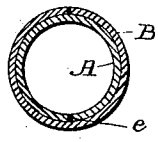


Fig. 2.



Fig. 3.



Fig. 4.

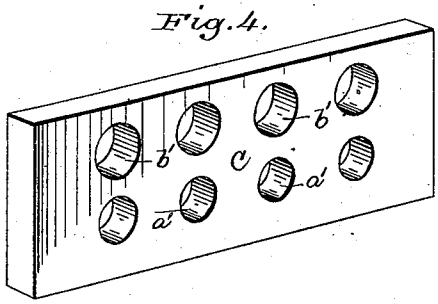


Fig. 5.

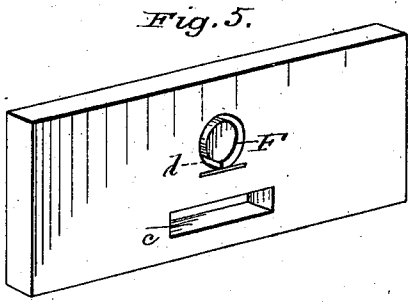


Fig. 6.

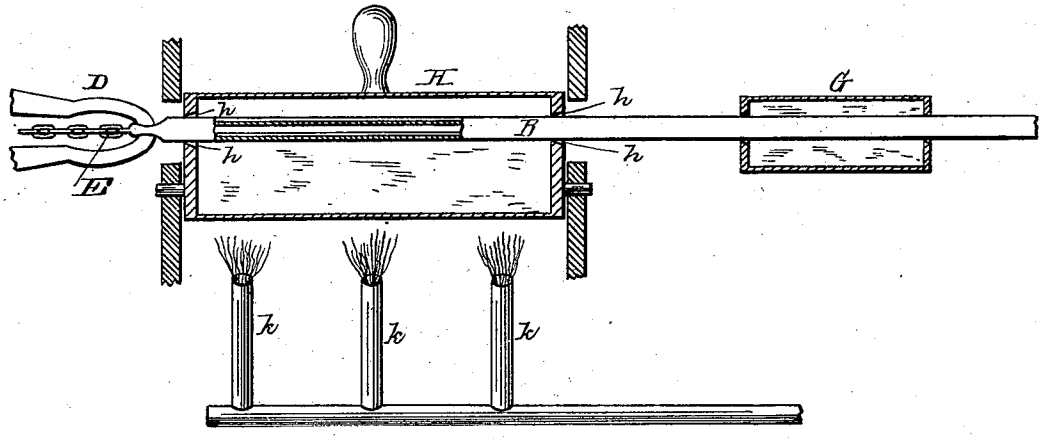


Fig. 7.

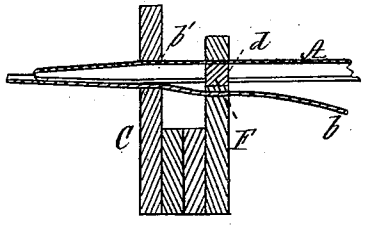
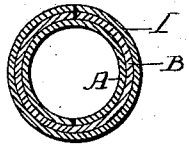


Fig. 8.



Witnesses:

W. B. Masson

E. E. Masson

Inventor:

Thomas J. Holmes,

pr. Norman W. Stearns,

Atty

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

THOMAS J. HOLMES, OF BOSTON, MASSACHUSETTS.

MANUFACTURE OF COMPOUND TUBES.

SPECIFICATION forming part of Letters Patent No. 275,826, dated April 17, 1883.

Application filed May 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. HOLMES, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in the Manufacture of Compound Tubes of Small Diameter; 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.

Figure 1 is an enlarged transverse section through a compound tube of small diameter, said tube being composed of an inner and an outer tube. Figs. 2 and 3 are skelps of sheet metal of the required widths to form respectively the inner and outer tubes of the diameters desired, one end of each skelp being tapered to admit of its entrance within the perforation in the die-plate, through which it is to be drawn. Fig. 4 represents the die-plate with its various-sized perforations. Fig. 5 is an enlarged transverse section through a guide which I employ. Fig. 6 is an enlarged longitudinal section through a compound tube as it is being drawn through the flux-trough and soldering-receptacle. Fig. 7 is a longitudinal section through the die-plate and guide. Fig. 8 is an enlarged transverse section through a compound tube formed by the union of three tubes.

My present invention relates particularly to the mode of making compound tubes of small diameter, employed in the manufacture of various surgical and toilet instruments, such as atomizing-tubes, perfume-jets, &c.; and this invention consists in the several successive stages of manipulation or method of construction, and in certain mechanical devices employed therein, to be hereinafter fully described and specifically claimed.

I first take a strip, *a*, usually termed a "skelp," of sheet-brass or other suitable metal, of the required length and width for the formation of the inner tube, A, and cut one end of the same tapering, as seen in Fig. 2, or press together the edges of this end to enable it to enter the perforation *a'* in the die-plate C of the required diameter. I then draw this skelp *a* through its die by grasping its forward end with a pair of pinchers, D, attached to an endless belt or chain, E, the drawing operation serving to close or nearly close the longitudinal edges together. Next I take a skelp, *b*, of the required width and length to form the outer tube, B, and taper or bend its forward end so as to enter it within a perforation, *b'*, in the die-plate C, of corresponding size, previously conducting the end of the skelp *b* within a space, *c*, under a guide, F, of the form seen in Fig. 5, and located near to and parallel with the die-plate C, said guide being provided with a central circular plug of a diameter corresponding to that of the interior of the inner tube, and having a thin bridge or knife-edge, *d*, extending vertically down therefrom, the said space *c*, below the guide, for the introduction and passage of the outer skelp, *b*, being in a line with that of the direction of the draft. I now guide, Fig. 7, the front end of the inner tube down upon the outer skelp, *b*, the position of the seam *e* of the inner tube, A, being directly under the point where the seam of the outer tube is to be formed, the end of the inner tube and the end of the outer skelp projecting through the die-plate sufficiently to enable them to be simultaneously grasped and pressed together by a pair of pliers attached to and drawn forward by an endless chain, E, or other suitable device, by which operation the seam of the outer tube, B, is closed or nearly closed. Next I cut off the forward end of the compound tube and cleanse the longitudinal edges of the seam of the outer tube by drawing it through a soldering-flux located in a trough, G, to adapt them for the reception of the solder, Fig. 6. Afterward I enter the compound tube within two circular openings, *h*, in the opposite ends of a receptacle, H, containing melted solder, located in line with the axis of the guide F and die C, and so pivoted as to be capable of being tipped or vibrated to one side, the openings being located at such height as to be above the melted solder when the vessel is tipped to one side, in order that the tube may be entered without allowing the solder to pass within it, after which the vessel is tipped in the opposite direction to cause the solder to flow over and lodge upon and "sweat" the seam, Fig. 6. The compound tube is finally passed through a finishing-die, which still further compresses it and reduces its di-

ameter and gives a smooth and bright appearance to its outer surface.

After forming the outer tube around the inner tube, instead of conducting the compound tube through the solder in the vibrating receptacle, as described, the solder may be applied to the seam after or at the time of the application thereto of a solution of borax to cleanse the surface; or the solder may be applied in any other manner well known in brazing; but I prefer the employment of the vibrating vessel containing the melted solder, owing to the facility of the operation and because no particle of solder can enter and obstruct the interior of the inner tube.

The solder in the receptacle H may be kept in a molten state by a series of gas-jets, *k*, located thereunder, Fig. 6. Where more than ordinary strength is required I may form a third tube, I, (see Fig. 8,) outside the second tube, B, in a manner similar to the formation of the second tube over the first or inner tube, the solder which seals the seam of the second or middle tube being made to sweat upon and around the interior of the seam of the outer tube.

For some purposes—for instance, to fill up the space between two objects and serve as sleeves or bearings—the soldering or sweating of the seam of the outer tube may be dispensed with, the drawing of the skelp of the outer tube through its die closing the edges sufficiently for such purposes.

The smaller the tube to be drawn the nearer the guide F should be placed to the die-plate C; or the guide may even be located against the latter to prevent any possibility of the twisting of the inner tube before the outer tube is formed around it. The thickness of the die-plate should be such as to afford a sufficient bearing-surface to insure the proper closing of the outer skelp, *b*, around the inner tube.

I claim—

1. The within-described method of forming compound tubes, consisting in first making the inner tube by drawing its skelp through a die, next guiding the inner tube, and guiding and drawing through a die the skelp to form the outer tube, with the inner tube located thereon, the seam of the inner tube being situated to one side of the seam of the outer tube, then soldering the outer seam, and finally smoothing and polishing the outer surface of the compound tube by drawing it through a finishing-die, as set forth.

2. The guide F, in combination with the die-plate C and a mechanism for drawing the tubes, substantially as described.

3. As one of the elements of an organized mechanism for manufacturing compound tubes, a soldering-receptacle, H, with the circular openings *h h* at opposite ends thereof in line with the guide F and die-plate C, and so pivoted as to be capable of being tipped or vibrated to one side to allow the molten solder to be laid upon the seam of the outer tube, B, in combination with a means of melting the solder, as and for the purpose set forth.

Witness my hand this 24th day of May, 1882.

THOS. J. HOLMES.

In presence of—
J. C. BOWKER,
GEO. W. MAY.