M. G. WILDER.

Making Metal Tubing.

No. 47,888. Patented May 23, 1865.

Fig. 3.

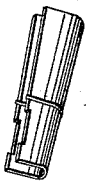


Fig. 4 a.

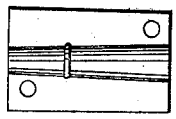


Fig. 7.

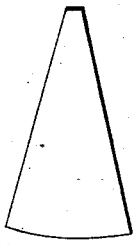


Fig. 2.

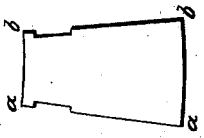


Fig. 5.

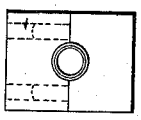


Fig. 1.

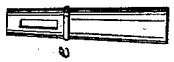
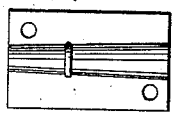


Fig. 6.

Fig. 4.



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UNITED STATES PATENT OFFICE.

MOSES G. WILDER, OF WEST MERIDEN, CONNECTICUT.

IMPROVEMENT IN FORMING TUBES OF SHEET METAL.

Specification forming part of Letters Patent No. **47,888**, dated May 23, 1865.

To all whom it may concern:

Be it known that I, MOSES G. WILDER, of West Meriden, in the county of New Haven and State of Connecticut, have invented a new and useful Process of Forming Tubes of Thin Sheet Metal; 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, in which—

Figure 1 represents a view of a wick-tube constructed according to my invention. Fig. 2 represents a plan of the sheet-metal blank of which it was formed, and Fig. 3 represents a perspective view of the intermediate form into which the blank is bent previous to its ultimate compression. Figs. 4 and 4ª represent face views of a pair of dies for forming wick-tubes according to my invention, and Fig. 5 represents an end view of the dies applied to each other. Fig. 6 represents a view of a tube for an oil-feeder, and Fig. 7 represents a plan of the sheet-metal blank of which it was formed.

Tubes of thin sheet metal, such as wick-tubes and tubes for oil-feeders, have hitherto been formed on a large scale of blanks bent into a tubular form, and with the edges of the sheet metal either lapped or butted at a longitudinal seam. According to the first of these ways the sheet-metal blank of which the tube is to be formed is cut so much broader than the development of the perimeter of the tube that when it is bent into a tube its edges overlap each other. The overlapping edges are then secured by solder. Tubes formed by this method are not round, and they depend upon the solder to render the seam tight and prevent them from being collapsed by external pressure. According to the second way the sheet-metal blank is cut no broader than the development of the perimeter of the finished tube, and the blank is bent upon a mandrel, and is subjected to the pressure of dies, by which the edges of the blank are caused to approach each other. The adjacent edges are then secured by solder. The result of this mode of operation is that the tube is never truly round, and the seam requires soldering to render it tight. Moreover, a mandrel is required to bend the metal upon.

I have discovered the fact that if the sheet-metal blank of which the tube is to be formed be cut somewhat broader than the development of the perimeter of the tube, so that the blank if merely bent to a cylindrical form would form a tube larger than the required tube, and be subjected in the operation of bending to sufficient pressure to compress the superabundant material into the perimeter of the required tube, the effect is that the tube may be formed perfectly circular without the use of a mandrel, that the material at the interior of the tube is so affected by the compression that the tube does not tend to open at the seam, and that the seam is rendered tight by the pressure, without the necessity of employing solder to secure it. The tube is also a stronger tube than can be formed in either of the previous ways, and can be crimped by endwise pressure, so as to secure it to a plate in which it is inserted without the use of solder. This new process of forming the sheet-metal tube by compressing a blank of superabundant size into the dimensions of the required tube, whereby the metal is shortened up or "upset," as it is technically termed, is the process which constitutes my invention.

In order that my new process may be understood, I will proceed to describe the formation of a wick-tube such as is represented at Fig. 1 according to it. The blank of which such a tube is to be formed is cut out of the thin sheet metal—tin-plate, for example—of the form represented at Fig. 2; but, instead of making the breadth of the sheet blank or the distance from the edge *a a* to the edge *b b* sufficiently greater than the development of the perimeter of the finished tube to permit the edges when the blank is bent to be overlapped according to the first of the before-mentioned old ways, and instead of making the said breadth equal to the development of the perimeter of the required tube according to the second of the before-mentioned old ways, the breadth is made about three one-hundredths of an inch greater than the development of the perimeter of the required tube, so that there is a superabundance of material to form a butted tube of the required size. If the finished tube is to have a bead upon it, as seen at *e*, the blank cut as above is first subjected to a pair of dies, which indent it at that part. The blank is then subjected to a pair of dies consisting, substantially, of a tongue and socket,

by which it is bent into the intermediate form shown at Fig. 3, the tongue and socket dies used for this purpose being counterparts of the interior and exterior of that intermediate form. This operation simply bends the material to a U form. The bent blank is next subjected to pressure in a pair of dies such as are shown at Figs. 4, 4^a, and 5, the surfaces of whose grooves form the counterpart of the finished tube, and have therefore a perimeter which is less than the breadth of the tube-blank. The effect of this pressure is, first, to bend the material into the circular form of the tube and cause the edges to approximate at a longitudinal seam; and, secondly, as the perimeter of the circular grooves of the dies is less than the perimeter of the blank, to compress or upset the superabundant material, thereby reducing its perimeter to the dimensions of the required tube.

The blank may be presented to the compressing-dies by hand or by tools, or by machinery devised for the purpose; and, instead of bending the blank into a U form before subjecting it to the compressing-dies, it may be bent into a circular form, if deemed expedient, and when so bent it may be presented to the compressing-dies by a stick or a metallic mandrel; but a mandrel is unnecessary for the purpose of completing the form of the tube, and the dies, tools, and machinery constitute no part of my invention, which consists of the new process above set forth.

When oil-feeder tubes such as are represented at Fig. 6 are to be made according to my invention, the blank, Fig. 7, is cut, as before described, broader than the development of the perimeter of the finished tube, so that there is a superabundance of material, which is upset by pressure in the finishing-dies, so that the perimeter of the finished tube measures less than the breadth of the blank.

The quantity by which the breadth of the blank should exceed the development of the perimeter of the finished tube depends upon the hardness and thinness of the metal, and also upon the size of the finished tube.

In using thin tin-plate, such as is usually worked into wick-tubes, and with tubes of the dimensions shown in the drawings at Fig. 1, I have found that an excess of three one-hundredths of an inch in the breadth of the blank gives satisfactory results; but I have also found that this excess may with thin sheet-copper be increased to eight one-hundredths of an inch without producing defective tubes.

The proper excess for a particular tube and a certain material is readily ascertained by cutting a blank slightly broader than the development of the periphery of the tube and subjecting it to the dies. If the breadth of the blank so cut be insufficient, the finished tube will not be circular, and the adjacent edges at the seam will form a ridge which is not a truly circular curve. The longitudinal seam also will not be closed at the exterior of the tube. If, on the other hand, the breadth of the blank be too great, the metal will be crimped at the seam, and the tube will not be truly circular. It is, therefore, easy to determine the proper size after one or two experiments; and when the proper size is determined all succeeding blanks may be cut of the same size.

Having thus described the mode of practicing my invention, I claim and desire to secure by Letters Patent—

The process of forming tubes of thin sheet metal by compressing blanks of greater breadth than the development of the perimeter of the required tube into that perimeter, substantially as set forth.

MOSES G. WILDER.

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