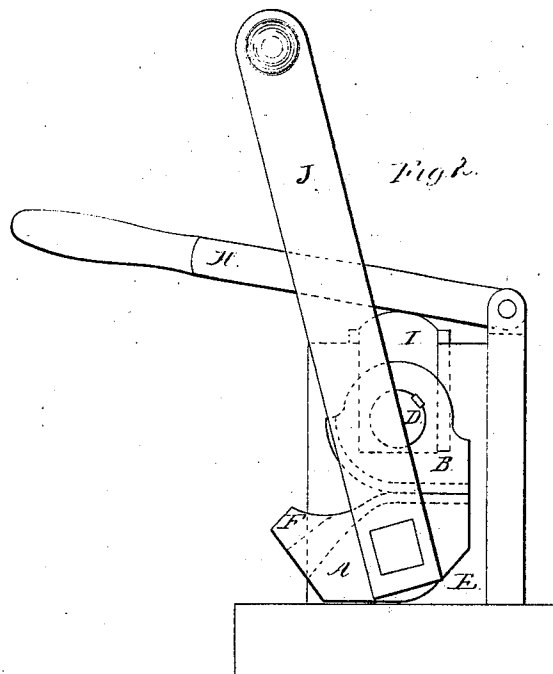
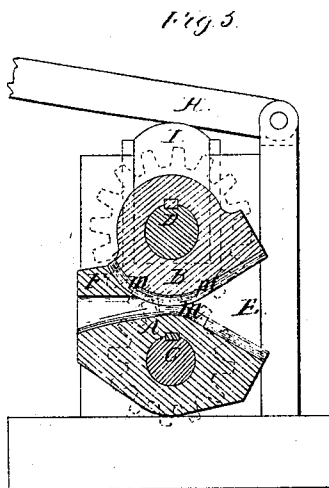
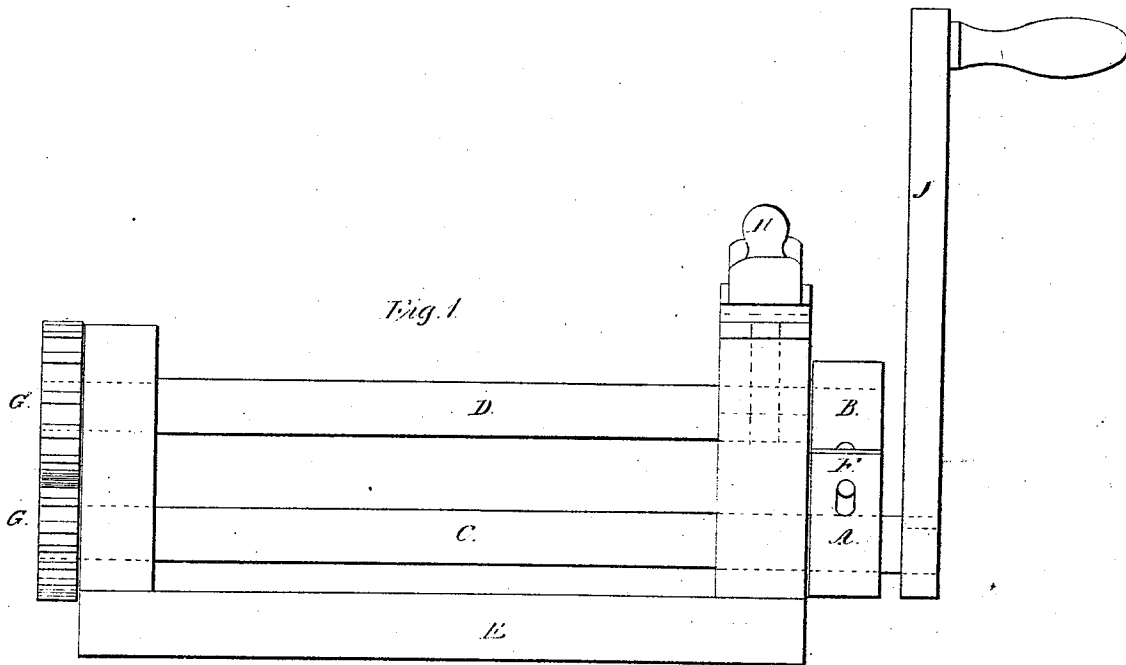


*M. G. Wilder.*

*Bending Metal Tubes.*

*N<sup>o</sup> 92, 134.*

*Patented Jun. 29, 1869.*



*Witnesses.*  
*H. L. Bennett.*  
*John Rachbone.*

*Inventor*  
*M. G. Wilder*  
*by his attorney*  
*E. S. Penwick.*

# United States Patent Office.

MOSES G. WILDER, OF WEST MERIDEN, CONNECTICUT, ASSIGNOR TO NATHAN F. GRISWOLD AND GEORGE F. SEARLES, OF SAME PLACE.

*Letters Patent No. 92,134, dated June 29, 1869.*

## IMPROVED MACHINE FOR BENDING TUBES.

The Schedule referred to in these Letters Patent and making part of the same.

*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 Machine for Bending Tubes; and that the following is a full, clear, and exact description and specification of my said invention.

The object of my invention is particularly to bend tubes of thin sheet-metal, such as the tapering beaks of oil-feeders, but the invention is applicable to the bending of tubes for other purposes.

Tubes of thin metal have hitherto been bent while supported internally either upon a filling or core of pitch, or some equivalent substance, or upon a flexible mandrel, so that the tube was prevented from collapsing or crimping by the article within it.

I have discovered that such tubes may be bent by the use of proper rolling-dies, without the necessity of employing a core, filling, or mandrel, and my new machine operates upon this principle.

My machine is composed of certain combinations of the following instrumentalities, viz:

First, two grooved dies, which are curved longitudinally, and have cavities or grooves, whose cross-sections are the counterparts of the bent tube to be produced.

Second, a bridle or clamp, by means of which the tube is compelled to remain in contact with one of the said dies, while being bent to its longitudinal curvature.

Third, shafts, or their equivalents, upon which said dies are mounted, so as to turn or roll.

Fourth, cog-wheels, or their equivalents, by means of which the dies are caused to maintain their proper relative positions during the bending of the tube.

Fifth, a lever, or its equivalent, by means of which the dies can be pressed towards each other.

Sixth, a lever, or its equivalent, by means of which the dies can be caused to exert a rolling action upon the tube submitted to them.

In order that my invention may be fully understood, I have represented in the accompanying drawing a machine embodying all parts of my invention, and I will proceed to describe the same, after which I will specify the instrumentalities composing each of my new combinations.

Figure 1 represents a side view of the machine;

Figure 2 represents an end view of it; and

Figure 3 represents a transverse section of it through the dies and bridle.

The dies A B of this machine are secured to ends of two shafts, C D, which are constructed to turn in bearings in a frame, E.

One of the dies, which, in this example, is the lower die A, has the longitudinal curvature of the bent tube; and as the tube is bent to the curved form of this die, it may be termed the forming-die.

The other, or upper die, B, is so curved as to roll upon the lower die A; and as the office of this die is to press the tube to the form of the forming-die, when the two are turned in concert, this second die, B, may be termed the bending-die.

Each of the dies has a cavity, *m*, formed in its face, corresponding in cross-section with the cross-section of half of the tube.

The forming-die A has a bridle, F, connected with it; the bridle and die being formed, by preference, of one piece of metal, as they are in the machine represented in the drawings.

The shafts C D of the two dies are connected by cog-wheels, G G', so that when one die is turned, the other is compelled to turn correspondingly.

The lever H, by which the dies can be pressed towards each other, is arranged to operate upon one of the bearings, I, of the shaft D of the bending-die B; and the lever J, by which the dies are caused to exert a rolling action upon the tube, is connected, in this example, with the forming-die A, and though it, and the shafts and cog-wheels, with the bending-die B.

In using this machine, the two dies are set as represented in figs. 1 and 3, and the tube to be bent is entered into the cavities of the dies by inserting it endwise under the bridle F.

Then, one hand of the operator is applied to the lever H, to exert pressure upon the dies, and the other hand is applied to the lever J, to cause them to roll upon the tube.

As the bridle F holds the tube in contact with the forming-die A, the outer end of the tube cannot rise from that die, and consequently the effect of the movement of the bending-die upon the lower, is to press the tube into the cavity of the latter, and cause the tube to conform to the longitudinal curvature of the forming-die.

Moreover, as during this operation the cavities of the two dies embrace the tube, it cannot flatten nor collapse.

If a straight tube, of uniform section throughout, is to be bent, the cavities of the dies must be of uniform section, or thereabouts, throughout their length, and if the tube is tapering, the cavities of the dies must be tapered in a corresponding manner.

If the tube has a longitudinal seam, that seam should be placed in the bottom of the cavity of the forming-die; but if the seam be soldered, this precaution is not always necessary.

The machine described by me is one which I have used with success; but I do not restrict my invention to a machine of this precise form and arrangement, as modifications may be made without changing the invention.

Thus, for example, the machine might be so constructed that the forming-die A, with its bridle, re-

mained stationary, while the bending-die might be caused to roll over and along the forming-die.

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

1. The combination of the two grooved dies, constructed to roll upon the tube, and the bridle for holding the tube to one of the dies, substantially as before set forth.

2. Also, the combination of the said grooved dies and bridle with cog-wheels, by which one die is caused to roll upon the other, substantially as before set forth.

3. Also, the combination of the said grooved dies, bridle, and cog-wheels, with shafts, substantially as before set forth.

4. Also, the combination of said grooved dies and

bridle with a lever, by which the dies are pressed together, substantially as before set forth.

5. Also, the combination of the said grooved dies and bridle, with a lever, by which the dies can be caused to exert a rolling action upon the tube, substantially as before set forth.

6. Also, the combination of the said grooved dies and bridle with two levers, one for pressing the dies together, and the other for causing them to exert a rolling action, substantially as before set forth.

In testimony whereof, I have hereto set my hand, this 9th day of September, A. D. 1868.

Witnesses:

MOSES G. WILDER.

RATCLIFFE HICKS,

BENJ. P. FOOTE.