(No Model.)

2 Sheets—Sheet 1.

J. GOULD, Jr.

MACHINE FOR MAKING SHEET METAL TUBES.

No. 519,182. Patented May 1, 1894.

Fig. 1.

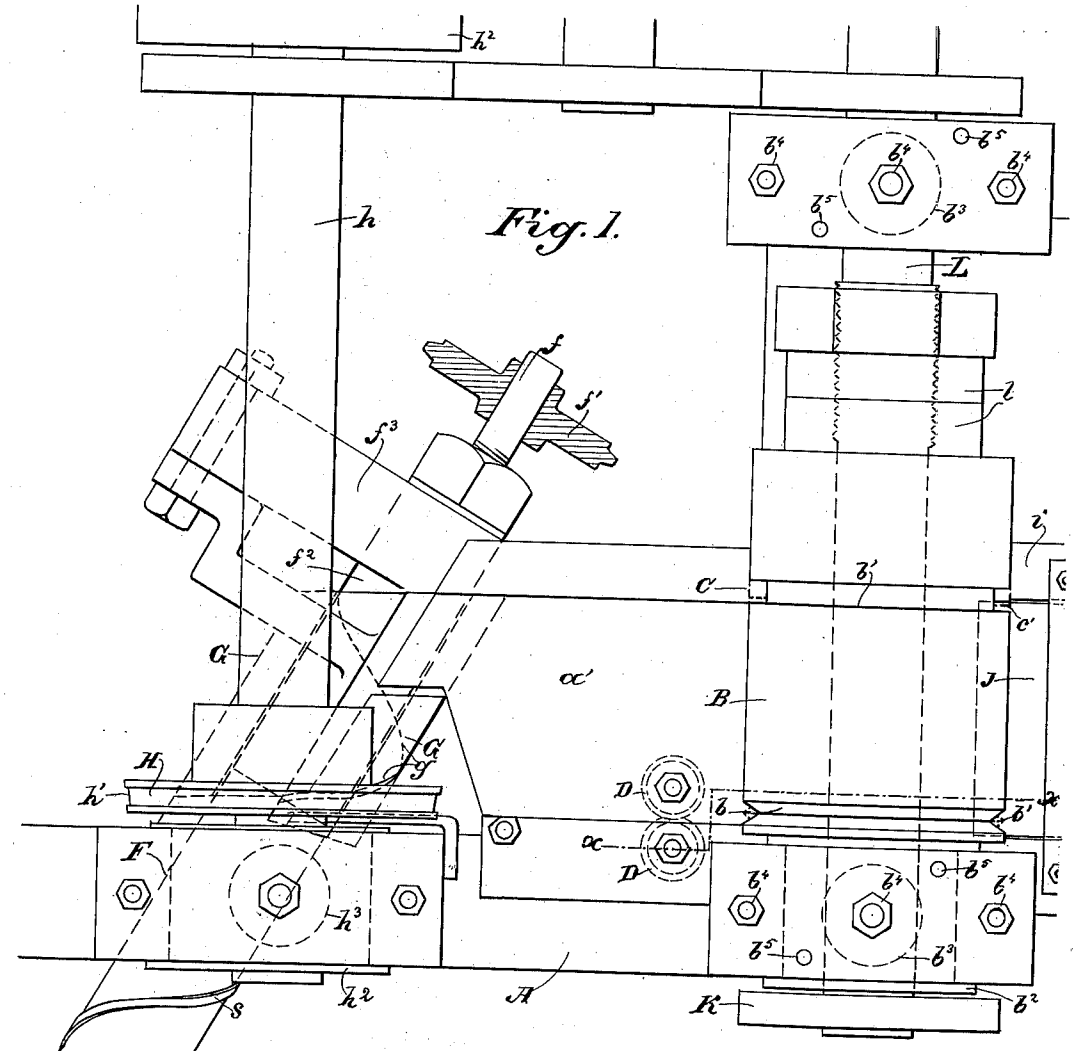
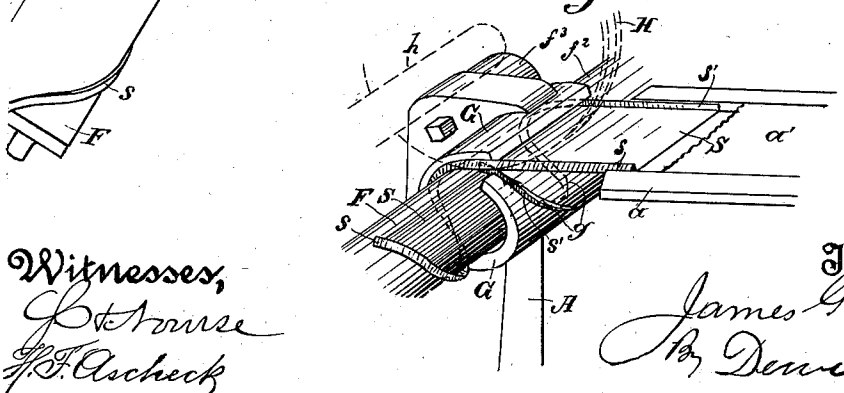


Fig. 2.



Witnesses,
C. Sedgwick
H. F. Ascheck

Inventor,
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By Dewey & Co.
attys.

(No Model.)

2 Sheets—Sheet 2.

J. GOULD, Jr.

MACHINE FOR MAKING SHEET METAL TUBES.

No. 519,182. Patented May 1, 1894.

Fig. 3.

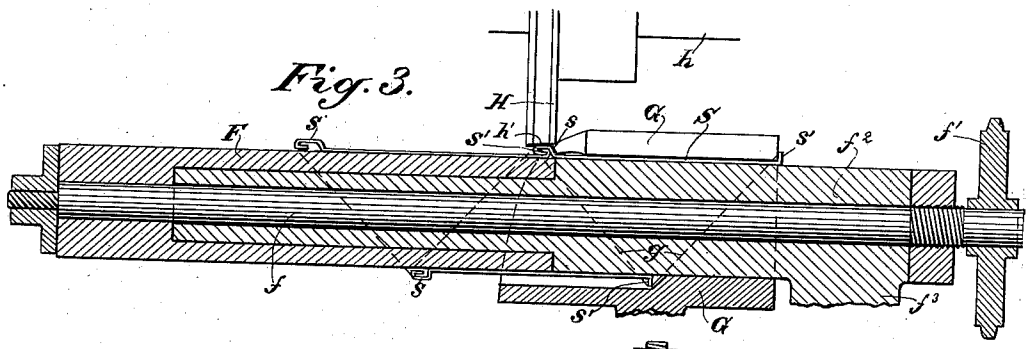


Fig. 4.

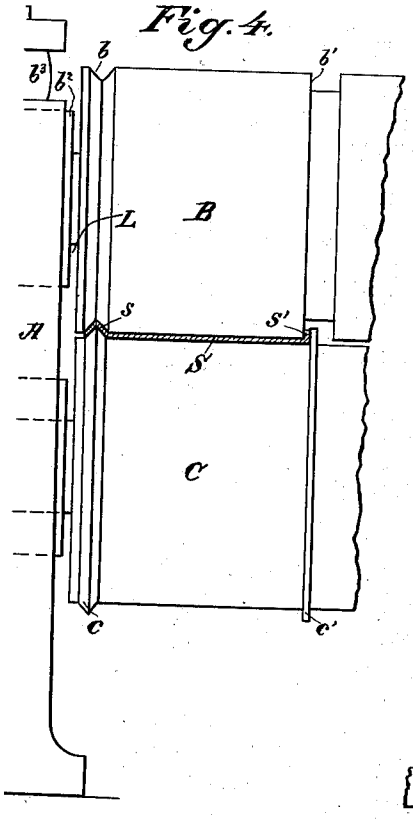
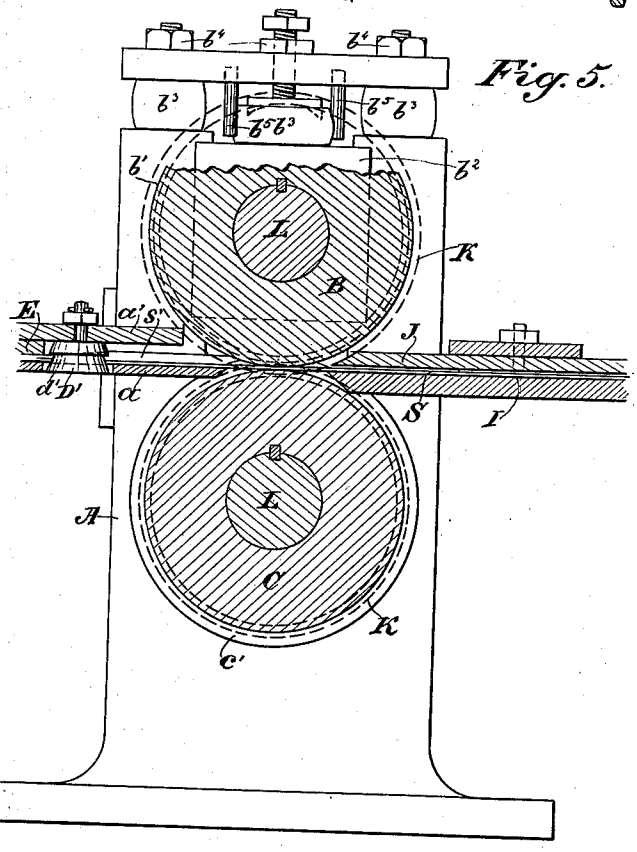


Fig. 5.



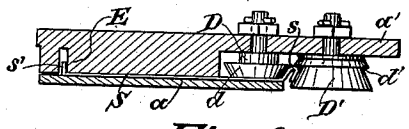


Fig. 6.

Witnesses,
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UNITED STATES PATENT OFFICE.

JAMES GOULD, JR., OF OAKLAND, CALIFORNIA.

MACHINE FOR MAKING SHEET-METAL TUBES.

SPECIFICATION forming part of Letters Patent No. 519,182, dated May 1, 1894.

Application filed October 23, 1893. Serial No. 488,946. (No model.)

To all whom it may concern:

Be it known that I, JAMES GOULD, Jr., a citizen of the United States, residing at Oakland, Alameda county, State of California, have invented an Improvement in Machines for Making Sheet-Metal Tubes; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of machines for making tubes of sheet metal, in which the metallic sheet is fed between rolls having dies for forming and shaping flanges upon its edges, and is then directed by a spiral sleeve to and wound spirally upon a mandrel inclined to the axes of the feed rolls, the flange on one edge of the outleading fold of the sheet engaging the flange upon the other edge of the inleading fold, said engaging flanges being then flattened down together to form the seam, by means of an overlying presser wheel.

My invention consists of the constructions and combinations of devices which I shall hereinafter fully describe and claim.

Figure 1 is a plan of my machine. Fig. 2 is a perspective detail of the directing sleeve and winding mandrel. Fig. 3 is a longitudinal section of the mandrel. Fig. 4 is an elevation of the feed rolls. Fig. 5 is a cross section on line x—x of Fig. 1. Fig. 6 is a detail of rollers D and D′.

A is the main frame.

B and C are the feeding and edge flange forming rolls. The roll B has at one end a V-grooved counter die b with which a correspondingly shaped die c on roll C engages, whereby the edge of the metallic sheet S, passing between them is formed into a V-hook s. The other end of roll B has a straight faced shoulder b', which is overlapped by a straight faced die c' on the end of roll C, whereby that edge of the sheet S, is bent into a straight flange s'. Beyond these rolls is a platform plate a and an overlying cover plate a', both secured properly to the main frame and forming a passage between them. Under the cover plate are journaled horizontal rollers D and D′. The roller D has a plain beveled face d and the roller D′ has also a beveled face, but broken by a circumferential offset d'. The faces of these rollers are separated by a space in which the hook flange s of the sheet S passes, whereby said flange is bent outwardly, thus forming a hook better adapted to receive the straight flange s' of the sheet in the spiral winding of the sheet as I shall hereinafter explain. The object of the offset d' of roller D′ is to receive the bearing of the upper end of the hook flange s and to form a stop therefor. Under cover plate a' is also secured a guide plate E, the edge of which receives and guides the straight flange s' of the sheet, as it travels on.

F is the winding mandrel mounted suitably in the frame and adapted to have a rotary motion imparted to it. This mandrel is set at the proper inclination to the axes of the feed rolls and the direction of travel of the sheet S, to enable the latter to wind up spirally upon it, and to bring the straight flange s' of a previous and outleading fold of the sheet up into engagement with the hook flange s of a succeeding inleading fold of said sheet. Partially encircling the mandrel is the fixed directing sleeve G, separated from said mandrel by a space through which the sheet passes. This sleeve is spirally directed and is divided into two spaced sections forming the spiral slot g between them to receive and permit the passage of the straight flange s' of the sheet. Upon a shaft h is mounted a presser wheel H, the periphery of which is provided with a groove h' which receives the loosely engaging flanges s and s' of the sheet and bears down upon them to press them against the mandrel and flatten and interlock them.

I is a grooved or channeled feed-table to direct the sheet to the rolls B and C. Over the channel of this table, just in advance of the rolls is a guard plate J, which serves to direct the sheet with precision to the rolls.

Before proceeding to describe various details of construction relating to the several parts heretofore mentioned, it will be well to set forth the general operation of the machine.

The sheet of metal is directed by the feed table I and guard plate J to the rollers B and C. Passing between these it is fed forward by them and is, by means of their dies and shoulders, formed with the hook flange s on one edge, and with the straight flange s' on the other edge. The hook flange s is subse-

quently, by the action of the rollers D and D′, shaped more suitably, as described, and then the sheet reaching the mandrel enters the space between the sleeve G and the mandrel, the hook flange of the sheet passing along the end of the sleeve and its straight flange passing through the spiral slot. On account of the inclination of the mandrel to the axes of the feed rolls and the travel of the sheet, the latter being directed by the sleeve and being positively drawn forward by the rotation of the mandrel, will wind up spirally upon said mandrel. The straight flange s' of the sheet, by reason of the guidance of slot g will uprise directly under and into the hook flange s of the inleading fold of the sheet, and immediately the wheel H will press and flatten the two flanges together, the necessary rolling contact being provided by the rotation of both wheel and mandrel. This whole operation is a continuous one, the sheet winding up on the mandrel and being gradually fed off its free end. In this operation, the rotation of the mandrel is to be noted as an improvement over the common practice of forcing the sheet from behind, to coil or bend around a stationary mandrel. In such an operation the least obstruction will stop the forming of the tube, but in my device, in addition to the feed of the rolls from behind, there is the positive pull and feed of the rotating mandrel, which renders the travel and winding of the sheet positive and certain. The upper roll B is mounted in vertically movable boxes b^2 controlled by cushions b^3 and set screws b^4. In this connection the limiting bar or stop b^5 is to be noted. This is a depending piece which is properly set to lie just over the movable boxes b^2 of the upper roll B, and to limit their upward movement at a proper point. This point is determined by the clearance in the space between the directing sleeve G and the mandrel F. This clearance must be sufficient to allow the joints or seams by which the sheets are connected into a continuous strip, to pass freely. These joints or seams are of unequal thickness and if the upper roll B were unlimited in its yielding movement upwardly, it would permit seams to pass which would be too large for the space between the sleeve and mandrel. But by limiting the upward movement of the roll by means of the stop b^5, the sheet joints or seams are all reduced and pressed down to a size which will enable them to pass freely through said space. The rolls B and C are driven by means of suitable intermeshing gears K.

In order to provide for different widths of sheets, the rolls B and C are mounted removably upon their shafts L, which are made long enough to receive rolls of different lengths, and removable washers l are packed in to secure the different rolls. By diminishing and increasing the number of these washers rolls of different lengths may be fitted and secured upon the shafts. For a like purpose of receiving sheets of different widths, the channel of the feed table I is adapted to be widened by setting over that boundary i which lies on the straight flange side of the sheet.

The mandrel may be mounted in any suitable manner. I have herein shown it as consisting of a cylindrical body secured upon a spindle f to which a rotary motion is imparted as by power transmitted to the sprocket pulley f' upon its end. The spindle is mounted in a fixed bearing f^2 carried and secured in a bracket f^3, and upon one end of this bearing the inner end of the mandrel is journaled and guided. This construction provides a simple and extensive bearing for the mandrel, the outer end of which is necessarily unsupported. The shaft h of the presser wheel H is mounted in sliding boxes h^2 controlled by cushions h^3.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a machine for making tubes by winding spirally a series of metallic sheets, the combination, with a mandrel and directing sleeve separated from each other, of the upper and lower feed rolls for said sheet, said upper roll being mounted in vertically movable boxes controlled by cushions and set screws at both ends, and the depending pieces located between the cushions of each movable box and having their lower ends disposed just over the said boxes and adapted to arrest the movement of the boxes beyond a distance approximately equal to the clearance in the space between the mandrel and directing sleeve whereby the seam is flattened to a uniform thickness before it enters said space.

In witness whereof I have hereunto set my hand.

JAMES GOULD, JR.

Witnesses:
S. H. NOURSE,
J. A. BAYLESS.