G. W. BLAKE.

Machine for Forming Tube.

No. 224,382. Patented Feb. 10, 1880.

Fig. 1.

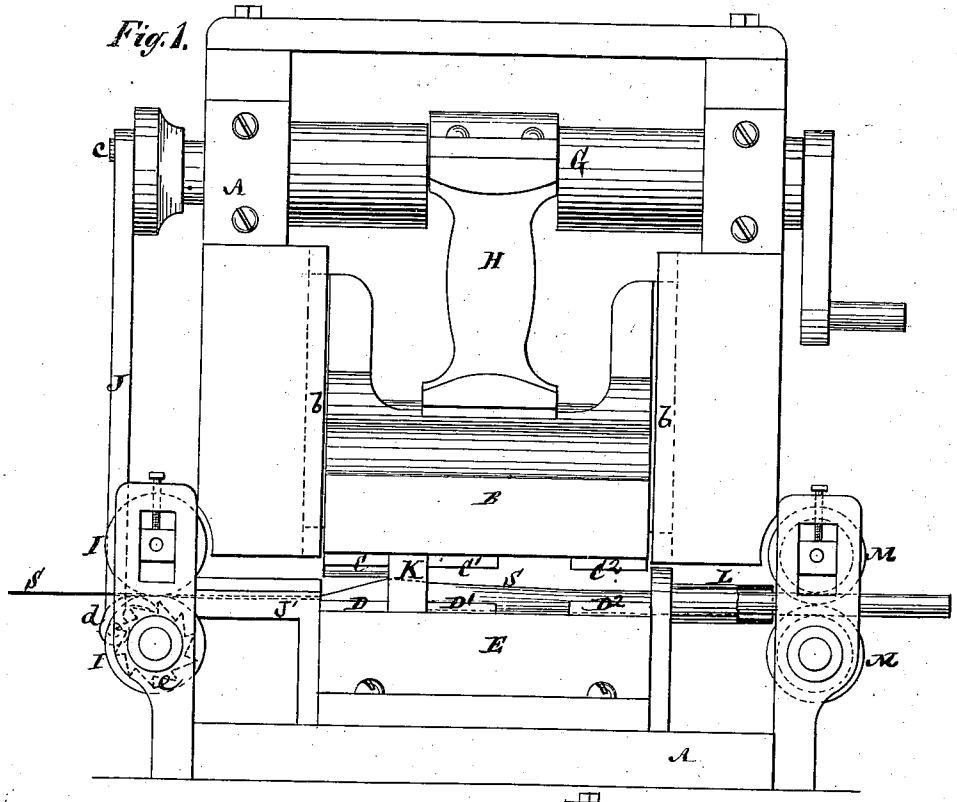


Fig. 3.

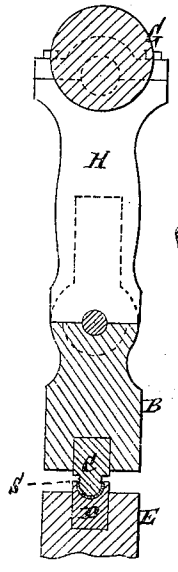


Fig. 5.

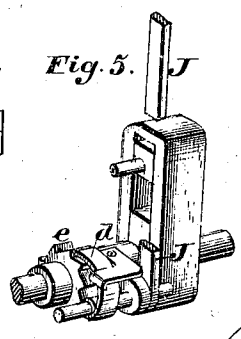


Fig. 2.

Fig. 3

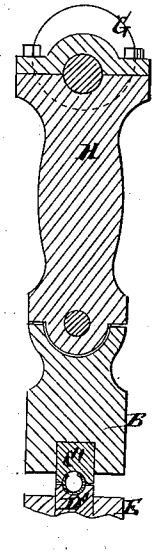


Fig. 4.



Witnesses:

Henry Eichling.

Henry T. Brown

Inventor:

George W. Blake

by his attorneys

Brown & Brown

UNITED STATES PATENT OFFICE.

GEORGE W. BLAKE, OF NEW YORK, N. Y., ASSIGNOR TO JOHN T. KELLY AND GEORGE M. JONES, OF PITTSBURG, PA.

MACHINE FOR FORMING TUBES.

SPECIFICATION forming part of Letters Patent No. 224,382, dated February 10, 1880.

Application filed July 11, 1879.

To all whom it may concern:

Be it known that I, GEORGE W. BLAKE, of the city and State of New York, have invented a new and useful Improvement in Machines for Forming Tubing, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

The machine which is the subject of this invention is more particularly designed for making sheet-metal tubes which are left open or unsoldered at their longitudinal joints—as, for instance, circulation-tubes of radiators and tubes for bell-wires and other purposes; but the tubes produced by it may have their longitudinal joints subsequently soldered or otherwise closed, if desired.

One of the objects of the invention is to produce, in a cheap and rapid manner, by a process of stamping or swaging, tubes as above of any length, only limited by the length of the plate or strip of which they are formed, and of an inferior and cheaper quality of iron than is necessary for the making of sheet-metal tubes by a drawing process.

The invention generally consists in certain novel combinations of devices for feeding the plate or strip of which the tube is formed, for breaking down said plate or strip to prepare it for being formed into a tube, for subsequently closing it or forming it into a tube, and ultimately for delivering it as a completed tube, all of which operations are performed successively during the passage of the strip through the machine, substantially as hereinafter described.

In the accompanying drawings, Figure 1 represents a front view of a machine constructed in accordance with this invention. Fig. 2 is a feeding-end view of the same; and Figs. 3, 3*, and 4 are vertical transverse sectional views of the swage or swages and devices immediately connected therewith for breaking down the strip, primarily shaping and closing it, and subsequently further closing and forming or completing the tube. Fig. 5 is a detached perspective view of the pawl, ratchet, and pitman for operating the feed-rolls.

A is the main frame, of any suitable construction. B is a cross head or slide, carrying the upper swages, C C′ C^2, at suitable distances apart in direction of the width of said cross-head, and arranged over or opposite corresponding lower swages, D D′ D^2, in a base-block, E. Said cross head or slide B is arranged to work up and down within guides *b b* in the sides or uprights of the main frame, and receives its motion by or from a rotating crank-shaft, G, and pitman H.

I I are feed-rolls at one end of the machine, one of which has an intermittent motion by means of a pitman, J, from a crank-pin, *c*, on one end of the shaft G, a driving-pawl, *d*, and a ratchet-wheel, *e*, on the shaft of said roll. The feeding motion of said roll takes place during each upstroke of the cross-head B, each intermittent feed not exceeding the length of the swages C C′ C^2 and D D′ D^2.

The plate or strip S to be formed into a tube is introduced in a flat form between the feed-rolls I I, by which it is passed in due course through a guide, J′, and from thence under the first upper swage, C, and over the first lower swage, D. These swages, as the cross-head B descends, serve to break down the strip and give it a U form, as shown in Fig. 3, and from these swages the bent tube passes in due course to and through a slotted clearer, K, which restrains the bent strip from being displaced by the upward motion of the swage C, and serves to guide it to the next lower swage, D′, which is of slightly smaller interior dimensions in its transverse section than the first lower swage, D, and the upper second swage, C′, instead of being of convex form like the first upper or breaking-down swage, C, is of concave shape similar to the lower swage, D′, so that when the swage C′ comes down it and the swage D′ give the plate a preparatory tubular or closed form, as shown. The strip thus closed next passes to the swages C^2 D^2, which are also of concave shape, and serve to further form and complete the tube. These several operations take place successively on the strip for or on short portions of its length at a time, equal to the lengths of the swages only, the intermittent feed of the strip occurring during the ascent of the cross-head which carries the upper swages. Leaving the last swages C^2 D^2, the tube into which the strip

has been formed next passes through a tubular conductor, L, and from thence through grooved delivery-rolls M M, which devices may assist in giving permanency or set and further finish to the tube, the delivery-rolls aiding in the passage of the strip by intermittent feeds through the machine, for which purpose one of said delivery-rolls is driven by a belt, *g*, passing round a pulley on the shaft of said roll and round a corresponding pulley on the shaft of the driven feed-roll I.

If desired, both of the feed-rolls and both of the delivery-rolls may have a positive motion.

The gradual pressure to which the strip is subjected by each pair of swages in succession and the detached arrangement of the several pairs of swages in direction of the feed insure the forming of the tube without severely straining the metal throughout the whole length of the strip, while the latter is accurately guided and held in position by the several dies and feed and delivery rolls.

To facilitate the passage of the strip over or through the lower swages and other parts it is desirable to smear it with oil before introducing it to the machine.

I claim—

1. The combination, with the cross head or slide, of a series of interrupted or detached upper swages carried by said slide and a corresponding series of lower swages, for operation in relation with the cross head or slide, substantially as described, whereby all the swages act simultaneously on the strip at different positions in the length of the latter as regards each pair of upper and lower swages to break down the strip and form it into a tube, as herein set forth.

2. The combination of a series of stationary and movable breaking-down and forming swages, in line with each other, with feed-rolls at one end of the series and delivery-rolls at the opposite end thereof, substantially as specified.

3. The combination of the crank-shaft G, the cross head or slide B, the upper breaking-down swage, C, and one or more upper closing-swages, C' C^2, the lower matching breaking-down swage, D, and one or more lower closing-swages, D' D^2, the feed-rolls I I, one or both of which have a positive motion, the tubular conductor L, and the delivery-rolls M M, one or both of which also have a positive motion, substantially as shown and described.

GEO. W. BLAKE.

Witnesses:

HENRY T. BROWN,

FREDK. HAYNES.