S. N. SMITH.

Making Eyelets.

No. 112,973. Patented Mar. 21, 1871.

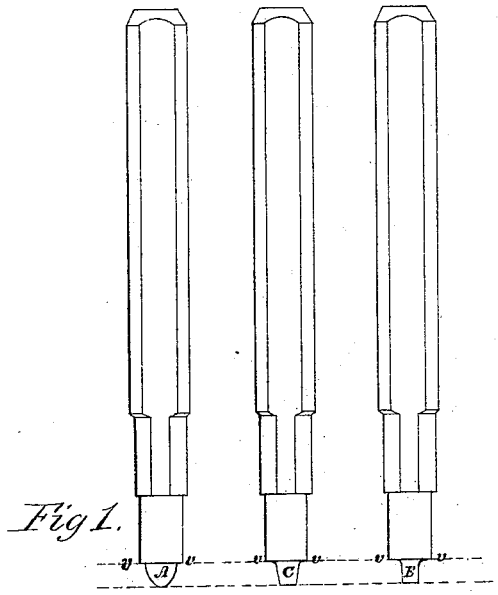

Fig 1.

Fig 2.

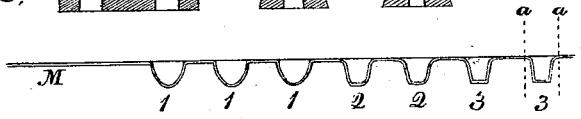

Fig 3.

Witnesses.

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STEPHEN N. SMITH, OF PROVIDENCE, RHODE ISLAND.

Letters Patent No. 112,973, dated March 21, 1871.

IMPROVEMENT IN THE MANUFACTURE OF EYELET-STOCKS.

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

I, STEPHEN N. SMITH, of the city and county of Providence and State of Rhode Island, have invented a certain Improvement in "Eyelet-Stock" and Tools for making the same, of which the following is a specification, in which—

Figure 1 is an elevation of a series of punches which constitutes the moving-tools for making my improved eyelet-stock.

Figure 2 is a cross-section of a series of dies constituting the stationary tools for the same purpose.

Figure 3 is a sectional view, longitudinally, of a piece of said eyelet-stock in the several stages of the development of the eyelet-shape.

Similar letters indicate corresponding parts in all the figures.

My invention relates to the manufacture of eyelets; and

The invention consists in a new process of forming the eyelet, and in a set of punches and dies specially constructed for carrying out or applying the process, and of which the following is a full, clear, and exact description.

My invention consists in at first projecting from the metal strip, by a single operation, a conoid containing the requisite quantity of the metal in greater bulk, and drawn to the full length of the proposed eyelet, and afterward contracting the diameter of the conoid by suitable means, and under circumstances that shall prevent any addition to the length of the barrel or tube of the eyelet, to the size and form of the eyelet.

In fig. 3 of the drawing—

M is the plain strip of metal.

1 1 1 are the conoids displaced therefrom.

2 2 are the conoids partially contracted laterally.

3 3, the same fully contracted to the form and size of the eyelet, which is separated from the strip by punching out the bottom or close end and cutting the flange from the strip in the usual way by the lines *a a*.

In thus, at first, projecting from the strip, at a single operation, the requisite quantity of metal drawn out to the full length for the eyelet, the entire stretching operation is performed at once, when the metal is in its original soft and malleable condition; and by projecting the metal in the form of a conoid, as shown, of larger bulk laterally than the proposed eyelet, it is only necessary to afterward contract or bend inward the outward swelling sides of the conoid to convert it into an eyelet shape, of which the length is already developed.

It will be perceived that the conoid 1 is of the full length of the complete eyelet-shape 3, but of greater bulk, its form in transverse section vertically being nearly a perfect parabola, and without any angles, and that this swelling bulk is disposed of by the after contracting operation in the formation of the spreading flange of the tapering barrel and square end of the eyelet-shape 3.

It will be understood that the full length and excessive bulk of this parabolic conoid 1 is developed from the strip at first, and by a single operation, when the metal is in its softest and most malleable condition, and most capable of undergoing the severe stretching consequent upon a sudden displacement of so large a quantity and bulk of metal from a flat condition, and that the parabolic-conoidal form of displacement is best calculated to stretch the metal uniformly from the apex to its base without liability to puncture or burst through the metal, at the same time leaving the uniformly-stretched metal in a position or form to be readily converted into the eyelet-shape by merely contracting its bulk, without any more stretching of the metal in any direction, so that the process of annealing to soften the metal between the operations is unnecessary.

This improved eyelet-stock, consisting of parabolic conoids, formed and contracted to the eyelet-shape on a strip of metal, may be successfully produced by means of the series of co-oporating punches and dies shown in figs. 1 and 2, of which the punch A co-operates with the die B to produce the parabolic-conoid form 1 in the flat strip.

The punch C co-operates with the die D to partially contract the conoid 1 and produce the approximate eyelet form 2 2, and the punch E co-operates with the die F to still further contract the metal shape 2 2 and produce the complete eyelet-shape 3 3.

It will be observed that the dies B D F resemble each other in form, and differ only in gradations of contraction; also, that the first punch A is a parabolic conoid in form, and that, in connection with its die B, it reproduces its form in sheet metal in the parabolic conoid 1 of the stock.

The punch C is frusto-conical in form, but of the same length as the coniodal punch A, and in connection with its die D it contracts the swelling bulk of the conoid 1 into the approximate eyelet form 2 2.

The punch E is cylindrical, and of the same length as the others, and, in connection with its die F, it still further contracts the form 2 2 to the complete eyelet-shape 3 3.

It will be understood that the parabolic-conoidal form 1 that is projected from the strip is due to the form of the punch A, over which the metal is stretched by being forced into the die B, the edge at the entrance of said die simply determining the size of the base of the conoid by pressing it sharply into the corner formed by the shoulder *v*, the distance between said shoulder and the apex of the punch determining the length of the conoid.

The punch C has a similar shoulder, but the corner

it forms with the frusto-conical punch is rounded, and tends to form the corner of the flange of the eyelet. When, therefore, the parabolic conoid 1 is placed in the die D and the punch C brought down to perform its operation, the punch C in its descent will come in contact with the bottom of the cup and drive the cup down into the die; and, as the diameter of both die and punch is less than that of the cup, the wall of the latter will, by the operation, be pressed inward to and against the punch, while the excess of the metal in the cup so displaced will be forced upward out of the die, and be deflected laterally by the shoulder of the punch, and thus ultimately become the flange of the eyelet.

The cylindrical punch E has the same length from the shoulder to its end, and holds the frusto-conical form 2 2 in the same manner to protect its length, as described, with reference to punch C, and being thus held, is forced into the die F, which still further reduces the size of the metal shape laterally, the contraction, as in the previous operation, being due to the diminished size of the die F from that of the die E, the punch merely serving to carry and preserve the length and shape the flange of the eyelet near its junction with the strip. In this manner the part of the operation that is allotted to each of the sets of punches and dies to perform as described, is calculated to enable the operations to be conducted consecutively with the greatest rapidity without the intervention of any other process or appliance whatsoever.

Having described my invention,

I do not claim prepared eyelet-stock generally, as I am aware that the same has been made and used in certain forms before; but

I claim—

1. The herein-described process of forming continuous strips of eyelet blanks, that is to say, successively projecting from said strip cups of depth equal to and of diameter greater than that of the finished eyelet, and then contracting the diameter of said cup by forcing it, by a punch of a suitable size and shape, into a die, the latter being so shaped as to impart to the blank the proper eyelet form.

2. The series of dies and punches constructed and operating as described, whereby eyelets are made in the manner and by the process above described.

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