

UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN MACHINES FOR MAKING EYELETS.

Specification forming part of Letters Patent No. 119,979, dated October 17, 1871.

To all whom it may concern:

Be it known that I, THOMAS GARRICK, of the city and county of Providence and State of Rhode Island, have invented certain Improvements in Eyelet Machinery, of which the following is a specification, referring by letters to the accompanying drawing making part of the same, in which—

Figure 1 is a front elevation of my improved machine. Fig. 2 is a plan of the bed-plate and the working parts thereon. Fig. 3 is an end elevation with the feeding mechanism, hereinafter referred to. Fig. 4 is a front elevation and vertical section of the bed-plate and parts immediately connected therewith. Fig. 5 is an end elevation and section of a portion of the machine. Fig. 6 is an elevation of the series of punches, and Fig. 7 is a vertical section of the series of dies and cutters employed in making eyelets in the said machine. Fig. 8 represents sections of the shapes into which the metal is successively wrought to make an eyelet by means of said punches and dies in said machine. Fig. 9 is a compound punch and compound cutter and die, which is designed to be used in connection with certain ones of the series in said machine. Fig. 10 is a vertical section, and Fig. 11 is a top view of the "carrier" hereinafter referred to. Fig. 12 is a vertical section, and Fig. 13 is a top view of another construction of said carrier. Fig. 14 is a plan of the transferring apparatus herein mentioned, for transferring the planchet of metal from the position where it is cut out to the die where it is first shaped.

Similar letters indicate corresponding parts in all the figures.

My invention relates to organized machinery for making eyelets from planchets or disks of metal by a number of consecutive operations upon the separate pieces, each tending to develop the eyelet shape more and more, and finally deliver the eyelet completely formed; and to a special mechanism for transferring and presenting the planchet, or a separate and detached piece of metal in its differently-developed forms, to the several punches and dies or instruments by which it is converted into an eyelet, in lieu of the means for presenting and transferring afforded by the continuous strip in the Letters Patent hereinbefore referred to.

My invention consists, first, in the combina-

tion and arrangement in an organized machine of the several sets of punches and dies or instruments for cupping, immediately drawing, shaping, cutting out, and delivering eyelets complete from a planchet or disk of metal, with the mechanism for transferring and presenting as separate pieces, the variously-developed forms of the planchet, as hereinafter described. Secondly, my invention consists in combining and arranging, with such organized machine, a cutting-punch and die or instruments, and a transferring device for cutting and delivering planchets thereto, to be operated upon consecutively, as hereinafter described. Thirdly, my invention consists in combining and arranging, with a punch and die for shaping the flange of the eyelet, mechanism which, in addition thereto, exerts a supplemental pressure to swage and reduce the thickness of the flange to approximate that of the body or opposite end of the eyelet, as herein specified. Fourthly, my invention consists in combining, in an organized machine for making eyelets from planchets or disks of metal, a supplemental punch and die or instrument for finally trimming the edge of the eyelet's flange vertically and evenly all round with its body, as herein specified. Fifthly, in the use of an elastic carrier that will receive and present the various wrought forms of the planchet, and in combination with an endless belt or band that will forward the carriers at proper intervals to the several sets of dies and punches, for the several operations to be performed thereon, as described. Sixthly, in supplementing the operations required for making eyelets such as are known to the trade and to the public, by certain other operations upon the flange, in virtue of which the eyelets are greatly improved.

To enable others skilled in the art to make use of my invention, I will proceed to describe the same.

In the drawing, the frame of the machine consists of a table, T, with suitable supports T¹, and three upright stands, T², with bearings at the top for the driving-shaft D, and vertical guides S S S for the sliding plungers H H², in which is held the series of cutting-and-forming punches E¹, E², E³, &c., beneath which, on the table, is arranged the series of dies G¹, G², G³, &c., which co-operate with said punches in making eyelets. By the method employed the first operation is

to cut the planchet or separate piece of metal from the sheet. This is performed by the first set of the punches and dies $E^1 G^1$, Figs. 4, 6, 7, and 8, the sheet m being presented and fed to the same automatically, as hereinafter explained. The second operation is to convert the planchet or piece into the shape of a cap or a tube, with one end closed, and is performed by the punch E^2 and its die G^2 . The two dies G^1 and G^2 , as shown in Fig. 4, are elevated from the table in the block J , and the first which cuts the planchet is elevated above the second, which forms the cap, so that, between the under side or delivery of the first, G^1 , and the top or entrance of the second, G^2 , there is a passage-way by which the planchets may be transferred and delivered singly from the first die to be operated upon by the second by means of a transferer, h , on a rod, b , Fig. 14, which is operated by the lever l from the cam n^2 on the driving-shaft. This passage-way p is of a depth only to admit of the passage of a single planchet at a time, which is deposited from the die G^1 , like a in front of the transferer h , by which it is pushed forward and deposited in the round guide at the entrance of the die G^2 , where it is operated upon by the punch E^2 and carried through the die G^2 and formed into a cap, 2, Fig. 8, and deposited in another transferring mechanism or device, which transfers it to the remaining sets of punches and dies. This transferring device is shown clearly in Fig. 4, and in detail in Figs. 5, 10, 11, 12, 13, and consists of a series of carriers, K , on an endless belt or band, g , supported and moving on two carrying-rollers, $C C'$, the latter being provided with a ratchet and pawl, j , by which an intermittent movement is given to the apparatus through the connecting and sliding rods c from the cam l on the driving-shaft. These carriers are arranged at the same distance apart on the endless belt as the distance between the several sets of punches and dies E^3, G^3 , &c., with which they co-operate, and so that the top of the carrier shall pass immediately under the second die G^2 and receive from it the cap, 2, Fig. 8, of metal as it is delivered therefrom and carry it between the next set, viz., the punch E^3 and the die G^3 , when the third operation is performed, which, as represented, consists in contracting the cap at its closed end, as shown in 3, Fig. 8; and after this operation is completed the cap 3 is, by the ascent and withdrawal of the punch from the die, assisted by the upward pushing of the clearer k from beneath, withdrawn from the die and deposited again in the carrier, by the next movement of which the cap 3 is carried to the next set of instruments, viz., punch and die E^4 and G^4 , by means of which the contracted cap is wrought into its complete eyelet-shape, and by the same means is returned to the carrier and again transferred to the next set of instruments, by which the closed end or bottom is punched out, and in the same manner to the next set of instruments, where the flange of the eyelet is trimmed to the proper size and evenly all round with the body of the eyelet. To render the action of the carriers as positive and accurate as possible the belt or band should be

of sheet metal, with one edge notched to fit a correspondingly-shaped flange of the carrying-roller C' , and the carriers may be secured to such a belt by rivets passing through a projection on each side, as shown in Fig. 11. The carrier K is a receptacle calculated to receive the planchet or separate piece of metal of the various forms of development and transfer and present the same from one set of instruments or devices to another, for the successive operations to be performed. It consists of an elastic socket, which may be made of a metallic shell, K , having an India-rubber griper, t , Figs. 10 and 11, that will gripe and hold the separate piece of metal after it has been formed into the cap 2, Fig. 8, by the second operation, and, by the movement of the endless belt, carry and present the piece 2 to the next of the sets of punches and dies, and, after the operation is performed upon the piece, will receive it from the punch and die, and carry and present it to the next set of instruments; and so on until the final operation is performed, when the completed eyelet is delivered into a common receptacle in a mass. In Figs. 10 and 11 the griper t is a rubber washer cut quartering from the hole in the center, as shown in Fig. 11, with its outer edge firmly held between the two parts of the shell K , which screws together and pinches it. The elastic four quarters of the rubber washer permit the passage of the piece of metal of the eyelet through the same when carried downward to the die by the punch, and arrest and remove the piece from the punch as the latter is withdrawn, when the operation is completed, and hold it in position to be presented to the next of the series of punches, when carried beneath it by the next movement of the endless belt. Instead of the rubber griper, as described, the shell K itself may constitute the griper, like that of the construction shown in Figs. 12 and 13, by making it in two vertical parts divided at the line $g g$, and having a recess, r , with a wider upper and narrower lower projecting lip or flange, $o o'$, to arrest and hold the separate piece 4, and making the grip elastic by a surrounding band of India rubber, n , on the shell, and having the shell secured by means of a dovetail recess at its bottom end to the endless belt, so as to slide laterally on a plate, u , riveted to said belt, as shown in Fig. 13, by which construction, together with the bell-shaped entrance of the carrier K , the punch may readily enter with the piece to be operated upon, carry it through the shell or socket into the die below, and, returning, leave the piece in the carrier or socket between the two lips or flanges, where, by the elastic action of the rubber band n , it is held in position to be presented to the next punch of the series when carried beneath it by the movement of the endless belt. Thus, by means of the series of carriers or transferring device, separate pieces of metal of different form may be transferred to successive instruments of a series for the performance of a number of consecutive operations upon the same piece, each developing the detached eyelet more and more until it is completed. As shown in the drawing,

Figs. 6 and 7, the planchet is cut and the eyelet completed therefrom by a series of six sets of punches and dies and six operations, illustrated by the several shapes the metal is made to assume in Fig. 8. But a greater or less number of punches and dies may be employed, according to the kind or nature of the metal to be punched and the length of eyelets to be produced; also, the cutting of the planchet may be performed in a separate machine or place, and the planchets or separate pieces fed and delivered by suitable means to the machine for converting the same into eyelets. As shown, the first set of the series $E^1 G^1$ cuts the planchet 1, Fig. 5; the second set $E^2 G^2$ draws the planchet into the cap 2, Fig. 8; the third set partially draws and contracts the bottom of the cap 2 into the shape 3, Fig. 8; the fourth set shapes this contracted cap into an eyelet with a wide flat flange, 4, Fig. 8; the fifth set is a cutting-punch and die, $E^5 G^5$, and cuts out the closed small end of the eyelet 5, Fig. 8; and the sixth set is also a cutting-punch and die, the punch having a protruding center-guide, f , at the end for giving position to the eyelet on the punch, and this trims the wide flange to the required size and evenly all round with the body. The first two separate sets for cutting and giving the first drawn form to the planchet may be merged in one set in the manner shown in Fig. 9, in which the forming-punch E^2 works inside the cutting-punch E^1 and forming-die G^2 is arranged below the cutting-die G^1 in the same piece of metal, and the planchet is first cut from the sheet by the punch and die $E^1 G^1$, and immediately following the planchet is carried into the lower part G^2 of the die by the inner punch E^2 , and formed into the cap 2 in a manner well known in making eyelets. The partial draft of the cap, as in 3, Fig. 8, may in some cases be dispensed with, as in making shirt-eyelets of ductile material; or two or more partial drafts may be here introduced for making long eyelets, or others of the harder and less ductile metals. In the punch and die of the fourth operation, as shown in No. 4, Fig. 8, the cup receives the eyelet shape, consisting of a conical or tapering body, with the edge of the cup turned over to form a flange. To such operation there is herein supplemented a swaging operation upon said flange to reduce its thickness of metal to approximate that of the body or opposite small end; and this is accomplished by so constructing and arranging the mechanism which operates this punch as to exert a pressure upon the flange after it is turned, and by so doing swage the flange of metal between the shoulder of the punch and the face of the die sufficiently to reduce the metal of the flange to the thickness of the body of the eyelet or nearly so, and flatten it at right angles thereto, and any excess of breadth of flange which is thus produced may be afterward trimmed off by a subsequent operation of a cutting-punch and die to sever, by a vertical cut all around, the superfluous metal from the said flange. By thus swaging the flange of the eyelet and trimming it concentrically with its body after it is formed, the thick rough puckered edge peculiar to the flange

of all eyelets made separately from planchets is obviated, and the eyelets will be of the same thickness, will turn over equally, and have the same appearance at both ends when inserted.

Besides separate pieces in the form of planchets or disks, I propose to use hexagonal and octagonal and other-shaped pieces, which may be cut with economy from sheet metal and be with facility wrought and transferred to be wrought into the form of eyelets or similar articles. The sheet metal is fed to the cutting-punch and die to cut the planchets or separate pieces therefrom by means of the set of feed-rollers $M M$, Figs. 1, 2, and 3. These are mounted in a suitable frame, N , on a sliding carriage, R , which has an intermittent movement in the table T , in a line parallel with the row of punches and dies, by means of a helical-grooved cam in the rotating cylinder V beneath the table to feed in one direction, and in the opposite direction to return the rollers M to resume the feeding operation by means of the spring U or a suitable force. At the same time with this return of the sheet by the rollers a new surface of the metal is presented by a partial rotation of the feed-rollers M by the action of the pawl w , connected to and operating with the pawl y , on the ratchet-wheel X ; on the shaft of the uppermost roller, when the rollers are in a position to begin cutting in a new place, which advances the sheet sufficiently to present a section of its uncut surface to the action of said punch and die. The movement of the said pawl w , as well as the cylinder V which imparts the sliding movement to the rollers M , being produced by suitable mechanism, consisting of the pawl y and ratchet y' and rod and spring q , and operated by the connecting-rod w from the crank Q on the driving-shaft. It will be seen that the feed-rollers M are placed at an angle with the line of direction in which they move with the carriage R , and that the sheet is also presented and advanced at an angle, so that the planchets are cut in diagonal rows across the sheet from side to side, as shown in Fig. 2; also, that the center of the cutting in one row is opposite the space between the cutting of the next adjoining ones, which is produced by a short and long tooth or division of the ratchet-wheel y , which has the effect to make the successive cuttings in the sheet as close as possible to each other, and thereby leave a very small percentage of waste.

Having described the construction and operation of the several parts of the said machine, it will be understood that, by the combination of the transferring devices with the series of punches and dies operating consecutively, eyelets can be made from planchets or separate pieces as by a number of consecutive operations of a series of instruments upon a strip of metal, with the advantage of greater perfection in the product, arising from the more equal distribution of the draft or strain upon the metal when used in the form of a disk or planchet; also, that by the operation of swaging and trimming the flange this part of the eyelet may be made with the same perfection from planchets or separate pieces, as

in a strip of metal from which they are finally cut separate by the flange complete and finished; and that by the mode of feeding the sheet itself without cutting it into narrow strips, besides dispensing with the stripping operation, a considerable saving of waste is effected.

Other combinations of a number of sets of eyelet-making punches and dies and transferring mechanism have hitherto been employed to make eyelets from planchets, in which the planchet was first made, then cupped, and next formed into the completed eyelet. But these, it will appear, differ essentially from the combination herein set forth in both the number and nature of the operations to which the planchet is subjected to convert it into the finished eyelet, and in the character of the transferring mechanism employed to transfer and present the planchet in the greater number and variety of forms produced by the several sets of dies and punches thus employed. Also, the combination of the dies and punches herein described is substantially set forth in the Letters Patent heretofore granted to me under date of July 6, 1869, and therefore forms no part of the present invention, except as combined with a suitable transferring mechanism that is capable of transferring separate pieces like the wrought planchets successively to the several dies and punches of such a series, and as herein otherwise more particularly set forth.

I therefore claim—

1. The combination, in an organized machine, of the series of dies and punches or instruments as described for cupping, intermediately-drawing, eyelet-shaping, end-punching, and deliver-

ing eyelets from a planchet, and the transferring mechanism, as described, for transferring and presenting the several shapes into which the planchet is by such means wrought successively from one set of instruments to the next in order, substantially as herein specified.

2. In combination with such organized machine, a preliminary cutting-punch and die and a transferring device for cutting out and delivering planchets to be operated upon by the said cupping and succeeding instruments of the said series, substantially as shown and described.

3. In combination with a suitable punch and die, as described, mechanism which, besides operating to force said punch into the die and turn over the flange of the eyelet, has also a further movement to give a supplemental pressure to swage and reduce the thickness of the eyelet's flange, substantially as specified.

4. In combination with an organized machine for making eyelets from planchets, as described, a supplemental punch and die for finally trimming the edge of the eyelet's flange vertically to the proper size, substantially as specified.

5. The elastic carrier K, as described, and in combination with the endless belt or band, substantially as and for the purpose specified.

6. As an improvement in the art of making eyelets, the reduction of thickness of the flange after the same has been turned, and the subsequent trimming of the margin of the flange, substantially as and for the purpose described.

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Witnesses:

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