

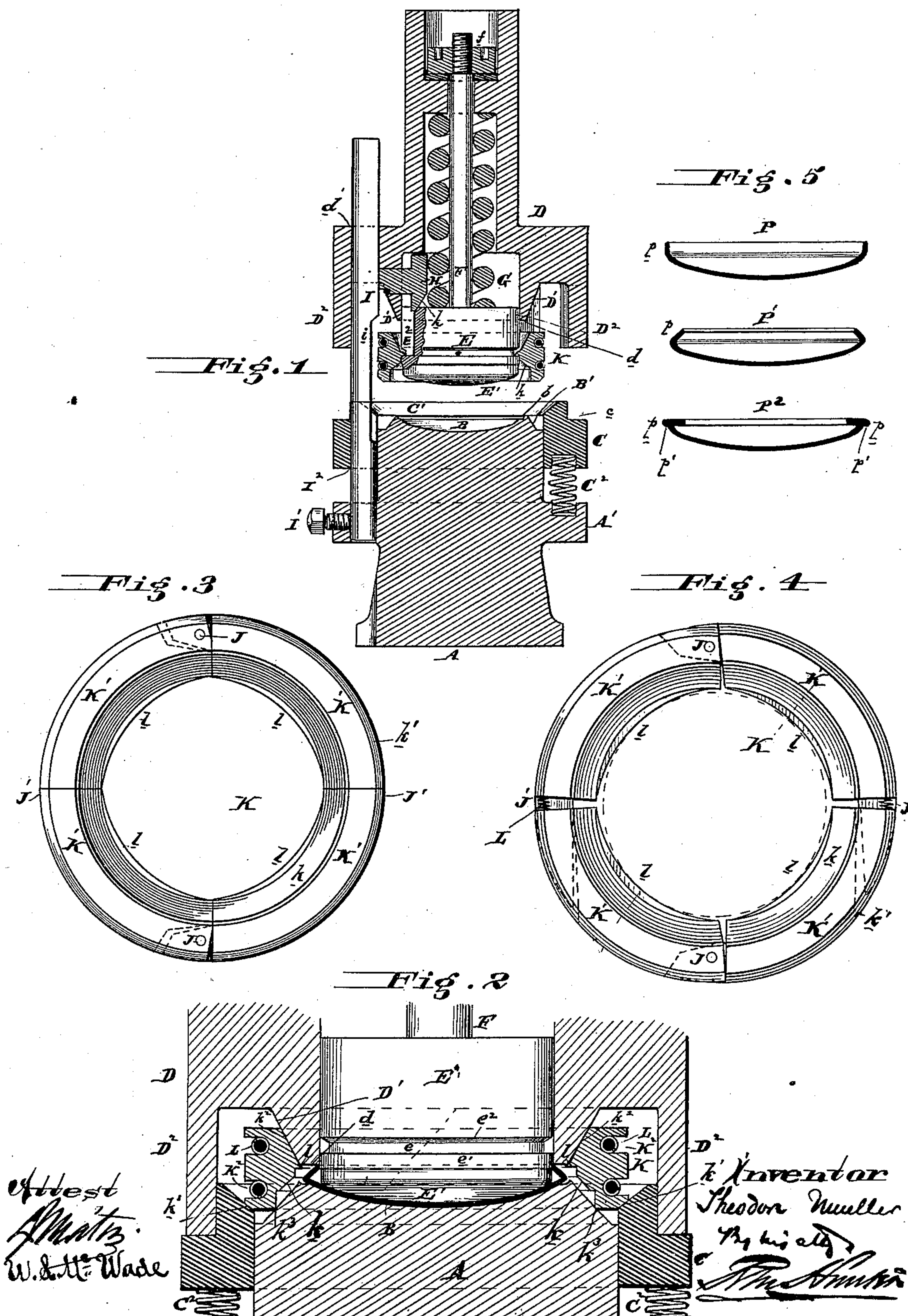
(No Model.)

T. MUELLER.

DIE FOR FORMING WATCH CASES.

No. 300,109.

Patented June 10, 1884.





# UNITED STATES PATENT OFFICE.

THEODORE MUELLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO  
CHARLES N. THORPE, OF SAME PLACE.

## DIE FOR FORMING WATCH-CASES.

SPECIFICATION forming part of Letters Patent No. 300,109, dated June 10, 1884.

Application filed April 26, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, THEODORE MUELLER, of the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Dies for Forming Watch-Cases, of which the following is a specification.

My invention has reference to dies adapted to single or double acting presses, and capable of stamping or forming lids or backs of watch-cases; and it consists in means to form the finished lid or bezel from a cup-shaped disk at a single operation, and in details of construction; all of which is fully set forth in the following specification and shown in the accompanying drawings, which form part thereof.

Heretofore the lids and bezels for watch-cases were formed from the cup-shaped disk by at least two operations and two separate sets of dies. This, however, required double handling and much waste of time.

The process invented and used by myself before the present invention is illustrated and set forth in Patent No. 226,870, granted to me April 27, 1880, (this being an improvement thereon,) in which to form a watch bezel or lid. I used two separate and distinct sets or pairs of dies, one pair to bend the edge of the cup-shaped disk to the position shown in P of Fig. 5, and then said disk with its bent edges I placed in another and separate pair of dies (shown in Fig. 2 of my former patent) having a steel collapsing ring provided with an outwardly-flaring edge, which collapsing ring fitted into the disk and supported the edge, which was then crushed down upon said ring. When this was done, the ring was made to collapse and the completed bezel or lid was removed. These operations were slow and necessitated the use of double the number of presses and twice the amount of handling required in my present improvement. The equivalent of the collapsing ring-die is not found in this invention, I having entirely dispensed with its use, and the result formerly requiring the pair of dies first mentioned is now accomplished by the use of a single expanding ring-die, which, from its construction, is carried by one of the male dies, and by its use I am enabled to accomplish at one continuous operation what it

formerly required two separate and distinct operations for, and I now require only four dies of all kinds, while before I required at least six.

In a patent to Field, dated February 15, 1881, and numbered 237,734, is shown a set of compound dies in which a collapsing die is made up of blocks held in place by the central part of the male die, which, when the operation of forming the bezel or lid is completed, is driven out, allowing the blocks to fall out; but in using the Field compound die another pair of dies must first be used to bend the edge of the disk to a position receivable in these compound dies. In my present invention I use no equivalent for the collapsing dies or blocks, and dispense with the first pair of dies by using an expanding ring-die.

The object of my invention is to provide a single set of dies, which will perform both of these operations.

In the drawings, Figure 1 is a sectional elevation of my improved forming-dies as detached from the press, and shows the male and female dies separated and in position for the cup-shaped blank or disk. Fig. 2 is an enlarged view of part of same, showing said dies in the operation of forming the lid or back. Fig. 3 represents a plan view of the movable part of the male die when in shape to bend in the flange of the cup-shaped blank. Fig. 4 represents the same after it has performed its function and has been expanded to allow the remaining part of the die to perform its function, and Fig. 5 shows the succeeding shapes given to the cup-shaped blank by the action of the dies.

A is the receiving or female die, and is formed of solid metal having a cup-shaped top, B, for the reception of the cup-shaped blank P. It may also be provided with a circumferential groove, *b*, which is adapted to form a small bead, *p'*, on the rim of the completed bezel. The outer surface of die A is made cylindrical or otherwise suitably shaped, and its upper edge is beveled, as at B'. Encircling the body of die A is a ring, C, supported upon springs C', resting on a flange, A', of said die, and having an annular step, *c*, and its upper and inner edge beveled, as shown at C'.



The upper or male die is formed of three parts—viz., the clamping part E, having a bottom, E', shaped so as to fit into the depression B of the female die A, to hold the cup-shaped disk during the final operation, the ring-piece K, which is carried by said die E, and turns the flange *p* inward, as shown at P' of Fig. 5, and the completing part or body, which carries both of the above-mentioned parts, and is adapted to press down the flange *p* to the form shown at P<sup>2</sup> of Fig. 5, in which is shown the completed lid or back with the bead *p'* formed thereon. The part E is provided with a groove, *e*, having a flat bottom, *e'*, and beveled top *e*<sup>2</sup>, about its body and near the bottom, and is supported by a pin, F, which extends upward, passing loosely through a hole in the top of the body D, and is prevented from falling down by a nut, *f*. A spring, G, is carried by body D, and is used to press said die E down and hold it steady, causing it to descend with the body D until arrested by the die A, when the spring G is compressed and the body D alone moves down. The die E fits into a recess in the body, and is caused to move downward with said body in opposition to any opposing force by means of a slide-block, H, preferably beveled on its lower edge, as at *h*. This block is kept in the position shown in Fig. 1 (in which position it is seen that it would be impossible to press the die E up into the body D) by the cam-pin I, which is notched at *i*, passes through hole *d'* in the body D, a hole, I<sup>2</sup>, in the ring C, and is clamped in position in flange A' of die A by set-screw I'. Now, as the body D descends, the slide-block is relieved by the cam-notch *i*, and the upward pressure of the die E forces it out, allowing the die E to be brought to rest while the body continues to descend, the block being received in slot E<sup>2</sup> in the side of die E. As soon as the block moves out the power of the spring G is utilized to cause the die E to clamp the lid or bezel.

The ring-die K, which is carried by die E, is formed as follows: Four or more segments, K', of which two or more parts are hinged together, as at J, and two of the parts so formed are provided with slide-joints, as at J', to form a ring-die, K, the said parts being caused to assume their normal ring shape by springs L, which completely encircle the said ring-die and lie in deep circumferential grooves K<sup>2</sup>. The inner surface of said ring is beveled from or near the center both upward, as at *k*<sup>2</sup>, and downward, as at *k*, the bottom of the beveled edge or rim *k*<sup>2</sup> being provided with small flanges *l*, flat on their undersides, which flanges catch in the groove *e* in the die E, and by which said ring-die is carried. It is evident that in place of making the ring-die K in four segments, hinged in pairs, three segments would suffice, and these might be all hinged together with a single sliding joint, J'; or two of the segments may be hinged together and the remaining one connected by sliding joints, it being understood that the ring, as described

above, is held together normally in its smallest diameter by springs L. The lower and outer edge of said ring-die is also beveled, as at *k'*, to correspond to the obliquity of the oblique face C' of the ring C.

The body D carries a beveled or conical part, D', having the forming-edge *d*; whose object is to crush down the metal shown at P' in Fig. 5 to the shape shown in P<sup>2</sup>. The obliquity of the conical surface D' corresponds with the obliquity of the face *k*<sup>2</sup> of the ring-die. The body also carries two or more arms or extensions, D<sup>2</sup>, which, during the descent, rest upon the shoulder *c* of ring C and depress it, compressing springs C<sup>2</sup> to allow of the expansion of the ring-die K at the proper moment to enable the edge *d* to come into play, the said expansion being caused by the descent of die K being arrested by die A, and the cone D' being forced into it from above, as shown in Fig. 2. By means of ring C the ring-die K is allowed to expand without losing its horizontal position, and during the upward movement of the various parts the springs L, beveled faces B' and C', cause the said ring-die K to automatically clamp upon the die E once more, and when the upward limit is attained the various parts are once more as seen in Fig. 1.

The operation then is as follows: The cup-shaped disk or blank P, previously formed, is placed on the die A. The body D, with dies E and K, descends, and the flange *p* of blank P, which extends upward, is bent inward to the shape shown in P', and in Fig. 2 by the inner and lower beveled face, *k*, of ring-die K, the lower outside edge of said ring-die having first passed within the inner edge of ring C, whereby said ring-die is kept from expanding. The inner edge, *k*<sup>3</sup>, of the die K then rests upon the beveled face B' of die A. The block H then being free, the die E clamps the blank and the cone D' expands the ring-die K, the parts D<sup>2</sup> of body D having first pressed down ring C to allow of the expansion of said ring-die. The edge *d* descends, as shown in Fig. 2, crushing down the blank from shape shown in said figure and P' of Fig. 5, to that shown at P<sup>2</sup>, at the same time forming the bead *p'*. As the ring-die K expands, it is received by the ring C, which is depressed by the extensions D<sup>2</sup> of body D. In ascending the reverse operation takes place. Now, while I have shown the dies as adapted for a single-acting press, my invention is equally adapted to a double-acting press. When the latter is used, the body of the die will be moved by one cam and the die E by another, thus enabling me to dispense with the spring G, slide-block H, and cam stud or pin I.

I do not limit myself to the devices shown, as they may be modified in various ways without departing from my invention.

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

1. The combination of a female die, a male



die, and an expanding or ring die, carried by said male die, with means to expand said ring-die and displace it from said male die, substantially as and for the purpose specified.

5 2. The combination of a female die, a male die, and an expanding ring-die, carried by said male die, with a crushing-die and means to expand said ring-die, substantially as and for the purpose specified.

10 3. The combination of a female die, a male die, and an expanding ring-die, carried by said male die, with a crushing-die, means to expand said ring-die, and means to control the relative time of action of the various dies, substantially as and for the purpose specified.

15 4. The combination of a female die, a male die, and an expanding ring-die, carried by said male die, with a crushing-die, means to expand said ring-die, and means to support and return said ring-die to the male die after being displaced therefrom, substantially as and for the purpose specified.

20 5. The combination of a female die, a male die, and an expanding ring-die, carried by said male die, with a crushing-die, means to expand said ring-die, means to control the relative time of action of the various dies, and means to support and return said ring-die to the male die after being displaced therefrom, substantially as and for the purpose specified.

30 6. The combination of dies A, E, K, and D' d and connecting mechanism, substantially as and for the purpose specified.

7. The combination of dies A, E, K, and D' d, ring C, and connecting mechanism, substantially as and for the purpose specified. 35

8. The combination of dies A, E, K, and D' d, body D, rod F, nut f, spring G, and locking mechanism to cause said die E to move with or be free of body D, substantially as and for 40 the purpose specified.

9. The expanding ring-die K, composed of segments K', held together by springs, the inner and lower edge of said die being beveled, substantially as and for the purpose specified. 45

10. The expanding ring-die K, composed of segments K', held together by springs, the upper and lower inner edges of said die being beveled in opposite directions, substantially as and for the purpose specified. 50

11. The expanding ring-die K, composed of segments K', held together by springs, the upper and lower inner edges of said die being beveled in opposite directions, the point of juncture of said beveled edges being provided 55 with fins l, substantially as and for the purpose specified.

In testimony of which invention I hereunto set my hand.

THEODORE MUELLER.

Witnesses:

H. L. ROBERTS,  
JOSHUA R. MORGAN.