(No Model.)

E. C. FITCH.

METHOD OF MAKING ENAMELED WATCH DIALS.

No. 366,085. Patented July 5, 1887.

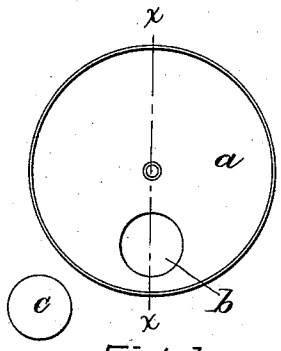

Fig. 1.

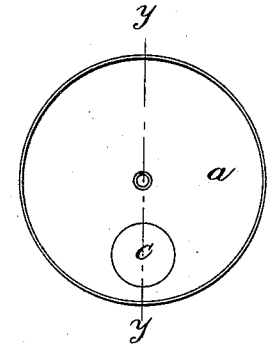

Fig. 2.

Fig. 3.

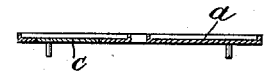

Fig. 4.

Fig. 5.

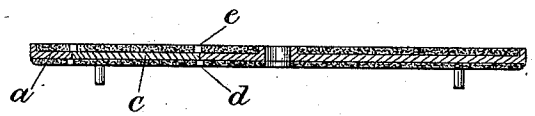

Fig. 6.

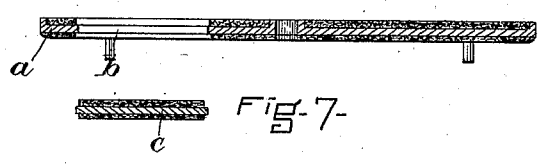

Fig. 7.

WITNESSES.

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METHOD OF MAKING ENAMELED WATCH-DIALS.

SPECIFICATION forming part of Letters Patent No. 366,085, dated July 5, 1887.

Application filed March 19, 1887. Serial No. 231,522. (No model.)

To all whom it may concern:

Be it known that I, EZRA C. FITCH, of Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in the Method of Making Enameled Watch-Dials, of which the following is a specification.

The body or foundation of the ordinary watch-dial is a disk of metal, usually copper. To this disk are attached the pins or feet, which serve to locate the dial in proper position on the "movement-plate," and also to hold the dial and plate firmly together. The disk is coated upon both sides with a paste of pulverized enamel, which is then fused by heat, and thus firmly united to the disk. Of course all dials are, when completed, provided with openings or perforations, through which project the train arbors or staves which carry the hands. In the cheaper grades of dials these holes are made in the copper disk, the enamel being prevented from closing the holes by a flange of the metal surrounding the holes, a similar flange around the edge of the disk preventing the enamel from running off while in a state of fusion.

In the better grades of dials it is customary to remove a portion of the body of the dial at the place which is occupied by the sweep of the second-hand. (This opening is then filled by another piece similar in size, but somewhat thinner, called a "bit.") In still higher grades a similar opening is made at the center of the dial. Dials made in this manner are designated as "sunk seconds" and "sunk centers."

The cutting and removal of the circular piece is an operation requiring much care to avoid cracking or chipping the dial, and may be described as follows: A cutting or grinding disk is made by bending a strip of thin copper into the form of a cylinder around an arbor or chuck of suitable size, with one end or edge of the copper projecting beyond the end of the arbor or chuck and constituting an annular cutter or lap. The copper strip is firmly fastened to the arbor, ordinarily by means of fine binding-wire, and is caused to revolve at suitable speed, and is supplied with abrading material, usually emery and water. The dial is held against the running edge of the copper with careful and even pressure, and the cutting material carried by the copper slowly cuts a circular groove of the size of the cutter or lap. The pressure of the dial against the lap, or of the lap against the dial, is continued until the coating of enamel is cut through and the copper body of the dial is reached. The same process is repeated on the other side of the dial, which, when completed, leaves the dial with the two circular coincident grooves separated by the copper body. Great care is demanded to avoid any undue pressure on the copper by the cutting, as there is great danger of cracking the brittle enamel by even a slight bending or forcing of the soft copper. To avoid this danger, and also to cheapen the cost of the operation, it is customary to subject the exposed copper to the action of strong acid, which attacks the copper and soon eats its way through it, when the core or bit falls out, leaving clear a round hole. The edges of the hole are then ground and smoothly polished with properly-charged laps, and when finished the hole, both on the front and back, is beveled. Into the bevel on the back side is fitted a previously-finished enameled and painted bit, which is held to its place by a suitable cement or an easily-fused alloy of metal.

The object of my improvement is to cheapen the cost of cutting out the hole for the bit, and more especially to greatly lessen or obviate the attendant liability of loss by cracking the enamel coating; and to this end I prepare the metallic disk, usually called the "copper," in the usual way, and before enameling I punch out the hole for the bit, and by suitable tools force the punched-out piece or blank back into its original place, where, by a slight upsetting of its edges, it is held in place. The entire disk is then coated with enamel, as before described. Using an annular cutter or lap such as has already been described, I then cut through the enamel on the back of the dial, the lap being formed to make a circular cut or groove a trifle larger in outside diameter and smaller inside diameter than the hole previously punched in the copper. Then, with a similar cutter but a trifle smaller in diameter, I cut through the enamel on the front, and, as soon as the copper is reached, the punched disk is pushed or driven out at the back of the dial, either by the pressure of the lap against said disk or by any other suitable

means. By this method I avoid in a great measure the liability heretofore experienced of cracking or breaking the enamel and the expense and labor involved in the removal of the core or bit by acids.

Referring to the accompanying drawings, forming a part of this specification, Figure 1 represents a view of the front side of the copper disk before enameling, showing hole for the bit punched out and the blank formed by punching said hole removed from the disk. Fig. 2 represents a similar view, showing the blank pressed back into the place from which it was punched. Fig. 3 represents a section on line *x x*, Fig. 1. Fig. 4 represents a section on line *y y*, Fig. 3. Fig. 5 represents an enlarged section of the dial after its sides have been enameled, showing the larger annular cut made in the enamel on the back of the dial. Fig. 6 represents a similar section, showing, in addition to the annular cut made in the back enamel, the smaller annular cut made in the front enamel. Fig. 7 represents a similar section, showing the blank removed.

The same letters of reference indicate the same parts in all the figures.

In carrying out my invention I take a disk, *a*, of copper—such as is usually employed as the body of a watch-dial—and punch the same at the proper point to form the circular hole *b*, which, in the completed dial, receives the bit. The punched-out piece or blank *c* is, by properly-constructed punches and dies, immediately forced back to its original place and retained in the hole by slightly upsetting the entire margin of the blank. I next apply and fuse the enamel in the usual manner—covering the blank on both sides—and then proceed to form an annular cut, *d*, Figs. 5 and 6, in the enamel coating at the back of the dial, using a cutter which is of somewhat larger diameter than the blank, the cut *d* being concentric with the blank. After this, I make an annular cut, *e*, in the face-coating of the dial, said cut being also concentric with the blank, but of lesser diameter than the latter, as shown in Fig. 5. As soon as the face-coating is cut through, the blank, with the detached disks of enamel thereon, may be forced out from the back of the dial, as shown in Fig. 7, by a slight pressure exerted on the blank.

I claim—

1. In the manufacture of sunk dials, the method of preparing the copper plate or foundation, the same consisting in punching out the hole for the sink and then forcing the punched-out piece or bit into its original position, as set forth.

2. The method of making circular orifices for the sinks of watch-dials, the same consisting in punching in the copper plate or foundation the hole for the sink, forcing into said hole the punched-out piece or blank, coating the plate with enamel, and finally cutting through the enamel to liberate the blank, as set forth.

3. The method of making circular orifices for the sinks of watch-dials, the same consisting in punching in the copper plate or foundation the hole for the sink, forcing into said hole the punched-out piece or blank, coating the plate on both sides with enamel, and making annular cuts in the enamel coatings concentric with the blank, the cut in the rear coating being of somewhat greater diameter than the blank and the cut in the face-coating of smaller diameter, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 11th day of March, 1887.

EZRA C. FITCH.

Witnesses:
HENRY N. FISHER,
EDWARD A. MARSH.