H. J. & W. D. DAVIES.

Manufacture of Contrate-Wheels.

No. 209,664. Patented Nov. 5, 1878.

Fig. 1.

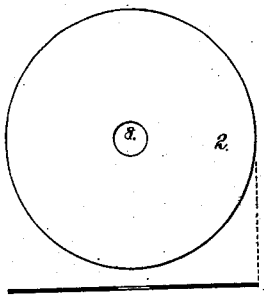


Fig. 2.

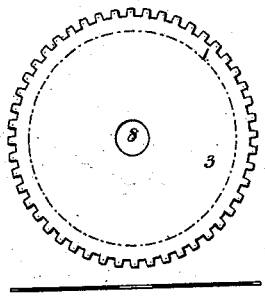


Fig. 3.

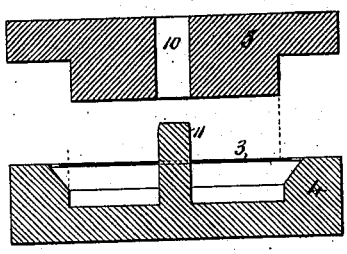


Fig. 4.

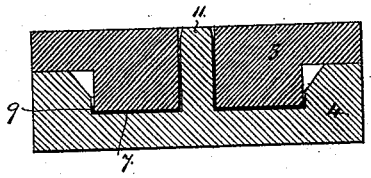


Fig. 5.

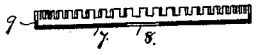
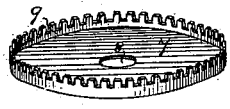


Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY J. DAVIES, OF BROOKLYN, NEW YORK, AND WALTER D. DAVIES, OF ANSONIA, CONNECTICUT.

IMPROVEMENT IN THE MANUFACTURE OF CONTRATE-WHEELS.

Specification forming part of Letters Patent No. **209,664**, dated November 5, 1878; application filed October 2, 1878.

To all whom it may concern:

Be it known that we, HENRY J. DAVIES, of the city of Brooklyn, county of Kings and State of New York, and WALTER D. DAVIES, of the town of Ansonia, county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Contrate-Wheels for Clock and Watch Movements; and we do hereby declare that the following specification, when taken in connection with the accompanying drawings, is such a full, clear, and exact description thereof as will enable others skilled in the art to make and use the same.

In said drawings, Figure 1 represents, in plan and section, the blank from which our improved wheel is made, Fig. 2 illustrating by similar views said wheel-blank after its edge has been cut to form teeth or cogs. Fig. 3 represents, in sectional views, a pair of open swaging-dies with the wheel-blank laid there, Fig. 4 illustrating the dies as closed and the wheel-blank as formed into shape; and Fig. 5 is a perspective view of my improved wheel as a finished product.

Contrate-wheels, or such as have their cogs or teeth projecting at an angle to the plane of their bodies, otherwise commonly known as "crown" or "face wheels," are ordinarily made by milling out the center of a circular blank of suitable dimensions and thickness, so as to leave a right-angular flange projecting from the outer edge thereof, which flange is then provided with teeth or cogs by means of a cutting-tool, which forms tooth after tooth until the wheel is complete. It has also been usual to cast the blank with a projecting right-angular flange, and then cut tooth after tooth thereon by the ordinary gear-cutting machine. In this mode of producing such wheels great expense both in time and labor is involved, whereby the cost of the product is necessarily much greater than is that of any other of its companion wheels used in a watch or clock movement.

This invention consists in an improved method of making contrate-wheels, and in the improved contrate wheel produced thereby, all of which is too particularly hereinafter explained to need preliminary description.

In the production of our improved contrate-wheel a number of circular blanks or disks, 2, having central bearings 8, preferably cut from suitable sheet metal rolled out to a proper thickness, but which may be cast, if desired, are first converted into toothed wheels by cutting appropriate teeth on their peripheries. This is done by stringing a number of the blanks upon a mandrel and clamping them tightly thereon side by side, where they form a compact body. Tooth after tooth is then cut throughout this body of blanks in like manner as if a single blank were being treated, so that when the body of blanks is detached from the mandrel each constitutes a toothed wheel, 3, as shown in Fig. 2. Such a toothed wheel is placed in the bed-piece 4 of a pair of swaging-dies, being properly centered therein by dropping it over a spindle, 11, which projects upward from said bed-piece 4. The opening or die in this bed-piece 4 is of the size and shape of the exterior surfaces of the contrate-wheel to be formed, and the punch 5, which is adapted to co-operate with it, conforms in dimensions and shape to that of the inner surfaces of said contrate-wheel, the punch having a central perforation, 10, which fits over the spindle 11, and serves as a guide, causing it to properly co-operate therewith as it descends into the die in the bed-piece 4.

The punch 5, as it descends, presses the wheel 3 into the die 4, causing the edges of said wheel to be pressed onto the inclined mouth of said die, and thus be bent upward over the edge of the punch 5 on the line 1, which upsetting of the edge of said wheel continues until the punch 5 reaches the limit of its downward movement, when the body 7 of the wheel 3 will rest upon the face of the die 4 and lie between it and the face of the punch 5, while the edge of the wheel will have been upturned so as to form the toothed flange 9, which will lie between the vertical sides of the said die 4 and punch 5, as seen in Fig. 4. By this operation the toothed wheel 3 will have had its outer edge turned upward at an angle to its body 7, thus providing it with a cogged or toothed flange, 9, standing at an appropriate angle to the plane of its body, whereby is constituted a contrate-wheel such

as is shown by a sectional view in Fig. 5 and in perspective in Fig. 6.

As is obvious, the swaging-dies may be constructed and operated in any approved manner. The general construction shown is, however, an advantageous one, since, by the use of the spindle 11, an accurate centering of the blank or wheel is insured, and the teeth or cogs of the flange 9 are brought into the same plane or lie evenly with respect to each other. The improved contrate-wheel thus formed from a sheet-metal blank whose toothed periphery is drawn or swaged so as to constitute an angular toothed flange possesses great advantages over the common construction of such wheels. It is composed of a single piece of homogeneous metal, the fibers of which are disposed in such lines by the process of drawing as to impart the greatest strength possessed by the metal to the toothed angular flange. Such a wheel is without flaws which frequently result from casting blanks, and is not liable to rupture from cracks often occasioned by the milling out of a blank.

In consequence of the method of their construction, the blanks for these improved wheels may be readily cut from the rolled sheet metal of commerce, be provided with teeth, and then bent into cup form, so as to complete the wheel with the utmost economy of material and manipulation, thus enabling one to produce contrate-wheels without cutting away any portion of the body of the blank save that necessary to provide it with teeth, which wheels possess a maximum degree of strength, are accurate in form, superior in finish, and are produced at a much less cost than contrate-wheels as now commonly made.

What we claim, therefore, is—

1. The method of making contrate-wheels, the same consisting in first converting a flat circular metal blank into a toothed wheel by cutting suitable teeth or cogs in its periphery, and then swaging or upsetting the outer edge thereof, so that it shall stand at an angle to the plane of the body of the wheel, substantially as described.

2. As a new article of manufacture, a contrate-wheel consisting of a sheet-metal body, 7, whose toothed edge is swaged or upset so as to constitute a toothed flange, 9, standing at an angle to said body 7, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRY J. DAVIES.
WALTER D. DAVIES.

Witnesses as to the signature of H. J. Davies:

H. T. MUNSON,
GEO. H. GRAHAM.

Witnesses as to the signature of W. D. Davies:

WM. POWE,
J. W. DREW.