

(No Model.)

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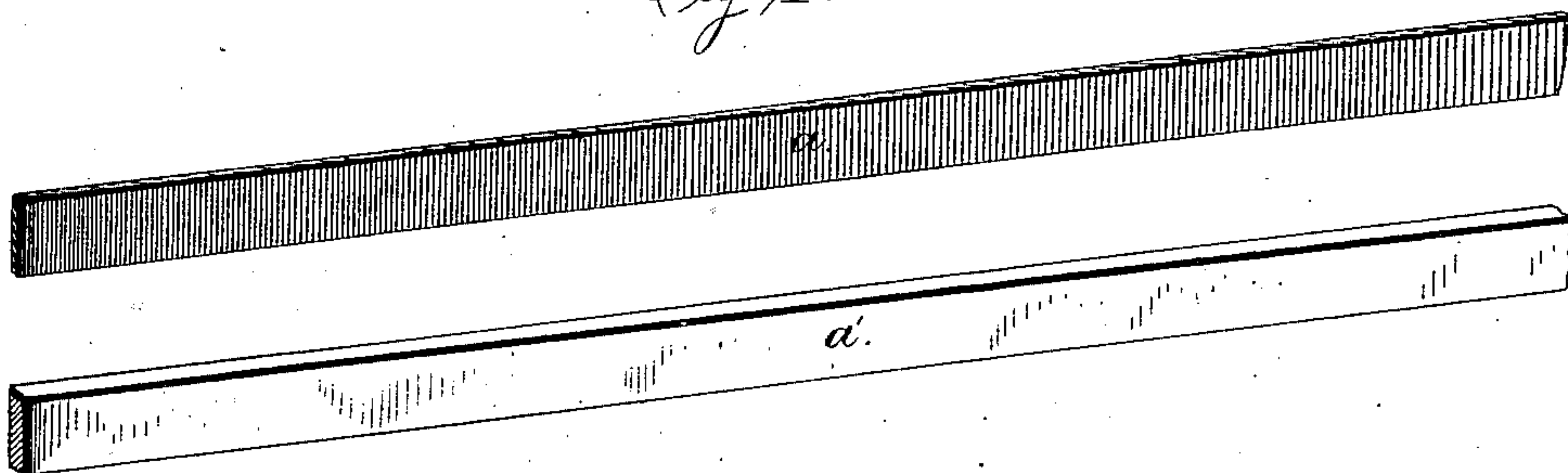
G. E. HUNTER.

MANUFACTURE OF WATCH BALANCES.

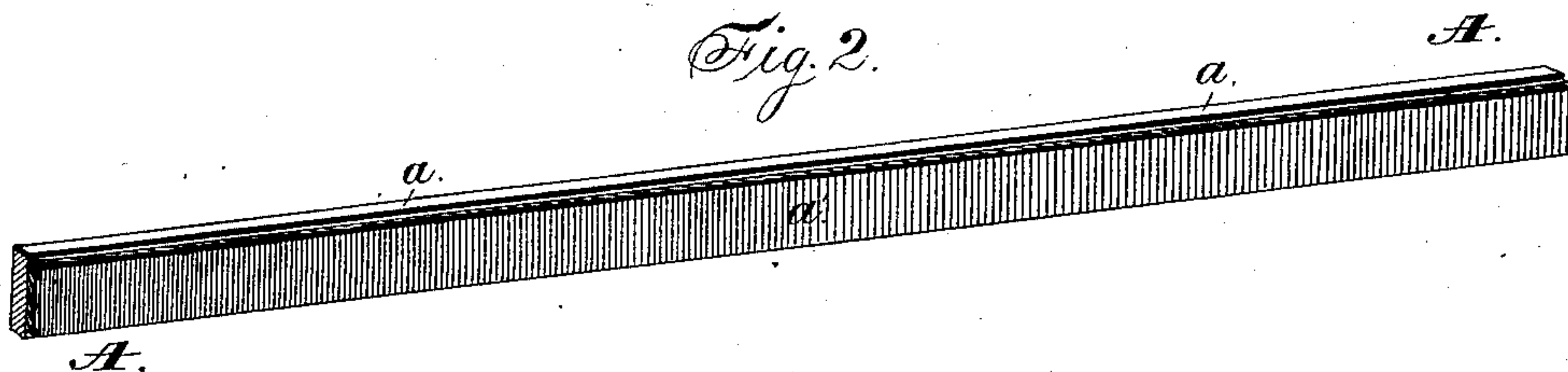
No. 347,271.

Patented Aug. 10, 1886.

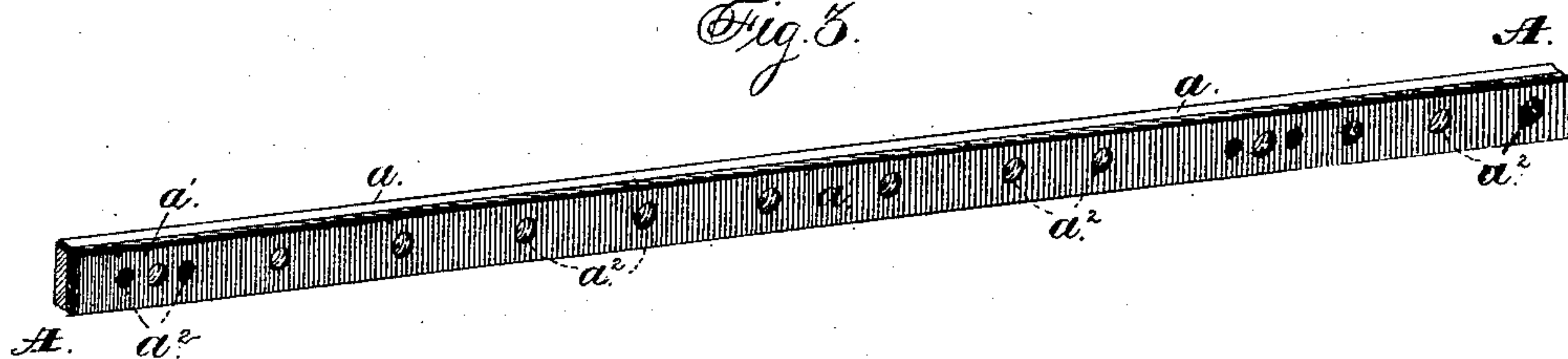
*Fig. 1.*



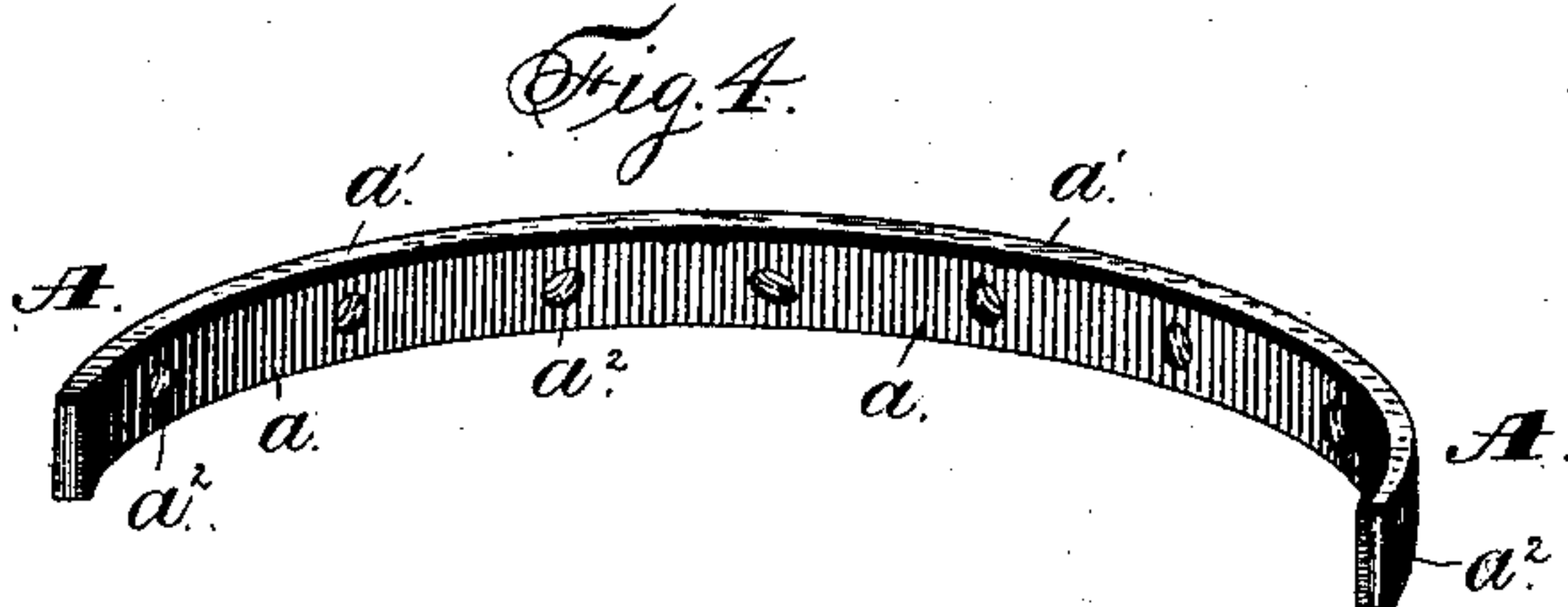
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



Witnesses:  
Jas. Hutchinson.  
Henry C. Hazard.

Inventor:  
Geo. E. Hunter, by  
Pindler Russell, his Att'y

(No Model.)

2 Sheets—Sheet 2.

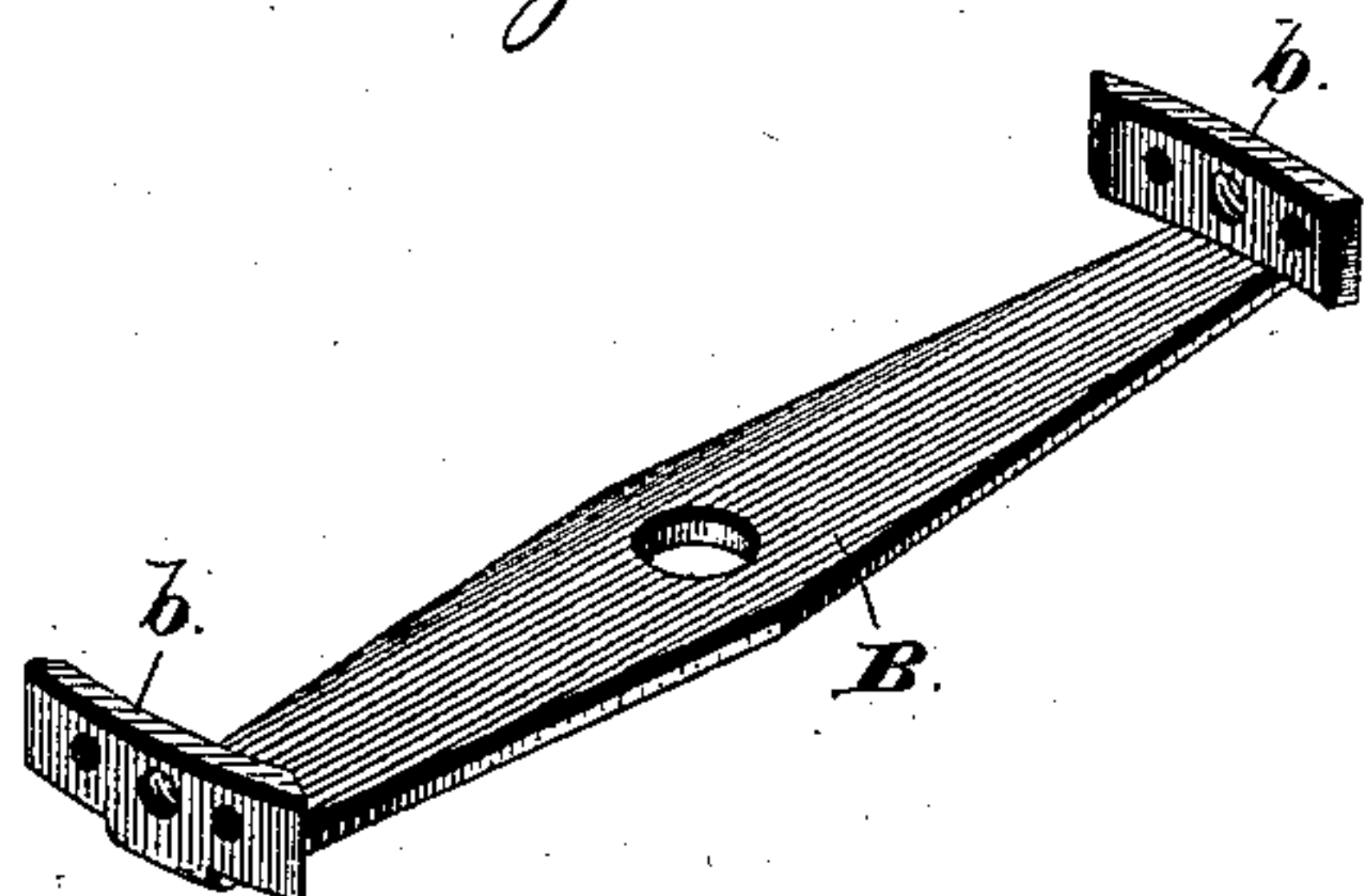
G. E. HUNTER.

MANUFACTURE OF WATCH BALANCES.

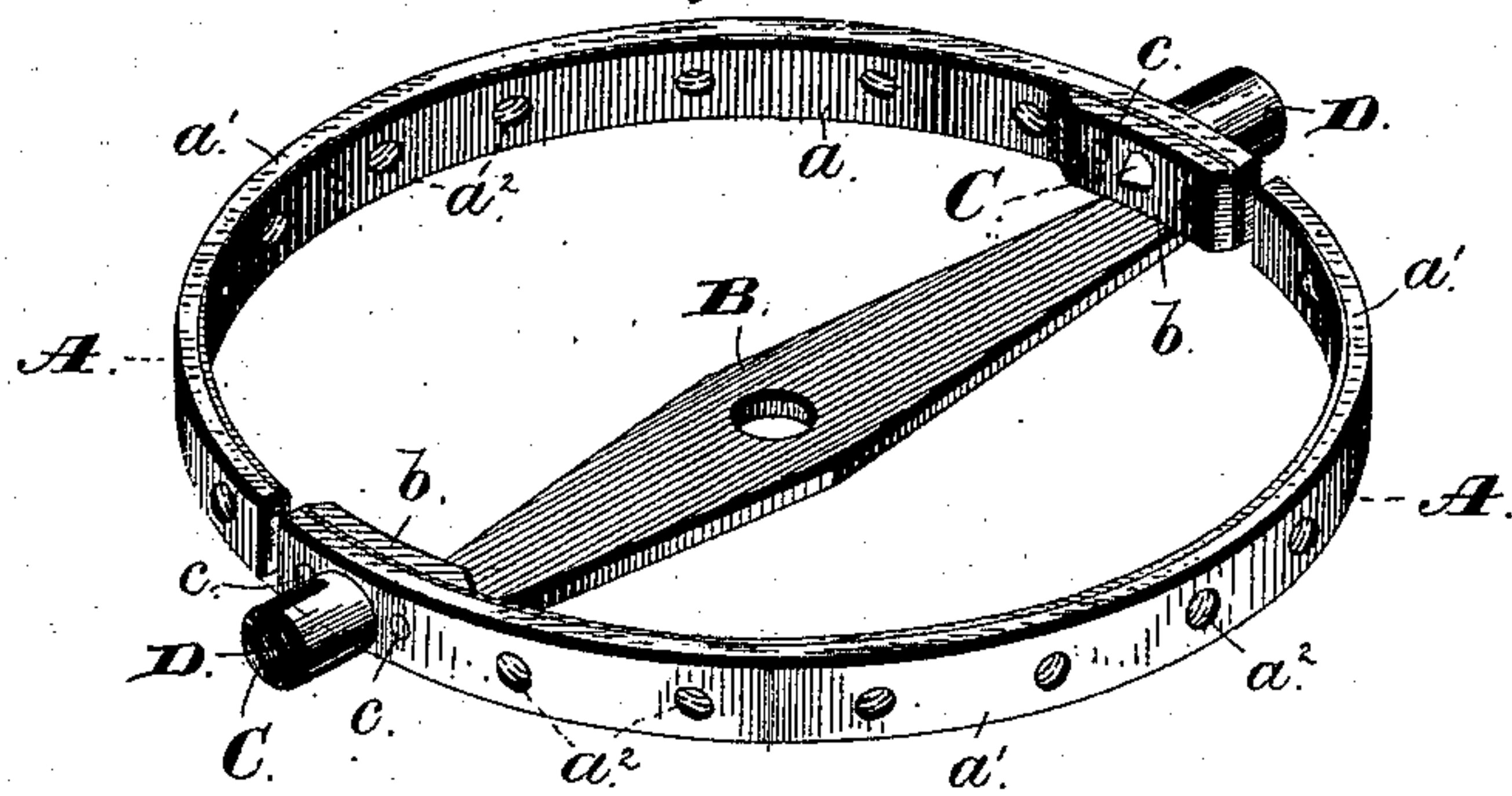
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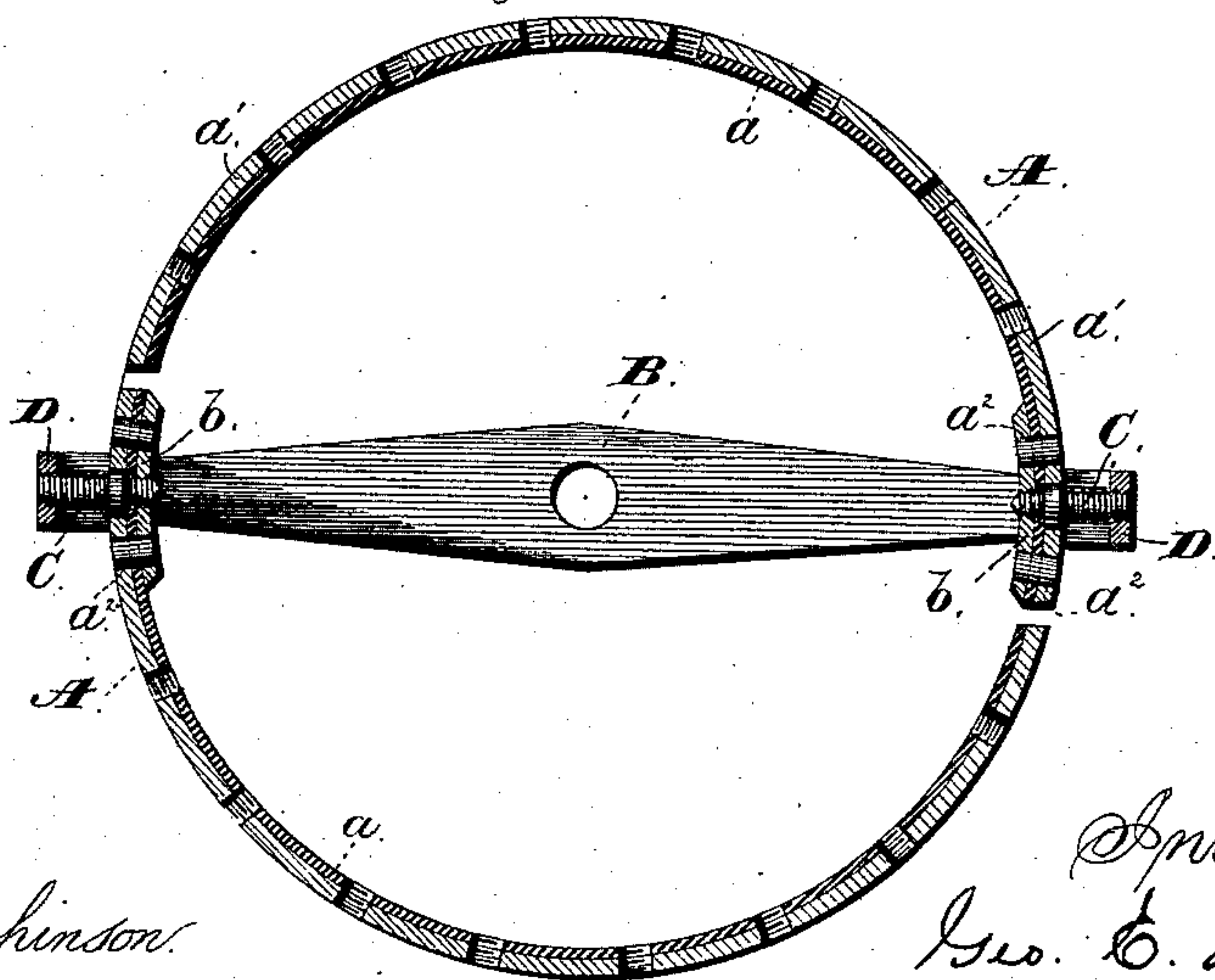
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



*Witnesses:*

*Jas. C. Hutchinson.*  
*Henry C. Hazard.*

*Inventor.*

*Geo. E. Hunter, by*  
*Prindle & Russell, his attys*



# UNITED STATES PATENT OFFICE.

GEORGE E. HUNTER, OF ELGIN, ASSIGNOR TO THE ELGIN NATIONAL WATCH COMPANY, OF CHICAGO, ILLINOIS.

## MANUFACTURE OF WATCH-BALANCES.

SPECIFICATION forming part of Letters Patent No. 347,271, dated August 10, 1886.

Application filed March 4, 1886. Serial No. 194,005. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE E. HUNTER, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in Watch-Balances; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of the steel and brass parts of the rim-blank before being united. Fig. 2 is a like view of the same when joined together. Fig. 3 is a perspective view of said rim-blank dressed to size and prepared for the reception of peripheral adjusting-screws. Fig. 4 is a like view of a rim cut to length and bent to shape. Fig. 5 is a perspective view of the central portion or spider of the balance-wheel. Fig. 6 is a like view of the completed wheel, and Fig. 7 is a section of said wheel through the plane of its vibration.

Letters of like name and kind refer to like parts in each of the figures.

In the construction of watch balances it has heretofore been customary to make the arm and the steel portion of the rim from one solid piece of metal by turning the same into the form of a disk having the desired diameter, then brazing upon its periphery a ring of brass, then turning within one face of said steel disk a recess which in diameter corresponds to the interior diameter of the balance-rim and in depth to the thickness of said rim, less the thickness of the balance-arm, then punching from the recessed portion of said disk the surplus metal, so as to leave said arm and rim, then drilling and tapping within said rim the necessary radial holes for the adjusting-screws, then cutting said rim at two opposite points, and, lastly, giving to said divided rim a true circular form. This method of construction is, however, expensive, and the product very inaccurate, as the metals composing the balance-rim do not have uniform thickness either jointly or severally throughout their length, and, consequently, there is such unequal expansion and contraction of said rim as to render it impracticable to properly poise the balance for the ordinary variations in temperature.

The design of my invention is to lessen the

cost, to simplify the construction, and to increase the efficiency of watch-balances; and to this end said invention consists in the method employed, substantially as and for the purpose hereinafter specified.

In the carrying of my invention into practice a strip of steel, *a*, having any desired length is drawn through or between polished dies or rollers until it has a uniform thickness, substantially such as is required for the rim of the finished balance, but is slightly greater in width than such rim. Upon one side of the steel strip *a* is now brazed a strip of brass, *a'*, which corresponds therewith in length and width, but has a slightly greater thickness than is desired in the finished rim, care being taken that said strips coincide throughout their length, after which the compound strip *A* is passed through or between spring-pressed rollers or dies, which operate to compress the brass portion *a'* equally throughout its length. The strip *A* will usually have such length as to enable several balance-rims to be constructed from it, in which event, before said strip is cut into the required lengths, the necessary openings, *a''*, for dowel-pins or rivets, and for adjusting-screws, are drilled at predetermined relative points, and said screw-openings tapped, after which it is passed between mills that operate upon its edges and upon the exposed side of the brass part *a'*, and give to said strip substantially the required transverse dimensions. The compound strip *A* is now passed between burnishing dies or rollers, which operate to finish its exposed surfaces, and at the same time remove any unevenness in thickness which may have resulted from the preceding operations. The brass portion *a'* being the softer metal, the action of said dies or rollers causes the same to accurately conform to the steel portion *a*, by which means said parts have jointly and severally a uniform thickness throughout their length, and the grains of the metals are arranged lengthwise of the same in parallel lines. The compound strip *A*, thus constructed, is now cut into suitable lengths, and each piece then completed by being passed between polished rollers, which give to the same the proper curvature.

The wheel-spider or cross-bar *B* is preferably made by dies from a strip of steel having suf-



ficient width, and at each end of the same is  
 formed a lug, *b*, that is turned upward at a  
 right angle to said bar, and has a length equal  
 to about twice the width of the same at such  
 point. The outer face of each lug is formed  
 upon a curved line, and to it is secured one  
 end of one of the curved rim-bars by means of  
 a screw, *C*, and one or more rivets or dowel-  
 pins, *e*, which pass radially through the inter-  
 secting parts. Said screw projects beyond the  
 periphery, and is threaded; and upon such  
 projecting portion is placed a nut, *D*, which  
 corresponds in general size and shape to the  
 like features of the heads of adjusting-screws  
 that are placed within the threaded openings  
*a*<sup>3</sup> between said nut and the free end of said  
 rim-bar. Said nut is preferably split from  
 one end nearly to its opposite end, and such  
 split portion given a slight inward spring, so  
 as to cause it to grasp its screw with sufficient  
 firmness to prevent accidental movement  
 thereon.

Having thus described my invention, what I claim is—

1. As an improvement in the construction  
 of watch-balances, the method employed for  
 forming the rim-sections, which consists in  
 combining two straight bars of steel and brass  
 by brazing, and then giving to the compound  
 bar the required curvature by means of roll-  
 ers, substantially as and for the purposes speci-  
 fied.

2. As an improvement in the construction  
 of watch-balances, the method of forming the  
 rim-sections, which consists in brazing to-  
 gether two bars of steel and brass, and then  
 compressing the brass between rollers until it

has the required density, substantially as and for the purpose shown.

3. As an improvement in the construction  
 of watch-balances, the method employed for  
 forming the rim-sections, which consists, first,  
 in uniting by brazing two straight bars of steel  
 and brass, next forming in such compound  
 bar threaded openings for the reception of  
 adjusting-screws, and, lastly, passing said bar  
 through or between rollers and giving to it  
 the required curved form, substantially as and  
 for the purpose set forth.

4. The method employed for constructing  
 watch-balances, which consists in forming each  
 of the rim-sections from straight bars of metal  
 brazed together, then curving such compound  
 bar by rollers, and, lastly, securing one end of  
 said bar-section to or upon the central portion  
 or spider, substantially as described.

5. The method employed for constructing  
 watch-balances, which consists, first, in form-  
 ing each of the rim-sections from straight bars  
 of metal brazed together, next in forming in  
 such compound bar threaded openings for the  
 reception of adjusting-screws, next in passing  
 said bar through or between rollers and giv-  
 ing to it a curved form, and, lastly, securing  
 one of its ends upon the spider of the wheel,  
 substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 28th day of December, 1885.

GEO. E. HUNTER.

Witnesses:

W. P. HEMMENS,  
W. H. CLOUDMAN.