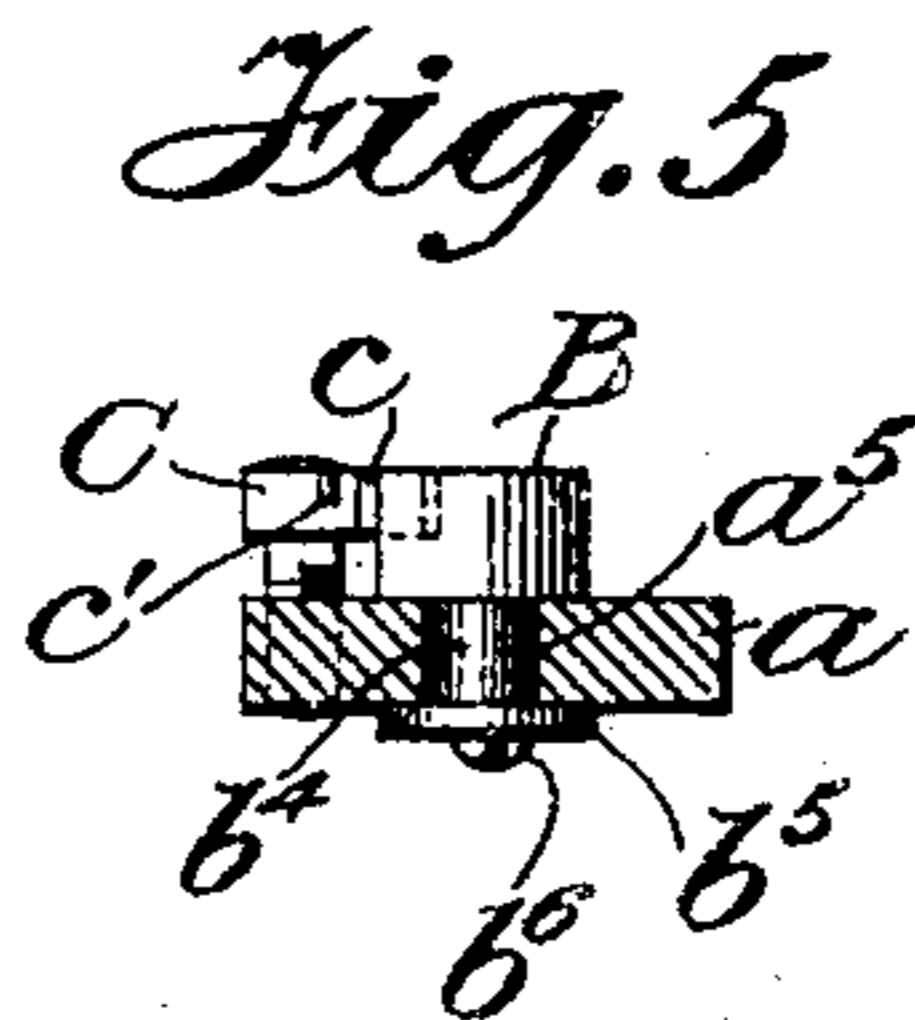
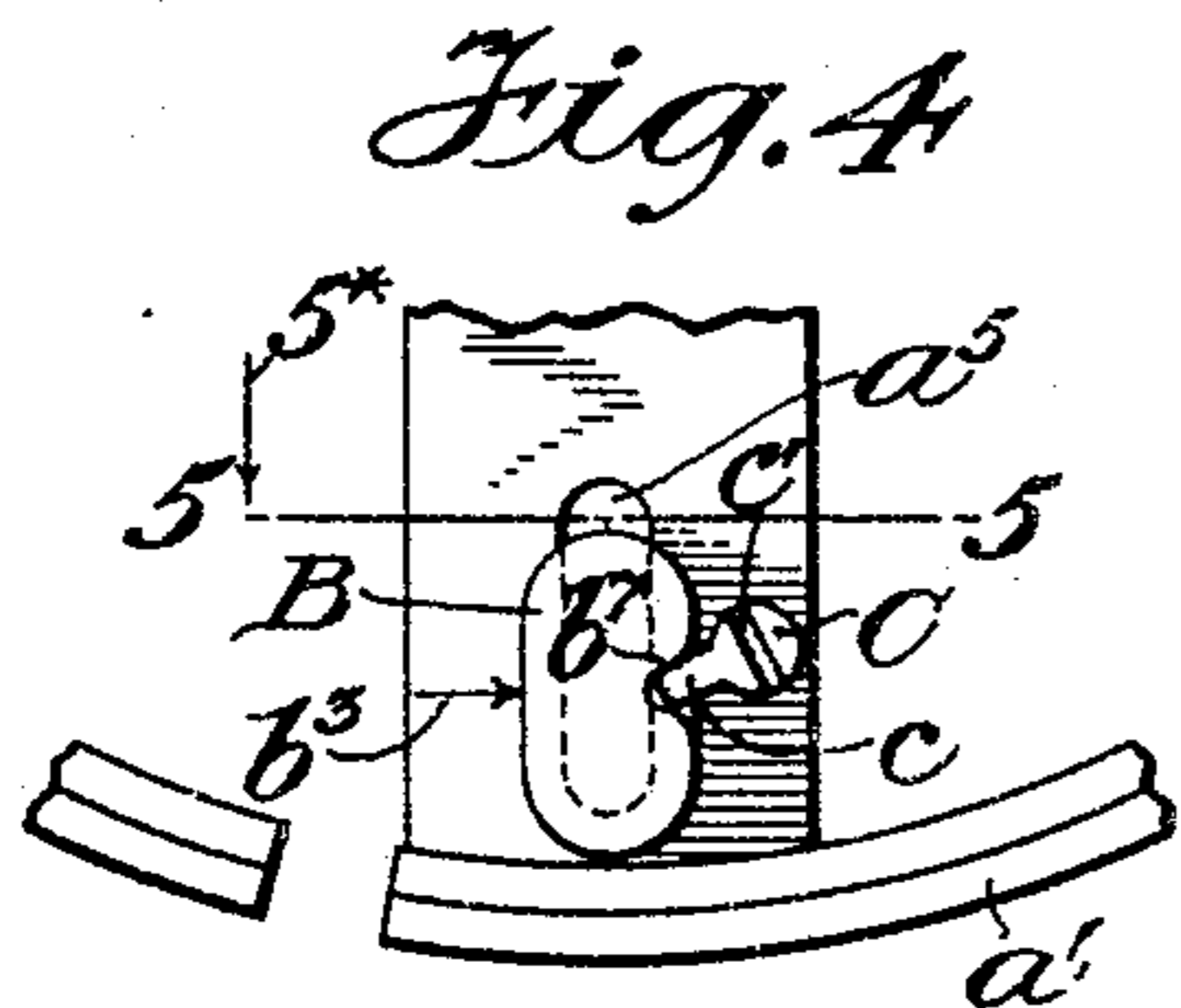
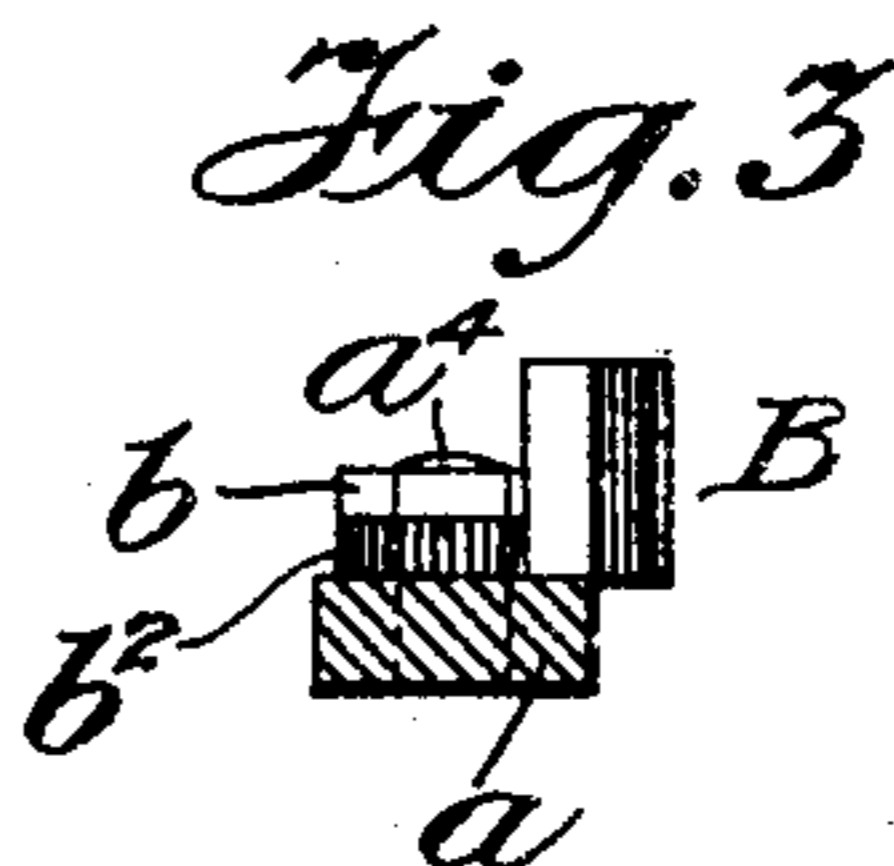
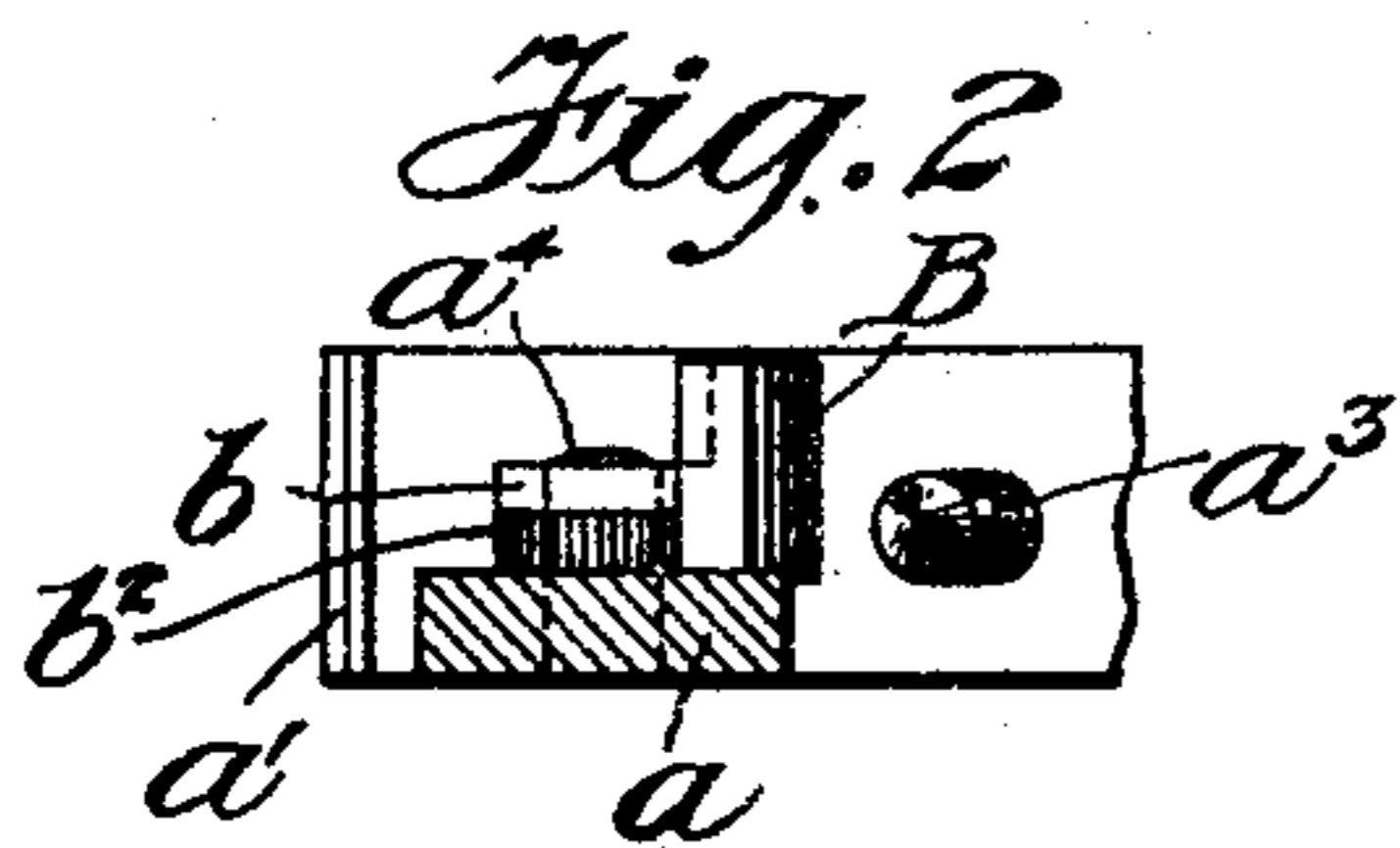
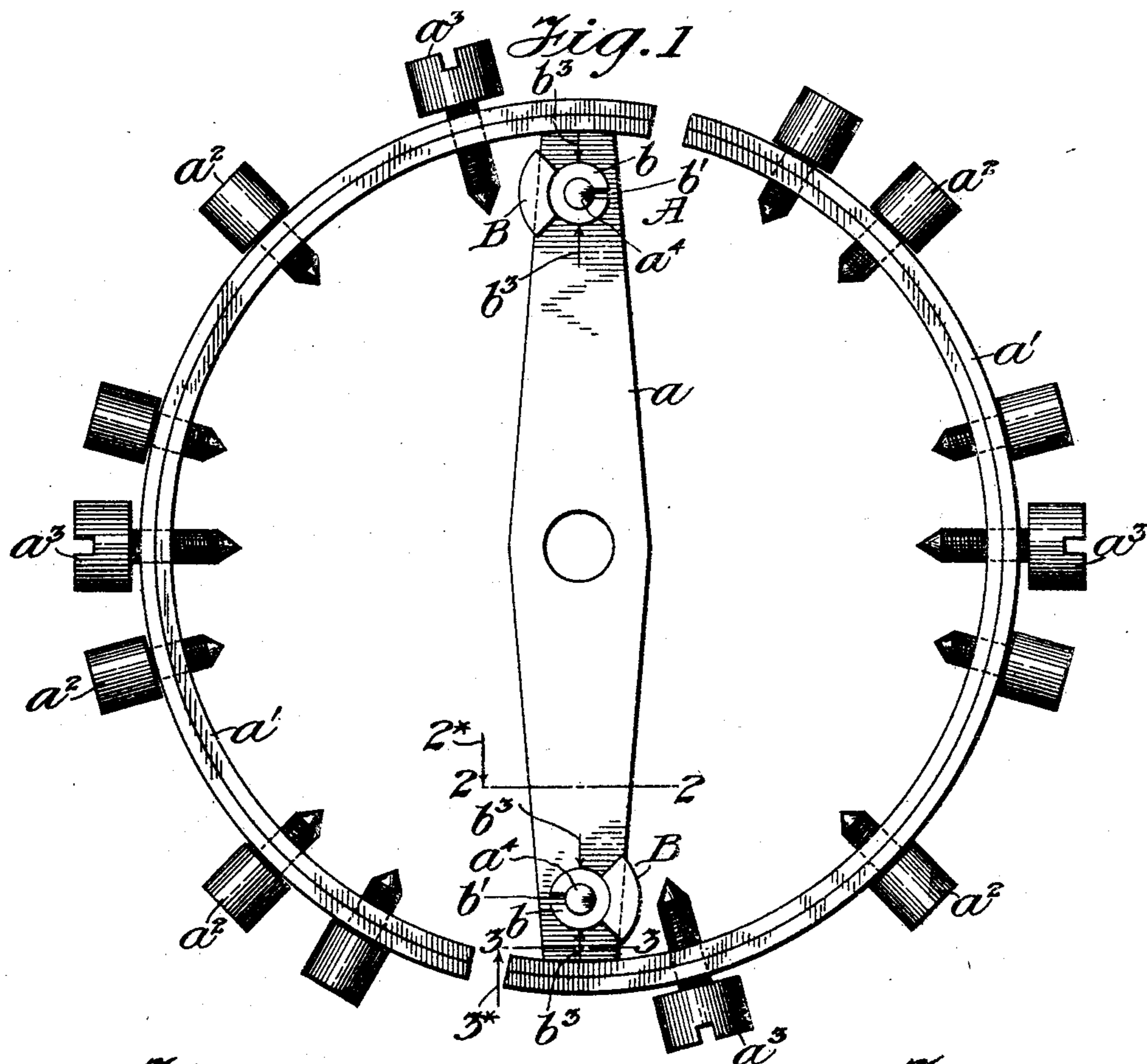


No. 788,399.

PATENTED APR. 25, 1905.

J. A. FRÉUND.  
WATCH BALANCE.  
APPLICATION FILED AUG. 22, 1904.



Witnesses  
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# UNITED STATES PATENT OFFICE.

JOSEPH ALEXANDRE FRÉUND, OF NEW YORK, N. Y.

## WATCH-BALANCE.

SPECIFICATION forming part of Letters Patent No. 788,399, dated April 25, 1905.

Application filed August 22, 1904. Serial No. 221,620.

*To all whom it may concern:*

Be it known that I, JOSEPH ALEXANDRE FRÉUND, a citizen of the United States, and a resident of the borough of Manhattan, in the city, county, and State of New York, have invented certain new and useful Improvements in Speed-Regulators, of which the following is a specification.

My invention relates to that form of regulator which is employed in connection with the balance-wheels of watches and clocks and with other similar vibrating or oscillating appliances to regulate and control the speed or frequency with which the vibration or oscillation of these wheels and appliances operate or recur, its object being to provide a mechanism of this class which while simple in construction and adapted for application directly to the balance-wheel or other appliances shall at the same time be capable of adjustment thereon for effecting the required regulation and control of the latter from the upper side thereof.

To these ends the invention consists, first, in a weight or weights applied directly to the balance-wheel or other appliance and capable of movement toward and away from its axis of motion; second, in the means whereby the weight or weights thus applied to the balance-wheel or other appliance is or are rendered adjustable thereon, and, third, in various other constructions and combinations of parts, all as will hereinafter more fully appear.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a plan view of a balance-wheel of a well-known construction with one form of my invention applied in connection therewith; Fig. 2, a section thereof, taken in the plane 2 2 of Fig. 1 and looking in the direction of the arrow 2\*; Fig. 3, a similar section taken in the plane 3 3 of Fig. 1, but looking in an opposite direction or in the direction of the arrow 3\*; Fig. 4, a plan view of a fragment of a balance-wheel broken away, with a slightly-modified form of my invention applied in connection therewith; and Fig. 5, a vertical section thereof, taken in the plane 5 5 of Fig. 4 and looking in the direction of the arrow 5\*.

In all the figures like letters of reference are employed to designate corresponding parts.

While my invention is capable of application to any of the various forms of balance-wheels of watches and clocks heretofore employed and to other similar vibrating and oscillating appliances, I have here shown it applied in connection with a watch or clock balance-wheel A of the compensating class, of which  $a$  indicates the arm of the wheel;  $a'$ , the segments comprising the rim thereof and made up from the two strips of dissimilar materials;  $a''$ , the balance-screws, and  $a'''$  the mean-time screws, all of which are or may be constructed and combined as is customary in watch and clock balance-wheels of this class as heretofore constructed.

Mounted upon the balance-wheel A, so as to be capable of adjustment toward and away from the axis of motion of the balance-wheel from the upper side thereof, are weights B, which are or may be located at any convenient points upon the balance-wheel and may be constructed in any approved form. I prefer, however, to locate these weights upon the arm  $a$  and to effect their adjustment toward and away from the axis of motion of the balance-wheel either by rotating them upon their own supporting-axes or by causing them to slide back and forth along the arm  $a$ . When the first of these forms of adjustment is adopted, I preferably construct the weights in the form of segments of circles and rotatively mount them upon studs  $a^1$ , which extend upwardly from the outer ends of the upper side of the arm  $a$ . To permit of this mounting of the weights upon the studs  $a^1$ , I provide each of the segmental weights B with a hub  $b$  on its inner side, which is provided with an orifice extending axially through it that is adapted to receive and closely fit upon its appropriate stud  $a^1$ , as shown in Fig. 1. As thus constructed and mounted the adjustment of the weights toward and away from the axis of motion of the balance-wheel is effected by rotating them upon their respective supporting-studs  $a^1$  in the required direction, and in order to permit of this being accomplished and the weights firmly held in adjusted positions after the adjustment the hubs

5  $b$  are preferably slotted, as shown at  $b'$ , whereby while permitting of the hubs by their own resiliency firmly gripping their respective studs when the weights are in their normal  
 10 adjusted positions they yet are capable of yielding sufficiently under the action of a screw-driver or other appropriate means to allow of the adjustment of the weights around their supporting-studs to the extent required.  
 15 While the adjustment of the weights  $B$  is thus effected, the amount of this adjustment may be indicated in various ways. I prefer, however, to employ for this purpose a series of graduating-lines  $b^2$ , which are disposed in  
 20 vertical relationship around the hub  $b$  of each and coöperate with index-lines or arrows  $b^3$ , which are formed in the upper surface of the arm  $a$  on opposite sides of the hub  $b$ , as shown. By this arrangement, as will be seen,  
 25 the amount of adjustment of the weights around their supporting-studs will be clearly indicated, while by locating the index lines or arrows on opposite sides of the axes of the respective studs one or the other of these  
 30 lines or arrows will always be exposed, no matter to what extent its coöperating weight may be rotated in one or the other direction. When the second of these forms of adjustment is employed, on the other hand, the weights  $B$   
 35 will in like manner be preferably located at opposite ends of the arm  $a$  and may be constructed in the form of elongated ovals, as shown, for instance, in Fig. 4 or otherwise. In whatever  
 40 form constructed, however, they will preferably be provided with a tongue  $b^4$ , projecting from the back of each, which will be adapted to fit and slide in an appropriate groove  $a^5$ , formed in the arm  $a$ , and be held in that relationship by a plate or washer  $b^5$ , which in turn will be  
 45 secured to the outer face of the tongue  $b^4$  on the under side of the arm  $a$  by a screw  $b^6$  or other equivalent means. As thus secured in place the adjustment of these weights toward and away from the axis of motion of the bal-  
 50 ance-wheel or other carrier will be effected by sliding them along their respective slots  $a^5$  in the required direction. For sliding these weights along their respective slots various means may be employed, or such result may  
 55 be accomplished by hand, if it be so desired. I prefer, however, to impart this sliding movement to each by a lug or cam  $c$ , which engages with a notch or depression formed in the side of the weight and is itself formed  
 60 upon a plug or screw  $C$ , which projects from and is fitted to rotate in the arm  $a$ , as shown. As thus constructed these plugs or screws are each provided in its outer free end with a notch or nick  $c'$ , and the adjustment of its re-  
 65 spective weight toward and away from the axis of motion of the balance-wheel will be effected by rotating the plug or screw  $C$  in the required direction by a screw-driver applied to the notch or nick  $c'$  therein, as will be readily understood. The adjustment of the weights

along their respective slots  $a^5$  being thus accomplished, the amount of this adjustment may be indicated, as in the first-mentioned construction, by vertically-disposed graduating-lines formed in the edge of each of the weights  $B$  and coöperating with an index line or arrow  $b^3$ , formed in the upper surface of the arm  $A$ , as shown in Fig. 4. 70

With the weights  $B$  applied as above explained these weights may be employed either alone or in connection with the usual mean-time screws  $a^3$  to effect the regulation and control of the balance-wheel or other appliance. When used alone, the regulation and control of the balance-wheel or other appliance will be effected by adjusting the weights either outward from or inward toward the axis of motion of the balance-wheel or other appliance, as the retardation or acceleration of the wheel or other appliance may require. 75  
 On the other hand, when employed in connection with the mean-time screws  $a^3$  the control and regulation of the movements of the balance-wheel or other appliance will preferably be made as far as practicable with the mean-time screws, as is usual, after which any refinement of the regulation and control may be effected by the weights, which will then be adjusted in the required direction to effect the desired result without necessitating a resort to the usual regulator, which acts upon the hair-spring. It will thus be seen that by the employment of the weights in the manner described a main or an auxiliary means for regulating and controlling the movement of a watch or clock balance-wheel or other appliance is provided, as such weights are used alone or in connection with the mean-time screws  $a^3$ , and the adjustment of these weights to effect the required results accomplished from the upper side of the balance-wheel or other appliance without necessitating the removal of the latter from the watch or other mechanism in which it is employed, which is a result that is not possible with the mean-time screws, as their adjustment can only be effected when the balance-wheel or other appliance in which they are employed is removed therefrom. Moreover, with the weights thus employed in connection with the balance-wheel or other appliance the hair-spring regulator usually employed is not required and may be omitted and not only a more accurate regulation of the movement of the watch or other mechanism accomplished, but the cost of such watch or other mechanism thereby cheapened. 80  
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While in the foregoing I have described the best means contemplated by me for carrying my invention into practice, I wish it distinctly understood that I do not limit myself strictly thereto, but reserve to myself the right to modify the same in various ways without departing from the spirit of the invention. 125

Having now described my invention and 130

specified certain ways in which it is or may be carried into effect, I claim and desire to secure by Letters Patent of the United States—

5 1. The combination, with a watch or clock balance-wheel, of weights for regulating the movements of said balance-wheel mounted upon the arm thereof, and means by which these weights are frictionally held in adjusted positions on such arm and rendered adjust-  
10 able from the upper or face side of said balance-wheel, along the said arm, toward and away from the axis, but always within the periphery, of the said balance-wheel, within the range of their adjustment, substantially  
15 as described.

2. The combination, with a watch or clock balance-wheel provided with studs, extending upward or outward from its arm, and with mean-time screws, of weights eccentrically  
20 mounted upon and frictionally held by these studs, whereby these weights are rendered capable of adjustment around their respective

studs from the upper or face side of such wheel and always within the periphery of the latter, and are firmly held in adjusted posi- 25  
tion by the friction between them and their respective studs, substantially as described.

3. The combination, with a watch or clock balance-wheel provided with studs extending from the arm thereof and with index-lines or 30  
arrows formed thereon, of weights constructed in the form of segments of circles and provided with slotted hubs applied to said studs with vertically - disposed graduating - lines  
35 formed around these hubs for coöperation with the index-lines or arrows, substantially as described.

In witness whereof I have hereunto set my hand this 18th day of August, 1904.

JOSEPH ALEXANDRE FRÉUND.

Witnesses:

WM. H. APPLETON,  
R. F. SWEENEY.