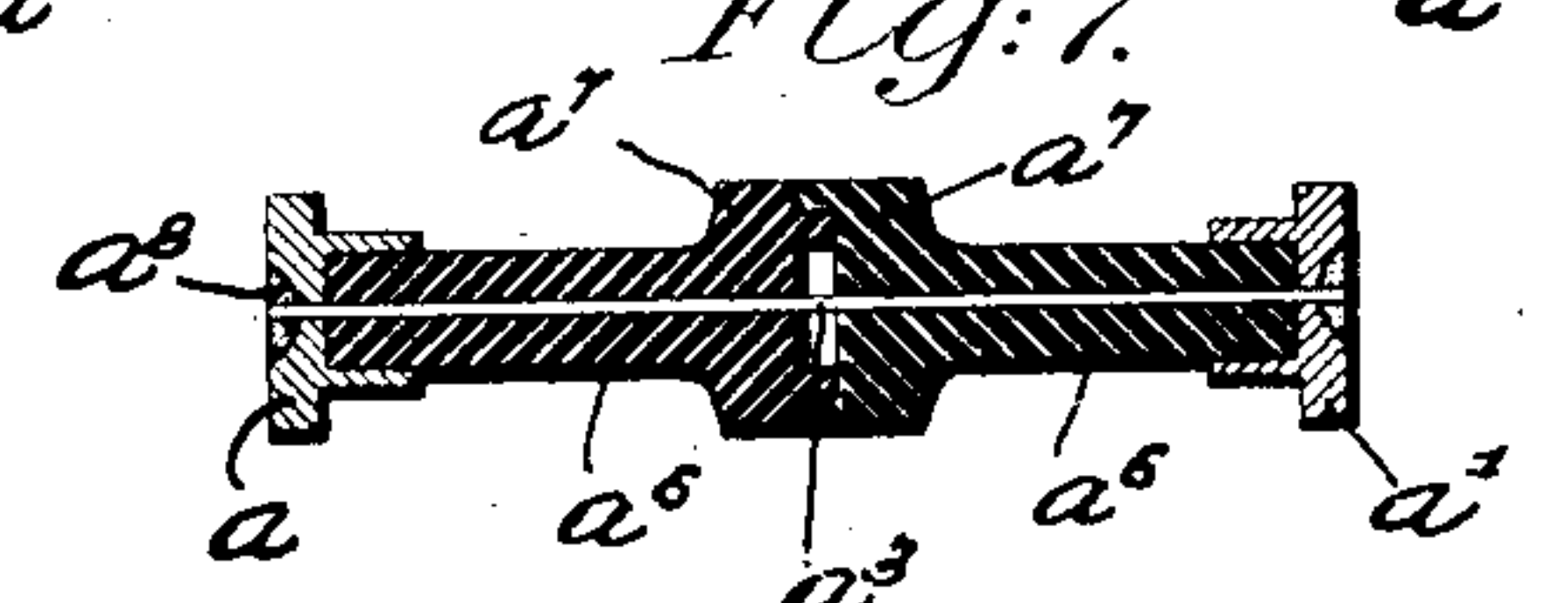
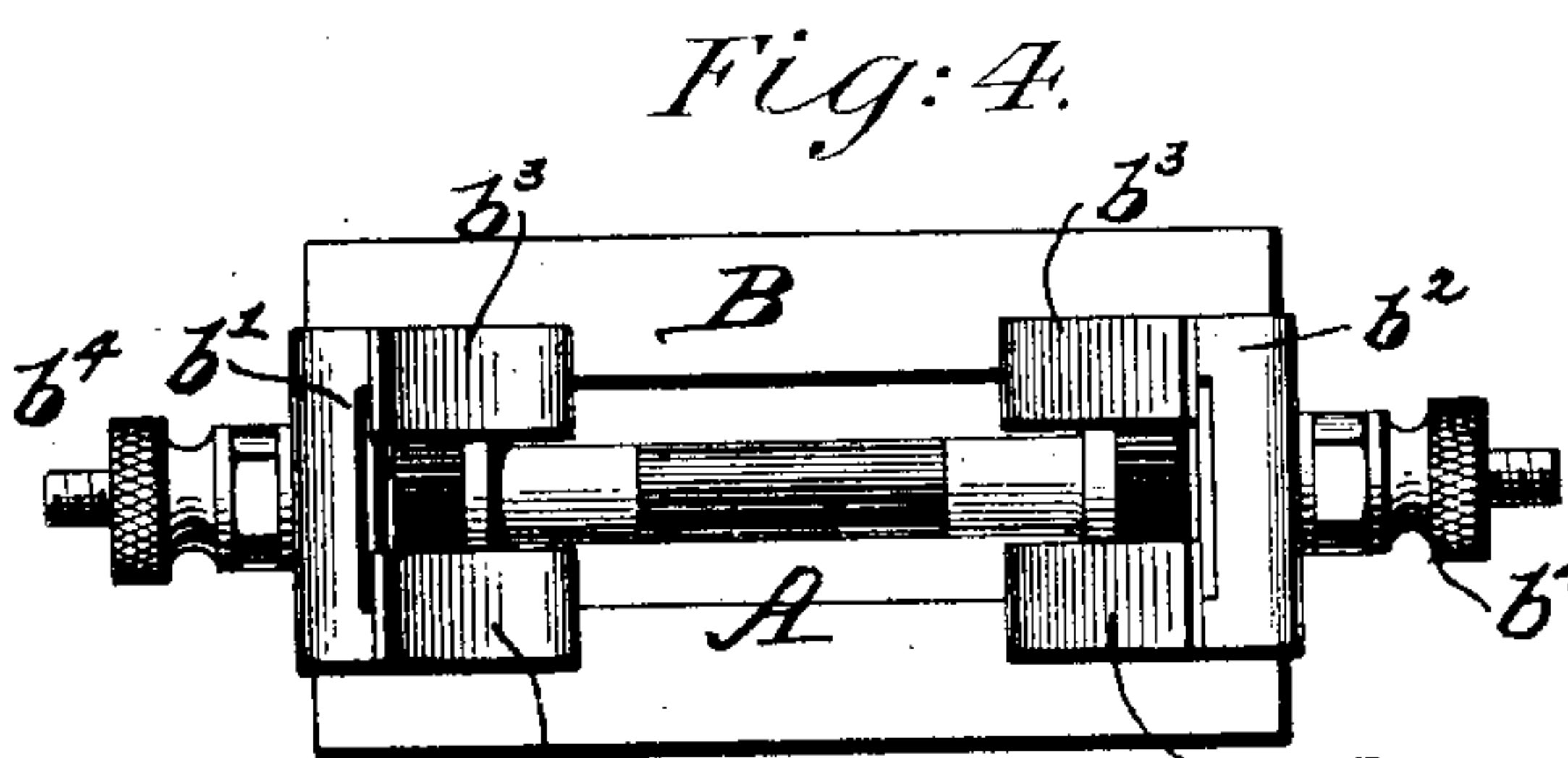
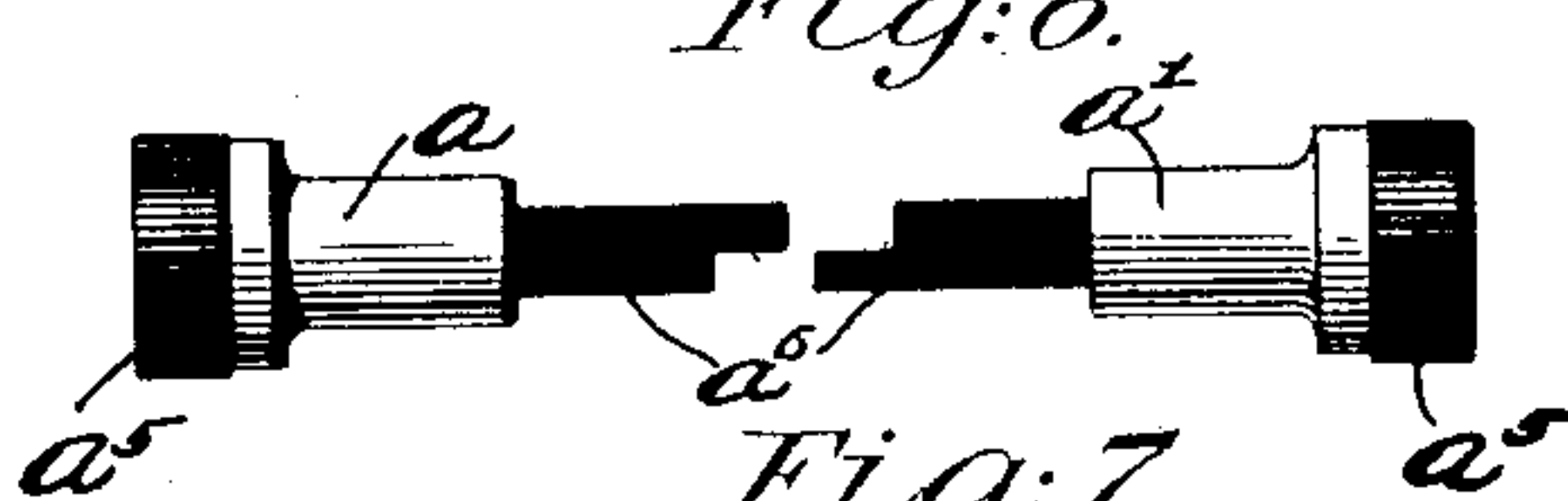
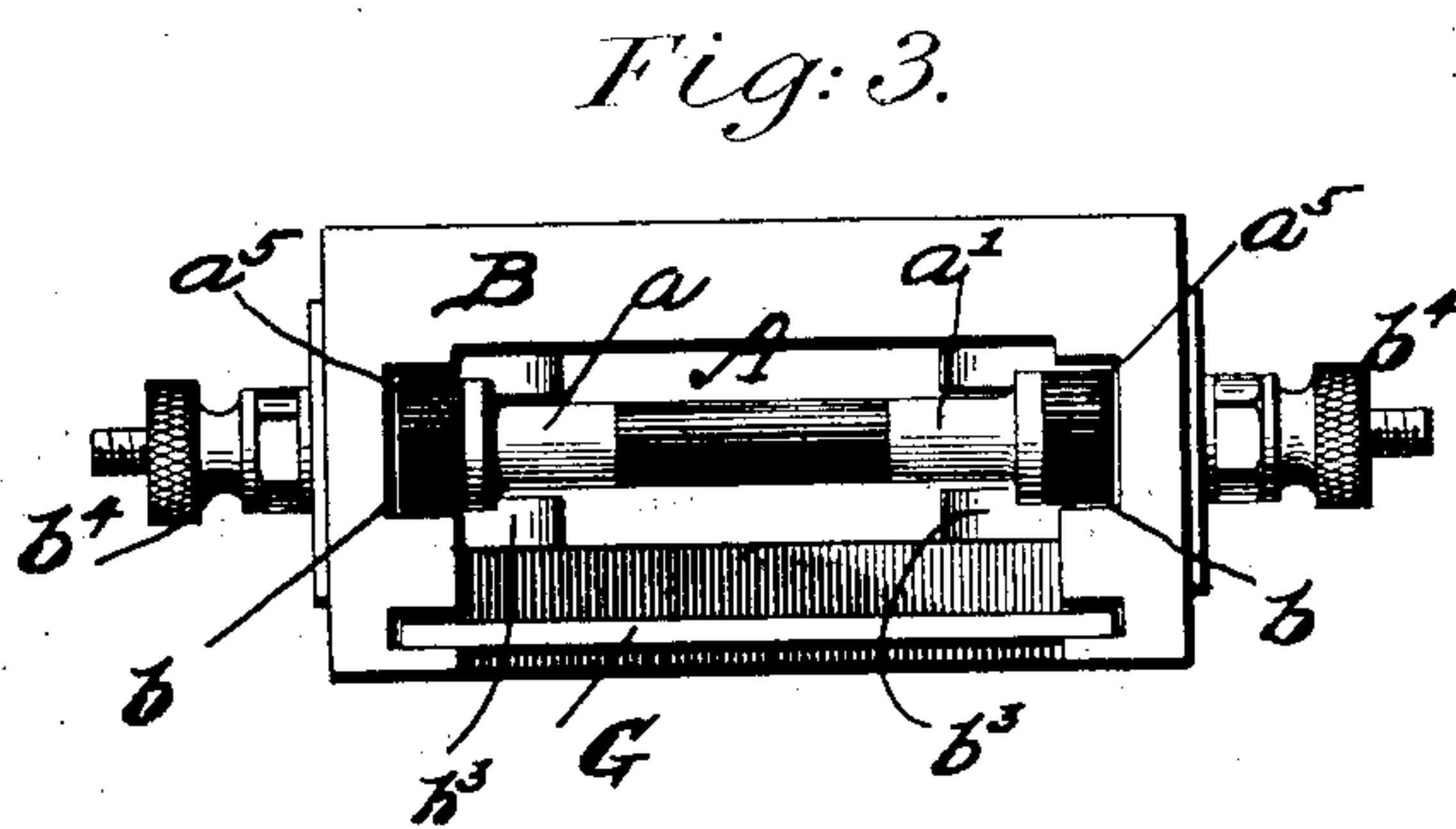
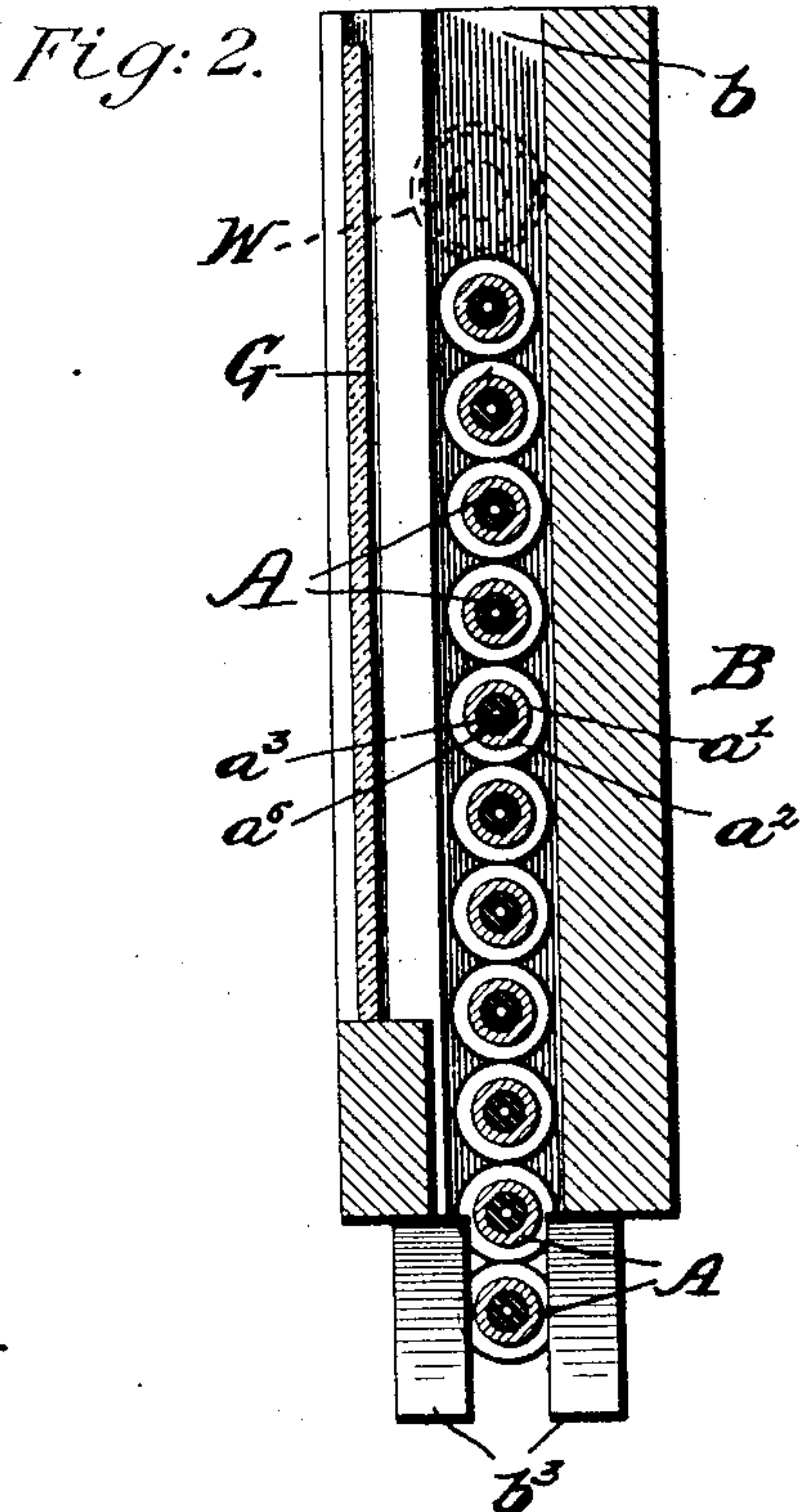
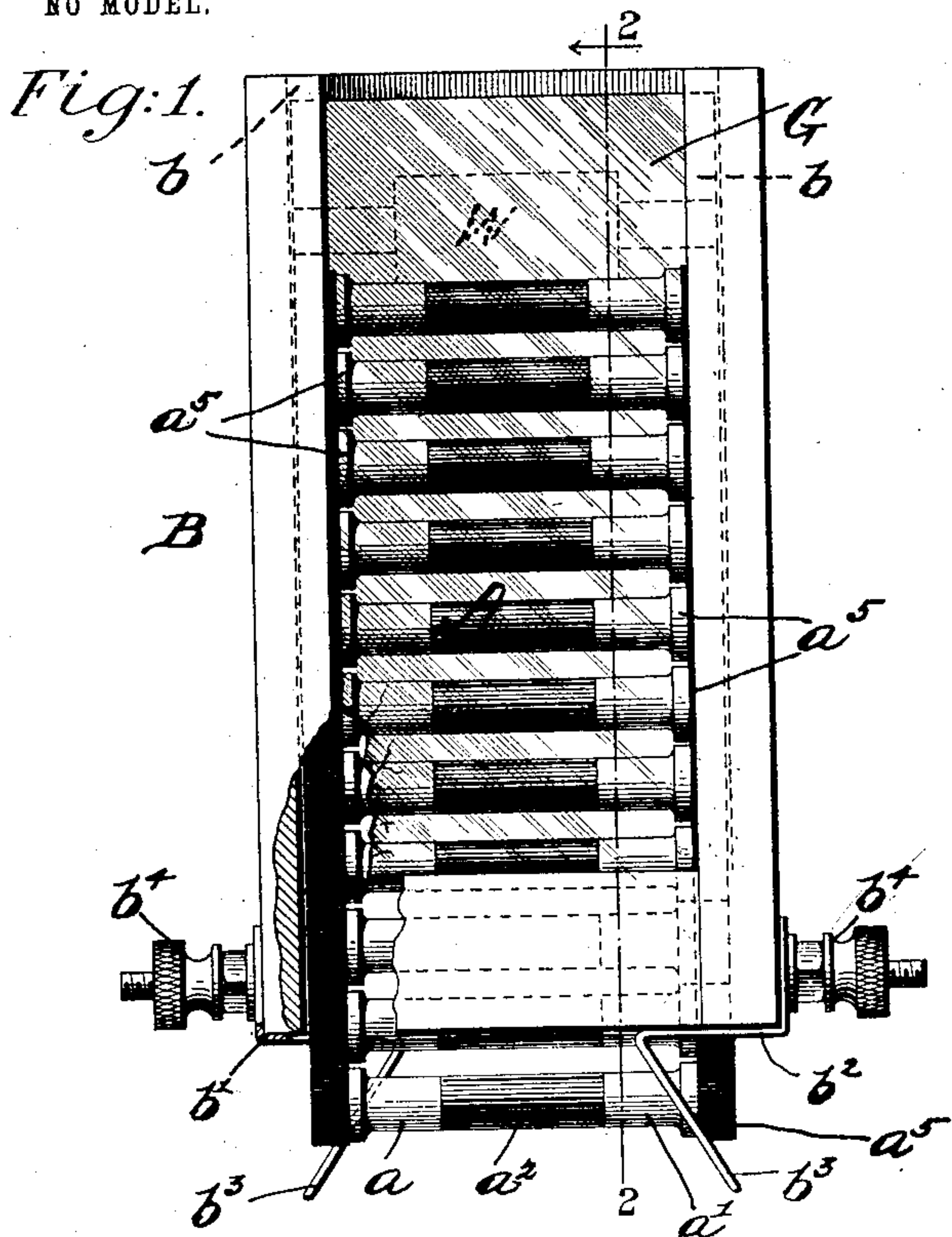


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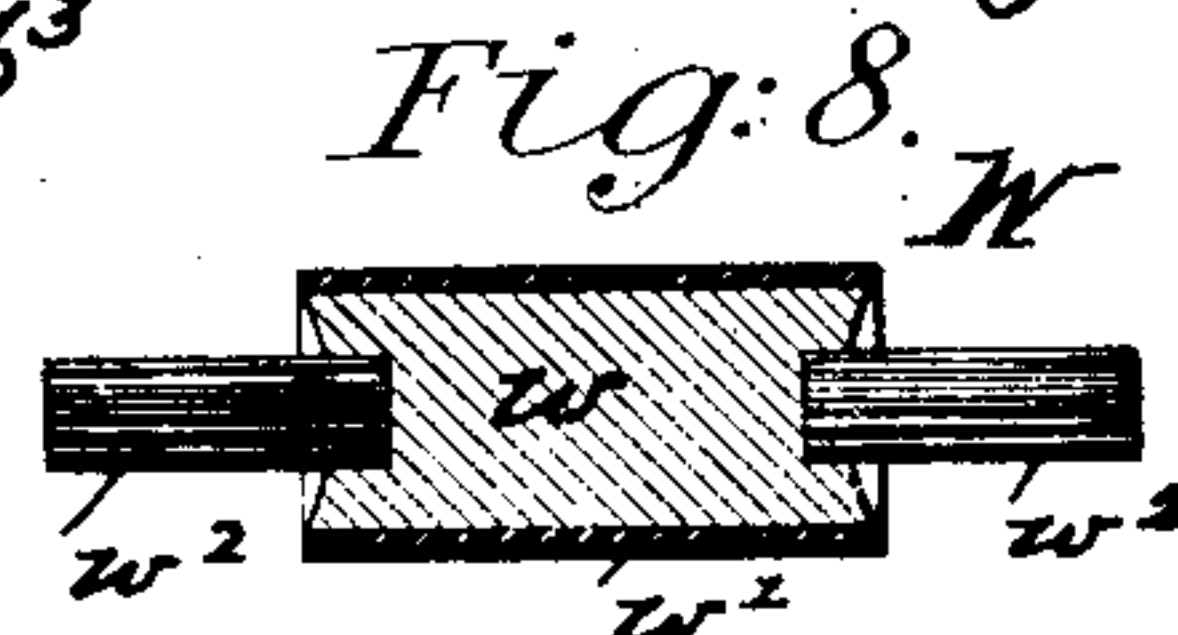
FUSE AND FUSE MAGAZINE.

APPLICATION FILED JUNE 12, 1903.

NO MODEL.



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# UNITED STATES PATENT OFFICE.

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## FUSE AND FUSE-MAGAZINE.

SPECIFICATION forming part of Letters Patent No. 747,528, dated December 22, 1903.

Application filed June 12, 1903. Serial No. 161,157. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM P. WOODRUFF, residing at Buffalo, in the county of Erie and State of New York, and DANIEL J. MCCARTHY, residing at Wilkesburg, in the county of Allegheny and State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Fuses and Fuse-Magazines, of which the following is a specification.

Our invention relates to fuses and also to fuse-magazines.

We will describe a fuse and a modification thereof and a fuse-magazine each embodying our invention and then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a vertical elevation of a fuse-magazine embodying our invention. Fig. 2 is a vertical and longitudinal sectional view of the fuse-magazine shown in Fig. 1, the section being taken on the line 2-2 of Fig. 1. Fig. 3 is a top plan view of Fig. 1. Fig. 4 is a bottom plan view of Fig. 1. Fig. 5 is a vertical and longitudinal sectional view of a fuse embodying our invention. Fig. 6 is a detail view in elevation of parts of the fuse shown in Fig. 5. Fig. 7 is a vertical and longitudinal sectional view of a modified form of fuse embodying our invention. Fig. 8 is a detail view, partly in section and partly in elevation, of a weight employed in connection with the fuse-magazine.

Similar letters of reference designate corresponding parts in all of the figures.

Referring now to the drawings and to Figs. 5 and 6, the fuse A, or it may be termed a "fuse-plug," is here shown as comprising end portions  $a'$ , of conducting material, an insulating and spacing tube  $a^2$  intermediate the end portions, and a fuse-wire  $a^3$ , which is inclosed by the end portions and the tube  $a^2$  and is soldered to the end portions, as shown at  $a^4$ . Each end portion comprises an exteriorly-arranged band  $a^5$ , of insulating material, which has preferably a greater diameter than any part of the end portions, and a tube  $a^6$ , of insulating material, through which the fuse-wire passes. The adjacent ends of the insulated tube portions  $a^6$  are interlocked,

the interlocking being obtained by shoulders on the ends of the tube portions, which overlap. The purpose of the interlocking is to prevent the rotating of one end portion relatively to the other, which, if it were possible, would twist and break the fuse-wire. The spacing-tube  $a^2$  also serves to support the adjacent ends of the tubes  $a^6$ . The end portions  $a'$  and the insulated spacing-strip are independent of one another, and these several parts are held in their proper positions relatively to each other (see Fig. 5) by the fuse-wire. Obviously when the fuse-wire is broken or burned the fuse will collapse—that is, the several parts will fall apart. The purpose of the insulating-bands  $a^5$  is to separate and insulate one fuse from another when a number are placed in a magazine.

In Fig. 7 we have shown a modified form of fuse. In this form each insulated tube  $a^6$  is enlarged circumferentially where they abut and overlap, as shown at  $a^7$ , and the enlargements serve to separate and insulate one fuse from another. In this form the insulating-bands  $a^5$  are dispensed with, as is the spacing-tube  $a^2$ , as the proper spacing for the end portions is obtained through the tubes  $a^6$ .

Referring now to Figs. 1, 2, 3, and 4, B designates a box or receptacle constituting a magazine for containing a number of fuses or fuse-plugs A. The box B is preferably of such form and proportions as to accommodate a single row or layer of fuses. As here shown, the box or receptacle is of the same shape throughout its length and is broader than it is wide. Suitable guides or ways are provided in the box for the fuses, and, as here shown, these guides or ways may be provided by forming grooves  $b$  in two opposite sides of the box. The box is provided with a discharging-opening, which, as here shown, is its lower end. At the discharging-opening means are provided for holding the fuses as they pass through the discharging-opening one at a time. The holding means are preferably included in and form part of a circuit for an electric current. As here shown, these means comprise a pair of plates  $b'$   $b^2$ , of some conducting material. The plates are secured to opposite sides of the box B, and each plate



extends under and downwardly in an inclined direction from the lower end of the box adjacent the discharging-opening in such manner as to form a pair of retaining-arms  $b^3$ , on which the fuses rest. Each plate  $b'$   $b^2$  is cut or recessed sufficiently (see Figs. 2, 3, and 4) to permit of each fuse passing out through the discharging-opening into the arms  $b^3$ . It will be understood that the arms  $b^3$  will be such a distance apart that they will while holding a fuse have electrical contact with the conducting end portions of each fuse. A binding-post  $b^4$  is provided for each plate  $b'$   $b^2$  in order that electrical connections with the plates  $b'$   $b^2$  may be conveniently made. In practice the box B is arranged in a vertical or inclined position, so as to have the fuses rest against one another and to have a movement due to gravity toward the discharging-opening of the box. In order to accentuate this contact and movement, a spring or springs, a plunger or a weight W may be placed on the uppermost fuse. As hereshown, we have employed a weight (see Fig. 8) which comprises a metallic central portion  $w$ , covered by a band  $w'$ , of insulating material, and end portions  $w^2$ , of insulating material, which extend in the guides or ways  $b$ . The upper end of the box may be left open, or it may be provided with a removable or hinged cover, as desired. We also provide a glass G in one side of the box, which may extend the whole length of the box, in order that the interior condition of the magazine can be easily seen.

The operation of the device is as follows: The box B is preferably placed in a vertical position, and the wires of the circuit in which the device is to be placed are connected with the binding-posts  $b^4$ . In this position a fuse will be resting on the arms  $b^3$ , and so long as there is a fuse on the arms another fuse cannot wholly pass out of the box through the discharge-opening. In this position of the fuse the conducting parts of the end portions and the fuse-wire will be in circuit with the holding means. Whenever a current passes through the circuit in which the device is placed heavier than the capacity of the fuse-wire in the fuse, the fuse-wire will burn and the several parts of the fuse will fall apart, and the fuse will fall from its position on the arms  $b^3$  and allow another fuse to take its place in the circuit. This action of the fuses continues as fast as the fuse-wires in the fuses are burned or their continuity is broken. The separation of the several parts of the fuse is insured by reason of the inclination of the arms  $b^3$ , for when the fuse-wire is burned or broken, leaving the end portions free, they are forced downwardly and outwardly on the arms by the fuses above.

The several parts comprised in each fuse may be used a number of times—that is, they may be used again with a new fuse-wire. The several parts are assembled in the manner shown in Fig. 6 and a fuse-wire run through them and soldered in place.

The device is applicable for use in any circuit where there is liability of currents flowing through the circuit which are heavier than any currents intended for the circuit. The device is particularly adapted for use in railway signal systems, telegraph and telephone systems, and fire-alarm systems. In railway signal systems the device may be used in connection with the lightning-arresters usually employed in such systems, or it may take the place of such lightning-arresters.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a fuse, the combination, of end portions of conducting material, insulating material carried by each end portion which insulating materials abut when the end portions are in operative position, an insulated spacing means for separating the conducting material and supporting the abutting ends of the insulating material, and a fuse-wire joining the conducting material in the end portions and for holding the several parts in operative position.
2. In a fuse, the combination of end portions of conducting material, a band of insulating material on each end portion, a tube of insulating material also carried by each end portion, a spacing-tube of insulating material, and a fuse-wire joining the conducting material in the end portions and for holding the insulating and spacing tubes in relative and operative positions.
3. The combination in a fuse, of separable end portions having interlocked ends, and a fuse-wire connected to the end portions.
4. The combination in a magazine-fuse, of a box or receptacle having a discharging-opening, holding means provided at said discharging-opening, and a plurality of collapsible fuses provided in said box or receptacle and adapted to pass one at a time through the discharging-opening into said holding means under the influence of gravity so that one fuse passes into the holding means as soon as the fuse in the holding means collapses.
5. The combination in a magazine-fuse, of a box or receptacle having a discharging-opening, holding means provided at said discharging-opening, a plurality of collapsible fuses provided in said box or receptacle adapted to pass one at a time under the influence of gravity through the discharging-opening into said holding means as the fuse in the holding means collapses, and means for insulating said fuses one from the other.
6. The combination in a magazine-fuse, of a box or receptacle having a discharging-opening, holding means provided at said discharging-opening and comprising inclined arms, and a plurality of fuses provided in said box or receptacle and adapted to pass one at a time through the said discharging-opening and into the holding means one at a time, each of said fuses comprising end portions which rest upon the inclined arms and



a fuse-wire connecting said end portions and which prevents them separating from each other.

- 5 7. In a fuse-magazine of the character described, a box or receptacle adapted to receive a plurality of fuses, one of which is in constant electrical circuit, and holding means for said fuses whereby they are retained within said box or receptacle and brought with  
10 regular sequence into electrical circuit, also each fuse when burned out collapses and fails by gravity from said box or receptacle.

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

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D. J. MCCARTHY.

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