

No. 636,030.

Patented Oct. 31, 1899.

A. H. ENGSTROM.
CIRCUIT BREAKER.

(Application filed Feb. 3, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig: 1.

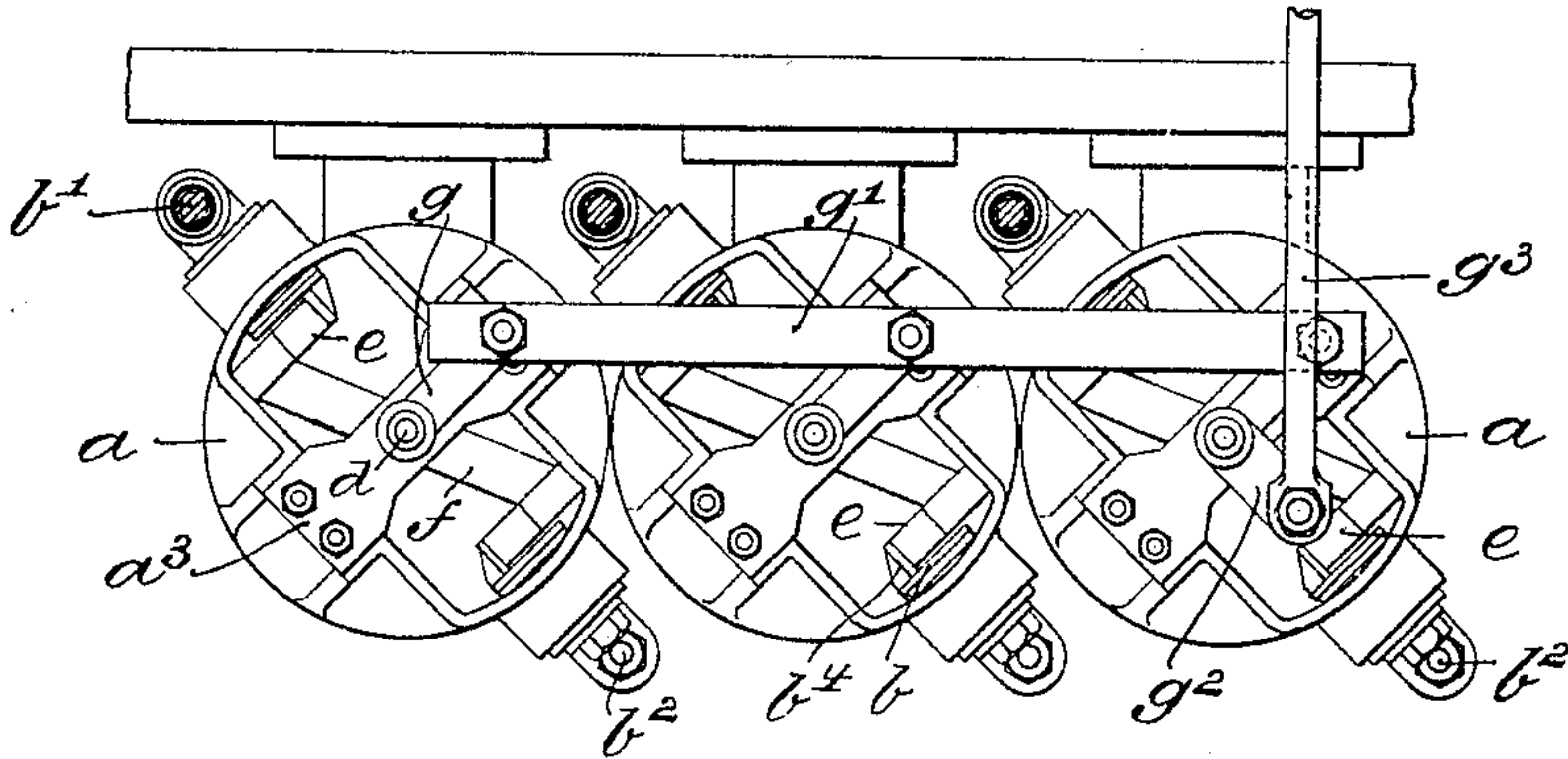


Fig: 2.

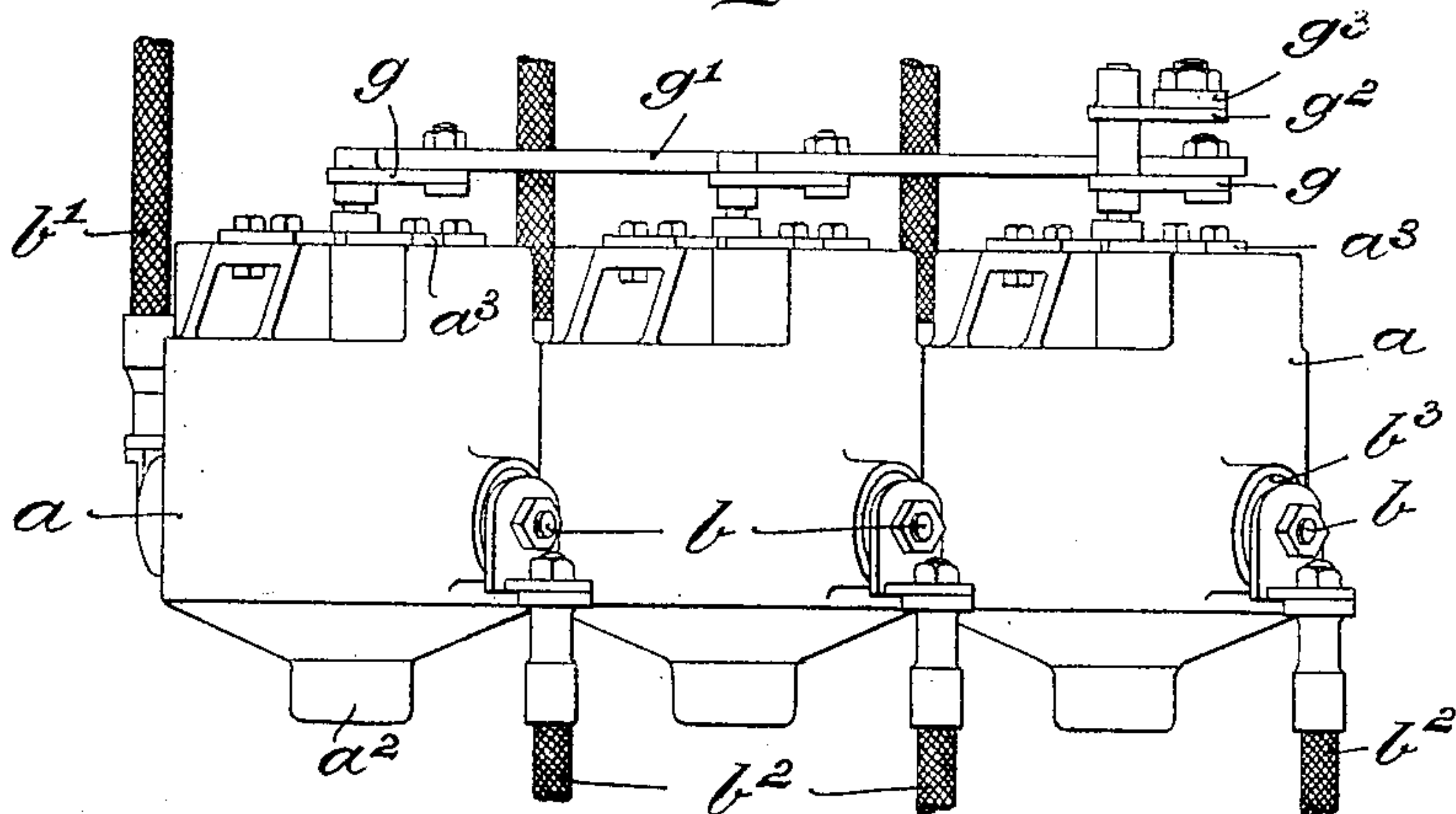
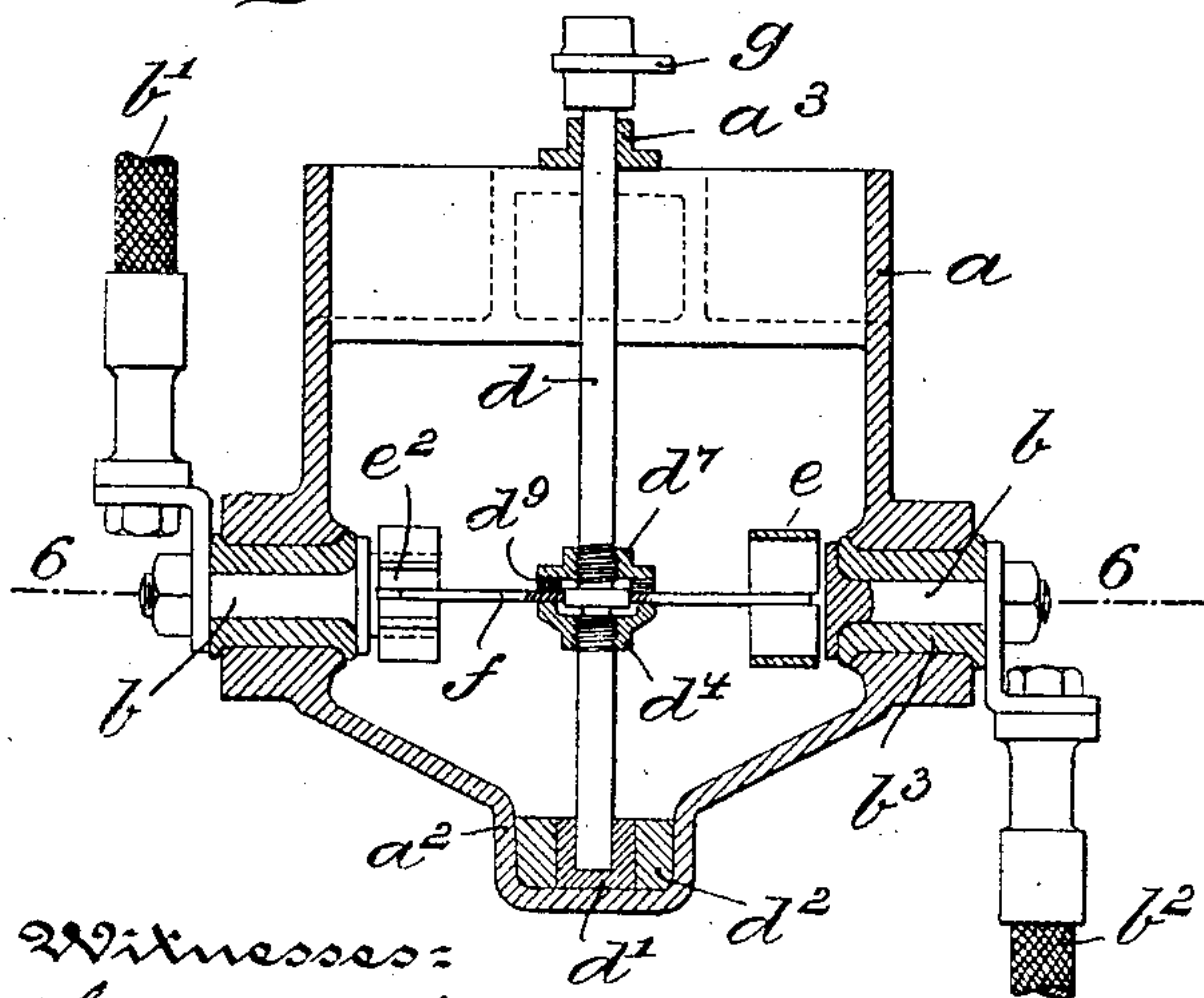
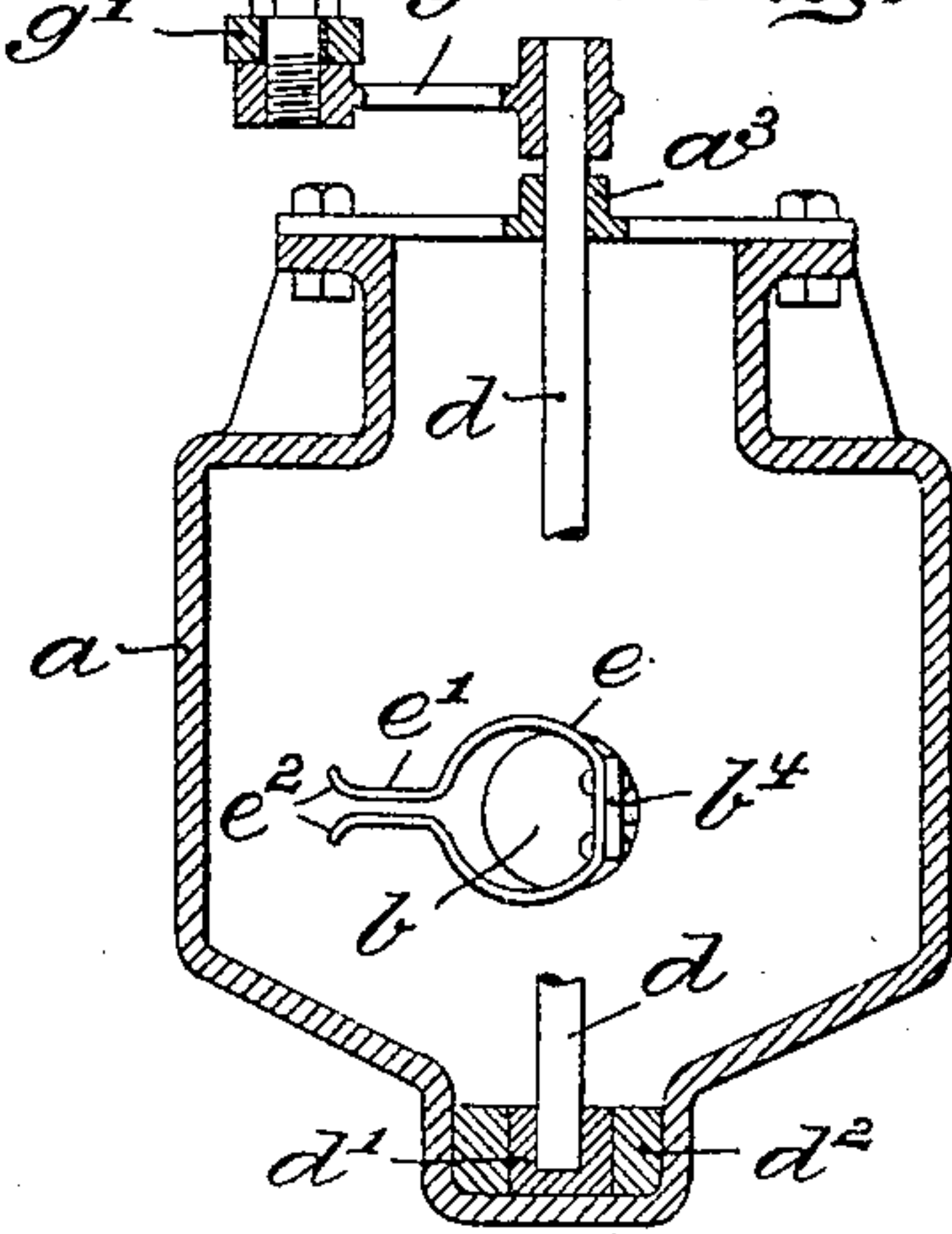


Fig: 3.



Witnesses:
Thomas M. Smith.
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Fig: 4.



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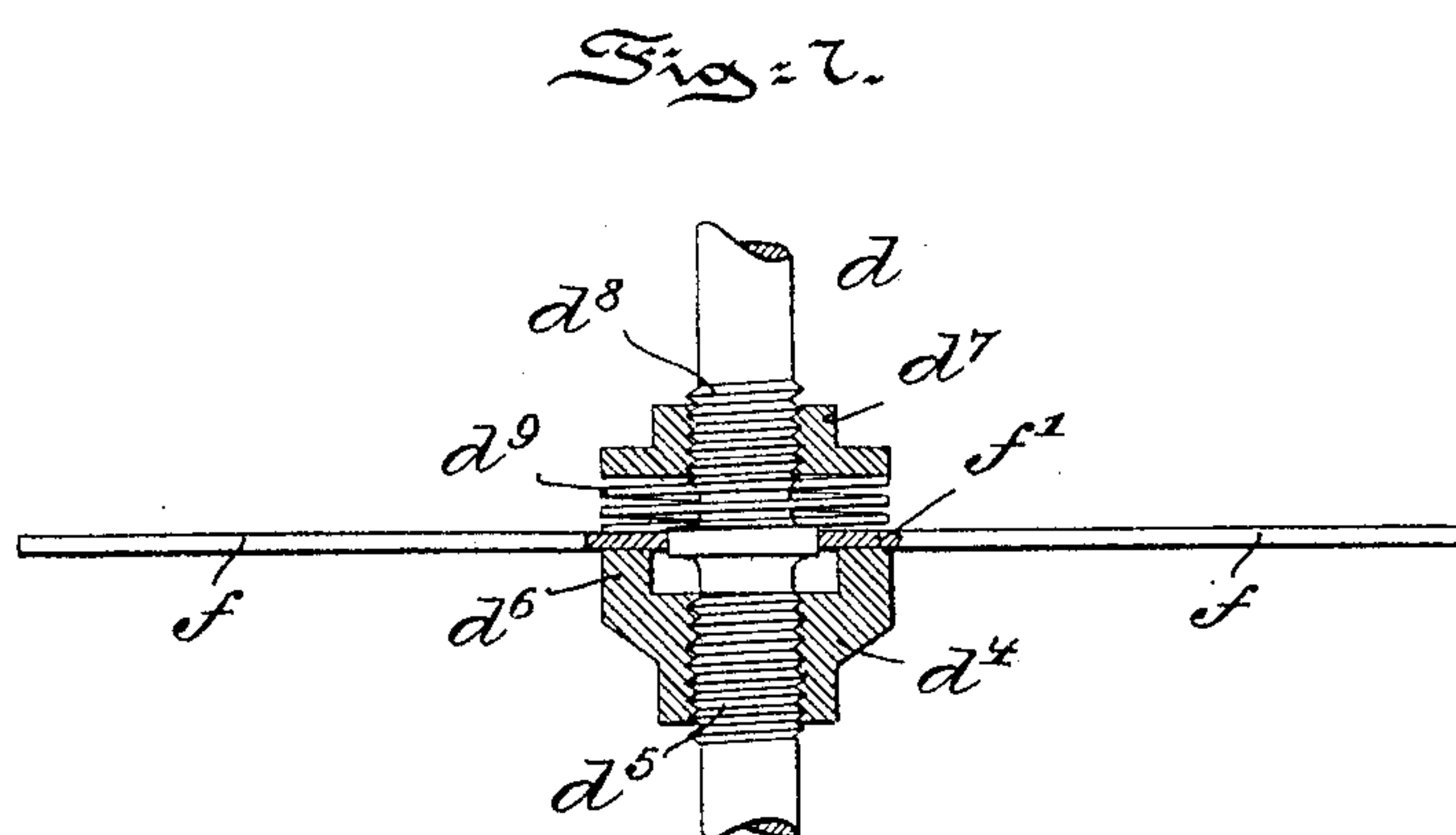
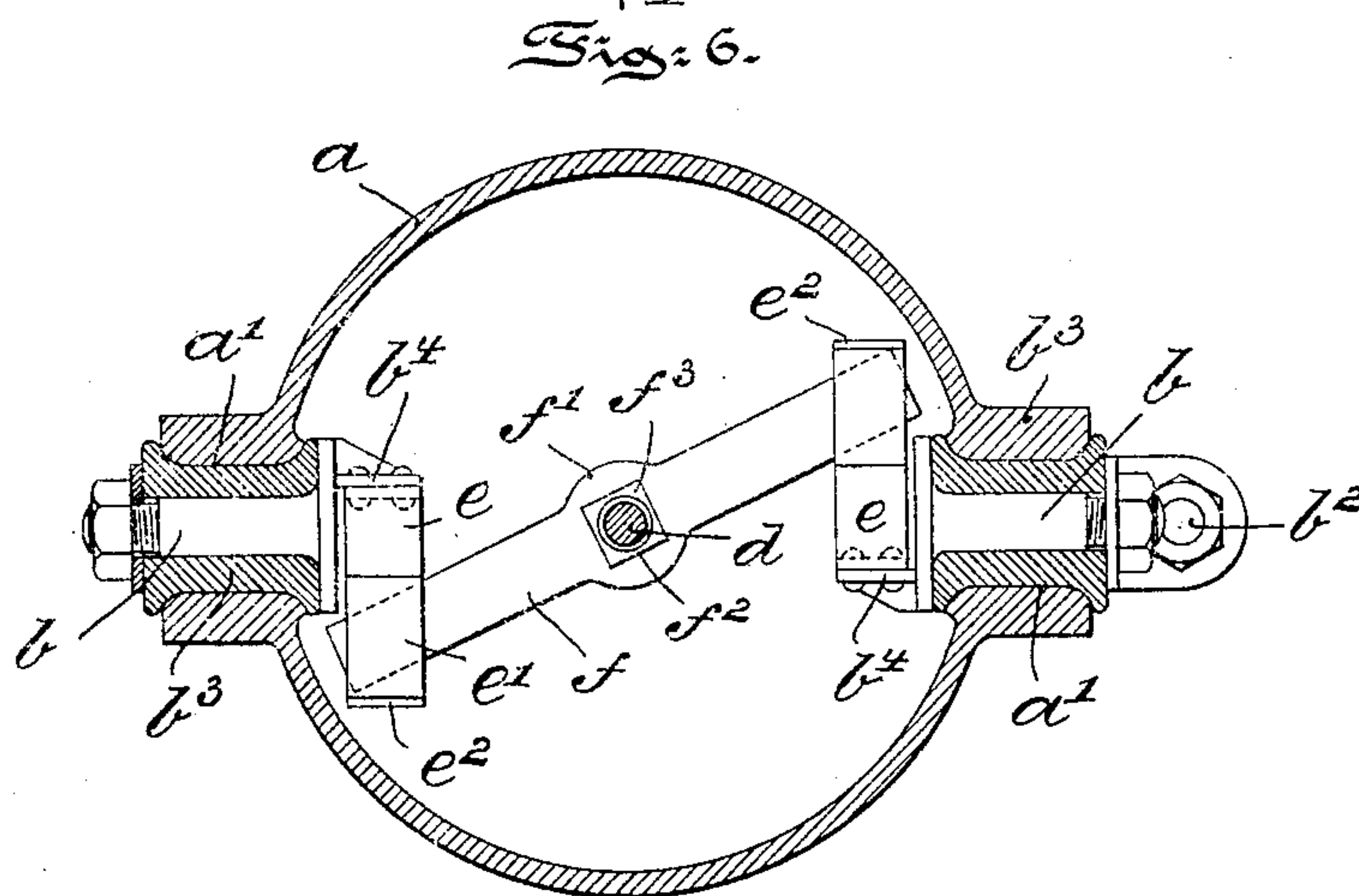
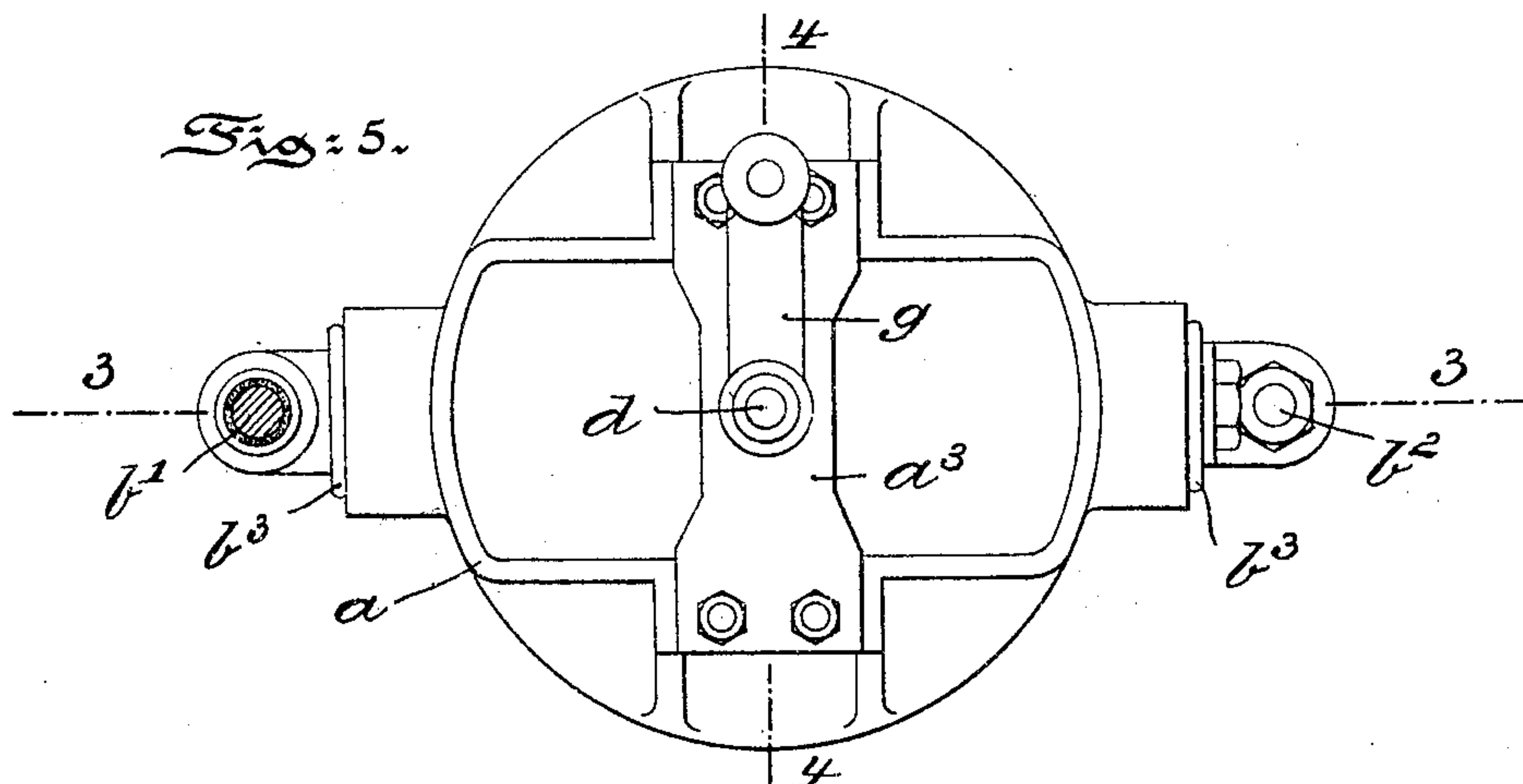
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UNITED STATES PATENT OFFICE.

AXEL H. ENGSTROM, OF PHILADELPHIA, PENNSYLVANIA.

CIRCUIT-BREAKER.

SPECIFICATION forming part of Letters Patent No. 636,030, dated October 31, 1899.

Application filed February 3, 1899. Serial No. 704,439. (No model.)

To all whom it may concern:

Be it known that I, AXEL H. ENGSTROM, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Circuit-Breakers, of which the following is a specification.

My invention has relation to a circuit-breaker for single or polyphase currents, and in such connection it relates more particularly to the construction and arrangement of such a circuit-breaker.

The principal object of my invention is to provide in a circuit-breaker a casing, a shaft arranged vertically within the casing, a switch-lever arm or blade adapted to turn with the shaft, a nut adapted to be advanced on the shaft in one direction to confine the switch-lever arm or blade to the shaft, and elastic means interposed between said nut and switch-lever arm or blade.

My invention, stated in general terms, consists of a circuit-breaker for single or polyphase currents constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a top or plan view of three circuit-breakers arranged in parallel or series and embodying my invention in a preferred form for use in a three-phase current. Fig. 2 is a side elevational view of Fig. 1. Fig. 3 is an enlarged cross-sectional view of one of the circuit-breakers, taken on the line 3 3 of Fig. 5. Fig. 4 is a similar sectional view on the line 4 4 of Fig. 5. Fig. 5 is a still further enlarged top or plan view of one of the circuit-breakers. Fig. 6 is an enlarged horizontal sectional view on the line 6 6 of Fig. 3; and Fig. 7 is an enlarged side elevational view, partly sectioned, of the switch-lever arm or blade.

Referring to the drawings, *a* represents the shell or casing for the circuit-breaker, which is formed of a frangible dielectric material, preferably porcelain, and is provided with the tubular openings *a'* *a'*, through which project

the studs *b b*, connected with the line-wires *b'* and *b''* of the circuit. Between the porcelain walls of the openings *a' a'* and the studs *b b* is arranged a tube or sleeve *b³*, of lead or similar soft metal. The base of the shell *a* is depressed, as at *a²*, to form a bearing for the lower end of the switch-shaft *d*. The end of the shaft rests in a bearing-piece *d'*, of hard metal, held in place in the depression *a²* by a packing *d²*, of lead or similar soft metal. The soft-metal tubes or sleeves *b³* form not only a cushion for the hard-metal studs *b b*, but also a packing to prevent leakage of oil or insulator liquid from the shell *a*. The sleeves *b³* thus permit of a firm and tight connection being made between the studs *b b* and the casing without danger of fracturing said casing, while the packing *d²* insures a firm connection of the bearing-block *d'* with the casing, as well as elastically supporting the block *d'* and shaft *d* and preventing the thrust of said shaft from fracturing the casing. Preferably cast integral with the inner end of each stud *b* is a bracket *b⁴*, to which is suitably fastened a terminal *e*. Each terminal *e* consists of a ring-shaped piece of spring metal, from which extend the two parallel arms *e'*, having diverging free ends *e²*. Between the arms *e'* of the terminals a switch lever or bar *f* is adapted to turn. This lever or bar *f* has a central enlargement *f'*, in which is formed a square or similar-shaped opening *f²*, adapted to fit over a correspondingly-shaped collar *f³*, formed on the switch-shaft *d*, to lock the lever or bar *f* to said shaft, so that it may be turned with the shaft. To confine the bar or lever *f* in a vertical direction to the shaft *d*, a nut *d⁴* is advanced upward upon the threaded portion *d⁵* of the shaft until its flange *d⁶* rests under the square enlargement *f'* of the switch-bar, and a nut *d⁷* is advanced downward upon the threaded portion *d⁸* of the shaft *d* to confine a spiral spring *d⁹* down upon said enlargement *f'*. The spring *d⁹* is spirally coiled about the shaft *d* and serves to permit a slight yielding motion up or down of the arms of the switch-bar. It may be replaced by a flexible washer or its equivalent, which is adapted to permit the arms of the bar to yield up or down. The top of the casing or shell *a* is substantially cross-shaped, and from two opposite arms of

the cross extends a bridge-piece a^3 , forming the upper bearing for the shaft d . To the upper end of the shaft d is secured a crank-arm g , by means of which the shaft may be
5 turned.

Where polyphase currents are to be broken, it is desirable to arrange the circuit-breakers in parallel or series and to connect them so that they all may be operated simultaneously.
10 Such a construction and arrangement is illustrated in Figs. 1 and 2 of the drawings and is preferably used for a three-phase current. In this arrangement the crank-arm g of each separate circuit-breaker is pivotally con-
15 nected to a connecting-rod g' , of wood or other insulator material, and on the shaft d of one of the circuit-breakers is fastened a second crank-arm g^2 , connected directly with a bar g^3 , which bar is controlled manually or auto-
20 matically, as desired. When the bar is shifted, motion is transferred to all the shafts d of the circuit-breakers simultaneously.

Having thus described the nature and objects of my invention, what I claim as new,
25 and desire to secure by Letters Patent, is—

1. In a circuit-breaker of the character de-

scribed, a casing, a shaft arranged vertically within the casing, a switch-lever arm, a blade adapted to turn with the shaft, a nut adapted to be advanced on the shaft in one direction 30 to confine the switch arm or blade to the shaft, and elastic means interposed between said nut and the switch-lever arm or blade, substantially as and for the purposes described.

2. In a circuit-breaker of the character de- 35 scribed, a casing, a shaft arranged vertically within said casing and having a bearing in the base of said casing, a switch-lever arm or blade adapted to turn with said shaft, two 40 nuts adapted to be advanced in opposite directions on said shaft to confine the switch arm or blade to the shaft, and a spiral spring or its equivalent interposed between one of the nuts and the switch-lever, substantially 45 as and for the purposes described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

AXEL H. ENGSTROM.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.