

No. 718,998.

PATENTED JAN. 27, 1903.

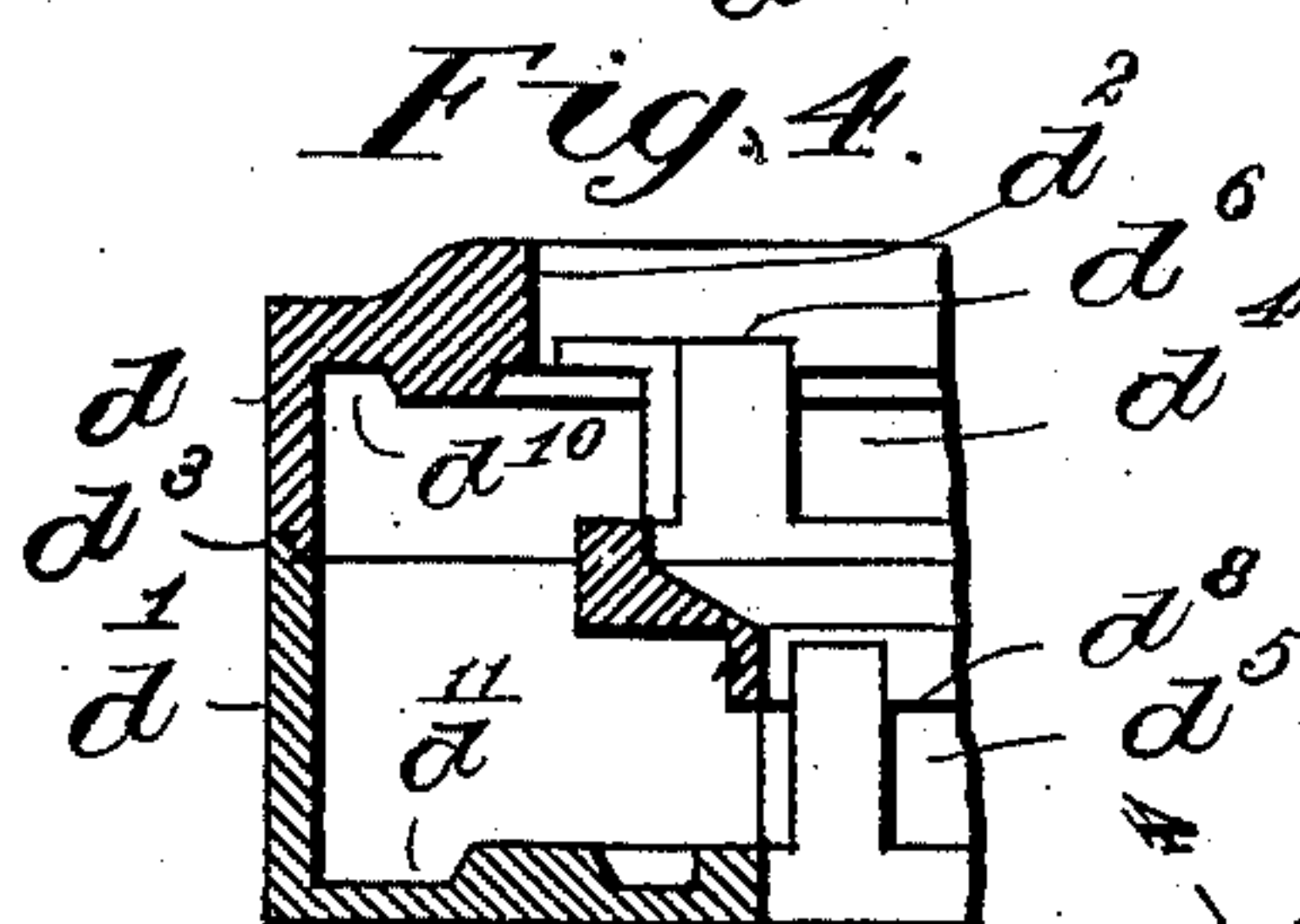
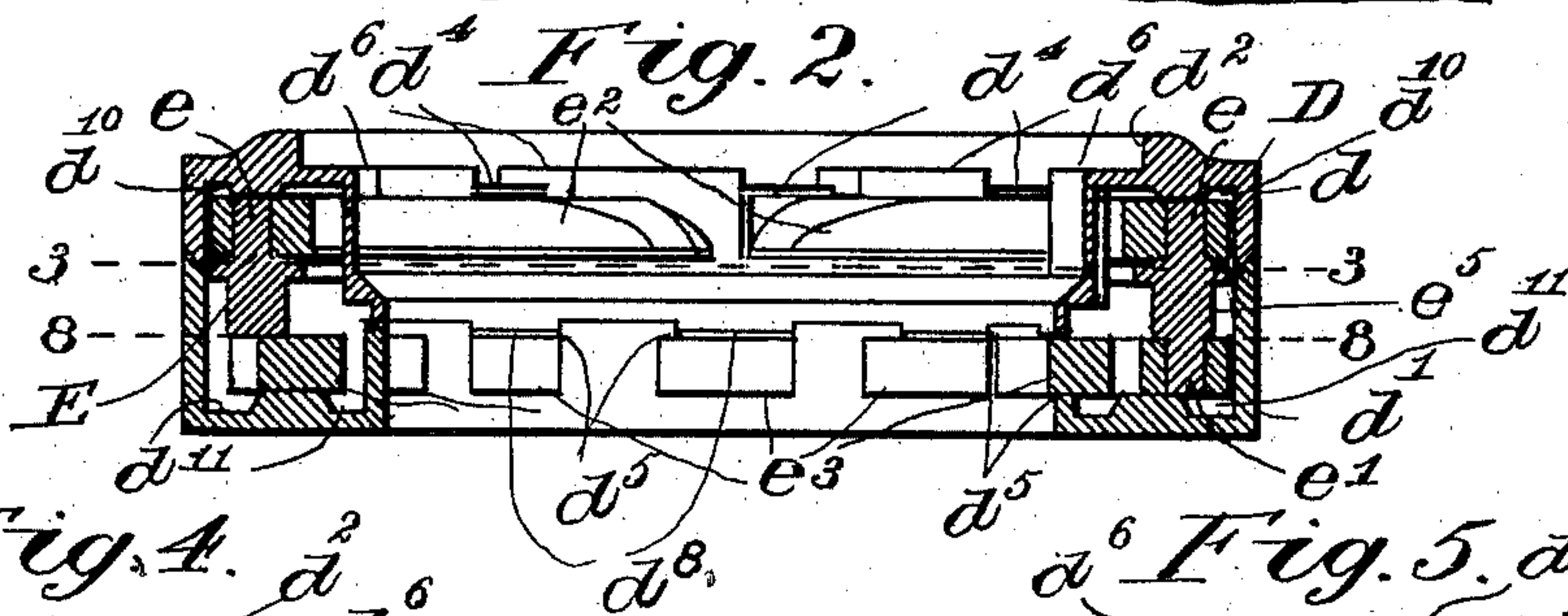
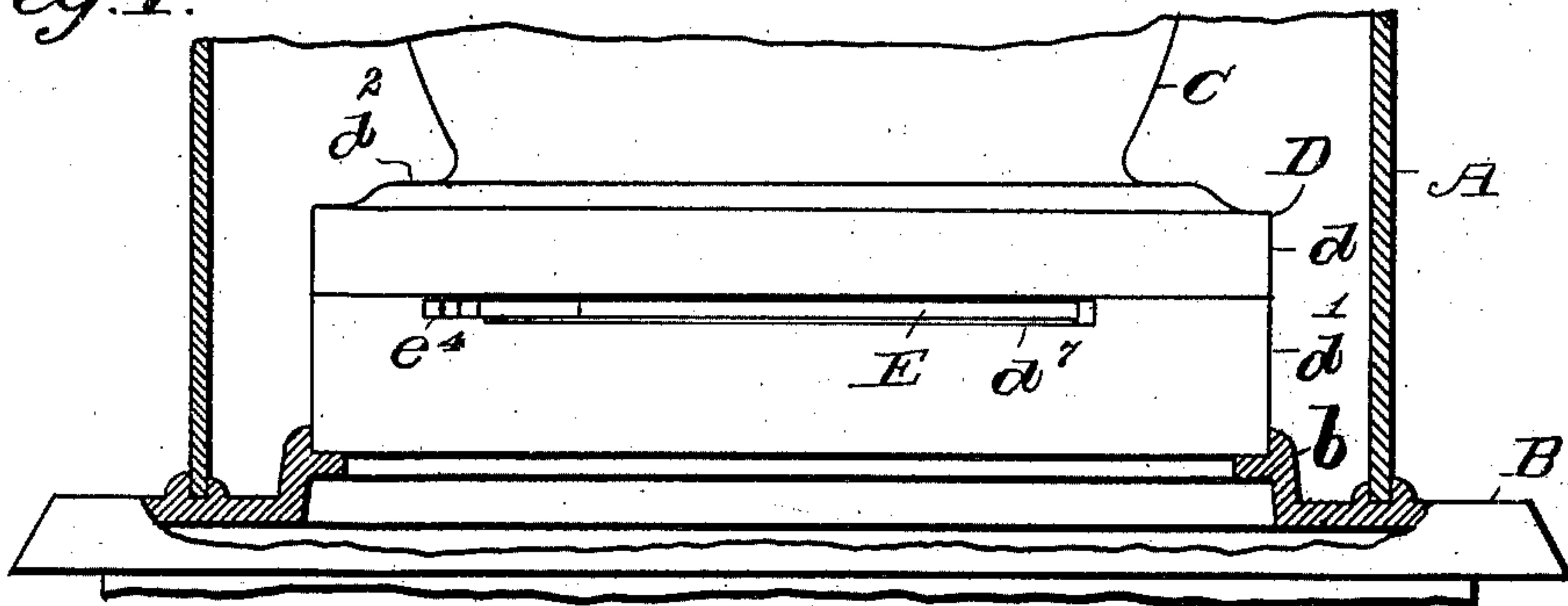
J. H. GOODFELLOW & J. W. PIPER.  
GRATE FOR STOVES OR FURNACES.

APPLICATION FILED APR. 12, 1902.

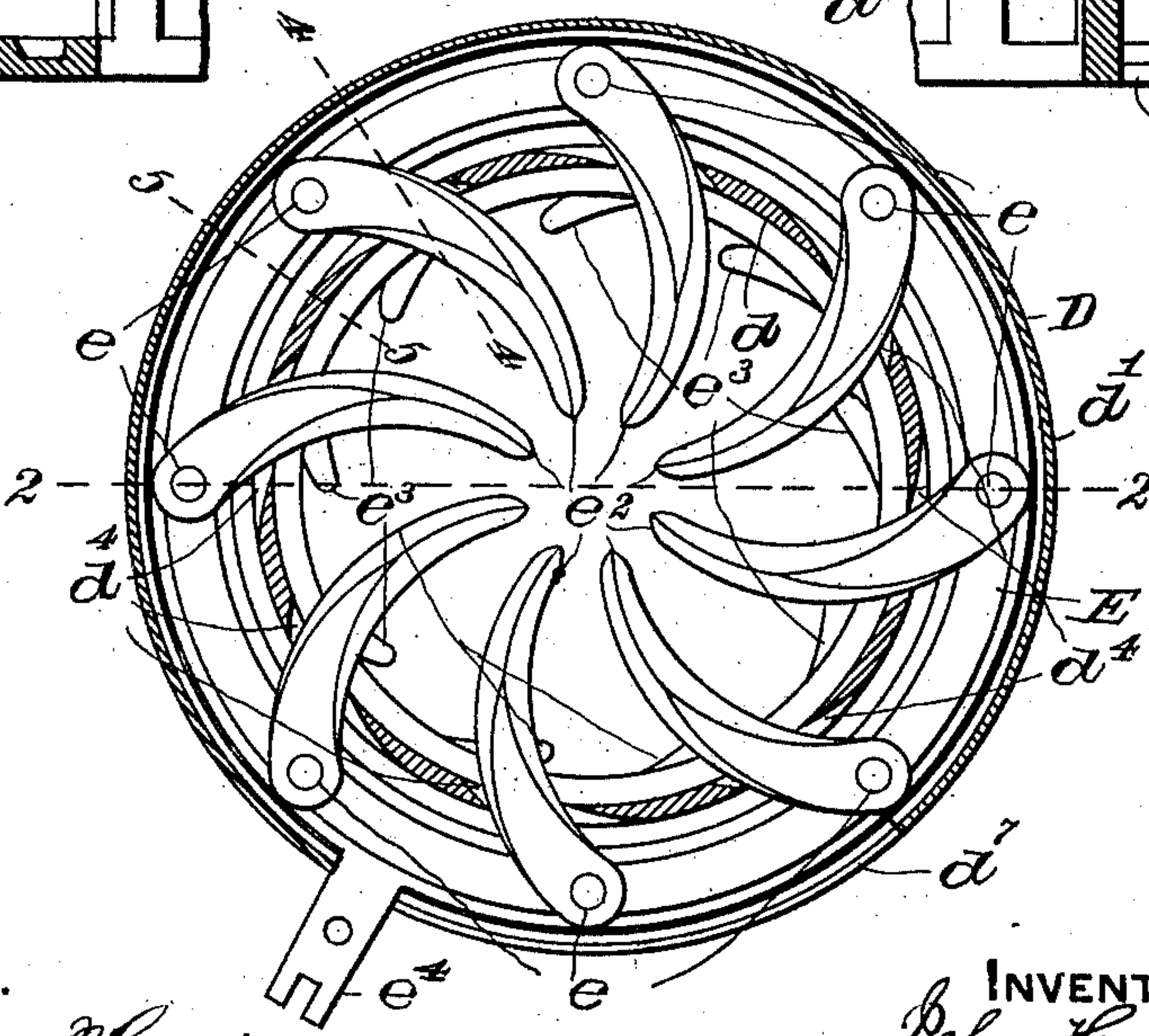
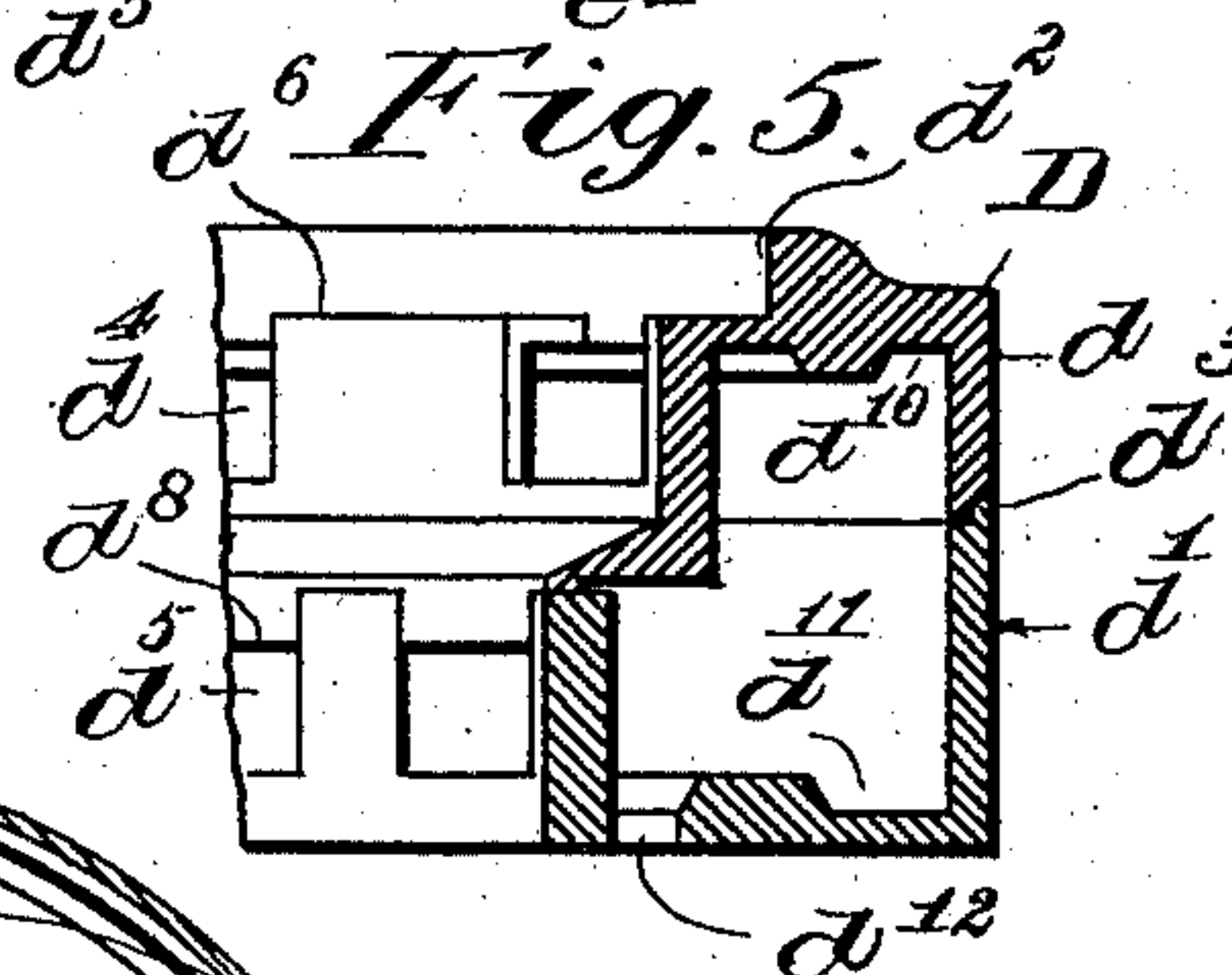
NO MODEL.

2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 3.*



WITNESSES.

*Kirkley Hyde,*  
*Anna T. Halloran.*

INVENTORS

*John H. Goodfellow,*  
*Joseph W. Piper,*  
By *Albert M. Moore,*  
*Their* ATTORNEY.

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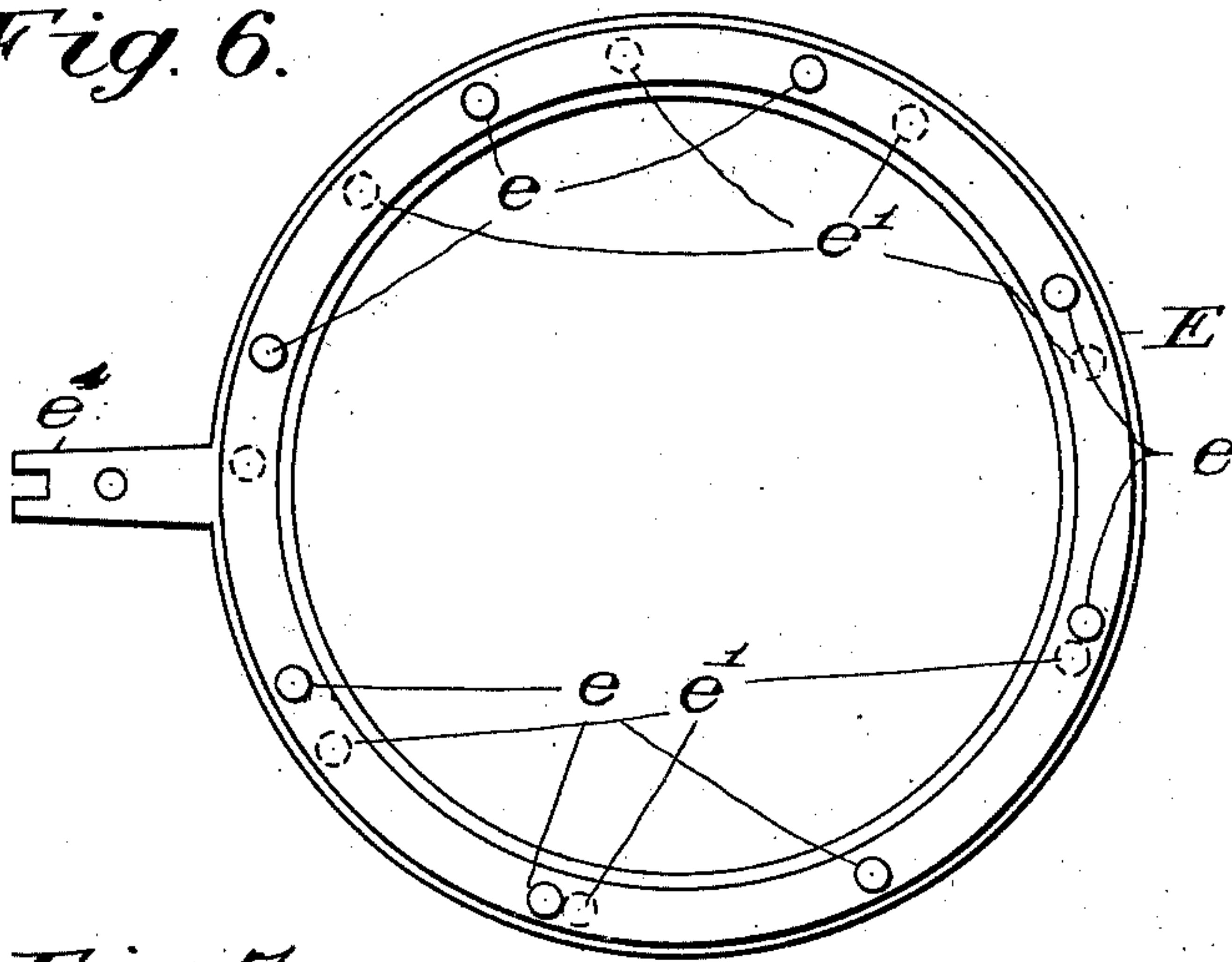
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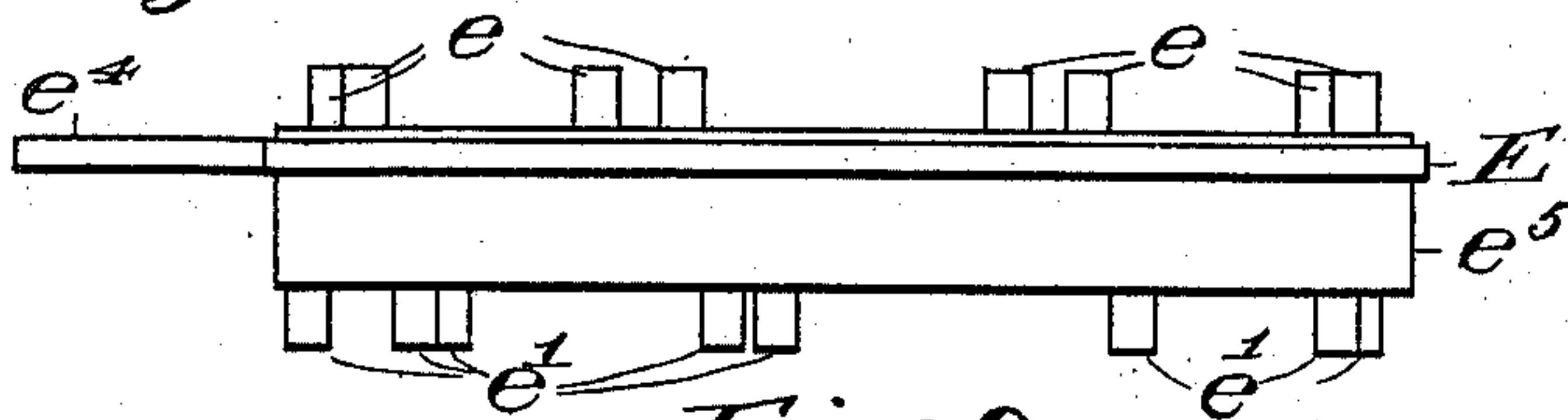
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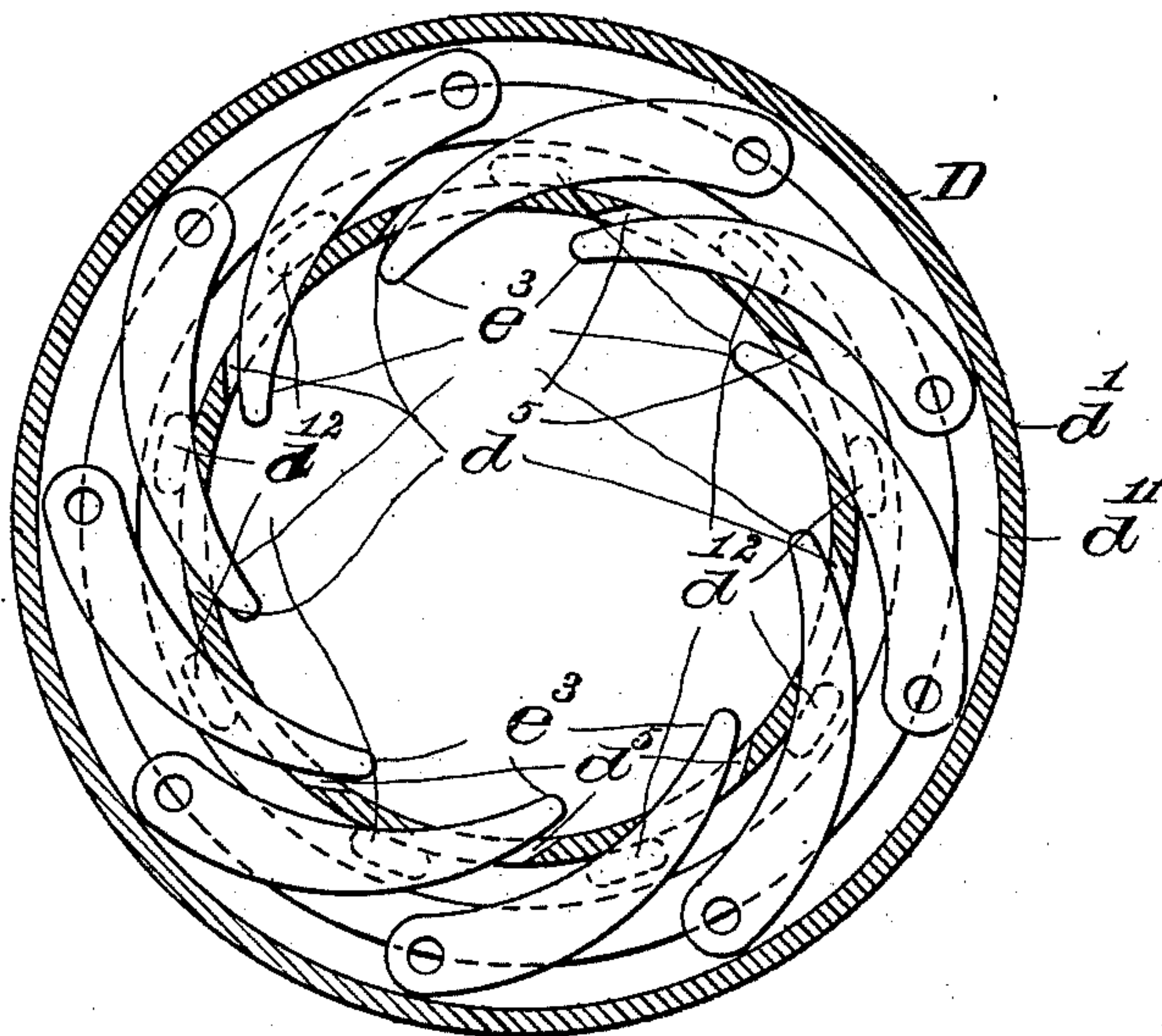
*Fig. 6.*



*Fig. 7.*



*Fig. 8.*



**WITNESSES.**

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*Anna T. Halloran.*

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*Their* ATTORNEY.



# UNITED STATES PATENT OFFICE.

JOHN H. GOODFELLOW, OF BUFFALO, NEW YORK, AND JOSEPH W. PIPER,  
OF LOWELL, MASSACHUSETTS; SAID GOODFELLOW ASSIGNOR TO SAID  
PIPER.

## GRATE FOR STOVES OR FURNACES.

SPECIFICATION forming part of Letters Patent No. 718,998, dated January 27, 1903.

Application filed April 12, 1902. Serial No. 102,616. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN H. GOODFELLOW, residing in Buffalo, in the county of Erie and State of New York, and JOSEPH W. PIPER, residing in Lowell, in the county of Middlesex and Commonwealth of Massachusetts, citizens of the United States, have invented a certain new and useful Improvement in Grates for Stoves or Furnaces, of which the following is a specification.

This invention relates to grates for stoves and furnaces, and is an improvement on the grates shown, described, and claimed in United States Letters Patent No. 629,719, granted July 25, 1899, to us. In said patented device two grates are used, one arranged above the other, the fuel normally resting on the lower grate and each of the grates consisting of a ring or annular frame, to which are pivoted at their outer ends curved tapering fingers or grate-bars which project through openings in housings, so that by moving either ring the corresponding grate-bars will be either forced into or withdrawn from the fire-chamber or combustion-chamber. Said patent discloses means by which such grates can be operated successfully to extend the upper grate-bars into the fire-chamber to support the main body of the fuel and then to withdraw the lower grate-bars to allow the ashes and clinkers below the upper grate to fall from the fire-chamber, after which the lower grate-bars are first restored to normal position, and then the upper grate-bars are withdrawn to allow the mass of fuel to fall upon the lower grate-bars. We have found that equally good results may be obtained by moving both sets of grate-bars simultaneously in opposite directions, effecting a gain in the time required and dispensing with a number of the parts necessary in the patented device.

In carrying out our present invention we use a single grate-ring to operate both sets of grate-bars, and we curve the grate-bars of one set in the opposite direction from the curvature of the bars of the other set, or, in other words, in the matter of curvature only the bars of one set are inverted with respect to those of the other set, the concave side of any bar when the same is withdrawn being the inner side or side toward the center of the

fire-chamber. The bars of the upper set are pivoted on the top of the grate-ring, while the bars of the lower set turn on pivots on the under side of the ring, or to save weight and thickness upon studs which project from the bottom of a flange which extends downward from said grate-ring. The grate-ring is arranged in an annular housing resembling that shown in said patent and provided with openings in its inner wall, through which the fingers project into the fire-chamber. The openings through the inner wall of the housing for the same set of grate-bars are arranged at equal angular intervals in the same plane; but the openings for one set of bars are so arranged with reference to the other set that when the bars of one set have their greatest projection from the housing the bars of the other set have their least projection, and so that turning the grate-ring in either direction moves the points of one set of bars outward or away from the center of the fire-chamber and simultaneously moves the points of the other set inward. This improvement enables the operation of removing the ashes and clinkers to be performed in about half the time required by the use of said patented invention, and the former may be substituted for the latter, except where the grate-surface is so large as to require considerable muscular strength to move the grate singly.

In the accompanying drawings, Figure 1 is a front elevation of the lower part of a fire-pot, grate-ring, housing, and base of a stove or furnace, showing a part of the outer casing in central vertical section; Fig. 2, a central vertical section of the grate-ring and housing on the line 2 2 in Fig. 3; Fig. 3, a horizontal section of the housing on the line 3 3 in Fig. 2. Figs. 2 and 3 also show the upper grate-bars or fingers, said bars being partly in vertical section and in operative position in Fig. 2 and in plan and in the same position in Fig. 3. Figs. 4 and 5 represent enlarged vertical sections of the housing on the lines 4 4 and 5 5, respectively, in Fig. 3; Fig. 6, a plan of the grate-ring, the dotted circles showing the lower pivots; Fig. 7, an elevation of the grate-ring; Fig. 8, a horizontal section on the line 8 8 in Fig. 2.

The case A, base B, and fire-pot or main



combustion-chamber C may be of any usual construction and as shown in said patent, said fire-pot being represented as supported upon a housing D, which forms a downward extension of the combustion-chamber. The base will contain the usual ash-pit below the housing and the usual doors for draft and removal of ashes, these parts not being shown, as they are well understood. The housing D is of somewhat different construction from that shown in said patent, but serves a similar purpose and is of substantially the same shape externally. In the present invention the housing D is made in two (instead of three) separable annular concentric sections  $d$   $d'$ , the upper  $d$  of which rests upon the lower section  $d'$ , the latter resting upon the base B within the concentric annular flange  $b$ . The top of the upper housing-section  $d$  may be provided with a concentric annular flange  $d^2$  to receive and fit the lower end of the fire-pot C. The housing-sections are held from lateral movement with respect to each other by the meeting edges of their outer walls being lap-jointed at  $d^3$ . The housing-sections may be secured to each other by bolts, as shown in said previous patent; but this is not considered necessary, as the weight of said sections and of the fire-pot, aided by the flanges  $b$   $d^2$  and the lap-joint  $d^3$ , will keep them in place. The inner walls of the upper housing  $d$  are provided with openings or ports  $d^4$ , which for convenience of casting are continued upward through the surface  $d^6$ , on which the fire-pot C rests, and other ports or openings  $d^5$  are formed in the top of the inner wall of the lower housing-section  $d'$ , the upper ends of which are closed by downward projections  $d^8$  on the lower edge of the inner wall of the section  $d$ , these last-named openings  $d^5$  being substantially as shown in said patent. Instead of the two separate grate-rings shown in said patent we have herein shown a single grate-ring E, which serves as an operating-ring for two separate series of grate-bars or fingers  $e^2$   $e^3$ . The grate-ring E is arranged in the housing D and is provided with a radial projection or handle  $e^4$ , which projects through a slot  $d^7$ , by means of which said ring E may be turned. Stud  $e$  project from the top of the ring E and serve as pivots for the upper grate-bars  $e^2$ , and similar studs  $e'$ , on

which are pivoted the lower grate-bars  $e^3$ , project downward from a flange  $e^5$  on the bottom of said ring. The upper grate-bars project through the ports  $d^4$  and the lower grate-bars through the lower ports  $d^5$  into the combustion-chamber or central space of the housing. The ports  $d^4$   $d^5$  are of such width that the abutments or sides of said ports cause the corresponding grate-bars  $e^2$   $e^3$  to swing outward or inward as the ring E is turned, and the pivots of said bars and said ports are so arranged that one series of bars are thrown inward toward the center of combustion-chamber simultaneously with the outward movement of the bars of the other series. The grate-bars of the upper and lower series are oppositely curved, but in other respects may be substantially alike and as shown in said patent and are retained on their respective pivots by the inner surfaces of the top and bottom of the housing and are partially supported by the lower edges of their respective ports. The housing is preferably provided with channels  $d^{10}$   $d^{11}$  to reduce friction of the moving parts—that is, of the ring E and grate-bars—on said housing, and is also provided with vertical perforations  $d^{12}$   $d^{13}$ , which allow the escape of ashes and prevent the clogging of said grate-ring and grate-bars by the accumulation of ashes in the housing, said perforations also admitting air to the outer parts of the fuel and serving the purpose of a gas-ring shown and described in said patent.

We claim as our invention—

The combination of a grate-ring, two series of oppositely-curved grate-bars, one series pivoted to the top and the other to the bottom of said ring, and a suitable housing for said ring having ports or openings in its inner wall through which said bars project, said ports or openings being arranged to cause the bars of either series to swing inward toward the center of said housing when the bars of the other series swing outward.

In testimony whereof we have affixed our signatures in presence of two witnesses.

JOHN H. GOODFELLOW.  
JOSEPH W. PIPER.

Witnesses:

ALBERT M. MOORE,  
PETER A. FAY.