

(No Model.)

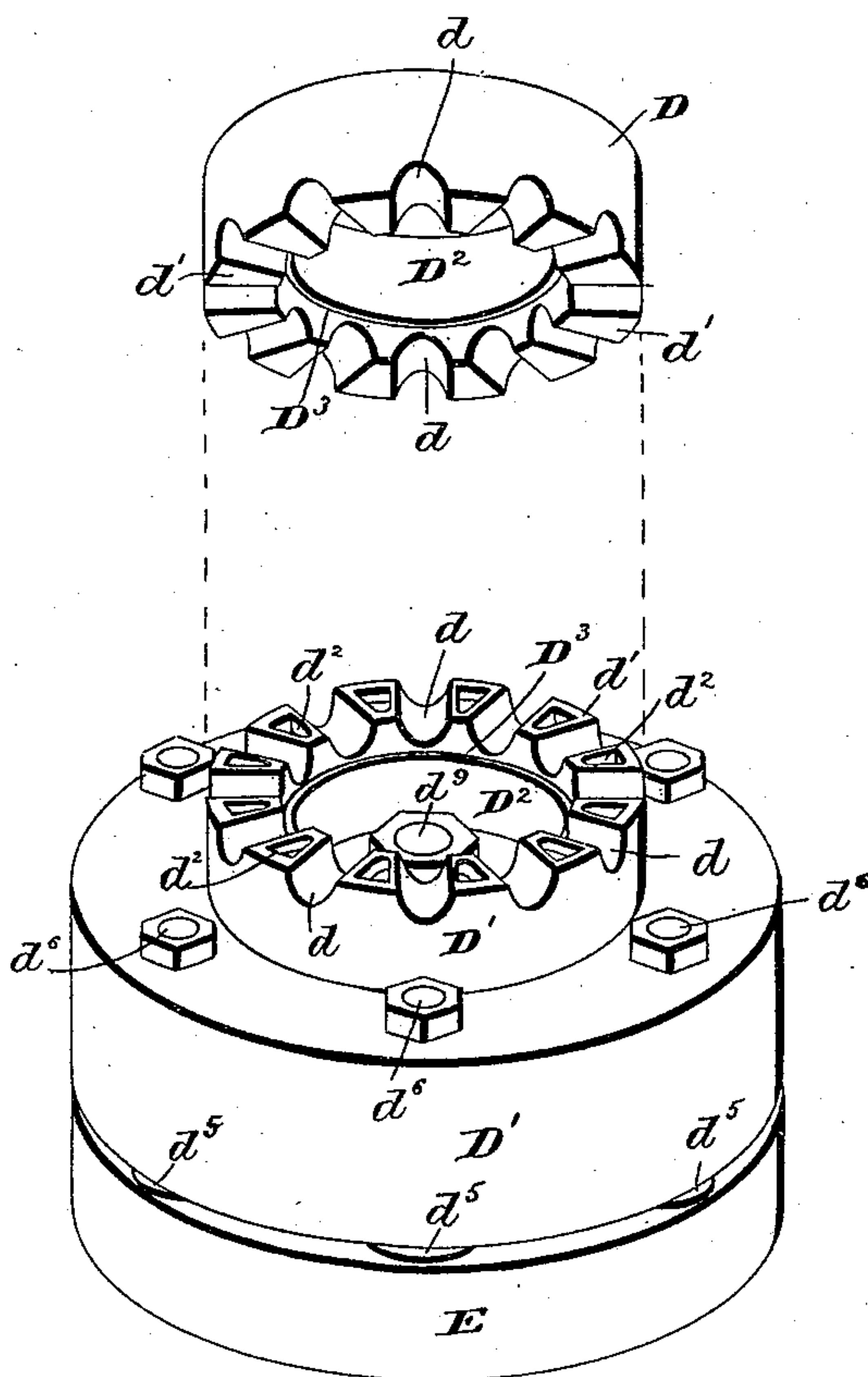
3 Sheets—Sheet 1.

J. R. LITTLE.  
ART OF MAKING METAL WHEELS.

No. 488,126.

Patented Dec. 13, 1892.

Fig. 1.



Witnesses:

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Inventor.

James R. Little  
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his Attorneys

(No Model.)

3 Sheets—Sheet 2.

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Fig. 2.

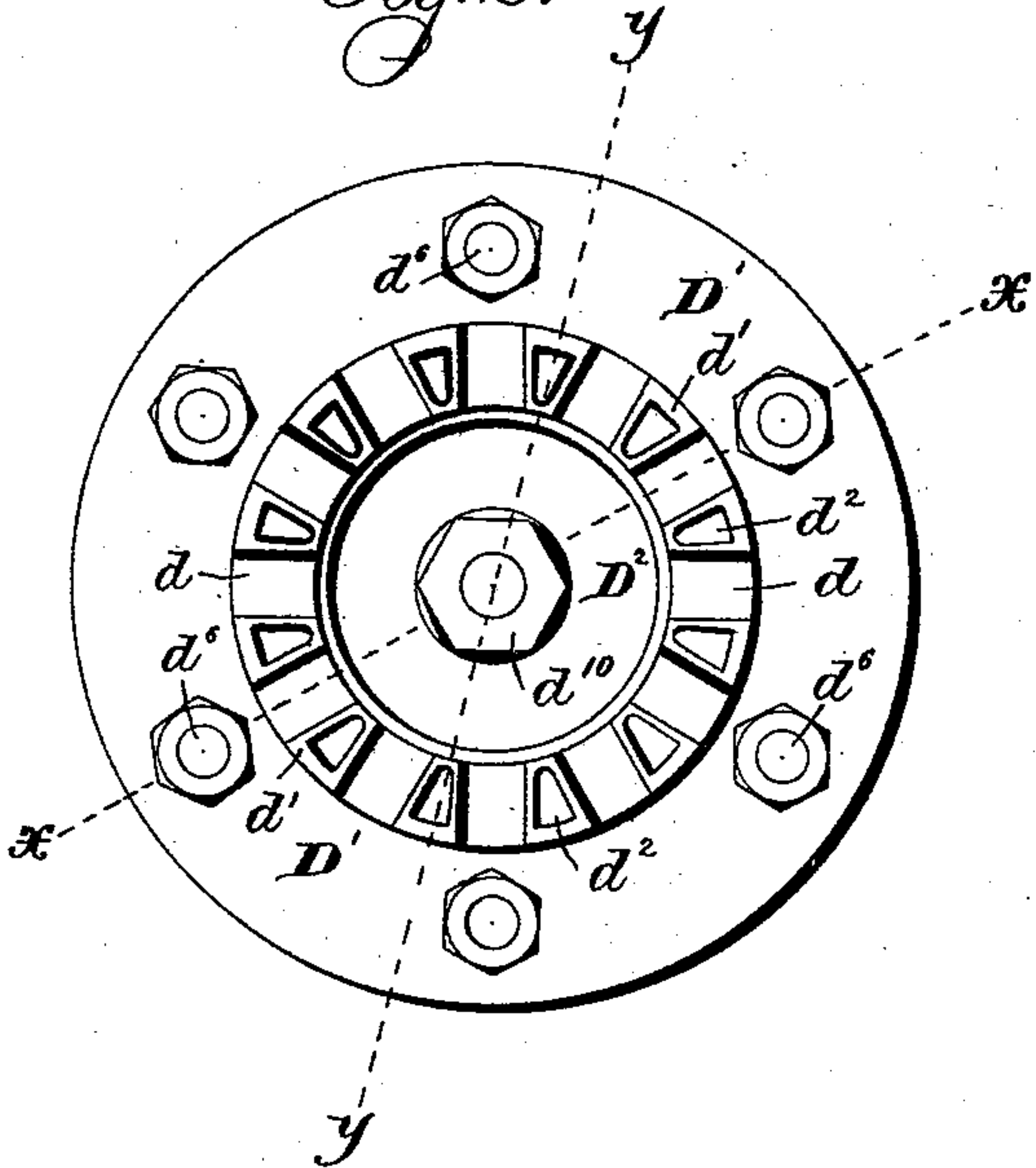


Fig. 3.

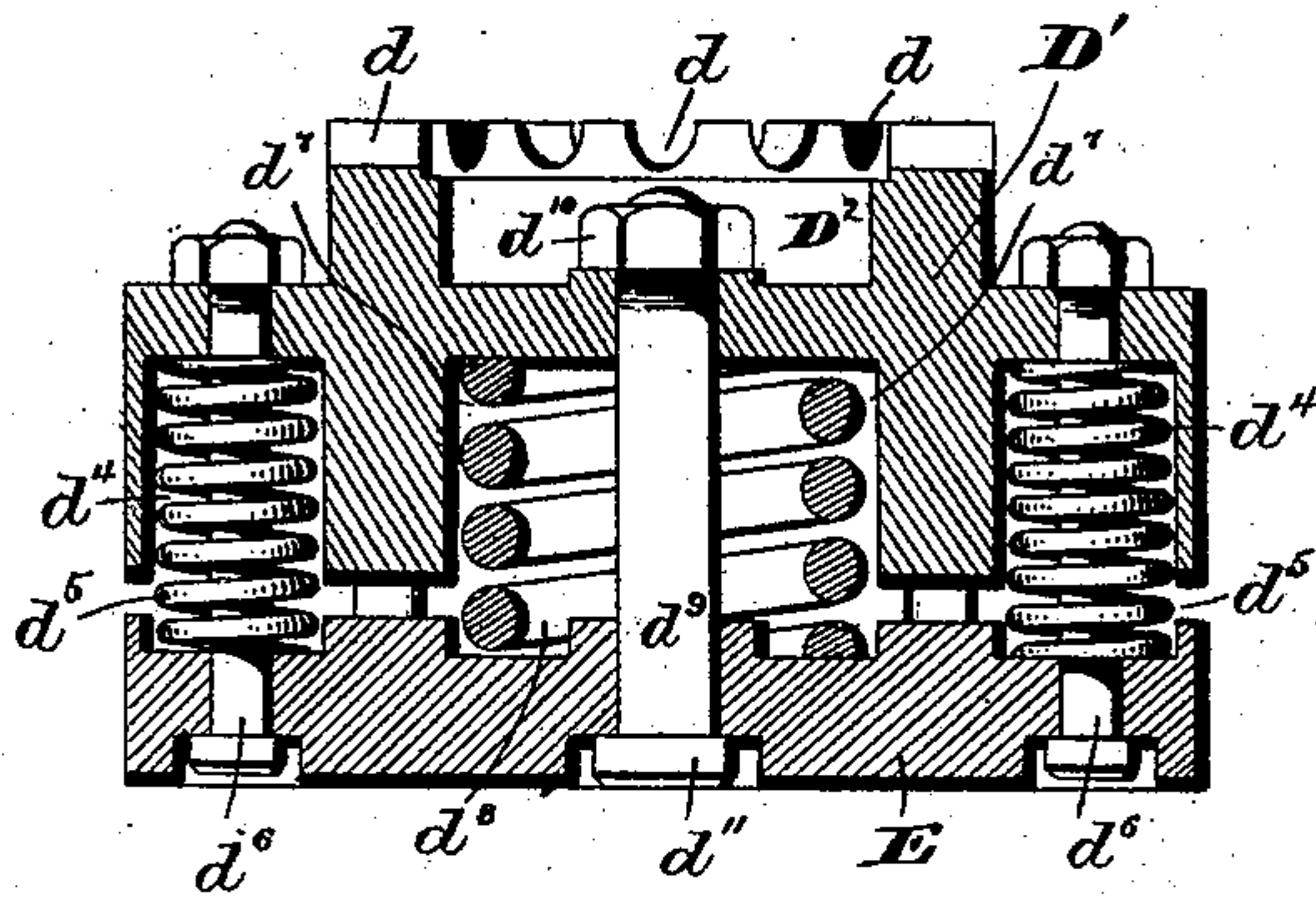


Fig. 5.

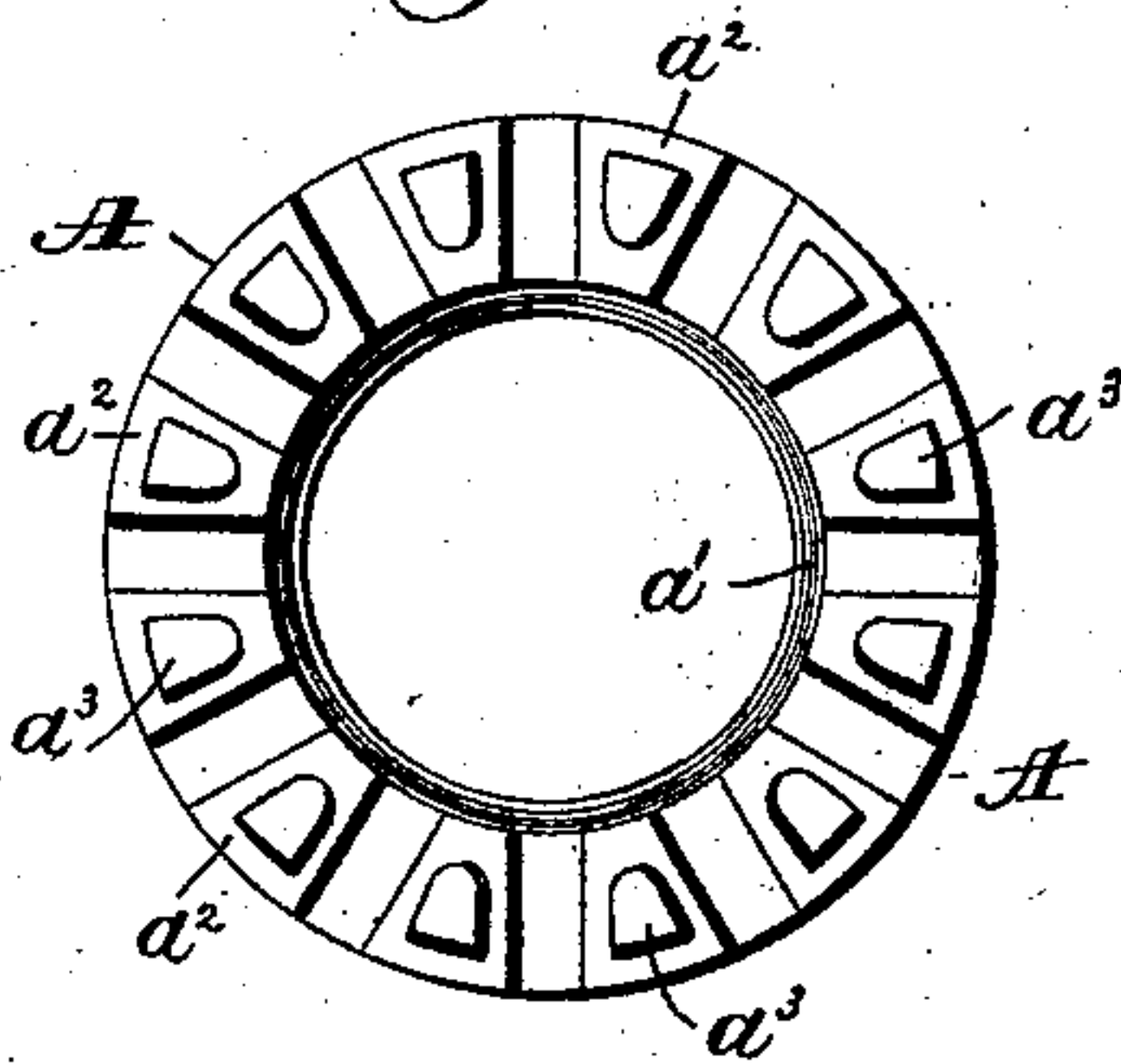


Fig. 4.

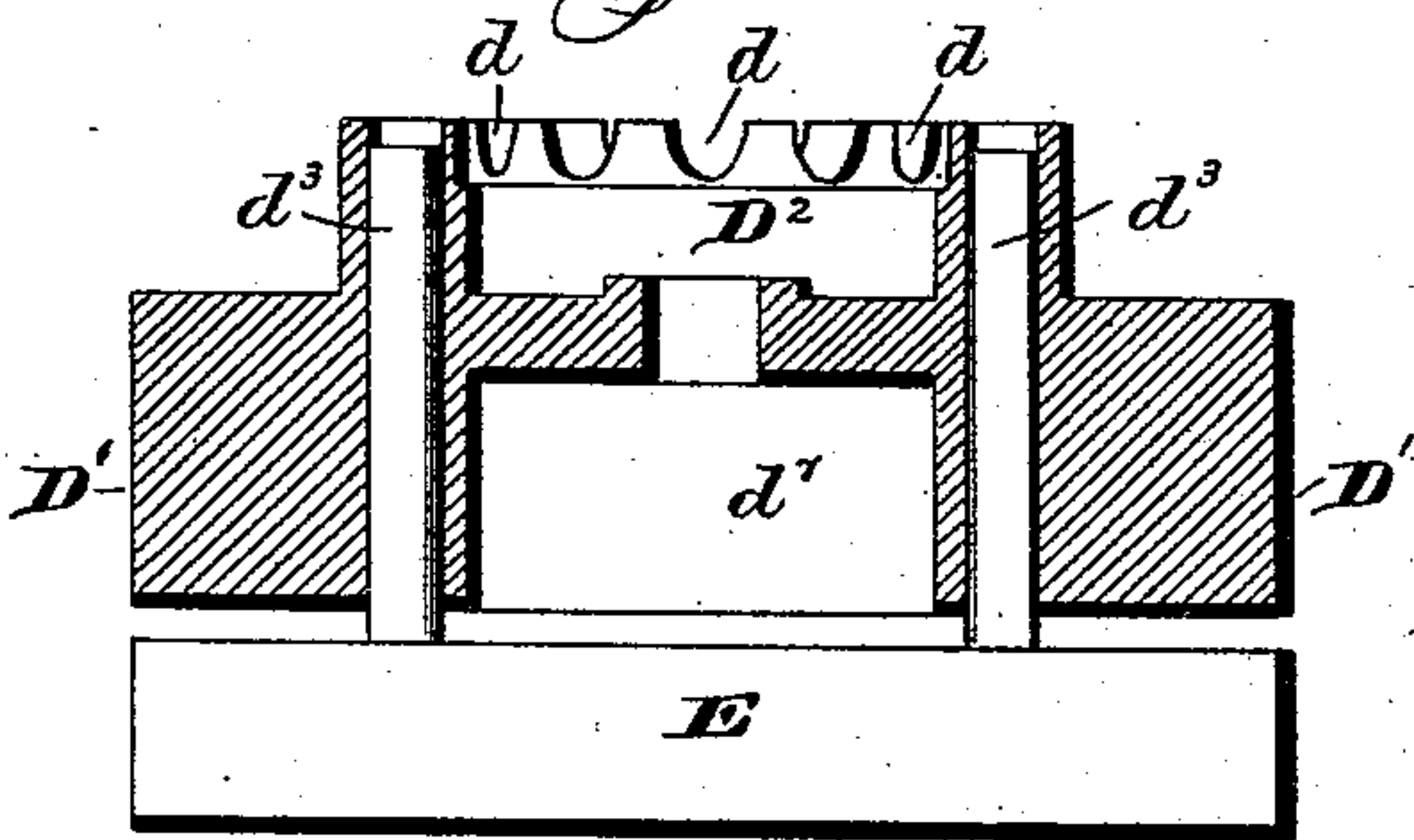
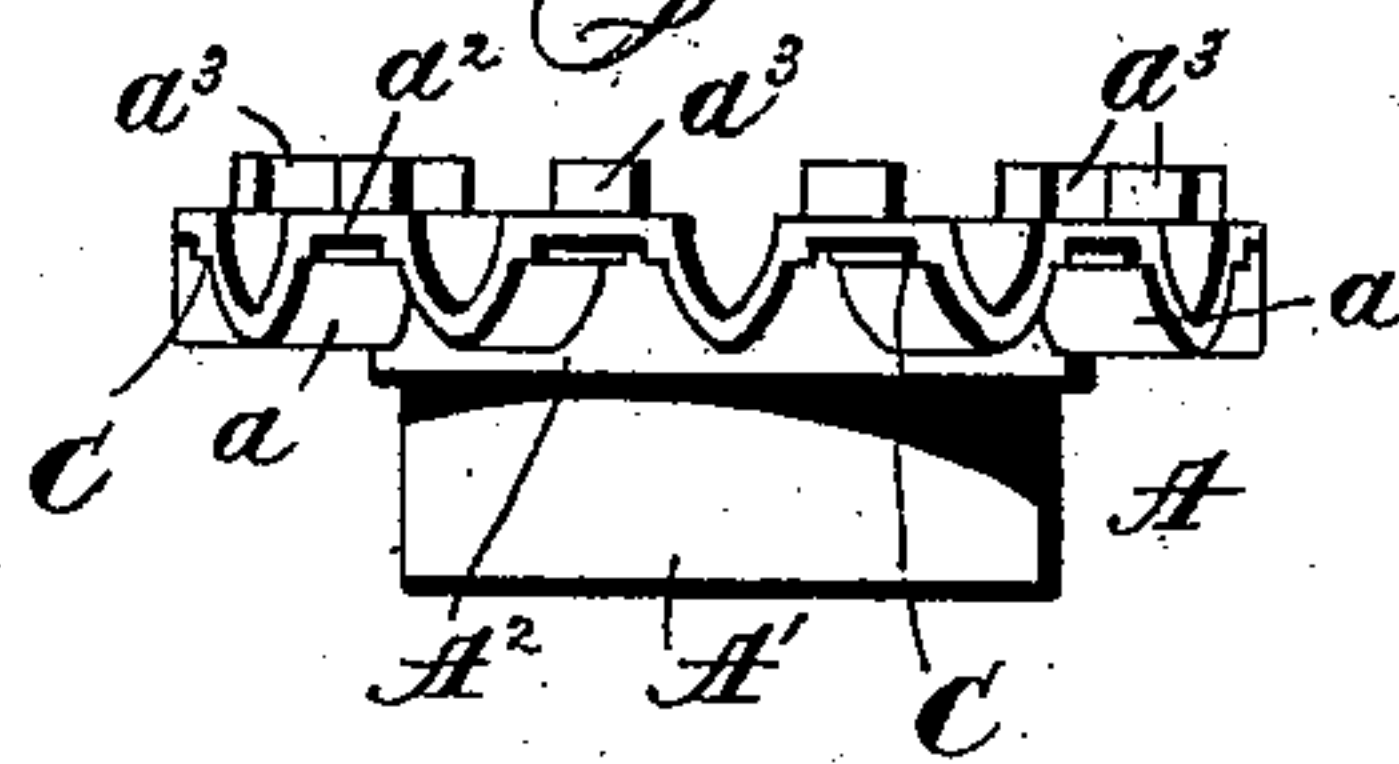


Fig. 6.



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Fig. 7.

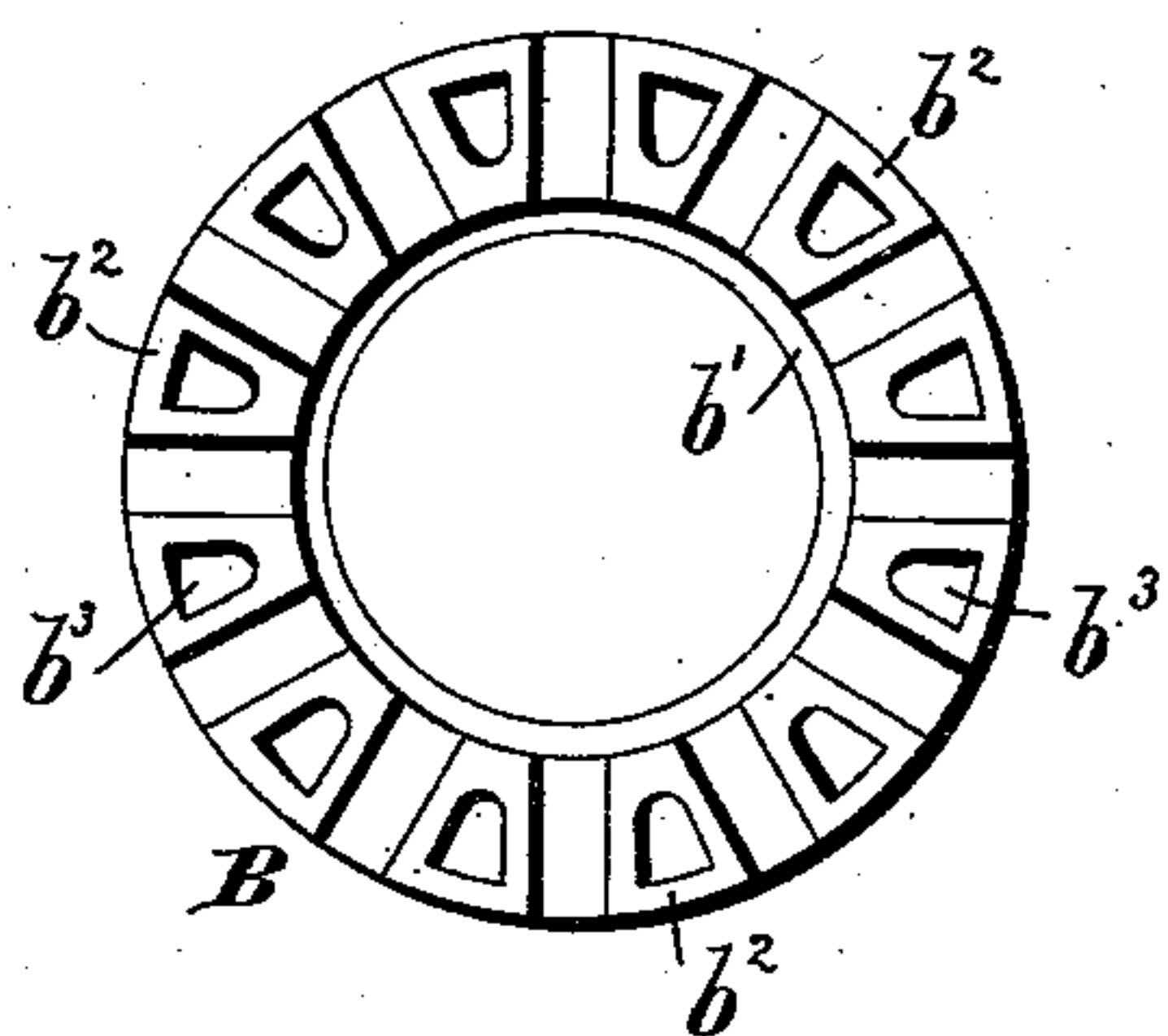


Fig. 8.

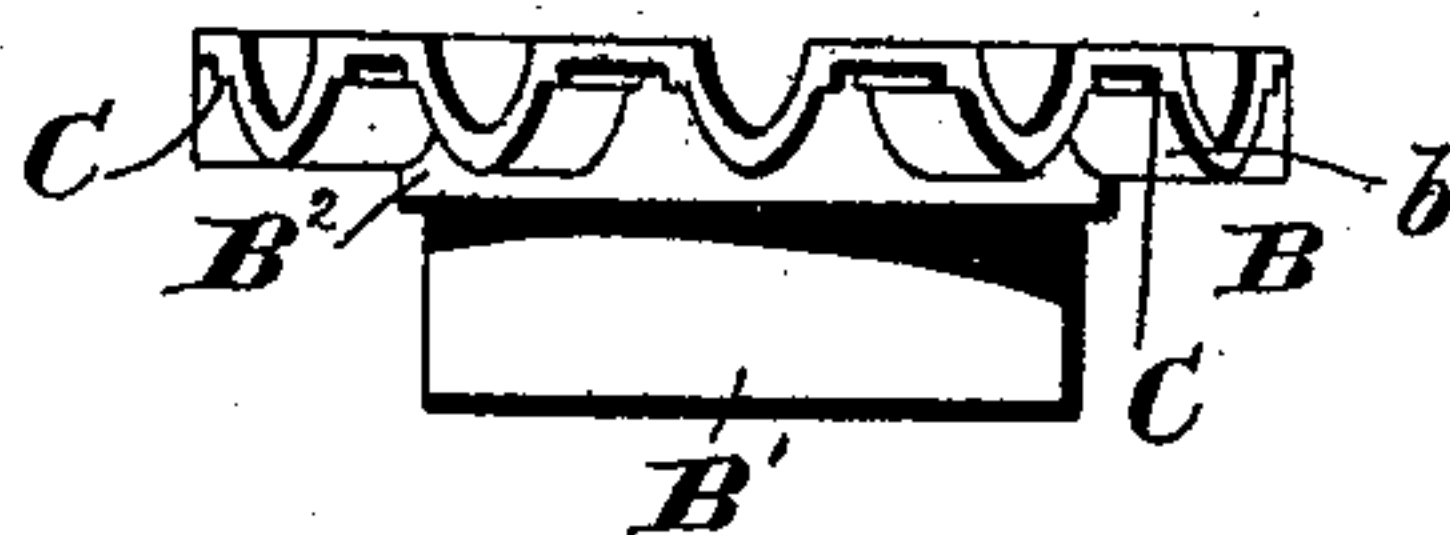


Fig. 9.

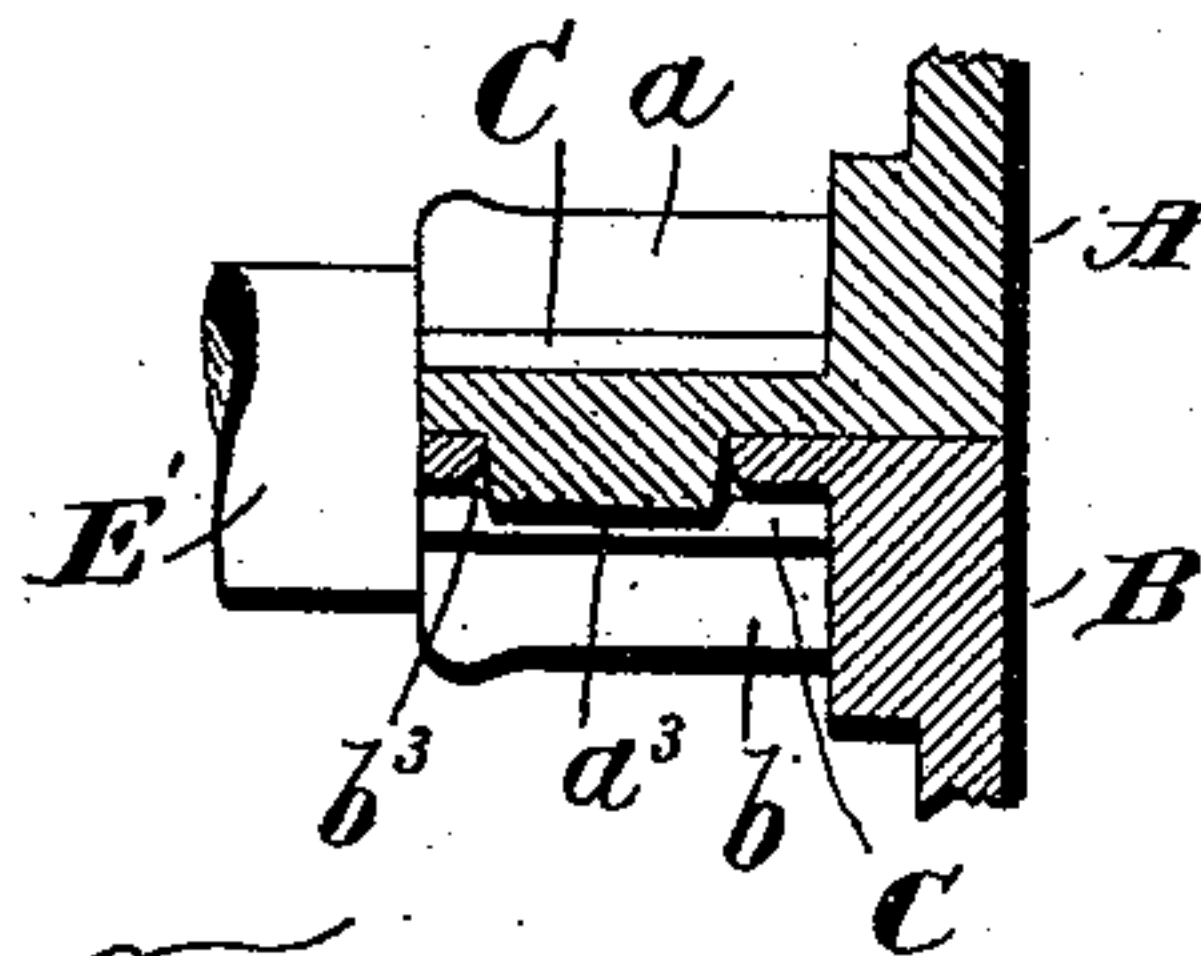


Fig. 10.

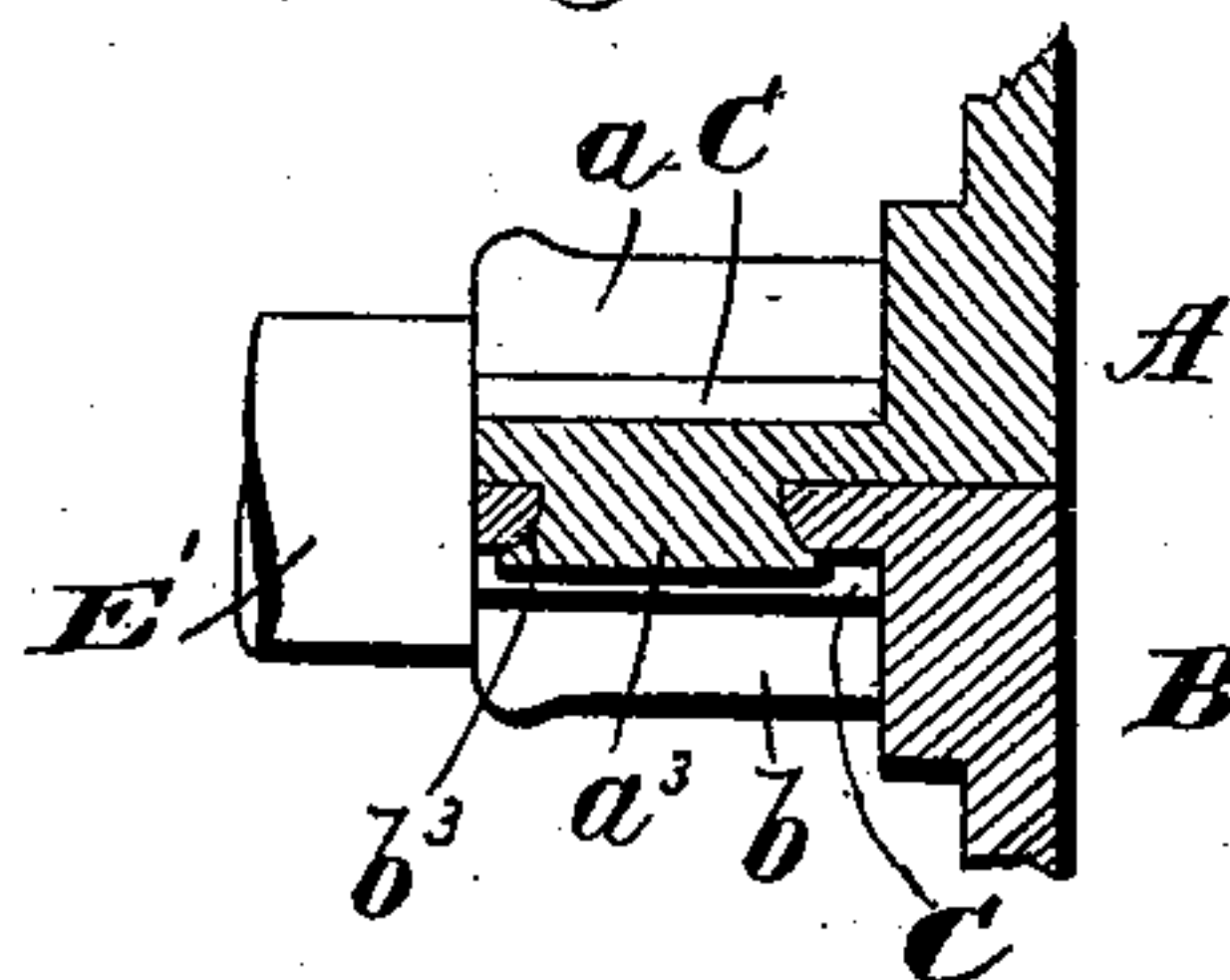


Fig. 11.

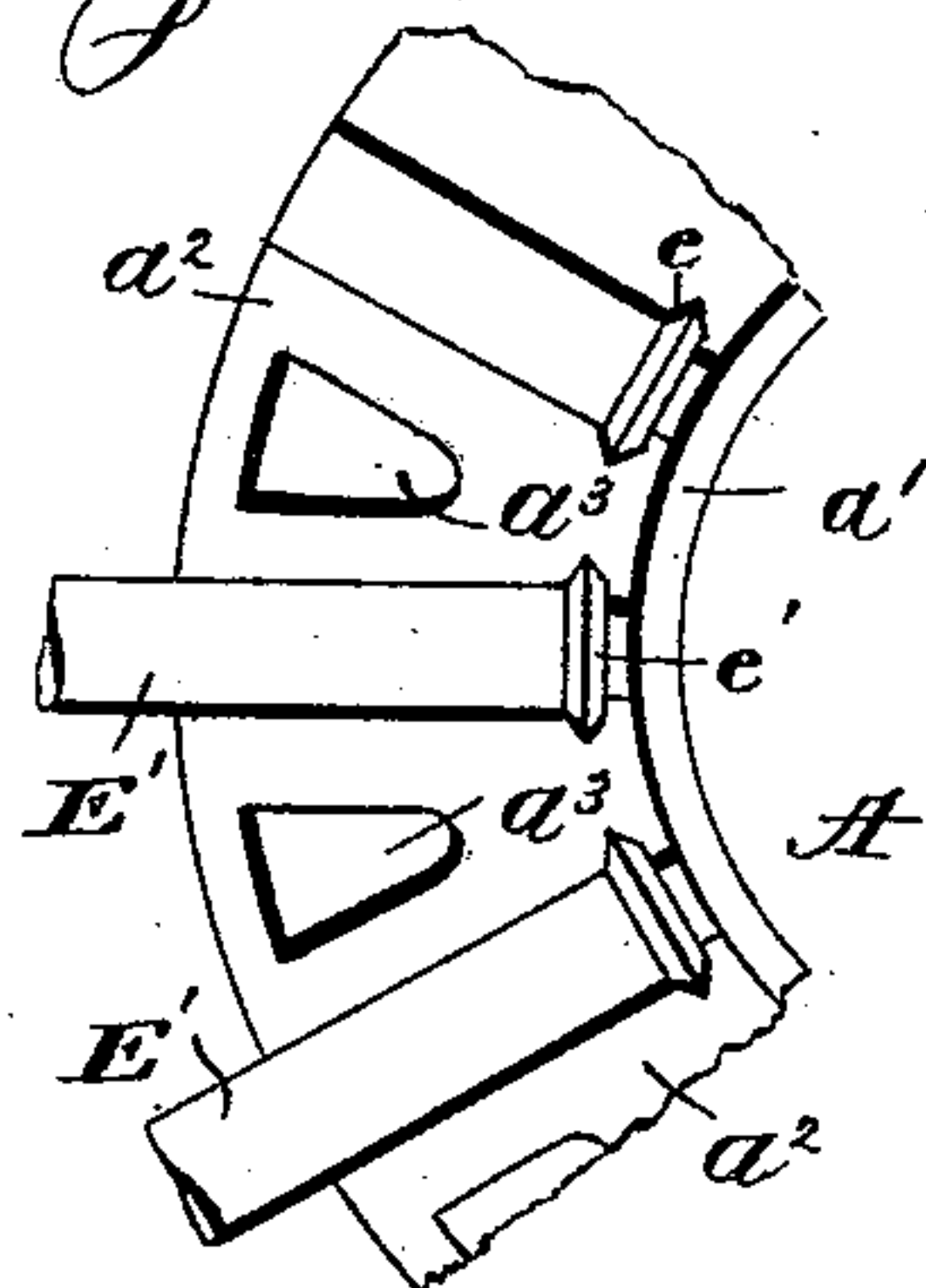
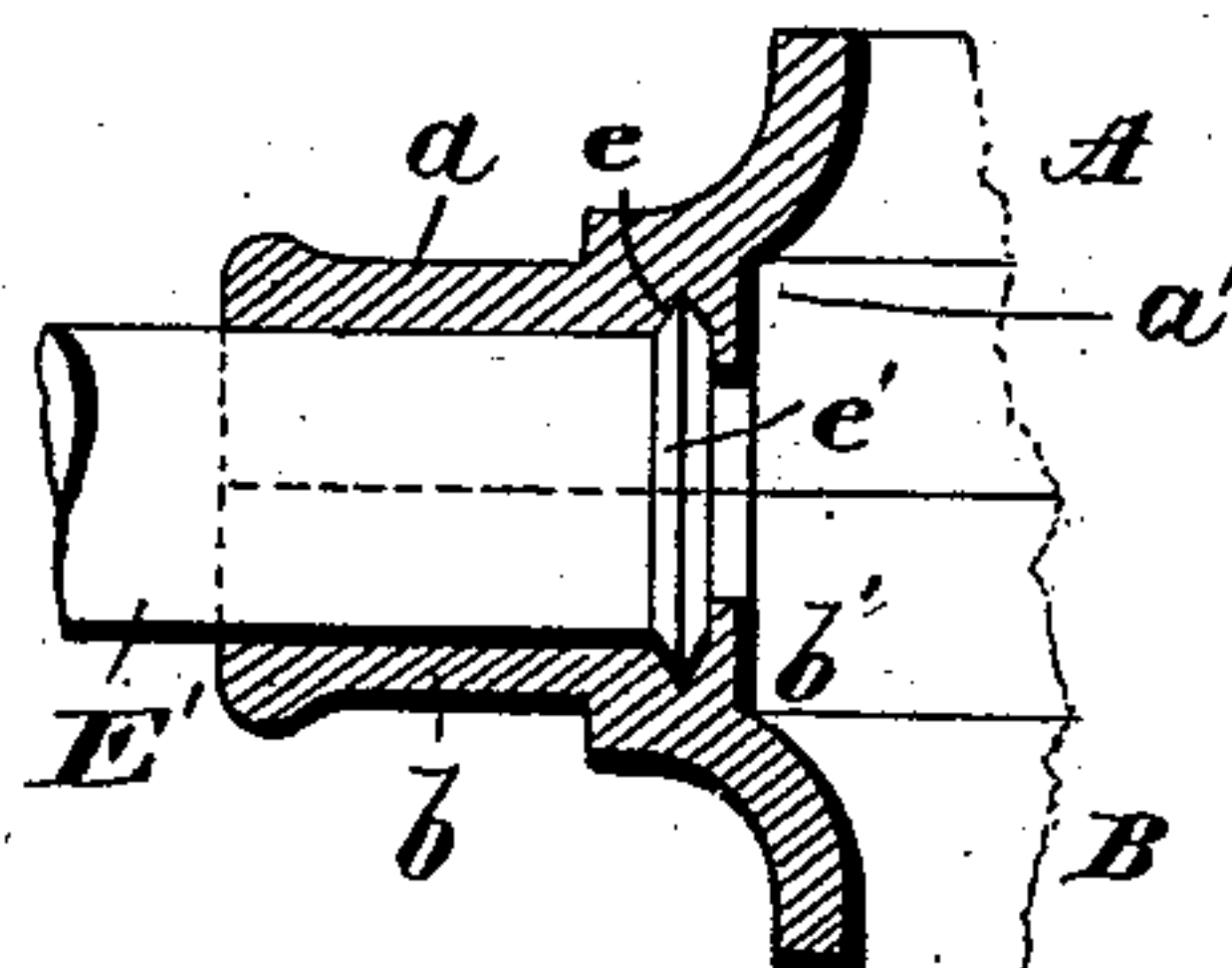


Fig. 12.



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# UNITED STATES PATENT OFFICE.

JAMES R. LITTLE, OF QUINCY, ILLINOIS.

## ART OF MAKING METAL WHEELS.

SPECIFICATION forming part of Letters Patent No. 488,126, dated December 13, 1892.

Application filed March 14, 1892. Serial No. 424,854. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES R. LITTLE, a citizen of the United States, residing at Quincy, in the county of Adams, and in the State of Illinois, have invented certain new and useful Improvement in the Manufacture of Metal Wheels; 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 shows a perspective view of my die with the two hub-inclosing parts separated; Fig. 2, a plan view of the die with the top part removed; Fig. 3, a view of a section on line  $xx$  of Fig. 2; Fig. 4, a view of a section on line  $yy$  of Fig. 2 with the springs removed; Fig. 5, a plan view of the male part of the hub; Fig. 6, a view of the same in elevation; Fig. 7, a plan view of the female part of the hub; Fig. 8, a view of the same in side elevation; Fig. 9, a detail sectional view, on an enlarged scale, showing a portion of the wheel-hub as brought together to inclose the end of a spoke before the riveting operation; Fig. 10, a similar view showing the hub parts secured together by the riveting operation; Fig. 11, a plan view, on an enlarged scale, of a portion of the male part of the hub and some of the spoke ends with corresponding enlargements and recesses on the spokes and spoke-receiving cavities, respectively; and Fig. 12, a view of a section showing a portion of a completed wheel in which the spoke ends and spoke-receiving cavities are formed, as shown in Fig. 11.

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

The object of my invention has been to provide an improvement in the art of manufacturing metal wheels; and to this end it consists in the process whereby the hub is formed and the spokes are secured thereto, as hereinafter specified.

In carrying out my said process I make the wheel-hub with its spoke-receiving cavities in two parts, each of which consists, essentially, of one-half of the hub-body having around its inner end the outwardly-projecting annular portion containing a series of radial sockets, which when the parts are put face to face will inclose portions of the spokes, as described more fully hereinafter. Each of said annular

portions is preferably made, as shown, in the form of a series of half-tubular bosses, connected together by webs extending from the edge of one-half boss to the adjacent edge of the next one. These hub-halves are, however, not precisely similar in all their details.

Referring to the drawings, A designates the male part of the hub, having the cylindrical portion  $A'$  to form one end of the finished hub, the enlarged portion  $A^2$  at the inner end of  $A'$ , and the series of half-tubular bosses  $a$ , whose cavities communicate at their inner ends with the rabbet  $a'$ , forming an annular offset from the bore of the hub. Such offset is preferably situated within the enlargement  $A^2$ , and is of such depth as to bring the inner wall of the latter outside of the plane of the periphery of the portion  $A'$ .

On the webs  $a^2 a^2$ , connecting the edges of adjoining half-bosses, are riveting pins or projections  $a^3 a^3$ , preferably made integral with the webs, but in the form of separately made rivets or pins situated in cavities, in or attached to the webs, if desired. As shown, they consist of integral portions of the hub and have the shape of short studs, whose form in cross-section is substantially like that of the spaces between adjoining half-bosses  $a a$ . They do not, however, extend to the inner and outer edges of the part in which the half-bosses are situated. The corresponding female part of the hub (designated by B in the drawings) is shaped like part A in all respects, except that it has in place of the pins or projections  $a^3 a^3$  openings  $b^3 b^3$ , in which the projections are to fit and through which they will pass when the hub parts are put together. The cylindrical portion  $B'$ , enlargement  $B^2$ , series of half-bosses  $b b$ , offset  $b'$  from the central hub-bore, and webs  $b^2 b^2$  are all substantially like those of the male part A.

Along the outer side of each half-boss on both the male and female parts of the hub are the longitudinal ribs or ridges C C, situated at the angles between the bosses, and webs connecting the same and formed to present abrupt outwardly-facing shoulders for engagement by parts of the die, to be used, as hereinafter set forth, to join the hub parts together. Such die has the two opposing parts D and D' each provided on its inner face with a central opening  $D^2$  to receive the cylindri-



cal part on one of the hub-halves, a rabbet  $D^3$  to receive the enlargement on such half and abut against its shoulder, the series of radial cavities  $d$   $d$  to receive the respective half-bosses, and the plane faces  $d'$   $d'$  adjoining the edges of the cavities to abut against the ridges or ribs C C. In the lower part  $D'$  of the die there are the vertical passages  $d^2$   $d^2$ , situated between the cavities  $d$   $d$ , and having, in cross-section, the shape of the projections or pins  $a^3$   $a^3$  and openings  $b^3$   $b^3$ . In such passages, and of sufficient length to extend through and beyond the ends of the same, are the riveting-plungers  $d^3$   $d^3$ . Outside of or beyond the passages  $d^2$   $d^2$  are recesses  $d^4$   $d^4$  to receive the springs  $d^5$   $d^5$ , which, engaging the upper ends of the recesses, rest upon the base E, situated below the die part  $D'$  in position to support the lower ends of the plungers. Bolts  $d^6$   $d^6$ , attached to this base and passing up through the portions of the die part  $D'$ , in which the springs  $d^5$   $d^5$  are situated, serve to limit the upward movement of the said part under stress of the springs while allowing it to be forced downward toward the base. In addition to the spring receiving recesses  $d^4$   $d^4$ , there is a large central cavity  $d^7$ , which contains the spring  $d^8$ , which, like the other springs, acts to hold the die part  $D'$  normally raised away from the base E. A central bolt  $d^9$ , passing up through the base and the portion of  $D'$  at the bottom of opening  $D^2$ , has the nut  $d^{10}$  and the head  $d^{11}$  engaging such portion and the base, respectively, so as to act with the heads and nuts on bolts  $d^6$  to limit the motion of  $D'$ .

While the two halves of the hub are shown in Figs. 5 to 10 as having straight plain spoke-receiving cavities, I contemplate, where desired, forming offsets  $e$   $e$  to accommodate corresponding enlargements  $e'$   $e'$  on the spokes E' E', as indicated in Figs. 11 and 12.

With the hub-halves and the die constructed and arranged as hereinbefore described and shown, I place the two hub-halves face to face with the riveting pins or projections on the male half entering the corresponding openings in the female half, and having inserted the spoke ends in the opposing receiving-cavities therefor in the two hub-halves and half-bosses thereon I put the whole between the parts D and  $D'$  of the die, with the female hub-half resting in the part  $D'$ , and then apply pressure to the die by means of a suitable press engaging the top of part D and the under side of base E. Before the pressure is applied the springs  $d^5$   $d^5$  and  $d^8$  hold the die part  $D'$  away from the base E, so that the plungers  $d^3$   $d^3$ , whose lower ends rest upon the base, stand with their upper ends below the faces of the part  $D'$  between the boss-receiving cavities therein. As the die part D is forced down by the press the two halves of the hub are forced toward each other to clasp the spokes in the cavities and cause the riveting pins or projections  $a^3$   $a^3$  on the male hub-half to pass down through

the openings therefor in the female half. The spoke-receiving cavities in the half-bosses on the hub-halves are preferably made not deep enough to entirely inclose the spokes and allow the hub-halves to come together during this stage of the operation. The plane faces on the hub-inclosing die parts between the boss-receiving cavities therein now rest against the abrupt faces of the ribs or ledges C C, and the abrupt inner ends of the rabbets around the central hub-end-receiving openings abut against the shoulders at the outer ends of the enlargements  $A^2$  and  $B^2$  on the respective hub-halves, so that there will be no injurious wear on the cavity-edges in the die parts caused by rubbing or sliding of such edges or portions of the hub and bosses during the subsequent compressing part of the operation. Continued pressure upon the die now causes compression of the springs  $d^5$ ,  $d^5$ , and  $d^8$ , so that the hub-inclosing parts of the die descend toward the base E. This movement causes the plungers resting on the latter to project at their ends from the passages  $d^2$   $d^2$ , so that they will come in contact with and upset or head down the riveting pins or projections  $a^3$   $a^3$  on the male half of the hub to rivet the two half-hubs firmly to each other. By further continuation of the pressure and increase therein, if necessary the hub-halves which have been forced into close contact with the portions of the spokes between them are pressed toward each other to compress the spokes in the receiving-cavities in bodies of the hub-halves and the half-bosses thereon. By the action of the plungers in pressing upon the riveting pins or projections on the male half of the hub the two hub-halves will be most securely fixed at any point to which they are forced toward each other in compressing them upon and around the spokes, so that when the die is removed the wheel-hub will retain the shape and proportions given it by the die. The flat or plane faces on the inner sides of the webs between the half bosses are preferably so arranged that those on the opposing hub-halves will not come into actual contact. They should at least not engage each other until the final part of the compression, in order that a strong compressing of the hub-halves upon the spokes can be easily and readily secured.

The result of the process is a very solid and compact hub with its two parts riveted together and with portions compressed upon and around the spokes, so as to hold them most firmly and solidly. This desirable result could be obtained by the use of the described die if instead of the pins or projections  $a^3$   $a^3$  made integral with the male hub-half I should use, as suggested hereinbefore, rivets or pins made separate from such hub-half and fixed thereto or inserted in cavities or openings therein, so that they would enter the openings in the female half of the hub when the two halves were placed together, and would then have their ends in position to be headed



down by the riveting-plungers in the same manner as the ends of the integral projections.

Having thus described my invention, what I claim is—

5 1. As an improvement in the art of making metal wheels, the process which consists in forming the hub in two parts having corresponding spoke-receiving cavities, placing such parts on opposite sides of the spokes to  
10 be secured to the hub, compressing them upon the spokes so as to compress the latter in the cavities, and riveting the two parts of the hub together as they are compressed upon the spokes, substantially as and for the purpose specified.

2. As an improvement in the art of making metal wheels, the process which consists in forming the hub in two parts, each having a series of cavities to partly inclose portions  
20 of the spokes, one part having riveting projections and the other openings to receive the latter, placing the two parts of the hub on opposite sides of the spokes with portions of the latter in their corresponding cavities,  
25 compressing the hub parts upon the spokes to compress the material of the inclosed portions of the latter, and heading down the riveting projections on the one part of the hub into the openings in the other part, substantially as and for the purpose shown.

3. As an improvement in the art of making metal wheels, the process which consists in forming the hub in two parts having corresponding part sockets for the spokes, one  
35 part having riveting projections and the other having openings to receive the latter, placing the hub parts on opposite sides of the spokes inserted in their cavities, compressing them upon the inclosed portions of the spokes so  
40 as to compress the material of the latter, and

during such compression heading the riveting projections on one part down in the openings in the other, substantially as and for the purpose set forth.

4. As an improvement in the art of making 45 metal wheels, the process which consists in forming the hub in two parts, each having a series of half-tubular bosses, one part having a series of riveting projections and the other a series of openings to receive such projec- 50 tions, placing the parts of the hub on opposite sides of the spokes inserted in their bosses, compressing the bosses upon the spokes to compress the latter, and simultaneously compressing the portions of the hub 55 parts which carry the part bosses, substantially as and for the purpose specified.

5. As an improvement in the art of making metal wheels, the process which consists in forming the hub in two parts, each having a 60 series of half-tubular bosses, one part having a series of riveting projections and the other a series of openings to receive such projections, placing the parts of the hub on opposite sides of the spokes inserted in their bosses, com- 65 pressing the bosses upon the spokes to compress the latter, and simultaneously compressing the portions of the hub parts which carry the part bosses, and heading down the riveting projections in the receiving-openings 70 so as to hold the hub parts compressed upon the spokes, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of 75 February, A. D. 1892.

JAMES R. LITTLE.

Witnesses:

THEODORE B. PAPE,  
JOSEPH N. CARTER.