

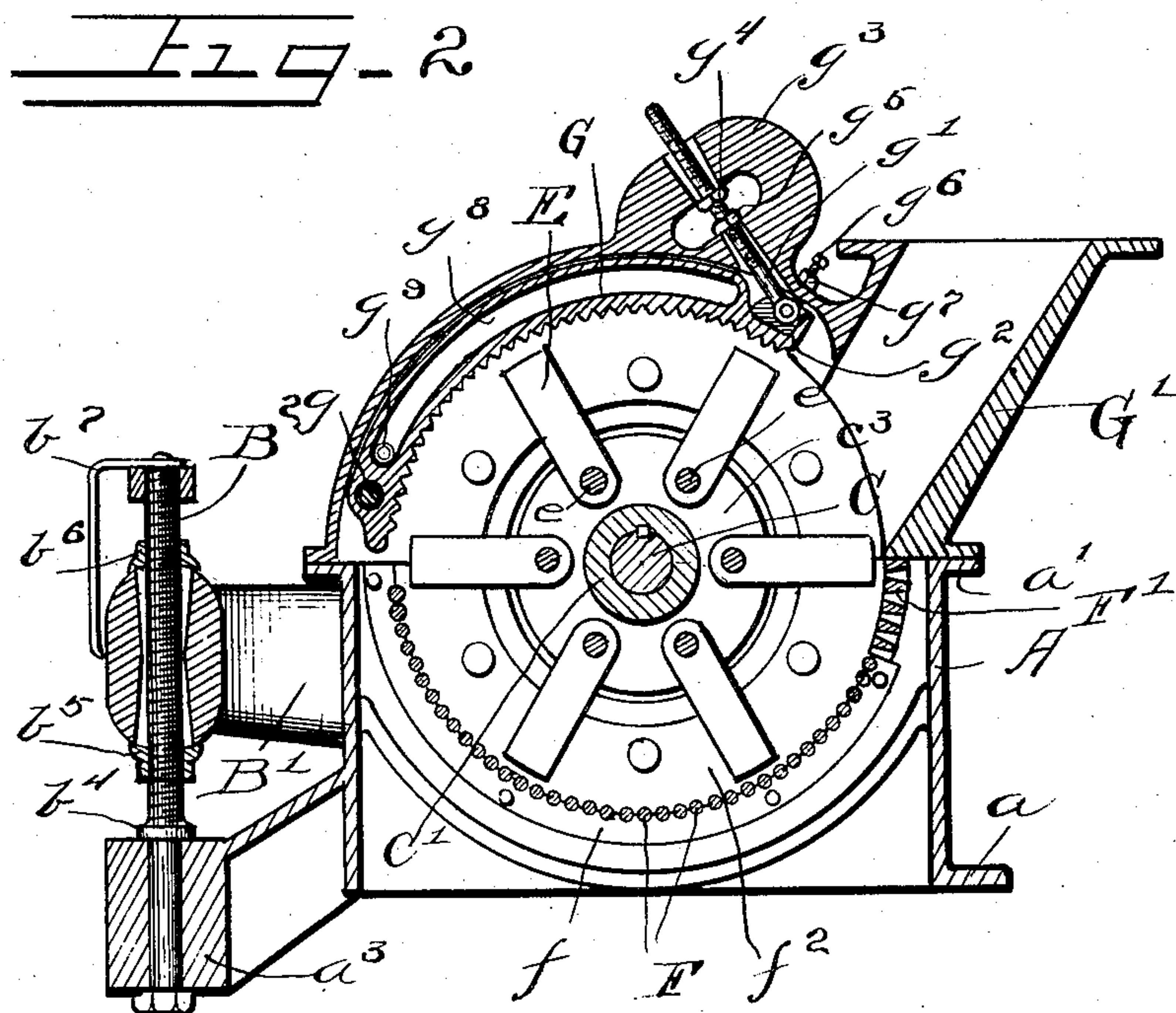
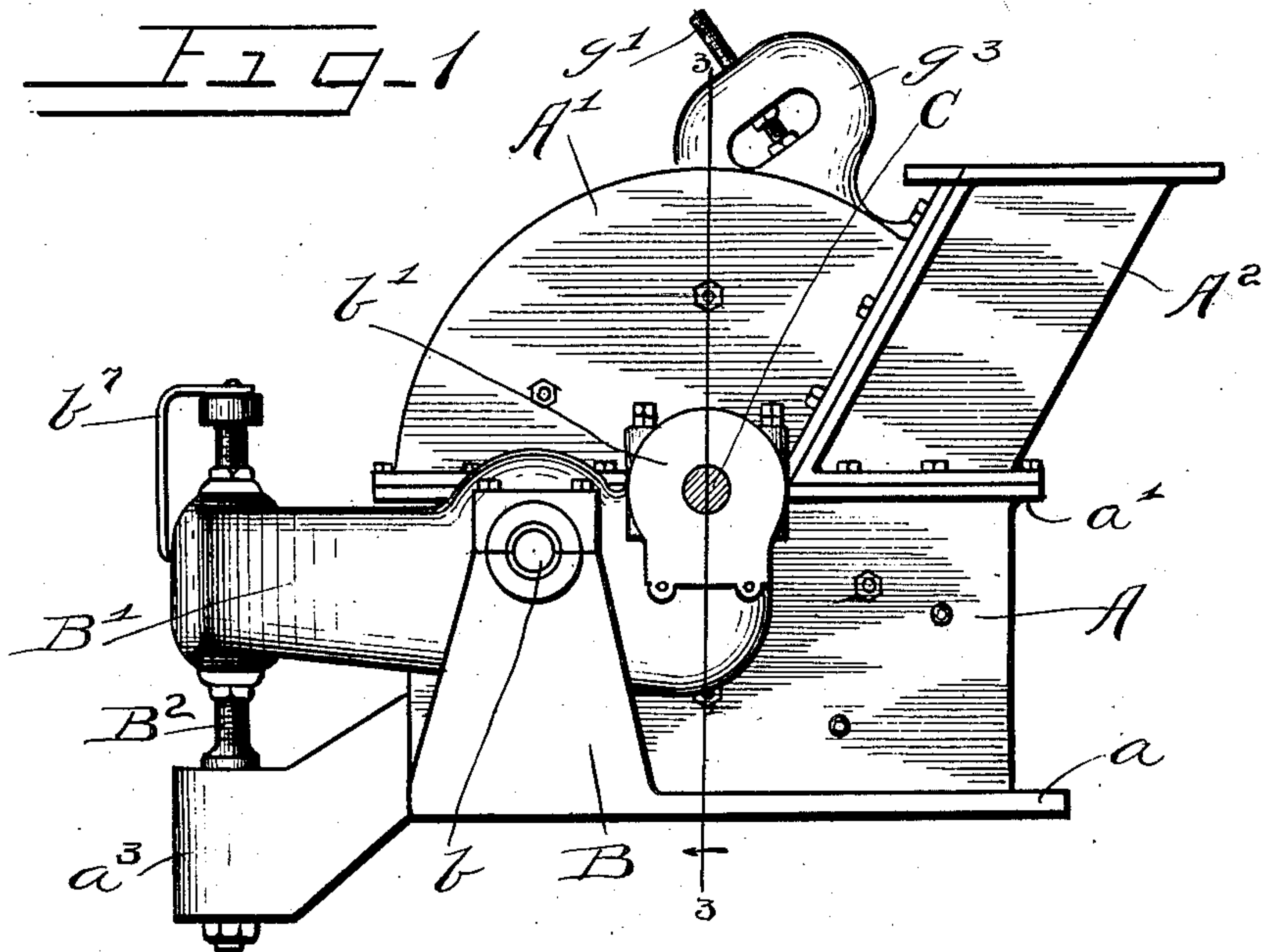
No. 842,430.

PATENTED JAN. 29, 1907.

P. L. SIMPSON.
PULVERIZER.

APPLICATION FILED JULY 24, 1905.

4 SHEETS—SHEET 1.



WITNESSES

J. W. Angell.

W. W. Withenbury

INVENTOR

Peter L. Simpson.

By Charles W. Rice, Att'y.

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4 SHEETS—SHEET 2.

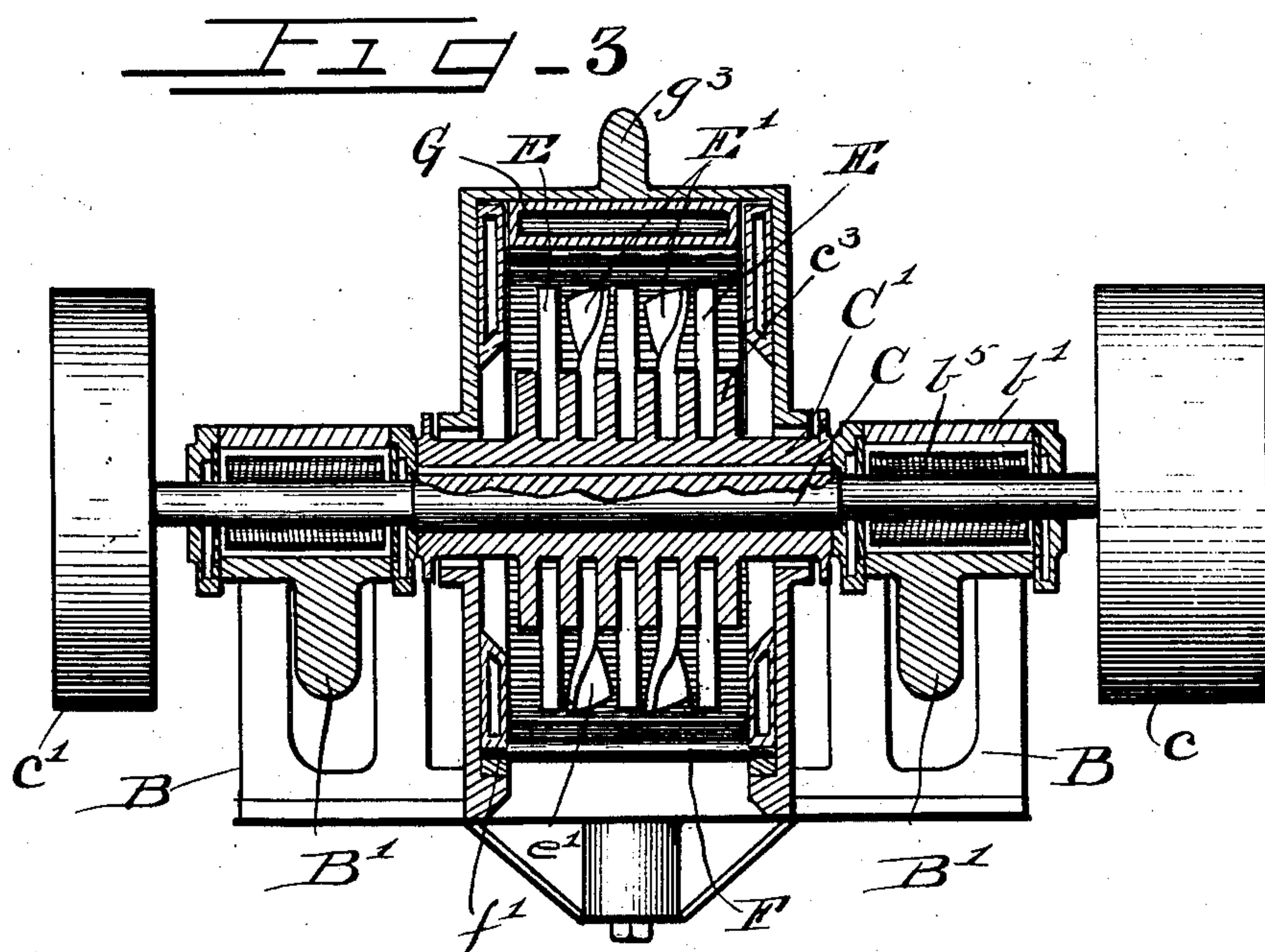
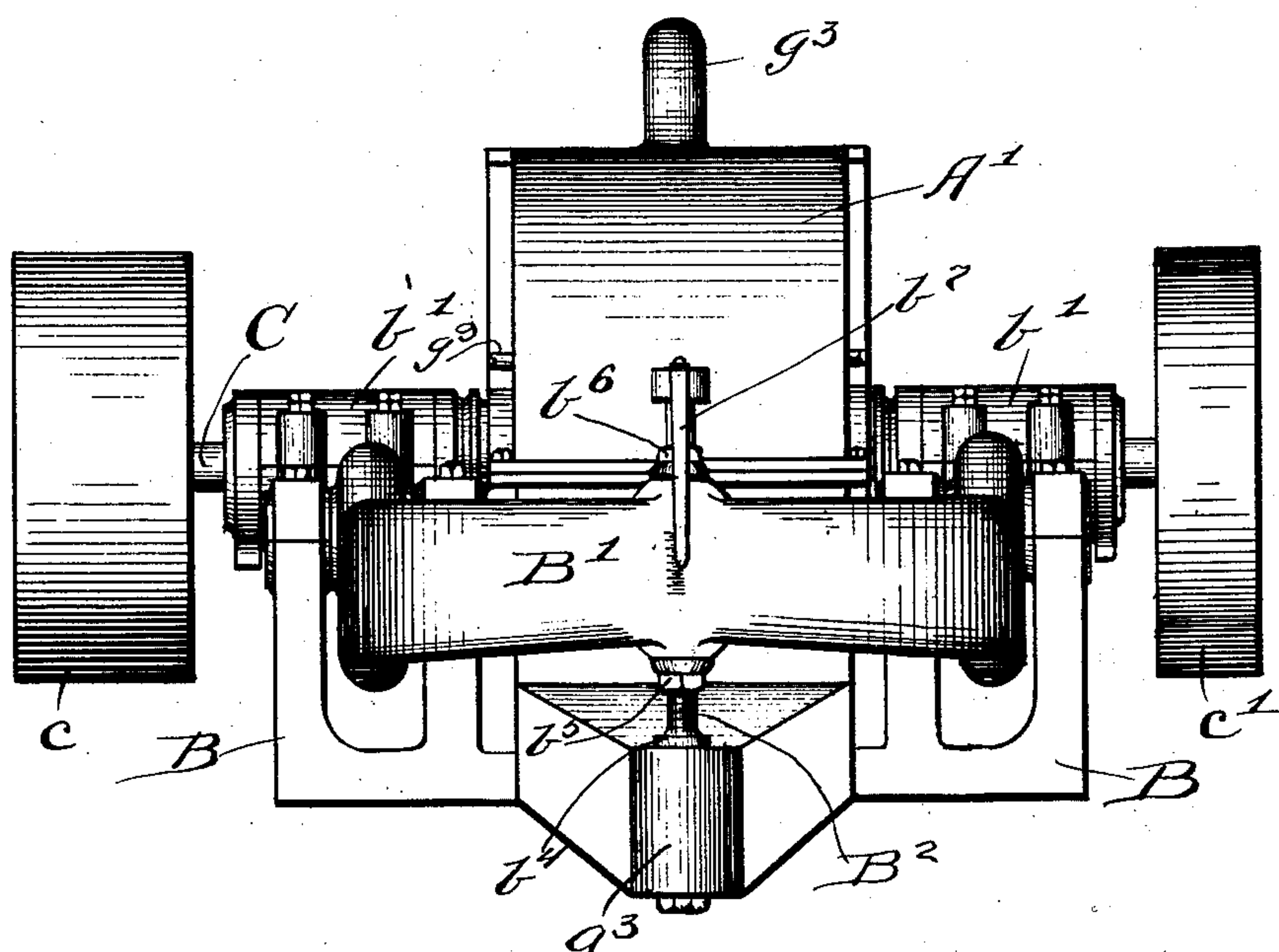


FIG. 4



WITNESSES

J. W. Angell.

W. W. Withensbury

INVENTOR

Peter L. Simpson

by Charles W. Rice, Atty.

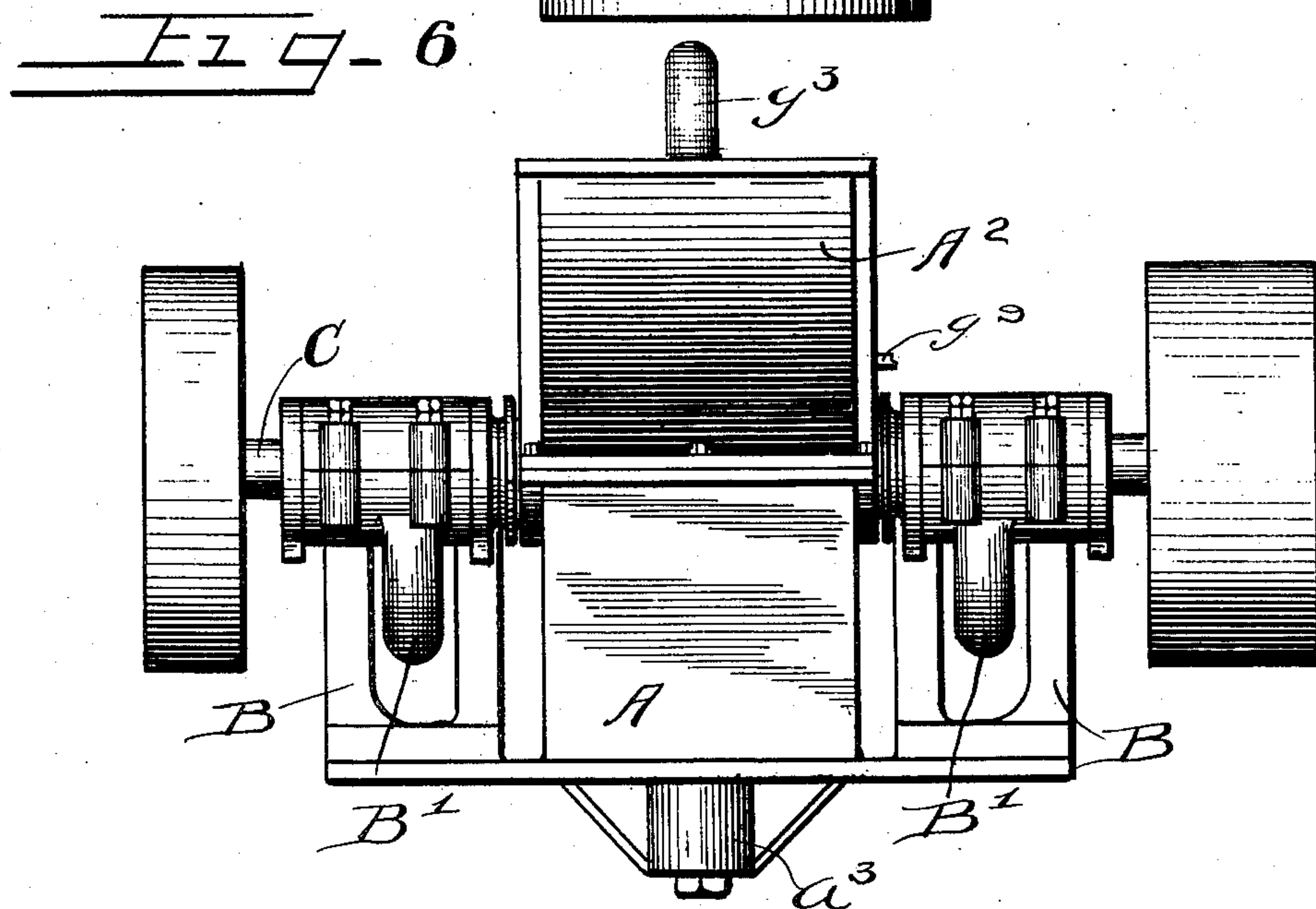
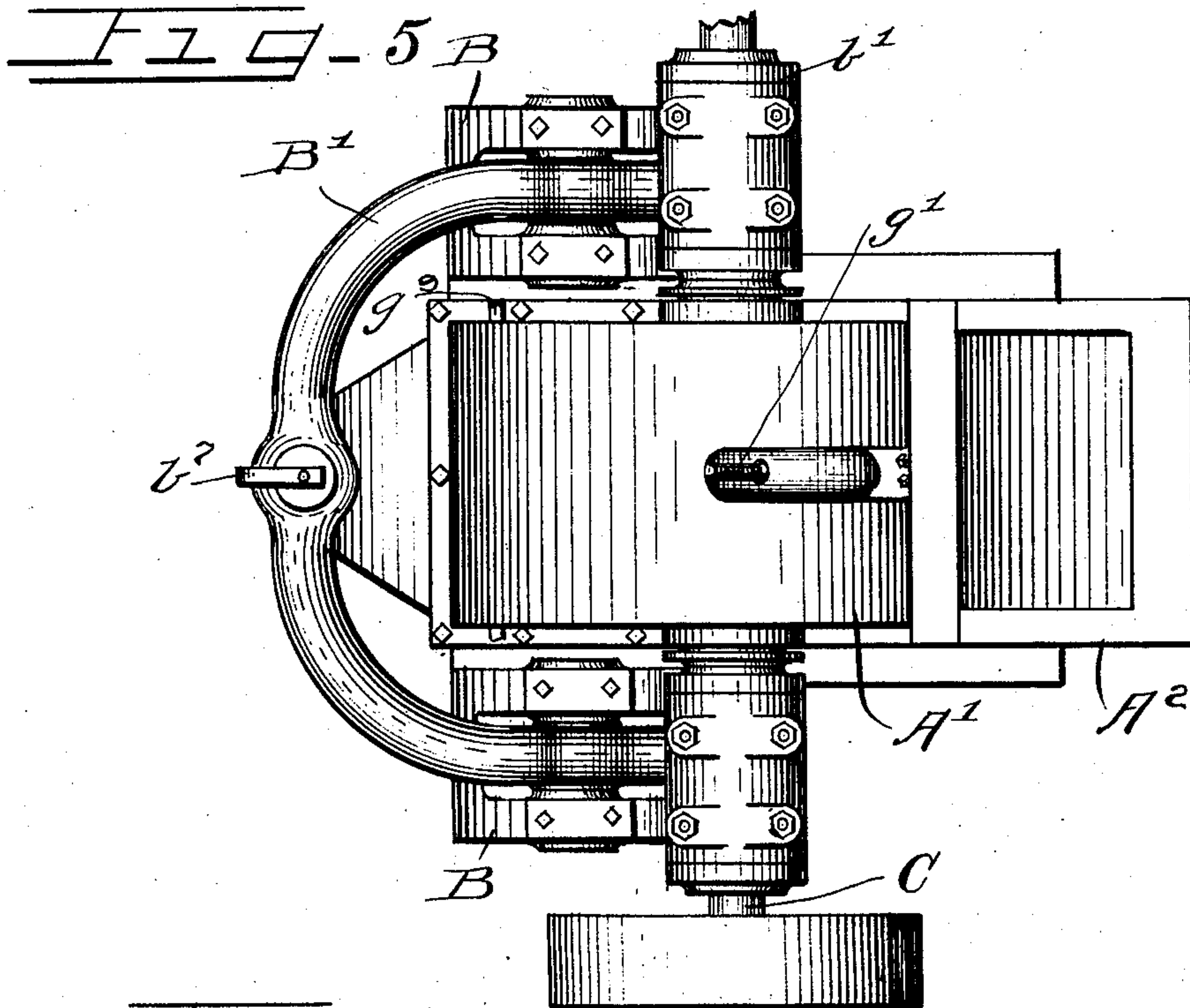
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4 SHEETS—SHEET 3.



WITNESSES
J. H. Angell.
or W. Withenbury

INVENTOR
Peter L. Simpson.
by Charles D. Rice Atty.

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4 SHEETS—SHEET 4.

Fig. 7

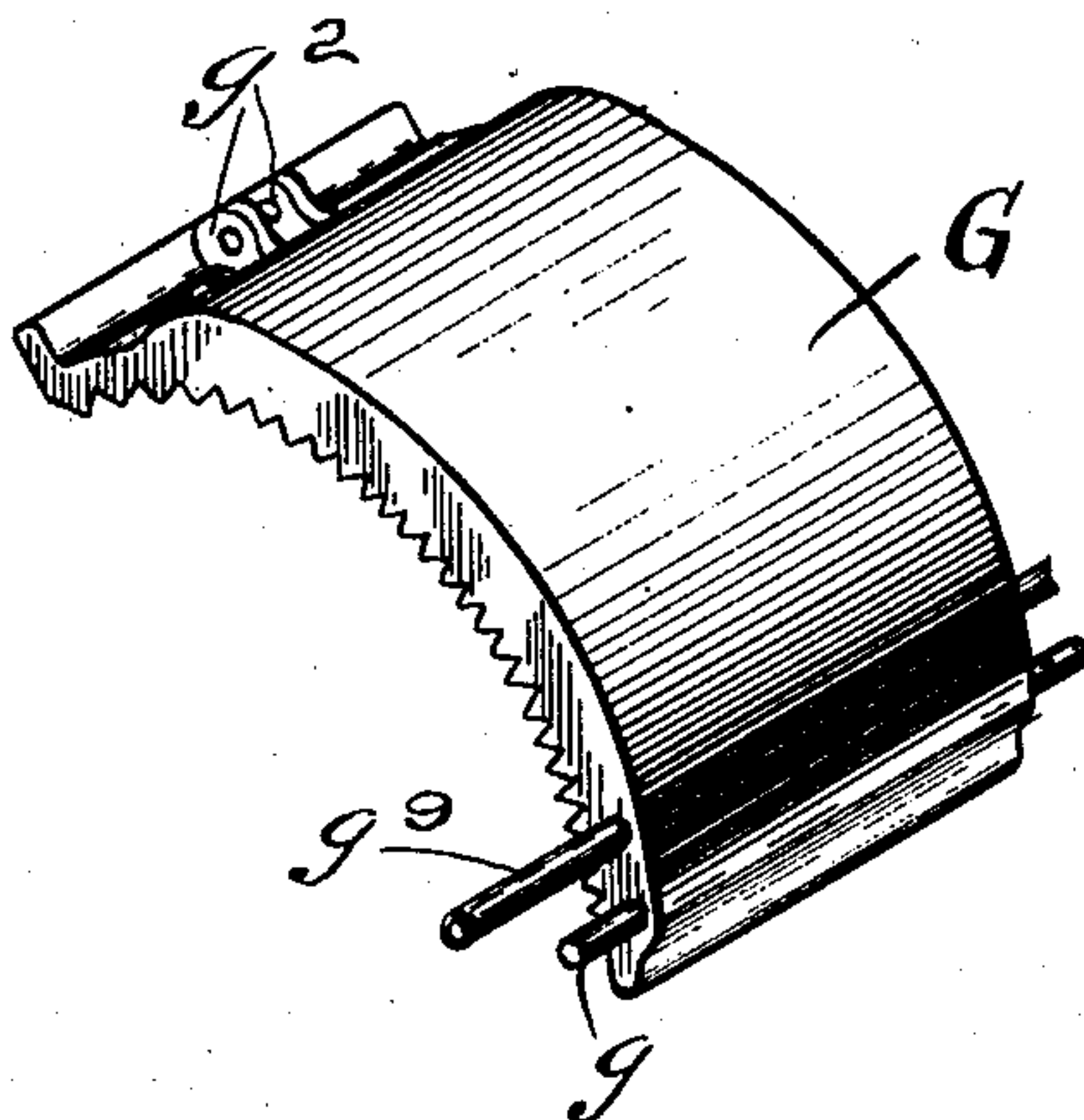


Fig. 8

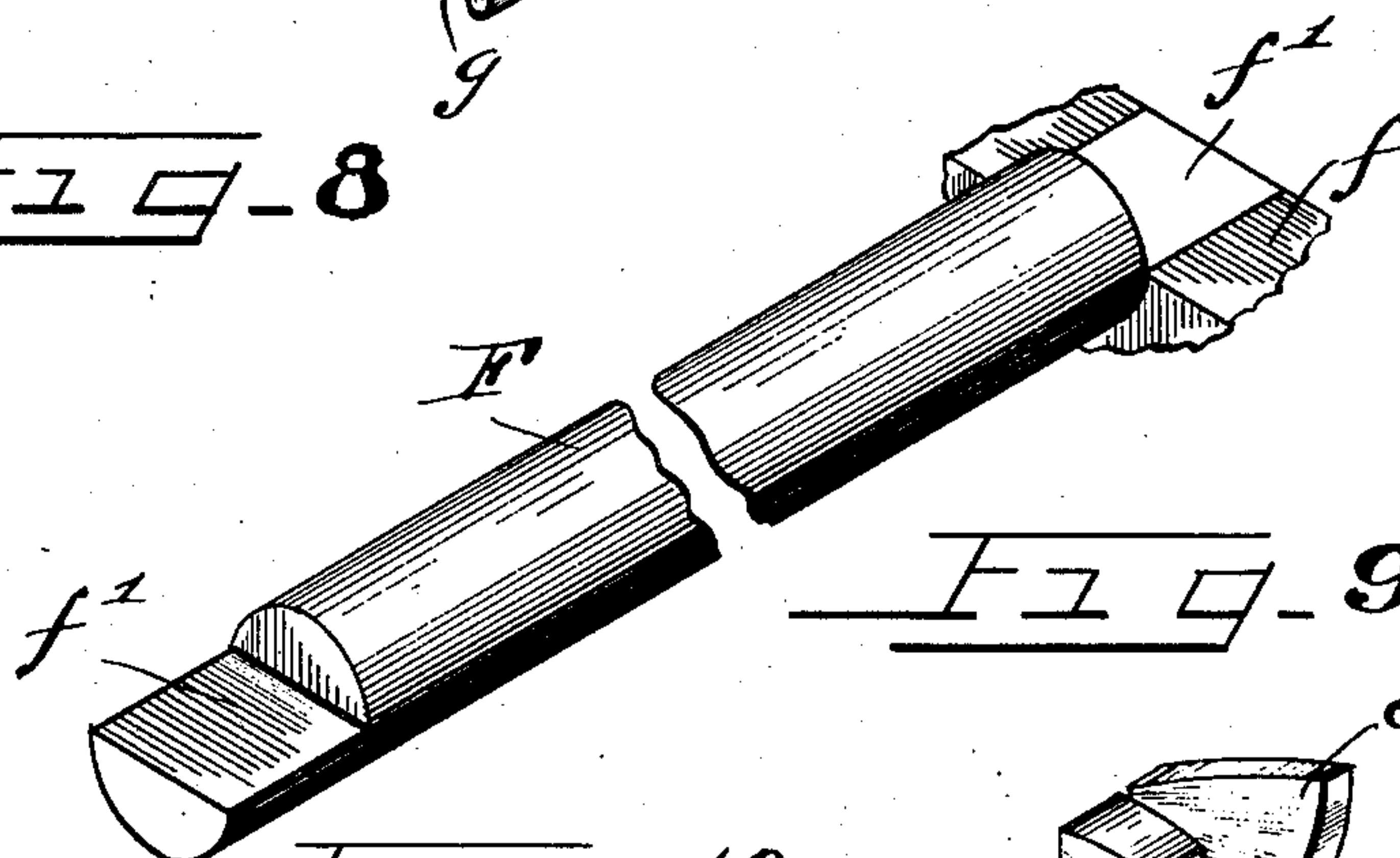
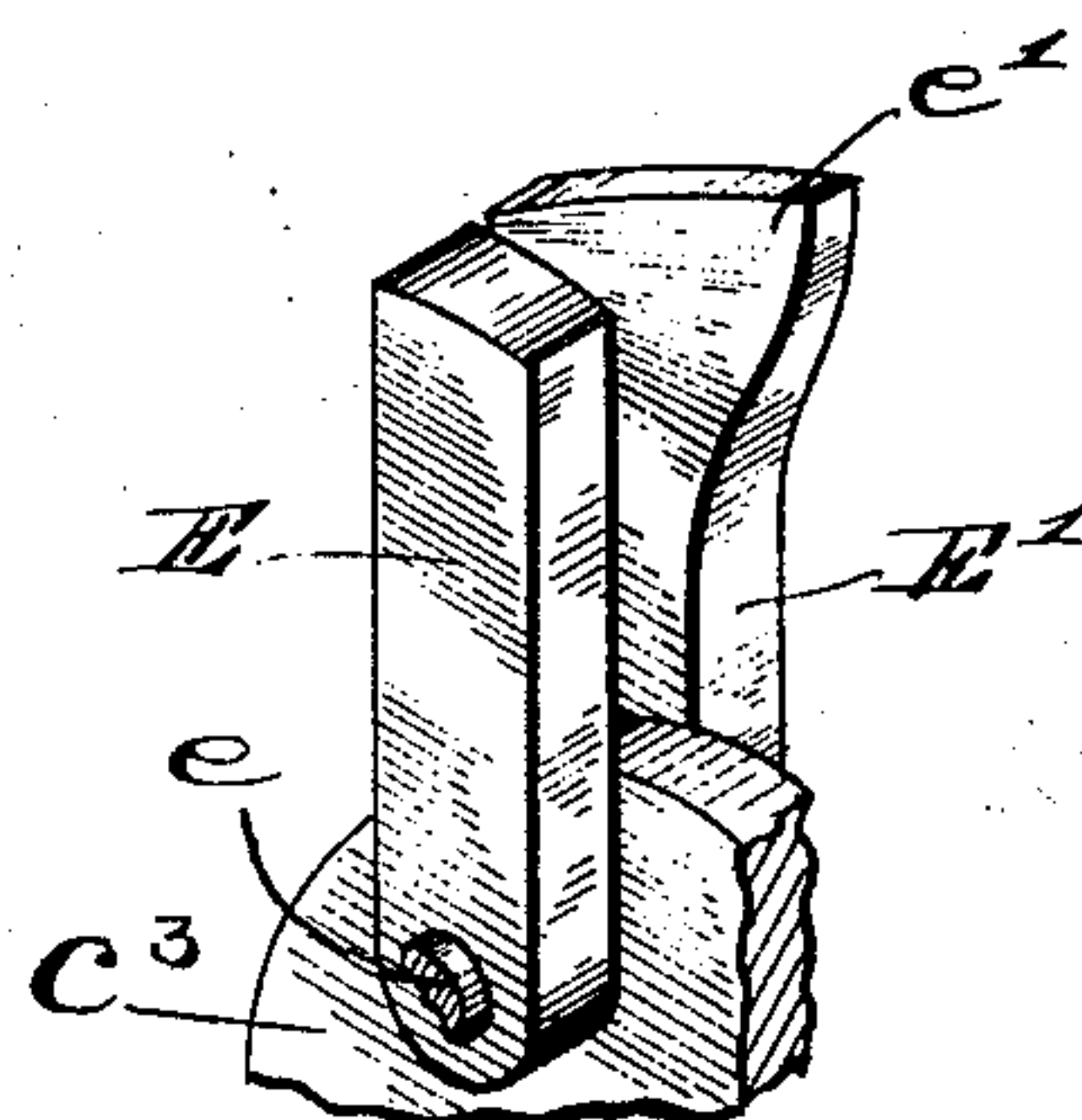
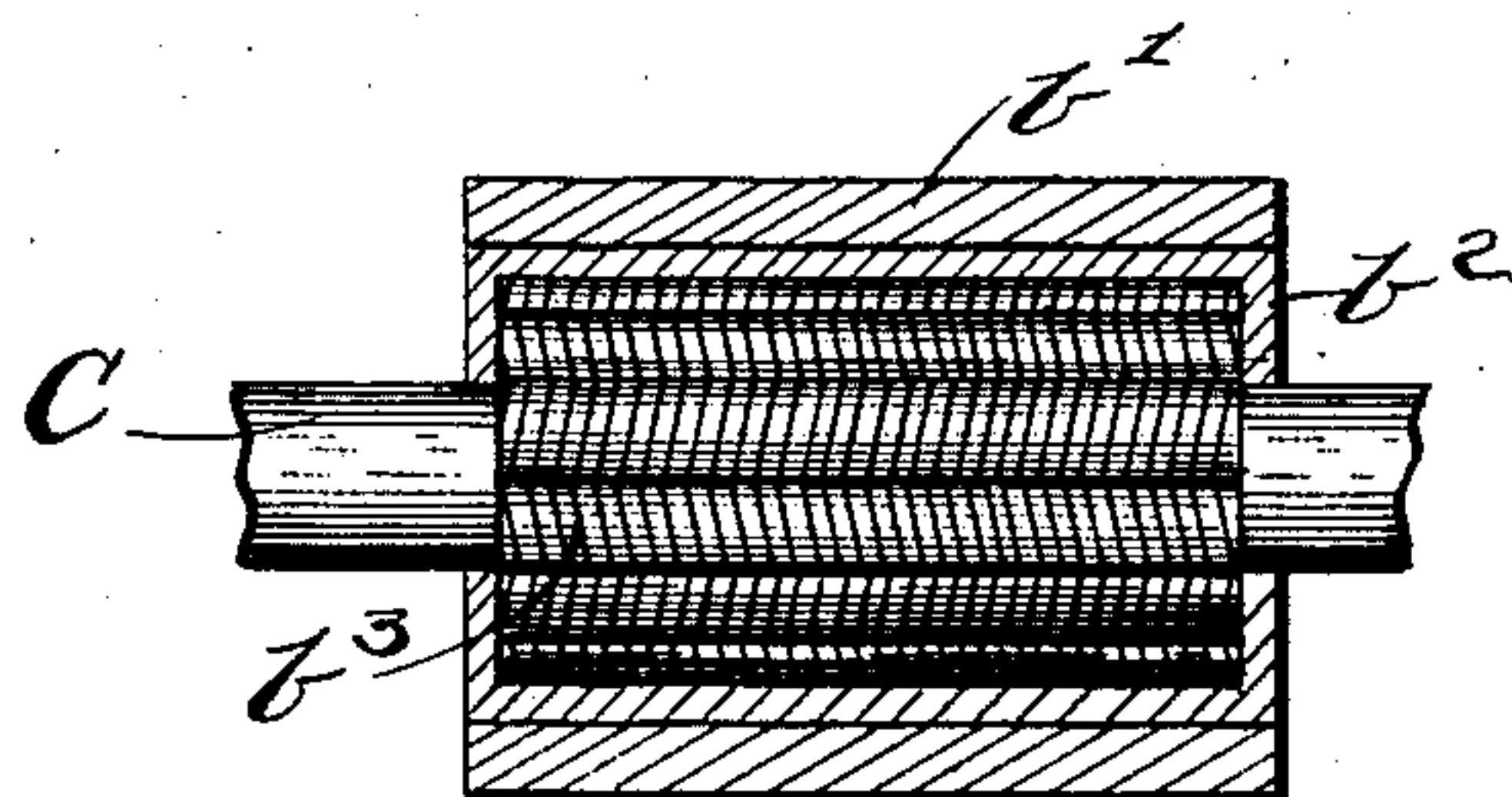


Fig. 9

Fig. 10



Witnesses

J. H. Angell
W. W. Withenbury

Inventor

Peter L. Simpson.

by Charles W. Rice Atty.

UNITED STATES PATENT OFFICE.

PETER L. SIMPSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO HERBERT S. SIMPSON, OF CHICAGO, ILLINOIS.

PULVERIZER.

No. 842,430.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed July 24, 1905. Serial No. 270,967.

To all whom it may concern:

Be it known that I, PETER L. SIMPSON, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pulverizers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in hammer-pulverizers. Heretofore in many of the devices of this class it has been difficult to secure uniformity of result for the reason that the materials are pulverized more perfectly when the hammers work closely to the grates. As the distance is increased through wear the material delivered from the machine becomes coarser until it becomes necessary to readjust the hammers. This has in many of the constructions necessitated stopping the machine and the resetting of the hammers, an operation which requires the utmost care and skill to secure the requisite accuracy of adjustment, for should the adjustment be faulty, as sometimes occurs, injury to the machine is likely to result. Furthermore, in machines of this class uneven wear of the hammers sometimes throws the machine out of balance, and inasmuch as such machines run at a very high speed injury to the bearings or other parts of the mechanism almost invariably results, necessitating expensive repairs and loss of time. Furthermore, in many of the machines heretofore devised the hammers have been so rigidly secured upon their shaft that should a lump of excessively hard material be delivered into the machine injury is likely to result.

With these defects in view the object of the invention is to afford a machine capable of being instantly adjusted to any required fineness of product without the necessity of stopping the machine or the expenditure of time required to adjust the hammers individually.

It is a further object of the invention to afford a construction obviating any tendency for the machine to get out of balance through use, thus obviating one of the most usual causes of injury to such machines.

It is a further and very important object of the invention to afford a construction in

which the hammers are flexibly secured upon the hammer-shaft, thereby enabling the hammers, though each delivering its full blow upon the material, to yield sufficiently in the event of encountering material of excessive hardness to prevent injury to the mechanism.

The invention embraces many novel features and consists in the matters hereinafter described, and more fully pointed out and defined in the appended claims.

In the drawings, Figure 1 is a side elevation of a machine embodying my invention. Fig. 2 is a central vertical section of the same. Fig. 3 is a section taken on line 3 3 of Fig. 1. Fig. 4 is an end elevation of the machine. Fig. 5 is a top plan view. Fig. 6 is an elevation of the end opposite that shown in Fig. 4. Fig. 7 is an enlarged perspective view of the wear-plate. Fig. 8 is an enlarged perspective view of one of the screen-bars. Fig. 9 is an enlarged fragmentary detail illustrating the construction of the hammers and connection of the same with the hammer-shaft. Fig. 10 is an enlarged longitudinal section illustrating one of the bearings for the hammer-shaft.

As shown in said drawings, A indicates the base portion or casing, affording a supporting-frame, which, as shown, is constructed of cast metal or other suitable material and is approximately rectangular, affording integral side and end walls, which, as shown, are flanged at the bottom *a* to afford means for rigidly securing the same upon a supporting foundation and flanged at the top to afford means for rigidly connecting the casing or hood A' and the chute or hopper A² therewith.

Secured on each side of the base-frame A are standards B, which are vertically slotted longitudinally of the machine to near the base, and at the upper ends thereof are bearings to receive a pivot-shaft *b*, one on each side the main frame A, and on each of which is pivoted a lever B', the rear ends of which curve around the rear end of the machine and are integrally connected, affording a yoke. The front ends of said levers are shorter than the rearwardly-directed ends and heavier and extend along each side of the frame and approximately to the center of the same and are provided at their ends with bearings *b'* for the hammer-shaft C. Said bearings, as shown, are self-adjusting anti-friction-bearings, comprising a case *b*², having

secured therein around the shaft a plurality of spiral springs b^3 , as shown in Fig. 10, constructed of flat steel bars, wound to afford a close spiral roller and, as shown, arranged in the case with alternate spring-rollers having the lead of the spiral reversed. At the rear of the yoke formed by the connected ends of said levers is a jack for adjusting the front ends of said levers vertically and comprising, as shown, a shaft B^2 , rotatively secured in a rearwardly-extending leg a^3 integral with the lower frame member. Said shaft extends upwardly through a vertical aperture at the middle of said yoke and is provided with a head below and a collar b^4 above the leg a^3 and is threaded for its entire length above said collar. Nuts b^5 and b^6 engage below and above the yoke, respectively, and act to hold the same rigidly in adjustment. At the upper end of said shaft B^2 is provided an indicator b^7 , the end of which extends down over and in close relation with the side of the yoke on which is indicated a linear scale, (shown in Fig. 4,) arranged to indicate the variation in the adjustment of the hammer-shaft by the vertical adjustment of the yoke.

Secured on the hammer-shaft C is a cylindrical sleeve C' , provided with flanges at its ends, which project beyond the side of the base-frame and the hood A' . Said sleeve is rigidly secured to the shaft by means of a long key, and integral with said sleeve and within the base-frame are peripheral ribs or rims c^3 . Six of said ribs c^3 are shown (though a greater or less number may be used) and are arranged equal distances apart and are provided with apertures equidistant from the axis and in alinement through the ribs, and through which extend cylindric rods or pintles e , upon which are pivoted the hammers E and E' . As shown, six of said pintles e are arranged at equal distances apart around the axis, though obviously the number of pintles may vary. The hammers E are bars of metal of equal length and a thickness to fit between adjacent ribs c^3 and are apertured near the inner end to receive the pintles therethrough. The hammers E' are similar to the hammers E and are arranged alternately therewith and similarly secured upon the pintles e . The outer ends e' of the said hammers E' are twisted in one direction obliquely with the plane of rotation. Said hammers are all of equal length and free to swing upon their shafts and when in operation are thrown radially outward from the hammer-shaft by centrifugal action.

The bottom of the base-frame is open to admit of delivery of material therethrough, and arranged transversely in the bottom and concentric with the shaft C are closely-arranged cylindric rods F , the ends f' of which are seated in a segment f and are flat on the upper side and are rigidly locked in place by a segment f^2 , fitting thereon, as shown in

Figs. 2 and 3. The arrangement of said rods is such as to permit particles of the material of desired fineness to pass therethrough, and the arc upon which said rods are arranged, is such to necessitate the ends of the hammers passing very closely to the rods.

At the front or feed end of the machine and continuous with the arc formed by the rods F is a plurality of flat bars F' , forming a grate, the inner faces of the individual bars of which extend in close relation with each other. Said grate-bars as shown are five in number, though obviously a greater or less number may be employed and permit material sufficiently comminuted when delivered to the machine to pass therethrough.

Secured in the hood or casing A' is a segment-shaped wear-plate G , having a transversely-corrugated inner surface. The inner surface of said wear-plate G affords an arc corresponding with the sweep of the hammer ends and approximately concentric with the shaft C . A shaft g extends through the rear end of the wear-plate and through the sides of the casing or hood A' , and the front end of the wear-plate is supported by means of a rod g' , pivotally secured thereto by means of the lugs g^2 , and extends obliquely rearwardly and upwardly through a centrally slotted and apertured boss g^3 upon the casing A' . Said rod g' is threaded for the greater part of its length, and nuts g^4 and g^5 engage thereon within the slot in said boss, as shown in Fig. 2, and act to firmly lock the wear-plate in adjusted position, though admitting of varying the adjustment toward or from the hammers at will by means of said nuts. As shown also, a set-screw g^6 is tapped through the top of the casing and bears upon the rear end of said wear-plate and is provided with a jam-nut g^7 in a familiar manner, firmly securing the set-screw in adjusted position to take part of the upward thrust on the front end of the wear-plate. Preferably said wear-plate is constructed of cast-steel or other suitable metal and is cored internally, as indicated at g^8 , to afford a steam-chamber, and, as shown, a pipe g^9 is connected therein and extends through the side of the casing A' and affords means for admitting live steam from any desired source, which is discharged therefrom through a similar pipe opening from the opposite side of the plate, as shown in Fig. 7.

The operation is as follows: The machine may be driven from any suitable source of power driving to the pulleys c and C' and rotating the hammer-shaft in a direction to carry the material received into the machine downwardly past the grates F' , over the screen-bars F' and upwardly beneath the wear-plate G , which is adjusted with respect to the hammers to compensate for wear by means of the screw-shaft g' . Centrifugal force holds the hammers radially of the shaft C when in

operation, and the shaft being driven at a high rate of speed each of the hammers strikes its full blow and with great rapidity upon the material contained in the machine, rapidly pulverizing the same. The finer material and particles are sifted through grates F' and the screen-bars F and delivered into any suitable receiving-hopper below the machine. The larger pieces of material are swept upwardly by the hammers to and along the wear-plate G, against which it impinges, owing to the centrifugal motion produced by the hammers. The roughing or corrugation of the wear-plate resists the movement of the material and aids in pulverizing it as the material is crushed by the blows of the hammers. Said wear-plate is heated to any desired temperature by means of steam admitted through the pipe g'. This with many kinds of material greatly assists in pulverizing the same. Should a piece of material be passed into the machine of sufficient hardness to resist the blow of a hammer, the hammer being pivotally supported upon the hammer-shaft is retarded sufficiently by such hard material to permit the same to slip past and immediately swing outward again into operative position.

Obviously by the construction described the hammers can be adjusted to any desired operative distance either from the screen-bars F or the wear-plate G by means of the yoke B'. If, for instance, it should be desired to elevate the hammer-shafts, bringing the hammers into closer proximity with the wear-plate, the nut b⁵ on the adjusting-shaft B² is loosened and turned downwardly, and the nut b⁶ above the yoke is turned down, tilting the yoke downwardly and elevating the shaft to an amount indicated upon the scale or indicator on the yoke, or should the reverse adjustment be desired the nut b⁶ is threaded upwardly upon the shaft and the nut b⁵ set up beneath the yoke, tilting the shaft downwardly and affording a larger space between the ends of the hammers and the wear-plate, but decreasing the space between the ends of the hammers and the screen-bars. The machine is thus capable of being adjusted either to fine or coarser material and the operator is always able to determine with exactness the adjustment of the hammers with relation either to the wear-plate or screen-bars. Should the wear-plate become worn through use, as it will eventually, its front end is adjusted downwardly by means of the screw-shaft g' and set-screw g⁶, thus swinging the wear-plate as a whole upon a pivot g and bringing the front end of the same in the desired proximity with the ends of the hammer. When adjusted either by shifting the yoke or by shifting the plate, the parts are rigidly locked in adjustment by means of the nuts on the jack-shaft B² or on the screw-shaft g'.

Inasmuch as the hammer is supported upon self-centering bearings, such as described, and the hammers are arranged of equal weight and at equal distances from the center of the shaft and from each other around, it follows that at all times the revolving element is in perfect balance and moves with the least possible friction, the roller-springs, as shown, affording a slightly-resilient antifriction self-centering bearing, which tends to absorb and greatly reduce the tendency to shock or jar from the blows of the hammer upon the shaft, thus to a great extent obviating the tendency toward crystallization.

Though I have shown but one construction embodying my invention, the invention is capable of embodiment in many different ways, and I therefore do not purpose limiting this application for patent otherwise than necessitated by the prior art, as may details of construction and arrangement and adjustment may be varied without departing from the principles of this invention.

I claim as my invention—

1. In a crusher or disintegrator, a casing having an upper charging-aperture, a shaft extending horizontally through the casing, hammers pivoted radially on the shaft, a wear-plate in the top of the casing, a screen in the casing below the shaft and traversed by said hammers, levers journaled exteriorly of the casing, self-centering, resilient bearings thereon for said shaft and means for operating the levers to adjust the hammers vertically.

2. In a pulverizer, a rotatable shaft, hammers pivoted thereon at suitable intervals around the shaft, a casing forming a chamber adapted to receive the material to be pulverized and having a charging-aperture therein, a plurality of screen-bars arranged in an arc beneath said shaft, segment-plates rigidly engaging said bars in place, a wear-plate above the shaft, antifriction self-centering bearings for said shaft and pivotally-supported means carrying said bearings and adapted for raising and lowering the shaft.

3. In a pulverizer, a casing, a rotatable shaft extending centrally therethrough, hammers pivoted radially on the shaft at equal intervals longitudinally and also circumferentially of the shaft, an arc-shaped screen extending beneath the hammers, a vertically-adjustable, pivotally-supported yoke, antifriction resilient bearings thereon for said shaft external to the said casing, simultaneously-acting means for adjusting both bearings and the shaft and an indicator to measure the adjustment.

4. In a pulverizer, a metallic casing, a shaft extending centrally therethrough, a sleeve on said shaft having a flange on each end on the outer side of the casing, a plurality of hammers pivotally engaged on said

sleeve, a screen extending at an arc beneath the sweep of the hammers, connected simultaneously-acting means for adjusting the hammers with respect to said screen, means
5 for locking the same in adjusted position, and self-centering resilient bearings for said shaft carried on said adjusting means.

5. In a pulverizer, a casing, a shaft extending therethrough and journaled externally thereof on self-centering bearing, radial hammers yieldingly secured on the shaft, a pivoted yoke external to the casing and on which the shaft is journaled, and adjusting means therefor acting to simultaneously adjust
15 just both ends of the shaft with respect to the casing.

6. In a pulverizer, a casing affording a pulverizing-chamber and having a charging-aperture in its top, hammers arranged and
20 adapted to operate within said casing, a screen on one side the hammers, a wear-plate on the other, a yoke supporting said hammers and pivotally supported intermediate the hammers and its outer end and means
25 acting on the outer end of said yoke to shift the hammers in either direction.

7. In a pulverizer, a stationary frame affording a closed casing, a shaft extending horizontally and centrally therethrough,
30 hammer-supports on the shaft, hammers pivoted to said supports radially of the shaft, a screen below and arranged in an arc approximately corresponding with the sweep of the hammers, a frame or yoke arranged
35 externally of and pivoted with its ends disposed centrally at opposite sides of the casing, resilient coiled bearings for said shaft thereon and adjusting means acting also to secure said yoke in adjustment.

8. In a pulverizer, a casing affording a frame, a yoke pivoted to swing its arms vertically at each side the casing and centrally thereof, a shaft extending centrally through the casing and journaled in the yoke-arms, a
45 plurality of coiled springs in said arm affording bearings for the shaft, hammer-supports on the shaft, hammers carried on said supports and a jack engaging the outer end of said yoke and adapted to adjust and lock the
50 same in the desired adjustment.

9. In a pulverizer, a casing, a yoke pivoted near its ends, on each side the casing, a shaft extending centrally of the casing and journaled on the ends of the yoke, hammer-supports on the shaft, hammers pivoted to the
55 said supports, in close relation longitudinally and swinging circumferentially, a screen arranged at an arc below and out of the path of the sweep of the hammers and a jack secured
60 on the frame and engaging the yoke and acting to adjust both ends of the hammer-shaft simultaneously and hold the same in adjusted position.

10. In a pulverizer, a casing affording a

material-chamber, a yoke pivoted with its
65 arms on each side of the casing, a shaft extending centrally through the casing and journaled to the ends of the yoke, yielding bearings in said arms for said shaft, a peripherally-ribbed sleeve on the shaft, hammers
70 pivoted between the ribs, a screen in the casing arranged below and in suitable proximity to the sweep of the hammers, a wear-plate above the hammers, adjusting means pivoted thereon, a jack engaged on the yoke and
75 acting to secure the same in adjustment and adapted to elevate or depress the hammer-shaft and lock the same in the adjusted position.

11. In a pulverizer, a casing affording a
80 material-chamber, a yoke having an arm on each side the casing and pivoted on the casing to simultaneously move both its arm ends vertically, a shaft extending centrally through the casing and journaled on the ends
85 of the yoke-arms, antifriction resilient self-centering bearings therefor, a peripherally-ribbed sleeve rigidly secured on the shaft, pintles extending through the ribs parallel with the shaft, a screen in said casing and arranged in suitable proximity with the sweep
90 of the hammers, a hollow wear-plate similarly but oppositely disposed in the casing, and indicating and adjusting mechanism acting on the yoke to shift the hammers toward
95 and from the wear-plate and the screen and to lock the same in adjustment while the hammers are in motion.

12. In a pulverizer, a casing having a charging-aperture and affording a material-
100 chamber, a shaft extending centrally therethrough, hammer-supports on the shaft, radially-swinging hammers pivoted to the said supports, a screen arranged below and in suitable proximity to the sweep of the hammers, a wear-plate adjustable to and above
105 the hammers, a threaded shaft pivoted thereon and adjustably engaged on the casing, a centrally-pivoted frame or yoke arranged externally of the casing and provided with
110 boxes affording an antifriction self-centering bearing for said shaft and rotatable means for securing the yoke in the desired adjustment.

13. In a pulverizer embracing a casing
115 open at the bottom and having a charging-aperture in its top, a vertically-movable shaft extending horizontally and centrally therethrough, hammer-supports rigidly but removably secured on the shaft, parallel
120 equidistant pintles in the hammer-supports, hammers pivoted on the pintles, a screen arranged below and in proximity to the sweep of the hammers, an adjustable wear-plate above the hammers a vertically-tiltable
125 frame or yoke pivoted intermediate its ends externally of the casing, antifriction-bearings on the ends of the arms thereof for the shaft

and registering adjusting means for said yoke or frame acting to hold the shaft and hammers in the desired adjustment.

14. In a pulverizer, a casing open at the bottom and having a charging-aperture, a shaft extending horizontally and centrally therethrough, ribbed hammer-supports on the shaft, parallel equally-distanced pintles extending through the ribs, hammers pivoted on the pintles and between the ribs, a screen arranged below the sweep of the hammers, an adjustable wear-plate above the hammers, an adjustable tilting frame on which the shaft is journaled and whereby the hammers are adjusted to the screen and the wear-plate while the hammers are in motion and means shifting and locking said frame in the desired adjustment.

15. The combination with a vertically-adjustable shaft of a casing inclosing the same and having a charging and a discharging aperture therein, a sleeve rigidly engaged on said shaft and having a flange on each end thereof engaging on the outer sides of the casing, radial hammers pivoted on the sleeve and resilient roller-bearings for said shaft.

16. The combination with a casing having a discharge and a charging opening therein, of a resiliently-supported shaft extending centrally and horizontally therethrough, a tilting yoke having a centrally-pivoted arm on each side the casing and on the ends of which the shaft is journaled, radial hammers on the shaft, a screen below and a wear-plate above the hammers, and a vertically-arranged screw-threaded stud secured to the casing and extending loosely through the crotch of the yoke and nuts on said stud above and below the yoke acting to hold the same in adjustment.

17. In a pulverizer, the combination with a casing having a discharge and a charging aperture, of a hammer-shaft extending centrally therethrough, a plurality of closely-arranged bars extending parallel with the shaft and disposed concentric therewith and acting with the hammers to pulverize the material inserted in the casing, a tiltable frame external to the casing, antifriction-bearings thereon for said hammer-shaft, a screw-threaded stud extending through the tiltable frame and nuts on the said stud above and below the frame acting to hold the frame rigidly in adjustment with respect to said bars.

18. In a pulverizer, the combination with a horizontally-arranged vertically-adjustable hammer-bearing shaft and its hammers, of a casing containing and surrounding the hammer-bearing portion of the shaft, a suitably-supported vertically-tiltable frame on which said shaft is journaled parallel with the axis of the frame, and provided centrally with an aperture of greater diameter at its ends than at its center, an upright stationary screw-threaded stud extending loosely through the

said aperture and nuts on said stud, respectively above and below said frame.

19. In a crusher or disintegrator, the combination with the horizontal vertically-adjustable hammer-bearing shaft and hammers pivoted thereon, of a casing containing and surrounding the hammer-bearing portion of said shaft, a vertically-tiltable frame external to the casing and having a central aperture therethrough tapering toward its center, bearings thereon for said hammer-shaft remote from and parallel to the axis of the frame, a stationary upright screw-threaded stud secured to the casing and extending loosely through said aperture, nuts on the stud respectively above and below the frame and an indicator on the stud extending in proximity to a scale on the frame.

20. In a pulverizer, a revoluble shaft and hammers thereon, of means for revolving the same, a casing forming a chamber wherein the said hammers operate and provided at one side of the shaft with a charging-aperture and at the bottom with a discharge-opening, a stationary screen in the casing arranged below and in suitable proximity with the sweep of the hammers, a vertically-tiltable frame pivoted intermediate its ends on the casing, bearings for said shaft thereon parallel to the axis of the frame, means for adjusting and securing the said frame in the desired adjustment, a curved wear-plate arranged above and in proximity to the sweep of the hammers, a pivoted bearing for said wear-plate at one end thereof and an adjustable bearing at the other, and means for securing the said wear-plate in the desired adjustment against the outward thrust.

21. In a machine of the class described the combination with a casing of a transverse shaft therein, a sleeve rigidly engaged on said shaft and provided with peripheral flanges on the outer sides of the casing, a plurality of hammers pivotally engaged on said sleeve, a segment-shaped wear-plate pivoted in said casing above the hammers, a lug on said casing, provided with an aperture therethrough opening through the casing at the front end of said plate, a threaded shaft pivoted on the front end of said plate and loosely engaged in said aperture, set-nuts thereon adapted to adjust said plate with respect to said hammers and a set-screw engaged in said casing and bearing on the front end of the plate.

22. In a disintegrator, a shaft arranged in a horizontal plane, hammer-supports on the shaft, hammers pivoted to said supports, a casing containing the hammers and provided at one side of the shaft with a charging-aperture and having a bottom discharge, a standard on each side of said casing, a yoke pivoted thereon, bearings in the ends of said yoke for said shaft, a rearwardly-directed leg on the casing, an upwardly-directed

threaded shaft in said leg adapted to extend through an aperture in said yoke and set-nuts on said shaft engaging above and below the yoke.

23. In a disintegrator, the combination with a horizontally-rotating hammer-bearing shaft, of a casing containing and surrounding the hammer-bearing portion thereof and provided at one side of the shaft with a charging-
aperture and having a bottom discharge, a screen rigidly engaged beneath the hammers, a yoke pivotally engaged without the casing, bearing-boxes on the ends thereof, a plurality of coiled bearing members in said
boxes adapted to resiliently support said shaft, an adjusting-shaft extending through an aperture in said yoke and means thereon adapted to hold the yoke in adjusted position.

24. In a device of the class described the combination with a casing, of a shaft extending transversely therethrough, a plurality of hammers pivoted on said shaft, a screen beneath the hammers and concentric with said shaft, a slotted standard on each side of said casing, a yoke pivoted in said standards and having its ends projecting beyond the same, resilient antifriction-bearings on said yoke ends of said shaft, a rearwardly-directed lug on said casing, a vertical adjusting-shaft rigidly engaged in said leg and extending through an aperture in said yoke and means on said adjusting-shaft adapted to hold the same in adjusted position.

25. In a pulverizer the combination with a casing having a bottom discharge and a charging-aperture, of a slotted boss thereon, a shaft extending centrally through the casing, hammers hinged to the shaft and revolving therewith, stationary screen-bars below the sweep of the hammers, segment-plates rigidly engaged on the casing and adapted to hold said bars in place, a hollow wear-plate above the sweep of the hammers, a steam connection therein, a pivot connection between one end of the wear-plate and the casing, a bolt pivoted to the other end of said wear-plate and extending loosely through the aforesaid boss and through the slot therein and nuts on the bolt within the said slot.

26. In a pulverizer of the class described the combination with the casing and the hammer-bearing shaft arranged rotatably therein, of a chambered wear-plate having a roughened inner face and arranged within the casing on an arc approximately coinciding with the sweep of the hammer ends, means for adjusting said wear-plate to or from the hammers comprising a bolt pivoted
on the plate, an apertured boss on the casing through which said bolt extends and having a transverse slot therein, nuts in said slots engaging the bolt and steam connections with the chamber in said wear-plate.

27. In a pulverizer of the class described

the combination with a casing having an aperture in each side, of a shaft extending transversely through said apertures, a sleeve rigidly engaged thereon and having a flange on each end closing said aperture, hammers pivoted on said sleeve, a pair of segment-bars on each side of the casing, screen-bars rigidly engaged between said bars, levers supporting said shaft and means for adjusting the same to raise and lower the hammers.

28. In a machine of the class described, a casing having a discharge-aperture and a charging-aperture, a yoke pivoted centrally with its ends on each side the center of the casing, a hammer-shaft journaled on the ends of said arms, a jack acting to swing said yoke to adjust said shaft in the casing, hammers arranged in longitudinal lines on the shaft and pivoted to swing circumferentially thereof, a plurality of closely-arranged rods affording a screen below the hammers, a wear-plate arranged above the hammers and adjustable with respect thereto and affording a steam-chamber and steam connections opening into said wear-plate.

29. In a machine of the class described a casing, a vertically-adjustable hammer-shaft therein, hammers pivotally engaged on said shaft, a pair of segment-bars rigidly engaged on each side of the casing, a plurality of screen-bars rigidly engaged therebetween and means for adjusting the hammers with respect to said screen comprising a yoke affording bearings for said sleeve, a vertical shaft extending through said yoke and set-nuts thereon adapted to support the yoke in adjusted position.

30. In a machine of the class described, a casing having a discharge-opening in the bottom and an upper charging-aperture, a hammer-shaft journaled centrally therein, hammers thereon revoluble therewith, a stationary screen comprising closely-arranged bars extending from the charging-aperture around approximately one-half the casing below the hammers, segment-plates rigidly engaged in the casing and adapted to hold said bars in place, a wear-plate extending from the screen to the charging-aperture above the hammers, a steam-chamber therein, means for adjusting the wear-plate to the hammers and means adjusting the hammer-shaft with its hammers bodily to and from the screen and wear-plate comprising a yoke affording bearings for said shaft, pivotal supports for said yoke, a fixed shaft extending through the yoke and means thereon adapted to hold the yoke in adjusted position.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

PETER L. SIMPSON.

Witnesses:

W. W. WITHEBURY,
HJALMAR S. RUDD.