

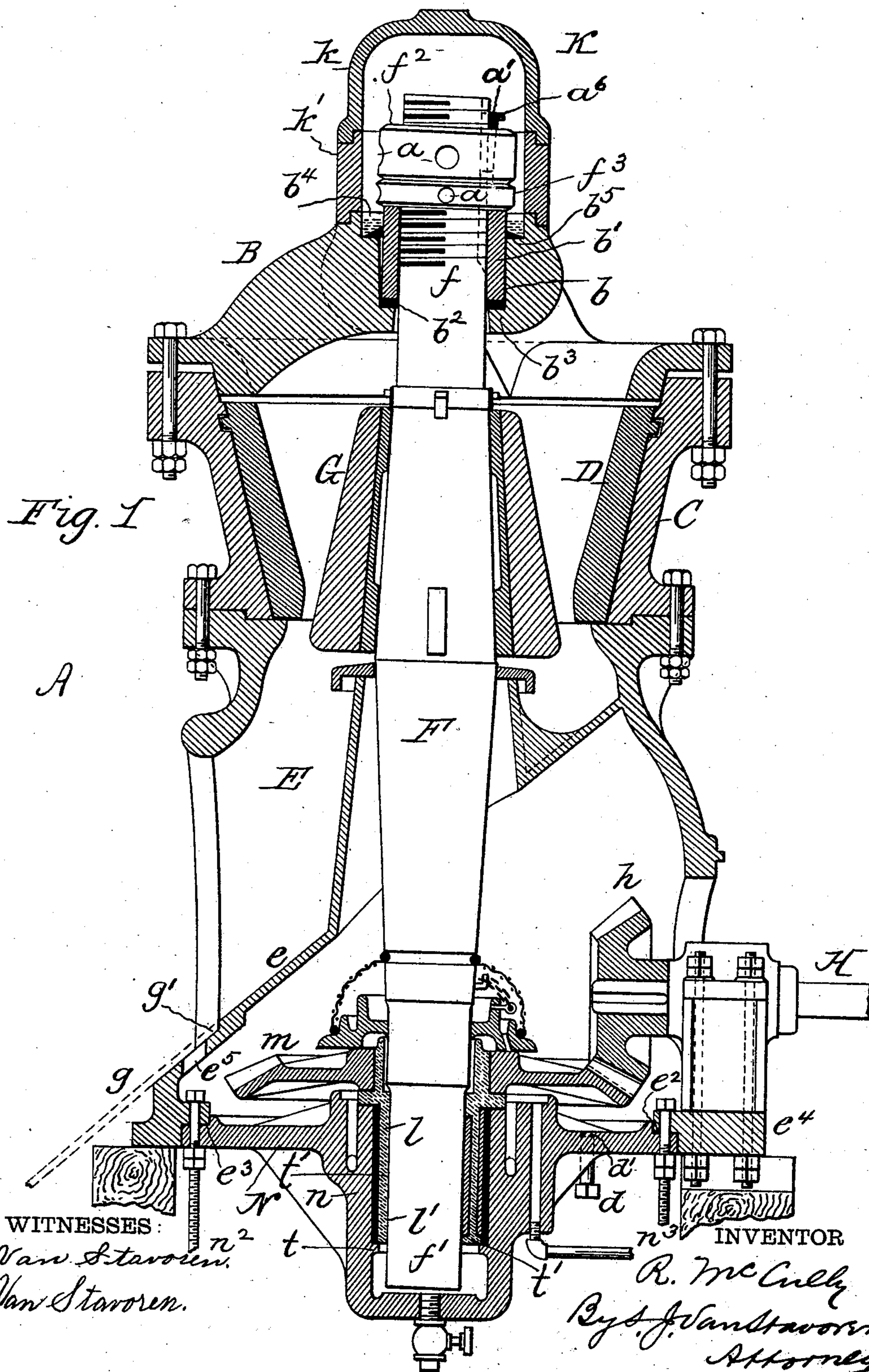
(No Model.)

3 Sheets—Sheet 1.

R. McCULLY.  
CRUSHING MACHINE.

No. 501,843.

Patented July 18, 1893.





(No Model.)

3 Sheets—Sheet 2.

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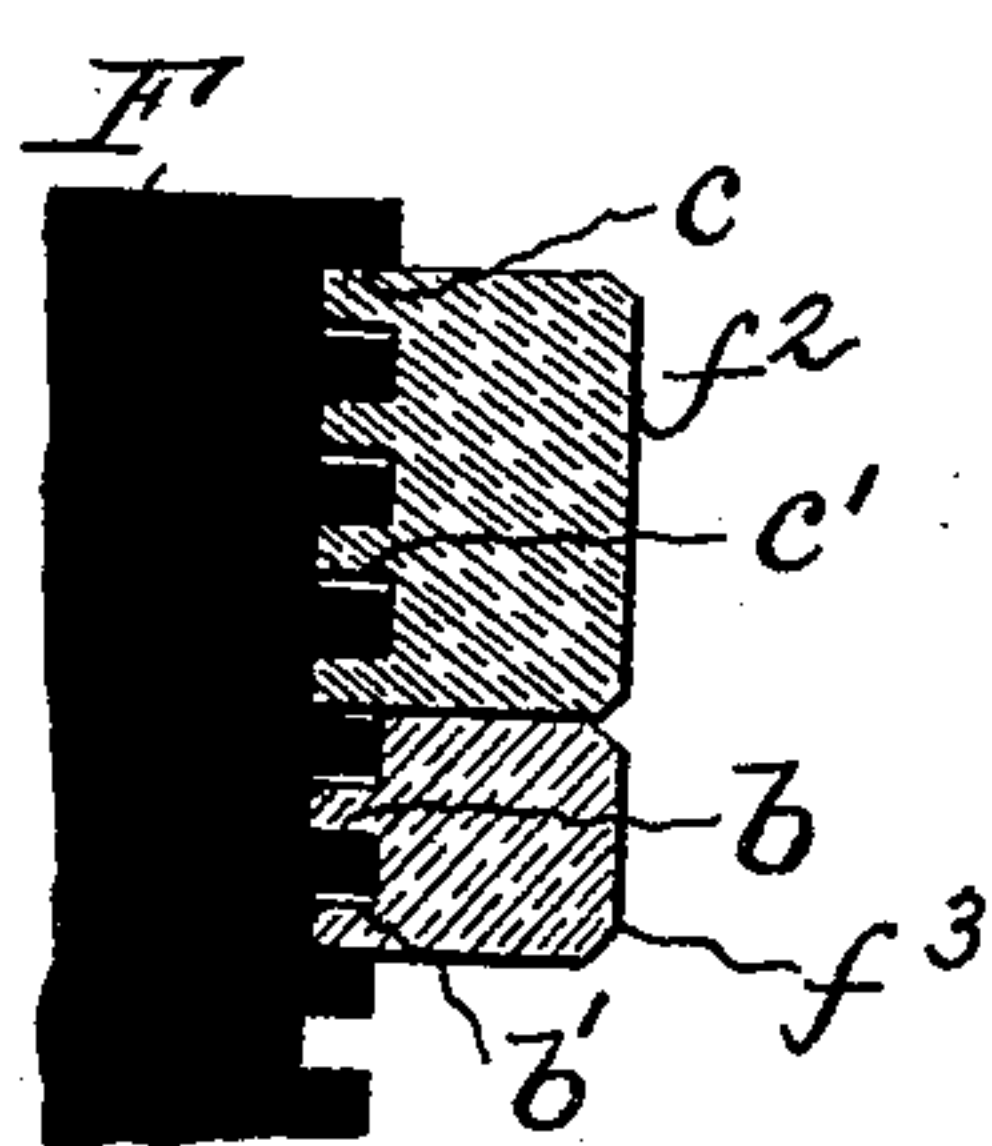


Fig. 5

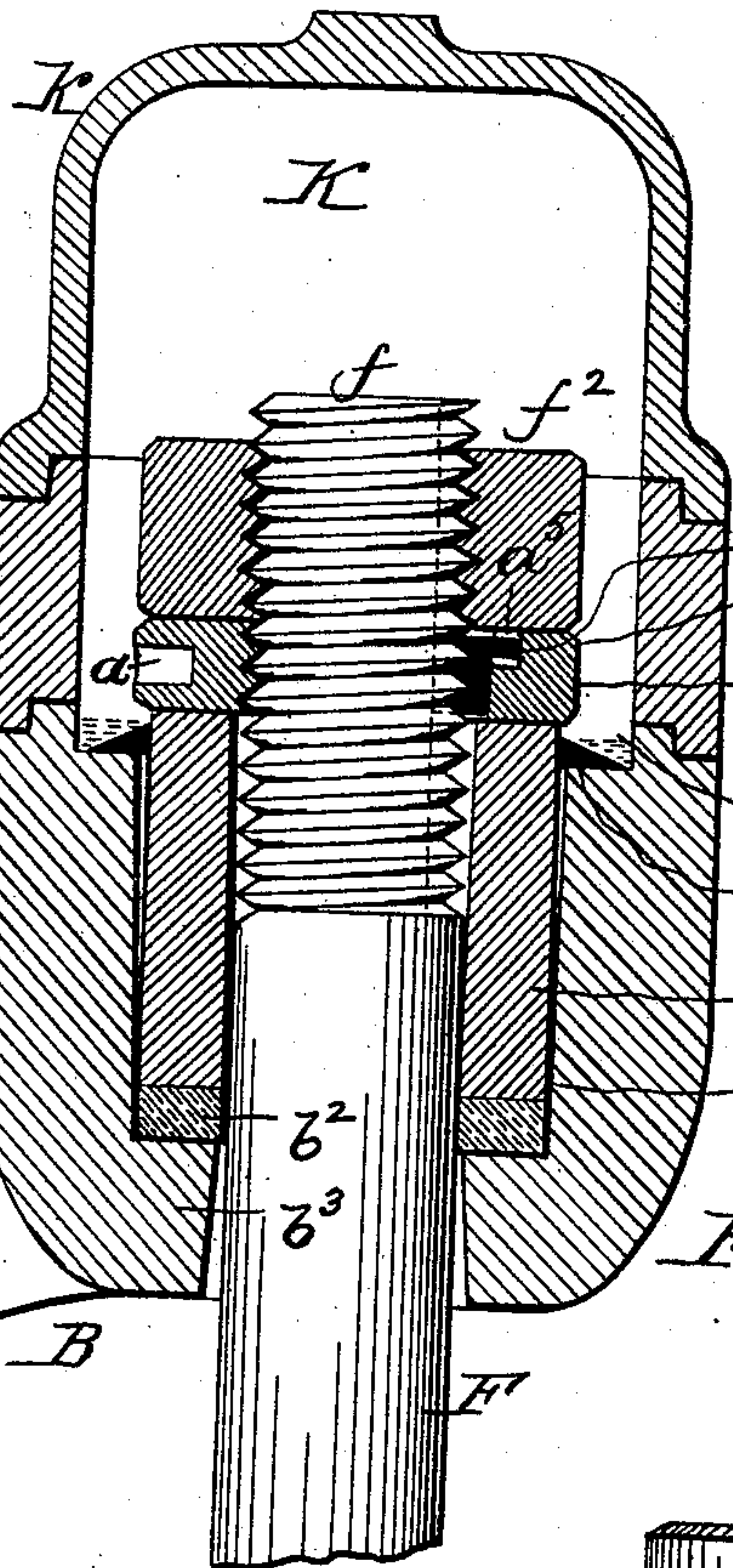


Fig. 2

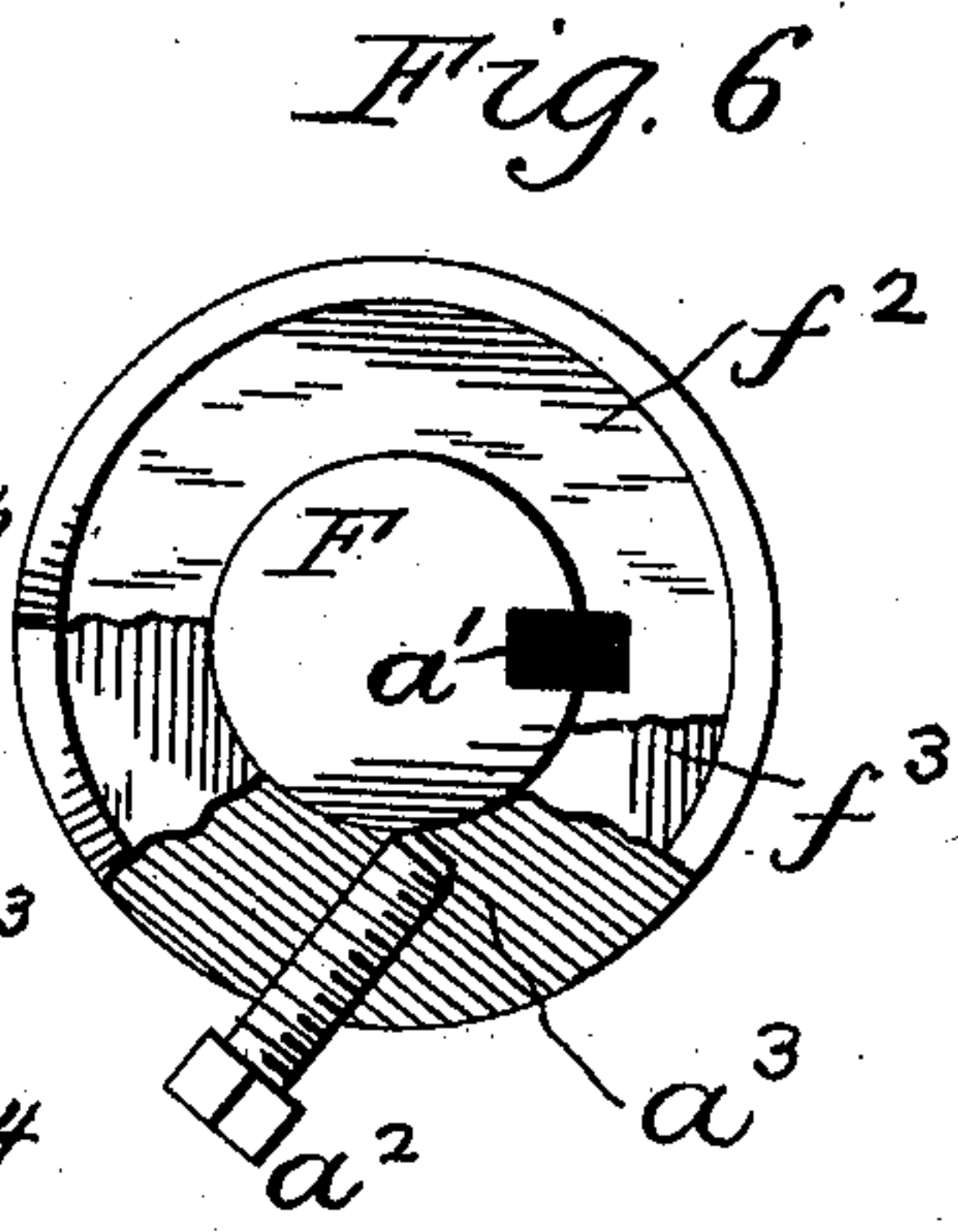


Fig. 6

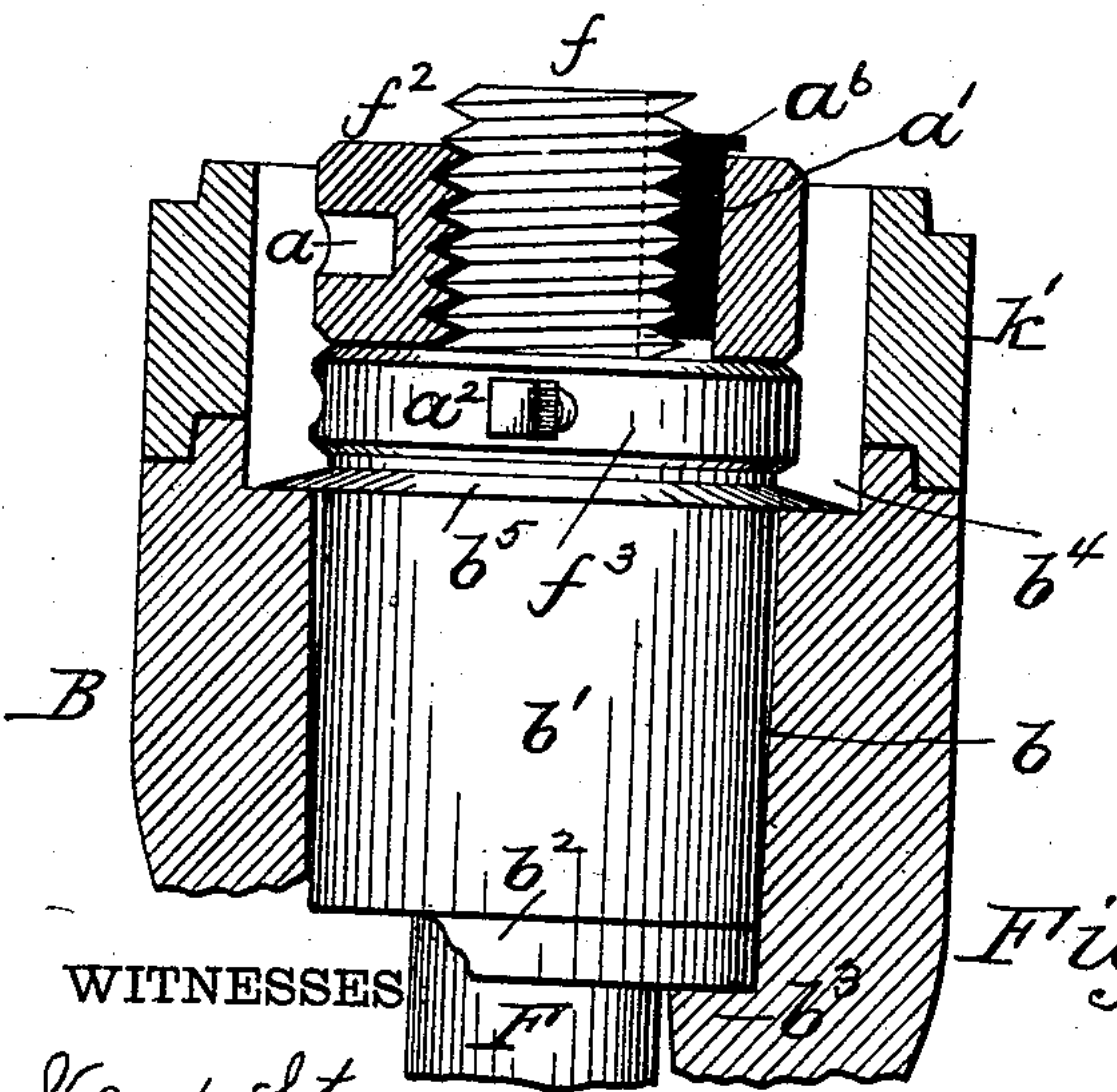


Fig. 3

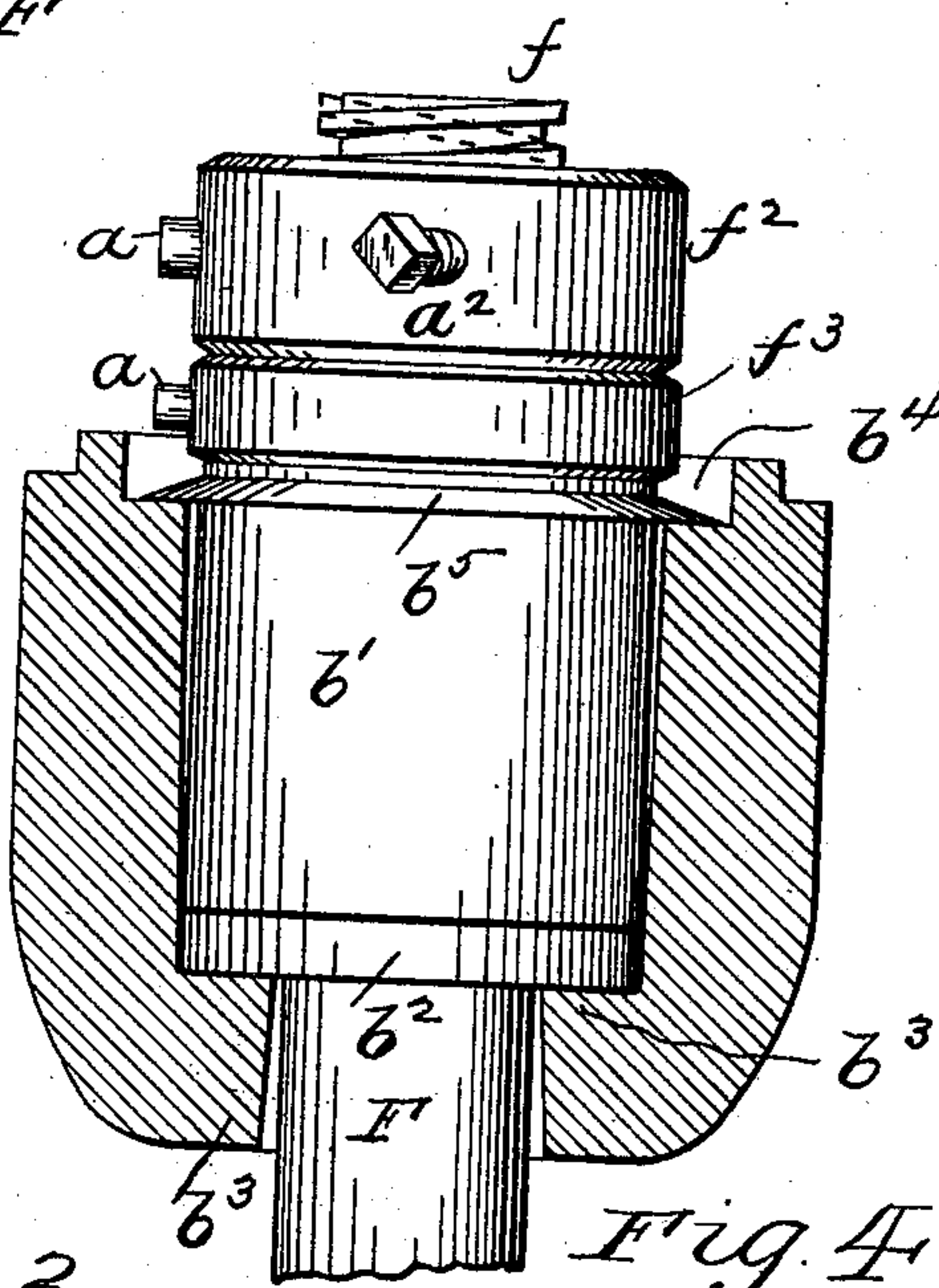


Fig. 4

WITNESSES  
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By S. J. Van Staroren  
Attorney

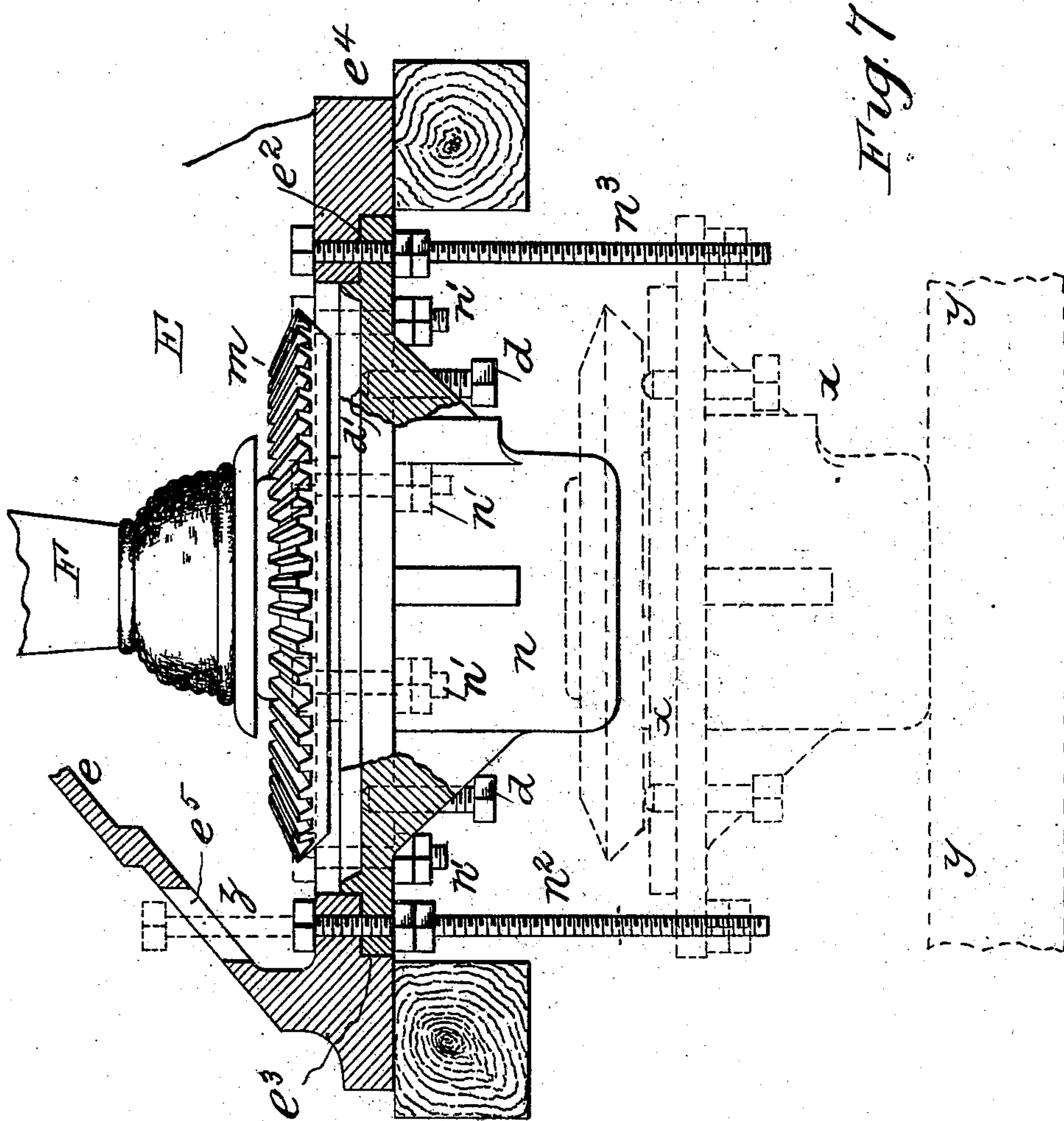
(No Model.)

3 Sheets—Sheet 3.

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CRUSHING MACHINE.

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**WITNESSES:**

WITNESSES:  
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# UNITED STATES PATENT OFFICE.

ROBERT McCULLY, OF PHILADELPHIA, PENNSYLVANIA.

## CRUSHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,843, dated July 18, 1893.

Application filed April 10, 1893. Serial No. 470,260. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT McCULLY, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Crushing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has relation generally to crushing machines having a gyratory shaft and crusher-head and particularly to that form of the same in which the shaft is wholly supported from its upper end by a screw-thread on the shaft engaging a nut which has a support upon the upper edge of a sleeve-bearing for the upper end of the shaft in the hub-opening of the spider as fully shown, described and claimed in United States Letters Patent granted to me November 17, 1891, No. 463,162. In said patent a single supporting and adjusting nut for the upper end of the shaft is shown and while such single nut subserves its functions yet under the heavy weight of the shaft and of the severe downward pressure or stress incident to the crushing, it is, in many cases, liable to work loose and as it does so, the threads both of the shaft and nut and particularly of the former, unduly and rapidly wear thereby necessitating frequent recutting of the threads especially that on the shaft. This recutting of the shaft-thread is disadvantageous as it reduces the diameter of the upper end of the shaft and consequently its supporting strength.

My invention has for its object to avoid the above described objection, or in other words, to provide the upper end of the shaft with supporting and adjusting nuts which cannot work loose to wear their threads nor those on the shaft and thereby avoid all recutting of the shaft-threads and renewal or repairs of the supporting devices for the shaft and crusher-head.

My invention has further relation to gyratory crushing machines having the lower end

shaft bearing formed on a plate which is removable from the machine and when removed the actuating mechanism in engagement with or located on the lower end of the shaft accompanies said plate and bearing in order that repairs or replacement of any of said parts may be effected without dismantling the remaining parts of the machine.

My invention has for its further object to provide said removable bottom with devices for initially starting it from its position or bearings and for sustaining its weight and that of the fixtures supported on it as it is gradually lowered from the machine to a temporary place of rest beneath the machine.

My invention accordingly consists of the combinations, constructions and arrangements of parts as hereinafter more particularly described in the specification and pointed out in the claims.

Reference is had to the accompanying drawings wherein—

Figure 1 is a vertical section, partly in elevation, of a form of gyratory crushing machine embodying my improvements. Fig. 2 is an enlarged sectional elevation of the upper end of shaft, supporting and adjusting devices therefor and part of the spider or top of the machine. Fig. 3 is a like view with oiling cap of a two part or sectional cover for the spider hub-opening removed. Fig. 4 is a similar view showing both sections of said removable cover detached from the spider. Fig. 5 is an enlarged sectional view of part of the upper threaded end of the shaft and supporting, adjusting and locking nuts, indicating more plainly the relative difference of surface contact between the shaft and nut threads for obtaining a nut support for the upper end of the shaft which will not work loose to wear the shaft and nut-threads. Fig. 6 is a plan, partly sectional, of shaft and its supporting and adjusting nuts with set screw in one of said nuts for taking up any looseness or play between the key for the adjusting-nut and the shaft, and Fig. 7 is a sectional elevation of the lower part of the machine showing more plainly the removable



bottom with initial starting devices and means for sustaining and gradually lowering it to its temporary support, the latter position being shown in dotted lines.

5 A represents the crushing machine of which its component parts, the spider B with hub-opening  $b$ , sleeve  $b'$  in said opening, crushing-chamber C, working-faces D, chute-chamber E, gyratory-shaft F, crusher-head G, chute  
10 e, driving-shaft H with gear  $h$  meshing with gear  $m$  on hub  $l$  having an eccentric bore  $l'$  for the lower end  $f'$  of shaft F, bearing  $n$  for hub  $l$  on removable bottom plate N, may be constructed and located for operation as illustrated in Fig. 1 or as desired. The upper end  
15  $f$  of shaft F is threaded as shown and is provided with two nuts  $f^2 f^3$  which may be of any suitable configuration and construction. They may also be of the same or different  
20 sizes and thicknesses. In the drawings I have shown them of the same size but of different thicknesses, the upper nut  $f^2$  being of the greater thickness as its threads alone support the entire weight of the shaft and crusher-head as hereinafter more fully explained.  
25 The lower nut  $f^3$  bears upon the upper edge of sleeve  $b'$  the lower edge of which may rest upon a washer  $b^2$  on a bottom inwardly projecting flange  $b^3$  in the hub-opening  $b$ , or if  
30 desired said washer may be dispensed with, in which case, the lower edge of the sleeve will rest on the flange  $b^3$ . So too, in other forms of top supports for the shaft F, the inwardly projecting flange  $b^3$  may be dispensed  
35 with and any suitable supporting devices for sleeve  $b'$  may be substituted. The top of hub-opening  $b'$  may be formed with or terminate in an angular oil chamber  $b^4$  in which may be a washer  $b^5$  having an outer beveled  
40 knife or other suitably formed edge for directing dirt and grit away from the sleeve  $b'$  and for graduating the supply of oil to the sleeve-bearings in hub-opening  $b$ . The upper end of the sleeve  $b'$  preferably projects above said  
45 oil-chamber as illustrated.

K represents the removable cover for the top of the hub-opening  $b$ , which cover is composed of two horizontally parted sections  $k k'$  the upper part or section  $k$  being the oiling-cap as it alone is removed when oil is supplied to chamber  $b^4$  and the lower ring or section  $k'$  being removed only when the nuts  $f^2 f^3$  are to be adjusted or access is had thereto. These cover-sections as well as the top of the hub-opening have preferably any form of rabbeted meeting edges so that the cover sections are maintained in position without the aid of screws, bolts or other fastening devices.

The threads for the upper end of the shaft  
60 and for the nuts  $f^2 f^3$  may be of any suitable form in cross-section and the nuts may be peripherally configured as desired for the application of a turning tool or device. In the drawings I have indicated them provided  
65 with spanner recesses or lugs  $a$  to admit of great turning pressure being applied thereto,

and in order to afford easy access of the spanner to the nuts and the application of its greatest turning pressure the lower removable cover section  $k'$  is provided, which when  
70 detached from the machine leaves the nuts  $f^2$  and  $f^3$  fully exposed. Either of nuts  $f^2$  or  $f^3$  may be the adjusting nut for shaft and crusher-head and whichever one is so used the other is the locking nut. In any case, however, the  
75 downward crushing pressure and the weight of the shaft and crusher-head fall entirely upon the threads of the upper nut and not upon those of the lower nut. The adjusting nut, whichever of the two nuts may be used,  
80 has a key connection  $a'$  with shaft F, which key is inserted into its seat in the shaft and nut so as to be readily removable when the nut is turned to adjust the shaft and the locking-nut is provided with an obliquely arranged  
85 set screw  $a^2$ , see more plainly Fig. 6. The direction or obliqueness of the set-screw  $a^2$  is such that when turned its inner end  $a^3$  impinges against the shaft F beyond its center as shown, and it turns the locking-nut to finish  
90 tightening it to take up any looseness between the key and its seat in the adjusting-nut. By so doing any tendency of the adjusting-nut to work loose owing to the play between its key  $a'$  and seat is avoided.  
95

In Figs. 2 and 5, the lower nut  $f^3$  is represented as the adjusting-nut and it has a key  $a'$ , the upper nut  $f^2$  being the locking-nut and it is provided with the set-screw  $a^2$ , while in Figs. 3 and 6 the reverse is the case.  
100

To provide for easy removal of the key  $a'$  in nut  $f^3$ , a suitable recess  $a^5$  is formed in the upper part of the key-way in the nut, and the key is provided with an eye or lug  $a^6$  in line with said recess for the insertion of a suitable  
105 tool into the recess for engaging the lug or eye of the key. The upper nut  $f^2$  requires no such recess as the top of the key may project above the nut as shown. In setting or adjusting the shaft and crusher-head, the ad-  
110 justing-nut, say nut  $f^3$ , is first turned to bring the crusher-head to the required adjustment relatively to the crushing-faces D. The key  $a'$  is then inserted into position to lock the nut  $f^3$  to the shaft and prevent it from turning.  
115 The nut  $f^2$  is then screwed or turned down hard or jammed against the adjusting nut  $f^3$ . The effect of which is, that the lower surfaces  $b$  of the threads of adjusting-nut  $f^3$  impinge tightly upon the upper surfaces of the shaft-  
120 threads, see more plainly Fig. 5, and the upper surfaces  $b'$  of said nut-threads and the lower surfaces of the shaft-threads do not impinge or contact, while on the other hand, the upper surfaces  $c$  of the threads in nut  $f^2$  im-  
125 pinge tightly against the lower surfaces of the shaft-threads and the lower surfaces  $c'$  of said nut-threads and the upper surfaces of the shaft-threads do not impinge or contact. As the lower surfaces of the shaft-threads im-  
130 pinge or contact tightly with the upper surfaces  $c$  of the threads of the upper nut  $f^2$  and



not with the corresponding thread surfaces of the lower nut  $f^3$ , the threads of the upper nut alone support or bear the weight of the shaft and crusher-head and also the downward pressure or strains incident to crushing while the threads of the lower nut  $f^3$  are entirely relieved of such weight and pressure, and as the pressure on the nuts is in opposite directions they do not work loose and all wear of the nut and shaft-threads is wholly avoided. After both nuts have been fully adjusted the set-screw  $a^2$  in the locking nut  $f^2$  is adjusted to take up any play between the key  $a'$  and its seat in the adjusting nut  $f^3$  to further prevent any tendency of loosening of said nut due to said play. The same result occurs when the nut  $f^2$  is the adjusting and the nut  $f^3$  the locking-nut as indicated in Figs. 1, 3 and 6.

If desired right and left shaft-threads of different depths, one thread for the upper and the other for the lower nut may be employed instead of a single shaft thread, see Fig. 4.

The removable bottom N is suitably secured to the bottom of the chute chamber or section E by bolts  $n'$  of which two or more of them  $n^2$   $n^3$  are of greater length than the others, which longer bolts are oppositely or otherwise located as desired to sustain the removable bottom and appurtenances accompanying it when it is lowered from the machine. The bottom N is also provided between the bolts  $n'$  with set screws  $d$  the ends  $d'$  of which impinge against the under side  $e^2$  of the recess  $e^3$  in the bottom  $e^4$  of chute chamber or casing section E. To remove bottom N, the nuts on the short bolts  $n'$  are first unscrewed, the nuts on long bolts  $n^2$   $n^3$  are loosened and the set-screws  $d$  are turned to effect the initial starting of the bottom N from its recess or bearing  $e^3$  in the casing-section bottom  $e^4$ . This operation is continued until the bottom N is clear of its bearing or recess  $e^4$  after which the nuts on the long bolts  $n^2$   $n^3$  are unscrewed to gradually lower the bottom N to a temporary support for access to it and the appurtenances removed with it. Such removal is indicated in Fig. 7 by dotted lines  $x$  and  $y$  the latter being the temporary rest for the removed bottom and after it is in position upon rest  $y$ , the nuts on bolts  $n^2$   $n^3$  are removed and the latter are raised into the casing-section E to admit of the bottom N or any of the appurtenances thereon being removed from beneath the machine for repairs or replacement. If one of the long bolts  $n^2$  be located beneath and adjacent to the lower outer end of the chute  $e$  a suitable opening  $e^5$  in line with bolt  $n^2$  is formed in chute  $e$  to admit of raising said bolt clear of the removable bottom after it is in position on rest  $y$  as indicated by dotted line  $z$ , Fig. 7. Said opening  $e^5$  is covered by an extension chute  $g$  which fits into a recess or rabbet  $g'$  on chute  $e$ , see more plainly Fig. 1, within the well  $n$  in an inwardly project-

ing flange  $t$  which supports a bushing  $t'$  for the hub  $l$ . Said flange prevents said bushing falling or working itself down into well  $n$ .

From the foregoing it will be noted that I do not confine myself to the construction and arrangement of the novel features hereof as the same may be varied without departing from the spirit of the invention.

What I claim is—

1. In a gyrating crusher, a gyratory-shaft having at its upper end an adjusting-nut and a locking-nut one above the other and the threads of the upper nut sustaining the entire weight of the shaft and crusher-head and downward pressure of crushing, substantially as set forth.

2. In a gyratory-crusher, a gyratory-shaft suspended at its upper end by an adjusting and a locking nut, the thread surfaces of which have opposite pressure impingement or contact with the shaft threads, substantially as set forth.

3. In combination with a gyratory shaft having an upper threaded end, an adjusting and a locking nut on said end, a key engagement between the adjusting-nut and shaft and a set-screw for the locking-nut, substantially as set forth.

4. In a crusher, the combination of a gyratory shaft having an upper threaded end, a sleeve surrounding said end, a support for said sleeve, an adjusting and a locking-nut on said shaft-end above said sleeve, a key engagement between the shaft and one of said nuts, and a set-screw for the other of said nuts, substantially as set forth.

5. In a gyratory crusher, the combination with the top-plate or spider having a hub-opening, a gyratory-shaft, and sectional cover for the top of said hub-opening, substantially as set forth.

6. In combination with the spider or top-plate hub-opening of a gyratory-crusher, a two part or sectional cover, and rabbetted meeting edges for said sections and hub-opening, substantially as set forth.

7. In combination with a gyratory-crusher, a removable bottom, short and long length securing bolts for said bottom and set-screws interposed between the bolts, substantially as and for the purpose set forth.

8. In a gyratory crusher, the combination of removable bottom N, bolts  $n^2$   $n^3$ , chute  $e$ , having opening  $e^5$  and rabbet or recess  $g'$  and extension chute  $g$ , substantially as set forth.

9. In a gyratory-crusher, the combination of a gyratory shaft having upper threaded end, supporting adjusting and locking nuts at said end, and the threads of the shaft having different surfaces contact with the nuts, substantially as set forth.

10. In a gyratory-crusher, a shaft having at its upper end a superposed adjusting and a lock nut, the threads of the upper nut sustaining the entire weight of the shaft and crusher-head and downward pressure of



crushing, and the threads of the lower nut being relieved of such weight and pressure, substantially as set forth.

11. In a gyratory crushing machine, the combination of gyratory shaft F, a bottom plate N having well *n*, an inwardly projecting flange *t* in said well, a bushing *t'* supported on said flange and actuating mech-

anism for said shaft within said bushing, substantially as set forth. 10

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT McCULLY.

Witnesses:

AL. P. BURCHELL,  
S. J. VAN STAVOREN.