(No Model.)

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R. McCULLY.

CRUSHING MACHINE.

No. 500,597. Patented July 4, 1893.

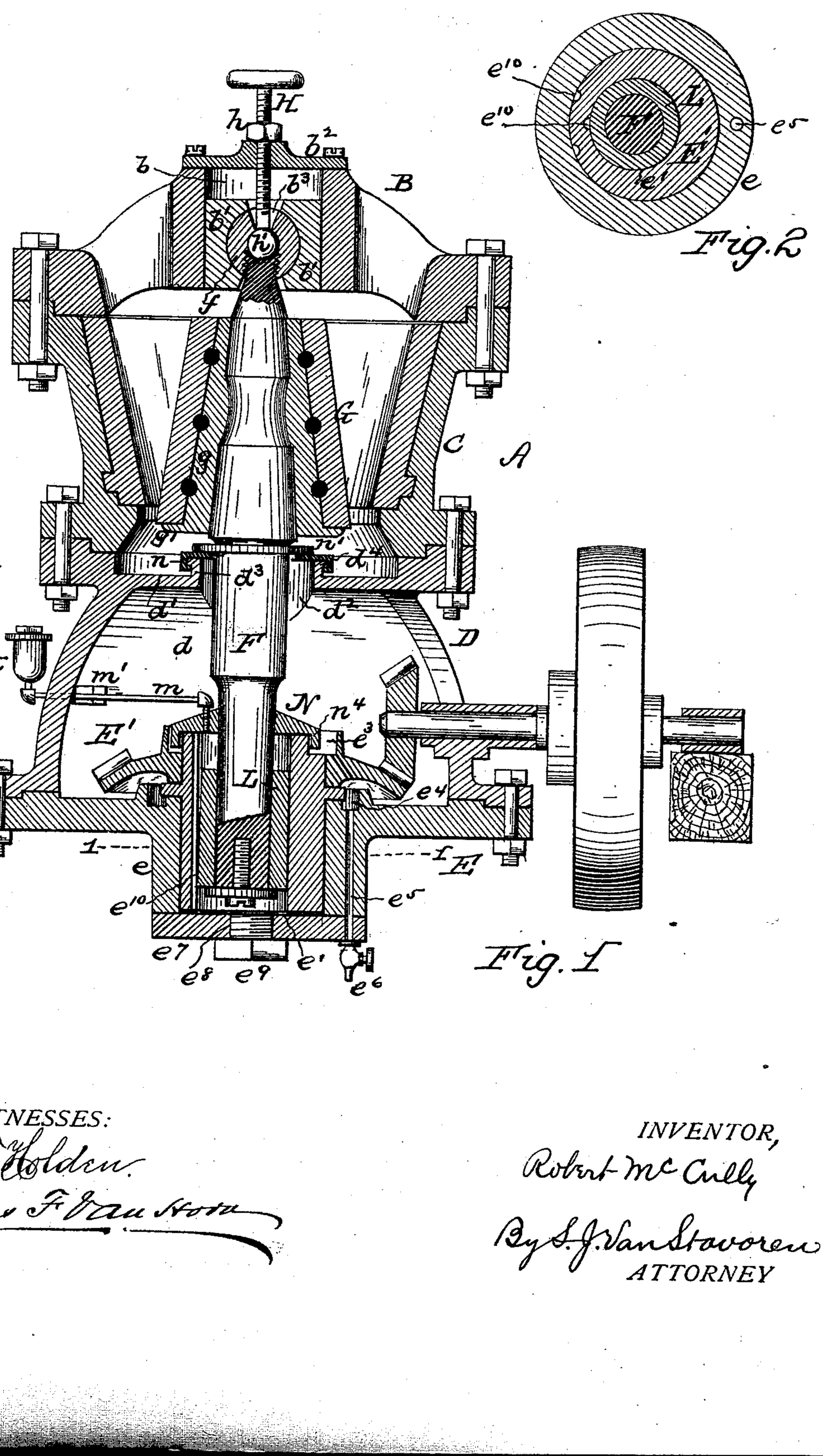

Fig. 1

Fig. 2

WITNESSES:

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Chas F. VanStoren

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(No Model.)

4 Sheets—Sheet 2

R. McCULLY.

CRUSHING MACHINE.

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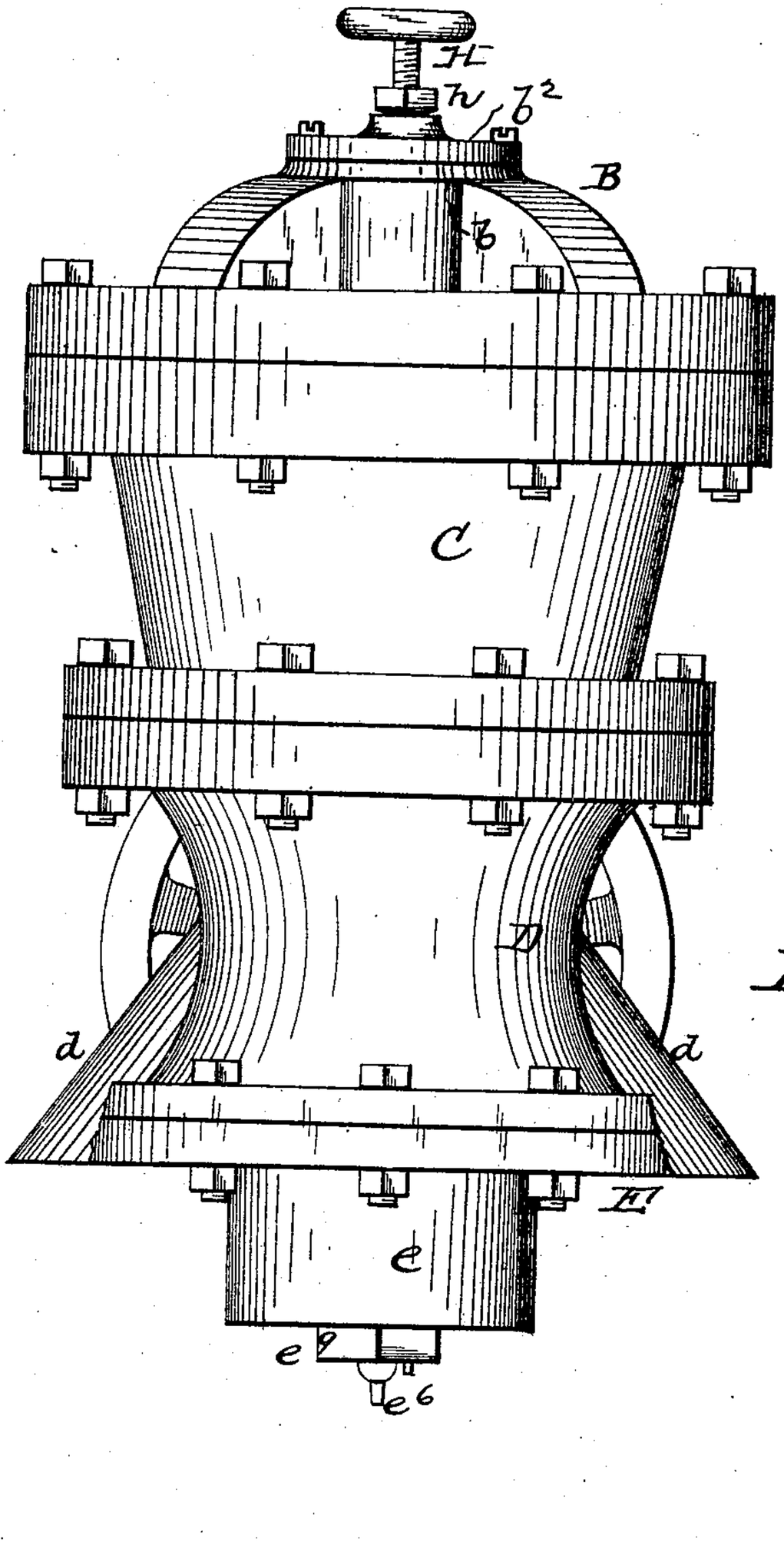

Fig. 3

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(No Model.) 4 Sheets—Sheet 3.

R. McCULLY.

CRUSHING MACHINE.

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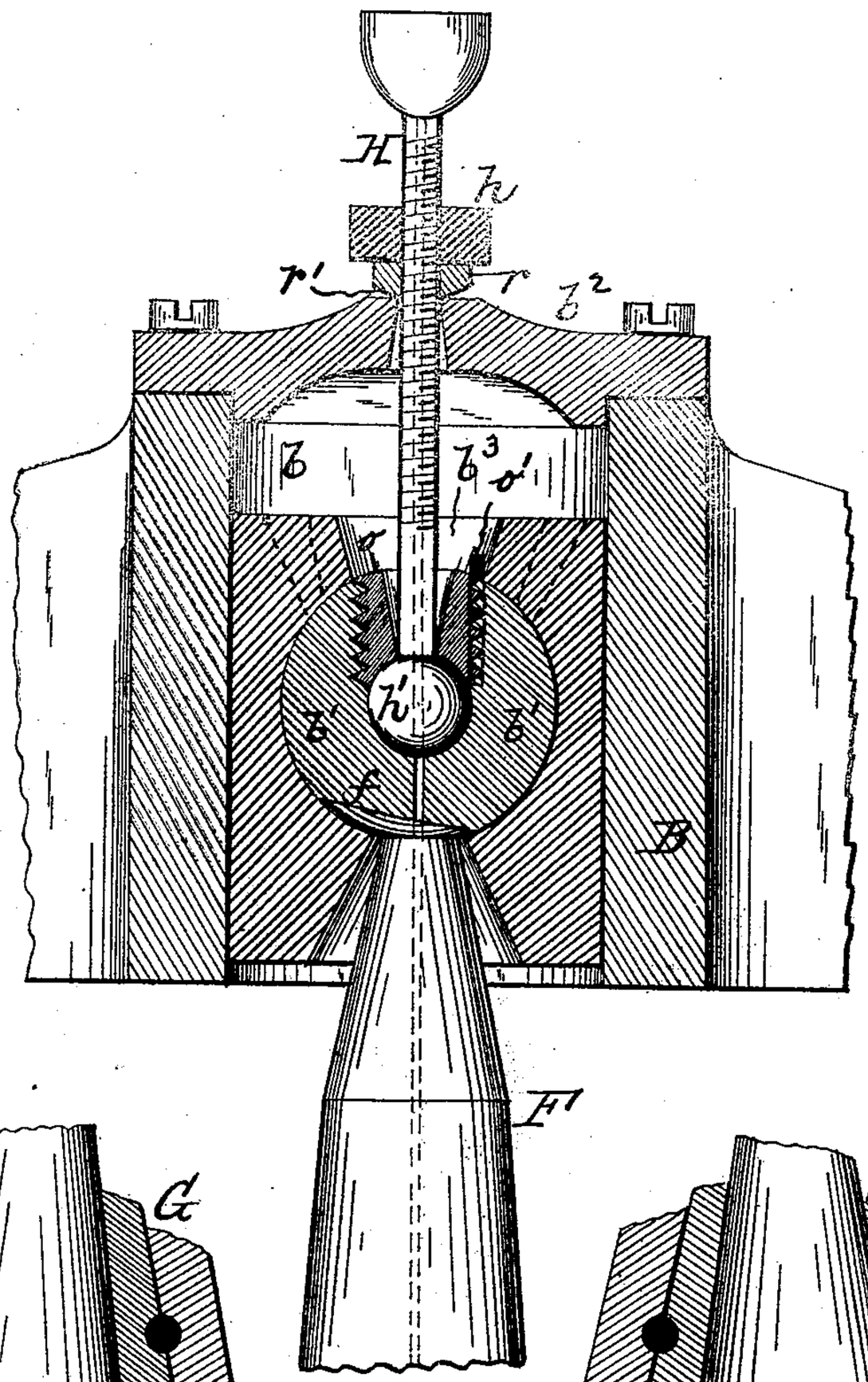

Fig. 4

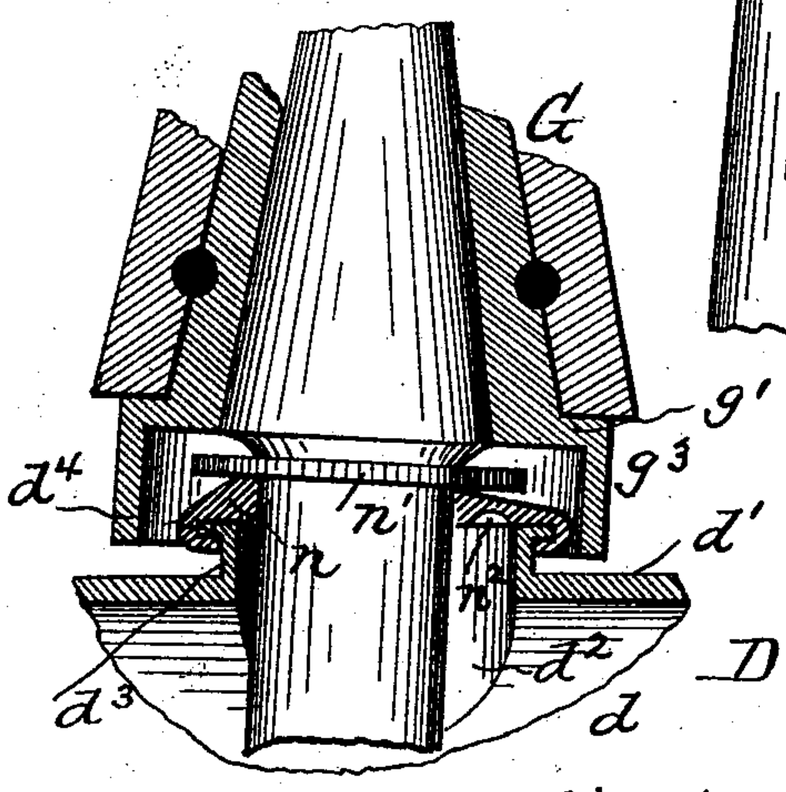

Fig. 5

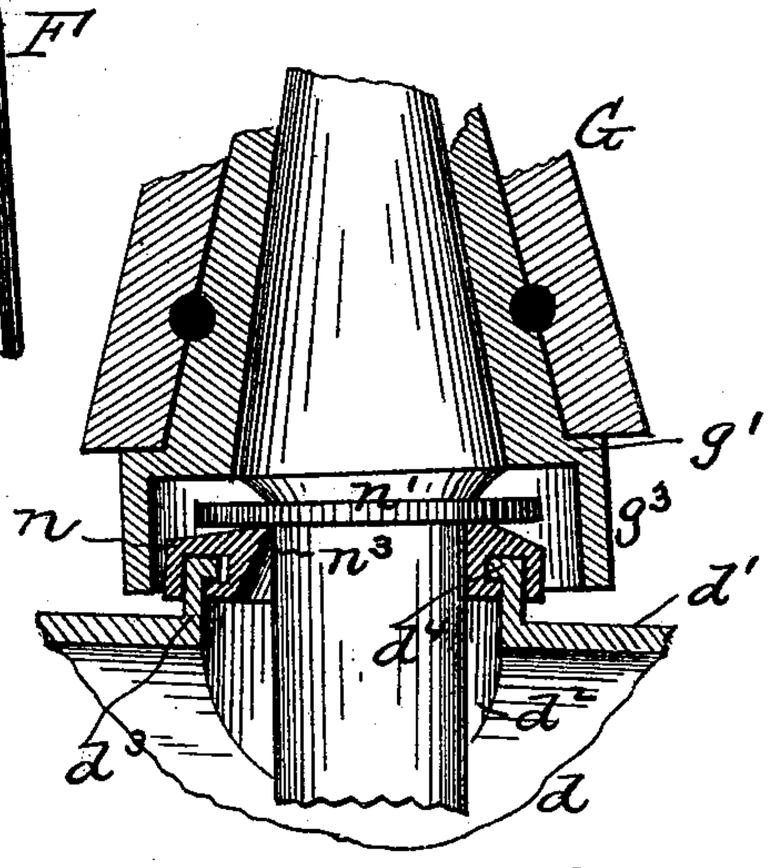

Fig. 6

WITNESSES:
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(No Model.) 4 Sheets—Sheet 4.

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CRUSHING MACHINE.

No. 500,597. Patented July 4, 1893.

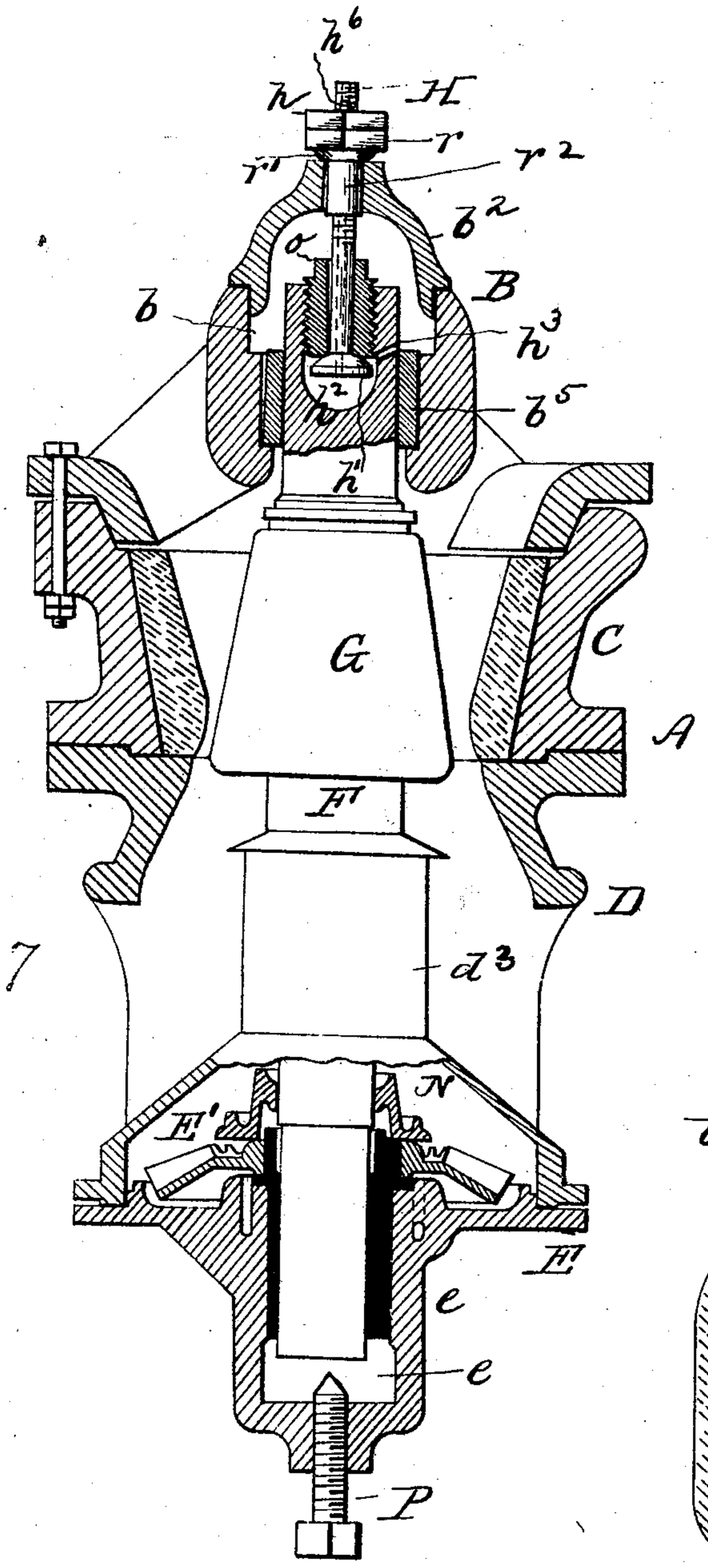

Fig. 7

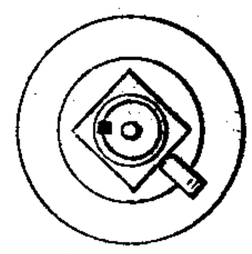

Fig. 8

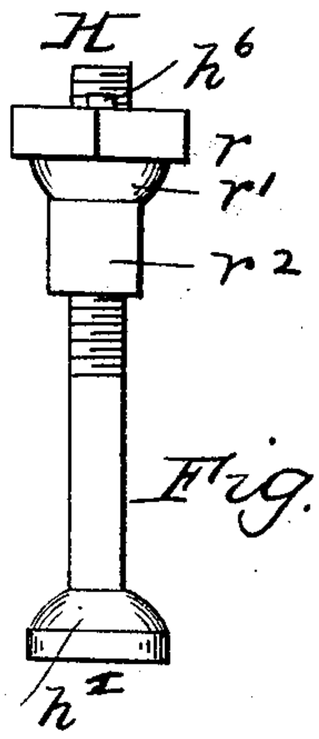

Fig. 9

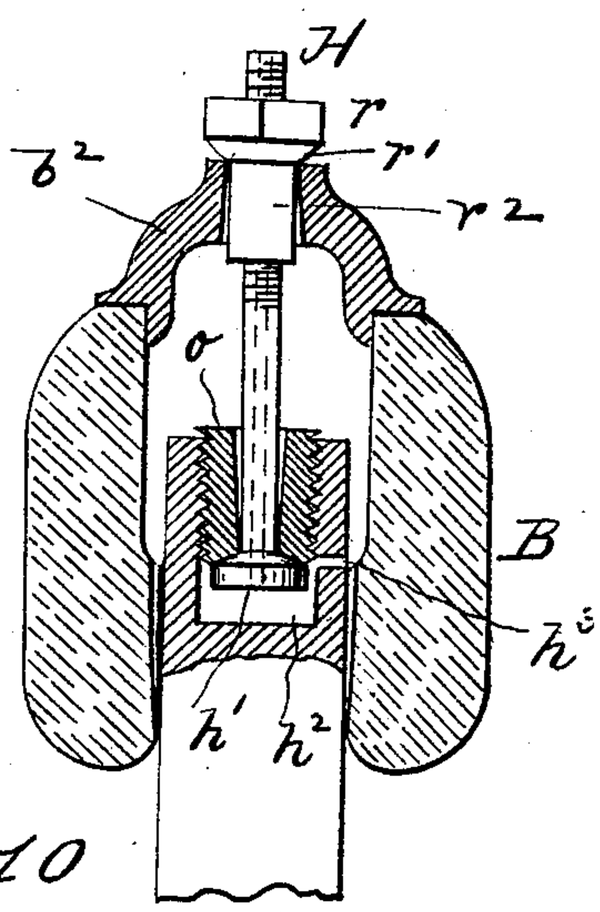

Fig. 10

WITNESSES:

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R. A. Smith

INVENTOR

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By D. J. Vanstavoren

attorney

UNITED STATES PATENT OFFICE.

ROBERT McCULLY, OF PHILADELPHIA, PENNSYLVANIA.

CRUSHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 500,597, dated July 4, 1893.

Application filed December 23, 1891. Serial No. 416,000. (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, of which the following is a specification, reference being had therein to the accompanying drawings, wherein—

Figure 1, is a vertical central section of a crushing machine with gyrating shaft showing my improvements applied to a form of gyratory shaft having an upper ball bearing or fulcrum. Fig. 2, is a section on the line 1—1 Fig. 1. Fig. 3, is a side elevation of the machine. Fig. 4, is a detail section, drawn to an enlarged scale, of the boxes for the ball fulcrum of the gyrating shaft and part of the head of the top plate of the machine showing modified form of connection for the supporting and adjusting screw for said boxes and shaft. Figs. 5 and 6, are detail sections, partly in elevation, and drawn to an enlarged scale, showing modified forms of dust shields interposed between the gyrating shaft and the opening in the top of the chutes or exit chamber of the machine. Fig. 7, is a vertical section similar to Fig. 1, showing a form of crusher having an adjustable gyratory shaft with upper cylindrical end arranged for operation so as not to change its angle when adjusted, and also indicating a preferable form of top support for the shaft. Fig. 8, is a top view of such support detached from the machine. Fig. 9, is an elevation of the same. Fig. 10, is a sectional elevation of a modification shown in Fig. 7.

My invention has relation to gyratory crushing machines wherein the gyratory shaft is supported wholly from the top of the machine; and it has for its main object the provision of a single screw, bolt or other analogous device engaging directly with the top of the gyratory shaft for wholly or partly supporting the shaft and which also serves as an adjusting screw for vertically raising or adjusting the shaft and crusher-head to take up the wear of the crushing faces or vary the degree of fineness of the crushing, and further for oiling the top bearings of the machine and also the bearings between said shaft and screw.

My invention accordingly consists of the combination, construction, and arrangement of parts as hereinafter described and claimed having reference particularly to the use of a single-screw bolt or analogous supporting and adjusting device engaging with the top of the shaft for supporting and adjusting the shaft and crusher head.

In the drawings A represents the frame of the machine of which its top or head plate B, crushing chamber C, chute or exit chamber D and bottom plate E, as well as the driving gear or wheel E′, shaft F and crusher head G, except as hereinafter noted, are all constructed and arranged for operation substantially as is usual or desired.

The top frame section B has the usual central opening *b* in which in the forms of machines shown in Figs. 1 to 4, slide the boxes *b′* for the shaft ball-fulcrum *f*, and is closed by a cap b^2 suitably screwed or fastened to section B to be removable therefrom. This cap is provided with a central screw H having jam nut *h* and extends downwardly between the boxes *b′*, and terminates in a ball *h′*. The ball fulcrum *f* of the shaft is made hollow to receive screw-ball *h′* and has a vertical opening b^3 for the passage of the screw. To admit of inserting the screw-ball *h′* into ball *f*, the latter is made separate from and screwed or otherwise fastened to the upper end of shaft F. The opening b^3 in ball *f* flares outwardly from below or is wider at the periphery of the ball to provide the necessary play or space to admit of the gyration of shaft F and also to afford an oil channel for said balls and their bearings.

The single screw H engages directly with the top of the shaft F and supports the shaft F, crusher head G and boxes *b′* and by turning it in the proper direction the shaft is raised or lowered to adjust the crusher-head either for varying the fineness of the feed or for taking up the wear of the crushing faces.

The crusher-head G in Fig. 1 is shown affixed to a sleeve *g* suitably secured to shaft F, the sleeve being provided with a bottom flange or shoulder *g′* upon which rest the lower edges of the crushing faces G, but this described construction may be altered as desired.

In Figs. 1 and 3 the two chutes *d* in chamber D are shown oppositely arranged and

their tops or meeting edges form a diametrical ridge d' which serves as a top for chamber D in which is an opening d^2 for shaft F, but this construction may be varied as described. Around opening d^2 in Fig. 1 is shown an upwardly projecting flange d^3 having at its upper edge an outside bead d^4 around which fits a rubber or flexible washer n. Upon this washer rests a weighted or metal washer or plate n' loosely surrounding or mounted upon shaft F. These washers n n' form a dust-shield for opening d^2 to prevent dust or crushed material in chamber C gaining access to chamber D. The opening in flexible washer n may be made large enough to prevent it hugging the shaft as shown in Fig. 1. If desired, however, it may hug the shaft as illustrated in Figs. 5 and 6 in which case it is either corrugated as shown at n^2 Fig. 5, or beveled off to a sharp or feather edge next to the shaft as shown at n^3 Fig. 6, to make a tight joint with both the shaft and flange and to admit of it yielding to the gyratory motion of the shaft. Instead of placing the bead d^4 upon the outside of flange d^3, the same may be formed on the inside of the flange as indicated in Fig. 6. To further insure the efficiency of said dust-shield it may be surrounded by a flange g^3 depending from the sleeve g, see Figs. 5 and 6. These described constructions of dust shields may, however, be varied as desired. The bottom section E as shown in Fig. 1 has the bearing e for the hub of driving wheel E' which has the usual eccentric bore e' for the reception of the shaft sleeve L. The latter has an outside taper from its lower to its upper edge and the extent or inclination of such taper is the same or about the same as that given to the gyrating shaft F by its eccentric driving gear so that only one side of the sleeve will contact with the eccentric bore e' as shaft F is gyrated, and thereby reduce the friction between sleeve L and bore of wheel E', but this described construction may be varied as desired. Upon the upper edge of the hub of wheel E' rests a plate or washer N loose upon shaft F and it has a downwardly projecting edge flange n^4 entering a gutter or annular groove e^3 on the top side of wheel E' to keep dust or dirt from entering the eccentric bore of said wheel. From this washer leads a pipe m through an opening m' in the side of chamber D and is at its outer end furnished with an oil cup M located above the plane of washer N. The oil from cup M flows into the bore e' of hub of wheel E', thence down between sleeve L and the sides of said bore thence up between the sides of the bearing e and said hub until it overflows into gutter e^4 and thence to duct or outlet e^5 having valve e^6 which is closed as soon as or prior to the escape of oil therefrom. The bottom plate e^7 for bearing e has an opening e^8 for draining off from time to time, the thick or gummy oil, and this opening is closed by a screw or other removable plug e^9.

To facilitate the described passage of the oil, the inner and outer sides of the hub of wheel E are provided with one or more vertical grooves e^{10}, see more plainly in Fig. 2. The grooves are placed on the hub back of the eccentric as there is no strain or pressure at that point. If desired, however, other suitable oiling devices may be substituted for those shown and described.

If desired the oil cup M and pipe connection m may be dispensed with and a hollow or tubular shaft substituted, through which the oil is conveyed to the driving gear and its bearings as described, in which case, however, the screw H is also made tubular and topped off with a cup as shown in Fig. 4.

Instead of making the ball-fulcrum for the shaft separate, both said parts may be formed integral, see Fig. 4, and the ball fulcrum suitably bored to receive the screw ball h' which is held in position by a tubular screw plug o having upwardly flaring bore. To prevent the screw plug o jarring loose, a key o' may be driven into a slot formed between the plug and the ball-fulcrum f. Again to give the screw H a lateral play to avoid strain between it and the shaft ball-fulcrum the opening in cap b^2 is not threaded, see Fig. 4, and the jam-nut h for said screw rests upon a washer r having a rounded under side r'.

In Fig. 7, a form of shaft having a cylindrical upper end instead of a ball end is shown which can be adjusted without altering its angle of inclination and having preferably a straight or cylindrical upper end with the top bore or recess h^2 which is screw threaded as shown for the reception of the tubular screw plug o. The upper end of the shaft has its bearing in a sleeve within the bore b of the top plate B, which bore has a bottom inwardly projecting flange for the sleeve to rest upon as shown. The bottom of the recess h^2 in this case serves as an oil receptacle for lubricating the bearing between the fulcrum h' of the bolt or screw H and the shaft F, and from said receptacle leads a channel h^3 for the passage of overflow oil to the top of flange or sleeve b^5 to oil its bearings with the shaft F and with the bore of the top plate.

To avoid wear on the threads of the bolt H the nut r is provided with a downwardly projecting collar r^2 which has its bearing in the cap b^2. This nut r has a removable key connection h^6 with the bolt H the same as that for the screw plug o with the shaft F. In Fig. 10, the sleeve b^5 is dispensed with and the top of the shaft has its bearing directly against the bore of the top plate B.

From the foregoing it will be noted that the supporting and adjusting device H for the gyratory shaft engages directly with the upper end of the shaft without interfering with its freedom of movement, and that such supporting device H has its support upon the frame of the machine or upon an immovable or rigid support. The advantages of this construction are, that the weight of the shaft and

crusher-head does not fall upon any part of the driving mechanism for the shaft, nor upon the large peripheral surfaces of the fulcrum boxes or top-bearing for the shaft, but upon the comparatively small surface area of the lower end of the supporting-device H engaging with the shaft. In other words said weight, instead of being peripherally supported outside of the shaft is centrally or axially upheld from within the shaft; hence, undue friction, wear of the fulcrum bearings for the top of the shaft as well as the latter, and the use of means for taking up such wear are avoided. This being the case less power is required for operating the machine and it is more effective and durable and its first cost and expense for repairs and replacement of parts are materially reduced.

What I claim is—

1. In a crushing machine having an eccentrically gyrating shaft, a single supporting and adjusting screw directly engaging with the top of said shaft and having a bearing located at the top of the machine substantially as shown and described.

2. In a crushing machine having a gyratory shaft, a freely suspended and adjustable single supporting device H engaging with the top of the shaft, and oiling channels for the bearing surfaces of said shaft and supporting device, substantially as set forth.

3. The combination with a gyratory shaft and frame, of a crushing machine, a single supporting screw located at and having a bearing on the top of said frame, and engaging directly with the top of the shaft, substantially as set forth.

4. In combination with the recessed upper end of a gyratory crusher shaft, a tubular plug *o* supporting and adjusting screw passing through and engaging with said plug, and a support or bearing for said screw, substantially as set forth.

5. In combination with shaft F having recess h^2, tubular plug *o*, screw H having nut *r* with depending flange r^2 and frame top-plate having bearing for said nut substantially as set forth.

6. In a crushing machine, the combination of a gyratory shaft having a cylindrical upper end, a bore or recess in said end, a hollow tubular screw plug in said bore, and a single tubular bolt or rod-support engaging with the under side of said plug for supporting and vertically adjusting said shaft, substantially as set forth.

7. The combination with the shaft F, having top recess or bore, a tubular plug in said bore, a support H having a head h' in said bore and passing through said plug, top holding nuts or keys for said bolt or support and oil passages substantially as set forth.

8. In a gyratory machine, a crusher head shaft upheld from the top of the machine by a single axially located support having a direct connection with the upper end of the shaft, and mechanism on said support for vertically adjusting it and the crusher head on the shaft to take up the wear of the crushing surfaces or to alter the degree of fineness of the crushing substantially as set forth.

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

ROBERT McCULLY.

Witnesses:
S. J. VAN STAVOREN,
CHAS. F. VAN HORN.