

(No Model.)

F. N. SPEAR.
PULVERIZING MILL.

No. 548,016.

Patented Oct. 15, 1895.

Fig. 1.

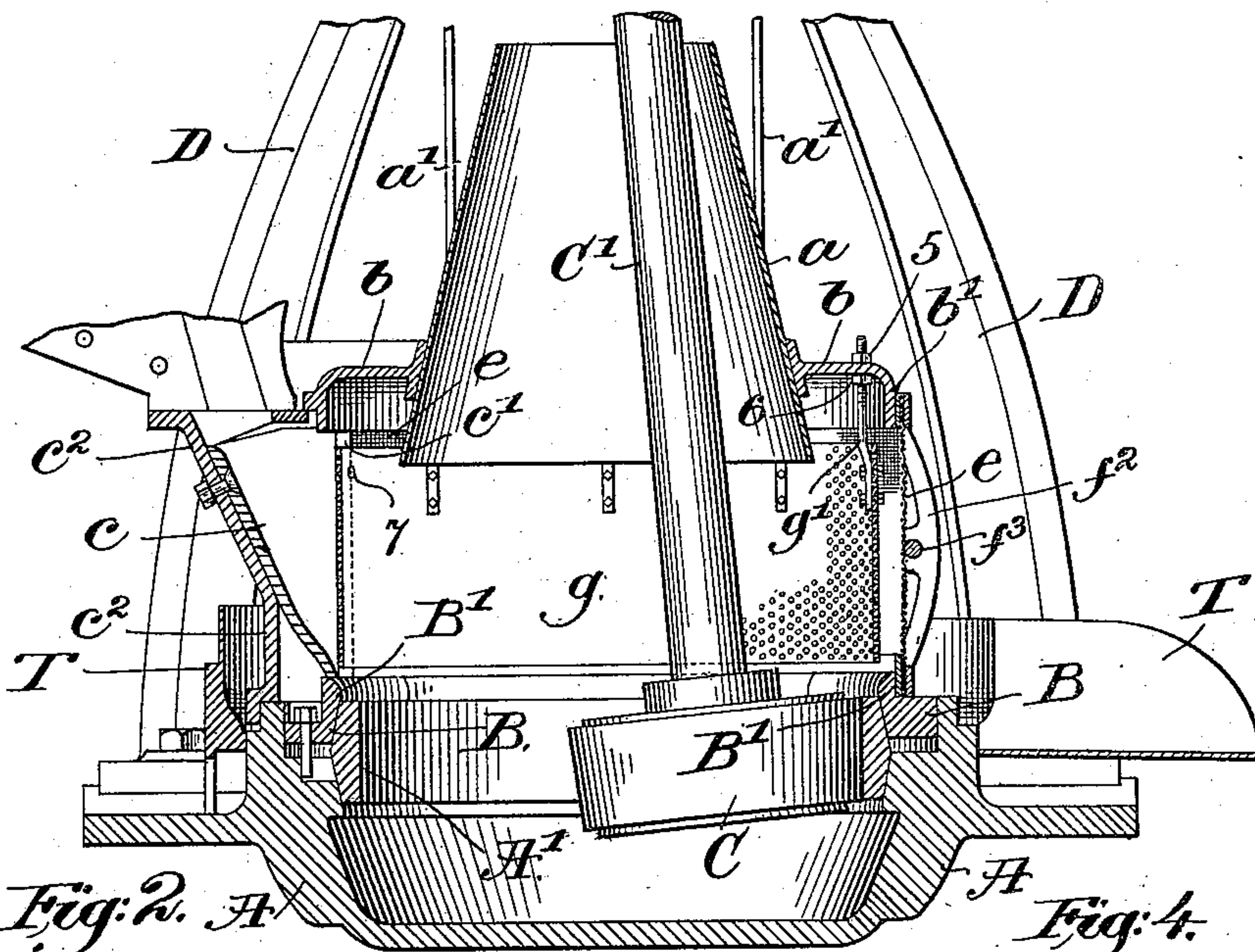


Fig. 2.

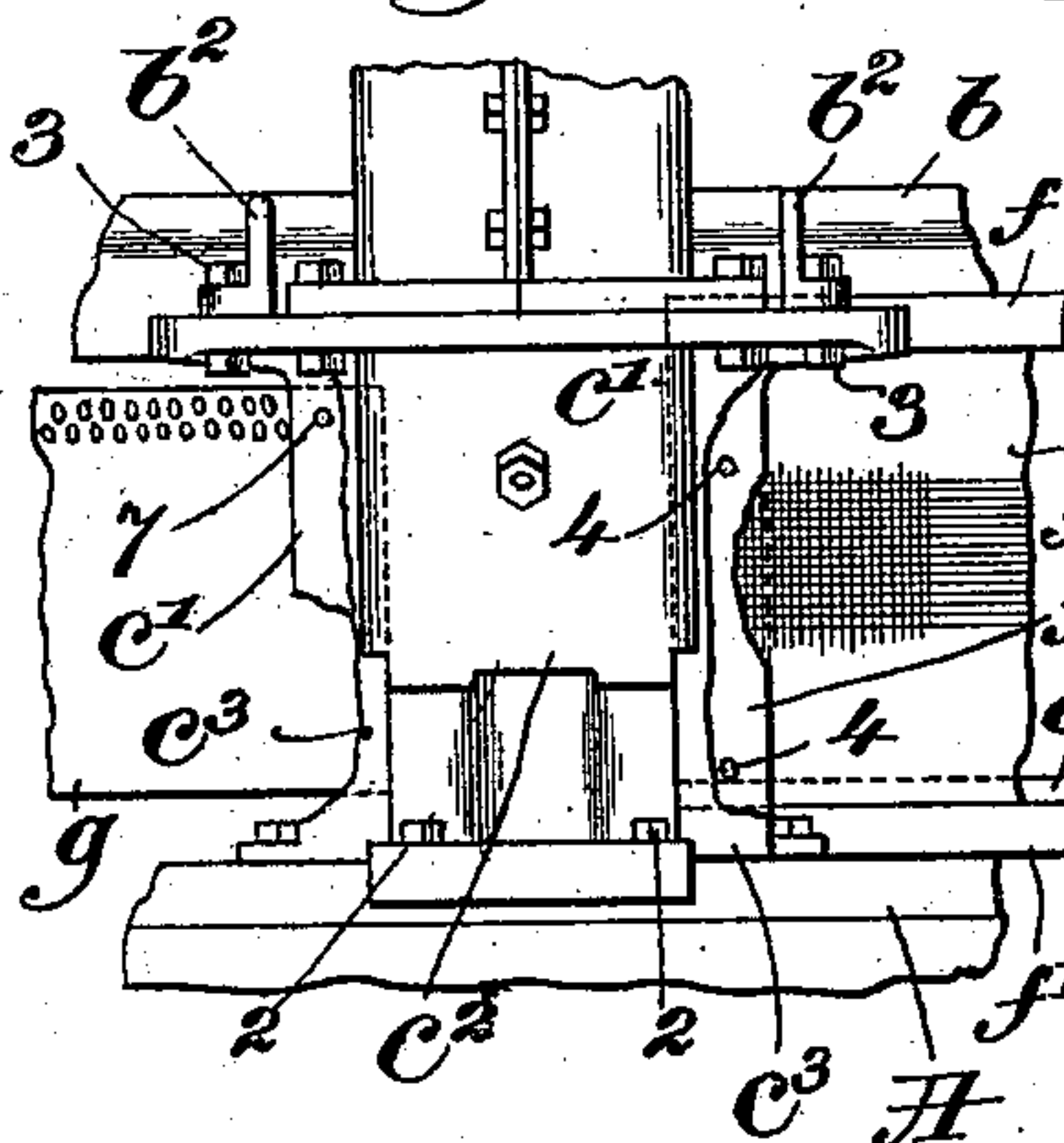


Fig. 3.

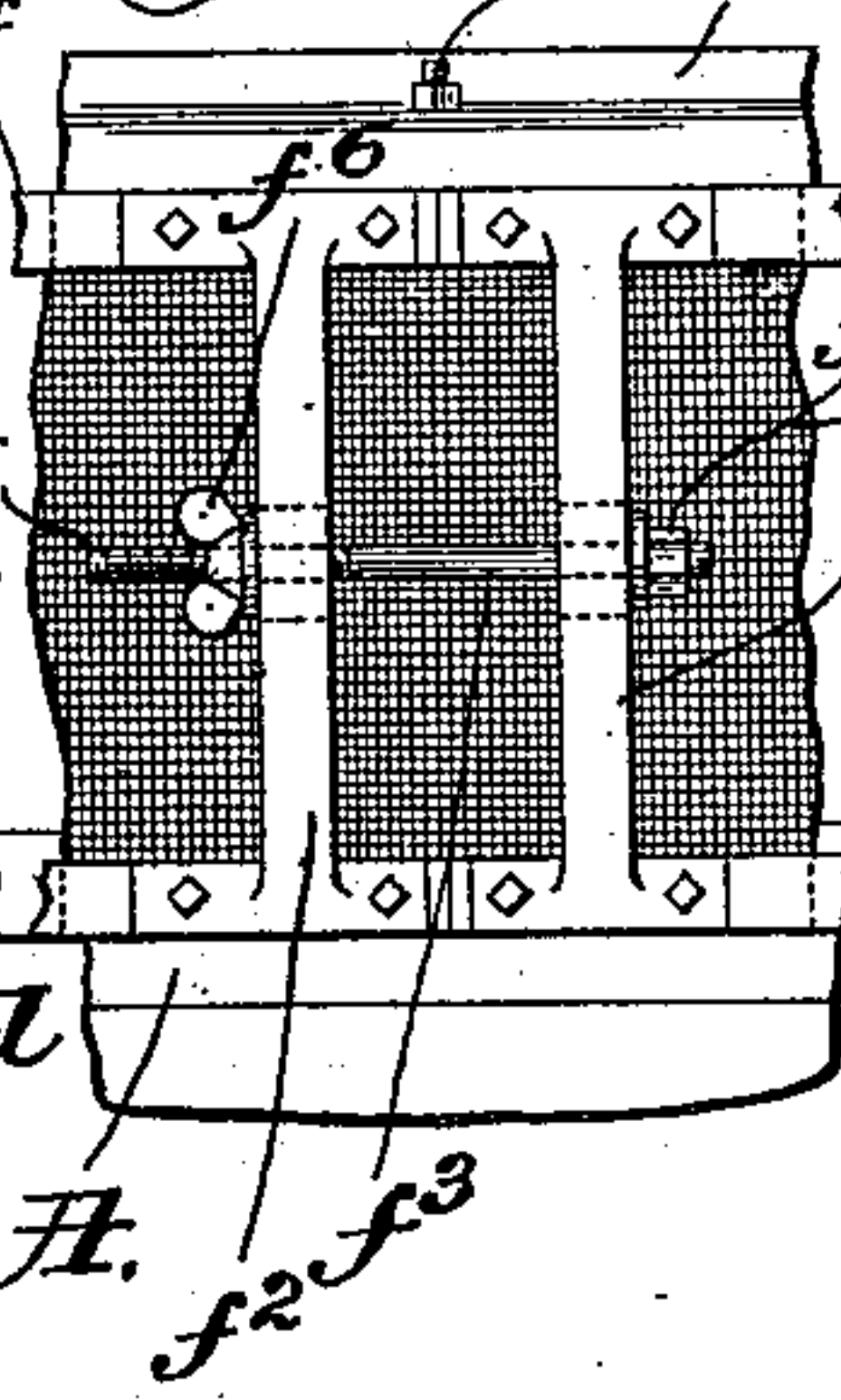
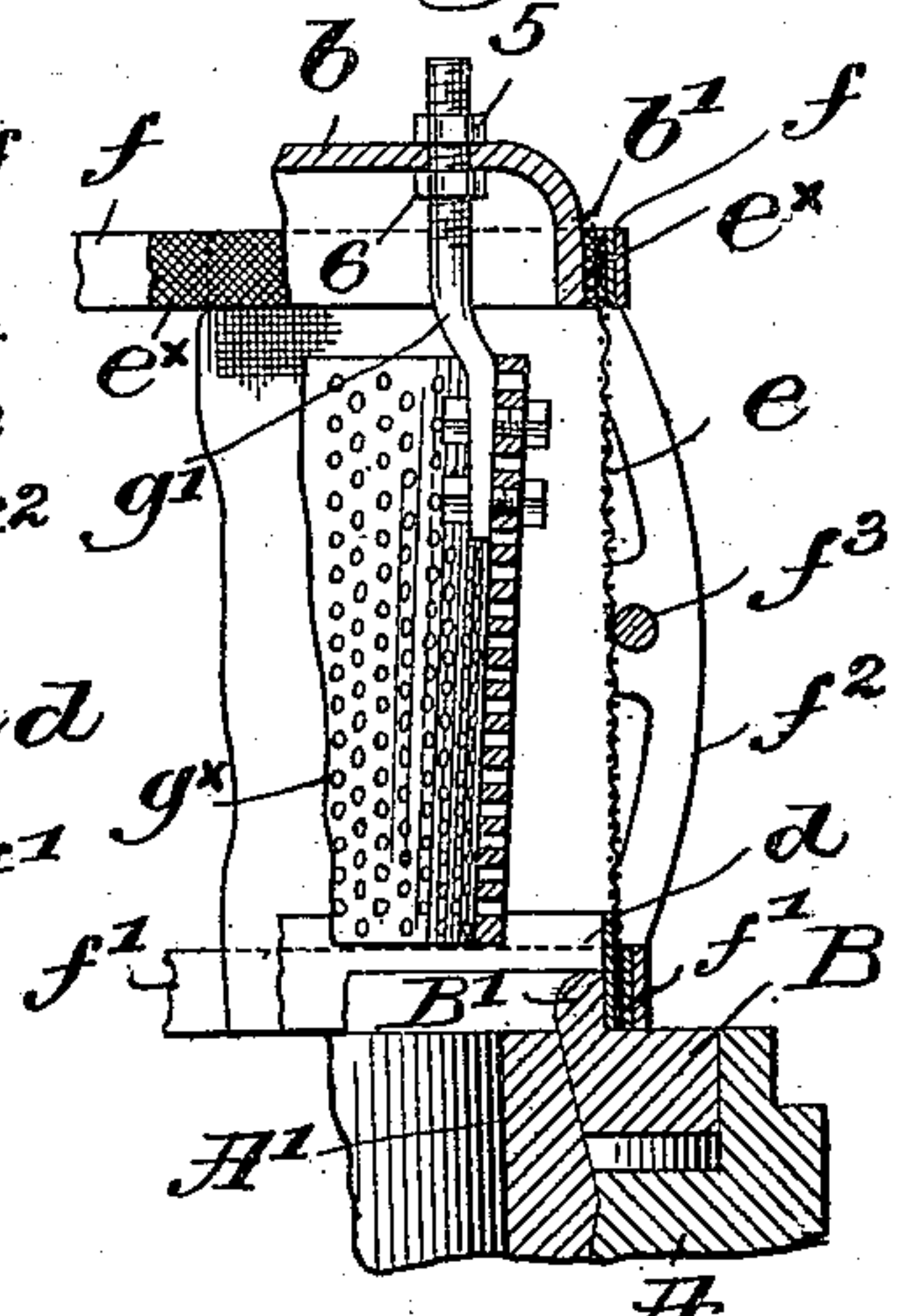


Fig. 4.



Witnesses.

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UNITED STATES PATENT OFFICE.

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PULVERIZING-MILL.

SPECIFICATION forming part of Letters Patent No. 548,016, dated October 15, 1895.

Application filed March 21, 1894. Serial No. 504,498. (No model.)

To all whom it may concern:

Be it known that I, FRANK N. SPEAR, of Los Angeles, county of Los Angeles, California, have invented an Improvement in Pulverizing-Mills, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 The reduction and pulverization of ore or other similar material is now very satisfactorily accomplished in so-called "centrifugal mills," wherein a roll is revolved within and against the surface of a ring or annular die, the roll being thrown against the inner periphery of the ring when in operation and crushing the material against it. The pulverizing-chamber of such a mill is provided with an external casing having screen portions through which the finely-pulverized material passes to a suitable delivery-passage in the dry process, and against which a large quantity of the material is thrown together with the mixing-water in the wet process.

25 The gyration of the roll violently agitates and stirs up the material, and in the wet process particularly it is thrown up against the screen with great force, so that the latter is abraded and scoured, wearing out very rapidly in consequence and necessitating frequent renewal. Attempts have been made to protect the screen from such hard usage and wear, and so far as known to me without success.

35 This invention has for its object the production of means whereby the objections in a mill of the class described are obviated in an efficient and simple manner, the life of the screen being greatly extended and the efficiency of the mill increased.

40 In accordance therewith my invention consists in various details of construction to be hereinafter described, and particularly pointed out in the claims.

45 Other features of my invention will be hereinafter described, and particularly pointed out in the claims.

Figure 1 is a vertical sectional view of a sufficient portion of a pulverizing-mill to be understood with my invention applied there-

to. Fig. 2 is a detail view, partly broken out, of the inlet-spout and the supporting mechanism for the screen ends. Fig. 3 is a detail to be described, and Fig. 4 is an enlarged sectional detail of a modified form of my invention.

50 The mill herein shown is particularly adapted for wet pulverizing and the base A thereof forming a part of the grinding-chamber, the annular ring or die A' oppositely beveled upon its outer side, as shown, the segmental wedge-blocks B to retain the ring or die in position in the base A. The roll C and its operating-shaft C' are and may be all of usual or well-known construction. Suitable standards D are secured to or form part of the base A and support at their upper ends actuating mechanism (not shown and forming no part of this invention) to rotate the roll C and its shaft C'. One very convenient form of such mechanism is shown in United States Patent No. 449,118, dated March 31, 1891, to which reference may be had.

55 A conical casing *a*, (see Fig. 1,) open at top and bottom and surrounding the roll-shaft, is suspended over the center of the pulverizing-chamber by suitable hangers *a'*, and an annular plate or cover *b*, having a downturned outer edge *b'*, is supported by the said casing *a* near its lower end, the said edge *b'* extending laterally beyond the pulverizing-chamber, as shown in Figs. 1 and 2. An inlet-spout *c* for the material is located at one side and above the pulverizing-chamber, and is provided with lateral vertical ledges or flanges *c'*, (see Figs. 1 and 2,) for a purpose to be described, the said spout being supported by a bracket or casting *c²*, resting upon the base A and secured thereto by bolts 2, Fig. 2, and to suitable ears *b²* on the plate *b* by bolts 3, the bracket or support *c²* also having lateral flanges *c³*. (Shown as broken away in Fig. 2.) The wedge-block segments B are shouldered, as at B', to support a curved metallic curb, plate *d*, its upper edge projecting above the shoulder and secured at its ends to the flanges *c'* of the inlet-spout by riveting or in other suitable manner. The outer screen *e* is herein shown as composed of finely-reticulated wire

5 fabric, or it may be of perforated metal of sufficient width to extend from the outer edge b' of the plate b to substantially the top of the wedge-block segments B , the ends of the screen being secured to the outer sides of the flanges c' by suitable pins, as 4, Fig. 2, and in order to retain the screen in place and yet permit ready removal thereof when necessary I have shown like two-part clamping-bands f and f' as bearing against the upper and lower edges, respectively, of the screen-strip, the clamping-bands being connected in pairs by an upright strip, as f^x , secured to their ends adjacent the inlet-spout and through which the pins 4 are passed to hold them in place.

10 The outer ends of the retaining-bands are connected in pairs, as best shown in Fig. 3, by bridge-pieces f^2 , and a connecting-rod f^3 is extended loosely through the bridge-pieces, said rod being provided at one end with a head, as f^4 , and threaded at its opposite end, as at f^5 , to receive thereon an adjusting-nut f^6 , rotation of the said nut in the proper direction drawing the bridge-pieces f^2 together and thereby tightening the retaining-bands around the longitudinal edges of the screen e and holding it firmly in place. The screen e thus incloses the annular space between the cover or plate b and the curb d , so that the water and more or less finely-pulverized ore or material mixed therewith would be thrown directly against the screen by the gyration of the roll C were it not for an auxiliary perforated screen g , herein shown as extended around inside of the screen e and a short distance therefrom, said auxiliary screen being formed of comparatively heavy sheet metal supported at its upper edge by straps g' , having threaded ends extended upwardly through the cover or plate b and provided with suitable retaining-nuts 5 and 6, the top of the said auxiliary screen being sufficiently high to prevent much of the swash, or "slush," as it may be termed, from passing thereover against the outer screen e , while the lower edge of the auxiliary screen projects below the top of the curb-plate b , as very clearly shown in Figs. 1 and 4, leaving an annular exit for the "pulp," as the mixture of pulverizing material and mortar is termed. The ends of the auxiliary screen are preferably secured to the inner side of the flanges c' at opposite sides of the inlet-spout by suitable fastenings, herein shown as pins 7.

55 In centrifugal or rotary mills of the class herein shown the pulp is thrown out laterally with great force by the gyration of the pulverizing-roll, and when the pulp is allowed to impinge directly against the outer screen the cutting or abrading action thereupon is so great that the screen is soon worn out and must be replaced, the wear being greatest of course at the lower part of the screen. By interposing the curb-plate d in the path of the escaping pulp between it and the lower

part of the outer screen the latter is protected and relieved from the impact of the mass of material, which latter is turned or deflected to pass upwardly beyond the inner and outer screens, coming with very little force against the outer screen. The inner auxiliary screen is extended down below the top of the curb-plate and forms the annular exit for the pulp. As the current of escaping pulp is deflected by the curb-plate and directed upward between the two screens, it is necessary to perforate the inner screen in order that the larger portion of the pulp which does not pass through the outer screen may pass through the auxiliary screen and thence to the pulverizing-chamber. If the auxiliary screen were not perforated all of the non-escaping material would be forced down against the outflowing current of pulp, and the consequence would be that the annular exit would become choked and the mill would not operate. Preferably the curb-plate is made of heavy material of sufficient strength to withstand the wear, and by its employment the outer screen can be used for a far longer period without being replaced than would be otherwise possible, and said screen may be made of very much lighter or finer stock than would be absolutely necessary in another construction.

95 In the modification shown in Fig. 4 the auxiliary screen g^x is shown as slightly inclined or converging from the top to the bottom thereof, such construction being useful in pulverizing certain materials, as it facilitates the delivery of the slush through the outer screen and the return of coarse material to the base of the mill. In either instance, however, whether the auxiliary screen be suspended vertically, as in Fig. 1, or slightly inclined, as in Fig. 4, its lower edge must extend below the top of the curb-plate d , so that the latter can protect the outer screen and also its line of attachment to the mill.

100 My invention is not restricted to the precise construction and arrangement of parts as herein shown nor to any fixed distance between the outer and auxiliary screens, as the same may be altered or modified without departing from the spirit of my invention.

I claim—

1. In a rotary mill, a pulverizing chamber, an outer surrounding screen extending above it, an inner perforated auxiliary screen leaving an annular exit beneath it for the pulp, and a curb plate surrounding the chamber between the screens and extended above the bottom of the auxiliary screen, to protect the outer screen from and to deflect the pulp thrown out from the chamber, substantially as described.

2. In a rotary mill containing a pulverizing chamber and an annular die, a roll adapted to be carried around the die and crush the material caught between them, an outer

5 screen surrounding the said chamber, and an annular perforated auxiliary screen suspended within and separated from the outer screen, to leave an annular exit opening below said auxiliary screen, and a curb plate extended above the die between the screens and above the bottom of the inner one, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK N. SPEAR.

Witnesses:

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FRANK H. JACKSON.