

(No Model.)

A. B. PAUL.
PULVERIZING MACHINERY.

No. 594,422.

Patented Nov. 30, 1897.

Fig. I.

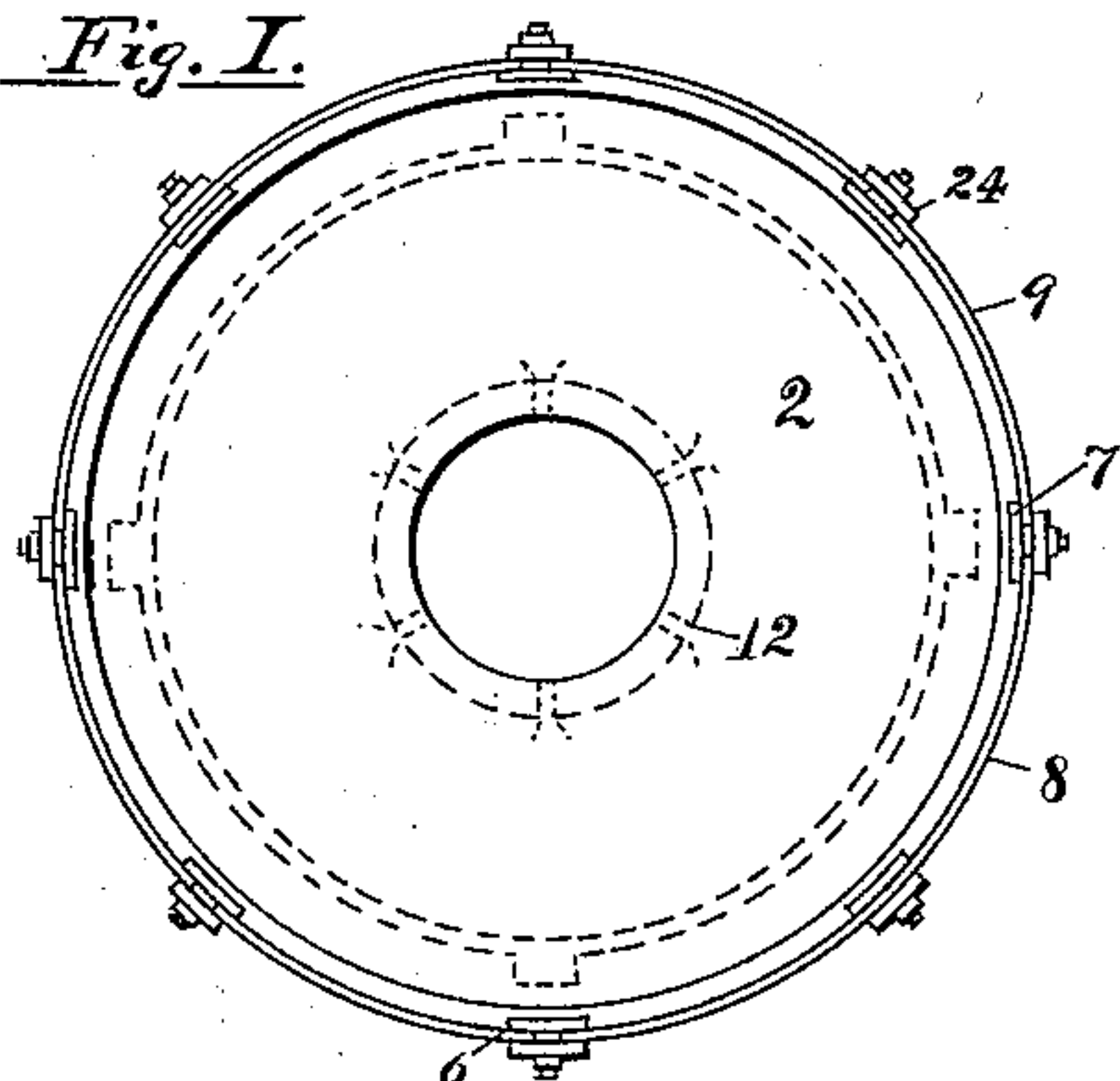


Fig. II.

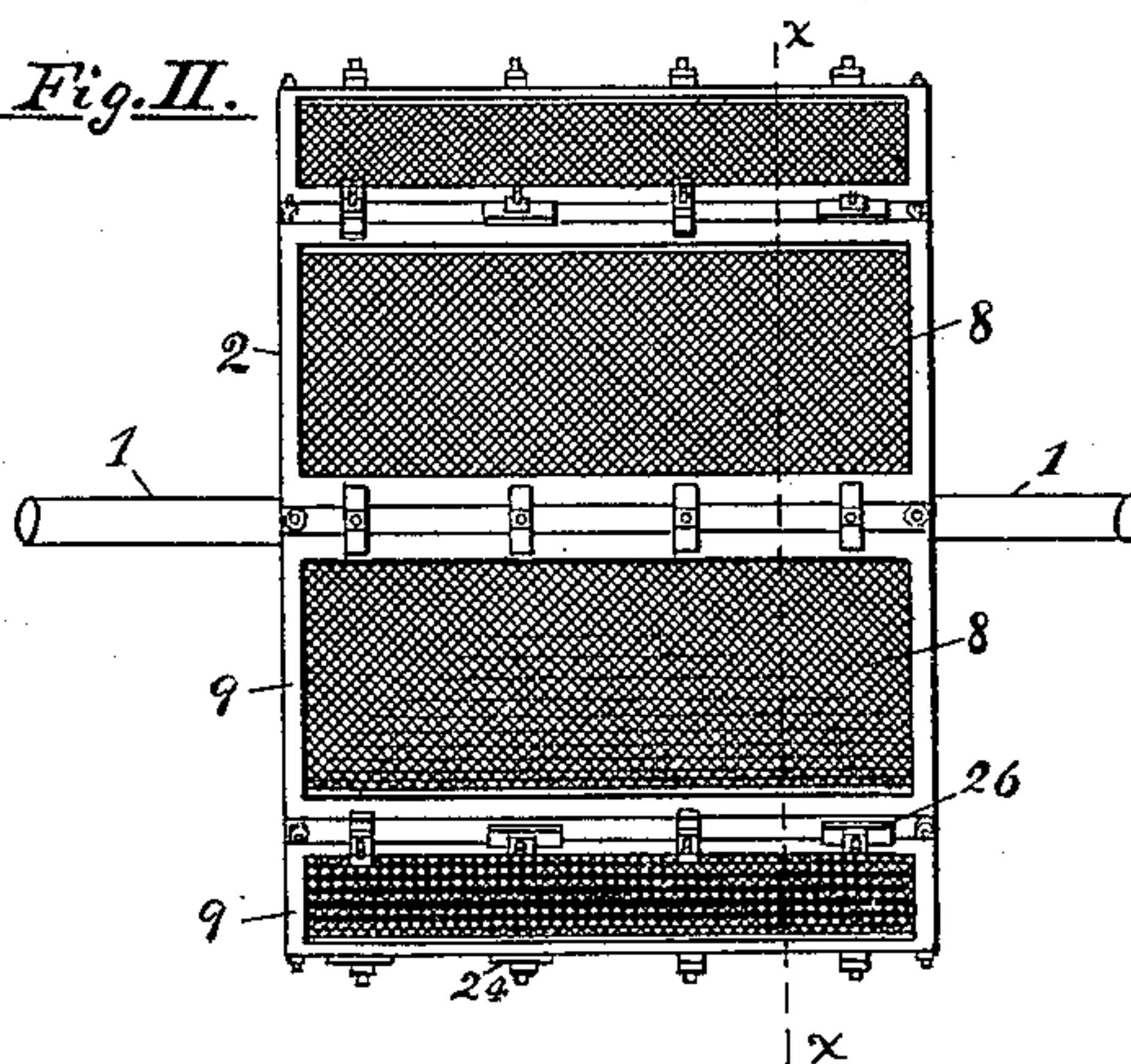


Fig. III.

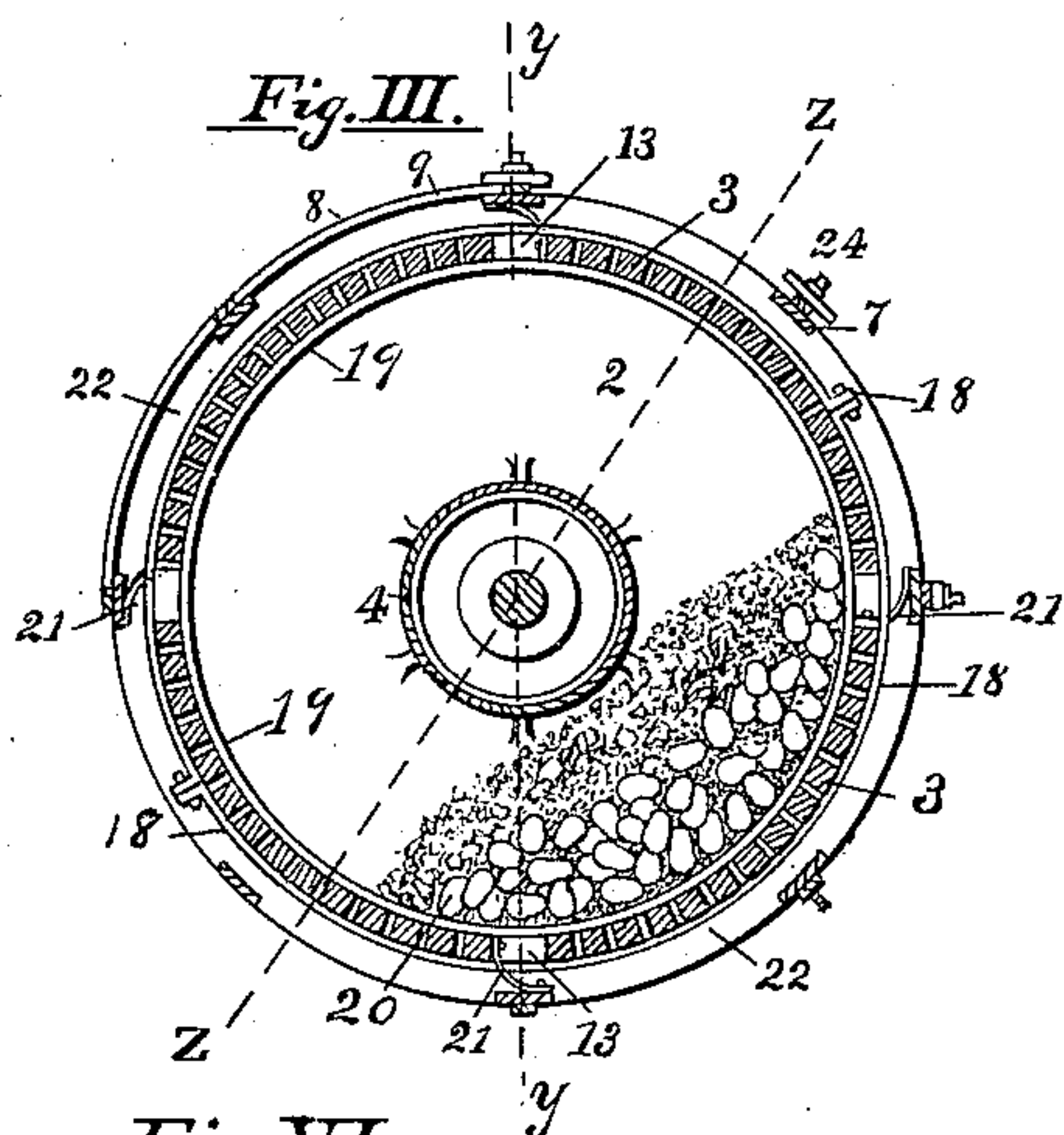


Fig. IV.

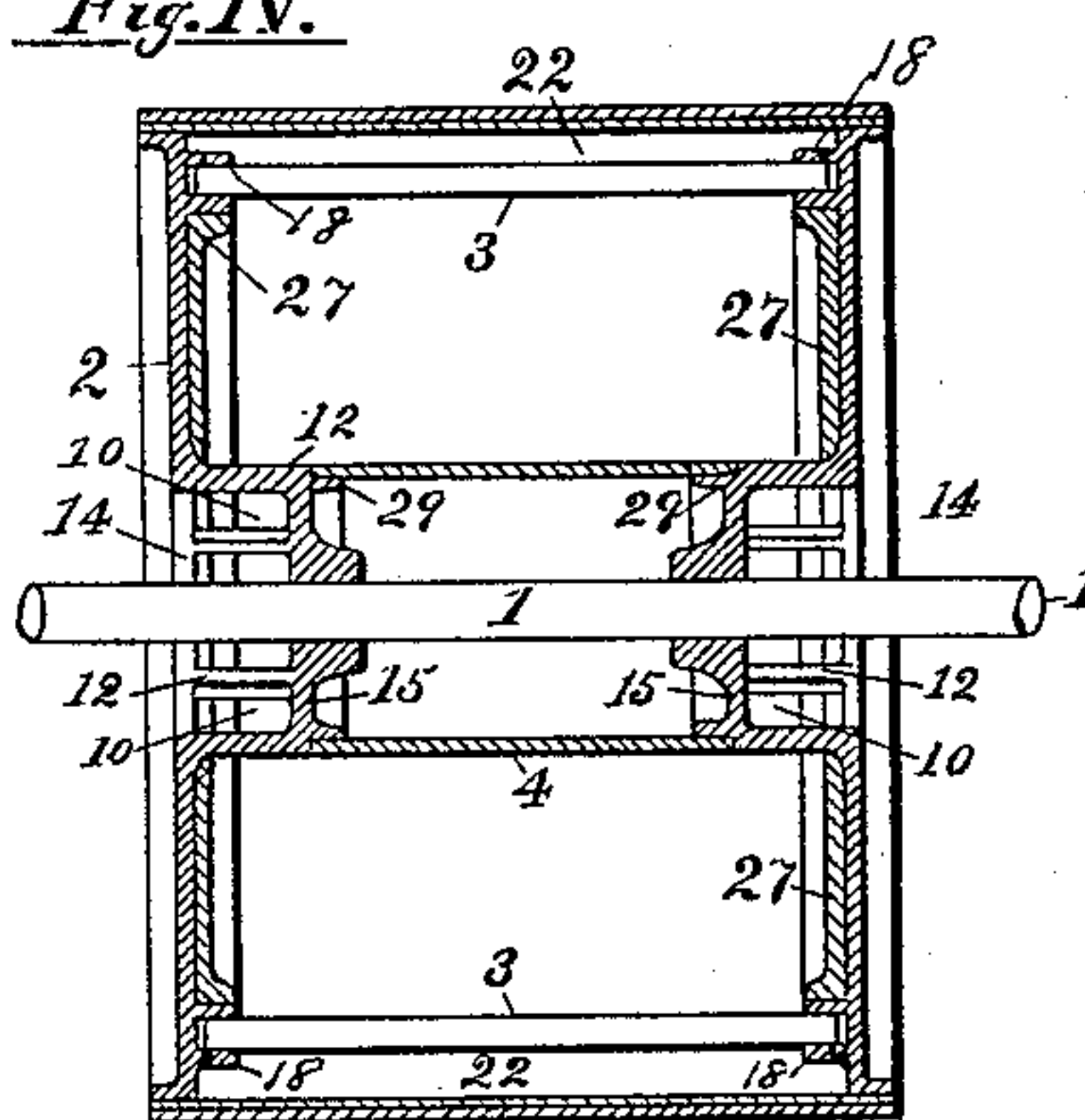


Fig. VI.

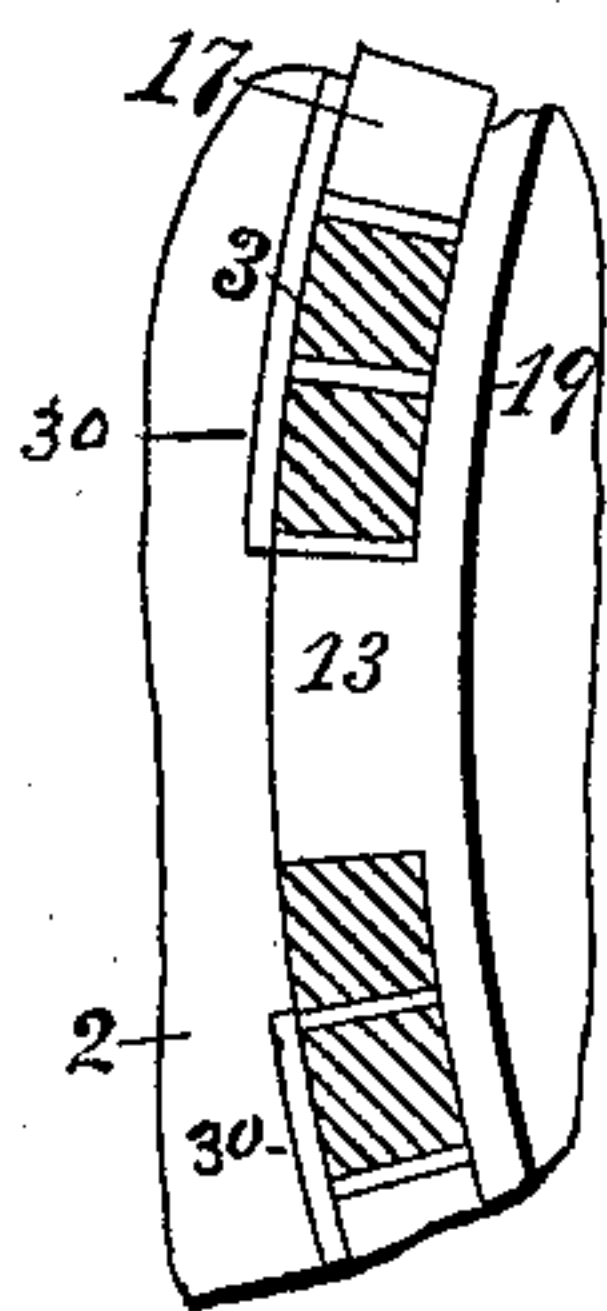


Fig. V.

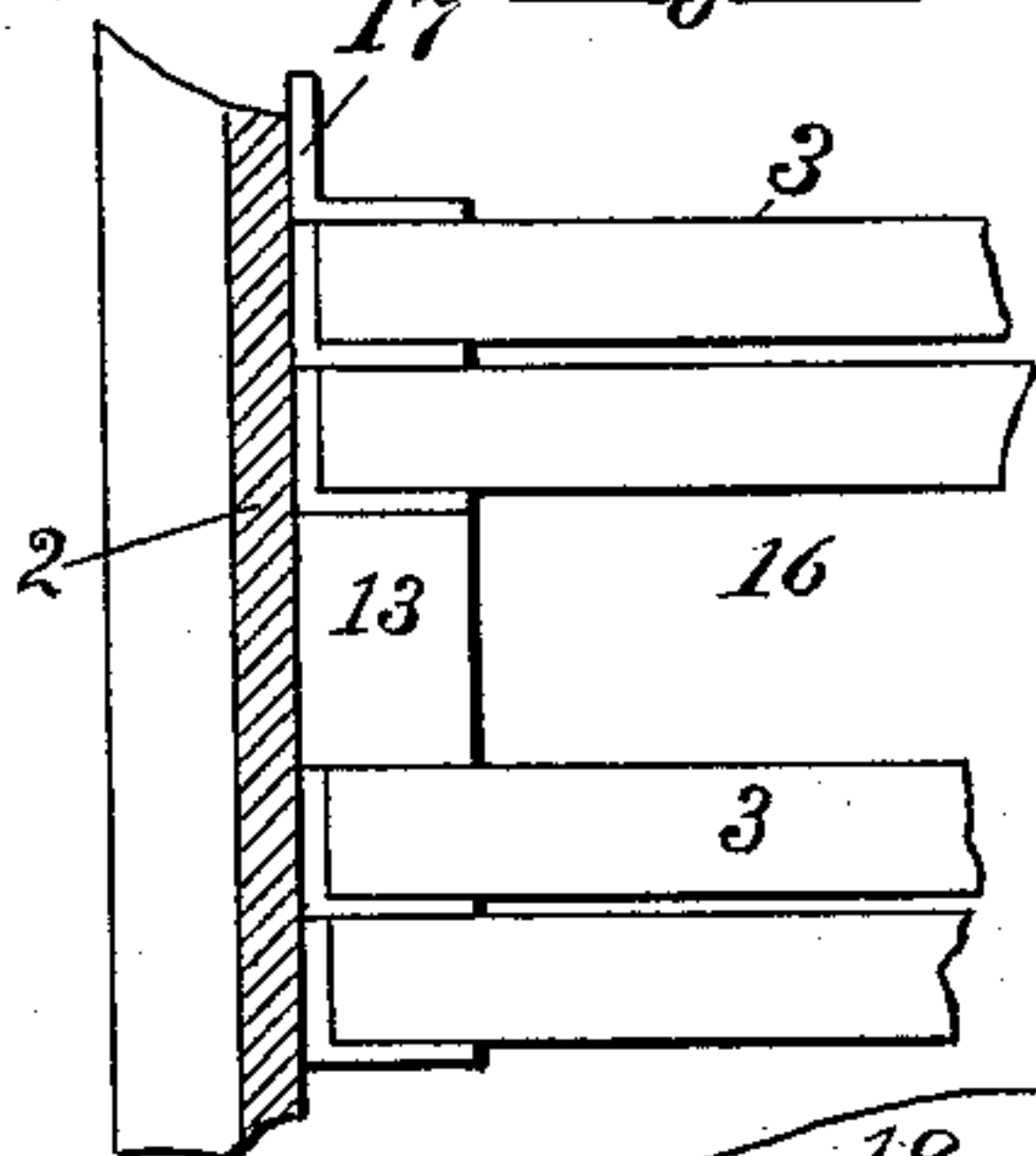


Fig. VII.

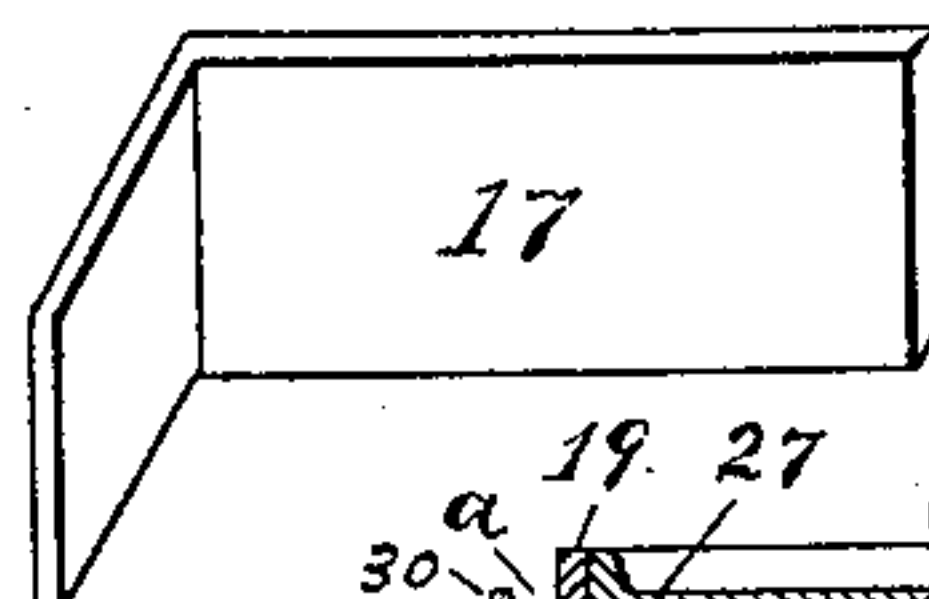


Fig. IX.



Fig. X.

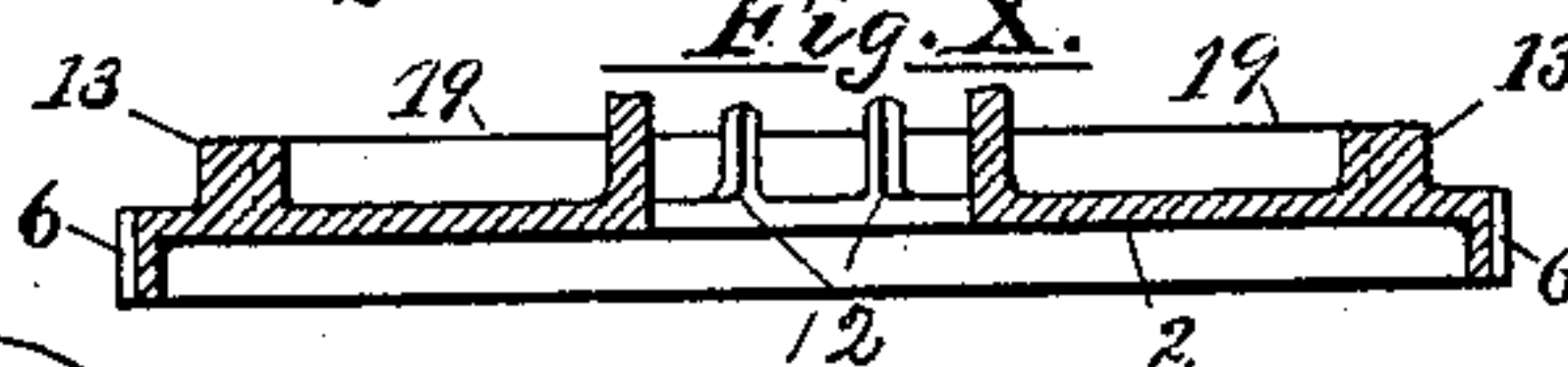
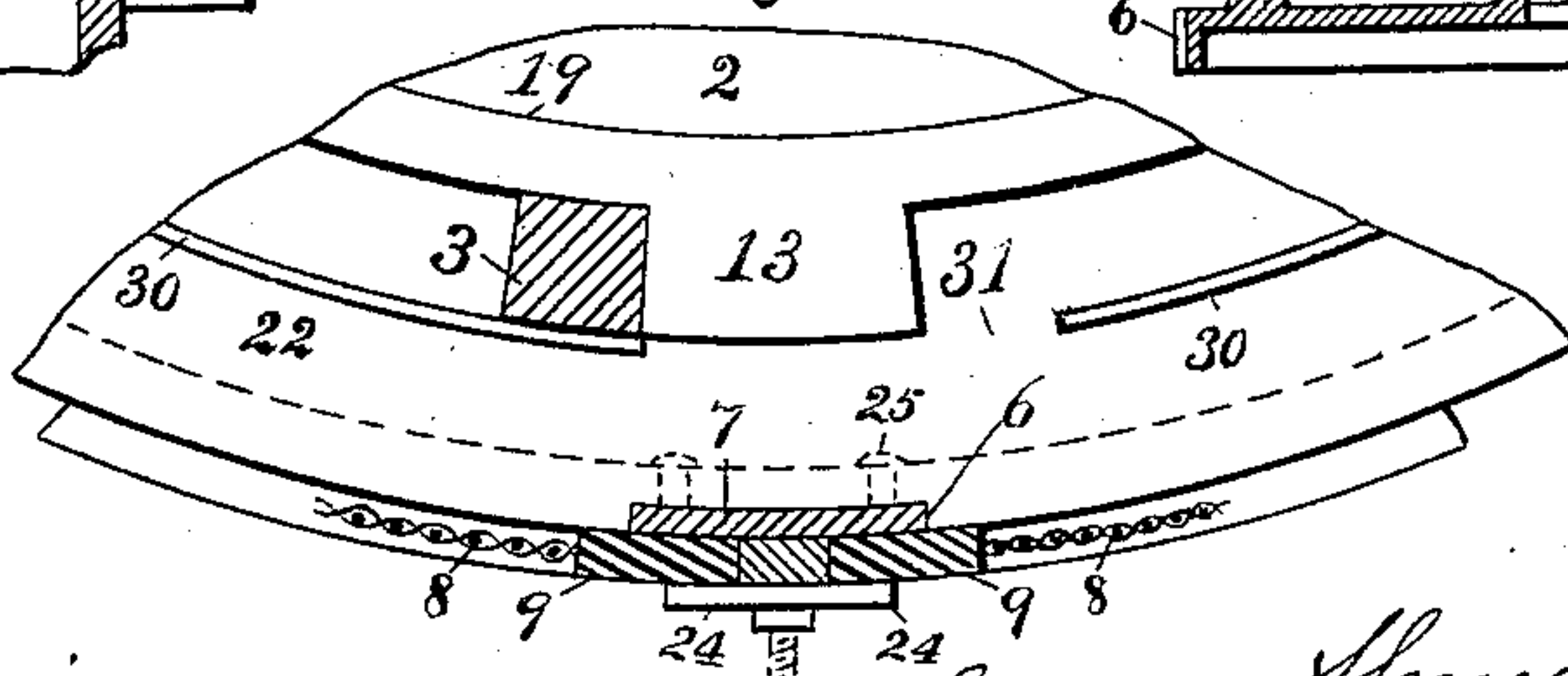


Fig. VIII.



Witnesses
K. Lockwood-Nevins
H. Sanderson.

Inventor
Abraham B. Paul
By his Attorney
J. Richards

UNITED STATES PATENT OFFICE.

ALMARIN BROOKS PAUL, OF SAN FRANCISCO, CALIFORNIA.

PULVERIZING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 594,422, dated November 30, 1897.

Application filed December 24, 1896. Serial No. 616,933. (No model.)

To all whom it may concern:

Be it known that I, ALMARIN BROOKS PAUL, of the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Pulverizing Machinery for the Reduction of Mineral Substances, especially Gold and Silver Ores; and I hereby declare the following specification and the drawings therewith to be a complete description of my improvements, with the method of constructing and applying the same in practice.

My invention relates to what are technically called "pulverizing-barrels," wherein, by the rotation of the cylinder or barrel and action of the weight within, the contained material is crushed, abraded, and pulverized, so as to admit of subsequent treatment by extracting processes.

My improvements consist in various features, constructive and operative, that will be hereinafter particularly pointed out in connection with the drawings.

The objects of my invention are to reduce the weight and cost of such machinery, simplify construction, and increase its endurance against the destructive wear to which such apparatus is especially liable; also, to facilitate the feeding of the material to the barrel and provide for convenient connection to the driving power.

Referring to the drawings, Figure I is an end view of a pulverizing-machine made according to my invention adapted for either wet or dry treatment of the ore. Fig. II is a side view of the same. Fig. III is a transverse section on the line *xx* in Fig. II. Fig. IV is a longitudinal section on the line *yy* in Fig. III. Fig. V is an enlarged detail showing the manner of holding and spacing the bars forming the inner or operating surface of the barrel. Fig. VI is a view of the same parts at a right angle to Fig. V. Fig. VII is a detail showing one of the spacing-irons detached. Fig. VIII is an enlarged partial end view of Fig. I, showing the manner of fastening the screens.

Similar numerals of reference are applied to corresponding parts throughout.

The main elements composing the barrel or cylinder, which can be of any suitable length, are the solid shaft 1, the two end

members 2, the series of grate-bars 3, a central tube or cylinder 4, connecting the ends 2, and the screens 8, forming the outer surface.

The heads or ends 2 are preferably cast of iron or steel, and have around their periphery a series of notches 6 to receive the longitudinal bars 7, that sustain the edges of the screens 8 and form a longitudinal connection. These screens 8 are held in frames 9 and are perforated in the usual manner to permit the escape of material when it is reduced to the required fineness.

The ends or heads 2 are indented or recessed to form chambers 14 at each end, as seen in Fig. IV, thus providing feeding-inlets 10 within the contour of the main barrel, the inner plate 15 being joined to the ends 2 by struts 12, that form a grating through which the material falls into the barrel.

The pulverizing-surface is formed of a series of metallic bars 3, of rectangular section, disposed in groups, as seen in Figs. III, V, and VI.

Projecting inward at each end from the main plates 2 are lugs 13, that divide the bars 3 into sections or groups, leaving spaces, as seen at 16 in Fig. V, the purpose of which will be hereinafter explained. These bars 3 are separated by the angular spacing-irons 17, that overlap the ends of the bars 3, so that when surrounded by the embracing-hoop 18 they cannot be displaced. This hoop or band 18 is made in two or more parts and provided with lugs and bolts, as seen in Fig. III, so that when drawn tight it will confine all the bars 3, pressing them inward against a continuous flange 19, and laterally against the spacing-irons 17 and the lugs 13, so the parts are held immovable against the jar and impingement of the ore and pulverizing-balls 20. These balls 20 are preferably ovaloid in form, but can be cylindrical and of any size to suit the size of the barrel or kind of material being treated.

In the annular chamber 22, between the screens 8 and the bars 3, are placed curved diaphragms 21, that extend the whole length of the barrel and catch any material that has fallen through the bars 3 but is too coarse to pass through the screens 8. Such material is caught by the diaphragms 21 and falls back through the apertures 16, to be again

subjected to the pulverizing process, and so on continuously until reduced to such fineness as will permit final passage through the outer screens 8, from where it falls into a receptacle beneath in the usual manner. The apertures 16 are preferably a little narrower than the annular space 22, so that the latter will admit any piece falling through the former, and thus avoids clogging.

At equidistant points around the heads 2 are notches to receive the longitudinal bars 7, attached to the head by rivets or bolts 25, as seen in Fig. VIII. On these bars and on the heads 2 at each end rest the screens 8, the latter being held in frames 9 and in place by the clamps or buttons 24, as shown in Figs. II and VIII. To remove the screens 8, these clamps 24 are loosened and turned longitudinally, as shown at 26 in Fig. II, which releases the screens 8.

Around the heads or ends of the barrel 2 I provide shallow ledges 30 to sustain the bars 3 before the hoops 18 are put on, spaces 31 being left in each division or at each lug 13, so the bars 3 can be inserted.

Connecting the recessed chambers 14 in the heads 2 is a cylinder 4, riveted at each end to the flanges 29. This cylinder has several purposes: it diffuses and spreads any material that may fall on it through the apertures 16, stiffens and supports the shaft 1 against the heavy load of material in the barrel, and acts as a guard or gage to prevent overfeeding or filling the barrel too full. When the barrel contains the proper quantity of material, the ore is clearly visible through the feed-openings at the ends, and when the barrel is filled up to the cylinder 4 this fact is at once apparent to an attendant.

It will be seen that when constructed as shown the barrel can be fed at either end or at both ends, also can be driven at either end and may operate with or without water, as may be required. It will also be seen that by the construction shown I dispense with the cumbrous hollow trunnions and the complicated feeding devices hitherto employed in machines of this kind and that the barrel is uniform at each end.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rotary pulverizing-machine, a rotary cylinder or barrel mounted on a solid horizontal shaft, ends or heads having recessed chambers concentric with the said shaft, radial feeding-ways through the cylindrical walls of said chambers, and a cylinder 4 surrounding said shaft and supported upon the walls of the said recessed chambers, substantially as shown and described.

2. In a rotary pulverizing-machine, a rotary cylinder or barrel mounted on a horizontal shaft, ends or heads having inwardly-

projecting recessed chambers formed with peripheral feed-openings, grate-bars connecting the heads near the outer margin of the said barrel, and a reinforcing drum or cylinder connecting the inwardly-projecting chambers and forming a longitudinal brace for the barrel, substantially as shown and described.

3. In a rotary pulverizing-machine, a central solid shaft, heads or ends having inwardly-projecting recessed chambers with feed-openings therein, a reinforcing-drum concentric with said shaft, and supported upon the inwardly-projecting chambers, grate-bars connecting the heads or ends near their outer margin, and a series of circumferential screens surrounding the said grate-bars, substantially as shown and described.

4. In a rotary pulverizing-machine, a rotary cylinder or barrel mounted upon a central solid shaft, ends or heads having inwardly-projecting recessed chambers with radial feed-openings in the walls thereof, interior projecting lugs 13 formed on said ends, grate-bars supported on said ends near the outer margin thereof and arranged in series with intermediate spaces corresponding to lugs 13, and a reinforcing-drum surrounding the central shaft, supported upon the said inwardly-projecting chambers, substantially as shown and described.

5. In a rotary pulverizing-machine, a central solid shaft, a barrel having recessed and chambered ends with feed-openings therein, reinforcing-drum 4, grate-bars arranged in annular-spaced series near the periphery of the said barrel, screens 8 outside the said grate-bars, forming the annular space or interval 22, curved diaphragms 21 arranged in the said spaces, and removable bands 18 embracing and confining the said grate-bars, substantially as shown and described.

6. In a rotary pulverizing-machine, a central solid shaft, a barrel having recessed and chambered ends with feed-openings therein, reinforcing-drum 4, grate-bars arranged in annular-spaced series near the periphery of the said barrel, inwardly-projecting flanges 19 for supporting the said grate-bars, segmental ledge 30 for guiding the insertion of the said bars, screens 8 outside the said grate-bars, forming the annular space or interval 22, curved diaphragms 21 arranged in the said spaces, removable bands 18, embracing and confining the said grate-bars, longitudinal bars 7 for sustaining the edges of the said screens, and clamps and buttons 24, substantially as shown and described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

ALMARIN BROOKS PAUL.

Witnesses:

K. LOCKWOOD-NEVINS,

H. SANDERSON.