

E. H. HANCE.
 DRUG MILL.
 APPLICATION FILED DEC. 1, 1908.

1,078,436.

Patented Nov. 11, 1913.

2 SHEETS—SHEET 1.

FIG. I.

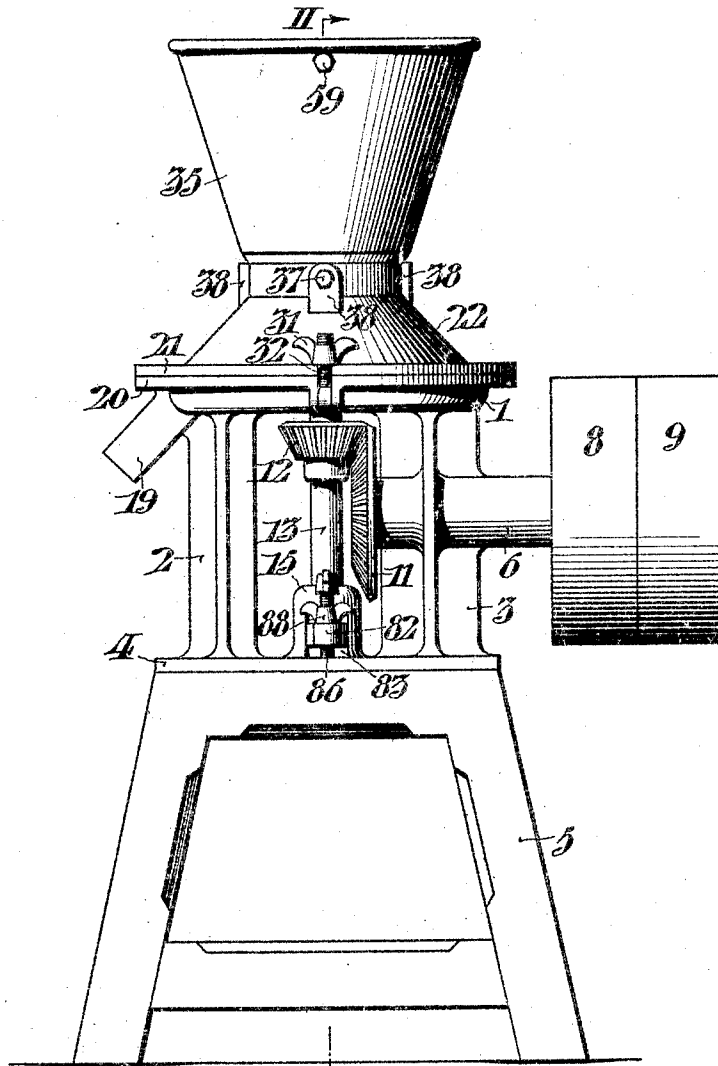
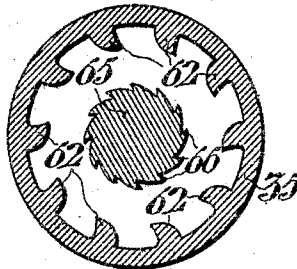


FIG. IV.



WITNESSES:

John C. Begner.
James H. Bell

INVENTOR:
 EDWARD H. HANCE,

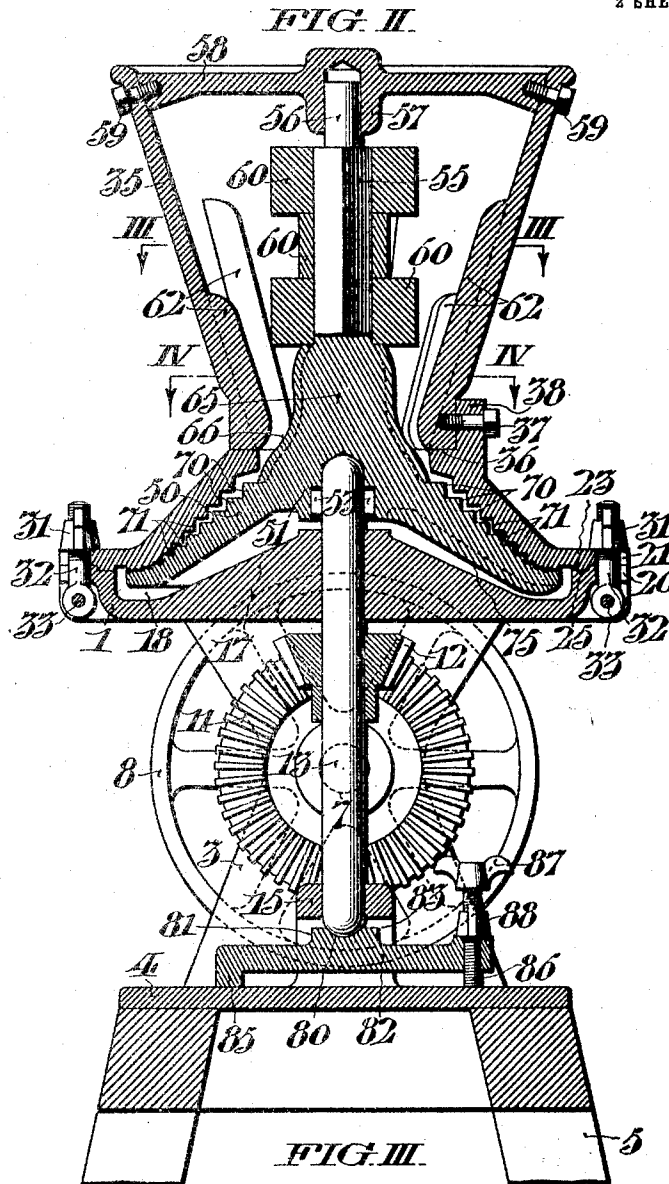
By May & Paul
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2 SHEETS—SHEET 2.



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John C. Bergner.
James H. Bell.

INVENTOR:

EDWARD H. HANCE,
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UNITED STATES PATENT OFFICE.

EDWARD H. HANCE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO HANCE BROTHERS & WHITE, OF PHILADELPHIA, PENNSYLVANIA, A COPARTNERSHIP COMPOSED OF EDWARD H. HANCE AND ANTHONY M. HANCE.

DRUG-MILL.

1,078,436.

Specification of Letters Patent.

Patented Nov. 11, 1913.

Application filed December 1, 1903. Serial No. 465,567.

To all whom it may concern:

Be it known that I, EDWARD H. HANCE, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Drug-Mills, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to drug mills of the conical-plate type, in which the serrations of a rotating conical-plate are opposed to the corresponding serrations in a fixed bell plate, which covers the same, and which approaches more closely to the surface of the conical-plate as it flares outwardly, so that the material deposited upon the center of the conical-plate is ground with increasing fineness, as it descends toward the rim of the plate, and, after being ground to the required fineness, falls from the same into an annular recess which guides it to the discharge chute. Although mills of this type are useful for grinding all sorts of roots, berries, barks, and other materials used in pharmacy, and also for other grinding purposes, yet there is a necessary limit as to the initial size of the pieces of the article to be ground.

It is the object of my present invention to provide a mill of this type with suitable crushing means, to which anything fed to the mill is subjected prior to its passing to the grinding surfaces of the conical-plate. This insures the proper sequence of operation, to wit, an initial crushing operation in the hopper where the crushing means are situated, then the coarse grinding at the top of the conical-plate, and in the end, a fine grinding operation by which the material may be comminuted to any desired extent.

In the accompanying drawings, Figure I, is a front elevation of a mill conveniently embodying my invention. Fig. II, is a central vertical sectional view on an enlarged scale, taken on the line II, II, in Fig. I. Fig. III, is a plan section through the hopper of the mill taken on line III, III, in Fig. II. Fig. IV, is a similar section taken on the line IV, IV, in Fig. II.

In the said figures, 1, designates the bed of the mill which is supported on the standards 2, and 3, terminating in base plate 4, mounted upon a pedestal 5. The standard 3, embraces a bearing 6, in which is jour-

naled the horizontal driving shaft 7, provided at its outer end with fast and loose pulleys 8, and 9, respectively.

A bevel gear wheel 11, is secured on the shaft 7, at its inner end and meshes with a pinion 12, which is keyed to the vertical shaft 13, journaled at its lower end in a boss 15, on the base plate 4, and at its upper end on the bed 1, where it terminates in a rounded end directly above the top of a conical portion 17 of said bed 1, surrounded by an annular recess 18, as seen in Fig. II.

The peripheral flange 20, on the bed 1, supports a corresponding flange 21, on the lower portion of the conical bell 22, whose proper alinement with the said bed 1, is maintained by the co-action of the annular shoulder 23, on the lower face of said flange 21, with the depression 25, on the upper face of the flange 20.

The conical bell 22, is held in place by winged nuts 31, on the swinging eye bolts 32, which are pivoted at 33, to lugs formed on the bed 1, and received within slots, in the peripheral flanges 20, and 21. By this means, the mill may be taken apart very readily for cleaning.

A conical hopper 35, rests upon a seat 36, formed on the top of the bell 22, and is there held in place by bolts 37, which pass through lugs 38, on said bell 22, and are threaded into the cylindrical lower end of the said hopper 35.

A hollow grinding cone 50, is rotatably supported within the bell 22, on the rounded top of the vertical shaft 13, being secured thereto by a key 53, which is received within the slot 51, in the said cone 50.

A squared stem 55, extends vertically from the top of the cone 50, and terminates in a trunnion 56, which is received in the boss 57, on the cross piece 58, located within, and at the top of the hopper 35, and secured by means of the bolts 59. The squared stem 55, carries a series of crushers 60, each having paired wings 61, the said crushers being built up with their wings in alternate relation to those which precede or follow. The advancing edge of the wings is inwardly curved, to produce a gradual crushing action. These crushers are opposed to, and therefore co-act with a plurality of ribs 62, cast on the inner surface of the hopper 35. All of the ribs are of varying heights, a long

rib succeeding a short rib. The shape of these ribs, as well as their arrangement and relation to the crushers 60, is clearly exhibited in Fig. III. By the action of these parts, the large material initially introduced into the hopper, is effectually crushed or disintegrated, and partially comminuted before it reaches the conical grinding plate, now to be described, the longer ribs thus co-acting with the largest pieces, and then the shorter ribs also coming into play.

Directly below the crushers 60, the cone 50, is provided with a dome shaped top 65, having cutting blades 66, which also co-act with the cutting blades 62, on the hopper 35, as best shown in Fig. IV. The remaining surface of the grinding cone 50, is provided with serrations 70, which are very coarse at the top and gradually become very fine at the bottom, and which co-act with corresponding serrations 71, on the inner face of the surrounding bell 22. It will be noticed that there is a slight difference between the angle of the inner face of the bell 22, and the outer face of the cone 50, so that the intervening space tapers very gradually downward. This together with the gradual decrease in the size of the co-acting serrations admits of very fine grinding.

The ground material drops within the annular recess 18, and is advanced to the chute 19, by means of the scraping rib 75, formed on the under surface of the grinding cone 50, and is then discharged through the chute.

In order to vary the degree of grinding, the vertical shaft 13, is supported at its bottom within a socket 80, in the lug 81, formed in the center of the adjustable plate 82. The said plate 82, is received within the opening 83, in the boss 15, and is provided at one end with a foot 85, and at the other end with an adjusting screw 86, having a winged

head 87, and a jam nut 88. The said adjusting screw 86, rests upon the base plate 4, and by its manipulation the shaft 13, and thereby the grinding cone 50, and all the parts attached thereto, can be vertically adjusted to regulate the degree of the grinding.

It will be noticed from the foregoing that the mill is so constructed that it may be readily taken apart, and the detachable feature between the vertical shaft 13, and the grinding cone 50, permits the latter to be removed for cleaning without affecting the previous adjustment.

Having thus described my invention, I claim:—

In a conical plate drug mill, the combination of a hopper provided on its inner surface with vertically extending ribs of varying lengths, the longer ribs alternating with the shorter ribs, and extending above the same, a bell connected with the hopper, a cone located in the bell and extending into the hopper, said cone and bell having oppositely disposed serrations, and said cone having cutting blades coöperating with said longer and shorter ribs at their lower ends, and a separate crushing member located above said cone, and mounted to rotate in axial relation with said cone and hopper, said crushing member having means co-acting initially with the longer ribs, and subsequently with the shorter and longer ribs, as the material to be crushed passes down the hopper.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this twenty-seventh day of November 1908.

EDWARD H. HANCE.

Witnesses:

JAMES H. BELL,
E. L. FULLERTON.