

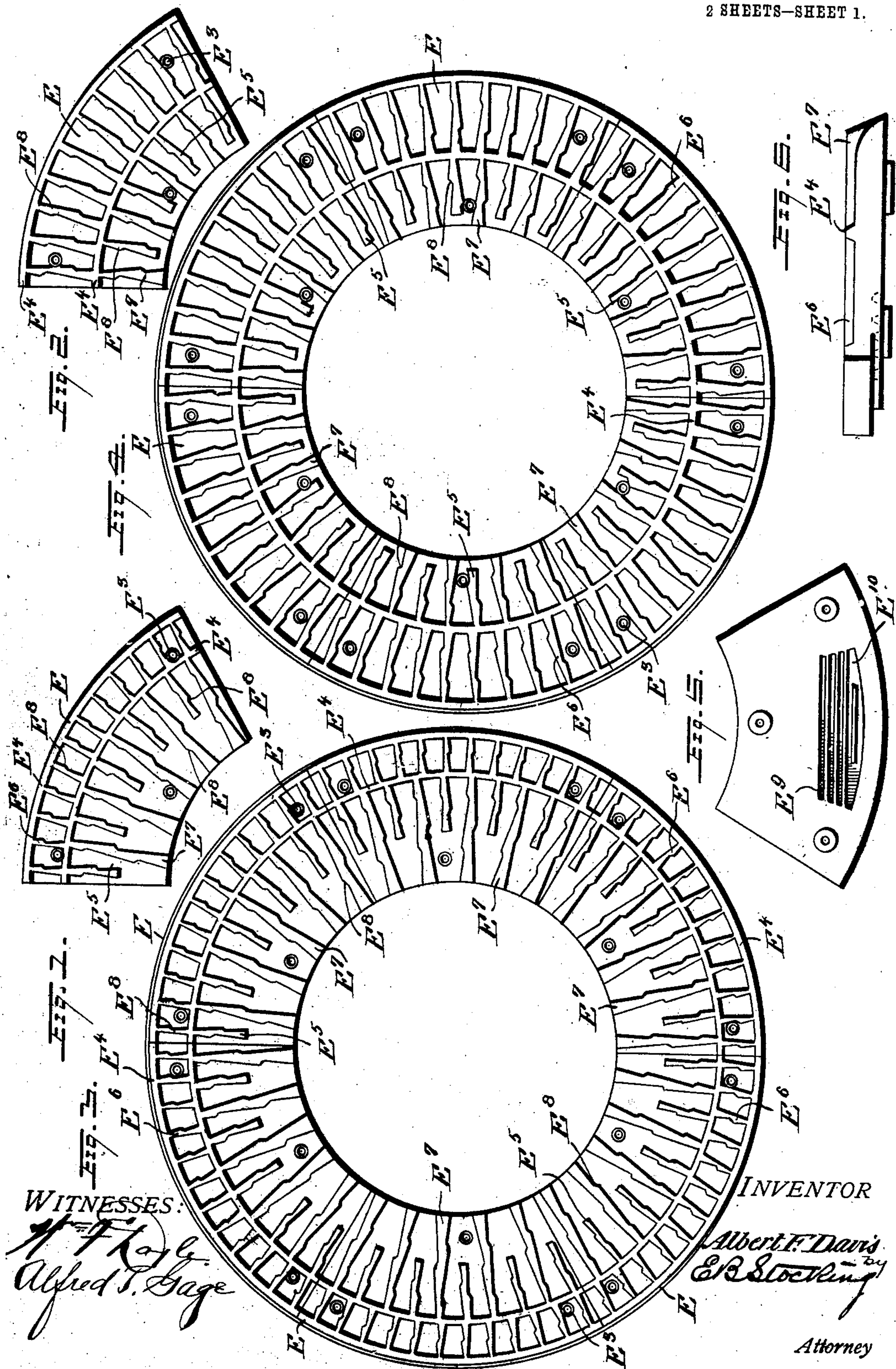
No. 827,059.

PATENTED JULY 24, 1906.

A. F. DAVIS.
GRINDING PLATE FOR MILLS.

APPLICATION FILED NOV. 29, 1905.

2 SHEETS—SHEET 1.



WITNESSES:

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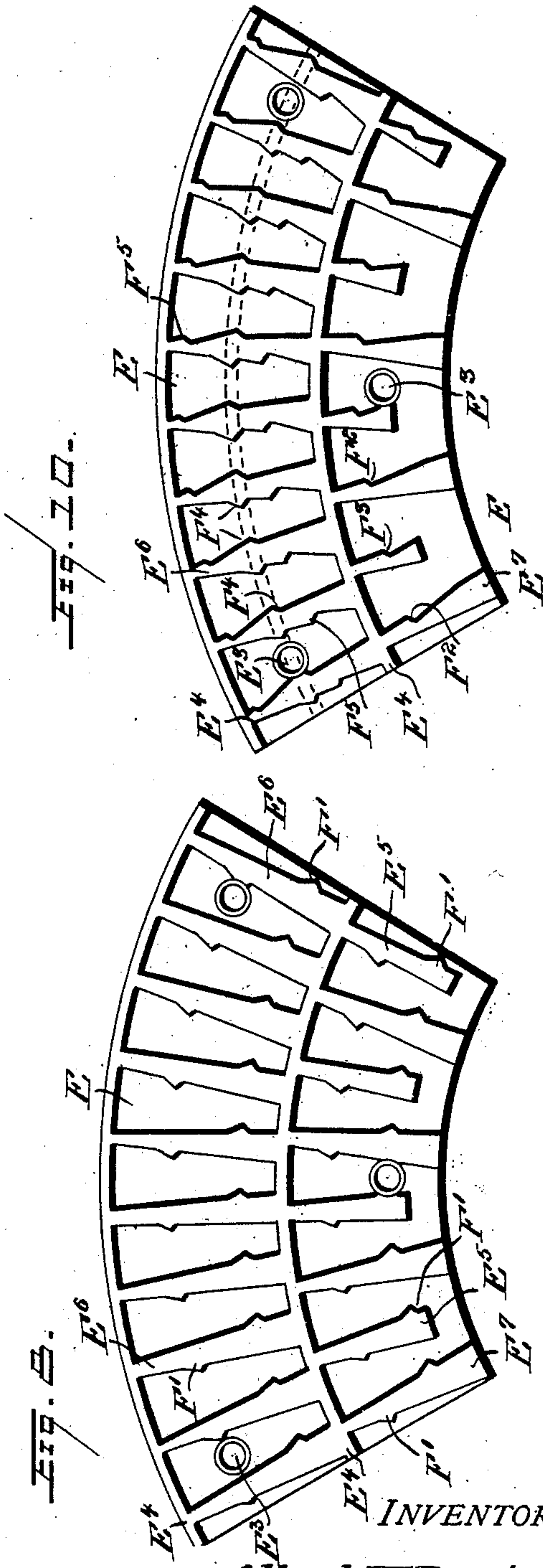
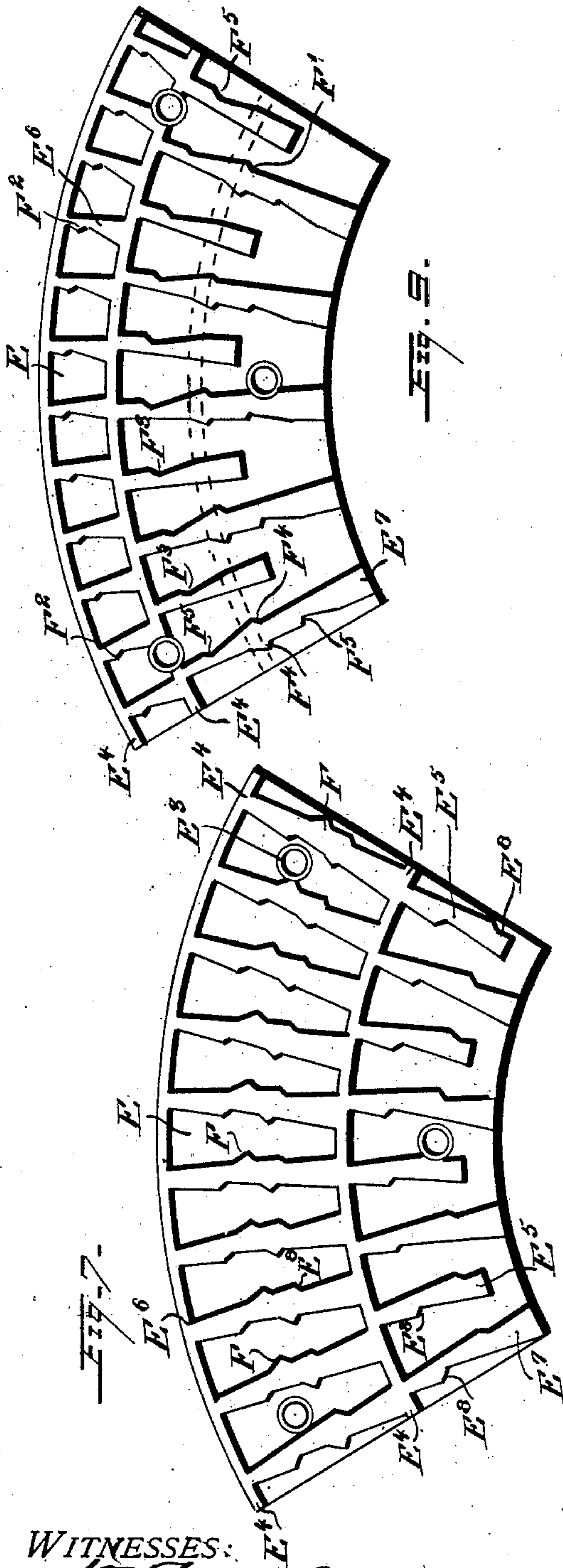
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ALBERT F. DAVIS, OF RUTLAND, VERMONT.

GRINDING-PLATE FOR MILLS.

No. 827,059.

Specification of Letters Patent.

Patented July 24, 1906.

Original application filed May 16, 1904, Serial No. 208,200. Divided and this application filed November 29, 1905. Serial No. 289,636.

To all whom it may concern:

Be it known that I, ALBERT F. DAVIS, a citizen of the United States, residing at Rutland, in the county of Rutland, State of Vermont, have invented certain new and useful Improvements in Grinding-Plates for Mills, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to a grinding-disk and the plates from which said disk may be formed, and particularly to a structure embodying opposing surfaces of different configuration between which the material is introduced.

15 The invention has for an object to provide an improved construction of the grinding-face by which the feed of the material from the center toward the outer edges of the surfaces is retarded and an opposing surface presented, so that the cooperating opposite plates produce a shearing and grinding action to most effectually operate upon the material.

25 Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

30 In the drawings, Figures 1 and 2 are plans of a preferred construction of cooperating grinding-plates adapted to be located opposite each other. Fig. 3 is an elevation of the plates shown in Fig. 1 assembled upon one disk. Fig. 4 is a similar view of the plates shown in Fig. 2 assembled upon the opposite cooperating disk. Fig. 5 is a bottom plan of one of said plates. Fig. 6 is an edge view thereof. Figs. 7 and 8 are plans, respectively, of different modifications in the structure of the grinding-surfaces, showing variable arrangements of the checks or shoulders upon the radial ribs carried thereon; and Figs. 9 and 10 are similar views of opposite cooperating grinding-plates, the position of the inner flanges upon one of said plates being indicated by dotted lines upon the opposite plate.

Like letters of reference indicate like parts throughout the several views of the drawings.

50 A preferred construction of the grinding-plates E is shown in Figs. 1, 2, 5, and 6, wherein it will be seen that each of the plates is provided with bolt-openings E³, extending therethrough, and with flanges E⁴, extending concentric to each other and adapted when

assembled upon the disks to form circular flanges extending about the circumference of the disk, as shown in Figs. 3 and 4, the flanges E⁴ upon one of said disks being disposed at a greater distance apart than upon the other, so that when assembled the inner flanges E⁴ will form rings on each disk of different respective diameters, which when opposed to each other in the operation of grinding will also be spaced apart by a distance equal to the difference of the spacings of the inner and outer flanges E⁴ on the segmental plates which make up the respective disks. These rings will cooperate with the angular projections F⁴ on the ribs E⁶ and E⁷, as shown in dotted outline in Figs. 9 and 10. The radial ribs E⁶ extend equal distances apart between the circular flanges E⁴, while the ribs E⁷ extend inward toward the axis of rotation from the inner circular flange. The ribs E⁵ are of less length than the ribs E⁷ and disposed intermediate thereof to cooperate with the inner flange E⁴ of the associated plate. Each of these radially-disposed ribs is provided upon one or more of its faces or sides with a check or shoulder E⁸, which tends to check the flow of the grain toward the periphery of the plate and to produce a shearing cut in connection with the circular flange of the cooperating plate, while the opposite plates are provided with a different number of radial ribs—for instance, as shown in Figs. 1 and 2, wherein a larger number of ribs are provided upon the plate shown in Fig. 1, so as to provide a greater grinding-surface at the periphery of the plates and to prevent any two flanges meeting in the same position, thus insuring a greater capacity to the mill and a reduction in the power required in the operation thereof. The character and position of the check or shoulder E⁸, provided upon each of the ribs, may be varied as found desirable. For instance, in Figs. 1 and 2 the check is cut into the rib. The under surface of each of these plates is provided with a series of balancing-flanges E⁹, disposed in a recess E¹⁰, as shown in Fig. 5, which may be ground out or removed for the purpose of facilitating the balancing of the plate in assembling a series thereof in contact to form the disk, as it is essential that the disk should be properly balanced in order to secure an even motion in the grinding action.

In Fig. 7 a modified construction of plate is shown in which the checks or shoulders F

may be provided upon the ribs E^6 in connection with the checks E^8 , cut into the ribs E^5 and E^7 , as before described.

In Fig. 8 a further modification of the checks upon the plate is shown wherein the checks or shoulders F' project outwardly from all of the ribs E^5 , E^6 , and E^7 .

In Figs. 9 and 10 a further modification of two cooperating plates is shown in which the plate E is provided with the concentric segmental flanges E^4 , those upon each plate being at a different distance apart, while the ribs E^6 upon one plate are provided with checks or shoulders F^2 upon one side thereof and the ribs E^5 with a similar shoulder F^3 upon the opposite side, while the extended radial ribs E^7 are provided at a point coincident to the inner flange E^4 upon the opposing plate with oppositely-disposed checks or shoulders F^4 , which act as a shearing cut upon the flange E^4 of the opposite plate, the position of said flange being indicated by dotted lines in Figs. 9 and 10. The ribs E^7 are also provided with the retarding-shoulders F^5 upon opposite sides thereof, as described in connection with the other forms of the invention. The cooperating plate to that just described has the oppositely-disposed shoulders F^4 located upon the ribs E^6 to act in a similar manner in connection with the inner flange E^4 of the first-mentioned plate. In other words, the arrangement of the shoulders disposed upon the ribs E^7 in one plate are duplicated upon the ribs E^6 of the opposing plate, thus producing a structure in which no two ribs will meet in the same relative position and securing an even distribution of the grinding action and consequent wear over the entire surface of the plate as it performs a continual shearing cut, thus increasing the capacity of the mill and requiring less power than otherwise. All of the plates hereinbefore described are adapted to be used upon either of the disks in order that the direction of rotation of the disks may be reversed and the wear taken upon an opposite side of the ribs from that first used.

In the operation of the invention the opposite disks or grinding-surfaces are rotated in opposite directions in the usual manner, while the material is fed from the center thereof toward the periphery, and thus effects the improved grinding action by the cooperation between the inner flanges of each plate with the ribs and shoulders upon the cooperating opposite plate, as hereinbefore set forth.

The plates herein shown may be of any desired shape or configuration—that is, the ribs and flanges thereon may be duplicated to provide a plate extending over a portion of or the entire surface of the disk.

Having now described my invention and set forth its merits, what I claim, and desire to secure by Letters Patent, is—

1. In a grinding-mill, a grinding-disk having a series of wedge-shaped ribs diverging inwardly from the periphery of the disk throughout their length and arranged in alternated concentric series separated by a curved intermediate flange.

2. In a grinding-mill, a grinding-disk having a series of wedge-shaped ribs diverging inwardly from the periphery of the disk throughout their length and arranged in alternated concentric series separated by a curved intermediate flange, and laterally-disposed shoulders upon one side face of said ribs provided with a face disposed toward the axis of the disk.

3. In a grinding-mill, a grinding-disk having a series of wedge-shaped ribs diverging inwardly from the periphery of the disk throughout their length and having laterally-disposed shoulders upon one side face thereof provided with an inclined face disposed toward the axis of the disk, and a curved flange intermediate of the periphery and axis of the disk to divide said disk into alternately-disposed series.

4. In a grinding-mill, a grinding-disk provided with a curved flange and having two series of flat-faced ribs provided with laterally-disposed shoulders thereon and located upon opposite sides of said flange, the ribs of the inner series being alternately unequal in length and out of alinement with those of the outer series.

5. In a grinding-mill, a grinding-disk provided with radially-disposed ribs thereon tapering continuously throughout their length and having upon their opposite sides between their ends oppositely-extending shoulders disposed out of alinement with each other.

6. In a grinding-mill, cooperating grinding-plates each provided with a series of radial ribs tapering continuously throughout their length and having upon opposite faces laterally-disposed shoulders located out of alinement with each other, one of said plates having a greater number of ribs than the opposite plate.

7. In a grinding-mill, a grinding-plate provided with radially-disposed ribs thereon having upon their opposite sides between their ends shoulders, and a cooperating plate provided with radial ribs thereon, and curved flanges upon each plate disposed to cooperate with the shoulders upon the ribs of the opposite plate.

8. A grinding-plate having a series of wedge-shaped ribs diverging inwardly from the periphery of the plate throughout their length and arranged in alternated concentric series separated by a curved intermediate flange.

9. A grinding-plate having a series of wedge-shaped ribs diverging inwardly from the periphery of the plate throughout their

length and arranged in alternated concentric series separated by a curved intermediate flange, and laterally-disposed shoulders upon one side face of said ribs provided with a face
5 disposed toward the axis of the plate.

10. A grinding-plate having a series of wedge-shaped ribs diverging inwardly from the periphery of the plate throughout their length and having laterally-disposed shoulders upon one side face thereof provided with an inclined face disposed toward the axis of the plate, and a curved flange intermediate of the periphery and axis of the plate to divide said ribs into alternately-disposed series.
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11. A grinding-plate provided with a curved flange and having two series of flat-faced ribs provided with laterally-disposed shoulders thereon and located upon opposite sides of said flange, the ribs of the inner series being alternately unequal in length and out of alinement with those of the outer series.
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12. A grinding-plate provided with radially-disposed ribs thereon tapering continuously throughout their length and having upon their opposite sides between their ends oppositely-extending shoulders disposed out of alinement with each other.
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13. In a grinding-mill, oppositely-disposed grinding-disks each having a series of wedge-shaped ribs diverging inwardly from the periphery of the disk throughout their length and arranged in alternated concentric series separated by a curved intermediate flange.
30 35

14. In a grinding-mill, oppositely-disposed grinding-disks each having a series of wedge-shaped ribs diverging inwardly from the periphery of the disk throughout their length and arranged in alternated concentric series separated by a curved intermediate flange, and laterally-disposed shoulders upon one side face of said ribs provided with a face disposed toward the axis of the disk.
40 45

15. In a grinding-mill, oppositely-disposed grinding-disks each having a series of wedge-shaped ribs diverging inwardly from the periphery of the disk throughout their length and having laterally-disposed shoulders upon one side face thereof provided with an inclined face disposed toward the axis of the disk, and a curved flange intermediate of the periphery and axis of the disk to divide said ribs into alternately-disposed series.
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16. In a grinding-mill, oppositely-disposed grinding-disks each provided with a curved flange and having two series of flat-faced ribs provided with laterally-disposed shoulders thereon and located upon opposite sides of said flange, the ribs of the inner
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series being alternately unequal in length and out of alinement with those of the outer series.

17. In a grinding-mill, a grinding-disk comprising a series of plates provided with two alternating series of ribs having laterally-disposed shoulders thereon, a continuous-curved flange between said series of ribs, a cooperating disk comprising a series of plates having two alternating series of ribs thereon provided with lateral shoulders, and a continuous-curved flange between said series of ribs at a different distance from the outer periphery of the plate than the flange upon the first-mentioned plate.
65 70 75

18. In a grinding-mill, oppositely-disposed grinding-disks each provided with radially-disposed ribs thereon tapering continuously throughout their length and having upon their opposite sides between their ends oppositely-extending shoulders disposed out of alinement with each other.
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19. In a grinding-mill, oppositely-disposed cooperating grinding-disks each provided with a series of radial ribs tapering continuously throughout their length and having upon opposite faces laterally-disposed shoulders located out of alinement with each other one of said disks having a greater number of ribs than the opposite disk.
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20. In a grinding-mill, a grinding-disk provided with radially-disposed ribs thereon having upon their opposite sides between their ends oppositely-disposed shoulders, and a cooperating disk provided with radial ribs thereon, and curved flanges upon each disk disposed to cooperate with the shoulders upon the ribs of the opposite disk.
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21. A grinding-disk provided on its grinding-face with radial ribs, concentric ribs crossing the radial ribs to form an inclosed space on the face of the disk, and additional ribs located in said inclosed spaces and extending from certain of the radial ribs whereby to form barriers resisting the outward movement of the material being ground.
100 105

22. In a grinding-mill, a grinding-disk provided with an annular flange having two series of flat-faced ribs provided with laterally-disposed shoulders thereon, and located upon opposite sides of said flange, the ribs of the inner series being alternately unequal in length and out of alinement with those of the outer series.
110 115

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

ALBERT F. DAVIS.

Witnesses:

HELEN H. CLARKE,
HARRY B. WHITTIER.