

J. A. CRAIG.
GRINDER PLATE.
APPLICATION FILED JULY 29, 1915.

1,248,814.

Patented Dec. 4, 1917.

FIG. 1.

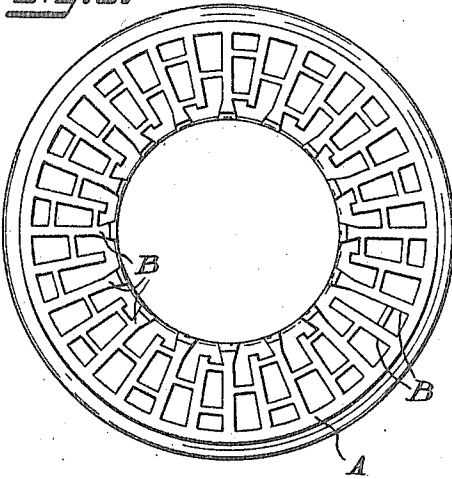


FIG. 2.

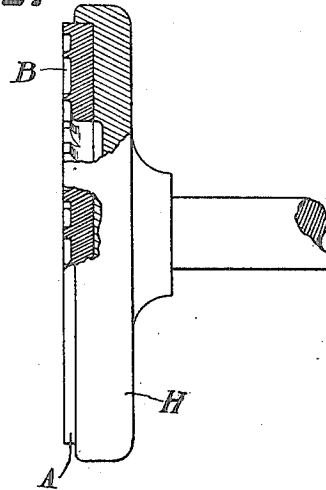


FIG. 3.

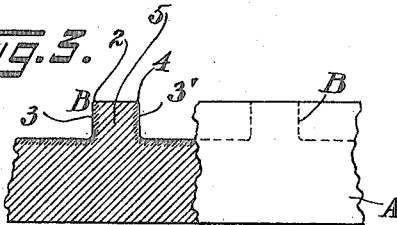


FIG. 5.

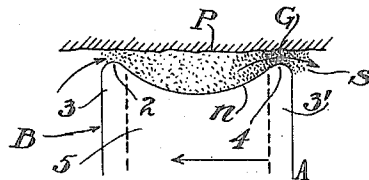
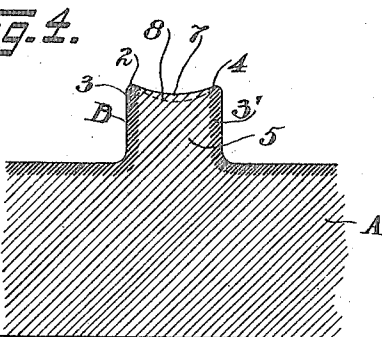


FIG. 4.



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UNITED STATES PATENT OFFICE.

JAMES A. CRAIG, OF NEW YORK, N. Y., ASSIGNOR TO CRAIG GRINDER AND MIXER CO.,
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GRINDER-PLATE.

1,248,814.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JAMES A. CRAIG, a citizen of the United States, residing in New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Grinder-Plates, of which the following is a specification.

This invention relates to grinder plates for grinding cocoa shells, grains, and the like, and has for a main object the production of a grinder plate whereby the ordinary length of efficiency is materially increased.

The main feature of the invention resides in the fact that the active grinding members of a grinder plate are so constructed that in the course of their use their initial wear will be so exercised that added grinding surfaces will be formed simultaneously with the reduction of the original grinding surfaces.

Still another feature of the invention is the protection of certain grinding surfaces so that with the first uses of the grinding plates only a part of the entire grinding surfaces are exercised to their fullest extent while the remaining part of the grinding surfaces are only gradually increasing in their activity so that when the first-named grinding surfaces have already been worn substantially useless, the latter-named grinding surfaces will still be substantially efficient.

A still further feature of the invention is the formation of a crushing or grinding throat having a concave funnel-like approach by means of which the material being ground is compacted and compressed between the grinding rib and its opposing bed-plate.

These and other features, capabilities and advantages of the invention will appear from the subjoined detail description of one specific embodiment thereof illustrated in the accompanying drawing in which

Figure 1 is a plan view of a grinding plate positioned on a holder.

Fig. 2 is a fragmental elevation, partly in section, showing a grinding plate positioned on a holder.

Fig. 3 is a fragmental view, partly in section, illustrating a rib of the grinding plate before being used.

Fig. 4 is a fragmental view, partly in section, showing a rib of the grinding plate after having been used.

Fig. 5 is a diagrammatic view illustrating the action of the material while being ground.

In the embodiment shown, there is provided a holder H of the usual construction having a circular recess therein to receive the grinder-plate A provided with ribs B.

The principal feature of the present improvement relates to a construction of the grinder-plate ribs or teeth B whereby a substantial duplication of the directly-acting grinding means is secured. For more fully explaining this feature, reference may be had to the enlarged view, Fig. 4, in which the two side areas 3 and 3' will be made of extremely hard and tough material which is normally, or preferably, integrally joined with the center portion, as 5, having a lesser degree of stability and resistance to wear. In the operation of the grinder, the tooth or rib B is subjected to an intense attrition and frictional resistance or action, and as a consequence the middle portion 5 being of lesser resistance, as described, becomes rapidly worn away so as to form a depression, as 7, Fig. 4, which thus leaves the two edges 2 and 4 projecting to such an extent as to become each effective independently of the other in certain respects, and in combination with the other to give a highly increased rate of grinding.

This depression 7 gradually increases in depth, as shown by the dotted curved line 8, Fig. 4, and thereby increases in effectiveness.

The resistance of surface on granular material, tends to cause a dense stream at S, because of the incline at *n*, which forms a sort of chute, and thus leads the material to the edge 3' in quite a different way than is the case with the forward edge 3.

By reason of the integrality connecting the grinding edges or faces 3 and 3', Figs. 4 and 5, these faces may be very narrow and therefore highly effective. By means of this integral connection 5, (Fig. 4) between the two plate-like components 3, 3', and the manner in which it progressively wears away during the slow and gradual reduction in the height of the rib B, there is continually reformed and maintained at the position *n* a guide surface leading up to the face 4, thus forming between the rib B and the opposing grinding bed or plate P a space in the nature of a funnel wherein and whereby the stream of material which was passing

between the rib B and said opposing plate P is compacted or compressed and is thus drawn in to the throat or grinding space at G, Fig. 5, in such manner as to largely increase the disintegrating action upon the material with a minimum reduction by wear upon the plate or edge 3'. This peculiar funnel-like formation is a space formed between a relatively straight line surface of said opposing bed or plate P and the relatively concave surface at the location n, thereby forming a funnel-like approach to the grinding throat G and through which the material goes forward and is compacted in a peculiarly effective manner.

The soft intervening connection may be preliminarily cut out so that it will possess the form above described and illustrated in Fig. 5.

The soft connection when not preliminarily cut, will continue to wear down with the hardened edges, in fact faster than the hardened edges so that the effective concave formation will be maintained as long as the hardened edges have a height that is effective.

In the manufacture of my improved grinding plates, it is desirable to use a metal for the body of the plate which shall be both tough and strong, and for this purpose I prefer to use a mild steel of ductile and uniform quality, and afterward to produce by suitable carbonization and heating or tempering treatment, the relatively hard and resistant layers or zones 3 and 3' and at the same time to so conduct these operations (by means and methods now understood by those expert in the treatment of such materials) as to produce or provide for the substantial omission of such a layer or zone over the top or outer end of the tooth of rib B.

It is obvious that various changes and modifications may be made to the details of construction without departing from the general spirit of the invention.

I claim:

1. A one-part grinder-plate having radial grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinding-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding.

2. A one-part grinder-plate having radial grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinding-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding; and like concentrically

arranged grinding-members extending from and formed integral with each of the abutting adjacent radial grinding-members.

3. A one-part grinder-plate having radial grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinding-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding; and like concentrically arranged grinding-members extending from and formed integral with each of the abutting adjacent radial grinding-members, such concentric grinding-members being staggered.

4. A one-part grinder-plate having radial grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinding-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding; and like concentrically arranged grinding-members extending from and formed integral with each of the abutting adjacent radial grinding-members, such concentric grinding-members being alternately staggered.

5. A one-part grinder-plate having radial grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinder-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding; and like concentrically arranged grinding-members extending from and formed integral with each of the abutting adjacent radial grinding-members, such concentric grinding-members being staggered, the grinder-plate having each alternate radial grinder-member shortened at its inner central end from that of each of its adjacent flanking members.

6. A one-part grinder-plate having radial grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinding-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding; and like concentrically arranged grinding-members extending from and formed integral with each of the abutting adjacent radial grinding-members, such concentric grinding-members being alternately staggered, the grinder-plate having each alternate radial grinder-member shortened at its inner central end from that of each of its adjacent flanking members.

7. A one-part grinder-plate having radial

grinding-members projecting therefrom, parallel with the axis of rotation, each projecting grinding-member having hard outer radial layer-edges, flanking a softer central layer so that when the softer central layer has been worn to concavity, the harder outer radial layer-edges will still be effective for grinding; and like concentrically arranged grinding-members extending from and formed integral with each of the abutting adjacent radial grinding-members, both radial and concentric grinding-members being of the same height.

8. A one-part revoluble plate grinder-member comprising reduction ribs formed integral therewith, each having a pair of abraded edges composed of relatively high resistant material integrally joined together by a mid-zone of softer and less resistant material, which mid-zone is adapted for wearing away more rapidly than the said edges, and thereby forming during use an inclined surface leading up to the rearward abrasive edge.

9. A revoluble grinder-plate-member, having grinding-members of equal height projecting therefrom, each grinding member being composed of two hard areas, and an intervening softer area integral with said two hard areas, said intervening soft area forming with the hard areas a concave recess or funnel-like approach to the second hard area so that the space between the second hard area and its opposing bed-plate will serve as a constricted throat into which the material being ground is compacted and compressed by said funnel-like approach, during the rotation of the grinder-plate-member.

10. A revoluble grinder-plate having grinding members projecting therefrom, each grinding member composed of two hard areas, and an intervening softer area integral with said two hard areas, said intervening area upon wear forming with the hard areas a concave recess or funnel-like approach to the second hard area so that the space between the second hard area and its opposing bed-plate will serve as a constricted throat into which the material being ground is compacted and compressed by said funnel-like approach.

11. A revoluble grinder-plate-member comprising a plurality of reduction ribs each

having a pair of abrasive edges composed of a hard metal and a mid-zone composed of a softer material joined with said abrasive edges, which mid-zone is adapted for wearing away in advance of said edges and thereby forming during use a concave funnel-like approach to the second abrasive edge so that the space between such second abrasive edge and its opposing bed-plate will serve as a constricted throat into which the material being ground is compacted and compressed by said funnel-like approach during the rotation of the grinder-plate-member.

12. A grinder plate member comprising reduction ribs each having a pair of abrasive edges being composed of a hard metal and a mid-zone composed of a softer material joined with said abrasive edges, which mid-zone is adapted for wearing away in advance of said edges and thereby forming during use a concave funnel-like approach to the second abrasive edge so that the space between such second abrasive edge and its opposing bed-plate will serve as a constricted throat into which the material being ground is compacted and compressed by said funnel-like approach during the rotation of the grinder-plate-member, said mid-zone wearing away so much faster than said abrasive edges that the funnel-like approach will be maintained effective as long as the abrasive edges will have a height that is effective.

13. A grinding-plate, comprising an annular body composed of a plurality of staggered grinding-members concentrically located, each of which is formed of soft metal at the center and hardened at the edges.

14. A grinding-plate, comprising a plurality of grinding-members, each of which is composed of homogeneous metal soft at the center and hardened at the attrition edges, such grinding-members being arranged in pairs extending radially of the grinding-plate, one pair of each quadruple set having a central passage, and the other having outer and inner passages on concentric lines, staggered to the central passage of the other pair.

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Witnesses:

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