

July 1, 1930.

C. M. STONER
PULVERIZING MACHINE

1,769,867

Filed Nov. 5, 1927

2 Sheets-Sheet 1

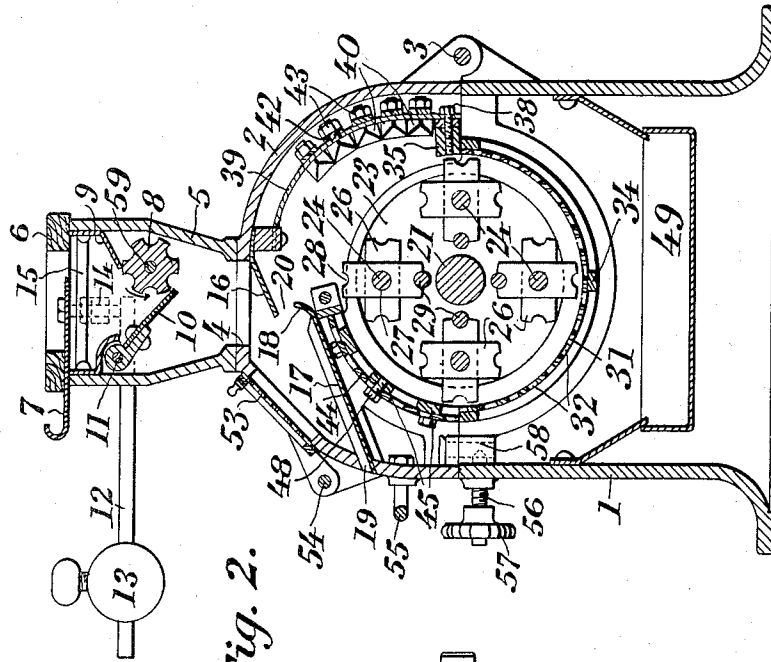


Fig. 2.

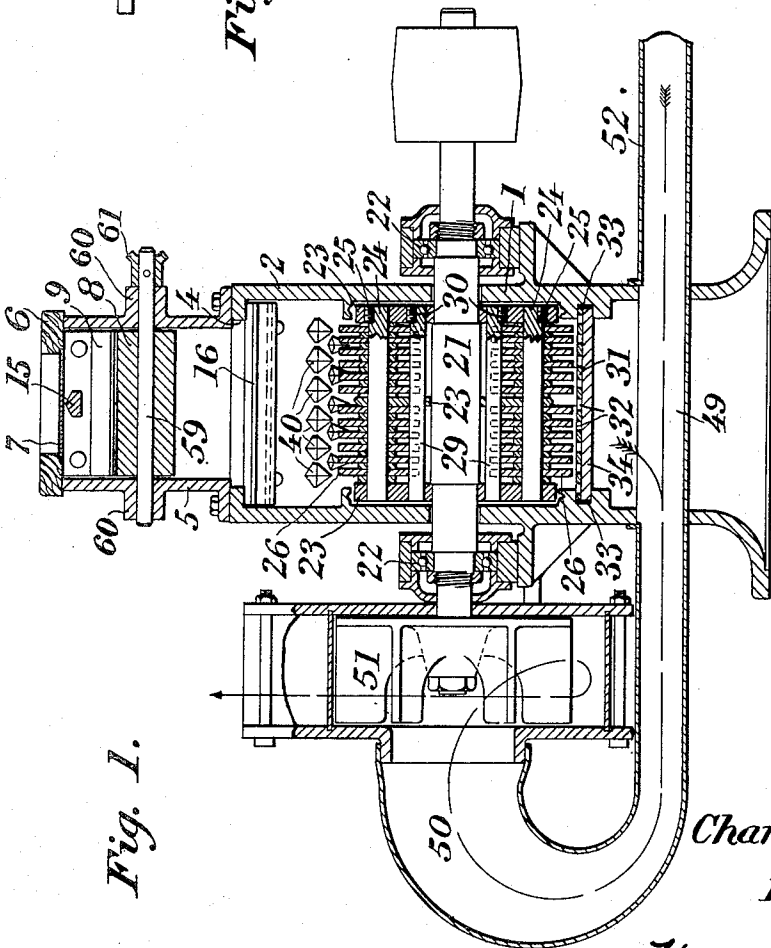


Fig. 1.

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2 Sheets-Sheet 2

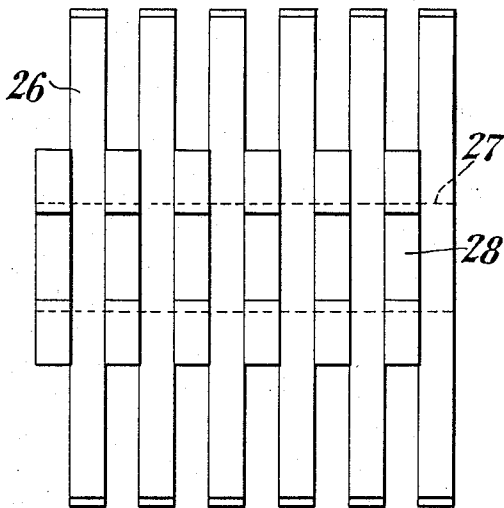


Fig. 3.

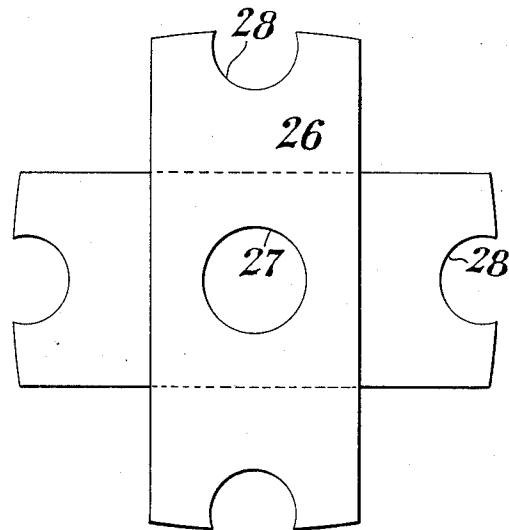


Fig. 4.

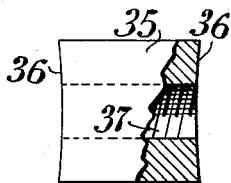


Fig. 6.

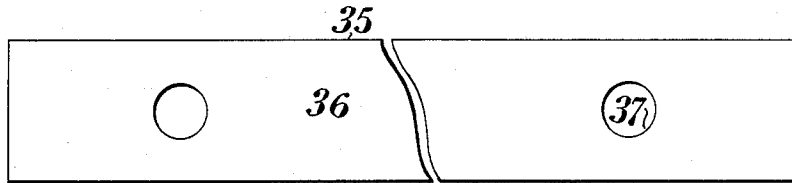


Fig. 5.

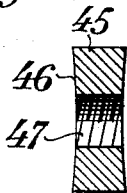


Fig. 8.

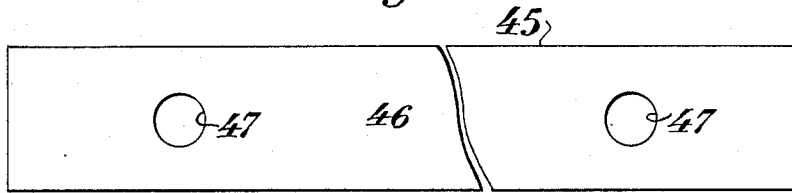


Fig. 7.

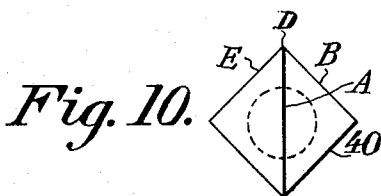


Fig. 10.

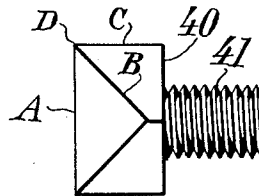


Fig. 9.

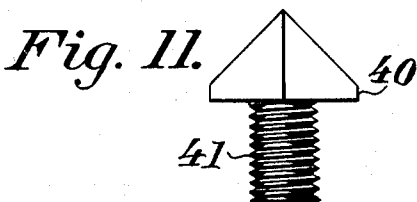


Fig. 11.

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UNITED STATES PATENT OFFICE

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PULVERIZING MACHINE

Application filed November 5, 1927. Serial No. 231,286.

This invention relates to pulverizing or grinding machines.

An object of the invention is to provide a pulverizing machine with means for converting relatively large pieces of various materials to a pulverized, or semi-pulverized state, or to any desired graded size, the final state of the material being substantially uniform throughout.

Another object is to provide a machine of the type specified which is so constructed as to eliminate foreign matter from the material being ground by the machine.

Another object is to provide a pulverizing machine with a plurality of interchangeable and reversible cutting elements.

Another object is to produce an efficient, strong, and durable machine of the type specified, which may be economically constructed and operated.

Other objects and advantages will hereinafter appear.

The views of the drawings are:—

Figure 1 is a vertical longitudinal section through a pulverizing machine constructed according to my invention;

Fig. 2 is a vertical transverse section thereof;

Fig. 3 is an edge elevation of a portion of the cutting blades;

Fig. 4 is a front view of the blades shown in Fig. 3;

Figs. 5, 6, 7 and 8 are detail views of the breaker bars; and

Figs. 9, 10 and 11 are detail views of one of the spurs.

Referring to the drawings, the machine comprises a casing including a base 1, having a cover 2 pivotally connected thereto, as indicated at 3. The base may be made substantially rectangular, while the cover may be of semi-cylindrical form and fit tightly on the top of the base.

The top of the cover has an opening 4 which registers with the bottom open end of a feeding head 5 that is carried by the cover.

The feeding head 5 is provided with a cap 6. This cap may serve as an adapter for a spout (not shown).

Beneath the cap 6 is a slide 7 for closing

the top of the feeding head. The slide 7 may be so positioned as to control the amount of material delivered through the feeding head to the machine.

Mounted in the feeding head 5, beneath the slide 7, is a fluted roll 8. Preferably, the roll is positioned longitudinally of the feeding head adjacent to one side thereof.

The roll 8 is fixed to a shaft 59 mounted in bearings 60 formed in the walls of the head 5. One end of the shaft 59 has a bevel gear 61 mounted thereon. This gear is adapted to be driven by suitable mechanism (not shown) to revolve the roll in the direction of the arrow (Fig. 2).

Directly above the roll 8 is an inclined plate 9 for directing the loose material, as it enters the feeding head, inwardly.

A valve 10 is also mounted in the feeding head.

The valve is pivotally mounted on a rod 11 which projects through the walls of the feeding head and has fixed thereto an arm 12 carrying an adjustable weight 13.

The relative position of the valve 10 is controlled through a set screw 14, carried by one wall of the feeding head and bearing against the inner end of the arm 12.

The normal position of the valve 10 is such that its inner edge is disposed beneath the adjacent portion of the roll 8.

The valve is inclined to a considerable extent, and it forms, with the roll, a trough having a restricted outlet through which the material flows. The width of this outlet can be increased or decreased by turning the screw 14. The flow of the material downwardly through the head will be assisted by the revolving roll, as will be readily understood.

Beneath the slide 7, and overlying the roll 8 and valve 10, is a spreader 15.

A baffle plate 16 is mounted in the top of the cover 2, beneath the opening 4. This baffle is slightly inclined, and it intercepts the material flowing through the head 5.

A chute 17 is mounted in the cover 2. The chute is disposed below the baffle 16, its inner edge being curved upwardly, as indicated at 18, while its opposite edge extends

through an opening 19 formed in the side of the cover. The arrangement of the baffle 16 and the chute 17 is such that a gap 20 is provided therebetween.

The grinding wheel comprises a drive shaft 21, which is mounted in bearings 22 carried by the base 1.

The shaft 21 has secured thereto a plurality of disks 23. These disks are disposed interiorly of the casing and they are connected by means of a plurality of rods 24.

The rods 24 are removably carried by the disks, being retained in position by means of screws 25.

The rods 24 are disposed adjacent to the periphery of the disks 23, and they provide supports for the cutting elements.

In the present instance, the cutting elements comprise crossed blades 26. The blades may be made from rectangular sheets, perforated in the center, as indicated at 27, for insertion on the rods.

In making the cutting elements two sheets of material are crossed at right angles to each other and then firmly attached together, by welding, or the crossed blades may be made unitary by any other suitable method.

The ends of the blades are made slightly arcuate, and are furthermore formed with semi-circular notches 28.

The notches 28 serve for two purposes. First the projecting ends of the blades are provided with a plurality of cutting edges. Second, the notches 28 that are disposed contiguous to the shaft 21 receive rods 29 which are carried by the disks 23 in a manner similar to the rods 24, the rods 29 being locked in position by means of screws 30. The rods 29 serve as means for retaining the blades in fixed position in the grinding wheel.

When the portions of the blades disposed around the circumference of the grinding wheel become worn, the rods 29 can be withdrawn, after first removing the set screws 30. The blades can then be turned on the pivots provided by the rods 24, so that the next unused end of the blades will be disposed in the cutting zone. The rods 29 can then be reinserted and locked in position by means of the screws 30.

Mounted in the base 1, and disposed beneath the grinding wheel, is a semi-cylindrical screen 31 having perforations 32 formed therein.

The perforations of the screen have a diameter substantially equal to the size of the pulverized particles formed by the machine.

The edges of the screen 31 are mounted in grooves 33 formed in the end walls of the base 1. The bottom of the screen is reinforced by means of a strap 34 that has its ends fixed in the end walls of the base.

Disposed adjacent to one edge of the screen, and carried by the cover 2, is a cutting bar 35. This bar is rectangular in form, and, as shown at 36, two of its surfaces are concaved, so that a plurality of relatively sharp cutting edges will be provided.

The bar 35 has threaded openings 37 which receive the shanks of bolts 38 carried by an arcuate plate 39.

The plate 39 is mounted in spaced relation to the inside of the cover and extends upwardly towards the opening 4.

The plate 39 has a plurality of spurs 40 removably mounted thereon, the spurs being arranged in rows that overlie the cutting bar 35.

The spurs 40 have threaded shanks 41 which are passed through openings 42 in the plate 39, and are secured to the plate by means of nuts 43.

As shown clearly in Figs. 9, 10 and 11, the spurs 40 have diamond-shaped heads that are formed with a plurality of relatively sharp edges A, B, C, D and E. When the exposed edges of the spurs become worn, new cutting edges can be obtained by loosening the nuts 43 and turning each spur one-half revolution.

On the opposite side of the machine and disposed between the chute 17 and the screen 31, the cover 2 is provided with a perforated arcuate plate 44, on which are detachably mounted a plurality of cutting bars 45.

The bars 45, which are rectangular in form, have their upper and lower surfaces concaved, as indicated at 46. The only difference between the bars 45 and the bar 35 is that the former are made from thinner material.

The bars 45 are provided with threaded openings 47 which receive the shanks of bolts 48 carried by the plate 44.

Beneath the screen 31, the casing 1 is provided with a trough 49 which extends longitudinally of the machine.

One end of the trough 49 terminates in a gooseneck portion 50 that is connected to a suction fan 51 mounted on the end of the shaft 21, while the opposite end of the trough projects from the machine and constitutes a conduit 52 that may be connected to a dust collector (not shown).

The conduit 52 is used for partially returning air from the dust collector. The current of air flows in the direction indicated in Figure 1 and the air assists in removing the material from the trough 49.

Another purpose for the return of air is to relieve the dust collector from exhausting a relatively large amount of air with the attendant difficulty of returning the fine dust.

The small amount of air exhausted from the dust collector is taken in through the

opening 19 and a perforated door 53 which is pivotally connected to the cover 2 by a hinge 54. The door 53 is disposed above the opening 19.

The air flowing through the opening 19 and door 53 produces a draft or suction of sufficient force to draw the material through the gap 20.

This same quantity of air drawn into the machine likewise produces a partial vacuum around the screen and accelerates the material passing through the perforations thereof.

The cover 2 is provided with a handle 55 by means of which the cover may be raised on its pivot.

For the purpose of retaining the cover closed, I utilize a screw 56 that is mounted in the base 1. The screw has a hand wheel 57 by means of which it may be turned in or out. When turned inwardly, the screw engages a lug 58 depending from the cover 2, and this action will firmly clamp the cover to the base.

In the operation of the device, the material is fed into the feeding head 5 and strikes the spreader 15. The spreader is so constructed that the material is divided into two streams that fall on to the roll 8. The material then passes to the valve 10 and is discharged therefrom in uniform quantities.

The purpose of the valve is to prevent any material having dimensions greater than the space between the roll 8 and the valve from collecting in the top of the feeding head and stopping the flow.

The material falls on the baffle 16 and is deflected therefrom towards the door 53. It is then drawn through the gap 20 by means of the vacuum created by the suction fan 51 and associated parts.

Material having a specific gravity greater than that of the material being ground will not be drawn through the gap 20. Such material will flow down the chute 17 and pass out of the machine through the opening 19. The angular pitch of the chute 17 exhausts the undesirable objects, thereby affording greater safety of operation, as well as protecting the machine from damage.

In this way, all foreign matter such as particles of metal, or other heavy substances, will be eliminated, before the material is delivered to the cutting elements of the machine.

The value of this function of the machine will be obvious, as a greater degree of safety in the elimination of sparks caused by a metal to metal contact is provided for, and the machine is further protected from damage due to metal pieces entering between the grinding elements.

The material that has been drawn through the gap 20 falls, and is struck by the rotating blades 26 of the grinding wheel. The blades

throw the material against the spurs 40 which split and break the material. The material is further broken between the bar 35 and the blades 26.

In its partial revolution over the inner periphery of the screen 31, the material, which has been reduced to a degree of fineness, passes through the screen, its movement through the screen being accelerated by the action of centrifugal force and the suction.

The material that still remains of a larger size receives a multiplicity of blows between the bars 45 and the blades 26, and in its succeeding revolution or revolutions passes through the screen and falls into the trough 49. The ground material is then removed in the direction of the arrow (Fig. 1) by the suction fan 51.

The invention set forth herein is, of course, susceptible of various modifications and adaptations.

The invention claimed is:—

1. A pulverizing machine comprising a casing including a base and a cover, a rotatably mounted cutting element, a semi-cylindrical screen surrounding the lower portion of said cutting element, a cutting bar disposed along the upper edge of the said screen on one side of the casing, a plurality of cutting spurs mounted in the cover above said cutting bar, and a plurality of cutting bars disposed above the edge of said screen on the side of the cover opposite to the said spurs.

2. A pulverizing machine comprising a casing including a base and a cover, a rotatably mounted cutting element, a semi-cylindrical screen surrounding the lower portion of said cutting element, a cutting bar disposed along the upper edge of the said screen on one side of the casing, a plurality of cutting spurs mounted in the cover above said cutting bar, and a plurality of cutting bars disposed above the edge of said screen on the side of the cover opposite to the said spurs, said cutting bars having concave faces disposed towards the said rotatable cutting element.

3. As an element of a pulverizing machine, a substantially rectangular shaped cutting bar having cutting edges at each end of one face thereof, and having a continuous concave surface between said edges.

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