Nov. 11, 1952 E. L. COLE 2,617,600

SCREEN WITH SLOT-AND-CIRCULAR OPENING-PATTERN FOR HAMMER MILLS

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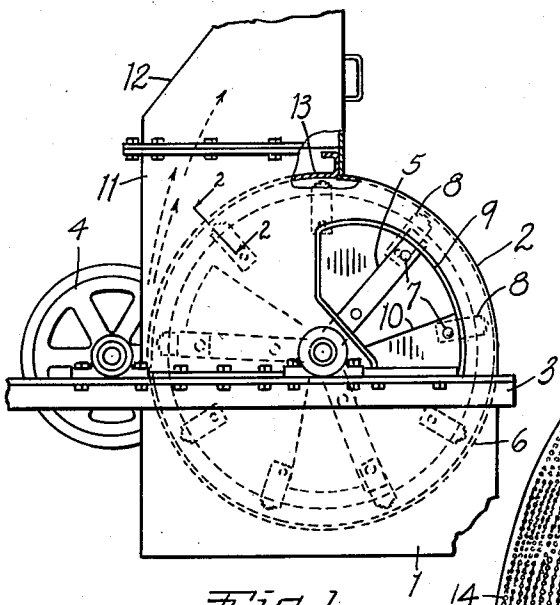


Fig. 1.

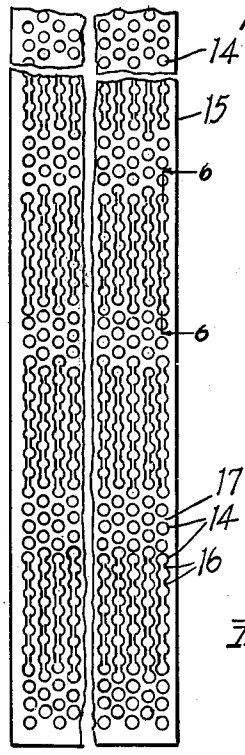


Fig. 5.

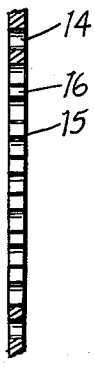


Fig. 6.

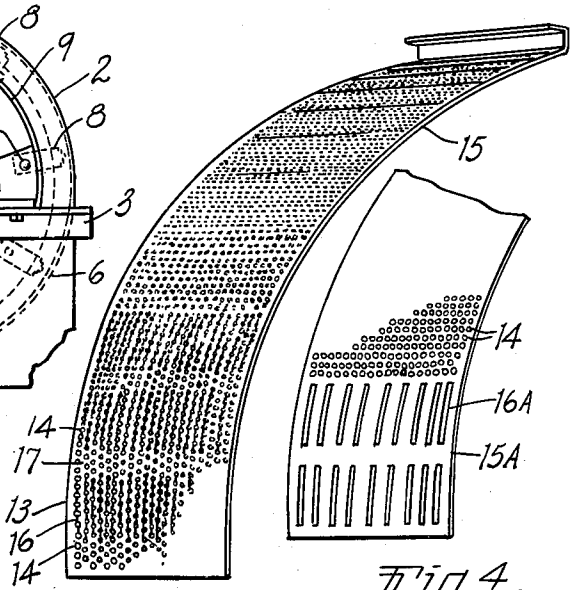


Fig. 3.

Fig. 4.

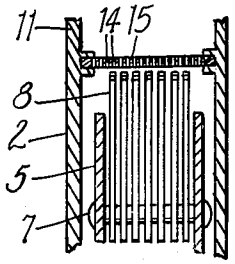


Fig. 2.

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SCREEN WITH SLOT-AND-CIRCULAR OPENING-PATTERN FOR HAMMER MILLS

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2 Claims. (Cl. 241—88)

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This invention relates to improvements in screen, with slot-and-circular opening-pattern, for hammer mills.

The principal objects of this invention are:

First, to provide an improved form of screen for hammer mills and the like which will not become clogged by the material passing therethrough.

Second, to provide an arcuate screen for hammer mills with openings therethrough which permit the flow of air and ground material directly through the screen in the direction of the outlet from the mill without reversing or changing the direction of the flow as it passes through the screen.

Third, to provide a screen for a hammer mill having openings therethrough for controlling the size of the material to be passed from the mill and at the same time permitting direct flow of the material through all portions of the screen.

Other objects and advantages relating to details of my screen will be apparent from a consideration of the following description and claims.

The drawings, of which there is one sheet, illustrate two highly practical forms of my screen.

Fig. 1 is a side elevational view of a hammer mill partially broken away in vertical cross section to illustrate the position of my screen therein.

Fig. 2 is a fragmentary cross sectional view transversely through the mill and screen taken along the plane of the line 2—2 in Fig. 1.

Fig. 3 is a perspective view of a first form of my screen.

Fig. 4 is a fragmentary perspective view of a second form of my screen.

Fig. 5 is an enlarged detailed elevational view of the first form of my screen in developed or flat position.

Fig. 6 is a fragmentary cross sectional view through the first form of screen taken along the plane of the line 6—6 in Fig. 5.

In the drawings I have illustrated a hammer mill which comprises a lower housing 1 and an upper arcuate housing 2. A horizontal framework 3 carried by the lower housing supports a driving wheel or pulley 4 and the rotor 5 which is positioned within the housings 1 and 2. A semi-cylindrical wall 6 completes the cylinder of the arcuate upper housing 2 within the lower housing. The rotor 5 includes a pair of rotatable discs having the pivot pins 7 extending therebetween at spaced points around the periphery of the discs. The pins 7 constitute pivotal supports

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for the bar-like hammers 8 so that as the rotor is driven at relatively high speed the hammers are thrown outwardly by centrifugal force to grind or beat grain or other material against the inner cylindrical sides of the housing. Material to be ground is delivered into the upper housing 2 through a feed opening 9 and the front disc is provided with one or more segmental openings 10 through which the material enters the interior of the rotor.

The leading quadrant of the upper housing 2 where the beaters enter the upper housing is extended tangentially and radially outwardly in an outlet throat 11 and a delivery stack or conduit 12 is secured to the open end of the throat 11. An arcuate screen 13 is positioned across the inner end of the throat 11 to coact with the hammers 8 while permitting the discharge of the ground material from the housing 2 to the throat.

The foregoing construction is generally familiar in the hammer mill art and is described in general terms only to illustrate the position and function of my improved screen. It should be understood that a blast of air is directed into the housings 2 and 3 to carry the ground material through the screen and out the duct 12. This blast of air may be created by an externally mounted and driven blower or may consist of vanes or blades carried directly by the rotor 5 radially inwardly of the hammers 8.

It will be noted that the throat 11 at its outer side extends generally tangentially with respect to the lower end of the arcuate screen 13. As the upper end of the screen is curved inwardly across the top of the rotor the direction of air travel from within the rotor to the throat 11 approaches and becomes generally radial with respect to the rotor and screen. I have noted that hammer mill screens have a tendency to become clogged at the lower outside ends thereof with a resulting loss of capacity and efficiency in the mill. I have further observed that this clogging of the lower portion of the screen apparently is due to the fact that the blast of air and entrained ground material leaving the rotor tangentially near the lower end of the screen must first make a 90° outward turn to pass radially through the screen and then make another 90° turn to pass upwardly through the outer side of the throat 11.

My improved form of screen 13 is formed to provide a plurality of slot-like openings extending circumferentially of the screen along the lower outside end thereof. The width of these

slots is controlled to be no greater than the diameter of the screen holes 14 which are formed radially through the upper portions of the screen. By use of these slots the air and ground material approaching the lower end of the screen tangentially are permitted to pass therethrough substantially without change in direction and consequently without resistance which would tend to decrease the velocity of the air and material at that point. Since the velocity of the air and material is maintained at the lower end of the screen there is little tendency for the slots to become clogged as would radially formed holes at the same position.

The first form of my screen illustrated in Figs. 3 and 5 to 6 consists of an arcuate plate 15 having a multiplicity of radially formed holes or bores 14 therethrough. Toward the lower end of the screen the several holes 14 are connected by forming the vertical cuts or slots 16 between adjacent vertically aligned holes. The slots 16 are vertically separated by unslotted portions 17 to retain the rigidity in the screen. It should be noted that the slots 16 are narrower than the diameter of the holes 14 so that there is little tendency for material to pass through the slots in any coarser size than would pass through the holes 14 themselves.

The modified form of screen illustrated in Fig. 4 consists of an arcuate screen plate 15A having the same screen holes 14 formed through the upper end thereof and continued downwardly toward the lower end to a point where the air flow from the housing tends to become tangential with respect to the screen. At this point in the lower end of the screen there is formed a series of transversely spaced circumferentially elongated arcuate slots 16A which function in the same manner as the slots 16 in the first form of screen.

Not only does my improved type of screen have better nonclogging characteristics than the old screen but it is less difficult and expensive to form than the old screen as it is no longer necessary to so accurately control the spacing of the holes through the lower end of the screen. The width of the slots and holes is still controlled and varied in different screens to regulate the size of the ground material which will be discharged from the mill but it is no longer necessary to carefully determine the spacing of the several holes 14.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a hammer mill having a delivery throat extending from a quadrant of the hammer mill cylinder, said throat opening tangentially from one edge of said cylinder and extending across said quadrant to open radially of the cylinder at the opposite edge of the throat, a screen extending across said throat, said screen comprising an arcuate strip of metal having a multiplicity of circular passages therethrough and distributed thereover in circumferential lines, adjacent passages near the tangential side of said throat being joined by circumferentially extending slots narrower than the diameter of said passages.

2. In combination with a hammer mill having a delivery throat extending from a segment of the hammer mill cylinder, said throat opening tangentially from one edge of said cylinder and extending across said segment to open generally radially of the cylinder at the opposite edge of the throat, a screen extending across said throat, said screen comprising an arcuate strip of metal having a multiplicity of circular passages therethrough and distributed thereover in circumferential lines, adjacent passages near the tangential side of said throat being joined by circumferentially extending slots.

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