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M. C. CECKA

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SCREEN CLEANER

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Fig. 1.

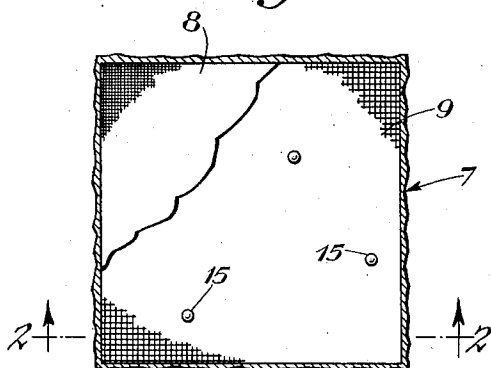


Fig. 3.

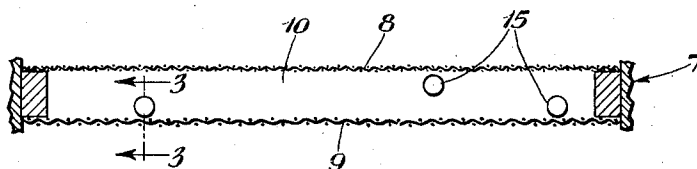
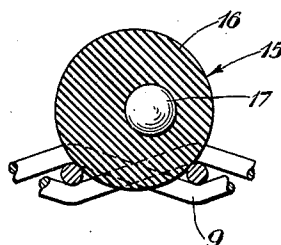


Fig. 2.

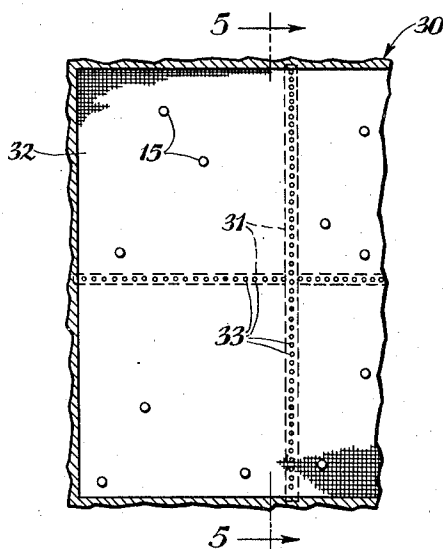
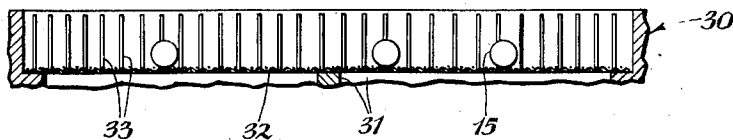


Fig. 4.

Fig. 5.



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SCREEN CLEANER

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1 Claim. (Cl. 209—323)

This invention relates to a screen cleaner and more particularly to such a cleaner adapted for use with gyrating or reciprocating shake sifters, screens or bolting equipment to keep the meshes of the sifting, screening or bolting silks, wires or other sifting mechanism from clogging with the material being separated or graded.

One of the objects of the invention is to provide such a screen cleaner which will maintain the meshes of the screen open at all times during its operation so as to maintain maximum separating capacity and efficiency.

A further object is to provide such a cleaning device which produces a minimum wear on the sifting device.

A further object is to provide such a cleaning device which will maintain the meshes of a screen or sifting surface open by the action or motion of the screening mechanism itself without propulsion by mechanical means of the cleaning device independently of the screening mechanism.

A further object is to provide a cleaning device which can be used in, or upon, any type of cleaning, sifting or bolting equipment.

A further object is to provide a cleaning device molded or formed from relatively soft compounded or synthetic rubber, or from a suitable relatively soft resilient plastic and loaded with a weight of heavier material than the rubber or plastic for the purpose of making the cleaning device heavier than the natural weight of the material from which it is fabricated. Such weighting of the rubber or plastic body permits of the use of lighter, softer and more resilient material in the body of the cleaner, thereby to provide increased life, decreased wear upon the screen, and increased movement and efficiency of the body as a screen cleaner.

Another object of the invention is to provide such a screen cleaner composed of a weighted body of relatively soft rubber or resilient plastic in which the weight is eccentrically disposed with reference to the center of gravity of the body so as to impart an erratic bouncing movement of the cleaner against the screen, thereby to improve its efficiency as a screen cleaner.

Another object of the invention is to provide such a weighted body of resilient material in which no fire hazard is created and in which there is no danger of damage to any of the equipment in the event that any of the weighting material becomes freed from the resilient bodies.

Another object of the invention is to provide such a screen cleaner which, when used on top of the screen, will serve to break up balls of material which tend to ball up on the screen, such balls of material tending to become harder unless immediately broken up.

In the accompanying drawing:

Fig. 1 is a horizontal section through a screen

frame and showing the same equipped with screen cleaners embodying my invention.

Fig. 2 is a vertical, enlarged, transverse section, taken on line 2—2, Fig. 1.

Fig. 3 is a vertical, further enlarged, transverse section taken on line 3—3, Fig. 2, and showing one of the screen cleaners embodying my invention in section.

Fig. 4 is a view similar to Fig. 1 and showing a screen frame of a construction suitable for use with the screen cleaners on top of the screen to break up balls of material which tend to ball up on the screen.

Fig. 5 is a vertical, enlarged, transverse section, taken on line 5—5, Fig. 4.

For the purpose of illustrating the action of the screen cleaning devices forming the subject of my invention, the screen cleaners are shown in conjunction with a screen frame which may form a part of any type of agitated screening, sifting or bolting equipment. Thus, the screen frame conventionally illustrated could be used in conjunction with a gyratory sifting machine, a reciprocating sifting machine or a combined gyratory and reciprocating sifting machine.

The form of the screen illustrated in Figs. 1-3, is shown as including a frame 7 which is shown as being of square rectangular form although it will be understood that the frame can be of any form to suit the particular machine in which it is used. Upon the upper side of the screen frame 7 is mounted a screen or bolting cloth 8. Although this screen usually consists of fine mesh woven silk cloth for use in manufacturing flour and other powdered or granular stock, this screen may be made of any other material and size of mesh to suit the particular kind of material which is to be sifted. Below the bolting screen a cleaner carrier 9 is mounted on the screen frame 7, this cleaner carrier preferably consisting of a grate of coarsely woven wires and upon which the cleaners embodying the present invention are supported for cleaning the bolting cloth screen 8 from its underside.

The cleaning devices 15 embodying my invention are illustrated in Figs. 1-3 as inserted in the space 10 between the screen 8 and the cleaner carrier 9 of each screen frame. The screen cleaners are confined in this space 10 by the frame 7.

The cleaning device 15 is shown as comprising a spherical body 16 made of compounded or synthetic and relatively soft and resilient rubber or of a suitable relatively soft and resilient rubbery plastic, this body being provided with a sphere 17 of a material heavier than the rubber or the plastic for the purpose of making the cleaning device heavier than the natural weight of the resilient material from which it is compounded. This weight 17 can be molded or other-

wise provided in the spherical body 26 of resilient material and is arranged eccentric to the center of gravity of the molded body 26, this constituting an important feature of the invention.

A further feature of the invention resides in the composition of the eccentric weighting sphere 17. It is essential that this be made of a material having a high specific gravity so as to greatly increase the weight of the spherical body 16 of plastic material. By using a material having such high specific gravity it is possible to employ relatively soft and resilient rubber or plastics in the composition of the spherical body 16 thereby to provide improved bouncing action of the screen cleaner with a minimum amount of wear and abrasion upon the screen. It is further essential, where danger of fire or explosion exists, that the weighting sphere 17 be made of a non-ferrous metal or suitable compound or plastic so that there will be no danger of sparks being generated in the event that the weighting spheres 17 become exposed. The danger of such sparks in flour mills, chemical plants and processes is recognized as a serious fire hazard. It is further essential, where the screened materials are to be subsequently processed, that the material of which the spherical weight 17 is composed be of such soft nature that it will readily pass through milling machinery, such as rolls, crushers and pulverizers without danger of injuring this machinery.

I have found that by using lead for the weighting spheres 17 all of the above requirements are met, lead having a high specific gravity so as to provide the desired total weight of the screen cleaner even when relatively soft and resilient rubber or plastics are used in the composition of the spherical body 16; lead being non-ferrous so that there is no danger of its causing sparks, if exposed, with consequent fire hazard; and lead being sufficiently soft to pass through the rolls and other milling machinery without danger of injuring the rolls or milling machinery.

In the operation of a screen cleaner, sifter, bolter or screening device including screens equipped with screen cleaners as above described, the screen frame is caused to be agitated so as to gyrate with a circular motion or move with a reciprocal shake, or a combination of both. Since the cleaning device forming the subject of this invention is not fastened to this apparatus, its inertia tends to keep it stationary when the sifter is in operation. This condition causes the carrier wire 9, or rough surface, on which the cleaning device rests, to move in its path at a speed greater than the cleaning device, which by its inertia and the pull of gravity tends to remain in a stationary position. The rough surface in moving under the cleaning device causes the cleaning device to get into motion by the impact of protruding surfaces on this rough surface.

The cleaning device, when it comes into contact with a protrusion of the rough surface on which it is supported, is caused to rebound under the impact of this contact. This rebound causes the cleaning device, by its resilient surface, to bound upward or sideward, or both, according to the angle and force which it receives under the impact. This upward or sideward motion causes the cleaning device to come into contact with the underside of the screening surface 8 which it is to clean. The motion caused by the impact of the rough surface 9 on the cleaning device causes the cleaning device to strike the underside of

the screening surface 8 with a sliding or rubbing or tapping action, or both. The cleaning device, by this impact of the projections of the rough surface 9 under it, will travel in a trajectory, the apex of which is a point on the sifting screen 8 to be cleaned, and returns by the pull of gravity to the rough surface 9 at a point some distance from the point at which it received the first impact. Upon again making contact with the moving rough surface 9, the cleaning device again comes in contact with a projection on this surface thereby causing another impact which again impels the cleaning device in a trajectory upward and sideward against the cleaning surface 8. Since the surface 9 on which the cleaning device rests is in a generally horizontal plane, the motion of the cleaning device under the impact of the projections of this rough surface, causes the cleaning device to travel in a trajectory to land at another point at some distance from its original point of impact, and upon landing the action of propulsion and trajectory is repeated, thereby to cause the cleaning device to rapidly move its position from place to place under the screening area and to rub and tap the entire area of the screening surface. The vertical walls of the frame 7, which restrict the travel of the cleaning devices to the area of the screening surface 8 which it is to clean, propel the cleaning device with the same effect as the projections of the rough surface 9 supporting the cleaning device and aid in the rubbing and tapping effect which the cleaning device produces on the underside of the screening surface.

Each time the cleaning device comes into contact with the underside of the screening surface 8 it produces a tapping or rubbing motion, or both, thereby to dislodge any particles which may tend to be caught in the apertures of the mesh of the screening surface. By this means the meshes of the screening surface 8 are kept free from particles which are small enough to become lodged in the mesh of the screen, but too large to pass through the apertures without force. In its action, the cleaning device taps or rubs the particles lodged in the mesh apertures from the underside and cause these particles to dislodge from the mesh and return to the top of the cleaning surface where it is rejected by the apertures of the mesh as oversize since its dimensions are too large to permit it to pass through the mesh freely. This insures accuracy of size determination by the mesh apertures of the screening surface and by dislodging the particles, the apertures are kept open for the passage of proper sized particles. Maintaining a maximum of unclogged apertures in the mesh increases the quantity of material passing through the screening surface, and thereby increases the capacity of the sifter.

The additional weight provided by the heavy core 17 molded in the resilient body 16 of the cleaning device increases the efficiency of the cleaning device. As the cleaning device is effective through its sideward and upward moving inertia after impact with a projection of the rough surface 9 on which it is supported, it will be seen that the increased weight provided by the weighting core 17 renders the cleaning device more effective in its rubbing and tapping action. Further, while the material composing the body 16 could be of higher specific gravity, the selection of such heavier material could only be done at a sacrifice of its resilience and softness, both of which are important elements in obtaining

the maximum efficiency with the minimum wear of both the cleaning device and the screening surface. The use of a lead weight or the like thereby permits of the use of a softer and more resilient material for the body of the cleaning device.

The eccentric location of the weight 17 is also an important feature of the invention. It has been found that with this eccentric arrangement of the weight the movement of the cleaning device is wildly erratic and unpredictable. This causes the cleaning devices to fly around in completely irregular paths so as to provide rapid cleaning action of all parts of the screening surface 8.

The spherical shape of the cleaning device provides a relatively smooth surface without sharp edges or projections, this combined with the relatively soft, resilient surface of the cleaning device permitted by the use of the eccentric weight 17, reducing the frictional and abrasive wearing effect on all the surfaces with which the cleaning device comes in contact. The resilient outer surface of the cleaning device further provides longer operating life for the cleaning device itself.

By the use of lead for the eccentric weight 17, the desired increased weight for the cleaning device can be readily provided because of the high specific gravity of lead. Further, if this weight should be released there is no danger of its causing sparks, with consequent fire hazard, as would be the case if a ferrous metal were used. Also, if the weight 17 of any cleaning device should become detached and pass through with the cleaned material, there is no danger of injury to the subsequent milling equipment since the lead, on passing through milling rolls, will be flattened out without injury to these rolls.

It has been found that where the material being sifted has a tendency to ball up, that is, the tendency to form into large masses which will not, of course, go through the screen, the screen cleaner forming the subject of this invention can be effectively used on top of the screen to break up and prevent the formation of such balls or masses of the material being sifted. Thus, by arranging my screen cleaners on top of the screen and confining them to the area of the screen and permitting them to bounce and move around irregularly in the same manner as shown in Figs. 1-3, the screen cleaners, on contacting any cohered masses of material will break up these masses so that all of the material of screenable size will pass through the meshes of the screen. Such use of my screen cleaners is shown in Figs. 4 and 5 in which is shown a frame 30 having at least three sides which are connected by cross bars 31 arranged under the screening cloth 32, the edges of this screening cloth being suitably secured to the bars forming the screened frame 30. The screen cleaners 15 embodying my invention are provided in a suitable number on top of the screen 32 and are shown as confined in different sections of the screen by pegs or nails 33 which are driven through the screen 32 into the cross bars 31 arranged under the screen, or suitably suspended over the screen from above. These pegs or nails 33 are uniformly spaced and are arranged sufficiently close together as to prevent the passage of the screen cleaners 15. These pegs or nails, however, permit the free flow of the material to

be screened along the screen cloth. The frame 30 of the screen can be agitated in any suitable manner as by a gyratory motion, a reciprocating motion, and a combination of both reciprocating and gyrating motions. The screen cleaners can be prevented from jumping over the pegs or nails 33 in any suitable manner, as by stacking the frames 30, the screen cleaners thereby being confined in the spaces delimited by the pegs 33 and by the frame arranged above the screen upon which the screen cleaners are supported.

In the operation of the screen cleaners embodying my invention as illustrated in Fig. 4, the screen cleaners are arranged in the flow of the material over the screen 32. As the screen frame is gyrated, reciprocated, or both, the screen cleaners are caused to bounce around in a highly irregular and erratic path in the same manner as in the form of the invention shown in Figs. 1-3. If any of the material flowing over the screen 32 forms into a ball or cohered mass, the screen cleaner upon striking this mass will immediately disintegrate it into its original powdery form thereby permitting the entire amount of screenable material to pass through the screen 32.

While I have shown, in Figs. 1-3, a form of the invention in which the screen cleaners 15 are arranged on a rough carrier wire grate 9 to rebound against the underside of the screen 8 to be cleaned, and have shown, in Figs. 4 and 5, these screen cleaners 15 arranged on top of the screen, it will be understood that these two uses of the screen cleaners 15 can be advantageously combined. Thus, the screen cleaners can be used both above and below the screen at the same time, thereby to preserve, in a pulverized condition, materials which tend to ball up on top of the screen, and also to rebound against the underside of the screen and keep the interstices thereof clean.

From the foregoing it will be seen that the present invention provides a screen cleaner which is simple and inexpensive in construction; which is eccentrically weighted so as to have a wildly irregular path of movement; which can be made of a soft, resilient, wear resisting material and still have the necessary weight to act with the maximum efficiency against the underside of the screening surface to be kept clean and which is weighted with a material which is of high specific gravity, will not cause sparks, and cannot injure any of the milling equipment.

I claim as my invention:

55 In a sifting mechanism having a frame, a screen carried by said frame, and means carried by said frame and cooperating with said screen to form an enclosed space, said screen frame being adapted to be agitated, a cleaner for said screen comprising a free solid sphere of soft, resilient, rubbery material arranged loosely in said space and a weight of lead completely embedded in and enclosed by said sphere thereby to prevent said weight from dropping out and passing on in the processing to cause damage to other machinery following the screen, said weight being arranged on one side of the center of gravity of said sphere and said sphere being of less diameter than the shortest diametrical dimension of said space allowing said sphere to jump freely in all directions.

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