March 10, 1925. 1,528,983

H. S. MONTGOMERY

METHOD AND APPARATUS FOR SCREENING MATERIALS

Filed Sept. 21, 1922

Fig. 1.

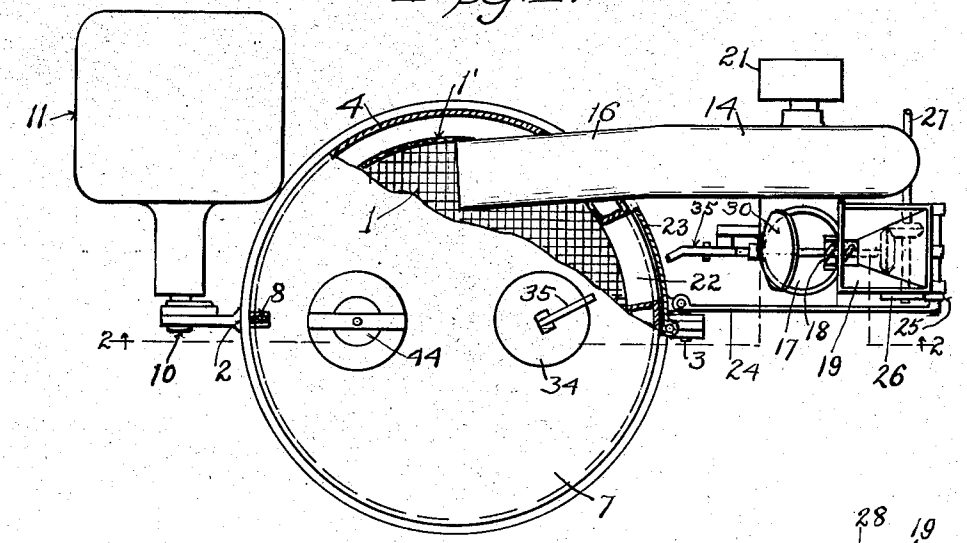


Fig. 2.

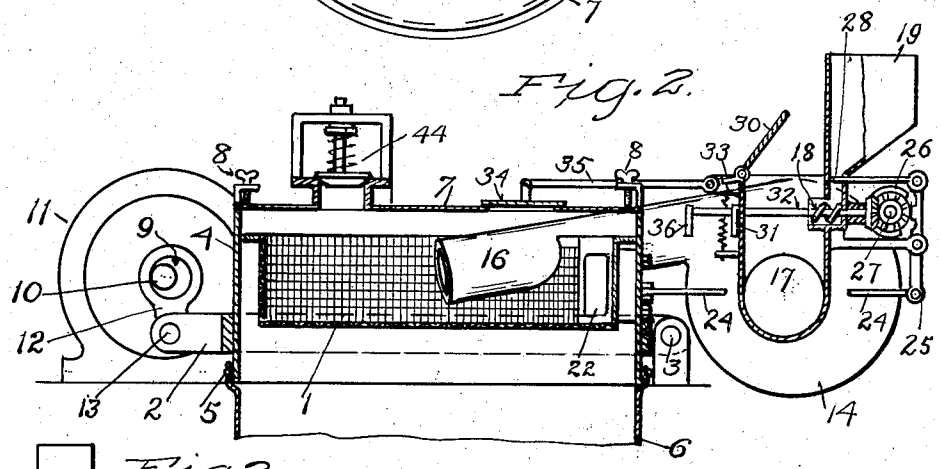
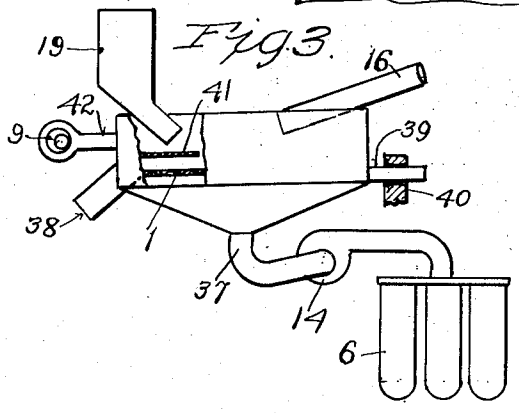


Fig. 3.



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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR SCREENING MATERIALS.

Application filed September 21, 1922. Serial No. 589,518.

To all whom it may concern:

Be it known that I, HENRY S. MONTGOMERY, a citizen of the United States, residing at Riverside, in the county of Riverside and State of California, have invented a new and useful Method and Apparatus for Screening Materials, of which the following is a specification.

This invention relates to the screening of materials to separate finer from coarser material and particularly to the screening of materials which are of a light, fluffy, nature and which are difficult to screen by the ordinary methods.

The main object of the present invention is to provide for screening such light fluffy materials in rapid, economical and effective manner.

The accompanying drawings illustrate an embodiment of my invention and referring thereto Fig. 1 is a partly broken plan of such apparatus; Fig. 2 is a vertical section thereof on line 2—2 in Fig. 1. Fig. 3 is a side elevation of a modification.

The apparatus shown in the drawings comprises a screen 1 of wire cloth, perforated metal, or other foraminous material, mounted on a frame 2 which is preferably supported in such manner as to permit free vertical or horizontal reciprocation of the screen, said frame, for example, being mounted on a pivotal support 3. The screen 1 may be provided with an enclosing box or casing 4 which may extend above and below the same, the portion below the screen being shown as provided with means 5 for attachment of a bag or sack 6 for receiving the material passing through the screen. A closure or cover 7 may be provided for the casing 4, said closure being provided, if required, with means indicated at 8 for attachment thereof to the casing 4. Screen 1, may be formed with a cylindrical extension 1′, so as to permit escape of fines laterally as well as downwardly, through the same.

Suitable means are provided for agitating vibrating or shaking the screens, said means comprising, for example, an eccentric 9 mounted on the shaft 10 of a motor such as an electric motor 11, said eccentric operating a link 12 which is pivotally connected at 13 to the frame 2 of the screen, or an air vibrator or electric vibrator may be connected directly to the screen to vibrate the same.

Means are provided for directing a current or blast of air, or gaseous medium, into the screen box 4 directly above the screen. For this purpose a blower, fan or compressor 14 may be provided having its outlet 15 leading into the screen box preferably in a tangential direction, said outlet being preferably formed as a nozzle, or nozzles, extending obliquely downward into the casing 4 so as to direct a current of air over, on to, and through the screen. The inlet 17 of said fan or blower is shown as provided with means 18 for feeding thereto the material to be screened, said material being supplied from a hopper or bin 19. The feed means 18 may be of any suitable construction, being formed, for example, as a screw conveyor or pusher which forces the material from the bin 19 into the air intake 17 for the blower 15. Said blower is provided with suitable driving means indicated at 21 for operating the same at the proper speed, to cause the air to be blown into the screen box 4.

Screen box or casing 4 is also preferably provided with an outlet 22 normally closed by a door or discharge gate 23 adapted to be opened when required for discharge of the coarse material. I have shown means for operating said gate automatically and periodically, said means comprising a link 24 connected to said gate and to a lever 25, which is operated by a cam 26 on a drive shaft 27 operated in any suitable manner, lever 25 may also operate a slide gate 28 for shutting off the feed when the discharge gate is opened.

The screen box or casing 4 is preferably circular in shape so that the current of air entering the same tangentially may set up a vertical or circular motion of the air and contents of the screen box.

The operation may be described as follows, as applied to the screening of diatomaceous earth which has been reduced to a suitable condition of fineness by crushing of grinding or both. Such material is supplied by feed means 18 to the intake of the blower 14 and is forced along with the current of air from the blower into the screen box 4, in such manner that it is caused to travel over the surface of the screen 1, the current or blast of air operating to feed the material to the screen box, to cause the material to travel over the surface of the screen, and to aid or force the fines in

passing through the perforations of the screen. The material referred to is so light and flocculent in its nature that the fines do not readily pass through the screen by gravity, but by reason of the pressure exerted on the material by the action of the air blast, the finer particles are forced through the screen so as to be rapidly separated from the coarser particles, which remain on top of the screen. By causing the material to travel over the surface of the screen, effective distribution of the material over the screen is insured and also a more rapid screening action. During this operation, the screen is agitated, vibrated or shaken back and forth by the shaking or jarring means above described, this movement of agitation of the screen also aiding in the screening operation and enabling the material to pass more rapidly through the screen. The agitation together with the mechanical effect of the air draft, prevent clogging of the screen by the fine light material. From time to time the discharge gate 23 is opened and the coarse material in the screen box discharged either by the mechanical effect of the air blast or in any other suitable manner.

I prefer to arrange the intake 15 for the screen box so that it forms a nozzle directing the air blast downwardly on to the surface of the screen. In some cases, however, this is not essential, it being sufficient to provide an air intake entering the screen box tangentially, or in any desired manner.

In some cases it is desirable to provide for an intermittent supply of air and for this purpose the air intake of the blower 15 may be provided with a damper or valve 30 which may be operated automatically and intermittently to shut off the air supply momentarily at intervals, giving the effect of successive puffs or blasts of air, which in some cases is desirable for producing a more sudden disturbing effect on the particles of material, tending to loosen them and to force them suddenly through the perforations of the screen. The intermittent closure means 30 may be operated by any suitable means, for example, by a tappet 31 on the shaft 32 of the feed means 18 and operating an arm 33 on closure means 30. If desired, the intermittent effect may be obtained by lifting a cover 34 in the top of casing 4, normally closing an opening, such lifting being effected, for example, by means of an arm 35 on said cover, operated by an arm 36 on shaft 32. A similar effect may be obtained by means of a relief valve 44, mounted on the casing 4 and opening automatically at intervals when the pressure exceeds a certain amount.

The fines passing through the screen 1 may be collected in the bag indicated at 6, the air passing through the walls of the bag, which is formed of the usual pervious fabric. In some cases, however, particularly in large installations, it is preferable, as shown in Fig. 3, to pass the air from the bottom of the screen box 4 through suitable conducting means 37 to a bag house containing the bags 6 to be filled so as to distribute the fine material to a plurality of bags, and in such case the fan or blower 14 may be located between the screen and the bag house. In that case the screen box may be opened to the air at its upper part, for example, through a nozzle or nozzles such as indicated at 16, which serves to direct the incoming air on to the screen, preferably in a tangential direction.

The screen may, as shown in Fig. 3, be mounted in inclined position, and in that case, an outlet, indicated at 38 may be provided at the lower end of the screen, so that the coarser material collecting at such lower end may be continually discharged through said outlet while the machine is in operation. This figure also illustrates the mounting of the screen box 4 so as to provide for both horizontal and vertical motion, a lug 39 on said box being adapted to slide and rock in a guide 40, and the operating eccentric 9 being in that case directly connected by its strap 42 to the screen box.

While I prefer to supply the material to the screen by means of the current of air, I may, in some case feed the material directly to the screen. Thus, as indicated in Fig. 3, the material may pass from the bin 19 to a shelf 41 in the screen box, being shaken therefrom by the agitation of the screen box and being distributed by the current of air which is directed in such manner as to blow the material downward on to and through the screen, as well as to cause it to travel over the screen. In this case the bin 19 may be carried by the screen box and the material may be supplied to said bin in any suitable manner.

What I claim is:

1. In combination with a substantially horizontal screen, means for agitating the same and means for directing a current of gaseous medium on to the surface of the screen from above in such manner as to cause the material to be screened to travel over the surface of the screen and through it.

2. In combination with a substantially horizontal screen, means for agitating the same and means for causing a gaseous medium to pass over the upper surface of the screen and downwardly through the screen so as to cause movement of material along as well as through the screen.

3. A construction as set forth in claim 2 in which the means for supplying the gaseous medium is formed as a nozzle adapted to direct a current of the gaseous medium downwardly on to the screen in a direction

inclined to the surface of the screen so as to cause movement of material along as well as through the screen.

4. In combination with a screen, a casing therefor, means for agitating the screen and means for supplying a current of gaseous medium over the said screen and tangentially within said casing and downwardly through the screen.

5. In combination with a screen, means for agitating the same and intermittently operating air supply means for supplying a current of air to the screen over the surface and downwardly through it in such manner as to cause the material thereon to travel over the surface of the screen and through it.

6. In combination with a screen, a casing therefor, means for agitating the screen, a nozzle extending into the said casing over the said screen and adapted to direct a current of air from said nozzle obliquely downward onto the screen in a tangential direction with relation to said casing.

7. A construction as set forth in claim 6 provided in addition with means for intermittently interrupting the current of air supplied through said nozzle.

8. In combination with a substantially horizontal screen, a casing therefor, means for agitating the screen, means for directing a current of air downwardly into said casing and along the upper surface of the screen, means for conducting away from below the screen the fines passing therethrough and for separating said fines from the stream of air passing through the screen.

9. A construction as set forth in claim 8 in which said casing is provided above the screen with a discharge opening for coarse material and closure means therefor adapted to be open to permit the coarse material to be discharged by operation of the current of air supplied to said casing.

10. The method of screening material which consists in supplying material above an enclosed substantially horizontal screening surface, agitating such surface, supplying a current of air to the said material while supported on said screening surface so as to cause the material to travel over said surface and to assist the fine material in passing through the screening surface.

11. The method of screening materials which consists in producing a current of air, supplying the material to be screened to such current of air in such manner as to cause it to be carried forward with such current of air, directing the current of air carrying such material on to and above an enclosed substantially horizontal screening surface, agitating such screening surface and separating the fines passing through such screening surface from the current of air passing through such surface with the fines.

12. A screening apparatus comprising a closed casing a screen therein, means for supplying a current of air to said casing downwardly onto and along the surface of the screen, means for supplying and distributing material to be screened to said current of air so that the material is fed to the screen by the current of air, and is also distributed on and forced through the screen by the current of air, and means for agitating the screen.

13. The method of screening material on a substantially circular screen surrounded by a substantially circular casing, which consists in moving the material to be screened down through and along the upper surface of the screen by directing into the casing a current of air diagonally downwardly onto the screen and in a direction tangential of the casing to set up a cyclonic air current.

14. The method of screening material on a substantially circular screen surrounded by a substantially circular casing, which consists in moving the material to be screened down through and along the upper surface of the screen by causing a cyclonic air motion above the screen and motion of the air down through the screen.

15. The method of screening material on a substantially circular screen surrounded by a substantially circular casing, which consists in moving the material to be screened down through and along the upper surface of the screen by causing a cyclonic air motion above the screen and motion of the air downwardly through the screen; and an intermittently operated gate in the wall of the casing for the purpose of intermittently allowing escape of material from the surface of the screen.

16. In combination with a screen, means for supplying a current of air above the screen to pass downwardly through the screen and to thereby assist material in passing through the screen, said means being intermittent in its actuation to intermittently apply the air current, and means to agitate and move the material over the surface of the screen.

In testimony whereof I have hereunto subscribed my name this 14th day of September, 1922.

HENRY S. MONTGOMERY.