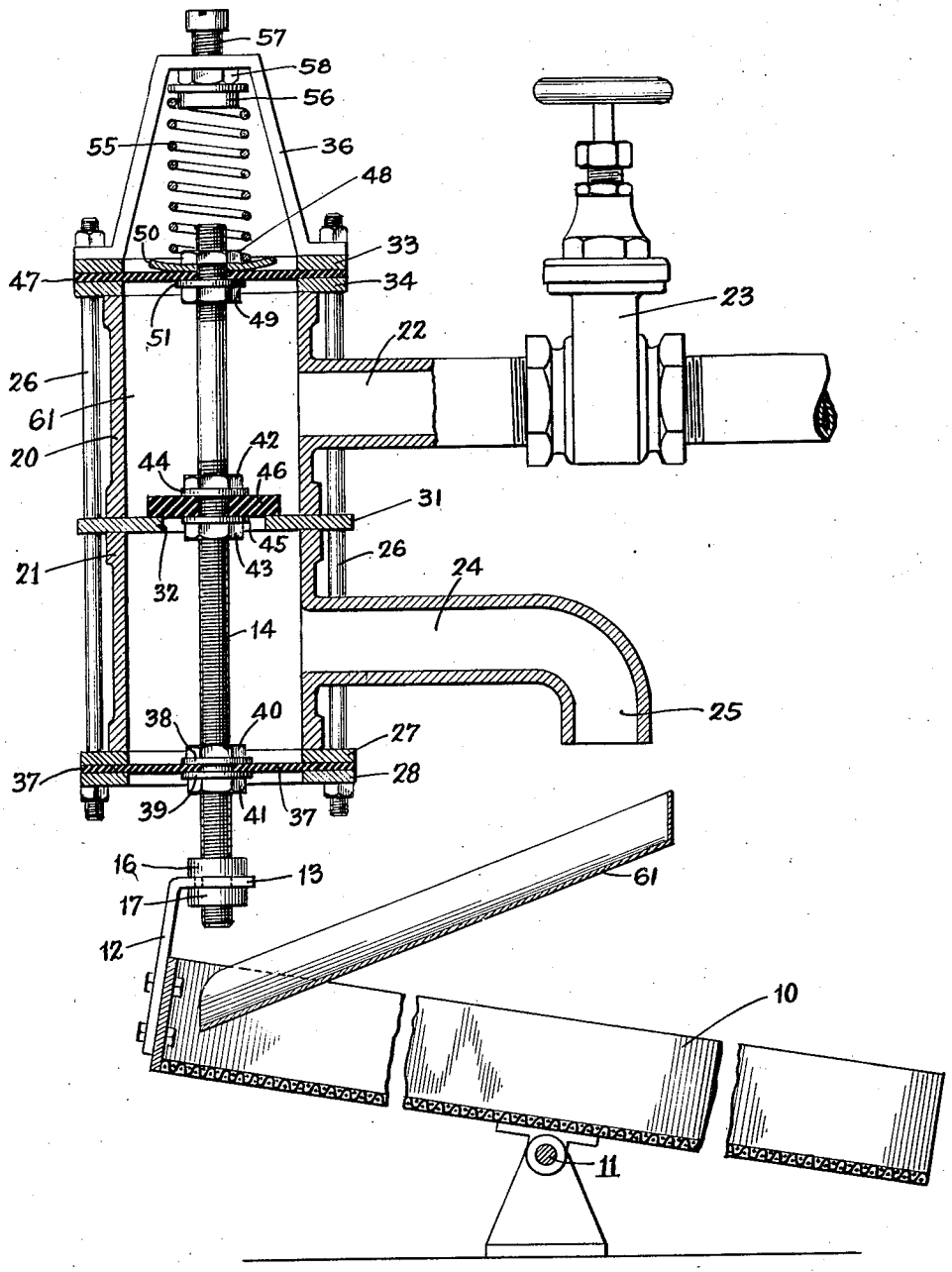
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SCREENING MECHANISM

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Inventor

George C. Crangle

By his Attorneys

Cooper, Kerr & Dunham.

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GEORGE C. CRANGLE, OF BUTTE, MONTANA

SCREENING MECHANISM

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This invention relates generally to separating mechanisms and has particular reference to screening mechanisms comprising a screen which is given a vibratory or shaking movement.

A broad object of the invention is to provide a mechanism for operating a screen to effect classification or separation of materials at a high speed, but which can nevertheless be controlled or regulated as to speed or rapidity of action according to the nature of the work to be performed.

Other objects are to provide a mechanism which can be constructed at a low cost but which is simple and durable in construction, and which will require a minimum amount of attention to maintain it in good working condition. Incidentally the mechanism is so constructed that if repairs are necessary they can be made with little trouble and expense.

With the foregoing and other objects in view, the invention consists in a novel construction and arrangement of parts, the novel features of which are pointed out in appended claims and an embodiment of which is hereinafter described with references to the drawing accompanying and forming a part of this specification.

Said drawing shows a screen mechanism and the mechanism for giving it a shaking or agitating movement, some of the parts being in section.

The apparatus shown in the drawing comprises a screen 10 pivoted as at 11 at a point intermediate its ends. The pivot may, as will be clearer later, be positioned at any point with reference to the length of the screen according to the results to be obtained. At one end the screen is provided with a metal strap 12 having a portion formed as at 13. In the portion 13 is an eye or opening engaging the lower end of a rod 14. The rod 14 is given a reciprocatory movement substantially endwise and it is preferred to have the connection between the strap 12 and the rod 14 free enough to allow a limited relative movement between the two, although owing to the construction of the mechanism for reciprocating and guiding the rod such relative movement is not absolutely necessary. The rod 14 is threaded for a greater part of its length, and nuts 16 and 17 on the rod may be adjusted to control the relative movement, if any, of the rod and screen. By separating the nuts far enough the rod 14 may have sufficient relative movement for the nuts to have a tapping effect upon the screen or by tightening them up substantially the full movement of the rod may be imparted to the screen.

The mechanism for actuating the rod 14 comprises two tubular sections 20 and 21, the section 20 having an inlet 22 controlled by a regulating valve 23, while the section 21 has an outlet 24 which preferably comprises a down-turned portion 25 for a purpose hereinafter explained.

The sections 20 and 21 of the casing, as well as other parts mentioned later on, are preferably held together by long bolts 26.

Below the section 21 of the casing is a pair of rings 27 and 28 provided with suitable holes or notches engaged by the bolts 26. Between the sections 20 and 21 of the casing is a plate 31 which is preferably engaged by the bolts 26 and which has a central opening 32. Above the section 20 of the casing is a pair of rings 33 and 34 provided with holes or notches for the bolts 26, and resting upon the ring 33 is a bracket 36 having ears which are also engaged by two of the bolts 26 to hold the bracket in position.

Clamped between the rings 27 and 28 is a flexible diaphragm 37 which is preferably made of sheet rubber. The center of the diaphragm 37 is perforated to accommodate the rod 14. Washers 38 and 39 and nuts 40 and 41 on the threaded portion of the rod are used to clamp the diaphragm to the rod. The diaphragm 37 serves to guide the lower end of the rod 14 and also close the lower end of the casing. It is obvious that the rubber diaphragm will, if properly constructed, center the rod 14 and at the same time permit an endwise movement of the rod; also that this construction does away with bearings requiring constant attention and lubrication.

Clamped to the rod 14 by nuts 42 and 43 and washers 44 and 45 is a valve member 46 nor-

mally resting upon the upper face of the plate 31 and closing the opening 32 in the plate. The member 46 may be made of any suitable material, but heavy leather or flexible rubber have been found satisfactory, as both accommodate themselves to proper engagement with the face of the plate 31, thereby making unnecessary the accuracy of workmanship required if, for example, metal were employed for making the valve member.

Clamped between the rings 33 and 34 is a flexible diaphragm 47 which is also preferably made of sheet rubber. The center of the diaphragm 47 is perforated to accommodate the rod 14 and is clamped to the rod by nuts 48 and 49 cooperating respectively with a cupped disk 50 and a washer 51.

The mechanism as so far described is operative to shake or agitate the screen in a satisfactory manner, but in addition it is preferred to use a spring 55, the lower end of which engages within the cupped disk 50 and the upper end of which engages a flanged cap 56 on the end of a bolt or screw 57 passing through the upper portion of the bracket 36. The screw 57 may be turned to increase or decrease the normal tension of the spring 55 and then held in the adjusted position by means of a lock nut 58.

In order to put the apparatus in operation the valve 23 is opened to allow water to pass under pressure through the inlet 22 into the compartment 61 formed by the casing member 20, the diaphragm 47 and the plate 31 with its cooperating valve member 46. The water will gradually cause the diaphragm 47 to be distended upwardly and pressure exerted on the valve member 46 tending to hold it closed. The area of the diaphragm which is engaged by the water is greater than the corresponding area on the valve member and when the diaphragm has been sufficiently distended it will act against the lower face of the cupped disk 50 to lift the rod 14 and unseat the valve member 46, thereby allowing the water to escape. As soon as the valve is opened the pressure is relieved, whereupon the diaphragm 47 returns to its original position and reseats the valve member 46. This cycle of operation is then repeated, causing repeated reciprocations of the rod 14, with resulting vibrations or agitations of the screen 10.

The relative areas of the surfaces of the diaphragm 47 and valve member 46 may be varied according to the rapidity of operation desired. It has been found that if the diameters of the effective portions of the diaphragm and valve members are in the proportions of 8 to 5, satisfactory results are obtained.

It is obvious that the resistance against upward movement of the valve member 46 is supplemented to a certain extent by the lower diaphragm 37, and that the amount of this supplementary resistance may be varied by making the lower diaphragm from material varying in thickness and other characteristics. These variations can have a wide range as after the water passes through the valve opening 32 it is not subject to pressure and simply runs out through the outlet 24. In other words, in constructing the diaphragm 37 the question of pressure upon its upper face may be ignored.

The main purpose of the spring 55, if it is used, is to insure prompt return of the valve member 46 to its seated position, although the spring also serves to prevent fluttering of the valve mechanism. A very satisfactory apparatus for the purpose has been constructed and used in which the spring 55 was not employed.

The apparatus illustrated in the drawing is constructed for screening material in the presence of water. The material is dumped in the inclined pan or chute 61 under the down-turned end 25 of the outlet, so that the water escaping from the outlet will fall upon the material and wash it down into the screen 10.

It will be apparent from the foregoing description that any suitable operating medium may be employed instead of water, as the apparatus will work just as well if (for example) an air pressure is supplied to the inlet 22.

In actual use the vibrations or reciprocations may run as high as several hundred a minute. The speed or rate of vibration may be controlled by the valve 23 and/or both the rate and the extent of movement of the rod 14 and connected parts may be regulated within certain limits by increasing or decreasing the tension on the spring 55 or by varying the relative dimensions of the diaphragm 47 and valve member 46, preferably (in the latter instance) by using valve members of different diameters.

The form of screen used is not important and the screen may, instead of being pivoted as shown in the drawing, be supported by or suspended from springs or otherwise mounted to permit it to have a bodily movement of the screen surface. Such changes in the form of support may involve a change in the form of connection between the rod 14 and the screen or a change in the relative positions of the actuating mechanism and the screen.

In fact, while the embodiment shown and described is admirably adapted to fulfill the purpose primarily stated, the invention is capable of various embodiments, with suitable changes in the construction and relative arrangement of the parts, all of which come within the scope of the claims which follow.

What is claimed is:—

1. In an apparatus of the character described, a reciprocating fluid operated motor,

a chamber provided with an inlet and an outlet for fluid, said outlet comprising an intermittently acting valve, a rod secured to said valve and interconnecting said valve with a flexible diaphragm and said diaphragm forming one of the walls of said chamber.

2. In an apparatus of the character described, a reciprocating fluid operated motor, a chamber provided with an inlet and an outlet for fluid, said outlet comprising an intermittently acting valve, a rod secured to said valve and interconnecting said valve with a flexible diaphragm, said diaphragm forming one of the walls of said chamber and a biasing spring for biasing said rod against longitudnal movement.

3. In an apparatus of the character described, a reciprocating fluid operated motor, a chamber provided with an inlet and an outlet for fluid, said outlet comprising an intermittently acting valve, a rod secured to said valve and interconnecting said valve with a flexible diaphragm, said diaphragm forming one of the walls of said chamber and an adjustable biasing spring for biasing said rod against longitudinal movement.

4. In an apparatus of the character described, a fluid operated motor for imparting reciprocating movement, a chamber into which operating fluid is directed, a valve closing one side of said chamber, a resilient diaphragm closing another side of said chamber and a rod rigidly connecting said diaphragm and said valve whereby the movements of said diaphragm and of said valve are at all times in unison.

5. In an apparatus of the character described, a fluid operated motor for imparting reciprocating movement, a chamber into which operating fluid is directed, a valve closing one side of said chamber, a resilient diaphragm closing one other side of said chamber, a second resilient diaphragm and a rod secured at its ends to said diaphragm and supporting said valve intermediate said diaphragms.

6. In a screening apparatus, a screen, a chute for conducting screenable material to said screen, a fluid operated motor, an inlet and an outlet for the operating fluid of said motor, said outlet provided with a conduit for conducting the exhaust fluid to the chute to wash the material to be screened from the chute to said screen.

In testimony whereof I hereto affix my signature.

GEORGE C. CRANGLE.