E. RAMSAY.

RECIPROCATORY PLATE FEEDER.

APPLICATION FILED MAY 2, 1914.

1,200,866.

Patented Oct. 10, 1916.

2 SHEETS—SHEET 1.

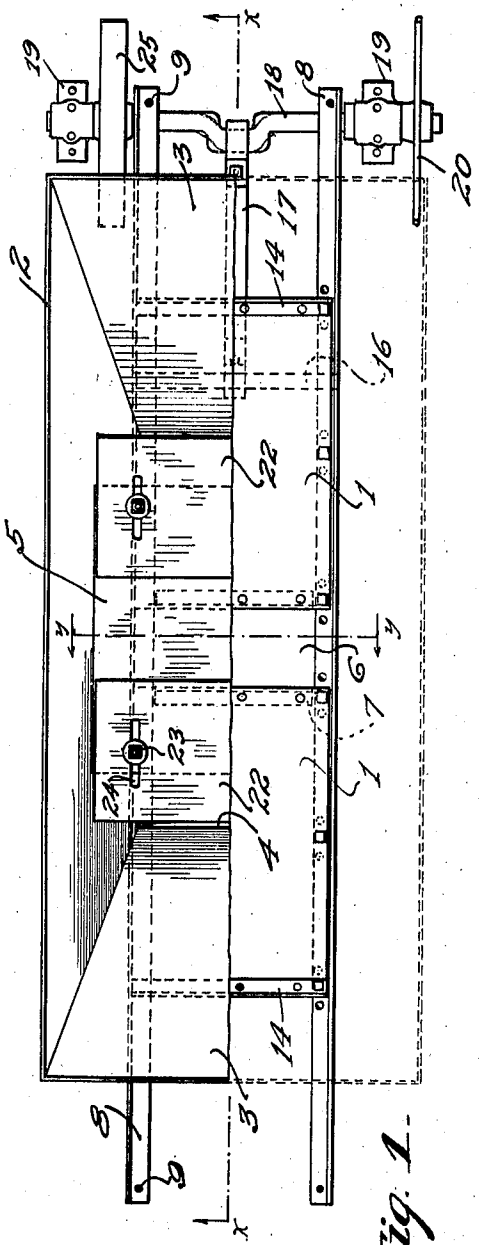


Fig. 1.

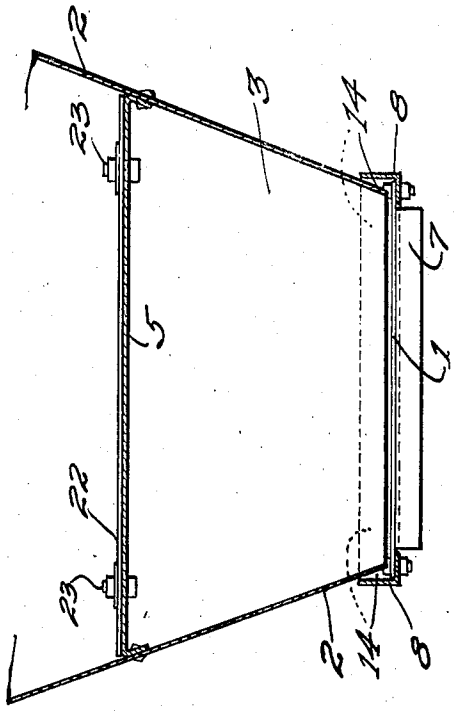


Fig. 2.

Witnesses

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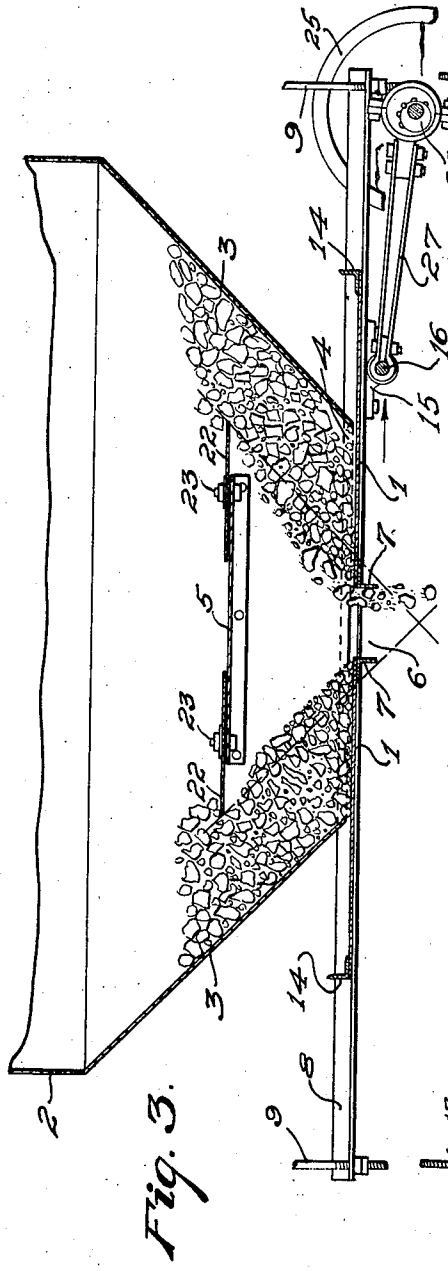


Fig. 3.

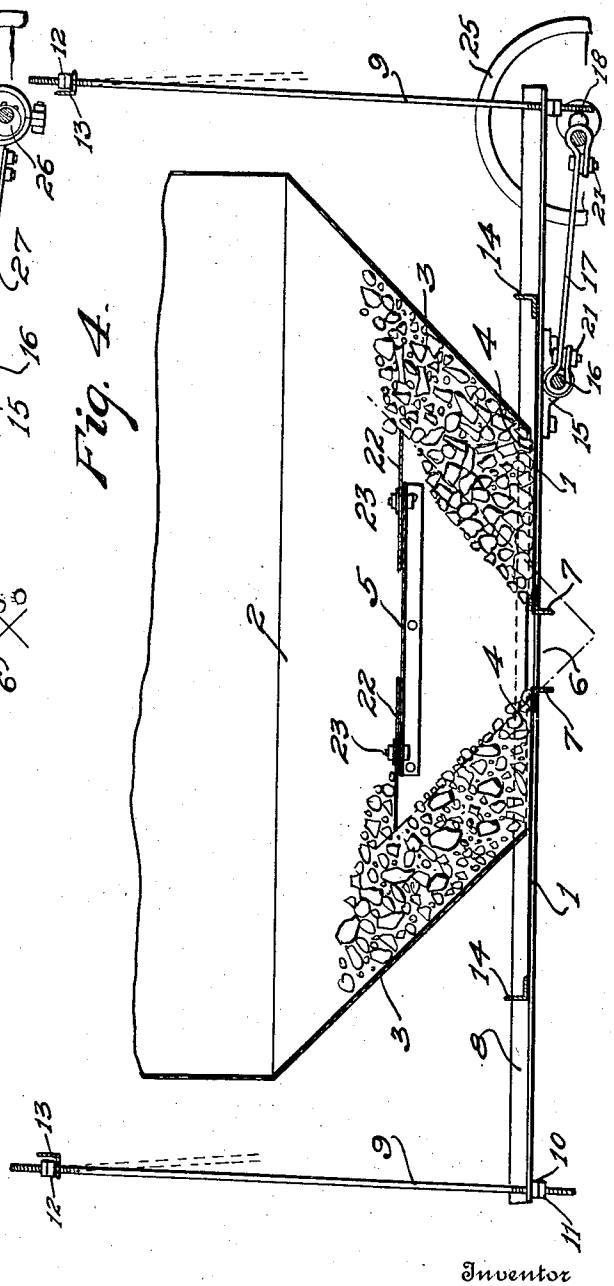


Fig. 4.

Witnesses

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RECIPROCATORY PLATE-FEEDER.

1,200,866. Specification of Letters Patent. Patented Oct. 10, 1916.

Application filed May 2, 1914. Serial No. 835,932.

To all whom it may concern:

Be it known that I, ERSKINE RAMSAY, a citizen of the United States of America, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Reciprocatory Plate-Feeders, of which the following is a specification.

My invention relates to automatic feeders of the reciprocating type for delivering material from chutes or hoppers to conveyers, screens, crushers or the like where it is desired that the material be fed uniformly and automatically and in regulable quantity.

The object of my invention is to increase the capacity and the constancy or regularity of the feed of a reciprocating plate feeder. By the use of my invention I am enabled to increase the capacity of the hopper to the extent required for the increased feed without necessarily increasing the head room required for it. This is possible because I can utilize a wide hopper having a substantially central bottom discharge opening above which I transpose a partition which may be capable of adjustment as to width, if desired, and which divides the material into two bodies which move from opposite sides toward the discharge opening. I provide the reciprocating plate feeder with a central opening so arranged that the material will rest on both ends of the plate which is reciprocated so that its opening travels only between points just between the angle of repose of the two bodies of material. As the plate moves in either direction it carries forward material from one body while it discharges material from the other body by sliding its opening under it. By this arrangement the material is fed equally with each movement of the plate, and, practically speaking, continuously during the travel in each direction of the plate, thereby doubling the capacity of the present types of reciprocating plate feeders and at the same time without increasing the head room required for the hopper. The reason for the increased capacity is that each movement of the plate serves equally to discharge a predetermined quantity of material on one side while drawing a predetermined quantity of material on the other side to be discharged on the return stroke so that in effect it is continuously charging and discharging and the result is a practically continuous flow of material which can be accurately regulated as to quantity.

My invention further comprises the novel details of construction and arrangement of parts which in their preferred embodiment only are hereinafter more particularly described and claimed, reference being had to the accompanying drawings which form a part of this specification, and in which:—

Figure 1 is a partial plan view of a hopper which is broken away to show the reciprocating feeder plate partly in plan view. Fig. 2 is an enlarged cross sectional view taken on the line y—y of Fig. 1. Figs. 3 and 4 are longitudinal vertical sectional views taken on the line x—x of Fig. 1 and showing the feeder plate in different operating positions.

Similar reference numerals refer to similar parts throughout the drawings.

In illustrating the preferred embodiment of my invention I have shown a reciprocating feeder plate 1 operating to control the feed of material from a hopper 2. It will be understood that the form of hopper shown is typical of the discharge end of any suitable type of bin, hopper or chute from which the material is to be fed. In the preferred construction, the hopper bottom has end walls 3 symmetrically sloped from its ends toward its bottom discharge opening 4. The side walls of the hopper also preferably slope toward this opening, but this is not essential. Above the opening 4 I mount in the hopper a transverse partition 5 which extends entirely across the hopper and overhangs the bottom opening 4. This partition has its side edges downturned and bolted or riveted to the hopper sides and it acts to divide the material in the hopper into two bodies which move between its end edges and the sloping walls 3 of the hopper and fall upon the ends of the feeder plate 1, but it will be noted that the hopper walls 3 support nearly all the weight of the material. I have indicated by dotted lines the line of repose of these two bodies of material which would be naturally assumed by them when unaffected by the movement of the feeder plate and with the partition adjusted as shown.

The feeder plate is provided at an intermediate point preferably at its center with a rectangular feed opening 6 which corresponds in width with the hopper opening

4, but is narrow as compared with the hopper opening. The end edges of the feed opening 6 are reinforced by transverse angle bars 7 fastened to the underside of the feeder plate. The feeder plate itself is preferably formed in two parts which are rectangular in shape and are fastened along their side edges in spaced relation to the side bars 8 of a swinging frame formed by side bars and hanging rods 9. The side bars 8 are formed by angle bars with their vertical legs disposed to the outside and made wider than their inturned horizontal legs to which the plates are fastened. The rods 9 are passed down through elongated openings in the horizontal legs of the bars near their ends and have threaded thereon nuts 10 and lock nuts 11. The rods 9 have their upper threaded ends similarly secured overhead by nuts 12 to angle bars 13 forming part of an overhead support. This supporting construction permits the frame to freely rock endwise of the hopper. To the outer end edge of each plate 1 I connect a transverse angle bar 14 having its vertical leg projecting above the top surface of the plates and engaging the vertical legs of the side bars 8. The plates 1 are suitably attached to the bar 8 preferably by means which permit of their ready removal or relative adjustment so that they may be moved more closely together or farther apart in the frame as the condition of the work or the material to be handled may require. Attached to the underside of the bars 8 near one end of the frame are hanger bearings 15 in which is mounted a cross shaft 16. This shaft is connected by a rod 17 to the crank shaft 18 which is mounted in suitable bearings 19 and driven by means of a sprocket wheel 20 or in any other suitable manner. The connecting rod 17 is preferably formed by a piece of strap metal, the ends of which are bent about the shafts 16 and 18 and fastened to the main body of the strap by bolts or rivets 21.

Under many conditions it is desirable to regulate the distance between the end edges of the partition 5 and the hopper walls 3, or in other words, to vary the width of the passage through which the divided bodies of material pass down to the reciprocating feeder plate. This adjustment I provide for by adjustably connecting slides 22 to the partition near each edge thereof by means of bolts 23 which pass through the partition and through elongated slots 24 in the slides 22. By this arrangement the slides can be drawn together to give the maximum width of openings or spread apart to reduce to a minimum the openings for the flow of material to the feeder plate. The side edges of the bars 8, as shown in Fig. 2, overlap the side edges of the bottom of the hopper sufficiently to prevent the escape sidewise of material on the feeder plate. The angle bars 14 of the outer ends of the feeder plate serve a like purpose. A fly wheel 25 is provided on the crank shaft to steady its movements.

In operation, the feeder plate is shown in central position in Fig. 3 and at the extreme of its travel to the left in Fig. 4. The dotted lines through the two bodies of material indicate their respective lines or angles of repose. Obviously these lines will change when the slides 22 are shifted to vary the end openings which regulate the thickness of said bodies. The shifting of the plate to the left (Fig. 4) advances the material at the right hand end of the hopper beyond its normal line of repose and it is this advanced portion of material that is fed through the feed opening 6 as the plate shifts to the right (Fig. 3). As it moves to the right, the plate is, in like manner, advancing material at the left hand end of the hopper beyond its line of repose so that when the plate starts its return travel to the left, this material advanced will be fed through the opening 6 of the plate. The travel of the plate is such as to confine the movements of its feed opening 6 between the lines or angles of repose of the two bodies of material, for the opening should not pass in either direction beyond a line of repose so as to permit of a direct gravity fall of material therethrough as under such conditions the feeder plate loses control over both the character and quantity of the feed. Preferably the opening 6 is made sufficiently narrow and the movements of the feeder plate is such that it will not pass beyond the extreme inner angles of repose of the bodies of material when the slides 22 are shifted to give the maximum feed opening for the material. If desired, however, the feed opening may be prevented passing different lines of repose by controlling the length of travel of the feeder plate, as for instance, by using an adjustable eccentric 26 to drive it instead of the crank drive shown in Fig. 1, or the same end may be obtained in the crank driven construction by drawing the plates 1 closer together or moving them farther apart to vary the size of the feed opening. The quantity of the feed may thus be regulated either by the size of the feed opening 6, by the position of the slides 22, by the speed of rotation of the drive shaft 18 which will give the plate a greater or lesser number of feeding movements per minute, or by the length of the reciprocating movements of the feeder plate. By the means described the feed can be very accurately controlled and it will be practically continuous.

Obviously the partition employed in effect divides the hopper into two chutes which feed separate bodies of material to the

feeder plate and I desire it understood that means of any character whatever that will deliver two bodies of material to the feeder plate in the manner described, may be substituted for the single divided hopper shown. The ends 22 being independently adjustable will permit an independent control of the volume of feed at each end of the plate, thus permitting any desired quantity to be fed from one body of material relatively to the quantity fed from the other body. This function of the apparatus is of particular advantage for both measuring and mixing different materials in prescribed percentages.

The details of construction illustrated are those which have been demonstrated in practice as thoroughly practical but they may be obviously varied in many respects without departing from the principles which underlie my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. A reciprocating feeder comprising a feeder plate having a feed opening intermediate its ends, which ends are each adapted to simultaneously support a body of material to be fed, feed means having end plates to deliver and maintain a body of material to be fed on each end of said plate free to assume an angle of repose from each end toward the center of the plate, guides for the plate, and means to reciprocate the plate endwise thereof in a manner to confine the travel of the feed opening therein between and not beyond the end plates of said feed means, said feed means being adapted to hold the material against movement with the feeder plate except toward the feed opening in the latter.

2. A reciprocating feeder comprising a hopper having a bottom discharge opening, a partition disposed above said opening and acting to divide the material into two bodies as it approaches said opening, a reciprocating feeder plate onto the ends of which said bodies of material pass and which has an intermediate feed opening therein, and means to reciprocate said plate endwise and move its feed opening between points slightly beyond the angle of repose of the bodies of material resting on each end of said plate, substantially as described.

3. In a reciprocating feeder, the combination of a hopper having bottom walls which converge symmetrically toward a bottom opening therein, a transverse partition above said opening which divides the material into two opposing streams as it flows to said opening, a reciprocating plate disposed below said opening and having a central feed opening, means to reciprocate said plate in a manner to confine the travel of the opening therein between the angles of repose of material resting on each end of said plate, substantially as described.

4. A reciprocating feeder comprising in combination a hopper having its bottom walls sloping toward a substantially central bottom opening, a transverse horizontal partition disposed across the hopper above the opening therein and having its side edges spaced substantially equi-distantly from said sloping bottom walls, means to adjust the partition to vary the space between its edges and the hopper walls, a feeder plate with an intermediate feed opening which has the transverse width of the hopper opening but is narrow relatively to the hopper opening, means to support said feed plate for reciprocation, and means to reciprocate said plate endwise, said means being adapted to limit the travel of said feed opening between points just within the angle of repose of the material resting on each end of the plate, substantially as described.

5. A reciprocating feeder comprising a hopper having a discharge opening, means in the hopper to divide the material into two bodies adapted to approach said opening from opposite sides, a reciprocating feeder plate onto the ends of which said bodies of material pass and which has an intermediate feed opening, means which provide for an adjustment in the size of said feed opening, and means to reciprocate said plate endwise.

6. A reciprocating feeder comprising a hopper having a discharge opening, adjustable means in the hopper to divide the material into two bodies adapted to approach said opening from opposite sides, a reciprocating feeder plate onto the ends of which said bodies of material are guided by the hopper walls and which has an intermediate feed opening, and means to reciprocate said plate endwise between the end walls of said hopper so that the opening in said plate does not pass beyond the same, substantially as described.

7. A reciprocating feeder comprising a reciprocatory feeder plate having an intermediate feed opening, means to support said plate and leave its feed opening free for the discharge of material therethrough throughout the travel of the plate, chute means to discharge two bodies of material to be fed onto the plate on opposite sides of its feed opening, means to reciprocate said plate, and separate means to regulate the flow of said bodies of material to the plate.

In testimony whereof I affix my signature in presence of two witnesses.

ERSKINE RAMSAY.

Witnesses:
R. D. JOHNSTON, Jr.,
LUCILE PACELEY.