

1,105,812.

Patented Aug. 4, 1914.

3 SHEETS—SHEET 1.

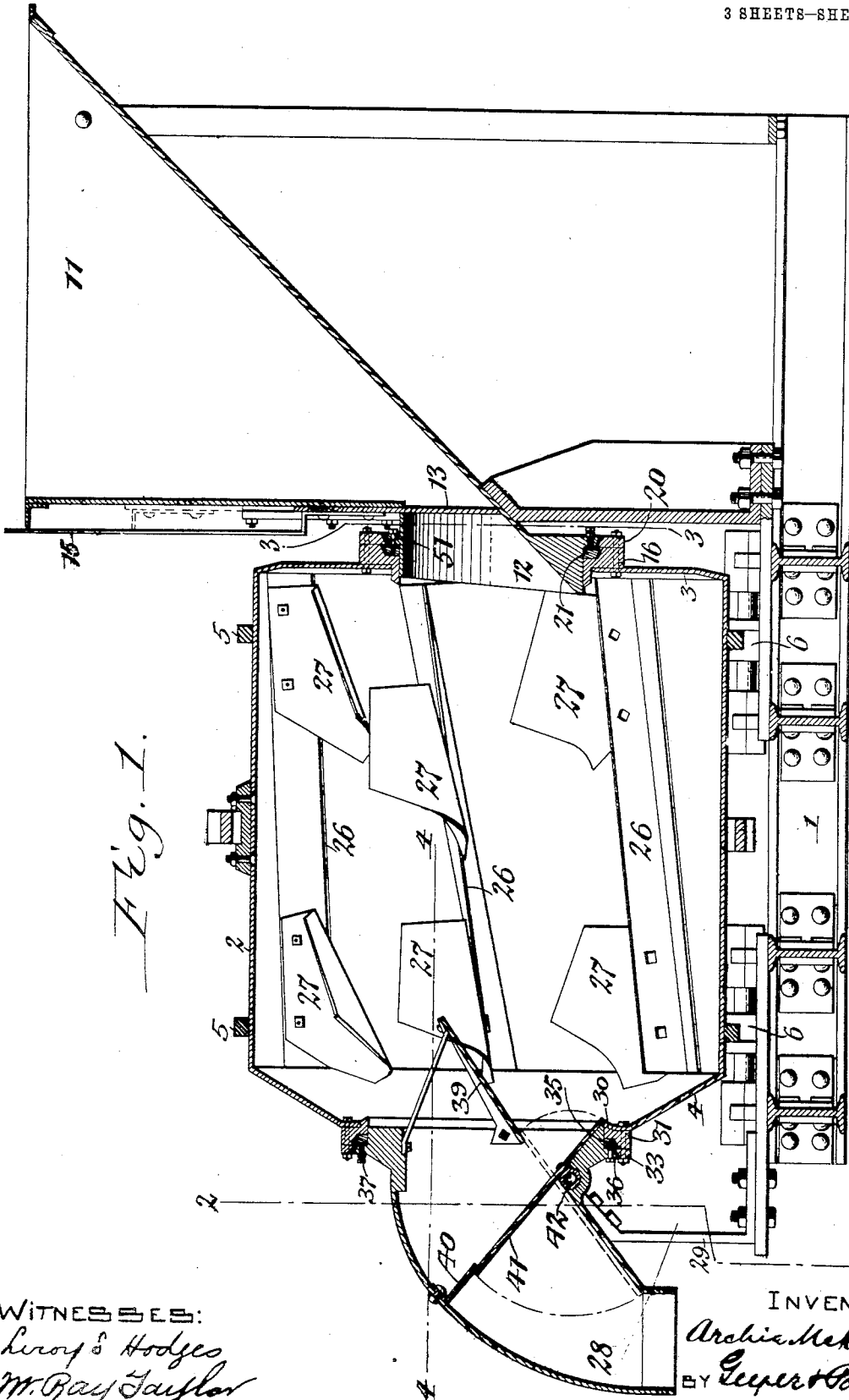


Fig. 1.

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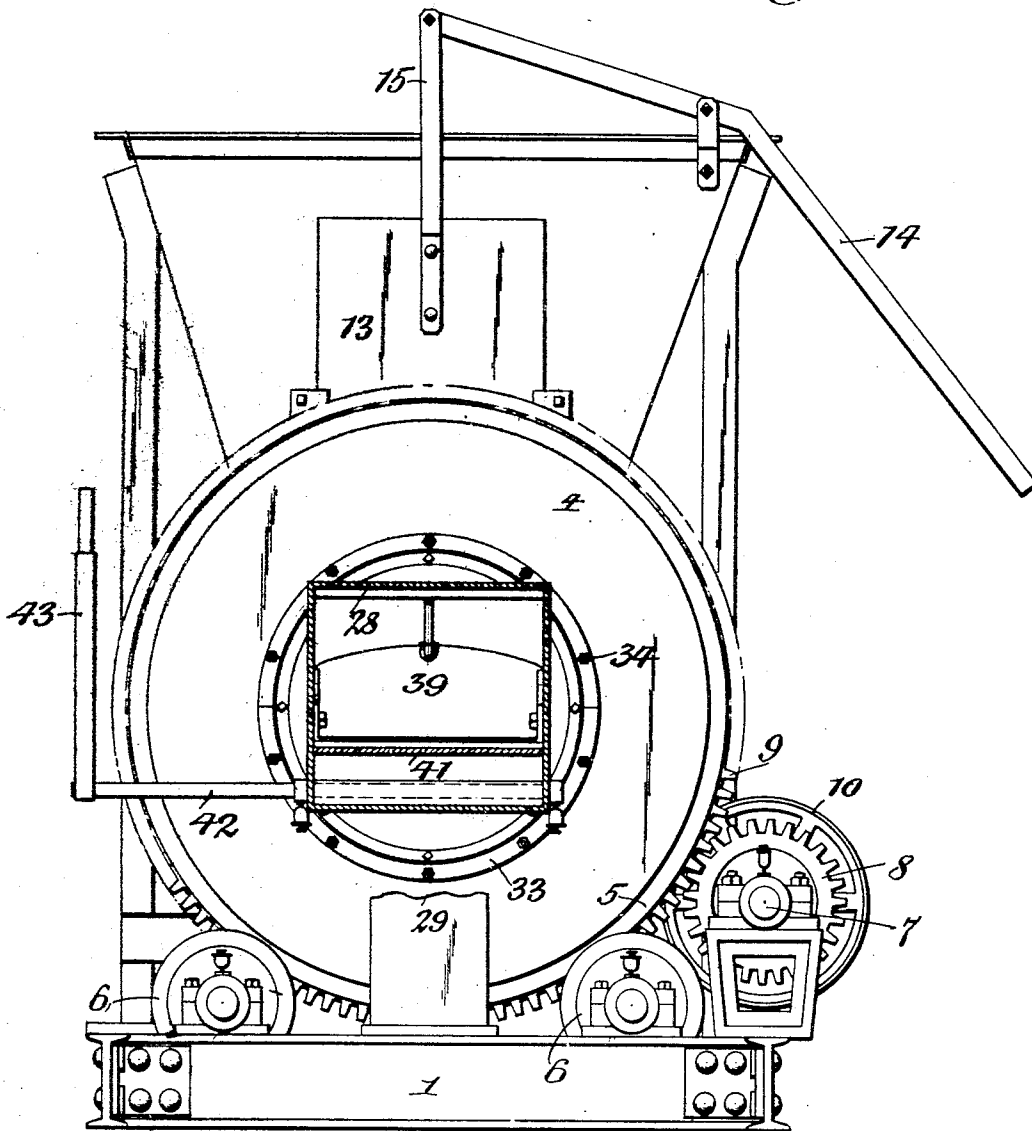
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3 SHEETS—SHEET 2.

Fig. 2.



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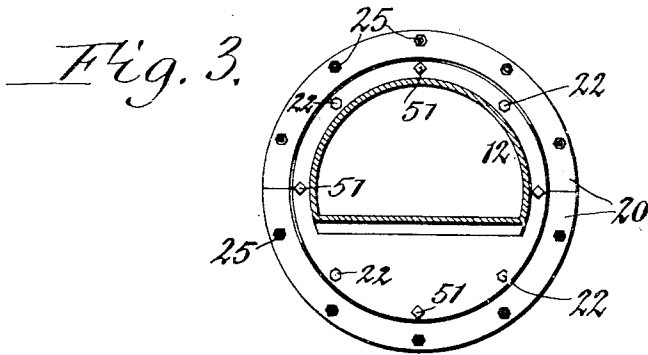
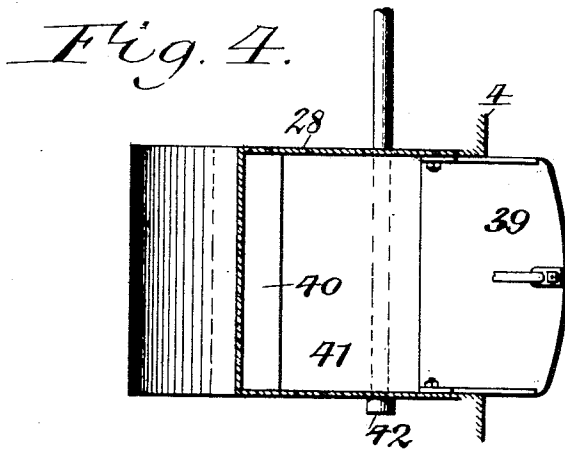
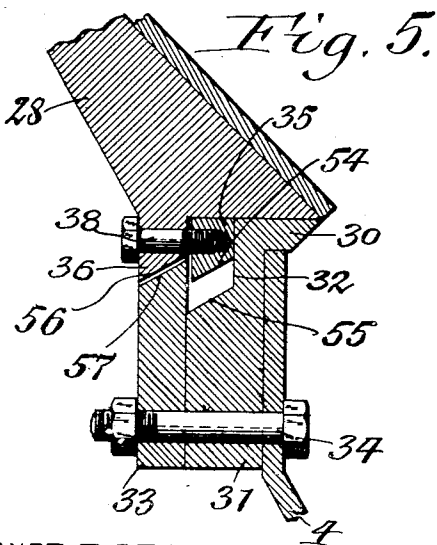
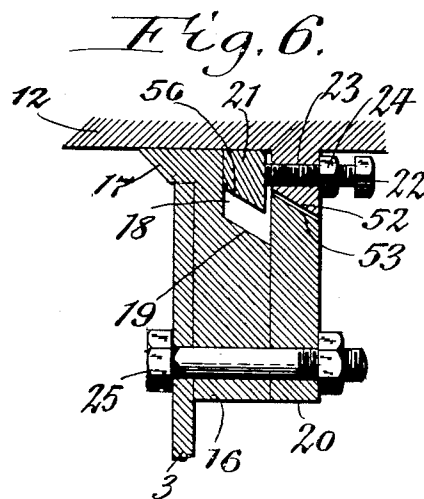
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ARCHIE McKAIG, OF BUFFALO, NEW YORK.

MIXING-MACHINE.

1,105,812.

Specification of Letters Patent.

Patented Aug. 4, 1914.

Application filed October 15, 1912. Serial No. 725,833.

To all whom it may concern:

Be it known that I, ARCHIE McKAIG, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Mixing-Machines, of which the following is a specification.

This invention relates to a mixing machine which is more particularly designed for mixing different ingredients or materials for fertilizing purposes although the same may also be used to advantage for mixing other materials.

When mixing materials for fertilizing purposes the agitation of this material produces considerable dust particularly when the material is dry and if this dust is permitted to reach the atmosphere it is not only injurious and disagreeable to the attendants but it also results in the loss of fertilizing material and interferes with the free working of the machine because the exterior thereof becomes coated with dust and therefore requires more power to operate the same.

It is the object of this invention to provide a mixing machine which is practically dust proof, which can be operated with less power than machines of this character as heretofore constructed, and which can be operated either for mixing the material in batches or to effect a continuous mixing of the material by feeding the material continuously into the inlet of the machine and discharging the same continuously through the outlet thereof.

My invention has the further object to so construct the machine that samples of the material may be taken from the machine whenever desired for the purpose of determining the character of the mixture.

In the accompanying drawings consisting of 3 sheets: Figure 1 is a vertical longitudinal section of a mixing machine embodying my invention. Fig. 2 is a vertical transverse section thereof taken in line 2-2, Fig. 1, looking rearwardly. Fig. 3 is a fragmentary vertical section taken in line 3-3, Fig. 1, looking forwardly. Fig. 4 is a fragmentary horizontal section taken in line

4-4, Fig. 1. Fig. 5 is a fragmentary section, on an enlarged scale, showing the joint between the mixing drum and the delivery spout. Fig. 6 is a similar view showing the joint between the supply hopper and the mixing drum.

Similar characters of reference indicate corresponding parts throughout the several views.

1 represents the main frame of the machine which may be of any suitable construction to support the various working parts of the machine. Above the front end of this frame is mounted the mixing drum which is preferably constructed of sheet metal and is rotatable about a horizontal axis. This drum preferably comprises a cylindrical body 2 which is arranged horizontally, a rear flat head 3 arranged at the rear end of the body and provided with a central inlet opening and a forwardly tapering front head 4 arranged at the front end of the body and having a central outlet opening. This drum may be mounted in any suitable manner for rotation about its horizontal longitudinal axis the preferred means for this purpose which are shown in the drawings comprising two annular tires, bands or rings 5 secured to the periphery of the drum at the front and rear ends thereof, and two pairs of supporting or guide wheels 6 journaled in suitable bearings on the frame and receiving the tires of the drum. In the preferred form of this rolling support for the drum each of the tires thereof is engaged by two of the supporting wheels the same being arranged on opposite sides of the vertical center thereof, as shown in Fig. 2. The several supporting wheels are journaled independently of each other so that any variation in the diameter thereof will not cause any dragging of the drum on one or the other of these supporting wheels.

Although various means may be employed for rotating the drum about its axis the means for this purpose shown in the drawings are suitable and comprise a horizontal driving shaft 7 journaled lengthwise adjacent to one side of the drum in bearings arranged on the main frame, a driving pinion

8 arranged on the central part of this shaft and engaging with a gear wheel or rim 9 secured to the central part of the periphery of the drum, and a driving pulley 10 mounted on the driving shaft and adapted to receive a driving belt whereby the same is operatively connected with a prime mover.

11 represents a feed hopper which is adapted to receive through its open upper end the material which is to be mixed and which is provided at its lower end with a feed spout 12 which projects into the inlet opening of the drum for the purpose of directing the material from the hopper into the rear end of the drum. The passage of the material from the hopper into the drum may be controlled by any suitable means so as to deliver the material into the drum either continuously or in batches. The means shown in the drawings for controlling the discharge of material from the hopper into the drum are suitable and comprise a vertically movable slide or gate 13 which is guided in suitable ways on the front wall of the hopper so that the same may be moved across the feed hopper and close the outlet of the same or to be withdrawn from said spout; and a hand lever 14 pivoted on the feed hopper and connected by means of a link 15 with the slide, as shown in Figs. 1 and 2.

In order to produce a dust proof joint between the feed spout of the hopper and the rear end of the drum a packing is provided between these parts which is best shown in Figs. 1, 3 and 6 and constructed as follows: Secured to the rear head of the drum is a supporting ring which comprises an annular laterally projecting or radial flange 16 secured to the rear side of the rear drum head and an inwardly projecting or axial annular flange 17 which is arranged within the opening of the rear drum head and surrounds the periphery of the feed spout or conduit which is of circular form. On its outer side this supporting ring is provided at its inner corner with an annular rabbet 18 the outer wall 19 of which is preferably made of forwardly tapering form for purposes which will presently appear. Secured to the outer face of the lateral flange of the supporting ring is a retaining ring 20 which has its inner edge projecting inwardly over the outer part of the rabbet 18 so as to form with the latter an annular undercut channel or packing groove. 21 represents a packing ring which surrounds the periphery of the feed spout within the rabbet of the supporting ring and arranged with its front radial face close to the adjacent radial face of the rabbet while its outer edge projects into the annular groove formed between the supporting and retaining rings. The outer edge 50 of

the packing ring 20 preferably tapers forwardly or inwardly at the same angle as the outer wall of the rabbet in the supporting ring. By thus beveling the outer wall of the rabbet in the supporting ring and the outer face of the packing ring a compact construction is produced which permits of utilizing the metal to the best advantage and also permits of a limited amount of lateral movement of the supporting ring and feed spout relatively to each other as the parts become worn while at the same time forming a circuitous passage from the interior of the drum to the external atmosphere through the rotary joint between the feed spout and drum which tends to check the escape of any dust from the drum to the atmosphere.

Means are provided for adjusting the packing ring on the feed spout relatively to the bottom of the rabbet on the supporting ring so as to reduce to a minimum the possibility of dust passing between the periphery of the feed spout and the bore of the supporting ring. These means are so constructed that the packing ring may be adjusted to the desired position relatively to the supporting ring and then held in this position so as to avoid cramping of these parts and avoiding undue friction. The preferred means for this purpose consists of a plurality of thrust screws 22 which are arranged in threaded openings at different points in an annular adjusting flange 23 arranged on the periphery of the feed spout adjacent to the outer side of the packing ring and which engage with the outer side of the packing ring, and a plurality of draw screws 51 engaging with threaded openings in the packing ring and passing through unthreaded openings in the adjusting flange of the feed spout, as shown in Figs. 1 and 6. Upon tightening the thrust screws until the packing ring has been shifted inwardly to the desired position relatively to the supporting ring and then tightening the draw screws the packing ring will be held rigidly in its adjusted position. If desired, jam nuts 24 may be applied to the thrust screws for holding the same in place which jam nuts are adapted to engage with the outer side of the adjusting flange, as shown in Fig. 6.

The adjusting flange of the feed spout and the retaining ring of the drum are arranged transversely in line and the meeting edges of this flange and ring are preferably tapered forwardly or inwardly, as shown at 52, 53 in Fig. 6, so as to obtain the maximum amount of metal in the adjusting flange and still permit of bringing the innermost edge of the retaining ring inwardly beyond the outermost edge of the packing ring so as to form the annular trap groove which re-

ceives the outer edge of the packing ring for preventing the escape of dust through the joint of this packing.

The supporting ring and the retaining ring are preferably secured to the rear head of the drum by a single set of bolts 25, as shown in Figs. 1, 3 and 6. In assembling the parts the packing ring is slipped over the feed spout before the latter is inserted within the bore of the supporting ring and then the retaining ring is secured to the supporting ring so as to overlap the packing ring. In order to permit of applying the retaining ring to the supporting ring when the meeting edges of the retaining ring and adjusting ring are beveled inwardly, as indicated in Fig. 6, the retaining ring is split diametrically into two parts, as shown in Fig. 3, thereby permitting of readily attaching this ring to or removing the same from the supporting ring when assembling or dismembering the machine.

As the material enters the rear end of the drum the same is lifted and dropped therein so that it is thoroughly mixed and at the same time this material is gradually propelled from the rear end of the drum toward the front end thereof preparatory to being discharged therefrom at the front end of the drum. Although various means may be employed for thus causing the rotation of the drum to mix the material and propel the same lengthwise therein those shown in the drawings are suitable and comprise a plurality of angle lifting bars 26 secured spirally to the inner side of the drum and a plurality of scoops, flights or wings 27 secured at different points to the angle bars, these angle irons and flights being so constructed that they lift the material to be mixed on the rising side of the drum and then let the same drop through the center thereof, and also produce a slow propulsion of the material to be mixed from the rear or inlet end of the drum toward the front or outlet end thereof.

28 represents a delivery spout or conduit through which the material after it is mixed in the drum may be discharged into a suitable receptacle or other place provided for the purpose. This spout is preferably curved vertically and opens at its inlet or rear end horizontally rearward into the outlet opening of the drum while its front or outlet end opens downwardly. This spout may be supported upon the adjacent stationary part of the main frame by any suitable means, for instance, by means of a bracket 29, as shown in Fig. 1.

A dust proof joint is produced between the stationary discharge spout and the front head of the drum by a packing which is constructed substantially like the packing between the feed spout and the rear end of

the drum. This packing between the front end of the drum and the delivery spout is best shown in Figs. 1, 2 and 5 and comprises an annular supporting ring having a horizontal or axial flange 30 projecting rearwardly into the opening of the front drum head and engaging its bore with the cylindrical periphery of the delivery spout and a radially outwardly projecting flange 31 secured to the outer side of the rear drum head and provided with an annular rabbet 32 at the outer corner of its bore, a diametrically split retaining ring 33 secured to the outer face of the lateral flange of the supporting ring and having its inner edge projecting over the rabbet of the supporting ring so as to form an annular undercut trap channel or groove between these parts, an annular row of bolts 34 connecting the retaining and supporting rings with the rear drum head, a packing ring 35 surrounding the inlet of the discharge spout and bearing with its inner flat side against the bottom of the rabbet and projecting with its outer edge into the trap groove formed thereby, an annular adjusting flange 36 arranged on the outer side of the delivery spout transversely in line with the retaining ring 33, a plurality of thrust screws 37 arranged in threaded openings formed in the adjusting flange and bearing against the outer side of the packing ring, and a plurality of draw screws 38 arranged in unthreaded openings in the adjusting flange and working in threaded openings in the packing ring. The outer edge 54 of the packing ring 35 and the outer wall 55 of the rabbet 32 are tapered inwardly, and the opposing outer edge 56 of the adjusting flange 36 and the inner edge 57 of the retaining ring 33 are also tapered inwardly for the purpose of obtaining the maximum metal in these parts within a given amount of space while permitting a certain amount of lateral movement of the packing ring within the rabbet when this is required during wearing of the cooperating surfaces of the supporting ring and the delivery spout and also forming the circuitous path in the joint between a delivery spout and the drum which operates to check or prevent the escape of any dust from the interior of the drum through this joint to the atmosphere.

39 represents a fixed chute which is mounted on the discharge spout and which projects in an inclined position from the central part of the same at the inner or inlet end thereof rearwardly and upwardly into the front part of the mixing drum so as to come within the range of travel of the rear ends of the lifting and propelling angle irons and flights of the mixing drum.

40 represents a shutter flange projecting

downwardly from the top of the delivery spout and preferably at an angle to the vertical.

41 represents a vertically swinging door which extends transversely across the entire width of the delivery spout and is mounted between its upper and lower edges on a horizontal shaft 42 which is journaled transversely in a bearing in the lower part of the delivery spout and provided on the exterior of this spout with an operating handle 43. This door is so constructed and arranged that when it is turned in one position it inclines from its upper front end downwardly toward its lower rear end and engages at its front end with the front side of the shutter flange 40 while its lower end engages with the lower side of the discharge spout in rear of the operating shaft, as shown by full lines in Fig. 1, while upon turning this door in the other direction the same will incline from its rear end downwardly toward its front end and its rear end will engage with the underside of the discharge chute and its front end will engage with the delivery spout in front of the operating shaft, as shown by dotted lines in Fig. 1. While the door 41 occupies the position indicated by full lines in Fig. 1, the discharge spout is closed and communication between the interior of the drum and the exterior is shut off. In this position of the door the front ends of the lifting and propelling angle irons and flights of the drum elevate the materials which are being mixed and deliver the same continuously upon the discharge chute from which latter these materials slide down upon the discharge door and are directed by the latter back again into the front end of the drum preparatory to being again elevated. The machine is used in this manner when it is desired to mix the material in batches. When it is desired to take a sample of the mixture from the machine, or to empty the drum of its contents, or to operate the machine as a continuous machine the door is swung into the position shown by dotted lines in Fig. 1, whereby the material deposited upon the discharge chute by the angle irons and flights of the drum is directed by the door to the outlet at the lower end of the discharge spout inasmuch as the door in this position practically forms a continuation of the discharge chute and closes the space between this chute and the lower part of the discharge spout so that the material delivered upon the chute cannot again return to the drum but is compelled to leave through the discharge spout.

It will thus be noted that this machine is not only practically dust proof but that the same is also capable of use for mixing ma-

terials either in batches or continuously. Furthermore, the same is simple and durable in construction, and is also efficient in operation and capable of being run with a minimum expenditure of power.

I claim as my invention:

1. A mixing machine comprising a hollow drum rotatable about a horizontal axis and provided with front and rear openings, a discharge spout having its inner end communicating with said front opening, a stationary outwardly inclined chute having its inner end arranged within the drum and its outer end arranged centrally relatively to the inner end of said discharge spout, and a door arranged in said spout and pivoted between its ends for turning the same about a horizontal transverse axis so that upon turning the door into an inwardly inclined position its outer part closes the spout and its inner part opens a space between the outer end of the chute and the spout while upon turning the door into an outwardly inclined position its inner part closes the space between the chute and spout and its outer part opens the spout and the inner and outer parts of the door form a continuation of said chute.

2. A mixing machine comprising a hollow drum rotatable about a horizontal axis and provided with front and rear openings, a discharge spout having its inner end communicating with said front opening, a stationary outwardly inclined chute having its inner end arranged within the drum and its outer end arranged centrally relatively to the inner end of said discharge spout, a door arranged in said spout and pivoted between its ends for turning the same about a horizontal transverse axis so that upon turning the door into an inwardly inclined position its outer part closes the spout and its inner part opens a space between the outer end of the chute and the spout while upon turning the door into an outwardly inclined position its inner part closes the space between the chute and spout and its outer part opens the spout and the inner and outer parts of the door form a continuation of said chute and a flange depending from the upper side of the discharge spout and adapted to be engaged by the outer edge of the door in the closed position of the same.

3. A mixing machine comprising a hollow drum rotatable about a horizontal axis and provided with front and rear openings, a discharge spout having its inner end communicating with said front openings, a stationary outwardly inclined chute mounted on the spout and having its inner end arranged within the drum and its outer end arranged centrally relatively to the inner end of said discharge spout, and a door ar-

ranged in said spout and pivoted between
its ends for turning the same about a hori-
zontal transverse axis, so that upon turning
the door into an inwardly inclined position
5 its outer part closes the spout and its inner
part opens a space between the outer end of
the chute and the spout, while upon turning
the door into an outwardly inclined position
its inner part closes the space between the

chute and spout and its outer part opens the
spout and the inner and outer parts of the
door form a continuation of said chute.

Witness my hand this 2nd day of October,
1912.

ARCHIE MCKAIG.

Witnesses:

THEO. L. POPP,

ANNA HEIGIS.