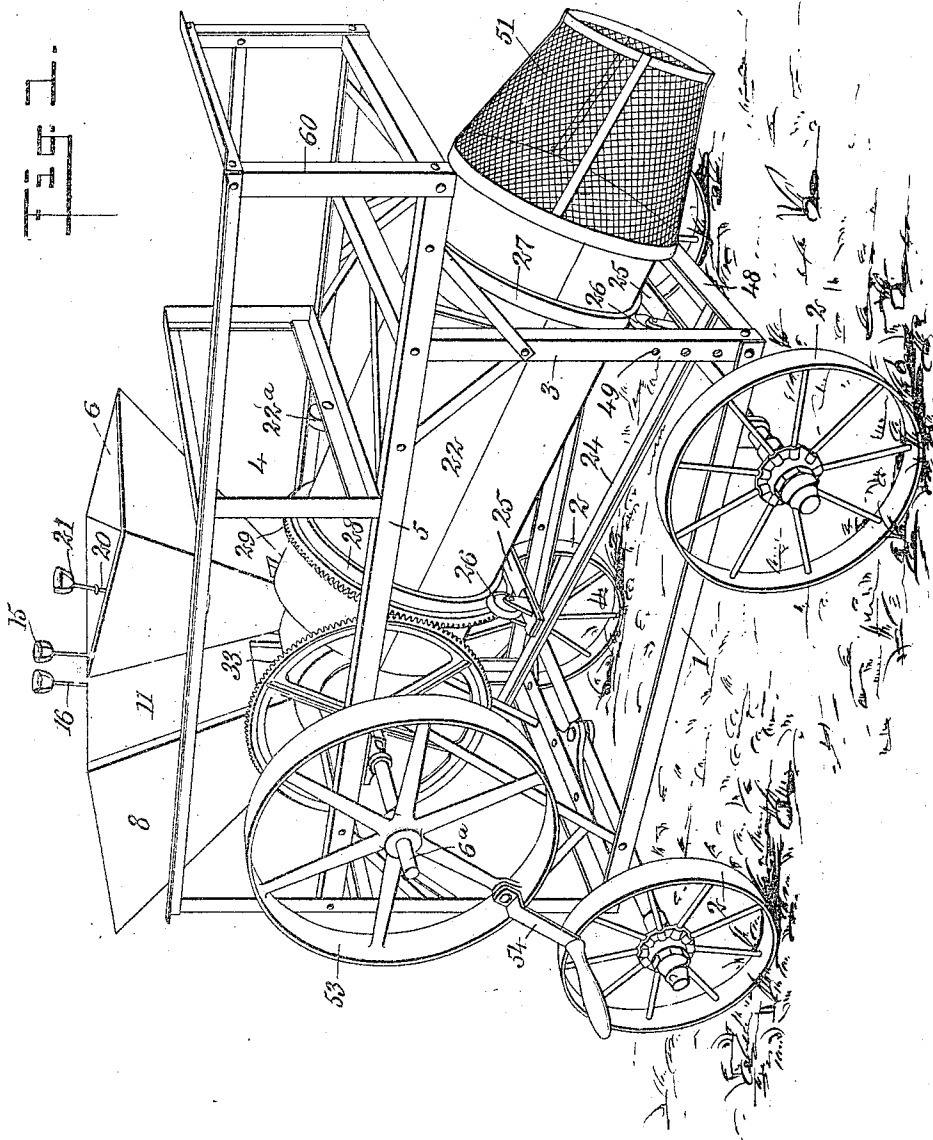


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MIXING MACHINE FOR FERTILIZERS OR CEMENTS.
APPLICATION FILED MAR. 3, 1909.

949,536.

Patented Feb. 15, 1910.

3 SHEETS—SHEET 1.



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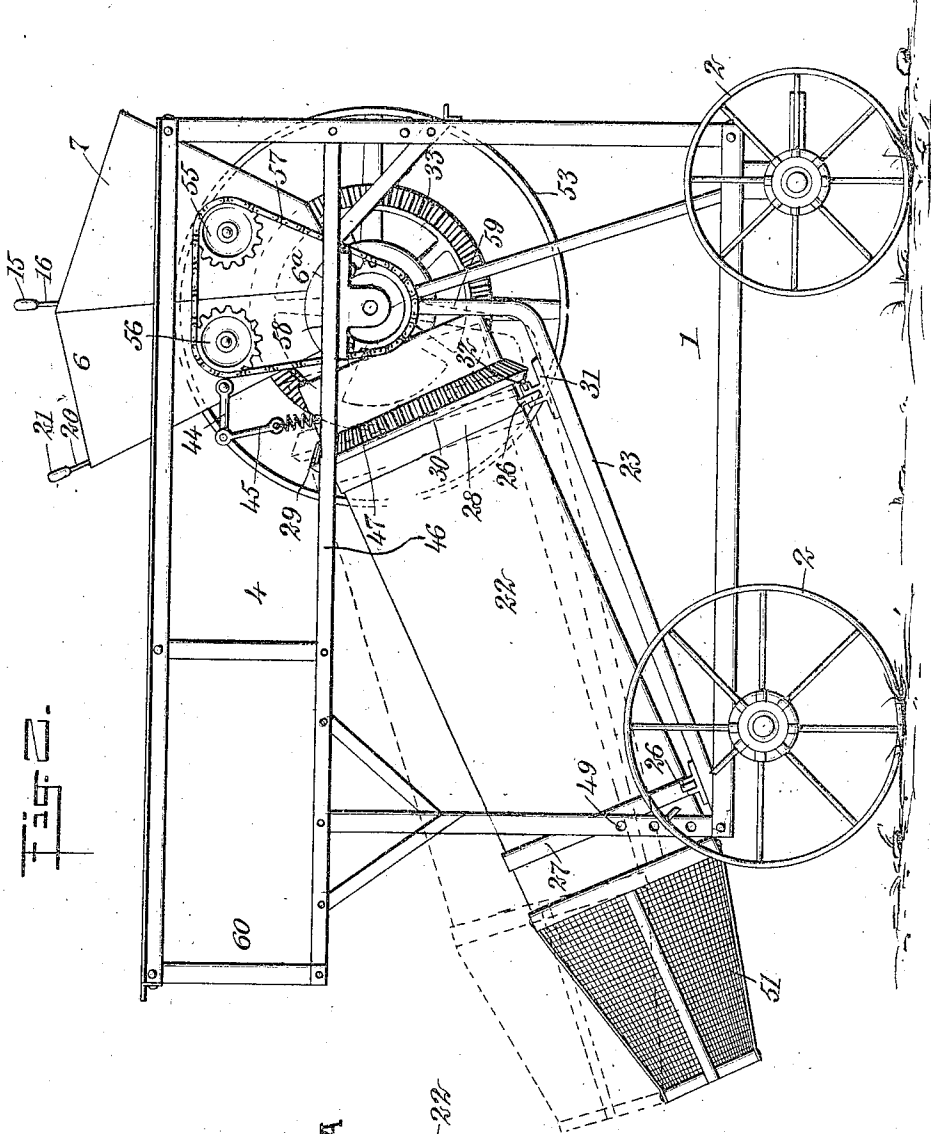
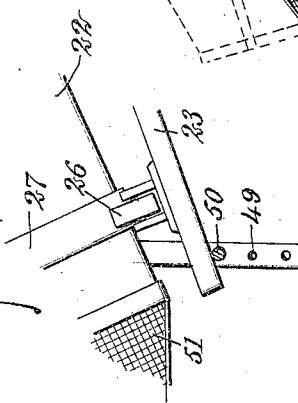


Fig. 2-A



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3 SHEETS—SHEET 3.

Fig. 3.

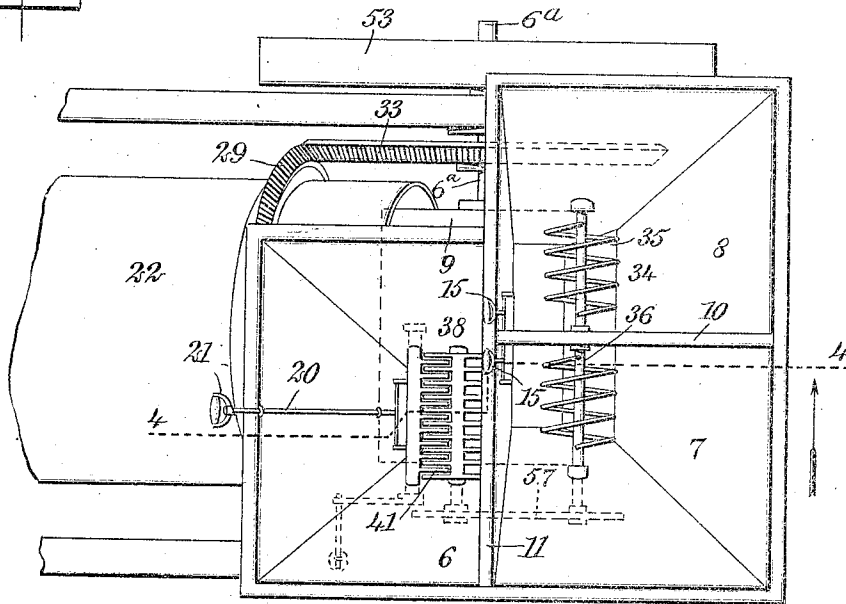
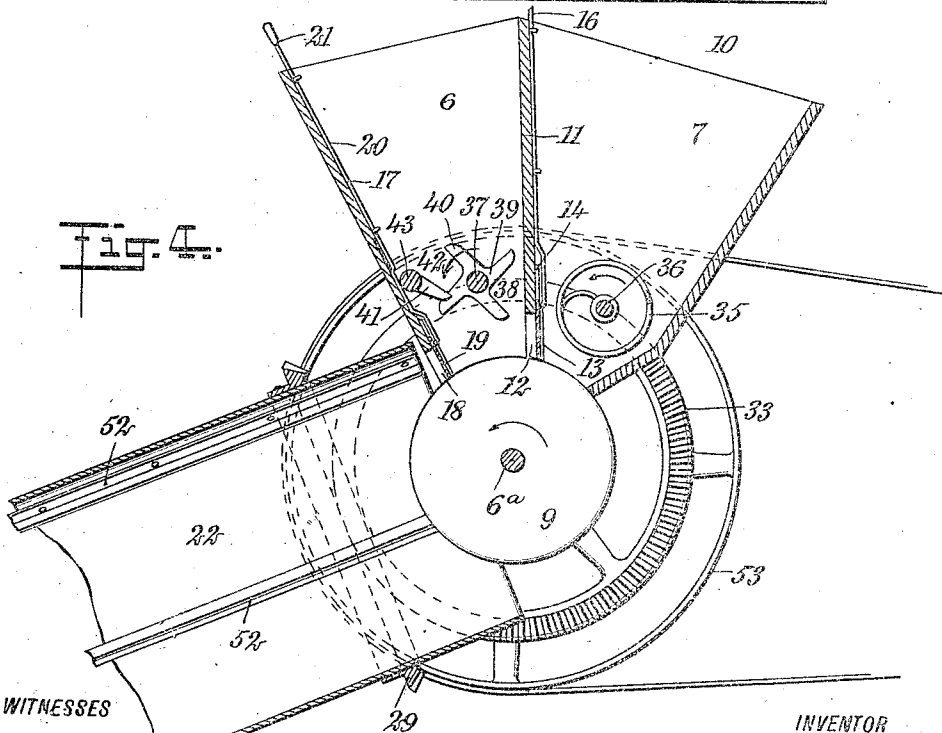


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES R. HERRICK, OF ATLANTA, GEORGIA.

MIXING-MACHINE FOR FERTILIZERS OR CEMENTS.

949,536.

Specification of Letters Patent.

Patented Feb. 15, 1910.

Application filed March 3, 1909. Serial No. 481,123.

To all whom it may concern:

Be it known that I, CHARLES R. HERRICK, a citizen of the United States, and a resident of Atlanta, in the county of Fulton and State of Georgia, have invented a new and Improved Mixing-Machine for Fertilizers or Cement, of which the following is a full, clear, and exact description.

This invention relates to mixing machines such as used for mixing fertilizers, cement, or other substances.

The object of the invention is to produce a machine of simple construction which will operate to mix and proportion fertilizers and other materials.

The construction is such as to produce a thorough mixture of the ingredients, and the machine comprises a crusher which is employed in connection with one of the hoppers, which enables one of the ingredients to be crushed as the mixing takes place. The construction involves a tumbling barrel which receives the ingredients to be mixed, and this barrel is rotated continuously in an inclined position so as to bring about a thorough mixture of the different ingredients. An arrangement is provided for adjusting the angle or inclination of this barrel so as to produce a more or less rapid operation of the machine.

The invention consists in the construction and combination of parts to be more fully described hereinafter and particularly set forth in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective of a machine constructed according to my invention; Fig. 2 is a side elevation of the machine showing the side opposite from that which is shown in Fig. 1; Fig. 2^a is a fragmentary view illustrating the means for supporting the lower end of the barrel, and showing the means for adjusting the same; Fig. 3 is a plan of one end of the machine showing the hoppers and the details of their construction, this view also shows a portion of the barrel; and Fig. 4 is a vertical section through the parts of the machine shown in Fig. 3, and taken substantially on the line 4-4 of said figure.

Referring more particularly to the parts, 1 represents the main frame of the machine

which is supported on wheels 2, as indicated. This frame comprises four corner posts or standards 3 which support an upper frame 4. The horizontal bars 5 and 46 of this upper frame support a horizontal main shaft 6^a which extends transversely of the frame, and passes under three hoppers 6, 7, and 8. Beneath the hoppers the shaft is provided with a drum 9 which forms the bottom for the hoppers, as indicated most clearly in Fig. 4. The hoppers 7 and 8 are constructed as divisions formed in a larger hopper by means of a partition wall 10. The hopper 6 is divided from the hoppers 7 and 8 by a dividing wall 11, as shown. This dividing wall is provided at its lower edge with openings 12 lying adjacent to the drum 9, and these openings are adapted to be closed by gates 13 which slide in suitable guides 14. These gates are adapted to be operated from a point above the hoppers by means of handles 15 attached to stems 16, as shown. On the forward wall 17 of the hopper 6, with respect to the direction of rotation, an opening 18 is provided, similar to the openings 12, and this opening is similarly provided with a sliding gate 19 provided with a stem 20 having a handle 21 disposed above the hopper.

The drum 9 constitutes a feed drum, and advances the ingredients of the mixture from the hoppers into a tumbling barrel 22. This barrel is in the form of a hollow cylinder, its upper end forming an open mouth into which the drum 9 projects, as indicated in Fig. 4. This tumbling barrel is supported on a swing or tilting cradle 23 formed of side bars 24 which are connected by cross bars 25. These cross bars 25 are provided with rollers 26, and these rollers run on collars 27 and 28 which encircle the barrel. The collar 28 is located near the upper end of the barrel, and has a bevel gear wheel 29 formed thereupon. This bevel gear wheel 29 projects laterally from the drum so as to form a shoulder 30, and the brackets 31 which carry the rollers 26 at this point are provided with small rollers 32 which roll on this shoulder 30 and prevent the barrel from sliding longitudinally down the cradle. The barrel is rotated continuously by means of this gear wheel 29, which meshes with a driving gear wheel 33 which is rigidly mounted upon the main shaft 6^a, as shown.

In the lower part of the hoppers 7 and 8, stirrers 34 are provided which consist of coils

35 of wire attached to a horizontal shaft 36 which passes through the hoppers at this point. These stirrers operate to agitate the material in the lower part of the hoppers so as to assist its being fed through the openings 12.

In the lower portion of the hopper 6 a crusher shaft 37 is mounted in a horizontal position, and this shaft is provided with a crusher 38, said crusher being composed of a plurality of closely disposed finger plates 39. Each of these plates 39 has four substantially radially projecting fingers 40. This crusher is driven continuously when the machine is in operation, and as it rotates, the fingers 40 pass between parallel fingers 41 which project toward the crusher and form a grate 42. These fingers 41 are all attached to a grate shaft 43 which is also in a horizontal position and disposed parallel with the shaft 37. The grate shaft 43 has a reduced extension which projects through the side wall of the hopper and carries a rigid arm 44. To the end of this arm 44 a link 45 is attached, and the lower end of this link 45 is connected with a frame bar 46 by a coil spring 47. As shown in Fig. 4, the fingers 41 of the grate incline downwardly so that they do not project directly toward the shaft 37.

When the machine is in operation, the material which is to be crushed is fed into the hopper 6 so that it will be ground between the fingers 40 and 41 as the crusher rotates. The spring 47 is utilized so as to give resiliency to the grate and to permit its fingers to be deflected in case a large or hard lump should come between the fingers. With this arrangement instead of breaking any of the fingers of the crusher on the grate, the grate will simply become depressed so as to permit the lump to drop through.

I provide means for supporting the lower end of the cradle 23 at different elevations so as to adjust the inclination of the barrel, as indicated by the dotted lines in Fig. 2. In Figs. 1 and 2, the lower end of the barrel is shown in its most depressed position; the end of the cradle 23 rests upon a horizontal cross bar 48 at the forward end of the frame. The vertical posts 3 at this end of the frame are provided with a plurality of oppositely disposed openings 49, and these openings are adapted to receive the ends of a cross bar or rod 50, in the manner indicated in Fig. 2^a. This cross bar 50 may support the lower end of the cradle so as to change the elevation of the barrel at this point, as will be readily understood. In adjusting the barrel it is raised or lowered by hand.

The lower end of the barrel 22 is provided with a nozzle or muzzle 51 which is of substantially conical form and is made of wire gauze so as to constitute a screen. The upper end of this nozzle is of substantially the

same diameter as the barrel so as to enable the nozzle to be attached, as shown. The lower extremity of the nozzle is of reduced diameter and is open so as to provide a discharge opening for the material which is mixed in the barrel.

The barrel 22 is provided on its inner side with longitudinally disposed strips or mixer bars 52 which may be formed of angle iron, as indicated. When the barrel is rotating these mixers pick up the material and let it fall again so as to bring about a thorough mixture of the different ingredients.

The shaft 6^a is provided with a large belt wheel 53 which is adapted to be driven continuously by a belt. This wheel is also provided with a crank 54 which enables it to be rotated by hand when desired. The shafts 36 and 37 extend through the walls of the hoppers 6 and 7 on the same side as shown, and these shafts are provided with sprocket wheels 55 and 56, respectively. The sprocket wheels are driven in the same direction by means of an endless sprocket chain 57 which runs over them, and which runs over a driving sprocket wheel 58 which is attached to the shaft 6^a.

From an observation of Fig. 2, it will be seen that the side bars 24 of the cradle 23 are substantially parallel with the axis of the barrel, but at their upper ends they have vertical extensions 59 which are pivotally attached to the shaft 6^a, as will be readily understood.

The upper frame 4 includes a landing frame 60 which is disposed near the hoppers, and this frame may be utilized as a support for the materials which are to be mixed in the machine. It also affords a support from which the handles of the gates may be readily operated.

In the operation of the machine the drum 9 is driven continuously in the direction of the arrow in Fig. 4, that is, its upper side rotates toward the barrel 22. The ingredients which are fed into the hoppers 6, 7, and 8, when the gates 13 and 19 are open, will therefore be advanced into the barrel. In the barrel they become thoroughly mixed with each other. The relative proportions of the different ingredients can be regulated by regulating the distance to which the gates 13 and 19 are raised. In other words, by regulating the amount of opening through which the hoppers deliver. If the quantity of material to be mixed is great without requiring a very thorough mixing of the ingredients, then the barrel 22 will be greatly inclined, as indicated by the full lines in Fig. 2. If, on the other hand, a very thorough mixture is necessary, the lower extremity of the barrel will be elevated to the highest possible point. In this way the material gravitating through the barrel moves slower and a very thorough mixture natu-

rally results. When the material mixed in the barrel reaches the screen 51, the smaller particles pass through the meshes of the screen, while the lumps which are too large pass out of the opening at the end of the nozzle.

The drum 9 may be made of any material desired, and it may be smooth or corrugated. When the machine is used for mixing fertilizers or similar materials containing acids, I prefer to form the drum of wood as it is not attacked by the acids. In mixing fertilizers the different hoppers can be used for holding cotton seed meal, sodium phosphate, muriate of potash, nitrate of soda, dried blood, or any other chemical that may be used as a fertilizer.

The hopper 6 having the crushing mechanism is intended to be used for crushing phosphates or similar materials when the machine is used for mixing fertilizers.

Special attention is called to the fact that the central axis of the barrel intersects the axis of the main shaft 6^a, which enables the gear wheels 29 and 33 to mesh with each other in any of the adjusted positions of the barrel. On one of the cross bars of the upper frame a roller 22^a is mounted that limits the upward adjustability of the barrel 22.

Having thus described my invention, I claim as new and desire to secure by Letters Patent,—

1. In a mixing machine, in combination, a frame, a main shaft mounted on said frame, a tumbling barrel, means for rotatably supporting said tumbling barrel with its central axis intersecting the axis of said shaft, a gear wheel carried by said shaft, a gear wheel carried by said barrel meshing with said first gear wheel for rotating said barrel, a feed drum mounted on said shaft, and hoppers over said feed drum and delivering thereto.

2. In a mixing machine, in combination, a frame, a hopper having a stirring device in the lower portion thereof, a second hopper having a crushing device in the lower portion thereof, a feed drum forming a bottom for said hoppers, means for rotating said feed drum, means for continuously actuating said stirring device and said crushing device, and a mixing barrel to which said drum delivers, affording means for mix-

ing the ingredients, said second hopper being located beyond said first hopper with respect to the direction of rotation of said drum.

3. In a mixing machine, in combination, a frame, a transverse shaft mounted therein, a hopper mounted over said shaft, a stirring device mounted in the lower portion of said hopper, a second hopper mounted over said shaft, a crushing device mounted in said second hopper, a drum on said shaft forming a bottom for said hoppers, means for driving said drum continuously, means for actuating said stirring device and said crushing device, an inclined barrel to which said drum delivers, and means for continuously rotating said barrel, said second hopper being located beyond the first hopper with respect to the direction of rotation.

4. In a mixing machine, in combination, a frame, a hopper mounted in said frame, a crusher shaft passing transversely through said hopper and having outwardly projecting fingers, a grate having fingers projecting toward said crusher shaft and receiving said first fingers therebetween, means for resiliently holding said grate to permit the deflection thereof, a second hopper, means for feeding the ingredients from said hoppers, and means for mixing said ingredients.

5. In a mixing machine, in combination, a frame, a hopper mounted in said frame, a crusher shaft rotatably mounted in the lower part of said hopper and having outwardly projecting fingers, a grate mounted in said hopper opposite to said crusher shaft and having fingers projecting downwardly and toward said crusher shaft, means for resiliently holding said grate in position and permitting a downward deflection of the fingers thereof, a second hopper, a feed drum on said shaft forming a bottom for said hoppers, means for continuously rotating said crusher shaft and said drum to advance the ingredients from said hoppers, and means for mixing said ingredients.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES R. HERRICK.

Witnesses:

E. R. GREENE,
C. P. LYNES.