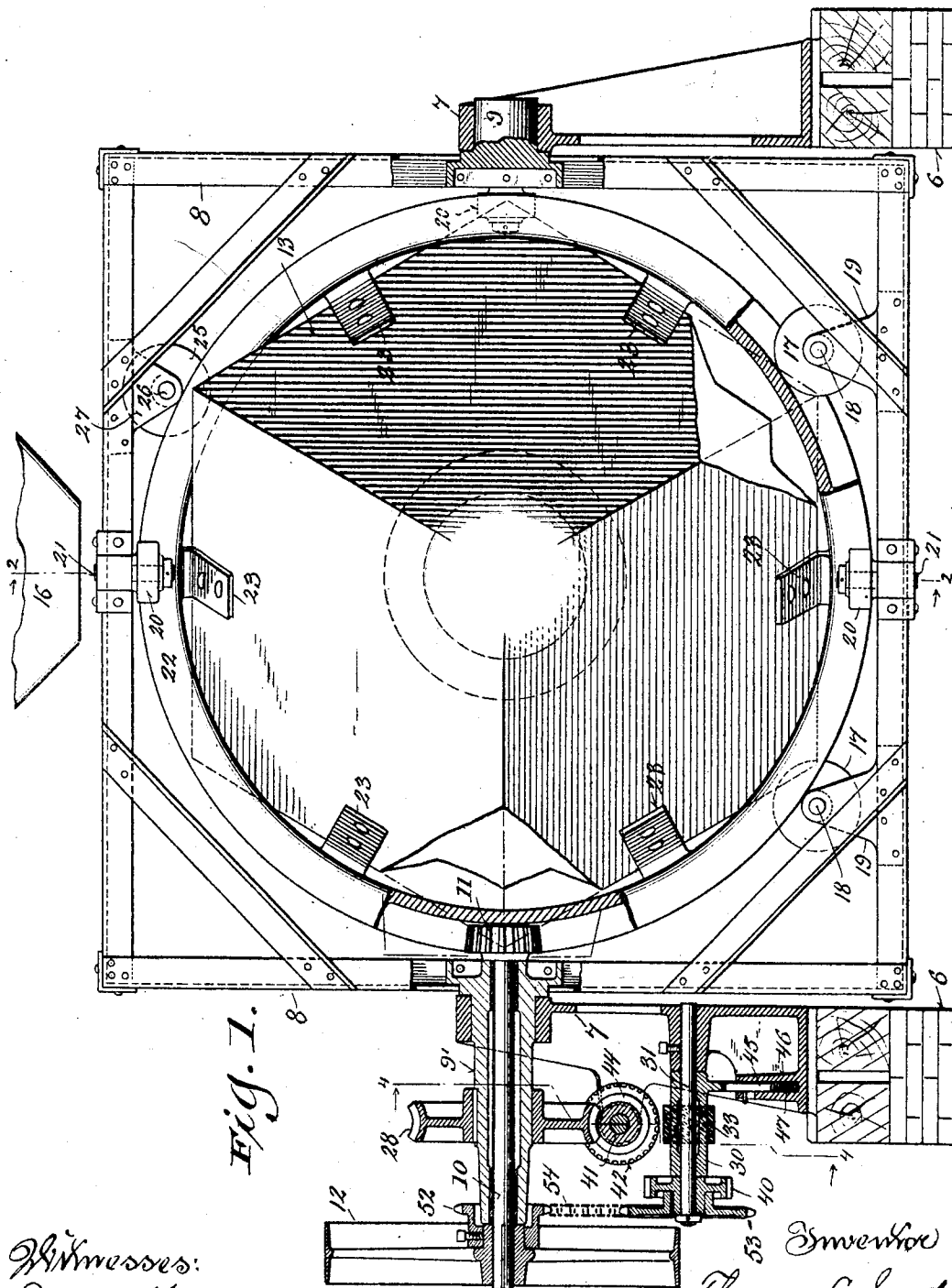


No. 803,721.

PATENTED NOV. 7, 1905.

T. L. SMITH.
MIXING MACHINE.
APPLICATION FILED AUG. 28, 1902.

4 SHEETS—SHEET 1.



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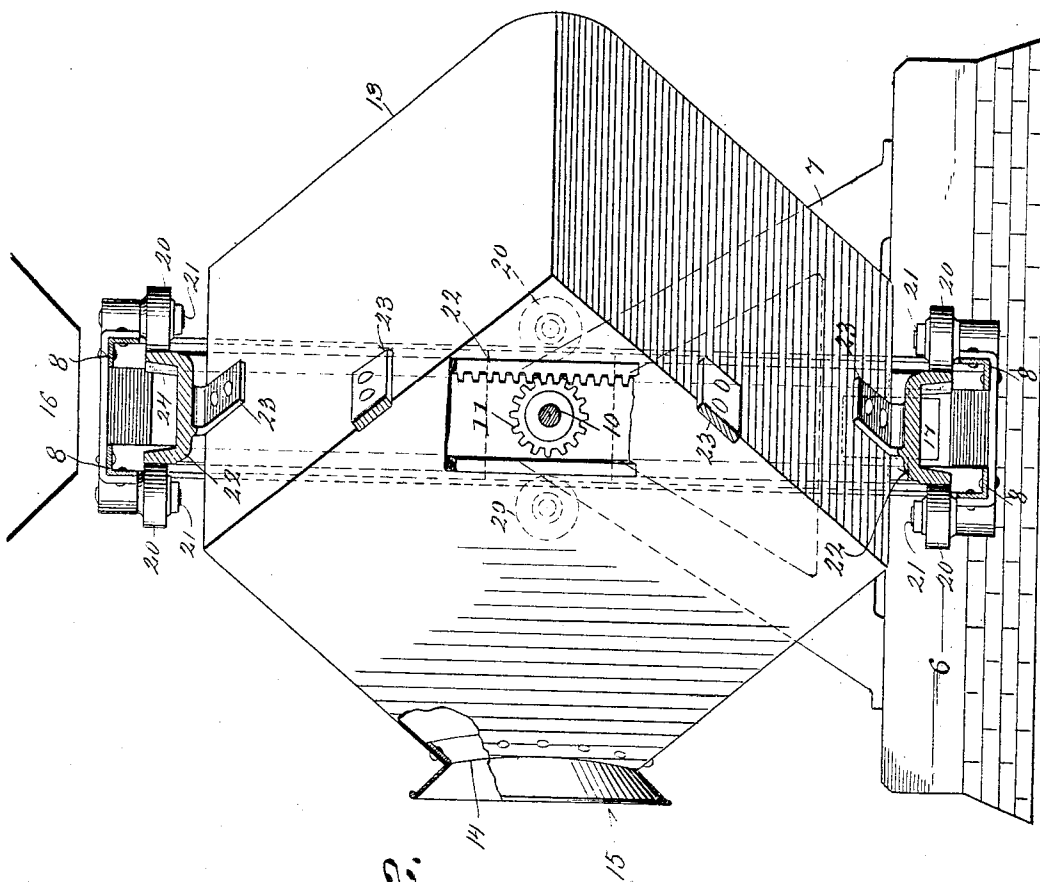


Fig. 2.

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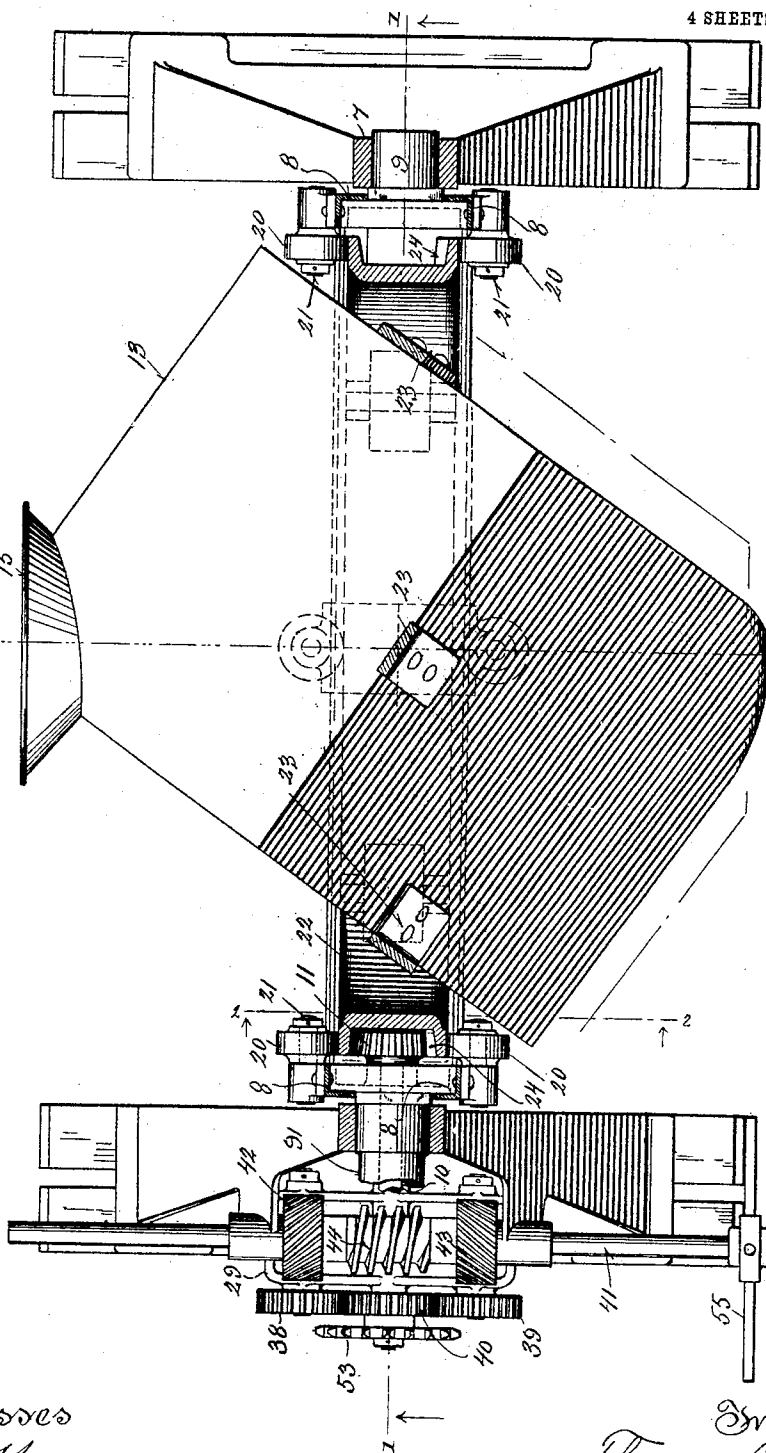
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4 SHEETS—SHEET 3.

Fig. 3.



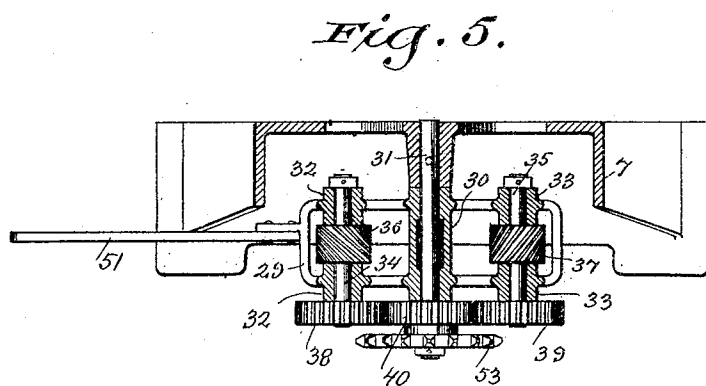
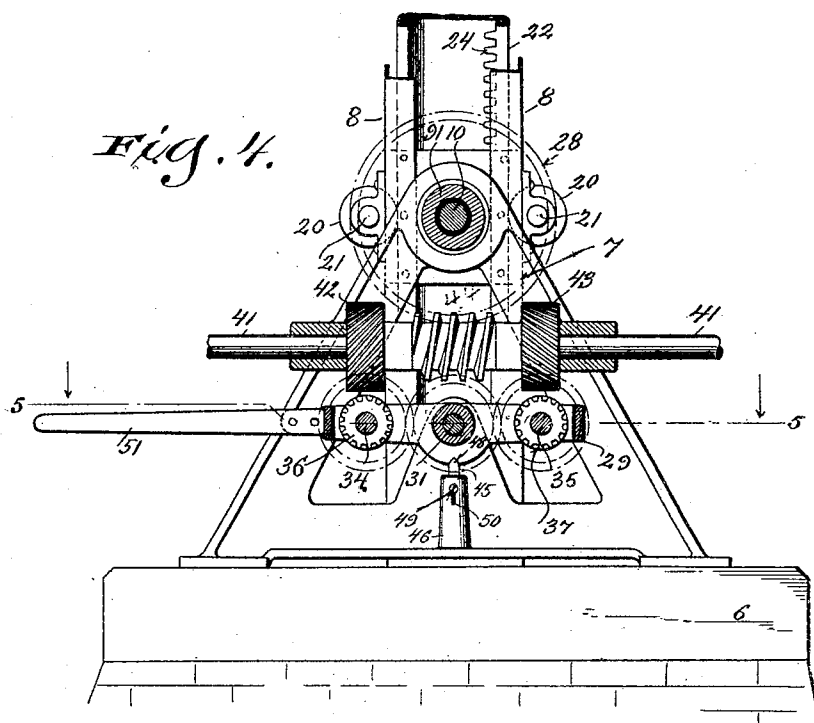
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

THOMAS L. SMITH, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO THE T. L. SMITH COMPANY, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

MIXING-MACHINE.

No. 803,721.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed August 28, 1902. Serial No. 121,282.

To all whom it may concern:

Be it known that I, THOMAS L. SMITH, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Mixing-Machines, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in mixing-machines adapted more especially for mixing concrete or other compounds in paving materials and also for mixing mortar and other materials wet or dry.

The primary object of the invention is to provide, in connection with a mixing-machine, improved means for tilting the mixing-receptacle, as will be hereinafter more fully set forth.

A still further object is to provide a simple form of gearing for rotating the receptacle.

In the accompanying drawings, Figure 1 is a section on the line 1 1 of Fig. 3. Fig. 2 is a section on the line 2 2 of Fig. 3. Fig. 3 is a plan view, the driving-ring and other parts being in section. Fig. 4 is a section on the line 4 4 of Fig. 1, and Fig. 5 is a horizontal section on the line 5 5 of Fig. 4.

Referring to the drawings, the numeral 6 indicates the base or foundation upon which the machine rests. Extending upwardly from this base and suitably spaced apart are supporting-standards 7 7. Between the standards is arranged a tiltable frame 8 of any desired form best adapted for supporting the mixing-receptacle hereinafter referred to, but preferably of the substantially rectangular form shown in the drawings, the sides thereof being advisably angle-irons. Projecting outwardly from opposite side pieces of this frame are trunnions 9 9', which are rotatable in bearings at the upper ends of the standards 7. The trunnion 9' projects outwardly a considerably greater distance than the trunnion 9 and is tubular in form to receive therethrough a shaft 10. The inner end of this shaft projects through the side pieces of the tiltable frame and carries at its inner extremity a beveled pinion 11. The outer end of this shaft, which projects beyond the outer end of the tubular trunnion, has mounted fast thereon a large pulley-wheel 12, around which extends a belt (not shown) leading from any suitable source of power.

Within the tiltable frame is arranged a mixing-receptacle 13. I preferably make this receptacle of polyhedric form or of cubiform shape or of a form in which a plurality of plane sides inclined to the axis of revolution are provided, the interior of the receptacle being devoid of blades. This particular form of receptacle not only increases the capacity thereof, but, furthermore, such special form has a particular relation to other features of my invention, as will hereinafter more fully appear. This receptacle is provided with but a single opening, said opening being arranged concentric with the axis of revolution, or substantially so, and being adapted when the drum is tilted to a certain position to be brought beneath the charging-hopper, to thereby serve as the means for charging the receptacle, and adapted when the receptacle is brought to another position by the tilting operation to serve as the means for discharging the receptacle of its contents, the said receptacle, however, when tilted to positions between the charging and discharging positions being revolved for the purpose of mixing the contents thereof. The charging and discharging opening referred to is indicated by the numeral 14 and has preferably extending from its edge an outwardly-flaring funnel 15, which when the receptacle is tilted to an upright position is directly beneath a charging-hopper 16. The opening is advisably provided with the flaring-edge funnel, inasmuch as by the provision thereof water, carrying with it cement, sand, or any of the mixing ingredients, will have to accumulate on the lowest point of the edge of the funnel and be thereby caused to drop off to the ground instead of passing onto the outer surface of the receptacle.

The mixing-receptacle is revolvably supported in the tilting frame on supporting-rolls 17, mounted on axial pins 18, which are journaled in bearings 19, extending from the frame. I have shown two of these rolls in the accompanying drawings and which are ordinarily found to be sufficient for the purpose, although, if desired, a greater number may be employed. The tilting frame furthermore carries several pairs of guiding-rolls 20 20, four pairs of such rolls being shown in the drawings, although any other desirable number may be employed. Each roll is carried on the end of a pin 21, journaled in suitable bear-

ings extending inwardly from the side of the tiltable frame.

Around the central portion of the receptacle is a ring or annulus 22, which is preferably of U-shaped form in cross-section. This ring is secured to the receptacle in any desirable manner. In the drawings I show for the purpose flanges 23, extending from the bottom of the U-shaped ring and bolted or otherwise secured to the receptacle. One of the side pieces of the ring or annulus is provided on its inner face with teeth which form a circular or annular rack 24, with which the teeth of the beveled pinion 11 engage, said beveled pinion lying between the sides or flanges of the ring. The supporting-rolls 17, as will be clearly seen from the drawings, are also disposed between the sides or flanges of the ring or annulus. The guide-rolls 20, however, are so spaced apart as to bear against the outer faces of the sides or flanges of the ring.

Besides the rolls already referred to I prefer to provide another rotatable roll, (indicated by the numeral 25,) and which is carried on an axial pin 26, journaled in bearings 27, extending inwardly from the upper side of the tiltable frame. This roll extends in between the sides or flanges of the ring, and its function is to completely center the ring or annulus.

At this point I would call attention to the fact that a single ring or annulus, in combination with a mixing-receptacle having one opening for charging and discharging, has a distinct advantage. In a form of mixing-receptacle such as that referred to it is necessary to tilt the receptacle to an upright position, so as to bring the opening in line with the charging-hopper. By providing the single ring or annulus and the rolls 20 when the mixing-receptacle is so tilted the rolls 20 of each pair which are lowermost will receive the weight of the receptacle by reason of the fact that the then lower flange of the ring will be bearing on said rolls.

In view of the fact that the trunnions 9' are rotatably supported in the bearings at the upper ends of the standards 7 it is obvious that when force is applied to the trunnions the frame is tilted in a direction corresponding to the line of direction of the force, and in view of the connection between the tiltable frame and the mixing-receptacle afforded by the several rolls hereinbefore referred to it necessarily follows that when the frame is tilted the mixing-receptacle is tilted therewith. The tilting may be effected in any desirable manner, either by manual power or by mechanical power. I prefer, however, to effect the tilting by mechanical power operated by the driving mechanism. In the drawings, however, I show mechanism for tilting by mechanical power, and I also show an alternative mechanism for tilting by manual power. The mechanical-power tilt is especially desirable in a machine such as that herein illustrated, inasmuch as

the mixing-receptacle is required to be tilted through a considerable arc—that is to say, a tilt of a quarter-turn. To accomplish this by hand would not only be quite difficult, but would also involve a considerable loss of time. Referring to the mechanical-power tilt, the numeral 28 indicates a worm-wheel mounted fast on the trunnion 9'. Below the trunnion 9' is an oscillating frame 29, provided with an intermediate tubular portion 30, which is mounted freely and adapted to oscillate on a shaft 31, extending outwardly from the standard 7. The frame 29 is also provided with sets of outer bearings 32 32 and 33 33. In the bearings 32 is mounted a short shaft 34, and in the bearings 33 is mounted a short shaft 35. On the shaft 34 and between the bearings 32 is a left-hand spiral worm-wheel 36, and on the shaft 35 between the bearings 33 is a right-hand spiral worm-wheel 37. On the outer ends of the shafts 34 and 35, respectively, are gear-wheels 38 and 39, while on the outer end of shaft 31 is a gear-wheel 40 in mesh with the wheels 38 and 39. Extending transversely across and above the oscillating frame 29 and mounted in suitable bearings is a shaft 41, and on this shaft and suitably spaced apart are worm-gears 42 and 43, the worm-gear 42 being directly above the worm-wheel 36 and the worm-gear 43 being directly above the worm-wheel 37. Formed or provided on the shaft 41 intermediate of the two worm-gears 42 and 43 is a worm 44, and this worm is in mesh with the worm-wheel 28 of trunnion 9'. The oscillating frame 29 is advisably held releasably in the position shown in Fig. 4 by any desirable means, and for this purpose I have shown in the drawings a spring-actuated pin 45, which is disposed in a tubular post 46. A coiled spring 47 is seated in the bottom of this tubular post and presses at its upper end against the lower end of the pin. The upper end of the pin is chisel-pointed, and this pointed end projects beyond the upper end of the post in position to engage a notch 48 in a curved portion of the frame 29, said notch having its bordering sides oppositely beveled. The pin has projecting laterally therefrom a stud 49, which extends through an elongated slot 50 in the post. A hand-lever 51 extends from the frame 29 and when operated is adapted to oscillate said frame.

Rotation from the shaft 10 to the shaft 31 is accomplished by any desirable means. In the drawings I show for the purpose a sprocket-wheel 52, mounted on the shaft 10, and a similar wheel 53, mounted on the outer end of the shaft 31, the two wheels being connected by a sprocket-chain 54. If desired, of course, in lieu of the sprocket-wheels and chain plain pulley-wheels and a connecting-belt could be substituted, or a suitable system of gearing could be interposed between the two shafts.

Where it is desired to tilt the tiltable frame

8 by hand, I simply mount on one of the ends of the shaft 41 a hand-wheel 55.

In the use and operation of my invention it is first necessary to tilt the tiltable frame 8 in a direction to bring the opening 14 in line with the charging-hopper 16. If it is desired to accomplish this by the hand-tilt, all that is necessary to be done is to rotate the shaft 41 in the proper direction by turning the hand-wheel 55. This will cause the worm 44 to rotate the worm-wheel 28, and consequently rock the tiltable frame 8 in a direction to bring the opening 14 beneath the hopper 8. After the receptacle is filled to the required extent with the material to be mixed the wheel 55 is turned in the opposite direction in order to tilt the frame 8 back to proper position for the mixing operation. It is obvious that this hand-tilting may be effected either at a time when the shaft 10 is stationary or when said shaft is rotating.

If instead of tilting the frame by hand it is desired to utilize the mechanical-power tilt, power is applied to the pulley-wheel 12, so as to rotate the shaft 10. This rotation of shaft 10 is conveyed to shaft 31 through the described connection. All that is now necessary to be done is to press downwardly on the lever 51, and this will rock said lever on the shaft 31 in a direction to throw the worm-gear 37 into engagement with the worm-wheel 43, and the shaft 41 is thereby rotated in a direction to cause, through the engagement of the worm 44 with the worm-wheel 28, a tilting of the frame 8 in a direction to bring the opening 14 beneath the hopper 16. At this position down pressure on the lever 51 is removed, and hence the oscillating frame 29 returns to its normal position. (Shown in Fig. 4.) The material to be mixed, of course, passes from the hopper and through the opening 14 into the receptacle, and after the receptacle has been charged with a sufficient quantity of the ingredients to be mixed the said receptacle is tilted back to a position in which the mixing operation is effected, and this tilting is accomplished merely by raising up the lever 51 and bringing the worm-gear 36 into mesh with the worm-wheel 42. In the operation of either pressing down or raising up on the lever 51 the pin 45 is pressed downwardly, and this permits of the oscillation of the frame 29, and when the hand is removed from the lever the oscillating frame 29 returns to its normal position and the spring 47, acting against the pin, causes said pin to move upwardly and firmly engage the notch, and hence lock the frame 29 in its normal position.

While I herein show my improved tilting mechanisms in connection with a mixing-receptacle of the described form and having but a single opening, yet I do not wish to be understood as limiting myself to that particular adaptation, inasmuch as said tilting mechan-

isms are equally applicable to any other form of mixing-receptacle in which it is necessary to tilt said receptacle in order to bring an opening thereof into and out of line with a charging-hopper—as, for instance, said mechanisms may be employed in connection with a mixing-receptacle of any desired shape, or it may be employed in connection with a mixing-receptacle having two openings, one for charging and the other for discharging and the said receptacle being of any desired form of construction without departing from the spirit and scope of my invention. The particular form of mechanical-power-tilting mechanism herein shown and described, however, has a peculiar relation to and coaction with a mixing-receptacle having but a single opening for charging and discharging, and hence its use in connection therewith will be found especially advantageous. For instance, in a mixing-receptacle employing but a single opening it is necessary that the receptacle should be tilted through an arc of one-fourth of a turn, and the accomplishment of this not only requires considerable power, but likewise considerable time. It is obvious, therefore, that by the provision of the mechanical-power tilt, in connection with a mixing-receptacle having a single opening for charging and discharging, a construction is provided possessing points of considerable advantage.

During the mixing operation the receptacle is tilted to an intermediate position between its charging and discharging positions. Fig. 2 of the drawings shows the mixing-receptacle tilted to a position in which the opening 14 is on a true horizontal plane. In practice, however, during the mixing operation the receptacle is preferably tilted to a position in which the bottom of the opening 14 is in line with the trunnions 9 9'. The mixing operation can then be effectually accomplished with the receptacle half-full of the ingredients to be mixed. It is for this reason that a one-opening receptacle is an advantage over a receptacle having separate charging and discharging openings, inasmuch as in such forms it is impossible to half fill the receptacle with the ingredients to be mixed.

Besides the advantages already alluded to attention is called to the fact that I provide a most simple form of mechanism or gearing for rotating the receptacle. I also obviate entirely the necessity for balancing the tiltable frame, inasmuch as the worm 44 holds the frame at any position to which it may have been tilted when said worm stops revolving.

From the drawings it will be seen that certain of the corners or angles of the mixing-receptacle are rounded. This is preferably done, as by such rounding the material is prevented from clogging or sticking at the corners or angles, and which would otherwise apt to be the case if said corners or angles were abrupt. If desired, of course, all the

other corners of the receptacle could be similarly rounded.

I would also call attention to the fact that the tiltable frame can be tilted to receive the material from any convenient point if need be, and that the discharge may be on either side, as the tilting can be done through a complete circle, and the tilting may be stopped anywhere without affecting the motion of the receptacle, owing to the system of rollers completely centering and supporting the receptacle in any position whatever.

It will be evident that in a construction as herein shown and described it is necessary that means should be provided for holding the tiltable frame in any position when tilted or where left by stopping the tilting action, and this requirement is met with by the employment of the worm 44, which is in mesh with the worm-wheel 28 and serves to effectually perform the function referred to.

What I claim as my invention is—

1. In a mixing-machine, the combination of a mixing-receptacle, means for rotating said receptacle, a frame in which the receptacle is revolubly mounted, said frame provided with projecting trunnions supported in suitable bearings, a gear-wheel mounted fast on one of the trunnions, a gear member engaging said gear-wheel, right and left hand spiral worm-wheels on the shaft of the gear member, an oscillatory frame having shafts mounted therein and geared together, worm-gears on two of said shafts and normally out of engagement with the worm-wheels, means for driving one of the shafts, means for oscillating the oscillatory frame, whereby, when oscillated in one direction, one of the worm-gears thereof is brought into engagement with one of the worm-wheels, and when oscillated in the opposite direction the other of the worm-gears is brought into engagement with the other worm-wheel, and a spring-actuated pin normally engaging the frame so as to hold said frame at such position that both worm-gears thereof are out of mesh with the worm-wheels, and said pin automatically disengaging the frame when said frame is oscillated in one direction, and automatically engaging the frame when the frame is brought back to normal position.

2. In a mixing-machine, the combination of a mixing-receptacle, means for rotating said receptacle, a frame in which the receptacle is revolubly mounted, said frame provided with projecting trunnions supported in suitable bearings, a gear-wheel mounted fast on one of the trunnions, a gear member engaging said gear-wheel, right and left hand spiral worm-wheels on the shaft of the gear member, an oscillatory frame having shafts mounted therein and geared together, worm-gears on two of said shafts and normally out of engagement with the worm-wheels, means for driving one of the shafts, and means for oscil-

lating the oscillatory frame, whereby when oscillated in one direction one of the worm-gears thereof is brought into engagement with one of the worm-wheels, and when oscillated in the opposite direction the other of the worm-gears is brought into engagement with the other worm-wheel.

3. In a mixing-machine, the combination of a mixing-receptacle, means for rotating said receptacle, a frame in which the receptacle is revolubly mounted, said frame provided with projecting trunnions supported in suitable bearings, a gear-wheel mounted fast on one of the trunnions, a gear member engaging said gear-wheel, right and left hand spiral worm-wheels on the shaft of the gear member, an oscillatory frame having shafts mounted therein and geared together, worm-gears on two of said shafts and normally out of engagement with the worm-wheels, means for driving one of the shafts, means for releasably holding the oscillatory frame in a position in which the two worm-gears thereof are out of engagement with the worm-wheels, and means for oscillating the oscillatory frame, whereby when oscillated in one direction one of the worm-gears thereof is brought into engagement with one of the worm-wheels, and when oscillated in the opposite direction the other of the worm-gears is brought into engagement with the other worm-wheel.

4. In a mixing-machine, the combination of a mixing-receptacle, a frame in which the receptacle is revolubly mounted, said frame provided with projecting trunnions supported in suitable bearings, a gear-wheel fast on one of the trunnions, a gear member engaging said gear-wheel, right and left hand spiral worm-wheels on the shaft of the gear member, an oscillatory frame having shafts mounted therein and geared together, worm-gears on two of said shafts, and normally out of engagement with the worm-wheels, means for oscillating the oscillatory frame, whereby when oscillated in one direction one of the worm-gears thereof is brought into engagement with one of the worm-wheels, and when oscillated in the opposite direction the other of the worm-gears is brought into engagement with the other worm-wheel, a driving-shaft, mechanism between the driving-shaft and the receptacle for rotating said receptacle, and mechanism between the driving-shaft and one of the shafts of the oscillatory frame and adapted for transferring the rotation of the driving-shaft to said shaft of the oscillatory frame.

5. In a mixing-machine, the combination of a receptacle provided with means for charging and discharging the same, a ring or annulus around the receptacle and provided with teeth forming an annular rack, a tiltable frame in which the receptacle is revolubly supported, said frame provided with projecting trunnions mounted rotatably in suitable

bearings, one of said trunnions being tubular, a shaft extending through the tubular trunnion and provided on its inner end with a gear-wheel engaging the annular rack-bar of the ring or annulus, and means for rotating said shaft.

6. In a mixing-machine, the combination of a receptacle provided with means for charging and discharging the same, a ring or annulus around the receptacle and provided with teeth forming an annular rack, a tiltable frame in which the receptacle is revolutely supported, said frame provided with projecting trunnions mounted in suitable bearings, one of said trunnions being tubular, a wheel mounted fast on one of the trunnions, means engaging the wheel to rotate it in opposite directions, and a rotatable shaft extending through the tubular trunnion and provided on its inner end with a gear-wheel engaging the annular rack.

7. In a mixing-machine, the combination of a receptacle provided with means for charging and discharging the same, a ring or annulus around the receptacle and provided with teeth forming an annular rack, a tiltable frame in which the receptacle is revolutely supported, said frame provided with projecting trunnions mounted in suitable bearings, and one of said trunnions being tubular, a wheel mounted fast on the tubular trunnion, a shaft passing through the tubular trunnion and provided on its inner end with a gear-wheel engaging the rack, and mechanism between said shaft and the wheel of the trunnion, and adapted for rotating said trunnion-wheel in opposite directions.

8. In a mixing-machine, the combination of a receptacle provided with means for charging and discharging the same, a ring or annulus around the receptacle and provided with teeth forming an annular rack, a tiltable frame in which the receptacle is revolutely supported, said frame provided with projecting trunnions mounted in suitable bearings, one of said trunnions being tubular, a gear-wheel mounted fast on the tubular trunnion, a driving-shaft passing through the tubular trunnion and provided on its inner end with a gear-wheel engaging the rack, a shaft below the tubular trunnion and having a gear-wheel mounted thereon engaging the gear-wheel of said tubular trunnion, and said shaft also having oppositely-spiraled worm-wheels mounted thereon, an oscillatory frame, shafts mounted therein and geared together, two of said shafts carrying worm-gears normally out of engagement with the worm-wheels, means for oscillating said oscillatory frame so as to bring one or the other of its worm-gears into engagement with one or the other of the worm-wheels, and means between the driving-shaft and one of the shafts of the oscillatory frame and adapted for rotating said shaft of the oscillatory frame.

9. In a mixing-machine, the combination of a tiltable frame, a mixing-receptacle revolutely supported therein, a ring or annulus, of channel form in cross-section, and arranged around the receptacle, supporting-rolls journaled in the bottom of the tiltable frame and engaging the ring between the flanges thereof, and a plurality of pairs of rolls engaging against the outer faces of the flanges of the ring.

10. In a mixing-machine, the combination of a tiltable frame, a mixing-receptacle revolutely supported therein, a ring or annulus, of channel form in cross-section and arranged around the receptacle, supporting-rolls journaled in the bottom of the tiltable frame and engaging the ring between the flanges thereof, a plurality of pairs of rolls engaging against the outer faces of the flanges of the ring, and a roll journaled in the upper portion of the tiltable frame and engaging the ring between the flanges thereof.

11. In a mixing-machine, the combination of a tiltable frame, a mixing-receptacle revolutely supported therein, a ring or annulus, of channel form in cross-section, and arranged around the receptacle, the inner face of one of the flanges thereof provided with teeth forming an annular rack, supporting-rolls journaled in the bottom of the tiltable frame and engaging the ring between the flanges thereof, and means engaging the annular rack to rotate the receptacle.

12. In a mixing-machine, the combination of a tiltable frame, a mixing-receptacle revolutely supported therein, and having an opening concentric or substantially so with the axis of rotation thereof, a ring or annulus, of channel form in cross-section, and arranged around the receptacle, and rollers bearing against the outer sides of the flanges of the ring, and so disposed that when said receptacle is tilted so as to bring its opening uppermost, the rolls will receive the contact or bearing of the ring and thereby support the receptacle in such tilted position.

13. In a mixing-machine, the combination of a tiltable frame, a mixing-receptacle revolutely supported therein, and having an opening concentric or substantially so with the axis of rotation thereof, the said receptacle having a plurality of plane surfaces inclined to the axis of rotation, a ring or annulus arranged around the receptacle, and of channel form in cross-section, and rolls bearing against the outer sides of the flanges of the ring, and so disposed that when said receptacle is tilted so as to bring its opening uppermost, the rolls will receive the contact or bearing of the ring and thereby support the receptacle in such tilted position.

14. In a mixing-machine, the combination of a mixing-receptacle provided with means for charging and discharging the same, a tiltable frame in which the receptacle is revolutely

bly supported, said frame provided with projecting trunnions journaled in suitable bearings, and one of said trunnions having a gear-wheel mounted thereon, a shaft provided with
 5 a gear-wheel meshing with the gear-wheel of the trunnion, and means for rotating the shaft in either direction.

15. In a mixing-machine, the combination of a mixing-receptacle of polyhedric form,
 10 having one opening for feed and discharge concentric, or substantially so, with the axis of revolution, a tiltable frame in which the receptacle is revolvably supported, and means for tilting the frame to any position in the entire
 15 circle of its revolution.

16. In a mixing-machine, the combination of a mixing-receptacle having one clear and unobstructed opening for feed and discharge, concentric, or substantially so, with the axis
 20 of revolution, a tiltable frame in which the receptacle is revolvably supported, means for tilting the frame to any position in the entire circle of its revolution, whereby the receptacle may be filled from any point above it and dis-
 25 charged either from the right-hand side, or the left-hand side of the machine.

17. In a mixing-machine, the combination of a mixing-receptacle, means for imparting to said receptacle a continuous rotation, a tiltable
 30 frame revolvably supporting such receptacle, means for tilting said frame to any position in the entire circle of its revolution, and means for holding said frame in any position.

18. In a mixing-machine, the combination
 35 of a mixing-receptacle, a tiltable frame revolvably supporting said mixing-receptacle, means for tilting said frame to any position in the entire circle of its revolution, and means for continually revolving said receptacle while in any
 40 tilted position, or while moving from one position to another.

19. In a mixing-machine, the combination of a mixing-receptacle, a tiltable frame revolvably supporting said receptacle, means for tilting
 45 said frame to any position in the entire circle of its revolution, means for revolving said receptacle while in any tilted position, or while moving from one position to another, and means for supporting and centering said
 50 mixing-receptacle, enabling it to be so revolved while in any tilted position whatever.

20. In a mixing-machine, the combination of a mixing-receptacle, a tiltable frame revolvably supporting said mixing-receptacle, means
 55 for tilting said frame to any position in the entire circle of its revolution, means for continually revolving said receptacle while in any tilted position, or while moving from one position to another, and a system of rollers so
 60 supporting and centering said mixing-receptacle, to enable said receptacle to be so revolved while in any tilted position whatever.

21. In a mixing-machine, the combination of a mixing-receptacle, a tiltable frame revolvably supporting said mixing-receptacle, means

for tilting said frame to any position in the entire circle of its revolution, means for continually revolving said receptacle while in any tilted position, or while moving from one position to another, and a set of supporting or
 70 centering rollers, and guiding or edge rollers, adapted to enable the mixing-receptacle to be revolved while in any tilted position whatever.

22. In a mixing-machine, the combination of a mixing-receptacle, a tiltable frame revolvably supporting said receptacle, means for tilting
 75 said frame to any position in the entire circle of its revolution, means for continually revolving said receptacle while in any tilted position, or while moving from one position to another, a set of supporting or centering
 80 rollers, and two sets of guiding or edge rollers, adapted to enable the mixing-receptacle to be revolved while in any tilted position whatever.
 85

23. In a mixing-machine, the combination of a polyhedric mixing-receptacle, a tiltable frame supporting said receptacle, means for tilting said frame to any position in the entire
 90 circle of its revolution, a gear attached to the periphery of said receptacle, and means for applying power to said gear in any position of said receptacle and tiltable frame.

24. In a mixing-machine, the combination of a polyhedric mixing-receptacle, a tiltable
 95 frame supporting said receptacle, means for tilting said frame to any position in the entire circle of its revolution, a gear attached to the periphery of said receptacle, said gear having supporting-surfaces and guiding-surfaces
 100 whereby said receptacle is completely centered and guided, and means for applying the power to said gear in any position of said receptacle and tiltable frame.

25. In a mixing-machine, the combination
 105 of a polyhedric mixing-receptacle, a tiltable frame supporting said receptacle, means for tilting said frame to any position in the entire circle of its revolution, a circular toothed rack disposed around the middle of said receptacle, a bevel-pinion engaging said toothed rack
 110 and journaled in the tilting axis, and means for connecting said pinion with the source of power.

26. In a mixing-machine, the combination
 115 of a polyhedric mixing-receptacle, a tiltable frame supporting said receptacle, means for tilting said frame to any position in the entire circle of its revolution, a circular toothed rack on the periphery of said mixing-receptacle,
 120 and provided with supporting and guiding surfaces whereby the said receptacle is completely centered and guided, a bevel-pinion engaging said toothed rack and journaled in the tilting axis, and means for connecting said pinion
 125 with the source of power.

27. In a mixing-machine, the combination of a mixing-receptacle, a tiltable frame supporting said receptacle, means for tilting said
 130 frame in either direction to any position in

the entire circle of its revolution, a gear on said receptacle and provided with supporting and guiding surfaces, and a system of rollers mounted in said tiltable frame and completely centering and guiding said gear in any position.

28. In a mixing-machine, the combination of a mixing-receptacle having one clear and unobstructed opening for feed and discharge, concentric or substantially so, with the axis of revolution, a tiltable frame supporting said receptacle, means for tilting said frame either to the right or to the left of the loading-point, a gear on said mixing-receptacle, and means for applying power to said gear in any position of said frame and receptacle.

29. In a mixing-machine, the combination of a mixing-receptacle having one clear and unobstructed opening for feed and discharge concentric, or substantially so, with the axis of revolution, a tiltable frame supporting said receptacle, means for tilting said frame either to the right or to the left of the loading-point, a gear on said mixing-receptacle and having supporting-surfaces and guiding-surfaces whereby said receptacle is completely centered and guided, and means for applying power to said gear in any position of said frame and receptacle.

30. In a mixing-machine, the combination of a mixing-receptacle having one clear and unobstructed opening for feed and discharge concentric or substantially so, with the axis of revolution, a tiltable frame supporting said receptacle, means for tilting said frame either to the right or to the left of the loading-point, a gear disposed around the middle of said receptacle, and means for applying power to said gear in any position of said receptacle and tiltable frame.

31. In a mixing-machine, the combination of a mixing-receptacle having one clear and

unobstructed opening for feed and discharge concentric, or substantially so, with the axis of revolution, a tiltable frame supporting said receptacle, means for tilting said frame either to the right or to the left of the loading-point, a gear on the largest diameter of said receptacle, and means for applying power to said gear in any position of said frame and receptacle.

32. In a mixing-machine, the combination of a mixing-receptacle having one clear and unobstructed opening for feed and discharge concentric, or substantially so, with the axis of revolution, a tiltable frame supporting said receptacle, means for tilting said frame either to the right or to the left of the loading-point, a circular toothed rack disposed around the middle of said receptacle, a bevel-pinion engaging said toothed rack and journaled in the tilting axis, and means for connecting said pinion with the source of power.

33. In a mixing-machine, the combination of a mixing-receptacle having one clear and unobstructed opening for feed and discharge concentric, or substantially so, with the axis of revolution, a tiltable frame supporting said receptacle, means for tilting said frame either to the right or to the left of the loading-point, a circular toothed rack on the periphery of said mixing-receptacle and provided with supporting and guiding surfaces, whereby the said receptacle is completely centered and guided, a bevel-pinion engaging said toothed rack and journaled in the tilting axis, and means for connecting said pinion with the source of power.

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

THOMAS L. SMITH.

Witnesses:

ANNA V. FAUST,
A. L. MORSELL.