T. L. SMITH.

MIXING MACHINE.

APPLICATION FILED FEB. 27, 1907.

951,460.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

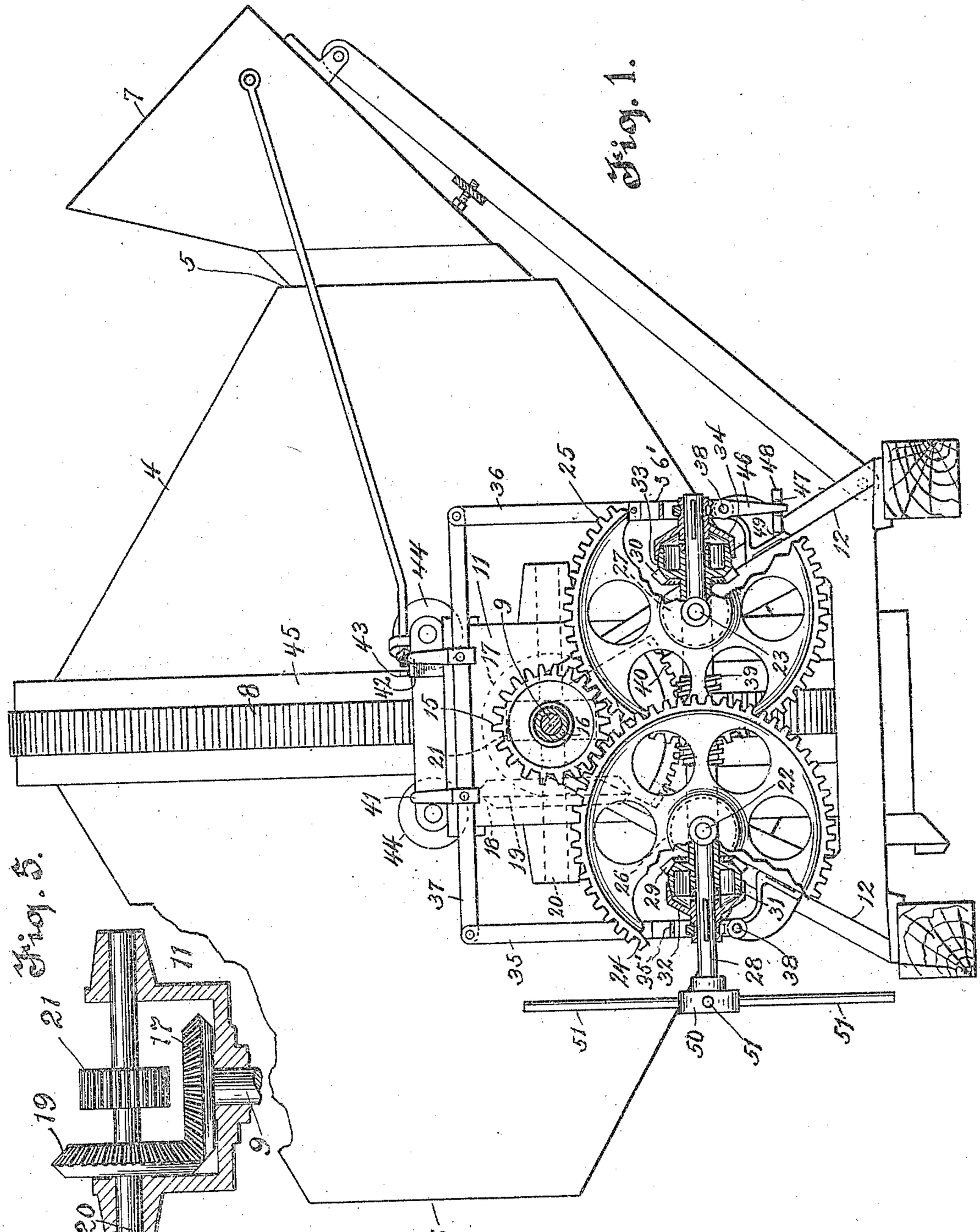

Fig. 5.

Witnesses.

A. N. Keeney

Anna E. Schmidtberger

Inventor.

Thomas L. Smith

By Benedict, Morsell & Caldwell

Attorneys.

T. L. SMITH.

MIXING MACHINE.

APPLICATION FILED FEB. 27, 1907.

951,460.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 2.

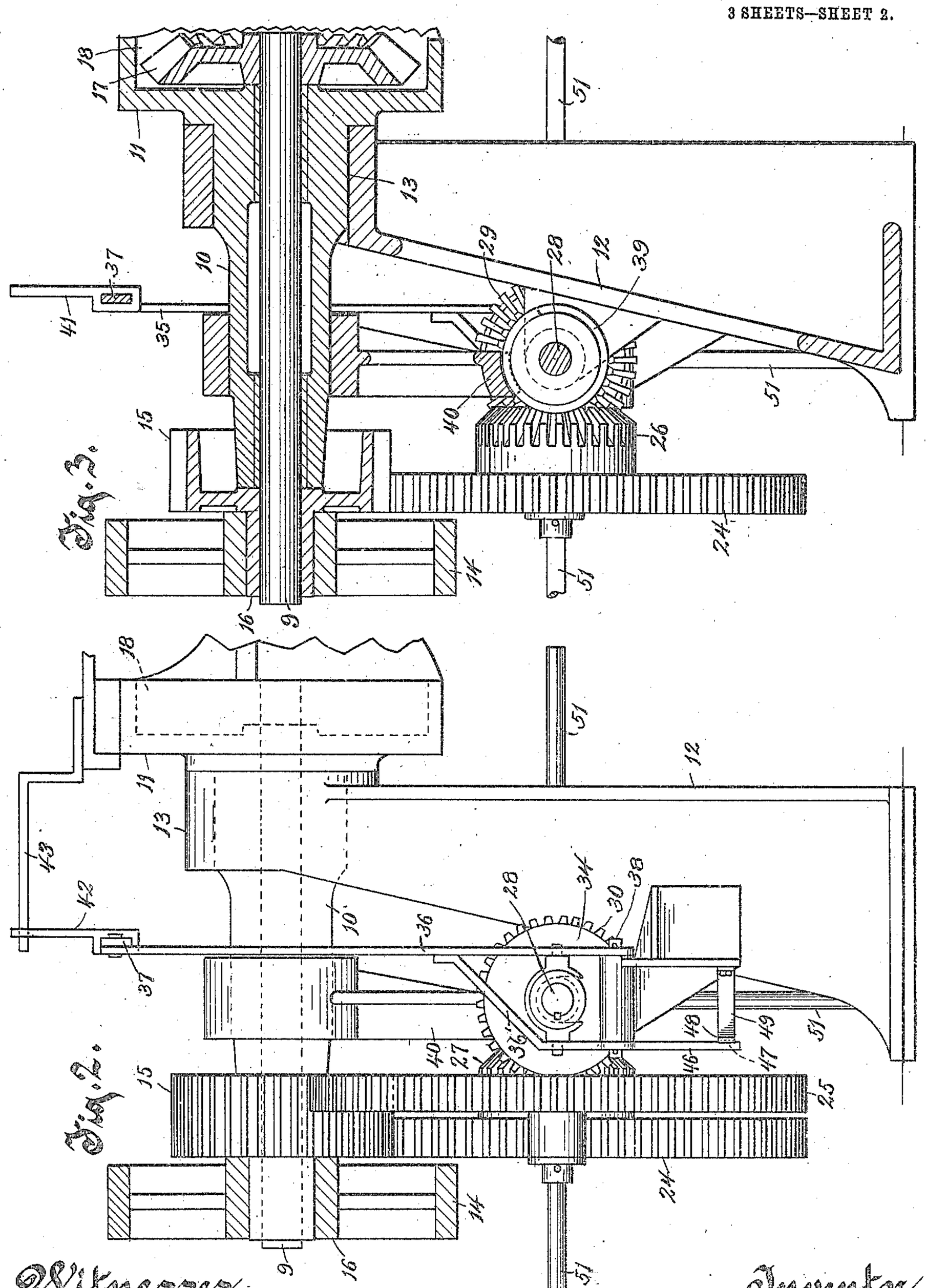

Fig. 2.

Witnesses:

C. F. Kemey

Anna F. Schmidtbauer

Inventor.

Thomas L. Smith.

By Benedict, Morsell & Caldwell.

Attorneys.

T. L. SMITH.

MIXING MACHINE.

APPLICATION FILED FEB. 27, 1907.

951,460.

Patented Mar. 8, 1910.

3 SHEETS—SHEET 3.

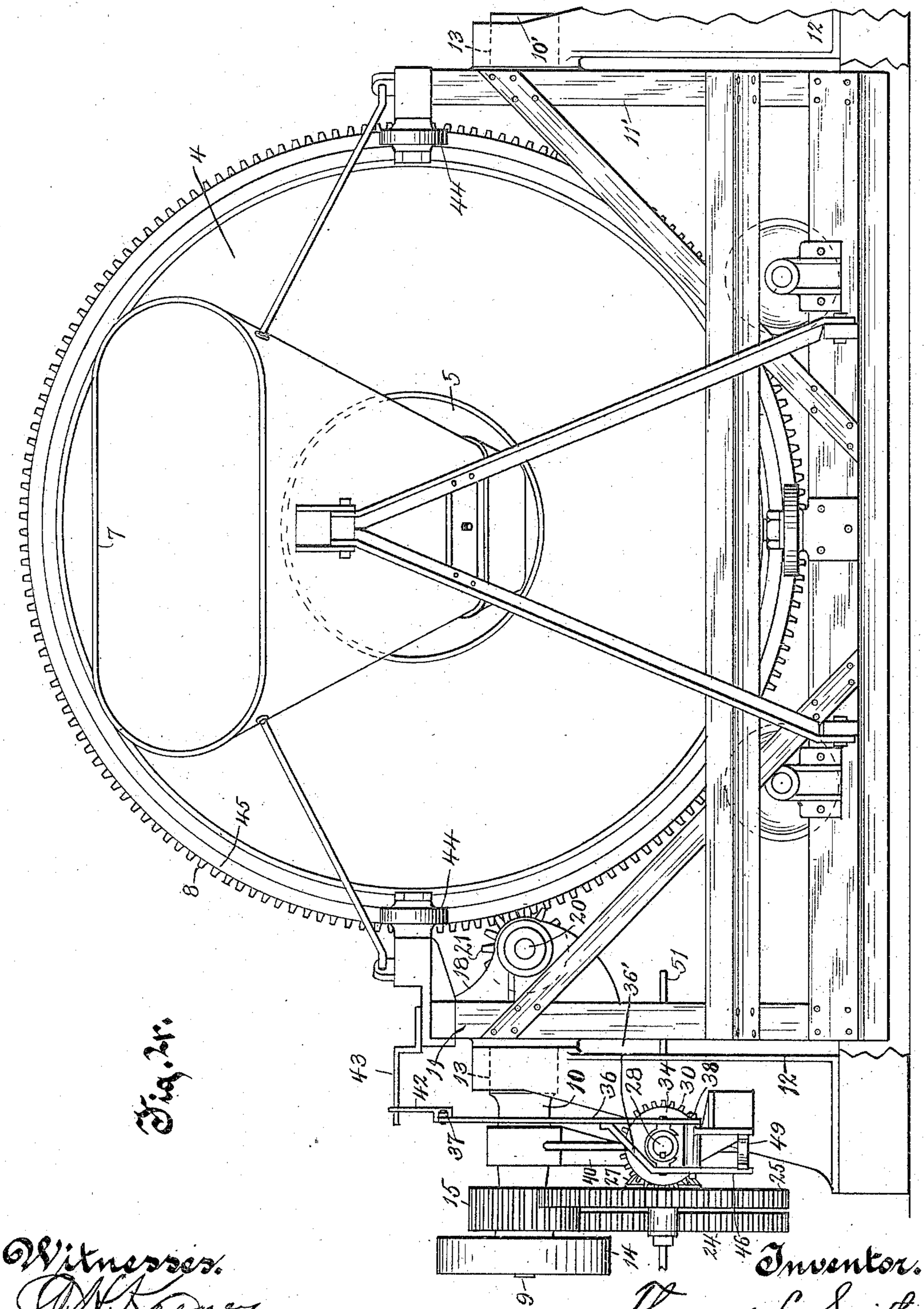

Fig. 2.

Witnesses.

D. H. Keeney

Alma A. Kling

Inventor.

Thomas L. Smith

By Benedict, Morsell & Caldwell

Attorneys.

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.

951,460. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed February 27, 1907. Serial No. 359,562.

To all whom it may concern:

Be it known that I, THOMAS L. SMITH, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements 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, more particularly to tilting and driving mechanism for the class of mixing machines intended for mixing concrete and analogous substances.

The object of the invention is to provide an improved and simplified means for tilting and driving a mixing receptacle, wherein the tilting operation can be effected either by hand or by mechanical means, and when tilted by the latter means, the tilting is effected preferably through the intermediary of the same power that rotates the receptacle.

A further object resides in the provision of a construction wherein the extent of tilting of the receptacle in either direction is automatically regulated, and wherein also the tilting can be stopped by hand at any point intermediate of the limit of tilting in either direction.

In the accompanying drawings, Figure 1 is a side elevation of the invention, parts being broken away and in section; Fig. 2 is an elevation on an enlarged scale of a fragment of Fig. 1; and at right angles to Fig. 1. Fig. 3 is a vertical section of Fig. 2. Fig. 4 is an end elevation, looking at the feeding end of the receptacle, and Fig. 5 is a horizontal sectional detail view of a portion of the mechanism.

Referring to the drawings, the numeral 4 indicates a desirable form of mixing receptacle, having the charging opening 5 at one end, and the discharge opening 6 at its opposite end. The usual hopper 7 is provided for the charging opening, to serve as a convenient means for depositing into the receptacle the materials to be mixed. The receptacle is also provided between its ends with the annular rack 8.

The driving shaft for rotating the receptacle and for furnishing the driving power for the mechanical tilting operation is indicated by the numeral 9. This shaft is free to rotate in a trunnion 10 which is rigid to and projects outwardly from one portion 11 of a frame. There are also provided upwardly converging supports 12 on opposite sides of the receptacle, which supports at the points of convergence are provided with openings 13, one of said openings forming a bearing for the trunnion 10, and the other for another trunnion 10′ projecting from a portion of the frame designated by the numeral 11′, it being understood that the frame is so arranged on opposite sides of the receptacle, as to provide the portions 11 and 11′ which are united and made rigid with each other by suitable connecting beams or framework, and having the trunnions 10 and 10′ projecting respectively therefrom.

Mounted fast on the outer end of the driving shaft 9 is a driving pulley 14, which may be rotated from any suitable source of power. Of course, if desired, a gear wheel might be substituted for the pulley. Also mounted fast on the driving shaft is a gear wheel 15. By preference, this gear wheel is mounted fast directly on the shaft, and is provided with an outwardly extending hub 16 to receive tightly therearound the hub of the pulley 14.

The inner end of drive shaft 9 has mounted thereon a beveled gear 17, preferably confined in a chamber 18 formed in the frame, and constituting a housing for the gear wheel. This gear wheel is in mesh with another beveled gear 19 on a shaft 20 extending in a plane at right angles to shaft 9 and mounted in suitable bearings in the portion 11 of the tilting frame. Shaft 20 has also mounted thereon a toothed wheel 21 which engages with the annular rack 8 of the mixing receptacle.

Below and running in the same direction as the driving shaft 9 are shafts 22 and 23 mounted in suitable bearings in the fixed frame work. On these shafts are loosely mounted two large toothed wheels 24 and 25, respectively, one of said wheels being set slightly in advance of the other, and both being in mesh with the gear wheel 15. Each of the toothed wheels 24 and 25 has projecting rigidly from one face thereof a beveled gear wheel. The beveled gear wheel of toothed wheel 24 is indicated by the numeral 26, and that of beveled gear wheel 25 by the numeral 27.

A shaft 28 mounted in suitable bearings in the fixed frame work is disposed back of the wheels 24 and 25 and at right angles to

the axes of said wheels. A beveled gear wheel 29 forming part of one member of a clutch mechanism is mounted loosely on this shaft, and is in mesh with the beveled gear 26, and a similar beveled gear wheel 30, forming one member of another clutch mechanism is also loosely mounted on shaft 28, and is in mesh with the beveled gear wheel 27. The member of the clutch mechanism pertaining to beveled gear 29, and which projects outwardly from said beveled gear, is indicated by the numeral 31, and is adapted to coöperate with a frictional clutch member 32, slidable on and rotatable with the shaft 28. The member of the clutch mechanism pertaining to beveled gear 30 is indicated by the numeral 33 and is adapted to coöperate with a frictional clutch member 34, also slidable on and rotatable with shaft 28.

Mechanism is provided for simultaneously operating the clutch members 32 and 34, so that one of said clutch members is moved into operative engagement with its companion clutch member, while the other of said clutch members is moved out of engagement with its companion clutch member; and in the specific embodiment of the invention illustrated in the accompanying drawings, I show the clutch operating mechanism as consisting of side arms 35 and 36, and an upper connecting arm 37, jointed at opposite ends to the upper ends of said side arms 35′ and 36′ respectively. The side arms have branch arms extending therefrom (see particularly Fig. 2) and each branch arm in conjunction with the main portion of the arm, form a fork, the arms of which straddle and are pivoted to a broken ring or annulus which is seated in a groove formed in the hub of each clutch member (32 and 34). The lower ends of the arms 35 and 36 and 35′ and 36′ extend slightly below shaft 28, and are pivotally mounted on pivot pins 38, 38. As shown in Fig. 1, the clutch members 32 and 34 occupy a neutral position, that is to say, they rotate with shaft 28, but are not in operative frictional engagement with the clutch members 31 and 33. If, now, the clutch adjusting mechanism is forced in a direction toward the right of Fig. 1, it will have the effect of throwing clutch member 32 into operative frictional engagement with clutch member 31, and clutch member 34 still farther out of clutching engagement with clutch member 33. In consequence, shaft 28 will derive its rotation from beveled gear 29, and hence will be rotated in one direction, while, on the other hand, if the clutch operating frame or mechanism is turned toward the left, clutch member 34 will be thrown into operative frictional engagement with clutch member 33, whereas clutch member 32 will be thrown out of operative engagement with clutch member 31, and hence shaft 28 will under these conditions be rotated in an opposite direction through the beveled gear wheel 30. Formed on shaft 28 between the two beveled gear wheels 29 and 30 is a worm 39. This worm is in engagement with a toothed segment 40 which is fast to and depends from the trunnion 10.

I also employ in connection with the clutch operating frame or mechanism, automatic tripping mechanism for limiting the extent of the tilting movement of the receptacle in either direction. This mechanism consists of two tappets 41 and 42, projecting upwardly from the upper connecting bar 37 of the clutch operating frame. These tappets are placed a desired distance apart and are adapted to coöperate with a finger 43 projecting outwardly from the frame and occupying a position between the two tappets. Fig. 1 of the drawings shows the position of the finger 43 with respect to the two tappets, when the receptacle is in its horizontal or nontilted position. If, now, the clutch adjusting frame is thrown over (which movement is accomplished by hand) in a direction toward the right of Fig. 1, the clutches 31 and 32 will be thrown into operative engagement and the shaft 28 thereby rotated in a direction to cause a tilting of the frame 11—11′ toward the left and consequently a tilting of the receptacle in the same direction. The tilting of the clutch adjusting frame toward the right, of course, moves the tappet 42 away from finger 43, and the tappet 41 toward but not in contact with finger 43. The tilting of the frame 11—11′ and the receptacle will continue until the finger 43 of the portion 11 of said frame strikes the tappet 41 which will, of course, throw the clutches 31 and 32 out of operative engagement, and thereby stop the tilting movement of the receptacle. If following this operation, it is desired to tilt the receptacle back to its Fig. 1 position, the clutch operating frame is turned from the position last referred to toward the left of Fig. 1, in order to throw the clutches 33 and 34 into operative engagement and the tilting back of the frame and receptacle will continue until the finger 43 strikes the tappet 42, when of course further tilting of the receptacle is prevented, and said receptacle is held in its normal horizontal position as illustrated in Fig. 1.

It will of course be understood that the frame 11 11′ forms no part of the receptacle, or in other words is separate therefrom. The rocking movement which is imparted to the trunnions 10 and 10′ is of course transferred to the frame 11 11′ which is rigid to the trunnions. The frame 11 11′ carries sets of rollers 44, and the rollers of each pair bear against opposite side edges of the ring 45 around which the annular rack 8 is ar-

ranged. It, of course, follows that when the frame 11, 11′ is rocked, its rocking movement is imparted to the receptacle by reason of the engagement of the rollers 44 with the edges of the ring 45, and at the same time the free rotation of the receptacle is not interfered with.

The branch 36′ of the side arm 36 of the clutch-operating frame is extended downwardly to form a finger 46. This finger is adapted normally to engage a notch 47 in a right angular extension 48 from an arm 49. When so engaging the notch, the receptacle is releasably held in its normal horizontal position as shown in Fig. 1. When the clutch-operating frame is moved in order to effect the engagement of one of the clutches, the finger 46 is moved out of engagement with the notch 47, and after the tilting operation, and when the clutch-operating frame is moved in an opposite direction to tilt the receptacle back to its normal position, the finger 46 automatically engages the notch 47, when the receptacle reaches said normal horizontal position.

It frequently happens that it is desirable to effect the tilting operation by hand, and not rely upon the mechanical tilt for accomplishing such tilting operation. In this case, no operation of the clutch-operating frame is necessary, and all that is required is that the shaft 28 be rotated in a direction to tilt the discharge end of the receptacle upwardly or downwardly as desired. As a convenient means for turning shaft 28 by hand, I mount fast on the end of said shaft a hub 50, having radiating therefrom a series of fingers 51, which form convenient handles for turning.

In the operation of the mechanism, if the parts are in the position shown in Fig. 1, and power is applied to the pulley 14 of the driving shaft 9, said shaft is, of course, necessarily rotated, and through the system of gearing herein before described, viz, the intermeshing beveled gears 17 and 19, and toothed wheel 21 engaging rack 8, the receptacle is also rotated, in order to accomplish the mixing of the materials within said receptacle. In view of the fact that, in the position of the parts shown in Fig. 1, the clutch mechanisms are not in operative engagement, the receptacle of course is not tilted, the toothed wheel 15 merely turning loosely the wheels 24 and 25 and the beveled gears 29 and 30 fast to said latter wheels, without imparting rotation to the shaft 28. After the receptacle is rotated in the manner stated a sufficient length of time to secure a thorough mixing of the ingredients, it is then necessary to tilt the receptacle in order to discharge the mixed materials therefrom. This is accomplished by turning the clutch-operating frame toward the right of Fig. 1, when of course the operation hereinbefore described will take place, and the discharge end of the receptacle depressed. Under this operation, the clutch-operating frame is of course turned on its pivots toward the right of Fig. 1. This makes the clutch-operating member 32 effective, and beveled gear 29 meshing with beveled gear 26 causes rotation of shaft 28, and the worm 39 on said shaft causes movement of the toothed segment 40, which movement of the sector is imparted to the trunnions 10 10′ and frame 11 11′ and said movement of the frame is imparted to the receptacle by the action of the rollers 44 of frame 11 11′ against the side edge of the ring 45. The tilting may, as previously suggested, be stopped before the completion of the full tilting movement of the receptacle toward the left, merely by reversing the throw of the clutch-operating frame, that is to say, moving said frame toward the left and back to its normal position, after the desired limited extent of tilting is secured. If, however, a complete tilt is desired, the clutch-operating frame is allowed to remain in its adjusted position toward the right, and after the receptacle is tilted to a certain extent the finger 43 is brought into contact with the tappet 41, and hence through the consequent disengagement of the clutches further tilting movement of the receptacle is prevented, the said contact thereby determining or controlling the full extent of tilt. It will, of course, be obvious that during the tilting operation described the receptacle is at the same time continuously rotated. After the tilting operation, and after the mixed materials have been discharged by reason of the depression of the discharge end of the receptacle, the clutch-operating frame is moved toward the left of Fig. 1, and this will make the clutch member 33 operative, and hence cause the shaft 28 to be rotated in a reverse direction, and thereby tilt the receptacle back to normal horizontal position, the receptacle being stopped at such position by contact of the finger 43 with the tappet 42, and the receptacle being held in this position by the engagement of the finger 46 with the notch 47. If for any reason it is not desired to effect the tilting by the mechanical means, but by hand, then all that is necessary for the operator to do is to turn shaft 28 by hand in one direction or the other, dependent upon the direction of tilt desired.

From the foregoing description of the specific embodiment of my invention, it will be evident that the mechanical tilting is effected by the same power which rotates the receptacle, and which is a very desirable construction as it enables the operator to give merely an initial movement to the clutch-operating frame, and the mechanism thereafter takes care of the complete opera-

tion. I do not wish to be understood, however, as limiting myself specifically to this arrangement, inasmuch as the invention contemplates the operation of the tilting mechanism by mechanical power other than the same power which is employed for rotating the receptacle.

What I claim as my invention is:

1. In tilting mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a shaft mounted in the fixed frame work, clutch members loose on the shaft, means independent of said shaft for rotating said clutch members in opposite directions, other coöperating clutch members slidable on and rotatable with said shaft, and adapted to be thrown out of operative engagement with the loose clutch members, when the receptacle is in its mixing or non-tilted position, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch members, a system of gearing between the shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle, whereby when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member, and the shaft is thereby rotated in one direction, and the system of gearing operated in a manner to effect the depression of the discharge end of the receptacle, and, when said clutch-operating mechanism is reversely operated, the other slidable clutch is thrown into engagement with its loose clutch member, and the shaft thereby rotated in the opposite direction, and the system of gearing operated so as to tilt the receptacle back.

2. In tilting mechanism for mixing machines, the combination of a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a connection between the tiltable frame and the receptacle, whereby the said frame and receptacle are tiltable together, a driving shaft, systems of gearing between the driving shafts and the tiltable frame, and adapted to effect the tilting of the tiltable frame and the receptacle together in either direction, clutch mechanisms for the systems of gearing, clutch operating mechanism for throwing the respective clutch mechanisms alternately into and out of operative engagement, the throwing of one or the other of the clutch mechanisms into operative engagement causing the tilting of the tiltable frame and the receptacle, in one or the other direction, and mechanism between the tiltable frame and the clutch operating mechanism and so constructed as to automatically throw one of the clutch mechanisms out of operative engagement, after the tiltable frame and receptacle have been tilted to a certain extent.

3. In tilting and driving mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, and also having an annular rack therearound, a driving shaft, a system of gearing between the driving shaft and the rack for continuously rotating the receptacle during the rotation of the shaft, a tiltable frame adjacent to the receptacle, another shaft mounted in the fixed frame work, clutch members loose on the latter shaft, systems of gearing between the driving shaft and said loose clutch members, other coöperating clutch members slidable on and rotatable with the clutch-carrying shaft, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch members, a system of gearing between the clutch-carrying shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle, whereby, when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member, and the clutch-carrying shaft is operated in one direction, and the system of gearing for effecting the tilting of the frame is operated in a manner to cause a depression of the discharge end of the receptacle, and, when the clutch-operating mechanism is reversely operated, the other slidable clutch is thrown into engagement with its loose clutch member, and the clutch-carrying shaft thereby rotated in an opposite direction and the system of gearing for effecting the tilting of the frame operated so as to tilt the receptacle back.

4. In tilting mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a shaft having a toothed wheel fast thereon, other shafts mounted in the fixed frame work and having toothed wheels thereon in mesh with the toothed wheel of the first named shaft, said latter toothed wheels having beveled gears rigid therewith, a clutch-carrying shaft mounted in the fixed frame work, clutch members loose on the clutch-carrying shaft and having beveled gears rigid therewith and in mesh with the beveled gears which are rigid with the toothed wheels, clutch members slidable on and rotatable with said clutch-carry-

ranged. It, of course, follows that when the frame 11, 11′ is rocked, its rocking movement is imparted to the receptacle by reason of the engagement of the rollers 44 with the edges of the ring 45, and at the same time the free rotation of the receptacle is not interfered with.

The branch 36′ of the side arm 36 of the clutch-operating frame is extended downwardly to form a finger 46. This finger is adapted normally to engage a notch 47 in a right angular extension 48 from an arm 49. When so engaging the notch, the receptacle is releasably held in its normal horizontal position as shown in Fig. 1. When the clutch-operating frame is moved in order to effect the engagement of one of the clutches, the finger 46 is moved out of engagement with the notch 47, and after the tilting operation, and when the clutch-operating frame is moved in an opposite direction to tilt the receptacle back to its normal position, the finger 46 automatically engages the notch 47, when the receptacle reaches said normal horizontal position.

It frequently happens that it is desirable to effect the tilting operation by hand, and not rely upon the mechanical tilt for accomplishing such tilting operation. In this case, no operation of the clutch-operating frame is necessary, and all that is required is that the shaft 28 be rotated in a direction to tilt the discharge end of the receptacle upwardly or downwardly as desired. As a convenient means for turning shaft 28 by hand, I mount fast on the end of said shaft a hub 50, having radiating therefrom a series of fingers 51, which form convenient handles for turning.

In the operation of the mechanism, if the parts are in the position shown in Fig. 1, and power is applied to the pulley 14 of the driving shaft 9, said shaft is, of course, necessarily rotated, and through the system of gearing herein before described, viz, the intermeshing beveled gears 17 and 19, and toothed wheel 21 engaging rack 8, the receptacle is also rotated, in order to accomplish the mixing of the materials within said receptacle. In view of the fact that, in the position of the parts shown in Fig. 1, the clutch mechanisms are not in operative engagement, the receptacle of course is not tilted, the toothed wheel 15 merely turning loosely the wheels 24 and 25 and the beveled gears 29 and 30 fast to said latter wheels, without imparting rotation to the shaft 28. After the receptacle is rotated in the manner stated a sufficient length of time to secure a thorough mixing of the ingredients, it is then necessary to tilt the receptacle in order to discharge the mixed materials therefrom. This is accomplished by turning the clutch-operating frame toward the right of Fig. 1, when of course the operation herein before described will take place, and the discharge end of the receptacle depressed. Under this operation, the clutch-operating frame is of course turned on its pivots toward the right of Fig. 1. This makes the clutch-operating member 32 effective, and beveled gear 29 meshing with beveled gear 26 causes rotation of shaft 28, and the worm 39 on said shaft causes movement of the toothed segment 40, which movement of the sector is imparted to the trunnions 10 10′ and frame 11 11′ and said movement of the frame is imparted to the receptacle by the action of the rollers 44 of frame 11 11′ against the side edge of the ring 45. The tilting may, as previously suggested, be stopped before the completion of the full tilting movement of the receptacle toward the left, merely by reversing the throw of the clutch-operating frame, that is to say, moving said frame toward the left and back to its normal position, after the desired limited extent of tilting is secured. If, however, a complete tilt is desired, the clutch-operating frame is allowed to remain in its adjusted position toward the right, and after the receptacle is tilted to a certain extent the finger 43 is brought into contact with the tappet 41, and hence through the consequent disengagement of the clutches further tilting movement of the receptacle is prevented, the said contact thereby determining or controlling the full extent of tilt. It will, of course, be obvious that during the tilting operation described the receptacle is at the same time continuously rotated. After the tilting operation, and after the mixed materials have been discharged by reason of the depression of the discharge end of the receptacle, the clutch-operating frame is moved toward the left of Fig. 1, and this will make the clutch member 33 operative, and hence cause the shaft 28 to be rotated in a reverse direction, and thereby tilt the receptacle back to normal horizontal position, the receptacle being stopped at such position by contact of the finger 43 with the tappet 42, and the receptacle being held in this position by the engagement of the finger 46 with the notch 47. If for any reason it is not desired to effect the tilting by the mechanical means, but by hand, then all that is necessary for the operator to do is to turn shaft 28 by hand in one direction or the other, dependent upon the direction of tilt desired.

From the foregoing description of the specific embodiment of my invention, it will be evident that the mechanical tilting is effected by the same power which rotates the receptacle, and which is a very desirable construction as it enables the operator to give merely an initial movement to the clutch-operating frame, and the mechanism thereafter takes care of the complete opera-

tion. I do not wish to be understood, however, as limiting myself specifically to this arrangement, inasmuch as the invention contemplates the operation of the tilting mechanism by mechanical power other than the same power which is employed for rotating the receptacle.

What I claim as my invention is:

1. In tilting mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a shaft mounted in the fixed frame work, clutch members loose on the shaft, means independent of said shaft for rotating said clutch members in opposite directions, other coöperating clutch members slidable on and rotatable with said shaft, and adapted to be thrown out of operative engagement with the loose clutch members, when the receptacle is in its mixing or non-tilted position, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch members, a system of gearing between the shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle, whereby when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member, and the shaft is thereby rotated in one direction, and the system of gearing operated in a manner to effect the depression of the discharge end of the receptacle, and, when said clutch-operating mechanism is reversely operated, the other slidable clutch is thrown into engagement with its loose clutch member, and the shaft thereby rotated in the opposite direction, and the system of gearing operated so as to tilt the receptacle back.

2. In tilting mechanism for mixing machines, the combination of a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a connection between the tiltable frame and the receptacle, whereby the said frame and receptacle are tiltable together, a driving shaft, systems of gearing between the driving shafts and the tiltable frame, and adapted to effect the tilting of the tiltable frame and the receptacle together in either direction, clutch mechanisms for the systems of gearing, clutch operating mechanism for throwing the respective clutch mechanisms alternately into and out of operative engagement, the throwing of one or the other of the clutch mechanisms into operative engagement causing the tilting of the tiltable frame and the receptacle, in one or the other direction, and mechanism between the tiltable frame and the clutch operating mechanism and so constructed as to automatically throw one of the clutch mechanisms out of operative engagement, after the tiltable frame and receptacle have been tilted to a certain extent.

3. In tilting and driving mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, and also having an annular rack therearound, a driving shaft, a system of gearing between the driving shaft and the rack for continuously rotating the receptacle during the rotation of the shaft, a tiltable frame adjacent to the receptacle, another shaft mounted in the fixed frame work, clutch members loose on the latter shaft, systems of gearing between the driving shaft and said loose clutch members, other coöperating clutch members slidable on and rotatable with the clutch-carrying shaft, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch members, a system of gearing between the clutch-carrying shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle, whereby, when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member, and the clutch-carrying shaft is operated in one direction, and the system of gearing for effecting the tilting of the frame is operated in a manner to cause a depression of the discharge end of the receptacle, and, when the clutch-operating mechanism is reversely operated, the other slidable clutch is thrown into engagement with its loose clutch member, and the clutch-carrying shaft thereby rotated in an opposite direction and the system of gearing for effecting the tilting of the frame operated so as to tilt the receptacle back.

4. In tilting mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a shaft having a toothed wheel fast thereon, other shafts mounted in the fixed frame work and having toothed wheels thereon in mesh with the toothed wheel of the first named shaft, said latter toothed wheels having beveled gears rigid therewith, a clutch-carrying shaft mounted in the fixed frame work, clutch members loose on the clutch-carrying shaft and having beveled gears rigid therewith and in mesh with the beveled gears which are rigid with the toothed wheels, clutch members slidable on and rotatable with said clutch-carry-

ing shaft, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of engagement with their respective loose clutch members, a system of gearing between the clutch-carrying shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle, whereby, when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member, and the clutch-carrying shaft is thereby rotated in one direction and the system of gearing leading to the tiltable frame is operated in a manner to effect the depression of the discharge end of the receptacle, and, when said clutch-operating mechanism is reversely operated, the other slidable clutch is thrown into engagement with its loose clutch member and the clutch-carrying shaft thereby rotated in an opposite direction and the system of gearing leading to the tiltable frame is operated to tilt the receptacle back.

5. In tilting and driving mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening and also provided with an annular rack, a tiltable frame adjacent to the receptacle, a driving shaft, a system of gearing between said driving shaft and the annular rack of the receptacle, a toothed wheel fast on the driving shaft, other shafts mounted in the fixed frame work and having toothed wheels thereon in mesh with the toothed wheel of the driving shaft, said latter toothed wheels having beveled gears rigid therewith, a clutch-carrying shaft mounted in the fixed frame work, clutch members loose on the clutch-carrying shaft and having beveled gears rigid therewith and in mesh with the beveled gears which are rigid with the toothed wheels, clutch members slidable on and rotatable with said clutch-carrying shaft, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch members, a system of gearing between the clutch-carrying shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle, whereby, when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member and the clutch-carrying shaft is thereby rotated in one direction and the system of gearing leading to the tiltable frame is operated in a manner to effect the depression of the discharge end of the receptacle, and, when said clutch-operating mechanism is reversely operated, the other slidable clutch member is thrown into engagement with its loose clutch member and the clutch-carrying shaft thereby rotated in an opposite direction and the system of gearing leading to the tiltable frame is operated to tilt the receptacle back.

6. In tilting mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a toothed segment extending from the tiltable frame, a shaft mounted in the fixed frame work, a worm gear on the shaft and meshing with the toothed segment, clutch members loose on the shaft, means independent of said shaft for rotating said clutch members in opposite directions, other coöperating clutch members slidable on and rotatable with said shaft, and adapted to be thrown out of operative engagement with the loose clutch members, when the receptacle is in its mixing or nontilted position, clutch operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch members, and a connection between the tiltable frame and the receptacle whereby, when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member and the shaft is thereby rotated in one direction and the intermeshing worm segment operated in a manner to effect the depression of the discharge end of the receptacle, and, when said clutch-operating mechanism is reversely operated, the other slidable clutch is thrown into engagement with its loose clutch member, and the shaft thereby rotated in the opposite direction and the intermeshing worm segment operated so as to tilt the receptacle back.

7. In tilting mechanism for mixing machines, the combination of a fixed frame work a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a trunnion extending from the tiltable frame, a toothed segment rigid to and extending from the trunnion, a shaft mounted in the fixed frame work, a worm gear on the shaft and in mesh with the toothed segment, clutch members loose on the shaft, means independent of said shaft for rotating said clutch members in opposite directions, other coöperating clutch members slidable on and rotatable with said shaft, and adapted to be thrown out of operative engagement with the loose clutch members, when the receptacle is in its mixing or nontilted position, clutch-operating mechanism for throwing the respective slidable clutch members alternately into and out of operative engagement with their respective loose clutch mem-

bers, and a connection between the tiltable frame and the receptacle whereby, when the clutch-operating mechanism is operated in a certain manner, one of the slidable clutch members is brought into operative engagement with its companion loose clutch member, and the shaft is thereby rotated in one direction, and the intermeshing worm and segment operated in a manner to effect the depression of the discharge end of the receptacle, and, when said clutch-operating mechanism is reversely operated, the other slidable clutch member is thrown into engagement with its loose clutch member, and the shaft thereby rotated in the opposite direction and the intermeshing worm and segment operated so as to tilt the receptacle back.

8. A tilting mechanism for mixing machines, comprising a fixed frame, a tiltable frame mounted in the fixed frame, a mixing receptacle provided with charging and discharging openings positioned adjacent to the tiltable frame, a shaft mounted on the fixed frame and provided with clutch members loosely mounted thereon, means for rotating said clutch members in opposite directions, other coöperating clutch members splined to said shaft, side arms pivotally mounted on said fixed frame and connected together by a cross bar for alternately moving the respective splined clutch members into and out of engagement with their respective loose clutch members, a train of gears between the shaft and the tiltable frame, and a connection between the tiltable frame and the receptacle for causing the tilting of the receptacle when one of the loose clutches is engaged by its coöperating clutch and to tilt the receptacle back when the other loose clutch is engaged by its coöperating clutch.

9. A tilting mechanism for mixing machines, comprising a fixed frame, a tiltable frame mounted in the fixed frame and provided with a projecting finger, a mixing receptacle provided with charging and discharging openings positioned adjacent to the tiltable frame, a shaft mounted on the fixed frame and provided with clutch members loosely mounted thereon, means for rotating said clutch members in opposite directions, other coöperating clutch members splined to said shaft, side arms pivotally mounted on said fixed frame and connected together by a cross bar for alternately moving the respective splined clutch members into and out of engagement with their respective loose clutch members, a train of gears between the shaft and the tiltable frame, tappets connected to the cross bar and positioned in the path of movement of the projecting finger of the receptacle to control the tilting of the receptacle, and a connection between the tiltable frame and the receptacle for causing the tilting of the receptacle when one of the loose clutches is engaged by its coöperating clutch and to tilt the receptacle back when the other loose clutch is engaged by its coöperating clutch.

10. A tilting mechanism for mixing machines, comprising a fixed frame, a tiltable frame mounted in the fixed frame and provided with a projecting finger, a mixing receptacle provided with charging and discharging openings positioned adjacent to the tiltable frame, a shaft mounted on the fixed frame and provided with clutch members loosely mounted thereon, means for rotating said clutch members in opposite directions, other coöperating clutch members splined to said shaft, side arms pivotally mounted on said fixed frame and connected together by a cross bar for alternately moving the respective splined clutch members into and out of engagement with their respective loose clutch members, a locking means connected to the clutch moving members and the fixed frame for releasably locking the receptacle in a mixing position, a train of gears between the loose shaft and the tiltable frame, tappets connected to the cross bar and positioned in the path of movement of the projecting finger of the receptacle to control the tilting of the receptacle, and a connection between the tiltable frame, and the receptacle for causing the tilting of the receptacle when one of the loose clutches is engaged by its coöperating clutch and to tilt the receptacle back when the other loose clutch is engaged by its coöperating clutch.

11. A tilting mechanism for mixing machines, comprising a fixed frame, a tiltable frame provided with a trunnion which is mounted in the fixed frame, a mixing receptacle provided with charging and discharging openings and also having an annular rack therearound, a driving shaft having its bearing in said trunnion and provided with a driving wheel, a train of gears connecting the inner end of the driving shaft to the annular rack, a segmental gear fast on said trunnion, a shaft mounted on the fixed frame and provided with a worm gear in mesh with the segmental gear and also with clutch members loosely mounted thereon, a train of gears connecting the clutch members to the driving shaft, other coöperating clutch members slidably mounted on said fixed frame shaft, clutch moving members mounted on the fixed frame, and a connection between the tiltable frame and the receptacle for causing the tilting of the receptacle when one of the loose clutches is engaged by its coöperating clutch and to tilt the receptacle back when the other loose clutch is engaged by its coöperating clutch.

12. In tilting mechanism for mixing machines, the combination of a fixed frame

work, a receptacle having means for charging the same, and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a shaft mounted in the fixed frame work and adapted to be rotated in either direction by hand, two friction clutches on said shaft, means for shifting said friction clutches so that but one of said clutches can be in engagement at a time, or both out of engagement, a system of gearing between the shaft and the tiltable frame, power means for turning the shaft in either direction through the medium of either one or the other of said friction clutches, and a connection between the tiltable frame and the receptacle, whereby, when the shaft is rotated in one direction, the system of gearing is operated in a manner to effect the depression of the discharge end of the receptacle, and when the shaft is rotated in the opposite direction, the system of gearing is operated in a manner to tilt the receptacle back.

13. In tilting mechanism for mixing machines, the combination of a fixed frame work, a receptacle having means for charging the same and provided with a discharge opening, a tiltable frame adjacent to the receptacle, a shaft mounted in the fixed frame work and adapted to be rotated in either direction by hand, two friction clutches on said shaft, means for shifting said friction clutches so that but one clutch can be in engagement at a time, or both clutches out of engagement, a system of gearing between the shaft and the tiltable frame, a connection between the tiltable frame and the receptacle, whereby, when the shaft is rotated in one direction, the system of gearing is operated in a manner to effect the depression of the discharge end of the receptacle, and when the shaft is rotated in the opposite direction, the system of gearing is operated in a manner to tilt the receptacle back, and power means for rotating the shaft in either direction through the medium of either one or the other of said friction clutches, said power means being so arranged that the power motion can be stopped or reversed at any intermediate position of the receptacle between its two limits of tilt.

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

THOMAS L. SMITH.

Witnesses:

A. L. MORSELL,

ANNA F. SCHMIDTBAUER.