P. A. KOEHRING.

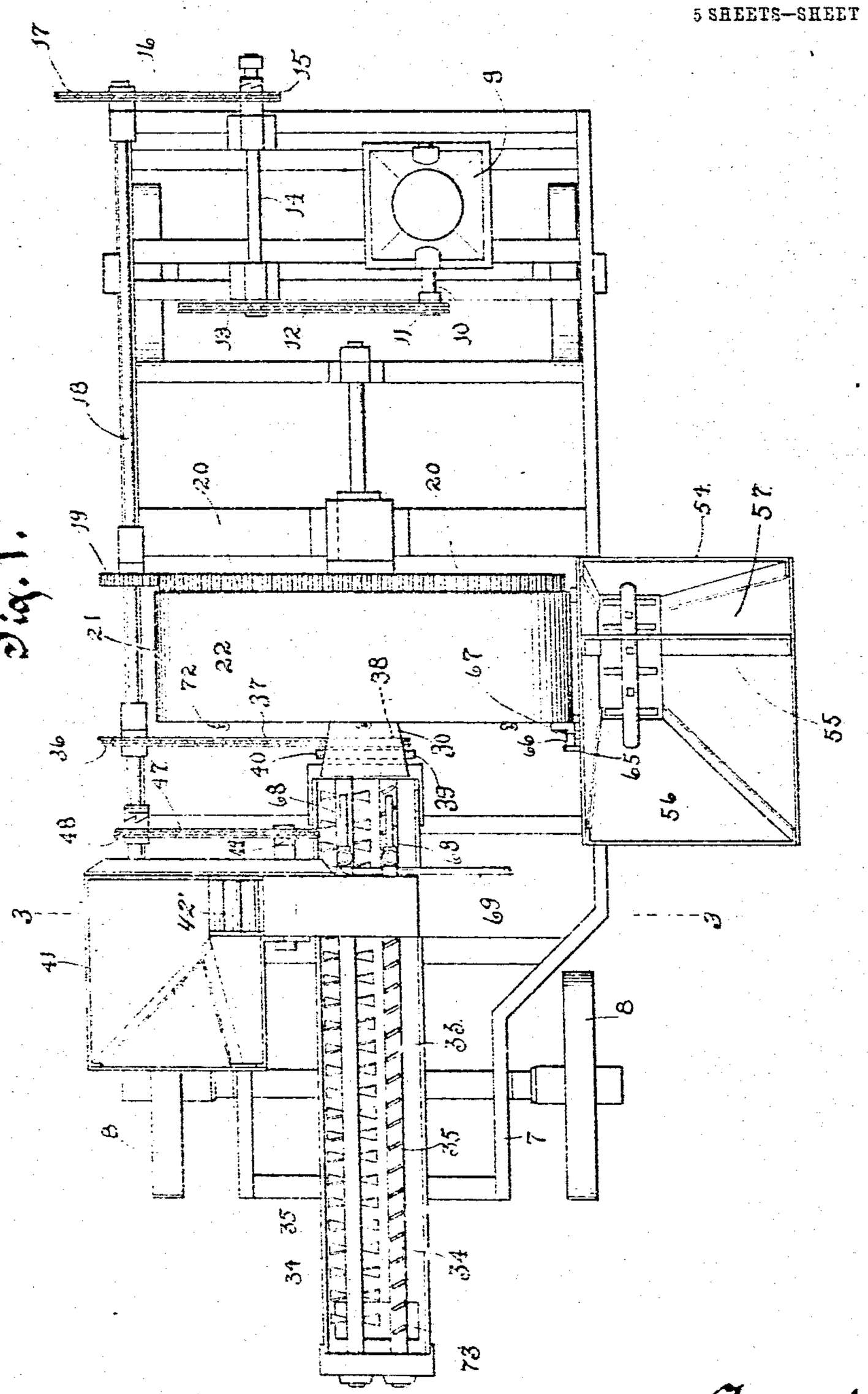
MIXING MACHINE.

APPLICATION FILED AUG. 30, 1906.

948,996. Patented Feb. 15, 1910.

5 SHEETS—SHEET 1.

Fig. 1.



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5 SHEETS—SHEET 2.

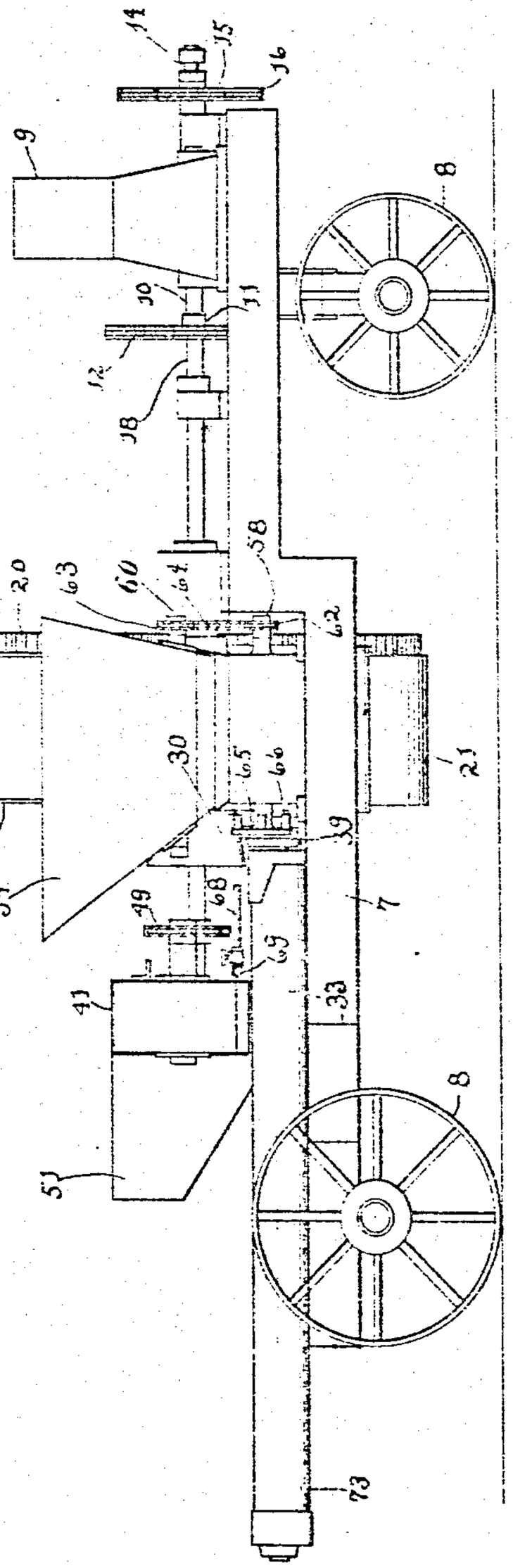

Fig. 2.

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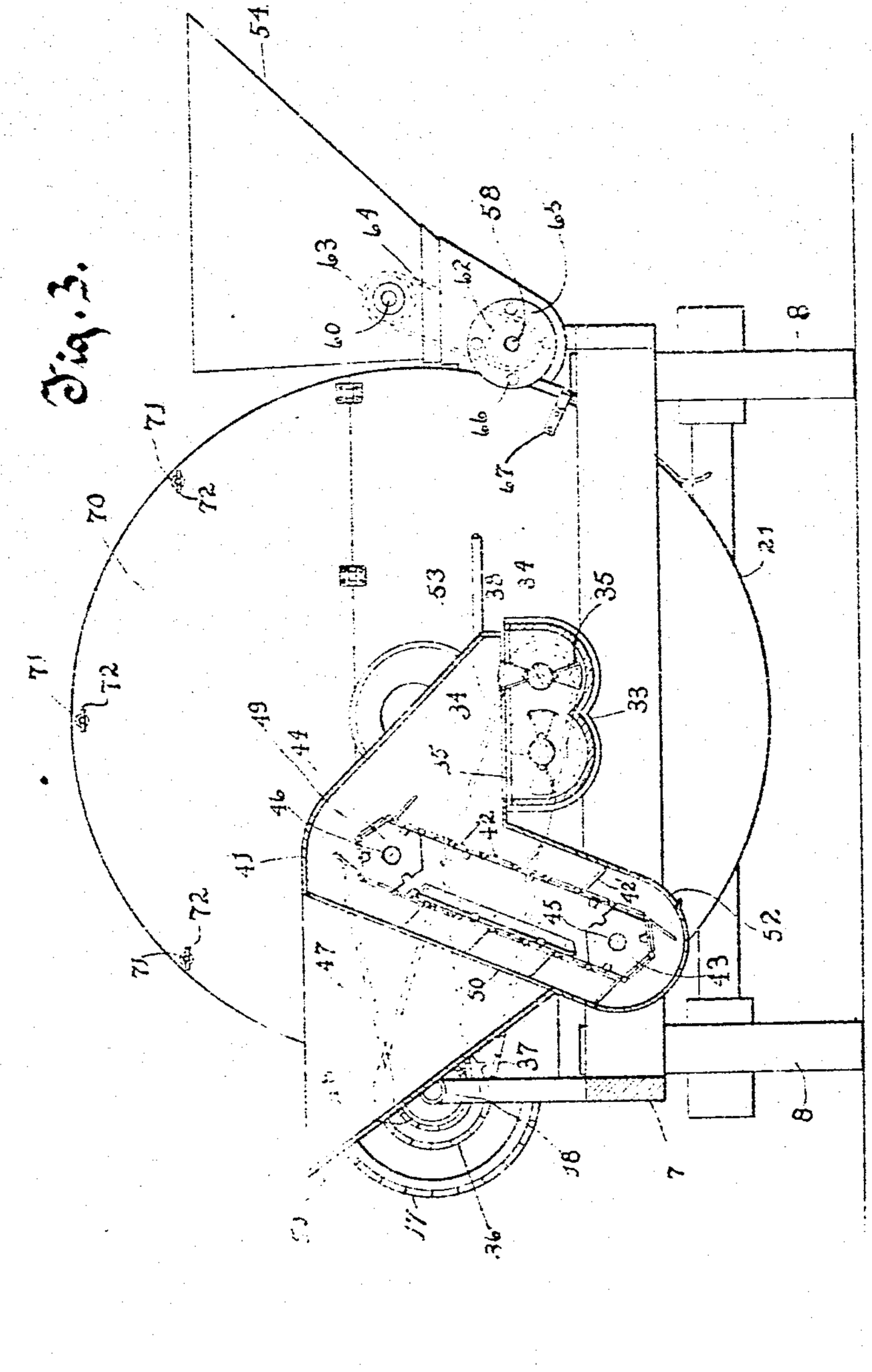
5 SHEETS—SHEET 3.

Fig. 3.



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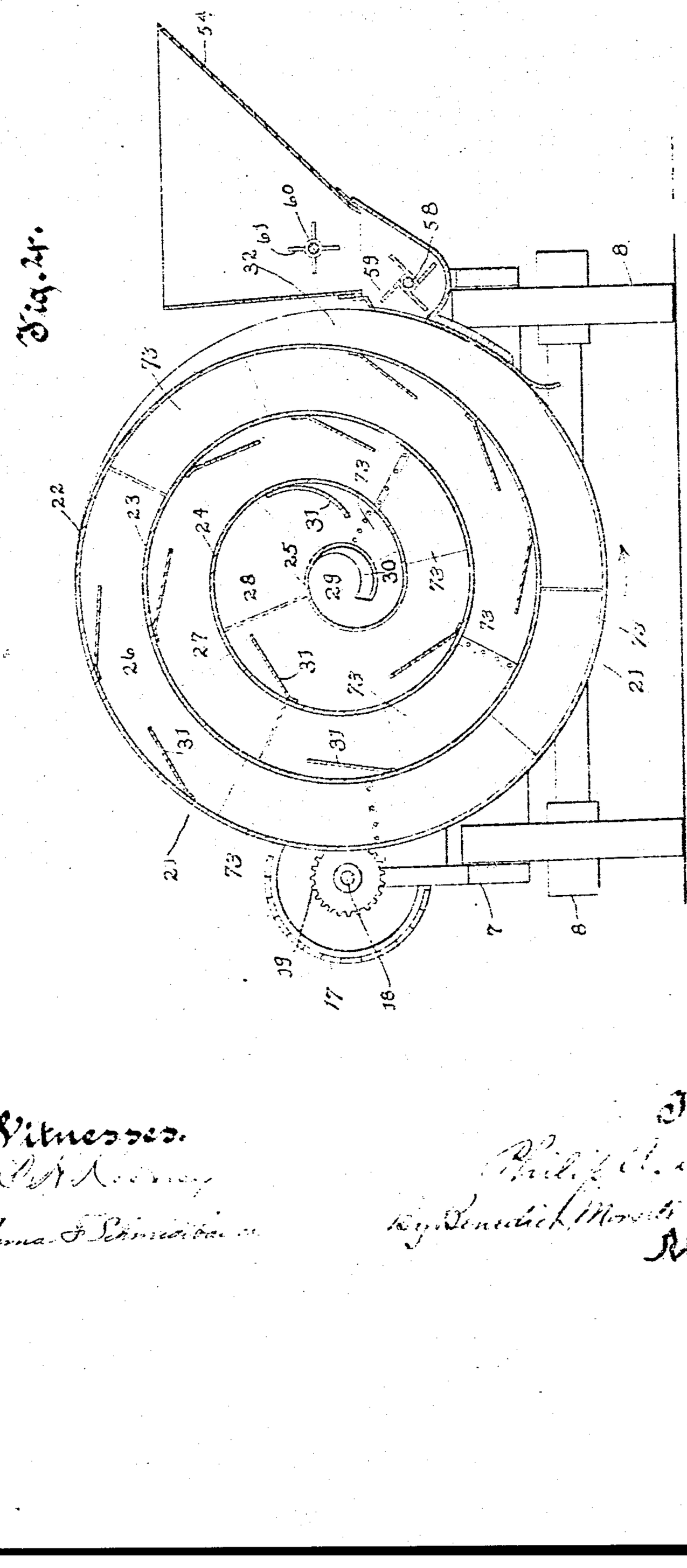
5 SHEETS—SHEET 4.

Fig. 24.



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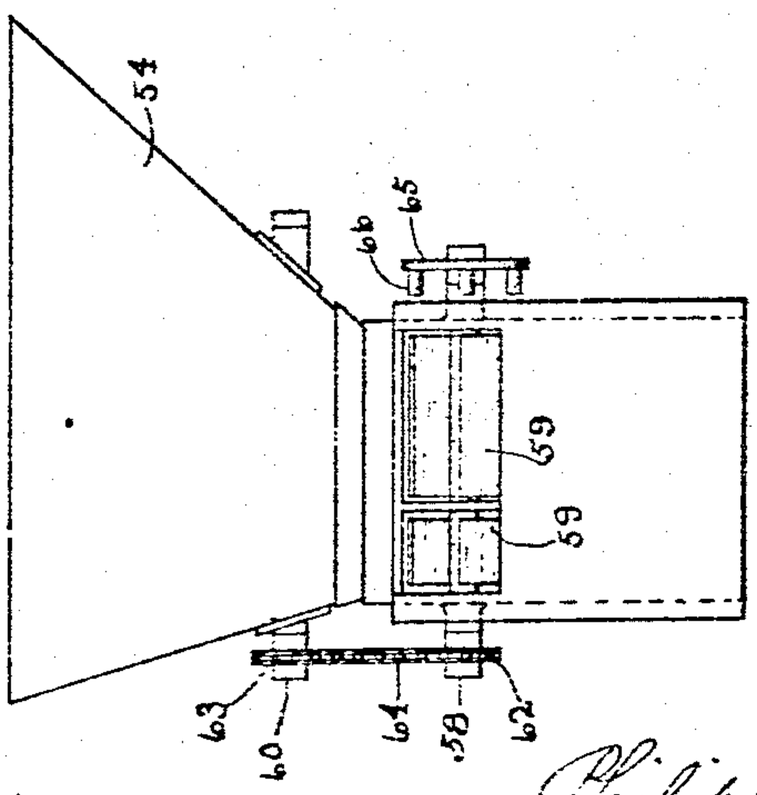
5 SHEETS—SHEET 3.

Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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MIXING-MACHINE.

948,996. Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed August 30, 1906. Serial No. 332,590.

To all whom it may concern:

Be it known that I, PHILIP A. KOEHRING, residing in Wauwatosa, 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 especially intended for mixing concrete, or other compounds in paving materials, or for mixing mortar, and the like.

The primary object of the invention is to provide an improved construction of machine of the above character having the capability of performing a most thorough mixing operation, the improvements relating particularly to the novel construction for effecting the mixing operation, and for the feeding of the different materials to be mixed.

With the above primary object, and other incidental objects, in view the invention consists in the devices and parts, or the equivalents thereof, as hereinafter more fully set forth and claimed.

In the accompanying drawings, Figure 1 is a plan view of the complete machine; Fig. 2 is a side elevation of Fig. 1; Fig. 3 is a cross section on the line 3—3 of Fig. 1; Fig. 4 is a transverse section of the machine on a plane through the mixing receptacle or drum, and allied parts; Fig. 5 is a transverse section of the mixing receptacle, also showing in section a fragment of the conveyer, and the water supply piping thereabove, one of the tubes of said piping being broken away; and, Fig. 6 is a side elevation of the hopper for feeding the sand and cement to the receptacle.

Referring to the drawings, the numeral 7 indicates a truck mounted on wheels 8. At one end of this truck is located an engine 9, adapted to drive a short shaft 10. On one end of this short shaft is a sprocket wheel 11 around which a sprocket chain 12 passes, said chain also passing around another sprocket wheel 13 on a shaft 14. This latter shaft carries on its outer end a sprocket wheel 15 around which a sprocket chain 16 passes, said chain also passing around a sprocket wheel 17 on the outer end of a long shaft 18. Shaft 18 carries a pinion 19 which meshes with an annular rack 20 around one end of a mixing receptacle or drum 21. The mixing receptacle 21 is constructed in the peculiar manner illustrated most clearly in Figs. 4 and 5, that is to say, it is composed of two end or head pieces, and a rim wound in the form of a spiral, the outer wall of said spiral being indicated by the numeral 22, the next innermost wall by the numeral 23, the next wall by the numeral 24, and the innermost wall by numeral 25, forming a continuous spiral passage the sub-divisions thereof being indicated by the numerals 26, 27, 28 and 29, and each successive sub-division being of gradually diminishing circumference. The innermost wall 25 terminates in a laterally extending funnel 30 which extends through one of the head or end pieces of the receptacle, and is widest at its outer end. This funnel is open longitudinally in so much of the length thereof as is contained in the receptacle, but is without the longitudinal opening outside of the receptacle. Each of the walls 22, 23, 24 and 25, respectively, have projecting inclined blades or wings 31, which serve to assist in the mixing of the ingredients contained in the receptacle. From the fact that the outer wall 22 of the receptacle curves inwardly to form the spiral, an opening 32 is necessarily formed which serves as the changing opening for the receptacle.

The funnel 30 is adapted to discharge into a double trough 33 for a double conveyer, said conveyer consisting of two shafts 34—34 having blades 35—35 radiating, respectively, therefrom. The conveyer shafts may be rotated in any desirable manner, and in the drawings I have shown for the purpose a sprocket wheel 36 mounted on shaft 18, and around which wheel passes a sprocket chain 37, said chain being extended to and passed around a sprocket wheel 38 on one of the conveyer shafts. In this manner rotation is imparted to one of said shafts, and this rotation is imparted to the other shaft by means of intermeshing gears 39 and 40 mounted on the respective shafts.

The numeral 41 indicates a casing for an elevator, said elevator consisting of an endless sprocket chain 42 provided with projecting lifting blades 42′. This chain passes around upper and lower sprocket wheels 43 and 44 mounted, respectively, on shafts 45 and 46. The elevator may be driven in any desirable manner, and as a convenient

means for driving, I provide a sprocket chain 47 which passes around a sprocket wheel 48 on shaft 18, and around another sprocket wheel 49 on the shaft 46. One side of the elevator casing or housing is open, as indicated by the numeral 50, and extending from said side of the casing and leading to the inlet opening is a feeding hopper 51. The elevator casing is also provided with another smaller opening 52 at its lower end and on the side thereof opposite to the side to which the inlet opening is located. This opening 52 permits any dirt which may settle in the lower portion of the casing to be discharged or removed from said casing. Crushed stone or gravel is adapted to be fed into the hopper 51, and this stone is lifted by the inclined blades 42' of the elevator, and discharged from said blades and through a discharge opening 53 in the elevator casing, which discharge opening is located directly above the double trough 33 of the conveyer.

For feeding sand and cement to the mixing receptacle 21, I provide on one side of the machine a hopper 54 which is subdivided by means of a partition 55 into two compartments 56 and 57, respectively, one of said compartments, as for instance compartment 56, adapted to have sand deposited therein, and the other compartment 57 adapted to have cement deposited therein. In the lower portion of the hopper is a shaft 58 provided with a series of divided feeding blades 59, and also in the hopper above the shaft 58 is another shaft 60 having a series of stirrer fingers 61 radiating therefrom. On corresponding outer ends of shafts 58 and 60 are mounted sprocket wheels 62 and 63 respectively, said wheels being connected by means of a sprocket chain 64. The shaft 58 also has a disk 65 mounted thereon, said disk being located on the shaft outside of the hopper, and being provided with a series of pins 66. These pins are adapted to be successively engaged by a finger 67 projecting from the mixing receptacle 21, one of said pins being struck on each complete revolution of the mixing receptacle, whereby a quarter turn is given to the disk 65, and consequently a partial rotation also given to the stirrer shaft 60, by reason of the sprocket chain connection 64.

Above the inner end of the conveyer trough 33, and parallel with the two conveyer shafts 34—34, are two tubes 68—68, which are connected to and fed with water from a common water supply pipe 69 leading from any suitable source of water supply.

I prefer that one of the end or head pieces of the mixing receptacle consist of two sections, one section being a hinge section indicated by the numeral 70, and forming a door, which when turned outwardly on its hinges will give free access to the interior of the receptacle for cleaning purposes. When the receptacle is in use, the door of course is closed, and is releasably secured in its closed position by any desirable means, as for instance by the provision of bolts 71, having their outer ends threaded to receive winged nuts 72.

In the operation of the machine, the engine mechanism being started, sand and cement in its natural dry state are fed into the hopper 51. As the mixing receptacle completes its first revolution, the contact 67 strikes one of the pins 66 of the disk 65, and gives said disk a quarter turn, thereby causing the feeding blades 59 to force a quantity of the materials through the charging opening 52 and into the mixing receptacle. At the same time the partial rotation is thus given to the feeding device, the stirring device is also given a partial rotation, and the fingers of said stirring device are thereby caused to act upon the materials in the upper portion of the hopper, and break up and separate said materials into small lumps or particles, thereby avoiding any danger of clogging. The sand and cement thus successively deposited in the mixing receptacle are caused by the revolving of the receptacle to take the circuitous route formed by the continuous spiral passage 26, 27, 28 and 29, and the ingredients are thereby caused to be thoroughly mixed. The mixing blades 31, of course, come in contact with the materials during their travel in the passage, and materially assist in the mixing operation. When the materials so mixed reach the terminus 29 of the passage, they thence travel outwardly laterally in the funnel 30, and are discharged from said funnel into the double trough 33. The crushed stones, as heretofore stated, are also deposited into this trough through the opening 53 of the elevator casing 41. The sand and cement, together with the crushed stone, are, by the action of the conveyer blades 35, caused to travel longitudinally through the trough 33. It will be understood that in my invention it is contemplated that the sand and cement should be deposited in the mixing receptacle in their natural dry state and mixed in said receptacle in a dry condition. It is therefore necessary, before the final mixing operation, that water should be fed to and mixed with the materials to be mixed, and in my arrangement I feed this water to the initial end of the double conveyer trough 33 through the medium of the two tubes 68—68 supplied by the pipe 69, the said tubes 68 being located, respectively, above the two conveyer shafts 34. The water, therefore, is supplied at a point where the crushed stones are fed to the mixed sand and cement. The conveyer blades 35 not only have the effect of causing the

mixed ingredients to travel longitudinally in the trough 33, but also cause a thorough commingling and mixing of the sand, cement, crushed stone and water in said trough during such longitudinal travel. When the mixed mass reaches the outer end of the trough 33, it is discharged through a discharge opening 73, into a suitable receptacle located below said discharge opening.

I not only provide mixing blades or wings 31 in the receptacle for mixing the sand and cement in its course through the spiral passage of the receptacle, but I also prefer to provide, in addition thereto, inclined mixing surfaces 72. These surfaces extend inwardly on inclined planes from the opposite ends or heads of the receptacle, as clearly shown in Figs. 4 and 5. It is obvious that the said inclined surfaces very materially assist in the mixing of the sand and cement in their travel through the receptacle, causing the ingredients to be thrown from side to side of the receptacle.

Attention is called to the fact that the crushed stone or gravel hopper 51 is so arranged that only a certain or measured quantity of the crushed stone or gravel is fed to the mixing trough 33 by the lifting blades 42'. This is important, inasmuch as the feeding blades 59 also only force or feed a certain or measured quantity of the sand and cement, and hence a predetermined quantity of the sand and cement is always mixed with a predetermined quantity of the crushed stone or gravel. It will be further noted that the sand and cement is fed into the mixing receptacle in separate batches, one batch being fed into said receptacle upon the completion of each revolution of the receptacle. In consequence of this arrangement, there is only one batch in a compartment at a time, but this batch must necessarily be most thoroughly mixed, and after being discharged from the receptacle, it is not only mixed with the crushed stone or gravel and the water in the trough 33, but also mixed with the succeeding batches of mixed sand and cement.

While I have herein shown and described a spiral mixing receptacle of circular form, yet I do not wish to be understood as restricting myself specifically to the circular form, inasmuch as the receptacle may be of square, hexagonal, or any other desired form, but having the wall spirally trending.

What I claim as my invention is:

1. In a mixing machine, the combination with a mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a spiral, a charging opening being formed at a point beyond the initial end of the spiral, and the terminal end of said spiral leading to and registering with a discharge opening or passage through one of the end pieces of the receptacle, a series of inclined mixing blades extending from the inner side of different points of the spirally formed wall, and means for rotating the mixing receptacle.

2. In a mixing machine, the combination with a mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a spiral, a charging opening being formed in the periphery at a point beyond the initial end of the spiral, and the terminal end of said spiral leading to and registering with a funnel-shaped medially positioned and laterally-projecting passage extending through one of the end pieces of the receptacle, the taper of said funnel increasing outwardly, of means for rotating the receptacle.

3. In a mixing machine, the combination of a rotatable mixing receptacle provided with charging and discharge openings, a hopper, a rotatable shaft in the lower portion of the hopper, and provided with a series of feeding blades, and also having a disk mounted thereon, said disk provided with a series of laterally-projecting pins, a shaft in the hopper located above the lower shaft and having a series of stirrer fingers projecting therefrom, sprocket wheels on corresponding ends of the respective shafts, a sprocket chain connecting said wheels, and a contact finger extending from the receptacle at the point of location of the charging opening of said receptacle, the said contact finger adapted to contact with one of the pins of the disk on each complete revolution of the receptacle, whereby a partial turn is given to the disk and its shaft, and simultaneously a partial turn is given to the upper shaft.

4. In a mixing machine, the combination of a rotatable mixing receptacle composed of end or head pieces, and a rim between the end pieces wound in the form of a convolute, a charging opening being formed at a point beyond the initial end of the convolute, and the terminal end of said convolute leading to and registering with a discharge opening or passage through one of the end pieces of the receptacle, a hopper, and means coacting with the receptacle, each time the receptacle completes a revolution, for intermittently feeding a quantity of the materials contained in the hopper through the charging opening of the receptacle.

5. In a mixing machine, the combination of a rotatable mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a spiral, a charging opening being formed at a point beyond the initial end of the spiral, and the terminal end of said spiral leading to and registering with a laterally-projecting discharge passage extending through one of the end pieces of the receptacle, a conveyer trough into which said passage is adapted to discharge, said trough provided at its outer

end with a discharge opening, and rotatable shafts mounted longitudinally in the troughs, and having conveyer and mixing blades projecting therefrom.

6. In a mixing machine, the combination of a rotatable mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a spiral, a charging opening being formed at a point beyond the initial end of the spiral, and the terminal end of said spiral leading to and registering with a laterally-projecting discharge passage extending through one of the end pieces of the receptacle, a conveyer trough into which said passage is adapted to discharge, said trough provided at its outer end with a discharge opening, rotatable shafts mounted longitudinally in the trough, and having conveyer and mixing blades projecting therefrom, and an elevator for lifting and discharging crushed stone into the trough.

7. In a mixing machine, the combination of a rotatable mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a spiral, a charging opening being formed at a point beyond the initial end of the spiral, and the terminal end of said spiral leading to and registering with a laterally-projecting discharge passage extending through one of the end pieces of the receptacle, a conveyer trough into which said passage is adapted to discharge, said trough provided at its outer end with a discharge opening, rotatable shafts mounted longitudinally in the trough and having conveyer and mixing blades projecting therefrom, an elevator for lifting and discharging crushed stone into the trough, and means for supplying water to the trough.

8. In a mixing machine, the combination with a mixing receptacle having end or head pieces and a connecting continuous convolute rim, of a series of inclined mixing surfaces extending inwardly from the opposite end or head pieces of the receptacle.

9. In a mixing machine, the combination with a mixing receptacle having end or head pieces and a connecting convolute rim, a series of inclined mixing blades extending inwardly from different points of the convolute rim, and a series of inclined mixing surfaces extending inwardly from the opposite end or head pieces of the receptacle.

10. In a mixing machine, the combination with a mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a convolute, a charging opening being formed at a point beyond the initial end of the convolute and the terminal end of said convolute leading to and registering with a discharge opening or passage through one of the end pieces of the receptacle, a series of inclined mixing surfaces extending inwardly from the opposite end or head pieces of the receptacle, and means coacting with the receptacle for rotating the mixing receptacle.

11. In a mixing machine, the combination with a mixing receptacle composed of end or head pieces and a rim between the end pieces wound in the form of a spiral, a charging opening being formed at a point beyond the initial end of the spiral, and the terminal end of said spiral leading to and registering with a discharge opening or passage through one of the end pieces of the receptacle, a series of inclined mixing blades extending inwardly from different points of the rim, a series of inclined mixing surfaces extending inwardly from the opposite end or head pieces of the receptacle, and means for rotating the receptacle.

12. In a mixing machine, the combination of a mixing receptacle having end or head pieces and a connecting continuous convolute rim, charging and discharging openings, and a series of mixing surfaces extending inwardly from different points of the convolute rim.

13. In a mixing machine, the combination of a mixing receptacle having a convolute rim and provided with inlet and outlet openings, and adapted to mix materials in a dry state, means for feeding materials to the inlet opening in the receptacle, means for rotating the receptacle and thereby mix and convey the mixed materials to the outlet opening adjacent to the inner convolution of the convolute rim, means for feeding crushed stone with the mixed materials discharged from the mixing receptacle, means for feeding water to the mixed materials, and other means for mixing all of the materials together.

14. In a mixing machine, the combination of a mixing receptacle having a convolute rim and provided with inlet and outlet openings, and adapted to mix materials in a dry state, means for feeding materials to the inlet opening in the receptacle, means for rotating the receptacle and thereby mix and convey the mixed materials to the outlet opening adjacent to the inner convolution of the convolute rim, a trough adapted to receive the dry mixed materials discharged from the mixing receptacle, means for feeding crushed stone into the trough, means for feeding water to the trough, and means within the trough for mixing the dry mixed materials with the crushed stone and water and discharge the same therefrom.

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

PHILIP A. KOEHRING.

Witnesses:
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