April 30, 1935. H. E. McCRERY 1,999,843

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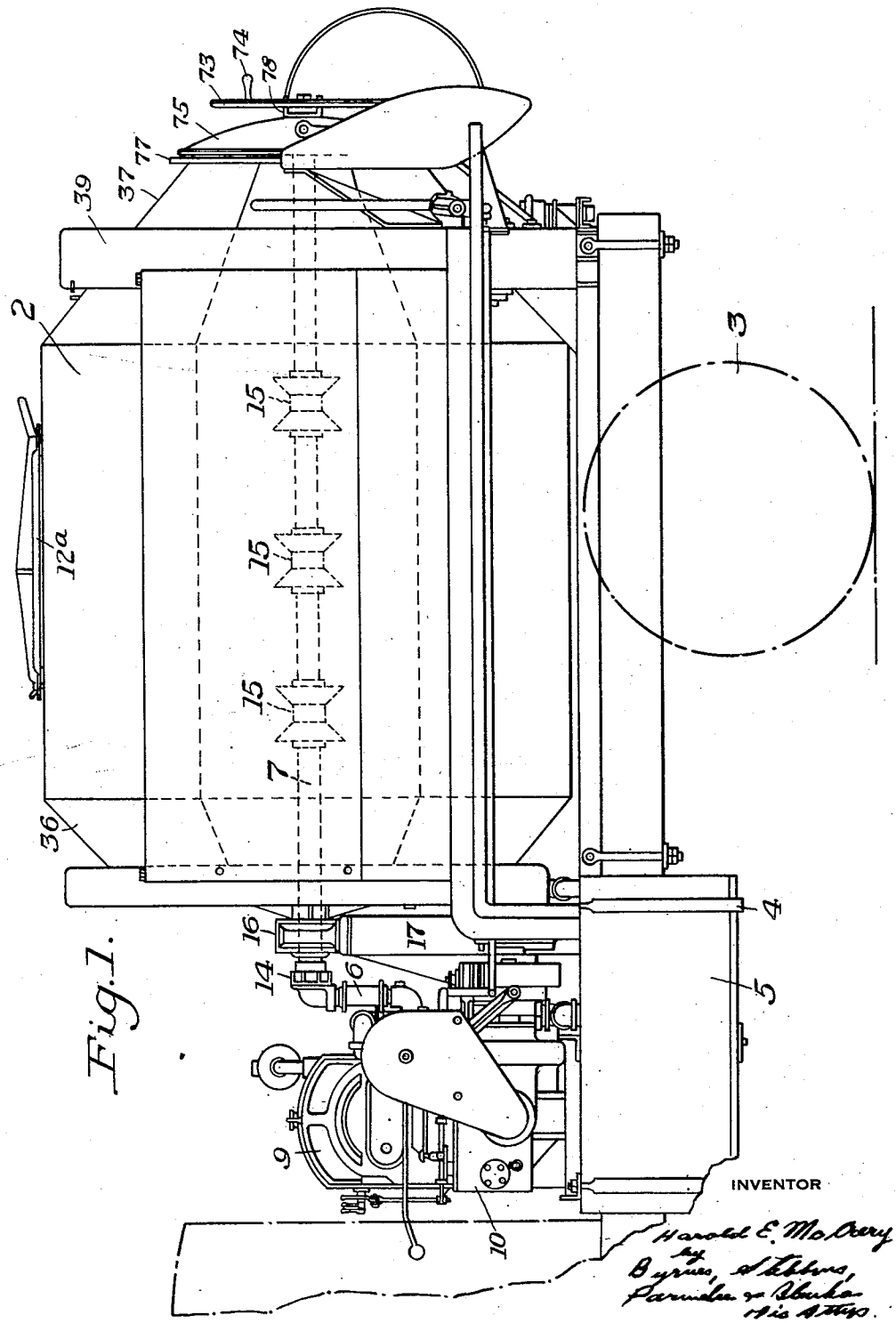


Fig. 1.

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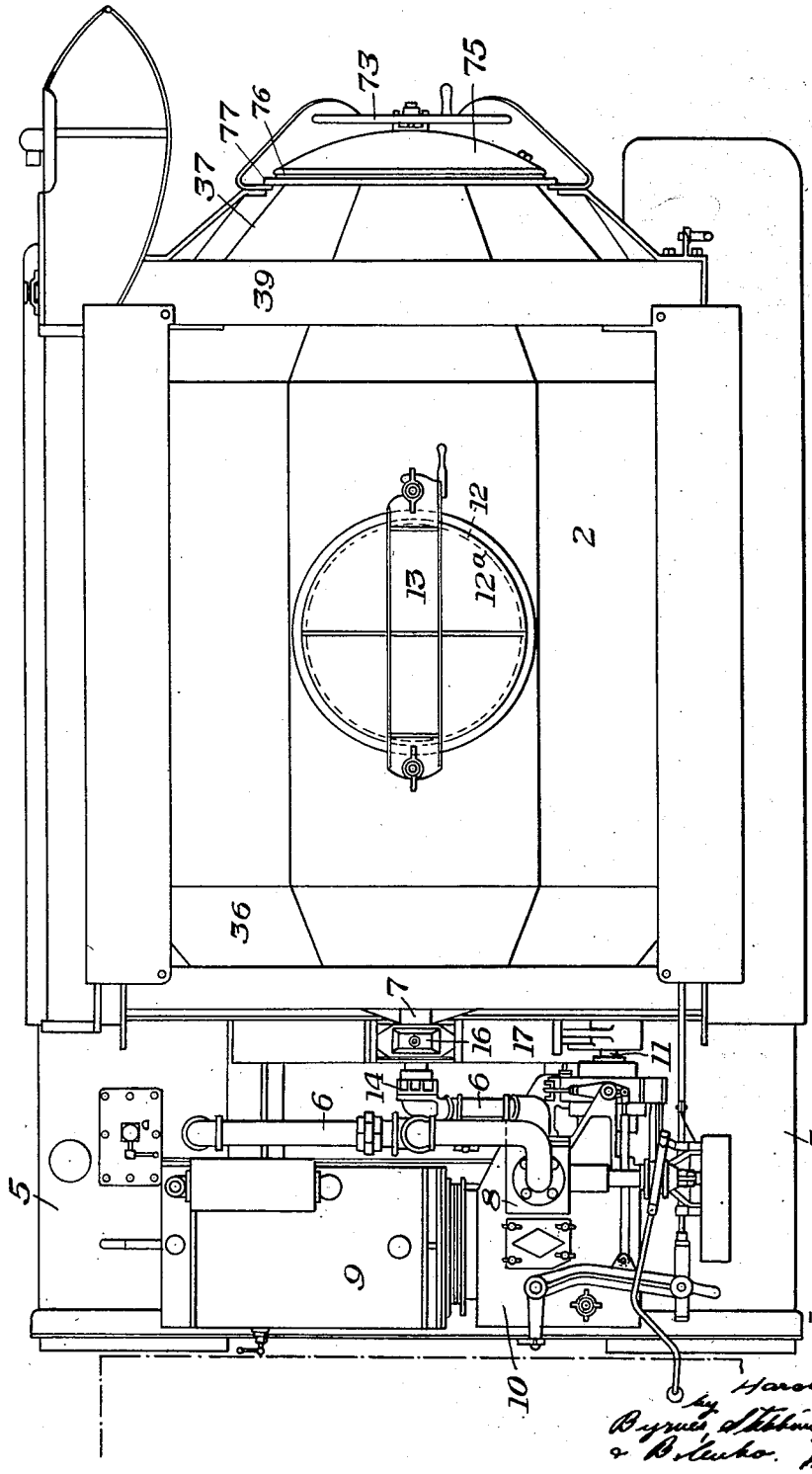


Fig. 2.

INVENTOR

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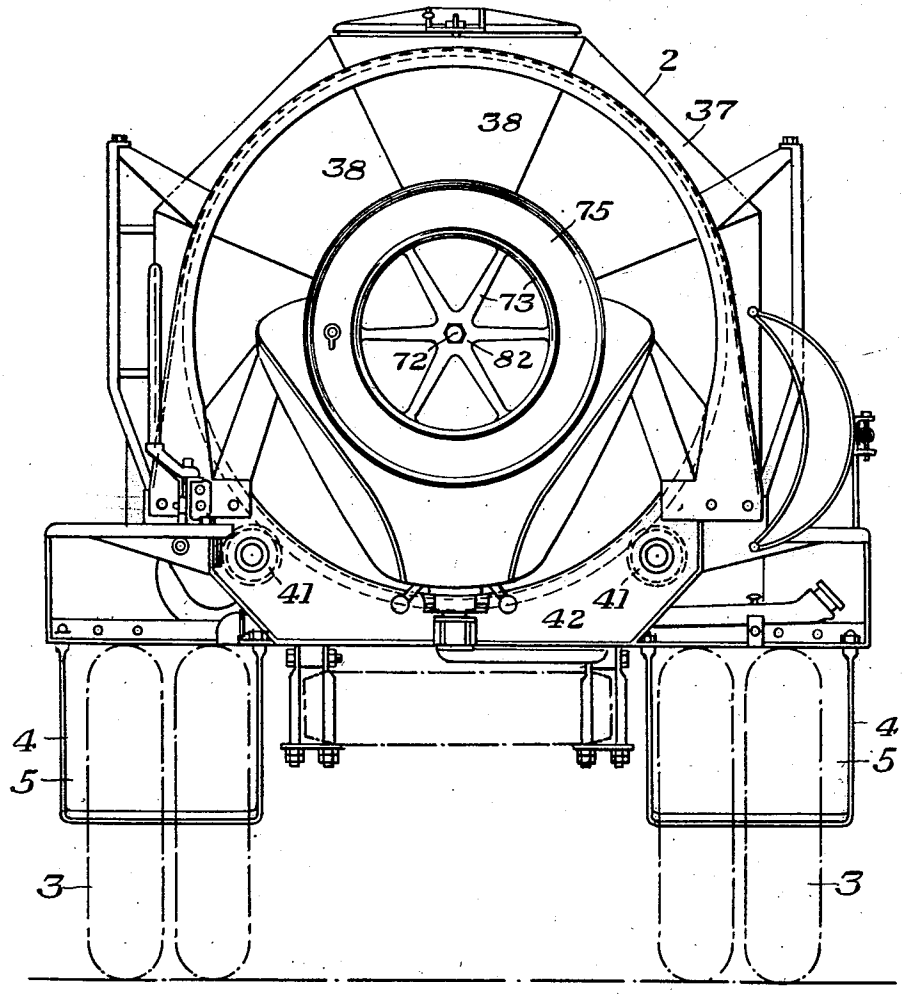
by Byrnes, Stebbins, Parmelee, & Belenko. His Attys.

April 30, 1935. H. E. McCRERY 1,999,843

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Fig. 3.



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Fig. 5.

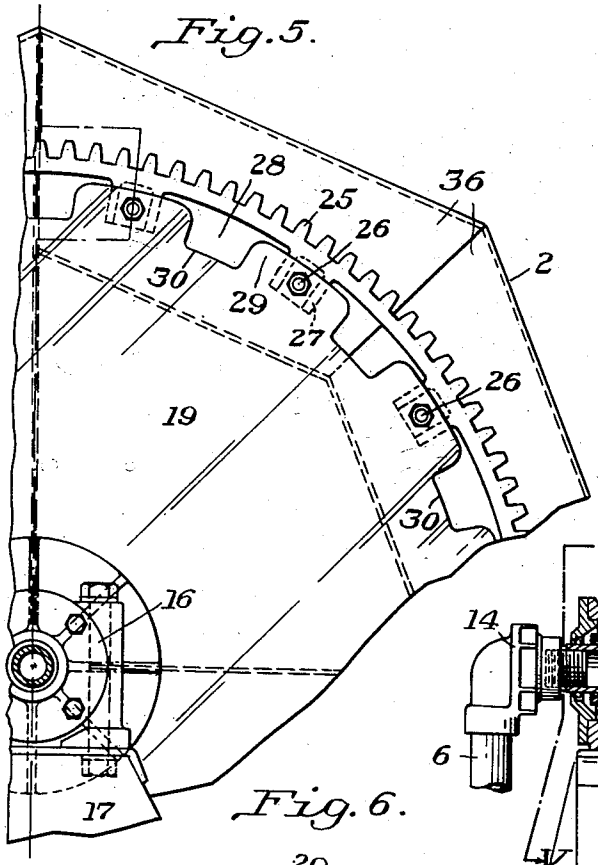


Fig. 6.

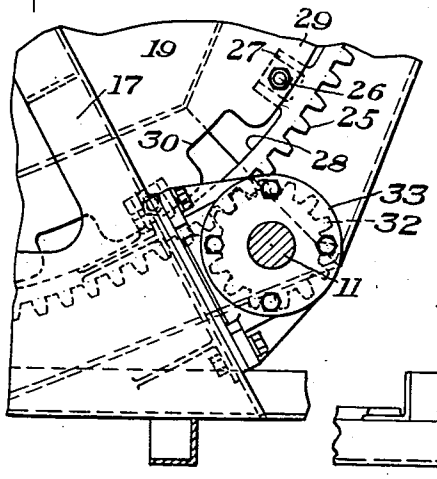
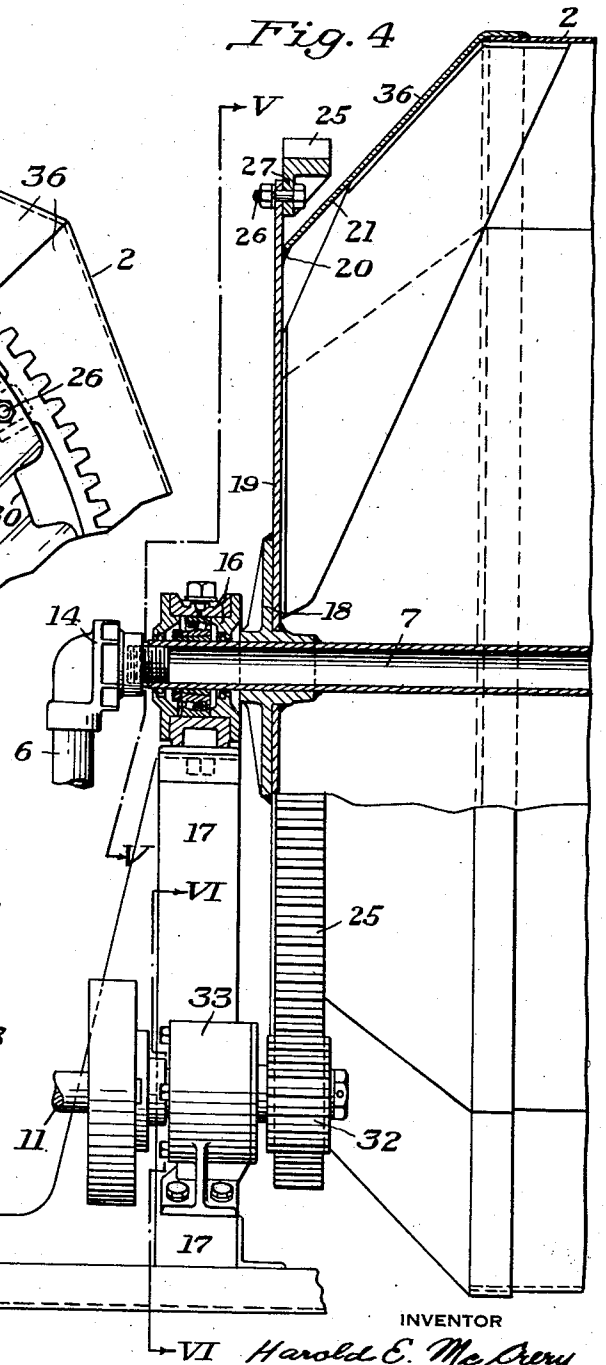


Fig. 4



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Fig. 7.

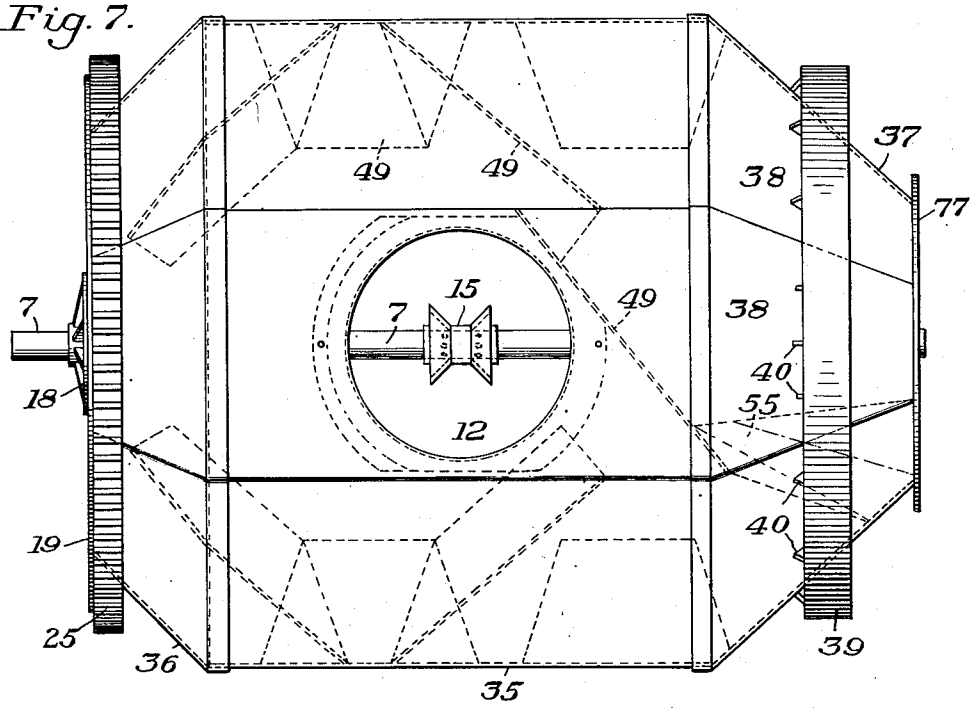
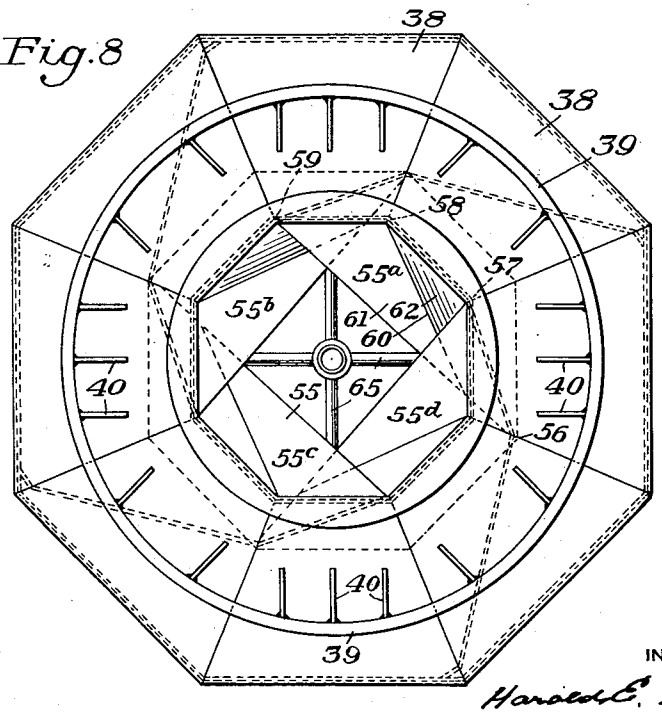


Fig. 8



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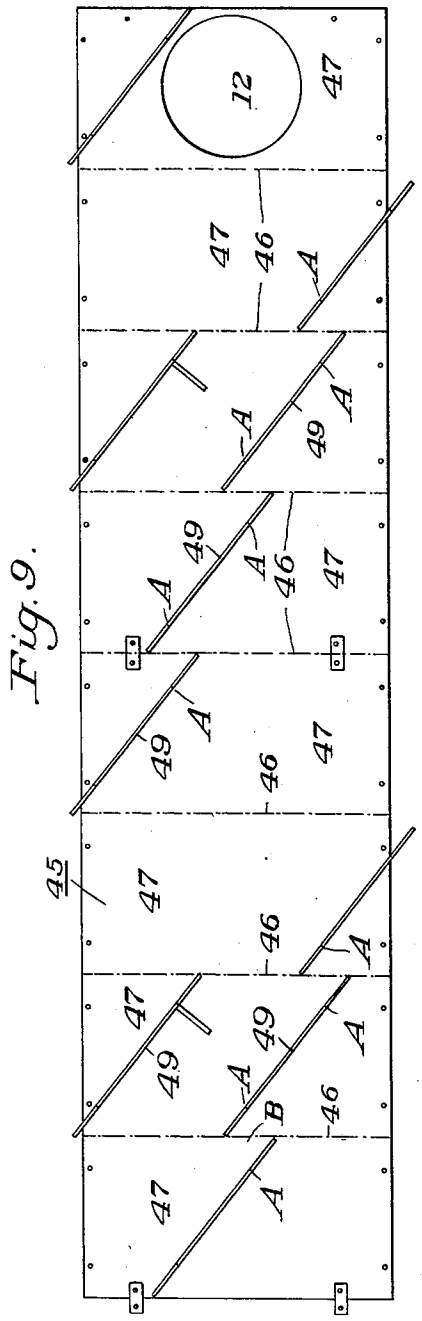


Fig. 9.

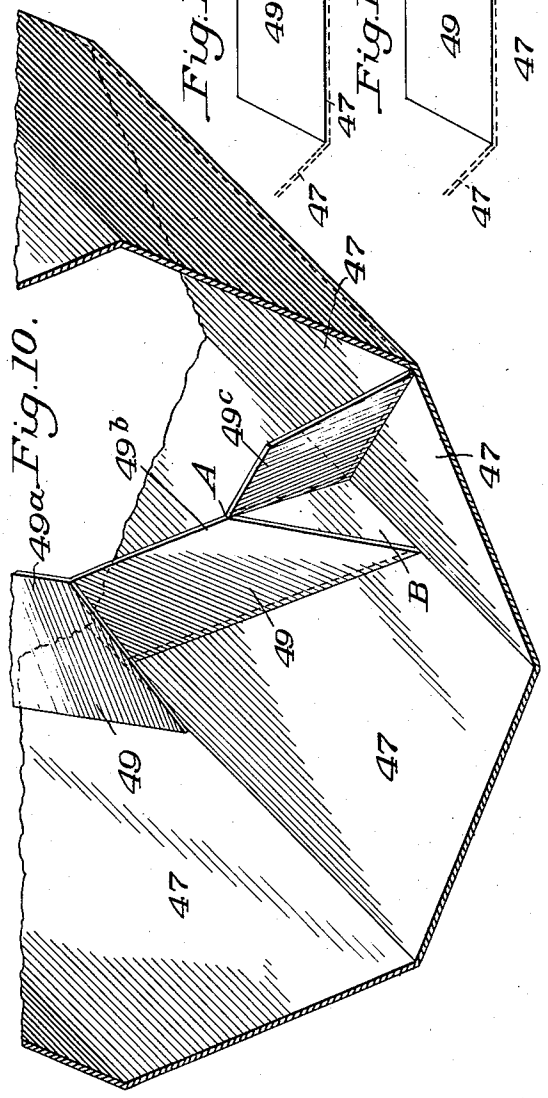


Fig. 10.

Fig. 11.

Fig. 12.

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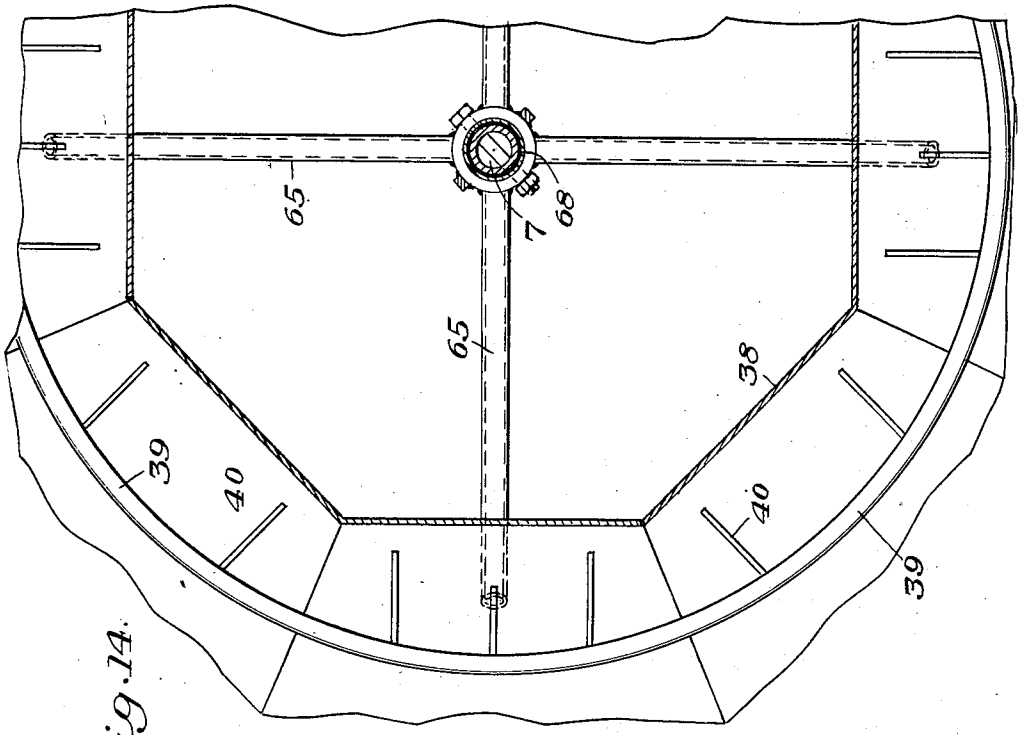


Fig. 14.

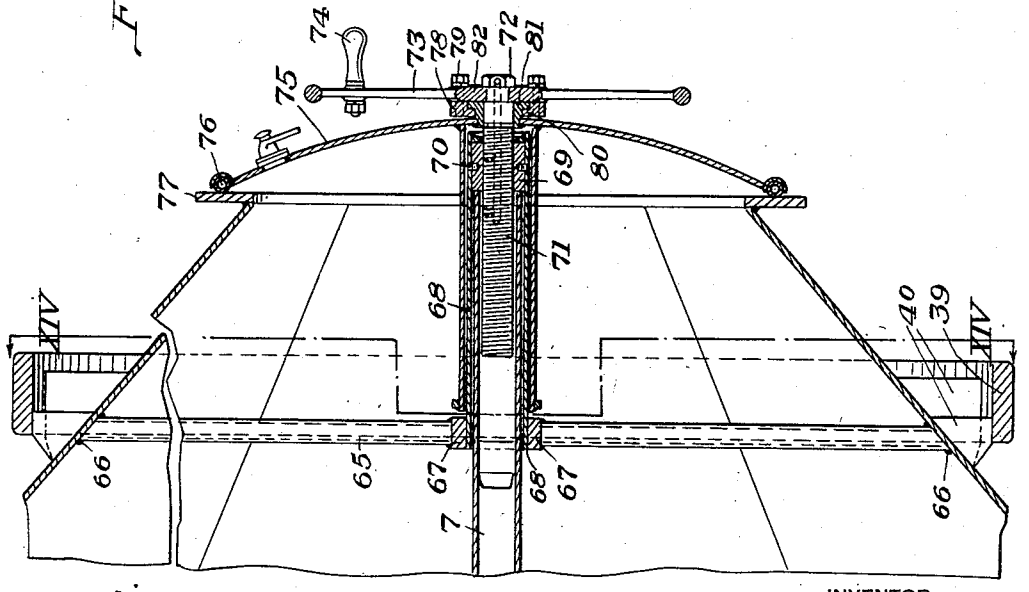


Fig. 13.

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Patented Apr. 30, 1935 1,999,843

UNITED STATES PATENT OFFICE

1,999,843

MIXER

Harold E. McCrery, Pittsburgh, Pa., assignor to Blaw-Knox Company, Blawnox, Pa., a corporation of New Jersey

Application October 9, 1931, Serial No. 567,826

6 Claims. (Cl. 83—73)

This invention relates generally to mixers, and more particularly to mixers for mixing concrete. Although the invention is capable of other applications, it is described herein as applied to a concrete mixer of the type wherein a rotatable drum is mounted on a truck in such manner that the drum may be rotated to mix the batch while the truck is moving from place to place.

In the drawings, which illustrate the present preferred embodiment of my invention,

Figure 1 is a side elevation of the mixer and truck, a portion of the truck being broken away;

Figure 2 is a plan view of the apparatus shown in Figure 1;

Figure 3 is an end elevation of the discharge end of the mixer;

Figure 4 is a vertical section through the front end of the mixing drum, showing the means for supporting the front end of the drum and the means for rotating the drum;

Figure 5 is a partial end elevation taken along the line V—V of Figure 4;

Figure 6 is a partial section taken along the line VI—VI of Figure 4;

Figure 7 is a plan view of the mixing drum showing the means for supporting and rotating the drum and also the mixing vanes inside of the drum;

Figure 8 is an end elevation of the mixing drum shown in Figure 7, and illustrating the mixing vanes at the discharge end of the drum;

Figure 9 is a development of a portion of the mixing drum showing a flat sheet which may be bent as indicated to form the body portion of a mixing drum of general cylindrical shape but having flat sides, the development also showing the mixing vanes;

Figure 10 is a partial perspective view looking into one end of the drum and illustrating the intermittent or broken spiral formed by the mixing vanes;

Figure 11 is a side elevation of one of the mixing vanes;

Figure 12 is a side elevation of one of the mixing vanes which extends into the end portion of the mixing drum;

Figure 13 is a partial longitudinal section through the mixing drum showing the means for mounting and operating the cover for the discharge opening of the mixing drum, and

Figure 14 is a vertical section taken along the line XIV—XIV of Figure 13.

Referring more particularly to the accompanying drawings, especially Figures 1, 2 and 3, a mixing drum 2 is rotatably mounted on a truck supported by wheels 3 so that the mixing operation may be carried out while the truck is in motion. Mounted below the mixing drum 2 and secured to the truck chassis by straps 4 are two water tanks 5, one water tank being mounted on each side of the truck. Water is supplied from these tanks through water pipes 6 shown in Figures 1 and 2, to a pipe 7 which extends axially of the drum. The water is pumped from the tanks through the pipes 6 by a pump 8 shown in Figure 2, which is driven by an engine 9 through gearing contained in a housing 10. The housing 10 contains driving and reversing gears which rotate a drive shaft 11, by means of which the drum may be rotated and automatically reversed in its rotation. The particular driving and reversing gears form no part of the present invention, except as it is necessary to describe them in connection with the operation of the mixing drum, and are claimed in my copending application Serial No. 524,506, filed March 23, 1931. The material to be mixed is charged into the drum through a charging opening 12 which may be closed by a cover 12a which is secured by a clamp 13.

The water pipe 7, which extends axially of the drum, is connected to the supply pipes 6 by a coupling 14 which allows relative rotation between the pipes 6 and 7, so that, although the pipe 7 is mounted within the drum in fixed position relative to the drum, and although the drum is rotated, water may be supplied to the pipe 7. The water pipe 7 is provided with spray nozzles 15, through which water is delivered to the batch within the mixing drum.

The front end of the drum is supported by the water pipe 7 which has a bearing 16 adjacent the front end of the drum in a support 17 secured to the truck chassis. The bearing for the front end of the drum is shown generally in Figures 1 and 2 and in detail in Figure 4. As shown in Figure 4, the pipe 7 extends through a casting 18 welded to an end plate 19, which, in turn, is welded as indicated by the reference numeral 20 to the plates 21 which form the generally conical, though flat-sided, front end portion of the mixer. The pipe 7 is supported in a bearing 16 of the self-alining type, and the bearing is supported by the support 17 which is secured to the truck chassis.

The means for rotating the drum is shown in Figures 4, 5 and 6. The end plate 19 at the front end of the drum extends outwardly beyond the front end of the drum. A ring gear 25 is secured to the end plate 19 by bolts 26. In order that the ring gear 25 may be assembled easily, or

may be replaced if it becomes broken, as is sometimes the case, the ring gear is provided with projections 27 and notches 28, and the end plate is provided with projections 29 and notches 30, as illustrated in Figure 5. The ring gear may be passed from the front to the rear side of the end plate by alining the projections 27 and the notches 30, and after the gear has been passed to the rear side of the end plate, it may be rotated to aline the projections 27 and 29 so that the gear may be secured to the end plate by the bolts 26.

The drum is rotated by a pinion 32 which meshes with the ring gear 25. The pinion is mounted on a shaft 11 which is driven from the engine 9, the shaft being mounted in a bearing 33 which is secured to the support 17, which also supports the bearing 16 for the pipe 7. The pinion 32, although not acting as the principal bearing for the front end of the drum (the principal bearing for the front end of the drum being the bearing 16 which supports the pipe 7), does act to keep the drum in proper alinement so that the pinion 32 and ring gear 25 mesh properly.

As shown in Figures 7 and 8, the mixing drum has a body portion 35 which is of general cylindrical shape, although in the specific embodiment shown, the sides of the body portion consist of flat surfaces so as to form an octagonal drum. The front portion 36 of the drum is of general cone shape, although it also, in the embodiment shown, is made up out of eight flat plates welded to each other. The discharge end 37 of the drum also is of general cone shape, but is made up out of eight flat plates 38 welded together as shown in Figure 8. A ring 39 is secured to the portion 37 by plates 40 which are welded to the ring and to the conical portion 37 of the drum. It is to be understood that, although in the embodiment shown, the drum has flat sides, and end portions made up out of flat plates, the main body portion of the drum corresponding to the portion 35 may be truly cylindrical and the end portions corresponding to the portions 36 and 37 may be truly conical. The ring 39 rests on rollers 41 supported in a yoke 42, as shown in Figure 3, the yoke extending transversely of and being secured to the truck chassis.

From the above description, it will be seen that the front end of the drum is supported by the pipe 7 which extends axially of the drum and which has a bearing in the bearing 16 supported by the support 17, and that the rear end of the drum is supported by rollers 41 mounted in a yoke 42 which bear against the ring 39 secured to the outside of the rear end of the drum.

The construction of the mixing vanes within the drum, which act to mix the batch, is shown in Figures 7 to 12. In Figure 9, there is shown a development of a sheet which might be used to form the octagonal body portion 35 of the drum shown in Figures 7, 8 and 10. The sheet 45 may be bent along the chain lines 46 to form the octagonal body portion 35 of the drum, the right-hand end plate 47, as shown in Figure 9, being provided with a charging opening 12. The vanes 49 consist of flat plates of the shapes shown in side elevation in Figures 11 or 12, Figure 11 illustrating a vane which lies entirely within the body portion 35 of the mixing drum, and Figure 12 representing a vane, a portion of which extends into either the end portion 36 or 37 of the mixing drum. These plates are welded or otherwise secured to the inside of the drum and are arranged as indicated in Figure 9 so that when the sheet is bent to form an octagonal drum, the points A on adjacent vanes meet as indicated in Figure 10, but leave openings B between the vanes for a purpose hereinafter described. The contact points A are welded so that the vanes form a spiral which is continuous along its inner edge but discontinuous along its outer edge where it joins onto the drum. The end edges of the vanes lie substantially in planes passing through the drum axis.

Figure 10 shows the arrangement of vanes in the drum as they appear if we were looking into the front end of the drum. Let us assume that a batch is being mixed in the drum and that the drum is being rotated in a clockwise direction. As the drum rotates, the batch will be moved toward us by the blade 49*b*. As the batch comes to the edge 50, it will drop off of the blade 49*b*. A portion of it will be picked up by the blade 49*c* and be moved toward us, but another portion of it will be crowded backward through the opening B and will be picked up by the plates (not shown) forming the next spiral. The arrangement of the vanes as indicated causes a breaking up of the batch and a crowding back of a portion of the batch so as to accomplish a more thorough mixing than if the vanes formed a true spiral. This division of the batch aids greatly in thorough mixing and is especially effective if there happens to be an excess of water in one part of the mixture as compared with other parts, because a mixture which is more plastic than the normal mixture will pass back more readily through the openings B so as to more evenly distribute the water throughout the batch.

The discharge portion 37 of the drum is provided with vanes 55 which, although made up out of flat plates, are bent so that each vane contains different portions which lie in different planes, although each portion of each vanes forms a flat surface. The discharge vanes 55 are shown in Figure 8, which illustrates the vanes as they appear when looking into the discharge end of the drum. There are four discharge vanes 55*a*, 55*b*, 55*c*, and 55*d*. The vane 55*a* is bounded by the points 56, 57, 58, and 59 and is bent along the line 60 so as to form two portions 61 and 62 which lie in different planes, although each portion is a flat surface. The vanes 55*b*, 55*c*, and 55*d* are of a similar construction.

The construction and operation of the door at the discharge end of the mixer is illustrated in detail in Figures 13 and 14. As has been described previously, the pipe 7 which supplies water to the batch within the mixer extends axially of the mixer. The pipe 7 is supported adjacent the rear end of the mixer by a spider 65 welded, as indicated at 66, to the inside of the drum, each of the pipes forming the spider being secured to a ring 67 in which the pipe 7 is supported. The pipe 7 extends through the opening in the ring 67 and is surrounded by a sleeve 68 which is secured at its inner end to the ring 67. A nut 69 is secured to the sleeve 68 by screws 70, the effect of this construction being the same as if the nut 69 were secured directly to the pipe 7. The nut, accordingly, is in fixed position relative to the pipe 7 and mixing drum. A screw 71 fits in the nut 69 and is secured by a nut 72 to a hand wheel 73 having a handle 74.

A cover 75, which is of general dished shaped, has a resilient packing 76 secured to its periphery so as to tightly close the discharge opening

when the cover is pressed against the end plate 77. The hand wheel 73 has a ring 78 secured to it by screws 79, and the ring has projecting fingers 80 which contact with, but are rotatable relative to, a boss 81 which is welded to the dished portion of the cover 75.

When the hand wheel 73 is rotated, the screw 71, which is integrally connected to the hand wheel, is rotated in the nut 69 and the screw moves outwardly or inwardly according to its direction of rotation. The hand wheel also moves outwardly or inwardly axially of the drum, and, if its movement is outward from the drum, the fingers 80 on the ring 78 cause the cover 75 to be moved outwardly. When the hand wheel is rotated in the opposite direction, the hub 82 of the hand wheel contacts with the boss 81 on the cover and moves the cover into closed position. It will be seen that by this construction the hand wheel can be rotated relative to the cover, although when the cover is in closed position and the mixer is rotating, both the cover and hand wheel rotate with the mixing drum. The cover is not hinged, but moves axially of the drum and is supported by the pipe 7 which, in turn, is supported by the spider 65 secured to the inside of the drum.

The construction of the mixer is such that substantially all of its parts can be made out of flat sheets or plates which eliminate many machining and pressing operations. The total weight of the welded structure can be made the lightest which is consistent with the necessary strength. In building the mixer, the parts of the drum are assembled in a jig where each part is held securely in the proper position and the connections are made by electric welding. Lightness of the mixer consistent with the necessary strength is an important feature, particularly where the mixer is transported by a truck during the mixing of the batch.

I have illustrated and described the present preferred embodiment of my invention, wherein the mixing drum is octagonal in shape and has flat side and end portions. It is to be understood that the main body portion of the mixer may be made truly cylindrical and the end portions truly conical, and that the invention may be otherwise embodied within the scope of the following claims.

I claim:

1. A mixer comprising a rotatable drum, means for rotating the drum, a series of mixing vanes secured to the inside of the drum, said adjacent vanes contacting with each other at their inner edges but being spaced from each other at their outer edges, said vanes forming a spiral which is continuous along its inner edge but discontinuous along its outer edge where it joins onto the drum.

2. A mixer comprising a drum, means for rotating the drum, a series of mixing vanes secured to the inside of the drum, said adjacent vanes contacting with each other at their inner edges but being spaced from each other axially of the drum at their outer edges, said vanes forming a spiral which is continuous along its inner edge but discontinuous along its outer edge where it joins onto the drum.

3. A mixer comprising a rotatable drum, means for rotating the drum, a series of vanes arranged in a spiral within the drum, one edge of each vane adjoining and being secured to the inside surface of the drum, one corner of each vane abutting and being secured to a corner of an adjoining vane, the end edges of adjoining vanes and the inside drum surface forming three-sided passages between the vanes.

4. A mixer comprising a drum, means for rotating the drum, a series of flat four-cornered vanes arranged in a spiral within the drum, one edge of each vane adjoining and being secured to the inside surface of the drum, one corner of each vane abutting and being secured to a corner of an adjoining vane, the end edges of adjoining vanes and the inside drum surface forming three-sided passages between the vanes.

5. A mixer comprising a drum, means for rotating the drum, a series of flat four-cornered vanes arranged in a spiral within the drum, one edge of each vane adjoining and being secured to the inside surface of the drum, one corner of each vane abutting and being secured to a corner of an adjoining vane, the end edges of adjoining vanes and the inside drum surface forming three-sided passages between the vanes, said end edges lying substantially in planes through the drum axis.

6. A mixer comprising a rotatable drum, means for rotating the drum, a series of flat four-cornered vanes arranged in a spiral within the drum, one edge of each vane adjoining and being secured to the inside surface of the drum, one corner of each vane abutting and being secured to a corner of an adjoining vane, the end edges of adjoining vanes and the inside drum surface forming three-sided passages between the vanes, the planes of said passages being at substantially right angles to the direction of rotation of the drum.

HAROLD E. McCRERY.