

June 6, 1939.

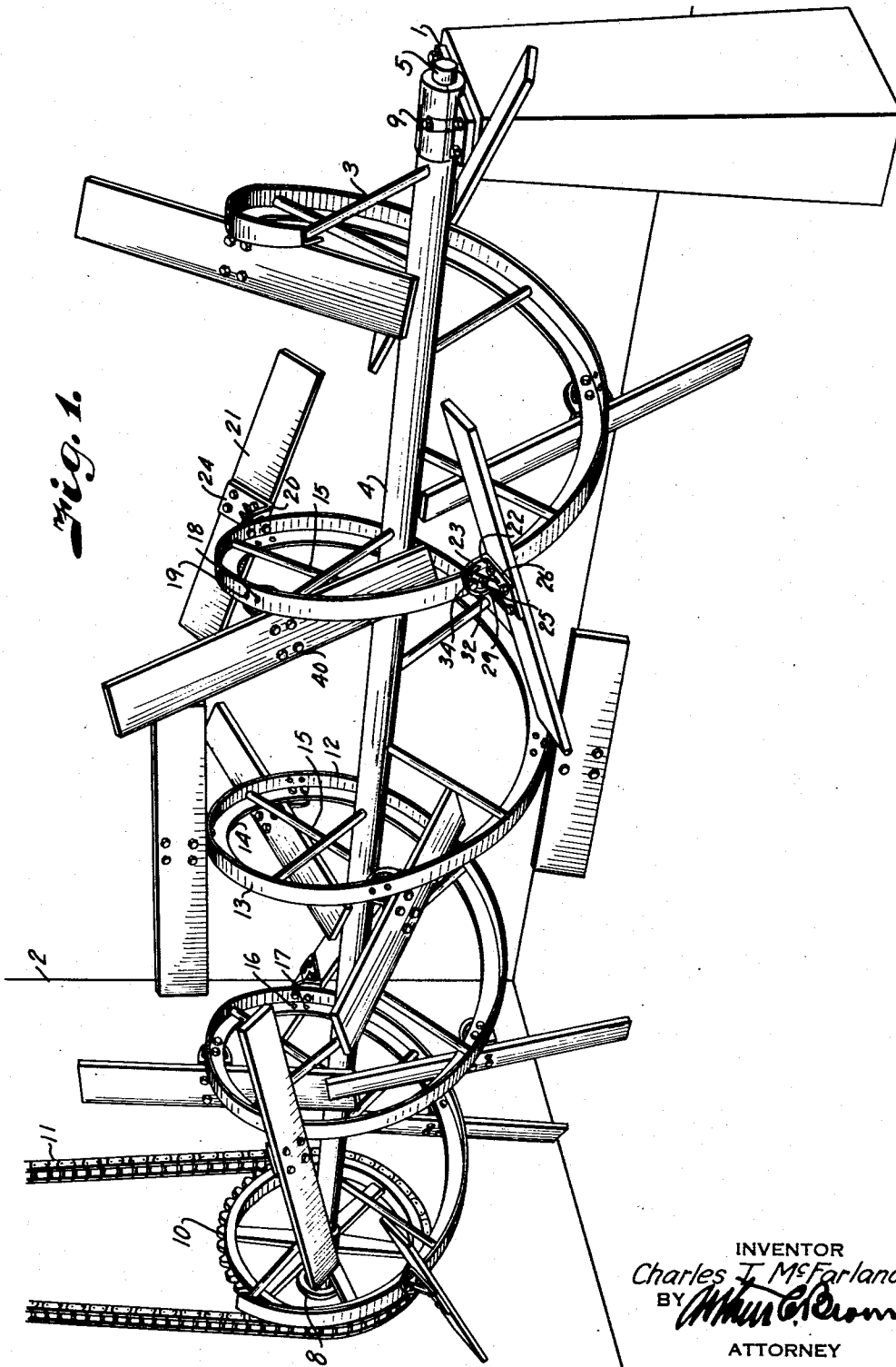
C. T. McFARLAND

2,161,631

MIXING APPARATUS

Filed Nov. 26, 1937

3 Sheets-Sheet 1



June 6, 1939.

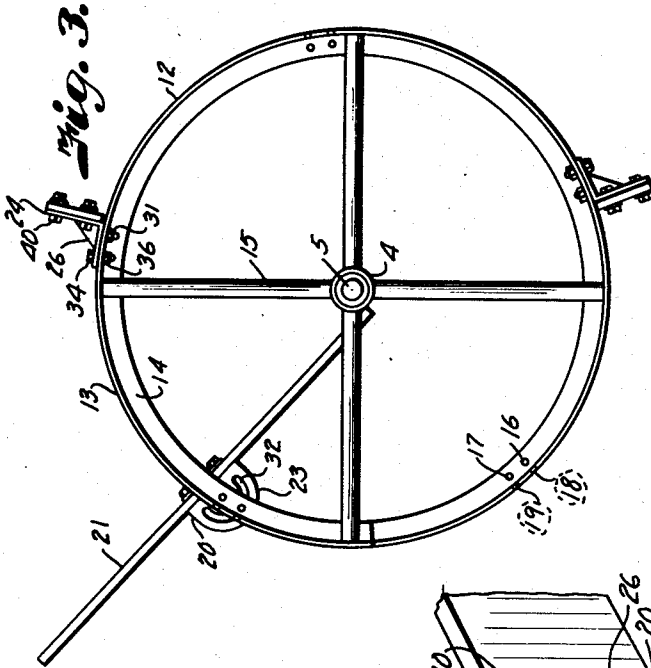
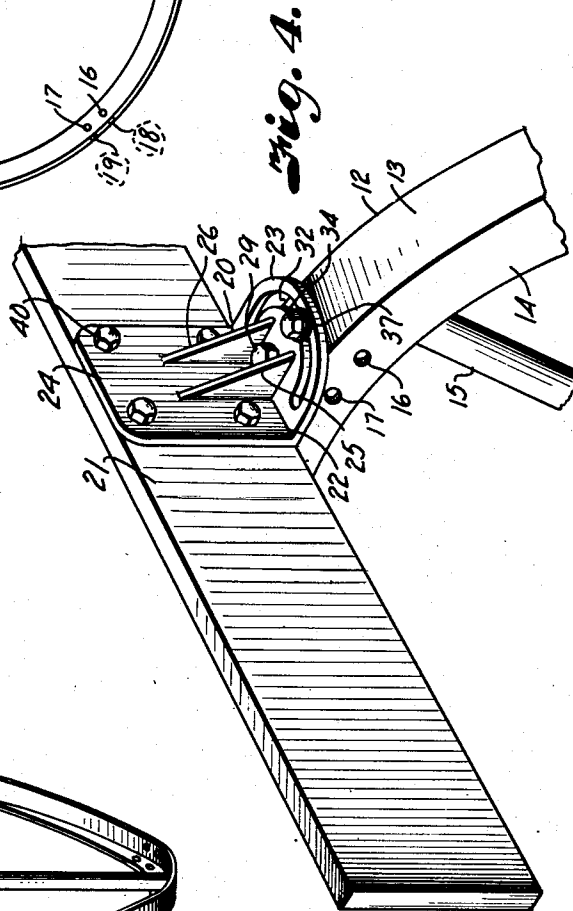
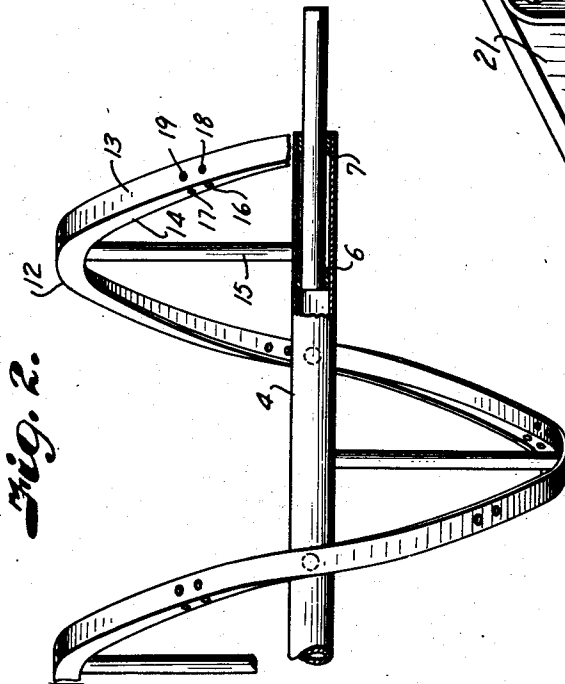
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MIXING APPARATUS

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3 Sheets-Sheet 2



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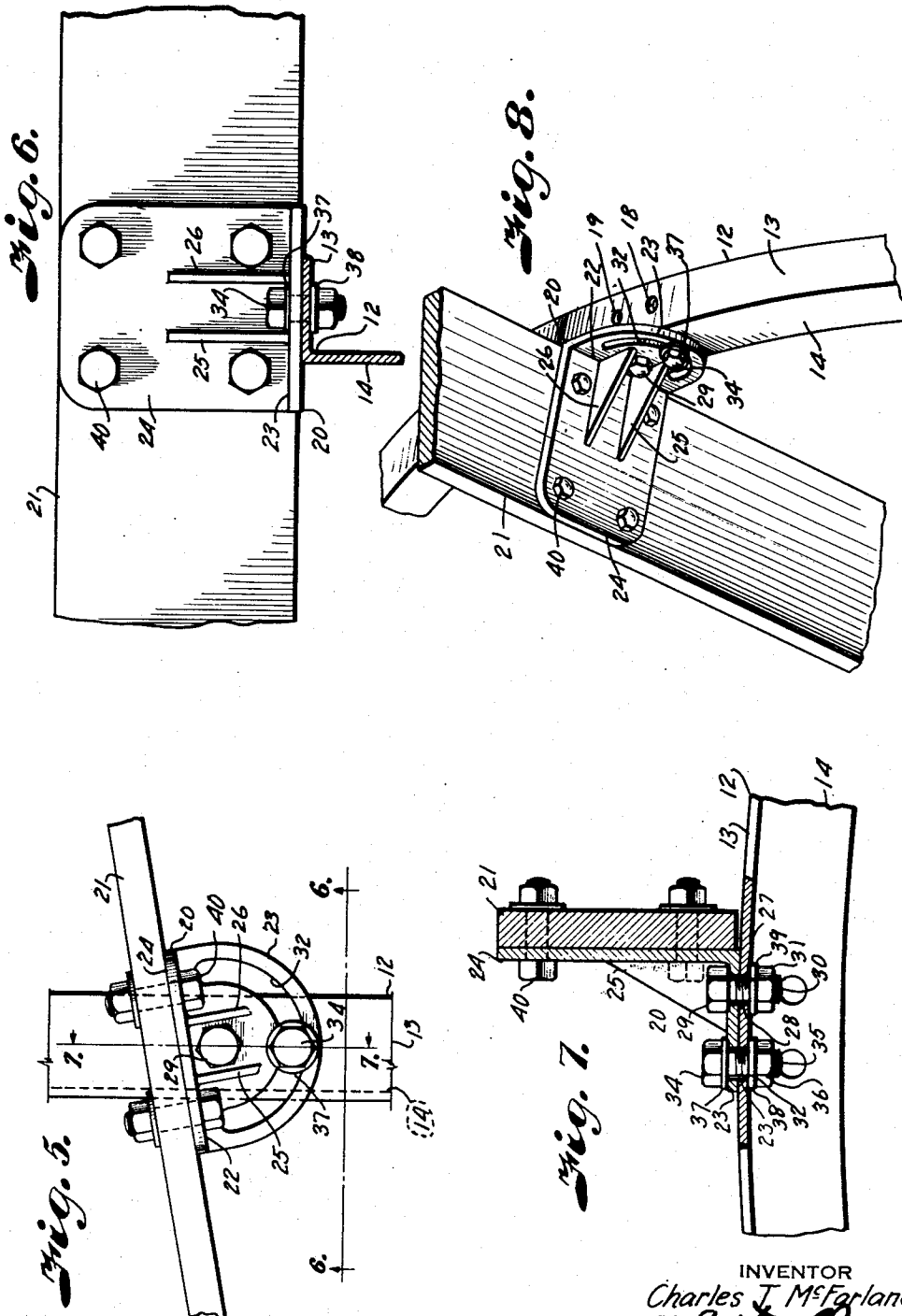
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MIXING APPARATUS

Filed Nov. 26, 1937

3 Sheets-Sheet 3



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MIXING APPARATUS

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6 Claims. (Cl. 259-136)

This invention relates to a mixing apparatus, particularly for coagulating and diffusing a chemical within a liquid substance, such as raw water, sewage or the like, and has for its principal object to provide a simple apparatus of this character with a mixer or agitator which effectively diffuses the chemical in the liquid.

Other important objects of the invention are to provide the mixer with paddles that may be set at various angles of attack so as to control the amount of agitation; to provide for adjustment of individual paddles so that certain paddles may be set at different angles to effect greater or less agitation in various parts of the vessel containing the liquid under treatment; and to provide a construction wherein the paddles may be readily applied or removed to conform with the requirements of the treating system.

It is also an important object of the invention to provide a mixer wherein the paddles may be selectively located tangentially and/or radially relatively to their supporting frame or helix.

In accomplishing these and other objects of the invention, as hereinafter pointed out, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a mixer constructed in accordance with the present invention and showing every other paddle arranged tangentially to the helix and the intermediate paddles substantially radially thereof.

Fig. 2 is a detail fragmentary view of one end of the mixer, particularly illustrating the shaft construction.

Fig. 3 is an end elevational view of the mixer.

Fig. 4 is a detail perspective view of a portion of the mixer, particularly illustrating one of the brackets for adjustably securing the paddles.

Fig. 5 is a plan view of the parts illustrated in Fig. 4.

Fig. 6 is a section on the line 6-6 of Fig. 5.

Fig. 7 is a section on the line 7-7 of Fig. 5, particularly illustrating the adjustable anchorage of the brackets on the helix of the mixer.

Fig. 8 is a detail perspective view of one of the brackets when attached to the helix to support the paddles in radial directions.

Referring more in detail to the drawings:

1 designates a mixing apparatus such as is employed in coagulating or diffusing a chemical in a liquid substance under treatment, as in raw water or sewage treating plants. The apparatus includes a tank 2 for containing the liquid substance to be treated, and one or more mixers 3.

Each mixer includes a central shaft 4 preferably formed of tubing and having its ends provided with gudgeons 5 formed of sections of rod that are sleeved within the open ends of the tube and have spaced rings 6 and 7 welded thereto and to the tubing as shown in Fig. 2. The ends of the rods project a sufficient distance to be rotatably mounted in bearings 8 and 9 that are located within the tank to rotatably support the shaft. Fixed to one of the gudgeons, at a point adjacent the end of the tube, is a sprocket or other suitable driving connection 10 that is driven by a chain belt 11 from a prime mover (not shown).

Extending about the axis of the shaft, in spaced parallel relation therewith, is a helix 12, preferably formed of a structural member which is shown in the drawing as being of angle cross-section to provide peripheral and radial flanges 13 and 14 respectively. The helix thus described substantially corresponds in length to the tube 4 and is supported in concentric relation thereon by means of rod-like arms or spokes 15 having their inner ends welded to the periphery of the tube and their opposite ends to the inner surface of the peripheral flange 13, as shown in Fig. 1, there being a sufficient number of spokes to support the helix in rigid relation with the shaft.

Formed in the flanges of the helix, at spaced points along the length thereof, are pairs of openings 16-17 and 18-19 for removably attaching brackets 20 for anchoring paddles 21. The brackets 20 are best illustrated in Figs. 4 to 8 inclusive, and each includes a substantially angle-shaped member 22 having an approximately semicircular base portion 23 and a paddle attaching arm 24, the arm 24 being braced relatively to the base by spaced webs 25 and 26 preferably formed as integral parts of the bracket as shown in Fig. 8.

Formed in the axis of the base portions 23 are openings 27 adapted to register with one of the openings of the helix flanges to pass fastening devices, such as bolts 28, having heads 29 engaging the base portions of the brackets and shanks 30 extending through the openings to mount nuts 31 engaging the inner faces of the flanges to clamp the brackets thereagainst.

Formed in the base portions 23, concentric with the openings 27 and spaced rearwardly therefrom corresponding to the spacing of the pairs of openings, are arcuate slots 32 for passing fastening devices 33, having heads 34 engaging the base portions of the brackets and threaded shanks 35 extending through the arcuate slots 32 and through the other opening of the pairs

of openings in the helix flange to mount nuts 36 for clampingly anchoring the brackets in selectively adjusted position on the helix, a washer 37 preferably being inserted under the heads 34, and lock washers 38 and 39 under the nuts 31 and 36, as shown in Fig. 7.

The paddles 21 may be of various shapes and dimensions but are here shown as being elongated and rectangular, and they are preferably formed of wood of thickness to provide the desired rigidity. The paddles are secured to the attaching arms 24 at approximately midway their ends by suitable fastening devices, such as bolts 40, so that they are rigidly secured against movement relatively to the brackets. In mounting the paddles on the helix they may all be attached to the peripheral flange 13 or to the radial flange 14 simply by extending the bolts 28 and 33 through the proper openings of the respective flanges, or certain of the paddles may be arranged tangentially while others of the paddles may be arranged radially, as shown in Fig. 1, the relative arrangement of the paddles, as well as their spacing and number, being calculated to conform with the conditions of the treating system with which the agitating mechanism is associated.

Attention is also directed to the fact that the paddles may be adjusted for different angles of attack by loosening the nuts 31 and 36 of the bolts 28 and 32 so that the brackets may be moved about the axis of the bolts 28 until the paddles are at the desired angle, after which the nuts are retightened to again clamp the brackets to the helix. The paddles are thus supported so that any desired angle of attack may be effected both when the paddles are arranged tangentially or radially of the helix, and certain of the paddles may be set at greater or less angles of attack than the others to give the desired agitation in various portions of the tank 2.

When the mixer, assembled as described, is operated by the chain 11, the paddles gyrate about the axis of the shaft and cause the chemical and liquid substances being treated to be thoroughly agitated so that currents are set up in the direction of the attack angle of the paddles. By adjusting the position of the paddles to various angles of attack, various counter and cross currents may be set up in the liquid to assure thorough coagulation or diffusion of a chemical or other treating medium in the liquid solution.

What I claim and desire to secure by Letters Patent is:

1. A mixer including a paddle supporting member in the form of a helix and having flanges arranged in circumferential and radial directions with respect to the axis of said helix, a plurality of elongated paddles, brackets fixed to the intermediate portions of the paddles, and means securing said brackets to selected flanges whereby some of the paddles are positioned tangentially and others radially with respect to the helix.

2. A mixer including a shaft, a paddle supporting member in the form of a helix and having flanges arranged in circumferential and radial

directions relatively to the shaft, spokes connecting said member with the shaft, a plurality of elongated paddles, brackets fixed to the intermediate portions of the paddles, and means selectively securing said brackets to the respective flanges whereby some of the paddles are positioned tangentially and others radially with respect to the helix.

3. A mixer including a paddle supporting member in the form of a helix and having a flange arranged circumferentially relative to the axis of said helix, there being spaced pairs of apertures in said flange, a plurality of paddles, angle-shaped brackets each having an arm fixed to a respective paddle and an attaching flange extending at substantially right angles to the arm, said attaching flange having an aperture and a concentric arcuate slot adapted to align with the respective pairs of apertures, and fastening devices extending through said apertures and slots, said fastening devices being positioned in the arcuate slots for adjustably changing attack angle of the paddles.

4. A mixer including a paddle supporting member in the form of a helix and having spaced pairs of apertures, a plurality of paddles, angle-shaped brackets each having an arm fixed to a respective paddle and an attaching flange extending at an angle to the arm, said attaching flange having an aperture and a concentric arcuate slot adapted to align with the respective pairs of apertures, and fastening devices extending through said apertures and slots, said fastening devices being positioned in the arcuate slots for adjustably changing attack angles of the paddles.

5. A mixer including a paddle supporting member in the form of a helix and having flanges arranged in circumferential and radial directions with respect to the axis of said helix, said flanges having spaced pairs of apertures, a plurality of paddles, angle-shaped brackets each having an arm fixed to a respective paddle and having an attaching flange extending at substantially right angles to the arm, said attaching flange having an aperture and a concentric arcuate slot adapted to align with the apertures of the respective pairs, and fastening devices extending through said apertures and arcuate slots whereby some of the paddles are positioned tangentially and others radially at predetermined angles of attack, said fastening devices being positioned in the arcuate slots for adjustably changing said angles of attack.

6. A mixer including a paddle supporting member in the form of a helix, means mounting the member for rotation about the axis of said supporting member, a plurality of elongated paddles, means securing the intermediate portions of selected paddles to the supporting member with said paddles positioned with their longer dimensions extending in the longitudinal direction of said axis, and means securing the other of said paddles to the supporting member with their longer dimension extending in directions radially to said axis.

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