May 13, 1947. T. B. OWENS 2,420,494

MIXING DEVICE

Filed June 6, 1945

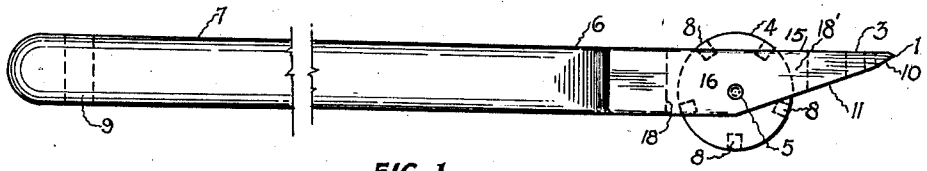


FIG. 1

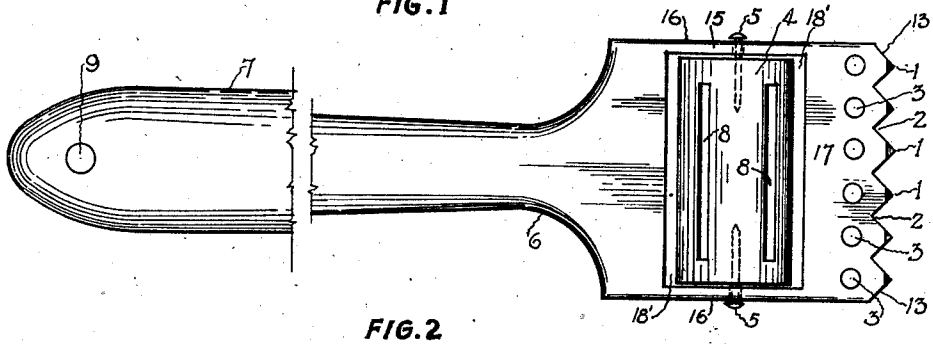


FIG. 2

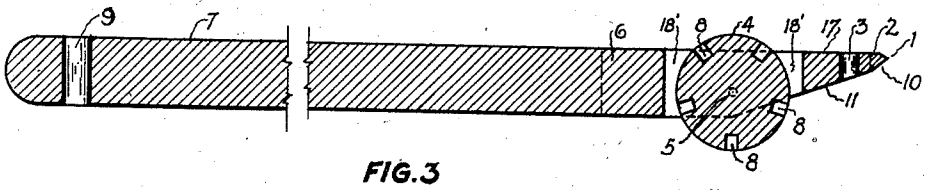


FIG. 3

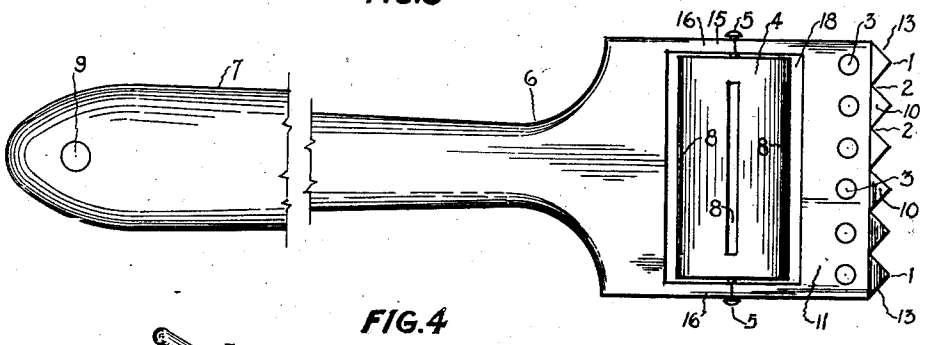


FIG. 4

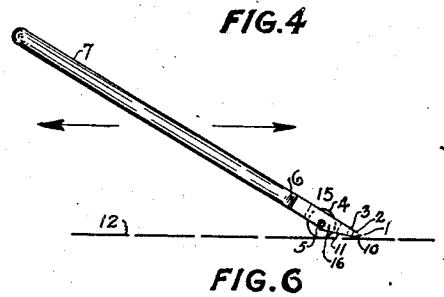


FIG. 6

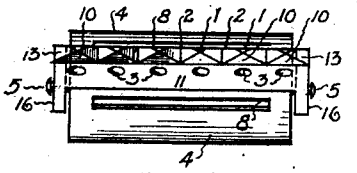


FIG. 5

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MIXING DEVICE

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5 Claims. (Cl. 259—126)

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The invention relates to mixing devices and particularly to devices of this character adapted to the hand mixing of chemicals and liquids of a character such that it is advisable that the hands do not come in contact therewith either because of the dangerous character of the materials being mixed or because of the high temperature at which the mixing is effected.

A field in which the use of the improved mixing device is particularly advantageous is the hand mixing of chemicals used in photography when mixed in trays in gallon lots or smaller.

The improved mixing device performs several functions. It mixes and dissolves granular substances and crushes lumpy particles. It prevents a formation of crust upon those materials which have a tendency to so form when mixed into a high temperature liquid. Thorough mixing is made certain by auxiliary actions induced by the structure of the device. Some of these auxiliary actions comprise cascading and gorging effects imposed upon the ingredients being mixed. The whole effect is to induce a high agitation and turbulence without an undue splashing of the ingredients. When a crushing effect is not desired, the improved mixing device can be utilized to effect stirring action only, this stirring, however, inducing a lively turbulence and effecting quick mixing by reason of the structure of the device.

Other advantages will be apparent from the description of the device hereinafter given by reference to the accompanying drawing.

The annexed drawing and following description set forth in detail certain means illustrating the improvements in mixing devices, such means constituting, however, only one of several forms in which the principle of the invention may be embodied.

In said annexed drawing:

Figure 1 is a side elevation of the improved mixing device, full size, the comparatively long handle thereof, however, being broken so that the length of so much of the device as is shown in Figure 1 is about one-half of the actual length thereof;

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

Figure 3 is a vertical axial section thereof;

Figure 4 is a bottom plan view;

Figure 5 is an elevation of the front or mixing head end of the device; and

Figure 6 is a side elevation, upon a reduced scale, suggesting the positioning of the device in action.

Referring to the annexed drawing in which the same parts are indicated by the same respective numbers in the several views, the improved mixing device comprises an elongated handle 7 formed at one end into a mixing head 15 of comparatively wide formation having a saw-tooth front end of spaced teeth 1 forming V-shaped recesses 2. The mixing head 15 has a rear portion 6 merging from the handle 7, comparatively narrow side portions or walls 16, and a front portion 17 forming the base of the saw-tooth end, there being provided a comparatively large hole 18 through the body of the head 15 bounded by the front face of the member 6, the inside faces of the side walls 16, and the rear face of the member 17, in which opening 18 is mounted a roller 4, on pins 5, extended inwardly from the side walls 16, and forming axles upon which the roller 4 can rotate. The axles 5 are so positioned in the side walls 16 that the peripheral surface of the roller 4 predominantly extends below the bottom surface of the body 6 as compared with the amount of the peripheral surface of the roller 4 which extends upwardly beyond the upper surface of the body 6, all as is clearly shown in Figures 1, 3, and 5. The peripheral crushing surface of the roller 4 is imperforate but is formed with a plurality of spaced longitudinal grooves 8, these grooves 8 not extending to the ends of the roller 4 but terminating somewhat short thereof so as to provide unbroken peripheral end rolling surfaces for the roller.

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The front part of the bottom surfaces of the side walls 16 and the bottom surface of the transverse head member 17 incline upwardly at an angle 11 to a plane somewhat to the rear of the terminal portions of the teeth 1 and from this plane forwardly the bottom surfaces of the teeth 1 incline upwardly at a sharper angle as indicated by "10."

The end saw teeth 1 also have the complete saw-tooth formation, as indicated by the surfaces 13 forming the outer portions thereof.

The front part 17 of the mixing head 15 is of substantial longitudinal length so as to provide for the formation therethrough of a transverse series of holes 3.

The use of the mixing device having the elements hereinbefore described, and relatively arranged as noted, is as follows:

Assuming that the ingredients to be mixed are contained in a tray whose bottom is suggested by the line 12, Figure 6, the device is rolled back and forth on the tray bottom 12, as suggested by the arrows in Figure 6, the conseqeunt rotation of the roller 4 crushing lumpy, hard, and gran-

ular particles, the front saw-tooth formation furrowing and slicing the material, the V-shaped recesses 2 agitating the slices, the grooves 8 filling with broken material and cascading it in the liquid as the roller 4 rotates, and the holes 3 acting to channel or gorge the material as it passes therethrough, the whole effecting an agitation and turbulence which is effective to produce quickly a fine and homogeneous mix without a slopping of the material.

The end bevel surfaces 13 of the front saw-tooth formation permit effective and convenient passing around the corners of the tray.

The fact that the grooves 8 do not extend to the ends of the rolling surface of the roller 4 obviates any jumpy or flat-wheel performance of the roller by thus providing unbroken peripheral rolling surfaces akin to perfect circular wheels.

The opening 18 is of liberal dimensions, front to rear, as compared with the diameter of the roller 8 so as to provide transverse front and rear passages 18' for material pouring through the opening 18 and material cascading from the grooves 8.

The fact that the surfaces 10 on the bottom of the teeth 1 are at a sharper angle, as compared with the bottom of the body 6, than the surfaces 11 of the walls 16 and member 17, obviates any catching of the teeth 1 on the bottom 12 of the tray in which the mixing is being done.

The grip end of the handle 7 is formed with a hole 9 by which it may be hung up when not in use for efficient draining thereof.

The structure of the improved mixing device is such that it will mix any liquids where dissolving of one chemical with another is desired, or mixing with water, or for color blending when no granular materials are involved. The device can be used in a vertical position, with the crushing roller inoperative, and a stirring action effected, the design of the mixing head end effecting agitation which produces a quick thorough mix.

The quick thorough and uniform mix obtained by the improved mixing device is particularly advantageous in the mixing or dissolving of those chemicals, of which there are many, which should be stirred and mixed at a given temperature range. Although the improved mixing device is highly serviceable for mixing at any temperatures, it is, as stated, particularly advantageous where mixing must be done before temperatures drop too low, or done in temperatures that should rise as the mixing takes place.

The improved mixing device has evident advantages of economy and compactness. It involves only one simple moving part, and this part acts as an efficient crushing member, and is so formed as to effect also a cascading action, and further so formed as to roll evenly on the surface of the mixing tray.

If the mixing device is not used on a surface having too sharp a radius, it will act well on either a convex or a concave surface, and can also be used on vertical surfaces of vessels where mixtures are involved which might cling to the vessel's sides.

What I claim is:

1. A mixing device comprising a body member formed with an end handle and a head, a roller mounted in the head and having its peripheral surface extended outwardly thereof, the head having a portion in which the roller is mounted, and a portion forming the end of the device opposite the handle end, the terminal edge of the last-mentioned head portion being of saw-tooth formation, the bottom surface of the front part of the head portion in which the roller is mounted being inclined upwardly at an angle to the bottom surface of the rear part thereof, and the bottom surface of the terminal edge being inclined upwardly at an angle to the inclined bottom surface of the front part of the head portion.

2. A mixing device having a handle end and a mixing head end, the latter being formed with an opening therethrough, a roller mounted in the opening and having its peripheral surface extended beyond the upper and lower surfaces of the adjacent portion of the head, the mixing head portion of the device between the roller and the free end of the head being of material area and being formed with a multiplicity of small spaced holes therethrough, the peripheral surface of the roller being formed with spaced mix-cascading grooves, the roller being spaced from the adjacent front and rear head walls to form passages for the cascading mix.

3. A mixing device having a handle end and a mixing head end, the latter being formed with an opening therethrough, a roller mounted in the opening and having its peripheral surface extended outwardly of the head, the peripheral surface of the roller being formed with spaced mix-cascading grooves, the roller being spaced from adjacent head walls to form passages for the cascading mix, the free end of the head being of furrowing formation.

4. A mixing device having a handle end and a mixing head end, a roller mounted in the mixing head end and having an imperforate peripheral crushing surface formed with spaced mix-cascading grooves, the roller being spaced from the adjacent walls of the head end to form passages for the cascading mix.

5. A mixing device, characterized as in claim 4, in which the mix-cascading grooves extend axially of the roller and terminate short of the roller ends, thereby providing unbroken roller end rolling surfaces functioning as circular wheels.

THOMAS B. OWENS.

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