

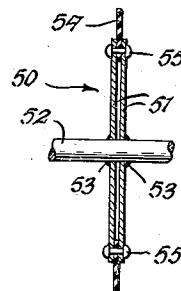
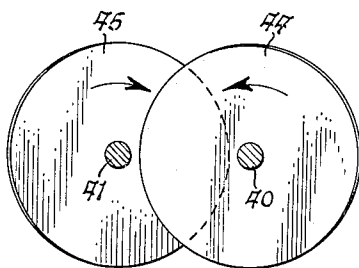
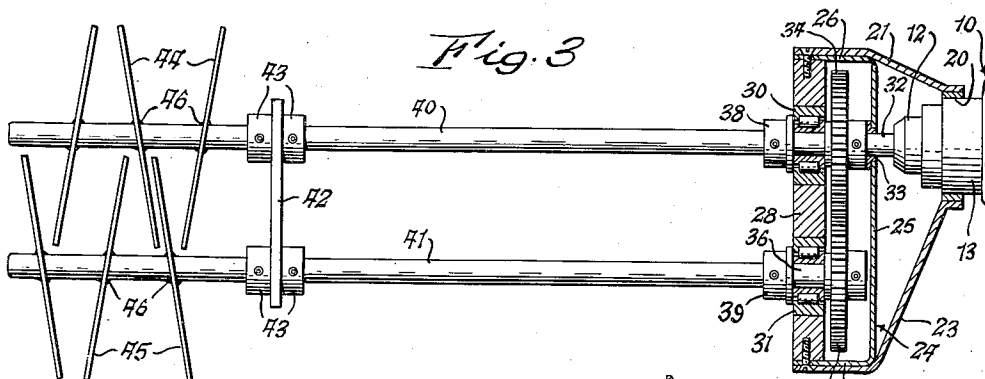
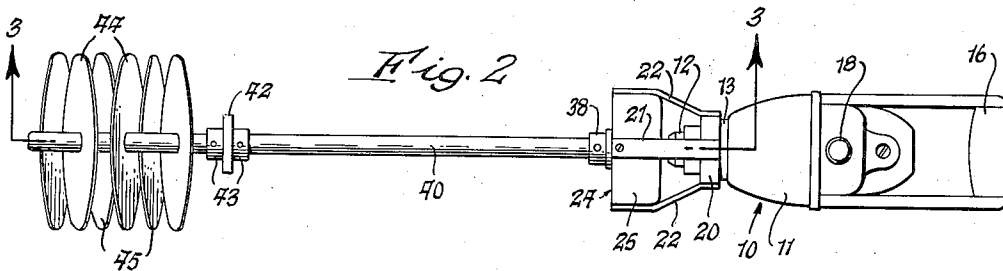
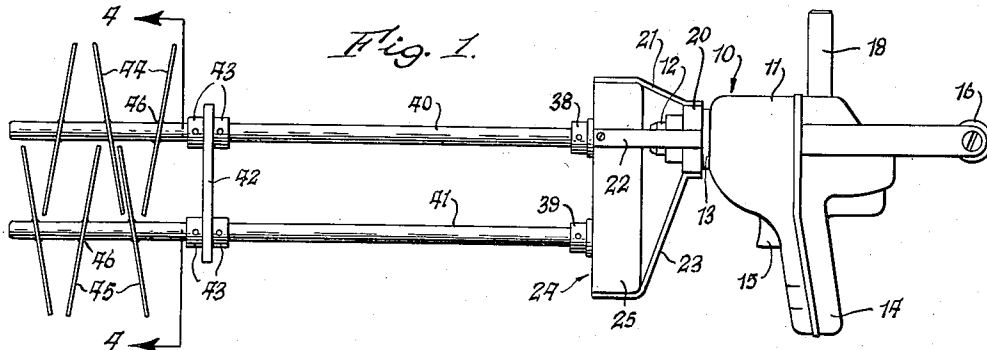
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MIXING APPARATUS

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2,973,188

MIXING APPARATUS

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1 Claim. (Cl. 259—131)

This invention relates to mixing apparatus and more particularly to a manually operable tool for mixing base coat plaster and lime by plasterers at the site, although the invention is not limited to mixing any particular materials and can be used wherever rapid and thorough blending of flowable materials, including solids, is required.

One of the principal objects of the present invention is to provide apparatus which will rapidly and efficiently mix and blend large quantities of heavy materials which are hard to handle.

Another object is to provide such apparatus which is light in weight so that it can readily be manipulated by hand.

Another important object is to provide such mixing apparatus in which there is no danger of fouling or clogging even when fibrous material is being handled.

Another object is to provide such apparatus which is conveniently portable so that it can readily be moved from batch to batch to be mixed or blended.

Another object is to provide such apparatus which can be used in any available type of container, such as a conventional mortar box, corrugated metal garbage can type of container or barrel.

Another object is to provide such apparatus which can be used to clean the side walls of the container.

Another aim is to provide such apparatus which is itself readily kept in a clean condition.

Another object is to provide such apparatus in which the mixing forces are counterbalanced so that the operator is merely required to hold the apparatus in position.

Another aim is to provide such apparatus in which the material is propelled in a stream through the apparatus thereby to insure uniform blending throughout the body of material being mixed.

Another object is to provide such apparatus which is adapted for blending of a wide range of flowable viscous liquids and solids.

Another purpose is to provide such apparatus which is of simple and rugged construction and which will stand up under conditions of severe and constant use without getting out of order or requiring repairs.

Other objects and advantages of the invention will be apparent from the following description and drawings in which:

Fig. 1 is a side elevational view of mixing apparatus embodying the present invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is a longitudinal sectional view taken generally on line 3—3, Fig. 2.

Fig. 4 is a transverse section taken generally on line 4—4, Fig. 1.

Fig. 5 is a fragmentary view similar to Fig. 3 and showing a modified form of paddle or impeller.

The numeral 10 represents a conventional electric hand drill having a housing 11 containing an electric motor (not shown) which drives a chuck 12 projecting from a stationary cylindrical extension 13 of the housing. The

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housing is shown as having a pistol grip 14 in conjunction with which a normally open trigger switch 15 is used to render the motor operative and inoperative. The housing also has a shovel type of grip 16 and is additionally provided with a removable upright pipe grip 18.

A ring 20 is fixed in any suitable manner to the stationary exterior of the cylindrical extension 13 of the casing and to this ring are fixed forwardly diverging upper, side and lower arms 21, 22 and 23, respectively. The forward ends of these forwardly diverging arms are fast to a gear case 24 comprising a shell 25 having a rim 26 embracing and secured to an end head 28.

This end head is provided with a pair of spaced roller bearings 30 and 31 arranged with their axes parallel and the axis of the roller bearing 30 being coincident with the axis of the chuck 11. In this roller bearing 30 is journaled a stub shaft 32 which extends through the shell 25 and is gripped by the chuck 11 of the hand drill so as to be rotated thereby. A duct seal 33 is provided at the opening through the shell 25 and within the gear case 24 a gear 34 is fast to the stub shaft 32. This gear meshes with an equal sized gear 35 fast to a stub shaft 36 journaled in the roller bearing 31.

Externally of the end head 23 the stub shafts 32, 35 have enlarged coupling sockets 38, 39, respectively, which receive and drive shafts 40, 41. The outboard ends of the shaft 40 and 41 are kept from whipping about by a cross tie 42 in which the shafts are journaled and which cross tie is held in place by collars 43 on the shafts.

The mixing action is effected by a series of nutating or wobble plates 44 fast to the shaft 40 which interleave or are intercalated with similar nutating or wobble plates 45 fast to the shaft 41. These plates are shown as being in the form of flat circular disks with the shaft 40, 41 extending through and welded to their centers, as indicated at 46 and each is pitched, that is, arranged in a plane the included angle of which, with reference to the axis of the shaft, is less than 90° or an acute angle. Also alternate plates of each shaft are pitched in opposite directions. Thus all of the plates are arranged to have their points of maximum convergence and divergence simultaneously reach the same plane, this being the plane of the two shafts 40, 41 illustrated in Fig. 3. By reason of the equal sized gears 34, 35, the nutating plates 44, 45 rotate in opposite angular directions as illustrated by the arrows in Fig. 4 at the same rate of speed. Accordingly as the shafts 40, 41 rotate the interleaving areas of the plates 44 periodically approach and retreat from the interleaving areas of the plates 45. The plates 44, 45 therefore in effect have an oscillatory motion lengthwise of the shafts with reference to one another and the material to be mixed is alternately squeezed between the approaching surfaces of the two series of plates and then subjected to suction between the surfaces of the two series of plates as they separate from one another. This squeezing and suction action on the material being handled also forcibly propels the material being mixed through the center of the mixing apparatus in the direction of the arrows shown in Fig. 4. While so being propelled in the manner of a pump through the space between the two shafts, the material is subjected to alternate squeezing and pulling apart action thereby to thoroughly knead and blend the material being handled and to rapidly work the material to a uniform consistency and in the case of plaster and lime coatings, leaving a high degree of plasticity.

One or more of the plates 44 or 45 can be rubber rimmed as illustrated by the blade 50, Fig. 5. Each of these blades is shown as composed of closely spaced circular disks 51 coaxially penetrated and welded to the cor-

responding shaft 52 as illustrated at 53 and with the two disks embracing the inner margin of a flat rubber ring 54. The rubber ring can be secured by rivets 55. The pair of disks 51 are set at the same angle, with reference to the shaft 52, as the plates 44, 45 with reference to their shafts. The primary utility of the rubber rim 54 is to wipe material from the container walls particularly dry material for incorporation into a wet mix and particularly where the walls of the container are corrugated as with metal containers such as are commonly used for garbage and which have been found to be particularly well suited for use with the present apparatus.

As indicated, in the use of the apparatus, the materials to be mixed are placed in a container and the bladed end of the apparatus inserted into the materials. The operator then closes the trigger switch 15 to energize the motor of the electric drill 10 and rotate its chuck 11. The stub shaft 32 is held in this chuck and hence this stub shaft and the two equal sized gears 34, 35 are rotated in opposite directions with reference to each other at the same rate of speed. This rotation is transmitted to the two shafts 40, 41 and the wobble or nutating disks angularly fastened to these shafts. As these angularly disposed disks 44, 45 rotate their interleaved or overlapping portions or areas periodically move toward and from each other thereby to alternately compress and suck upon the material being handled to knead the same. At the same time this alternate pressure and suction effect of the intercalated areas of the plates 44, 45 cause a pumping action which propels the material being treated between the shafts. Accordingly the material in the container is constantly being recirculated and acted upon again and again by the plates.

From the foregoing it will be seen that the present invention provides a light weight manually operable mixing apparatus in which the mixing forces counterbalance each other so as to reduce the effort required to a minimum and that the apparatus accomplishes the various objectives set forth in a highly efficient and sturdy tool.

I claim:

In mixing apparatus for flowable materials having a pair of generally parallel, spaced shafts rotated in opposite directions, the combination therewith of means for alternately exerting squeezing and suction forces in an axial direction on material between said shafts as well as conveying the material through the space between said shafts, comprising a series of generally circular metal plates fixed in spaced relation along each of said shafts generally concentric therewith and projecting laterally therefrom with the plates on one shaft having portions which interleave with the plates on the other shaft, alternate plates of each series being pitched at one acute angle with reference to the axis of their shaft and the remaining alternate plates of each series being pitched at an opposite acute angle with reference to their shaft whereby upon said rotation of said shafts the opposing interleaved portions of said plates on the two shafts alternately move toward and from each other parallel with their axes thereby to exert alternately squeezing and suction forces in an axial direction on the material and also to propel the material through the space between said shafts.

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