

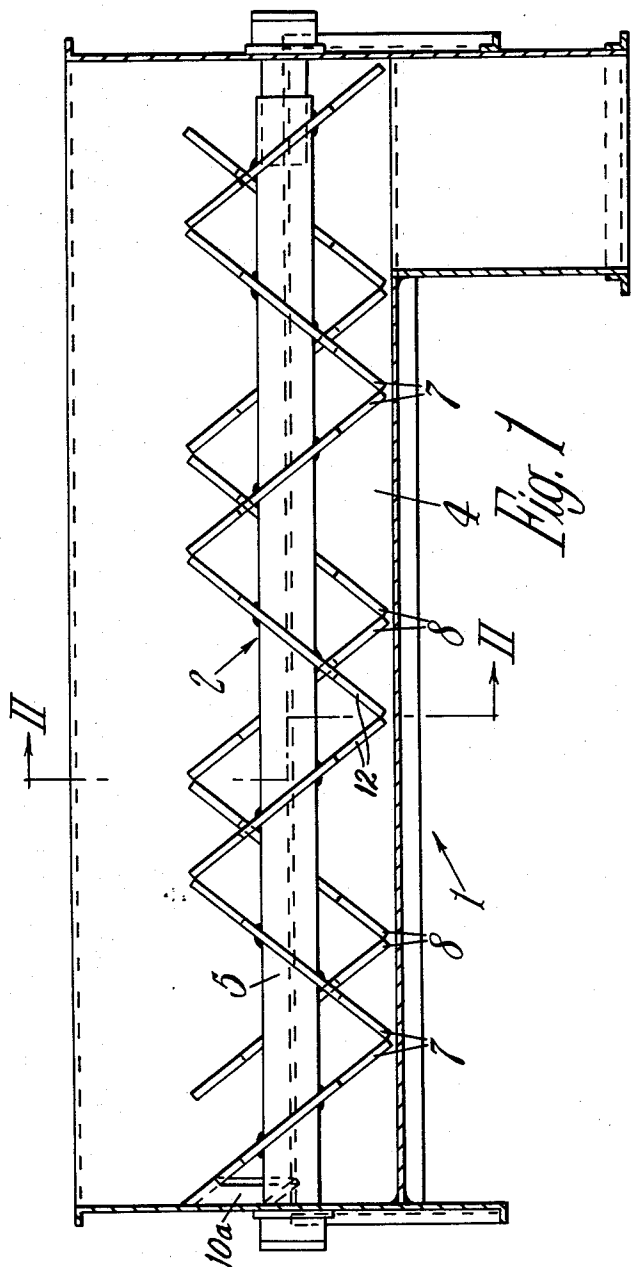
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J. H. C. ATKINS
MIXING MACHINES

3,248,092

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3 Sheets-Sheet 1



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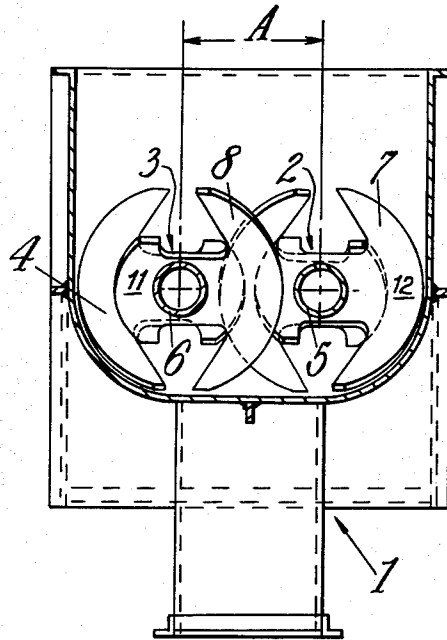


Fig. 2

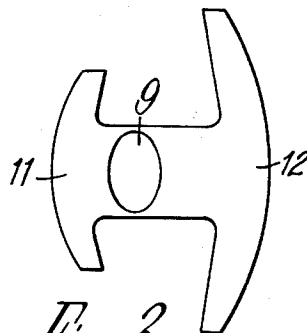


Fig. 3

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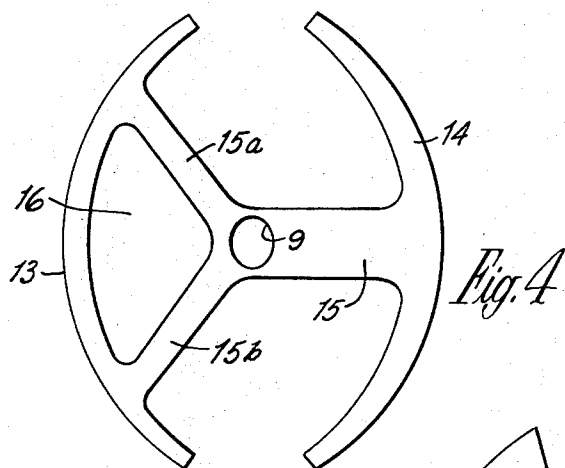
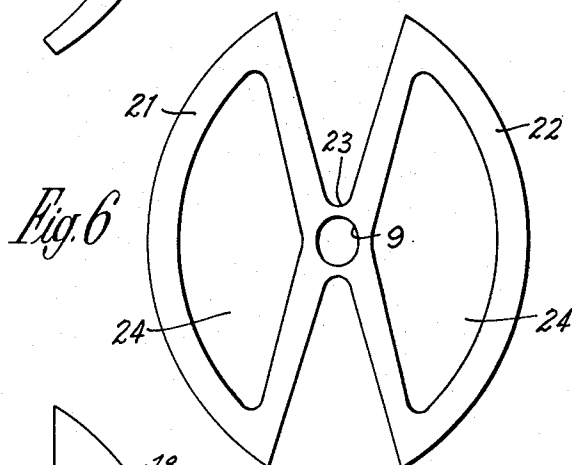
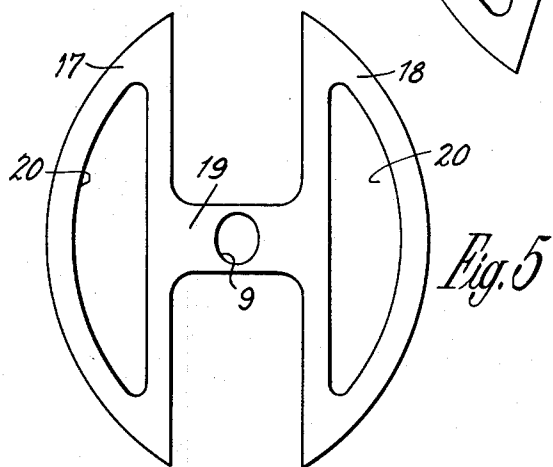
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MIXING MACHINES

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10 Claims. (Cl. 259—129)

This invention relates to mixing machines, and more particularly to mixing elements for use therein. Such machines commonly comprise a mixing chamber into which extend one or more suitably mounted, rotary mixing elements, and, where two or more of such elements are used, these may be arranged to interact or intermesh so as to eliminate "blind" or "dead" spots within the mixing chamber.

There are numerous known types of mixing elements, for example the worm type, which may have one or more starts, or the ribbon type which comprises an axial shaft carrying helically extending members radially spaced from the shaft. Certain mixing elements are manufactured by forging processes, others being manufactured as castings, whilst ribbon type elements are normally produced in a prefabricated form, the helical blades being cut and formed from flat plate and welded to or mounted on transverse discs or arms attached to the axial shaft. This method is time consuming and involves complicated jiggling arrangements for the welding operation, as well as accurate forming of the helical members.

An object of the present invention is to provide a simplified mixing element for use in a mixing machine, the element being simpler and more economical to manufacture than known types whilst retaining their mixing efficiency.

The invention consists in an element for a mixing machine or the like comprising an axial shaft, and one or more substantially flat mixing members or discs, each having an opening engageable with the shaft, at least one dimension of which is greater than the corresponding shaft dimension such that the disc may be fixedly attached to the shaft in a tilted position.

The opening may be in the form of a hole, defined as an opening completely surrounded by material, or in the form of a recess formed from the side of a disc, and by "tilted" is meant that the general plane of the disc lies in a non transverse position with respect to the shaft axis.

The shaft of the mixing element according to the invention, may be of any convenient cross section, the or each mixing disc being provided with a suitably shaped hole for threading onto the shaft, and each disc may be of any convenient shape and form, conducive to efficient mixing. Furthermore, the discs may be aligned at the same or different angles on the shaft (depending on the relative sizes of the holes formed therein) and adjacent discs may be tilted in the same or opposite directions.

The invention will now be described by way of an example, with reference to the accompanying drawings in which:

FIGURE 1 is a sectional side elevation of a mixing machine,

FIGURE 2 is a sectional end elevation of the machine taken on line II—II of FIGURE 1,

FIGURE 3 is a plan view showing the true shape of the discs used for the mixing elements of the machine, and

FIGURES 4 to 6 show alternative forms of discs for the mixing elements.

Referring now to FIGURES 1 and 2, a mixing machine 1 is provided with a pair of intermeshing, rotary mixing elements 2 and 3 which extend into the mixing chamber 4 thereof.

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Each mixing element comprises a round shaft 5 and 6 upon which is mounted a series of spaced mixing blades or discs 7 and 8 respectively, each cut from a flat plate and having a shape similar to a rounded letter H with an enlarged central portion or cross-bar 10 which terminates in curved ends or limbs 11 and 12. The enlarged central portion 10 is provided with an elliptical hole 9 (see FIGURE 3), the minor axis of which is sufficient to allow the disc to be threaded onto a shaft 5 or 6. The major diameter of the hole 9 allows the disc to be tilted with respect to the shaft thereby controlling the angle at which it is fixed to the shaft by welding. The elliptical hole may be centrally located with respect to the disc, or offset as shown, depending on the mixing effect required.

Thus the mixing elements 2 and 3 may be simply constructed by providing the shafts 5 and 6 each with a series of similar mixing discs, spaced apart and welded to the shaft at angles dependent on the relative sizes of their major diameters, and adjacent discs may be tilted in the same direction, or in opposite directions (as shown).

According to the present example, the mixing machine is provided with a pair of parallel, spaced apart shafts, on each of which is a plurality of axially spaced, generally H-shaped mixing members or blades having limbs of unequal size or area and joined by a cross-bar. Alternate blades on each shaft are tilted in opposite directions. Moreover, alternate blades on each shaft have their larger area limbs disposed on opposite sides of the respective shaft. The blades on the shafts are axially staggered and the inter-element spacing A, see FIGURE 2, is such that the blades intermesh, in operation, to eliminate dead spots within the mixing chamber 4, and such that a small clearance is maintained between the rotating discs and the walls of the mixing chamber. The size or area of each of the longer limbs 12 is such that, when the blades are fixed on their respective shafts, the confronting ends of two adjacent limbs 12 will terminate in the same vertical plane transverse to the axis of the associated shaft.

The outline of the disc members may be designed according to the material to be mixed, and the shape of these is in no way restricted to that described above. Thus, for example, any of the alternative shapes shown in FIGURES 4 to 6 may be used. The angular position of the discs on the shaft need also not be constant and may vary from disc to disc.

The mixing member shown in FIGURE 4 is substantially H-shaped having a pair of limbs 13 and 14 joined by a cross-bar 15 in which the opening 9 is located. The cross-bar 15 terminates at one end in a pair of branches 15a and 15b between which is a generally triangular opening 16.

The mixing member shown in FIGURE 5 also is substantially H-shaped in plan and comprises a pair of limbs 17 and 18 joined by a cross-bar 19 in which the hole 9 is located. In each limb is an opening 20.

The mixing member shown in FIGURE 6 also is substantially H-shaped in plan and includes a pair of limbs 21 and 22 connected by a cross-bar 23 in which the hole 9 is located. Each limb has an opening 24 therein.

Furthermore the shaft, whilst described as being of circular cross section, may be a square or rectangular, or of other suitable section, provided that the holes 9 in the disc members are of a suitable shape as to allow the desired disc angle with respect to the shaft to be obtained, and it may also be desirable to provide a scraping blade 10a at one or each end of the mixing chamber attached to the shaft.

A mixing element of the type described may be manufactured simply and cheaply, whilst at the same time being

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comparable in efficiency with other known types of elements, and it has been found that the mixing effect of the element described above, may be practically identical to that obtained with a helical ribbon type element.

Manufacture of elements of the type heretofore described, is extremely simple, the discs themselves acting as jigs inasmuch as the major diameter of the elliptical, or other suitably shaped hole, controls the angular setting of the disc with respect to the shaft. Some additional, simple form of jig may be required when welding the discs to the shaft but such arrangements are simple as compared with the construction of other known types of pre-fabricated mixing elements.

I claim:

1. Apparatus for use in a mixing or like machine comprising a pair of substantially parallel, spaced apart, rotatable shafts; a plurality of mixing members for each shaft, each of said mixing members being generally H-shaped in plan and having a pair of spaced apart limbs joined by a cross-bar, the limbs and cross-bar of each of said mixing members being substantially co-planar, the cross-bar of each of said members having an opening therein through which its respective shaft extends, the opening in each of said members having a dimension greater than the corresponding dimension of its respective shaft whereby each of said members may be tilted relatively to its respective shaft; and means fixing each of said members on its respective shaft in axially spaced relation, the axial spacing of the members on each of said shafts and the spacing between said shafts being such to enable intermeshing of the members on said shafts in response to rotation thereof.

2. The construction set forth in claim 1 wherein one of said limbs of each of said members has an area larger than the other.

3. The construction set forth in claim 2 wherein alternate members have their larger area limbs disposed on one side of their respective shaft and their smaller area limbs on the opposite side of their respective shaft.

4. The construction set forth in claim 1 wherein alternate members on each of said shafts are tilted in opposite directions.

5. The construction set forth in claim 1 wherein the limbs of each of said members are of unequal area and wherein alternate ones of said members on each of said shafts are tilted in opposite directions, and wherein the

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confronting ends of the larger area limbs of two adjacent members on each of said shafts terminate in substantially the same plane transverse to the axes of said shafts.

6. An element for a mixing machine or the like comprising a rotatable shaft; a plurality of substantially planar mixing members each of which comprises a pair of unequal area, spaced apart blade portions joined by a cross member having an opening therein through which said shaft extends, at least one dimension of said opening in each of said mixing members being greater than the corresponding dimension of said shaft whereby each of said mixing members may be tilted relatively to said shaft; and means fixing each of said mixing members on said shaft in axially spaced, tilted relation.

7. The construction set forth in claim 6 wherein alternate mixing members are tilted in opposite directions.

8. The construction set forth in claim 6 wherein the larger area portions of alternate mixing members are located on opposite sides of said shaft.

9. The construction set forth in claim 6 wherein alternate mixing members are tilted in opposite directions and wherein the larger area portions of alternate members are located on opposite sides of said shaft.

10. The construction set forth in claim 9 wherein the axial spacing between adjacent mixing members is such that the confronting ends of the larger area portions terminate in a common plane transverse to the axis of said shaft.

References Cited by the Examiner

UNITED STATES PATENTS

662,978	12/1900	Schmidt	107—36
2,503,993	4/1950	Blombren	259—136
2,868,144	1/1959	Ambrette	107—31
2,973,188	2/1961	Howe	259—131

FOREIGN PATENTS

670,815	8/1929	France.
394,017	4/1924	Germany.

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