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P. VOLLRATH

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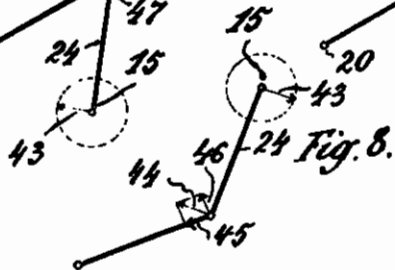
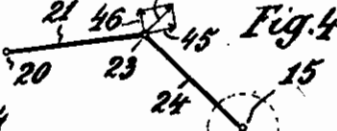
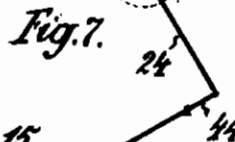
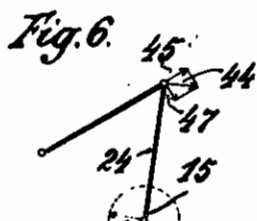
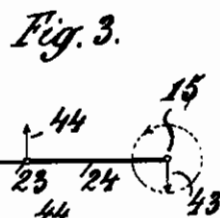
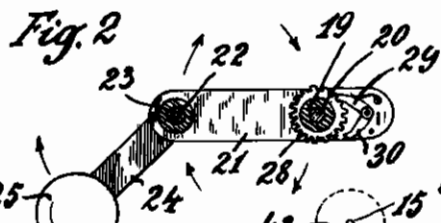
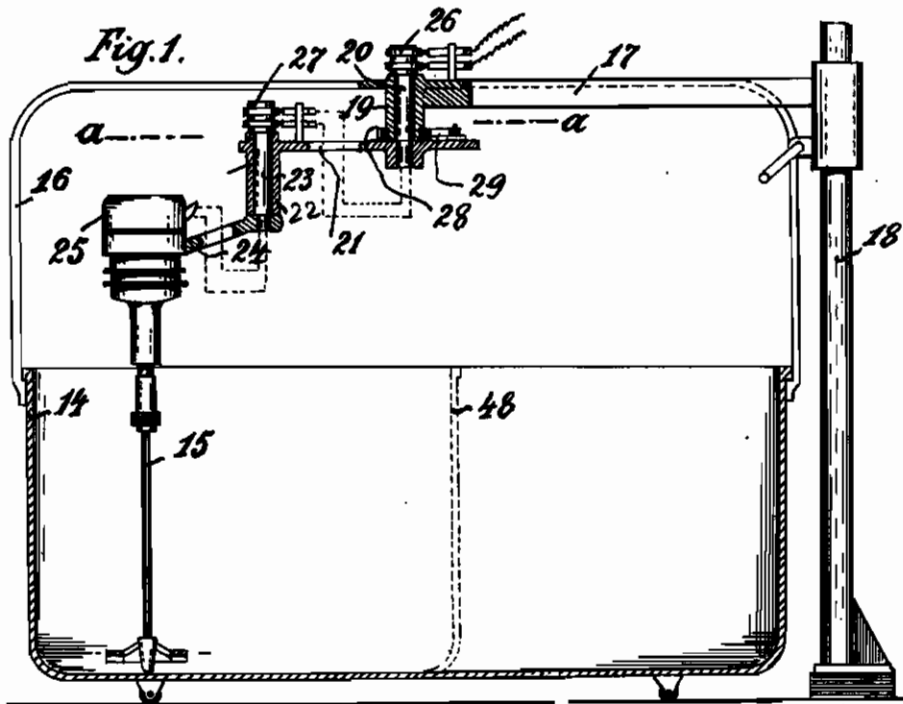
MAY 25, 1943. APPARATUS FOR MIXING, SIFTING AND KNEADING

368,050

BY A. P. C.

Filed Nov. 30, 1940

3 Sheets-Sheet 1



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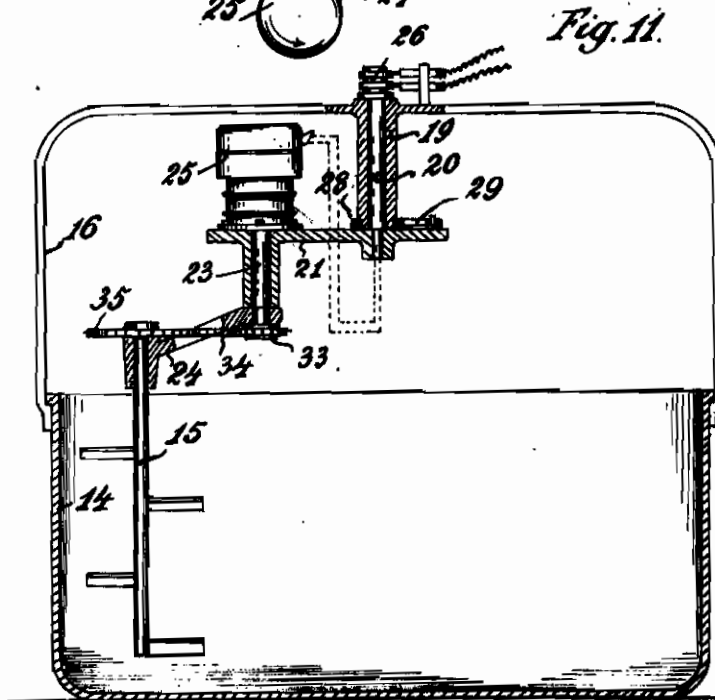
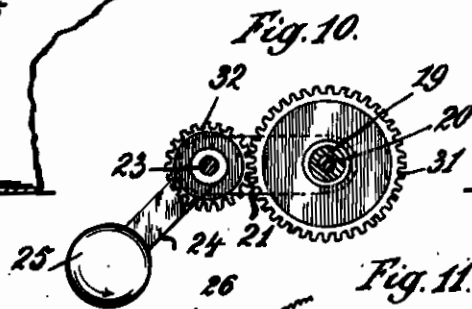
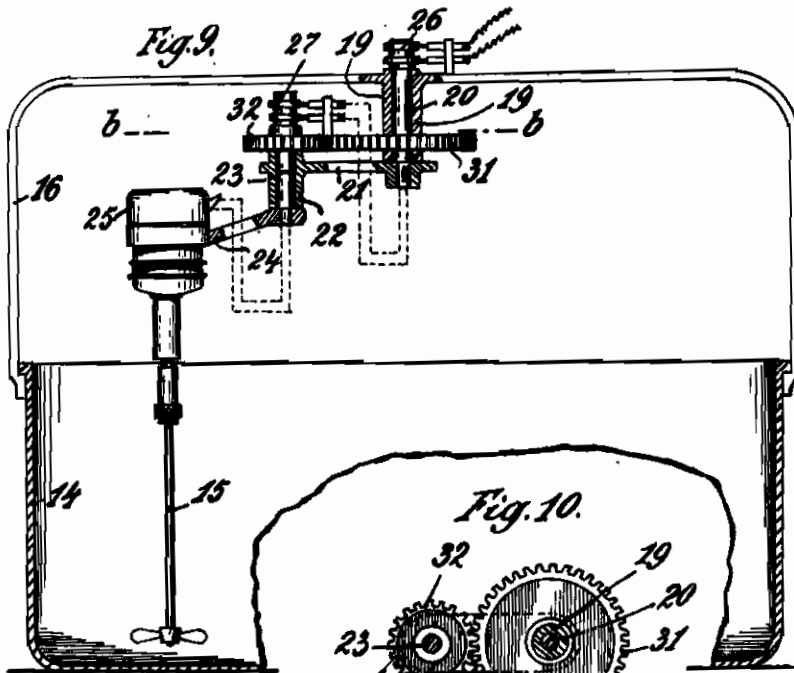
APPARATUS FOR MIXING, SIFTING AND KNEADING

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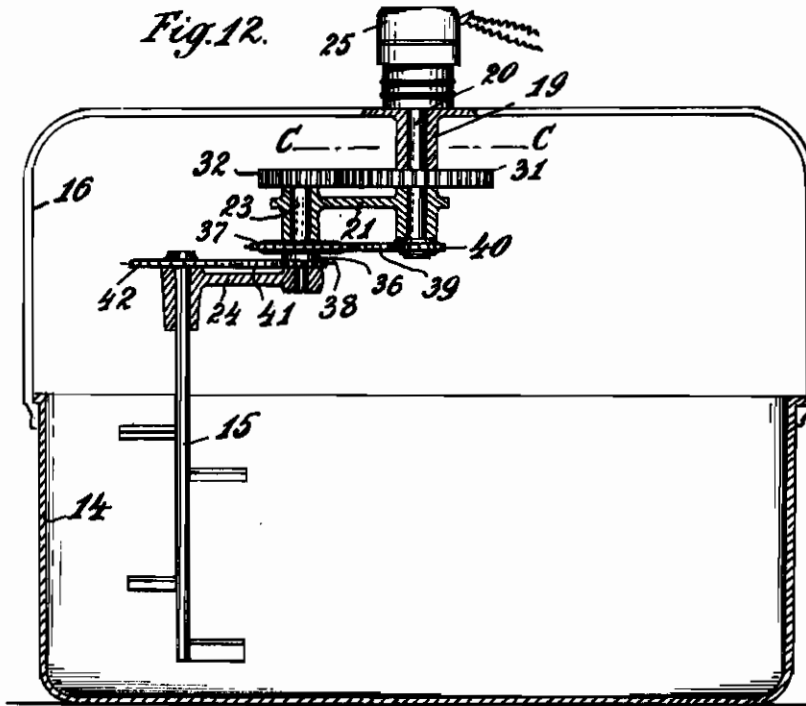
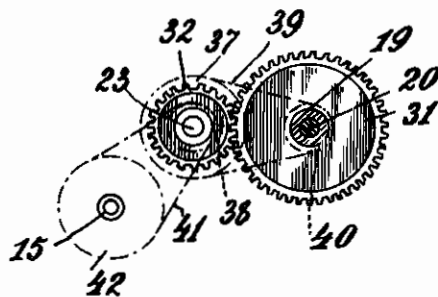


Fig. 13.



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ALIEN PROPERTY CUSTODIAN

APPARATUS FOR MIXING, SIFTING AND KNEADING

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in the Alien Property Custodian

Application filed November 30, 1940

The invention relates to an apparatus for mixing, sifting and kneading of liquid, semi-liquid, pasty, pulverous or dry material with mixing-, sifting- or kneading-tool arranged above a stationary or movable trough, the driving shaft of which tool is arranged eccentrically to the central axis of the trough in a jib-arm oscillatable about a vertical shaft. In apparatus of this kind, for instance planet-stirring apparatus, the mixing tool carries out a circulating movement about the vertical shaft of the jib-arm with the result that a very good and thorough mixing-, sifting- or kneading-effect is produced.

The object of the invention is, to further improve, in apparatus of this type, the mixing effect and to thereby save time, power and money. This is effected chiefly thereby that the jib-arm carrying the tool consists of two hingedly connected parts, and that both arm parts are connected the one with the other or with the central shaft independently on the arrangement of the drive of the tool shaft from the central shaft, shaft with joint or the tool shaft by ratchet-wheels and pawls, planet wheels or similar devices, so that, owing to the resistance of the rotating tool in the material to be treated, a stepwise or continuous turning movement of the inner part of the jib-arm is produced or the movement of the same is locked. In machines for the wet dressing of ores, in which air in as fine distribution as possible is blown through the mixture of ore and water, it is known to employ, for blowing-in the air, nozzles arranged eccentrically to the vertical revolvable shafts, so that owing to the recoil of the blown out air the nozzles rotate about their vertical shafts, and this turning movement is transmitted by means of spur wheels and sprocket wheels onto a common vertical central shaft, in order to produce in this manner a planet-like circulating movement of the nozzles always progressing in the same direction. The idea is not realized hereby to produce a quite special mixing-, sifting- or kneading effect in a mixing-, sifting- and kneading-machine by combination of two different kinds of movement.

According to the invention the driving motor may be mounted on the tool shaft or on the shaft with joint or on the middle shaft, the drive of the tool being effected in the two last mentioned possibilities by chains or equivalent means. The outer arm part and a spur wheel may be fixed on the shaft with joint of the bipartite arm, and this spur wheel mesh with a spur wheel on the bearing of the inner arm part. For the

obtention of different movements of the tool the spur wheel mounted on the shaft with joint of the bipartite arm may be adapted to be selectively coupled with the shaft or with the bearing body of the same.

Several embodiments of the invention are illustrated by way of example in the accompanying drawing, in which

Fig. 1 shows a vertical section through a mixing apparatus,

Fig. 2 a section on line *a— a* of Fig. 1.

Figs. 3 to 8 diagrammatical illustrations of the individual elements and of the occurring forces,

Fig. 9 another form of construction according to the invention,

Fig. 10 a section on line *b— b* of Fig. 9.

Fig. 11 a second modification,

Fig. 12 a third modification,

Fig. 13 a section on *c— c* of Fig. 12.

In all forms of construction of the invention the mixing trough is designated by 14 and the shaft of the mixing tool, which may be different according to the problem to be solved, is designated by 15.

In the form of construction shown in Fig. 1 a central shaft 20 is revolvably mounted either on a bow 16 extending over the trough 14 or on a jib arm 17 which is adjustable in vertical direction along an upright 18, an arm 21 being keyed onto the central shaft 20 which is located in a bearing sleeve 19. This arm 21 carries at its front end a shaft 23 with joint revolvable in a bearing sleeve 22, on the lower end of which shaft with joint a second arm 24 is keyed and carries on its free end a driving motor 25 for the tool shaft 15. Current is supplied to the motor 25 by sliding contacts 26 and 27. On the bearing sleeve 19 a ratchet-wheel 28 is keyed which cooperates with two pawls 29 and 30 acting in different directions.

In the form of construction shown in Fig. 9 a spur wheel 31 is arranged on the bearing sleeve 19 instead of the ratchet-wheel with pawls, said spur wheel 31 meshing with a spur wheel 32 keyed on the hinge shaft 23. By clutch devices not shown and of known type, the spur wheel 32 can be coupled either with the hinge shaft 23 or with the bearing sleeve 22 of the same.

In the form of construction shown in Fig. 11 the driving motor 25 is mounted on the arm 21 and drives the hinge shaft 23. On the lower end of shaft 23 a sprocket wheel 33 is keyed, which drives by means of a chain 34 a sprocket wheel 35 keyed on the tool shaft 15 and through the same the shaft 15.

In the form of construction shown in Fig. 12 the driving motor 25 is mounted on the bow 16 and drives the central shaft 20.

On the hinge shaft 23 a bush 36 is mounted so that it can loosely turn about this shaft and is equipped with two sprocket wheels 37, 38. The sprocket wheel 37 is driven by means of a chain 39 from a sprocket wheel 40 mounted on the central shaft 20, whereas the sprocket wheel 38 drives by means of a chain 41 a sprocket wheel 42 keyed on the tool shaft 15 and thus this shaft 15 itself. Evidently, instead of the chain gears any other means for transmitting power may be employed in the last mentioned embodiments of the invention. The form of construction shown in Fig. 1 with jib arm 17 and upright 18 may also be employed in the other embodiments of the invention.

In all forms of construction the arms 21 and 24 may be adjustable in length and adapted to be locked by any suitable known means, it being then necessary, in so far as positively cooperating driving elements are provided, to make the same exchangeable.

The operation is diagrammatically shown by Figs. 3 to 8, which especially relate to the embodiment shown in Figs. 1 and 2.

Suppose, the individual elements assume the position shown in Fig. 3, in which the inner arm 21 and the outer arm 24 are in alignment. If then the tool turns about its shaft 15 in the direction of the arrow, a reaction effect will be produced, owing to the unequal resistance encountered by the mixing tool, related to the bolt 23 as fulcrum, in the material to be mixed, which reaction effect tends to oscillate the arm 24 in the direction of the arrow 43, whereas at the same time an oppositely directed force acts in the direction of the arrow 44 onto the hinge shaft 23. Herefrom results, that the outer arm 24 is oscillated in clockwise direction about the hinge shaft 23 and the inner arm 21 in anti-clockwise direction about the central shaft 20. The individual elements assume therefore now the position indicated in Fig. 4, the force acting in the direction of the arrow 44 being decomposed into the two components 45 and 46 and only a smaller force tends to turn the inner arm 21 in anti-clockwise direction. If finally the elements assume the position shown in Fig. 5, the component 46 disappears completely and the inner arm part 21 comes to standstill, whereas the outer arm 24 continues its oscillating movement in clockwise direction.

If there were no locking device provided, a component 47 would occur at further rotat-

ing of the outer arm 24, said component tending to oscillate the inner arm 21 in opposite direction, i. e. also in clockwise direction. As, however, the locking device 28, 29, 30 only admits of a rotation in the one direction, and as this device is usually engaged, the inner arm 21 remains at standstill until the position shown in Fig. 7 has been passed and then again a component 46 occurs, which tends to oscillate the inner arm 21 in anti-clockwise direction. Whilst therefore, the outer arm 24 circulates continually with the mixing tool, there always occurs an interruption of the circulating of the inner arm 21, so that this arm rotates only stepwise and, according to which one of the two pawls 29 or 30 is engaged, either in the one or the other direction. If, however, both pawls are engaged, the inner arm part 21 cannot oscillate in any direction and the tool circulates merely about the shaft 23. Consequently it is possible to work also with smaller troughs as indicated at 51.

Accurately the same manner of operation takes place in the form of construction shown in Fig. 11, whereas in the forms of construction shown in Figs. 9, 12 a difference can be noted in so far as the rotating movement produced by the reaction effect of the mixing tool is utilized to produce a planet movement with the aid of spur wheels, so that in this instance the circular movement is a continuous one always in the same direction and dependent on the revolving direction of the tool shaft 15. Also in the forms of construction shown in Figs. 9 and 12 a modification may be obtained, in that the spur wheel 32, instead with the hinge shaft 23, is coupled with the bearing casing 20 of the same so that thereby the arm 21 remains at standstill.

Whether the drive of the tool shaft 15 takes place directly as shown in Figs. 1 and 9 or indirectly as shown in Figs. 11, and 12 does not alter the operation in the least, as in any case a reaction effect occurs by the movement of the mixing tool in the material to be mixed and has the tendency to produce a circulating movement of the tool whereby then further automatically the movements must take place owing to the new arrangements. If the arms 21 and 24 are locked the one relative to the other, the whole arrangement rotates about the central shaft 20, which under certain circumstances may be desirable, same as the complete exclusion of a rotary movement, as soon as, the arms 21, 24 being locked the one relative to the other, the arm 21 is further locked relative to its bearing 19.

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