May 9, 1939. P. VOLLRATH 2,157,683

DEVICE FOR MIXING, SIFTING, AND KNEADING

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Fig. 1.

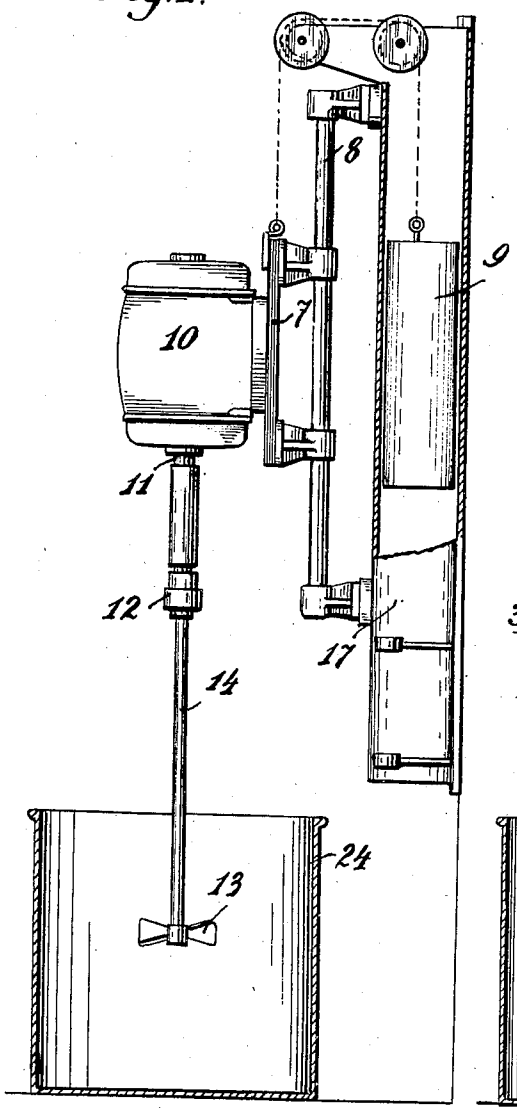

Fig. 2.

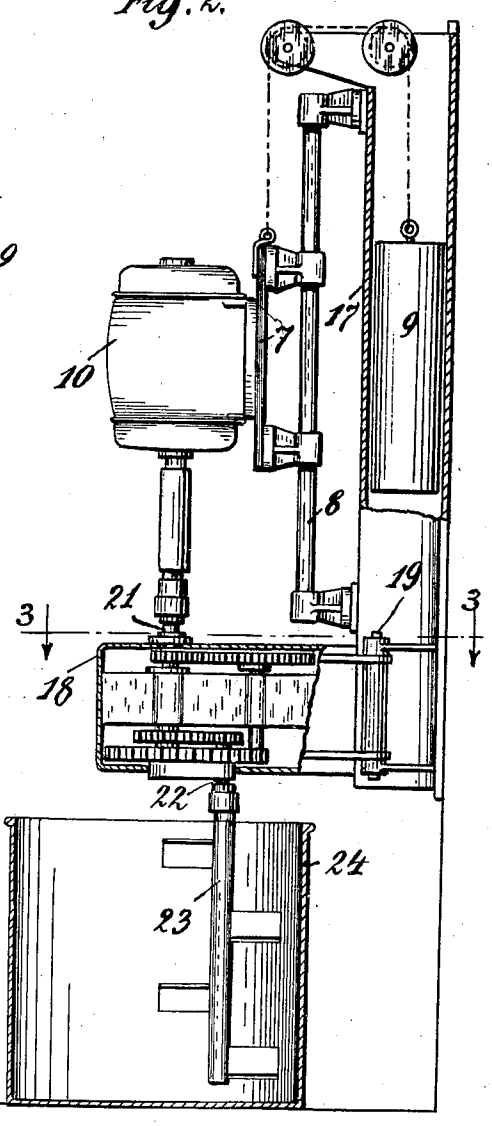

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Fig. 3.

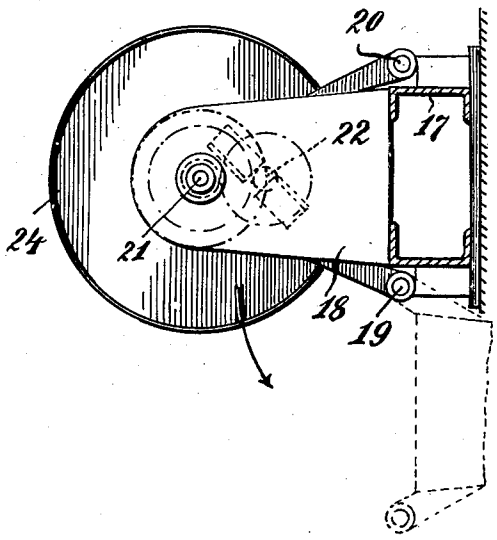
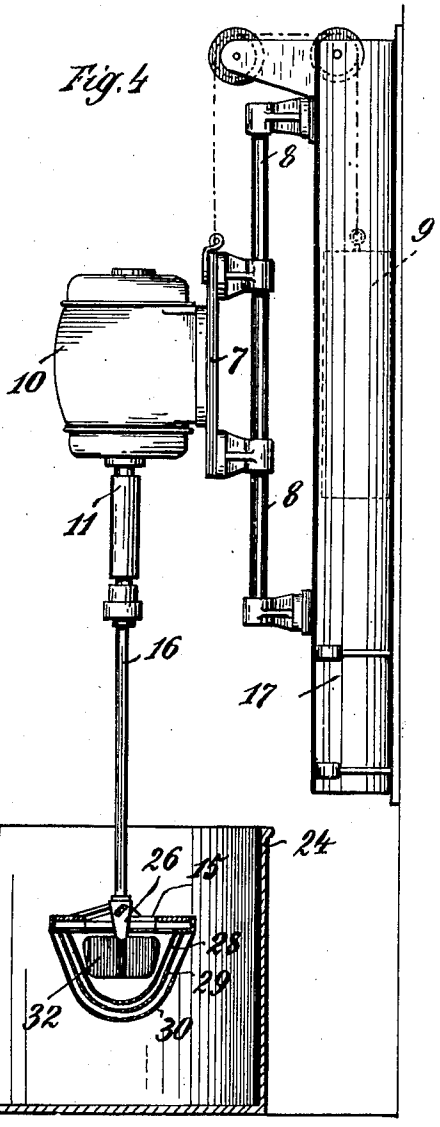


Fig. 4



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DEVICE FOR MIXING, SIFTING, AND KNEADING

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Fig. 5.

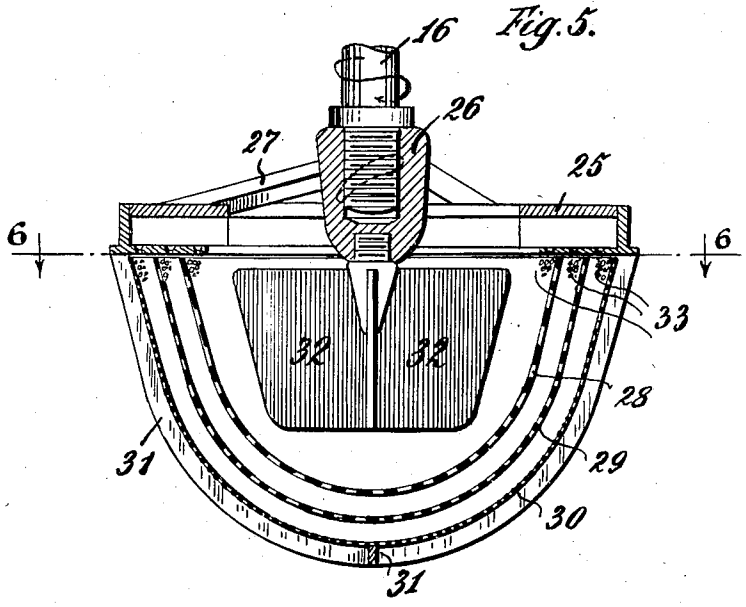
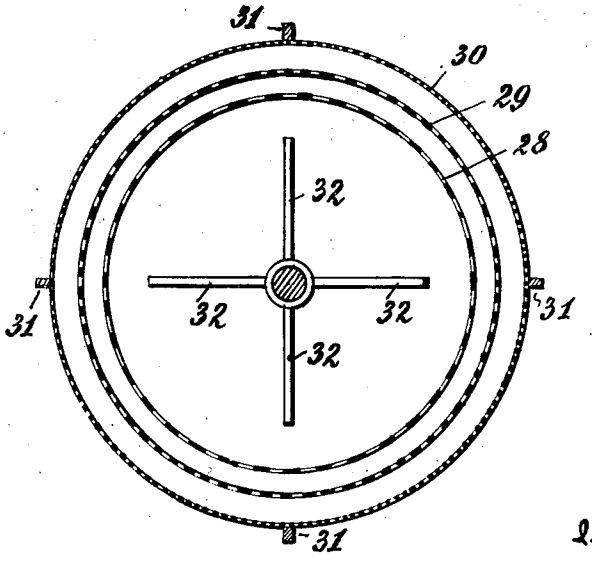


Fig. 6.



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Patented May 9, 1939 2,157,683

UNITED STATES PATENT OFFICE

2,157,683

DEVICE FOR MIXING, SIFTING, AND KNEADING

Paul Vollrath, Cologne-Ehrenfeld, Germany

Application December 20, 1937, Serial No. 180,699
In Germany December 24, 1936

1 Claim. (Cl. 259—1)

For the correct treatment of liquid, semi-fluid, pasty and also powdery materials mixing, kneading and sifting machines are used according to the class of material and the necessary treatment thereof. In the case of certain materials, for instance dyestuffs, the treatment is frequently carried out by means of machines of all the three kinds referred to. In other words, as long as the mass is pasty, it is kneaded, then after liquids have been added, so as to render it more fluid, it is further treated by means of mixing and sifting devices.

It is the object of the present invention to provide for a device which may optionally be used for mixing, sifting and kneading so that the purchase of three different machines may be dispensed with, chiefly in the case of small factories. The essential feature of the invention consists in that above a stationary or movable trough there is arranged a driving shaft adjustable in a vertical direction and with which may optionally be coupled a mixing device or a rotary sieve or, through the intermediary of a reduction gear, a kneading device. In this way the possibility of utilization of the machine is extremely increased whereas the expenses for purchase and operation are naturally reduced.

The subject matter of the present invention is in an embodiment represented by the accompanying drawings in which

Figure 1 is an elevation, in part in section of the device combined with a mixing and stirring device,

Fig. 2 shows the device when used as a kneading machine,

Fig. 3 is a horizontal section on line 3—3, Fig. 2,

Fig. 4 shows the device when used as a sifting machine,

Fig. 5 on a larger scale shows the sifting attachment, and

Fig. 6 is a horizontal section on line 6—6, Fig. 5.

A frame 7 displaceable in a vertical direction on two vertical rails 8 mounted on a vertical base 17 and balanced by a counterweight 9 carries the driving motor 10, preferably an electric motor. By members not shown the frame 7 may be fixed in any position desired.

The driving shaft 11 of the electric motor extends in a vertical direction and at its bottom end carries a universal coupling 12 by means of which optionally either the shaft 14 of a mixing device of any description or the shaft 16 of a sifting device 15 to be described may be coupled thereto. According to the invention the base 17 for frame 7 is provided with a gear box 18 pivotally mounted thereon by means of a vertical axle 19 and which, as Fig. 3 shows, may be turned from the dotted into the full line position so as to be positioned beneath the motor 10 and locked in that position to the base 17 e. g. by a pin 20. The gear lodged in the box 18 has a trunnion shaft 21 extending through the top of the box and a trunnion shaft 22 extending through the bottom thereof which trunnion shafts are so disposed that the upper one 21 can be coupled with the shaft 11 of the motor and the lower one 22 with the shaft 23 of a kneading device. No matter whether it is the question of a planetary gear or any other suitable gear, the principal purpose thereof is to reduce the comparatively high speed of the motor. When at the same time the reduction gear is so designed that it also imparts a bodily circular movement to the kneading device around the central axis of trough 24 the efficiency of the device will be further increased.

The trough 24, in which the devices 13, 15 or 23 may work as desired, is either stationary or movable and arranged beneath the driving motor.

The sifting device 15 comprises an annular portion 25 which is fastened by spokes 27 to the hub 26. The cross section of the spokes 27 is so shaped that the latter are adapted to act like turbine blades and to thus draw the liquid material into the sifting device. The annular body 25 carries a plurality of sieve baskets, e. g. three, 28, 29, 30, one nested into the other and suspended from the body the size of the meshes of the baskets decreasing from the center in an outward direction. The outside sieve 30 is provided with radial outside ribs 31 while the hub 26 carries a blade cross 32 depending therefrom. The several sieve baskets may readily be removed and replaced by other sieves and with meshes of another size in accordance with the material to be treated therein. The propeller-like shape of the spokes 27, as shown in dotted lines in Fig. 5, will result in an intense circulation of the material being treated which is urged to pass through the several sieves while the blade cross 32 will direct the stream of liquid substantially flowing from the top downwardly, toward the surfaces of the sieves.

The particular shape of the sieves which enlarge toward the top will result in any dirt retained by the sieves rising upwards and collecting in the corners 33 as shown, while the other por-

tions of the sieves remain free so that cleansing thereof is rendered necessary but upon extended use. In order that the velocity of flow be increased and the pressure of the liquid as prevailing outside the sieves be reduced, the outside sieve basket is, as mentioned, provided with ribs 31 which at the same time render the body of the sieve more rigid. By the cooperation of the blade cross 32 with the ribs 31 there is produced a pressure above atmospheric within the sieves and a pressure below atmospheric on the outside thereof which fact increases the efficiency of the unit.

Although the drive as accomplished by an electric motor is particularly simple and practical the invention is however not limited to this as any other driving device may be made use of without departing from the scope of the present invention.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

In a device for mixing, sifting and kneading a given material, a support, a power drive for the tools for said operations disposed on said support above the trough containing the material, said drive including a vertical driving shaft extending downwardly toward the trough, means for adjusting said drive on said support in a vertical direction at different heights within the operating range of the tools required by the trough, a coupling at the end of said shaft, arranged to attach different treating tools for the material to said shaft, and a reduction gear drive pivotally supported on said support laterally of said driving shaft and disposed to swing into position for coupling its power input shaft with said driving shaft coupling, said reduction gear having suitable means at its output shaft for coupling the desired operating tool with it.

PAUL VOLLRATH.