

March 11, 1930.

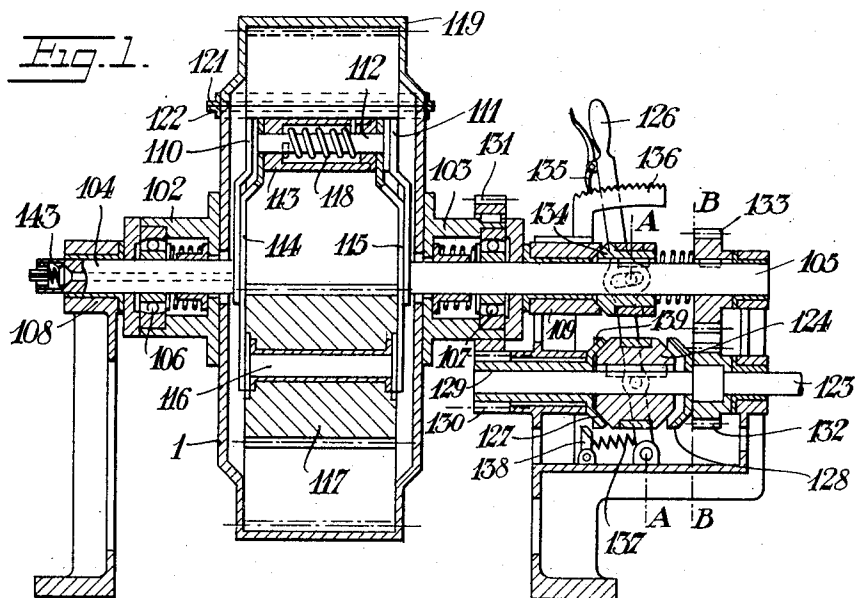
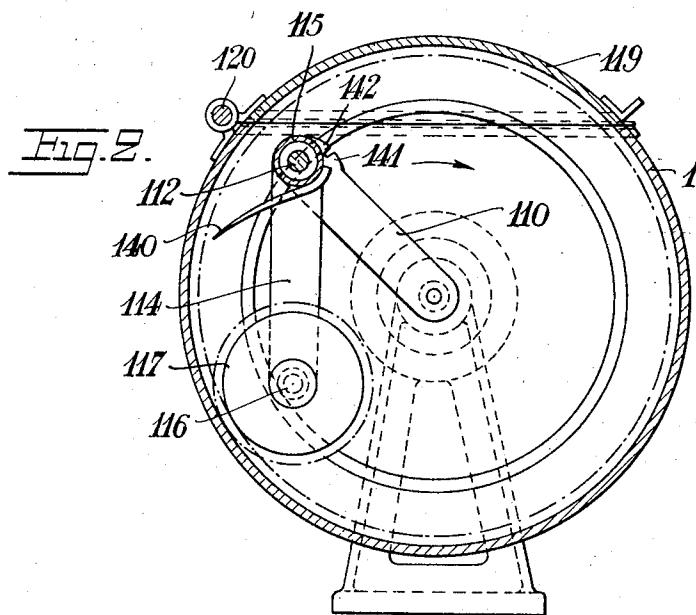
B. ZETTERGREN

1,750,558

MACHINE FOR KNEADING, CRUSHING, AND SIMILAR OPERATIONS

Filed Oct. 2, 1928

2 Sheets-Sheet 1



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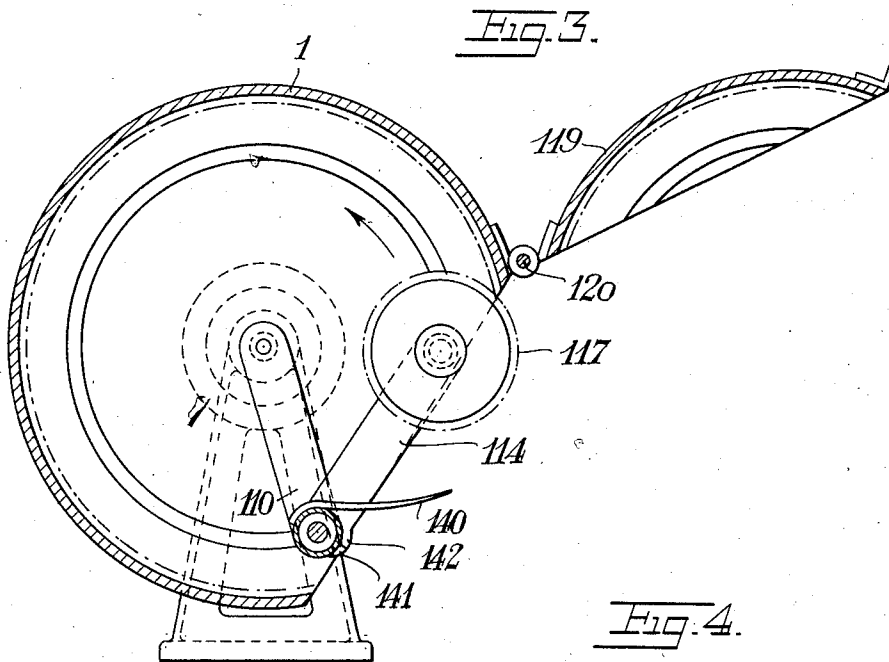
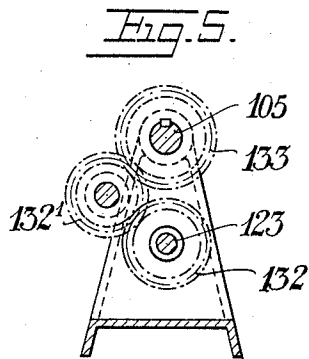
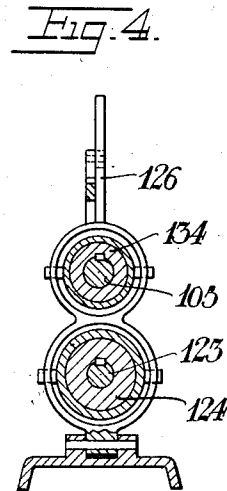
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MACHINE FOR KNEADING, CRUSHING, AND SIMILAR OPERATIONS

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## UNITED STATES PATENT OFFICE

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MACHINE FOR KNEADING, CRUSHING, AND SIMILAR OPERATIONS

Application filed October 2, 1928, Serial No. 309,751, and in Sweden December 23, 1927.

This invention relates to a machine by means of which kneading, crushing, mixing and similar operations may be performed in a simple and time saving way.

5 More particularly, the invention relates to that kind of such machines which comprises a rotary receptacle to receive the material to be treated, and one or more rollers yieldingly pressed against the inside wall of said  
10 receptacle which upon the rotation of the receptacle is or are caused to rotate due to frictional engagement with said wall or with the material under treatment.

One object of the invention is to provide a  
15 machine of the said kind which permits an automatic emptying operation, even in case of material which must be positively scraped out, as dough and the like.

One feature of the invention consists in  
20 that the axis of the rotary receptacle is horizontal or substantially horizontal.

In the accompanying drawings one embodiment of the invention is illustrated. Fig. 1 is a vertical longitudinal section of the machine. Fig. 2 is a similar section of the  
25 receptacle of the machine with the cover thereof shown in closed state. Fig. 3 is a similar section with the cover shown in opened state. Fig. 4 is a vertical cross section on the line  
30 A—A in Fig. 1. Fig. 5 is a similar section on the line B—B in Fig. 1.

With reference to the drawings, the numeral 1 indicates a drum like receptacle which is rigidly secured to two ball bearings  
35 106, 107 mounted on horizontal shafts 104, 105. Said shafts 104, 105 which are situated centrally relatively to the drum are mounted in bearings 108, 109 and project with their ends facing each other through openings  
40 formed in the side walls of the drum. Inside the drum said shaft ends are rigidly connected to arms 110, 111 connected together at their outer ends by the shaft or spindle 112. Rotatably mounted on the shaft 112 is a  
45 sleeve 113, connected at its ends to crank arms 114, 115. Said arms carry at their other ends a shaft 116 on which the roller 117 is rotatably mounted. The shafts 112, 116 are both  
50 parallel to the shafts 104, 105. Surrounding the shaft 112 within the sleeve 113 is a

spring 118 tending to rotate the sleeve 113 so as yieldingly to maintain the roller 117 in engagement with the inside of the drum 1. The roller 117 as well as the drum may preferably, but not necessarily, be fluted or provided with cooperating teeth.

The receptacle 1 is divided along a plane parallel to the direction of the shafts 104, 105 so as to form a cover 119. Said cover is hinged at 120 and both the receptacle proper  
60 and its cover are provided with cooperating sealing flanges 121, 122, one or both of which may be lined with some appropriate packing material. A tight closing of the cover may be obtained by means of screw bolts, clamping  
65 straps, or the like.

The shaft 112 carrying the supporting arms 114, 115 of the roller 117 is adapted to be adjusted vertically to any level desired within the receptacle 1. This may be effected by  
70 rigidly connecting its supporting arms 110, 111 to the shafts 104, 105 and making said shafts rotatable and capable of being locked in any position desired.

The rotation of the shafts 104 and 105 may  
75 be effected by transmission of power from the motor shaft 123. This shaft carries a slidable, double clutch cone 124, 125, which is prevented from rotation relatively to the shaft. Said double cone may be brought into  
80 and out of engagement with one or the other of two corresponding conical shells 127, 128, respectively. The clutch cone 127 is rigidly connected by its hub 129 to a pinion 130 engaging in a toothed wheel 131 keyed to the  
85 hub 103. The clutch cone 128 is rigidly connected to a pinion 132 which is rotatably mounted on the shaft 123 which meshes in an idle toothed wheel 132' in turn meshing in a  
90 toothed wheel 133 keyed to the shaft 105. Said shaft 105 further carries a slidable clutch cone 134 which is normally kept in engagement with a corresponding conical recess in the bearing 109 under the action of the  
95 spring 150 and which may be released therefrom by means of the control lever 126. Said control lever 126 which is thus common to all of the clutch cones 124, 125, and 134, carries a pawl 135 to mesh in a ratchet segment 136.

With the control lever in the position

shown in Fig. 1, that is, with cone 124 engaging in cone 127 and cone 134 engaging in the conical recess of the bearing 109 power will be transmitted from shaft 123 through gearing 130, 131 to the hub 103 and from thence to the receptacle 1 which is thereby caused to rotate. The engagement of the cone 134 in the bearing will lock the shaft 105 together with arm 111, shaft 112, arm 110, and shaft 104 in the momentary position of said elements. During the rotation of the receptacle the roller 117, as a result, will be held at the same position within the receptacle. Due to the gear of the teeth of the roller with those of the receptacle the roller is caused to rotate around its own axis 116 thereby to effect the desired treatment of the material contained in the receptacle.

If it is desired to change the position of the roller 117 inside the receptacle the control lever 126 should be shifted to the right, Fig. 1, so as to release the engagement of the cones 124 and 134 and cause the cone 125 to engage the cone 128. The rotation of the receptacle 1 ceasing, power being now transmitted from motor shaft 123 by way of the transmission gear 132, 133 to shaft 105. After the position of the roller desired is reached, the control lever is again restored to its left hand position. Fig. 1.

At the said first-mentioned shifting of the control lever 126 to the right, said lever, by means of the spring 137, acts on a pawl 138, causing it to engage teeth 139 formed on the clutch cone 127 to lock the latter against rotation which in turn prevents the receptacle from rotation. Said locking is of importance at the emptying of the receptacle. When emptying is to take place the transmission of power to the receptacle is cut off when the discharge opening is in a suitable position, as will appear from Fig. 3. It is now of importance to cause the rotation of the receptacle to cease immediately upon the interruption of the power transmission. After the receptacle has been stopped and locked in the position desired the cover is opened, as will appear from Fig. 3 and maintained in opened position by the hand or by any suitable mechanism. The control lever 126 is then shifted further to the right to throw the cone 125 into engagement causing power to be imparted to the shaft 105. If, as an example, the receptacle has rotated in the direction of the arrow in Fig. 12, and the roller during the rotation of the receptacle has reached the position shown in Fig. 2, the roller will be moved in the direction of the arrow shown in Fig. 3, as soon as the shaft 105 is started. In this movement a scraper 140 carried by the sleeve 113 will slide along the inside wall of the receptacle so as to discharge the content of the receptacle through the opening. In order to prevent the roller from swinging too far outwards when pass-

ing the opening, the arms 110, 114 and 111, 115, respectively, are provided with cooperating stops 141, 142.

The material discharged may be received by a trough or the like placed below the receptacle.

To carry off steam that may be produced within the receptacle the shaft 104 is made hollow and provided with a non-return valve 143.

In the embodiment last described the roller 117 and the receptacle 1 are formed with cooperating teeth. It is to be noted that they may, of course, be smooth or fluted.

It is further to be noted that two or more rollers may be provided within one and the same receptacle.

What I claim is:

1. A machine of the character described comprising a rotatable drum having a cylindrical peripheral wall and two vertical side walls, said cylindrical wall being provided with a port and a closure therefor to allow introduction and removal of the material to be treated or having been treated in the drum, a roller within said drum extending substantially along the entire axial length of the drum, two horizontal shafts, each extending through an individual one of the side walls of the drum, means secured to said shafts to carry a spindle within said drum eccentrically with respect to the axis of the drum so as to allow it to move in a circular path parallel to the peripheral wall of the drum due to relative rotation of the shafts and the drum, and a pair of arms loosely mounted on said spindle to carry said roller.

2. A machine of the character described comprising a rotatable drum having a cylindrical peripheral wall and two vertical side walls, said cylindrical wall being provided with a port and a closure therefor to allow introduction and removal of the material to be treated or having been treated in the drum, a roller within said drum extending substantially along the entire axial length of the drum, two horizontal shafts, each extending through an individual one of the side walls of the drum, means secured to said shafts to carry a spindle within said drum eccentrically with respect to the axis of the drum so as to allow it to move in a circular path parallel to the peripheral wall of the drum due to relative rotation of the shafts and the drum, a pair of arms loosely mounted on said spindle to carry said roller, a spring carried by said spindle to act on said arms to cause them to press the rollers against the peripheral surface of the drum, and a protecting cover for said spring.

3. A machine of the character described comprising a rotatable drum having a cylindrical peripheral wall and two vertical side walls, said cylindrical wall being provided with a port and a closure therefor to allow

introduction and removal of the material to be treated or having been treated in the drum, a roller within said drum extending substantially along the entire axial length of the drum, two horizontal shafts, each extending through an individual one of the side walls of the drum, means secured to said shafts to carry a spindle within said drum eccentrically with respect to the axis of the drum so as to allow it to move in a circular path parallel to the peripheral wall of the drum due to relative rotation of the shafts and the drum, a closed sleeve loosely mounted on said spindle, a pair of arms secured to said sleeve to carry said roller, a scraper secured to said sleeve, a coiled spring supported by said spindle within said sleeve to be protected thereby, said spring being connected to the spindle and the hub in such a way as to cause the arms to press the rollers against the peripheral wall of the drum.

4. A machine of the character described comprising a rotatable drum having a cylindrical peripheral wall and two vertical side walls, said cylindrical wall being provided with a port and a closure therefor to allow introduction and removal of the material to be treated or having been treated in the drum, a roller in said drum extending substantially along the entire axial length of the drum, two horizontal shafts, each extending through an individual one of the side walls of the drum, means secured to said shafts to carry a spindle within said drum eccentrically with respect to the axis of the drum so as to allow it to move in a circular path parallel to the peripheral wall of the drum due to relative rotation of the shafts and the drum, a pair of arms loosely mounted on said spindle to carry said roller, a spring carried by said spindle to cause said arms to press the roller against the peripheral wall of the drum, a protecting cover for said spring, a single driving shaft, and independent means to transmit power from said driving shaft to said shafts and said drum to rotate in opposite directions.

5. A machine of the character described comprising a rotatable drum having a cylindrical peripheral wall and two vertical side walls, said cylindrical wall being provided with a port and a closure therefor to allow introduction and removal of the material to be treated or having been treated in the drum, a roller in said drum extending substantially along the entire axial length of the drum, two horizontal shafts, each extending through an individual one of the side walls of the drum, means secured to said shafts to carry a spindle within said drum eccentrically with respect to the axis of the drum so as to allow it to move in a circular path parallel to the peripheral wall of the drum due to relative relation of the shafts and the drum, a pair of arms loosely mounted on

said spindle to carry said roller, a spring carried by said spindle to cause said arms to press the roller against the peripheral wall of the drum, a protecting cover for said spring, a single driving shaft, independent power transmission means between said driving shaft and said horizontal shafts and drum, and a shiftable clutch mechanism to throw one of said independent power transmission means into operation at a time.

6. A machine of the character described comprising a rotatable drum having a cylindrical peripheral wall and two vertical side walls, said cylindrical wall being provided with a port and a closure therefor to allow introduction and removal of the material to be treated or having been treated in the drum, a roller in said drum extending substantially along the entire axial length of the drum, two horizontal shafts, each extending through an individual one of the side walls of the drum, means secured to said shafts to carry a spindle within said drum eccentrically with respect to the axis of the drum so as to allow it to move in a circular path parallel to the peripheral wall of the drum due to relative rotation of the shafts and the drum, a pair of arms loosely mounted on said spindle to carry said roller, a spring carried by said spindle to cause said arms to press the roller against the peripheral wall of the drum, a protecting cover for said spring, a single driving shaft, independent power transmission means between said driving shaft and said horizontal shafts and drum, a shiftable clutch mechanism to allow power transmission to one of said driven elements only at a time, and means to positively lock the other driven element against rotation.

In testimony whereof I have signed my name.

BIRGER ZETTERGREN.