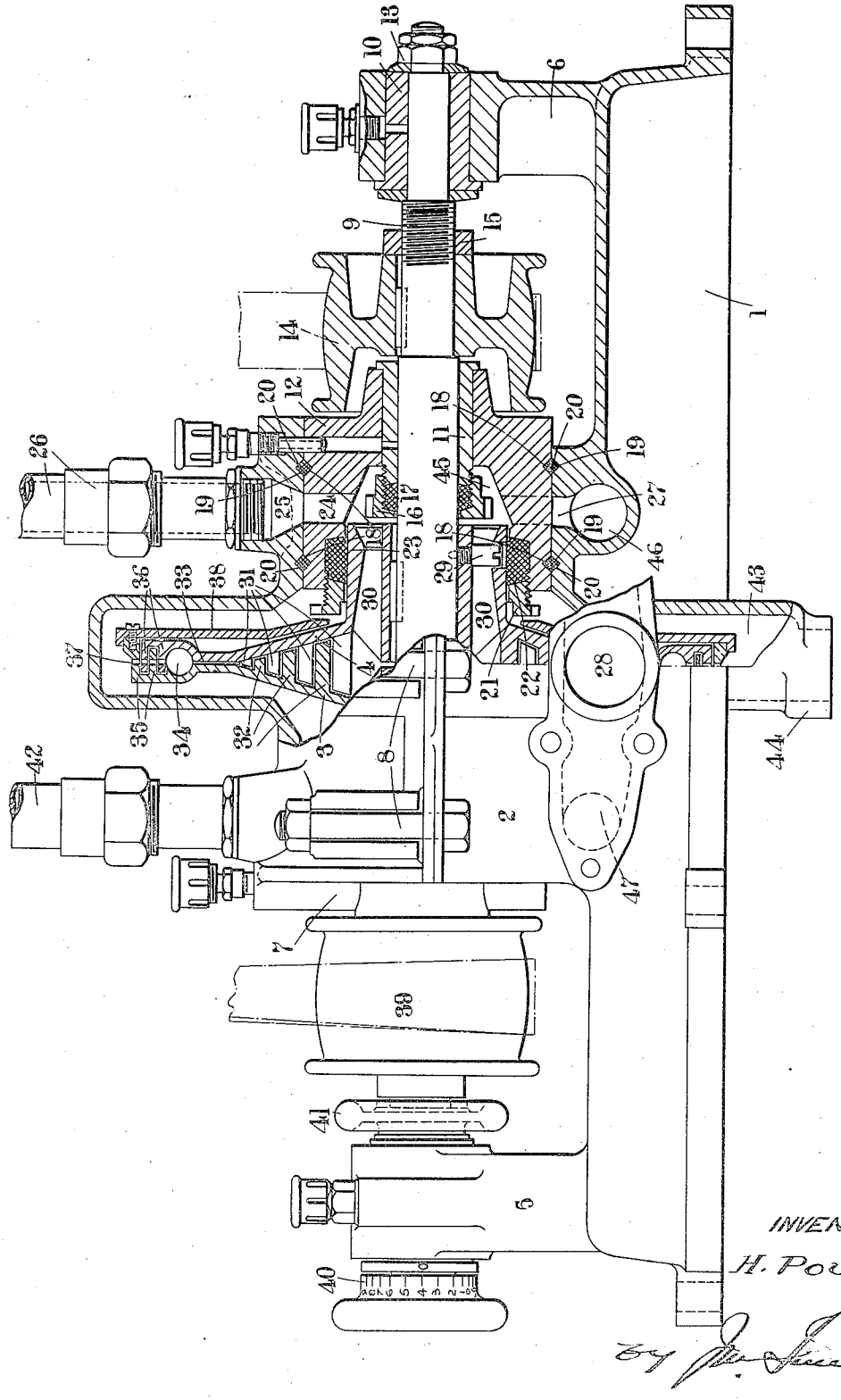
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MACHINE FOR DISINTEGRATING OR EMULSIFYING MATERIALS

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MACHINE FOR DISINTEGRATING OR EMULSIFYING MATERIALS.

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To all whom it may concern:

Be it known that I, HARRY POVEY, a subject of the King of Great Britain, residing at Stanmore, in the county of Middlesex, England, have invented certain new and useful Improvements in Machines for Disintegrating or Emulsifying Materials, of which the following is a specification.

My invention relates to machines for disintegrating, emulsifying or admixing materials.

In machines of the above type in which the material during treatment is projected centrifugally, it is found in the case of some materials that the high velocity with which the material is passed through the machine does not permit of sufficient time to effect its reduction to the requisite state of division or the necessary degree of admixture and as a consequence, the material must be returned to the machine and retreated as often as is necessary until the desired result has been obtained.

The object of my present invention is to provide an improved machine of the type indicated in which the efficiency is substantially increased.

My invention consists in the improved machines for disintegrating, emulsifying or admixing materials to be hereinafter described.

Referring now to the accompanying drawings, which illustrate my invention and form part of my specification.

The accompanying drawing shows a part sectional elevation of one form of machine constructed according to my invention.

In carrying my invention into effect according to one form, and as applied to a machine for disintegrating a solid admixed with a liquid, I construct the base-plate 1 of the machine integrally with the lower portion 2 of the casing which houses the rotatable members 3 and 4, and also with the lower portions of the outer bearings 5 and 6 for the driving shafts of these members.

The upper portion 7 of this casing is attached to the lower portion by means of bolts 8.

The driving shaft 9 of the member 4 is rotatably mounted in bushes 10 and 11 on the bearing 6 and the annular supporting member 12 respectively, the shaft being fixed in position longitudinally by means of the nuts 13.

A driving pulley 14 is keyed on to the shaft 9 and is secured in position by the nut 15.

The bush 11 is threaded at its inner end and provided with a gland 16 and packing 17 in order to prevent leakage either of lubricating oil or the fluid being treated along the shaft 9.

On the outer periphery of the supporting member 12, two grooves 18 are formed which register with corresponding grooves 19 formed on the casing, and in these grooves packing rings 20 of rubber or other suitable material are disposed for the purpose of effecting a fluid tight joint between the supporting member and the casing.

The inner end of the supporting member 12 is recessed and threaded and is provided with a gland 21 and packing 22 to form a fluid tight joint between the hub 23 of the member 4 and the suporting member 12.

A duct 24 is formed in the supporting member 12 and registers with the inlet port 25, as shown, when the material being treated is supplied to the machine through the pipe 26 on the top of the casing, the member 12 being adapted to be rotated through an angle of 180° so as to bring the duct 24 into register with the port 27 when the material is supplied through the pipe 28 on the bottom of the casing.

The member 4 is keyed to the shaft 9 and secured in position by the set screw 29.

A number of axial ducts 30 are formed in the hub 23 of the member 4 for leading the material to the space betwen this member and the member 3.

The member 4 is provided on its inner surface with rings of blades 31 which intermesh with corresponding rings of blades 32 formed on the inner surface of the member 3.

External to the bladed portions, the members 3 and 4 are spaced apart to form a narrow annular duct 33 which leads the material after treatment by the blades to an intermediate annular chamber 34 of circular cross section.

Beyond the chamber 34, the members 3 and 4 are formed with intermeshing annular projections 35 and 36 which extend axially as shown, holes 37 being formed on these projections at spaced intervals so as to allow the material to pass therethrough, when the holes register with one another during the rotation of the members.

The projections 35 and 36 form a running

fit with one another and leakage of the material through the clearance space between these parts during the operation of the machine is prevented by an annular plate 38 which is attached to the member 3.

The plate 38 forms a trough in the vicinity of the mouth of the clearance space so that the material which leaks therefrom initially, passes into the trough and under the action of centrifugal force forms a seal which prevents further leakage at this point.

The member 3 is constructed and mounted in a similar manner to the member 4 above described and is driven by means of a pulley 39. Circular nuts 40 and 41 are provided on threaded portions of the driving shaft of the member 3 for adjusting the clearance in a known manner between the members 3 and 4.

The material to be treated may be supplied to the machine either through the pipes 26 and 42 at the top of the casing, or through the pipe 28 at the bottom thereof.

The material after treatment is collected in the chamber 43 and is discharged through the outlet pipe 44.

In the operation of the machine as above described, the driving pulleys are connected to the power shaft in such a manner that the members 3 and 4 rotate in opposite directions.

The material supplied through the pipe 26 passes through the duct 24 into the chamber 45, thence through the axial ducts 30 in the member 4. On emerging from these ducts, the streams of material impinge against similar streams emitted from the axial ducts in the member 3, and which entered the casing through the pipe 42.

The path, through the machine, of the material entering by the pipe 42 is exactly similar to that of the material entering by the pipe 26.

The streams of material after impact are forced centrifugally by the rotation of the members 3 and 4 through the rings of intermeshing blades 31 and 32, and thence to the annular chamber 34 through the duct 33. From this annular chamber the material passes to the chamber 34 through the holes 37 in the intermeshing projections 35 and 36 and is discharged from the machine through the outlet pipe 44.

When the material is supplied to the machine through the pipe 28, it divides into two streams on entering the casing, one of the streams passing through the channel 46, and port 27 to the duct 24, which is in the position indicated by the dotted lines, and thence through the member 4 in the manner above described.

The other stream passes through the duct 47 to the member 3 in a similar manner.

The passage of the material through the blades and the annular duct causes the solid particles to be reduced to a finely divided state on discharge into the chamber 34. As the discharge from the chamber takes place intermittently, viz when the holes in the projections 35 and 36 register with one another, the progress of the material through the blades and annular duct is slowed down and a finer state of division of the solid particles is obtained than is the case if the material is discharged directly and continuously from the annular duct.

Further as the annular projections 35 and 36 rotate in opposite directions the passage of the material through the holes 37 therein subjects the particles to a shearing action which effects the final reduction in its state of division.

The speed of the rotatable members, the blade clearances the width of the annular duct and the diameter and number of the holes in the intermeshing projections may be varied as required.

In one machine constructed as above described the rotatable members were $9\frac{3}{4}$ inches in overall diameter and they were rotated in opposite directions at 3000 revolutions per minute.

The number of blades in each member was 100, the axial and radial blade clearance was $\frac{1}{64}$ of an inch the width of the annular duct was .006 while 32 holes $\frac{1}{16}$ of an inch in diameter were spaced around the circumference of the intermeshing projections.

When the above machine operated on a solid admixed with a liquid no sign of settling out of the solid particles was apparent in the product after several weeks observation, and the treated fluid exhibited Brownian movement under the microscope.

The holes 37 may be of the same diameter in all the projections or they may be formed so that they progressively decrease in diameter from the innermost to the outermost projections.

Also the sides of the discs may be corrugated, serrated or otherwise formed to increase the shearing effect.

In a modification of my invention, only one rotatable member is arranged in the casing, the member being formed in a similar manner to those above described. The blades on the rotatable member intermesh with corresponding blades formed on the casing while the narrow annular duct and intermediate annular chamber are arranged by correspondingly forming the adjacent surfaces of the rotatable member and the casing. The discharge from the annular member is effected intermittently through holes arranged in a series of annular projections intermeshing with one another and formed on the rotatable member and the casing.

Again, in some cases the intermediate annular chamber in the arrangements above

described may be dispensed with so that the material passes directly from the annular duct through holes in the annular projections.

Machines constructed according to my invention may be used for disintegration of solids, other than milk powder, admixed with a fluid and also for the emulsification or admixture of fluids. They may also be adapted for the treatment of solids in the dry state.

By means of my invention an efficient machine is provided in which solids either in the dry state or admixed with a fluid may be efficiently reduced to a state of division approaching the colloidal while the admixture or emulsification of liquids may be effected with facility.

I wish it to be understood that the above examples of my invention are simply to be regarded as typical only, and not as in any way restricting my invention thereto, as modifications in detail and arrangement may be made in these examples, without departing beyond the scope of my invention.

I claim:—

1. In disintegrating, emulsifying or admixing machines, the combination of relatively movable members and means for leading material to the interior of said members, said members being adapted to intermittently discharge treated material as set forth.

2. In disintegrating, emulsifying or admixing machines, the combination of relatively movable members, having intermeshing rings of blades formed internally thereon, and means for leading material to the interior of said members, said members being adapted to intermittently discharge treated material as set forth.

3. In disintegrating, emulsifying or admixing machines, the combination of relatively movable conical members, having intermeshing rings of blades formed internally thereon and an annular chamber external to said blades; and means for leading material to the interior of said members, said members being adapted to intermittently discharge treated material from said chamber as set forth.

4. In disintegrating, emulsifying or admixing machines, the combination of relatively movable conical members, having intermeshing rings of blades formed thereon, an annular duct external to said blades and an annular chamber external to said duct, and means for leading material to the interior of said members, said members being adapted to intermittently discharge treated material from said chamber as set forth.

5. In disintegrating, emulsifying or admixing machines, the combination of relatively movable conical members, having intermeshing rings of blades formed thereon, an annular duct external to said blades, an annular chamber external to said duct and intermeshing annular projections having spaced co-acting holes external to said chambers; and means for leading material to the interior of said members.

6. In disintegrating, emulsifying or admixing machines, the combination of co-acting hollow members relatively movable to one another and means for leading material to be treated in opposing streams to the interior of said members, said members being adapted to intermittently discharge treated material as set forth.

7. In disintegrating, emulsifying or admixing machines, the combination of co-acting conical members relatively movable to one another, having intermeshing rings of blades formed internally thereon, and means for leading material in opposing streams to the interior of said members, said members being adapted to intermittently discharge treated material as set forth.

8. In disintegrating, emulsifying or admixing machines, the combination of co-acting conical members relatively movable to one another, having intermeshing rings of blades formed internally thereon and an annular chamber external to said blades, and means for leading material in opposing streams to the interior of said members, said members being adapted to intermittently discharge treated material from said members, as set forth.

9. In disintegrating, emulsifying or admixing machines, the combination of co-acting conical members relatively movable to one another, having intermeshing rings of blades formed internally thereon, an annular duct external to said blades and an annular chamber external to said duct; and means for leading material in opposing streams to the interior of said members, said members being adapted to intermittently discharge treated material from said chamber as set forth.

10. In disintegrating, emulsifying or admixing machines, the combination of a co-acting conical members relatively movable to one another having intermeshing rings of blades, an annular duct external to said blades, an annular chamber external to said duct, and intermeshing annular projections having spaced co-acting holes, external to said chamber; and means for leading material in opposing streams to the interior of said chamber, as set forth.

11. A disintegrating, emulsifying or admixing machine, having relatively movable members from which the treated material is discharged intermittently as set forth.

12. In disintegrating, emulsifying or admixing machines, the combination of relatively movable members and means for leading the material to said members in oppos-

ing streams, said members being adapted to discharge the treated material intermittently as set forth.

13. In disintegrating, emulsifying or admixing machines, the combination of relatively movable members, having intermeshing rings of blades formed thereon, an annular duct external to said blades, an annular chamber external to said duct, and intermeshing annular projections having spaced co-acting holes external to said chamber; means for preventing leakage through the clearance space of said annular projections; shafts for said members; a casing for said members; a plurality of sets of ducts leading material to the interior of said annular members; means for rendering inoperative a set of said ducts together with means for rotating said shafts in opposite directions.

In testimony whereof I have signed my name to this specification.

HARRY POVEY.