G. TER MEER.

CENTRIFUGAL MACHINE.

APPLICATION FILED MAR. 19, 1908.

973,121. Patented Oct. 18, 1910.

4 SHEETS—SHEET 1.

Fig. 1

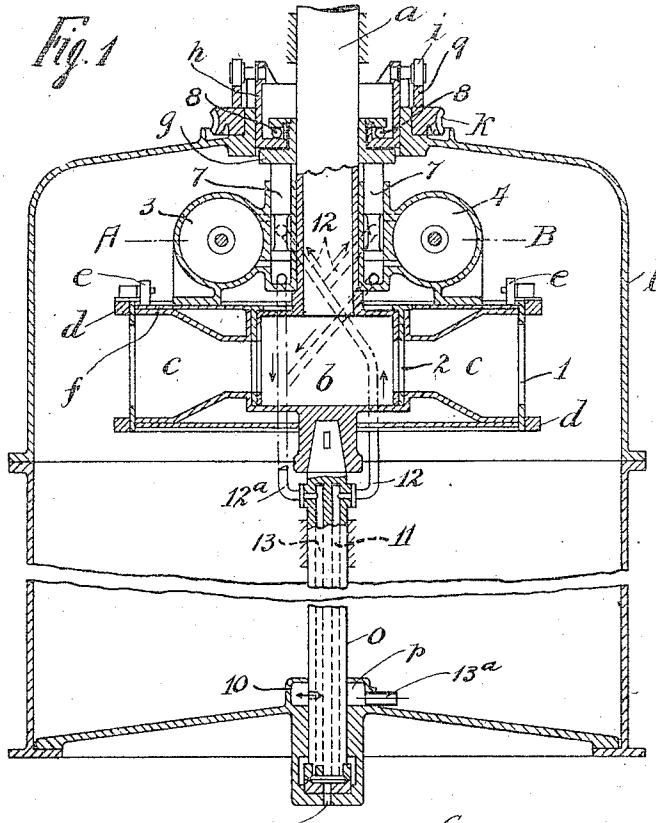
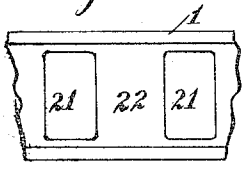


Fig. 8.



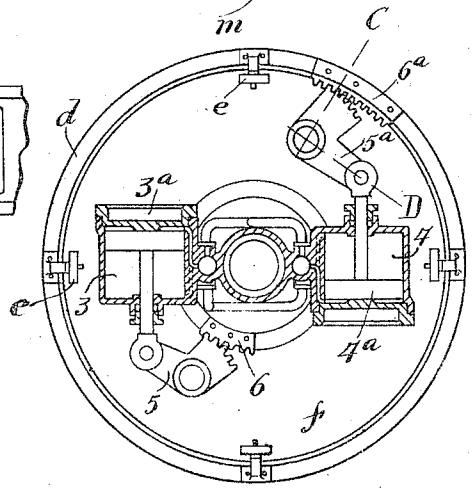


Fig. 7.

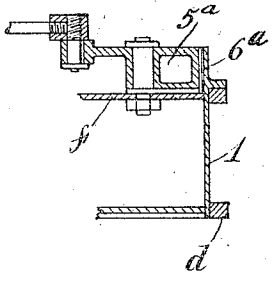


Fig. 2.

Witnesses:
Arthur E. Zumpe.
H. R. Schultz.

Inventor:
Gustav ter Meer
by Dawson Pierce Atty.

G. TER MEER.

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4 SHEETS—SHEET 2.

Fig. 3

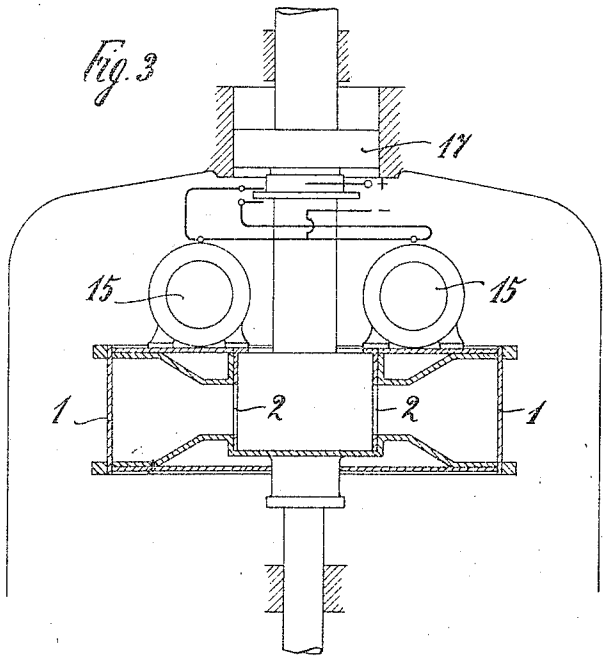
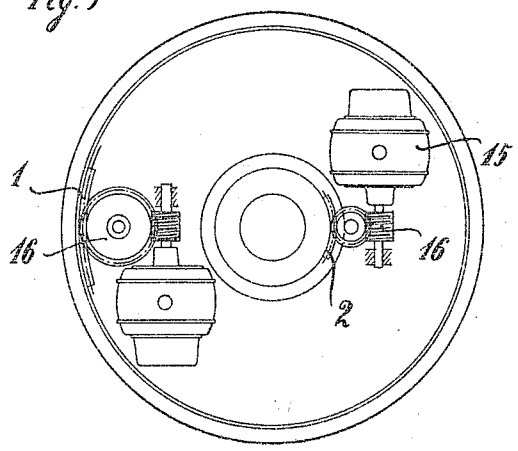


Fig. 4



Witnesses:
Arthur E. Jennings
H. R. Schulz.

Inventor:
Gustav ter Meer
by Strauch Brieser Atty.

G. TER MEER.

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4 SHEETS—SHEET 3.

Fig. 5

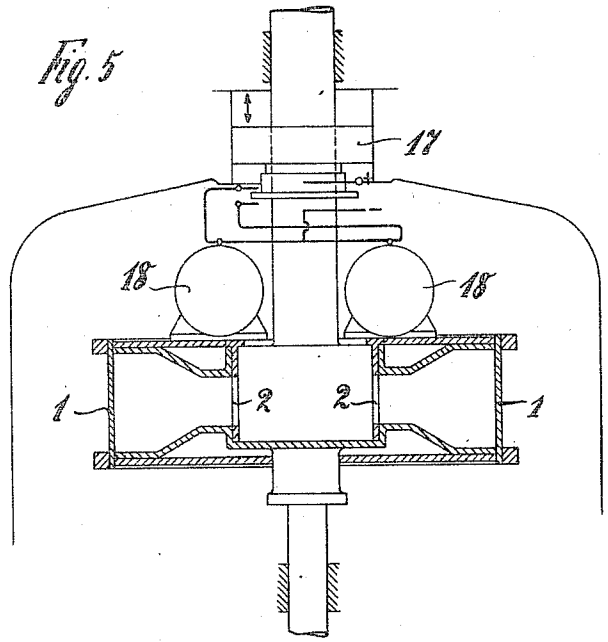
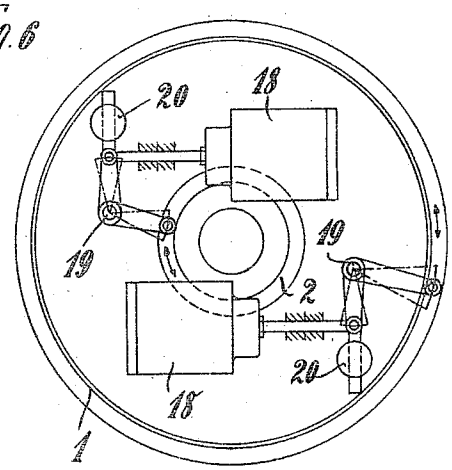


Fig. 6



Witnesses:
Arthur E. Jumpe.
W. R. Schulz.

Inventor.
Gustav ter Meer
by Frank V. Briesen Att'y.

G. TER MEER.

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APPLICATION FILED MAR. 19, 1908.

973,121. Patented Oct. 18, 1910.

4 SHEETS—SHEET 4.

Fig. 9.

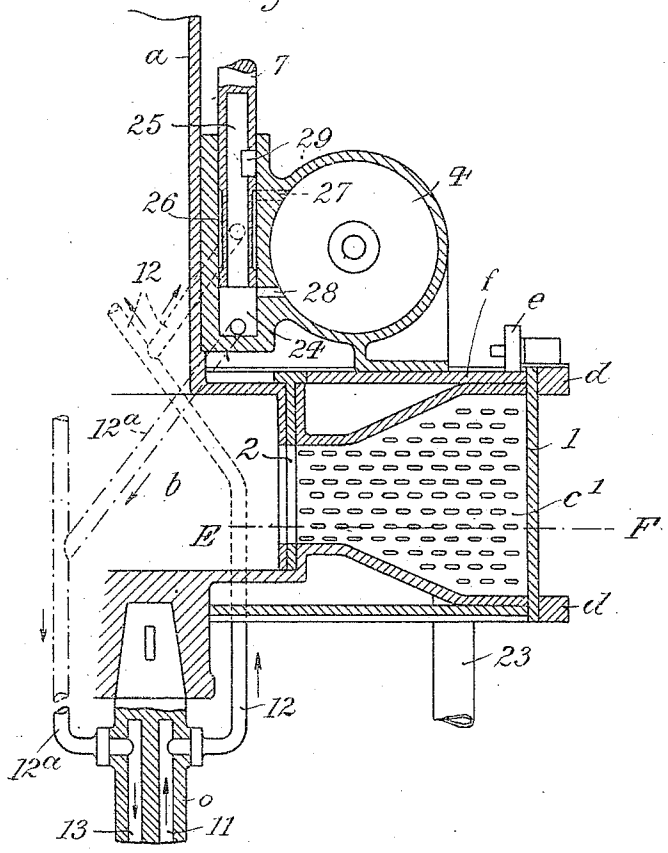
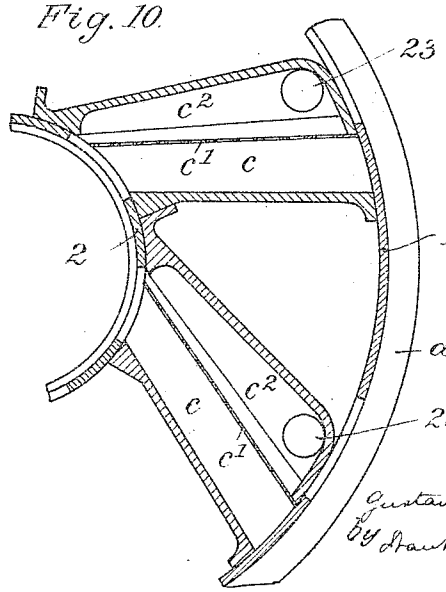


Fig. 10.



Witnesses
Arthur E. Gumpel
Katheryne Koch

Inventor
Gustav ter Meer
by Dawson & Bressler
Att'y.

UNITED STATES PATENT OFFICE.

GUSTAV TER MEER, OF HANOVER, GERMANY.

CENTRIFUGAL MACHINE.

973,121. Specification of Letters Patent. Patented Oct. 18, 1910.

Application filed March 19, 1908. Serial No. 421,981.

To all whom it may concern:

Be it known that I, GUSTAV TER MEER, a subject of the German Emperor, and residing at Hanover, Germany, have invented new and useful Improvements in Centrifugal Machines, of which the following is a specification.

This invention relates to a centrifugal machine and more particularly to novel and effective means for controlling the inlet and outlet ports thereof, while the machine is in operation.

In the accompanying drawings: Figure 1 is a vertical section of my improved centrifugal machine; Fig. 2 a horizontal section on line A—B, Fig. 1; Fig. 3 a vertical section of a modification; Fig. 4 a plan thereof, with some of the parts omitted; Fig. 5 a vertical section of a further modification; Fig. 6 a plan thereof, with some of the parts omitted; Fig. 7 a section on line C—D, Fig. 2; Fig. 8 a detail, showing the gate openings; Fig. 9 an enlarged section through part of the centrifugal machine illustrated in Fig. 1, and Fig. 10 a horizontal section on line E—F, Fig. 9.

The material to be dried enters through a hollow shaft *a*, into the radially arranged compartments *c*, of drum *b*, communication between the interior of shaft *a*, and compartments *c*, being controlled by an inner circular valve or gate 2. Each compartment *c*, is provided with a sieve or screen *c'*, that permits the liquid contained in the material to be discharged into a chamber c^2, from which said liquid is withdrawn through pipe 23. The discharge of the dried material from the compartments *c*, is controlled by an outer circular valve or gate 1. Drum *b*, is preferably inclosed within a stationary casing *l*, provided with a foot bearing 10, which supports the lower end of a shaft *o*, carrying the drum *b*. Valve 1, is provided with reinforcing rings *d*, having rollers *e*, which engage the upper wall *f*, of drum *b*. On wall *f*, are mounted a pair of cylinders 3 and 4, the plungers 3^a, 4^a, of which are pivotally connected to elbow levers 5, 5^a, respectively. The latter are provided with toothed segments engaging corresponding segments 6, 6^a, of valves 2, 1.

Cylinders 3 and 4 are controlled by steering rods 7 which reciprocate in corresponding bores 24, said rods acting as balanced cylindrical slide valves for said cylinders. Rods 7, are connected to a sleeve *g*, slidably engaging shaft *a*, and actuated by a ring *h*, while anti-friction balls 8 are interposed between the sleeve and ring. Ring *h*, is provided with rollers *i*, engaging a cam 9, which may be rotated by worm wheel *k*, mounted upon casing *l*, so that by rotating wheel *k*, a vertically reciprocative movement will be imparted to rods 7. The pressure medium such as oil under pressure, is admitted into bearing 10 of shaft *o*, through a duct *m*, while the spent oil is discharged through a pipe 13^a. The diameter of the foot of shaft *o*, is such that the weight of the drum is nearly compensated for, by the pressure of the oil, which also serves as a lubricant. Shaft *o*, is provided with a pair of longitudinal ducts 11, 13 which communicate with bifurcated pipes 12, 12^a respectively. Duct 11 is in permanent communication with the inlet duct *m*, while duct 13 discharges the oil into a chamber *p*, to which pipe 13^a, is connected. The steering rods 7, are made hollow at their lower ends, as at 25, and are provided with circumferential recesses 26. The latter are adapted to alternately register with the upper and lower ducts 27, 28 of cylinders 3 and 4. Pipe 12 is in permanent communication with recesses 26, while bores 24 are in like communication with pipe 12^a. A perforation 29 of each rod 7 registers with duct 27, when the rod is in its lower position, thereby connecting said duct with bore 24. It will be seen that when rod 7 occupies the position shown in Fig. 9, the pressure medium is admitted to cylinder 4 through pipe 12, recess 26 and duct 27, while the oil at the opposite side of piston 4^a, is discharged through duct 28, bore 24 and pipe 12^a. When rod 7 is lowered, the fresh oil will be admitted to duct 28 through pipe 12 and recess 26, while the spent oil is discharged through duct 27, perforation 29, channel 25, bore 24 and pipe 12^a, as will be readily understood. The oil leaving pipe 13^a, is preferably collected and returned to a suitable pump or storing vessel (not shown).

The steering gear for cylinders 3 and 4, owing to the reciprocative movement of rods 7, connects both ends of the cylinders alternately with the oil supply pipes 12, while their opposite ends are simultaneously connected with discharge ducts 12^a. Rods 7 receive a reciprocative movement through ring *h*, from cam *g*, hereinabove referred to, said cam being firmly secured to worm wheel *k*. According to the speed imparted to said

wheel, the number of strokes of pistons 3^a, and 4^a, may be readily controlled.

Compartments c, as well as the openings 21 of gates 1 and 2 may be of any suitable shape, said openings being preferably oblong in cross section, as illustrated in Fig. 8. Between each two adjoining openings 21, there is formed a solid section 22, the width of which exceeds that of openings 21. Inner gate 2 and outer gate 1 are alternately actuated in such a manner, that when the outer gate is closed, the inner gate is opened, and vice versa. When the inner gate is open, the material to be dried enters chamber c, through hollow shaft a. After drying, gate 2 is closed and gate 1 is opened, to permit the discharge of the dried material.

With the construction shown in Figs. 3 and 4, a pair of electromotors 15 are mounted upon drum b, and are operatively connected to the gates 2 and 1 by worm gears 16. According to the position of the steering plunger 17, the electromotors rotate in one or the other direction, to either open or close valves 2, 1.

In lieu of employing electromotors, electromagnets 18 may be used for operating the gates, as illustrated in Figs. 5 and 6. The armatures of these electromagnets consist of elbow levers 19 connected to gates 2, 1. By correspondingly adjusting steering plunger 17, the electromagnets are energized, to thereby operate the gates. In order to return the gates to their original position, the electric current is interrupted, whereupon weights 20 will swing outward and thus cause the desired movement of the gates.

What I claim is—

1. A centrifugal machine, comprising a rotatable drum, an inner gate and an outer gate controlling admission to and discharge from the drum, and means carried by the drum for actuating said gates.

2. A centrifugal machine, comprising a rotatable drum, an inner gate controlling admission to the drum, a cylinder carried by the drum, a piston operatively connected to the gate, and means for feeding a pressure medium to the cylinder.

3. A centrifugal machine, comprising a rotatable drum, an inner gate and an outer gate controlling admission to and discharge from the drum, cylinders carried by the drum, pistons operatively connected to the gates, and means for feeding a pressure medium to the cylinders.

4. A centrifugal machine, comprising a rotatable shaft having pressure medium ducts, a drum carried by the shaft, an inner gate and an outer gate controlling admission to and discharge from the drum, cylinders carried by the drum and communicating with the pressure medium ducts, and pistons operatively connected to the gates.

5. A centrifugal machine, comprising a rotatable shaft having pressure medium ducts, a drum carried by the shaft, an inner gate and an outer gate controlling admission to and discharge from the drum, cylinders carried by the drum and communicating with the pressure medium ducts, pistons operatively connected to the gates, valves controlling the cylinders, and a cam controlling the valves.

Signed by me at Hanover this 28, day of February 1908.

GUSTAV TER MEER.

Witnesses:

ROBERT v. BULOW,

W. W. LEHNE.