No. 655,717. Patented Aug. 14, 1900.

E. KÖPPELMANN.

MACHINE FOR WASHING FIBROUS OR LOOSE MATERIAL.

(Application filed Apr. 14, 1900.)

(No Model.) 3 Sheets—Sheet 1.

FIG 1

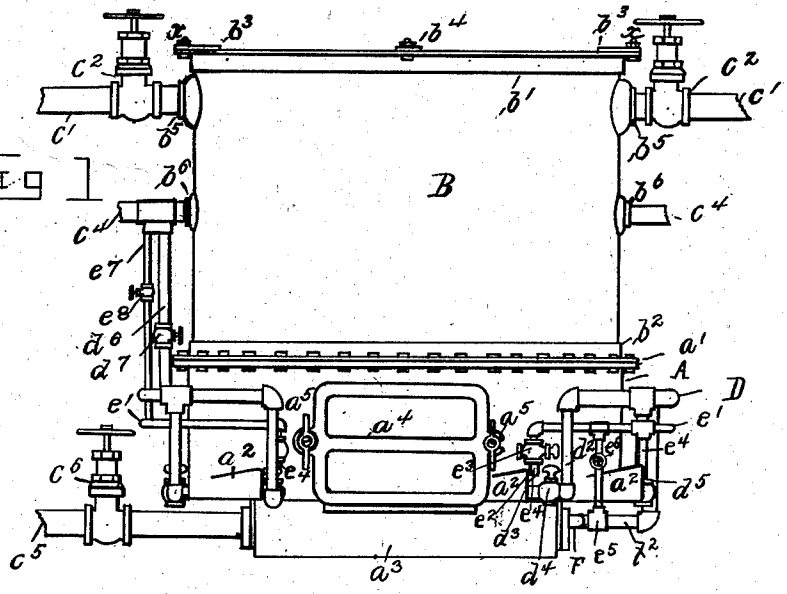
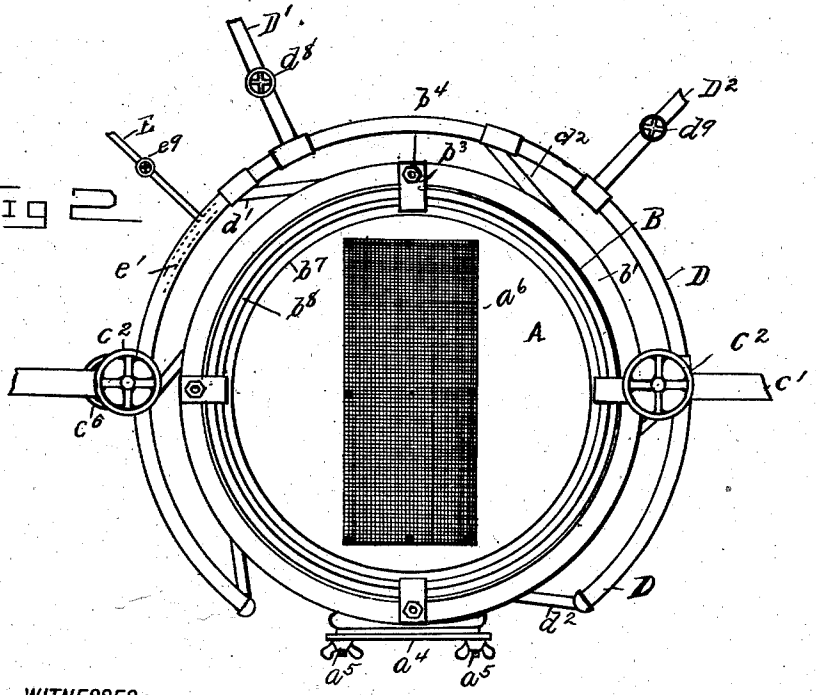


FIG 2



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FIG 3

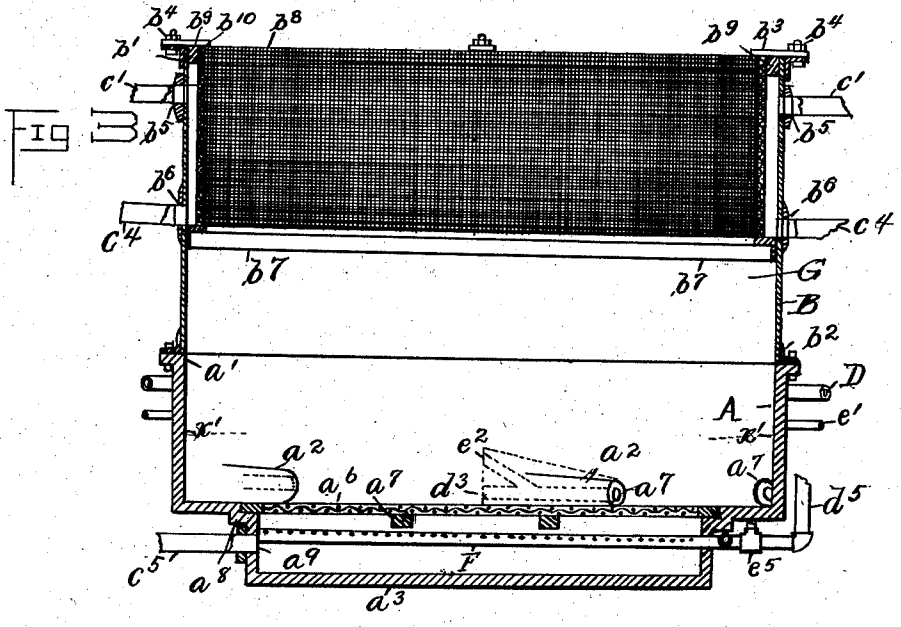
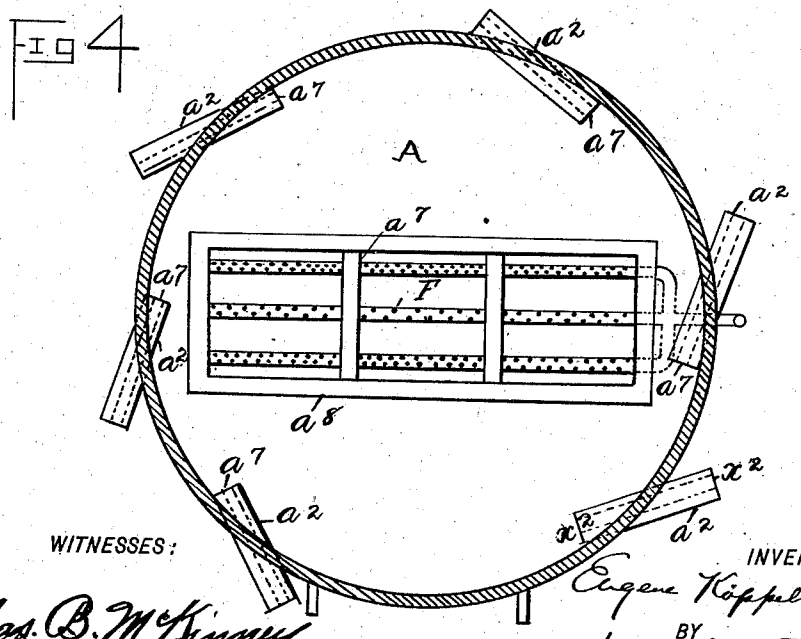


FIG 4



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MACHINE FOR WASHING FIBROUS OR LOOSE MATERIAL.

(Application filed Apr. 14, 1900.)

(No Model.) 3 Sheets—Sheet 3.

FIG 5

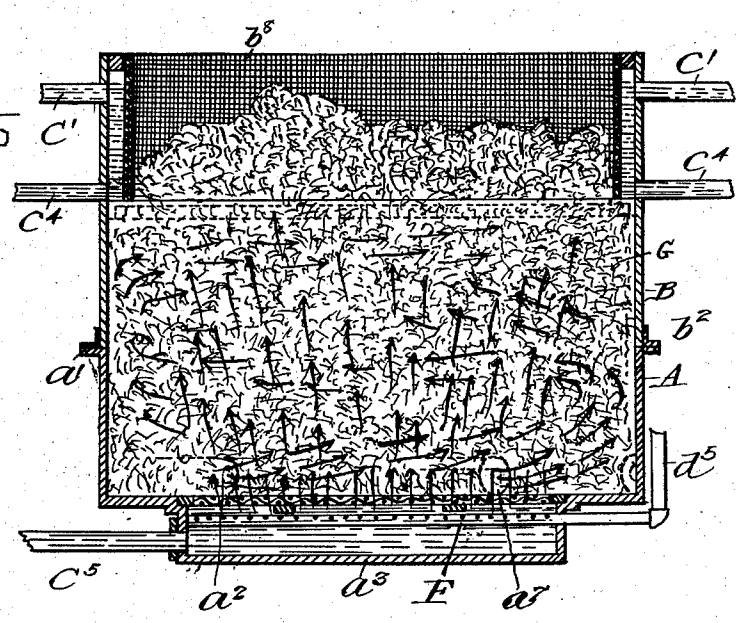


FIG 6

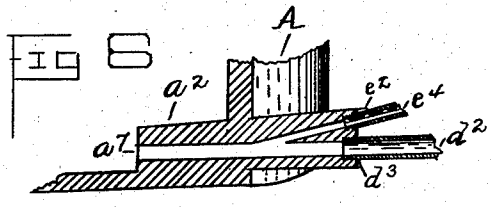
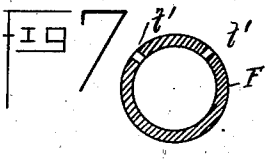


FIG 7



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MACHINE FOR WASHING FIBROUS OR LOOSE MATERIAL.

SPECIFICATION forming part of Letters Patent No. 655,717, dated August 14, 1900.

Application filed April 14, 1900. Serial No. 12,810. (No model.)

To all whom it may concern:

Be it known that I, EUGENE KÖPPELMANN, a citizen of the United States of America, and a resident of the city of New York, borough of Bronx, county of New York, and State of New York, have invented certain new and useful Improvements in Machines for Washing Fibrous or Loose Material, of which the following is a specification.

My invention relates to that class of apparatus generally used by brewers and other establishments for the washing and cleansing of pulp and other materials used in filters for the purpose of straining malt or spirituous liquors.

It is the custom in brewing maltous liquors immediately before shipment to strain the liquor as it comes from the storage-casks through filters under pressure in order to clarify it and remove any sediment or other impurities resultant from the brew of the same. This is done by passing the beer or other liquor through filters, in which are placed layers of pulp, consisting of fibrous material, either cotton, wood, or any other suitable fiber closely packed, which pulp is designed to catch said impurities and to strain and filter the liquor when it is forced through the same by pressure. The pulp after frequent use must be washed and thoroughly cleaned, as it becomes slimy and saturated with the impurities coming from the liquors, after which it can be replaced in the filters for further use.

The object of my invention is to provide an apparatus for the purpose of thoroughly and properly cleansing the pulp or filter mass after use and in such a manner as to not in any way injure the same or impair its usefulness.

I have illustrated my invention by the accompanying drawings, in which like letters refer to like parts throughout the various figures.

Figure I is a side elevation of my apparatus. Fig. II is a top plan view of Fig. I. Fig. III is a longitudinal section of Fig. I, taken on the line $x\,x$. Fig. IV is a cross-section of casting A, taken on the line $x'\,x'$ of Fig. III. Fig. V is a longitudinal section showing the contents of the tank. Fig. VI is a sectional view of the lug a^2, Fig. IV, of the casting, taken on the line $x^2\,x^2$. Fig. VII is a cross-section of the spreader.

My apparatus consists of a large cylindrical tank supported on a standard or such base as may be convenient to construct and provided with interior sieves and a system of piping for introducing air, steam, and hot and cold water under pressure.

Referring to the figures, A is a cylindrical tub-shaped iron casting and forms the base of the apparatus. It is cast with a number of lugs $a^2\,a^2$, Figs. I, III, and IV, near the bottom edge, which lugs extend from the exterior to the interior of the casting and penetrate the shell in a substantially-tangential direction. At the bottom of the casting A and forming an integral part of the same is a rectangular box-like chamber a^3. A is also cast with a shoulder a' extending around the upper edge of the same, and a shoulder a^8 at the top of the box a^3.

The lugs $a^2\,a^2$ are bored longitudinally, Fig. VI, and obliquely, forming two exterior ports d^3 and e^2 and one at a common interior port a^7. These lugs are of such length as will give sufficient directive force to the currents passing through the same. The ports d^3 and e^2 are threaded with a female screw to connect with piping systems, as hereinafter described. The box a^3 is supplied with a port a^9 in one of its ends, to which is connected the pipe c^5. a^3 is also supplied with a spreader F, mounted in its interior. This spreader F consists of a fork-shaped pipe with three prongs and closed ends. It is fed from a common supply-pipe f^2 and connected with the piping systems hereinafter described. A large number of small ports are bored through the pipes, forming the spreader at an angle to the perpendicular diameter of the pipes, Fig. VII, and extending longitudinally along its sides. Fitted across the top of the box and resting upon a shoulder a^8 is a rectangular sieve a^6, made of steel, brass, or copper wire or other suitable material of such mesh as will allow the free passage and circulation of water and still confine the media. The supports $a^7\,a^7$ are provided to strengthen the sieve. The spreader F is mounted as close to the bottom of the sieve as possible.

Mounted on the shoulder a' of the base A

is a cylindrical shell B, of sheet-iron or other suitable material. At the bottom of B is soldered or riveted the angle-iron b^2, for the purpose of securing B to the base A, as shown in Fig. I. At the top of B an angle-iron or shoulder b' is also provided for the purpose of strengthening the cylinder B and securing the sieve b^8 in place by clamps, as hereinafter described. Around the interior of the cylinder B about midway between the top and bottom is mounted the angle-iron b^7. Directly above this angle-iron are situated the ports b^6 b^6 and near the top of the tank the ports b^5 b^5.

The tank is provided with a cylindrical sieve b^8 of a diameter somewhat less than the tank in order to provide an annular chamber between said sieve and the tank for the purpose of easily drawing off all of the dirty water which may rise to the top of the apparatus without containing any of the material being treated. This sieve rests freely upon the angle-iron b^7 and is kept in place by the upper rim of said sieve b^{10}, which is made of wood or other suitable material. The sieve is substantially of the same construction as the lower sieve a^7. It is kept firmly in place by the clamps b^3 b^3, adjusted and secured by the bolts b^4 and b^4 to the shoulder b'.

The systems of piping the apparatus are described as follows: There are three systems—first, the supply of hot and cold water and steam; second, the air-supply, and, third, the overflow.

D, Figs. I and II, is a pipe extending around the tank and fed by the pipe D' (steam) and D^2, (water, hot or cold,) coming from any ordinary source of supply. At as many different points as there are lugs, Figs. II to IV, are placed the pipes d^2 d^2, connecting the pipe D with the lower ports of the lugs d^3 d^3 and in a manner as to direct the water, air, steam, &c., into the tank substantially tangential to the interior surface of the same. The pipes d^2 d^2 are provided with valves d^4 to regulate the supply. The pipes D' D^2 each have valves d^8 d^9 to govern the same. The air-supply is a similar system and consists of the pipe e', extending around the tank, the connections e^4 e^4 with the upper ports e^2 e^2 of the lugs a^2 a^2 and with the valve e^3 and are fed by the air-pipe E, governed by the valve e^9, E being supplied from a compressor or any other suitable source. Each of the systems D and e' are connected with the spreader F by the pipes d^5 and e^5 and provided with suitable valves. The valves are all situated near the ports e^2 and d^8, so as to regulate the supply at each port when necessary to secure uniform pressure in the interior of the tank. Near the top of the tank, at the ports b^5 b^5, are connected the pipes c' c', controlled by the valves c^2 c^2, to take off the overflow and at the ports b^6 b^6 the pipes c^4 c^4 to take off such dirty water which may rise to the top of the tank. At the bottom of the tank and connected with the port a^9 of the box a^3 is the pipe C^5 and valve C^6 to drain off and remove all the water in the tank whenever the same may be necessary in order that the material treated may be removed in as dry a condition as possible.

It is often necessary to use steam, air, and hot water to cleanse the upper sieve, and for this purpose the pipes c^4 are connected with the supply-pipes D and e' by the pipes d^6 and e^7, each provided with a valve d^7 and e^8.

The bottom of the base is provided with a door a^4, suitably secured with screws a^5, so as to be easily removed whenever the washing is finished and the material is to be withdrawn.

The operation of my apparatus is as follows: I place the pulp to be cleaned in the tank A. I turn on the valves supplying the cold water and air to the ports d^3 d^3 and e^2 e^2, which soon causes the mass to whirl rapidly and become agitated and ebullient, resulting from the tangential pressures from the different ports. At the same time the pressure is turned on from the pipe d^5 e^5 and into the spreader F, Fig. V, this pressure exerts itself directly upward and outward through the sieve and acts upon the base of the filter mass in the tank, permeates the same, and lends its aid in making the mass turbulent and agitated. The action of the air and water from the different ports is substantially as follows: The side ports being situated tangential to the side of the filter mass will cause the same to take a revoluble motion around the inside of the tank and force the media toward the center of the same, while the upward pressure of the air coming from the spreader below the sieve a^6 will act directly upon the center of the media and force it upward and outward to the side, where it comes again into the field of pressure from the side ports, Fig. V. In this way a constant motion is given to the filter mass and the same is kept violently agitated and disturbed. The mass before this introduction being completely saturated with slime and impurities from the beer must be well soaked, and cold water is allowed to flow until the pulp is in proper condition. The foul or dirty water is forced to the top and flows off continually through the pipes c' c' and also through the pipes c^4 c^4, when necessary. The foul water having free circulation through the sieve b^8 and in the annular chamber between the sieve and tank may be easily drawn off without any of the pulp or fiber. The cold water is turned off and either hot water or steam may be introduced by turning valves d^8 for a more thorough cleansing of the stuff in the same manner and with the same whirling and ebullient effect. As many ports in the bottom and side of the tank may be used as may be practicable to the size and efficiency of each apparatus. The air-pressure may be varied according to the circumstances and the quantity desired in each instance. When the filter mass is thoroughly cleaned, the valves

are all closed, the water remaining in the tank is drawn off through the pipe c^5, and the mass is removed through the door a^4. Sometimes the sieves become coated with slime, and for the purpose of cleaning the same while in use means are provided through the pipes c^4 c^4 for blowing steam, water, and air into the tank from the back of the sieve, and thus removing the slime therefrom. The pipes d^6 (water and steam) and e^7, (air,) with suitable valves d^7 e^8 and connected with c^4 c^4, are used for this purpose. When not in use, all sieves can be easily removed for purposes of cleaning by hand.

Formerly machines have been used for washing filter media with shafts and revolving arms mounted in a tank to keep the mass in agitation; but this has been found to injure the fiber and cause the material used to become lumpy and hard after cleaning. In my apparatus the complete agitation in every direction, together with the ebullient character of the same directly resulting from the introduction of air under pressure, keeps the fibrous material from lumping, and while thoroughly cleansing each particular fiber keeps the same separated from each other and when removed from the tank the same is soft and in good condition for reuse.

It will be noticed that the fundamental principle upon which this apparatus is operated is a violent agitation of the material to be treated while the same is contained in the vessel and the use of steam, air, and water under pressure in order to effect that result. The pressure to be used is not constant, but necessarily varies with the size of the vessel, the condition and quality of the material treated, and the time in which it may be necessary to treat or clean the stuff. The apparatus has therefore been supplied with sufficient number of valves to regulate this pressure at different points of the same and need adjustment until the proper results are obtained. It is also evident that in order to procure the best effects the interior of the tank must be free from any obstruction to which the media may cling or which may reduce the effects of the pressure introduced through the various ports.

I am aware that prior to my invention filters have been invented and used with the apparatus connected therewith for applying air and water to cleanse and purify the bed of the filter while in use in such filter, and I do not claim the application of my invention to any filter or filtering apparatus while the same is in use as such.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. An apparatus for cleaning loose material, consisting of a tank with a free and unobstructed interior and systems of piping connected with ports in said tank and said systems and ports so arranged as to introduce air, water or steam into said tank, under such pressure, quantity and in such a manner as to cause the contents of the tank to become rapidly and violently agitated.

2. An apparatus for washing loose material consisting of a tank and systems of piping connected therewith tangentially and perpendicularly arranged, for supplying air, water, hot water or steam under pressure, through the tank and in a manner to cause the contents of said tank to whirl and become rapidly agitated.

3. An apparatus for cleaning loose material, consisting of a tank provided with a cylindrical sieve mounted in its interior, a sieve mounted in its bottom, means for supplying under pressure, either water, air, steam or all of them, through ports in its side, and ports connected with the bottom of said tank, and means for drawing off foul water.

4. An apparatus for cleaning loose material, consisting of a tank provided with sieves, and means for supplying pressure to said tank either of water, air, steam, or all of them, through ports in its sides tangentially arranged, and means for drawing off the foul water.

5. An apparatus for cleaning loose material, consisting of a tank provided with a cylindrical sieve mounted in its interior, a sieve mounted in its bottom, and means for supplying under pressure, either water, air, steam or all of them through ports in its sides tangentially arranged, and also through ports directly underneath the sieve in the bottom of the tank.

6. An apparatus for cleaning loose material, consisting of a cylindrical tank provided with a cylindrical sieve mounted in its interior, a sieve mounted in its bottom, a chamber underneath said bottom sieve, and means for supplying pressure either of water, air, steam or all of them through ports in its sides, and ports in said chamber, together with means for drawing off the foul water.

7. An apparatus for cleaning loose material consisting of a tank provided with a cylindrical sieve mounted in its interior, a sieve mounted in its bottom, a chamber underneath said sieve in which is mounted a spreader, directly connected with a pipe supplying steam and air or both of them under pressure, and means for supplying pressure either of water, air, steam, or all of them through ports in the sides of said tank and ports in the bottom and ports in the chamber, together with means for drawing off the foul water.

8. An apparatus for cleaning loose material, which consists of a cylindrical tank, provided with a cylindrical sieve mounted in its interior, a sieve mounted in its bottom, a door opening into the lower part of said tank, a chamber underneath said bottom sieve in which is mounted a spreader directly connected with a pipe containing air and steam, or either of them under pressure, and systems of piping provided with suitable valves

connected with ports tangentially arranged in the sides of the tank, near the bottom of the same, and systems of piping with suitable valves connected with the chamber underneath the tank, said systems adapted to supplying air, water and steam or either of them to the tank, and systems of piping provided with suitable valves situated adjacent to the cylindrical sieve for the purpose of drawing off the foul water.

Signed at New York city, New York, this 7th day of March, 1900.

EUGENE KÖPPELMANN.

Witnesses:

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GEORGE M. S. SCHUTZ.