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CONTINUOUS APPARATUS WORKING WITH DRAWN OR BLOWN BLAST OR GAS

Filed July 9, 1928

Fig. 1

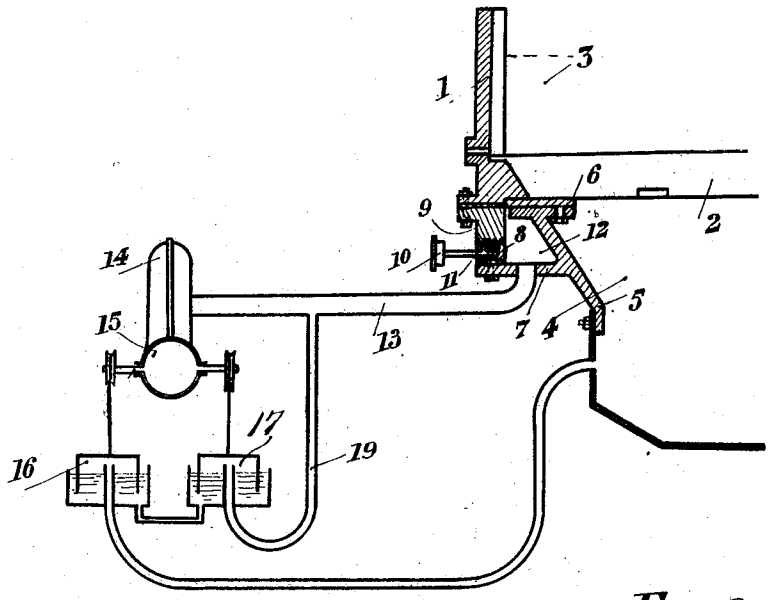


Fig. 2.

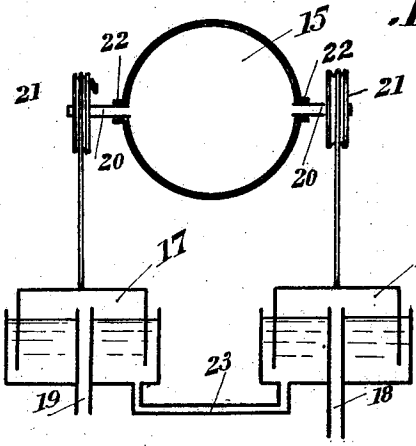
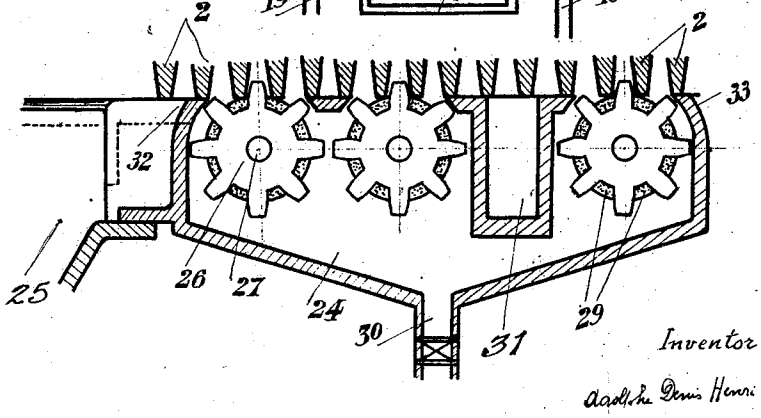


Fig. 3.



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CONTINUOUS APPARATUS WORKING WITH DRAWN OR BLOWN BLAST OR GAS

Application filed July 9, 1928, Serial No. 291,411, and in Belgium July 20, 1927.

This invention relates to continuous apparatus working with drawn or blown blast or gas, and its object is to remedy the absence of tight joint fit of these apparatuses.

The invention consists in a continuous apparatus with movable joints working with drawn or blown blast or gas, having two or several movable joints placed in such a manner as to leave a space or chamber between two successive joints, and means for maintaining inside the said space a pressure substantially equal to that existing in the suction or blowing box of the apparatus. The suction or blowing box is thus protected against air admissions or leakages.

The said space or chamber is connected with a suction fan the discharge of which is controlled by a regulating device which can open or close the outlet pipe of the fan to a variable extent according as the amount of pressure in the space comprised between the two joints tends to increase or decrease relatively to the amount of pressure which exists in the suction box. Thus, even if the joint separating the said chamber from the suction box is of an imperfect tight fit, the gaseous exchanges between the suction box and the chamber are theoretically nil and in practice only very small and depend only on the sensitivity of the regulating device. The regulating device is, of course, to be constructed of extreme sensitivity.

The amount of air drawn and afterwards sent into the free air depends soley on the degree of tight-fit of the joint which separates the chamber from the outside atmosphere and on the service pressure to be maintained inside the said chamber. In case that there is a high leakage of the joint and that the difference between the service pressure and the atmospheric pressure is great, the said amount can be sufficiently important to involve an appreciable consumption of motive power, but in no case, will there be a dilution of the gases of the suction box. The second joint which forms a limit to the said chamber is placed in such a manner that it shall be at a temperature approaching the surrounding temperature, and thus it can be provided with devices which reduce the air admissions through the joint to a minimum, and therefore also the consumption of motive power of the compensating fan.

One mode of application of the present invention to a continuous roasting and sintering apparatus known in metallurgy under the name of "Dwight-Lloyd apparatus" is described hereinafter by way of example.

In the accompanying drawings, Fig. 1 illustrates diagrammatically a vertical half-section perpendicular to the axis of a Dwight-Lloyd apparatus.

Fig. 2 is a section of the regulating device hereinafter referred to; and

Fig. 3 is a vertical section made along the axis of part of a machine according to the present invention.

Referring to Fig. 1, 1 is the outside wall of one of the movable carriers, which are placed one after another and form thus the movable grate on which is effected the roasting and the sintering of the material. 2 is one of the bars of the grate. 3 is the layer of material to be roasted and sintered, incident to the suction maintained in the suction box 4 shown in part in the drawing. 5 is the upper portion of said suction box; provided on one side with a first joint 6, of any type and shown in the drawing as having the form of a sheet, which may be made of asbestos or other suitable material, pressed against the wall of 1, and provided at 7 with a flanged extension on which is bolted a member 8 intended to form the second joint, with insertion of asbestos or other non-heat conducting substance. The carrier 1 has also a flange on which is bolted, with interposition of a joint which is bad conductor of heat, the second piece 9 of the joint. The members 8 and 9 which form the joint penetrate into each other several times owing to the formation of their meeting faces as of serrated, undulated or grooved shape, in such a manner as to leave a space as small as possible between them, and not to impair the regular working of the apparatus. The said space is filled with a plastic material, for instance a mixture of consistent grease with graphite. This plastic material is renewed from time to time, as by means of a pressure

lubricator 10 which communicates with the joint through a series of small channels 11. The joints of asbestos, which separate the members 8 and 9 from the carrier 1 and from the suction box 4, prevent a transmission of heat by conductivity, which transmission of heat would be harmful to the consistency or to the preservation of the plastic material used. The chamber 12 thus limited between the joints 6 and 8—9, is placed in communication by a piping 13 with a suction fan 14 the discharge of which into the free air is controlled by a movable flap valve 15 operated by the regulating device. This regulating device includes a bell 16 which is connected by means of the piping 18 with the suction box 4, and a bell 17 which is connected by means of the piping 19 with the chamber 12. The movable flap 15 (see Figure 2) is fixed on the axle 20—20 carrying two identical discs 21—21. The whole arrangement: flap valve, axle and discs, is carefully balanced and is supported by ball bearings 22—22 or any other device giving a minimum of friction. The bells 16, 17 strictly identical to each other are each suspended by a flexible wire fixed in an identical manner to the corresponding bell and each disc is immersed in a bath of water or other liquid strictly maintained at the same level, for instance by a connection 23. From the perfect symmetry of the device, any difference of pressure between the chamber 12 and the box 4 breaks the equilibrium between the two bells 16 and 17 and causes the rotation of the flap valve 15 in one direction or the other to cause a variation in the discharge of the fan such as to re-establish the equilibrium of pressure between the chamber 12 and the box 4.

Under these conditions, the equilibrium of pressure between the chamber 12 and the box 4 will be always maintained, provided, of course, that the joint 8—9 and the fan 14 are chosen so that the joint 8—9 shall never leak under the normal service pressure, a volume of air higher than what the fan 14 can evacuate.

The sensitivity of the system should be so regulated that the apparatus shall enter into operation as soon as the difference of pressure between the chamber 12 and the box 4 exceeds an appreciable amount, for instance $\frac{1}{10}$ mm. of water. This result is attained by giving large dimensions to the bells, by making them with thin walls and by avoiding all possible friction in the rotation of the axis of the flap valve, or any other friction.

The ends of the chamber 12, which are parallel to the section shown in Figure 1, are suitably closed by means such as metallic blocks the profile of which is identical with that of the empty space of the chamber 12 and which fill completely this empty space for such a length that the movable joint which they form with the wall 1—9—8 of the carrier which is displaced, will permit only very small amounts of air to enter the chamber 12. In order to obtain the same chamber of equilibrium on the small sides of the suction box of the apparatus as on the long sides, it is necessary to replace the two sliding joints 8 and 9 shown in Figure 1 by the rotating joints shown in Figure 3.

In this Figure 3, 25 is the end of the suction box (called 4 in the diagram 1), 32, 33 is a horizontal table placed exactly at the level of the lower edge of the grate bars 2, 2. Under this table, 32, 33 and integral with it, is provided a box 24. In this box 24 rotate a certain number of toothed pinions 26 (three in the case of the drawing). Between the teeth of these pinions are fixed small cushions 29 of felt, asbestos or any other substance which is resilient and is capable of absorbing moisture. The axles 27 of these pinions rest inside cavities of the walls of 24, upon small springs which enable them to be lowered slightly in case that a pressure downwards is exerted upon the pinion. The box 24 is filled with water or any other liquid till about the height of the axes of the pinions. 30 is an emptying pipe for the box 24; it serves at the same time to feed fresh water for maintaining the level, or if necessity arises, for avoiding an excessive elevation of the temperature. Lastly, between two of these pinions, is provided the chamber 31 which acts in the same manner as the chamber 12 of the diagram 1.

When the grate bars are displaced upon the table 32, 33, they meet the pinions 26 and cause their rotation by acting upon them in the manner of a rack. The contact of the bars with the teeth of the pinions and the moderate pressure which they exercise upon the resilient cushions 29 ensure a good tight joint fit and prevent admission of the air which would have a tendency to come from 33 towards 32, owing to the vacuum existing in the suction box 25.

The chamber 31 is maintained by the device described in Fig. 1 and Fig. 2, at the same pressure as the box 25.

I claim:

1. A sintering machine having movable pallets displaced over a suction box, at least two distinct successive sealing joints adapted to shut off the suction box from the atmosphere, a fan, means for connecting the space comprised between the said successive sealing joints with the fan, and means for regulating the action of the fan so that the pressure inside the said space shall be substantially the same as that in the suction box.

2. A sintering machine having movable pallets displaced over a suction box, at least two distinct sucessive sealing joints adapted to shut off the suction box from the atmosphere, a fan, means for connecting the space comprised between the said successive seal-

ing joints with the fan and a regulating device for automatically regulating the action of the fan, whereby the pressure in the space between the successive sealing joints as controlled by the fan will be substantially the same as the pressure in the suction box.

3. A sintering machine having movable pallets displaced over a suction box, at least two distinct sucessive sealing joints adapted to shut off the suction box from the atmosphere, a fan, means for connecting the space comprised between the said successive sealing joints with the fan and a regulating device for automatically regulating the action of the fan, said device being controlled by the relative pressures in the space between the sealing joints and in the suction box and serving to insure that the pressure developed by the fan in said space will be substantially the same as in the suction box, and means for protecting one of the sealing joints against radiation and conduction of heat, as and for the purpose set forth.

4. A sintering machine having movable pallets displaced over a suction box, at least two distinct sucessive sealing joints adapted to shut off the suction box from the atmosphere, a fan, means for connecting the space comprised between the said successive sealing joints with the fan, a regulating device for automatically regulating the action of the fan to maintain the pressure developed by the fan in the space between the sealing joints substantially the same as the pressure in the suction box, and means for protecting one of the sealing joints against radiation and conduction of heat, said means comprising two serrated members which slide upon each other and between which a plastic material is fed, one of the serrated members being fixed to the movable pallet with interposition of substance non-conductive of heat.

5. A sintering machine having movable pallets, displaced over a suction box, at least two distinct successive sealing joints adapted to shut off the suction box from the atmosphere, a fan, means for connecting the space comprised between the said successive sealing joints with the fan, a flap valve for regulating the discharge of the fan and capable of moving around a shaft, two hydraulic bells, the interior of one hydraulic bell being connected with the suction box, while the interior of the other hydraulic bell is connected with the space between two distinct sealing joints, and means for operating the shaft of the flap valve from the hydraulic bells.

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