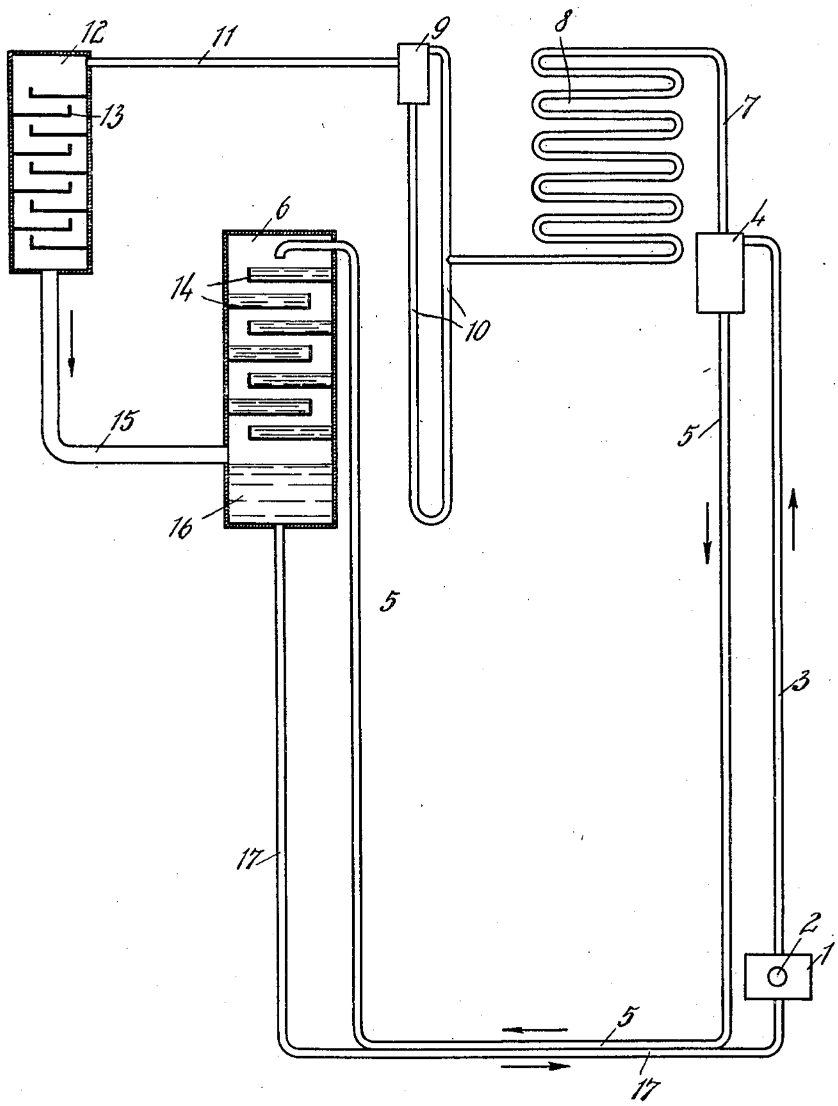
PROCESS AND APPARATUS FOR OPERATING CONTINUOUS ABSORPTION MACHINES

Filed Oct. 24, 1929 4 Sheets-Sheet 1

Fig. 1



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PROCESS AND APPARATUS FOR OPERATING CONTINUOUS ABSORPTION MACHINES

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Fig. 2

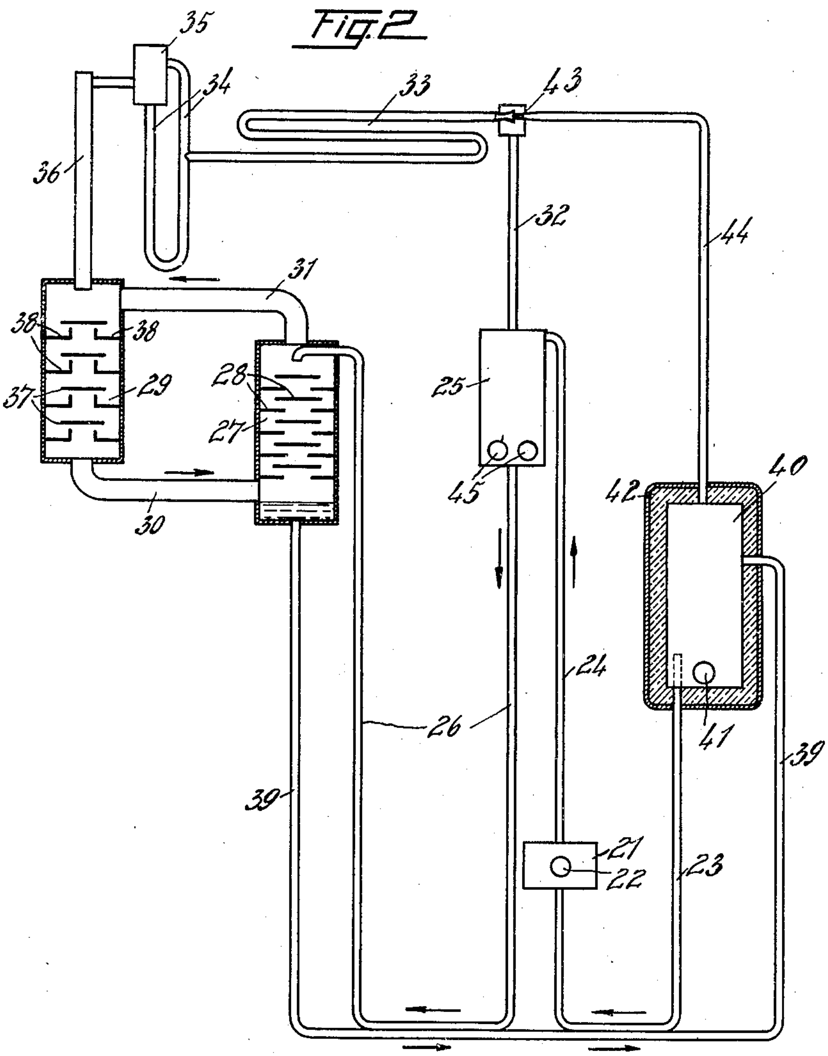

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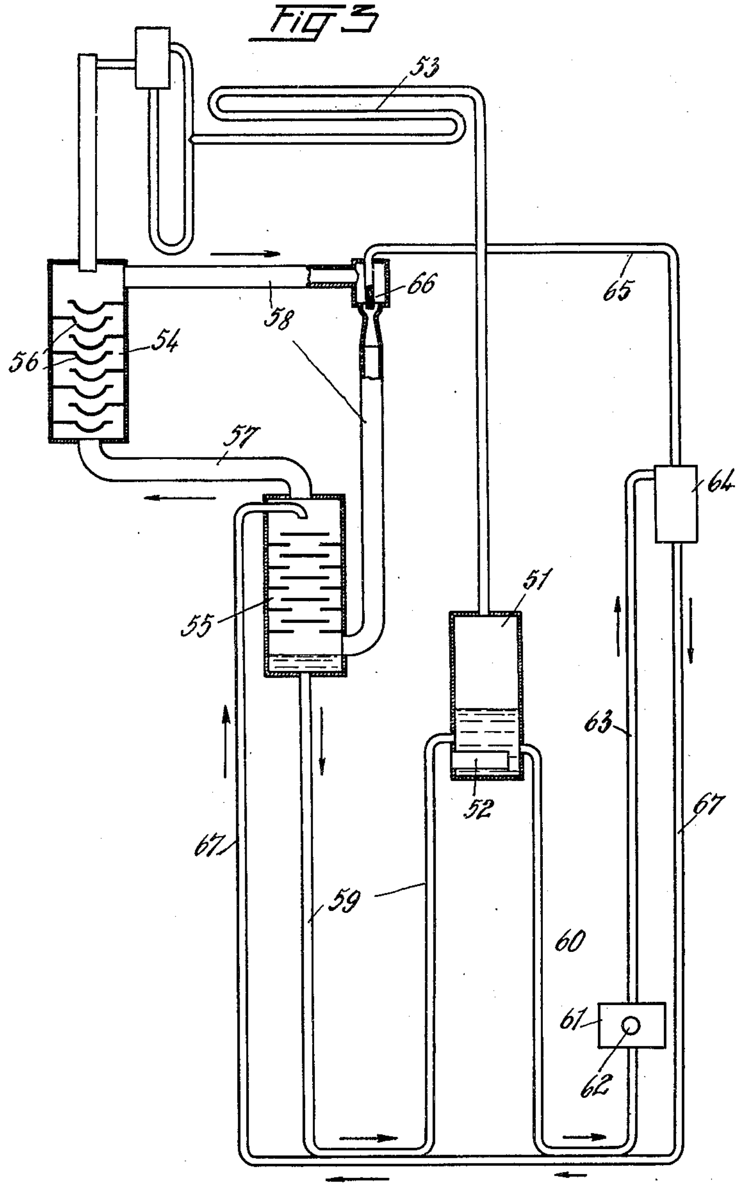
Fig 3



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PROCESS AND APPARATUS FOR OPERATING CONTINUOUS ABSORPTION MACHINES

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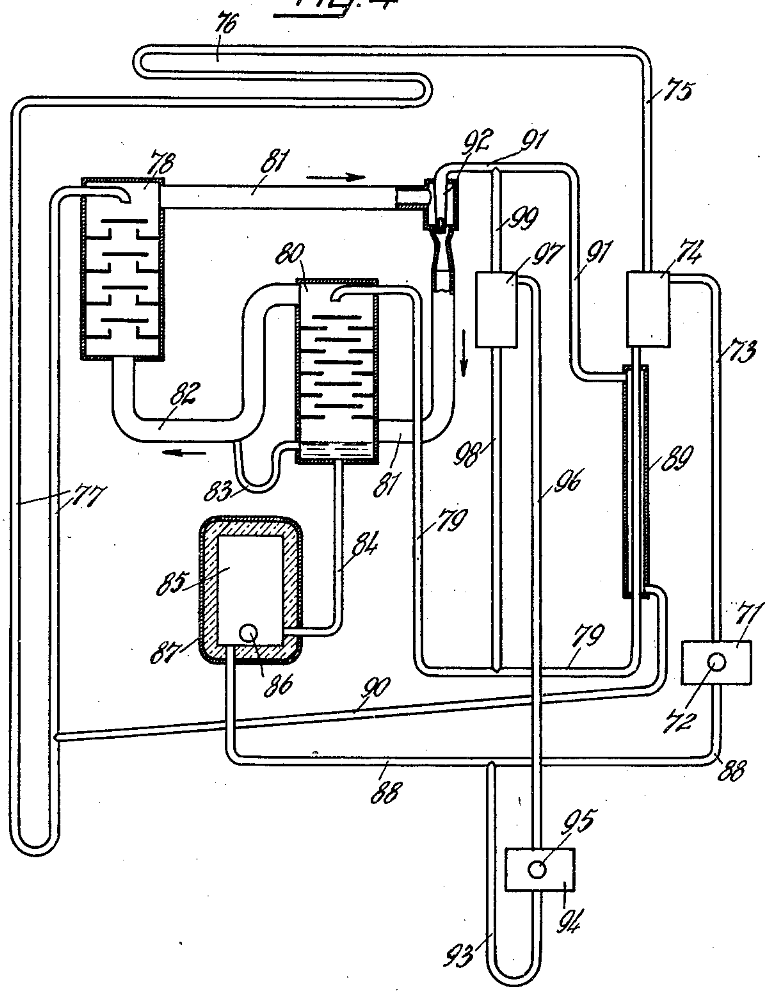
Fig. 4



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Patented Feb. 14, 1933 **1,897,223**

UNITED STATES PATENT OFFICE

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PROCESS AND APPARATUS FOR OPERATING CONTINUOUS ABSORPTION MACHINES

Application filed October 24, 1929, Serial No. 402,027, and in Germany October 26, 1928.

My invention relates to improvements in the process and apparatus for operating continuous absorption machines.

The main advantage of the continuous absorption machine over the intermittent absorption machine is that it is able to produce cold continuously. On the other hand the requirement of a continuous heat supply in continuous absorption machines is in some cases a disadvantage.

The object of my invention is to provide a process and apparatus by which by means of a refrigerating machine constructed as continuous absorption machine the production of cold is continued also when the supply of heat to the generator, boiler or still is reduced or entirely discontinued for a considerable time. The invention is of importance in cases where electric current may at certain times, for instance during the night, be obtained at cheaper rates than during other times.

According to my invention the end in view is attained by storing the condensed or liquefied working medium, produced during the supply of heat to the generator, in such a manner that it is able to evaporate after the supply of heat is discontinued, and to thus generate cold. This may, for example, be brought about by providing the evaporator with storage spaces capable of accumulating each a certain amount of condensed working medium.

The process of storing the condensed or liquefied working medium in the evaporator while maintaining the production of cold may be accelerated by cooling the absorber less for the duration of the normal outside heat supply to the generator, or by not making use of the evaporator to its full capacity, for instance, by reducing the air circulation in the cooling chamber.

If with an accumulation of condensed medium the supply of heat is now interrupted, and the output of cold is to be continued unchanged, care must be taken that absorption solution is available in sufficient quantity, during this intermission of heat supply, in order to absorb the stored up working medium after its evaporation. This requirement may, for instance, be complied with by storing absorption solution of low concentration in larger quantities in the absorber. The quantity of the solution to be stored in the absorber should be so proportioned that it corresponds to the quantity of the stored condensed working medium to be evaporated during the interruption of outside heat supply.

A good absorption in the stored solution may, for instance, be obtained by introducing the gaseous working medium below the level of the stored absorption solution. Another possibility to insure a sufficient absorption consists in circulating the absorption solution in the absorption system vigorously also during the cessation of heat supply to the generator. The application of this means has the further advantage that the store of absorption solution may be accommodated at a point of the liquid circulating system located outside the absorber.

In absorption machines with an admixture of an inert or neutral gas the advantage of a circulation continued during the interruption of the heat supply to the generator becomes particularly noticeable, because otherwise the intimate mixture of the gas with the absorption solution would become difficult and the absorber would attain inconveniently large dimensions.

The maintenance of the circulation of the liquid also during the interruption of heat supply to the generator may, for instance, be effected by providing in the cycle of circulation of the absorption solution a special heating point at which only so much gaseous working medium is developed from the absorption solution as is necessary to maintain the circulation of the solution. Assuming a suitable arrangement of the heating device (for example a great depth of immersion of the gas development point, or by making use of "bumping" for conveying the liquid) a very insignificant amount of heat is necessary for this purpose.

In absorption machines with an admixture of an inert auxiliary gas a heatable container is preferably provided in the liquid circulation of the absorption system for the purpose of regulating the quantity of the gas mixture flowing into the absorber. This container is closed at the top or in communication with a part of the machine located at a higher elevation, for instance with the gas pipe leading to the condenser, by a gas pipe provided with a throttling device. As soon as the absorption solution is heated in this receptacle gaseous working medium is developed which displaces some of the absorption solution in the container. Since this displaced solution is backed up in the absorber the gas mixture circulation is more or less diminished in the absorber. If a pipe provided for the circulation of the gas mixture is so arranged that it opens into the lower part of the absorber closely above the normal level of the liquid, regulation of the gas mixture circulation by throttling may be attained in this manner, provided the heatable container is made of sufficient capacity. If necessary, this throttling may be carried to the complete arrest of the gas mixture circulation.

Further construction possibilities will appear as the specification proceeds.

A number of embodiments of my invention are illustrated in the drawings affixed to my specification.

In these drawings:

Fig. 1 represents a diagrammatic sectional elevation of one embodiment,

Fig. 2 a similar view of another embodiment in which the gas separator is likewise adapted to be heated,

Fig. 3 a further embodiment provided with a second evaporator, and

Fig. 4 a still further embodiment and more elaborate system in which the circulation of the gas mixture may be regulated within wide limits.

Referring to Fig. 1 of the drawings, 1 is the generator adapted to be heated by an electric heating cartridge 2, 3 a pipe leading to the gas separator 4 and in which ascends the expelled gaseous working medium, such as vapor mixed with absorption solution (aqueous solution of potassium lye, sodium lye, sulphuric acid and the like). From separator 4 the weak solution is conveyed to the absorber 6 by a pipe 5 which opens into its upper portion while the separated gaseous working medium passes through pipe 7 to the condenser 8 where it is condensed or liquefied with discharge of heat. The condensate passes through an intermediate container 9 and a U-shaped pipe 10, forming with it a pressure maintaining device, into a pipe 11 which opens into the upper part of the evaporator 12. In the evaporator are provided liquid trays 13 arranged in staggered relation, and constituting storage chambers for working medium not evaporating at once. From the bottom of evaporator 12 the gaseous working medium passes to the lower part of the absorber 6 through a pipe 15. This absorber is likewise equipped with storage trays 14 in a manner similar to the evaporator trays, the absorber trays serving for storing the weak absorption solution introduced into the absorber by pipe 5. The lower part of absorber 6 is so designed that it is able to accommodate a continuous store of liquid 16. A pipe 17 which forms a heat exchanger with pipe 5 returns the absorption solution concentrated in the absorber into generator 1.

With the hereinbefore described absorption machine a continuous production of cold is possible not only so long as the condenser 8 is vigorously cooled but also the absorber 6. By an increased supply of heat to the generator the result may be attained, however, that more working medium is expelled and condensed than the absorber is able to absorb. The storage spaces or trays of evaporator 12 consequently become filled with unevaporated working medium. If simultaneously the absorber cooling is reduced (in the case of artificial air cooling by arresting a fan, for instance), the process of storage in the evaporator is still more accelerated. If the heating of the generator is now restricted, even to the point of interrupting it altogether, the further production of cold takes place at the expenditure of the liquid working medium stored up in the evaporator, the solvent necessary for the absorption being available in the storage spaces of the absorber. Since the absorption capacity of the absorption solution in the absorber drops gradually, the evaporation and thus the output of cold gradually drops.

If now the cooling of the absorber is increased the absorption capacity of the solution is increased and the evaporation becomes more lively again.

The absorption process is, furthermore, promoted if in storing absorption solution in trays, these trays are made brim full, so that by the volume increase of the solution, due to absorption during the restricted heat supply, an overflow of the upper and a spraying of the lower storage trays occurs. A further improvement of the absorption may be attained by not stopping the supply of heat to the generator altogether, or by resuming it to only a limited extent some time after the cessation. In this way the result is obtained that the circulation of the liquid through the absorber is not interrupted so that an intimate mixing of the gaseous working medium with the solvent in the gas space of the absorber is insured at all times.

The mode of operation described so far assumes comparatively large storage spaces for the absorption solution in the absorber. If, however, as already pointed out, merely an insignificant heating of the generator is maintained so that circulation of the liquid through the generator, the liquefier and the absorber is maintained also during the duration of the reduced heating of the generator, it is possible to manage with considerably smaller storage spaces in the absorber. In certain circumstances it is then possible to abandon altogether the provision of storage spaces in the absorber since with the continued circulation of liquid it is possible to store the absorption solution at any other point of the cycle of circulation of the liquid (for instance as a store of liquid 16). This will be more fully discussed as the description of further modifications of the system proceeds.

Referring to the embodiment illustrated in Fig. 2 of the drawings 21 is a generator adapted to be heated by an electrical heating element 22 and in which gaseous working medium (for instance ammonia) is expelled from absorption solution supplied from a storage container 40 through a pipe 23. The expelled medium then ascends together with the weak absorption solution through a narrow riser 24 into the separator 25 where the ammonia vapor is separated from the liquid. The liquid flows through a U-shaped pipe 26 into the absorber 27 at the top. Here it trickles down over baffle plates 28 and encounters on its way the mixture of evaporated working medium and an inert gas admixed with it coming from the evaporator 24 and supplied to the absorber through a gas pipe 30. The gas mixture partly deprived of its content of gaseous working medium returns through the gas pipe 31 to the upper end of the evaporator 29. The gaseous working medium separated in separator 25 passes through a pipe 32 into the condenser 33 where it is condensed. The condensate enters one leg of a U-shaped pipe 34, the two legs of which terminate in the liquid space and the gas space respectively of a condensate storage container 35. Pipe 34 together with this container represents a pressure maintaining device. From container 35 the condensate flows into the upper end of a pipe 36 of comparatively wide cross-section and thence enters evaporator 29 at the top. The evaporator is provided with a plurality of superposed tray-like liquid containers 38 alternating with distribution plates 37, the said trays forming storage receptacles for storing working medium not evaporated at once. The evaporated medium is discharged at the bottom of evaporator 29 through mixture pipe 30 which enters absorber 27 near the bottom.

From the lower end of absorber 27 the strong absorption solution passes into the aforementioned liquid storage container 40 through a pipe 39 which forms a heat exchanger with the pipe 26 as well as with the pipe 23, both of which carry solution warmer than the one discharged from absorber 27. This container 40 is adapted to be heated by a cartridge 41 and is covered with a lagging or poor conductor of heat 42. From the lower part of the container 40 the absorption solution returns to generator 21 by the pipe 23 mentioned before. The upper part of container 40 is in communication with condenser 33 by a gas pipe 44, terminating in a nozzle 43.

If generator 21 is normally heated the system described functions in every way like an ordinary continuous absorption refrigerating machine with gas mixture circulation between the evaporator and the absorber. If the generator is more intensely heated the storage trays of the evaporator become filled with liquid working medium. In order to be able to accelerate the charging of evaporator 29 with a store of liquid refrigerating medium, heating elements 45 are built into the liquid space of gas separator 25 whereby it is possible to develop gaseous working medium also from the leaner absorption solution contained in separator 25. If generator 21 as well as separator 25 are heated the operation may, in the manner already described above, be so conducted that liquid working medium becomes rapidly stored up in the storage spaces 38 of the evaporator 29. If the heating is confined to generator 21, however, the gas development in this generator in the first instance serves to maintain the circulation of the liquid through the absorber and relatively little condensed working medium reaches the evaporator 29. In the latter therefore takes place mainly evaporation of the condensed working medium stored in the trays 38, and the degree of this evaporation depends on the quantity of the gaseous working medium which can be absorbed in absorber 27 in the unit of time. The speed of the evaporation depends, furthermore, also upon the greater or smaller intensity of the gas mixture circulation through the evaporator and absorber. This circulation may be regulated by supplying to the solution in container 40 heat by the heating element or cartridge 41. The gas thereby developed from this absorption solution escapes slowly only through the fine nozzle 43, and mainly displaces absorption liquid from container 40 through generator 21 and separator 25 into absorber 27. So much liquid can be displaced from container 47 into the absorber that the gas mixture pipe 30 connecting the bottom part of evaporator 29 with the bottom part of the absorber fills more or less with liquid so that the admission of gas mixture to the absorber is gradually restricted and finally stopped altogether. By continuous heating of container 40 the circulation of the gas mixture may be completely arrested, as will be obvious from the above description, and therewith also stops the further evaporation and the production of cold. The heating of container 40 thus presents a means of restricting at times the production of cold as desired, or of stopping it altogether and at the same time of speeding up the storage of condensed working medium.

Referring to the embodiment illustrated in Fig. 3 of the drawings 51 is the generator, 52 the electric heating element for the generator, 53 the condenser, 54 the evaporator and 55 the absorber. The evaporator 54 is equipped with cup-shaped storage receptacles 56 for the reception of the condensed working medium to be stored. The lower end of evaporator 54 is connected with the upper end of the absorber 55 by a gas conduit 57. A second gas conduit 58 leads from the upper part of evaporator 54 to the lower part of absorber 55. The lower end of the absorber is connected with the generator 51 by a liquid pipe 59. From generator 51 a further liquid pipe 60 leads to a second gas developer or generator 61 adapted to be heated by a heating element 62. The gas developed in it ascends together with the absorption solution in a thin pipe 63 and separates from the entrained liquid in a separator chamber 64. This chamber is on the one hand by a gas pipe 65 connected with a nozzle 66 which is located in the gas mixture pipe 58 and effects in it the circulation of the gas mixture in the direction of the arrows, and on the other hand a liquid pipe 67 leads from separator 64 to the upper end of absorber 55 and on its way forms a heat exchange with the liquid pipes 59 and 60. If by the apparatus described cold is to be supplied in normal manner, a circulation of liquid through the vessels 61, 64, 55 and 51 is first set up by supplying electric current to the heating element 62. By supplying simultaneously the gaseous working medium developed thereby to nozzle 66, the gas mixture circulation through the evaporator and the absorber is set in motion. By heating up the heating element 52, rich solution from the absorber, traversing the generator 51, is deprived of gas in generator 51 and the expelled gaseous working medium is condensed in the condenser 53. The condensate thence passes into the evaporator 54, as in the system illustrated in Fig. 2 of the drawings, and here encounters the inert gas traversing the evaporator from the bottom toward the top. This gas becomes during the passage through the evaporator enriched with gaseous working medium and the gas mixture enters through the pipe 58 into the lower part of absorber 55 where it is again partially freed of its content of gaseous working medium by the absorption solution flowing in counter current to it. The strong absorption solution produced in this way returns through the liquid conveying pipe 59 into the two series connected generators 51 and 61.

If now, after a sufficient quantity of condensed working medium has accumulated in the storage receptacles 56 of the evaporator 54, the heating of generator 51 is interrupted, the further gas development in this vessel is stopped as well as the condensation of the working medium in condenser 53, but the generation of cold in the evaporator 54 continues. The quantity of the stored working medium to be evaporated may be regulated on the one hand by making the circulation of the liquid through the absorber 55 more or less vigorous, on the other hand by varying the supply of gas through nozzle 66 into the gas mixture pipe 58 and by thus controlling the circulation of the gas mixture. Both of these procedures take place by regulating the supply of heat to the generator 61. The more this generator is heated the larger becomes the volume of gas separated in the separator 64 and the more is supplied to the nozzle 66 by the pipe 65. With the quantity of the nozzle vapor, its pressure increases so that the circulation of the gas mixture through the absorber and the evaporator is accelerated. At the same time the head of liquid above the generator drops. Since on this head in turn depends the intensity of the liquid circulation, the latter is diminished at a smaller liquid head. In this way means are given to tune the liquid and the gas mixture circulation in relation to each other in such a manner that a maximum of cold production under each given condition is attained.

The gas expeller 51 forms a storage vessel for the absorption solution when the supply of heat is interrupted.

A further embodiment of my invention is illustrated in Fig. 4 of the drawings. Here the gas (for instance ammonia) developed from the absorption solution in a generator 71 by means of a heating element 72 lifts the weak absorption solution in an ascending pipe 73 into a separator 74. The ammonia separated from the liquid flows through a pipe 75 into the condenser 76 where it is condensed with liberation of heat. The condensate then passes through a U-shaped pipe 77 into the evaporator 78 which is equipped with storage trays as previously described for storing the condensed working medium. The weak absorption solution flows from separator 74 through a pipe 79 into the absorber 80 which by gas pipes 81 and 82 is in communication with the evaporator 78 in the conventional manner illustrated in the drawings. From the lowest point of pipe 82 a drainage pipe 83 forming a liquid seal leads into the liquid space of absorber 80.

From the lower part of absorber 80 the strong absorption solution first reaches through a pipe 84 a container 85 closed at the top, and at the bottom of which is located a heating element 86. This container is provided with a lagging 87. From the lower part of container 85 a pipe 88 returns the strong absorption solution to generator 71.

The part of pipe 79 close to separator 74 passes through a jacket 80 which is connected with the previously mentioned U-shaped pipe 77 by a pipe 90. This arrangement serves to evaporate condensed working medium in jacket 89 by means of the heat contained in the weak absorption solution traversing the pipe 79. The gaseous working medium developed from the condensate passes through a pipe 91 into a nozzle 92 located in gas circulation pipe 81 and in this way effects the gas mixture circulation through the absorber and the evaporator in the direction of the arrows shown.

From the pipe 88 returning the strong solution to the generator 71 branches a U-shaped pipe 93 which leads to an auxiliary generator 94 adapted to be heated by a heating element 95. The gas bubbles developed in it lift the thus weakened solution by means of a riser 96 into a second separator 97 from where the solution passes through a pipe 98 into the liquid pipe 79 and thus to absorber 80 while the gas separated from the solution is delivered by pipe 99 into the nozzle gas pipe 91.

The above described absorption machine may be operated in various ways. If merely the generator 71 is heated the development of the gaseous working medium as well as its condensation, evaporation and absorption takes place in the normal manner. The circulation of the gas mixture through the evaporator and the absorber is then maintained by the nozzle gas which is developed in the pipe 89 from condensed operating medium.

If now, after sufficient liquid working medium is stored in the evaporator, the heating element 72 is switched off, and instead the heating element 95 is switched on, the gas development in the generator 71 and the formation of condensate in the condenser 76 ceases. The circulation of liquid through the absorber, however, should be continued. For the maintenance of this circulation a small supply of heat only is necessary on account of the great immersion depth of generator 94. Since the gas, developed in generator 94 after it has lifted the absorption solution into the auxiliary separator 97, flows to the nozzle 92 the circulation of the gas mixture through the absorber and evaporator is also maintained. If it is desired to reduce the useful output of the machine during the storage of the working medium in the evaporator, which, for instance, is necessary if for the purpose of accelerating the storage both generators 71 and 94 are heated simultaneously, this may be effected by developing gas from the absorption solution traversing container 85 by operating heating element 86. This gas accumulates in the upper part of container 85, and gradually displaces the liquid through pipe 84 into absorber 80. Thus the level of the liquid rises in the absorber and gradually effects a throttling of the gas mixture circulation in the lower part of pipe 81. If the heating of the container 85 is continued until the circulation of the gas mixture is stopped entirely cessation of the evaporation and absorption and thus of the useful output of the machine is brought about. By regulating the heating period of the heating element 86 it is thus possible to regulate the circulation of the gas mixture within wide limits and in this way to affect extensively the useful output of the absorption machine.

It will be readily understood that structural changes and modifications may be made without departing from the spirit of my invention or the scope of the appended claims.

I claim as my invention:

1. In a normally continuous, open circulation absorption machine including an evaporator and an absorber in its conduit system, the method of operating said machine at substantially normal output intermittently with a restricted artificial heat supply, which consists in producing and storing during the normal heat supply to the machine at normal operation excessive amounts of condensed operating medium in the evaporator, and permitting the evaporation of said stored medium during the restriction of heat supply, and in maintaining the absorption liquid circulation through the absorber during said restriction, whereby the production of cold by the evaporator is continued during the period of restricted heat supply.

2. In a normally continuous, open circulation absorption machine including an evaporator and an absorber in its conduit system and a neutral gas circulating system between the evaporator and the absorber, the method of operating said machine at substantially normal output intermittently with a restricted artificial heat supply, which consists in producing and storing during the normal heat supply to the machine at normal operation excessive amounts of condensed operating medium in the evaporator, and permitting the evaporation of said stored medium during the restriction of heat supply, and in maintaining the absorber at a lower temperature during said restriction than during normal heat supply, and in maintaining the absorption liquid circulation through the absorber, and the neutral gas circulation through the evaporator and absorber during said restriction, whereby the production of cold by the evaporator is continued during the period of restricted heat supply.

3. An open circulation absorption machine of the continuous type having a gas generator operated by supplying heat from outside, an absorber, an evaporator, a condenser and a conduit system operatively connecting aforesaid vessels, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted heat supply to the generator,

comprising a plurality of storage trays disposed in said evaporator, and adapted to accumulate an excess of condensed operating medium during normal heat supply to the generator, and means for maintaining the absorption liquid circulation through the absorber during said restriction, whereby through the evaporation of the stored medium in the evaporator the production of cold is continued in the evaporator during said restriction or heat supply.

4. An open circulation absorption machine of the continuous type having an absorber, an evaporator, a condenser, a main gas generator operated under normal, continuous operating conditions by supplying a normal amount of heat from outside, and a conduit system operatively connecting aforesaid vessels for circulating operating medium and absorption solution, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted outside heat supply to said main generator, comprising a plurality of storage trays disposed in said evaporator and adapted to accumulate an excess amount of condensed operating medium during normal heat supply to said generator, an auxiliary gas generator, disposed in the portion of the conduit system carrying absorption solution and adapted to receive a small amount of outside heat, sufficient to maintain circulation of solution through said absorber when the heat supply to the main generator is restricted, to permit during the period of heat restriction the evaporation of the medium stored in the evaporator, thereby causing the cold production in the evaporator to continue.

5. An open circulation absorption machine of the continuous type having an absorber, an evaporator, a condenser, a main gas generator operated under normal continuous operating conditions by supplying a normal amount of heat from outside, and a conduit system operatively connecting aforesaid vessels for circulating operating medium and absorption solution, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted outside heat supply to said main generator, comprising a plurality of storage trays disposed in said evaporator and adapted to accumulate an excess amount of condensed operating medium during normal heat supply to said generator, an auxiliary gas generator, connected in series with the main generator and adapted to receive a small amount of outside heat, sufficient to maintain circulation of solution through said absorber when the heat supply to the main generator is restricted, to permit during the period of heat restriction the evaporation of the medium stored in the evaporator, thereby causing the cold production in the evaporator to continue.

6. An absorption machine of the continuous type having an absorber, an evaporator, a condenser, a main gas generator operated under normal, continuous operating conditions by supplying a normal amount of heat from outside, and a conduit system operatively connecting aforesaid vessels for circulating operating medium and absorption solution, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted outside heat supply to said main generator, comprising a plurality of storage trays disposed in said evaporator and adapted to accumulate an excess amount of condensed operating medium during normal heat supply to said generator, an auxiliary gas generator connected in shunt to the main generator and adapted to receive a small amount of outside heat sufficient to maintain circulation of solution through said absorber when the heat supply to the main generator is restricted, to permit during the period of heat restriction the evaporation of the medium stored in the evaporator, thereby causing the cold production in the evaporator to continue.

7. An open circulation absorption machine of the continuous type having an absorber, an evaporator, a condenser, a main gas generator operated under normal, continuous operating conditions, by supplying a normal amount of heat from outside, and a conduit system operatively connecting some of aforesaid vessels to circulate absorption solution and others of said vessels to circulate a mixture of gaseous medium and inert gas, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted outside heat supply to said main generator, comprising a plurality of storage trays disposed in said evaporator and adapted to accumulate an excess amount of condensed operating medium during normal heat supply to said generator, and an auxiliary gas generator, disposed in the portion of the conduit system carrying absorption solution, and adapted to receive a small amount of outside heat, sufficient to maintain circulation of solution through said absorber when the heat supply to the main generator is restricted, to permit during the period of heat restriction the evaporation of the medium stored in the evaporator, thereby causing the cold production in the evaporator to continue, each of said generators having a connection for discharging its developed gas, the connection of one generator leading to said condenser and the connection of the other generator leading to the conduit system containing the gas mixture, for maintaining the circulation of the latter for all operating conditions of the machine.

8. An open circulation absorption machine of the continuous type having an absorber, an evaporator, a condenser, a main gas generator

operated under normal, continuous operating conditions by supplying a normal amount of heat from outside, and a conduit system operatively connecting some of aforesaid vessels to circulate absorption solution, and others of said vessels to circulate a mixture of gaseous medium and inert gas, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted outside heat supply to said main generator, comprising a plurality of storage trays disposed in said evaporator and adapted to accumulate an excess amount of condensed operating medium during normal heat supply to said generator, and an auxiliary gas generator disposed in the portion of the conduit system carrying absorption solution, and adapted to receive a small amount of outside heat, sufficient to maintain circulation of solution through said absorber when the heat supply to the main generator is restricted, to permit during the period of heat restriction the evaporation of the medium stored in the evaporator, thereby causing the cold production in the evaporator to continue, said main generator having a connection for supplying its developed gas to said condenser, and said auxiliary generator having a gas connection with the conduit system containing the gas mixture for maintaining the circulation of the latter during the normal and the restricted main generator heat supply.

9. In absorption machine of the continuous type having an absorber, an evaporator, a condenser, a main gas generator operated under normal, continuous operating conditions by supplying a normal amount of heat from outside, a conduit system including the absorber and the generator for circulating absorption solution, a conduit system including the absorber and the evaporator for circulating a mixture of gaseous operating medium and inert gas, and a connection for delivering developed gas from the generator to said condenser and a connection for delivering condensed medium from the condenser to the evaporator, in combination with means for permitting the operation of said machine at substantially normal output intermittently with a restricted outside heat supply to said main generator, comprising a plurality of storage trays disposed in said evaporator and adapted to accumulate an excess amount of condensed operating medium during normal heat supply to said generator, and an auxiliary gas generator connected in shunt to said main generator and adapted to receive a small amount of outside heat sufficient to maintain circulation of solution through said absorber when the heat supply to the main generator is restricted, to permit during the period of heat restriction the evaporation of the medium stored in the evaporator, thereby causing substantially normal cold production in the evaporator to continue, said auxiliary generator having a gas connection with the gas mixture conduit system for supplying its developed gas to said system to maintain the mixture circulation therethrough, and a heatable liquid container connected between said absorber and said generators, and adapted when heated to displace by the gas developed therein absorption solution through said absorber into the gas mixture system to throttle the mixture circulation therethrough.

In testimony whereof I affix my signature.

EDMUND ALTENKIRCH.