B. WALTER.

DRY BLAST SYSTEM.

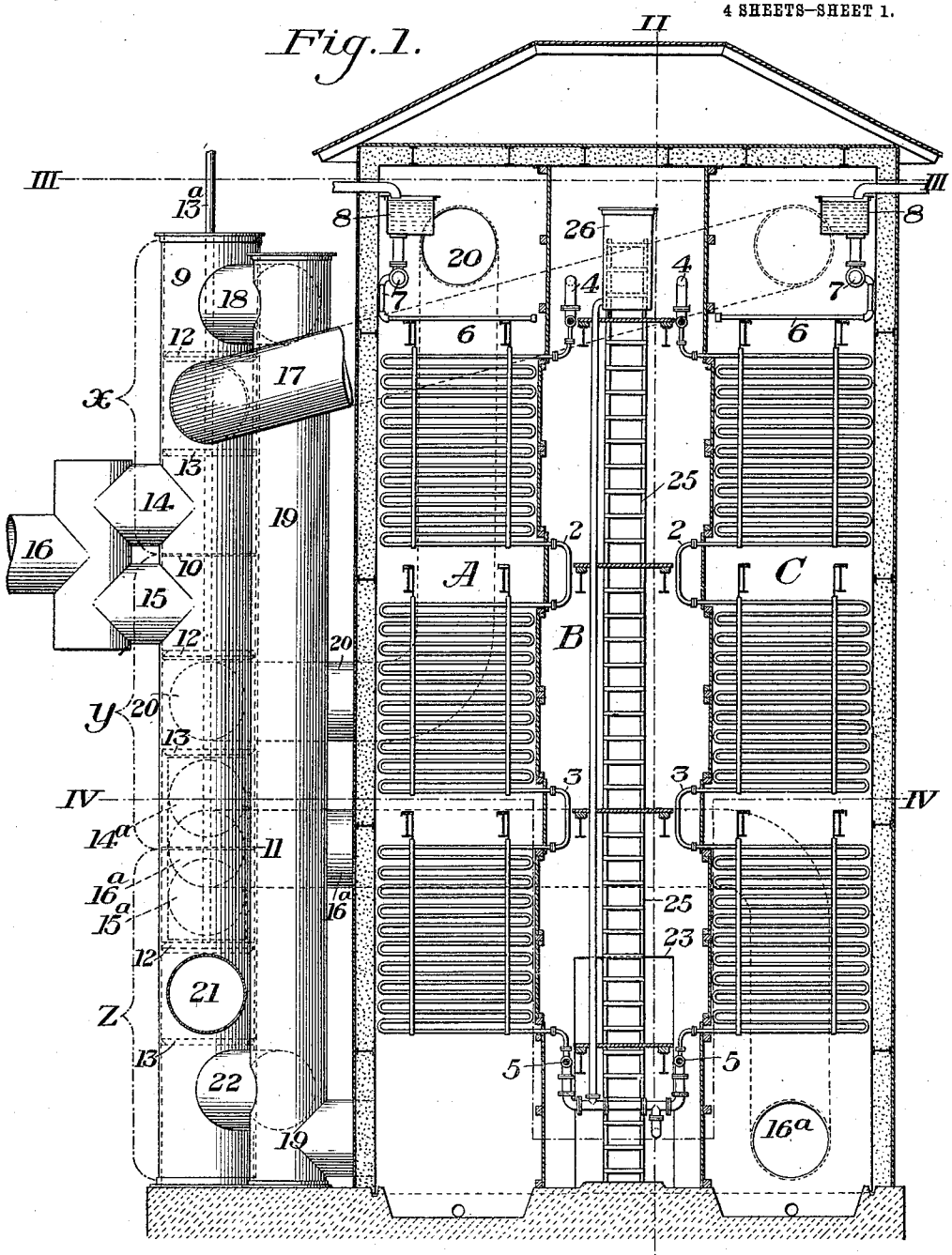
APPLICATION FILED JULY 22, 1912.

1,134,568.

Patented Apr. 6, 1915.

4 SHEETS—SHEET 1.

Fig. 1.



WITNESSES

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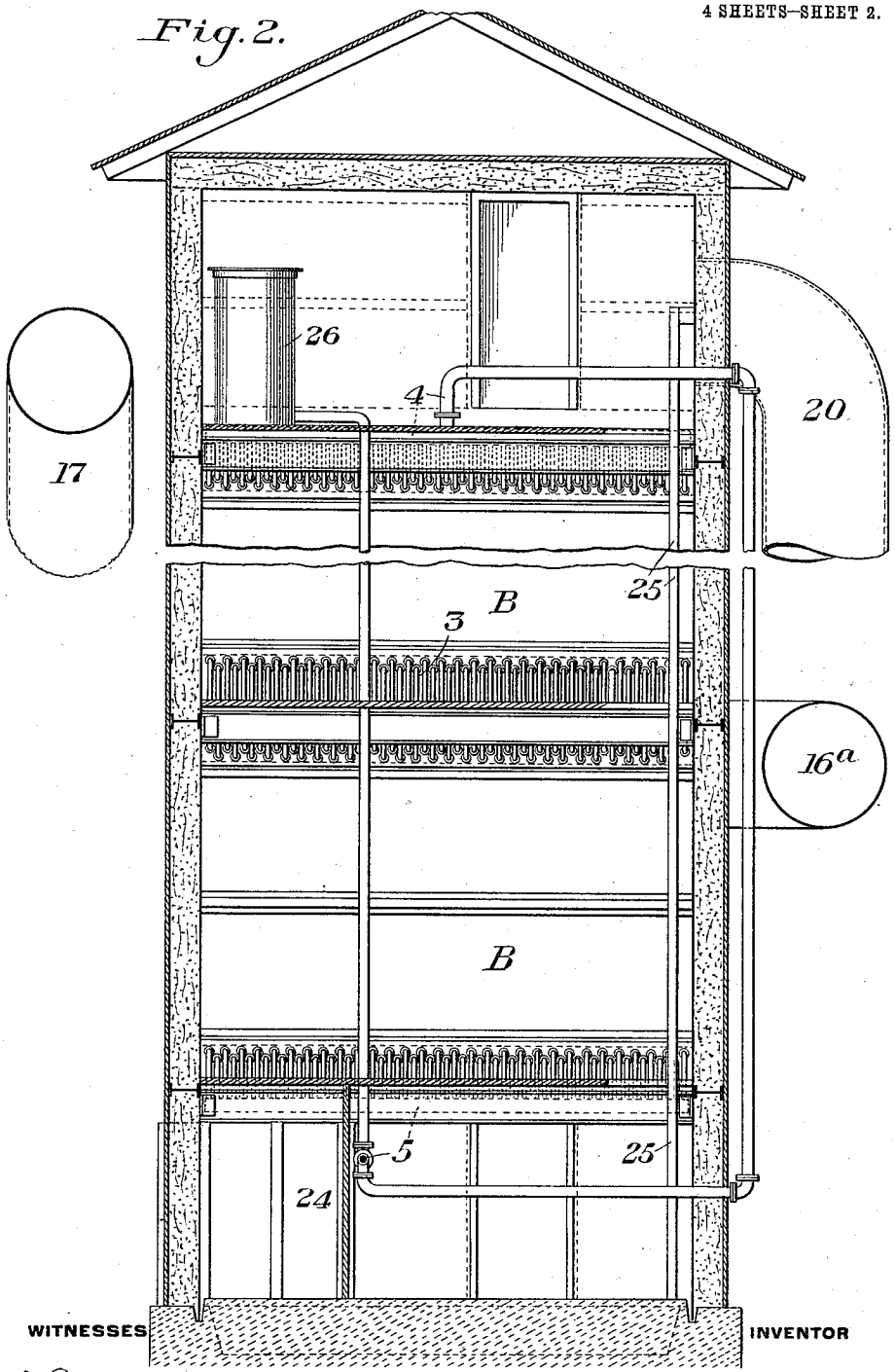
4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

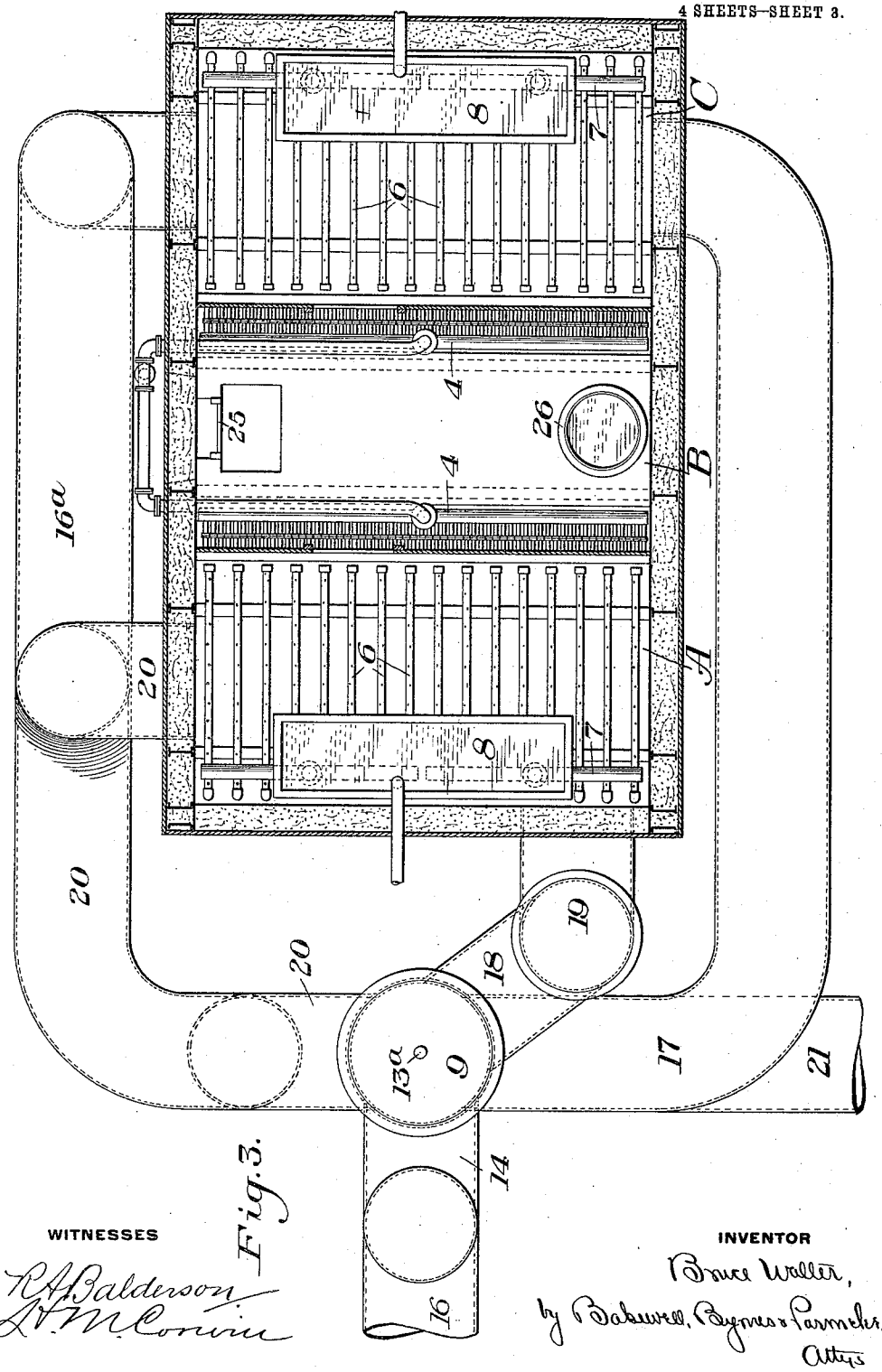

Fig. 3.

WITNESSES

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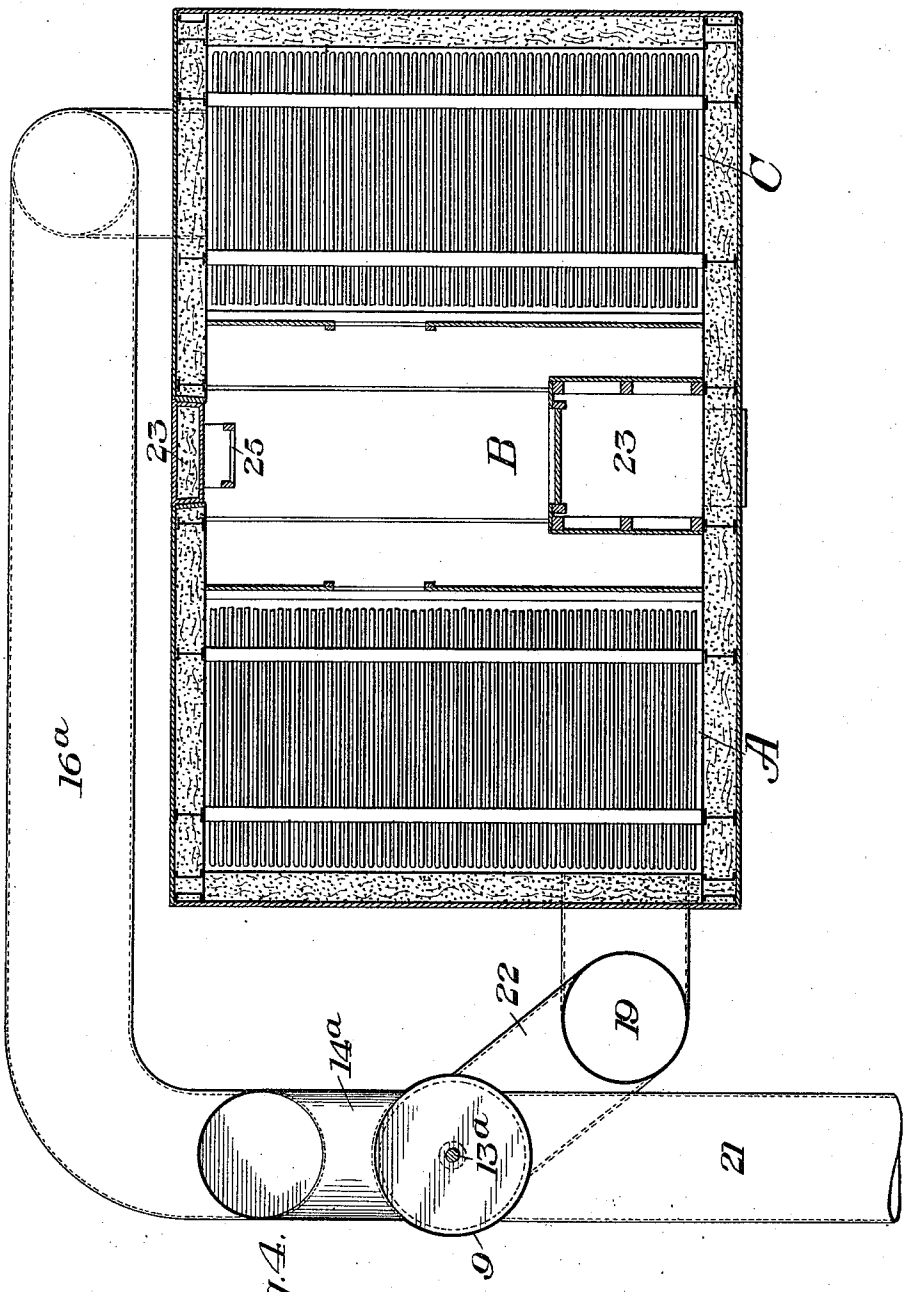

Fig. 4.

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UNITED STATES PATENT OFFICE.

BRUCE WALTER, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO JAMES GAYLEY, OF NEW YORK, N. Y.

DRY-BLAST SYSTEM.

1,134,568. Specification of Letters Patent. Patented Apr. 6, 1915.

Application filed July 22, 1912. Serial No. 710,877.

To all whom it may concern:

Be it known that I, BRUCE WALTER, a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dry-Blast Systems, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which:

Figure 1 is a sectional side elevation, showing one form of my improved apparatus; Fig. 2 is a vertical transverse section on the line II—II of Fig. 1; Fig. 3 is a sectional plan view on the line III—III of Fig. 1; and Fig. 4 is a similar view on the irregular line IV—IV of Fig. 1, showing more clearly the air lock.

My invention relates to the extraction of moisture from air by cooling in accordance with the now well known Gayley system.

The object of the invention is to simplify, cheapen and improve the apparatus, as well as the method, and provide a simple, economical system.

To that end, it consists in a two-stage system in which the circulation of air is reversed as between the two stages.

It also consists in the two-stage reversing system wherein the first stage is a direct contact system with a refrigerated liquid, while the second stage is an indirect system, the air being cooled by conduction through pipes.

In the drawings, in which I show a preferred apparatus for carrying out my invention, I show a tower divided vertically into three compartments A, B and C. The compartments A and C are the working compartments, while the central one is an access compartment.

Each compartment A and C has coils of pipe arranged preferably in separate groups, as shown. These groups of coils may be connected in any desirable manner, as by pipe connections shown at 2 and 3. The top set or group connects with the brine inlet 4, while the bottom set connects with the brine outlet 5. The compartments are vertically closed off from each other, access being had through compartment B to the compartments A and C through suitable door-closed openings.

Each compartment A and C is provided in its upper part with water distributers, shown at 6, which preferably consist of perforated pipes. These perforated pipes are fed through connections 7 from water supply tanks 8, in which a substantially constant level is maintained. Previously refrigerated water is supplied to these tanks 8, 8, successively, depending on which compartment is acting for the first stage. The bottom of each compartment A and C is provided with a suitable tank or well in which the water is received and from which it may be drawn out and taken back to the cooling apparatus, if desired.

In order to reverse the order of flow from the compartments A and C, I provide a reversing valve system, which is preferably so arranged that the air always enters at the bottom of each chamber and passes upwardly therethrough, or the order of entering the chambers is reversed.

In the form shown, to carry out this function, I provide a vertical valve chamber 9 in the form of a stand pipe, having pipe partitions 10 and 11, dividing it into three chambers x, y and z. Each of these chambers is provided with a double-seat valve, which seats against upper and lower seats 12 and 13, respectively, in each chamber. All of the valves are fastened to the same vertical stem 13^a, so that they move in unison. From above and below the partition 10, pipes 14 and 15 connect with a single pipe 16; the same fixture being provided for the lower partition 11, in which case, the parts are marked with the same numerals with the letter "a" applied. The pipe 16 leads to the blowing engine, while the pipe 16^a leads to the lower part of compartment C.

In the upper compartment, a pipe 17 leads from between the seats 12 and 13 over to and enters the top of compartment C, while above the seat 12, a pipe 18 leads into pipe 19, which enters the bottom or compartment A. In compartment y, a pipe 20 leads from between the valve seats 12 and 13 to the upper part of compartment A, while between the seats 12 and 13 in the lower compartment z is the inlet 21 from the fan. With the parts as shown, the air entering at 21 from the fan passes out through 22 into pipe 19, and thence into the bottom of compartment A. It rises through this compartment, passing back through pipe 20 into compartment y of the valve, and thence out

through 16^a to the lower part of compartment C. Rising through this compartment, it passes out through pipe 17 into compartment x and thence down and out through the outlet pipe 16 to the blowing engine. On reversal, the valves being moved down to their lower seats, the air entering through the fan passes through pipe 16^a into the bottom of compartment C, rises through this compartment and passes back to the valve chamber through pipe 17; then passing out through pipe 18, it flows down through pipe 19 into chamber A and rising through this chamber, it passes out through pipe 20 to compartment y, and thence through pipes 15 and 16 to the blowing engine.

When the air first enters the bottom of compartment A, the previously refrigerated water in this tank is fed downwardly in a shower or rain, thus removing a considerable amount of moisture from the air. Thereafter the partially dry air enters the bottom of compartment C and passes up about the dry pipes through which refrigerated brine or ammonia is circulated. In this second stage, the air is cooled to the desired low temperature, and the desired degree of dryness thus reached. When the system is reversed and the air first enters the bottom of compartment C, then the previously refrigerated water is showered through this compartment and the supply is shut off in compartment A.

While the air is passing through the first compartment, the brine is held in the coils in that compartment, without circulation; but in the second compartment, a circulation of the brine is being maintained through the coils. On reversal, this condition is reversed, the circulation being stopped in the one compartment and started in the other.

In order to provide for this removal of defective pipe coils, etc., I preferably provide a large opening 23 in the wall of the central compartment, which is provided with a suitable closure. Defective pipe coils may be passed out through this opening and other coils taken in through it.

The tower is preferably insulated on all sides as indicated, and provided with an insulated roof. The central compartment is preferably provided with a ladder 25, by which the various groups of pipes in the compartments may be reached, and if desired, a brine tank 26 may also be placed at the top of this central compartment.

The advantages of my invention will be obvious to those skilled in the art, since provision is made for thawing the frozen rime from the indirect acting coils, without cutting out a compartment for this purpose. The incoming air on reversal, together with the water used in the first stage, act to thaw off the rime from the pipes in this compartment which was formerly the second stage, and thus not only thawing off the frozen rime, but aiding in cooling down the air thereby.

The apparatus is relatively economical and simple and cheap to construct. It is also efficient in operation.

Many changes may be made in the form and arrangement of the chambers, means for reversing the stages, etc., without departing from my invention.

It will be obvious, for instance, that instead of using the apparatus to dry the air before compression, it may be arranged intermediate the blowing engine and the stoves. In this case, the connection 21 would constitute the intake from the blowing engine and the connection 16 the outlet to the stoves.

I claim:

1. In the drying of air for metallurgical purposes, the steps consisting of feeding the air successively through a plurality of compartments over pipes, the air being subjected to the direct action of a counter-current of previously cooled fluid in the first compartment, further cooled in the second compartment by conduction from the pipes, and periodically reversing the order of flow through the compartments while always subjecting the air to a counter-current of previously cooled liquid in the one which it first enters; substantially as described.

2. In the drying of air for metallurgical purposes, the steps consisting in feeding the air upwardly through a succession of compartments and subjecting it to a cooling action in each compartment, and periodically reversing the order of flow through the compartments, thereby, at each reversal, causing the air entering the first compartment in its reversed order of flow to thaw off rime formed therein prior to the reversal, and also thereby utilizing such rime to increase the cooling action on the air, substantially as described.

3. In the drying of air for metallurgical purposes, the steps consisting of feeding the air successively through a plurality of compartments, subjecting the air to the direct action of a counter-current of cooling liquid in the first compartment, then further cooling the air in the second compartment, and periodically reversing the order of flow through the compartments; substantially as described.

4. In the drying of air for metallurgical purposes, the steps consisting of feeding the air successively through a plurality of compartments, subjecting the air to the direct action of a counter-current spray of cooling liquid in the first compartment, then further cooling the air in the second compartment, and periodically reversing the order of flow through the compartments; substantially as described.

5. In the drying of air for metallurgical purposes, the steps consisting of feeding the air upwardly through a plurality of compartments, subjecting the air to the direct action of a counter-current spray of cooling liquid in the first compartment, then feeding the air through a pipe cooling compartment, periodically reversing the order of flow through said compartments, and subjecting the air to the direct action of a cooling fluid in the first compartment; substantially as described.

6. In the drying of air for metallurgical purposes, the steps consisting in feeding the air successively in a plurality of compartments over pipes, the air in the first compartment being subjected to the direct action of a counter-current of previously cooled liquid, and in the second compartment being subjected to further refrigeration by direct conduction from the pipes, and periodically reversing the order of flow through the compartments while always subjecting the air to a counter-current of cooled liquid in the first compartment, and confining the circulation of cooling liquid through the pipes of the second compartment, thereby, after each reversal, utilizing the air and water used in the first compartment to thaw off the rime produced on the pipes prior to reversal; substantially as described.

In testimony whereof, I have hereunto set my hand.

BRUCE WALTER.

Witnesses:
G. M. VIERS,
H. M. CORWIN.