C. F. PEASE.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

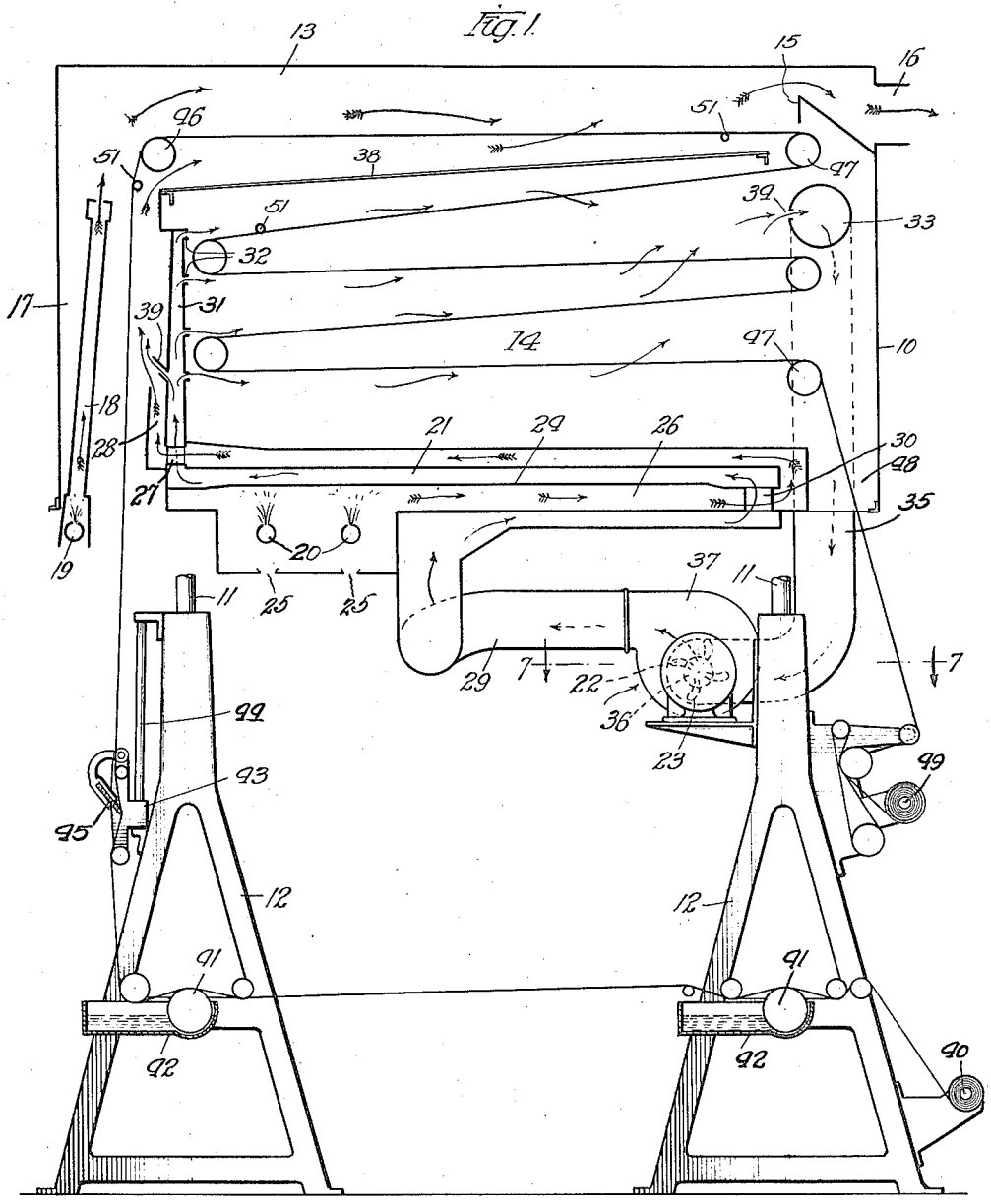
APPLICATION FILED MAR. 6, 1917.

1,260,570.

Patented Mar. 26, 1918.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Robert H. Weir
Arthur W. Carboy

Inventor
Charles F. Pease
George Bagnall Jones Atty

C. F. PEASE.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

APPLICATION FILED MAR. 6, 1917.

1,260,570.

Patented Mar. 26, 1918.

6 SHEETS—SHEET 2.

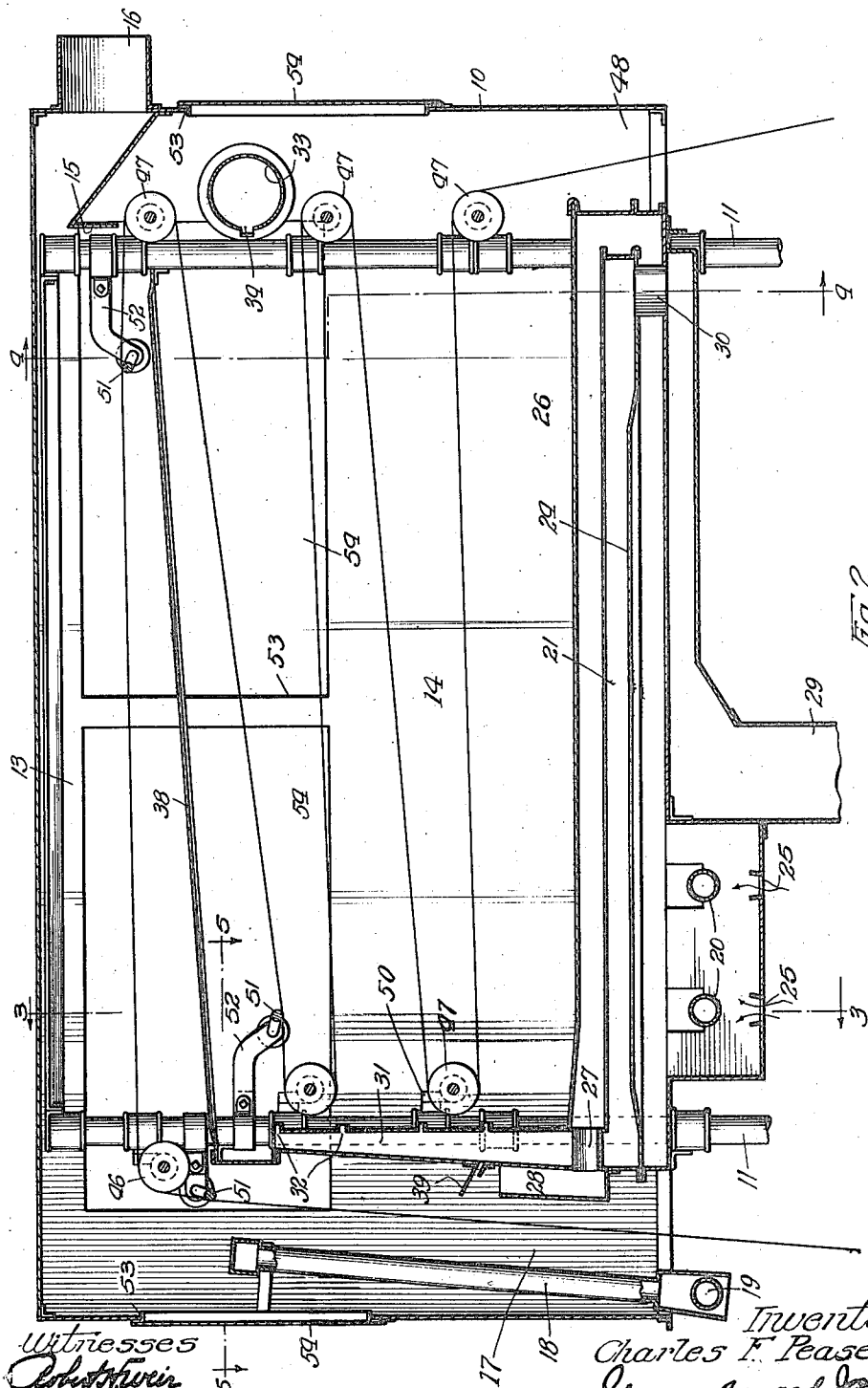


Fig. 2.

Witnesses
Robert H. Irwin
Arthur M. Carlson

Inventor
Charles F. Pease
George Bayard James
Attys.

C. F. PEASE.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

APPLICATION FILED MAR. 6, 1917.

1,260,570.

Patented Mar. 26, 1918.

6 SHEETS—SHEET 3.

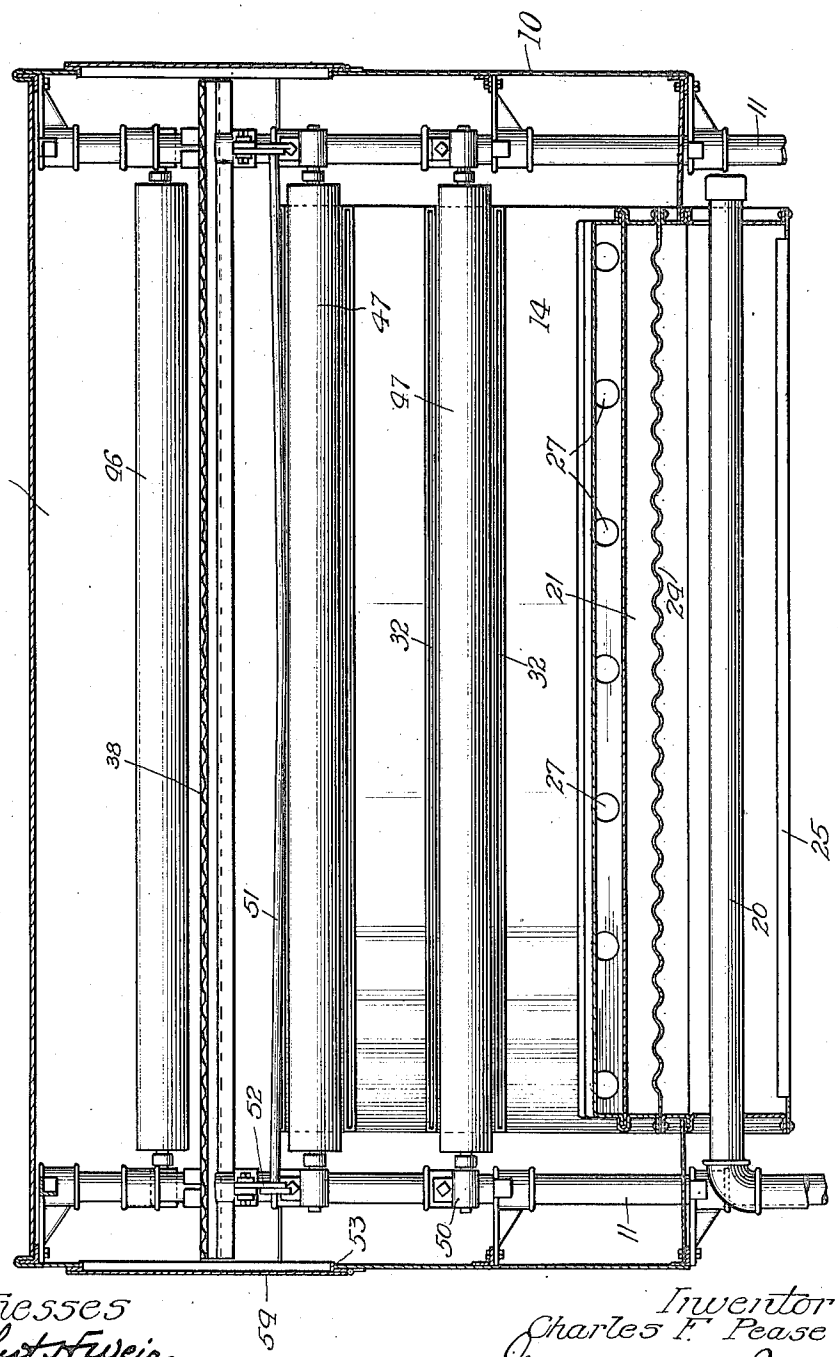


Fig. 3.

Witnesses
Robert H. Weir
Arthur M. Parker

Inventor
Charles F. Pease
Geo. Bayard Jones, Atty.

C. F. PEASE.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

APPLICATION FILED MAR. 6, 1917.

1,260,570.

Patented Mar. 26, 1918.

6 SHEETS—SHEET 4.

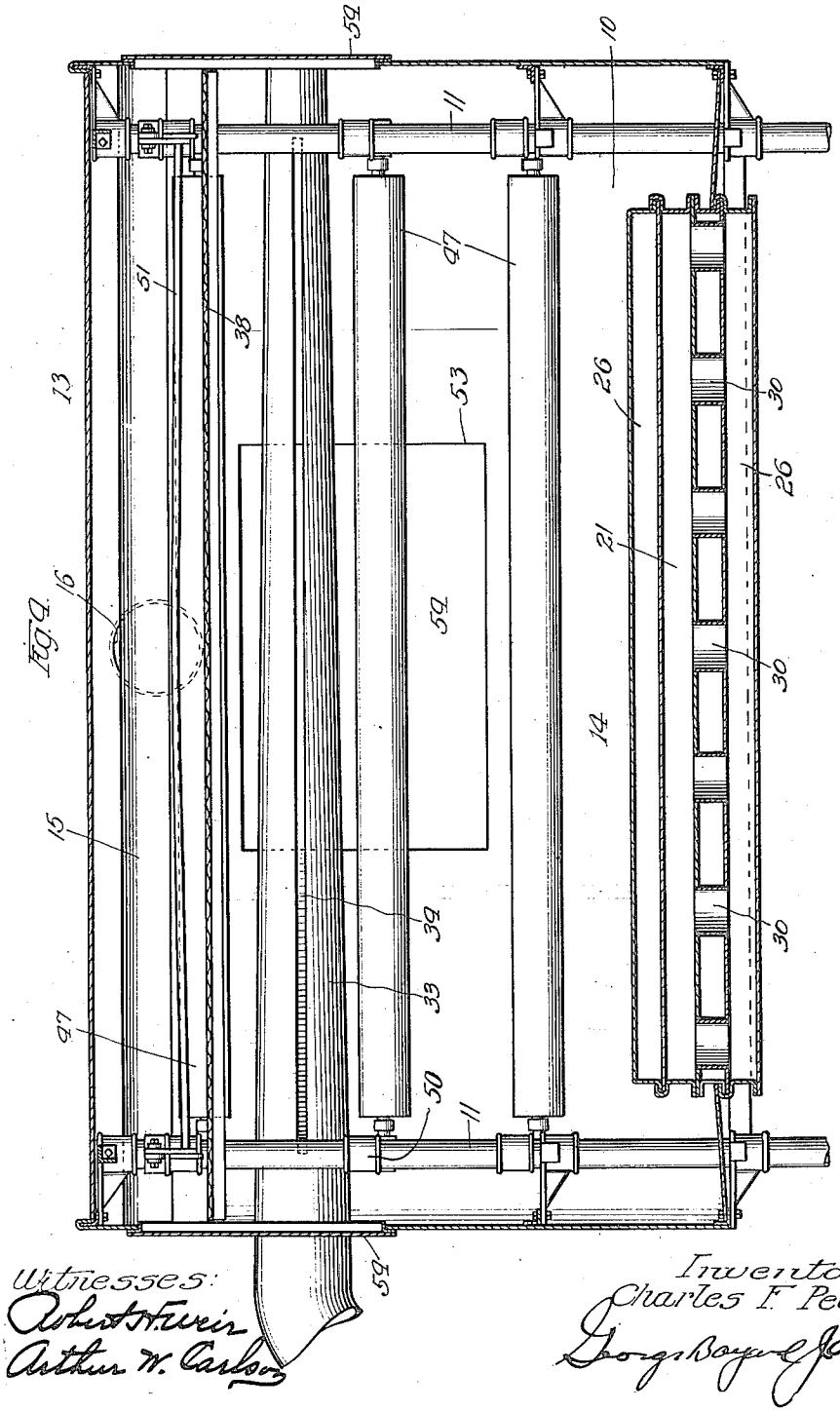


Fig. 4.

Witnesses:
Robert H. Fuerst
Arthur W. Carlson

Inventor
Charles F. Pease
George Boyd Jones Atty.

C. F. PEASE.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

APPLICATION FILED MAR. 6, 1917.

1,260,570.

Patented Mar. 26, 1918.

6 SHEETS—SHEET 5.

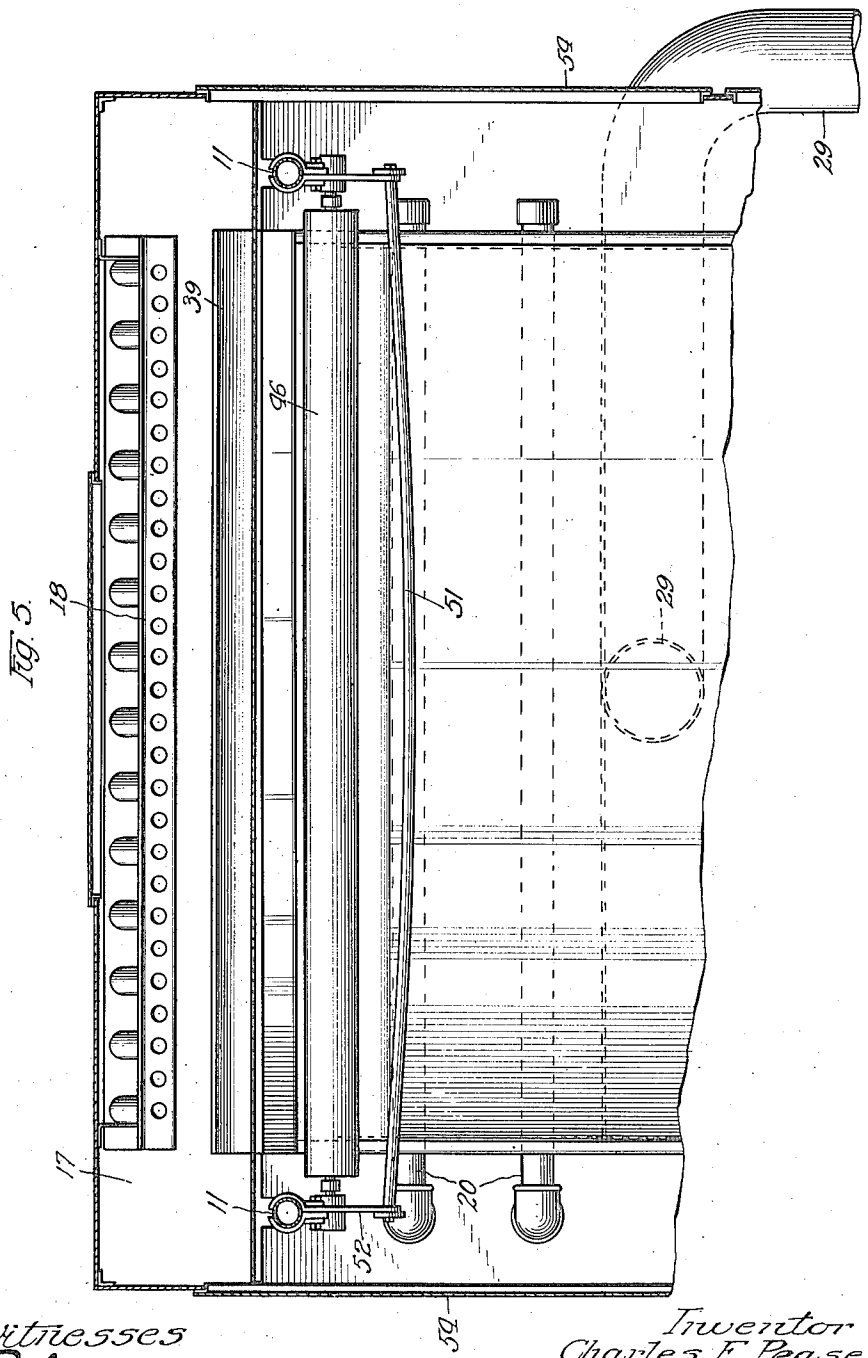


Fig. 5.

Witnesses
Robert H. Weir
Arthur W. Cabey

Inventor
Charles F. Pease
George Bagnall Jones.
Atty.

C. F. PEASE.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

APPLICATION FILED MAR. 6, 1917.

1,260,570.

Patented Mar. 26, 1918.

6 SHEETS—SHEET 6.

Fig. 7.

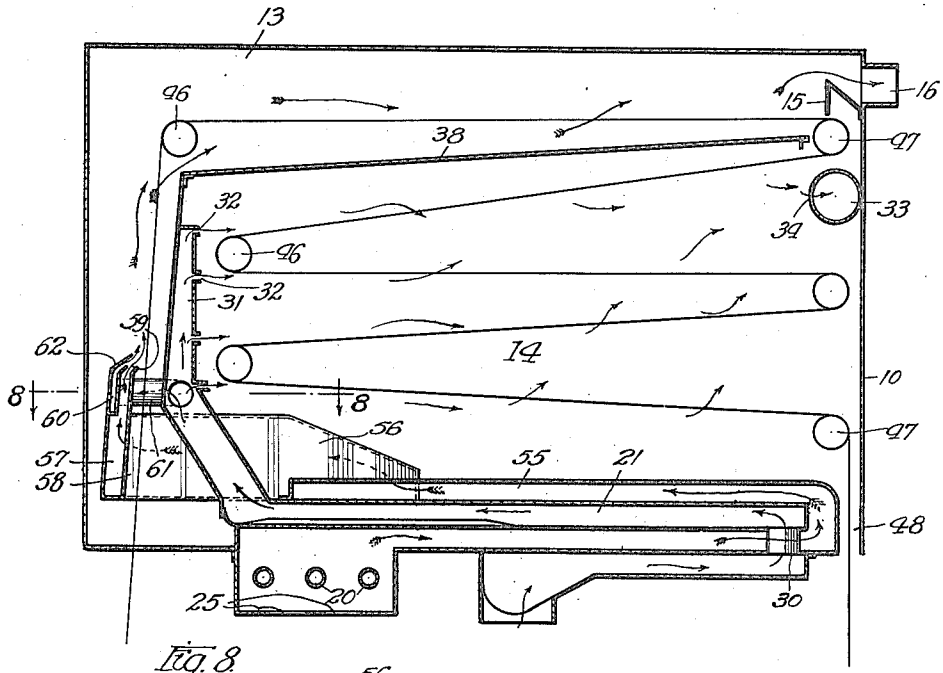


Fig. 8.

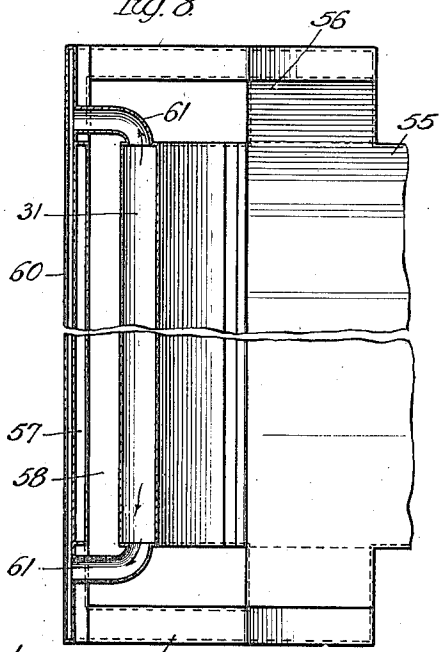
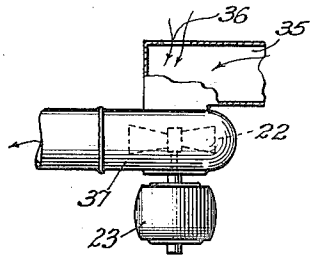


Fig. 6.



Witnesses:
Robert H. Weir
Arthur M. Carlson

Inventor
Charles F. Pease
Gregg Bogard & Jones
Atty

UNITED STATES PATENT OFFICE.

CHARLES F. PEASE, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE C. F. PEASE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

METHOD OF AND APPARATUS FOR DRYING COATED PAPER.

1,260,570. Specification of Letters Patent. Patented Mar. 26, 1918.

Application filed March 6, 1917. Serial No. 152,519.

To all whom it may concern:

Be it known that I, CHARLES F. PEASE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Methods of and Apparatus for Drying Coated Paper, of which the following is a full, clear, concise, and exact description.

This invention relates to a method of and apparatus for drying paper and particularly blue print paper after the same has been coated with a suitable sensitizing compound.

Heretofore, paper of this kind, after it has been coated with the usual sensitizing solution, has been dried in a medium containing a considerable amount of moisture, which has injurious effects upon the quality of the paper and also materially shortens the period within which it can be commercially used. In other words, the finished paper as produced by the methods now in common use, deteriorates rapidly, due to the ineffective drying thereof.

It is an important object of the present invention therefore, to provide an improved method of treating the paper after the same has been coated whereby substantially all moisture is effectively removed therefrom, thereby greatly increasing the life and quality of the paper.

Another object of the present invention resides in the provision of a suitable apparatus for carrying into effect the above method and wherein said paper is passed through a plurality of chambers to thoroughly dry the same.

Other objects and advantages will be apparent from the following description, taken in connection with the accompanying drawings, wherein two embodiments of the invention are shown. It will be readily understood however, that the drawings are for purposes of illustration only, and not as defining the limits of the invention.

Figure 1 is a diagrammatic view of the invention.

Fig. 2 is a longitudinal sectional view of a drying cabinet constructed in accordance with the present invention.

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 2.

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 2.

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 2.

Fig. 6 is a detail view.

Fig. 7 is a diagrammatic view of a modified form of the invention; and

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 7.

The drying cabinet is shown in the drawings at 10, and is supported on suitable uprights 11, mounted on the standards 12. The drying cabinet is preferably provided with a plurality of drying chambers 13, 14, through the former of which is circulated what is herein termed combustion heat, and through the latter of which is circulated hot air. The term combustion heat is herein used to designate atmospheric air which has been heated by direct contact with the combustion gases of an open flame.

The drying cabinet 10 is shown provided with a suitable baffle plate 15 positioned within the chamber 13, said baffle plate being adapted to prevent the combustion heat which is circulated through said chamber from passing into the chamber 14. This baffle plate 15 also serves to guide the combustion heat after it has been passed through the chamber 13, out through the outlet 16. Mounted within the entrance chamber 17 of the drying cabinet 10 is shown a bank of suitable heating tubes 18, at the lower end of which is provided an open flame heater 19. These heating tubes 18 are shown open at both ends to permit of the pasage of air over the flame 19 and upward through said tubes and into the combustion heat chamber 13. Within the base of the drying cabinet 10, there is another set of open flame heaters 20, the flames from which are adapted to contact with the heating chamber 21, through which air is circulated by means of a suitable circulating fan 22 adapted to be driven by a motor 23 or any other suitable means. The base plate 24 of the heating chamber 21 is preferably corrugated to permit of its expansion and contraction, due to the changes in temperature to which it is subjected. Suitable openings 25 are provided in the plate positioned beneath the heaters 20 to permit of the passage of atmospheric air over said heaters. This air, after it has been passed over the heaters, is conducted through a suitable conduit 26, which is shown surrounding the heating chamber 21, passes through suitable ports 27

and out through the outlet 28 into the entrance chamber 17, where it is conducted into the combustion heat chamber 13 and through the outlet 16. Leading from the fan 22 is a suitable conduit 29, through which air is fed to the heating chamber 21. The heating chamber 21 is connected with the air conduit 29 by means of suitable ports 30, said ports extending through the conduit 26. It will thus be seen that the air which is passed from the conduit 29 into the heating chamber 21, receives its initial heat, by its passage through said ports 30 by reason of the direct contact of the combustion heat within the conduit 26 with said ports. This air, after it has been thus heated, passes into the transverse chamber 31, from whence it is forced into the hot air chamber 14 through suitable elongated slotted openings 32. Positioned within the hot air chamber 14 is shown a return header 33 provided with an elongated slot 34 which extends substantially over the entire width of the drying cabinet 10. This return header is connected by a suitable return pipe 35 with the fan 22, the operation of said fan 22 acting to produce a suction within the return pipe and header. It will thus be seen that the air within the chamber 14 after the same has been completely circulated therethrough, is drawn into the header 33 and through the return pipe 35 to the fan 22, said fan causing said air to again circulate through the various conduits to the hot air chamber as just described. A suitable intake opening 36 is shown provided in the return pipe 35 at the point adjacent the fan housing 37. Through this opening, fresh air is drawn into the circulating system and mixed with the heated air, as it is forced therethrough. It will be noted from the construction just described, that the hot air which is used in connection with the present method is kept in continuous circulation. The combustion heat chamber 13 and the hot air chamber 14 are separated by a suitable corrugated plate 38.

The transverse chamber 31 is shown provided with a suitable outlet nozzle 39 extending into the entrance chamber 17 directly above the combustion heat outlet 28. The air forced through this nozzle 39 produces a suction effect on the combustion heat within the outlet 28, tending to draw the same upward and into the entrance chamber 17. This construction produces a more effective circulation of the combustion heat through the conduit 26 and eliminates a definite amount of the air in the chamber 14, which is replaced by fresh air, thereby preventing the circulating air from becoming moist.

The uncoated paper is mounted at 40 and is shown passing over suitable rollers 41 which act to coat said paper with the usual sensitizing solution, said solution being contained in suitable troughs 42 in which said rollers 41 revolve. After the paper has been thus coated, it is passed over suitable rollers mounted in the bracket 43, said bracket being vertically adjustable along the rod 44. Also mounted in this bracket 43 is shown a scraping element 45 which is adapted to bear against the paper as it is passed over said rollers to remove therefrom any surplus coating. After the paper has thus been scraped, it is passed through atmospheric air under ordinary conditions, and then through the entrance chamber 17 of the drying cabinet 10, the combined combustion heat and the hot air from the outlets 28 and 39 being forced into contact with the uncoated side of the said paper, as the same is thus being passed through said entrance chamber 17. The paper is then passed over the roller 46 and through the chamber 13, where it is subjected to the combustion heat supplied to said chamber by the bank of heaters 18. After passing through the combustion heat chamber 13, the paper is passed in a zig-zag path over rollers 47, through the hot air chamber 14, where substantially all of the moisture in said paper is effectively removed. After the paper has thus been treated, it is passed out through the outlet 48 and rolled about a suitable roller 49.

It will be noted from Fig. 3 of the drawings, that the rollers 47, which are mounted adjacent to the transverse chamber 31, are positioned between the elongated slotted openings 32. Thus the hot air emitted from said elongated slotted openings 32 contacts with the coated surface of the paper as the same is fed toward the chamber 17, and also as it is fed away from said chamber 17. The rollers 47 are shown mounted in suitable brackets 50 secured to the uprights 11. Adjustable buldger rods 51 are shown mounted in suitable brackets 52 also supported on the uprights 11, said buldger rods being adapted to bear against the surface of the paper as shown, to hold the same taut, as it is passed over the various rollers and to prevent any creasing of the paper. The drying cabinet 10 is preferably provided with a plurality of openings 53 shown provided with doors 54 through which access may be had to the interior of said cabinet for the purpose of repairing any of the parts or for adjusting the buldger rods.

In Figs. 7 and 8 is illustrated a slightly modified form of the invention, wherein the bank of heating tubes 18 is dispensed with, the combustion heat from the heaters 20 being conducted through the conduit 55, which is substantially similar to the corresponding conduit 26 shown in the preferred embodiment of the invention, to the con-

duits 59 shown connecting with said conduit 55 at each side of the forward end thereof. These conduits 56 pass around the transverse chamber 31 and serve to conduct the combustion heat from said conduit 55 into the chamber 57, which is mounted in the rear of said transverse chamber 31, but sufficiently spaced therefrom to provide an entrance chamber 58 similar to the one shown and described in connection with the preferred embodiment. From this chamber 57, the combustion heat is conducted upwardly into the chamber 13 through a suitable outlet nozzle 59. The suction effect in this construction is produced by the formation of a sub-chamber 60 within the chamber 57, said sub-chamber 60 being supplied with hot air from the heating chamber 21 by means of suitable bypasses 61 positioned on either side of the transverse chamber 31 and connecting said chamber with said sub-chamber. The sub-chamber 60 is shown provided with a suitable outlet nozzle 62 through which the air thus bypassed is forced, and by means of which the desired suction effect upon the combustion heat within the chamber 57 is effected. In other respects, this embodiment of the invention is substantially similar to the preferred construction as illustrated in the other figures of the drawings.

Although blue print paper has been referred to for convenience, the invention is applicable also to the drying of white print paper or other paper or fabric. The utilization of combustion heat insures efficiency of operation where open flame heaters are employed, as in the construction illustrated herein. It will be understood, however, that heat from any source may be used. It is further apparent that various other changes and modifications may be made in the construction herein illustrated, without departing from the spirit of the invention as expressed in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. The improved method of drying coated paper which consists in first passing said paper through a chamber containing combustion gases and then passing the same through a chamber containing circulating hot air.

2. The improved method of drying coated paper which consists in first passing said paper through a chamber containing combustion gases and hot air and then passing the same through a chamber containing circulating hot air.

3. The improved method of drying sensitized paper which consists in first subjecting the uncoated surface of said paper to a current of combustion gases and hot air, then subjecting the coated surface of said paper to a current of combustion gases and later passing said paper through a chamber containing circulating hot air.

4. The improved method of drying blue print paper which consists in first passing the same through atmospheric air at ordinary temperature, then subjecting the uncoated surface of said paper to a current of combustion gases and hot air, then subjecting the coated surface of said paper to a current of combustion gases and later passing said paper through a chamber containing hot air.

5. A drier of the type described, comprising a plurality of drying chambers, means for supplying one of said chambers with combustion gases and means for supplying the other of said chambers with hot air.

6. A drier of the type described comprising a plurality of drying chambers, means for supplying one of said chambers with combustion gases, means for supplying the other of said chambers with hot air, and means for continuously circulating said hot air.

7. A drier of the type described, comprising an entrance chamber, a combustion gases chamber, and a hot air chamber, a bank of heating tubes positioned within said entrance chamber and communicating with said combustion gases chamber, an air heating chamber, a plurality of heaters therefor, a combustion gases conduit surrounding said hot air heating chamber, said conduit communicating with said entrance chamber, a transverse chamber communicating with said hot air chamber and with said hot air heating chamber, said transverse chamber being provided with means adapted to increase the flow of combustion gases through said conduit.

8. A drier of the type described, comprising an entrance chamber, a combustion gases chamber, and a hot air chamber, a bank of heating tubes positioned within said entrance chamber and communicating with said combustion gases chamber, an air heating chamber, a plurality of heaters therefor, and means for conducting a strip of paper in a zig-zag path through certain of said chambers to thereby dry the same.

9. In a drier of the class described, an entrance chamber, a combustion gases chamber, and a hot air chamber, a bank of heating tubes positioned in said entrance chamber at one side thereof, a plurality of outlets on the other side thereof, one of said outlets being so positioned with relation to the other that the emission of gases therefrom produces a suction effect on the gases emitted from the other.

10. In a drier of the type described, an entrance chamber, a combustion gases conduit mounted in the base of said drier and

having an outlet in said entrance chamber, an air heating chamber mounted within said conduit and an outlet nozzle for said heating chamber, said nozzle being adapted to coöperate with the outlet of said combustion gases conduit to increase the circulation of gases therethrough.

11. A device of the type described, comprising a plurality of uprights, a drying cabinet mounted thereon, a hot air chamber within said cabinet, a transverse chamber positioned at one end of said hot air chamber and between two of said uprights, and a plurality of rollers mounted on said uprights and adjacent said transverse chamber.

12. A device of the type described, comprising a plurality of uprights, a drying cabinet mounted thereon, a hot air chamber within said cabinet, a transverse chamber positioned at one end of said dry air chamber and between two of said uprights, said transverse chamber being provided with a plurality of elongated slotted openings adapted to emit a drying medium into said hot air chamber, and a plurality of rollers mounted on said uprights, adjacent said transverse chamber and between certain of said elongated openings.

13. A drier of the type described, comprising an entrance for the paper to be dried, a combustion gases conduit, a hot air conduit, each of said conduits having an outlet into said entrance and means whereby the gases emitted from one of said outlets tends to increase the discharge of gases from the other of said outlets.

14. A drier of the type described, comprising a plurality of outlets, and means whereby the gases emitted from one of said outlets tends to increase the discharge of gases from the other of said outlets, said gases acting as a drying medium for the material being fed through said drier.

15. In a device of the type described, a drier, means for introducing a strip of paper into said drier and means for directing a current of combustion gases and hot air against said strip of paper as the same enters said drier.

16. In a drier of the type described, means for directing a current of combustion gases and dry air against a strip of paper as the same enters said drier, and means whereby the discharge of one of said gases into contact with said paper acts to increase the discharge of the other of said gases into contact therewith.

17. A drier of the type described, comprising a plurality of drying chambers, an air heating chamber communicating with one of said drying chambers, and a combustion gases conduit communicating with the other of said chambers, said air heating chamber being positioned within said combustion gases conduit.

18. Apparatus for drying sensitized paper, comprising a plurality of drying chambers, means for supplying heat to one of said chambers to effect an initial drying of said paper, means for supplying a heated atmosphere to another of said chambers and causing it to move toward the upper part thereof, and means whereby said paper after said initial drying in said first chamber is caused to travel back and forth in nearly horizontal spans in said second chamber, and move toward the lower part thereof as it becomes dryer, whereby the drier portion thereof is subjected to the drier atmosphere.

19. Apparatus for drying sensitized paper, comprising two drying chambers, means for heating one of said chambers to effect an initial drying of said paper, a plurality of substantially horizontal rollers in said second chamber arranged at opposite ends thereof, whereby said paper may travel back and forth over said rollers from the top to the bottom of said chamber in a plurality of substantially horizontal spans, said second chamber having an inlet at one end thereof and having an outlet at the other end near the top, and means for causing a heated atmosphere to pass through said chamber from said inlet to said outlet whereby the moisture from said paper is carried upwardly as said paper descends.

In witness whereof, I hereunto subscribe my name this 7th day of February A. D. 1917.

CHARLES F. PEASE.