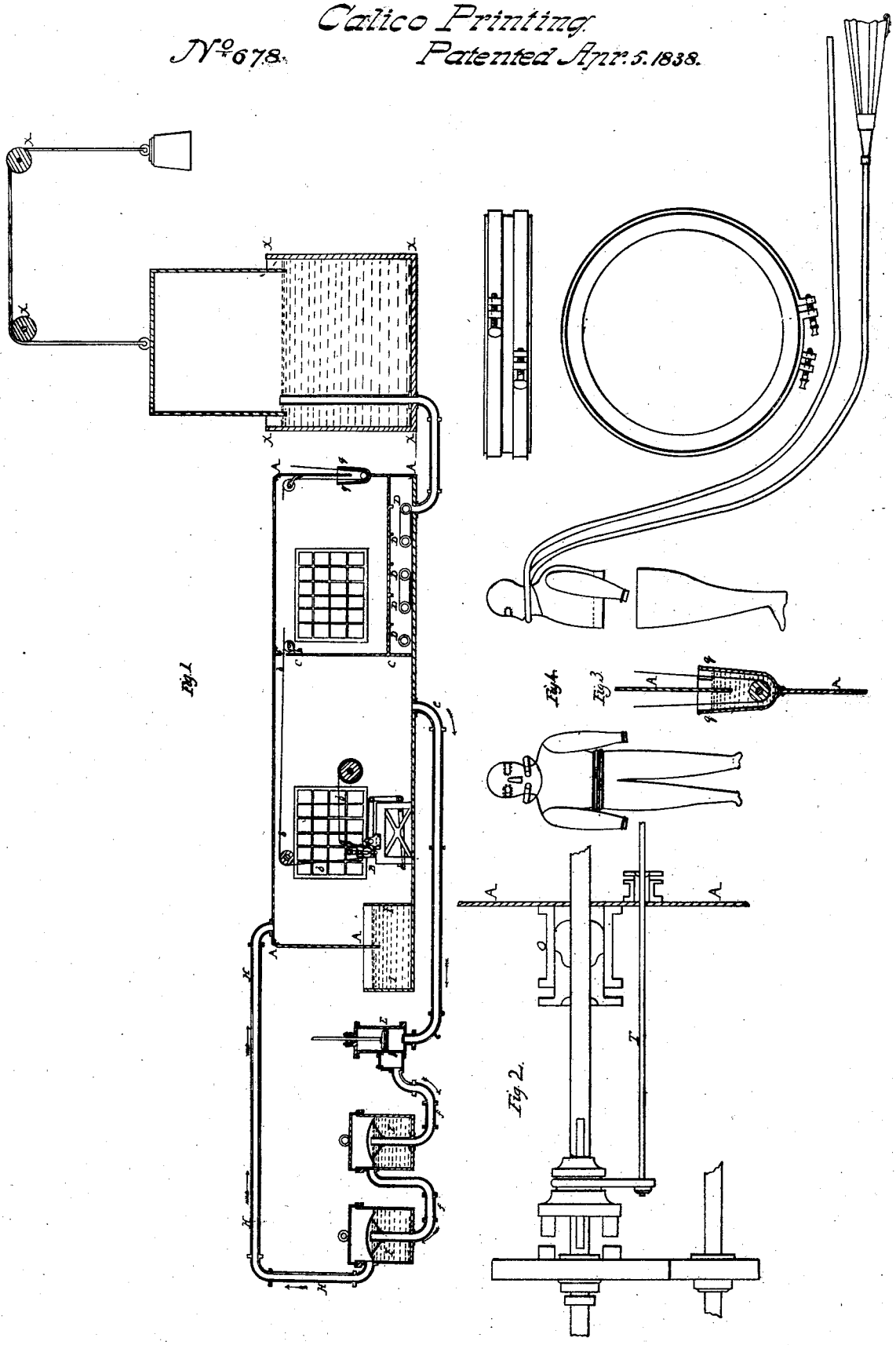
B. Woodcroft.

Calico Printing.

No. 678. Patented Apr. 5. 1838.



UNITED STATES PATENT OFFICE.

BENNET WOODCROFT, OF ARDWICK, ENGLAND.

MODE OF PRINTING CERTAIN COLORS ON CALICO AND OTHER FABRICS.

Specification of Letters Patent No. 678, dated April 5, 1838.

To all whom it may concern:

Be it known that I, BENNET WOODCROFT, a subject of the Queen of Great Britain, and now residing at Ardwick, in the parish of Manchester, in the county of Lancaster, in the said Kingdom, have invented or discovered an Improved Mode of Printing Certain Colors on Calico and other Fabrics; now know ye that I, the said BENNET WOODCROFT, do hereby declare the nature of my said invention to consist—

In printing calico and other fabrics, when indigo is used to produce a blue color, or, combined with other materials, to produce other colors, in an artificial atmosphere, deprived of or devoid of free oxygen, and subsequently allowing the indigo to imbibe the oxygen necessary for producing and fixing the said colors by exposure to the atmospheric air, in order that the indigo may by certain mechanical means be applied in that soluble and deoxidized state best adapted for penetrating the substance of the fibers of the said calico and other fabrics with uniformity, and afterward exhibit the color required, and become fixed by oxygenation. By which improved mode of printing these colors I am enabled to give to the said colors so printed upon such calico and other fabrics as aforesaid a more even or uniform appearance than by any of the modes now or heretofore adopted, and whereby also I am enabled to avoid the known difficulties arising to the calico printer from the natural and rapid affinity of indigo for oxygen—and in further compliance with the said proviso I the said BENNET WOODCROFT do hereby describe the manner in which my said improved mode is or may be carried into effect by the following statement thereof, reference being had to the drawing annexed and to the figures and letters marked thereon, that is to say:

Figure 1, in the drawing represents a longitudinal section, which I consider sufficient and the best to represent the nature of my apparatus—A, A, A, A, represent a chamber constructed of wrought iron plates, riveted together so as to be air-tight and provided with air-tight windows for the admission of light only. In this chamber the mode of ingress and egress is by means of an opening through a tank or waterlute, which is to be filled with water up to such a level above the opening as to prevent the admission of air into or out of the chamber. The tank or water lute in the chamber which I have used is formed at one of the corners thereof, and is denoted by the letters I, I, in the said figure. B, is an ordinary cylinder-printing-machine placed in the chamber A, A, A, A, and *b*, *b*, *b*, *b*, indicate the course of the calico or other fabric in the progress of being printed with a solution of deoxidized indigo in the manner in which calicos are usually printed by such a machine. The printing machine B, is driven by a shaft (to be turned by any adequate power) which passes through a stuffing box, fixed in the side of the chamber, as seen on an enlarged scale at O Fig. 2, and the shaft is thrown in and out of gear by the rod T, Fig. 2, which passes through another stuffing box in the side of the chamber. C, C, (in Fig. 1) represent a partition, which separates the chamber A, A, A, A, into two parts, videlicet, one where the printing machine B is, the other where the stove or drying portion of the apparatus is placed and into which the calico or other fabric passes (through the partition C, C,) for the purpose of being dried after being printed. D, D, D, D, D, are the flues by which the drying is effected. E is an exhausting pump or cylinder, with a solid piston, which is worked by adequate motive power. This pump draws the air from the chamber A, A, A, A, through the pipe *e*, *e*, and forces it forward by means of the pipes *f*, *f*, through the vessels F, F, successively and through the pipe H, H, H, again into the chamber A, A, A, A. These vessels F, F, are of the same construction as the liquid purifiers used in modern gas-works. The vessels F, F, contain a solution of sulfuret of lime, which has a strong affinity for oxygen, of which it deprives the air when mechanically forced through it. When the air in the chamber has been passed through the solution last mentioned until all the oxygen has been thereby absorbed, nothing but nitrogen will remain.

When a quantity of oxygen has been abstracted from the air in the chamber, a partial vacuum is formed therein, and the pressure of the external atmospheric air, acting upon the water in the tank or water-lute I, I, depresses the water in the external portion of that tank or water-lute so low, that fresh atmospheric air is admitted into the chamber. The process continues until all (or

what practically may be called all) the oxygen in the chamber has been abstracted. This tank or water-lute I, I, serves the purposes of admitting air into the chamber when a partial vacuum is formed in the interior thereof, and of separating the internal artificial atmosphere from the external air. It is also the entrance as before mentioned by which the operatives, who are to work in the interior, go in and out of the chamber. The air in the inside of the chamber will be increased in bulk by means of the heat generated in the drying process. Therefore, at the opposite end of the chamber A, A, A, A, is placed an ordinary gasholder with its usual apparatus (which gasholder and apparatus are indicated by X X X X X X) for the purpose of receiving air out of the chamber as the bulk of air increases therein, and allowing air to return into the chamber when the temperature of the air therein is reduced, so that thereby an equilibrium of pressure is as nearly as may be kept up inside and outside the chamber. The operatives who are to work in the chamber must be provided with dresses perfectly waterproof and impervious to air, and to be so formed and adjusted as to admit and enable them to breathe and respire therein the external air only. The following (being the sort of dress which I use) will be found sufficient for the purpose. It is made of prepared cloth of the kind known by the name of Mackintosh's waterproof or india rubber cloth. The dress, which is shown at Fig. 4, consists of two parts. The upper part resembles a jacket, with a hood or head-piece attached to the neck of the jacket in order to receive the head of the workman or operative. This jacket has no other opening than at the waist and at the terminations of the sleeves, and is impervious to water and air in all other places. In the inside of the lowest part or waist of the jacket a circular and even belt or ring of wood is fastened, which is about three inches broad and half an inch in thickness. The lower part of the dress is in the form of a pair of trousers, terminating like boots and without any opening except at the waist. The waistband of the trousers is so wide that it admits of being drawn over the wooden ring or belt of the jacket, around which it is so tightly bound by two brass clips or hoops, provided with tightening screws, as to become water and air-tight at that junction. The wrists of the sleeves of the jacket are so closely pressed to the wrists of the operative by india rubber bracelets as to prevent the entrance of water into the jacket, or the entrance or escape of air into it or out of it. The hood or head-piece is provided in front with large glasses to look through and the junction of which with the hood or head-piece must also be water and air-tight. The hood also has two elastic tubes, which are united therewith near the mouth, through one of which the external atmospheric air is constantly forced by means of bellows, or other adequate apparatus or instruments (but I have used bellows) and through the other of which it passes out again. These tubes, which form part of the dress, extend from the operative through the tank or water-lute I, I, to the external atmosphere, where one of them is attached to the bellows or other forcing apparatus. The calico and other fabrics to be printed may be taken in and passed out of the chamber in a dry state through a trough or lute of mercury as exhibited in section Fig. 3, where A, A, represent the perpendicular side of the chamber and *q q* the surface of the mercury through which the goods are passed under the roller *r*. Goods, implements and other materials may also be passed in and out of the chamber in a dry state through the tank or water-lute I, I, when previously inclosed in a close vessel or wrapper formed of caoutchouc or india rubber cloth or some other suitable material impervious to water and air and which should be so used as to convey as little as may be of atmospheric air into the chamber.

Now, whereas I do not claim as my invention either the printing machine or the particular construction or material of the chamber or apparatus which I have mentioned, nor the particular construction or material of the dress to be used by the said operatives, but whereas I do claim as my invention—

The inclosing calico or other fabrics intended to be printed, along with the printing apparatus, whatever it may be, and the material to be printed upon them, in a chamber case or compartment filled with an artificial atmosphere deprived of or devoid of free oxygen, such as atmospheric air deprived of its oxygen as herein before described, or any other suitable artificial atmosphere, and there printing the said calico and other fabrics, with a solution of deoxidized indigo when required to produce a blue color, or with a solution of deoxidized indgo and such other suitable materials as are usually used in combination with indigo when required to produce other colors, and subsequently exposing the said calico and other fabrics so printed as aforesaid to the action of the atmospheric air in order to imbibe the necessary quantity of oxygen therefrom to produce and fix the colors required.

BENNET WOODCROFT.

Witnesses:

L. CARPMAEL,

W. H. W. RITCHIE.