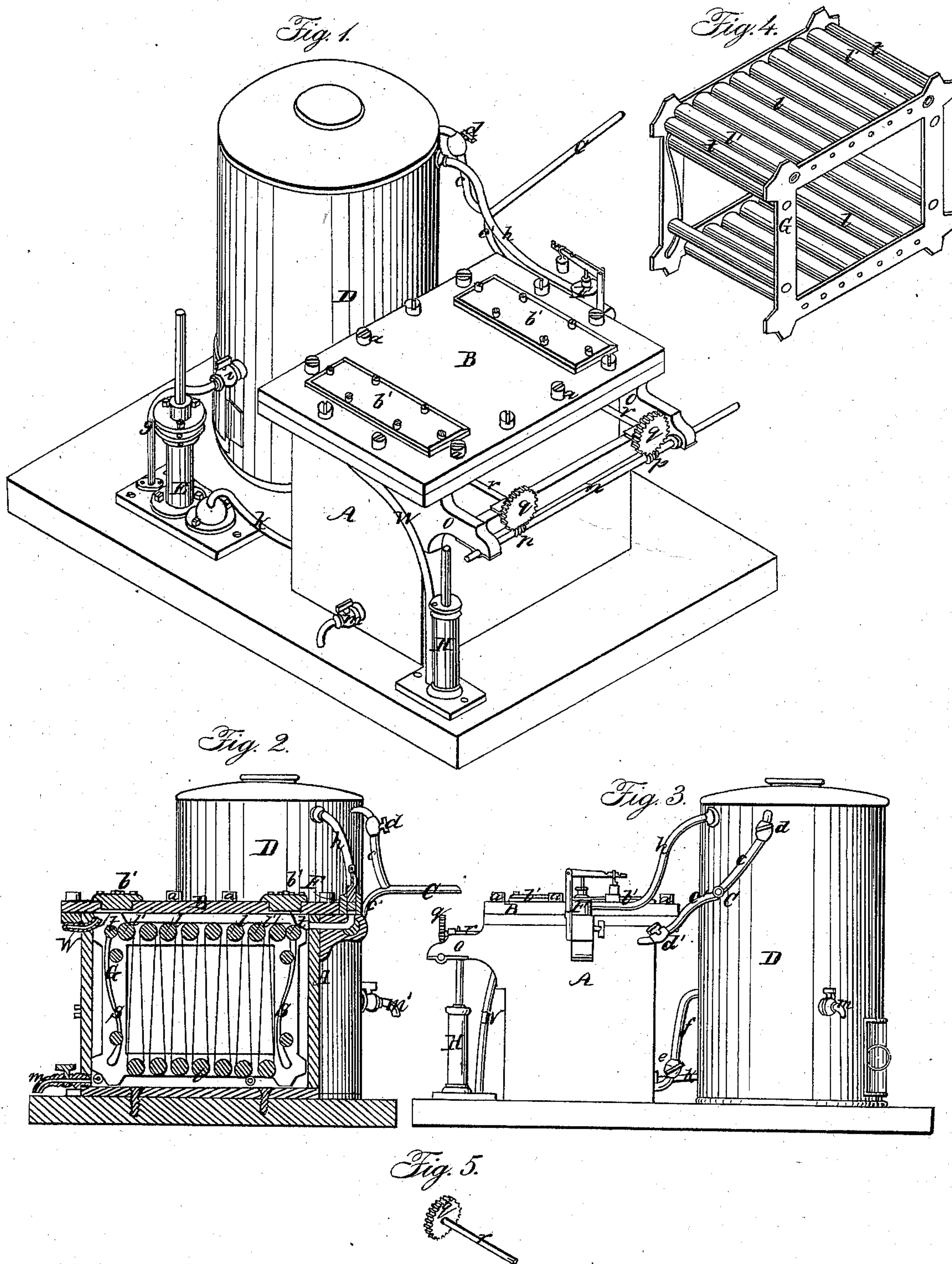


C. T. APPLETON.  
Dyeing Apparatus.

No. 10,978.

Patented May 30, 1854.





# UNITED STATES PATENT OFFICE.

CHARLES T. APPLETON, OF ROXBURY, MASSACHUSETTS.

## IMPROVEMENT IN DYEING PROCESSES.

Specification forming part of Letters Patent No. 10,978, dated May 30, 1854.

*To all whom it may concern:*

Be it known that I, CHARLES T. APPLETON, of Roxbury, in the county of Norfolk and State of Massachusetts, have made certain new and useful Improvements in the Art of Dyeing; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is an isometric representation of the apparatus which I employ in carrying out my invention; Fig. 2, a longitudinal section through the center of the dyeing-vat. Fig. 3 is an end view of the apparatus. Fig. 4 is the removable frame of rollers which carry the cotton or other goods, by which means they are kept in motion during the process of dyeing. Fig. 5 is a detached view of one of the wheels by which the rollers which carry the cloth are kept in motion.

The nature of my invention consists in subjecting the dyeing-liquor, after the goods are immersed therein, to different degrees of pressure above and below the normal pressure of the atmosphere, for the purpose of expanding the globules of air which are contained in the fibers of the material and forcing in the dyeing-liquor into the pores thus emptied, the goods being kept in constant motion during the process or otherwise loosely suspended, so that the coloring-liquor may have constant and free access to every part of the material to be dyed.

To enable others skilled in the art to make use of my invention, I will proceed to describe its nature and operation, setting forth, first, the separate steps of the process, and then describing some of the various methods which I have adopted with success for producing the requisite exhaustion, pressure, &c.

A is a vessel of suitable material in which the dyeing is performed, and which is constructed of a strength that shall enable it to bear the requisite internal pressure. The cover B is made to fit air-tight, and is confined to the vessel A, when in place, by screws *a* or otherwise. To prevent the necessity of removing the cover B each time the material is changed, openings are provided in the former, which are suitably closed by the covers *b'*.

Within the dyeing-vat is placed the frame G,

which carries the rollers *l l'*, over which the goods are passed, and which is kept in constant motion by the revolution of the rollers.

To the outside rollers *l'* is communicated an intermittent rotary motion in the following manner: *n* is a shaft running in brackets O, projecting from the vat A. This shaft is caused to revolve alternately in one direction and the other by means of suitable connections with movable machinery. Upon the shaft *n* are screws *p*, which engage with cog-wheels *q* upon the short shafts *r*, which pass through stuffing-boxes in the side of the vat A and are secured to the outside rollers *l'*.

S are spring-arms, which carry at their superior extremities the rollers *t*, which are pressed by the springs against the rollers *l'*, and the latter are revolved in the manner described alternately in one direction and the other. The cloth being threaded over the rollers *l l'*, to which motion is communicated in the manner described, the cover B and the smaller covers *b'* are screwed down and the atmosphere is exhausted from the vat in any suitable manner, by which the globules of air within the pores of the material are caused to expand and ascend to the surface of the liquid. The air is then admitted to the vat and the dyeing-liquid is forced into the pores of the goods by the pressure of the atmosphere, additional pressure being applied to the surface of the liquid if required. In some cases the pressure alone may be used without the previous exhaustion. In general, however, both will be required—the exhaustion for the purpose of freeing the pores of the goods of the globules of air which they contain and the pressure for the purpose of forcing the dyeing-liquor into the pores thus left vacant.

With some dyes it will not be found absolutely necessary to keep the goods in motion while the process is going on, it being sufficient to hang them upon hooks at the top of the vat in such a manner that the dyeing-liquid may have free and uninterrupted access to both sides of the cloth. In the majority of cases, however, it will be found better to keep the goods in constant motion during the whole of the time that they are in the dyeing-liquid.

Various methods may be adopted for the purpose of exhausting the atmosphere from the dyeing-vat and of producing the requi-



site degree of pressure therein. Either they may both be effected by bringing a steam-boiler into communication with the dyeing-vat by means of steam-pipes, &c., or suitable air-pumps and force-pumps may be employed for the purpose. As, however, these processes of themselves form no part of my invention, they are described simply for the purpose of rendering the method by which my invention is carried out more clearly understood.

C is a steam-pipe from a boiler or other suitable generator, having two branches *c c'*, in each of which is a cock *d d'*. The branch pipe *c* passes to the vessel D, which is a tight boiler or other vessel containing the dyeing-liquor. *f* is a pipe furnished with a cock *e* and leading from the vessel D to the vat or close vessel A. If now the stop-cock *d'* be opened and steam be admitted to the vat A, the atmosphere will be driven out through the cock *m*, which is left open to permit its escape. The cocks *m* and *d'* are then closed, and a partial vacuum is thus formed within the vat A by the condensation of the steam within. The cocks *e* and *d* are then opened and the liquor from the vessel D is forced through the pipe *f* into the vat A, the pressure within the boiler being communicated through the pipe *c* to the vessel D, whence it is transmitted to the vat A.

Where air-pumps and force-pumps are made use of the following arrangement may be employed: E, Fig. 1, is the barrel of a common force-pump, as usually applied to a Bramah's or hydrostatic press, which is fed from the vessel D through the pipe *g*, which is furnished with a cock *i*. The pipe *k* carries the dyeing-liquor from the pump E to the vat A. F is a safety-valve of ordinary construction, attached to the vat A and furnished with the pipe *h*, so that when the pressure in the vat A becomes excessive the valve will be raised and the liquor will be returned again to the vessel D. *m m'* are cocks by

which the vessels A and D may at any time be emptied of their contents. H is an air-pump, which may be operated in any appropriate manner, and from which a pipe W leads to the upper part of the vat A, by means of which the air may be exhausted therefrom.

The vat being now filled with the dyeing-liquid, or sufficiently so entirely to cover the goods, the latter are threaded upon the rollers *l l'* and the covers B *b'* closed, a vacuum is produced within the vat A by means of the air-pump H, and when the air within the pores and interstices of the goods has been thus caused to expand and rise to the surface the atmosphere is admitted, and if extra pressure be required it may be applied by means of the force-pump E, the liquor from the vessel D being forced into the vat until the requisite pressure is produced or until the safety-valve F is raised and the liquor flows through the pipe *h*.

I do not claim dyeing fibrous materials by subjecting them to pressure while they are allowed to lie in bulk within the dyeing-liquid, as this has been essayed before, but has failed to be productive of any useful result on account of the impossibility of obtaining by this means a uniform action of the dye upon the material; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

Controlling the pressure of the atmosphere during the process of dyeing by means of exhaustion, pressure, &c., in combination with the method herein described of keeping the folds of the goods separated from each other, either by keeping the fabric constantly in motion or by suspending it upon hooks within the vat, as set forth.

CHARLES T. APPLETON.

Witnesses:

WM. C. APPLETON,  
S. G. SNELLING.