

(No Model.)

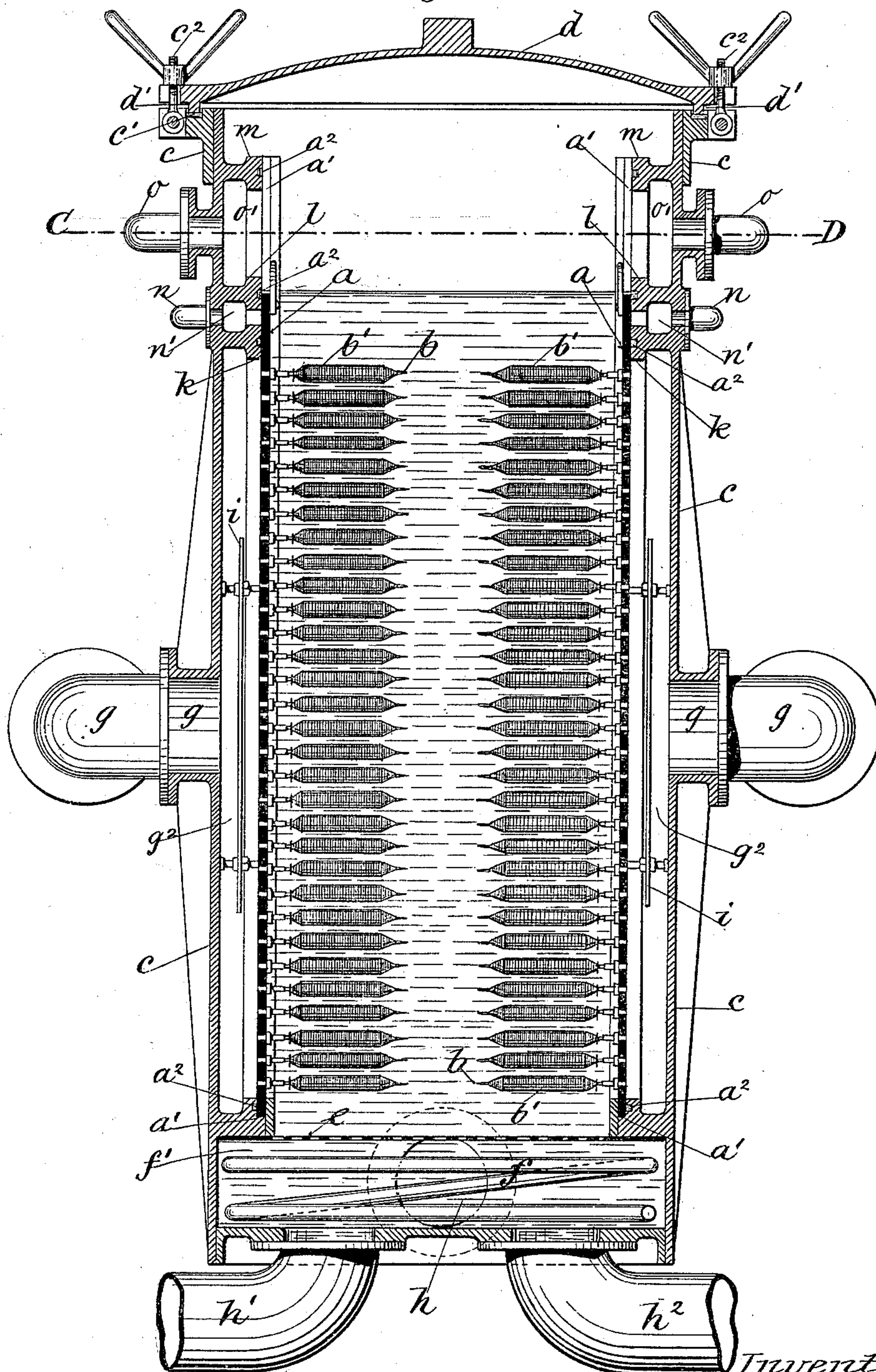
3 Sheets—Sheet 1.

A. & J. GRAEMIGER.  
APPARATUS FOR DYEING, &c.

No. 509,431.

Patented Nov. 28, 1893.

*Fig. 1.*



Witnesses:  
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E. H. Sturtevant

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August Graemiger  
Joseph Graemiger  
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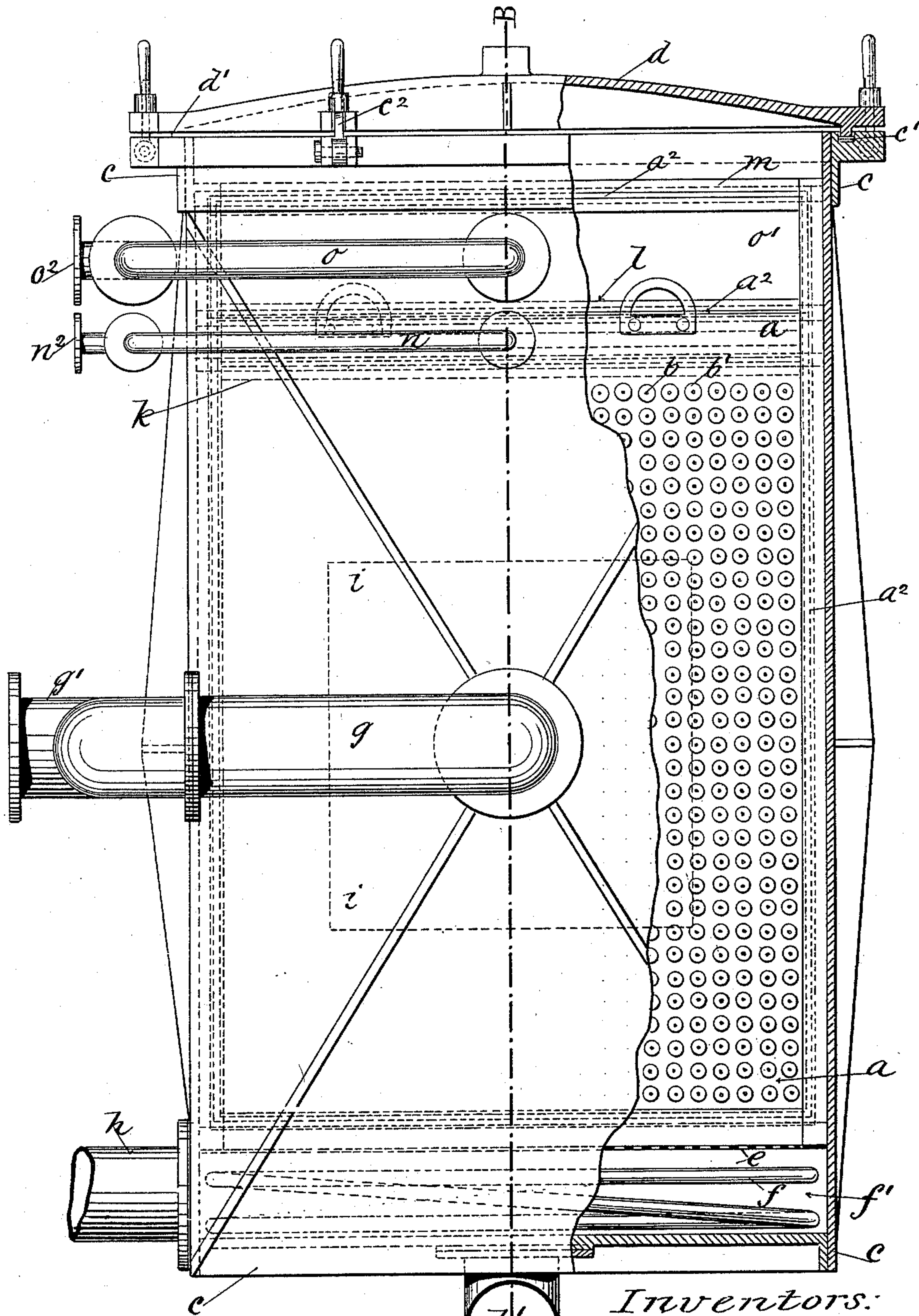
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No. 509,431.

Patented Nov. 28, 1893.  
*Fig. 2.*



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*h'*

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(No Model.)

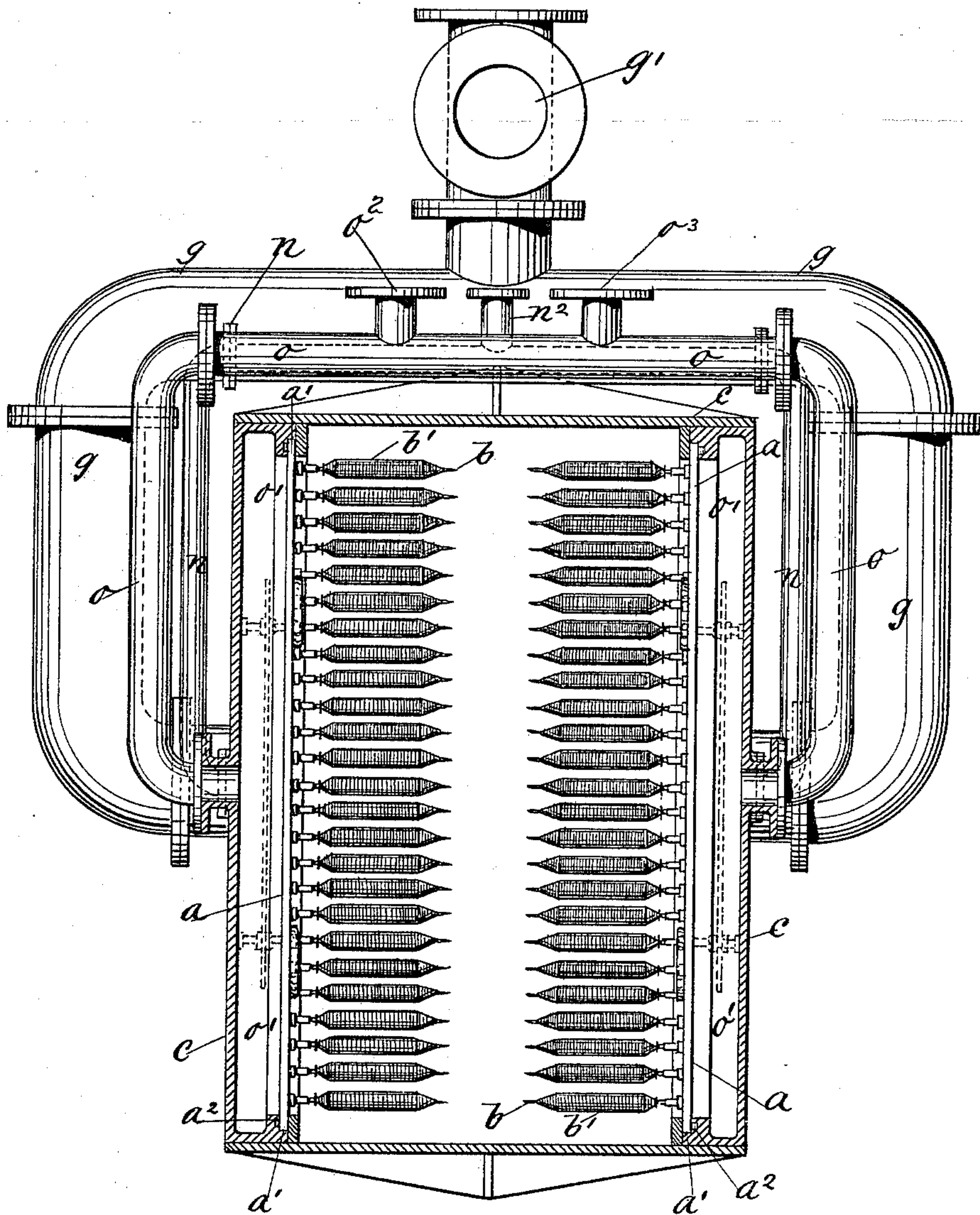
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Fig. 3.



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# UNITED STATES PATENT OFFICE.

AUGUST GRAEMIGER AND JOSEPH GRAEMIGER, OF EDENFIELD, NEAR BURY, ENGLAND.

## APPARATUS FOR DYEING, &c.

SPECIFICATION forming part of Letters Patent No. 509,431, dated November 28, 1893.

Application filed November 7, 1892. Serial No. 451,167. (No model.)

*To all whom it may concern:*

Be it known that we, AUGUST GRAEMIGER and JOSEPH GRAEMIGER, citizens of the Republic of Switzerland, residing at Edenfield, near Bury, in the county of Lancaster, Kingdom of Great Britain, have invented certain new and useful Improvements in Apparatus for Dyeing, Scouring, Bleaching, and otherwise Treating Yarn in Cop or Similar Form, of which the following is a specification.

Provisional protection has been secured in Great Britain under application filed September 8, 1891, No. 15,174.

This invention relates to that class of apparatus for dyeing, scouring, bleaching and otherwise treating yarn in cop or other similar compact form, in which it is placed on hollow perforated injection tubes or spindles, by means of which latter and the assistance of suitable pump or pumps the yarn is exhausted of air and impregnated with dye or other other suitable liquor, by drawing or forcing it through and ultimately extracting the superfluous liquor from the same.

Our invention includes one or more interchangeable plates or carriers, serving for the reception of hollow perforated injection tubes or spindles carrying the yarn to be treated, which plates or carriers are adapted to be placed in a treating tank, capable of being hermetically closed, in communication with a liquor and air pump or pumps and suitable supply pipes, in such a manner, as to subject the yarn in cop or other similar compact form, to air exhaustion on the plates carrying it being placed into, and on being removed out of the treating tank, to liquor extraction, while when in the same it may be impregnated with dye or other suitable liquor or suitable gases through the action of a force or suction pump or pumps, either with or without preliminary air exhaustion or on hermetically closing the treating tank through the combined action of compressed air or steam and a suction pump and finally dried in the same apparatus by superheated air or steam. Near the lower end we employ, in the said treating tank, a perforated bottom and below the same a steam coil, to permit of heating the dye or other liquor in the treating tank. The sides of the said treating tank, a suitable distance above

the perforated bottom, we bring, by suitable pipes, into communication with a circulating pump, the return pipe of which is in communication with the space of the treating tank containing the said steam coil. The plates carrying the yarn to be treated in cop or other similar compact form, are arranged to slide in grooves formed at the ends and in the perforated bottom of the treating tank at a short distance apart from the orifice of the pipes leading to the circulating pump, the said orifices being furnished with deflector plates, so as to divide the suction of the pump equally over the whole surface of the said plate or carrier, the upper ends thereof being supported by a rim furnished with a packing, thus forming a chamber between the said plates or carriers and the side of the treating tank. Above the said rims two other similar rims are formed a suitable distance apart from each other and pipes arranged between the same, communicating with an air pump. The said plates or carriers when lowered into or lifted out of the treating tank, by suitable appliances, bear against the said rims and thus form a comparatively narrow chamber, so that on communication being established between the same and the said air pump, the yarn on the plates or carriers is respectively subjected to air exhaustion and liquor extraction, which owing to the plate or carrier being gradually passed over said chambers and the comparatively small number of injection tubes or spindles thus brought in communication therewith successively, requires only a small air pump, and effects a more uniform exhaustion of air and extraction of liquor. The upper end of the said treating tank we furnish with a readily removable hermetically closing lid, by means of which the yarn in cop or other similar compact form may be dyed or otherwise treated under vacuum by exhausting the treating tank of air and afterward admitting and circulating the dye or other liquor through the same. In cases where the dye or other liquor is used in a very hot state, air or steam may be compressed onto the same whereby the action of the circulating pump is assisted and thorough impregnation of the yarn effected, or suitable gases may be used only. In connec-



tion with the said treating tank, we arrange a number of dye or other liquor supply cisterns, so as to permit of readily changing the dye or other liquor at will.

5 A number of the described apparatus may be arranged in connection with each other, so as to perform the various operations simultaneously and thereby save removing the cops from the plates or carriers.

10 Figure 1, is a longitudinal section of our apparatus on line A—B of Fig 2, which latter is partly a side view and partly a vertical section, and Fig. 3, a plan in section on line C—D of Fig. 1.

15 In carrying out our invention and to remedy the aforesaid defects our improvements consist in the use of one or more, by preference four, interchangeable plates or carriers *a*, serving for the reception of hollow perforated  
20 injection tubes or spindles *b*, carrying the yarn *b'*, to be treated, which plates or carriers *a* are adapted to be placed in a treating tank *c*, two of them being used in the treating tank *c*, while the other two serve as reserve plates  
25 or carriers, to permit of exchanging the treated yarn for untreated yarn. In order to render the treating tank *c*, capable of being hermetically closed a lid *d*, is employed, having on its under side a rim *d'*, adapted to fit onto  
30 a packing *c'*, placed into a groove formed in the flange of the treating tank *c*, and secured thereto by means of hinged bolts *c''*. Near the lower end we employ, in the treating tank *c*, a perforated bottom *e*, and below  
35 the same a steam coil *f*, to permit of heating the dye or other liquor in the treating tank *c*. The sides of the treating tank *c*, a suitable distance above the perforated bottom *e*, we bring, by suitable pipes *g*, *g'* respectively into com-  
40 munication with a circulating pump (not shown), the return pipe *h*, of which is in communication with the space *f'* of the treating tank *c*, which is also furnished with an inlet and outlet pipe *h'*, *h''*, having suitable valves  
45 (not shown).

The plates *a*, carrying the yarn *b'*, to be treated in cop or other similar compact form, are arranged to slide in grooves *a'*, furnished with a packing *a''*, and suitably formed at  
50 each end and near the perforated bottom *e*, at a short distance apart from the pipe or orifice *g*, the latter being furnished in front with deflector plates *i*, so as to divide the suction of the circulating pump (not shown) equally over  
55 the whole surface of the plates or carriers *a*. The upper ends of the latter are supported by a rim *k*, furnished also with a packing *a''*, thus forming chambers *g''*, between the plates or carriers *a*, and the sides of the treating  
60 tank *c*. Above the rims *k*, two other similar rims, *l* and *m*, are formed a suitable distance apart from each other and pipes *n* and *o*, arranged between the same, communicating with a suction or air pump (not shown).

65 The plates or carriers *a*, when lowered into or lifted out of the treating tank *c*, by suitable appliances, bear against the packing *a''*,

of the rims *k*, *l*, and *m*, and thus form each space between, into a comparatively narrow  
hermetically closed chamber *n'*, *o'* so that on  
70 communication being established between the same, pipes *n*, *n''* and *o*, *o''* and the suction or air pump (not shown) respectively, the yarn *b'*, is subjected to air exhaustion, and liquor  
75 extraction, which owing to the plates or carriers *a*, being gradually passed over the chambers *n'*, *o'* and the comparatively small number of injection tubes or spindles *b*, thus brought in communication therewith suc-  
80 cessively, requires only a small suction or air pump (not shown), and effects a more uniform exhaustion of air and extraction of liquor.

The yarn *b'* to be treated is subjected to air exhaustion on the plates or carriers *a*, being placed into and on being removed out of the  
85 treating tank *c*, to liquor extraction, while when the plates or carriers *a*, are in their lowest position the yarn *b'* can be impregnated with dye or other suitable liquor or gases through the action of a force or suction  
90 pump or pumps connected with the pipes *g*, (not shown) either with or without preliminary air exhaustion, or on hermetically closing the treating tank *c*, through the combined  
95 action of compressed air or steam introduced into the treating tank *c*, through pipe *o''*, *o'* connected with a compressor and a suction pump (not shown) and finally dried in the  
100 same apparatus by superheated air or steam or other hot gases if desired, introduced into the treating tank *c*, through pipe *o''* and permitted to escape through pipes *g*, *g'*.

On hermetically closing the treating tank *c*, by means of the lid *d*, the yarn *b'*, in cop or other similar compact form may be dyed  
105 or otherwise treated under vacuum by exhausting the treating tank *c*, of air and afterward admitting and circulating the dye or liquor through the same by way of the pipes  
110 *g*, and chamber *g''*.

In cases where the dye or other liquor is used in a very hot state, air or steam may be compressed onto the same whereby the action  
of the circulating pump (not shown) is assisted and a thorough impregnation of the  
115 yarn *b'* effected, or suitable gases may be used only.

In connection with an inlet *h'* and outlet *h''*, of the treating tank *c*, we arrange a number of dye or other liquor cisterns (not shown)  
120 so as to permit of readily changing the dye or other liquor at will.

A number of the described apparatus may be arranged in connection with each other, so as to perform the various operations simulta-  
125 neously and one treating tank may be connected with various supply tanks to permit of the successive application of various liquids to the same cops without removal.

Having now particularly described and as-  
130 certained the nature of this invention and in what manner the same is to be performed, we declare that what we claim is—

1. In combination, the tank having the ways



or bearings  $a'$  therein and at a slight distance within the outer walls of said tank, the movable perforated yarn carrying plates adapted to said ways to inclose a space  $g^2$  between the outer tank walls and themselves, the pipes  $g$  leading through the outer wall into the space inclosed by the plates and the inwardly projecting ways and the return pipe leading to the tank between the plates, the said plates having the cops on their inner sides only, substantially as described.

2. In combination, the tank, the perforated yarn carrying plates arranged in said tank, to form a chamber  $g^2$ , between the same and the wall of the tank, the pipe leading from said chamber and the shield  $i$ , extending across the mouth of said pipe, substantially as described.

3. In combination, the tank, the perforated plate arranged therein, with a space  $g^2$ , between the same and the wall of the tank the pipe  $g$ , connecting with the said chamber or space the heating chamber  $f'$  at the bottom of the tank, the coil therein and the return pipe  $h$ , connecting with the said heating chamber, substantially as described.

4. In combination the tank having the inwardly projecting ways adapted to afford bearings for the cop plates around the entire edges thereof and to inclose with said plates and the wall of the tank the space or chamber  $g^2$ , the pipe connections to said chamber, the return pipe leading to the space between the cop plates, and the liquid supply pipes  $h'$   $h^2$  also leading to said intermediate space, substantially as described.

5. In combination, the tank the perforated plate adapted to carry the yarn and arranged in said tank to form a space  $g^2$ , the pipe connecting with said space, the heating chamber  $f'$  at the bottom of the tank, the perforated cover  $e$ , for said chamber and the return and

supply pipes leading to the said chamber, substantially as described.

6. In combination, the tank, the way therein the perforated yarn carrying plate adapted to move in said way, and over the chamber at the upper end of the same and the pipe connecting with the said chamber, substantially as described.

7. In combination, the tank having the inwardly projecting ways  $a'$  to receive the cop plates and adapted to form with said cop plates and tank wall an inclosed space  $g^2$ , the pipe  $g$  leading therefrom, the pipe  $h$  leading to the space between the cop plates and the pipe opening at the upper end of the tank above the liquid level and adjacent to the ways  $a'$ , substantially as described.

8. In combination, the tank, the perforated plate arranged therein with a space  $g^2$ , between it and the tank wall, the pipe  $g$ , connecting with the said space, the ways in the tank adapted to receive the plate, said tank having the chamber  $o'$  above the upper edge of the plate and over which the plate moves and the pipe connecting with said chamber, substantially as described.

9. In combination, the tank having the ways and the rims  $k, l, m$ , forming chambers  $g^2, n'$ ,  $o'$  adjacent to said ways the plates carrying the yarn and provided with perforations, said plates being adapted to move in said ways over the said chambers and the pipe connecting with the several chambers, the said chamber  $o'$ , being above the level of the liquid in the tank, substantially as described.

This specification signed and witnessed the 10th day of November, 1891.

AUGUST GRAEMIGER.  
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Witnesses:

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