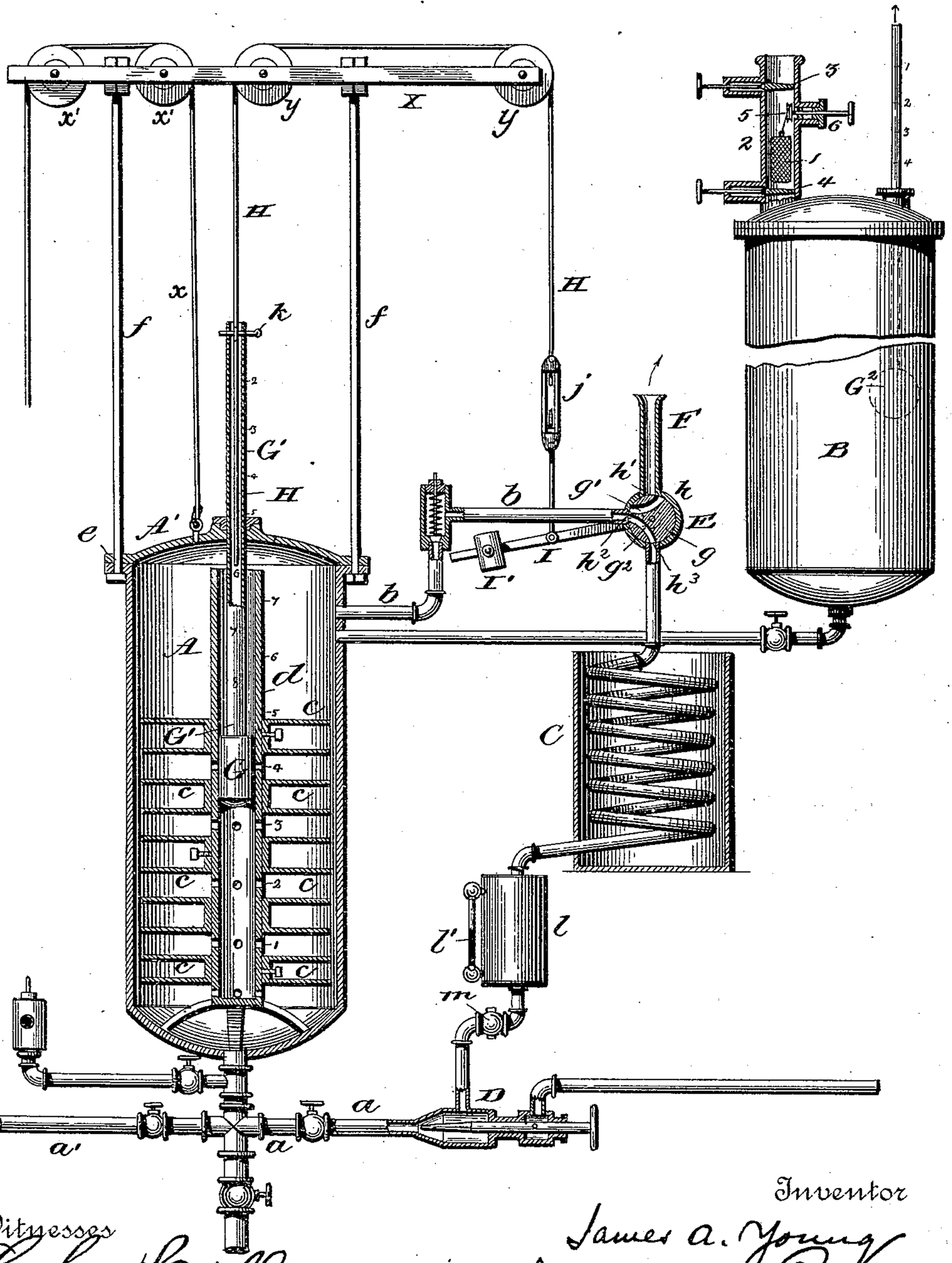
(No Model.)

J. A. YOUNG.

APPARATUS FOR DYEING STRAW GOODS, &c.

No. 446,051. Patented Feb. 10, 1891.



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UNITED STATES PATENT OFFICE.

JAMES A. YOUNG, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO E. B. SEAVER AND A. SEAVER, OF SAME PLACE.

APPARATUS FOR DYEING STRAW GOODS, &c.

SPECIFICATION forming part of Letters Patent No. 446,051, dated February 10, 1891.

Application filed December 18, 1890. Serial No. 375,112. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. YOUNG, of Boston, Suffolk county, Massachusetts, have invented a new and useful Improvement in Apparatus for Dyeing Straw Goods and other Materials, of which the following is a specification.

My present invention is an improvement on dyeing apparatus of the kind of which that described and claimed in my application for Letters Patent filed April 21, 1890, Serial No. 348,940, is the type. In such apparatus the goods to be dyed are placed in a tight dye-chamber, in which they are immersed in the liquor, and steam is continuously injected into the lower part of the chamber, and is permitted to escape as it exceeds a predetermined pressure from the upper part of the chamber, the effect obtained being that of boiling the goods under pressure, the dye-liquor during the operation being kept in continuous ebullition or agitation under pressure, but without bodily movement into, through, and out of said chamber. The steam or vapor escaping from the top of the dye-chamber is subsequently condensed and is then conducted as water to an injector, by which it is returned with steam to the dye-chamber. Under this arrangement manifestly the dye-liquor in process of time would become unduly diluted by the gradual addition of condensed steam, and for this purpose a by-passage or overflow is provided for the discharge of water or steam in excess of that required to maintain the desired quantity of liquid in the dye-chamber.

Such in a general way is the apparatus in my aforesaid prior application so far as necessary to an understanding of my present improvement.

This improvement is designed to automatically regulate the supply of liquid furnished by the water of condensation to the dye-chamber in such manner as to maintain automatically a practically constant level of liquid in the chamber, and consequently to maintain the dye-liquor at a practically constant strength. This result I attain by combining with the by-passage or overflow for the surplus steam or liquid and the passage leading to the condenser a float which will rise and fall with the rise and fall of the level of the liquid in the dye-chamber, and a cock or valve connected to and operated and controlled by the movement of the float, so as to direct the steam passing from the top of the dye-chamber either to the condenser or to the by or discharge passage, according as the liquid in the dye-chamber falls below or rises above the predetermined level.

The nature of my improvement will be readily understood by reference to the accompanying drawing, which represents in vertical section so much of a dyeing apparatus of the kind hereinbefore referred to as is necessary to an understanding of my present improvement.

A is the tight dye-chamber.

B is the preparing-chamber in which the dye-liquor is prepared.

C is the condenser.

D is the injector.

E is the pressure-valve between the top of the dye-chamber and the condenser.

F is the by-passage or overflow for surplus steam.

The injector discharges into the bottom of the dye-chamber through pipe *a*. From the top of the dye-chamber leads pipe *b* to the condenser, the pressure-valve E being located in this pipe. The by or overflow passage F communicates with pipe *b* at a point between the pressure-valve and the condenser. The preparing-chamber receives the liquid with which the dye-stuff is to be mixed, this liquid being under pressure of steam introduced therein through means which do not require here to be shown, and the dye-stuff itself is introduced by means of the wire cage 1, located in the entrance pipe 2 between the two valves 3 and 4. In operating this introducing device the top valve is opened and the bottom valve is closed. Then the wire cage receives its supply of the dye-stuff. Then the top valve is closed and the bottom valve is opened, and then the cage by its suspending-cord 5 and windlass 6 is lowered into the liquid in the preparing-chamber.

When the apparatus is first started, steam is introduced into the dye-chamber direct

from the boiler through a branch pipe a', communicating with pipe a. After the operation, however, is fully in progress the steam is shut off from pipe a' and the injector D is put in operation.

Thus far the apparatus does not differ, essentially, from that shown and described in my aforesaid prior application.

I pass now to those parts of the apparatus in which my present invention is embodied.

Within the dye-chamber is the removable supporting-frame for the goods, consisting of a series of foraminous supporting-shelves c for the goods, attached to a central stem d, which is a tube closed at the bottom and having perforated sides to admit the dye-liquid freely to its interior. The removable cover A′ of the dye-chamber is bolted or otherwise suitably secured to the top of chamber A, and is provided with eyes e, which fit around vertical rods f, attached to the chamber below and a fixed framing X above, so as to serve as guides on which the eyes e will slide when the cover is lowered or raised. The lifting and lowering of the cover can be effected by a rope or chain x, attached to it and passing up over pulleys x' on the frame X. A weight in the nature of a counterpoise for the cover can be attached to this chain, if desired. Within the tubular stem d is a float G, which is preferably a hollow body of copper or other suitable metal having connected to it a vertical stem G′, which extends out through a suitable stuffing-box in the cover A′ and can slide up and down therein. This stem is tubular. It communicates at its lower end with the interior of the float and at its upper end is open, one object of this arrangement being to admit air freely to the interior of the float, so as to prevent the latter from collapsing, as it might otherwise do under certain conditions. To the stem G′ is attached a cord or chain H, which passes up over pulleys y on the frame X, and thence down to a lever I, which is attached to the stem of the rotary plug g of a cock or valve, the valve-case of which is shown at h. The case has three ports, lettered, respectively, h' h^2 h^3, communicating, respectively, with the pipe leading from the pressure-valve E to the case, the pipe leading from the case to the condenser, and the discharge or overflow pipe F. The plug has two separate passages g' g^2 through it. Passage g' is intended to establish communication between ports h' h^2 and passage g^2 is intended to establish communication between ports h^2 h^3.

A turn-buckle j, or some equivalent means, is introduced into the chain H for the purpose of taking up any slight slack in the chain, and the chain itself is united to the stem G′ by connection which will permit it to be taken up or let out, according to the height at which the stem should normally stand. To this end the chain is united to the stem by a cross-pin k, which passes through the stem and that link of the chain which may meet it. The rest of the chain below the pin is received and hangs down in the hollow stem, which is quite large enough to accommodate it.

The arrangement of parts is such that the descent of the float G will lift the lever I. The latter is provided with a weight I′, so that when the float rises the weight will act to depress the lever. In the position in which the parts are represented the way is open to the condenser and the overflow-passage F is closed. As soon, however, as the water of condensation is forced by the injector into the dye-chamber to appreciably and materially raise the level of the liquid therein the float will rise, and thus will permit the weight I′ to depress the lever, with the effect of turning the plug g, so as to open the port leading to the overflow and to close that leading to the condenser. In this way condensation will be stopped, the supply of water will be exhausted, the steam will discharge into the open air, and consequently the level of the liquid in the dye-chamber will fall, with the effect of causing the descent of the float, and thereby lifting the lever I and operating the cock to open the way to the condenser and close the overflow F. In this way a practically constant level of the liquid in the dye-chamber can be automatically maintained, thus preserving a practically uniform strength of dye-liquor.

I prefer to introduce between the condenser and the injector a small drum l, which receives the water from the condenser and supplies it to the injector. This drum is provided with a gage-glass l' to indicate the height of water therein. In the pipe between the drum and the injector is inserted a check-valve m to permit water to pass to the injector, but to prevent back-pressure of steam in the drum.

In practice the dye-chamber is of considerable size—say, for example, a cylindrical vessel eight feet in diameter and twelve feet high. The quantity of goods put in the chamber will vary at different times. On one occasion, for instance, the supporting-frame may be filled for one-third of its height, on another for one-half of its height, and so on. It is of course desirable to use no more dye-liquor than is requisite for the particular quantity of goods to be treated, all that is needed being sufficient dye-liquor to cover the goods, allowing for that which is absorbed by them. In order to determine the amount of liquid to be let into the dye-chamber for any particular lot of goods, I provide the central supporting-tube d with a scale marked off in feet or subdivisions thereof, as convenient, numbered from the bottom, and I provide the float-stem with a corresponding scale, but numbered, however, from the top, all as indicated in the drawing. When the float rests on the bottom of the tube, the two scales exactly correspond, except of course that the numbers are reversed. When arranging the goods for the dyeing operation, the supporting-frame of

course is hoisted out from the dye-chamber and the goods are placed on the shelves, the operator noting the height to which the goods come on the scale marked on the tube *d*. Then the frame is lowered into the dye-chamber and the cover A′ is lowered and made fast, the unmarked end of the stem G′ projecting up through the stuffing-box in the cover. Then the dye-liquor is admitted into the dye-chamber from the preparing-chamber, and as the level of the liquid in the dye-chamber rises the float will rise and its stem G′ will move up through the cover until the number on it corresponding to the noted number on the tube *d* is reached, at which time the operator will know that the liquid has reached the level of the top of the goods, and then additional dye-liquor can be introduced sufficient to cover the goods and to furnish such additional supply as will be absorbed by the goods during the operation.

As a further means of determining readily the supply of dye-liquor, I make the preparing-chamber B of precisely the same dimensions internally as the dye-chamber, and I provide it with a float and stem G^2, similar to the like parts in the dye-chamber and having a similar scale. Once having ascertained the height to which the particular goods to be treated come on the scale of their supporting-frame the operator by the scale on the float-stem of the preparing-chamber can readily ascertain when he has introduced into that chamber the quantity of water required for dye-liquor sufficient to treat that lot of goods.

In conclusion I would state that manifestly various mechanical intermediaries between the float and the valve or cock can be availed of to cause the latter to be operated by the rise and fall of the float. What is essential is that there should be a cock controlling the water-supply to the injector, which cock is connected to a float which rises and falls with the level of the liquid in the dye-chamber, and in so doing operates the cock to regulate the flow of water to the injector according to the level of the dye-liquid.

I do not restrict myself therefore to the particular instrumentalities herein shown and described by me for this purpose; but

What I claim, and desire to secure by Letters Patent, is—

1. The combination, in dyeing apparatus, of the tight dye-chamber provided at bottom with a steam-inlet and at the top with a steam-outlet, the pressure-valve controlling the steam-outlet, the condenser, the injector, the water-supply pipe connected to the injector, the cock for regulating the flow of water of condensation to the injector, the float contained in the dye-chamber, adapted to rise and fall with the level of the liquid in said chamber and provided with a stem projecting through the top of said chamber, and adjustable connections between said float-stem and cock, whereby as the float rises and falls the cock will be operated to cut off or open, as the case may be, the water-supply to the injector, and thus preserve a substantially constant strength of dye-liquid in the dye-chamber, substantially as and for the purposes hereinbefore set forth.

2. In dyeing apparatus, the combination of the dye-chamber provided with steam-inlet below and steam-outlet above, the pressure-valve controlling said outlet, the injector, the condenser, the overflow or discharge passage, the cock whereby the steam-outlet from the dye-chamber is put in communication either with the said discharge or with the condenser, and the float connected to and adapted to operate and control said cock, the combination being and acting substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 17th day of December, 1890.

JAMES A. YOUNG.

Witnesses:

EWELL A. DICK,

M. BAILEY.