

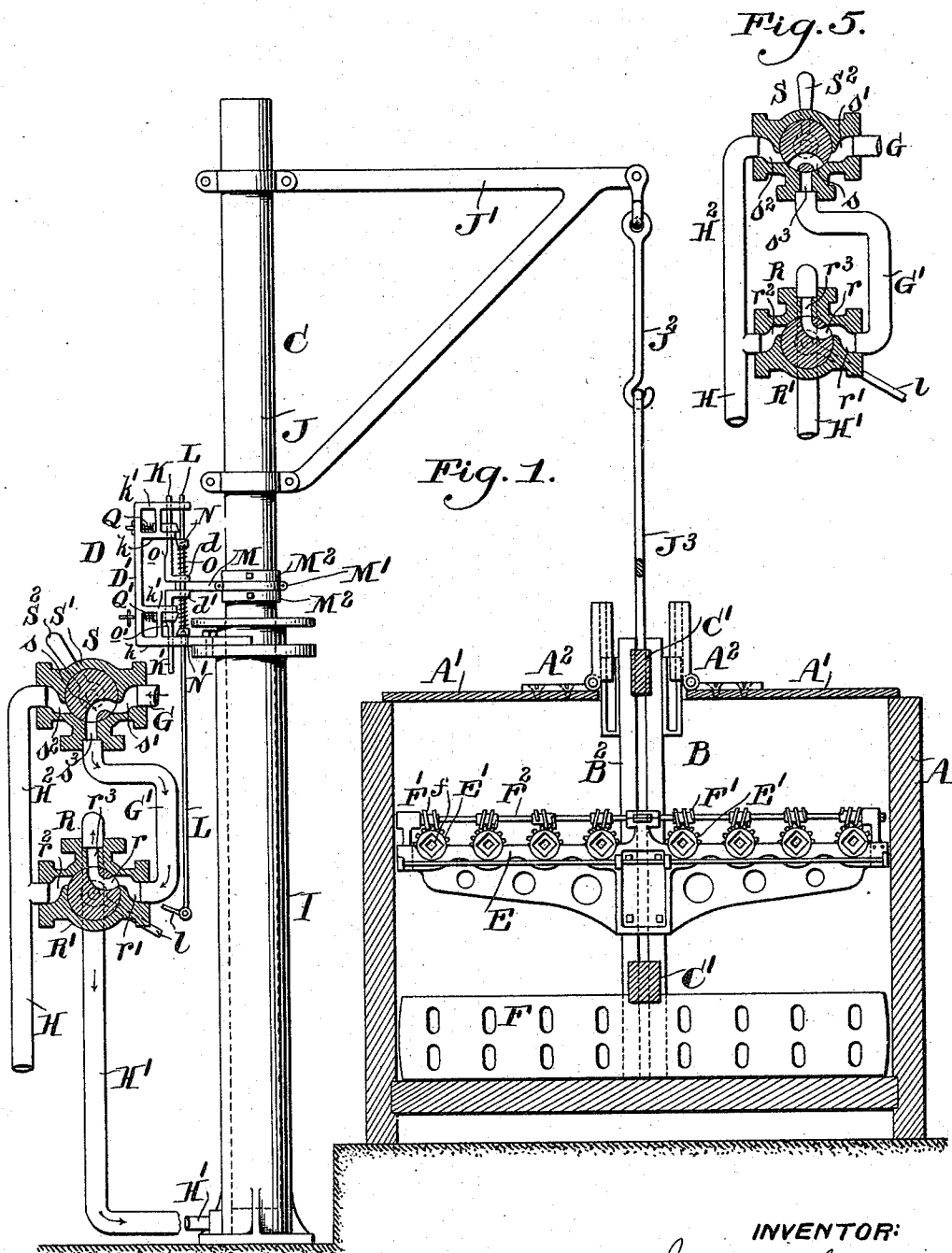
(No Model.)

3 Sheets—Sheet 1.

J. H. LORIMER.
APPARATUS FOR DYEING.

No. 570,488.

Patented Nov. 3, 1896.



WITNESSES:
Henry D. ...
Wm. M. ...

INVENTOR:
Joseph H. Lorimer
By his attorney,
...

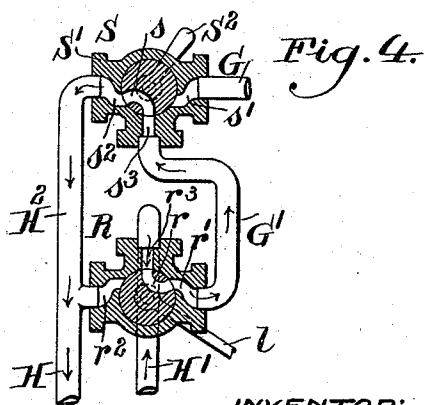
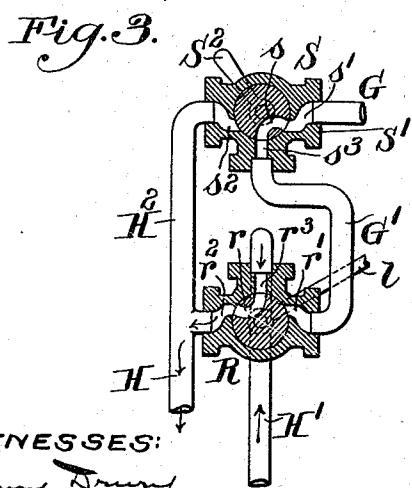
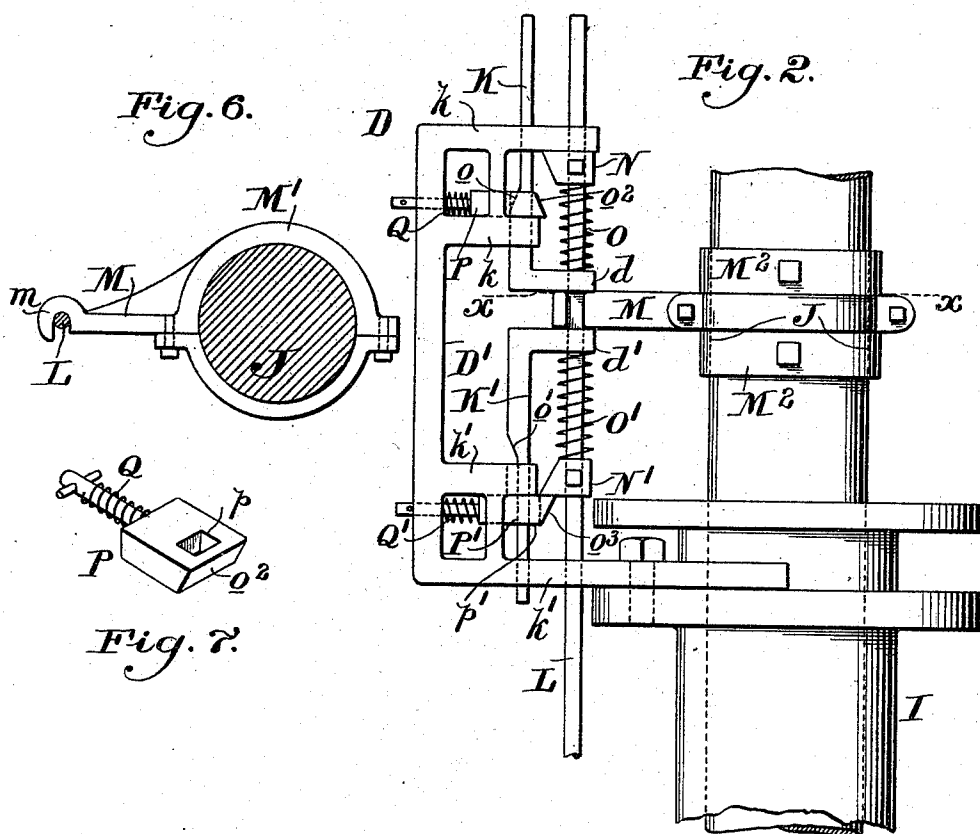
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3 Sheets—Sheet 2.

J. H. LORIMER.
APPARATUS FOR DYEING.

No. 570,488.

Patented Nov. 3, 1896.



WITNESSES:

Henry Dunning
Mustard & Co.

INVENTOR:

Joseph H. Lorimer,
By his attorney,
[Signature]

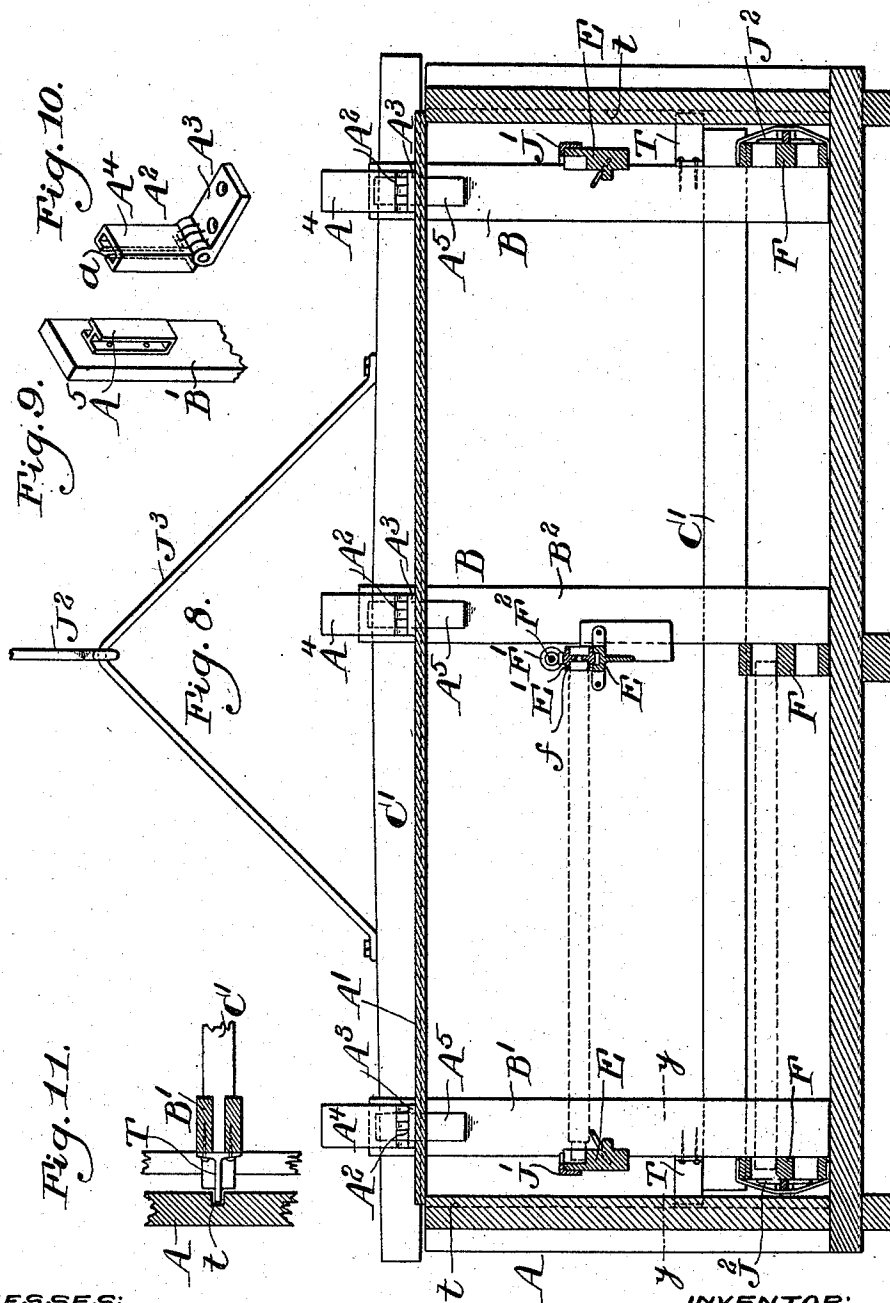
(No Model.)

3 Sheets—Sheet 3.

J. H. LORIMER.
APPARATUS FOR DYEING.

No. 570,488.

Patented Nov. 3, 1896.



WITNESSES:

Harry Denny
Miss Mary Denny

INVENTOR:

Joseph N. Lorimer
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UNITED STATES PATENT OFFICE.

JOSEPH H. LORIMER, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 570,488, dated November 3, 1896.

Application filed April 15, 1895. Serial No. 545,705. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. LORIMER, of Philadelphia, Philadelphia county, Pennsylvania, have invented an Improvement in Dyeing Apparatus, of which the following is a specification.

My invention relates to dyeing apparatus; and it consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings. My invention relates particularly to that class of dyeing apparatus in which the dyeing-frame is reciprocated in the dye liquor in the vat, and a part of my improvements relate to devices for automatically imparting the desired reciprocations to the frame.

To carry out my invention, I employ a lift operated by a motor fluid with a valve for controlling the movement of the motor fluid in the lift, and automatic devices controlled by a moving part of the lift for shifting the valve to change the direction of the movement of the motor fluid and thereby impart an upward and downward movement to the lifting devices. The operating connections between the movable part of the lift and the automatic valve-operating devices may be disconnected when desired, to throw the automatic devices out of action, and the movements of the lift may be controlled by an auxiliary valve independent of the automatic valve when it is desired to raise the dyeing-frame entirely out of the liquor or to lower it therein.

My improvements are preferably employed in connection with hydraulic lifting apparatus, but may also be employed in connection with other actuating means.

My invention also embraces improvements in the dyeing-frame whereby covers or lids may be applied to the vat to prevent the vapors rising from the heated liquor from escaping into the room without interfering with the reciprocation of the dyeing-frame.

My invention also relates to other improvements and combination of parts, which are fully set forth, and claimed hereinafter.

I shall now refer to the accompanying drawings for the purpose of more particularly describing my invention.

Figure 1 is a view of my improved yarn-dyeing machine, showing the lifting devices in elevation, with the valve mechanism thereof enlarged and in vertical section and the

dyeing apparatus and tank in transverse vertical section. Fig. 2 is an enlarged view of the valve-operating devices of the lifting mechanism. Figs. 3, 4, and 5 are respectively vertical sectional views of the valve mechanism, showing the valves in different positions. Fig. 6 is a horizontal sectional view of part of the lifting apparatus on the line *xx* of Fig. 2. Fig. 7 is a perspective view of one of the trips. Fig. 8 is a longitudinal vertical sectional view of the dye-tank and yarn-frame. Figs. 9 and 10 are perspective views of detached detail parts of the lid-hinging mechanism. Fig. 11 is a horizontal sectional view of part of the apparatus on the line *yy* of Fig. 8.

A is a suitable tank.

B is the yarn-frame.

C is a lift, preferably operated by hydraulic pressure.

D is the valve-operating mechanism.

R and S are two valves for controlling the movement of the motor fluid.

G is the inlet or supply pipe for the motor fluid.

H is the outlet discharge-pipe.

I is the cylinder of the lift, and J is the movable plunger thereof.

J' is a bracket carried by the plunger and overhanging the vat, with which the yarn-frame may be directly connected by a suitable connection J^2 (shown as a pendent hook engaging a rod J^3 of the yarn-frame).

By the reciprocation of the plunger J the yarn-frame B may be moved up and down in the dye liquor and may be entirely lifted from the vat or lowered into it.

I shall now describe the automatic valve-operating mechanism to control the motor fluid in the cylinder which I prefer to employ to impart the desired reciprocations to the yarn-frame.

D' is the frame of the valve-operating mechanism, which is arranged adjacent to the plunger J. It is shown in the drawings bolted to a flange of the cylinder I.

K K' are two oppositely-disposed slides, each movable in suitable guides *k k'* in the frame D'. These slides are provided with suitable lugs or projections *d d'*, respectively, through which a valve-rod L extends. The valve-rod is also guided through guides in the frame D, as in the guides *k k'* thereof, and is movable with reference to the slides K K'.

M is an arm carried by the plunger J and

moving therewith, which extends between the two opposed portions d d' of the slides K K' .

N N' are suitably disposed stops carried by the rod L and disposed on opposite sides of the lugs d d' .

O O' are springs located between the respective lugs d d' and stops N N' .

P P' , Fig. 2, are trips carried by the frame D' and movable in suitable guides therein. The trips P P' are located adjacent to the slides K K' , and the slides are provided with cam-faces o o' , adapted when the slides are moved to act upon opposed faces of the trips P P' and push them back against the action of springs Q Q' , which normally throw them forward. In the construction shown the slides K K' extend through apertures p p' in the trips P P' and the cam-faces o o' act upon the faces of the trip in these apertures. The extremities or noses o^2 o^3 of the trips P P' are located in the path of the stops N N' , respectively, so as to obstruct the movement of either stop until the trip is retracted by the cam-face of the correspondingslide. I shall now describe the operation of these devices in shifting the valve-rod L .

When the plunger J moves up or down, the arm M , carried by it, operates one of the slides K K' .

Supposing the parts to be in the position shown in Fig. 1 with the plunger lowered. As the plunger rises, the slide K is moved upward, and through the tension of the spring O the stop N is pressed against the opposing end o^2 of the upper trip P . The movement of the stop N and rod L is thus obstructed, and as the slide K continues to rise its end d compresses the spring O and puts the stop N under considerable tension. When the cam-face o operates the trip P and retracts it, the stop N is released and is instantly moved forward by the tension of the spring O into the position shown in Fig. 2. Thus a very quick movement is imparted to the stop N and rod L , and the valve controlled by the rod L is operated to control the motor fluid and permit the plunger J to descend. On the downward movement the operation is reversed. The arm M moves the slide K' down and compresses the spring O' , owing to the obstruction of the stop N' by the extremity o^3 of the trip P' , until the cam-face o' operates the trip and thus releases the stop N' and permits the stop and the rod L to move down under the tension of the spring O' . The valve is thus again operated and the plunger rises, as before. The movement of the plunger will thus automatically actuate the rod to operate the valve and impart the up-and-down reciprocation to the plunger and yarn-frame carried by it. The valve-operating mechanism is of such a character that the shifting of the valve to control the motor fluid is accomplished by a quick sudden action instead of by a slow gradual movement.

I shall now describe my preferred valve mechanism for controlling the motor fluid.

R is the control-valve, which is operated by the rod L , with which it is connected by a suitable lever l . The valve R is provided with a suitable passage-way r . R' is the control-valve casing, having an inlet-port r' for the motor fluid, a discharge-port r^2 to the discharge-pipe H , and an intermediate port r^3 to a pipe H' communicating with the port in the lower portion of the cylinder. The movement of the plunger J is controlled by the admission or discharge of motor fluid through the pipe H' into the cylinder I , below the plunger J . When the valve R is turned into the position shown in Fig. 1, communication is opened between the ports r' r^3 , through the valve-passage r , and the motor fluid passes from the port r through the pipe H' and enters the cylinder I . When the valve R is turned into the position shown in Fig. 3, communication is opened between the ports r^3 and r^2 , and the motor fluid is permitted to escape from the cylinder I through the pipe H' .

As it is desirable that the motor fluid should also be controlled by hand for the purpose of completely lifting the yarn-frame from the vat and for maintaining it in a state of rest, either when raised or lowered, I employ an auxiliary valve S , operated independently of the operation of the valve R , as by the hand-lever S^2 . This valve is located in the inlet-pipe to the valve R , and also communicates with the discharge-pipe H .

S' is the valve-casing, having the inlet-port s' communicating with the supply-pipe G , the discharge-port s^2 communicating with the pipe H through the branch H^2 , and the intermediate port s^3 communicating with the inlet-port r' of the valve R through a pipe G' .

The valve S is provided with the valve passage-way s . When the valve S is in the position shown in Figs. 1 and 3, the passage-way s opens communication through the valves s' s^3 and pipe G' to the port r' , so that the movement of the motor fluid may be controlled by the operation of the valve R in the manner described. When the valve S is thrown into the position shown in Fig. 4, the inlet to the valve R is closed and the discharge-passage for the motor fluid is opened through the pipe H' , ports r^3 r' , pipe G' , ports s^3 s^2 , and pipe H^2 . The plunger J will then be permitted to remain in a state of rest in its lowered position.

To throw the automatic valve-operating devices into operation, it is only necessary to throw the valve S back into the position shown in Figs. 1 and 3 to open the inlet to the valve R .

To elevate the plunger J so as to lift the yarn-frame out of the tank, the arm M is disconnected from the valve-operating devices D , and the plunger will continue to rise without any automatic action of the valve R . To permit the arm M to be easily disconnected from the valve-operating mechanism, I prefer to employ an arm carried by a collar M' , sup-

ported upon the plunger J, between the fixed collars M² M², and free to be turned upon the plunger, so as to disconnect its end from the mechanism D. The end of the arm M is preferably provided with a notch or hook *m*, adapted to engage the rod L between the ends *d d'* of the slides K K'. (See Figs. 2 and 6.) When the arm M is thus disconnected from the mechanism D and the plunger J is permitted to continue its upward movement, the plunger may be arrested by throwing the valve S in a position to close both the ports *s' s'*, as shown is Fig. 5. This will close both the inlet and discharge, and the plunger will be maintained in elevated position until the valve S is again operated.

I shall now describe the improvements in the yarn-frame, but it is to be understood that the automatic devices for reciprocating the yarn-frame and for raising it from the vat and lowering it therein may be employed with a yarn-frame of any suitable construction.

The yarn-frame shown is of the same general construction as the frame described in Letters Patent No. 505,471, dated September 26, 1893, to Joseph H. Lorimer.

B' B' are the vertical end pieces, B² the intermediate vertical piece, and C' C' the top and bottom longitudinal pieces making up the framework.

E and F are the supporting-frames for the upper and lower yarn-sticks, respectively, located at the middle and each end of the frame.

E' are a series of worm-wheels journaled in bearings in the central upper frame E, and provided with sockets *f* to receive the inner ends of the two sets of upper sticks. F' are a series of worms engaging the worm-wheel E', and carried by a shaft F², extending transversely over the central frame E. By turning the shaft F², all the worm-wheels and yarn-sticks may be turned simultaneously to shift the position of the skeins. The worms are preferably arranged in alternately opposite directions, so that adjacent sticks will move in opposite directions. The yarn-sticks are locked by suitable shifting locking-plates J' J². For further detail reference may be had to the said Letters Patent No. 505,471.

A part of my improvements relates to the employment, with a reciprocating yarn-frame, of movable covers or lids, which may be kept closed over the top of the vat while the frame is being reciprocated to prevent the escape of vapors from the liquor.

A' A' are the doors or covers adapted when closed to rest upon the top of the vat A. These covers or lids are loosely connected with the frame B, so that the frame may reciprocate without lifting them.

A² A² are hinges, of which one leaf, A³, is fastened to the door or lid, and the other, A⁴, is provided with a vertical groove or slot *a*, adapted to engage a complementary vertical guide or plate A⁵ on the top of the yarn-frame.

They are shown in the drawings carried by the uprights B' B' B². These guides A⁵ are of sufficient length to slide up and down in the grooves *a* of the hinges without disengagement when the yarn-frame is reciprocated. By making the grooves or slots *a* open at the top and the guides A⁵ free at their upper ends, as shown, the hinges A² may be lifted from the guides A⁵ when it is desired to entirely remove the doors from the yarn-frame.

The upper stick-supports E should be located at sufficient distance below the top of the frame, that they will not strike the doors A' on the upward reciprocation of the frame in the dye liquor.

For the purpose of holding the yarn-frame steadily against lateral displacement during its reciprocations, I provide the ends of the frame with tongues T on the ends, which extend into vertical grooves *t* in the ends of the vat.

The details of construction shown may be varied in many ways without departing from my invention.

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

1. In a dyeing-machine, the combination with a dye-vat, and yarn-frame, of a hydraulic lift carrying the yarn-frame and adapted to raise and lower it in the vat, and valve mechanism for automatically controlling the motor fluid in the lift at a predetermined point in the upward and downward movements of the yarn-frame, whereby the lift operates to automatically reciprocate the yarn-frame up and down in the liquor, and a valve, independent of the automatic valve devices, which control the reciprocation of the yarn-frame, for independently controlling the motor fluid in the lift and raising the yarn-frame from the vat or lowering it therein.

2. In a dyeing-machine, the combination with the dye-vat, of a yarn-frame, a door or cover for the vat and slides connecting the door or cover and the yarn-frame, whereby the yarn-frame may be reciprocated without lifting the door or cover.

3. In a dyeing-machine, the combination with a dye-vat, of a yarn-frame, a door or cover for the vat, and a hinge between the door or cover and the frame, having a loose connection with the frame, whereby the frame may reciprocate in said hinges without lifting the doors.

4. In a dyeing-machine, the combination with the dye-vat, yarn-frame and covers, of the hinges A² between the yarn-frame and the covers having the leaf A³ provided with the groove *a*, and the guide-pieces A⁵ on the yarn-frame engaging the grooves *a* and free to slide therein when the yarn-frame is reciprocated.

In testimony of which invention I have hereunto set my hand.

JOS. H. LORIMER.

Witnesses:

R. M. HUNTER,
THOS. L. EVANS.