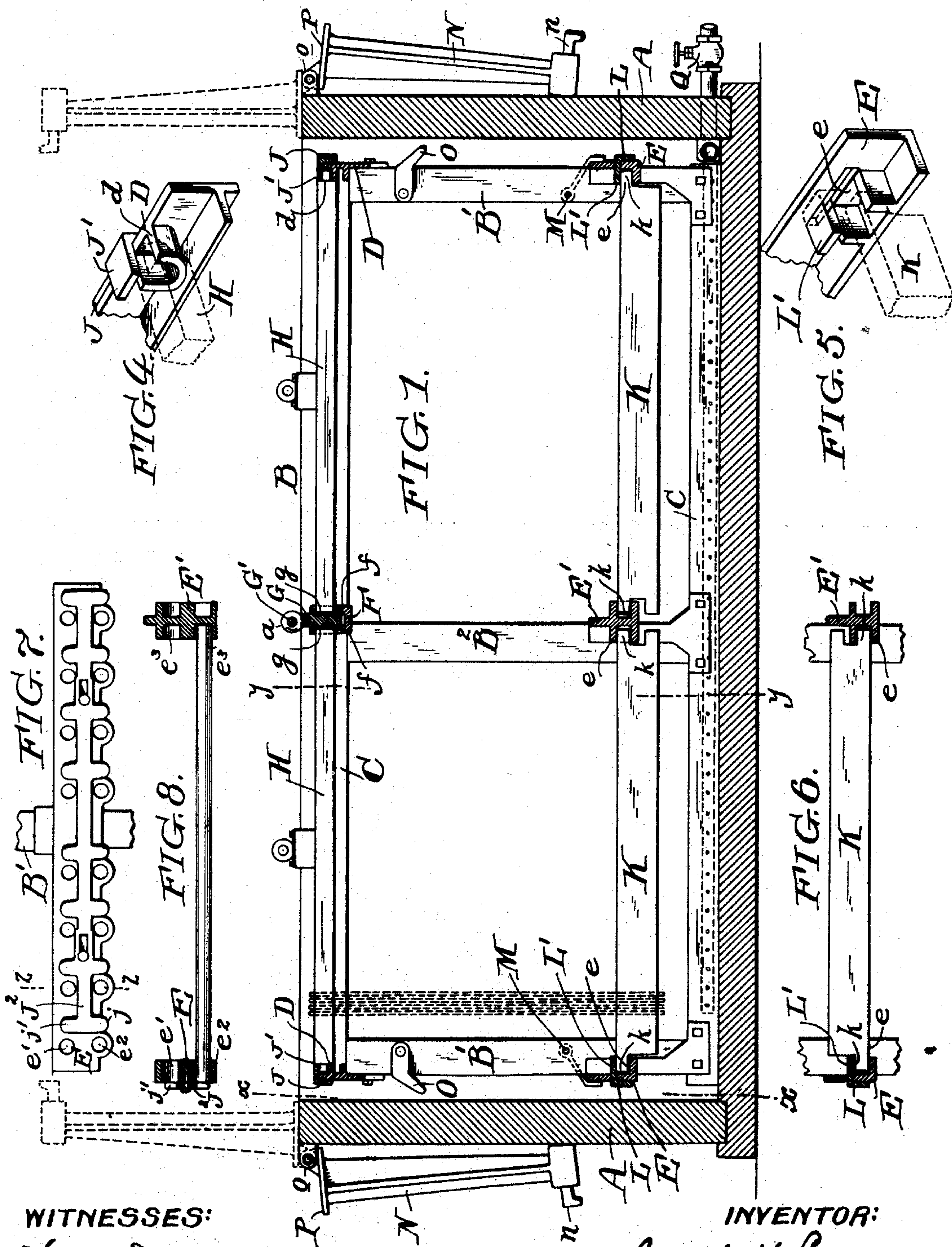


J. H. LORIMER.  
DYEING MACHINE.

No. 505,471.

Patented Sept. 26, 1893.



WITNESSES:

Henry D. Dwyer  
Helen G. Mathewson

INVENTOR:

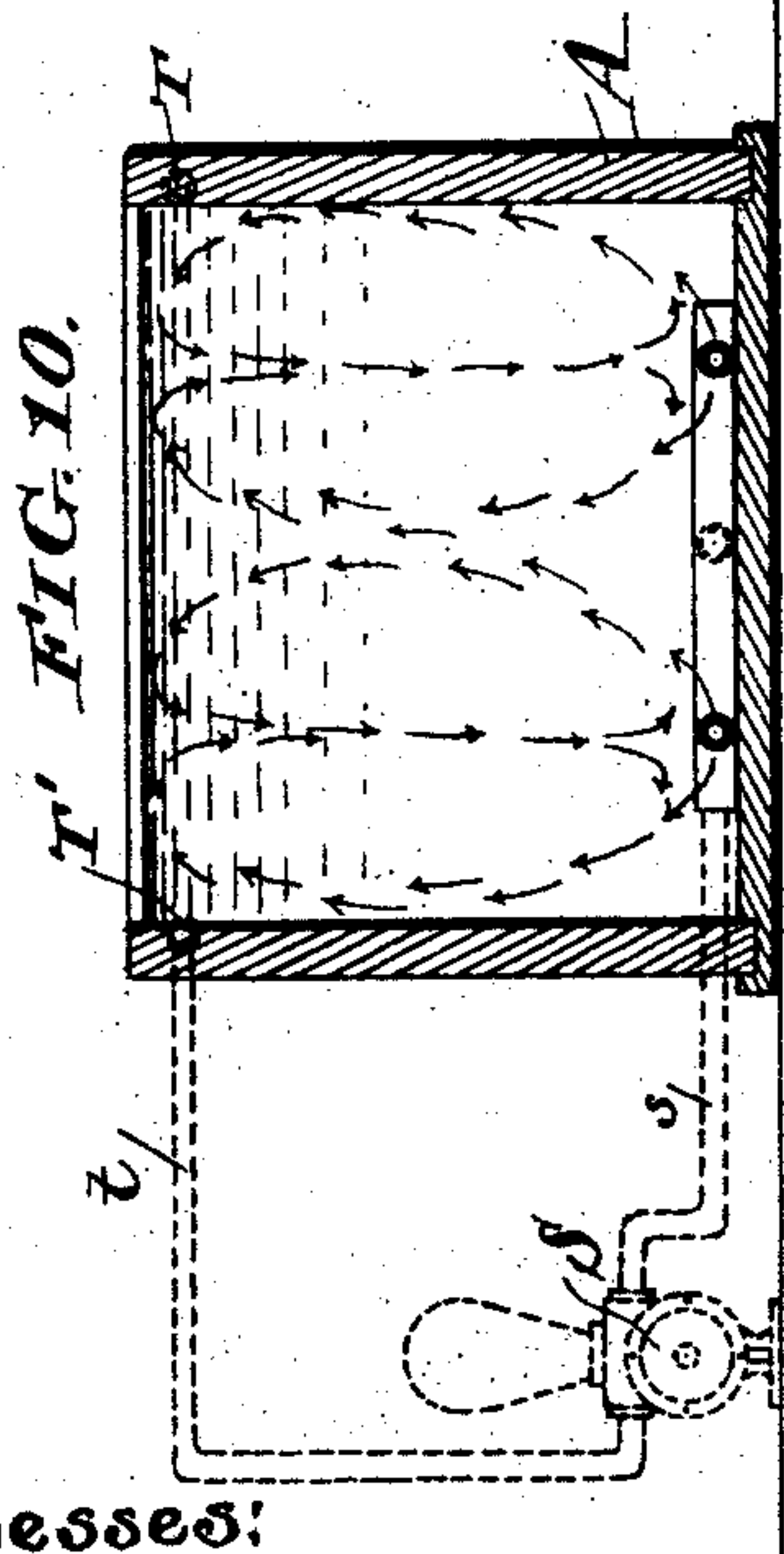
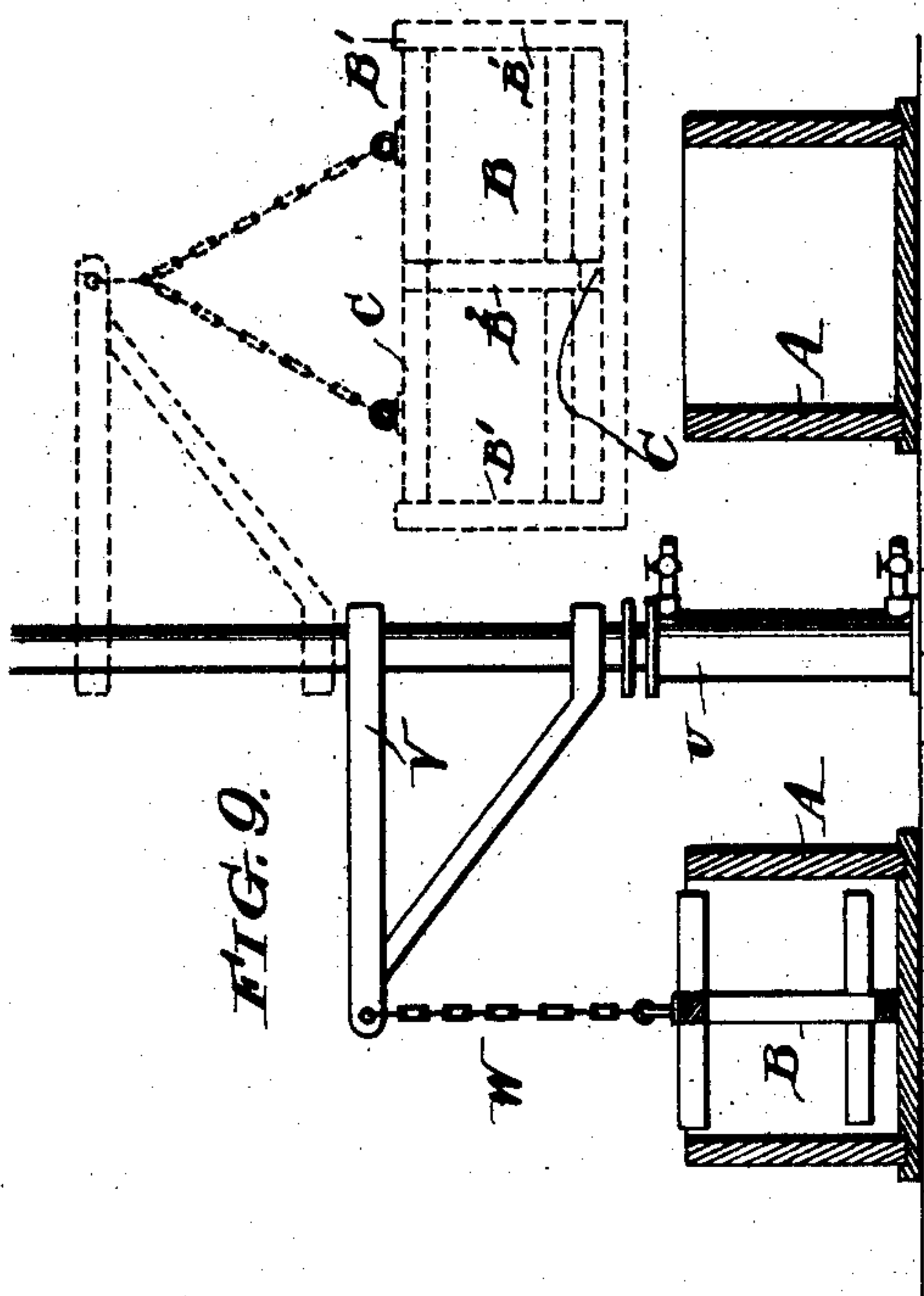
Joseph H. Lorimer  
By his atty

*[Signature]*

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Witnesses:  
Harry D. ...  
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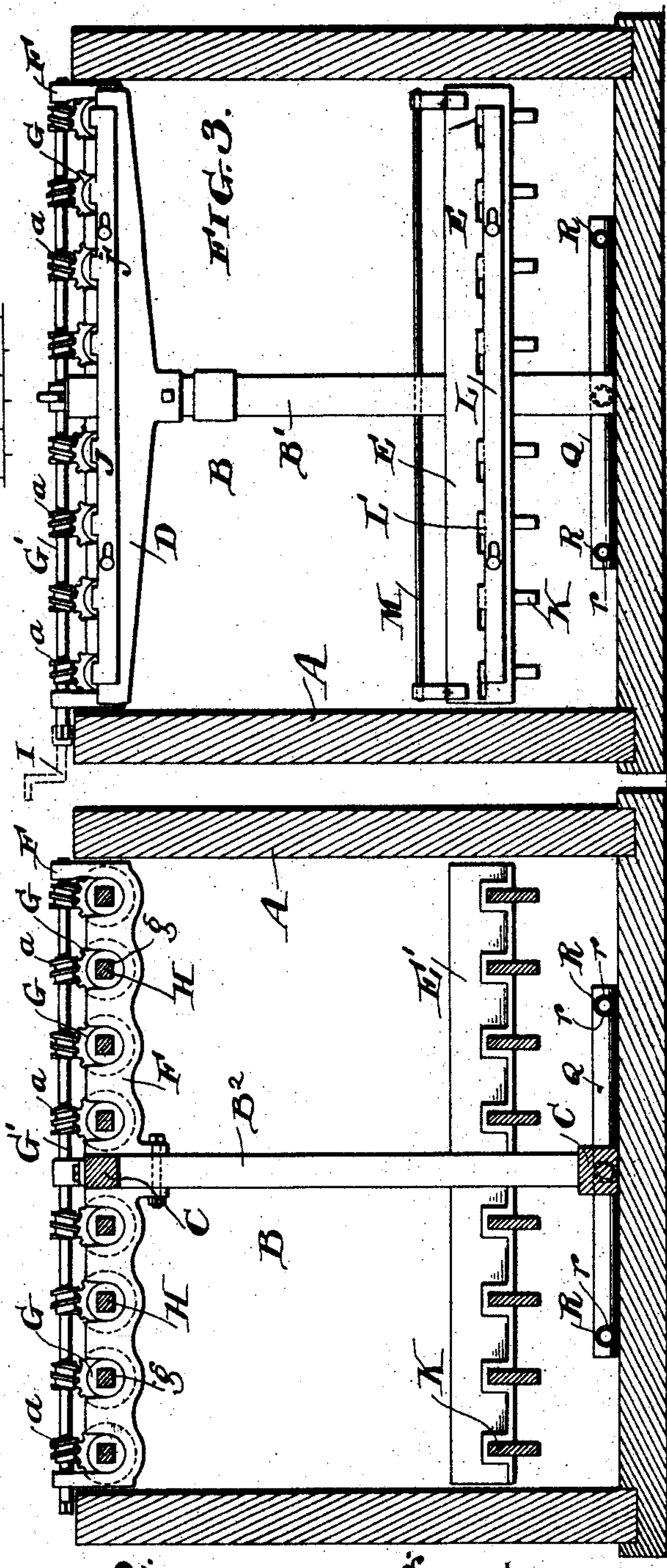


FIG. 2.

Inventor:  
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# UNITED STATES PATENT OFFICE.

JOSEPH H. LORIMER, OF PHILADELPHIA, PENNSYLVANIA.

## DYEING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 505,471, dated September 26, 1893.

Application filed December 29, 1891. Serial No. 416,496. (No model.)

*To all whom it may concern:*

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

My invention relates to dyeing and scouring machines and consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings which form a part thereof.

It is the object of my invention to accomplish an even and uniform dyeing of skeins of yarn, &c., without employing complicated mechanism for the purpose of intermittently raising and lowering the skein supporting frames and moving the yarn thereon.

In the dyeing of yarn in the skein, the usual method employed is that of hand dyeing, in which the yarn is moved through the dye liquor in a tank or vat by hand operation. This method is both expensive and slow. Machines have been designed to accomplish the dyeing mechanically, by moving the skein supporting frame through the liquor and intermittently turning the yarn supporting sticks so as to change the position of the skeins thereon. An objection with this process is that the yarn is subjected to considerable movement which tends to fret the fibers and often results in the breaking or tearing of the skeins.

In carrying out my invention, I propose to allow the yarn supporting frame to remain in the liquor and to accomplish the dyeing by circulating the liquor through the yarn. By this means an excessive working of the yarn is avoided. Whenever desired the yarn may be moved by turning the supporting sticks.

My apparatus may be used either for hot or cold dyeing as is hereinafter more fully set out.

My invention also relates to certain improvements in the construction of the dye vat and supporting frame and to other improvements and combinations of parts which are hereinafter more fully set out and claimed.

In the drawings: Figure 1 is a longitudinal vertical sectional view of my improved dye vat and yarn supporting frame. Fig. 2 is a transverse sectional view of the same on the line  $y-y$  of Fig. 1. Fig. 3 is a similar view

on the line  $x-x$  of Fig. 1. Fig. 4 is a perspective view of a portion of the support for the upper sticks. Fig. 5 is a similar view of a portion of the support for the lower sticks. Fig. 6 is a longitudinal sectional view of a portion of the yarn supporting frame shown in Fig. 1 illustrating the manner of adjusting the lower supporting sticks. Fig. 7 is an end elevation of a modification of the support for the lower sticks. Fig. 8 is a vertical sectional view of the same on the line  $z-z$  of Fig. 7. Fig. 9 is a side elevation of the apparatus for raising and lowering the yarn supporting frame; and Fig. 10 is a transverse vertical sectional view of the vat illustrating the circulation of the liquor in the process of dyeing.

A is the vat which may be of any convenient shape.

B is the yarn supporting frame consisting preferably of the vertical end pieces  $B'$ ,  $B''$ , intermediate piece  $B^2$  and the top and bottom longitudinal pieces C, C.

Arranged transversely to the end pieces  $B'$ ,  $B''$ , are the upper stick support frame D and the lower stick support frame E. For convenience of construction and operation and to avoid the use of long yarn sticks, I find it preferable to employ two sets of upper and lower sticks with suitable supports therefor at the middle portion of the frame.

E' is the support frame for the lower set of sticks at the middle of the frame.

F is a frame corresponding to the lower support frame E arranged at the top of the vat and at the middle thereof, provided with bearings  $f$ , in which is journaled a series of worm wheels G provided with angular or irregular sockets  $g$  for the ends of the upper yarn sticks H.

G' is a shaft carried in bearings of the frame F extending over the worm wheels G and provided with worms  $a$  engaging therewith. The shaft G may be turned by a handle I, thus rotating all of the yarn sticks H.

To accomplish the movement of adjacent portions of successive skeins in the same direction, the worms G are arranged with threads winding in opposite directions as shown in Figs. 2 and 3. The upper support frames D are provided with a series of bearings  $d$  (preferably cup shaped as shown) to



receive the round ends of the sticks H and to permit the same to be turned thereon when the yarn sticks are rotated by the worms *a* and worm wheels *G'* as heretofore described.

5 J is a sliding bar carried by the support frame D and free to be moved slightly in a longitudinal direction thereon by the slots *j'* (see Fig. 3). This sliding bar J is provided with a series of projections or flanges *J'* which  
10 are adapted to be moved over the ends of the sticks H while resting in the bearings *d* to lock them therein. By sliding the bar back these projections *J'* are moved from over the ends of the sticks, which may then be re-  
15 moved. By this sliding bar J with its projections *J'* a very convenient means is provided for locking all of the sticks in place and of releasing them again when desired. The lower support frames E and E' are simi-  
20 larly provided with a series of sockets *e* and *e'* to receive the ends *k* of the lower yarn sticks K.

L is a sliding bar similar to the bar J provided with projections *L'* for locking the  
25 ends of the lower sticks in their sockets or supports or releasing them therefrom when desired.

The upper yarn sticks H are preferably round or rectangular in cross section, while I  
30 prefer to make the lower yarn sticks K of considerable width as shown with the projections *k* by which it is received at the supports adjacent to its edge; so that the yarn stick may be turned with reference to the projec-  
35 tions *k* as shown in Fig. 1, or down as shown in Fig. 6. By this means the distance between the edges of the upper and lower sticks may be adjusted to suit the size of the skeins. In Figs. 7 and 8, I have shown, however, a  
40 modification of the means for adjusting the sticks for different sizes of skeins. In this construction, the ordinary round or rectangular sticks may be employed with the support frames E made with two or more series of  
45 holes *e'* *e''* located one below the other, and the sticks may be passed through either set of holes, the other ends being received in corresponding sockets *e'''* in the frame E'. A sliding bar *J''* is employed having arms *j''*  
50 which may be moved over the holes *e'*, *e''*, to lock the sticks against movement in their sockets.

M is a bar arranged transversely across the ends of the yarn supporting frame to keep the  
55 yarn upon the sticks from moving down upon the ends thereof.

N, N are arms hinged upon the ends of the vat A provided with supports *n* which are adapted to receive hooks O upon the frame  
60 B and support it in a raised position out of the liquor. The arms N, N, are hinged so that they may be turned down out of the way as shown in full lines in Fig. 1, where the frame is lowered into the vat. These arms  
65 N, N, are preferably hinged at *o* adjacent to the outer edge of the vat and are provided with flat bases P which are adapted to rest

upon the flat surface of the edge of the vat and to be supported thereby.

For producing the circulation of the liquor 70 whereby it is made to move among the fibers of the yarn and the movement of the yarn through the liquor is avoided, I employ a pipe Q which enters the vat and is provided with two branch pipes R arranged longitudinally 75 in the vat and at a distance from the sides thereof (see Figs. 2 and 3). These pipes R are provided with lateral perforations *r* opening from their sides. For hot or steam dye-  
80 ing, the vat is filled with the liquor and steam is introduced into the pipes R, R, from the pipe Q. The steam issuing from the lateral surfaces of the pipes seeks an escape in the surface of the liquor as is shown by the arrows in Fig. 10. This movement or circu- 85 lation of the liquor causes it to pass through and among the fibers of the yarn and thus produces a perfect saturation with the dye liquor without the necessity of moving the yarn. When it is desired to expose the sat- 90 urated yarn to the atmosphere, the yarn supporting frame is raised and is supported by the arms N, N. Once or twice or at intervals, while the yarn is in process of dyeing, the sticks H may be turned to move the skeins 95 upon their supports. The particular location of the pipes R, R, may be varied if desired. For cold dyeing, I induce the circulation by means of a pump S (shown in dotted lines in Fig. 10). At the top of the vat is an outlet 100 or overflow pipe T connected with the suction side of the pump by a pipe *t*, and the pipe Q is connected by a pipe *s* with the pressure side, so that the dye liquor is forced by the pump through the pipe Q into the pipes R, 105 R, and is taken out again through the pipe T being thus circulated through the vat. The apparatus may thus be used either for steam or cold dyeing, by simply disconnecting or using the pump S. 110

In Fig. 9 is shown the manner in which I prefer to raise and lower the yarn supporting frames into and from the vat by means of a hydraulic lift U, which carries a rotary arm or crane V to which the creel may be attached 115 by a chain W or otherwise as desired. As shown a single lift may be used with two or more vats.

While I prefer the details of construction here shown, I do not limit my invention to 120 them as it is apparent that these details may be varied without materially departing from the invention.

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

1. In an apparatus for dyeing yarn, &c. the combination of a vat, a frame for supporting yarn therein, a pipe entering said vat adja-  
cent to its bottom, branch pipes leading there- 130 from within the vat and adjacent to the bot- tom thereof having perforations or openings, an overflow pipe near the top of the vat, a circulating pump, and pipes connecting said pump respectively with the pipe entering the



vat near the bottom and the overflow pipe near the top.

2. In an apparatus for dyeing yarn, &c. the combination of a vat, arms hinged thereto and provided with supports, a frame to support the yarn provided with hooks or projections adapted to be received in the supports of the arms when the frame is raised from the vat.

3. In an apparatus for dyeing yarns, &c. the combination of a vat, arms hinged thereto adjacent to the edge and provided with flat bases P adapted to rest upon the edge of the vat when the arms are raised and with supports at the upper or free ends, a frame to support the yarn provided with hooks or projections adapted to be received in the supports of the arms when the frame is raised from the vat.

4. A yarn supporting frame for a dyeing machine having upper and lower supporting sticks, a support for said sticks, and a sliding locking bar having a series of projections adapted to be moved over the ends of said sticks while resting on the support, to lock the sticks therein.

5. In a yarn supporting frame for a dyeing machine the combination with the upper and lower sets of sticks of the support frame D for the upper sticks having a series of supports *d*, and the sliding bar J having a series of projections J' adapted to be moved over the ends of the sticks resting in the supports.

6. In a yarn supporting frame for a dyeing machine the combination of a longitudinal frame with upper and lower support frames for the yarn sticks at its ends, a transverse frame located at the middle of the yarn supporting frame provided with a series of worm wheels, a shaft carried by the frame adjacent to the worm wheels, worms carried by the shaft and meshing with the worms, and two sets of upper and lower yarn sticks, both sets of upper sticks being supported at the outer ends in the end supports of the frame and having their inner ends connected with the worm wheels at the middle thereof, whereby both sets of sticks may be turned together.

7. In a yarn supporting frame for a dyeing machine, the combination of end supporting pieces for the outer ends of the yarn sticks, an intermediate supporting frame, located between the end frames, for supporting the inner ends of the sticks, rotary supports carried by said intermediate frame and connected with the inner ends of each set of sticks, and means to rotate the rotary supports carried by the intermediate frame in unison, whereby both sets of sticks may be turned or rotated together.

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

JOS. H. LORIMER.

Witnesses:

ERNEST HOWARD HUNTER,  
S. T. YERKES.