

3 Sheets—Sheet 1.

No. 453,646.

Patented June 9, 1891.

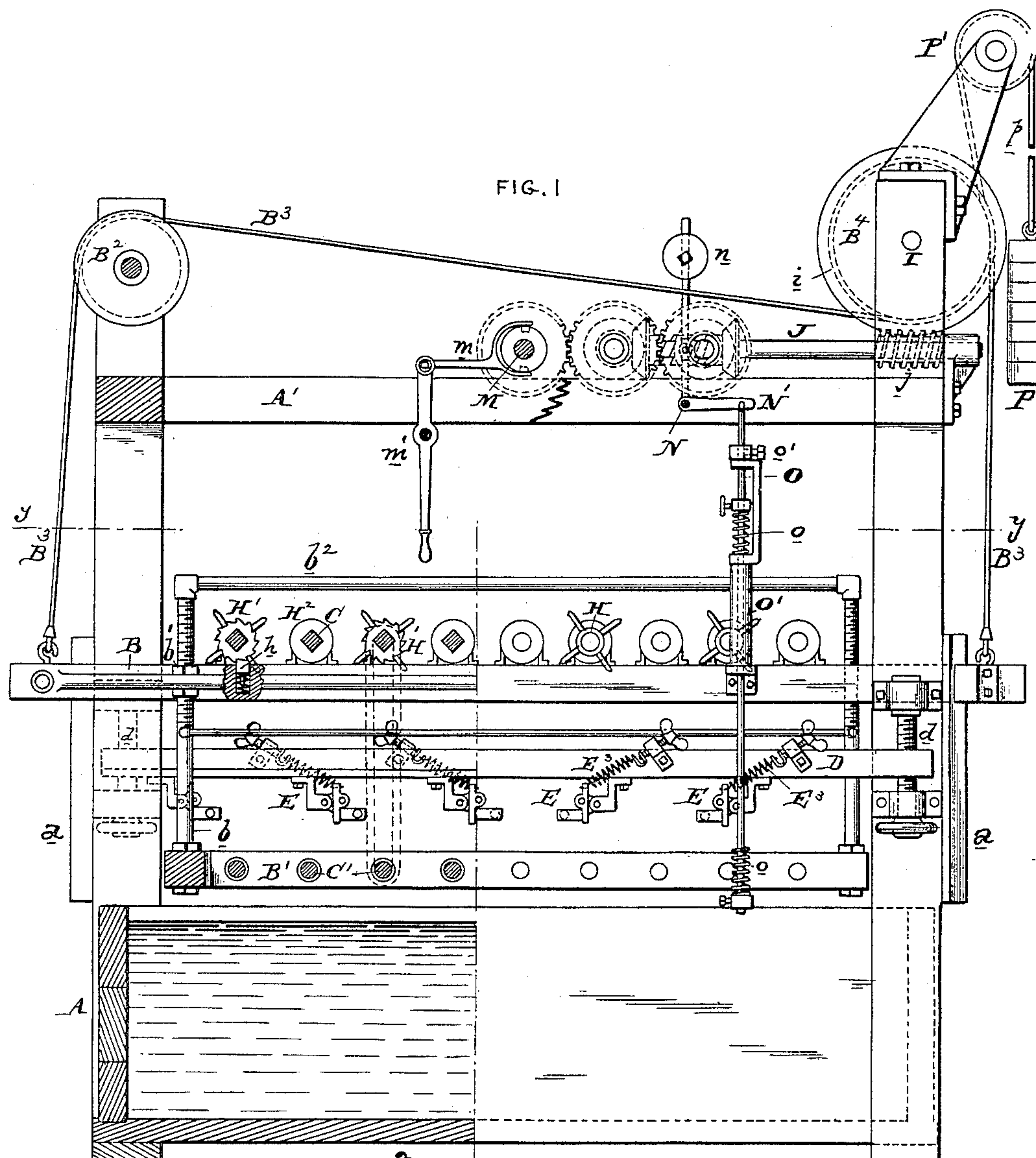
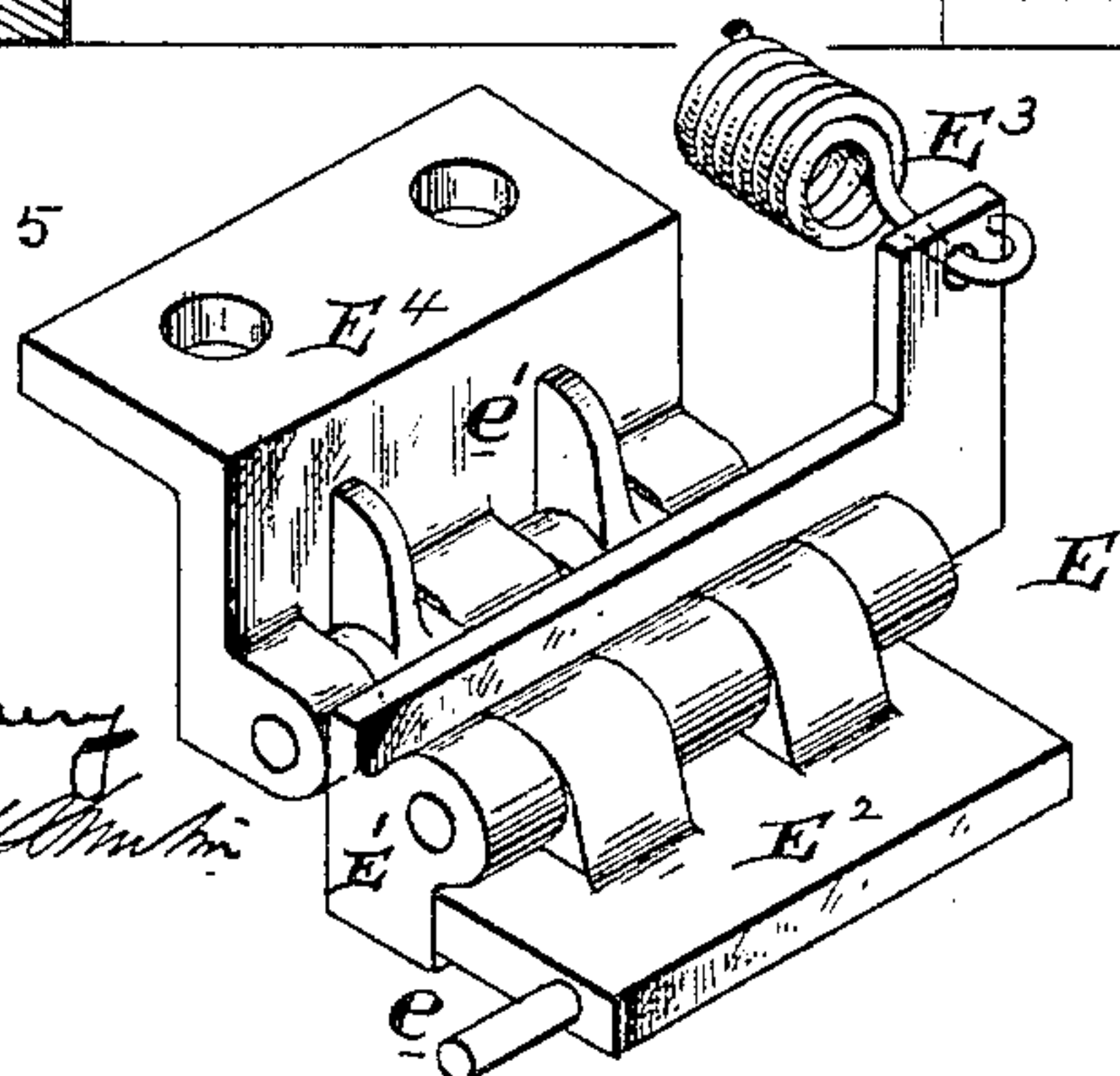


FIG. 1



Witnesses:

Henry Tracy
Merrill Woodman

FIG. 6

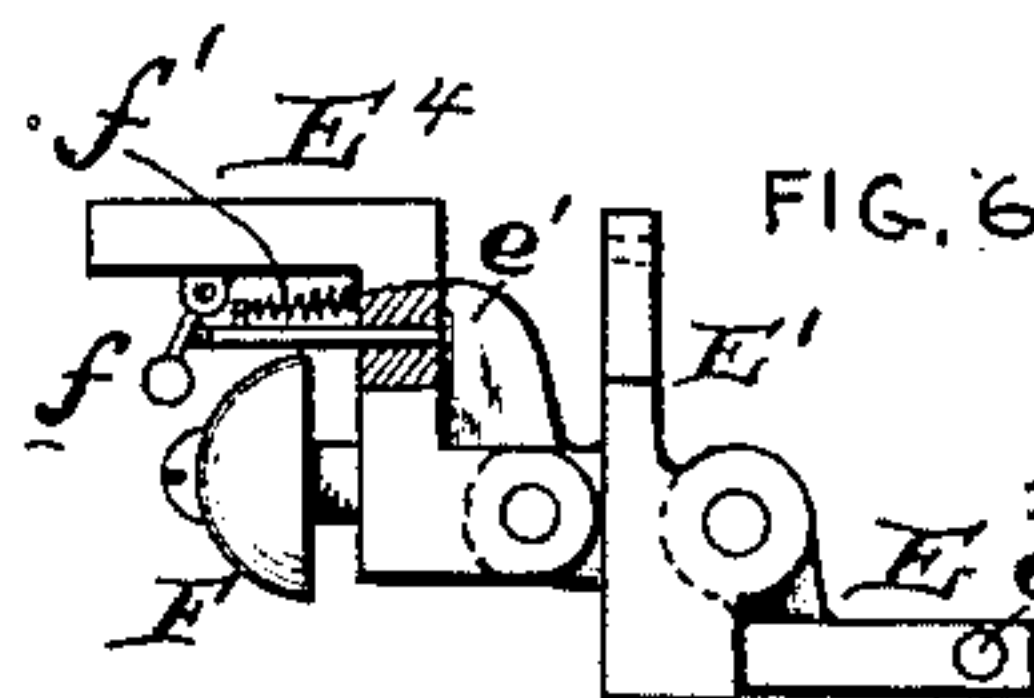
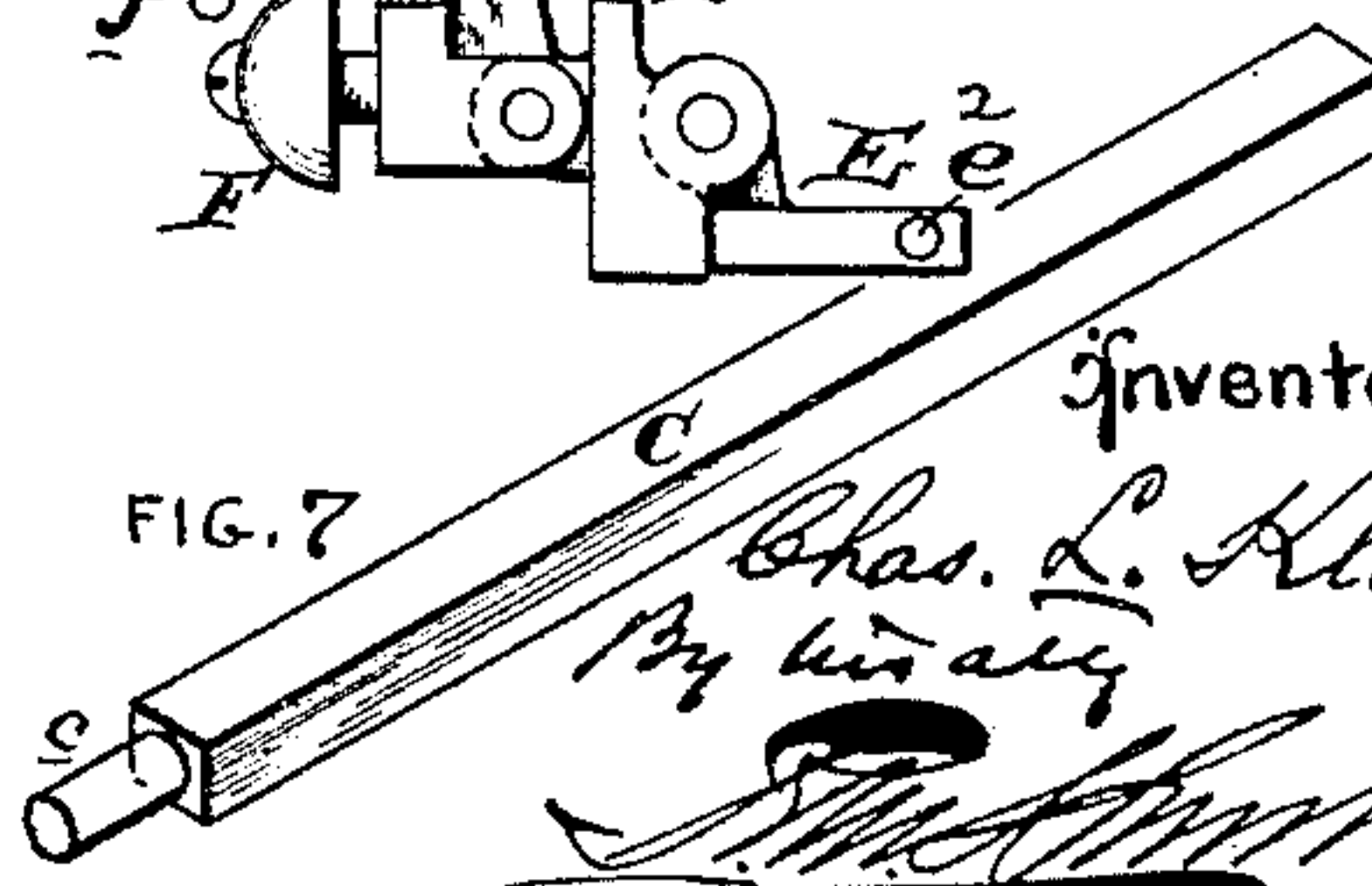


FIG. 7



Inventor:

Chas. L. Klauder

By his atty

Wm. H. Smith

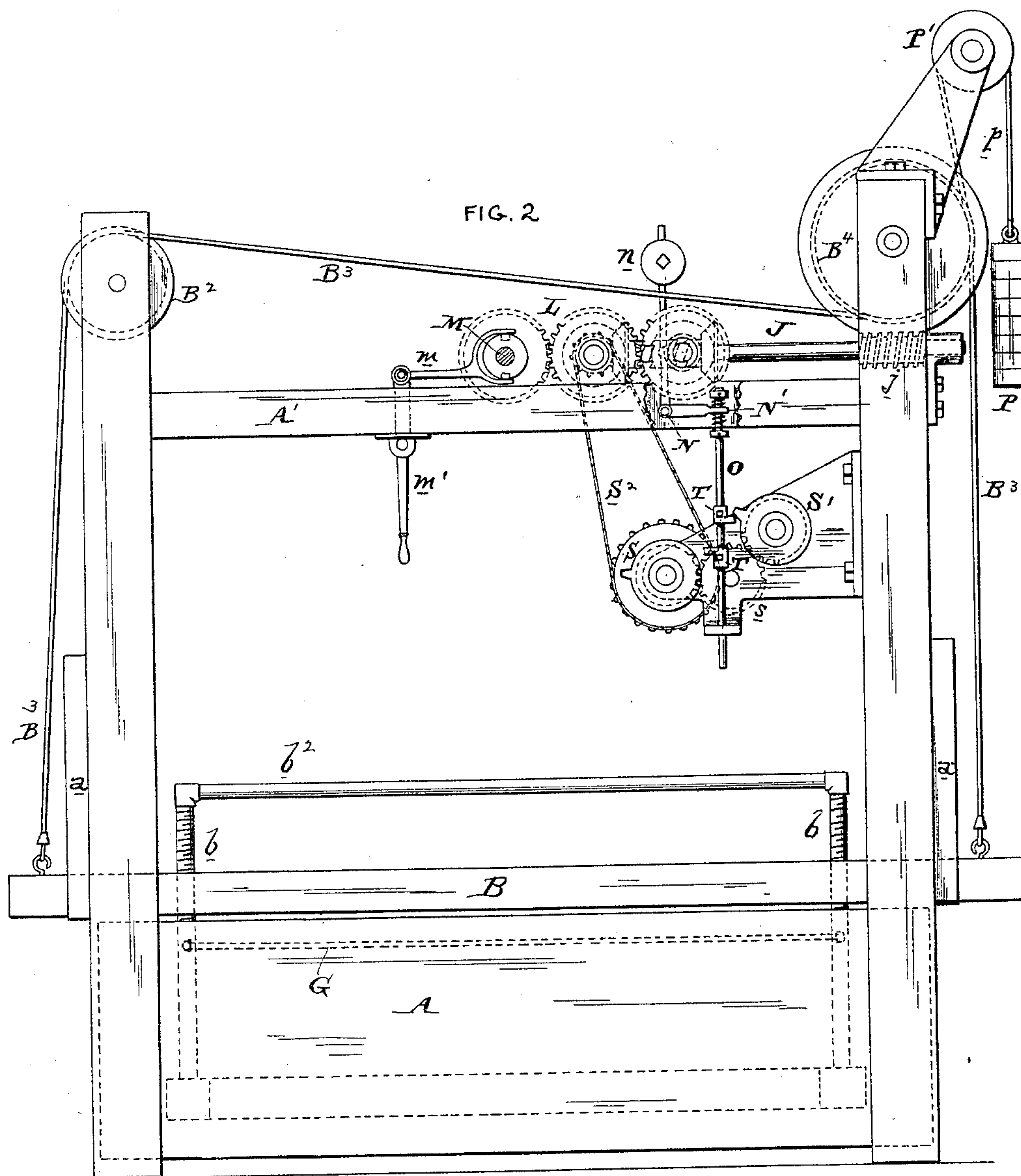
(No Model.)

3 Sheets—Sheet 2.

C. L. KLAUDER.
APPARATUS FOR DYEING.

No. 453,646.

Patented June 9, 1891.



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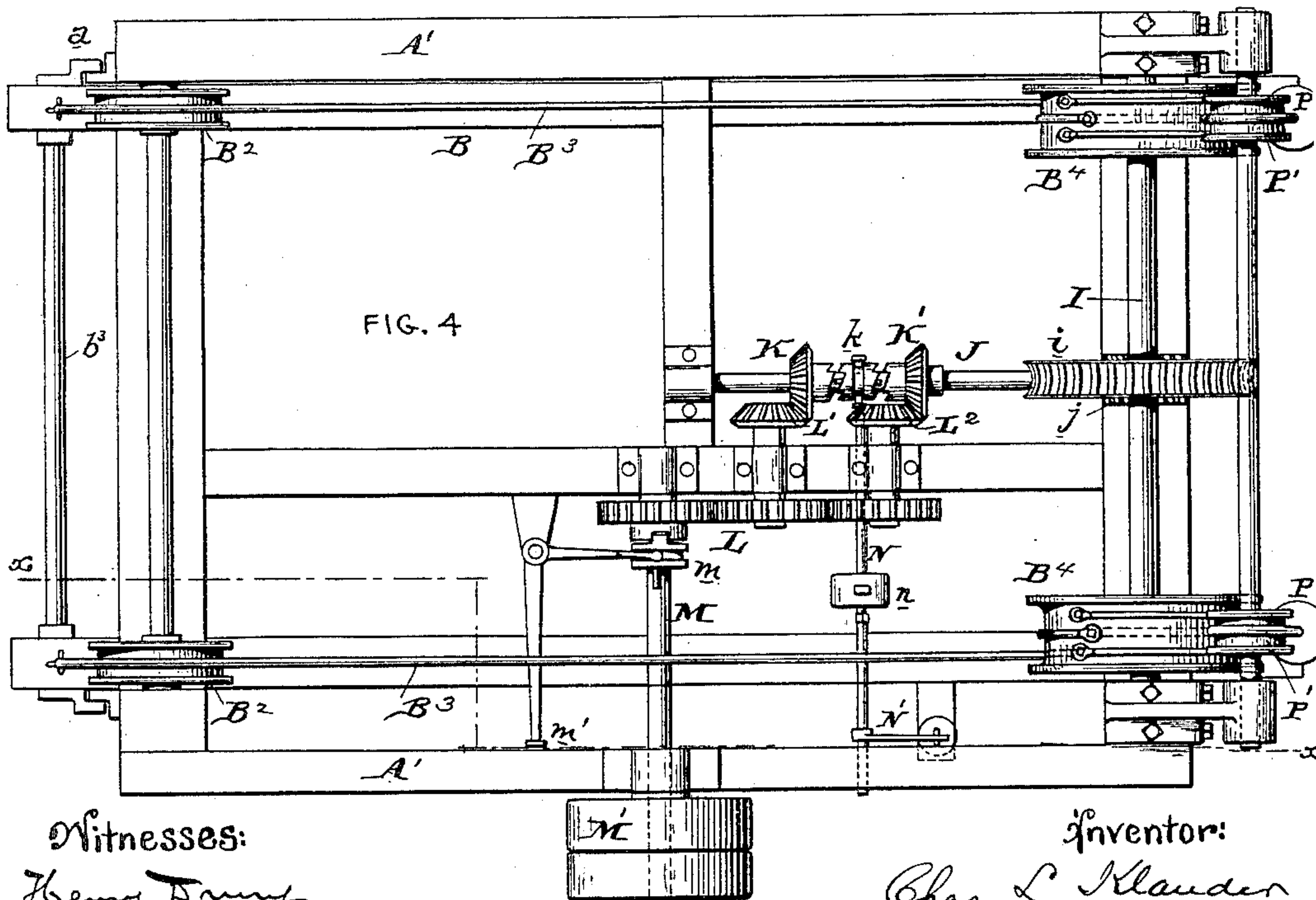
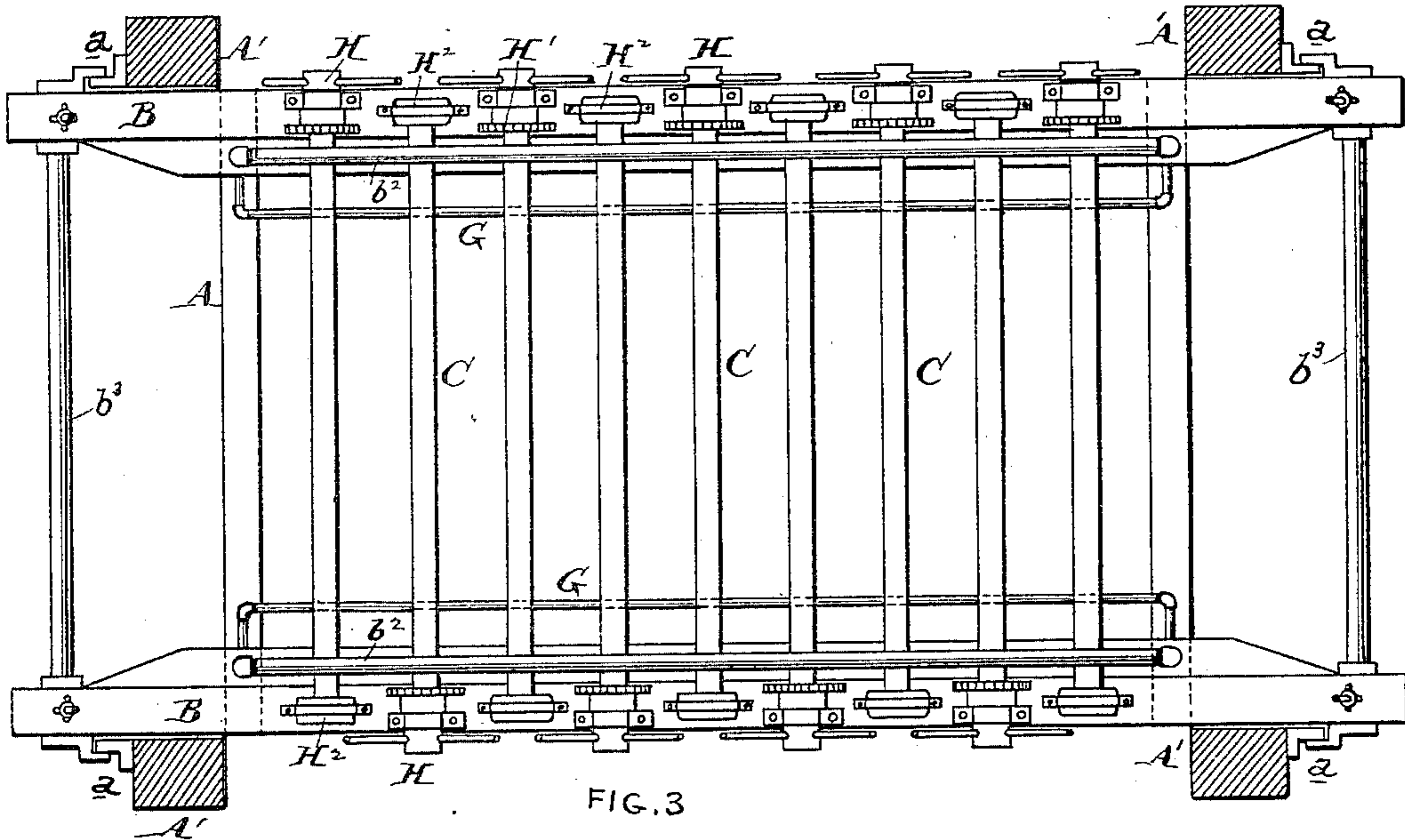
(No Model.)

3 Sheets—Sheet 3.

C. L. KLAUDER.
APPARATUS FOR DYEING.

No. 453,646.

Patented June 9, 1891.



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UNITED STATES PATENT OFFICE.

CHARLES L. KLAUDER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
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APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 453,646, dated June 9, 1891.

Application filed October 9, 1890. Serial No. 367,484. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. KLAUDER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Dyeing-Machines, of which the following is a specification.

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

My invention is particularly adapted to the dyeing of yarn in the skein, and is intended to more perfectly and rapidly accomplish the process and to subject all portions of the yarn of each skein to equal contact with the dye solution, so that a regular dye or color is obtained.

In carrying out my invention I employ a series of skein-supporting sticks, which, by means of suitable mechanism, are raised and lowered to successively immerse the yarn in the dye-liquor and then expose it to the air. With each successive reciprocation of the yarn-supporting sticks they are rotated so as to move the skein, in order that no portion of the material may remain in contact with the supporting-stick a greater length of time than other portions, and thus be less subjected to the action of the dye-liquor. The raising and lowering of the yarn-supporting sticks may be a uniform reciprocation, producing a regular dipping of the yarn in the liquor, or it may be automatically controlled, if desired, so that the dipping may be interrupted to keep the yarn submerged for a longer period of time. The rotation of the yarn-supporting sticks is accomplished by means of a projection or stop arranged in the path of the stick during its reciprocation. By making this stop yielding it may be pushed aside if the stick is unable to rotate by reason of tangling of the yarn or for any similar cause, thus permitting the stick to pass without rotating, and thereby preventing breaking of the yarn or injury of the machine.

My invention also relates to certain novelties in the construction and in the combination of the parts, which are fully described and claimed hereinafter.

In the drawings, Figure 1 is a side elevation of my improved dyeing apparatus, with one half in section, on the line *x x* of Fig. 4. Fig. 2 is a side elevation of the same with the yarn-supporting sticks, &c., removed, showing a modification of the devices for controlling the reciprocation of the frame. Fig. 3 is a sectional plan view on the line *y y* of Fig. 1. Fig. 4 is a plan view of the apparatus. Fig. 5 is a perspective view, on an enlarged scale, of one of the stops for rotating the yarn-sticks removed from the machine. Fig. 6 is a side elevation of the same upon a smaller scale; and Fig. 7 is a perspective view of one of the yarn-supporting sticks.

A is the dye-vat, which may be made of any convenient construction and is preferably rectangular in shape.

A' is the frame of the apparatus above the vat, consisting of the usual upright and cross-pieces.

B B are two side frame-pieces, which may be connected at their ends by rods *b*³, or in any other convenient manner, to form a rectangular frame which is free to reciprocate above the vat A, being guided by means of guides *a* between the frame-pieces B and the uprights of the frame A'.

B' are two side frame-pieces adapted to be moved into and out of the vat A, being connected to the pieces B by means of the rods *b*. These rods *b* are connected with the frames B by means of nuts *b'*, and are screw-threaded, as shown, so that the lower frames B' may be adjusted to or from the frame-piece B. Each lower frame-piece B' is connected with its corresponding upper frame-piece B by means of two of the rods *b*, these rods *b* being united at the top by a cross-rod *b*².

C are a series of yarn-supporting sticks arranged transversely between the upper frame-pieces B B, having one end journaled in bearings H² upon one frame-piece B, and the other end journaled in bearings on the opposite frame-piece and provided with star-wheels H.

H' are ratchets carried by the sticks C, and *h* (see Fig. 1) are spring-pawls upon the frame B, engaging therewith to prevent backward rotation of the sticks C.

C' are a second set of yarn-supporting

sticks journaled in the frames B' B' below the sticks C.

The sticks C are preferably constructed in the manner shown in Fig. 7—i. e., rectangular in cross-section, with a round journal end *c* to fit with the bearing H². The ratchets H' are provided with a rectangular recess to receive the rectangular end of the stick C, and with a circular collar which is journaled in the bearings upon the frame-piece B. The frame-pieces B B are connected by cords B³ with a drum B⁴, carried by a shaft I in the upper part of the frame A'. B² B² are guide-rollers for guiding the cords B³ B³ from one end of the frame-pieces B B to the drum B⁴. The star-wheels H are preferably located upon alternately opposite ends of the sticks C, as shown in Figs. 1 and 3, so that the projections of the star-wheels of adjacent sticks will not interfere one with another.

E are yielding stops carried by the frame A' in the path of the projection of the star-wheels H. These pivoted stops E are preferably carried upon frames D upon the sides of the machine, and may be raised or lowered by adjusting-screws *d*. By the adjustment of the frames D the position in which the yarn-supporting sticks are rotated may be varied, thus rotating them when the yarn is more or less submerged in the liquor or exposed to the air.

The details of the stops E are shown in Figs. 5 and 6. E⁴ is an angular piece adapted for attachment to the frame D. E' is a piece hinged thereto and provided with feet *e'*, which rest against the piece E⁴, preventing a movement of the part E' upon its hinge in one direction, while allowing it to move in the other direction. Thus while the part E' is free to swing downwardly upon its hinge an upward movement is prevented by the feet *e'* bearing against the fixed part E⁴. Hinged to the part E' is a second part E², which bears against the part E' in one direction, while being free in the other direction, so as to be free to move in one direction only, its freedom of movement being in the opposite direction to that of the part E'. This piece E² carries a pin or projection *e*, which is in the path of the projections of the star-wheels H. E³ is a spring connecting the movable part E' with the frame D, so as to prevent movement of the part E' upon the fixed part E⁴, unless considerable tension is exerted, and to maintain the parts E' and E² to their normal positions after they have been moved. The tension of this spring may be adjusted in any well-known manner, as shown.

The operation of the stop E is as follows: When the sticks C are raised, the projections of the star-wheels H, coming in contact with the pin *e* of the stop E, will move the part E² upon its hinge, allowing the projections of the star-wheels to pass; but when the star-wheel strikes the pin *e* in descending it will be rotated thereby, turning with it the stick C, since the downward movement of the part E² is prevented by the part E', which is held in

position by the spring E³. If for any reason, however, such as the tangling of the yarn, the stick C is not free to rotate, the increased tension of the star-wheel upon the pin *e* will overcome the tension of the spring E³ and push the parts E' and E² aside, allowing the star-wheel to pass the pin *e* without a rotation of the stick C. In this manner the breaking of the yarn is prevented. The stop E is thus a compound pivoted stop adapted to rotate the yarn-carrying stick. To indicate to the operator when a stick has failed to rotate, I employ a bell F, carried by the part E⁴, which is adapted to be struck by a gong *f*. By means of a pin *f'*, extending through the part E⁴ and resting against one of the feet *e'*, the gong is kept out of operation. It will be seen that whenever the part E' is moved upon the failure of the stick to rotate the foot *e'* will be moved from the pin *f'* and will thus release the gong *f*.

G are guides upon the sides of the movable frame to prevent the skeins of yarn upon the sticks coming in contact with the operative mechanism upon the ends of the sticks.

Carried by the shaft I is a worm-wheel *i*, which is operated by a worm *j* upon the shaft J, journaled in the upper part of the apparatus.

Journaled loosely upon the shaft J are two beveled gears K and K', between which is a clutch *k*. This clutch is keyed upon the shaft J and is operated by a clutch shifter and lever N, so that either of the beveled gears K or K' may be connected with the shaft J, as desired.

M' is the driving-wheel carried by the shaft M, which, by means of a clutch *m*, may be connected with the train of gear-wheels L. Power is transmitted to the beveled gears K and K' from two of the gear-wheels L by means of the intermediate beveled gears L' and L². As these two gear-wheels L are geared together, it is apparent that they will rotate in opposite directions and impart opposite rotations to the gears K or K', so that the shaft J and its worm *j* will rotate in opposite directions as the shaft is connected with the gears K or K'. By throwing these gears K and K' into connection the shaft J, and by it the shaft I, are rotated in alternately opposite directions, thus raising and lowering the frames B B and the yarn-supporting sticks. The clutch *k* is kept in either of its shifted positions by means of a weight *n*, carried by an arm of the lever N. To accomplish this alternate connection of the gears K and K', I employ the mechanism shown in Fig. 1. The lever N, by which the clutch *k* is operated, is provided with a crank N', which is connected with a rod O. This rod O passes through a sleeve or tubular piece O', carried by the movable frame B. The rod O is provided with adjustable spring-stops *o*, against which the ends of the sleeve or tubular piece O' strike as it is carried up and down by the frame B, thus removing the rod O successively up and down and shifting the

lever N and clutch *k*. By adjusting the stop *o* the amount of each reciprocation of the frame B may be regulated, the reciprocation being regular.

5 I prefer to construct the tubular piece O' with a yoke at its upper portion, within which the upper spring-stop *o* is placed. In addition to these spring-stops *o*, I employ a third stop *o'*, located at a high point upon the rod
10 O, and adapted to be struck by the sleeve O' only when the frames B and B' are raised entirely out of the liquor. To use this stop *o'* the upper spring-stop *o* is loosened upon the rod O, and is carried up and down upon it by
15 the yoke of the sleeve O'. When the stop *o'* is struck, it throws the clutch *k* out of gear with both the gears K and K', entirely disconnecting the shaft J and permitting the frames B and B' to remain at rest. By means
20 of a lever *m'* the clutch *m* may be operated to connect or disconnect the power-shaft M.

P is a counterbalancing-weight connected by the cord P', passing over the guide P with the drum B⁴.

25 In Fig. 2 is shown a modification of the devices for automatically shifting the clutch *k*, by which the reciprocation is not uniform, the frame B being maintained longer in one position than in the other.

30 S and S' are two gear-wheels of different diameters mounted in a suitable bracket of the frame A' and carrying trips adapted to strike the adjustable stops T T upon the rod O, so as to shift or reciprocate the rod in the manner heretofore set out. The gears S and
35 S' are connected by an intermediate gear *s*, and power is transmitted to the gear S from a sprocket-wheel upon the shaft of one of the gears L by a chain S², or in any other convenient manner. Since the wheels S and S', which carry the trips, are of different diameters and are driven together, it is apparent
40 that the intervals between the operation of the trip of larger diameter will be longer than those between the operation-trip of smaller diameter, and thus the frame B will remain longer in one position than in the other.

With the mechanism shown in Fig. 2 the frame will remain in a lower position for a
50 longer interval of time than in the raised position, thus interrupting the dipping operation and allowing the yarn to remain for a longer time in the liquor.

55 While I prefer the mere details of construction which have been hereshown, it is apparent that they may be varied without departing from the principles of my invention, and I do not limit myself to them.

60 The operation of the apparatus is as follows: The skeins of yarn are supported upon the upper and lower set of yarn-supporting sticks C C', being stretched between the two, as indicated in dotted lines in Fig. 1. As heretofore stated, the frame B' B', carrying
65 the sticks C', may be adjusted to or from the frames B B' to suit the size of the skeins to be treated. Upon operating the clutch-shifter

m the apparatus will be put into operation.

Considering the frames as raised in the operation of dipping and the gear K' in connection with the shaft J, the shaft I and the drum B⁴ will be rotated, lowering the frames B and B' and submerging the skeins in the dye-liquor in the vat. As the frames descend, the projections of the star-wheels strike the stops
70 E, thereby rotating the sticks C and shifting the yarn. When the frame reaches its lowest position, the lower end of the sleeve O' strikes the stop *o* at the bottom of the rod O and lowers the rod, throwing the clutch *k* out
80 of connection with the gear K' and into connection with the gear K. The shaft J will thereupon rotate in the opposite direction, raising the frames B and B'. In ascending, the projections of the star-wheels H strike the
85 pivoted ends E² of the stops E and push them aside in the manner heretofore set out. Upon rising again the upper end of the sleeve O' strikes the upper stop *o*, shifting the clutch
90 *k* and reversing the rotation of the shaft J, causing the frames B and B' to again descend, as before. When the yarn has been sufficiently treated, the upper stop *o* may be loosened, allowing the sleeve O' to strike the
95 stop *o'*. This will throw the clutch *k* out of connection with both gears K and K', and arrest the frame in its highest position out of the liquor, as shown in Fig. 1. With the modified mechanism shown in Fig. 2 the operation is similar, except that in lieu of the
100 collar O' the rotating trips S and S' are employed. Thus when the frame has been lowered it will remain in that position until the trip S strikes the stop T and shifts the rod O, and through it the clutch *k*. In a similar
105 manner, when the frame has been raised it will remain raised until the trip S' operates the stop T, and since the trip S' operates with greater rapidity than the trip S it is apparent that the frame will remain in its lowest position
110 for a greater interval of time than in its highest.

Having now described my invention, what I claim as new, and desire to secure by Letters
115 Patent, is—

1. In a yarn-dyeing machine, the combination of a dye-vat, a vertically-reciprocating frame, a series of rotatable yarn-supporting sticks carried thereby and provided with projections, and a stop arranged in the path of
120 the projections of said sticks, adapted to strike them to cause said sticks to rotate.

2. In a yarn-dyeing machine, the combination of a dye-vat, a vertically-reciprocating frame, a series of rotatable yarn-supporting
125 sticks carried thereby and provided with projections, a yielding stop arranged in the path of the projections of said sticks, adapted to strike them to cause said sticks to rotate, but to be pushed aside and permit said projections to pass when the sticks are not free to
130 rotate.

3. In a yarn-dyeing machine, the combination of a dye-vat, a vertically-reciprocating

frame, a series of rotatable yarn-supporting sticks carried thereby and provided with projections, a stop arranged in the path of the projections of said sticks, adapted to strike them to cause said sticks to rotate, and provided with a pivoted end movable in one direction only.

4. In a dyeing-machine, the combination, with a dye-vat, of a series of movable yarn-supporting sticks having projections, and a stop arranged in the path of the projections of said sticks, consisting of a fixed part, a movable part carried thereby and formed with a stop to limit its movement in one direction only, and a third part pivoted to said movable part, and also provided with a stop to limit its movement in one direction only, the direction of movement of said movable parts being relatively opposite.

5. The combination, in a dyeing-machine, of a dye-vat, a series of movable yarn-supporting sticks provided with projections, and a stop E, arranged in the path of said projections, consisting of the fixed part E¹, the intermediate part E', pivoted thereto and provided with feet e' bearing against the part E¹ to prevent movement of the part E' in one direction, the part E², pivoted to the part E' and having a stop to prevent its movement in the direction of the movement of the part E', and the spring E³, carried by the part E' to normally prevent the movement thereof.

6. In a yarn-dyeing machine, the combination, with a dye-vat, of a series of rotatable yarn-supporting sticks provided with projections, means to move said yarn-supporting sticks into and out of the dye-vat, a stop arranged in the path of the projections of said sticks to cause the sticks to rotate, and an adjustable support carrying said stop, whereby its position may be adjusted relatively to the vat.

7. The combination, in a dyeing-machine, of a vat, a vertically-movable frame, a series of yarn-supporting sticks carried thereby, a power-shaft, connections between said power-shaft and frame to raise and lower the frame, oppositely-rotating power devices, a clutch to connect said shaft with said power device successively, and a trip carried by the frame to shift said clutch successively as the frame is raised and lowered.

8. In a dyeing-machine, the combination of a vat, a reciprocating frame, a series of yarn-supporting sticks carried thereby, a power-shaft, connections between the power-shaft and reciprocating frame, oppositely-rotating power devices, a clutch and clutch-shifter to connect said power devices with the shaft successively, an extension or rod connected with said clutch-shifter, provided with stops, and a trip carried by the frame adapted to strike said stops when the frame is raised and lowered to operate the clutch-shifter and clutch.

9. In a yarn-dyeing machine, the combination, with a vat, of a rotatable yarn-supporting stick, means to reciprocate said sticks vertically to dip the yarn in the liquor, said sticks being provided with a projection, a projection arranged in the path of said projection of the yarn stick adapted to rotate said stick, one of said projections being yielding and the other fixed, whereby the yielding projection may be pushed aside by the fixed projection when undue tension is exerted upon it.

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

CHARLES L. KLAUDER.

Witnesses:

ERNEST HOWARD HUNTER,
A. J. DUNN.