

(No Model.)

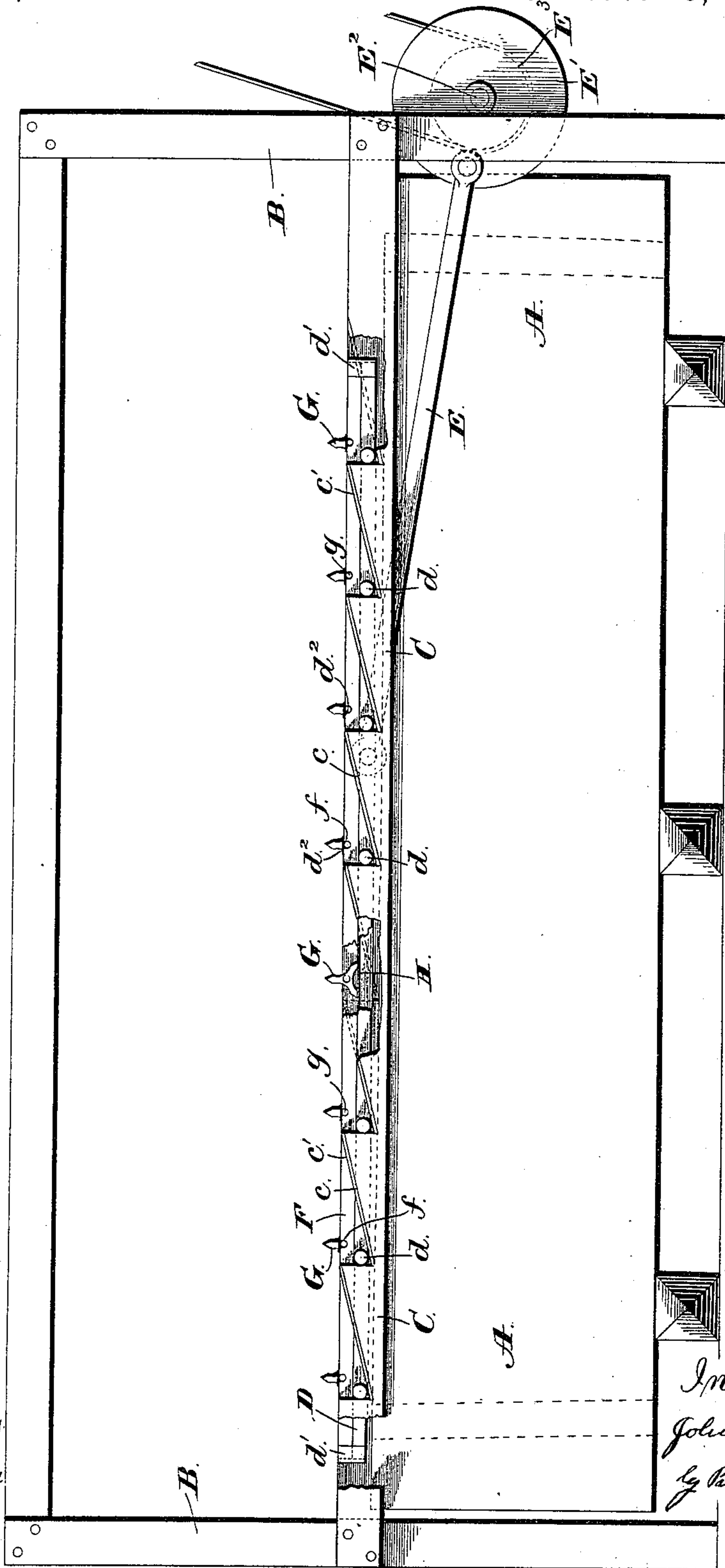
3 Sheets—Sheet 1.

J. F. WILMOT.
DYEING APPARATUS.

No. 441,528.

Patented Nov. 25, 1890.

Fig. 1.



Witnesses:
Jas. C. Hutchinson
Henry C. Hazard.

Inventor.
John F. Wilmot
By Rindge & Russell
his attorney

(No. Model.)

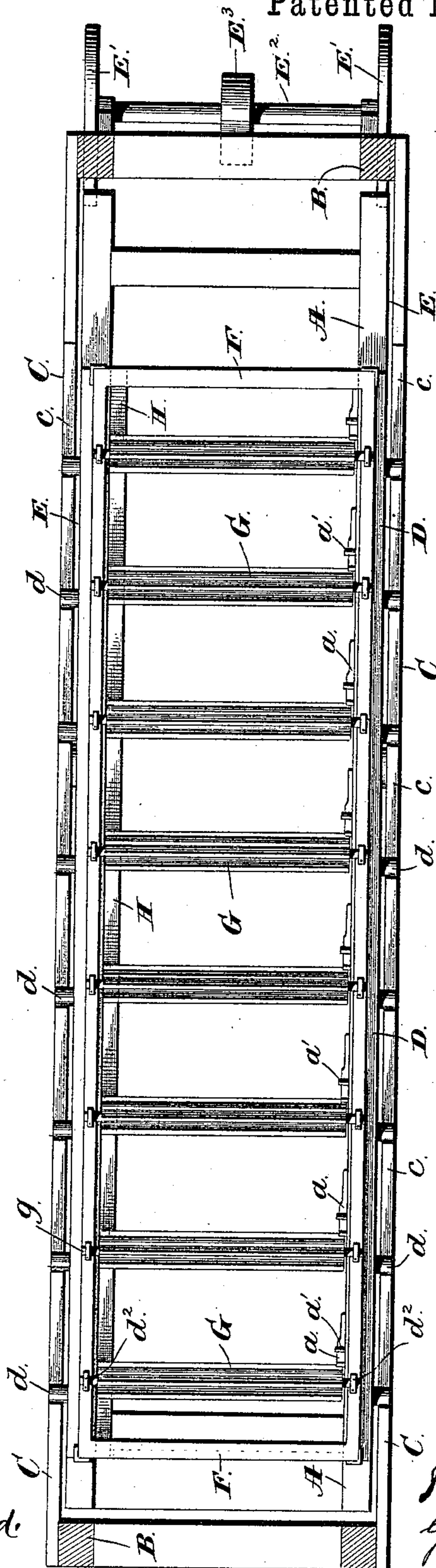
3 Sheets—Sheet 2.

J. F. WILMOT.
DYEING APPARATUS.

No. 441,528.

Patented Nov. 25, 1890.

Fig. 2.



Witnesses:

Jas. E. Hutchinson

Henry C. Hazard

Inventor.

John G. Wilmot

by Russell
 his attorney

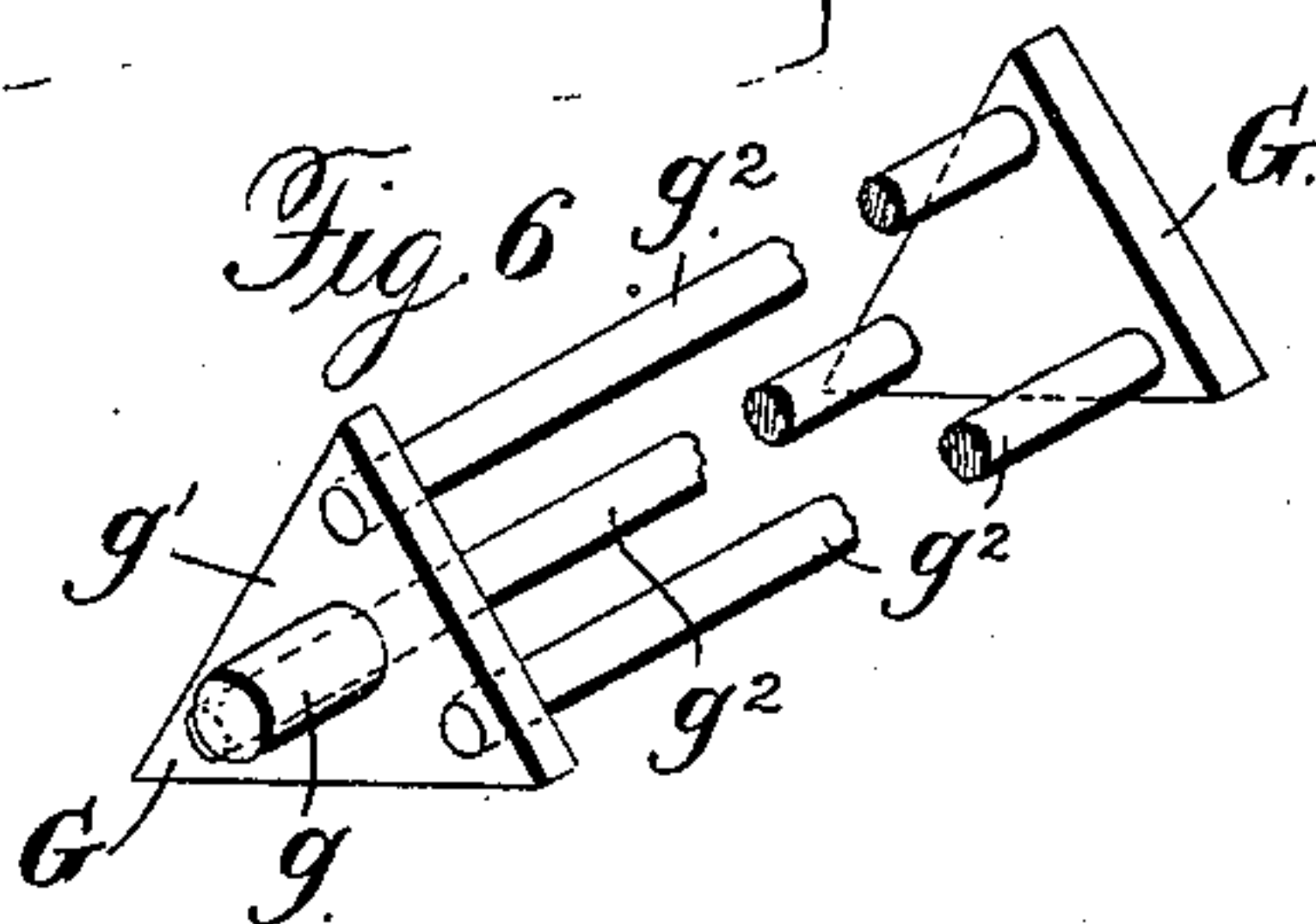
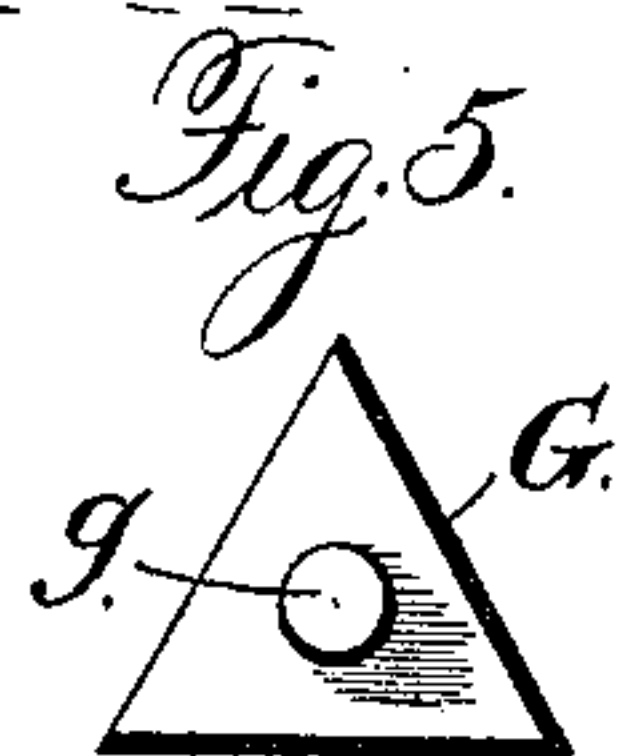
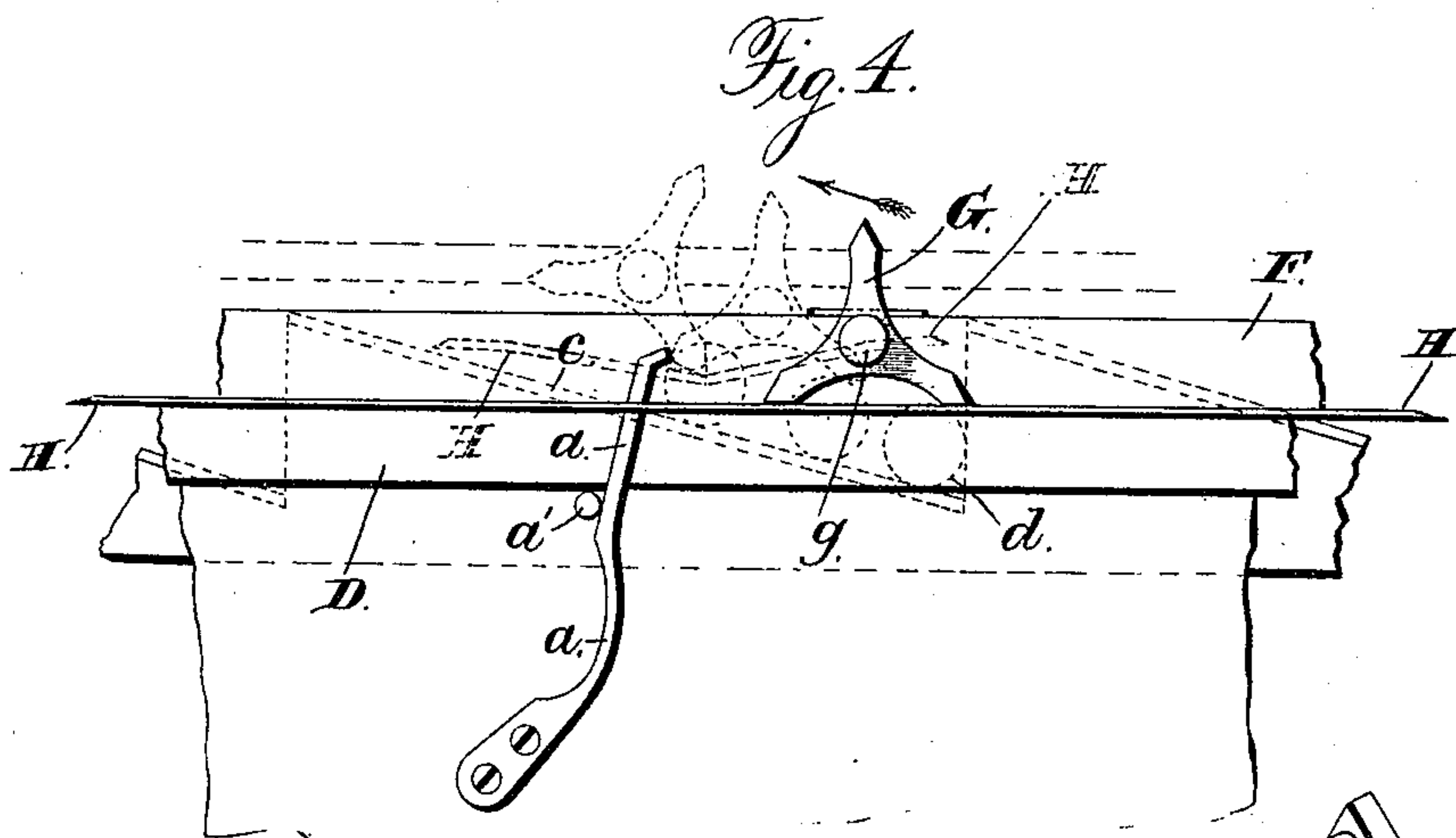
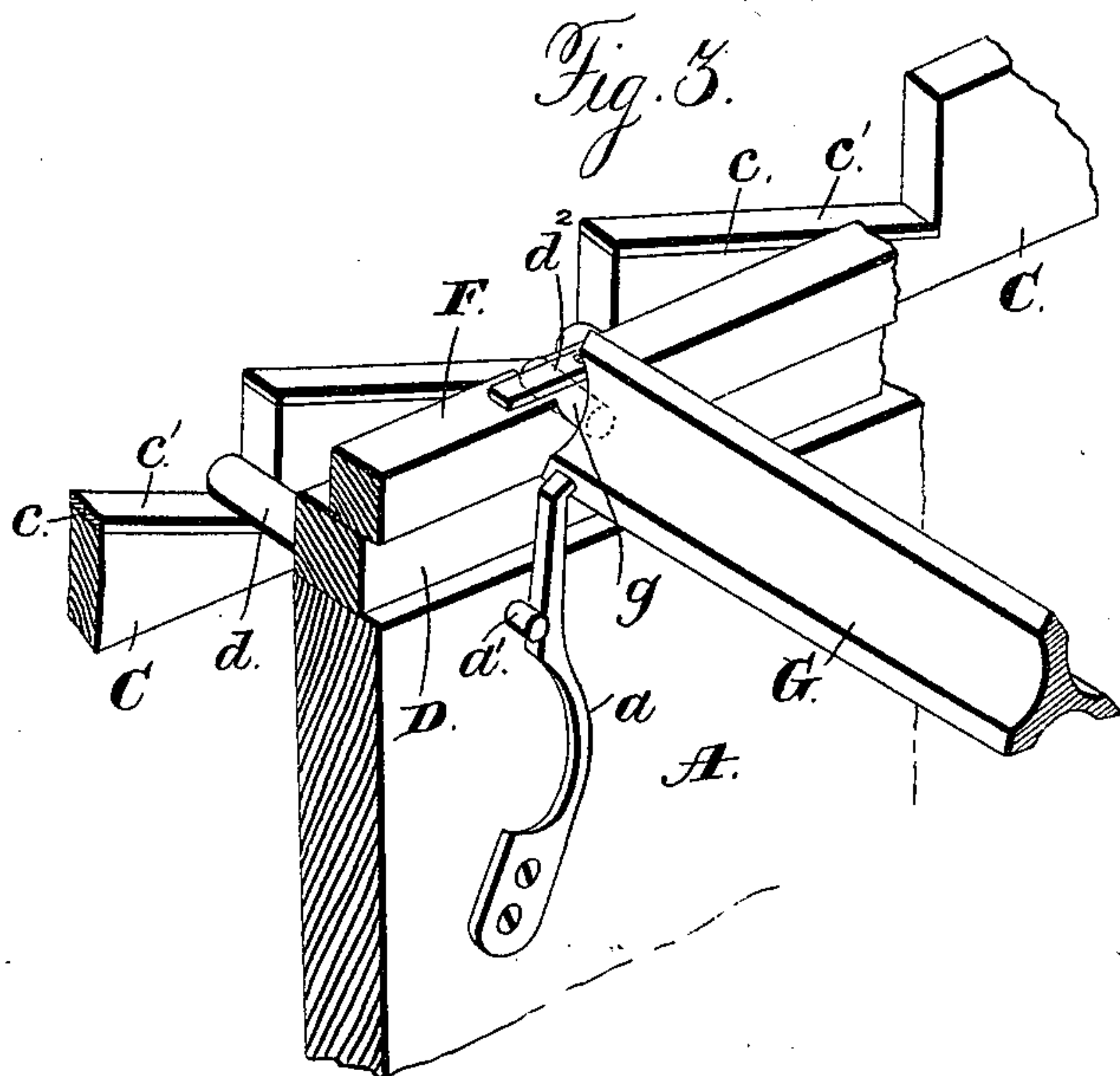
(No Model.)

3 Sheets—Sheet 3.

J. F. WILMOT.
DYEING APPARATUS.

No. 441,528.

Patented Nov. 25, 1890.



Witnesses:
Jas. E. Hutchinson
Henry L. Hazard

Inventor.
John F. Wilmot
by Prindle and Russell
his Attorney

UNITED STATES PATENT OFFICE.

JOHN F. WILMOT, OF RAHWAY, NEW JERSEY.

DYEING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 441,528, dated November 25, 1890.

Application filed October 3, 1890. Serial No. 366,965. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. WILMOT, of Rahway, in the county of Union, and in the State of New Jersey, have invented certain new and useful Improvements in Dyeing Apparatus; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows a view of my apparatus in side elevation; Fig. 2, a plan view of the same; Fig. 3, a detail perspective view of a portion of the apparatus on an enlarged scale; Fig. 4, an enlarged detail view, in side elevation, showing the manner of turning the sticks and the movements of the latter; Fig. 5, a detail view, in end elevation, of a modified form of stick; and Fig. 6, a detail perspective view of a portion of another modification of the stick.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide certain improvements in machines for dyeing silk, cotton, wool, &c., in skeins; and to this end my invention consists in the apparatus and the parts thereof, constructed, arranged, and combined as hereinafter specified.

It has been my special purpose in making the present invention to devise a machine which, while capable of being used in connection with either open or closed vats, without the use of complicated machinery, dangerous gearing, or innumerable pieces, such as exist in dyeing apparatus as heretofore made, shall move and manipulate the skeins of silk or other material so as to secure the best and most uniform and complete action of the dye upon them. In order to make certain of securing this desired action, I have, as will be seen by the drawings and description hereinafter given, arranged the skein holding and moving parts of the apparatus so that they will give the skeins as nearly as possible the same movements which would be given them when manipulated by hand in the old and well-known way.

In the drawings, A designates the vat, which, while shown as an open one, may be closed instead, if desired. Attached to posts B B outside of the vat are the two longitudinal bars C C, having on their upper

sides a series of inclines *c c*, all extending in the same direction. These inclines, with the abrupt upright faces between them, give the bars the appearance of being provided with series of ratchet-teeth, the teeth on one bar being opposite to those on the other. Between the bars is a movable frame D, having on its outer sides rollers *d d* or rounded studs to engage the inclines on the respective bars C C. While I have shown a number of these inclines and engaging rollers, I contemplate using less, if desired. For instance, there might without departure from my invention be only two of the surfaces on each bar, adapted to be engaged by corresponding rollers situated near the ends of the sides of the frame D.

To prevent wear of the inclined surfaces as the frame-supporting rollers travel up and down them, facing-strips *c' c'* of brass or other metal are used. Connected with the opposite sides of said frame D are the pitmen E E, driven by the crank-wheels E' E' on the shaft E², which in turn is driven by a pulley E³ or other suitable gearing, to be connected by a belt or otherwise with any desired form of motor. The stroke of the pitman should be such as to carry the frame-rollers *d d* from the lower ends of the inclines well up on the latter, but not beyond their highest points. With the construction so far described, as the shaft E² is revolved the frame D will be reciprocated back and forth, and will at the same time be given a rising-and-falling motion.

Resting upon and detachably held to the frame D, so as to move with it, is the holder F for the skein-receiving rotary sticks G G. While any desired form of means for detachably fastening the stick-holder upon its carrier, as the frame D, can be employed without departure from my invention, I prefer to provide said carrier with the angle-pieces *d' d'*, adapted to receive and engage the corners of the stick-holder, as shown in the drawings.

Each stick G is provided on its ends with bearings *g g* to rest in notches or open slots *f f* in the upper sides of the side bars of the holder. To retain the stick-bearings in such notches, said bars have pieces *d² d²* adapted to be moved over the upper ends of the notches. These pieces can be in the form of

springs to be raised away from the bar-tops when the stick-bearings are to be removed from the holder, or can be pivoted, so as to be swung into or out of position to close said notches. The sticks are made triangular in cross-section in order that as little of their peripheries as possible may be in contact with the parts of the skeins resting upon them.

Three constructions of stick are shown in the drawings. One has its faces between the angles concaved or grooved longitudinally. Another, as shown in Fig. 5, has flat sides. The third form (see Fig. 6) is made of plain triangular heads or ends $g' g'$, connected at or near their angles by the three rods $g^2 g^2 g^2$.

In order to give the sticks a third of a revolution each time that the carriage D is moved so as to carry its rollers $d d$ up the inclines on bars C C, I provide on the inside of the vat or on any suitable support the pawls $a a$ —one for each stick—having their upper ends projecting up into the paths of the lower sides of the sticks as the latter travel with the holder and carriage. A stop-pin a' for each pawl serves to hold the same from being moved by the respective stick as the latter travels in the direction indicated by the arrow in the drawings, while leaving it free to yield as the stick engages it again during the return movement of the holder and carriage.

While spring-pawls are shown, I desire it to be understood that pivoted ones can be used instead, being held up in operative position against their stop-pins either by springs or weights.

To hold the sticks normally in position with one angle upward for the skeins to rest upon, while allowing them to be turned, as described above, at one point in the motion of the stick-holder, I provide an elastic band H, of rubber or other suitable material, attached at opposite ends to the end bars of the holder F, and extending along under the sticks so as to bear against the under sides thereof, as shown in the drawings.

The operation of my machine or apparatus constructed as described and shown is as follows: The sticks, being removed from the holder F, are inserted in the skeins of silk or other material to be dyed, and are then put back with their bearings $g g$ inserted in the holder-notches $f f$, where they are held by the retaining-pieces $d^2 d^2$, turned or moved over said notches. When the stick-holder has been put in place on the carriage D, with the skeins hanging down in the vat, the shaft E^2 is started, and the pitmen draw the carriage and holder on the latter toward the end of the frame where the shaft is situated. This movement causes the rollers $d d$ to ride up the inclines $c c$, so that the carriage, stick-holder, and sticks are given an upward as well as longitudinal motion with reference to the frame. As the rollers thus travel up the inclines, the sticks are by the engagements of their lower sides with the upper ends of the

pawls $a a$ given a one-third turn, so as to bring another angle of each stick upward and change the position of the skeins in the vat. As the carriage and stick-holder are moved back again, the carriage-rollers run down the inclines, and the pawls, yielding, allow the sticks to pass without further turning. The elastic strip H, engaging the flat under side of each stick, or the two lower angles thereof, serves to prevent rotation of the sticks until the pawls are engaged again during another longitudinal and upward motion of the holder.

It will be observed that by my machine constructed, arranged, and operating as set forth the movement of the skeins by the sticks is like that which is given them by the hand of the dyer in the old hand process of dyeing. The skeins are lifted and then moved so as to immerse new portions of them in the dyeing-liquid in the vat. This manipulation has been found to secure the most free and complete access of the dye to the different portions of material treated and the most uniform and perfect dyeing action. When the operation of the machine has been continued long enough, the driving-shaft is stopped, and the sticks are lifted from the holder for removal of the skeins. New skeins are then put on them and they are replaced in the holder.

My machine as shown and described is simple and cheap in construction, is easy to operate, has no parts or gearing to get out of order, and does the desired work in thoroughly subjecting the skeins to the action of the dye in the most rapid and efficient way. It is capable of handling a large number of skeins at a time and causing them to be all treated alike.

With my skein-supporting sticks of the special shape shown, normally held with the angles or sharp corners upward, a very desirable result is produced—that is, only the smallest possible amount of the surface of the sticks will be in contact with the skeins, and the circulation of the dye through the parts of the skein will consequently be unimpeded and most thorough.

Having thus described my invention, what I claim is—

1. In a dyeing apparatus, in combination with a suitable frame or holder, one or more rotary skein-holding sticks made triangular in cross-section and means for holding such sticks normally turned so as to bring one of their angles or corners upward when they are not being rotated, substantially as and for the purpose set forth.

2. In a dyeing apparatus, in combination with a suitable frame or holder, one or more rotary skein-holding sticks made triangular in cross-section and a yielding piece bearing against the under side of the sticks, substantially as and for the purpose described.

3. In a dyeing apparatus, in combination with a suitable frame or holder, a series of rotary skein-holding sticks journaled thereon, made triangular in cross-section, and the elas-

tic strip attached to the frame and extending along in contact with the under side of the sticks, substantially as and for the purpose specified.

5 4. In a dyeing apparatus, in combination with a reciprocating holder, one or more rotary sticks carried thereby, and pawl mechanism to rotate the stick or sticks as the holder moves in one direction and leave them
10 unturned during the holder's return movement, substantially as and for the purpose specified.

5 5. In a dyeing apparatus, in combination with the movable frame or holder and the
15 rotary skein-receiving sticks carried thereby, and pawls, one for each of the sticks, adapted to engage portions of the latter to turn them as the frame or holder moves, substantially as and for the purpose set forth.

20 6. In a dyeing apparatus, in combination with the movable holder and the rotary skein-receiving sticks carried thereby, made angular in cross-section, the pawls, one for each stick, adapted to engage portions of the sticks
25 and rotate them as the holder is moved in one direction, substantially as and for the purpose described.

7. In a dyeing apparatus, in combination with the movable stick-holder and the rotary
30 triangular skein-receiving sticks journaled thereon, a pawl for each stick adapted to positively engage the sticks and turn them through one-third of a rotation only as the holder moves in one direction, substantially
35 as and for the purpose specified.

8. In a dyeing apparatus, in combination with the movable holder having a to-and-fro movement, one or more rotary sticks triangular in cross-section carried by the holder, a
40 yielding stop device for holding each stick with one of its angles turned upward when such stick is at rest, and pawl mechanism for giving each stick a partial rotation as the holder moves in one direction, substantially
45 as and for the purpose shown.

9. In a dyeing apparatus, in combination with the movable holder and the triangular skein-receiving sticks journaled therein, pawls to positively engage the forward edges
50 of the under sides of the sticks as the holder moves in one direction, and the elastic strip bearing up against such under sides, substantially as and for the purpose shown.

10. In a dyeing apparatus, in combination
55 with the movable carriage and means for reciprocating it, inclines on a stationary support, and guiding and supporting devices on the carriage engaging the inclines, so that the carriage is caused to rise and fall as it is reciprocated, substantially as and for the purpose set forth.
60

11. In a dyeing apparatus, in combination

with the moving carriage provided with rollers, stationary inclines engaged by the rollers, and a holder for the material to be dyed, supported from the carriage, substantially as and for the purpose described. 65

12. In a dyeing apparatus, in combination with the movable carriage provided with supporting and guiding rollers, stationary
70 inclines engaged by the rollers, and the frame carrying the skein-supporting sticks, supported on and moving with the carriage, substantially as and for the purpose specified.

13. In a dyeing apparatus, in combination
75 with the series of stationary inclines, the carriage having supporting and guiding devices engaging the inclines, and the skein-receiving stick-holder detachably held on the carriage, so as to move with it, substantially as and
80 for the purpose shown.

14. In a dyeing apparatus, in combination with one or more rotatory skein-receiving sticks and a movable carriage from which the sticks are supported and with which they
85 move, cam devices for causing the carriage to rise and fall as it is reciprocated, the pawls in the paths of portions of the sticks to engage and turn the latter partly as the carriage is moved in the direction to cause its rising,
90 and means for reciprocating the carriage, substantially as and for the purpose set forth.

15. In a dyeing apparatus, in combination with a movable carriage provided with rollers, stationary inclines engaged by the latter,
95 one or more rotary skein-receiving sticks supported from and traveling with the carriage, and pawls in the paths of portions of the sticks adapted to engage the latter and give them a partial turn as the carriage
100 moves to cause its rollers to ride up the inclines, substantially as and for the purpose described.

16. In a dyeing apparatus, in combination with a vat for the die, a reciprocating frame
105 over the same, provided with rollers on its sides, stationary inclines engaged by the rollers, the stick-holder on the carriage, the rotary skein-receiving sticks journaled on the holder, the pawls to engage portions of the
110 sticks and turn them partly as the carriage-rollers ride up the inclines, means for holding the sticks normally with one angle or corner upward while allowing them to be turned by the pawls, and means for reciprocating the
115 carriage, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 26th day of September, 1890.

JOHN F. WILMOT.

Witnesses:

HENRY C. HAZARD,

CHAS. J. WILLIAMSON.