

No. 617,561.

Patented Jan. 10, 1899.

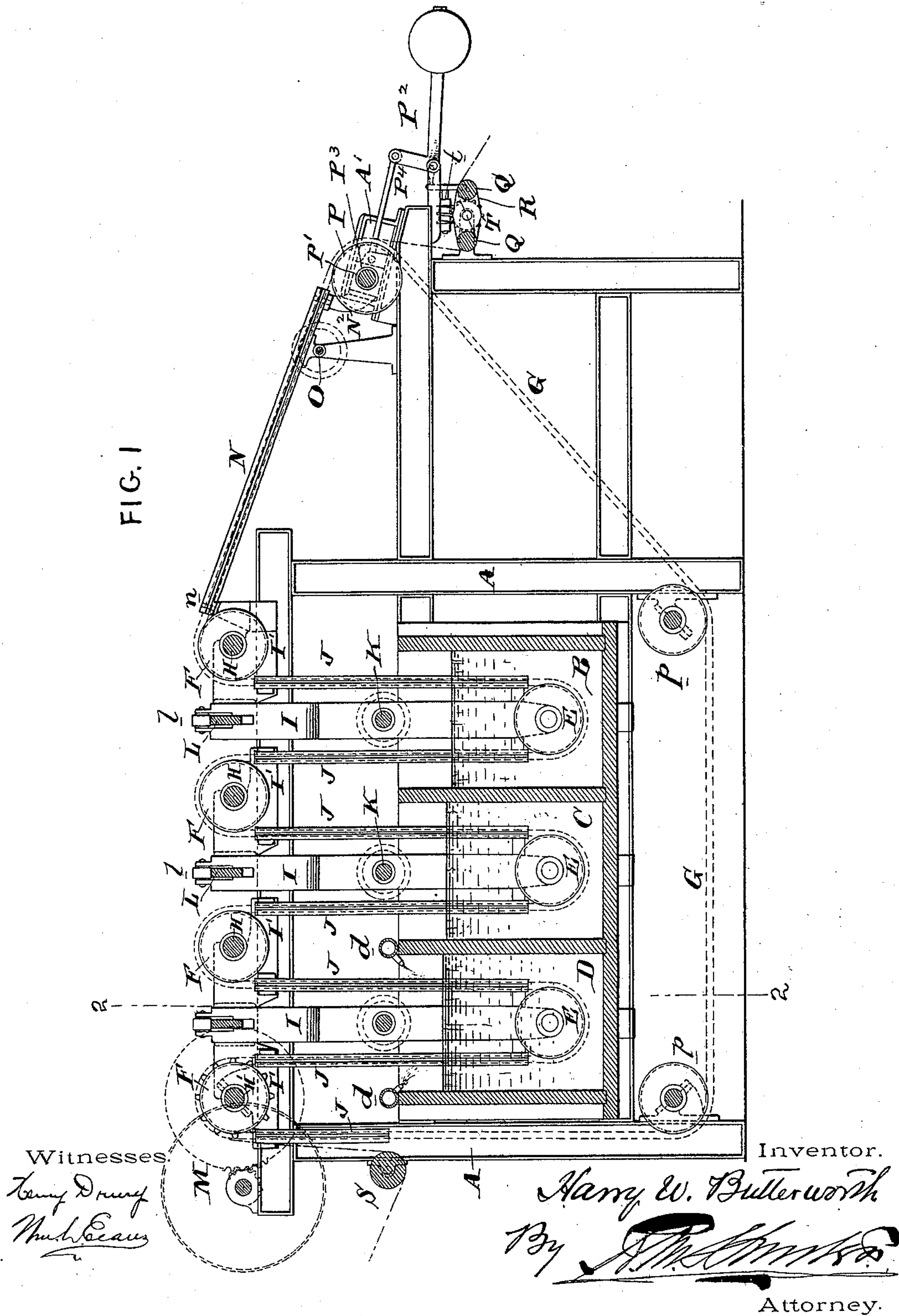
H. W. BUTTERWORTH.
MACHINE FOR MERCERIZING.

(Application filed Aug. 25, 1897.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1



No. 617,561.

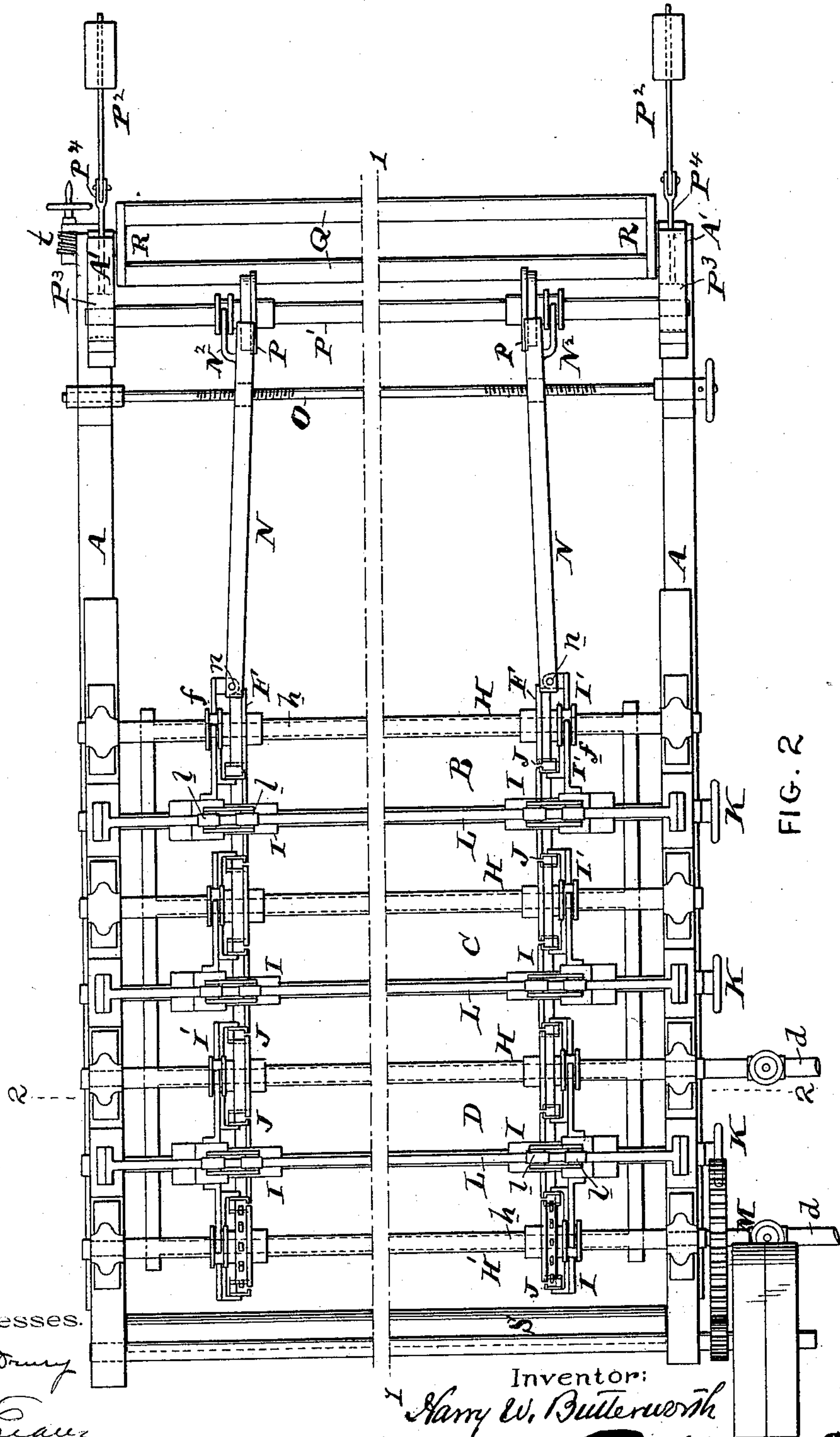
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3 Sheets—Sheet 2.



Witnesses.

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Inventor:

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3 Sheets—Sheet 3.

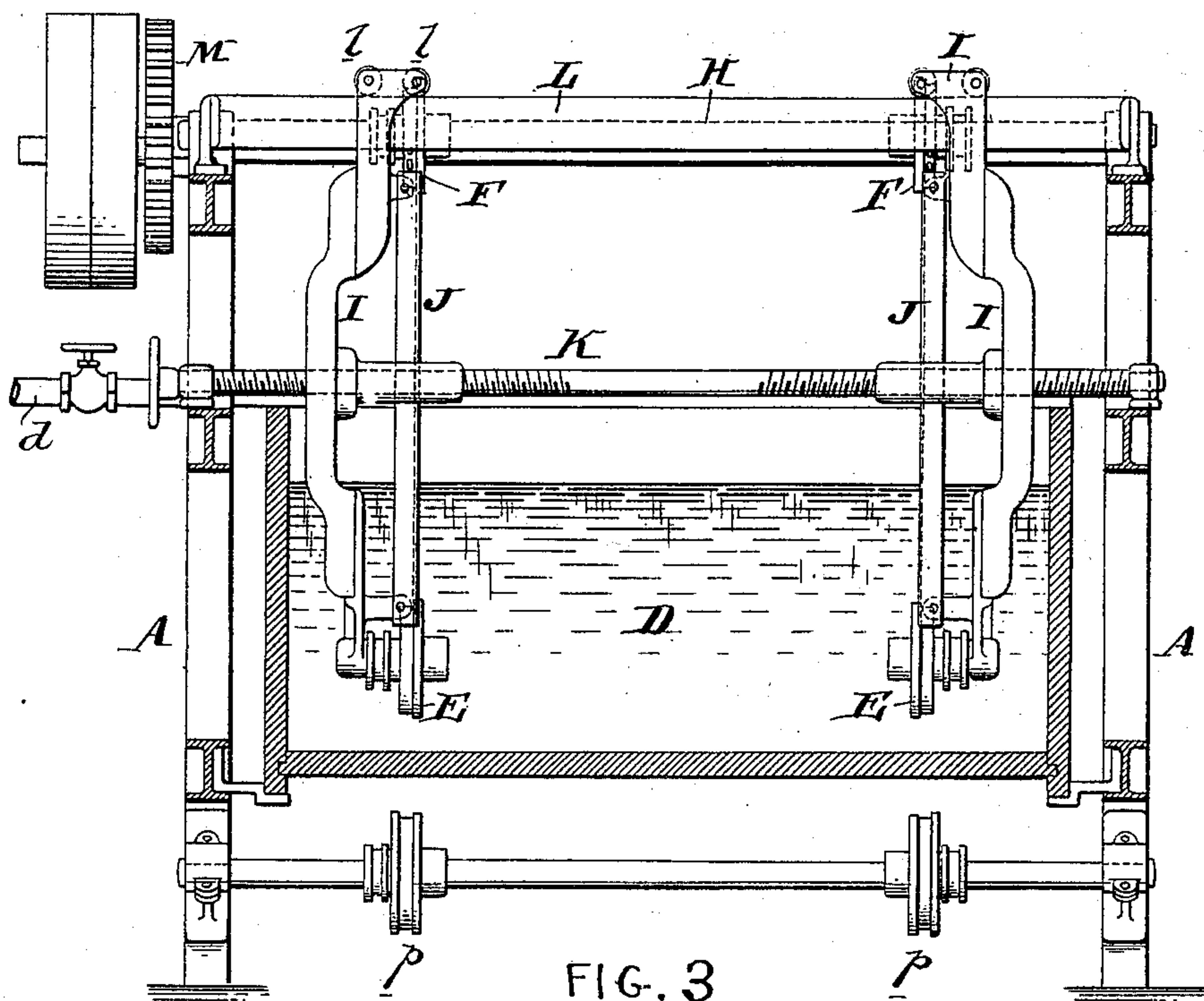


FIG. 3

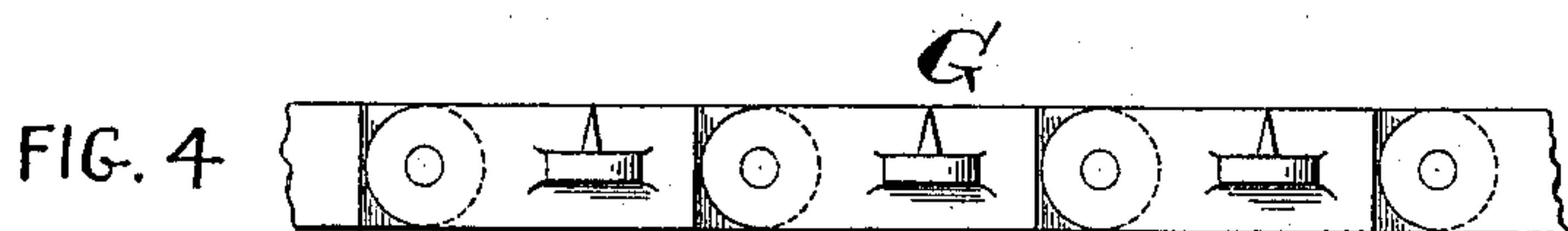


FIG. 4



FIG. 7

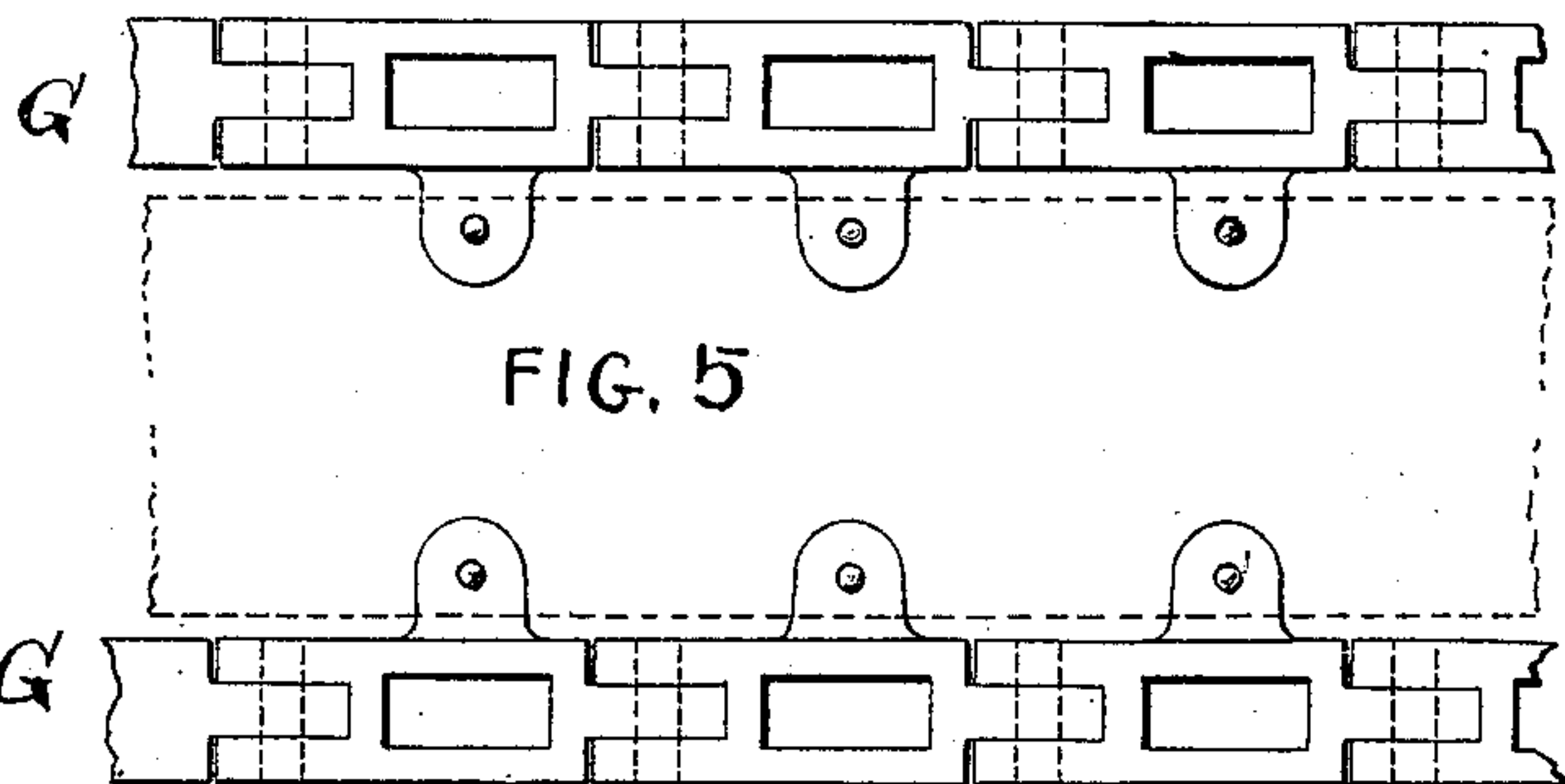


FIG. 5

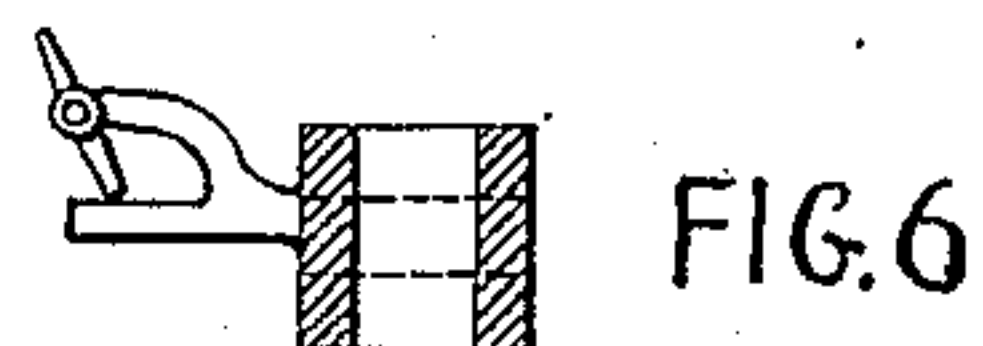


FIG. 6

Witnesses.

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UNITED STATES PATENT OFFICE.

HARRY W. BUTTERWORTH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO THE H. W. BUTTERWORTH & SONS COMPANY, OF PENNSYLVANIA.

MACHINE FOR MERCERIZING.

SPECIFICATION forming part of Letters Patent No. 617,561, dated January 10, 1899.

Application filed August 25, 1897. Serial No. 649,431. (No model.)

To all whom it may concern:

Be it known that I, HARRY W. BUTTERWORTH, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Mercerizing-Machines, of which the following is a specification.

My invention has reference to mercerizing-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.

The object of my invention is to provide a suitable construction of apparatus which shall properly stretch and hold the web of cloth against shrinkage or contraction while subjecting it to the action of a strong alkali, such as caustic soda, whereby the contractile effort under the action of the alkali shall exert itself upon the fibers of the material, rather than upon the fabric stretched as a whole, and produce thereby certain rearrangements and characteristics of the fiber, which shall induce a silky appearance.

My object is more particularly to provide a construction of machine which shall positively and quickly handle the fabric during the said process, whereby accuracy of results and economy are secured.

In carrying out my invention I employ endless chains or conveyers provided with pins or clamps to hold the lateral edges of the textile fabric, and said conveyers are passed over suitable guide-wheels, which convey the fabric into a bath of caustic soda and then into a washing-bath with or without an intermediate acid-bath. My construction is such that the power is applied to the chains constituting the conveyers at the place thereof adjacent to where the fabric leaves the chains, so that the tension under which the conveyers and the fabric are put is exerted throughout the entire length of the fabric under treatment, thus insuring a very positive and sure manner of the fabric passing through the machine and the several baths therein, so that there is no danger whatever of any backward creeping or shrinking. I furthermore provide a suitable feed whereby a variable degree of friction may be placed upon the fabric as it is drawn into the machine to prevent

any looseness thereon. Furthermore, my improvements comprehend suitable adjusting devices whereby the guides for the conveyer-chains may be relatively adjusted to or from each other to suit different widths of fabric to be supplied to the mercerizing-baths, thereby enabling the machine to be suited to almost any fabric which might be required to be treated.

My invention will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional elevation on lines 1 1 of Fig. 2. Fig. 2 is a plan view of my improved machine. Fig. 3 is a cross-section of same on lines 2 2. Fig. 4 is a side elevation of one form of conveyer-chain. Fig. 5 is a plan view of a pair of such chains. Fig. 6 is a cross-section of a modified form of conveyer-chain employing clamps in lieu of the pins, and Fig. 7 is a cross-section of the conveyer-chain shown in Fig. 4.

A is the main frame of the machine and may be of any suitable construction.

B, C, and D are three baths or tanks built into the machine and arranged adjacent to each other. The bath B is designed to contain a strong alkali, such as caustic soda. The bath C is designed to contain a weak acid solution, such as a solution of dilute sulfuric acid, and the bath D is designed to contain water for washing the mercerized fabric.

E are a series of guide-wheels arranged within and near the bottom of each of the several baths B, C, and D and are supported by suitable frames I. F are a series of similar guide-wheels arranged at the upper part of the machine and considerably above the tanks or vats B C D. The said guide-wheels F are supported upon transverse shafts H H', journaled on or supported on the main frame A. The said wheels are each provided with grooved hubs *f* and are preferably connected by means of feathers *h*, so as to rotate with the shafts H H', the said feathers working in suitable grooves in the hubs of the wheels F. This insures both wheels of any shaft rotating at the same surface speeds.

I are a series of frames arranged, respectively, above the vats or tanks B C D and so

that their lower ends extend down into the tanks for connection with the guide-wheels E to support them and firmly hold them at a fixed distance from the wheels F. The upper
 5 part of the frame I is provided with trolley-wheels *l*, which are guided upon transverse rails L, bolted to the main frame. Each of the frames I is provided with one or more lateral extensions I', having curved members
 10 to receive the groove *f* of the wheels F, so that when said frames I are moved toward or from each other over a common rail L the said wheels F are simultaneously moved to or from each other to correspond to the different
 15 widths of the goods to be treated and the tension under which the fabric is to be subjected laterally. These frames I and the wheels F E moved thereby are adjusted by means of a shaft K, having right and left hand screw-
 20 threads thereon meshing with the frames I I in pairs. The shaft K is journaled in the main frame so as to have a fixed location relative thereto for the purpose of insuring the frames I I moving to or from each other, and
 25 thereby keep all of the parts centralized or in proper alinement. By employing the trolley-wheels *l* and the transverse rail L no strain due to the weight of the frames I is put upon the shafts J, and likewise there is little or no
 30 wear upon the shafts H H'. Furthermore, the frame I may be made very strong, so as to positively restrict the great shrinking action of the fabric under treatment with the caustic soda. The fabric may be put under any de-
 35 sired lateral tension in any bath by simply adjusting the frames I I corresponding to said bath by its screw K. The endless conveyer-chains G pass over an upper wheel F, then down under a wheel E, thence up over the
 40 next wheel F, and so on, in such manner that they form loops in the successive baths B C D and are adapted to convey the fabric first into the bath B, thence into the bath C, and finally into the bath D. To prevent swinging of the
 45 chains, suitable guides J are secured to the frames I intermediate of the wheels F and E to properly guide the fabric. The rearmost shaft H' is driven by means of power-gearing M or in any other suitable manner, for at this place
 50 the power is transmitted to the conveyer-chains. The wheels F, corresponding to the shaft H', may, if desired, be sprocket-wheels—that is, provided with teeth working in the chains to positively move them in the man-
 55 ner of gears rather than by frictional contact. The guide-rollers P act as guides to return the chains to the feed end of the machine. A roller S is provided, about which the mercerized fabric is drawn in removing
 60 it from the pins or clamps of the conveyer-chains immediately after leaving the guide-wheels on the shaft H'. Water-pipes *d d* are provided for forcing water upon the fabric while passing through the vat D for the pur-
 65 pose of thoroughly washing it in connection with the washing action of the body of water

in the vat itself. A suitable overflow (not shown) from the tank D may be employed to permit the waste water to freely pass off after acting upon the fabric. 70

N N are a pair of guides which are pivoted at one end near the wheels F upon vertical pivots *n* on the frames I, so that the distance apart of this end of the guides corresponds exactly with the distance apart of the wheels F on the same shaft H. The other ends of the guides N are made adjustable and are moved to or from each other by means of a right and left hand screw-shaft carried in the main frame and adapted to be operated by
 80 hand. By this means the conveyer-chains may be brought sufficiently close together at the start to easily receive the fabric and then be fed gradually apart until they put the said fabric under great tension. 85

P are the feeding guide-wheels for the endless conveyer-chains G and may be supported upon a shaft P', but so as to be adjustable laterally thereon by extensions on the ends of the guides N substantially of the same
 90 character as the parts I' of the frames I, working in connection with said wheels P to locate them upon the shaft P'. In this manner the wheels P correspond in location to the ends of the guides, so that the chains pass-
 95 ing about them will be properly delivered to the guides. The shaft P', carrying the guide-wheels P, is journaled in boxes P³, movable in guides A' on the main frame, and these boxes are connected by links P⁴ with heavy
 100 counterweighted levers P². In this manner any desired degree of tension may be put on the chains or conveyers, so as to prevent any lost motion between the links and at the same time provide a means which will give more
 105 or less in case of necessity. It is evident that any other suitable form of tension device may be used in lieu of that shown.

Q Q are two tension-cylinders and are secured to frames R, which are journaled in the
 110 main frame on an axis intermediate of the cylinders K K. The frames R may be adjusted by means of a worm-wheel T and hand-operated worm *t* to change the relative positions of the cylinders Q Q about the axis of
 115 said frames R. The fabric to be treated passes upward and over the first cylinder Q, then under the second cylinder Q, thence upward to the conveyer-chains adjacent to the wheels P. By changing the relative position
 120 of the cylinders Q Q greater or less friction may be put upon the fabric, so that objectionable looseness may be readily obviated. Any other suitable form of tension device may be employed in lieu of that shown. 125

By my improved construction it will be observed that the links composing the conveyer-chains will be subjected to tensile strain, and thereby overcome any looseness which might be due to the wearing of the chains between
 130 the links. As the entire chains between the point P and power devices M are under strain,

it is evident that the fabric will remain under a continuous and positive tension. Furthermore, it will be evident that by employing chains to convey the fabric through the machine each portion of the fabric between the several links is made to act as a separate element, and consequently any tendency to extend or elongate at one place does not interfere or affect the operation of the apparatus upon the fabric at any other place. Thus, for instance, if there were any tendency of the fabric to elongate during the treatment in the baths C and D, said tendency would not relieve the tension under which the fabric would be subjected in passing through the caustic-soda bath B. It is therefore seen that only a single power device is necessary to insure the proper action upon the fabric at several points in passing through the machines.

By having the separate adjusting screw-shafts J enables me to increase the lateral stretching action in any bath irrespective of the corresponding tension in the other baths. This will secure the desired degree of tension on the fabric without elongating tension other than that due to the shrinkage.

It is observed that in my improved machine the fabric is first delivered to the conveyer-chains and never released until the operation is completed, thus obviating any handling of the fabric in the wet or intermediate operations. Furthermore, the tension under which the fabric may be put during the process of mercerizing is uniform, and thereby secures a desirable product. It will also be observed that as the width of the fabric is maintained no matter how strong the shrinking action the commercial value as to width of the fabric is not decreased by the treatment.

While I have shown the acid-bath C interposed between the caustic-soda bath B and the washing-bath D, I do not necessarily confine myself to the employment of the said bath C for acid, as it might be employed as a second caustic-soda bath or as an additional washing-bath, such conditions not altering the general principle of construction and operation of my machine.

While I prefer the construction shown, I do not limit myself to the minor details thereof, as they may be modified in various ways without departing from the principle of my invention.

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

1. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels

about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, and power devices acting upon the conveyers after leaving the several vats for moving them and the fabric supported by them.

2. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, feeding-guides for the conveyers pivoted at one end and adapted to be adjusted to or from each other at the other end so as to cause said conveyers to move farther apart as they approach the guide-wheels and in which the said guides are interposed between the feeding devices and the aforesaid guide-wheels, and power devices acting upon the conveyers after leaving the several vats for moving them with the fabric supported by them.

3. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, means for adjusting the upper and lower guide-wheels in pairs relatively to or from each other to suit fabrics of different width and vary the tension, and power devices acting upon the conveyers after leaving the mercerizing-vat for moving them with the fabric supported by them.

4. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, means for adjusting the upper and lower guide-wheels in pairs relatively to or from each other to suit fabrics of different width and to vary the tension, transverse rails, supporting means carried thereby for sustaining the adjusting devices, and power devices acting upon the conveyers after leaving the mercerizing-vat for moving them with the fabric supported by them.

5. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, supporting transverse shafts above the vats for the several guide-wheels upon which they are arranged in pairs, frames for moving upper and lower guide-wheels in pairs simultaneously to or from a further set of upper and lower guide-wheels in pairs, and adjusting-screws for directly operating upon the said adjusting-frames in pairs there being one screw and pair of adjusting-frames to each vat, and power devices acting upon the conveyers after leaving the mercerizing-vat for moving them with the fabric supported by them.

6. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, spraying nozzles or pipes arranged within the upper part of the rearmost vat for directing streams of water upon the fabric held in the conveyers while passing through said vats, and power devices acting upon the conveyers after leaving the several vats for moving them with the fabric supported by them.

7. In a mercerizing-machine, the combination of two or more vats, a series of guide-wheels within the vats, a series of guide-wheels at a distance above the vats, continuous conveyers passing over the wheels above the vats and under the wheels in the vats, suitable guides for said conveyers outside of the vats, means to guide the fabric to the conveyers before passing to the aforesaid wheels about which the conveyers are guided, means to deliver the fabric from the conveyers after they leave the several vats, vertical adjusting-frames for simultaneously moving an upper and lower guide-wheel corresponding to a vat to or from a similar pair of upper and lower guide-wheels corresponding to the same vat, hand devices for adjusting the frames to or from each other, feed-guides for the conveyers respectively pivoted to the guide-frames so as to be moved simultaneously with said guide-frames, adjusting devices for adjusting the other ends of said feed-guides to or from each other and adjacent to the feed-

ing devices, and power devices acting upon the conveyers after leaving the mercerizing-vats for moving them with the fabric supported by them.

8. In a machine for subjecting a fabric to the action of a liquid bath, the combination of a vat, a pair of endless conveyer-chains, a transverse guide arranged above the vat, two depending frames having their weight sustained by and relatively adjustable upon the said guide, guide-wheels journaled above the vat for guiding the conveyers, guide-wheels within the vat for guiding the conveyers, connections between the guide-wheels and the depending frames, and adjusting devices for moving the two frames with their guide-wheels relatively to and from each other.

9. In a machine for subjecting a fabric to the action of a liquid bath, the combination of a vat, a pair of endless conveyer-chains, a transverse guide arranged above the vat, two depending frames having their weight sustained by and relatively adjustable upon the said guide, guide-wheels journaled above the vat for guiding the conveyers, guide-wheels within the vat for guiding the conveyers, connections between the guide-wheels and the depending frames, connecting devices between said wheels above the vat to make them rotate at the same speed, and adjusting devices for moving the two frames with their guide-wheels relatively to and from each other.

10. In a machine for subjecting a fabric to the action of a liquid bath, the combination of a vat, a pair of endless conveyer-chains, a transverse guide arranged above the vat, two depending frames having their weight sustained by and relatively adjustable upon the said guide, guide-wheels journaled above the vat for guiding the conveyers, guide-wheels within the vat for guiding the conveyers, connections between the guide-wheels and the depending frames, connecting devices between said wheels above the vat to make them rotate at the same speed, upright stationary guides between the guide-wheels above and in the vat carried by the two depending frames, and adjusting devices for moving the two frames with their guide-wheels and upright guides, relatively to and from each other.

11. In a machine for subjecting a fabric to the action of a liquid bath, the combination of a vat, a pair of endless conveyer-chains, a transverse guide arranged above the vat, two depending frames having their weight sustained by and relatively adjustable upon the said guide, guide-wheels journaled above the vat for guiding the conveyers, guide-wheels within the vat for guiding the conveyers, connections between the guide-wheels and the depending frames, a pair of upright guides upon each of the depending frames arranged tangentially to the circumference

of the guide-wheel within the vat and extending to or near the guide-wheels above the vat, a second pair of upright guides also carried by the depending frames and extending from the opposite side of the guide-wheels in the vat upwardly to one side of the guide-wheels above the vat, adjusting devices for moving the two frames with their guide-wheels and upright guides relatively to and from each other, guide-wheels arranged above

the vat above the last-mentioned pair of upright guides, and means to adjust the said guide-wheels in alinement with the upright guides.

In testimony of which invention I hereunto set my hand.

HARRY W. BUTTERWORTH.

Witnesses:

J. W. KENWORTHY,

WM. L. EVANS.