

No. 696,032.

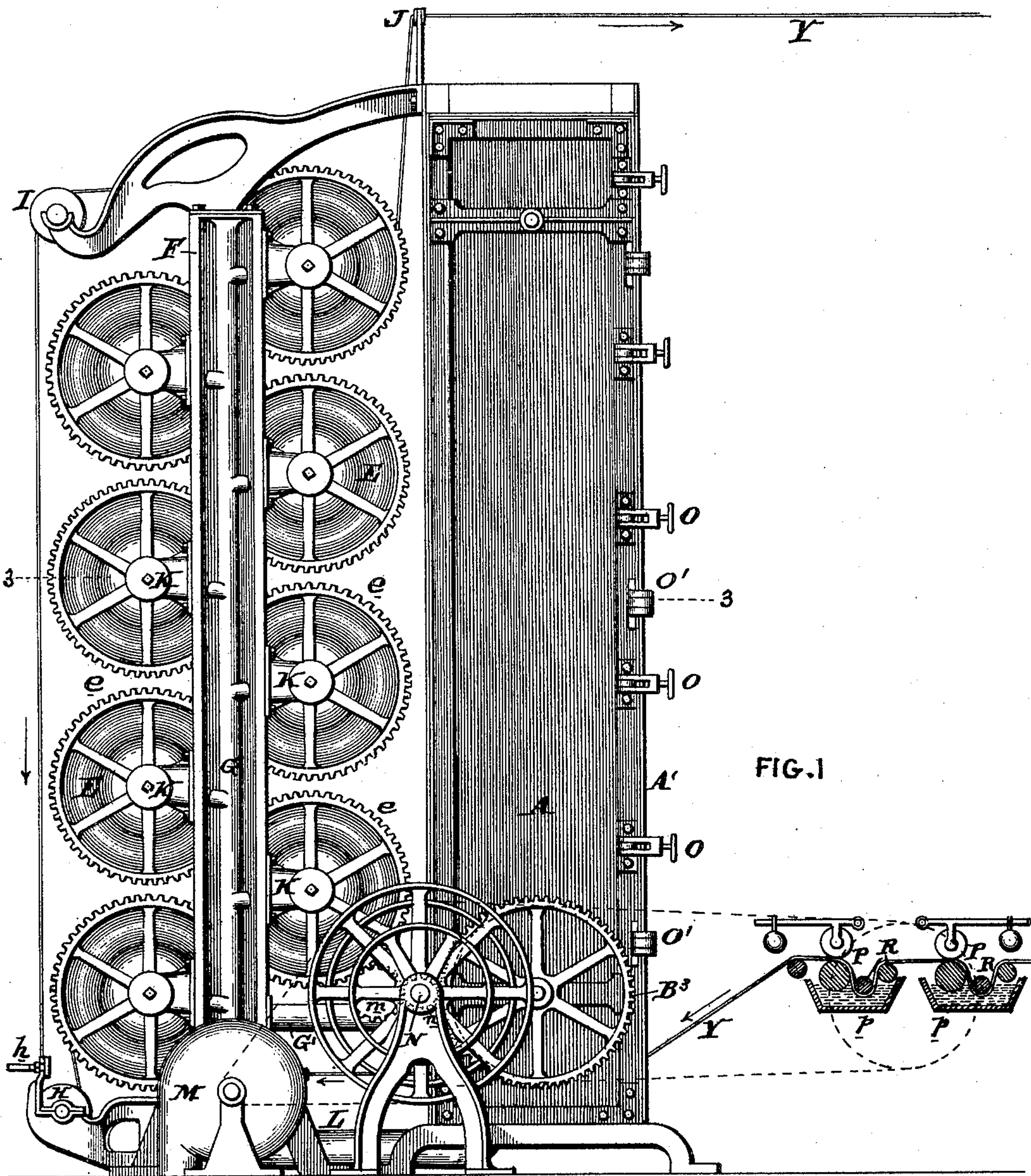
Patented Mar. 25, 1902.

J. W. FRIES.  
MACHINE FOR OXIDIZING YARN, &c.

(Application filed Oct. 23, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

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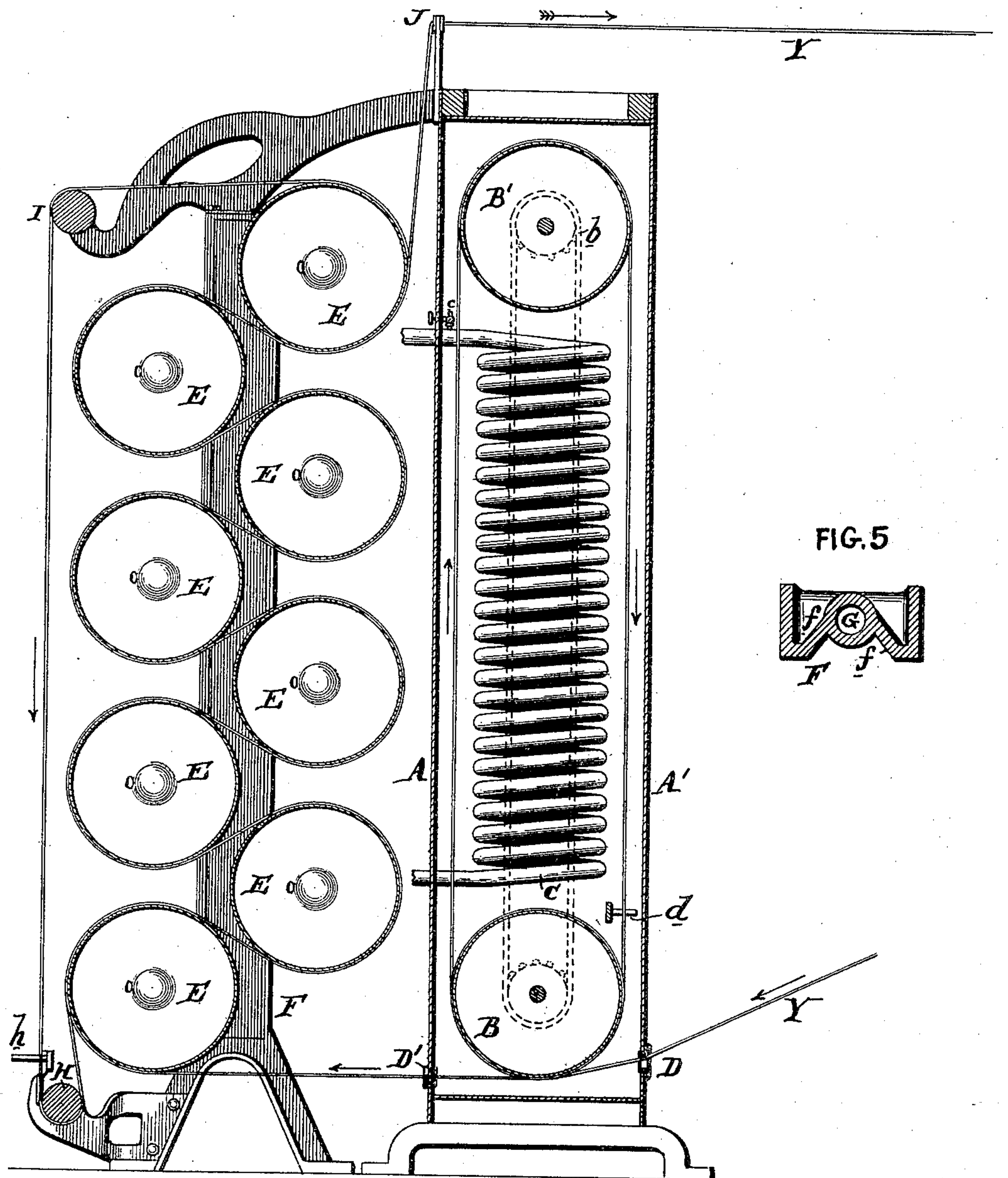


FIG. 2

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3 Sheets—Sheet 3.

FIG. 3

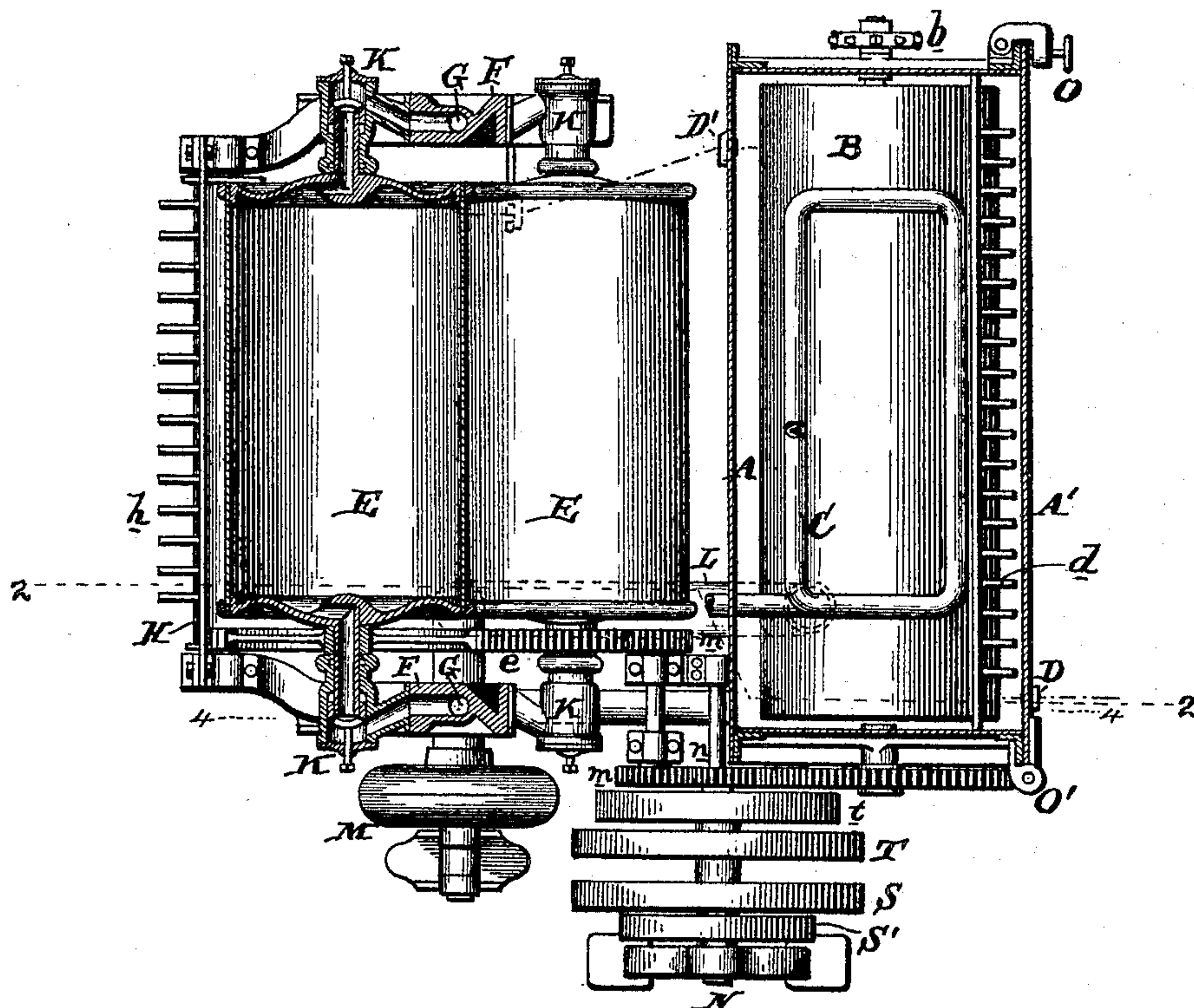
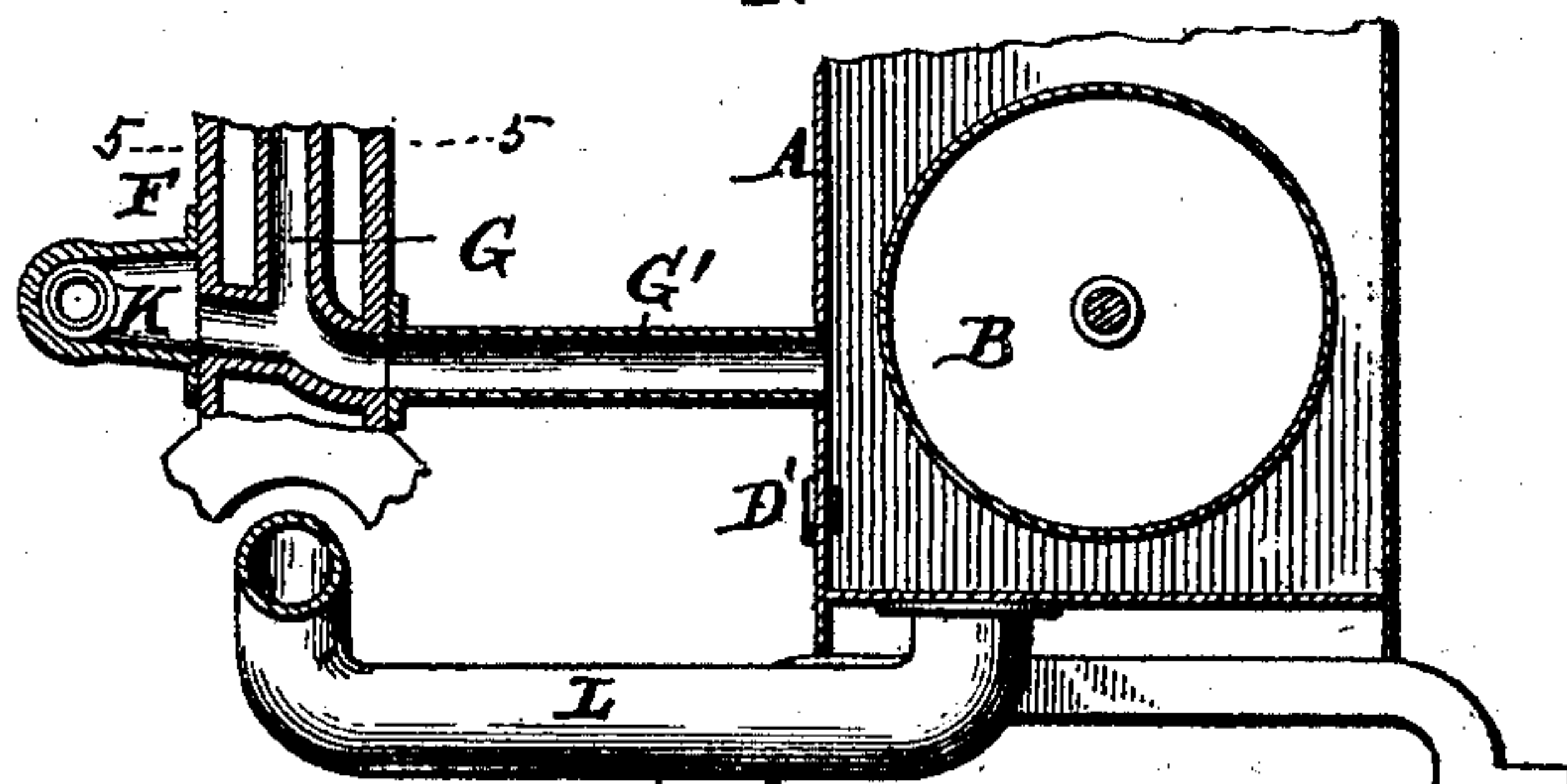


FIG. 4



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# UNITED STATES PATENT OFFICE.

JOHN W. FRIES, OF WINSTON-SALEM, NORTH CAROLINA.

## MACHINE FOR OXIDIZING YARN, &c.

SPECIFICATION forming part of Letters Patent No. 696,032, dated March 25, 1902.

Application filed October 23, 1901. Serial No. 79,663. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. FRIES, of Winston-Salem, county of Forsyth, State of North Carolina, have invented an Improvement in  
5 Machines for Steaming, Oxidizing, and Drying Yarns, of which the following is a specification.

My invention has reference to machines for steaming, oxidizing, and drying yarns; and it  
10 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  
15 suitable construction of machine adapted to handle long lengths of yarn in the warp or filling and maintain it in continuous motion and at the same time remain connected with the operating parts of the machine for a  
20 great length of time, whereby the yarn is subjected to the action of steam and radiant heat and then to a drying operation in the open atmosphere. In this manner the yarn may be subjected to a coloring or dyeing process similar to that set out in Letters Patent to me  
25 No. 659,343 and dated October 9, 1900, or by any other process, and then quickly and completely oxidized and dried in the smallest possible space and under uniform action.

In carrying out my invention I provide, in connection with a dyeing or coloring apparatus, a closed compartment having within, at top and bottom, revolving cylinders, over  
30 which the dyed yarn is fed in a helical condition, so that it travels from cylinder to cylinder and at the same time advances along the length of the cylinders prior to emerging. During the passage through the closed chamber the yarn is subjected to the action of  
35 steam and radiant heat from a suitable steam-coil, which not only vaporizes the moisture in the yarn, but also treats it to a high temperature of radiant heat for the purpose of oxidizing the color. After the oxidizing process  
40 and the expulsion of the excessive moisture, the yarn is fed over a series of steam-heated drying-cylinders in the open air, and after passing over the said cylinders it is returned and again passed over them, and so on a large  
45 number of times, whereby it is thoroughly dried and all moisture dissipated. After this

drying operation the yarn is guided from the machine and delivered in good condition to be beamed or quilled.

My invention also comprehends many details of construction, which will be better understood by reference to the drawings, in which—

Figure 1 is a side elevation of a machine embodying my improvements. Fig. 2 is a sectional elevation of same on lines 2 2 of Fig. 3. Fig. 3 is a sectional plan view of same on line 3 3 of Fig. 1. Fig. 4 is a sectional elevation of a portion of the apparatus on line 4 4 of Fig. 3, and Fig. 5 is a cross-section of one of  
60 the supporting-columns on line 5 5 of Fig. 4.

A is a closed compartment or chamber and is provided on the front with a door A', hinged at O'.

O represents a series of screw-clamps, which  
70 are adapted to clamp the door A' tightly upon the flange of the chamber A when closed to make it practically steam-tight. Within this chamber at the top is a large cylinder B' and at the bottom is a similar cylinder B, said  
75 cylinders being geared together through a sprocket chain and wheels b. (Shown in dotted lines in Fig. 2.) In this manner the two cylinders or drums are revolved at the same surface speeds, and they may receive  
80 motion by a spur-wheel B<sup>3</sup>, driven by a pinion n on the driving-shaft N. Arranged within this chamber A and located between the two cylinders B B', I arrange steam-coil C, preferably bent or built in rectangular form, as  
85 shown. The width of said coil is less than the diameter of the drums, so that the yarn passing about the drums will not rub against the surface of the coils. Steam is supplied or  
90 passed through this coil under the control of any suitable valve devices.

Located to the rear of the compartment A and parallel to it I arrange a series of drying-cylinders E, said cylinders being staggered and geared together by spur-gears e, so that  
95 they revolve at the same surface speeds and alternately in opposite directions. The yarn after leaving the oxidizing-chamber passes about the lowermost drying-cylinder and advances around each of the other cylinders in  
100 succession, assuming a zigzag course until the top is reached. The yarn is then led



over a guide-roller I and advances downward around a second guide-roller H close to the floor and then once more about the drying-cylinders, and so on continuously until it is thoroughly dried. It then passes upward through a guide J and is delivered to any suitable place.

As it is necessary to cause the yarn to be guided longitudinally over the cylinders B, B', and E, I provide guide-pins *d* upon a transverse bar for guiding the yarn passing downward from the upper cylinder B' to the lower cylinder B and causing it to advance lengthwise of the cylinders a definite distance with each passage about said cylinders, and likewise I employ a series of guide-pins *h* for causing the yarn in passing over the roller I to the roller H to advance longitudinally a definite amount with each complete movement of the yarn over the drying-cylinders E.

The drying-cylinders E are journaled in hollow bearings K, extending from opposite sides of the upright standards F. These standards consist of longitudinal webs of **W** cross-section, the outer webs being parallel and the two inner webs *f* inclined and united in a vertical tube G. The hollow bearings K open into said tubular part G, as shown in Figs. 3 and 4. Steam is supplied to the tubular part G. (Shown at the upper portion of Fig. 3.) It then passes through the hollow bearings K into the interior of the drying-cylinders E. Thence steam passes through the opposite hollow journal-bearings K to the tube G in the opposite standard. At the bottom this tube G connects by a tube G' with the bottom of the chamber A, as shown in Fig. 4. The steam which passes from the drying-cylinders is thus delivered to the steaming-chamber A and is drawn off through a suction-pipe L by the exhaust-fan M. The action of this fan also draws off the air and any excess of steam from the chamber A.

As the chamber A has its openings arranged at the bottom, it is evident that the air, wet steam, and water being of greater specific gravity than dry steam will fall to the bottom and pass off at the opening L. This action is assisted by the action of the exhaust-fan M. It is my aim to maintain an atmosphere of dry steam in the upper portion of the chamber A, in which the yarn travels, and when sufficient steam is not secured by the vaporization of the moisture in the yarn under the action of the coils C, I may supply a quantity of steam from the supply-pipe for said coils to said chamber by providing a nozzle and valve *c*.

The several cylinders E being geared together, as is above pointed out, they insure the same surface speeds and rotation in opposite directions. They are driven by means of a pinion-shaft *m*, which in turn is driven by the pinion *n* of the power-shaft N. The power-shaft N is driven by a driving-wheel S through any suitable clutch mechanism, of which S' represents the controlling or brake

wheel. The power-shaft N is also provided with a band-wheel T for driving the exhaust-fan M and with a band-wheel *t*, if desired, for operating the dyeing-machine at the right-hand part of Fig. 1. Referring to this dyeing-machine, when two liquors are employed there are two pans *p p*, each of which is provided with a pair of pressure-rolls P P and suitable guiding-rolls R R. The yarn is first caused to pass through one of these pans and pressure-rolls to receive the necessary coloring-matter, then through the second pan and pressure-rolls to precipitate the coloring-matter upon the yarn to render it insoluble, substantially as set out in my Patent No. 659,343, hereinbefore referred to. After leaving the said coloring-machine the yarn Y is delivered through the guide-aperture D to the cylinders within the chamber A and from said cylinders through a guide-aperture D' in the chamber A and to the lowermost drying-cylinder E. If desired, only one set of rolls P and one pan need be used when a single dye liquor is employed. It is immaterial to my invention how the yarn may be colored or dyed, and while I prefer to color it in the manner stated, I do not limit myself thereto, as any other mode or process of coloring or dyeing the warp may be employed prior to the warp entering the chamber.

While I have described my invention as especially adapted for treating yarn, I do not confine myself thereto, as it is adapted for treating any textile material of continuous length, such as cloth. In this case, however, the guide-pins *d* and *h* would be removed and the material would also be caused to travel through the machine more slowly.

While I prefer the construction shown, I do not limit myself to the details thereof, as they may be modified without departing from the spirit of the invention.

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

1. In a machine for treating yarn, the combination of a closed chamber provided with guide-cylinders at top and bottom and radiating coils interposed between said cylinders, a series of drying-cylinders arranged outside of said chamber, means to drive the drying-cylinders and the cylinders within the closed chamber at the same surface speeds, means for supplying steam to the drying-cylinders, and an exhaust device for removing the air, water and moist steam from the closed chamber.

2. In a machine for treating yarn, the combination of a closed chamber provided with guide-cylinders at top and bottom and radiating coils interposed between said cylinders, a series of drying-cylinders arranged outside of said chamber, means to drive the drying-cylinders and the cylinders within the closed chamber at the same surface speeds, means for supplying steam to the drying-cylinders, an exhaust device for removing the air, moist



steam and water from the closed chamber, and a discharge-pipe for the steam from the drying-cylinders to the exhaust device.

3. In a machine for treating yarn, the combination of a closed chamber provided with guide-cylinders at top and bottom and radiating coils interposed between said cylinders, a series of drying-cylinders arranged outside of said chamber, means to drive the drying-cylinders and the cylinders within the closed chamber at the same surface speeds, means for supplying steam to the drying-cylinders, a pipe for conveying the steam from the drying-cylinders into the closed chamber, and an exhaust device for removing the air, moist steam and water from the closed chamber and also inducing the circulation of steam through the drying-cylinders.

4. In a machine for treating yarn, the combination of a closed chamber provided with guide-cylinders at top and bottom and radiating coils interposed between said cylinders, a series of drying-cylinders arranged outside of said closed chamber, means to drive the drying-cylinders and the cylinders within the closed chamber at the same surface speeds, means for supplying steam to the drying-cylinders, an exhaust device for removing the air, moist steam and water from the closed chamber, a series of guides arranged within the closed chamber for guiding the yarn into an advancing position as it passes successively over the two cylinders, guide-rollers arranged parallel to the drying-cylinders and respectively near each end of the series for receiving the yarn from the drying-cylinders and directing it back again thereto, and a series of guides arranged at fixed intervals lengthwise of the axes of the drying-cylinders for causing the yarn to advance over the surface of said cylinders each time it is led back to them.

5. In a machine for treating yarn, the combination of a closed chamber provided with guide-cylinders at top and bottom and radiating coils interposed between said cylinders, a series of drying-cylinders arranged outside of said closed chamber, means to drive the drying-cylinders and the cylinders within the closed chamber at the same surface speeds, means for supplying steam to the drying-cylinders, a series of guides arranged within the closed chamber for guiding the yarn into an advancing position as it passes successively over the two cylinders, guide-rollers arranged parallel to the drying-cylinders and respectively near each end of the series for receiving the yarn from the drying-cylinders and directing it back again thereto, and a series of guides arranged at fixed intervals lengthwise of the axes of the drying-cylinders for causing the yarn to advance over the surface of said cylinders each time it is led back to them.

6. In an apparatus for drying yarn, the combination of a series of drying-cylinders rotating in opposite directions and about which

the yarn is passed, with means for heating the said cylinders by steam, guide-rollers arranged parallel to the drying-cylinders and respectively near each end of the series for receiving the yarn from the drying-cylinders and directing it back again thereto, and a series of guides arranged at fixed intervals lengthwise of the axes of the drying-cylinders for causing the yarn to advance over the surface of said cylinders each time it is led back to them.

7. In an apparatus for drying yarn, the combination of a series of drying-cylinders rotating in opposite directions and about which the yarn is passed, with means for heating the said cylinders by steam, guide-rollers arranged parallel to the drying-cylinders and respectively near each end of the series for receiving the yarn from the drying-cylinders and directing it back again thereto, a series of guides arranged at fixed intervals lengthwise of the axes of the drying-cylinders for causing the yarn to advance over the surface of said cylinders each time it is led back to them, and an exhaust apparatus for exhausting the waste steam and water from the drying-cylinders.

8. In a machine for treating textile material, the combination of means for applying a coloring-matter to a continuous length of textile material, a steaming and heating chamber provided with apertures for admitting and removing the colored textile material to and from the lower part thereof and further with an outlet for the air water and moist steam also at the lower part thereof, guiding-cylinders located within the chamber at the upper and lower portions thereof and about which the textile material is guided, and steam coils or pipes for supplying high-temperature radiant heat to the interior of the chamber arranged intermediate of the levels of the upper and lower guiding-cylinders.

9. In means for drying yarn, two upright standards containing vertical steam-passages, and a series of hollow journal-bearings communicating with said steam-passages, in combination with a series of drying-cylinders having hollow journals and carried by the hollow journal-bearings so as to be arranged in two vertical series and whereby they are supplied with steam from the upright standard on one side and discharge the waste steam and water of condensation through the vertical standard on the other side, gearing connecting the several drying-cylinders so as to make them move at the same surface speeds and adjacent surfaces to revolve in opposite directions, and an exhaust device connected with the tubular part of the standard on the discharge side of the drying-cylinders.

10. In means for drying yarn, two upright standards containing vertical steam-passages, and a series of hollow journal-bearings communicating with said steam-passages, in combination with a series of drying-cylinders having hollow journals and carried by the hol-



low journal-bearings so as to be arranged in two vertical series and whereby they are supplied with steam from the upright standard on one side and discharge the waste steam and water of condensation through the vertical standard on the other side, gearing connecting the several drying-cylinders so as to make them move at the same surface speeds and adjacent surfaces to revolve in opposite directions, guide-rollers arranged parallel to the drying-cylinders and arranged respectively near each end of the series for receiving the yarn from the drying-cylinders and directing it back again thereto, and a series of guides arranged at fixed intervals lengthwise of the axes of the drying-cylinders for causing the yarn to advance over the surface of said cylinders each time it is led back to them.

11. In apparatus for drying yarn, the combination of an upright closed chamber, a large revolving cylinder at the top, a similar cylinder at the bottom, means to revolve the cylinders at the same surface speeds, a coil of steam-pipe arranged within the chamber, an aperture for leading the yarn into the chamber, a guide-aperture leading the yarn out of the chamber, and a series of guides within the chamber arranged parallel to the axes of the cylinders for causing the yarn to advance a given distance in the length of the cylinders with each complete travel about said cylinders.

12. In a machine for treating textile material, the combination of means for applying a

coloring-matter to a continuous length of textile material, a steaming and heating chamber provided with guiding-cylinders at top and bottom portions thereof about which the textile material is guided, steam coils or pipes for supplying high-temperature radiant heat to the interior of the chamber, and an outlet for the air, water and moist steam at the bottom of the chamber, the said parts being further combined with a series of steam-heated drying-cylinders arranged in the open air adjacent to the steaming-chamber and adapted to receive the textile material therefrom and dry it in the open atmosphere.

13. The combination of means for applying coloring-matter to a continuous length of textile material, a series of steam-heated drying-cylinders about which the textile material is passed, and a steaming and heating chamber having an opening at the bottom, guide-cylinders for guiding the textile material through the chamber and high-temperature steam-coils for supplying high-temperature radiant heat to the chamber, the textile material being caused to pass first through the means for applying the coloring-matter, then through the steaming and heating chamber and finally through the drying-cylinders.

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

JOHN W. FRIES.

Witnesses:

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