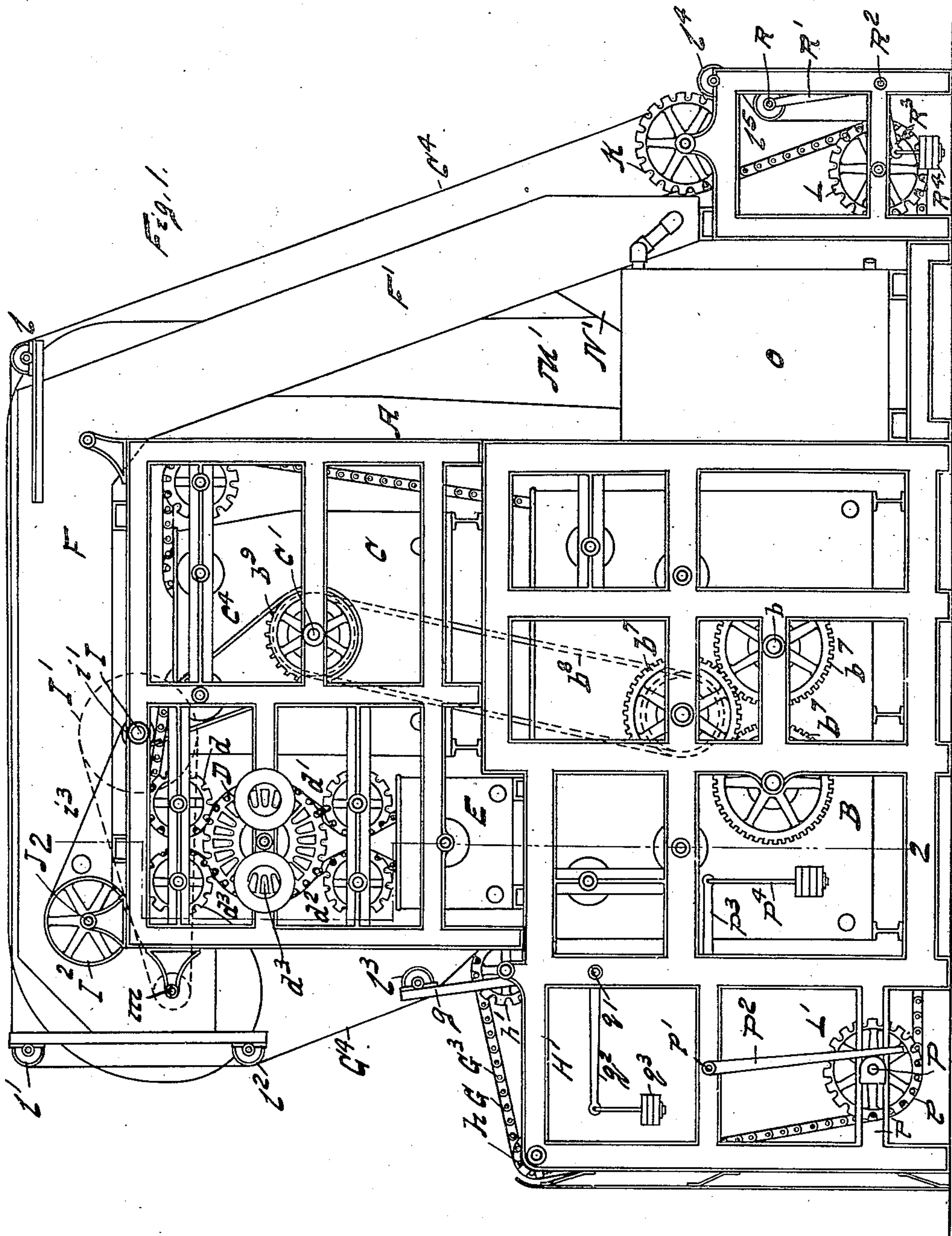


A. B. TOZER.
ART OR PROCESS OF LAUNDRYING.
APPLICATION FILED OCT. 5, 1904.

998,935.

Patented July 25, 1911.

6 SHEETS—SHEET 1.



Witnesses
Wm. Burs
M. C. Sullivan

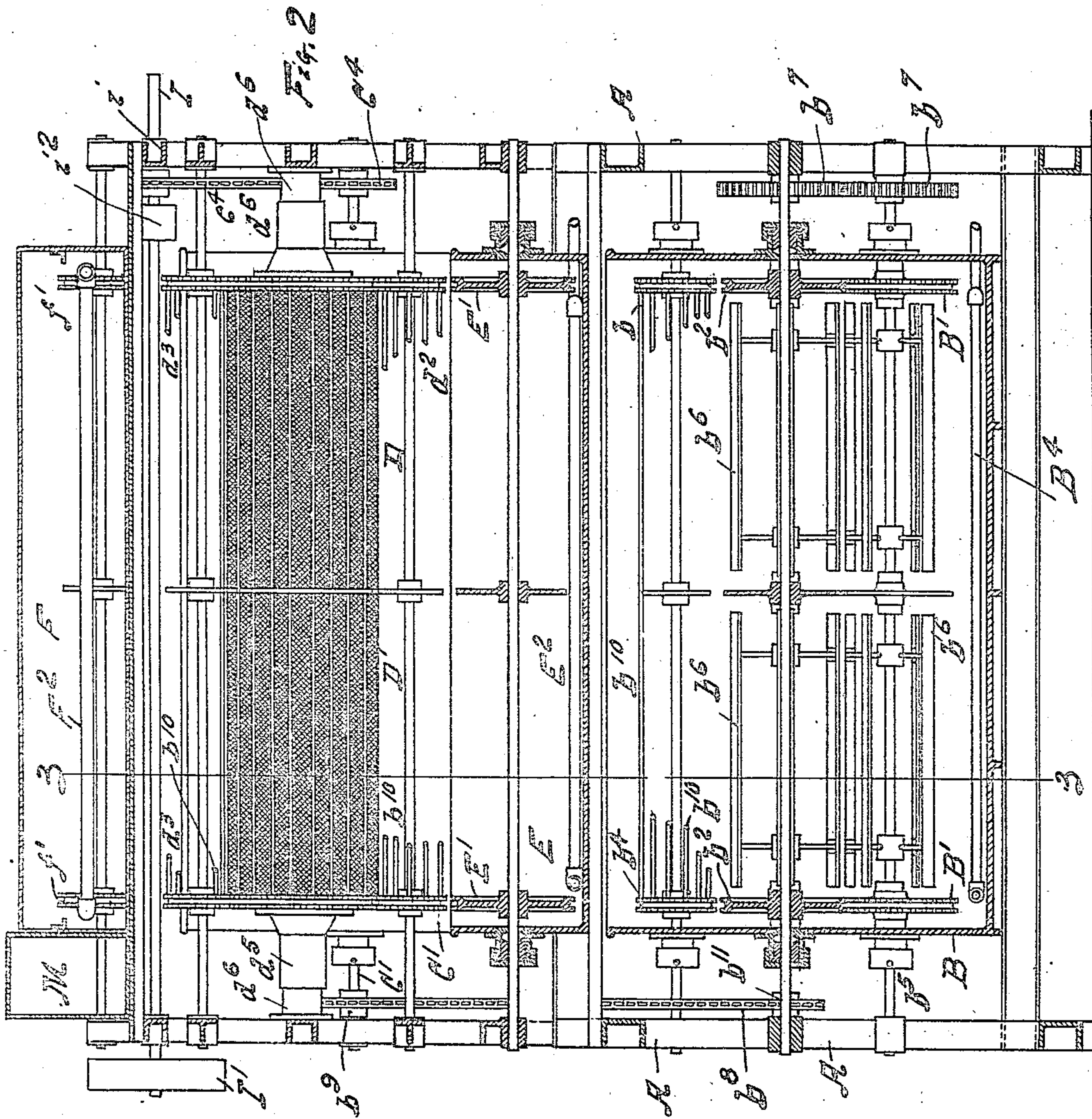
Inventor
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6 SHEETS—SHEET 2.



Witnesses
Wm. B. Burr
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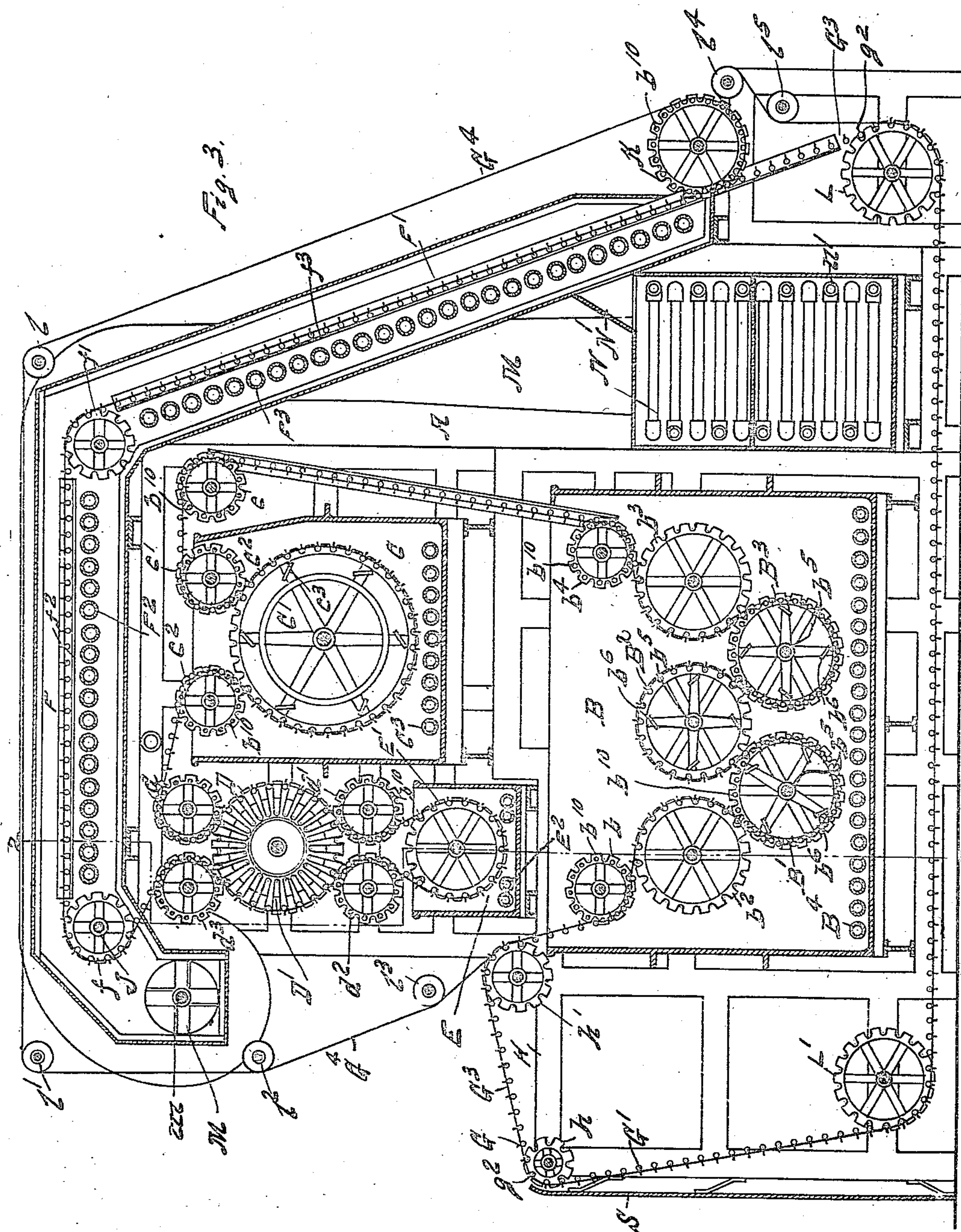
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6 SHEETS—SHEET 3.



Witnesses
Wm. Beers
M. C. Sullivan.

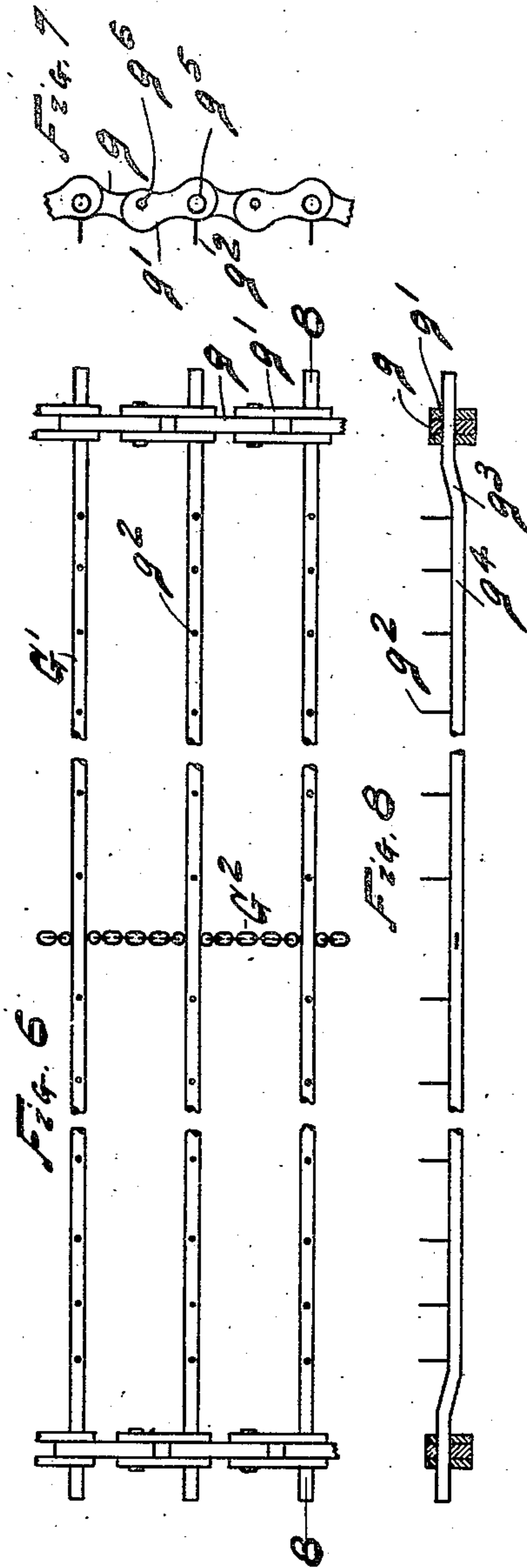
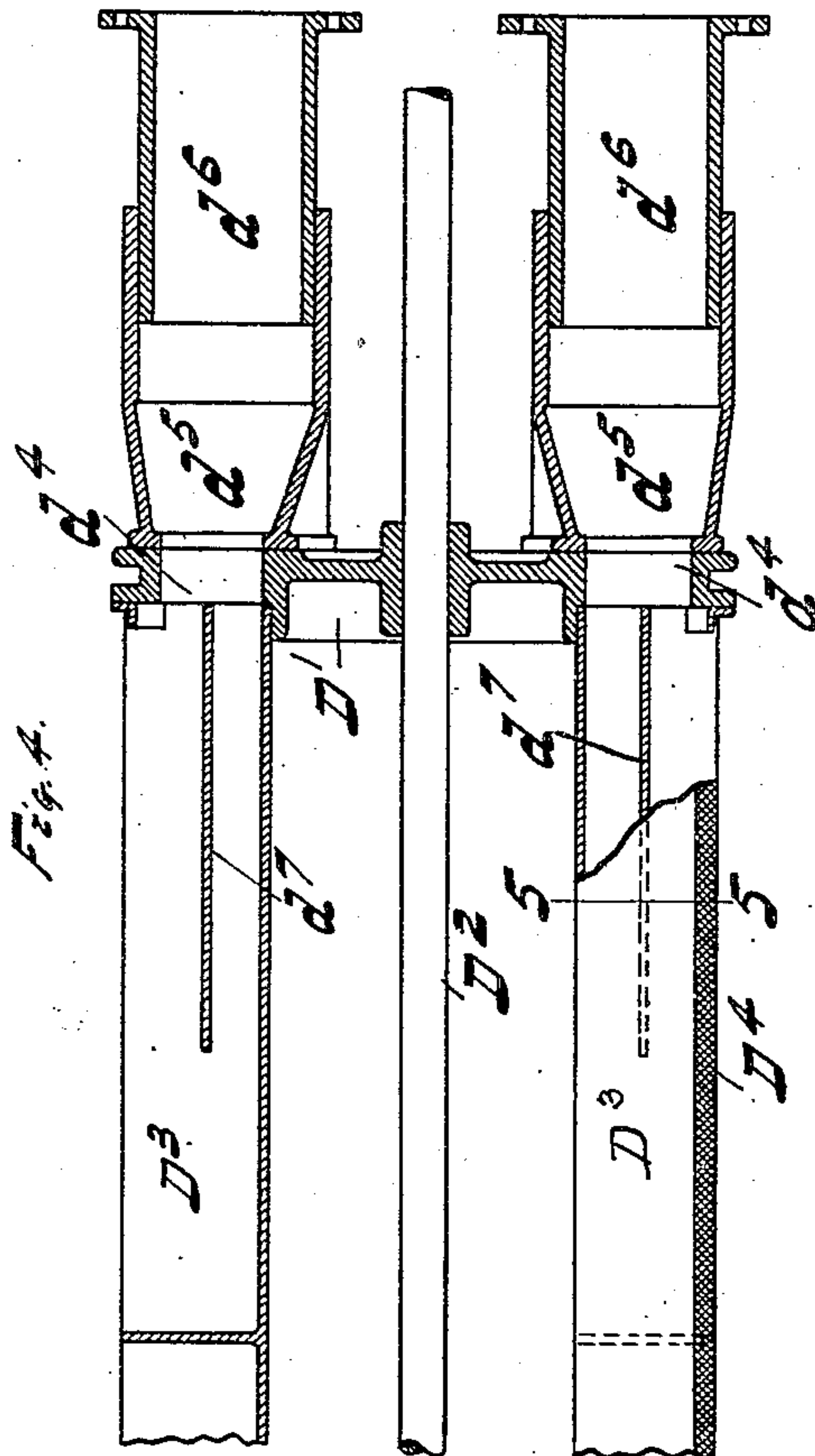
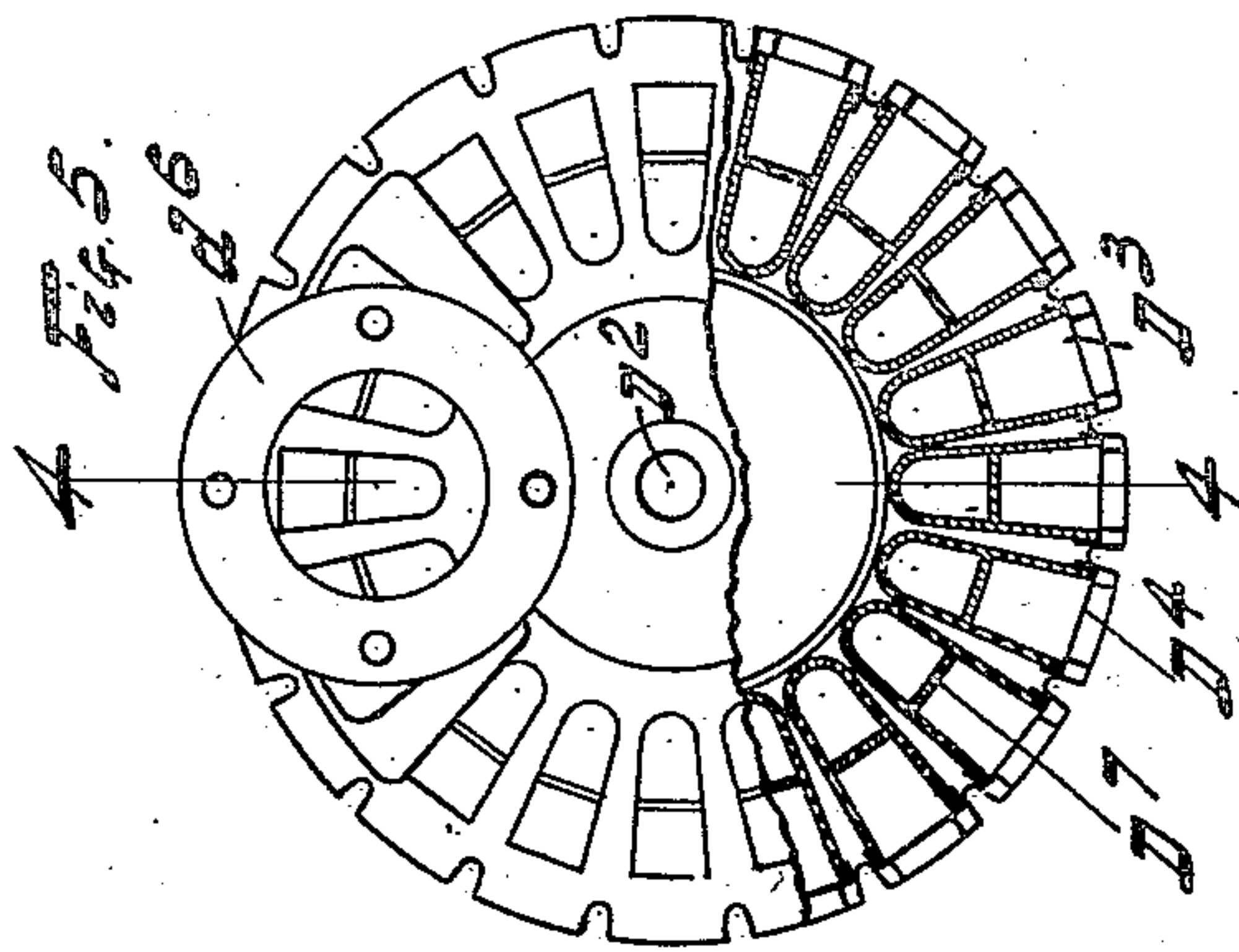
Inventor
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6 SHEETS—SHEET 4.



Witnesses
Wm. C. Beers
M. C. Sullivan

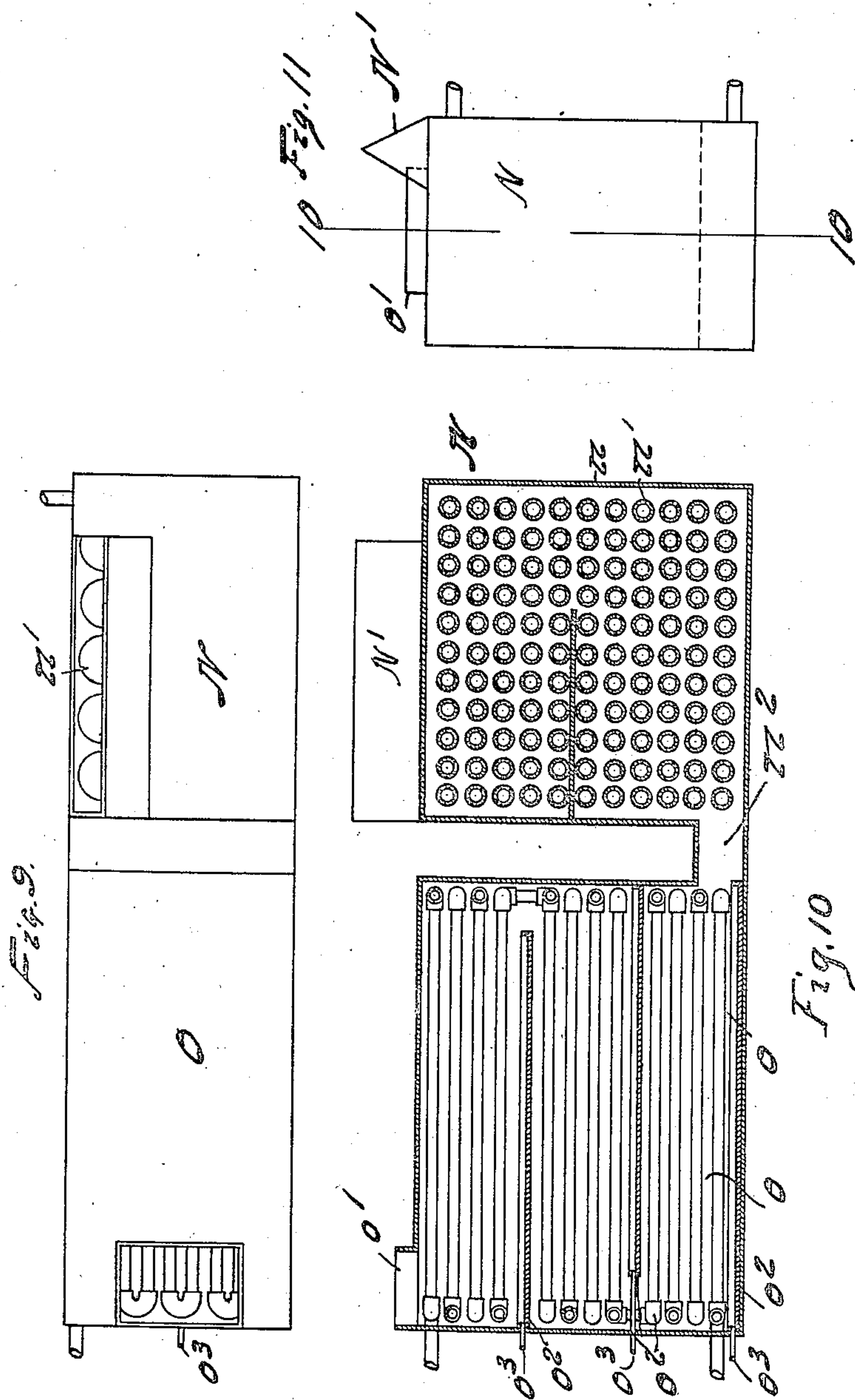
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4 SHEETS-SHEET 5.



Witnesses
Wm. Beer
M. C. Sullivan.

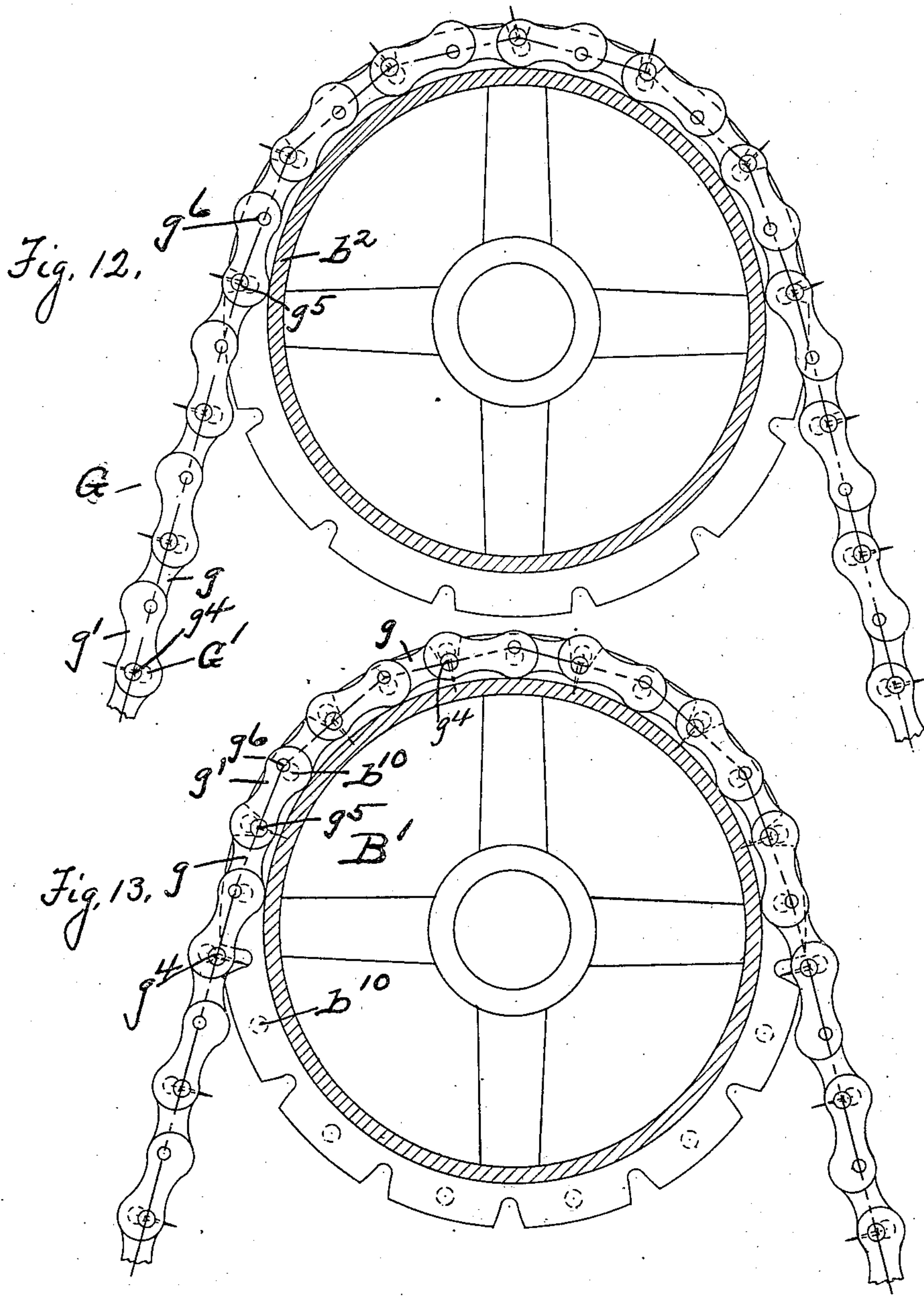
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Archibald B. Tozer
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6 SHEETS—SHEET 6.



Witnesses

G. B. Burgess
M. C. Sullivan

Inventor
Archibald B. Tozer
by W. L. Ford
Attorney

UNITED STATES PATENT OFFICE.

ARCHIBALD B. TOZER, OF ERIE, PENNSYLVANIA, ASSIGNOR OF ONE-FIFTH TO D. O. SUMMERS CLEANING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

ART OR PROCESS OF LAUNDRYING.

998,935.

Specification of Letters Patent.

Patented July 25, 1911.

Original application filed March 24, 1904, Serial No. 199,789. Divided and this application filed October 5, 1904. Serial No. 227,241.

To all whom it may concern:

Be it known that I, ARCHIBALD B. TOZER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented new and useful Improvements in the Art or Process of Laundrying, of which the following is a specification.

This invention relates to improvements in the art or process of laundrying and consists in certain improvements therein as will be hereinafter fully described and pointed out in the claims.

More particularly the invention relates to a process for laundrying fragile fabrics such as lace curtains and in the following description and illustrations the invention is disclosed as particularly applied to such articles.

In a general way the process consists in securing the fabric at numerous points and while so secured washing said fabric and finishing the same. The finishing may be more or less complex as the process is carried out. In the preferred process it consists in starching and drying.

Heretofore great difficulty has been experienced in laundrying fragile fabrics such as lace curtains and similar articles for by reason of their fragile nature it is difficult first, to properly wash them; secondly, to dry and finish them, giving to the article as turned out the proper shape; and thirdly to accomplish these results without injuring the fabric.

The mechanism for carrying out my process shown herein as well as the process has been heretofore disclosed by me in an application filed Mar. 24, 1904, #199,789, of which this is a division.

I carry out my process with the machine herein shown and described wherein,

Figure 1 is a side elevation of the machine. Fig. 2, a section on the line 2—2 in Figs. 1 and 3. Fig. 3, a section on the line 3—3 in Fig. 2. Fig. 4, a section on the line 4—4 in Fig. 5, being part of the suction roll. Fig. 5, an end elevation of a part of Fig. 4, a part being in section on the line 5—5 in Fig. 4. Fig. 6, is a plan view of a fragment of the fabric carrier. Fig. 7, a side elevation of the same. Fig. 8, a section on the line 8—8 in Fig. 6. Fig.

9, a side elevation of the condensing and heating apparatus. Fig. 10, a section of the same on the line 10—10 in Fig. 11. Fig. 11, an end elevation of the same. Fig. 12 is a detailed view of a sprocket wheel and carrier. Fig. 13 is a similar view with the fabric arranged on the inner surface of the carrier.

The machine is mounted in the frame A and has in it as its main constituents the washer B, the rinser, C, the suction apparatus D for partially drying the fabric, the starching devices E, the apparatus D being arranged for removing surplus starch, and the drying chambers or devices F.

The fabric is fed onto the carrier G, on a platform or extension of the machine H. The carrier is shown in detail in Figs. 6, 7, 8, 12 and 13. It comprises the rods G' which are rigidly secured in the links g. Loose links g' connect the links g with the next succeeding rod. The rods are provided with numerous adjacently arranged pins g². In practice I have found pins arranged at a distance of two inches apart admirably adapted for the ordinary lace curtains for the treatment of which this process is peculiarly applicable. Some latitude however may be exercised in this. The surface developed by the motion of the rods G' is made coincident with the cylindric surface defined by the motion of the joints between the rods and links g' by means of offsets g³, so that the surfaces g⁴ have the same travel as the axes of the joints formed between the rods G' and the links g'. The carrier is further stiffened by the chain G² which extends across the bars. Numerous pins g² form the numerous and adjacently arranged points for securing the fabric. I prefer that these numerous and adjacently arranged points extend throughout the body of the fabric. In the washing of lace curtains where this is done not only is the general outline of the fabric maintained but the pattern is also maintained as the fabric shrinks and with the varying strength of such fabrics this method of securing prevents the drawing of the fabric at the weaker points. The process however in some of its broader aspects includes the securing of the edges of the fabric. The flexible nature of the carrier permits of the

fabric while so held being washed and afterward treated or permits of its treatment, especially permits of its being dried while secured to these numerous and adjacently
5 arranged points so that the fabric as it comes from the machine is in proper shape for use.

The carrier G runs over the sprockets h and h' and from the sprockets h' into the
10 washer B. A supporting sheet G^3 of pervious material is run onto the carrier G in the machine shown upon the application of the fabric thereto forming a complete support for the light fabric. This sheet is preferably of ordinary mesh net. A second sheet
15 G^4 is fed over the fabric at the wheel h' so that the fabric to be treated is not only secured at numerous points by the pins g^2 but it is supported throughout its surface by the
20 sheets G^3 and G^4 .

The washer B consists of the tub in which the mechanism is placed. It has the heating coils B^4 . It also has the series of wheels over which the carrier G runs. The carrier
25 on entering runs over the sprocket b onto the sprocket b^2 , from this to the first washer sprocket B' and from this is reversed on sprocket B^2 then passes onto the washer sprocket B^3 , and passes out of the tub over
30 the sprockets b^3 and b^4 . Where the pins g^2 on the carrier extend outwardly from the axis of the sprocket over which it is running the carrier by reason of the offset g^3 maintains the distance between the securing
35 points constant. This is assisted by the fact that the end of the link at the joint g^6 is offset as shown in Figs. 7, 12 and 13 so that only the ends of the links at the joint g^5 contact the bottom of the grooves in the
40 sprocket wheels as clearly shown in Figs. 2 and 12. With the links in this position, the fabric extends in straight lines from rod G' to rod G' . The chains in going over the sprocket wheels run over these grooves.
45 The bars G' extending into the notches of the sprocket wheels and thus engage the sprocket wheels. By making the carrier in the form of a chain and extending it over numerous sprocket wheels the parallel relation of the members G' is maintained,
50 thus insuring the smooth running of the device, and a uniform strain on the fabric, the sprocket wheels being locked together in pairs one at each side of the carrier.

55 When the carrier G runs over a wheel wherein the pins g^2 extend toward the center as on the washer wheel B' some means must be provided for keeping the fabric on the pins. To accomplish this those wheels,
60 on which the carrier runs bringing the pins in this relation, are provided with a series of rods extending from a sprocket on one end of a shaft to the opposite sprocket, said rods being identified by b^{10} in Figs. 3 and 13.
65 These rods b^{10} are placed opposite the joints

g^6 and the envelop of these rods b^{10} are coincident with the cylindrical surfaces developed by the motion of the axes of the joints g^6 . It will be noted that the links at the joints g^5 will not contact the bottom of
70 the grooves in the sprocket wheels B' (see Fig. 13) so that the chain will extend in a straight line between the joints g^6 . This will maintain the bars G' , so that the pins g^2 will have a radial direction and at the
75 same time the distances between the pins g^2 along the line of the fabric will be constant by reason of the fact that the rods b^{10} are distanced to exactly the distance between the axes of the joints g^6 . The fabric then
80 passes in straight lines between the rods b^{10} , the line of the fabric being exactly at the axis of the joint g^6 at said rod b^{10} and approximately in contact with the rods or bars G' . In practice I allow for the thick-
85 ness of a supporting carrier or web between the line of the fabric and the rods G' and bars or rods b^{10} . By this arrangement the flexible carrier formed with the chain having the numerous points of support may be
90 run over numerous wheels and reversed in its relation to said wheels. This is particularly desirable in the washer, in that the liquid can be passed through the fabric in all directions with equal force. The washer
95 wheels B' , B^2 and B^3 mounted on the shafts b^5 and being journaled on said shafts are driven by the carrier G. These shafts are driven by the gears b^7 (see Figs. 1 and 2) in
100 a direction opposite to the movement of the wheel, the shaft for the wheel B^2 being driven through a sprocket wheel b^{11} . The sprocket wheel b^{11} is driven through the chain b^8 from the sprocket b^9 , the sprocket
105 b^9 being mounted on the shaft C' , the shaft C' getting its movement from mechanism hereinafter described. The agitators b^6 are fixed on the shaft b^5 and force the liquid in front of them through the fabric drawn
110 around the wheel. The liquid of course flows in through the fabric behind the arms of the agitators so that liquid is forced through the fabric both in front of and behind the arms of the agitators, so that there
115 is a forced circulation of liquid through the fabric, and a consequent washing action.

The carrier G is run from the washer B to a rinsing apparatus C. This is heated by the coils C^3 . The carrier in going from
120 the sprocket b^4 passes over the sprocket c , then the sprocket c' , the rinser wheel C^2 and sprocket c^2 out of the rinser. The rinser wheel C^2 is mounted on the shaft C' and is driven by the carrier G. The agitator c^3 is
125 fixed on the shaft C' and rotates in opposite direction from that of the wheel C^2 and forces liquid through the fabric and accomplishes the rinsing by practically the same process as the washer. The shaft C' is
130 driven by the sprocket C^4 (see Figs. 1 and

2), a chain c^4 extending from this sprocket to the sprocket i on the shaft I. The shaft I is driven from the pulley i^2 (see Fig. 2) by the belt i^3 from the main drive wheel I^2 .

5 The carrier passes from the sprocket c^2 of the rinser to an extracting machine D. In passing from the sprocket d into the extractor D it passes over the extracting wheel D' . This takes out a portion of the moisture. It then passes over the sprocket d' into the starcher E around the wheel E' , over the sprocket d^2 , again around the extractor wheel D' , and over the sprocket d^3 out of the extractor.

15 The extractor wheel is shown in detail in Figs. 4 and 5. It consists of a series of channels D^3 which are open on their outer face and covered with a pervious material as a gauze D^4 . The ends of the channel have the openings d^4 which are adapted to be brought into register with the connections d^5 . The connections d^5 are telescopically connected with the fittings d^6 and these are connected with the intake of the compressor or other suction device (not shown) so as to draw air from the channels D^3 . The channels D^3 are provided with partitions d^7 so as to effect a more uniform distribution of the movement of the air through the fabric on the extractor wheel. The connection d^6 is subjected to endwise pressure incident to its tapered shape, thus forcing it into contact with the end of the wheel so as to maintain a tight joint. As the wheel is turned and the fabric is passed over it the connection d^5 is brought into register with the various channels at opposite sides of the wheel, so that the excessive moisture is extracted at one side of the wheel, and the excessive starch at the opposite side of the wheel.

The starcher is heated by the coil E^2 , the fabric running through it takes up sufficient starch to properly treat it.

45 From the extractor the carrier G passes into the drier F. In passing into the drier it passes onto the sprocket f . This is mounted on the shaft J and is driven by the wheel I^2 , the main driving element of the machine. The drier has the upper or horizontal compartment F and the extension F' . The upper compartment is heated by the coils F^2 and the extension by the coils F^3 . The carrier is preferably supported while passing through these driers by platforms f^2 and f^3 . It is carried over the sprocket f' and the sprocket K at the end of the drier.

55 The sheet G^4 is passed around the rods b^{10} of the sprocket K and back to the sprocket h' over the top of the machine by means of the rollers l , l' , l^2 and l^3 . As it passes around the sprocket K it is of course drawn off all the pins g^2 of the carrier. The sheet G^3 is also carried preferably around the sprocket K and this of course acting with the sheet G^4 takes with it the interposed

fabric which is being treated, so that the fabric is removed from the carrier and delivered from the roller l^4 . The sheet G^3 passes from the sprocket K over the rollers l^4 l^5 and again passes onto the carrier G around the sprocket L. The carrier G and sheet G^3 pass over the sprocket L' and from there to the initial point at the sprocket h .

It is desirable that some tightening device be arranged for each of these continuous carriers. The carrier G is tightened at the sprocket L' . This sprocket is carried on the shaft P which is journaled in the bearing p . The bearing p is mounted in a guide P' . The arm P^2 abuts the bearing. It is mounted on the shaft p' from which the lever p^3 extends. A weight P^4 is extended from the arm P^3 and thus keeps the carrier in tension. The roller l^3 is mounted on an arm q . The arm q is mounted on a shaft q' from which extends the arm q^2 . The weight q^3 is suspended from this arm and gives to the sheet G^4 a proper tension. The roller l^5 is mounted on the shaft R. This is carried by the arms R' mounted on the shaft R^2 . The arm R^3 extends from the shaft R^2 and the weight R^4 is suspended from this lever thus putting the sheet G^3 under proper strain.

95 I have devised a preferable means of operating a drier either in this apparatus or others as follows:—The intake of a fan is connected with the chamber F, and air is forced from the fan through the connection M into the condenser O through the opening o' (see Fig. 10). The condenser has a series of pipes o and the pans o^2 for catching the moisture that is precipitated. Drain pipes o^3 convey the liquid to without the condenser chamber. The condenser chamber is connected by a passage n^2 with the heater N. This comprises the chamber n and series of coils n' . The air passes from the heater N again to the drying chamber, being connected with the extension F' through the connection N' . By this arrangement the air is continuously circulated, and it is not necessary to completely cool it to precipitate the moisture in the condenser, so that it goes to the heater with some initial heat. The continuous circulation also relieves the fan. By passing the current in a direction reverse to that of the movement of the carrier through the drier greater efficiency is effected.

120 It will be noted that the curtain is fed onto the carrier G over the roll h . If the pin g^2 extended exactly in a radial line as it went over the wheel h there would be some puckering of the fabric when the carrier G was straightened out. The carrier G is arranged on the sprockets so that the end of the link g connected with the pivot g^6 is ahead. Inasmuch as the line of the pivots g^5 and g^6 is brought into alinement in going over the wheels, the pin g^2 will be parallel

to a radial line running through the pivot g^6 . In other words the pin g^2 will as it comes off the wheel h have a slant slightly forward, and will be in perpendicular position to the carrier when the carrier is straightened out.

By this process it will be noted that fabrics of the most fragile nature can be most thoroughly washed, rinsed and dried while being secured at numerous points. It is peculiarly applicable to handling lace curtains and similar fabrics, where it is desired to hold the fabric after it has been stretched in the moist state, while it is dried so that the fabric will have the proper form after it is dried.

What I claim as new is:—

1. That improvement in the art of treating fabrics, which consists in securing a fabric at numerous adjacently arranged points throughout the fabric, cleansing the fabric so secured by the application of a liquid, extracting the excess of moisture therein, starching and drying the same while maintaining the distances between the points along the line of the fabric constant.

2. That improvement in the art of treating fabrics, which consists in securing the fabric at numerous adjacently arranged points throughout the fabric, cleansing the fabric so secured by the application of a

liquid, maintaining the distances between the points along the line of the fabric constant, and extracting the moisture therefrom while so secured.

3. That improvement in the art of treating fabrics which consists in flexibly supporting the fabric, securing it at numerous adjacently arranged points extending along the edges of the fabric, maintaining the distances between said points along the line of the fabric constant, and passing the fabric through a liquid while so secured and supported.

4. That improvement in the art of treating fabrics which consists in flexibly supporting the fabric, securing it at numerous adjacently arranged points throughout the body of the fabric, maintaining constant distances between said points along the line of the fabric, and passing the same through a liquid while so secured and supported.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

ARCHIBALD B. TOZER.

Witnesses:

H. C. LORD,
M. C. SULLIVAN.