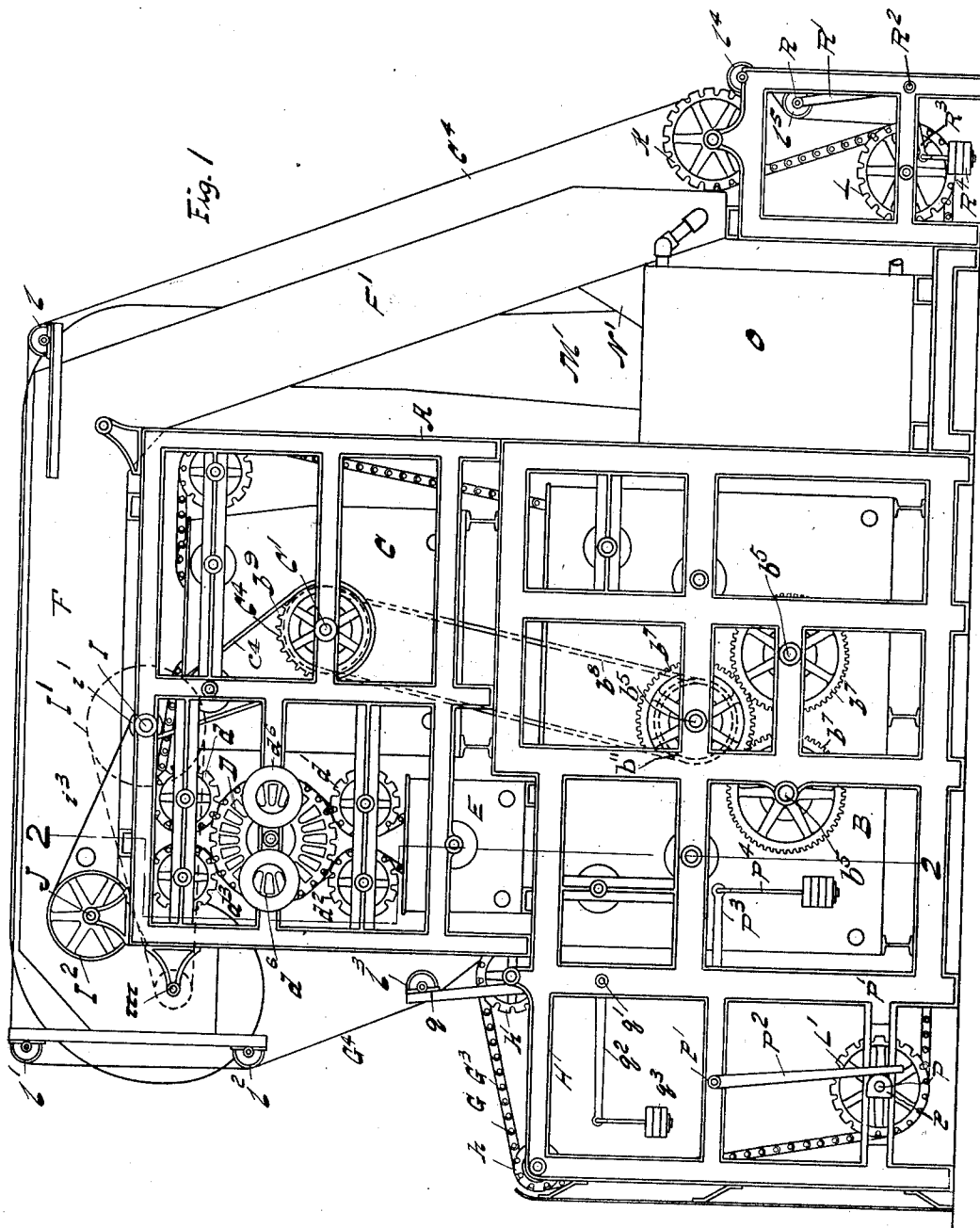


A. B. TOZER.
MACHINE FOR LAUNDRYING.
APPLICATION FILED MAR. 24, 1904.

1,002,473.

Patented Sept. 5, 1911.

6 SHEETS—SHEET 1.



Witnesses

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M. C. Sullivan

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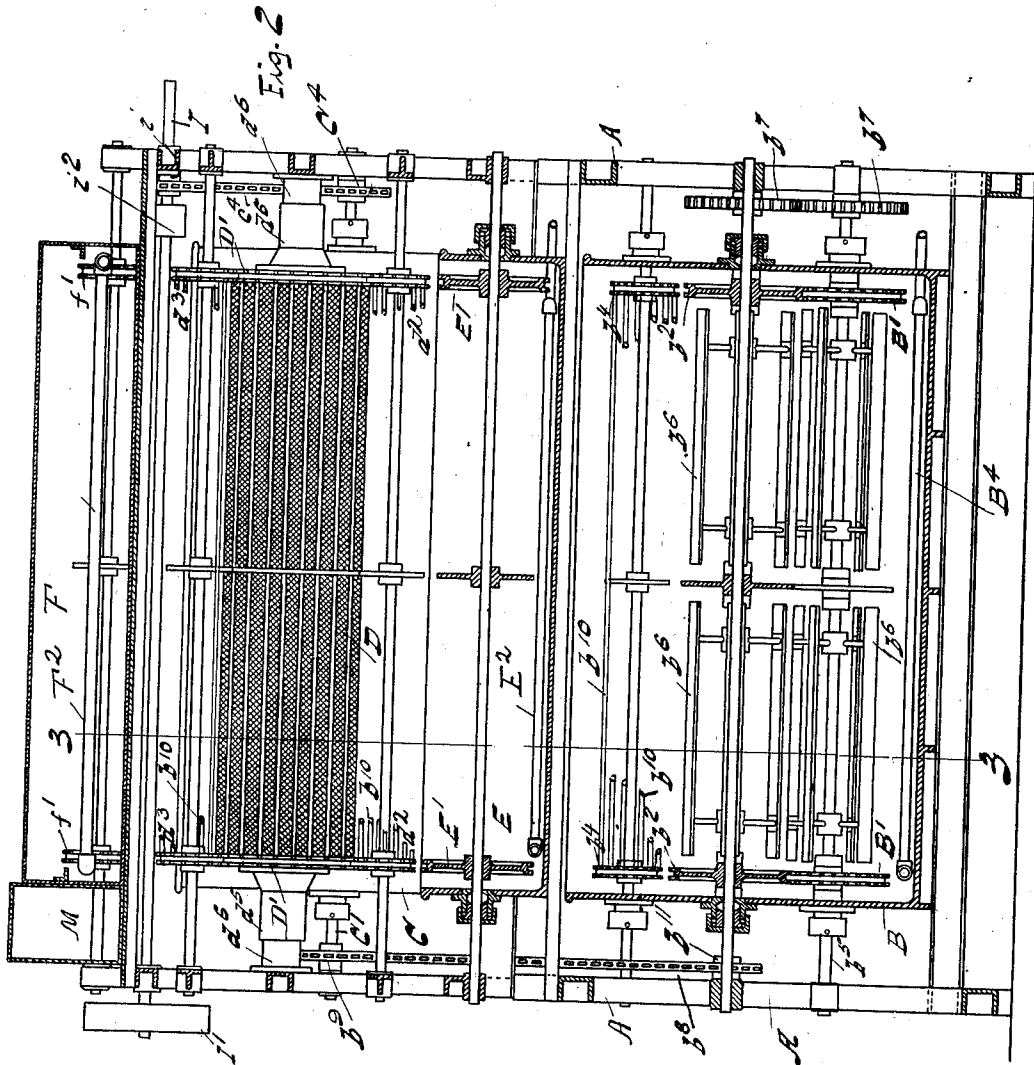
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Witnesses

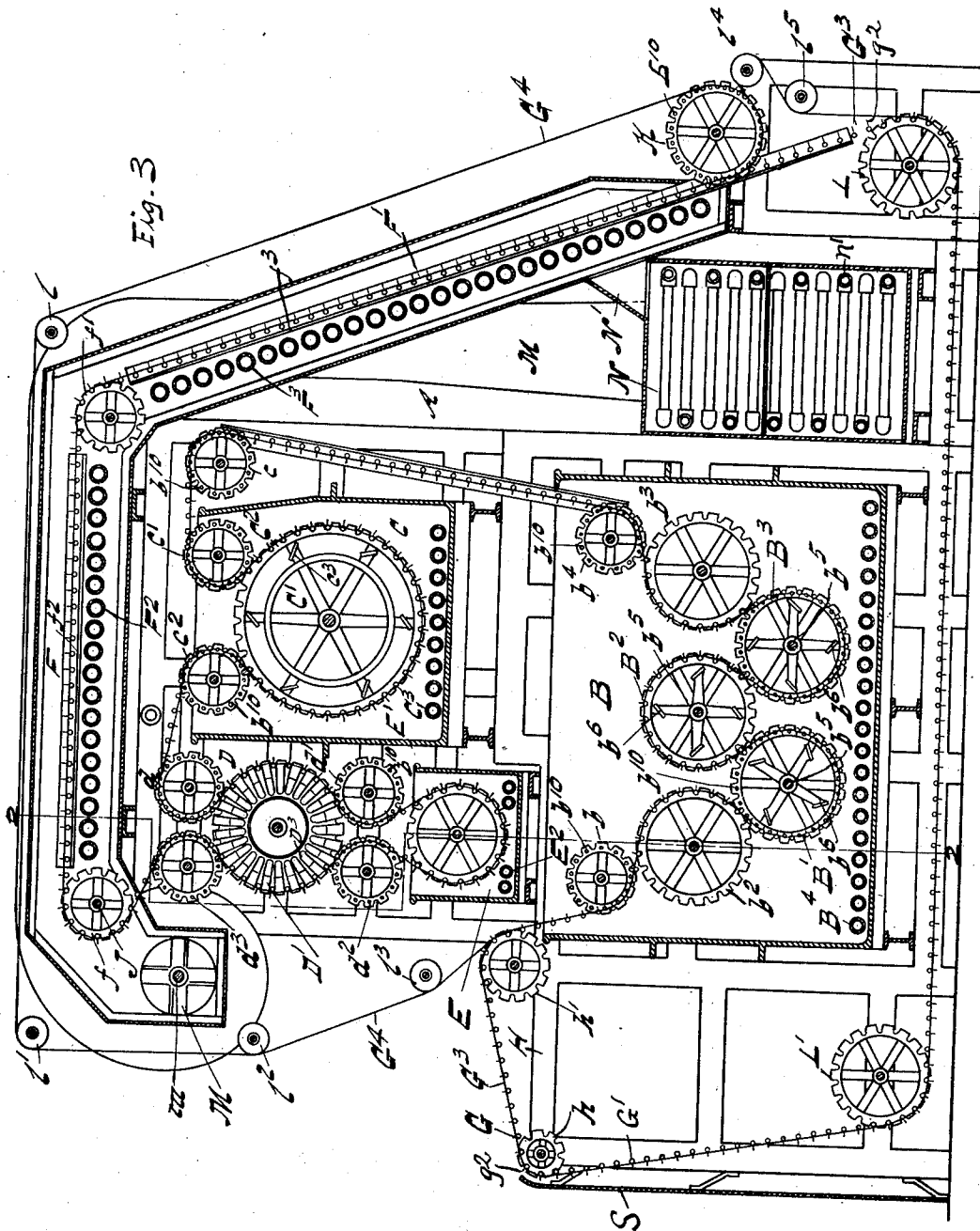
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6 SHEETS—SHEET 3.



Witnesses
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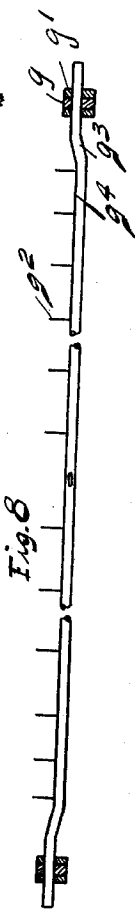
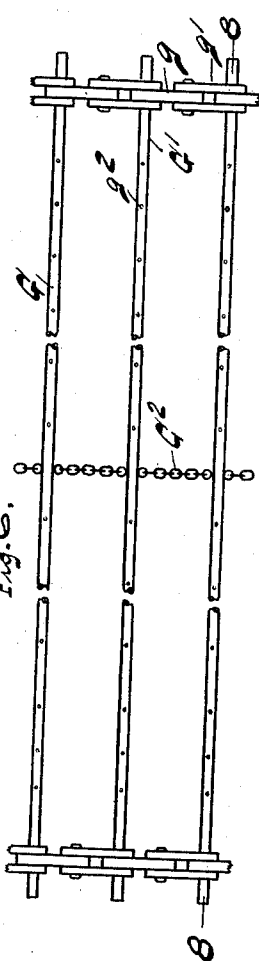
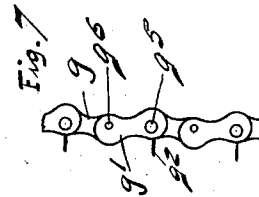
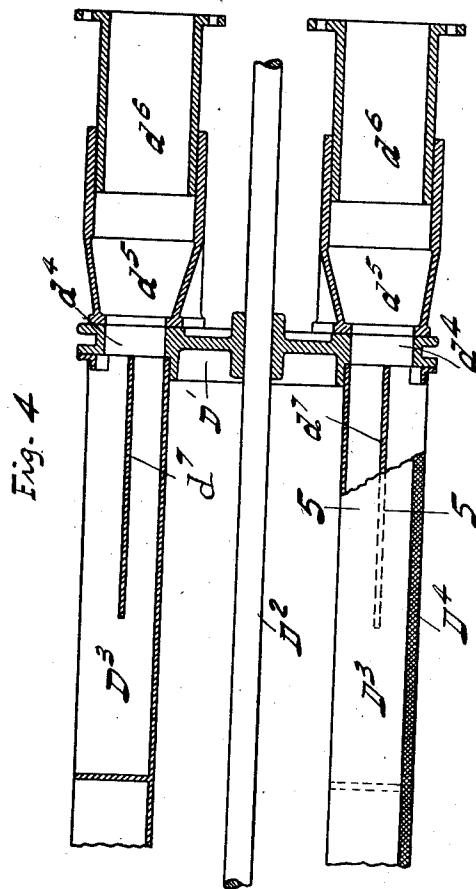
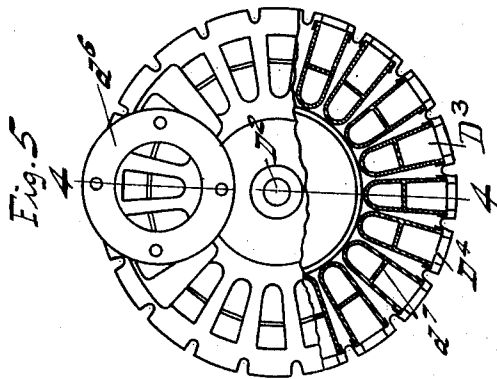
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6 SHEETS—SHEET 4.



Witnesses
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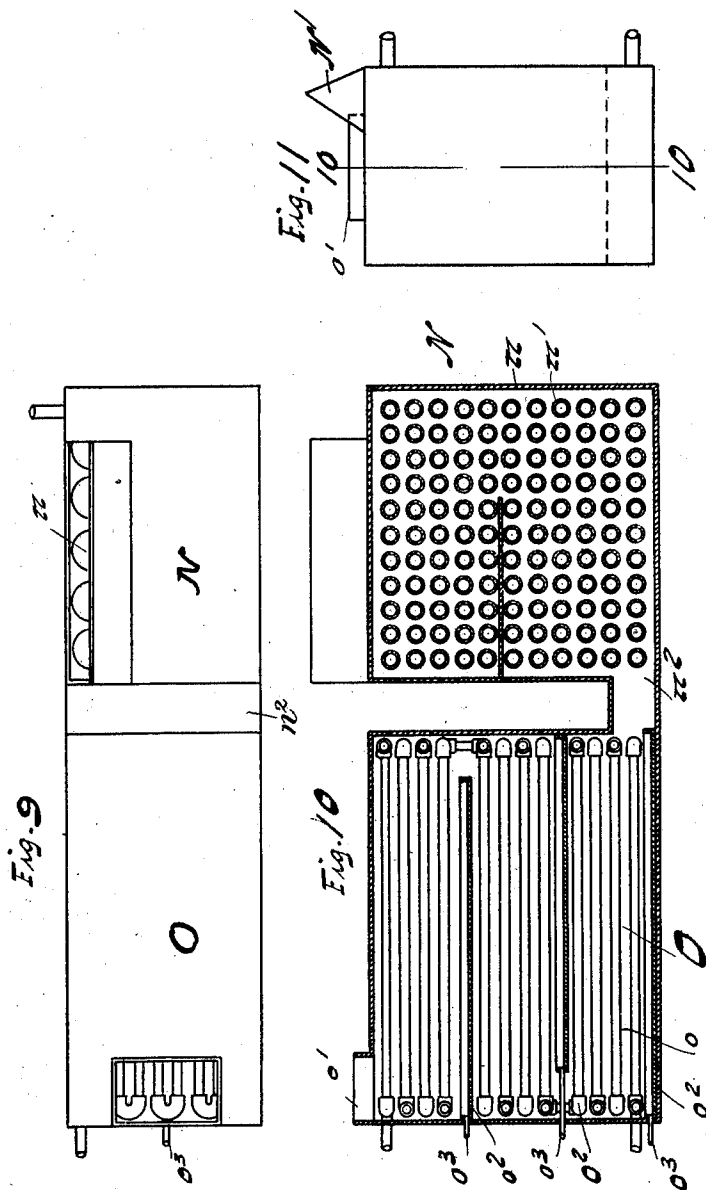
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6 SHEETS—SHEET 6.



Witnesses

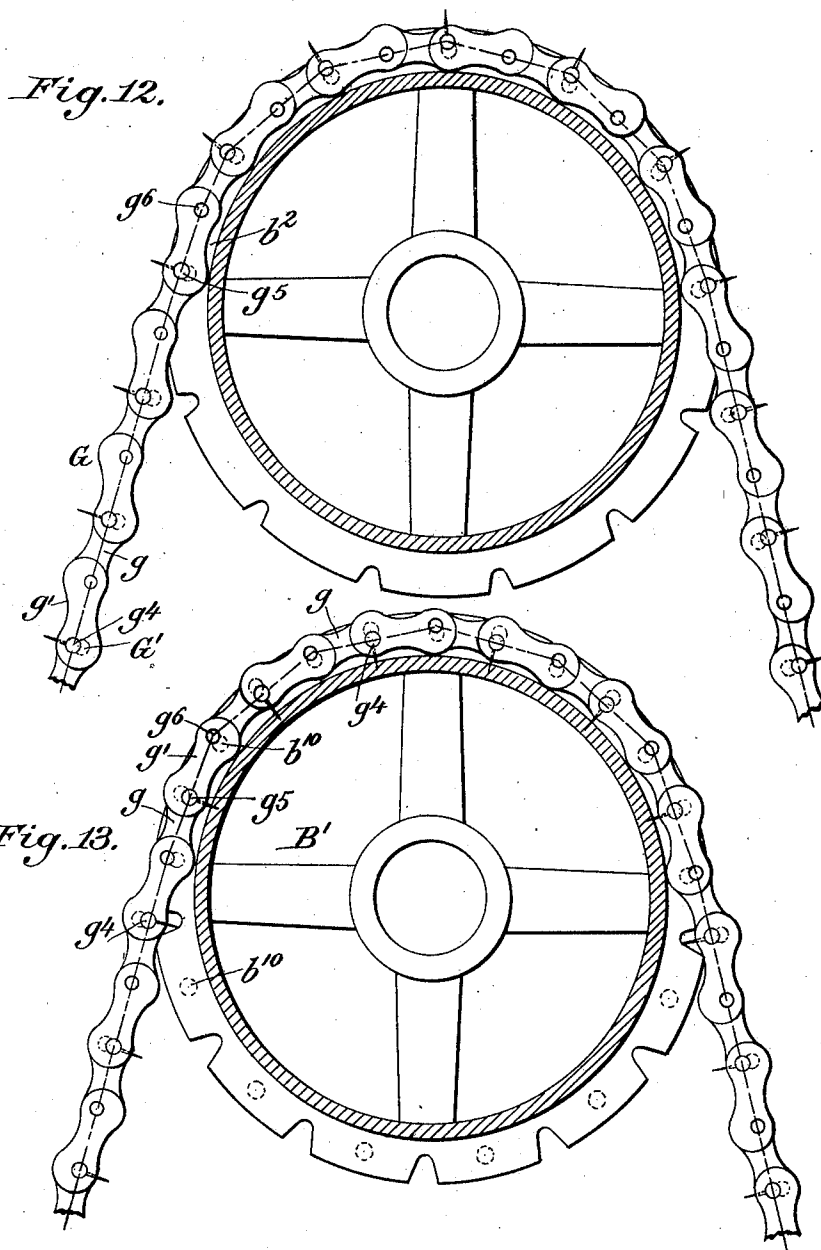
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Patented Sept. 5, 1911.
6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR LAUNDRYING.

1,002,473.

Specification of Letters Patent.

Patented Sept. 5, 1911.

Application filed March 24, 1904. Serial No. 199,789.

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 Machines for Laundrying, of which the following is a specification.

This invention relates to machines for laundrying and consists in certain improvements in the construction thereof as will be hereinafter fully described and pointed out in the claims.

More particularly the invention relates to machines 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 machine is arranged to secure the fabric at numerous points, and while so secured wash said fabric and finish the same. The finishing may be more or less complex as the process is carried out. In the preferred machine 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 invention is illustrated in the accompanying drawings as follows:

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 detail view of a sprocket wheel and carrier with the fabric on the outer surface of the carrier. Fig. 13 is a view of a

sprocket wheel and carrier 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 means for utilizing the apparatus D 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 pins g². The surface developed by the motion of the rods G' is made co-incident 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 numerous points for securing 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 points so that the fabric as it comes from the machine is in proper shape for use. The carrier G runs in the sprockets h and h' and from the sprockets h' into the washer B. A supporting sheet G³ of pervious material is run onto the carrier G before 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 G⁴ 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 g² but it is supported throughout its surface by the sheets G³ and G⁴.

The washer B consists of the tub in which the mechanism is placed. It has the heating coils B⁴. It also has the series of wheels over which the carrier G runs. The carrier on entering runs over the sprocket b onto the sprocket b², 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 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 (as shown in Fig. 12) the surface g^4 by reason of the offset g^3 maintains the distance between the securing points. This is assisted by the fact that the end of the link at the joint g^6 is offset as shown in Fig. 7, so that only the ends of the links at the joint g^6 contact the bottom of the grooves in the sprocket wheels as clearly shown in Fig. 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 in these grooves. The bars G' extend into the notches of the sprocket wheels and thus engage the sprocket wheels. By making the carrier in the peculiar form of a chain shown and extending it over numerous sprocket wheels the parallel relation of the members G' is maintained, 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.

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, 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. These rods b^{10} are placed opposite the joints g^6 and the envelop of these rods b^{10} is in coincidence with the cylindrical surface defined by the motion of the axes of the shafts. It will be noted that the links at the joints g^5 will not contact the bottom of 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 same time the length of the line of the fabric between the pins g^2 will be maintained 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 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 of bars G' . In practice I allow for the thickness 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 run over numerous wheels and reversed in its relation to said wheels. This is particularly de-

sirable in the washer, in that the liquid can be passed through the fabric in all directions with equal force. The washer wheels B' , B^2 and B^3 are 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 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 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 shafts b^5 and force the liquid in front of them through the fabric drawn 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 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 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 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 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 . 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.

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 fittings extend circumferentially beyond the telescoping part as clearly shown in Figs. 4 and 5. When the
 5 air pressure is reduced in the fitting atmospheric pressure on the outside of the circumferentially extending parts being greater than the pressure on the inside forces the face of the connections in to contact with the
 10 ends of the wheel thus forming a closure. 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 ex-
 15 cessive 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
 20 starch to properly treat it.

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
 25 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
 30 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.

The sheet G^4 is passed around the rods b^{10}
 35 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 of the pins g^2 of the carrier. The sheet G^3 is
 40 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
 45 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
 50 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
 55 is carried on the shaft P which is journaled in the bearing p . The bearing p is mounted in a guide P^7 . 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
 60 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.
 65 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
 70 under proper strain.

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
 75 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
 80 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
 85 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
 90 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
 95 passing the current in a direction reverse to that of the movement of the carrier through the drier greater efficiency is effected.

With this apparatus 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
 100 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 proper form when it is
 105 dried.

Of course some of these steps of this process may be omitted and the machine as a whole may be used successfully where the carriers do not include the numerous points
 110 for securing the fabric. Where so arranged it will be particularly applicable for washing sheets or similar fabrics. These can be by a continuous operation washed, rinsed, and dried, and of course can be advantageously delivered to a machine operating
 115 continuously for further finishing them if desired.

It will be noted that the curtain is fed onto the carrier G over the roll h , it being passed over the apron S (see Fig. 3). If
 120 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
 125 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
 130 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.

I do not claim in this application the process herein disclosed as it forms the subject matter of a separate application. Neither do I claim specifically the extractor or drying mechanism herein disclosed as the same forms the subject matter of a separate application.

What I claim as new is:—

1. In an apparatus for treating fabrics, the combination of a means for removably securing the fabric at numerous adjacently arranged points throughout the fabric; devices for maintaining the distances between the points along the line of the fabric constant; and means for passing the fabric so secured through a liquid.

2. In an apparatus for treating fabrics, the combination of a series of bars, said bars having means thereon for removably securing the fabric at numerous adjacently arranged points on adjacent bars; means for flexibly connecting the bars; and devices for passing the bars so connected and with the fabric engaging points on a plurality of bars through a liquid, said means and devices being arranged to maintain the distances between the points along the line of the fabric constant.

3. In an apparatus for treating fabrics, the combination of a continuous carrier; means on said carrier for securing a fabric at numerous adjacently arranged points extending throughout the body of the fabric; devices acting with the carrier for maintaining the distances between the points along the line of the fabric constant; and means for treating the fabric as the carrier is moved.

4. In an apparatus for treating fabrics, the combination of a supporting sheet of pervious material for supporting the fabric throughout its surface; means for securing the fabric and supporting sheet at numerous adjacently arranged points while so supported; devices acting with the carrier for maintaining the distances between the points along the line of the fabric constant; and means for passing the fabric through a liquid so supported and secured.

5. In an apparatus for treating fabrics, the combination of two continuous supports between which the fabric may be arranged; means for securing the fabric at numerous adjacently arranged points extending throughout the fabric so supported; devices acting with said supports for maintaining the distances between the points along the line of the fabric constant; and means for treating the fabric so supported and secured.

6. In an apparatus for treating fabrics,

the combination of two continuous supports between which the fabric may be arranged; means for securing the fabric at numerous adjacently arranged points extending throughout the fabric so supported; devices acting with said supports for maintaining the distances between the points along the line of the fabric constant; means for treating the fabric so supported and secured; and means for separating the fabric from said support and securing means after said treatment.

7. In an apparatus for treating fabrics, the combination of a continuous support; means for securing the fabric at numerous adjacently arranged points extending throughout the body of the fabric; devices acting with said means for maintaining the distances between the points along the line of the fabric constant; a washer, starcher and drier interposed in the path of said support whereby the fabric may be washed, starched and dried while so supported and secured in a continuous operation.

8. In an apparatus for treating fabrics, the combination of a continuous support, a continuous means for securing the fabric at numerous adjacently arranged points; devices acting with said means for maintaining the distances between the points along the line of the fabric constant; and a washer interposed in the path of said supporting and securing means whereby the fabric is maintained at constant tension and is washed while so secured in a continuous operation.

9. In an apparatus for treating fabrics, the combination with the means for applying fluids to the fabric for treating the same; of a carrier comprising a series of bars and linked connections connecting said bars, the surfaces g^4 of the bars being in line with the axes of the joints in the flexible connection whereby the distance between the bars is maintained as the carrier is flexed.

10. In an apparatus for treating fabrics, the combination with the means for applying fluids to the fabric for treating the same; of a carrier comprising a series of bars and linked connections connecting said bars, the surfaces g^4 of the bars being in line with the axes of the joints in the flexible connection whereby the distance between the bars is maintained as the carrier is flexed; and a series of pins extending from the surfaces g^4 of the bars.

11. In an apparatus for treating fabrics, the combination of a flexible carrier; a wheel over which said carrier is moved; means for maintaining liquid about said wheel; an agitator mounted with its axis concentric with the axis of the wheel for forcing liquid through the fabric as it passes over said wheel; and means for actuating the agitator independently of the wheel.

12. In an apparatus for treating fabrics, the combination of a carrier for the fabric; means for securing the fabric at numerous points upon the carrier; a wheel around which said carrier is moved; devices acting with said means for maintaining the distances between the secured points along the line of the fabric constant; and an agitator to force the liquid through the fabric as it passes around said wheel.

13. In an apparatus for treating fabrics, the combination of a carrier for the fabric; a series of wheels around which said carrier is adapted to carry the fabric presenting to said wheels the different surfaces of the fabric; and agitators mounted within the wheels for forcing liquid through the fabric.

14. In an apparatus for treating fabrics, the combination of a carrier for the fabric; means for securing the fabric on said carrier at numerous points; a series of wheels around which said carrier passes; devices

acting with said means for maintaining the distances between the several securing points along the line of the fabric constant as it passes around said wheels in reverse curves; and agitators adjacent to said wheels for forcing liquid through the fabric as it passes around the same.

15. In an apparatus for treating fabrics, the combination of the wheel B' around which the fabric is carried; the shaft b^5 on which the wheel is mounted; the agitator b^6 arranged within the wheel; and means for rotating the wheel and agitator in opposite directions.

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

ARCHIBALD B. TOZER.

Witnesses:

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R. BATTLES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."