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J. PATTERSON & D. STEWART.

APPARATUS FOR TREATING TEXTILE FABRICS.

No. 246,547. Patented Aug. 30, 1881.

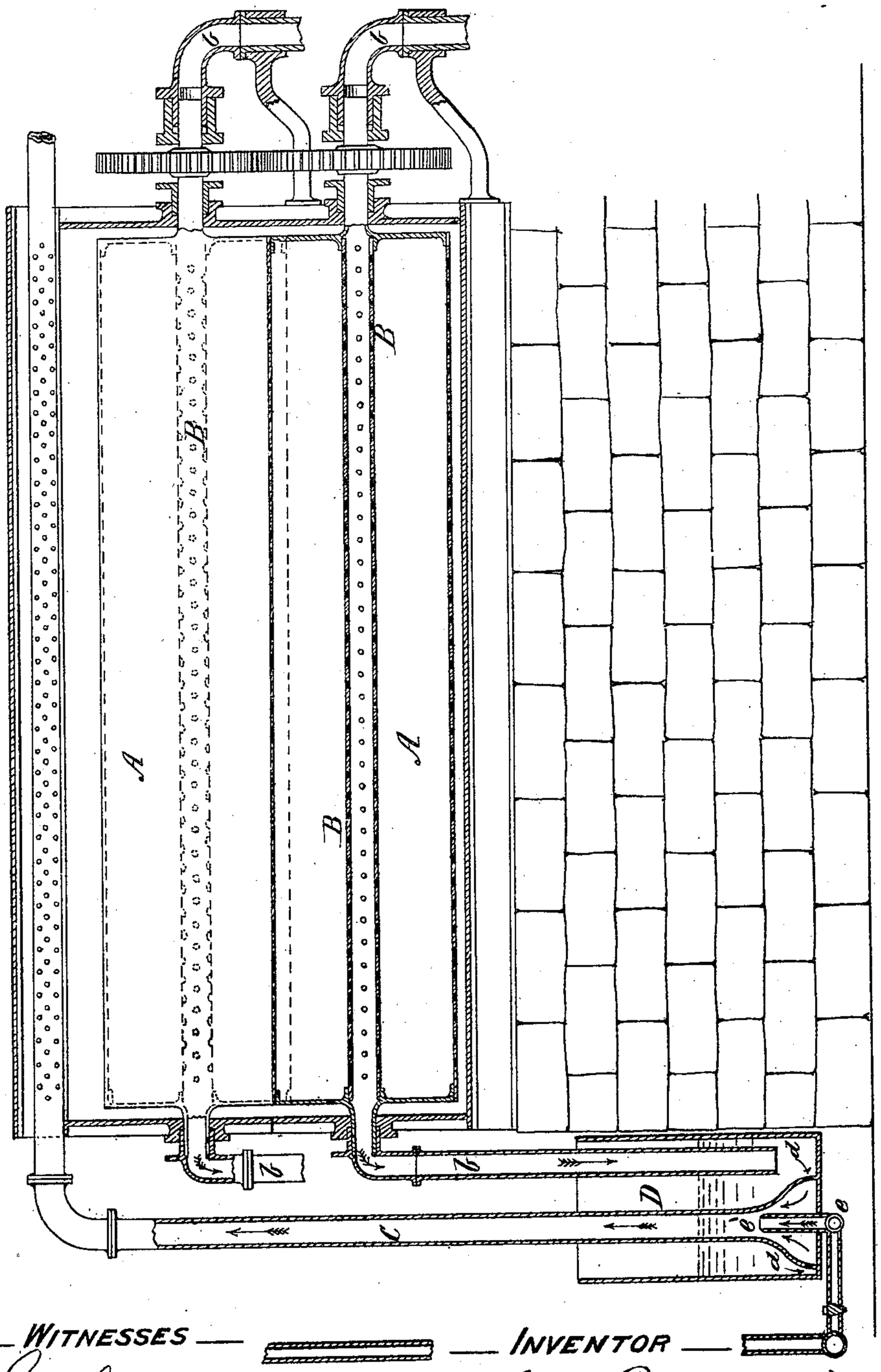

Fig. 1.

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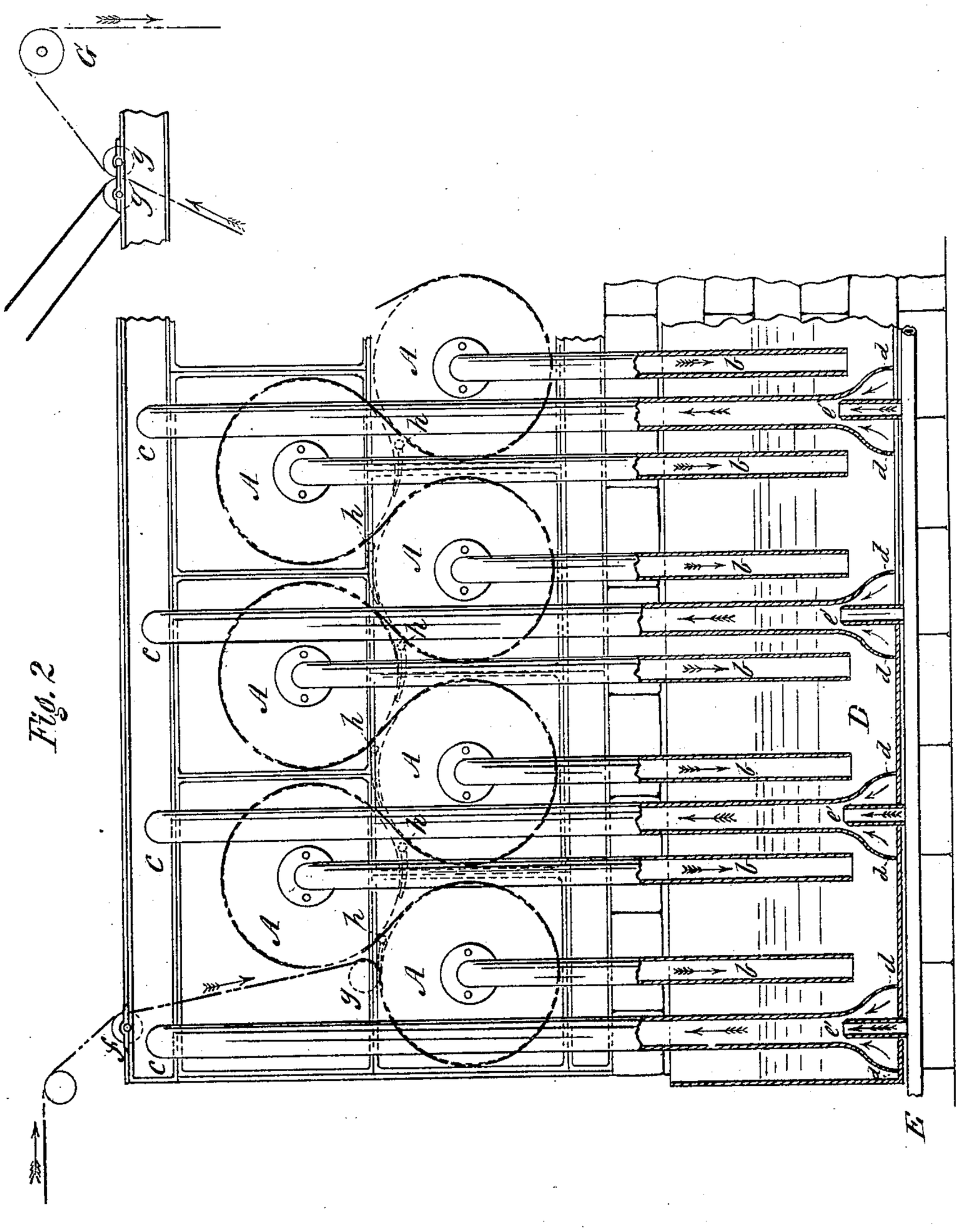

Fig. 2

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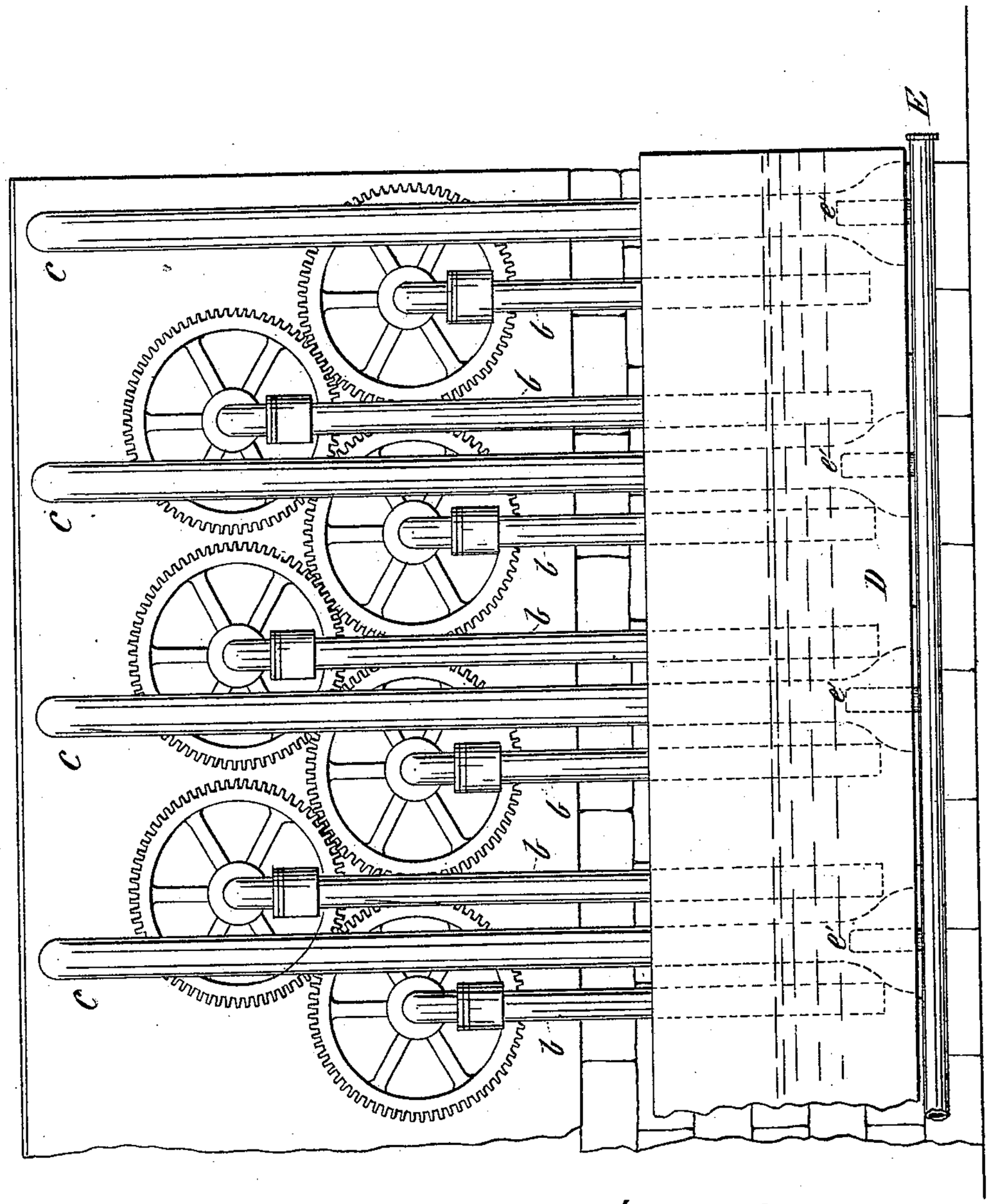

Fig 3

WITNESSES

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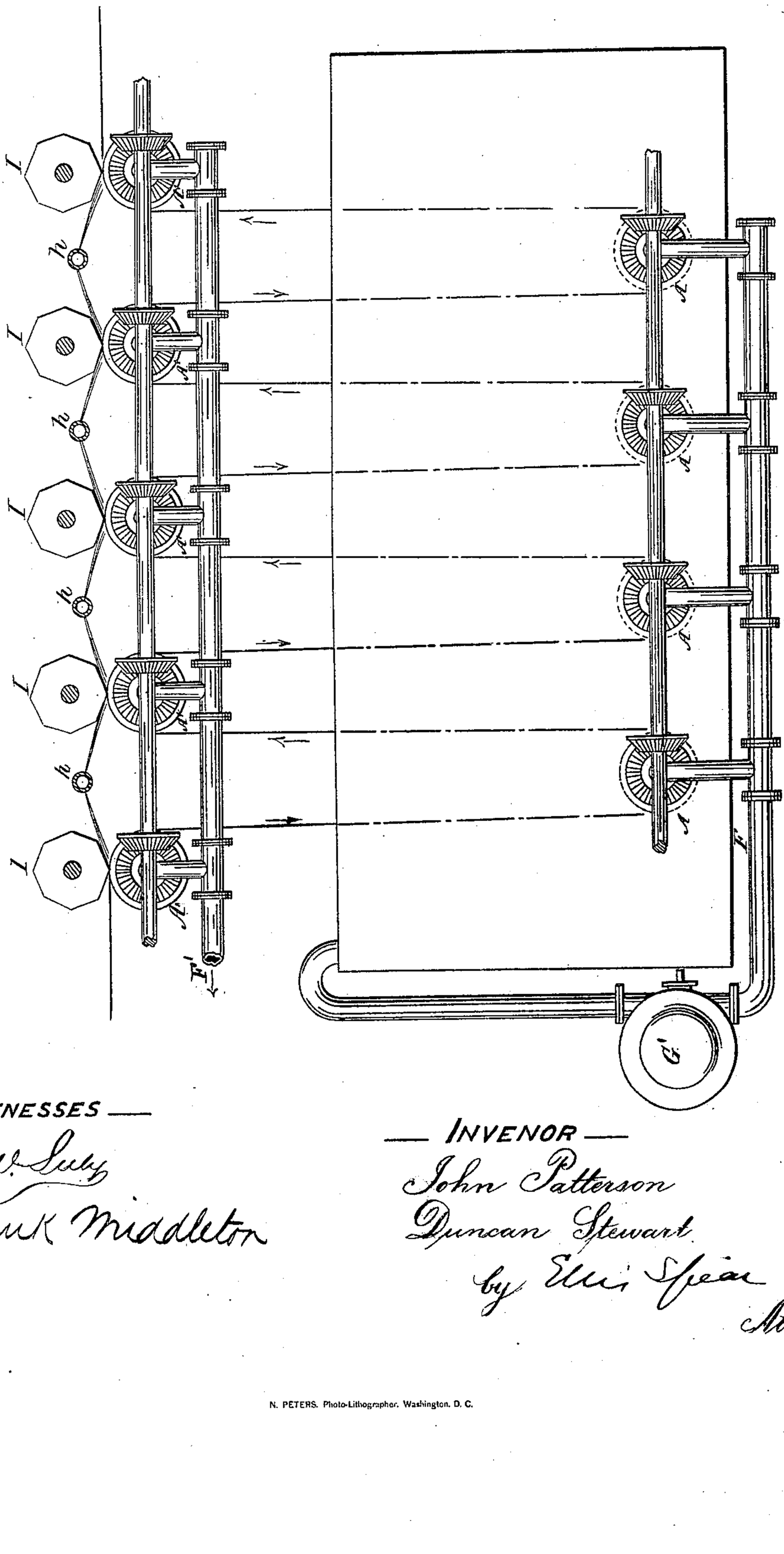

FIG. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR TREATING TEXTILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 246,547, dated August 30, 1881.

Application filed January 26, 1881. (No model.)

To all whom it may concern:

Be it known that we, JOHN PATTERSON, linen bleacher, of Belfast, in the county of Antrim, Ireland, and DUNCAN STEWART, engineer, of Glasgow, in the county of Lanark, North Britain, both temporarily residents of London, England, have invented a certain new and useful improvement in apparatus for treating textile fabrics, yarns, and fibrous materials with fluids, gases, or vapors; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

In the process of bleaching, printing, dyeing, steaming, soaping, raising, and otherwise treating, it has heretofore been the practice to immerse the fabrics, yarns, or other material in the fluids, vapors, or gases. Under these circumstances, as there is an equal pressure acting simultaneously on both sides of the materials, the liquids, vapors, or gases mutually oppose themselves to their active passage through and through the materials treated, and in order to insure the requisite action on the tissues of the same the process not only has to be prolonged, but is also irregular and hazardous in its results.

The object of our invention is to remedy these defects, which we do by applying the fluids, vapors, or gases first on one side of the materials treated, and then reversing the action by applying them to the opposite side, and this continuous process we carry out by means of the apparatus hereinafter described, and illustrated by the accompanying drawings, in which similar letters of reference refer to corresponding parts of the apparatus.

Figure 1 represents a side sectional elevation. Fig. 2 represents the left-end elevation of Fig. 1. Fig. 3 represents the right-end elevation of Fig. 1. Fig. 4 represents a modification of the apparatus.

Upon a suitable foundation is erected the requisite tank, vessel, or chamber, in which revolve hollow perforated cylinders or frames covered with porous material A, carried upon hollow perforated axles B, which pass through suitable bushings in the end or ends of the tank and terminate in or are connected with an eduction pipe or pipes, *b b*, which, according to one form of our invention, discharge into tank or tanks D, the ends of the pipes being always covered by the liquid therein contained.

C C represent the induction-pipes, open at the points D D, (in order that the liquid may always rise to the same height in pipe C as in tank D,) and perforated or open at the top in order that the liquid may pass back into the main tank.

E represents the main steam-supply pipe, provided with branch pipes *e*, which are supplied with suitable stop-cocks and terminate in jets or nozzles *e'*. When steam is admitted through jet *e'* it forces the liquid above it in pipe C up into the main tank, at the same time heating it and drawing in and up a further supply through the openings *d d*. The action of gravitation causes the liquid in the main tank to pass through the hollow perforated cylinders and axles and pass down the pipes *b* to the tank D, and thus a constant circulation and heating of the liquid is obtained. One end of the main tank is preferably made or built up of plates, so that a single plate and cylinder may be removed, if desired, while at the other end are placed the driving or gear wheels, as shown. When using heated liquids, vapors, or gases the entire tank is preferably covered in order to retain its liquid contents in as heated a state as possible.

The fabrics, yarns, or other materials to be treated are fed in over roller *f*, then down and under roller *g*, around perforated cylinders A A A, where its sides are alternately subjected to the action of the liquid bath, the material being eventually delivered between rollers *g g* and over roller G, after which it may be plaited down or rolled on a batching-roller. Rollers *g g* may be "squeezers," by means of which the moisture carried up by the material may be largely expressed. When the tank D is placed at a sufficient distance below the level of the main tank, the action of gravitation is quite sufficient to draw the liquid through the materials ordinarily treated, as well as through the perforated cylinders, (the pressure being forty-three and one-half pounds per square inch for each one hundred feet of fall,) and as the liquid penetrates first from one side and

then from the other, the material becomes thoroughly impregnated therewith.

We have found that when treating materials such as linens the cylinder may advantageously made of copper and perforated with about sixty-four holes to the square inch, or according to the texture of the fabrics treated. To prevent the liquid passing through that portion of the cylinder not covered by the material being treated, we employ small valve-rods *h*, carrying ordinary rubber, leather, metal, vulcanite, or other flap-valves, the material chosen being such as will not injuriously affect or be affected by the liquid contents of the tank. When employing heated liquids, vapors, or gases, the temperature in the main tank or chamber will gradually be lowered by radiation, and the heat thus lost may be conveniently replaced by means of a steam pipe or coil carried into the said tank or chamber. When liquids are employed they become gradually weaker or diluted in excess by combining with and condensing the steam supplied through jet *e'*, and this loss may be conveniently made up by the addition in the tank D of the requisite substances.

When treating prints (calicoes) it is sometimes advisable that the liquid should only be applied from the printed side, in which case the tendency will be to permanently fix the print in the fibers of the material. To accomplish this desirable result the liquid in the main tank may be drawn off until it only covers the bottom set of hollow cylinders, the upper set in this case merely acting as rollers, over which the material passes, in order to constantly present the same side or surface to the action of the liquid.

When passing the fabrics or materials through a soaping or other bath we have found it advantageous, under certain circumstances, to employ the form of apparatus shown in Fig. 4, in which the fabrics are alternately treated by the liquids while upon the cylinders in the tank or chamber, and by vapors or gases, or a combination of vapors or gases and liquids, while passing over the overhead cylinders, the vapors or gases being sucked or impelled through cylinders A' and pipe F' in the manner before described, the soaping or other liquid being ejected through pipes *h* upon the opposite surface of the materials from that to which they were exposed when in the main tank or chamber, while the rollers I, by their rotation, beat or rub the fabric during treatment.

A pump, G', is shown, (although a steam-ejector may be used,) by which the liquid is drawn from pipe F and delivered back into the main tank or chamber, and this arrangement we consider desirable when the requisite drop or fall for the liquids cannot be conveniently obtained, although the main tank may be made liquid-tight and of sufficient size to carry within it the roll of material to be treated and the roll upon which it is to be wound after such treatment, the liquid in this case being supplied from an overhead cistern or tank, to which it is pumped in the ordinary manner, or being pumped under pressure into the main tank direct; but this plan we do not deem so convenient or practicable.

When treating the materials with gases or vapors the main tank may also be made tight, and said gases or vapors may be forced therein under pressure; but we prefer to substitute therefor a vacuum pump or fan which shall suck or draw the gases or vapors through the cylinders and axles and deliver them back into the tank or chamber. The vacuum pumps or fans now known can readily be applied for this purpose.

Having thus described our invention, we claim—

1. An improved apparatus for treating fibrous material, consisting of a tank containing a series of perforated cylinders provided with gearing adapted to rotate said cylinders, combined with induction and eduction pipes arranged to treat the fibrous material alternately on opposite sides with liquids, vapors, or gases.

2. The combination of a tank containing a series of perforated cylinders adapted to revolve within said tank with a reservoir and distributing-pipe, whereby liquids or other chemical agents are introduced into the top of such tank, and induction-pipes, substantially as described.

3. The combination, with the tank and the induction-pipe, of the perforated cylinder *a*, the hollow perforated shafts or axles B, and a train of gearing adapted to rotate said cylinder.

JOHN PATTERSON.
DUNCAN STEWART.

Witnesses:
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ALLEN P. JONES.