

(No Model.)

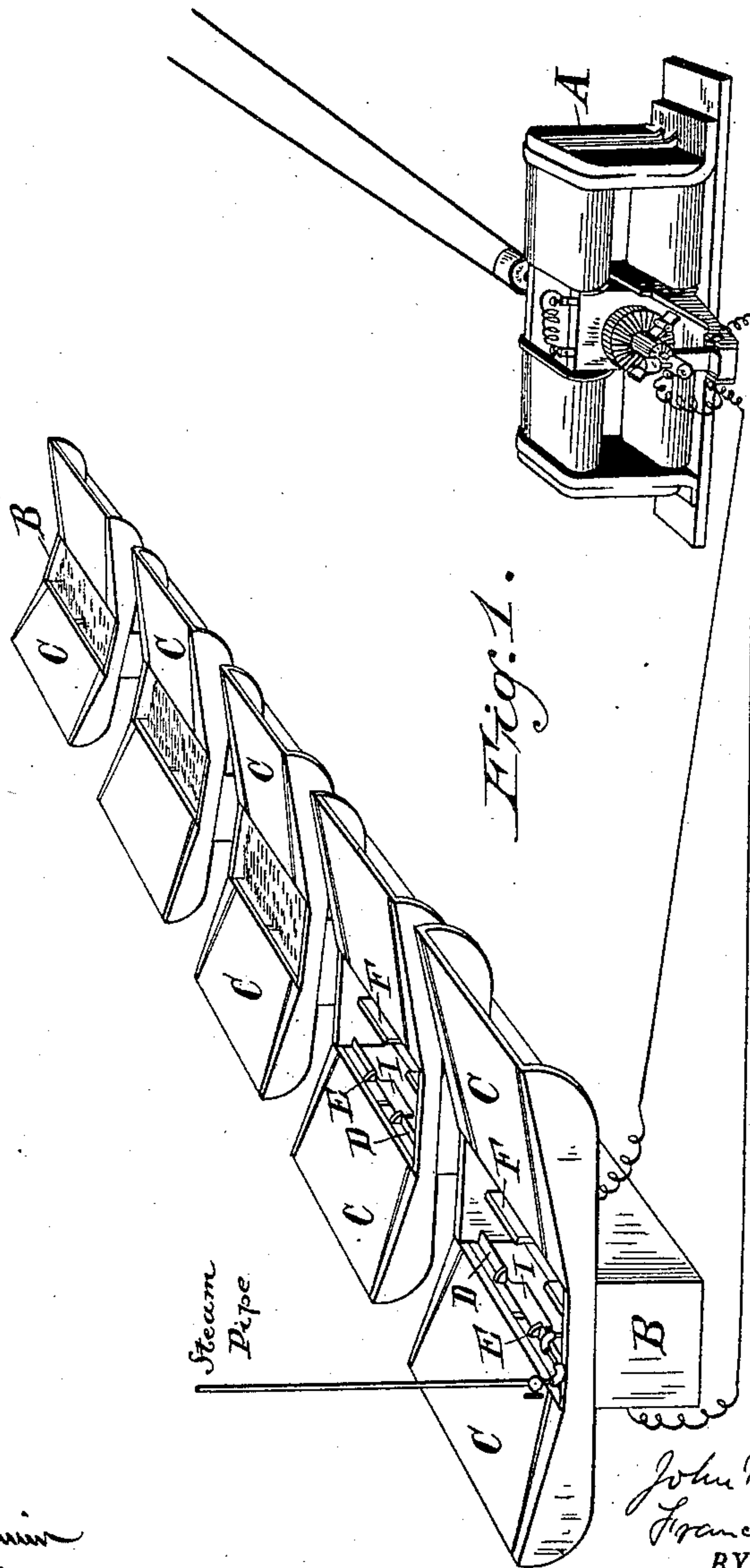
3 Sheets—Sheet 1.

F. C. TAYLOR & J. R. HARD.

PROCESS OF SHRINKING AND PULLING FELT BY ELECTRICITY.

No. 428,026.

Patented May 13, 1890.



WITNESSES:

W B Benjamin
W B McGinnis

INVENTORS

John R Hard
Francis C Taylor

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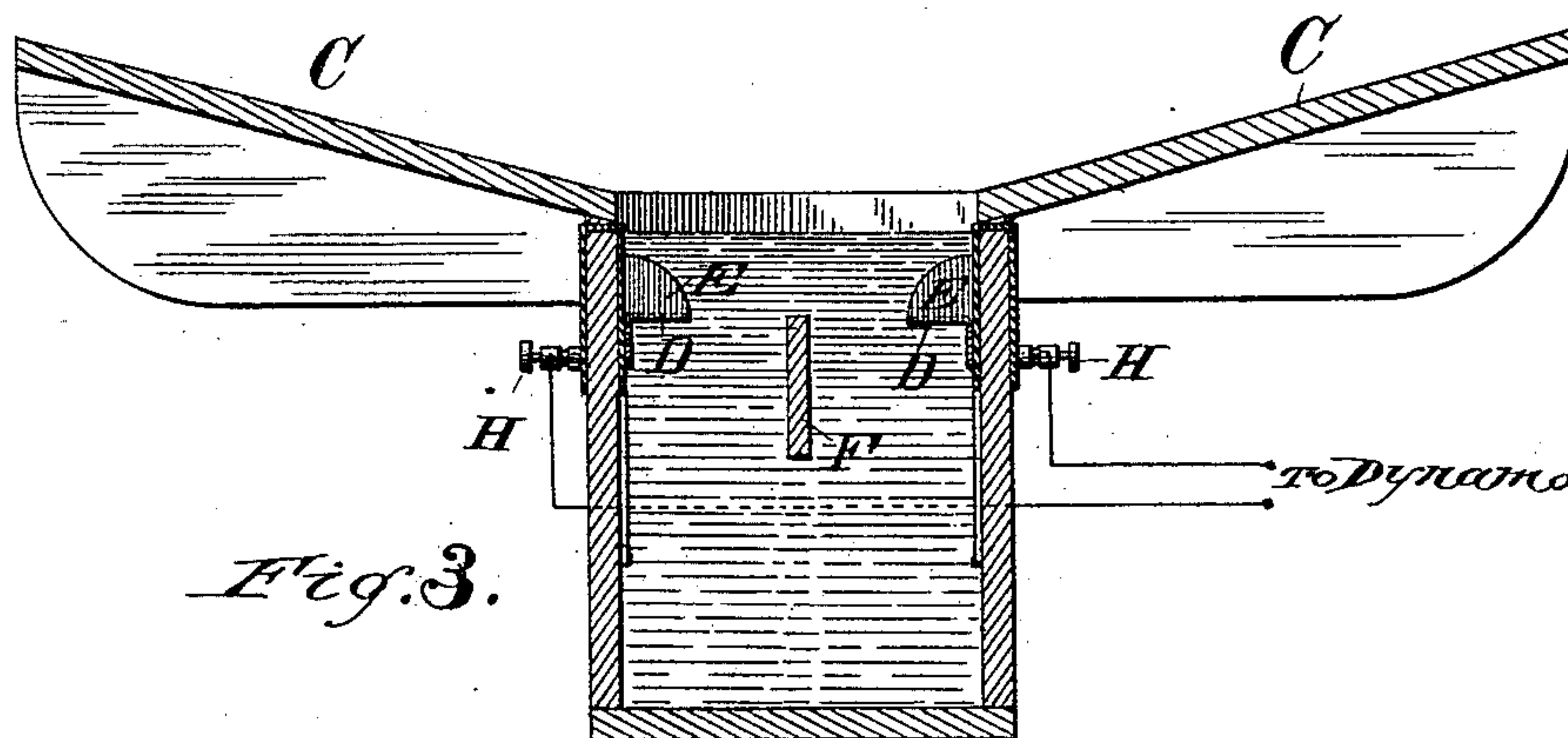
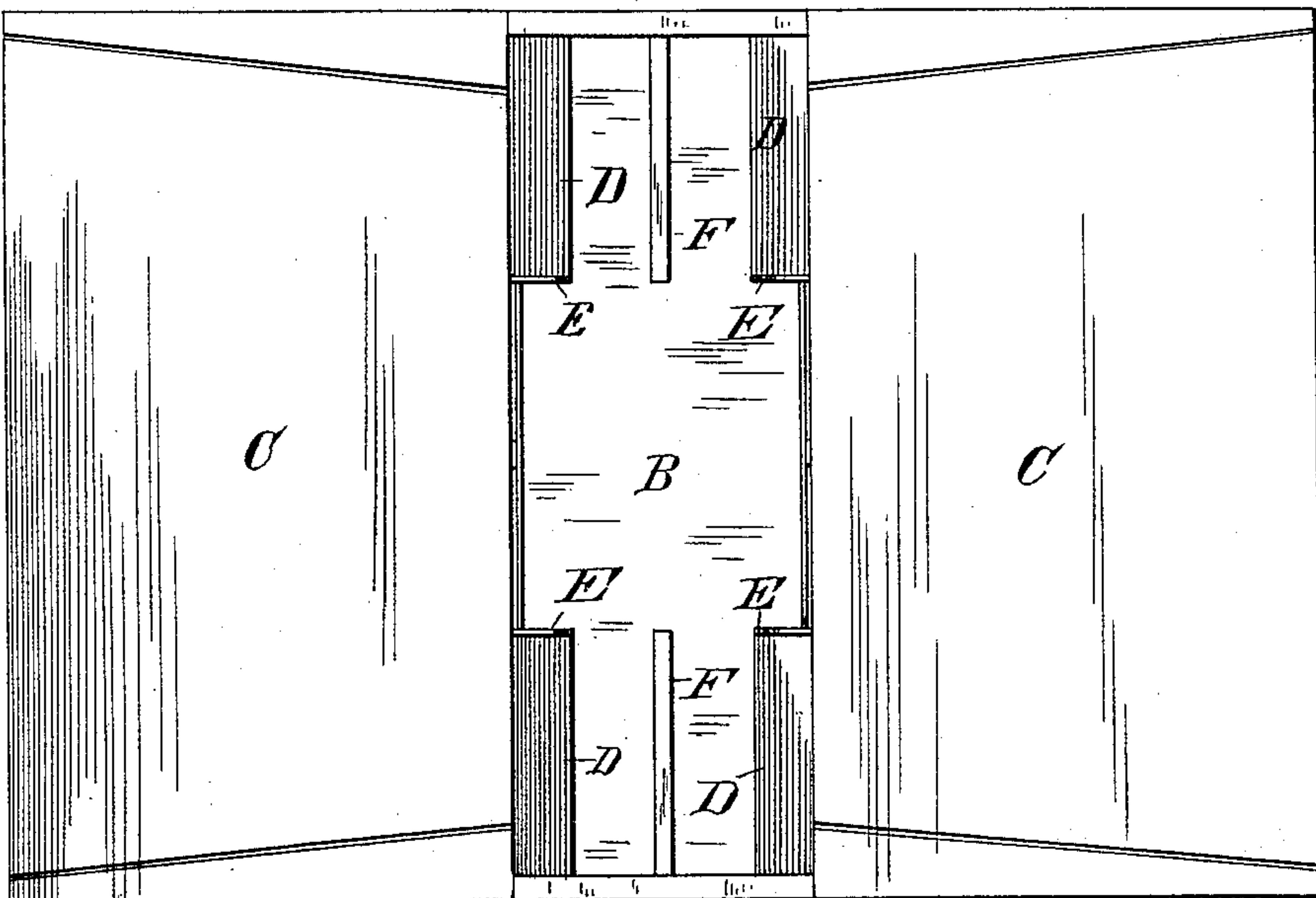
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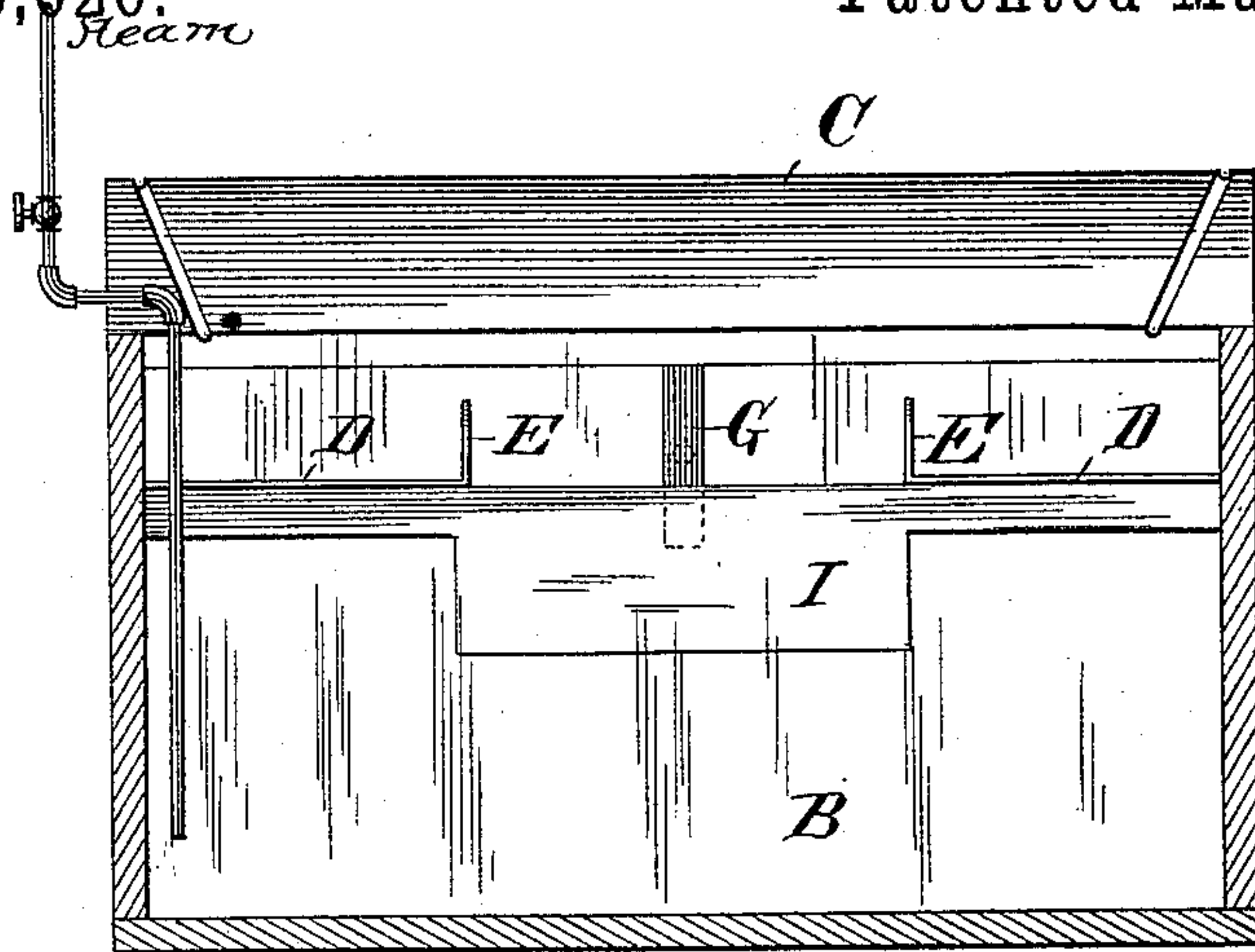


Fig. 4.

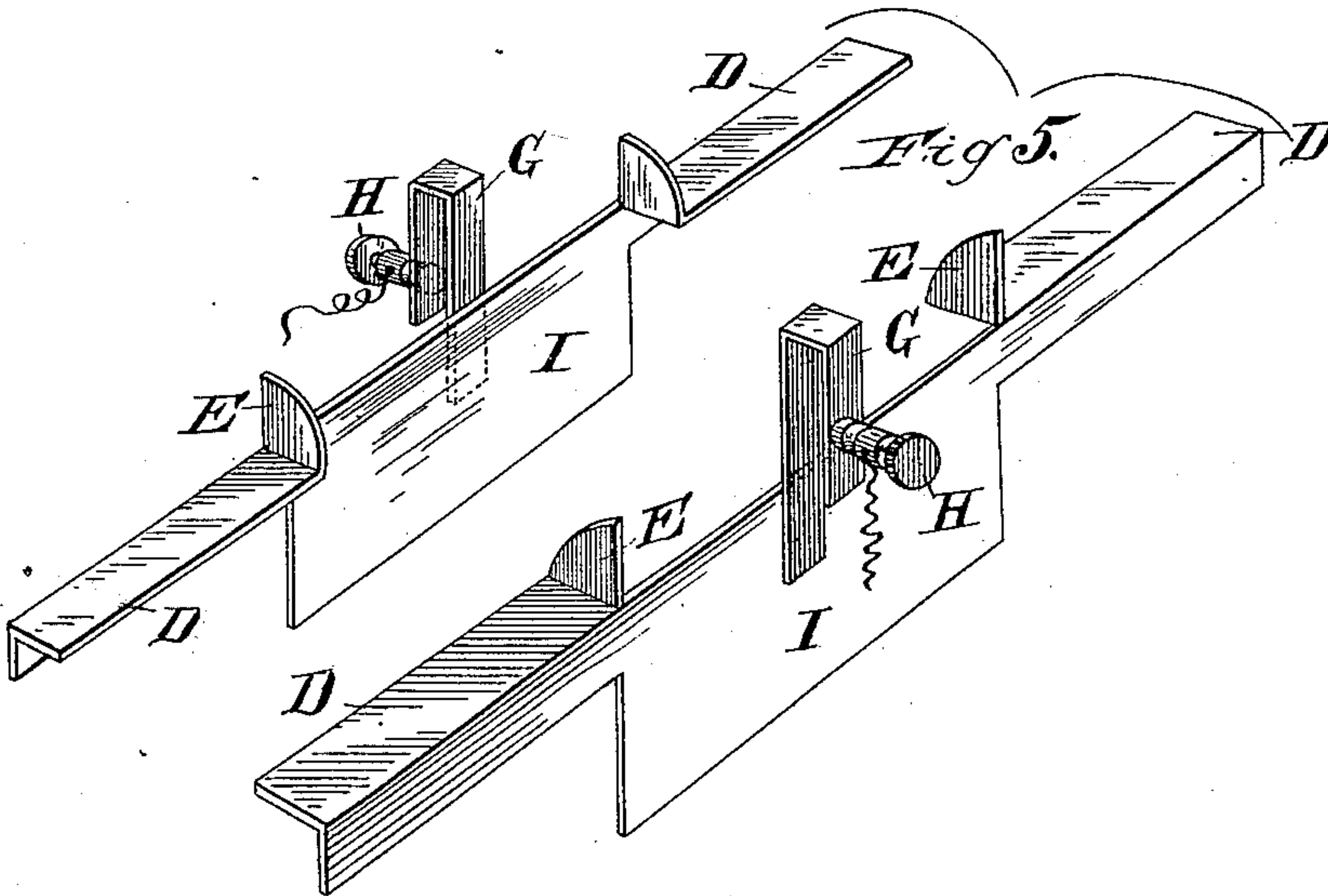


Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANCIS C. TAYLOR, OF DANBURY, CONNECTICUT, AND JOHN R. HARD, OF NEW YORK, N. Y., ASSIGNORS OF ONE-HALF TO PETER V. HUSTED, OF NEW YORK, N. Y.

PROCESS OF SHRINKING AND FULLING FELT BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 428,026, dated May 13, 1890.

Application filed February 21, 1889. Serial No. 300,756. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS C. TAYLOR, of Danbury, Connecticut, and JOHN R. HARD, of New York, N. Y., citizens of the United States, have invented certain new and useful Improvements in the Process of Shrinking and Fulling Felt by Electricity, of which the following is a specification.

The object of our invention is to apply an electric current to the shrinking and fulling of felt, cloth, hats, and all other articles, whether woolen or not, of such character that the individual fibers are susceptible to electric or magnetic attraction, so that the drawing together of these fibers and concentrating the same around a solid or partially solid base may make the resulting substances firm and strong.

Our invention is more particularly intended for use in the manufacture of hats, but can be applied to a great many other purposes in which this condensing, or fulling, or shrinking, as it is technically known, would be an advantage. The process of applying the electricity, apart from the particular apparatus used, would be of about the same character, whatever the character of the articles to be treated might be, and we will therefore describe the application more particularly as we have used it in practice in the manufacture of hats.

Heretofore when the felt, more or less loosely blown upon the fragile base, which is afterward shrunk to the size requisite for a hat, leaves the machine from which the felt has been blown upon it it is placed in hot water and there submitted to an agitating action on the part of the workmen, whose duty it is to take out a hat as soon as it has reached a certain stage of shrinkage, unfold it, roll it, fold it again, and return it to the bath, in which a further shrinkage takes place, and this process is kept up until the hat is shrunk the desired number of inches necessary to get it to a size suitable for a hat. Of course in this shrinking the body of the hat becomes much fuller and firmer and attains the quality required in its subsequent use as a hat. This process uses up a great deal of time, which cannot

well be spared where a large quantity of hats have got to be put through a factory, passing through many hands utterly dependent upon the amount of work brought to them from the shrinking-room.

Our invention, by a skillful application of electricity to the hats or felt while in the bath, facilitates the shrinkage to a very marked degree, enabling one workman to turn out three or four times as many hats in a given space as can be done either by the old process of using hot water alone, or even when a sort of agitating and rolling machine is employed in connection therewith. This latter machine is known in the trade as a "starter;" but our invention entirely dispenses with the need of such machinery, which is both cumbersome and expensive.

Our invention consists in the process of shrinking or fulling fibrous substances by the aid of electricity, which consists of resting such substances, when in the bath, upon independent supports and charging said supports with electric currents of opposite polarity, so that electric discharges may take place from support to support through said fibrous substances, as hereinafter explained.

One form of apparatus by means of which our invention can be applied is shown in the accompanying drawings, it being always remembered that though the apparatus shown is more particularly adapted to hats, the changes necessary to use our invention for all sorts of fibrous substances, woolen or otherwise, of which the fibers could be affected by electricity would be very slight and are claimed as coming within our new process.

Figure 1 is a perspective of a number of shrinking-tubs placed in a row and a dynamo-machine from which the electricity is supplied. Fig. 2 is a top plan of one of the shrinking-tubs. Fig. 3 is a vertical cross-section on line *xx* of Fig. 2. Fig. 4 is a vertical longitudinal section on line *zz* of Fig. 2. Fig. 5 is a detail of the combined plate and shelf from which the electric current is received from the dynamo-machine and passed on to the hat.

Same letters indicate similar parts in the different figures.

A is the dynamo-machine, which may be of any ordinary and suitable construction, situated in any desired part of the factory; or, instead thereof, batteries may be employed, if desired.

B B are the shrinking-tubs, which are of peculiar construction, and each of which is connected with the battery or dynamo-machine by electric wires, so as to form a circuit.

C C are the tables or shelves, projecting on each side of the oblong tubs, as shown in Figs. 1, 2, and 3, leaving the ends of the tub free. These tables slope slightly toward the tubs, so that the moisture which comes out of the hats while being handled by the workmen, who stand one at each of the points marked *x* in Fig. 2, will flow back into the tub.

The oblong tub B is of any usual make as to material and size, so that it is made perfectly water-tight and strong, and is a plain oblong box provided with the features hereinafter described, which constitute its peculiar construction.

The shelves D D are arranged two on each side, as shown in Fig. 2, and are composed of metal or other good conductor of electricity, the two on the same sides of the tub being supported and connected by a metallic plate I, as shown in Figs. 4 and 5, the center of which descends some distance into the tub. The inner end of the shelves is protected by the upright flange E, so that the hats may not roll off and fall into the tub. At each end of the tub between the shelves is the bracket F, projecting inward from the solid frame at that end of the tub. The metallic bar at each side of the tub which bears the shelves, as before described, is hung by means of the bent piece G, also metallic, which fits over the upper edge of the tub, and which is provided with a cap H on the outside of the tub, in which, by means of a set-screw of usual construction, is clasped one of the wires constituting the circuit. It is obvious that in this way an electric current, which is received by the cap on one side of the tub, will spread through the metallic plate I to the shelves D, and if no other escape is provided will pass across through the water in the tub, which comes up over the shelves to the corresponding shelves of the opposite side of the tub, which, by means of a commutator, have received an electric charge of opposite polarity, as of course all the impulses of one polarity are sent to one side of the tub and all those of the opposite polarity sent to the other side.

In using this apparatus hats which are gen-

erally operated upon in threes, three hats being rolled around each other in a coil, are placed upon the shelves D D, running across the open space at the ends of the tub. The shelves D D slope a little toward the upright flanges, before described, so that there is a tendency of the hats to roll down against those flanges. The hats being placed on the shelves, which are intended to accommodate three rows of three hats each, which are covered by hot water, as before stated, the electric current is turned on, and as soon as the workman, standing, as before stated, at *x* in Fig. 2, finds that the row of hats nearest the upright flange has shrunk sufficiently to make refolding and rolling advantageous he removes said roll, the next roll falling down into the place thus vacated. As soon as the roll taken out of the tub has been subjected to the handling usual in shrinking hats it is returned to the place then vacated, which is the one nearest the end of the tub. The center of the hats, of course, is supported by the bracket F during the process. The shrinking is very much accelerated by the electricity, from the fact that the hats furnish a better path for the electricity to flow in springing from shelf to shelf than the water alone does, and this electric current cannot pass thus through the hat from shelf to shelf without causing the fibers, which are more or less loose, to be attracted toward each other under the magnetic or electric influence.

A steam-pipe is provided, as shown in Fig. 1, by means of which the water in the tubs is always kept at a sufficiently high temperature, steam being introduced when the temperature gets too low.

The uses and advantages of our improved process are, we think, sufficiently obvious without further description, it being evident that many changes of details might be made in the apparatus used or in the character of the articles to which the electricity is applied.

We claim—

The process of shrinking or fulling fibrous substances by the aid of electricity, which consists of resting such substances when in the bath upon independent supports and charging said supports with electric currents of opposite polarity, so that electric discharges may take place from support to support through said fibrous substances, substantially as and for the purposes specified.

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JOHN R. HARD.

Witnesses:

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WALLACE WILLAMS.