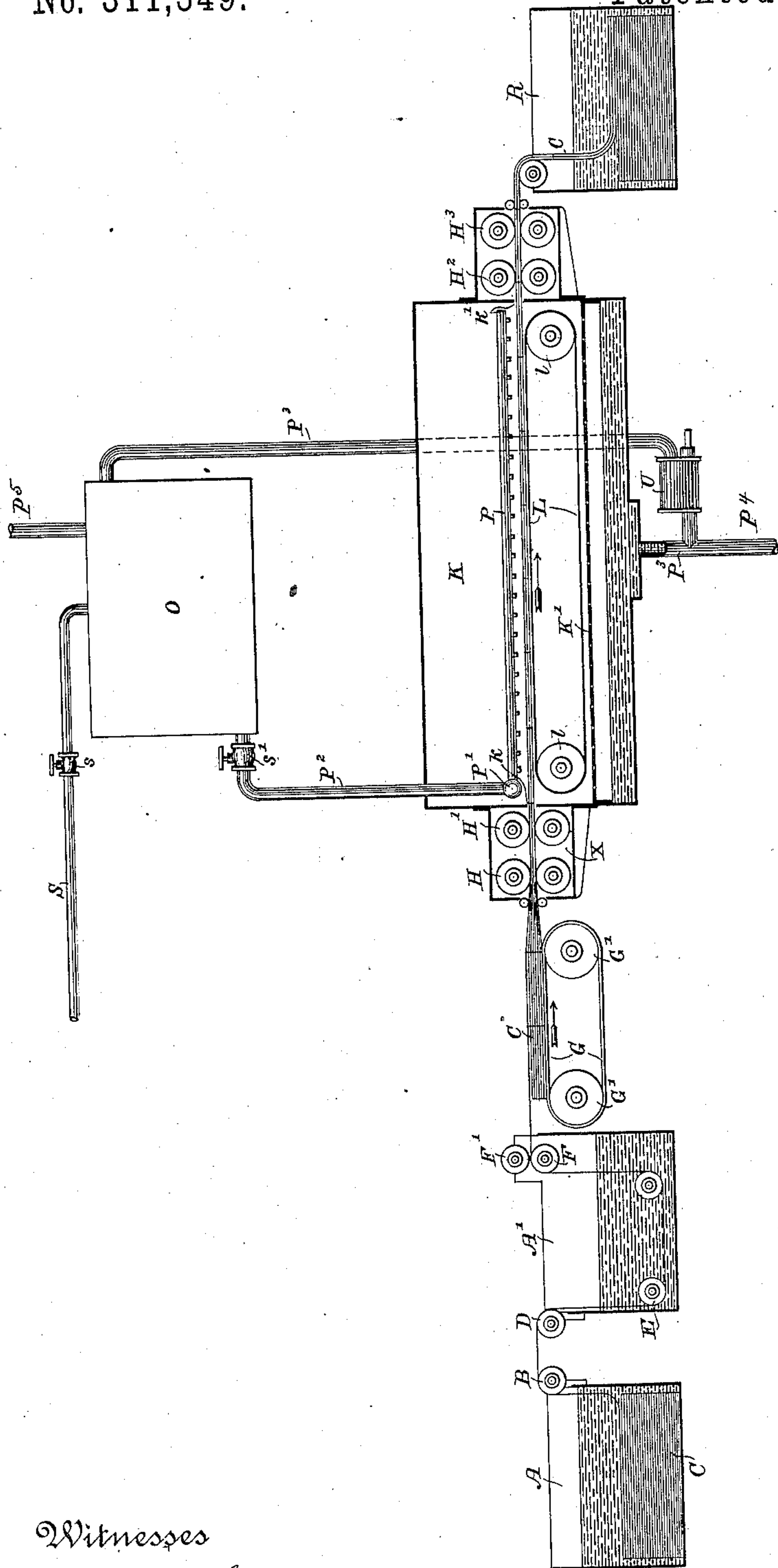


(No Model.)

J. MEIKLE.  
BLEACHING APPARATUS.

No. 311,349.

Patented Jan. 27, 1885.



Witnesses

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# UNITED STATES PATENT OFFICE.

JAMES MEIKLE, OF PROVIDENCE, RHODE ISLAND.

## BLEACHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 311,349, dated January 27, 1885.

Application filed July 22, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES MEIKLE, now a subject of the Queen of Great Britain, but having declared my intention of becoming a citizen of the United States, residing in the city and county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Bleaching Apparatus, of which the following is a specification.

10 The object of my invention is to provide apparatus whereby the bleaching of cotton and other fibrous and textile fabrics may be effected in a less expensive manner than has hitherto been possible, whereby the result may be produced in a shorter time than hitherto and without injury to the fabric, and whereby larger quantities of goods may be operated upon within the same area.

20 The essential features of the process of bleaching fabrics as ordinarily conducted at the present time consist, generally, in successive boilings and washings in solutions of lime, in very dilute acid, in a solution of soda-ash, and in solutions of chlorine. During the intervals 25 between these several treatments the fabric is washed many times in water, and a period of not less than from four to eight days is necessarily occupied in carrying out the whole process.

30 The object of the several different and successive treatments is to entirely remove from the fabric the oils and other extraneous substances which have become incorporated with it during the process of manufacture, and to enable the chlorine—which is the principal 35 bleaching agent—to exert full and equal chemical action upon all parts of the fabric, so as to produce a uniform whiteness of the same in every part.

40 The essential feature of my invention consists in exposing the fabric to the action of the bleaching agent or solutions in such a manner that the foreign substances are not only forced out of the fabric by mechanical action, but the 45 bleaching-liquid is brought into intimate, rapid, and effectual contact with every portion of it, thereby producing the desired effect with great rapidity, and at the same time without injury to the fabric. This I effect by 50 bringing the cloth or other material to be operated upon into such a position with refer-

ence to a series of pipes carrying the bleaching-liquid in an inclosed keir or boiler that the solution may be forced, under considerable pressure, entirely through the interstices of 55 the fabric. Large quantities of the chemical solution are thus brought into contact with every portion of each one of the threads of the fabric in a short period of time, thus rapidly producing both the cleansing and the bleaching effects. 60

The accompanying drawing illustrates a convenient form of apparatus embodying the essential features of my invention.

I have ascertained by experiment that in 65 bleaching by my process it is wholly unnecessary in most cases to use successively several solutions, as in the ordinary process of bleaching. A single solution containing the necessary elements for both cleansing and bleaching 70 the fabric has been found generally sufficient to produce the best results. Several pieces of cloth are taken at a time, and these are first well soaked in a tank containing the same liquor as it is intended to use in the keir. 75 The ends of the several pieces are then taken together and are drawn out of the tank over rollers, in the usual manner, and are then made to pass through a second tank, preferably containing the same liquor, and thence through 80 a pair of nipping-rollers as it leaves this second tank. The cloth is now kept spread out to its full width, and is folded back and forth, in the usual manner, in folds of a yard or thereabout in length, until a large number of thick- 85 nesses have been spread evenly together.

I have found in practice that by the use of my apparatus three hundred thicknesses or more may conveniently be laid together, and can be successfully operated upon by the so- 90 lution as applied at the next step of the process. The folds are then laid upon an endless belt, and from this are carried through successive pairs of rollers to the inside of the keir, where the principal part of the process 95 is accomplished. The keir is of sufficient length to admit a number of series of the folds or layers of the cloth, as described. The width of the keir is the same as the width of the cloth. Within the keir the series of folds 100 are received upon an endless belt or apron, of wire-cloth or similar open construction, and



are carried slowly through the keir in the direction of its length, passing out through a system of rollers similar to that at its entrance. Within the keir, and just above the layers of cloth, a system of perforated pipes is arranged, the pipes being placed side by side, extending lengthwise of the keir and covering its entire breadth. These pipes have numerous perforations in their under sides, and are intended to convey the bleaching solution and to discharge the same forcibly through the perforations and downward upon the layers of cloth over the whole extent as spread out within the keir. The mass of folded cloth rests upon the endless apron before mentioned, beneath which is a perforated false bottom of the keir a few inches above the main bottom. Underneath this false bottom the solution collects after having been forced through the mass of cloth, from which it is pumped back into the same tank that supplies it to the perforated pipes above the cloth. In this way the same solution can be used over and over again until its strength is exhausted, when it may be drawn away from the bottom of the keir and a new supply provided.

The most important feature of my invention consists in applying the solution to the cloth by means of the perforated showering-pipes, as before explained, in a finely-divided state, and under sufficient pressure to force the liquid through the entire mass of cloth and over its whole surface in so effectual and rapid a manner as to both cleanse and bleach the cloth in a short time. In some cases it may be necessary to pass the cloth in the same manner through a similar keir with a fresh solution and under less pressure than in the first one; but this is not generally the case. After leaving the keir the fabric is thoroughly washed in clear water, after which it may be soaked in chlorine-liquor, and after that it should be soured and washed in clear water and then dried.

Referring now to the accompanying drawing, A represents the first tank, in which the cloth C is soaked, the tank being partly filled with a solution containing the bleaching and cleansing agents. From the tank A the several ends of the cloth are passed over the rollers B and D into the tank A'. This tank is also partly filled with a similar solution. It passes through the tank under the roller E, thence up and out of the tank between the pressure-rollers F and F', which press the several pieces closely together. It then passes on to the upper side of the endless belt or apron G, which moves in the direction of the arrow over the rollers G' G'. On this belt the cloth is folded back and forth in folds of about one yard evenly and smoothly until a sufficient number of thicknesses have been laid to be properly operated upon within the keir. The object of the soaking within and passing through the tanks A and A' is to get the fabric thoroughly wet and to a certain extent impregnated with the solution, so that it is in a

better condition to allow the latter to be readily forced through it, which is done at the next step of the process. From the endless belt G the cloth thus folded is led between two pairs of closely-fitting rollers, H and H'. These rollers are pressed together by suitable springs, and have their bearings within the sides of the box X. This box is securely attached to the end of the keir K. Through an opening, k, in the end of the keir the cloth, having its layers pressed closely together, enters the keir, and the series of folds are laid successively upon the endless belt L, which passes in the direction of the arrow over the rollers l l. This belt is preferably made of wire or other woven material, so as to be as open as possible and not obstruct the passage of the solution downward as it is forced through the cloth. The width of the keir is the same as the width of the cloth, so that the folds of the latter fit as closely as practicable the sides of the former. The cloth, having passed through the keir, leaves the same through a similar opening, k', and passes between the rollers H<sup>2</sup> and H<sup>3</sup>. Within the keir, and extending through its length in a position just over the layers of cloth, is a system of pipes, P. These are placed closely side by side throughout the width of the keir, and are each joined to the cross-pipe P'. Into this is led the supply-pipe P<sup>2</sup> from the tank O, which tank contains the bleaching solution. The solution in the tank is heated by the steam-pipe S, steam being admitted by the valve s. The valve s' admits the solution from the tank O to the pipe P'. A pressure of from sixty to one hundred pounds per square inch is preferably maintained within the tank O, and is communicated to the supply-pipes P. As the cloth passes through the keir on the endless belt L the solution is admitted to the system of pipes P by turning the valve s', and under the pressure above stated the solution is driven through the perforations which closely cover the under surface of the pipes P, is showered upon and forced through the layers of cloth spread out evenly beneath, and fitting the sides of the keir closely. The solution, having passed through the cloth and through the wire belt L, passes also through the perforated false bottom K' and falls to the bottom of the keir. The pipe P<sup>3</sup> leads from the bottom of the keir into the tank O, and the pump U within said pipe is kept in action to remove the solution from the bottom of the keir into the tank O. It is evident that by this means a rapid circulation of the solution may be kept up as long as the latter is fit to use. When the solution is exhausted, it may be drawn off by means of the pipe P<sup>4</sup> below the keir, and new solution may be let into the tank O by means of the pipe P<sup>5</sup>. After the cloth has left the keir it is led into the tank R, in which it is thoroughly washed. It may then be soaked in a solution of chlorine to further whiten it, then soured, washed, and dried in the ordinary manner.

I have found in practice that cloth may be



bleached by means of this apparatus within from four to six hours, and which will have at least an equal purity in color and retain at least equal strength with goods bleached 5 by the ordinary process, occupying from five to eight days.

I claim as my invention—

1. The combination, substantially as here-  
inbefore set forth, with a bleaching keir or  
10 boiler, of an endless apron or belt within the  
same for conveying the fabric, a system of  
perforated pipes extending above said belt or  
apron, and means, substantially such as de-  
scribed, for conveying the fabric into and out  
15 of said keir.

2. The combination, substantially as here-  
inbefore set forth, of a bleaching keir or boiler,  
a system of perforated pipes therein and ex-

tending across the same, an endless belt or  
apron within said keir, for conveying the fab- 20  
ric therethrough, a perforated false bottom to  
said keir, and means, substantially such as de-  
scribed, for conveying a solution into said pipes  
under pressure, and for drawing the same  
away from said keir.

3. The combination, with the keir or boiler 25  
K, of the rollers H, H', H<sup>2</sup>, and H<sup>3</sup>, the belt  
L, the pipes p, p', p<sup>2</sup>, and p<sup>3</sup>, and the pump U,  
substantially as described.

In testimony whereof I have hereunto sub- 30  
scribed my name this 17th day of July, A. D.  
1884.

JAMES MEIKLE.

Witnesses:

ALEXANDER A. McCAUGHIN,  
CHARLES H. BROWN.