(No Model.)

C. L. KLAUDER.

DYEING APPARATUS.

No. 428,614. Patented May 27, 1890.

FIG. 1

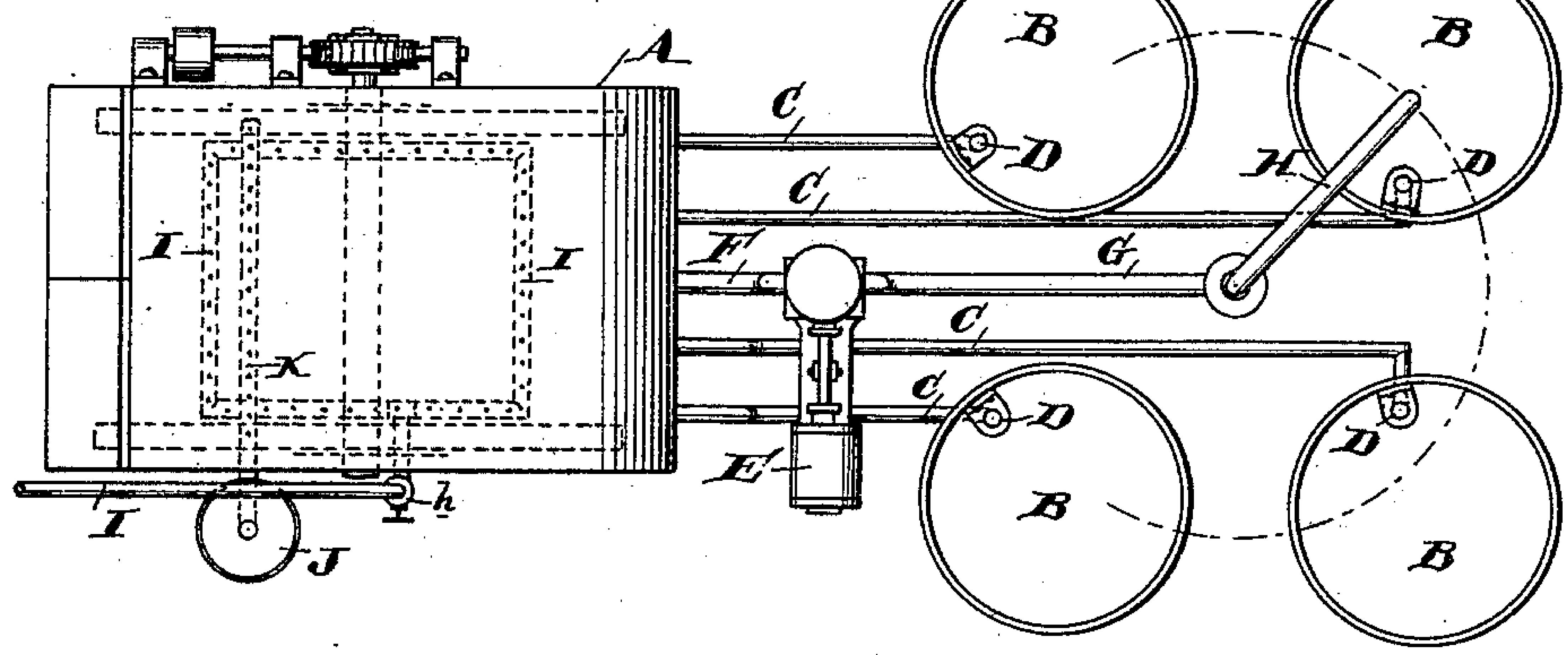


FIG. 2

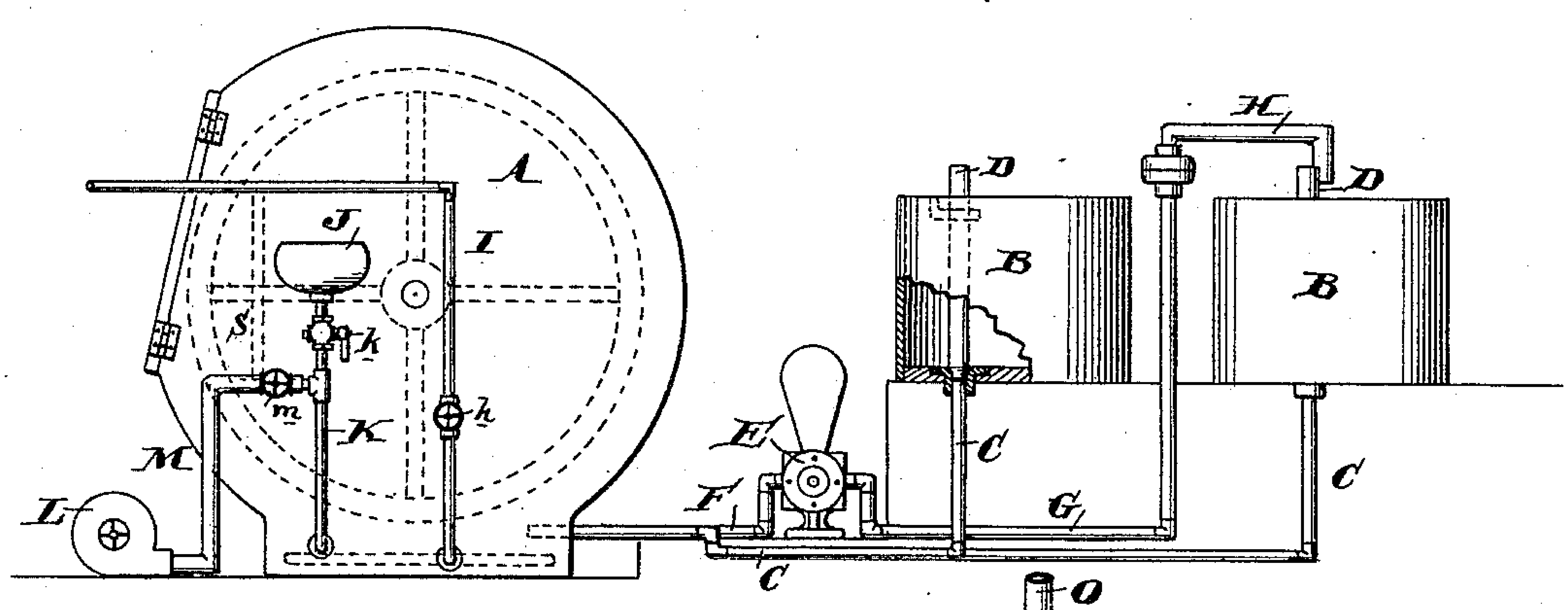
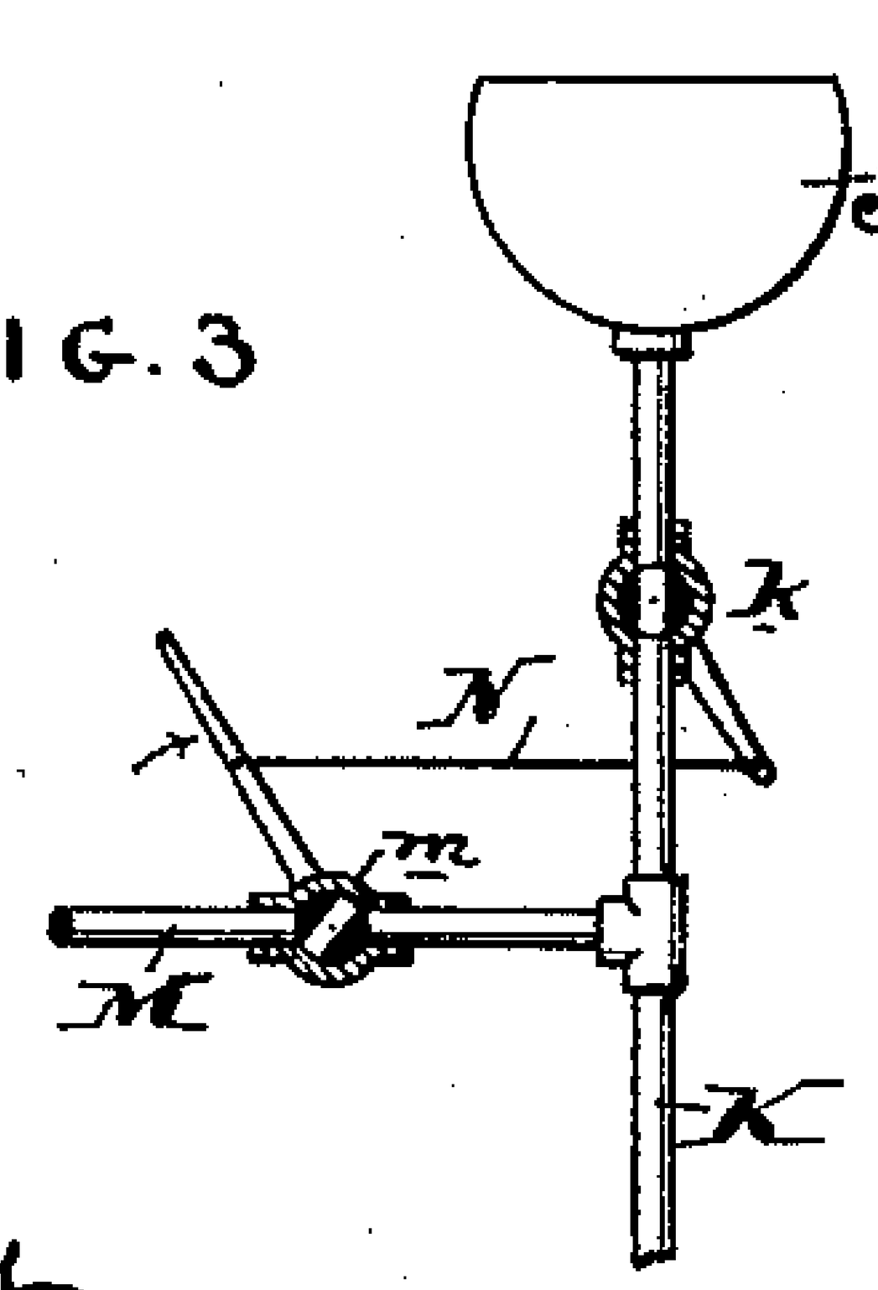


FIG. 3



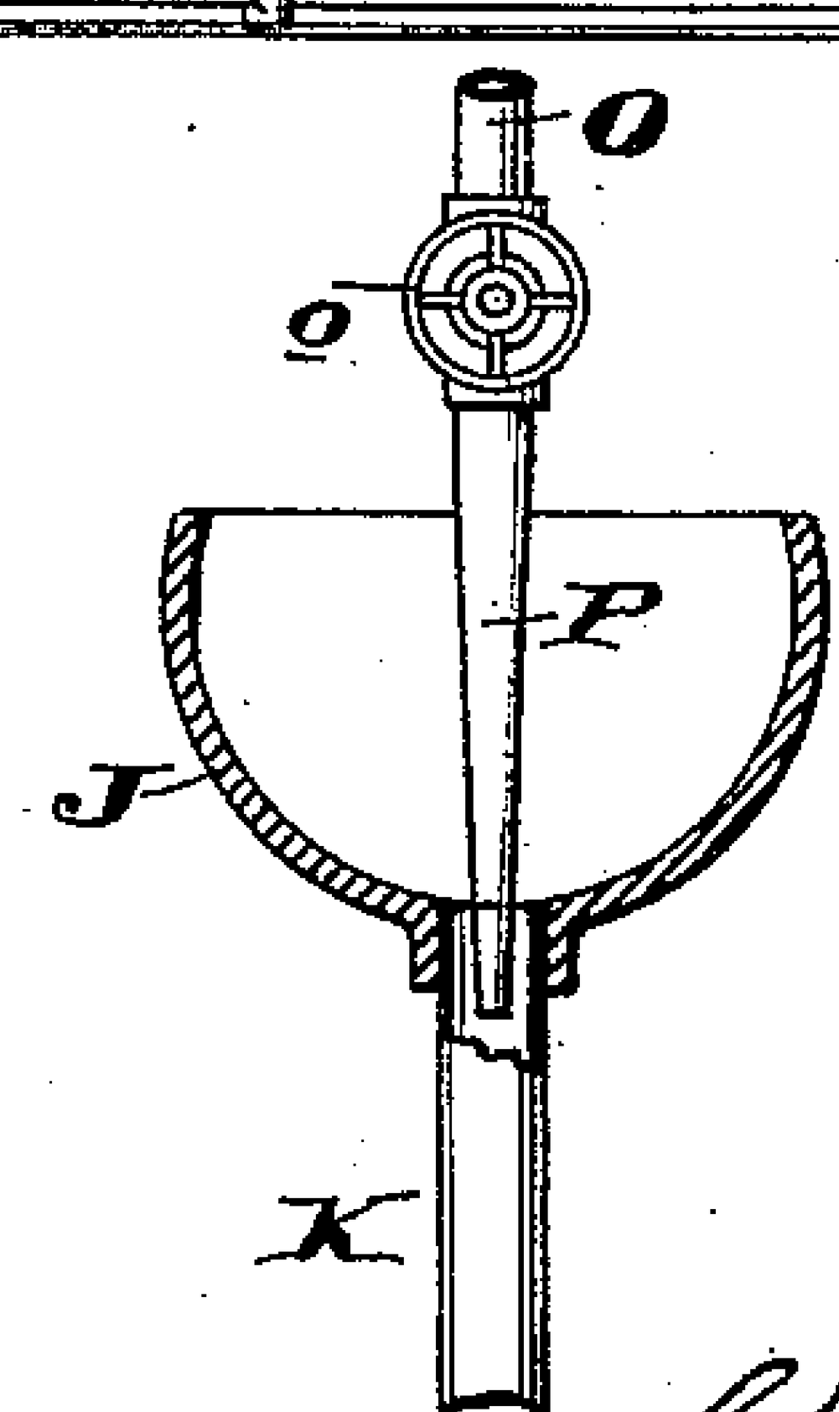


FIG. 4

Witnesses:

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Inventor:

Charles L. Klauder

By his atty

[signature]

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES L. KLAUDER, OF PHILADELPHIA, PENNSYLVANIA.

DYEING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 428,614, dated May 27, 1890.

Application filed September 17, 1888. Serial No. 285,588. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. KLAUDER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Dyeing Apparatus, of which the following is a specification.

My invention relates to dyeing apparatus; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

In the dyeing of yarn or other materials it is often necessary in order to obtain a particular tint or shade of color to subject the material to a series of baths of different dye-liquor, or in ordinary cases to a bath of mordanting material and then to one or more coloring-baths. At the present time this is performed with a great degree of inconvenience and trouble by the necessity of removing the material from the vat containing one liquor and immersing it in the others successively, according to the number of baths to which it must be subjected. Manifestly this consumes a large amount of time and labor, and requires expensive and cumbersome mechanism to convey the material from one vat to another.

In apparatus embodying my improvement it would be convenient to make the dye or mordant bath in the dye-vat and then pump the liquor out into the reservoir-tanks. It also happens that after a short while the dye or other liquor loses a large portion of its strength and requires to be enriched by the admixture of a new quantity of dye-matter.

It is the object of my invention to accomplish the successive subjection of the material to a series of baths of different liquor, and when desired to make or to enrich the liquor in the tank by mixing with it a new quantity of dye or other stuff used without removing the material from the vat. For this purpose the dye-vat is connected by pipes to any required number of tanks or reservoirs, according to the number of different baths to which the material is to be subjected. Through these pipes the liquor may flow from the tanks into the vat, the flow being controlled by valves. The vat is connected by a pipe to a pump which is discharged into either of the reservoirs or tanks, whereby the liquor may be drawn off from the vat and placed into one of the tanks, and another bath of liquor allowed to flow into the vat from another tank. For the purpose of enriching the bath, instead of thus drawing off the liquor, additional dye-stuff may be forced or allowed to flow into the vat in the manner hereinafter described.

To accomplish the making or enriching of the dye-bath, I provide a pipe entering the bottom of the vat and furnished with apertures. At the upper end of the pipe in a bowl or receiver the dye is placed and may run into the vat by gravity or be forced therein by a jet of air, gas, or other suitable medium. Simultaneously with the admixture of the dye steam may be blown into the liquor in the vat by additional perforated steam-pipes.

There are many details to my invention set out later on.

In the drawings, Figure 1 is a plan view of my improved dyeing apparatus. Fig. 2 is a side elevation of the same, and Figs. 3 and 4 are views of modifications of mechanism for introducing dye or other stuff to enrich the bath.

A is a dyeing-machine, with the particular form or construction of which this invention has nothing to do, as the invention is equally adaptable to any of the known machines or vats. I prefer, however, to employ the dyeing-machine set out in my Letters Patent No. 377,393, dated February 7, 1888, which is the one shown in the drawings.

B are tanks to contain the different mixtures of liquor to which the material is to be subjected. There may be any number of them, as desired, and their capacity should be at least that of the dye-vat of the machine A. These tanks may be either open or closed at the top.

C are pipes leading from the tanks B to the dye-vat. In practice I prefer to have the tanks B stationed at a slight altitude above the vat and the pipe C leading from the bottom of the tanks to the bottom of the vat, so that the liquor may flow into the vat by gravity. Each tank may have a separate pipe connecting with the vat, or these pipes may be united in one entering it.

D are plugs or valves by which the flow of liquor from the tanks B may be opened or closed. I do not limit myself to the particu-

lar form of valve-plugs shown, for while I prefer that construction it is evident that any other satisfactory form of valve may be employed.

E is a pump connected on the vacuum or suction side with the dye-vat by a pipe F and on the discharge side with the tanks B by a pipe G and pivoted nozzle H, which may be brought in position to conduct the liquor to any of the tanks B, as indicated in dotted lines Fig. 1.

I is a steam-pipe provided with a valve *h*, entering the bottom of the dye-vat and having a number of holes or perforations for the escape of the steam into the liquor to raise the temperature of the bath to the desired degree of heat. I prefer to have this pipe extend about the bottom of the vat in the manner shown in dotted lines in Fig. 1.

J is a small receiver for the dye-stuff which may be used to enrich the bath, opening by a pipe K, having a valve *k*, into the dye-vat. I prefer to have this pipe K extend some distance into the dye-vat and to provide it with holes or perforations (see Fig. 1) to more thoroughly disseminate the dye-stuff through the liquor. The pipe K is preferably arranged parallel to the steam-pipes I and transversely across the vat.

L is a blower connecting with the pipe K below the valve *k*, by which air or gas may be blown into the pipe K to force the dye-stuff from the receiver J. The pipe M, connecting this blower L with the pipe K, is provided with a valve *m*, by which its operation may be controlled. In Fig. 3 is shown a modification in which these valves *k* and *m* are connected by a link N, so that upon opening the valve *m* the valve *k* is instantly closed, and vice versa, and the dye-stuff in the pipe K is forced into the dye-vat. It is practically necessary that this valve *k* should be closed when the valve *m* is opened, or else the dye-stuff and steam would be forced out of the receiver J.

In Fig. 4 is shown a modification in which a pressure-pipe O is provided with a valve *o*, and a nozzle P is inserted into the receiver at the opening of the pipe K, through which air, gas, or steam may be used to force the dye-stuff into the dye-vat through the pipe K.

It is evident that instead of enriching the dye-liquor from the receiver J it might be drawn off into one of the tanks B and there enriched by the addition of the dye-stuff; but I prefer to use the receiver J for this purpose, because it is equally effective and causes less delay.

From this description the operation of my apparatus will be readily understood. The material is placed in the dyeing-machine A, the vat of which is filled from one of the tanks B with the desired liquor or may be filled directly. When it is desired to change the bath, the pivoted nozzle is placed in connection with an empty tank B and the pump E is put into operation. When the liquor is thus entirely withdrawn from the vat and discharged into one of the tanks B, the valve D of that tank which contains the liquor next to be used is opened and the liquor is allowed to flow into the vat, subjecting the material to a new bath, and so on, as required. It is apparent that the supply-pipes C of the tanks might be connected to the dye-vat through the pump E, which might then be used both to pump the liquor from the vat to the tanks and again from the tanks to the vat; but I do not consider such a process expedient or necessary unless for some reason it is inconvenient to connect the tanks B directly with the vat and allow the liquor to flow therefrom by gravity, as described. In the receiver J the enriching dye-stuff is placed and the valve *k* is opened. The dye-stuff then flows down through the pipe K, and upon closing the valve *k* and opening the valve *m* it may be blown or forced into the bath through the perforations in the pipe K within the dye-vat.

The steam for the bath is admitted by pipe I, and simultaneously therewith or separately the dye-stuff may be admitted by the pipe K with air, gas, or other medium. A dotted pipe S is shown as connecting the steam-pipe I and the dye-pipe K, (see Fig. 2,) so that steam may be used, if desired, in place of air.

By having separate pipes for admitting the steam for heating the bath and dye-stuff for coloring it the steam may be regulated to any degree or be made to act continuously without interfering with the desired admittance of the dye-stuff. Thus the dye-stuff may be admitted very slowly while the steam for heating the bath may be allowed to rush in under full head, and thus keep up the boiling temperature with a gradual supply of the enriching material.

The invention is equally applicable to scouring purposes.

The minor details of construction which are here shown are not to be considered limitations of my invention, for while I prefer them in practice it is apparent that they may be varied in many ways without departing from the principles of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a dye-vat, of a reservoir to contain enriching stuff, a pipe leading from said reservoir and entering the vat below the level of the liquor therein, a valve in said pipe, and a valved blast-pipe (through which no dye-stuff passes) entering said enriching-pipe to blow enriching stuff from said reservoir through the enriching-pipe directly into the dye-vat below the liquor-level, and a steam-supply pipe independent of the enriching-pipe to supply steam to the dye-vat for boiling purposes.

2. The combination, with a dye-vat, of a reservoir to contain enriching stuff, a pipe leading from said reservoir and entering the vat below the level of the liquor therein, an air-blast pipe opening into said enriching-

pipe to blow the enriching stuff from said reservoir through the enriching-pipe directly into the vat, and valve mechanism for simultaneously and inversely controlling the openings in said enriching-pipe and air-blast pipe, whereby when the one is closed the other is opened, and vice versa.

In testimony of which invention I hereunto set my hand.

CHARLES L. KLAUDER.

Witnesses:
ERNEST HOWARD HUNTER,
E. M. BRECKINREED.