No. 716,926. Patented Dec. 30, 1902.

J. O. OBERMAIER.

DYEING APPARATUS.

(Application filed Sept. 7, 1900.)

(No Model.) 4 Sheets—Sheet 1.

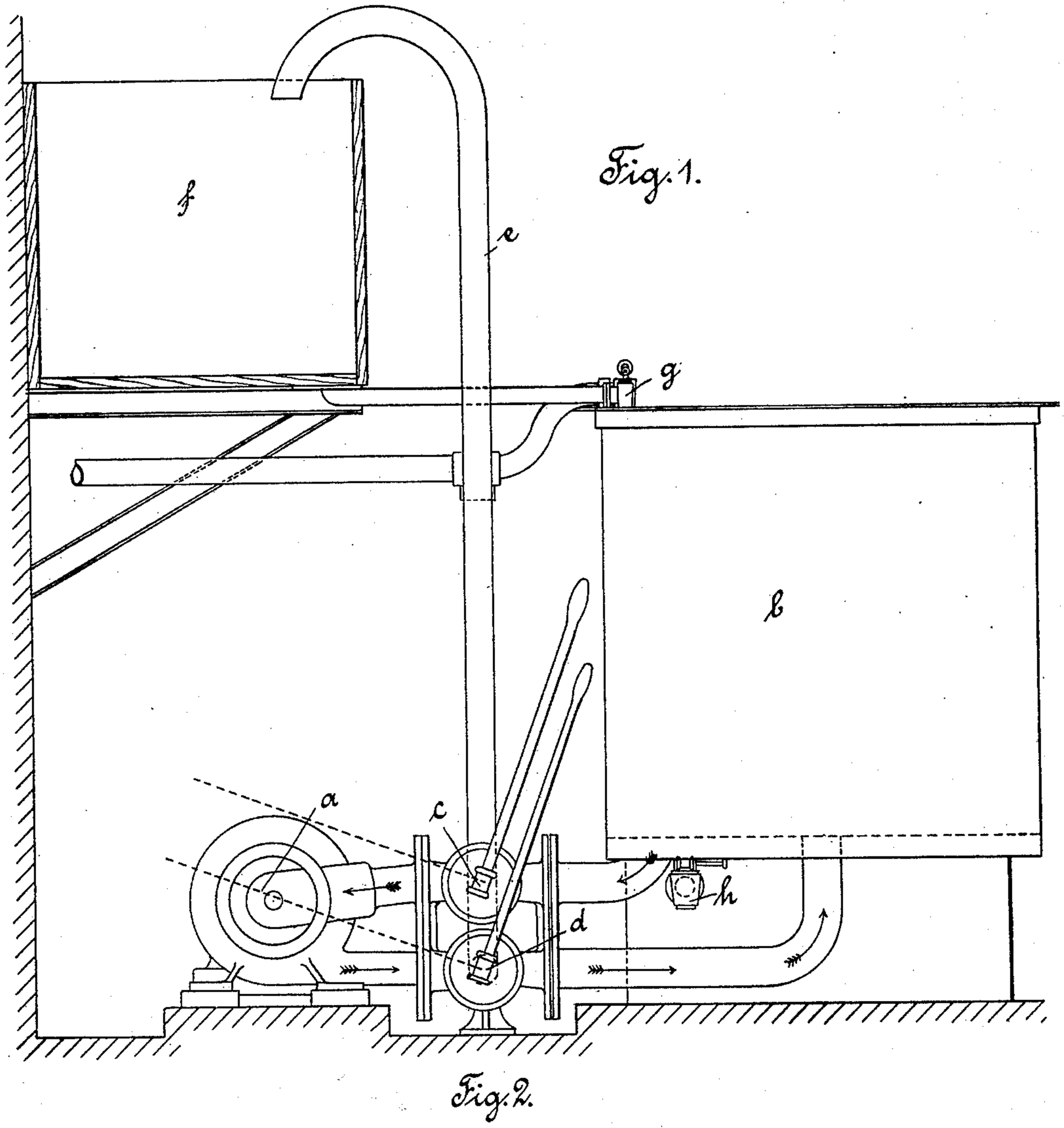

Fig. 1.

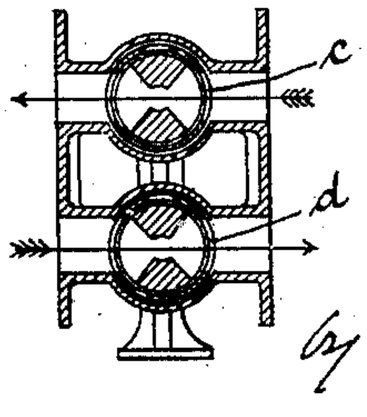

Fig. 2.

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Fig. 3.

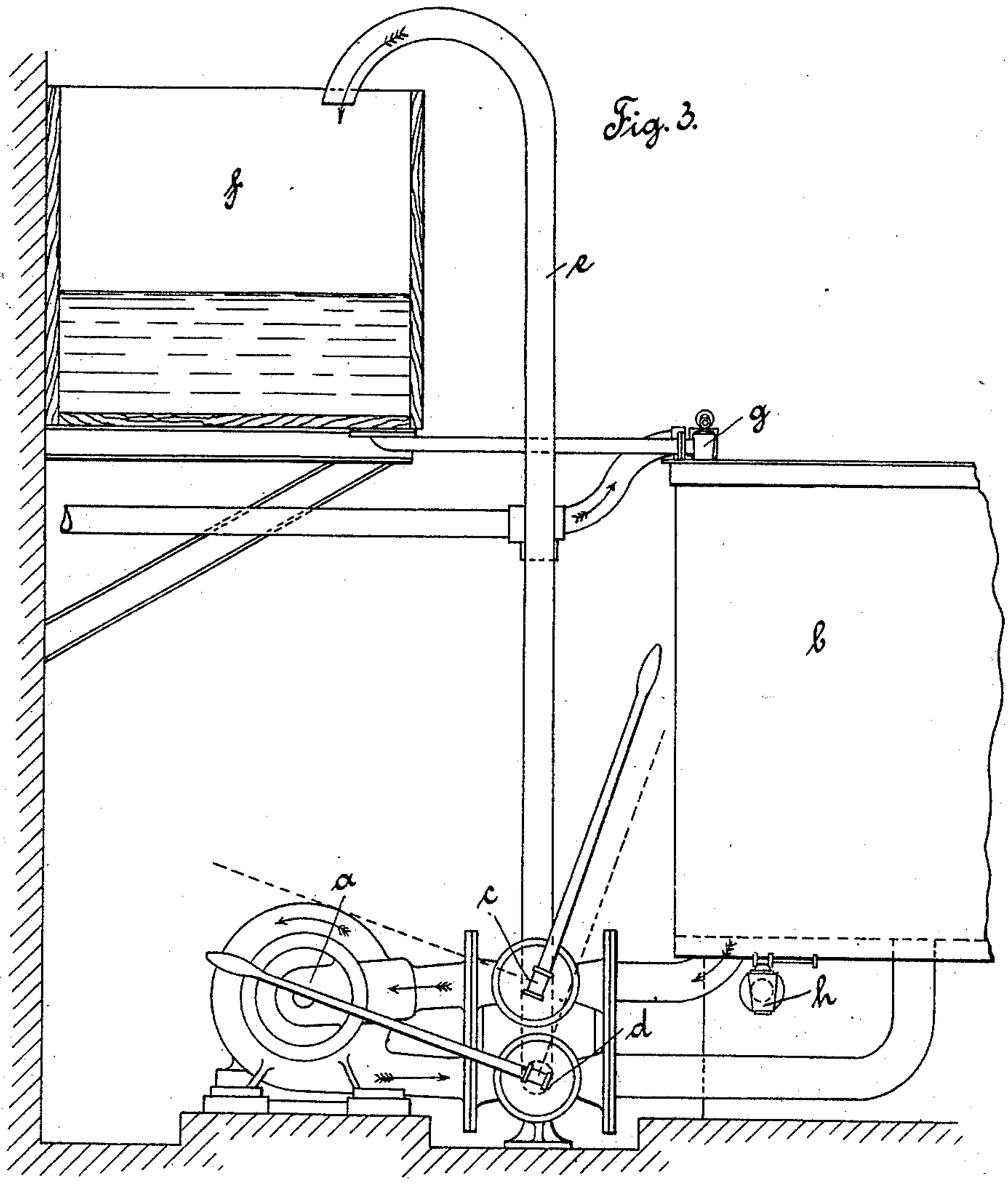

Fig. 4.

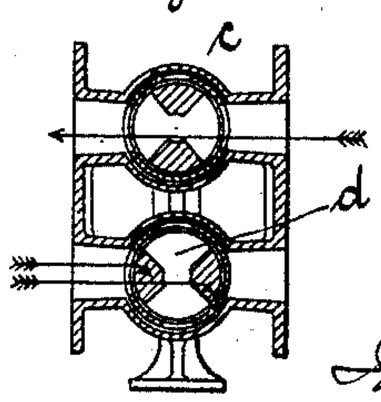

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Fig. 5.

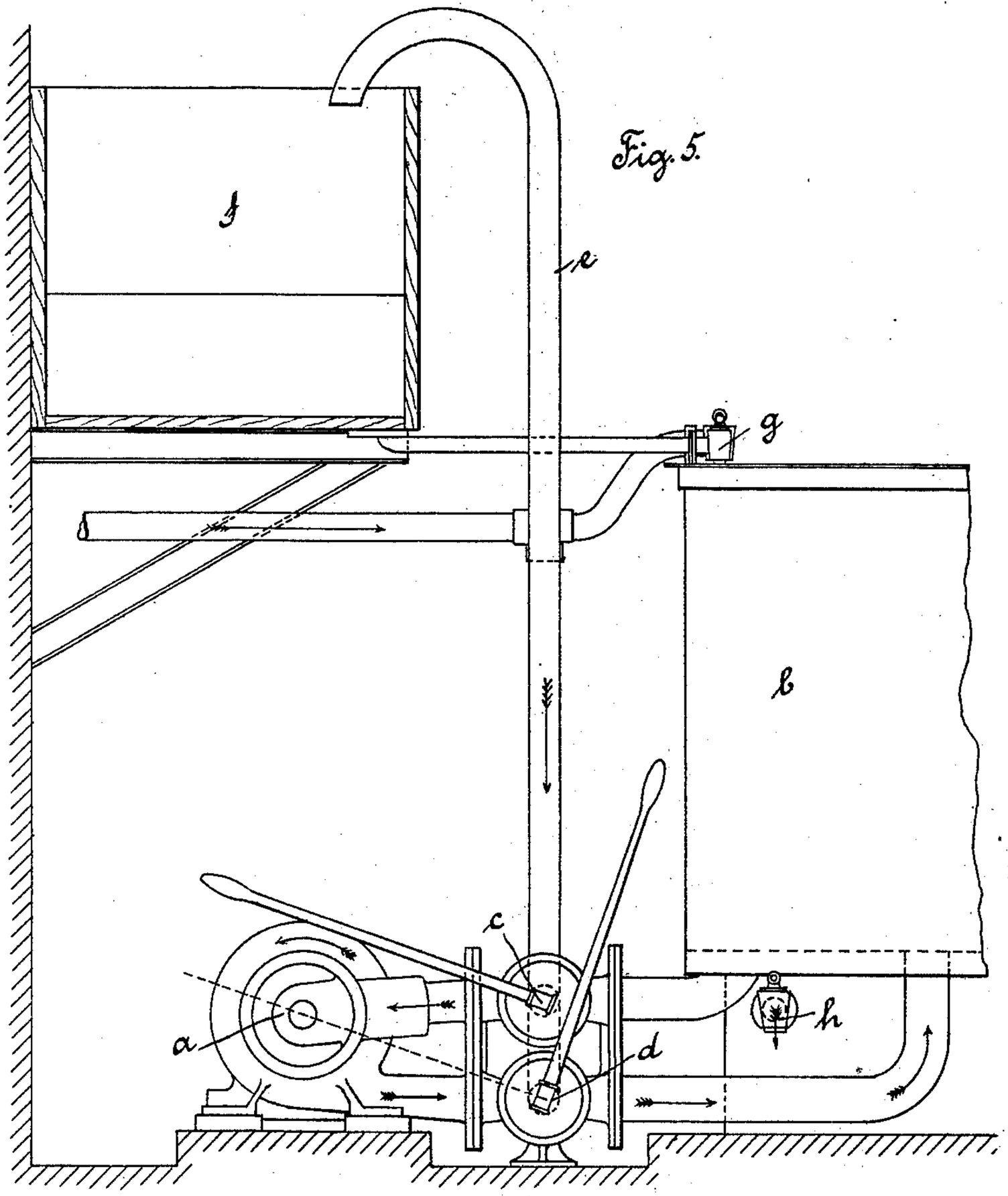
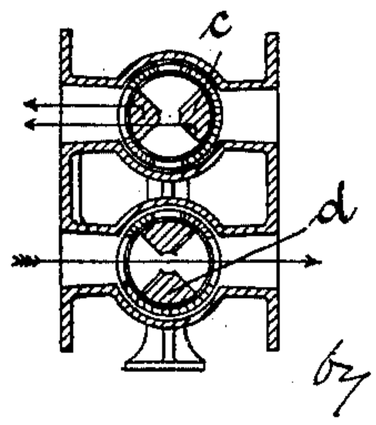


Fig. 6.



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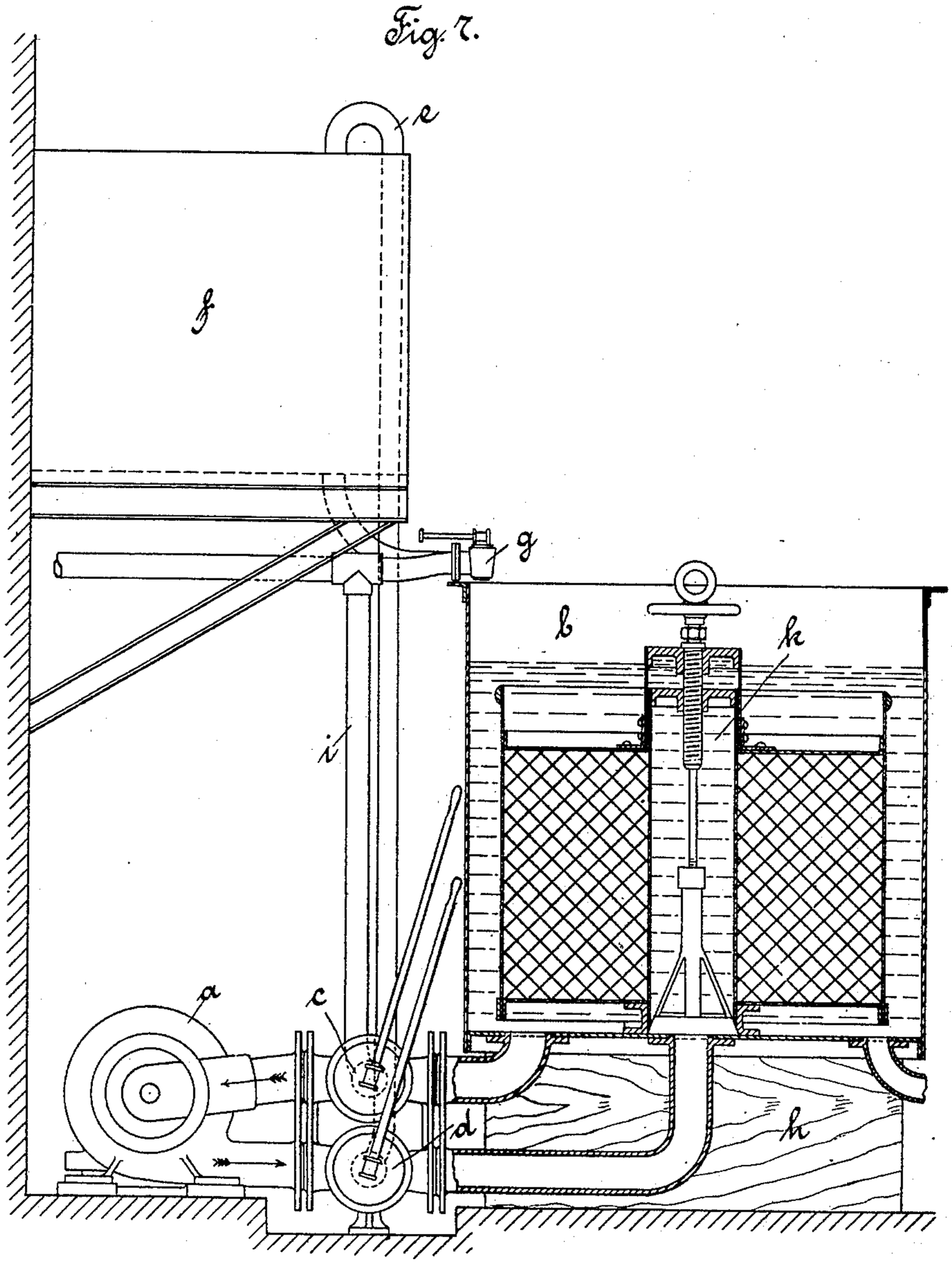
(No Model.) 4 Sheets—Sheet 4.

Fig. 7.



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UNITED STATES PATENT OFFICE.

JULIUS OTTO OBERMAIER, OF LAMBRECHT, RHEINPFALZ, GERMANY.

DYEING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 716,926, dated December 30, 1902.

Application filed September 7, 1900. Serial No. 29,336. (No model.)

To all whom it may concern:

Be it known that I, JULIUS OTTO OBERMAIER, a subject of the King of Bavaria, residing at Lambrecht, Rheinpfalz, in the Kingdom of Bavaria, Empire of Germany, have invented certain new and useful Improvements in or Relating to Dyeing Apparatus, of which the following is a specification.

This invention relates to a new arrangement of dyeing devices by which for certain purposes very essential advantages are attained.

In the accompanying drawings I have illustrated an apparatus embodying my invention, in which—

Figures 1, 3, 5, and 7 are side views of the apparatus, showing parts in different positions, as more fully described hereinafter. Figs. 2, 4, and 6 are respectively sectional views showing the cocks in different positions.

For some time past sulfureous very alkaline dyestuffs have been employed on a large scale, such dyestuffs containing considerable quantities of sulfid of sodium. Materials dyed with these dyestuffs cannot be treated in the hitherto usual manner by centrifugal machines, because the considerable admission of air produced by the centrifugal action separates the dyestuff dissolved in the dye in such a degree that noxious mechanical deposits of dyestuffs are produced upon the fiber. Moreover, these dyestuffs require for the rinsing process after the dyeing operation has been finished a sudden overflowing with fresh water. Owing to the great alkalinity the supply of rinsing-water must be very energetic and take place under pressure, and correspondingly the evacuation of the waters having passed through the goods must take place without any interruption. In order to attain in dyeing with such dyestuffs the best practical results, I have devised the apparatus illustrated in the accompanying drawings, wherein known means are used, (dyeing by means of liquors in circulation, employment of three-way cocks for controlling the flow of the liquor;) but, notwithstanding, by a particular combination of these elements effects are obtained which represent an essential technical progress.

As shown in Fig. 7, there are arranged between the pump *a* and a dye-vat *b* two three-way cocks, one of which (the cock) *c* is inserted in the suction-pipe, and the other cock, *d*, in the forcing-pipe between the pump and the vat. The cock *c* is in communication by means of a pipe *i* with a water-reservoir, while to the cock *d* there is connected a vertical pipe *e*, through which the dyeing liquor is led to the reservoir *f*. *g* is the water-supply cock at the top of the dyeing-vat, and *h* the lower water-outlet cock.

Dyeing process.—This device works as follows: The cocks *c* and *d* are in the position shown in Figs. 1 and 2. The dyeing is effected as generally known—that is to say, the cylinder *k*, section Fig. 7, is placed in the vat *b* above the cone upon the outlet-mouth of the pump and screwed to the spindle. The vat is then filled with water up to the upper border of the cylinder, the pump is started, and all the air contained in the materials is thus expelled by the circulation of the water. The dyestuff is then added, and the dyeing takes place. As the dye liquor extends above the cylinder and all the perforations are under water—*i. e.*, under the dye liquor—no air can enter during the working. If the dye liquor extends, for instance, only to half the height of the cylinder, it would be decomposed—*i. e.*, the dyeing-stuff would be eliminated—because it would be continuously in contact through the great quantity of holes provided in the outer circumference of the cylinder with the outer air. This would be, by way of example, the same as in the case of rain-drops, which falling to the ground are surrounded with air. After the dyeing process is terminated the three-way cock *d* in the pressure-tube is turned through ninety degrees, (see Figs. 3 and 4,) and in consequence the dyeing liquor is sucked off by the working pump from the dyeing-vat and forced through the vertical tube *e* into the dye-reservoir *f*. After this has taken place, the cock *d* is returned into its first position. This lasts about half a minute.

Recovery of the dyestuff in excess.—In order to obtain very deep tinges, it is necessary to prepare very concentrated dye liquors where only a part of the dyestuff is to be brought upon the material, while the larger quantity remains in the bath. In order to

work in a rational manner, it is necessary to recover and to use again the liquor for further dyeing. This recovery must be accomplished very quickly, because, as above mentioned, the dye liquor when the material comes into intimate contact with air, as it is the case in the centrifugal and compressing operation, is decomposed, so that inequalities of the tinge and staining are produced. For this purpose the working is as follows: The water-cock *g* is opened, the vat is filled, and the cock shut off again. The pump is started and all the fibers are rinsed over with cold water. This dilute dye liquor is then pumped by turning the cock *d* through ninety degrees (see Figs. 3 and 4) through the vertical pipe *e* into the reservoir *f*. After this has been done this cock is returned into its first position. (See Figs. 1 and 2.) By this operation I attain besides the necessary rinsing over of the material, moreover, that nearly all the dyestuff still contained in the goods—*i. e.*, in the dye liquor—is recovered. This recovery of the dyestuff is in economical respect of great importance.

For carrying out finally the rinsing process the cock *c* in the suction-pipe of the pump is turned, as shown in the Figs. 5 and 6, into such a position that the suction-head of the pump rests shut off from the receiver *b*. The fresh water passes from the water-reservoir through pipe *i* and cock *c* directly to the pump and is forced by the latter through the material and flows off through the outlet-cock *h* of the receiver. As by shutting off the suction-pipe used rinsing-water cannot return to the pump, an energetic and complete rinsing with fresh water is always rapidly effectuated.

There result from the working in the above-described manner the following advantages: first, a very quick and simple recovery of the dyestuff in avoiding that the materials containing the dye liquor come into contact with the outer air and without making use of a centrifugal machine; second, a sudden and energetic rinsing of the material in all its parts immediately after the dyeing process; third, a very complete and rapid rinsing.

I claim—

The combination with a dye-vat, of a pump, a suction-pipe leading from the vat to the pump, a three-way cock in said pipe, a water-supply pipe connected to said three-way cock, a delivery-pipe leading from the pump to the vat, a three-way cock in said delivery-pipe, a reservoir for dye liquor, a pipe leading from the three-way cock in said delivery-pipe to discharge into said reservoir, a branch pipe leading from the water-supply pipe to discharge into the vat, a pipe leading from the said reservoir to discharge into the vat, a cock to control the last-named pipe and the branch pipe, and a discharge-pipe leading from the vat, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JULIUS OTTO OBERMAIER.

Witnesses:
JACOB HAYN,
KARL LAUBSCHER.