(No Model.)

5 Sheets—Sheet 1.

J. GILLET.

DYEING APPARATUS.

No. 345,892. Patented July 20, 1886.

Fig. 1.

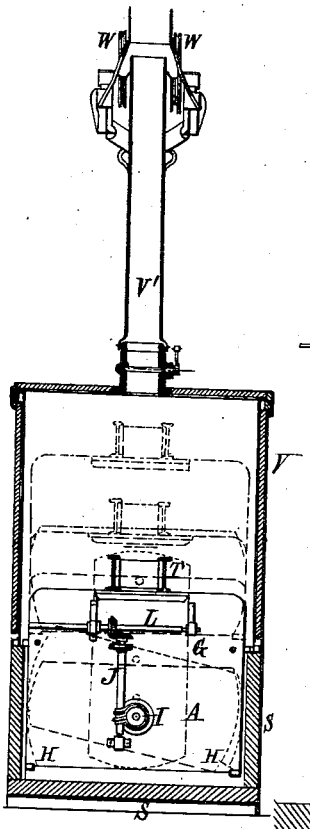
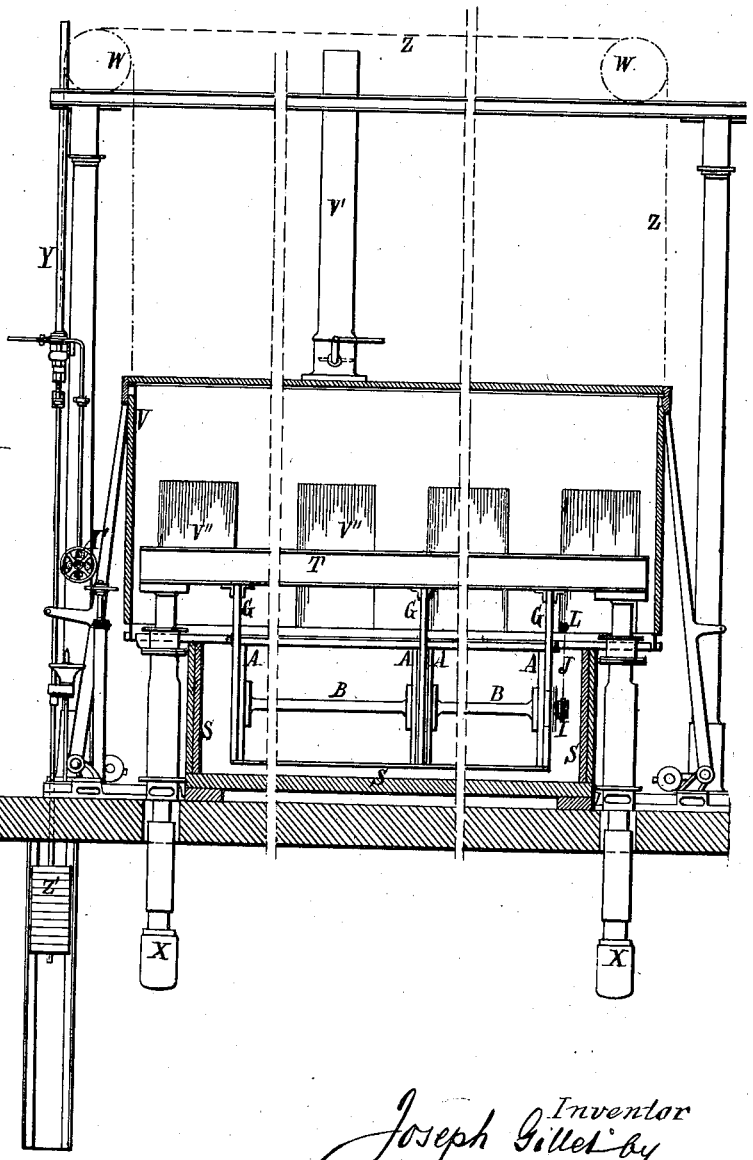


Fig. 2.



Witnesses
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(No Model.)

5 Sheets—Sheet 2.

J. GILLET.

DYEING APPARATUS.

No. 345,892.

Patented July 20, 1886.

Fig. 5.

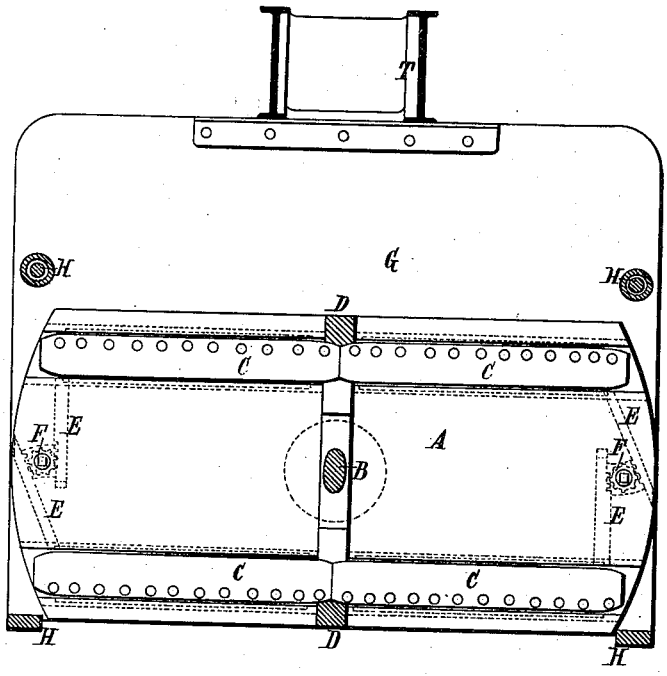
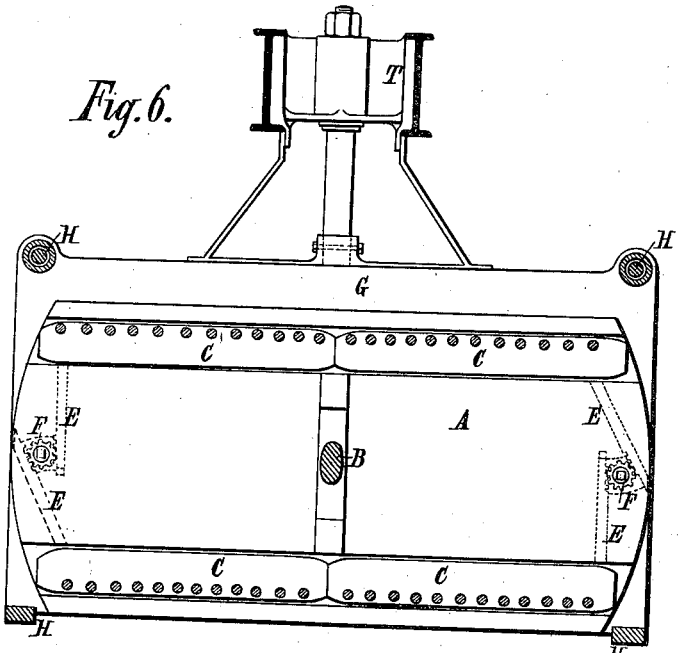


Fig. 6.



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(No Model.)

5 Sheets—Sheet 3.

J. GILLET.

DYEING APPARATUS.

No. 345,892. Patented July 20, 1886.

Fig. 4.

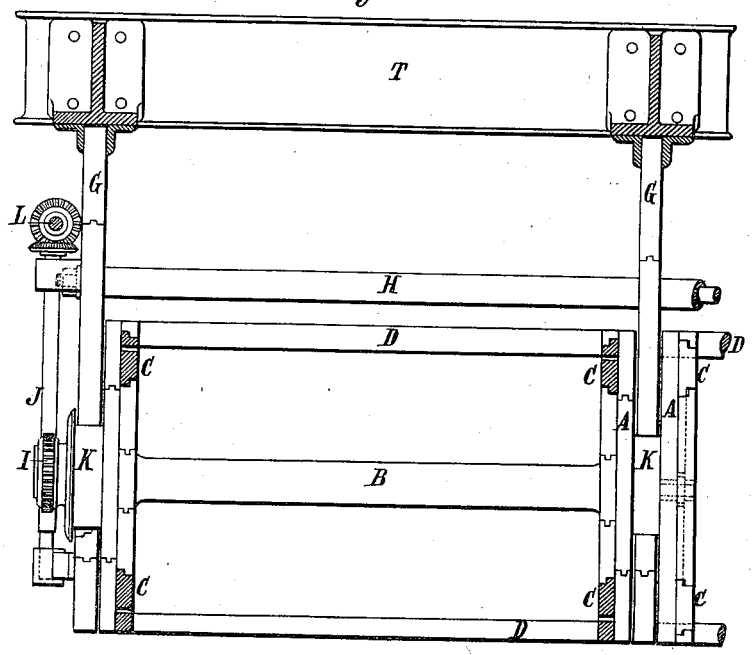
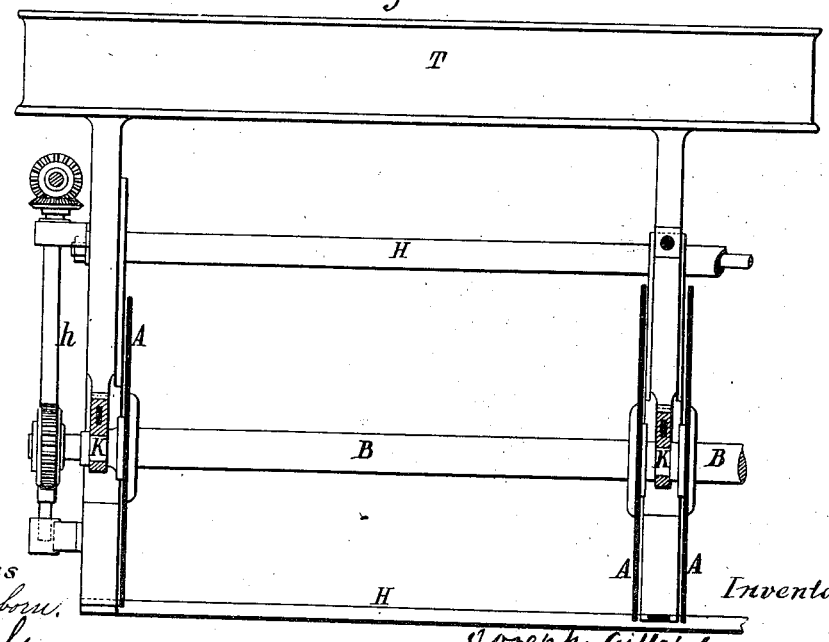


Fig. 7.



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(No Model.)

5 Sheets—Sheet 4.

J. GILLET.

DYEING APPARATUS.

No. 345,892.

Patented July 20, 1886.

Fig. 5.

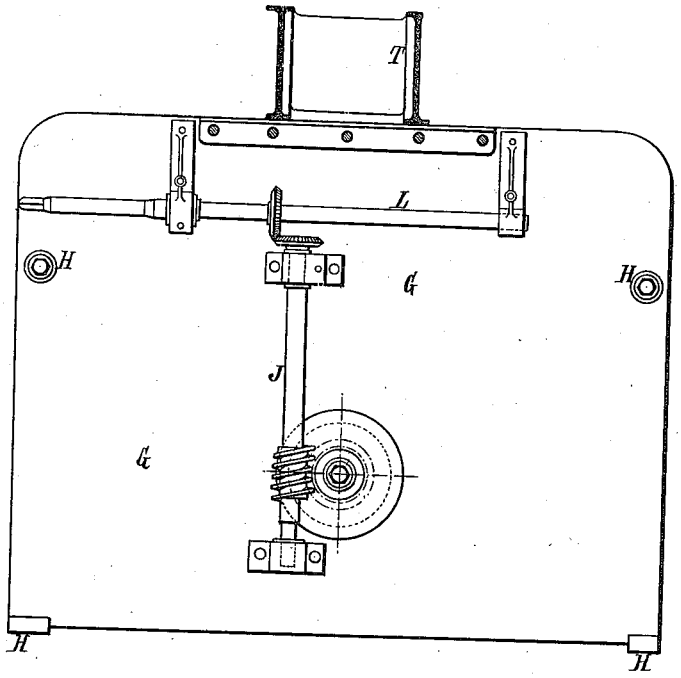
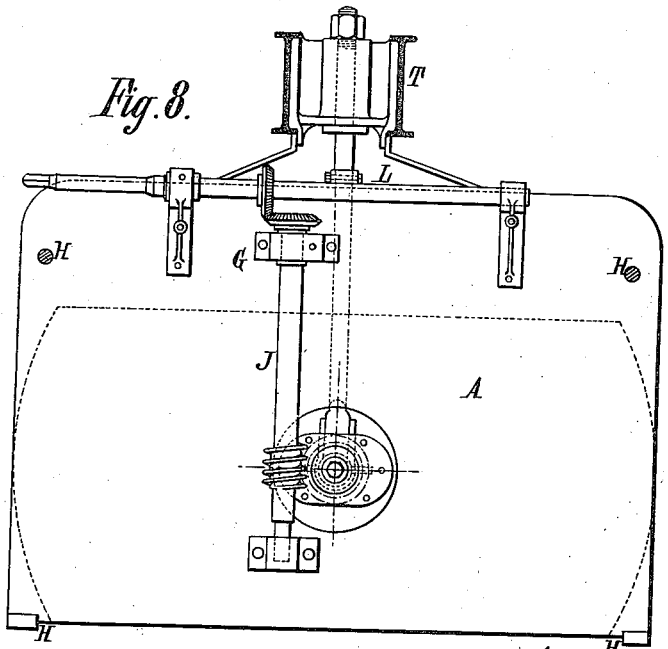


Fig. 8.



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(No Model.)

5 Sheets—Sheet 5.

J. GILLET.

DYEING APPARATUS.

No. 345,892. Patented July 20, 1886.

Fig. 9.

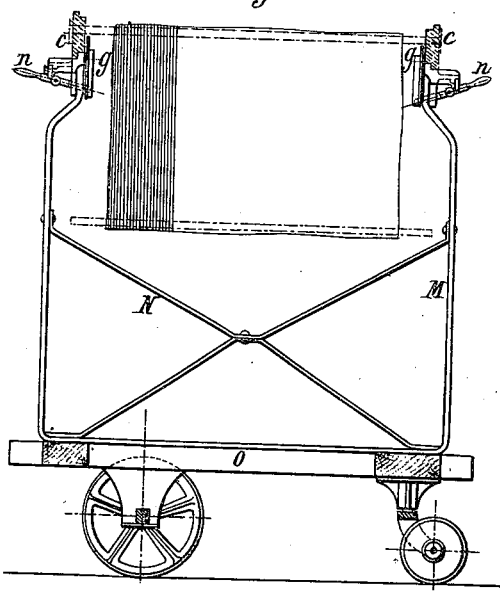


Fig. 10.

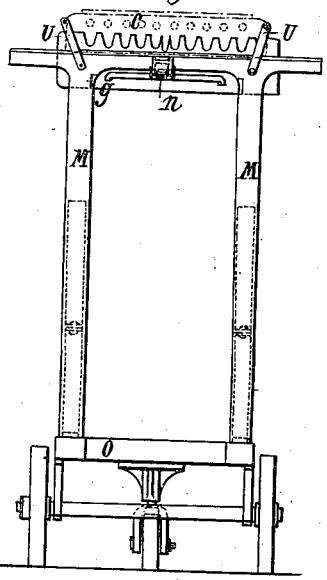


Fig. 11.

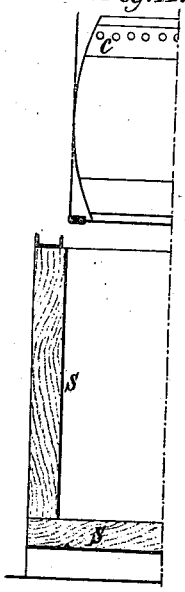


Fig. 14.

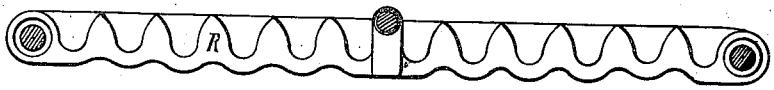


Fig. 15.

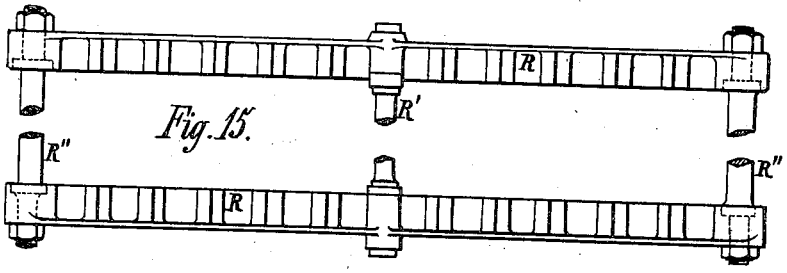


Fig. 12.

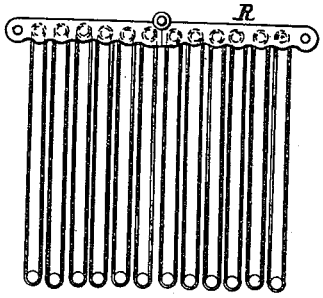
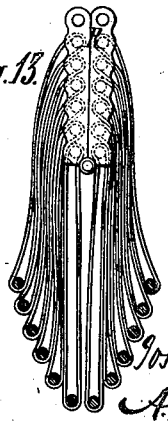


Fig. 13.



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UNITED STATES PATENT OFFICE.

JOSEPH GILLET, OF LYONS, FRANCE, ASSIGNOR TO THE SOCIÉTÉ GILLET ET FILS, OF SAME PLACE.

DYEING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 345,892, dated July 20, 1886.

Application filed December 23, 1885. Serial No. 186,550. (No model.) Patented in France June 25, 1885, No. 169,779.

To all whom it may concern:

Be it known that I, JOSEPH GILLET, a citizen of the Republic of France, and a resident of Lyons, in said Republic, have invented an Improved Dyeing Apparatus, of which the following specification is a full, clear, and exact description.

This invention is more particularly designed for the treatment of silk, but is applicable also to other textile materials—such as wool, cotton, ramie, and the like—and it can be employed in the operations of ungumming, soaping, mordanting, and dyeing, properly speaking; also, in various other operations, such as washing, drying, and the like.

Apparatus constructed in accordance with the invention may be of wrought or cast iron, copper, bronze, ordinary or hard rubber, wood, and other substances adapted to the special conditions under which it is to be used.

The general object of the invention is to facilitate the transportation of the silk or other material, its introduction into and removal from the vat or other apparatus, and its treatment in the vat. The skeins are distended between rods placed in a rod-holder, which in turn is supported in a cage. The cage, which has places preferably for several rod-holders, is lowered into the dye-vat, which is provided with a ventilating-cover having windows for observing what goes on in the vat. A carriage is provided for transporting the rods with their skeins, the rods being held in slides or similar contrivances, which can be inserted into and removed from the rod-holders. An arrangement of folding racks is also provided for transporting the series of rods with their load of skeins.

In the accompanying drawings, which form a part of this specification, Figure 1 is a cross-section, and Fig. 2 a longitudinal section, of a dye-vat with its cover, cages, rod-holders, and operating mechanism. Figs. 3, 4, and 5 are respectively a cross-section, a partial longitudinal section, and an end elevation, of rod-holders and cages, constructed of wood. Figs. 6, 7, and 8 are similar views of rod-holders and cages made of metal. Figs. 9 and 10 are side and end elevations, respectively, of the carriage. Fig. 11 is a view which, in connection with Fig. 10, illustrates the relative positions of the carriage and rod-holder in transferring the silk from one to the other. Fig. 12 is a side elevation of the rack (extended) with its load of silk. Fig. 13 is a view of the same folded, and Figs. 14 and 15 are sectional elevation and partial plan of the rack (extended) on an enlarged scale.

For working in acid baths the rod-holders are made of wood, and the parts that cannot well be made of anything but metal are protected with suitable material not attacked by the chemicals—such as hard rubber and the like. Each rod-holder (see Figs. 3, 4, 5, and also 6, 7, 8) consists of two large end plates or frames connected at the center by a strong bar, B, the ends of which are provided with or form journals, whereon the rod-holders can be revolved, as may be required in different operations. There are grooves in these end plates for receiving slides C, of wood or metal, which slides are perforated to receive the rods. The perforations are made at different distances from the edges in different slides, so that there is a set of slides for each length of skein. With this system the necessity of tentative efforts in placing the skein in the holders or cages is avoided and the equal stretching of all the filaments is assured.

Four slides, C, are provided for each end plate, A, so that silk can be placed in the holder on both sides of the bar B. Braces D (see Figs. 3 and 4) serve to unite the end plates. Sliding bolts E (shown in dotted lines 3 and 6) engage the slides C when inserted and retain them in the rod-holders. The bolts are moved out and drawn in, as required, by the pinions F.

The rods used may be of wood; but are preferably formed of tubes of brass, copper, iron, or other metal coated with rubber more or less hard, according to the particular use. Rods of this construction are strong, clean, and not liable to be attacked by the acid.

The cages are made each of plates or frames G, connected by and depending from beams T. The rod-holders A B are journaled in these plates G. Preferably, there are a series of cages arranged in line, the intermediate plates or frames, G, being common to adjacent cages and forming partitions between them. The beams T (shown as I-beams, although other

forms—such as ⊔-beams—may be employed) are held apart and braced by cross-pieces inserted between and bolted to them, and the plates G are secured firmly to them. The axes of the several rod-holders are placed in line, and the journals in the intermediate plates, G, are common to the adjacent holders, so that the series can be turned simultaneously. The beams T at the end are supported by hydraulic lifts X, so that the cages, with their loads, can be lowered into or lifted out of the liquid in the vat S. This vat can be made of wood or metal, of dimensions determined by the size and number of the cages, and is provided with means for heating and emptying, like ordinary dye-vats. It is provided with a cover, V, in the form of an inverted box, (made of wood or metal and about the size of the vat S.) A hydraulic joint is or may be made between the cover and the vat. At the top of the cover there is a chimney, V′, (provided with a valve for opening and closing the same,) for carrying off the steam or vapors, when desired, and in both sides windows V″ are provided for observing what goes on inside. This cover has great advantages in dye-works, as, owing to its form and the facility in moving it, the operations can be performed in a closed chamber, and, consequently, condensation and oxidation of metals in the work-rooms can be prevented, and greater economy of fuel, salubrity of the works, and an easier oversight secured.

The lifts X, for raising and lowering the cages, are shown placed below the vat S; but they could be placed above the vat, their relative position being unimportant so long as hydraulic motors are employed. It is not, however, intended to limit the invention to hydraulic lifts to the exclusion of other elevators which might be used, if desired, in place of the hydraulic apparatus. The cover V is raised, when desired, by chains Z running over pulleys W, and connected with a piston working in the hydraulic cylinder Y. The inlet and outlet of the water is controlled by valves Y′. The counter-weight Z′, slightly less than the weight of the cover V, depends from the piston, so that the cover V is nearly balanced and can be raised and lowered with facility. In consequence of the slight extra weight of the cover it will descend, simply by opening the outlet of cylinder Y.

In order to turn the rod-holders A B in their cages the gearing shown in Figs. 5 and 8 is employed. A worm-wheel on the journal of bar B is engaged by the endless screw on the vertical shaft J, which is connected with the horizontal shaft L by a pair of bevel-wheels. The end of the shaft L is squared to receive a key for turning it, as desired. To enable this to be done without raising the cover V this latter is provided with openings, through which the key can be inserted.

The carriage shown in Figs. 9 and 10 consists of a truck, O, (mounted, as shown, on three wheels,) on which are fixed two frames, M, in flat or hoop iron, connected by the braces N. At the top of the frames are ways for the reception of the slides C, and also racks *g*, movable vertically in ways of the frames M for maintaining the rods in place before the introduction or after the removal of the slides C. The racks *g* can be raised and lowered by the levers *n*, as desired, for retaining the rod on the carriage, or for removing them with the folding racks, (of which more hereinafter,) or with the slides C.

For transferring the slides C from the carriage to the rod-holders, the latter are raised out of the bath, as indicated in Fig. 11, so that the grooves in said holders are opposite the slides C on the carriage. Said slides are then pushed off the carriage into the grooves. When the slides C are on the carriage, small guides U, Fig. 10, prevent them from tipping over or moving sidewise.

To simplify in certain cases the transportation of the silk on the rods from one machine to another, the system of folding racks shown in Figs. 12 to 15 is employed. The spaces between the teeth of these racks correspond to the holes in slides C. Two of the racks are jointed in the middle to the shaft R′, and are connected at the ends by bolts R″, as in Fig. 15. When the rods have been placed in the spaces between the teeth, (see Fig. 12,) the racks can be folded, as shown in Fig. 13. When it is desired to carry the silk placed on the rod-holders to another machine, the slides C are disengaged by slipping the folding racks under the upper rods of the skeins and withdrawing the slides C laterally. When the racks are folded, Fig. 13, the silk is in the form of a bundle of, say, a dozen skeins, each arranged on its rods.

It will be understood that the carriages for transporting the bundles are different from those for transporting the slides C, and that they may consist simply of an appropriate system of pulleys running upon little rails placed at the ceiling of the room. This modification in the means for carrying the silk does not require any alteration in the principles of the dyeing operations; but it gives great advantage in all the operations, particularly in the drying in the centrifugal machine and in the washing.

The silk being distributed in the rod-holders by bundles of about a dozen rods—say twelve kilograms—the skeins can easily be taken out of the dyeing apparatus by means of the folding rack, and be formed into transportable bundles which are not liable to become soiled, which can be introduced with the racks into the drying-machine, and be thence removed for returning the same to the dyeing apparatus. These operations can all be performed without requiring the rods to be removed, and without having to take them one by one for replacing. In this way there is considerable economy of manipulation, and also a better treatment of the fiber.

The operation of the apparatus is, briefly, as

follows: The silk to be dyed is first disposed by skeins on the rods, the ends of which are inserted in the slides C. Then the slides are slipped in the grooves of plates A, the cages G being lifted above the bath. The cages and their loads are then lowered into the dye-vat until the silk is fully immersed. The cover V is lowered, and remains down while the silk is in the bath. The puckering of the silk in the bath is prevented by giving small movements to the cages, movements which can easily be given by hand or automatically. After immersion for a suitable time the cover is lifted, and the silk removed, either by means of the carriages for transporting the slides C or by means of folding racks, to be transported to divers other apparatus—such as the drying-machine, washing-baths, stoves, and the like. In all cases the silk remains on the rods from the beginning to the end of the operations, so that it is not apt to be soiled or broken, and, besides, a notable economy in work and time is effected.

It is evident that modifications can be made in details—as, for example, in forms, proportions, materials, and the like—without departing from the spirit of the invention, and parts of the invention can be used separately.

I claim the following parts, improvements, and combinations, all and several:

1. The combination, with the vat and cover therefor, of the cage, rod-holder, slides, and the lift for raising and lowering the cage and its contents, substantially as described.

2. In a dye-vat, the rods for supporting the fiber, in combination with the slides, and the rod-holders grooved to receive said slides, substantially as described.

3. In a dye-vat, the combination, with the cage, of the rod-holder journaled therein and the gearing for turning said rod-holder, substantially as described.

4. The combination of a series of connected cages, a series of connected rod-holders journaled in said cages, and gearing for turning said holders simultaneously, substantially as described.

5. The folding racks for transporting the silk on rods, said racks being provided with notches to receive said rods, substantially as described.

6. The folding racks having notches or sockets, in combination with a series of fiber-supporting rods held thereon, substantially as described.

7. The carriage provided with ways for receiving the slides in which the rods are placed, substantially as described.

8. The apparatus for manipulating and transporting fiber in dye-works, comprising, in combination with the vat, the rod-holder, the cage, and the lift for said cage, the slides, and the carriage provided with ways for said slides, so that the latter, with the rods and the fiber thereon, can be slipped from one to the other, substantially as described.

9. The combination, with the vat, of the beams running lengthwise over said vat, the series of cages depending from said beams, the rod-holders in said cages, and the hydraulic lifts applied to the ends of said beams, substantially as described.

10. The cover provided with a chimney and windows, in combination with the vat, the chains and weights for counterpoising said cover, and the hydraulic apparatus for controlling said cover, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH GILLET.

Witnesses:
ROBT. M. HOOPER,
EUG. DUBAIL.