(No Model.) 2 Sheets—Sheet 1.

W. LAIDLAW.

APPARATUS FOR DYEING YARN.

No. 501,517. Patented July 18, 1893.

FIG. 1.

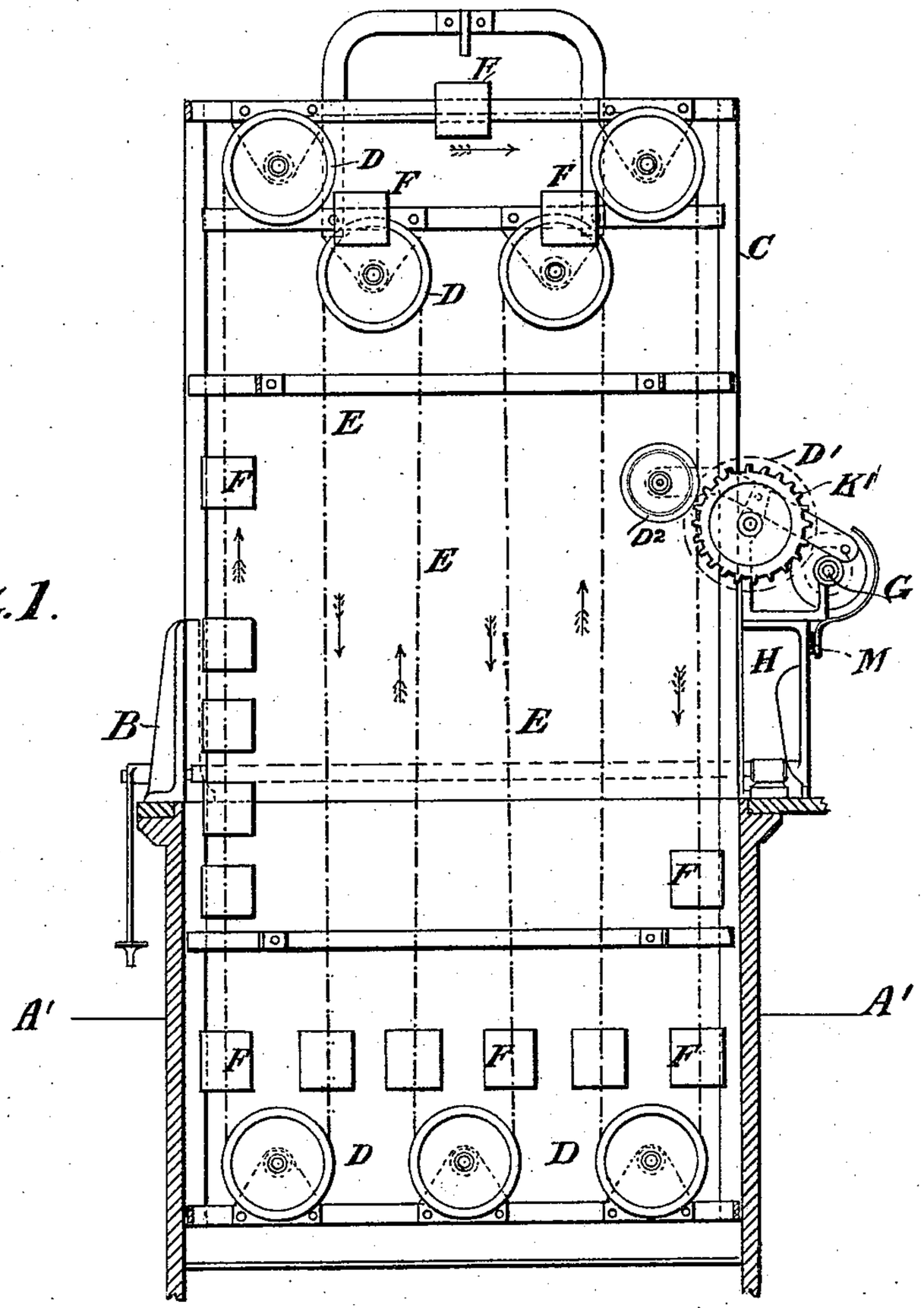
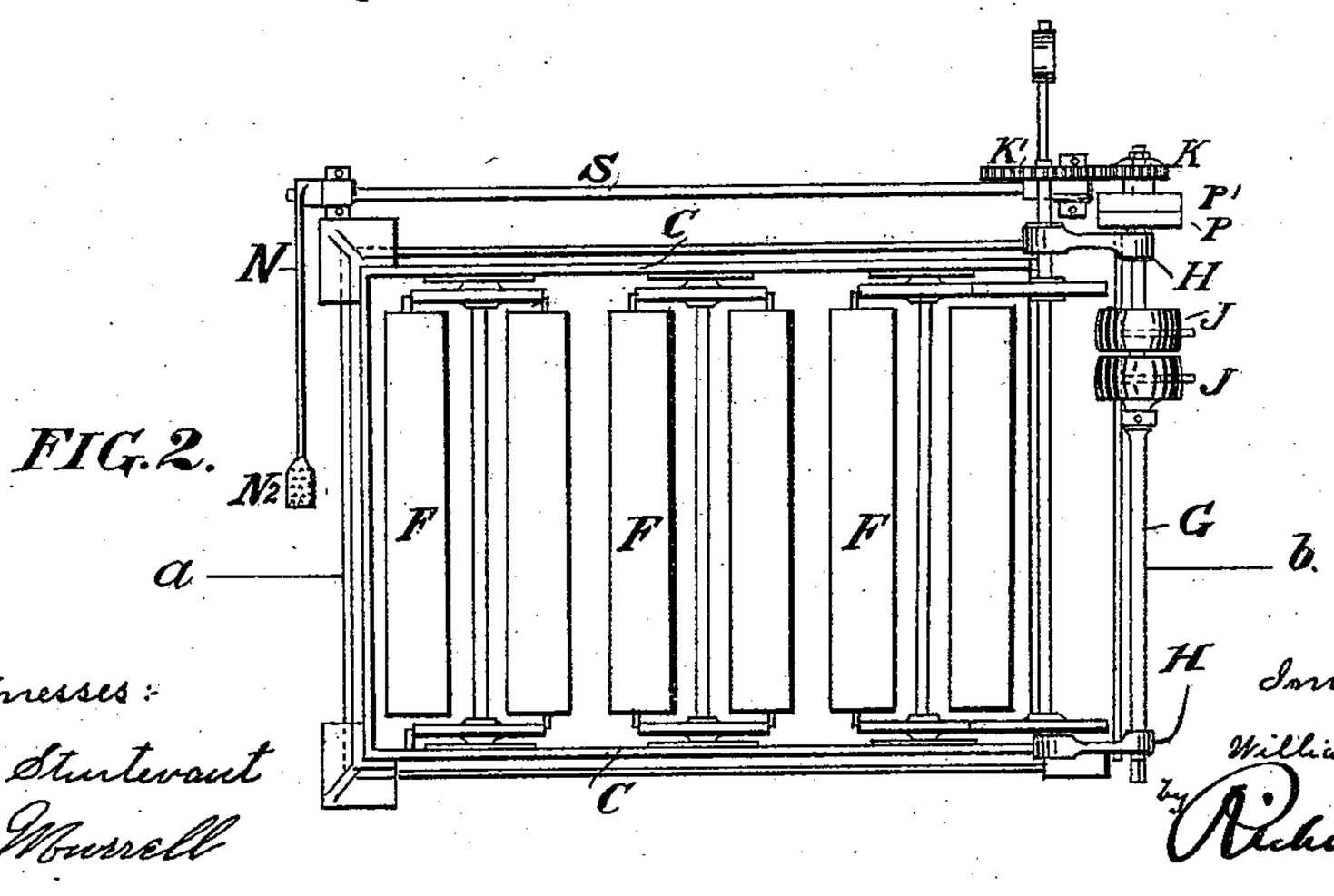


FIG. 2.



Witnesses:
E. H. Sturtevant
R. Worrell

Inventor:
William Laidlaw,
by Richards & Co
Attys.

(No Model.) 2 Sheets—Sheet 2.

W. LAIDLAW.

APPARATUS FOR DYEING YARN.

No. 501,517. Patented July 18, 1893.

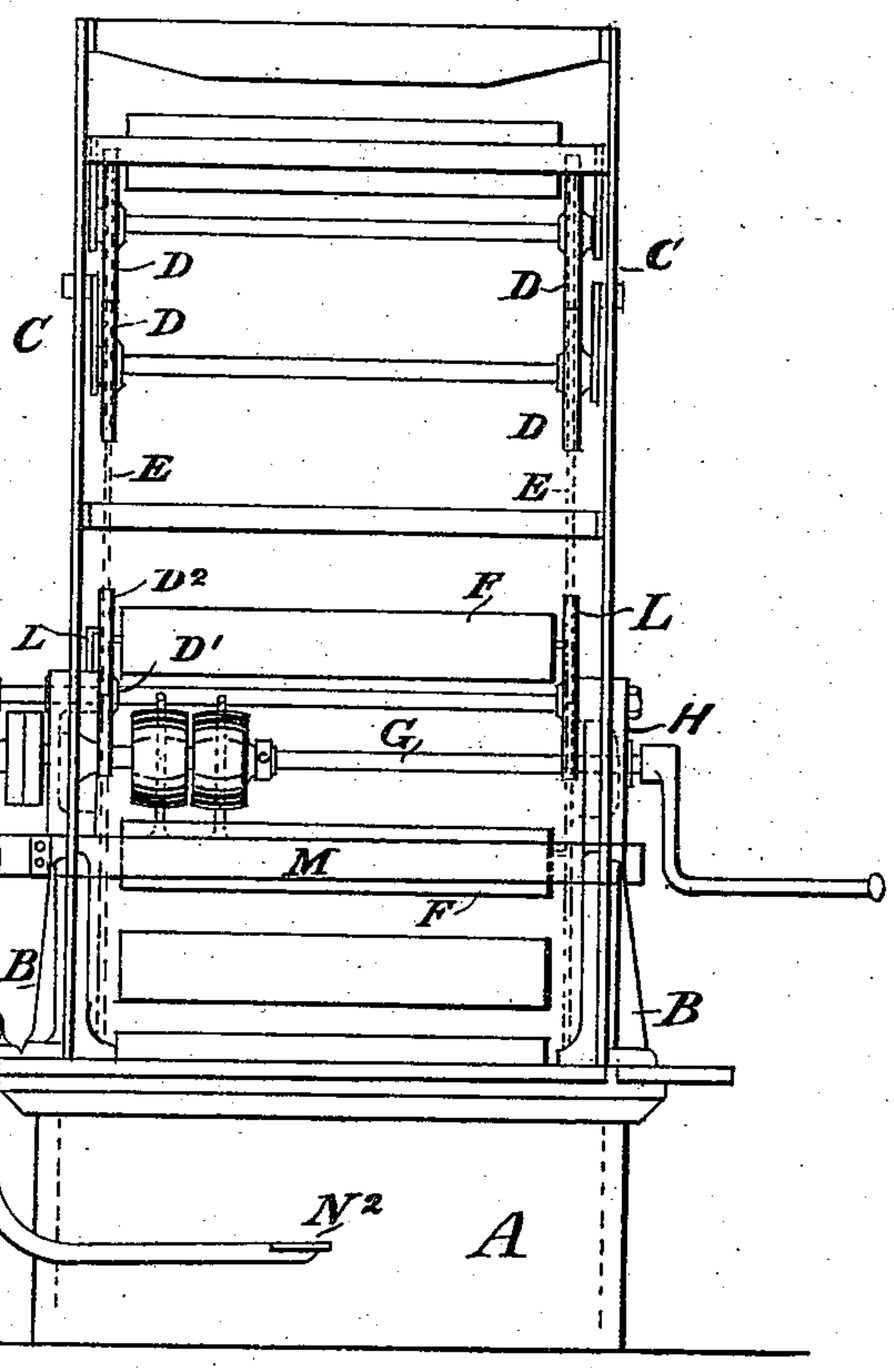


FIG. 3.

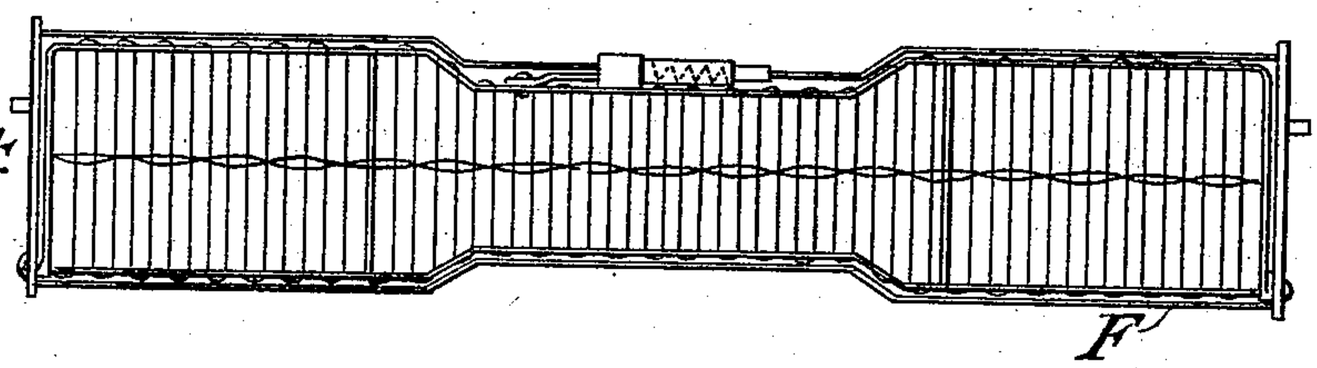


FIG. 4.

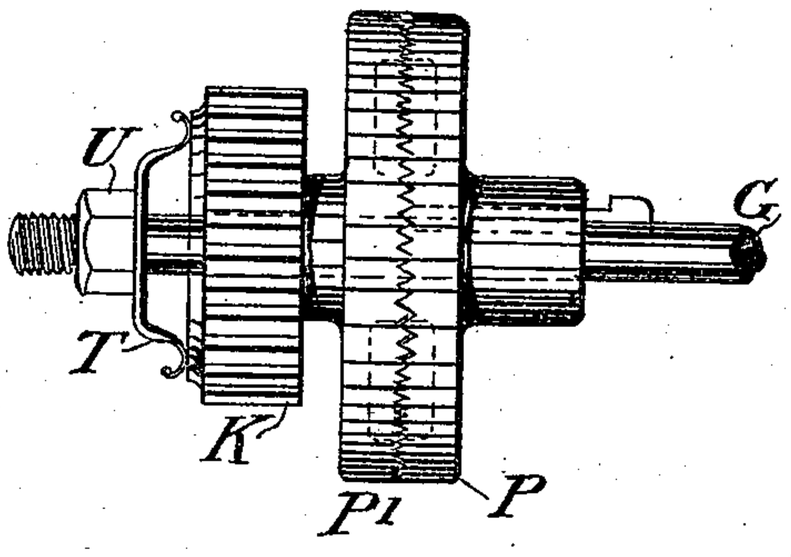


FIG. 5.

Witnesses:-
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UNITED STATES PATENT OFFICE.

WILLIAM LAIDLAW, OF HAWICK, SCOTLAND.

APPARATUS FOR DYEING YARN.

SPECIFICATION forming part of Letters Patent No. 501,517, dated July 18, 1893.

Application filed August 24, 1892. Serial No. 443,941. (No model.) Patented in England October 21, 1890, No. 16,751; in France August 21, 1891, No. 215,634, and in Belgium August 22, 1891, No. 96,119.

To all whom it may concern:

Be it known that I, WILLIAM LAIDLAW, a subject of the Queen of Great Britain and Ireland, residing at Hawick, in the county of Roxburgh, Scotland, have invented certain Improvements in Apparatus for the Dyeing of Yarn and other Fiber, (for which I have obtained Letters Patent in England, No. 16,751, dated October 21, 1890; in France, No. 215,634, dated August 21, 1891, and in Belgium, No. 96,119, dated August 22, 1891,) of which the following is a specification.

The object of my invention is the more effectual dyeing of yarns and the like by mechanical means in less time and with less labor than hitherto, and in such a manner that "pirling" or looping and entangling of the yarn during the operation of dyeing is prevented and consists of placing the fiber loose within a series of perforated cages of novel configuration attached to endless chains passing over pulleys mounted on framework constructed in a manner that it may be lifted clear or lowered into the dye vat while the pulleys, chains, and perforated cages are in motion, the said framework when in its normal position resting in the bottom of the dye vat and by the motion of the pulleys and chains the cages are mechanically immersed in the dye liquor any number of times until the fiber is effectually dyed.

In describing my invention in detail reference is made to the accompanying drawings in which—

Figure 1. represents a sectional elevation of my apparatus through line *a. b.* Fig. 2. is a plan; Fig. 3. a front elevation; Fig. 4. a view of a cage suitable for holding the yarn or other fiber to be dyed, and Fig. 5. is an enlarged elevation of the clutch plates.

The dye vat indicated by the letter A. for holding the dye liquor may be partly inserted below the floor line A′. in the same manner as the vats of ordinary machines, and at each corner of the vat A. is secured an angular upright bar B. for guiding and keeping the framework C. in the position within the said vat.

To the framework C. which may be raised and lowered in the dye vat are mounted a number of pulleys D. suitable for carrying endless pitch chains of the usual construction, which are represented by the dotted lines E. and to which are mounted on pivots a series of perforated cages F. in such a manner that, the sides thereof are always somewhat vertical and pass through the apparatus in the direction of the arrows.

Motion to the endless chains E. may be obtained from the shaft G. mounted to brackets H. attached to the vat A. and provided with a fast and loose pulley J and J′. On one end of the said shaft is mounted a pair of clutch plates P. and P′. constructed in the manner as hereinafter described, and on the boss of one of these clutch plates is secured a spur wheel K, gearing into the teeth of spur wheel K′. and upon the said shaft within and near to the framework C. are secured one at each side of the machine pitch chain pulleys D′. by which motion is communicated to the respective endless pitch chains E. and perforated cages F. attached thereto. The pitch chains E. are kept in contact with the teeth of the ordinary pitch chain pulleys D′. D′. by means of additional pulleys D^2. one of which is mounted at each side of the machine on an arm L. and in such a position that, the pitch chains are supported and the opposite side of the chains kept in gear with the teeth of the driving pulleys D′.

To the belt fork bar M. is attached a lever N. secured on a shaft S. supported by suitable journals, and on the shaft is also secured a lever N′. extending on the front of the machine and terminating with an expanded or tread portion N^2. so that the operator standing at the front of the machine can actuate the belt guide and belt by means of his foot, the arm of the lever being balanced by the lever and weight attached to the shaft S.

The framework C. and pulleys D. may be raised clear of the interior of the vat A. by mounting the driving pulleys D′. and retaining pulleys D^2. in the manner described; motion being communicated to the pitch chains E. in all positions of the framework C. and to the pulleys D mounted thereon.

The yarn or other fibrous material is placed in the perforated cages F. through a suitable door formed by one of the sides being made

to open and is placed therein by preference when the framework C. is raised out of the vat A. The endless chains E. may then be put in motion and the framework C. lowered without stopping the said chains, which, on continuing to rotate over the pulleys D. mechanically immerse the perforated cages F. and contents in the liquor in the vat any number of times until the fiber in the cages is effectually dyed.

By my invention the yarn or other fiber placed within the perforated cages is subjected to no friction or tension during the operation of dyeing, as the hanks lie loosely within the perforated cages, thus allowing the liquor to act evenly on all parts, and by frequent immersion all the threads are dyed without any deleterius effect on the yarn when dried.

The cages F. are supported at the ends by pivots projecting from the endless chains E. and the center of each cage is contracted in area, thus leaving the ends of the hanks of yarn freer than the center by which the fiber is more effectually dyed and the "pirling" or looping and entangling of the threads prevented.

In order to provide means whereby the rotation of the cages may be stopped should anything become entangled with the cages, I mount on the shaft G. a pair of clutch plates; plate P. being secured on the shaft G. and P′. having the spur wheel K. secured on the boss thereof mounted loosely on the shaft, but kept in contact with fixed plate P. by means of bow spring T. The face of each plate is provided with angular teeth kept in gear by means of the bow spring T. the pressure of which is adjusted by the nut U. and should the power required to drive the machine become greater than the friction applied to the clutch plates by the pressure of the spring T. the angular teeth on the fixed clutch plate P. will force the sliding clutch plate P′. and wheel K. on the shaft G. and thus stop the machine.

What I claim as my invention is—

1. In a dyeing apparatus the vat, the frame work C, capable of having vertical movement relatively to the vat, the guides for said frame work, the pulleys D, carried by the frame work, the chain carrying the cages F, and passing over the pulleys, and means adapted to operate the chain in all the vertical positions of the frame work, substantially as described.

2. In a dyeing apparatus, the vat, the frame work having vertical adjustment, the guides, the pulleys and chains carried by the frame work and operating means adapted to operate the chains and pulleys in all the vertical positions of the frame work, substantially as described.

3. In combination, the vat, the vertically adjustable frame work, the guides therefor, the pulleys, and chains carried by the frame work, the drive chain wheels D′, supported on a stationary part and engaging the chains, the means for operating the said pulleys and the means for keeping the chains in engagement therewith consisting of the pulleys D^2, and the yielding support therefor carried by a stationary part of the frame work adjacent to the drive chain pulley D′, substantially as described.

4. In combination, in a dyeing apparatus, the vat, the pulleys and carrying chains, the supporting means for the same and the perforated cages F, secured to the chains, said cages having the contracted central portions, substantially as described.

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

WILLIAM LAIDLAW.

Witnesses:

WILLIAM BALLANTYNE,

WILLIAM OLIVER.