(No Model.)

3 Sheets—Sheet 1.

W. D. JONES.

APPARATUS FOR DYEING.

No. 420,877. Patented Feb. 4, 1890.

Fig. 1.

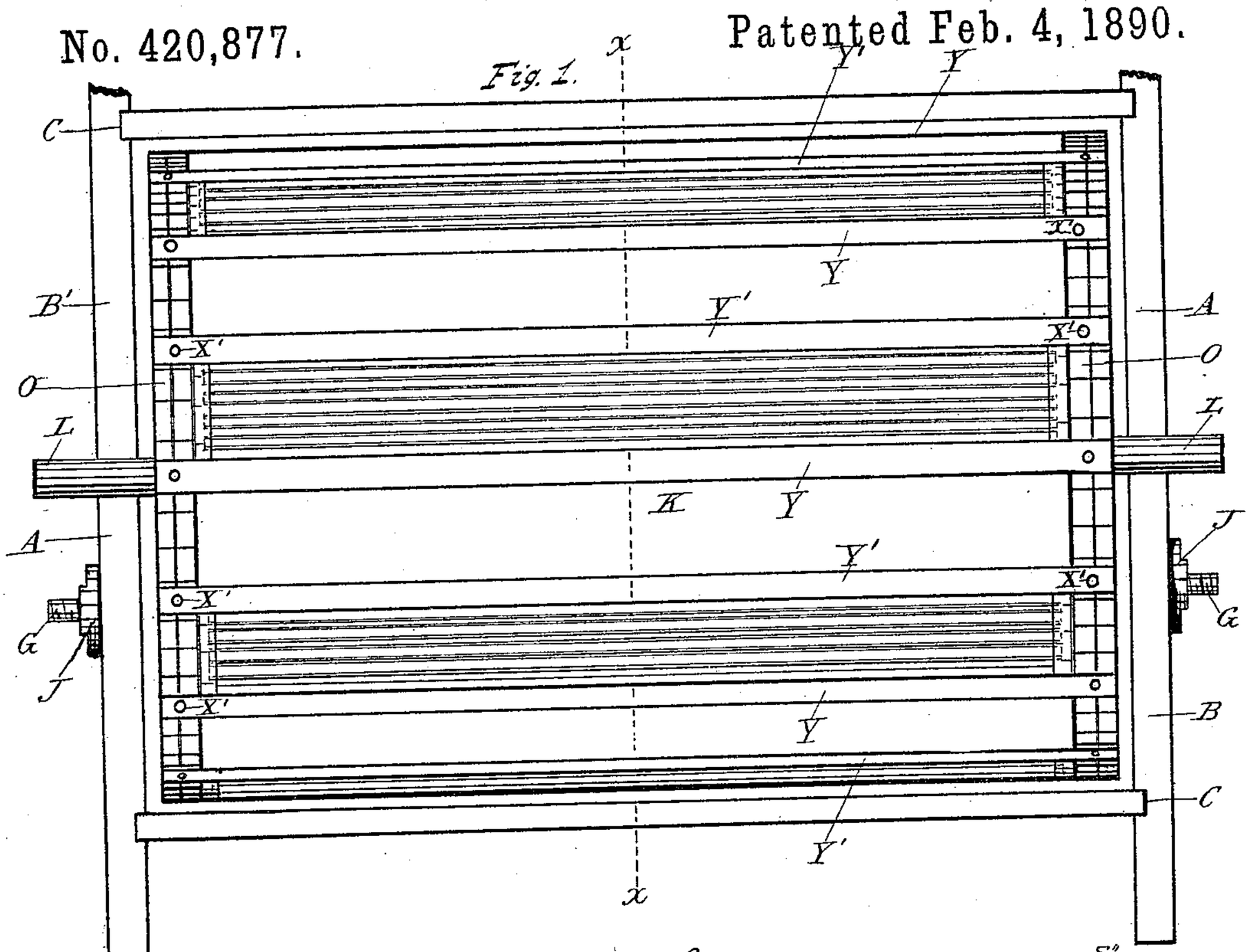

Fig. 8.

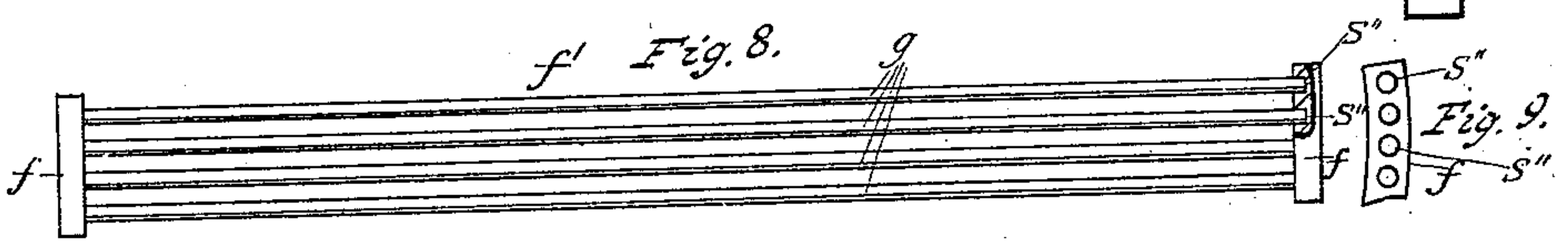

Fig. 9.

Fig. 10.

Fig. 4.

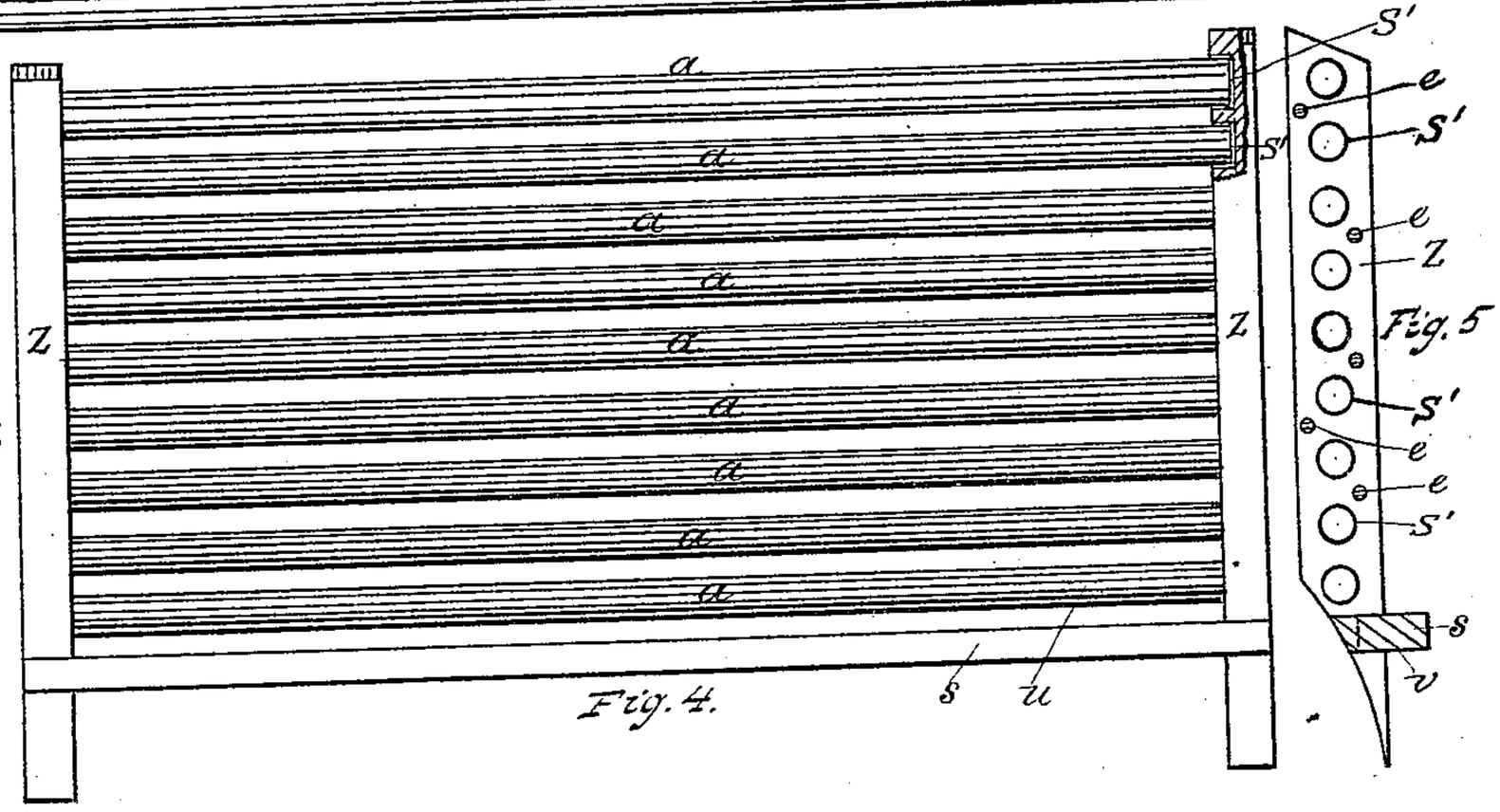

Fig. 5.

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Fig. 3.

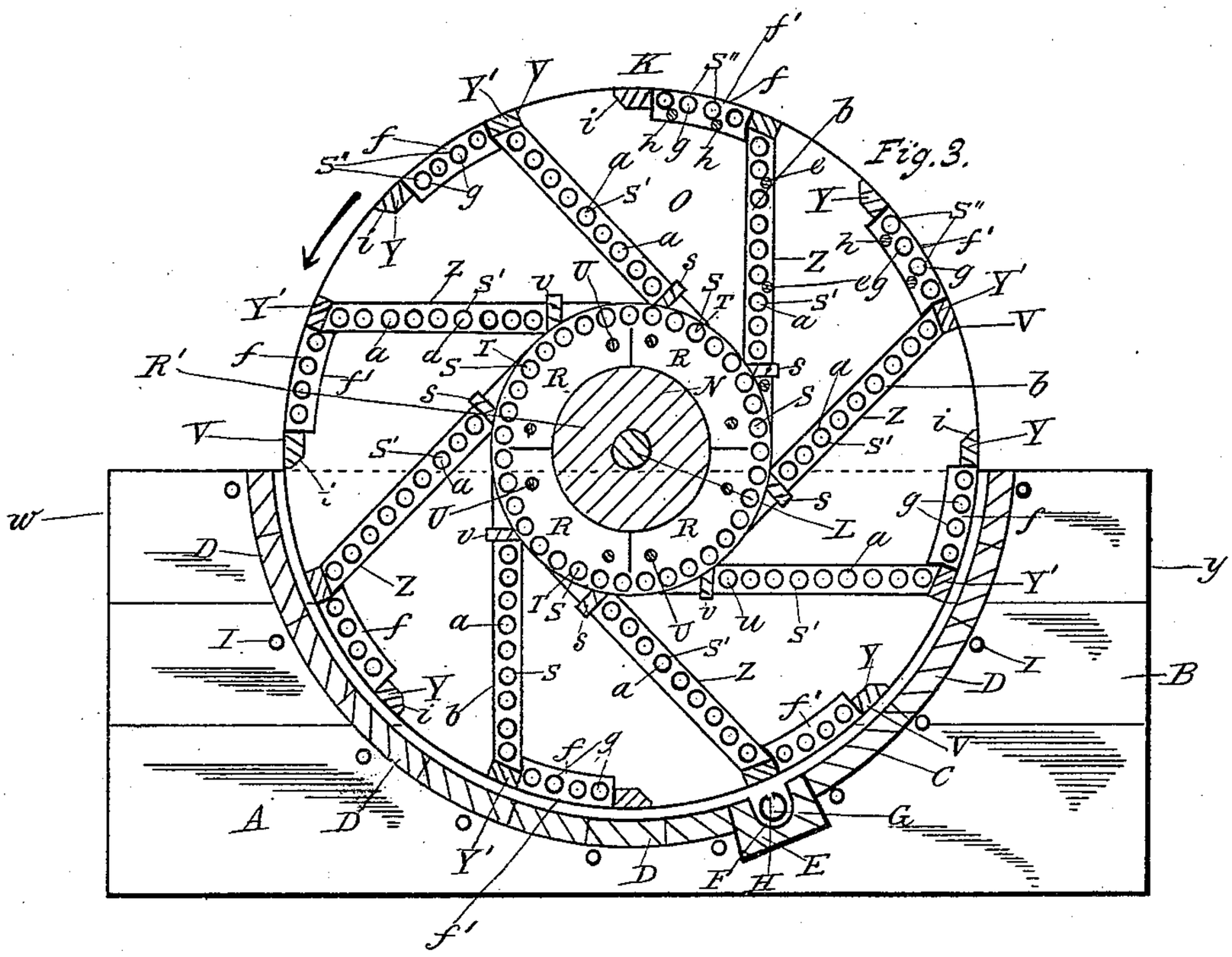
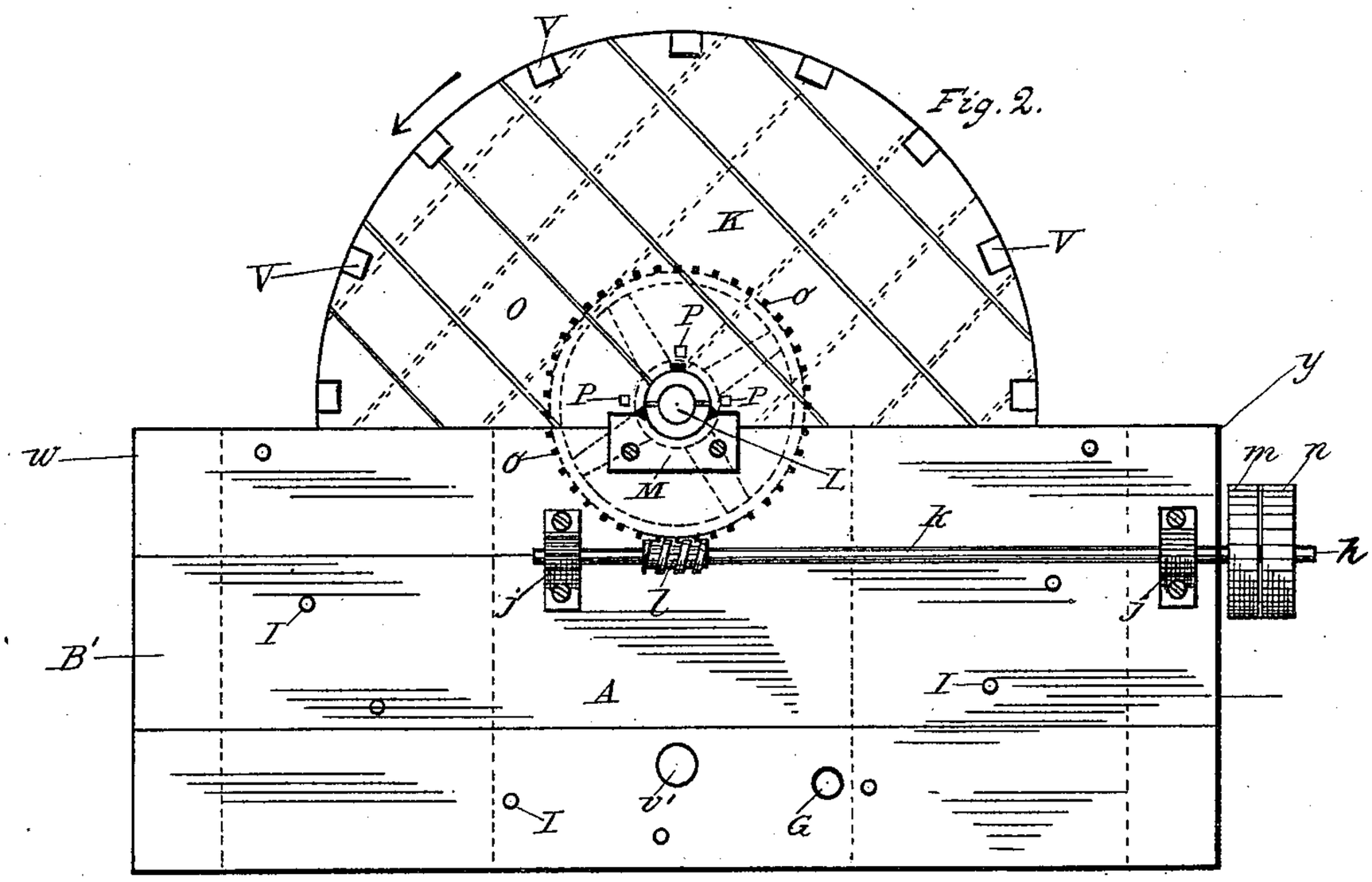


Fig. 2.



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APPARATUS FOR DYEING.

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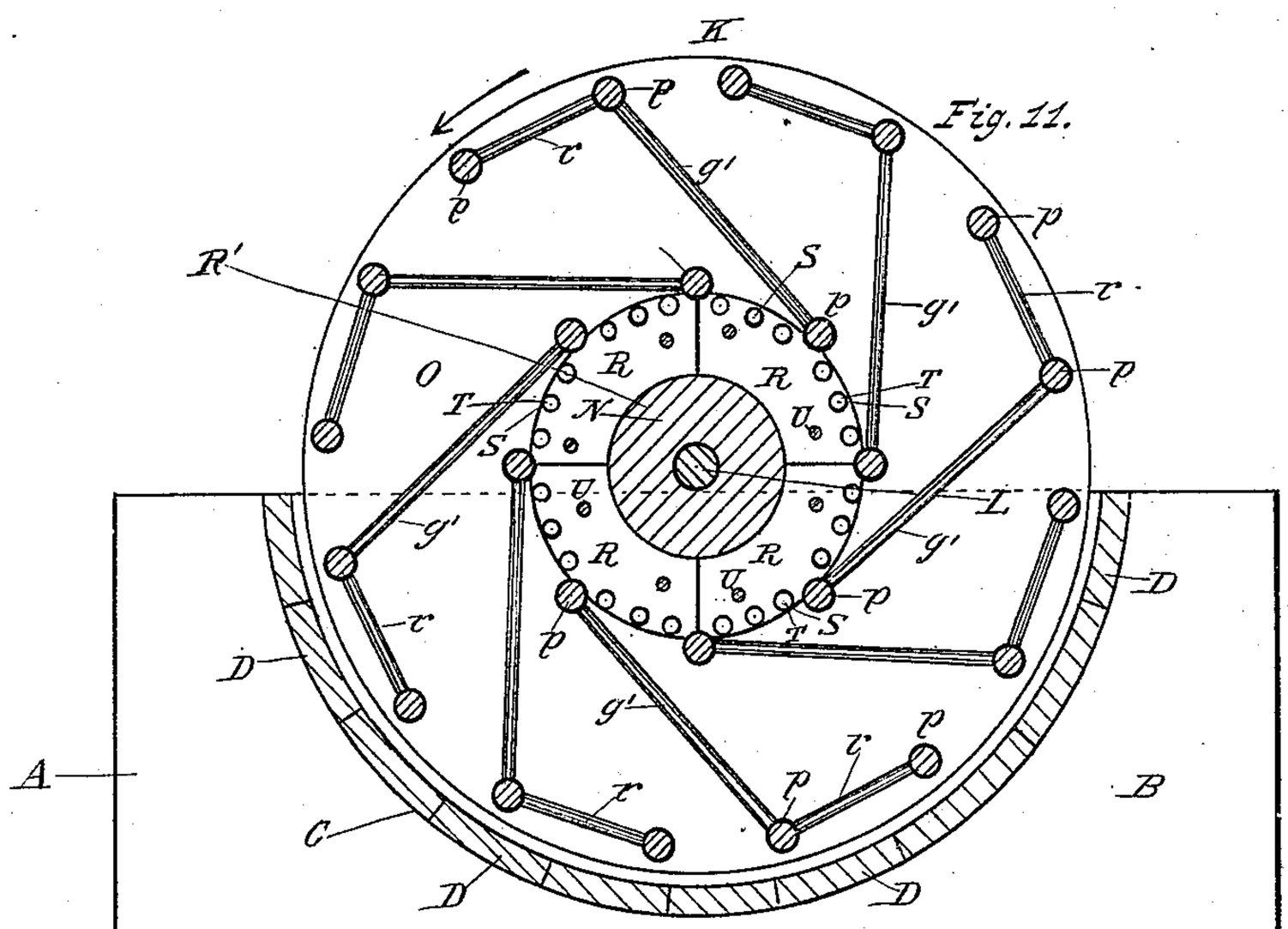

Fig. 11.

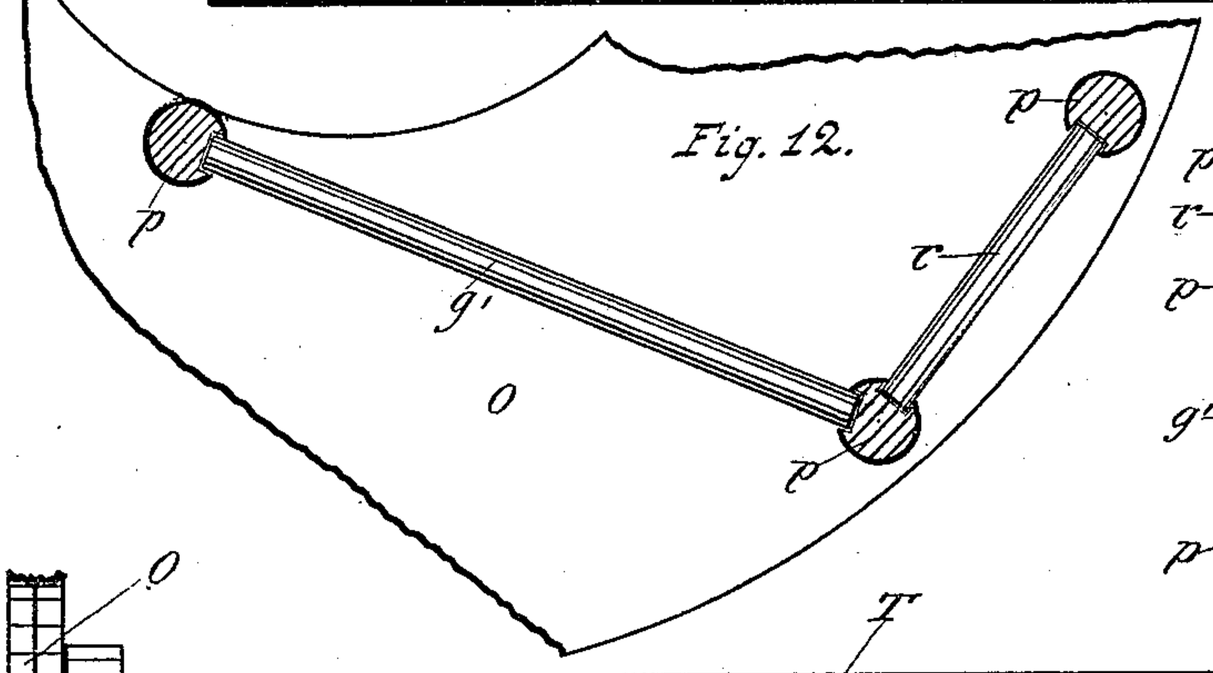

Fig. 12.

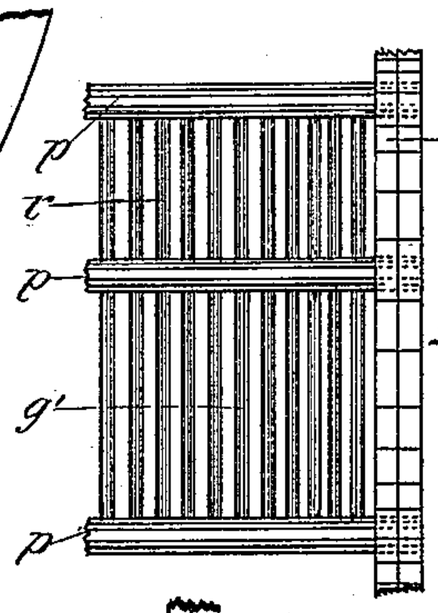

Fig. 13.

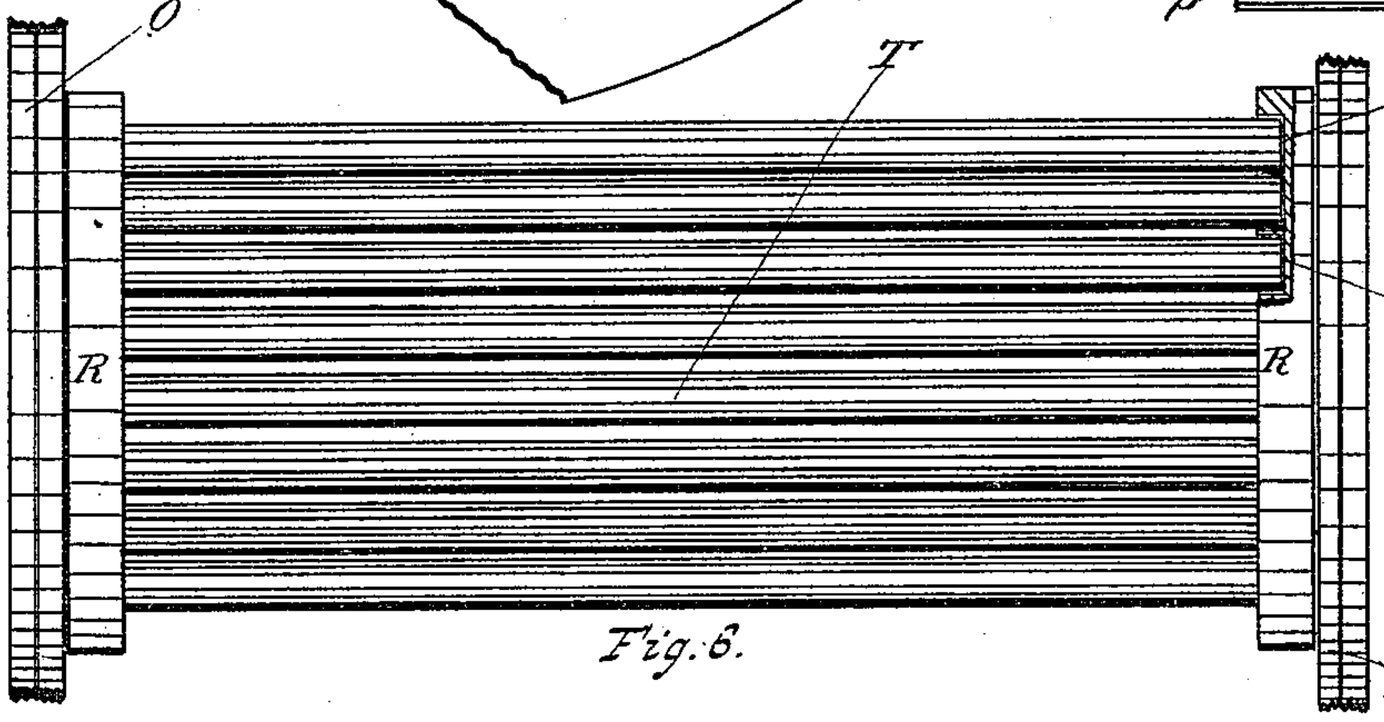

Fig. 6.

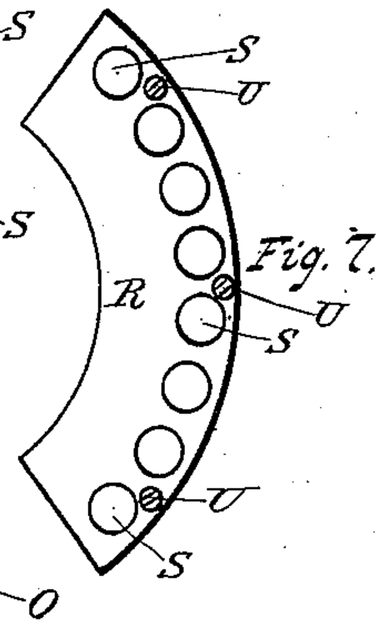

Fig. 7.

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W. Davidson Jones

UNITED STATES PATENT OFFICE.

W. DAVIDSON JONES, OF AMSTERDAM, NEW YORK.

APPARATUS FOR DYEING.

SPECIFICATION forming part of Letters Patent No. 420,877, dated February 4, 1890.

Application filed March 9, 1887. Serial No. 230,185. (No model.)

To all whom it may concern:

Be it known that I, W. DAVIDSON JONES, a citizen of the United States, residing at Amsterdam, in the county of Montgomery and State of New York, have invented certain new and useful Improvements in Dyeing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improved machine or apparatus for dyeing fabrics of various kinds; and it consists of a revolving dye-wheel provided with a series of buckets, combined with a dye-vat having a semi-cylindrical bottom provided with a channel or groove of sufficient size to receive a perforated steam-pipe to introduce steam-heat and boil the dye-liquor without any portion of the inside of the tank or vat being perforated or provided with a false bottom, thereby nearly forming a perfect section of a circle on the inside of the tank or vat, which construction obviates and does away with all "dead-spaces," thereby effecting a saving in steam to heat the extra liquor contained in the "dead-spaces," and also effecting a saving in dyes. This peculiar construction avoids any depressions in the inside of the tank or vat where goods may be caught and injured by the revolutions of the dye-wheel, as the upper portion of the steam-pipe (which is usually about one and one-quarter inch in diameter) is about flush with the curvature-line of the arc of the circle forming the inside of the tank or vat. By the use of a dye tub or vat of this construction, if a garment escapes from one of the buckets, it will simply be swept out by the dye-wheel without injury, when it can be replaced.

Referring to the accompanying drawings, and the letters of reference marked thereon, which form a part of this specification, Figure 1 is a plan. Fig. 2 is an end elevation. Fig. 3 is a transverse sectional end elevation on the broken line *x* in Fig. 1. Figs. 4, 5, 6, and 7 are enlarged plans of sections of the interior dividing-pieces, which in connecting with other parts form the buckets to receive the fabrics to be dyed. Figs. 8 and 9 are views of the outward sections that in connection with other parts, form the buckets. Fig. 10 is a plan upon an enlarged scale of the steam-pipe to introduce steam to boil the dye-liquor. Fig. 11 is a modification of the same general form of buckets, as shown in Fig. 3. Fig. 12 is a sectional elevation of one of the buckets in Fig. 11, exhibiting the method of construction; and Fig. 13 is a plan of a portion of one of the buckets in Fig. 11, showing the detail of their general construction.

Like letters of reference indicate like parts in each view, and the arrows the direction of motion.

Referring to the drawings, A represents a semi-cylindrically-formed tub or vat constructed of any convenient size, with the end pieces B B′, having therein the channels or grooves C to receive the series of staves D and the large stave E. (See Figs. 1, 2, and 11.) The large stave E (see Fig. 3) I construct of greater dimensions, so as to be of sufficient strength when the groove or channel F is made therein, as shown in Fig. 3, to receive the perforated steam-pipe G. (See Figs. 1, 2, 3, and 10.) This steam-pipe contains the perforations H, and may extend the full length of the groove or channel F, with the perforations H upward, and project through the end pieces B B′; or the steam-pipe G may extend only partially through the length of the channel F—as an example, say, seven-eighths, or about that distance, or a sufficient distance to secure the heating and boiling of the dye-liquor. To one of these projecting ends connection is made with a steam-pipe to introduce steam into the bottom of the tank to boil the dye-liquor, and the opposite end is closed with a cap or stop-cock.

The tank or vat A is secured firmly together with the longitudinal bolts I, thereby holding the staves securely in place.

The perforated steam-pipe is secured in place by screw-threaded collars J at each end of the tank; or the perforated pipe may be secured to one of the end pieces B or B′, and may not extend the full length of the channel or groove F. In this case the extreme end should be closed to prevent the escape of steam and cause it to pass through the per-

forations. The grooves or channels C in the end pieces B B′ to receive the staves are cut upon the arc of a circle of which the shaft L is the center. By this peculiar and novel construction I obviate the necessity of a false bottom or a perforated bottom, which has heretofore been in use in apparatus of this character, and consequently economize by the use of only a sufficient quantity of dye-liquor to immerse the goods in properly, which is all brought in contact with the goods being dyed, thereby saving the excess of dye-liquor and steam, which is required to fill and heat the chambers between the true and false or perforated bottoms in machines heretofore used for dyeing.

The dye-wheel K, I construct with a central shaft L, journaled in boxes M, placed upon the upper central portion of the end pieces B B′, as shown in Fig. 3 of the drawings. I provide this central shaft L with a covering of wood N to protect it from the dye-liquor.

I construct the disks O of two layers of wood, with the grain of one layer running crosswise of the grain of the other, substantially as shown in Fig. 2, and secure the layers in each disk firmly together with non-corrosive screws, which are not shown in the drawings, and secure the disks O to the shaft L and wooden covering N with bolts P, or by any of the well-known mechanical methods.

I construct segmental pieces R, substantially as shown, (see Figs. 3, 6, 7, and 11,) and make in each a series of holes S near the periphery of the completed circle, substantially as shown in Figs. 3, 6, 7, and 11. These holes I bore about one-half way through these pieces R, substantially as shown, at the broken-away sectional portion of the segmental piece R in Fig. 6. These segmental pieces are joined together in pairs by inserting in the holes S longitudinal rods T (see Figs. 3, 6, and 11) of such length as to form a section, as shown in Fig. 6, that can be placed in and nicely fit between the disks O and close to the wooden covering N of the center shaft L, as shown in Figs. 3, 6, and 11. These sections I secure in place with non-corrosive screws or nails U, thereby forming the complete cylinder R′. With this mode of construction there is formed an open circumferential chamber between the rods T and the wooden piece N. (See Figs. 3 and 11.)

The disks O are provided with mortises V, (see Figs. 1, 2, and 3,) into which I insert and secure with screws X′ the longitudinal bars Y and Y′. These mortises may be dovetailed in form, and the bars Y and Y′ constructed to correspond, or they may be secured by any other well-known method in common use.

I construct side supporting-pieces Z substantially of the form shown in Figs. 3, 4, and 5. These side pieces necessarily must be in pairs, and I provide them with holes S′ bored about one-half way through, substantially as shown in the several views of the drawings, and more particularly shown in the partly broken away section in Fig. 4. I insert in these holes, as shown in Fig. 4, the rods *a*, thereby forming a section *b*. It may be well here to observe that the rods T, *a*, and *g* are of the same exact length, and that the side pieces Z, segmental pieces R, and the segmental pieces *f* are all of the same exact thickness, and the holes in each are bored to the same exact depth.

The longitudinal bars *s* are secured in position, substantially as shown in Figs. 3, 4, and 5, by small mortises in the side pieces Z. These bars close up and prevent pieces of fabric from passing through a wide space, which necessarily occurs in construction at the lower portion of each bucket between the rods *t* and *u*, (see Fig. 3,) and the projecting back *v* of the bars *s* causes the pieces of fabric to be separated when the dye-wheel revolves, which will be more fully described hereinafter.

The section-pieces *b*, I place in position between the disks O, with the outer ends of each abutting against the inside of the longitudinal bars Y′, and the inside ends resting upon the segmental pieces R that support the rods T that form cylinder R′, and secure them firmly in place with screws *e*. (See Figs. 3 and 5.) These pieces Z, I place in position upon a tangent with the periphery of the segmental pieces R and cylinder R′, all substantially as shown in the several figures.

f represents short segmental pieces provided with holes S″, bored about one-half way through, as shown in the broken sectional view in Fig. 8. These segmental pieces *f* are connected together in pairs by rods *g*, thereby forming sections *f*′, substantially as shown in Figs. 1, 3, and 8, and are placed in position, as shown in Figs. 1 and 3, between the disks O and the longitudinal bars Y and Y′, and are firmly secured in place by screws *h*. (See Figs. 1 and 3.) There is provided a space of about one inch between the disks O of the dye-wheel K and the inside of the end pieces B and B′. The longitudinal bars Y and Y′ sweep or run within about three-quarters of an inch of the inside of the series of staves D when the dye-wheel is in motion.

v′ is an aperture through which the spent dye-liquor is discharged. The longitudinal bars Y are beveled on their forward inward part, as shown at *i* in Fig. 3, for the purpose of allowing the bars Y, which form the forward portion of each bucket, to more readily scoop in any garment that may fall out. Upon the side of the end piece B′, I place boxes *j j*, in which is journaled the shaft *k*, having secured thereon a worm *l* and a tight pulley *m* and loose pulley *n*. The worm *l* engages a worm-gear *o*, that is secured upon the end of the shaft L, which projects a sufficient distance through the box M to receive it. This worm-gear is indicated by the broken lines. Power from any prime motor through the medium of a belt engages the pulley *m* and revolves the dye-wheel.

Figs. 11, 12, and 13 exhibit a modification or another mode of constructing buckets embodying the same principle of invention as the buckets just above described, which consists in securing longitudinal bars *p* in the disks O, substantially as shown in Figs. 11, 12, and 13, and provided with series of transverse small rods *q'* and *r*, supported in perforations in the longitudinal bars, substantially as shown in the several figures referred to, and more particularly in Fig. 12.

The operation of my invention is as follows: The tank or vat is supplied with the requisite amount of dye-liquor. The fabrics to be dyed are placed in the buckets, preferably at the side of the apparatus marked *y* in Figs. 2 and 3, as the dye-wheel K is slowly revolved forward. Motion is communicated to the dye-wheel in the direction indicated by the arrows through the medium of a belt from any prime motor. Steam is introduced through the perforated steam-pipe G to heat and boil the dye-liquor. As the dye-wheel revolves, the fabrics in the buckets or compartments are gradually passed through the dye-liquor in the vat and carried up out of the dye-liquor on the rods *a* in the section-pieces *b*, or, in other words, in the bottoms of the buckets, until by reason of the position attained by the dye-wheel revolving the fabrics gradually fall in toward the central portion of the wheel upon the rods T, bar *s*, and the rods *a* in the preceding bucket, where they are retained until they have passed sufficiently over on the downward side to cause the fabrics by their specific gravity to fall from their position down the incline of the back of the rods *a* into the dye-liquor. As the fabrics fall from the last-mentioned position, the bar *s* causes them to be parted and prevents them from falling in one mass, for the reason the bar *s* forms a retainer, which retains or holds back a portion of the goods for a very short time. The fabrics in passing over in the revolving buckets are drained, aired, turned, and separated and changed from the position they occupied during the preceding revolution of the wheel K, thereby causing the dye-liquor to pass through the fabrics in different directions at each revolution of the dye-wheel, thereby causing the fabrics to be dyed uniformly throughout. By the continued slow revolutions of the dye-wheel K for a short time the fabrics are submitted to alternate dipping or passing through the dye-liquor and airings and drainings, which insures perfect dyeing of the fabrics.

When the buckets of the revolving dye-wheel are supplied with the usual quantity of goods, the dye-liquor, as a natural result, rises a little higher than the true level on the side of the tank marked *y*, and consequently sinks a little lower on the opposite side, which causes a strong current of dye-liquor to pass through the rods T in the cylinder R' to again come in contact with the descending fabrics as they fall down the back of the descending buckets.

To deliver the fabrics from the dye-wheel when dyed, the wheel is stopped with the bar Y' or heel of each bucket at or a little above the top of the edge of the tank at the end marked *w*, when the fabrics can be easily removed into a box to receive them.

It is evident that the rods T, *a*, and *g* may be substituted with small square rods or with slats or strips, or with perforated plates or non-corrosive metal wire-cloth, or the rods T, *a*, and *g* may be inserted in holes made direct in the disks O, or the number of buckets may be increased or diminished without changing the nature of my invention.

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

1. A dye-wheel provided with buckets adapted to receive and carry the fabrics to be dyed, in combination with a dye-vat having a semi-cylindrical bottom provided with a channel or groove at or near the bottom and containing a perforated steam-pipe, for the purposes set forth.

2. A dye-vat having a semi-cylindrical bottom, provided with a channel or groove at or near the bottom thereof, and a perforated steam-pipe contained in said channel or groove, for the purposes set forth and described.

In testimony whereof I affix my signature in presence of two witnesses.

W. DAVIDSON JONES.

Witnesses:

STEPHEN COLLINS,

PETER J. LEWIS.