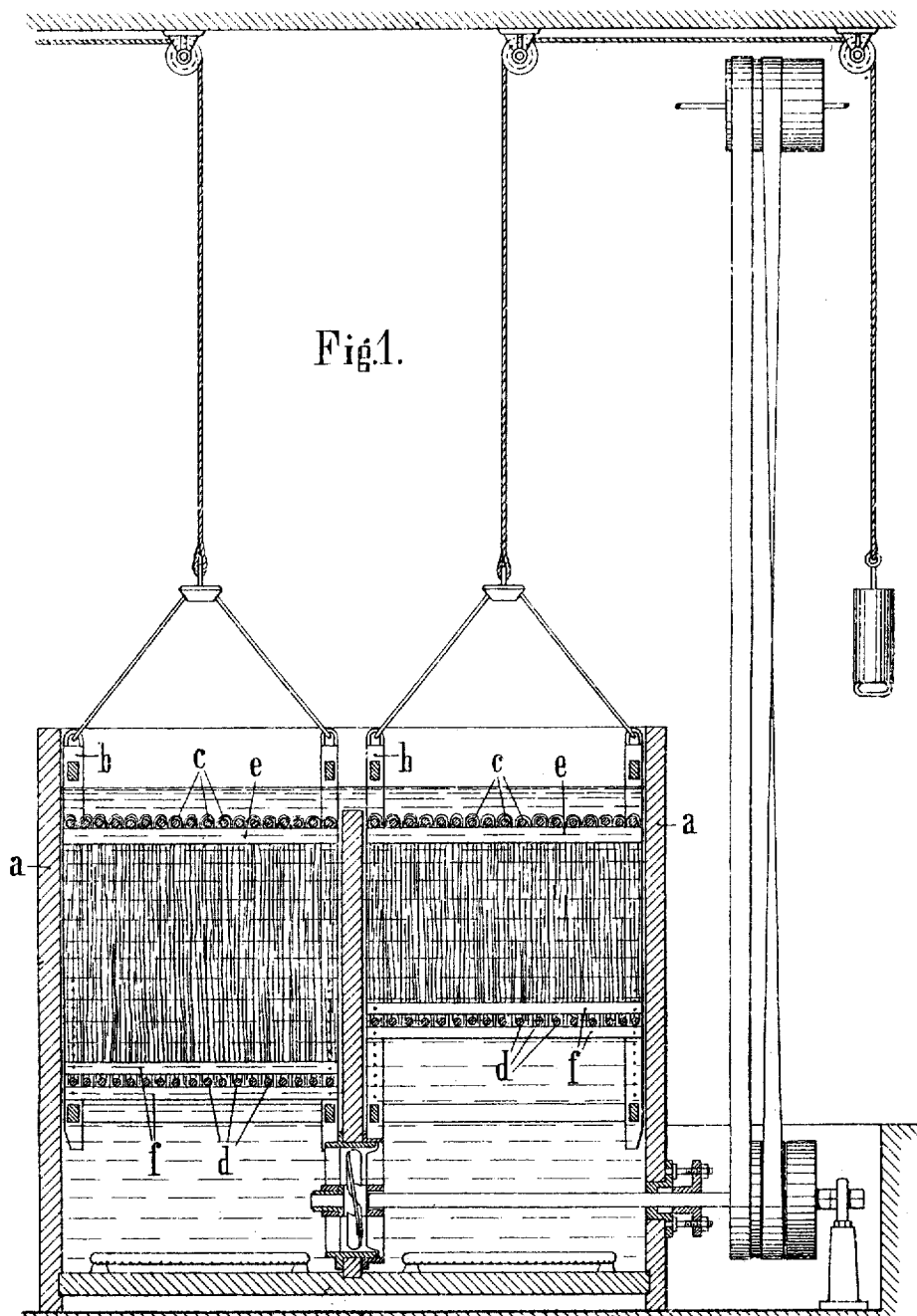


F. GEISSLER & B. WAGNER.
 APPARATUS FOR DYEING YARN.
 APPLICATION FILED JAN. 28, 1909.

940,868.

Patented Nov. 23, 1909.

3 SHEETS—SHEET 1.



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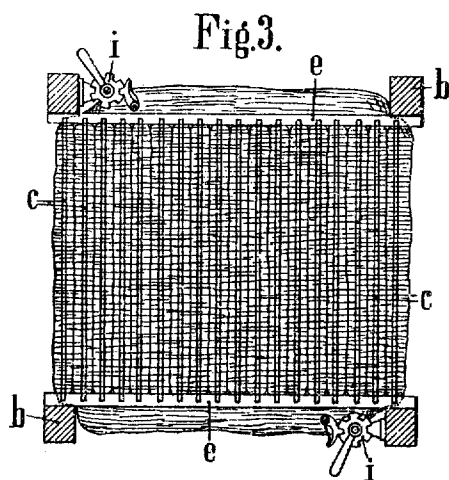
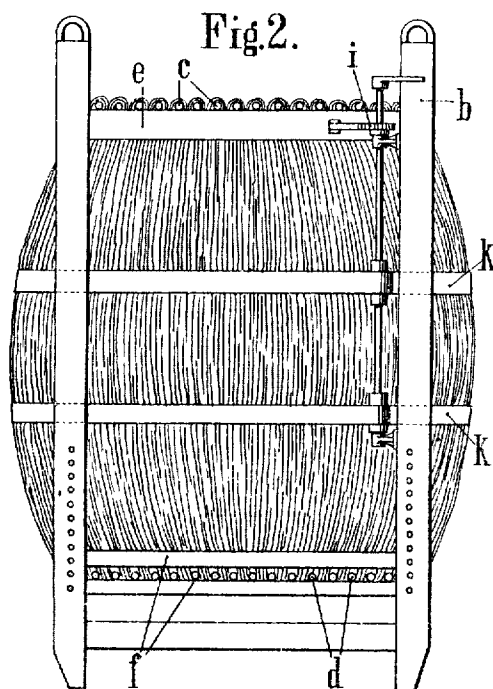
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 3 SHEETS—SHEET 2.



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 3 SHEETS—SHEET 3.

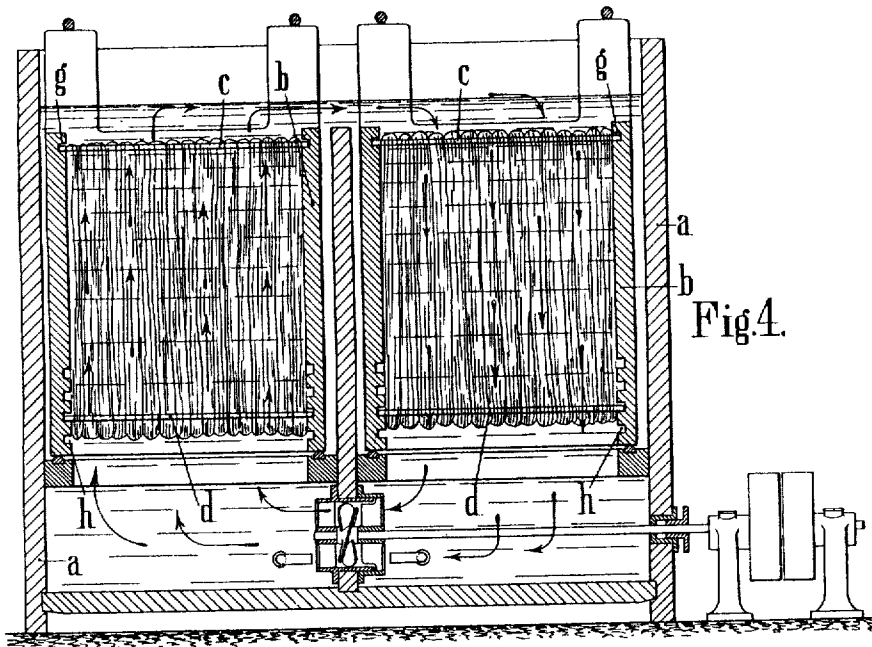


Fig. 4.

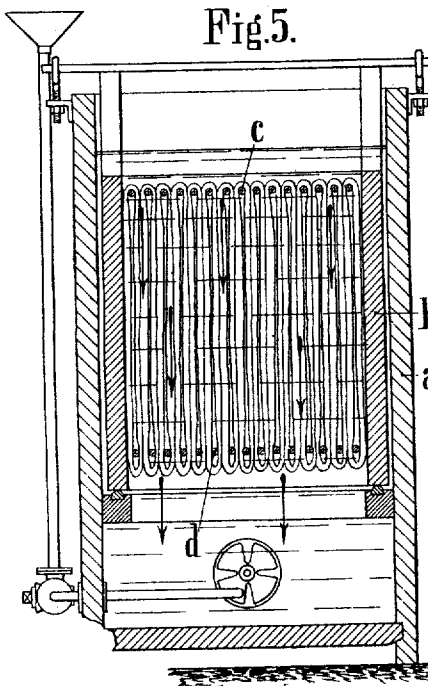


Fig. 5.

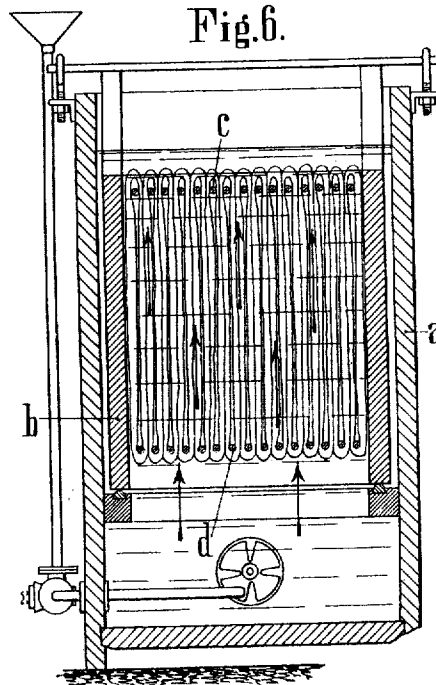


Fig. 6.

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UNITED STATES PATENT OFFICE.

FRANZ GEISSLER, OF KOTTBUS, AND BRUNO WAGNER, OF GÖRLITZ, GERMANY.

APPARATUS FOR DYEING YARN.

940,868.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed January 28, 1909. Serial No. 474,829.

To all whom it may concern:

Be it known that we, FRANZ GEISSLER, of Kottbus, Prussia, and BRUNO WAGNER, of Görlitz, Prussia, Germany, both subjects of the German Emperor, have invented new and useful Improvements in Apparatus for Dyeing Yarn, of which the following is a specification.

This invention relates to apparatus for dyeing yarn in strands with the use of circulating dye liquor which flows in alternate directions through the yarn.

According to this invention, the strands of yarn are suspended on two bars arranged at a distance apart, depending on the length of the yarn strands,—preferably on two bars arranged vertically above each other—and introduced with the said bars into a special frame or box open in the direction of the strands, at the top and at the bottom, or at two opposite sides, in such manner that the whole charge of yarn, held together by the frame or box can be moved on the suspension bars by the liquid dye flowing in the direction of the threads and all portions of the yarn efficiently treated by the dyeing liquor. The bars filled with yarn strands are arranged in a suitable manner side by side in slots or on supporting ledges of the said frame or box until the whole box or supporting frame is filled with yarn strands, whereupon it is introduced with the latter into the dyeing vat. Yarn strands arranged in such manner, in combination with the reversible circulation of the dyeing liquid, produce an exceedingly good dyeing.

Certain soft qualities of yarn cannot be dyed when arranged on the top of each other, as yarn strands situated at the bottom, get impressions from those situated above, and these impressions cannot be removed. These impressions are, however, completely avoided in the suspension according to this invention. The chief point is, however, that the reversible circulation of the liquid dye prevents the portions of yarn situated directly on the yarn bars, from remaining undyed. The yarn strands which are suspended loosely over the series of bars, will of course bulge out, in the center, when arranged in a large number in a frame, but held together at the sides the whole uniform block of yarn will be able, as already stated, to shift in the direction of flow of the circulating dye liquor, so that the yarn portions resting on each other, will be attacked

by the liquid at every point. This will result in the yarn strands being automatically moved by the liquid dye during the dyeing, and without the supporting box or frame being moved, in such manner that alternately one or the other bearing place is lifted off from the frame.

The nature of our invention will be best understood in connection with the accompanying drawings, in which—

Figure 1 is a longitudinal section through a dyeing vat with circulating dye liquor, after the yarn strands have been introduced. Fig. 2 shows in side elevation a supporting frame removed from the vat and filled with yarn, the yarn masses bulging out in the middle, being held together by bands during the introduction. Fig. 3 is a plan after the bands have been tightened. Fig. 4 is a section through a dyeing vat with a slightly modified construction of the supporting frame. Fig. 5 shows the action of the downward passage of the dye liquor on the yarn strands, while Fig. 6 illustrates the circulation of the dye liquor in the opposite direction.

Similar characters of reference designate corresponding parts throughout the several views.

In accordance with these drawings, into the cells of the dyeing vat *a* are introduced removable supporting frames *b* made of metal, wood or the like, in which the yarn strands are suspended on bars *c* and *d*, for instance, vertically. The single strands are arranged preferably on round bars. The bars *c* and *d* are arranged side by side, in accordance with the suspension system, either on supporting ledges *e* and *f*, or in slots *g* and *h* (Fig. 4) of the supporting frame or box, which is open at the top and at the bottom, the supporting ledges being either adjustable (Figs. 1 to 3), or a large number of slots being arranged one above another, so as to enable the bars to be introduced into the frame at a higher or lower level, according to the length of the yarn strands. When supporting ledges are used (Fig. 1) the bottom bars *d* are introduced between two ledges *f*. The bars filled with yarn in the manner described, are arranged in the frame close to each other, so that they are in contact with each other, until the whole frame is filled with yarn. When a box open at the top and at the bottom is used as a supporting-frame, one lateral wall

of the box is arranged in a detachable or folding manner for the purpose of introducing the yarn. In that case the filled box contains, as is known by experience, a slightly, compressed block of vertically arranged yarn strands, and shows in all portions a uniformity of density of the yarn which can be scarcely exceeded, the bars held fast in the guide slots of the lateral walls, preventing the yarn from becoming entangled even during dyeing. These closely packed boxes, open at the top and at the bottom, are arranged in the dyeing vat side by side.

When the yarn bars are mounted in a supporting frame without lateral walls, they are held together at the top and at the bottom by means of buckles or the like, while the portion of the yarn bulging out in the center, which naturally projects beyond the frame, is drawn in, during the introduction of the latter into the vat, by means of suitably arranged bands *k* which can be tightened together by means of winches *i*. The bands, or winches *i* can be fixed by means of an arrangement of ratchet wheels and pawls. After the yarn frames are introduced into the vat, the winches can be released, and the bands loosened, in such manner that the yarn comes into a thorough contact at all sides with the walls of the vat and is thus attacked on all sides by the circulating dye liquor.

As already stated, the yarn strands are not fixed above the series of bars, but have sufficient clearance or play in order to enable them to move up or down, as a whole block, under the action of the alternating flow of the dye liquor. In that way, after each flow of the dye liquor in each direction, the upper or the bottom portion of yarn resting on the series of bars, is lifted off, and thus a uniform dyeing at all points is produced. A special arrangement can be made for locking or fixing the frames introduced into the dyeing vat so as to prevent them from shifting during the circulation of the dyeing liquor. The described arrangement of the yarn strands, chiefly in a box, has the advantage that the permeability is everywhere uniform and does not change during the dyeing, so that there is no danger of an unintentional compression and shrinking of the yarn during the dyeing, at the cost of its quality and thickness or appearance. It must be pointed out again that the yarn strands can also be suspended in any other than vertical direction. The chief characteristic feature is that the yarn strands or hanks are arranged in the direction of the circulation of the dye liquor, and are held together as described by the supporting box.

Having now particularly described and ascertained the nature of the said invention,

and in what manner the same is to be performed, we declare that what we claim is:—

1. An apparatus for dyeing yarn in strands, comprising: a vat; a frame adapted to removably fit within said vat and open at its two opposite sides to permit the liquor to flow through the frame; bands adapted to surround the contained yarn; means to adjust said bands to confine said yarn within said frame during the introduction of the latter in the vat; upper fixed supports, and lower adjustable supports carried by said frame; two series of bars over which the yarn is to be suspended, said bars being respectively supported by said upper fixed and said lower adjustable supports and at a distance apart corresponding to the length of the strands, and the said strands having sufficient longitudinal play, whereby as the liquor is circulated through the frame in the direction of the yarn strands, the yarn portions resting upon said bars are lifted and attacked by the dye liquor.

2. An apparatus for dyeing yarn in strands, comprising: a plurality of adjacent, communicating vats to contain a suitable dye liquor; liquor circulating means in the communication between said vats adapted to alternately circulate the liquor through the several vats; a plurality of removable supporting frames adapted to fit within the respective vats, and open at two opposite sides to allow the liquor to flow through same; bands adapted to surround the contained yarn, and means to adjust said bands to confine said yarn within said frames during the introduction of the latter in the respective vats; upper fixed supports, and lower adjustable supports carried by said frames; two series of bars over which the yarn is to be suspended, said bars being respectively supported by said upper fixed and said lower adjustable supports and at a distance apart corresponding to the length of the strands, and the said strands having sufficient longitudinal play whereby, as the liquor is circulated through the frames in the direction of the yarn strands, the yarn portions resting upon said bars are lifted and attacked by the dye liquor.

3. An apparatus for dyeing yarn in strands, comprising: communicating vats, adapted to contain a suitable dye liquor; liquor circulating means in the communication between said vats adapted to alternately circulate the liquor through the several vats; removable supporting means adapted to fit within the respective vats, and open at two opposite sides to allow the liquor to flow through same; adjustable bands adapted to surround the contained yarn; two series of bars over which the yarn is adapted to be suspended, said bars being respectively supported in slots arranged one above another

so as to enable the bars to be introduced in
the boxes at a distance apart corresponding
to the length of the strands, and the said
strands having sufficient longitudinal play
5 whereby, as the liquor is circulated through
the frames or boxes in the direction of the
yarn strands, the yarn portions resting upon
said bars are lifted and attacked by the dye
liquor.

In testimony, that we claim the foregoing 10
as our invention, we have signed our names
in presence of two witnesses, this ninth day
of January 1909.

FRANZ GEISSLER.
BRUNO WAGNER.

Witnesses:

RICHARD DINKLER,
WILHELM KUTTING.