June 9, 1953 S. BAILEY, JR 2,641,120

APPARATUS FOR FINISHING HOSIERY

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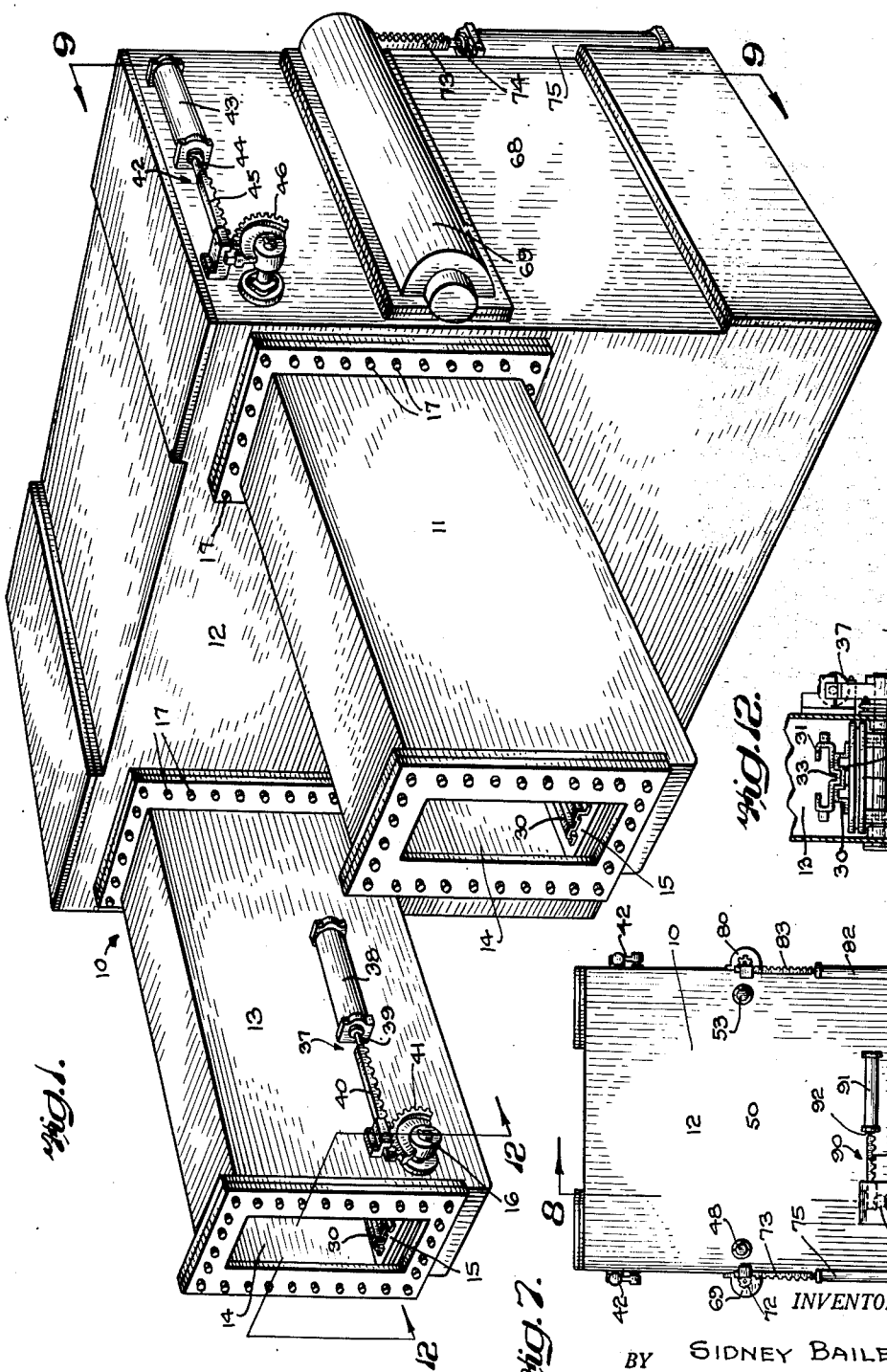



Fig. 1.




Fig. 12.




Fig. 7.

INVENTOR.

BY SIDNEY BAILEY, JR.

Leon Edelson

ATTORNEY

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APPARATUS FOR FINISHING HOSIERY

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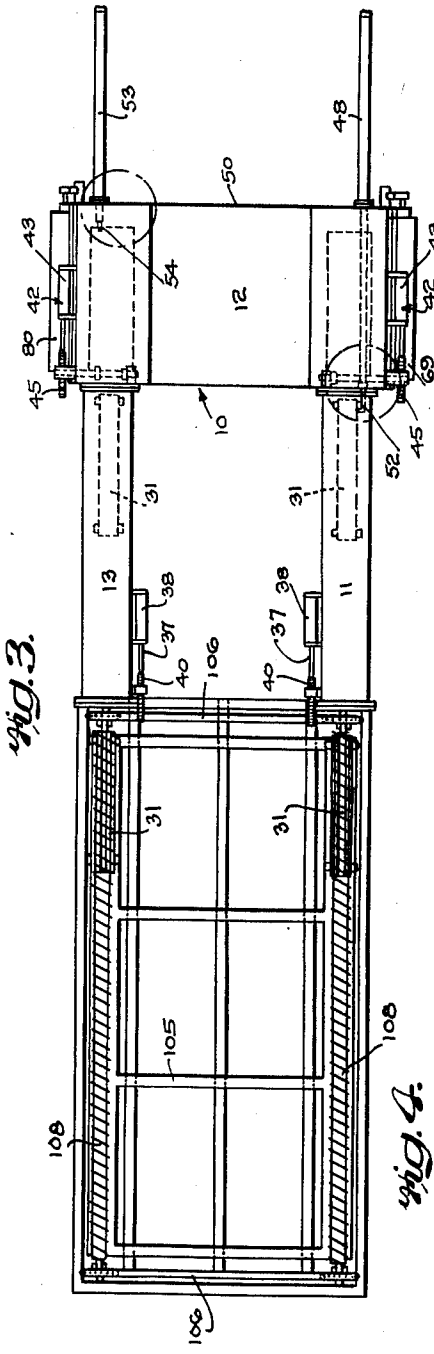


Fig. 3.

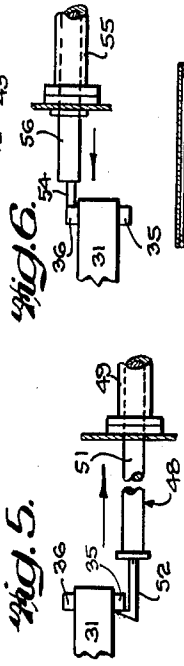


Fig. 6.



Fig. 5.

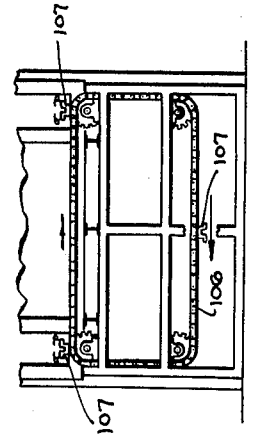


Fig. 4.

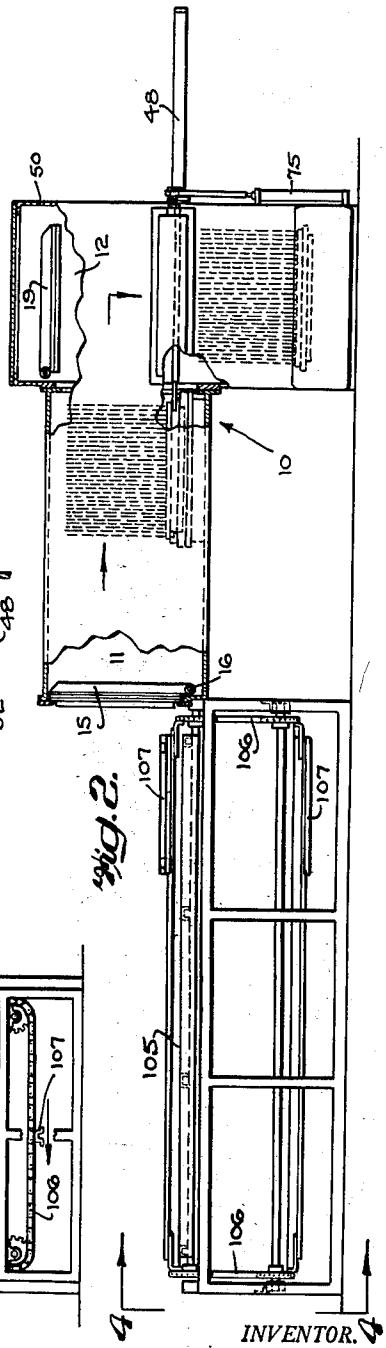


Fig. 2.

INVENTOR.

BY SIDNEY BAILEY, JR.

Leon Edelson

ATTORNEY

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APPARATUS FOR FINISHING HOSIERY

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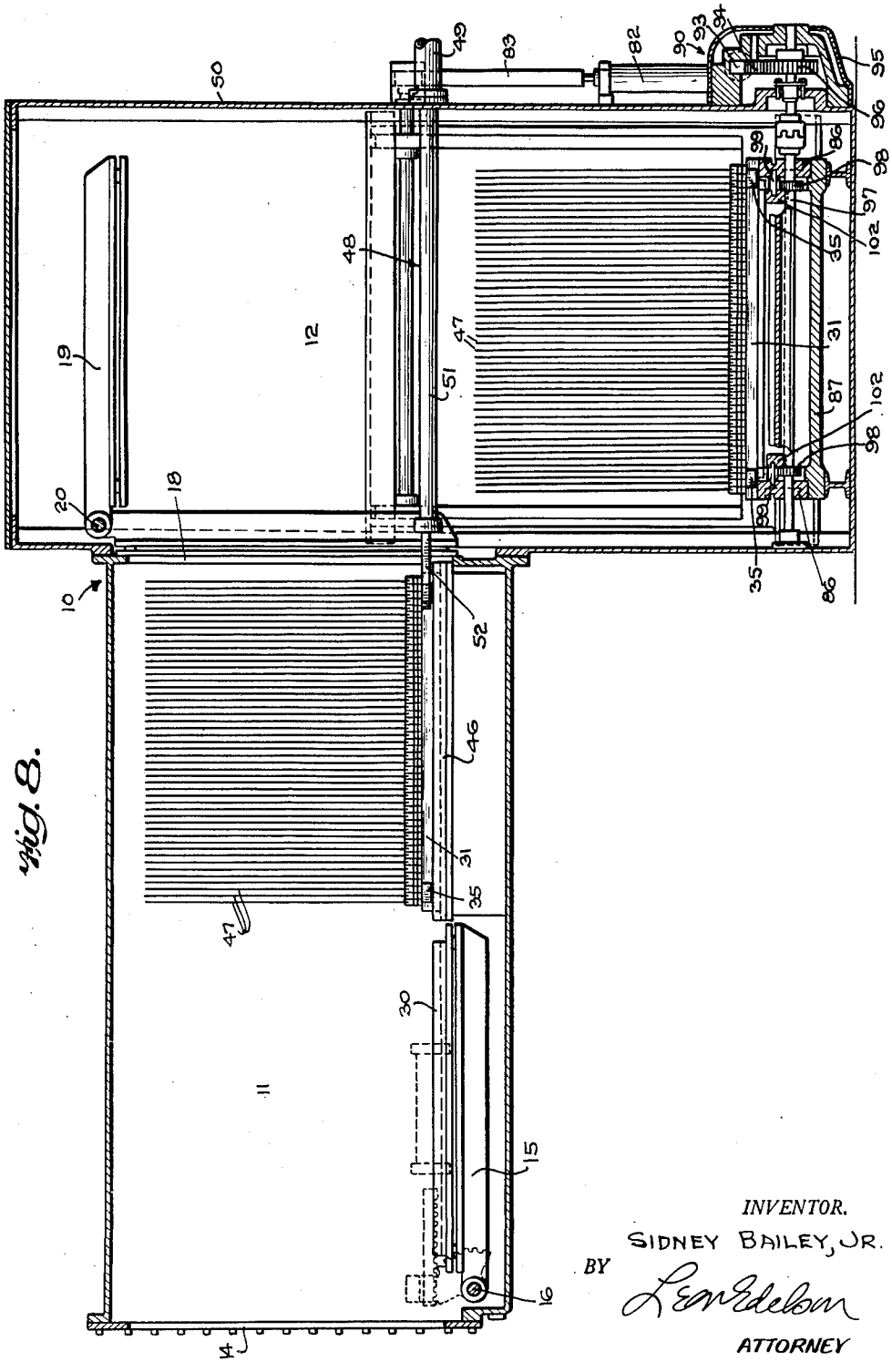



Fig. 8.

INVENTOR.
SIDNEY BAILEY, JR.
BY Leon Edelson
ATTORNEY

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APPARATUS FOR FINISHING HOSIERY

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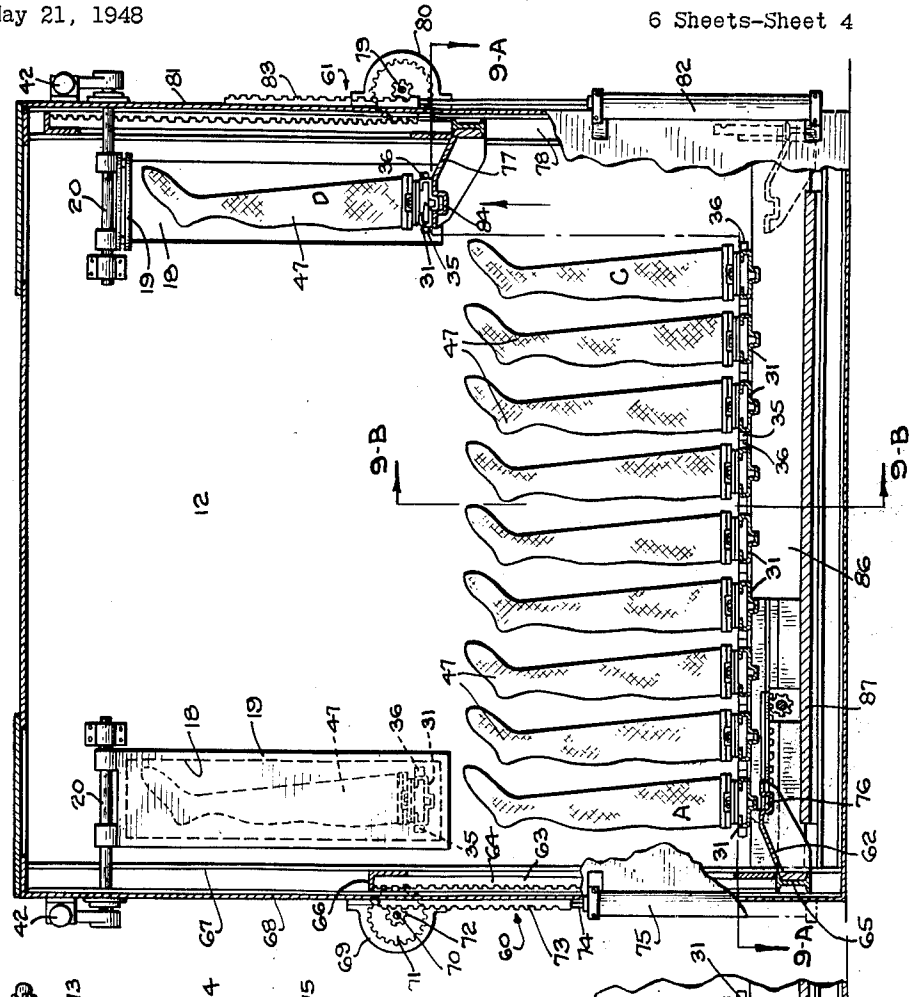


Fig. 9.

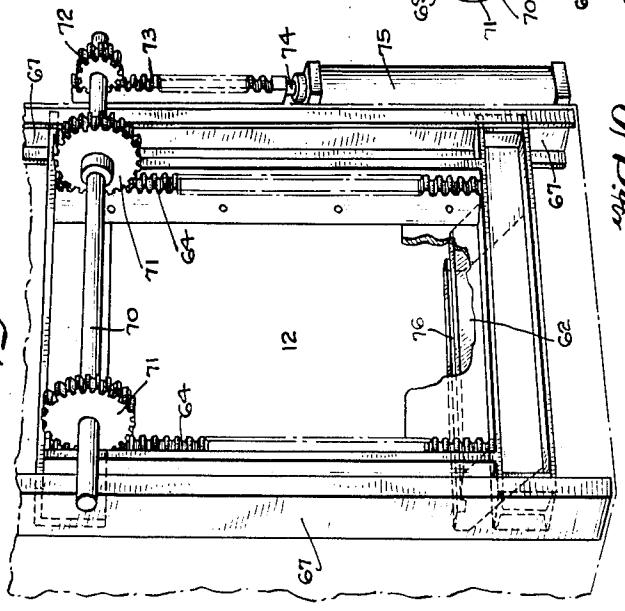


Fig. 11.

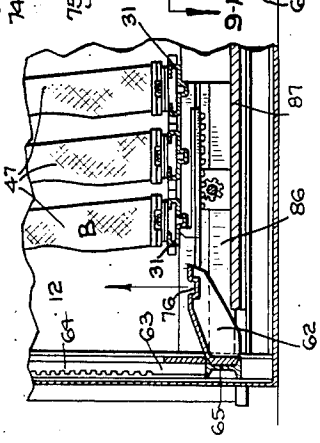


Fig. 10.

INVENTOR.
SIDNEY BAILEY, JR.
BY Lee Edelson
ATTORNEY

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APPARATUS FOR FINISHING HOSIERY

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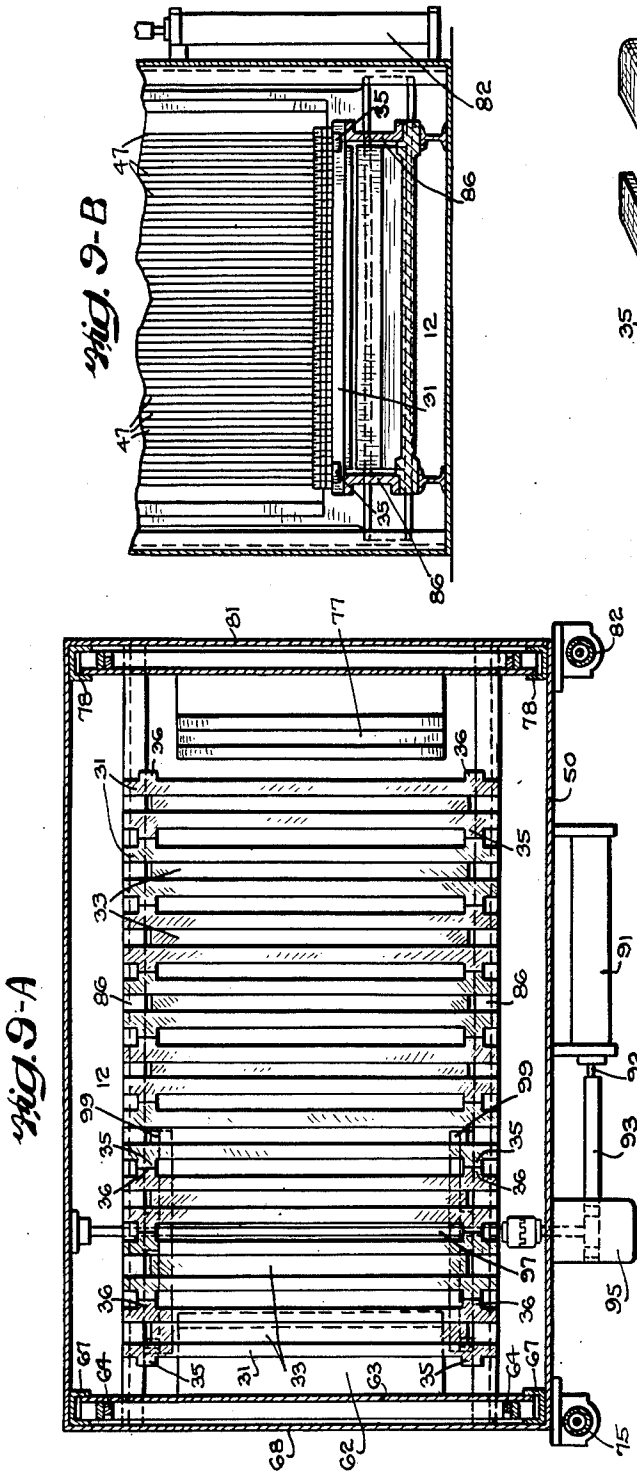


Fig. 9-A



Fig. 9-B

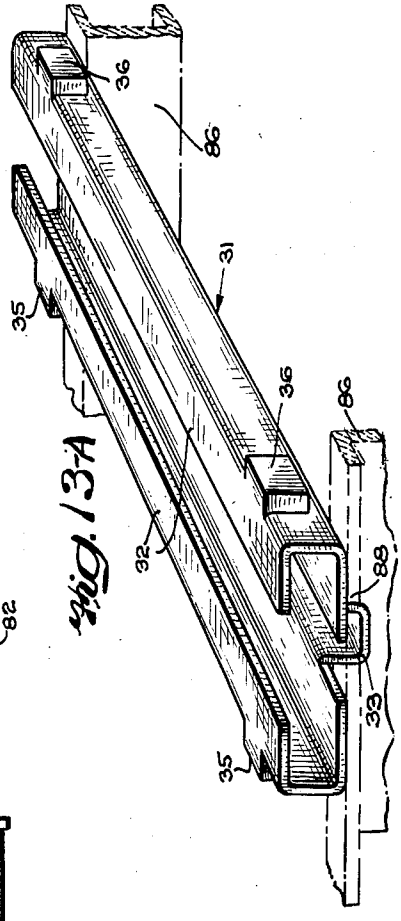


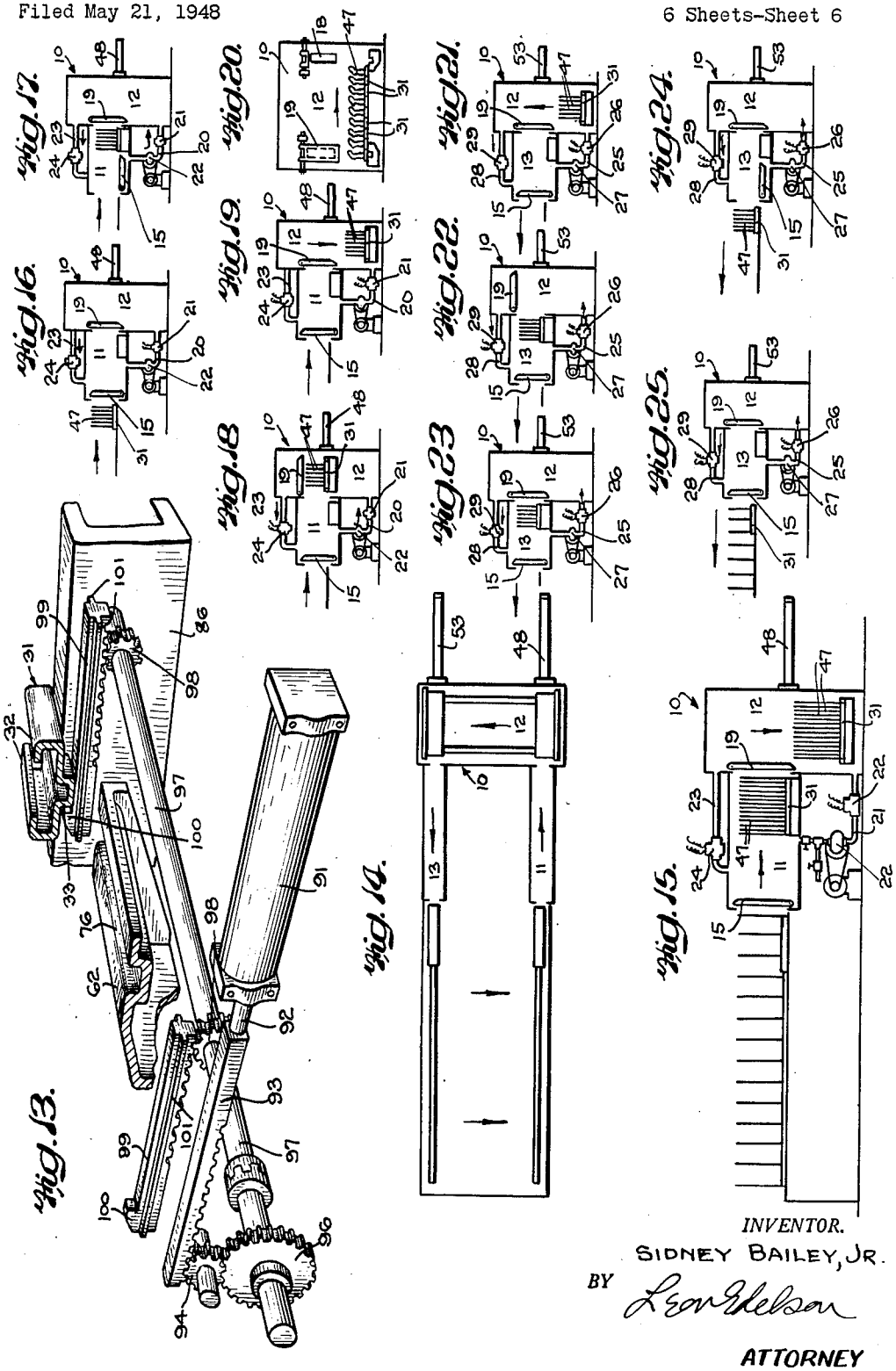
Fig. 13-A

INVENTOR.
SIDNEY BAILEY, JR.
BY Lear Edelson
ATTORNEY

June 9, 1953 S. BAILEY, JR 2,641,120

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INVENTOR.
SIDNEY BAILEY, JR.
BY Leon Nelson
ATTORNEY

Patented June 9, 1953

2,641,120

# UNITED STATES PATENT OFFICE

2,641,120

## APPARATUS FOR FINISHING HOSIERY

Sidney Bailey, Jr., Philadelphia, Pa., assignor to Bailey Dye Works, Philadelphia, Pa., a corporation of Pennsylvania

Application May 21, 1948, Serial No. 28,454

17 Claims. (Cl. 68—20)

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This invention relates generally to apparatus for treating articles of textile material, particularly goods knitted or woven of synthetic yarns capable of being "set" preparatory to dyeing.

In the finishing of articles such as hosiery woven or knitted of synthetic yarns, it has been found desirable, in order to provide the same with a satisfactory feel and wrinkle-free appearance, to subject them to a hot vaporous pressure medium, such as steam under pressure, to pre-set the woven or knitted yarns preliminarily to dyeing and finally drying the articles upon their shape-sustaining forms. Inasmuch as the pre-setting, dyeing and drying operations, as heretofore carried out in accordance with more or less conventional practice, are all necessarily effected by the use of heated fluid mediums, considerable time and labor has been consumed in the handling of the fabricated articles during their successive treatments, much of this time and labor being wasted in transferring the articles from one treatment apparatus to another.

The present invention has as its primary object the provision of an apparatus in the nature of an autoclave in which all the necessary treatments are successively applied to the articles while the latter move continuously through the apparatus, each article being uniformly subjected to the same cycle of treatments, thereby assuring not only uniformity in the final result but also achieving for the treated articles a finish of uniformly high quality with an economical use of the several treating media and the expenditure of a minimum amount of time and labor.

More specifically, it is an object of the present invention to provide an autoclave type of apparatus having separate chambers through which the articles to be treated move continuously for successive pre-setting, dyeing and drying treatments, the initial pre-setting and the final drying operations being each effected in a chamber filled with a hot vaporous pressure medium, such as steam under pressure, and the intermediate dyeing operation being effected in a chamber suitably containing a heated liquid dye bath, the articles undergoing treatment being automatically conveyed through the several chambers in accordance with a predeterminedly fixed operational cycle.

Still another specific and important object of the present invention is to provide an apparatus of the character and for the purpose above described having means which are operative automatically to seal off the several treatment chambers one from the other as the articles are transferred successively therefrom to not only insure full and adequate treatment for the articles while contained in a given chamber but to insure also the maintenance of an adequate pressure of the vaporous medium within the sealed chambers for the time interval necessary to complete the desired treatment, the internal operating pressures of each of the presetting and drying chambers being alternately transferred to and from the dyeing chamber by means of externally controlled gates through which the articles pass from one chamber to the other.

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Each of the pre-setting and drying chambers is provided with inner and outer closure gates for selectively sealing these chambers from the dyeing chamber. In its general aspects, the autoclave apparatus of the present invention is so designed and operated that as an individual rack containing a given number of the articles to be treated is moved into the pre-setting chamber through its opened front closure gate the interior of such chamber is sealed off from the adjoining dyeing chamber by closing the rear gate, the dyeing chamber being then filled throughout the free space above the level of the dye bath contained therein with steam at relatively high pressure and temperature. Upon disposition of the rack within the pre-setting chamber, the front closure gate thereof is closed, thereby sealing the interior of the presetting chamber, following which the steam under pressure is delivered from the dyeing chamber into the sealed interior of the pre-setting chamber by way of a valve controlled conduit. In this condition of the apparatus the interiors of the pre-setting chamber and the dyeing chamber are under equalized internal steam pressure, in consequence of which the outer closure gate of the pre-setting chamber is maintained closed while the inner closure gate thereof is freely movable to provide an opening between the pre-setting and dyeing chambers through which the rack containing the articles may be shifted after they have been pre-set, for the subsequent dyeing operation.

After the pre-set articles are thus shifted into the dyeing chamber and while the internal pressures of the pre-set and dyeing chambers are still under equalized pressure, the rear closure gate of the pre-set chamber is again closed to seal it off from the dyeing chamber, following which the internal pressure of the pre-set chamber is reduced to that of atmosphere by exhausting the high pressure steam into the dyeing chamber. By so reducing the internal pressure of the pre-

set chamber to that of the atmosphere, the outer closure gate is again freely movable into open position to permit movement of a second rack of articles into the pre-set chamber, the cycle of operation as just described being repeated for each rack successively fed into the autoclave.

As each rack of articles passes through the rear opened gate of the pre-set chamber it is received by an elevator mechanism which lowers the rack to the bottom of the dye bath for complete submergence of the articles within the heated liquid dye, the lowered rack with its load of articles to be treated still immersed in the dye, being then transferred laterally across the dye bath to a second elevator mechanism which raises the rack out of the bath and into position for movement outwardly of the autoclave by way of a drying chamber above referred to. As in the case of the pre-set chamber, this drying chamber is also provided with inner and outer closure gates, the inner gate being freely movable into open position only while the internal pressure of the drying chamber is equalized with that of the dyeing chamber.

Upon such opening of the inner closure gate of the drying chamber, the elevated rack of the dyed articles is shifted into the drying chamber wherein they are dried by the superheated steam. Following such shifting of the rack into the drying chamber, the inner closure gate thereof is closed to seal its interior from the dyeing chamber whereupon the internal pressure of the drying chamber is reduced to that of the atmosphere by exhausting the high pressure steam into the dyeing chamber by way of a suitably valved conduit. Thereupon the outer closure gate of the drying chamber is free to be opened to permit delivery of the finished articles from the autoclave, each rack being successively shifted to and through the drying chamber from the dye chamber upon completion of the dyeing treatment. Thus, the drying chamber operates in a manner similar to that of the pre-setting chamber to successively accept the several racks of articles for treatment by the same fluid pressure medium, such as steam under relatively high pressure and temperature, one chamber serving initially to pre-set the articles into wrinkle-free condition preliminarily to dyeing the same and the other serving finally to dry the articles after they have been dyed.

It will be understood, of course, that it is among the objects and aims of the present invention to provide an apparatus which will efficiently operate as above described and that still other objects and advantages will be apparent from the detailed description of the present invention as hereinafter set forth.

It will be understood also that the present invention consists not only in the combination, construction, location and relative arrangement of parts as shown in the accompanying drawings, but also in the novel continuous method of treatment made possible by the apparatus of the present invention, all as will appear more fully hereinafter and as finally pointed out in the appended claims.

In the accompanying drawings, which are illustrative of a preferred form of apparatus constructed in accordance with and embodying the principles of the present invention,

Figure 1 is a front perspective view showing the autoclave apparatus of the present invention;

Figure 2 is a side elevational, partially in section, showing the apparatus of Figure 1 operatively associated with an external conveyor for the articles delivered to and from the autoclave;

Figure 3 is a top plan view of the apparatus shown in Figure 2;

Figure 4 is an end elevational view as taken along the line 4—4 of Figure 2;

Figures 5 and 6 are enlarged views of the transfer mechanisms respectively embraced by the dotted line circles of Figure 3;

Figure 7 is a rear elevational view of the autoclave;

Figure 8 is a longitudinal sectional view thereof as taken along the line 8—8 of Figure 7;

Figure 9 is a transverse sectional view of the dyeing chamber as taken along the line 9—9 of Figure 1;

Figure 9A is a horizontal sectional view as taken along the line 9A—9A of Figure 9;

Figure 9B is a vertical sectional view as taken along the line 9B—9B of Figure 9;

Figure 10 is a vertical section corresponding to the lower left portion of Figure 9 showing the article supporting racks moved into position free of the rack-lowering elevator;

Figure 11 is a perspective view of the rack-lowering elevator of Figure 10 and its operating mechanism;

Figure 12 is a transverse sectional view of the drying chamber as taken along the line 12—12 of Figure 1, the outer gate of the chamber being shown in its open position;

Figure 13 is a perspective view illustrating the mechanism for effecting lateral transfer of the article-supporting racks from the lowering elevator on one side of the dyeing chamber to the lifting elevator on the opposite side of said chamber;

Figure 13A is a perspective view showing a preferred form of one of the shiftable racks designed to support the work to be treated by the present apparatus;

Figure 14 is a diagrammatic view in plan of the apparatus of the present invention;

Figure 15 is a diagrammatic view in vertical section of the apparatus, said section extending longitudinally through the pre-set and dyeing chambers; and

Figures 16 to 25, inclusive, are diagrammatic views, all in longitudinal vertical section, illustrating operation of the apparatus as the articles to be treated are passed successively through the several treatment chambers of the autoclave.

Referring now more particularly to the drawings, it will be observed that the present invention is essentially in the form of an autoclave designated generally by the reference numeral 10 having a plurality of chambers 11, 12 and 13 each of which is adapted to be separately closed to the atmosphere. As appears most clearly in Figures 1 and 2, the autoclave 10 in horizontal plane is of generally U-shape, the chamber 12 constituting the base of the U and the chambers 11 and 13 extending forwardly from one side wall of the chamber 10 to form the legs of the U, these chambers 11 and 12 being arranged in laterally spaced parallel relation for respective communication with opposite ends of the chamber 12.

The chamber 11 serves as the pre-setting chamber in which the synthetic yarns of the articles to be treated by the apparatus of the present invention are initially pre-set to render the article fabric free of wrinkles or creases. The chamber 12 constitutes the dyeing chamber

within the interior of which is contained a heated liquid dye path through which the pre-set articles are passed preliminarily to the final drying of the same, this drying operation being effected in the chamber 13 termed the drying chamber.

It will be noted that these chambers 11, 12 and 13 are so correlated as to permit the articles to be treated to be successively passed therethrough, each article being thus uniformly subjected to the same sequence of treatments, namely, first, a pre-setting treatment, second, a dyeing treatment, and third, a drying treatment. It will also be noted that the intermediate dyeing chamber 12 is of considerably greater capacity than either of the chambers 11 and 13, its bottom being disposed well below the coplanar horizontally disposed bottom walls of the chambers 11 and 13. The general arrangement of the apparatus is such that the chamber 12 may receive a bath of the liquid dye in sufficient volume to completely submerge the articles as they pass through the bath from one side thereof to the other, the upper level of the dye bath in the chamber 12 being somewhat below the horizontal plane of the bottom walls of the chambers 11 and 13 so as to prevent any possibility of the dye spilling into these latter chambers.

Each of the chambers 11 and 13 is provided with a frontal opening 14 adapted to be closed by a pivotally mounted closure gate 15. As most clearly appears in Figures 1 and 8, these outer closure gates 15—15 of the chambers 11 and 13 are respectively secured to transversely extending shafts 16 disposed just within the openings 14—14 adjacent the bottoms thereof, these bearing shafts for the closure gates 15—15 being each suitably journalled within the opposite side walls of the chambers 11 and 13 for oscillatory movement by means of operating mechanisms to be presently described, the closure gates 15—15 being thus operative to be swung through arcs of approximately 90 degrees to fully close or open the outer openings 14—14 of the chambers 11 and 13.

These chambers 11 and 13, which are respectively suitably bolted to the front wall of the chamber 12 as by the bolts 17 (see Figure 1) are each adapted for communication with the interior of the chamber 12 by way of openings 18—18 respectively adapted to be closed or opened by swingably mounted gates 19—19. These latter gates 19—19 are suitably fixed to oscillatably mounted shafts 20—20 extending transversely across the top edges of the openings 18—18, the closure gates 19—19 being thus swingable into open or closed positions by suitable operating mechanisms to be presently described. It will be important to note that the front opening 14 and the rear opening 18 of each of the chambers 11 and 13 are longitudinally alined with respect to each other so that the work to be treated may be moved rectilinearly through each of these chambers. In the case of the chamber 11, the work to be treated moves inwardly through said chamber 11 into the interior of the dye chamber 12, while in the case of the chamber 13 the work moves outwardly therethrough from the dye chamber 12. The closure gates 15 and 19 operatively associated with each of the chambers 11 and 13 serve, when closed, to hermetically seal the interiors of said chambers, thereby enabling each of said chambers to be filled with a vaporous pressure medium, such as super heated steam, preferably at a temperature of from 210 to 260 degrees F. and at a pressure of from 20 to 50 pounds. The inner closure gates 19—19 serve the additional function of sealing off the chamber 12 from the interiors of the chambers 11 and 13, as when one or the other of the outer closure gates 15—15 of the latter is open, thereby maintaining within the chamber 12 the steam at the desired operating temperature and pressure. By selectively opening and closing the closure gates 15 and 19 of one or the other of the chambers 11 and 13, by the mechanisms to be presently described, it becomes possible to equalize the internal steam pressures of the chambers 11 and 12 or of the chambers 13 and 12 so as to render the inner closure gates 19—19 freely movable into their open or closed positions and to maintain the outer closure gates 15—15 securely closed against atmospheric pressure.

As most clearly appears in the diagrammatic views shown in Figures 15 to 25, inclusive, the pre-set chamber 11 is connected to the bottom of the dye chamber 12 by a conduit 20 within the length of which is included a valve 21 and a motor driven pump 22, the valve being designed, upon operation of the pump 22 to transfer the steam under pressure from within the sealed chamber 11 to the interior of the dyeing chamber 12. A second conduit 23 interconnects the top of the dye chamber 12 with the interior of the chamber 11 by way of a check valve 24, the flow of the pressure fluid through the check valves 21 and 24 being as indicated by the arrows in the diagrammatic views of Figures 15 to 20.

The chamber 13 is similarly interconnected with the chamber 12 by a conduit 25 having included therein a valve 26 and a motor driven pump 27 and by a second conduit 28 in which is included a valve 29, the flow of the pressure fluid through these conduits 25 and 29 being as indicated by the arrows in the diagrammatic views in Figures 21 to 25, inclusive.

As most clearly appears in Figures 1, 8 and 12, the front closure gates 15—15 and the chambers 11 and 13 are each fitted on its outer surface with a guide track 30 extending longitudinally of the gate, these guide tracks being respectively adapted, when the gates are swung into their horizontally disposed open positions, as in Figures 1 and 8, to receive specially formed article supporting racks for rectilinear guidance through the chambers 11 and 12. Figure 13a shows a preferred form of one of said racks designated generally by the reference numeral 31, it being observed that each such rack consists of an elongated member of generally channel-shaped cross section, the opposite side walls of which are respectively provided with inwardly turned freely extending top flanges 32—32, while the bottom wall of the member is provided with a longitudinally extending central rib 33. This bottom rib 33 of the rack 31 is adapted to nest in an upwardly presenting longitudinally extending groove 34 formed in the track 30 supported by each of the closure gates 15—15, the arrangement being such that the rack 31 is rectilinearly shiftable along the track 30 in which it is nested. Each of the racks 31 is provided with longitudinally spaced pairs of opposed outwardly projecting elements 35—36, the function of which will be apparent hereinafter.

Operatively associated with each of the front closure gates 15—15 of the chambers 11 and 13 is an operating mechanism therefor designated generally by the reference numeral 37. As most clearly appears in Figures 1 and 3, these operating mechanisms 37—37 are respectively mounted

upon the proximate side walls of the chambers 11 and 13, each such mechanism including a fluid pressure cylinder 38 having a piston 39 operable therein for reciprocation of a toothed rack 40 in meshed engagement with a segmental gear 41 keyed to the oscillatably mounted shaft 16 of the closure gate. Upon operation of the cylinder 38, which is preferably of single acting type and designed to be operated either pneumatically or hydraulically by a suitable pressure fluid operatively delivered thereto by way of suitable conduits (not shown), the rack 40 may be projected forwardly and retracted rearwardly to alternately close and open the closure gate 15 of the chamber with which the operating mechanism 37 is associated.

Similarly mounted upon the opposite side walls of the chamber 12 are the operating mechanisms 42—42 for closing and opening the inner closure gates 19—19, these latter operating mechanisms being in all material respects identical to those just described for operation of the front closure gates. Thus, each includes a fluid pressure cylinder 43, a reciprocable piston 44 to which is connected a toothed rack 45, and a segmental gear 46 keyed to the closure gate shaft 20 and in mesh with the rack 45. The operation of the mechanisms 37—37 and 42—42 for closing and opening the inner and outer closure gates of the chambers 11 and 13 may be effected by any desired control means located at any point convenient to the operator in charge of the apparatus, which control means may be in the form of manually or electrically operable valves for controlling the supply of the pressure fluid to the pressure cylinders 38 and 43 of the operating mechanism.

As appears most clearly in Figure 8, the track 30 carried by each of the front closure gates 15—15 of each of the chambers 11 and 13 serves, when the latter gates are swung into their open positions as shown in Figure 8, as a forward extension or continuation of a fixed track 46 suitably mounted in the rear portion of each of said chambers 11 and 13, the relative locations of these fixed tracks 46—46 being as shown by the dotted lines in Figure 3. It will be understood, of course, that the fixed track 46, in each of the pre-setting and drying chambers, is in longitudinal alinement with the swingable track 30 so that when the latter is lowered into its horizontal position the article supporting rack 31 may be moved lengthwise through the whole length of each of said chambers.

While the apparatus of the present invention is especially adapted for the treatment of knitted hosiery, it will be understood, of course, that the apparatus is applicable for the treatment of various other articles. For the treatment of knitted hosiery as illustrated in the drawings, each stocking to be treated is fitted over a rigid form to provide a series of units 47 adapted to be removably slipped into each of a number of separate racks 31. Preferably, each of these racks is of a length sufficient in itself to accommodate forty-eight closely associated units 47, as most clearly appears in Figure 8, the rack so supporting all of these stockings to be treated being progressively shifted through the pre-setting, dyeing and drying chambers in their order named. The forms upon which the stockings are fitted to make up each of the units 47 may be of any conventional type and may each be provided with a base adapting it to be slidably received within the longitudinally extending channel of the supporting rack 31.

In order to shift the rack 31 with its load of stockings to be treated through the pre-setting chamber 11, the apparatus of the present invention includes a fluid pressure operated puller mechanism 48 essentially consisting of a fluid pressure cylinder 49 mounted upon and extending rearwardly of the rear wall 50 of the dye chamber 12. Operatively associated with this cylinder 49 is a horizontally reciprocable piston 51 upon the free end of which is fitted a spring-pressed latch 52 having a laterally turned terminal end adapted to engage behind the laterally projecting element 35 of the rack 31 when the latter has been shifted into its proximate position within the chamber 11 as shown in Figure 8. It will be apparent that upon retraction of the piston 51 under the influence of its fluid pressure operated cylinder 49, the loaded rack 31 will be rectilinearly drawn rearwardly of the chamber 11 into the dye chamber 12. It will be understood, of course, that the cylinder 49 is of adequate length to insure sufficient travel of the piston 51 to position the loaded rack 31 fully within the confines of the chamber 12.

To shift the loaded rack 31 outwardly of the chamber 12 and into the drying chamber 13, following the dyeing operation performed within the chamber 12, a fluid pressure operated pusher mechanism 53 is provided, this pusher mechanism being in all material respects similar to that of the puller mechanism 48 excepting that the outer end of its horizontally reciprocable piston is provided with an axially extending rigid stem 54 (see Figure 6) which engages the element 36 of the rack 31 to push the latter outwardly of the chamber 12 and rectilinearly into the drying chamber 13. As in the case of the puller mechanism, the cylinder 55 of the pusher mechanism is of such length as to insure sufficient travel of its piston 56 to shift the loaded rack completely out of the dye chamber 12.

Operatively disposed within the dyeing chamber 12 are a pair of elevator mechanisms 60 and 61 respectively located at opposite sides of the chamber and adapted to respectively lower the loaded racks 31 into the dye bath and raise the same therefrom following completion of the dyeing treatment. As appears most clearly in Figures 9, 9A, 10 and 11, the work-lowering elevator mechanism 60 is that which is immediately associated with the pre-setting chamber 11, this mechanism including a longitudinally grooved elevator platform 62 suitably secured to and extending laterally of a vertically shiftable supporting frame 63. This frame 63 comprises a pair of laterally spaced vertically extending toothed racks 64—64, the lower ends of which are rigidly interconnected by a horizontally extending lower frame member 65, while their upper ends are similarly interconnected by a horizontally extending upper frame member 66. The elevator platform 62 and its supporting frame 63 are movable as a unit between a pair of vertically extending guide channels 67—67 suitably secured within the fore and aft corners of the chamber 12 on the side thereof adjoining the pre-set chamber 11.

It will be noted that the teeth of the racks 64—64 are disposed externally of the vertical guide channel 67—67 and also that said teeth present in a direction facing the end wall 68 of the chamber 12. Suitably mounted upon the external surface of this end wall 68 is a horizontally

extending mounting 69 of semicylindrical form between the opposite end walls of which is suitably journalled a rotatable shaft 70. Keyed to this shaft 70 are a pair of laterally spaced pinions 71—71 (see Figure 11) for meshing engagement respectively with the vertically shiftable toothed racks 64—64, these pinions being projected through the wall 66 of the chamber 12 by way of openings suitably provided in said wall. The mounting 69 serves as an enclosure for the pinions 71—71 and also as a cover for hermetically sealing said openings through which the gears 71—71 project against communication with the atmosphere.

The shaft 70 extends through the rear end of the mounting 69 to provide an extension upon which is keyed a pinion 72, this pinion being in mesh with a toothed rack 73 suitably secured to the end of a fluid pressure actuated piston 74 suitably operable within a cylinder 75. This cylinder 75 is externally mounted upon the chamber 12 at the rear side corner thereof and serves as the means for vertically shifting the elevator platform 62 through the intervention of the several racks and pinions just described.

It will be noted that the longitudinally extending groove 76 in the upper face of the elevator platform 62 lies in the vertical plane of the correspondingly grooved track extending longitudinally through the drying chamber 11, in consequence of which it will be apparent that when the elevator platform 62 is raised to its uppermost position by means of the fluid pressure operating mechanism consisting of the cylinder 75 and its associated parts, the groove 76 will be in longitudinal alinement with the groove of the stationary track 46 in the pre-set chamber 11 and thus will be in position to accept a loaded rack 31 as the latter is drawn rearwardly from the pre-set chamber by means of the fluid pressure operated puller mechanism 48 hereinbefore described. The elevator platform 76 is of sufficient length to itself fully support a single rack for lowering the same downwardly into the dye bath contained in the lower portion of the chamber 12.

The elevator mechanism 61 which is disposed oppositely to the elevator mechanism 60 and which is adapted to raise the loaded rack upwardly through the dye bath is in all material respects similar in construction and in operation to the lowering elevator mechanism just described. As in the case of the elevator mechanism 60, the elevator mechanism 61 is also provided with a longitudinally grooved elevator platform 77, suitably supported upon a vertically shiftable frame guide for rectilinear movement between a pair of vertically extending guide channels 78—78, these latter being respectively disposed in the fore and aft corners of the chamber 12 on the side thereof adjoining the drying chamber 13. The mechanism for vertically shifting the platform 77 of the elevator mechanism 61 includes coacting racks and pinions similar to those previously described for operating the elevator mechanism 60, these pinions being keyed to an operating shaft 79 suitably journalled between the end walls of a mounting 80 secured to the side wall 81 of the chamber 12. Rotation of the shaft 79 for raising and lowering of the elevator platform 77 is effected by means of a fluid pressure motor consisting of the cylinder 82 and its vertically reciprocable piston actuated rack 83. As in the case of the platform elevator 62, the platform elevator 77 is also longitudinally grooved, as at 84 (see Figure 9) to provide a longitudinal continuation of the groove provided in the fixed track 46 of the chamber 13. It will be understood that the function of the elevator platform 77 is to successively raise each of the loaded racks upwardly through the dye bath and into position in horizontal alinement with the track extending through the drying chamber 13.

Suitably arranged within the dyeing chamber 12 is a lateral transfer mechanism 85 for successively shifting the loaded racks 31 from the elevator mechanism 60 to and upon the elevator mechanism 61, this transfer mechanism operating to shift the racks 31 edgewise along a path adjoining the bottom of the chamber so that the articles to be treated are completely submerged in the dye bath during the course of their travel from one to the other of the laterally spaced elevator mechanisms. This lateral transfer mechanism, as is most clearly shown in Figures 8 to 10, inclusive, and 13, includes a pair of spaced parallel rails 86—86 which extend transversely across the bottom of the chamber 12 from one side wall 68 thereof to the opposite side wall 81, these rails being suitably supported upon an understructure 87 (see Figure 8) resting upon the bottom wall of the chamber 12. The rails 86—86 are spaced apart a distance somewhat less than the overall length of the work-supporting rack 31 so that the opposite ends of each of the latter may rest upon the spaced rails and so be supported thereon for edgewise shift of the racks in a horizontal plane. As most clearly appears in Figure 13A the downwardly projecting longitudinally grooved rib 33 of each rack 31 is cut away at its opposite ends, as at 88, so that the racks may rest flatwise upon the upper supporting edges of the rails 86—86 with the grooved rib 33 projecting below the horizontal plane of said supporting edges, thereby preventing displacement of the racks laterally of their supporting rails while permitting edgewise shifting lengthwise of the rails from the elevator mechanism 60 operatively associated with the pre-set chamber 11 toward the elevator mechanism 61 operatively associated with the drying chamber 13.

It will be noted, as most clearly appears in Figures 9, 9A, 10 and 13A, that the longitudinally spaced flat-surfaced bosses 35—36 provided upon each outer face of a given work-supporting rack 31 are respectively adapted to abut the corresponding bosses of a next adjoining rack supported upon the rails 86—86, thus maintaining all of the racks in parallel, spaced relation upon their supporting rails 86—86. It will be apparent also that as each rack 31 is transferred from the lowered elevator mechanism 60 to and upon the rails 86—86 for edgewise shifting therealong, said rack engages the rack previously transferred to the supporting rails 86—86 and pushes it along the rails toward the elevator mechanism 61. Thus, step-by-step shifting of all of the racks 31 along their supporting rails 86—86 for a distance equal to the overall width of a given rack is simultaneously effected as the given rack is transferred to and shifted edgewise along the rails, the leading rack in the group so shifted being moved into position directly above the elevator platform 77 simultaneously as the last rack in the group is moved from the elevator platform 62 into its

initial position upon the supporting rails 86—86.

In order to effect this step-by-step shifting of the racks 31 along their supporting rails 86—86, there is provided a fluid pressure operated transfer mechanism designated generally by the reference numeral 90 (Figures 7 and 8). This mechanism 90 includes a fluid pressure cylinder 91 suitably mounted upon the rear wall of the chamber 12 having a reciprocable piston 92 the free end of which is fitted with a toothed rack 93 constituting an extension of the piston. This toothed rack 93 is in mesh with a pinion 94 suitably mounted in a journal box 95 externally fixed to the rear wall of the chamber 12, this pinion 94 being in meshed engagement with a gear 96 also enclosed within the box 95, this latter gear being suitably keyed to a shaft 97 projecting from the journal box 95 into the chamber 12. The shaft 97, which extends transversely of the fixed rails 86—86 (see Figures 9A and 13), is provided with a pair of pinions 98—98 respectively located adjacent the inner sides of the rails, these pinions 98—98 being keyed to the shaft 97 for rotation therewith.

Operatively associated with each of these pinions 98—98 is a hook bar 99 in the form of a toothed rack each of which latter extends in parallel relation to its closely adjoining fixed rail 86 and is provided at one end thereof with a hooked end 100. These hook bars 99—99 are guided for rectilinear movement in a common horizontal plane by a suitable means, preferably by providing each bar with oppositely extending guide flanges 101—101 which coact with and slide in complementally grooved supporting brackets 102 secured to or formed as integral parts of the fixed rails 86—86 (as see Figure 8).

As most clearly appears in Figure 13, the horizontal plane of movement of the hook bars 99 is at such elevation as to permit the hooked ends 100 thereof to engage behind the grooved rib 31 of each work-supporting rack 31 when the latter is initially deposited upon the rails 86—86 by the lowered platform 62 of the elevator mechanism 60. In this connection it will be noted that the elevator platform 62 is of such length and is so disposed between the fixed rails 86—86 as to provide between each rail and the opposite ends of the elevator platform free spaces within which the book bars 99—99 may shift without interference by the elevator platform 62 even when the latter is lowered into its bottom-most position. It will be noted also that the permissible travel of the hook bars 99 is such that when they are shifted to their fullest extent toward the elevator mechanism 60 the hooked end 100 of said bars will be disposed immediately beyond the grooved center 76 of the elevator platform 62 so that as the latter descends with its loaded rack 31 the hooked ends 100 of the hook bars will be in position to engage behind the grooved rib 33 of the loaded rack 31 simultaneously as the latter is deposited upon the laterally spaced rails 86—86. Thereupon, as the elevator platform 62 descends below the horizontal rack-supporting plane of the rails 86—86 into its lowermost position shown in Figures 10 and 11, the loaded rack 31 is free to be drawn by the hook bars 99—99 upon operation of the lateral transfer mechanism 90 from its initial position (designated A in Figure 9) immediately above the platform 62 into its transferred position (designated B in Figure 10) upon the supporting rails 86—86. As previously described, each such loaded rack 31 thus transferred from position A to position B engages the previously transferred rack and so effects step-by-step shifting of all of the loaded racks 31 along the rails 86—86 toward the elevator mechanism 61 which includes the lifting platform 77.

As in the case of the work lowering platform 62 of the elevator mechanism 60, the lifting platform of the elevator mechanism 61, when moved into its lowermost position as shown by the dotted line representation in Figure 9, assumes a position wherein its grooved portion 84 is horizontally disposed below the horizontal shifting plane of the loaded racks 31 along the rails 86—86. Consequently, when these rails 86—86 support their full complement of the loaded racks 31, as in Figure 9, upon each shift of the supported group of racks along the rails 86—86 the foremost one of said racks is free to be shifted from its position designated C into a position wherein it is located directly above the groove 84 of the platform 77. Thereupon, upon upward movement of the platform 77 by operation of the lifting elevator mechanism 61, the rack 31 so positioned above the platform 77 is engaged thereby and raised vertically into its final position designated D, from which latter position the elevated rack 31 is shifted longitudinally into the drying chamber 13 by means of the fluid pressure operated pusher mechanism 53 hereinbefore described.

From the foregoing it will be apparent that the several fluid pressure operated mechanisms operate in predetermined sequence to successively move the several loaded racks 31 along a fixed course of travel through the several chambers 11, 12 and 13, this course of travel for each loaded rack being as follows: longitudinally through the pre-setting chamber 11 to and upon the raised platform 62 of the elevator mechanism 60 operatively associated with said chamber, thence downwardly into the dyeing chamber 12 toward the bottom thereof for submergence of the work in the liquid dye bath contained in the chamber 12, thence laterally across the dyeing chamber while maintaining the work submerged within the dye bath, thence upon the lowered platform 77 of the elevator mechanism 61 operatively associated with the drying chamber 13, thence upwardly into position for horizontal shift into said drying chamber, and thence finally longitudinally through the drying chamber 13 wherein the dyed work is completely dried.

Before describing in detail the operation of the apparatus of the present invention, it may be pointed out that any suitable conveyor mechanism may be employed for handling the work-supporting racks 31 as they are successively fed into the presetting chamber 11 and successively delivered from the drying chamber 13. In Figures 2, 3 and 4 one such form of handling mechanism is generally shown, such mechanism including a suitably driven endless conveyor 105 located immediately in advance of the autoclave apparatus of the present invention with the opposite side portions of the upper level of the conveyor in approximate coplanar alinement with the bottoms of the laterally spaced chambers 11 and 13. The endless conveyor 105, which is preferably driven by sproket and sproket chain sets 106—106 respectively disposed at the fore and aft ends of the endless conveyor, is suitably provided with a series of longitudinally grooved members 107, these latter members being arranged in spaced parallel relation on the conveyor so that as the latter moves along its

path of travel, as indicated by the arrows in Figure 4, successive pairs of these members 107 may be presented in horizontally extending longitudinal alinement with the tracks extending through the chambers 11 and 13 and thus provide, in effect, forward extensions of said tracks.

The endless conveyor 105 is, of course, arranged for intermittent operation by any suitable operating and control means (not shown), the conveyor being maintained stationary during each of the periods that a loaded work-supporting rack 31 is fed into the pre-setting chamber 11 and a correspondingly loaded work-supporting rack 31 is discharged from the drying chamber 13. It will be understood, of course, that for each loaded rack 31 passed into the pre-setting chamber 11 a correspondingly loaded rack is discharged from the drying chamber 13, this, assuming, of course, a continuous supply of loaded racks are being passed through the autoclave. In order to insure that each of the work-supporting racks 31 completes its full course of travel through the autoclave, it will be apparent that the number of such racks passing through the autoclave must be sufficient to effect discharge of a rack from the drying chamber for each rack fed into the pre-setting chamber. Of course, all of the racks so passed into and through the autoclave need not be loaded with work to be treated, the unloaded racks serving merely as the means for advancing the loaded racks step-by-step through the autoclave to thereby subject the work to the full course of treatment afforded by the autoclave.

In order to facilitate handling of the individual units 47 comprising in the present instance the stocking fitted upon its rigid shape-retaining form, the several units supported by a given rack 31 may be transferred to and from extensible carriages operative to space the units apart, as shown at 108—108 of Figure 3. Inasmuch as such extensible means for spacing apart the work forms no part of the present invention, further detailed description thereof is not believed essential, it being merely pointed out that the spacing of the work would be effected along the longitudinally extending tracks 107—107 of the endless conveyor 105, the untreated work being compacted upon each of the racks 31 just prior to passing the latter into the pre-setting chamber 11, while the finished work is extended into relatively spaced relation after the compactly loaded rack 31 is finally discharged from the drying chamber 13. Of course, any other desired means may be employed for handling the work-supporting racks 31 to facilitate their successive delivery into the pre-setting chamber 11 and their successive discharge from the drying chamber 13.

In the general operation of the autoclave apparatus of the present invention, it will be understood, of course, that the several fluid pressure operated mechanisms which are respectively employed for opening and closing the fore and aft closure gates of the chambers 11 and 13 and for progressively propelling the work-supporting racks 31 through the autoclave may be correlated or co-ordinated for proper sequential operation thereof by any suitable means which latter may be operated either automatically or manually as may be desired, the sequential operation of the several fluid pressure operating mechanisms being such as to insure that the work is subjected to each treatment afforded by the autoclave for a time period sufficient to satisfactorily complete the treatment. Naturally, the timing will be such as to avoid any unnecessary loss of time in completing the full cycle of operations capable of being performed by the autoclave.

In operation of the autoclave apparatus of the present invention steam under suitable pressure and at suitable temperature is supplied to the interior thereof by way of conduits (not shown) leading from any suitable source of supply of the steam. For most satisfactory operation of the autoclave the temperature of the steam may range from 210 degrees F. to 300 degrees F., while a satisfactory operating pressure of the stream may be within the range of from 20 to 75 pounds. Under such conditions of pressure and temperature the steam is superheated so that it constitutes a satisfactory medium for pre-setting the synthetic yarn of the fabricated articles when the same are sealed within the interior of the pre-setting chamber 11, as well as to satisfactorily dry such articles when they are sealed within the drying chamber 12. Also, the superheated steam serves as a heating medium for maintaining the liquid dye bath contained in the dyeing chamber 12 at the desired heated temperature for most satisfactorily effecting dyeing of the fabricating articles as they are passed through the dye bath.

As has been previously indicated, the closure gates provided at the fore and aft ends of each of the chambers 11 and 13 serve to seal these chambers as required to maintain therein the desired pressure and temperature of the steam, the two rear closure gates of these chambers serving further to seal the steam under pressure within the dyeing chamber 12 against any possibility of loss of the steam pressure when one or the other or both of the frontal closure gates of the chamber 11 and 13 are opened.

Referring now more particularly to the diagrammatic views of Figures 14 to 25, inclusive, it will be noted that the work to be treated passes through the several treatment chambers 11, 12 and 13 of the autoclave in the direction as indicated by the arrows in Figures 12 and 15. In its initial condition, that is, just prior to entry of the work into the pre-setting chamber 12, the fore and aft closure gates of this chamber will be closed as shown in Figure 16, as will be the fore and aft closure gates of the drying chamber 13. In this state of conditions all of the chambers 11, 12 and 13 will be sealed one from the other and will be filled with the steam at the desired temperature and pressure, this steam pressure being sufficient to maintain the outer closure gates of the chambers 11 and 13 closed against the pressure of the atmosphere.

When it is desired to introduce into the chamber 11 one of the racks 31 loaded with its full complement of the articles to be treated, the steam within the chamber 11 is pumped into the dyeing chamber 12 through the conduit 20 by means of the motor driven pump 22, reverse flow of the steam through this conduit being effectually prevented by the unidirectional flow valve 21 which may be of any conventional type. Having so exhausted the interior of the pre-setting chamber 11 of all of its steam under pressure, the outer closure gate 15 may then be freely moved into its fully opened position as shown in Figure 17 by means of the fluid pressure operating mechanism 37 operatively associated with said gate. Thereupon, the outer

gate 15 of the chamber 11 is again closed by reverse operation of the mechanism 37 following which the valve 24 in the condiut 23 is opened to permit flow of the steam under pressure from the chamber 12 back into the sealed chamber 11, thereby equalizing the pressure of the steam within the interconnected chambers 11 and 12. Under such equalized steam pressure within the chambers 11 and 12, the closure gate 19 at the inner end of the pre-setting chamber 17 is freely movable into its fully opened position, as shown in Figure 18, by means of its fluid pressure operated actuating mechanism 42. The outer gate 15 of the pre-setting chamber will, of course, be held tightly closed by the pressure of the steam contained within the connecting chambers 11 and 12.

When the inner closure gate 19 is opened, as in Figure 18, the fluid pressure operated puller mechanism 48 engages the loaded rack to draw the same from the pre-setting chamber 11 into the the dyeing chamber in position within the latter chamber for placement upon the lowering platform 62 of the elevator mechanism 60. Upon movement of the platform 16 with the loaded rack 31 supported thereon into its lowermost position, as shown in Figure 19, the inner closure gate 19 is closed to again seal off the interior of the chamber 12 from the interior of the pre-setting chamber 11, following which the steam under pressure is again exhausted from the chamber 11 as above described to permit free opening of the outer closure gate 15 for acceptance of another loaded rack within the chamber 11, the cycle of operation being repeated for each of the racks 31 passed into the drying chamber 13. It will be understood, of course, that whenever the outer closure gate 15 of the pre-setting chamber 11 is opened, the inner closure gate 19 thereof is closed to prevent the escape to atmosphere of the steam under pressure within the autoclave, the same condition prevailing when the outer gate 15 of the drying chamber is opened.

When the loaded rack is lowered by its supporting platform 62 into its lowermost position within the dye bath contained in the chamber 12, the rack is transferred from said platform on to the fixed supporting rails 86—86 for edgewise movement laterally through the dye bath, as shown by the directional arrow in Figure 20. This lateral transfer is effected by means of the lateral transfer mechanism operating in the manner hereinbefore described.

As each loaded rack is successively presented in position above the platform 77 of the elevator mechanism 61 for movement upwardly out of the dye bath, as shown in Figure 21, the internal steam pressures of the dye chamber 12 and of the drying chamber 13 are equalized by opening of the valve 29 in the line 28 interconnecting said chambers. Thereupon, the inner closure gate 19 of the drying chamber 13 may be freely opened, as in Figure 22, to permit horizontal rectilinear movement of the raised work-supporting rack 31 from the dye chamber into the drying chamber. The rack 31 with its load of dyed work being then so positioned with the drying chamber 13, the rear closure gate 19 of the latter is again closed, as in Figure 23, the interior of the drying chamber being then sealed from atmosphere and from the chamber 12 by its fore and aft closure gates 15 and 19.

When it is desired to remove the dyed work from within the drying chamber 13 following completion of the drying treatment, the steam under pressure contained within the drying chamber 13 is exhausted into the dye chamber 12 by means of the pump 27 operating in the valved conduit 25, whereupon the outer closure gate 15 of the drying chamber is free to be moved into its opened position, as shown in Figure 24. Upon so opening this outer gate 15, the finished work may be discharged from the dyeing chamber 12, as shown in Figure 24, following which the closure gate 15 is again closed, the cycle of operation just described being repeated for each rack successively moved into and through the drying chamber.

It will be understood, of course, that during operation of the pump 22 for pumping the steam under pressure from the pre-setting chamber 11 into the dyeing chamber 12, the valve 24 will be closed, and similarly, when the pump 25 operates to pump steam under pressure from the drying chamber 13 into the chamber 12 the valve 29 will be closed. Any suitable means may be provided as desired for the opening and closing of the valves 24 and 29 and for the operation of the pumps 22 and 27.

The term "dye bath" as employed in this specification and in the accompanying claims is intended to embrace not only a bath of liquid dye contained within the chamber 12, but also a vaporized dye solution which may be introduced into said dye chamber from any suitable source of supply in the form of a superheated vaporous medium, such as steam, saturated with a suitably colored dye-stuff. In the use of such vaporized dye solution, the autoclave apparatus of the present invention need not employ the elevator mechanism 60 and 61 hereinbefore described, since the dye-saturated vaporous pressure medium would be commonly employed in all of the several chambers of the autoclave to effect pre-setting, dyeing and drying of the articles in what might be considered a single operation and there would be no necessity for lowering the work into and raising it out of a liquid dye bath. Instead, the lateral transfer of the racks 31 across the chamber 12 could be effected in the same horizontal plane as that in which the racks are shifted longitudinally through the chambers 11 and 13. In such single level movement of the racks through the autoclave, the chamber 11 would operate primarily as the receiver chamber for work to be treated, while the chamber 13 would operate primarily as the discharge chamber for the finished work.

In such case, the pre-setting, dyeing and drying operations would all be carried out more or less simultaneously in each of the chambers 11, 12 and 13, the several closure gates being then selectively operated as hereinbefore described primarily to effect sequential sealing of the several chambers against escape of the pressurized medium to atmosphere as the article-supporting racks 31 are successively introduced into and successively discharged from the autoclave. In this connection it will be apparent upon opening of the outer closure gate of the chamber 11 for acceptance of a loaded rack of articles to be treated, the inner closure gate thereof will necessarily be closed to confine the vaporous dye-saturated medium under pressure within the chamber 12 until such time as the outer gate of the chamber 11 is again closed. Similarly, upon opening the outer closure gate of the chamber 13 for discharge of a load of finished articles, its inner gate will also be closed to confine the pressurized medium within the chamber 12 until such time as the outer gate of the chamber 13 is again closed. Inasmuch as the chamber 12 thus serves to receive

and hold under suitable pressure the vaporous medium alternately exhausted from the chambers 11 and 13 preliminary to opening the outer closure gates of the latter, it will be evident that for effective operation of the autoclave, regardless whether the dye be in the form of a liquid bath contained in the chamber 12 or in the form of a dye-saturated vaporous pressure medium, a minimum of three chambers is required.

It is within the contemplation of the present invention to introduce the dye medium into the chamber 12 from any suitable stored supply thereof, the requisite quantity being pumped into the chamber 12 by any suitable means (not shown). Upon completion of a particular operation, the dye may be pumped from the chamber 12 to a storage tank or the like (not shown) for subsequent re-use thereof as desired.

While the autoclave of the present invention has been described hereinbefore for use particularly in the treatment of textile materials fabricated of synthetic yarns which preferably require pre-setting as a preliminary to dyeing and drying of the materials, it is to be understood that the autoclave apparatus is not limited to such special use but instead is equally well adapted for the dyeing and drying of textile materials of all kinds and character, regardless of the nature of the yarn employed in their fabrication. For example, for the dyeing and drying of hosiery knitted of natural silk or other yarns which require no pre-setting, the autoclave would be employed exactly as hereinbefore described, the chamber 11 serving merely as the receiving chamber for each hosiery-supporting rack 31 passed into and through the autoclave, the hosiery being dyed in the chamber 12 and dried in the chamber 13. Accordingly, it will be understood that it is not intended to limit the autoclave to solely the treatment of goods fabricated of yarns which require to be "reset," nor it is intended to so limit the present invention as to constitute the pre-setting treatment hereinbefore referred to an indispensable step in the operation or operations capable of being performed by the autoclave of the present invention.

It will also be understood, of course, that the present invention is susceptible of various changes and modifications which may be made from time to time without departing from the real spirit or general principles thereof, and it is accordingly intended to claim the same broadly, as well as specifically, as indicated in the appended claims.

What is claimed as new and useful is:

1. In an apparatus for treating textile materials, an autoclave comprising a plurality of article-receiving chambers each adapted to contain a vaporous treating medium under superatmospheric pressure, said chambers being at least three in number and being arranged in series relation with one of said chambers disposed intermediately of two end chambers, said chambers being respectively provided with contiguous passages therethrough for movement of the articles to be treated successively through said chambers, means for conveying said articles successively through said chambers of the autoclave, fluid-tight closure gates operative to seal the outer ends of said end chambers from atmosphere and the inner ends thereof from said intermediate chamber, means for equalizing the pressure of the treating medium within said intermediate chamber and at least one of said end chambers preliminarily to opening of the closure gate therebetween for passage of the articles from one to the other of said pressure-equalized chambers, and means for exhausting the pressure medium from each of said end chambers preliminarily to opening the outer gate of said pressure-exhausted chamber.

2. In an autoclave having a plurality of article-receiving chambers arranged in series relation and having fluid-tight pressure gates for hermetically sealing the several chambers from each other and from atmosphere, each of said chambers being thus adapted to contain a vaporous treating medium under superatmospheric pressure a conveying system for moving the articles through said chambers, said system including a line of article-supporting members shiftable successively through said chambers, means for shifting each said member from the first of said series-related chamber into the second one thereof, means operable upon each member shifted into said second chamber to effect its engagement with a preceding member for advancing the latter and all members preceding it as a group through said second chamber, and means for shifting the leading member of the group advanced through the second chamber outwardly therefrom and into the next adjoining one of said series-related chambers.

3. In an autoclave of the character defined in claim 2 wherein the several shifting means aforesaid and the said advancing means are independently actuated by fluid-pressure operating mechanisms.

4. In an autoclave of the character defined in claim 2 wherein said series-related chambers are respectively provided with guide tracks along which the several article-supporting members are shiftable successively through said chambers.

5. In an autoclave having a pair of laterally spaced parallel chambers each with a tunnel-like passage through which the articles undergoing treatment may be shifted and a third chamber extending transversely between said pair of laterally spaced chambers and having openings respectively in registry with the inner ends of said tunnel-like passages a series of article-supporting racks adapted to be progressively shifted successively through said three chambers, and means for shifting said racks through said chambers, said means including a shift mechanism operative to draw said racks successively from the tunnel-like passage of one of said laterally spaced chambers into the interior of said third chamber, a lateral transfer mechanism operative to laterally shift each rack into engagement with a rack previously drawn into said third chamber for advancing the racks as a group through said third chamber, and a shift mechanism operative to push the leading rack of the group advancing through said third chamber into the tunnel-like passage of the other of said laterally spaced chambers.

6. In an autoclave for treating textile materials according to claim 5 in which the several chambers are provided with closure gates for hermetically sealing the same from each other and from atmosphere and wherein means are provided for selectively opening and closing said gates during progress of the article-supporting racks through said chambers.

7. In an autoclave having a dyeing chamber adapted to contain therein a bath of liquid dye and a pair of auxiliary chambers respectively in communication with the interior of said dyeing chamber above the upper level of the dye bath

contained therein: a plurality of racks upon which the articles to be treated are adapted to be supported for conveyance successively from one of said auxiliary chambers into and through the dyeing chamber and thence into the other of said auxiliary chambers, and rack-conveying means including a pair of mechanisms respectively operative for shifting the racks from one auxiliary chamber into the dyeing chamber and from the dyeing chamber into the other of said auxiliary chambers, said shifting being effected along a horizontal plane above the upper level of the dye bath, a mechanism for lowering the racks shifted into the dyeing chamber for submergence of the articles carried by the racks in the dye bath, a mechanism for raising the racks from said dye bath to the horizontal plane aforesaid and a mechanism for shifting the racks, while the articles carried thereby are submerged in said bath, from the lowering mechanism to the raising mechanism.

8. In an autoclave according to claim 7 wherein the several mechanisms of said conveying means are respectively actuated by fluid-pressure operated motors.

9. In an autoclave according to claim 7 wherein said auxiliary chambers respectively include longitudinally extending guide tracks for the articles to be shifted therethrough and wherein the lowering and raising mechanisms respectively include elevator platforms vertically movable into longitudinal alinement with said guide tracks for rectilinear transfer of the article-carrying racks from one track to its alined elevator platform and from the other elevator platform to its alined track.

10. In an autoclave according to claim 9 wherein said dyeing chamber is provided with a pair of laterally spaced fixed rails extending normal to the guide tracks of said auxiliary chambers and disposed in a horizontal plane spaced vertically below that of said guide tracks, said rails being adapted to receive thereon the article-supporting racks aforesaid for edgewise movement along said rails.

11. In apparatus for treating textile articles, an autoclave comprising a plurality of chambers respectively adapted to receive and contain heated vaporous treating media under superatmospheric pressure, said chambers being interrelated and communicable for progressive passage therethrough of the articles to be treated to successively subject said articles to presetting and dyeing treatments, at least one of said chambers being adapted to contain a heated fluent dye medium to which the articles are subjected for dyeing under superatmospheric pressure, fluid-tight closure gates for selectively hermetically sealing the several chambers from each other and from atmosphere, means for equalizing the operating pressure within the dye-containing chamber and a communicating one of said other chambers preliminarily to effecting free communication between said pressure-equalized chambers for passage of the articles from one to the other of said pressure-equalized chambers, means for exhausting the pressure medium from said communicating chamber while maintaining all of said chambers hermetically sealed from atmosphere, means for selectively opening the pressure-exhausted chamber to atmosphere for passage of the articles into or out of such pressure-exhausted chamber, and means for conveying said articles successively through the several chambers of the autoclave.

12. In an apparatus for treating textile articles, an autoclave comprising at least three chambers respectively adapted to receive and contain heated vaporous treating media under superatmospheric pressure, said chambers being interrelated for progressive passage therethrough of the articles to be treated, one of said chambers being intermediate of and communicable with each of the others, means for conveying said articles successively through said chambers of the autoclave, fluid-tight closure gates for hermetically sealing the several chambers from each other and from atmosphere, and means for exhausting the vaporous pressure medium from one of said other two chambers preliminarily to opening the exhausted chamber to atmosphere.

13. In an autoclave having a plurality of article-receiving chambers arranged in series relation and having fluid-tight pressure gates for hermetically sealing the several chambers from each other and from atmosphere, each of said chambers being thus adapted to contain a vaporous treating medium under superatmospheric pressure; a conveying system for moving the articles through said chambers, said system including a line of article-supporting members shiftable successively through said chambers, means for shifting each said member from the first of said series-related chambers into the second one thereof, means operable upon each member shifted into said second chamber to effect its engagement with the preceding member therein, and means for shifting the leading member of the group advanced through the second chamber outwardly therefrom and into the next adjoining one of said series-related chambers.

14. In an apparatus for treating textile articles, an autoclave comprising a plurality of chambers respectively adapted to receive and contain a heated vaporous treating medium under superatmospheric pressure, said chambers being interrelated for progressive passage therethrough of the articles to be treated to successively subject said articles to various finishing treatments, including pre-setting and dyeing of the articles, an intermediate one of said chambers being communicable with each of the others and being adapted to contain a heated dye bath in which the articles received thereby from one of said other chambers and later delivered to the other of said other chambers are adapted to be subjected to said dye bath, means for conveying said articles successively through said chambers of the autoclave, fluid-tight closure gates for selectively hermetically sealing the several chambers from each other and from atmosphere, and means for exhausting the pressure medium from one of said other chambers while all of said chambers are hermetically sealed from each other and from atmosphere.

15. In an apparatus for treating textile articles, an autoclave comprising a plurality of chambers respectively adapted to receive and contain heated vaporous treating media under superatmospheric pressure, said chambers being inter-related for progressive passage therethrough of the articles to be treated to successively subject said articles to various finishing treatments, including presetting and dyeing of the articles, an intermediate one of said chambers being communicable with each of the others and being adapted to contain a heated dye bath in which the articles received thereby from one of said other chambers and later delivered to the other of said other chambers are adapted to be dyed, means for conveying said

articles successively through said chambers of the autoclave, fluid-tight closure gates for selectively hermetically sealing the several chambers from each other and from atmosphere, means for equalizing the pressure of the treating medium within said intermediate chamber and either one of said other chambers preliminarily to effecting free communication between said pressure-equalized chambers for passage of the articles from one of said latter chambers to the other, and means for exhausting the pressure medium from either one of said other chambers while maintaining all of said chambers hermetically sealed from atmosphere.

16. In an apparatus for treating textile articles, an autoclave including inter-communicating pre-setting, dyeing and drying chambers respectively adapted to receive and contain a heated vaporous treating medium under superatmospheric pressure and in which the articles to be treated are respectively subjected to successive pre-setting and dyeing treatments, means for conveying said articles successively through said chambers of the autoclave, means for hermetically sealing each chamber during the period that the articles are contained therein for treatment, said means including fluid-tight closure gates for sealing the outer end of the pre-setting chamber to atmosphere and the inner end thereof from the interior of said dye chamber, fluid-pressure-operated means operatively associated with said closure gates for selectively opening and closing the same in predetermined sequence to permit passage of the articles successively through said pre-setting and dyeing chambers while maintaining the treating medium in said chambers at superatmospheric pressure, and means for exhausting the pressure medium from the pre-setting chamber preliminarily to opening of the outer closure gate of said pre-setting chamber.

17. In an apparatus for treating textile articles, an autoclave comprising at least three chambers respectively adapted to receive and contain heated vaporous treating media under superatmospheric pressure, said chambers being inter-related for progressive passage therethrough of the articles to be treated, one of said chambers being communicable with each of the others, means for conveying said articles successively through said chambers of the autoclave, fluid-tight closure gates for hermetically sealing the several chambers from each other and from atmosphere, and means for delivering into said common chamber the vaporous medium alternately discharged from the other two chambers preliminarily to opening the latter chambers to atmosphere.

SIDNEY BAILEY, JR.

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