

July 25, 1972

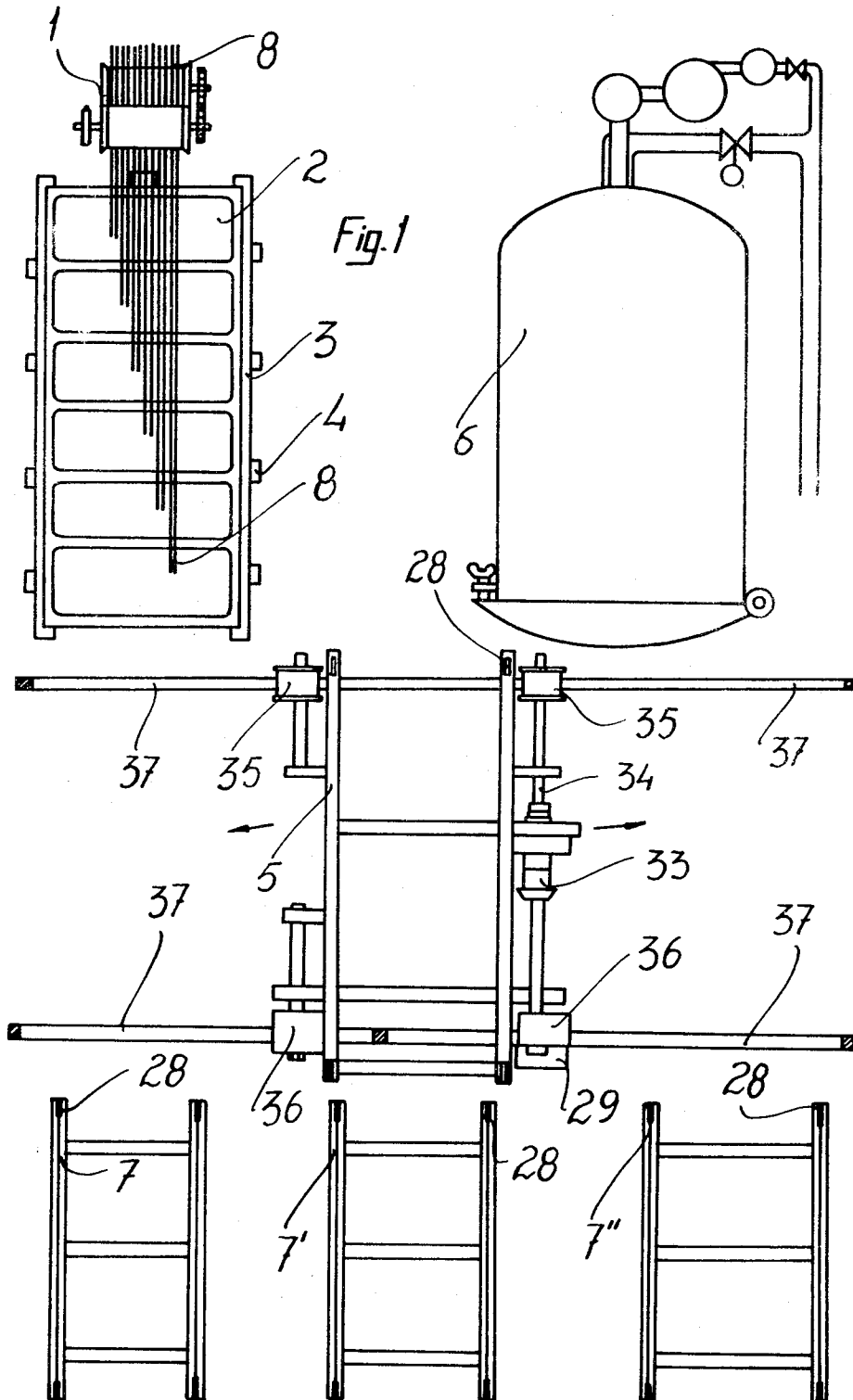
F. V. CALVET

3,679,356

PROCEDURE FOR THE DYEING OF TEXTILE RIBBONS

Filed May 1, 1969

7 Sheets-Sheet 1



INVENTOR
FRANCISCO VANCELLS CALVET
BY *Woodhams, Blanchard & Flynn*
ATTORNEYS

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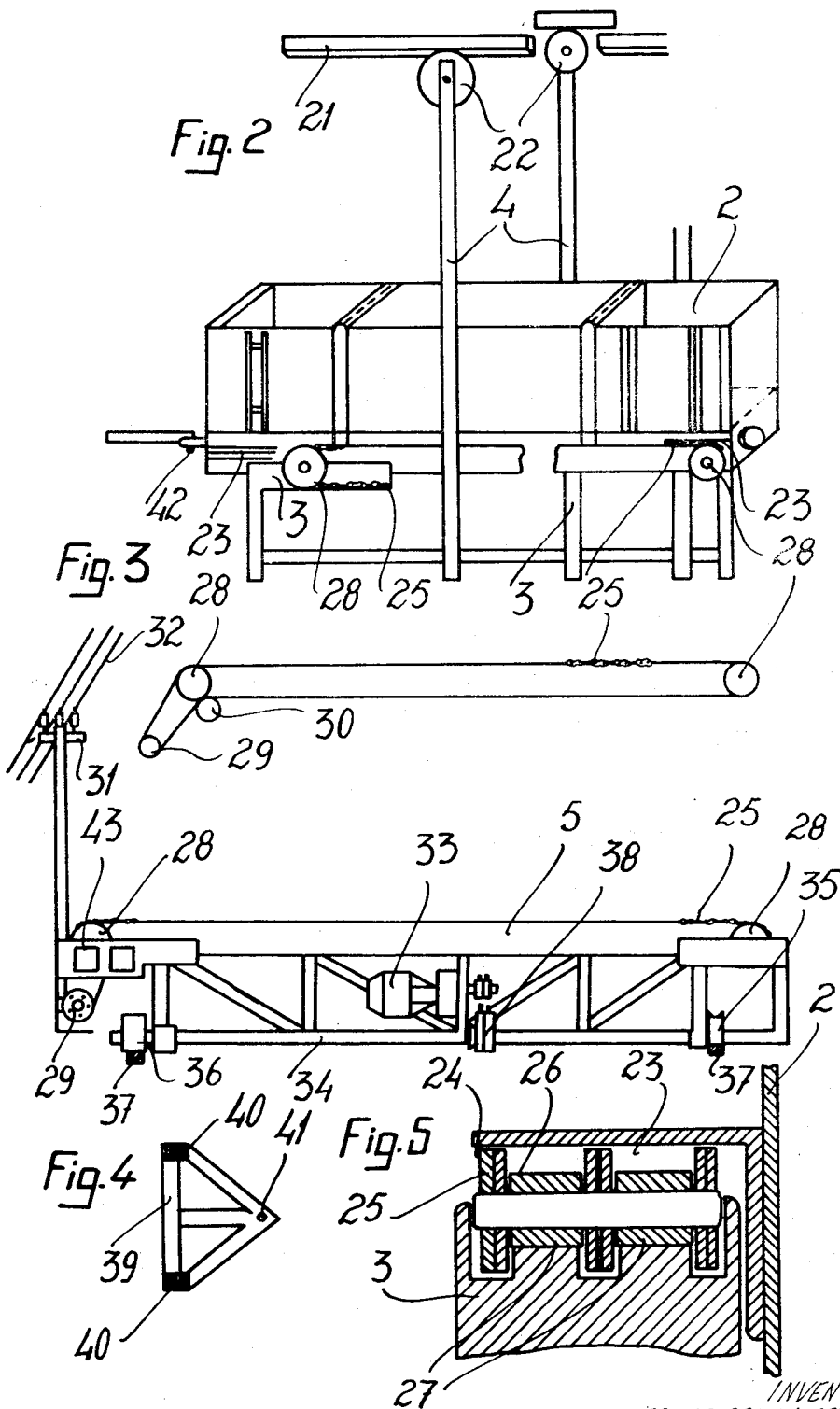
F. V. CALVET

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7 Sheets-Sheet 2



INVENTOR
FRANCISCO VANCELLS CALVET
134 Woodhams, Blanchard & Fourn
ATTORNEYS

July 25, 1972

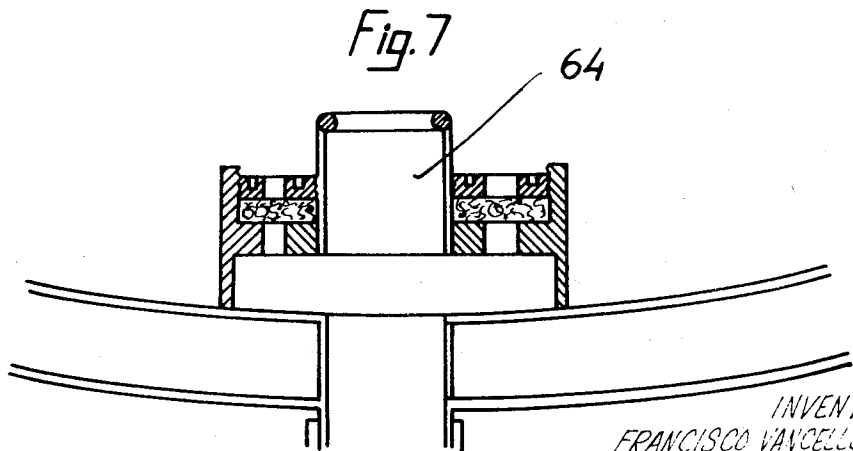
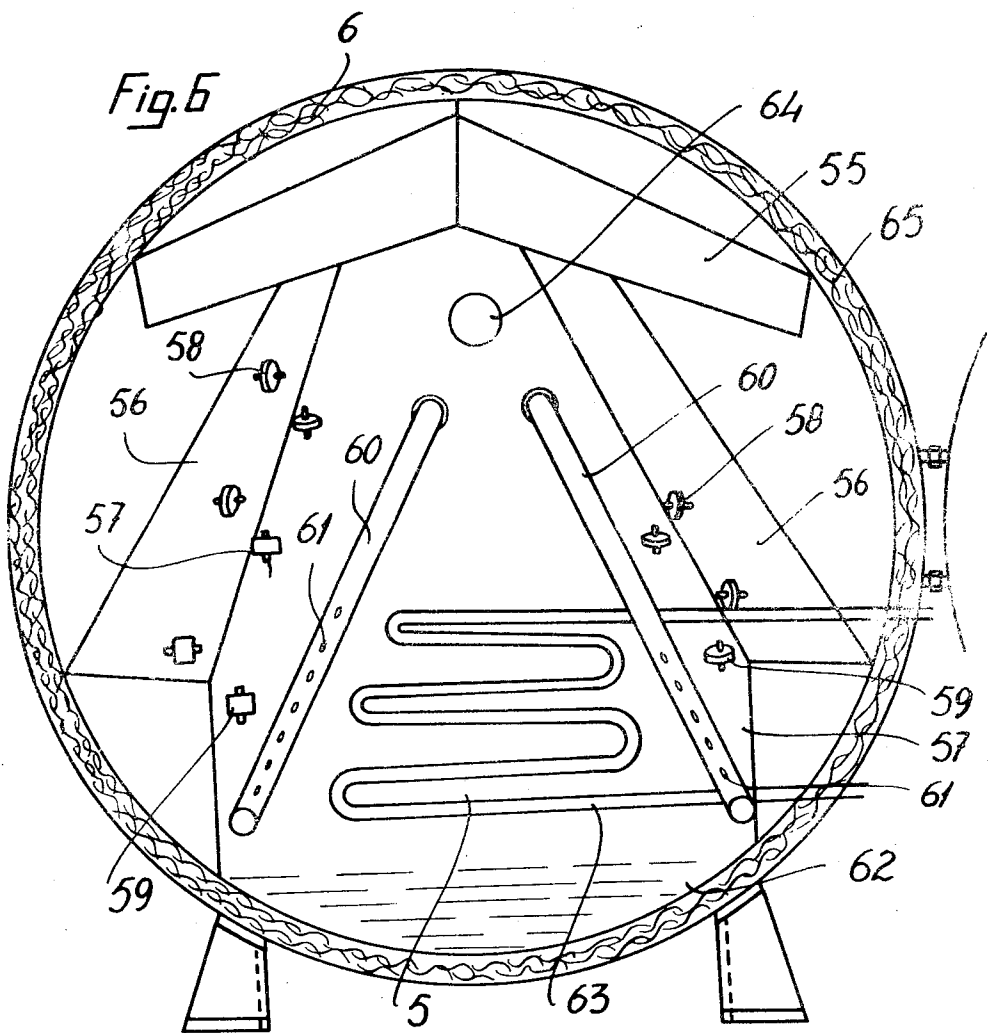
F. V. CALVET

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7 Sheets-Sheet 3



INVENTOR
FRANCISCO VANCELLS CALVET

BY
[Signature]
[Name]
[Address]

July 25, 1972

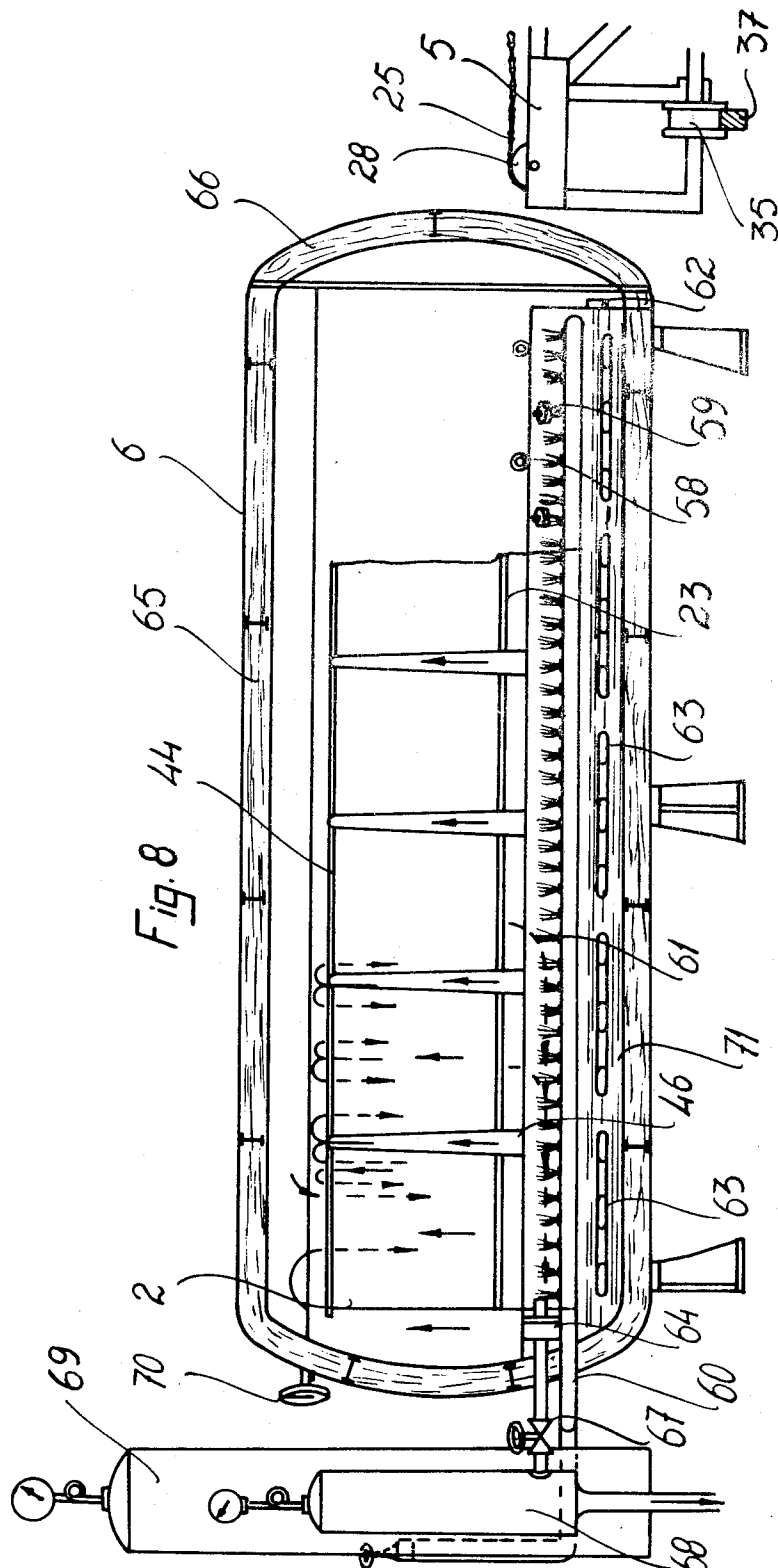
F. V. CALVET

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7 Sheets-Sheet 4



INVENTOR
FRANCISCO VANCELLS CALVET
BY Woodhams, Blanchard & Flynn
ATTORNEYS

July 25, 1972

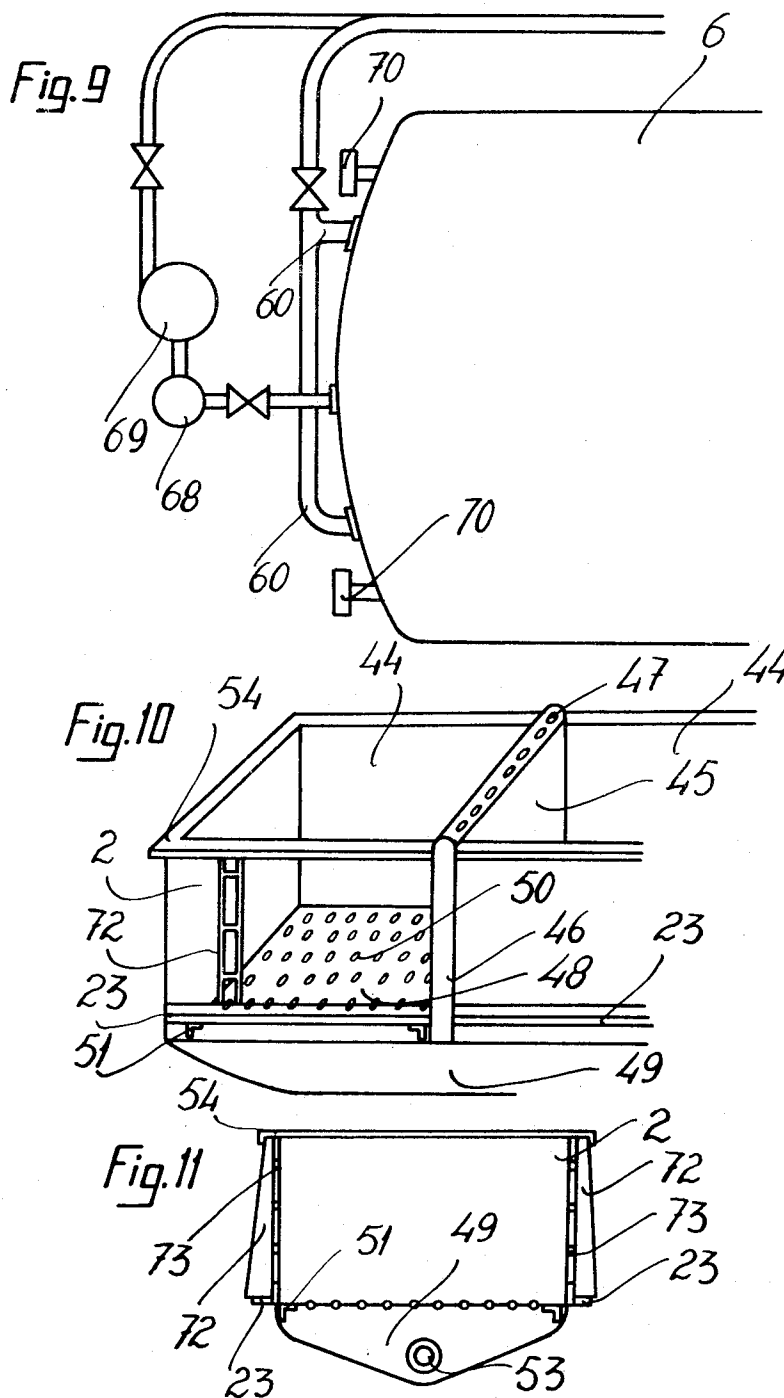
F. V. CALVET

3,679,356

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7 Sheets-Sheet 5



INVENTOR
FRANCISCO VANCELLS CALVET
BY
Woodhams, Blechman & Flynn
ATTORNEYS

July 25, 1972

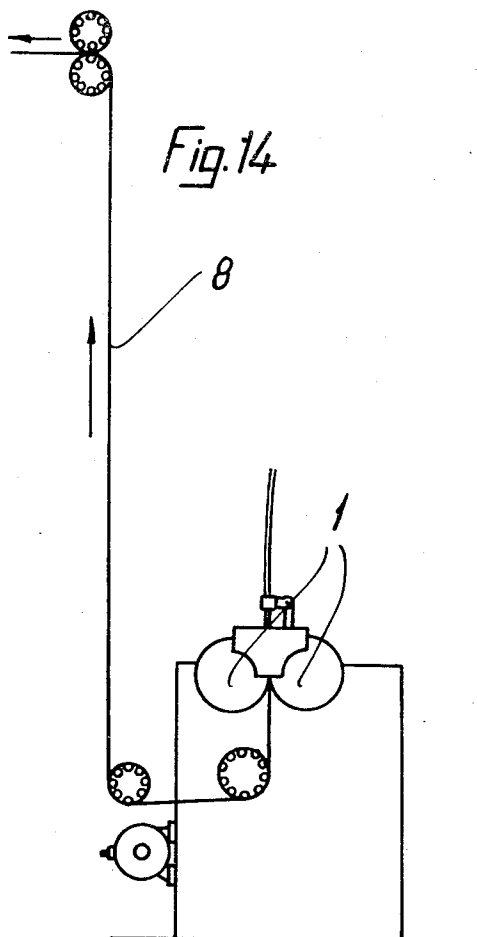
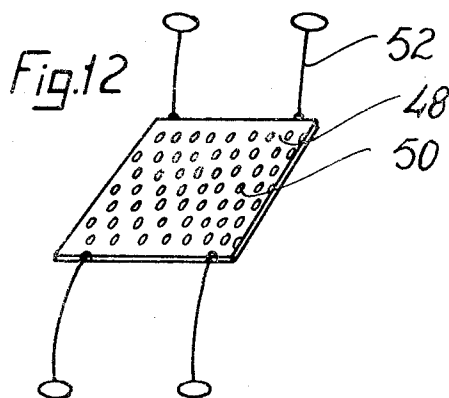
F. V. CALVET

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PROCEDURE FOR THE DYEING OF TEXTILE RIBBONS

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7 Sheets-Sheet 6



INVENTOR
FRANCISCO VANCELLS CALVET
BY
Woodhams, Blanchard & Higgins
ATTORNEYS

July 25, 1972

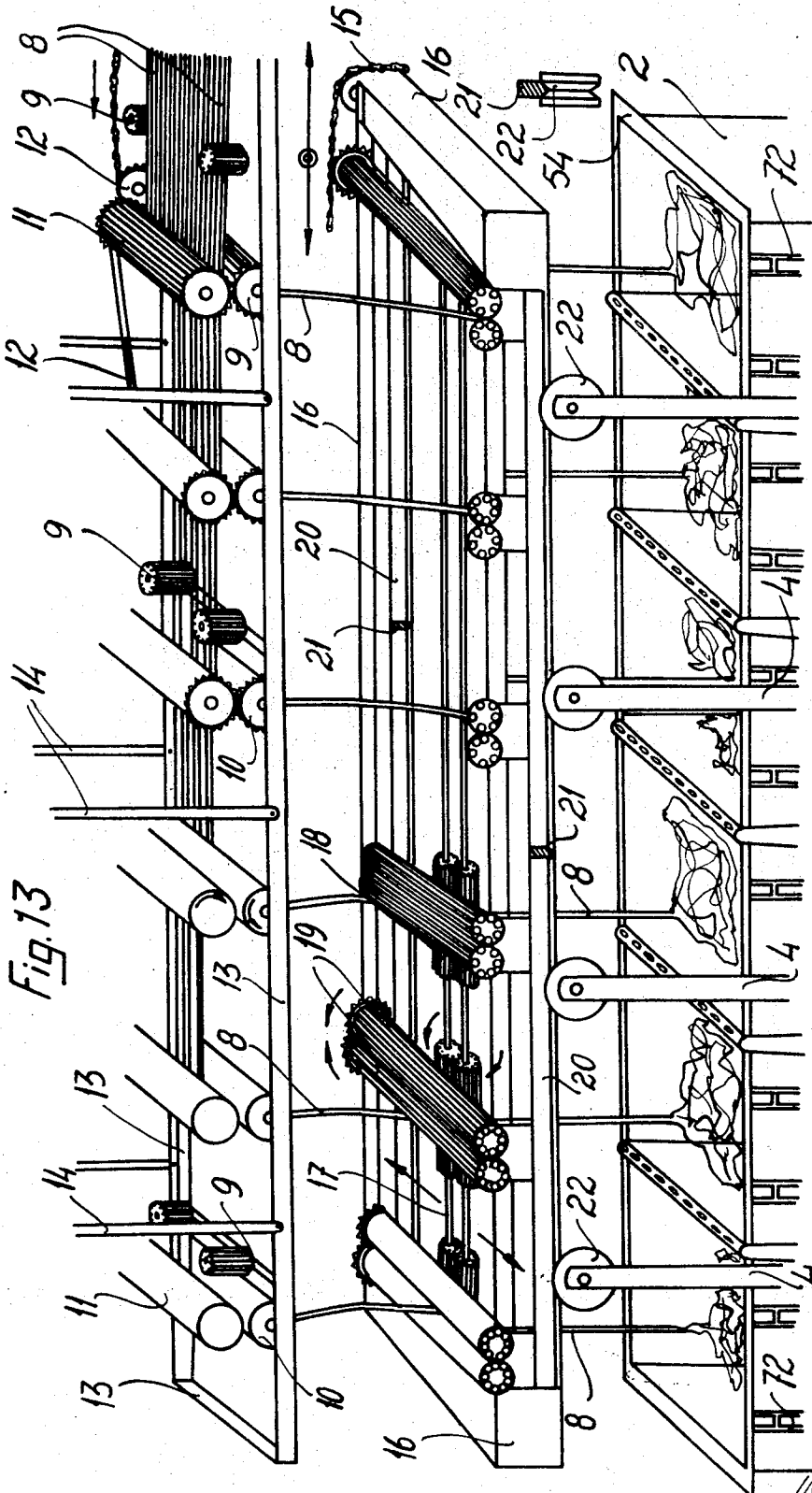
F. V. CALVET

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PROCEDURE FOR THE DYEING OF TEXTILE RIBBONS

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7 Sheets-Sheet 7



INVENTOR
FRANCISCO VANCELLS CALVET
BY Woodhams Olmstead & Co., Inc.
ATTORNEYS

1

3,679,356

PROCEDURE FOR THE DYEING OF TEXTILE RIBBONS

Francisco Vancells Calvet, Tarrasa, Spain, assignor to
Hilados y Tintes Soler, S.A., Barcelona, Spain

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5 Claims

ABSTRACT OF THE DISCLOSURE

A process for the dyeing of textile ribbons wherein the air is swept out of the ribbons and expelled prior to the dye fixing process. The moistened dyed ribbons are delivered to a tub which is positionable within a dye fixing chamber, the tub being heated by a heat source disposed below the tub. A dry vapor is supplied to the interior of the fixing chamber. The vapors within the fixing chamber are drawn downwardly into the tub and through the ribbons contained therein, which vapors are drawn through the bottom of the tub and discharged to a location externally of the fixing chamber. The air contained with the ribbons is also drawn downwardly and discharged externally of the dye fixing chamber. The dye fixing chamber is then heated to a predetermined temperature and maintained at this temperature for a predetermined time for fixing of the dye within the textile ribbons.

This invention refers to a process for the dyeing of textile ribbons, wherein the air is swept out of the ribbons and expelled prior to the dye fixing process, with the dye then being immediately fixed within the ribbons as disposed within a dye fixing chamber.

The process preferably initially requires the distribution of the ribbons or cables in various units of single multiple yarns which units are transported to a device which impregnates them and expresses them by the dye bath, and is arranged to methodically distribute them equally into each of the corresponding integrating compartments of an open tub having common bottom and transportable on a carriage running on rails driven by its own means.

The following phase comprises the longitudinal horizontal displacement of the referred multiple tub to situate same onto the movable carriage, which conveys transversely said tub in front of the entrance mouth of the horizontal cylinder of the vaporizer and dye fixer, in whose cavity the open multiple tub is placed by horizontal rolling displacement; the cylinder cover is then closed to proceed with the primary operation of fixing the dye, having previously boiled the water in the bottom of the cylinder and the dry vapor projected by the two lateral parallel tubes; which conjunct whole of ebullition and dry vapor, after heating the common base of the tub and the four sidewalls of each of the integrating compartments, from below upwards, penetrates in the compartments by the upper open part, precisely through the material impregnated with the adequate dye, from above downwards, leaving through a double bottom plaque, perforated, comprising each of the compartments, above which the mass of ribbon to be fixed is sustained, to pass the vapor to the common bottom, sweeping away with same the air contained in the mentioned mass, whose perma-

2

nence in the material would produce the oxidation of the textile and which is expelled to the outside of the cylinder owing to the aspirator suction of a vacuum device situated in the exterior. The operation of fixing the dye is then immediately proceeded with, within the limits of time and temperature appropriate for the operation to be carried out, after which, the temperature is lowered and the steam inlet closed, the ambient pressure is re-established, the cylinder door is opened, the multiple tub is extracted, sliding same on the transport carriage, situated in front, to immediately rest it on one of the fixed rear carriages and the dyed material is then removed, extracting same from each integral compartment, pulling the perforated plaques of the double bottom, while the transport carriage proceeds with the loading of another tub, full of material impregnated with the dye stuff to place it on the inside of the vaporizing cylinder, thus initiating another fixing cycle and so on repeatedly.

The first phase of the procedure comprises the situation of the textile ribbons up to the wringer-impregnator which is carried out by means of a conventional feeding means, which delivers the ribbons or cables to the guiding cylinder that passes them vertically toward the impregnator where the ribbons are changed from a dry to a moist state due to the absorption of the dyeing solution.

In the second phase, the moist ribbons are threaded to the upper horizontal distributor, passing them to the folder device which deposits them geometrically in the interior of the corresponding compartment that comprise the open transportable tub, suspending the ribbons above the double bottom perforated plaque. The horizontal folding device comprises a framework provided with longitudinal reciprocating movement by the support of the longitudinal guides of its lower frame, which is provided with an end V profile to run in the necks of freely gyratory pulleys arranged one at each extremity of the vertical mounts, fixed in the floor and which form

3

steps of impregnating the ribbons with dyeing paste, delivering the moistened dyed ribbons to a tub having a ribbon receiving compartment positioned above a closed chamber with the ribbon receiving compartment being provided with a perforated bottom wall for separating the ribbon receiving compartment from the hollow chamber, positioning the tub with the ribbons therein within a dye fixing chamber, heating the tub when positioned within the dye fixing chamber, supplying a dry vapor to the interior of the dye fixing chamber in surrounding relationship to the tub, and creating a partial suction within the closed chamber of the tub for drawing the vapors within the dye fixing chamber and the air contained within the ribbons downwardly through the perforated wall of the tub into the closed chamber, and then passing the vapor and air to a location external of the dye fixing chamber.

In order to facilitate the explanation, the drawings show one method of realization as an example only, in which drawings:

FIG. 1 represents a succinct plan of the installation which begins with the expressure-impregnator; the multiple transportable tub deposited on the fixed framework, with the supports of the ribbon or cable folding carriage that deposits same within the multiple tub compartments by means of the cylinders conjugated to this effect; the transport carriage provided with transverse movement on rails; the vaporizing fixing cylinder in parallel position to the multiple tub framework loading position; the three fixed supports for the convenient stationing of the elements or multi-tubs necessary for their unloading, and their unloaded or loaded availability for entrance at the right time into the vaporizing fixing cylinder.

FIG. 2 shows an elevation view of the assembly comprising the open multiple tub partly in perspective, supported on a fixed frame provided with vertical side supports that sustain the free pulleys for the displacement of the sliver horizontal folder.

FIG. 3 represents a side view in elevation of the multiple tube transport carriage, provided with the end motor for the tractioning of the multiple tub, in addition with another central motor for the cross translation of the carriage; a trolley bar rises from the left extremity of the carriage for feeding the electric energy to both motors.

FIG. 4 is a plan view of the auxilliary triangular piece, which, by means of a lower vertical shaft engages with the hole in an adequate piece that projects from the central extremity of the tub, for promoting the longitudinal displacement of same by means of the gearing of undercut toothed blocks situated on the other two vertices of the triangular piece, which teeth engage with the upper side duplex chains of each side of the transport carriage to promote the traction, or else the impulsion of the multiple tub to load same or deposit same respectively.

FIG. 5 shows in detail the actuation of the two pairs of side duplex chains of the transport carriage as rolling elements on adequately machined rulers effected by the chain rollers, arranged lengthwise in the upper part of the supports that constitute the frame of the transport carriage, while the multiple tub is supported on the edge of the stamped sheets that form the links by virtue of the horizontal wings that project lengthwise from each under side of the multiple tub.

FIG. 6 shows an inside perspective frontal view with door open of the vaporizer dye fixing cylinder; the upper part shows two flat plates joined at the highest part by two geometric chords whose object is to avoid that dripping caused by condensation fall on the ribbons or cables to be dyed; beneath the geometric center of the cylinder, two horizontal plates, one at each side that close in rectangle with other two vertical plates whose angle reaches the rounded cylindrical bottom of the cylinder; on the horizontal plates gyratory horizontal shaft pulleys or rollers have been distributed, above those supporting the horizontal wings, that project along each side of the multiple tube; vertical axis gyratory rollers also have been

4

distributed on the vertical plates, for the support guide of the lateral faces of the multiple tube which they respectively make contact and guide, when the transport carriage deposits same within the cylinder, or alternatively when same is drawn for loading on its chains, and then to transport and place it onto one of the fixed stationary supports; longitudinal and horizontal parallel tubes have been provided closed to the lower part of the vertical plates that are joined up on the outside with the dry steam network, these tubes being provided throughout their entire lengths on their upper sides with distributing holes to inject the dry vapor into the cylinder for the required heating of the multiple tub; a vertical plate like a cord maintains the mass of heating water deposited in the lower part of the cylinder; below the level of the referred volume of water and submerged in same, conveniently situated parallel branches of serpentine have been distributed that promote the ebullition of the aforementioned mass of water; in the front or discoidal wall of the cylinder, above the vapor entrance tubing, the tubular device is situated that joins and unjoins by contact with the confrontable opening or hole of the common bottom of the multiple tub, to promote the sweeping out of the air contained within the cylinder and within the mass of material to be dyed, due to the sucking aspiration of the exterior vacuum device.

FIG. 7 shows a detail in section of the tubular joining device by elastic contact, situated in the base plate of the cylinder.

FIG. 8 shows a conventional section longitudinal view of the fixing vaporizing cylinder with the multiple tub situated inside; showing one of the longitudinal tubes with the holes in its upper part for injecting the dry steam for heating the multiple tub; at water level supported in the vertical plate like a geometrical chord, said mass of water being heated to boiling point by the help of flat horizontal serpentine that receive the vapor from the supply network; arrows indicate the route followed by the vapor for the previous air sweeping operation from below upwards, heating the four walls of each of the multiple tub integrating compartments, to penetrate into each one through the material to be dried, to effect the direct outlet along the common base of the tub to the exterior due to the suction exercised by the exterior vacuum device, originated by the depression of a stream of vapor into the exterior, which device is seen in the left part of the figure; the right part of the

5

vertical axis cylinders for the lateral guidance of the sliver yarns or the cable. The folding device comprises two longitudinal parallel gyratory shafts, animated also in an alternative direction of cross travel, provided with a pair of confronted cylinders, each pair to cover the respective multiple tub compartment, and which shafts are situated in a carriage animated with longitudinal reciprocating movement. Above each pair of these cylinders there is another pair of cylinders one at the side of the other, transverse and parallel and in contact with each other, animated by the convenient gyratory movement which absorb the ribbons or cables in order that the longitudinal pairs of cylinders progressively deposit them within the compartments so that due to the two combined reciprocating movements they are deposited over the whole of the surface of each compartment.

FIG. 14 is a side elevation view of the impregnation-wringer with its frame, showing the single motor fastened to the side of said frame, showing the slivers or cables entering vertically between the cylinders under strong pressure from the impregnation-wringer, leaving vertically toward the distributing and folding device and depositing the textile material within the compartments of the multiple tub.

All the gyratory cylinders comprising the device are provided with multiple rods parallel to the cylinder axes and perimetricaly distributed.

The feeder, impregnation-wringer, distributor and folder are driven conjointly by a single electric motor fitted to the frame of the impregnation-wringer through a speed regulator, the transmission being effected by rigid means or through a simple or duplex chain to the diverse elements of the device, the speed being conjugated with that of the outgoing shaft of the speed regulator.

The transverse cylinders of the folder carriage are of friction drive to prevent the passage of a knot or other adhered objects that may accompany the ribbons or cables, or slivers.

For the continuous functioning of the installation, a minimum of three multiple tub elements are required.

The fixing vaporizing cylinder is provided with a double wall over the whole of its surface, and the space between the inner and outer walls is filled with thermal insulating material.

Referring to the figures, 1 represents the impregnator-wringer of the dosified dyeing solution, of the type comprising two cylinders covered with half-hard synthetic material pressed against each other, provided with two metal side plates each pressing the two upper quadrants and contiguous of both bases, by which a trough is established of sufficient volume to produce optimum impregnation. The tub 2 is subdivided into various compartments, each provided with a perforated plate that communicates with a common base above the fixed frame 3 in the floor, above whose longitudinal walls it rests and is displaced horizontally on the duplex chains carrying the multiple tub 2. Vertical supports 4 are consolidated with the sidewalls of the frame 3 fixed in the floor.

The transport carriage 5 is provided for transverse movement on rails which confront the frame 3, the carriage being driven by two duplex chains driven by a specially provided motor for transporting the multiple tub 2 to a position in front of the vaporizing fixing cylinder 6 in whose interior it is deposited due to the inverse movement of its two duplex chains. The references 7, 7' and 7'' represents three fixed supports on each of which a multiple tub 2 may be situated, the supports 7, 7' and 7'' constituting convenient stationary points for the multiple tubs 2 necessary for the functioning of the device.

The reference 8 represents each of the slivers or textile cables to be treated; in which 9 represents the vertical cylinders or lateral guides of the slivers or cables arranged along the distributor section; in which 10 shows the lower driving cylinders of the distributor; where 11 shows the free pressure upper cylinders but geared above the cylin-

6

ders 10; where 12 shows the driving chain of the cylinders 10; where 13 shows the frame supporting the distributing cylinders sustained by tie-rods 14 fixed to the roof; where 15 represents the folding device driving chain which delivers the slivers or the cables to each of the compartments comprising the multiple tub 2; where 16 denoted the folding device carriage provided with reciprocating longitudinal movement; where 17 shows each of the two horizontal, longitudinal, rotary shafts, actuated also alternatively with cross travel, provided with as many pairs of cylinders 18 as the number of compartments integrating the multiple tub 2, for each pair 18 to attend to the respective tub compartment situated beneath the folding carriage 16; where 19 shows each pair of rotary, horizontal and transverse cylinders situated each pair of cylinders 18 and supported by the pertaining carriage 16, which pairs 19 absorb the ribbons or cables distributed by the respective cylinders 10, delivering them to the pairs 18, with which conjugated movements reciprocating and rotary, the referred pairs 18 deposit the slivers 8 into the compartments covering the whole of their surface; where 20 represents the lower longitudinal bars of the carriage 16 provided with a lower V profile supported by the necks of the pulleys 22 in which the carriage 16 is supported and moves in reciprocation, and which pulleys rotate on shafts situated at the upper extremities of the vertical supports 4 solidly fixed to the fixed frame 3 that supports the multiple tub 2, supported by its lateral longitudinal projecting lower wings 23, above the borders 24 of the stamped sheets constituting the links of the duplex chain 25, its rollers 26 supported above the notched border 27 on the upper side of each longitudinal face of the framework 3 on which it rolls.

The endless duplex chains 25, one for each face of the frame work freely rotate on two pulleys 28; the notched borders 27, in addition to, in the frame 3 are provided in the transport carriage 5 and in the fixed stationary supports, 7, 7' and 7''; the duplex chains 25 turn freely on the pulleys 28 in the frame 3 and in the fixed supports, and they are actuated directly by the end motor 2

7

for reinforcing the sidewalls and extremities of the compartments 44; where 55 represents each of the two inclined sheets that cover lengthwise the inside upper part of the cylinder 6 in order to prevent drops due to condensation from falling onto the material under treatment; where 56 represents each of the two inside sheets that horizontally cover the length of the cylinder 6 for the sustenance of the multiple tub 2; where 57 shows each of the two lateral sheets in vertical position forming a box-like rectangle with the horizontal sheets 56; where 58 shows each of the two freely turning rollers with horizontal axes for distribution onto and along the two horizontal plaques 56, arranged for supporting the side projecting wings 23 that sustain the multiple tub 2; where 59 represents each of the freely turning rollers with vertical axes distributed along the two vertical sheets 57 for lateral guidance by contact of the multiple tub 2; where 60 represents each of the two horizontal tubes that enter through the closed end of the cylinder 6, and terminate near to the entrance end, in whose upper part there are holes 61 distributed throughout the length thereof to distribute the vapor under pressure supplied by the network which is connected on the exterior; where 62 shows a frontal plaque that maintains the boiling water level which is promoted by flat serpentine-like pipes 63 through which passes steam; where 64 shows the hole in the back of the cylinder base that connects elastically with the central hole 53 of the multiple tub double bottom, through which the air is swept; where 65 represents the total space between the double walls of the cylinder 6, filled with antithermic synthetic material insulating the internal heat; where 66 shows the cylinder cover 6 provided with a safety lever closing device; where 67 shows the external valve for promoting the sweeping suction by 68 to the vertical cylinder of the exterior vacuum device; where 69 shows the vertical cylinder that produces the vacuum effect; where 70 represents the exterior control apparatus, one for reading the temperature and the other for reading the pressure of the cylinder interior 6 for the optimum conduction of the operative function; where 71 represents the volume of water being boiled by the serpentines 63 therein immersed; and where 72 represents reinforcements arranged on the sidewalls of the compartments 44 with which they make contact only by the specially provided stops 73.

To briefly summarize the operation of the present invention, the ribbons are deposited into the tub 2, which tub is then positioned within the dye fixing chamber defined by the interior of the cylinder 6. The tub, when positioned within the cylinder 6, is then heated by means of the boiling water disposed within the bottom of the cylinder 6. Further, a dry vapor is supplied to the interior of the dye fixing chamber through the pipes 60 and orifices 61. Due to the externally positioned cylinder 69, a suction is imposed on the opening 64 which is in communication with the chamber 49 provided in the bottom of the tub 2. The suction created within the chamber 49 causes the vapors within the interior of cylinder 6 to be drawn downwardly through the interior of the tub and through the perforated wall 50. This suction also causes the air contained within the ribbons to also be drawn downwardly into the chamber 49, whereupon the air and vapors are then drawn through the opening 64 so as to be discharged externally of the cylinder 6.

The tub containing ribbons, as positioned within the cylinder 6, is then heated to a predetermined temperature and maintained at said temperature for a predetermined time to cause fixing of the dye in the textile ribbons, whereupon the temperature within the chamber is then lowered and the tub removed from the cylinder 6.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A process for the dyeing of textile ribbons wherein the air is swept out of the ribbons and expelled prior to the dye fixing process, comprising the steps of:

8

delivering moistened dyed ribbons to a tub having a ribbon receiving compartment positioned above a closed chamber with the tub having perforated wall means separating the ribbon receiving compartment from the closed chamber;

positioning the tub within a dye fixing chamber;

heating the tub when positioned within the dye fixing chamber by means of a heat source disposed below the tub;

supplying a dry vapor into the interior of the dye fixing chamber;

drawing the vapors within the dry fixing chamber downwardly in the compartment and through the ribbons into the closed chamber, and then discharging said vapors to a location disposed externally of the dye fixing chamber;

drawing the air contained within the ribbons downwardly into the closed chamber and then discharging the air within the closed chamber to a location disposed externally of the dye fixing chamber; then

heating the dye fixing chamber to a predetermined temperature and maintaining said predetermined temperature for a predetermined time for causing fixing of the dye in the textile ribbons; then

lowering the temperature within the dye fixing chamber and removing the tub with the dyed ribbons from the chamber.

2. A process according to claim 1 comprising a multiple tub integrated by various compartments, whose intermediate and individual walls are separated by a free space, and united at their upper part by a curve provided with holes, by comprising compartments with a base or bottom for holding the material to be dyed, consisting of a movable perforated plaque provided with multiple holes situated on angular profiles with which a double longitudinal base is established having a hole on its frontal face which joins by elastic contact with the respective hole in the lower central part of the rear base of the fixing cylinder that communicates with an external vacuum device formed by the external vertical cylinders and conjugated, by effecting the sweeping of the air and establishing a sufficient difference of pressure between the interior and the exterior of the cylinder through the holes with the exterior valve open.

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9

positioning the tub with the ribbons therein within a dye fixing chamber;
heating the tub when positioned within the dye fixing chamber;

supplying a dry vapor to the interior of the dye fixing chamber in surrounding relationship to the tub; and
creating a partial suction within the closed chamber of said tub for (a) drawing the vapors within the dye fixing chamber downwardly through the ribbons and through the perforated wall into the closed chamber and (b) drawing the air contained within the ribbons downwardly into the closed chamber and then passing the vapor and air within the closed chamber to a location external of the dye fixing chamber.

5. A process according to claim 4, further including the steps of providing a quantity of water in the lower portion of the dye fixing chamber, heating the water prior

10

to positioning the tub within the dye fixing chamber, and then positioning the tub within the dye fixing chamber whereby the heat from the water causes a heating of the tub from below.

References Cited

UNITED STATES PATENTS

318,205	5/1885	Rau	68—5 C
1,249,384	12/1917	Halliwell	68—5 C
1,683,687	9/1928	Mijer	8—149.2
1,796,039	3/1931	Mijer	8—149.2
2,297,230	9/1942	Langen	8—149.1 X

WILLIAM I. PRICE, Primary Examiner

U.S. Cl. X.R.

68—5 C