# United States Patent [19]

**Edwards et al.**

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[54] **HIGH PRESSURE PLATE WASHER**


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[52] **U.S. Cl.** ..... **134/144,** 134/131, 134/154, 134/181, 134/199

[51] **Int. Cl.** ..... **B08b 3/02**

[58] **Field of Search** ..... 134/45, 72, 82, 123, 134/144, 154, 165, 176, 179, 180, 181, 183, 199, 131



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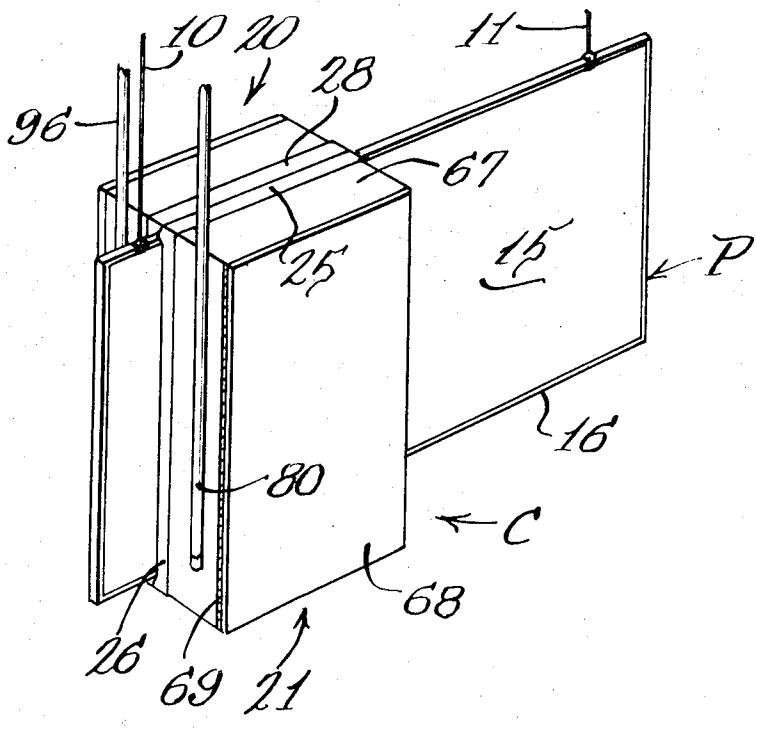
[57] **ABSTRACT**

A jet washer for cleaning plates used in the leather tanning industry for adhesively mounting hides during processing thereof. The jet washer includes cabinet structure located at each side of a path of travel of the plates with each cabinet having a plurality of rotatable multi-arm jet spray units for delivering high velocity water or other liquid jets against the surface of the plate and with the multi-arm jet units being in sufficient numbers and oriented vertically and horizontally to have a liquid jet directed against every part of the opposite sides of the plate during the travel of the plate through the washer.


**9 Claims, 4 Drawing Figures**



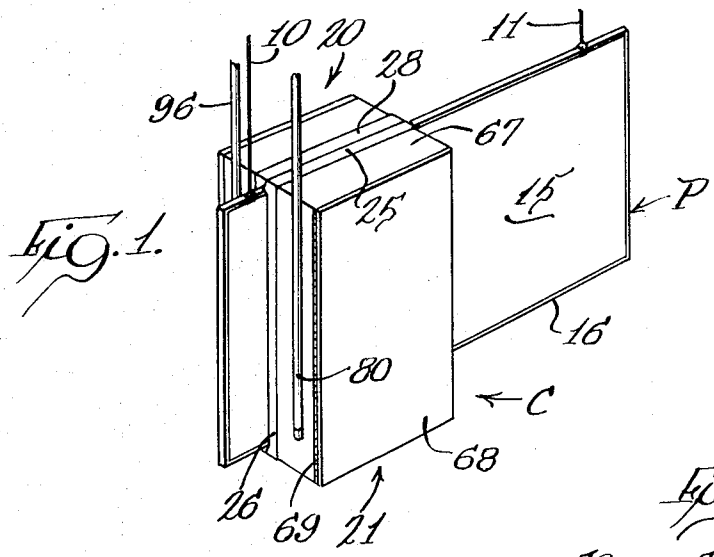



Fig. 1.

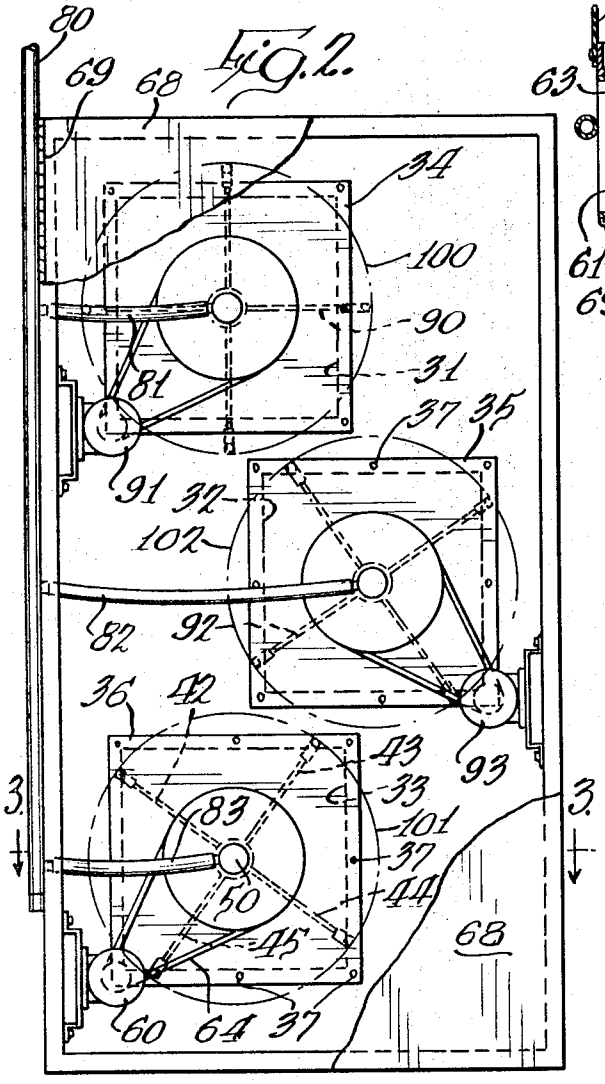



Fig. 2.

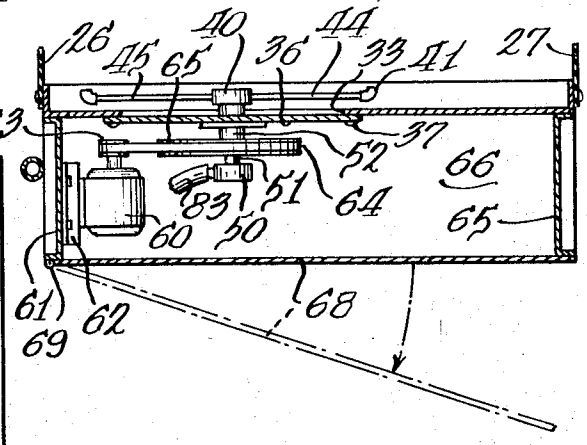



Fig. 3.

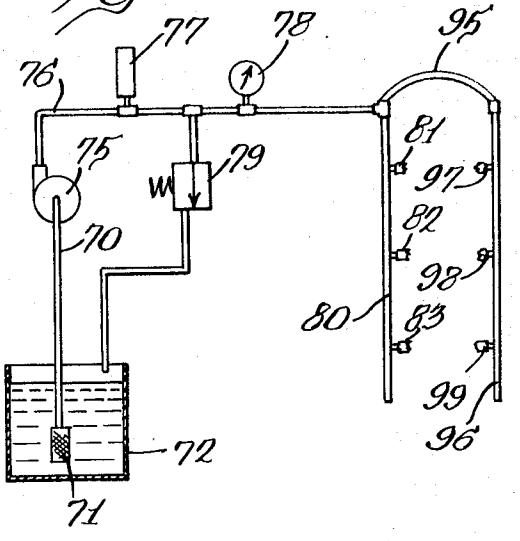



Fig. 4.

# HIGH PRESSURE PLATE WASHER

## BACKGROUND OF THE INVENTION

This invention pertains to equipment primarily for use in the leather tanning industry and, more particularly, for cleaning the opposite sides of a plate having a bubble porcelain surface which has had leather hides adhesively mounted thereto by a jet washer which impinges jets of liquid against the entire opposite sides of the plate.

For many years, the leather tanning industry has used plates of a substantial size which are used in conjunction with the drying of leather hides. The plates are associated with travelling conveyor structure and, at a station in advance of a dryer, a worker applies adhesive to the surface of the plate and a hide is then mounted onto the plate surface and pressed and stretched, with another hide similarly applied to the other side of the plate. These plates help to control the size of the hide during the drying process. After leaving the dryer, the leather hides are removed from opposite sides of the plate and, prior to reuse of the plate, it is necessary to remove adhesive and colorants from the plate. Prior to this invention, the common system for cleaning the plates has been the use of cleaning liquids and rotating brushes which are movably mounted for movement toward and away from the path of travel of a plate. Such cleaning devices have required controls for cycling the position of the brushes relative to the position of the plate and did not completely clean the plates partly because of the failure of the brushes to get close to the plate in the areas adjacent a frame forming a surround for the plate. Generally, the plates have a bubble porcelain surface which is not a smooth surface, but has an irregular contour having both valleys and high areas, so that a brush does not clean the entire surface and, therefore, does not remove all of the adhesive. The failure to obtain a complete cleaning of the plate results in drops of adhesive on the surface of the hide next applied, which is undesirable.

The problems existing in the prior art are solved by the invention disclosed herein by the use of a jet washer which causes direct impingement of liquid jets against the entire surface of both sides of the plate and which avoids the necessity for the adjustable positioning of any parts during a cycle and, therefore, the need for controls providing this function.

## SUMMARY

A primary feature of the invention is to provide a new and improved washer for leather mounting plates used in the leather tanning industry and cleaning method wherein a plurality of liquid jets are directed against the surface of the opposite sides of the plate in a manner to have a liquid jet impinge against all portions of the surfaces during the course of travel of the plate through a cleaning station.

A primary object of the invention is to provide a jet washer as defined in the preceding paragraph wherein the washer embodies a series of multi-arm jet units mounted at each side of the path of travel of a plate through the washing station with the jet units being positioned in horizontal and vertical relation and being rotatable at a rate to have a liquid jet impinge against all surfaces of the plate during its travel through the cleaning station.



Another object of the invention is to provide a jet washer for cleaning porcelain plates as used in the leather tanning industry for adhesively mounting leather hides for drying and having a pair of cabinet units mounted at opposite sides of a path of travel of the plates at a cleaning station with flexible wipers at the top and sides thereof extending toward said path of travel to form an enclosure to confine the liquid used in washing the plates, a plurality of rotatable multi-arm pressure liquid jet units mounted in each cabinet and having a nozzle at the end of each arm pointed toward the path of travel of the plates and with the units vertically spaced and horizontally staggered in the direction of plate travel whereby the arcs of the nozzles in adjacent jet units overlap in the vertical direction to have the entire height of the plate subject to liquid jets emitted from the nozzles, a pressure fluid circuit for delivering liquid under high pressure to the nozzles, and means for rotating the jet units at a rate of speed related to the speed of travel of the plate to have a liquid jet directed against every part of the surface of a plate.

Other objects of the invention include a washer structure as defined in the preceding paragraph wherein the multi-arm units are each independently driven through a drive including an electric motor and are mounted in the cabinet by each being rotatably mounted on a planar base which overlaps an opening in a mounting panel of the cabinet whereby a multi-arm unit may be easily removed for service through the opening upon removal of a mounting base from the panel, and the fluid circuit having provision for maintaining a uniform high-volume flow of high pressure liquid to the jet nozzles.

## BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the cleaning station showing the cleaning structure in association with a mounting plate to be cleaned;

FIG. 2 is a view, on an enlarged scale, looking toward the front of FIG. 1 and with a cabinet door broken away;

FIG. 3 is a plan section, taken generally along the lines 3—3 in FIG. 2, and showing the cabinet door in open, broken line, position; and

FIG. 4 is a schematic of the fluid circuit.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1, the cleaning structure is disposed at a cleaning station, indicated generally at C, for cleaning a mounting plate, indicated at P, which is suspended from a travelling conveyor structure (not shown) by a pair of mounting members **10** and **11** to have the plate P travel along a path through the cleaning station C. The mounting plate P has a planar shape defined by a panel **15** and has a raised surround frame **16.** Conventionally, these plates are approximately 5 feet high and 10 feet long, and the plate has a metal base with each side having a bubble porcelain surface. This results in a dimpled type of surface having raised parts and valleys.

The structure at the cleaning station C includes a pair of mounting structures in the form of enclosing cabinets, indicated generally at **20** and **21,** positioned at opposite sides of the path of travel of the plate P and spaced apart a distance greater than the thickness of the plate. Each of the cabinets has flexible wipers at the

sides and top thereof extending inwardly toward the path of plate travel to form a flexible seal and a liquid-confining enclosure. The cabinet **21** has the top wiper **25** and side wipers **26** and **27** and the cabinet **20** has corresponding wipers with the top wiper being shown at **28.**

Each of the cabinets is of the same construction and the construction of cabinet **21** and parts associated therewith will be described in detail.

The cabinet **21** includes a mounting structure for a plurality of multi-arm jet units which is in the form of a panel **30** extending vertically and defining a wall of the cabinet next to the path of travel of a plate P. This panel **30** is provided with a series of openings **31, 32,** and **33** which are vertically spaced and with the middle opening **32** horizontally displaced in the direction of plate travel from the other two openings. A mounting base for a multi-arm jet unit is associated with each of the openings **31-33** and, as shown at **34, 35,** and **36,** respectively. Each of the mounting bases is of the same generally square shape as the panel opening and of a slightly larger size to over lap and seal off the opening whereby the interior of the cabinet is watertight. Each mounting base is removably attached to the mounting panel by a series of fasteners **37** extending around the perimeter thereof.

Each mounting base has a multi-arm spray unit and the unit on base **36** is typical and will be described in detail. The multi-arm jet unit has a hub **40** with four outwardly extending arms in the form of small diameter pipes, with the arms of the multi-arm spray unit mounted on mounting base **36** being identified at **42, 43, 44** and **45.** The outer end of each of the arms has a jet-emitting nozzle **47,** with an orifice opening toward a plate P. The hub **40** is hollow to provide liquid communication to the arms **42–45,** with the liquid being received from a rotary union **50** which connects with a hollow shaft **51** mounting the hub **40.** The mounting base **36** mounts a bearing **52** for rotatably mounting the shaft **51.** The multi-arm spray unit is rotated by power means including a motor **60** mounted on a side wall **61** of the cabinet by a mounting base **62,** with the motor having a drive pulley **63** driving a belt **64** passing about a driven pulley **65** on the shaft **51.**

In addition to the mounting panel **30** and the cabinet side wall **61,** the cabinet includes a side wall **65,** a base panel **66,** a top panel **67,** and a cabinet door **68** which is hinged to the cabinet by a hinge **69.** The cabinet thus defines a watertight enclosure for mounting the electric motors for the jet units with service access thereto through the cabinet door **68.** Service access for the multi-arm jet units is obtained by release of the fasteners **37** and removal of the particular mounting base, such as the mounting base **36,** which permits removal of the jet arms provided they are oriented in a position slightly clockwise from that shown for the lowermost unit in FIG. **3** to withdraw the nozzles **41** through the corners of the opening **33** in the panel.

The fluid circuit is shown in FIG. **4** and has a fluid intake line **70** for a liquid, such as water, with a strainer **71** positioned in a tank **72.** The line **70** has a motor-driven pump **75** which delivers the liquid to a line **76** having a surge-arrester **77,** a pressure gauge **78** and a pressure regulator bypass valve **79.** The line **76** connects to a pipe **80** having outlet hoses **81, 82** and **83** connected thereto which supply the three multi-arm jet units in cabinet **21.** The hose **81** supplies the jet unit having arms **90** and which are rotated by a motor **91.** The hose **82** supplies the jet unit having arms **92** which are rotated by a motor **93.** The hose **83** supplies the unit having arms **42–45.** A hose **95** connects the line **76** to a pipe **96** having outlet hoses **97, 98,** and **99** which supply the multi-arm jet units in the cabinet **20.**

The jet units have their arcs of travel overlapping with the arcs **100** and **101** in vertical alignment and with the arc **102** offset horizontally to overlap the arcs **100** and **101** in the vertical direction.

As an example and not to be deemed as limiting, the plates P move through the cleaning station C at the rate of six feet per minute and the multi-arm jet units are rotated at 400 r.p.m. The relative speeds together with the related arcs of travel of the jet units cause the liquid jets emitted from the nozzles **41** to impinge upon the entire surface of the plate P. Theoretically, this complete impingement could be obtained with a speed of rotation of 168 r.p.m. for the multi-arm jet units. This would be computed on the basis of each jet effectively scrubbing a ¼ inch length of plate surface and the plates travelling along the path at the rate of 14 ft./min. which is 168 in./min. Thus one revolution of a jet unit scrubs **1** lineal inch of plate surface. With the speed of rotation of 400 r.p.m., it will be seen that the speed of the plates P can be substantially increased and still have complete jet liquid impingement. Further as an illustrative example, the pump **75** has a design capacity of 35 gallons per minute and with a setting of approximately 900 p.s.i. on the pressure regulator valve **79** the nozzles are sized to provide a total flow of 20 gallons per minute and at a high pressure with a resulting high-pressure, high-volume delivery of water against the surface of the plate P.

We claim:

**1.** A jet washer for a mounting plate used in leather tanning processes, said plate having a planar body and a surrounding frame including connections to a travelling conveyor, said washer comprising: a pair of mounting structures positioned one at each of opposite sides of the conveyor path and each having a vertically extending panel disposed adjacent said path, a plurality of multi-arm pressure jet units rotatably mounted on each of said panels and positioned in vertically and horizontally spaced relation and with a nozzle at the end of each arm, and means for rotating said nozzles at a rate of speed relative to the rate of travel of a plate to have direct impingement of high pressure liquid against the entire surface of a plate in the course of travel of a plate through the washer.

**2.** A jet washer as defined in claim **1** wherein said nozzles are supplied with liquid from a fluid circuit including a pump to deliver liquid from the nozzles at a pressure in excess of 500 p.s.i.

**3.** A jet washer as defined in claim **1** wherein the space between said mounting structures exceeds the thickness of a plate and flexible wipers extending inwardly from the top and sides of each mounting structure to close off the space therebetween but permit travel of a plate through said space.

**4.** A jet washer as defined in claim **1** wherein each of said pressure jet units is rotatably mounted on one of said panels by means including a mounting base removably secured to a side of said panel facing into the cabinet and covering an opening in the panel, said opening being of a size to permit movement of a jet unit there-

through for service by release and movement of the mounting base.

**5.** A jet washer as defined in claim **4** with a plurality of motors associated one with each jet unit, a drive belt for each motor driving a pulley at each jet unit, and said pulleys being supported by said mounting bases whereby removal of a drive belt disconnects the drive to a jet unit to facilitate service of a jet unit.

**6.** A jet washer for cleaning porcelain plates used in the tanning industry to adhesively mount leather hides for treatment thereof comprising: a pair of cabinets positioned one at each side of a path of travel for a series of said plates and spaced apart a distance greater than the thickness of a plate, a plurality of flexible wipers on the top and sides of each cabinet extending inwardly toward said path to sealingly engage a plate travelling between said cabinets, a plurality of rotatable multiarm pressure liquid jet units mounted in each cabinet with a nozzle at the end of each arm pointed toward said path of travel, the jet units associated with each cabinet being vertically spaced and horizontally staggered in the direction of plate travel whereby the arcs of the nozzles in adjacent jet units overlap in the vertical direction to have the entire height of a plate subject to liquid jets emitted from the nozzles, a pressure fluid circuit for supplying liquid under high pressure to said nozzles, and means for rotating said jet units at a rate of speed related to the speed of travel of a plate to have a liquid jet directed against every part of the surface of a plate.

**7.** A jet washer as defined in claim **6** wherein each cabinet has a panel to mount the rotatable jet units, each spray unit being mounted on a planar base removably attached to and overlying a panel opening of a size to permit passage of the spray unit through the panel opening for service thereof.

**8.** A jet washer as defined in claim **6** wherein said jet units are each driven by an electric motor positioned within the cabinet.

**9.** A jet washer as defined in claim **6** wherein said pressure fluid circuit includes a high volume, high pressure liquid pump and a pressure regulating valve in the circuit with said nozzles sized to provide a liquid delivery pressure in excess of 500 p.s.i. to have the liquid impinge on the plate surface as scouring jets.

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