

Sept. 17, 1968

E. K. WELSH ETAL

3,401,668

MASK WASHER APPARATUS

Filed Dec. 14, 1966

3 Sheets-Sheet 1

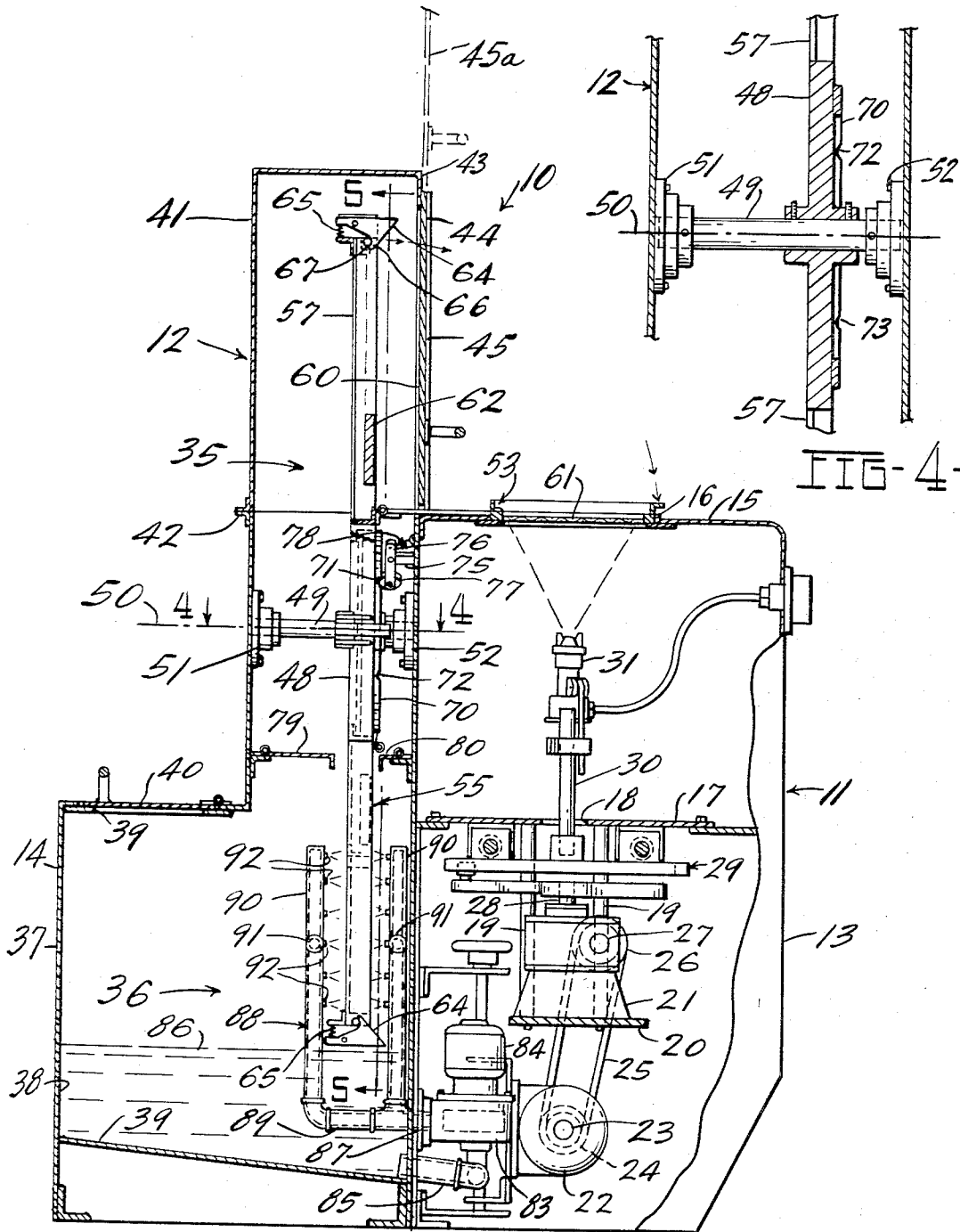


FIG-1-

INVENTORS:
ERWIN K. WELSH.
GLENN L. WELSH.

Owen & Owen

ATT'YS.

Sept. 17, 1968

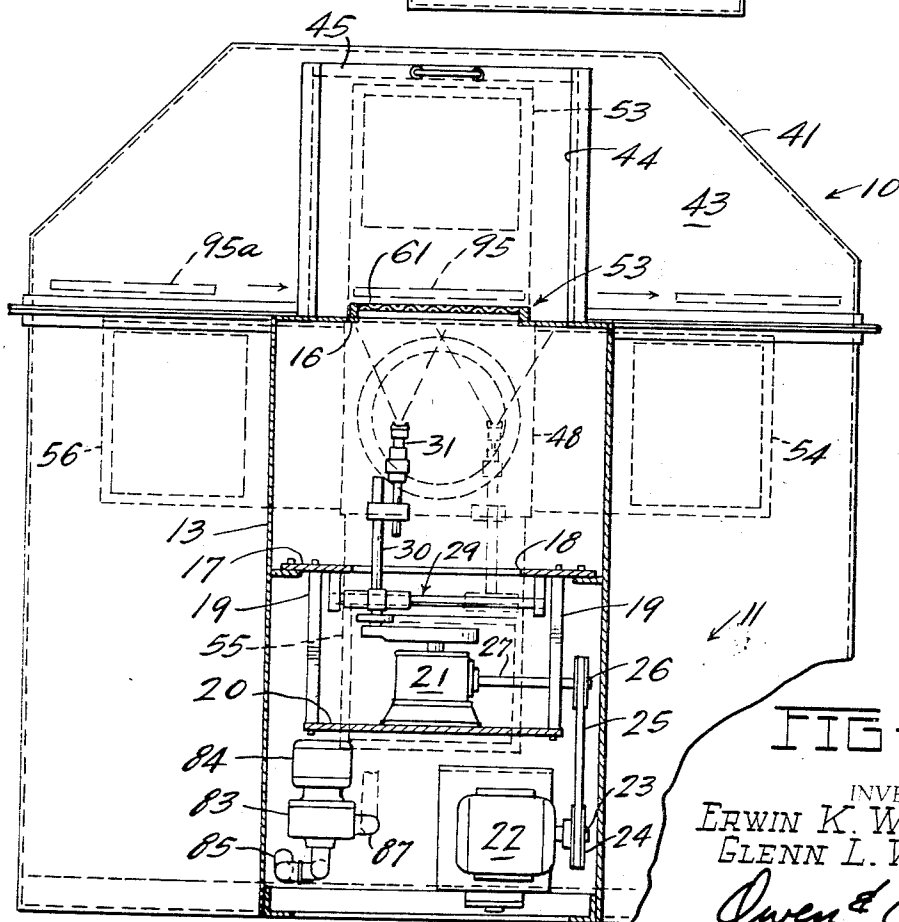
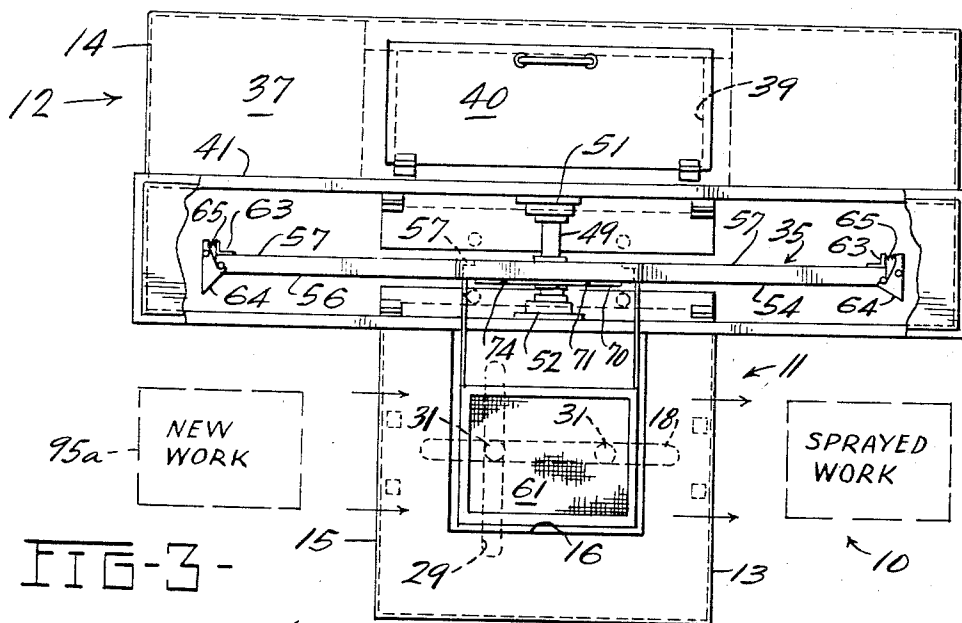
E. K. WELSH ETAL

3,401,668

MASK WASHER APPARATUS

Filed Dec. 14, 1966

3 Sheets-Sheet 2



INVENTORS:
ERWIN K. WELSH,
GLENN L. WELSH.

Owen & Owen
ATT'YS.

Sept. 17, 1968

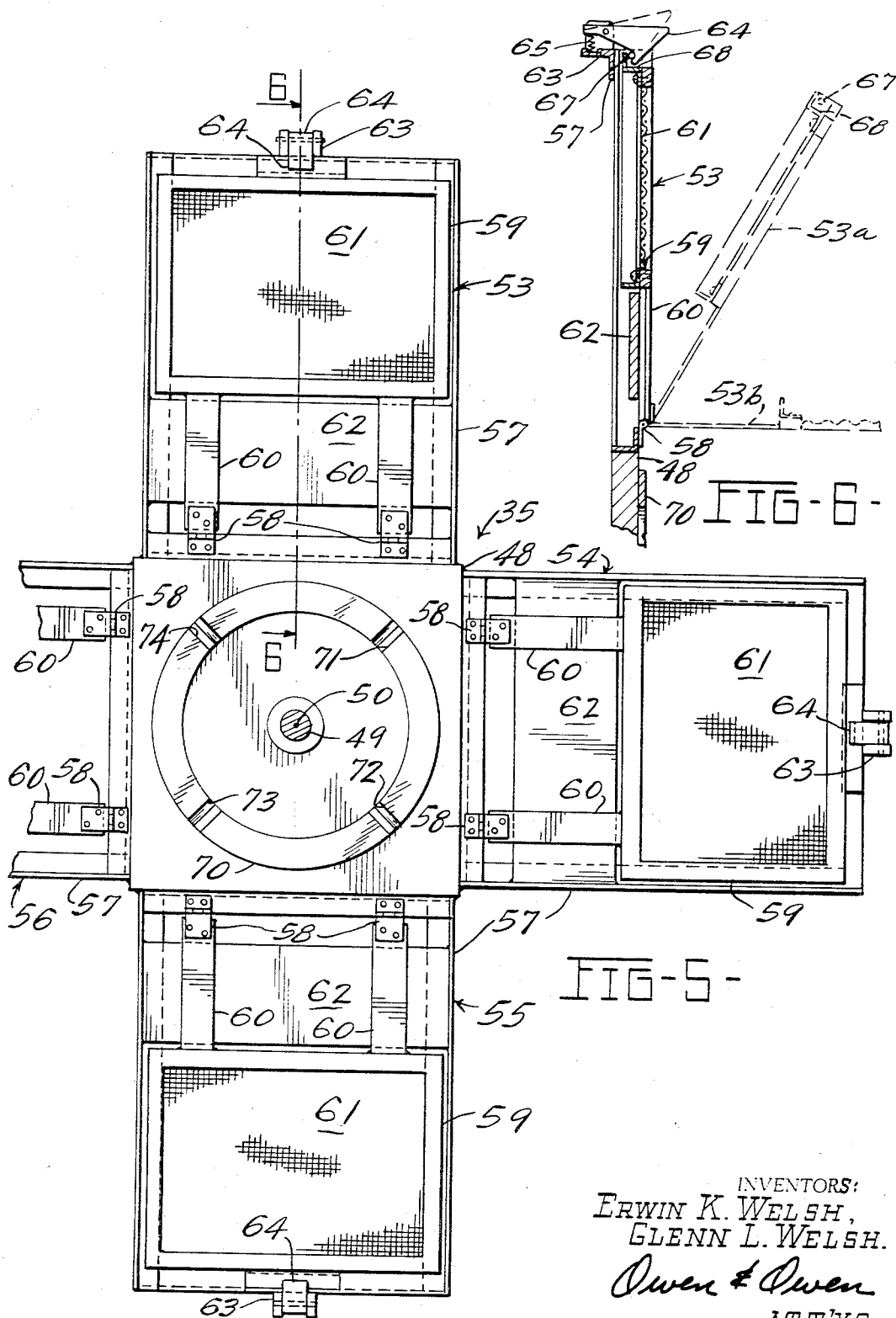
E. K. WELSH ETAL

3,401,668

MASK WASHER APPARATUS

Filed Dec. 14, 1966

3 Sheets-Sheet 3



INVENTORS:
ERWIN K. WELSH,
GLENN L. WELSH.
Owen & Owen
ATT'YS.

1

3,401,668

MASK WASHER APPARATUS

Erwin K. Welsh and Glenn L. Welsh, Vassar, Mich., assignors to Deco Tools, Inc., Toledo, Ohio, a corporation of Ohio

Filed Dec. 14, 1966, Ser. No. 601,704

9 Claims. (Cl. 118—70)

ABSTRACT OF THE DISCLOSURE

A mask washer apparatus for use in a decorative painting operation. A mask assembly having a plurality of outwardly extending mask holding frames is positioned within a housing and is mounted for rotation on a horizontal axis. The mask assembly is removably held in a respective one of a plurality of predetermined rotative positions. The housing has a mask opening and each of the mask holding frames is pivotally mounted for movement between a rest position perpendicular to the horizontal axis and an operational position wherein the mask is moved through the mask opening into a painting position. The housing defines a cleaning chamber which has a solvent reservoir. A solvent distribution system effective to direct a pressurized solvent spray to opposed sides of a mask is provided in the cleaning chamber. The solvent distribution system includes a plurality of spray conduits positioned adjacent to and on opposite sides of the path of movement of the mask holding frames. A pump is used to supply solvent under pressure to the spray conduits.

This invention relates to decorative painting apparatus and, more particularly, to a mask washer apparatus which is used in the cleaning of decorative masks.

In the decorative painting art, a workpiece to be coated, for example, a name plate, is placed in a workholder. A decorative mask having accurately formed openings is positioned adjacent the workpiece surface. The openings in the mask define the areas of the workpiece surface which are to be painted. Paint is applied to the workpiece surface by the use of spray gun apparatus, for example, an atomizing air type spray gun. An example of one type of decorative painting spray gun apparatus is disclosed in detail in co-pending application, Ser. No. 542,318, filed Apr. 13, 1966. After a number of workpieces have been painted, the decorative mask must be cleaned.

It is the primary object of the present invention to provide decorative painting apparatus including mask washer apparatus for cleaning decorative masks which have waste paint upon their surfaces.

It is another object of the present invention to provide a novel mask washer apparatus, suitable for cleaning decorative masks, which may be utilized in connection with varying types of decorative painting spray apparatus.

It is a further object of the present invention to provide a mask washer apparatus which cleans one decorative mask while another mask carried by the mask washer apparatus is in an operational painting position.

It is a still further object of the present invention to provide a mask washer apparatus having retaining means for releasably retaining a plurality of masks in a selected one of a plurality of predetermined positions.

Further objects of this invention will become apparent from the following specification and drawings in which:

FIG. 1 is a vertical, sectional view, of a decorative painting apparatus including a mask washer apparatus according to the present invention;

FIG. 2 is a front elevational view, with parts broken away, of the decorative painting apparatus shown in FIG. 1;

2

FIG. 3 is a top plan view of the decorative painting apparatus shown in FIG. 1;

FIG. 4 is a fragmentary, horizontal sectional view taken along the line 4—4 of FIG. 1;

FIG. 5 is a fragmentary vertical sectional view, showing the mask assembly, taken along the line 5—5 of FIG. 1; and

FIG. 6 is a vertical sectional view taken along the lines 6—6 of FIG. 4 and showing diagrammatically various positions during the pivotal movement of a mask holding frame.

Briefly, the present invention comprises a mask washer apparatus which is used in a decorative painting apparatus having spray painting mechanism for directing paint to a predetermined spray area. The mask washer apparatus is positioned adjacent the spray area and has a plurality of mask holding frames which are mounted for movement so that a respective one of the mask holding frames is removably positioned adjacent the spray area. In the present embodiment, the mask holding frames are positioned in a manner similar to the spokes of a wheel and are rotated around a central horizontal axis. The uppermost one of the workholding frames is pivoted downwardly to an operational position immediately adjacent the spray area. Cleaning means are positioned within the path of movement of the mask holding frames for cleaning a decorative painting mask which is retained in one of the non-operative mask holding frames.

Referring to FIG. 1, a decorative painting assembly is generally indicated by the reference number 10 and comprises a decorative painting spray apparatus 11 and a mask washer apparatus 12, according to the present invention. The decorative painting spray apparatus 11 is enclosed by a housing 13 and the mask washer apparatus 12 is enclosed by a housing 14. In the present embodiment, the mask washer apparatus 12 is physically connected to the decorative painting spray apparatus 11.

The mask washer apparatus 12, according to the present invention, may be used with numerous types of decorative painting spray apparatus and the apparatus 11 is shown by way of example only. A more complete description of the decorative painting spray apparatus 11 is given in the above-mentioned co-pending application Ser. No. 542,318, filed Aug. 13, 1966.

The housing 13 of the spray apparatus 11 has an upper horizontal surface 15 which serves as a work table. The surface 15 has an opening 16 which defines the boundary limits of the spray area. A horizontal member 17 having a longitudinally extending slotted opening 18 (see FIG. 2) is connected to the interior walls of the spray housing 13. A plurality of columns 19 depend from the horizontal member 17 and support a platform 20, which in turn mounts a speed reducer mechanism 21. Referring to FIG. 2, an electrical motor 22 having an output shaft 23 is positioned in the housing 13 beneath the platform 20.

A pulley 24 is keyed to the output shaft 23 of the motor 22 and a drive belt 25 extends between the pulley 24 and an input pulley 26 which is mounted on an input shaft 27 of the speed reducer mechanism 21.

An output shaft 28 of the speed reducer mechanism 21 is operatively connected through a drive assembly 29 to a vertically extending gun post 30.

In the present embodiment the gun post 30 reciprocates within the opening 18 of the member 17 and mounts a single atomizing air type spray gun 31. The spray gun 31 is effective to direct paint to the predetermined spray area which is defined by the opening 16 in the upper horizontal surface 15 of the housing 13.

Referring to FIGS. 1, 2, and 3, the mask washer apparatus 12, according to the present invention, includes a mask assembly 35 and cleaning means generally indicated by the reference number 36. The mask washer hous-

ing 14 has a lower cleaning chamber section 37 which has a solvent reservoir 38. An inclined floor 39 serves as the bottom of the solvent reservoir 38. The cleaning chamber section 37 of the housing 14 has a chamber opening 39 which is normally closed by a door 40.

The housing 14 includes an upper vertically extending section 41 which is mounted by a hinge 42 to provide access to the mask assembly 35. Referring to FIGS. 1 and 2, a front side 43 of the upper section 41 of the housing 14 is provided with a mask holder opening 44. A vertically slidable door 45 is removably positioned with respect to the opening 44. The door 45 is removed during use of the decorative painting assembly 10. Referring to FIG. 1, the dashed lines 45a indicate a position of the door 45 as it is being moved vertically upwardly.

In the present embodiment, the mask assembly 35 (see FIG. 5) includes a generally rectangular base 48 which is fixedly mounted on a horizontally extending shaft 49. The shaft 49 rotates on a central axis, indicated in FIG. 1 by the reference number 50. The shaft 49 is rotatably journaled in bearings 51 and 52 which are located on opposed interior walls of the upper section 41 of the housing 14.

In the present embodiment, four equally spaced mask holding frames 53, 54, 55, and 56 extend radially outwardly in a direction perpendicular to the shaft 49. Support frames 57 are mounted on the base 48 and serve as supports for the mask holding frames 53-56.

Referring to FIGS. 5 and 6, each of the mask holding frames 53-56 is pivotally mounted by hinges 58 to a respective one of the support frames 57. Each of the mask holding frames 53-56 includes a mask holder 59 and two arms 60 which are connected by a pair of the hinges 58 to the support frames 57. Referring to FIG. 6, a decorative painting mask 61 is removably secured in each of the mask holders 59. Each of the support frames 57 includes a stop member 62 which limits the pivoting movement of a respective one of the mask holding frames 53-56. When the mask holding frame 53 is in a vertical rest position its arms 60 are adjacent the stop member 62 of the support frame 57.

A bracket 63 is mounted at the outer end of each of the support frames 57 and pivotally secures a catch 64. A spring 65 urges the catch 64 inwardly toward the support frame 57. The catch 64 serves as releasably clamping means for securing a respective one of the mask holding frames 53-56 in the vertical rest position, wherein the mask holding frame is perpendicular with respect to the central axis 50. Referring to FIG. 6, when the mask holding frame 53 is in the vertical rest position, a detent 66 on the catch 64 snaps inwardly against a rod 67 which is located in a recess 68 in the outer border of the mask holder 59.

Referring to FIG. 6, when the mask holding frame 53 is in the uppermost position within the upper section 41 of the housing 14, the door 45 is removed and the mask holding frame 53 is pivoted downwardly past a position indicated by the reference number 53a to a horizontal operational position 53b. Referring to FIG. 1, when the mask holding frame 53 is in the horizontal operational position it is parallel to the central axis 50 and the decorative painting mask 61, which is held by the mask holding frame 53, is positioned directly adjacent the spray area defined by the opening 16 in the upper horizontal surface 15 of the spray housing 13.

Retaining means are provided for releasably retaining the mask assembly 35 in each of a plurality of predetermined angular rotative positions with respect to the central axis 50. In the present embodiment, the retaining means comprises a circular ring 70 which is secured to the mask assembly base 48 in a concentric relationship with the shaft 49. Four circumferentially spaced radial grooves 71-74 are located in the ring 70. The grooves 71-74 are equally spaced around the ring 70 and in the present embodiment are 90° removed from one another.

The retaining means also include a locking member 75 which is mounted on the interior wall of the housing 14 adjacent the ring 70. Referring to FIG. 1, the locking member 75 includes a pivot arm 76 having a roller 77 mounted at one end. A spring 78 is mounted at the opposite end of the pivot arm 76 and biases the roller 77 inwardly toward the ring 70. The roller 77 functions in a cooperating relationship with a respective one of the grooves 71-74 to retain the mask assembly in a predetermined angular position of rotation with respect to the central axis 50. The grooves 71-74 are so located around the surface of the ring 70 that, when the roller 77 of the locking member 75 is in engaging relationship with one of the grooves 71-74, a respective one of the mask holding frames 53-56 is in the uppermost position within the housing 14 and such mask holding frame may be pivoted downwardly into operative relationship with the spray area defined by the opening 16.

The retaining means is so designed that when the mask holding frame 53 is in the operative position shown in FIG. 1, the opposed mask holding frame 55 extends downwardly into the cleaning chamber 37.

Hinged gas plates 79 and 80 are pivotally mounted on the interior walls of the upper section 41 of the housing 14. The plates 79 and 80 extend inwardly toward the frame holding members, for example the frame holding member 55, in FIG. 1 and serve as shields to retard the upward movement of solvent fumes from the cleaning chamber 37.

Referring to FIGS. 1 and 2, the cleaning means includes a pump 83, driven by a motor 84, both of which are positioned in the spray housing 13 in the present embodiment. The pump 83 has an intake conduit 85 which extends inwardly into the cleaning chamber 37 and receives solvent which is placed in the solvent reservoir 38. Solvent is indicated by the reference number 86. The pump 83 also has a discharge conduit 87 which discharges cleaning solvent under pressure into a solvent distribution system indicated by the reference number 88.

In the present embodiment, the solvent distribution system 88 includes a header 89, vertical spray conduits 90 in liquid communication with the header 89 and horizontal spray conduits 91 which are in liquid communication with the vertical spray conduits 90. The spray conduits 90 and 91 are positioned within the cleaning chamber adjacent the predetermined path of movement of the mask holding frames 53-56. The vertical spray conduits 90 and the horizontal spray conduits 91 have a plurality of nozzle openings 92 which direct the cleaning solvent upon opposed sides of the decorative painting mask 61 which is retained in the mask holding frame 55.

Different types of solvent 86 may be utilized within the cleaning chamber 37 depending upon the characteristics of the paint used in the decorative painting operation. As an example, acetone has been found to be a satisfactory solvent in many decorative painting operations. Depending on the characteristics of the solvent which is utilized, it is often preferable to provide exhaust means (not shown) in communication with the cleaning chamber 37.

In a typical decorative painting operation, decorative masks 61 have been positioned within the mask holders 59 of each of the mask holding frames 53-56. The door 45 is removed from its position over the mask holder opening 44 on the front side 43 of the housing 14. The catch 64 which secures the mask holding frame 53 in its vertical rest position adjacent its respective support frame 57 is released (see FIG. 6) and the mask holding frame 53 is pivoted downwardly into the operative position, as shown in FIG. 1.

When the mask holding frame 53 is operational, the roller 77 of the locking member 75 is biased inwardly and is in cooperating relationship with the groove 71 in the ring 70. The retaining means holds the mask assembly 35 in a stationary rotative position with respect to the central horizontal axis 50.

At the same time, the opposed mask holding frame 55 extends vertically downwardly into the cleaning chamber 37 and the decorative painting mask 61, positioned within the mask holder 59 of the mask holding frame 55, is cleaned by the solvent 86 which is directed against its opposed sides by the nozzles 92. When the mask holding frame 53 is in the operative position and the mask holding frame 55 is in the cleaning position, the two remaining mask holding frames 54 and 56 are in opposed lateral rest positions.

A workpiece 95 (see FIG. 2) is positioned over the mask holding frame 53 in contacting relationship with the decorative painting mask 61. The decorative painting spray apparatus 11 is actuated and the spray gun 31 reciprocates along its rectilinear path, directing paint upon the workpiece 95 in the areas defined by the decorative painting mask 61. When the workpiece 95 has been painted, it is removed and a new workpiece 95a (see FIG. 2) is moved into painting position.

After a number of workpieces 95 have been coated, the decorative painting mask 61, within the mask holding frame 53, becomes coated to the extent that it no longer is operational. At this time, the mask holding frame 53 is pivoted upwardly against its support frame 57 and the catch 54 clamps the mask holding frame 53 in its rest position. The mask assembly 35 is then rotated 90° to a new position. The roller 77 of the locking member 75 is now in cooperating relationship with the groove 74 in the ring 70. The mask holding frame 56 is adjacent the mask holder opening 44 and may be pivoted downwardly to its operational position adjacent the opening 16 in the upper surface 15 of the spray housing 13. Simultaneously, the opposed mask holding frame 54 is rotated downwardly, along the predetermined path of movement, to a position within the cleaning chamber 37. While the mask holding frame 56 is being utilized in the decorative painting of additional workpieces 95, the decorative painting mask 61, retained in the opposed mask holding frame 54, is being cleaned.

It should be expressly understood that numerous modifications may be made to the above described embodiment and still fall within the scope of the present invention. While the preferred embodiment shows the use of four mask holding frames 53-56, it is, of course, possible to vary the number of mask holding frames.

It is also within the scope of the present invention to provide automatic rotative movement of the mask assembly. The rotative movement may occur at the end of a predetermined period of time. An electrical circuit is closed and an electrical motor (not shown) is energized. The motor is operatively connected to the mask assembly which is rotated a predetermined distance, for example, through an angular distance of 90 degrees. The motor is deenergized by a limit switch (not shown). At this time, a new mask has been positioned adjacent the spray area and the above described mask washer cycle is repeated.

We claim:

1. A mask washer apparatus comprising, in combination, a housing, a mask assembly positioned within said housing, said mask assembly being mounted for rotation on a horizontal axis, said mask assembly including a plurality of mask holding frames, each of said mask holding frames extending perpendicularly from such horizontal axis, retaining means for releasably retaining said mask assembly in a respective one of a plurality of pre-

determined rotative positions, said housing defining a mask opening, each of said mask holding frames being pivotally mounted for movement between a rest position perpendicular to such horizontal axis and an operational position wherein said mask holding frame passes through such opening into a painting position, said housing defining a cleaning chamber, a solvent reservoir within said cleaning chamber, and solvent distribution means effective to direct a pressurized spray of solvent to opposed sides of a mask which is in a cleaning position within said cleaning chamber, said solvent distribution means including a plurality of spray conduits positioned adjacent to and on opposed sides of the path of movement of said mask holding frames and pumping means effective to distribute solvent under pressure from said solvent reservoir to said spray conduits.

2. Apparatus according to claim 1, including spray painting means for applying decorative paint when one of said mask holding frames is in an operational painting position.

3. A mask washer apparatus according to claim 1, including means for releasably holding each of said mask holding frames in its rest position.

4. A mask washer apparatus according to claim 1, wherein said mask assembly includes support means for supporting each of said mask holding frames.

5. A mask washer apparatus according to claim 4, wherein said support means comprises a plurality of support frames extending perpendicularly from such horizontal axis, each of said support frames being adjacent a respective one of said mask holding frames when such mask holding frame is in its rest position.

6. A mask washer apparatus according to claim 5, including means for releasably clamping each of said mask holding frames to a respective one of said support frames when such mask holding frame is in its rest position.

7. A mask apparatus according to claim 1, wherein said mask assembly includes four equally spaced mask holding frames.

8. A mask apparatus according to claim 1, wherein said housing includes a cleaning chamber opening and door means for closing such cleaning chamber opening.

9. A mask washer apparatus, according to claim 1, wherein said mask assembly includes four equally spaced mask holding frames and wherein said retaining means comprises a plurality of radially extending and circumferentially spaced grooves defined by said mask assembly, and a spring biased member operatively connected to said housing, said member having a groove engaging portion, whereby when the groove engaging portion of said member is in a cooperating relationship with one of such grooves, one of said mask holding frames is in a painting position and a mask holding frame is positioned within such cleaning chamber.

References Cited

UNITED STATES PATENTS

3,104,181	9/1963	Minnick	118—301 X
3,327,721	6/1967	Carlson	134—153 X

CHARLES A. WILLMUTH, *Primary Examiner*.

J. P. MCINTOSH, *Assistant Examiner*.