

[54] SAND BLASTING OF METAL SURFACES AT AN ANGLE OF LESS THAN 45°

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Related U.S. Application Data

[60] Division of Ser. No. 235,293, March 16, 1972, Pat. No. 3,769,753, which is a continuation-in-part of Ser. No. 68,151, Aug. 31, 1970, abandoned.

[52] U.S. Cl. 134/7, 51/321, 134/36, 134/38, 134/40

[51] Int. Cl. B08b 5/02, B08b 7/04, B24c 1/08

[58] Field of Search 134/38, 7, 36, 29, 40; 51/11, 8, 321

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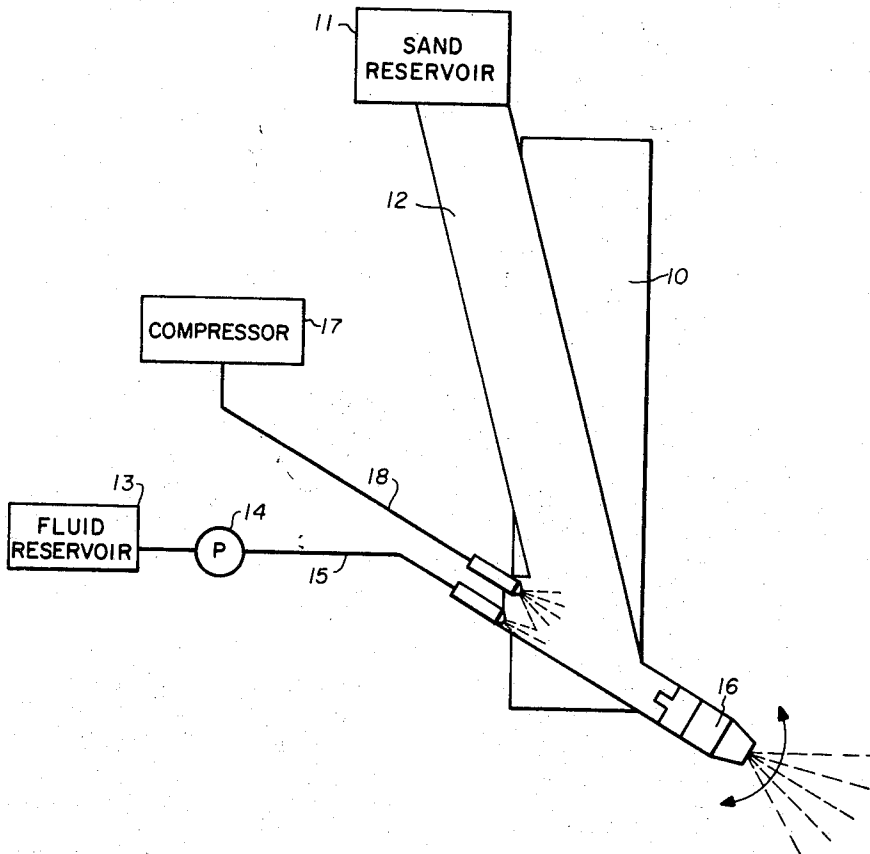
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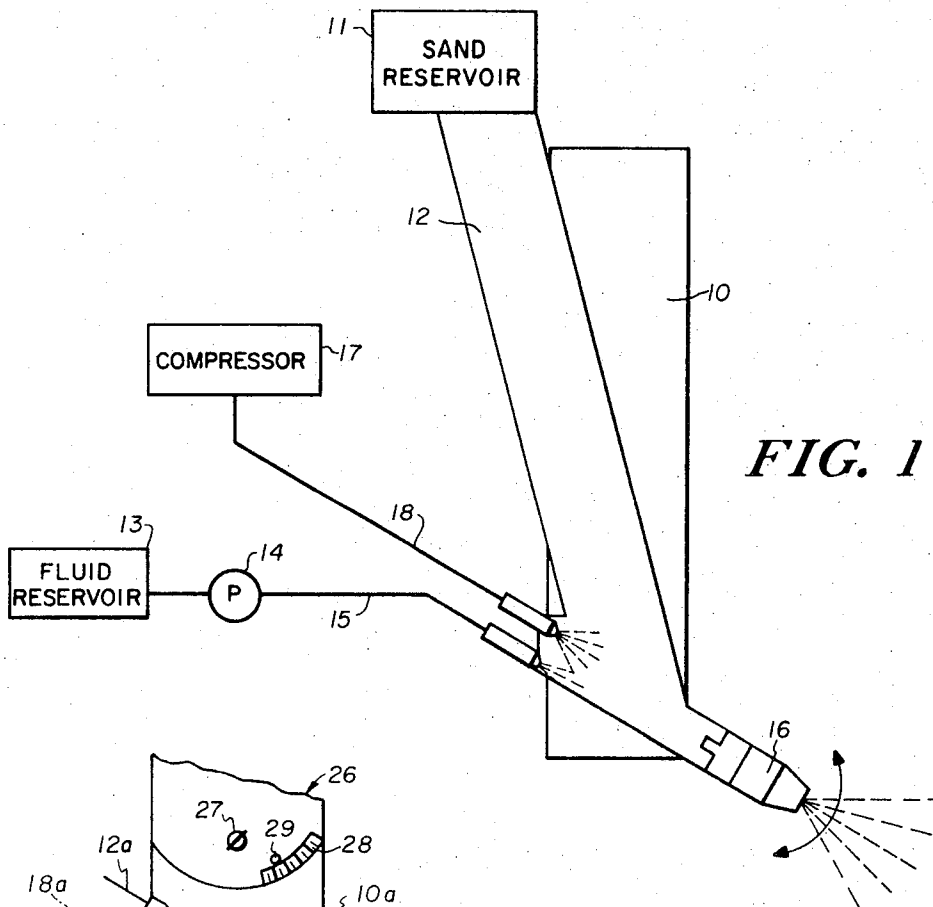
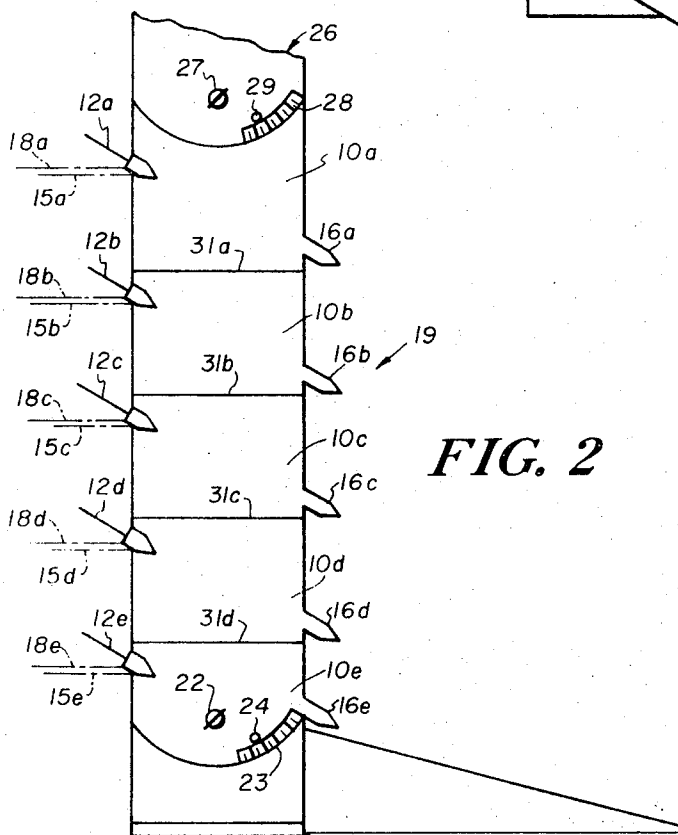
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ABSTRACT

A method for removing paint from a metal surface wherein a mixture of a highly volatile chemical solvent and an abrasive (such as sand) is sprayed onto the metal surface (such as an automobile) at an oblique angle. The abrasive removes the paint without chipping and roughs up the surface while the chemical solvent removes film and dirt thereby enabling the surface to receive a new coat of paint.

4 Claims, 10 Drawing Figures





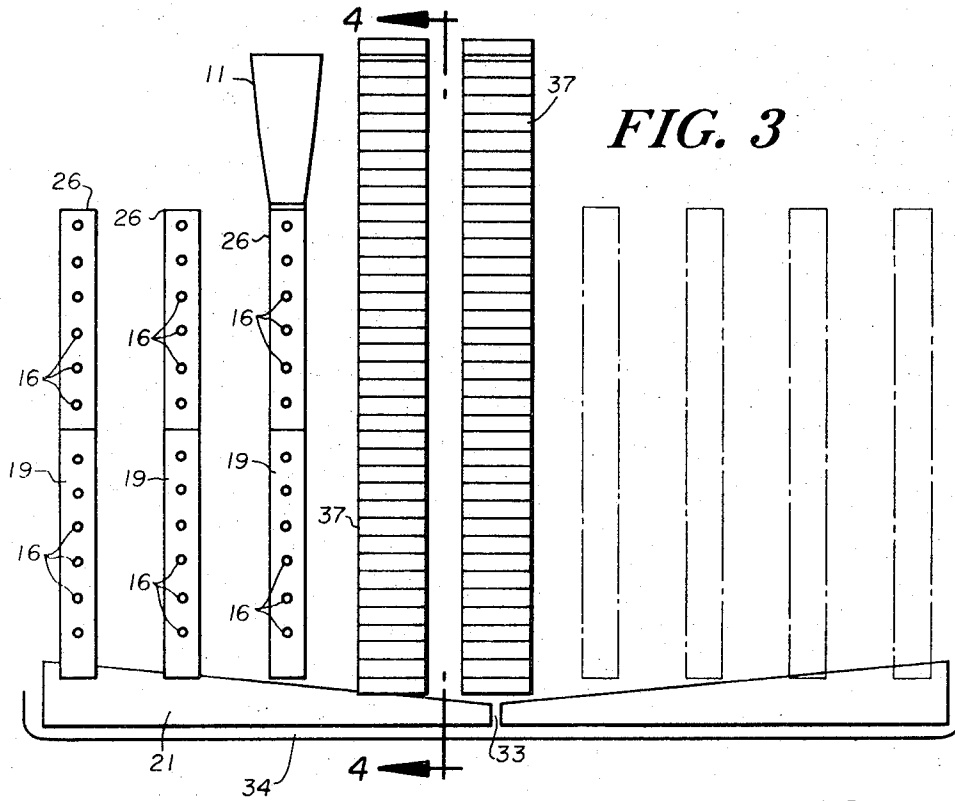
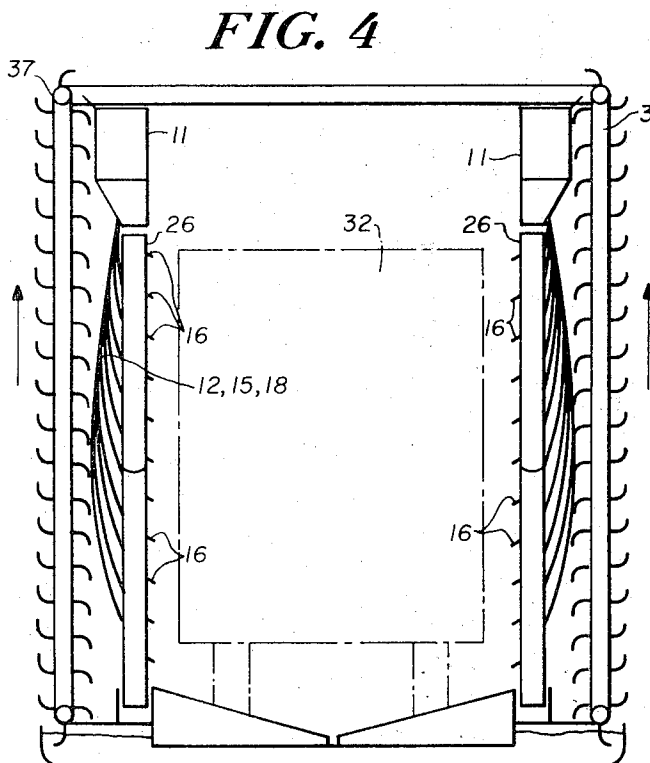
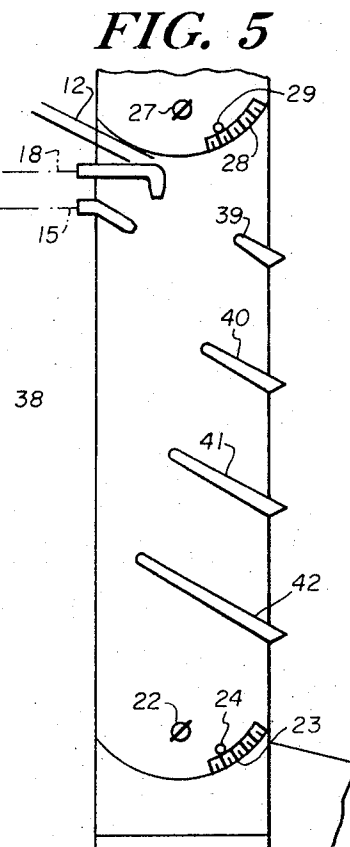


FIG. 10

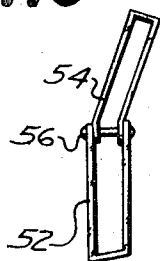


FIG. 6

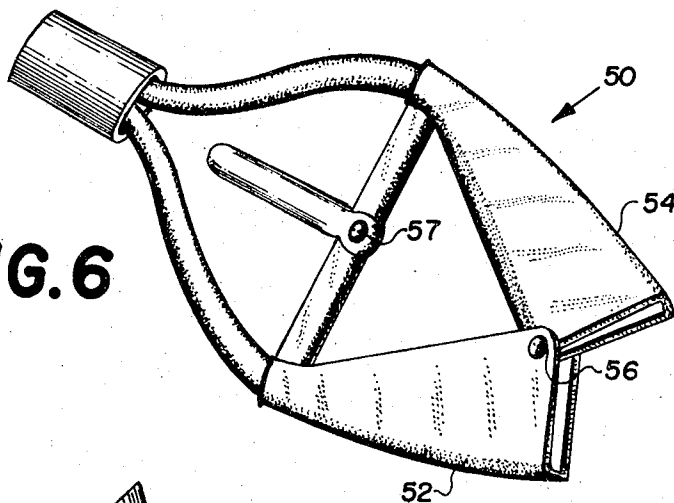
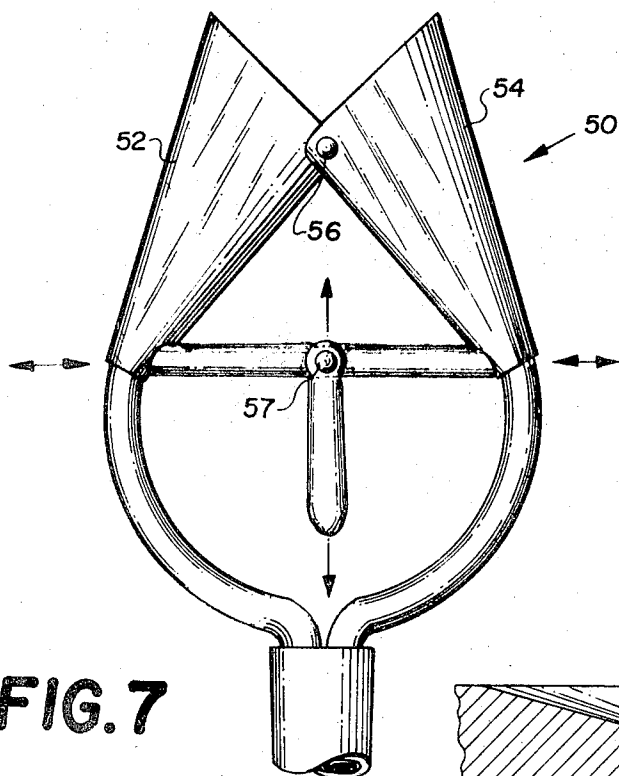


FIG. 7



FIG. 9

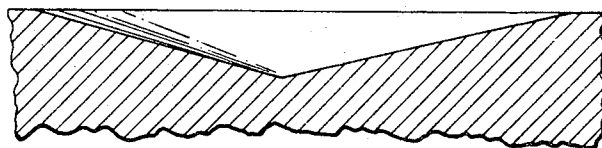


FIG. 8

SAND BLASTING OF METAL SURFACES AT AN ANGLE OF LESS THAN 45°

This is a division of application Ser. No. 235,293, filed Mar. 16, 1972, now U.S. Pat. No. 3,769,753, which is a Continuation-In-Part of U.S. Pat. application Ser. No. 68,151, filed Aug. 31, 1970, now abandoned.

FIELD OF THE INVENTION

This invention relates to the preparation of previously painted surfaces for repainting and particularly to the preparation of automobiles for repainting.

BACKGROUND OF THE INVENTION

Many automobiles which are discarded as junk have nothing more wrong with them than a rusted-out body. In many cases this can be prevented by a timely repainting of the body of the car. As with many things a decision to repaint or not to repaint is determined to a large extent on cost.

Before a car, truck, or other similar items can be repainted, the old paint must be removed and the metallic surface thereunder properly cleaned and prepared to receive a fresh coat of paint.

Almost all paint removal and surface preparation of cars is done by hand by unskilled workers. Therefore, as the minimum cost of labor increases, the cost of repainting cars is directly affected.

In recent years, it has been exceedingly difficult to obtain workers to prepare cars for repainting even at increased wages. As a result, it is not only more expensive than before to have a car painted, but it is also more difficult to get the job done.

Therefore, it is an object of this invention to provide a machine for automatically removing paint and dirt from the surface of an automobile and simultaneously preparing the surface for repainting.

It is another object of this invention to provide a machine for automatically preparing a car for repainting which removes the paint without chipping or gouging the automobile trim.

It is still another object of this invention to provide a machine for automatically preparing a car for repainting which does not necessitate a drying operation after use of the machine.

It is further object of this invention to provide a machine which may be constructed to accommodate a small automobile repainting facility or a facility which repaints large numbers of cars and trucks.

BRIEF DESCRIPTION OF THE INVENTION

With these and other objects in view, the present invention contemplates a method of and apparatus for removing paint from a surface of an automobile and preparing the surface to receive a new coat of paint in which a mixture of abrasive and a volatile chemical solvent are sprayed under pressure onto the surface at an oblique angle i.e., less than 45°.

In one embodiment sand is gravity fed into a chamber and the chemical solvent is sprayed across the path of the falling sand to carry the sand therewith through a nozzle. The nozzle is pivotally mounted to direct the spray of chemical solvent and sand onto the surface of the automobile at the oblique angle.

Compressed air is also injected into the chamber to aid the mixture of chemical solvent and sand being sprayed through the nozzle.

In a further embodiment a plurality of chambers and nozzles are arranged around a platform to simultaneously spray the surface of a car. A drain is located in the bottom of the platform to recover abrasive for reuse and means are provided for separating the solvent and recovering it for reuse. Hand means are also provided for finishing the job.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a spraying unit constructed to practice the principles of this invention.

FIG. 2 shows a plurality of spraying units as embodied in FIG. 1 formed in a single element and how the element is interconnected with additional apparatus to form a machine for stripping paint in accordance with the teachings of this invention.

FIG. 3 is a side view of a machine employed in practicing the principles of this invention.

FIG. 4 is a sectional view taken along line 4—4 of FIG. 3 showing additional features of the machine in FIG. 3.

FIG. 5 shows an alternate embodiment of the spring element shown in FIG. 2.

FIG. 6 is a perspective view of a hand instrument used with the present invention for finishing the car.

FIG. 7 is a top view of the instrument of FIG. 6.

FIG. 8 is a sectional view of a car surface repaired using the hand instrument of FIGS. 6 and 7.

FIG. 9 is a view similar to FIG. 8 of a scratch removed by a prior art device.

FIG. 10 is an end view of the edge of the nozzle shown in FIGS. 6 and 7.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. 1, we see a chamber 10 into which sand from a reservoir 11 gravity fed through a flexible rubber conduit 12. A highly volatile fluid is pumped from a reservoir 13 by a pump through a flexible hose 15 across the path of the falling sand. The stream of pumped fluid is directed at a movably mounted nozzle 16. A compressor 17 blows air through a flexible hose 18 into the chamber 10 in a direction similar to the flow of fluid therethrough. The flow of air and fluid across the path of the sand is slightly downward so as not to push the sand back up the conduit 12 blocking its downward flow. It should be observed that the mouth of the conduit 12 is extremely large to aid in the free flow of the sand therein.

The compressed air and fluid are directed at the nozzle 16 which has sufficient passing capacity to prevent a backup of sand, air and fluid. This is desirable so that the chamber 10 does not back up and become pressurized. By having a separate fluid and air supply, the volume of fluid can be separately regulated by, for example, adjusting the speed of the pump 14 while the pressure of flow can be set by proper adjustment of the compressor 17. The nozzle 16 can be angularly adjusted with respect to the side of the chamber 10 so that the angle of incidence of the mixture of sand, air and fluid upon a surface to be cleaned can be adjusted so that abrasion rather than chipping occurs.

It should be understood that the term volatile when used with respect to a fluid, means that the fluid is one

which is easily evaporizable at a temperature below the boiling point of water.

In FIG. 2 we see a cleaning section 19 comprising a plurality of chambers 10 a through 10e each constructed similarly to the chamber 10. The flexible inlet hoses or conduits for sand 12a through 12e, air 18a through 18e, and fluid 15a through 15e are shown schematically as are the nozzles 16a through 16e. Each of these inlet devices 12a through 12e, 18a through 18e, 15a through 15e are connected to the cleaning member 19 by quick connect-connectors.

The cleaning member 19 is pivotally adjustably mounted on a platform 21 by a swivel pin 22. A tilt angle gauge 23 is carried by the cleaning member 19 so that a tightening screw 24 may be employed to secure the cleaning member at a desired angular relationship with respect to the platform 21.

A second cleaning member 26 is pivotally mounted on the first cleaning member 19 by a swivel pin 27. The second cleaning member 26 has a tilt angle gauge 28 and a tightening screw 29 similar to the tilt angle gauge 23 and the tightening screw 24 of the first cleaning member 19.

In each of the chambers 10a through 10e sand is gravity fed through the conduits 12a through 12e. The conduits 12a through 12e may be connected to a single sand reservoir such as sand reservoir 11. Volatile fluid from a fluid reservoir such as fluid reservoir 13 is pumped to each of the hoses 15a through 15e to be sprayed across the path of the sand at a downward angle and directed towards the nozzles 16a through 16e. In a like fashion, air from a compressor such as compressor 17 is forced through the hoses 18a through 18e to assist the fluid in carrying the sand to the nozzles. It should be clear that the details of the sand, air and fluid entry into the chamber 10 in FIG. 1 is representative of the construction and entry of materials into the chambers 10a through 10e.

It should be noted that the chambers 10a through 10e are separated from each other by separating walls 31a through 31d so that each of the chambers 10a through 10e are selfcontained. In this way, sand, fluid and air will not pass from chamber to chamber. The nozzles 16a through 16e are located toward the lower extremity of the chambers 10a through 10e to prevent a buildup of material at the bottoms thereof.

Referring now to both FIGS. 3 and 4, we see a paint removing and surface preparing apparatus that could be employed in a commercial repainting environment. A plurality of cleaning members are arranged around a platform 21. Each of the cleaning members are formed from a lower section 19 and an upper section 26. Each of the sections has a plurality of chambers 10, (not shown), such as the chambers shown in FIG. 2 and a plurality of nozzles 16. Flexible hoses and conduits 12, 15 and 18 bring sand from a reservoir 11, air from a compressor not shown, and a highly volatile fluid from a reservoir not shown into each of the chambers. The nozzles designated 16 spray the preparing mixture of sand and the highly volatile solvent under pressure onto the surface of a truck 32.

As the preparing mixture strikes the surface of the truck 32 at an oblique angle (i.e., less than 45°), the solvent removes film and dirt from the surface thereof. The abrasive striking at an oblique angle removes the paint without chipping. Glass and trim have been masked so that the impact of the abrasive will not chip

or scrape them. It should be noted that if the angle of the mixture strikes the surface was greater than 45°, there would be a sand blasting effect on the surface, injuring the same.

The chemical solvent carries away the abrasive and bits of material removed from the surface of the truck 32 across the top of the platform 21 and through a drain 33. The solvent which does not run off of the surface of the truck 32 will evaporate quickly, as it is highly volatile so that relatively little further work must be done on the surface of the truck 32 before repainting is accomplished. The sand carried by the chemical solvent is brought through the drain to rest on the surface of a conveyor belt 34. The conveyor belt 34 will bring the abrasive to rest in piles 35 and 36. The solvent will quickly evaporate and can then be collected by a fumehood (not shown) and then condensed to retain the solvent.

A plurality of basket type conveyors 37 scoop up the abrasive from the piles 35 and 36 and bring them back to the reservoirs 11. It should be understood that the recirculating systems described above is employed to bring solvent back to the fluid reservoir 13.

In FIG. 5, we see an alternate embodiment for the cleaning member 19. In this embodiment, the cleaning member 38 is not divided into compartments as is the cleaning member 19. Instead, sand, air and the highly volatile solvent is brought in through the quick connect-connectors attached to the conduit 12 and hoses 15 and 18 causing the mixture to travel down the full length of the member 38. A plurality of scoops 39 through 42 pass through the wall of the cleaning member 38. The higher scoop 39 is shorter than each of the succeeding lower scoops 40, 41 and 42. When material strikes scoop 39, a portion thereof will be sprayed out of the cleaning member 38 onto a surface at an oblique angle. As less material is left in the cleaning member 38, a larger scoop will intersect the path of travel. In this way, a relatively constant stream of cleaning material will be provided thereby.

A cleaning member 38 can be employed in small painting shops because it will be considerably less expensive than the cleaning member 19. Its construction is simpler and requires only one inlet for sand, one inlet for air, and one inlet for the highly volatile solvent. In a shop, however, that does a large volume, the cleaning member 19 would be more suitable.

In FIGS. 6, 7 and 10 there is shown a hand nozzle adapted to be connected to the source of sand, solvent and compressed air generally designated by the numeral 50. The instrument 50 has two flat nozzles 52 and 54 hinged at 56 and controlled by a hand adjusted member 57 to widen or narrow the area covered by the nozzle. The nozzles 52 and 54 provide a V-shaped pattern.

Thus, the instrument 50 is intended to be used to correct scratches, and other flaws not cleaned by the automatic apparatus shown in FIGS. 1-5. Thus the nozzles 52 and 54 interact and are tapered against one another causing the outflowing mixture to abrade the surfaces and to taper the painted surface gradually to form a gradual concave or shallow V shape when the surface is viewed at cross section as in FIG. 8. This permits scratches, chips, and nicks to be painted over without any further sanding which now has to be done manually through the use of machines. No other slurry streams or combination of chemical abrasive and air will pro-

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vide this tapered effect upon a painted surface. The presently known slurry and sand blast patterns produce a non-tapered effect as shown in the FIG. 9 cross section view.

This effect requires manual treatment by sanding machines to make a gradual taper over which fillers and paints can be applied; otherwise a deep groove or scratch effect will be visible upon the completion of the paint job.

The following differences are also obvious. The interaction of the nozzles 52 and 54 makes a double taper multiangle abrading action upon the treated surfaces. Of course the instrument 50 is operated at an angle less than 45° to the surface being cleansed.

It should be understood that the above embodiments are merely illustrative of the principles of this invention and that numerous others will become obvious to those who have ordinary skill in the art in light thereof.

What is claimed is:

1. A method of preparing a painted metal surface for repainting, which comprises:
 - feeding an abrasive along a path,

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spraying a volatile chemical solvent across said path of the abrasive and

blowing compressed air across said path to aid said volatile chemical solvent to carry said abrasive therewith so that said abrasive and volatile chemical solvent are sprayed onto said metal surface at an oblique angle of less than 45°.

2. The method as defined in claim 1 in which said volatile chemical solvent and said compressed air are directed at an angularly adjustable nozzle which diverts said volatile chemical solvent and said compressed air onto said surface at said oblique angle.

3. The method of preparing a painted metal surface of claim 1 wherein said step of spraying includes spraying in a V-shape onto said surface at an oblique angle.

4. The method as defined in claim 1 wherein said abrasive and organic chemical solvent sprayed onto said metal surface abrade said surface and taper said surface gradually to form a gradual concave or shallow V-shape when the surface is viewed at cross-section.

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