ABSTRACT

An apparatus for low pressure spraying of passing articles and having a series of adjustable spray assemblies located along the articles path. Multiple adjustments provided enable convenient setting of the spray pattern size and inclination to best treat the passing articles. A surge tank receives a directional incoming flow with each spray assembly being fed from the remote end of the surge tank. Large orifice nozzles advantageously are not susceptible to damage from fluid contaminants.

1 Claim, 5 Drawing Figures
LOW PRESSURE PAINT SPRAY APPARATUS FOR CONVEYOR CARRIED ARTICLES

BACKGROUND OF THE INVENTION

The present invention relates generally to spray equipment as of the type used in applying paint and the like to manufactured items and more particularly to an apparatus for treating articles as they are conveyed therewith.

In the manufacture of wood molding, box components and other dimensioned wood products, a great deal of wood dust is generated from sawing and sanding equipment. The dust is extremely fine and becomes airborne as well as remaining on the wooden article. A problem exists by reason of the fact that such dust enters and eventually clogs spray systems used in staining or painting of such articles. Contributing to the problem are the typical nozzles used in such spray systems, such nozzles having minute orifices which are highly susceptible to clogging by the dust particles suspended in the paint, lacquer, etc. Since most spray systems include an open catch basin below the passing article, it is not uncommon for air carried dust resulting from manufacturing operations to enter the recirculated paint supply. The clogging of spray components results in uneven spraying, costly down time for cleaning and the frequent replacement of costly spray nozzles.

The use of low pressure spray systems has heretofore been objectionable for the reason that uneven spray application results when two or more nozzles are used. Variance in the fluid pressure at each nozzle will obviously cause uneven paint application.

Additional problems are encountered in providing a highly flexible spray apparatus readily adaptable to various articles of manufacture. In a plant producing a multitude of various sizes and shapes it is highly advantageous to provide a spray apparatus wherein the nozzles are conveniently positionable throughout a wide range to evenly spray the passing articles which may vary considerably from one run of articles to the next.

SUMMARY OF THE INVENTION

The instant apparatus embodying the present invention includes a framework for positioning along a conveyor system. The articles to be treated are conveyed past the framework and past a multitude of adjustable spray nozzles each of which apply a uniform, unbroken curtain of non-alomined paint over the passing articles. Disposed adjacent the spray nozzles is a surge tank which inhibits internal eddying of the fluid to assure an even discharge rate of fluid through all nozzles. Alternatively, the discharge may be individually regulated by valve means. The surge tank is provided with an upwardly directed inlet while the tank outlet is at a level above said inlet for advantageous purposes. The inlet and outlet, so disposed, inhibit fluid turbulence within the tank without the use of costly internal baffle structure. Each nozzle is adjustably supported for movement about and along plural axes while additional swivel means permits precise setting of the impact angle of each nozzle discharge.

An important object of the present invention is to provide a spray apparatus for use in those environments where considerable paint contaminants are encountered. The use of low pressures with relatively large nozzle orifices results in an extremely low maintenance system of low manufacturing cost.

Equally important is the provision of a spray apparatus having a series of spray nozzles each readily positionable to apply an even, unbroken curtain of spray on the passing article without lap marks or gaps. The present apparatus is extremely useful for the painting or staining of wood products such as lengths of wooden molding, wooden box components and related wood products all heretofore presenting a problem to existing spray equipment by reason of particulate paint contaminants and dust both on the article and airborne. Such dust and particles ultimately enter the recirculated paint supply ultimately resulting in costly down time.

BRIEF DESCRIPTION OF THE DRAWING

In the accompanying drawing:

FIG. 1 is a front elevational view of the instant spray apparatus,

FIG. 2 is a side elevational view of the right hand side of the apparatus shown in FIG. 1,

FIG. 3 is an enlarged detail view of a spray assembly,

FIG. 4 is a side elevational view of the spray assembly shown in FIG. 3, and

FIG. 5 is an enlarged front elevational view of the surge tank showing details of construction.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With continuing reference to the accompanying drawing wherein applied reference numerals indicate parts similarly identified in the following specification, the reference numeral 10 indicates generally the spray apparatus embodying the present invention. A welded angle iron framework includes four leg members 11 with the rear leg members having upwardly extending portions 11A interconnected at their upper ends by a crosspiece 12.

The framework leg members 11 are interconnected by four angle iron sections 13 to which the upper perimeter of a catch basin structure 14 is secured as by welding. Additionally interconnecting the leg members 11 is an angle iron frame 15 comprised of end welded members which contribute to the rigidity of framework 10 as well as support the later described spray components.

The above described framework is of a size permitting convenient placement between conveyor sections the ends of the latter shown in broken lines at 16 in FIG. 1. A framework width of approximately two feet permits most articles to be conveyed therewith from the live rolls of one conveyor section to the other without interruption or serious reduction of their speed. Support means for the passing articles is indicated at 17 which may rest in place on angle irons 13 and may include rounded article supports 18 extending transversely of the articles path. A spray booth is provided by four wall sections 20 which close those areas intermediate angle iron sections 13 and the upwardly spaced frame 15. Openings at 20A (FIG. 2) allow ingress and egress of the passing articles.

Supported by crosspieces 12 is a fluid surge tank 21 secured in place to a mounting bracket 22. Tank 21 is fed by a supply line 23 through which a continuous pressurized flow of fluid is delivered from a pump 24 driven by a motor 25. The pump inlet is served by a supply line 26 directing fluid from a storage tank 27.
which receives a circulated flow from catch basin 14 and surge tank 21 via conduits 30–31 respectively.

With particular attention to tank 21, inlet and outlet pipe fittings are indicated at 32–33 with the arrangement of same being deemed highly advantageous to the desired operation of the apparatus. The inlet 32 extends through the tank wall at an angle of thirty degrees or so horizontal with its end tank 32A terminating inwardly from the tank wall. The fluid discharged is thereby directionized to some extent toward the inner end of outlet fitting 33 with a portion of the incoming flow exhausted out therethrough. A gate valve 34 is manually settable to regulate surge tank pressure as read on pressure gauge 35. In the present low pressure system a tank pressure of between 3 and 10 P.S.I. has been found satisfactory.

Leading from the lower or outlet end 21A of tank 21 are a plurality of tank outlets in the form of lines 36 having valves 37 for individual flow regulation. Flexible tubing at 38 provides a regulated flow into the upper end of a conduit 40 each constituting part of a separate spray assembly one of which is shown in detail in FIGS. 3 and 4.

The spray assemblies each include a holder 41 positionable along a horizontal support of the framework in the form of a rod 42 passing through one end of the holder. Each holder 41, in addition to having aligned apertures at 43 for rod 42, has a second pair of apertures at 44 offset and on an axis perpendicular to the axis of rod 42. A set screw at 45 secures the holder 41 in an adjusted position both along and about the rod 42 while the set screw at 46 cooperates with a conduit 40 to provide a height adjustment toward or away from the passing article for each spray assembly.

Additionally each spray assembly includes a nozzle 47 preferably joined with the lower end of the assemblies pipe segment by means of an adjustable joint generally at 48. Said joint is of the conventional type including a spherical or ball element 50 internally threaded to receive the threaded nozzle end. A retainer plate 51 is biased towards a base plate 52 by screws 53 to frictionally load the element 50. The base plate 52, a nut element 54 with a threaded shank are integral for screwed engagement with an elbow 56 on the lower end of the conduit.

A double ended arrow adjacent the nozzle in FIG. 3 indicates nozzle movement provided for by the adjustable joint to vary the angle of spray impact and of course may be independent of or in conjunction with the other adjusted movement of the spray assembly above described.

The spray assembly shown in FIGS. 3 and 4 is adjusted (typical of all assemblies) so as to achieve the desired spray pattern with respect to the passing article. The non-atomized spray pattern is flat, termed a curtain in the art, with unbroken article coverage. In a typical set-up of the present apparatus an additional spray assembly would be located in like relationship to the passing article but on the opposite side of the articles centerline while a third assembly would be disposed so as to provide a symmetrical overhead spray pattern from above the centerline of the articles path.

One type of nozzle found to be very satisfactory is that manufactured by Spraying Systems Co., under the trademark Flood Jet with a discharge orifices ranging from 12/64 through 7/32 no internal vane structure. Other equipment found to contribute to a very satisfactory factory apparatus is a general purpose pump manufactured by Viking Pump having a nominal pump rating of 20 GPM at 1,200 RPM. Large diameter supply line 23 contributes towards maintaining a low pressure paint flow circuit as does return line 31 with gate valve 34 being settable to partially restrict the circulating flow to regulate tank pressure.

The apparatus is conveniently set up for desired operation with a particular run of articles with only a wrench and screwdriver required for adjustment of each spray assembly. The operator may visually inspect the nozzle spray patterns and regulate same via the gate valve or alternatively regulate same individually by valves 37. In some spray operations it may be desirable to altogether shut off a spray assembly or assemblies by means of valve or valves 37.

While I have shown but a single embodiment of the invention it will be apparent to those skilled in the art that the invention may be embodied still otherwise without departing from the spirit and scope of the invention.

Having thus described the invention what is desired to be secured under a Letters Patent is: 1. A spray apparatus of a non-clogging nature for applying unbroken, low impact curtains of paint to sanded wood articles conveyed therepast, said apparatus comprising, a framework for placement intermediate the ends of conveyor sections along which the wood articles to be painted are conveyed, said framework having stationary article supports over which the articles pass, an elongate tank supported in an upright manner by said framework above the path of the articles being painted for the storage of a transient quantity of paint, said tank having multiple outlets at its lower end with each of said outlets including separate regulating means for controlling a low pressure flow of paint through each outlet, said tank having an upwardly inclined paint inlet fitting located adjacent the tank upper end to discharge paint towards the upper end of the tank, said tank having an outlet fitting located immediately below the tank upper end and generally opposite to the inlet fitting to receive a portion of the incoming paint flow, a reservoir, a tank outlet conduit in return communication with said reservoir, valve means in the tank outlet conduit whereby the return flow may be restricted, if so desired, for a range of operating pressures of from 3 PSI to 10 PSI, pump means in communication with the upper end of said tank and delivering a continuous supply of paint thereto via said upwardly inclined tank inlet, and multiple spray assemblies fed from the lower end of said tank spaced both along and transversely from the path of said material, each of said assemblies including a nozzle of the type discharging a non-atomized spray in an unbroken triangular spray pattern extending transversely beyond the edges of each passing article to assure desired paint application, said nozzle orifices having a diameter approximately of 7/32 of an inch and hence not susceptible to clogging from paint or wood particles.

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