Feb. 7, 1939. L. V. CASTO 2,145,861

COATING OR DECORATING APPARATUS

Filed June 13, 1935 2 Sheets-Sheet 1

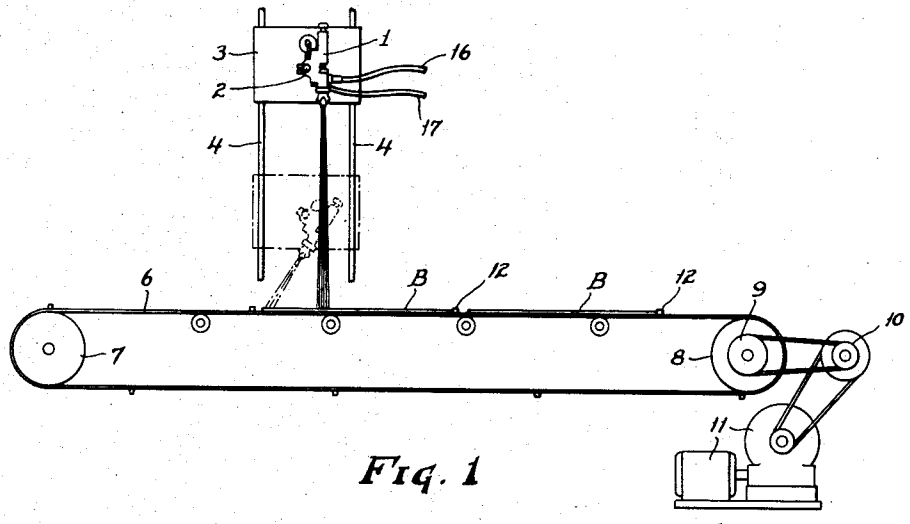


FIG. 1

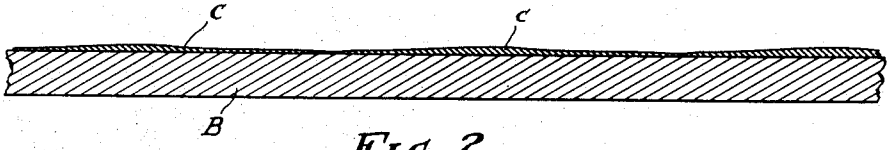


FIG. 2

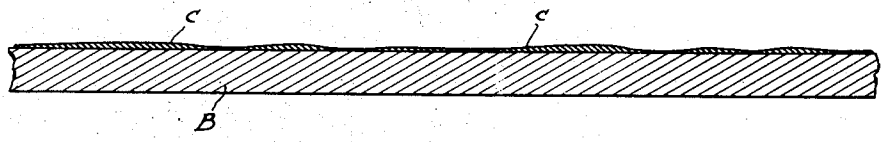


FIG. 3

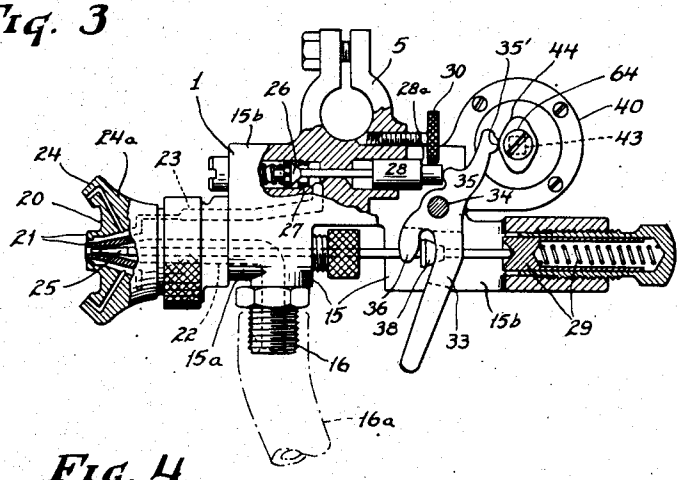


FIG. 4

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COATING OR DECORATING APPARATUS

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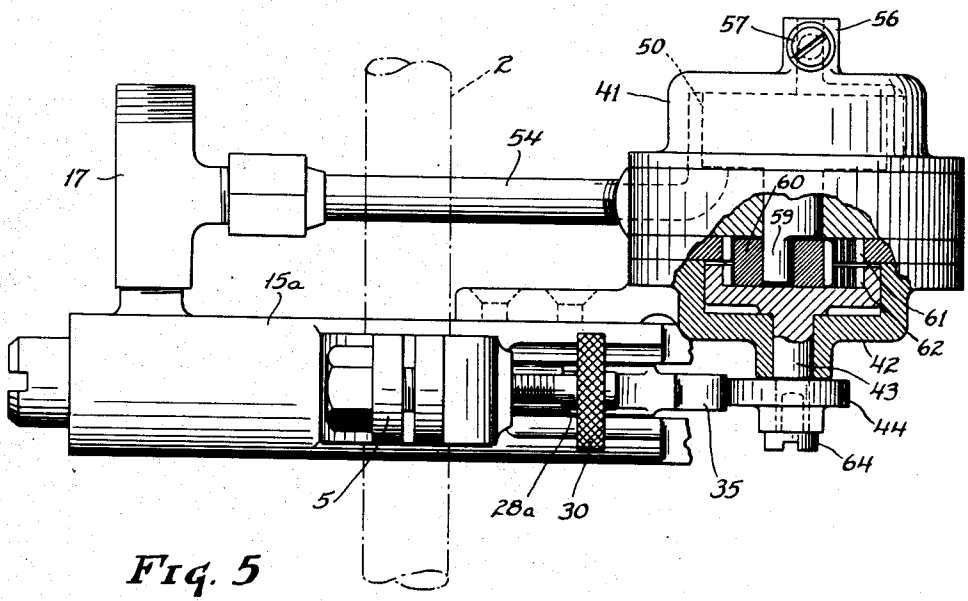


Fig. 5

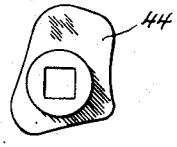


Fig. 7

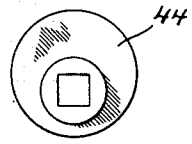


Fig. 8

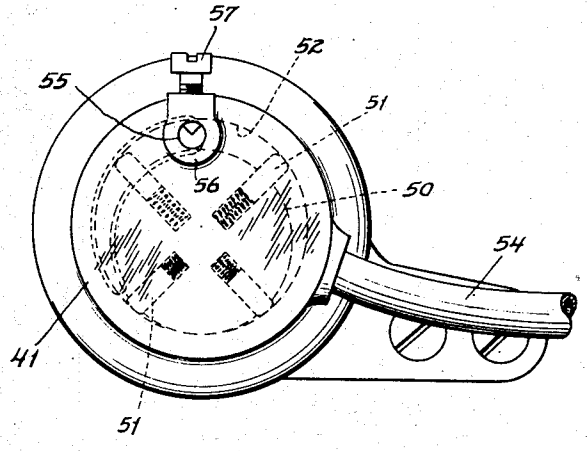


Fig. 6

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COATING OR DECORATING APPARATUS

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Application June 13, 1935, Serial No. 26,441

4 Claims. (Cl. 91—45)

This invention relates to spray coating apparatus for applying varnish and lacquer for example, and particularly to improvements in automatic apparatus by which blanks are coated successively while supported on a suitable conveyor.

The principal object is to provide a coating apparatus operable to controllably apply coats of lacquer, varnish, etc. with predetermined unevenness.

A further object is to provide an improved apparatus for applying decorative and/or protective coatings to blanks in a manner to controllably vary the reflecting effects of the surfaces coated.

A further object is to provide a coating mechanism for applying a coating as of lacquer or varnish with predetermined unevenness, which mechanism will not require a power source extraneous to that of the spray gun or other applying means.

A further object is to provide a coating mechanism which may be easily and quickly adjusted to vary the period of projecting or spraying alternately heavy and light coatings on a single blank.

Other objects and features of the invention will become apparent from the following description relating to the accompanying drawings, showing the preferred form.

In the drawings, Fig. 1 is a diagram showing a complete apparatus including the spray gun hereof, support therefor, and conveying apparatus or mechanism for blanks to be coated; Figs. 2 and 3 are diagrammatic sectional views (greatly enlarged) showing the effects it is desired to produce on a blank with the present arrangement; Fig. 4 is a sectional side elevation of a known type of spray gun for varnish, lacquer, etc., the novel parts of the gun being shown in side elevation; Fig. 5 is an enlarged sectional fragmentary plan view of the motor and gearing arrangement in place on the gun; Fig. 6 is a side elevation of the motor and gearing unit shown in place on the gun in Fig. 5, and Figs. 7 and 8 illustrate different forms of cams that may be used on the apparatus shown in Fig. 4.

Wood, metal, etc., as ordinarily finished by paint, varnish, lacquer or enamel, if in comparatively large panels, presents unbroken highlights which are unpleasant to view under certain illuminations. Hand rippling of such surfaces has been practiced in an attempt to break up the uniformity of glare observable under such conditions. The previous methods are not subject to very accurate control. As stated above, the principal object hereof is to provide a suitable apparatus whereby such breaking up of highlights may be effected in a convenient and practicable way without requiring attention on the part of the operator.

As shown in Fig. 1, a suitable form of spray gun is illustrated at 1, and this may be mounted as on a horizontal bar 2, which is in turn, carried on a vertically shiftable carriage 3 supported on guides conventionally shown at 4. The bar is adapted to extend through a clamping device 5 on top of the gun body, as shown particularly in Fig. 5.

Beneath the gun supporting parts just described, is a conveyor belt 6, the support for which may comprise rollers 7 and 8, at least one being a drive roller, and the drive roller may be provided with an adjustable driving means such as an adjustable V pulley assembly 9 and 10 to vary the speed of the work past the gun. Suitable mechanism for driving one element of the V pulley assembly may comprise a motor and reduction gearing conventionally illustrated at 11. The conveyor belt may be provided with suitable driving lugs 12 for carrying the blanks B to and past the gun. With this arrangement, the gun may be moved different distances from the work, the angle at which the coating material is projected onto the panel may be varied as desired, and as will later be more fully shown the coating supplied to the panel or work B will be alternately thick and thin, as shown in Figs. 2 and 3, at C.

Referring now to Fig. 4, this shows a general frame or body member 15 for the gun, which body is made hollow and provided with attachment adapters 16 and 17 for supply hose or conduits 16a and 17a respectively for fluid coating material and a suitable atomizing medium such as air. The air hose connection is shown only in Fig. 5.

The spray nozzle 20 may be of any known or suitable type and is located at one end of the body and comprises a head 21 having generally conical orifices, one surrounding the other, and which, through suitable passages 22 and 23, communicate respectively with the coating material hose and the air hose. Additional lateral air passages 24 (on an adjustable head 24a which is turned at right angles to the position shown for operation in the present arrangement) convert the atomized stream into fan form for covering a comparatively wide area. The liquid coating material is metered at the orifice of the nozzle by a needle valve 25 projecting into the nozzle orifice and its character and operation will be more fully hereinafter described.

It is to be understood that any suitable means

may be employed to control the essential passageways from the air hose to the air discharge nozzle and from the coating material hose to its nozzle orifice or orifices.

As shown, the gun body 15 is in two major parts 15a and 15b and the coating material metering valve is supported substantially entirely by the body part 15a in suitable bores. The body part 15b surmounts the part 15a and the air passages thereof are controlled by a plunger valve 26 therein cooperating with a valve seat 27, the valve stem having an operating part 28 projecting rearwardly from the body to suitable control means to be hereinafter described. The air valve is maintained closed by a spring inside the body.

The body part 15b has an extension at one end carrying a suitable spring plunger assembly 29 normally bearing against the rear end of the coating material metering valve stem and tending to seat its forward end in the liquid discharge orifice of the nozzle to close it.

To control the valves, a common lever is shown at 33, pivoted as at 34 to the body part 15b. The upper end of the lever has an arm 35, a portion of which engages the part 28 of the air valve, and below the pivot the lever has arms at 36 straddling the stem of the valve 25 and adapted to engage an abutment member 38 thereon to open the valve 25 by the same motion which opens the air valve 26. An adjustable screw 39 is shown in Figs. 4 and 5 for separately controlling the air valve to hold it in predetermined open positions continuously for purposes which will later be more apparent.

The arrangement for automatically adjusting the valves or one of the valves, as the case may require, during operation of the gun, comprises, as shown, a motor and reduction unit, generally indicated at 40. This comprises an air motor 41, a gear unit 42, and a driven shaft 43 to which suitable cams 44 are removably connected for operating the valve control lever 33.

The cam 44, as shown in Fig. 4, has two high points and two low points, and these successively engage a suitable follower surface 35' on an upstanding arm 35 of the lever. When the cam follower surface is on the low portions of the cam, both valves are ordinarily slightly cracked; and as the high portions of the cam ride against the follower, the valves are opened more fully, and thus during the continued operation of the motor and gearing the gun sprays the coating medium first heavily and then lightly, twice for each complete rotation of the shaft 43, with the particular form of cam shown.

With the cam arrangement of Fig. 7, showing an irregular arrangement of cheeks and hollows, the coating is laid onto the panel in alternately thick and thin bands or areas, but these vary in width and thickness, in accordance with the irregularities of the cam surfaces. The cam of Fig. 8 merely effects one change in the thickness of the coating for each complete rotation of the shaft 43.

The fluid motor and its gearing may be greatly modified. As shown, the impeller of the motor comprises a disk 50 having a suitable arrangement of radial vanes 51, which are spring pressed outwardly in suitable ways so as to cooperate with the relatively eccentric peripheral surface 52 of the impeller barrel. Operating fluid (air e. g.) is fed to the vanes between the disk and said surface 52, as through a suitable conduit 54 connected at one end with the air line adapter 17 shown as a T coupling. This form of motor operates at very high speed. The used air may be discharged through a suitable duct 55 in a boss 56 on the casing, the duct being under the control of a suitable adjustment screw 57 by which the speed of the motor may be varied by controlling the back pressure. The exhaust air may be salvaged by means not shown and used in the spray gun.

The gearing illustrated comprises an internal type of low reduction gear, the impeller shaft of the motor having an eccentric end portion at 59, forming a planetary support for a pinion 60 meshing with a fixed reactance internal gear 61 and also with a driven internal gear 62 connected with the cam shaft (integral therewith, as shown). The internal gears are of the same pitch but have a different number of teeth, say a difference of one tooth, so that a low reduction is obtained.

The cams may be interchangeably mounted on the end of the cam shaft which is shown as square and provided with internal threads for receiving a cam attaching cap screw 64.

It is sometimes desirable to automatically vary only the feed of fluid coating medium as by the use of the mechanism above described. In such event the air valve 26 is initially set as by means of the adjustable screw 30, the lower edge of which is adapted to bear on an abutment shoulder 28a of the air valve so as to hold the valve part 28 in spaced relation to the actuating arm of the main control lever 33. The invention contemplates similarly independently controlling the coating fluid valve, as by adjustment of the abutment member 38 on the stem of the valve 25.

It will be seen from the above description that the unpleasant highlight effects on coated surfaces may be broken up by the use of the apparatus in any desired fashion all without requiring attention on the part of the operator once the various parts are properly adjusted.

I claim:

1. In coating apparatus, means to feed blanks continuously in one direction at a uniform rate, a spray gun in fixed operative relation to said means during operation thereof and arranged to spray a coating of material on said blanks while moved past the same, and mechanism on the gun controlling its operation in predetermined cycles to cause it to spray relatively thick and thin volumes of coating material on the blanks as the same are moved past the spraying zone of said gun.

2. A spray gun having a variable nozzle discharge orifice to govern the rate of discharge of coating material, and power-operated mechanism including a prime mover mounted entirely on the gun and controlling said orifice during operation of the gun in a manner to effect an uneven but continuous coating.

3. In decorating apparatus, comprising a spray gun, and a support for work blanks to be decorated by the gun, means adapted and arranged to move the support and gun relative to each other continuously at a uniform rate, means to maintain the spray gun in a single operative relationship to the support during such relative movement, and mechanism on the gun which controls its operation in predetermined cycles to cause the gun to spray relatively thick and thin volumes of coating material on the individual blanks during such relative movement of the support and gun.

4. In a decorating apparatus, a conveyor arranged to move, at a uniform rate, work blanks

to be coated, a relatively fixed support adjacent the conveyor, a spray gun mounted on the support and movable thereon toward and away from the supporting surface of the conveyor, a connection between the gun and the support so arranged that the gun can be directed for the discharge of coating material at various operating angles relative to work on the conveyor surface, and mechanism connected with the gun in a manner to cause it to spray relatively think and thin layers of coating material on the individual blanks, during said movement thereof by the conveyor.

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