

CLAIMS

1. A liquid coating nozzle for coating liquid, ^{an object with} ~~on an object~~ ~~to be coated~~, comprising:

5 a first block ~~(11)~~ ^{having} which has an inner liquid reserving section ~~(12)~~ ^{which} that extends in ~~the~~ ^a longitudinal direction and an inner discharge section ^{which is} formed in ~~the~~ ^{said inner} longitudinal direction at a bottom portion of ~~the~~ liquid reserving section, ^{and which extends in the longitudinal direction} ~~the~~ inner discharge section ^{being} ~~being~~ ^{having formed therein} ~~comprised of~~ a plurality of ~~small~~ ^{said} holes ~~(13)~~ or a slit; and

10 a second block ~~(14)~~ ^{having} which has an inner space defining a gas reserving section ~~(15)~~ ^{which} that extends in the longitudinal direction ~~outside the first block~~ and an outer discharge section ^{which is} formed in ~~the longitudinal direction~~ at a bottom portion of ~~the~~ ^{said} inner space, ^{said gas reserving section, and which extends in} the outer discharge section ^{having formed therein} ~~being comprised of~~ a plurality of ~~small~~ ^{said} holes ~~(16)~~ or a slit, ^{P-A-A} and forming a gas flow that externally surrounds a linear or curtain shaped liquid flow that flows downward ~~from the inner discharge section.~~

2. A liquid coating nozzle as defined in Claim 1, ^{said} wherein the first block and ^{said} the second block are each comprised of bisected bodies divided by a ~~vertical~~ plane ^{extending} that ~~extends~~ in the longitudinal direction through a ^{said} widthwise center of the inner discharge section.

3. A liquid coating nozzle as defined in Claim 1 or ^A 2, wherein ~~a shape of~~ each of the ~~small~~ holes constituting

the inner discharge section and the outer discharge section
~~has~~^{has} an elongated hexagon^{shape}.

4. A ~~liquid coating~~ nozzle as defined in ~~any of~~
Claims 1 through 3, wherein ~~the~~^{said} liquid reserving section
5 has an inclined surface ~~(43a)~~ at a bottom of which ~~the~~^{said}
inner discharge section is positioned.

5. A ~~liquid coating~~ nozzle as defined in any of
Claims 1 through 4, wherein ~~the gas reserving section has a~~^{E-F}
sectional shape which is made as large as possible so long
10 as ~~a required strength is maintained.~~

6. A liquid coating nozzle manufacturing method for
manufacturing ~~the~~^a nozzle for coating liquid on an object
~~to~~ to be coated, comprising: a first block ~~(41)~~ which has
an inner liquid reserving section ~~(42)~~ that extends in its
15 longitudinal direction and an inner discharge section
formed in the longitudinal direction at a bottom portion of
the liquid reserving section, the inner discharge section
being comprised of a plurality of small holes ~~(44)~~ or a
slit; and a second block ~~(42)~~ which has an inner space
20 defining a gas reserving section ~~(45)~~ that extends in the
longitudinal direction outside the first block and an outer
discharge section formed in the longitudinal direction at a
bottom portion of the inner space, the outer discharge
section being comprised of a plurality of small holes ~~(46)~~
25 or a slit and forming a gas flow that externally surrounds

a linear or curtain-shaped liquid flow that flows downward from the inner discharge section, in which the first block and the second block are each comprised of bisected bodies divided by a vertical plane that expands in the longitudinal direction through a widthwise center of the inner discharge section and the inner discharge section and/or the outer discharge section is comprised of a plurality of small holes (44, 48, 164),

the method comprising:

positioning two bisected bodies which have been preparatorily processed with a groove-shaped space that serves as the liquid reserving section and/or the gas reserving section so that an opening plane of the groove-shaped space defines an identical plane; and

thereafter, concurrently cutting small grooves for constituting the small holes of both the bisected bodies, whereby processing of the small holes is performed.

7. A ~~liquid coating~~ method for coating ~~liquid~~ on an object ~~to be coated by a liquid coating nozzle~~ (4, 4a, 124), comprising: — (B-B) —

~~using the nozzle as defined in any of Claims 1 through 5, for making the outer discharge section face the object to be coated and then discharging the liquid flow in a linear or curtain-like shape while discharging the gas~~

~~flow toward the object to be coated through the outer
discharge section; and~~

~~moving the object to be coated and the nozzle
relatively to each other in a direction which intersects
the longitudinal direction while discharging the liquid~~

8. ~~A liquid coating method for coating liquid on an
object (2) to be coated by a liquid coating nozzle
(4,4a,124) as defined in Claim 7, further comprising:~~

~~discharging a superfluous liquid from the object
to be coated while tilting and rotating the object to be
coated after the object to be coated and the nozzle are
relatively moved to each other; and~~

~~thereafter, drying the liquid coated on the
object to be coated.~~

9. ~~(C-D) A liquid coating apparatus for coating liquid on
an object (2) to be coated, comprising:~~

~~the nozzle (4,4a,124) defined in any of Claims 1
through 5; and~~

~~a relative movement device (54,51,52,53) for
moving at least one of the nozzle and the object to be
coated that faces the nozzle in a direction which
intersects the longitudinal direction.~~

10. ~~(D-D) A liquid coating apparatus as defined in Claim 9
further comprising:~~

~~a liquid circulating passage (31,32) for~~
supplying in a circulating manner the liquid to the liquid
reserving section; and

an opening and closing member (36) for opening
5 and closing the liquid circulating passage.

11. A liquid coating apparatus as defined in Claim 9
or 10, further comprising:

a rotating mechanism ~~(30)~~ and a tilting mechanism
~~(91,92,93)~~ for discharging a superfluous liquid from the
10 object to be coated while tilting and rotating the object
to be coated after the object to be coated and the nozzle
are relatively moved to each other; and

a drying device ~~(99)~~ for drying the liquid coated
on the object to be coated.

15 12. A liquid coating nozzle in which a plurality of
discharge holes ~~(302)~~ are arranged linearly, and when the
discharge hole has a length D in a nozzle sweep direction
and a liquid guiding section inside the nozzle has a length
L, a relation of $1 < L/D \leq 10$ is held.

20 13. A liquid coating nozzle as defined in Claim 12,
wherein the length D of the discharge hole in the nozzle
sweep direction is larger than the length d thereof in the
direction perpendicular to the nozzle sweep direction.

25 14. A liquid coating nozzle as defined in Claim 12 or
13, wherein when the discharge hole has the length D in the

nozzle sweep direction and the liquid guiding section inside the nozzle has the length L, a relation of $3 \leq L/D \leq 8$ is held.

5 15. A cathode ray tube manufacturing method for coating coating materials for phosphor screen process on a glass panel ~~(4)~~ by using a liquid coating nozzle ~~(101, 124)~~ in which a plurality of discharge holes ~~(102, 104)~~ are arranged linearly, when the discharge hole has a length D in a nozzle sweep direction and a liquid guiding section
10 inside the nozzle has a length L, a relation of $1 < L/D \leq 10$ is held,

the method comprising:

15 sweeping the coating nozzle either in a direction of a shorter side or in a direction of a longer side of the glass panel; and

thereby linearly coating the coating materials for phosphor screen process on a screen area of the glass panel.

20 16. A ~~phosphor surface forming~~ method as defined in Claim 15, wherein a front surface of the glass panel is arranged substantially parallel to a horizontal axis in coating the liquid.

25 17. A ~~cathode ray tube manufacturing~~ method as defined in Claim 15 or 16, in addition to the coating, further comprising:

spreading the coating materials for phosphor screen process on an entire surface of the screen area of the glass panel while making the glass panel have a glass panel rotating speed of 30 to 60 rpm after the coating;

5 thereafter, discharging a superfluous coating materials for phosphor screen process while setting the glass panel rotating speed at 50 to 150 rpm and setting a glass panel tilt angle θ at 95 to 115 degrees relative to the horizontal axis; and

10 thereafter, drying a phosphor film while setting the glass panel rotating speed at 10 to 150 rpm.

18. A ~~cathode ray tube manufacturing~~ method as defined in any one of Claims 15 through 17, wherein the screen area of the glass panel has a completely flat shape.

15 19. A ~~cathode ray tube manufacturing~~ method as defined in any one of Claims 15 through 18, wherein such a nozzle is used that the length D of the discharge hole in the nozzle sweep direction is larger than the length d thereof in the direction perpendicular to the nozzle sweep
20 direction.

20. A ~~cathode ray tube manufacturing~~ method as defined in any one of Claims 15 through 19, wherein such a nozzle is used that when the discharge hole has the length D in the nozzle sweep direction and the liquid guiding

section inside the nozzle has the length L , a relation of $3 \leq L/D \leq 8$ is held.