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A recording implement and ink jet recording device equipped with the same

5 BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a recording implement to be used for a recording device which performs recording by use of an ink (recording liquid), for example, an ink
10 jet recording device which performs recording by discharging small droplets of ink, particularly a recording implement improved in corrosion resistance to ink and also to an ink jet recording device equipped with the same.

15 Related Background Art

Heretofore, with a view to avoiding frequent ink supply for the efficient recording operations, in such a recording device by use of an ink as mentioned above, it has been generally practiced to separate the functions
20 of the recording device into the following sections: (1) an ink storing member such as an ink storing vessel having some extent of storing capacity; and (2) an ink feeding member such as an ink feeding tube, etc., for feeding the ink stored in the ink storing member to,
25 for example, a recording means equipped with a discharging mechanism for discharging small droplets of ink etc.

And, the material constituting the recording

1 implement equipped with such ink storing member, ink
feeding member, etc., is required to have the character-
istic of excellent corrosion resistance to ink (herein-
after referred to as ink resistance), particularly
5 excellent ink resistance at the contacted face with an
ink so that according to deterioration in ink resistance
impurities may not be released into an ink. Also, the
characteristic in manufacturing steps of recording imple-
ment are also demanded such as easy working, molding or
10 assembling of the material. Further, in some cases,
transparency may be also demanded to the extent that
the presence of ink can be discriminated.

In the related art, for the recording implement
of such a recording device, various resins, glasses,
15 ceramics or metals have been generally utilized as the
constituting material. Among them, polyethylene included
in a polyolefin is transparent and also has good chemical
resistance, and polypropylene has good chemical resistance
as well as good impact strength. In addition, it is also
20 good in flow characteristic. These properties enable easy
molding of such a polymer with a thin thickness or a
complicated shape, giving further transparency.
Accordingly, they have been frequently utilized for the
above recording implement.

25 However, even in a recording implement formed by
use of a polyolefin such as polyethylene or polypropylene
having such excellent properties, for example, due to

1 residence of ink for a long term, said recording imple-
ment may be damaged by dissolution of itself into an ink
and aggregation of fibrous floating matter and the like
generated thereby is formed. This causes clogging of
5 the recording means or the ink feeding member, whereby
there have been caused the problems that discharging of
an ink from the recording means becomes instable, that
an ink may be intermitted and that recording inability
is brought about due to discharging inability of ink
10 in an extreme case.

SUMMARY OF THE INVENTION

The present invention has been accomplished in view of
such problems as described above, and the principal
object of the present invention is to overcome the
15 problems associated with the prior art and to provide
a novel recording implement which is capable of
feeding smoothly an ink and is free from occurrence of
discharging instability of ink, ink intermission or
discharging inability of ink, etc.

20 In accordance with one aspect of the present
invention, there is provided a writing or printing
contrivance which utilises ink, at least part of the
contrivance which, in use, contacts the ink including
a polyolefin which has been polymerised with a
25 catalyst neutralised by an inorganic metal salt.

In accordance with another aspect of the present invention, there is provided a recording implement comprising at least an ink storing member and an ink feeding member, wherein a part or all of the site of said recording implement which is in contact with ink is formed of a polyolefin as the main component obtained by addition of an inorganic metal salt as the neutralizing agent for the catalyst during polymerization.

In accordance with a further aspect of the invention, there is provided an ink jet recording device equipped with an implement according to said other aspect of the invention.

There follows a description of a specific embodiment and examples of the present invention with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a schematic sectional view of an embodiment of the ink jet recording device by use of the recording implement of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The recording implement of the present invention is equipped with at least an ink storing member and an ink feeding member as described above, and it can be used for a recording device utilizing ink, more specifically, for example, writing implement such as a fountain pen, a felt pen, an aqueous ball-point pen, or an ink jet recording device. Its shape and size may be set up as desired corresponding to the above recording device. Such a

1 recording implement of the present invention can be
prepared by using a polyolefin as a main component such
as polypropylene, polyethylene, polystyrene, etc.,
which is obtained by adding an inorganic metal salt as
5 the neutralizing agent for the catalyst during polymeri-
zation, and optionally adding various additives, dispers-
ing agents, etc., to the polymer and forming the polymer
into an implement by utilizing various known molding
methods.

10 The polyolefin in the present invention is
obtained by adding an inorganic metal salt as the neutra-
lizing agent for the catalyst during polymerization,
for example, the catalyst known as the Ziegler-Natta
catalyst, etc., and it can be obtained by use of any of
15 the methods, known as the methods for production of
polyolefins (e.g., see Plastic Handbook, Murahashi et al,
Asakura Shoten P308-P357) except for adding said inorganic
metal salt.

Examples of the inorganic metal salt to be added
20 as the neutralizing agent during polymerization of
polyolefin may include, for example, those produced from
barium, cadmium, zinc, lead, calcium, strontium, magnesium,
potassium, etc., as the metal component, silicic acid
anhydride, prussic acid, boric acid, phosphorous acid,
25 carbonic acid, thiosulfuric acid, etc., as the inorganic
acid radical. At least one kind of these inorganic
metal salts may be suitably selected. They should be

1 preferably added in the shape of particles and in amount
of about 0.1 to 1.5 phr (per hundred resin), more prefe-
rably 0.2 to 0.5 phr.

The action of these inorganic acid salts is not
5 necessarily clear, but it may be considered that
deterioration in heat resistance and weathering resistance
of polyolefins due to remaining of the chlorinated
catalyst therein is prevented by the action of making
the chlorinated catalyst to be used during polymerization
10 of α -olefin harmless as the metal chloride.

Referring now to the drawing, an embodiment of
the recording implement formed by use of polypropylene
of the present invention is to be explained.

Fig. 1 is a schematic sectional view of an embodi-
15 ment of the ink jet recording device by use of the
recording implement of the present invention.

This recording device performs recording by feed-
ing the ink 6 stored in the main ink tank 7 through the
ink feeding tubes 4, 8 and the sub-ink tank 5 to the ink
20 jet nozzle 2, permitting the ink 6 to be discharged as
ink small droplets from the ink jet nozzle 2a and attach-
ing the ink small droplets onto the recording paper P
delivered by paper conveying roller 1.

In the device of this embodiment, the main ink
25 tank 7 which is an example of the ink storing member as
mentioned in the present invention, and the ink feeding
tubes 4, 8 and the sub-ink tank 5 each of which is an

1 example of the ink feeding member for feeding the ink
from said storing member to a recording means (constituted
of ink jet nozzles 2, 2a and the piezoelectric element 3
in this embodiment) are constituted of the polypropylene
5 obtained by using the inorganic metal salt as mentioned
in the present invention as the neutralizing agent.

The recording implement of the present invention
by use of such a polypropylene is extremely excellent in
ink resistance, and free from formation of a dissolved
10 matter by dissolution of said recording implement into
an ink, particularly at the site which is in contact with
the ink even during use for a long term, whereby it is
possible to feed the ink smoothly to a recording means
and stable recording can be performed over a long term
15 without discharging instability of ink, ink intermission
or discharging inability of ink in the recording means.

In the above embodiment, all of the ink storing
member and the ink feeding member are constituted of
the polypropylene as mentioned in the present invention,
20 but only one of the ink storing member and the ink
feeding member, or only a part thereof can be constituted
of said polypropylene to give a similar effect.

As described above, according to the present
invention, it has been rendered possible to provide a
25 novel recording implement which can feed an ink smoothly
to a recording means and is free from discharging
instability of ink, ink intermission or discharging

1 inability of ink in the recording means.

The present invention is described in more detail by referring to the following examples and comparative examples.

5 Examples 1-6

The sub-ink tank 5 as shown in Fig. 1 was formed by using the polyolefins obtained by use of the inorganic metal salts shown in Table 1 as the neutralizing agent for the catalyst during polymerization.

10 The sub-ink tank 5 is mounted on an ink jet printer PJ1080A produced by Canon K.K., and the printer was held at 60°C for 720 hours before carrying out printing test. The results are shown in Table 2. Printing test was conducted by use of three printers,
15 respectively. Each printer had four ink jet nozzles as the recording means.

Separately, the above ink tank 5 was dipped in a test solution comprising 50 wt.% of an aqueous 5 wt.% NaOH solution and 50 wt.% of N-methyl-2-pyrrolidone by
20 heating under the conditions of 120°C for 10 hours to carry out the dipping test. For each of the test solution after practicing said test, turbidity of the test solution based on JISK0101 was measured by use of a HAZE meter produced by Toyo Seiki Seisakusho K.K. The
25 results are shown in Table 2. Each turbidity of the test solutions before the test was 0.10.

1 Comparative examples 1-4

The sub-ink tank 5 was formed in the same manner as in Examples 1-5 except for using the organic metal salts as shown in Table 1 as the neutralizing agent for the catalyst during polymerization, and the printing test and measurement of turbidity of the test solution were conducted. The results are shown in Table 2.

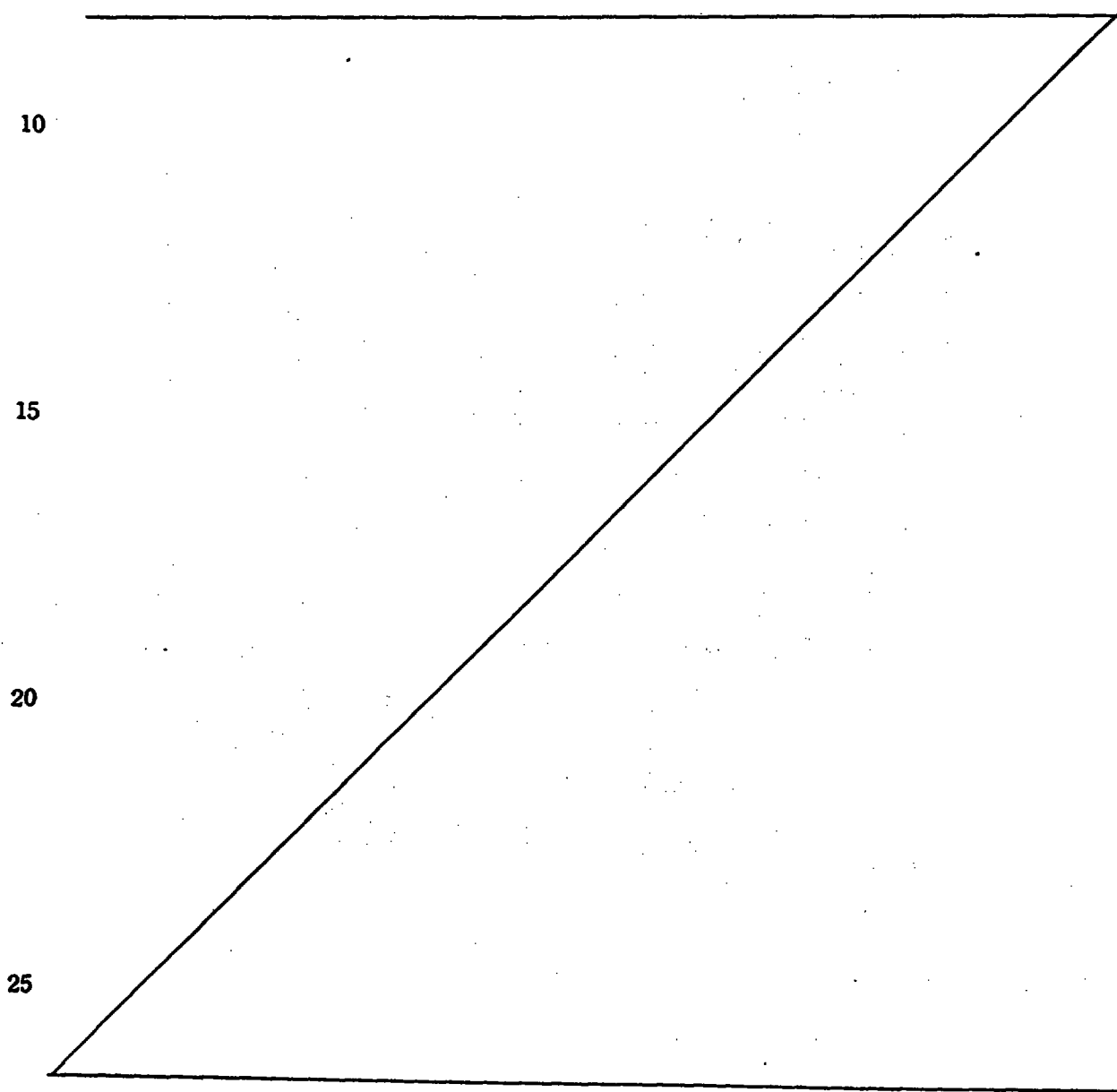


Table 1 Polyolefins employed

Polyolefin	Neutralizing agent for the catalyst during polymerization	Polymer
Example 1	Polypropylene	Block polymer
Example 2	Polypropylene	Block polymer
Example 3	Polypropylene	Homopolymer
Example 4	Polypropylene	Random copolymer
Example 5	Polypropylene	Block copolymer
Example 6	Polypropylene	Polyethylene + vinyl acetate (5%) copolymer
Comparative example 1	Polypropylene	Block copolymer
Comparative example 2	Polypropylene	Block copolymer
Comparative example 3	Polypropylene	Homopolymer
Comparative example 4	Polypropylene	Polyethylene + vinyl acetate (5%) copolymer

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Table 2

After storage of printer at 60°C for 720 hours				Turbidity of test solution
Presence of floating matter in ink (visual observation)		Printing test results		
Example 1	none	Good without nozzle clogging		0.10
Example 2	none	"		0.15
Example 3	none	"		0.10
Example 4	none	"		0.15
Example 5	none	"		0.14
Example 6	none	"		0.15
Comparative example 1	Floating matter slightly present	Ink non-discharging generated due to nozzle clogging of one nozzle in one (four nozzles of 3 printers)		0.30
Comparative example 2	Floating matter minutely present	Printing disturbance occurred with pressure loss increase during ink		0.20
Comparative example 3	"	"		0.20
Comparative example 4	"	Ink non-discharging generated due to nozzle clogging of one nozzle in one (four nozzles of 3 printers)		0.30



CLAIMS

- 5 1. A recording implement comprising at least an ink storing member and an ink feeding member, wherein a part or all of the site of said recording implement which is in contact with ink is formed of a polyolefin as the main component obtained by addition of an inorganic metal salt as the neutralizing agent for the catalyst during polymerization.
- 10 2. An ink jet recording device equipped with a recording implement as claimed in claim 1.
- 15 3. A writing or printing contrivance which utilises ink, at least part of the contrivance which, in use, contacts the ink including a polyolefin which has been polymerised with a catalyst neutralised by an inorganic metal salt.
- 20 4. An implement, device or contrivance according to any preceding claim, wherein said polyolefin is polypropylene or polyethylene.
- 25 5. An implement, device or contrivance according to any preceding claim, wherein the inorganic acid radical of said inorganic metal salt is selected from



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silicic acid anhydride, prussic acid, boric acid, phosphorous acid, carbonic acid and thiosulfuric acid.

- 5 6. A contrivance substantially as described in the description with reference to the drawings.
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