

(12) **United States Plant Patent**
Matsui

(10) **Patent No.:** **US PP21,426 P3**
(45) **Date of Patent:** **Oct. 26, 2010**

(54) **ZOYSLAGRASS PLANT ‘TMX’**
(50) Latin Name: *Zoysia matrella*
Varietal Denomination: **TMX**

(75) Inventor: **Kunio Matsui**, Nishikamo-gun (JP)
(73) Assignee: **Toyota Jidosha Kabushiki Kaisha**,
Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 175 days.

(21) Appl. No.: **12/149,800**

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May 8, 2007 (JP) 21038

(51) **Int. Cl.**
A01H 5/00 (2006.01)

(52) **U.S. Cl.** **Plt./390**
(58) **Field of Classification Search** **Plt./390**
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

PP17,514 P3 3/2007 Matsui

Primary Examiner—Kent L Bell
(74) *Attorney, Agent, or Firm*—Oblon, Spivak, McClelland,
Maier & Neustadt, L.L.P.

(57) **ABSTRACT**

The present culivar ‘TMX’ (*Zoysia matrella* Merr.) advanta-
geously has a very slow growing rate in terms of plant height
as compared with existing cultivars and requires mowing not
more than once a year so as to be maintained in fair condition
and allows the amount of fertilizer to be reduced. It also has a
high-level of shade tolerance.

8 Drawing Sheets

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Latin name of the genus and species of the plant claimed:
The present invention relates to the species *Zoysia matrella*
Merr.
Variety denomination: ‘TMX’.

BACKGROUND OF THE INVENTION

Field of Invention
The present invention relates to a new and distinct peren-
nial variety of *Zoysiagrass* asexually reproduced and
selected.

SUMMARY OF THE INVENTION

The present invention relates to a new and distinct Zoysia-
grass cultivar (*Zoysia matrella* Merr.) named ‘TMX’.
Zoysiagrass is a popular lawn grass which has been widely
used as greening turf. The turf thereof, however, should be
mowed 3 to 5 times per year so as to be maintained in beau-
tiful condition. Since the newly developed ‘TMX’ advanta-
geously has a very slow growing rate in terms of plant height
as compared with conventional cultivars, mowing is required
not more than once a year to maintain fair condition and the
amount of fertilizer can be reduced to almost less than half.
Therefore, labors and cost necessary for maintenance of the
turf as well as clipping from lawn-mowing can be reduced.
Furthermore, the cultivar can be readily grown in a place
where a lawnmower cannot be conveniently used, such as on
a rooftop of a building. In addition, ‘TMX’ has superior shade
tolerance to that of a conventional cultivar, and thus can be
raised even in a place with insufficient sunlight exposure.
In addition, it is expected that prevalence of ‘TMX’ facili-
tates greening of the rooftop and schoolyard and leads to
alleviation of heat island phenomenon and reduction of the
amount of CO₂.
For purposes of registration under the “International Con-
vention for the Protection of New Varieties of Plants” (gen-
erally known by its French acronym as the UPOV Conven-

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tion) and noting sections 1612 of the Manual of Patent
Examining Procedure, it is proposed that the new variety of
Zoysiagrass of the present invention be named ‘TMX’.

BRIEF DESCRIPTIONS OF THE
ILLUSTRATIONS

FIG. 1 is a set of photographs comparing spikestems of
control cultivars and the present cultivar (‘TMX’) (Left:
Emerald; Middle: TM9; Right: ‘TMX’). Photographed on
May 22, 2006 in Nishikamo-gun, Aichi, Japan.
FIG. 2 is a set of photographs comparing grass shapes of
control cultivars and the present cultivar (‘TMX’) (Upper:
Emerald; Middle: TM9; Lower: ‘TMX’). Photographed on
May 12, 2006 in Nishikamo-gun, Aichi, Japan.
FIG. 3 is a set of photographs comparing stolons of control
cultivars and the present cultivar (‘TMX’) (Upper: Emerald;
Middle: TM9; Lower: ‘TMX’). Photographed on Oct. 20,
2005 in Nishikamo-gun, Aichi, Japan.
FIG. 4 is a photograph showing a full view of test field for
the present cultivar (‘TMX’) ((1): Individually planted plot of
Emerald; (2): Individually planted plot of TM9; (3); Individu-
ally planted plot of ‘TMX’). Photographed on Sep. 25, 2006
in Nishikamo-gun, Aichi, Japan.
FIG. 5 is a set of photographs comparing control cultivars
and the present cultivar (‘TMX’) in terms of plant vigor in fall
(Upper: Emerald; Middle: TM9; Lower: ‘TMX’). Photo-
graphed on Nov. 13, 2006 in Nishikamo-gun, Aichi, Japan.
FIG. 6 is a photograph showing culture of control cultivars
and the present cultivar (‘TMX’) in a shade tolerance test with
the use of a light-shading net. Photographed on Sep. 7, 2006
in Nishikamo-gun, Aichi, Japan.
FIG. 7 is a graph showing the relative amounts of growth
with 75% light shielding in a shade tolerance test (light
shielding/untreated plots).

FIG. 8 is a set of photographs comparing grass shapes after culture in a shade tolerance test (Panel (1): untreated plots; Panel (2): light shielding plots) (Left: Emerald; Middle: TM9; Right: ‘TMX’ in Panels (1) and (2)). Photographed on Sep. 7, 2006 in Nishikamo-gun, Aichi, Japan.

DETAILED BOTANICAL DESCRIPTION OF THE PLANT

1. Characteristics of the plant body of the present invention
1) Overview

Self-fertile seeds (50,000 seeds) of a lawn cultivar ‘TM9’ (*Zoysia matrella* Merr.) were seeded (June 2003), 70 individuals exhibiting short plant height as pot seedlings were selected from the germinated individuals (in the year 2003), and 6 individuals were selected from among these seedlings based on their growing properties as a pot seedling (in the year 2004). They were planted in a field and an outdoor cultivation test was initiated (in the year 2005). The present cultivar was obtained after completion of cultivation tests in various locations throughout Japan (completed in the year 2006). Characteristics of the present cultivar are as follows: extremely creeping plant form; spikestem of medium-sized thickness and short length; dense stolons of medium-sized thickness; leaves of very short length, very narrow leaf width, and a yellowish green leaf color; short spike length and grayed purple spike color; medium spikelet length, narrow spikelet width, and a small number of spikelets; moderate initial growth; moderate plant vigor in spring and good plant vigor in fall; medium (not early nor late) timing in spike-sprouting; spike-sprouting only in spring with a medium number of spikes; medium (not early nor late) timing in turning green; medium (not early nor late) timing in turning red; medium winter hardiness; good summer tolerance; strong shade tolerance; medium drought tolerance; medium salinity tolerance; and medium tread pressure resistance.

2) Comparison with control cultivars (Table 1)

TABLE 1

Item	Trait	Present cultivar ‘TMX’
1 Height	Height of mature plant	Low (2.0 cm)
2 Plant	Plant	Extremely creeping
3 Stem	Thickness of spikestem	Medium (0.7 mm)
	Length of spikestem	Short (2 cm)
4 Stolon	Density of stolons	Dense
	Internode length of stolon	18 mm
	Thickness of stolon	Medium (1.0 mm)
5 Foliage	Leaf length	Extremely short (1 cm)
	Leaf width	Extremely narrow (1.2 mm)
	Leaf color (Whole leaf including both sides, apex and margin)	141C: Strong yellowish green group
6 Spike	Spike length	Short (12 mm)
	Spike color	183A: Grayed purple group
	Spike diameter	2 mm
	Spikelet length	Medium (2.7 mm)
	Spikelet width	Narrow (0.8 mm)
	Number of spikelet	Few (17)
7 Initial growth	Initial growth	Medium
8 Plant vigor	Plant vigor in spring	Moderate
	Plant vigor in fall	Good
9 Spike-sprouting time	Beginning of spike-sprouting	Medium (not early nor late)

TABLE 1-continued

10 Spike-sprouting properties	Spike-sprouting in spring/fall	Spike-sprouting only in spring
	Number of spikes	Medium (100-150 spike/m ²)
11 Growing period	Timing to turn green	Medium (not early nor late)
	Timing to turn red	Medium (not early nor late)
12 Winter hardiness	Good/Bad in winter hardiness	Medium
13 Summer tolerance	Good/Bad in summer tolerance	Good
14 Environmental tolerance	Shade tolerance	Strong
	Drought tolerance	Medium
	Salinity tolerance	Medium
15 Tread pressure resistance	Tread pressure resistance	Medium

		Control cultivar	
Item	Trait	‘Emerald’	‘TM9’
1 Height	Height of mature plant	High (14.0 cm)	Middle (5.7 cm)
2 Plant	Plant	Intermediate	Creeping
3 Stem	Thickness of spikestem	Medium (0.7 mm)	Medium (0.7 mm)
	Length of spikestem	Medium (5 cm)	Short (2 cm)
4 Stolon	Density of stolons	Dense	Extremely dense
	Internode length of stolon	22 mm	19 mm
	Thickness of stolon	Medium (1.1 mm)	Medium (1.1 mm)
5 Foliage	Leaf length	Short (8 cm)	Extremely short to short (4 cm)
	Leaf width	Narrow (1.6 mm)	Narrow (1.8 mm)
	Leaf color (Whole leaf including both sides, apex and margin)	144A: Yellow green group	137A: green group
6 Spike	Spike length	Short (17 mm)	Short (14 mm)
	Spike color	183A: Grayed purple group	183A: Grayed purple group
	Spike diameter	2 mm	2 mm
	Spikelet length	Medium (3.2 mm)	Medium (2.8 mm)
	Spikelet width	Medium (1.2 mm)	Medium (1.1 mm)
	Number of spikelet	Few (16)	Few (17)
7 Initial growth	Initial growth	Medium	Medium
8 Plant vigor	Plant vigor in spring	Moderate	Moderate
	Plant vigor in fall	Good	Good
9 Spike-sprouting time	Beginning of spike-sprouting	Medium (not early nor late)	Medium (not early nor late)
10 Spike-sprouting properties	Spike-sprouting in spring/fall	Spike-sprouting only in spring	Spike-sprouting only in spring
	Number of spikes	Medium (100-150 spike/m ²)	Many (150-200 spike/m ²)

TABLE 1-continued

11	Grow- ing period	Timing to turn green	Medium (not early nor late)	Medium (not early nor late)
		Timing to turn red	Medium (not early nor late)	Medium (not early nor late)
12	Winter hardi- ness	Good/Bad in winter hardiness	Medium	Medium
13	Summer toler- ance	Good/Bad in summer tolerance	Good	Good
14	Envi- ronmen- tal toler- ance	Shade tolerance Drought tolerance Salinity tolerance	Medium Medium Medium	Medium Medium Medium
15	Tread pressure resistance	Tread pressure resistance	Medium	Medium

Colors are based on the RHS color chart.

3) Other characteristics of the plant body of the present inven-
tion

Length of internode.—18 mm.
Diameter of internode.—1.0 mm.
Blade villus.—Hairs absent on adaxial and abaxial leaf
surface.
Ligule hair.—0.1 mm in length, continuously.
Color of anther.—183D grayed purple group.
Color of stigma.—8C reverse yellow group.
Average number of florets per raceme.—17.
*Total length of culm up to the node immediately below
the flag leaf (including the flower portion).*—1.4 cm.
Length of stalk of inflorescence.—0.7 cm.
Length of flower portion.—1.2 cm.
Color of mature spikelet.—161D grayed yellow green
group.
Color of stolon.—60B red purple group and 144D yel-
low group.

4) Sensitivity to diseases or insect pests ‘TMX’ did not exhibit
sensitivity to diseases or insect pests that are generally
found in plants of the *Zoysia* genus over 21 months starting
from April in 2005 in Japan.

*Notes:

Type of plant.—lawn.
Name of the applied cultivar.—‘TMX’.
Cultivator.—Kunio Matsui.
Address of the applicant.—1 Toyota-Cho, Toyota-shi,
Aichi, Japan.
Cultivation site.—Nishikamo-gun, Toyota-shi, Aichi,
Japan (Latitude:N 35° 08' 06"; Longitude: E 137° 05'
59").
Place where characteristics research was conducted.—
Nishikamo-gun, Toyota-shi, Aichi, Japan (Latitude: 55
N 35° 08' 06"; Longitude: E 137° 05' 59").
*Name of researcher who conducted characteristics
research.*—Kunio Matsui.
Period when characteristics research was conducted.—
2005-2006.
Control cultivar (most approximate cultivar).—‘TM9’.

5) Characteristics by which the present cultivar is distin-
guished from the control cultivars

- a) Control cultivars ‘Emerald’ ‘TM9’
b) Distinguishing characteristics

The present cultivar can be distinguished from ‘Emerald’
in that the present cultivar has a low height (2.0 cm) (whereas
‘Emerald’ has a high height (14.0 cm)); an extremely creeping
plant form (whereas ‘Emerald’ has an intermediate plant
form); short-length spikestems (2 cm) (whereas ‘Emerald’
has medium-length spikestems (5 cm)); very short leaves (1
cm) (whereas ‘Emerald’ has short leaves (8 cm)); an
extremely narrow leaf width (1.2 mm) (whereas ‘Emerald’
has a narrow leaf width (1.6 mm)); a strong yellowish green
leaf color (141C) (whereas ‘Emerald’ has a yellow green leaf
color (144A)); a narrow spikelet width (0.8 mm) (whereas
‘Emerald’ has a medium spikelet width (1.2 mm)); and a
strong shade tolerance (whereas ‘Emerald’ has a medium
shade tolerance).

The present cultivar can be distinguished from ‘TM9’ in
that the present cultivar has a low height (2.0 cm) (whereas
‘TM9’ has a medium height (5.7 cm)); an extremely creeping
plant form (whereas ‘TM9’ has a creeping plant form); dense
stolons (whereas ‘TM9’ has extremely dense stolons); very
short leaves (1 cm) (whereas ‘TM9’ has short to extremely
short leaves (4 cm)); an extremely narrow leaf width (1.2 mm)
(whereas ‘TM9’ has a narrow leaf width (1.8 mm)); a strong
yellowish green leaf color (141C) (whereas ‘TM9’ has a
green leaf color (137A)); a narrow spikelet width (0.8 mm)
(whereas ‘TM9’ has a medium spikelet width (1.1 mm)); a
medium number of spikes (whereas ‘TM9’ has a large num-
ber of spikes); and a strong shade tolerance (whereas ‘TM9’
has a moderate shade tolerance).

6) Cultivation conditions for characteristic research experi-
ment of above 1) to 5)

- a Cultivation site.*—Nishikamo-gun, Aichi, Japan (Lati-
tude: N 35° 08' 06"; Longitude: E 137° 05' 59").
b Cultivation time and period.—21 months from April,
2005.
c Cultivation method.—(Examples: cultivation style
such as on bare ground, in a facility, field planting or
pot planting, cultivation scale, etc.).

Pot seedlings reproduced by cutting rootstocks and stolons
and planting them in soil were raised in greenhouse for two
months and fix planted on bare ground in April along with
control cultivars in order to perform a characteristic research
experiment. Five individuals (triplicates) were fix planted at a
density of one seedling per an area of 200 cm × 200 cm in an
individually planted plot while they were fix planted in trip-
licates at a density of one seedling per an area of 15 cm × 15
cm in a dense plated test plot having an area of 150 cm × 150
cm thereby performing a characteristic research experiment.

7) Shade tolerance test

- a) Test method.*—Three pot seedlings (pot diameter: 12
cm) of each of ‘Emerald’, ‘TM9’, and ‘TMX’ were
raised under 75% light shielding with a light-shading
net for approximately 2 months from July 6 to Sep-
tember 7 in 2007 in Nishikamo-gun, Aichi, Japan
(Latitude: N 35° 08' 06"; Longitude: E 137° 05' 59")
(FIG. 6). In addition, three pot seedlings of each of the
above cultivars were raised under conditions without
the use of a light-shielding net (untreated plot). The
aerial portions of each cultivar were mowed. Then, the
mean value of the weights of the mowed parts of three
pot seedlings that had been raised while covered with
a light-shading net was divided by a mean value of the
weights of the mowed parts of three pot seedlings in
the untreated plot. Thus, the relative amount of growth
was calculated.

b) *Results*.—The seedlings of ‘Emerald’ and ‘TM9’ that had been raised with light shielding grew to an extent comparable to that of those in the untreated plot. Meanwhile, the amount of growth of the seedlings of ‘TMX’ that had been raised with light shielding was approximately 1.6 times greater than that of those in the untreated plot (FIG. 7). In addition, the leaf length became longer in the case of every cultivar raised with light shielding. However, no abnormalities in leaves or the like were found (FIG. 8).

Accordingly, the shade tolerance of ‘TMX’ was likely to be stronger than that of ‘Emerald’ and of ‘TM9’.

2. Reproduction method

Vegetative propagation.—Rootstocks, stolons, tillers, and turf.

3. Conditions of keeping and storage the plant having identifiable characteristics

Place where the plant is maintained and/or stored.—Nishikamo-gun, Aichi, Japan (Latitude: N 35° 08' 06"; Longitude: E 137° 05' 59").

Method of maintenance/storage.—pot planting and ground planting.

4. History of cultivating the present cultivar

1) *Material of new cultivar*.—Self-fertile seed of ‘TM9’ (*Zoysia matrella* Merr.).

2) *Cultivation site*.—Nishikamo-gun in Aichi, Japan (Latitude: N 35° 08' 06"; Longitude: E 137° 05' 59").

3) *History of cultivating the cultivar*.

Self-fertile seeds of ‘TM9’ were seeded in June, 2003, and individuals exhibiting short plant height as pot seedlings were selected from the germinated individuals. The thus selected lines were reproduced by root separation asexually in April 2004 and the uniformity of these vegetative propagated lines was respectively confirmed in greenhouse by January, 2005. Newly root separated lines (January 2005) were fix planted in a field in April 2005. A line exhibiting a short leaf length and a satisfactory initial growth was selected and the stability thereof was confirmed to complete the cultivating of the new cultivar on Dec. 28, 2006. All cultivating was done at the above-noted cultivation site.

5. Main use of the present cultivar

The present cultivar can be used for ground covering of a park, garden, etc.

6. Other items in relation to the cultivation of the present cultivar

1) *Applicable area*.—Warm area.

2) *Specific cultivation site in Japan Address (Zip code. 470-0201)*.—1099 Kurozasa-Marune, Miyoshi-machi, Nishikamo-gun, Aichi, Japan (Latitude: N 35° 08' 06"; Longitude: E 137° 05' 59")

3) *Cultivation style*: Normal cultivation. Bare ground. Seasons suitable for seeding, planting, etc.

Other reproduction method.—Vegetative propagation by stolons from the beginning of April to the beginning of May/year round Blooming season, harvest season, and any other seasons in cultivation stage suitable for specifying characteristics of the present cultivar.

Blooming season.—from the beginning to the end of May /year round.

Greening season.—from the end of April to the end of October/year round.

4) Other items to be mentioned for the cultivation of the present cultivar

The present cultivar is extremely creeping in plant form and short in leaf length, which allows weeds readily to grow. Frequent weeding is therefore required.

7. Other Information

When the present cultivar is allowed freely to grow, the plant height (i.e. the height from the ground to the tip of the leaf blade) is as about ¼ of that of ‘Emerald’ and half of that of ‘TM9’.

The variety ‘TMX’ produces seeds, but is not propagated by seed. The number of seed per plant, seed length, seed width and generic color of seed correspond to the number of spikelets, spikelet length, spikelet width and spike color, respectively.

What is claimed is:

1. A new and distinctive variety of *Zoysia matrella* Merr. plant named ‘TMX’ as illustrated and described in the present specification.

* * * * *

Fig. 1

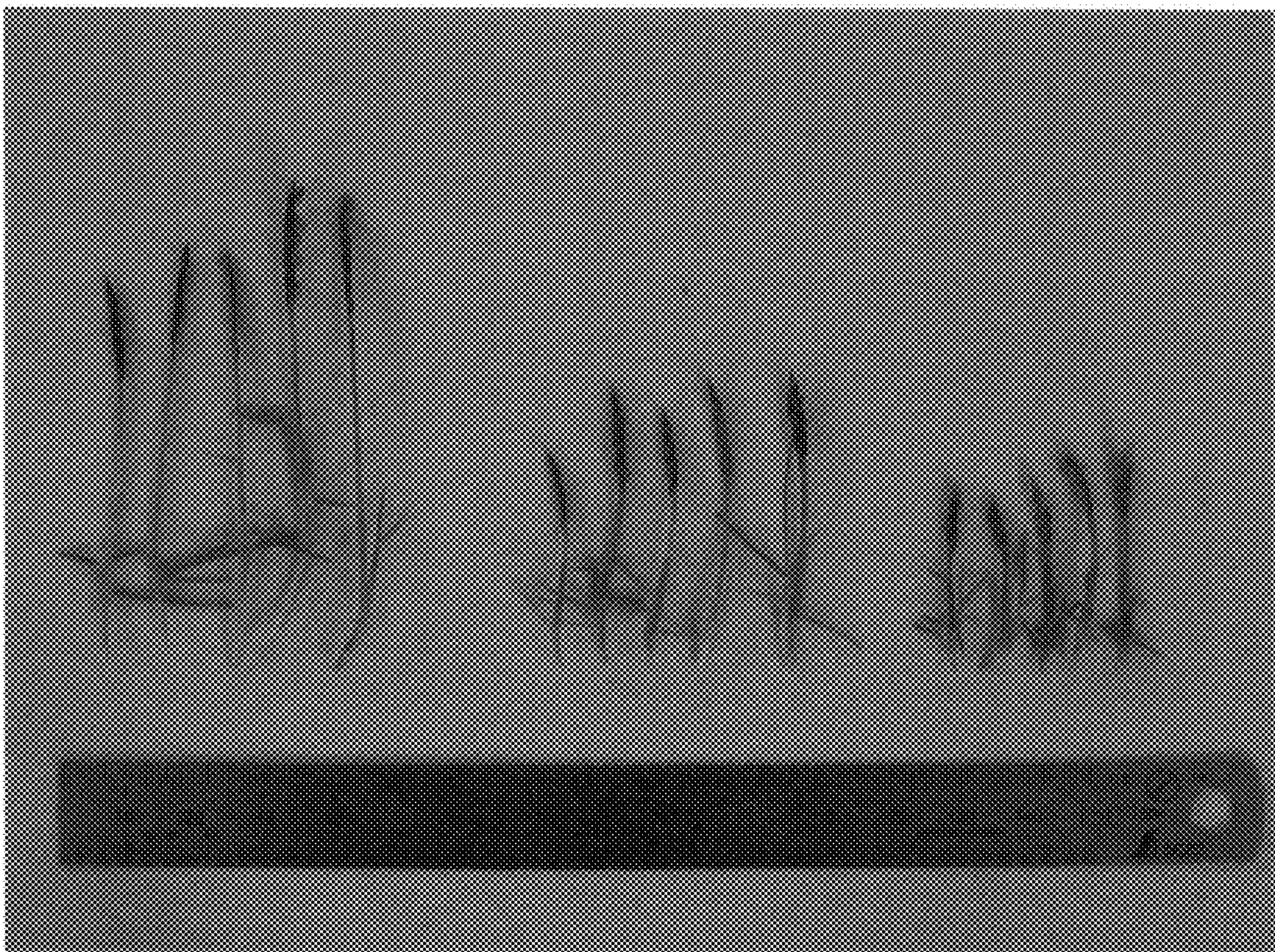


Fig. 2

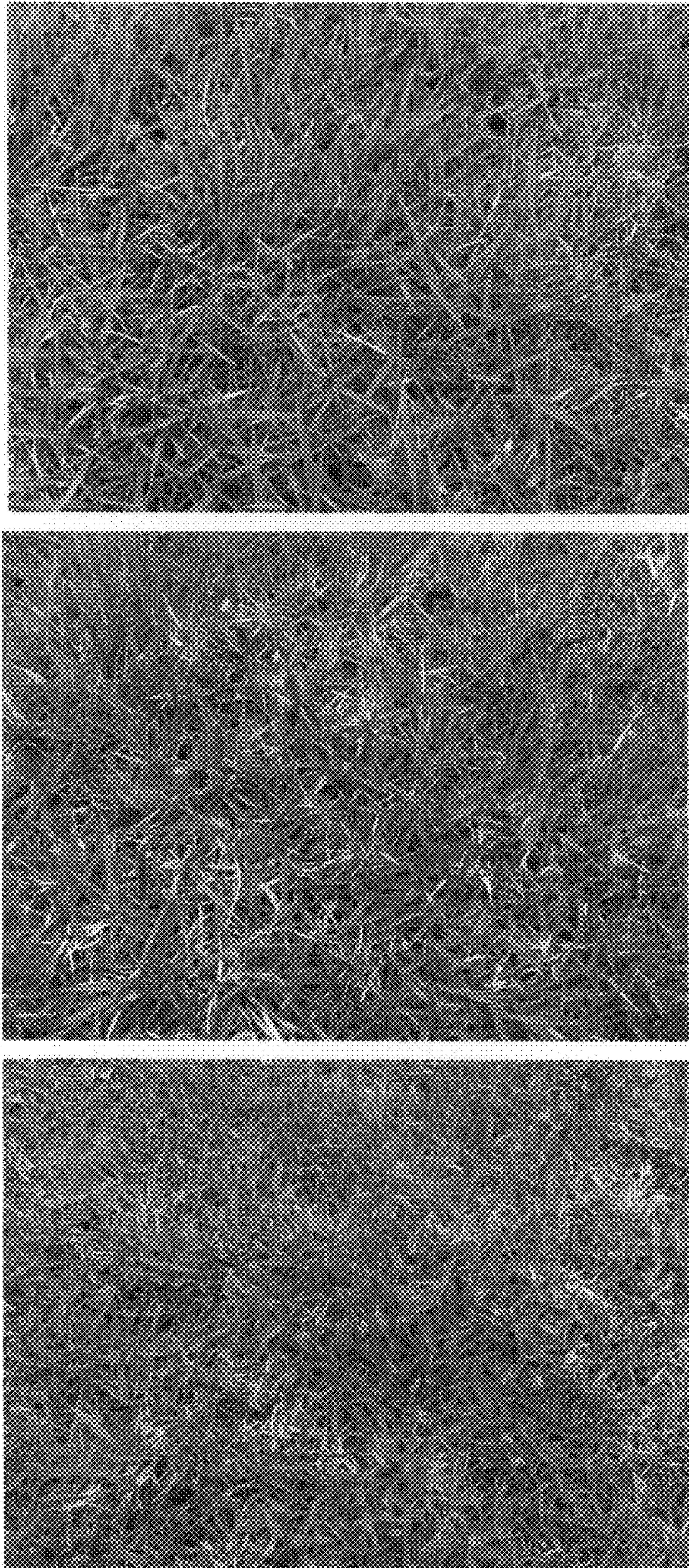


Fig. 3

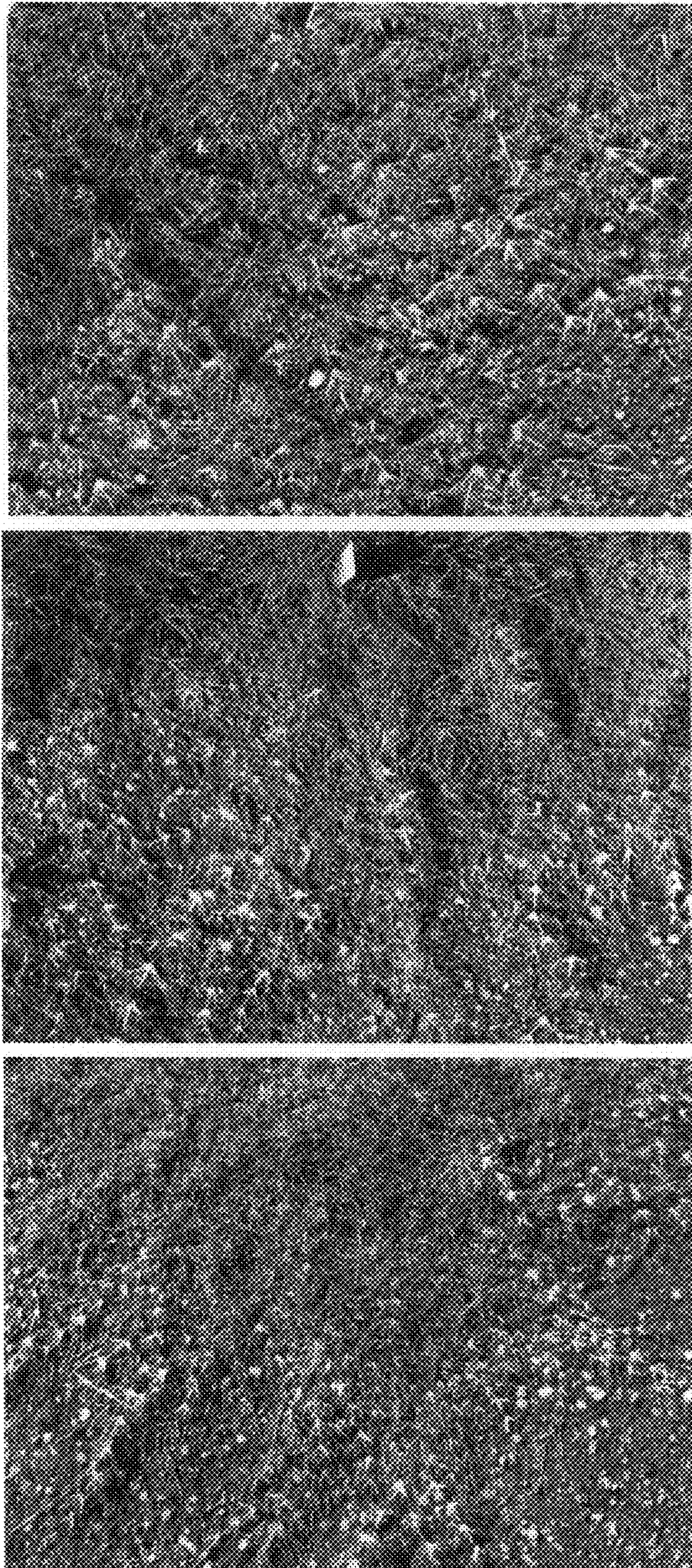


Fig. 4

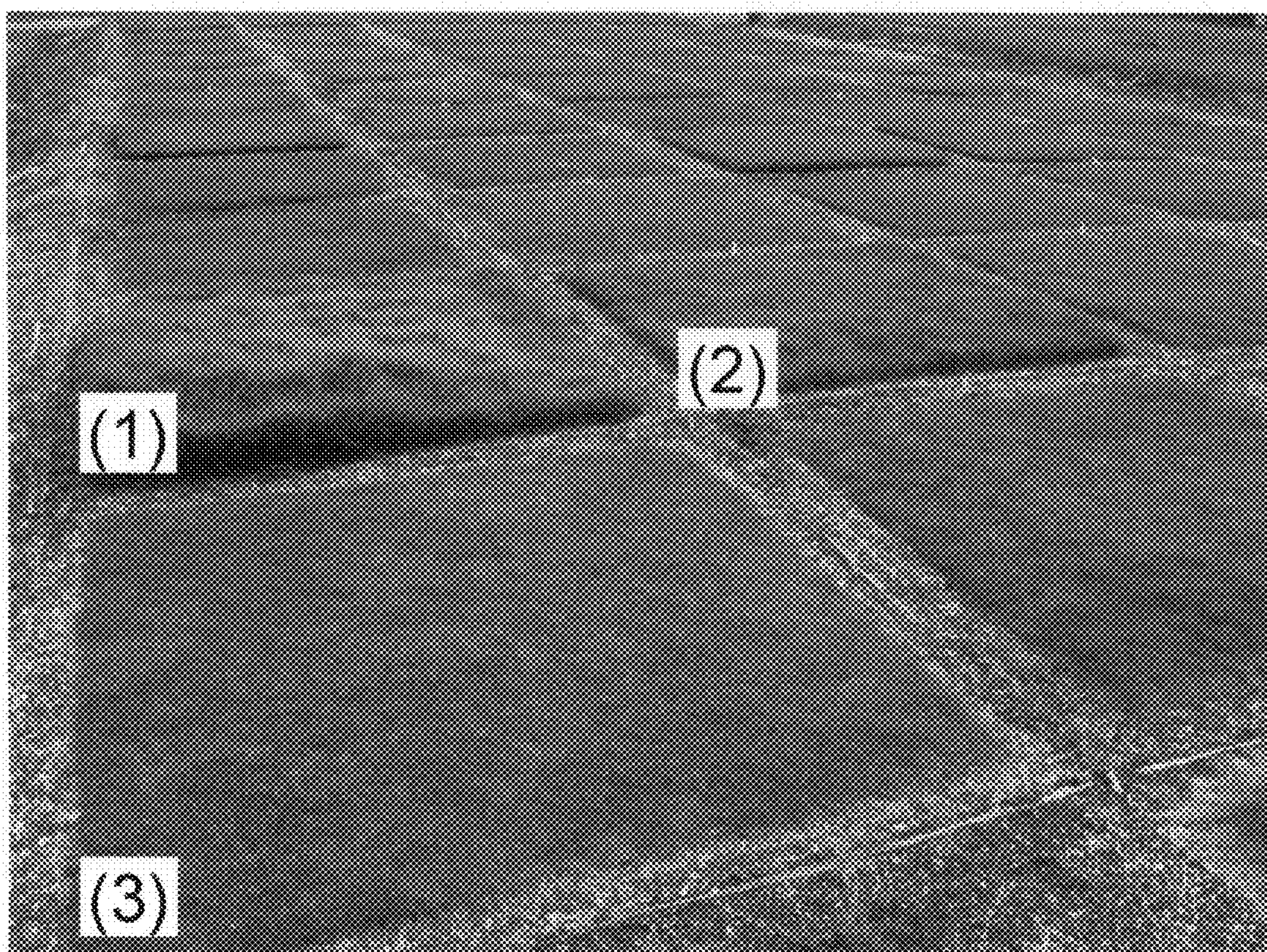


Fig. 5

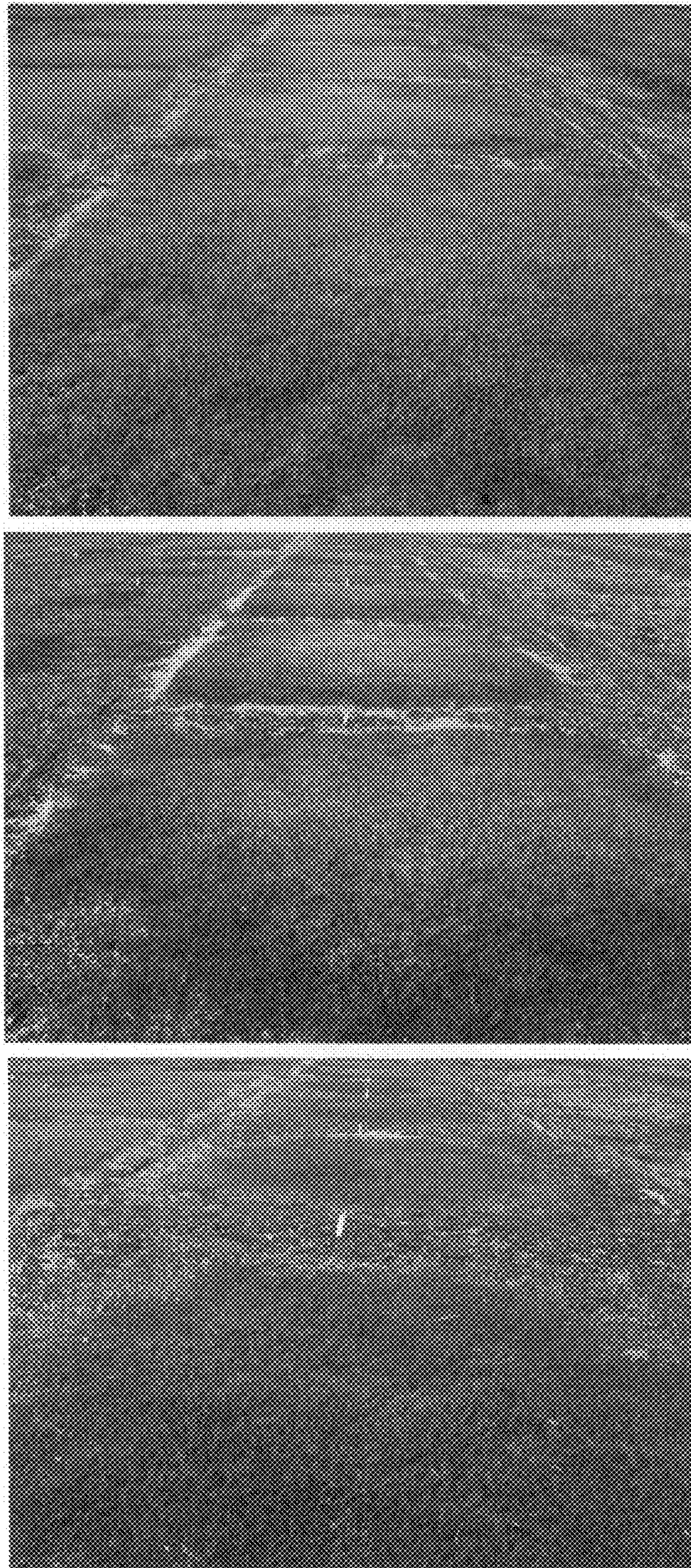


Fig. 6



Fig. 7

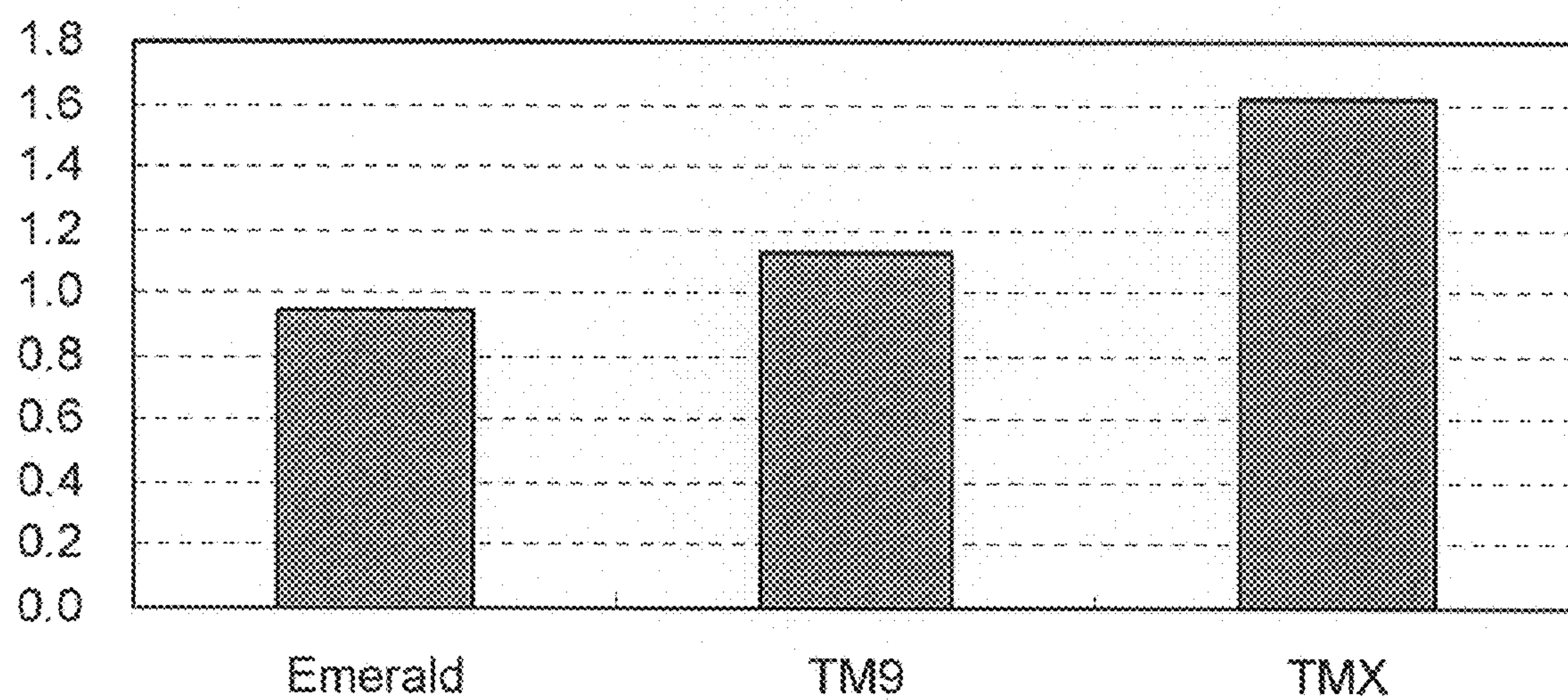


Fig. 8

(1)



(2)



UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : PP21,426 P3
APPLICATION NO. : 12/149800
DATED : October 26, 2010
INVENTOR(S) : Kunio Matsui

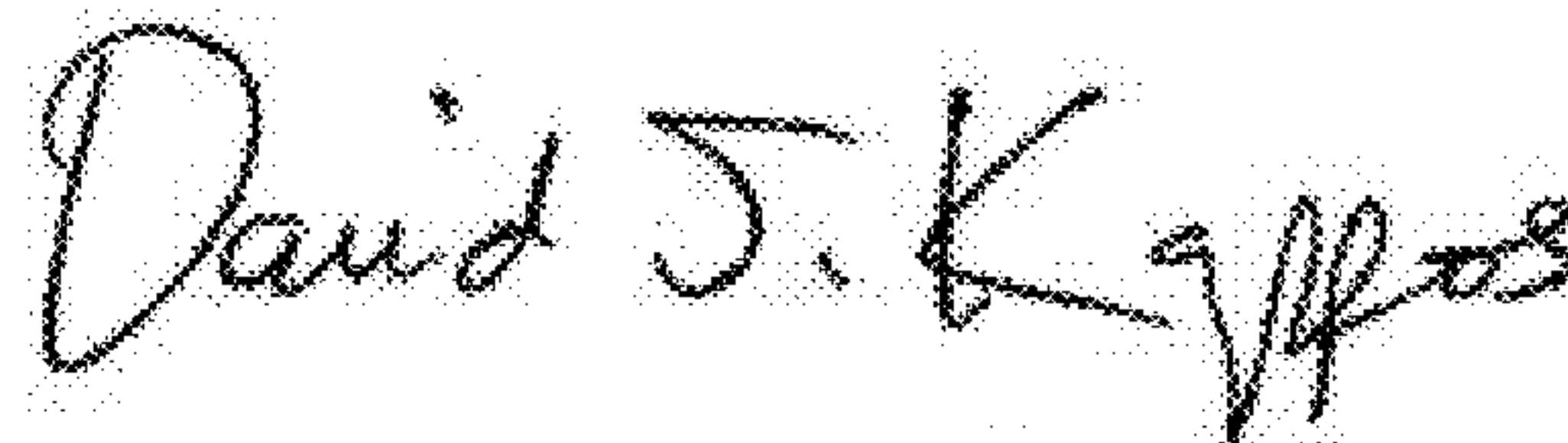
Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the title page, Item (73), the address of the Assignee is incorrect. Item (73) should read:

-- (73) Assignee: **Toyota Jidosha Kabushiki Kaisha**, Toyota-shi (JP)--

Signed and Sealed this
Fifth Day of April, 2011

A handwritten signature in black ink, reading "David J. Kappos". The signature is written in a cursive, flowing style with a large initial "D" and a stylized "K".

David J. Kappos
Director of the United States Patent and Trademark Office