



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

(10) **Patent No.:** **US PP33,700 P2**
(45) **Date of Patent:** **Nov. 30, 2021**

- (54) **TANGOR TREE NAMED ‘SWEET COTT 2’**
- (50) Latin Name: *Citrus clementina hort. Ex Tanaka x Citrus reticulata Blanco*
Varietal Denomination: **Sweet Cott 2**
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- (72) Inventor: **Mustapha Zemzami**, Kenitra (MA)
- (73) Assignee: **Qualiagro SA**, Casablanca (MA)
- (*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
- (21) Appl. No.: **17/031,339**
- (22) Filed: **Sep. 24, 2020**
- (51) **Int. Cl.**
A01H 5/08 (2018.01)
A01H 6/78 (2018.01)
- (52) **U.S. Cl.**
USPC **Plt./201**
- (58) **Field of Classification Search**
USPC Plt./156, 202, 201
See application file for complete search history.

(56) **References Cited**

PUBLICATIONS

Bulletin de la Protection des Obtentions Vegetales. 2017. http://www.onssa.gov.ma/images/controle_semences/bulletin-de-protection-des-obtentions-vegetales-n28-septembre-2017.pdf. 12 pages. (Year: 2017).*

* cited by examiner

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(57) **ABSTRACT**

A new and distinct tangor tree characterized by less sensitivity to fruit drop due to heat wave, no alternate bearing, seedless fruits, low viable pollen, better fruit size, small canopy size, less fruit drop at full maturity, and rare *Ceratitits capitata* damage on the fruit.

8 Drawing Sheets

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Genus and species: *Citrus clementina hort. Ex Tanaka x Citrus reticulata Blanco*.

Variety denomination: ‘Sweet Cott 2’.

CROSS-REFERENCES TO RELATED APPLICATIONS

Co-pending U.S. application Ser. No. 17/031,491 (Tangor tree named ‘Sweet Cott 3’) was developed by the same breeding program.

ORIGIN OF THE INVENTION

The present invention relates to a new and distinct variety of a tangor tree named ‘Sweet Cott 2’ which was originated by the inventor by gamma irradiating the variety ‘AS-2’ (unpatented), and selecting for trees having late ripening timeframes, lower seediness levels, desired organoleptic quality and some other descriptors of interest.

BACKGROUND OF THE INVENTION

The citrus industry is facing tremendous challenges to cope with the recent extensive world-wide plantings of soft citrus that resulted in congestion of market supply due to the narrow maturity windows of conventional varieties that suffer lower sell prices.

To overcome this situation, a breeding program was instituted to generate new varieties of late easy-peeling citrus selections that may expand soft citrus offer beyond traditional maturity time frames. The breeding program targeted creation of new varieties of very late easy peelers with superior agronomical and organoleptic features. Field

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trials were conducted using shoot-tip grafted and indexed plant material of selected late varieties from our germplasm repository (unpatented). After evaluation, a late maturing tree was identified and was propagated from budwood introduced from Saudi Arabia under the name ‘Furr 2 mandarin’ which was registered in our repository as Tangor ‘AS-2’ (unpatented).

In the field trial, trees from ‘AS-2’ exhibited numerous phenotypical similarities with variety ‘SRA 337’ (known in USA as ‘C54-4-4’ or ‘Furr’ mandarin, which is unpatented) when grown under the same environmental conditions. However, one of the ‘AS-2’ trees in the trial was noticeably distinct with less vigor of its canopy, its upright growth and a much later maturity (Week 13 to 17) than ‘SRA 337’ (Week 43 to 52). Budwood of this unique tree was gamma irradiated in 2013 using a Cobal-60 panoramic irradiator in Boukhalef, Tangier, Morocco.

Irradiated budwood was sequentially grafted at a citrus nursery in Kénitra, Morocco on Volkamer lemon root-stock (unpatented) to speed up the growth. The last generation of vegetatively propagated plants was planted in 2015 at the experimental field in Beni Mellal, Morocco. Pomological observations started in 2017 with a focus on seediness, time of maturity, organoleptic quality and some other descriptors of interest. ‘Sweet Cott 2’ and other unique varieties were selected, each having several distinct characteristics making it unique as compared to ‘AS-2’.

BRIEF SUMMARY OF THE INVENTION

As evidenced by the following unique combination of characteristics that are outstanding in ‘Sweet Cott 2’, this new variety is distinct from ‘AS-2’ variety, as well as from

all other varieties of which I am aware. Among several selections, 'Sweet Cott 2' has several distinct characteristics that make it unique as compared to 'AS-2' including but not limited to:

1. Less sensitivity to fruit drop due to spring heat wave.
2. No alternate bearing even with very late harvest of the previous season crop.
3. Nearly seedless fruits (0.3 seed per fruit for 'Sweet Cott 2' versus 19 seeds per fruit for 'AS-2') under heavy open field cross-pollination.
4. Low viable pollen as shown by pollen culture on sucrose-agar medium (7.2% for 'Sweet Cott 2' compared to more than 60% for 'Nadorcott' mother variety).
5. Better fruit size (mean width 71.5 mm for 'Sweet Cott 2' versus more than 95 mm for 'AS-2').
6. Small canopy size suitable for high density planting.
7. Less fruit drop at full maturity.
8. Rare *Ceratitidis capitata* damage on the fruit.

'Sweet Cott 2' also has several distinct characteristics from 'Sweet Cott 3,' including but not limited to:

1. Ripening time (weeks 11 to 14 for 'Sweet Cott 3' versus weeks 13 to 16 for 'Sweet Cott 2').
2. Fruit seediness (2 seeds per fruit for 'Sweet Cott 3' versus less than 0.3 for 'Sweet Cott 2) under heavy open field cross-pollination.
3. 'Sweet Cott 3' has a greater fruit load.

Asexual reproduction of this new variety by bud-grafting, as performed in the citrus nursery in Kénitra, Morocco, shows that the foregoing and all other characteristics and distinctions come true to form and are established and transmitted through succeeding propagations. Bud-eyes are collected and side grafted on a certified receptive Volkamer lemon root-stock and grown for development under plastic house covered with a layer of anti-insect white screen and a top layer of anti-UV yellow plastic. Each of the progeny exhibits identical characteristics to the original plant. The present invention has not been evaluated under all possible environmental conditions. The phenotype may change with variations in environment without a change in the genotype of the plant.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying illustrations show typical specimens of the tree, flowers, and fruit of 'Sweet Cott 2' depicted in color as nearly true as it is reasonably possible to make the same in a color illustration of this character.

FIG. 1 is a photograph of 'Sweet Cott 2' tree canopy with the upright growth.

FIG. 2 is a photograph of 'Sweet Cott 2' trunk showing that the stem is strong with smooth bark. It is equal in diameter to the root-stock.

FIG. 3 is a photograph of a 'Sweet Cott 2' first year twig, which is green and glabrous and moderately thick.

FIG. 4 is a photograph of a 'Sweet Cott 2' second year twig, which is striate.

FIG. 5 is a photograph of a 'Sweet Cott 2' leaf, showing elliptic and crenate shape.

FIG. 6 is a photograph of a 'Sweet Cott 2' leaf, showing apex slightly emarginated.

FIG. 7 is a photograph of a 'Sweet Cott 2' petiole, showing it is glabrous with no wings.

FIG. 8 is a photograph of a 'Sweet Cott 2' leaf, showing conspicuous oil glands.

FIGS. 9-11 are photographs of a 'Sweet Cott 2' type 1 flower with one set of petals, and showing sparse oil glands.

FIGS. 12-14 are photographs of a 'Sweet Cott 2' type 2 flower with two sets of petals and showing showing numerous conspicuous oil glands.

FIG. 15 is a photograph of a 'Sweet Cott 2' fruit, having a width of about 71.5 mm.

FIG. 16 is a photograph of 'Sweet Cott 2' fruits, with stylar areola and stalk slight grooves.

FIG. 17 is a photograph of a comparison between 'Sweet Cott 2' fruits (zero seed per fruit; 9 to 11 segments) and 'AS-2' fruit (19 seeds per fruit; 9 to 12 segments).

FIG. 18 is a photograph of a 'Sweet Cott 2' fruit peel, with a thickness of 2.2 mm.

FIG. 19 is a photograph of a 'Sweet Cott 2' fruit, showing that it is an easy peeling fruit, with medium albedo strands present.

FIG. 20 is a photograph of a 'Sweet Cott 2' fruit juice bag length of 12.9 mm.

FIG. 21 is a photograph of a 'Sweet Cott 2' fruit juice bag width of 2.4 mm.

FIG. 22 is a photograph comparing juice from late Valencia and 'Sweet Cott 2' fruit.

DETAILED BOTANICAL DESCRIPTION

The following is a detailed description of the new tangor tree selection with color descriptions using terminology in accordance with The Royal Horticultural Society (London) Colour Chart, 4th Edition, (2001), except where ordinary dictionary significance of color is indicated. Observations were made of a 5-year old tree.

Tree:

Plant diameter.—230 cm on a 4-year-old tree on *Citrus volkameriana* root-stock.

Trunk.—Stem is firm with a smooth bark; its diameter is equal to the root-stock. See FIG. 2.

Canopy.—Low vigor with an ellipsoid shape and an upright growth. The density of branches is medium; their attachment angle is narrow See FIG. 1.

Twig.—First year twig is glabrous, moderately thick and has a green color. See FIG. 3. It becomes subsequently striate with age. See FIG. 4. Thorns are absent and spines are tiny when present.

Growth conditions.—No particular farming techniques are needed to grow 'Sweet Cott 2'. It does not require any special conditions beside what is usually applied for citrus production. With its compact canopy, Sweet Cott 2 is highly suitable for very high-density planting (1666 plants/ha) on trifoliate root-stock and may ensure significant yields of good quality fruits.

Stem description:

Stem Length.—630 mm.

Diameter.—72 mm.

Texture.—Smooth.

Strength.—Strong.

Color.—RHS N 197 A (Light Olive Light Brown).

Leaf description: Unifoliate, plane and elliptic in shape with a glabrous non-winged petiole. The lamina is dotted with medium size oil glands. It has an obtuse apex slightly emarginated and the margin is slightly crenate.

Shape.—Elliptic.

Length.—82 mm.

Width.—29 mm.

Apex.—Obtuse with slight emargination.
Margin.—Slightly sinuate.
Texture (both surfaces).—Glabrous.
Color.—Adaxial: RHS 137 D (Moderate Yellowish Green); Abaxial: RHS 139 B (Moderate Yellow Green).
Petiolate or sessile.—Petiolate. Petiole length: 10 mm. Petiole diameter: 1.2 mm. Petiole color: RHS 146 B (Moderate Yellow Green).
 Root description: Grafted on *Citrus volkameriana* root-stock.
 Flowers: ‘Sweet Cott 2’ has 2 types of flowers. Type 2 flowers differ from type 1 by having 2 sets of petals. ‘Sweet Cott 2’ flowers in mid-March and is very productive. It is not prone to alternate bearing in spite of very late harvest of the previous crop.
Height.—13 mm.
Diameter.—10.2 mm before anthesis.
Typical date of bloom.—Mid-March in Beni Mellal, Morocco.
Number of flowers.—2 types in singles and clusters.
Color.—RHS 155 D (Yellowish White).
Type 1 flower.—Set of petals: 1. Pedicel: up to 12 mm in length. Calyx: 5 mm in diameter with 5 sepals arranged in a cup-like structure. Sepal shape is an equilateral triangle with a side length of 4 mm. Color is RHS 137 D (Moderate Yellowish Green). Corolla: composed of 5 petals (16.5 mm in length and 5.0 mm in width) arranged in a circle in alternation with the sepals. Stamens: about 15 to 20 in number that seem to be sticking together at their lower part, arranged in a circle. Each stamen has an anther composed of 2 parallel longiform lobes of 2.5 mm in length. The stamens circle the pistil and their anthers are positioned around the stigma at about its same height.
Type 2 flower.—Set of petals: 2. The outer set of petals: similar to petals of type 1 flowers but contains a greater number of oil glands much more conspicuous. The inner set of petals: alternate with the petals of the outer set and differ in their shape as their lower portion is narrow and their upper portion (about 1/3rd) is large and has a cup-like form which covers the anthers.
 Rostellum:
Length.—9.4 mm.
Thickness.—1.2 mm.
Color.—RHS 154 B (Brilliant Yellowish Green).
 Fruit: Fruit attachment to the stalk is strong with no neck, it sometimes shows short radial grooves, which are not always conspicuous.
Shape.—Slightly round. larger than long and has an obloid form.
Diameter at equatorial level.—About 70 mm and it is truncate at both stalk and distal parts. The distal end is depressed and has a perceptible smooth areola of round form.
Width.—About 70 mm.
Texture.—Slightly rough.

Color.—Green fruit — RHS 126 A (medium blue Green); non-dehiscent fruit — RHS N30B (Strong Reddish Orange).
Fruit rind.—Dark orange in color RHS N30B and has a thickness of about 2.23 mm shared equally by flavedo and albedo. The rind is dotted with oil glands at a density of 20 small glands per cm² of about 0.8 mm in diameter, and a larger number of tiny oil glands (about 80/cm²). The evident oil glands tend to render the surface of the rind looking slightly rough. The albedo is of pinkish white color RHS N155B and shows visible cracking which tends to increase with the progress of ripening.
Segments.—9 to 11 which are uniform with a thin membrane.
Seeds.—Mean seed count under high cross pollination pressure in mixed bloc with ‘Nadorcott’, Rough Lemon and Clementine in adjacent rows was 0.3 per fruit. Seeds are polyembryonic and seed-coat is of yellowish-White color- RHS 155 D.
Fruit axis.—Hollow with a diameter of about 8 mm.
Peel thickness.—2.2 mm. The peel is easy peeling with medium albedo strands present.
Stylar.—A small stylar scar is visible at its center.
Pulp.—Strong reddish orange color RHS 31A, it is firm and fleshy. Juice vesicles are steady rolls of 12.9 mm in length and 2.4 mm in width. The percentage of juice in the endocarp exceeds 50%, Total Soluble Solids (TSS) varies from 11 to 15% and Titratable Acidity (TA) varies from 12 to 0.85, with maturity progress.
 Production: Extrapolation of yield of ‘Sweet Cott 2’ after 5 yrs post-planting with a spacing of 6 by 2 m will exceed 50 Kg of fruit per tree (>40,000 Kg/Ha).
 Maturity: ‘Sweet Cott 2’ matures in Beni Mellal locality of Morocco starting from week 13 (last week of March) and its last pick extends to week 16 (third week of April). The fruit stores well up to 6 weeks under normal citrus cold storage conditions.
 Tolerance to heat waves: ‘Sweet Cott 2’ is far more resistant than common varieties that suffer great fruit drops due to mid-spring heat waves which cause heavy losses to citrus when they occur in the Mediterranean Basin.
 Tolerance to frost: ‘Sweet Cott 2’ is more tolerant to frost damage than oranges and clementine. Many days of -2° C. to -4° C. in February did not cause any significant damage as was the case with other varieties.
 Resistance to *Ceratitis*: Fruit of ‘Sweet Cott 2’ appear to not be attractive to the fruit fly, and seldom fruit damage due to *Ceratitis capitata* is observed.
 Market use: Fruit of ‘Sweet Cott 2’ is intended mainly for fresh fruit consumption, but may also serve for fresh juice extraction.
 I claim:
 1. A new and distinct tangor tree named ‘Sweet Cott 2’, as herein shown and described.

* * * * *



FIG. 1



FIG. 2

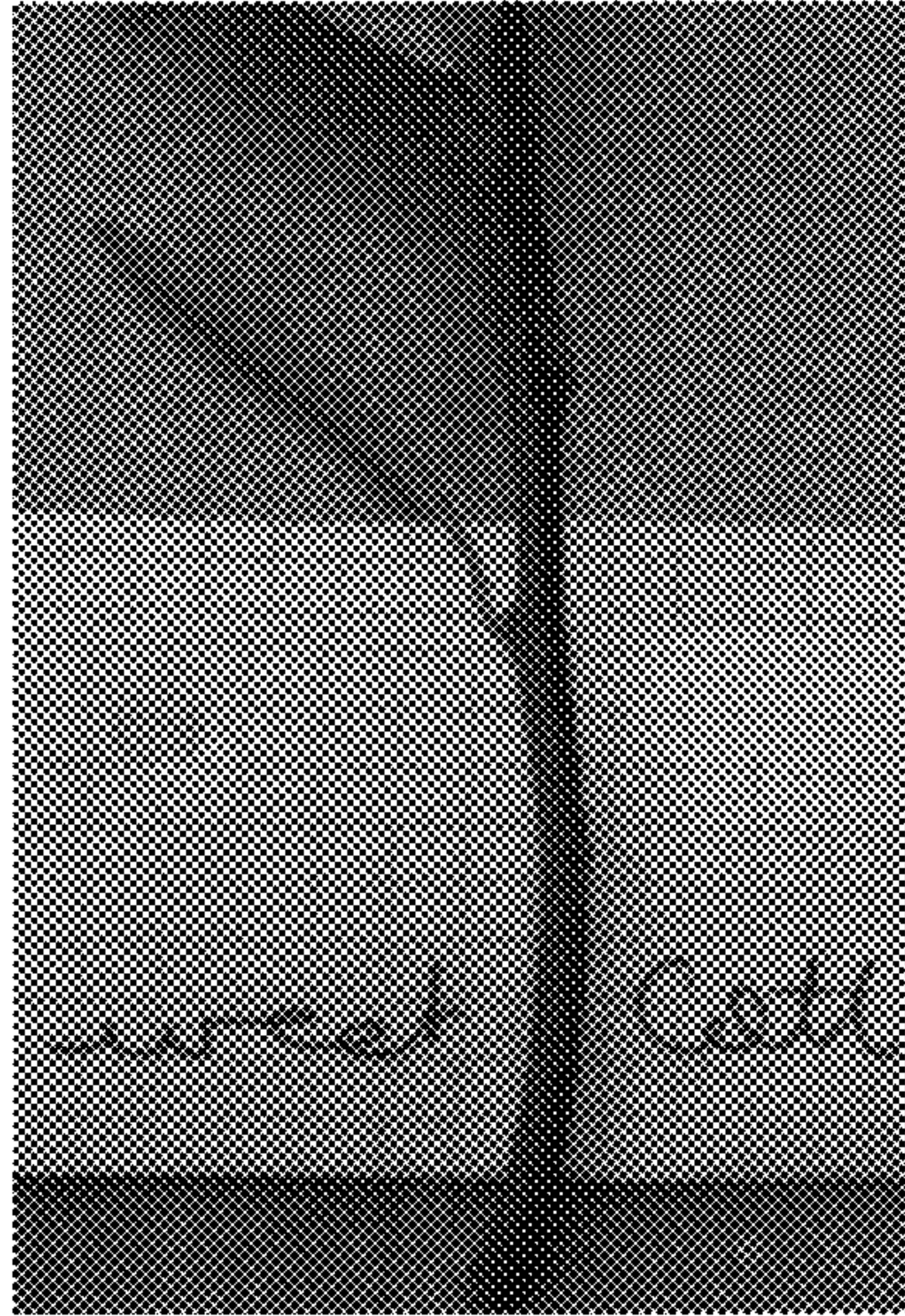


FIG. 3



FIG. 4

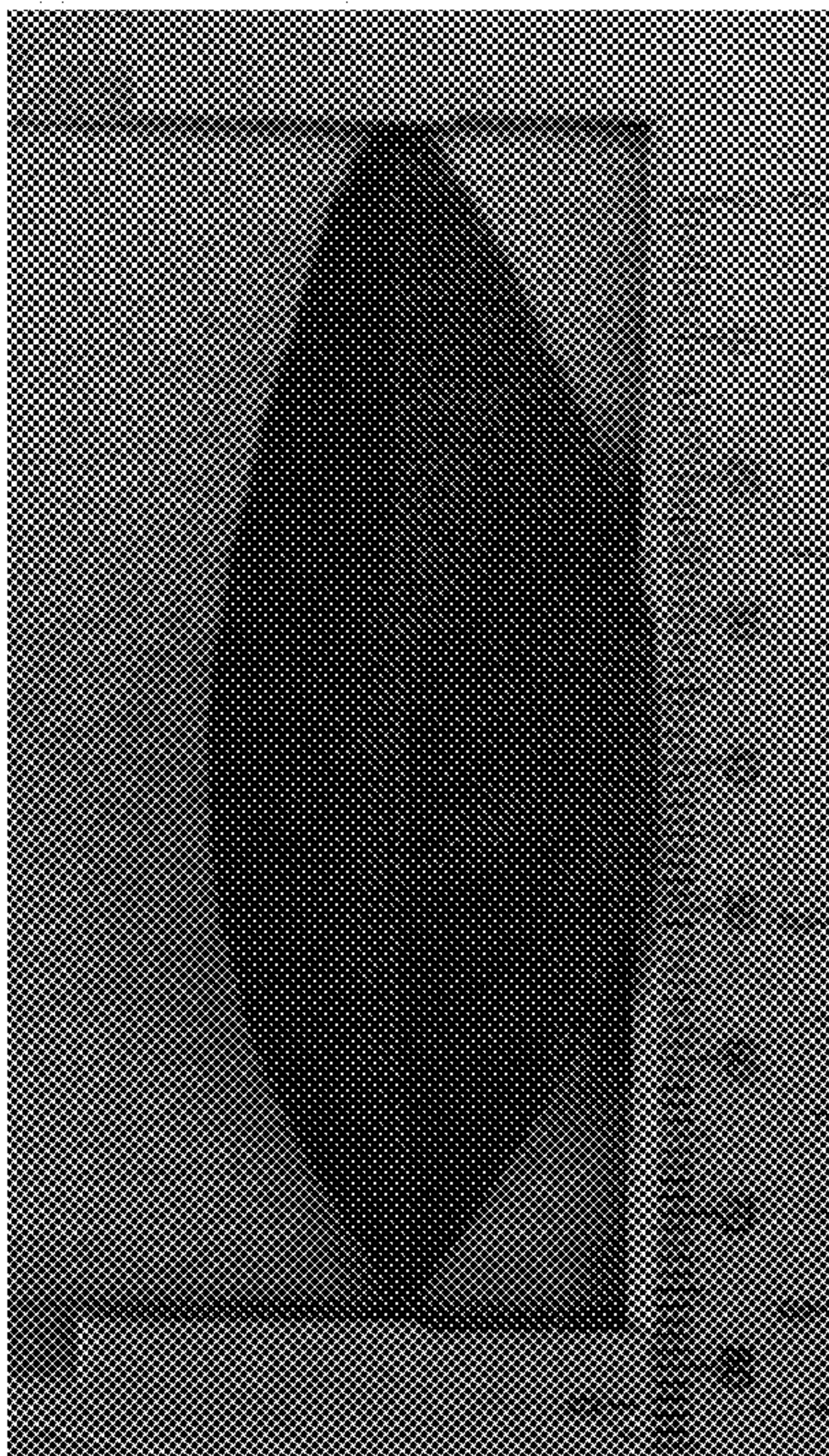


FIG. 5



FIG 6

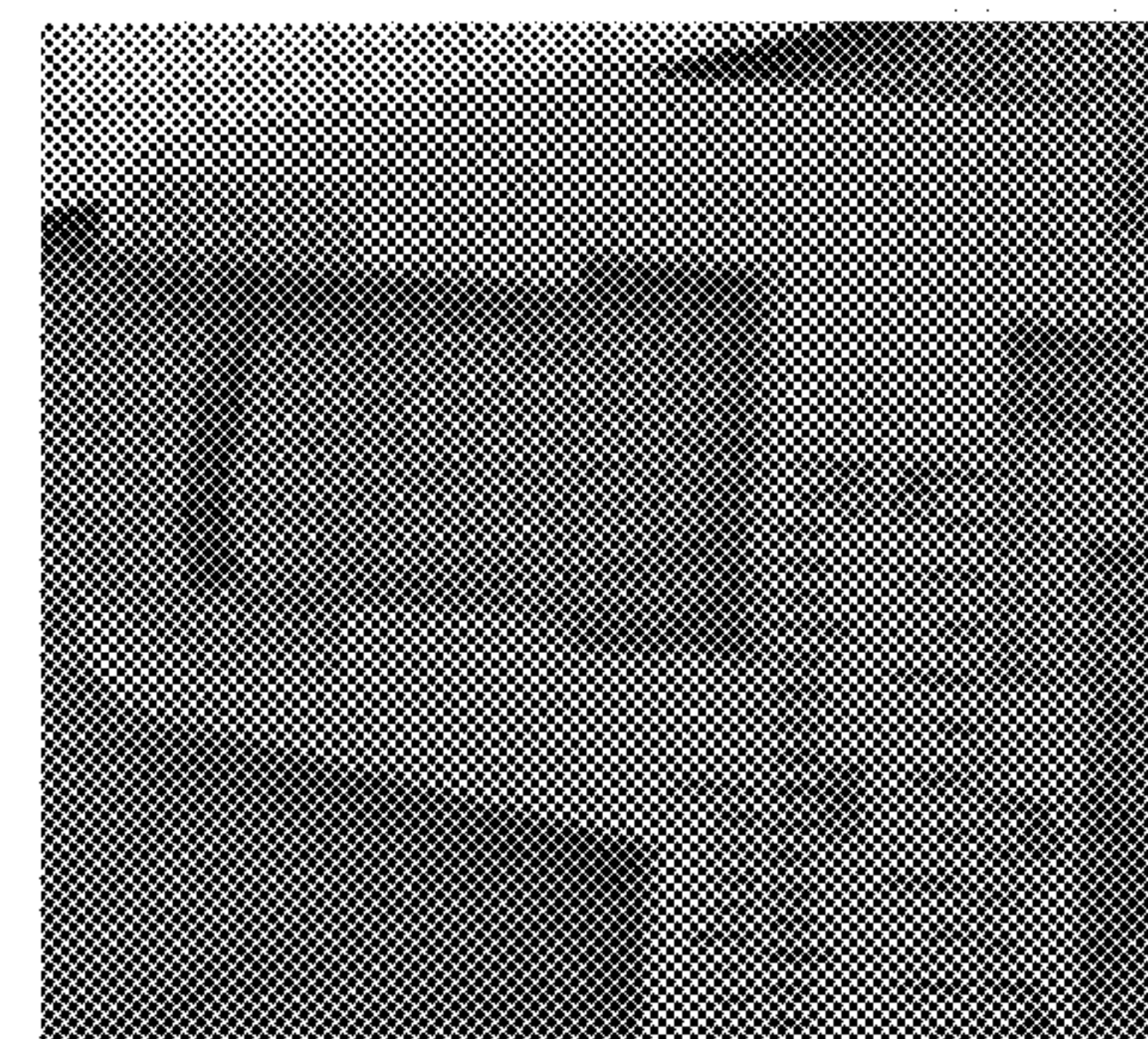


FIG 7

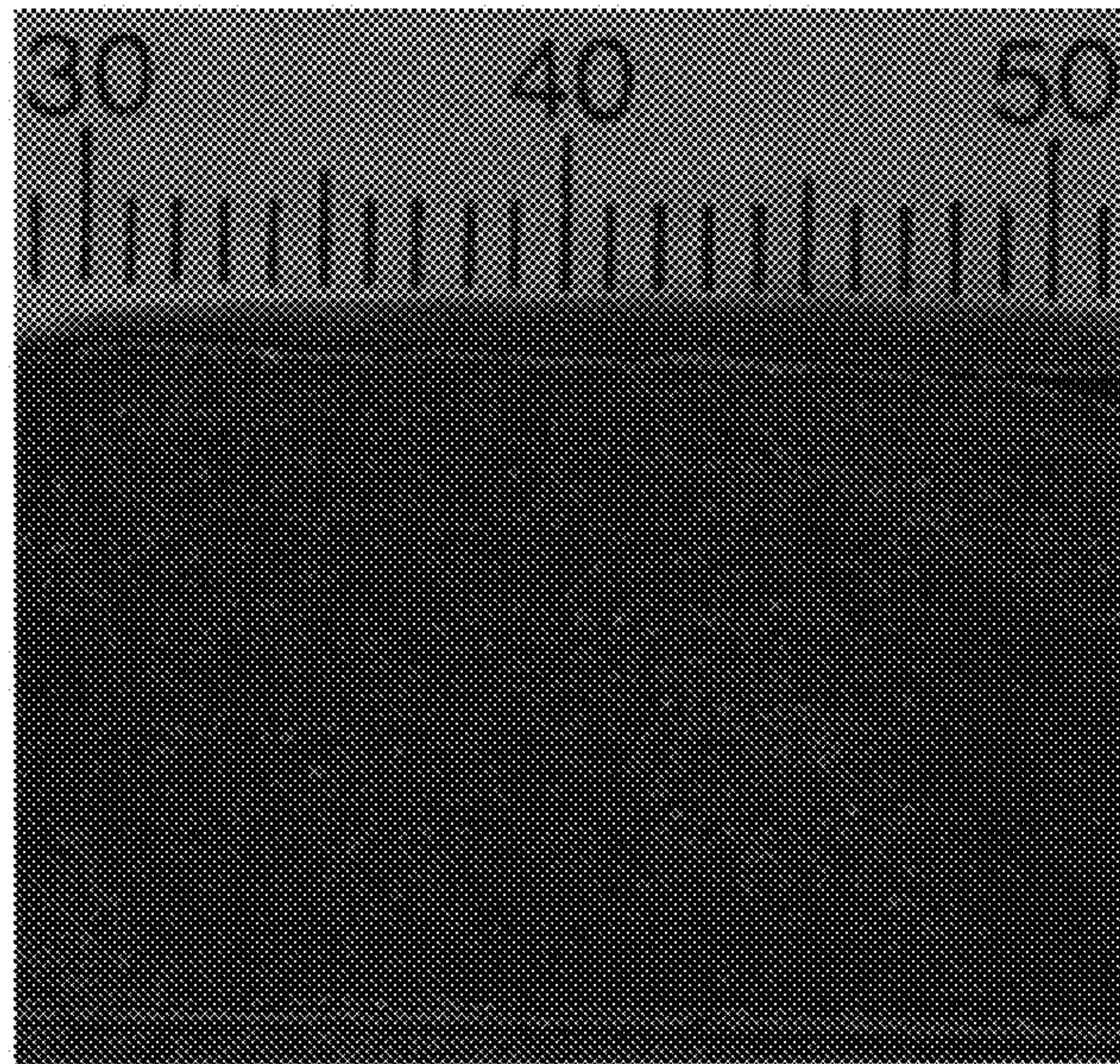


FIG. 8

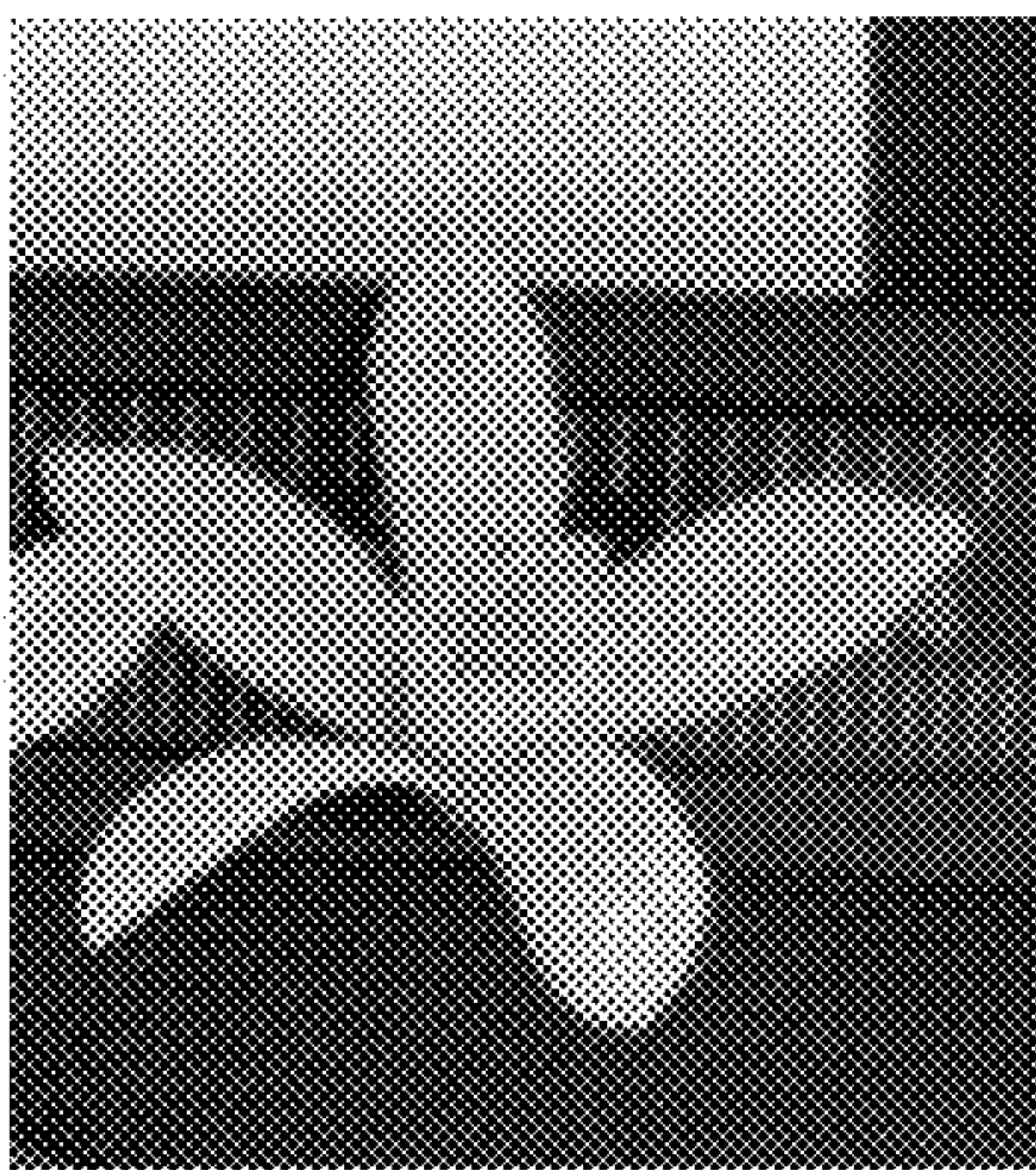


FIG. 9

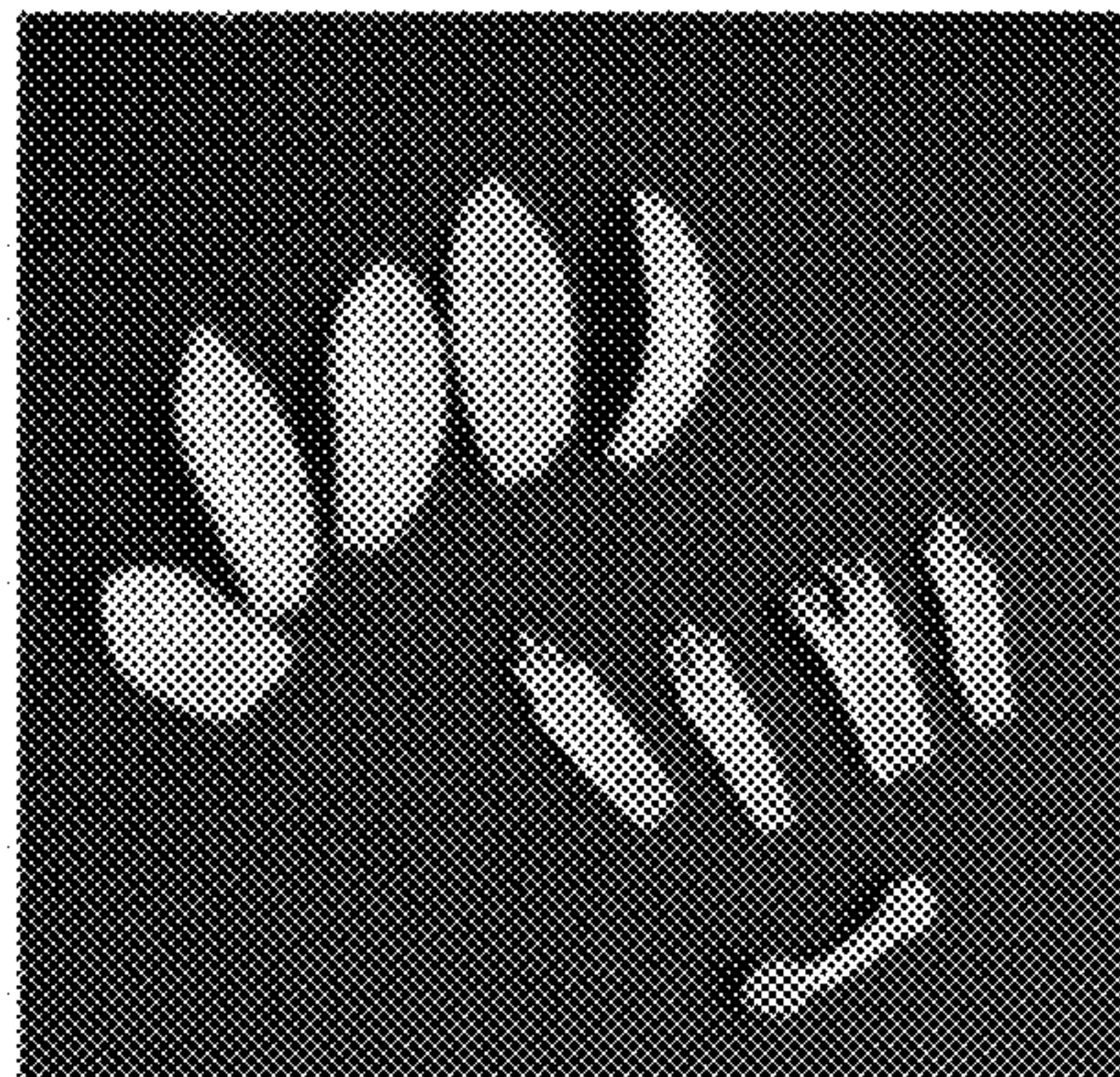


FIG. 10

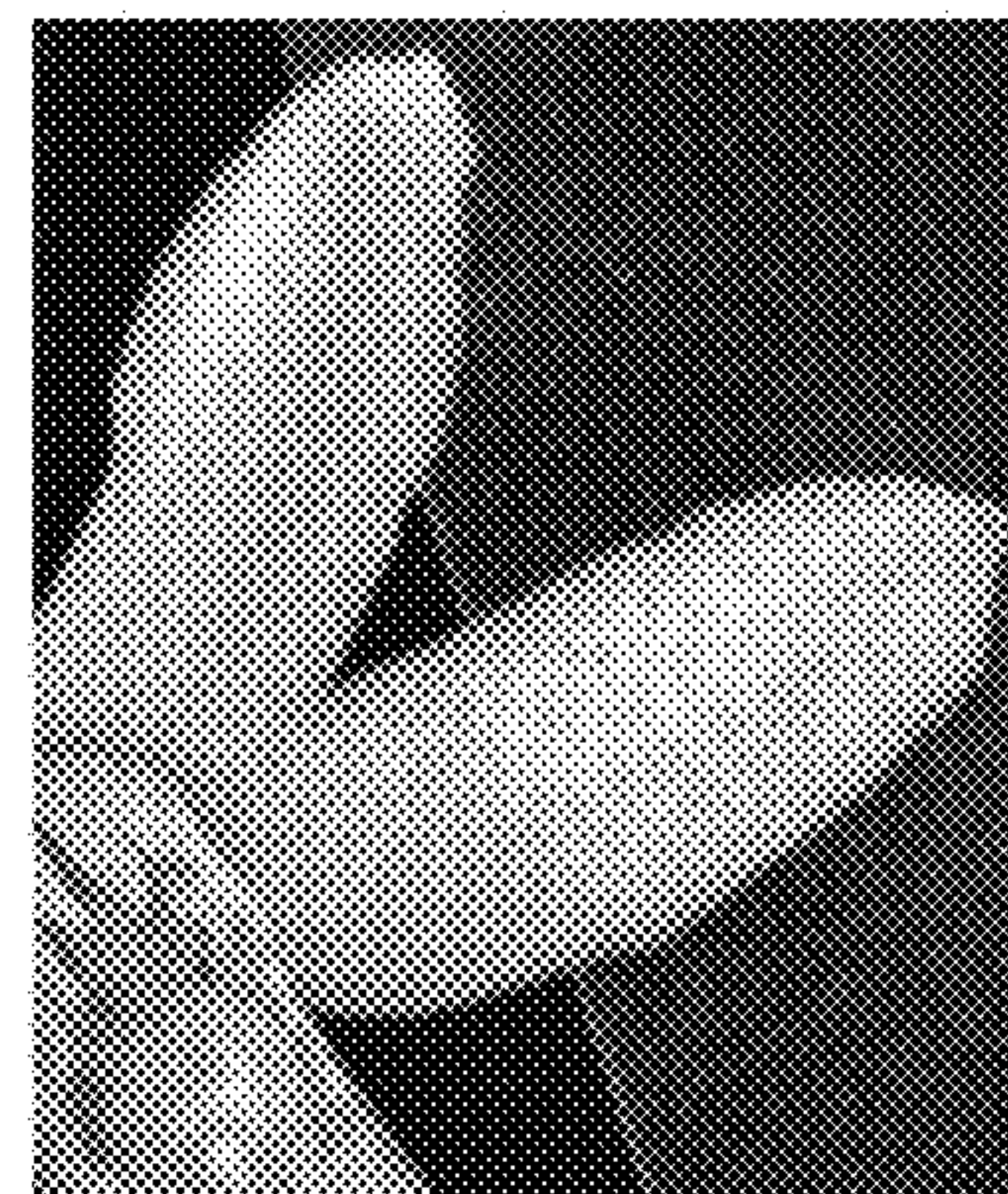


FIG. 11



FIG. 12

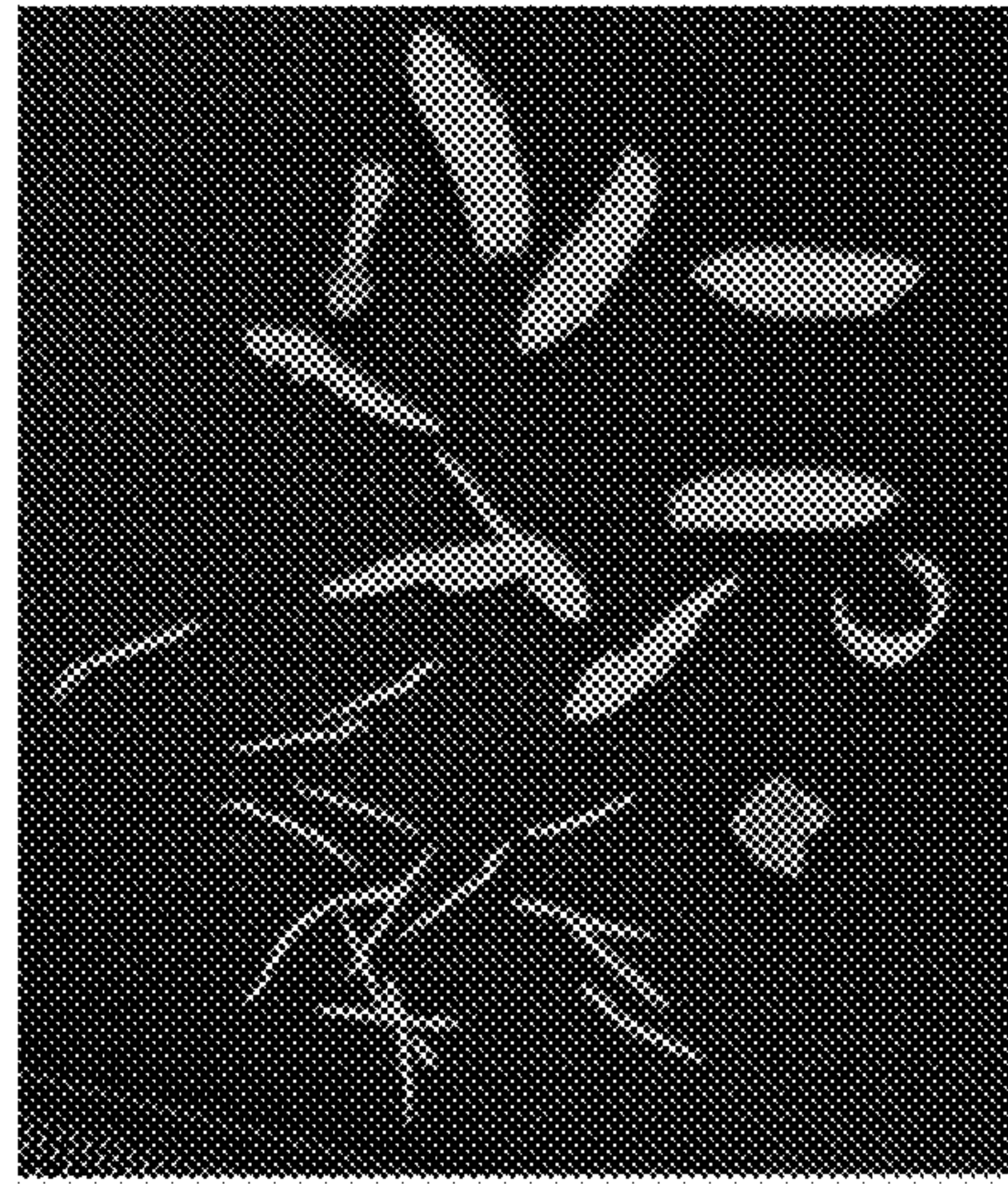


FIG. 13

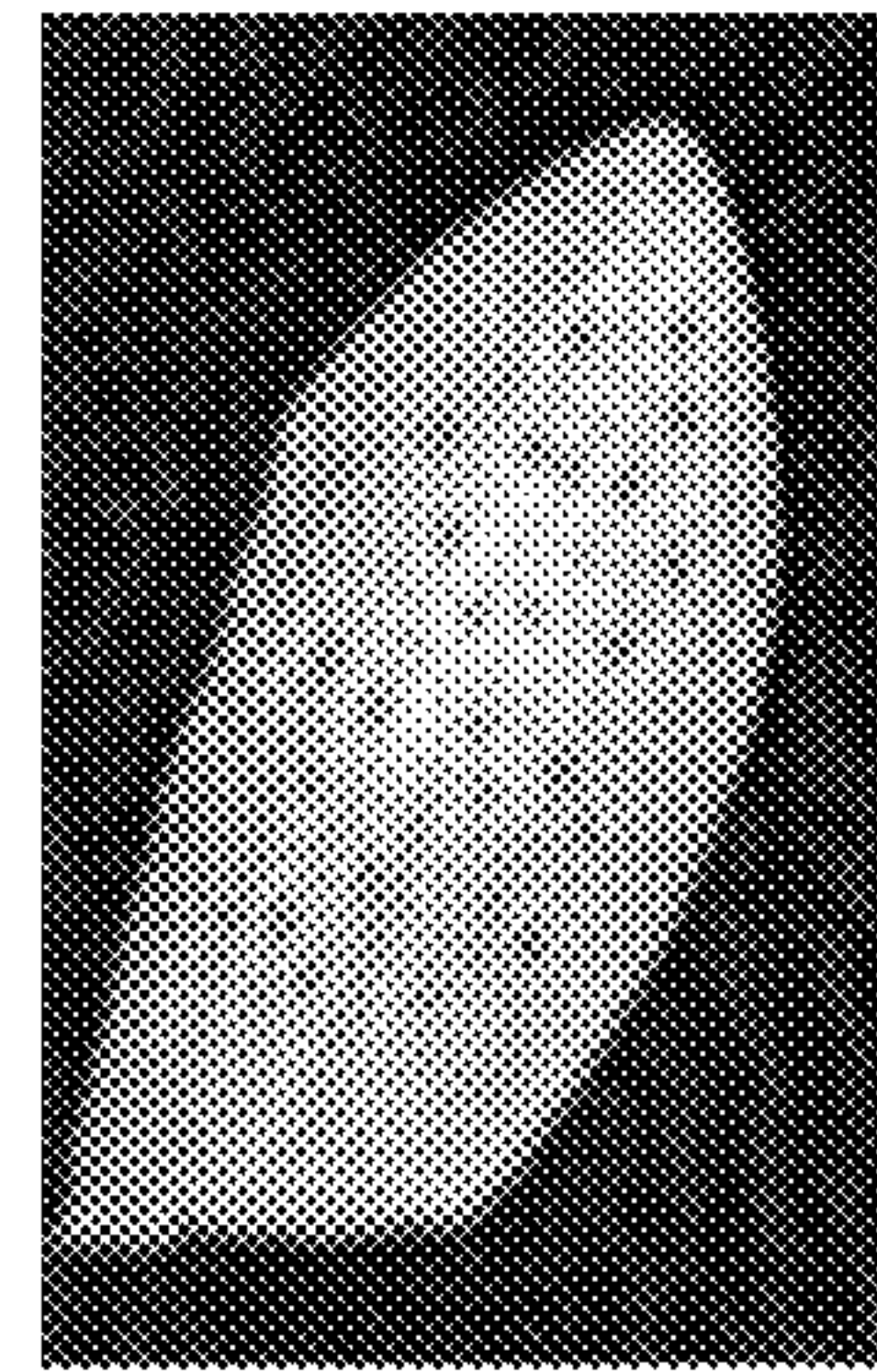


FIG. 14

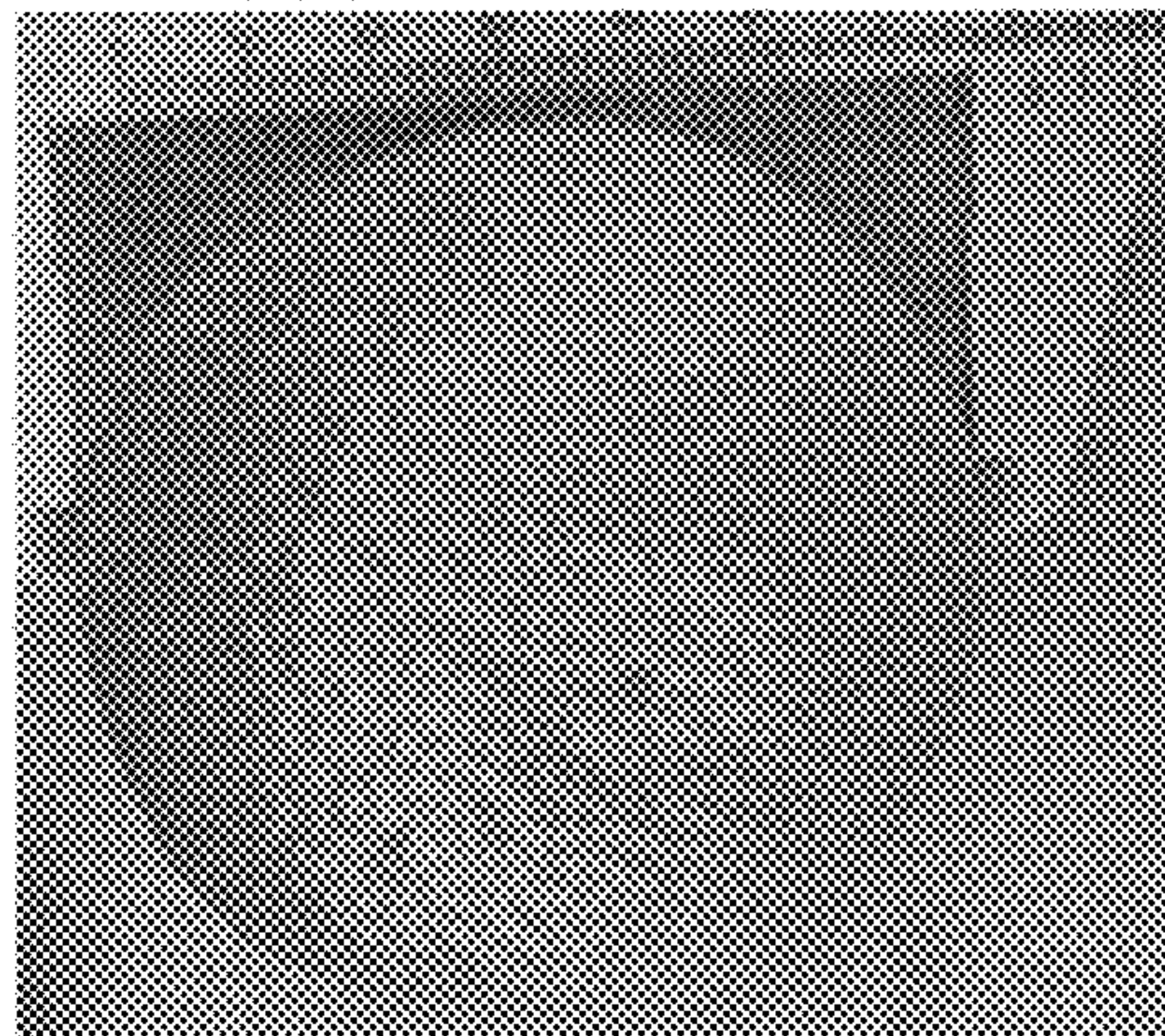


FIG. 15

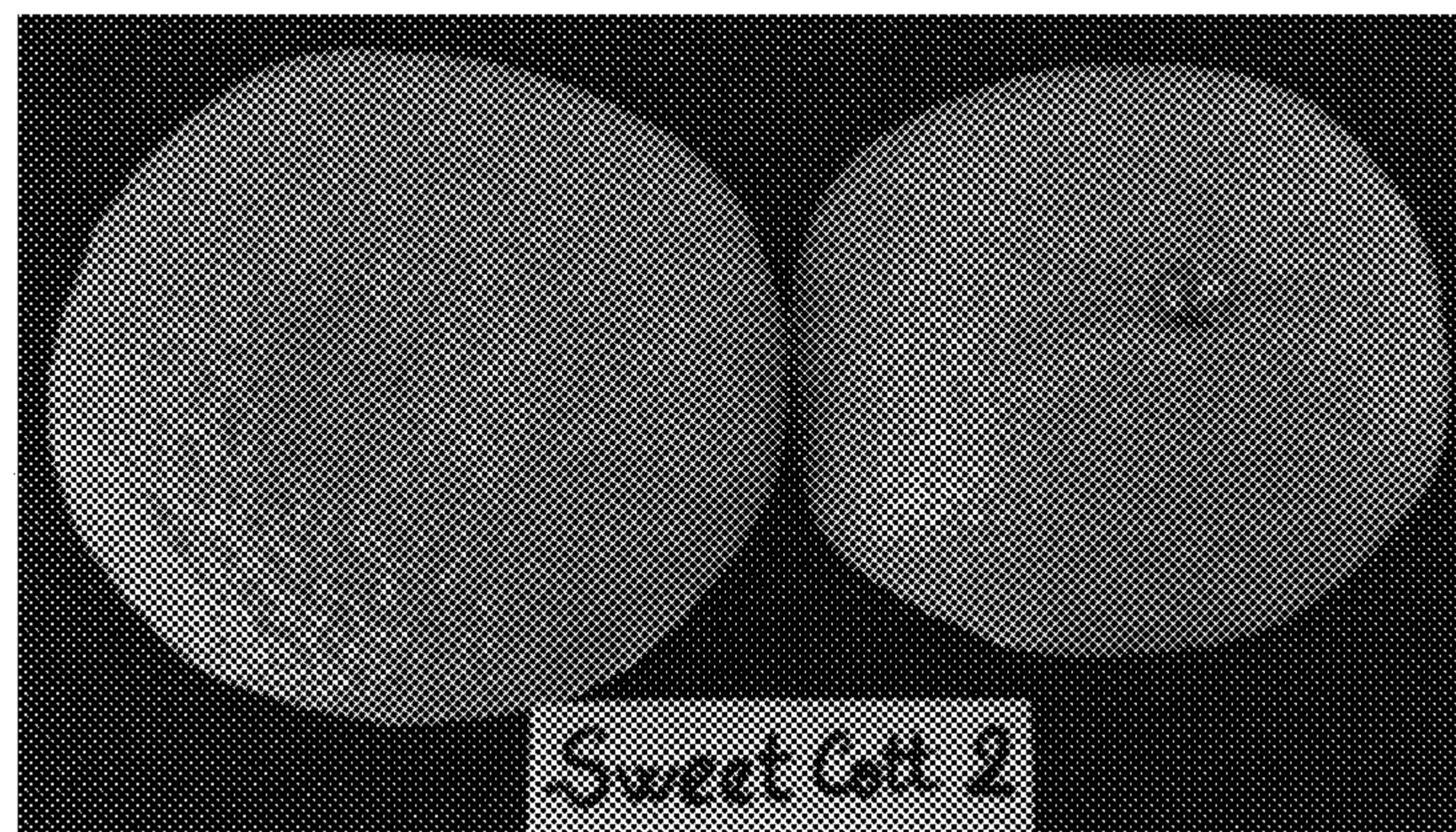


FIG. 16

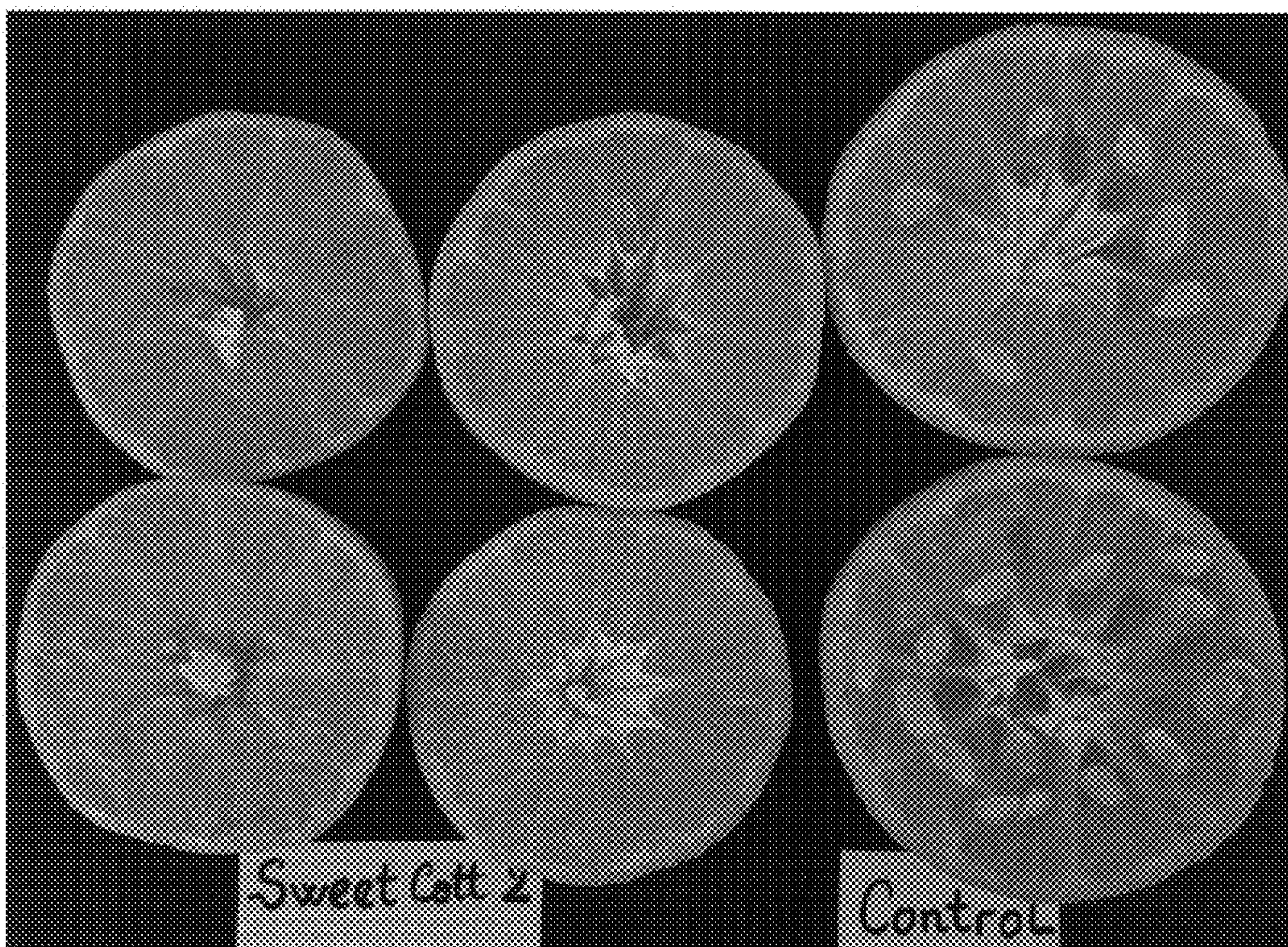


FIG. 17



FIG. 18

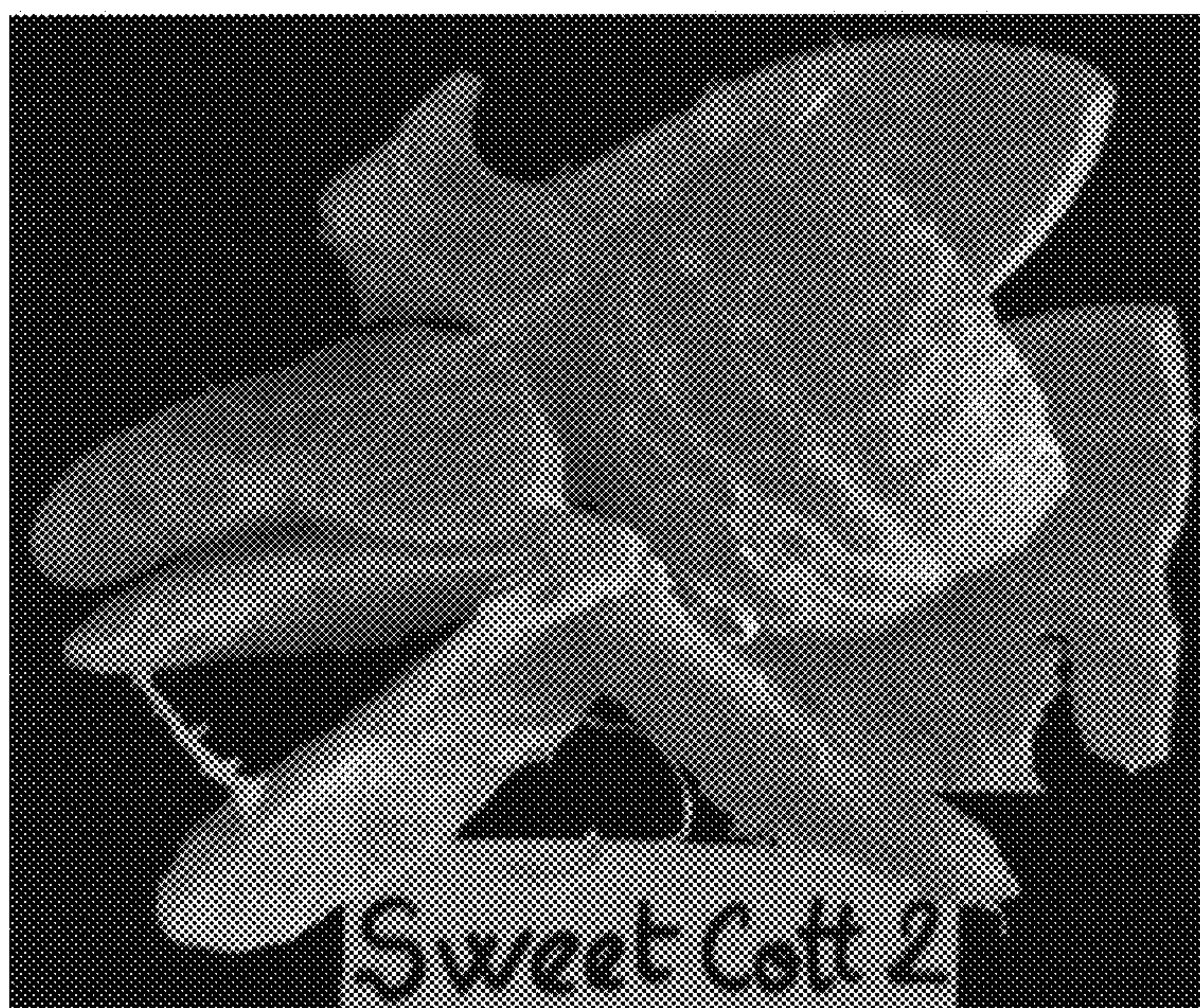


FIG. 19



FIG. 20

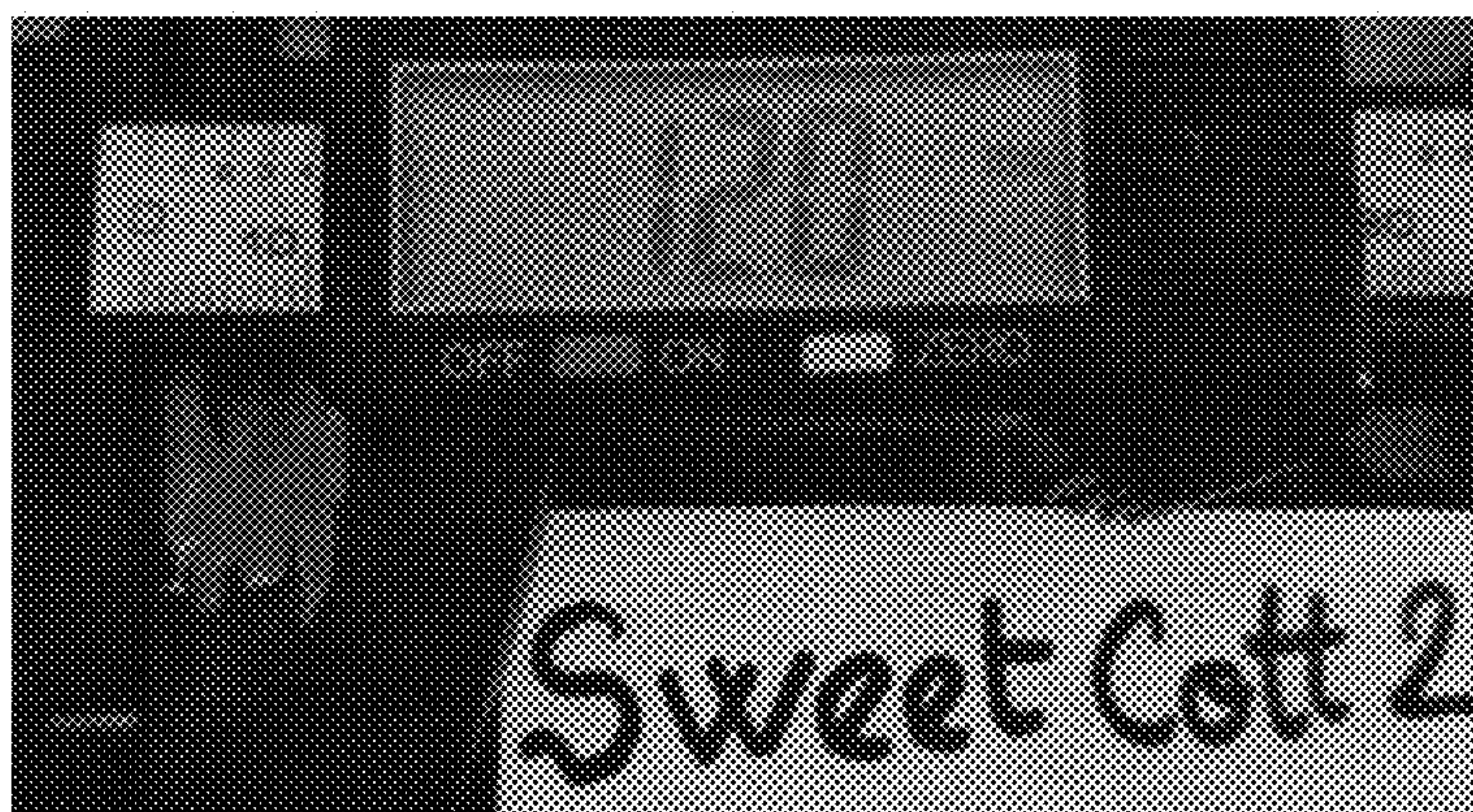


FIG. 21

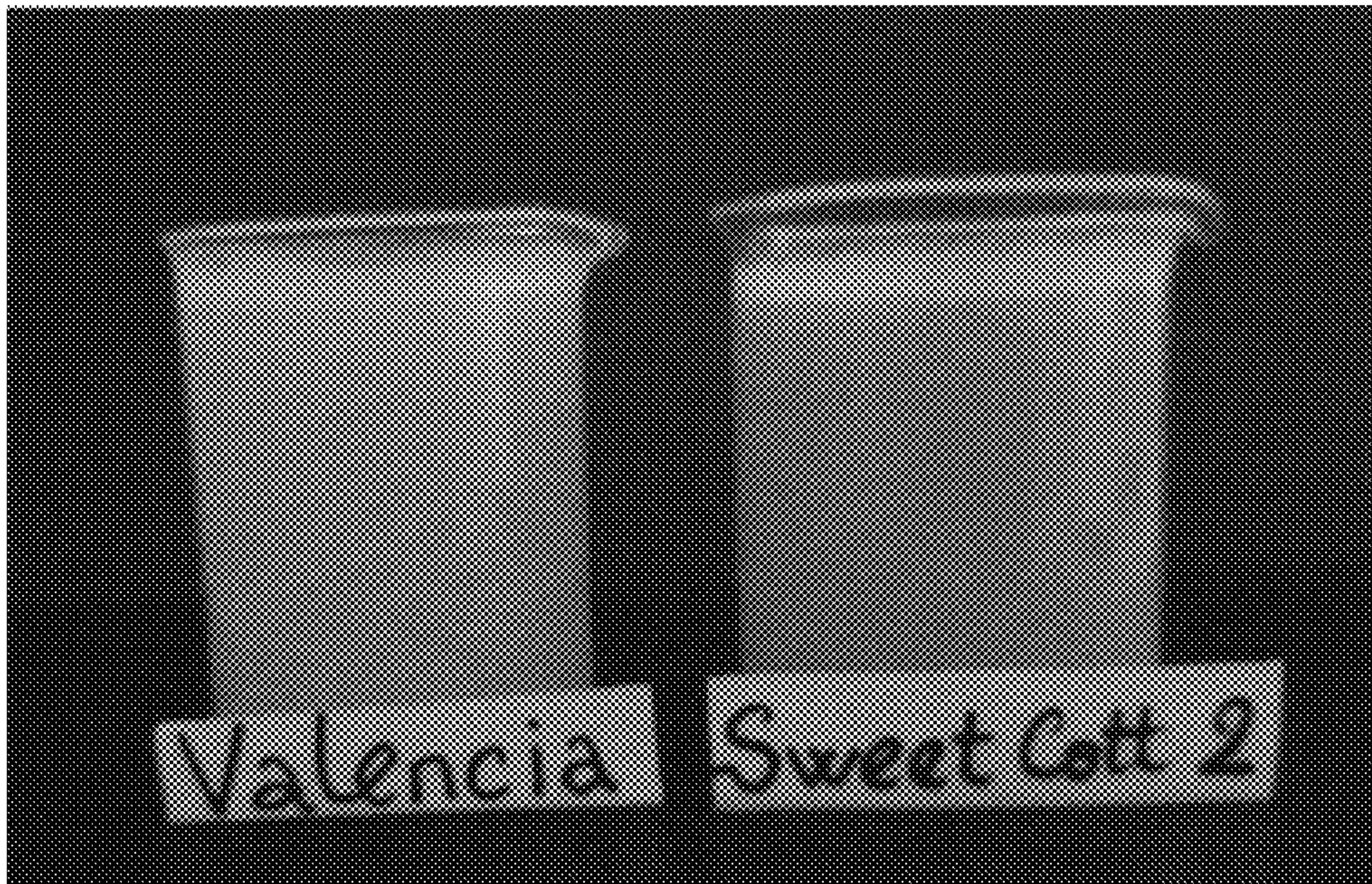


FIG. 22