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

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(54) **BLACK WALNUT TREE NAMED ‘BEINEKE 14’**

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PP9,925 P 6/1997 Jones
PP14,777 P2 5/2004 Beineke
PP14,829 P2 5/2004 Beineke
PP14,839 P2 6/2004 Beineke
PP14,978 P2 7/2004 Beineke
PP15,079 P2 8/2004 Beineke

(50) Latin Name: *Juglans nigra L.*
Varietal Denomination: **Beineke 14**

(75) Inventor: **Walter F. Beineke**, West LaFayette, IN (US)

OTHER PUBLICATIONS

(73) Assignee: **American Forestry Technologies, Inc.**, West Point, IN (US)

Appleton, Bonnie, et al. (2000) “Trees for problem Landscape Sites—The Walnut Tree: Allelopathic Effects and Tolerant Plants” *Virginia State University* Publication No. 430–021.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

Beineke, Walter F. (1989) “Twenty Years of Black Walnut Genetic Improvement at Purdue University” *NJAF* 6:68–71.

(21) Appl. No.: **10/887,566**

Coladonato, Milo (1991) “*Juglans Nigra*” 1–11.

(22) Filed: **Jul. 9, 2004**

Esser, Lora. (1993) “*Juglans Californica*” 1–11.

(65) **Prior Publication Data**

US 2006/0010536 P1 Jan. 12, 2006

Pavek, Diane S. (1993) “*Juglans Major*” 1–13.

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

Tirmenstein, D.S. (1990) “*Juglans Microcarpa*” 1–11.

(52) **U.S. Cl.** **Plt./154**

Website: <http://www.treeguide.com/naspecies.asp?treeid=junigr1>; printed Aug. 30, 2001: pp. 1–11.

(58) **Field of Classification Search** **Plt./154**
See application file for complete search history.

Website: <http://viral.clemson.edu/groups/FieldOps/Cgs/walnut.htm>; printed Aug. 30, 2001: pp. 1–3.

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Woeste, K., et al. (2002) “Thirty Polymorphic Nuclear Microsatellite Loci From Black Walnut” *The Journal of Heredity* 93(1):58–60.

Primary Examiner—Kent Bell

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(57) **ABSTRACT**

A new and distinct cultivar of black walnut tree (*Juglans nigra L.*) which is distinctly characterized by extremely rapid growth rate, and excellent central stem tendency, thereby producing good timber qualities. This new variety of black walnut trees was discovered by the applicant near South Raub, Tippecanoe County, Ind. in a black walnut planting from previously selected trees for outstanding timber production potential. This selection has been designated as BW511, a seedling progeny of unpatented BW95 in records maintained by the applicant on the performance of this selection, and grafts made from the selection and will be known henceforth as ‘Beineke 14’.

3 Drawing Sheets

1

2

Latin name of the genus and species: *Juglans nigra L.*
Variety denomination: ‘Beineke 14’.

unknown, as is generally the case with black walnut trees. (Beineke, 1989).

BACKGROUND OF THE INVENTION

SUMMARY OF THE INVENTION

This new variety of black walnut tree (*Juglans nigra L.*) was discovered by the applicant near South Raub, Tippecanoe County, Ind. in a black walnut planting of seedling progeny from previously selected trees for outstanding timber producing potential. This selection has been designated as BW511, a seedling progeny of BW95, unpatented in records maintained by the applicant on the performance of this selection, and grafts made from the selection, and will be known henceforth as ‘Beineke 14.’ The male parent is

A new and distinct cultivar of black walnut tree (*Juglans nigra L.*) which is distinctly characterized by extremely rapid growth rate, excellent central stem tendency, and excellent straightness, thereby producing excellent timber qualities, the trait of commercial interest, and has good resistance to anthracnose leaf disease. Beineke 14 was 9 years old when described at a location near South Raub, Ind.

After the original clone was selected, and assigned an identity number of BW511 the aforesaid tree was repro-

duced by collecting scions from it and grafting these onto common black walnut rootstocks at American Forestry Technologies, Inc., West Point, Ind. These asexual reproductions ran true to the originally discovered tree and to each other in all respects. A growth comparison between BW95 and Beineke 14 could not be made at this site because BW95 was not planted at South Raub or West Point and the original tree was cut down. However, since form is not site dependent, old form ratings of BW95 on other sites can be used.

Color values used were from the Munsell Color Chart for Plant Tissues. However, color is too dependent on weather conditions and fertilization to be consistent or distinctive. For example, leaves can be made a deeper green by applying nitrogen. Walnut tree leaves turn yellow as the season progresses, especially if there is a lack of rainfall. As black walnut meats dry, they become darker. Simply being on the ground for a week causes the outer shell to darken. Bark color involves many shades of gray through brown and black.

'Beineke 14' is hardy in USDA zones 4,5,6,7, and 8.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a photograph showing the timber form of 'Beineke 14.'

FIG. 2 is a photograph showing the leaves of 'Beineke 14.'

FIG. 3 is a photograph showing the nuts of 'Beineke 14.'

BOTANICAL DESCRIPTION OF THE PLANT

The botanical details of this new and distinct variety of walnut tree are as follows:

Tree:

Size.—Large, 31 ft. at 9 years; crown diameter of 17 ft.

Vigor.—Vigorous.

Growth rate.—Very rapid, 45.6% larger in diameter than the average of 'Purdue 1' (U.S. Plant Pat. No. 4,543) grafts, planted the same year on the same land. Diameter growth rate (at 4½ feet above the ground) averaging 0.83 inches per year over 9 years was 7.5 inches at 9 years.

Form.—Excellent timber form 54.4% better than average of the entire planting and the same as 'Purdue 1'. Stem form was obtained by subjectively rating the straightness of the main stem on a scale of 1 to 5 with 1 representing a perfectly straight stem; 2, slight crook or deviation of the central stem (no crooks); 3, about average straightness; 4, several severe crooks or a single fork; and 5, a very crooked, forked and/or leaning central stem. 'Beineke 14' averages 1 on the 1 to 5 scale, while parent BW95 averaged 3 on another site.

Branches: Diameter depends on age and size of tree, varies from ½" to 12", bark color varies from grays to browns.

Leaves:

Compound leaves.—Size — Large; average length — 19.03"; width 9.23". Compared to 'Purdue 1' (U.S. Plant Pat. No. 4,543), the leaves of 'Beineke 14' are much longer. 'Beineke 14' averages 4.53 inches longer than 'Purdue 1'.

Leaflets.—Size — Large; average length — 4.73"; average width 1.78"; average number of leaflets — 17.8 — lanceolate; acutely pointed, rounded base. The leaflets of 'Beineke 14' are 0.36 inches longer

and 0.28 inches wider than 'Purdue 1'. 'Beineke 14' averages 2.4 fewer leaflets than 'Purdue 1'. Leaflet number appears to be a consistent trait within tree and year to year.

Thickness.—Thin; Texture — smooth; Margin — serrated; Petioles — short; Color — Topside — dark green (5GY3/4 by the Munsell Color Chart for Plant Tissues); Underside — light green (5GY5/4 on the Munsell Color Chart for Plant Tissues).

Anthracnose resistance.—Excellent.

Nut:

Size.—Large; average length — 1.07"; average diameter in suture plane — 0.97"; average diameter cheek to cheek — 1.10".

Uniformity of size.—Not much variation.

Form.—Round. See FIG. 3.

Blossom end.—Rounded.

Basal end.—Rounded.

Thickness of shell.—Thin.

Ridges.—Rounded.

Color.—Mottled, 5YR3/2 and 2.5YR3/4 by the Munsell Color Chart for Plant Tissues.

The nut of 'Beineke 14' averages 0.68 inches shorter than 'Purdue 1' (U.S. Plant Pat. No. 4,543). 'Beineke 14' averages 0.16 inches narrower in the suture plane and 0.15 inches narrower cheek to cheek than 'Purdue 1'. 'Beineke 14' has an unusually small nut.

Nut with husk:

Size.—Small; average length — 2.23".

Average suture plane width.—1.93"; average.

Cheek to cheek width.—2.08".

Husk thickness.—0.97 inches.

Form.—Almost round except blossom end slightly pointed.

Blossom end.—Slight point.

Basal end.—Rounded.

Surface.—Small warts, waxy.

Color.—Greenish-yellow, 2.5 GY 6/10 by the Munsell Color Chart for Plant Tissues.

The nut in the husk of 'Beineke 14' is 0.27 inches shorter than 'Purdue 1' (U.S. Plant Pat. No. 4,543). 'Beineke 14' average 0.06 inches wider in the suture plane and 0.02 wider cheek to cheek than 'Purdue 1'. The husk of 'Beineke 14' averages 0.22 inches thicker than 'Purdue 1'.

Flowering habit:

Age at which trees start producing catkins.—Early, 3–4 years.

Number of catkins produced.—Abundant.

Age at which trees start producing pistillate flowers.—Early, it takes about 5 years to flower, but the flower number varies with the age of the tree.

Number of pistillate flowers produced by young trees.—Average.

Lateral shoots producing pistillate flowers.—None.

Number of pistillate flowers per inflorescence.—2 to 4. Flower season: Flowers typically in May in Indiana. There are probably 1-million pollen per catkin. Female flowers are about ¼" long and grow to two "pollen pick up points" which subsequently break apart. Pollen exists as "dust" which is not feasible to quantitate.

Nut crop:

Bearing.—Biennial.

Ripening period.—Very late — late October.

Evenness of maturity (period between first and last nuts are ready for harvest).—Uneven.

Quality.—Good.

Distribution of nuts on tree.—Throughout.

spacers. The resulting data was analyzed using ABI's GeneScan 3.1.2 and Genotyper 2.5 (Perkin Elmer). Microsatellite sizes were checked against previously published standards and verified by a second independent analysis. The "fingerprint" is the collection of microsatellite allele sizes at each locus for each tree.

Locus	Forward (SEQ ID NOS:1–11)	Reverse (SEQ ID NOS 12–22)
WGA6	CCATGAAACTTCATGCGTTG	CATCCCAAGCGAAGGTTG
WGA24	TCCCCCTGAAATCTTCTCCT	TTCTCGTGGTGTGTGTTGAG
WGA27	AACCCTACAACGCCCTTGATG	TGCTCAGGCTCCACTTCC
WGA32	CTCGGTAAGCCACACCAATT	ACGGGCAGTGTATGCATGTA
WGA72	AAACCACCTAAAACCCCTGCA	ACCCATCCATGATCTTCCAA
WGA89	ACCCATCTTTCACGTGTGTG	TGCCTAATTAGCAATTTCCA
WGA90	CTTGTAATCGCCCTCTGCTC	TACCTGCAACCCGTTACACA
WGA97	GGAGAGGAAAGGAATCCAAA	TTGACAAAAGGCCGTTTTTC
WGA69	TTAGTTAGCAAACCCACCCG	AGATGCACAGACCAACCCCTC
WGA76	AGGGCACTCCCTTATGAGGT	CAGTCTCATTCCTTTTTTCC
WGA82	TGCCGACACTCCTCACTTC	CGTGATGTACGACGGCTG

GENETIC METHOD OF IDENTIFICATION

DNA "fingerprint" for identification of 'Beineke 14':

DNA was isolated from the leaves of 'Beineke 14'. For purposes of DNA fingerprinting, eleven highly polymorphic loci from a suite of microsatellites developed by Woeste et al. (2002) were chosen. Microsatellites sizes were checked against previously published standards and verified by a second independent analysis. The "fingerprint" is the collection of microsatellite allele sizes at each locus for 'Beineke 14'.

DNA was isolated from the leaves of 4 black walnut trees obtained from Walter Beineke using CTAB extraction buffer (50mM TRIS-HCL, pH 8.0, 20 mM EDTA, pH 8.0, 0.7 M NaCl, 0.4 M LiCl, 2% SDS, 2% CTAB, nd 1% PVP). After isolation the DNA from each tree was quantified and diluted with nanopure distilled water to a final concentration of 5 ng/microliter. The samples were stored in 96-well plates at -20 degrees C.

For purposes of DNA fingerprinting, eleven highly polymorphic loci from a suite of microsatellites developed by Woeste et al. (2002) were chosen. Amplification of each locus was performed with an MJ Research Tetrad Thermocycler (Waltham, Mass.) using 10 microliter reactions in 96-well plates. The PCR reaction mix contained 2 microliter of the aforementioned black walnut DNA, 5 microliter Sigma Taq ReadyMix (Sigma Aldrich, St. Louis, Mo.), 0.4 microliter of a 20 pmol mixture of forward and reverse fluorescence labeled primer, and 3 microliter PCR grade water supplied with the Sigma ReadyMix. PCR amplification was for 30 cycles of 94 degrees C. for 20 sec, 55 degrees C. for for 30 sec, and 72 degrees C. for 1 min. All primers were annealed at 55 degrees C. The products were then held at 4 degrees C. until aliquots could be loaded into 6% Long Ranger (polyacrylamide) denaturing gels BMA, Rockland, Me.). For each individual 0.5 microliter PCR product was added to 0.75 microliter blue dextran and 0.25 microliter of CXR 350 bp Ladder Standard (Applied Biosystems, Inc., Foster City, Calif.) in a new 96-well plate. The samples were denatured for 2 min at 95 degrees C. and loaded onto a CAL96 96-well laminated membrane comb (The Gel Company, San Francisco, Calif.). Electrophoresis was at 3,000 V, 60 mA, 200 Watts, 50 degrees C. for 2 hours using an ABI 377 (Perkin Elmer) with 36 cm plates and 0.2 mm

The best interpretation of the current data indicates that the probability that any other black walnut tree would have the collection of microsatellite allele sizes listed is estimated to be less than 3×10^{-14} .

Sizes (bp) of microsatellites at 11 loci used to fingerprint 'Beineke 14' (2 alleles at each locus).

Microsatellites used to fingerprint 'Beineke 14':							
WGA6	WGA24	WGA27	WGA32	WGA72	WGA89	WGA90	WGA97
142	142	236	238	223	223	183	207
145	147	199	199	158	162	153	175
172	172	230	232	164	180		

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Beineke, Walter F. (1989) Twenty years of black walnut genetic improvement at Purdue University *North J. Appl. For.* 6:68–71.

Woeste, K., Burns, R., Rhodes, O., and Michler, C. (2002) Thirty polymorphic nuclear microsatellite loci from black walnut. *Journal of Heredity.* 93:58–60.

SEQUENCE LISTING

<160> NUMBER OF SEQ ID NOS: 22

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<213> ORGANISM: Juglans nigra

<400> SEQUENCE: 22
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I claim:

1. A new and distinct variety of black walnut tree named 'Beineke 14' substantially as illustrated and described, which has excellent timber quality, extremely rapid growth rate, and excellent central stem tendency.

* * * * *

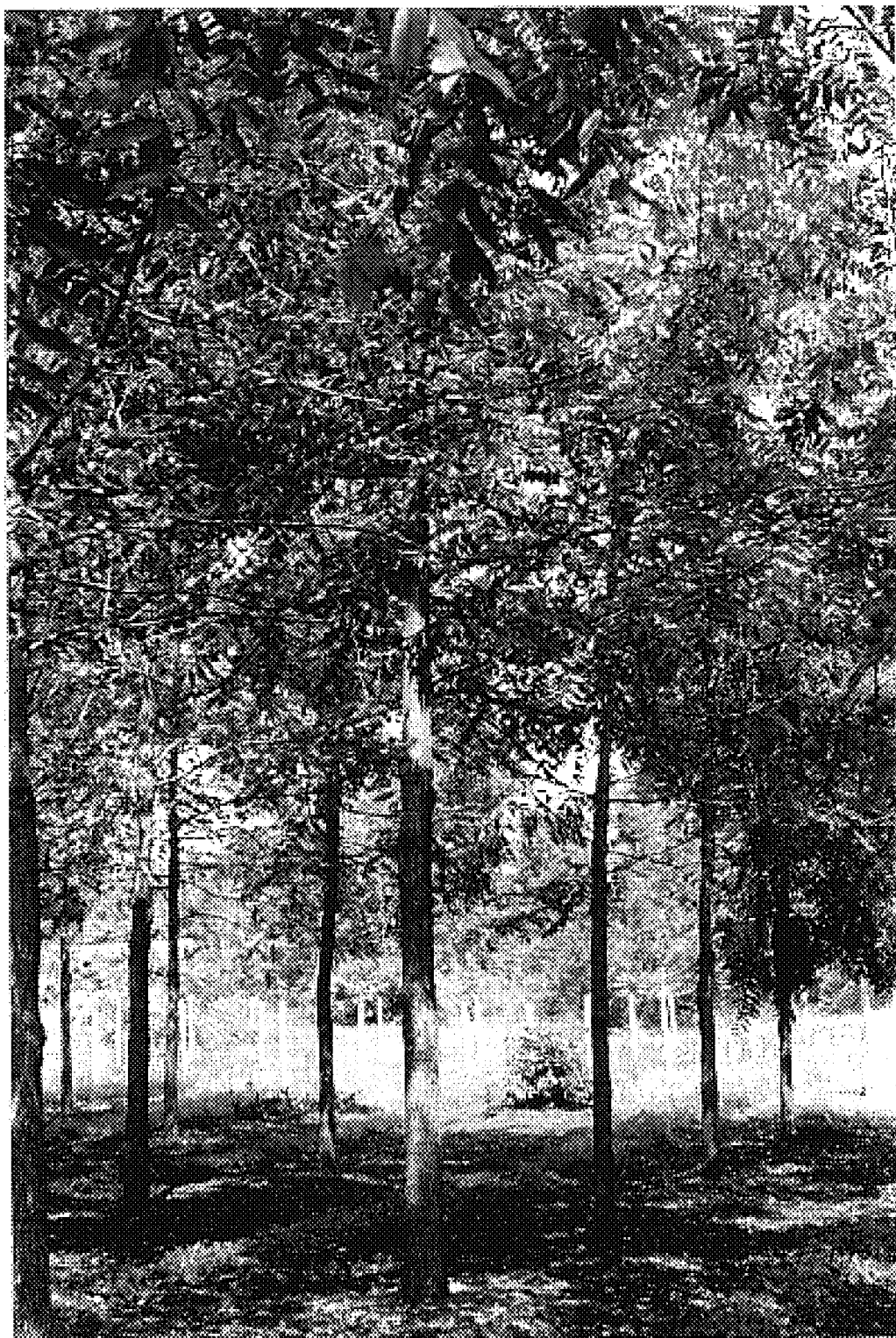


FIG. 1



FIG. 2

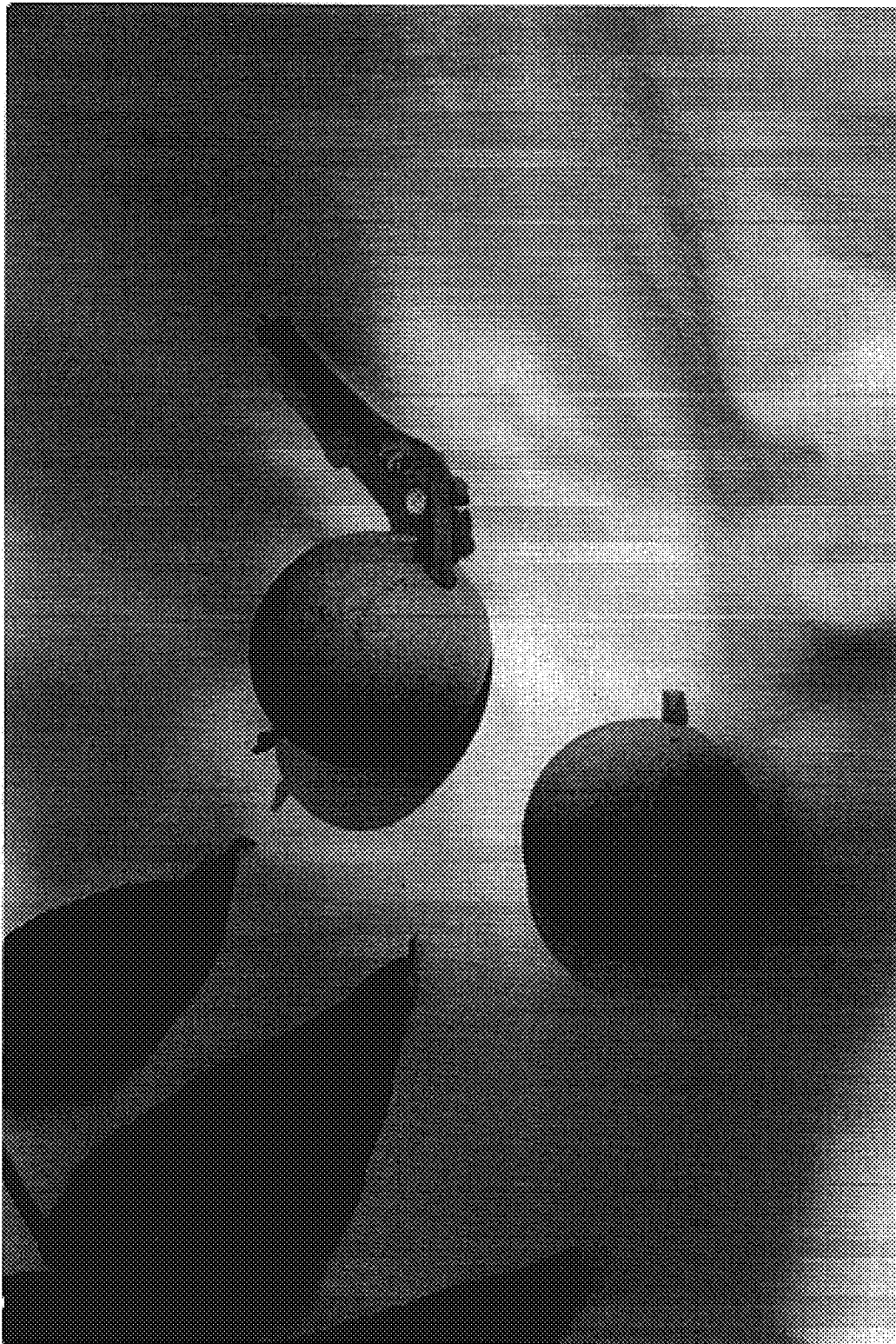


FIG. 3