

NOTE: MIL-STD-407 has been redesignated as a Test Method Standard. The cover page has been changed for Administrative reasons. There are no other changes to this Document.

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15 FEBRUARY 1957  
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DEPARTMENT OF DEFENSE  
TEST METHOD  
VISUAL INSPECTION GUIDE  
FOR  
RUBBER MOLDED ITEMS



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**MIL-STD-407**

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**OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE,  
WASHINGTON 25, D. C.**

15 FEBRUARY 1957.

Supply and Logistics

VISUAL INSPECTION GUIDE FOR RUBBER MOLDED ITEMS

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1. This standard has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force, effective immediately.

2. In accordance with established procedure, the Standardization Division has designated the Ordnance Corps, the Bureau of Ships, and the Air Force, respectively, as Army-Navy-Air Force custodians of this standard.

3. Recommended corrections, additions, or deletions should be addressed to the Standardization Division, Office of the Assistant Secretary of Defense (Supply and Logistics), Washington 25, D. C.

## FOREWORD

Government material procurement specifications have been primarily concerned with detailing composition, construction and necessary physical requirements. However, little attention has been paid to defining the limits of acceptable quality regarding manufacturing defects other than such generalizations as "the workmanship shall be first class". In such a diverse industry as that of rubber manufacturing, individual plants vary considerably in their production and quality control techniques. Defects are likely to occur from many causes such as variation in the quality of the basic materials and variations in manufacturing processes and finishing operations. Therefore, the quality generalizations used in this document must of necessity cover a considerable range which represents the best available judgment. This document is issued as a practical yardstick which Inspectors will use to appraise visually the quality of rubber molded items.

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## 1. SCOPE AND PURPOSE

**1.1 Scope.** This document covers the defects for conventional rubber molded items, that is, articles which are made by curing rubber compounds in a forming mold. Cast plastisol items, "O" rings, pneumatic tires and tubes, molded rubber fuel tanks, ebonite items and items containing cellular rubber are specifically excluded.

**1.2 Purpose.** The primary objective of this document is to present word descriptions and photographs of possible defects in rubber molded items that may be presented for inspection. In addition it provides a training aid for inspectors.

**1.2.1** In general, this document is not intended to take the place of a particular inspection procedure aid which may be provided for inspectors to verify conformance with a particular specification. The quality requirements specified in the basic specification are governing.

## 2. REFERENCED DOCUMENTS

### 2.1 Standards

#### MILITARY

ML-STD-105—Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-177—Rubber Products, Terms for Visible Defects of.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

## 3. DEFINITIONS

**3.1** The categories, major and minor defects, are as defined in Standard MIL-STD-105.

**3.2** Word descriptions of defects used in this standard are in accordance with Standard MIL-STD-177.

**3.3 Location I defect.** The condition where the imperfection occurs on a primary use part of the item surface as regards dimensional tolerances or physical stress in service.

**3.4 Location II defect.** The condition where the imperfection does not occur on a primary use part of the item surface as regards dimensional tolerances or physical stress in service.

**3.5 Fabric, floating.** The condition where a reinforcing fabric is not in the correct position.

**3.6 Staking, bad.** The condition where an insert is not in the correct position.

## 4. DEFECT DESCRIPTIONS AND CLASSIFICATION

**4.1** Since the classification of certain defects depends on the service requirements of the item, it is imperative that the end use be known before inspection is started. In the majority of cases, the end uses will be apparent or can be readily determined from the procurement document. However, in case of doubt, the cognizant technical bureau or agency (on primes) or the endorsing inspection service (on subs) should be requested to supply this information.

**4.2** The classification of defects for molded items is more complex than that for a single-shape, single-application item such as V-belts. Molded items are produced in a nearly infinite variety of sizes and shapes so that there is no common or typical shape for this class of item. Also, these items have several principal end uses or service requirements which are dissimilar in the amount of perfection or quality required. These include the following:

- (a) *Flexing* —A primary use where the item undergoes constant or intermittent bending, twisting or deflecting during service such as a vibration isolation mounting.
- (b) *Sealing* —A primary use where the item serves as an airtight or watertight closure such as a gasket or a boot.
- (c) *Barring (barrier material)* —A primary use where the item serves as an impervious material to passage of a liquid or gas such as a diaphragm or pneumatic closure.,
- (d) *Matching* —A primary application for dimensional tolerances where the item must be assembled with mating parts such as a stud mounting or a cable connector.
- (e) *Protecting*—An intermediate use where the item serves as a covering material and physical stress is non-existent or occurs infrequently, such as a brake pedal.

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- (f) *Filling* —Subordinate use where the item serves merely as an internal space filler and physical stress is non-existent or occurs infrequently.

A molded item may, and frequently does, have two or more of these service requirements in combination.

**4.3** It is recognized that the rejection of an inspection lot of molded items for defects which are not commensurate with the dimensional tolerances or degree of quality required by the user can result in an appreciable increase in the cost of production. Also, in some in-

stances the enforcement of very high standards could result in an appreciable decrease in the volume of production. Accordingly, some of the defects in this standard are classified under three categories (major, minor, or acceptable) depending on the type of service requirement. Note the definitions of location I and location II defects under definition of terms.

**4.4 Illustrations.** The illustrations of physical defects, as shown on figures 1 through 116 and listed in table I, have been selected as typical ones, it not being feasible to gather examples of all possible defects.

Table I.—*Defects Classification*

Figure No.	Defect	Major	Minor
<b>ALL RUBBER PARTS</b>			
1	Air check —location I location II	x	x
2	Air checks—whole surface —location I location II	x	
3	Air trapped—amount shown —location I location II	x	
4	Air trapped—extending through body —location I location II	x	
5 and 6	Air trapped—amount shown —location I location II	x	
7, 8 and 9	Blister—extending through body —location I location II	x	
10, 11 and 12	Blister —location I location II	x	x
13 and 14	Bloom—heavy —location I location II	x	x
Not shown	Bloom—light —location I location II		x
	NOTE.—Under certain conditions, for example where ozone resistance is required, bloom necessarily results, and in this case, bloom is not a defect.		
15 through 20	Cavity, damaged —location I location II	x	x
21	Cavity—small mold scratch —location I (usually) location II (always)	Not a defect	
22, 23 and 24	Coating, defective (missing) —location I location II	x	
25, 26 and 27	Crack—extending through body —location I location II	x	
28	Crack —location I location II	x	
29	Deformed —location I location II	x	
30, 31 and 32	Deformed —location I location II	x	x

Table I.—Defects Classification— Continued

Figure No.	Defect	Major	Minor
ALL RUBBER PARTS—continued			
33, 34 and 35.....	Fill, bad	—location I location II	x x
36.....	Fill, poor	—location I location II	x x
37.....	Flash, cured in (delamination)	—location I location II	x x
38.....	Flash, cured in (no delamination)	—location I location II	x x
39, 40, 41 and 42.....	Flash, excessive. See "Trim" listings and "Flash, excessive" under "Rubber-Metal parts"		
	Flow mark (no internal delamination)	—location I location II	x x
43 and 44.....	With internal delamination this is a major defect in all cases Foreign material (extending into body)	—location I location II	x x
45.....	Foreign material (on surface)	—location I location II	x x
Not shown.....	Hole (material missing or void through body).	—location I location II	x x
46, 47 and 48.....	Hole pin	—location I location II	x x
49, 50 and 51.....	Identification, not clearly legible		
52, 53, 54 and 55.....	Mold, dirty	—location I location II	x x
56 and 57.....	Porosity (extending into body)	—location I location II	x x
58 and 59.....	Porosity (surface only)	—location I location II	x x
60 and 61.....	Register, off (dimensions outside specified limits or where part would not fit in a subsequent assembly).	—location I location II	x x
62, 63 and 64.....	Register, off (dimensions inside specified limits and defect would not affect subsequent assembly).	—location I location II	x x
65 and 66.....	Rind, back (dimensional distortion or a void extending into body).	—location I location II	x x
67 and 68.....	Rind, back (no dimensional distortion and no internal void).	—location I location II	x x
69.....	Sprue mark (excess backrind)	—location I location II	x x
70 and 71.....	Sprue mark (slight projection or recess)	—location I location II	x x
72.....	Trim, buff (material missing)	—location I location II	x x
73 and 74.....	Trim, buff (small material missing)	—location I location II	x x
75.....	Trim, buff (only surface marked)	—location I generally location II always	Not a defect
Not shown.....	Trim, hand (material missing or large piece of flash attached).	—location I location II	x x
76, 77, 78, 79 and 80.....	Trim, hand (excess material)	—location I location II	x Not a defect

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Table I.—*Defects Classification*— Continued

Figure No.	Defect		
<b>ALL RUBBER PARTS—continued</b>			
81, 82 and 83	Trim, machine (material missing)	—location I location II	x
84, 85 and 86	Trim, machine (small undercut)	—location I location II	x
87, 88, 89	Trim, machine (excess material)	—location I location II	x
Not shown	Trim, machine (small excess material) NOTE: Similar to figure 74	—location I location II	x
90	Trim, machine (tear)	—location I location II	x
91	Trim, tumble (material missing)	—location I location II	x
Not shown	Trim, tumble (small material missing)	—location I location II	x
Not shown	Trim, tumble (large excess material)	—location I location II	x
92 and 93	Trim, tumble (small excess material)	—location I location II	x Not a defect
<b>FABRIC INSERTS</b>			
Not shown	Fabric broken, delamination or missing	—location I location II	x
Not shown	Fabric, floating (dimensional distortion)	—location I location II	x
94	Fabric, floating (no dimensional distortion)	—location I location II	x
<b>METAL INSERTS</b>			
95, 96 and 97	Adhesion, bad	—location I location II	x
98, 99 and 100	Adhesion, poor (slight edge break)	—location I location II	x
101, 102 and 103	Flash, excessive (functional)	—location I location II	x
104	Flash, excessive (nonfunctional)	—location I location II	x
105 and 106	Misplaced	—location I location II	x
107 and 108	Missing	—location I location II	x
109	Rust (excessive)	—location I location II	x
110	Rust	—location I location II	x
111	Staking, bad	—location I location II	x
112, 113, 114, 115	Threads, bad		x
116	Threads, poor		x

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Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the constructing officer.

Copies of this standard for Military use may be obtained as indicated in the foreword to the Index of Military Specifications and Standards.

Copies of this Standard may be obtained for other than official use by individuals, firms, and contractors from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Both the title and the identifying symbol number should be stipulated when requesting copies of Military Standards.

Notice.—When Government drawings, specifications, or other data are used for any purpose other than in

connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility, nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacturer use or sell any patented invention that may in any way be related thereto.

Custodians:

Army—Ordnance Corps  
Navy—Bureau of Ships  
Air Force

Other interest:

Army—CEQSigT  
Navy—AOr<sup>v</sup>





FIGURE 1. —Air check—location I—major; location II—minor.

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FIGURE 2.—Air checks—location I—major; location II—major.

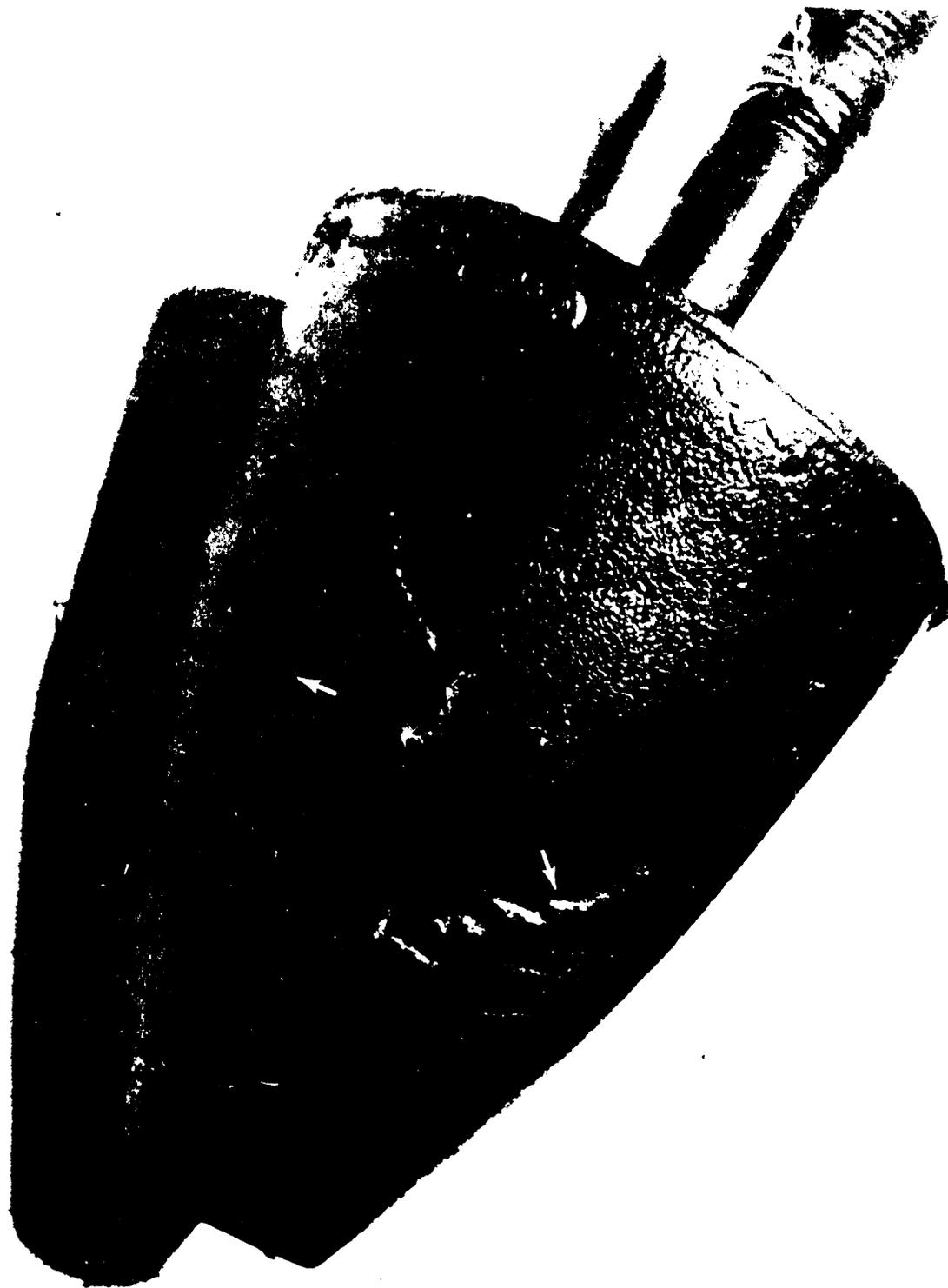


FIGURE 3. —*Trapped air—location I—major; location II—major.*

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FIGURE 4. —*Trapped air—location I—major; location II—major.*



FIGURE 5.—Trapped air—location I—major; location II—minor.

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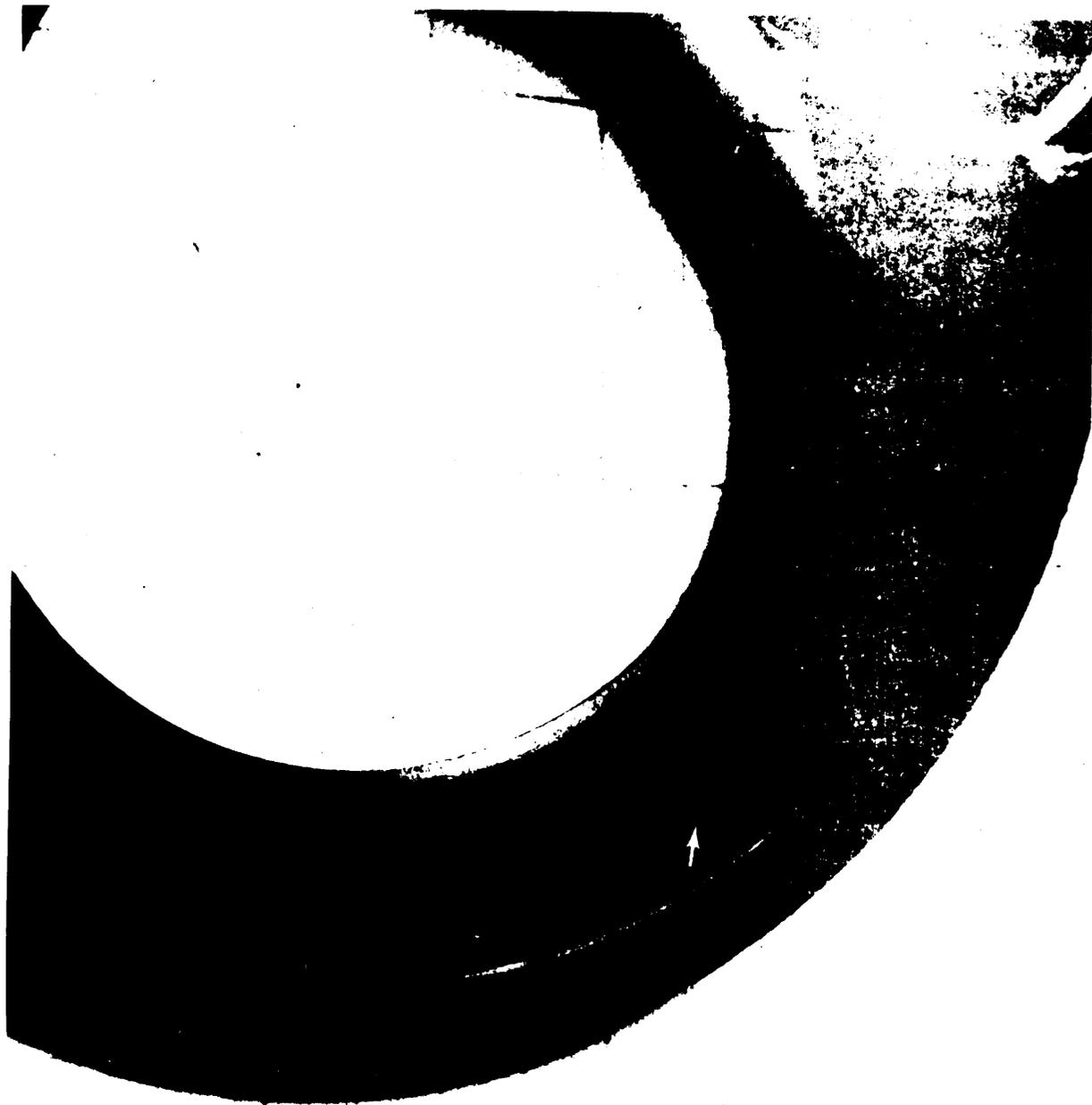


FIGURE 6. —*Trapped air—location I—major; location II—minor.*

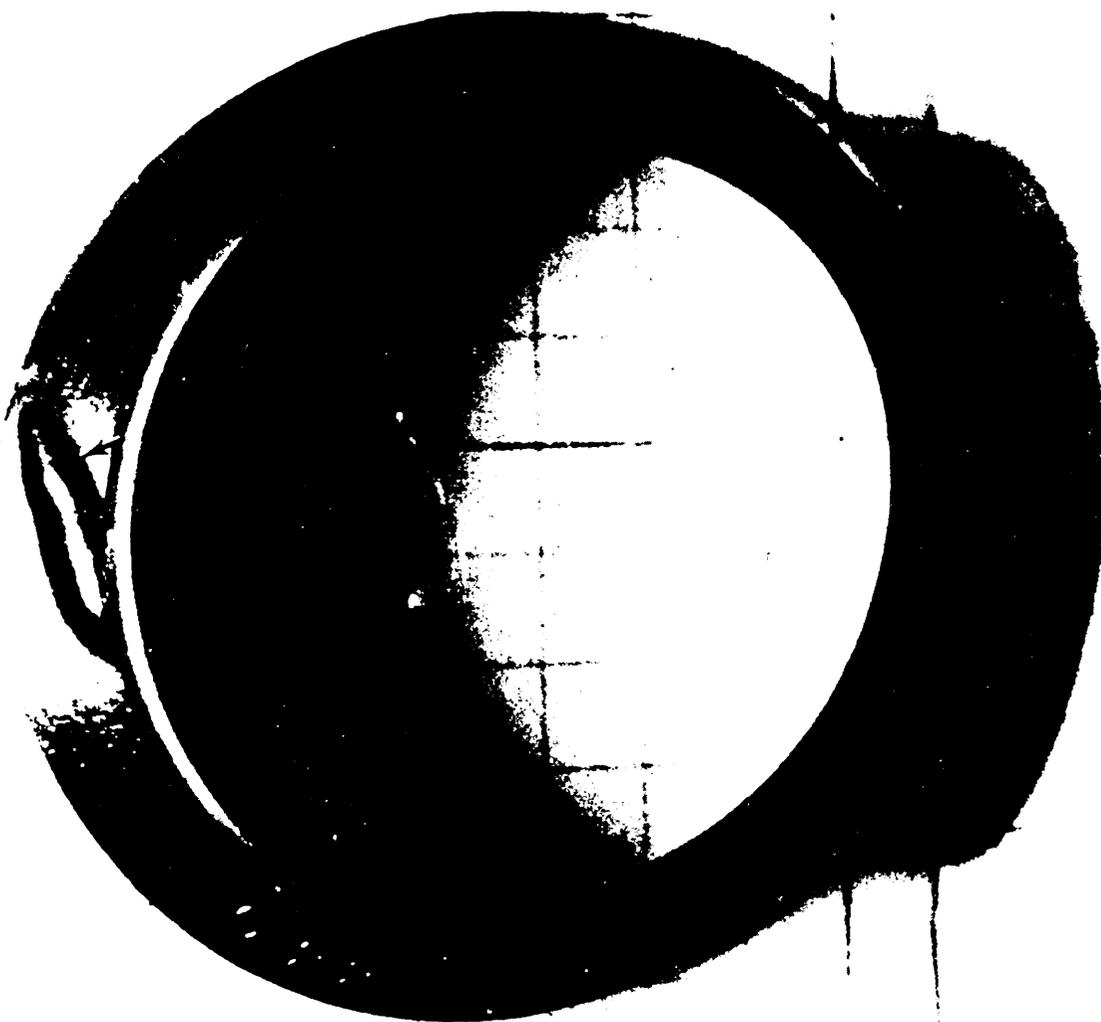


FIGURE 7. —Blister—location I—major; location II—major.

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FIGURE 8. —*Blister location I—major; location II—major.*

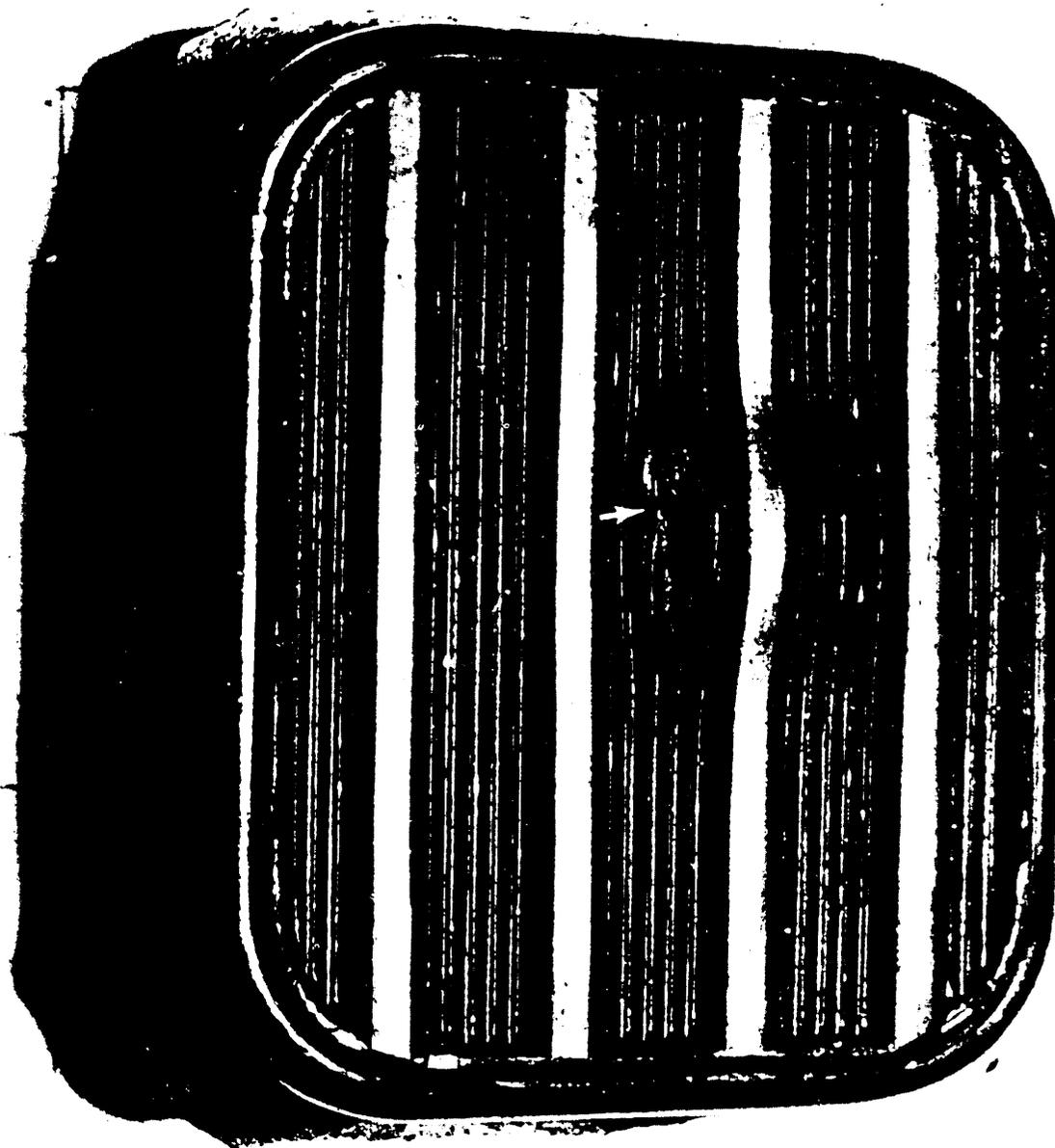


FIGURE 9. —Blister—location I—major; location II—major.

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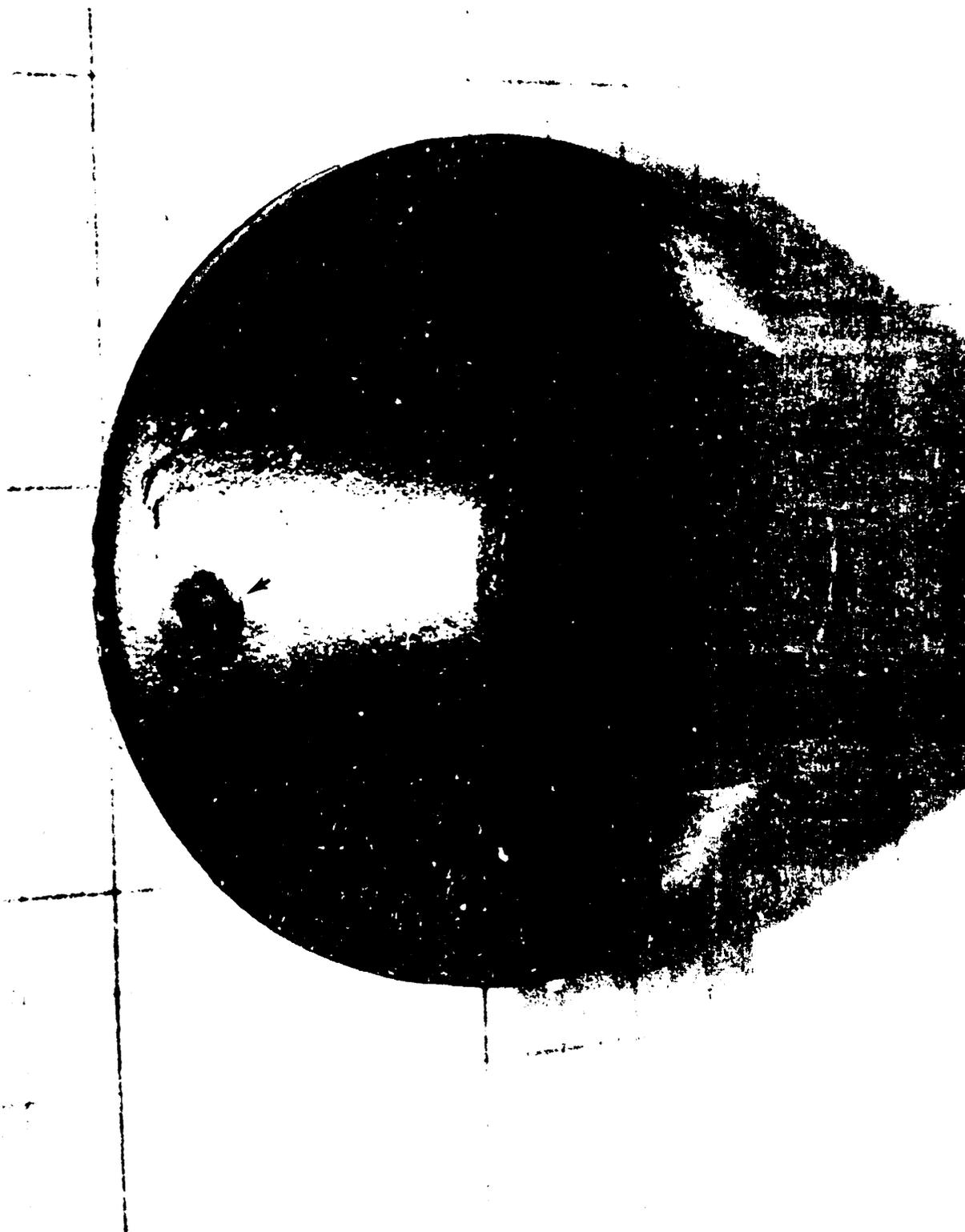


FIGURE 10. —Blister—location I—major; location II—minor.



FIGURE 11. —Blister—location I—major; location II—minor.

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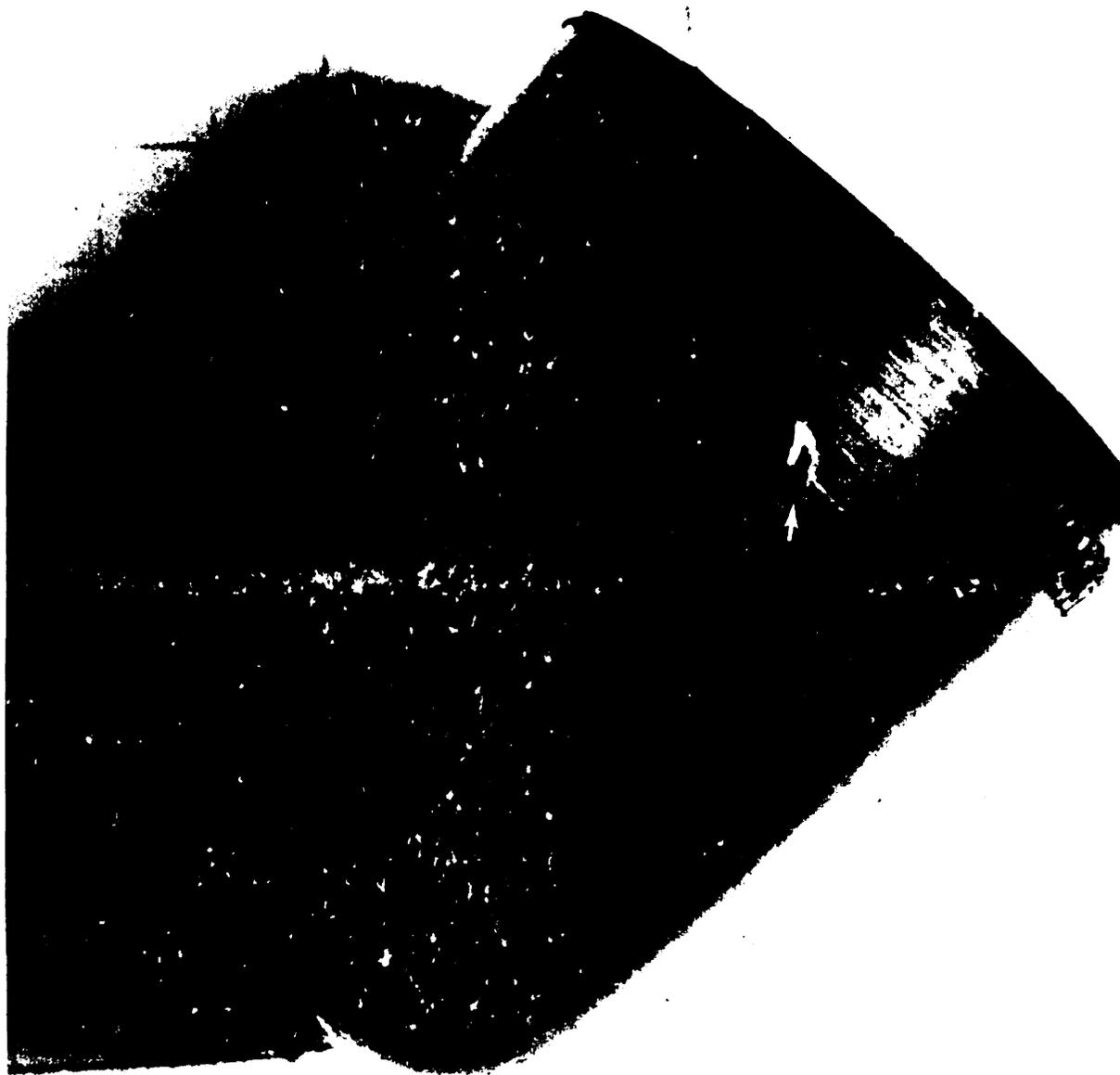


FIGURE 12. —*Blister—location I—major; location II—minor.*

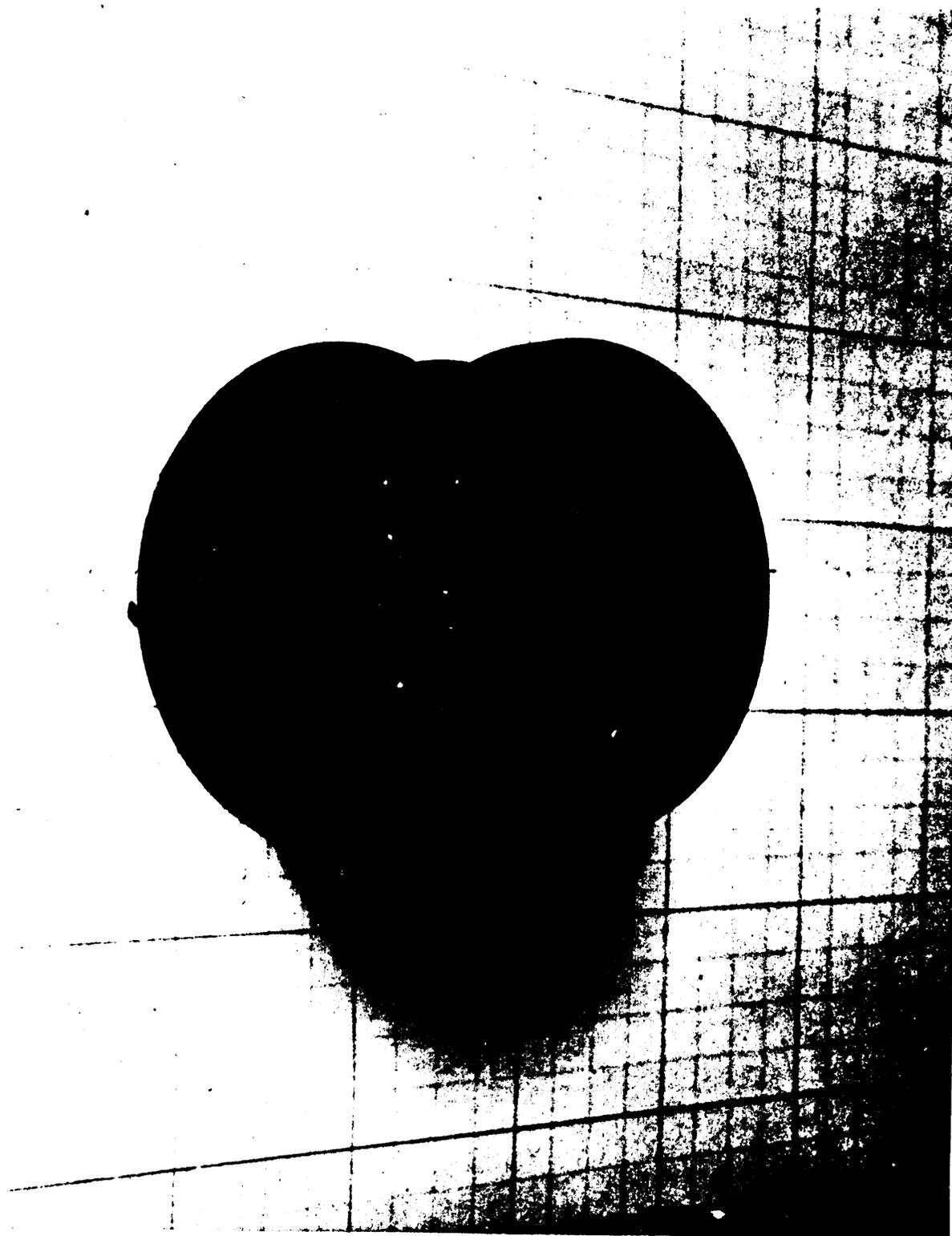


FIGURE 13. —*Bloom, heavy—location I—major; location II—minor.*

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FIGURE 14. —*Bloom heavy—location I—major; location II—minor.*



FIGURE 15. —Cavity, damaged—location I—major; location II—minor.

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FIGURE 16. —*Cavity damaged—location I—major; location II—minor.*



FIGURE 17. —Cavity, damaged—location I—major; location II—minor.

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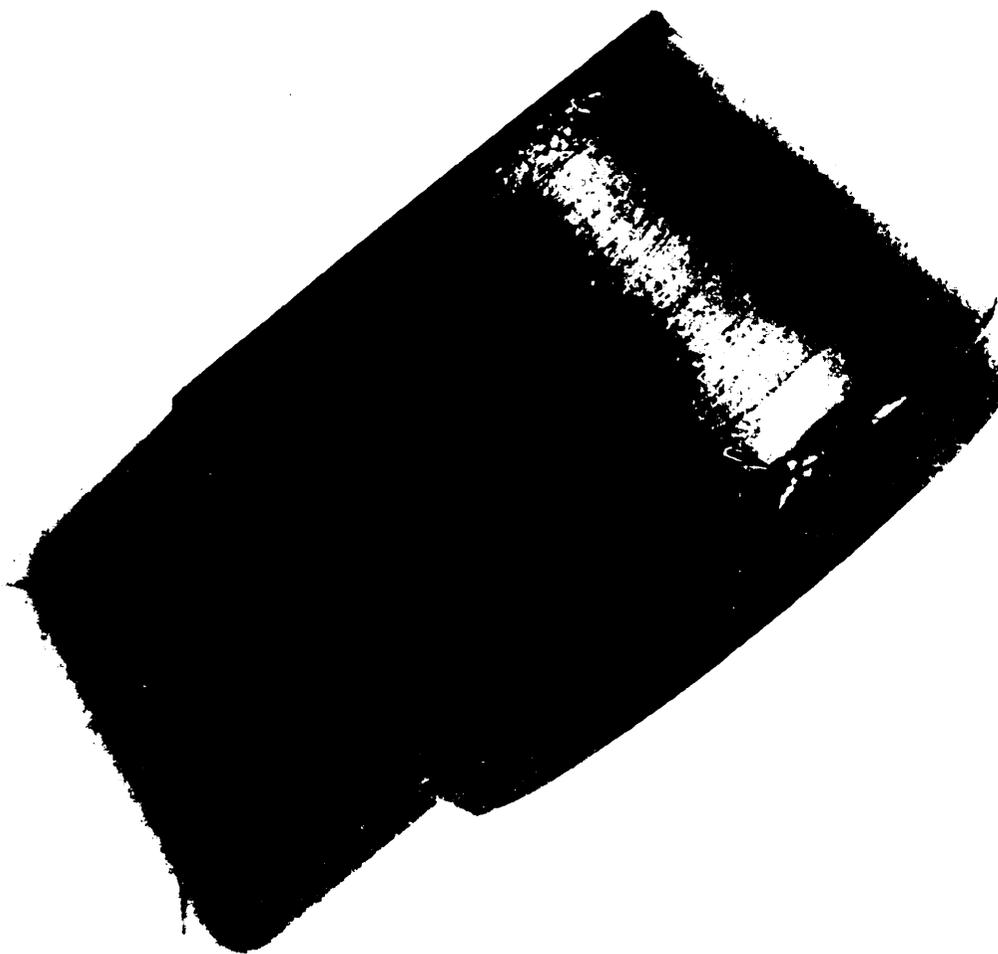


FIGURE 18. —Cavity, *damaged—location I—major; location II—minor*



FIGURE 19. —Cavity, damaged—location I—major; location II—minor.

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FIGURE 20. —*Cavity, damaged—location I—major; location—minor.*

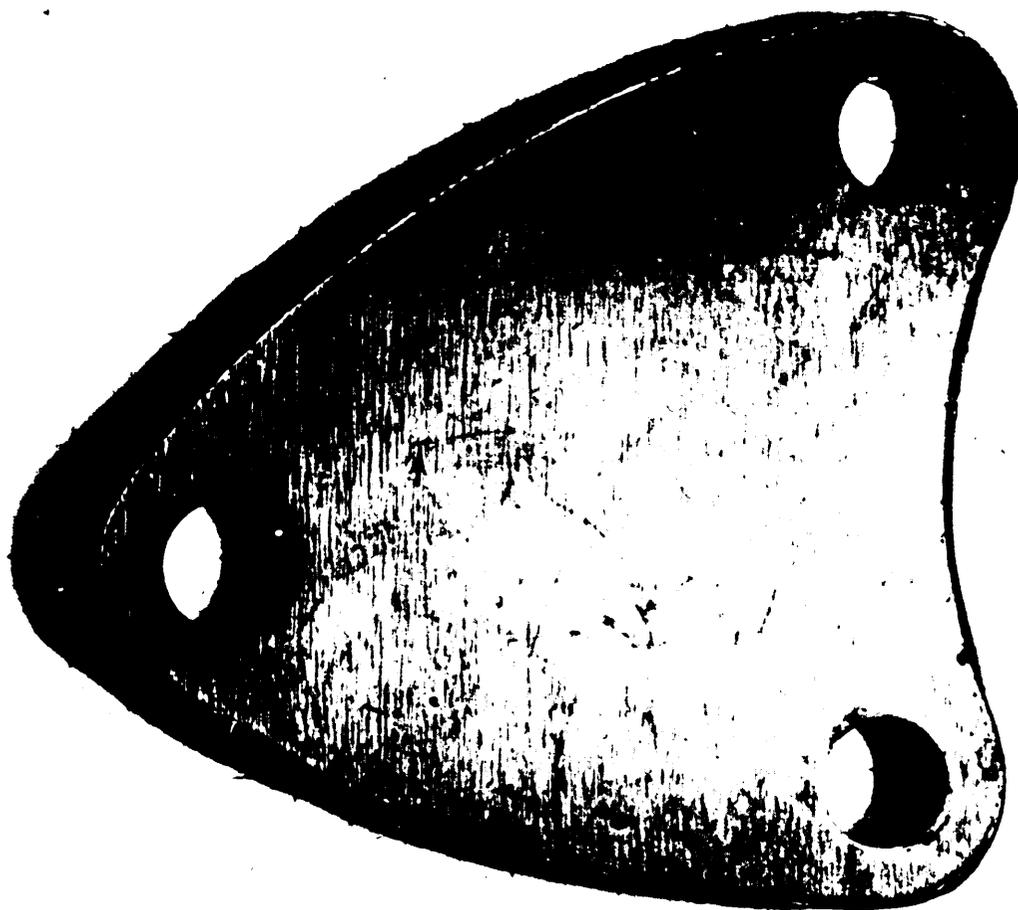


FIGURE 21. —Cavity, small mold scratch—location I—not a defect (usually); location II—not a defect.

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FIGURE 22. —Coating, defective—location I—major; location II—major.



FIGURE 23. —Coating, defective—location I—major; location II—major.

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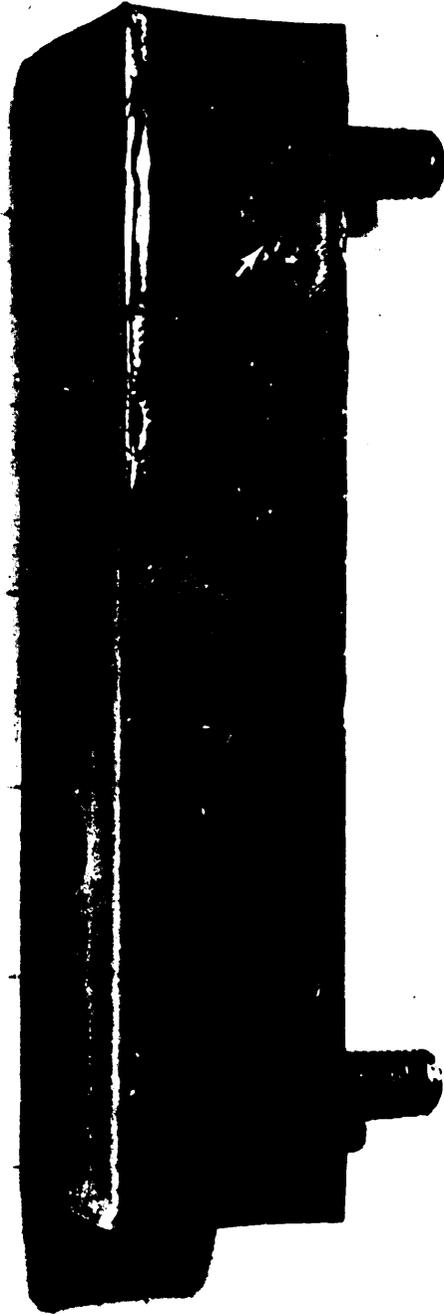


FIGURE 24. —Coating, defective—location I—major; location II—major.



FIGURE 25. —Crack—location I—major; location II—major.

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FIGURE 26. —Crack—location I—major; location II—major.



FIGURE 27. —Crack—location I—major; location II—major.

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FIGURE 28. —Crack—location I—major; location II—minor.



FIGURE 29. —*Deformed—location I—major; location II—major. Upper example is a defective. Lower example is a correct one for comparison.*

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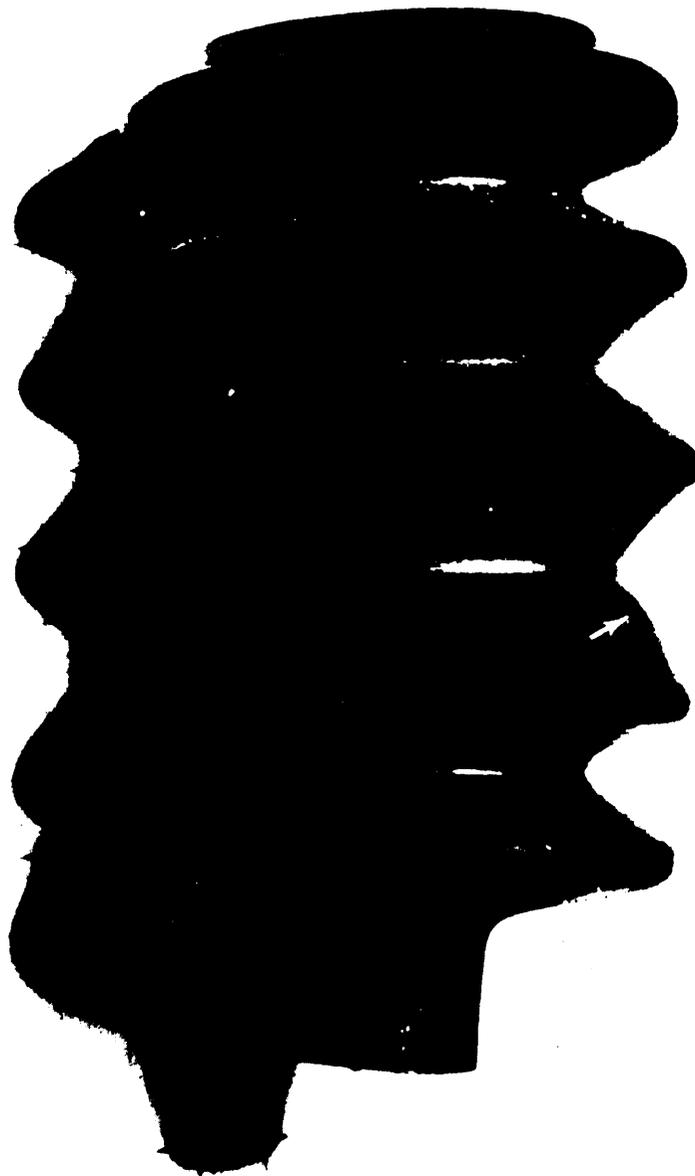


FIGURE 30. —*Deformed—location I—major. location II—minor.*

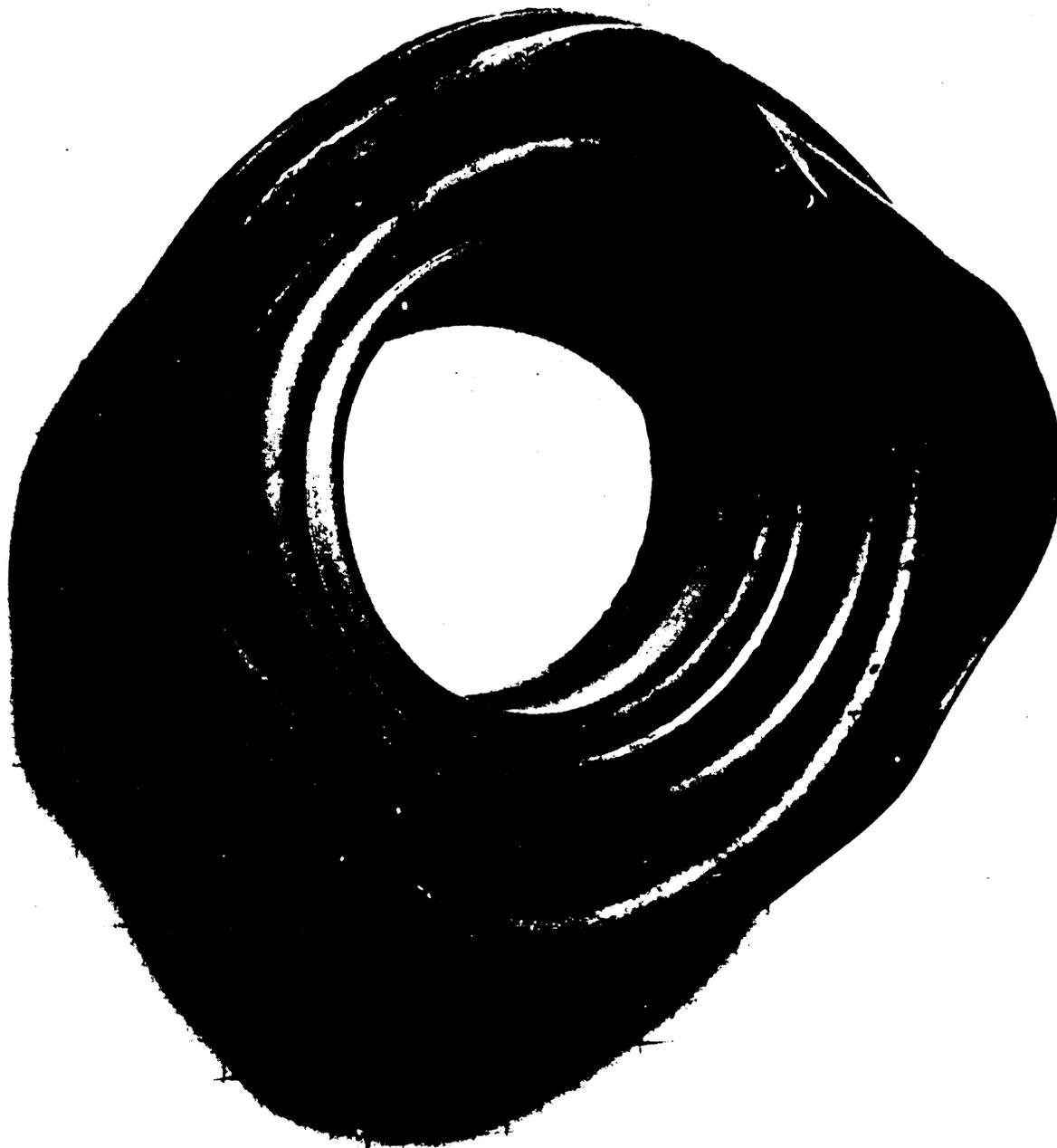


FIGURE 31. —*Deformed—location I—major; location II—minor.*

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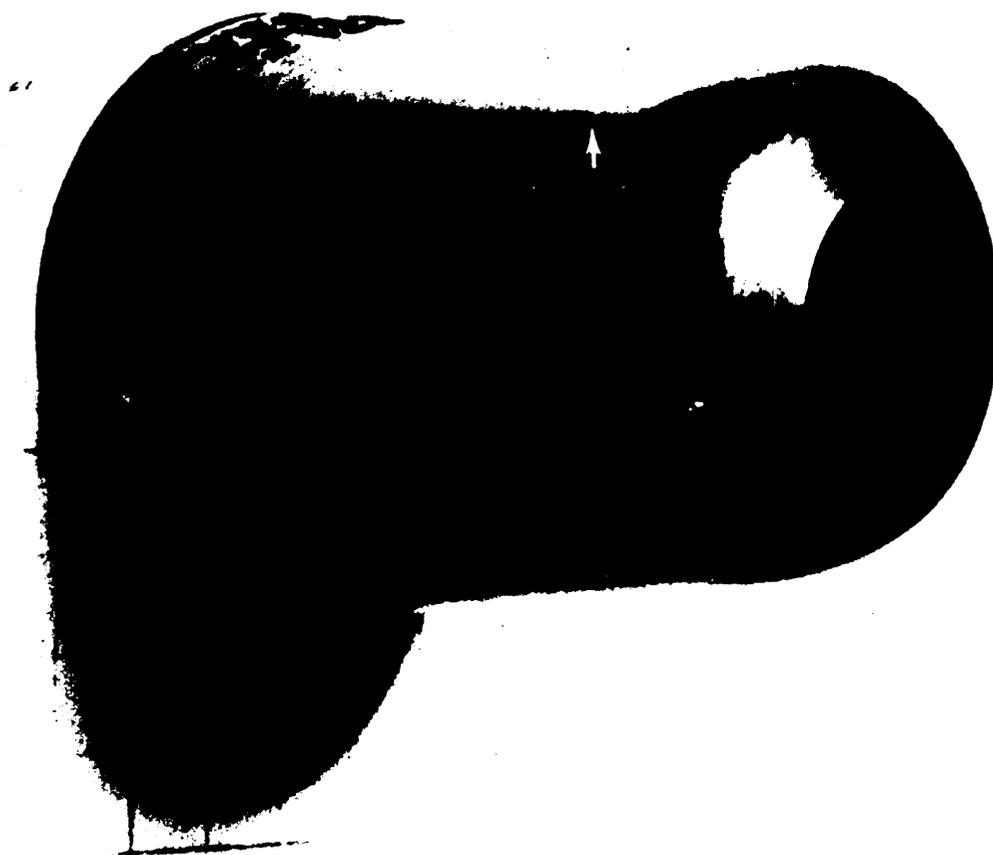


FIGURE 32. —*Deformed—location I—major; location II—minor.*

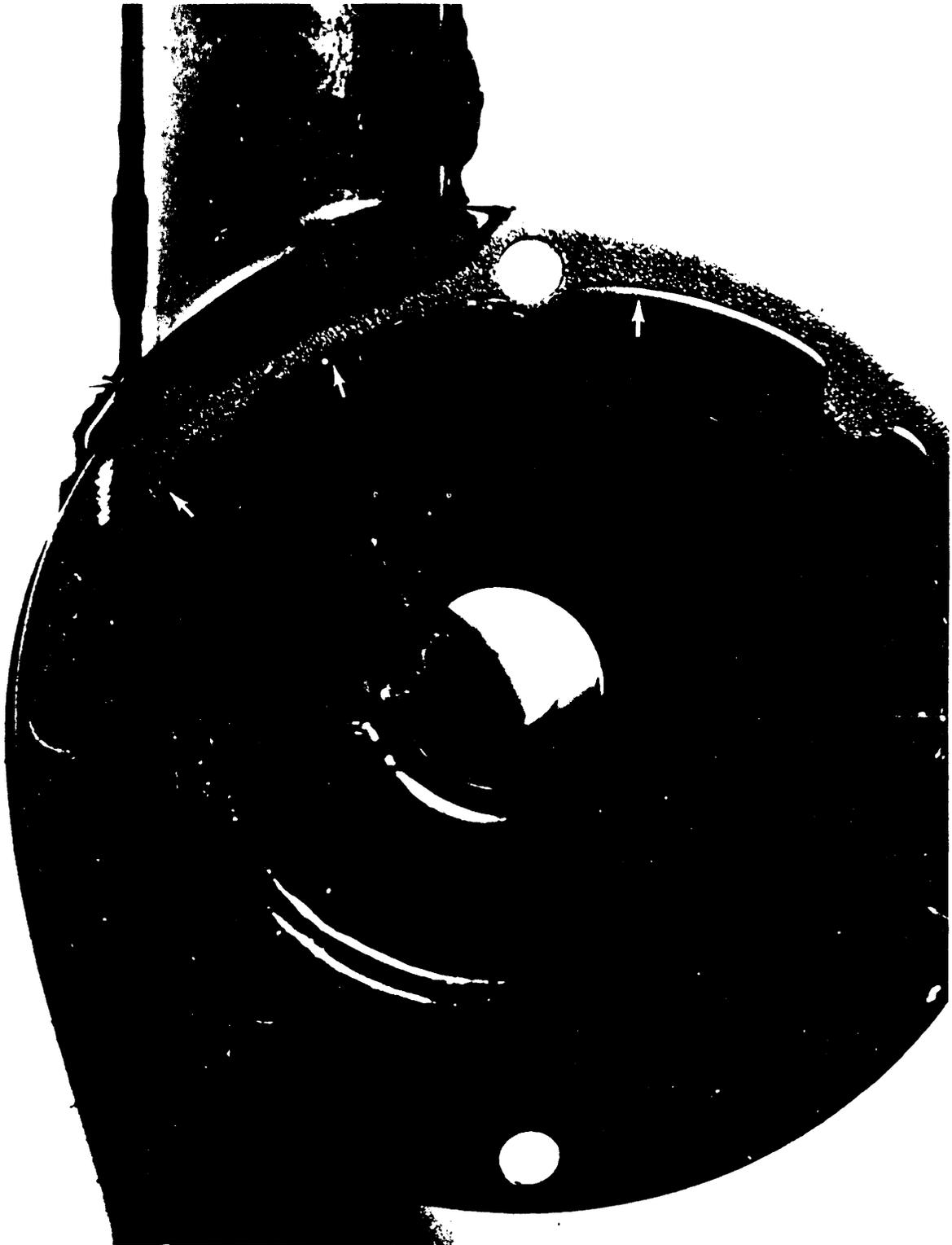


FIGURE 33. —Bad fill—location I—major; location II—major.

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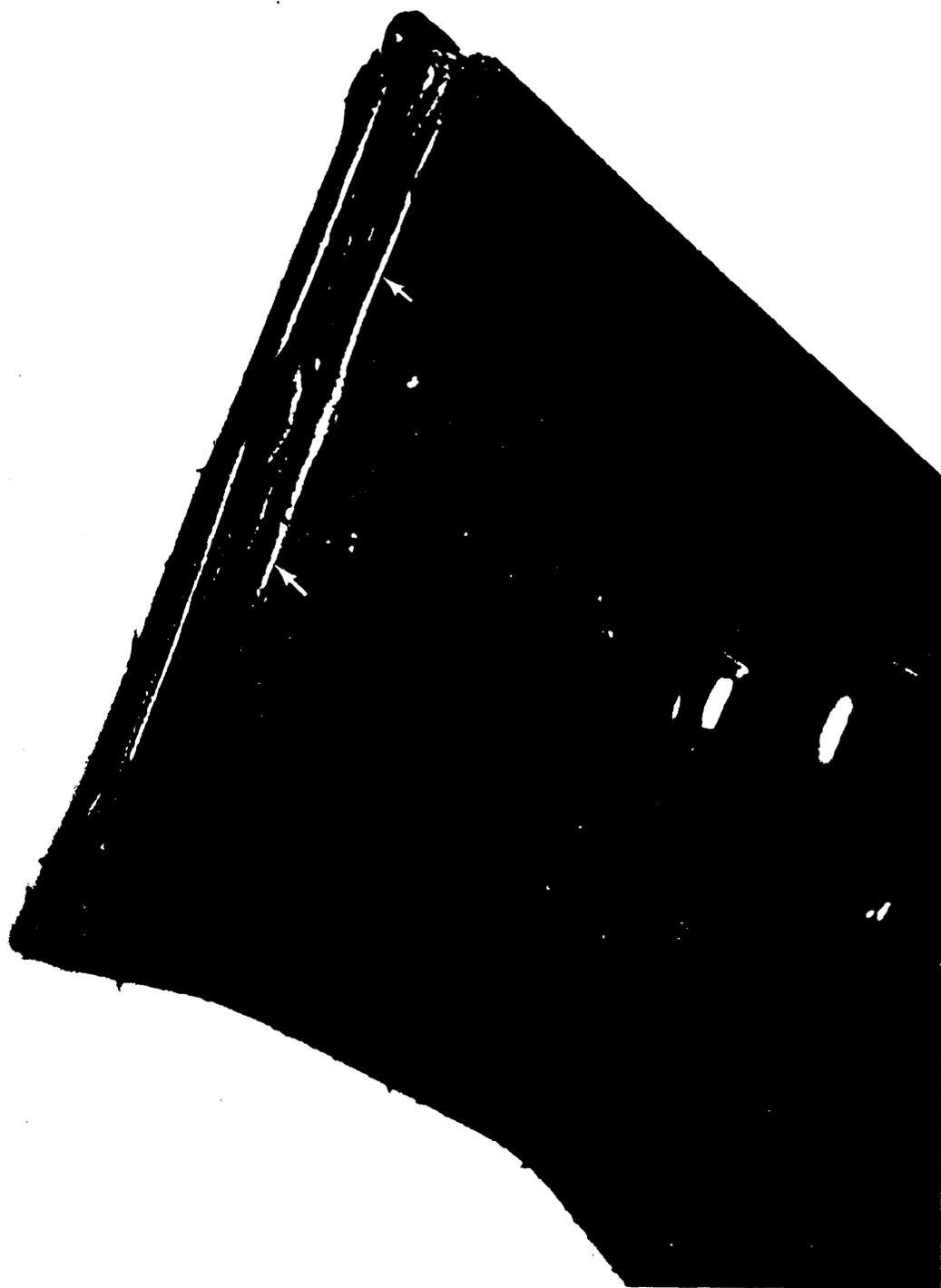


FIGURE 34. —*Bad fill—location I—major; location II—major.*

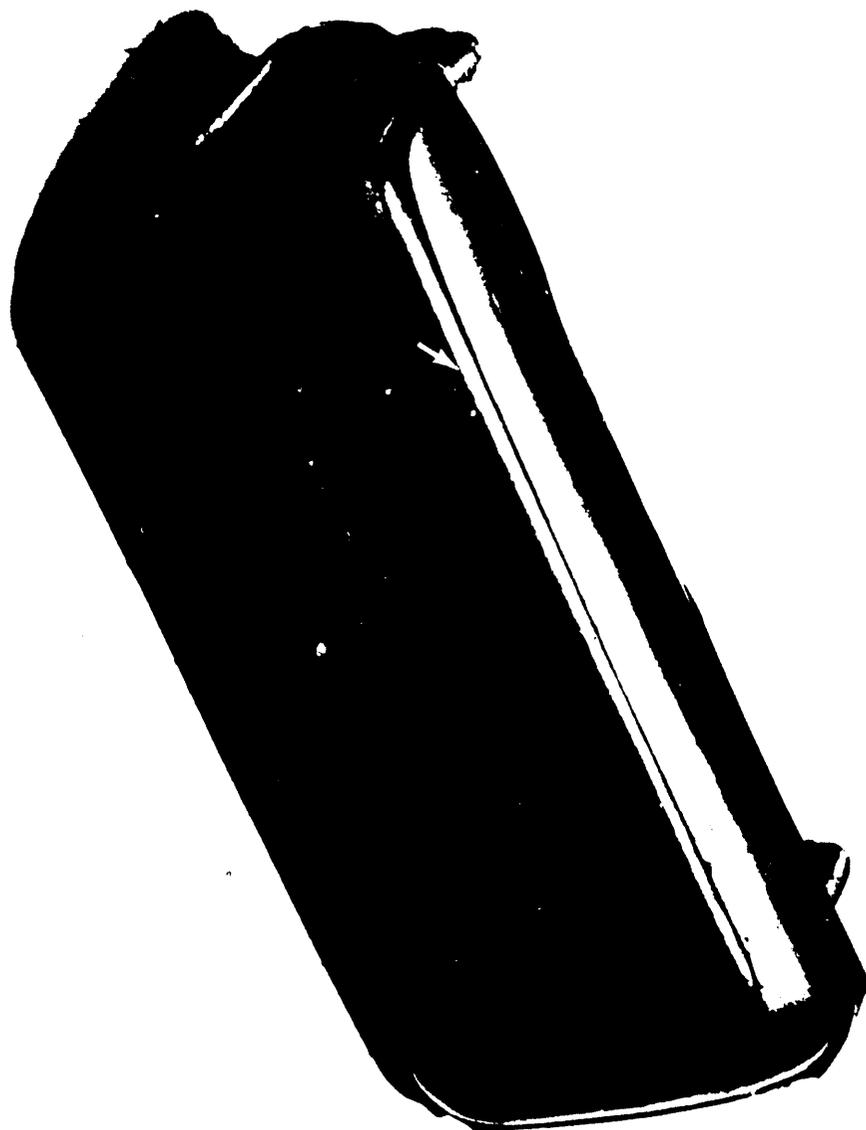


FIGURE 35. —*Bad fill—location I—major; location II—major.*

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FIGURE 36. —*Poor fill—location I—major; location II—minor.*



FIGURE 37. —Flash, cured-in—location I—major; location II—major.

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FIGURE 38. —Flash, cured-in location I—major; location II—minor.



FIGURE 39. —*Flow mark—location I—major; location II—minor. With internal delamination this is a major defect in all cases.*

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FIGURE 40. —Flow mark—location I—major; location II—minor. With internal delamination this is a major defect in all cases.



FIGURE 41. —*Flow mark—location I—major; location II—minor. With internal delamination this is a major defect in all cases.*

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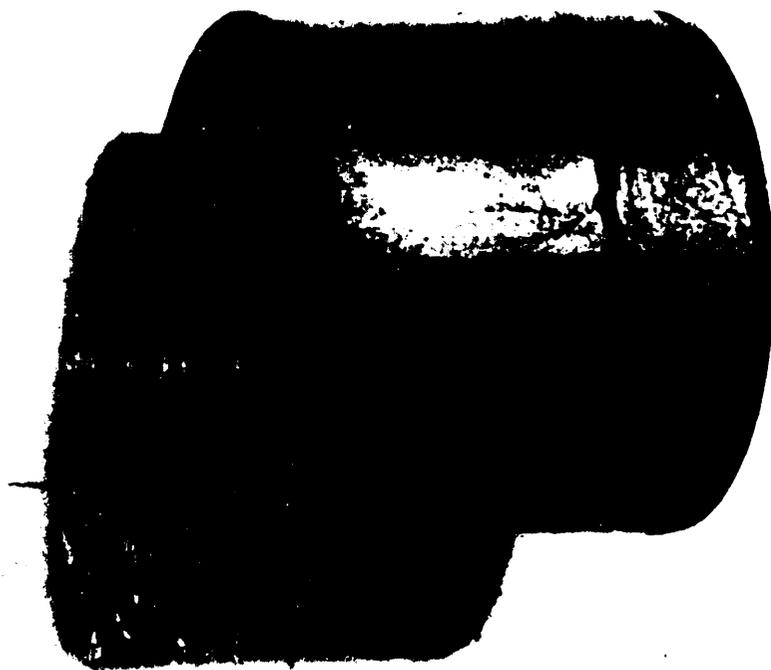


FIGURE 42. —*Flow mark—location I—major; location II—minor. With internal delamination this is a major defect in all cases.*



FIGURE 43. —*Foreign material—location I—major; location II—major.*

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FIGURE 44. —Foreign material—location I—major; location II—major.



FIGURE 45. —*Foreign material—location I—major; location II—minor.*

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FIGURE 46. —Pin hole—location I—major; location II—minor.



FIGURE 47. —*Pin hole—location I—major; location II—minor.*

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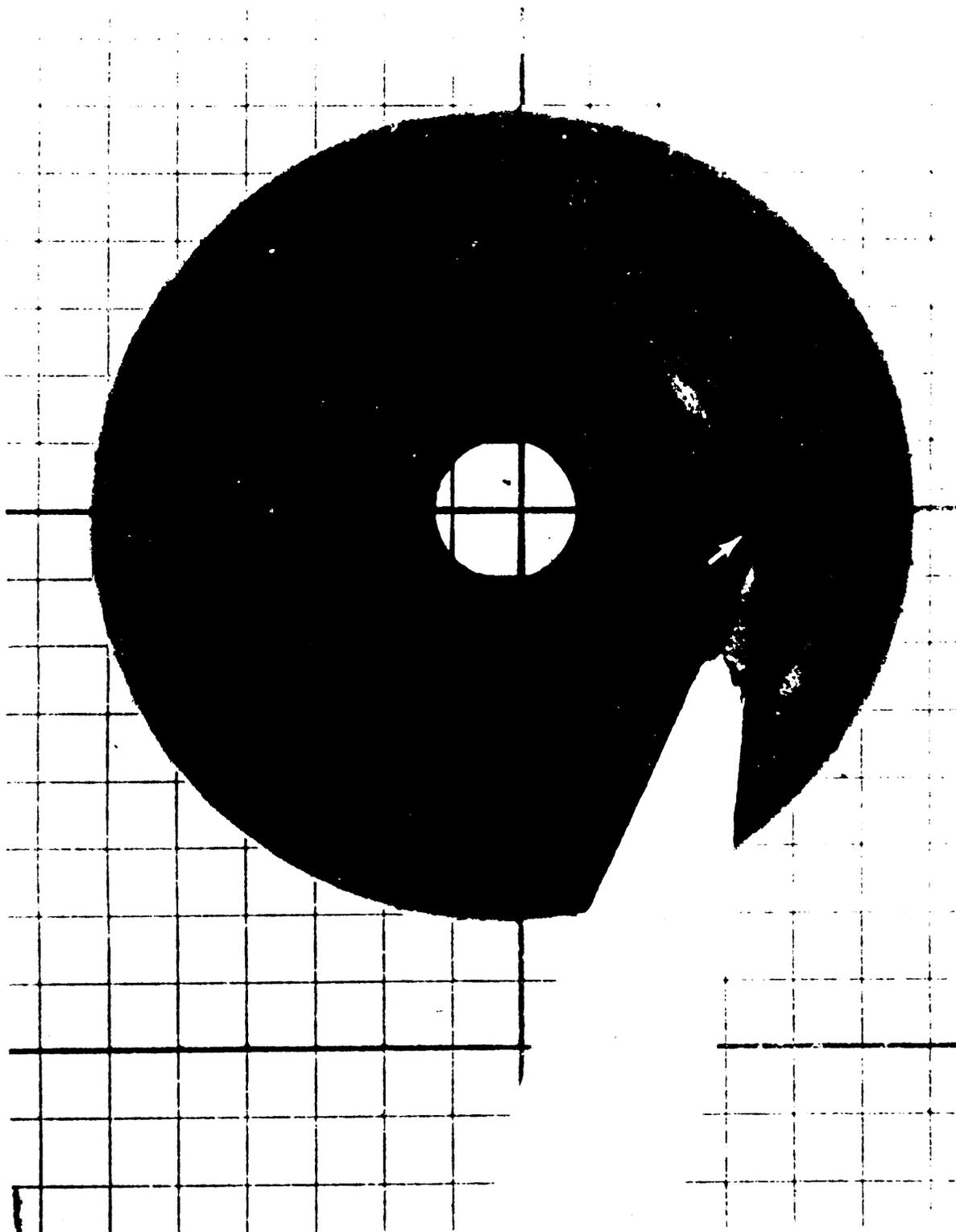


FIGURE 48. —*Pin hole—location I—major; location II—minor.*

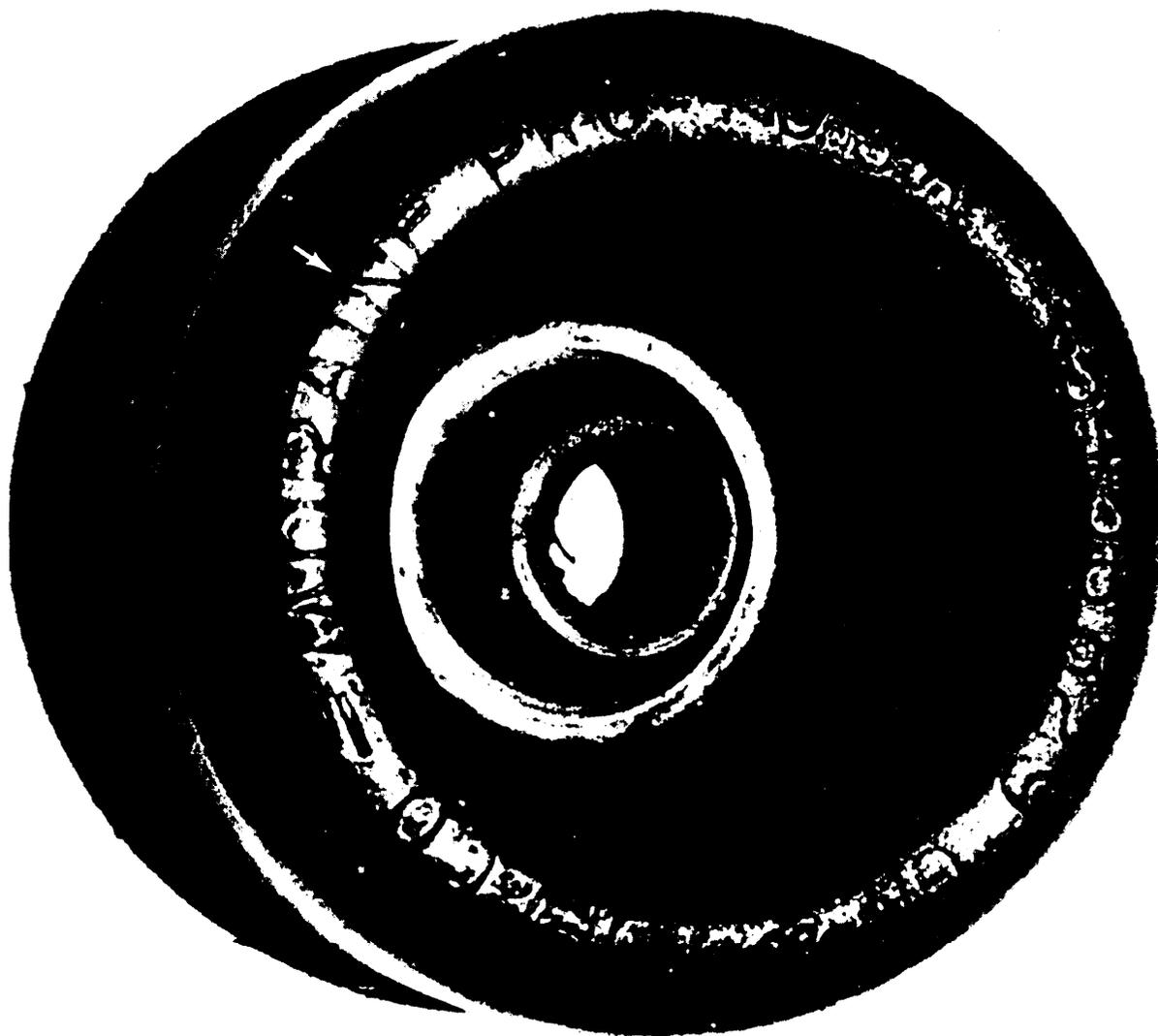


FIGURE 49. —*Marking not clearly legible—minor.*

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FIGURE 50. —*Marking not clearly legible—minor.*



FIGURE 51. —*Marking not clearly legible—minor.*

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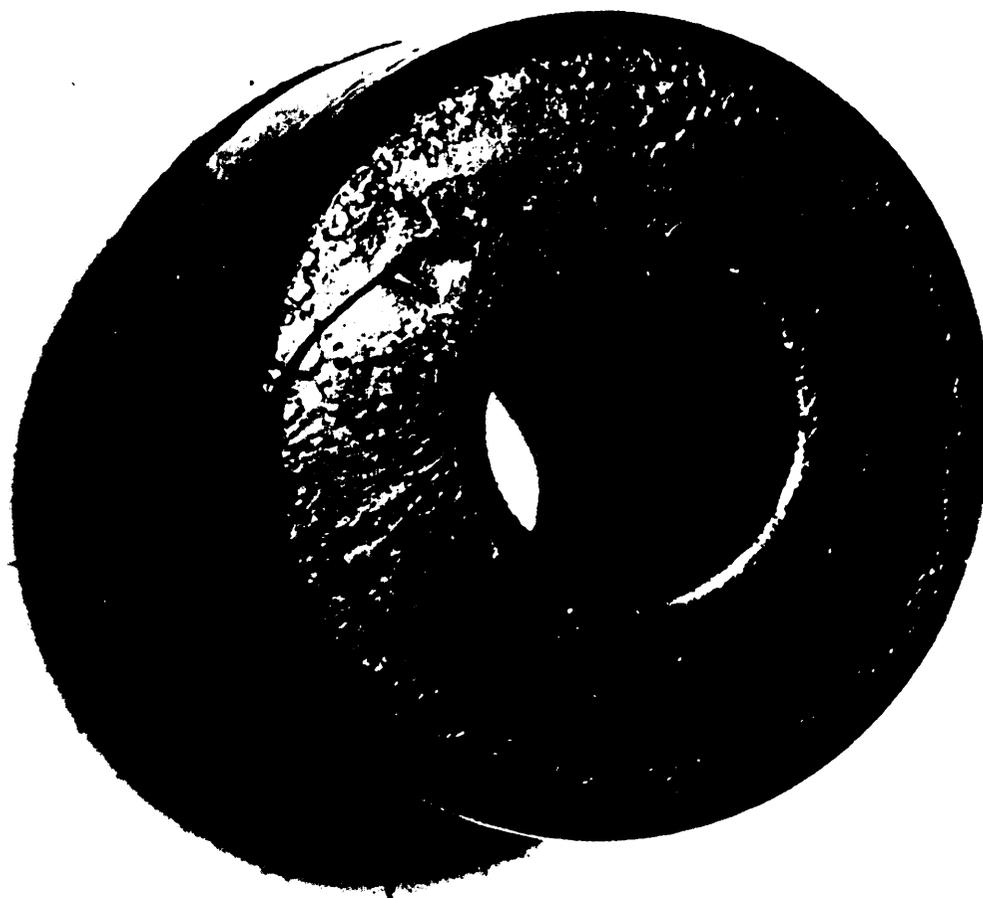


FIGURE 52. —*Dirty mold—location I—major; location II—minor.*

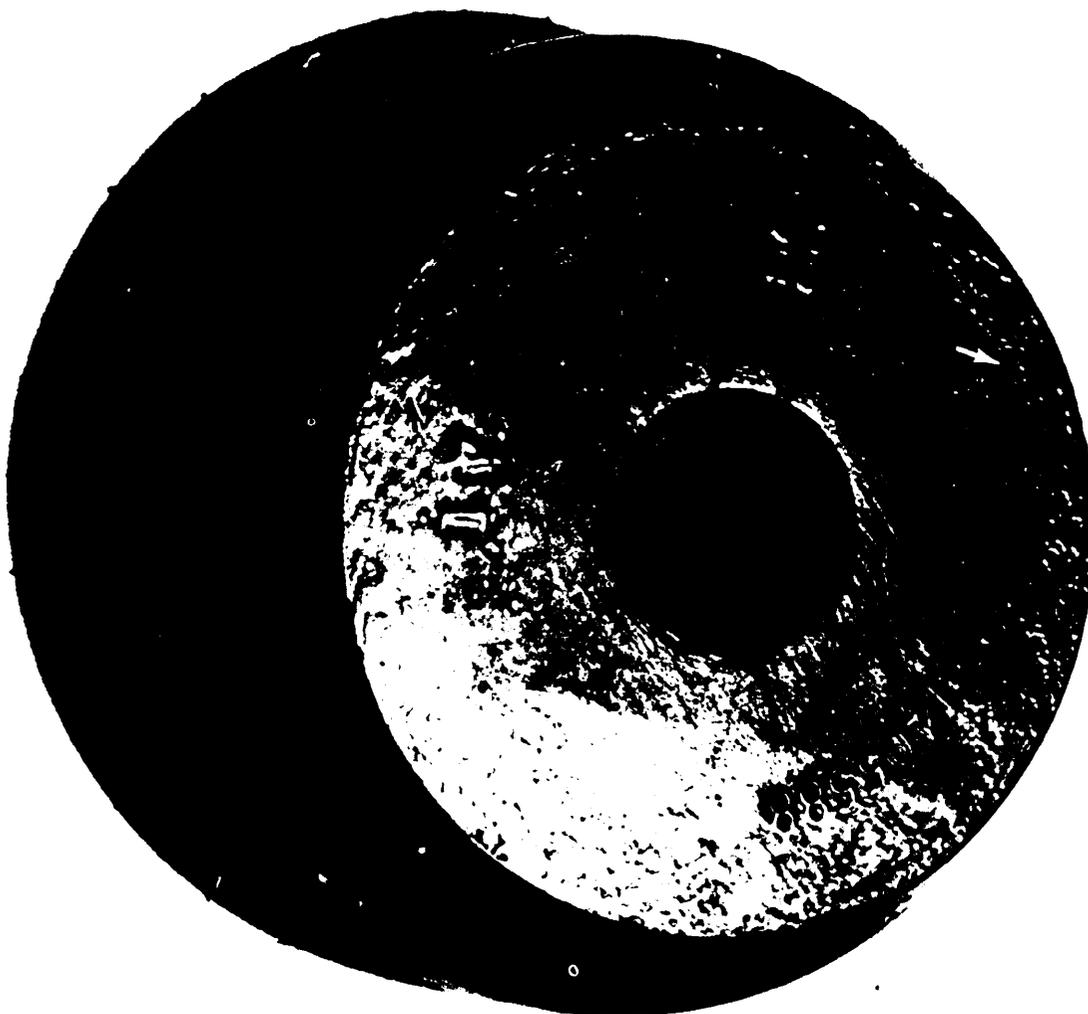


FIGURE 53. —*Dirty mold—location I—major; location II—minor.*

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FIGURE 54. —*Dirty mold—location I—major; location II—minor.*



FIGURE 55. —*Dirty mold—location I—major; location II—minor.*

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FIGURE 56. —*Porosity—location I—major; location II—major.*

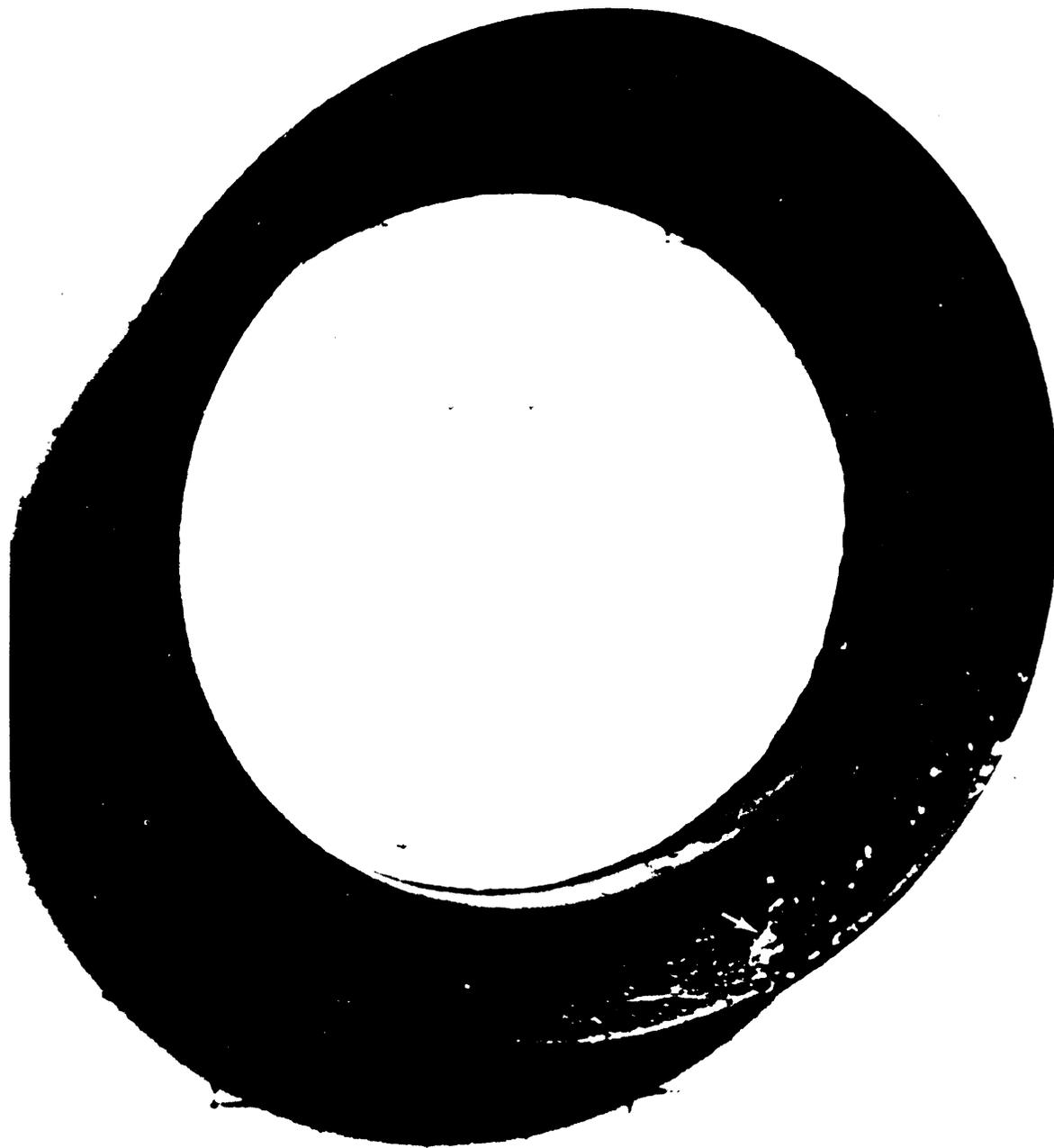


FIGURE 57. —*Porosity—location I—major; location II—major.*

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FIGURE 58. —Porosity—location I—major; location II—minor.

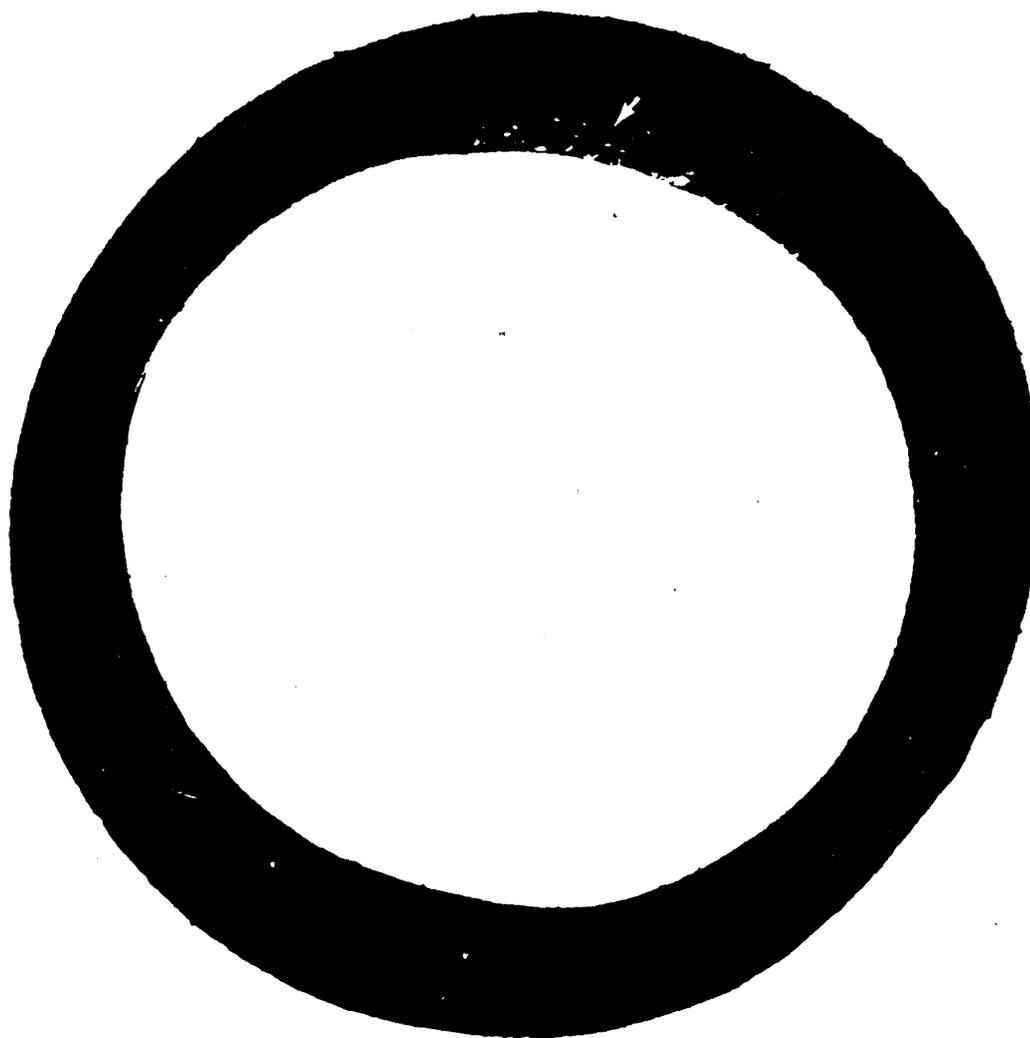


FIGURE 59. —*Porosity—location I—major; location II—minor.*

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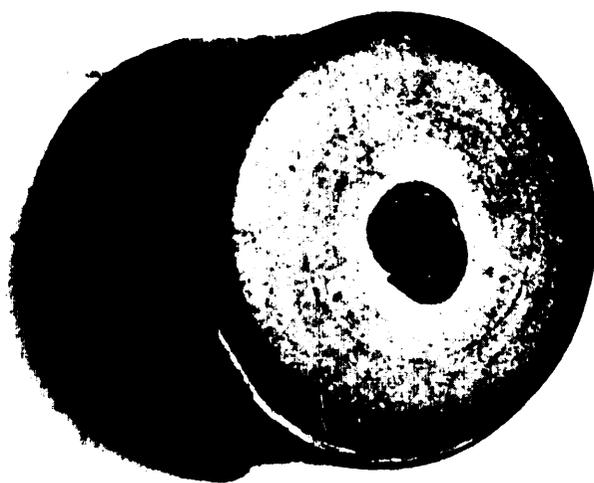


FIGURE 60. —*Off register—location I—major; location II—major.*

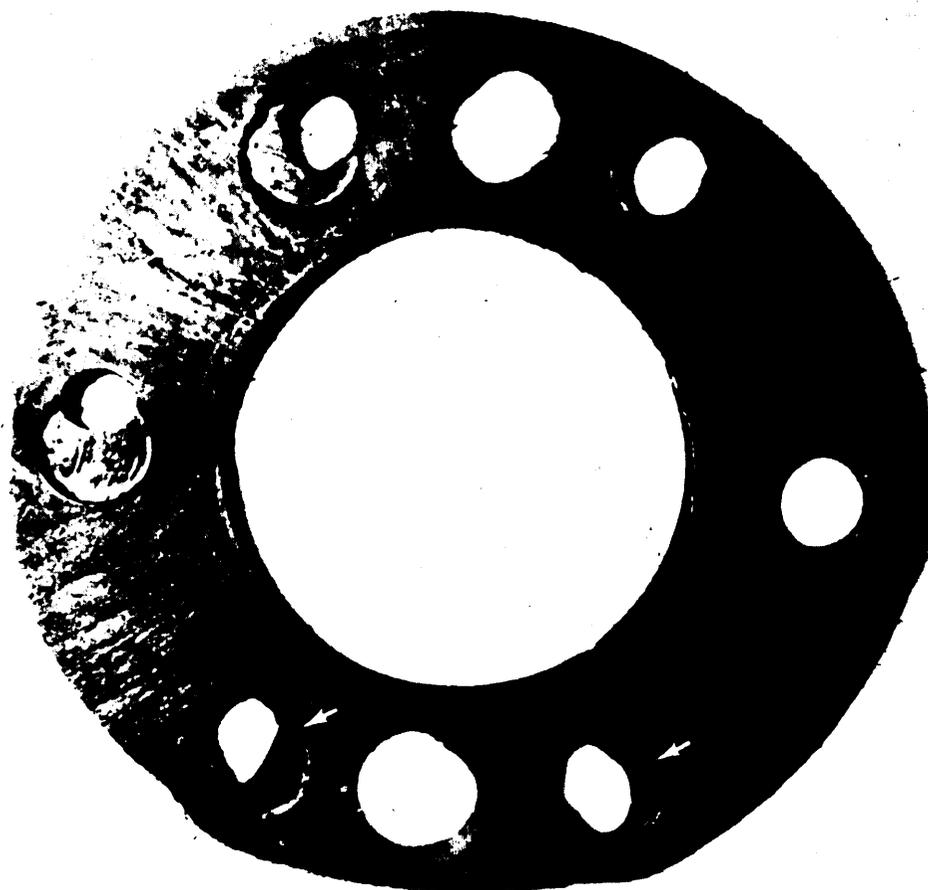


FIGURE 61. —*Off register— location I—major; location II—major.*

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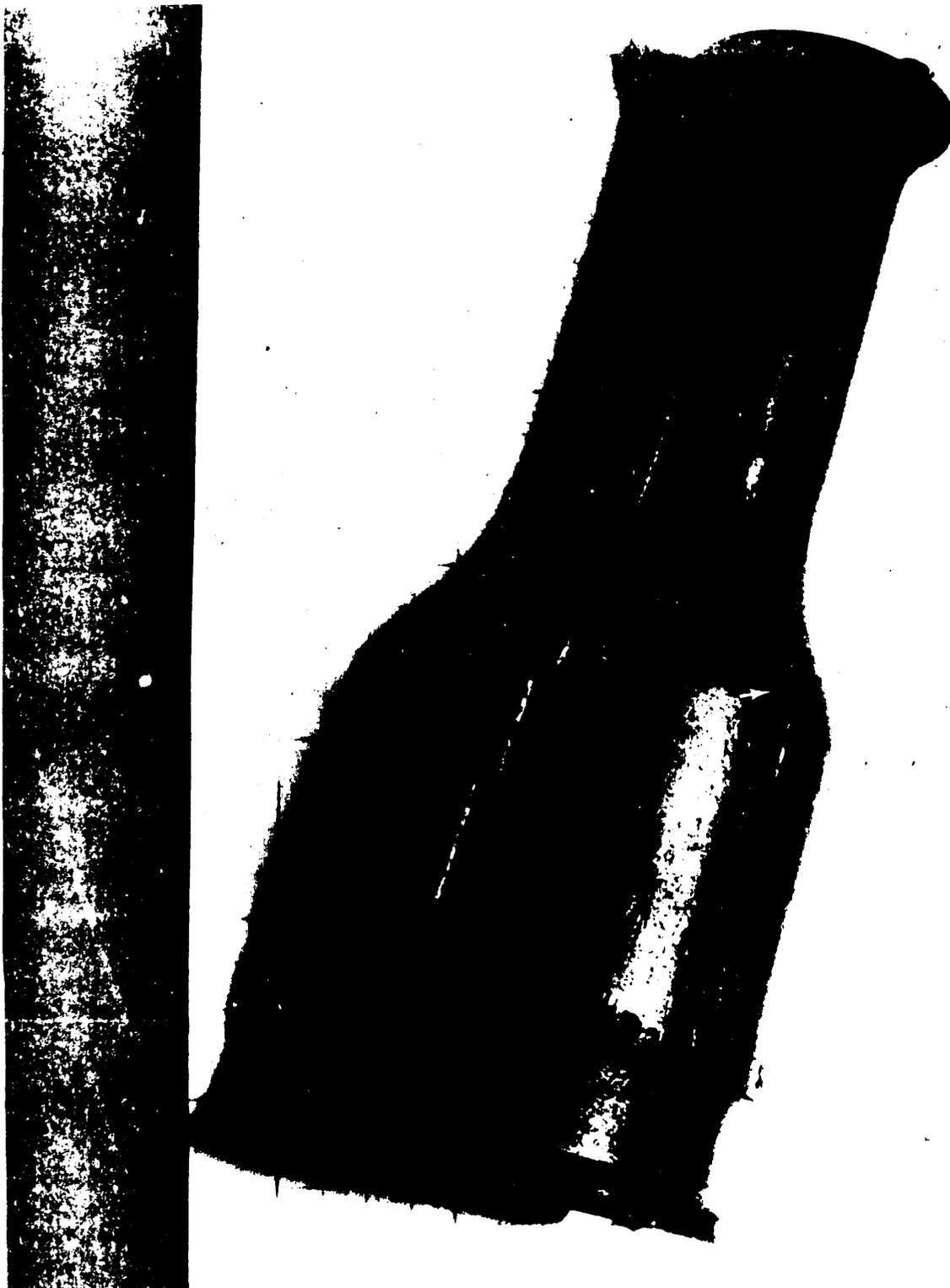


FIGURE 62. —Off register—location I—major; location II—minor.

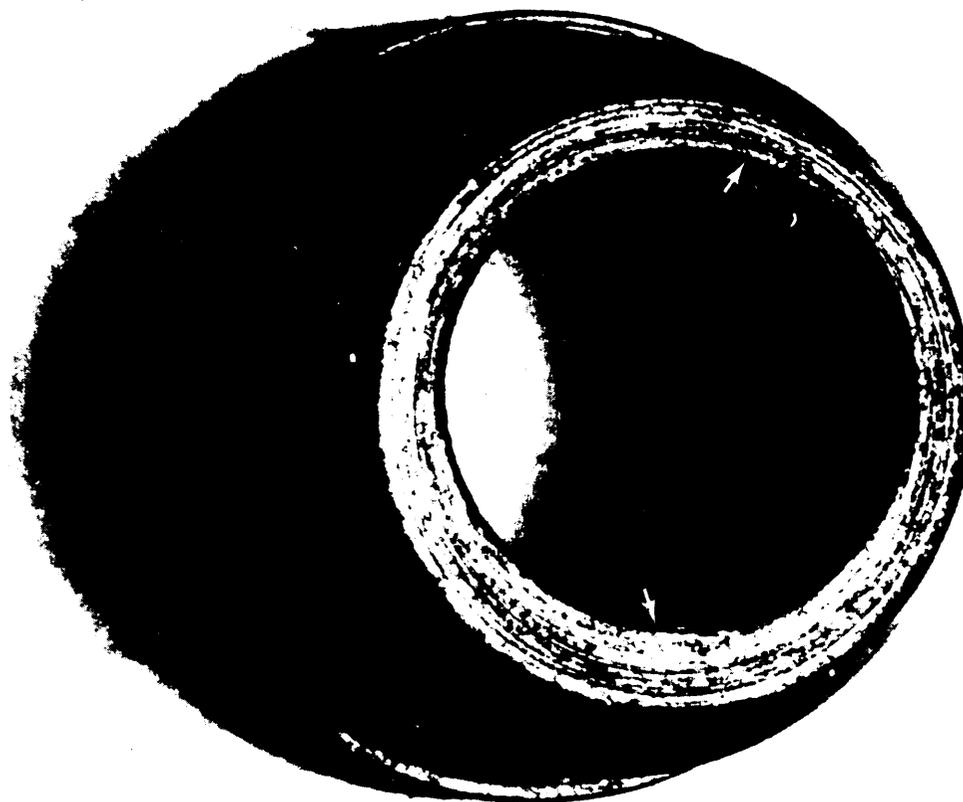


FIGURE 63. —*Off register—location I—major; location II—minor.*

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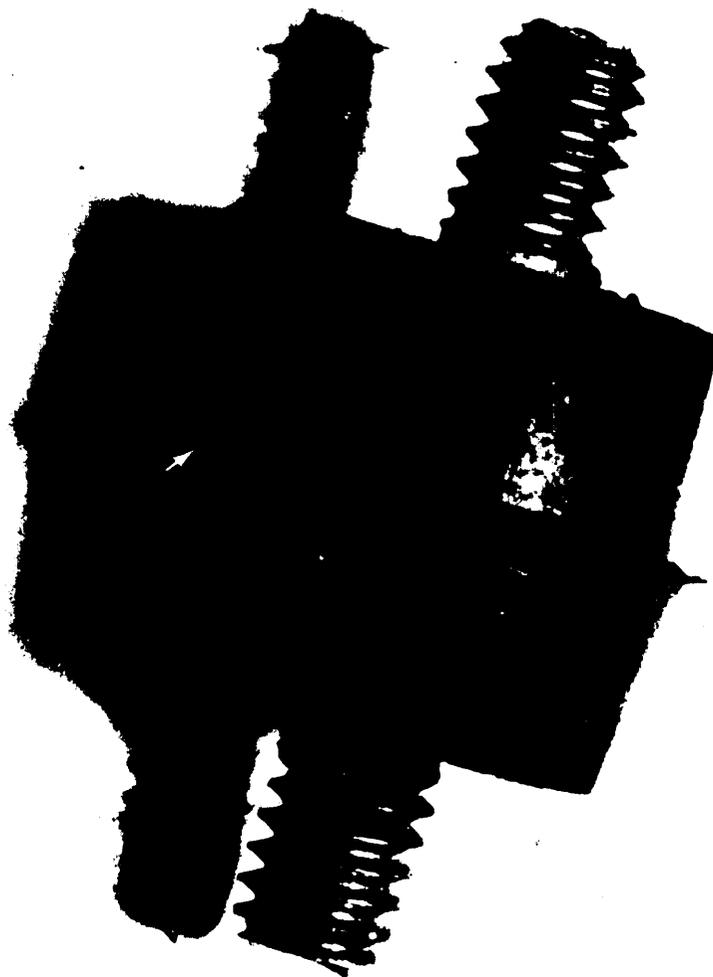


FIGURE 64. —*Off register—location I—major; location II—minor.*

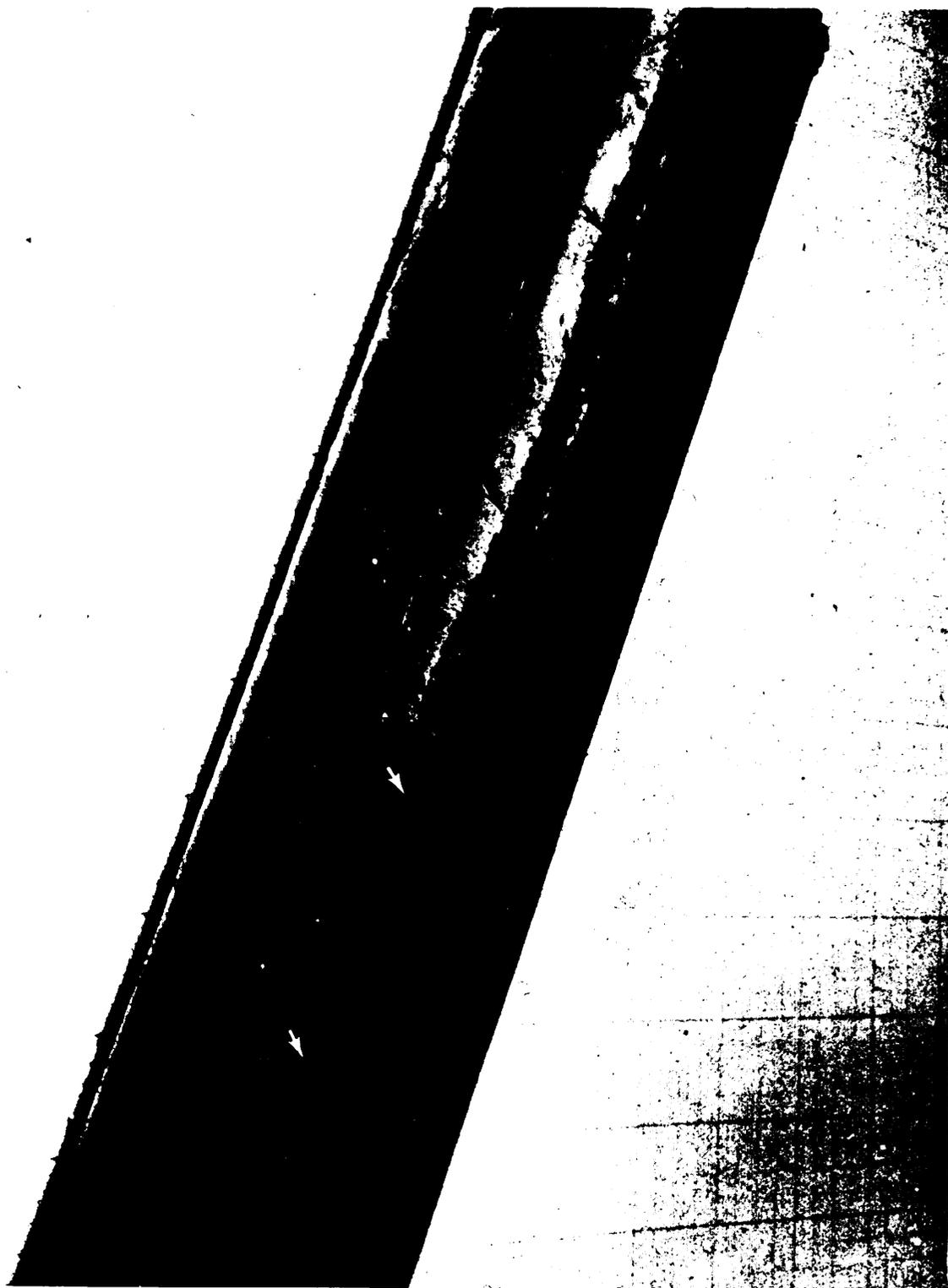


FIGURE 65. —Back rind—location I—major; location II—major.

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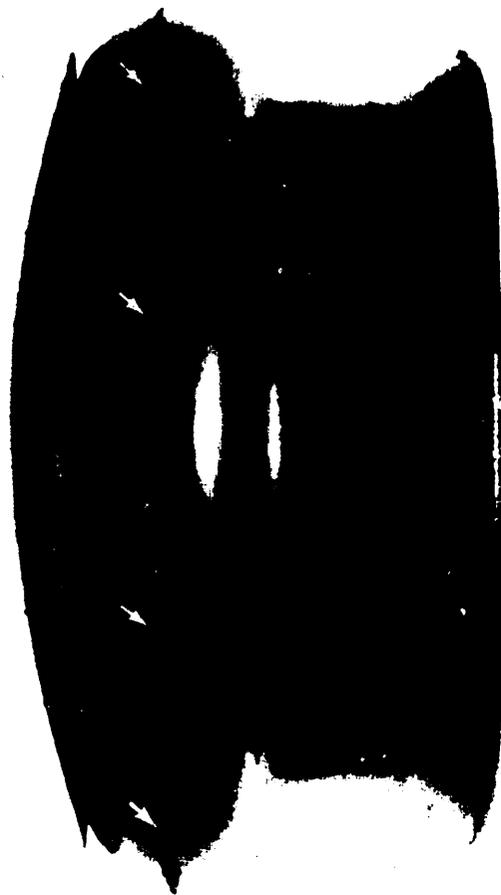


FIGURE 66. —*Back rind—location I—major; location II—major.*



FIGURE 67. —*Back rind—location I—major; location II—minor.*

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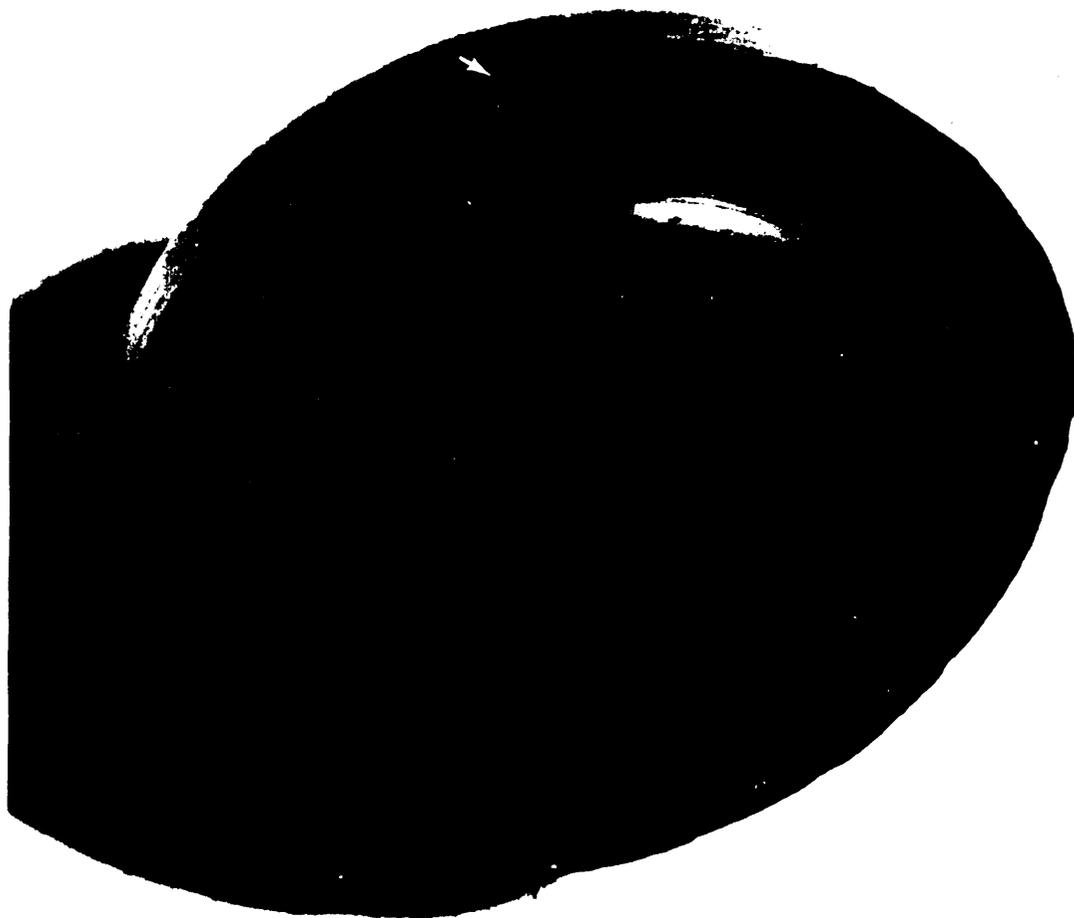


FIGURE 68. —*Back ring—location I—major; location II—minor.*

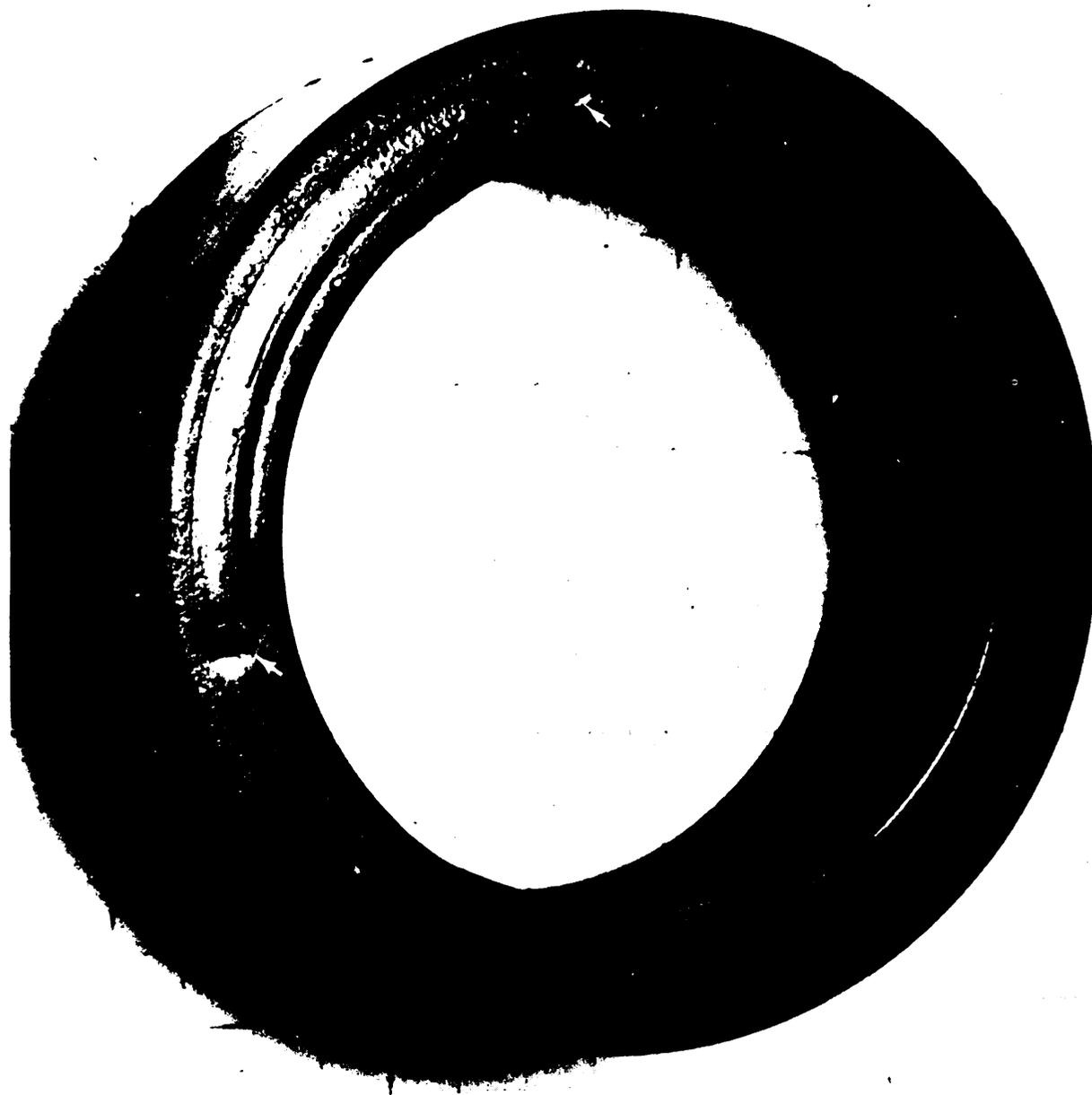


FIGURE 69. —*Sprue mark—location I—major; location II—major.*

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FIGURE 70. —*Sprue mark—location I—major; location II—not a defect.*



FIGURE 71. —*Sprue mark—location I—major; location II—not a defect.*

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FIGURE 72. —Trim, buff—location I—major; location II—major.



FIGURE 73. —Trim, buff—location I—major; location II—minor.

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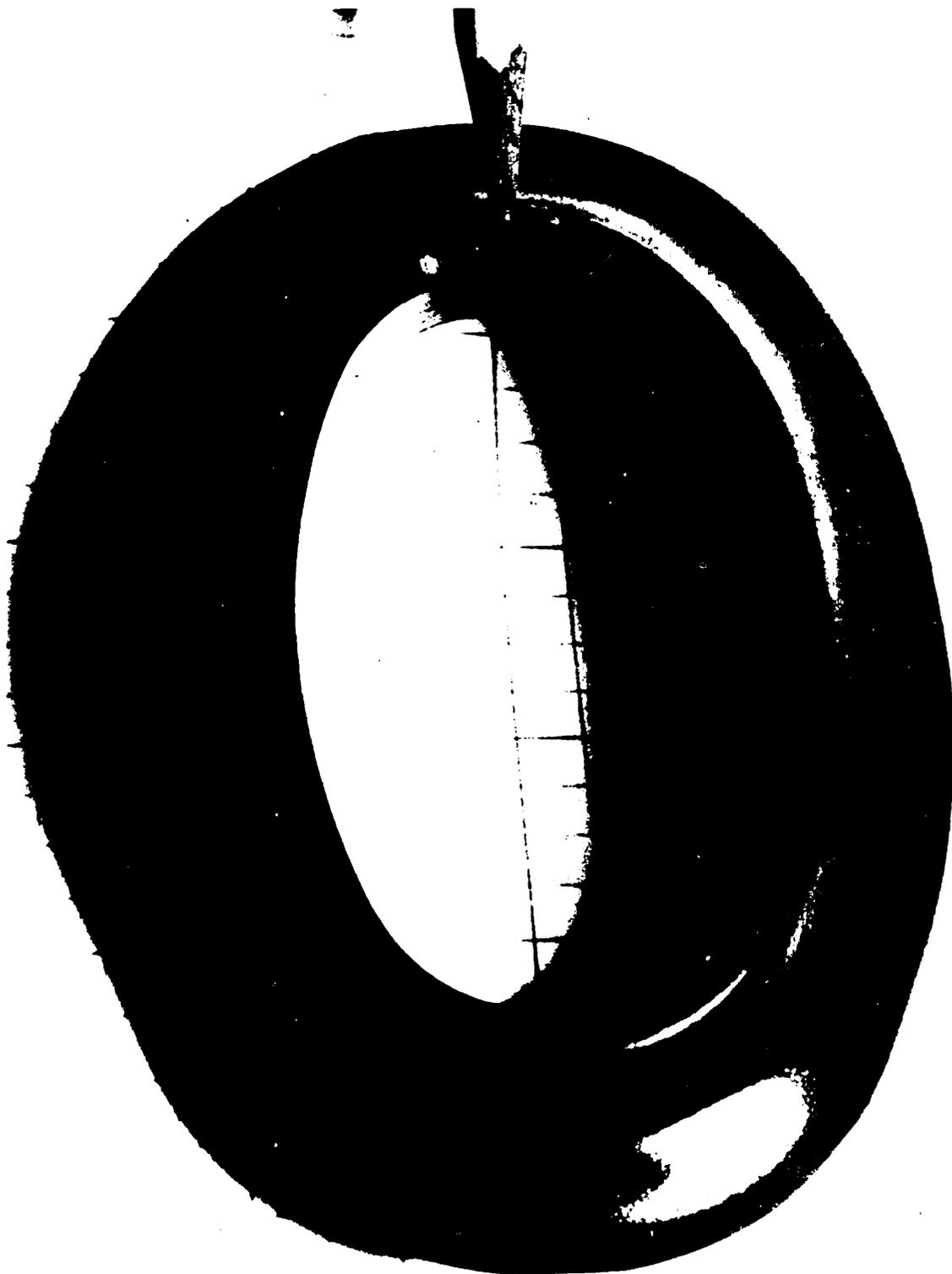


FIGURE 74. —Trim, buff—location I—major; location II—minor.

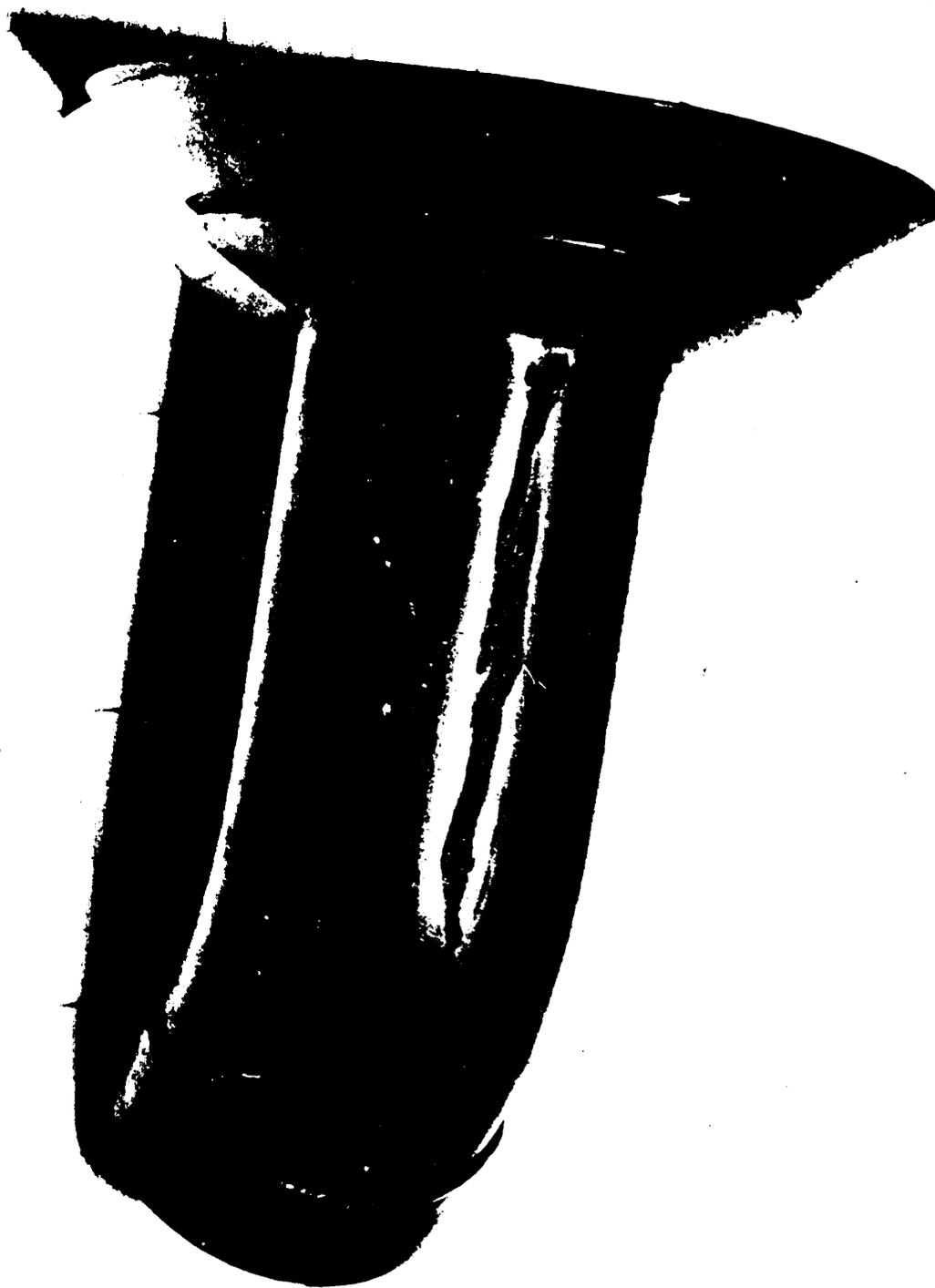


FIGURE 75. —Trim, buff—location I—not a defect (generally); location II—not a defect.

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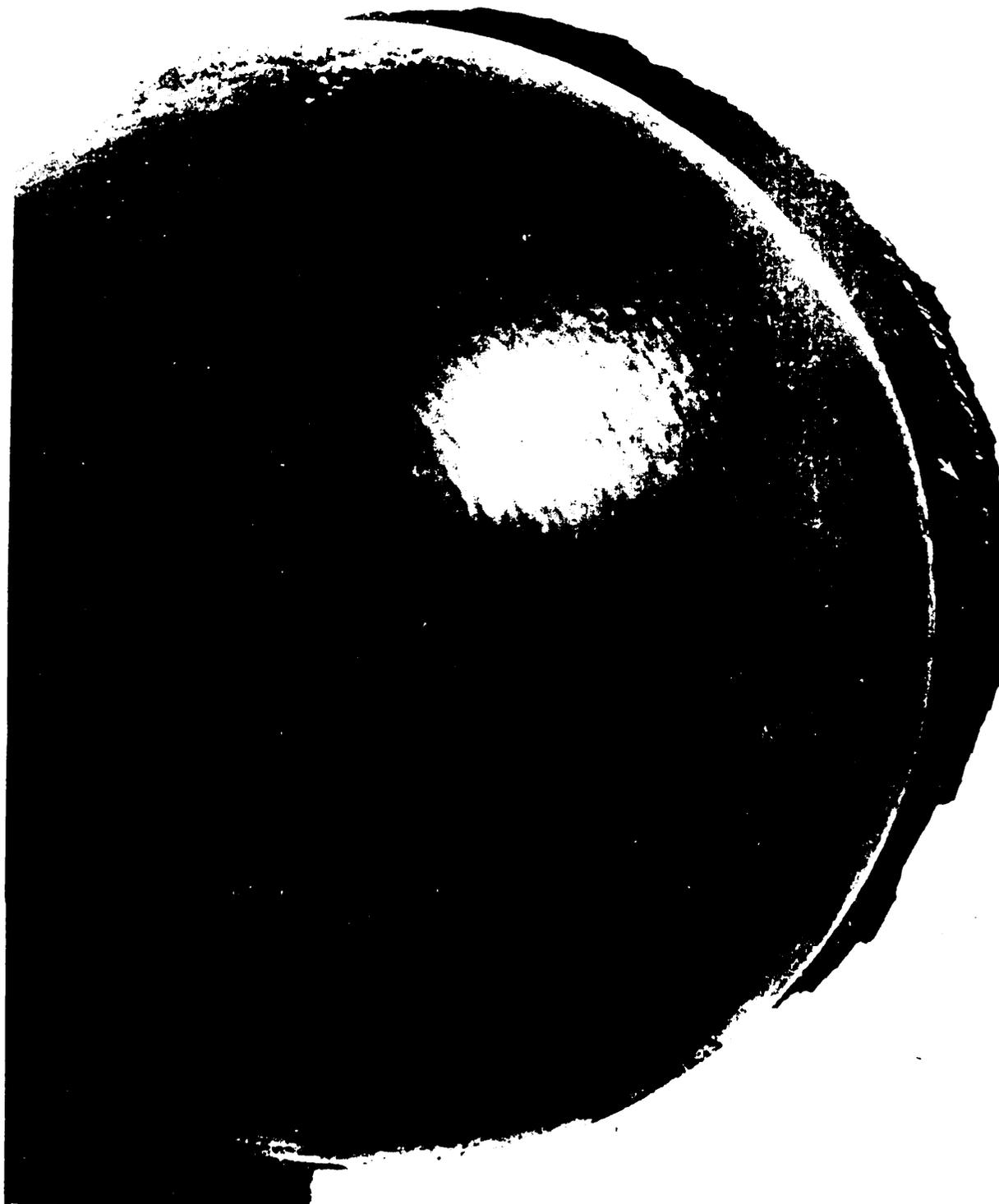


FIGURE 76. —Trim, hand—location I—major; location II—not a defect.



FIGURE 77. —Trim, hand—location I—major; location II—not a defect.

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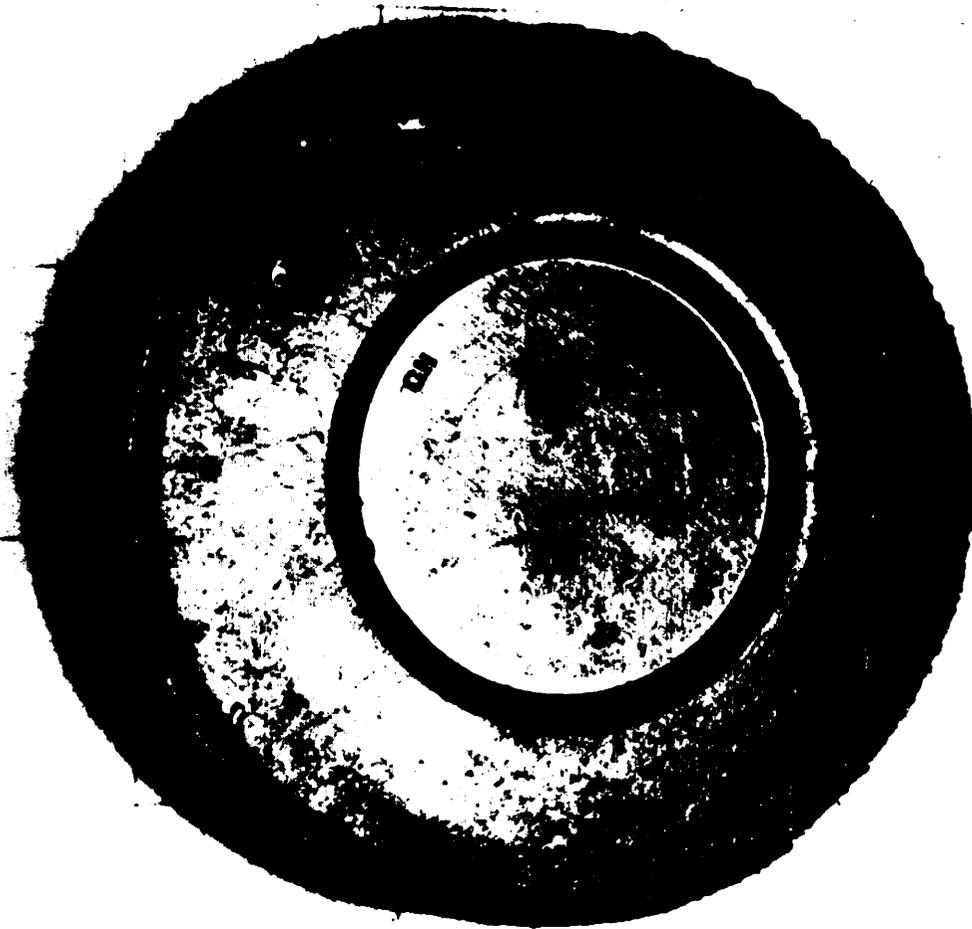


FIGURE 78. —Trim, hand—location I—major; location II—not a defect.



FIGURE 79. —*Trim, hand—location I—major; location II—not a defect.*

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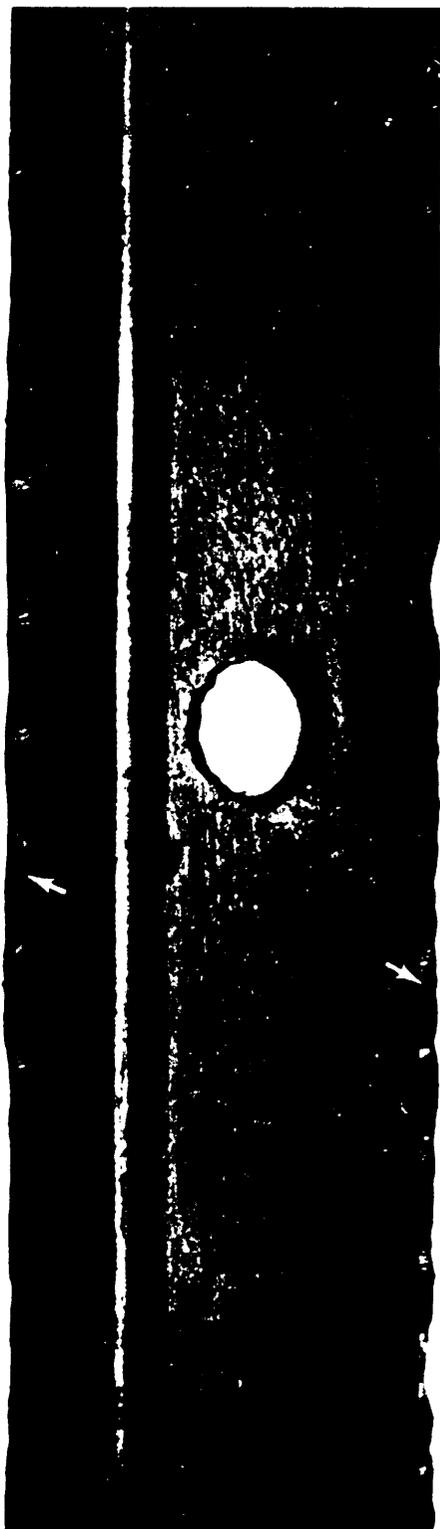


FIGURE 80. —Trim, hand—location I—major; location II—not a defect.

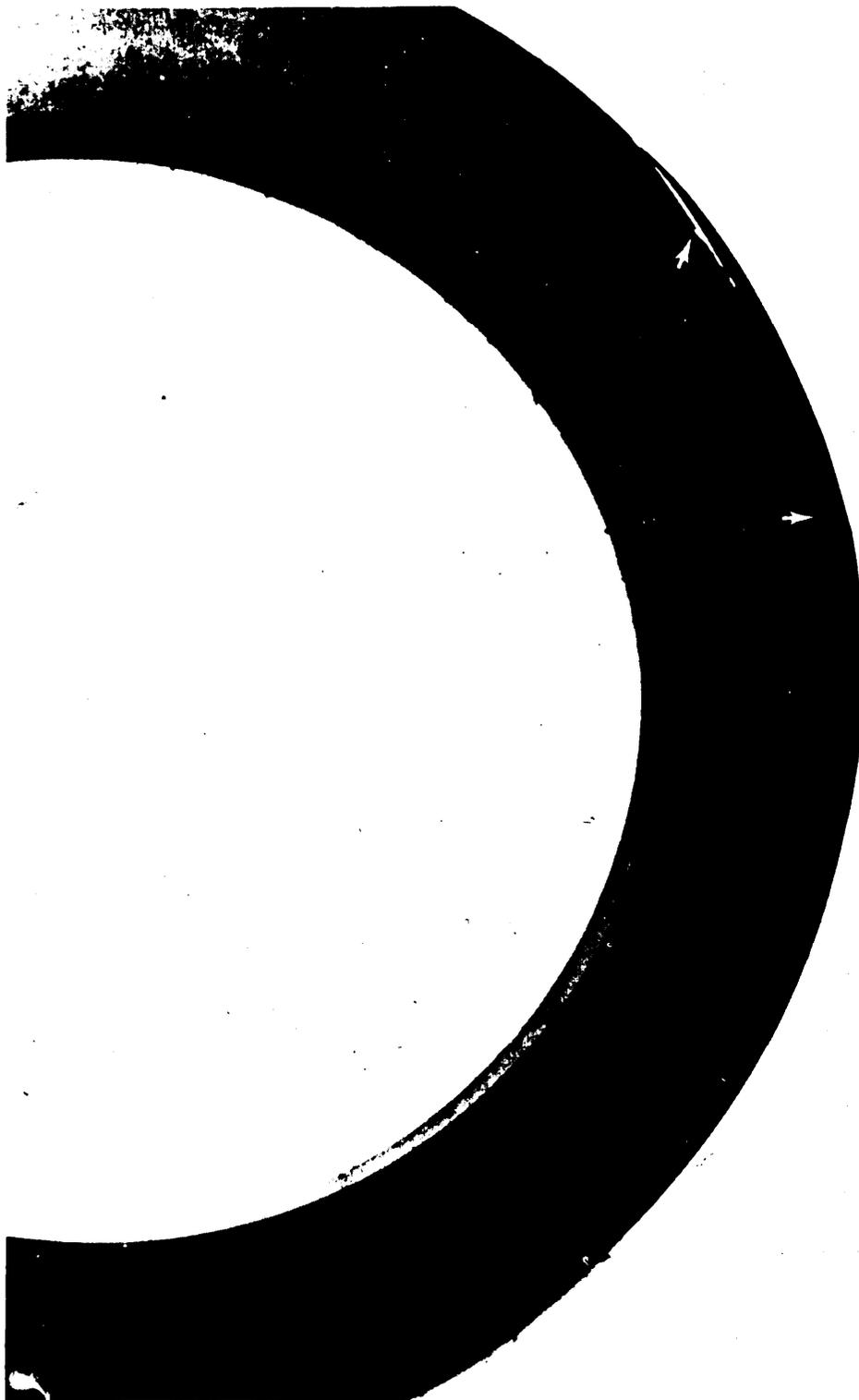


FIGURE 81. —*Trim, machine—location I—major; location II—major.*

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FIGURE 82. —Trim, machine—location I—major; location II—major.



FIGURE 83. —*Trim, machine—location I—major; location II—major.*

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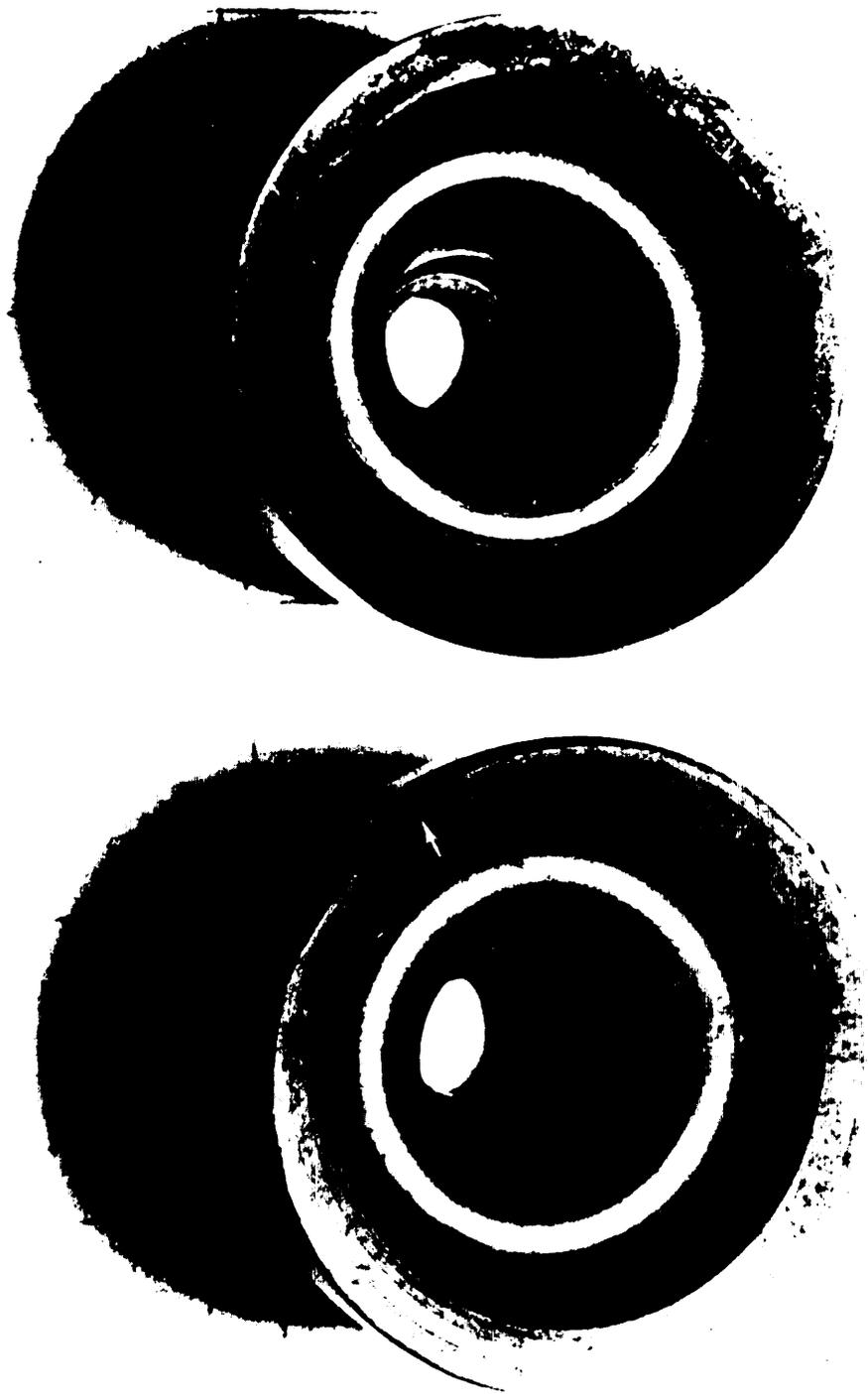


FIGURE 84. —Trim, machine—location I—major; location II—minor. Top example is correct for comparison. Bottom example is a defective.



FIGURE 85. —Trim, machine—location I—major; location II—minor.

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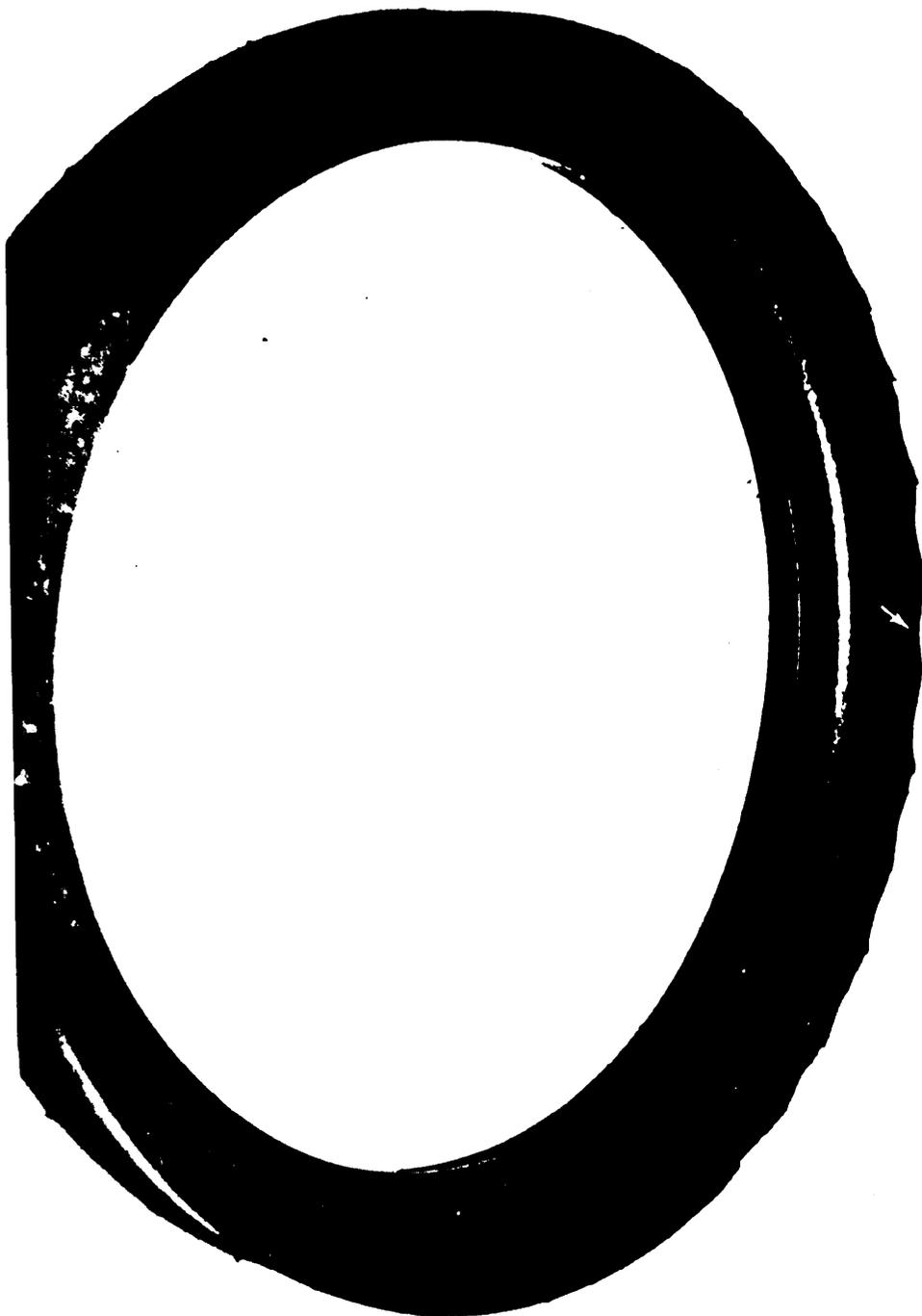


FIGURE 86. —*Trim, machine—location I—major; location II—minor.*



FIGURE 87. —Trim, machine—location I—major; location II—major. Top example is the defective. Bottom example is a correct one for comparison.

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FIGURE 88. —*Trim, machine—location I—major; location II—major.*



FIGURE 89. —Trim, machine—location I—major; location II—major.

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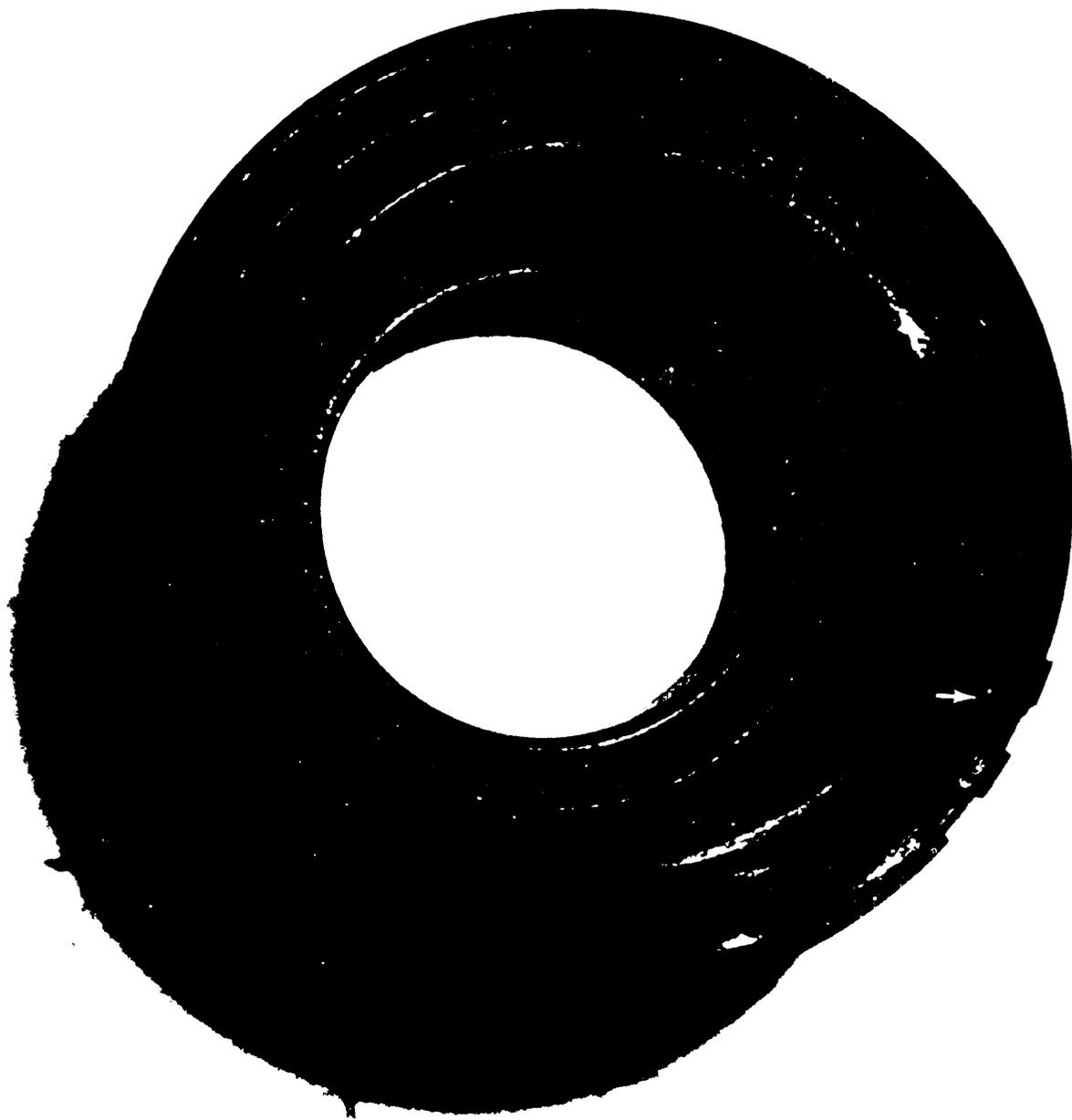


FIGURE 90. —Trim, machine—location I—major; location II—major.

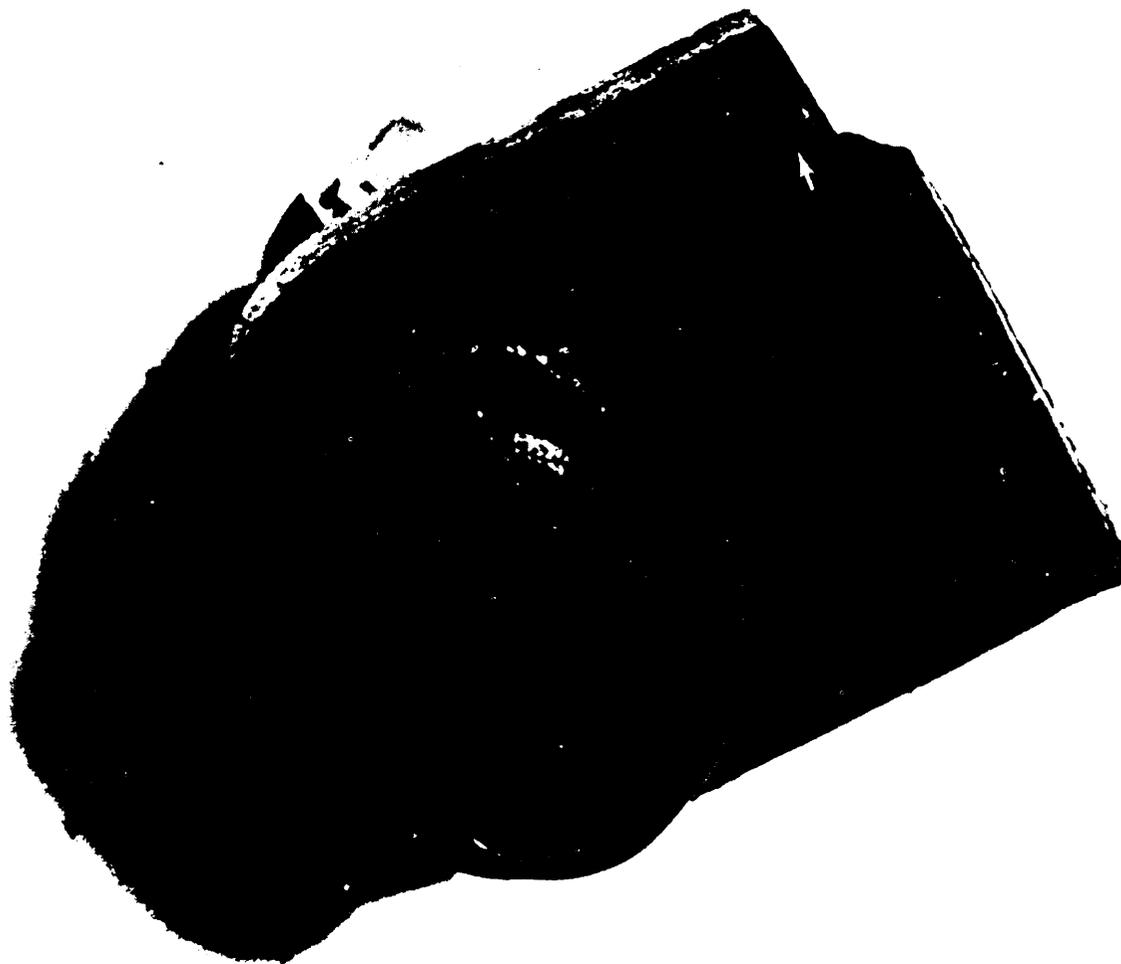


FIGURE 91. —*Trim, tumble—location I—major; location II—major.*

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FIGURE 92. —*Trim, tumble—location I—major; location II—not a defect.*



FIGURE 93. —*Trim, tumble—location I—major; location II—not a defect.*

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FIGURE 94. —*Floating fabric—location I—major; location II—minor.*

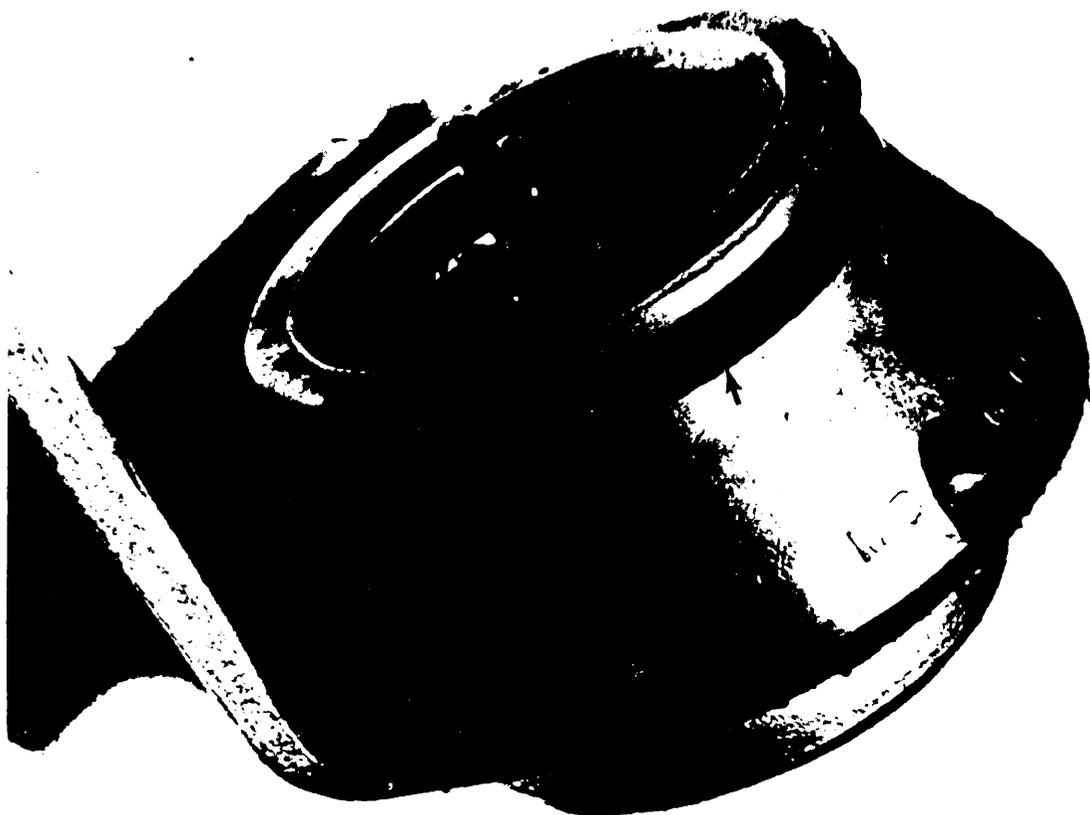


FIGURE 95. —*Bad adhesion—location I—major; location II—major.*

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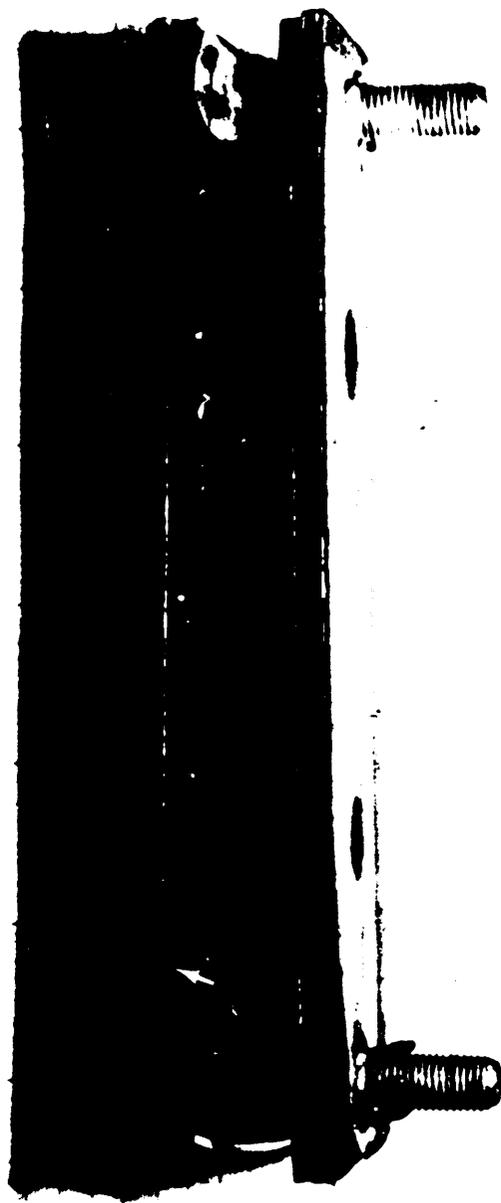


FIGURE 96. —*Bad adhesion—location I—major; location II—major.*

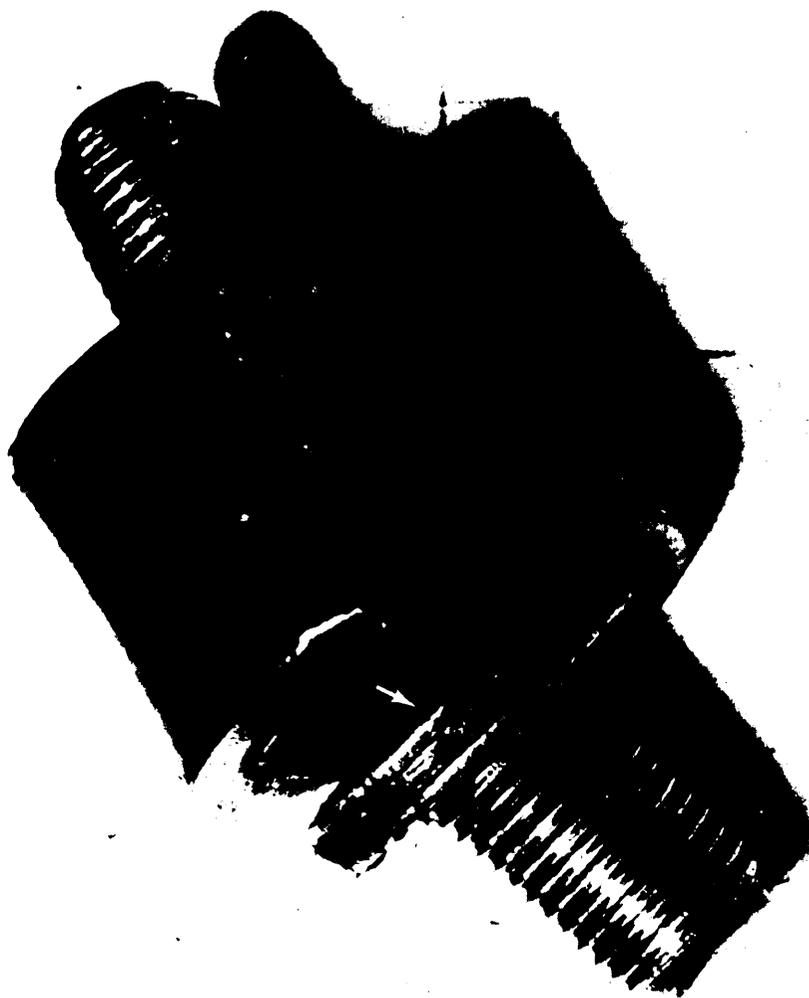


FIGURE 97. —*Bad adhesion—location I—major; location II—major.*

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FIGURE 98. —*Poor adhesion—location I—major; location II—minor.*



FIGURE 99. —*Poor adhesion—location I—major; location II—minor.*

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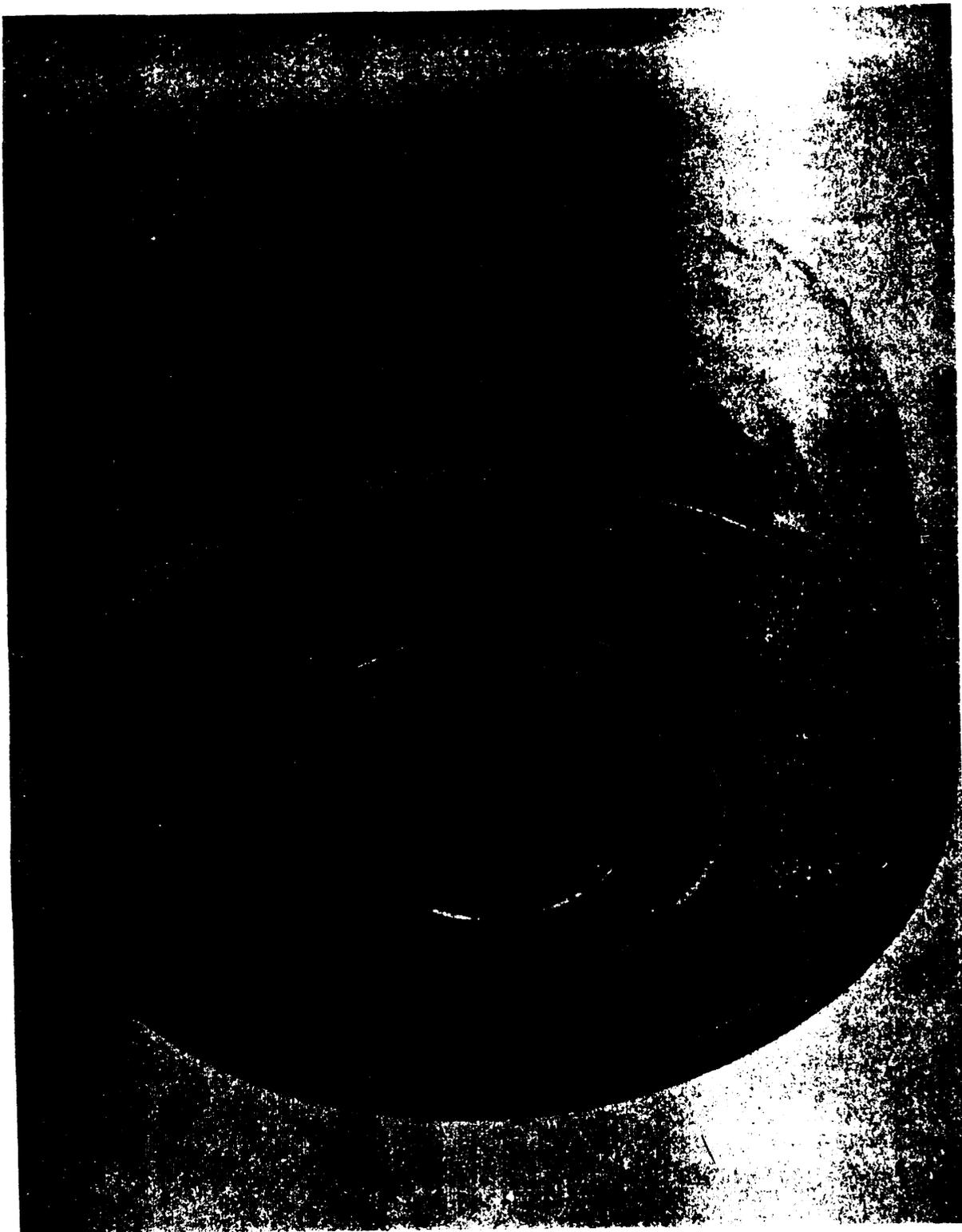


FIGURE 100. —*Poor adhesion—location I—major; location II—minor.*



FIGURE 101. —Excessive flash—location I—major; location II—major.

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FIGURE 102. —*Excessive flash—location I—major; location II—major.*



FIGURE 103. —*Excessive flash—location I—major; location II—major.*

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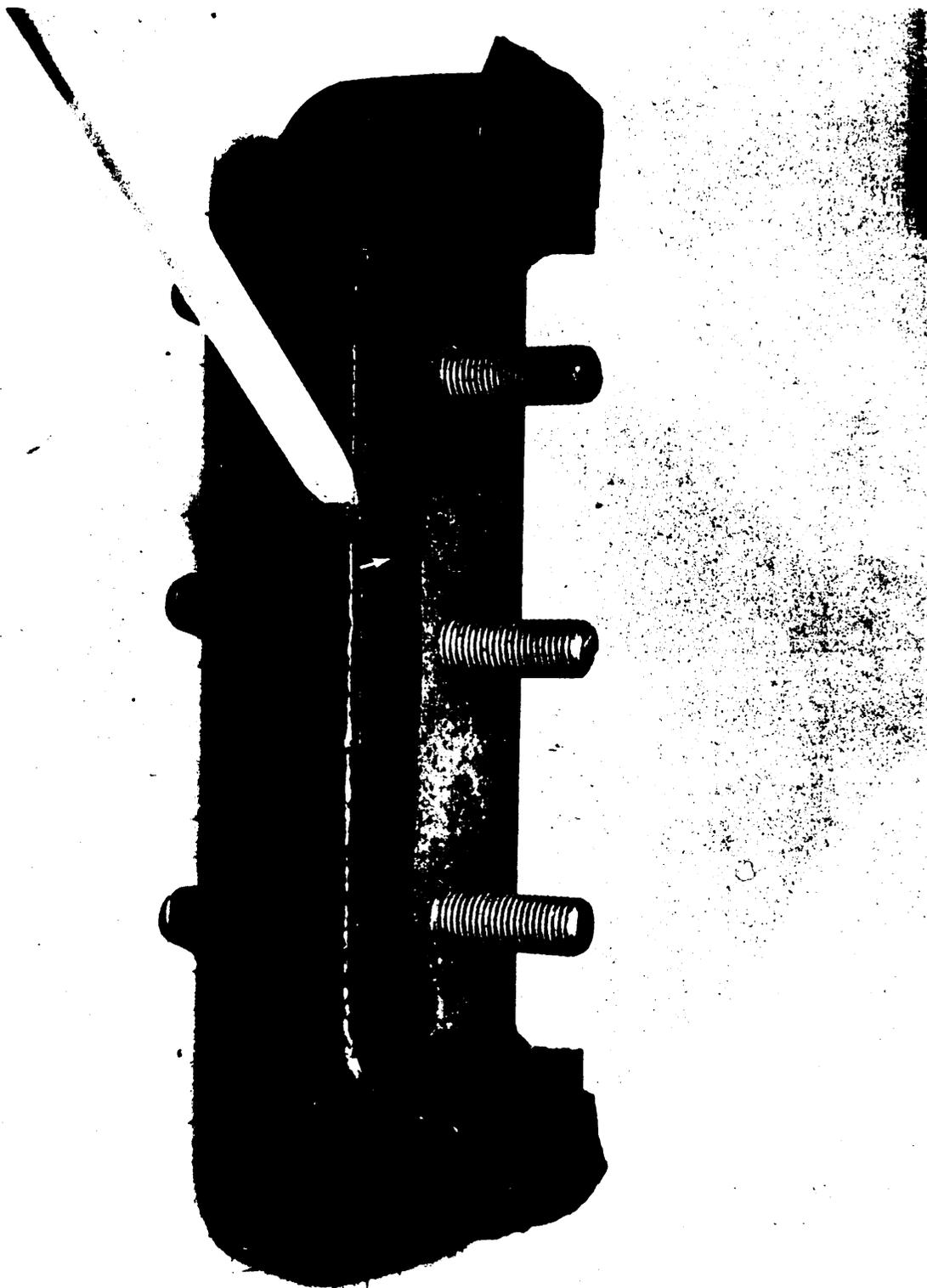


FIGURE 104. —Excessive flash—location I—minor; location II—not a defect.

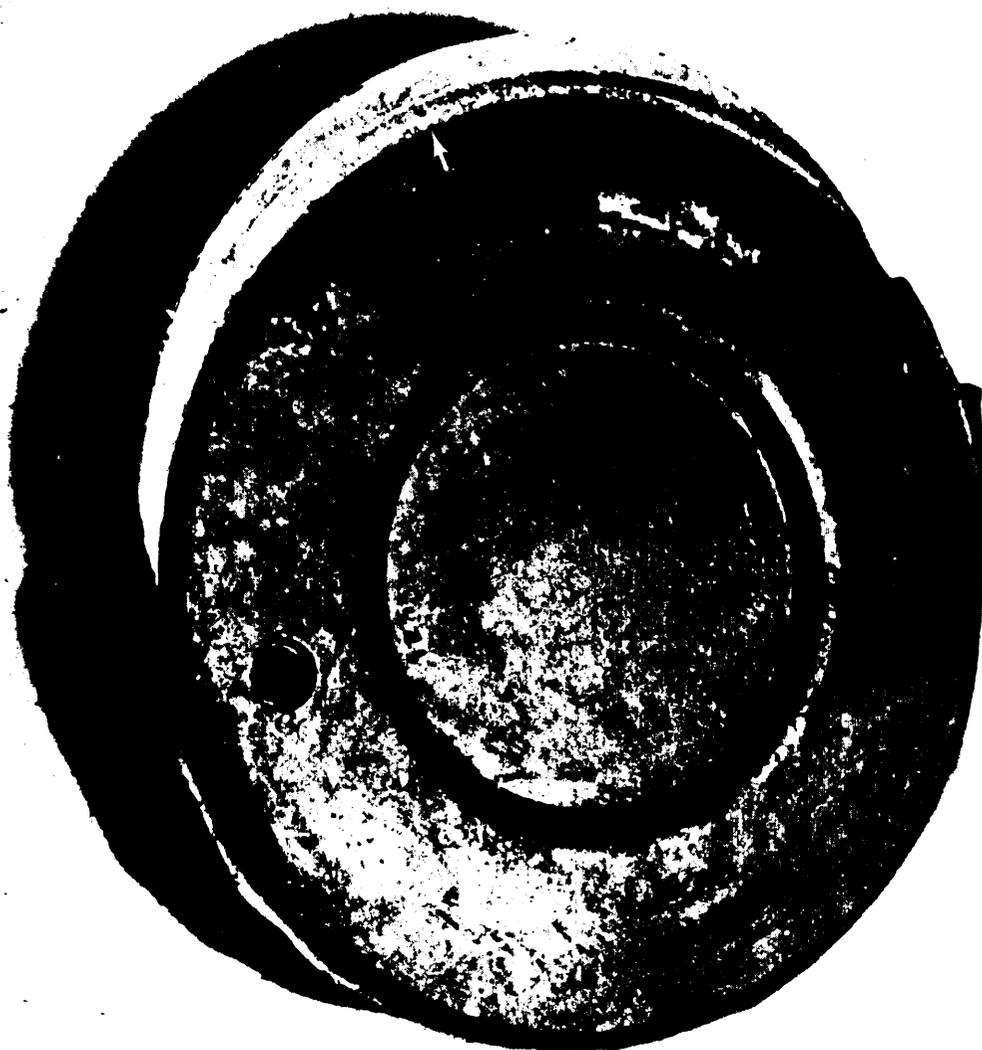


FIGURE 105. —*Misplaced (insert) location I—major; location II—major.*

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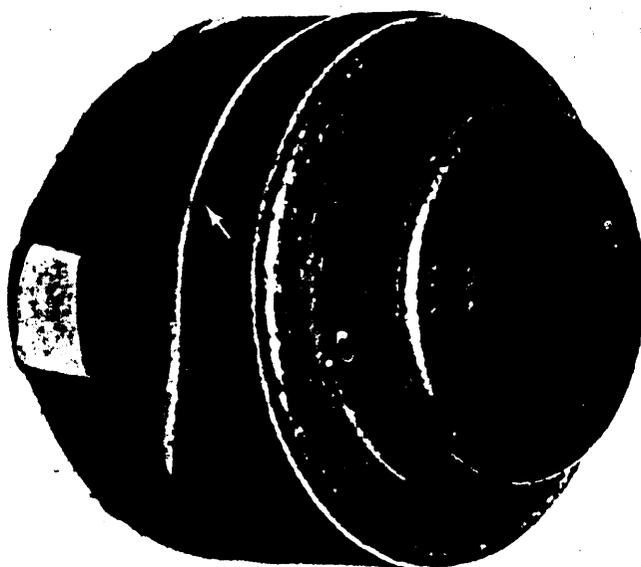


FIGURE 106. —*Misplaced (insert) location I—major; location II—major.*



FIGURE 107. —Missing (insert)—location I—major; location II—major.

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FIGURE 108. —*Missing (insert)—location I—major; location II—major.*



FIGURE 109. —Rust—location I—major; location II—major.

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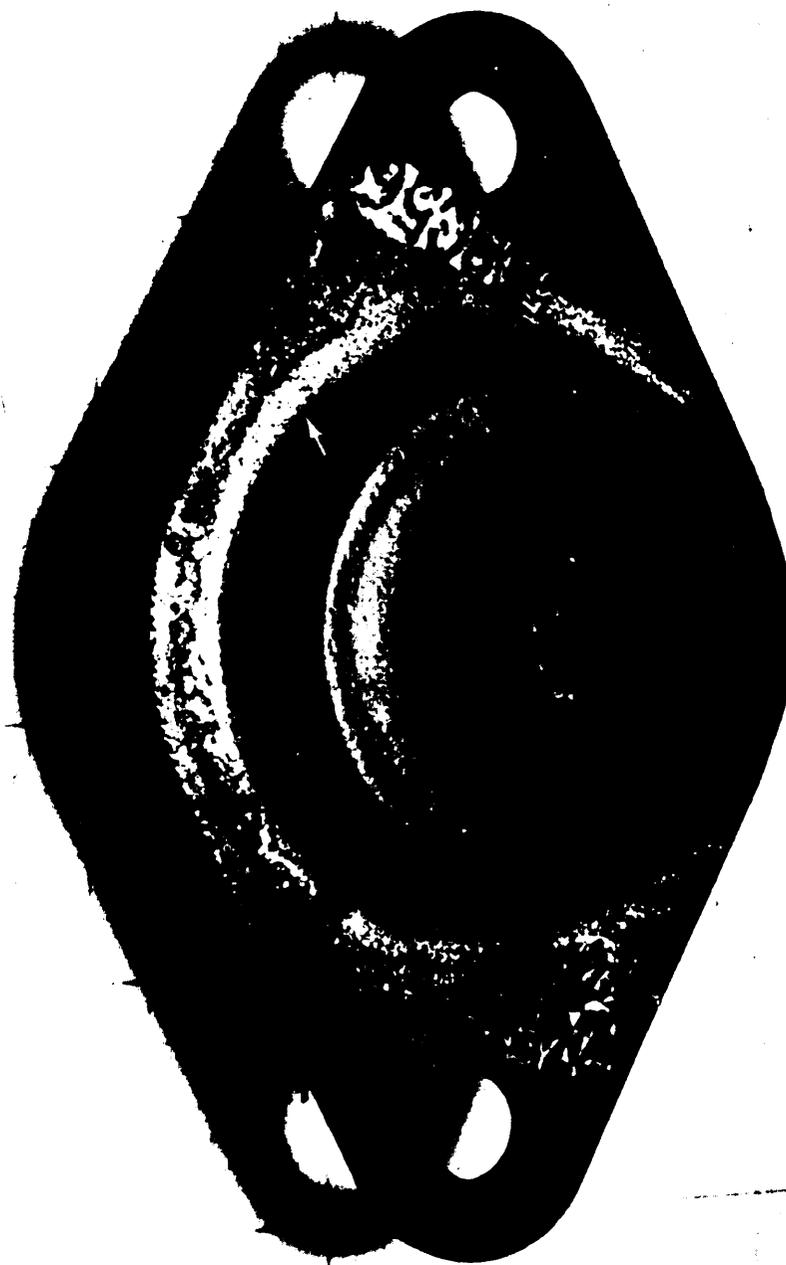


FIGURE 110. —Rust—location I—major; location II—minor.

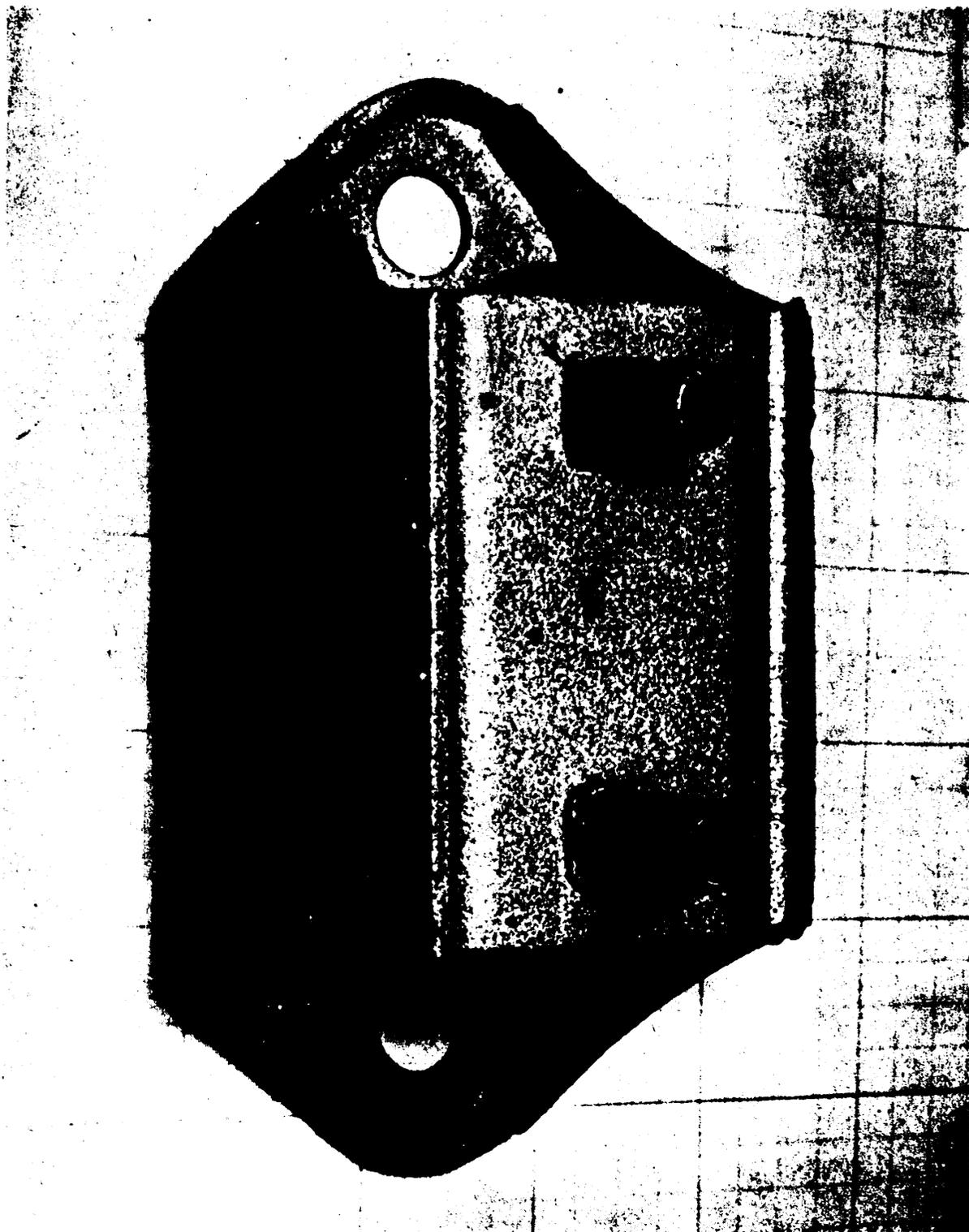


FIGURE 111. —*Bad staking—location I—major; location II—major. Top bolt is the defective. Bottom bolt shows the correct position.*

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FIGURE 112. —*Bad threads—major.*

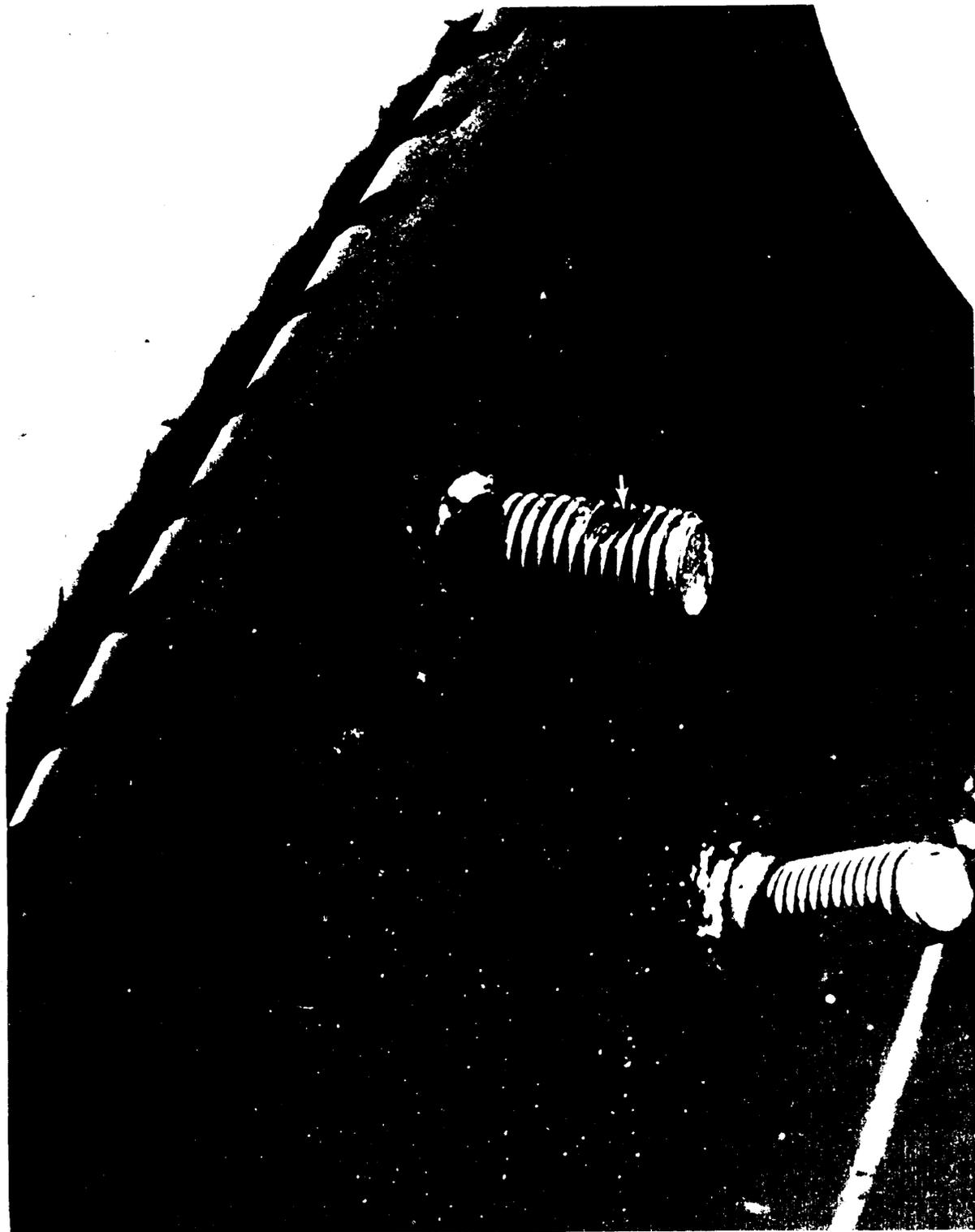


FIGURE 113. —*Bad threads—major.*

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FIGURE 114. —*Bad threads—major. Top bolt has chafed threads. Bottom bolt is an acceptable example.*

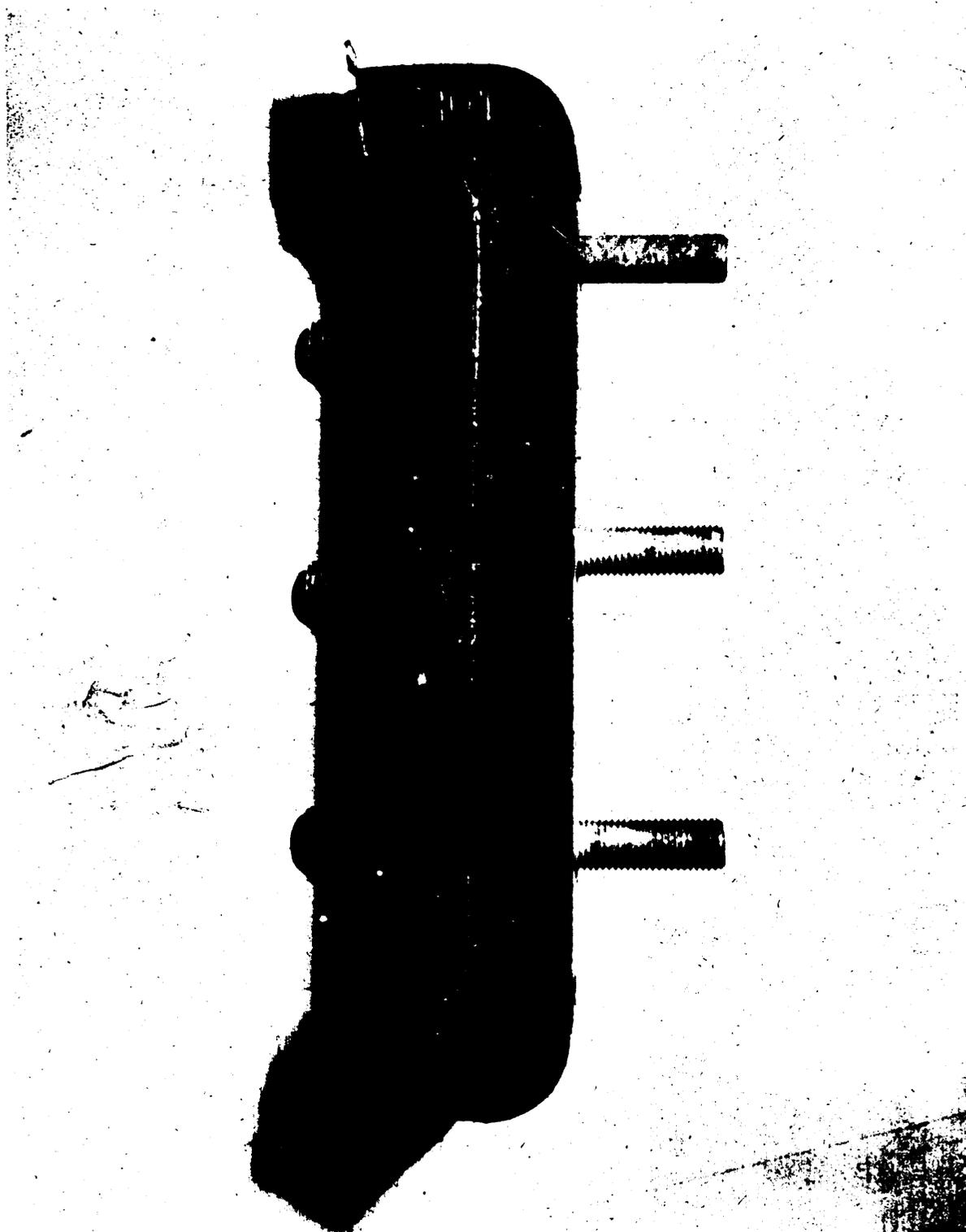


FIGURE 115. —*Bad threads—major. Threads in the top bolt are missing. Other bolts are acceptable examples.*

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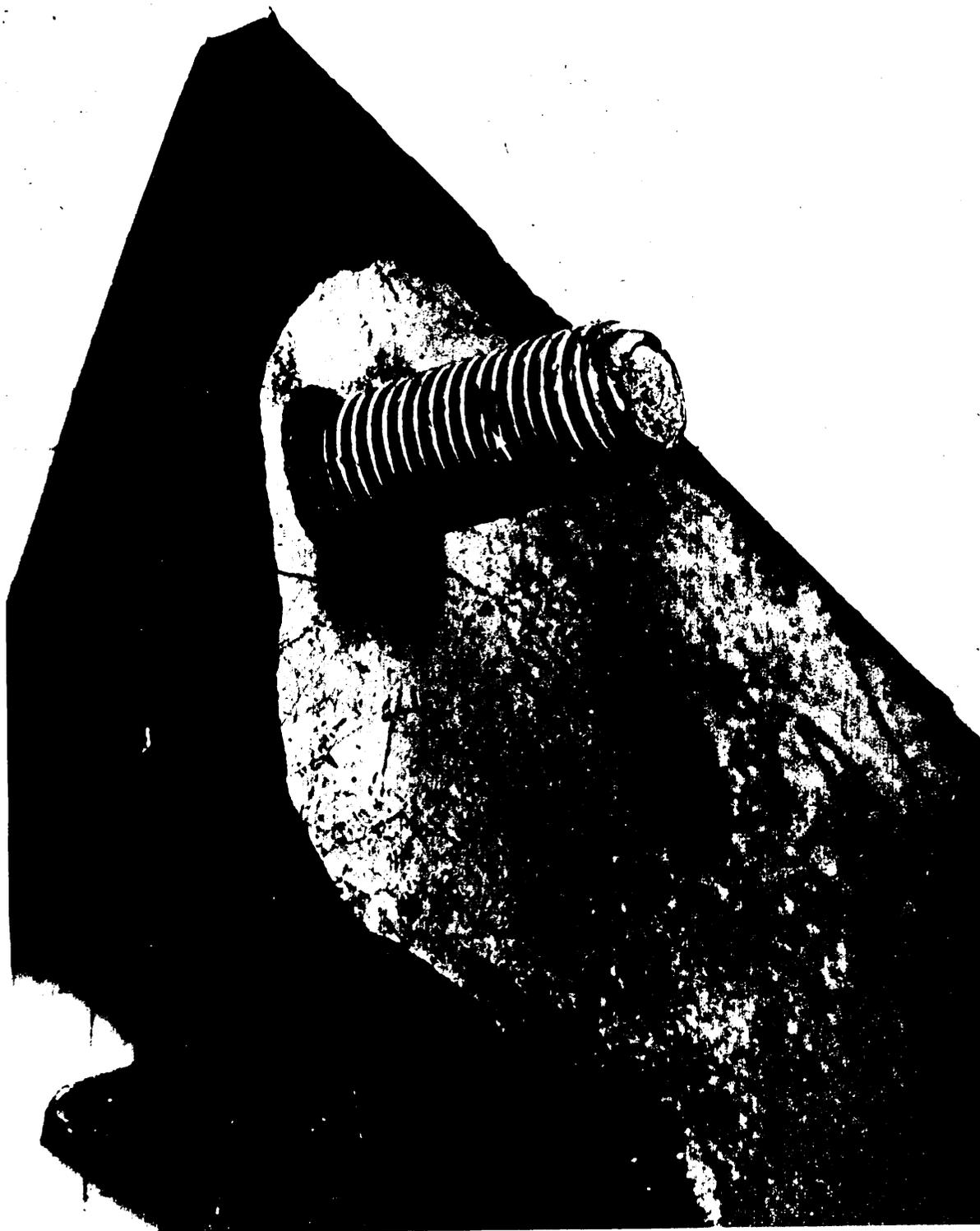


FIGURE 116. —*Poor threads—minor.*

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions – Reverse Side)*

<b>1. DOCUMENT NUMBER</b>	<b>2. DOCUMENT TITLE</b>
<b>3a. NAME OF SUBMITTING ORGANIZATION</b>	<b>4. TYPE OF ORGANIZATION (Mark one)</b>
<b>b. ADDRESS (Street, City, State, ZIP Code)</b>	<input type="checkbox"/> VENDOR  <input type="checkbox"/> USER  <input type="checkbox"/> MANUFACTURER  <input type="checkbox"/> OTHER (Specify): _____
<b>5. PROBLEM AREAS</b>	
<b>a. Paragraph Number and Wording:</b>          <b>b. Recommended Wording:</b>          <b>c. Reason/Rationale for Recommendation:</b>          	
<b>6. REMARKS</b>	
<b>7a. NAME OF SUBMITTER (Last, First, MI) – Optional</b>	<b>b. WORK TELEPHONE NUMBER (Include Area Code) – Optional</b>
<b>c. MAILING ADDRESS (Street, City, State, ZIP Code) – Optional</b>	<b>8. DATE OF SUBMISSION (YYMMDD)</b>