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Ram Jet Helicopter Development - Progress Report 65 - Month of Jan 1952

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USAF Contr. No. AF33(038)-9845

Helicopter rotors, Jet
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H-20

Rotating Wing Aircraft (34)
Drive System (6)

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REPORT

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PROPELLER LABORATORY

DATE 15 February 1952

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MCDONNELL *Aircraft Corporation*

ST. LOUIS 3, MISSOURI

PROGRESS REPORT 65

MONTH OF JANUARY 1952

RAM JET HELICOPTER DEVELOPMENT

SUBMITTED UNDER Contract AF 33(038)-2815

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1. **SUMMARY**

The higher thrust, larger 8.71-inch diameter ram jets required for flight test program with the 27-foot diameter motor are 50% completed. The jets are scheduled to be available to start the program in compliance with Item 5 and 8 of subject contract late in March. The modified design for the second 27-foot motor in compliance with Item 6 of subject contract was submitted to SACM on 15 January 1952.

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MODEL XII-20

2. ROTOR DEVELOPMENT

2.1 No. 1, 27-Foot Diameter Rotor

No Change.

2.2 No. 2, 27-Foot Diameter Rotor

2.2.1 The modified design of the second 27-foot diameter rotor was submitted to WJMR on 15 January 1952. The basic changes were:

2.2.1.1 The removal of the gear clevis channel and substitution of an internal spar compression member.

2.2.1.2 The increase of the trailing edge skin gauge. Successful structural tests have been made on samples of the new design (MAC Drawing 22-19201). A set of blades MAC-finned, is currently under construction.

2.2.2 WJMR's letter dated 30 January 1952, with reference to the construction of the second 27-foot diameter rotor, is being studied and a letter reply is being prepared.

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MODEL XI-20

3. 0.71-INCH DIAMETER RAM JETS

The structural re-design of the 0.71-inch diameter ram jets was completed in January. One set of the new ram jets is scheduled to be available for whirl tests on the 27-foot diameter test rig in March. Eight tests in compliance with Items 5 and 8 of subject contract are scheduled upon completion of the whirl tests.

The estimated required procedure for the design and fabrication of one set of structurally improved 0.71-inch ram jets is:

Stress Analysis

Weights and C.G. Determination

Preparation of Drawings

Re-work of Test Jets

Static Testing (Free Air Jet)

Repair and Re-work of Available Jets

Whirlstand Test of Jets

Preparation of Inconel "X" Tensile Test Specimen

Ignition Development and Re-work

Fabricate New Set of Jets

Whirl Test of New Jets

Temperature Surveys and Data Analysis

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MODEL XF-20

3.1 Whirl Test High Speed Photography

High speed photographs were taken of the ram jet exit during whirl test operations. Enclosures (1) through (5). They show that the exit deforms during the whirl test without a permanent modification in the exit shape. The measurements of ram jet exits during whirl tests are scaled off the enlarged prints and may reflect errors due to printing, paper stretching, or in measuring the print.

3.2 Modified Whirl Stand

The MAC-financed single blade hub rotor and the modified whirl test stand reported in Progress Report No. 60 for August 1951, is approximately 90% complete.

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MODEL XH-20

4.0 XH-20, USAF 46-689 and 46-690

4.1 XH-20, No. 1, USAF 46-689

No change.

4.2 XH-20, No. 2, USAF 46-690

No change.

5.0 DAILY FLIGHT SHEETS - XH-20 Flight Test Data

There were no scheduled flights during January 1952.

6.0 WORK PROGRAM FOR FEBRUARY 1952

The increased thrust 8.71-inch diameter ram jets are scheduled for completion late in March 1952.

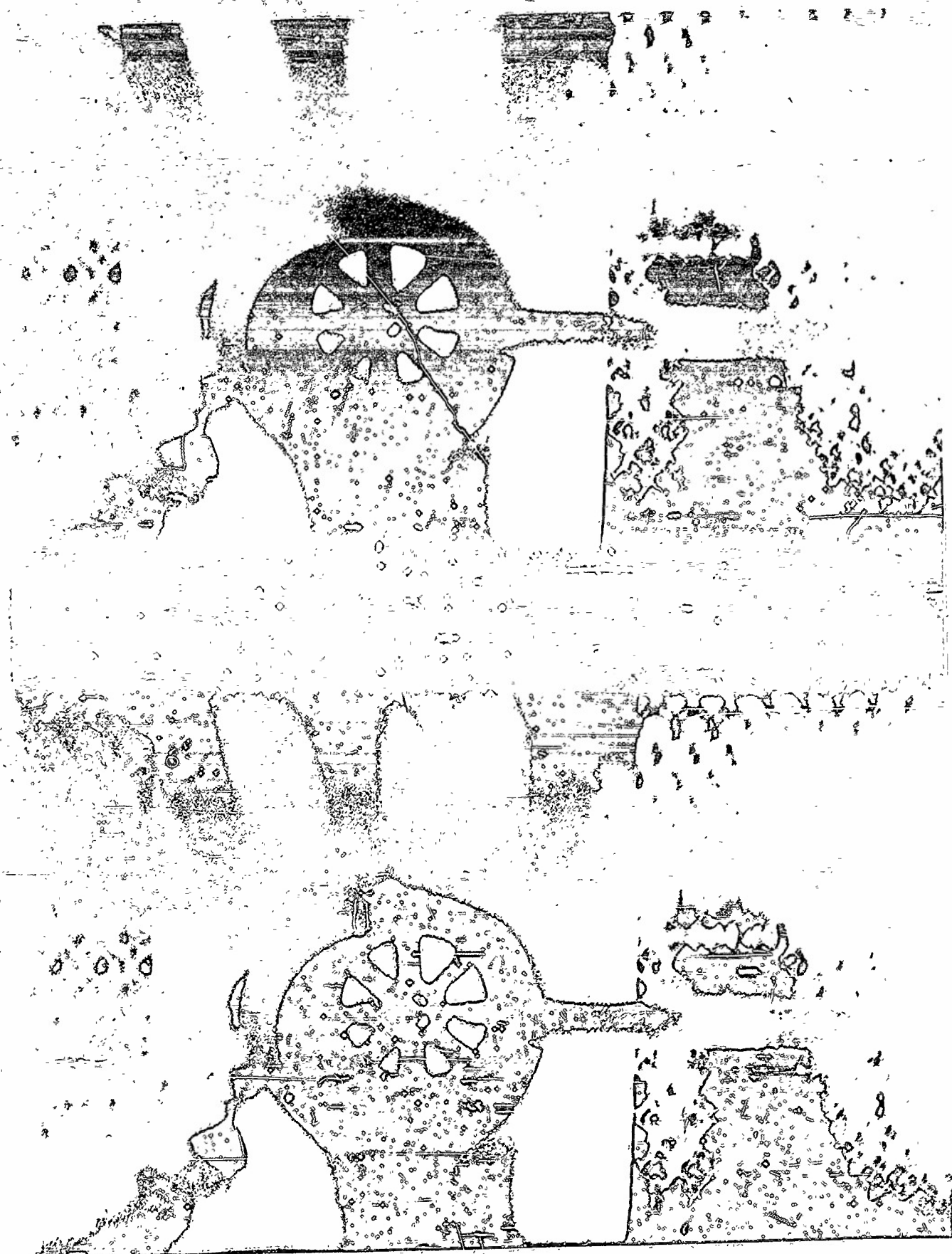


FIGURE (1)

TEST 8.71-INCH DIAMETER RAM JET

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STATIC ON WHEELSTAND

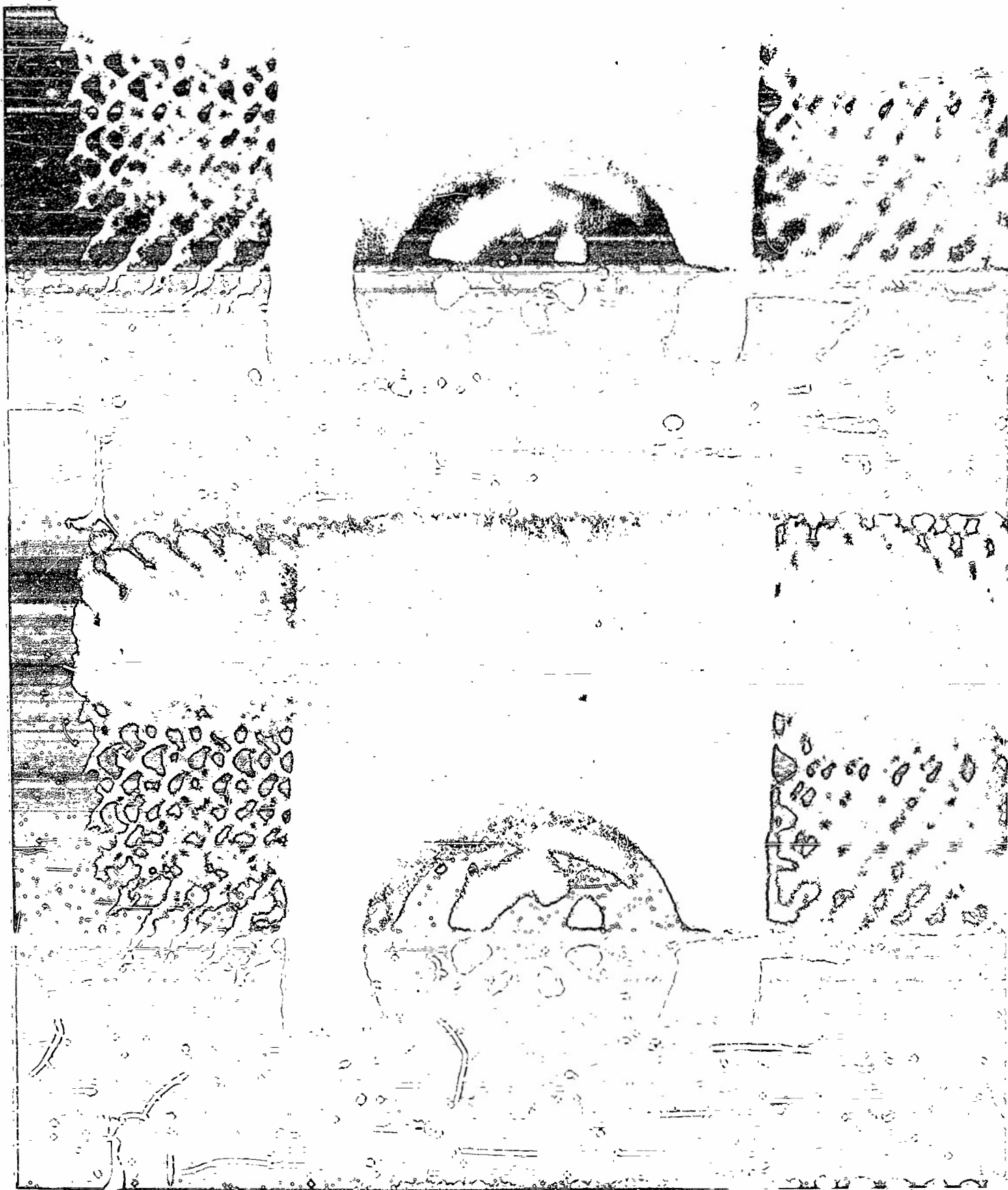


FIGURE (2)

TEST 8.71-INCH DIAMETER RAM JET

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AT 418 RPM ON WHIRLSTAND

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FIGURE (3)

TEST 8.71-INCH DIAMETER RAM JET

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AT 425 RPM ON WHIRLSTAND

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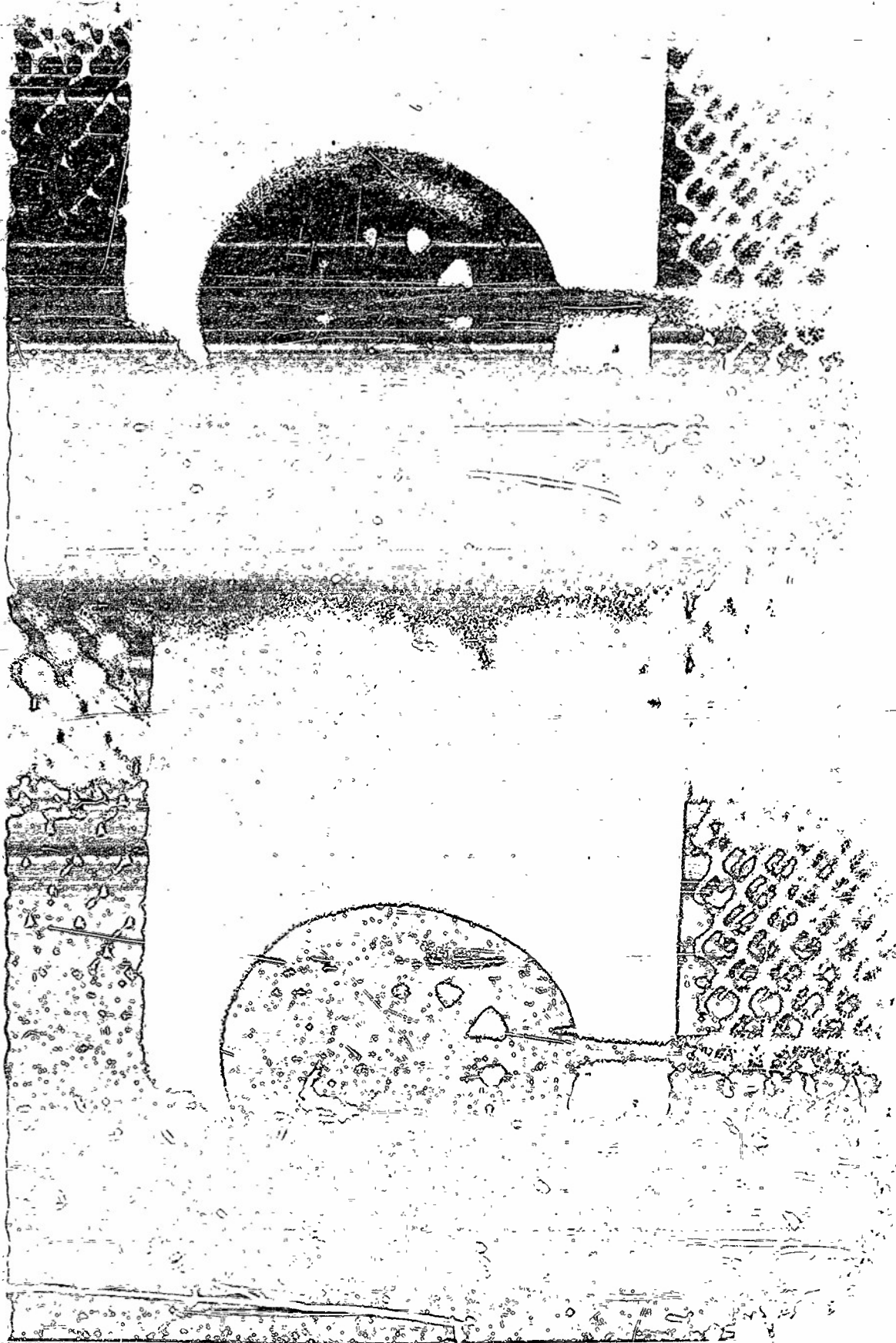


FIGURE (4)

TEST 8.71-INCH DIAMETER RAM JET

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AT 462 RPM ON WHIRLSTAND

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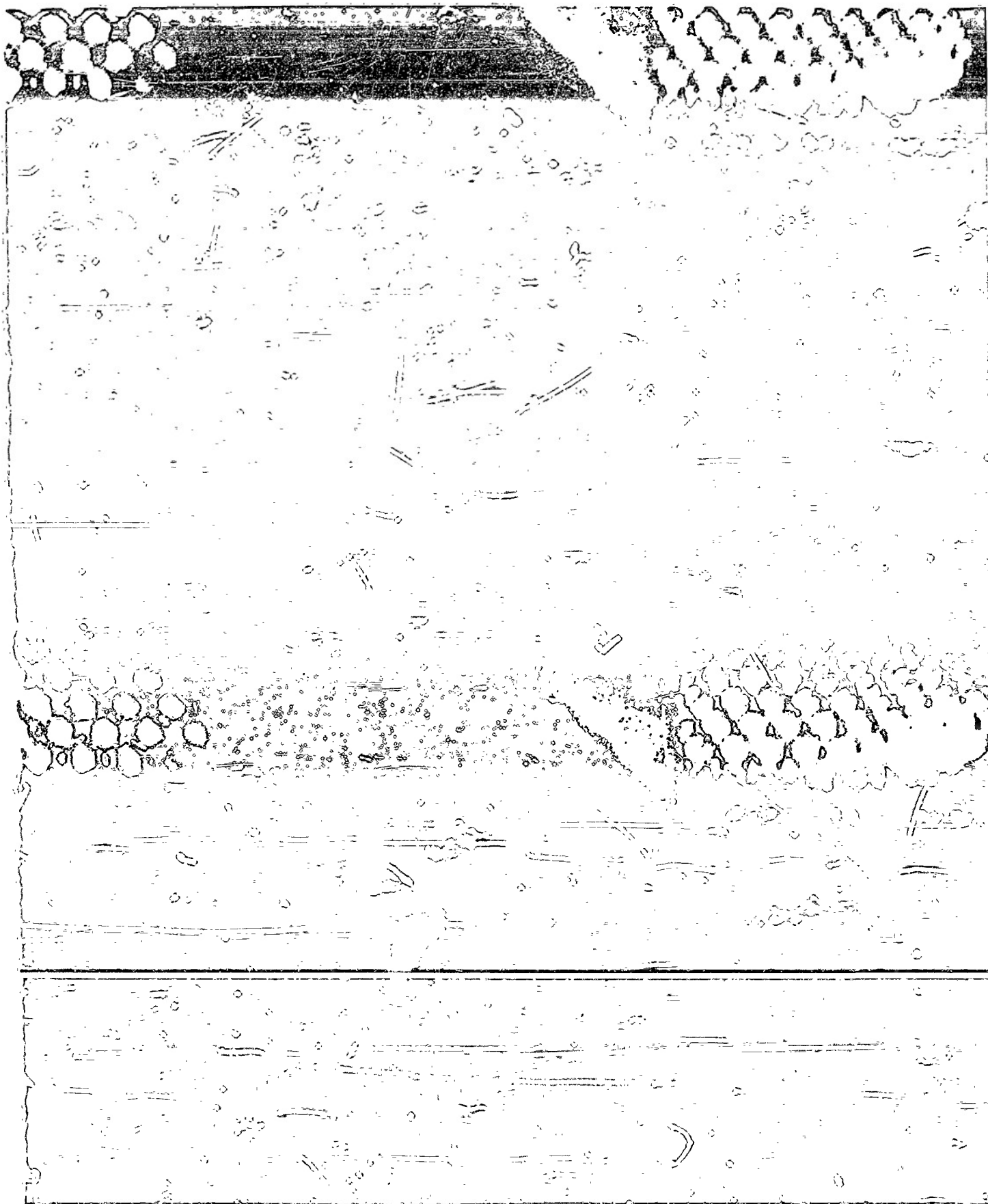


FIGURE (5)

TEST 8.71-INCH DIAMETER RAJ. JET

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AT 480 RPM ON WHIRLSTAND

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