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A FLUE PIPE EXPERIMENT RELATING

to

DELLWOOD MATERNITY HOME, READING.

by

H. L. Malhotra

June, 1954.

Fire Research Station,
Station Road,
Boreham Wood, Herts.

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Introduction

On 18th April a fire occurred in the Nursery at Dellwood Maternity Home, Reading, resulting in serious loss of life. It was concluded at the inquest that the fire started under the floorboards of the Nursery situated above a boiler room. The heating equipment in the boiler room consisted of a domestic boiler placed near a 9 in. brick partition wall through which the cast iron flue pipe passed at a distance of 11 in. below the soffit of the ceiling and 8 in. below a timber wall plate. An experiment was carried out on a mock up representative of actual construction, the nearness of the flue pipe to the ceiling, which was of traditional construction, could have caused the fire.

Experimental technique

A 9 in. brick wall corner having 3 ft. sides and 5 ft. high with a 4 sq. ft. specimen floor of timber boarding and joists and a plaster ceiling on timber lath was built. A 6 in. cast iron flue pipe was fixed in position, reproducing the exact position as at Dellwood Maternity Home. Figs. 1 and 3 show the general arrangement. A bunsen type gas burner held in position just inside the vertical portion of the flue pipe.

The two open sides of the brick built corner were covered by asbestos wood sheets, the upper edges contacting the ceiling and the lower edges approximately 18 in. above the ground level.

Thermocouples were attached at five different positions as shown in Fig. 1 to measure the temperatures of the flue pipe, the wall plate, the soffit and the inside of the ceiling. A continuous record of temperatures were taken.

Test results

There were two preliminary heating periods of 4 hours each when different sizes of burners were tried out. The temperature of the flue pipe varied from 450 and 550°C and the soffit attained a maximum temperature of 165°C. This [illegible]

ADDENDUM

Since the above experimental work was carried out a report has become available (1) which suggests that the maximum temperature of the part of the flue passing through the brickwork at the Dellwood Maternity Home was 330°C. It will be seen, therefore, that the temperatures used in the above experiments were in excess of those experienced. The results, however, do point to the fact that with some appliances, in which the flue pipe operates at a higher temperature, there may be a risk of the ignition of buried woodwork, or in cases where the pipe runs underneath a ceiling, of ignition of the laths and joists.

Reference

(1) Oxford Regional Hospital Board. Dellwood Maternity Home, Reading. Report on Engineering Services following a fire in the Babies' Nursery on the 18th April, 1954.

flue pipe - 600°C

soffit - 195°C

wallplate - 180°C

inside surface of ceiling - 160°C

Fig. 3 shows the continuous temperature record during the test.

On removal of the wallplate at the end of the test, it was found that the lower middle portion at the corner totally enclosed by brickwork had substantially charred. The temperature of the charred portion had been higher than that indicated by the thermocouple, which had occupied a position on which only slight charring had occurred. Fig. 4 shows the appearance of the wallplate at the end of the test.

The cracks in the plaster of the ceiling had only slightly widened at the end of the test (Fig. 5). On carefully removing the plaster it was observed that serious charring of the timber lath had occurred in the portion above the flue pipe and particularly where it was nailed to the timber joist which ran parallel to and alongside the flue. This was no doubt due to the fact that the joist prevented the lath cooling at the points. The timber joist was also slightly charred.

Fig. 6 shows the charred timber lath and the joist, the shaded portion representing the position of the flue pipe relative to the ceiling.

Conclusions

A flue pipe, positioned in a structure as described in this test and heated to about 600°C over long periods can lead to severe charring of timber construction nearer than 12 in. and under certain circumstances may prove a serious fire hazard.

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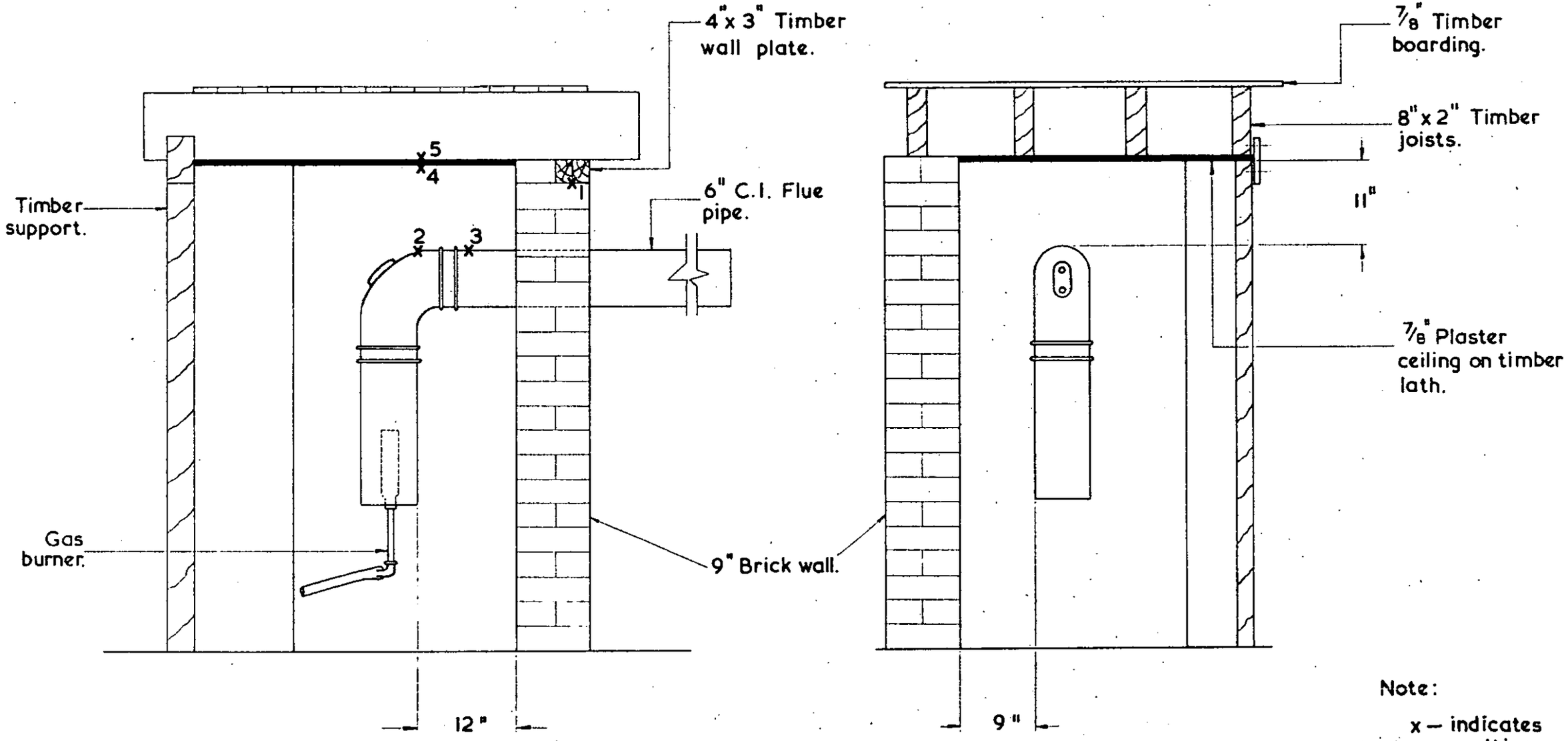

FIG. 1. ARRANGEMENT OF TEST.

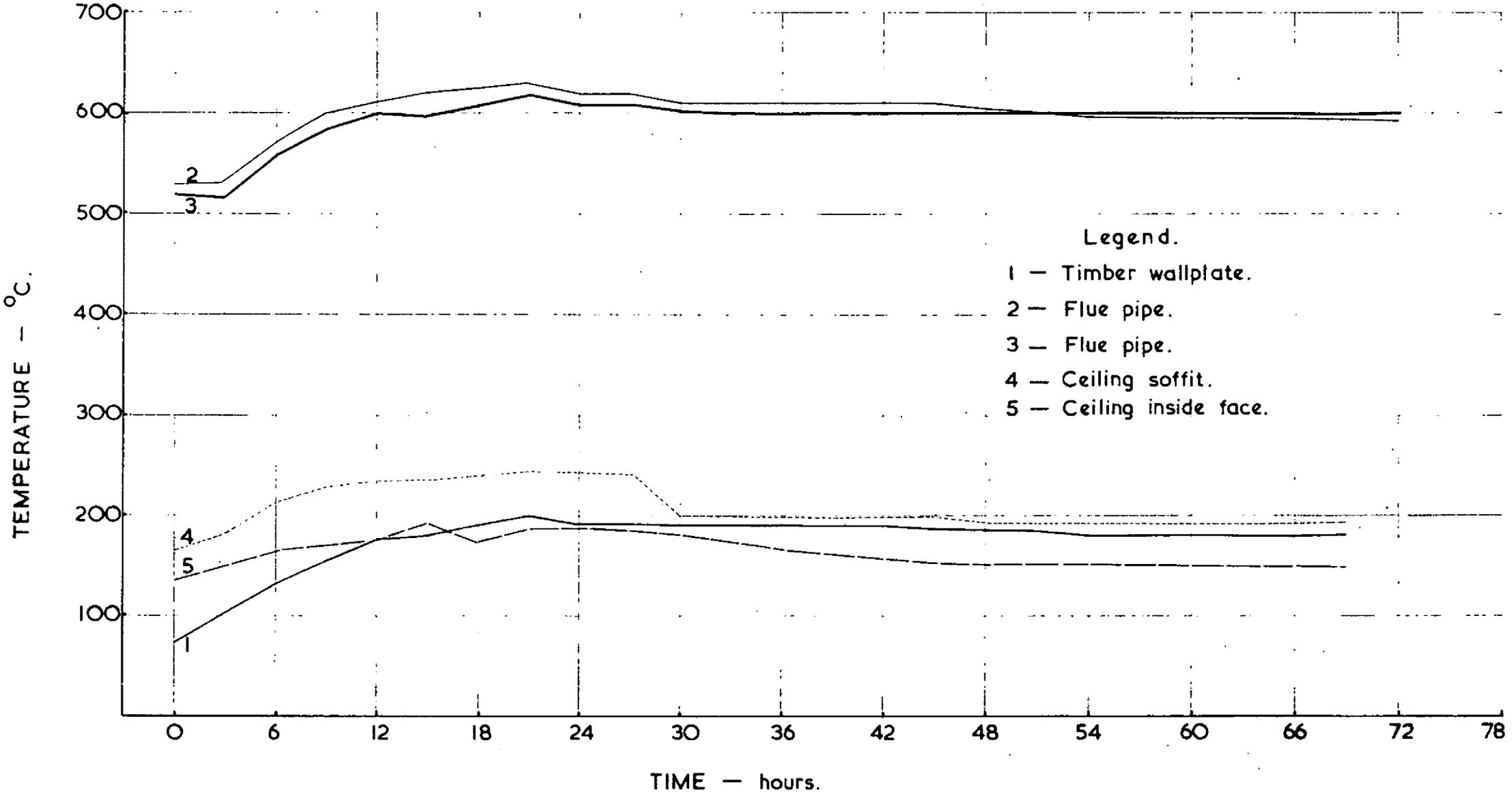

FIG. 2. TEMPERATURE READINGS.

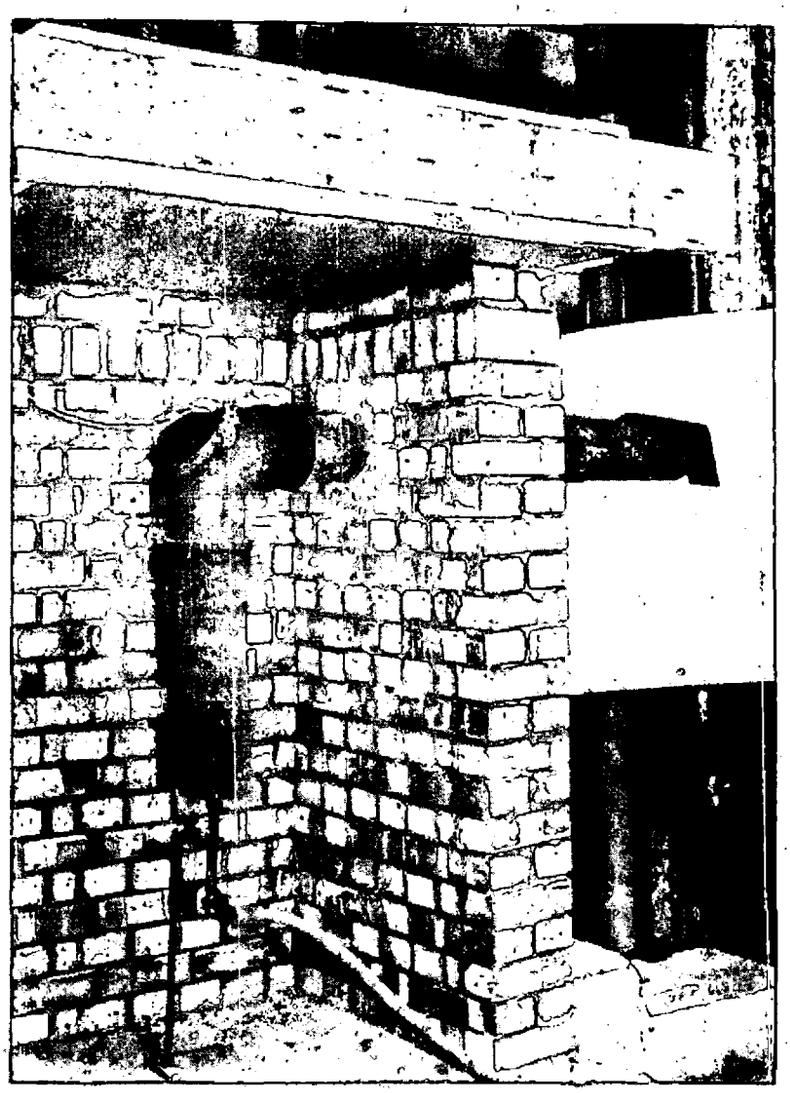

FIG.3. GENERAL LAYOUT OF REPLICA OF THE CORNER NEAR TO THE FLUE PIPE

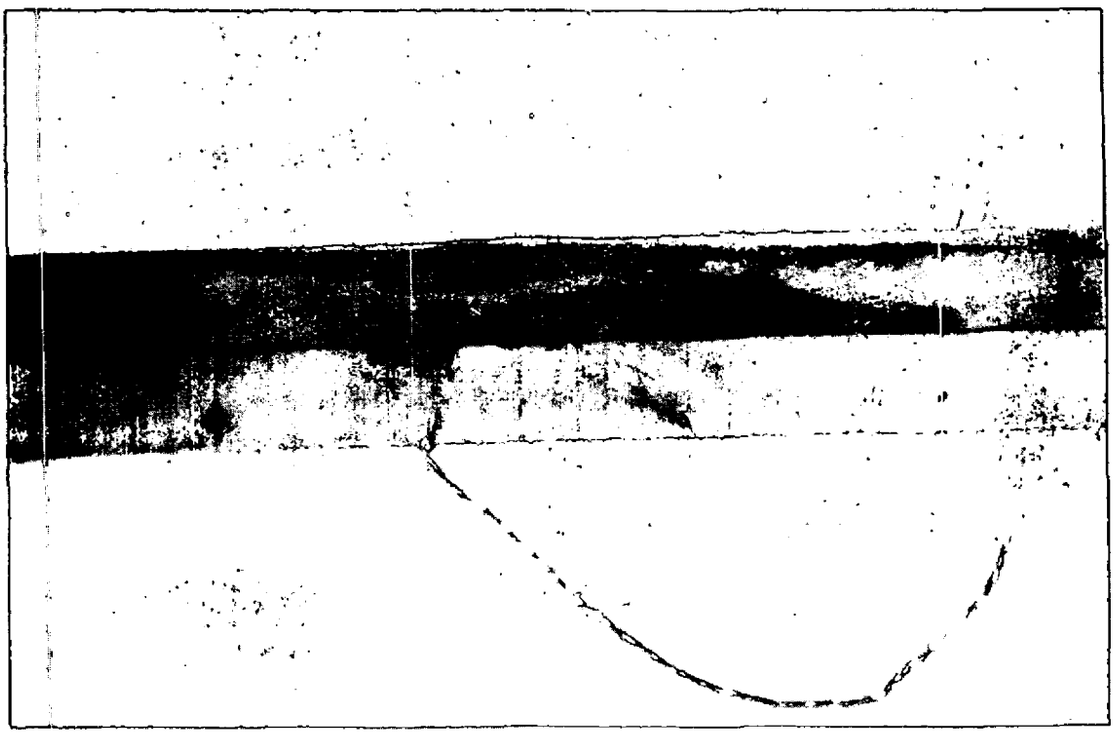

FIG. 4. APPEARANCE OF TIMBER PLATE AFTER TEST

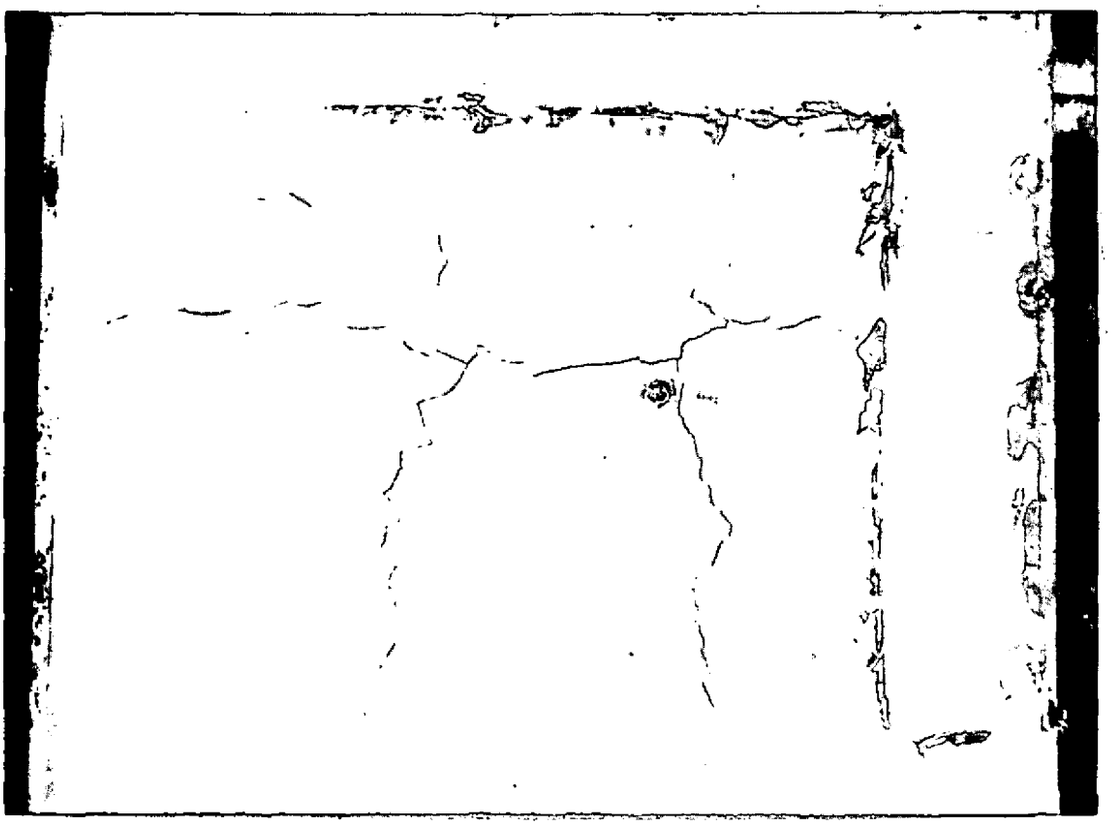

FIG. 5. APPEARANCE OF CEILING ABOVE FLUE PIPE AFTER TEST

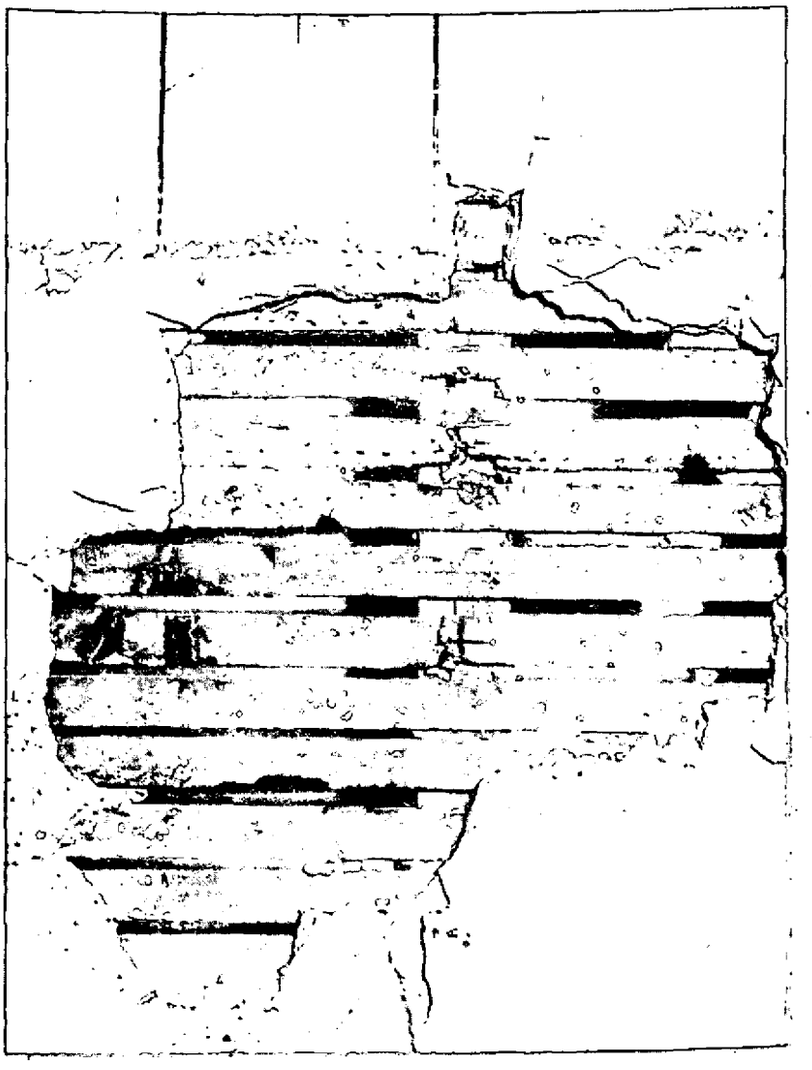

FIG. 6. THE CEILING ABOVE THE FLUE PIPE (POSITION SHOWN SHADED) WITH THE PLASTER REMOVED

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