Measurement by Photography at Kew Observatory

Publication/Creation

c1896

Persistent URL

https://wellcomecollection.org/works/cpf459yw

wellcome collection

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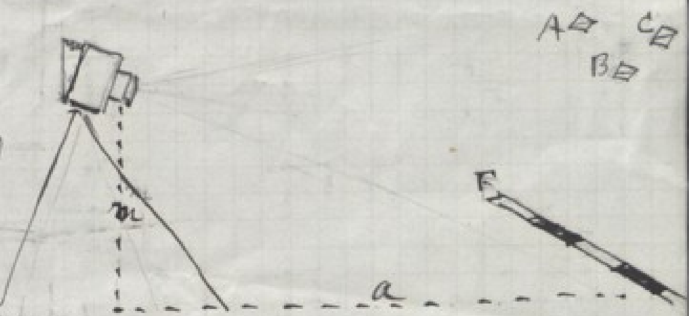
F. Galton
April 14/96 F. 1

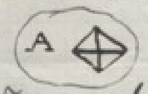
Take. Small pine-wood Camera
Lens and Stops (about 2.75 focus)
3 Dark slides (double) & their holder
Tripod and its top
Painted lathes (in feet) to fiducial line

· Packet of 1/4 plates.

Lens to be regularly tested

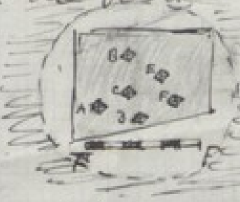


Object the receding side of a house on level ground of which the base is clearly visible.
On the house at various heights from 2 to 7 feet, stick paper, marked lozenges ⊠ with cross lines, & with distinctive letters;



the letters & lozenges to be quite 4 inches high. & the cross lines 1/4 inch wide

Fiducial line to be laid on the ground ~~perpendicular~~ at right angles to the ~~vertical~~ plane passing through the optical axis of the lens

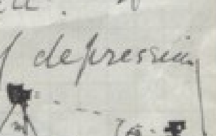


Tilting the Camera. Camera to be tilted so that all the lozenges and the fiducial line shall lie within the field of view, but the focussing screen (and plates) must be strictly vertical. — Use exclusively the largest stop

Reduction to between about $\frac{1}{50}$ or $\frac{1}{60}$ & $\frac{1}{200}$ of original sizes

(a): Distance of Camera ~~[illegible]~~ about 10 12 feet from the fiducial line Its image need not be extremely sharp. neither need those of the lozenges

(m): Height of Camera above ground, as high as will suit the tilt. It is important to the results of the experiment that the angle of depression of the ~~plane passing through~~ ~~centre of~~ the fiducial line & the optical axis sh^d be large.



the ratio of a to m may perhaps be made as large as 3 : 1

When all is fixed measure & record carefully a & m. Also measure & record the vertical height above ground & the horizontal ~~lengths~~ lengths from the camera of the centres of the several lozenges

The Repeat the operation (three times twice, making) ~~with~~ (3) different installations in all, & ~~try~~ with distances of a = about 10, 12, 14, & 16 feet.
= In one or more of them erect a vertical staff with ~~two~~ lozenges on the hitherward side of F.F.

=

3 prints wanted of each of the (4) photos

=

General remarks

Pay attention to the general effect of the arrangements, as one at least of the 4 photos will be published

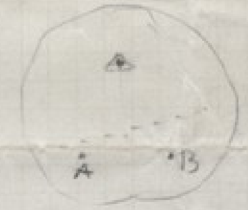
Also take a fifth photograph of the complete installation on one of the occasions (using of course another camera to do it) This also may want to be published

Send me the negatives as well as the prints

=

Return this paper of instructions

=



Measurements of the various objects on Photographs (Nos 1 and 2).

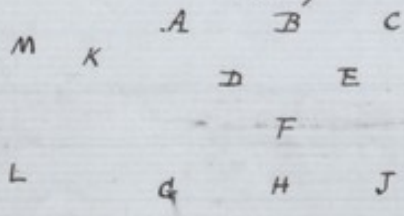
Object	Vertical Height (and) inches	y inches	x inches
Centre of Lens	(m) 57.75		
Centre of Field	20.5		
A	60.6	45.1	−3.8
B	60.6	31.9	+15.25
C	60.6	17.0	37.75
D	44.5	38.25	8.0
E	44.5	23.6	30.0
F	29.6	31.1	18.75
G	13.7	42.3	2.4
H	13.6	31.7	18.5
J	13.5	22.25	+32.8
K	47.5	39.6	−19.0
L	?17.75 27.75	15.0	−23.1
M	52.4	8.1	−24.1

Length of Base line (Photo 1) = 45.0 inches
Length of (a) (Photo 1) = 134.25 inches
Length of Base line (Photo 2) = 50.0 inches
Length of (a) (Photo 2) = 152.25 inches

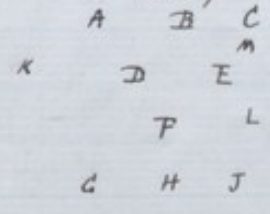
Photograph 3

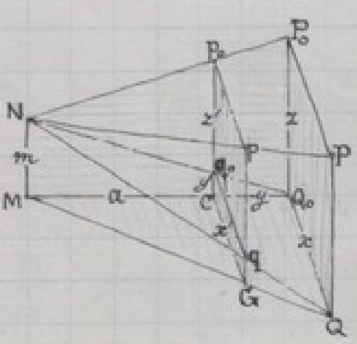
Height of Centre of Lens = 60.2 inches
Length of Base line = 50.0 inches
Centre of Field = 16.0 inches
Length of (a) = 204 inches

Photographs 1 and 2
Lettering



Photograph 3
Lettering





d = distance between the fiducial [illegible]
δ = corresponding measure in the [illegible]
$x\ y\ z$ = the coordinates of P
$x'\ y'\ z'$ = their representations on the picture [illegible]
$\xi\ \eta\ \zeta$ correspond to $x'\ y'\ z'$ in the [illegible]

$$\frac{x}{x'} = \frac{y+a}{y} \quad \text{whence} \quad x = \frac{x'm}{y'} \quad (1) \quad = \frac{m\xi}{\chi}$$

$$\frac{y}{y'} = \frac{y+a}{m} \quad \text{"} \quad y = \frac{y'a}{m-y'}, \quad (2) \quad = \frac{ad\chi}{m\delta - d\chi}$$

$$\frac{z}{z'} = \frac{y+a}{a} \quad \text{"} \quad z = \frac{z'm}{m-y'}, \quad (3) \quad = \frac{md\zeta}{m\delta - d\chi}$$

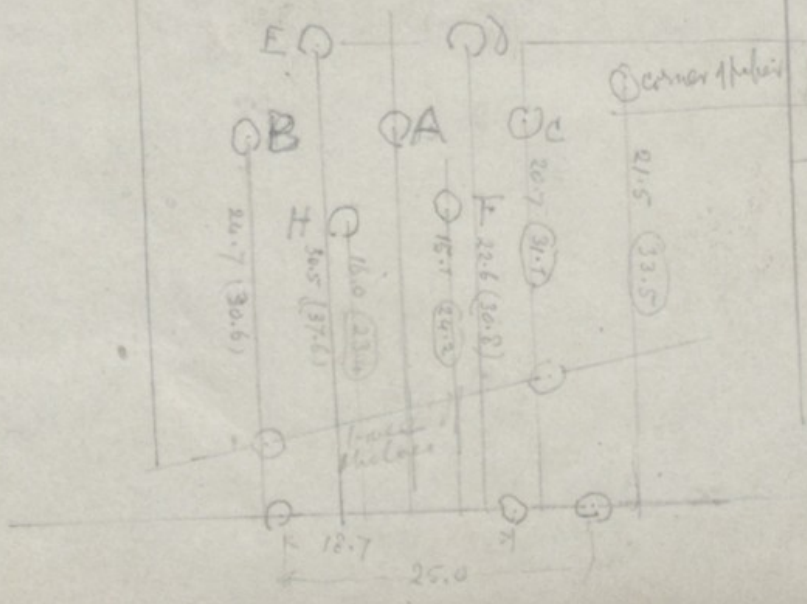
because

$$xy = x'y + x'a, \quad x = x' + \frac{1}{y}x'a = x' + \frac{m-y'}{y'a}x'a = \frac{x'y' + mx' - x'y'}{y'} = \frac{mx'}{y'} \quad (1)$$

$$my = y'y + y'a \qquad y = \frac{y'a}{m-y'} \quad (2)$$

$$az = z'y + z'a \qquad z = z' + \frac{z'y}{a} = z' + \frac{z'y'}{m-y'} = \frac{z'm - z'y' + z'y'}{m-y'} = \frac{z'm}{m-y'} \quad (3)$$

f. 1v



F. 25

Kew
Photo of Shelves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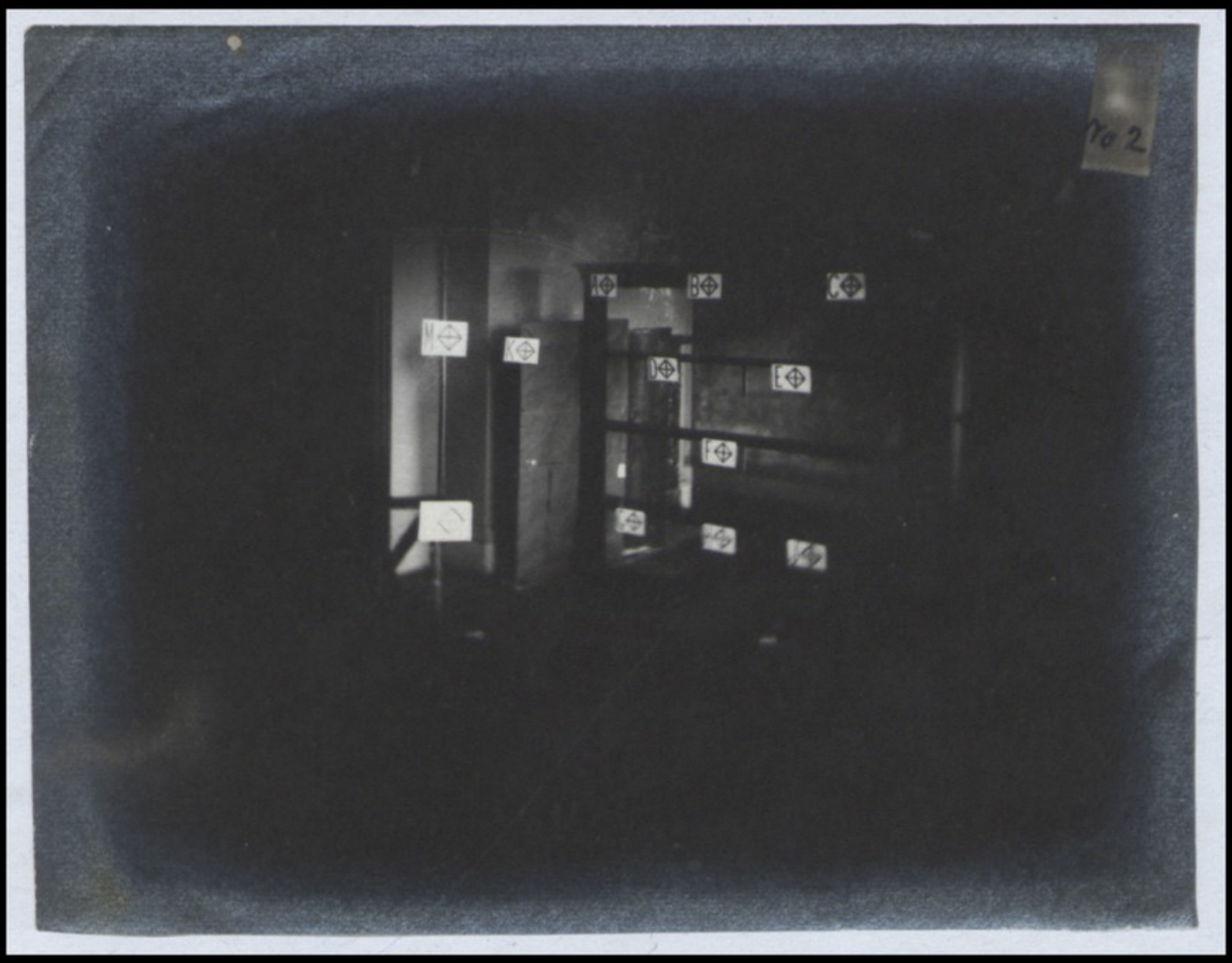
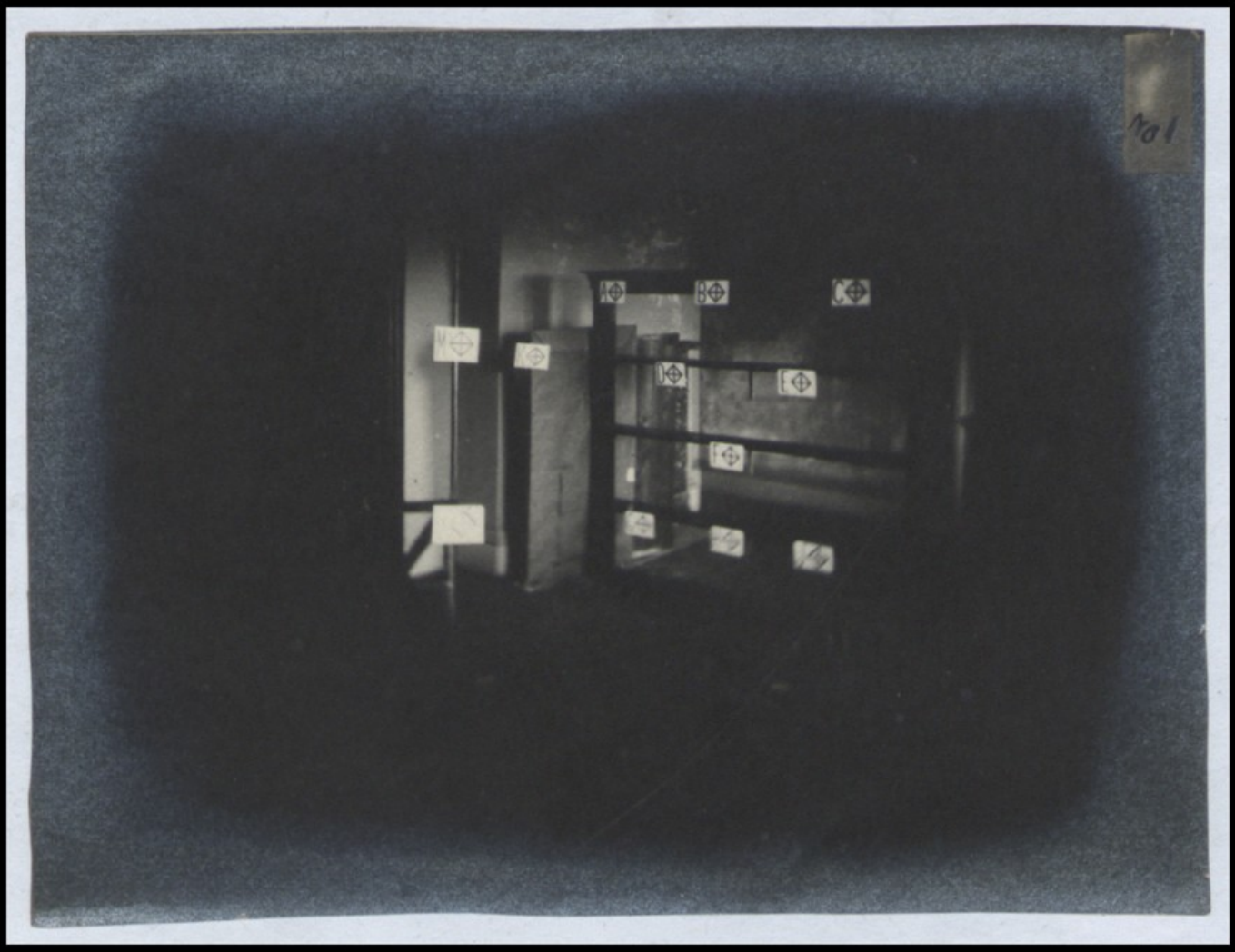

No 2

Print from
No 2

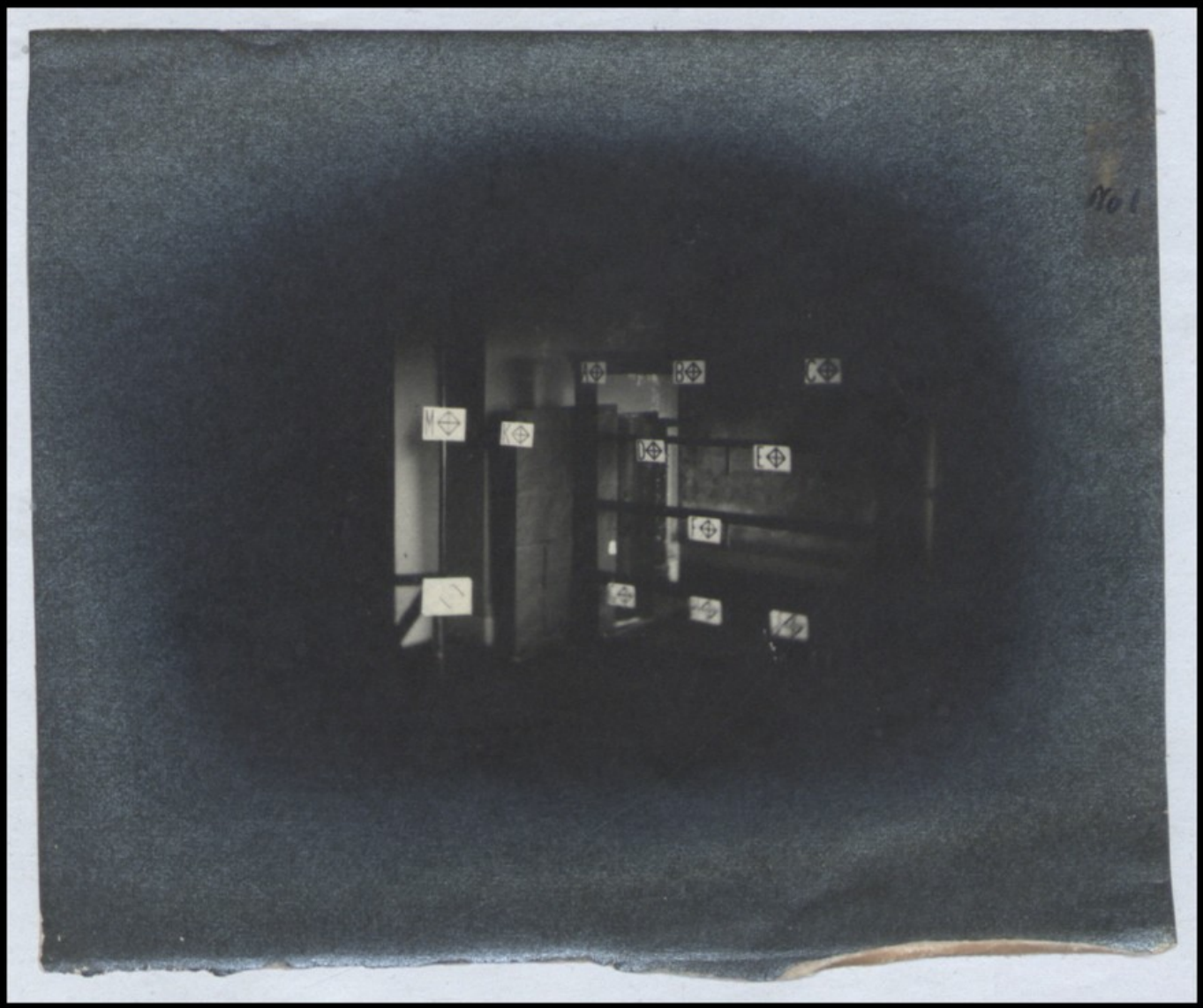

No 2

f 2v

Print from
102

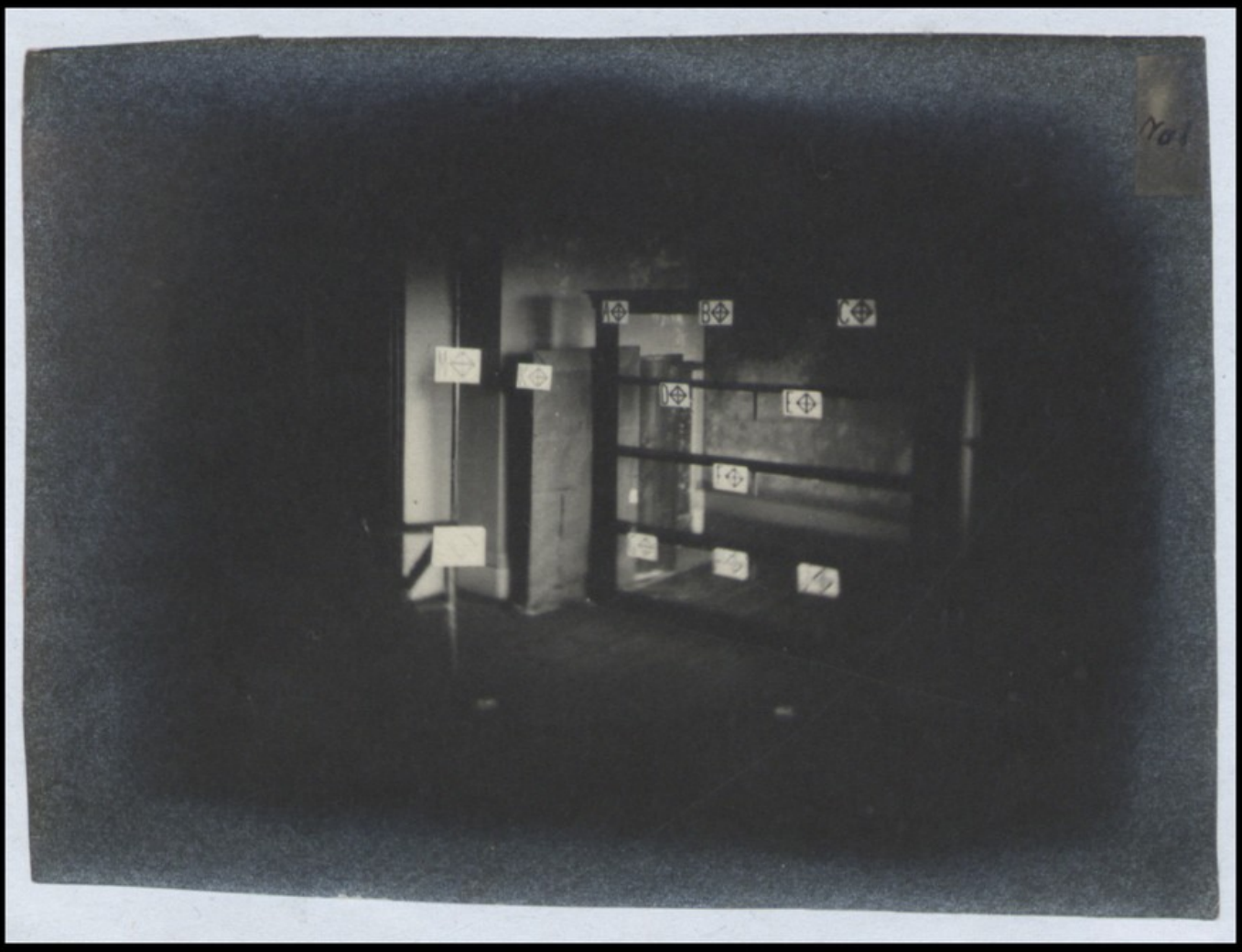

No 1

Print from
No 1


No 1

f. 4v

Print from
No 1



f. 5v

Print from B A

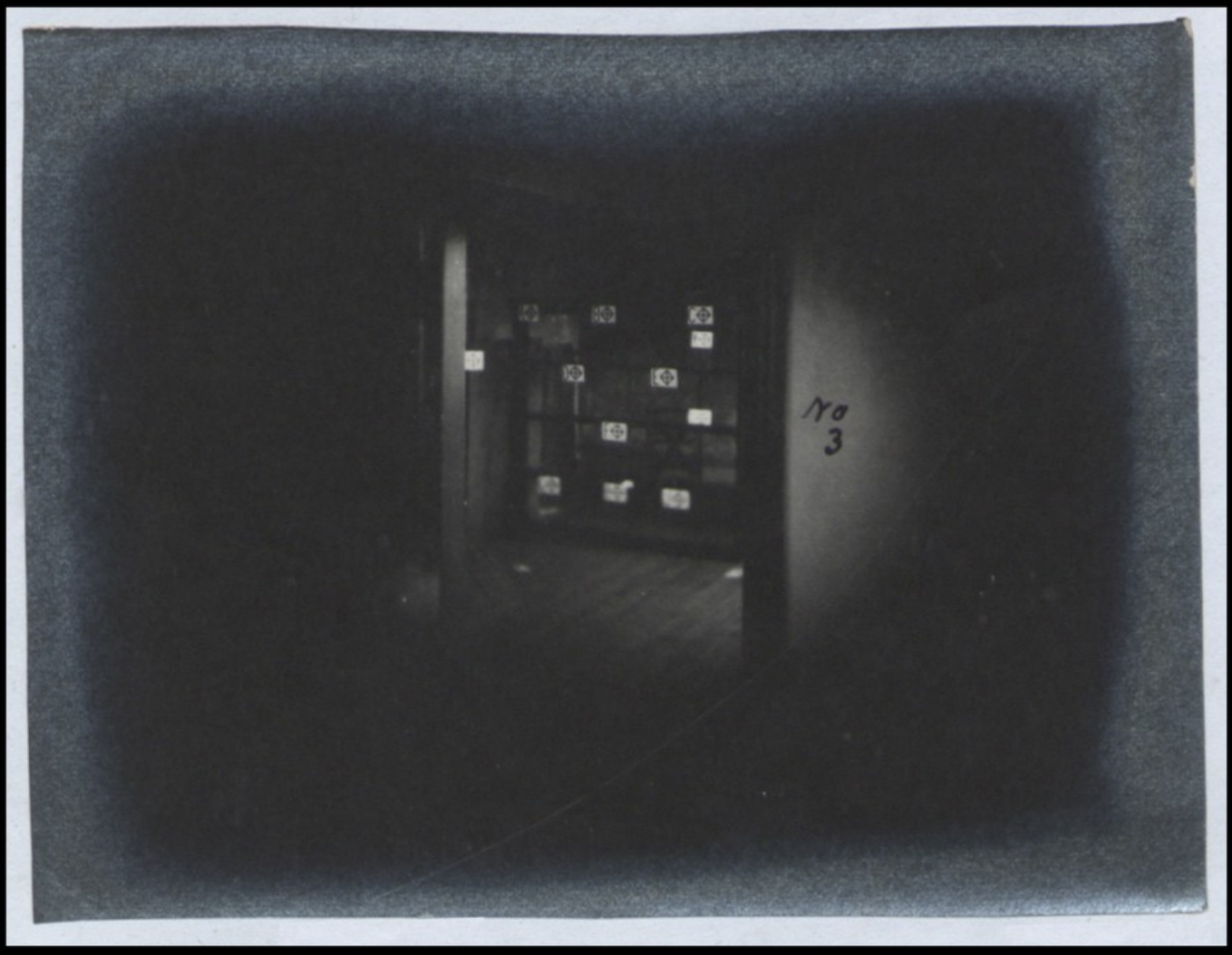
No 100

OE


702

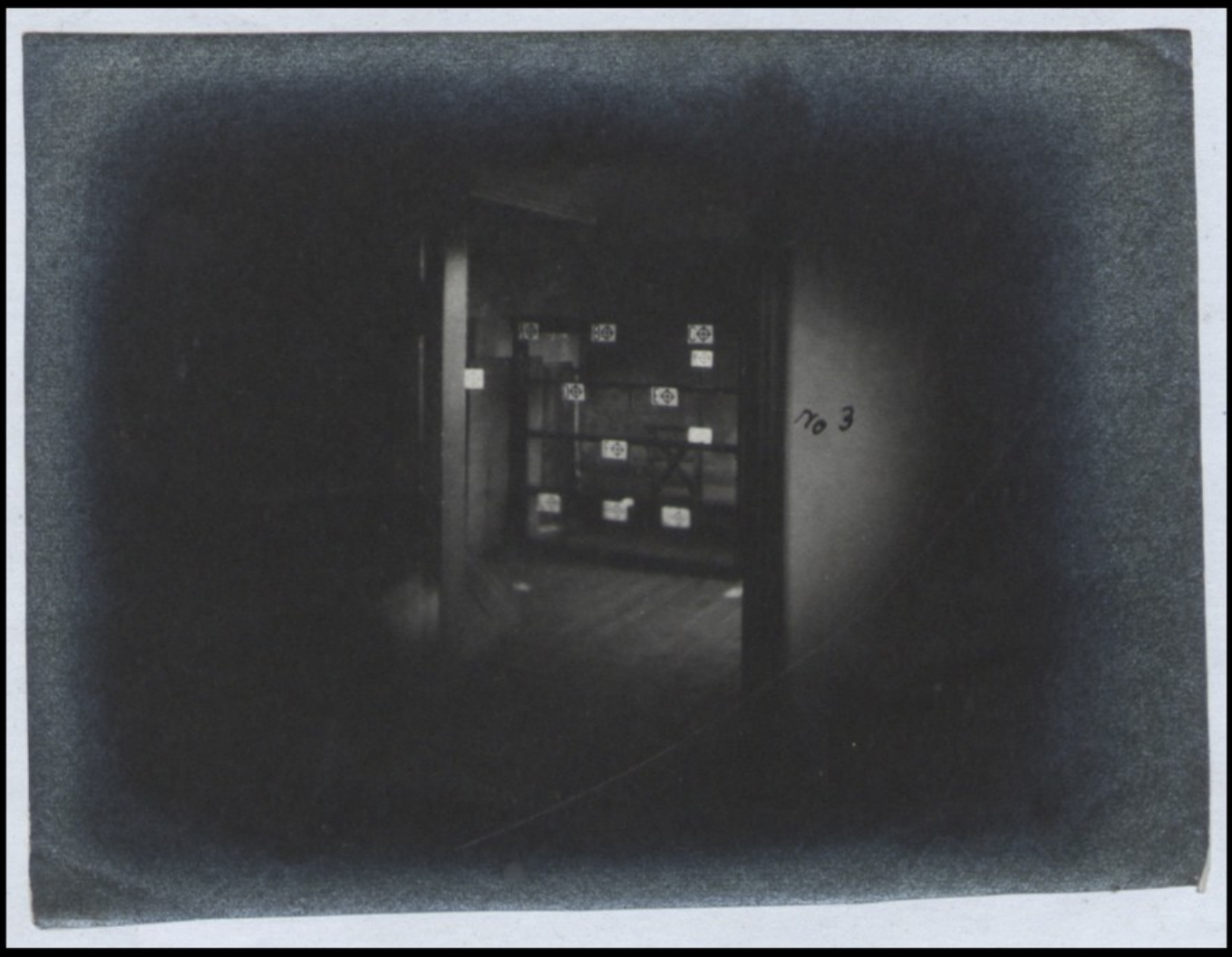
f.6v

Print from
No 2


No
3

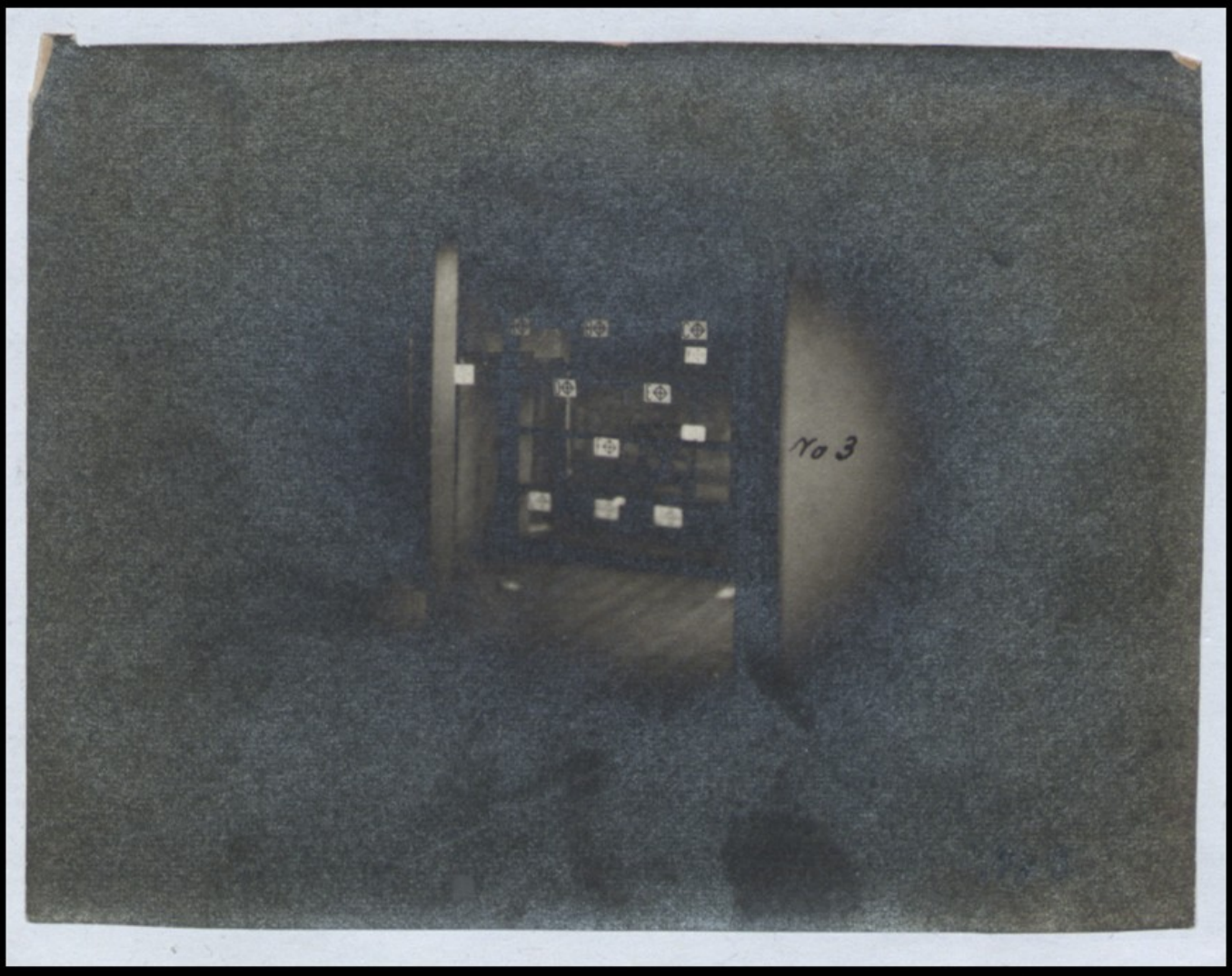
f. 7v

Print from
No 3


No 3

f. 8v

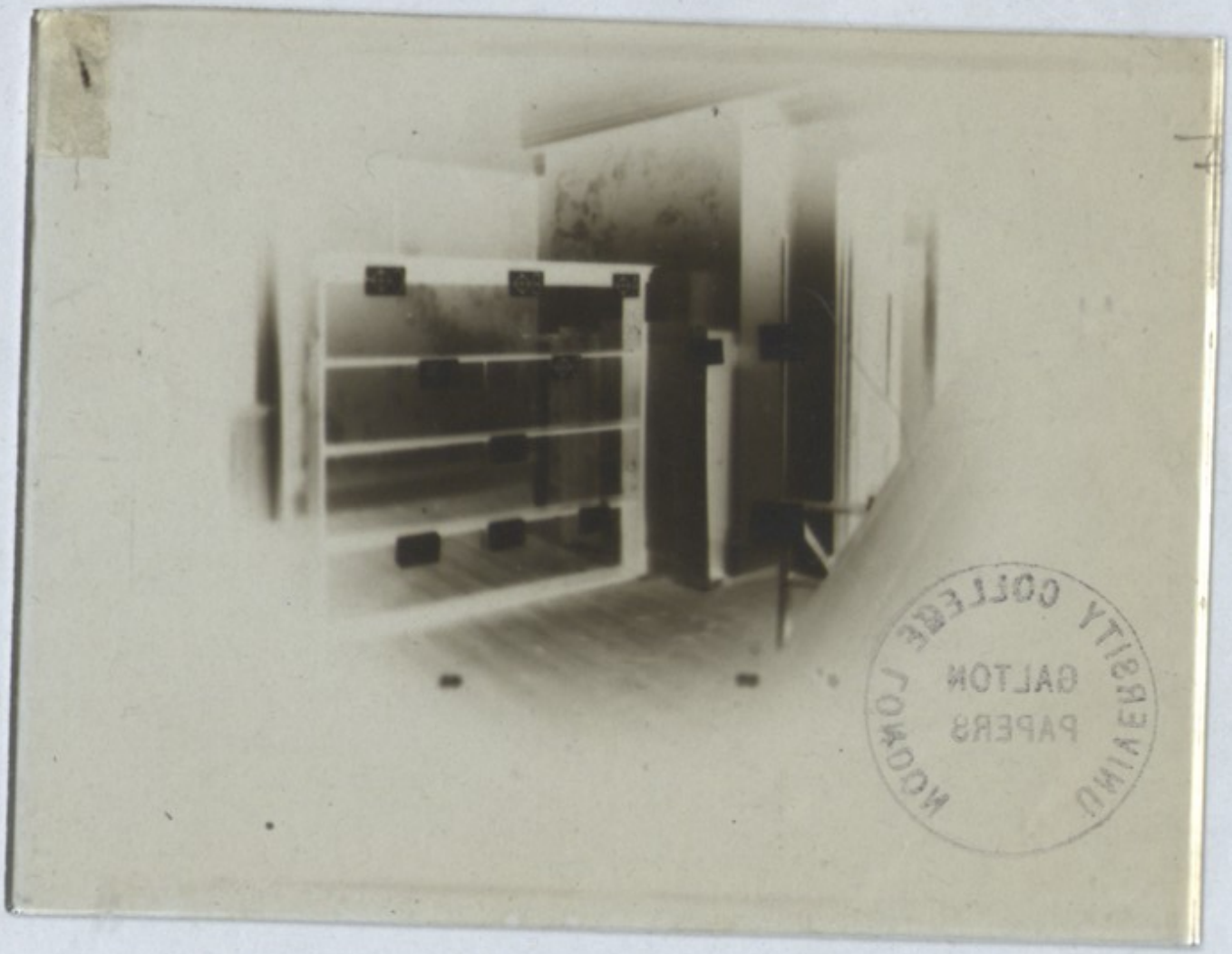
Print from
No 3

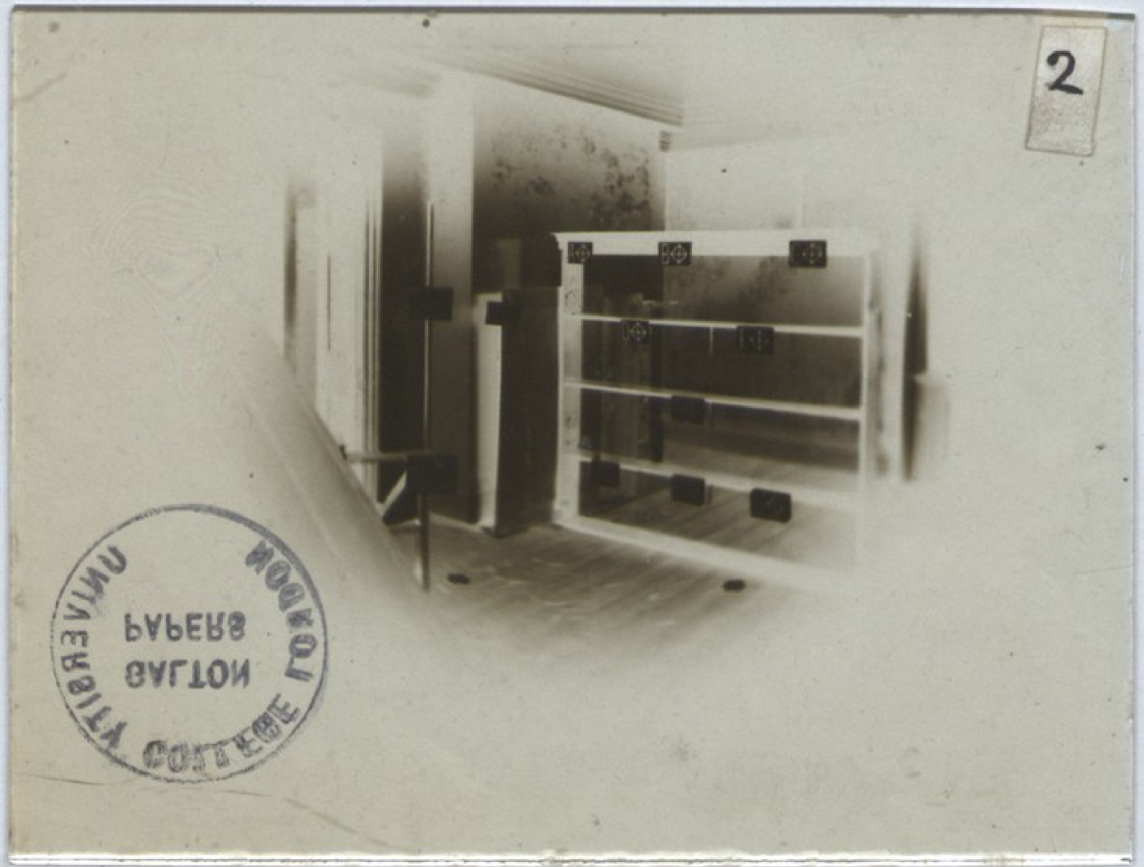

No 3

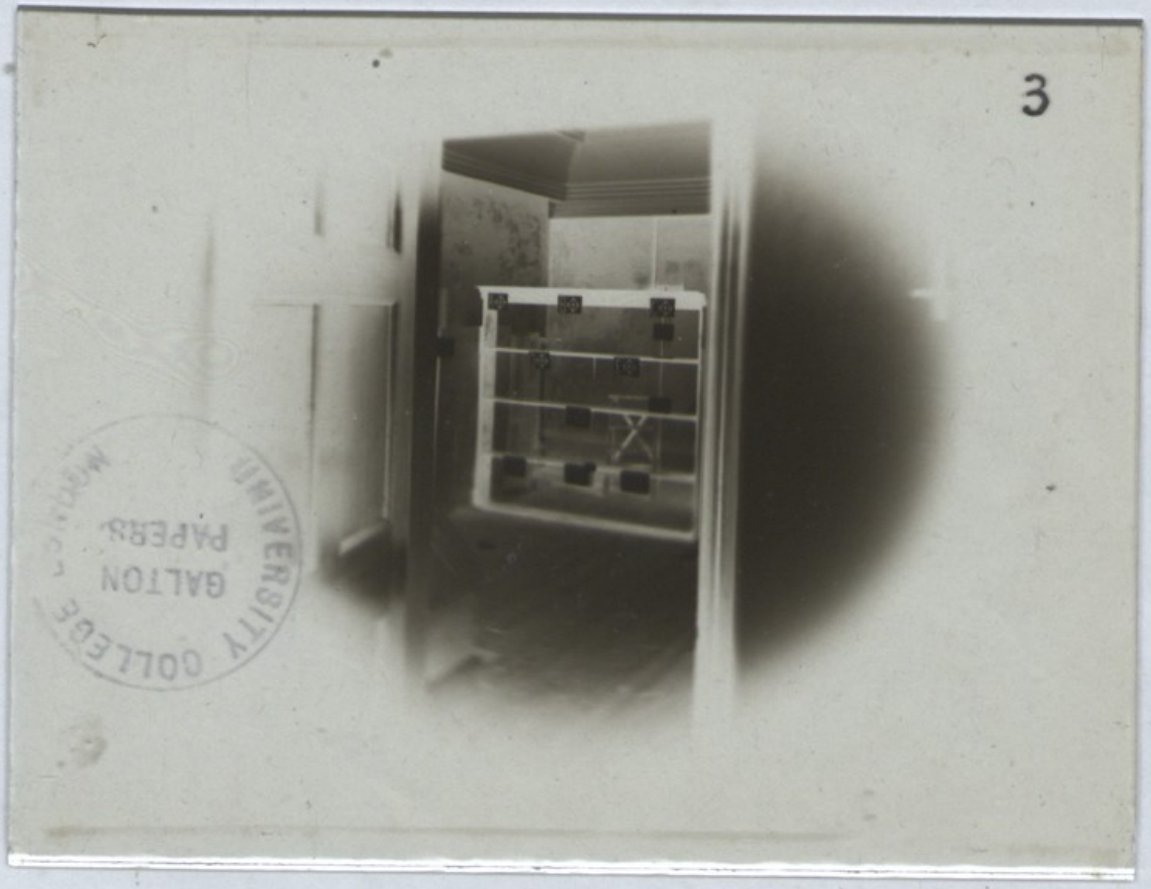
f. 9v

Print from

No 3






3
UNIVERSITY COLLEGE
GALTON
PAPERS

FORMULA FOR ILFORD DRY PLATES.

The solutions must be ACCURATELY prepared by weighing and measuring. Guess work will not do.

No. 1.—STOCK SOLUTION.

Pyrogallic Acid ... 1 ounce.
Bromide of Ammonium } 600 grains.
Made up to 6 ounces with water.
When dissolved add EXACTLY 20 drops of Pure Nitric Acid.
This will keep for a considerable time.

No. 2.

Strongest Liquor Ammonia °880 } 3 drams.
Water ... ... 1 pint.
This will keep some time if well stoppered.

No. 3.

No. 1 Solution ... 1 ounce.
Water ... ... 19 "
This will keep for a few hours only.

For developing, mix the Solutions Nos. 2 and 3 in equal proportions just before using.

If the plate is found to be over-exposed, at once remove it from the dish, and pour over it, once or twice, some of solution No. 3, *allowing that which runs off the plate to mix with the solution in the dish.* Upon returning the plate to the dish, it will be found in most cases to develop as if correctly exposed.

When the development is about three parts completed (or sooner, in the case of under exposure), it may be hastened by adding more of solution No. 2.

NEVER OMIT THE ALUM BATH BEFORE FIXING.

Acid added to the Alum Bath entirely destroys its property of hardening the film.

Do not be tempted to add Alum or any other foreign matter to the Fixing Bath.

NOTICE.—The Special Rapid Plates (Red Label) take longer to develop than the ordinary make.

THE BRITANNIA WORKS CO., ILFORD, LONDON, E.