

**INVENTORY AND
APPRAISAL
OF
EXCHANGE
TELEPHONE PLANT**

**SAN FRANCISCO
CALIFORNIA
DEC. 31, 1912**

Vol. XIV

PHOTOGRAPHS

**THE PACIFIC TELEPHONE
AND
TELEGRAPH COMPANY**

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73
Don

UNDERGROUND CONSTRUCTION

Bush St. Near Larkin St.

In this picture is shown a loading pot being lowered into the manhole. This loading pot contains coils which will be spliced into the cable in order to improve transmission. Also note the temporary repavement with slabs of asphalt which will be later replaced with permanent paving. It has been necessary to enlarge this manhole to make room for this loading pot.



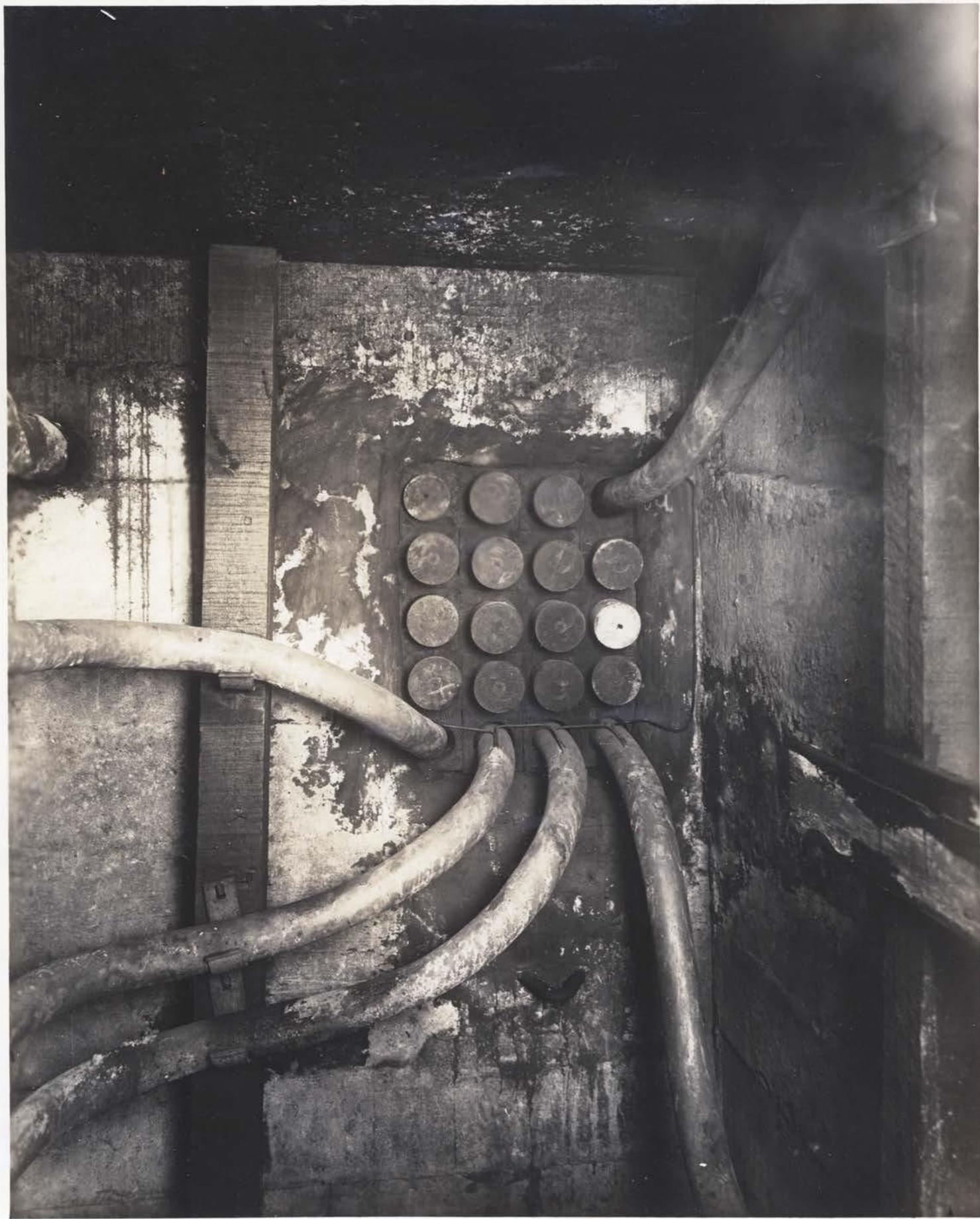
11E-1

74
Don

UNDERGROUND CONSTRUCTION

Bush St. and Kearny St.

This is typical underground construction with creosoted wood ducts and concrete manholes. Note the arrangement of the bond wiring and the round conduit plugs used to plug the open end of the ducts when not in use.



XIV-2

75
Don

UNDERGROUND CONSTRUCTION

Manhole on Bush Street near Market

This is typical of some of the older conduit and cable construction. The conduit is of vitrified clay, called "shelf" duct to distinguish it from the more modern types. Each of the two chambers in this duct was designed to hold three cables of the largest size manufactured at the time this conduit was placed. Only two, however, of the present standard full sized cable can be installed in these ducts. Note the manner in which the second cable from the top on the left hand side is trained around the manhole.

XIV-3



UNDERGROUND CONSTRUCTION

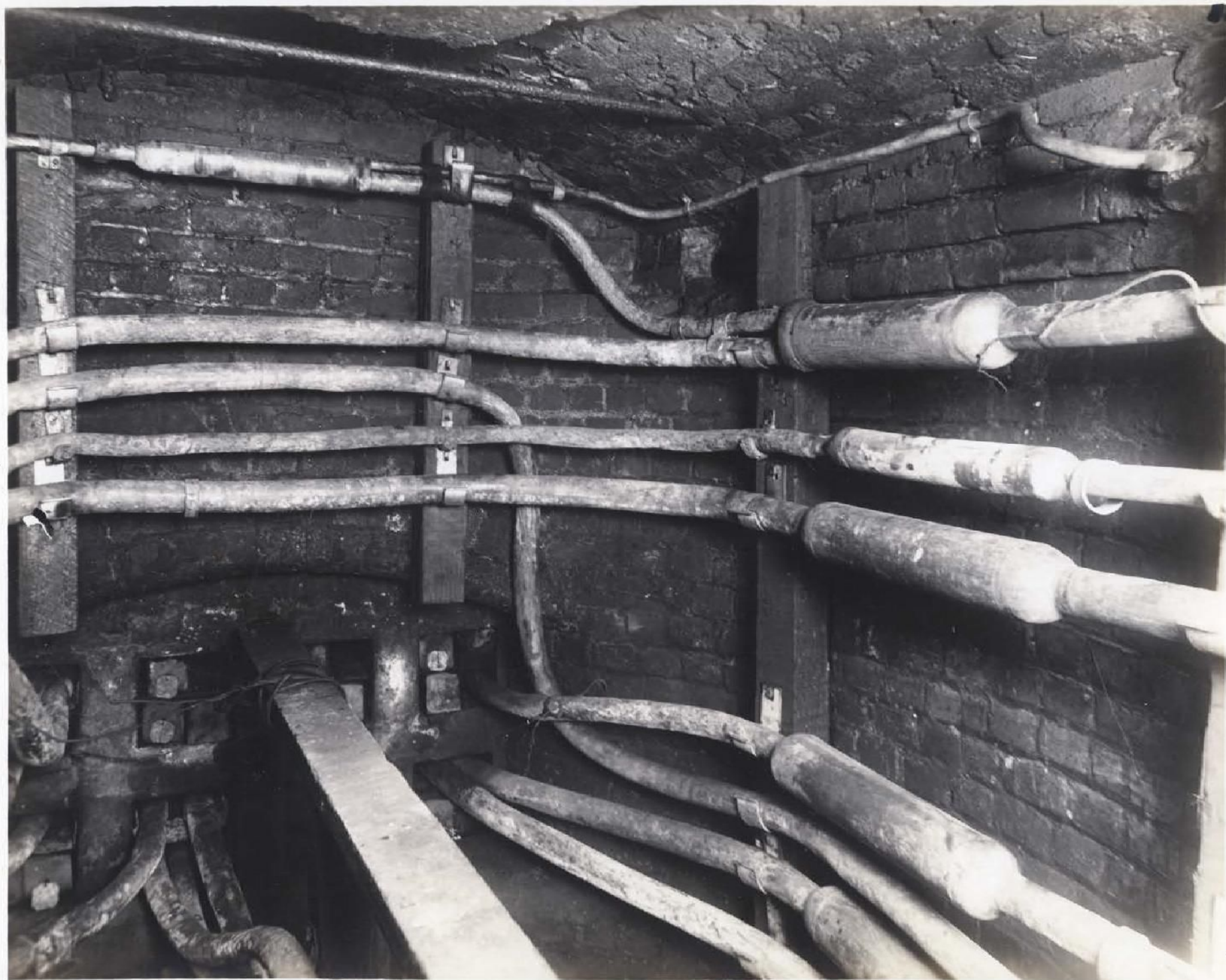
Manhole on Bush Street Near Market

This picture shows the method of splicing subsidiary cables into the main feeder cables illustrated by the large cable at the upper right hand corner of the picture at the right of the "Y" splice. This cable contains 600-pairs; at the left are shown two cables, the lower of which is a 400 pair continuing through the duct into another manhole. The smaller of the two cables is a 200 pair "stub" into which is spliced two separate cables as shown at the top of the picture. This arrangement, using the stub, is useful, as lateral cables or subsidiary cables may be at any time through it, connected to the main cable without disturbing the larger splice. The stub itself is usually spliced into the main cable at the time the main cable is installed. Subsidiary cables may not be spliced into the stub until sometime later, in many cases several months.

75

Don

XIV-4



Don

UNDERGROUND CONSTRUCTION

Mills Building
Corner Bush and Montgomery Sts.

This shows the building entrance of the lateral cable of one of the larger office buildings. The pipe ducts shown suspended from the ceiling are placed by the Telephone Company especially to contain the cable.



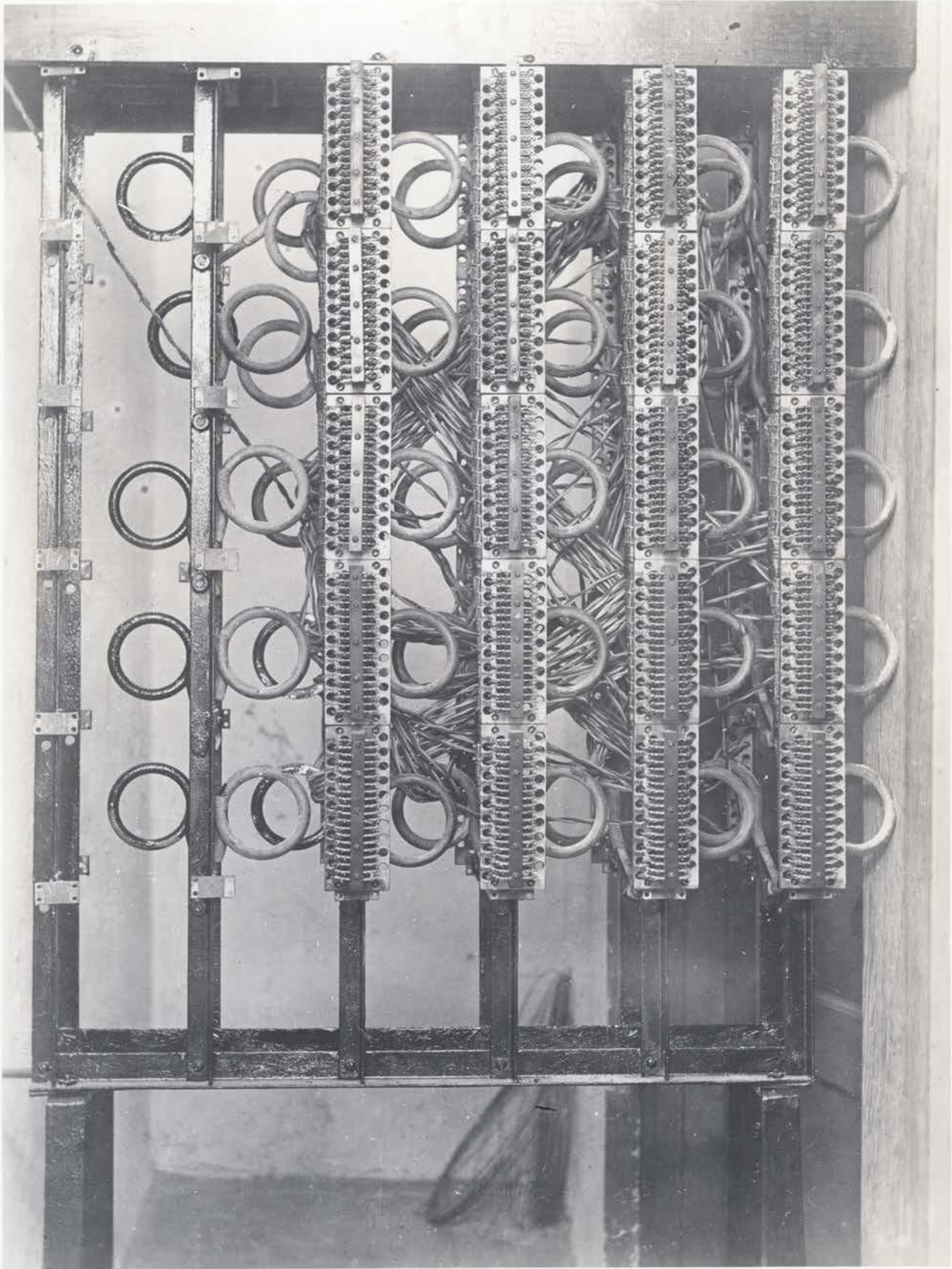
78

Don

UNDERGROUND CABLE CONSTRUCTION

Sharon Building - Montgomery & Jesse Sts.

Here is shown the crossconnecting rack on which the subsidiary cable terminates. From this rack are taken the wires for the various subscribers' telephone throughout the building, either as single pairs of twisted wire or as wires in cable. If cable is used, other terminals placed at various locations throughout the building are necessary to provide connection with the local wiring of the subscribers' instruments. Note the numbers on the vertical strips attached to the front of the rack. These numbers identify the wires.

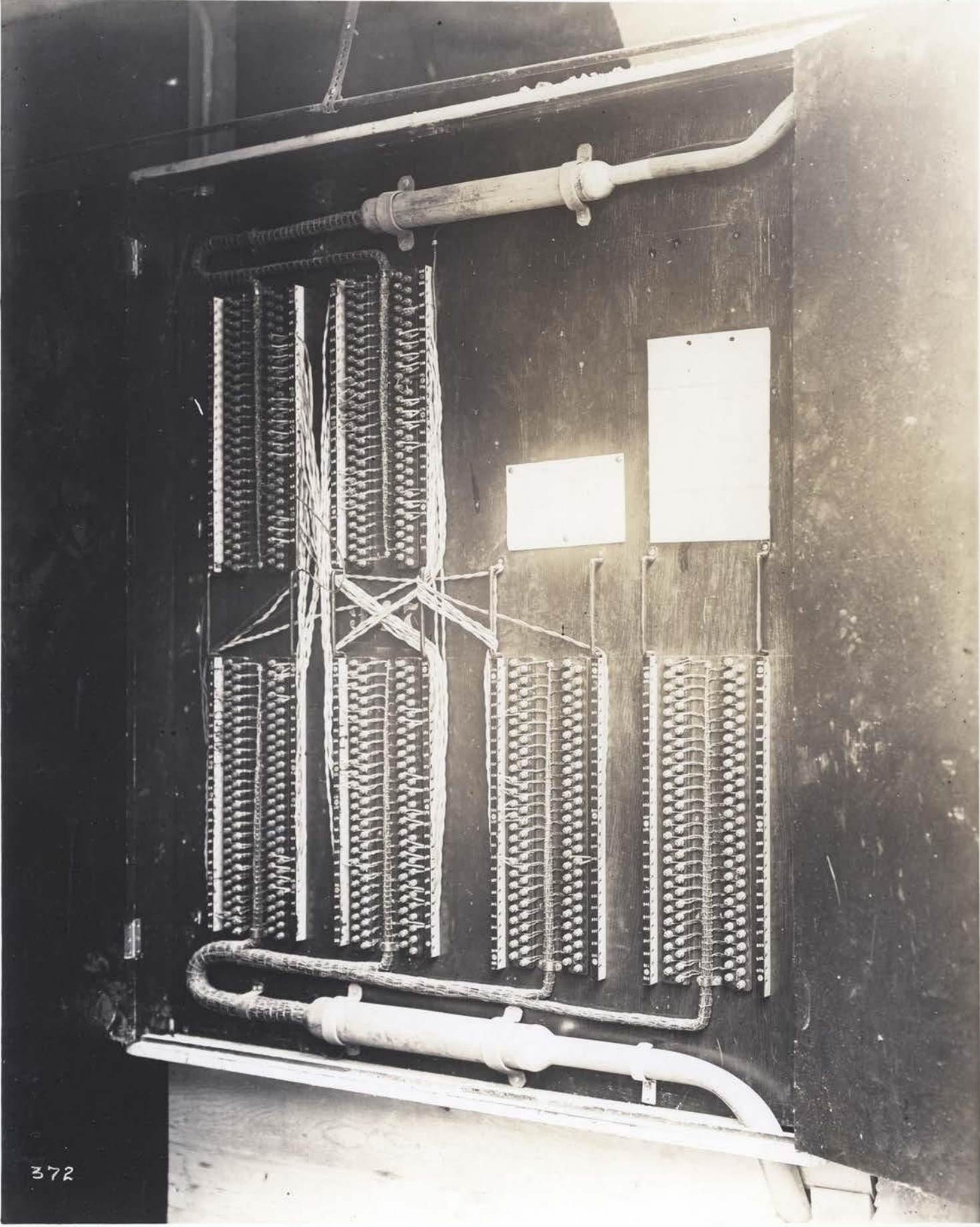


9-VIX

UNDERGROUND CABLE CONSTRUCTION

Hearst Building
3rd and Market Streets.

This shows the wall type of building terminal and crossconnecting rack. The cable at the lower part of the terminal is the lateral cable from the underground and is terminated on the various gutta percha connecting blocks. From the opposite side of these several blocks will be seen the flameproof jumper or bridle wire carried to the row of strips above, there connecting with a similar cable terminal arrangement. The cable in the upper part of the picture is the house or riser cable extending throughout the building.



372

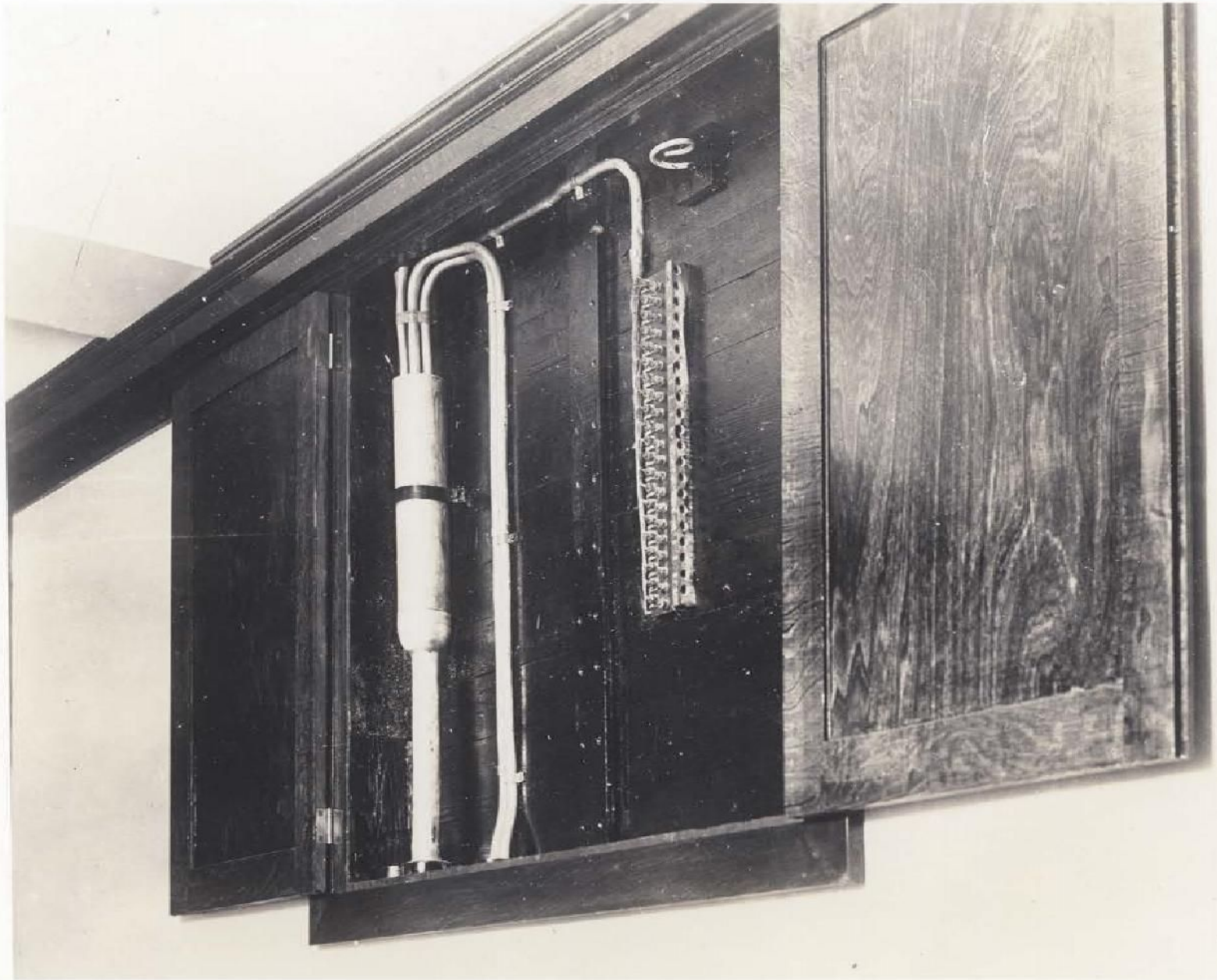
14-7

80

Don

UNDERGROUND CABLE CONSTRUCTION

This shows a typical arrangement of riser cables at a distributing point. Here are shown the several small cables carried to the local distributing points, one of which is here shown. The wires to the various subscribers' telephones will be taken from the connecting block through the fanning strip which is a hard maple strip with holes chambered to prevent wear; then through the bridle ring shown in the upper right hand corner; then through condulets or other duct arrangements to the subscribers' telephone.



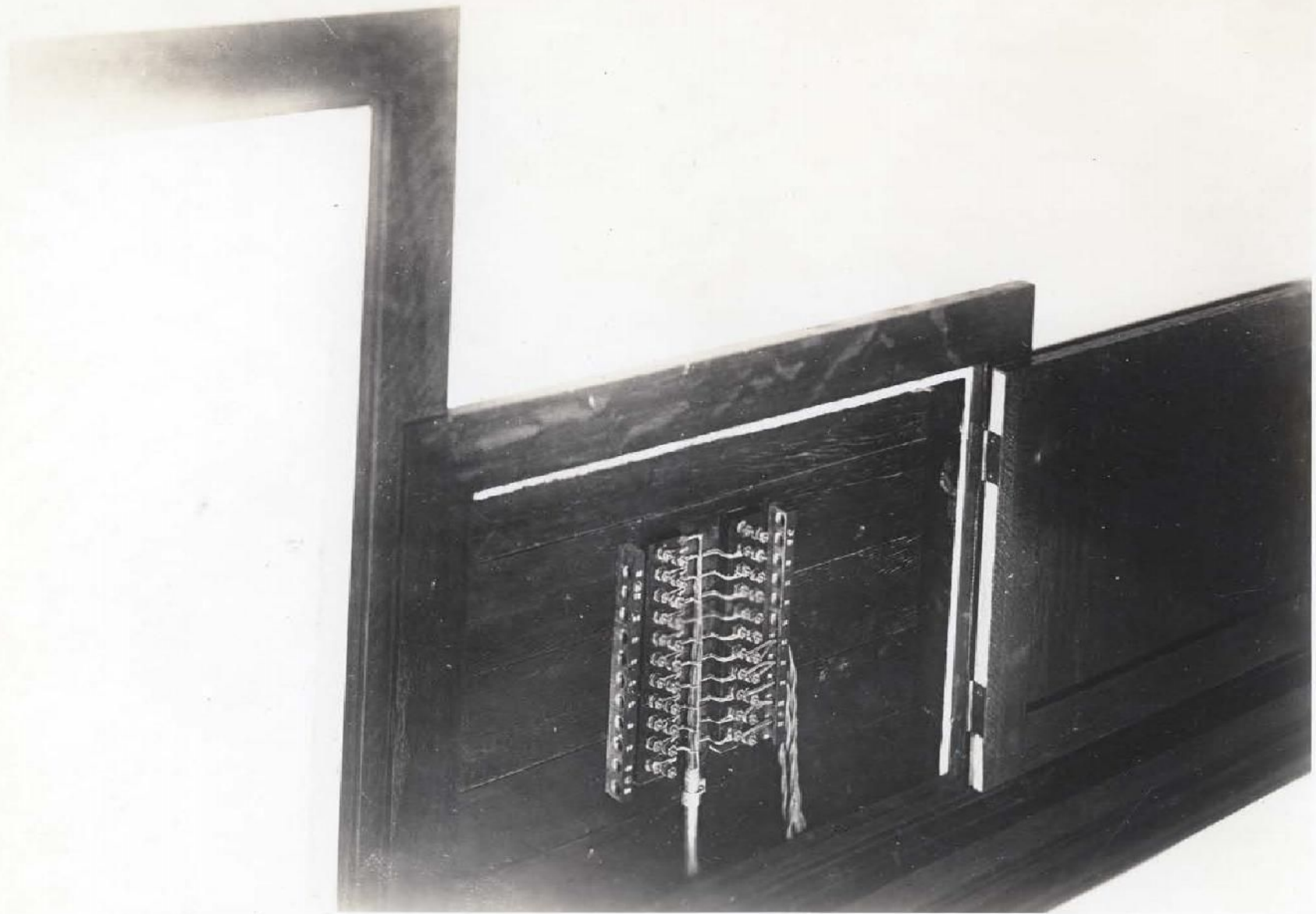
THE PACIFIC TELEPHONE AND TELEGRAPH COMPANY
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81

Don

UNDERGROUND CABLE CONSTRUCTION

Here is shown the local distributing terminal at a more distant point from the main riser cable.

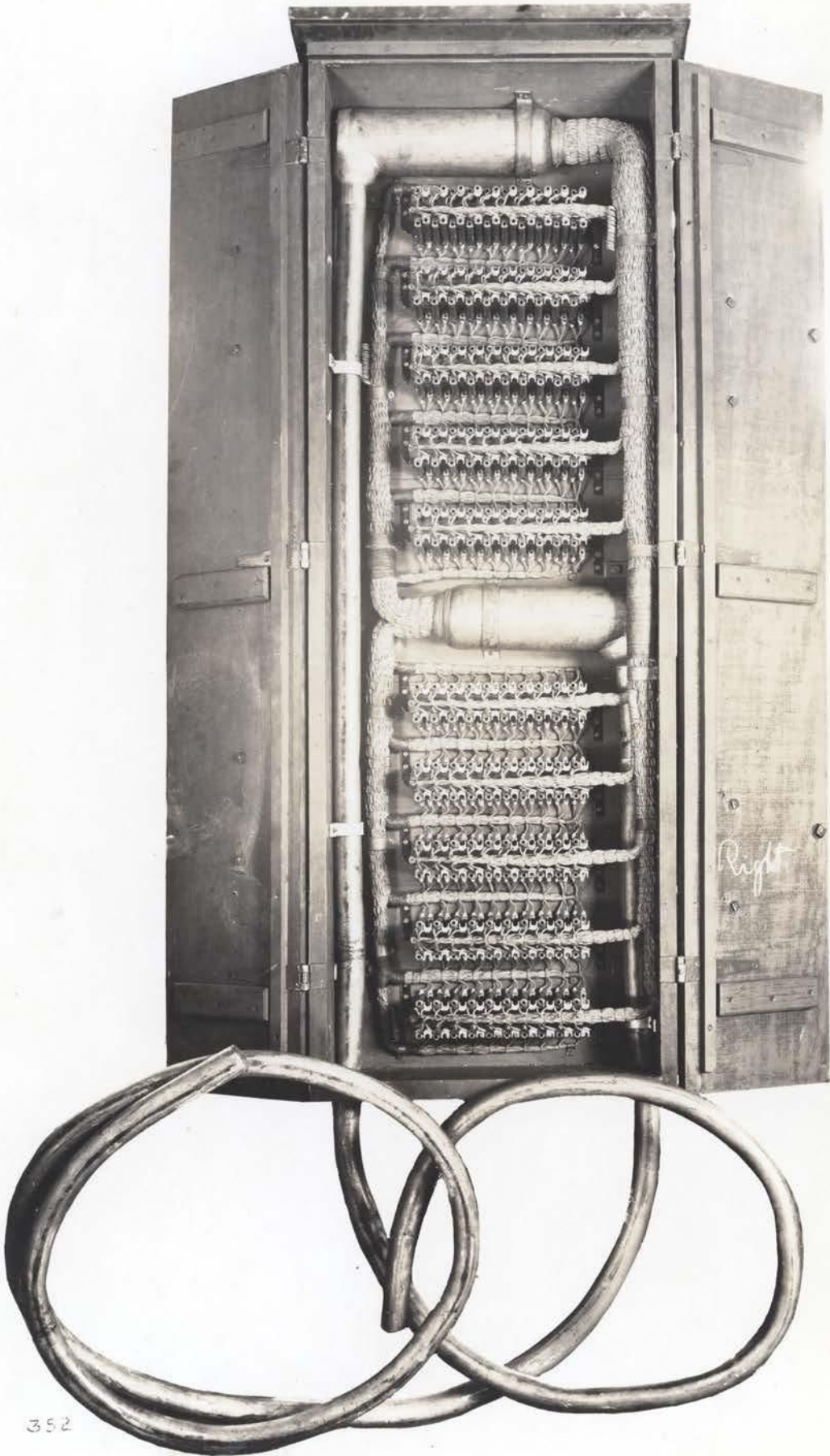


82

Don

UNDERGROUND CABLE CONSTRUCTION

Showing a type 15-B, 200 pair terminal box equipped with No. 77-B protectors. This terminal is used to connect the underground subsidiary and aerial cables. These boxes are equipped in the shop complete as shown and are ready to be attached to the pole. The cable entering the box at the left is spliced to the underground subsidiary while the cable on the right is spliced to the aerial cable. The wire shown is rubber covered twisted pair wire and is connected to the cables in the potheads, which can be seen at the top and in the center of the box.



Right

352

XIV-10

83

Don

UNDERGROUND CABLE CONSTRUCTION

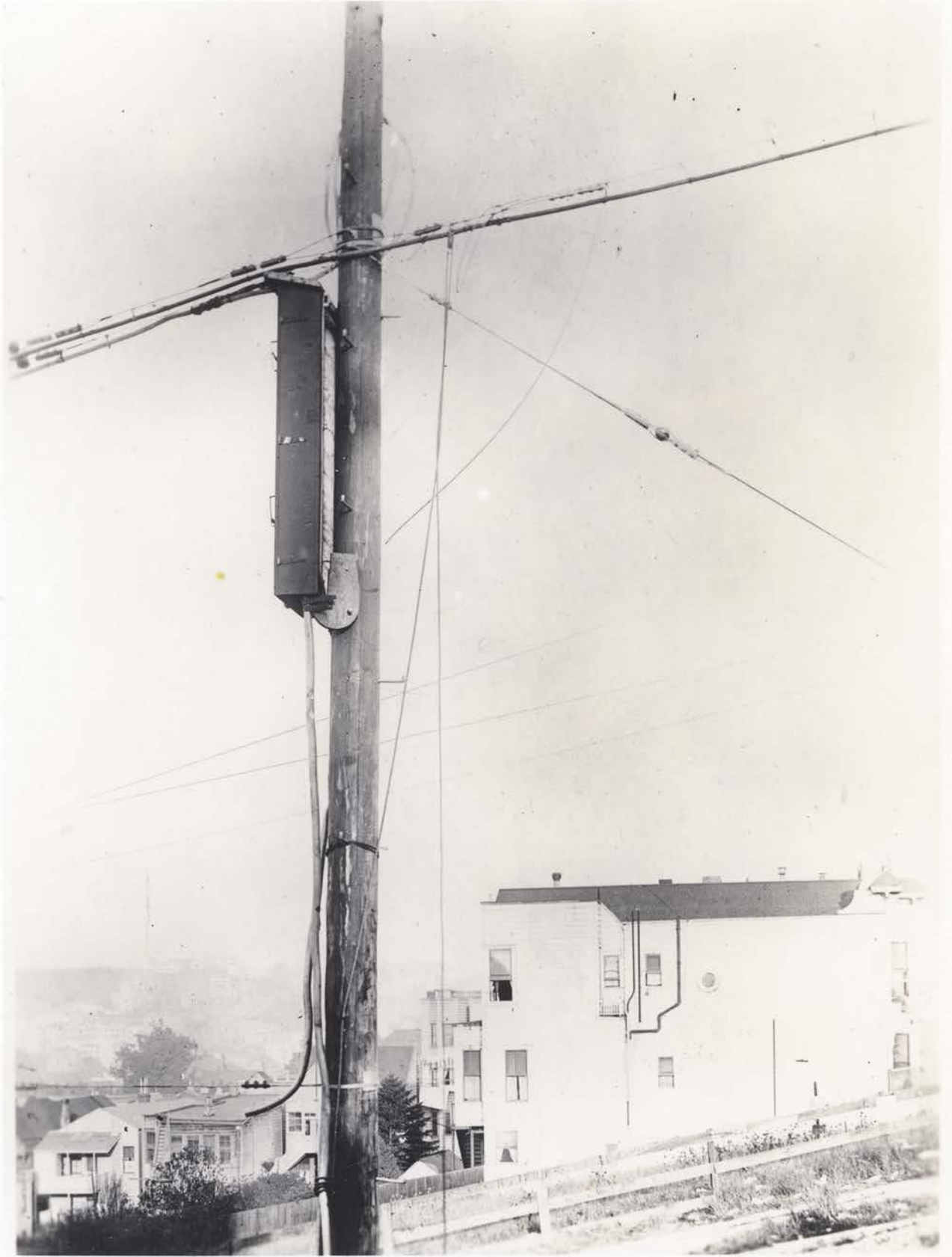
The 200-pair cable box, the detail of which is shown in the preceeding picture, is here shown in its proper position on the underground pole. The underground subsidiary cable may be seen temporarily attached to the pole. The aerial cable to be connected to this terminal is coiled on the pole step just above the box.

84

Don

UNDERGROUND CABLE CONSTRUCTION

This view shows the cable ends unrolled.
Note the handline is in position to haul the aerial
cable tail up into position. Note also the wooden
form around which the aerial cable will be bended.
This form is shown immediately below the box and at-
tached to the cable with straps.



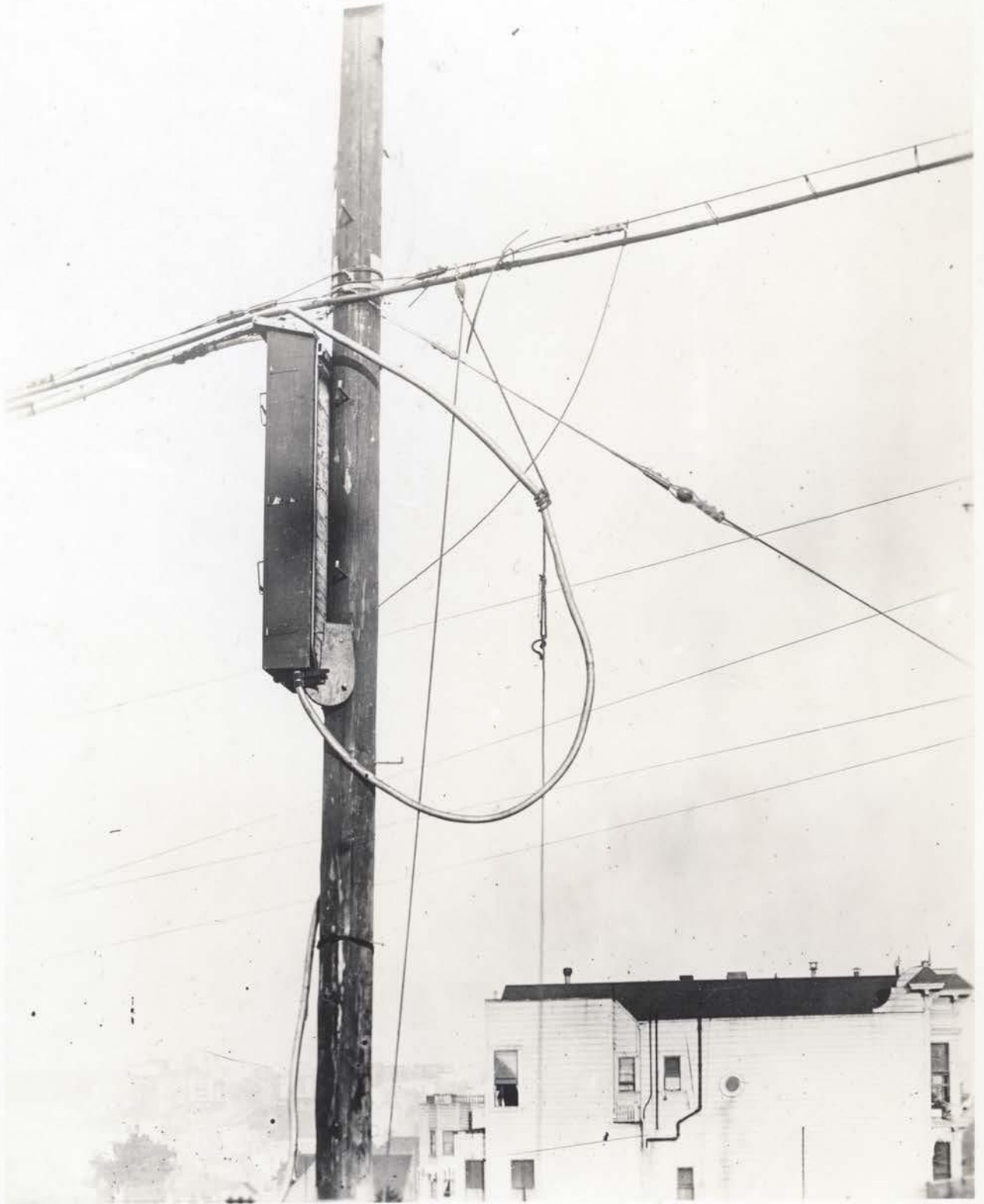
14-12

85

Don

UNDERGROUND CABLE CONSTRUCTION

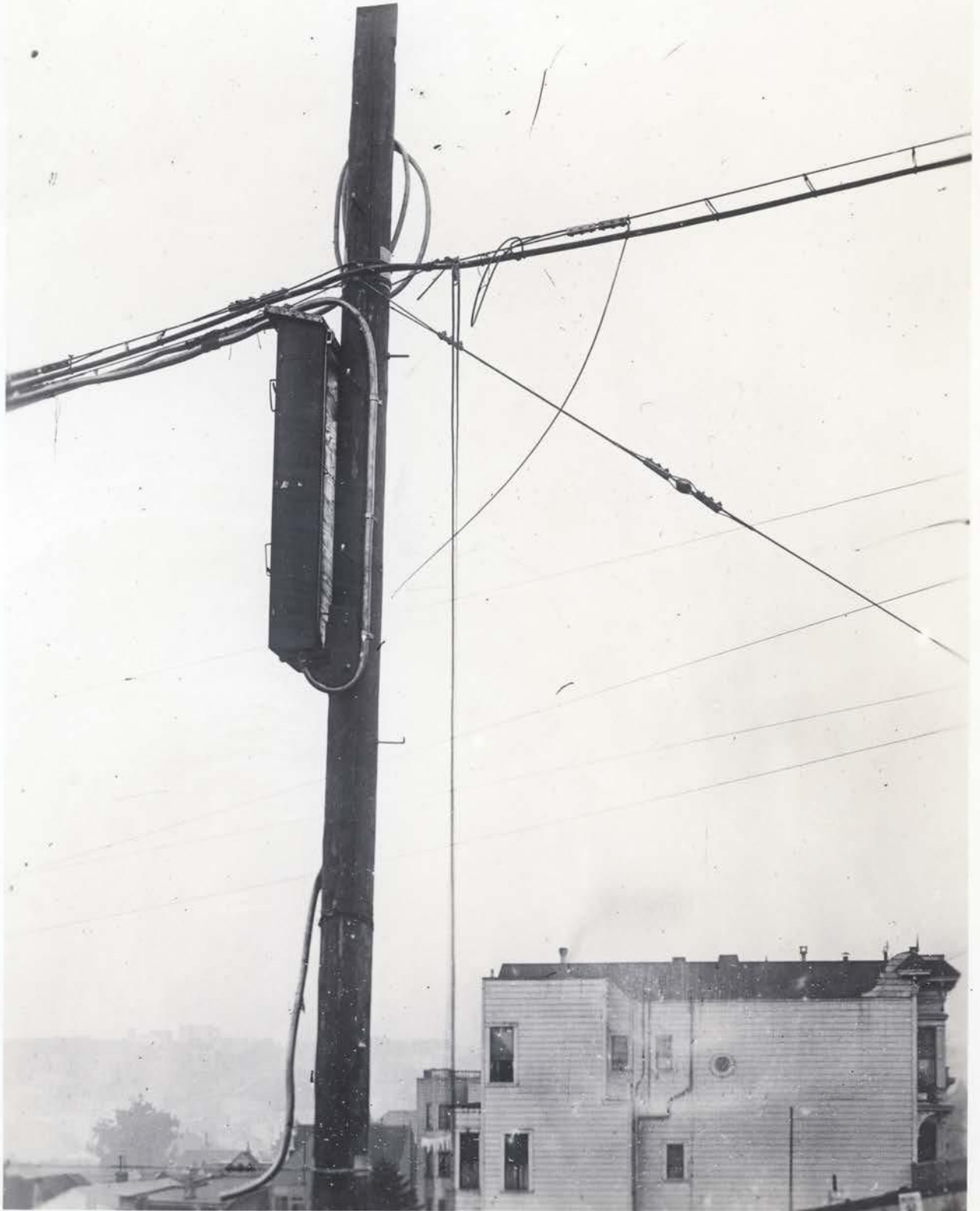
This view shows the arial cable tail partly raised into position.



86
Don

UNDERGROUND CABLE CONSTRUCTION

This view shows the aerial cable formed and clamped to the pole. This cable is now in position for splicing to the cable on the messenger.



4-1-14

UNDERGROUND CABLE CONSTRUCTION

California and Maple Sts.

This shows a 200-pair, 15-B terminal box in service. Protective terminals such as these are not used for distributing purposes. The local distribution, at this point, is served from the No. 8 W.E.Co. terminal which can be seen on the back of the pole. Note the platform for the workmen with its protective guard.

87

Don



88

Don

UNDERGROUND CABLE CONSTRUCTION

Block bounded by Sutter, Bush, Pierce, and
Scott Streets.

Showing a terminal box, non-protective type,
in place on a distributing pole in the interior of the
block. The wooden platform which is shown is the old
style. Note the angle iron back brace reenforcing the
crossarm.



14-16

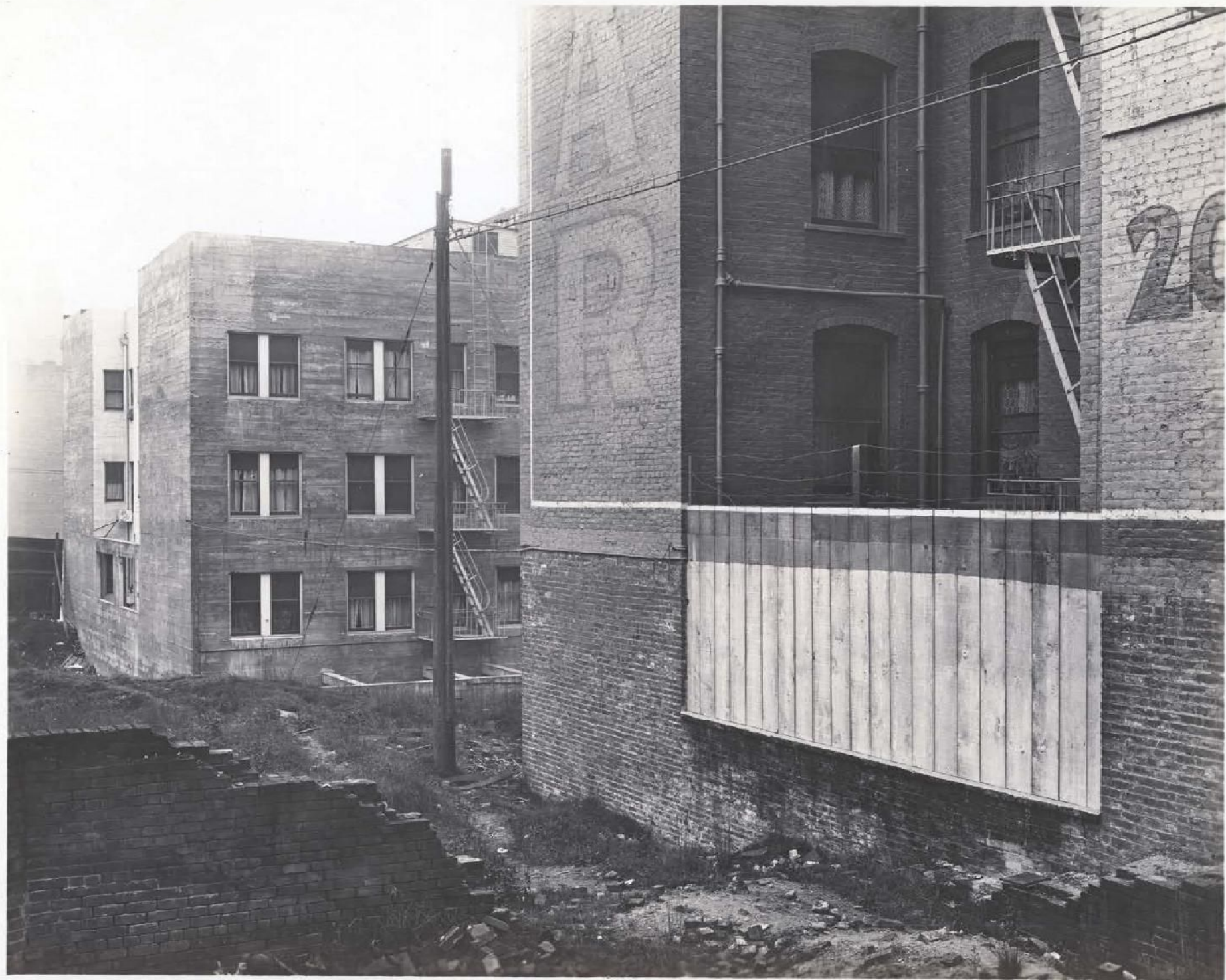
89

Don

UNDERGROUND CABLE CONSTRUCTION

Block bounded by Taylor, Jones, Ellis and
Eddy Streets.

The distributing terminal in this case is a
No. 8 type Western Electric Company, containing 50-pairs.
The underground cable is here continued aerially to another
part of the block.



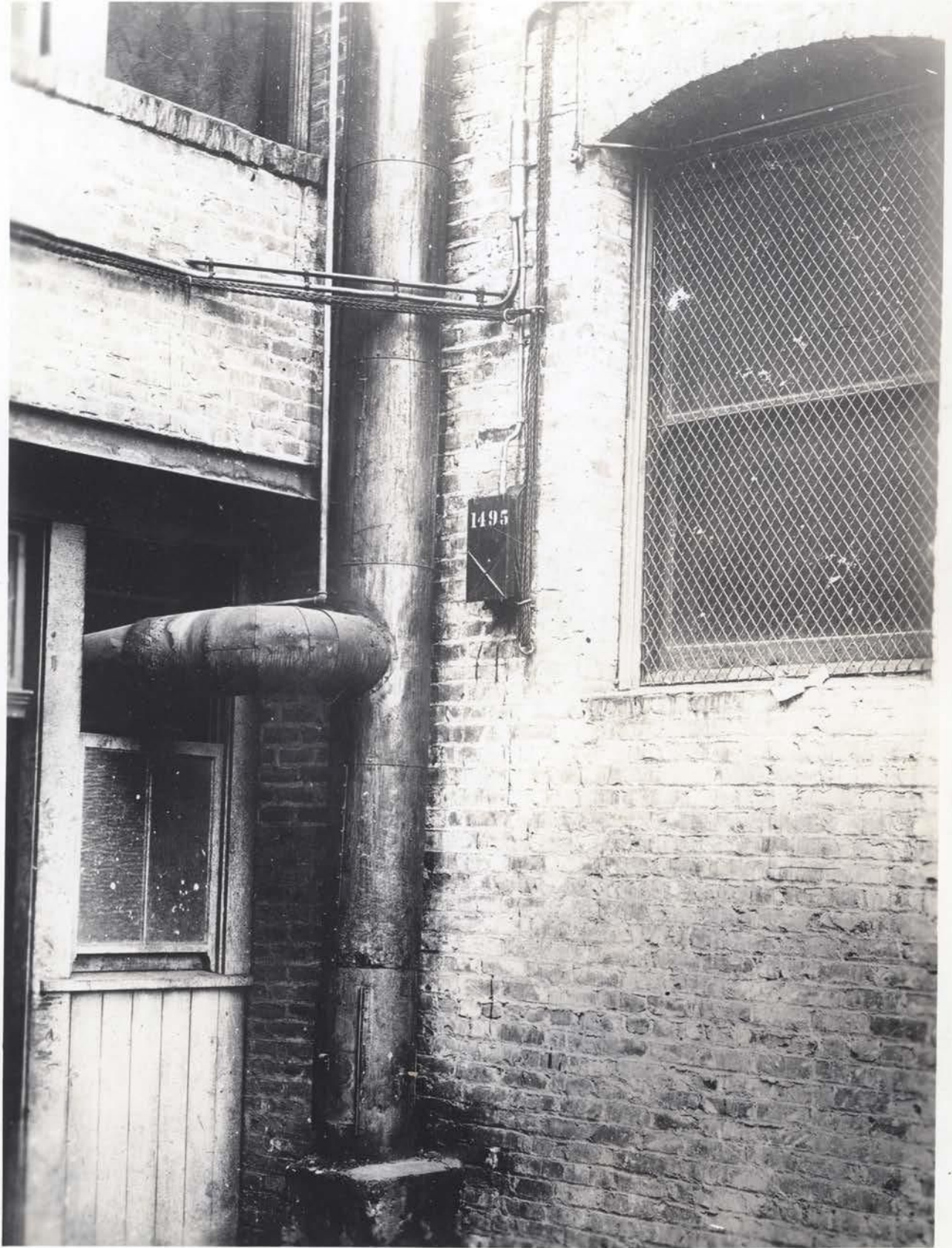
90

Don

UNDERGROUND CABLE CONSTRUCTION

Mary Lane

This illustrates typical interior block construction on walls and buildings. The cable extending directly from the underground is here supported with hangers and extension bolts. Note the short piece of pipe, the ends of which are cemented in the wall and from which the cable is supported by marlin hangers. This construction is necessary in this case because of the hot vent pipe in the corner. The distributing wires to the various subscribers' telephone extend from the terminal through the bridle rings to the telephones. Note the identification number on the face of the terminal. Note also the leading in wire at the corner of the window which is protected by the circular loom.



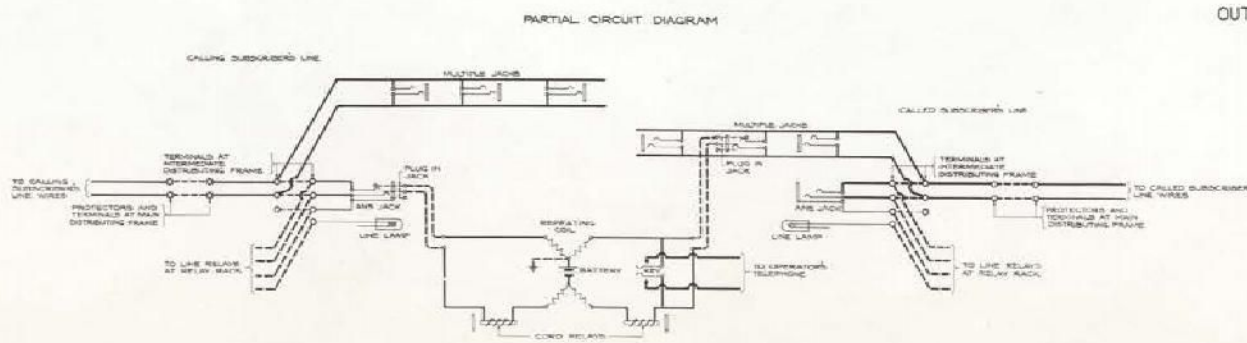
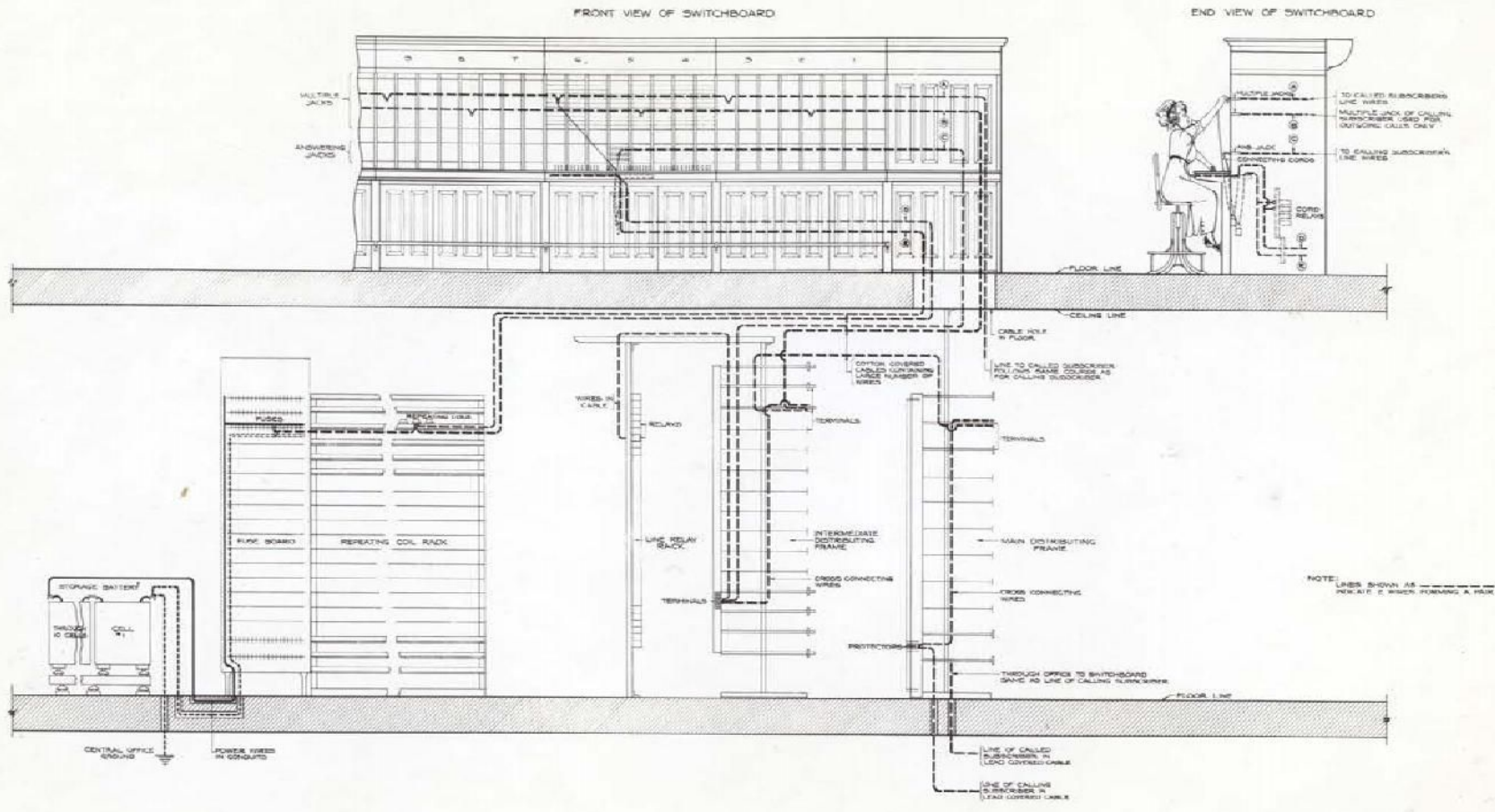
XIV - 10

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Don

CENTRAL OFFICE EQUIPMENT

This picture gives an outline of a complete talking connection within the central office, indicating diagrammatically the course taken by the wires used in conversation. The wires are shown entering the office at the dotted line in the lower right-hand corner of the picture to the left of the title. The course of the wires may then be followed by tracing this dotted line throughout the diagram. The line of the calling subscriber only is shown as the line of the called subscriber is an exact duplicate. At the bottom of the picture is shown the circuit diagram of a complete connection. The various portions of the equipment will be explained more in detail in the pictures following.



OUTLINE OF COMPLETE TALKING CONNECTION BETWEEN TELEPHONE SUBSCRIBERS IN FRANKLIN OFFICE - SAN FRANCISCO DECEMBER 31, 1912

CENTRAL OFFICE EQUIPMENT

445 Bush Street

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Don

This is an end view of the main distributing frame at Kearny Office, showing the method of distributing the wires entering in the lead covered underground cable to the central office. The cable is shown just to the right of the telephone. At the bottom of the picture may be noted another cable, the fanning out of which is more clearly shown extending from the base of the main distributing frame to near the top of the picture. These wires are fanned out to the right of the cable and connect there with the protective apparatus. Each of these cables contains 200 pairs of wire.

The mass of wires seen immediately to the left of the cable are flame proof "jumper", i. e., crossconnecting wires and connect the protective apparatus opposite the cable connection with the terminal strips on the opposite side of the main distributing frame. These terminal strips are fastened to the opposite end of the horizontal iron bars shown as a part of the frame.

92
Don

At the left of the picture are seen the "switchboard" cables which extend from this main distributing frame to the intermediate distributing frame. These cables connect on the main distributing frame with the jumper wires shown in the picture through the terminal strips referred to above. The path of these cross-connecting wires and cables may easily be traced on the diagrammatic chart.



17-41

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Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.

This shows another view of the same main distributing frame, giving an idea of the number and compact arrangement of the central office cables extending from this frame to the various intermediate distributing frames on the floors above. Each of these cables in this picture contains 43 wires. In the extreme upper left-hand corner of this picture may be noted a difficult turn in the cable run.



14-21

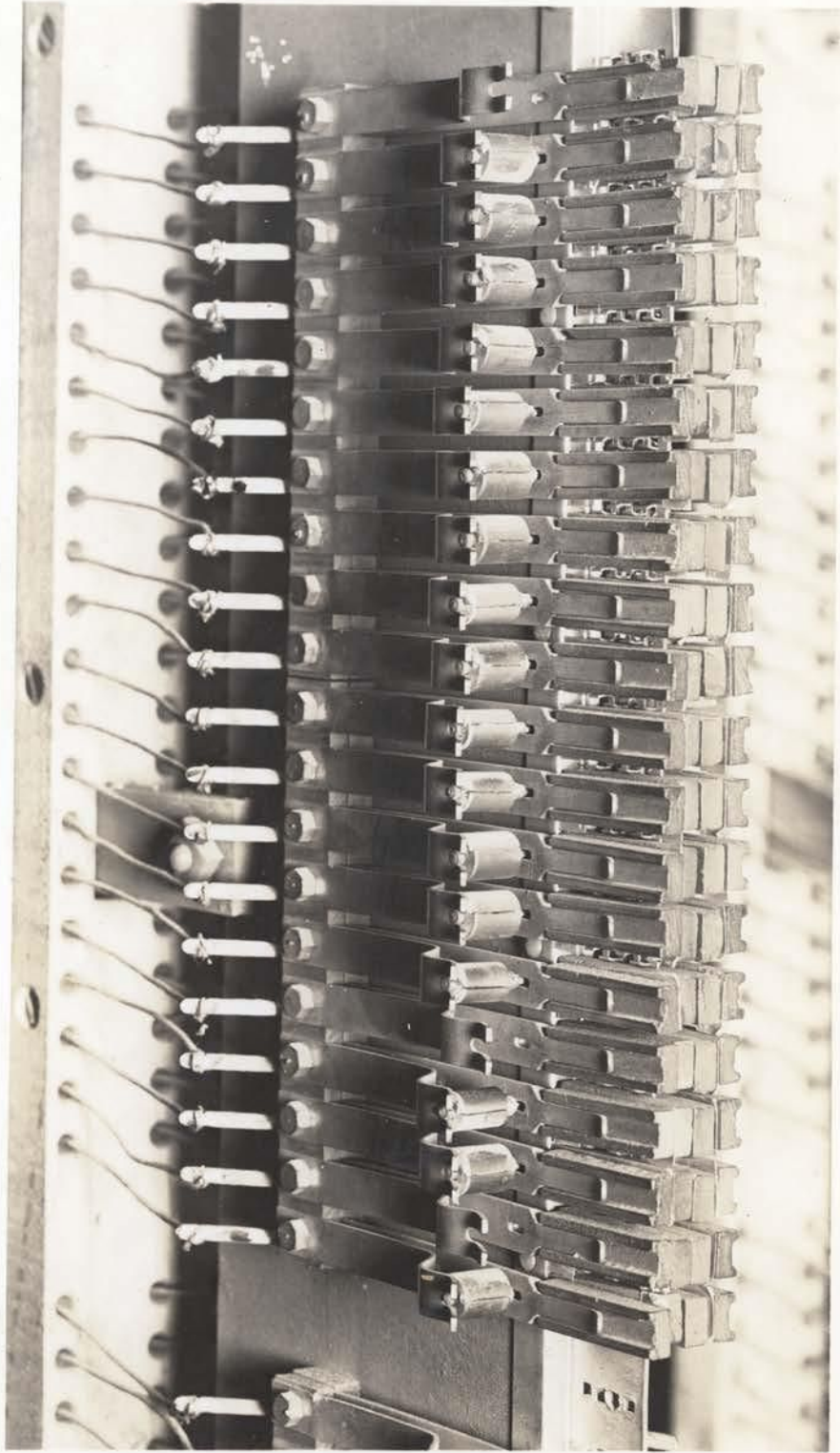
0

94
Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.,

This picture gives a detailed view of one group of 20 line protectors, the type #74, at about two-thirds full size. The wires seen at the left passing through the holes in the fanning strip are soldered to the lugs. Thus in terminating a 600 pair underground cable on such protectors 1200 separate soldered connections are required, one to each terminal lug. It takes 30 groups such as shown in the picture to terminate one 600 pair cable. The purpose of these protectors is to protect the apparatus in the central office from electrical disturbances such as lightning or dangerous electrical currents.



ALZ-2-2

95

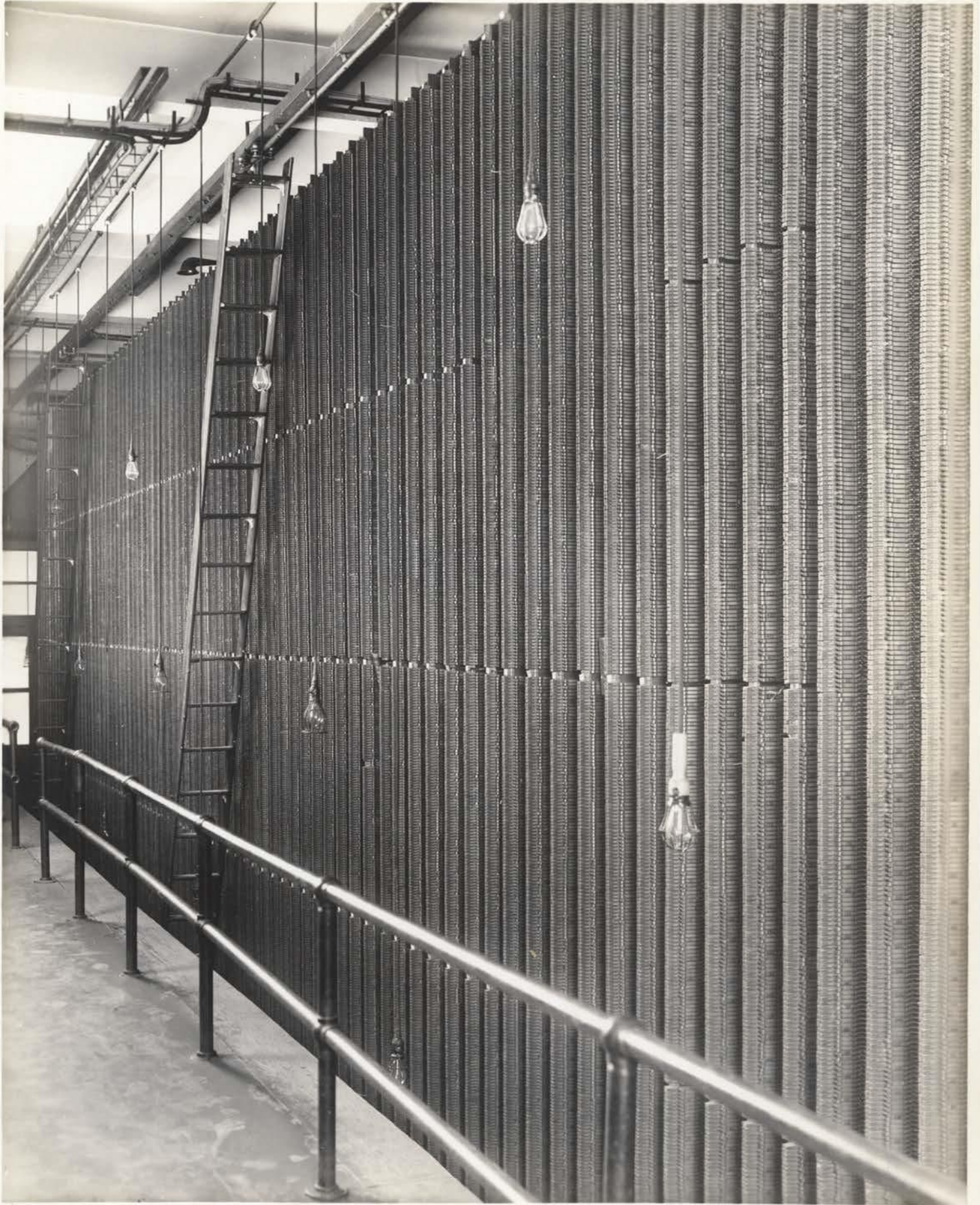
Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.

View of the main frame at Kearny Office, on which are terminated all the underground cables entering the office, a total of more than 56,000 wires.

Note the sliding ladders giving a means of access to the upper portions of the frame. This frame is probably the largest main distributing frame in the United States.



14-25

CENTRAL OFFICE EQUIPMENT

827 Hyde St.

This is a view of the horizontal side of the intermediate distributing frame at Franklin Office. The cables from the main distributing frame enter this frame so as to fan out on the terminal strips here shown. The cables shown underneath the horizontal rows and extending to the left of the picture terminate at the switchboard. Note the flame proof jumper wires on this frame. Each of the connections to the terminals here shown is soldered, 60 on each of the individual blocks, which may be readily distinguished.



97

Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.,

In this picture are shown the cables entering the Franklin switchboard from the lower floor on which the intermediate distributing frame is located. The section of the switchboard where these cables enter is known as the cable turning section. Note the compact form and arrangement of these cables. At the extreme left of the picture, which is taken from the rear of the switchboard, is shown the fanning out of the separate wires in these cables for properly attaching these wires to the multiple jacks in the front of the switchboard. The face of the cables here shown is approximately two feet from the jacks, to which the wires must be soldered. There are 480 separate cables here shown, each carrying 60 wires, the ends of which are soldered to the terminals on the jacks. Each of these cables serves 20 lines.



1112-25

98
Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.,

This is a view of the relay rack on which are placed the combination line relays. A group of these relays is here shown uncovered. There is one of these combination relays for each subscriber's line entering the central office. The action of this relay serves to light the lamp on front of the operator when the receiver is taken off the hook by the subscriber. The numbers appearing on the covers are for identification only.



99
Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.,

This is a view of the subscriber switchboard at Franklin Office. In the face of the switchboard may be seen the separate multiple "jacks" to which the wires of the switchboard cable are soldered. In the length of switchboard represented by three consecutive numbers, that is, three consecutive operators, 9600 of these jacks are placed, this comprising one "section" of switchboard. These jacks individually and collectively are multiplied and duplicated throughout the several sections exactly alike, thus one subscriber line entering the office terminates on as many separate multiple jacks as there are sections of the switchboard. In this way any operator in any position can always reach a multiple jack carrying the telephone number of the subscriber being called. The peculiar appearance of the face of the multiple jacks, is caused by the use of "signal plugs" which convey certain information necessary for operating purposes.



LII

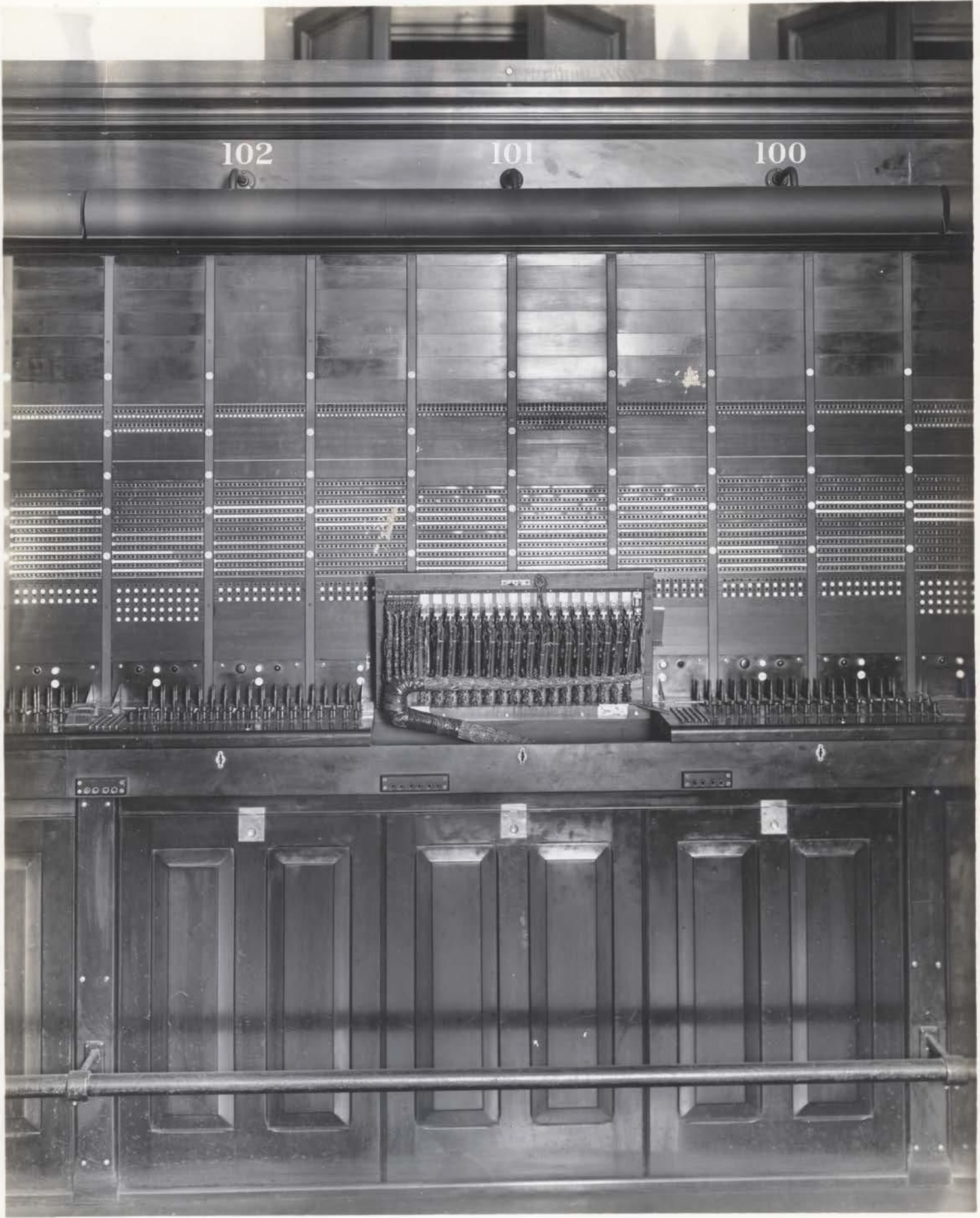
100

Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.

This is a view of the front and keyshelf equipment used on the Sutter switchboard at 445 Bush Street, comprising a complete section. A closer view of this is shown in the following picture.



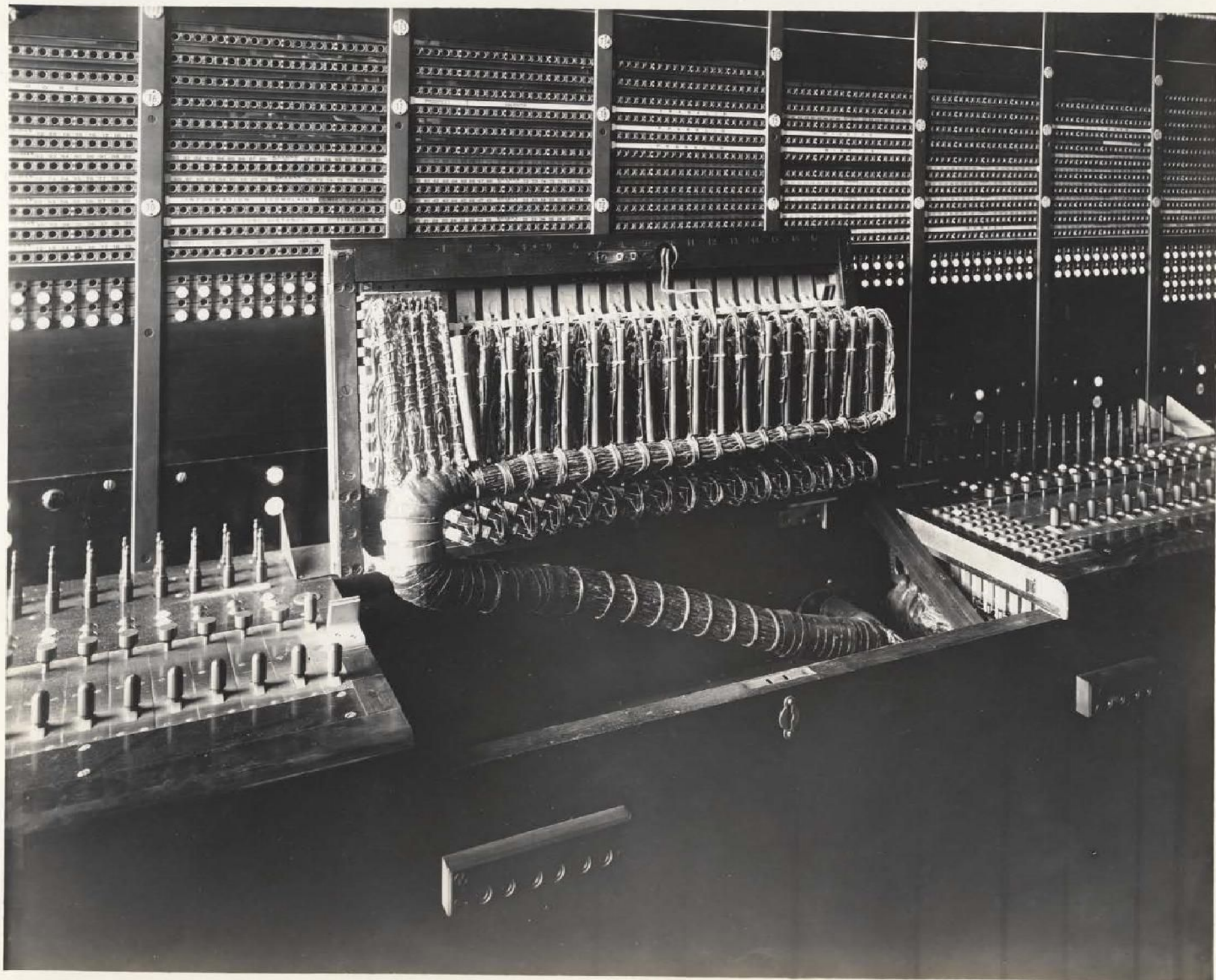
IV - 28 0

101
Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.,

A detail view of the equipment directly in front of and used by each operator. Near the bottom of the picture is shown the "jacks" used for connecting the operators transmitter and receiver into the circuit. The center shelf is shown raised giving an idea of the equipment and wiring underneath. The "jacks" are here also shown as they appear in the front of the board.



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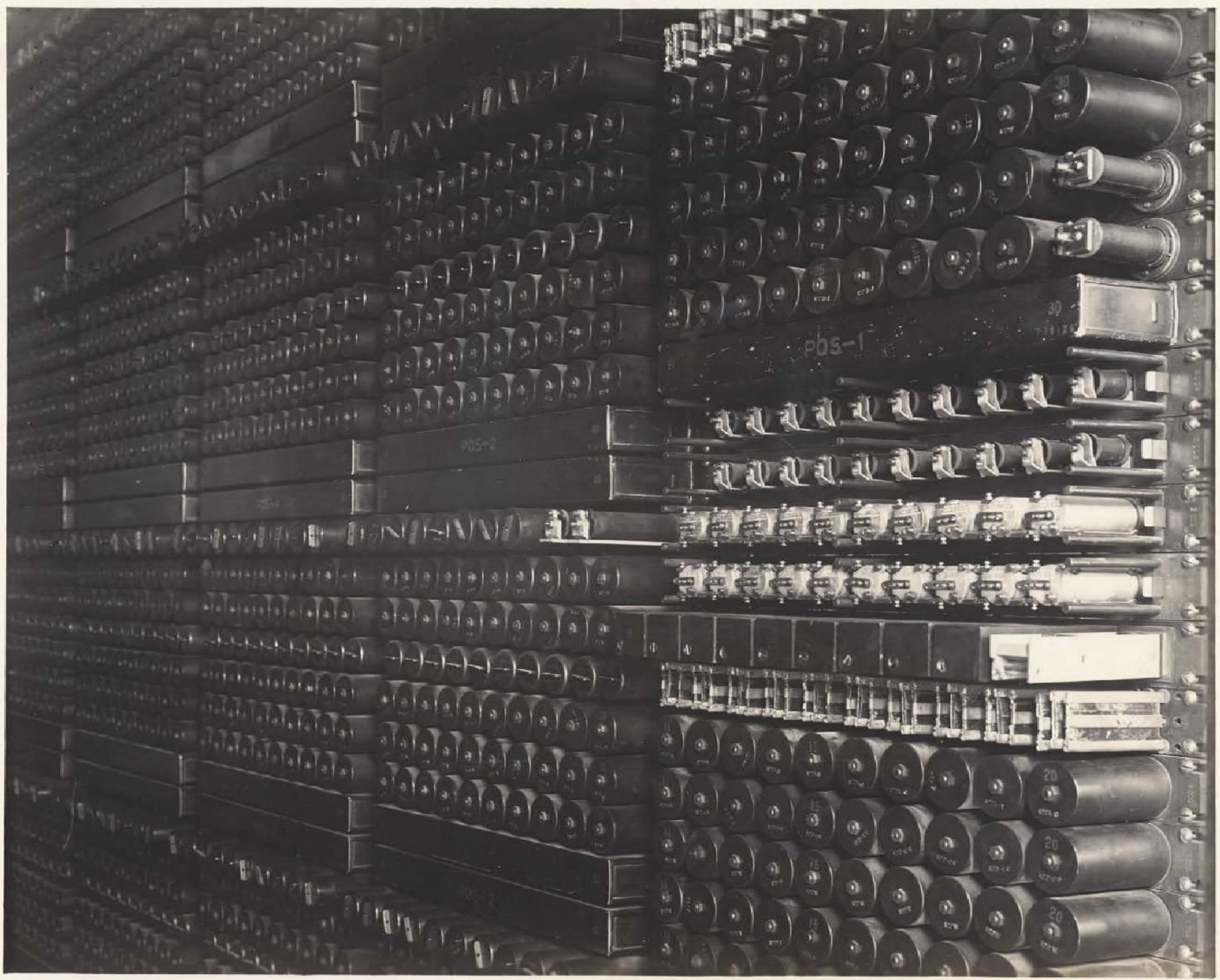
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Don

CENTRAL OFFICE EQUIPMENT

827 Hyde Street.

Some of the equipment on the trunk relay rack
at Franklin Office.



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Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.

Message register rack at Franklin Office. For each subscriber having message rate service there is a separate message register such as shown here. This is a delicate piece of apparatus designed to accurately register the number of calls actually placed by the subscriber. Certain of these registers are shown with the outer casings removed.

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
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XIV-31.0

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Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.

A view of the storage room at Franklin Office.
From these batteries comes the current supply for operating
the various subscribers' telephones. This is the "central"
energy" supply of a common battery system such as operated
in San Francisco.

32-32



105
Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.

This is a closer view of the end cell of this battery showing the manner of connecting the heavy copper cables to the elements of the battery. These cables pass through the battery panel and terminate at the various fuse boards where the current is divided and distributed to the several switchboards.

XIV-83



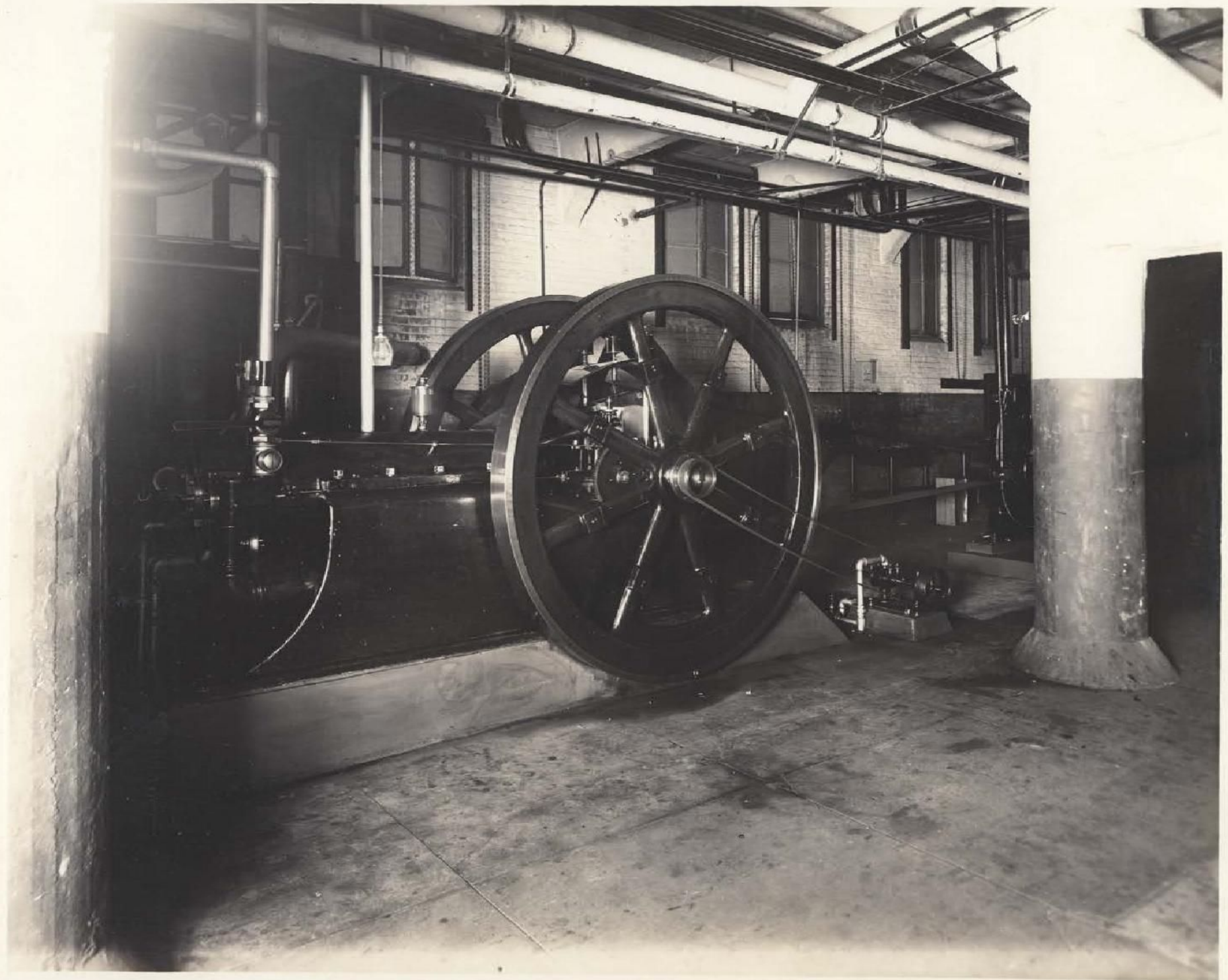
106
Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.,

Here is shown the 40 h.p. gas engine at Kearny office used for driving the dynamo which generates current for charging a storage battery similar to that shown in the preceding picture. The small apparatus shown near the column is a pump for forcing cooling water through the engine jacket. A separate power plant must be provided for each central office.

X.112 - 34.



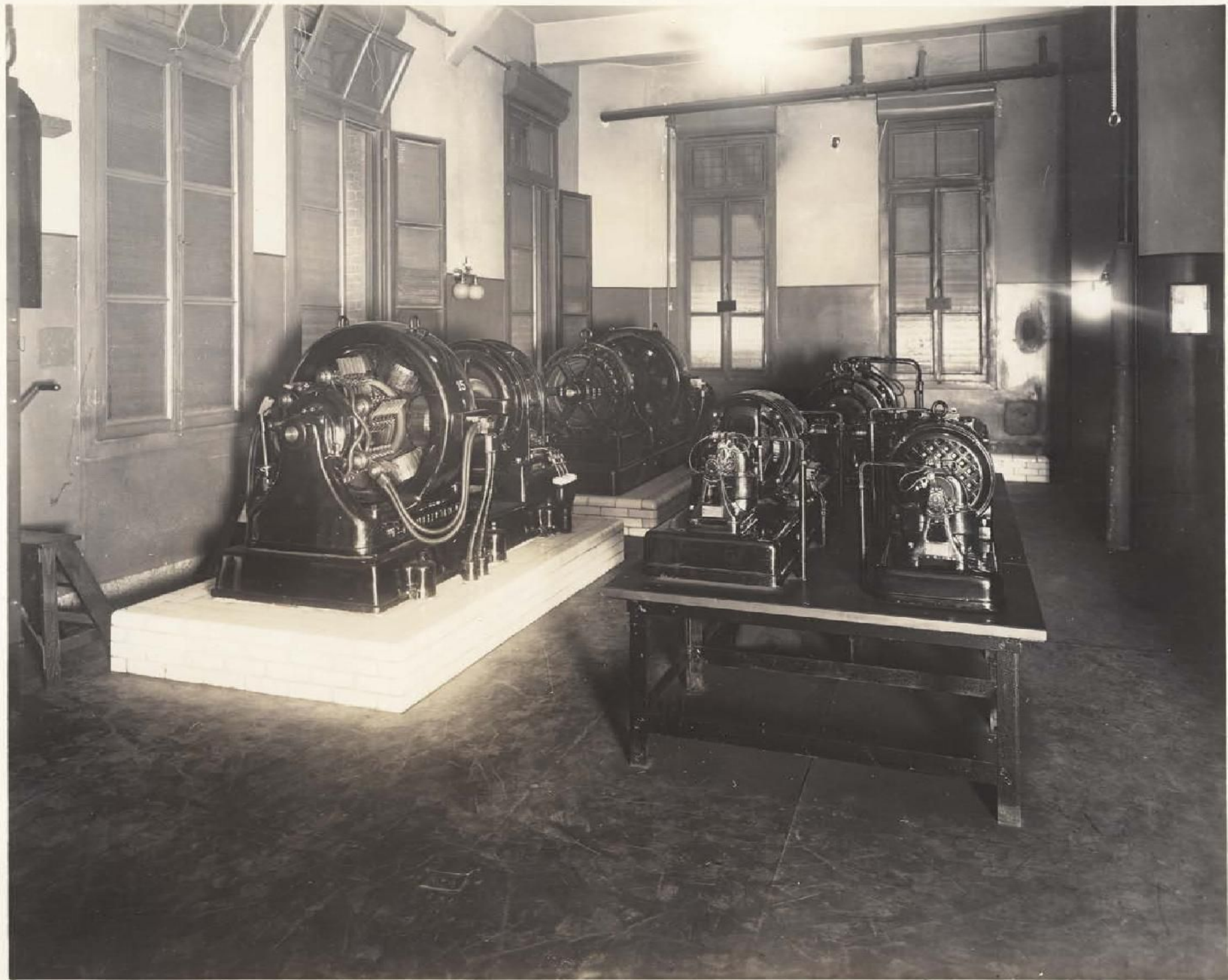
107

Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.

In this picture is shown the power room at Kearny Office in which is located the motor generator sets also used for charging the storage batteries. These machines are the ones along the rear wall and with the gas engine provides two independent sources of power supply. The other machines shown in the picture are used for various purposes, such as supplying power for ringing over the subscriber lines, etc.



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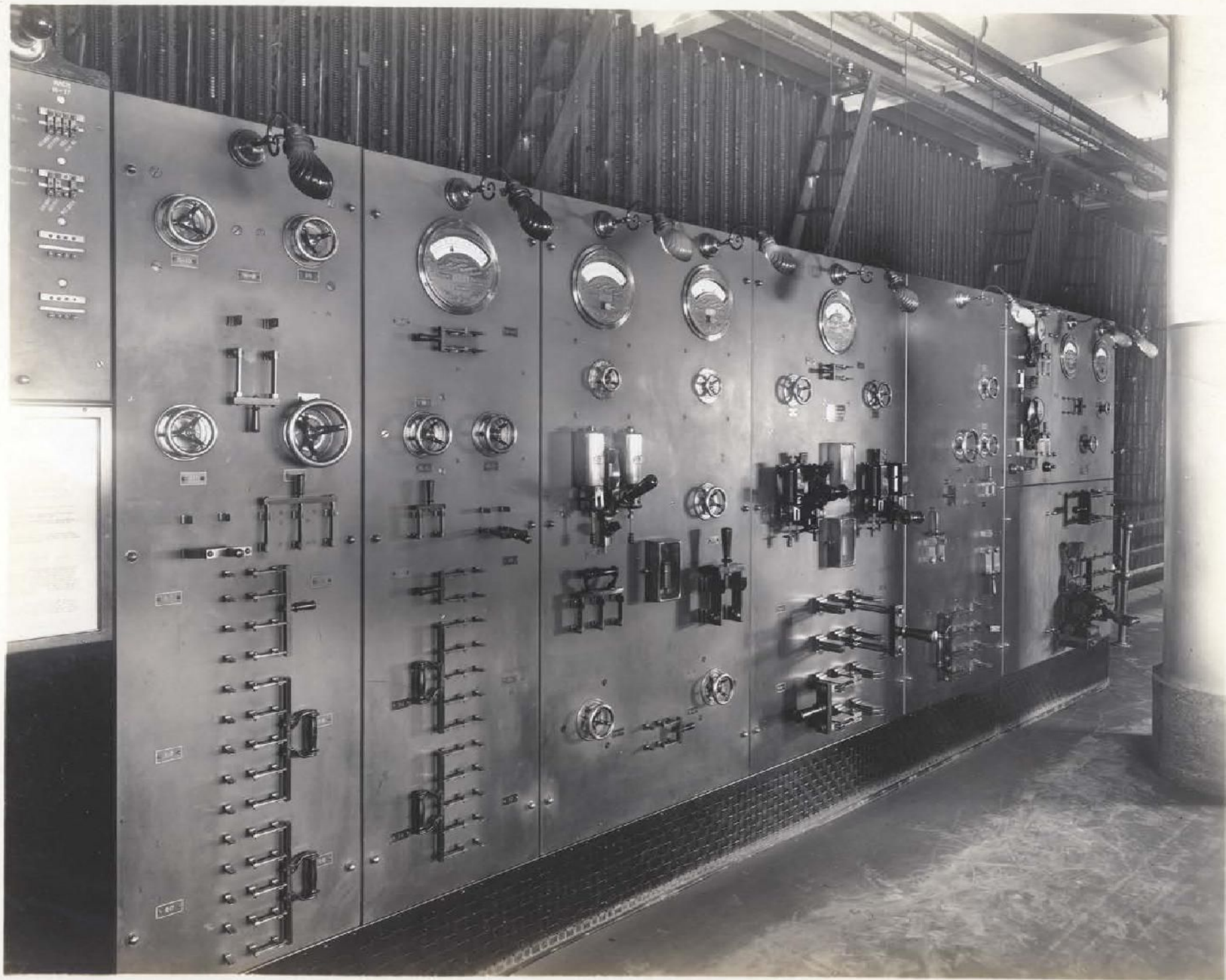
108

Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.

This picture shows in detail, the face equipment of the power switchboard in Kearny Office.



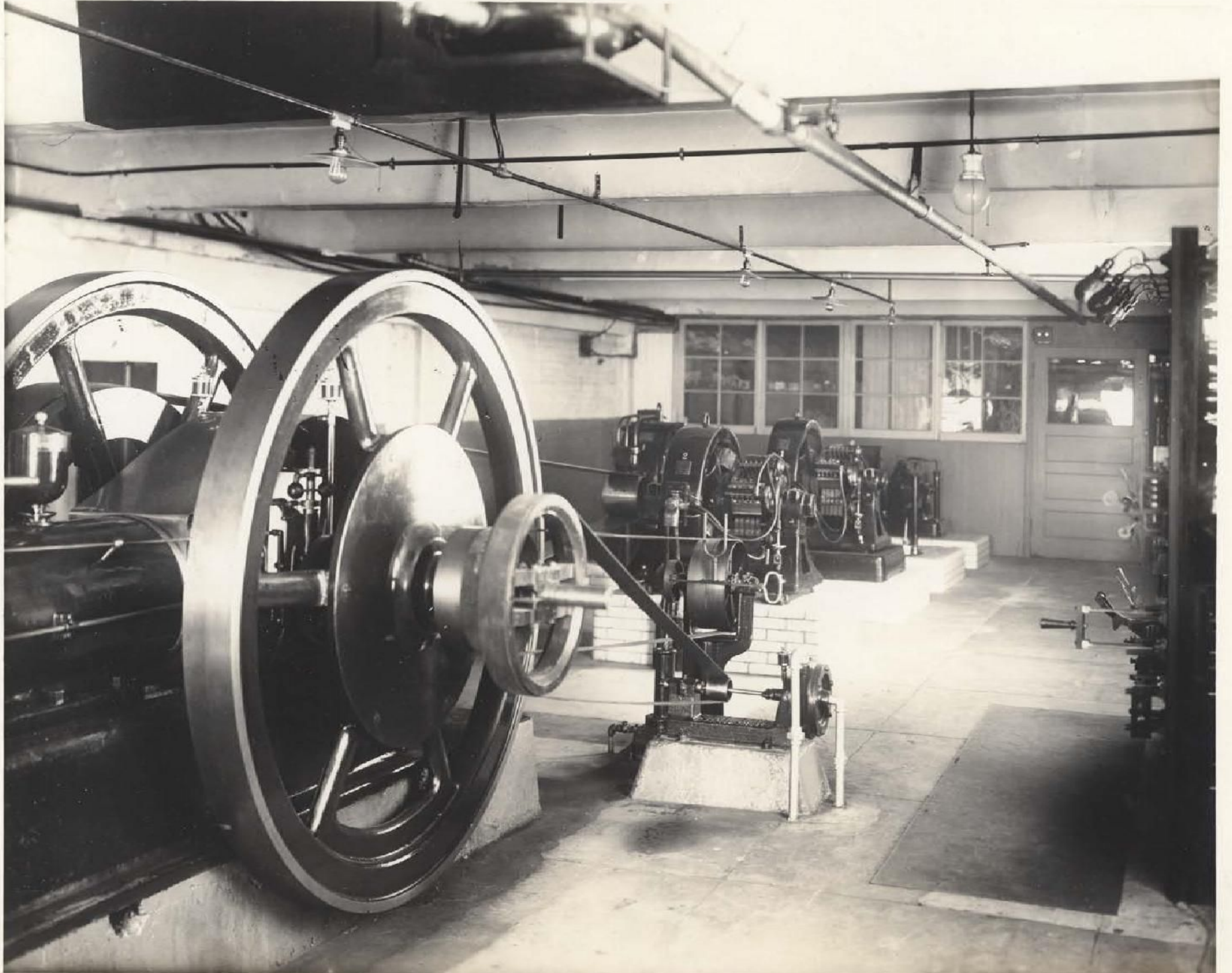
109

Don

CENTRAL OFFICE EQUIPMENT

827 Hyde St.,

A view of the power room at Franklin Office.
The power switchboard may be seen at the right of the picture and in the back of the room the motor generator charging set.

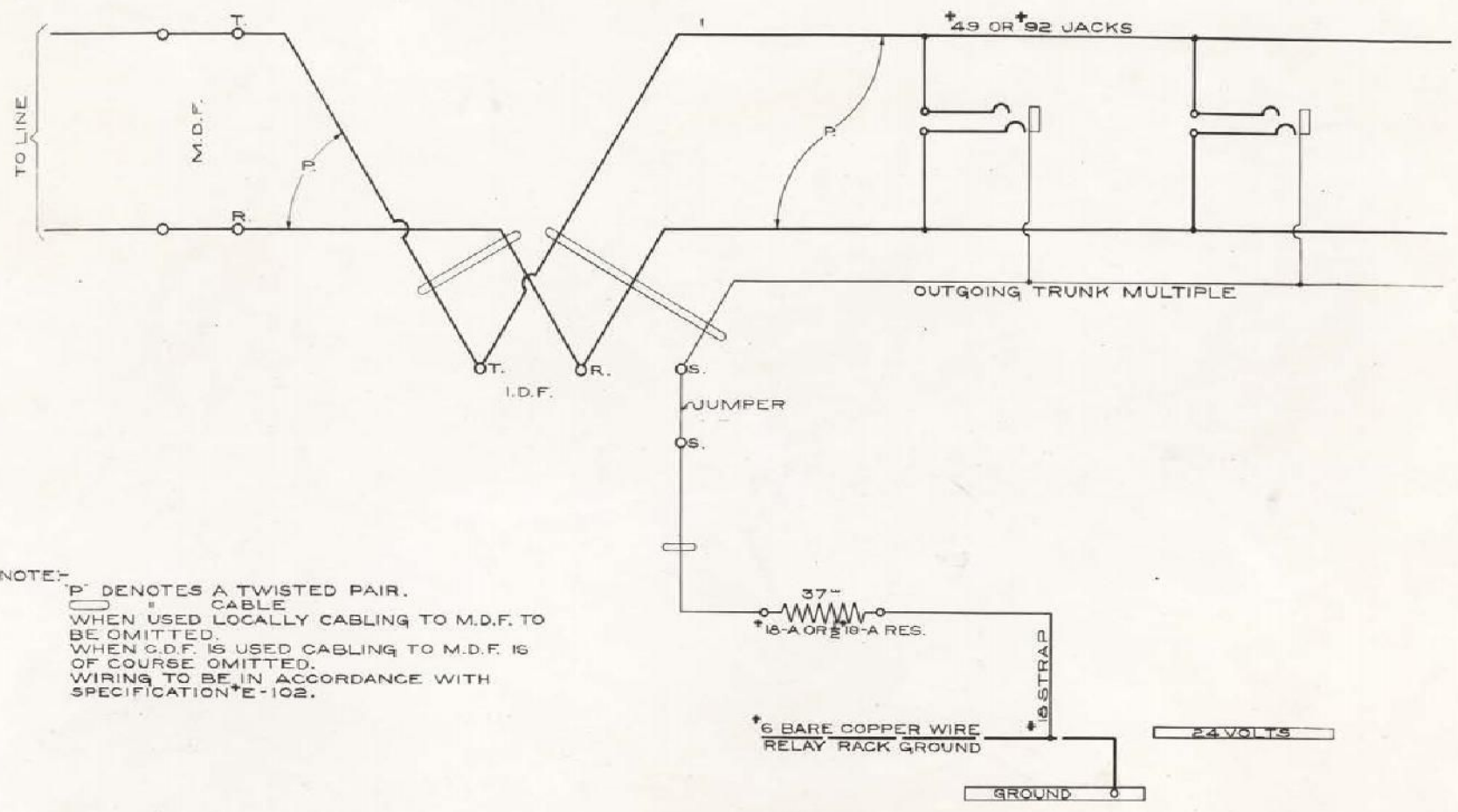



110

Don

CENTRAL OFFICE EQUIPMENT

A photograph of a circuit drawing such as is used by the equipment engineers in designing equipments, and by those having charge of the switchboards and equipment at the central office.



NOTE:-
 'P' DENOTES A TWISTED PAIR.
 CABLE
 WHEN USED LOCALLY CABLING TO M.D.F. TO BE OMITTED.
 WHEN C.D.F. IS USED CABLING TO M.D.F. IS OF COURSE OMITTED.
 WIRING TO BE IN ACCORDANCE WITH SPECIFICATION E-102.

PACIFIC STATES TEL. & TEL. CO. ENGINEERING DEPARTMENT SAN FRANCISCO	DRAWING	B-123
	SCALE	
RELAY SWITCHBOARD No. 1. TRUNK CIRCUIT. OUTGOING TO OTHER OFFICES.	7-20-04	
	6-16-06	

111

Don

CENTRAL OFFICE EQUIPMENT

This is a photograph of a drawing of one of the more complicated circuits used in diagrammatically describing central office equipments. This illustrates some of the equipment which is put into use in a long distance connection.

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AS AT DECEMBER 31, 1912

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CENTRAL OFFICE EQUIPMENT

Two trucks being loaded with equipment for
the new central office unit at 333 Grant Ave.,

XIV-40



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CENTRAL OFFICE EQUIPMENT

Hoisting a section of switchboard to the
seventh floor at 333 Grant Ave.



142 541

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CENTRAL OFFICE EQUIPMENT

Hoisting a motor generator equipment to
the seventh floor, 333 Grant Ave.

8/10
62
31



14-42

115

Don

CENTRAL OFFICE EQUIPMENT

Here is shown a 4000 lb. motor generator set
being brought in through the window. Two such sets were
placed on the seventh floor.

XIV-43.



116

Don

CENTRAL OFFICE EQUIPMENT

A view of the equipment as stored at 333 Grant Avenue, awaiting the Western Electric Company installers. This represents only a portion of the equipment required for the new "unit" of switchboard. The frames of the new sections can be seen just above the pile of boxes.

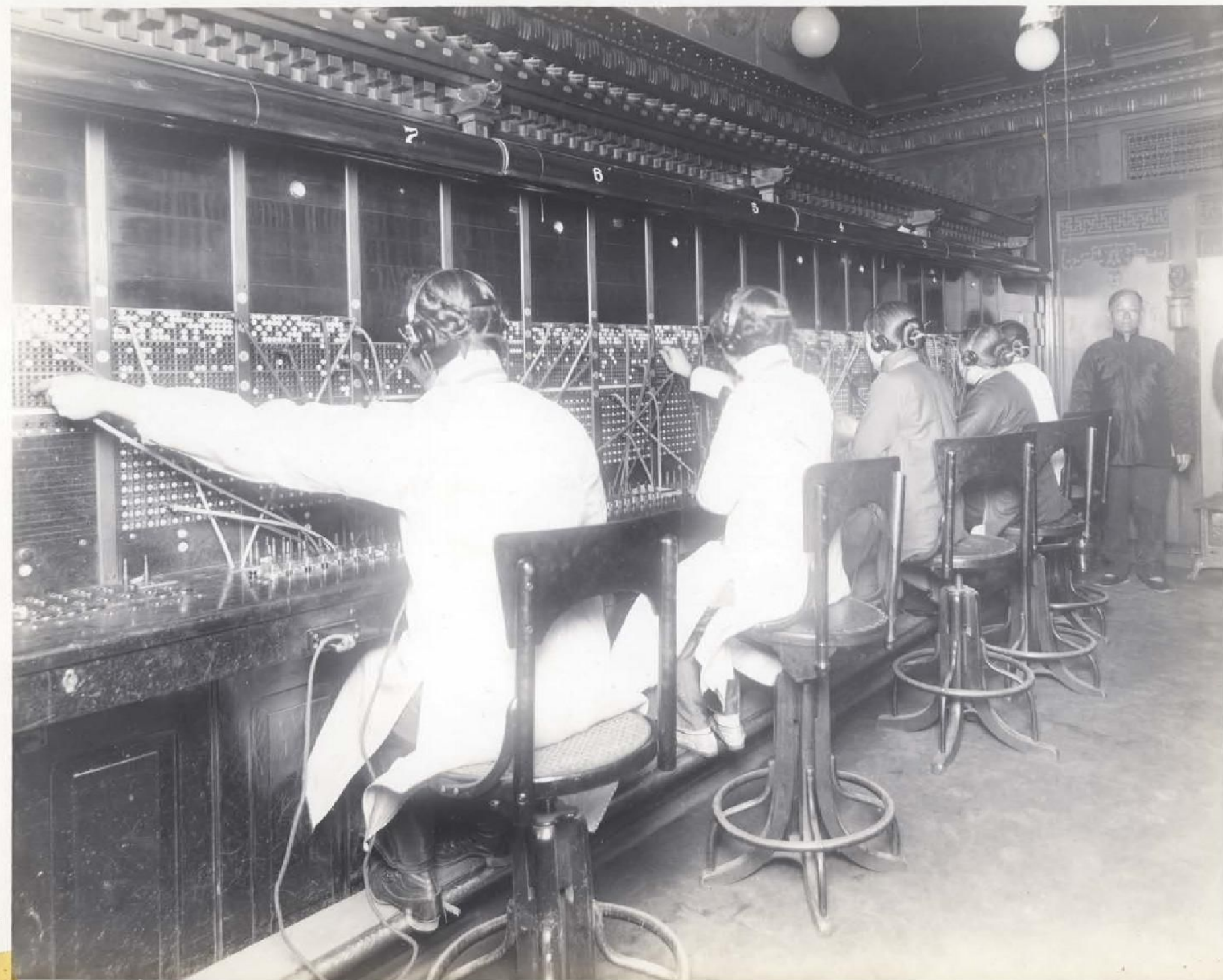


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on
CENTRAL OFFICE EQUIPMENT

743 Washington St.

China Office Switchboard. The Chinese Manager
is seen in the background.



118

Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.,

View of the Douglas subscribers' switchboard.
The subscribers' switchboard is the one at which terminates subscribers' lines. Small electric lights on these switchboards indicate to the operator a call incoming over a subscriber's line. All calls from subscribers having Douglas numbers are answered here.



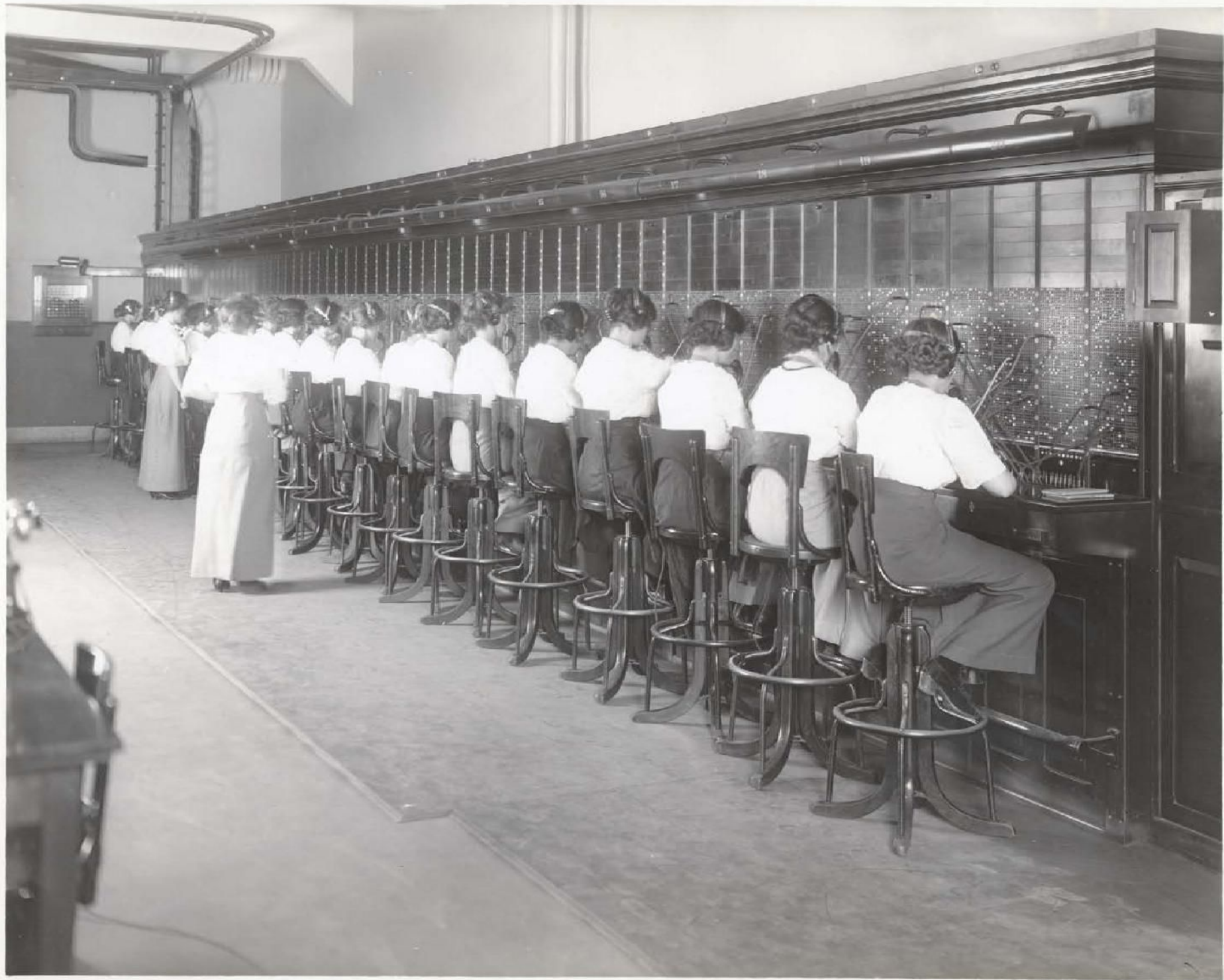
119

Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.

This is a view of the Douglas trunk switchboard. The trunk switchboard as distinguished from the subscribers' switchboard is the one where terminate the trunk lines incoming from all subscribers' switchboards throughout the city central office. A call answered by an operator on any subscribers' switchboard in the city is relayed by her over the proper trunks to the trunk switchboard of the office called. Thus any subscriber calling a Douglas number is relayed by the first operator to this board where the connection is completed.



120

Don

CENTRAL OFFICE EQUIPMENT

2001 Steiner St.

View of Positions 46 to 59 on the Fillmore
subscribers' switchboard.

XIV-48



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CENTRAL OFFICE EQUIPMENT

2001 Steiner St.

View of Positions 60 to 83 on the Fillmore
subscribers' switchboard.

XIV-49



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CENTRAL OFFICE EQUIPMENT

2001 Steiner St.,

View of the Fillmore trunk switchboard.

XIV-50.

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123

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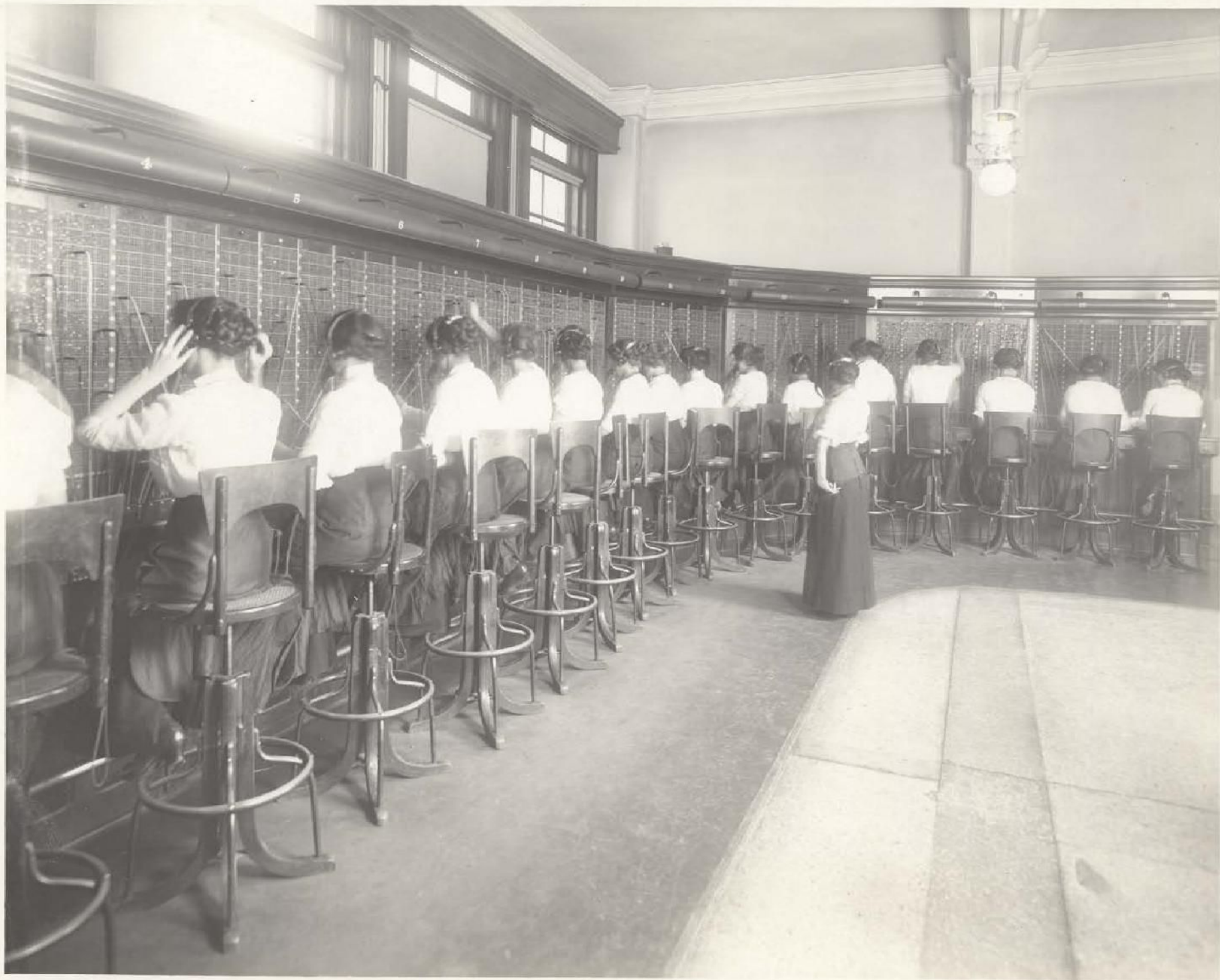
CENTRAL OFFICE EQUIPMENT

827 Hyde St.

View of the Franklin trunk switchboard.

212-51

0



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AS AT DECEMBER 31, 1912

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CENTRAL OFFICE EQUIPMENT

445 Bush Street

View of Kearny Subscribers' switchboard.

XIV-52



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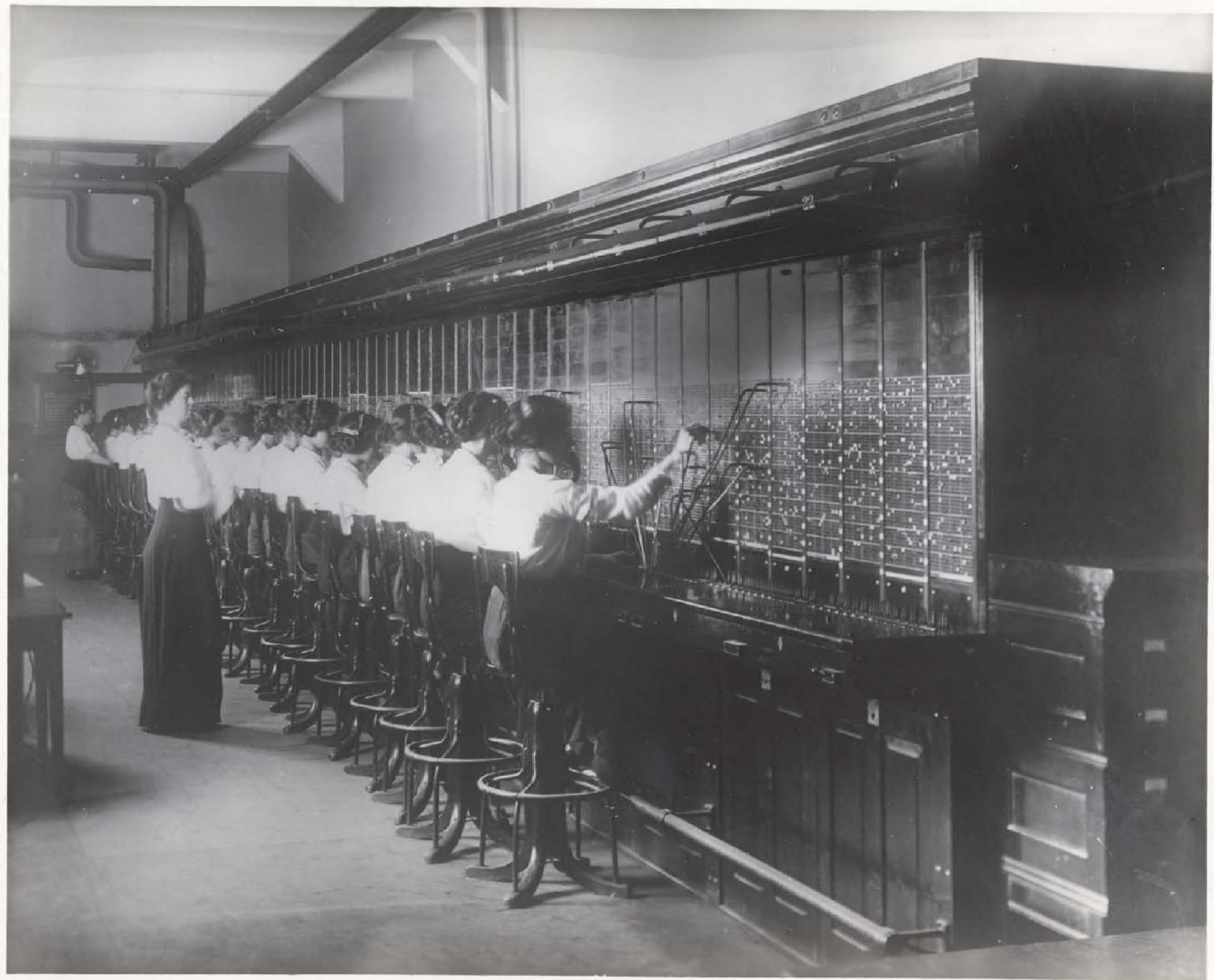
125

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CENTRAL OFFICE EQUIPMENT

445 Bush St.,

View of Kearny trunk switchboard.



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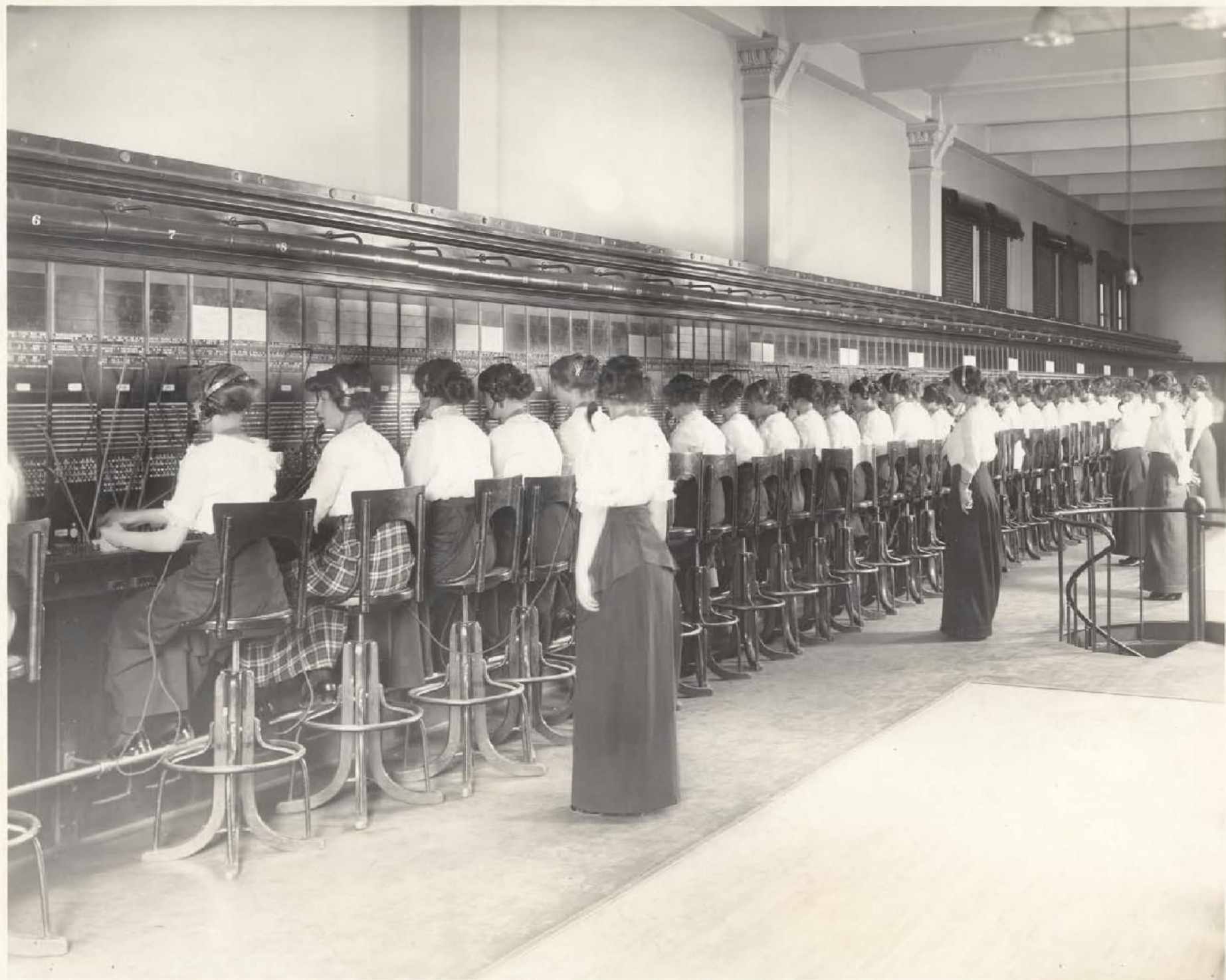
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CENTRAL OFFICE EQUIPMENT

74 Otis Street

View of Market subscribers' switchboard.

XIV-54.



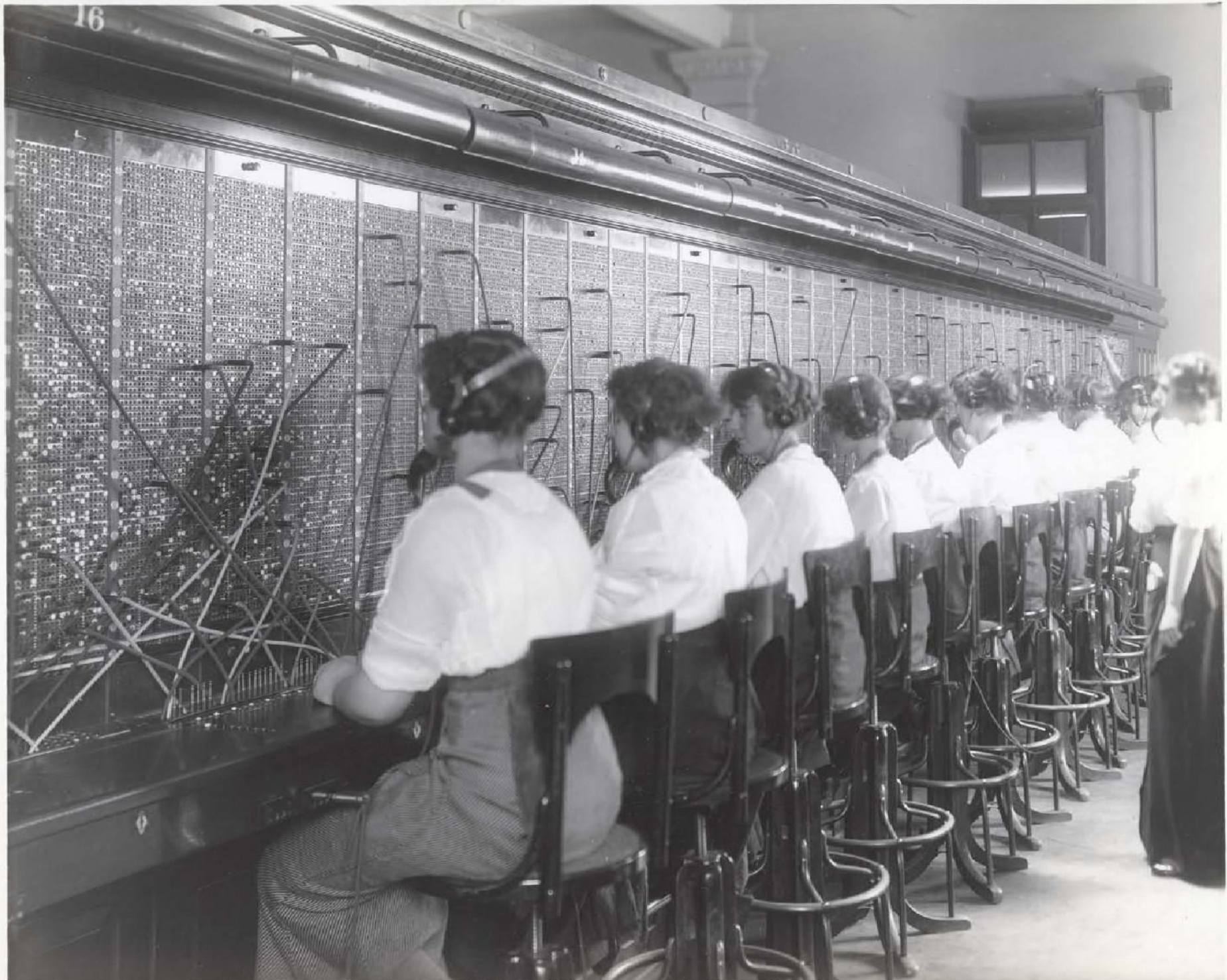
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CENTRAL OFFICE EQUIPMENT

74 Otis Street

View of Market trunk switchboard.



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CENTRAL OFFICE EQUIPMENT

1045 Capp St.,

View of Mission subscribers' switchboard.



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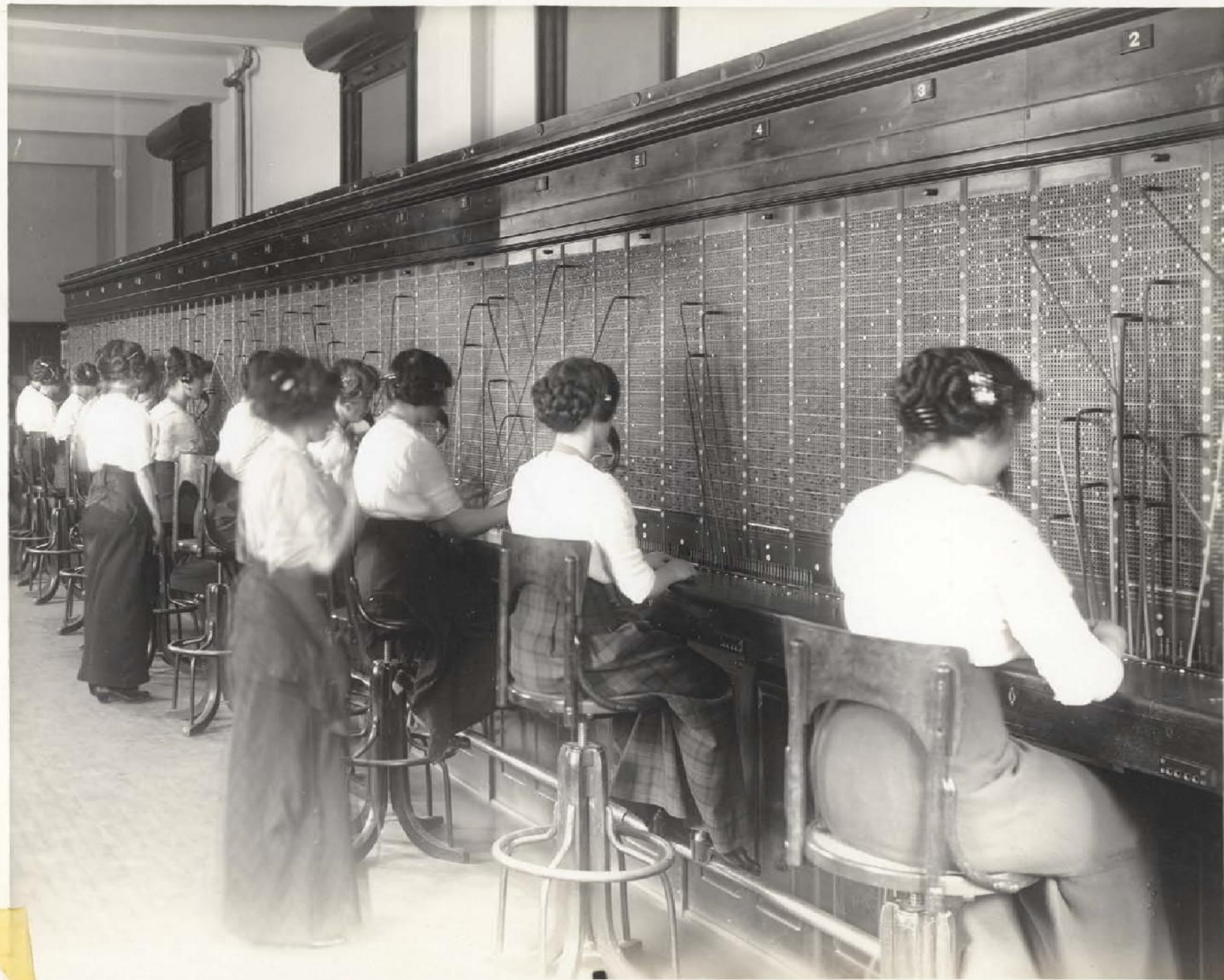
129

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CENTRAL OFFICE EQUIPMENT

1045 Capp St.

View of Mission trunk switchboard.



2

3

4

5

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CENTRAL OFFICE EQUIPMENT

450 - 5th Ave.,

View of Pacific subscribers' switchboard.

Positions 1 to 6.



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CENTRAL OFFICE EQUIPMENT

450 - 5th Ave.

View of Pacific subscribers' switchboard.

Positions 8 to 25.

XII-59.



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CENTRAL OFFICE EQUIPMENT

450 - 5th Ave.

View of Pacific trunk switchboard.



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CENTRAL OFFICE EQUIPMENT

74 Otis Street,

View of Park subscribers' switchboard.



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CENTRAL OFFICE EQUIPMENT

74 Otis Street

Park trunk switchboard.



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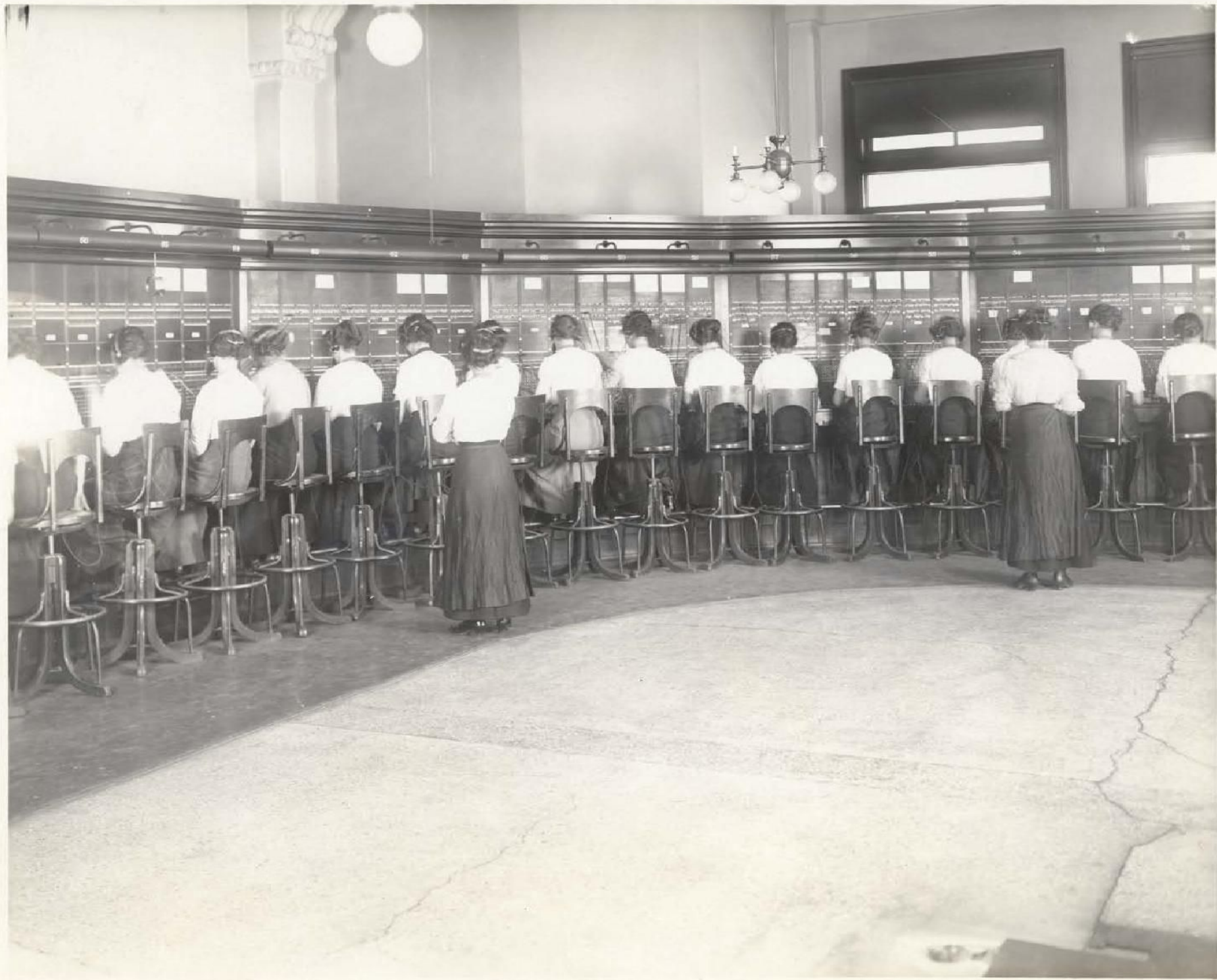
135

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CENTRAL OFFICE EQUIPMENT

827 Hyde Street.

View of Prospect subscribers' switchboard.



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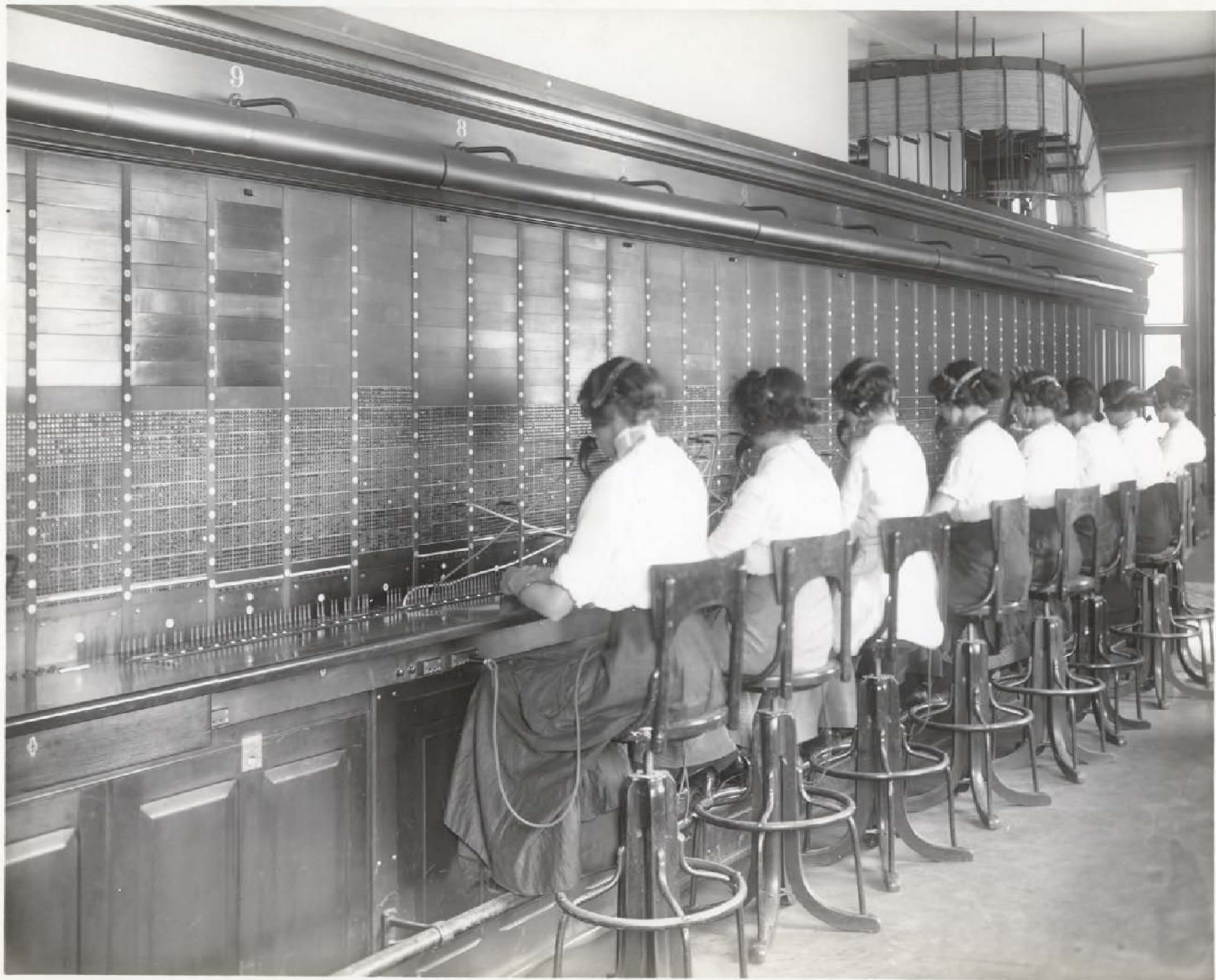
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CENTRAL OFFICE EQUIPMENT

827 Hyde St.,

View of Prospect trunk switchboard.



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CENTRAL OFFICE EQUIPMENT

2001 Steiner Street

A view of the subscribers' switchboard used as part of the equipment of the operators' school. Such equipment as this is provided for use in training new operators before taking up positions on the boards used in regular service.

XIV - 65
0



759

65

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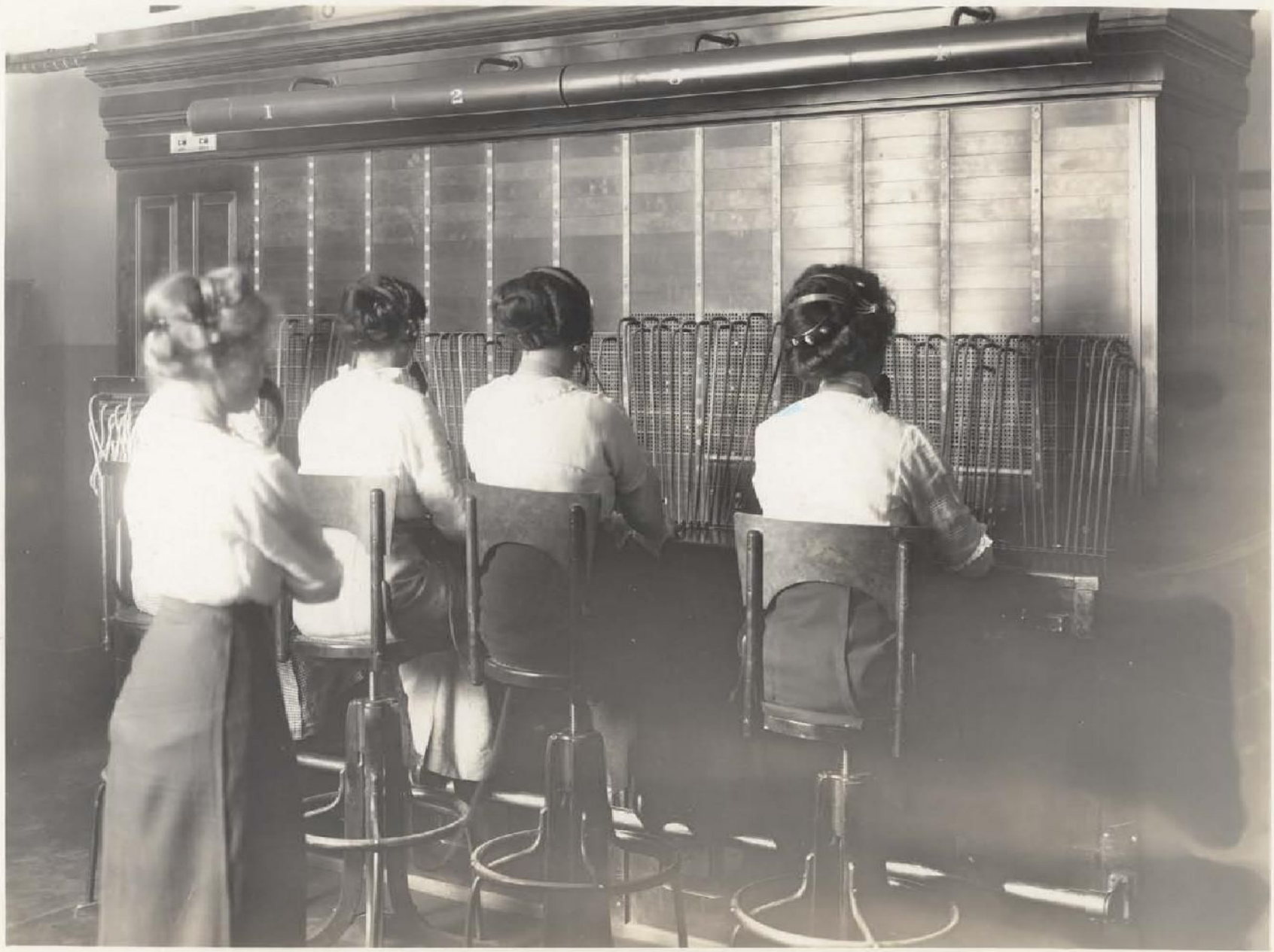
Don

CENTRAL OFFICE EQUIPMENT

2001 Steiner St.

A view of the trunk switchboard in use in the
operators' school.

XIV-66



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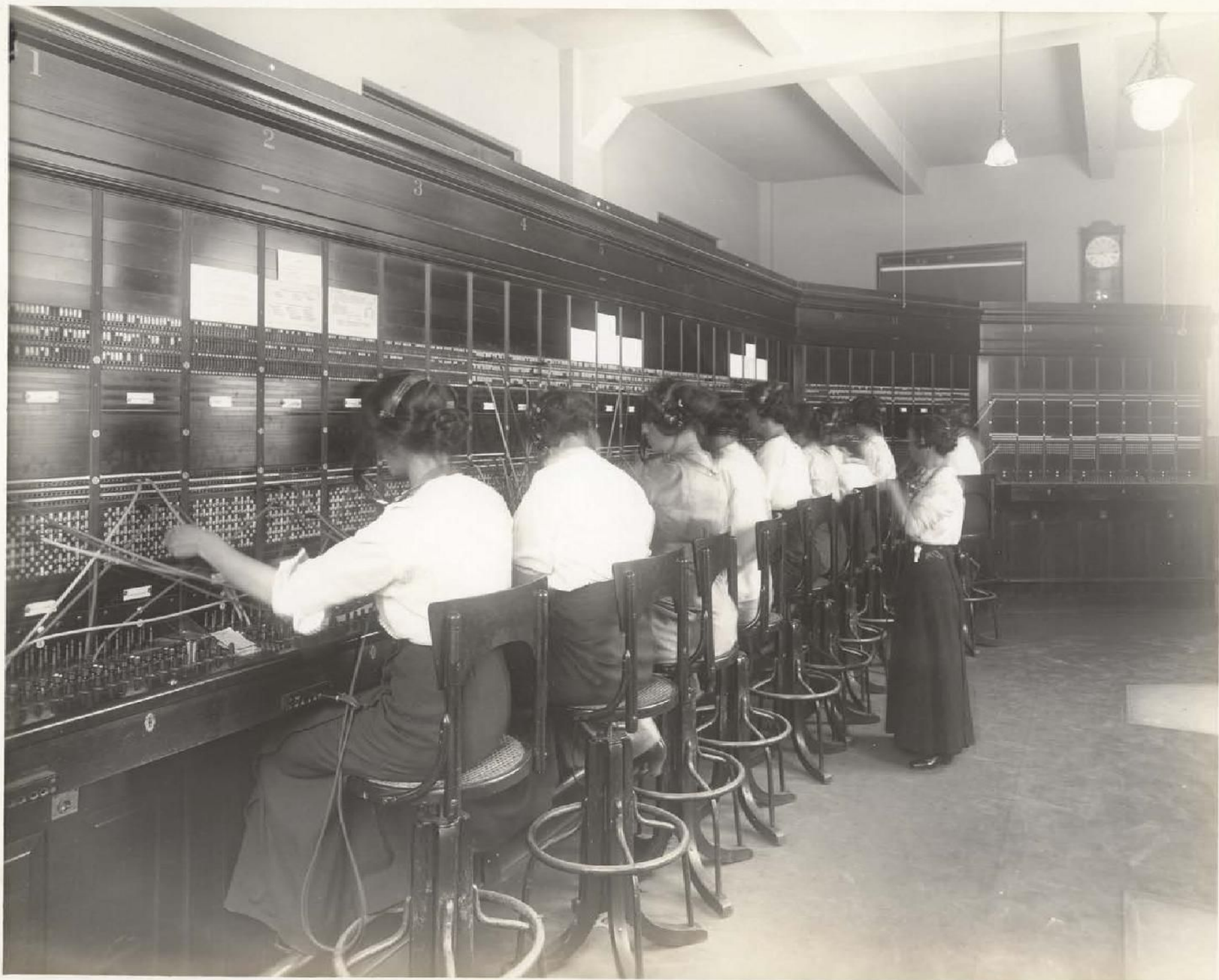
139
Don

CENTRAL OFFICE EQUIPMENT

1145 - 9th AVE.

View of Sunset subscribers' switchboard.

XIV-67



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CENTRAL OFFICE EQUIPMENT

1145 - 9th Ave.,

View of Sunset trunk switchboard.

XIV-28.



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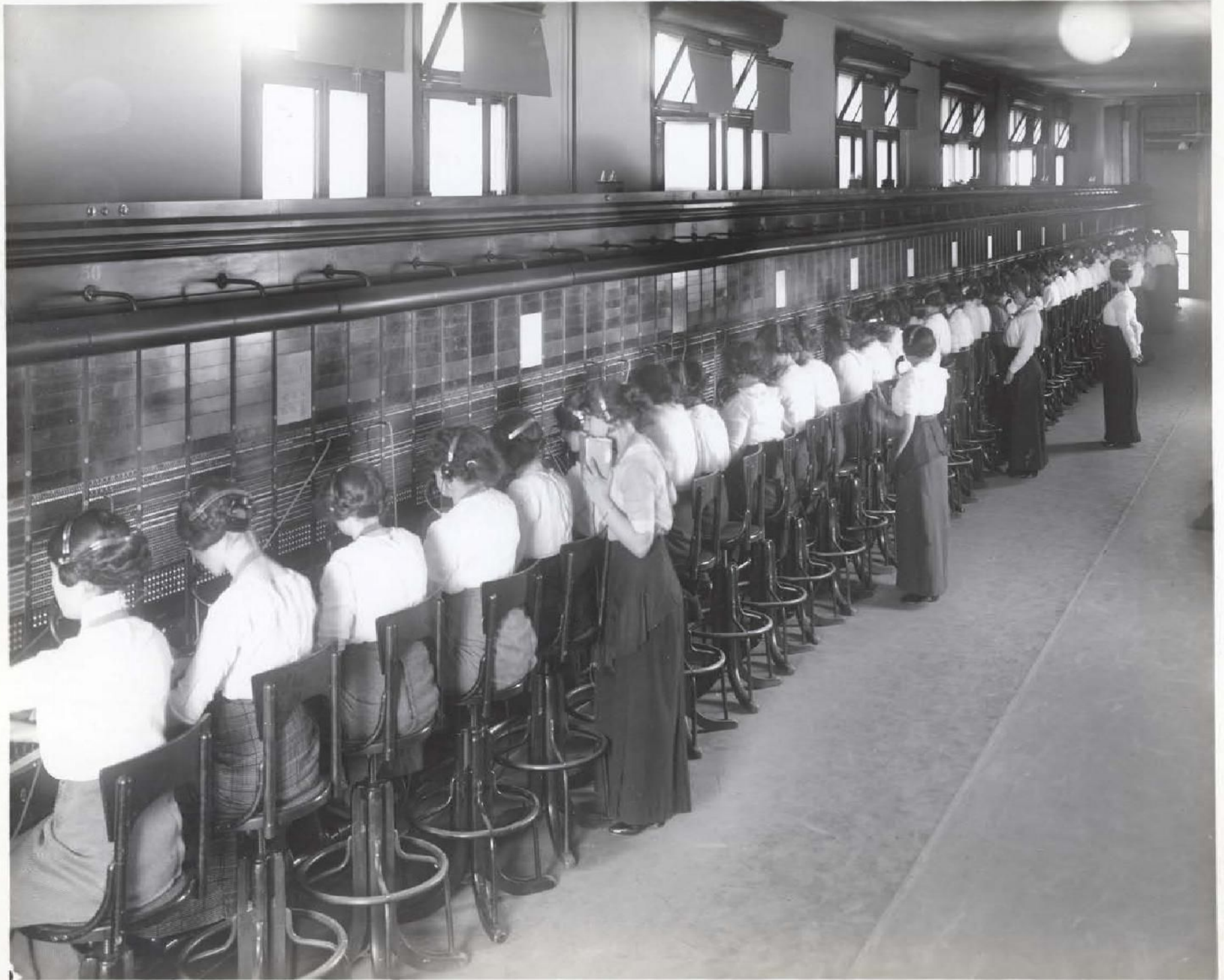
141

Don

CENTRAL OFFICE EQUIPMENT

445 Bush St.,

View of the Sutter subscribers' switchboard
on the eighth floor at Kearny Office.



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CENTRAL OFFICE EQUIPMENT

445 Bush St.,

A view of the Sutter subscribers' switchboard
extension located on the fourth floor of Kearny Office.



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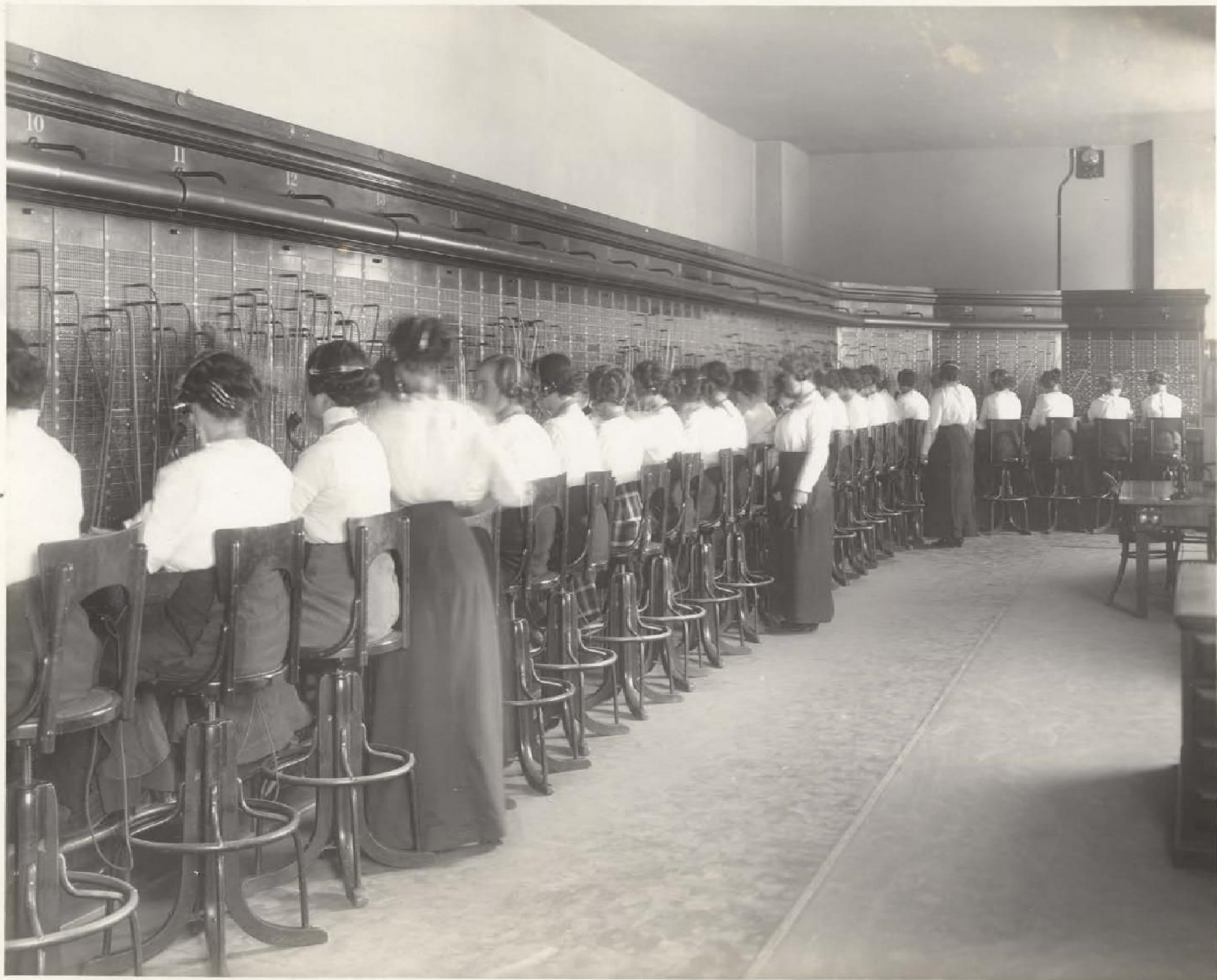
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CENTRAL OFFICE EQUIPMENT

445 Bush St.,

View of Sutter trunk switchboard.

XIV 71



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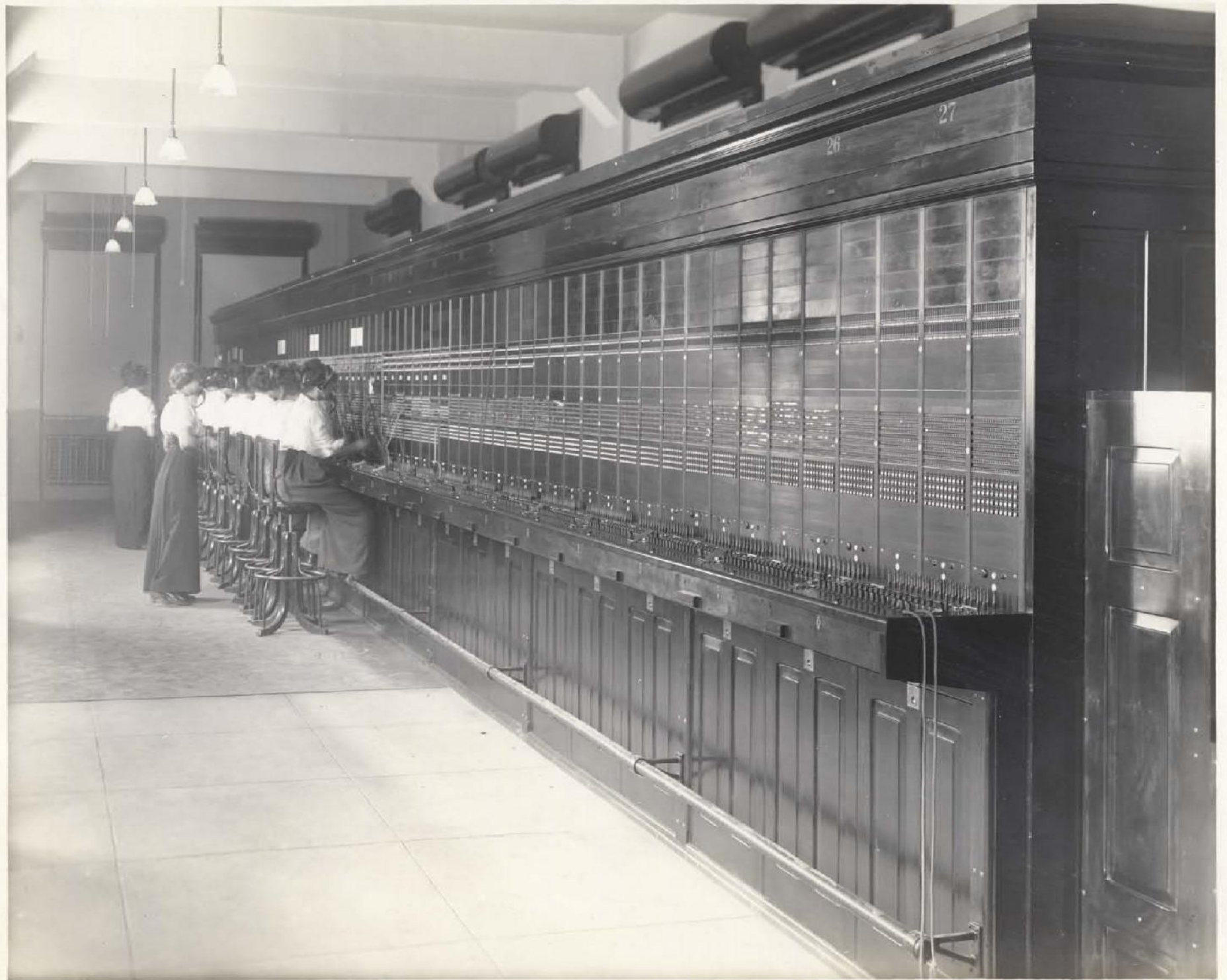
X43
144
Don

CENTRAL OFFICE EQUIPMENT

1045 Capp Street

View of Valencia subscribers' switchboard.

XIV-72



145
Don

CENTRAL OFFICE EQUIPMENT

1045 Capp St.,

View of Valencia trunk switchboard.

XIV-73 0

