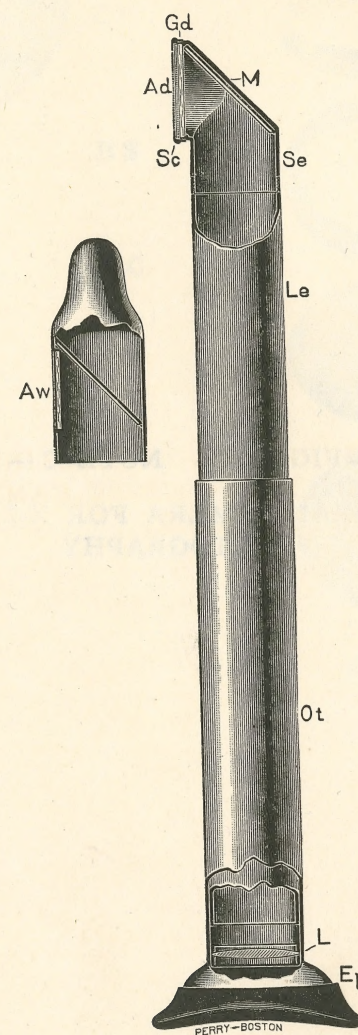


NOTE B—FIGURE 1—A REFLECTING CRYPTO-
SCOPE AND CRYPTOSCOPIC CAMERA WITH
NON-RADIABLE WALLS



PERRY-BOSTON

NOTE C—FIGURE 1 NOTE C—FIGURE 3
AN ORAL CAMERA FOR X-LIGHT
PHOTOGRAPHY

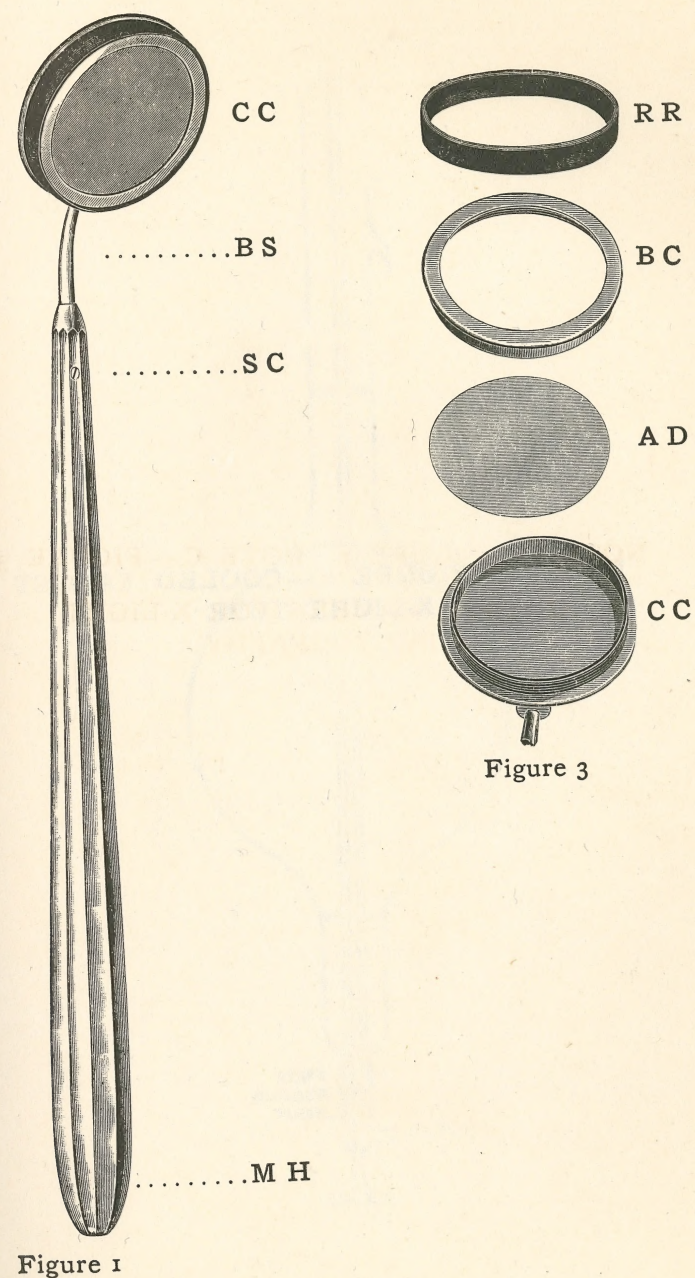
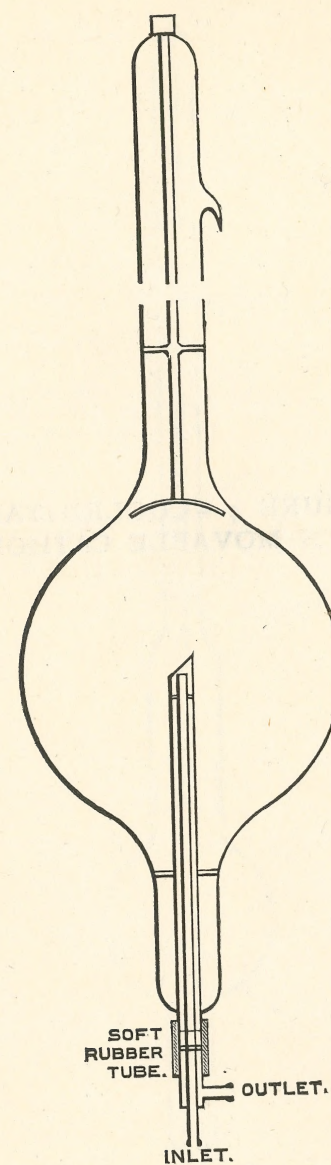


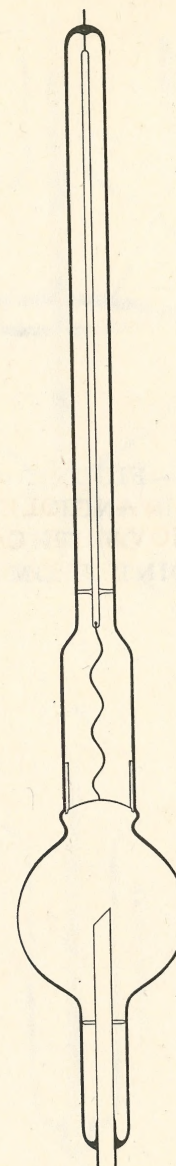
Figure 1

Figure 3

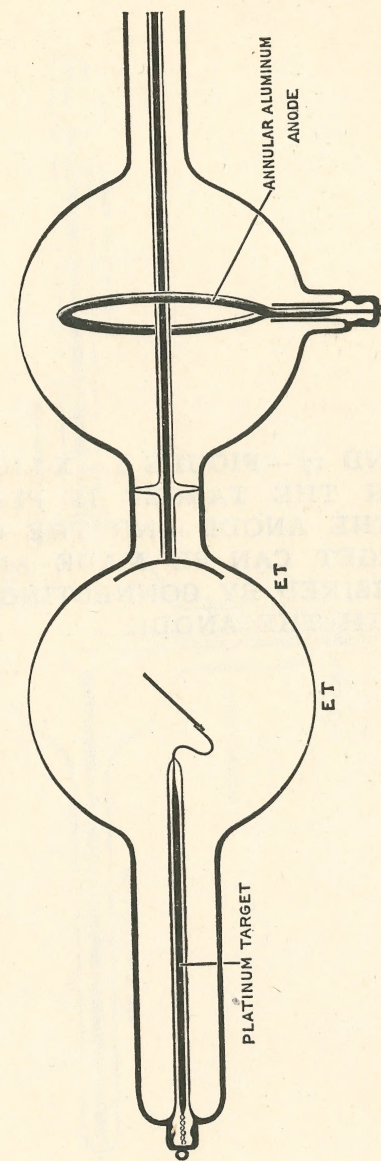
NOTE 1—FIGURE 1—COOLED TARGET
X-LIGHT TUBE



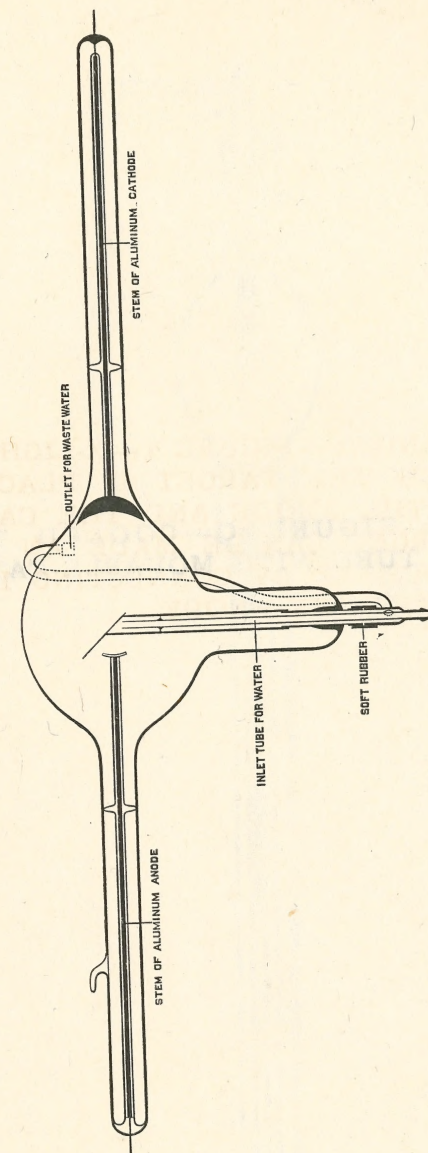
NOTE 4—FIGURE 4—COOLED TARGET TUBE,
WITH MOVABLE CATHODE



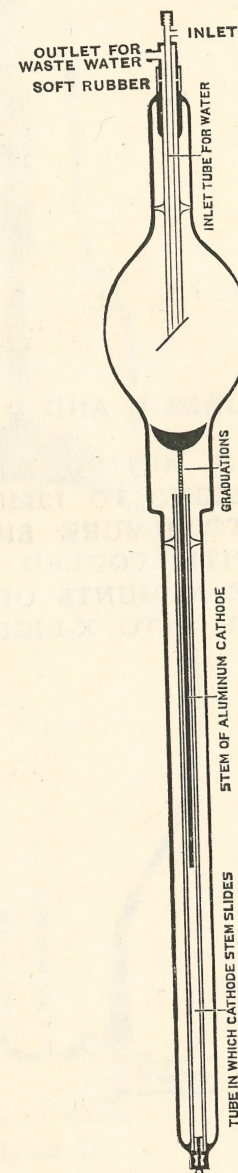
NOTES 15 AND 16—FIGURE 1—X-LIGHT TUBE,
WITH ANNULAR ANODE, TO SHOW THAT
THE POSITION OF THE ANODE DETER-
MINES THE POINT FROM WHICH X-LIGHT
WILL ARISE



NOTES 16 AND 17 — FIGURE 2 — X-LIGHT TUBE
IN WHICH THE TARGET IS PLACED BE-
TWEEN THE ANODE AND THE CATHODE.
THE TARGET CAN BE MADE AN ANODE,
WHEN DESIRED, BY CONNECTING IT BY A
WIRE WITH THE ANODE



NOTE 19—FIGURE C—COOLED TARGET
X-LIGHT TUBE WITH MOVABLE CATHODE



FIGURES D AND D I

NOTE 19—DIRECT ACTING X-LIGHT TUBES WITH DIAPHRAGMS TO LIMIT THE RADIANT AREAS TO INSURE SHARP DEFINITION, AND WITH COOLED TARGETS TO ALLOW LARGE AMOUNTS OF ENERGY TO BE CONVERTED INTO X-LIGHT

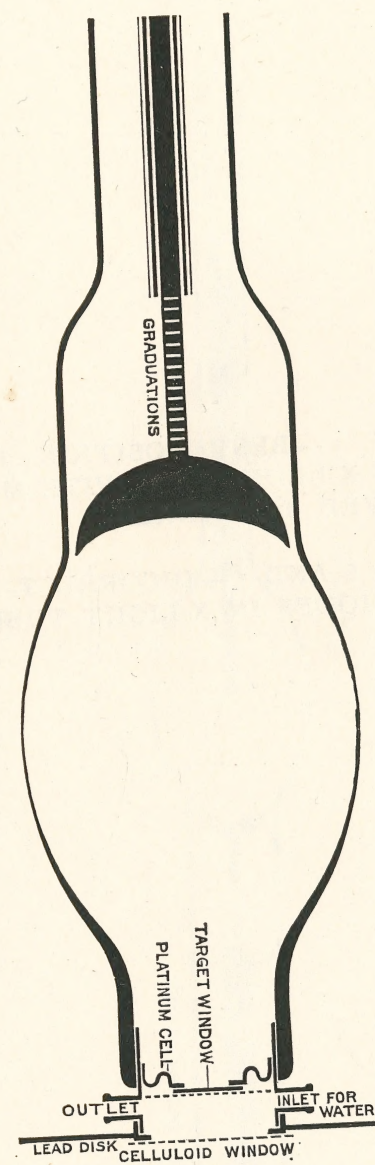


Figure D

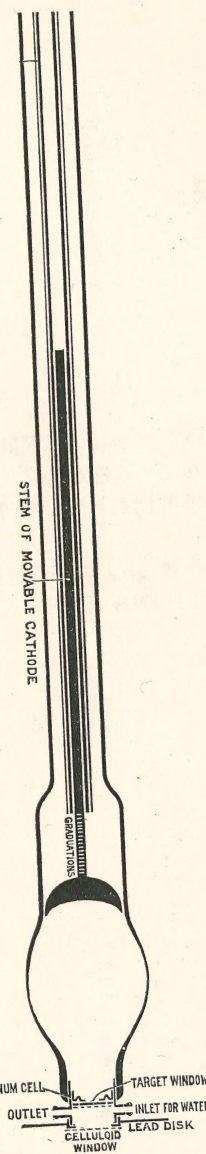


Figure D I

NOTE 20—FIGURE 5—BEST POSITION FOR
A CATHODE. AN X-LIGHT TUBE WITH MAG-
NETICALLY MOVED TERMINALS

NOTE 20—FIGURES 6 AND 7—INCORRECT PO-
SITIONS FOR CATHODES IN X-LIGHT TUBES

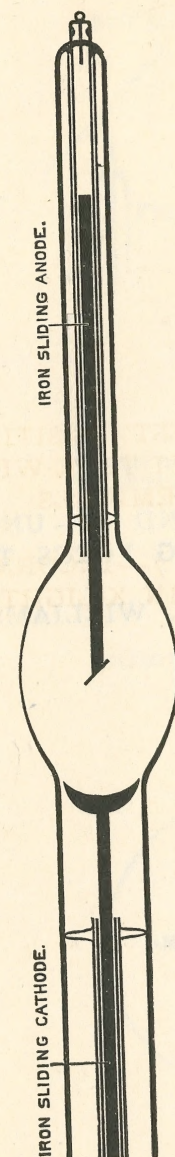


Figure 5

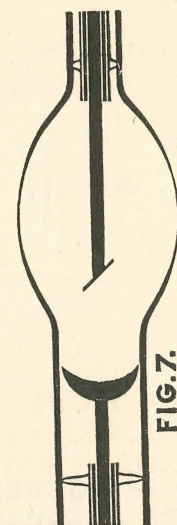


FIG.7.



FIG.6.

NOTE 21 — FIGURES 8 AND 9 — UNCOOLED
ANODES IN REFLECTING FOCUS TUBES

NOTE 22 — FIGURE 10 — DR. WILLIAMS' TUBE

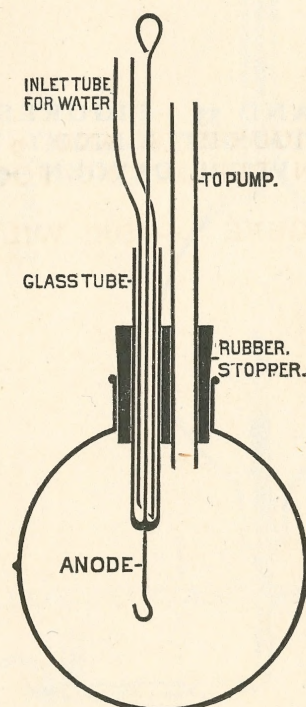
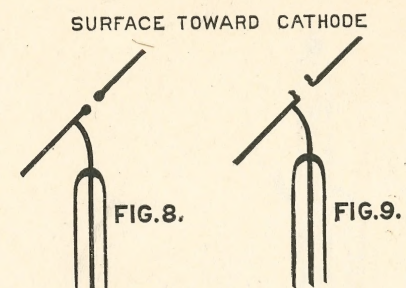


Figure 10

NOTES 30 AND 33 — FIGURES 30 AND 31 —
COOLED TARGET X-LIGHT TUBE REGEN-
ERATING WITH OXYGEN — PERFORATED
CATHODE

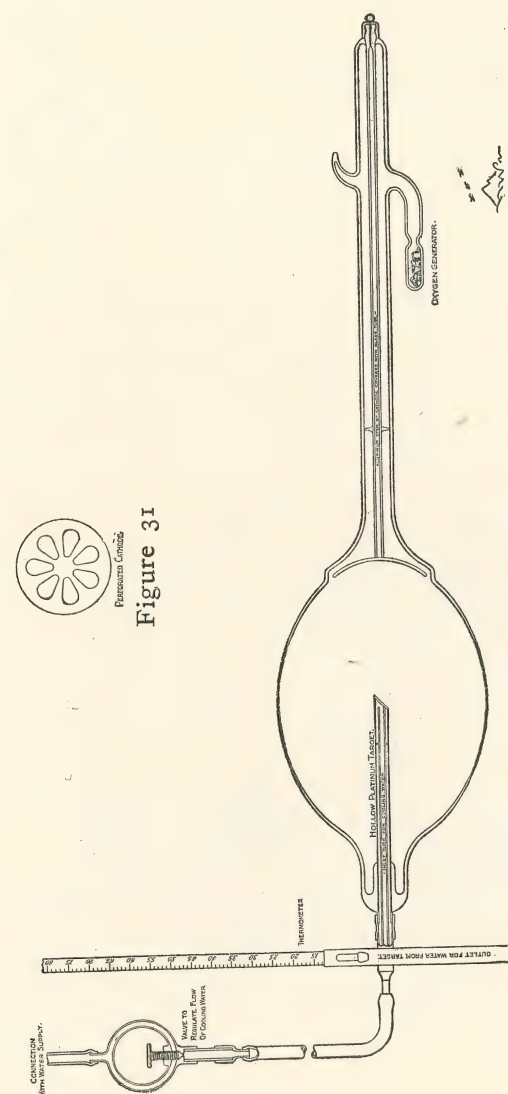
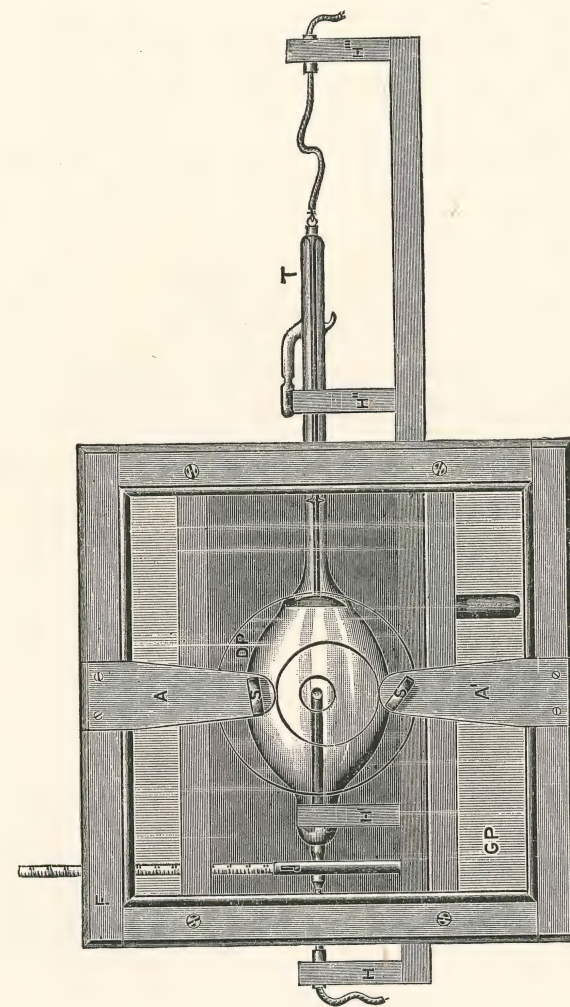


Figure 30



Figure 31

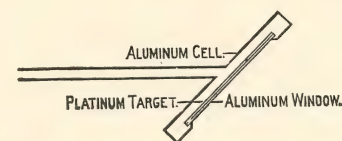
NOTE 36—FIGURE 34—NON-RADIABLE
X-LIGHT TUBE BOX WITH CENTRING DIA-
PHRAGM PLATE



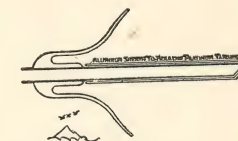
NOTE 35 — FIGURES 32 AND 33 — COVERING THE PLATINUM TARGET WITH ALUMINUM

NOTE 36 — FIGURES 35, 36, AND 37 — DIFFERENT POSITIONS FOR THE NON-RADIABLE TUBE BOX SHOWN IN PLATE 12

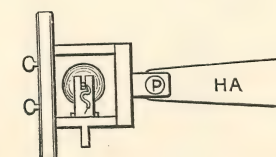
NOTE 37 — FIGURE 38A — COOLING THE TARGET OF AN X-LIGHT TUBE WITH EXTERNAL METAL VANES



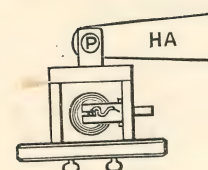
Note 35 — Figure 32



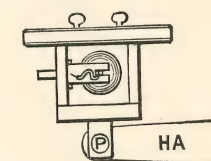
Note 35 — Figure 33



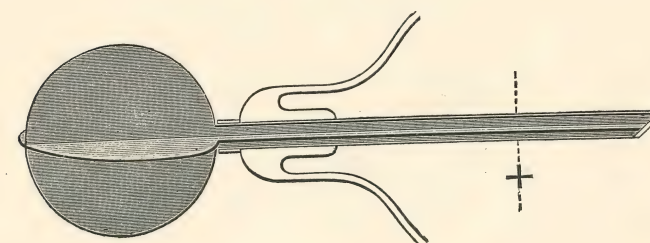
Note 36 — Figure 35



Note 36 — Figure 36

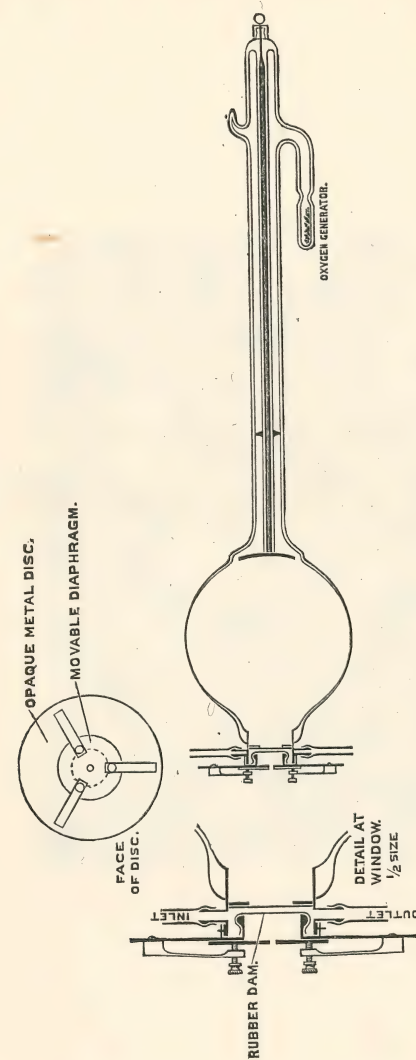


Note 36 — Figure 37



Note 37 — Figure 38 A

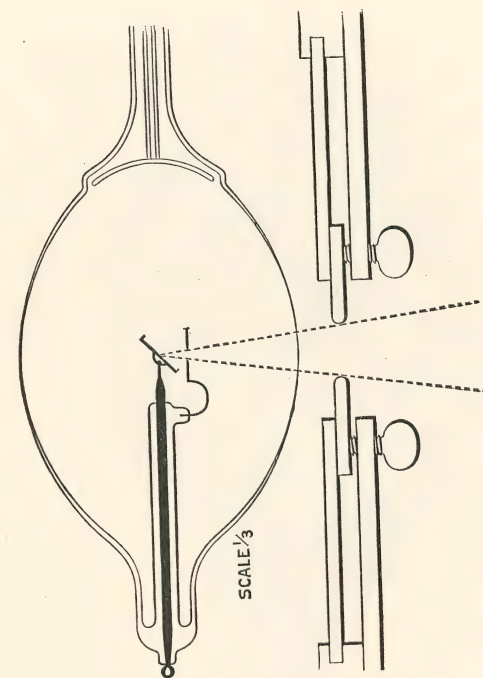
NOTE 41—FIGURE 41 A—DIRECT ACTING
X-LIGHT TUBE, WITH A COOLED TARGET
AND AN EXTERNAL DIAPHRAGM



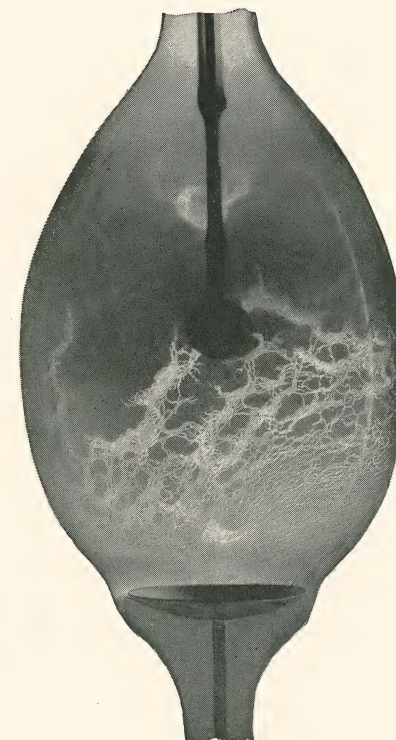
NOTE 45 — FIGURE 43 — INTERNAL DIAPHRAGM
X-LIGHT TUBE EXCITED



NOTE 45 A — FIGURE 42 — INTERNAL
DIAPHRAGM X-LIGHT TUBE



NOTE 46 — FIGURE 45 — AN X-LIGHT TUBE RUN
OUT OF HARMONY WITH THE GENERATOR
TO SHOW THE EFFECT OF DISCORD

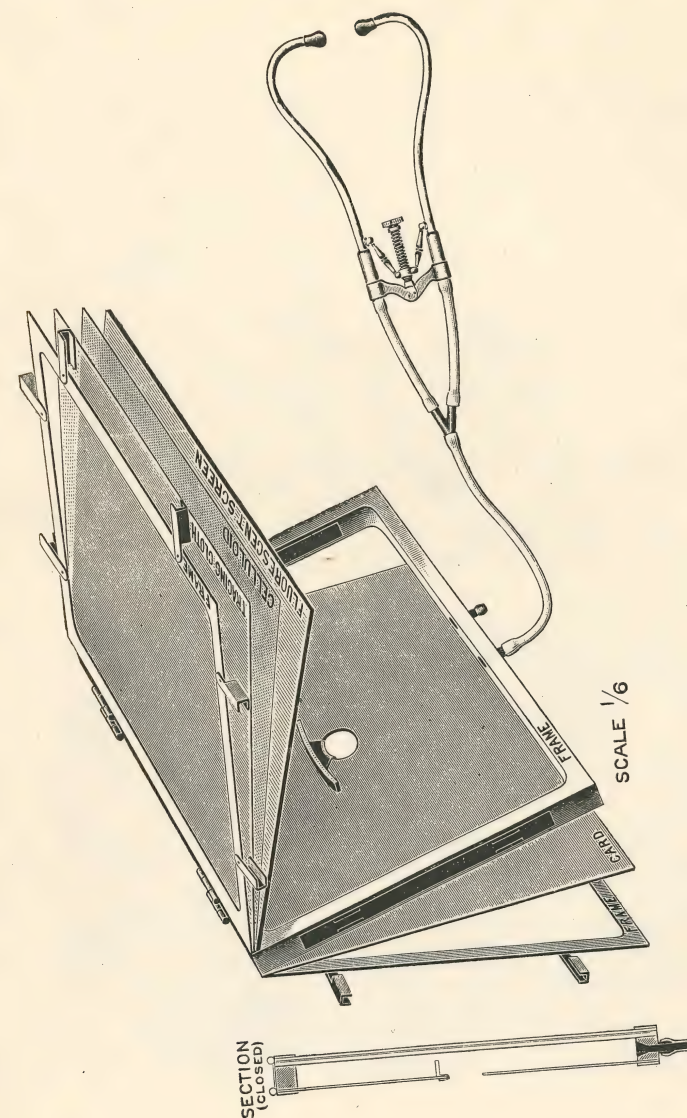


NOTE 46 — FIGURE 44 — COOLED TARGET
X-LIGHT TUBE SHOWING EFFECTS OF THE
ANODE RUSH

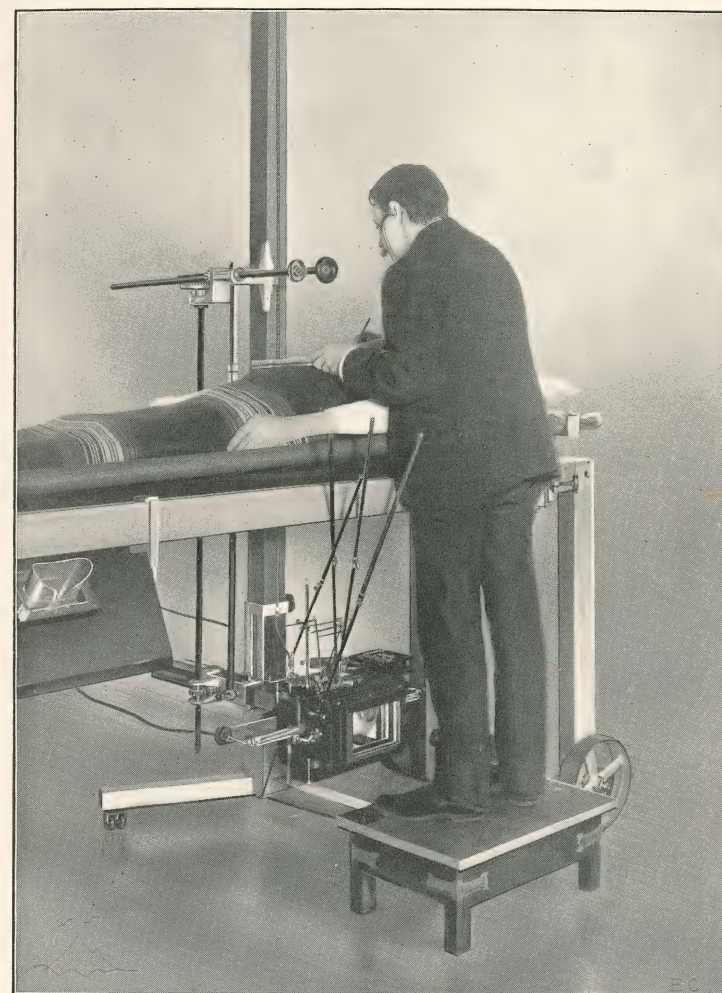
Plate 18



NOTE 47—FIGURE 46—THE SEEHEAR AND TRACING ARRANGEMENTS FOR MAKING DIAGRAMS OF THE INTERNAL ORGANS IN X-LIGHT EXAMINATIONS



NOTE 47—FIGURE 47—SHOWING SEEHEAR
IN USE

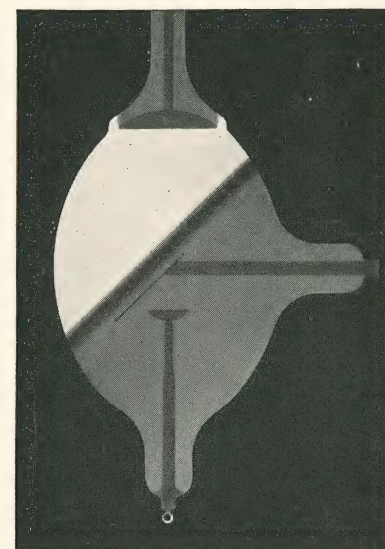


NOTE 48—FIGURE 48—REFLECTING CRYPTO-
SCOPE AND NON-RADIABLE TUBE BOX
WITH A DIAPHRAGM

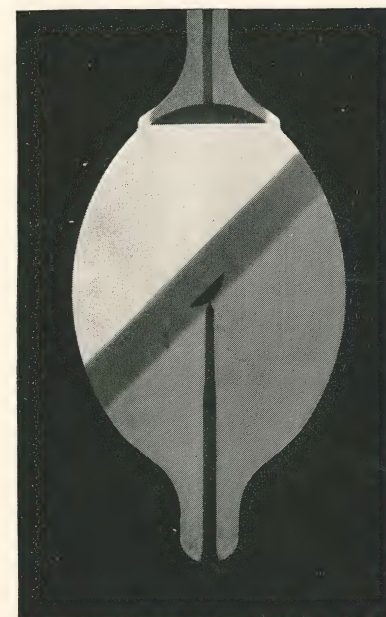


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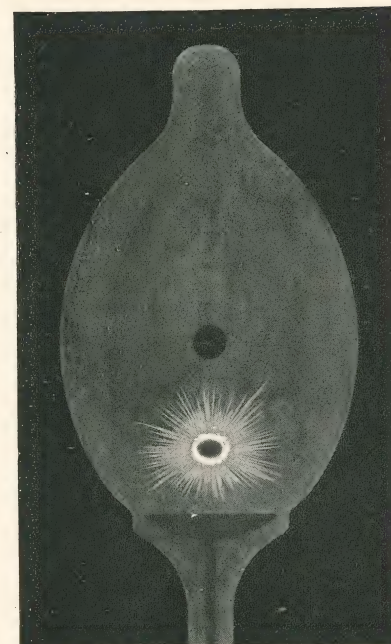
NOTE 49—FIGURE 49—X-LIGHT TUBE WITH
THE TARGET BETWEEN CATHODE AND
ANODE SHOWING THE "GIRDLE"



NOTE 49—FIGURE 50—THE GIRDLE OF AN
X-LIGHT TUBE



NOTE 49—FIGURE 51—THE CORONA OF AN
X-LIGHT TUBE



NOTE 50—FIGURE 52—REVOLVING TARGET
X-LIGHT TUBE WITH OXYGEN AND HY-
DROGEN REGULATORS

NOTE 49—FIGURE 142

NOTE 50—FIGURE 53—FULL-SIZE VIEW OF
REVOLVING TARGET

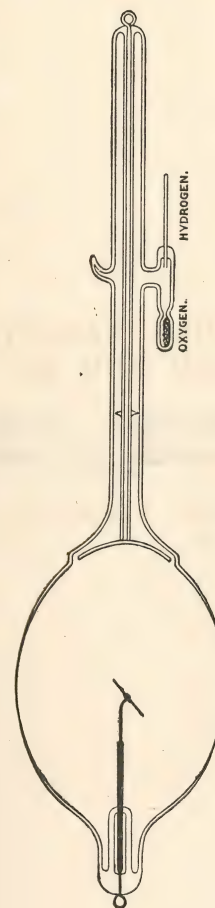


Figure 52

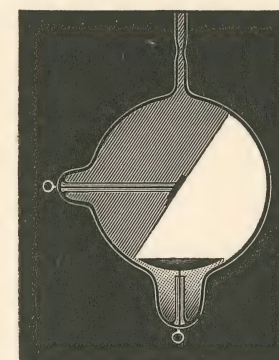


Figure 142

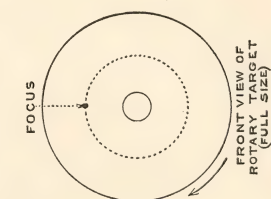
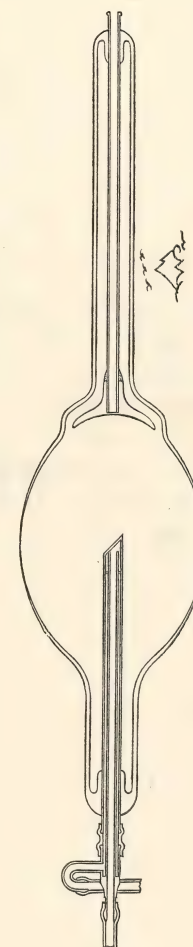


Figure 53

NOTE 58—FIGURE 55—AN X-LIGHT TUBE
WITH HOLLOW TERMINALS OPEN TO THE
ATMOSPHERE AT ONE END



NOTE 60—FIGURE 56—A ROTARY TARGET
X-LIGHT TUBE WITH AN INTERMOLECULAR
VACUUM REGULATOR AND TERMINALS
WITH BARE STEMS

NOTE 62—FIGURE 57—A METHOD OF INTRO-
DUCING ELECTROLYTIC HYDROGEN INTO
AN X-LIGHT TUBE

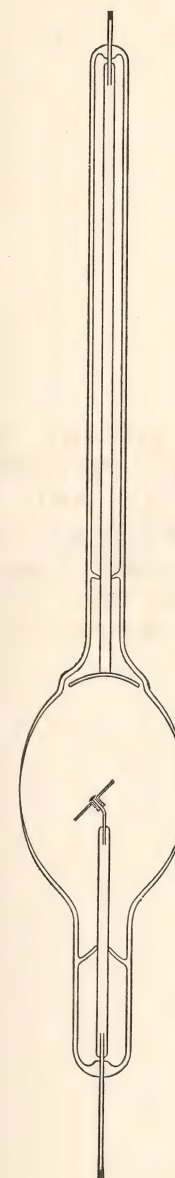


Figure 56

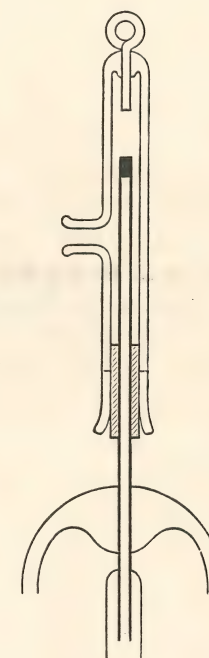
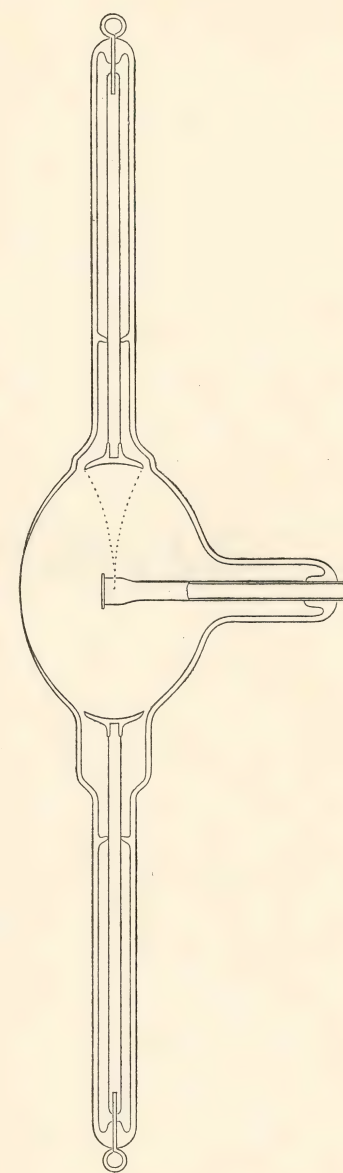
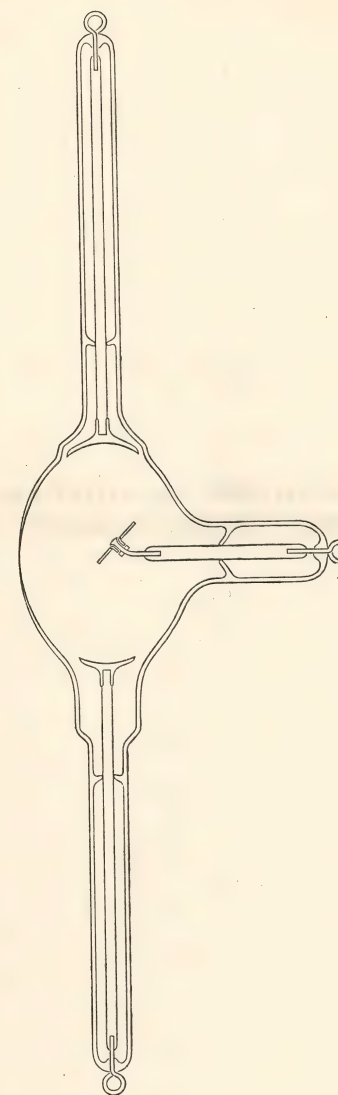


Figure 57

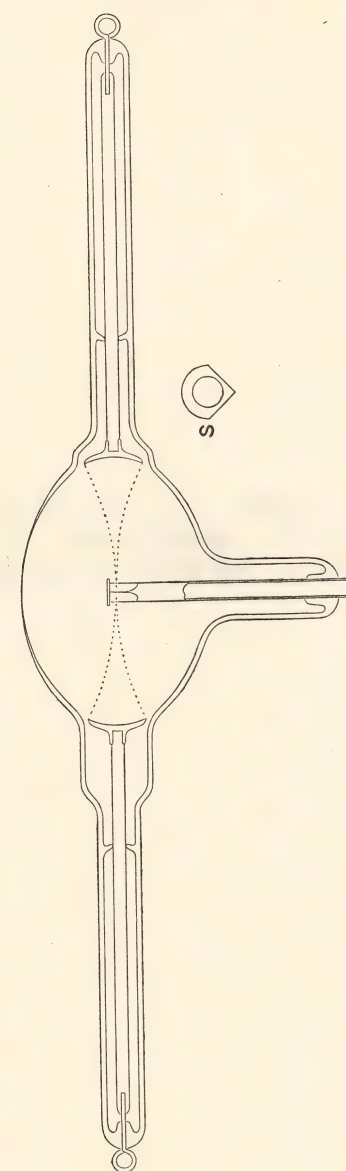
NOTE 65—FIGURE 58—COOLED TARGET
DOUBLE FOCUS X-LIGHT TUBE



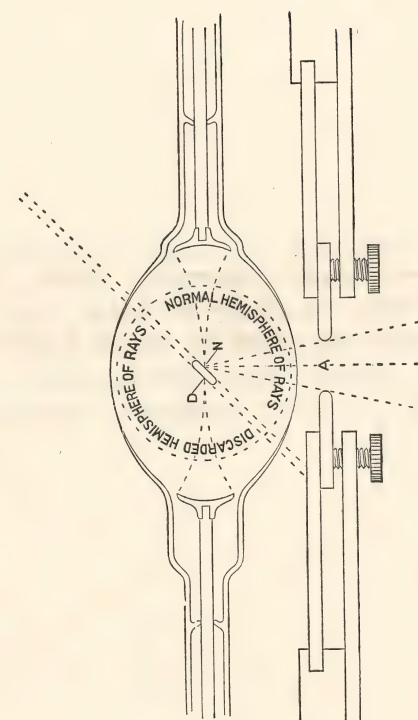
NOTE 65—FIGURE 59—ROTARY TARGET
DOUBLE FOCUS X-LIGHT TUBE



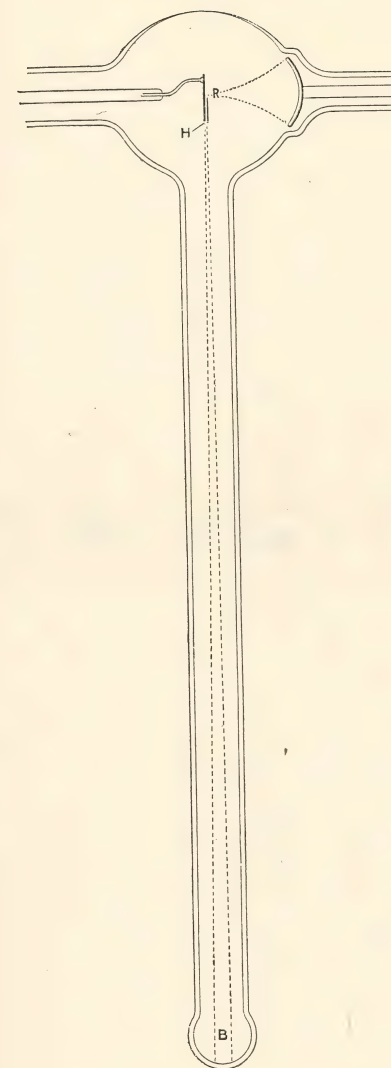
NOTE 65—FIGURE 61—COOLED TARGET
DOUBLE FOCUS X-LIGHT TUBE



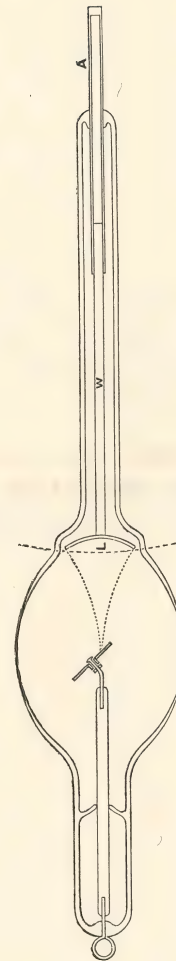
NOTE 65—FIGURE 60—DIAGRAM SHOWING
THE PLAN ON WHICH THE TUBE SHOWN
IN FIGURE 58, PLATE 28, IS CONSTRUCTED



NOTE 69—FIGURE 62—AN X-LIGHT TUBE
IN WHICH THE CENTRAL CATHODE RAY
STRIKES THE TARGET NORMAL TO ITS SUR-
FACE. THE TARGET IS PROVIDED WITH A
SLIT TO SHOW THE SPREADING OF THE
BEAM OF X-LIGHT PASSING THROUGH IT



NOTE 70—FIGURE 63—AN X-LIGHT TUBE
WITH A HOLLOW CATHODE



NOTE 80—FIGURE 64—X-LIGHT TUBE WITH
A ROTARY TARGET AND A PALLADIUM
VACUUM REGULATOR, THE TERMINALS
WITH BARE STEMS

NOTE 80—FIGURE 65—A COOLED TARGET
X-LIGHT TUBE WITH A PALLADIUM REG-
ULATOR, THE TERMINALS WITH BARE
STEMS

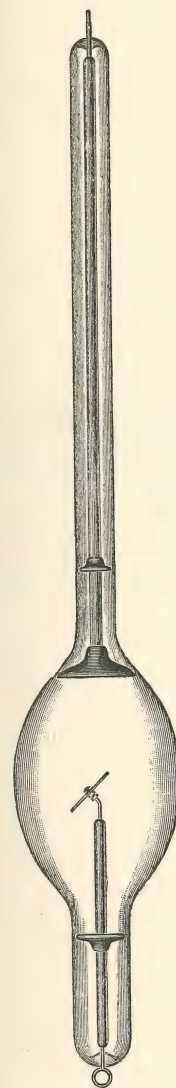


Figure 64

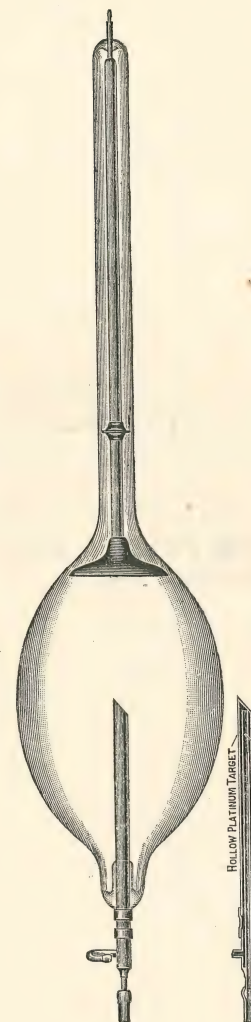


Figure 65

NOTE 80 — FIGURE 68 — DETAILS OF AN ELECTROLYTIC REGULATOR FOR INTRODUCING HYDROGEN INTO AN X-LIGHT TUBE

NOTE 84 — FIGURE 69 — AN X-LIGHT TUBE MADE FROM A BULB MOULDED IN A GLASS MANUFACTORY

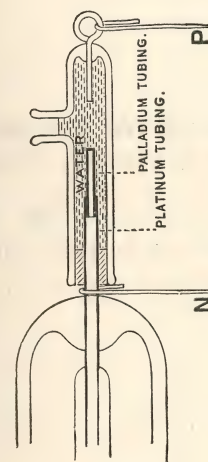


Figure 68

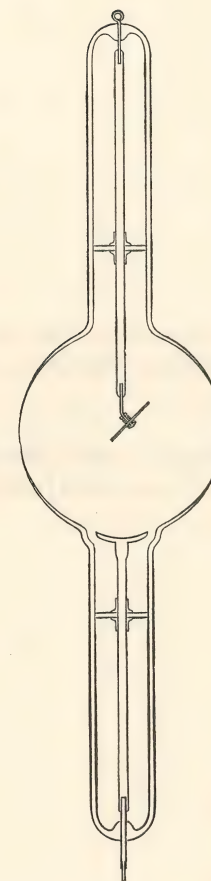


Figure 69

NOTE 84—FIGURE 70—A BULB MOULDED IN
A GLASS HOUSE FOR AN X-LIGHT TUBE

NOTE 84—FIGURE 71—ONE STAGE IN THE
PROCESS OF MAKING AN X-LIGHT TUBE
FROM A MOULDED BULB

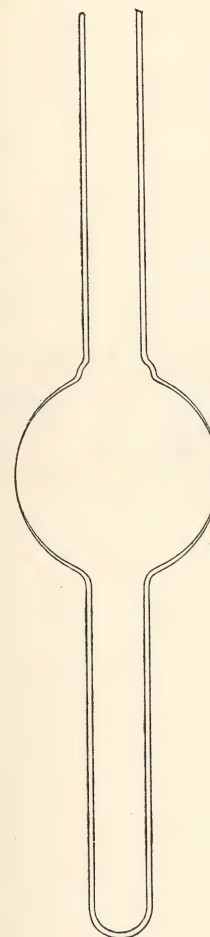


Figure 70

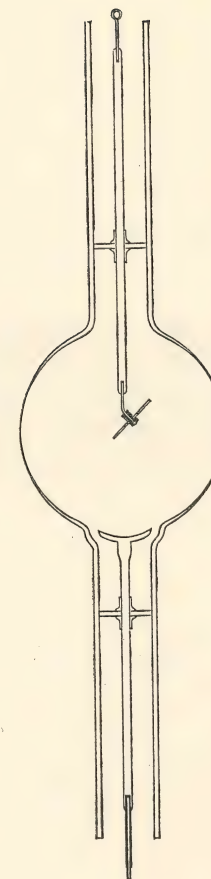
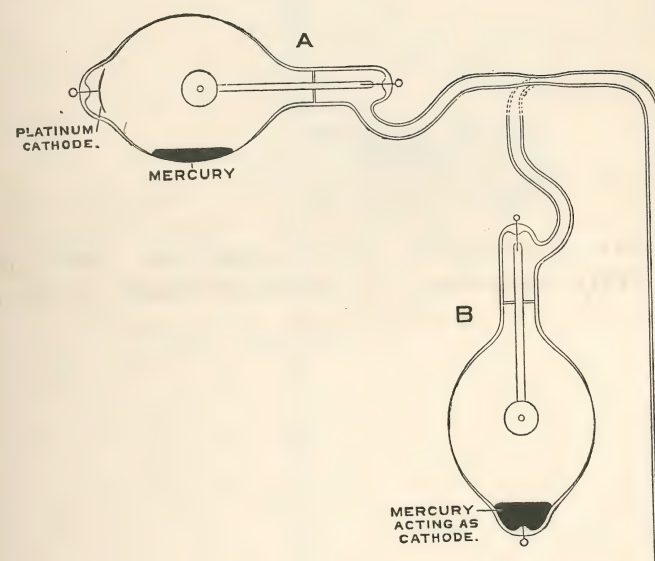
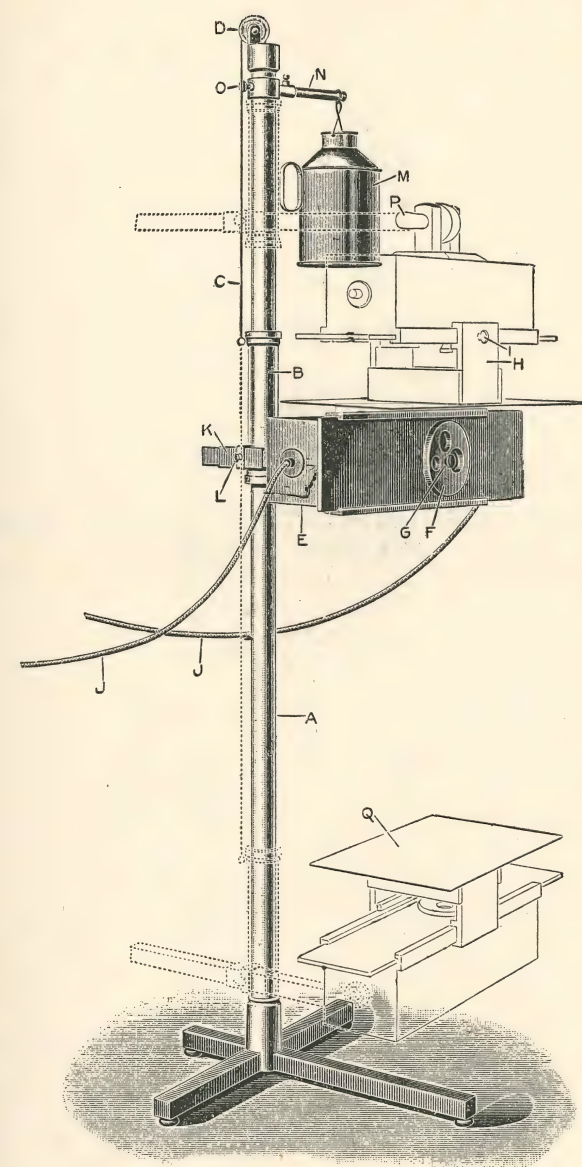


Figure 71

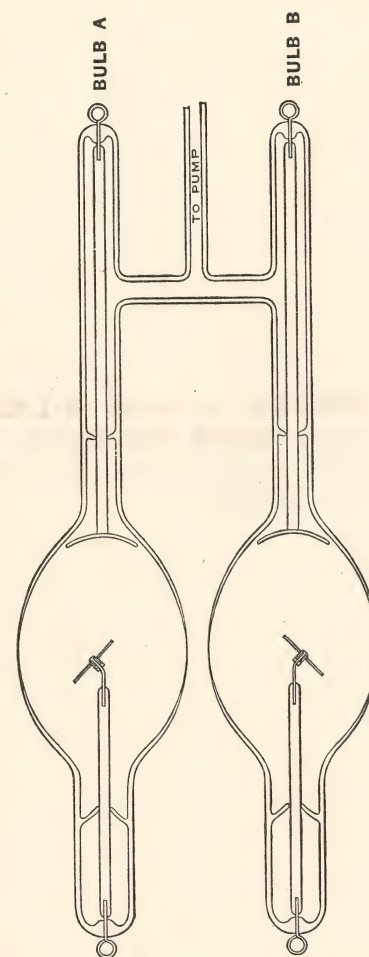
NOTE 85—FIGURE 72—AN X-LIGHT TUBE
WITH A PLATINUM CATHODE WHICH CAN
BE COVERED WITH MERCURY TO SHOW
THE EFFECT OF A MERCURY CATHODE
ON THE PRODUCTION OF X-LIGHT



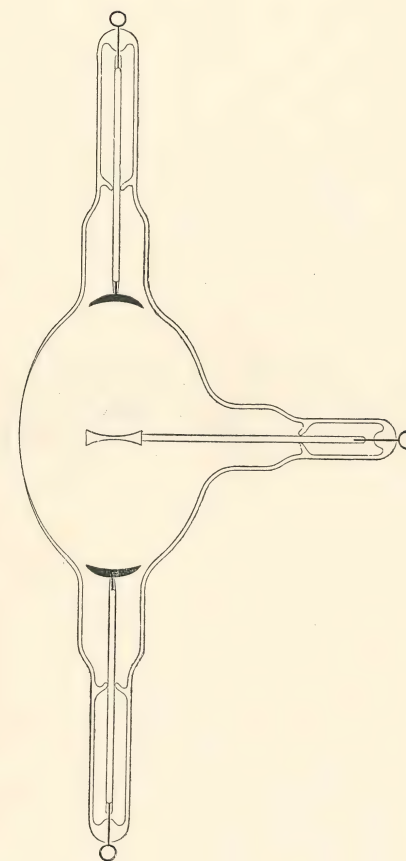
NOTE 94—FIGURE 73—A SIMPLE FORM OF
NON-RADIABLE X-LIGHT TUBE-HOLDER



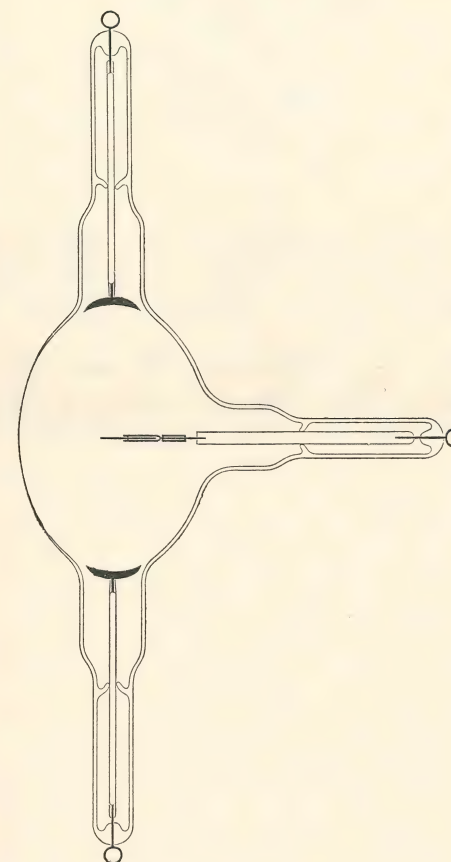
NOTE 95 — FIGURE 74 — TWIN ROTARY TARGET
X-LIGHT TUBES



NOTE 102—FIGURE 75—AN X-LIGHT TUBE
WITH A BICONCAVE CATHODE, TO SHOW
THAT X-LIGHT ARISES WHERE THE ETHER
IS MOST STRAINED



NOTE 103—FIGURE 76—AN X-LIGHT TUBE
WITH THE TARGET ROTATING IN TWO
PLANES AND WITH A RESERVE CATHODE



NOTE 103—FIGURE 77—DETAILS OF THE
TARGET OF THE X-LIGHT TUBE SHOWN
IN PLATE 41—FIGURE 76 -Full Size-

NOTE 103—FIGURE 78—SECTIONAL VIEW,
SHOWING THE TARGET SWUNG TO ALLOW
THE CATHODE TO REGENERATE

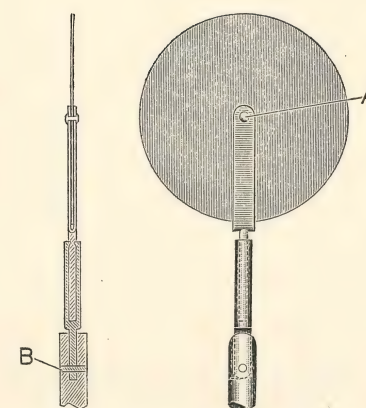


Figure 77

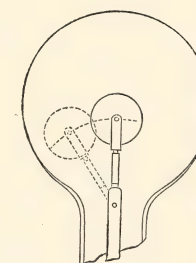


Figure 78

NOTE 112—FIGURE 79—SECTION OF MULTIPLE SPARK-GAP

NOTE 112—FIGURE 80—MULTIPLE SPARK-GAPS APPLIED TO A COIL

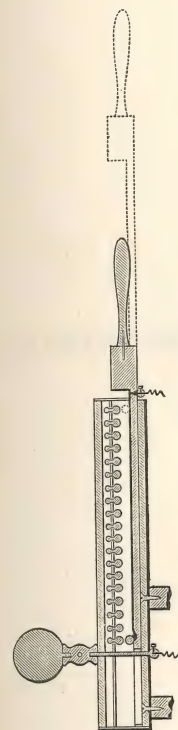


Figure 79

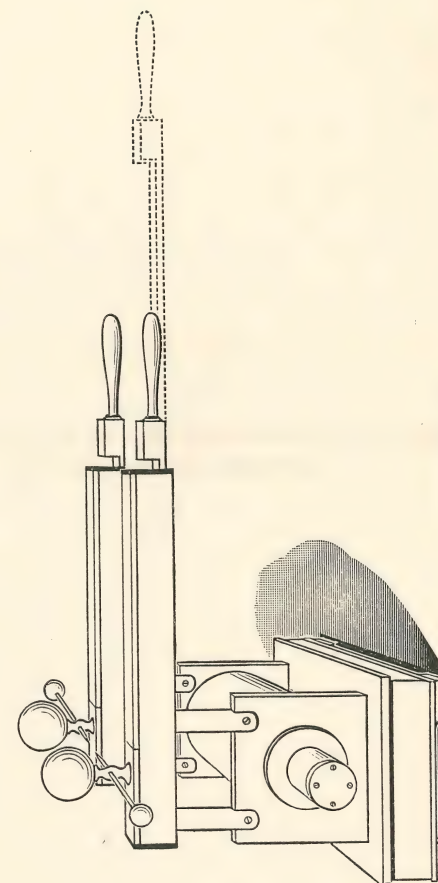
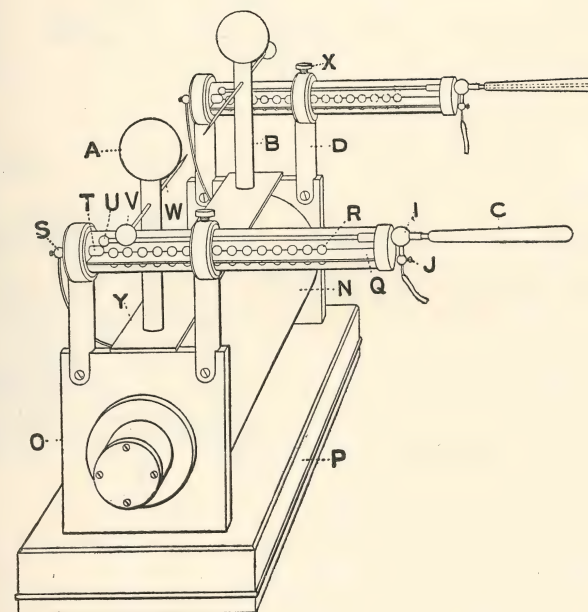
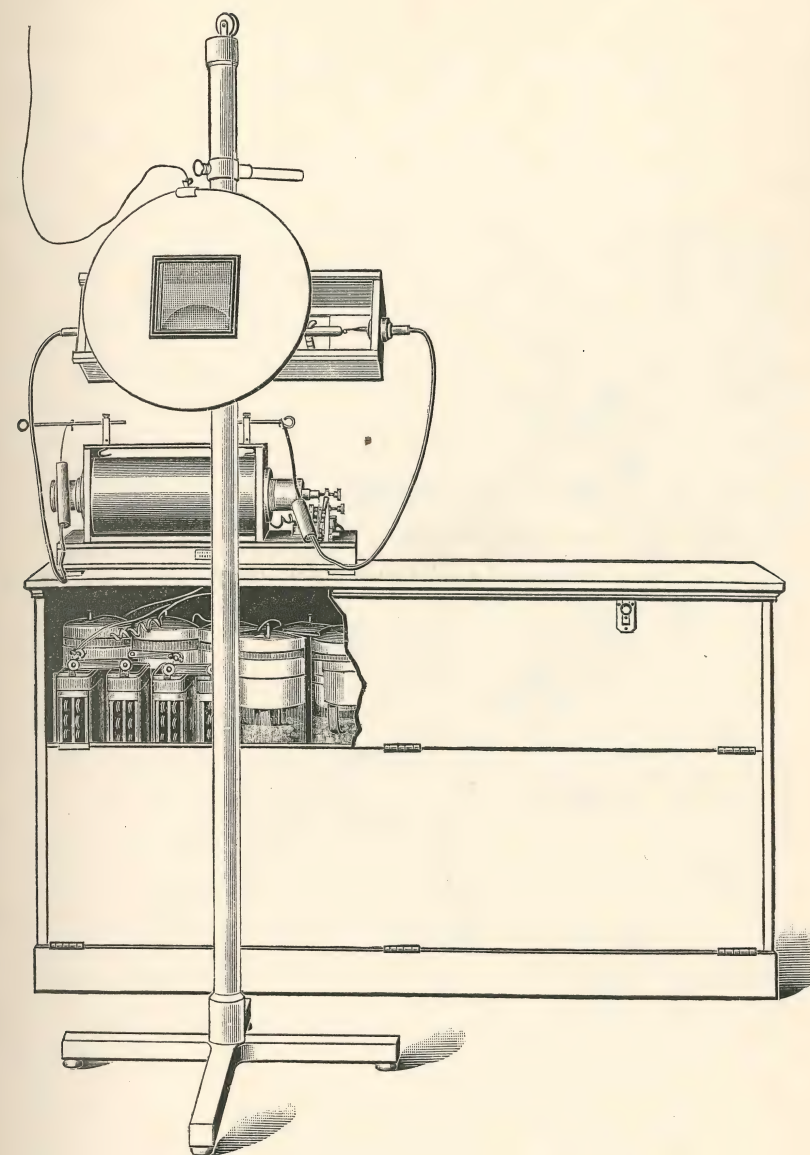


Figure 80

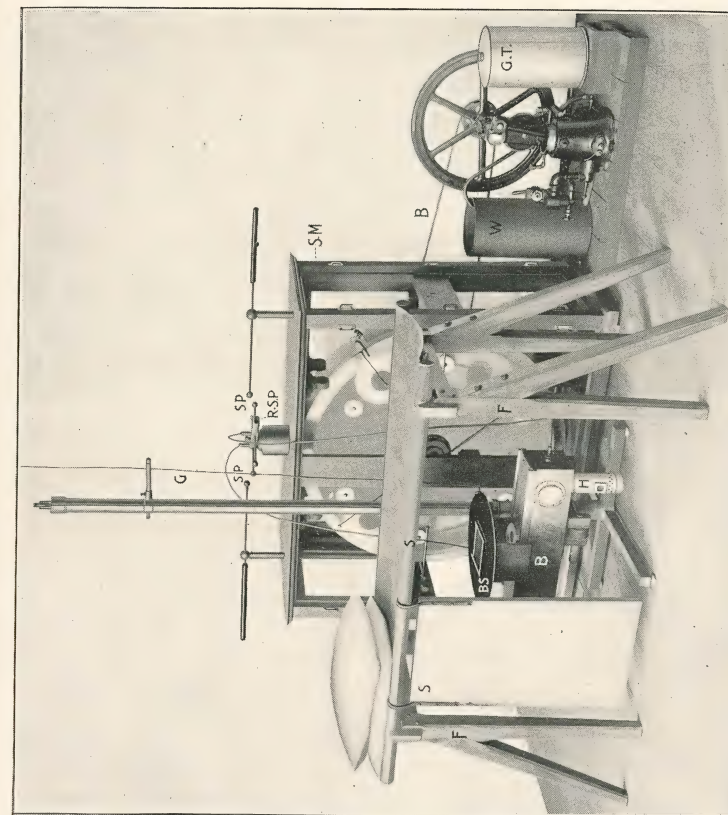
NOTE 112 — FIGURE 81 — ENCLOSED MULTIPLE
SPARK-GAPS ON A COIL



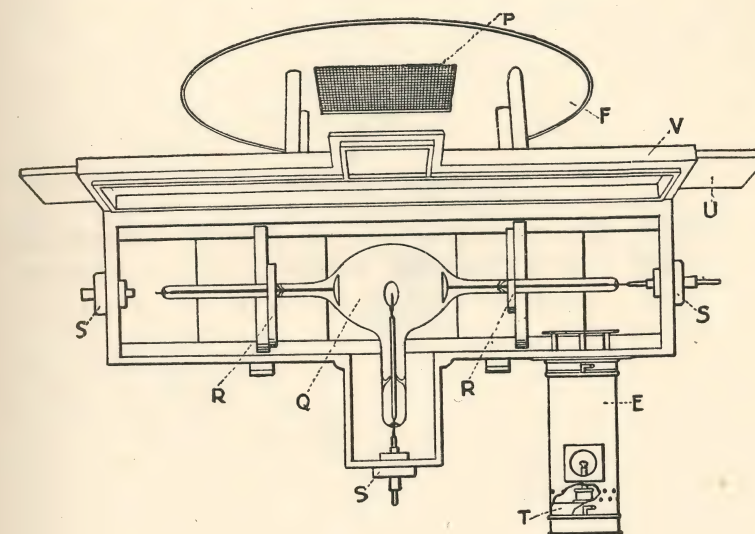
NOTE 112—FIGURE 82—A COIL OPERATED BY
STORAGE CELLS



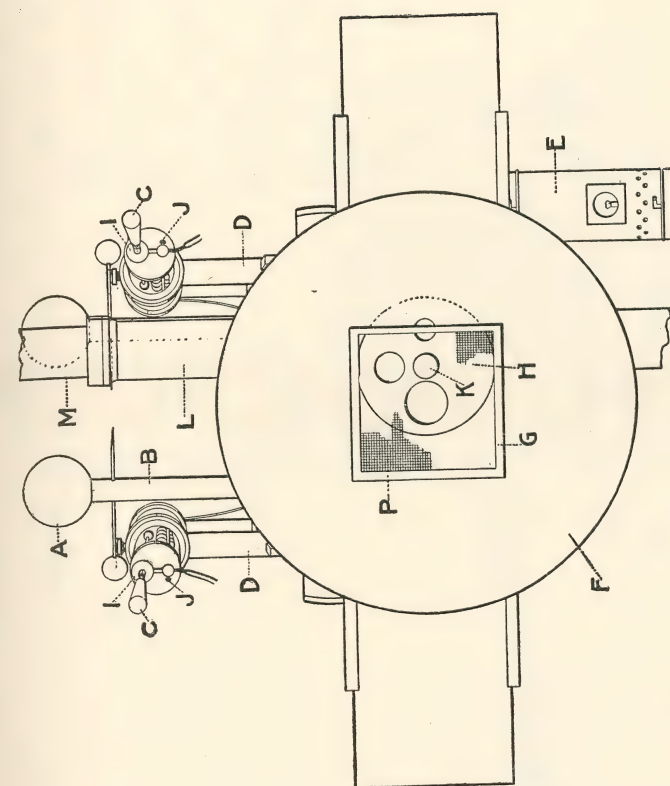
NOTE 112—FIGURE 83—A STATIC MACHINE
DRIVEN BY A GASOLINE ENGINE



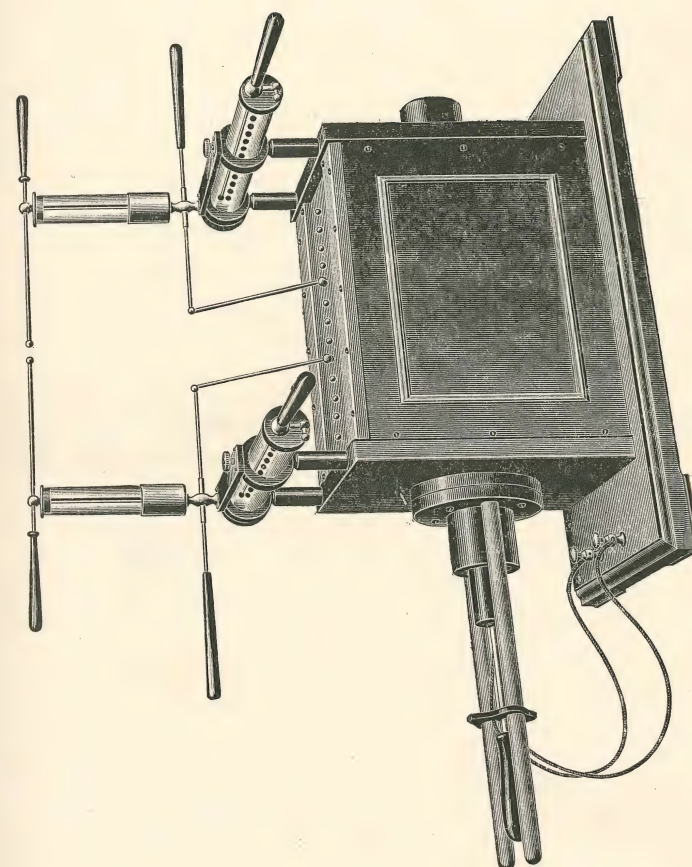
NOTE 112—FIGURE 84—A NON-RADIABLE
X-LIGHT TUBE-HOLDER WITH AN ADJUST-
ABLE DIAPHRAGM PLATE, A TESLA SCREEN,
AND A HEATING ATTACHMENT TO LOWER
THE STARTING RESISTANCE OF AN X-LIGHT
TUBE



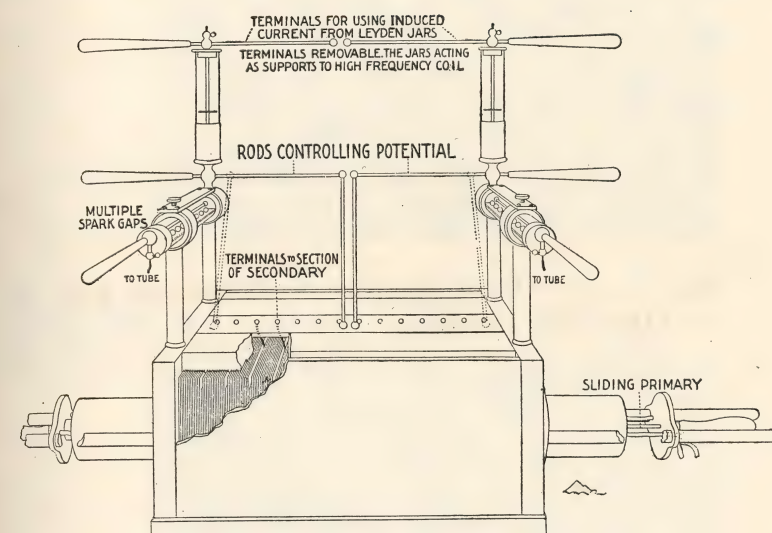
NOTE 112—FIGURE 85—A FRONT VIEW OF
THE TUBE-HOLDER SHOWN ON PLATE 47



NOTE 112 — FIGURE 86 — VARIABLE POTENTIAL
INDUCTION COIL HAVING THE SECTIONS
OF THE SECONDARY INTERCHANGEABLE



NOTE 112—FIGURE 87—A VARIABLE POTENTIAL COIL WITH INTERCHANGEABLE SECONDARY SECTIONS



NOTE 112 — FIGURE 88 — A PHOTOGRAPH MADE WITH AN X-LIGHT TUBE HAVING A LOW RESISTANCE; NO SPARK-GAPS BEING USED

NOTE 112 — FIGURE 89 — A PHOTOGRAPH OF THE SAME SUBJECT MADE WITH THE SAME TUBE; MULTIPLE SERIES SPARK-GAPS BEING USED

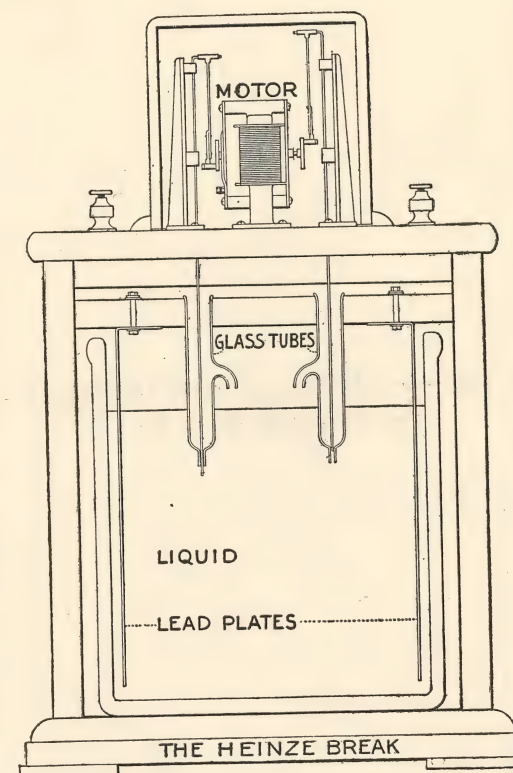


Figure 88

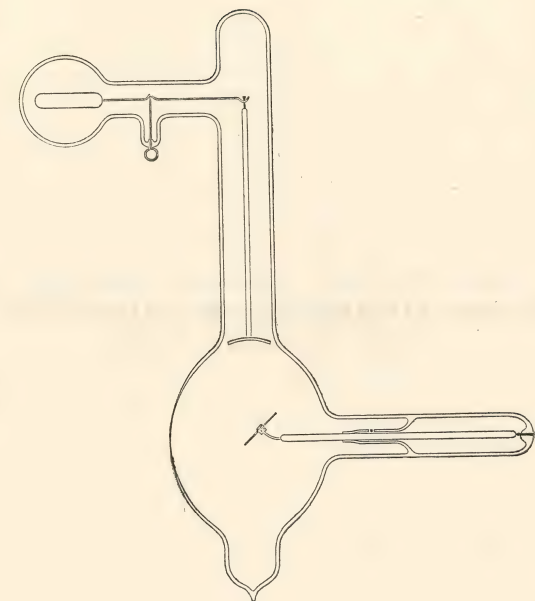


Figure 89

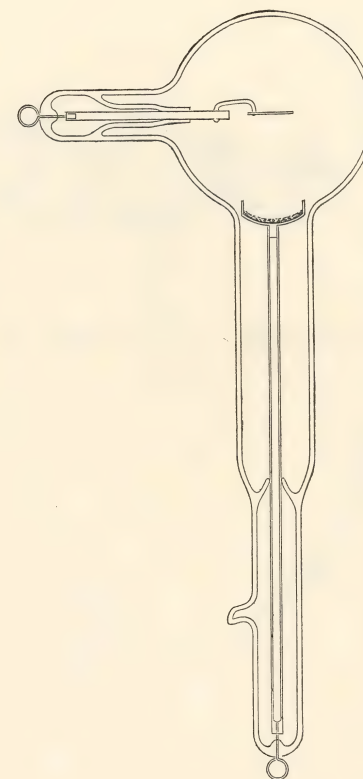
NOTE 112 — FIGURE 90 — THE HEINZE ELECTROLYTIC BREAK



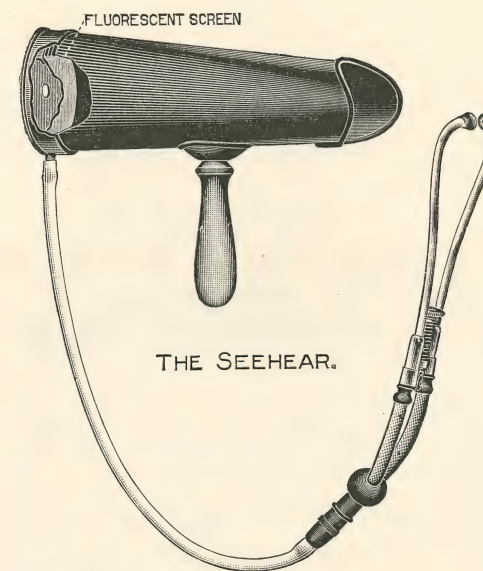
NOTE 114—FIGURE 91—A BALANCED CATH-
ODE X-LIGHT TUBE



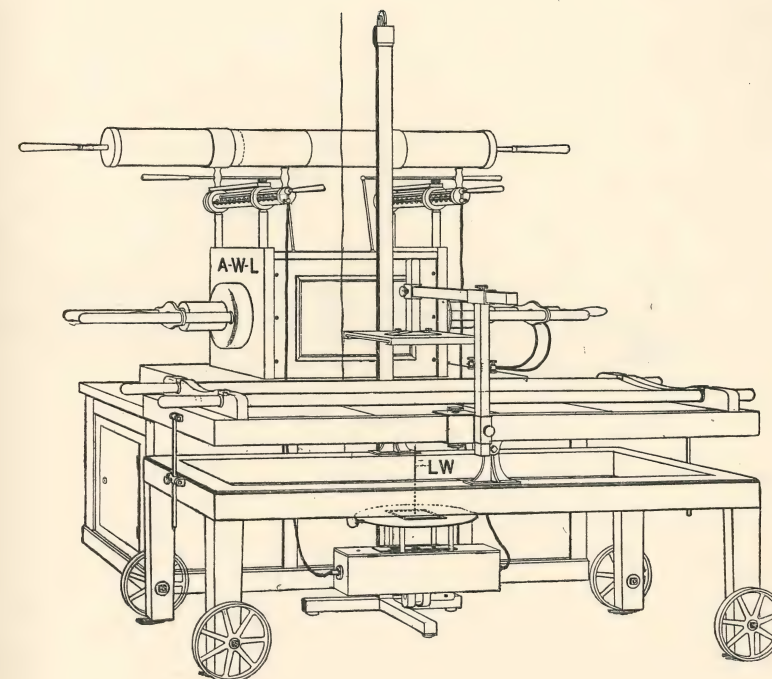
NOTE 115—FIGURE 92—AN X-LIGHT TUBE
WITH A RADIO-ACTIVE CATHODE



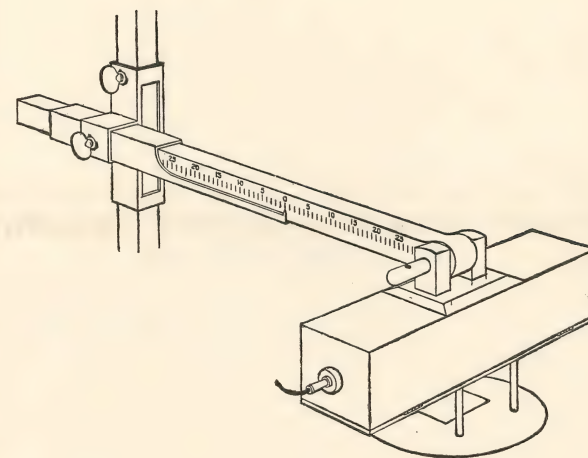
NOTE 116—FIGURE 93—A SMALL “SEEHEAR”



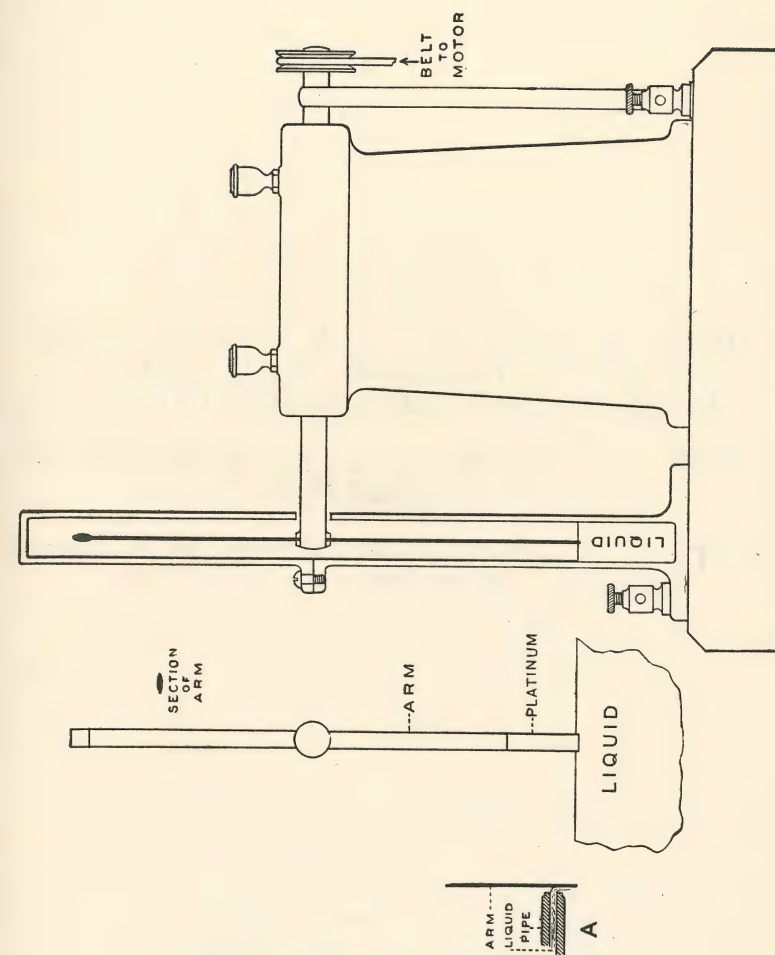
NOTES 116 B AND 117 — FIGURE 95 — A MOVABLE
X-LIGHT EXAMINATION TABLE



NOTE 116C—FIGURE 96—A NON-RADIABLE
X-LIGHT TUBE BOX WITH A GRADUATED
ARM



NOTE 120—FIGURE 8—A ROTARY BREAK FOR
AN INDUCTION COIL



NOTE 121 — FIGURE 5 — A NON-RADIABLE
X-LIGHT PLATE-HOLDER TO PREVENT DIF-
FUSED X-LIGHT FROM FOGGING THE PLATE

NOTE 121.—FIGURE 6—A SUPPORT FOR A
PLATE-HOLDER

NOTE 121 — FIGURE 7 — A SECTION OF A NON-
RADIABLE X-LIGHT PLATE-HOLDER

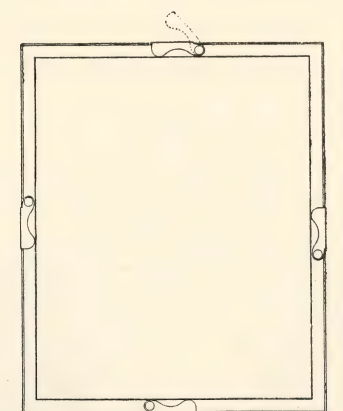


Figure 5

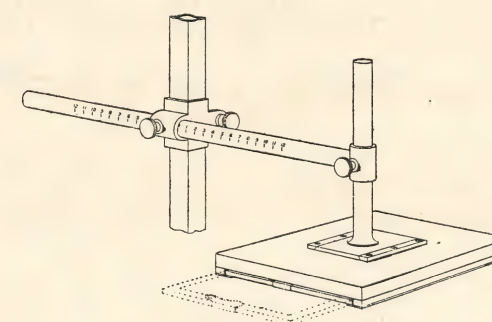


Figure 6

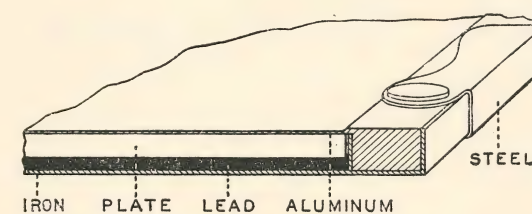


Figure 7

NOTE 137 — FIGURE 1 NOTE 137 — FIGURE 2

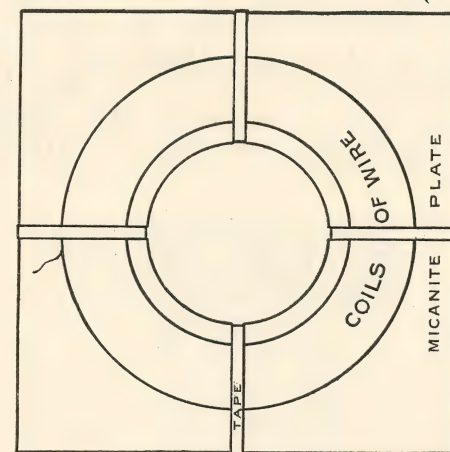


Figure 1

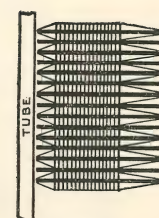
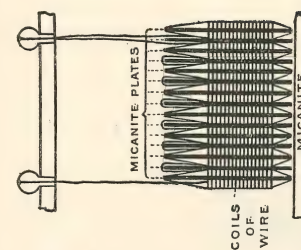


Figure 2

NOTE 137—FIGURE 3—A SECTION THROUGH THE SECONDARY OF AN INDUCTION COIL HAVING INTERCHANGEABLE SECONDARY SECTIONS SHOWING GLASS TRAYS. A, GLASS PLATE SEPARATING THE COILS OF ONE SECTION; B, COIL; C, MICANITE TUBE

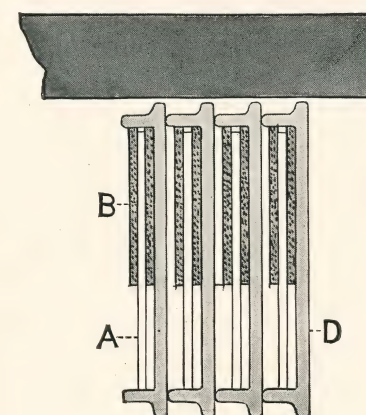
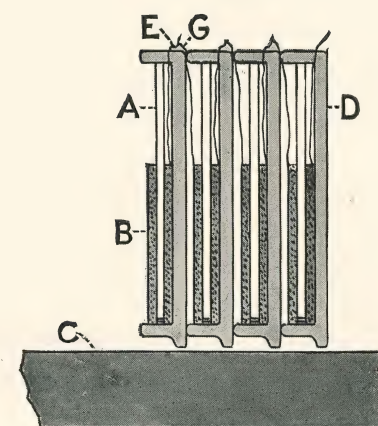
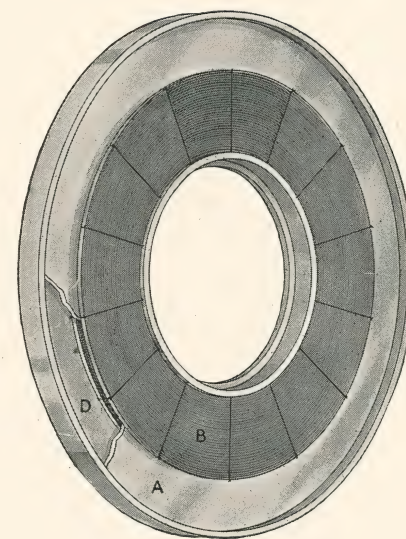


FIG. 3. SCALE $\frac{1}{2}$

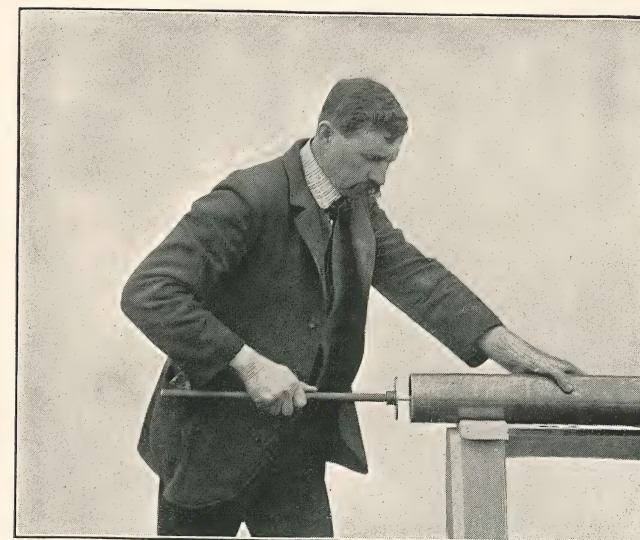
NOTE 137 — FIGURE 4 — A GLASS CELL OF THE
SECONDARY OF AN INTERCHANGEABLE
SECTION INDUCTION COIL. TWO COILS
MAKING ONE SECTION ARE SHOWN IM-
BEDDED IN INSULATING MATERIAL



NOTE 137—FIGURE 5—METHOD OF PACKING
THE IRON WIRE CORE



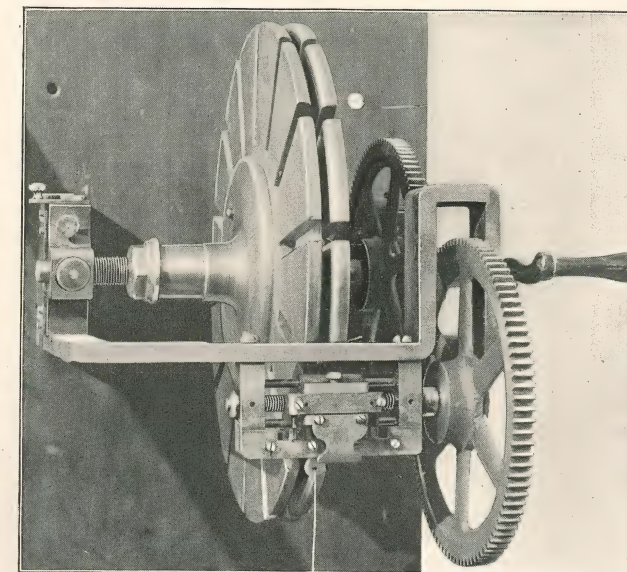
NOTE 137 — FIGURE 6 — PUSHING OUT THE
CORE -OF THE PRIMARY OF AN INDUCTION
COIL- FROM THE PACKING TUBE



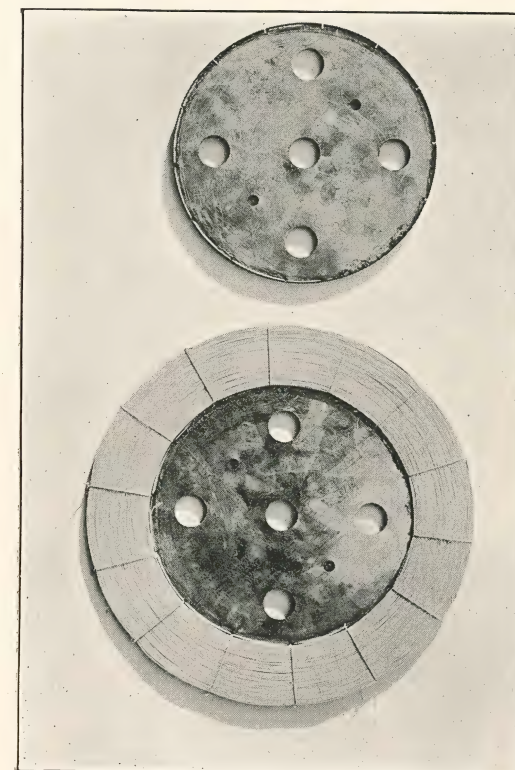
NOTE 137 — FIGURE 7 — TYING THE IRON CORE
WIRES OF THE PRIMARY OF AN INDUC-
TION COIL



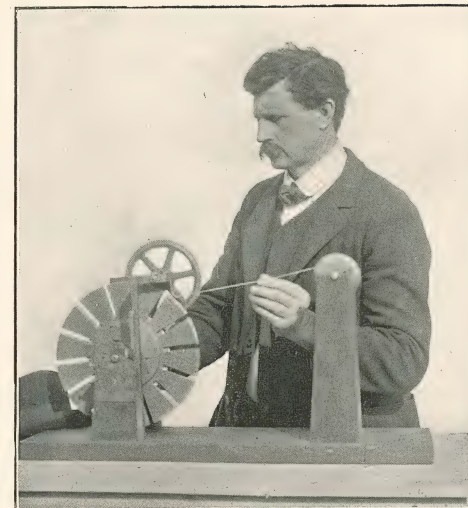
NOTE 137 — FIGURE 9 — A MACHINE FOR WIND-
ING THE SECONDARY COILS OF AN INTER-
CHANGEABLE SECONDARY INDUCTION COIL



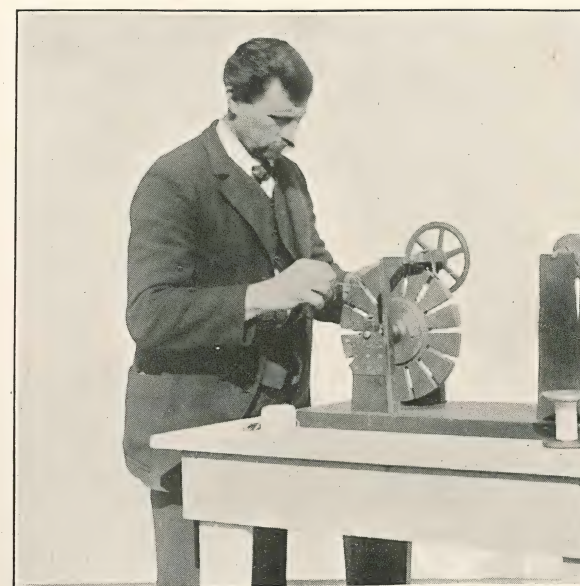
NOTE 137—FIGURES 10 AND 14—A METAL FORM WITH A FRESHLY WOUND COIL SHOWING THE METHOD OF TYING ONE OF THE SECONDARY COILS OF THE SECONDARY OF AN INDUCTION COIL HAVING INTERCHANGEABLE SECONDARY SECTIONS



NOTE 137 — FIGURE 11 — WINDING A SECOND-
ARY COIL, FORMING ONE HALF OF A
SECTION OF THE SECONDARY OF AN IN-
DUCTION COIL WITH INTERCHANGEABLE
SECONDARY SECTIONS



NOTE 137 — FIGURE 12 — TYING A SECONDARY COIL AFTER WINDING, THE COIL FORMING ONE HALF OF A SECTION OF THE SECONDARY OF AN INDUCTION COIL HAVING INTERCHANGEABLE SECTIONS IN THE SECONDARY



NOTE 137 — FIGURE 13 — SHAFT OF THE WINDING MACHINE REMOVED FROM ITS BEARINGS WITH ONE FLANGE TAKEN OFF TO SHOW A COIL FORMING ONE HALF OF A SECTION OF THE SECONDARY OF AN INDUCTION COIL HAVING INTERCHANGEABLE SECTIONS IN THE SECONDARY

NOTE 137 — FIGURE 16 — A DIPPING-ARBOR WITH ONE FLANGE REMOVED, SHOWING ONE COIL PARTLY REMOVED AND OTHERS PLACED TO ILLUSTRATE THE RIGIDITY PRODUCED BY DIPPING

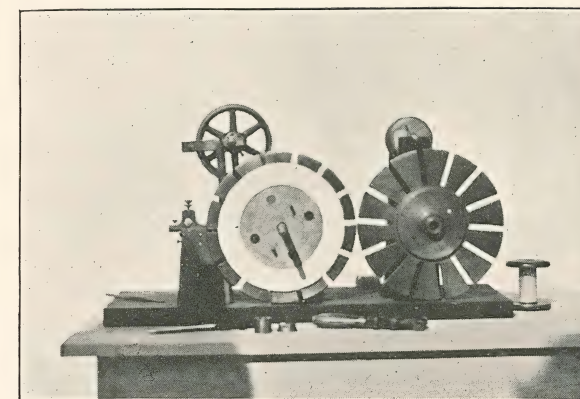


Figure 13

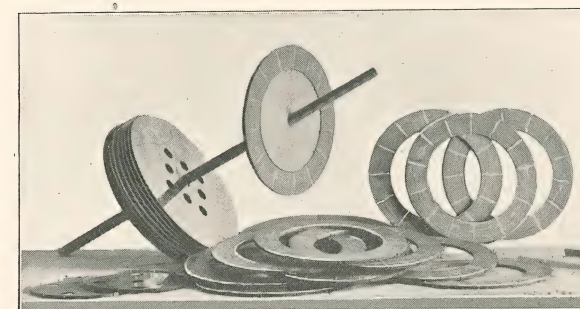
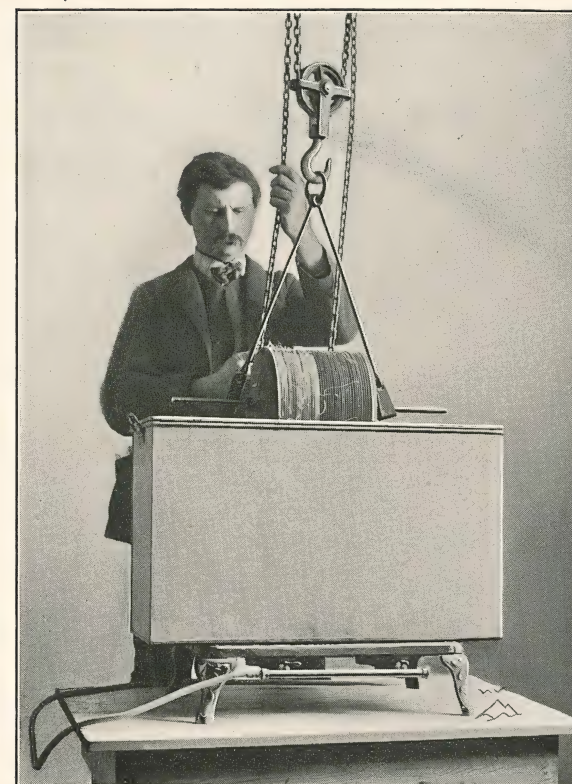


Figure 16

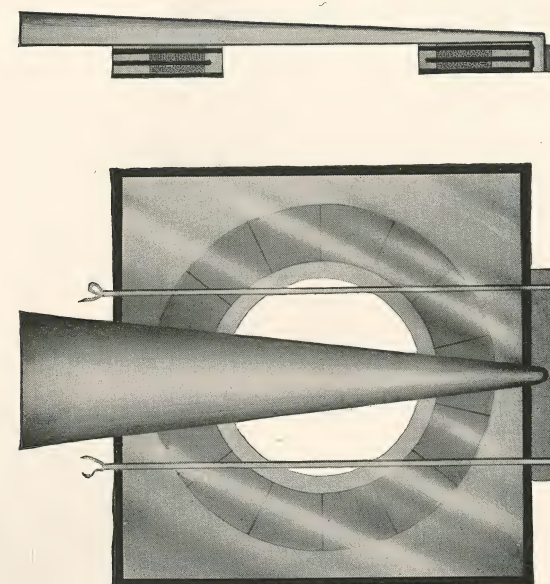
NOTE 137 — FIGURE 15 — DIPPING SECTIONS
OF THE SECONDARY OF THE INTERCHANGE-
ABLE SECONDARY INDUCTION COIL



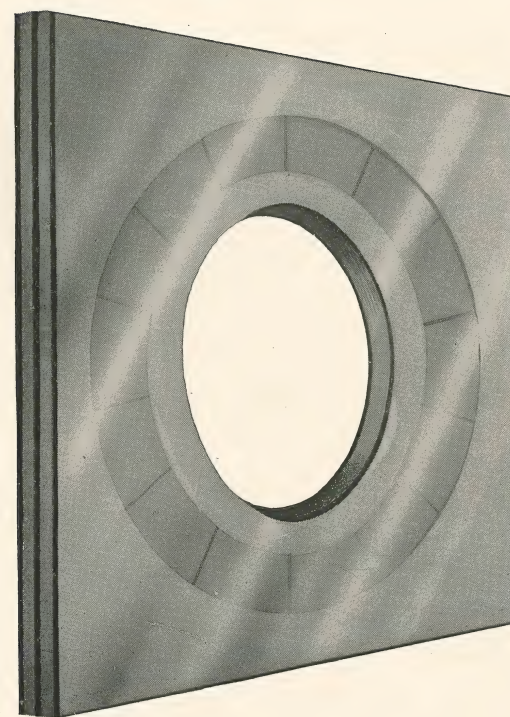
NOTE 137 — FIGURE 17 — ELEMENTS OF ONE
SECTION OF THE SECONDARY WINDING
OF 70-CENTIMETRE COIL HAVING INTER-
CHANGEABLE SECTIONS IN THE SECONDARY



NOTE 137 — FIGURE 18 — A METHOD OF CASTING OZOKERITE AROUND ONE PAIR OF COILS, FORMING A SECTION OF AN INDUCTION COIL WITH INTERCHANGEABLE SECTIONS IN THE SECONDARY



NOTE 137 — FIGURE 19 — A FINISHED SECTION
OF THE SECONDARY OF AN INDUCTION
COIL HAVING INTERCHANGEABLE SEC-
TIONS IN THE SECONDARY



NOTE 137 — FIGURE 8 — A GENERAL VIEW OF THE PRIMARY OF A 70-CENTIMETRE COIL, CUT AWAY TO SHOW THE INTERIOR

NOTE 137 — FIGURE 20 — PERSPECTIVE VIEW OF 70-CENTIMETRE INTERCHANGEABLE SECONDARY INDUCTION COIL

NOTE 137 — FIGURE 21 — A PERSPECTIVE VIEW OF A 70-CENTIMETRE INTERCHANGEABLE SECONDARY INDUCTION COIL SHOWING THE DIVISION BOXES SEPARATED

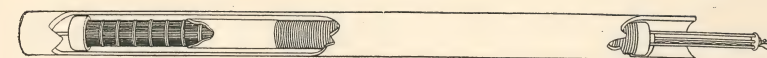


Figure 8

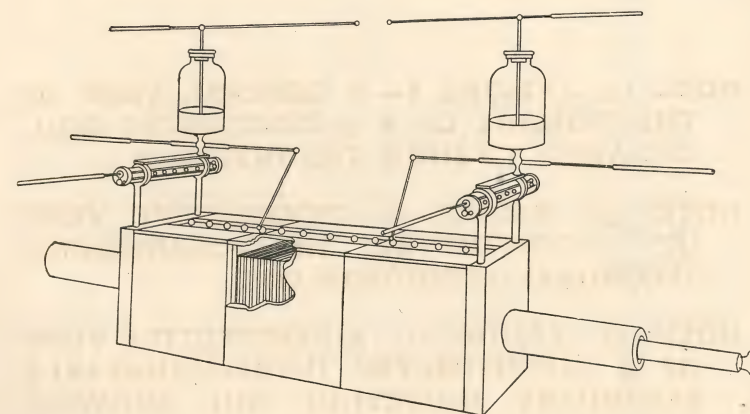


Figure 20

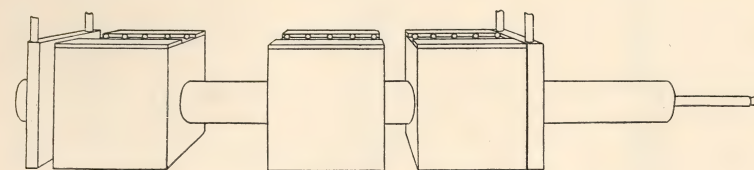


Figure 21

NOTE 138—FIGURE 1—AN X-LIGHT TUBE WITH AN AUTOMATIC VACUUM REGULATOR AND A ROTARY TARGET WHOSE DISTANCE FROM THE CATHODE CAN BE VARIED TO SUIT THE RESISTANCE OF THE TUBE

NOTE 138—FIGURE 2—ADJUSTABLE TARGET FOR AN X-LIGHT TUBE

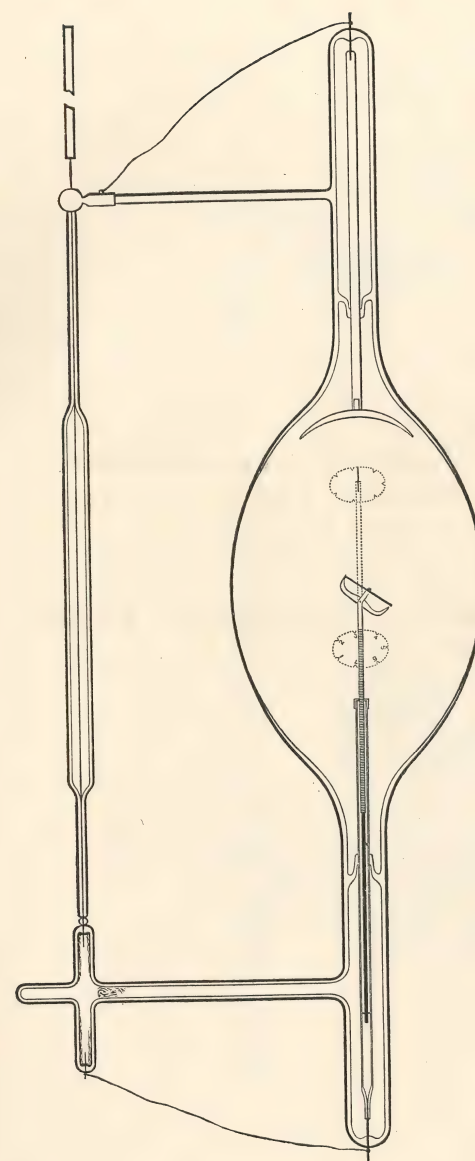


Figure 1

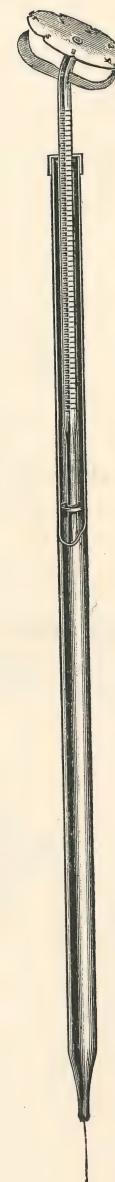


Figure 2

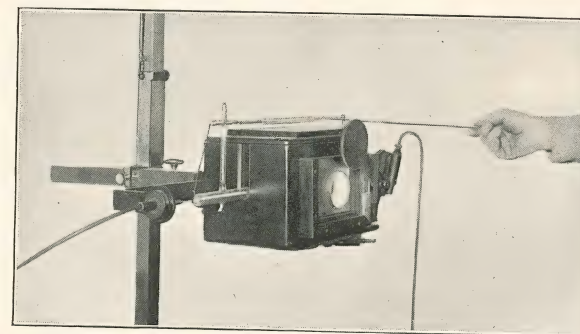


Figure 1

NOTE 139—FIGURE 1—A NON-RADIABLE BOX
FOR AN X-LIGHT TUBE

NOTE 139—FIGURE 2—A NON-RADIABLE
X-LIGHT TUBE BOX SHOWING THE TOP
BEING REMOVED TO ALLOW THE TUBE
TO BE TAKEN OUT

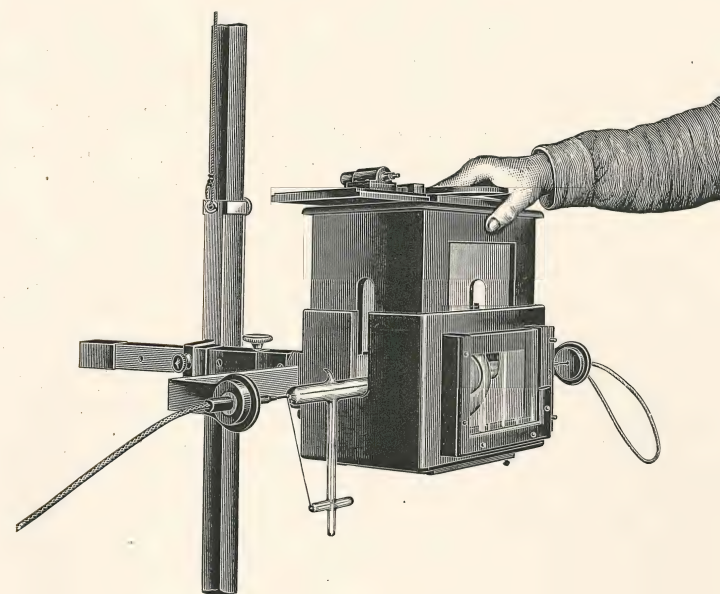
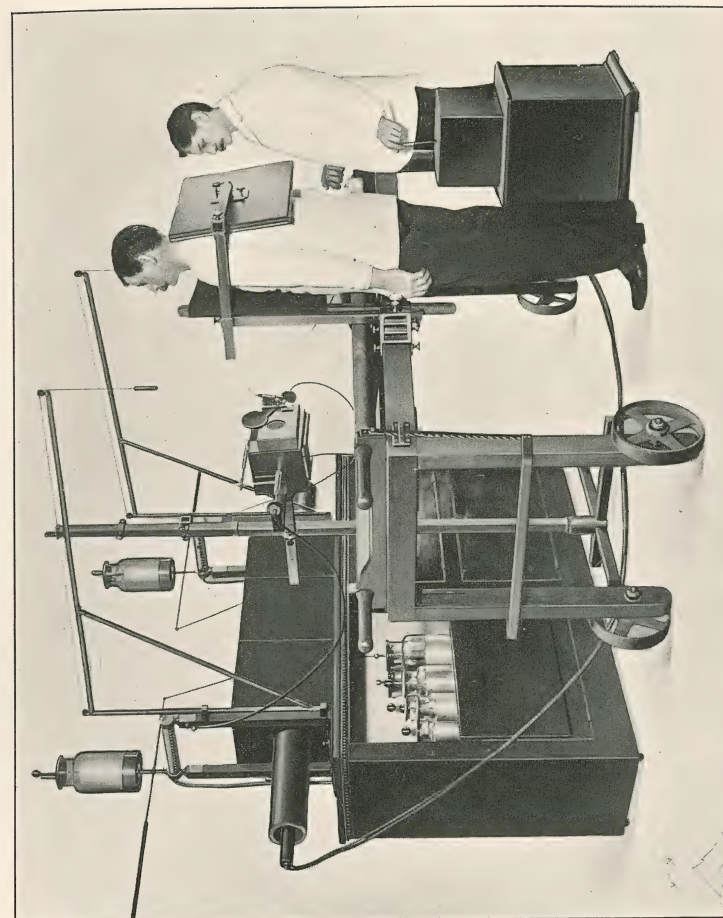
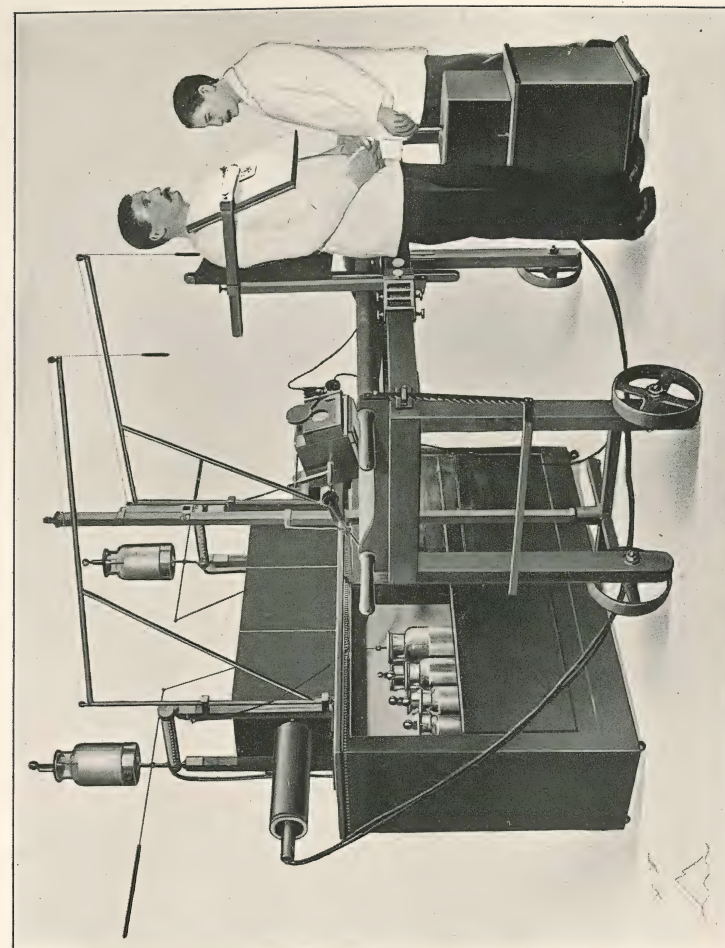


Figure 2

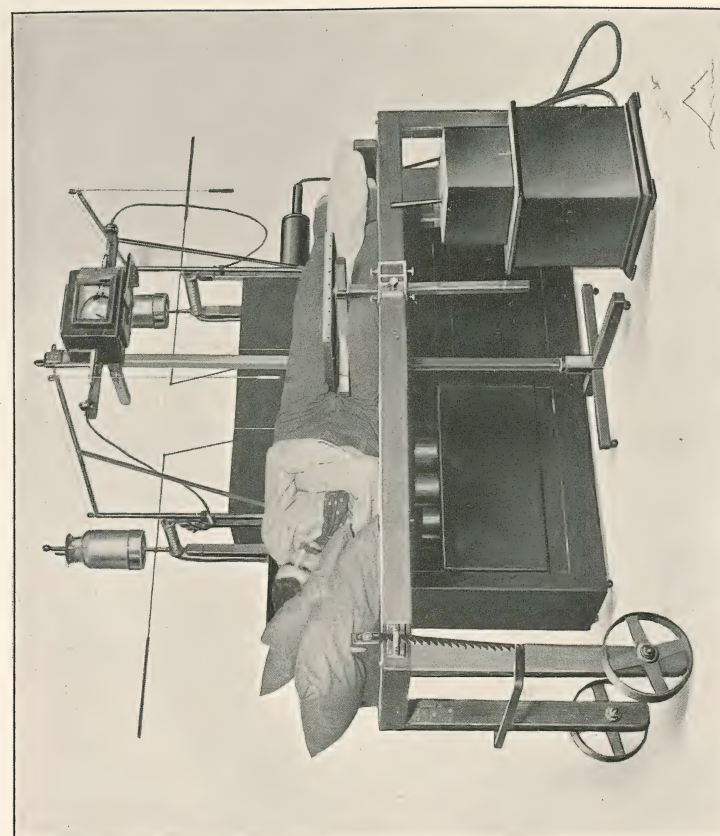
NOTE 140 — FIGURE 4 — PHOTOGRAPHING A
CHEST WITH THE SOURCE OF X-LIGHT
IN FRONT



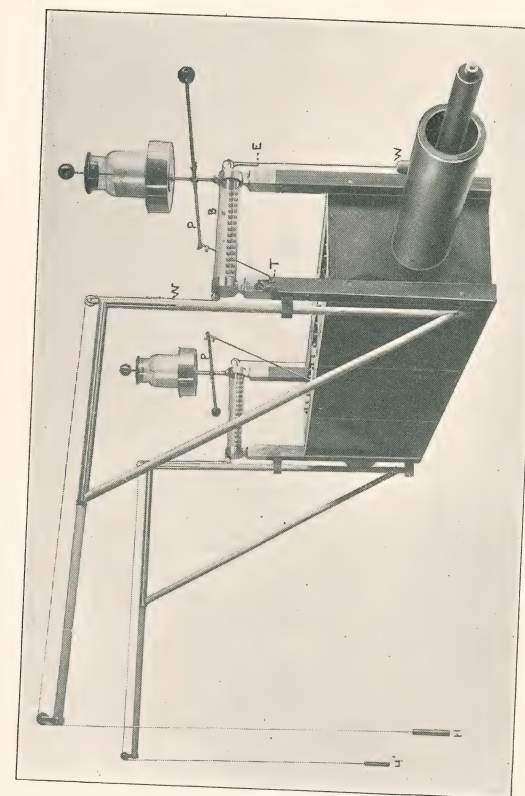
NOTE 140 — FIGURE 5 — PHOTOGRAPHING A
CHEST WITH THE PATIENT UPRIGHT AND
THE SOURCE OF X-LIGHT BEHIND



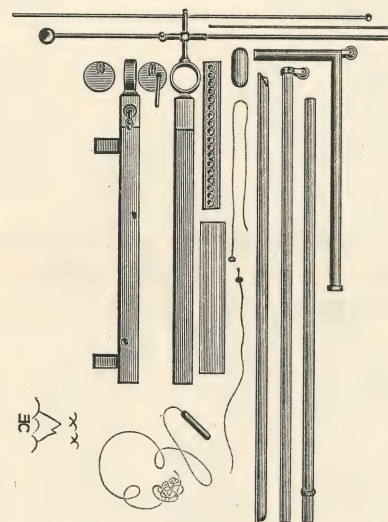
NOTE 140 — FIGURE 5½ — PHOTOGRAPHING A
KNEE WITH THE SOURCE OF X-LIGHT
ABOVE



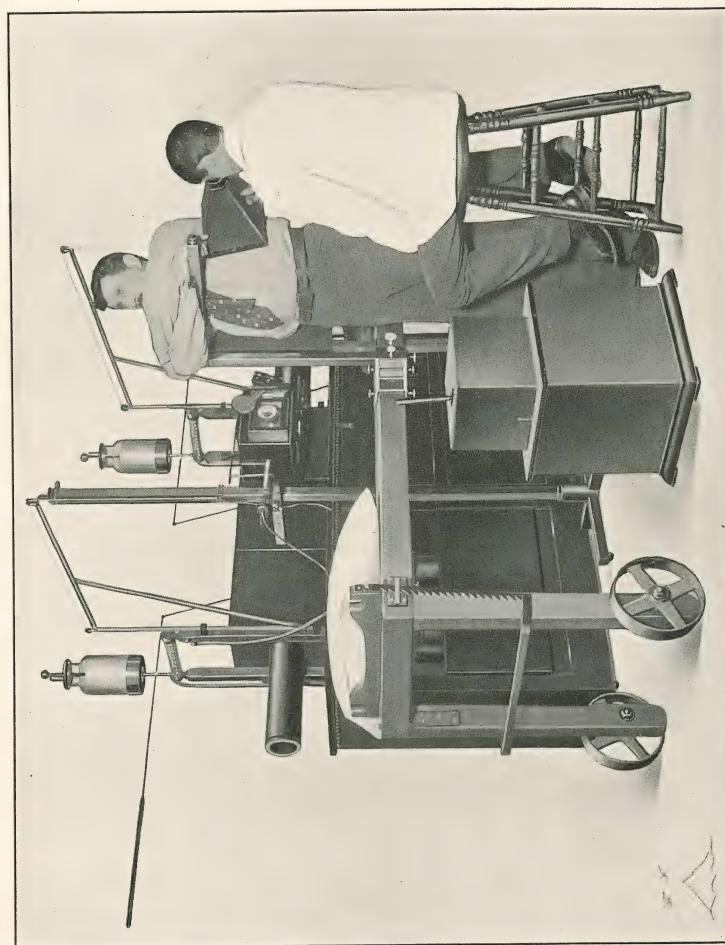
NOTE 140—FIGURE 6—INTERCHANGEABLE
SECONDARY INDUCTION COIL ARRANGED
FOR CRYPTOSCOPIC EXAMINATIONS



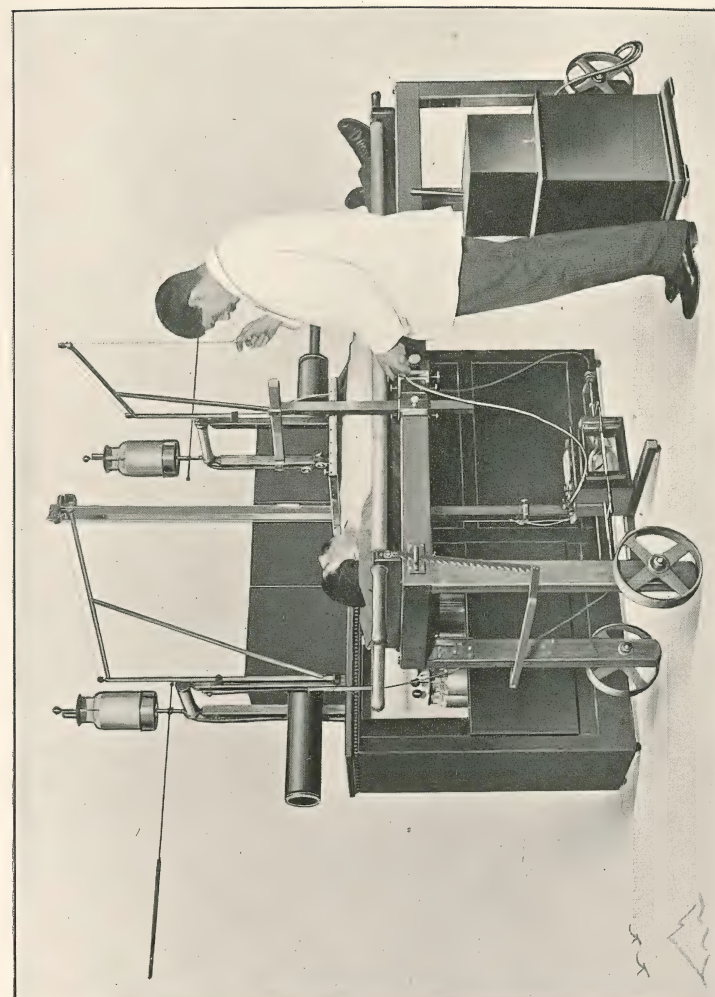
NOTE 140—FIGURE 7—DETAILS OF THE
SPARK-GAPS OF A 71-CENTIMETRE INTER-
CHANGEABLE SECONDARY INDUCTION COIL



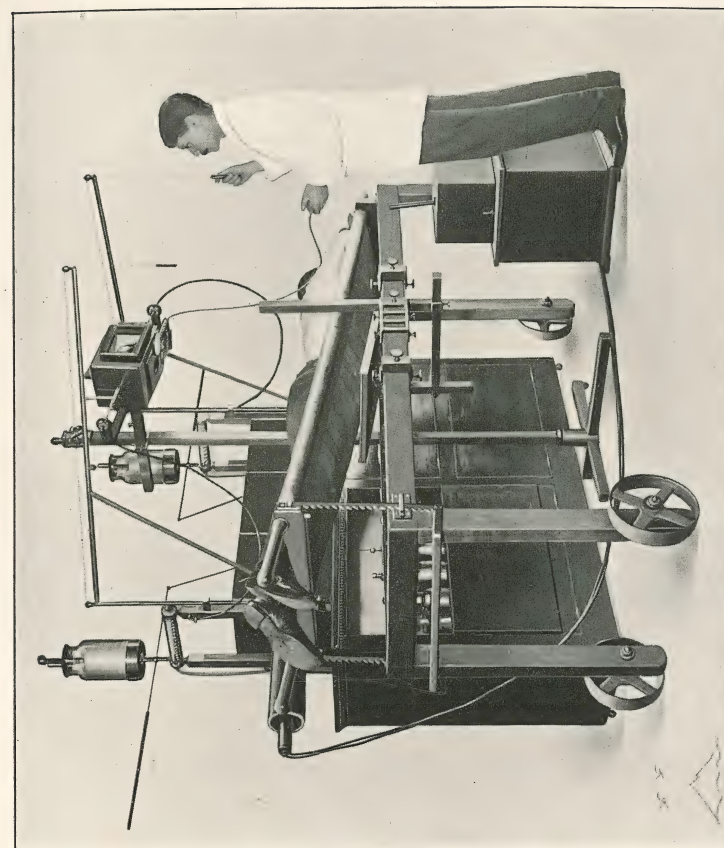
NOTE 140 — FIGURE 8 — EXAMINING THE
HEART FROM ONE SIDE. WILLIAMS
TRIANGLE



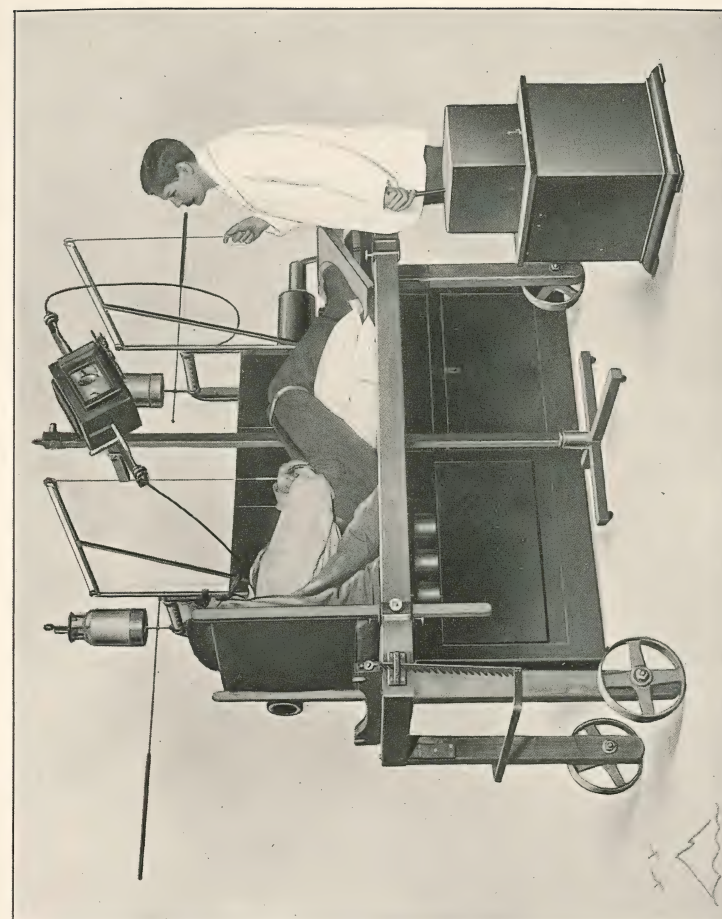
NOTE 140 — FIGURE 8½ — PHOTOGRAPHING
THE CHEST BY X-LIGHT WITH THE
X-LIGHT TUBE BELOW. SHOWING THE
USE OF AN INSTANTANEOUS SHUTTER



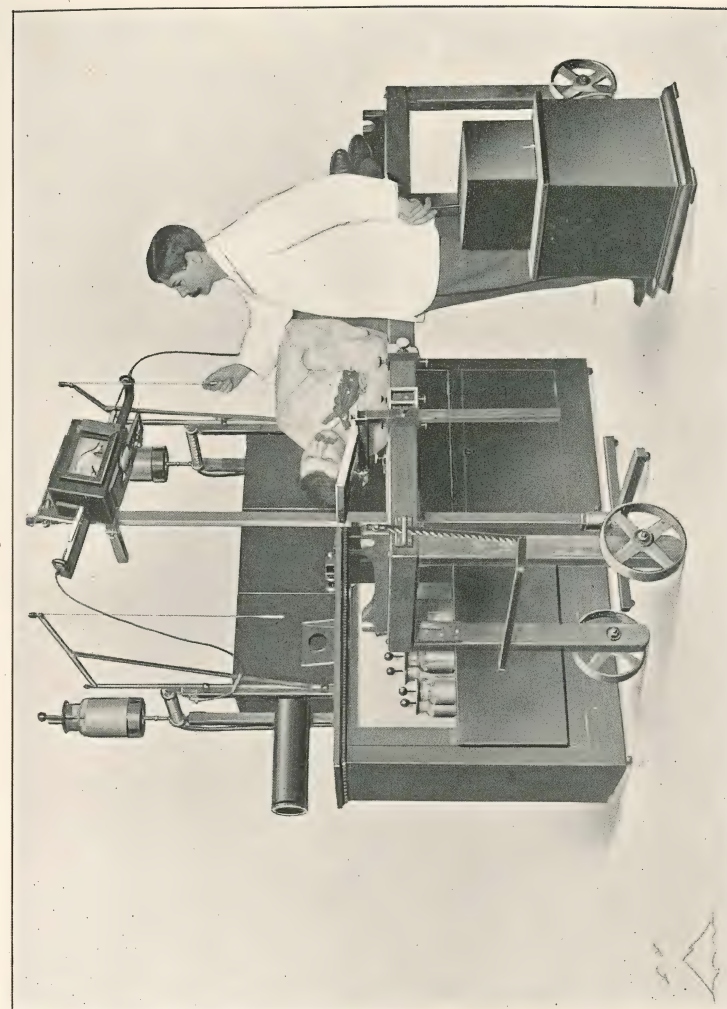
NOTE 140 — FIGURE 9 — POSITION FOR PHOTOGRAPHING A STONE IN THE BLADDER



NOTE 140 — FIGURE 10 — PHOTOGRAPHING THE
FEET WITH THE SOURCE OF X-LIGHT
ABOVE



NOTE 140 — FIGURE 11 — PHOTOGRAPHING THE
HEAD WITH THE X-LIGHT TUBE ABOVE



NOTE 139—FIGURE 3—SHOWING AN INSULATING COLLAR AND A SPIRAL SPRING CONNECTION BETWEEN THE X-LIGHT TUBE AND THE COIL

NOTE 140—FIGURE 11½—A BACK SUPPORT FOR AN X-LIGHT EXAMINATION TABLE

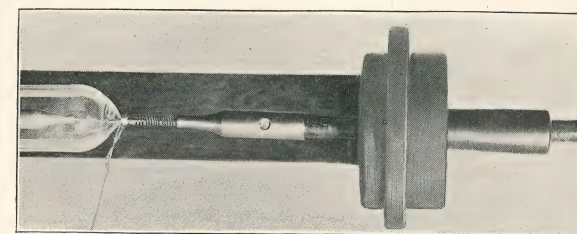


Figure 3

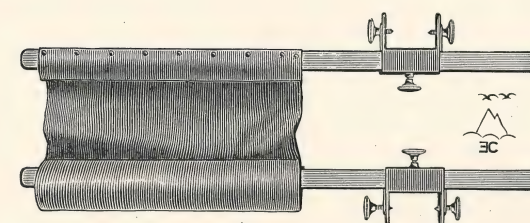
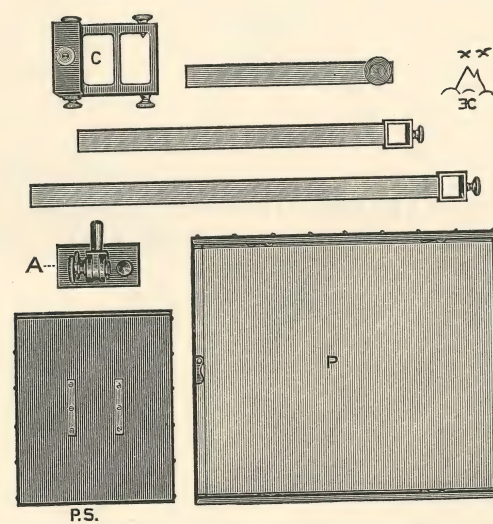
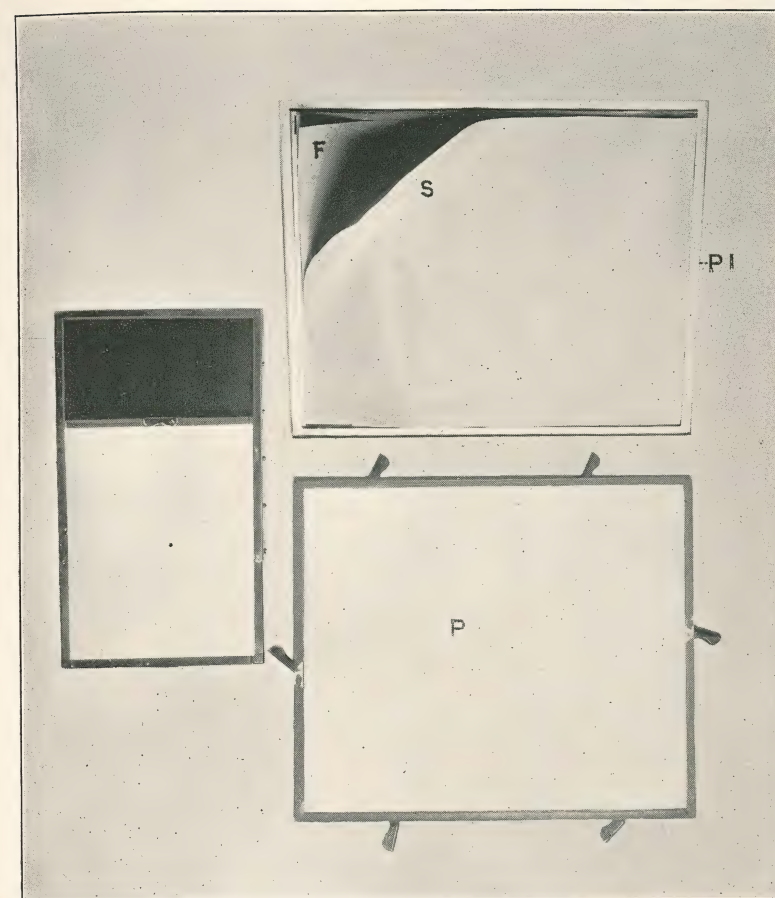


Figure 11½

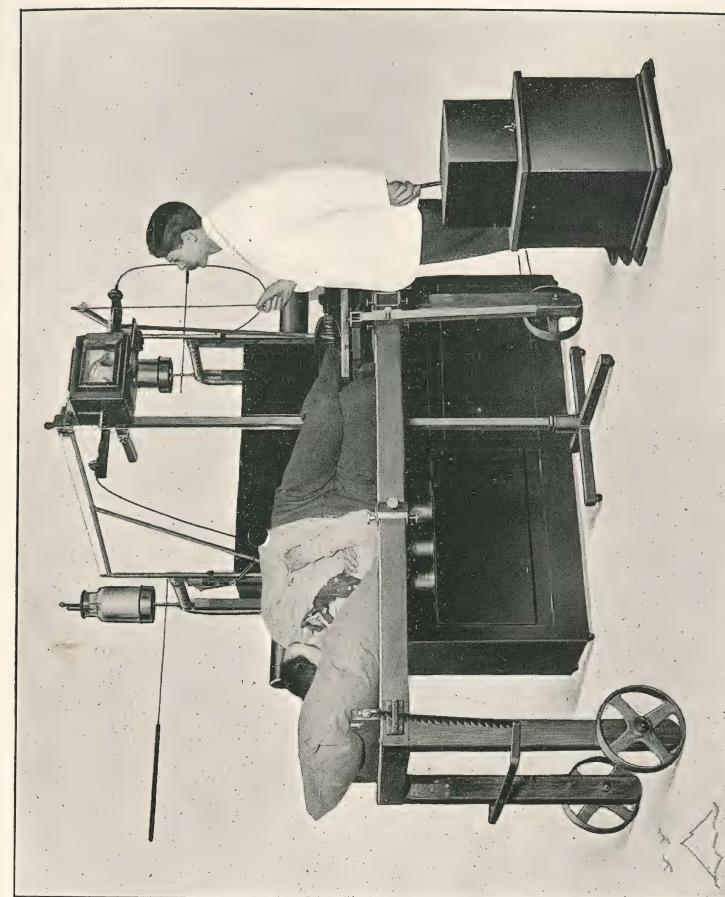
NOTE 140—FIGURE 12—APPARATUS FOR
SUPPORTING A PHOTOGRAPHIC PLATE



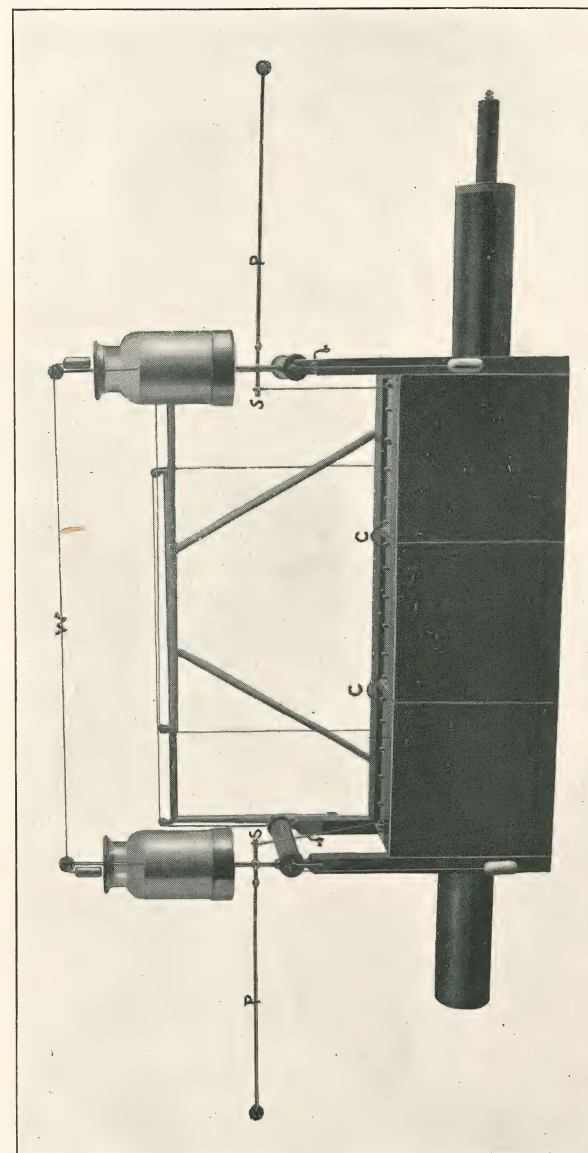
NOTE 140—FIGURE 14—DETAILS OF A NON-RADIABLE PLATE-HOLDER FOR PREVENTING DIFFUSED X-LIGHT FROM FOGGING THE PHOTOGRAPHIC PLATE



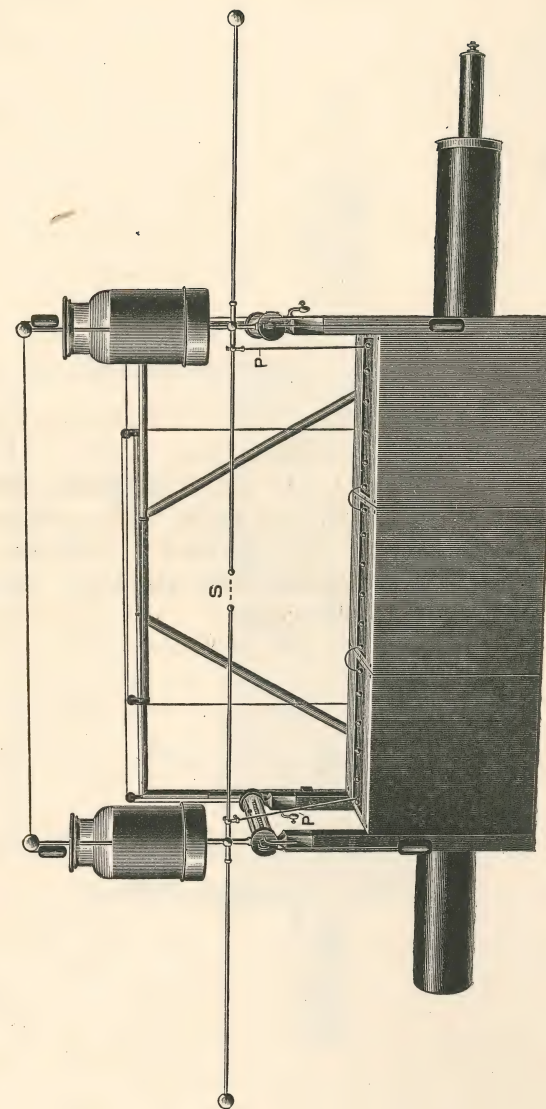
NOTE 140 — FIGURE 15 — PHOTOGRAPHING AN
ANKLE WITH THE SOURCE OF X-LIGHT
ABOVE



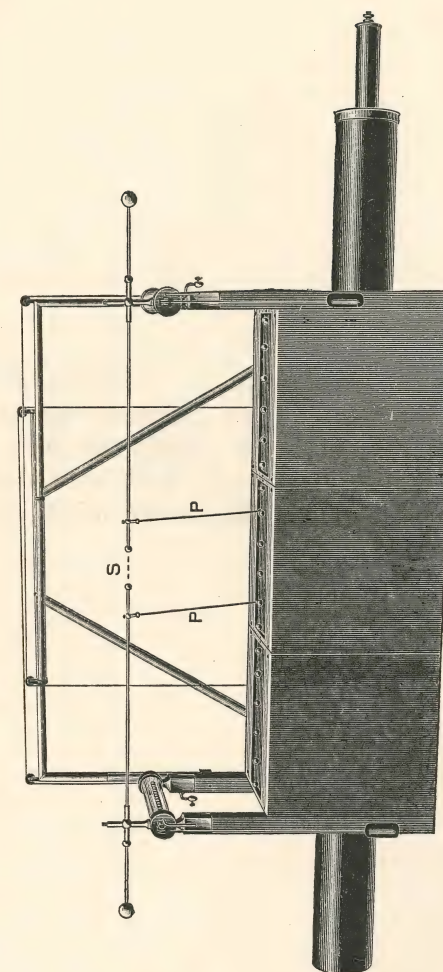
NOTE 141 — FIGURE 16 — RODS ARRANGED TO
GIVE THE FULL POTENTIAL OF THE COIL



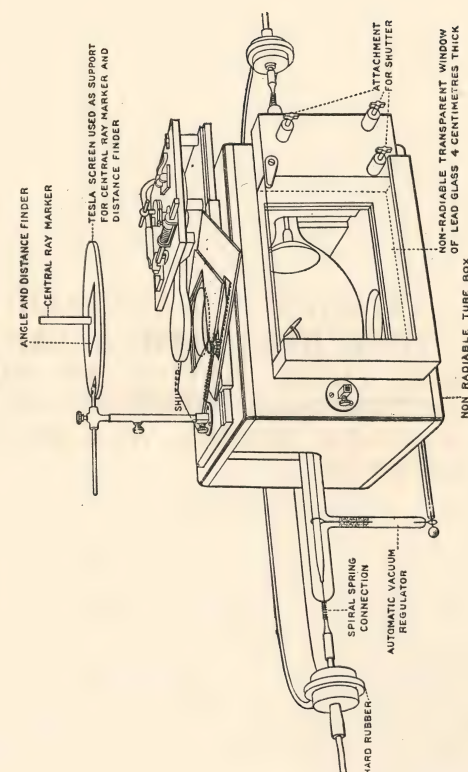
NOTE 141—FIGURE 17—ARRANGEMENT OF AN INTERCHANGEABLE SECONDARY INDUCTION COIL WITH ALL THE SECTIONS OF THE SECONDARY IN USE, GIVING THE FULL POTENTIAL OF THE COIL, AND WITH THE SPARK-GAPS ARRANGED TO SHUNT THE CURRENT, WHEN THE STARTING RESISTANCE OF THE X-LIGHT TUBE IS HIGH



NOTE 141—FIGURE 18—ARRANGEMENT OF AN INTERCHANGEABLE SECONDARY INDUCTION COIL WITH ONLY A FEW OF THE SECONDARY SECTIONS IN USE, DIMINISHING THE POTENTIAL



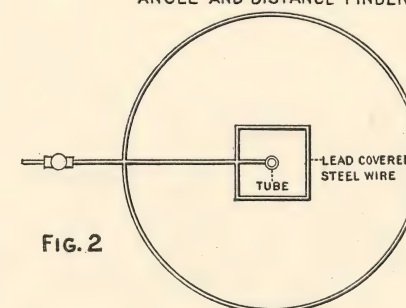
NOTE 143 — FIGURE 1 — NON-RADIABLE
X-LIGHT TUBE BOX WITH A CENTRING
DIAPHRAGM PLATE HAVING AN ADJUST-
ABLE RECTANGULAR OPENING, AN ORI-
ENTER, A TESLA SCREEN, AND AN AUTO-
MATIC SHUTTER



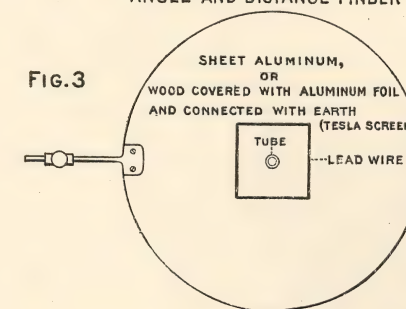
NOTE 143—FIGURE 2

NOTE 143—FIGURE 3

CENTRAL RAY MARKER
ANGLE AND DISTANCE FINDER



CENTRAL RAY MARKER
ANGLE AND DISTANCE FINDER



NOTE 143—FIGURES 4 AND 5—ILLUSTRATING
THE USE OF AN ORIENTER

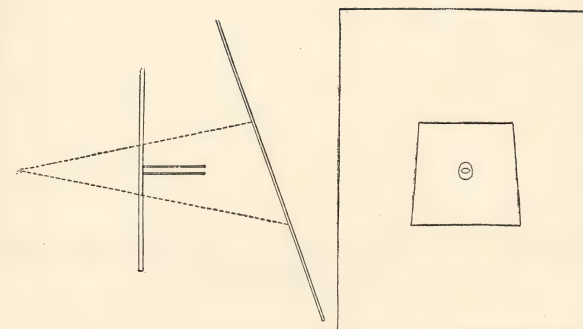


Figure 5

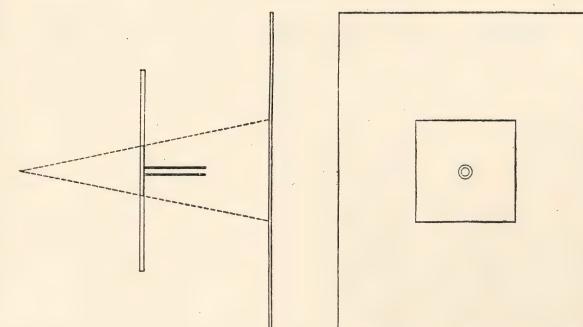


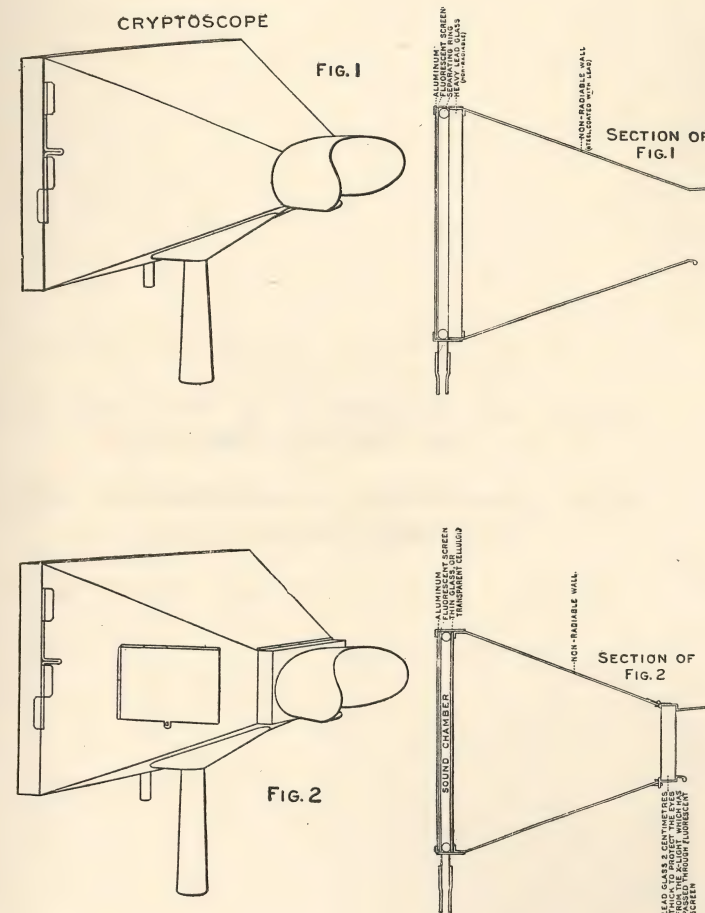
Figure 4

NOTE 145—FIGURE 1—NON-RADIABLE
CRYPTOSCOPE

NOTE 145—SECTION OF FIGURE 1

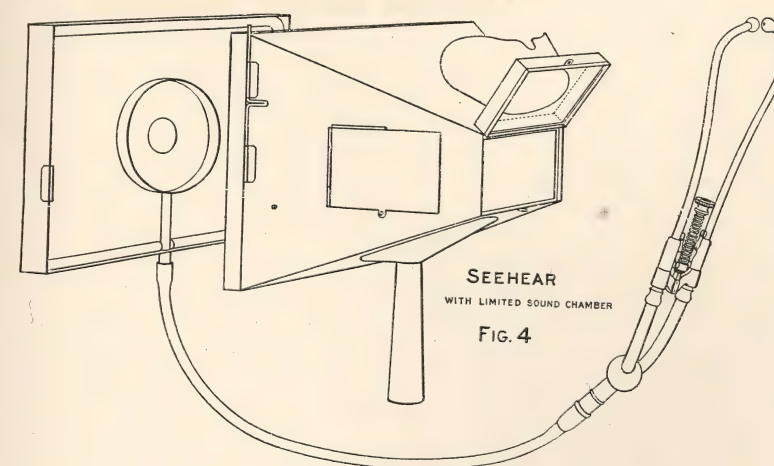
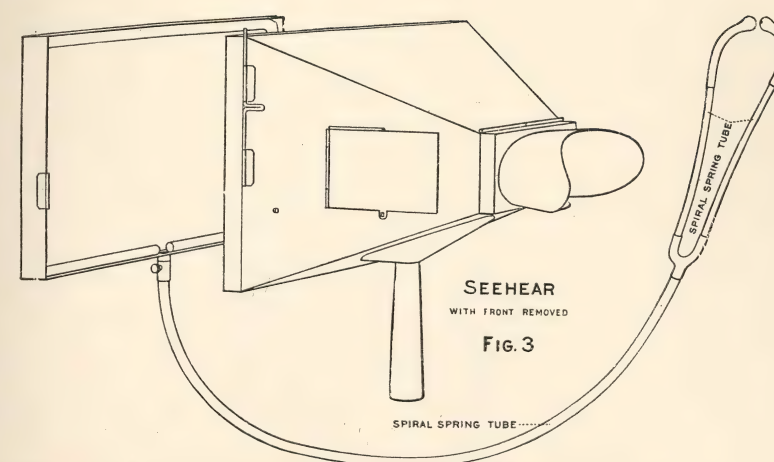
NOTE 145—FIGURE 2—NON-RADIABLE
CRYPTOSCOPE

NOTE 145—SECTION OF FIGURE 2



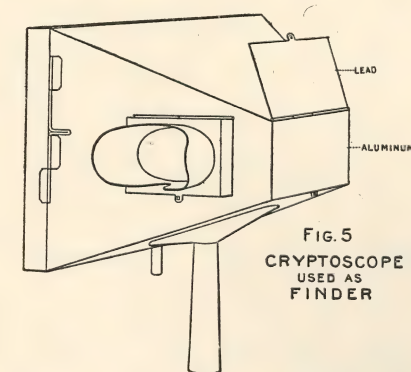
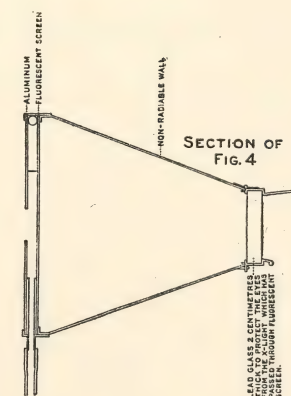
NOTE 145—FIGURE 3—A SEEHEAR WITH
THE FRONT REMOVED

NOTE 145—FIGURE 4—A SEEHEAR WITH A
LIMITED SOUND CHAMBER

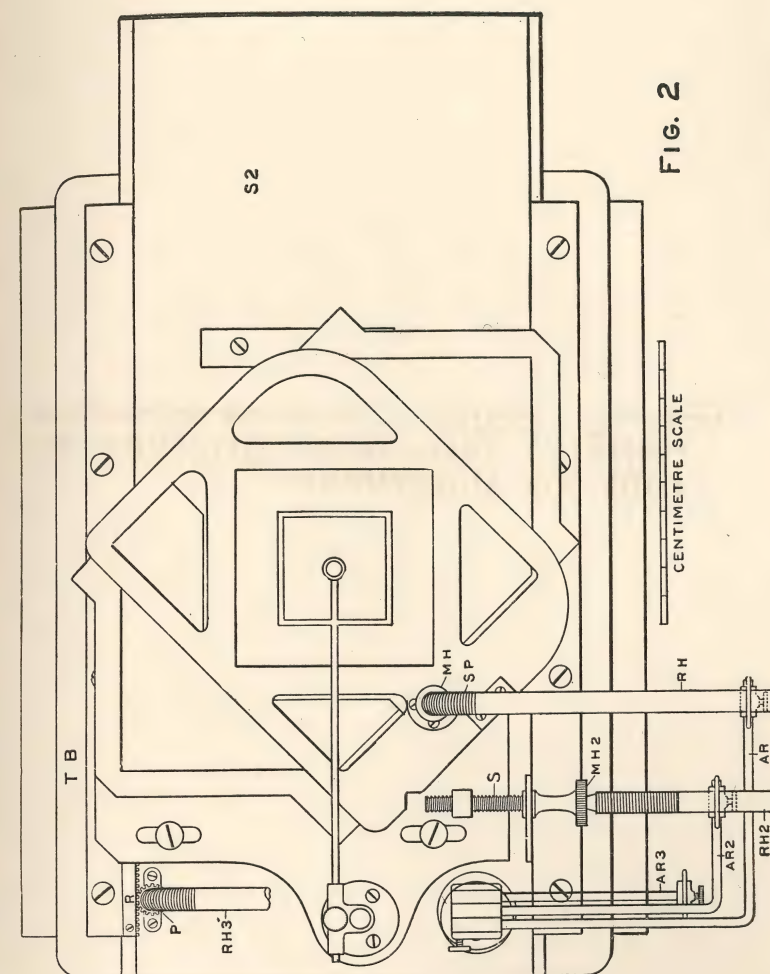


NOTE 145 — SECTION OF FIGURE 4 — PLATE 99

NOTE 145 — FIGURE 5 — A CRYPTOSCOPE
USED AS A FINDER



NOTE 149 — FIGURE 2 — PLAN OF ADJUSTABLE
CENTRING DIAPHRAGM; ORIENTER AND
RODS FOR ADJUSTMENT



NOTE 149—FIGURE 3 NOTE 149—FIGURE 4
 DETAILS OF THE LEAVES OF THE NON-
 RADIABLE DIAPHRAGM PLATE SHOWN ON
 PLATE 101

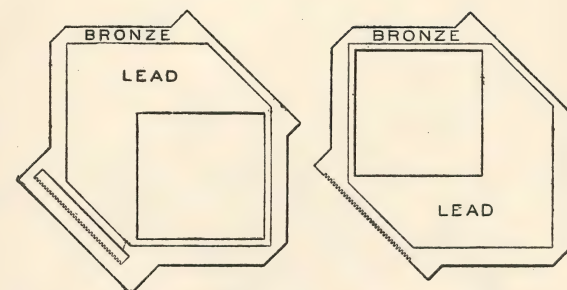


Figure 3

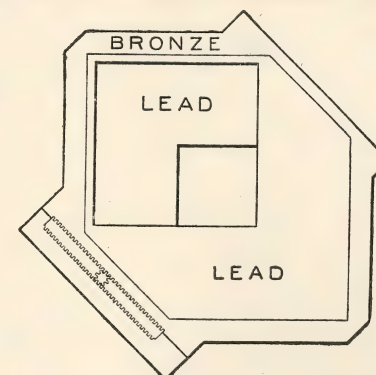
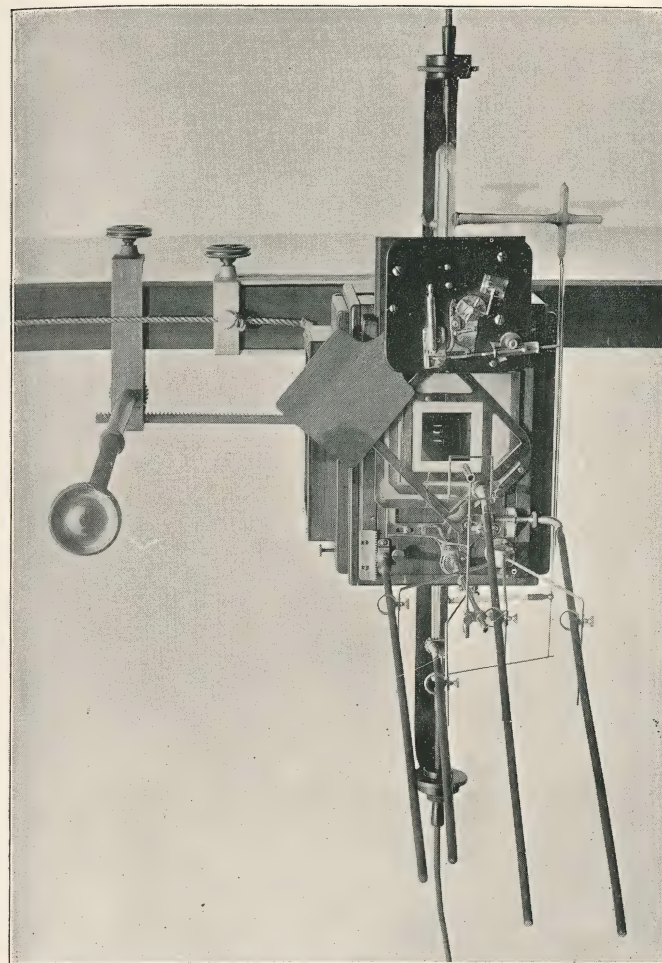


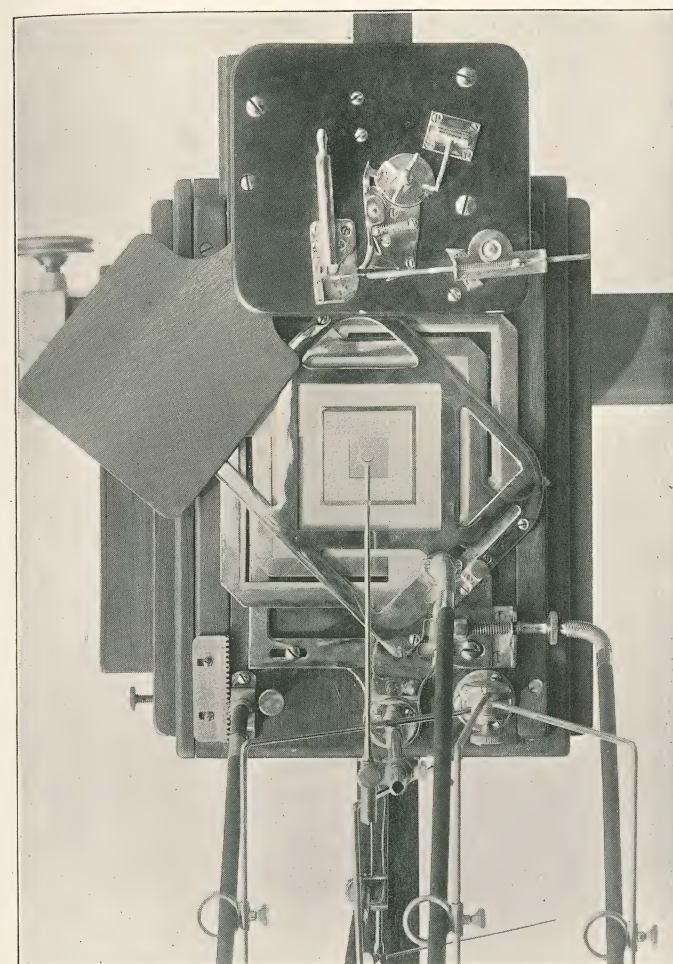
Figure 4

NOTE 149—FIGURE 5—A PERSPECTIVE VIEW
OF A NON-RADIABLE TUBE BOX



RH 3...
RH 4...
RH ...
RH 2...

NOTE 149—FIGURE 5A—A TUBE BOX WITH
AN ADJUSTABLE, CENTRING DIAPHRAGM;
SHUTTER; ORIENTER; VACUUM REGULA-
TOR AND ADJUSTING RODS



RH 3 . . .

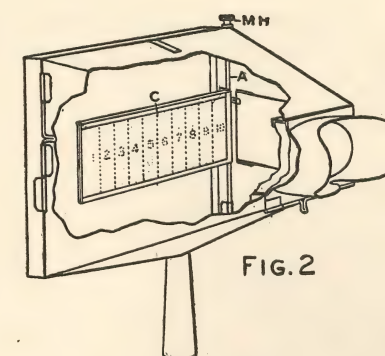
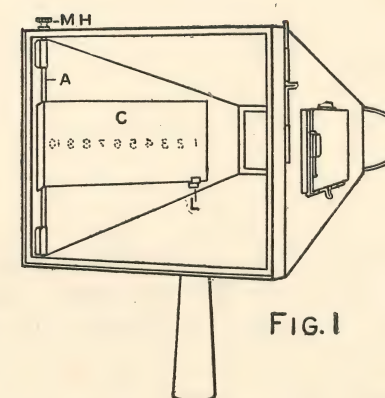
RH 4 . . .

RH . . .

RH 2 . . .

NOTE 153 — FIGURE 1 — A CRYPTOSCOPE WITH
A PENETRATION GAUGE TURNED BACK AND
ACTING AS A COVER TO THE MIRROR

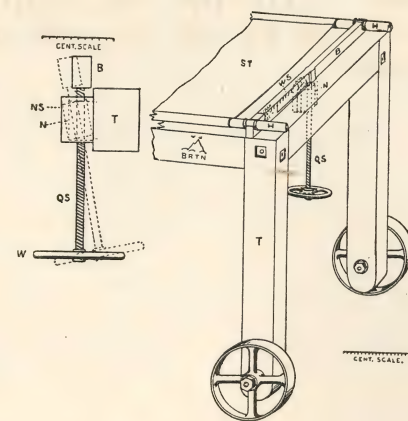
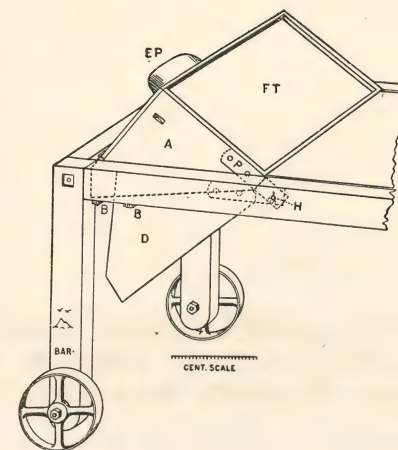
NOTE 153 — FIGURE 2 — A PENETRATION GAUGE
TURNED DOWN IN FRONT FOR USE



NOTE 155—FIGURE 1—REFLECTING CRYPTO-SCOPE AND CRYPTOSCOPIC CAMERA ATTACHED TO AN X-LIGHT EXAMINATION TABLE

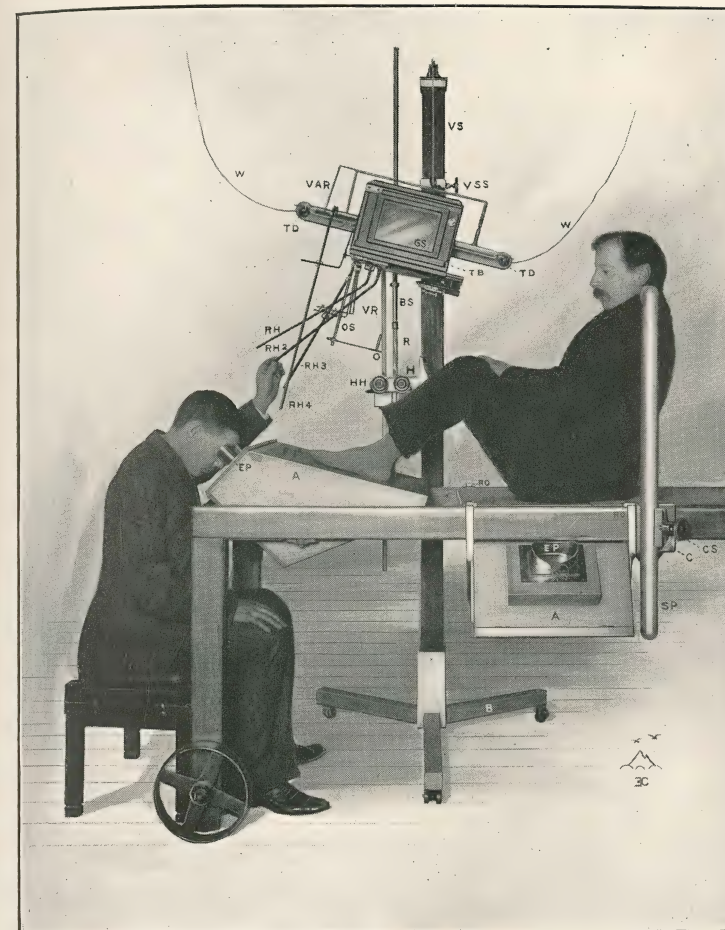
A, Reflecting cryptoscopic camera in position. D, Camera turned down out of the way. P, Metal bar fitting over the axis H, enabling the camera to be removed from the examination table. B, Button holding the camera in position, A.

NOTE 155—FIGURE 5—LIFTING MECHANISM FOR THE STRETCHER OF AN X-LIGHT EXAMINATION TABLE



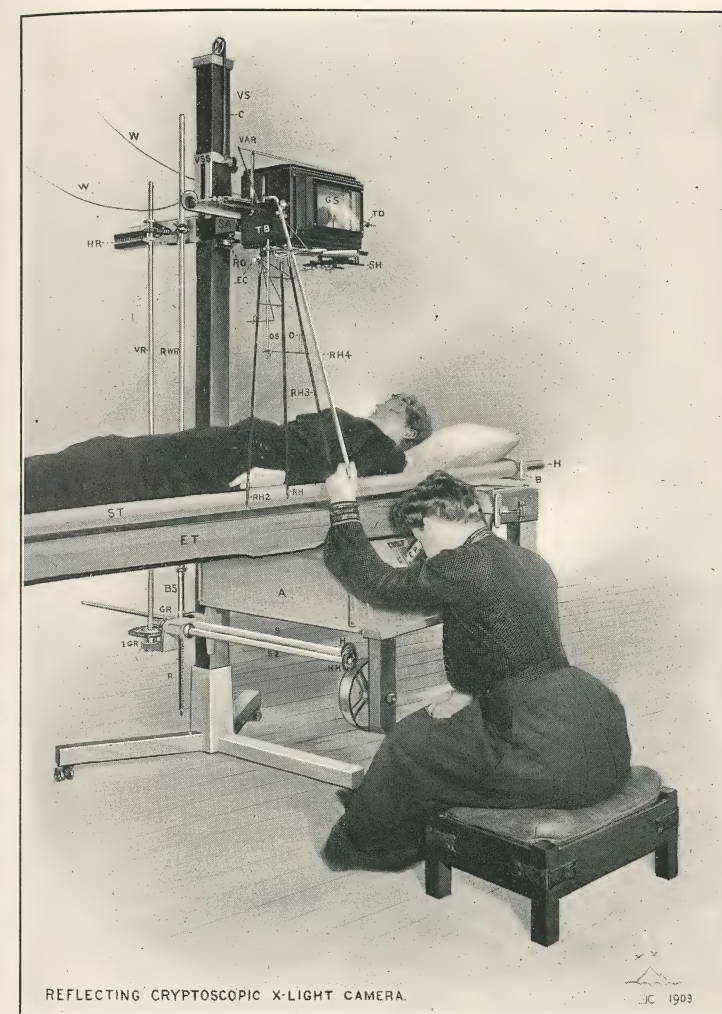
NOTE 155—FIGURE 3—REFLECTING CRYPTO-
SCOPIC CAMERA

Reflecting cryptoscopic camera in use for photographing the feet for signalment by X-light. The observer has within reach, while looking in the camera, six handles, two of which, H and HH, regulate the distance of the source of X-light and allow it to be moved in a horizontal plane. Taken in connection with rolling movements of the examination table, they enable the source of X-light to be quickly brought into proper relations with fluorescent screen. Handle RH 4 controls the quality of the X-light. Handles RH and RH 3 enable the opening of the diaphragm and the orienter to be centred with the source of X-light. Handle RH 2 regulates the size of the area of the patient illuminated. This illuminated area must be as small as possible to avoid injuring the definition of the image on the screen and on the photographic plate. For further explanation of the letters refer to descriptions under the illustrations 1 and 4, Plates 109 and 112, Note 156, and to the text of Notes 148, 149, 150, 151, 155.



NOTE 155 — FIGURE 4 — EXAMINATION OF A
PATIENT WITH A REFLECTING CRYPTO-
SCOPE AND CAMERA

The figure shows a reflecting cryptoscopic camera in use for photographing the spine, the patient being in a horizontal position on the stretcher, ST, of the examination table, ET. The observer looks into the eye-piece, EP, of the camera, A, and sees on the mirror an image of the spine made by the X-light on the fluorescent screen at the top of the camera directly under the patient. It will be observed that the stretcher is slightly raised at the head to bring the axis of the spine nearly parallel with the screen and consequently with the photographic plate. By means of the handles, HH, H, RH, RH 2, RH 3, the direction of the source of X-light and the size of the illuminated area of the patient can be controlled by the observer while making the examination. The quality of the X-light is controlled by the handle RH 4. For further explanation of the letters refer to the description under Plate 109, Figure 1, Note 156, and to the text of that note.



NOTE 155—FIGURE 2—A REFLECTING
CRYPTOSCOPIC CAMERA

NOTE 155—FIGURE 2 A—A REFLECTING CRYPTOSCOPIC CAMERA FOR PHOTOGRAPHING THE FEET

NOTE 155—FIGURE 6—LIFTING MECHANISM FOR THE STRETCHER OF THE X-LIGHT EXAMINATION TABLE

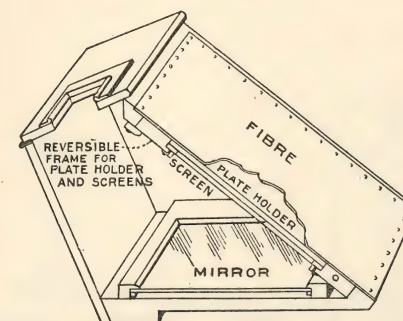


Figure 2

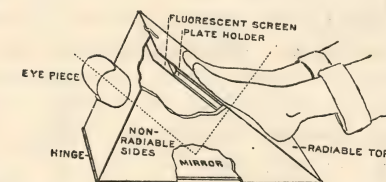


Figure 2 A

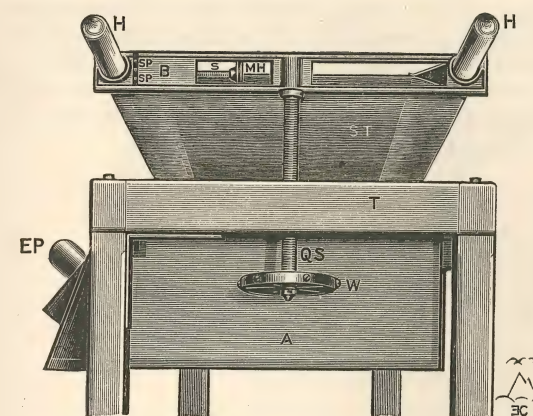
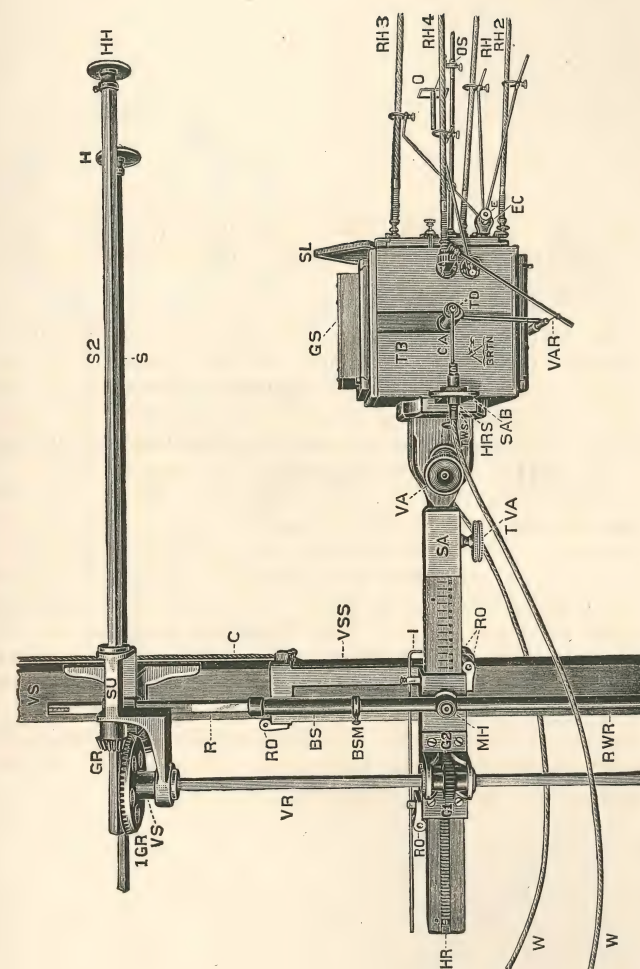


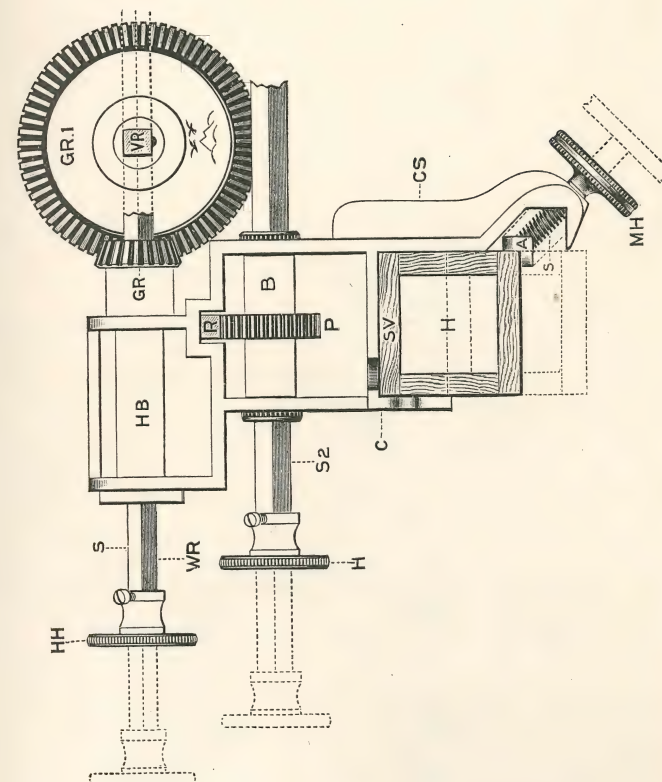
Figure 6

NOTE 156—FIGURE 1—DETAILS OF A NON-RADIABLE X-LIGHT TUBE-HOLDER AND ITS SUPPORT

W, Wires to generator. C, Cord to counterpoise. RH, Handle regulating the size of the opening in the diaphragm plate -refer to the figures in Note 149 for details. RH 2, Handle raising or lowering opening in diaphragm plate. RH 3, Handle moving the diaphragm plate horizontally. RH 4, Handle regulating the quality of the X-light by operating the vacuum regulator VAR. O, Orienter -for details refer to Notes 143 and 150-. OS, Support for orienter. SL, Slide closing the opening in shutter. GS, Slide with transparent non-radiable window through which the X-light tube can be seen. TVA, Screw-clamping movement in vertical arc. TD, Terminal plate of the wire W to generator. HRS, Hard rubber sleeve for terminal wire W. SAB, Sliding wooden arm supporting terminal wire and terminal disk -refer to Plate 115, Figures 1 and 2, Note 157, for details-. EC, Support for the arms of the regulating handles. E, Clamping screw made on the plan shown in Plate 113, Figures 5 and 6.

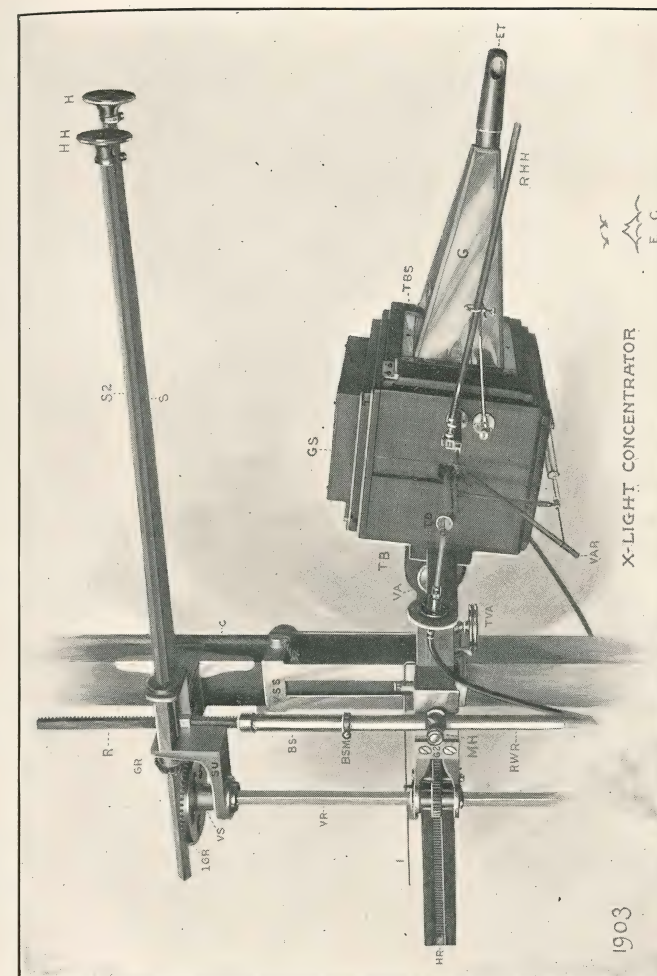


NOTE 156—FIGURE 2—DETAILS OF SUPPORT
-SU- SHOWN IN FIGURE 1, PLATE 109



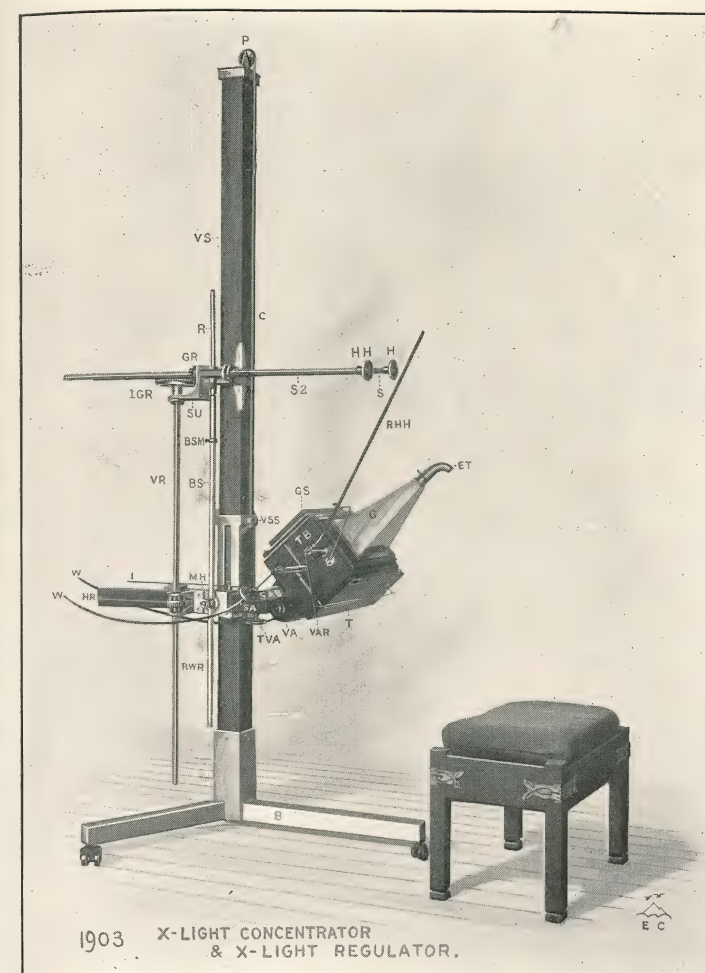
NOTE 156—FIGURE 3—X-LIGHT TUBE BOX
WITH CONCENTRATOR

To the non-radiable tube box TB is attached a pyramid of non-radiable material lined with zinc which reflects X-light. To the end a lead tube lined with zinc, with an aperture ET in the side, is attached, through which the concentrated X-light escapes to the part of the body to be treated. A number of ends of different sizes and shapes are required. The quality of the X-light is regulated by turning the handle RHH. The movements described in the text allow the end ET to be brought into proper relations with the patient. For further explanation of the lettering refer to the explanation under Plate 109, Figure 1, and to the text.



NOTE 156—FIGURE 4—A NON-RADIABLE
X-LIGHT TUBE BOX WITH AN X-LIGHT CON-
CENTRATOR ARRANGED FOR TREATING
DISEASES OF THE MOUTH

The figure shows an X-light concentrator in position for treating a disease of the mouth. The end ET of non-radiable material is placed in the mouth against the diseased area. By means of the handles H and HH and the movements in vertical arc described in the text, the opening in the end ET can be brought into correct relations with the patient, who sits on the stool. For a further description of the lettering refer to the text and to the description under Plate 109, Figure 1.



NOTE 156—FIGURES 5 AND 6—DETAILS OF
THE PIVOT MECHANISM OF AN X-LIGHT
TUBE-HOLDER

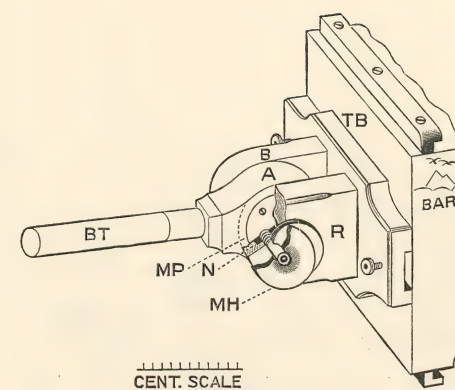


Figure 5

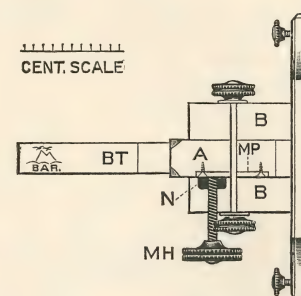
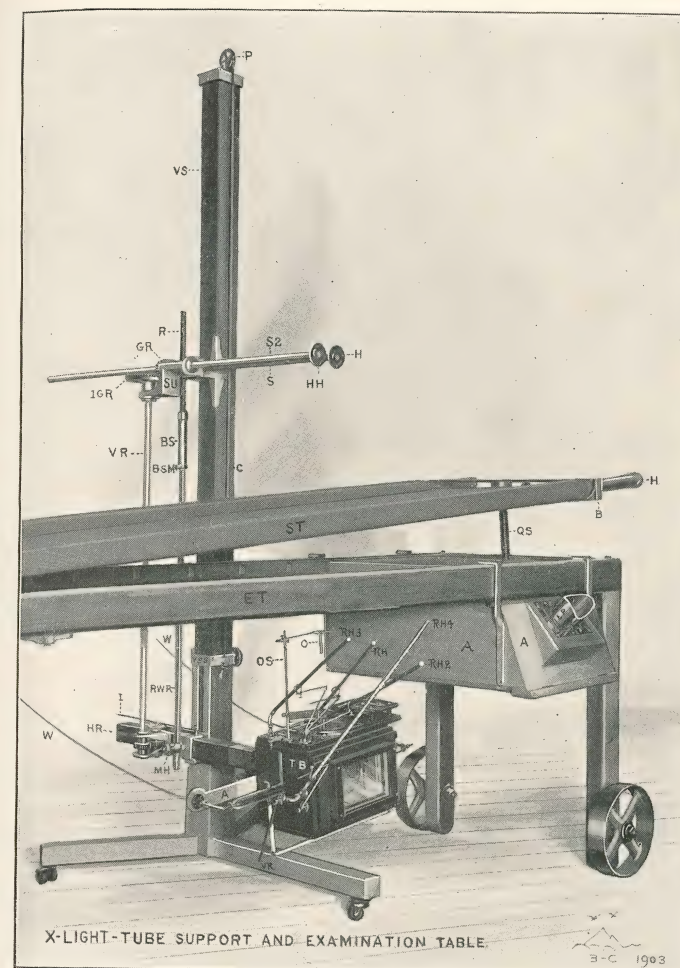


Figure 6

NOTE 156—FIGURE 7—AN X-LIGHT EXAMINATION TABLE, SHOWING THE LIFTING MECHANISM OF THE STRETCHER: A NON-RADIABLE TUBE BOX AND SUPPORT: A NON-RADIABLE CRYPTOSCOPIC CAMERA WHICH SLIDES ON THE RAILS OF THE EXAMINATION TABLE

To show the necessity of having the tube box turn in a vertical plane about an axis parallel with the transverse axis of the X-light tube. With the stretcher ST tipped as it must be in some cases—as shown in Note 139, for example—the central ray of X-light escaping from the tube box and used to take the photograph could not strike the plate normal to its surface without this movement. The tube box appears to be tipped more than the stretcher, but this is an effect of perspective due to the short focus of the lens which was used in making the photograph. For further explanation of the letters refer to the text and to Plate 109, Figure 1.



NOTE 157—FIGURES 1 AND 2—DETAILS OF
A METHOD OF CONNECTING AN X-LIGHT
TUBE WITH THE WIRES FROM THE ELEC-
TRICAL GENERATOR

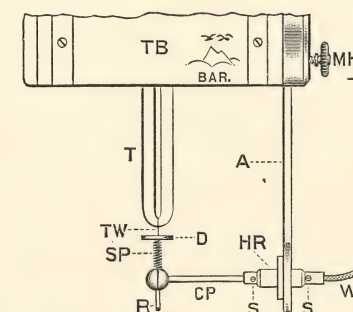


Figure 1

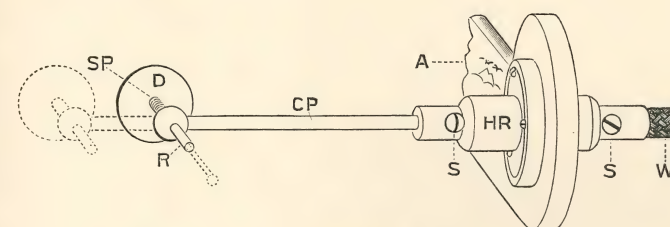
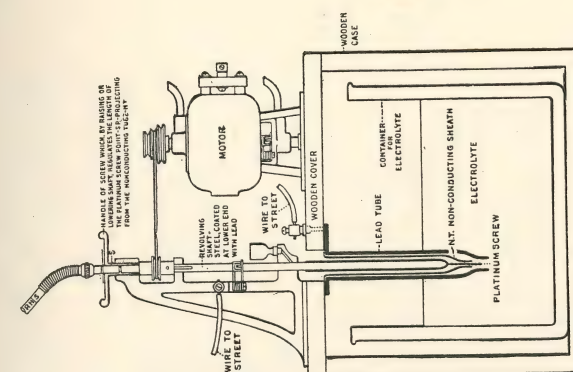


Figure 2

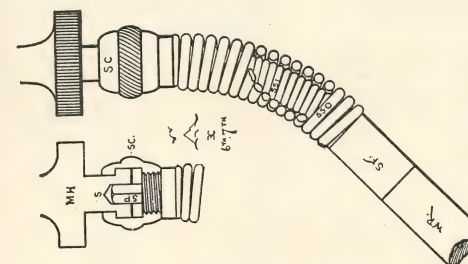
NOTE 149 — FIGURE 1

NOTE 156 — FIGURE 8 — SPIRAL SPRING CONNECTIONS OF THE ADJUSTING RODS OF THE NON-RADIABLE TUBE BOX SHOWN IN PLATE 109

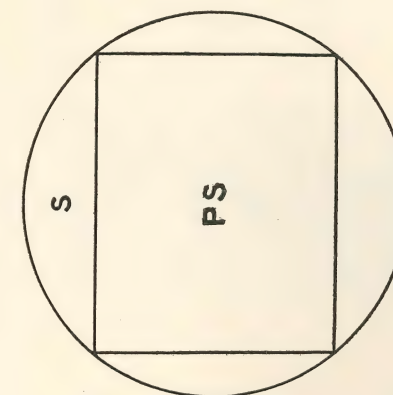
NOTE 161 — FIGURE 1 — A FORM OF ELECTROLYTIC BREAK



Note 161 — Figure 1

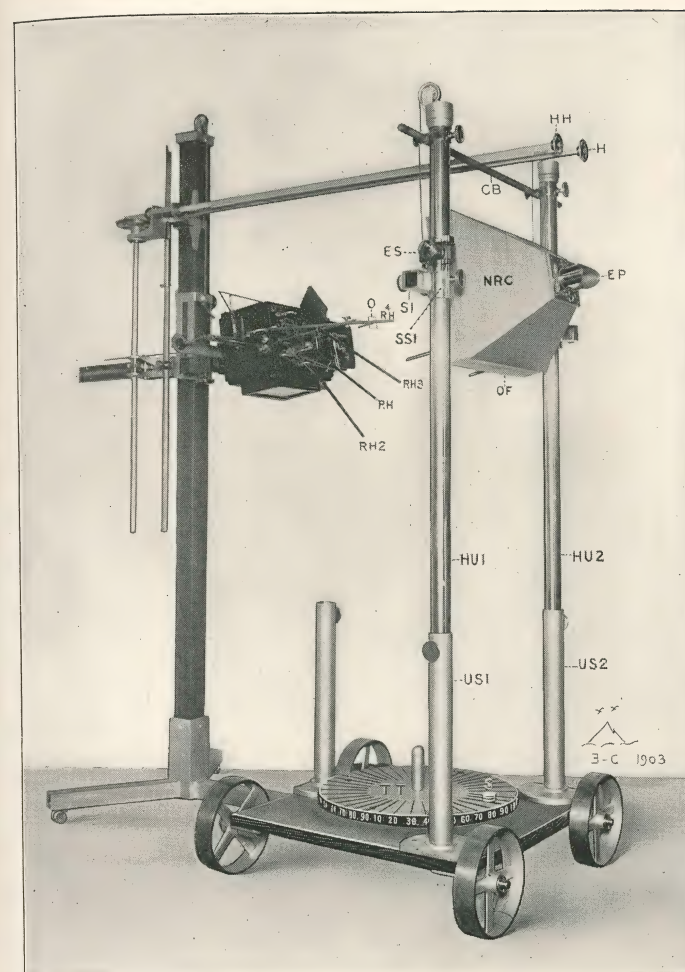


Note 156 — Figure 8



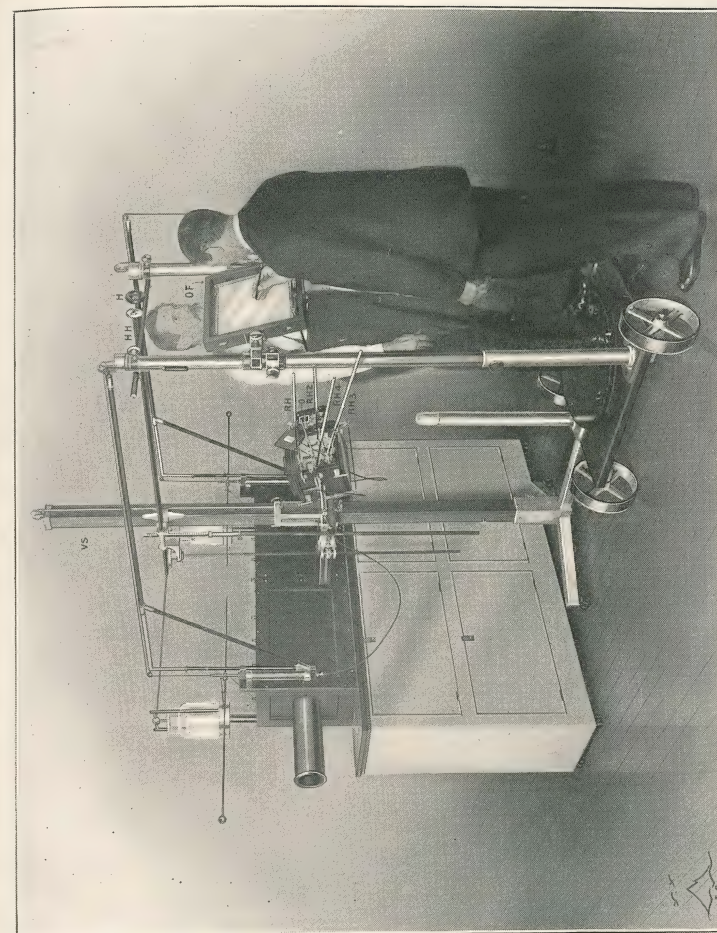
Note 149 — Figure 1

NOTE 162 — FIGURE 1 — AN X-LIGHT EXAMINATION WAGON, TUBE BOX, AND SUPPORT FOR EXAMINING A PATIENT IN A STANDING POSITION



NOTE 162—FIGURE 1 A—EXAMINING THE CHEST WITH THE PATIENT ON THE X-LIGHT WAGON, SHOWING THE METHOD OF USING THE TRACING FRAME

The various handles are numbered to correspond with those in other figures, which should be consulted.



NOTE 162—FIGURE 3—DETAILS OF A TRACING FRAME FOR THE X-LIGHT WAGON SHOWN ON PLATE 117

NOTE 162—FIGURE 4—DETAILS OF THE CRYPTOSCOPE OF THE X-LIGHT WAGON SHOWN ON PLATE 117

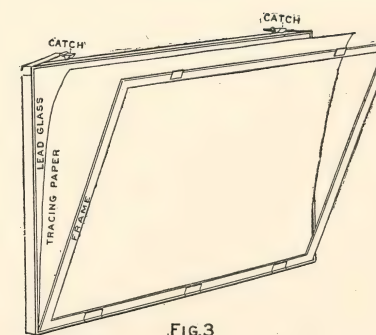


FIG. 3

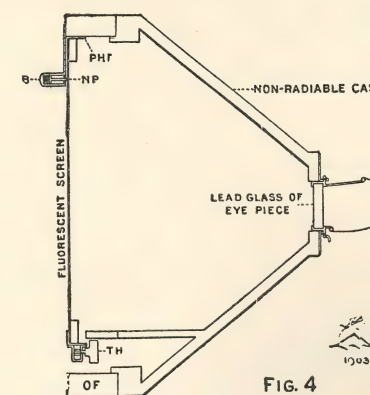


FIG. 4

NOTE 162—FIGURE 2—DETAILS OF THE
TRACING FRAME

NOTE 162—FIGURE 5—A TRACING FRAME
ATTACHED TO THE EXAMINATION TABLE
SHOWN ON PLATES 106, 107, 114

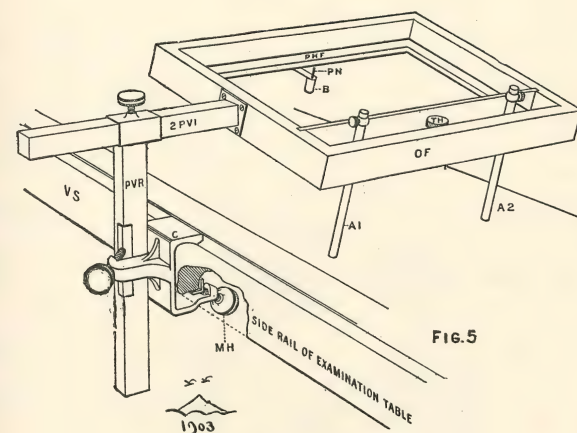


FIG. 5

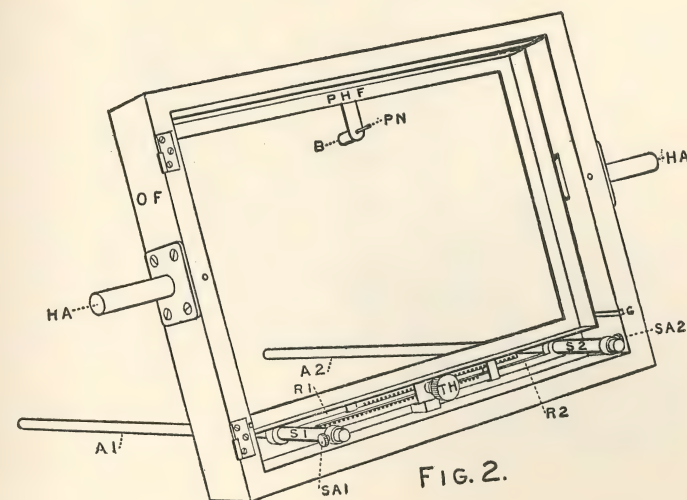
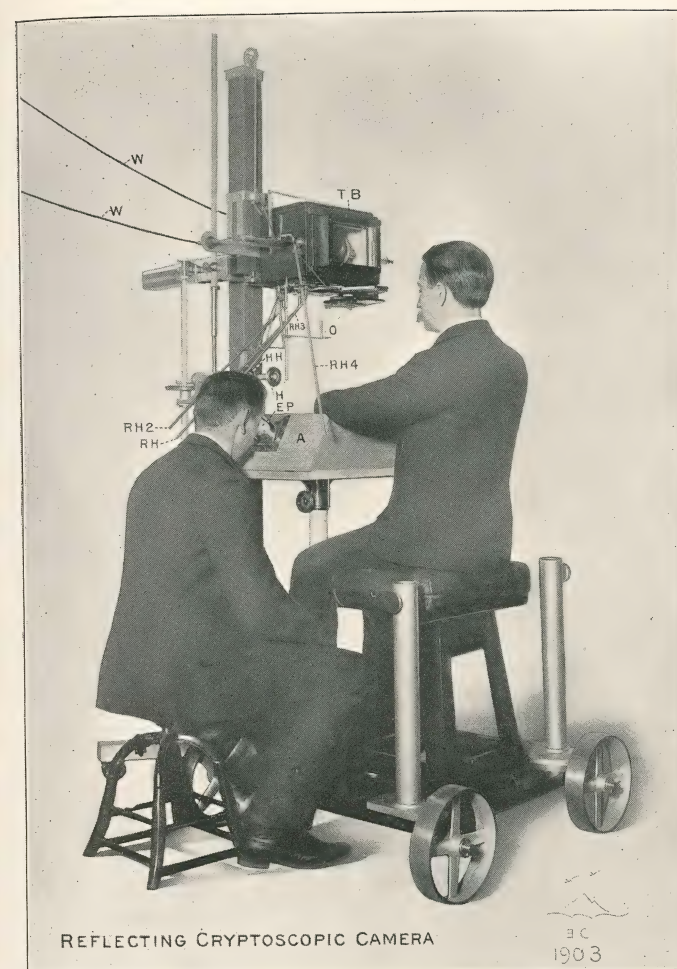


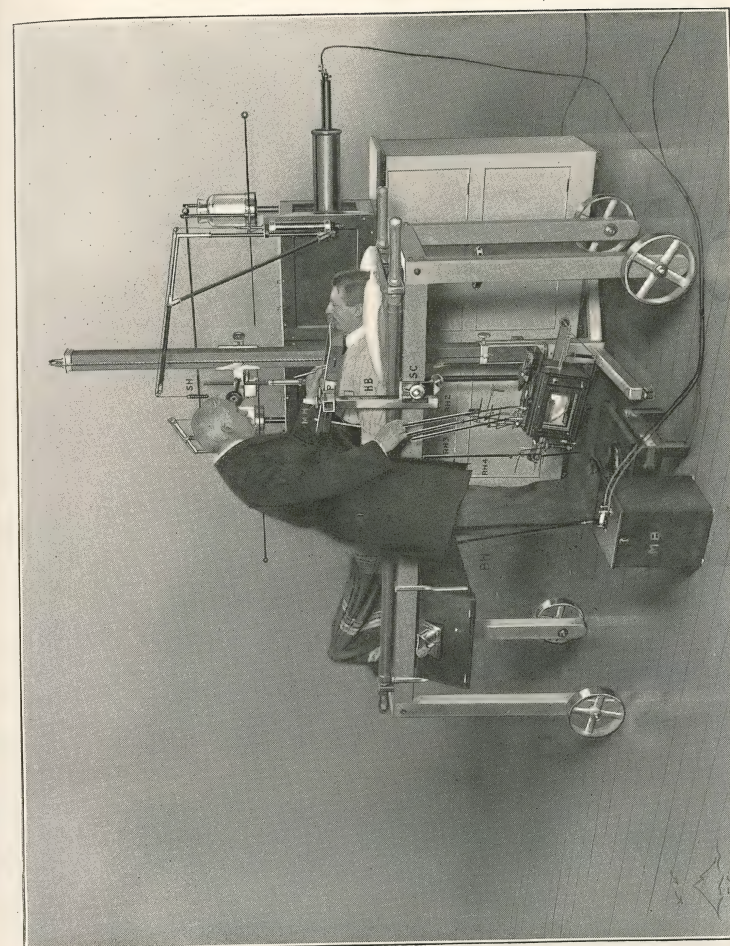
FIG. 2.

NOTE 162 — FIGURE 6 — PHOTOGRAPHING THE
HANDS FOR SIGNALMENT

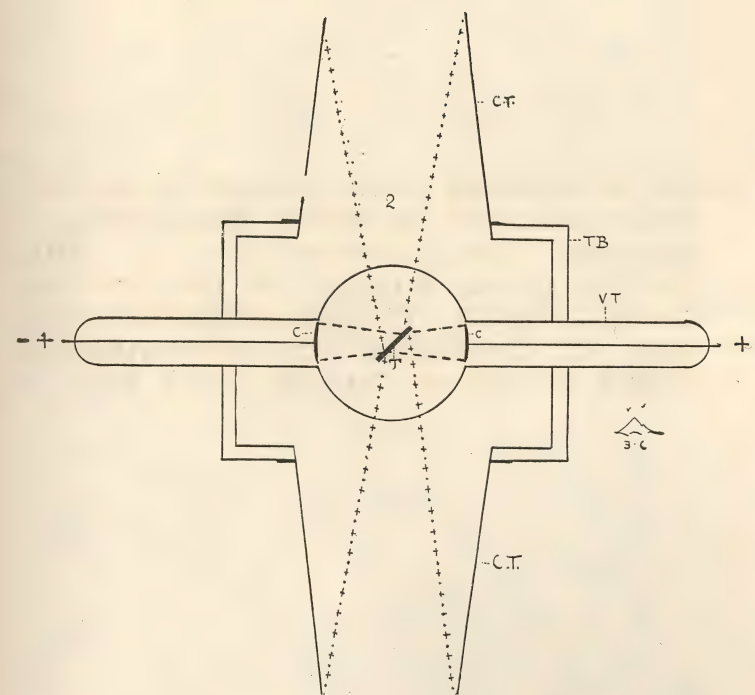


NOTE 162—FIGURE 8—A METHOD OF USING
A TRACING FRAME IN EXAMINING THE
CHEST WHEN THE PATIENT IS IN A HORI-
ZONTAL POSITION

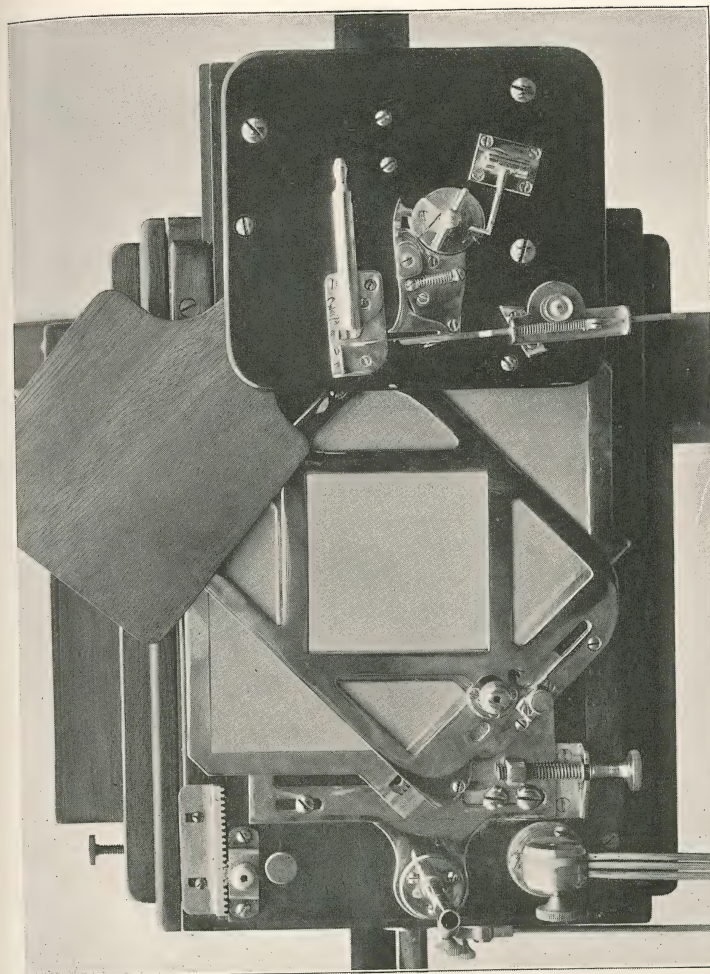
The tracing frame is attached to the side rail of the examination table by the sliding clamp SC. It can be adjusted in height by the bar HB. It turns on a pivot P to allow it to fit the patient's chest, and can be clamped in any position by the milled head MH. In one of the axioms mentioned it was stated that the central ray of the beam of X-light used should strike the tracing paper normal with its surface. Apparently this rule has been departed from in the illustration, but this is due to the perspective, the tube box having been placed at the same angle as the tracing paper. In the illustration the physician has one hand on a handle which regulates the size of the opening in the diaphragm plate. Near this are other handles, whose use has been fully described in other illustrations. Standing up from the break MB is a handle BH, which allows the amount of current to be varied by the physician without interrupting the examination.



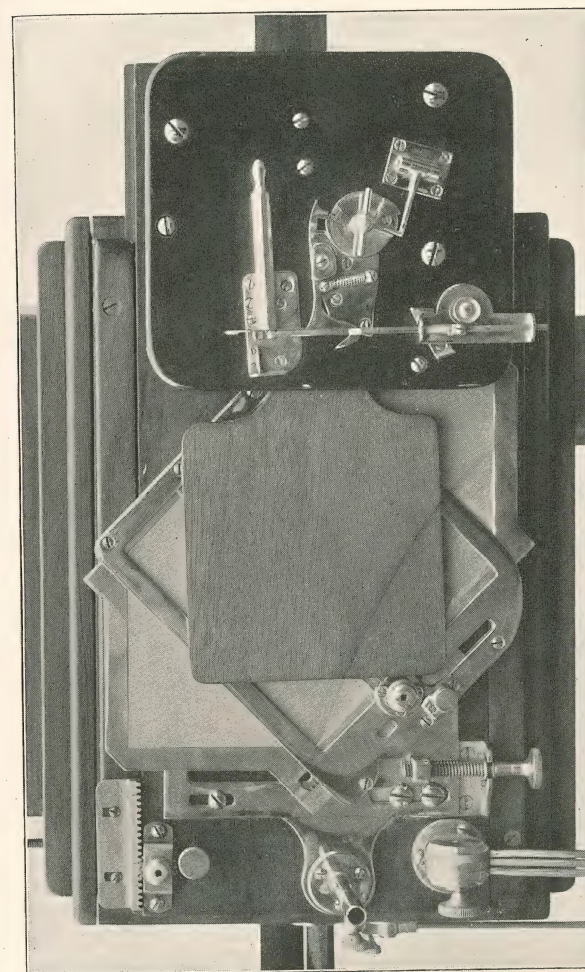
NOTE 168 — FIGURE 1 — AN X-LIGHT TUBE FOR
TREATING TWO PATIENTS. THE CATHODE
STREAMS ARE REPRESENTED BY THE
DOTTED LINES; X-LIGHT BY THE DOTTED
CROSSED LINES. TB, NON-RADIABLE TUBE
BOX. CC, CATHODES. CT, NON-RADIABLE
CONES ATTACHED TO THE TUBE BOX



NOTE 169—FIGURE 1—A SHUTTER FOR AN
X-LIGHT TUBE BOX, OPEN

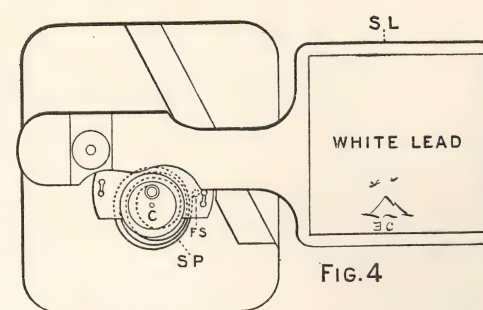
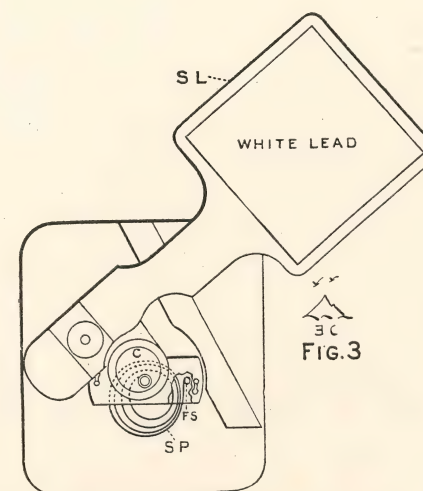


NOTE 169—FIGURE 2—A SHUTTER FOR AN
X-LIGHT TUBE BOX, CLOSED



NOTE 169—FIGURE 3—BACK OF A SHUTTER
FOR AN X-LIGHT TUBE BOX

NOTE 169—FIGURE 4—A SPIRAL SPRING FOR
MOVING AN X-LIGHT TUBE-BOX SHUTTER



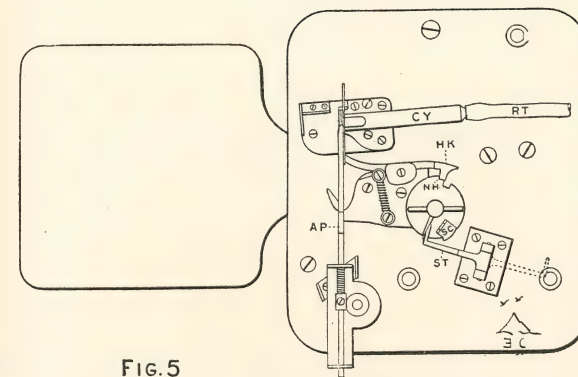


FIG. 5

NOTE 169—FIGURE 5—DETAILS OF THE
SPRING MECHANISM FOR AN X-LIGHT
TUBE SHUTTER

NOTE 169—FIGURE 6—POSITION OF THE
MECHANISM WHEN OPENING THE X-LIGHT
TUBE SHUTTER

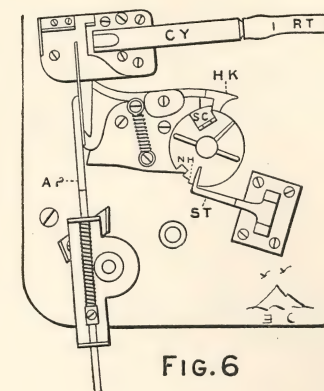
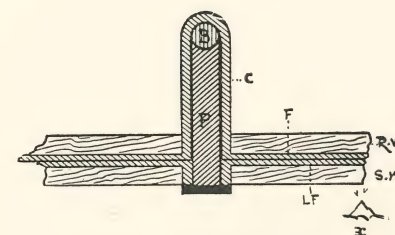


FIG. 6



Note 162 — Figure 7

NOTE 162 — FIGURE 7 — PIVOT PLATE OF THE
X-LIGHT WAGON SHOWN ON PLATES 117
AND 121

NOTE 169 — FIGURE 7 — POSITION OF THE
MECHANISM WHEN CLOSING X-LIGHT TUBE
SHUTTER

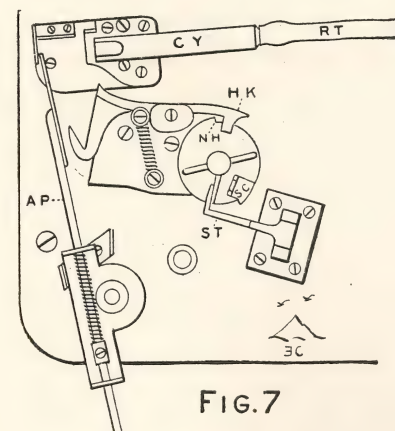


FIG. 7
Note 169 — Figure 7

NOTE 170—FIGURE 1—AN ORDINARY FORM OF A MERCURY PUMP

NOTE 170—FIGURE 2—A METHOD FOR KEEP-
ING THE MERCURY OF AN AIR PUMP DRY

NOTE 170—FIGURE 3—A METHOD FOR KEEP-
ING THE MERCURY OF AN AIR PUMP DRY

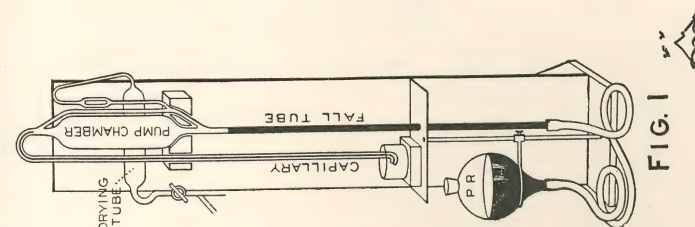


FIG. 1

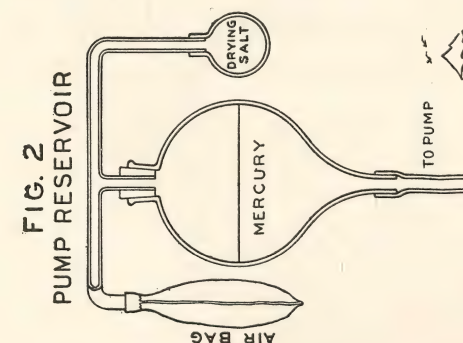


FIG. 2
PUMP RESERVOIR

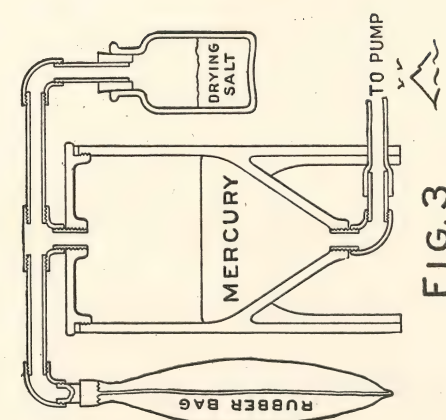
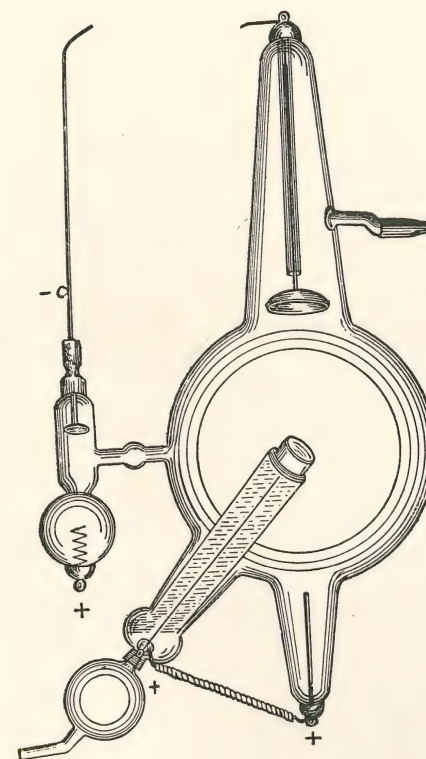
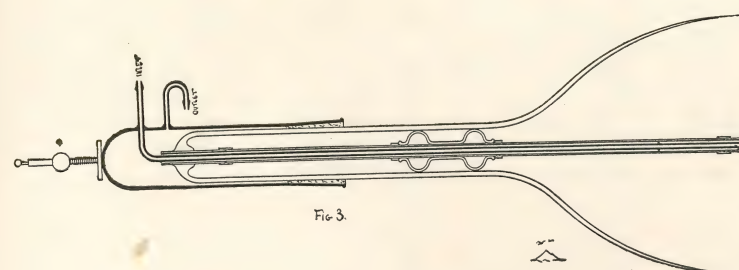
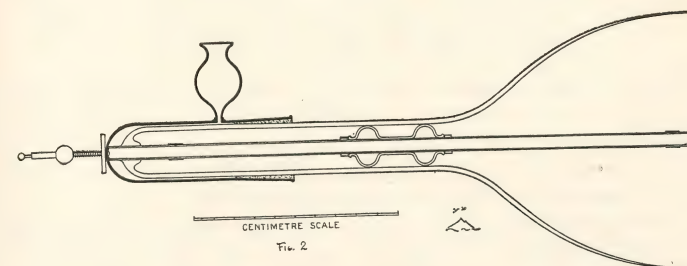


FIG. 3

NOTE 171—FIGURE 1—A DEFECTIVE TYPE
OF A COOLED X-LIGHT TUBE

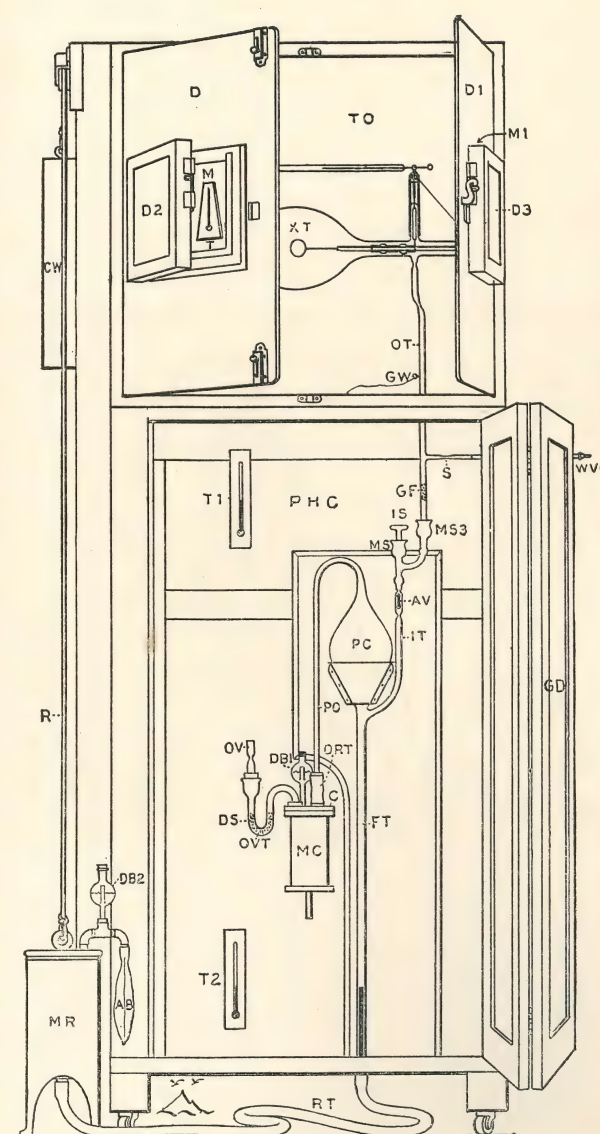


NOTE 171—FIGURES 2 AND 3—DETAILS OF
A METHOD OF COOLING THE TARGET OF
AN X-LIGHT TUBE



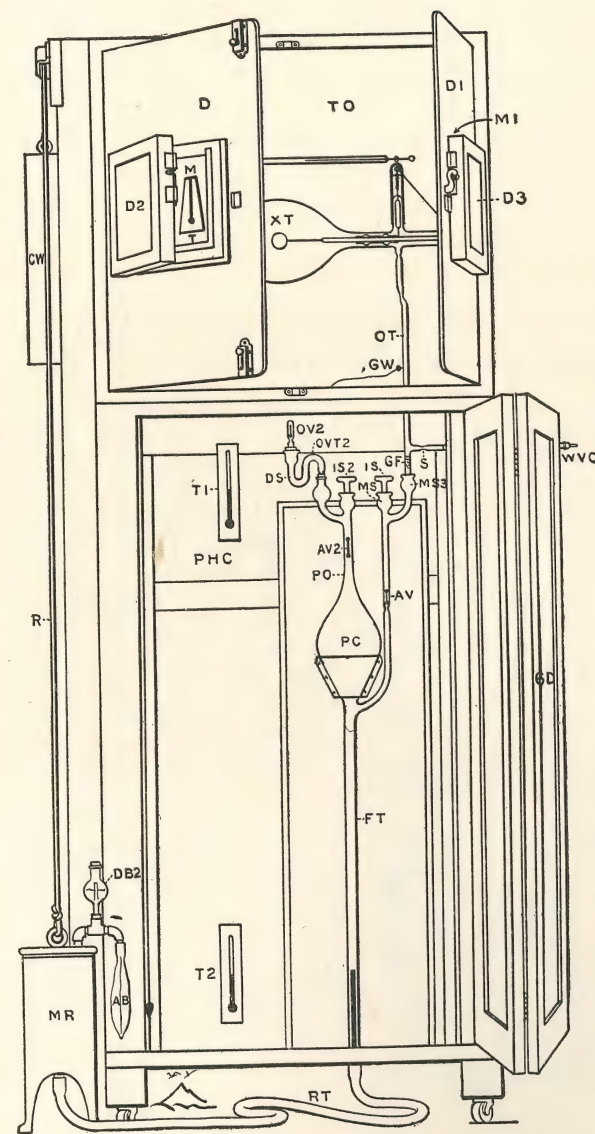
NOTE 173—FIGURE 2—APPARATUS FOR
PRODUCING HIGH VACUA

Front view of tube oven and pumping arrangements. TO, tube oven with non-radiable walls. D and DI, non-radiable doors. M and MI, mica windows. D₂ and D₃, non-radiable lead glass doors. XT, X-light tube. OT, tube connecting X-light tube with the pump. GW, grounding wire on outlet tube. S, tube connecting X-light tube with mechanical exhaust pump. GF, gold foil to prevent mercury from entering the X-light tube. MS₃, mercury seal where tube OT joins pump. AV, automatic valve. IS, stopcock with mercury seal MS on inlet of pump. PC, Pump chamber. FT, fall tube connecting pump chamber with mercury reservoir MR, through rubber tube RT. AB, air bag on mercury reservoir. DB₂, drying bulb. R, rope connecting mercury reservoir with counterweight CW. PO, pump outlet. ORT, soft rubber tube connecting pump outlet tube with mercury cistern MC. C, cover of mercury cistern. DB, drying bulb. OVT, outlet tube of mercury cistern. DS, drying salt. OV, outlet valve. T, T₁, T₂, thermometers, which can be read from the outside. PHC, pump warm closet.



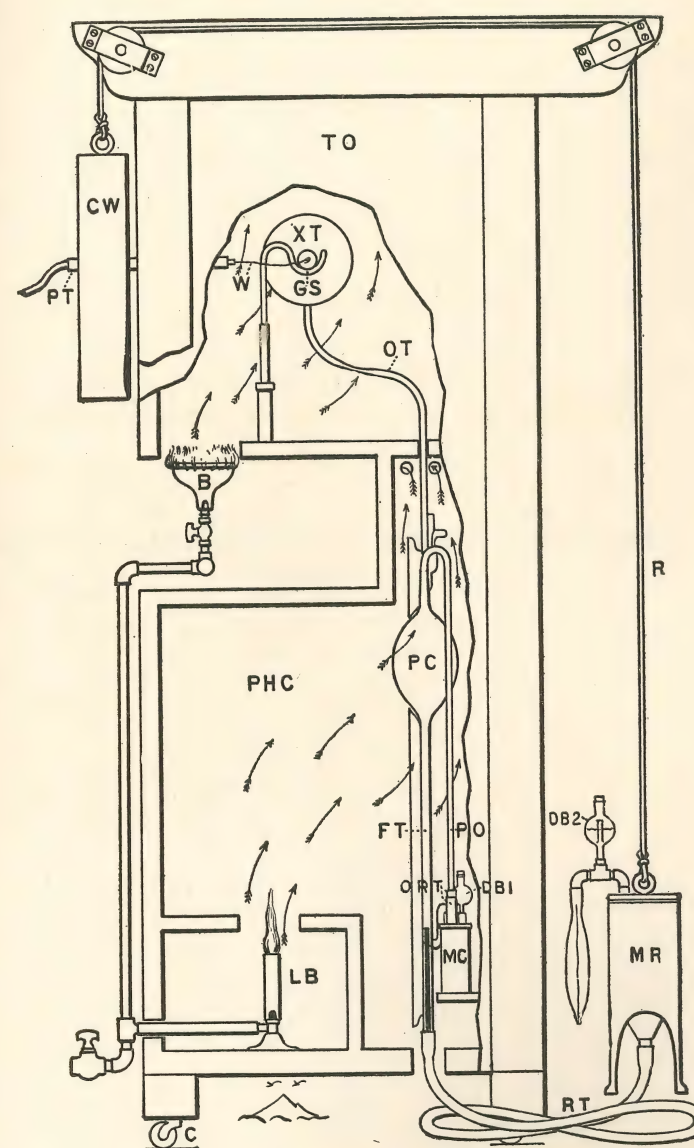
NOTE 173 — FIGURE 2 A — APPARATUS FOR EX-HAUSTING AND TUNING X-LIGHT TUBES

Front view of tube oven and pumping arrangements for routine exhaustion of X-light tubes. TO, tube oven with non-radiable walls. D and DI, non-radiable doors. M and MI, mica windows. D₂ and D₃, non-radiable lead glass doors. XT, X-light tube. OT, tube connecting X-light tube with the mercury pump. GW, grounding wire on the outlet tube. S, tube connecting the X-light tube with the mechanical exhaust pump. GF, gold foil to prevent mercury from entering the X-light tube. MS₃, mercury seal where the tube OT joins the pump. AV, automatic valve. IS, stopcock with mercury seal MS on inlet of the pump. PC, pump chamber. FT, fall tube connecting the pump chamber with the mercury reservoir MR through the rubber tube RT. AB, air bag on mercury reservoir. DB₂, drying bulb. R, rope connecting mercury reservoir with counterweight CW. PO, pump outlet. AV₂, automatic valve. IS₂, stopcock with mercury seal. OVT₂, drying tube. DS, drying salt. OV₂, outlet valve. T, T₁, T₂, thermometers.

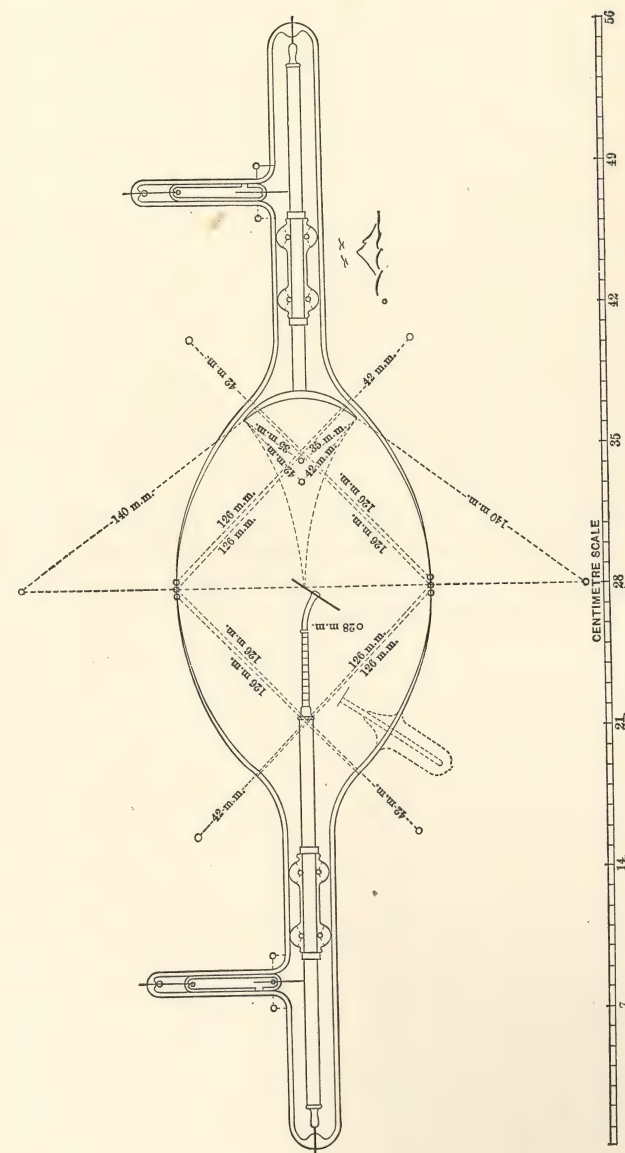


NOTE 173—FIGURE 3—APPARATUS FOR EX-HAUSTING AND TUNING X-LIGHT TUBES

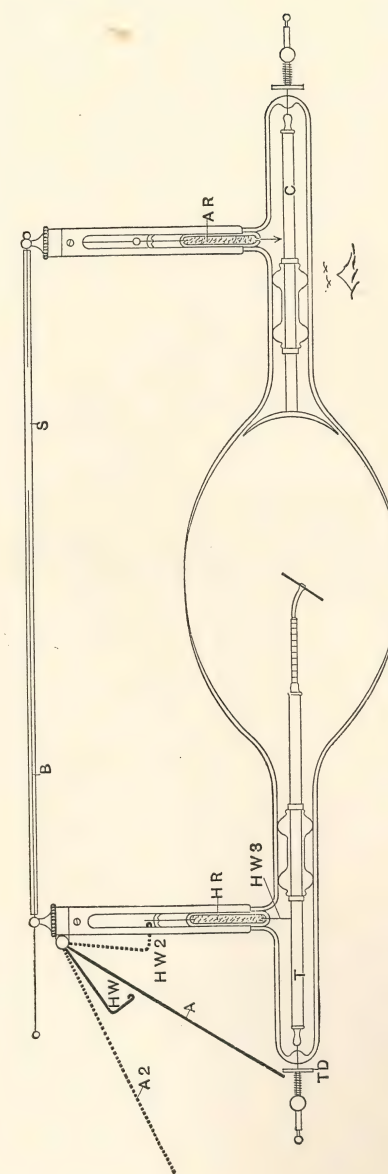
Side view of tube oven, TO, and pump warm closet, PHC, with sides partly removed to show the interiors. B and LB, burners for heating. PC, pump chamber. PO, pump outlet. MC, mercury cistern on pump outlet to which it is connected air tight by the soft rubber cylinder, ORT. DBI, drying bulb. MR, mercury reservoir. DB 2, drying bulb. RT, rubber tube connecting the mercury reservoir MR with the fall tube FT. R, rope connecting mercury reservoir with counterweight CW. OT, tube connecting X-light tube XT with the pump. GS, glass fork supporting one end of the X-light tube. W, one of two wires connecting the X-light tube with the electric generator. PT, one of two porcelain tubes insulating wires from the metal walls of the tube oven. C, one of four castors. The arrows indicate heated air.



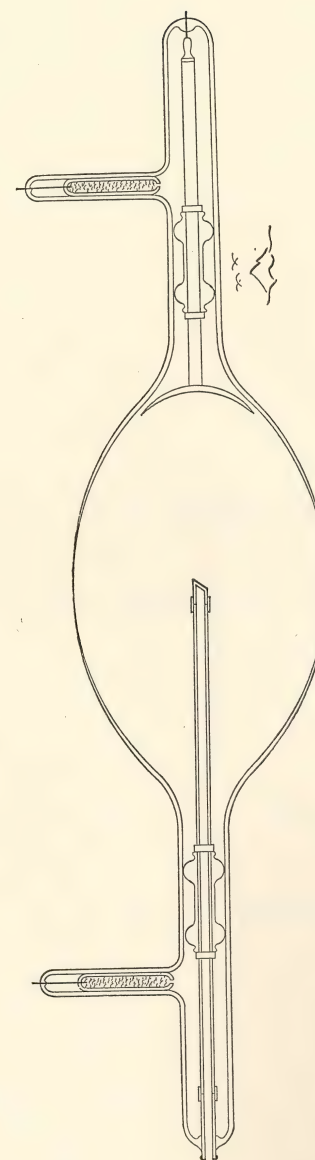
NOTE 175 — FIGURE 1 — DESIGNING AN X-LIGHT TUBE



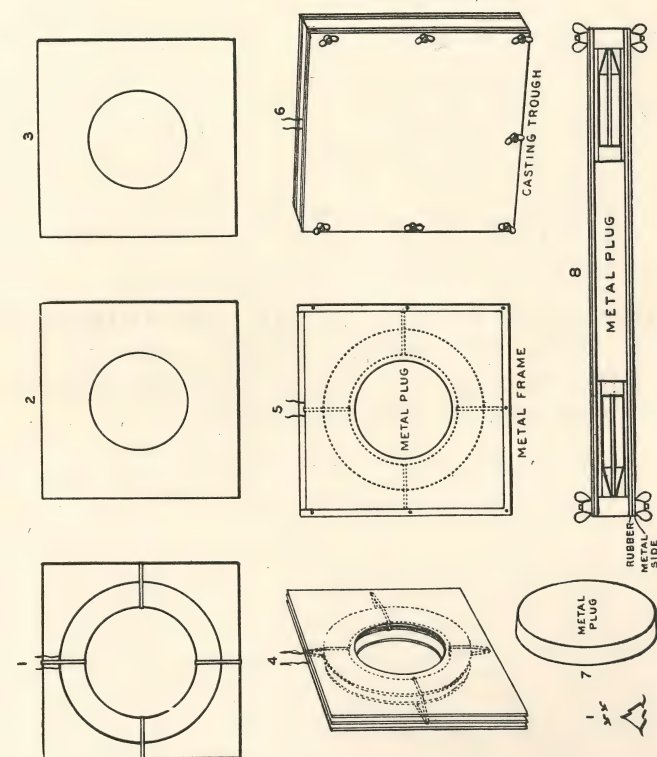
NOTE 175 — FIGURE 2 — DETAILS OF THE METHOD OF OPERATING THE RESISTANCE REGULATOR AND THE REGENERATOR OF AN X-LIGHT TUBE



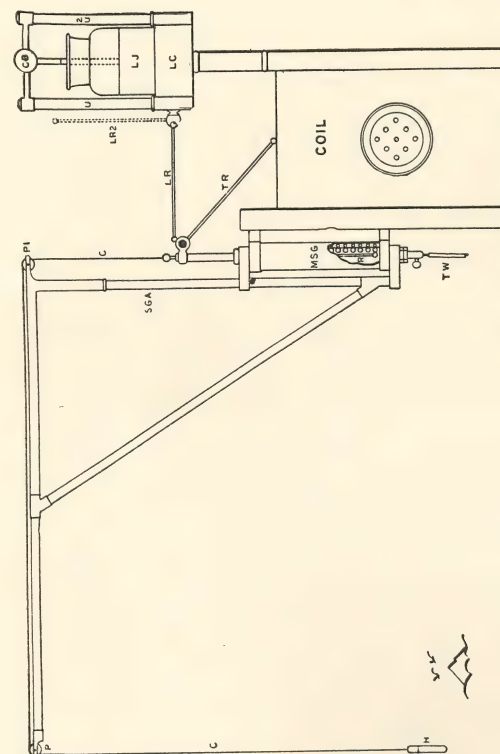
NOTE 175—FIGURE 3—A DESIGN FOR A
COOLED TARGET X-LIGHT TUBE



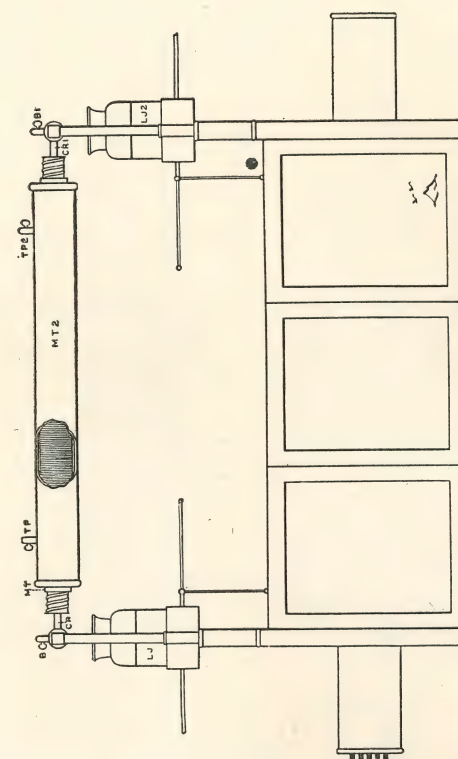
NOTE 179 A — DETAILS OF A METHOD OF CASTING THE INSULATION ABOUT A SECTION OF THE SECONDARY OF THE INDEPENDENT INTERCHANGEABLE SECONDARY INDUCTION COIL



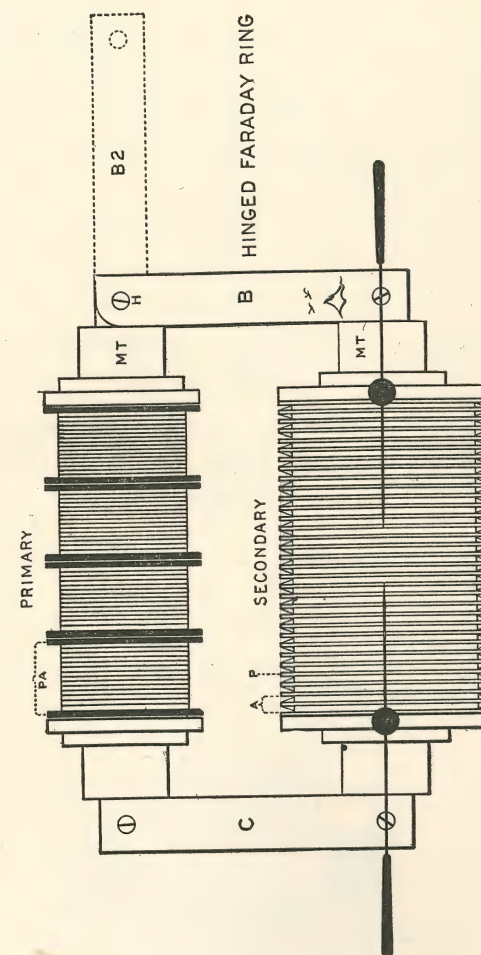
NOTE 179 B—FIGURE 1—AN ARRANGEMENT
OF THE MULTIPLE SERIES SPARK-GAPS
AND LEYDENS OF AN INTERCHANGEABLE
SECONDARY INDUCTION COIL



NOTE 179 B—FIGURE 2—AN ARRANGEMENT
OF A TESLA COIL ON AN OPEN CIRCUIT
HIGH VOLTAGE TRANSFORMER



NOTE 179 D—FIGURE 1—HINGED FARADAY RING FOR ETHER AND ELECTRON THERAPEUTICS AND FOR EXAMINING MINERALS



NOTE 179 D—FIGURE 2—DERMA-RAY TUBE
IN A PORTABLE NON-RADIABLE HOLDER

NOTE 179 D—FIGURE 3—A FARADAY RING
WITH A HINGE, THE SECONDARY WITH
INTERCHANGEABLE SECTIONS

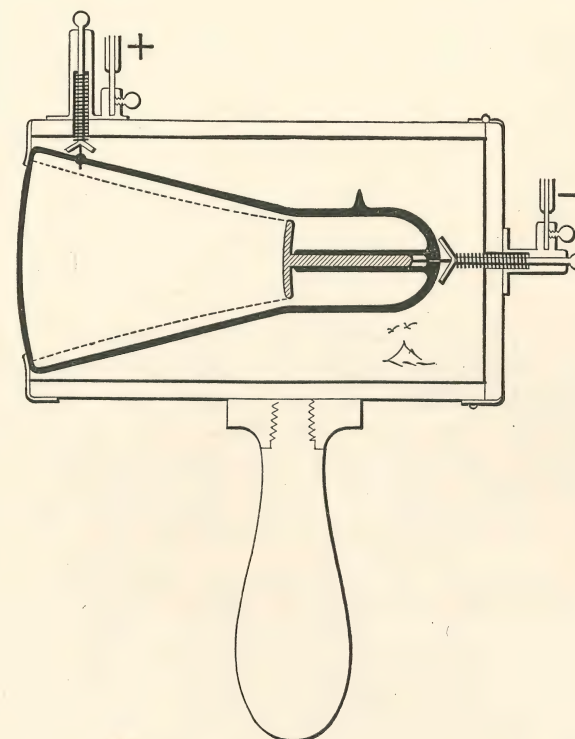


Figure 2

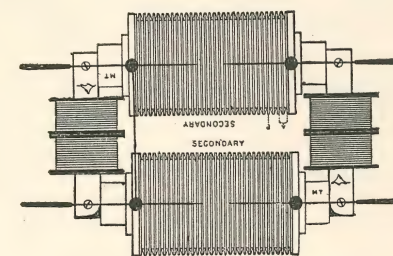
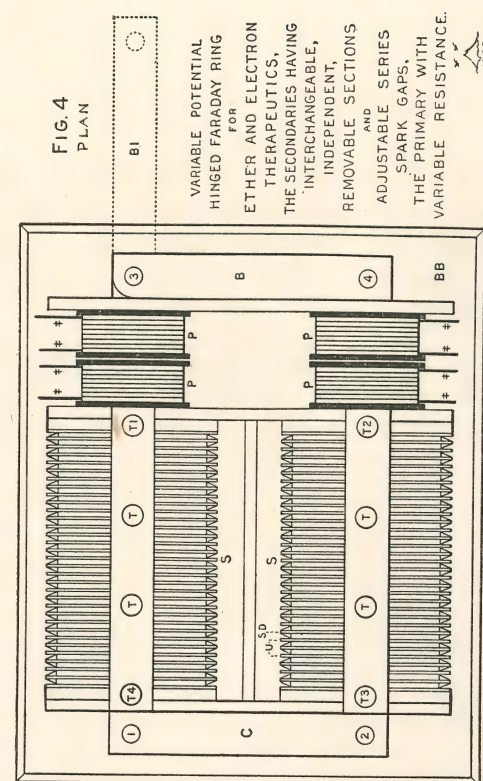


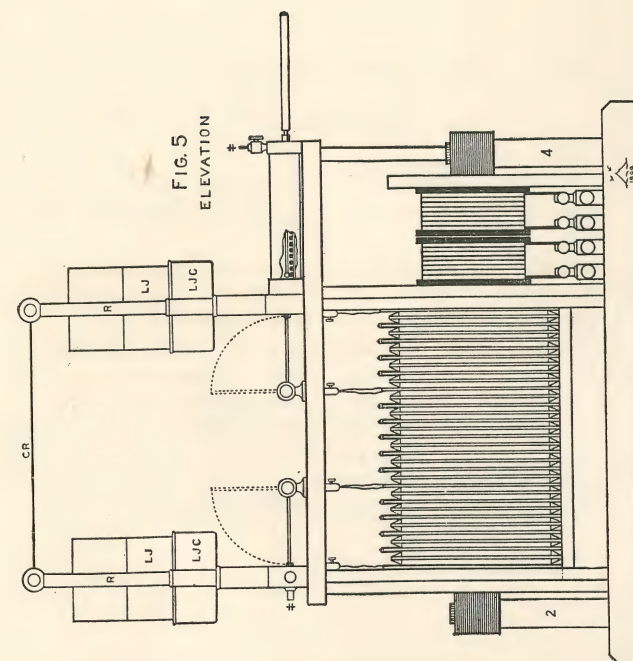
Figure 3

NOTE 179 D—FIGURE 4—VARIABLE POTENTIAL HINGED FARADAY RING WITH TWO SECONDARIES, WHICH MAY BE USED IN SERIES OR INDEPENDENTLY AND PROVIDED WITH THE ARRANGEMENTS FOR VARYING THE POTENTIAL ILLUSTRATED AND DESCRIBED IN NOTE 112

Each section of the secondary is independent of the others and of the tube separating it from the core; therefore when a section is injured the end bar of the coil may be unlocked, turned back on its hinge, the injured section easily removed and replaced by a new section. The primary is arranged to allow the sections to be used singly, in series, or otherwise. Multiple series spark-gaps enable the vacuum tubes to be operated over a considerable range in resistance.



NOTE 179 D—FIGURE 5—A HINGED FARA-
DAY RING FOR ETHER AND ELECTRON
THERAPEUTICS



NOTE 179 D—FIGURES 6 AND 6 A—DETAILS
OF A MULTIPLE SERIES SPARK-GAP

It consists of a micanite tube containing a row of metal balls, as shown in Note 112. Instead of attaching the balls to a strip of mica, as in the illustrations to Notes 112, 137, 140, holes are bored through the wall of the micanite tube, through which pass screws which clamp the balls to the wall of the tube. Multiple series spark-gaps require to be enclosed to prevent the nitrogen acids from irritating the respiratory organs. The gas should be drawn off from the spark-gaps by an aspirator, as described in Note 122 and illustrated in Note 112 and Plate 81, Note 140, Figure 6.

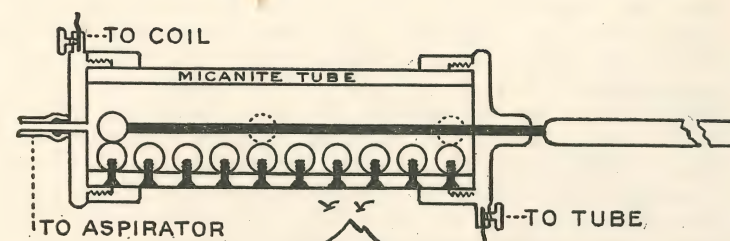


Figure 6

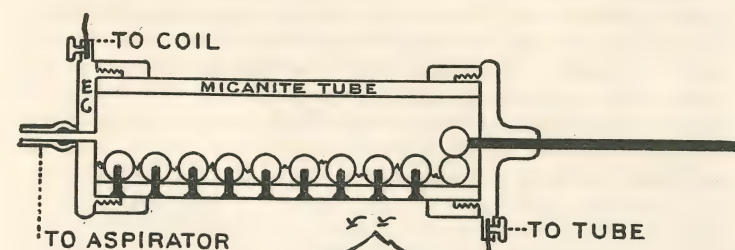
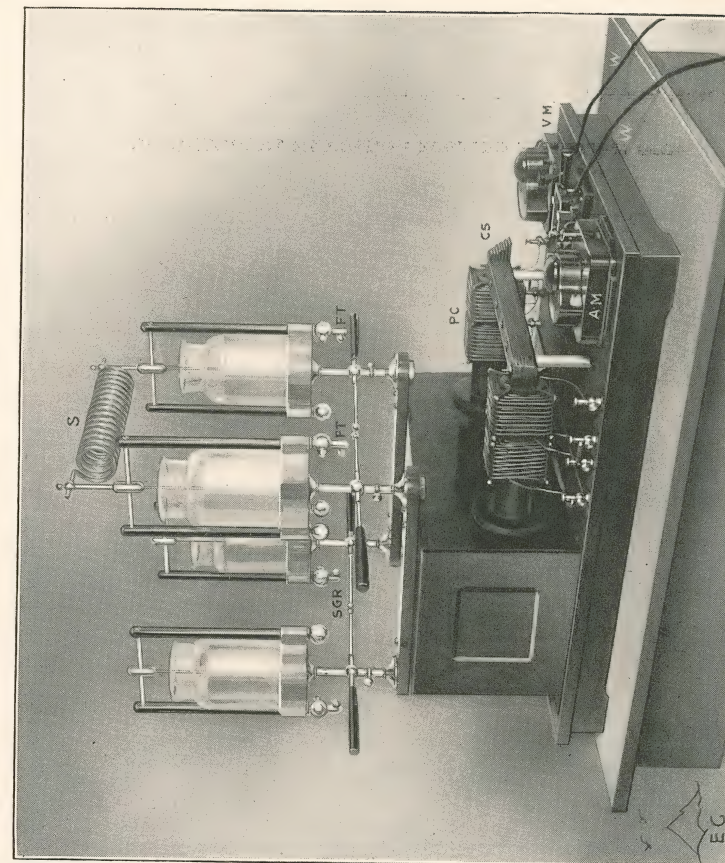


Figure 6A

NOTE 179 D—FIGURE 7—HINGED FARADAY RING FOR ETHER AND ELECTRON THERAPEUTICS WITH THE SECONDARY SECTIONS IN SERIES

This transformer is of the type illustrated in Plates 143 and 144, Figures 4 and 5, though some of the details of construction are different. The core is unusually light to make the transformer portable, being only four centimetres square in cross-section. It is provided with a hinge like those already illustrated. To facilitate closing, each of the plates of one of the side bars is made one millimetre longer than the next, allowing the sheets to be inserted one at a time. This is a point of practical importance. The construction is shown at CS. The primary coils PC are wound more openly, air spaces of three millimetres being left between the layers and between the strands of each layer, to allow of a larger current being used without injurious heating. The primary contains four coils, each having forty-nine turns of number ten copper wire. The secondary contains thirty-eight sections constructed on the plan illustrated in Notes 112 and 137, each section having two coils attached to a micanite plate one millimetre thick. Half the coils are wound with number thirty-two copper wire, each containing nine hundred turns. The other coils are wound with number thirty-four wire, and each coil contains fifteen hundred turns.

There are four Leydens, as in the transformer illustrated in Plates 143 and 144, Figures 4 and 5. Two are connected with the terminals of the united secondaries. If the vacuum tube is attached to the terminals FT of the secondaries, which are connected by bringing the spark-gap rods SGR together, the transformer has sufficient voltage to excite a double-focus or Roentgen X-light tube and amperage enough to melt even a cooled target, unless it is cooled by a constant circulation, as described in Note 1. It will also excite a single focus or Crookes X-light tube. It is not particularly recommended for exciting any form of X-light tube for diagnosis, because, as already frequently stated, a generator should have a very high voltage for this purpose. For therapeutics the case is different, as quantity is of more importance than ability to regulate the X-light with great nicety. The transformer is useful for exciting derma-ray

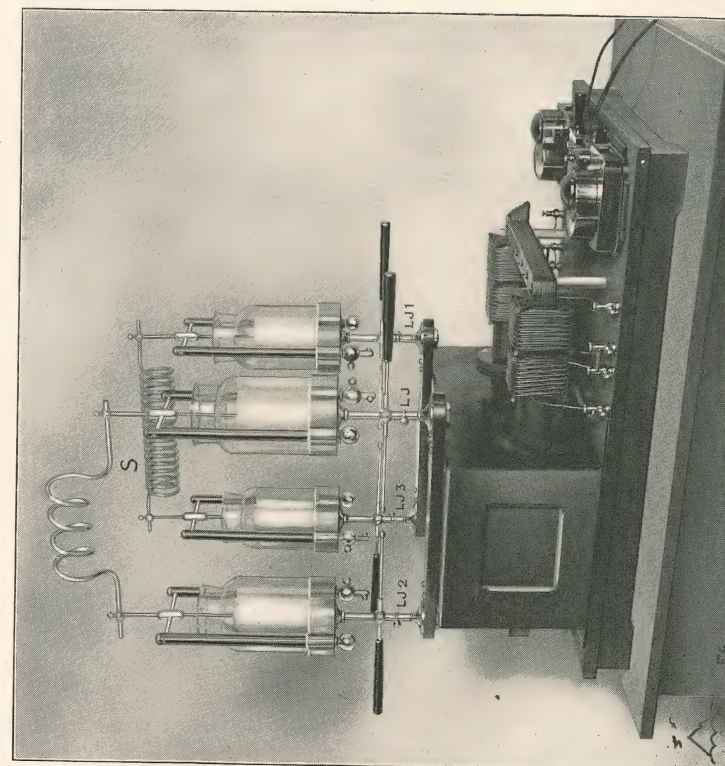


tubes, either of the type shown in Figure 2 or of other types, having two terminals, from both of which cathode streams are sent forward to the wall of the tube nearest the patient, there producing the derma rays by their impact. Little energy is required in the primary of the transformer when it is used for this purpose with a small derma-ray tube. Enough current will pass through a fifty-candle, one hundred and ten volt Edison lamp in series with the primary, or, if the condensers are used, the tube will be lighted with the current, which will pass through a similar thirty-two candle-power lamp. The transformer is valuable for producing the ultra-violet arc for treating lupus. For this purpose a greater current is used in the primary. The arc should be between aluminum terminals. If it is about three millimetres long, it is almost noiseless, and so cool it may be brought almost in contact with the patient's skin. The aluminum, high-voltage arc was recommended in earlier papers as far superior to the low-voltage arc between carbon or iron terminals, because most of the energy of the current is converted into short ether waves, on which we depend for ionizing the tissues to get therapeutic effects, while with the low-voltage arc most of the energy is converted into the long heat waves, which are not useful, and require complicated apparatus to absorb them. For the high-voltage arc the inner coatings of the condensers are connected, otherwise the arc is a pale yellow flame. The transformer is also useful for producing the electron arc mentioned in Note 179. When it is used for this purpose the wires leading to the arc are attached at FT and the inner coatings of the Leydens connected. In this case, also, the energy in the primary should be considerable. Absence of heat and ability to bring the source of electrons in near contact with the patient are valuable features. As it has been shown by the experiments on animals and on man, briefly mentioned in earlier papers, that these electrons have the same therapeutic effects as the beta radium rays, a transformer for producing them should be interesting. The transformer is also valuable when it is desired to subject a patient to rapid polarizations of the ether in his tissues, — such, for example, as is obtained by placing a part or the whole of his body in a solenoid through which alternating currents from the secondary of the Faraday ring are passing. For

this work connection is made between the solenoid and the main terminals of the transformer at FT. If more rapid changes in the ether are desired, the inner coatings of the Leydens should be connected by a rod. The transformer was also designed for exciting vacuum tubes to be applied to the skin or to be held near the body in treating internal diseases, — tuberculosis and dilation of the stomach, for example, — the tubes being connected with one pole of a large solenoid whose other pole is attached to one terminal of the secondary, the current returning to the transformer through the ether. Still more rapid ether changes may, of course, be obtained by connecting the solenoid with the terminals of the secondary of the Tesla coils which were designed for this apparatus. These coils, as already stated, will form the subject of a future note, as they require many illustrations and a detailed description. The transformer can be used with direct currents if some form of break is employed. When excited by alternating currents from commercial circuits it is the most convenient source of ultra-violet light, derma rays, X-light, and electrons for examining minerals. As one large enough could be sold for seventy-five dollars, it is hoped some manufacturer will make them commercially available, for no examination of a mineral can be considered to be complete until the specimen has been bombarded by electrons and short ether waves. A transformer of the size illustrated in Figure 1 is large enough for these examinations, and weighs so little it can be easily moved about by one man. A voltmeter VM and an ammeter AM are mounted on the base, as it is important to know the amount of energy employed in the treatment. A fuse is desirable for preventing too strong a current. The wires W from the commercial circuit are attached to the switch.

NOTE 179 D—FIGURE 8—HINGED FARADAY
RING FOR ETHER AND ELECTRON THERA-
PEUTICS WITH THE SECONDARY SECTIONS
IN TWO GROUPS

This is the same transformer shown in Plate 146, Figure 7, but with the secondaries independent instead of in series. Each secondary will give sufficient voltage for the ultra-violet arc or the electron arc or for exciting derma-ray tubes. One secondary is provided with a Tesla, not shown in the photograph, the other with a solenoid S. To provide spark-gaps for the two independent coils, the supports -LJ, LJ 2, LJ 3, LJ 4- are pivoted to allow them to turn from the positions in Plate 146, Figure 7, in a horizontal plane ninety degrees, to the positions shown in Plate 147, Figure 8.



NOTE 179 D — FIGURE 10 — A PORTABLE
ELECTRON ARC

The illustration shows one of the forms of electron arc mentioned in earlier papers. The instrument is attached to the hinged Faraday ring illustrated in Plates 146, 147, Figures 7 and 8, by flexible wire cables, which are attached at P and N. The terminal HN is connected with the negative terminal of a high-voltage generator, whose other terminal charges the patient positively. The patient is placed on an insulating platform. The arc formed by the current from the Faraday ring is between the aluminum terminals X. It is rich in ultra-violet light, which, illuminating the face of the disk HN, causes it to send out electrons that bombard the patient's skin when the arc is placed near it, ionizing the tissues. The whole arc is enclosed in an insulating tube T provided with a movable handle H, which allows it to be placed in any position near the patient. The aluminum terminals can be removed and others put in their places, as they are held in tubes BT.

NOTE 179 D — FIGURE 11 — A FORM OF ULTRA-
VIOLET ARC

In this arc the negative terminal is a curved plate N, the positive terminal is a blunt hook P, both terminals being made of aluminum. The arc is enclosed in an insulating case T and provided with a handle, to allow the arc to be brought near any part of the patient. The apparatus is connected with the generator by flexible wires attached at PI and NI.

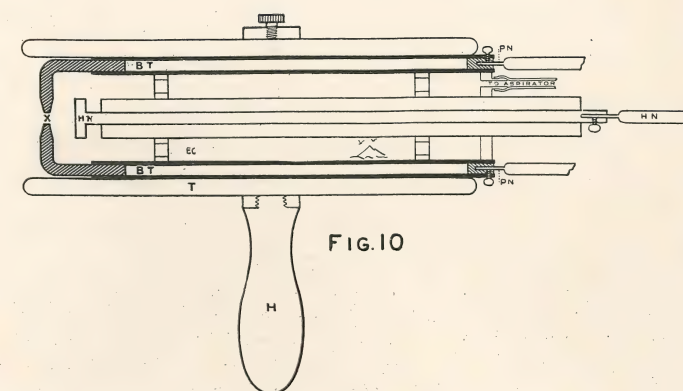


FIG. 10

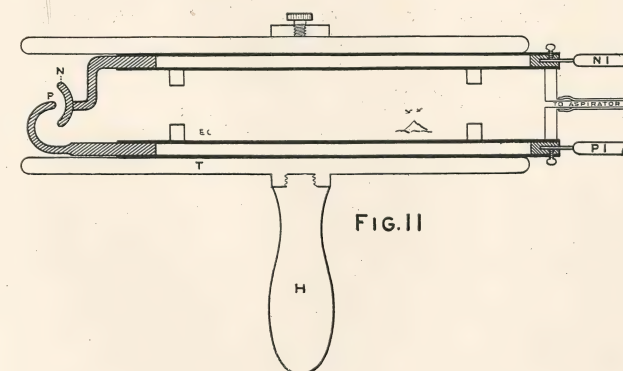
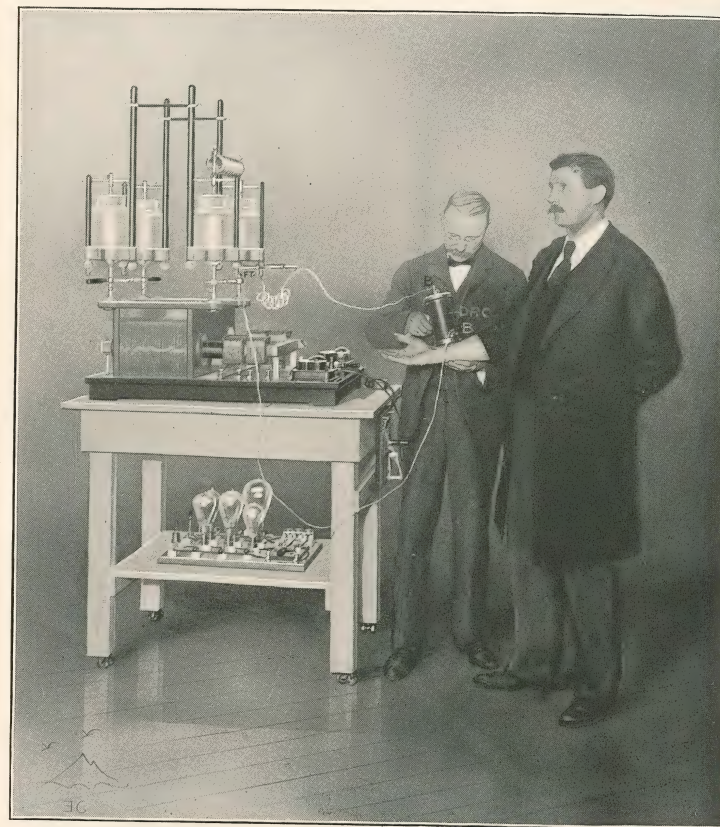


FIG. 11

NOTE 179 D—FIGURE 12—A METHOD OF
USING A DERMA-RAY TUBE

The wires leading from the closed Faraday ring are attached to the terminals of the secondary at FT, the other ends being connected with the terminals of the derma-ray tube by means of the binding posts B. The derma-ray tube case DRC is lined with a heavy coating of non-radiable material, and the hand which holds the tube case is enveloped in a non-radiable glove.

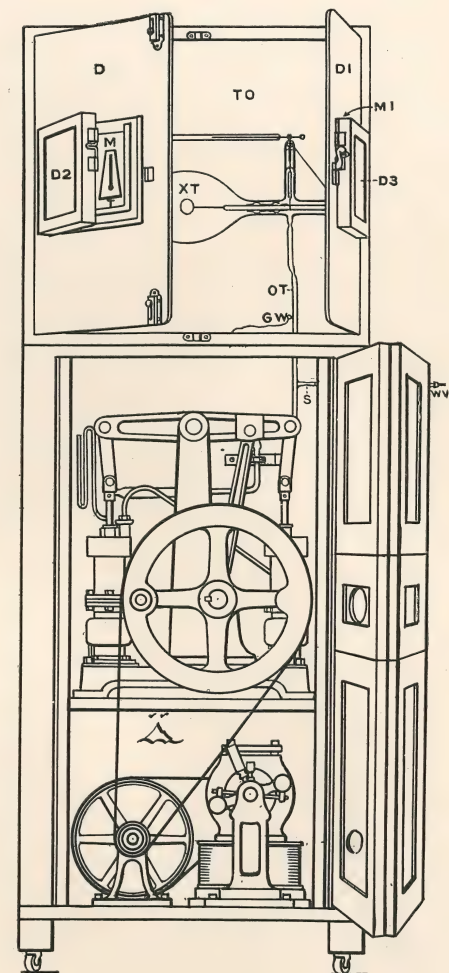


NOTE 179 D—FIGURE 13—A METHOD OF
USING A HINGED FARADAY RING FOR EX-
CITING A VACUUM TUBE ELECTRODE

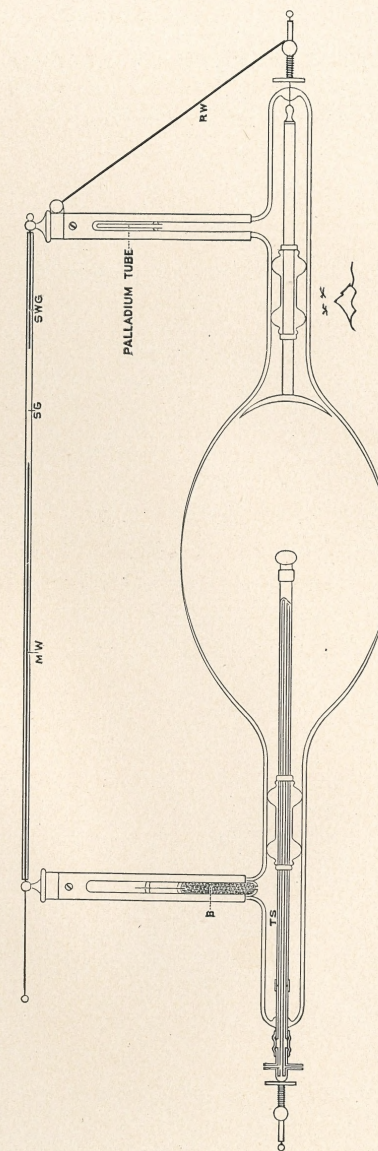
The solenoid BS is supported and insulated by the fibre rods FR, one end being connected with the secondary of the Faraday ring at FT. The other end of the solenoid is attached to a wire W, which is in metallic connection with the electrode vacuum tube EVT. As only one terminal of the secondary of the closed Faraday ring is connected with the vacuum electrode, the current, after leaving the patient, returns to the generator through the ether without a wire to guide it. Under these circumstances, when the room is dark, the generator sometimes presents appearances similar to those shown by the Aurora. The simplest way to regulate the strength of the energy applied to the patient is to vary the current in the primary of the Faraday ring by means of a graduated resistance. The solenoid can be removed from the position shown in the figure and placed on the floor or in any other convenient position. Various sizes of these solenoids should be provided and used after French methods, both terminals being connected with the terminals of the secondary of the Faraday ring, the whole or any part of the patient being enclosed by the solenoid.



NOTE 179 F—FIGURE 1—ARRANGEMENT OF
A MECHANICAL PUMP FOR EXHAUSTING
VACUUM TUBES FOR USE IN MEDICINE



NOTE 179 G—FIGURE 1—AN X-LIGHT TUBE
WITH A COOLED TARGET, AN AUTOMATIC
REGULATOR, AND A REGENERATOR



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