

BELL SYSTEM PRACTICES
Outside Plant Construction
and Maintenance

SECTION G31.910
Issue A, 5-1-35
Long Lines Department

OPEN WIRE

INSTALLATION OF DRAINAGE CIRCUIT

ON TERMINAL POLES

1. STANDARD NAMES OF SUPPLIES

1.01 Supplies required for the installation of the drainage circuit and not covered elsewhere in standard instructions, are listed below:

Coil: No. 217-A retard coil with mounting bolt.

Protector: Protector mounting per Drawing ESO-344755 equipped with four No. 26 and four No. 27 blocks.

Screw: One inch No. 8 round head galvanized wood screw.

2. GENERAL

2.01 These instructions cover the methods to be followed in installing retard coils and associated protectors on open wire terminal poles and connecting them to the circuits and ground to mitigate the effect of lightning and other high voltage disturbances on certain types of open wire services.

3. DRAINAGE CIRCUIT

3.01 The drainage circuit is added to the existing open wire termination without making any change in it. It consists of an arrangement of a specially designed retardation coil with open space cutouts connected across the line at the termination of the open wire with the mid-point of the coil connected to ground. It may also be used on phantom circuits, in which case a third coil is connected to

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the ground leads of the two coils of the physical circuits and the mid-point of the phantom retard coil is connected to ground.

3.02 The wiring diagrams for the drainage circuit are shown in Figure 1. It will be noted that one protector mounting and one, two, or three coils are required to drain circuits on any one arm terminating on one side of the pole (half of the arm). Bridling shall not be run to the protector from arms above or below that to which it is mounted or from the other half of the same arm.

4. LOCATION OF COILS AND PROTECTORS

4.01 It is necessary to locate the coils and protectors as close to the open wire as practicable. They are, therefore, hung on the crossarms in the positions shown in Figures 2, 3, 4, and 5. These figures show typical installations on types A, CS, and CW arms. Installations on type S arms should be in the same relative locations as shown for type CS arms.

4.02 The protector mounting should be located so as to be readily accessible to a man on the pole and placed so the cover can be readily removed to inspect, clean, or renew the No. 26 and No. 27 protector blocks. If existing equipment interferes with placing the mounting as shown in the figures, shift the location of the mounting to some other point on the arm on the same side of the pole. If the existing bridle run on the arm interferes with placing the mounting, pull slack into the wires and pass them back of the mounting. The mounting is normally fastened to the arm with two 1/2" by 4-1/2" machine bolts with 9/16" by 1-3/8" round washers between the head or nut of the bolt and the arm. Where clearances will permit, it may be mounted with a coil on the U bolt furnished for mounting the retard coil as shown in Figures 4 and 5. When mounted together, the top of the cover of the protector mounting should clear the bottom of the arm about 1/2" and the top of the coil should be flush with or slightly below the top of the arm. It is desirable to use the back of the protector mounting as a guide to mark the position of the holes in the

arm before boring, so that the mounting will be plumb and the cover will have the required clearance to the arm when installed.

4.03 The retard coil is fastened to the arm with the special U bolt furnished with it. 9/16" by 1-3/8" round washers should be placed between the nuts of the bolt and the arm. Coils mounted on single armed terminal poles should preferably be placed on the side of the arm opposite to that from which the wires take off. Coils should be mounted so the tops of the coils will be flush with or slightly below the top of the arm. If equipment on the arms interferes with mounting the coils in the positions shown in the figures, they may be mounted at other nearby points on the arm. Avoid drilling holes for the U bolts, which would cut through pin holes or interfere with braces or other existing attachments. A line through the center of the two bolt holes should be substantially parallel with the bottom edge of the arm.

5. BRIDLING

5.01 The bridling of the drainage circuit should be made as direct and simple as possible and distinct from the bridling of the regular termination of the circuits, where conditions will permit. It should be run with a view to preventing men working on the pole from being caught in the loops or from disturbing the connection. On double armed poles the bridling of the drainage circuit should be run on the bottom of the arm not occupied by the bridling of the normal termination of the circuits. The ground connection from the coil or coils shall also be run on this arm. On single armed poles the existing ring run of the existing bridling should be used for bridling the drainage circuit when sufficient space can be had in the existing rings. The ground connection is to be kept separate and fastened to the bottom of the arm as described in Paragraph 5.03.

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5.02 Connections to the Coils. The coils are equipped with three insulated leads, each about four feet in length, which come through bushings in the bottom of the case. The case is stamped 1, 2, and T opposite each wire respectively. The wire marked T is the ground wire connected to the mid-point of the coil. Wires marked 1 and 2 are the ends of the coil and are to be connected through the protector blocks to the circuit wires at the odd numbered and even numbered pin positions respectively. In the case of a phantom circuit, the No. 1 and No. 2 wires of the third or phantom retard coil are connected to the T wires from the two physical circuit coils.

After the coils are mounted on the arms run the No. 1 and No. 2 wires from the coils to be connected to the open wires, along the bottom of the arm in type E bridle rings or in the existing ring run to the protector mounting. Cut them to the required length to bring them into the mounting through the hole on the right-hand side at the bottom of the box and to their respective positions at the terminal posts. If drainage is being applied to only one circuit and it happens to be the lower numbered pair of line wires on that side of the arm (example, wires No. 37 and No. 38), terminate the coil leads on the two top right-hand side binding posts of the mounting, connecting wire No. 1 to the top post and wire No. 2 to the post directly below it. In like manner, if drainage is to be applied only to the higher numbered pair of wires on that side of the arm (example, No. 39 and No. 40), terminate the coil leads on the two bottom right-hand posts, wire No. 2 to the bottom post and wire No. 1 to the one directly above it. When a group of four wires is to be drained the connections at the binding posts in the protector mounting, reading from the top down, will be in the same rotation as the connections to the line wires, reading from the lowest numbered wire to the highest (see Figure 6).

When all wires have been run from coil or coils to the protector mounting, cut to the required length, and the insulation removed from the ends, they should be temporarily connected to the binding posts, and the point where they pass through the

bottom of the box should be marked. The wires should then be removed, held in the same relative positions and a wrapping of friction tape applied at the marked level so that when they are again threaded through the hole in the bottom of the box the tape wrapping will close the hole as if with a cork, preventing the entrance of moisture or insects when the cover is on.

5.03 Connections of Ground Wires. When only one coil is installed the lead wire marked T on the bottom of the case should be run along and in contact with the bottom of the arm to the pole, thence down the pole to the existing 83-A protector mounting and into the mounting through the hole provided for the existing ground wire. The lead should be terminated on the same post with the existing ground connection. When the pole is not equipped with a protector mounting this wire should be run down the pole as described in Paragraph 8.02. This ground wire is to be fastened to the bottom of the arm with No. 6 cable clamps, each clamp held in position with a 1" round head galvanized wood screw driven into the bottom of the arm 1" or more (the overall length of the screw) from one of the bottom edges, with the clamp faced toward the nearer bottom edge. These clamps and screws or guy staples should be used to fasten the wire to the pole. The lead should be long enough to reach for all normal locations for the coil without splicing. If it must be spliced out a twisted soldered joint should be made with No. 14 H.C. drop wire, with the splice covered with rubber tape and friction tape in the standard manner described in Section G31.940.

When two coils are installed to drain two open wire circuits the T lead from the coil farthest from the 83-A protector, which will reach the 83-A protector without splicing, should be temporarily run and the T lead from the second coil cut as short as practicable to make a Y splice to the T lead of the first coil. This requires removing

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a section of the insulation from the T lead of the first coil and wrapping the cut end of T lead of the second coil to it. The Y joint so made should be soldered, taped with rubber and friction tape in the standard manner (Section G31.940) and then the entire run of the ground wire fastened to the bottom of the arm and to the pole with the No. 6 cable clamps.

When a third or phantom retard coil is applied to a phantom circuit the T lead of this coil should be run direct to the 83-A protector mounting and the No. 1 and No. 2 leads run along the bottom of the arm and fastened with No. 6 cable clamps to points near the other two coils respectively. A twisted soldered joint taped in the standard manner should be made to the T leads from the two coils connected through the cutouts to the line wires, and the entire ground run made fast with No. 6 clamps.

5.04 Connections from Protectors to Line Wires.

No. 14 H.C. drop wire should be used to bridle from the line wire to the protector mounting of the drainage circuit. This wire should be connected to the line wire in the standard manner required for terminating high grade toll circuits in Section G31.135, except that no bridle wire insulators should be used. It should be soldered to the line wire on the side of the dead-ended loop of the line wire around the insulator not occupied by the end of the existing bridling for the normal termination. At the other end, the new bridle wire should pass through the hold at the left-hand side in the bottom of the box of the protector mounting and terminate on the posts on the left-hand side of the No. 26 and No. 27 blocks in a similar manner to that described for the wires at the right-hand; i.e., for but a single physical circuit installation the bridling will be run to the two posts opposite to those to which the coil leads have been connected, the bridle from the lower numbered line wire being connected to the post above that from which the bridle to the higher numbered line wire is run. When two circuits are drained all four posts will be used, the connections in the mounting reading from the top down running to the respective line wires reading from the lowest numbered wire to the highest.

When the bridle wires have been run they should be taped to close the hole in the bottom of the mounting box, as described in Paragraph 5.02 for the coil leads at the point where they enter the mounting.

6. BINDING POST INSULATORS

6.01 Equip the binding posts in service in the protector mounting with standard binding post insulators as described in Section G31.135.

7. NEW PROTECTOR BLOCKS

7.01 When the installation of the drainage circuit is completed, the No. 26 and No. 30 blocks normally used for the protection of the circuits being drained shall be replaced with new No. 26 and No. 30 blocks.

8. INSTALLATION OF GROUND

8.01 It is desired to connect the ground lead of the drainage circuit to the same ground as that used for the normal protection of the open wire circuits at the terminal. In general, the normal protection will consist of No. 26 and No. 30 blocks in an 83-A protector mounting installed on the pole with a ground wire run from the mounting to a connection on the lead cable sheath, to a ground rod driven near the base of the pole, or to the office ground. In a few cases no protector mountings may be on the pole, the protectors in the office being sufficient when the terminal pole is close to the office and only a short length of bridle wire is required to enter the office.

8.02 When the terminal pole is equipped with No. 83-A protector mountings or EA or EU terminals, the T lead from the No. 217-A retard coil should be run to the ground wire binding post in the protector

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mounting associated with the circuits on which the drainage circuit is being applied. (Should two wires be found already connected to the ground post in an 83-A mounting, the ground connections shall be rearranged to be in accordance with Section G31.140, and the ground wire of the drainage circuit connected to the post in the mounting.)

8.03 When the terminal pole is not equipped with No. 83-A, or other type protector mountings equipped with a standard ground connection, splice out the T lead with No. 6 R.C. wire, using a twisted soldered joint protected with tape as described in Section G31.940, and run it as directly as convenient to the ground normally used to protect the termination of the open wire. In general, it will be satisfactory to place this ground wire in the same run as the bridling from the open wire.

8.04 When the ground connection is made for the drainage circuit, the ground wire from the No. 83-A protector mounting or other terminal to the ground should be examined to make sure the connections are not broken and that the run does not include any unsoldered joints. If any unsoldered joints are found they should be remade, and soldered and taped as described in Section G31.~~140~~

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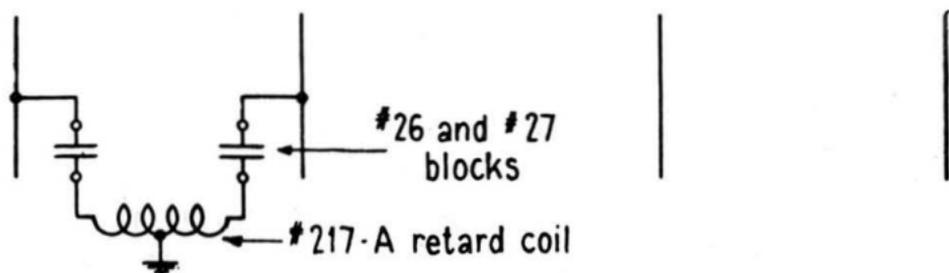
9. JOINTS IN BRIDLE WIRE

9.01 When it is necessary, due to making rearrangements in drainage circuits or in connection with other work, to splice any of the leads from the retard coils, the joint should be a twisted soldered joint taped with rubber and friction tape in the standard manner described in Section G31.940. Do not splice the bridle run from the protector mounting to the line wire. In case of trouble in this bridle, replace it with a new run.

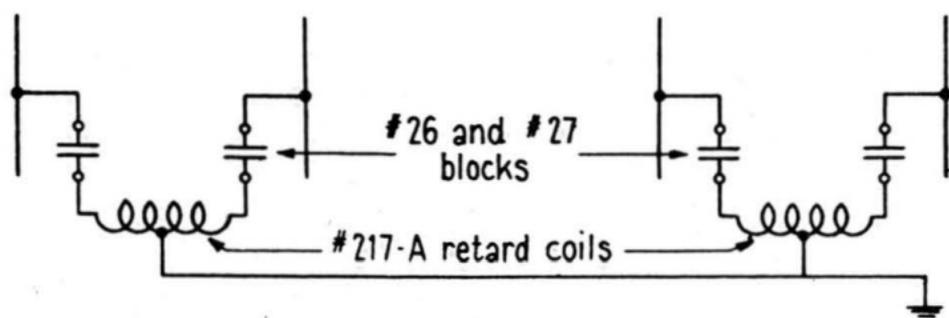
10. DEFECTIVE RETARD COIL

10.01 In the event a retard coil becomes defective, do not open the case. Return the coil to the supplier and substitute a new coil.

Drainage circuit for single pair.



Drainage circuit for non-phantom group.



Drainage circuit for phantom group.

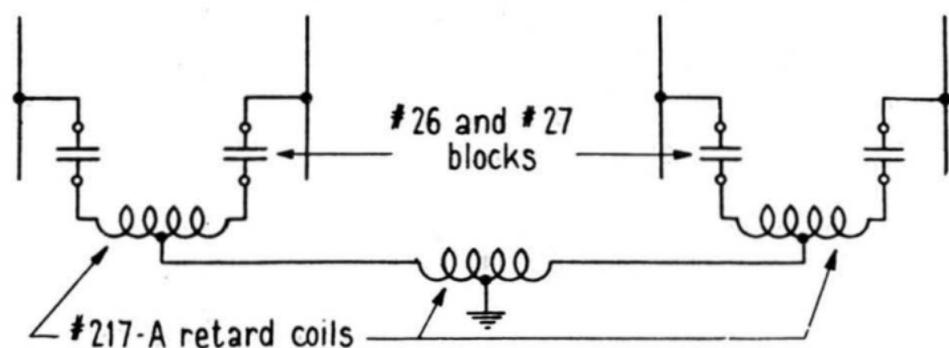
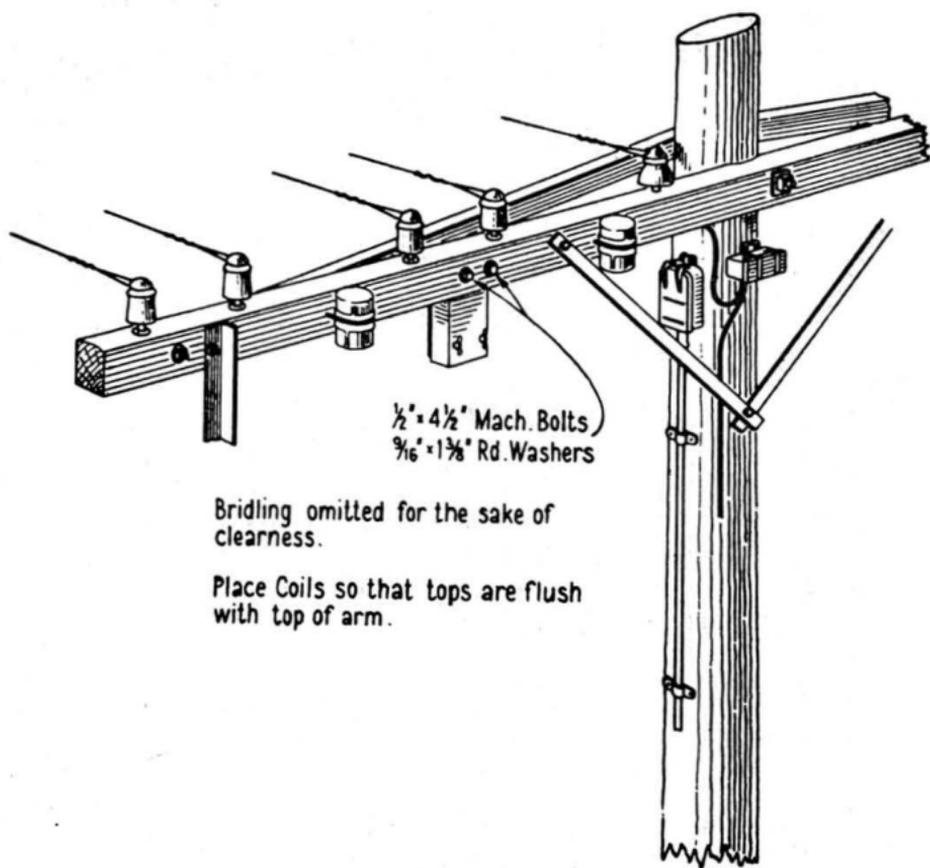


FIG 1

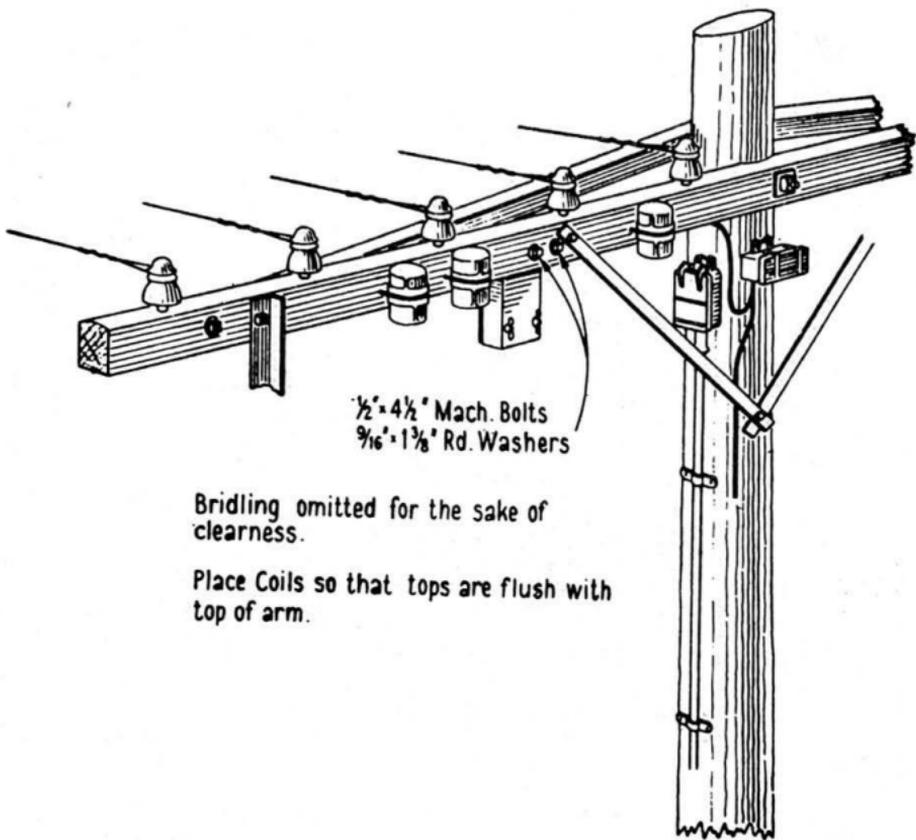


$\frac{1}{2}$ " = 4 $\frac{1}{2}$ " Mach. Bolts
 $\frac{3}{16}$ " = 1 $\frac{3}{8}$ " Rd. Washers

Bridling omitted for the sake of clearness.

Place Coils so that tops are flush with top of arm.

FIG. 2



Bridling omitted for the sake of clearness.

Place Coils so that tops are flush with top of arm.

FIG. 3

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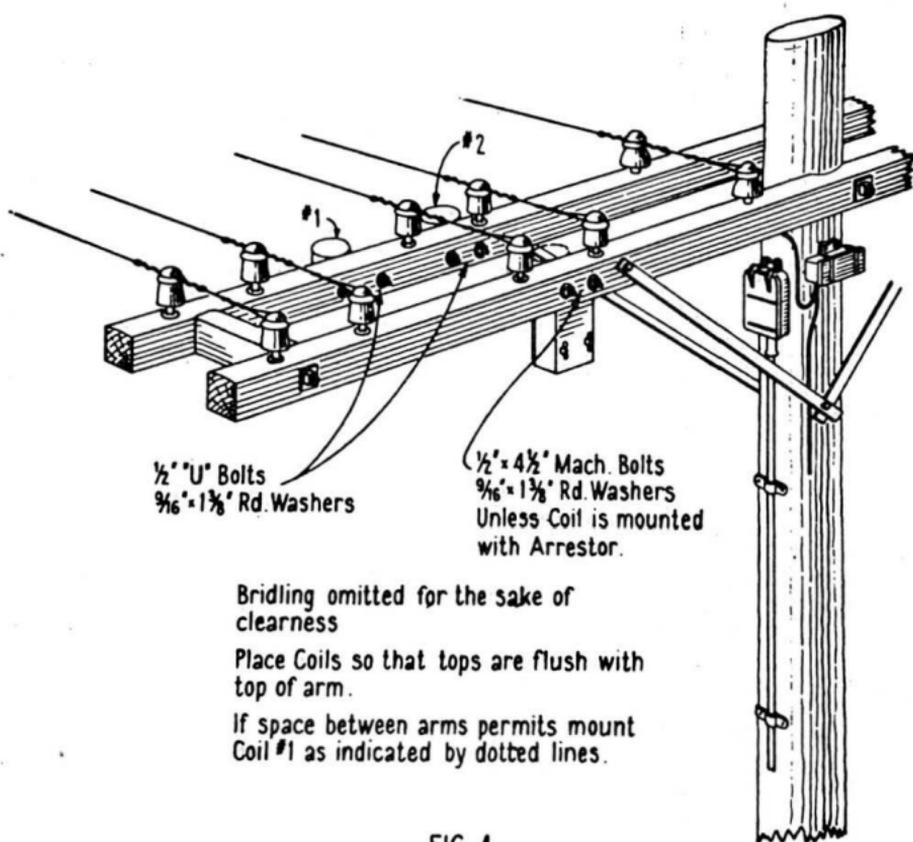


FIG. 4

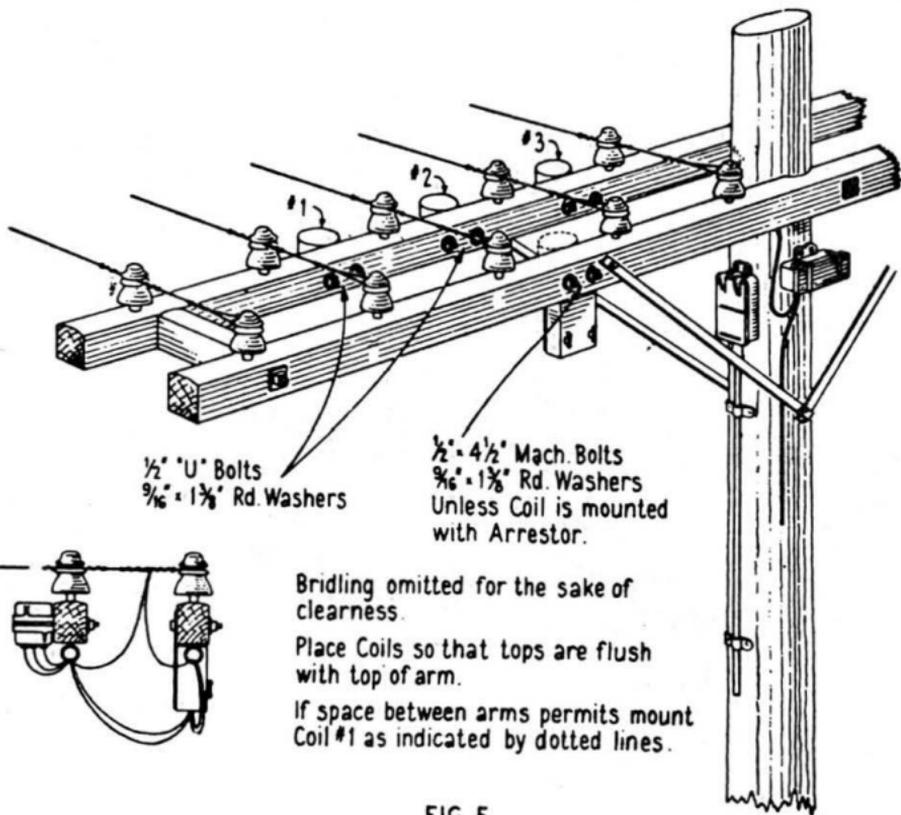


FIG. 5

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