April 16, 1940. J. R. BARDSLEY 2,197,513

LOADING APPARATUS CASE

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FIG. 1

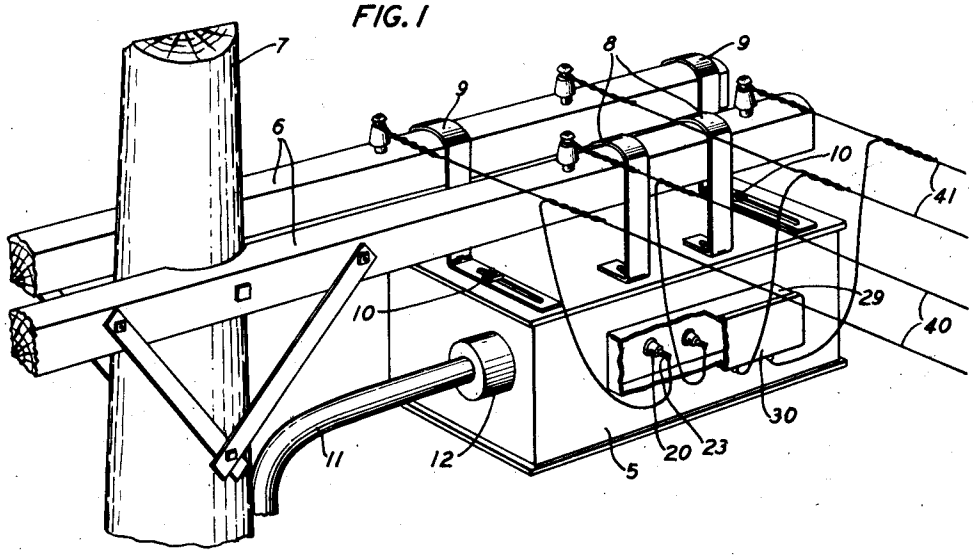


FIG. 2

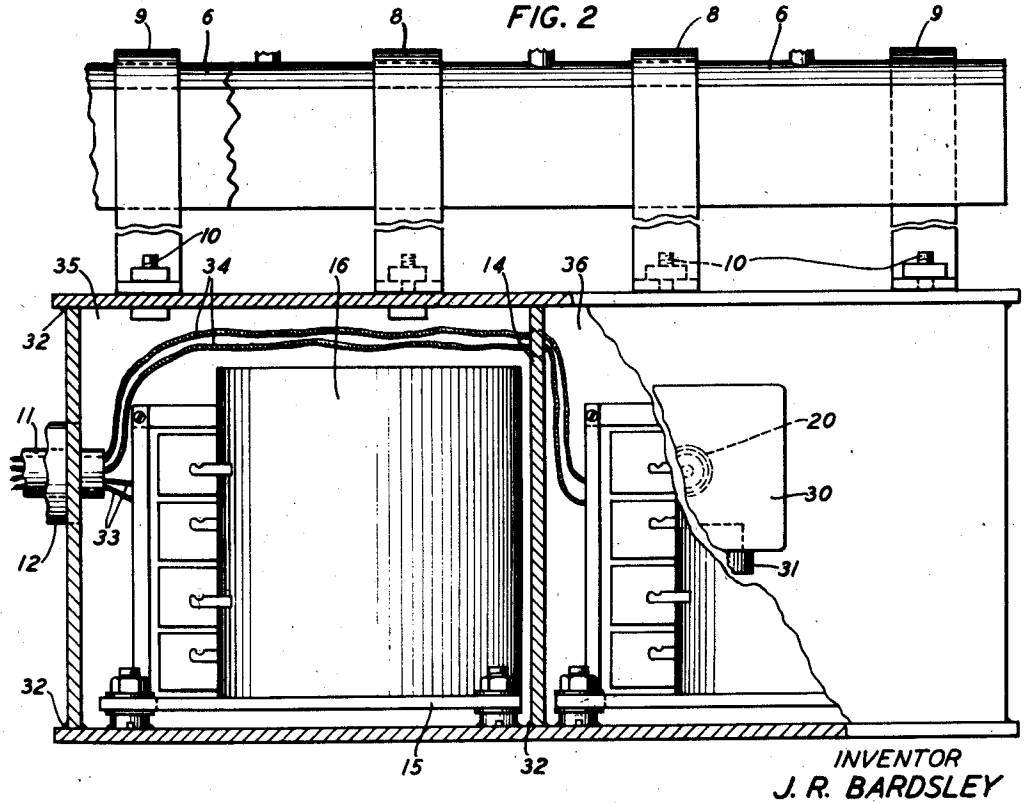


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FIG. 3

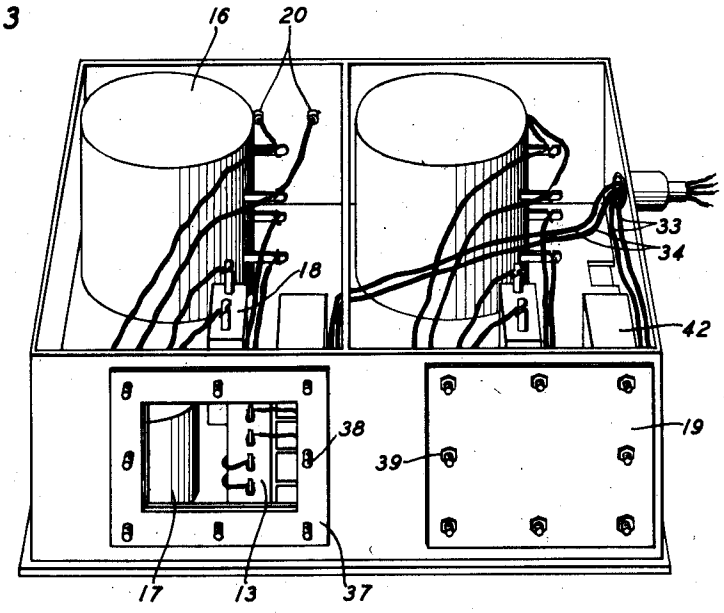
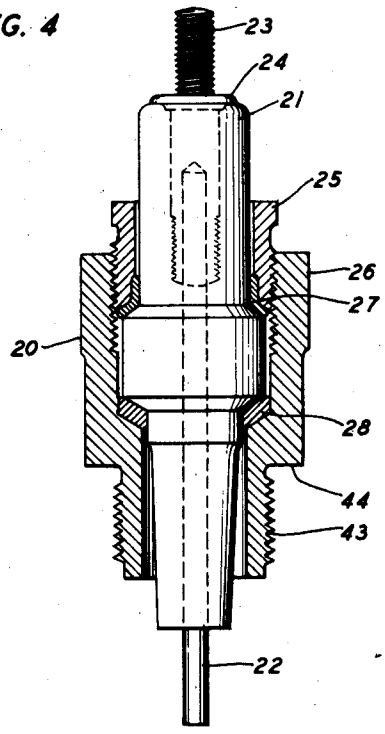



FIG. 4

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# UNITED STATES PATENT OFFICE

2,197,513

## LOADING APPARATUS CASE

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Application October 18, 1938, Serial No. 235,580

3 Claims. (Cl. 178—46)

This invention relates to containers for apparatus used in telephone transmission lines and more particularly to cases for use in unprotected places such as on poles for supporting wires, which cases are adapted to house loading apparatus for telephone lines at the junction of a lead covered cable and an open wire line where the cable contains gas under pressure.

An object of this invention is a container to enclose apparatus and protect it from adverse atmospheric conditions.

Another object is a telephone line loading coil case adapted for mounting on poles which support the telephone lines.

A further object is a loading coil case adapted for housing loading apparatus at the junction of open wire lines and a cable filled with gas under pressure.

A preferred form of this invention comprises a gas-tight container provided with external terminals for connection with an open wire line and equipped with a stub cable for connection with the main cable in such a manner that the gas under pressure in the cable may freely pass into the container without danger of leakage. The container may be divided into a plurality of compartments each containing loading or building-out apparatus electrically connected between a pair of the external terminals and a stub cable pair. A side wall of each compartment is provided with a hand hole and cover to permit installation, replacement or adjustment of the apparatus contained therein. The covers for the hand holes are hermetically sealed to withstand the pressure of the gas within the cable and the container. The external terminals for the connection of the enclosed apparatus to an open wire line are also gas-tight, and these terminals are shielded exteriorly of the container to protect the terminals from adverse weather conditions. Suitable hangers are provided to suspend the container from the cross-arms of a telephone pole and these hangers may be adjustably fastened to the container by stud bolts which are fixed in the case.

The invention will be better understood from the following description and attached drawings showing one form which the invention may take when used at the junction of a two-pair cable and a four-wire open line.

In the drawings,

Fig. 1 illustrates a method of attaching the case to the cross-arms of a telephone pole;

Fig. 2 is a front elevation of the case with a part of the front wall broken away to show the arrangement of the enclosed apparatus;

Fig. 3 is a rear perspective showing some of the enclosed apparatus and the hand hole construction; and

Fig. 4 is a sectional view of the terminal structure by means of which connection is made from the enclosed apparatus to open wire lines.

Referring now to the drawings, Fig. 1 shows the case 5 suspended from cross-arms 6 which in turn are fastened to telephone pole 7 in the usual manner. Case 5 is preferably made of steel plates welded together as indicated at 32 in Fig. 2. The case is suspended from the cross-arms by means of straps 8, 8 and 9, 9 which are of steel or other suitable metal. The straps are bent at one end to loop over the cross-arms and are bent and slotted at the other end to engage stud bolts 10 which are fixed to the case. The slots in the straps permit adjustment to allow for different spacings of the cross-arms.

The cable 11 is fastened to the pole in any preferred manner and led into the case through a boss 12 to which the cable may be fastened by soldering, welding, etc. This cable may be of the type disclosed in Fig. 3 of U. S. Patent 2,086,629 to S. P. Mead, July 13, 1937, and comprises an outer lead sheath surrounding an inner sheath of copper and steel. The individual conductors are maintained in position inside the metal sheaths by means of insulating discs having notches in their periphery at equally spaced points to receive the conductors. Such cables are commonly called disc insulated cables and are usually filled with an inert gas under pressure of the order of ten pounds per square inch.

In the cable chosen for illustration, there are two pairs of wires each pair constituting a transmission circuit. As shown in the drawings, one pair 33 is led to a terminal plate 13 (Fig. 3) in compartment 35 while the other pair 34 is led to a similar terminal plate in compartment 36.

Compartments 35 and 36 are separated by a partition 14 which is welded to the sides and bottom of the case and which is provided with a hole through which the pair 34 is led. This partition also forms an electrical shield between the apparatus in the two compartments.

From the terminal plates 13 wires are led to the enclosed apparatus as required. Some of this apparatus may be installed at the factory. Such loading apparatus may comprise a loading coil as shown, for example, at 16, a retardation coil 17 and condensers 18. This apparatus together with terminal plates 13 may be mounted on sub-

bases 15 and the subbases bolted to the bottom of the case as shown, after which the top of the case is welded on.

Transmission lines are normally loaded at points the distance between which is known as a loading section or at points which define predetermined partial sections. Usually the lines terminate at points other than those defining loading sections or specific partial sections. Hence, when a line is terminated it is usually necessary to insert in the line apparatus which simulates the line impedance for the uncompleted section or partial section. Apparatus for simulating this impedance are called building-out units and are preferably installed in the field after tests have been made to determine the amount of building-out required. Building-out units 42 are installed in case 5 through hand holes provided for that purpose. In the case chosen for illustration there are two compartments and hence there are two hand holes and covers 19 therefor.

As the case is filled with the same gas that fills the cable and is at the same pressure the case must be gas-tight. Rubber or other soft gaskets 37 are, therefore, provided to form a gas-tight seal between the covers 19 and the sides of the case. The covers are attached to the case by means of stud bolts 38 and nuts 39.

To connect with the open wire lines, leads are run from the apparatus within the case which contains gas under pressure to special gas-tight terminals 20. Terminals 20 of compartment 35 lead to the open wire pair 40 and leads from the terminals in compartment 36 lead to the open wire pair 41.

Protection is provided on the outside of the case for terminals 20 by a box-like extension 29 which may be welded to the case and which has a removable cover 30. The leads from the terminals 20 pass through insulating bushings 31 (Fig. 2) in the lower side of the protection box 29.

Fig. 4 shows one of the terminals 20 in section. The central part consists of an insulating member 21 preferably of ceramic material substantially as shown provided with a hole into which conductor 22 may be closely fitted. In the upper portion (as shown) of member 21 the central hole is somewhat enlarged and threaded near its lower end. A conducting member 23 having a threaded portion near one end is screwed into the insulating member 21. A hole is provided in conductor 23 into which conductor 22 is entered and soldered or brazed. In assembling, the hole in insulator 21 is filled with cement and then the electrode assembly 22 and 23 is screwed into the insulating member, and is cemented therein.

Conductor 23 is provided with a shoulder 24 to limit the distance that it may enter member 21 and is threaded on that part that extends beyond insulator 21 to faciliate connection to the outside wires by means of a nut or its equivalent.

The exterior portion of the terminal consists of two metallic pieces 25 and 26 substantially as shown. Piece 26 is provided with an externally threaded portion 43 on one end which screws into a threaded hole in the side of the case. Shoulder 44 acts as a stop against the side of the case. Flat sides are provided on piece 26 to permit the use of a wrench in attaching this terminal to the case. On the other end, piece 26 is provided with an internally threaded portion into which piece 25 may be screwed. Lead or other soft metal washers 27 and 28 provide a gas-tight seal between pieces 25 and 26 and insulator 21. Connections from the apparatus enclosed in the case are soldered to conductor 22.

The invention has been described as applied to a specific junction point but many modifications of the invention may be made without departing from the spirit thereof, and the invention is, therefore, to be limited only by the scope of the appended claims.

What is claimed is:

1. A loading coil casing for use at the junction of an open wire line and a cable having a gas-tight cover and containing gas under pressure greater than atmospheric pressure, said casing comprising a gas-tight container hermetically sealed to withstand an internal gas pressure of the order of ten pounds per square inch, said cable projecting through one wall of said container, said cable cover being hermetically sealed to said wall and terminating inside said container whereby the gas within said cable may freely enter said container, spaced loading coils within said container substantially surrounded by air spaces filled with gas derived from said cable, and spaced electrical terminals projecting through a wall of said container for connection to said open wire line, said terminals being sealed to said wall to prevent leakage of gas from said container, said loading coils being electrically connected between said terminals and the conductors of said cable.

2. A loading coil casing in accordance with claim 1 in which said casing has adjustable means for supporting said casing from the cross-arms of a telephone pole.

3. A loading coil casing for use at the junction of an open wire line and a cable having a gas-tight cover surrounding electrical conductors and containing gas under pressure greater than atmospheric pressure, said casing comprising a gas-tight container hermetically sealed to withstand an internal gas pressure of the order of ten pounds per square inch, one wall of said container having an aperture, said cable conductors projecting through said aperture with said cable cover hermetically sealed to said wall to permit said gas to freely enter said container while preventing any leakage of said gas to the outer atmosphere at the junction of said container and said cable, spaced loading coils within said container substantially surrounded by air spaces filled with gas derived from said cable, and spaced electrical terminals projecting through a wall of said container for connection to said open wire line, said terminals being sealed to said wall to prevent leakage of gas from said container, said loading coils being electrically connected between said terminals and the conductors of said cable.

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