June 27, 1933. G. W. PICKARD 1,915,692

CONDENSER SUPPORT

Filed Nov. 1, 1928 2 Sheets-Sheet 1

Fig. 2.

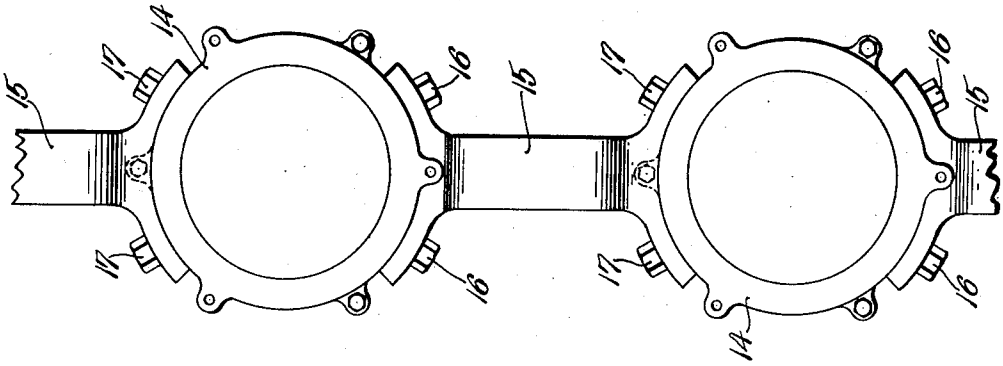


Fig. 1.

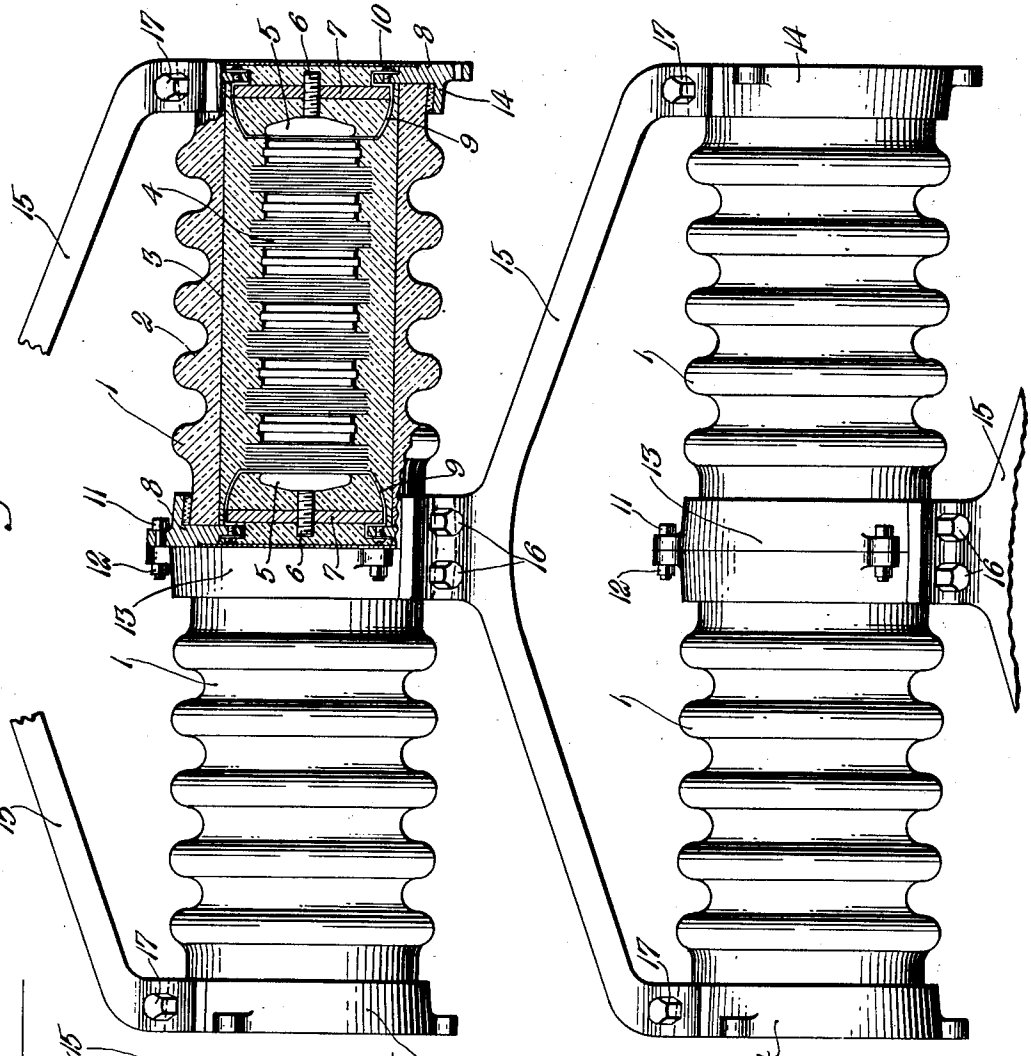
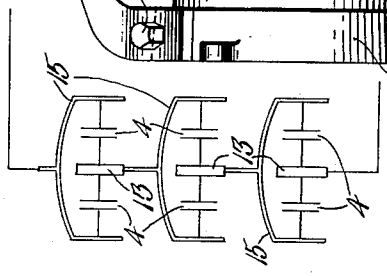


Fig. 3.



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Filed Nov. 1, 1928 2 Sheets-Sheet 2

Fig. 4.

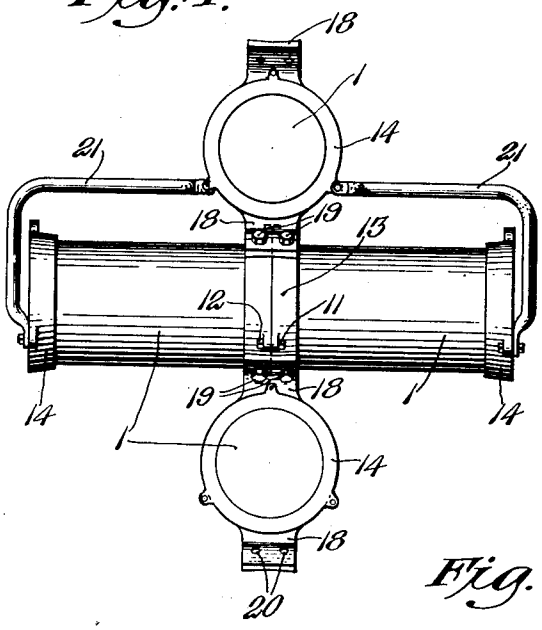


Fig. 5.

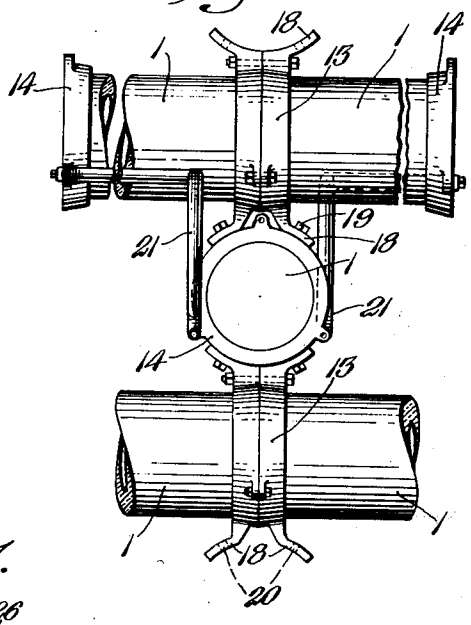
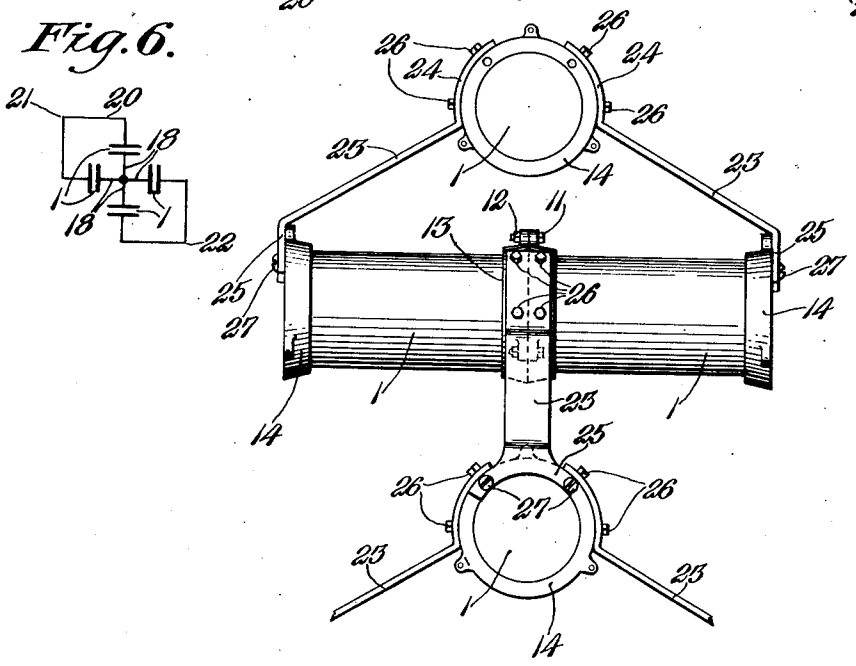


Fig. 7.

Fig. 6.



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UNITED STATES PATENT OFFICE

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CONDENSER SUPPORT

Application filed November 1, 1928. Serial No. 316,484.

This invention relates more particularly to an electrical condenser installation of the type in which an insulating casing is provided with metal end members adapted to act as compressing members for the enclosed stacks and also serve as electrical connections of varying polarity, the installations generally being provided for use in carrier current condenser circuits or in other high voltage circuits. The invention relates in general to condenser structures involving a mid-point connector and more particularly a mid-point connector and two end connectors.

An object of this invention is to provide means whereby the condenser units may be easily transported from the factory to the place of installation, and a novel method of assembling them to form operative units with a minimum amount of labor and cost for assembly.

It is a further object of this invention to provide a novel arrangement of carrier current condensers whereby to secure a maximum of efficiency in both installation and operation without having recourse to special units or construction for any given installation.

These and other desirable objects and advantages will be set forth in the accompanying specification and illustrated in the drawings, it being understood that while preferred embodiments are shown, they are given merely for the purpose of illustration, and it is not intended to be restricted to such showings except as such limitations are clearly imposed by the appended claims.

In the drawings like numerals refer to similar parts thruout the several views, of which

Fig. 1 is a view partly in section and partly in elevation of a plurality of condenser units arranged according to the novel method of this invention;

Fig. 2 is an end view of the structure shown in Fig. 1;

Fig. 3 is a wiring diagram of a condenser assembly;

Fig. 4 is an elevation of an arrangement of a plurality of condenser units connected in multiple;

Fig. 5 is a view taken at right angles to that shown in Fig. 4;

Fig. 6 is a wiring diagram of the arrangement of condenser units shown in Figs. 4 and 5; and

Fig. 7 is a modification of the structure shown in Figs. 1 and 2.

Referring now to Fig. 1 there is shown a plurality of insulation-sided condenser casings 1, having corrugated side outer walls 2, which may be smooth, if desired, and smooth inner walls 3. These casings may be made of any suitable material such as high grade porcelain, or boro-silicate glass, or other like structural insulating materials having the requisite strength and electrical properties. Disposed within the casings are a plurality of series connected stack sections, designated generally by the numeral 4, and described more particularly in the patents to John A. Proctor and William M. Bailey, No. 1,869,168 of July 26, 1932 and its parent Patent No. 1,812,713 of June 30, 1931. The stack members are secured in position within the casing by suitable compressing means such as the compression plates 5, screws 6 and locking plates 7. Connection between the metal ends 8 of the casing and the stack sections at either stack end is secured by the interposition of conductors 9 secured to the member 8 in any suitable manner, as by screws 10.

A plurality of condenser units may be bolted together, as shown, by suitable bolts and nuts 11, 12, the resulting structure forming a common terminal or mid-point for the juxtaposed condenser units. The so-joined condenser unit assembly may be connected in a non-columnar series arrangement with other like assemblies in a manner now to be described.

Referring now more particularly to Fig. 1, the mid-point metal end connections (or mid-point connector) of one mid-point condenser designated generally by the numeral 13, and are electrically and mechanically connected to the metal ends (or end connectors), 14 of a second mid-point assembly, by providing a yoke 15 which is secured to the mid-point connector 13 by suitable means such as bolts 16 and to the end members or end connectors

14 by like securing means 17, the entire mid-point terminal structure or connector 13 including all parts involved with portions 13 and 15.

It will now be seen that the structure of Figs. 1 and 2 comprises a rigid non-columnar condenser assembly in which the condenser units, two in each mid-point assembly, are arranged in series parallel relation, as in Fig. 3, thereby providing a high degree of electrical and mechanical efficiency, the construction being adapted to be varied at will to meet any requirements, and the whole being constructed of standard parts or units of the type set forth and claimed in the Proctor and Bailey patents, above referred to.

The sole added element required for this novel arangement of condensers, is substantially that of the yoke member 15 or its equivalent, which as will be readily recognized, can be readily made of any suitable metal or alloy having the requisite mechanical strength and electrical conductivity. The high degree of novelty involved in this construction resides more particularly in the discovery that by arranging the units in general or shown, a much greater number can be encompassed within a given space without involving any added labor, and also in view of the extreme ease of installation and replacement, any given assembly can be readily ordered and assembled by the user with a minimum of trouble and labor. It will be seen that in order to assemble a structure such as is disclosed in Fig. 1, all that is required is a suitable number of bolts and nuts together with the connecting yoke 15 and a suitable wrench, in addition to the requisite number of capacitors, two in each mid-point assembly, to give the desired capacity.

These assemblies of any of the forms of the invention may be appropriately supported on insulating bases such as that disclosed in the patents above referred to, and a plurality of such assemblies may be mechanically and electrically connected in parallel, as more particularly disposed in said patent, thus permitting a desired range of flexibility in a given installation, whereby to take care of any current and voltage requirement.

Where it is desired to arrange the units in parallel to secure greater capacity, the several horizontally disposed sections may be provided with common mid-point connections shown more particularly in Figs. 4 and 5.

Referring to these figures, the units 1 with the end connections 14 and common mid-point connections or terminals 13, are secured to adjacent groups disposed substantially at right angles to each other by means of mid-point connections or lugs 18, which may be formed integral with the component parts of members 13 or may comprise separate portions adapted to be secured to the members 13 by suitable securing means such as bolts 19. As shown in Fig. 5, the members 18 are formed integral with the members 13 and are oppositely disposed on either side thereof, and in substantially a common plane with each other. These members are provided with suitable apertures 20, adapted to receive the bolts 19, previously noted.

The end terminals 14 of the respective units are connected to each other by means of connectors 21, which may be of copper tubing or other suitable material. These connectors are connected to the several terminals in any suitable manner, as shown. In Fig. 5, the units are shown partly in elevation to bring out the connections between the several end members 14. By this arangement, it is possible to secure the standard units in a desired parallel arrangement, without altering their structure or capacity and merely requiring the connections 21 and the mid-point connections 18.

As shown in Fig. 6, the circuit diagram shows the common mid-point connection and the parallel connection between the end terminals of the several units. By providing terminals at the points marked 21, 22, the two groups of condensers shown are connected in series parallel. By providing a common terminal at the mid-point 18 and a common connection between the terminals 21, 22, the several condenser units are connected in parallel.

In place of the yoke 15, described previously, the arrangement shown in Figs. 1, 2 and 3 may be carried out as in Fig. 7, by providing a plurality of strap members 23 provided with arcuate portions 24 adapted to conform to the mid sections, and with end portions 25 adapted to abut the end sections. Portions 24 and 25 of these members are secured to the respective mid-points and end terminals by suitable securing means, such as the bolts 26 and screws 27, and these members have the decided advantage of being easily formed from any material having the requisite mechanical strength and electrical conductivity, such as strap iron, without involving any great expenditure in time or labor.

In the particular embodiment shown in Fig. 7, the successive units have been positioned at right angles to each other, although it will, of course, be understood, that they may be arranged in the same horizontal plane. In this particular form, however, by positioning the units at right angles to each other a more suitable arrangement is secured which is a marked advantage.

It will now be seen that there has been provided an improved condenser arrangement adapted for high voltage uses, in which the several assemblies are given a maximum exposure to the cooling action of the air as well as being structurally simplified in such a manner as to permit the installation of any

desired number of standard units to secure a desired electrical characteristic, such as capacity, without involving a redesign for each individual construction. The simplicity of such arrangements is enhanced and made possible by the novel employment of the connecting yoke or strap members or the like which are not only adapted to serve as mechanical supports for the several mid-point assemblies, but also to act as electrical connections therebetween.

What is claimed is:

1. In a condenser installation, the combination with a plurality of insulation-sided metal ended condenser units arranged in alternate right angle planes in a non-columnar arrangement, and mechanically and electrically connected in series in the several stacks, of metal members connecting the ends of the plurality of juxtaposed condenser units with the mid-point of a succeeding unit assembly.

2. In a condenser assembly, the combination with a pair of insulation-sided metal ended condenser units arranged in a common plane, of a common mid-point, and end connections adapted to serve as a mid-point connection to a duplicate assembly.

3. An improved high-potential condenser assembly, including insulation-sided metal-ended condenser units secured together end to end in a plurality of pairs in different planes of which each pair has a common mid-point terminal structure; and means both electrically and mechanically connecting the common mid-point terminal structure of one of said pairs with the metallic end terminal structure of another of said pairs.

4. A conductor yoke of the class described comprising an arcuate central portion provided with means to attach it to the mid-point of a capacitor assembly, integral arms extending from said arcuate portions, and apertured extensions on said arms adapted to be attached to end sections of another capacitor assembly.

5. A conductor support of the class described, comprising a central section and arcuate extensions on each end of said section and means cooperating with said arcuate sections to attach them to the mid-points of succeeding capacitor units.

6. A conductor support comprising an angular yoke having apertured portions midway and near each end, whereby the yoke may be secured to the end portions of a capacitor assembly, and to the mid-point of a succeeding capacitor assembly.

7. A mid-point condenser comprising a stack on each side of the mid-point, insulating material connecting the stack ends and transmitting stack pressure, and metallic means connecting the ends of said condenser but without transmitting to said insulating material, stress due to stack pressure.

8. A mid-point condenser comprising a stack on each side of the mid-point, insulating material connecting the stack ends and transmitting stack pressure, and metallic means connecting the ends of said condenser but without transmitting stress due to stack pressure, said means being under an independent tensional stress.

9. A plurality of at least two neighboring pairs of insulation-sided, metal-ended condenser units combined in an arrangement wherein the units in each pair are arranged end to end in alinement, the pairs are arranged in disalinement; and the plurality of units are mutually supported mechanically and electrically connected in circuit relations with one another, the units of each pair being electrically connected together and held in rigid mutually supporting relation, and the pairs being electrically connected together and held in rigid mutually supporting relation, all by means of a mechanical terminal structure which includes the adjacent metal end members of one pair and the non-adjacent metal end members of a neighboring pair.

10. In an assembly of a plurality of insulation-sided, metal-ended condenser units wherein at least four of such units are arranged in two neighboring pairs and the units in each pair are arranged end to end and mechanically and electrically connected together in rigid relation by way of their adjacent metal ends, the combination with means mechanically supporting the pairs rigidly in their neighboring positions and electrically connecting them together, said means including metallic connecting means extending in angular directions from the non-adjacent metal ends of one pair to the adjacent metal ends of an adjacent pair.

11. In a combination including a plurality of condensers successively including a mid-point connector, said condensers being electrically connected together in an arrangement wherein the mid-point connector of one condenser constitutes a mechanical support for an adjacent condenser.

12. In a combination including a plurality of condensers successively including a mid-point connector and two end-connectors, said condensers being electrically connected together in an arrangement wherein the mid-point connector of a given one of the condensers constitutes a mechanical support for a second one of such condensers, and the two end-connectors of said given condenser constitute a mechanical support for a third one of such condensers.

13. In a combination including a plurality of condensers having mid-point connectors, said condensers being electrically connected together in an arrangement wherein said mid-point connectors constitute mechanical condenser-supports.

14. In a combination including a plurality of electrical condensers having mid-point connectors, said condensers being electrically connected together in an arrangement wherein the mid-point connector of one of such condensers constitues a mechanical support for an adjacent condenser, each condenser including an insulating casing under a tension substantially equal to the stack-compression.

In testimony whereof I hereunto affix my signature.

GREENLEAF WHITTIER PICKARD.