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INSULATOR

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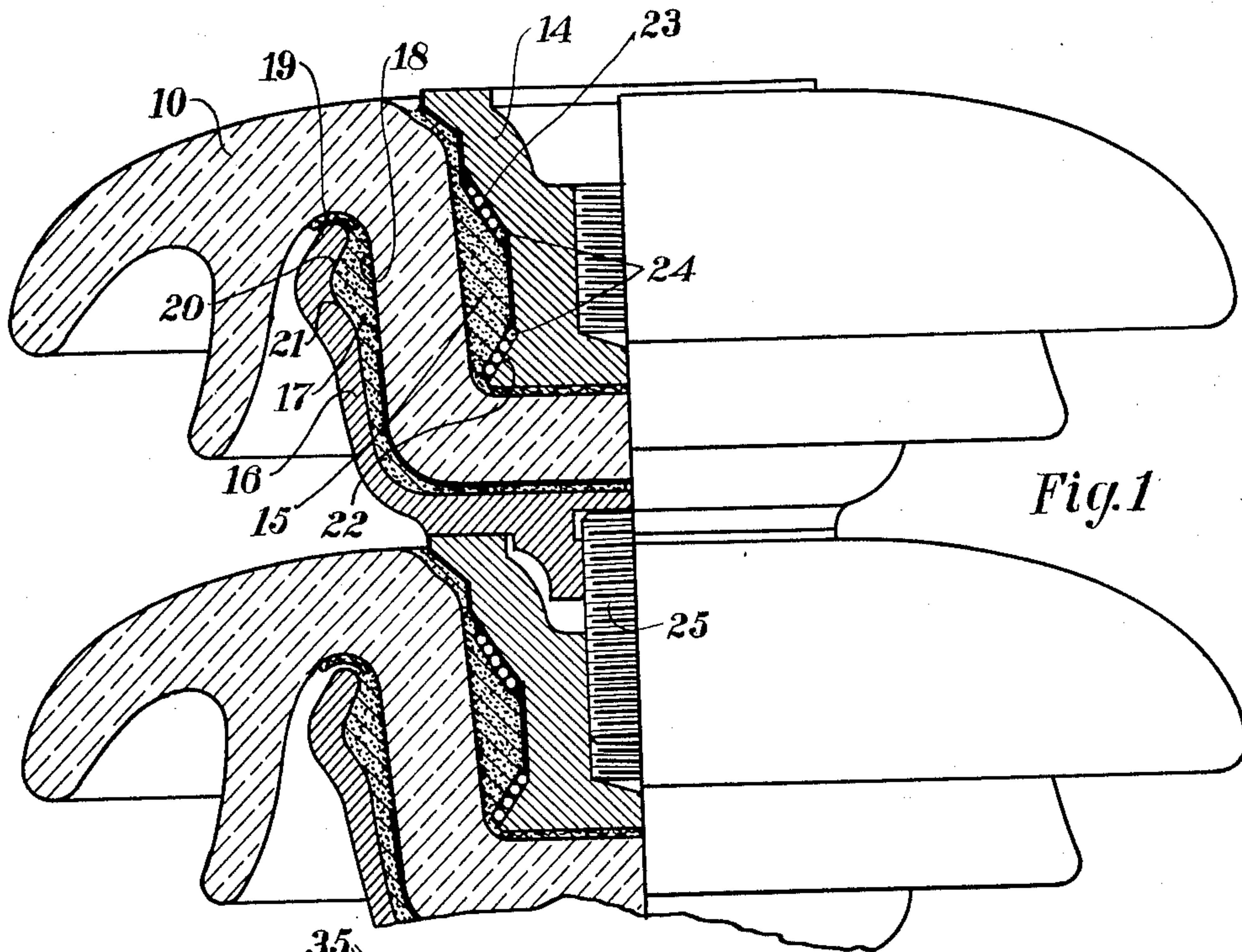


Fig. 1

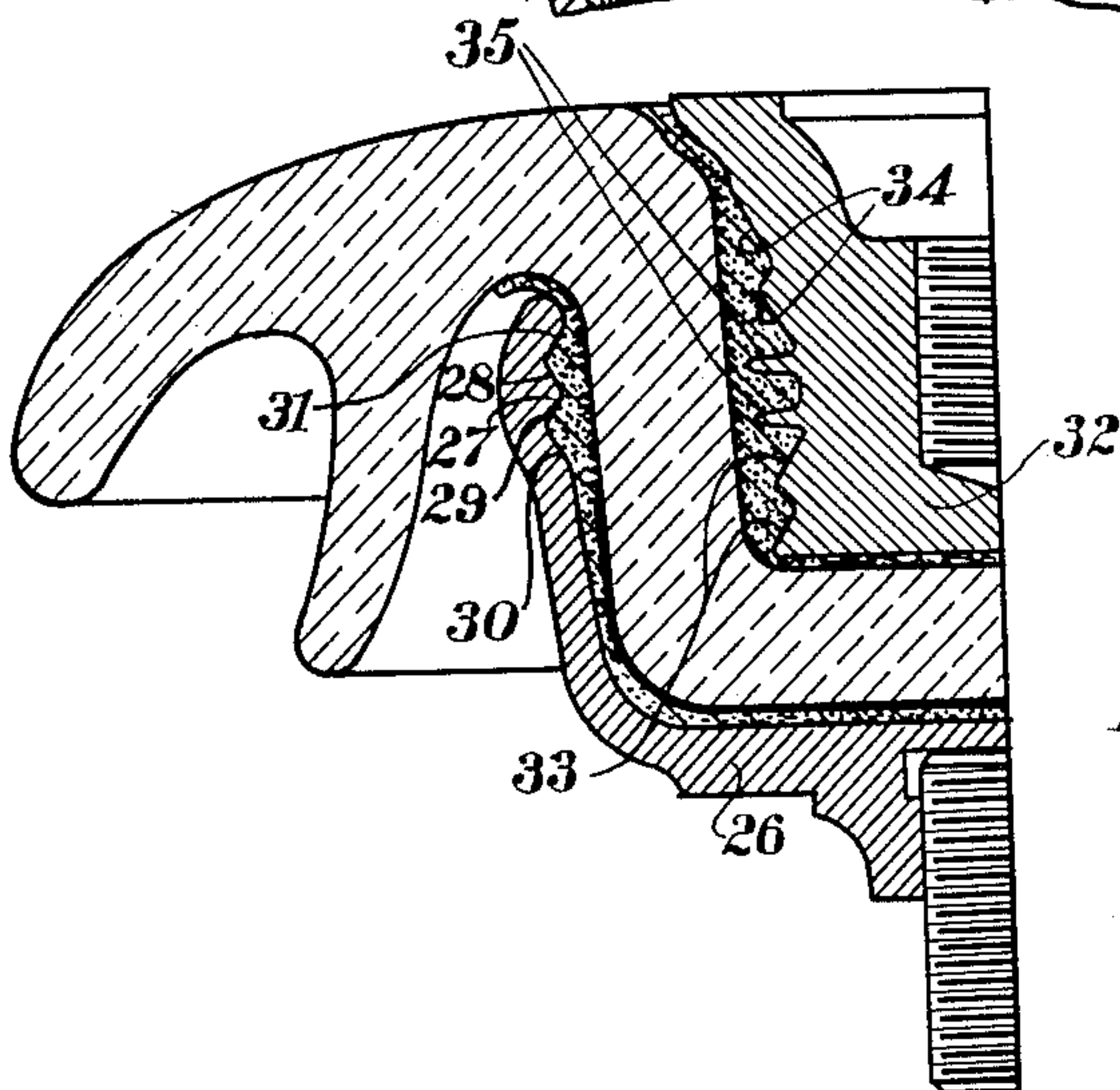


Fig. 2

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INSULATOR

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7 Claims. (Cl. 173-318)

This invention relates to insulators and particularly to insulators subjected to bending moments, such as those used for supporting catenary messengers which carry trolley wires and commonly referred to as catenary insulators. The invention is also adapted to a wide range of uses and is applicable to insulators subjected to tension, compression or bending moments.

One object of the invention is to provide an insulator which is adapted to withstand bending moments, although it may be relatively short in the direction of its axis so as to permit a plurality of units to be connected together to provide insulators of varying lengths.

Another object of the invention is to provide an insulator which is adapted to withstand either tension or compression and also bending moments.

Another object of the invention is to provide an insulator of improved construction and operation.

Other objects and advantages will appear from the following description.

The invention is exemplified by the combination and arrangement of parts shown in the accompanying drawing and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 is a fragmentary elevation with parts in section showing one embodiment of the invention.

Fig. 2 is a fragmentary sectional view showing a modified form of the invention.

Insulators as heretofore manufactured, and particularly insulators of the flat disc type, have been designed to withstand either tension or compression but the individual units have not been adapted to withstand both tension and compression nor to withstand bending moments. The present invention provides an insulator unit, which although of comparatively short dimensions in the direction of its axis, will withstand both tension and compression and also bending moments, and the units are adapted to be connected together so that a stack of any desired length in the direction of its axis may be built up. An insulator of this kind is particularly well adapted for the suspension of catenary messengers for supporting trolley wires, but there are of course many other purposes to which the insulator may be put.

In the form of the invention shown in Fig. 1, the numeral 10 designates an insulating disc of porcelain or other suitable material provided

with an attachment head having a recess in which a metal pin 14 is secured by cement 15. A cap 16 is secured to the outer surface of the attachment head by cement 17; the surface of the dielectric member being suitably roughened to provide a cementing surface 18. A cushion or gasket 19 may be inserted between the rim of the cap 16 and the disc 10 to prevent the cap from bearing directly on the porcelain at this point. The cap 16 is provided with two tapered bearing surfaces 20 and 21, inclined in opposite directions relative to the axis of the insulator. The inner surface of the cap is preferably coated with wax, bitumen or other suitable material to prevent the cement from bonding to the surface of the cap. The pin 14 is also provided with tapered bearing surfaces 22 and 23; the bearing surface 22 being disposed in opposition to the bearing surface 20, and the bearing surface 23 being opposed to the bearing surface 21.

The bearing surfaces of the cap and pin are disposed in symmetrical relation to a plane perpendicular to the axis of the insulator and passing through the apex of the angle formed by the surfaces 20 and 21.

When the insulator is placed under compression, the cement and dielectric material between the surfaces 21 and 23 will receive the load on the insulator and the force of the load will be transmitted between these two surfaces in a direction approximately normal to the bearing surfaces. If the insulator is placed under tension, the load will be received by the bearing surfaces 20 and 22 and transmitted by compression in the dielectric member substantially normal to these two surfaces.

If the insulator is subjected to a bending moment, the insulator at one side of the axis will be subjected to tension and the other side will be subjected to compression, so that one set of bearing surfaces will receive the load at one side of the insulator and the other set of bearing surfaces will receive the load at the opposite side of the insulator. It is thus seen that irrespective of the nature of the load placed on the insulator, opposed bearing surfaces are provided for receiving the force of the load and transmitting the load by compression in the dielectric member. Since the dielectric member has its greatest strength in compression, this strength will be utilized to the best advantage for any form of load to which the insulator is subjected.

In order to prevent concentration of the load

over the bearing surfaces 22 and 23, these surfaces may be covered by a suitable resilient means for distributing the load. In Fig. 1 of the drawing, a helical spring 24, wound in successive convolutions upon the bearing surfaces, is shown for this purpose.

The pin 14 is made comparatively large in diameter so as to provide a comparatively long radius from the axis of the pin to the bearing surfaces 23 and 24, since this radius constitutes the lever arm for the bearing surfaces for resisting the bending moment upon the insulator. The increased diameter of the pin also proportionally increases the amount of bearing surface for a given length of pin. It will be noted that the insulator units are made comparatively flat so that their dimension is relatively short in the direction of the axis, and the units are equipped with stud bolts 25 by which they may be assembled to form a stack of any desired length. Since the units themselves are comparatively short in the direction of their axis, the length of the stack may be accurately adjusted to suit any conditions which may arise.

In the form of the invention shown in Fig. 2, the cap 26 is provided with an inwardly projecting rib 27 which forms supplemental bearing faces 28 and 29. The bearing face 28 will supplement the bearing face 30, and the bearing face 29 will supplement the bearing face 31. The pin 32 is provided with bearing faces 33 opposed to the bearing faces 29 and 31, and with bearing faces 34 opposed to the bearing faces 28 and 30. The pin 32 is also provided with radial resilient flanges 35 which provide resilient means for supporting a portion of the load, either in tension or compression, and for thus relieving the pressure upon the bearing faces 33 and 34.

This is particularly advantageous in the case of a bending moment which tends to place the greater stress upon the outermost bearing faces 33 and 34. The resilient flanges 35, by absorbing a portion of this stress, prevent excessive pressure at the extremities of the pin which otherwise would tend to produce failure in the dielectric member adjacent these points.

I claim:

1. An insulator comprising a dielectric member having an attachment head provided with a recess, a pin secured in said recess, a cap surrounding said attachment head and secured thereto, said pin and cap each having a pair of tapered bearing faces inclined in opposite directions relative to the axis of the pin and disposed in symmetric relation relative to the same plane normal to the axis of the pin, the bearing faces on said pin being opposed to the bearing faces on said cap respectively.

2. An insulator comprising a dielectric member having an attachment head provided with a

recess, a pin disposed in said recess, a cap surrounding said attachment head, said pin and cap each having a pair of tapered bearing surfaces inclined in opposite directions relative to the axis of the pin, cement interposed between said pin and cap respectively and said dielectric member, the bearing surfaces on said pin and cap being arranged symmetrically relative to the same plane normal to the axis of the insulator.

3. An insulator comprising a dielectric member, a pair of metal fittings attached to said dielectric member and each having a pair of tapered bearing faces inclined in opposite directions relative to a common axis and arranged symmetrically relative to the same plane normal to said common axis.

4. An insulator comprising a dielectric member having an attachment head thereon provided with a recess, a pin secured in said recess, a cap enclosing said attachment head and secured thereto, said pin and cap each having a pair of bearing faces inclined in opposite directions relative to the axis of said insulator and disposed symmetrically relative to the same plane normal to said axis.

5. An insulator comprising a dielectric disc having an attachment head projecting from one side thereof and having a recess entering said head from the opposite side of said disc, a pin secured in said recess, a cap surrounding said head and secured thereto, said pin and cap each having a pair of tapered bearing surfaces inclined in opposite directions relative to the axis of said disc and disposed in symmetric relation to the same plane normal to said axis.

6. An insulator comprising a dielectric member having a recess therein, a pin secured in said recess, a cap secured to said dielectric member, said pin and cap, each having a plurality of bearing faces inclined in opposite directions relative to the axis of the pin and disposed in symmetric relation relative to the same plane normal to said axis, and a resilient flange on said pin substantially normal to said axis for transmitting a portion of the load on said insulator.

7. An insulator comprising a dielectric disc having an attachment head projecting at one side thereof, said disc having a recess therein open at the opposite side of said disc, a pin disposed in said recess, a cap surrounding said head, said pin and cap each having a plurality of bearing faces inclined in opposite directions relative to the axis of said disc and disposed in symmetric relation to the same plane normal to said axis, cement securing said pin and cap to said attachment head, and a resilient flange on said pin extending substantially normal to said axis and embedded in said cement for transmitting a portion of the load on said insulator.

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