May 12, 1942. W. HAGEN ET AL 2,283,057

WIRE CARRIER SYSTEM

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FIG. 1.

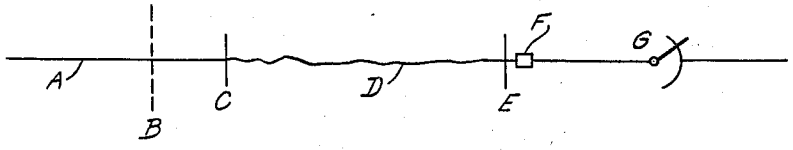

FIG. 2.

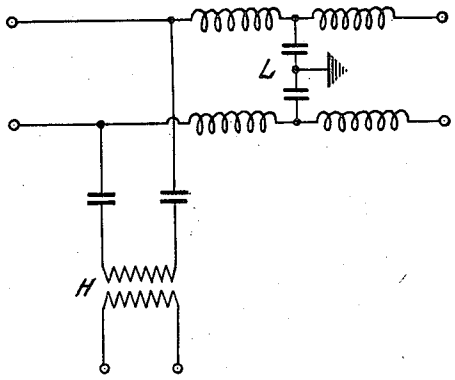

FIG. 3.

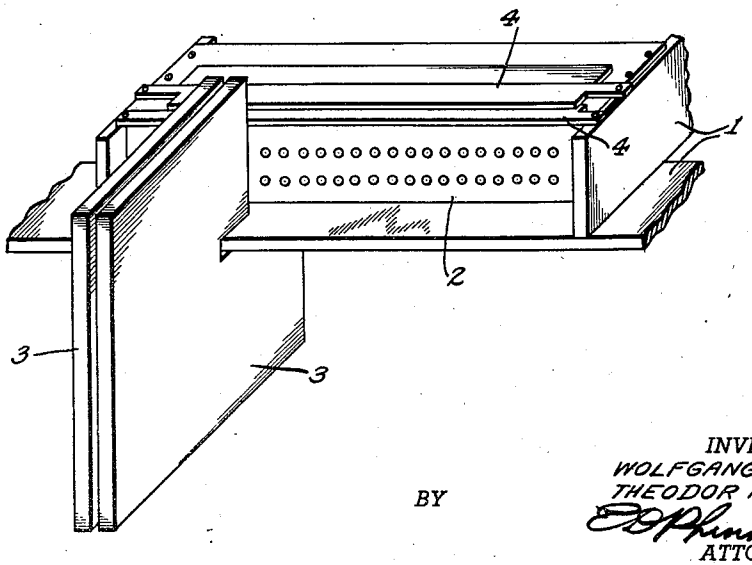

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FIG. 4.

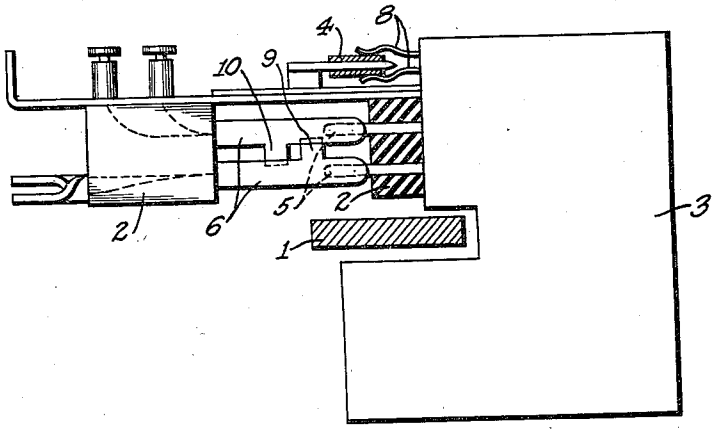
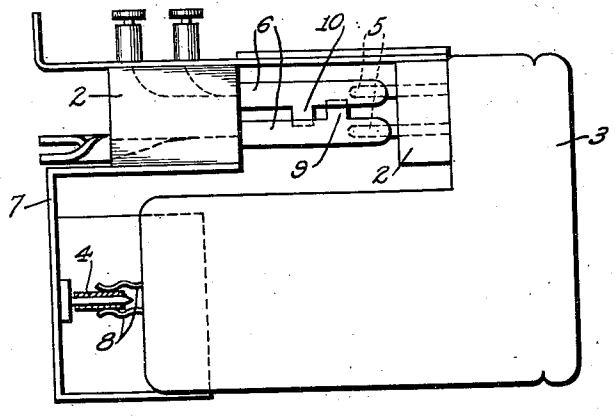


FIG. 5.



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WIRE CARRIER SYSTEM

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5 Claims. (Cl. 179—98)

This invention is concerned with the separating filters provided in carrier frequency telephone systems and consists in certain features of novelty which will appear from the following description and be particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which

Fig. 1 is a diagram that illustrates how telephone lines are usually connected to an exchange or central office. Fig. 2 is a circuit diagram showing a customary construction of separating filters. Fig. 3 represents in perspective a somewhat diagrammatic fragmentary view of one embodiment of the invention. Fig. 4 is a sectional side elevation of the arrangement illustrated in Fig. 3. Fig. 5 is a side elevation of another embodiment of the invention.

In telephone exchanges the incoming lines are in general joined to a so-called main distributing frame that comprises horizontal and vertical connection strips, designated as jack strips, through which these lines are connected to the office lines joined, for instance, to the selectors in the exchange. Such strips at the same time serve for measuring and testing the incoming lines.

This will be understood from Fig. 1. A denotes a cable while B is to represent the inlet thereof. A horizontal jack strip C is connected to a vertical jack strip E by a jumper wire D. Joined to E is a safety fuse F included in the line that is connected with a preselector G or the like.

In order now to supply a carrier frequency to the telephone lines the exchange must have separating filters inserted between B and G, Fig. 1.

Such a separating filter, shown in Fig. 2, acts to supply the carrier frequency by means of a high-pass filter H and to prevent it by a low-pass filter L from flowing to the exchange while the low frequency telephone communication must traverse the low-pass filter without hinderance.

Where the separating filter is fitted to a vertical jack strip E the following disadvantages result. The carrier frequency on its way to the subscribers flows through the jumper lines which in a large exchange may be 100 meters long and which for reasons of service are not screened. Consequently, high frequency energy can happen to be conveyed to other lines while disturbances may be received from these. The effect of the low-pass filter is in part neutralized thereby. Furthermore, for space requirements it is difficult to supply the carrier frequency to the vertical strips because these are associated with the fuses F. For the same reason high-pass filter and low-pass filter are difficult to arrange.

It has therefore been proposed to separate high-pass filter and low-pass filter from each other. This requires the low-pass filter to be fitted to a vertical strip. Such arrangement, however, has the drawback that also in this case the jumper line is liable to receive disturbances. In addition, the high frequency energy passes not only into the subscriber's line but also into the jumper line. The subscriber's line is hence subject to capacitive loading effects which depend on the length of the jumper line. Such loading is disadvantageous especially where amplifiers provided with a reactive coupling are employed, because in this case the efficiency of the amplifiers is decreased in consequence of phase variation. Also, a property of the low-pass filter, namely, that this has a great impedance for high frequency energy, is impaired by the jumper line.

In arrangements as provided by the present invention the width of a separating filter is made to correspond to the test plug used in systems of this kind. By this means any desired lines joined to a jack strip which is the first as viewed from the subscriber may be equipped with separating filters. Equally, the other dimensions of these filters are so small that the jack strip is of easy access during operation.

Comprising high-pass filter and low-pass filter in one device has the advantage that the number of terminals of this device is only six.

Fig. 3 shows some of the bars 1 of which the main distributing frame is composed and also represents a horizontal jack strip 2, two separating filters 3, and two contact bars 4 formed with soldering tabs at both of their ends.

Each filter 3 comprises the high-pass filter H and the low-pass filter L shown in Fig. 2, and has a casing for these which is composed of a frame of insulating material and thin sheet metal plates which form the side walls of such casing and also serve for screening. These casings are given a width of 4 to 6.5 millimeters each. The said insulating frame thereof carries plug pins 5 and a pair of contact springs 8. The pins 5 are inserted in the holes of the jack strip 2, thus holding the filters in position, and are to act on contact springs 6 in order to interrupt low frequency paths that comprise the springs 6 and telephone lines connected to these springs in the usual manner. With the filters 3 in this position the high frequency bars 4 are engaged by the contact springs 8.

Although only two contact springs 6 are shown

in Figs. 4 and 5 it will be appreciated that four springs are necessary to effect the insertion of the low pass filter L in the line. Two further flat springs similar to the springs 6, but without the contact tongues 9 and 10 are mounted behind the springs 6. Normally the contact tongue 9 on the lower front spring makes contact with the inner face of the upper rear spring and the contact tongue 10 on the upper front spring makes contact with the inner face of the lower rear spring so as to complete the line circuit. The plug pins 5 are split along their length in the plane of the paper, the two halves of each pin being insulated from one another. The half portions of one pin are connected to the input terminals of the low frequency filter and the half portions of the other pin are connected to the output terminals of this filter. When the pins 5 are inserted in the appropriate holes of the jack strip 2, their tips pass between the upper and lower pairs of contact springs forcing them outwardly so as to break contact at the tongues 9 and 10 and thereby open the line conductors. At the same time the half portions of the split pins 5 make contact with the front and rear springs respectively so as to insert the filter unit in the line.

The bars 4 are shown in Fig. 4 to be mounted on the jack strip 2. They may, however, be located below this strip, as represented in Fig. 5. In the latter case the utilization or space is still better while the vertical dimension of the filters 3 is less than in the case of Fig. 4. The bars 4 are mounted on a bracket 7 that may be of sheet metal. This bracket also serves as a guide for the filters 3.

Since the low-pass filter is looped into the telephone lines with the aid of the contact springs 6 these lines need not be spliced or provided with soldered joints.

Furthermore, as the jack strip itself is employed for holding the filters 3 in position its springs are accessible as soon as the filters are removed from it, no separate holding device being arranged in front of the jack strip.

As is well known a number of jack strips are located beside each other and one above another.

The soldering tabs of the bars 4 are so long that the bars 4 of a jack strip can be connected with those of a neighbouring jack strip. All of the bars 4 may be connected in series and the high frequency energy may be supplied at one side of the main distributing frame. Also, any number of jack strips may be comprised in this way and the high frequency energy may be supplied through a special transformer.

When fastening the bars 4 in their position on the jack strips these are not removed from the bars 1. Only some fastening screws must be removed in order to fasten to the jack strips a holding device for the bars 4.

The plug pins 5 are springy to some extent and will thus overcome inaccuracies of the jack strips.

The vertical dimension of the separating filters is such that they do not extend beyond the level of the upper ends of the binding posts for the cables.

What is claimed is:

1. A filter rack assembly structure for a telephone exchange system which comprises, a main distributing frame in this exchange, jack strips forming part of this distributing frame, telephone lines connected to said jack strips, these strips having holes for the insertion of junction plugs, break contacts in said telephone lines, separating filters each comprising a high-pass filter section, a low-pass filter section and a casing for these sections, said filters having conductive plug pins adapted to be inserted in said holes and thereby to open the said break contacts, thus looping the low-pass filter into the telephone line connected to said break contacts, two contact bars to be supplied with high frequency energy, and contact means, carried by said filters, for connecting these bars to the high-pass filter when said plug pins are inserted in said holes.

2. A system according to claim 1, wherein the separating filters are 4 to 6.5 millimeters in width and wherein the plug pins and contact means of these filters are fastened in a wall thereof which is of the said width.

3. A system according to claim 1, wherein the said high frequency contact bars are strips which extend along the jack strips and are mounted on these.

4. A system according to claim 1, wherein the said high frequency contact bars are strips which extend along the jack strips and are mounted below these.

5. A system according to claim 1, wherein the said contact means of the separating filters is a spring contact plug which at the same time serves to guide the separating filter in lateral direction.

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