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ELECTRICAL SIGNALING SYSTEM

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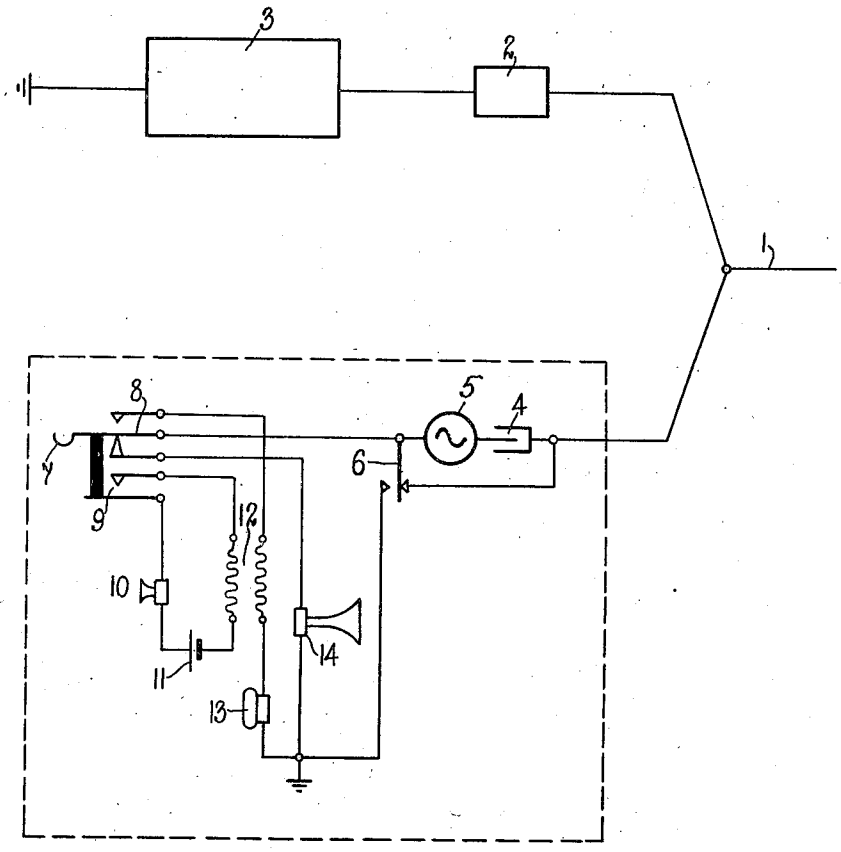

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ELECTRICAL SIGNALING SYSTEM

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2 Claims. (Cl. 179—3)

The present invention relates to electrical signaling systems and is more particularly concerned with systems in which telegraphy and telephony are enabled to take place simultaneously over the same circuit. The invention moreover is particularly applicable though not limited to cases in which the signaling is effected over a single line with earth return, which line may be of a temporary nature as in military operations or the like.

One of the most serious difficulties which have been experienced in the design of systems of the character indicated is that of providing means for calling on the telephone circuit which shall not interfere seriously with the telegraph equipment. This equipment will normally be extremely sensitive and is likely to be damaged, or at any rate put out of adjustment, if it is traversed by comparatively high voltage alternating current such as is usually employed for ringing purposes in a telephone circuit. The use of filters which will cut off all currents above a comparatively low frequency is not by itself sufficient since it does not take care of transients and also of the fact that if a magneto generator is used and is permanently connected up the currents generated initially while the crank handle is being turned slowly will be of very low frequency and will not be satisfactorily cut off by the filter.

According to the invention in a signaling system of the type described, damage to the telegraph receiving equipment by telephone calling current is prevented by the use of a filter with a low cut-off in the telegraph circuit in conjunction with a small condenser in series with the calling generator. As will be readily appreciated, the effect of the condenser is to offer a high resistance to currents of low frequency and since these currents will also be of low voltage, the actual current flowing through the telegraph equipment is not sufficient to cause interference or damage. As the operator rotates the handle of the generator at a faster speed, both the voltage and the frequency of the current increase and consequently more current passes through the condenser. By the time this current reaches serious proportions, however, the frequency will be such that the filter will have come into operation and thus the telegraph receiving equipment is protected.

The invention will be better understood from the following description of one method of carrying it into effect which should be taken in conjunction with the accompanying drawing. This shows diagrammatically the apparatus at one end of the line and it will be assumed that the apparatus at the remote end is similar. The incoming line 1 has connected to it by way of the low-pass filter 2 the telegraph equipment generally indicated by the rectangle 3, and the telephone equipment enclosed in the dotted rectangle is connected to the line in parallel therewith. The telephone equipment comprises the small condenser 4 which is in series with the magneto generator 5 and connected so that both are normally short-circuited by the contact 6 which is operated when the generator handle is turned. The switch-hook is represented by 7 and operates the springs 8 whereby either the calling equipment or the speaking equipment is connected up and also the springs 9 which serve to complete a circuit for the transmitter 10 from the battery 11 by way of the primary of the speech transformer 12. The secondary circuit of this transformer includes the telephone receiver 13 while the circuit over the contact engaged by the switch-hook spring 8 includes the calling signal 14.

In the arrangement shown this comprises a telephone receiver suitably mounted and provided with an amplifying horn so that it will produce a magnified howl varying in pitch according to the speed of the generator at the other end of the line. Alternatively, the equipment for responding to calling signals in the telephone circuit may consist of a drop indicator of the usual type preferably shunted by a dry rectifier in order that it may operate reliably with the alternating current. This drop could be arranged to close a local circuit for a bell or the like in the usual manner.

The generator 5 is preferably of the type commonly used for telephone purposes which when operated at full speed will produce current of a frequency in the neighbourhood of 150 cycles. The filter 2 is conveniently arranged to pass only currents of a frequency less than about 20 cycles.

It is not essential that the condenser 4 should be normally short-circuited and it might be included in the speaking circuit in so far as it did not interfere with speech requirements. Alternatively it might be included in the lead by which the generator is connected to earth, the important point being that it should be in the circuit to line when the generator is being used. Similarly the generator could merely be disconnected rather than short-circuited when it was not being used.

The equipment will normally be arranged for duplex working and the equipment at the two ends may be identical, or there may be differences

due to different conditions. The arrangement is particularly suitable for field signaling purposes as used in military operations, in which case the line may be terminated at one end in buildings of a more or less permanent nature, while the other end may be in the field and actually on the move.

With the arrangement according to the invention in adidtion to the advantage that independent telegraphy and telephony may take place over the same wire there is the further advantage that the telegraph and telephone positions need not be adjacent since the telegraph and telephone circuits are quite separate, and even calling on the telephone circuit which is likely to produce considerable more disturbance than speech will not interfere with the normal telegraph operation.

I claim:—

1. In a combined telephone and telegraph line, a pair of branch circuits connected to the line in multiple, one branch circuit including telegraph equipment and a low pass filter connected in series in said one branch, the other branch including telephone equipment, a calling generator and a condenser connected in series with the telephone equipment in said other branch, said low pass filter preventing signaling current from the generator from passing into the first branch, and said condenser preventing sub-normal frequencies in the telephone circuit from reaching the line.

2. A combined telephone and telegraph circuit comprising a line, a branch circuit connected to the line including telegraph equipment and a low pass filter in series therein, another branch circuit connected to the line in multiple with the first branch including in series therein, telephone equipment, a magneto generator, and a condenser, said generator and condenser normally short circuited, and means for removing said short circuit whenever the generator is operated, said low pass filter and condenser preventing interference between said branches.

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