

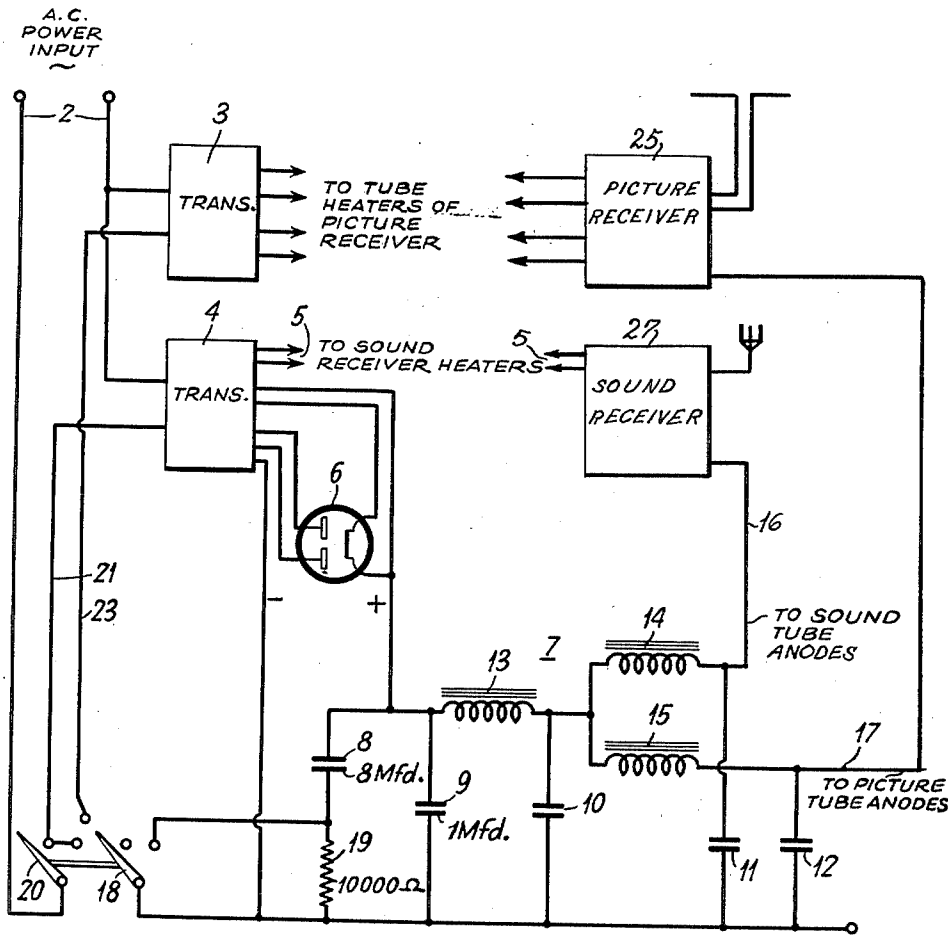
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POWER SUPPLY ARRANGEMENT FOR VARIABLE LOADS

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POWER SUPPLY ARRANGEMENT FOR
VARIABLE LOADS

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The present invention relates to power supply arrangements for variable loads, and more particularly power supply arrangements comprising a rectifier arrangement for supplying smooth rectified current to a load of which a substantial part may be switched in or out of circuit while the remainder of the load remains in circuit.

The invention has been developed more especially for use in connection with combined broadcast and television receivers of low cost which may be used for receiving vision signals and accompanying sound signals, which receivers are also required to be able to receive sound signals alone and not accompanied by vision signals. In such receivers it is important that the number of tubes employed and the power consumption should be kept as low as possible. It is also important to make the useful life of the receiver as long as possible compatible with a low operating cost.

For example, in a low cost combined broadcast and television receiver, a total of sixteen tubes may be employed only six of which are required for operation when the receiver is used for broadcast reception and all sixteen tubes being required for operation when vision and accompanying sound signals are being received. Clearly, for the purposes of economy in use and power consumption in such receivers it is desirable to switch off the unused vision stages completely when only sound is required to be received. To enable this to be done the stages required for television purposes and the stages required during broadcast reception may be provided with completely separate power supply arrangements comprising, for example, separate transformers connected or adapted to be connected to supply mains. Such an arrangement would require separate rectifiers and smoothing arrangements with each transformer and would consequently require duplication or further multiplication of components. Another method which might be contemplated is to arrange the whole of the high tension supply for the television and broadcast stages to be supplied from one rectifier or rectifying arrangement. However, such an arrangement has the disadvantage that the high tension supply is subject to a greatly varying load between the broadcast sound and television settings resulting in a dangerous rise of voltage in the broadcast position, and known methods of effecting suitable regulation of the transformer, chokes and other components are prohibitive in cost. If the expedient of switching in a dummy load is resorted to, this wastes power.

The object of the present invention is to provide a rectifier arrangement for supplying smooth rectified current to a load of which a substantial part may be switched in or out of circuit, the arrangement being suitable for use in a low cost receiver for combined broadcast and television reception.

In accordance with the invention an arrangement for supplying smoothed rectified electric current to a load of which a substantial part can be switched in or out of circuit is provided said arrangement including filtering or smoothing means comprising inductance in series and capacity in shunt with the supply line to the whole of the load, the arrangement being such that when said part of the load is switched out of circuit, a part of said shunt capacity is rendered substantially ineffective.

Preferably said part of said shunt capacity is connected in series with a high resistance having a switch connected across it, said switch being so arranged as to be closed when the whole of the load is switched in and to be opened when said part of the load is switched off.

In applying the invention to a combined broadcast and television receiver, the switch means associated with the shunt capacity in the filter circuit of the power supply for the receiver are preferably linked with switch means for conditioning the receiver as a whole to operate in respect of television or normal broadcast signals as required. The power supply switching arrangement being operated automatically when the receiver is conditioned for one or other kind of reception.

The nature of the invention and the method of carrying the invention into effect will be fully understood from the following description with reference to the single figure of the drawing which is a circuit diagram of a power supply arrangement according to the invention, as applied to a receiver intended for use for broadcast or television reception as desired.

In the arrangement shown in the drawing alternating current supply leads are indicated at 2. To the leads 2 is connected an arrangement represented by rectangle 3 comprising transformers as necessary for supplying alternating current required for the heaters of the tubes used in the receiver 25 for vision signals only and for the energization of the cathode ray tube used in reconstituting the received picture. There is also connected a further group of transformers included in the rectangle 4 from which current is supplied to the heaters of tubes used in the sound

signals receiver 27 which are also effective both in respect of the sound signals accompanying the vision signals and in respect of ordinary broadcast sound signals, the leads for this purpose being indicated at 5. The block 4 also includes a transformer through which the rectifier 6 is energized for the purpose of providing a high tension supply for all the tubes in the receiver. The output of the rectifier 6 includes a filter circuit generally indicated at 7 including a number of shunt condensers 8, 9, 10, 11 and 12 respectively and also a number of series inductances 13, 14 and 15 respectively, the condensers and inductances being arranged in association in well understood manner, except that the first two condensers 8 and 9 are both arranged in front of the first inductance 13 so as to be the equivalent of, when both are switched in, a single shunt capacity. The inductances 14 and 15 and associated condenser 11 and 12 are shown to be connected in two supply circuits, the lead 16 connected to the inductance 14 and condenser 11 being used for the high tension supply to the tubes used in the broadcast sound receiver 27 and the lead 17 connected to the inductance 15 and the condenser 12 being used for the high tension supply for the tubes used in the television receiver 25. Inductance 14 may be constituted by the field winding of the loud speaker of the receiver.

In a typical case, the current required to be supplied over line 16 was 60 milli-amperes and the current to be supplied over line 17 was 100 milli-amperes. It is therefore clear that if the vision or picture tubes are cut out of circuit the major part of the load in the arrangement 7 is removed and unless precautions are taken a dangerous rise in voltage may be set up in the arrangement which may over-load the tubes or other components which remain connected for broadcast reception. Accordingly, in accordance with the invention, a switch 18 is arranged in series with the condenser 8 whereby the condenser 8 can be rendered substantially ineffective when the receiver is not being used for reception of vision signals, the switch 18 being preferably shunted by a high resistance 19 the potential drops across which maintains substantially the full static charge on the condenser 8 when the switch 18 is open so that there is no appreciable sudden charging action when the switch 18 is closed. Preferably the switch 18 is mechanically linked with a switch 20 which is included in the power input circuit for the transformers 3 and 4. Switches 18 and 20 are shown in the "off" position. In the next position the switch 20 completes a circuit over conductor 21 for the sound receiver only. In the final position of the switches 18 and 20 the sound receiver is maintained energized, the picture tubes are placed in condition for operation by energizing transformer 3 over conductor 23 and the filter circuit is altered by placing the condenser 8 directly across the output of the rectifier tube 6 in order to maintain proper anode potentials for the tubes. Accordingly by a single control element the device may be made inoperative, or it may be completely conditioned to operate as a sound receiver only or as a combined picture and sound receiver, as desired.

In a particular case the value of the choke 13 was ten to fifteen henries, the capacity of the condenser 8 was eight microfarads and of the condenser 9 one microfarad and the value of resistance 19 was 10,000 ohms. It was found that the effect of the reduction of the filter input

shunt capacity in the manner described was sufficient to compensate for the reduction of the current flowing in the choke 13, which, as will be seen, is reduced to about 40% of its maximum value in the case when only sound signals are being received.

In some cases, if desired, condenser 9 can be eliminated entirely, shunt condenser 10 and 12 then being utilized to provide the effective shunt capacity in the filter circuit when the smaller load is being supplied.

I claim:

1. A power supply unit for supplying rectified and filtered electric current to a load in which a substantial part of the load may be switched in or out of the circuit, the power supply unit including a rectifier and an associated filter, said filter comprising a series inductance and capacitances in shunt with the power supply line to the load at the input and output ends of said inductance, and means for substantially reducing the effectiveness of a part of said shunt capacitance at the input of said inductance when part of the load is switched out of the circuit.

2. An arrangement according to claim 1, wherein at least a part of the filter input shunt capacitance is connected in series with a high resistance having a switch connected in parallel therewith, said switch being so arranged as to be closed when the entire load is switched in and to be opened when a part of the load is switched off.

3. A combined broadcast sound and television receiver comprising means for switching off unused picture stages when only sound signals are to be received, a supply power unit including a rectifier and a series inductance and parallel capacitance filter network, and means for altering the input capacitance of the filter network in accordance with the operation of said first named means.

4. In combination with a television receiver including a sound receiver and a picture receiver for simultaneous sound and picture reproduction or for sound reproduction alone, a supply power unit including a rectifier and a filter network, and means for altering the input capacitive reactance of the filter network in accordance with the operation or non-operation of the picture receiver.

5. In combination with a television receiver for simultaneous sound and picture reproduction or for sound reproduction alone, a supply power unit including a rectifier and a filter network, switch means for selectively placing the sound receiver in operation alone or for operating the sound receiver with the picture receiver, and means operable in conjunction with said switch means for altering the input capacitive reactance of the filter network in accordance with the selection.

6. A power supply unit for supplying rectified and filtered energy to one or another of a plurality of load circuits, having different load requirements comprising a rectifier and an associated filter network, said filter including a series inductance and parallel filter input and output capacitances, and means for altering the input capacitive reactance of the filter network in accordance with the application of the different loads to maintain the output potential of the power unit substantially constant.

7. In a power supply system, a source of pulsating current, a filter for smoothing out the pulsations of said current, a pair of load circuits with diverse load requirements, means to effect

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an electrical connection of the output side of the filter at will to either load, and means coupled to said switching means for altering the circuit configuration of the input termination of the filter to provide one terminating configuration 5 when the connection of the first load is effected and another terminating configuration when the connection of the second load is effected.

8. In a power supply system, a source of pulsating current, a filter for smoothing out the pulsations of said current, a pair of load circuits with diverse load requirements, switching means to effect an electrical connection of the output side of the filter at will to either load, and means simultaneously operating in conjunction with 10 said switching means for altering the circuit configuration of the input termination of the filter

to provide one terminating configuration when the connection of the first load is effected and another terminating configuration when the connection of the second load is effected.

9. In a power supply system, a source of pulsating current, a filter for smoothing out the pulsations of said current, a pair of load circuits with diverse load requirements, switching means to supply either load with useful energy from the filter, and means controlled by the switching means for altering the circuit configuration of the input termination of the filter to provide one terminating configuration when the connection of the first load is effected and another terminating configuration when the connection of 15 the second load is effected.

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