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VOLTAGE CONTROL OF GENERATORS IN ELECTRICAL INSTALLATIONS OF VEHICLES

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Fig. 1

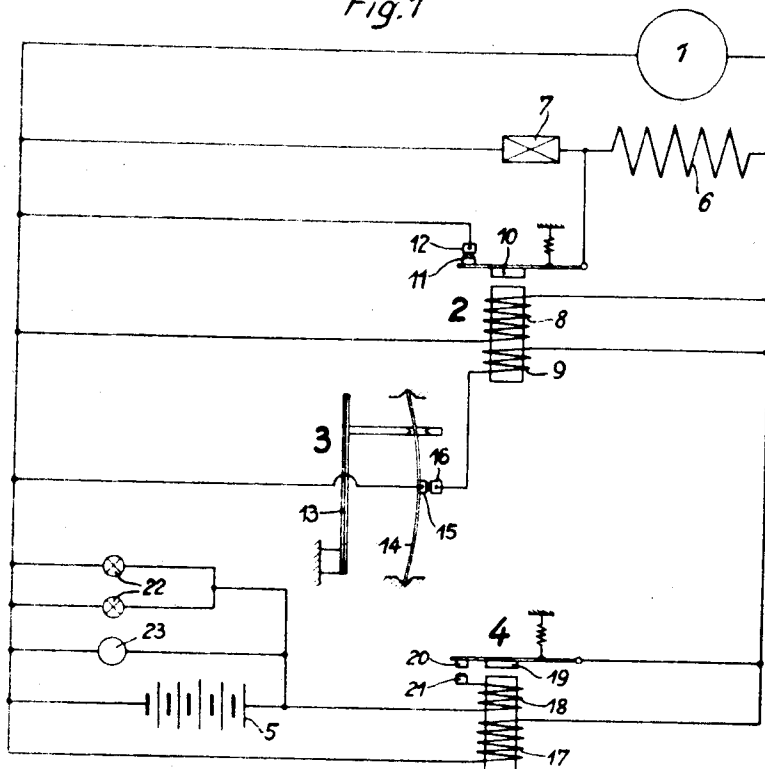
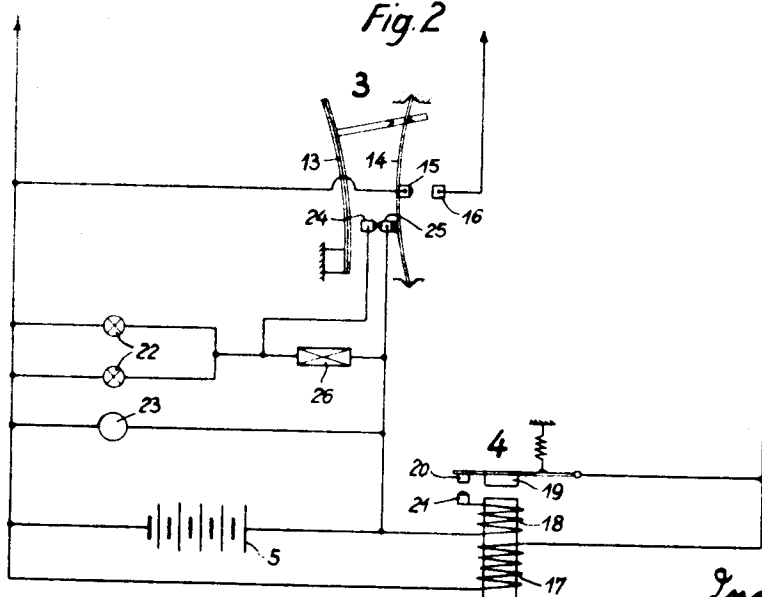


Fig. 2



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VOLTAGE CONTROL OF GENERATORS IN
ELECTRICAL INSTALLATIONS OF VE-
HICLESFriedrich Menzel, Stuttgart, Germany, assignor to
Robert Bosch Gesellschaft mit beschränkter
Haftung, Stuttgart, GermanyApplication October 19, 1938, Serial No. 235,891
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3 Claims. (Cl. 171—314)

The present invention relates to devices for governing generators adapted to charge accumulators of installations on motor and other vehicles.

The charging voltage of an accumulator is known to depend on temperature and in fact it increases with a decreasing temperature. It is desired to charge the accumulator in cold weather at least as quickly as in warm conditions, for in winter, the discharge of the accumulator is particularly large on account of the greater current consumption for lighting and starting.

Again it is known to reduce the controlled voltage of the generator at a fairly high temperature by means of a bi-metal switch.

According to the present invention, the heat-sensitive switch is constructed as a snap switch and on increasing heating it is adapted to effect reduction of the voltage to the generator at a substantially higher temperature than that at which it causes an increase of the voltage during a drop in temperature.

With an arrangement according to the present invention the changing over to a lower voltage occurs only at such a temperature—for instance between 30° and 40° C.—which is a temperature above that reached in short journeys in winter. For this reason the accumulator is efficiently charged during the cold part of the year during short journeys in town, in which the vehicle starter is used frequently.

On the other hand, the changing over to the higher voltage only occurs at a considerably lower temperature, such as for instance between 0° and 5° C., so that such change over does not take place during every small cooling off temperature range in summer.

Two examples of construction of the present invention are shown in the accompanying drawing, in which—

Fig. 1 illustrates schematically one embodiment, and

Fig. 2 illustrates a modified form of the invention.

In Figure 1, a continuous current dynamo is shown at 1, a voltage governor at 2, a heat-sensitive switch at 3, a charging switch at 4, and an accumulator at 5. The continuous current dynamo 1 has an excitation winding 6 and a resistance 7 disposed in series therewith.

The voltage governor 2 has a voltage coil 8 and a coil 9 counteracting the latter, and also an armature 10 which influences a pair of contacts 11, 12.

The heat-sensitive switch has a bi-metal spring 13 which is connected with a snap spring 14 gripped for instance at its ends or rim. On the spring 14 is a contact 15 which co-operates with a contact 16 connected to the end of the coil 9.

The charging switch 4 has a voltage coil 17 and a current coil 18, and its armature 19 actuates a pair of contacts 20, 21. 22 denotes lamps and 23 any other current consumers.

The voltage governor 2 works in the manner of the known vibration governors and controls the voltage of the dynamo 1, for instance by periodic switching on and off the resistance 7 in the circuit of the excitation winding 6, or in any other suitable manner.

In the position according to Figure 1, the heat-sensitive switch 3 maintains its pair of contacts 15, 16 closed and remains in this position under all circumstances below a predetermined temperature, for which is assumed for example as 0° to 5° C. So long as the pair of contacts 15, 16 remain closed, the electric circuit includes the coil 9 which is traversed by current in the opposite direction from the coil 8. In order to cause the governor 2 to respond, the coil 8 must therefore be traversed by more current than with the coil 9 switched off. The dynamo 1 is therefore governed to generate a higher voltage, so that the accumulator 5 is charged rapidly corresponding to the requirements with cold conditions.

Should the bi-metal spring become heated above the predetermined temperature, then the spring 14 is only able to push it through to the left at a considerably higher temperature, for instance at 30° to 40° C., whereby the pair of contacts 15, 16 is opened and the coil 9 is de-energised. When this occurs, the coil 9 no longer counteracts the coil 8 and the governor 2 responds on a smaller passage of current through the coil 8 than with the coil 9 energised. The governed voltage of output of the dynamo 1 consequently becomes smaller, so that the accumulator 5 cannot be overcharged.

Again should the heating of the bi-metal spring 13 then decrease, for instance while the vehicle is stopped, then the snap spring 14 is only able to press it to the right again at the temperature of 0° to 5° C., whereby the pair of contacts 15, 16 is again closed and the coil 9 energized. Thus on decreasing heating, the governor 2 first continues to govern the low voltage, whilst only on considerable cooling off, to be-

tween 0° and 5° C., for instance, does it again govern to high voltage output of the dynamo.

In the warm period of the year, the bi-metal spring will not cool off to 0° C. at all and thus the heat-sensitive switch 3 will maintain the pair of contacts 15, 16 permanently open.

In the cold part of the year on the other hand, at the beginning of a journey, a temperature of 0° to 5° C. at the most will generally be present and thus the heat-sensitive switch 2 will keep the pair of contacts 15, 16 closed. During short journeys in town such as frequently occur during the cold period of the year, the heat-sensitive switch 3 will rarely heat up to 40° C., so that control is permanently effected to higher voltage and the accumulator is charged quickly. Only on long journeys, which make possible a sufficient charging of the accumulator, will the heat-sensitive switch become heated to 40° C., in winter, whereupon the governor governs to lower voltage.

The heat-sensitive switch 3 is appropriately accommodated in the neighbourhood of the accumulator or at a point at which it is substantially exposed to the same conditions of heating and cooling as the accumulator. It is generally sufficient to instal the heat-sensitive switch below the base of the governor, where it is not exposed to the influences of the heating of the governor.

The type of construction of the heat-sensitive snap switch may be as desired. It is not compulsory for the snap spring to be gripped at the rim but it can also be arranged in any other desired manner. Again the snap spring itself may be constructed as a bi-metal spring, so that a separate bi-metal spring is not necessary.

In the switching diagram given in Figure 2, the upper half, of the circuit is the same as that of Figure 1 and has therefore been omitted. The heat-sensitive switch 3 is shown in a position in which the snap spring 14 has been pushed through to the left. The snap spring 14 has, apart from the contact 15, a further insulated contact 25 which co-operates with a contact 24. The contacts 24, 25 are each connected with an end of a resistance 26 which is situated in series with the circuit of the lamps 22. This resistance 26 is thus switched off when the dynamo governs to low voltage and is switched on when the dynamo governs to higher voltage. This avoids the lamps being too highly stressed during operation with higher voltage.

I declare, that what I claim is:

1. In combination, a battery, a generator for charging said battery, an electromagnetic regulator for regulating the voltage of said generator, a heat-sensitive snap switch including a contact operated thereby for controlling the energizing of said regulator so that the regulated voltage of said generator is reduced upon increase in temperature at a predetermined temperature of said heat-sensitive snap switch, the said snap switch operating the said contact upon increase in temperature at a substantially higher temperature than on decrease in temperature and operative to maintain said reduced voltage condition upon decrease in temperature substantially below said predetermined temperature whereby said switch operates only upon seasonal variations in temperature.

2. In combination, a battery, a generator for charging said battery, an electromagnetic regulator for regulating the voltage of said generator, a heat-sensitive snap switch including a contact operated thereby for controlling the energizing of said regulator so that the regulated voltage of said generator is reduced upon increase in temperature at a predetermined temperature of said heat-sensitive switch, the said snap switch operating the said contact upon increase in temperature at substantially +30° C. to +40° C. and upon decrease in temperature at substantially 0° C. to +5° C.

3. In combination, a battery, a generator for charging said battery, an electromagnetic regulator for regulating the voltage of said generator, a heat-sensitive snap switch including a contact operated thereby for controlling the energizing of said regulator so that the regulated voltage of said generator is reduced upon increase in temperature at a predetermined temperature of said heat sensitive snap switch, the said snap switch operating the said contact upon increase in temperature at a substantially higher temperature than on decrease in temperature, a lamp circuit for said battery, a resistance in series with said lamp circuit, and means controlled by said heat-sensitive switch and being operable, simultaneously therewith to exclude said resistance from said lamp circuit upon reduction in the regulated voltage of the generator and to include said resistance in said lamp circuit upon increase in the regulated voltage of the generator.

FRIEDRICH MENZEL