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COMBINED ELECTROMAGNETIC GOVERNOR AND SWITCH

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Fig. 1

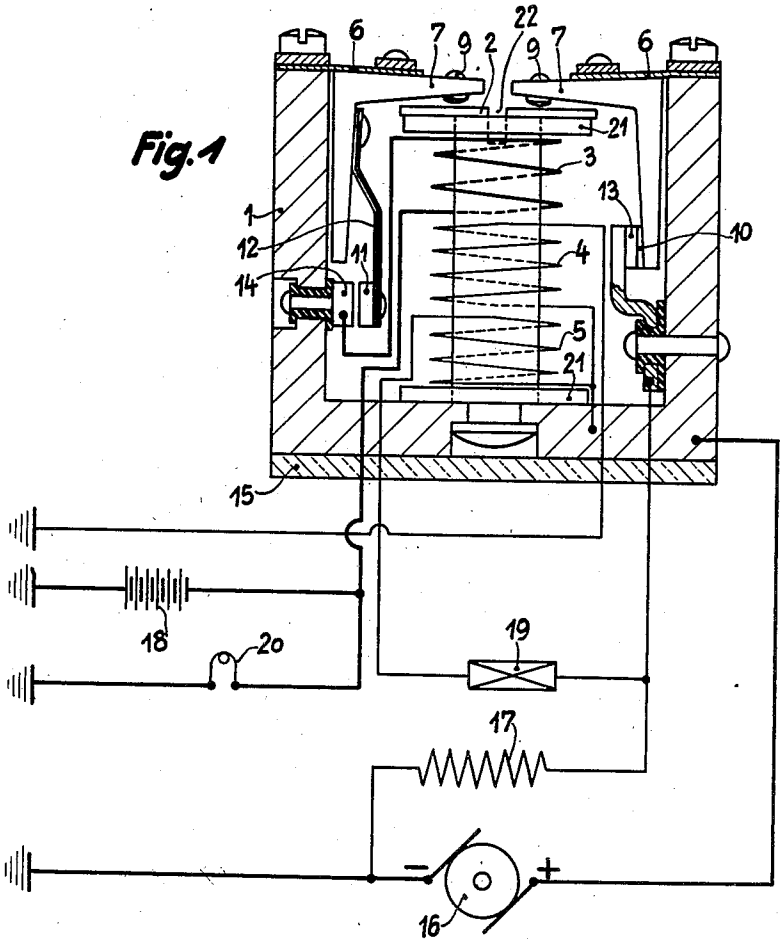
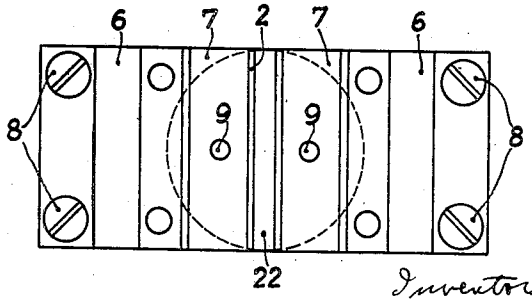


Fig. 2



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COMBINED ELECTROMAGNETIC GOVERNOR AND SWITCH

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8 Claims. (Cl. 200—103)

The invention relates to combined electromagnetic governors and switches more particularly for electrical systems on vehicles having an armature for the governor and switch and a common electromagnetic core which is disposed vertical to the base plate of a U-shaped iron frame.

According to the invention, the two armatures secured at each end of the U-shaped frame extend over the attractive surface or pole face of the electromagnetic core up to about the centre of the same and the contacts influenced by the two armatures are located within the U-frame.

The two armatures are fairly short through this arrangement. This is not only advantageous on account of the compact construction of the governor switch obtained thereby, but also because, as a result of the short lever arm, the two armatures cannot be put into vibration so easily through the shocks when the vehicle is in motion. In addition, the U-shaped frame protects the contacts mounted within the same against damage from without.

One form of construction of the invention is shown by way of example in the drawing as a combined governor switch arrangement for the electrical system of a motor vehicle.

Figure 1 is a vertical section through the governor switch together with a circuit diagram.

Figure 2 is a plan view of the governor switch.

An iron core 2 is riveted to the base plate of a U-shaped frame 1 preferably of sheet iron, a current coil 3, a voltage coil 4 and a demagnetizing coil 5 being wound about this iron core. Two copper rings 21 which act as a damping winding are placed on the two ends of the core 2. Two armatures 7, the left hand armature for the switch and the right hand armature, as seen in Figure 1, for the governor, are suspended from leaf springs 6 which are secured by screws 8 to the ends of the two arms of the U-shaped frame 1. The two armatures 7 have the form of a right angle with arms of approximately equal length which are tapered towards their ends. The arms of the two armatures 7 lying above the pole face of the core 2 extend inwardly to approximately the centre of the core, where there is provided a slot 22, and carry on each of their two ends a brass rivet 9 which limits the path of attraction of the armatures against the attractive force of the core 2. The downwardly pointing arms of the two armatures 7 are provided respectively with a contact 10 and a contact 11. The contact 10 is directly secured to its armature and forms one contact of the governor. The contact 11 is secured to its armature through a bi-metal spring 12 and forms one contact of the switch.

A counter contact 13 of the governor and a counter contact 14 of the switch are insulatedly mounted near the base of the two arms of the frame 1.

The base plate of the iron frame 1 is insulatedly mounted on a suitable support, for example the bearing bracket of a dynamo, through an insulating disc 15.

Were it not for the provision of the copper rings 21, the switch armature otherwise under certain working conditions, could be put into oscillation and resonance phenomena would then occur between the switch and governor arm, the accuracy of their operation being impaired thereby. This disadvantage is eliminated by the copper rings 21 acting as a damping winding which counteracts any quick change in the electromagnetic field. If desired a copper sleeve may be mounted on the core instead of the two copper rings 21 and such sleeve would achieve the same purpose.

The slot 22 of the core 2 separates virtually the lines of force passing to the two armatures 7, so that the magnetic circuits of the two armatures have little influence on each other.

As can be seen from the diagram of connections in Figure 1 a lead passes from the positive brush of a dynamo 16 to the frame 1, whilst the negative brush is "grounded". One end of each of the windings 4 and 5 is also connected to the frame 1, whilst the other end of the winding 4 is connected to ground.

A lead passes from the contact 13 of the governor to an exciter winding 17, the other terminal of which is also "grounded". A lead passes from the contact 14 of the switch over the current coil 3 to the positive pole of a battery 18, the negative pole of which is grounded. The circuit of winding 5 passes from the frame 1, around the core 2 and thence over a series resistance 19 to the exciter winding 17. Current consumers 20, the negative terminals of which are grounded, are connected to the positive pole of the battery 18.

In the position of rest as shown in the drawing, the pair of switch contacts 11, 14 are opened, whereby the battery 18 is cut off from the dynamo 16 whilst the pair of governor contacts 10, 13 are closed. The demagnetizing coil 5 and the series resistance 19 lying in series with it are thus short-circuited through the iron frame 1, the governor armature 7 and the pair of con-

tacts 10, 13. As soon as the dynamo 16 produces sufficient voltage at a certain speed of rotation, the switch armature 7, the mounting spring 6 of which is rather less tensioned than the mounting spring of the governor armature, is attracted by the core 2 through the excitation of the voltage coil 4 so that the two switch contacts 11, 14 are closed. The dynamo 16 is thereby connected to the battery 18 through the iron frame 1, the switch armature 7, the bi-metal spring 12, the two contacts 11, 14 and the current coil 3. If the voltage produced by the dynamo 16 increases at a greater speed of rotation, the governor armature 7 is attracted by the core 2 and the two governor contacts 10, 13 open thereby. As a result of this, current from the dynamo 16 must flow to the exciter winding 17 through the demagnetizing coil 5 and the series resistance 19. The demagnetizing coil 5 which counteracts the voltage coil 4 hereby weakens the field of the governor circuit. The field excitation of the dynamo 16 is weakened by the insertion of the series resistance 19 and the voltage produced by this falls as a result thereof. The core 2 therefore quickly releases the governor armature 7 whereon the voltage of the dynamos increases again and the play of the governor is carried on in known manner.

If there is short circuiting in a lead located beyond the two switch contacts 11, 14, the switch opens and closes in quick sequence. The sparks occurring with the opening of the switch heat the bi-metal spring 12 which, as a result of this heating, bends in such a way that the two switch contacts 11, 14 are closed. As soon as the bi-metal spring has cooled, the two switch contacts 11, 14 open again. The play of the switch effected through the bi-metal spring is carried on as long as the short-circuit is in evidence without the interrupting sparks being able to damage the switch contacts 11, 14. If desired the bi-metal spring can also be chosen so that it opens the switch instead of closing the same during heating by the interrupter sparks.

As can be seen from Fig. 1, the heads of the four securing screws 8 project beyond the two armatures 7. On that account, should the device receive a fall inadvertently when being installed, it cannot drop on either of the two armatures 7, so that these cannot be damaged even slightly. Since the two governor and switch contacts are mounted within the U-shaped frame they are perfectly protected against being damaged from the outside.

By using the bi-metal spring 12, it is unnecessary to use a current coil, which formerly was mounted about the arm of the iron frame belonging to the switch in combined governor switches having a common electromagnet, and interfered with the erection of the governor switch. The governor switch according to the invention has a uniform flat shape which is favourable for production as well as for installation.

What we claim is:

1. A relay comprising a U-shaped metal frame, an electromagnet core arranged wholly within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a pair of armatures operated by said electromagnet core, said armatures being mounted on said free ends of the opposed side walls of said frame and extending over the said pole face substantially approximately to the centre of the same, and contacts operated by said armatures and located wholly within said frame.

2. A relay comprising a U-shaped metal frame, an electromagnet core arranged wholly within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a pair of armatures operated by said electromagnet core, each of said armatures having two arms at right angles mounted on said free ends of the opposed side walls of said frame, one of said arms of each of said armatures extending substantially to the centre of said pole face, the other of said arms extending from said one arm inwardly of said frame and carrying a contact, and contacts located within said frame and arranged to cooperate with the contacts on said arms.

3. A combined electromagnetic regulator and cut-out suitable for use with the electrical systems of motor vehicles comprising, a U-shaped metal frame, an electromagnet core arranged wholly within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a current coil and a voltage coil wound about said core, a pair of armatures operated by said electromagnet core, said armatures being mounted on said free ends of the opposed side walls of said frame and extending substantially to the centre of said pole face, and contact-pairs operated by said armatures and located between one of said coils and the opposed side walls of said frame within said frame.

4. A combined electromagnetic regulator and cut-out suitable for use with the electrical systems of motor vehicles comprising, a U-shaped metal frame, an electromagnet core arranged within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a current coil and a voltage coil wound about said core, said frame having transverse dimensions spanning the diameters of said coils, a pair of armatures operated by said electromagnet core, each of said armatures having two arms at right angles mounted on said free ends of the opposed side walls of said frame, one of said arms of each of said armatures extending substantiallly to the centre of said pole face, the other of said arms extending from said one arm inwardly of said frame and carrying a contact, and contacts located wholly within said frame and arranged to cooperate with the contacts on said arms.

5. A combined electromagnetic regulator and cut-out suitable for use with the electrical systems of motor vehicles comprising, a U-shaped metal frame, an electromagnet core arranged wholly within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a current coil and a voltage coil wound about said core, said coils presenting diameters spanned by the opposed side walls of said frame, a pair of armatures operated by said electromagnet core, means mounting said armatures on said free ends of the opposed side walls of said frame, each of said armatures extending substantially to the centre of said pole face, said mounting means comprising protecting lug elements projecting for such a distance beyond the armatures that the

armatures lie below the plane formed by the upper portions of said lug elements, and contact-pairs operated by said armatures and located wholly within said frame.

6. A combined electromagnetic regulator and cut-out suitable for use with the electrical systems of motor vehicles comprising, a U-shaped metal frame, an electromagnet core arranged wholly within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a current coil and a voltage coil wound about said core and presenting such diameters as to be spanned by the opposed side walls of said frame, a pair of armatures operated by said electromagnet core, each of said armatures having two arms at right angles tapered to their ends, means for mounting said armatures on said free ends of the opposed side walls of said frame, one of said arms of each of said armatures extending substantially to the centre of said pole face, the other of said arms extending from said one arm inwardly of said frame and carrying a contact, and other contacts cooperating with said arm contacts mounted on the inner faces of said opposed side walls.

7. A combined electromagnetic regulator and cut-out suitable for use with the electrical systems of motor vehicles comprising, a U-shaped metal frame, an electromagnet core arranged wholly within said frame at right angles to the base of said frame and having a pole face on the free end thereof inwardly adjacent the free ends of the opposed side walls of said frame, a current coil and a voltage coil wound about said core and having diameters spanned by said opposed side walls of said frame, a pair of armatures operated by said electromagnet core, each of said armatures having two arms at right angles, means for mounting said armatures on said free ends of the opposed side walls of said frame, one of said arms of each of said armatures extending substantially to the centre of said pole face, the other of said arms extending from said one arm inwardly of said frame and approximately parallel to said opposed side walls and said inwardly extending arms carrying contacts, one contact being mounted directly on its arm and a leaf spring mounting the other contact on its arm, and other contacts mounted on the inner faces of said opposed side walls of said frame in position to cooperate with said arm contacts.

8. A combined electromagnetic regulator and cut-out suitable for use with the electrical systems of motor vehicles comprising, a U-shaped metal frame, an electromagnet core arranged at right angles to the base of said frame and having a pole face on the free end thereof, a current coil and a voltage coil being wound about said core, a pair of armatures operated by said electromagnet core, said armatures having two arms at right angles, means for mounting said armatures on the ends of the upwardly extending walls of said frame, one of said arms extending substantially to the centre of said pole face, the other of said arms extending approximately parallel to said walls and carrying contacts, one contact being mounted directly on its arm and the other contact being mounted on its arm by means of a leaf spring, and other contacts cooperating with said arm contacts mounted on the insides of said upwardly extending walls, said leaf contact spring being of bi-metal construction adapted to close the contact-pair under the influence of the heat occurring by the interrupter sparks in case of a short circuit.

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