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E. VON LEPEL
CHAIN CONVERTER

1,775,007

Filed May 28, 1928

Fig. 1.

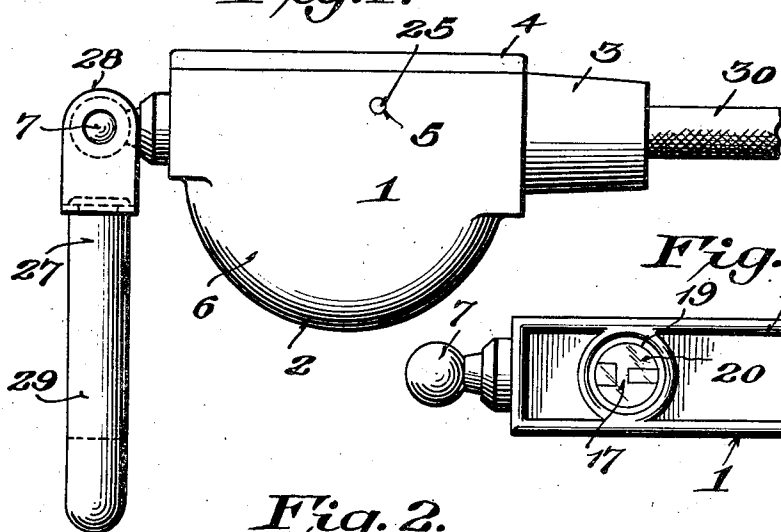


Fig. 3.

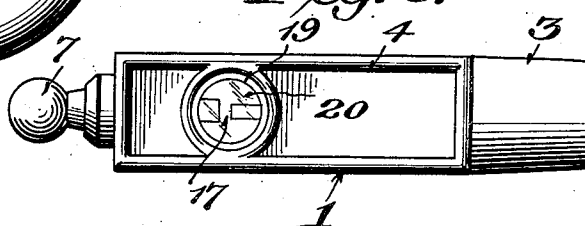


Fig. 2.

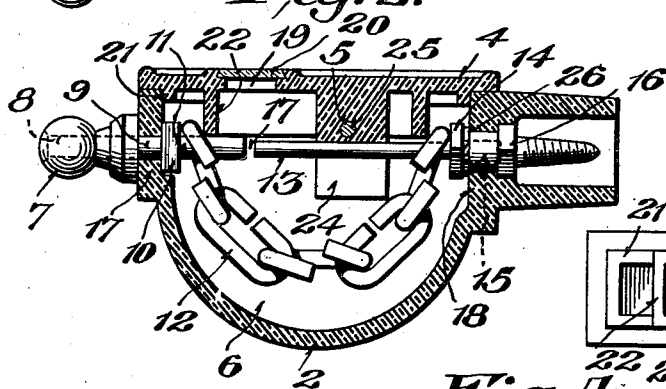


Fig. 5.

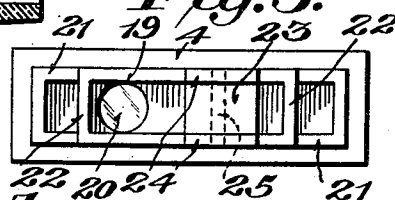
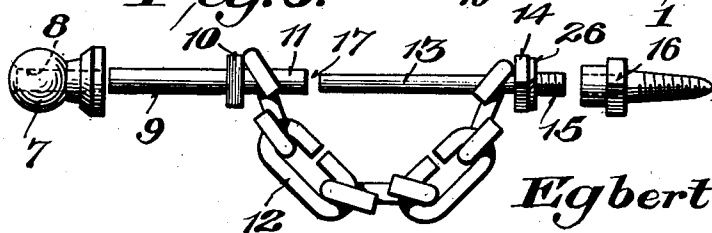


Fig. 4.



Fig. 6.



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CHAIN CONVERTER

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This invention relates to a chain converter particularly for the ignition circuit of an internal combustion engine and is a continuation in part of my co-pending application Serial No. 241,947, filed December 22, 1927. Its object is to provide a series of self adjusting narrow spark gaps enclosed in an insulated housing. A further object resides in constructing the housing so that the chain will be suspended to move freely within certain limits for the purpose of adjusting the narrow gaps. A still further object is to provide a safety gap of the parts for suspending the chain to carry the current in the event of failure of the chain and to indicate that such failure has taken place. Further objects reside in the construction of the top of the converter casing which has means thereon for holding the chain in place and which is provided with an opening for observing the safety gap.

Other objects will be apparent from the following description taken in connection with the accompanying drawing in which like reference characters indicate corresponding parts and in which:

Figure 1 is a side view of the chain converter,

Fig. 2 is a side view of the converter with one side removed,

Fig. 3 is a top view of the converter,

Fig. 4 is a top view of the converter with the top removed,

Fig. 5 is a bottom view of the top of the converter, and

Fig. 6 shows the metallic elements of the converter in side elevation in unassembled order.

The converter comprises a casing 1 of insulating material having a semi-circular bottom portion 2 and a cylindrical wire receiving socket 3 at one end. The top of the casing is open to receive the top 4 which fits thereon. The top is secured in place over the opening in the casing by means of a pin or rivet 5 which passes through holes in the side walls 6 of the casing 1 and the projection 23 of the top.

The metallic parts or elements of the converter are shown in unassembled order in

Fig. 6 which shows a ball connector 7 having a perforation 8 therethrough into which the outer extension 9 of the chain suspending member 10 is secured by riveting. An inner extension 11 of the chain member 10 forms a support for one end of the chain 12, the other end of the chain being supported on the elongated extension 13 of the chain suspending member 14. This member 14 has a screwthreaded portion 15 by which it is secured in the screw connector 16. The chain is thus suspended under preferably catenary suspension and the ends of the chain are held in spaced relation and the chain held in approximately catenary form by the top 4 as clearly shown in Fig. 2. The extensions 11 and 13 form the safety gap 17 and are made of such a length that when assembled the proper width of the gap is maintained to provide for passage of current in the event of failure of the chain and to indicate by the spark across the gap that the chain has failed.

A lock washer 26 is provided between the member 14 and the screw connector 16.

The chain suspending members 10 and 14 together with the extensions 9, 11 and 13 and portion 15 and the chain are preferably made of aluminum, magnesium or other metal or alloy which has the property of forming, by means of the electrical discharge, a layer of oxide of highly insulating qualities. The connectors 7 and 16 are preferably made of brass but other suitable conducting materials can be used including also aluminum.

As clearly indicated in Fig. 2, the elements shown in Fig. 6 are assembled in the casing 1 and the chain is held in place by the top 4. The ball connector 7 and chain suspending member 10 are riveted together and secured in end wall 17 and the member 14 and screw connector 16 are secured in wall 18. The chain 12 is suspended and hangs in the semi-circular bottom portion 2.

The top or cover 4 of the casing has an opening 19 therein which is preferably provided with a transparent window 20. The opening is provided directly above the gap 17 so that this gap may be observed. As shown in Figs. 2 and 5, a projecting edge 21

is provided which fits into the casing 1 and acts as a guide for the cover. The chain spacing projection 22 is rectangular in shape and projects from the cover a distance to just contact with the extensions 11 and 13. The ends of this projection will keep the chain spaced to provide for free suspension subject, of course, to any lateral swaying which is advisable to prevent welding of the links and to keep the oxide formed between the links as thin as possible. An approximate central projection 23 extends to the approximate extent of the projection 22 and also bears on the extension 13. At each side of the projection 23, a side guide 24 is provided which extends into the bottom portion 2 of the casing and prevents the chain from being distorted too much vertically. This projection 23 is also provided with a perforation 25 through which the pin 5 passes.

The chain 12 may comprise any other suitable construction which will provide the necessary narrow gaps and is flexible but a link chain is preferable. Any number of links can be used depending upon the number of gaps and for the latter, it has been determined that six gaps seem to be suitable for the average ignition system. The extension 11 and the link of the chain may comprise one gap, as also the extension 13 and its link. In order to introduce a very short space or separation between the metal of each of two links for obtaining a series of very small spark gaps, the metal is preferably originally covered with a thin coating of enamel or varnish or other suitable insulating material which, of course, soon entirely disappears as the sparks jump the links and its place is taken by the oxide forming as a result of the sparks. A vertical suspension of the chain can also be provided, it being only essential that a slight swing or tremble, as, for instance, the vibration of an internal combustion engine, shall provide only a thin coating of oxide and to prevent two adjacent links from welding together. A slight jar will, however, immediately break two links apart when a slight welding has taken place due to possibly a heavy current passing through the chain.

The size of the wire used for the links can, of course, vary but a diameter of $\frac{3}{32}$ of an inch is found practical for the average ignition system. The links can, of course, be open whereby new links may be inserted, but a closed link can also be used. This chain will provide a width of gap of approximately $\frac{3}{1000}$ of an inch but this may vary within certain limits.

The chain converter can be applied directly on the distributor by means of the clip rod 27 having a spring slip connector 28 adapted to fit on the ball connector 7 by spring action. The rod 29 fits into the central portion of the distributor and a lead wire 30 is secured to

the screw connector 16. As far as the functioning of the converter is concerned, it can be applied anywhere in the high tension circuit of an ignition system.

I claim as my invention:—

1. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing and having extensions thereon, said extensions forming a safety gap; a chain suspended on said extensions and consisting of a plurality of links forming narrow gaps therebetween; and a cover for said casing of insulating material and adapted to keep the ends of the chain in spaced relation and to prevent undue vertical distortion of the chain.

2. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing and having extensions thereon; a chain suspended on said extensions and consisting of a plurality of links forming narrow gaps therebetween; and a cover for said casing of insulating material and having means thereon cooperating with the extensions to keep the ends of the chain in spaced relation and also having means thereon for preventing undue vertical distortion of the chain.

3. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing and have extensions thereon, said extensions forming a safety gap; a chain suspended on said extensions and consisting of a plurality of links forming narrow gaps therebetween; and a cover for said casing of insulating material and adapted to keep the ends of the chain in spaced relation and to prevent undue vertical distortion of the chain, said cover having an opening therein for observing the safety gap.

4. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing and having extensions thereon; a chain suspended on said extensions and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain.

5. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing and having extensions thereon; a chain suspended on said extensions and consisting of a plurality of links forming narrow gaps therebetween; a cover of insulating material for

said casing having a spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain; and a pin riveted in place through perforations in the casing and cover for keeping the parts in assembled relation.

6. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing, one of said members having outer and inner extensions thereon, the outer of which having a ball connector secured thereto, and the other member having an elongated extension and also having a screw connector secured thereto; a chain suspended on the inner and elongated extensions of said suspending members and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain.

7. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material; a pair of suspending members secured in the casing, one of said members having outer and inner extensions thereon, the outer of which having a ball connector secured thereto, and the other member having an elongated extension and also having a screw connector secured thereto; a chain suspended on the inner and elongated extensions of said suspending members and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain, said inner extension and elongated extension forming a safety gap adapted to function upon failure of the chain.

8. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material having a semi-circular bottom portion; a pair of suspending members secured in the casing, one of said members having outer and inner extensions thereon, the outer of which having a ball connector secured thereto, and the other member having an elongated extension and also having a screw connector secured thereto; a chain suspended on the inner and elongated extensions of said suspending members in the semi-circular bottom portion and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a

spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain.

9. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material having a semi-circular bottom portion and a cylindrical wire receiving socket; a pair of suspending members secured in the casing, one of said members having inner and outer extensions thereon and the other member having an elongated extension; a ball connector secured on the outer extension of the one of said suspending members; a screw connector provided in the wire receiving socket and secured to the elongated extension of the other of said suspending members; a chain suspended on the inner and elongated extensions of said suspending members and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain.

10. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material having a semi-circular bottom portion and a cylindrical wire receiving socket; a pair of suspending members secured in the casing, one of said members having inner and outer extensions thereon and the other member having an elongated extension; a ball connector secured on the outer extension of the one of said suspending members; a screw connector provided in the wire receiving socket and secured to the elongated extension of the other of said suspending members; a chain suspended on the inner and elongated extensions of said suspending members and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a spacing projection cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain, said inner and elongated extensions of the suspending members forming a safety gap adapted to function upon failure of the chain.

11. A converter for the ignition system of an internal combustion engine comprising a casing of insulating material having a semi-circular bottom portion and a cylindrical wire receiving socket; a pair of suspending members secured in the casing, one of said members having inner and outer extensions thereon and the other member having an elongated extension; a ball connector secured on the outer extension of the one of said

suspending members; a screw connector provided in the wire receiving socket and secured to the elongated extension of the other of said suspending members; a chain suspended on the inner and elongated extensions of said
5 suspending members and consisting of a plurality of links forming narrow gaps therebetween; and a cover of insulating material for said casing having a spacing projection
10 cooperating with the extensions to keep the ends of the chain in spaced relation and also having a pair of side guides for preventing undue vertical distortion of the chain, said inner and elongated extensions of the suspending members forming a safety gap
15 adapted to function upon failure of the chain and said cover having an opening therein to observe the safety gap.

In testimony whereof I affix my signature.

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EGBERT VON LEPEL.

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