

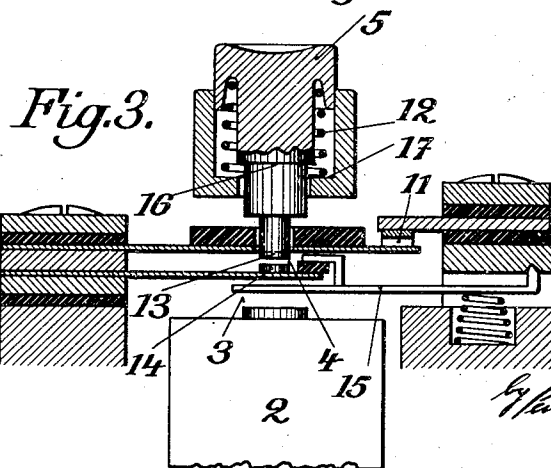
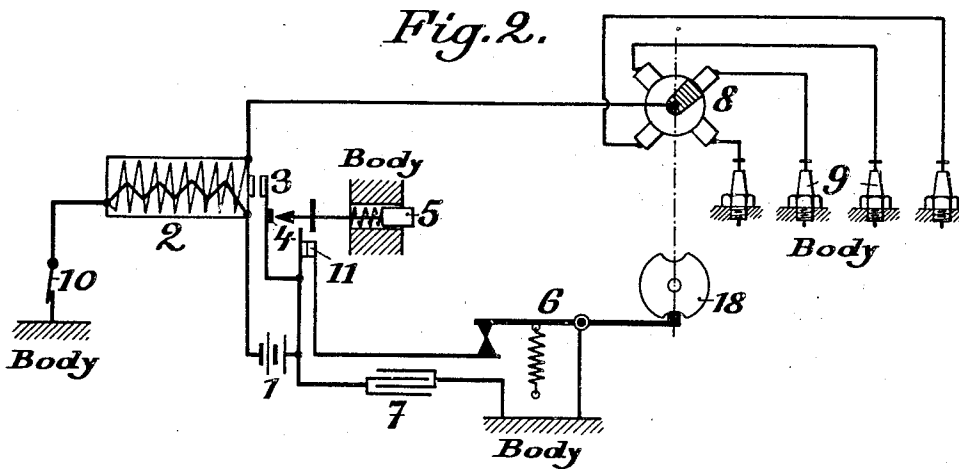
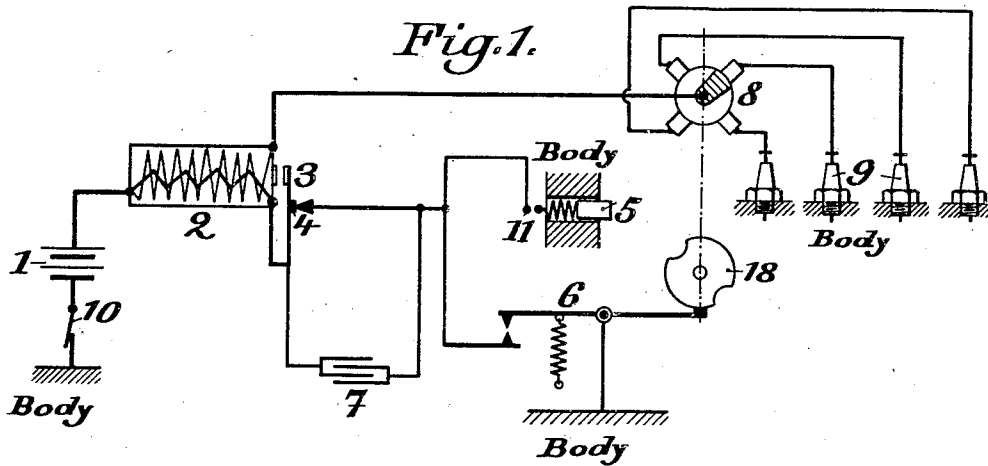
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APPARATUS FOR STARTING MULTIPLE CYLINDER INTERNAL COMBUSTION ENGINES.

APPLICATION FILED SEPT. 13, 1910.

1,063,541.

Patented June 3, 1913.



WITNESSES
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APPARATUS FOR STARTING MULTIPLE-CYLINDER INTERNAL-COMBUSTION ENGINES.

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Specification of Letters Patent.

Patented June 3, 1913.

Application filed September 13, 1910. Serial No. 581,782.

To all whom it may concern:

Be it known that I, GOTTLÖB HONOLD, a subject of the Emperor of Germany, residing at Stuttgart, Germany, have invented
5 certain new and useful Improvements in Apparatus for Starting Multiple-Cylinder Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention,
10 such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to apparatus for starting multiple cylinder combustion engines of that kind wherein, after the engine
15 is stopped, it may again be started by ignition if an ignitable gas is present in one of the cylinders; and it has for its object, in those cases in which the conditions for such
20 an ignition are not present, to make possible the starting of the machine without the assistance of a special cranking device.

In German Patent No. 207,962, is described a method for starting internal combustion engines wherein the ignition for
25 starting takes place upon cutting in by hand an automatic electro-magnetic interrupter (buzzer). In this case it is presupposed that the engine comes to rest at such a position of its crank that the mechanical current
30 controlling device (interrupter) is open. Although this assumption is true in most cases of practice, it sometimes happens in consequence of poor balance or inertia of
35 the moving parts that the crank comes to rest in a position wherein the interrupter is closed. When this occurs, it is impossible to start the machine in accordance with the method referred to, since for this method
40 it is a condition for oscillation of the buzzer armature that the interrupter be open. If, on the other hand, buzzer ignition is contemplated for running as well as for starting, it may likewise occur that the interrupter
45 does not occupy a position which makes the starting of the machine possible by means of the buzzer. In contrast to the kind of ignition for starting hereinbefore referred to, it is requisite, in this case, that the interrupter be closed, since the buzzer

and interrupter are conductively connected in electrical series. The methods of buzzer ignition heretofore known, (where buzzer ignition is relied upon for both starting and
55 running, as well as where the buzzer is used only for starting and individual sparks are used for running) are therefore of limited service, as they presuppose a condition which is not fulfilled in all cases by the internal combustion engine.

The subject of the present invention is an apparatus for starting, which is serviceable for all cases and whereby ignition is assured in the cylinder which contains fresh
60 gas and whose spark plug is introduced into the circuit by the distributor. The solution of this problem requires that the introductory operation of the buzzer armature be made independent of the interrupter by
65 the temporary action of an auxiliary contact, which, in case the buzzer and interrupter are connected in electrical series, is located in a shunt to the interrupter, whereas when the buzzer and interrupter are arranged in electrical parallel, it is interposed
70 directly in the circuit of the interrupter. In the first case, the auxiliary contact must be temporarily closed, whereas, in the second case, a temporary opening of this contact is necessary.

In the drawings the subject matter of the invention is illustrated.

Figure 1 represents diagrammatically the arrangement of the auxiliary contact in the case of a buzzer ignition only. Fig. 2 represents
85 diagrammatically the arrangement of the auxiliary contact in the case where ignition upon starting is by means of the buzzer and during running by means of single sparks. Fig. 3 represents an example of
90 a mechanical construction of the auxiliary contact with a hand switch for the arrangement illustrated in Fig. 2.

In Fig. 1, 1 is the battery or other source of current, 2 the ignition coil, and 3 the buzzer
95 whose break is closed at 4 in the condition of rest, and which is conductively connected in series with the mechanical current controlling device or interrupter 6, which is actuated by a cam driven directly or indi-
100

rectly from the engine so its speed is dependent upon that of the engine. The condenser 7 is connected across the buzzer break. 8 indicates the mechanically actuated distributor, 9 a set of spark plugs, and 10 a switch for cutting off the ignition. This arrangement of circuits can be used at once for the ignition of internal combustion engines while the engine is running. If, however, it is attempted to start an engine, the case may arise, as stated before, that the buzzer 3 will not operate because the interrupter 6 is open, and consequently, the closed circuit necessary for the operation of a buzzer connected in series with an interrupter is not present. In order to start the engine when the interrupter 6 is open, an auxiliary contact 11 is, in accordance with the invention, inserted in shunt around the interrupter 6, this auxiliary contact being closed by means of a push button or the like 5. In this way it is possible simply by momentarily depressing the push button 5 to close the buzzer circuit and thereby, in spite of the unfavorable position of the interrupter 6, to bring about a starting ignition. When the engine is once under way, the further ignitions take place by the automatic action of the interrupter 6 after releasing the pressure on the push button.

The circuit arrangement shown in Fig. 2 differs essentially from that shown in Fig. 1, in that the starting ignition is effected by means of the buzzer, whereas, during running, the ignition is effected by individual sparks. In this arrangement also, 1 indicates the battery or other current source, 2 the ignition coil, and 3 the buzzer which is conductively connected on the one side with the battery and on the other side with the body of the engine by a normally open contact 4 which may be closed temporarily by means of a push button or the like 5. Here also 6 is the mechanical current controlling device or interrupter which is connected in parallel with the buzzer. The condenser 7 is connected across the buzzer break; 8 is the distributor and 9 is a set of spark plugs, while 10 indicates a switch for cutting off the ignition. At the normal position of the engine piston, the two cranks are nearly vertical and the interrupter 6 is open. The engine can then be started by lightly depressing the push button 5, as the previously opened buzzer circuit is now closed. If, however, the engine is not in the normal position specified, *i. e.* if the interrupter 6 is closed, as indicated in Fig. 2, then the buzzer 3, even when the buzzer circuit is closed at 4, will not be actuated, because the buzzer armature is held continuously as a result of the current flowing from the battery through switch 10, coil 2, interrupter 6, and the en-

gine body. In order to avoid this difficulty, in accordance with the present invention, an auxiliary contact 11 is inserted in the circuit in which the interrupter 6 is contained, thus rendering it possible to open at 11 the circuit closed by the interrupter 6 and thereby allow the buzzer 3 to oscillate. As a means for the solution of this problem the auxiliary contact with its hand switch, as shown in Fig. 3, is employed. As shown in the drawing, this device consists of a push button 5 which is controlled by the spring 12 and whose contact surface 13 is, by simple depression, brought into contact with the buzzer contact 14, thereby releasing the buzzer armature 15. However, in the above described unfavorable position of the interrupter 6 the buzzer armature will not oscillate. Upon further depressing the push button 5 to the point of full contact of the surface 16 of the push button with the surface 17 of its guide sleeve, the contact 11 is opened and the previously closed circuit through the interrupter is thus opened so that the buzzer armature 15 is actuated. It is desirable that the supplemental depression of the push button 5 for opening contact 11 should be of short duration. Otherwise, by maintaining the depression of the push button 5 and therefore maintaining the opening of the contact 11, it may readily happen that the engine would reverse because the control of the ignition current in that case would be practically by the distributor.

The push button shown in Fig. 3 performs two functions. In the first place, by simple depression it completes the buzzer circuit, and thereafter by a further depression when necessary on account of the unfavorable position of the interrupter 6, it opens the interrupter circuit at the spring contact 11. It is immaterial to the essence of the invention whether these two functions are combined in one and the same device, or whether separate means are provided for cutting in the buzzer circuit and opening the auxiliary contact 11. Furthermore, the arrangement may be such that the push button can be continuously held fast in that position in which the buzzer circuit is complete, in order to make possible a continuous buzzer ignition in the arrangement shown in Fig. 2. Furthermore, instead of the push button illustrated, any other device for closing or opening the circuit in question can be employed.

What I claim is:—

1. In apparatus for starting multiple-cylinder internal combustion engines, ignition mechanism including a buzzer, an interrupter connected in electrical parallel therewith, an auxiliary contact and connections for completing the circuit of said buzzer in-

dependently of said interrupter, and means for opening the circuit of said interrupter; substantially as described.

5 2. In apparatus for starting multiple-cylinder internal combustion engines, ignition mechanism including a buzzer, an interrupter connected in electrical parallel therewith, and means for successively completing the circuit of said buzzer independently of

said interrupter and opening the circuit of said interrupter; substantially as described. 10

In testimony whereof I affix my signature, in presence of two witnesses.

GOTTLOB HONOLD.

Witnesses:

H. KEMPTER,

MAX ANSCHUTZ.