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Spahr

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[54] **AUXILIARY MOTOR STARTER CONTROL CIRCUITRY INCLUDING REMOTE AND LOCAL CONTROL OF PLURAL BATTERIES**

[75] Inventor: **Gene L. Spahr,** Zionsville, Ind.

[73] Assignee: **FMC Corporation,** San Jose, Calif.

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[52] **U.S. Cl.** **290/37,** 290/38, 290/50, 307/48, 307/66

[51] **Int. Cl.**.....**F02h 11/00**

[58] **Field of Search** 290/50, 37, 38; 307/48, 66

[56] **References Cited**

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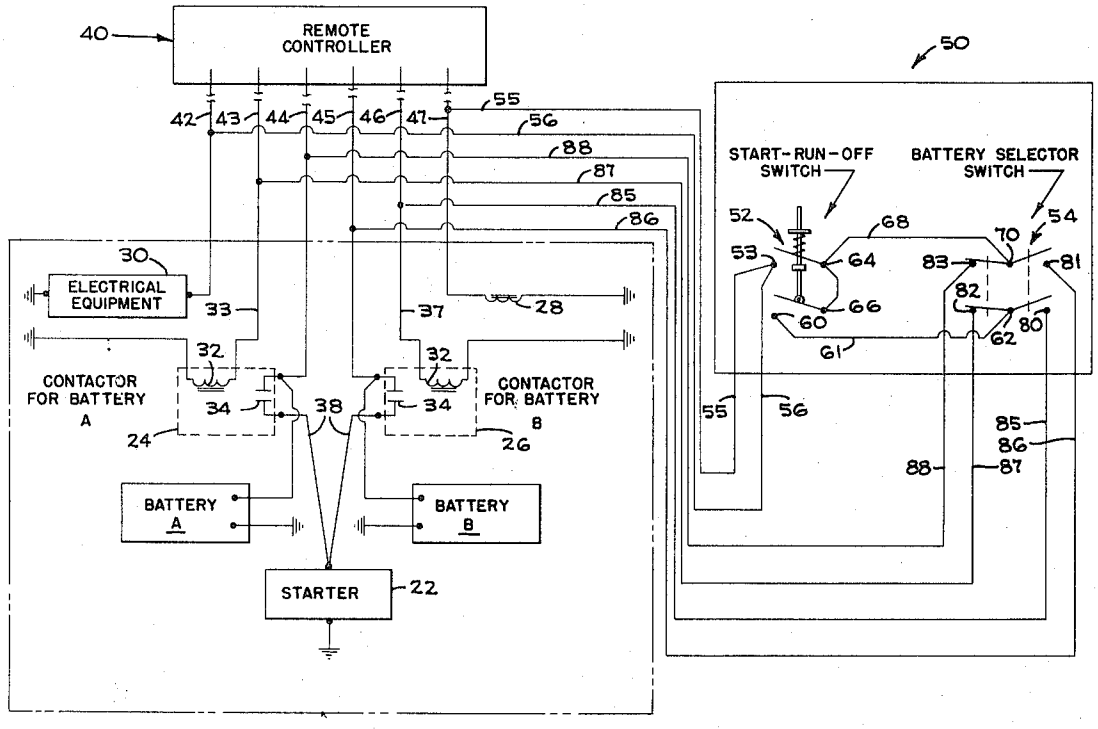
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Primary Examiner—G. R. Simmons
Attorney—F. W. Anderson et al.

[57] **ABSTRACT**

An auxiliary starter circuit for an engine-driven fire pump which circuit is located upon the engine itself while the primary automatic starting circuit is located at a distance therefrom whereby the engine may be easily started manually if desired. The circuitry components for starting the engine include two alternatively usable batteries which are arranged to be selectively connected in series with an engine starter. The auxiliary starter circuit includes a double pole, two-position toggle switch which selects the desired battery and a three-position (start-run-off) toggle switch which is manipulated to momentarily connect the starter in series with the selected battery until the engine has been started and to thereafter permit the engine to continue to run until it is switched to the "off" position.

3 Claims, 3 Drawing Figures



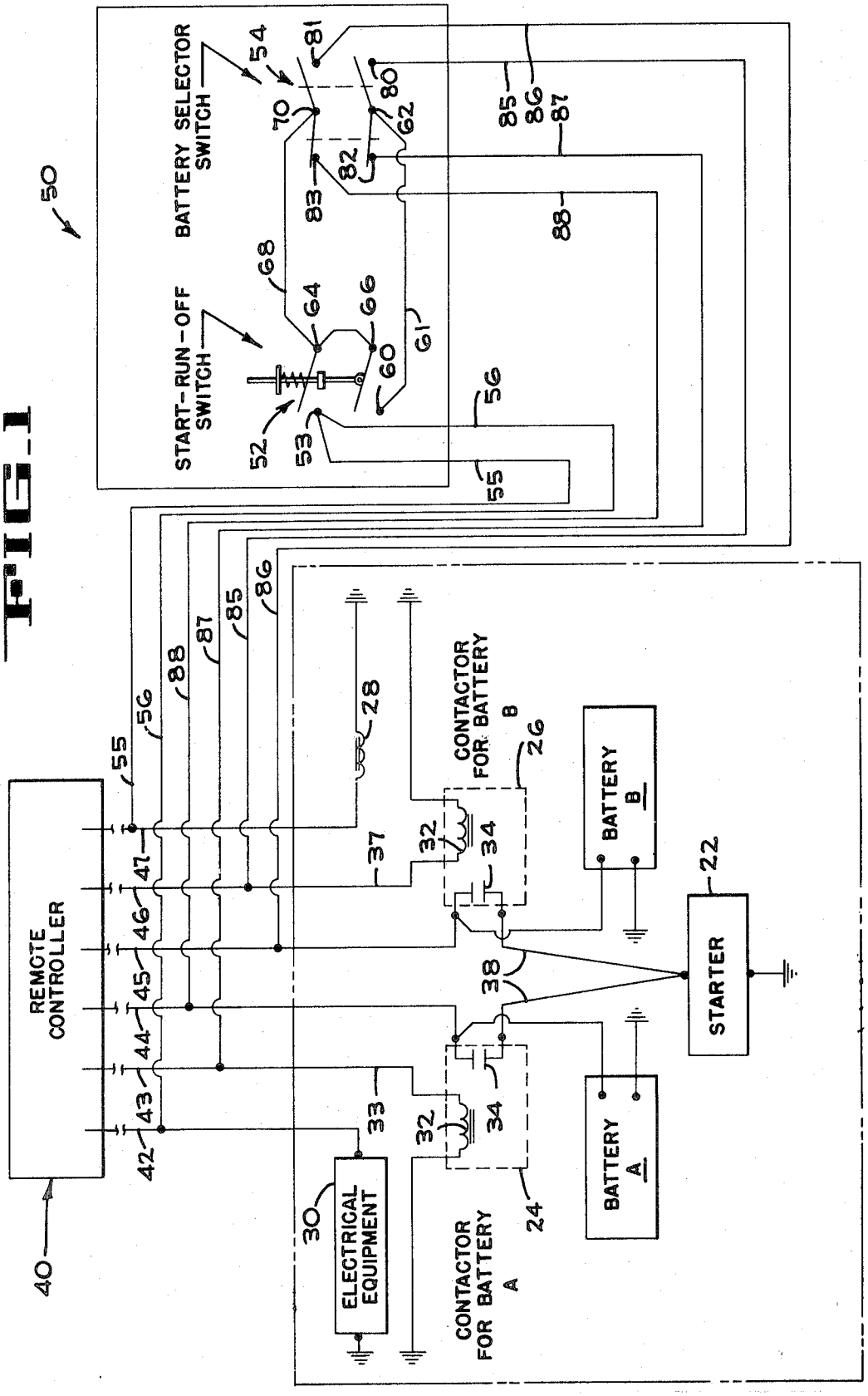

50
BATTERY SELECTOR SWITCH
START-RUN-OFF SWITCH
REMOTE CONTROLLER
ELECTRICAL EQUIPMENT
CONTACTOR FOR BATTERY A
CONTACTOR FOR BATTERY B
BATTERY A
BATTERY B
STARTER
40
42
43
44
45
46
47
52
53
54
55
56
60
61
62
64
66
68
70
80
81
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83
85
86
87
88
22
24
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32
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34
37
38

FIG. 1

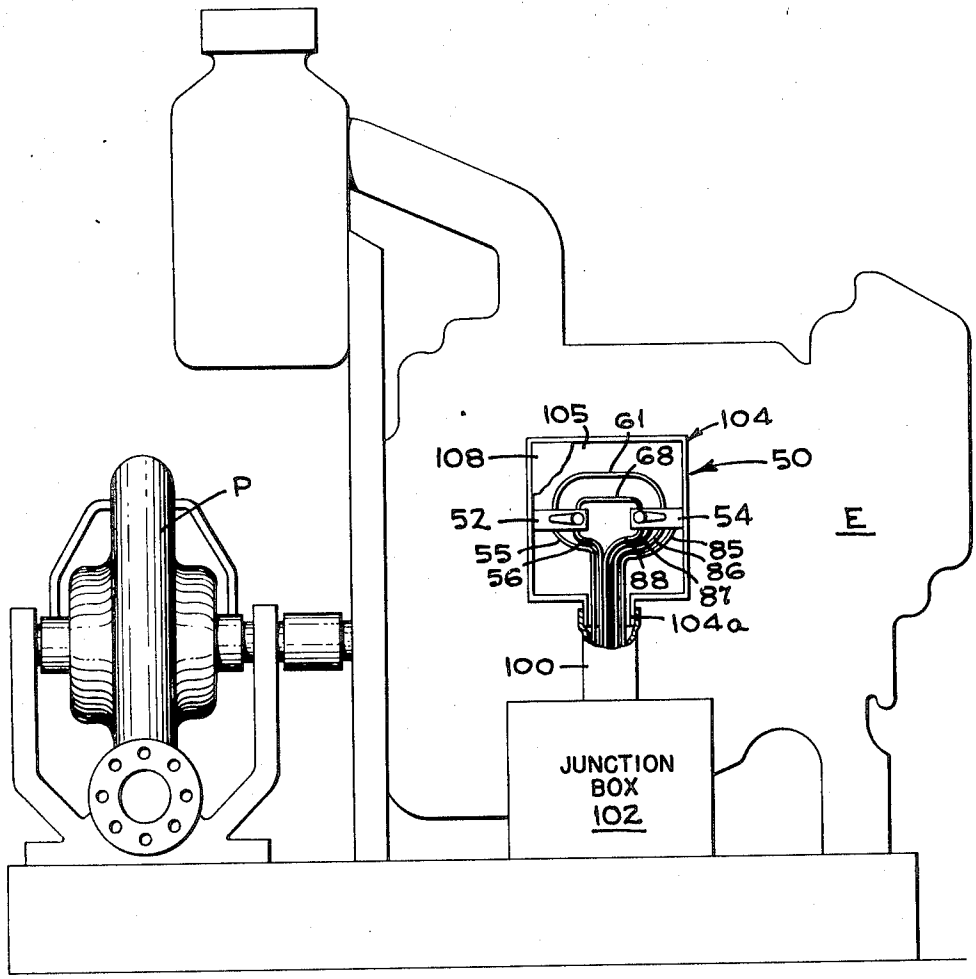

105
61
104
108
68
50
P
52
54
E
55
85
56
88
86
87
104a
100
JUNCTION
BOX
102

FIG_2

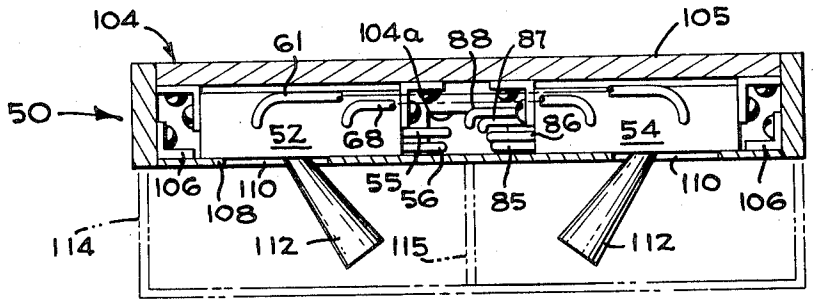

104
61
104a
88
87
105
50
52
68
86
54
106
110
55
56
85
110
106
108
114
112
115
112

FIG_3

AUXILIARY MOTOR STARTER CONTROL CIRCUITRY INCLUDING REMOTE AND LOCAL CONTROL OF PLURAL BATTERIES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally pertains to electrical control systems for starting engines, and more particularly, it pertains to an auxiliary starter control system to be used in lieu of the primary starter control system.

2. Description of the Prior Art

Engines, or motors, which are started and operated by remote controllers are commonly provided in various industrial applications. For example, fire pump engines are typically started by remote controllers which are located at or near the fire sensing devices with the pump and driving engine being located at a distance therefrom near a ready source of water. Such remote control equipment is typically adapted to completely control the operation of the engine, and, in order to provide reliable starting of the engine under emergency conditions, the remote controller is usually the only engine control provided. This lack of an auxiliary control presents a problem when it is desired to operate the engine at the site of the fire pump rather than attempting to start the engine at the remote location of the controller. With conventional engine controls a cumbersome arrangement of temporary jumper wires or the like must be provided in order to accomplish this manual operation. It is, of course, necessary to maintain the remote control connections to the engine to provide for reliable remote starting of the engine, and yet it has been found to be desirable to have an auxiliary, or manual, control provided at the location of the engine which could be operated in lieu of the remote controls and which would not in any way reduce the efficiency and reliability of the remote controls.

In one prior art type of control system for starting a fire pump engine a pair of alternatively usable batteries are provided which are each connected through conventional electrical contactors to a starter for the engine. By remote control means, either one or the other battery may be selected to power the starter and to power the other electrical equipment involved in the operation of the engine such as the fuel solenoid, spark plugs, indicator lights, etc. Heretofore, no simple and reliable manual control means has been provided for operating such an engine starter system independently of the remote controller.

SUMMARY OF THE INVENTION

With the present invention an auxiliary control system for starting an engine is provided whereby either one of two batteries may be selectively connected to energize the starter for the period of time required until the engine is started. The control means will then leave the selected battery connected to the various electrical equipment necessary for the operation of the engine while removing the starter connection to the battery. It will be recognized that the aforedescribed starter system of the prior art has been provided with an easily operable manual control means while maintaining its regular remote controller without any loss in reliability.

The control system of the present invention includes a pair of conventional switches with one switch comprising a two-pole switch adapted to select the desired battery with the other switch comprising a two-pole switch adapted to connect the selected battery temporarily to the starter and then to permit the starter to be removed from the power circuitry once the engine has been started while providing battery power to the other electrical equipment in the engine. Thus, manual control of the engine can be readily provided by a relatively simple and inexpensive auxiliary starting system which is comprised of only two switches. As will be pointed out hereinafter, this auxiliary starting system can be directly attached to the engine block for ready availability.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic illustration of starting circuitry for an engine which circuitry embodies the auxiliary control system of the present invention.

FIG. 2 is a diagrammatic illustration of a fire pump and the drive engine therefor with the engine having attached thereto the auxiliary control system of the present invention.

FIG. 3 is an enlarged transverse section of the auxiliary control system and the mounting means therefor as shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now more particularly to the drawings, FIG. 1 shows schematically the control circuitry for starting and operating an engine. The conventional control circuitry and components for starting the engine include a starter **22**, a pair of selectively operable batteries A and B, a pair of electrical contactors **24** and **26** which are selectively energized to respectively connect the battery A or B to the starter, and a fuel solenoid **28** and the other electrical equipment **30** which is necessary for operating the various components and accessories of the engine. Each of the electrical contactors **24** and **26** is conventional and includes a relay coil **32** and an electrical contact **34** which is adapted to be closed when its associated relay coil is energized. By selectively energizing the relay coils **32** through their power connection lines **33** and **37**, respectively, one of the batteries A or B will be connected in series with the starter **22** since (as can be seen in FIG. **1**) the starter is electrically connected by means of leads **38** with each of the contacts **34** in the contactors **24** and **26**.

In a conventional set-up the engine is started and is operated from a remote controller **40** which is provided with a series of leads **42**, **43**, **44**, **45**, **46** and **47** which are connected to the aforedescribed electrical circuitry and electrical components of the engine. Line **42** is connected to the various electrical equipment **30** in the engine, line **43** is connected to the lead **33** to the relay coil in the contactor for battery A, line **44** is directly connected to one terminal of the contact **34** for the electrical contactor for battery A, line **45** is connected to the contact **34** in the electrical contactor for battery B, line **46** is connected to lead **37** to the relay coil in the contactor for battery B, and line **47** is connected to the fuel solenoid **28**. When it is desired to start the engine power must be provided on lines **42** and **47** so as to operate the electrical equipment, and power must be selectively provided on either line **33** or **37** so as to ac-

tivate one of the contactors **24** or **26** to connect the selected battery in series with the starter **22**. With the lines **44** and **45** being directly connected to one terminal of the batteries A and B, respectively, the necessary power for lines **42, 43, 46** and **47** can be provided by the selected battery with the appropriate switching being done in the remote controller **40**.

With the present invention an auxiliary or manual controller **50** is provided which is adapted to be attached directly to the engine itself. The manual controller is wired to the various leads **42–47** from the remote controller **40** to the engine so that it can start and operate the engine with the same effectiveness as is provided by the remote controller. As shown, this manual controller comprises only two switches including a three-position (start-run-off) switch **52** and a battery selector switch **54**.

The start-run-off or power switch **52** comprises a three-position, two-pole toggle switch with one of the positions providing a momentary contact which must be maintained by the operator and with the other position providing a contact which is maintained by the switch itself. Such a switch, for example, can be one such as Model No. 312TS1-59 provided by Micro Switch, a Division of Honeywell Inc., of Freeport, Ill. The open pole or contact **53** of the maintained switch position is connected by leads **55** and **56** to the lines **47** and **42**, respectively, of the aforedescribed engine control circuitry. The other open pole or contact **60** at the momentary switch position is connected by a line **61** to a first terminal **62** in the battery selector switch **54**. Terminals **64** and **66**, which are adapted to be connected to the contacts **53** and **60** respectively when the switch **52** is closed, are each connected to a second terminal **70** in the battery selector switch **54** by means of a line **68**.

The battery selector switch is a two-position two-pole toggle switch such as switch Model No. 12TS15-3 provided by Micro Switch, a Division of Honeywell Inc., of Freeport, Ill. The switch includes the aforedescribed center terminals **62** and **70** which are adapted to be selectively connected either to a set of contacts **80** and **81**, respectively, or to a set of contacts **82** and **83**, respectively. Contacts **80** and **81** are connected by means of leads **85** and **86**, respectively, to the lines **46** and **45**, respectively, in the aforedescribed engine control circuitry. Also, contacts **82** and **83** are connected by means of leads **87** and **88**, respectively, to the lines **43** and **44**, respectively, of the aforedescribed engine control circuitry.

In operating the manual controller **50** the battery selector switch **54** is first moved into one of its two alternative positions wherein either contacts **82** and **83** are closed (with contacts **80** and **81** being open) or wherein contacts **80** and **81** are closed (with contacts **82** and **83** being open). As shown in FIG. **1**, the contacts **82** and **83** are closed. This will allow lines **43** and **44** to be connected through the power switch **52** so that battery A may be switched into operation. When it is desired to start the engine with battery A, the power switch **52** is depressed so as to close both contact **53** and contact **60**. Battery A is then connected through line **44**, line **88**, and line **68** to the terminals **64** and **66** of the power switch. With terminal **53** closed, the battery then provides power to the fuel solenoid **28** and the other electrical equipment **30** through connecting lines **55** and **56**, respectively. With the terminal **60** also closed, battery A provides power to the relay coil **32** in the contactor **24** via terminal **62**, connecting line **87**, and line **43**. The energization of the appropriate relay coil **32** closes the associated contact **34** and energizes the starter **22**. The power switch **52** is such that it must be held down to maintain the terminal **60** closed. Once the starter has started the engine, the switch is released and the momentarily closed contact **60** is opened. However, contact **53** is maintained closed by the switch so as to provide continuous power to the electrical components in the engine to provide for continued engine operation until such time as switch **52** is manually switched to its "off" position wherein both contacts **60** and **53** are opened (shown in FIG. **1**).

It will be readily appreciated that the battery selector switch **54** may be flipped into its alternate position wherein terminals **80** and **81** are closed, and a similar operation to that aforedescribed can take place wherein battery B can be momentarily connected in series with the starter **22** to start the engine by means of the connecting lines **85** and **86** and the corresponding leads **46** and **45** to the engine electrical control circuitry.

FIG. **2** diagrammatically illustrates the manner in which the manual controller **50** may be attached to an engine E which is being used to drive a fire pump P. The manual controller may be attached directly to the side of the engine with the various lines leading from the switches **52** and **54** being directed through a conduit **100** to an underlying junction box **102** which connect the rest of the electrical circuitry for operating the engine.

The specific construction of the manual controller **50** is shown in FIG. **3**. Each switch is mounted by lock nuts to cover plate **108**. The enclosure includes an integrally formed outlet portion **104a** on the bottom wall thereof for directing the connecting lines **55, 56** and **85–88** to the conduit **100**. A flange **106** is attached at each side of the enclosure to provide a means for mounting a cover plate **108** to the front face of the enclosure. Suitable cut-out portions **110** are provided in the cover plate so that the protruding switch actuating arms **112** may extend exteriorly of the plate to be readily accessible to the operator who desires to operate the engine in accordance with the aforedescribed procedure. In addition, it is desirable to provide an enclosure **114** to normally cover the switches. This enclosure **114** is sealed to the cover plate (by means not shown) and extends completely about the switches so that the engine may only be operated in emergencies by first breaking the seal **115** and removing the enclosure.

From the foregoing description it will be apparent that the manual controller of the present invention provides a means whereby two rather conventional switches can be used to start and operate an engine wherein the starter for the engine is selectively connected to one of two batteries. The control circuitry utilizes a manimum number of components and is arranged to be used without decreasing the efficiency or reliability of the main remote control operator.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and

variation may be made without departing from what is regarded to be the subject matter of the invention.

What is claimed is:

1. In a starting circuit for an engine having a starter and first and second batteries which are arranged to be selectively connected in series with said starter, each of said first and second batteries having a separate circuit to said starter including a normally open relay contact, secondary circuits for each of said first and second batteries including a relay coil for closing the relay contact connected to the associated battery, an additional circuit connected to electrical equipment necessary for operation of the engine, primary switch means located at a point remote from said engine for selecting one of said first and second batteries and for connecting it in series with said additional circuit and with said relay coil so as to close said associated normally open relay contact and provide power to said starter, the improvement comprising an auxiliary starting circuit provided on said engine including first and second switches, said first switch comprising a two-pole switch with one pole being arranged to be selectively connected to one of said first and second batteries and with the other pole being arranged to be selectively connected with the relay coils associated with said batteries, said second switch comprising a two-pole switch with one of said poles selectively connecting one of said relay coils with one of said batteries and with the other of said poles connecting to said selected battery the additional circuit connected to the equipment necessary for operation of the engine whereby said engine can be started by closing both poles of said second switch.

2. In a starting circuit for an engine as set forth in claim 1 wherein said other pole of said second switch is connected to said one pole thereof and to said additional circuit connected to the equipment necessary for operation of the engine and with said one pole of said second switch being connected with said other pole of said first switch which selectively connects said battery relay coils, and a connection between said pole of said first switch and said other pole of said second switch.

3. In a starting circuit for an engine as set forth in claim 2 wherein said second switch is a three-position switch and wherein said other pole of said second switch includes a momentary contact while said one pole of said second switch includes a maintained contact whereby said engine is started by holding said second switch in a closed position for a period of time after which time said engine continues to run when said second switch is released because of the maintained contact of said one pole of said second switch.

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