

**Motor-Starters With Switches and Fuses Attached.**

The accompanying illustrations show a line of motor-starters with switches and fuses attached, placed on the market by the Ward Leonard Electric Company, Bronxville, N. Y. For sizes below those requiring

starter, and this line switch is not opened except when the motor is developing high protective volts. The real closing of the motor circuit is upon the rheostat and these rheostats are equipped with circuit-closing and breaking switches. The circuit is never opened on the rheostat con-

horse-power and volts, whether series or shunt-wound, variable or fixed speed. They are fully equipped with approved switch and fuses as part of the rheostat, ready for mounting; have sufficient capacity for one-minute starting duty; are approved by the Underwriters for use in dirty or dusty places, and the resistance is enclosed and will not rust out.

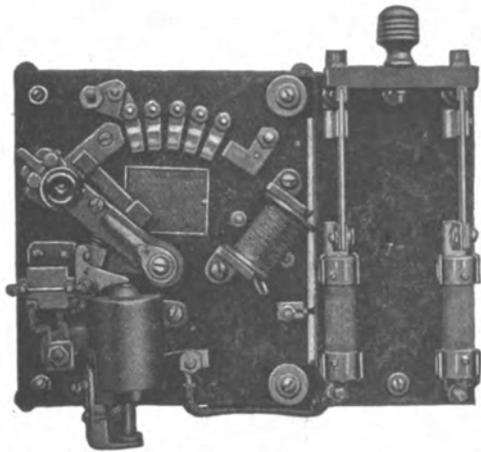


FIG. 1.—FIVE-HORSE-POWER, 125-VOLT MOTOR-STARTER.

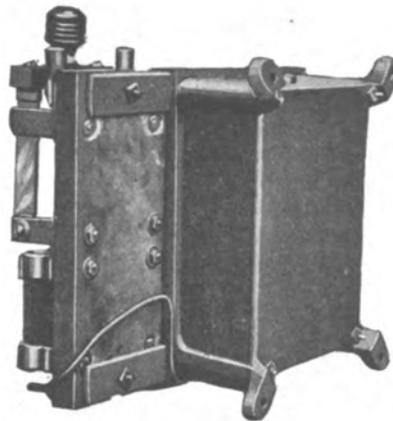


FIG. 2.—BACK VIEW OF FIVE-HORSE-POWER, 125-VOLT MOTOR-STARTER.

twenty-five ampere fuses an approved combination switch and fuse is used, with a porcelain base. In larger sizes approved, plain-finished switches and fuses are used. Fig. 1 shows a five-horse-power, 125-volt motor-starter. Fig. 2 shows a back view of Fig. 1, illustrating the method of at-

taching the switch and fuses. There is provided an auxiliary initial contact, which is a separate, removable part readily renewable, and so placed that no arc at the auxiliary contact can burn the stationary contact segments or the movable contact shoe. Supplementing the initial contact there is provided a

**Primary Battery Renewals.**

Two of the important points to consider in choosing primary batteries for use on a gasolene engine are simplicity of construction and adaptability for rapid and easy renewal. In the case of the Edison primary battery the renewals are very inexpensive. The manufacturer claims that there is no deterioration of its permanent parts, and each time the battery is renewed it will last as long and deliver the same current as when it was new. When this is considered, the first cost is lost sight of in the advantage to be gained by the economical renewals. Zinc, black oxide of copper and a solution of high-grade caustic soda are the elements used in the Edison primary battery. The battery requires no attention until exhausted, unless, through carelessness, it is short-circuited.

The battery is made by the Edison Manufacturing Company, 10 Fifth avenue, New York city.

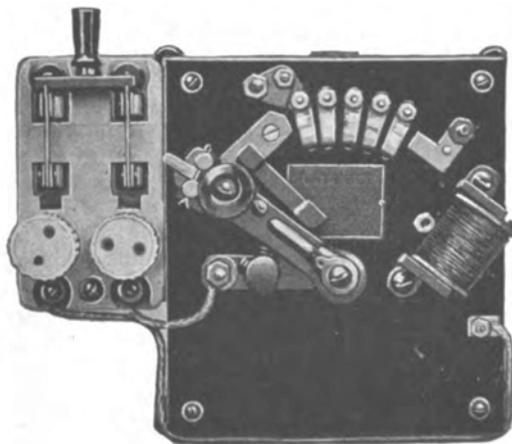


FIG. 3.—THREE-HORSE-POWER, 220-VOLT MOTOR-STARTER.

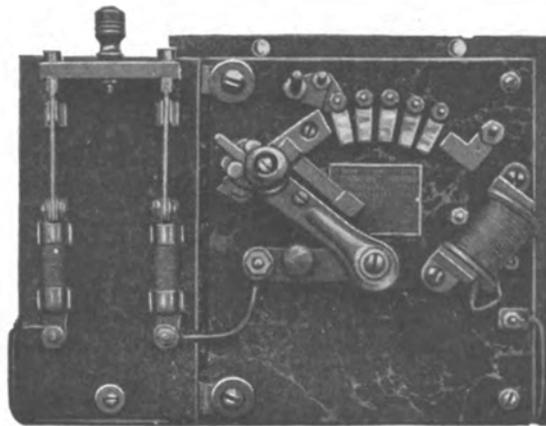


FIG. 4.—THREE-HORSE-POWER, 110-VOLT MOTOR-STARTER, WITH BACK-MOUNTING SLATE.

taching the switch and fuses. Fig. 3 shows a three-horse-power, 220-volt motor-starter. Fig. 4 shows a three-horse-power, 110-volt motor-starter with a back-mounting slate.

It is the intention of the Ward Leonard Electric Company to quote such low prices upon this apparatus that it will be found more profitable to install the combined motor-starter and switch and fuse than to install the switches and fuses separate from the rheostat, with the necessary wiring connections, etc.

A motor line switch is not closed except when the circuit is open upon the motor-

separate, renewable, spring-actuated flipper switch, carried by the rheostat arm and connected to it by a flexible copper cable. This flipper switch breaks the arc between it and the auxiliary initial contact by a quick snap action, independent of the slowness of movement of the operator's hand.

In the case of motor-starters larger than ten horse-power the arc-rupturing parts of the initial contact are provided with magnetic blowouts.

These rheostats are of the universal type, and can be used to start any known type of direct-current motor at its rated

**St. Paul Railroad to Electrify Bitter Root Division.**

It is announced that plans are under consideration for the electrification of the Bitter Root Mountain Division of the Chicago, Milwaukee & St. Paul's extension to the Pacific Coast. The section of the line which it is planned to operate by electricity is about fifty-four miles long.

It includes 8,000 feet of tunnel through the Bitter Root Mountains and the grades on both sides of the mountain.

Coming so soon after the adoption of plans by the Great Northern for the electric operation of its Cascade tunnel and approaches, and within a few days of the letting of contracts for the electrification of some of the Southern Pacific's lines in California, the St. Paul's plans are regarded as indicating the extent to which electricity is being substituted for steam power in the operation of through railroad lines.