The rectifier will stop in a position to open the circuit and prevent the battery from discharging back through the alternating current circuit when the power supply is interrupted, and will start up again automatically when the power is restored.

The battery may be installed in the same compartment with signal relays and other apparatus without danger of injury to the latter. Since the battery is always fully charged, the specific gravity of the electrolyte is maintained at a point where it will not freeze even in the coldest weather, so that it is not necessary to provide a special battery vault, located below the frost line, or any special means for keeping the battery compartment warm.

The conditions of battery operation with this system tend to give long battery life. The transmission line ordinarily supplies the steady load on the signal circuit, and the battery is only called upon to discharge to meet momentary demands or in case of the interruption of the normal supply.

Current from the a. c. circuit may be used for signal lights, a relay being provided to throw the lights on the battery in case of failure on the a. c. line.

This system does not require spare batteries to provide for charging. There is no transporting or handling to the battery and the damage and deterioration due to this cause is eliminated. The cost of a battery attendant at a central charging plant is eliminated.

The a. c. floating battery system can be introduced in connection with the existing d. c. signal circuits without any change in the present equipment. It is well to bear in mind some of the following points in connection with this system.

The net trickle charge supplied to the battery (after allowing for the current furnished to the signal circuit) must be adjusted within the maximum and minimum limits given in the operatig instructions for the type of battery used.

The readings of voltage and current on the d. c. side of the rectifier should be made with d. c. (not with a. c.) meters, and *with the battery connected.* With the battery disconnected, the voltage reading at the d. c. terminals of the rectifier will be about half that obtained with the battery connected.

The d. c. ammeter reads the *arithmetical* average of the pulsating current, which is the correct value to use in considering the charge of a storage battery. The heating effect of this pulsating current is equal to that of a continuous current from 2 to 2¼ times that shown on the d. c. ammeter and this fact should be taken into consideration in selecting resistance units and fuses to carry the pulsating current.

DERAILS: ARE THEY GOOD OR BAD?

By A. H. Rudd

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THE proposition to eliminate derails in main tracks, especially at grade crossings, may at first glance appear radical, revolutionary and retrogressive; and yet many signal engineers and other operating officers who have studied results now feel that safer and, therefore, better and more economical operation and maintenance would be attained by such elimination, and that the introduction of a device which may cause an accident to prevent an accident appears, to put it mildly, somewhat illogical.

The subject is at least a fruitful one for discussion, although, as the installation of these devices is largely a matter of state regulation, results in the near future in the direction indicated are more or less problematical.

The frequent derailments at derails might be cited as arguments for their retention, and as proofs of the danger resulting from their removal; and yet some roads which do not have derails in their main tracks not only escape these accidents, but do not have the collisions which derails are supposed to prevent.

It would appear that the sentiment is quite general that "our men are so careful we do not need derails, but we are afraid of what the *other fellow* may do;" and the other fellow feels the same way. Those who admit that they need derails to enforce their own discipline are few and far between—it is the "other fellow." Put yourself in the other fellow's place and what becomes of the derail? It stays in, because the third party in the case, the arbiters, as represented by the public service commissions, feel "We might not be able to rely on either or any of you."

On the one hand we have the actual derailments, on the other, occasional collisions. Unquestionably there are many more derailments than collisions, but the answers to the questions, "*Did* the derail prevent a collision?" or "*Would* a derail *have* prevented the collision?" must be, in a very large number of cases, more or less conjectural. For this reason, comprehensive comparative statistics have never, as far as the writer knows, been compiled; and obviously they are inherently difficult of compilation.

Does the derail tend to better observance of signals? Is it a "moral agent" as some claim, or an immoral one? Its theoretical utility is to protect the careful from the negligent, and, in some cases, the innocent from the guilty. Does it always work out that way?

At a crossing or junction on a double-track or a four-track road, where a derailed train may foul other tracks, is it a safeguard or a menace?

It is not used or required to be used to protect crossovers in double track and four track roads; why? Largely because of this danger of wrecking trains other than the one intended. Does experience show that its omission has resulted disastrously? Is it better to put a train down the bank if it overruns a stop signal fifty or sixty feet, or to give it 500 ft. more in which to have a chance to stop before it reaches an open draw, or a crossing?

Which signals are more frequently overrun, stop signals or stop-and-proceed signals—due allowance being made for the number of each in service? Which signals are most frequently disregarded—interlocking or block (manual, controlled manual or automatic)? Why? Are they in most cases actually disregarded and ignored, or are they, when overrun, passed only a few feet?

How many derailments at derails have occurred in the past 10 years? Count not only those which have resulted in fatalities or injuries, but also those classed as minor accidents but which, nevertheless, blocked traffic and required the services of the wrecking crew. How many serious collisions have resulted in the same period at interlocked crossovers, crossings and junctions not "protected" by derails? What is the percentage of each?

The facts noted early in this contribution—frequent derailments and the absence of accident on some roads—have led some of us to think that the derail is perhaps an *unnecessary* rather than a "necesary evil;" that at least its value is open to question, and that an unprejudiced examination may disclose some interesting facts. What are these facts?

Are reliable statistics available? If not, perhaps the *Railway Signal Engineer* will attempt to collate them: not only for the information of railroad officers, but also for the public authorities, so that all doubt may be removed, and we may know definitely whether the derails should be retained or removed.