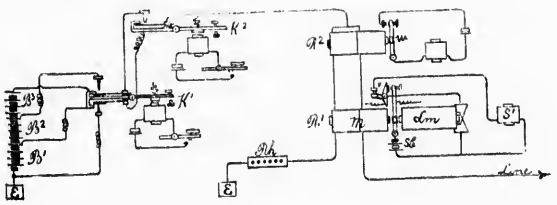
keys together are in action, an intermediate strength of current goes to line. At the distant end there are two receivers. One of them is an ordinary duplex relay R^2 connected in the usual way; a retractile spring holds its armature with a force superior to the magnetic effect of the minimum current, but it is responsive to the intermediate and maximum currents; R^2 therefore, freely and readily responds to the manipulation of the transmitter K^2. The other receiver comprises the distinctly unique feature that has raised the straight current quadruplex to its present perfection. Its contrivance is such that the sounder or recording instrument operating in its local circuit responds promptly and accurately to the manipulation of K^1, under the action of the minimum and intermediate currents, while the maximum current produces upon it absolutely no effect whatever. In this arrangement the sounder is operated directly by the armature lever contacts, and there is consequently no enfeeblement of the signals and no uncertainty whatever about its action. In consequence, the transmissions on both sides are equally rapid and reliable. For the information of those interested in the solution of the problem involved, a detailed explanation of the receiver R^1 is given in the accompanying note.

A test which the writer was enabled to make, in conjunction with Mr. H. Bott of Ottawa, on a line between this place and Toronto, nearly 300 miles long, showed that the apparatus would respond properly to currents (= ·038 amp. max.) derived from batteries of 150 cells at each end of the line. On the self same line wire the standard polar quadruplex is regularly operated with currents (=·070 amp.) derived from batteries of 275 cells at each end of the line; which, under certain positions of the transmitting keys, produces in the circuit a current of (·070 × 2 =) ·140 amp. max. from the combination of the (275 × 2 =) 550 cells.

The comparison speaks for itself.

We have now arrived at the conclusion of this paper. Its purpose has been to show that the practice of telegraphy to-day, despite the many advances that have been made in the service in one way and another, is not so scientific as we find it to have been so long as twenty years ago. An endeavor has been made to show that the development of the polar quadruplex, now so extensively used, has occasioned this departure from first principles, and how the now perfected straight-current quadruplex would admit of a return thereto. And the question submitted for consideration is, Would it be worth while now to return to the original practice and continue in that good old way?



NOTE.

In the straight-current quadruplex the receiver on one side responds to the stronger currents and the receiver on the other side responds to the weaker currents. It is obviously an easy matter to prevent the former being interfered with by the currents intended for the latter side, as it is only a matter of adjustment of the retractile force on the armature lever. On the other hand, it is equally obvious that an electro magnet cannot be constructed to respond to weak currents and at the same time be unaffected by strong ones. As, however, the signals are, in practice, always taken from a second instrument, operating on a local circuit of the receiver or relay, it is possible to so arrange the intervening mechanism that the local circuit shall be closed only when the currents designed therefor are traversing the magnet coils. In the construction of the instrument, therefore, a supplementary lever is hung in such a way as to hold the armature lever in an intermediate position, between its limiting stops,