DYNAMO-TELEGRAPHY.

Until within a comparatively recent period all attempts at transmission of telegraphic messages with dynamo-electricity have proven futile.

There seemed to be no probability that the old voltaic battery system, involving multitudinous inconveniences, would ever be supplanted, and there are at the present time only two systems of dynamical telegraphs which are operative from a successful standpoint, both being of very recent origin and as yet comparatively unknown to the public.

For the successful operation of any telegraph line two important elements enter into consideration, viz.:

1st. A steady or uniform current.

2d. Delicate adjustment of receiving instruments; and any variation of the former necessarily precludes the possibility of the latter, so that they may be operative under all conditions of the line.

It is scarcely necessary to add that electricians have never fully appreciated the difficulties to be overcome in this class of telegraphy, and their attempts heretofore but verify this assertion.

These fluctuations of current are due to several causes, viz.:

1st. Any change of velocity in the generator.

2d. Any variation of external or internal resistance (the latter being often the result of the former, owing to high normal internal resistance); and either necessarily varying the electromotive force, and hence the current to line.

3d. To a total discharge of the magnetism in the field of force magnets on opening the line, and thus completely breaking down the currents until the line shall again be closed.

This might properly be included under the same head as the second, inasmuch as a total discharge of the field of force magnets is, theoretically speaking, simply the result of an infinite resistance offered to the current.

A dynamo machine produces a current of electricity by a series of actions and reactions in its internal mechanism; that is to say, the armature of the machine acts upon the field of force magnets, and these in turn react upon the armature at each revolution, and thus a set of actions and reactions ensue until a max mum effect is attained. This results when the neutral fluids (so to speak) balance each other.

Now, any increase in the external or line resistance acts to discharge the field of force magnets, and a break in the line, which necessarily occurs on opening a key to transmit a signal, increases the resistance to an infinite amount, and hence totally discharges the field of force magnets. Hence, inasmuch as it requires a definite time to charge the line by the above described series of actions and reactions, it is obvious that there would ensue at each break such fluctuations of current as would totally prevent any transmission of signals.

Furthermore, such an increase of external resistance reacts upon the machine and heats it internally, thus offering another objectionable element.

Thus we have a series of changes, which, acting under varying circumstances, produce fluctuations in the line current beyond the limits of accurate adjustment of delicate receiving instruments required on long lines of high resistance.

The problem, then, to be solved is:

1st. To prevent the total discharge of the field of force magnets on any variation of external resistance; or, at least, to provide some means for a constant relation between the resistances and the electromotive force of the machine.

2d. To prevent undue variations of current caused by an increase or decrease of the velocity of the generator.

Two systems have been devised which involve all of the essential principles required by the problem: one the invention of Mr. Stephen D. Field, Jr., and the other of Dr. Orazio Lugo, of New York city.

To obviate the first difficulty, Mr. Field energizes his field of force magnets by an independent generator, actuated by an independent power, the circuit from the commutators being through the field of force magnets of said generator, thence through the coils of the field of force magnets which develop the line currents. This circuit is entirely independent from the line circuit, and constitutes, as it were, an infinite supply of electricity to energize the field of force magnets, or at any rate an inexhaustible supply dependent on the power and capacity of the generator.

Hence, any change of resistance in the line can have no appreciable effect upon the field of force magnets.

To obviate any change in the current due to a change of velocity of the generator, he connects up a series of line generators whose field of force magnets are energized as above, and connects the commutators and said line generators to common supply points, being necessarily at the opposite poles of the machine. Each generator of line currents is actuated by an independent pulley, so that any change of velocity of any one generator can only affect the sum total of currents by its proportional ratio of gain or loss.

Theoretically, then, an infinite number of generators would be required to produce the best results, bearing in mind, of course, that such a series implies a range of velocities or changes of relative velocities varying from zero to infinity.

It is found in practice that a series of five generators produces satisfactory results. This, of course, is apparent if we consider that a change of velocity in any one from a normal velocity is not liable under ordinary circumstances to be more than ten per cent.

It is apparent that any change of velocity in the generator which energizes the field of force magnets would increase proportionately the electromotive force of the line generators. This is obviated by a governor which regulates the speed of the motive force and keeps it within practical limitations.

The same system of generators might be used to energize the field of force magnets as is required to generate line currents, thus making the system automatic in its operation; but this feature does not appear to have suggested itself to Mr. Field. In this manner any change of speed in any one of the energizing machines would only affect the line field of force magnets a proportional amount, as above suggested.

Thus it will be seen that if any one of the five generators increases or decreases twenty per cent from the normal rate it only has a proportionate effect of one twenty-fifth of the whole line current, which in practice is found to be inappreciable.

The broad idea of energizing the field of force magnets by an independent generator is not new *per se*, as is seen in the Wilde machine; but Mr. Field claims to be the first to energize a series of field of force magnets in this way, and just how much invention is involved in this idea it is not the province of this article to discuss.

Dr. Lugo has recently invented and patented a much simpler method of avoiding these difficulties, dependent upon well known electrical laws.

He uses a single current generator on the line with a shunt wire of low resistance, connecting the opposite poles thereof; so that the total resistance is that due to the lines, the shunt, and the machine.

The resistance of the shunt is less than that of the external lines and greater than that of the machine itself.

There results from this combination, under well known laws, a proportionate division of current between the line and the shunt; a much larger portion, of course, going through the shunt because of its low resistance.

It is obvious, then, that the field of force magnets can never be discharged, for there is always a path of low resistance for the current. Hence the electromotive force is dependent only upon two causes for its variations, viz., a change of velocity of the generator and a change of resistances between the shunt and the line. The former it is proposed to regulate by electrical governors, such as are well known, dependent upon the current sent to line, and the latter is in a measure automatically regulated by the shunt itself, inasmuch as changes of fluctuations which result from changes of resistances in the external line necessarily increase the flow in the shunt itself, and hence vary the resistance of the shunt by heating it. Hence there can be no change of resistance in the internal machine, because normally it is much less than that of the shunt. Of course in practice these adjustments must be made dependent upon varying circumstances of the external lines, but certain ratios may be attained which will produce the best results, and theoretically this will be when these line resistances equal that of the shunt.

When they pass below this limit the system is, of course, inoperative; but there exists a sufficient limit under ordinary circumstances to afford a perfect working system. This limit, it will be understood, is dependent upon the relative sectional area of the external line and that of the shunt, which affords sufficient resistance to prevent the machine from heating; thus in practice the generator never grows warm.

An attendant at the shunt may regulate variable resistances by testing the warmth thereof. Hence as long as a mean temperature exists a uniform current flows to line and no change need be made.

Both of the above described systems are in use, and the best results are attained; it being found that steady currents at all times flow on the line.

It is then entirely probable that within the next decade we shall find our large telegraphic corporations operating their elevators, supplying motive power, heat, and light throughout their buildings, and electricity for their lines from one common source of power.

Thus saving annually thousands of dollars, and being happily rid of numerous annoyances consequent upon such a system of forces as now exists by a concentration thereof at one common center.

C. J. KINTNER,
U. S. Patent Office.

Improvements in Cotton Pressing.

The new Morse Compresses in New Orleans are producing astonishing results by way of largely increased cargoes of cotton from this port.

The ship Mary E. Riggs, of 1,277 tons American register (1,226 British), received a cargo of 5,400 bales of cotton, weighing 2,568,640 pounds; making 2,011 pounds per ton American and 2,095 pounds per ton British measurement.

The first cargo of this ship from this port was 3,740 bales; the last, and largest (previous to the present one), was 4,364 bales, weighing 1,943,498 pounds. Her present cargo of 5,400 bales exceeds her largest previous cargo 1,036 bales, or 625,142 pounds, exceeding her largest previous cargo 1,404 bales of same average weight. With freight at one cent per pound and five per cent primage, the value of this increase, for this medium-sized vessel, is about $6,600. This cargo was compressed, without the advantage of a "tie puller," in the ordinary course of business by the Factors' Press, one of the seven large Morse Compresses. The only cargoes of single bales taken by sail vessels approximating this one are the following:

The Minnie H. Gerow (1,304 tons American), from the Champion Press, 2,481,790 = 1,903 pounds per ton measurement. The Western Empire (1,399 tons American register), from the Champion Press, 2,022 per ton. The Minnie H. Gerow, from the International Press (Taylor hydraulic, 64-inch cylinders), 2,644,906 = 2,028 pounds per ton. But in all of these cargoes of 1,903, 2,022, and 2,028 per ton measurement, tie pullers were used for which is claimed an advantage of 20 per cent. If the present cargo of the Mary E. Riggs had had this advantage, her 2,011 pounds per ton American, and 2,095 British, would have been 2,413 and 2,514 per ton—or say 20 per cent larger than any cargo of single bales ever cleared in this country.

Since the above, the British ship Ben Lomond, of 887 tons register, cleared at New Orleans by her agents, Messrs. Forstall, Ross & Clayton, with 4,363 bales cotton under deck, none in cabin or crew spaces, weighing 2,054,848 pounds, making 2,316 pounds to the ton measurement. This is the largest cargo per ton ever taken by a sail vessel from an American port. The larger part of this cargo was "doubled." The cotton was tied by hand (by colored men), and consequently without the 20 per cent advantage claimed for steam "band pullers." It was all compressed at the Southern Press by the 90-inch cylinder Morse Compress. Not more than three years ago the average cargoes of ships from this port did not exceed 1,425 pounds per ton register; and for other modern-built presses the average is now about 1,725. The above cargo of 2,316, without tie pullers, therefore, exceeds recent average compressing by 35 per cent, or 524,773 pounds, in a single cargo of a small ship like the Ben Lomond, and at the rate of freight received makes a gain of £820—say, $3,936. The proprietors claim that under more favorable circumstances the 90-inch Morse Compress can considerably excel the above.

The Keely Motor Deception.

It is stated that immediately after the annual meeting of the Keely motor stockholders, held two weeks ago, a couple of gentlemen who are heavy on the motor stock called upon Mr. Keely and demanded that he should at once name a day and date for a public exhibition of his wonderful apparatus. They had a very plain talk with him, and announced that they voiced the sentiments of most of the parties interested. Unless the engine was put to work within a short time and sawed wood, sent a locomotive to Jericho on a pint of water, and did a hundred other things claimed for it, they would resist further payments to the discoverer.

Keely was not the least disturbed by their threats, and when they found this they began to persuade and coax him, as a boom in the stock was needed. The man of mysteries declined to accede to their requests, but said: "I see my way as clear as sunlight." Then he eased their minds by stating that he would make no further demands upon the company for funds for his own use, because he had enough to live on. This was very assuring, and made the stockholders happy. If they did not give him the money to complete his invention, he told them that he would keep his secrets to himself. This caused some bitter words, and Mr. Keely was the recipient of some unvarnished opinions. Already they had spent over $500,000 on the machine, and could see no appreciable results. Keely plainly informed his visitors that he would not give an exhibition for two months at least, because the engine needed some alterations.

Keely has had a new engine built at a cost of $10,000, and the lower one has been placed on the lower floor of the building on Twentieth street. Keely promised that when the exhibition is given both engines should be placed in operation, so as to show the improvement in the new one over the old. The callers were compelled to depart without being able to convince Keely that a time for a boom was near at hand.

The stock of the Keely Motor Company is now held at about $7 per share. This time last year it was worth $18. The highest it ever reached was $300, when 3,000 shares were disposed of in New York at the figures named. The average price has been about $150 per share, and the transactions at those rates have been large. Of the present stockholders but few were on the original list, they having all been able to get out at the top price. Keely has been at work some seven years.—*Philadelphia Record.*

Paraffine as a Wood Preserver.

A German chemist, Dr. Schal, has established the useful fact that wood impregnated with paraffine is preserved from rot, especially when employed in alizarine manufactures, where it is exposed to the decaying action of damp, acid, and alkaline lyes. Wooden vessels which become totally rotten in two months last for two years when impregnated with paraffine. The preparation of the wood is effected by drying it in warm air for three weeks, then steeped in melted paraffine to which has been added some petroleum ether or sulphuret of carbon. In preparing this bath great care must, however, be exercised, owing to the inflammability of its ingredients. To prevent the paraffine from escaping from the pores, the wood should be coated with oil varnish or soluble glass, washed after drying with diluted hydrochloric acid. The silicic acid thus formed clogs up the pores from the outside, and protects the paraffine from the action of water. Paraffine, melted with equal parts of linseed or rapeseed oil, is also, according to Dr. Schal, useful for coating iron vessels, which in chemical manufactories are otherwise very liable to rust.