der. The steam space, A, Fig. 2, will let the steam under the piston, and help carry the weight of the piston from the bottom of the cylinder, and the little knob, B, Fig. 3, keeps the rings from working round.

Fig. 2.

The advantage of this piston is, that your engineer has nothing to meddle with. The same ring casting will make two sets of these rings, and they can be fitted to a solid calliper, and are ready to step in at any time in a few minutes. From my experience thus far, I think one set will last one year without any appreciable wear of the cylinder. I believe the Ramsbottom piston is the best now in use; unless it is those which I have made and introduced, the technical improvements of which I have described.

Fig. 3.

Editorial Correspondence.

NEW RAPID TELEGRAPH.

THE Abbé Moigno, who for many years contributed largely, as co-editor, to the usefulness and success of the *Cosmos*, has lately accepted an engagement as regular Paris Correspondent to the English *Chemical News*. His letters to that Journal display alike his excellent command of our language and extensive connection with all that is going on in the wide field of scientific novelty. It is thus with peculiar pleasure that we have received from him a letter for the *Journal*, which he proposes to follow up with others from time to time.—EDITOR.

PARIS, December 28th, 1867.

Since the 11th September, 1867, the administration of the French telegraphic lines uses, for its service between Paris and Lyons, a new system of rapidly telegraphing, the invention of M. M. Chaurapaignes and Lambrig, telegraph assistants.

This telegraph acts automatically, transmitting despatches between two towns at the rate of 120 to 180 despatches per hour, by a single conducting wire, a velocity already equal to three times that of other telegraphs, and capable of being augmented proportionally to the diameter of the conductor.

The transmissions are made by means of a band of metallic paper on which the signals composing the despatch are traced with insulating ink. The reproduction is obtained on a band of unsized paper, the middle portion of which is impregnated with a chemical liquor, necessary for the formation of the signs existing on the metallic band.

In order to obtain regularity of execution, the work, such as the composition, transmission, and reception, is divided among a certain number of hands, according to requirement.

One and the same instrument in communication with the line, is composed of—

1. A clock-work movement; 2. A double roller, which draws either the metallic band or the chemical one; 3. A ringing apparatus for warning the corresponding clerk; 4. A Morse manipulator or key of ordinary construction.

The clock-work is put in movement by a weight which is wound up by a crank; it sets the rollers in motion.

Near the roller on which the metallic band passes, is a point which represents the extremity of the conducting wire. The roller communicates with an electric battery. When the band is drawn by the roller, the point is sometimes on the metallic portions of the band, and sometimes on the surfaces containing the writing of the despatch in insulating ink, thus producing emissions and cessations of the current, according to the signification of the message.

Near the roller, where the band of unsized paper passes, there is a small cup filled with a liquor composed of water, nitrate of ammonia and ferro-cyanide of potassium. In the midst of this cup is placed a small roller, which dips into the cup by its lower portion. The upper portion is a little higher than the edges of the cup, and thus supports the band of unsized paper, which, being drawn by the rollers, causes the little roller to revolve in the cup, and to leave on the paper a thin film for the reproduction of the signals when the current passes. This film extends through the paper immediately, and disappears immediately.

An iron point, representing, as that of the metallic band, the extremity of the line, rests by its own weight, slightly inclined, upon the fillet in communication with the earth, the electric current decomposes the humid portion and leaves a colored deposit, which represents the signals of the despatch.

The working of this instrument is so simple and self-acting, that

one clerk can manage it perfectly without fatigue. He can prepare from thirty-five to forty despatches per hour; the assistants acquainted with the Morse instrument can compose the despatches. For the composition of the transmission between Paris and Lyons, three composing clerks are sufficient.

We have received the following communication from M. Bertsch, of Paris, relative to a note, inserted in the *Mondes* of the 21st November, from Mr. Morton, of Philadelphia; an extract will suffice:—

“M. Morton, après avoir observé, comme beaucoup de physiciens, que dans la machine de Holtz, telle que la construit M. Ruhmkorff, le courant va en s'affaiblissant pour cesser tout à fait au bout de quelques semaines, a cru reconnaître que l'amoidrissement graduel des effets devait être attribué à un decollement partiel des bords des armatures. En conséquence a fractionnel le plateau fixe pour pouvoir aisément, dit il, en changer les différents segments lorsque la machine ne fonctionne plus, &c.”

Mr. Morton, after having observed, as many physicists have done, that, in the Holtz machine as constructed by Mr. Ruhmkorff, the current decreases gradually, and then ceases altogether at the end of a few weeks, thinks that the gradual decrease of the effects must be attributed to a loss of insulation occurring at the edges of the armatures. Consequently, he has divided the fixed plate, in order, says Mr. Morton, to exchange the different segments when the machine will no longer work. It is only necessary to glance at the details of this construction and the figures accompanying the note, to see that it enormously complicates the organs of the machine so elegantly and skillfully combined by Mr. Ruhmkorff. Mr. Morton does not seem to me to have remedied the inconvenience, more apparent than real, which is avoided, in the meantime, while preserving the excellent dispositions of the machine.

The weakening of the current cannot be attributed to the cause assigned by Mr. Morton. It depends on a superficial modification of the surfaces in front of each other. The disks covered with shellac get covered gradually with organic matter, which in inhabited places soon tarnishes all polished bodies, such as glass, mirrors, &c.

Under the progressive influence of this sufficiently conducting surface, the rotating plate ceases by degrees to become polarized. It becomes electrified by taking a portion of the charge from the armatures; on the other hand, these latter, from the same cause, communicate between each other by means of the fixed plate, which has

become a conductor, and which causes a current to be established, and the machine stops. The simplest remedy for this, is to pass between the isolating surfaces a pad of soft paper, imbibed with a few drops of turpentine, naphtha oil, benzine, or petroleum oil, so as to restore all its energy to this curious machine.

F. MOIGNO.

We are very far from wishing to take any advantage of our position, as nearer to our readers, to depreciate the arguments or ability of M. Bertsch, whose reasons have been repeated as above by our learned correspondent. Mr. Bertsch, as will be seen by reference to this *Journal*, Vol. LIII., page 36, is the author of one of the first and most admirable improvements on the Holtz machine, and is thoroughly conversant with its theory. In the present case, we think he is, however, hasty in his conclusions. The drawings to which he refers are those representing the modified forms of the Holtz machine made by Mr. Chester and Mr. Ritchie and published in the *Journal*, Vol. LIII., pp. 253 and 344, and which we afterwards sent, with the note or description mentioned, to *Les Mondes*. The drawings might naturally suggest to one inspecting them for the first time the idea of complication. But we, who have the advantage over M. Bertsch, that we have in our own possession both forms of the machine (that of Ruhmkorff and the new American modification), find, from absolute use and experience, that the latter is not only infinitely more easy to manage, but is likewise far cheaper and more simple in construction. Cutting the stationary plate into four, makes, to be sure, four pieces in place of one; but as these four need but one support apiece, and the entire plate required four, nothing is lost here, while, on the contrary, a great gain is secured with reference to other parts, and the facility of renewal.

As regards the remedy suggested by M. Bertsch, we sincerely wish that it were effective. It is the plan advised by the inventor in his first description, and we tried it at once, when our machine, made by Ruhmkorff, first failed, but without effect.

The varnishing of the edge of the paper, however, we have repeatedly found most efficient. This, however, only shows that there are certain conditions not yet fully understood which have a great influence. We do not for a moment doubt that the cleaning process has succeeded with M. Bertsch; but as it certainly fails with our apparatus, it is well to bear both remedies in mind.