

parts of the instrument are mounted. The scale is supported by vulcanite studs projecting from the columns, and to one of the columns is attached a clock movement provided with three sets of spur wheels, by either of which it may be connected with the arbor of the cylinder. One pair of wheels connects the minute hand arbor of the clock with the cylinder, revolving the cylinder once an hour; another pair of wheels connect the hour hand mechanism with the cylinder, so that the latter is revolved once in twelve hours; while a third pair of wheels give the cylinder one revolution in six days.

This instrument is designed especially for making prolonged tests of different batteries in order to determine their characteristics. It is provided with four binding posts, two of which connect the wires of the batteries under test with the helixes. The other binding posts are connected respectively with the posts supporting the needle and with the journals of the recording cylinder. These posts receive wires from an induction coil capable of yielding a spark from one-eighth to one-quarter inch long.

The induction coil is kept continuously in action by two Bunsen elements, and a stream of sparks constantly pass between the elongated end of the index and the brass cylinder, perforating the intervening paper and making a permanent record of the movement of the needle. To render the line of perforations as thin as possible, the end of the index is made sharp and bent inward toward the cylinder. The spur wheels are placed loosely on the arbor of the cylinder, and the boss of each is provided with a set screw by means of which it may be fixed to the arbor. This arrangement admits of giving to the cylinder either of the speeds, as may be required.

The paper upon which the record is to be made is divided in one direction into degrees and in the other into hours and minutes. The hour and minute lines are curved to coincide with the path of the end of the index. The greatest strength of current being indicated by the greatest deflection from the central line of the record sheet, the approach of the index toward the central line indicates a diminution of the current, which is faithfully recorded by the passing sparks.

These records may be duplicated by using the sheet as a stencil and employing the method of printing used in connection with perforating pens. When the tests are of long duration the action of the induction coil is rendered intermittent by an automatic switch connected with the clock.

This method of recording may be applied to the electrical dynamometer, to electric meters, and to the more delicate galvanometers; and substantially the same device may be applied to recording thermometers, barometers, and other delicate meteorological instruments.

A New Ferry House.

The Hoboken Ferry Company have in process of construction at the terminus of the Delaware, Lackawanna, and Western Railroad, at Hoboken, a new ferry house, which, from its quaint, Queen Anne style of architecture, attracts considerable attention. The roof presents the curious appearance of being covered with snow. This is produced by the use of H. W. Johns' asbestos roofing, which is being extensively employed on factories and public buildings throughout the country. The snow-white roof, in contrast with the brilliant color of the walls of the new ferry house, gives a striking and showy effect to the structure.

M. DE LESSEPS does not believe in the efficacy of quarantines. He recalls that in 1834-5 in Egypt, although the foreign consuls managed the quarantine on the coast, they were unable by the most severe precautions to prevent the introduction and development of the worst plague that ever ravaged the Orient, carrying off in eight months one-third the population of Lower Egypt, particularly around Alexandria and Cairo, while it made no victims in Upper Egypt, although there was daily communication between the two parts of the country. He believes that sanitary precautions, improvement of food, air, and water, cleanliness, and temperance are the best preventives against contagious diseases.

Dr. Holmes on Spelling Reform.

Dr. Oliver Wendell Holmes says, in a letter to a member of the English Spelling Reform Association: I should not care to be an obstructive (if I could be) in the way of any well organized, scholarly attempt to reform our English and American language. But you must allow a fair share of old square-toed prejudices in their personal likings to old square-toed people. I hate to see my name spelled *Homes*, yet I never pronounce the *l*. I know from old Camden that its derivation is from the word *holm*, and I want the extra letter.

The Schroon Lake Meteor a Fraud.

The circumstantial story of the falling of a meteorite at Schroon Lake a short time since proves to be a cheat. The alleged meteorite is simply a mass of white quartzite, somewhat weathered, inclosing small particles of mica, a common stone in the Adirondack region.

FOLLOWING the example of the Baldwin Locomotive Works, the first to introduce the Tanite Company's improved surface grinder for perfecting locomotive slide-bars, the Danforth Locomotive Works have recently ordered one of the same machines for their establishment. The Tanite Company are also busy filling an order for several tons of emery wheels for the French Government.

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THE TELEPHONE ON THE BATTLEFIELD.

The development of the telephone has been so rapid and so recent that it has not yet been extended to all the fields of usefulness for which it is destined. Thus we believe it has not only never been used in actual battle, but it has had few if any opportunities to show its capacity even upon the fields of mimic war, Grand Army reviews, and mock battles. Yet it is evident that no more important use could be found for it than a great commander could make in a general engagement. In these days when a plan of battle includes the management of three or four great armies on each side, all under one head but scattered over wide areas and separated from each other by great distances, it is necessary that the commander-in-chief should have the most rapid communication with his different corps commanders, and be able to judge of the situation at any given point by reports instantaneously conveyed. In recognition of the importance of this necessity there are signal corps and telegraph brigades attached to the army staff of all great countries, but up to the present time they do not seem to have appreciated the telephone sufficiently to make it an important part of their equipment.

A means of conveying information, instructions, and orders rapidly and accurately during an engagement cannot be too highly regarded. The field telegraph was a long step in the right direction, but telegraphic messages are open to many objections which would be wholly avoided by the use of the telephone. Of course it may be taken for granted that the electric wire will hereafter be in general use on the battlefield, but the transmission of words letter by letter is necessarily slow and uncertain compared with the ease of communication by word of mouth; hence the telephone affords a great advantage to the general having it available for use. He is able to learn in a moment the exact condition of affairs at any quarter of the field. Not only can he communicate detailed instructions and receive specific information upon all points bearing upon the attack and defense, but he can gather some knowledge of the state of affairs at any given point, even though there may be no officer present at that point having the experience and judgment necessary for forming a proper estimate of the condition of affairs. The telephone, conveying the sounds of the battle, would enable the general to determine by the character and rapidity of the fire at that point how serious the situation was. Again, if a general of division defending an important position far distant on the flank should be killed, and the casualties among the brigade commanders should be heavy, it might happen that the senior officer living might be not sufficiently acquainted with the field, or not of wide experience enough to handle properly the force left under his command. In such a case the general-in-chief would be able to give all necessary instructions and orders direct from headquarters.

Moreover, this instrument cannot fail to diminish the danger to the general in command. It will not be necessary for him to advance to points under fire in order to confer with his corps commanders. Of course no general would hesitate to expose himself wherever the necessity existed for so doing, but inasmuch as the fate of an army may depend upon the life of the commander, it is desirable to reduce to the minimum the possibility of his sudden taking-off. As an example of this the case of Gen. McPherson may be cited. When Gen. Hood relieved Gen. Johnston in the command of the Confederate Army before Atlanta, he made a sudden violent attack upon Gen. Sherman's left. Just before the attack, Gen. McPherson, who commanded the Army of the Tennessee, was feeling anxious about the position of the enemy, and he rode to the furthest line of pickets to get information. Following the advanced line toward the left, he was at the extreme front when Gen. Hood's onset was made and he was killed in the first ten minutes of the action. Deprived of the commanding general, the Fifteenth Corps was routed and swept back upon the Seventeenth, and for a time there was every reason to fear that the whole position would be carried, involving a serious defeat to Gen. Sherman and possibly changing the whole subsequent course of the campaign. Had the telephone been in use from the front line to Gen. McPherson's headquarters, the latter's life would not have been lost.

The important requisites of a telephone for army use are that it shall be simple, not easily deranged, and able to stand rough usage. There is no reason to doubt that these essentials can readily be obtained, and then the constant use of the telephone in all army operations will be assured.

WHAT WE BUY AND SELL ABROAD.

The official statement of United States exports and imports, in which the returns from all the custom houses are corrected to August 23, gives the total exports of domestic merchandise at \$823,946,353, for the year ending June 30, while the merchandise imports for the same time were \$667,954,746, showing, as compared with the previous year, an increase in exports amounting to \$125,605,563, and increased imports of \$222,176,971. Of the imports, \$459,652,883 were of dutiable goods, and \$208,301,863 were free of duty. In the latter class the framers of our tariff intended, in a general way, to include many articles not produced at all here, as well as raw materials used in manufactures, making goods which were largely the product of foreign cheap labor pay a high rate of duty, in order to encourage our manufacturing industries. A large proportion of the value of the imports free of duty is covered in the two items of coffee and tea, which we received last year to the value