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THE EXHIBIT OF THE BRUSH ELECTRIC COMPANY AT THE INTERNATIONAL ELECTRICAL EXPOSITION PHILADELPHIA.

To the intelligent visitor, as well as to the student, the Brush exhibit was a constant source of attraction. So extensive was the plant, and so varied its features, that new and interesting subjects for contemplation were constantly appearing. Scattered through the great hall around pillar and buttress were myriads of lamps, large and small, bearing the legend, "Brush system." But to understand their character, a mere glance would not suffice; the large lamps differed in important essentials from those of any other system displayed, and the small incandescence lights, though giving out the same intensity, were of altogether different

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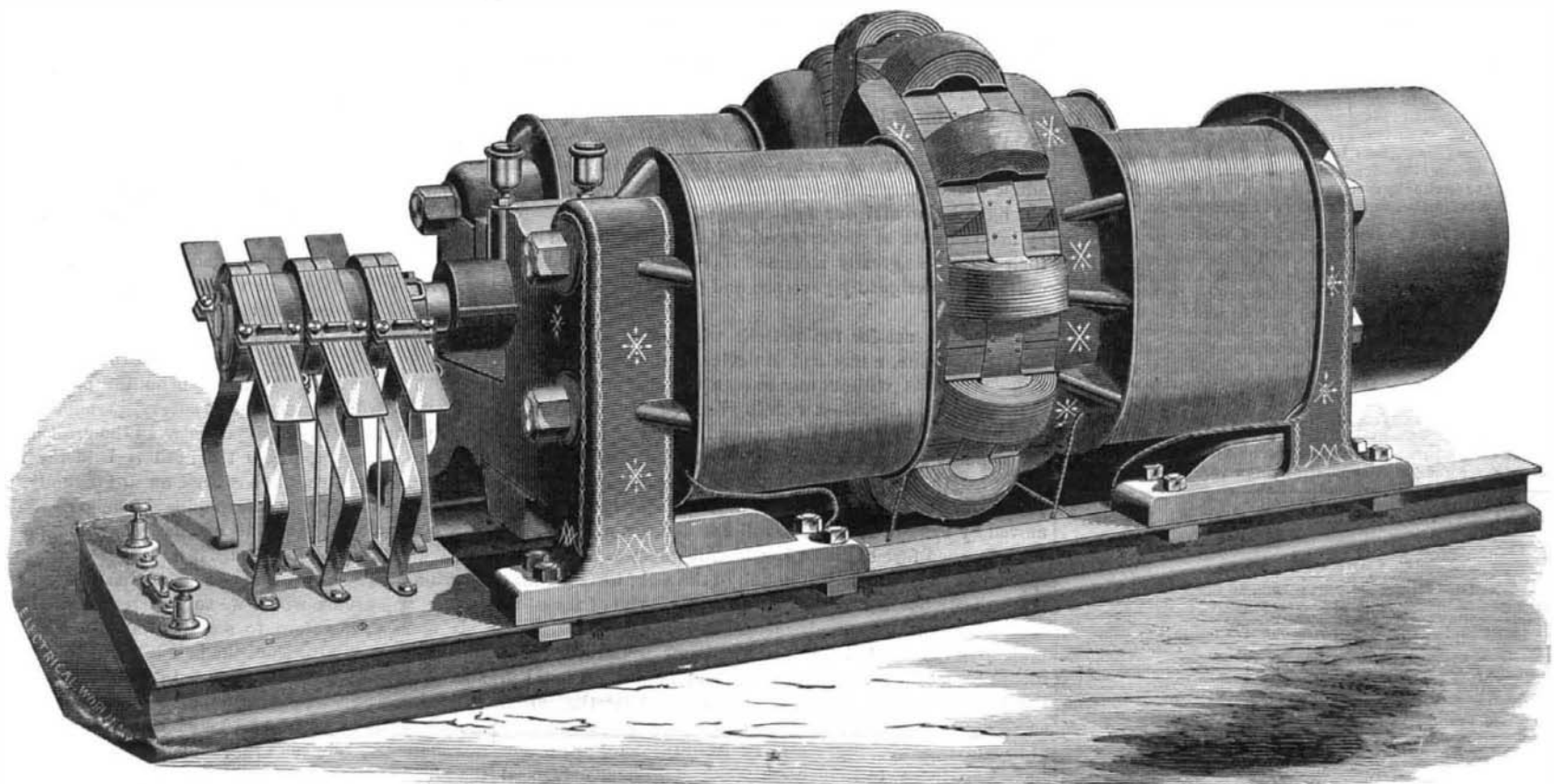
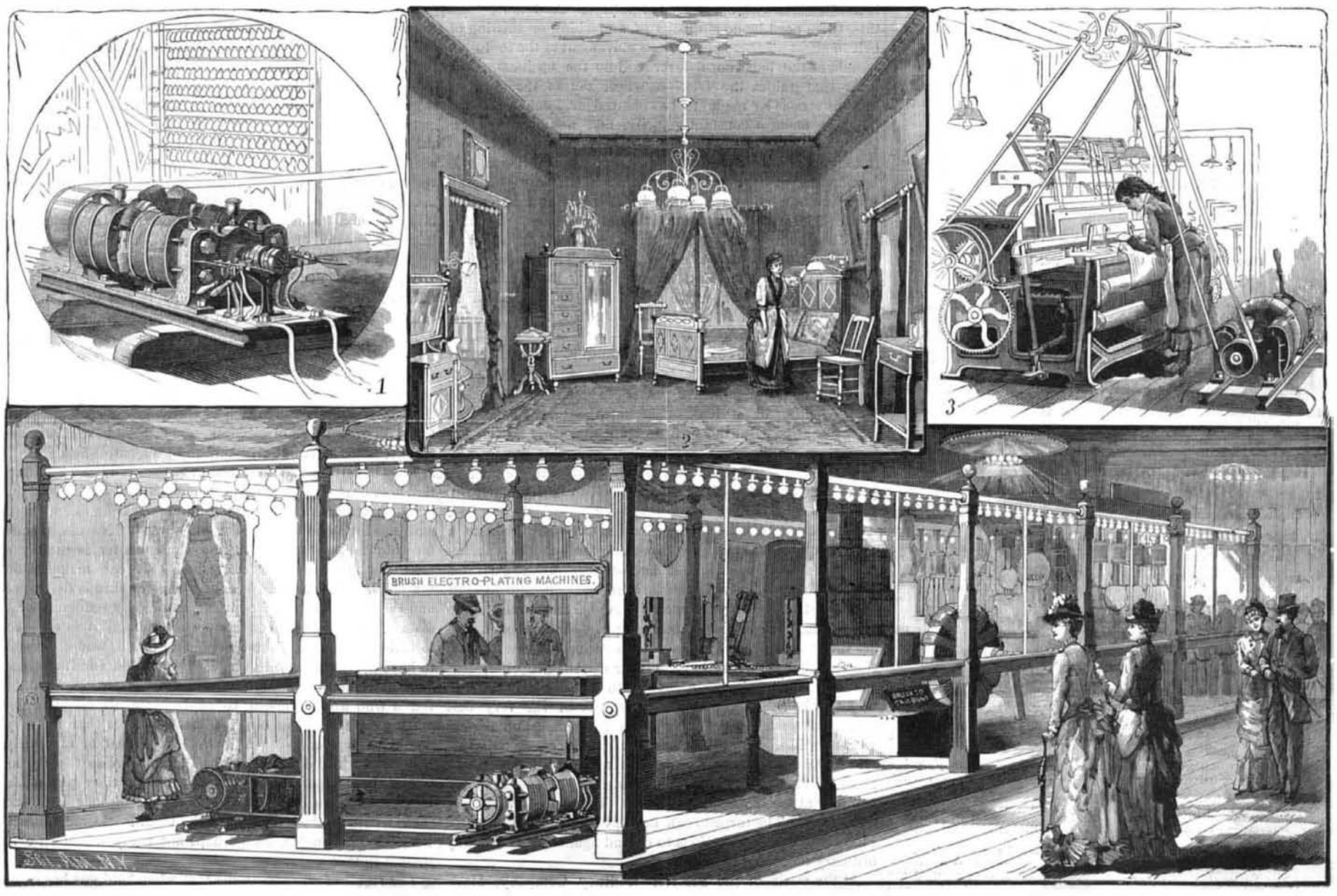


THE BRUSH DYNAMO ELECTRIC MACHINE.



THE INTERNATIONAL ELECTRICAL EXHIBITION, PHILADELPHIA.—THE BRUSH ELECTRIC CO.'S EXHIBIT.

EXHIBIT OF THE BRUSH ELECTRIC COMPANY.

(*Continued from first page.*)

origin, the one from the other. For, as could be seen in the exhibit, these incandescence lights may, in the Brush system, be generated both from the dynamo direct and through the interposition of the storage battery.

Of all the apparatus exhibited in the two great buildings of the Exposition, it is safe to say that nothing attracted more attention or was so attentively and continuously observed as the storage batteries in the Brush exhibit One of these batteries was placed in the exhibit on the ground floor and another in the west gallery. Both were in active operation, furnishing light for the incandescence Brush-Swan lamps, and so arranged that the general visitor, who came with rather confused ideas about the properties of storage batteries, could observe their working, and depart thence with some idea of their utility and convenience.

The scheme to charge these secondary batteries during the day by the use of the same wires which at night furnish the current for the arc lights was graphically set forth, and the advantages of the system explained.

For the purpose of practically illustrating their system of domestic lighting, a parlor, bedroom, and an additional chamber were exhibited by the Brush Company, the two first being lighted by the Brush-Swan incandescence lamps, fed by a secondary battery, and the third containing two looms driven by a Brush motor This motor was fed by the current taken from the battery by the same wire that supplied the lamps.

While the battery is in operation it has an E. M. F. of 37 volts, and is charged at the rate of twenty amperes Under ordinary circumstances it will feed forty lamps, each of sixteen candle power, and is said to have the ability when once thoroughly charged of furnishing 250 hours of light, whether used in large or small quantities.

Affixed to the wall in the west gallery was the manipulator of one of these batteries, by which the contact between the dynamo station, the battery, and the lighting apparatus was automatically maintained. By this ingenious contrivance the current is permitted to enter and charge the battery, and is cut off when the process is complete; to permit the current to flow into the lighting apparatus, and to check it when light is no longer needed.

The battery itself consists of twenty-one cells, each of which is composed of three plates of cast lead, the center one being an oxygen plate and those on either side hydrogen. The plates measure 16x16 inches square and are connected, the two outside ones with the middle plate of the neighboring cell—a system known as "series." As the electric current traverses the cells, it results in the decomposition of the electrolyte ($H_2SO_4+H_2O$), the two outside plates absorb hydrogen, and the center plate absorbs oxygen; the hydrogen and oxygen thus absorbed join again, and acting as a battery are resolved into water. A meter was attached to the batteries exhibited, which indicated the amount of light used, or rather the amount of current that had passed. The innumerable little incandescent lamps fed by these batteries were connected by wires hidden from view. Whether the battery was being charged or already complete, there was no noticeable difference in the intensity of the lights, which were kept aglow during the one period as well as at the other.

Besides furnishing light, it was shown at the Brush exhibit that these batteries could likewise be made to furnish power, not only in small quantities, as was shown by running the two looms in the exhibit, but sufficient for running street cars, boats, tricycles, and the like. Improvements are being continually made in regard to efficiency and simplicity, and consequently the cost is being lessened.

In the parlors which constituted a part of the Brush exhibit, circles of colored lamps, fed both by dynamos and secondary batteries, cast a steady and well diffused glow upon the elaborate paneling of the walls, and without a series of arc lamps poised on wooden columns stood like sentinals to mark the approach to the general headquarters.

As a practical illustration of "multiple arc," a hundred and sixty lamps glowed behind a finely wrought screen, while in front a dynamo of noiseless though rapid movement furnished the energy.

Still further northward from the headquarters exhibit, the Brush Company maintained six dynamo electric machines in motion; and from the same engines which supplied the power for these, an electro-plating machine of the Brush type, situated near the Brush parlors, was operated. This plating machine is in most respects similar to the arc light machine, except that the field magnets are coarsely wound in general circuit, in order that the E. M. F. may be retained at the low degree required for the class of work for which it is designed.

At the evening exhibitions it was shown that in these plating machines the largest portion of electricity produced from a given expenditure of power may be utilized for external work—the plating being done in the baths—and the minimum being absorbed in the machine itself. The result is that the machine does not become hot when doing its maximum amount of work. It does not require water to keep it cool, and is so arranged that its poles cannot reverse while running. The adjustability of the brushes at the commutator prevents its wear by an undue amount of spark, and its parts, being interchangeable, may, in case of accident, be quickly replaced. A most ingenious device for connecting up the currents from the armature prevents that pulsation of current which heretofore has proved so annoying to manufacturers of electro-plated ware. In order to ascertain the polarity of this plating machine, two small wires are run from the binding-posts, and, when their ends are dipped in the solution, the wire which gives off gas profusely is the one to be attached to the rod in which the work is placed; the other wire being attached to the rod in which the anodes are hung.

Near this electro-plating machine were exhibited three arc-light machines of the Brush pattern, one having a power of seventy arc-lights, each of 2,000 candle power. The dynamo machines used to supply the Brush-Swan incandescence lights are seen to be slightly modified for that special purpose In these the field magnets are compound wound, being in part shunt circuit and in part open circuit; the armature wire was in like degree coarse. Machines of this nature, each with a capacity of 150 incandescence lights, were in the exhibit. The machine used in supplying the Brush secondary battery was classed as of fifteen arc-light capacity.

The lamps shown in the exhibit were Wall lamp incandescence for bracket, ornamental swinging lamp, groups of sixteen candle power lamps for parlors, each lamp jutting out of a globe made in imitation of a flower, the large incandescence projecting downward from ceiling, and various descriptions of arc-lamps for street and theater.

The Brush-Swan incandescence lamp exhibited is exceedingly simple in construction. It consists of a small glass globe from which the air has been excluded, and in which is placed a thin film of carbon, forming a complete coil. On passing the electric current through the carbon it becomes intensely white heated, and emits a beautifully soft, clear, and steady light. The carbon not being in contact with the air, there is no combustion, and consequently no vitiation of atmosphere.

The lamp has no mechanism, and when it fails from use or accident, may readily be replaced by another. Its power varies from sixteen to one hundred candle power; the standard size being sixteen candle power. It has an average life of 1,000 hours, but may glow for several times that period. With but little cost it can be adapted to any gas fixtures, the wires being run through the pipes out of sight. It can be turned on or off by means of a key or button made of rubber, and each lamp is entirely independent of its neighbors. Every lamp is provided with a safety attachment. In case of accident to the line by short circuiting, the circuit is instantly broken. The wires leading to the fittings are carefully insulated in a fireproof material which prevents accidents by fire. They may be run between walls and floors or through partitions with safety, or inclosed, as at the Exposition, in ornamental wood strips crossing the ceilings.

The Brush dynamo-electric machine, which may be said to be the base of the whole Brush-Swan system, was shown in the exhibit, not only as an entirety, but exposed so that all could see its parts and comprehend the theory upon which it is based. It is a modification of the Gramme machine, and its most striking feature consists in the arrangement of the collectors and coils, whereby each pair of the four pairs of coils is, in turn, cut out of the circuit during one-eighth of a revolution, so that there are only three pairs of coils in circuit at one time. The object is to get rid of the waste of energy necessitated by sending a current through one pair of coils during the time at which they are of little service and cutting few lines of force. As might be supposed, this is when the coils are at an angle of very nearly ninety degrees to the lines of force; for at this time the number of lines of force passing through these coils is at a maximum, but their rate of change at a minimum, because the rate of change varies as the cosine of the angle. There are two sets of brushes and four commutators, one commutator for each pair of coils. Each brush is made to touch the commutators of two pairs of coils which are not contiguous, but at right angles to each other. The two strips of each commutator are separated from each other by about one-eighth of the circumference, so that whenever these insulating spaces come under a brush the pair of coils corresponding to this commutator are cut out of the circuit.

The brushes are so placed that they come over these insulating spaces just at the time when the coils corresponding are in the position of minimum action, and they come into contact with the strips of the commutator again when they are approaching a position of greater effectiveness. In this machine the four pairs of coils form four independent machines, the two coils of each machine being in series; but the four machines are joined in two pairs by the arrangement of the collector, the two machines thus formed being joined in series at the last, so as to generate one continuous current of high electro-motive force. Of the two machines thus joined in series, one has one pair of coils in the position of maximum effect, the other pair in the position of minimum effect, and therefore cut out. The other machine has both pair of coils in circuit and both in positions of medium effect. The current finally generated may therefore be said to be that of two machines joined in series, one machine having two coils in series in a position of maximum effect, the other machine being composed of two machines joined in parallel, each of these machines consisting of two coils joined in series and occupying positions of medium effect.

A very interesting part of the Brush exhibit were the great arc lamps which the company use for lighting up towns and cities by a system of light towers. These lights are of the regulating order, and have as much to do with the success of the system as the dynamo itself. They are made to burn continuously for eight, sixteen, twenty-four, or indeed for any desired number of hours, and so simple is the mechanism that it is only necessary to place one of the lamps in position to insure its working. These lamps are of the double carbon or sixteen hour type, and, as in many other description of lamps, the upper carbon falls by its own weight upon the lower carbon, and thus closes the circuit. The pencils of carbon within these lamps are about 12 inches long, and coated with copper. They last about eight hours, by which time about 9¼ inches of the positive and about 4 inches of the negative carbon are consumed. If it is necessary that the lamps should burn a still longer time, the double carbon lamp type are employed, these being fitted with two pairs of carbon holders. When one set of carbons is consumed, the change to the other pair is effected by mechanical means, and simply.

Telegraphing Extraordinary.

A contemporary supplies some interesting particulars as to the number of words transmitted by telegraph to all parts of the kingdom of Great Britain on the occasion of the Prime Minister's recent visit to Edinburgh. On the evening of Mr. Gladstone's arrival, press messages containing over seventeen thousand words were handed in at the telegraph department of the General Post Office; but the actual number of words transmitted was over sixty-seven thousand, owing to the fact of the same report being sent to more than one newspaper. Mr. Gladstone's visit to the Forth Bridge works led to the transmission of twelve thousand words, and his movements on the following day to nineteen thousand. On the occasion of his first speech on Saturday evening (August 30) in the Corn Exchange, sixty-two thousand four hundred and seventy-one words were handed in, and one hundred and thirty-eight thousand four hundred and forty-five transmitted. The number would have been greater had not Sunday intervened, allowing of the transmission of many messages by train. On Monday evening (September 1) the press messages reached the enormous number of one hundred and seventeen thousand words, causing the transmission of about four hundred and twenty-seven thousand words, the largest number ever transmitted on any one night from Edinburgh. After the Waverley Market speech of Tuesday night (September 2), one hundred and seventy-two thousand eight hundred and twenty-one words were transmitted.

On Monday evening, when the strain was heaviest, one hundred and thirty operators were at work, and in spite of the constant stream of messages the department kept abreast of the reporters. As many as four towns in the same telegraphic circuit were enabled to read almost the same message at the same time. The message having been "punched" on long slips of prepared paper, the plan was adopted, instead of running it entirely through one machine, of taking the slip out of the first machine after it was three yards clear, and running it into a second and a third.

Cobalt Bronze.

Under the above name we have a new alloy introduced by Wiggin & Son, of Birmingham. Cobalt bronze is a whiter but slightly more expensive metal than silveroid. It is, perhaps, the more interesting of the two, because there is introduced into its composition small quantities of the metal cobalt. The malleability of cobalt in a pure metallic form has long been understood, but we believe it was not until a few years ago that it was demonstrated by Messrs. Wiggin that it might be rolled into sheets, and wrought like other metals into articles of utility. Its high price, however, interfered with its production, and militated against its use. This fact induced Messrs. Wiggin to endeavor to compound an alloy, in which the sterling qualities of this valuable metal could be fully represented, and which, at little more than the cost of ordinary German silver, might possess in a large degree all the attributes of the pure metal itself. Possessing, as it is said to do, many of the qualities and every appearance of metallic cobalt, it is manufactured in several qualities, the higher grades being preferable, on account of their suitability for casting purposes, their close, steel-like surface, their susceptibility of a high polish, as well as their hardness, toughness, and great tensile strength.

Panacea for Trouble.

Life is filled with trouble, as a writer in *Our Homes* has said, and we must shoulder our share with the best grace we can. We may only seek to make them as light as we can, since to avoid them is impossible.

There is one sovereign panacea for this. It is work. Brooding over trouble is like surrounding one's self with a fog. It magnifies all objects seen through it. Occupation of the mind prevents this; hard work, manual work even, gives the mind other matters of concern, tires the body so that sleep will come.

Very few suicides occur when men are actively employed. When out of work they think of their other troubles, and the despondency arising from this added one throws the mind from its balance, and the fatal deed is done. Many a man would have committed suicide if he had had the time. Work of any kind, especially work for others, is the great panacea for a troubled mind.

AN Alaska U. S. Signal Corps observer writes us of the discovery of a wonderful medicinal spring in that Territory, long highly esteemed by the Indians and greatly valued by the few whites who yet know of it.