### THE AMSTUTZ ELECTRO-ARTOGRAPH.

The advent of each year is made attractive by the development of some new and useful invention for the use of humanity, or, possibly, by the improvement of what was supposed to be an already perfected idea. That improvements in the general use of the electrical current would continue was naturally to be expected, considering the greater knowledge of its laws each year brings to the engineer who makes a study of this marvelous agency.

When the telephone was introduced to the attention of the world, and the human voice was made audible miles away, and also when the phonograph, with its capabilities of storing up the human voice, was made public, there were dreamy visions of other combinations of natural forces by which even sight might be obtained of distant scenes through inanimate wire.

It may be claimed, now, that though we do not see an object miles distant through the wire, yet this same inanimate wire and electrical current will soon serve us, automatically, as both artist and engraver, transmitting and engraving at the same time a copy of a photograph miles away from the original.

Mr. N. S. Amstutz, a well known mechanical and electrical engineer of Cleveland, Ohio, has brought out of the elements an invention by which this is accomplished. As will be seen by the workings described, it might appropriately be termed a marriage of the phonograph and telephone, as the features of these two inventions are allied in this, called by Mr. Amstutz, electro-artograph. The object of the invention is to transmit copies of photographs to any distance, and reproduce the same at the other end of the wire, in line engraving, ready for press printing.

The undulatory or wave current is used, as in the telephone, while the reproduction is made upon a synchronously revolving, waxed cylinder, as in the phonograph. There is required for this end both a transmitting and receiving instrument, views of each of which are shown in our illustrations, from sketches made from the instruments in use by Mr. Amstutz.

The principle by which this work is accomplished is quite simple, and will readily be understood by reference to the diagrams shown, Fig. 3 representing the transmitter and Fig. 4 the receiver.

An ordinary photographic negative is made of the subject to be transmitted; an exposure is made under this negative of a film of gelatine, sensitized with bichromate of potash, and by which the effect is produced of rendering insoluble in water the parts exposed to the light passing through the thin portions of the negative, while those portions protected from the action of the light can be dissolved away; the capabilities of dissolving away varying with the intensity of shade or light upon the negative. After dissolving away the soluble portions from the film there will remain the same picture as appeared on the negative, but it will be entirely in relief. We show a section of such a film, exaggerated, in Fig. 5, in which the variations upon the surface represent the varying effects of the light and shade of the picture.

This film is now attached to the surface of the cylinder, A, Fig. 3, and caused to revolve; a tracer or point, B, adjustably connected to a lever, C, rests upon the film, and as the film revolves, rises and falls with the undulating surface of the film and communicating an up and down movement of the end of the lever, C, in a multiplied degree. A number of tappets or levers, F, are centrally fulcrumed at D and arranged so that one end presses upward on the lower end of terminals, E; the opposite ends of the tappets varying in distance from a horizontal line over the end of the lever, C, as shown. When the lever, C, is at its lowest point, as influenced by a depression in the gelatine film, all the tappets press up against the terminals; with a further revolution of the cylinder, A, and an elevation in the film forcing the lever, C, upward, all of the tappets' contact with the terminals, except one, is broken. The height of the hill and depth of valley of the film's surface meausuring the number of tappets in contact with the terminals.

One terminal of a battery, N, is grounded and the other is connected to the fulcrum, D, of the tappets, F, and the current passes through the tappets, F, terminals, E, and resistance, H, to the main line wire, and thence on to the distant solenoid, I, at the receiving end, and to the ground. When all of the tappets touch the terminals, all the resistances are in parallel and the total resistance is least and the current greatest; and vice versa, resistance greatest and current least as the number of tappets' contact are broken. By this arrangement of the resistances, there are hills and valleys in the current corresponding to those on the film's surface. This variable current, circulating around the solenoid, I, produces a varying pull on the core attached to the end of the lever, J. This lever is fulcrumed at K. A diamond or V shaped cutter, L, is attached to the lever, beneath which is a plain gelatine or wax film attached to the cylinder, M

With this arrangement in mind, it will readily be seen that with one revolution of the cylinder, A, as the tracer follows the elevations and depressions upon the film, the free end of the lever, C, is made to contact with the ends of one or more of the tappets, permitting more or less of a current to pass through the resistance, and exerting thereby more or less of a downward pull on the end of the lever, J.

We have shown but four of these tappets for simplicity, but it will readily be seen that the greater the number, the more delicate will the variations be of the pull on the core of the solenoid. The number is not limited, but Mr. Amstutz finds not more than ten as being all that would be required, while for the bold work required for newspaper printing, a much less number would be better.

Supposing now that a relief plate or film has been fastened upon the transmitting cylinder, A, and a smooth film of gelatine or wax upon the receiving cylinder, M, and both are revolved at the same speed. One revolution would cause the V tool, L, to cut a line around the film, irregular in its depths and widths, caused by the varying pull on the lever's end by the core of the solenoid. A picture is not made, however, by one line, but one line is, however, an element of a whole picture, so, as the cylinder revolves, the tracer and the V tool are moved along by the screw shown in Figs. 1 and 2, and, spirally, another line is produced by the side of the first one, with varying depths and widths of cut, Fig. 6, corresponding to the neighboring waves of surface on the film. The lines are thus continued over the film from end to end, and when the film on the cylinder is electrotyped it is ready to be printed from.

The two machines which we show in Figs. 1 and 2 have the same general characteristics: A mounting frame, a traveling tracer and graver carriage, guided by the round bar at the back and moved forward over the cylinder by the screw in front of the guiding bar, a rotating cylinder corresponding to the cylinders, A and M, suitable gearing at the ends for revolving the cylinder and screw, the necessary adjusting screws and nuts and a synchronizing device for governing the speed of each cylinder.

With the perfection of detail, which is now the work of Mr. Amstutz, the class of engraving done by this method will be of the highest order of art—line engraving. The work it accomplishes is not confined in its scope to gelatine, but designs may be chased and engraved also upon the metals, as gold and silver ware. Neither is it necessarily a long distance or line operator, for the machines may be placed side by side and local work can be accomplished.

We have selected two examples of the work done by these machines in their present form, which will convey to the intelligent critic a faint idea of the artistic capabilities it can be made to display when its future perfection of detail is accomplished. Both the portrait of the inventor and the view of the boy and dog were engraved upon these machines in the private laboratory of Mr. Amstutz, the time required in engraving the latter being but three minutes.

It is not difficult to believe that in the future events which may take place in London or Paris may be sent from photos taken in Europe, and the reproduction of the same, in an artistic picture, appear in the next morning's New York or Chicago papers; and this without disturbing the existing conditions of telegraphic communication further than supplying the two offices each with machines for transmitting and receiving.

Mr. Amstutz has had practical experience with and is familiar with the general requirements for illustrative work, and is conversant with the limitations of art work as used in book and newspaper printing. In consequence, he has been better enabled to cope with all the difficulties and overcome them in these machines. Improvements, however, are now in progress, principally to give greater expedition, and to render either continuous or alternating currents applicable—the same principle, however, being the foundation.

We are under obligations to Mr. Amstutz for the opportunity to present these, the first sketches ever made from these machines; and courteously permitting us to lay all this interesting subject, in a complete form, before our readers. Mr. Amstutz has signified his willingness to answer such correspondents as may, briefly, desire further information.

### The Fender Craze.

The mayors and inhabitants of some of our cities are going daft about fenders for street cars. It is in a way a repetition of the early craze for guard wires. In some places fenders have been made compulsory, in others they soon will be. Now we have nothing to say against the proposition that a fender may save life and limb. Probably the best fenders now on the market may be useful once in a while. But we know that some of the fenders are dangerous delusions and that it is a better principle to avoid knocking a foot passenger down than to chance picking him up alive but in a more or less bruised and mutilated condition. Several cases have been recorded of late in which people struck by fenders have not only been injured but killed.

To us it seems to be altogether the better way to give the cars improved braking facilities. Then the fender can be added, if desirable, but as a general thing these fenders have many elements of undesirability. They obstruct the street more or less. They add to the driver's cares and demand special attention, instead of relieving him of strain and worry. They act after the event instead of before it and instead of preventing it. Cable or electric street cars often make locomotive speed. They are permitted and adopted because they can give the public such speed. If they did not, it would be better to go back to horses. But on a locomotive the cowcatcher does not replace the air brake.

The main, vital, essential thing to-day with all fast-running cars is to give the drivers swift, direct, easy control of the speed of their vehicles, and this is to be done only with brakes that act instantaneously. If there is to be any legislation, let it be of a kind looking to the adoption of good brakes. A car with its running gear all housed around with a light valence close to the ground and furnished with an efficient brake can maintain high speed and will take no life that is not sacrificed to it. Accidents there will always be so long as humanity is weak, careless and erring; but cars equipped as we suggest will be juggernauts only to willful suicides.—Electrical Engineer.

### An Unjust Patent Statute.

Such is the designation to statute 4,887 of the patent laws given by Dr. Elihu Thomson in a recent article in the Electrical World. He says:

"While the decision of the Supreme Court makes it plain that the wording of the law in relation to the limitation of United States patents by foreign patents is to be taken instead of what would seem to me to have been the evident intent of the original enactment, I wish to point out some of the injustices under which the American inventor has suffered from this law, as it has been and is now interpreted, in comparison with inventors and workers abroad.

"An American inventor making application for a patent has been and will still remain under the disadvantage of being required to perfect his United States patent before applying for patents abroad, and in order to secure valid patents abroad he must refrain from publication of any new matter which he may have discovered until such foreign patents have been obtained, as the mere publication nullifies the right to take a patent in most important foreign countries. But it is practically impossible, as is well known, under our system of patent examinations, to control the *time of* issuance of a patent in the United States, and if the application should become involved in an interference, which is more than apt to occur with inventions of any considerable importance, the issuance of a patent may be tied up for an indefinite period of years. During this period there is every prospect of the same subject matter being worked upon abroad, or the matter becoming published, especially if the invention undergoes development in the United States. The inventor, therefore, if he desires foreign patent protection, must take his foreign patents and stand the shortening of the term of the United States patent; or, if the interference proceedings or other delays last during the life of the shortest foreign patent, he receives a patent which has already expired when it issues, a "still born" patent, so to speak.

"Again, in the race between two interfering inventions, the weaker party, finding that he will probably lose the interference in the United States, may easily transfer his scene of activity to foreign countries, while the stronger party, feeling that he does not wish to ruin his United States interest, at the same time refrains from patenting abroad. In this case the party who is likely to come out ahead here does come out at the last without any foreign patents, while the other party to the interference may come out with several valid foreign patents, but no United States patent.

"Now, I do not think it requires any argument to show that the evident intention of the United States law when it was first passed was not to bring about this state of things, and so handicap the honest American inventor. Nor is this all. The position of the foreign inventor under the United States law has been that he could make his applications in foreign countries whenever he felt like doing so and receive his patents, and, after an indefinite period thereafter, he was at liberty to apply for a United States patent and obtain a patent only limited by the shortest term foreign patent. Prior publication here would not affect his rights. Prior publication does affect the United States inventor's rights abroad. Does not this amount to a discrimination against the United States inventor? And would it not really tend, were there not other favorable influences, to discourage invention here?

"The United States is entitled to take its proper place, not only in the actual work accomplished, but in the literature which naturally accompanies the work and without such a restraint as now exists. The question arises, How long is the United States worker to be so handicapped, or practically put under a ban, by ill-considered laws? This is a question which I have often asked myself, and the answer to which, I have no doubt, has been sought by many who have experienced the same hardships."

# SCIENTIFIC AMERICAN

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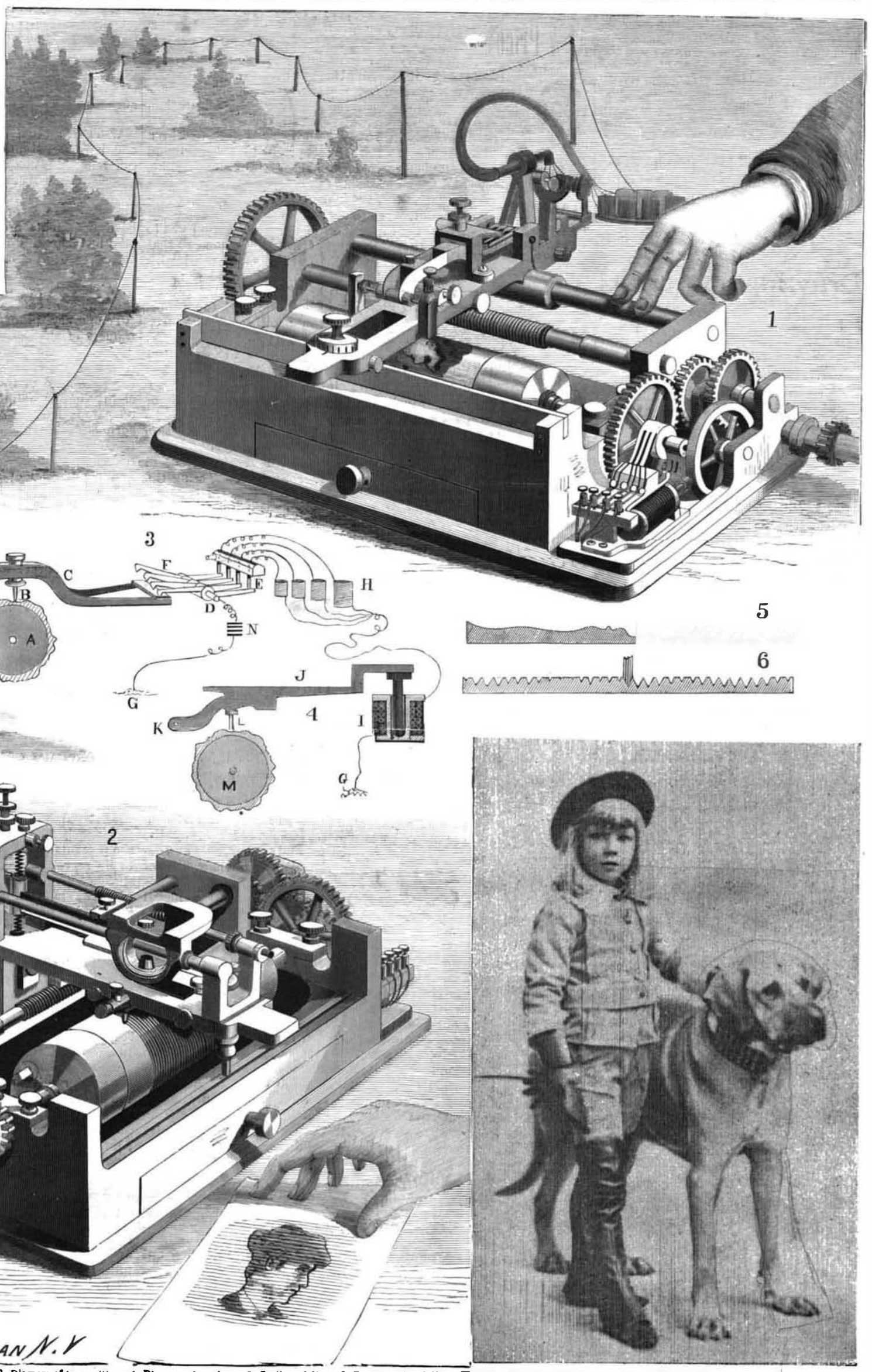


1. The transmitter. 2. The receiver. 3. Diagram of transmitter. 4. Diagram of receiver. 5. Section of film. 6. Section of lined film. The portrait at the upper corner is that of the inventor and is printed from an electro of the picture made by the apparatus. The engraving at the right is another picture printed from an electro of the picture made by the apparatus.

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