

Notes from the World's Columbian Exposition.  
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a new surface on the building at not very great expense. The building is regarded as one of the masterpieces of architecture of modern times, and its location at the north end of the lagoon is an ideal one.

Several forthcoming expositions in different parts of the world have taken the opportunity to advertise themselves at this Exposition. The coming Midwinter Fair at San Francisco has sought every possible opportunity to make known some of the special features that it will have, and the International Exposition at Antwerp, Belgium, which is to be held from May to November, 1894, has been seeking to secure exhibits as well as attendance by making known its attractions. A national exposition is to open at Kyoto, Japan, in April, 1895, and a picture of the proposed buildings and grounds, with some information regarding the exposition, formed a noticeable feature of the Japanese exhibit in the Manufactures and Liberal Arts building. This exposition is to be held to commemorate the 1,100th anniversary of the establishment of the city of Kyoto as the capital of the Japanese empire.

A feature of some interest, says the *Electrical World*, regarding the relative sizes of dynamos and machines which are used to drive them is shown quite nicely in some exhibits at the World's Fair. In all cases where there is direct driving, or where a single engine drives a single dynamo, it may be assumed that the dynamo and its prime mover are practically of the same horse power. When the prime mover is a steam engine, it will be noticed that the difference between the sizes, floor space, etc., of the dynamo and the engine is very greatly in favor of the former, the proportions being, perhaps, roughly, about as one to three, or at least as one to two; if the boiler is included with the steam engine, as it should be, the difference becomes very much greater. This shows that, besides being a much more efficient transformer of energy, the dynamo has a very much greater output per pound, per volume or per square foot of the floor space, than the steam engine, especially when the boiler is included. The lower the speed, the greater this difference seems to be; or, in other words, the engine seem to decrease less in size at higher speeds than the dynamo. But we noticed that the case was different in the high-speed water wheel that drives the dynamos in the General Electric Company's exhibit; here the dynamo and the water wheel appeared to be very nearly the same size. On making a comparison in the case of the high speed steam turbine, exhibited in the Swedish department in the Machinery building, we noticed that the tables were completely turned, and that here the relative sizes were just about the reverse of what they are in the case of the usual steam engine. Here a small eight inch wheel (illustrated in SCIENTIFIC AMERICAN of October 21, 1893), running at a speed of 20,000 revolutions per minute, developed 20 horse power, if the statements made to us were correct, and we have no reason to believe that they were not. It is needless to say that the dynamo which it was driving was far greater in size, even the gearing for reducing the speed down to one-half occupying a much greater volume than the engine itself. If, however, the boiler is included, the difference is again in favor of the dynamo.

RUSSIAN EXHIBITS.

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The statistics in regard to illiteracy in Russia are so familiar that we are hardly prepared to find her exhibit in the educational department so extensive. There are many portfolios of views of different schools, showing fine buildings, spacious rooms and many students. Herbaria collected by scholars are placed beside the needlework which is conspicuous in the exhibits of all foreign schools.

The Central School of Design, founded by Baron Stieglitz at St. Petersburg, has very interesting work to show, including designs in color for weapons, vases, lace and gold plate for ecclesiastical use.

The prominent place assigned to the Marie Educational and Charitable Institutions, "under the immediate patronage of their Majesties the Emperor and Empress," gives one a desire to know what they accomplish, and the documents which are included in the exhibit furnish much interesting information. It was upon the accession to the throne of Catherine II that attention was first given to the education of women. The history of the movement then begun, the methods used to extend it, and its extraordinary outcome, are not without their lessons for the student of sociology. It may thus briefly be told: In 1764, an "Educational Home for Girls of Noble Birth" was established by the Empress, and within a year a school for girls of the middle class was opened in the same convent, by royal decree. The studies pursued in the first school were religion, three languages besides Russian, music, drawing, arithmetic, dancing, sewing, and knitting. The higher class gave some attention to architecture, heraldry, history, and literature.

For girls of the middle class more instruction was provided in needlework, cooking, and weaving and

less in books. A year previous, the Empress had opened a large foundling hospital in St. Petersburg, and one in Moscow. The philanthropist Betski, who from the beginning of the educational enterprise gave valuable aid, and who planned these hospitals, had difficulty in getting all the money necessary to carry them on. To this end he organized auctions and savings banks in both these cities, the revenue from which was devoted to the maintenance of these institutions. Tickets of admission to places of amusement were taxed for their support, and playing cards were made and sold exclusively for their benefit.

In 1774, Prince Demidoff gave 205,000 rubles toward the foundation of a commercial school for boys of the mercantile class, and this was attached to the Moscow foundling hospital. When, in 1796, after the death of Catherine, Marie Feodorovna became Empress and the head of the girls' schools, she endowed them with an annuity of 15,000 rubles from her personal income, and made many changes in their management. She altered the courses of study, and reformed the conduct of the hospitals, savings banks and commercial schools. Then she began to widen the scope of the work in many directions. At her death in 1828, she had established the Kharhof Institute, to which merchants' daughters were admitted, two schools, one at Nicholaieff and another at Sebastopol, for daughters of sailors, and two for daughters of soldiers; a school for the deaf and dumb of both sexes; another foundling asylum, and homes for widows of men in the civil service. The Empress Marie took most active personal interest in these institutions, visiting class-rooms and learning to know the scholars. In memory of her, all the institutions—those founded by her predecessor as well as her own—were made by royal decree the Marie Institutions.

The Emperor Nicholas established government schools for girls of noble birth in provinces most remote from the capital. He also founded orphan asylums, but so far all the schools were for boarding pupils. It was not till 1858 that public day schools for girls were started. They were soon multiplied in towns which asked permission to establish them without government aid, but only those receiving a subsidy from the government are included in the Marie Institutions. Of these, there are now 472 scattered all over the empire; in the year 1891, they aided or relieved 498,108 persons; of these, only 27,417 were in the schools; the others were in the hospitals, asylums and hospices. In the foundling hospitals, 24,424 illegitimate and 579 legitimate children were received, and for them 107 elementary schools were maintained.

A pamphlet which was given me tells the history of the educational movement on behalf of the emancipated serfs, begun in 1861. It took the form of Sunday schools for adults. In two respects they resembled our Sunday schools—the teachers were volunteers and unsalaried, and the pupils were taught in groups. Men and women from the upper classes of society gave themselves enthusiastically to the work, which extended from the centers into the provinces. But, before the first decade had passed, political reasons led to the closing of nearly all of the schools. Finally, but one was left, that at Kharhof, a school for women: this survived because it was maintained by a lady at her own expense. It has now seventy teachers, and three hundred and fifty pupils attend it annually. Since 1880 more liberty has prevailed, and similar schools for both sexes have been opened in many provinces, even in remote hamlets; in St. Petersburg and Moscow it has been done by the municipalities. At present one hundred thousand scholars are at work under ten thousand teachers.

The instruction in the Kharhof school is in reading, writing, the elements of grammar, arithmetic, religion and the Gospel. The scholars are in groups; their ages range from six to forty-five years. The session lasts from ten in the morning to two in the afternoon, with short intervals of rest. At the close of the session, books from the library are given out; these books, some of which are prepared expressly for the purpose—written down to their capacity—are carried to the homes. It has become the custom for neighbors to gather to hear these books read, and thus the influence of the school reaches far beyond the pupils.

The postal service exhibit is curious; its chief value, perhaps, is to impress upon the visitor the extent of the empire and the widely differing conditions which exist in the different sections. For instance, here is the miniature model of a Siberian mail wagon in the form of a sled drawn by seven tiny dogs; one man drives them and another guards the mail; again, a sledge is the vehicle and a reindeer the power. In Archangelsk, we see the mail carried in a boat rowed by four women, while a man at the helm guards the precious box. The Caucasus Mountains are represented in miniature; on the lower heights a camel, loaded with five bags, is conducted by two men; but in the upper regions, where snow and ice offer serious obstacles, a procession of men is shown. The one in advance carries a pick; the second, a shovel; the third, the mail bag; the fourth and fifth are armed with swords.

It is a significant exhibit, when we consider how much it has cost to send these little figures from the other side of the globe, and set them up here in life-like attitude and suitable environment.

Photographs of bridges, drawings of various internal improvements, and the monograph of Lieut.-Gen. Jilinsky on "Irrigation in the South of Russia," are other evidences of the progress of the empire.

In comparison with Germany, Russia's display in the Mining building is small, but a book case filled with bound volumes of mining reports from 1881 to 1892 is evidence of the extent of the industry.

Nobel Brothers make a large exhibit of petroleum and the derivative oils, from their refinery in Baku. A most interesting one is that of the Briantzewka mine of rock salt and soda. It is near the town of Bakhmont in the government of Ekaterinoslaw. The mine is worked by a company, some of whose members are noblemen, under imperial sanction. The four shafts are from 120 to 164 meters deep; 600 men are employed, and last year's yield was 150,000 metrical tons; these are, in brief, the statistics given. In the show case, there are large and small cubes of salt, a pyramid and fragments in jars, and photographs of the mine. A neat and complete model of the extensive Votkinsky Iron Works in Ural shows the buildings and grounds in minute detail; they form a good sized village. There are samples of steel and iron castings, and models of farming implements and ships built there. From one point of view, the most interesting exhibit is that of the Slavianoff electrical welding process. A table is sometimes covered with broken articles; a cast iron pulley, broken into many pieces; a steel shaft; teeth of a spur wheel; copper tubes; the necks of shafts and other similar castings have all been repaired by this new and secret process of welding by electricity. The chemicals used in the process are enclosed in a case under glass; from their appearance, it is easy to guess what some of them are, but their names are not obtainable. The works where the process is carried on are at Perm in the Ural. The only distinct reference to the Siberian mines, with their broken-hearted toilers, that I could find is in the form of three immense yellow cubes piled in a series, showing the relative production of gold in West Siberia, East Russia, and East Siberia from 1845 to 1891. The largest one represents the amount found in East Siberia, 1,097,232 kg.

In the Fine Arts building, the Russian exhibit occupies a large and a small room, opening from the south court in the central pavilion. It is sent mainly, according to the catalogue, by the Imperial Academy of Fine Arts, which owns some of the pictures.

Among the few pieces of sculpture may be mentioned a bust of Count Tolstoi and statuettes of Tchaikoffsky and Vereschagin, by Gunzbourg. His representation of the soldier-artist is very life-like and true.

An art critic is my authority for saying that the painters show much boldness in the use of color and skill in general technique. It is impossible to escape being deeply impressed by several of the pictures. Among these, that called "Grandmother and Granddaughter," by Tvoroiukof, should be mentioned. It represents an old woman with something slung over her bent shoulders, and a large, coarse muffler tied over her head. The child's head is covered in the same way, and her hands are hidden in the long sleeves of her loose coat. They stand close together, the little girl in the forefront of the canvas, in a dreary spot, near a few dried grasses and leafless bushes, with a waste of snow beyond them. Dull faces they have, and the scene is probably typical of their lives.

No picture is, to me, more impressive than that named "Christians awaiting Death after the Free Sappe." It is by Theodore Bronnikov, a native of Siberia. The scene is at night; the only light in the long room where it is laid comes from a hanging lamp in one end. A procession seems to be entering the room, and another to be passing out. The most conspicuous figures are those in long flowing white robes. One of these, a man, is the center of the group in the foreground; his countenance is radiant; with one hand he points upward, the other is outspread toward the sorrowing ones gathered about him. An old woman, with agonized expression, is clasping his neck; a young woman kneeling at his feet holds a baby toward him; another form, perhaps that of a daughter, is also at his feet, with her face hidden in his garments. I haven't known where to find an explanation of the historical significance of the picture, and I wish that some one who may chance to read this inadequate description of the solemn scene would be kind enough to supply it to the SCIENTIFIC AMERICAN. "A Drowned Man," by Dimitriev-Orenburgsky, is a work of merit. A group of men in a variety of costumes and in most natural attitudes is gathered about a form prostrate on the edge of a stream. At his head stands a man with sleeves rolled up and legs bare, evidently the one who went to the rescue. The interest of the spectators is divided between him and the poor fellow on the ground.

"The Moscow Rag Fair," by Vladimir Makovsky is a most animated scene; evidently an entire square is occupied by the venders of old clothes, and an eager

bustling crowd is gathered, full of action and color and suggestion for the moralist.

"The First Born," by T. A. Pelevin, is one of the few pictures in the collection that brings a touch of light-heartedness to the beholder.

In a little peasant's cottage, where garments and kitchen utensils are side by side on the wall, a young mother is holding her baby, and the kitten is creeping into the warm cradle beside her. The little hands are raised, the face is full of smiles, and the mother's seems lit from the glow of the baby's eyes.

In general, the pictures intensify any previous notion one may have had of the seriousness of life in the Czar's dominions.

Nearly all the subjects are national, but Ivan Constantinovich Aivazovsky has ventured into foreign fields. (What might not a man with such a name venture?) His five large paintings of scenes in Columbus' career show much power. No 106 is the Santa Maria in a storm when the dauntless leader is surrounded by his crew in mutiny. No. 107 is Columbus landing with his suite at San Salvador. No. 108 is a scene from his early life, when as a youth he saves himself on the mast of a mercantile ship which has been set on fire off the coast of Portugal by a Venetian galley. No. 109 is Columbus' farewell in Palos, and No. 110 the arrival of the flotilla on the American shore. If one would like a series of sensations, novel if not bewildering, let him on the same day visit the Santa Maria, moored beside the peristyle, the convent of La Rabida with its portraits of Columbus, for whom a dozen or more men might have sat, and then look at these canvases aglow with fierce color and terrible with the storm of sea and angry men—a Russian's interpretation to us of the life of our discoverer.

My strong impression of the labor, thought, ingenuity and expense which have made the foreign exhibits so valuable has deepened every day. Never, I think, was the brotherhood of man taught in a more forceful way than at the Fair; and, notwithstanding the bickerings and disappointments attendant upon its management, it cannot fail to result in closer bonds between the scattered families of nations who for these summer months have been represented in the White City. A. DINSMOOR.

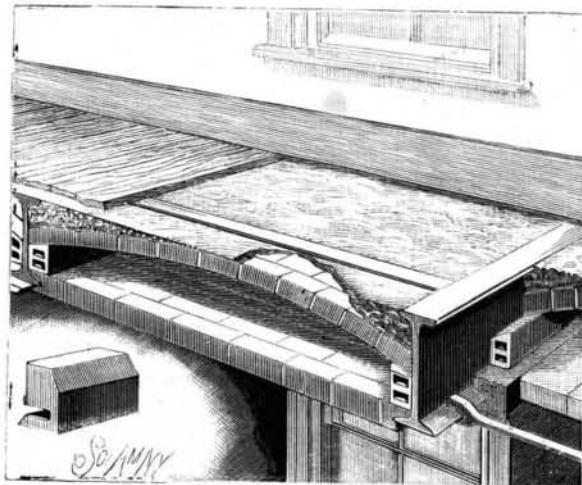
#### Pixol, a New Disinfectant.

The *Lancet's* Russian correspondent cites a report published in a supplement to the *Army Medical Journal*, by Dr. Eberman, on pixol, a cheap disinfectant introduced by Dr. Raptchevski. It is prepared by dis-

has been proved to be fatal to the *Bacillus anthracis*, to the bacilli of typhoid fever and cholera, and to the cocci of suppuration. It is said that the preparation costs only about two cents a pound.

#### IMPROVED CONSTRUCTION OF FLOORS, CEILINGS, ARCHES, ETC.

The illustration presents a combined floor, arch and ceiling, in which the ceiling is flat and the floor support arched, but with a large air chamber between the floor and ceiling, the construction being of great



DE RACHE'S FLOOR AND CEILING ARCHES.

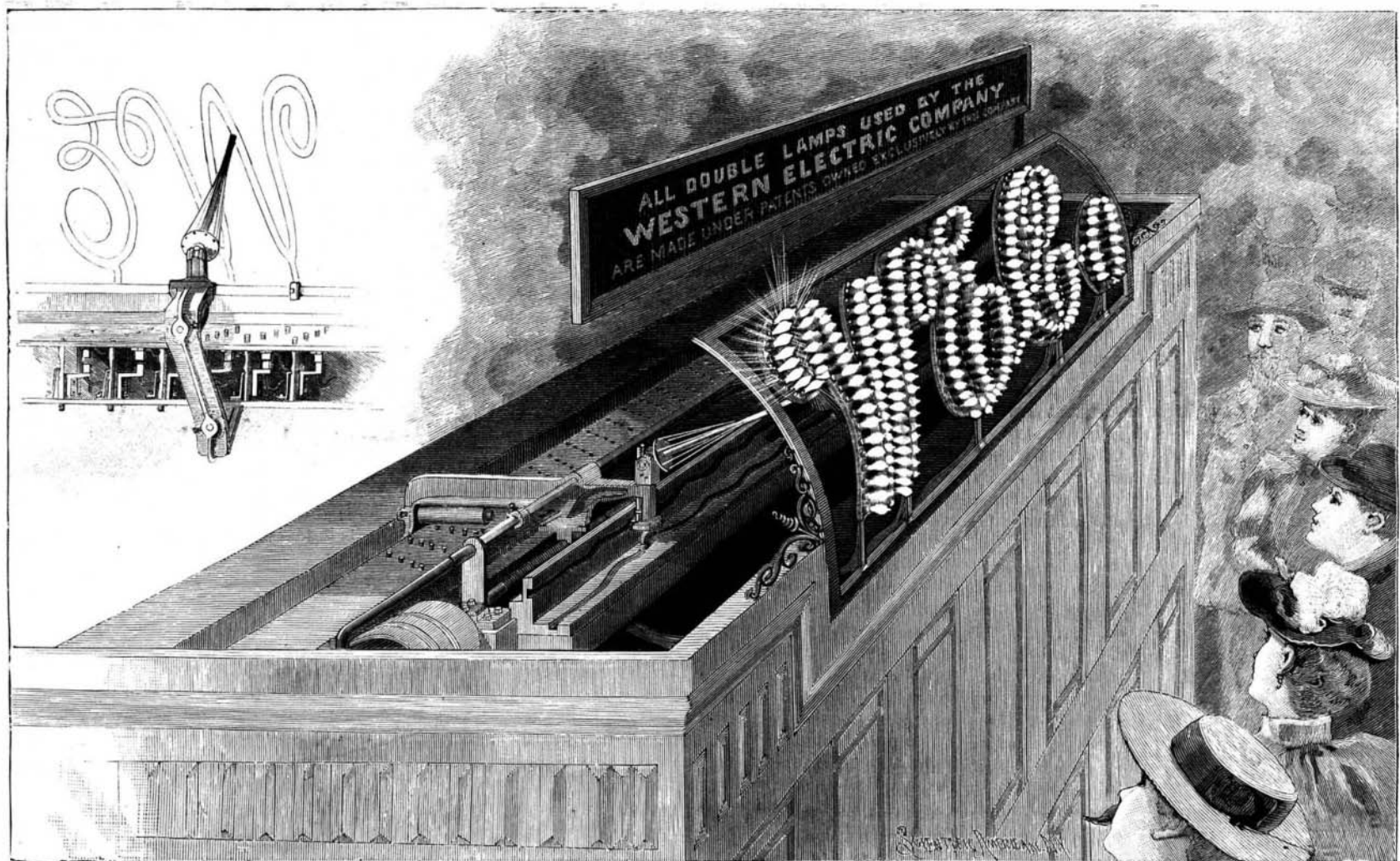
strength and such as to effectually deaden sound. The improvement has been patented by Mr. Pierre J. L. De Rache, known as Leonard De Rache, of No. 755 East 141st Street, New York City. The floor and ceiling are arranged between parallel I beams or girders of the usual kind, but the blocks, which bear upon the lower flanges of the girders and which come at the ends of the courses, are recessed to fit snugly upon the flanges and have lips which project beneath the girders, so that a key may be inserted between the lips of opposite and adjacent bearing blocks, thus covering the girder bottom and making a smooth finish. On the bearing blocks next the girders are supporting blocks or skewbacks, which support the end blocks or tiles of the series forming the arch, or the ends of the arches may, if preferred, be made to bear directly upon the bearing blocks. A different form of bearing block, with lip fitting the bottom flange of the I beam, is

#### WESTERN ELECTRIC COMPANY'S LUMINOUS SIGN.

One of the exhibits of the Western Electric Company at the Columbian Exposition received a great deal of attention from the general public. This exhibit, while in the line of what theatrical people call "business," was really remarkable in its ingenuity and construction, and answered the purpose of attracting the popular mind. It appeared like a veritable writing on the wall. It consisted of a series of lamps arranged as shown, to give the initials of the company's name in script outline. These lamps apparently are lighted and extinguished by means of a wand that moves mysteriously along the path of the letters at their rear, and which, although it does not touch the lamps, seems to exercise some magic influence and causes them to break out into a brilliant glow. It moves forward on its journey, writing on the air the letters W. E. Co., and as it moves along the lamps become illuminated. When it has reached the end of its journey and lighted all the lamps in the series, the wand begins deliberately to move back in the reverse direction but in the same path, and extinguishes each lamp as its point passes by. The movement of the wand is automatic and the precision of its movement renders it fascinating to watch. As a matter of fact, the only part that the wand has to play in this little comedy is that of heightening the illusion. It really has no function to perform beyond bewildering the uninitiated. The real secret of operation of the apparatus is not understood until the beholder has abandoned this idea and has grasped the fact that each lamp is connected with the operating table or switchboard, separately. Then all becomes comparatively clear, and he will be ready to have explained to him the details of operation which are rendered comparatively simple by having exposed to his view the internal mechanism, as appears in our illustration.

The wand or pointer is mounted on a slide rest or carriage, so that as the slide rest is traversed by a feed screw back and forth from right to left and left to right the pointer is automatically moved, so that its end, by a species of pantograph mechanism, follows exactly the outlines of the letters. Its motion in doing this is controlled by two sinuous grooves in planes lying at right angles to each other. These planes, with their grooves, are seen below the base of the pointer. Each groove receives a projecting piece, which, as it moves, actuates the pointer.

The travel of the wand is effected by a feed screw exactly as a slide rest in a lathe is worked. On the rod supporting part of the weight of the carriage, with its



THE WESTERN ELECTRIC COMPANY'S EXHIBIT AT THE COLUMBIAN EXPOSITION—WRITING THE COMPANY'S NAME IN INCANDESCENT LAMPS.

solving a pound of green soap in three pounds of tar and slowly adding a solution of a little over three ounces and a half of either potash or soda in three pounds of water. At the time of using, one part of the sirupy liquid thus formed is added to nineteen parts of water, forming a five per cent solution of pixol, and it is used of this strength for disinfecting linen and for washing the hands; for the disinfection of dejecta ten per cent solution is recommended. Such a solution

shown in the small figure, the girders with this construction, being preferably placed parallel with each other, and a tie beam or bar extending between the ends of the arch, thus increasing the sustaining power of the floor.

The advantage in this system of construction is that any kind of bricks or partition blocks, hollow or solid, may be used, but the hollow ones are preferable, on account of their lightness.

switch-shifting rollers and pointer, are two collars, one at each end, which, when struck by the carriage, shift the belt so as to reverse the feed. Thus as long as the machinery operates, the pointer moves back and forth, from right to left, and reversing from left to right, along the line of the letters, the pantograph attachment causing it to follow their outline exactly.

Behind the apparatus is a double switchboard, whose surface above and below is traversed by two