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THE NEW LAW FOR BRAKES AND CAR COUPLERS.

At the recent session of Congress, a law was passed making compulsory the use of brakes controlled by the engineer, and also the use of self-acting couplers. It will be noticed that no special inventions are selected, but the field is left open for the introduction at any time of the latest and best improvements.

In respect to car couplers it may be well for inventors to bear in mind that, while the link and pin variety of couplers has many advocates, especially among the brakemen, who have to handle the cars, still the Master Car Builders' Association advise the throwing out of the link and pins and the substitution of the knuckle form of couplers. The recommendations of the association have made much progress among railway companies, and the knuckle couplers are now extensively used on passenger cars.

The following is the text of the new law.

AN ACT

To promote the safety of employes and travelers upon railroads by compelling common carriers engaged in interstate commerce to equip their cars with automatic couplers and continuous brakes and their locomotives with driving wheel brakes, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled :

Sec. 1. That from and after the first day of January, 1898, it shall be unlawful for any common carrier engaged in interstate commerce by railroad to use on its line any locomotive engine in moving interstate traffic not equipped with a power driving wheel brake and appliances for operating the train brake system, or to run any train in such traffic after said date that has not a sufficient number of cars in it so equipped with power or train brakes that the engineer on the locomotive drawing such train can control its speed without requiring brakemen to use the common hand brake for that purpose.

Sec. 2. That on and after the first day of January, 1898, it shall be unlawful for any such common carrier to haul or permit to be hauled or used on its line any car used in moving interstate traffic not equipped with couplers coupling automatically by impact, and which can be uncoupled without the necessity of men going between the ends of the cars.

Sec. 3. That when any person, firm, company, or corporation engaged in interstate commerce by railroad shall have equipped a sufficient number of its cars so as to comply with the provisions of section one of this act, it may lawfully refuse to receive from connecting lines of road or shippers any cars not equipped sufficiently, in accordance with the first section of this act, with such power or train brakes as will work and readily interchange with the brakes in use on its own cars, as required by this act.

Sec. 4. That from and after the first day of July, 1895, until otherwise ordered by the Interstate Commerce Commission, it shall be unlawful for any railroad company to use any car in interstate commerce that is not provided with secure grab irons or hand holds in the ends and sides of each car for greater security to men in coupling and uncoupling cars.

Sec. 5. That within ninety days from the passage of this act the American Railway Association is authorized hereby to designate to the Interstate Commerce Commission the standard height of drawbars for freight cars, measured perpendicular from the level of the tops of the rails to the centers of the drawbars, for each of the several gauges of railroads in use in the United States, and shall fix a maximum variation from such standard height to be allowed between the drawbars of empty and loaded cars. Upon their determination being certified to the Interstate Commerce Commission, said commission shall at once give notice of the standard fixed upon to all common carriers, owners, or lessees engaged in interstate commerce in the United States by such means as the commission may deem proper. But should said association fail to determine a standard as above provided, it shall be the duty of the Interstate Commerce Commission to do so, before July 1, 1894, and immediately to give notice thereof as aforesaid. And after July 1, 1895, no cars, either loaded or unloaded, shall be used in interstate traffic which do not comply with the standard above provided for.

Sec. 6. That any such common carrier using any locomotive engine, running any train or hauling or permitting to be hauled or used on its line any car in violation of any of the provisions of this act, shall be liable to a penalty of one hundred dollars for each and every such violation, to be recovered in a suit or suits to be brought by the United States district attorney in the district court of the United States having jurisdiction in the locality where such violation shall have been committed, and it shall be the duty of such district attorney to bring such suits upon duly verified information being lodged with him of such violation having occurred. And it shall also be the duty of the Interstate Commerce Commission to lodge with the

proper district attorneys information of any such violations as may come to its knowledge: provided, that nothing in this act contained shall apply to trains composed of four-wheel cars or to locomotives used in hauling such trains.

Sec. 7. That the Interstate Commerce Commission may from time to time upon full hearing and for good cause extend the period within which any common carrier shall comply with the provisions of this act.

Sec. 8. That any employe of any such common carrier who may be injured by any locomotive, car or train contrary to the provision of this act shall not be deemed thereby to have assumed the risk thereby occasioned, although continuing in the employment of such carrier after the unlawful use of such locomotive, car or train had been brought to his knowledge.

THE TELEPHONE AND THE BERLINER PATENT.

As the federal administration changes, an interesting legacy to the incoming department of justice is the action commenced by the United States Attorney-General to annul what has become the famous Berliner patent for telephone transmitters. This is the patent issued on November 17, 1891, in pursuance of an application filed on June 4, 1877. A period of fourteen years was consumed in dilatory proceedings. The application was kept pending all this period, while the original Bell telephone patents were protecting the art of telephoning for the benefit of the assignees of the Berliner patent. The fifth claim of the first Bell telephone patent covered the method of transmitting sound by causing electrical undulations similar in form to the vibrations of air accompanying the sound. To this claim the courts awarded the broadest possible scope. The patent now has lapsed. On March 7, 1893, the undulatory current, as it has been called, became public property.

The apparatus for producing the undulatory current is the next question. By the expiration of the original Bell patent, just alluded to, the public acquires the right in general terms to an electro-magnetic telephone. On January 30, 1894, the second of the fundamental Bell patents will expire and the permanent magnet telephone will be public property. It would seem that the field of telephony should now be open.

In its early days the telephone was recognized as a very imperfect appliance for the transmission of speech. The Bell telephone, whether magnetic or electro-magnetic, acted very imperfectly as a transmitter. It required the use of a loud voice to cause sufficient vibration in the diaphragm to induce operative current changes.

The microphone came next. What the microscope does for the eyes, the microphone in some sense does for the ears. It produces changes of resistance in an electric circuit by varying the closeness of contact between two loosely-touching portions of the circuit. It may be of the simplest description. A couple of round nails may be attached to the ends of a broken circuit, and the interval may be closed by a third nail laid across them. If the nails are subjected to disturbance or agitation of any kind, the resistance at the points of contact will change. Even so simple a contrivance as this constitutes a microphone. It gives no sound. But if in the circuit with it is included a Bell telephone, the latter, by producing sound, responds to every disturbance however slight of the microphone. As a matter of practice, carbon is universally used as one or all of the electrodes or contact surfaces of the microphone. The action of a microphone usually depends on the changes of pressure between the faces of its abutting electrodes. All telephone transmitters are microphones.

The delayed Berliner patent, which will not expire until November 17, 1908, virtually claims any microphone depending for its action on changes of pressure between abutting electrodes. The same thing as far as apparatus is concerned was shown in the Reiss telephones of many years ago. The Bell telephone was shown in the House patent, also antedating the Berliner patent by many years. And now the public are to be enjoined from possession of the art of telephony until the next century shall have nearly completed its first decade.

The protection of the last seventeen years has had its effect in building up a powerful corporation. This corporation has introduced most extensive telephone plants in the cities of the United States, and recently has extended its long distance service by the erection of expensive metallic circuits between cities as distant as New York or Boston and Chicago. As its statutory monopoly seemed expiring, the company held a business standing almost as a monopoly. But not content with this, the issuing of the Berliner patent has been brought about, which continues their statutory protection for fifteen years more.

In the bill of complaint presented by the Attorney-General very serious allegations are made concerning the proceedings incident to the issuance of this patent. The specification was amended some three years after the date of application by the wholesale process of striking out the entire specification and claims, except the preamble and signature, by striking out all

the drawings and by substituting new specification, claims and drawings. This proceeding, it will be observed, was done when three years' experience had indicated what the art of telephony really was. The knowledge acquired in those three years had enabled the scope of the Berliner patent to be judiciously expanded. Just at this time an extra anchor seems to have been cast to windward by the securing of a second patent to Berliner on the same drawings for the same apparatus when used as a receiver. How all this is compatible with patent law does not appear.

It has been found that carbon contact microphones are the only practical ones. By an early amendment a carbon contact was introduced as an element of the Berliner invention. This brought about an interference with Edison, which was only dissolved on October 21, 1891, after some thirteen years' pendency. Both Edison's and Berliner's inventions during this period were the property of the American Bell Telephone Co., so that the company was keeping alive proceedings against itself.

The theory of telephony was imperfectly known in the early days when the Berliner patent was being manipulated. But in those times the great preponderance of knowledge was possessed by the telephone company's experts. Therefore they were at a great advantage in dealing with the Patent Office examiner. The government makes a strong point of this fact in its complaint.

It is out of the question for us to present even an outline of the many points brought forward to invalidate the Berliner patent. The above are merely samples. Equity is strongly against it; but the equity of the federal courts has gradually become codified and fixed by precedents until it is nearly as inelastic as law itself. In the past, rival telephone inventors have endeavored to produce make-and-break current telephones so as to escape the fifth claim of the original Bell patent. Hereafter, if the Berliner patent is sustained, the effort must be to produce microphones of unvarying pressure, which will depend on varying area of contact for their action.

A suit to annul the original Bell patent was commenced by the federal government many years ago. This patent has now expired, but the suit is still alive. It is to be sincerely hoped that the suit to annul the Berliner patents will be pushed more energetically, and that the case will be brought to an issue before the patent dies a natural death in 1908.

The World's Columbian Exposition. SPECIAL NOTES.

It is unfortunate that such a great undertaking as that of preparing the buildings and installing the exhibits at the World's Columbian Exposition cannot be made one of the features of the Exposition itself. It is more inspiring and instructive to see men take swamp and sandy waste and transform it into the present "White City" than to walk through a building filled with set exhibits and not be able to see any of the process of manufacturing or preliminary preparation. This preliminary preparation has been particularly instructive with this exposition, as the swamp has been transformed into lagoons, and the sandy wastes into sward or building sites. In erecting the buildings some foundations were almost literally laid in the mud, yet every building is firm and no trouble whatever has been experienced from settling. The whole seven hundred acres of ground is now fully laid out and only needs the finishing touches of cleaning up, turfing, etc., to make it highly attractive. The whole area has been drained with a complete sewerage system. Water, compressed air and electricity are distributed to all parts of the grounds where needed, so that the "White City" is laid out with the completeness of a city that has required years to develop in.

Still another very instructive feature in the preliminary work is that of the variety of nationalities among the workmen and the characteristics peculiar to each in the manner of doing their work. Englishmen, Frenchmen, Germans, Japanese, Turks, and many other nationalities are busily engaged in preparing their several exhibits.

For months Jackson Park and the Exposition buildings have been referred to as the "White City," and when the Transportation Building was colored a fierce red three months ago a cry of horror was raised. But this cry was uncalled for, as the "White City" will still be practically white when completed. All the buildings will remain as they are now, white, or only a shade or two from it, except the Transportation Building, which is to be painted in the polychromatic style, but which will be very light in effect. On the exterior of this building winged figures are to be stenciled on the panels which alternate with the flag staffs, while all the flat surfaces are to be quite elaborately decorated, one of the patterns being composed of conventional thistles and foliated designs. All the color of feet within the grounds will be given by flags, bunting, awnings and hangings. Large awnings of bright colors will be on the roof of the Woman's Building, over the golden entrance to the Transportation Building, and on many balconies and on other buildings.

The stability of the covering to the buildings—staff—has had a thorough test with the long cold winter, and the material has proved all that could have been asked for. The staff used in covering and decorating the Exposition buildings is composed of plaster of Paris and fiber, "New Zealand hemp" being used mostly. Each piece of staff is cast in a mould. If it is a plain flat surface, the mould is simply a box; but if the staff is ornamental the mould is of gelatin, so as to have elasticity. The process of making it is simple. A coating of plaster is thrown over the face of the mould to the depth of about an eighth of an inch, to give a smooth, clear surface. The fiber is then beaten until it is in a feathery condition, dipped in liquid plaster, and pressed into the mould. When hardened, the staff stands considerable hard usage, and the slabs can be nailed in place like so many boards. In every instance where the laying has been properly done the staff has not been appreciably affected by the long, hard winter. In a few isolated instances flat surfaces have cracked off; but this is only where water has found its way in. The lagoons are mostly walled in by what appear to be marble walls. These are simply wooden surfaces covered with staff; but in preparing the material for this use it is composed of one-fourth of best Portland cement. When the staff work is pointed up and given a coating of paint, it will not absorb moisture.

Some weeks ago it was announced that the Vanderbilt family had leased one of the largest and most commodious mansions on Michigan Avenue for the six months of the World's Fair for \$20,000. But this is only one of many similar leases. Another Michigan Avenue house has just been leased for four months at \$4,500 a month to a prominent New Yorker, while a well known Philadelphian has leased a commodious Prairie Avenue house for six months at \$3,000 a month. The highest price yet offered for a residence has been \$50,000 for the season of the Fair for the palatial residence of a Chicago millionaire, which has been only recently occupied. The offer was made by a Philadelphia street railway magnate. Inquiry at the leading renting agencies by your correspondent reveals the fact that forty or more leases have already been made of private houses in Chicago in which each lease has been for \$1,000 a month or over. Many negotiations are now being carried on, and from present indications it would not be surprising if there were as many more leases made before May 1 of equal value. The number of leases of smaller amounts are quite without number, and include some of the best known names in the country in social, political, and financial circles. Many choice suites at the leading hotels have also been arranged for by well known people. The people to whom price is a minor consideration have very generally engaged accommodations ahead.

With the disappearing of the snow the working forces at the Exposition are increased; over six thousand men are now employed. Over five hundred car loads of exhibits have arrived, and the arranging and installing of these requires the services of many men, but in a week or two the daily arrival of exhibits should be about five hundred car loads a day, as it is estimated that there will be all told over twenty-five thousand car loads. A great demand for men as soon as the snow and ice are gone will be in clearing up and completing the work of beautifying the grounds. The work of hardening the paths was scarcely more than begun when the cold weather interfered. Then debris as a result of pushing building operations with such vigor is scattered everywhere, and it will take several thousand men two or three weeks at least to clear away this. When the grounds are once cleaned they are to be kept so with much care, and during the holding of the Exposition it is proposed to have them cleaned from one end to the other every day. This work in itself will require a large number of men, as there are seven hundred acres inclosed in the park, and a few evenings each week the grounds will be open to the public until ten o'clock.

Work is being pushed in all parts of the Exposition with restless energy. The weather has hampered progress in every way, but work has gone on in spite of it. The great passenger station has been completed during all the cold weather, and will be ready for trains on May 1 without difficulty. In all the buildings as many men are given employment as the amount of work will warrant. Foreign exhibitors are, as a rule, much more prompt than those of this country. The Palace of Mechanic Arts is particularly interesting just now with the work of installing such a vast amount of machinery. The temporary power plant, which has been in service from the first, can be used only until the 15th inst., so work is being pushed with special reference to putting part of the permanent plant into operation on that date. There are already about a dozen engines of the fifty or more to be installed on their foundations, and several batteries of boilers are ready for firing. The plant for handling the fuel oil is ready for use, and only waiting for the Standard Oil Company to turn the oil into the tanks, as the pipe line connections are already made. The Westinghouse 4,000 light alternating dynamos are connected and ready for operation, and the work of

putting two of the large dynamos, with a maximum capacity of 15,000 lights, is well under way. Parts of these enormous machines are scattered about the building and attract much attention from electrical men. The gallery in which is to be the switchboard for the incandescent plant is well on toward completion. In the center of the building the pit has been cemented preparatory to installing the fountain. An interesting sight in the Transportation Building is the little Pioneer, the first locomotive which ran out of Chicago, a mere speck of a machine, while a little distance away Englishmen are erecting a monster locomotive built years ago for a seven-foot gauge, the Lord of the Isles.

The foundations for the two electric fountains at the head of the basin have been put in under much difficulty, as the work has all been done during the cold weather, but the General Electric Company, which has a contract for constructing the fountains, has had a large force of men at work, and the superstructures are now being placed in position.

Work on the boiler plant has been much hampered by legal complications between two safety boiler companies, one of which claimed to hold a concession granting it the privilege to install all the boilers. After litigation for two months the courts have decided against this special concession. The day following the decision, workmen were on hand clearing away the ground ready for installing enough boilers to fill the main boiler house. Contracts have just been made for several hundred horse power to be installed in the boiler house annex.

The annual election of officers of the World's Columbian Exposition takes place April 1, and for weeks past a number of men who are anxious to help carry some of the honors that will go with an official position during the holding of the Exposition have been soliciting proxies, and in several instances buying up stock. But the present management has carried on the work so efficiently and with such evident satisfaction that there is little probability of any official being unwillingly retired. It is understood that more proxies than enough to re-elect the present board of directors have already been offered them unsolicited.

The last building to be contracted for is the Bureau of Public Comfort, which is to cost \$28,000. Although the contract was let only three weeks ago, the framework of the first story is nearly completed.

President Cleveland has been officially invited to be in Chicago on May 1, and open the Exposition to the public, and start the machinery.

Plans were partially perfected to install a complete still in miniature in the agricultural section for the manufacture of whisky, but the internal revenue officers were so strict in their requirements that this exhibit may be dispensed with.

Director-General Davis has issued an order calling upon all exhibitors to give definite information immediately as to their intentions in all detail. Not only must the work of installation be begun at once, but notice must also be given by those who wish electricity for purposes of lighting or power, or who want telephone or other services.

During the recent cold weather the trusses of the Manufactures and Arts Building are understood to have contracted five inches. In midsummer it is estimated that the building will expand to be about a foot wider than it is now.

Mr. Frederick Sargent, who has been engineer of the combined mechanical and electrical department, has been made general manager of the department, and his assistant engineers promoted, thus relieving him of much of the detail work of the department.

About the middle of February it was announced through the daily press that a large number of young men would be able to find service under the Exposition, either in the Columbian guards or as guides, and that college students would be given the preference. In two weeks a thousand applications for positions as guides were received. Only one hundred or two hundred men at the outside will be required for this service, but applications still continue to come in.

A post office has been established in the Administration Building for the convenience of Exposition employes, and a sub-station will probably be established just outside the grounds for convenience of visitors during the holding of the Fair.

The foundation is being put in for the Ferris wheel. This wheel is to be 264 feet in diameter, with 36 cars, each as large or larger than a Pullman, attached to the circumference, and swinging from it.

A SUCCESSFUL test of a Harveyized steel armor plate was recently carried out at the Indian Head proving grounds. The object of the test was to determine the trial of the plates representing 2,000 tons of armor for which bids have recently been received by the Navy Department. A 10 inch gun was used, placed at about 30 feet from the plate. In three successive shots the velocity was increased from 1,472 feet to 2,060 feet. The last shot penetrated deeply, but the excellent quality of the armor was fully demonstrated.