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THE AUTOMATIC COUPLER LAW TO BE ENFORCED.

Our readers are doubtless aware that there is a law upon the statute books requiring the railroads to equip all their freight cars with automatic couplers, and to equip a sufficient number of them with train brakes to enable the speed to be controlled by the engineer. The time limit for making these changes was set for the first of January, 1898, and the near approach of that day finds the majority of railroads either unwilling or professedly unable to meet the requirements of the law. The statistics in the hands of the Interstate Commission show that some of the railroads have been as diligent in complying with the demands of the law as others have been dilatory. Five roads, the Boston and Albany, the Delaware, Lackawanna and Western, the New York Central and Hudson River, the New York, Ontario and Western and the Lake Shore and Michigan Southern, have equipped the whole of their freight cars with automatic couplers, and from 50 to 75 per cent of their cars are fitted with train brakes. This is an excellent showing and speaks well for the efficiency of these roads. Among the forty-five other roads that have sent in reports to the commission, the percentage of cars equipped with automatic couplers varies from 11 per cent on the Norfolk and Western up to 94·28 per cent on the Chicago and Northwestern. The equipment with train brakes varies from 6 per cent on the Cincinnati, Hamilton and Dayton Railroad to 92½ per cent on the Atchison, Topeka and Santa Fe Road.

Now it appears that a large number of railroads are petitioning the commission for an extension of time for completing their safety equipment. The commission require that all petitions be filed by November 15, and that each road shall state how many cars have been equipped each year since March 2, 1893. In extending the time we understand that the commission will make no general extension, but will consider each case by itself, and will take into consideration the financial standing of the road, and the various causes, such as the "bad times," which may have prevented full compliance with the law.

We sincerely hope that the commission will stand by this policy and maintain a firm attitude in the presence of the influences which are sure to be brought to bear to obtain concessions. It is not unlikely that the very roads that have been most delinquent will be most importunate for further delay. No doubt a strenuous effort will be made by those roads which have not been paying dividends to secure extension of time on this very ground; but that this does not constitute sufficient cause is shown by the case of the Southern Pacific, which is not a dividend-paying property, and yet is able to report that 69 per cent of its cars are equipped with automatic couplers and 96 per cent with train brakes. Another case is that of the Baltimore and Ohio, which has equipped 80 per cent of its cars with both couplers and brakes.

In the presence of such cases as the above the commission will, no doubt, receive very coldly the petitions of such roads as are paying good dividends. A notable case is that of the Chicago and Alton, which in spite of the fact that it has been paying dividends as high as 8 per cent, has equipped only 37·9 per cent of its cars with automatic couplers and 17½ per cent with train brakes. Yet this company is one of the leading petitioners for an extension of time.

Now the question of safety equipment is a question between the profits of the companies and the safety of the employes. One section of the law gives the employe remedy where safety appliances are not in use "by relieving him of the risk which he is held to assume under the common law and would give him the same right to recover as an outsider." If the petitions of the railroads are granted, the commission will take away from the employe this very important remedy. This would scarcely be justifiable, even in the case of such roads as are in financial straits, but in the case of many of the wealthy and profitable roads which are likely to apply for extension of time, it would be a positive shame.

The great body of railroad employes at large will be glad to know that the Interstate Railroad Commission is disposed to take hold of the matter with a firm hand, and it is to be hoped that the welfare of one of the hardest worked body of men in the country will be carefully safeguarded during the hearing, which will take place on the first of December.

THE ROLLER BOAT PROBLEM.

One would have thought that the failure of the curious roller boat of M. Ernest Bazin would have deterred inventors from further experiment in such an unpromising field, at least for the present. The causes of failure were so radical and inherent in the principles of the design that it is difficult to see what hope there is of any modification in the form of this type of boat serving to render it successful. It will be remembered that the Bazin design consisted of a platform upon which were located the engines, boilers and passenger accommodation, and that this superstructure was carried by six large airtight disk-shaped wheels, arranged in two parallel lines, whose buoyancy served to keep the strange craft afloat.

Each pair of wheels was driven by a 50 horse power engine, and under their combined influence and that of a screw propeller, the ship was rolled, as it were, over the water. The professional standing of M. Bazin, and the fact that a model had shown very promising results in experimental tank tests, restrained the criticism which would ordinarily have been made upon a design which had so many features to render it impracticable, at least upon the high seas.

It is unnecessary to recount the failures of the ship. It was found that the wheels picked up and carried round with them a film or layer of water, whose weight, dragging upon the wheels in the upward half of their revolution, acted like a brake and brought down the speed to a very disappointing figure. It was stated that the inventor sought to overcome the difficulty by the use of some kind of shield or scraper which should free the wheels of water at the water line. This device, however, failed to produce better results. An attempt was then made to increase the speed by an increase of engine power, but the added weight of machinery immersed the wheels so deeply that the increased resistance absorbed the extra engine power, and the speed remained as low as before.

Apart from the question of speed, however, it is questionable whether the Bazin boat would have been comfortable, or even manageable, among the giant rollers of an Atlantic gale or in the wicked cross sea that is often met with in the English Channel.

The failure of this costly venture, however, has not daunted the designer and builders of another roller boat, which is now having its preliminary trials. The designer in this case has decided to dispense with wheels and let the ship do its own rolling. According to published reports the so-called boat is nothing more or less than a huge cylinder 22 feet in diameter and 110 feet long. At about 5 feet from each end the diameter is reduced to 15 feet. Inside the cylinder a number of circular steel tracks are laid completely around the shell, and upon these, by means of flanged wheels, 3 feet in diameter, the engine and boiler platforms travel, the idea being that whatever rotation there may be of the cylinder, the platforms will maintain a nearly level position in the lower part of the shell. Each platform is to carry a boiler and a pair of high speed engines, and the latter will be geared to the platform wheels in the ratio of two to one. The engines are set in motion so as to turn the platform wheels in the direction in which the boat is to travel. If the cylinder were held rigidly in one position the platform would climb the circular track and be carried up the inside of the shell; but as the former is free to move on the water, and is provided with paddle wheel floats, it is expected that it will roll forward with considerable speed across the sea.

It will be seen that the Toronto boat is exposed to the same difficulty as M. Bazin's vessel, in that the water is liable to cling to the surface of the cylinder and be lifted up and carried over, acting as a brake to check the rotation. This effect will be intensified by the radial floats, which will of themselves tend to lift a large quantity of water, that is, supposing that the boat attains any reasonable speed. When the vessel is in motion, the weight of the engine, boilers and platform (which, it will be remembered, are all the time trying to climb the inside wall of the cylinder) will be balanced by the resistance of the water displaced by the cylinder, by the internal friction of the machinery, and by the necessarily large amount of water carried up on the rear side of the cylinder. The last, we think, will be the greatest obstacle to progress when the vessel is in still water. What will happen when the cylinder attempts to roll up the face of an oncoming wave 15 to 25 feet high is a matter of conjecture.

Another troublesome problem to be solved will be that of wind resistance, as the following considerations will show. It is stated that at its launch the cylinder drew 2 feet of water, and that its weight was 70 tons. The total weight is to be about 100 tons, and the draught, when everything is in place, will therefore be, say, about 2 feet 6 inches. This will leave 19 feet 6 inches as the height of the cylinder above the water line. As the length is 110 feet the plane area presented to the force of the wind will be 2,145 square feet. The wind pressure provided for in engineering structures is from 35 to 45 pounds per square foot. If we take the lower figure, we get a total pressure against the vessel in a strong gale of 37½ tons.

As the engines and platform are to weigh apparently only 30 tons, it is evident that however far they may roll up the forward or windward face of the cylinder, they would never prevent the vessel from being rolled bodily to leeward before the force of the gale. Even if the wind pressure be assumed at the low figure of 20 pounds to the square foot, the total pressure against the boat's surface would still be over 20 tons, and if to this be added the internal friction of the machinery, the resistance of the water displaced and the drag of the water lifted up by the floats and adhering to the shell, it is reasonable to suppose that the roller boat will refuse to roll except in calm water or before a favoring wind.

This experiment in marine roller locomotion is as novel in its way as was its predecessor, and fortunately, as in the case of the French boat, it is being carried

out on a scale that will give a thorough test of its possibilities.

Since the above was written the Knapp boat has had one or two trials which verify the theories we have advanced. In place of the high speed which was expected by the designer, the vessel has, so far, only been able to roll at the rate of six miles an hour in still water.

OUR GREAT COTTON CROP.

While the few lucky miners who have reached the Klondike are digging for the gold in the frozen ground of their Arctic home, and stories of the wonderful richness of the mines are published to agitate a world of readers, a different kind of a gold mine is being worked in another fairer and warmer part of our country, where the sun shines eternally and the conditions of life are all that one could desire for comfort and pleasure. The great cotton crop of the Southern States is worth several Klondikes; it yields profits to hundreds of thousands of toilers, and enriches our country by many millions of dollars. Our exports of cotton alone amount to more than the output of all the gold mines of the world. We get on the average more than $200,000,000 annually from the cotton we ship abroad, after deducting enough for our own use. The lauded wealth of gold and silver mines sinks into insignificance in comparison.

Early in October the new crop of cotton begins to come to market, and during the pleasant autumn months the white fields of the South are alive with pickers. Simultaneous with the advent of the first large shipment of the new crop, a great industry that gives employment to thousands of men throughout the country awakens into activity. The cotton is picked and baled on the farms scattered throughout the cotton belt, and an army of buyers appear there to solicit trade for their houses. Fully five thousand of these buyers are often in the fields at once, trying to secure trade for their respective houses. The advance couriers receive twenty-five cents per bale commission, and a good buyer will sometimes secure ten thousand or more bales for his house, making for himself the handsome salary of $2,500 for a few months' labor.

The cotton is marked and shipped generally to New Orleans, Galveston, Mobile, Savannah or Charleston, the five leading cotton-receiving cities of the Union. The European tramp steamers visit these cotton ports and load up direct for Europe. Many of these tramps now carry ten and twelve thousand bales of cotton a year, and their size and capacity are increasing year by year. But the great bulk of the crop comes from the Southern ports to New York in the steamers of regular coast lines, which make most of their annual profits in handling the immense cotton crop. In recent years New Orleans has tried to send most of its cotton direct to Europe in regular steamers plying between that city and Liverpool; but New York will control most of the trade for many years yet. Most of the transatlantic lines touch at New York, and they carry the cotton abroad at rates that are hard to outbid.

Besides the army of cotton pickers, the new crop gives employment to thousands of sailors, captains of steamers and trading vessels, merchants and their clerks, truckmen in the city, and lightermen and longshoremen, and many others. It is estimated that, before the cotton reaches the cotton factories, it has given employment to nearly 300,000 people in Europe and this country. In the South a good part of the cotton handling is done by negroes, who, picturesquely attired, load the ships with fleecy bales to the sound of music and song. But when it reaches New York this picturesque scene vanishes. Large, able-bodied longshoremen assemble at the ship's side in response to a whistle, and begin to transfer the cotton from wharf to wharf or from steamer to lighter. These men receive from fifty to seventy-five per cent higher wages than the ordinary freight railway handlers, and they earn from twenty to twenty-five cents an hour.

As most of the cotton received in New York is in transit for Europe or New England, and very little is consumed here, there is of necessity a great deal of transferring from wharf to wharf, and from vessel to vessel. Besides the longshoremen employed in this business, there are the truckmen and the owners and crew of the lighters. The truckmen transfer the bales when the distance is only a matter of a few blocks, and they charge about fifteen cents a bale. The lightermen charge about the same.

The lighters have greatly improved in recent years, and they have labor-saving machinery for facilitating work. They are mostly owned by the big cotton-carrying companies; but some are the sole possessions of their captains or small lighter companies who operate two or three. The ordinary lighter carries from 1,000 to 1,500 bales at a time. The lighters can draw up alongside of a Southern steamer, and, by means of machinery, take the heavy bales from her hold and transfer them to their decks without much trouble. The crew of these lighters receive rather less pay than the regular longshoremen, but their labor is less onerous and wearying. The derricks do most of the lifting, while the men merely guide the swinging bales as they shoot up in the air and land on the deck of the lighter.

Each compressed bale of cotton weighs about 500 pounds, and uncompressed nearly a third less. Sea Island cotton is generally received here uncompressed, for there is a prevailing notion abroad that it is injured by the process. Nevertheless, greater care is exercised in handling the Sea Island than the ordinary varieties. There has been considerable discussion in late years about improving our methods of baling. Before the bales reach their final destination there is a large percentage of loss to be deducted through insufficient covering of the cotton, and this has prejudiced foreign dealers against handling American cotton except when forced to.

Cotton picking is done almost entirely by hand. Large sums of money have been invested in cotton picking machines, and several have been put in the fields to do the work of negro laborers; but so far the problem of reducing this work to machinery has not yet been solved. The expense of picking is the heaviest item in handling the crop. It costs between fifty and sixty million dollars to harvest the crop annually. A negro picker in slave days averaged 100 pounds of cotton per day; but this average is nearly doubled by the modern employes, who receive from 35 cents to 50 cents per 100 pounds in various States of the South.

When picked, the cotton is carted to the gin house, where it is weighed and piled away. The ginning process is nearly the same as that introduced by old Eli Whitney years ago, and there is no apparent need for any improvement. The fiber passes through a series of circular saws or rollers which tear the seed from the fiber and blow them out into two separate compartments. Formerly all this cotton seed was practically wasted; but now it adds about $50,000,000 annually to the resources of the South. To every bale of 500 pounds there are generally about 800 pounds of seed, and a ton of this seed yields about thirty-five gallons of oil, valued at forty to fifty cents per gallon. This part of the industry has sprung into existence only in the past ten years; but it is already an enormous business. In 1889 the export of cotton seed oil amounted to 6,250,000 gallons, and in the next year it reached 14,324,000 gallons. In 1895 over 1,200,000 tons of cotton seed were crushed and about 42,000,000 gallons of oil were obtained. Besides furnishing oil, the cotton seed, after it has been crushed, supplies the cattle with good food in the form of meal and cake, which is claimed to be only a little less nourishing than corn.

The cotton belt of the South has been greatly extended since slave days. Then it was considered to be only a narrow belt through Georgia, the Carolinas and Virginia; but it now measures about 600,000 square miles. All of it is not by any means cultivated with cotton. Probably not more than 20,000,000 acres are cultivated with cotton in any one year, and some years it has run less than half this number of acres. The average yield of this immense territory is between 6,000,000 and 9,000,000 bales. Texas leads all the other States by nearly one-half, with Georgia and Mississippi following in order. With an average crop of 8,000,000 bales, we lead all other countries by far in cotton growing. India is second, with about 3,000,000 to 4,000,000 bales, and China and Egypt come next in order with less than 2,000,000 bales each. The cotton area in these other countries is being extended, however, and while the South will undoubtedly always control the markets of the world, she will suffer more or less from foreign competition. We produce the best cotton in the world, and in no parts of the globe can our famous Sea Island cotton be duplicated. This variety, Gossypium Barbadense, grows on the islands off the coast of South Carolina and Georgia, and produces a fiber about one inch longer than that of any other variety grown in this or any other country. The Sea Island cotton is as fine and glossy as silk, and the English spinners take nearly all that we can raise of this superior grade.

There have been many agencies at work to improve the cotton crop as well as to utilize the by-products; but so far the only real advance has been made through the slow process of superior cultivation and the improvement of plants by careful selection. Recently the newspapers gave currency to a story of a marvelous cotton plant introduced from Africa, which promised to revolutionize the cotton industry of the world in a year or two. This new cotton plant was described as towering to the height of twenty feet, and producing a great mass of downy balls that would increase the acreage enormously. But R. J. Redding, director of the Georgia Experiment Station, discounts the wonderful claims of the new variety, and adds: "The claim that the variety of cotton belongs to a different genus cannot for a moment be allowed. It is not even of a new species, but simply a variety of Gosspyium herbaceum, and very probably of local (domestic) origin."

Nevertheless, the cotton plant has been greatly improved in the last half century through cultivation and selection. Fifty years ago the old "peeler" variety of cotton was used entirely by the Southern planters. This was a long jointed, straggling variety, with comparatively few bolls to the stalk. The comparison between it and a specimen of the present "peerless" variety is vivid. The latter is short, compact in form, and loaded down with bolls. The first step in improving the upland short staple cotton through careful selection and cultivation was followed by an improvement in the length and fineness of staple. This was accomplished by hybridizing it with the long staple or Sea Island cotton. The result of these two improvements, carried on through many years of careful work and study, is that the modern "W. A. Cook" variety shows such an improvement over the old "Dixon," popular forty years ago, that one would hardly recognize them as belonging to the same class of plants.

NEW ARGENTINE LAW IN REGARD TO THE SALE OF MEDICINES.

The Congress of the Argentine Republic is expected to pass a law creating a national board of health (or Department of Public Health, as it is called officially). The law will become effective in a short time. This board of health will have complete control as to what medicines or compounds shall be allowed upon the Argentine market, as will appear from the following two articles of the law:

Article 36.—It shall be lawful to sell or to expose for sale in any pharmacy or apothecary's shop or store such specialties or compounds only whose component parts are clearly specified upon a visible part of the package thereof, setting forth also the doses of the active substances contained therein.

Article 37.—The Department of Public Health will authorize the sale of the medicines referred to in Article 36, when the required conditions have been fulfilled, without which authorization such goods cannot be offered for sale.

Failure to comply with the requirements of these two articles will be punished by a fine of from $100 to $200.

It will therefore become necessary for American manufacturers exporting medicinal compounds and specifics to the Argentine Republic to obtain the required permit from the Department of Public Health and to state the composition of the medicine on each package. Full information concerning the further requirements for securing the above permit will be supplied upon application to the editors of this paper.

CHANGES IN SWEDISH PATENT AND TRADE MARK LAWS.

Under the present Swedish patent law, the publication of a printed copy of a foreign patent becomes a bar to the allowance of a Swedish application only when said application is filed more than 180 days after the date of publication. An amendment which will take effect January 1, 1898, provides that an invention will not be considered patentable if the application for a Swedish patent is filed after the issue of any printed publication (including a printed patent copy) in any country. However, if an invention has been exhibited at an international exposition, any publication made simultaneously with the exhibiting of it, or thereafter, will form no bar to the allowance of an application for patent, provided said application is filed within 180 days after the invention has been exhibited.

According to an amendment which took effect on October 1, 1897, trade marks may now be registered even when they consist of fancy designations, that is, words coined for the purpose of designating certain goods, provided such words do not indicate the origin, nature, intended use, amount or price of the goods. Under the old law, words could be registered as trade marks only when printed in a distinctive style.

MULTIPLICATION OF EXPLOSIVES.

The ingenuity that has been exhibited of late years in the discovery and application of explosives for mining purposes has really been remarkable, and not less so has been the growth of the trade in explosives during the period of twenty years since the English act of 1875 came into operation, says The Trade Journals Review. Not only has the number of factories more than doubled, but the number of persons employed in them is now over 10,000, which shows an increase of nearly 3,000 even during the last ten years. This increase follows naturally on the increase in the number of nitroglycerine compounds in the market and the introduction of smokeless powders. Four new factories have been licensed during the year 1895 and 113 since the act came into operation, or more than double the number of factories existing at the passing of the act. The net increase is 79 factories, or an average of 3·95 annually. While the number of factories in which gunpowder and nitrate mixtures may be made has remained stationary during the twenty years, the number in which nitroglycerine compounds may be made has risen from one to nine, and whereas dynamite was the only nitroglycerine compound produced in 1876, there are now twelve such compounds licensed. The guncotton nitro-compounds, which include nearly all the smokeless powders, were nine in 1876, and are now twenty-nine. Similarly, the fulminate of mercury factories have increased from two to six.