Freight Car Doors.

At the January meeting of the Central Railway Club a paper upon the subject of "Freight Car Doors and Fixtures" was read by Mr. J. D. McIlwain, superintendent of the Union Car Company, in which the author presented the claims of a number of door appliances and concluded as follows, in which he represented a committee appointed to consider the subject given in the title of the paper:

"We wish first to repeat the statement made in our previous report, that the coming freight car door, to be perfect in every particular, and satisfactory to both the transportation and mechanical departments, requires the following essential points:

"First, safety; second, protection to the property in transportation, from theft, fire, and water; third, ease of operation; and last, but not least, economy in production and maintenance. We do not believe that the freight car door has yet been produced that embodies all of these requirements perfectly. In our opinion the perfect door should be hung at the top, on antifriction rollers which cannot be derailed. The bottom girders should permit sufficient play between the doors and the car to give the door ease of motion at once after the fastenings are loosened. The fastenings should be designed to close the door tight against the car when locked, and release it when unlocked. There should be a permanent stop or cleat at the back edge of the door when closed, for protection from fire and water. The door posts should be trussed to prevent bulging outward, which is the principal cause of doors binding and the attendant evils. We question if there is a complete door that is not weak in some one of these features, and leave the subject for your digestion."

In the discussion Mr. McIlwain said he thought that door construction was the leading question of today in car design, that is, the providing of "proper doors, properly hung, that will properly protect the property in the car and that will not cost too much for operation and maintenance." The discussion was continued in the March meeting of the club when it was opened by Mr. Perkins, joint freight agent of East Buffalo, who represented the "men who look after the freight and keep track of it." He stated that the number of box cars, not counting those belonging to private car owners, in use in the country was about 512,000, which makes the car doors number over a million. Based upon 200,000 doors opened, closed, and fastened each day, allowing one minute for every complete operation, he figured that it cost $500 per day for this insignificant item, which would become $2,500 if the time occupied was placed at five minutes. This showed the importance of furnishing doors which may be opened, closed and sealed easily and quickly. He spoke of the safety of employes as the matter of first importance in the car door question, applying to the dangers to men in opening and closing the doors as well as those resulting from improperly secured doors upon the road. After enumerating some of the defects which lead to danger of falling doors, he said: "The door of which the least complaint is heard among freight handlers is that hung on rollers or pulleys at the top, with projecting door guides below the bottom of the door and wedge shaped pieces on the bottom of the door to fill guides when the door is closed. These doors always work well, even when bolts that hold pulleys to the door are loose or the door gets old or shaky. . . . Freight men are well satisfied with doors hung this way, and if made a few inches wider than the doorway, the lap over the door post at the back and the door stop in front make the necessary protection against sparks and rain."

New Lake Steamers.

At the Cleveland Ship Building Company's yard, April 20, was launched the steel steamer Chili, built to the order of Captain Drake, of Buffalo; Captain A. B. Wolvin, of Duluth; Wm. Dickinson, of Chicago; Captain David Vance, of Milwaukee, and others. The Chili measures 342 and 324 by 42 and 27 feet. Her engines are triple expansion, 20, 33 and 54 by 40 inches, the two boilers being 12 feet 4 inches by 13 feet. A 12 by 12 inch hoisting engine operates a fore and aft shafting, by which freight is lowered into and hoisted out of the hold. She will be ready for sea about June 1, and will carry 3,200 tons on 15 feet draught.

On the same day the steamer J. J. McWilliams, building at the Wheeler yard, West Bay City, was launched. She is building for the Mitchell-Gratwick syndicate, and is 370 feet over all, 352 between perpendiculars, 42 beam and 27 depth. Her engines are 20, 32 and 55 by 42 inches. Her boilers were made by Wicks Brothers, of Saginaw, and are 13½ by 12 feet. She is expected to be out in about four weeks.

The Detroit Dry Dock Company launched, April 20, at their Orleans Street yard, Detroit, a fine lumber steamer, the Argo, for C. R. Jones & Company, the Fisher-Wilson Lumber Company, and others, of Cleveland. She is a single decker, 203 feet in length, with 185 feet keel, 35½ feet beam and 15 feet depth, and will carry 800,000 feet of lumber on 12½ feet draught. Her engine is a fore and aft compound, 22 and 46 by 36 inches, with cylindrical boiler 12 feet 3 inches by 11 feet. She will carry two pole spars and one stack. She is expected to be out in three weeks and will tow two of the A. G. Comstock's barges.—Marine Record.

AN IMPROVED GASOLINE TRACTION ENGINE.

The illustration represents a gasoline traction engine which has been used in the field for several seasons, doing most efficient service. It is manufactured by the Charter Gas Engine Company, of Sterling, Ill. It is of neat design, strong and well built, the frame being all iron and steel, and the rear axle has roller bearings. The platform is suspended on springs. The steering wheel and levers are within easy reach of the operator, and the traction motion can be reversed instantly. The gearing is arranged to give two speeds, two and a half or four miles per hour.

THE "STERLING" GASOLINE TRACTION ENGINE.

The Prevention of Window Cleaning Accidents.

According to the report of the registrar-general, the number of fatal falls from the window in England alone is eighty per annum, but notwithstanding this fact, little has been done either on the part of the government or on the part of house owners to take means to lessen this unnecessary mortality. In 1892 the corporation of Glasgow passed a by-law enacting that in dwelling houses all window sashes above the ground floor should be hinged or constructed so as to admit of the outsides of the windows being cleaned from the inside of the apartment; and we believe that an old act, passed in 1847 and applying to English boroughs, made it an indictable offense to allow any one to stand outside a window, with a fine of 40s. payable by the occupier. But this act is undoubtedly a dead letter in the country, and would anyhow be impracticable in a large city like London. The proper remedy obviously lies in the fitting of the window itself. If this can be so constructed that the operation of cleaning can be performed from the inside, while the framework is both air and water tight, the safety of the cleaner is assured, but before any such innovation can become popular among those who have grown up among sashes and are returning to casements, it must be made clear that the new invention does not lose in comfort for its user what it may gain in safety for his servants. --The Lancet, London.

The Gateway to Lake Superior.

For many years the United States has had possession of the gateway to Lake Superior, for such may be termed the lock at the St. Mary's Falls Canal, and quite as much so as Gibraltar is the key to the Mediterranean.

It appears that Canada, or rather the imperial government, could not rest quietly under this state of affairs, which in a sense debarred access to their territory on the north shore of Lake Superior. This feature was brought strongly to the front a quarter of a century ago, when Canadian vessels with military supplies for Manitoba were refused permission to lock through the canal, which was then under the jurisdiction of the State of Michigan.

It may be assumed that from the above episode sprung the idea to have a national waterway whereby Dominion tonnage could pass on to Lake Superior under all conditions, and now this has been accomplished. Furthermore, it will be remembered that three seasons ago the Canadian government, by an order in council, so changed the rules governing the imposition of tolls in the Welland Canal, their gateway to the coast, that a rebate to the tolls would only be allowed to vessels that discharged their cargoes at a Canadian port. While the new order appeared all right and just on the face of it, there was really a strong discrimination against the port of Ogdensburg, N. Y., and as a consequence against American tonnage consigned there, and this meant the building up of Kingston, Ont., as a terminal lake point at the expense of Ogdensburg. Remonstrance on the part of commercial and transportation interests with the Dominion government proved futile, and finally a law was enacted by Congress exacting toll from all Canadian vessels passing to or from Lake Superior. This state of affairs lasted only about five months, when such pressure was brought to bear on the Dominion government that the order in council was abrogated relative to the Welland Canal tolls, and at the same time the American "Soo" Canal was again thrown open to the use of Canadian vessels free of all charges.

Canada is now independent regarding access to her Lake Superior ports. She has a splendid canal in her own territory and need not be under any further obligations to the United States for permission to reach her northern limits. In addition to this feature she holds the key to the coast via the St. Lawrence route, and with these facts in mind it has been a consideration for some time past to know whether the Welland Canal tolls would not be put in force again, seeing that the Dominion could no longer be checkmated by the United States in the same manner as formerly, and it is of particular interest to note that Canada seems to have no inclination at this time to reimpose burdens on American commerce, for not only is the new canal at Sault Ste. Marie declared free of tolls for all tonnage, but the Welland and St. Lawrence Canals remain as formerly relative to toll charges. This is the more magnanimous on the part of Canada considering that she has spent vastly more money, considering the meager population of the country, in improving natural and forming artificial waterways than has the United States, and the announcement that the Canadian St. Mary's Falls Canal is free to all vessels shows the spirit and feeling which the Dominion bears toward this country, for, of course, only American tonnage is meant when it is said that the canal is free to all.

Such concessions, or international courtesies, if so they may be called, will no doubt go far toward smoothing over rough places which crop up from time to time in the usual order of events, and questions involving international rulings are much easier settled in an amicable manner when a mutual feeling of friendliness predominates, and such must be regarded the recent action of Canada in throwing open the new Sault Ste. Marie Canal.—Marine Record.

THE average production of ice, by means of the expansion of cold air, in what are known as cold air ice machines, is two and one-half tons of ice per ton of coal. Other machines vary from two and one-half tons to twelve and one-half tons of ice per ton of coal.

Notes on Aluminum.

From a large number of experiments made by the author, the following results have been obtained:

Alloys Containing Gold.—Alloys of aluminum and gold, although interesting, are of little practical use except for decorative purposes. With 6 per cent of gold, the alloy is as white as pure aluminum, but more brittle; and with 10 per cent the product has a light violet brown color, is harder than aluminum, and only works well at high temperatures. A 15 per cent gold alloy is almost white, with a violet shade, very soft, and a fine grained metal. An alloy of 50 per cent gold is soft and spongy, and possesses a beautiful violet color; while with 78 per cent of gold it is very brittle, and of a pinkish violet color. With 90 cent of gold, the color is a pale violet, and with 94 per cent it approaches a pink. Alloys containing small percentages of aluminum leave a bright violet color on the cupel under the blowpipe. An alloy of 50 per cent of gold, 45 per cent copper and 5 per cent aluminum takes the color and polish of 14 carat gold, but easily tarnishes.

Alloys Containing Silver.—Alloys of aluminum with 4 to 8 per cent of silver are harder than pure aluminum, and not brittle, and take a fine polish. The color is similar to that of fine silver; they are used for medals, charms, etc.

Alloys Containing Nickel.—An alloy of 50 per cent nickel and 50 per cent aluminum is of a dull gray color, very porous, and too brittle to use. The following alloys of copper, nickel, and aluminum are very strong, hard, and fine grained: With 66 per cent of copper, 24 per cent of nickel, and 10 per cent of aluminum an alloy is formed which takes a fine polish, and has the color of 10 carat gold. With 55 per cent of copper, 33 per cent of nickel, and 12 per cent of aluminum the color is a beautiful golden brown; and with 72½ per cent of copper, 21¼ per cent of nickel, and 6¼ per cent of aluminum, the color becomes richer and deeper.

Melting of Aluminum.—The temperature should be kept even, and not much above the melting point of the metal, which should be fed into the crucible in small pieces. The most useful flux is a little tallow. A crucible mainly of siliceous material must not be used, as the aluminum attacks the silicon. In alloying, the aluminum is put into the crucible after the other metals have become liquid.

Restoration of the Mat.—Aluminum can be cleaned and its mat restored by dipping for 1¼ minutes in a solution of 3 ounces of caustic potash or soda in a quart of water, then washing well, and dipping in a solution of three parts nitric and three parts sulphuric acid (by volume).—G. F. Andrews, J. Amer. Chem.

The Wonders of the Joints.

Dr. J. H. Hanaford, in the Phrenological Journal for May, gives the following interesting facts relative to a most important function of the human body:

The more than two hundred bones of the body would be of but little service to us aside from their joint connections. Some of these are of a remarkable character.

The twenty-four ribs are attached to the spine by a kind of immovable joint, the seven upper ones to the breast bone, by cartilages; three, more movable, are tied to each other and then fastened above, while four are "floating ribs;" these, with the six above, affording elasticity and motion in the act of breathing, accommodating themselves to the varying size of the chest.

In the place of these ribs a solid plate of bone would be cumbrous, heavy, not admitting of the motions needed at this part, while the curved and elastic ribs afford similar protection to the organs within. The wedge-shaped bone of the lower spine fits firmly into a corresponding cavity in the hip bone—a grand foundation bone of great strength, admirably adapted to its use.

Of the two other kinds of joints, the "ball-and-socket" and the "hinge," much might be said if space would admit. The ball-and-socket is well represented by the joint at the shoulder, which allows the arm to move in all needed directions.

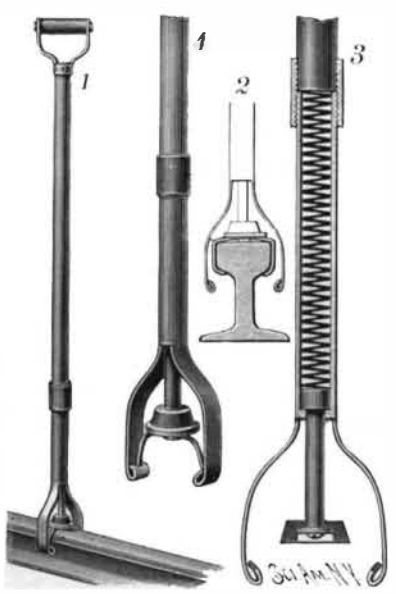
That the arm may have a wider scope, the socket is very shallow, so that when "out of joint" it may be easily put back again, almost by the unfortunate boy, if he only understood the matter. (It would not be safe for him to attempt to walk on his hands, instead of his feet, as the "ball" would slip out too easily for safety.) In this respect the hip joint differs, the socket being quite deep, at the bottom of which there is a round, strong cord, which is so attached to the thigh bone as to prevent dislocation, unless from a severe accident. In consequence of this depth the leg is not afforded much movement, its principal movement being that of walking—a boy need not kick! This depth is needed to bear the weight of the body, with that of burdens which must be carried, in active life. This "ball" cannot get out without breaking the cord, in which case it is useless to put the "ball" back. In the case of a dislocation, the "ball" being pressed up, nature (God in nature) by the aid of the nerves, blood, etc., performs a miracle, making a "socket" around this "ball," so that, after awhile, one can walk tolerably well, always limping, however, because the leg has become shorter than the other.

The other joint is the "hinge joint," like that of the common door, admitting of motion only forward and backward. In the case of the arm, which demands so many motions, the two joints are supplied, making the limb wonderfully useful, adapting it to various, if not numberless, employments. Think of the friction of walking naturally resulting from our motions, particularly of the bones of the leg and thigh, caused by the weight of the body! Indeed, if these were made of steel, without any means of lubrication, only a few years would be required to wear them away so that a man would be cut down to one-half his height. To prevent this, the ends of the bones are provided with a smooth, gristly matter, which is repaired as fast as it wears away, the joint supplying its own oil, with no care on our part. Thus the wonderful machinery of the body goes constantly on.

INSTRUMENT FOR PLACING TORPEDOES.

One of the indispensable danger signals used on railroads is the torpedo, which is exploded by the passing train, but to place the torpedo on the track in position to be acted on by the wheels of the train to be signaled, it has heretofore been necessary to stop the train leaving the signal to enable a man to place it in position on the rail.

Mr. James D. Seamands, of 623 Buena Vista Street, San Antonio, Texas, has recently patented a very simple device by means of which the torpedo may be placed on the rail by a man on a moving train. The complete instrument is shown in Fig. 1. In the tubular end of a long handle is placed a spring pressed follower, carrying at its lower end a foot of soft material, such as rubber, which rests on the upper surface of the torpedo. The latter, which is of the usual description, is furnished with a spring capable of embracing the head of the rail when allowed to assume its natural shape. The spring is held in an extended position by the downwardly extending arms of the instrument, as shown in Fig. 1.



SEAMANDS' TORPEDO PLACER.

The operator grasps the handle and carries it in position to hold the torpedo-supporting spring over the head of the rail. By a quick downward pressure the handle is disengaged from the torpedo spring, which instantly contracts and embraces the rail head, as shown in Fig. 2. Figs. 3 and 4 are enlarged sectional views clearly showing the construction.

World's Fairs in 1896.

Two countries will hold world's fairs in 1896, one in the old world and one in the new. The Exhibition of Industries and Fine Arts which will be opened April 2, 1896, near the castle of Chapultepec, city of Mexico, will be of special interest to Americans. Under the enlightened rule of President Diaz, Mexico has had an opportunity in the last few years to cultivate her great resources, and is now in a position to look for purchasers of her products and bid for the articles she requires. She needs agricultural and mining machinery, printing presses, pianos and canned goods as well as thousands of other articles which the United States is in a position to supply in return for her minerals, cereals, fruits, and coffee. Important inducements are offered to exhibitors, such as the importation of goods in bond and low transportation rates. Senor Ignacia Bejarano, the official mayor of the federal government, is acting as director-general. California, Oregon, Nebraska, Kentucky and Iowa have already appointed State commissioners to look after their interests and a stock company has been organized in Chicago to build the exposition palaces.

An industrial exposition will be held in Berlin in 1896. Special reference is to be paid to exhibits which shall illustrate the history of firearms. One of the features will be an exposition of sports, including a museum of rare objects of the chase and hunting trophies. A dog show will also be held.

BY means of the quadruple effect distilling apparatus thirty-six pounds of water may be evaporated with one pound of coal.

Lightning Freaks.

As the season for lightning flashes is upon us, it may be well to call attention to one or two points and to urge their careful observation and study. The camera has added greatly to our knowledge of these interesting phenomena, and every one in a position to do so should aid in photographing these flashes. We have the multiple flash, the dark flash, the ribbon flash and so on, and these have caused widespread discussion.

Some photographs show a series of parallel flashes following precisely the same path at some distance apart. That separate discharges can make such similar paths for themselves side by side seems incredible. In July, 1892, on an exceedingly hot afternoon at Bay Ridge, Md., a violent thunder storm passed quite near my point of observation. At one point in the storm I saw flash after flash in exactly the same path. There were four or five of these flashes and the whole display lasted more than a second. If a camera were moved very rapidly over such a display, it might give the many distinct parallel flashes, and if it should be moved with less speed, such a broad ribbon flash as is illustrated in La Nature for March 2 might be secured. This "poly flash" or "poly phleg" (Greek, many and flash) should receive some designation to distinguish it from the so-called "multiple flash."

Observations of lightning with the unaided eye may add a good deal to our knowledge. It is highly probable that the estimates of the duration of an ordinary flash of 0·002 to 0·0001 of a second are far too small. It is certain that no broadening of a single flash as sudden as that could ever be had upon the swiftest moving camera. To the unaided eye most single flashes are not more than 0·01 of a second. It is also entirely possible to follow the direction of motion of a flash in the sky.

On April 13, 1895, while a thunder storm was passing directly overhead, I observed a sharp lightning stroke, and, simultaneous with the sound of the thunder, which came four or five seconds later, there was an unmistakable increase in the air pressure. This was not due to the wind, as the air was still at the time. It may be of a good deal of value to obtain additional observations of this kind. H. A. HAZEN.

Cycling and the Heart.

The Popular Science Monthly for May condenses from a lengthy paper on bicycling by Dr. B. W. Richardson, who represents cycling as differing from other exercises, in that it tells primarily and most distinctly upon the heart. It produces at once a quickened circulation, though the riders may not be conscious of it; and this accounts for the astonishing journeys a cyclist can undertake, and his endurance as against sleep. Although the heart increases in action and sometimes undergoes enlargement, the author has never seen a rider embarrassed by overstrain of it, faintness, breathlessness, angina or vertigo, so as to oblige him to dismount. Indeed, he had known a practiced rider who climbs hills on his machine, but could not mount a flight of stairs on his feet without breathlessness and a slight palpitation; he had never seen a sudden death from cycling. He had met with instances in which, after several years of cycling, there was evidence of heart disease, with general languor and inability to sustain fatigue if exercise were again tried on the machine; and, on the other hand, he had known examples in which even an octogenarian had kept up the exercise in a moderate degree apparently with benefit to the circulation. He had seen in some cases apparent benefit arising from cycling even where there was an indication of some disease affecting the circulation, and had known good to arise from it in cases of varicose veins and of fatty degeneration, and in conditions of anæmia. In other cases excessive cycling had been a definite cause of injury to the circulation. The author believes that cycling in moderation may be permitted and even recommended to persons with healthy hearts; that it is not necessary to exclude it in all cases of heart disease, while it may be even useful where the action of the heart is feeble and signs of fatty degeneration are found; that, as the action of cycling tells directly upon the motion of the heart, the effect it produces on that organ is phenomenally and unexpectedly great compared with the work it gets out of it; that the ultimate action of severe cycling is to increase the size of the heart, to render it irritable and hypersensitive to motion; that the overdevelopment of the heart affects in turn the arterial resilience, modifies the natural blood pressure, and favors degenerative structural changes in the organs of the body generally; that in persons of timid and nervous natures the fear incidental to cycling is often creative of disturbance and palpitation of the heart, and should be taken account of; that, in giving advice, it is often more important to consider the peripheral conditions of the circulation than the central; that venous enlargement is often rather benefited than injured by cycling; and that straining to climb hills and meet head winds, excessive fatigue and alcoholic stimulants should be avoided, and the proper number of meals of light, suitably selected food should not be neglected.