A REVOLUTION IN POSTAL CAR CONSTRUCTION.

BY LOUIS C. KANE.

New methods are being adopted by railroad companies in the construction of postal cars, with a view to reducing fatalities in accidents on the line and to afford as great resisting power as possible in collisions. Worthy of note in this connection is the new all-steel mail car, known as car No. 6546, operated by the Pennsylvania Railroad Company between New York and Washington, which recently had its initial run and was inspected and approved by the Postmaster-General and other officials of the Post Office Department.

Previous to the building of this car, the strongest and best-equipped car was that known as the "Universal Postal Car," which is 60 feet long, constructed of wood, lighted by gas lamps, and weighs 110,000 pounds. The new mail car is the nearest approach to the ideal all-steel car that has yet been built; it contains only 370 pounds of wood, but has 2,840 pounds of fireproof composite and asbestos board, and 3,200 pounds of cement flooring. Everything in the car, including paper cases, letter cases, paper boxes, and doors, is metal. It is ten feet longer than postal cars built heretofore, and is the first 70-foot postal car ever built. An entirely new interior arrangement has been effected, which includes space at each end of the car, and this eliminates the necessity for turning the car end for end at terminals.

The maximum outside dimensions are: 74 feet 9¾ inches length over buffers; 9 feet 11½ inches width over roof eaves; and 14 feet 5 inches height from top of rail to top of junction box on the roof. The inside length is 70 feet 8¾ inches, and inside width 9 feet ⅜ inch. The wooden postal cars have reinforced ends containing 10-inch beams placed vertically at each side of the doorways, while the 70-foot steel car has 12-inch I beams. The new car is lighted by electric lamps in conjunction with storage batteries and an axle-light generator, and weighs 128,500 pounds. The trucks and body framing incorporate all the features which were introduced in the steel passenger car. The trucks are of the six-wheel type, have a framing made of steel entirely, and are of sufficient strength for use under cars having a total weight of 190,000 pounds. The axles are of large diameter, and the wheels are made of rolled steel. A special flexible spring rigging combined with the use of four side bearings per truck imparts exceptionally easy riding qualities.

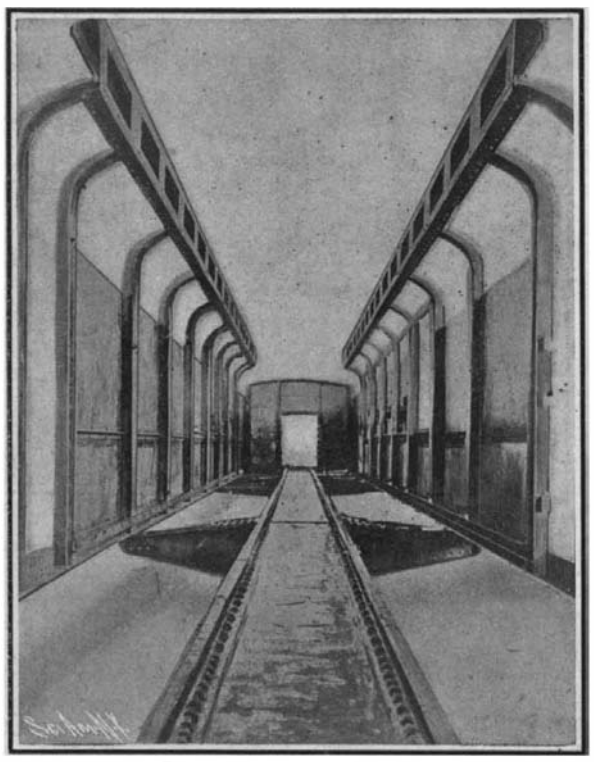
The body framing of the car includes a heavy central box girder built up of two 18-inch I beams and two ½-inch by 24-inch cover plates, and side girders 36 inches deep, having a strong bottom flange made of an angle, and a top flange of large area, which also forms the belt rail. A 12-inch I beam is placed on each side of each end door, riveted at the bottom to a steel center sill and casting, and at the top to a cross beam of channel section. The cross beam distributes the strains, which may come on the vertical I beams on account of collision, to the roof construction and side plates. This strong end framing, combined with the peculiarly heavy longitudinal girders in the underframe, presents end shock-resisting qualities never before attempted.

An entirely new departure from the old construction is the flooring, which consists of cement spread over corrugated iron foundation plates in a plastic state. The outside sheathing, including the roof, is made of steel plates. The inside of the car, where not covered with furniture peculiar to postal cars, is lined with fireproof composite board; and for sound and heat non-conductors, all inside lining plates are covered with an asbestos cloth glued to the sheets. The wires and storage battery boxes for electric lighting have been carefully insulated.

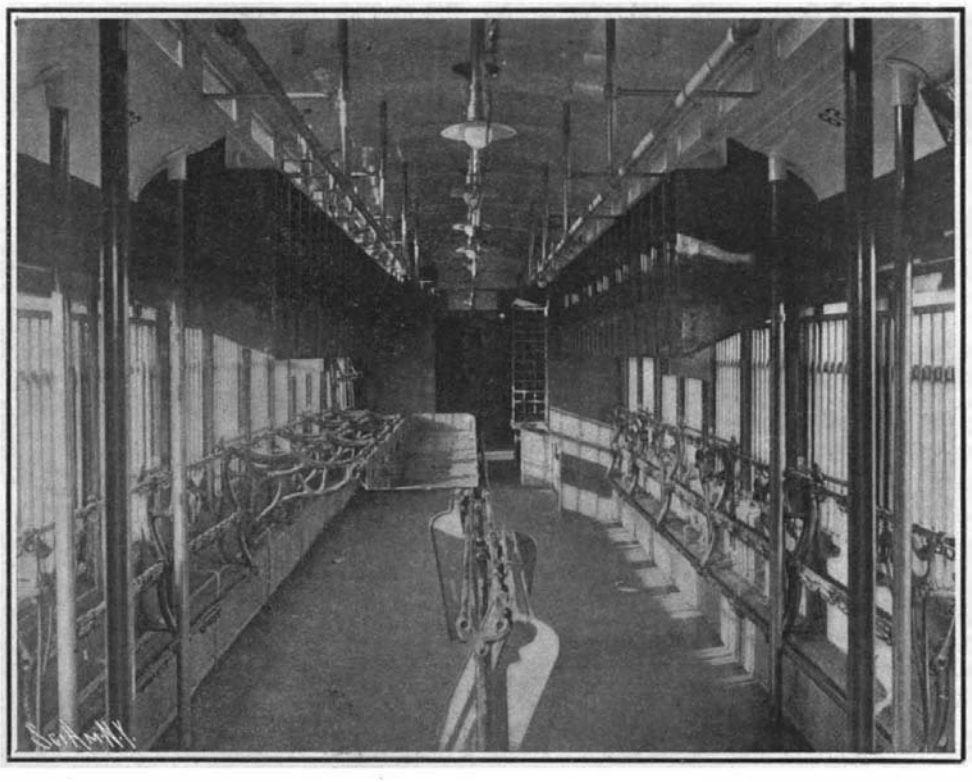
The steam heat and brake arrangements are of the latest and most improved types, and the draft gear is of the same flexible and strong pattern as that used on the steel passenger car. The furniture in the car is in conformity with the requirements of the Railway Mail Service Department, but it is made of steel instead of wood. The only danger from fire will be on account of the inflammable nature of the mails. Fire extinguishers are provided for emergency.

Heretofore the trouble with mail cars in accidents of a serious nature has been their inability to resist the impact as well as their destruction by fire. All chances of fire are eliminated, and the terrific force of a collision which the car has to sustain, due to its close proximity to the tender, is provided against by the reinforced ends of the car and the solidity of its cement floor construction. Whatever weight the car may have to sustain by rear coaches piling upon it, has been carefully worked out and provided for.

The car presents a fine appearance both inside and out, and the officials of the Post Office Department are well pleased with its construction. Aside from the fact that all fear of being reduced to ashes in a head-on collision is removed from a postal employee's mind during the performance of his duties, his life in the all-steel mail car is made an agreeable one by the new arrangement of the distributing cabinets, and by the easy-riding qualities of the car.



THE BODY FRAMING OF THE CAR.



INTERIOR OF THE STEEL POSTAL CAR.

A Safety Rescue Appliance for Submarine Boat Crews.

An ingenious invention, the object of which is to enable the crew of a submarine boat in the event of disaster to effect their escape, has been devised conjointly by Commander S. S. Hall, the British inspecting officer of submarines, and Staff Surgeon Oswald Rees, of H. M. S. "Mercury." The results of the investigations that have been carried out upon wrecked submarine craft after salvage have shown that in order to succor the crew within at the time of an accident, they must not only be saved from drowning purely and simply, but from asphyxiation from the noxious fumes of the chlorine gas, which is generated immediately the salt water comes into contact with the electrical storage batteries. Moreover, when a catastrophe befalls the vessel when submerged, facilities should be provided for the purpose of enabling the crew to escape from the craft and immediately ascend to the surface. It is a well-known fact that a diver, when in difficulties with his air supply while under water, immediately rises to the surface if he removes his weighted leaden boots and permits his dress to become inflated with air. The foregoing safety appliance is based upon this circumstance. There is a helmet made of light metal, so as to reduce the weight, and similar in design to that worn by divers, together with a canvas jacket. This helmet weighs only 10 pounds, and is so designed that it can be instantaneously donned by a man. Within this helmet is carried a supply of oxygen in concentrated form, which not only gives off ample supplies for breathing purposes, but also absorbs the exhaled carbonic gas, which it regenerates for reinhalation.

The success of this invention depends to a very great extent upon the concentrated oxygen supply, which is known as "oxylith," and which has been described at length in these columns. The evolution of this emergency substance is the result of several years' research, which were occasioned by the urgency for facilitating respiration in submarine boats when submerged, and dispensing with the necessity of periodical risings to the surface, in order to obtain a renewed charge of breathable atmosphere. "Oxylith" is oxygen purely in a latent state, retained in a compound, and all that is necessary when the gas is required, is to add water to the compound in precisely the same manner as acetylene gas is produced by the action of water upon calcium carbide. Immediately the water comes into contact with the compound, chemically pure oxygen is released, generation continuing until the water supply is cut off. The gas generation during the application of water is effected very violently, and the alkali residue acts as an excellent absorbent for the exhaled carbonic acid gas. The advantages of this concentrated oxygen-yielding compound are obvious, dispensing with the cumbersome steel reservoir cylinders, while it can also be kept for an indefinite period without deterioration so long as it is kept free from contact with moisture. The gas generated by this means consists of one hundred per cent pure oxygen, the yield per pound of the oxylith being three cubic feet. Even the residue is of value, since being soda lye it can be used for washing, bleaching, or other purposes.

With the safety lifebuoy helmet for use with submarines, a sufficient supply is carried therewith to sustain life for about eighty minutes, and this is ample time in which to permit the crew to effect their escape from within a wrecked craft. Immediately the man issues from the boat, the gas contained within his helmet and canvas jacket imparts such buoyancy to his body that he instantly rises to the surface of the water, where he will float safely until he can be picked up. In connection with this apparatus the inventors have devised special arrangements, by means of which the hatch of the conning tower can be opened readily and easily from within under all conditions. Another distinct advantage is that if necessary, such as in the case of dangerous operations, owing to the light weight of the appliance, it can be worn by the men while engaged in their duties within the boat, the helmet offering no inconvenience to their movements. The British government has tested the apparatus severely at Portsmouth, and owing to its complete success will, it is announced, officially adopt it for use in the navy.

Amundsen's Advice to Wellman.

Captain Amundsen, the well-known Arctic explorer, has expressed very pessimistic views as to the possibility of Mr. Walter Wellman reaching the Pole by means of his airship. He has strongly endeavored to persuade Mr. Wellman and his companions to postpone their expedition for at least a year when certain improvements which have proved their worth on French and German balloons might be added to their outfit.

The captain is confident that within a few years balloons will be constructed which will make the exploration of the pole possible; at present the risk is unduly great. Mr. Wellman's only hope, he thinks, lies in a strong south wind which might drift him across the Pole to some part of America or Asia. Should progress be delayed by adverse winds or other causes, the airship might be weighed down by crust ice; in which case a return by dog sleds would be necessary. Whether this return would be feasible would depend on where the airship sank to earth.

Mr. Wellman has, however, considered the risks. The record of Arctic exploration is one of contending with obstacles; no expedition yet started without knowing what it might be called on to face.

A Lens Composed of Multiple Liquid Floats.

BY HORATIO C. POLLOCK.

In the September 29, 1906, issue of the Scientific American an article, "Liquid Specula for Astronomical Purposes," appeared over the signature of A. W. Nightingale, of Hobart, Tasmania, and its appearance impelled me to make known some of the facts in regard to the discovery of a "parabolic mirror of incomparable precision, with practically no limit as to size," the discovery of Mr. C. H. Hulbert, wireless expert for the military government in Manila. The article in question was recently brought to my attention, and is the first intimation I have had that others in the Orient were trying by the use of liquid mirrors to improve the Newtonian telescope.

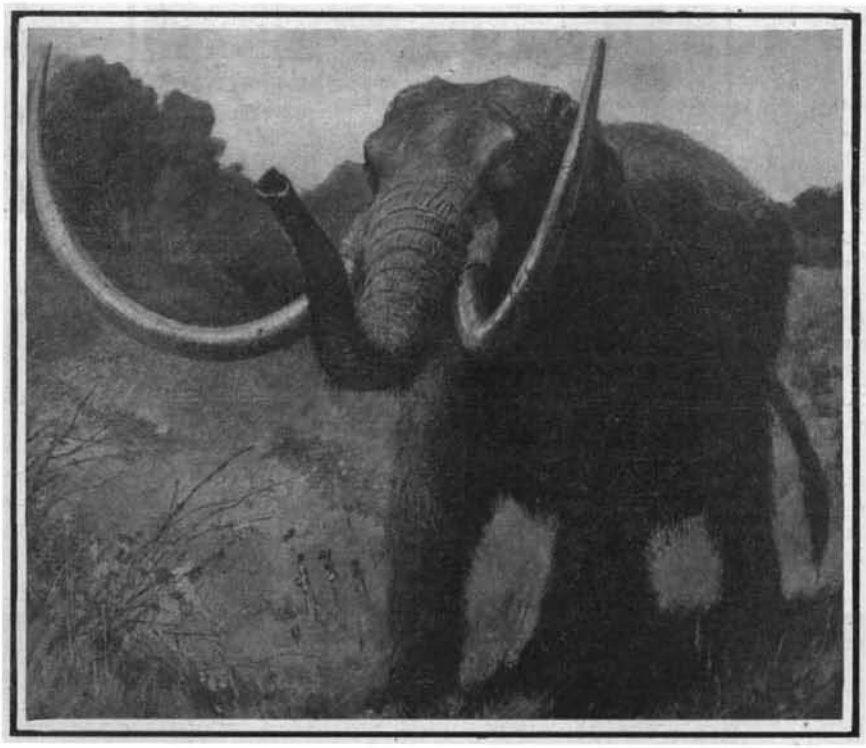
The use of a multiple, or as I shall term it, the Hulbert liquid float lens, has been directed, not only to test its worth in securing perfect optical performance, but also in studying the heavenly bodies, with results that, aside from the fact that the lens is a success, Mr. Hulbert will say nothing. Enough has been gathered, however, from demonstrations he has made in the presence of friends to convince them that the lens is all he claims for it.

The lens of the multiple floating disk telescope consists, in the major part, of a basin filled with oil (ordinary machine oil) or other liquid of some such consistency, in which revolve, balanced on magnetic center points, a combination of floats; the outer rotated by power transmitted by a finely-woven wire thread, the next inner revolved by frictional momentum; the lens basin, with a reflecting surface of mercury, in the center. The outer edge of the lens parabola is bent over to cut out capillary action on the side of the metal; the gears connected direct; the friction pulley controls the focus, resulting also in the total absence of vibration. A mirror is used, and a person can sit at the focusing point, and observe directly in the basin. This in a very limited way describes the lens. The public will have the benefit of all the facts concerning the invention as soon as the model reaches Drexel Institute, to which it is to be sent on the next steamer.

The International Motor Boat Race for the Harmsworth Trophy Won by an American Boat.

A cable dispatch announces that an American motor boat—Commodore E. J. Schroeder's "Dixie"—won on August 2 the handsome trophy given by Mr. Harmsworth for an annual international motor boat race. The "Dixie" beat her nearest competitor, "Daimler II.," by 1 minute 40 4-5 seconds in a 35-mile race run at Southampton, England. Her time was 1 hour, 15 minutes, 44 3-5 seconds, which corresponds to an average speed of 27.72 miles an hour. The "Dixie" is 39 feet 11 inches long and 5 feet beam. She is fitted with an 8-cylinder Simplex engine rated at 132.72 horse-power. It was expected that several of the fast French boats would compete, but they were ruled out on account of the entries not having been made in time.

A Tusk 8 Feet 7 Inches Long.



The Probable Life Appearance of a Mastodon.

Since the drawing was made it has been found that the tusks curved inward. From a drawing by Charles R. Knight.

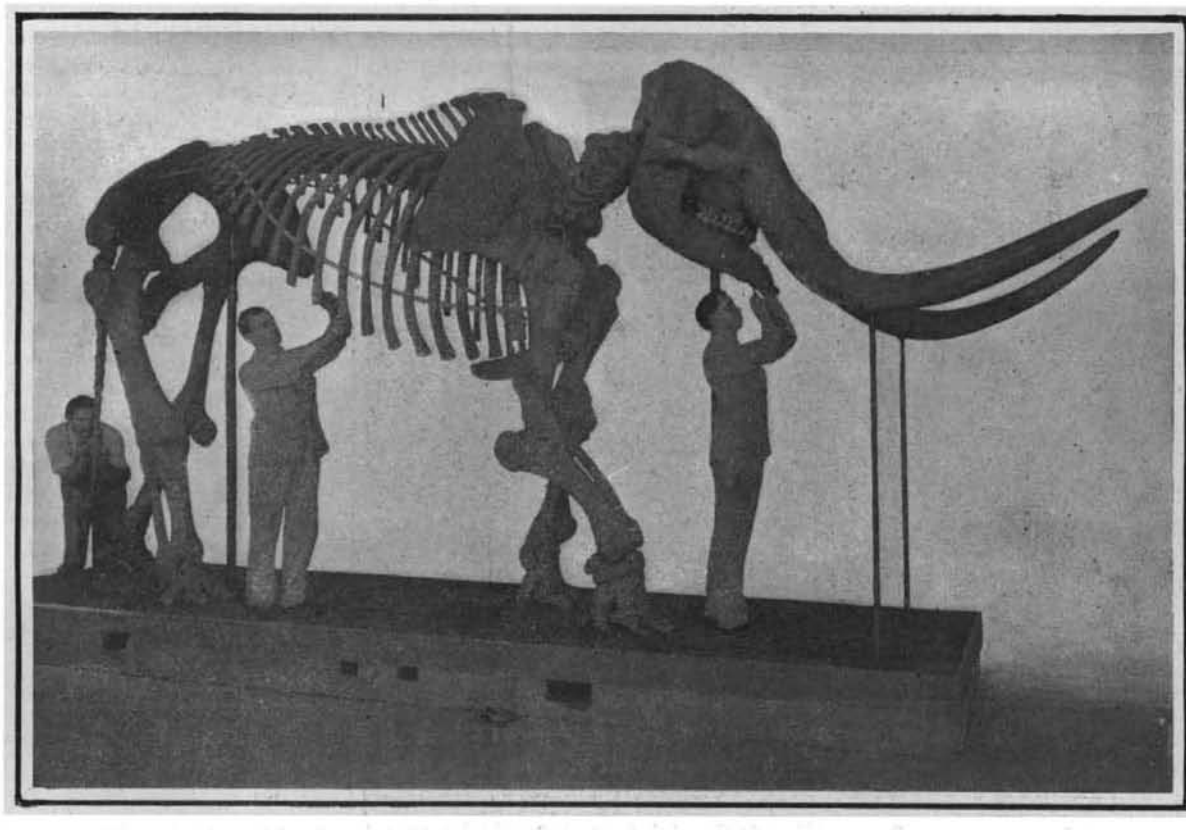
The Immense Lower Jaw of the Mastodon.

THE GREATEST OF MASTODONS.

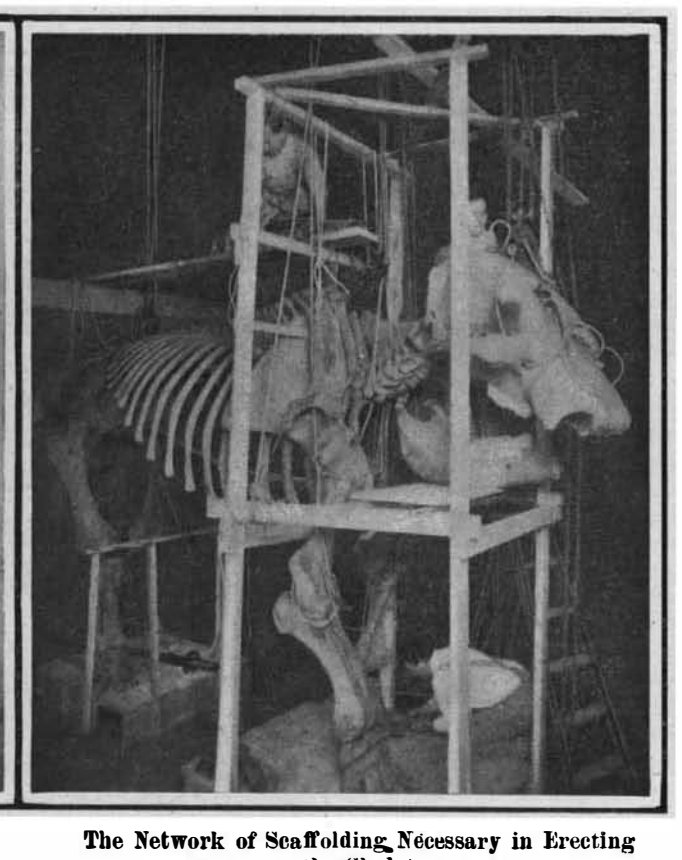
BY WALTER L. BEASLEY.

Through the generosity of J. Pierpont Morgan, Esq., the famous Warren mastodon skeleton, the most complete and finest specimen of its kind in the world, has been presented to the American Museum of Natural History. The splendid and accurate remounting and forthcoming exhibition of this rich fossil prize by Prof. Henry F. Osborn is considered one of the noteworthy achievements of this foremost paleontologist and a memorable contribution to science. The discovery of this celebrated fossil is not recent. After remaining fifty years in almost practical seclusion, more or less, and hidden away from the knowledge and inspection of the general public, now, thanks to the donor and the reconstructive technique of the paleontologist, the world at large is able to study and view this gigantic and record-breaking mastodon skeleton of America. The specimen was arranged so as to be on exhibition in time for the meeting of the International Congress of Zoologists, to be held in New York the middle of the present month.

Through the courtesy of Prof. Osborn the writer was given special facilities for obtaining the accompanying series of representative photos, together with some data concerning the discovery and other main details of interest connected with this remarkable specimen, for the pages of the Scientific American. The skeleton measures 14 feet 11 inches from base of tusk to tail, and 9 feet 2 inches in height. The original tusks were incorrectly reported as being over 11 feet, and so described and restored by Dr. Warren. But the correct original length has been very exactly determined by skillful piecing together of the fragments to be 8 feet 7 inches; of this 23 inches of each tusk is inserted in the sockets, and the projecting tusks measure 6 feet 8 inches. Only a portion of the base of tusks and a few of the toes of the fore feet are restored, the remainder being all genuine bone. An idea of the painstaking and laborious attention bestowed upon this specimen can be gleaned from the fact that an entire year was devoted in the Paleontological Laboratory to the preparation and correct adjustment of the skeleton. The skeleton was



The Finishing Touches. A Year's Work Has Been Devoted to the Preparation and Correct Adjustment of the Skeleton.



The Network of Scaffolding Necessary in Erecting the Skeleton.

THE GREATEST OF MASTODONS.