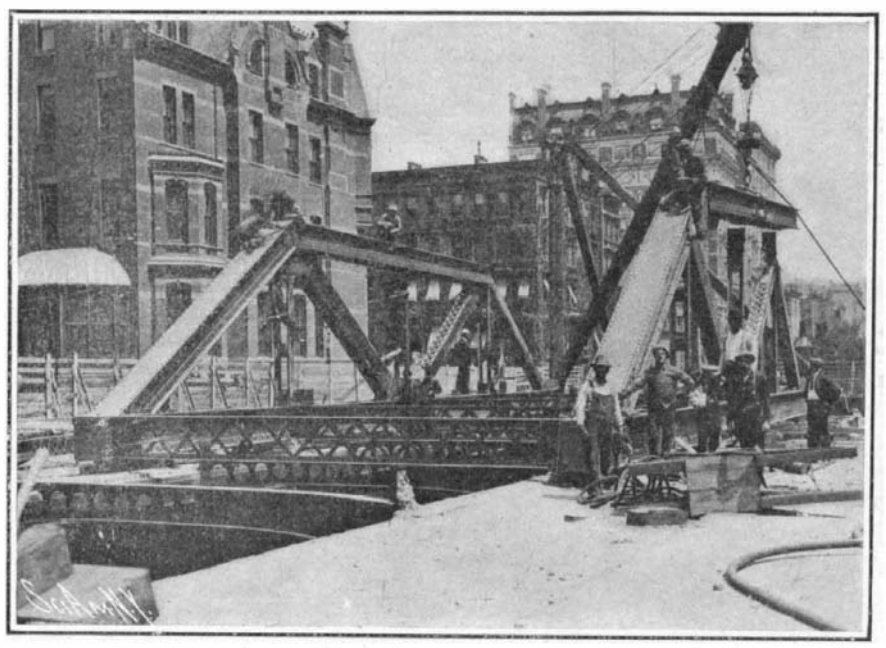
THE GRAND CENTRAL STATION TERMINAL IMPROVEMENTS.

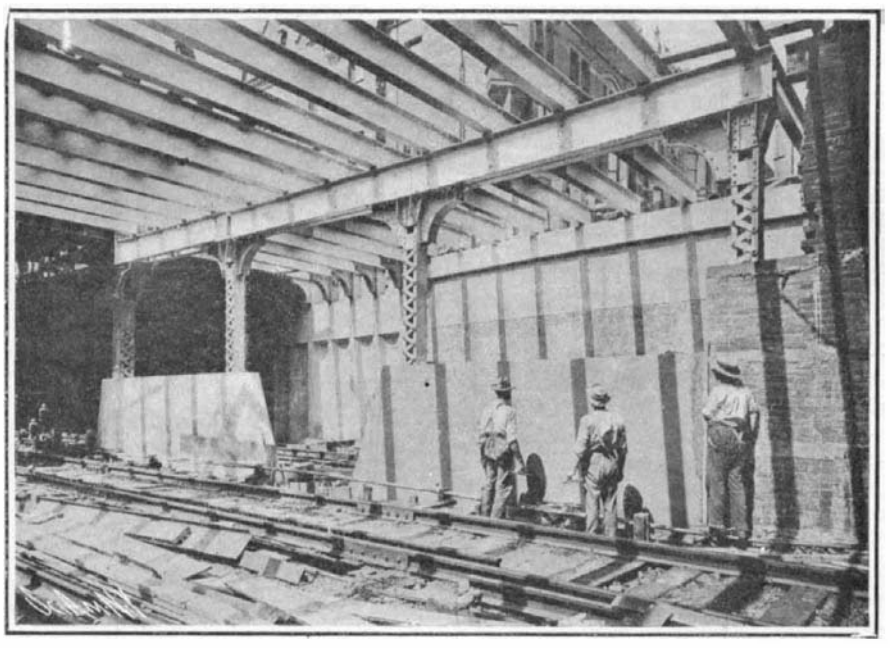
One of the features that render the construction of the new Grand Central terminal station a work of unprecedented and monumental proportions, is the vast amount of preliminary excavation that has to be carried out before a single track of the station yard, or a single brick or stone of the station building can be laid. This excavation amounts to a total of over 2,000,000 cubic yards, a large part of which is rock. The blasting out and digging of this material in the heart of a great city, and its removal and disposal many miles from the point of excavation, is in itself a task of huge proportions.

The vast amount of excavation that is being done at the site of the new station is necessitated by the fact that the tracks, both of the terminal yard and in the two miles in length, below Park Avenue. This tunnel will not be enlarged by the addition of more tracks, but its capacity for the regular passage of trains will be enormously enlarged for the reason that the storage yard for cars and engines will no longer be at Mott Haven, beyond the Harlem River, but will be located within the terminal yard itself. This means that the large number of empty trains that used to be taken out through the tunnel to Mott Haven for cleaning and overhauling, will remain in the terminal yard between trips, and the present congestion through the tunnel will be relieved to that extent, enabling a much larger number of regular daily passenger trains to be run through the tunnel in the twenty-four hours. Furthermore, the installation of electric traction will render the tunnel atmosphere clear, and will enable the trains to run under closer headway.

to Fiftieth Street, where they will open out into the main yard, and occupy the space from Lexington Avenue to a line 100 feet east from Madison Avenue to Forty-third Street, and thence to Forty-second Street the station ground will be bounded by Vanderbilt Avenue on the west and for a shorter distance by Depew Place on the east. After the station yard has been completed, all the cross streets from Fifty-seventh Street to the north face of the terminal station will be restored, and a driveway will be formed on each side of Park Avenue. From these streets and driveways it will be possible to look down upon the upper deck of the terminal yard. Ultimately, however, it is likely that the blocks bounded by these streets will be covered by buildings, thus entirely shutting in the station yard. Provisions for the footings of these buildings will be made during the construction of the terminal.

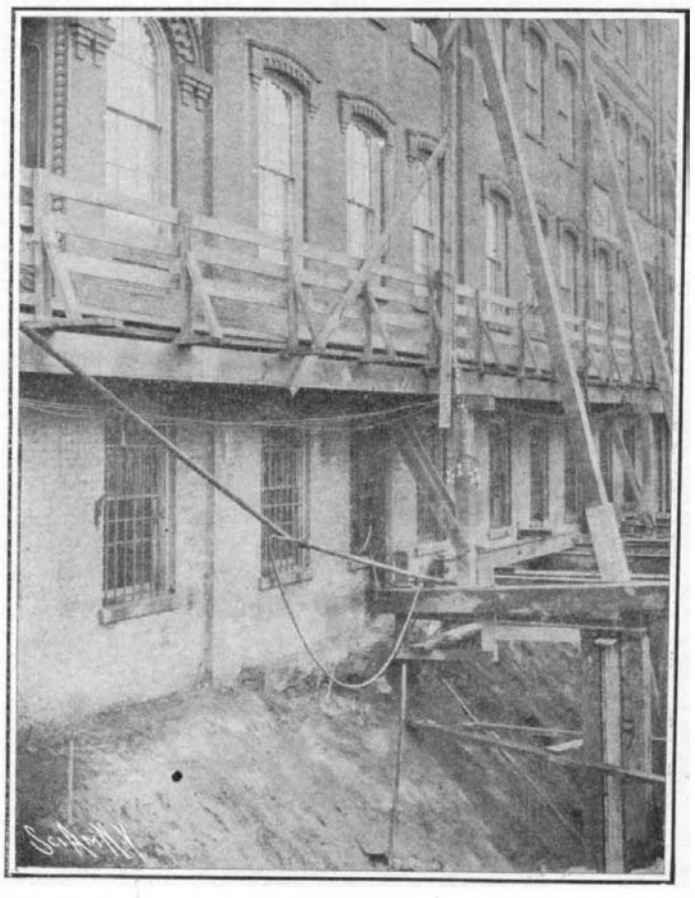


Erecting a Truss Above the Present Wells Opening Into the Park Avenue Tunnel.

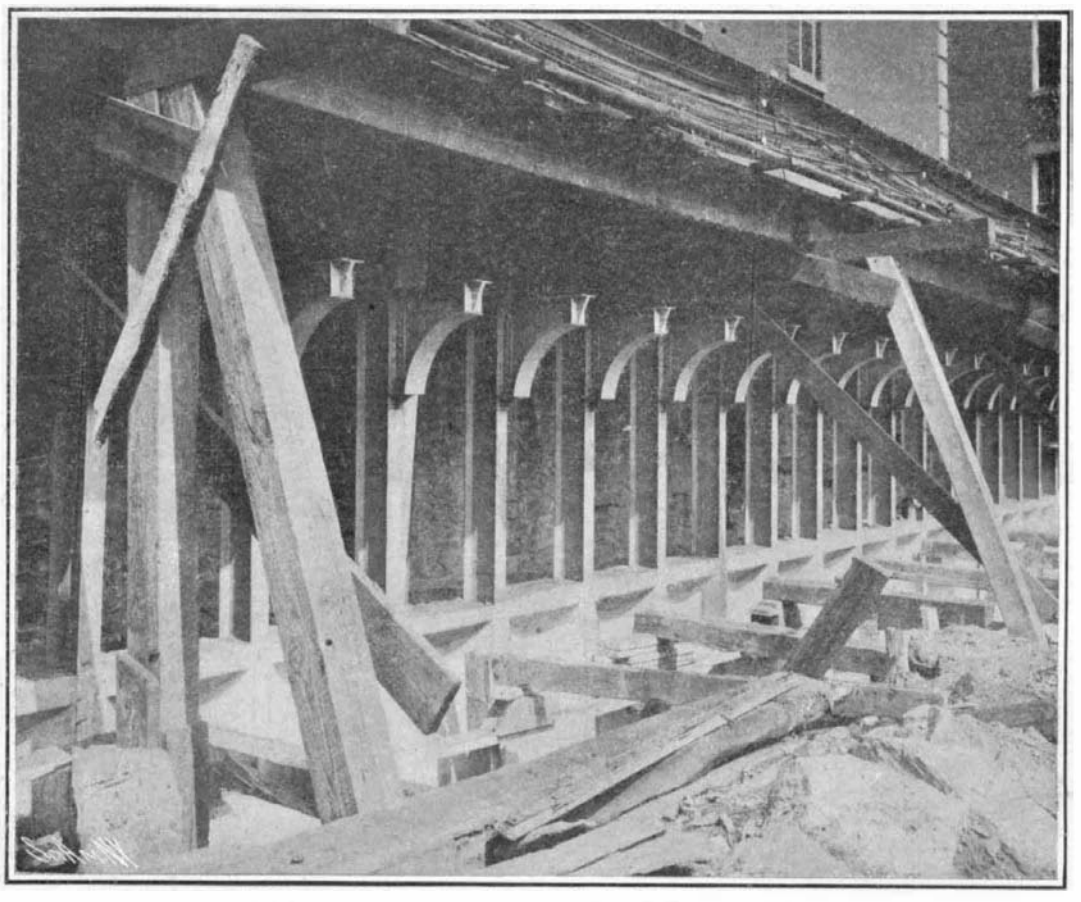


Note the concrete walls to protect the bases of the columns in case of a derailment.

Where the Tunnel Opens Into the Yard.



Costly Underpinning to Carry the Steinway Factory Walls During Excavation.



Construction of I-Beam and Concrete Side Wall of the Station Yard.

THE GRAND CENTRAL STATION IMPROVEMENTS, NEW YORK.

station itself, will be carried on two levels, one above the other, and to the further fact that the whole of the double-decked terminal, as thus constructed, will be below street grade. The total average depth of the excavation to sub-grade of the suburban tracks on the lower deck will be about 35 feet. The area to be excavated will extend the total width of Park Avenue for a distance of 1,700 feet from Fiftieth to Forty-fifth Street, and it will extend from Vanderbilt Avenue to Lexington Avenue from Forty-fifth to Forty-second Street. The difficulty of the work will be more fully understood when it is mentioned that every cubic yard of the total of over 2,000,000 yards has to be taken out and removed through the four-track tunnel, which is the only means of access to the station, without interfering with the regular traffic of the road.

The entrance to the present and to the future terminal station is by way of the existing four-track tunnel,

The new station yards will commence at Fifty-seventh Street, where the tunnel has been excavated out to the full width of Park Avenue—140 feet. In order to enable the turnouts to be made without interference from supporting columns, a massive steel truss has been erected at this point for carrying the roof of the tunnel. Provision against accident at these turnouts is further secured by imbedding the lower half of the columns in continuous concrete walls. It is expected that if a derailment should at any time occur, these walls will serve as a shield to protect the columns, and also to prevent the telescoping or serious wrecking of the cars. This is a safety provision which we commend to the consideration of the builders of our future subways in this city, in which, at all curves, there should be similar continuous concrete walls between adjoining tracks. The 140-foot excavation will provide width for ten parallel tracks, which will be continued down

The tracks of the main or upper yard begin to drop at Fifty-seventh Street, until they reach a level 15 feet below the grade of the present tracks. This level is continuous over the whole of the yard and through the terminal building. At Fifty-third Street the two outermost of the ten tracks begin to drop on a two per cent grade to the level of the lower deck, which will be 35 feet below street grade. The excavation for the lower level for suburban trains will not extend over the full width of the yard throughout its entire length. This level will be provided in the station with fifteen parallel tracks, and in the station yard with thirty tracks. The lower deck excavation will be carried for its full width as far north as Forty-eighth Street, whence it will narrow gradually to the point where it meets the two outermost suburban inclines, that lead up to the common level in the tunnel.

The method of carrying through the work so as not

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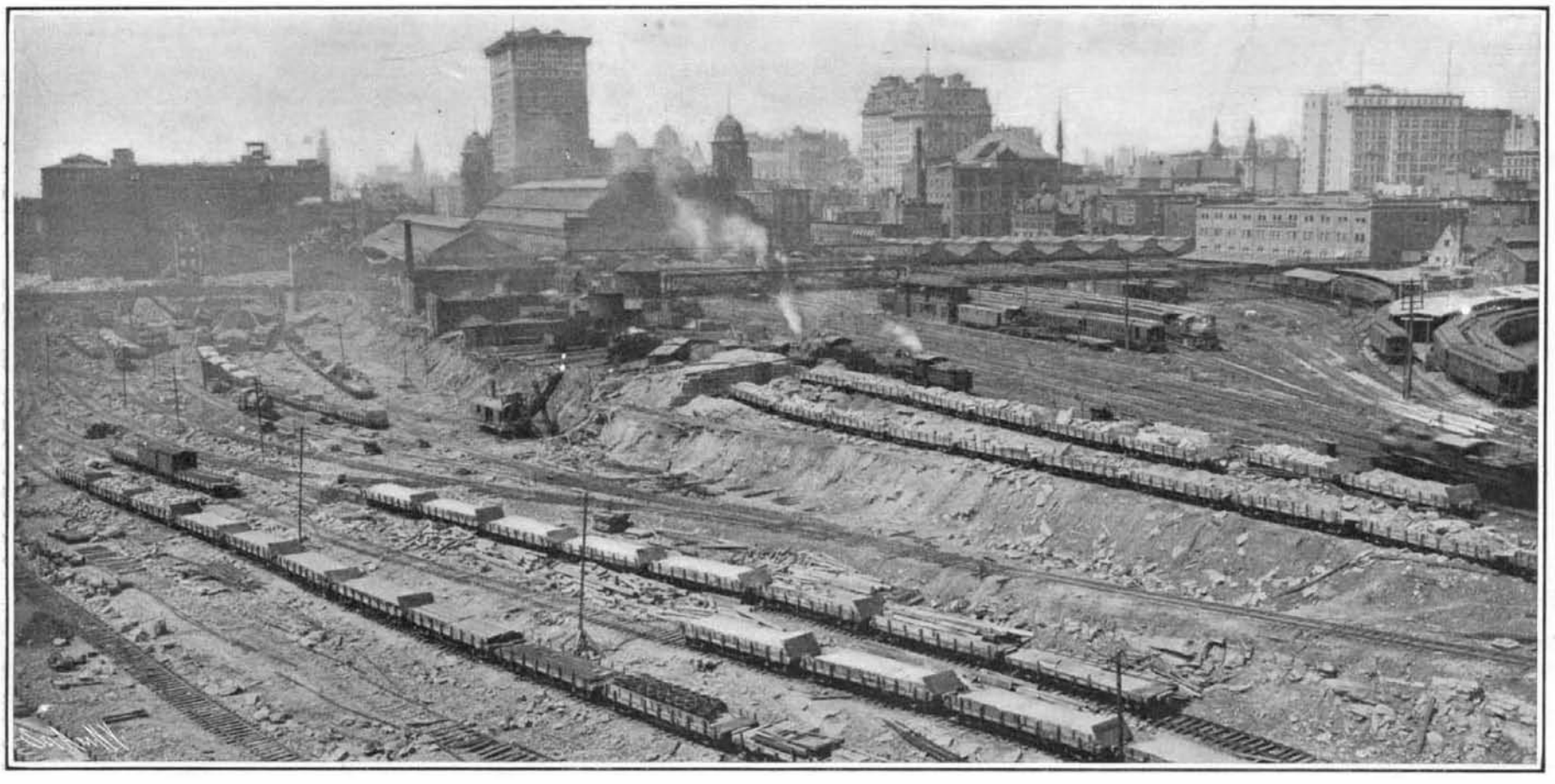


View looking southwest, showing the excavated easterly portion of the yard in the foreground, and the present yard and station to the right. The building will cover eight acres, and the yard fifty-six acres.

Site of the New Grand Central Station and Yard, New York.

The massive truss is put in at the point where the four tunnel tracks widen out to ten tracks, filling the whole of Park Avenue.

Looking North Through Park Avenue Tunnel at Entrance to Terminal Yard.

THE GRAND CENTRAL STATION IMPROVEMENTS.—[See page 222.]

to interfere with existing traffic will be to excavate for two or three tracks at the main yard or upper level, each side of the approach to the main yard, and put in a temporary station for the use of the suburban traffic on the easterly side of the yard. When this has been done a straight section will be excavated right down through the yard, and then the western section will be taken out. The lower level construction will be carried on conjointly with that of the main yard, or at least as far as it is possible to do so. The excavation is being done chiefly by steam shovel. The material is loaded directly on to flat cars, and is taken out through the tunnel, and used chiefly in widening the embankment of the New York Central roadbed sufficiently to provide for a fourth track from New York to Croton, a distance of 34 miles. There is also sufficient material for adding, if desired, a fifth or sixth track roadbed, while a large amount of the material has been used for filling in fifty or sixty acres of land belonging to the company at Highbridge marshes, ground which will be very serviceable for storage purposes.

The excavation of the station has called for some very careful work in underpinning the buildings that front on Park Avenue. One of our photographs shows an extensive piece of needle-beam work put in to carry the weight of the Steinway piano factory, and is a fair sample of the difficulties encountered. The side walls of the excavation are formed of 15-inch vertical I-beams, placed 3 feet 6 inches between centers, with concrete arches turned in between. The roof, forming the roadways of Park Avenue and the intersecting streets, is formed of 24-inch I-beams, with flooring of reinforced concrete or of buckleplate.

The terminal station was described and illustrated in our issue of January 21 of this year, to which article reference is now made for further particulars; but it may be mentioned here that the southerly façade extends for 300 feet on Forty-second Street, and the westerly façade for 680 feet on Vanderbilt Avenue. The building will also have a frontage on Forty-fifth Street of 625 feet, and on Lexington Avenue of 400 feet. The station will include a ticket lobby, 90 feet by 300 feet, and a grand concourse 160 feet by 470 feet in length, with a height from floor to top of dome roof of 150 feet. Our acknowledgments are due to Mr. W. J. Wilgus, the vice-president, and to Mr. A. B. Corthell, the terminal engineer of the New York Central Company, for assistance in the preparation of the present article.

AN AERIAL ROWBOAT.

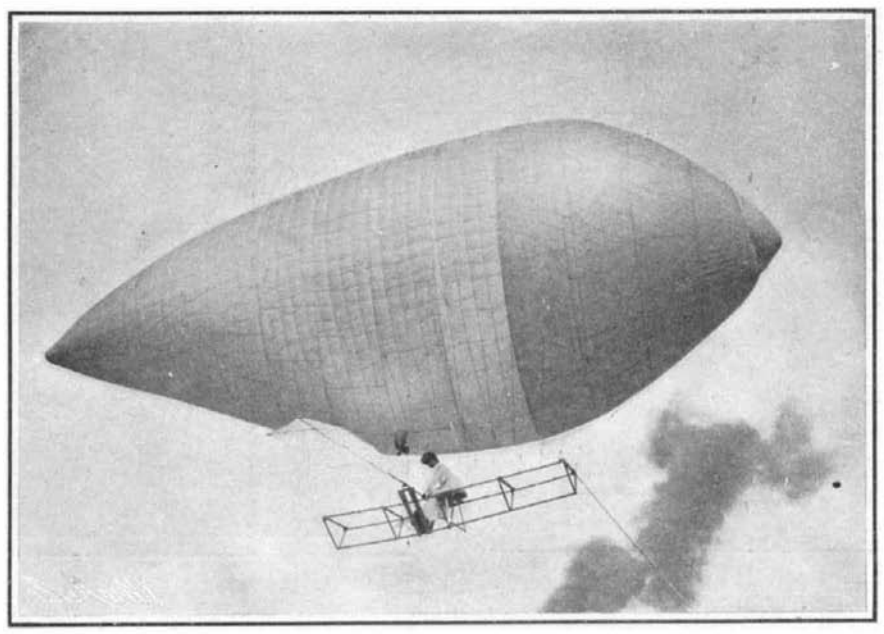
BY E. O. SAWYER.

A late feature of the attempts to navigate the air is an aerial rowboat which has been constructed by Alva L. Reynolds, of Los Angeles, Cal. It is composed of a gas bag whose equator is much nearer the front of the bag than usual, and a light framework which supports the occupant. It is raised and lowered, propelled forward and backward by the use of a pair of wing-like oars.

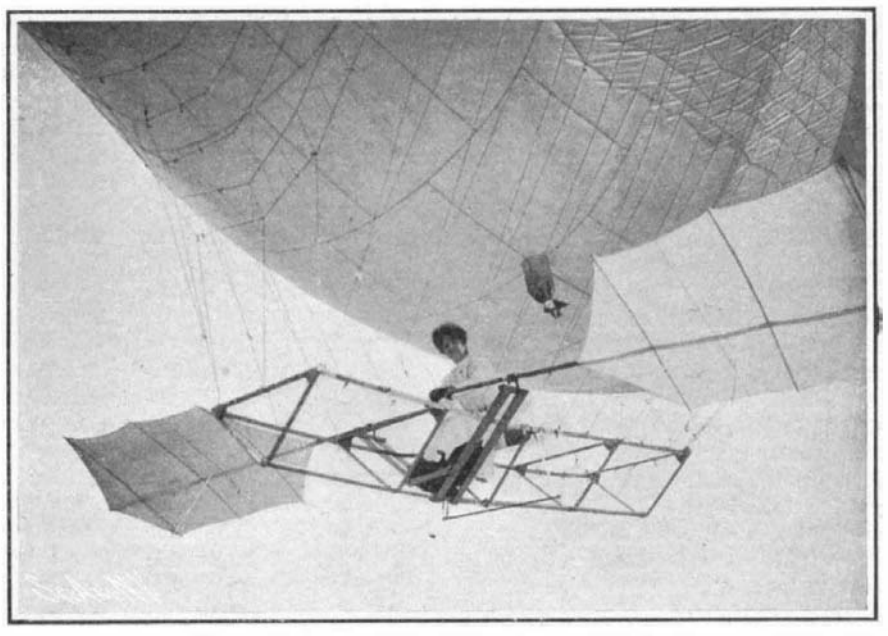
By the use of weights the bag can be made to raise just a half pound less than the weight of the occupant. Then gravity is overcome by the use of the oars. Any one who understands how to row can operate the aerial rowboat. So far no experienced aeronaut has ridden in the machine, although several hundred people have tried their hand at rowing up and down the park where the machine is being tested.

The bag is 37 feet long and 15 feet in diameter at the equator. To raise the car and an occupant weighing 150 pounds, 2,500 cubic feet of gas is sufficient.

One of the features of the new air-boat is that the cost of building a car and bag sufficient to carry one person is but a trifle over one hundred dollars. A speed of from four to six miles an hour has been attained by good oarsmen. There is always the drawback, characteristic also of the ordinary rowboat, that it is difficult to row against the current, or rather against the wind in this case.



Rowing in the Skies



The Car and the Wing-like Oars With Which the Aerial Rowboat is Propelled.

AN AERIAL ROWBOAT.

Wines of the port type are made by taking colored grapes and crushing and putting them in fermenting vats to ferment the same as for making red wines. As soon as fermentation has reduced the sugar in the must to the desired point (during which fermentation color and other matters have also been extracted from the pulp and skins), the juice is drawn off, put in storage cooperage, and fortified.

Increasing the Life of Telephone Poles.

During the past year the Forest Service, in co-operation with the American Telephone and Telegraph Company and the Postal Telegraph-Cable Company, has been making an investigation to find the best methods of seasoning telephone poles and of treating them with preservatives.

Fifty green poles were furnished every month to each of five experimental stations. Each pole was exposed to the open air, and was weighed every month until it ceased to lose weight. The rate at which weight was lost showed the rate of seasoning in different months.

After one year of seasoning, preservative treatment was applied to the poles, beginning last spring. Several different preservatives and three different methods of applying the preservatives were experimented with. Most of the poles at two of the stations—Wilmington and Pisgah, N. C.—were treated by applying the preservatives with a brush. In a few cases a cap or plate was fitted to the butt of the pole and creosote forced in with a pump, but with unsatisfactory results. Both chestnut and juniper poles were treated by these methods. To test the efficacy of the treatment as a preventive against decay, these poles, carefully numbered and labeled for identification, have been set in an experimental section of the American Telephone and Telegraph Company, between Savannah and Meldrim, Ga. Each treated pole is set between a green and a seasoned pole, so that the absolute and relative values of the different preservatives will be fully tested.

The third method of applying the preservative is that from which the best results are expected. This method was applied to chestnut poles only. At Dover, N. J., in addition to the external applications, a number of seasoned poles were treated in an open tank, constructed to permit the treatment of 30-foot poles inclined at an angle of 20 degrees. In this tank the poles are boiled in creosote for several hours. They are then either shifted to a tank of similar construction containing cold creosote, in which they stand for several hours, or are left in the hot oil to cool down gradually. This treatment covers the pole with creosote to a distance of from 8 to 10 feet from the butt. Up to this time a penetration of one inch and an absorption per pole of 35 to 40 pounds of creosote have been obtained. Changes in the method of operation are almost daily increasing the depth of penetration and amount of absorption. This is the first apparatus of this character constructed in the United States for impregnating the butts of telephone and telegraph poles, and the success which is being attained with it indicates the practicability of its widespread adoption in commercial practice.

Since the life of such poles is determined by the decay at the ground line, only the section from the bottom of the pole to about two feet above the ground line needs to be treated. Creosote is expensive, and if the whole pole must be treated the added years of service may not compensate for the outlay—it may be cheaper to use two untreated rather than one treated pole. But if an effective method of treating not more than 8 or 10 feet of a pole can be found, there is every reason to expect that treatment will prove profitable to the users of poles as well as an economy of forest material.

The Delay of Old Age.

In the August issue of the Buffalo Medical Journal, Dr. Charles G. Stockton deliberates on a topic that is of interest to all mankind, namely, the consideration of what may be done to postpone age and to render it more tolerable when it no longer is avoidable. One of the aspects of the subject that deserves especial consideration, says the author, is the improvement in the nutrition of the aged as the result of good teeth. In his opinion it is doubtful if we fully appreciate how much the dentists have contributed to good health and longevity. Thereupon he pays his compliments to the oculists and observes: "Who can estimate the additional resources both of usefulness and happiness secured through the discovery of spectacles and the operation for cataract? Useful eyesight contributes much toward good health and long life, for the reason that it permits of a continued interest in living which otherwise would be lost. . . . Perhaps no one factor is so important in maintaining courage and health in old people as the creation and continuance of some keen interest in life." With reference to the time-worn but neglected subject of arterial disease, Dr. Stockton states that much may be done in the earlier steps of arteriosclerosis (a hardening of the arteries) if intelligent study be given to the individual, to his habits of life, to his excesses, and to his deficiencies. Emphasizing the importance of judging and correcting the disturbed balance between assimilation and waste, the doctor observes that there are successful methods of lessening the extent of auto-intoxication and of widening the field for the play of nutritional processes. He points to the fact that middle age often brings luxury and at the same period the contracting arteries narrow the field of physiologic activities.

In considering the question of what may be done to make old age more tolerable, the author gives it as his opinion that most of the derangements from which the aged suffer can be classified as belonging distinctly to pathology. He fears there exists a tendency among physicians to dismiss these matters as necessary corollaries of senility without giving them that careful consideration which similar processes receive in younger patients. Those who make a specialty of senile diseases seem to agree that complaints of the aged arise for the most part from toxic causes, and there is good reason for believing that this toxic state which underlies the decadence of senility takes its origin for the most part in the colon. This organ harbors an immense number of bacteria leading to fermentations, putrefactions, and the production of alkaloids, fatty acids, and toxins which man has to combat for the length of his mortal days.

In concluding his very interesting paper, the author says: "The indications are obvious. In addition to the usual measures for improving the general circulation, old people are benefited by systematic colonic lavage, stimulating baths with superficial massage, prescribed pulmonary gymnastics, and an abundant drinking of pure water."

Superheating is being forced to 554 deg. F. on the Prussian State railroads. When steam is superheated to 500 deg. F., a saving of 16 per cent in steam and 12 per cent in fuel can be obtained, as compared with similar locomotives using saturated steam, the greater saving in water than in fuel being due mostly to the prevention of losses caused by condensation.