SCIENTIFIC AMERICAN

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THE NEBRASKA CITY PONTOON BRIDGE.

We illustrate in the present issue a new bridge recently completed, which crosses the Missouri River at Nebraska City, Neb. The bridge is of a type that has been but little used, except for military purposes. It consists of a flooring carried by a substructure which floats upon the river. A similar bridge across the Rhine, between Coblentz and Ehrenbreitstein, will be remembered by our readers, where the floor is carried by a series of boats or pontoons. A pontoon bridge is also in use across the Mississippi River at Prairie du Chien. In military operations pontoon bridges, from their portability, and on account of the rapidity with which they can be put together, have acquired much importance, and have figured in nearly all the important wars of modern times.

Nebraska City had held a franchise for twelve years for the construction of a pontoon bridge. All movements in the direction of carrying on the work met with the inevitable objections of those interested in steamboats plying on the river. Many predicted that it would be impossible to construct it. The Missouri River, noted for its swift current, at this point attains about its highest velocity. The river carries with it many floating logs and trees, which alone would seem to make the maintenance of such a structure impossible.

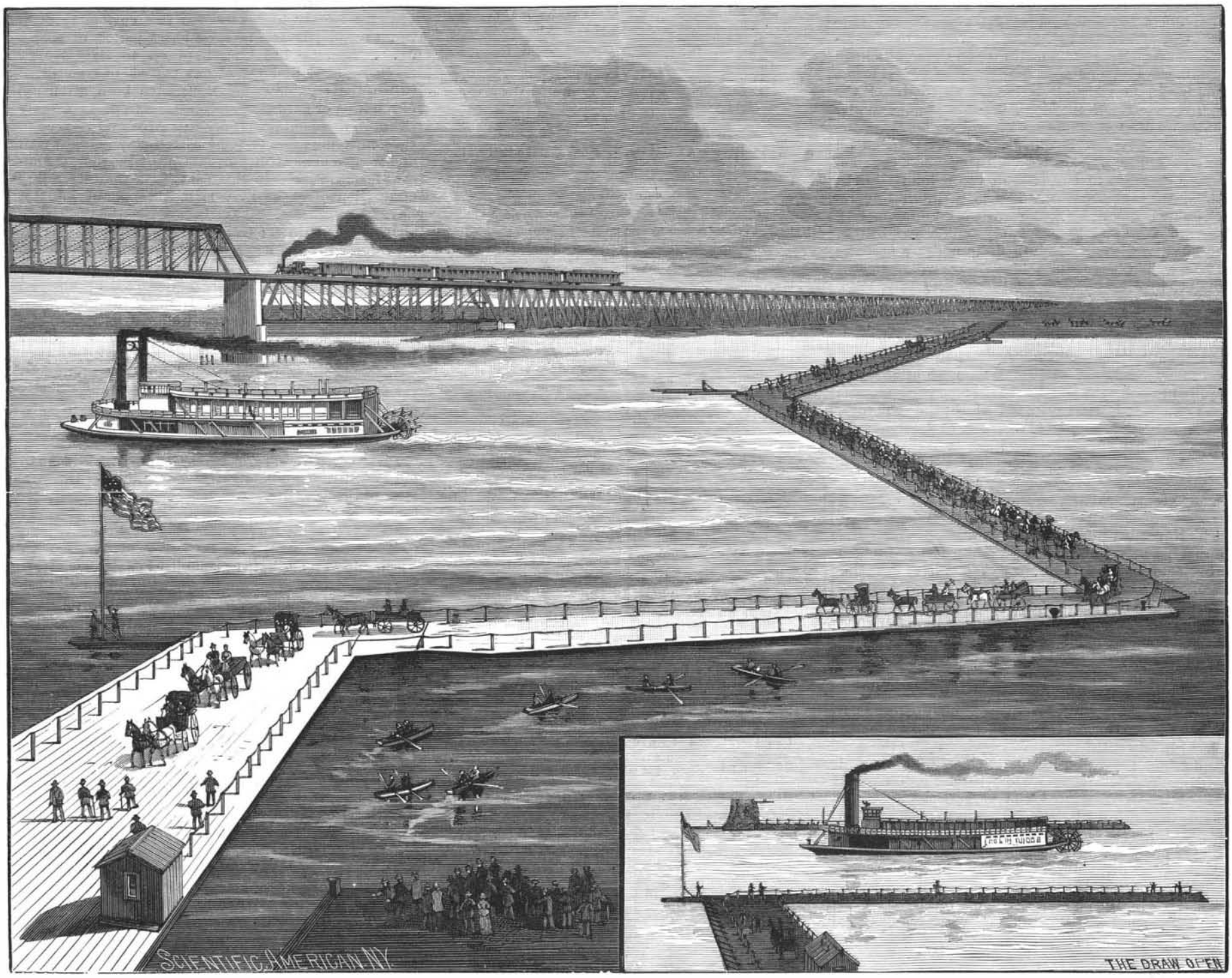
The river at this point has two arms. Over one of them a permanent cribwork bridge passes, having a total length of 1,050 feet. Where it stops the pontoon bridge begins, and reaches across the main river, with a length of 1,074 feet. As will be seen from the cut, the bridge is angular or V-shaped. The point or apex of the angle points down stream. When it is necessary to open the draw, the connections at the apex are loosened and the current at once swings the two members apart, leaving an unobstructed channel of 528 feet in width. In this feature it is the largest drawbridge in the world. When it is desired to close it, the ends of the draw members are brought together, the current being made to do most of the work. The entire operation can be managed by one man.

This is in strong contrast to other structures of the same character. The draw in the Prairie du Chien structure alluded to above requires a powerful engine to close it.

The bridge is divided into a roadway for vehicles and two side paths for foot travelers. The roadway is sixteen feet wide. On one side is a three-foot sidewalk, and on the other side one of five and one-half feet width. This gives a total width of twenty-four and one-half feet.

The floats are anchored by a very perfect system, and one which, it is believed, will stand every condition the structure is likely to be exposed to. When it was in process of building, the water was within two feet of high water mark, and the river swept down many logs and trees of great size. Numbers were carried by the current under the boats without any bad effects. For the spring floods it is proposed to greatly increase the strength of the steel anchoring cables. The bows of the boats are to be sheathed with iron and the bottoms are to receive an extra planking of oak. It is considered certain that the rapid current will sweep all obstacles under the boats. It is proposed to remove the bridge when ice forms on the river.

The object of arranging the draw in the peculiar shape shown was to facilitate closing. The government, in granting the charter, had stipulated for so wide an opening that it seemed doubtful if a pontoon could be closed at right angles to the axis of the stream.



THE GREAT PONTOON DRAW BRIDGE OVER THE MISSOURI RIVER, AT NEBRASKA CITY.

Both the pontoon and crib bridges were built within the short space of twenty-eight days, at a cost of about $18,000. Col. S. N. Stewart, of Philadelphia, was the constructing engineer.

In the background is shown a second bridge, built for the use of the railroads. This also is a recently completed structure. It was built by the Union Bridge Works. It is of steel throughout. The caissons were sunk in December, 1887, and January and February of this year. The first piece of metal was put in position February 13, and on June 8 the last piece was in place. The through spans are 400 feet, the deck span 325 feet long. The entire length of the bridge is 1,128 feet and its weight is 1,489 tons. The stone piers are 85 feet high and are 18 by 46 feet area at their bases.

The pontoon bridge has proved so successful that it has been proposed to form a company for the construction of pontoon bridges across the Missouri River,

Certainly, from considerations of cheapness and practicability, they would seem to leave little to be desired. The multiplication of bridges across the great rivers of the West is a movement in the direction of advanced civilization. The simple and cheap pontoon bridges, by their number, may be made to do better work in facilitating intercourse than would be effected by a smaller number of more pretentious structures. For some years their service may be all that will be desired, and, as they prove inadequate, one by one they can be replaced by more permanent works.

Solidification of Powdered Metals.

Professor Chandler Roberts Austen dealt with the formation of solid metals by compressing strongly the powders of the constituent metals. Since 1878, the labors of Professor Walthere Spring, of the University of Liege, have been mainly devoted to the study of the effect of compression on various bodies. The particles of a metallic powder left to itself at the ordinary atmospheric pressure will not unite, but by augmenting the points of contact in a powder, the result may be very different. Professor Austen's experiments were made with the aid of a compression apparatus, in which the metallic powder is placed under a short cylinder of steel in a cavity in a steel block divided vertically, held together by a collar. The pressure is applied to a cylindrical rod. Under a pressure of 2,000 atmospheres on the piston, or 13 tons on the square inch, lead, in the form of filings, becomes compressed into a solid block, in which it is impossible to detect the slightest vestige of the original grains; while, under a pressure of 5,000 atmospheres, lead no longer resists the pressure, but flows as if it were liquid through all the cracks of the apparatus, and the piston of the compressor descends to the base of the cylindrical hole, driving the lead before it. The more interesting results were obtained by Spring with crystalline metals. Bismuth, as is well known, is crystalline and brittle, yet fine powder and bismuth unite under a pressure of 6,000 atmospheres into a block very similar to that obtained by fusion, having a crystalline fracture. Tin, when compressed in powder, unites, and if it is made to flow through a hole in the base of the compression apparatus, the wire so formed sometimes, though not always, emits the peculiar "cry" of tin when bent. The following figures show the amount of pressure required to unite the powders of the respective metals: Lead unites at 13 tons per square inch, tin at 19 tons, zinc at 38 tons, antimony at 38 tons, aluminum at 38 tons, bismuth at 38 tons, and copper at 33 tons. Lead flows at 33 tons per square inch, tin at 47 tons.

The Architect's and Builder's Edition of the Scientific American.

The November number of this splendid architectural journal has been out a few days, and may be obtained at book stores, news stands, or by mail direct from this office. Price 25 cents.

Besides two full pages of colored illustrations of new dwelling houses, the November issue contains engravings of a number of low priced houses, of recent construction, representing the latest designs and accompanied with plan views, showing the interior arrangements of the houses. This number also contains an engraving of the beautiful municipal building just completed at Glasgow, also the design for a new and magnificent hotel at Richmond, Va., a view under the central dome of the exposition building of Glasgow, and the New York *Times* nine story handsome building, which is nearly completed, and views illustrating the manner in which the building was reconstructed without disturbing the compositors or other employes or the printing presses or other machinery used in producing a daily newspaper, which feat was never before accomplished on so extensive a scale.

A small country church, with plan of the arrangement of the seats, and a stable and carriage house of moderate cost, are among the many other useful subjects treated in the November number; and any persons contemplating the building of a new house, or the remodeling of an old one, will find it to their advantage to consult all the back numbers (thirty-seven already published) of the ARCHITECT'S AND BUILDER'S EDITION of the SCIENTIFIC AMERICAN, and whoever does it will be very likely to save a good many dollars, besides being better satisfied with his improvement from the good suggestions he derived from their perusal.

THE cranks of the age are for the present turning from the congenial labor of inventing perpetual motion machines to invent a new language, which they call "Volapuk." It is a conglomeration of all the modern and some of the dead languages, and an experienced linguist can see little sense in it. When a miller receives a letter informing him that "Klub at alabom rigi omik in lenpuk pegivol sis vigs kil komu volapukaklubi keli opubobs sosus olabobs spadi e vodabuk upubom egetobs bletimo penedi estabobs," he need not be alarmed. It is not a complaint that his flour is "off," nor a death warrant, nor a notice of the coming of the sheriff. It is simply a "volapuk" crank unloading his superfluous and valueless attainment.—*Milling World.*

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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 671.

For the Week Ending November 10, 1888.

Price 10 cents. For sale by all newsdealers.

FACTS AS TO LONG LIFE.

What tends to long life is a study with more profit as facts are used for data. The editor of a Boston paper, unread in theory, sent blanks through Massachusetts to men and women of eighty years and more, inquiring as to habits, state of eyes, teeth, hearing, and the like, getting over 3,500 replies, and if in these there is nothing to refute the assertions of the theorists, there is yet not anything to sustain them.

They ate meat, save in a few cases, *ad lib.*, and though none of them, if we take their own word for it, have drunk freely of spirits, all, or nearly all, have taken of them on occasion. These old people are from cities, towns, agricultural and maritime districts, in nearly all cases leading active lives, eating three meals a day, the dinner being, as is the custom in New England, in the middle of the day, of meat and vegetables, and pie, and very hearty. Curiously enough, though the women are of medium height, the men are mostly tall, above the average; and so greatly do blue and gray eyes prevail that other shades are notable exceptions. Baldness is rare, the hair being usually brown and thick, but the teeth are very poor or entirely gone. The report says:

"These old people, men and women alike, are early risers almost without exception, and fully nineteen out of every twenty have observed this custom through life, except, perhaps, in some short period of youth. . . . Exercise has been hard up to sixty-five or seventy years, and after that period has consisted (when the regular occupations have been given up) of walking or gardening, or both. Except in cases of sickness, these old people are as active and as fond of constant occupation of some sort to-day as most men and women are at thirty-five. One of the most significant facts gathered in this canvass is that regarding occupation. Out of 1,000 men, throughout life, 461 have been farmers; 92 have been carpenters; 70, merchants; 61, mariners; 49, laborers; 42, shoemakers; 41, manufacturers; 23, clergymen; 23, masons; 16, blacksmiths; 16, bankers; 12 each iron workers, mill hands, physicians, and lawyers; and the rest are divided among nearly all the other trades and professions. Eight hundred out of twelve hundred have been farmers' wives, and all but about fifty of the remainder have been housewives."

Tea and coffee drinking was indulged in by fully two-thirds of the 3,500, with some of them to excess; and of the men, nearly all have both smoked and chewed tobacco, the amount daily consumed by some having been enormous.

Their cares were as heavy as those which come to most of the human family, their work not less arduous. Most of them led lives which some might call monotonous, yet with occasional excitement to them as great as the intenser kinds to those more used to it.

Summing up all that the compiler has set down from the answers sent to his questions, we find that all were regular in their habits, with plenty to occupy their hands and minds and getting plenty of fresh air. This seems to be at least a primal quantity in the solution of the problem of long life. Men like these, with plenty of work and fresh air, are able to eat and smoke, even to a point we would call excess, without injury, and even to drink at times with no evil resulting. It is those of sedentary habits, who do no hard labor and get little exercise or fresh air, who must be the most careful.

QUICK LETTER DELIVERY.

No mail service can be said to be good enough while a better one may be had. In New York City such possibility is clearly in sight, the means at hand, the way clear, and all that is wanted to take advantage of the conditions existing, an order from the postmaster-general and the preparation of a time schedule. Three lines of elevated roads traverse the city, with trains running constantly and rapidly, and horse car lines bisecting them at every principal point. How easy to dispatch a letter quickly by means of these, if only some of the "routine" and manipulation now employed were dispensed with! Now, a letter posted say in lower Broadway and directed to West 25th Street, must needs be taken to the general post office. Thence it goes uptown, perhaps by elevated train, perhaps by wagon, and to the sub-station nearest. As will be seen, it is delayed while *en route* to the general post office, again, if it goes by the elevated, while taken afoot to the sub-station. Supposing now the sub-stations were all arranged on the line of the elevated roads or the crosstown horse car lines, and let us suppose also that the carrier, on finishing his collections from the lamp post boxes, takes his letters directly to the nearest elevated railroad station, leaving the pouch for the first post car [a small section of a car would be sufficient for the purpose, and say there was such a one every 15 minutes]. With the letters assorted simply as to the nearest sub-stations, the work could be quickly done, a man from each ready on the platform to take the packet for his station, and then hurrying off to the near-by branch office or taking a crosstown car for it, leaving a mate to await the next trains, down and up.