**Sandhog: Building the Brooklyn Bridge, 1871**

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**T**he cold, bitter winter of 1866-67 reminded the citizens of Brooklyn why they so desperately wanted a bridge constructed over the East River to connect them with New York City. Once again, the East River was frozen, leaving them no easy way to get to the city to either work or play. It took less time; it was said, to go from the state capital of Albany to New York City by train than to go from Brooklyn to New York City by carriage when the river was frozen. This time, the political leaders of Brooklyn determined, the dream would not be denied.

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The dream was realized only after the support of New York City's political boss, William Tweed, was assured with an ample financial payoff. Nothing like it had ever been tried on such a large scale. It would be the longest suspension bridge in the world - stretching over a mile from end to end. It would include an elevated pedestrian promenade and two twin towers that would dwarf everything in the surrounding skyline.

The bridge's designer, John Roebling, died in a freak accident as he was surveying the location of the bridge's Brooklyn tower in 1869 and the task of turning his design into reality fell to his son, Washington.

The first objective was to securely anchor the bridge's two towers on the solid bedrock found under the layers of mud below the East River. A huge wooden caisson, resembling a giant box, was assembled on land, towed to the site of the Brooklyn-side tower and sunk. Compressed air was pumped into the chamber to prevent the surrounding water from leaking in. The caisson's false floor was then ripped out allowing workers to dig up the river bottom.

The working conditions within the caisson resembled a scene from Dante's *Inferno*. The tremendous pressure, the suffocating heat, the lack of oxygen and the noise all combined to limit a worker's time within the caisson to a maximum of two hours. As they ascended through the compressed air to the top of the caisson, the workers were threatened with the crippling and painful effects of the bends - an imbalance of nitrogen in the blood caused by a too rapid ascension out of the compressed air.

Despite the engineering, political and financial difficulties, the bridge was opened with tremendous public acclaim in 1883.

**"...a dreadful pain shot through both my ears."**

*Frank Harris arrived in New York City from his native Ireland in 1871. The fifteen-year-old moved into a Brooklyn boarding house where a fellow resident - Mike - told him of jobs paying five dollars a day for working in the Brooklyn Bridge caissons. We join Frank's story as he and Mike go to the construction site:*

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"Next morning Mike took me to Brooklyn Bridge soon after five o'clock to see the contractor; he wanted to engage Mike at once but shook his head over me. 'Give me a trial,' I pleaded; 'you'll see I'll make good.' After a pause, 'O.K.,' he said; 'four shifts have gone down already underhanded: you may try.'

In the bare shed where we got ready, the men told me no one could do the work for long without getting the 'bends'; the 'bends' were a sort of convulsive fit that twisted one's body like a knot and often made you an invalid for life. They soon explained the whole procedure to me. We worked, it appeared, in a huge bell-shaped caisson of iron that went to the bottom of the river and was pumped full of compressed air to keep the water from entering it from below: the top of the caisson is a room called the 'material chamber,' into which the stuff dug out of the river passes up and is carted away. On the side of the caisson is another room, called the 'air-lock,' into which we were to go to be 'compressed.' As the compressed air is admitted, the blood keeps absorbing the gasses of the air till the tension of the gasses in the blood becomes equal to that in the air: When this equilibrium has been reached, men can work in the caisson for hours without serious discomfort, if sufficient pure air is constantly pumped in. It was the foul air that did the harm, it appeared. 'If they'd pump in good air, it would be O.K; but that would cost a little time and trouble, and men's lives are cheaper.' I saw that the men wanted to warn me, thinking I was too young, and accordingly I pretended to take little heed.

When we went into the 'air-lock' and they turned on one air-lock after another of compressed air, the men put their hands to their ears and I soon imitated them, for the pain was very acute. Indeed, the drums of the ears are often driven in and burst if the compressed air is brought in too quickly. I found that the best way of meeting the pressure was to keep swallowing air and forcing it up into the middle ear, where it acted as an air-pad on the innerside of the drum. . . .

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| Working in the caisson from a contemporary illustration |

When the air was fully compressed, the door of the air-lock opened at a touch and we all went down to work with pick and shovel on the gravelly bottom. My headache soon became acute. The six of us were working naked to the waist in a small iron chamber with a temperature of about 80 degrees Fahrenheit: in five minutes the sweat was pouring from us, and all the while we were standing in icy water that was only kept from rising by the terrific air pressure. No wonder the headaches were blinding. The men didn't work for more than ten minutes at a time, but I plugged on steadily, resolved to prove myself and get constant employment; only one man, a Swede named Anderson, worked at all as hard.

The amount done each week was estimated, he told me, by an inspector. Anderson was known to the contractor and received half a wage extra as head of our gang. He assured me I could stay as long as I liked, but he advised me to leave at the end of a month: it was too unhealthy: above all, I mustn't drink and should spend all my spare time in the open. He was kindness itself to me, as indeed were all the others. After two hours' work down below we went up into the air-lock room to get gradually 'decompressed,' the pressure of air in our veins having to be brought down gradually to the usual air pressure. The men began to put on their clothes and passed round a bottle of schnapps; but though I was soon as cold as wet rat and felt depressed and weak to boot, I would not touch the liquor. In the shed above I took a cupful of hot cocoa with Anderson, which stopped the shivering, and I was soon able to face the afternoon's ordeal.

For three or four days things went fairly well with me, but on the fifth day or sixth we came on a spring of water, or 'gusher,' and were wet to the waist before the air pressure could be increased to cope with it. As a consequence, a dreadful pain shot through both my ears: I put my hands to them tight and sat still for little while. Fortunately, the shift was almost over and Anderson came with me to the horse-car. 'You'd better knock off,' he said. 'I've known 'em go deaf from it.'

...One day, just as the 'decompression' of an hour and a half was ending, an Italian named Manfredi fell down and writhed about, knocking his face on the floor till the blood spurted from his nose and mouth. When we got him into the shed, his legs were twisted like plaited hair. The surgeon had him taken to the hospital. I made up my mind that a month would be enough for me."

**References:**   
    Frank Harris' account appears in: Harris, Frank, My Life and Loves (1963, originally published in 1922); McCullough, David, The Great Bridge: The Epic Story of the Brooklyn Bridge (1972).

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