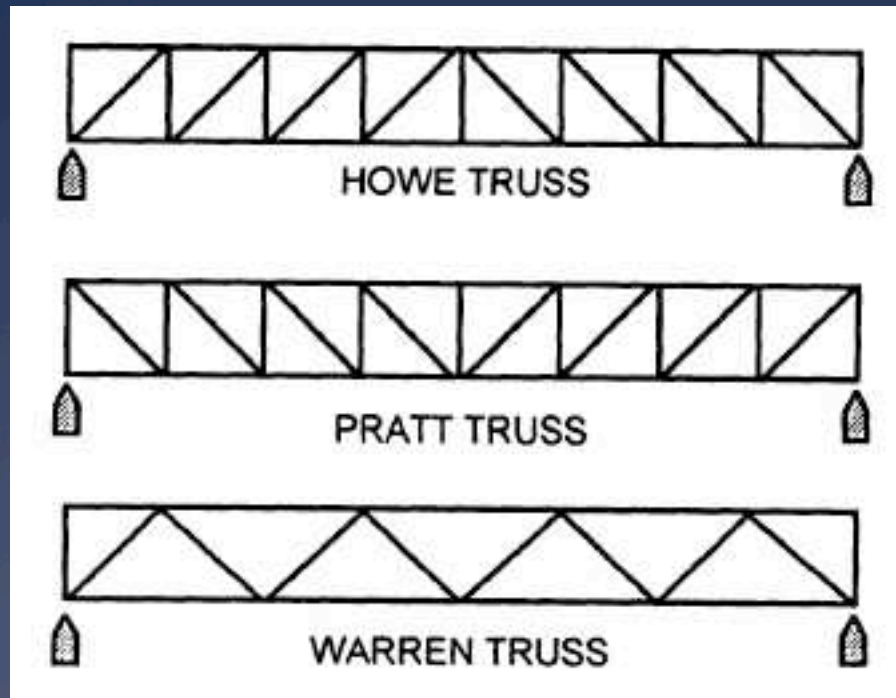


The habitable structure

Supertrusses and
space

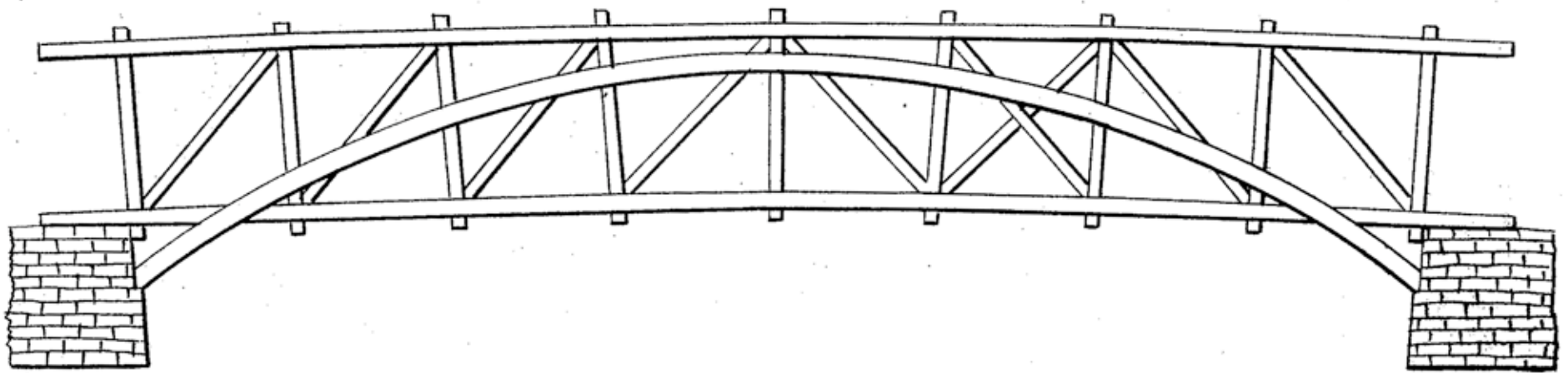
The major players...



Vierendeel Truss

Burr arch and Towne truss...its all about buckling

Theodore Burr's 1817 patent...a braced arch/truss

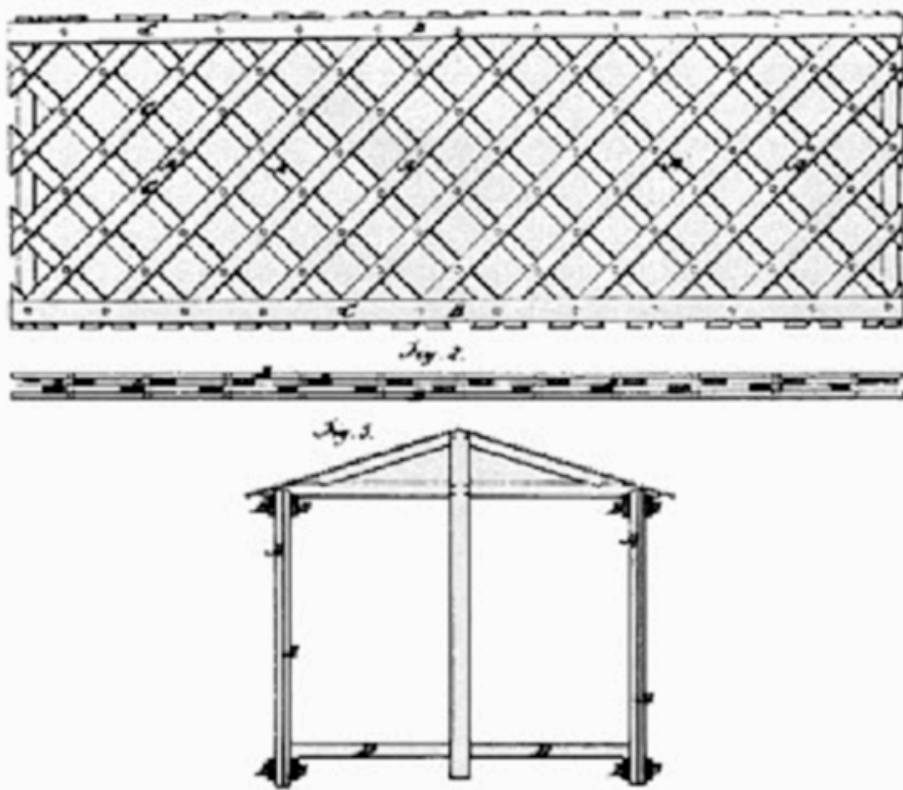


Room as structure: The Burr Arch

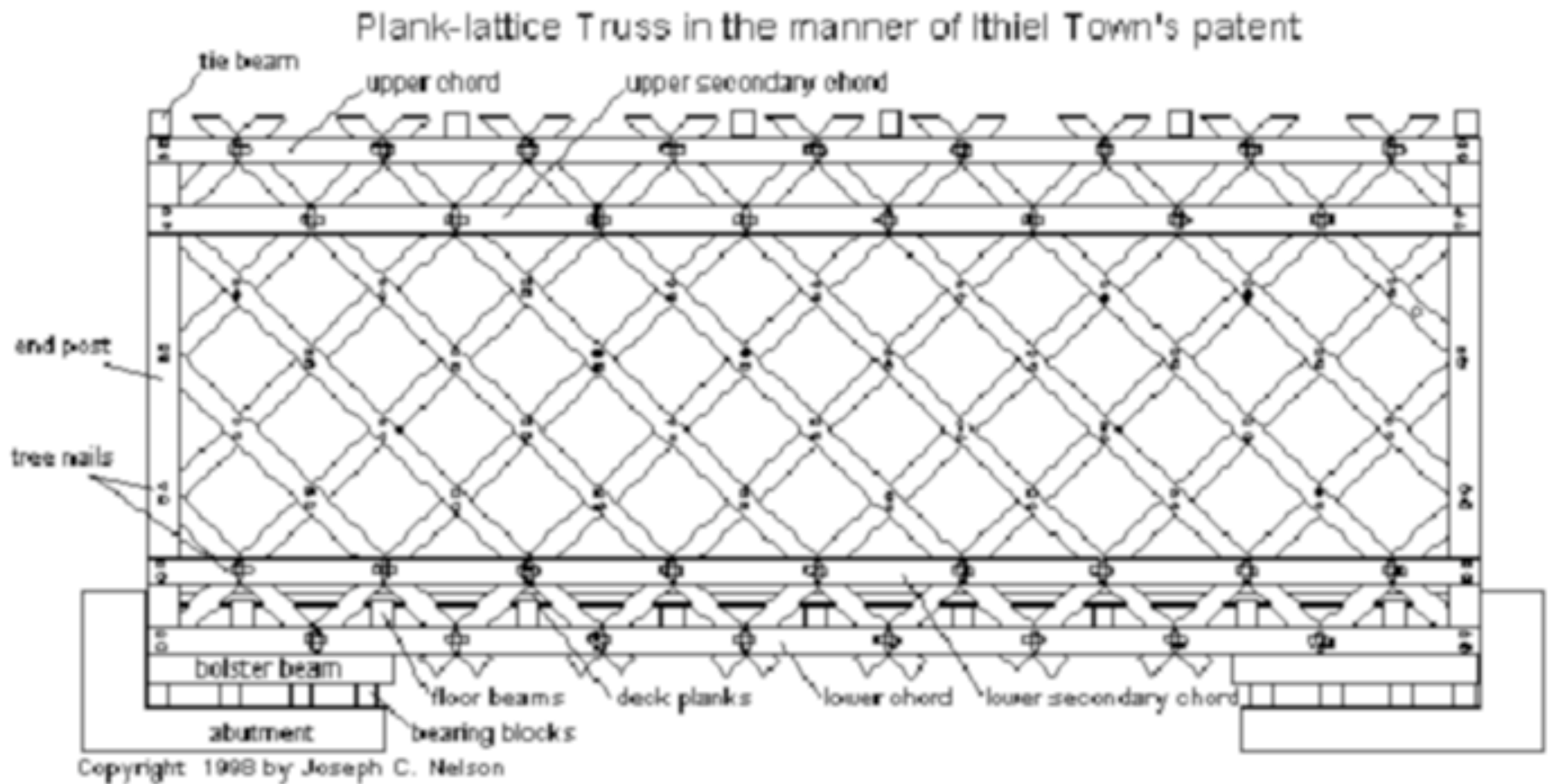




Blenheim bridge, surviving Burr arch



Towne's 1820 patented truss



Bracing everywhere...do you see a yurt anywhere?

Ithiel Towne's Lattice Truss







Inhabiting bridges...a new idea to America?

Ponte Vecchio, 1345, Florence

fig . 33 .

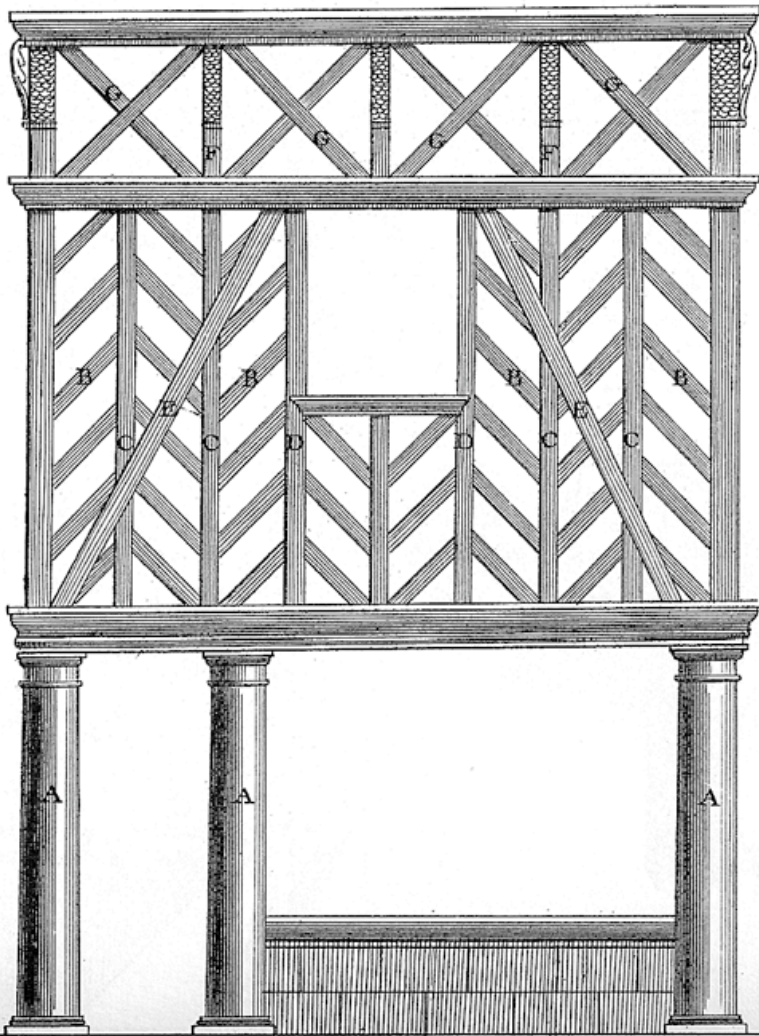
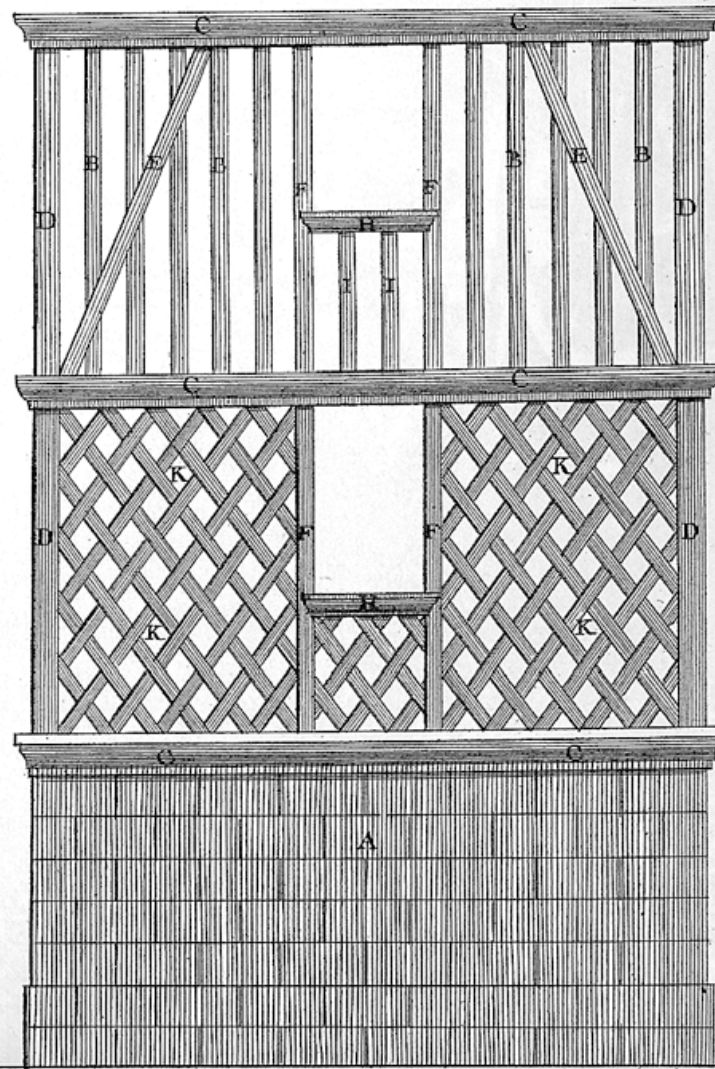
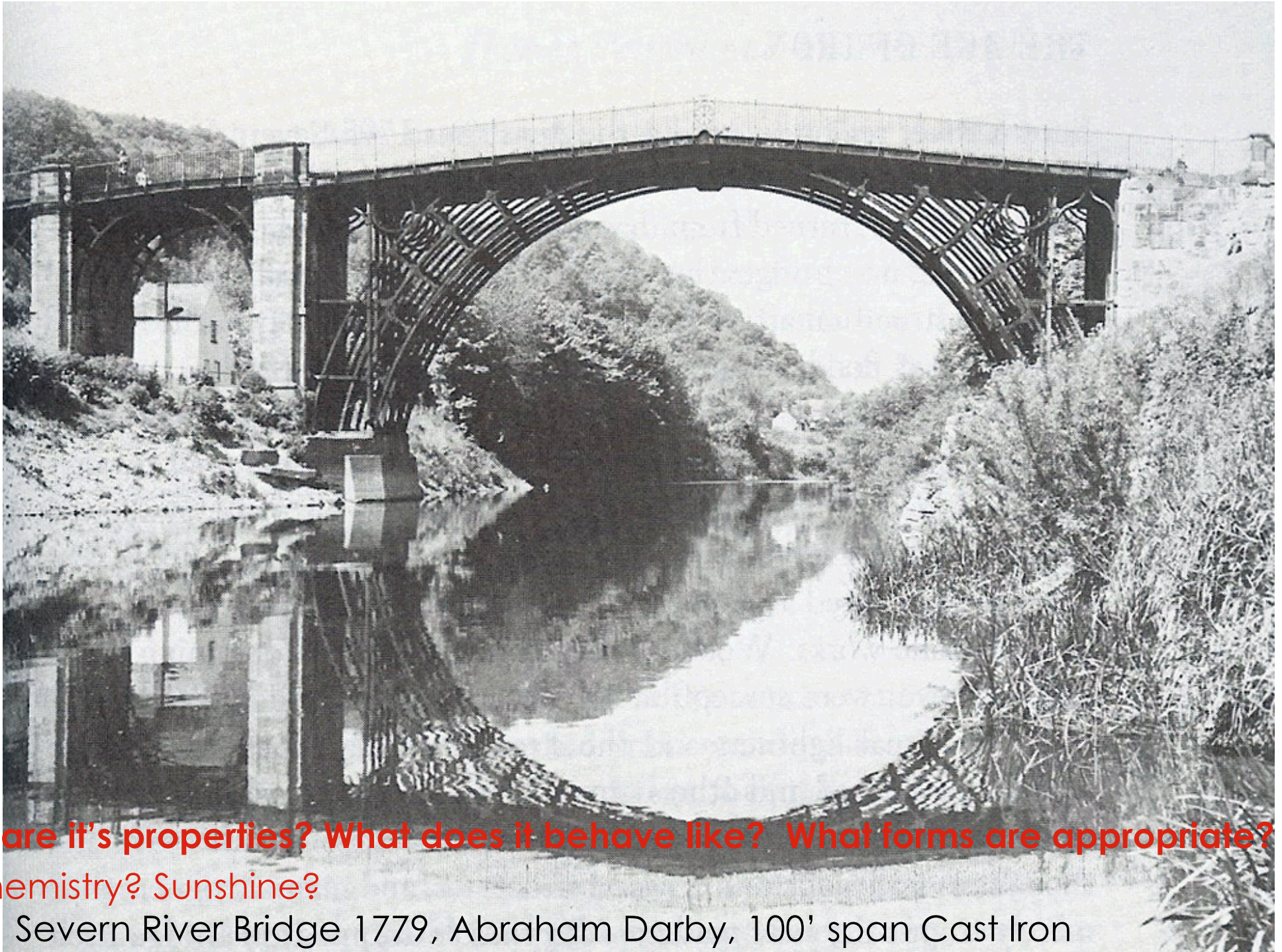


fig . 32 .



Denis Diderot "Encyclopedie" ... images of everything... 1751



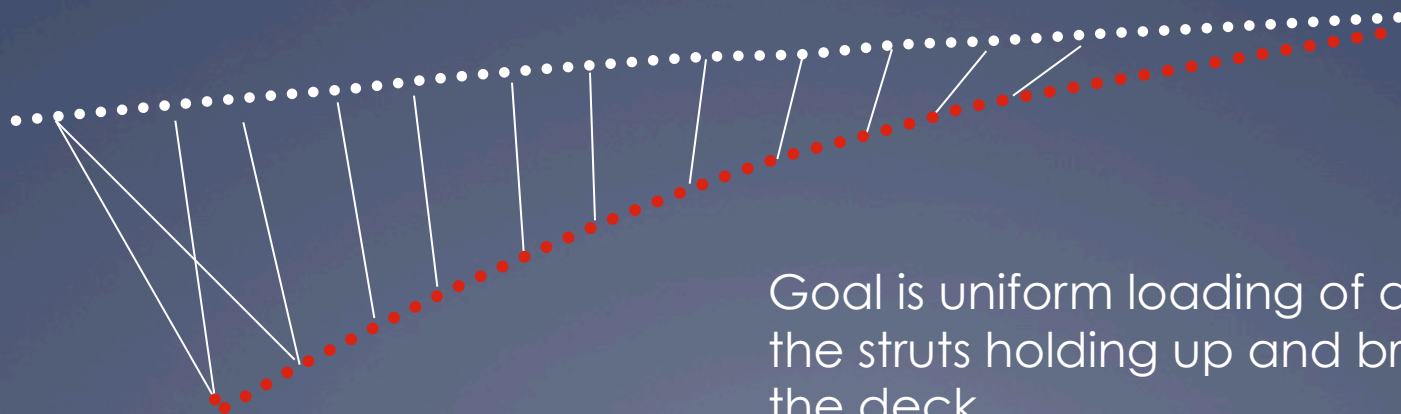
What are its properties? What does it behave like? What forms are appropriate?
Chemical chemistry? Sunshine?

Severn River Bridge 1779, Abraham Darby, 100' span Cast Iron



Craigellachie Bridge 1814, Thomas Telford, 150' span Cast Iron





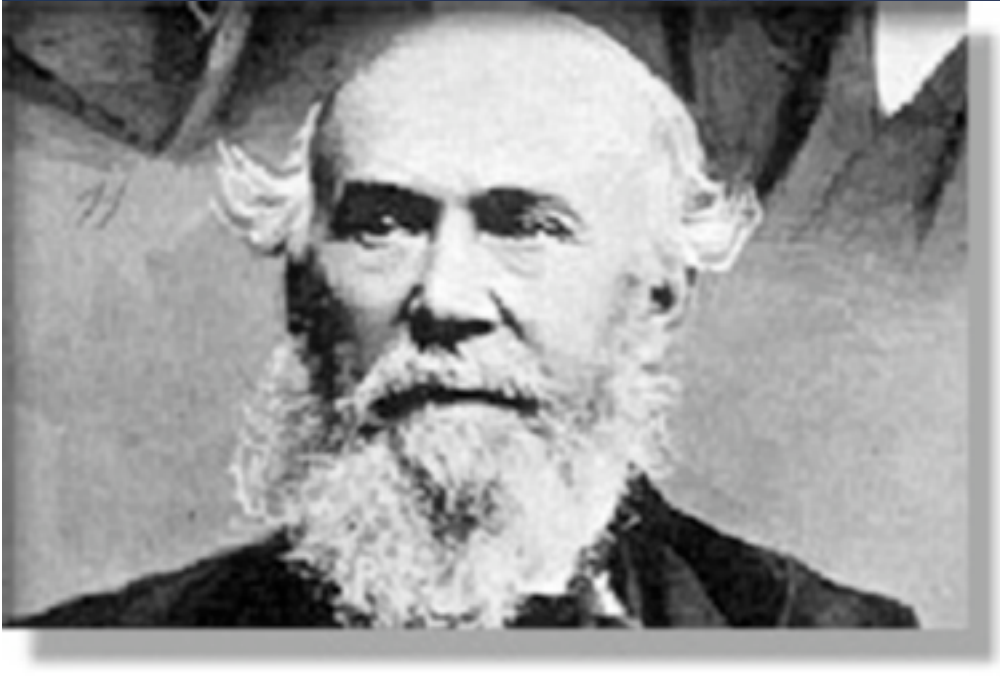
Goal is uniform loading of arch by the struts holding up and bracing the deck

Cultural Differences:

Telford 1812: “efficiency, economy, elegance”....
through full-scale tests... trial and error

Eiffel 1867: “lighter, cheaper, stronger”...
by combining theory and practice...calculation and observation

Sir Thomas Bouch



* Knighted upon completion of the bridge crossing the Firth of Tay, 1877

* Commissioned to design Firth of Forth crossing 1873

Firth of Tay 1867 Progress



2.25 miles of value engineered cast
iron



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ACCIDENT IN SCOTLAND.
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Sermon by Rev. Dr. Talmage.—The Holy Land.
PORTRAIT OF THE REV. S. A. WALKER.
AN INCIDENT IN THE CRIMEA. By Major

Malan.—A Hunter's Discovery of a Crazy Man.
Flight into Egypt—S.S. Lesson. By Mrs. Baxter.
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Alfonso.—The Turkish Difficulty.—Afghan War
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£40,000,000 Saved.—Among Pines.—Week of
Prayer.—Watch-night Services.—Mr. Spurgeon—
Desirable Madness.—Birthday Gift.—Death of a

Crew.—Gift of a Lady's Hair.—A Time Saver—
Centenarian.—Black Cross.—A Pope in Paradise.
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NEW YEAR'S ADDRESS TO OUR READERS.
A Carpenter's Vision of a Lender.—A Tragedy.
THE ROUGH DIAMOND. Our Serial Story.
ALMANACK FOR 1880, with Texts.



VIEW OF THE TAY BRIDGE BEFORE THE ACCIDENT.



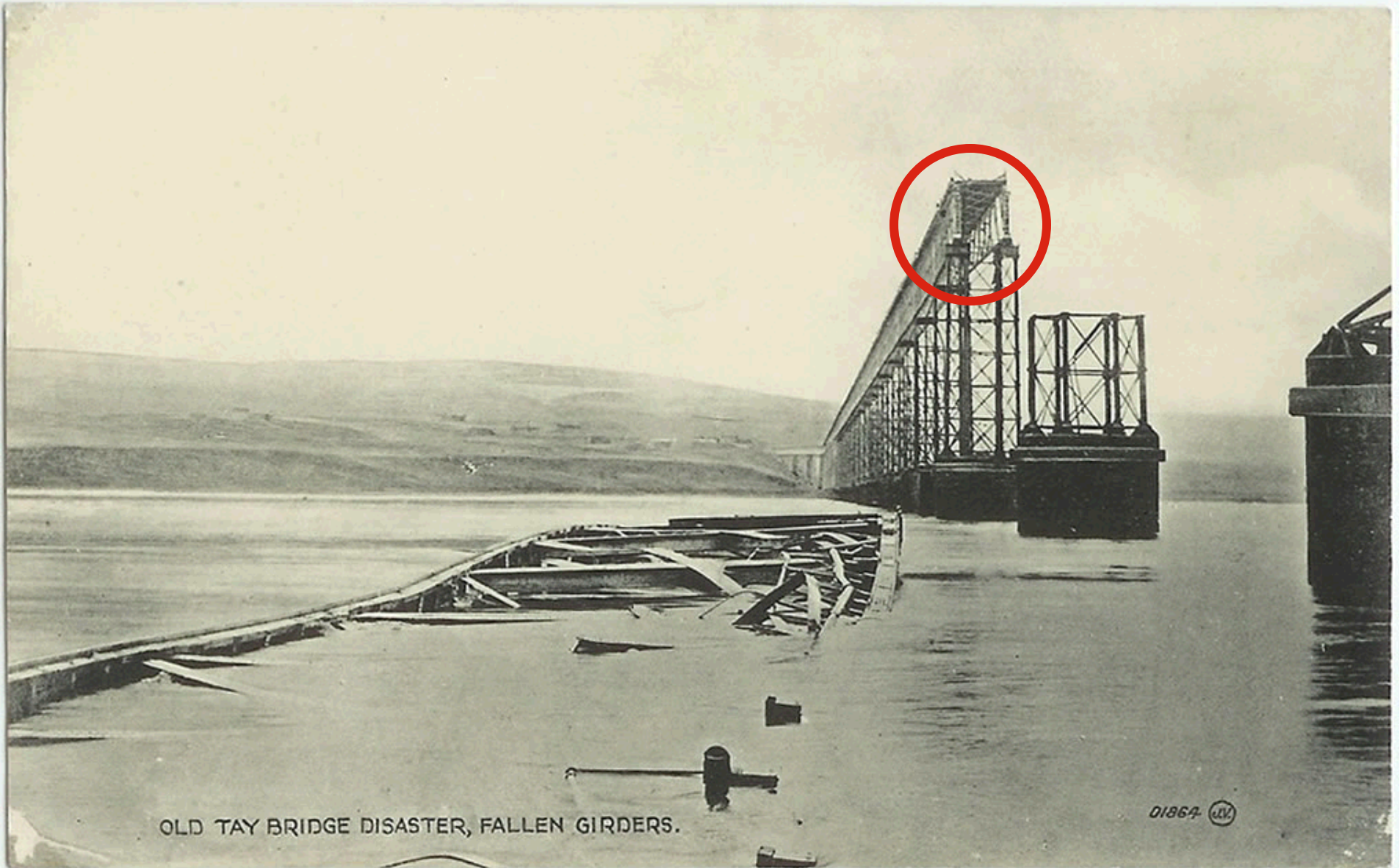
VIEW OF THE TERRIBLE RAILWAY ACCIDENT AT TAY BRIDGE ON DEC. 28.

* Remains
worst
structural
disaster in
British History

Beufort 10... 55-70mph wind

- * Dec. 28, 1879
- * Train was crossing at the time
- * Engine, tender and first class coaches fall in, second class coaches remain on rails
- * Death toll 75
- * Includes Bouch's son-in-law

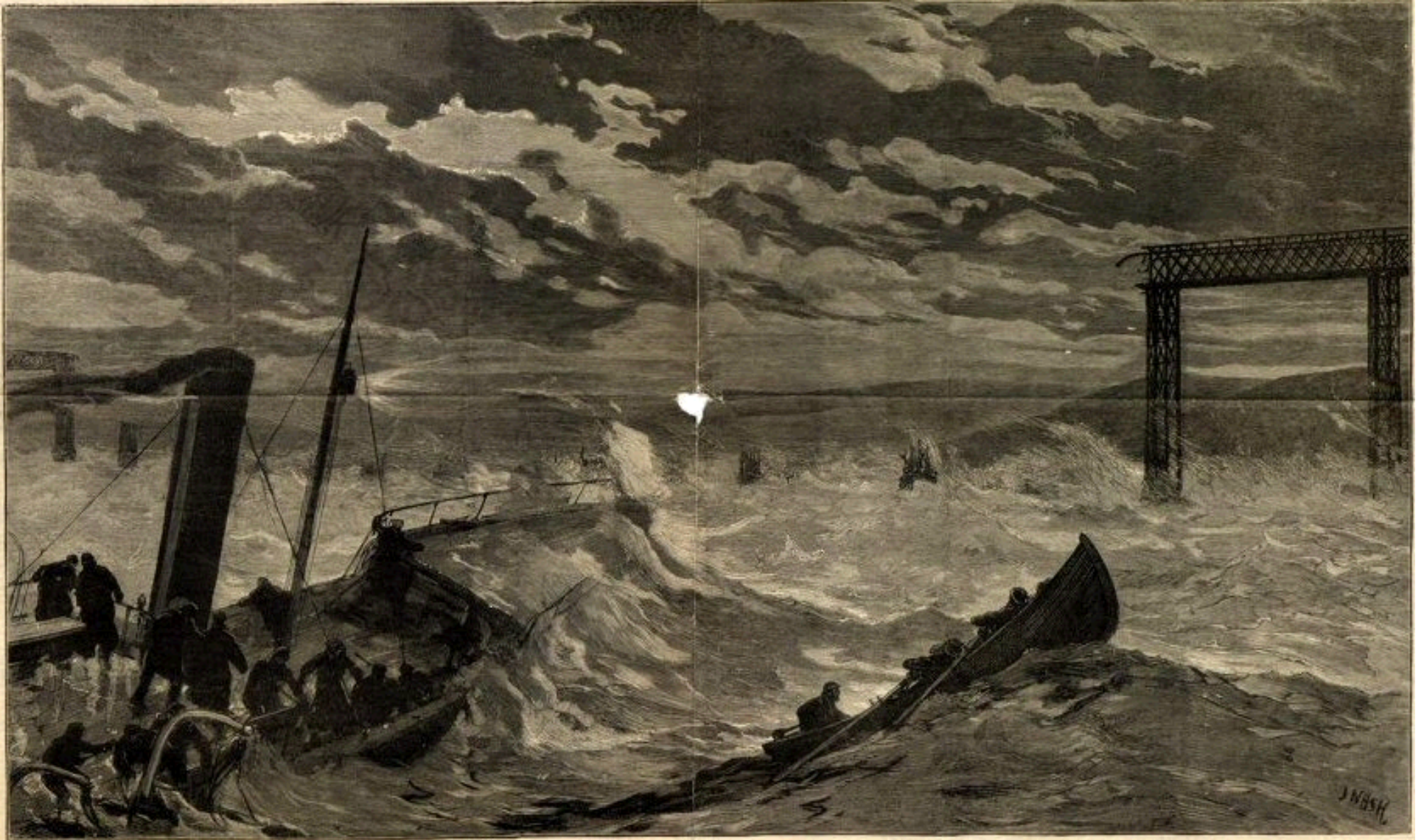
Cast iron disaster



OLD TAY BRIDGE DISASTER, FALLEN GIRDERS.

01864 (W)

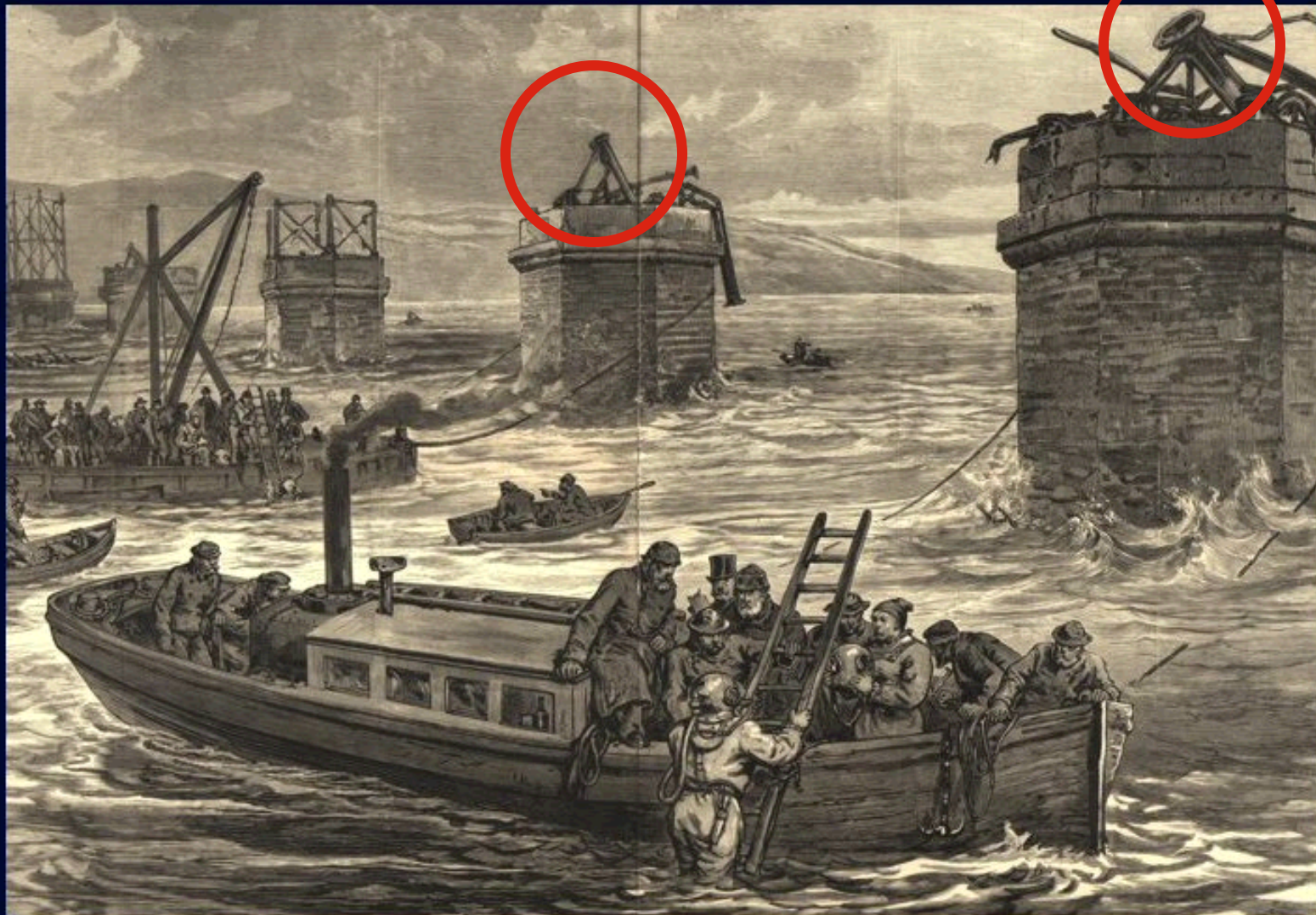
Search and Rescue



THE TAY BRIDGE DISASTER—VISIT OF THE OFFICIAL STEAMER TO THE RUINS ON THE NIGHT OF THE ACCIDENT.

THE GAP SHOWN IN THE ENGRAVING WAS OCCUPIED BY THE CENTRAL RAISED GIRDERS OF THE BRIDGE, HALF A MILE IN LENGTH, ALL OF WHICH WERE CARRIED AWAY.

Hardhats to recovery

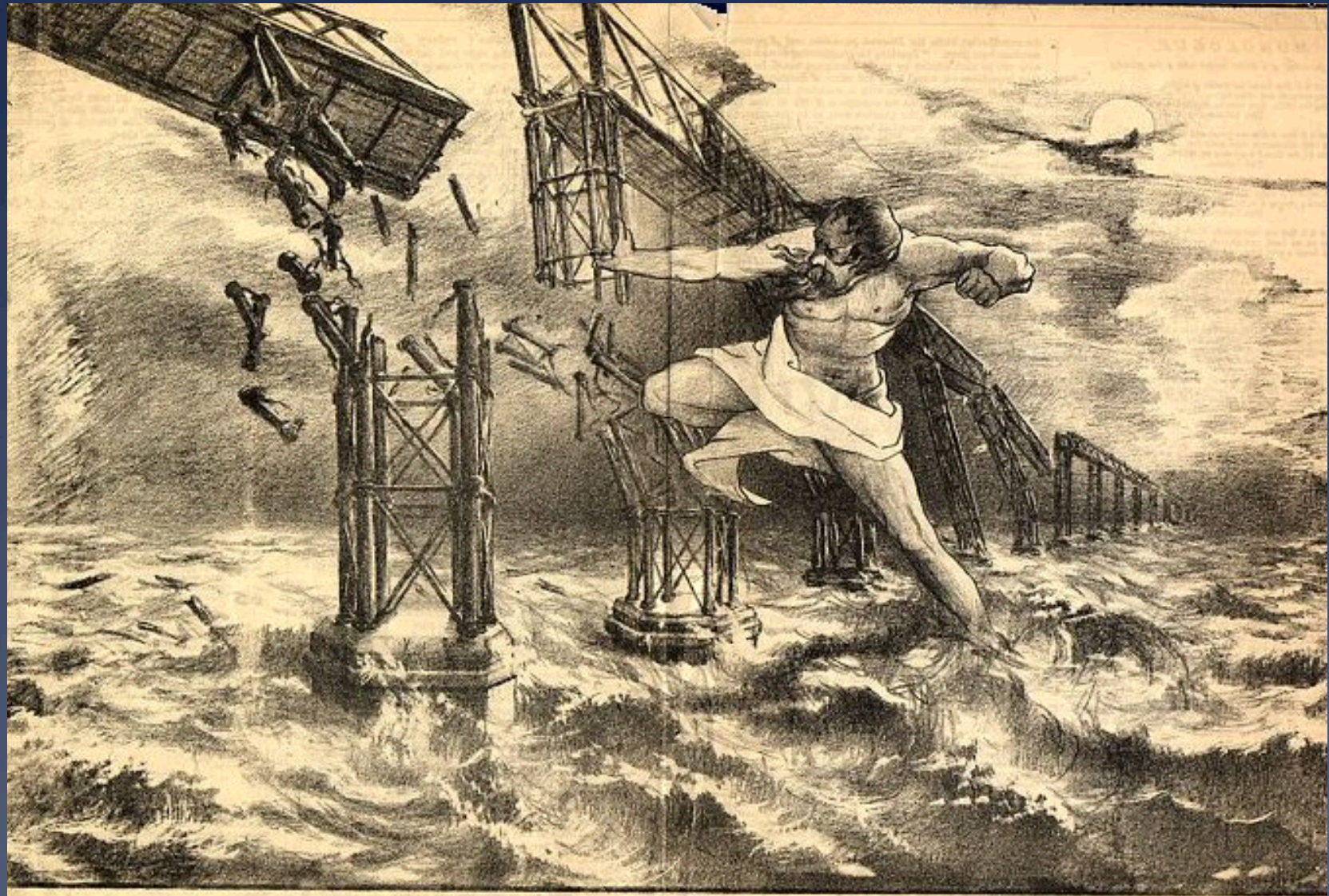


After S&R, recovery



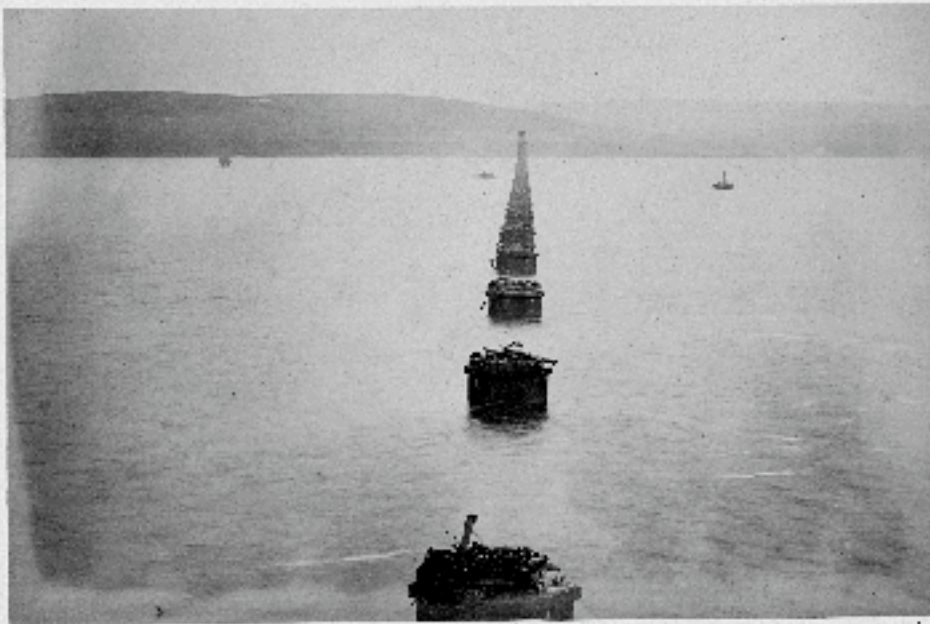
DIVERS AT WORK

Told you it wouldn't work



THE SPIRIT OF THE STORM.
"VENI, VIDI, VICI"

Relief, Rebuild, don't repeat causes



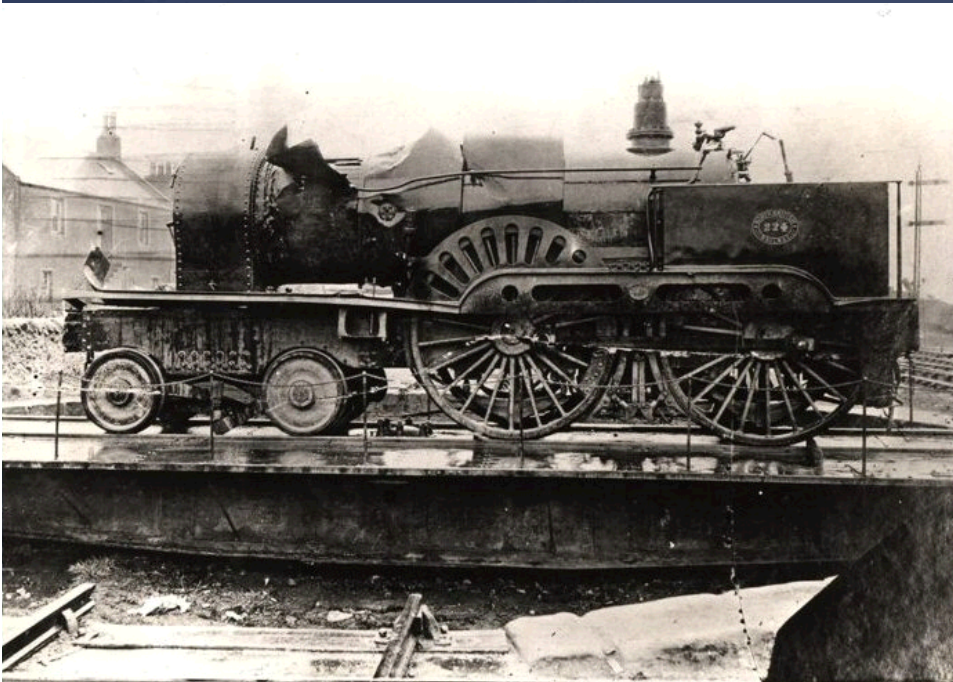
View from north end of bridge

THE TAY BRIDGE DISASTER

SOME account of this dreadful accident will be found on page 17, but we may here add that up to Wednesday night no more bodies had been recovered, although one of the divers reported that he had felt what he believed to be the clothing of some persons in the submerged carriages. On Wednesday, at a meeting held at the Town Hall, Dundee, under the presidency of the Provost, it was stated that the number of lives lost was certainly not less than seventy-five, many of the victims being young men and women who were the stay and support of their aged parents, whilst some had left widows and large families of young children. It was resolved to establish a Relief Fund, to be administered by a Committee, including the Provost and other local officials, and it was announced that subscriptions to the amount of 1,830*l.* had already been promised, including 500*l.* from the North British Railway Company, besides individual sums from directors to the amount of 560*l.*, Sir T. Bouch himself contributing 250*l.* On the same day the directors held a meeting, at which it was decided that immediate steps should be taken to re-establish communication by way of the bridge.

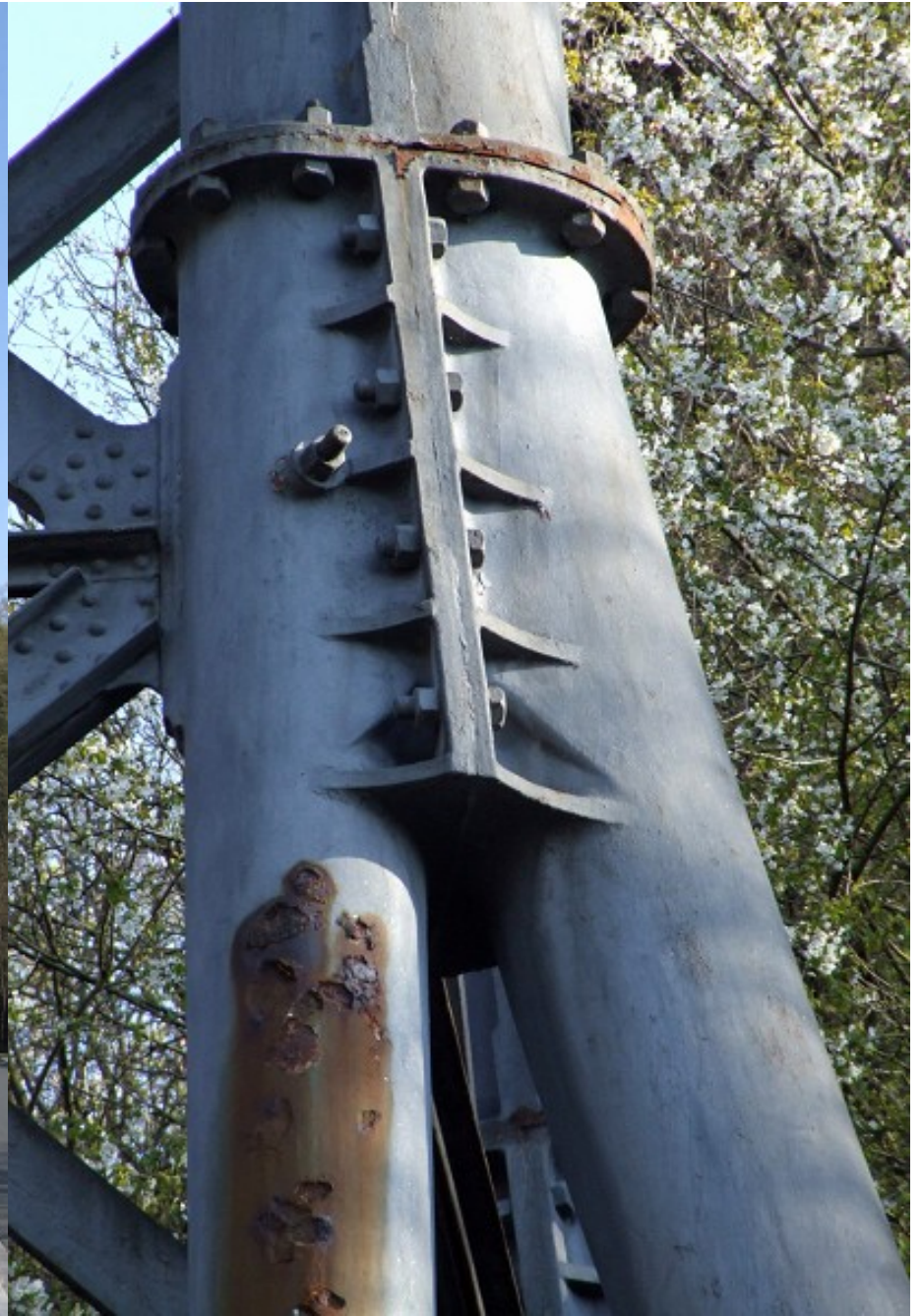
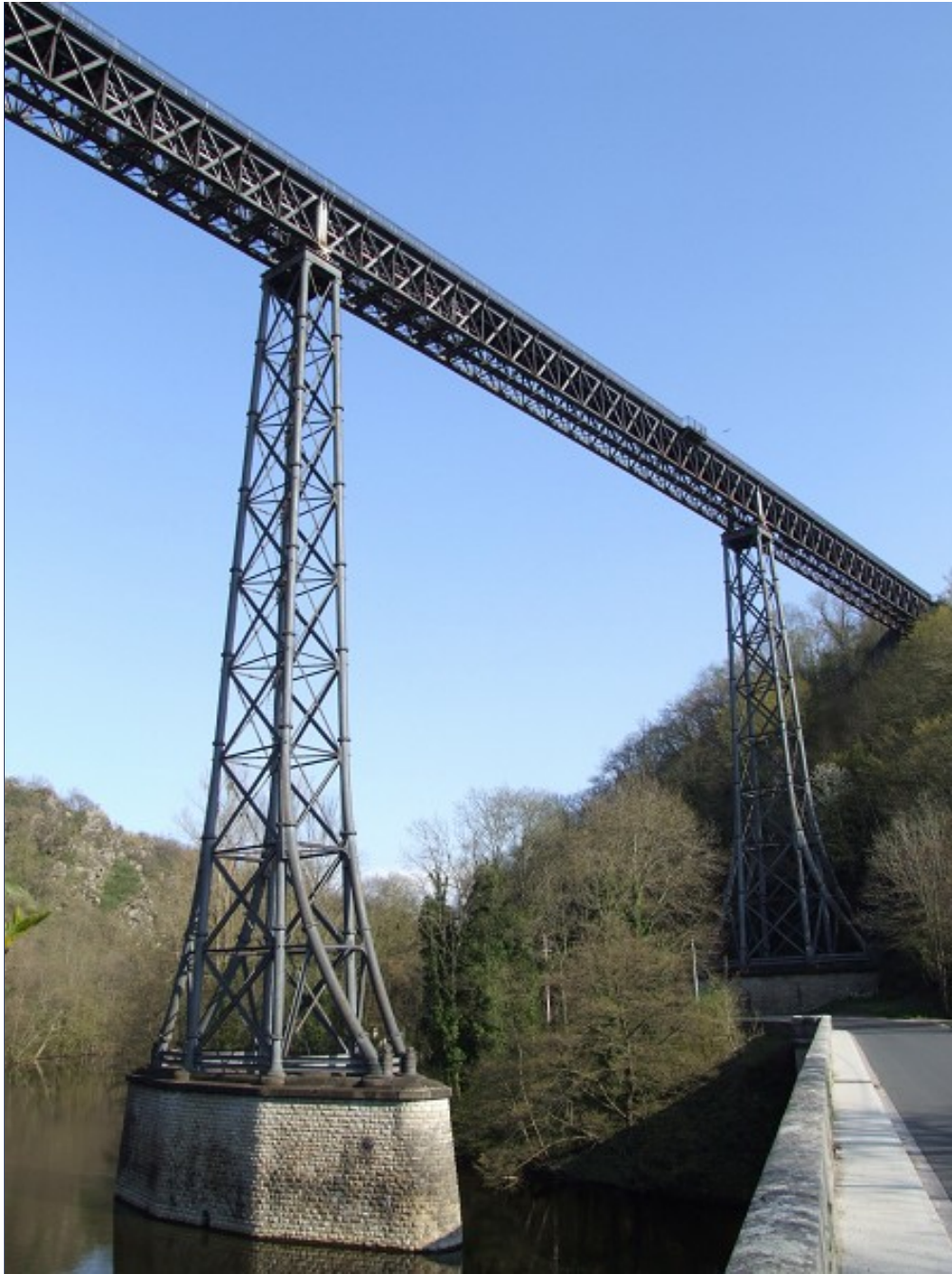
Local opinion seems to attribute the accident to the extreme narrowness of the bridge (only fifteen feet), and confidence is expressed that one twice the width, with a double line of rails, would be perfectly safe. It is also thought that the extreme height of the centre girders is not really necessary for the passage of such vessels as ordinarily frequent the river.—Our engravings of the Bridge from the Firth, and from the Tay side, are reproduced from *The Graphic* of Oct. 27th, 1877; that representing the official visit to the ruins is from a sketch, and the sectional view of the girders from a photograph, both kindly sent to us by Mr. James Russell of Dundee; while the view of the Bridge from the Fife bank is from a sketch by Mr. G. M. Paterson of Dundee.

Reuse



Material innovation provokes change in relations between structure and spaces

Eiffel garabit viaduct and eiffel tower...vert truss



Rouzat viaduct 1869 Gustav Eiffel...the truss learns about wind



Deep enough to walk in... deep enough to inhabit?

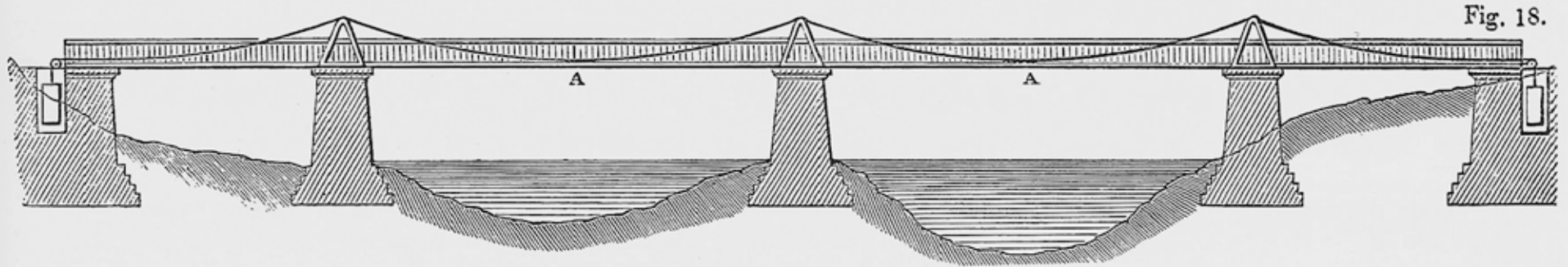
Gustav Eiffel's tower 1889



- 117 years old
- 968 feet tall
- 18,000 parts
- Eiffel was the contractor
- 2 years to build

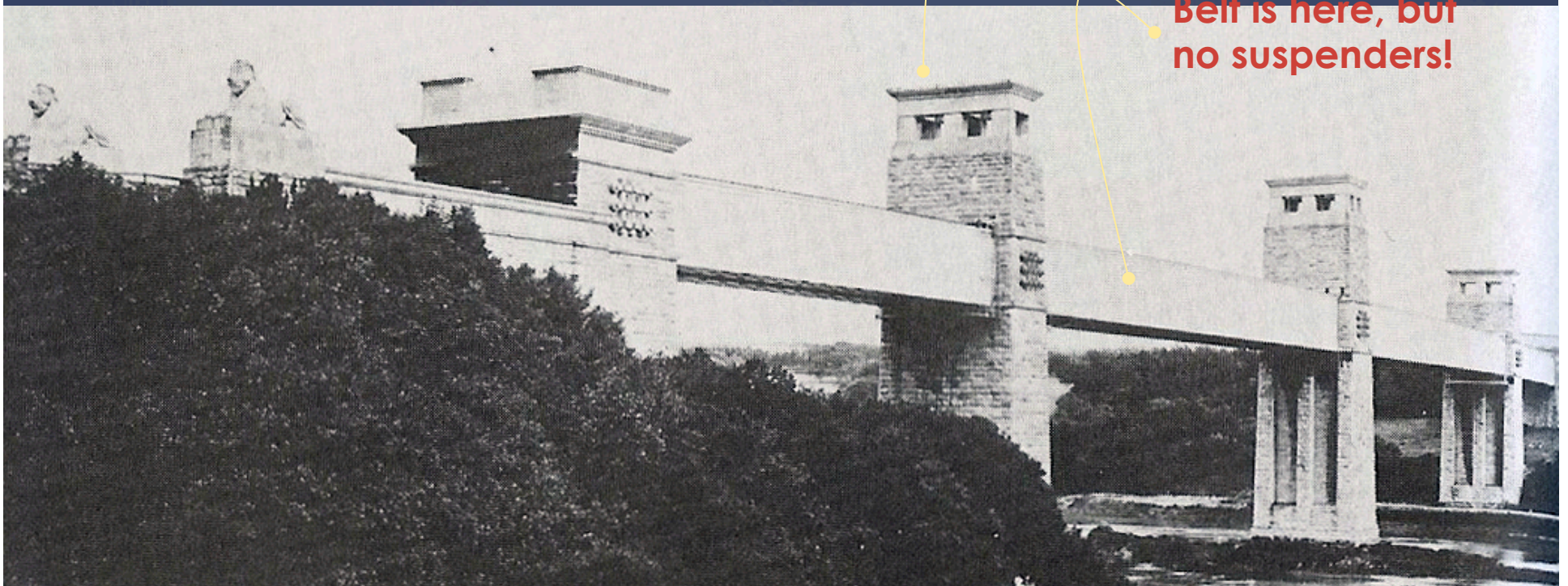


Concern over railroad vibration
pushes design to extra stiffness



Stephenson's Box Beams

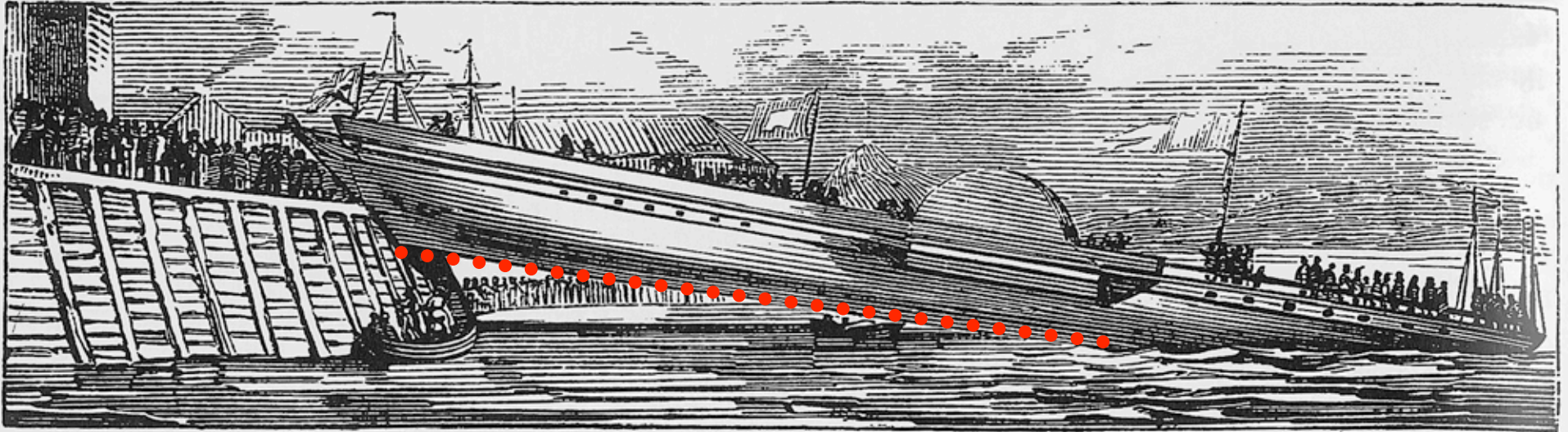
Brittania Bridge over the Menai Strait, Robert Stephenson 1850, 460 foot span



**Towers are here,
Belt is here, but
no suspenders!**

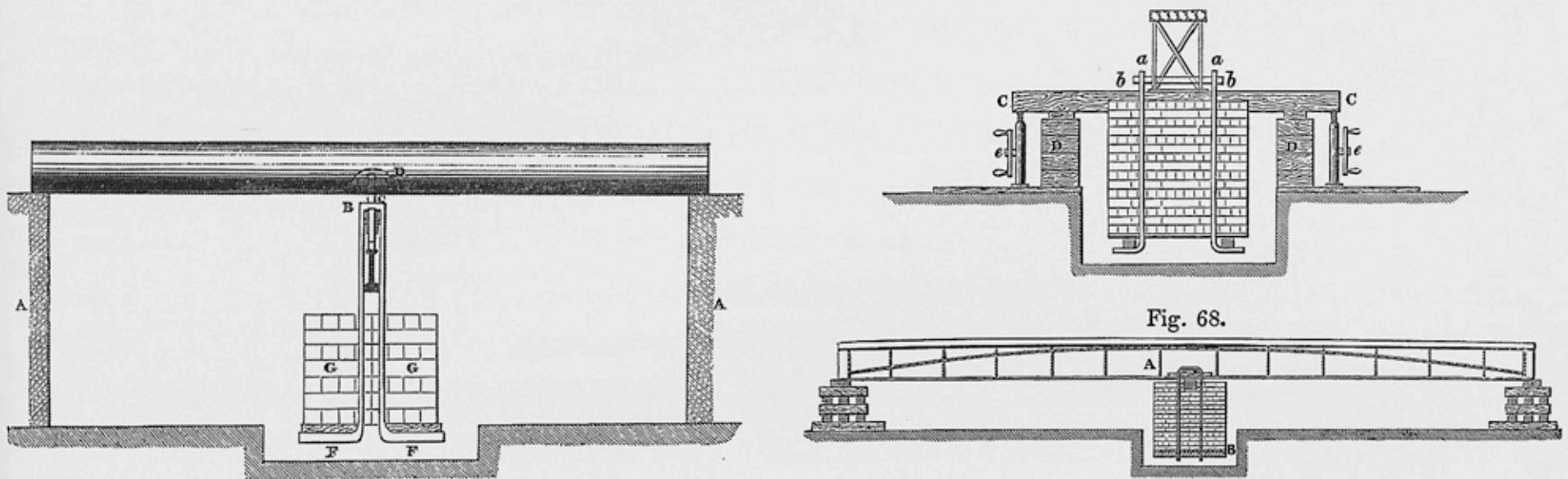
A mistake gives Stephenson the idea

* An ironclad ships hull...the first structural tube?



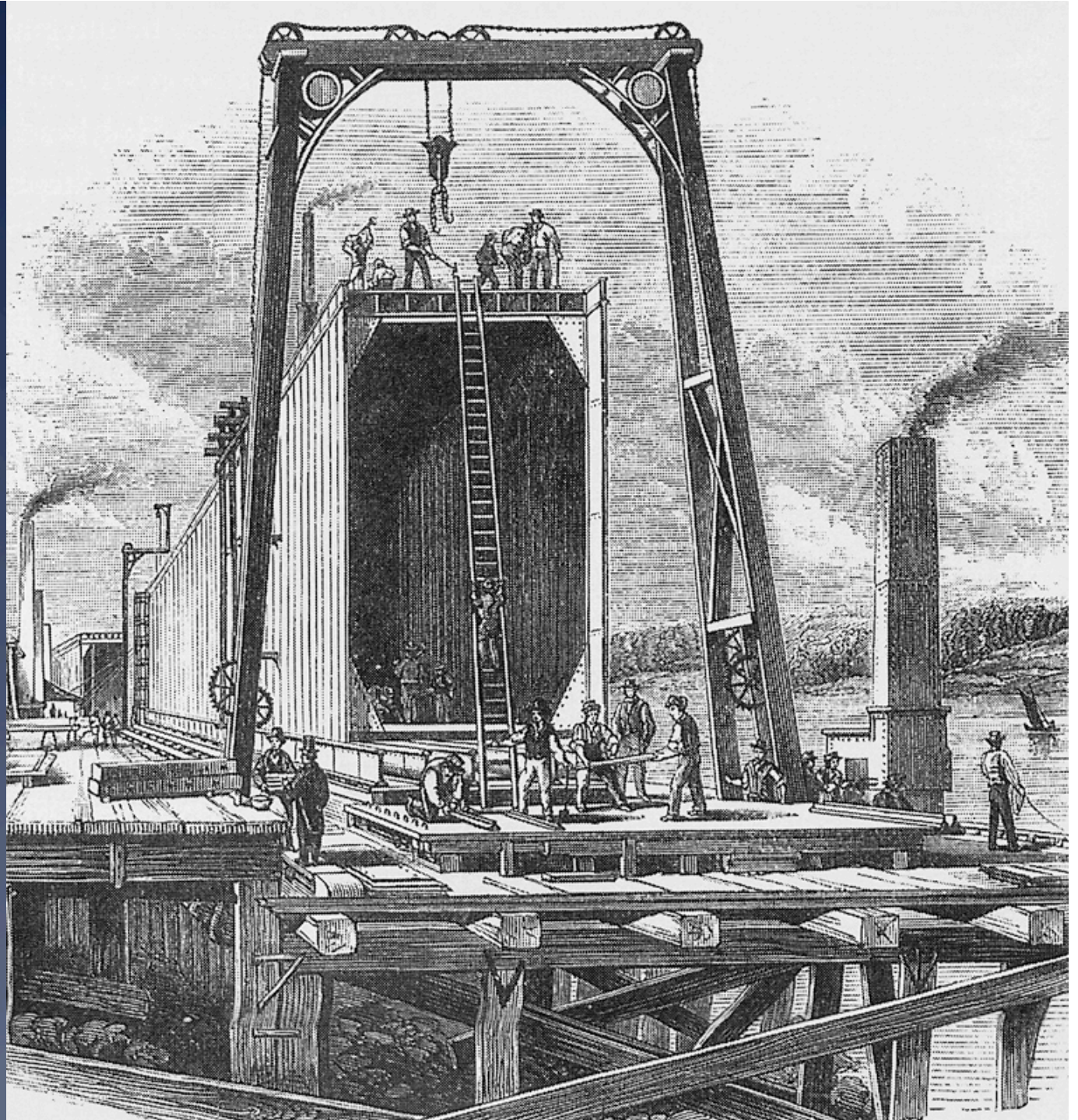
Test to Destruction

...we don't need no theory

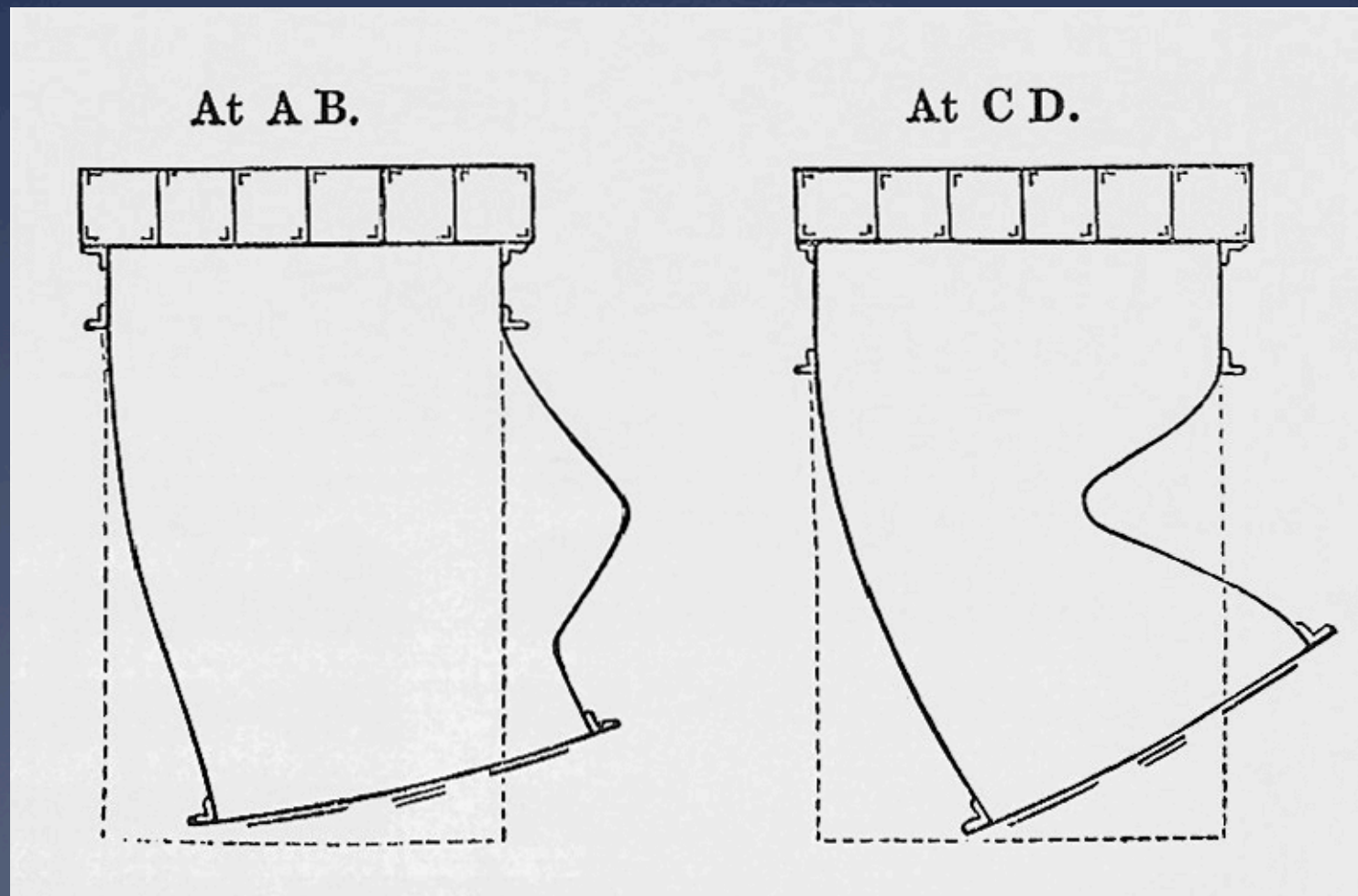


Birth of the Box Beam ?

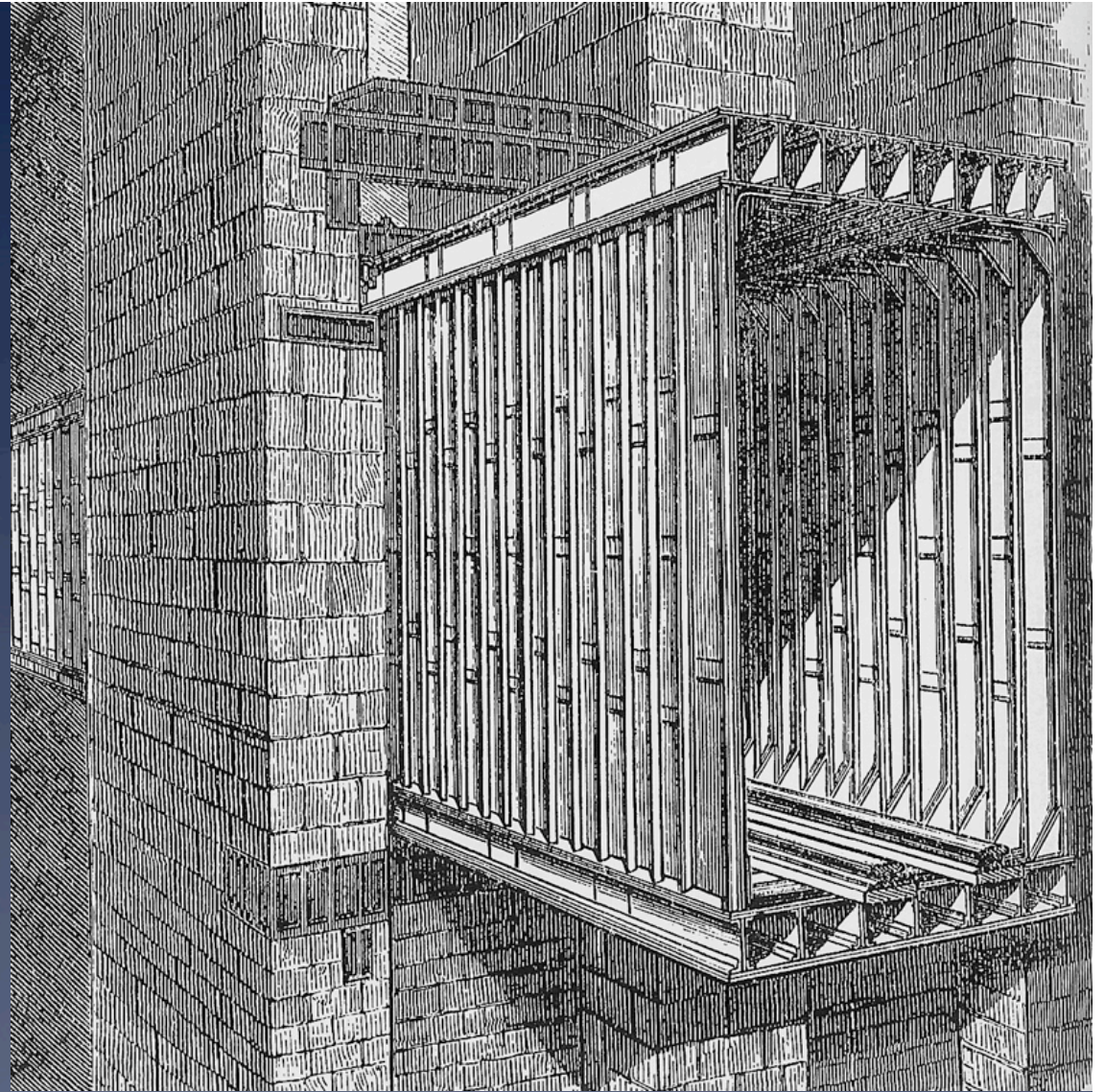
Britannia Bridge crossing of the
Menai straits 1850



Midspan sway causes buckling...
Brace till it doesn't buckle



Iron Box



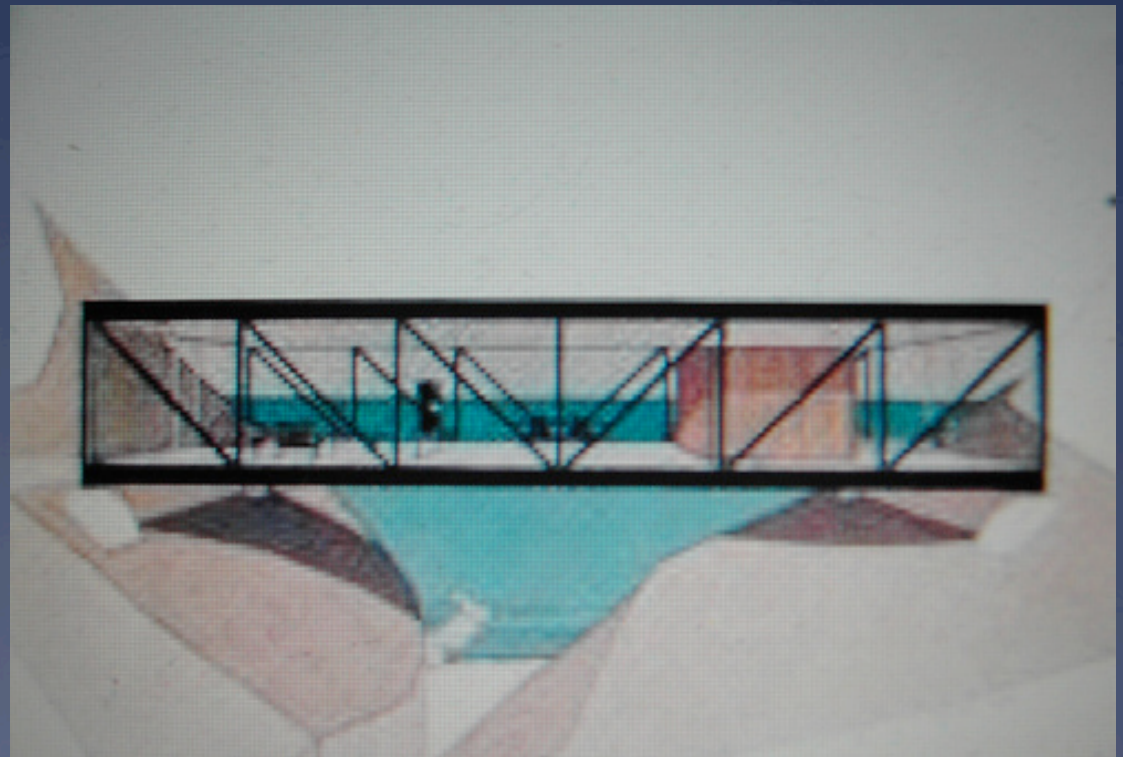
Billington “The aesthetic defects of the Britannia Bridge are rooted in the fact that **structural art does not flourish when the constraint of economy is removed**”...more beef does not make art...more money does not make art...

“David Billington, The Tower and The Bridge”

Craig Ellwood spans a canyon
...but why?



"In architecture, structure is
the only clear principle".
Craig Ellwood





Art Center College of Design, Pasadena California, Craig Ellwood, 1976





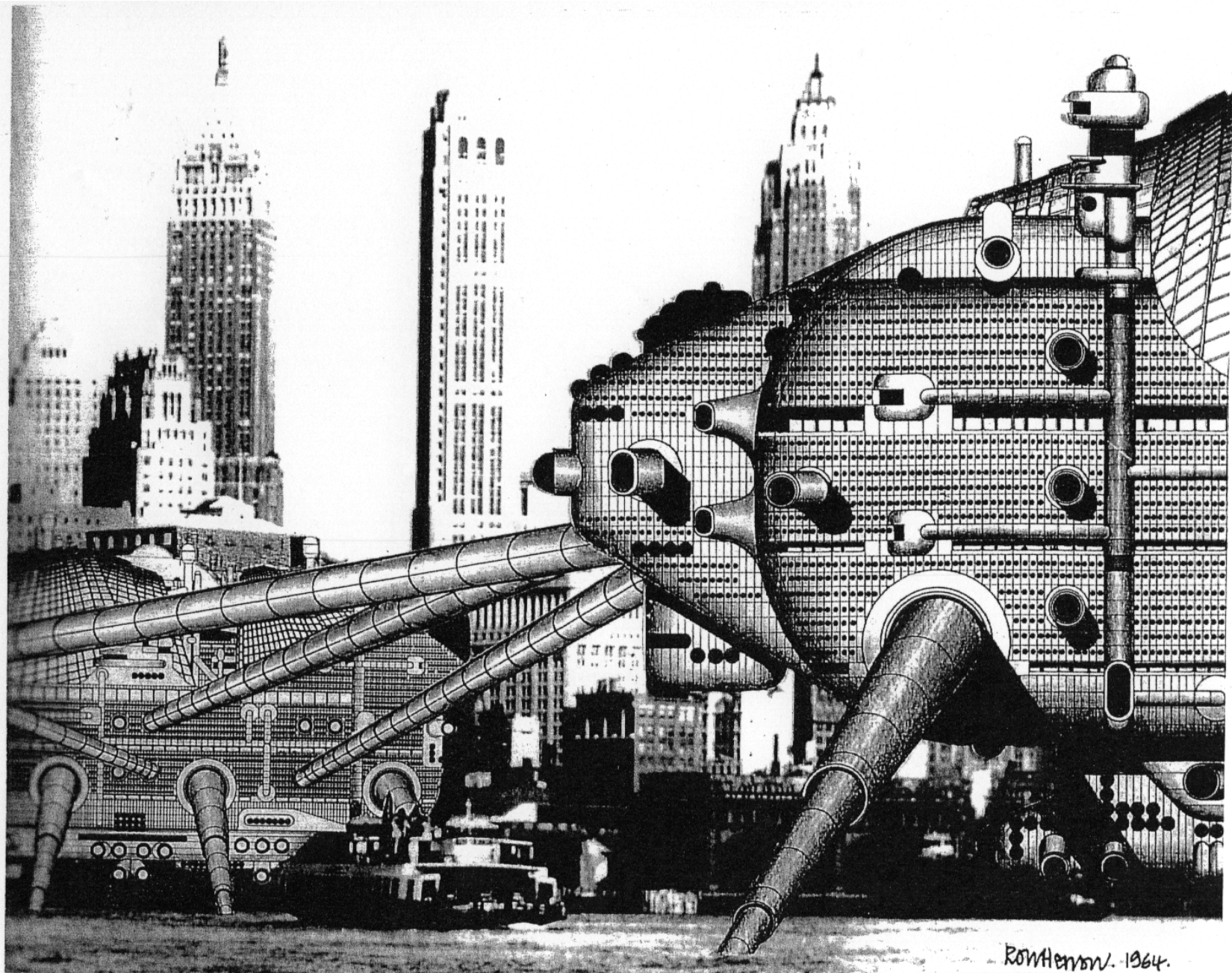


Skyways... life out of the cold and above the street in Minneapolis



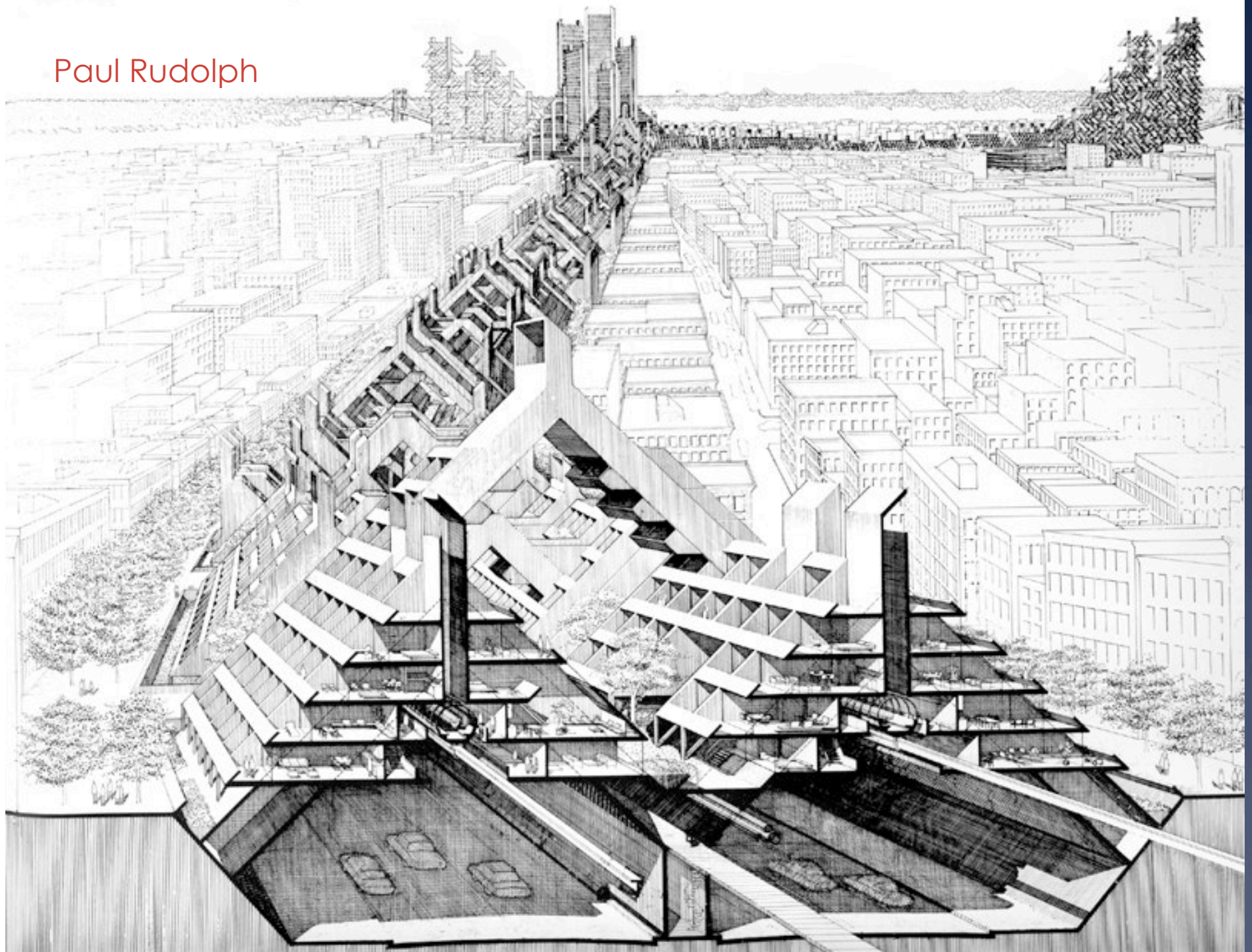


Minneapolis firm City Desk Studio to transform a skyway into, among other things, a lakeside retreat. It was being offered on Craigslist. For \$79,500.



Megastructures proposed and
Archigram, The Walking City, Ron Herron, 1964

Paul Rudolph





Megastructures proposed and ... the university of Winnipeg



Ontario School of Art and Design, Toronto Will Alsop, of Alsop Architects



Saves land area...

http://www.architecture.uwaterloo.ca/faculty_projects/terri/steel/ocad.html















...a quiet neighbor?





Clinton presidential center







