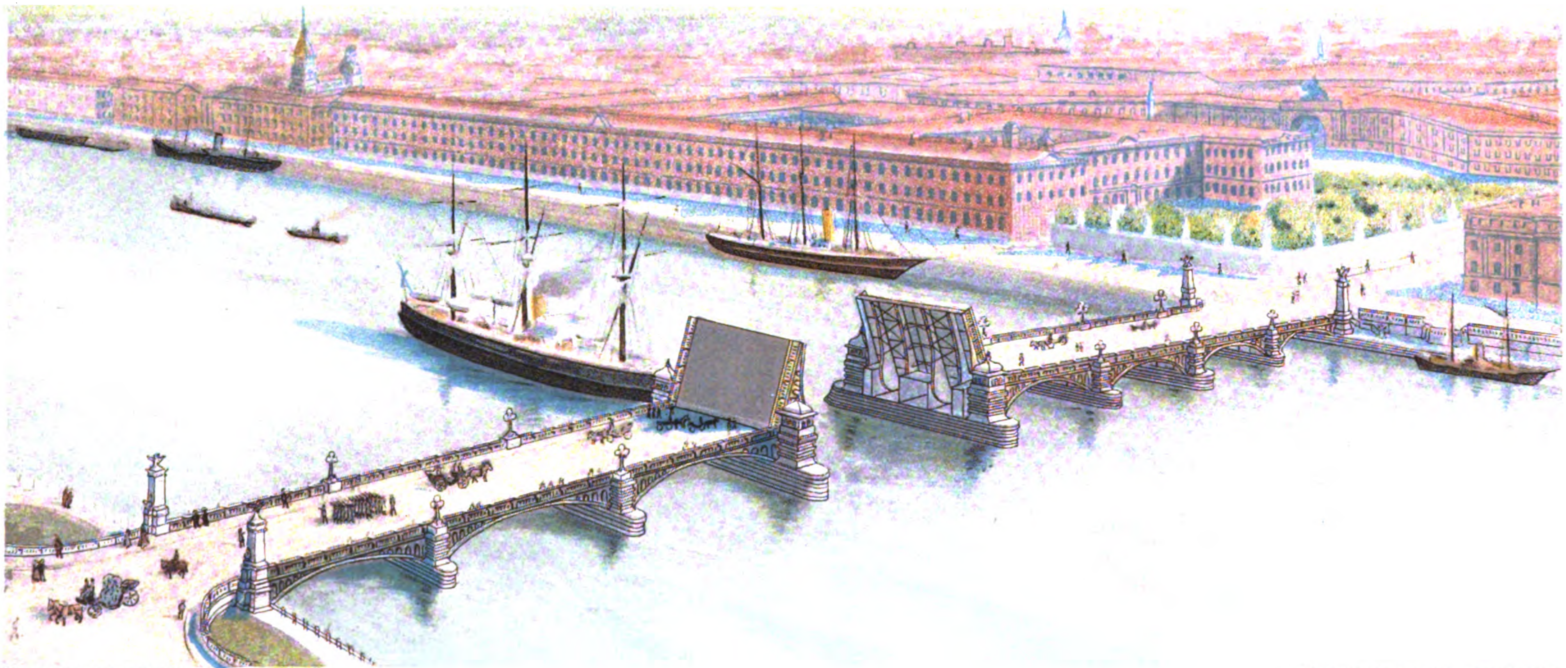
Scherzer Rolling Lift Bridges

SCHERZER ROLLING LIFT BRIDGES



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THE SCHERZER ROLLING LIFT BRIDGE CO.
CHICAGO. U. S. A.

-SCHERZER-ROLLING-LIFT-BRIDGE-
ACROSS THE GREAT NEVA RIVER AT THE WINTER PALACE, ST. PETERSBURG, RUSSIA.

ДВОРЦОВЫИ МОСТЪ СИСТЕМЫ ШЕРЦЕРА ЧЕРЕЗЪ РѢКУ БОЛЬШУЮ НЕВУ, ВЪ С. ПЕТЕРБУРГѢ.

PREFACE

IN PRESENTING to our patrons and the public, this third, revised and enlarged edition on the Scherzer Rolling Lift Bridge, the author desires to acknowledge his indebtedness to the inspiration, inventions and achievements of his deceased brother, William Scherzer, which made possible the construction of the Scherzer Rolling Lift Bridges illustrated and described, and the production of this volume.

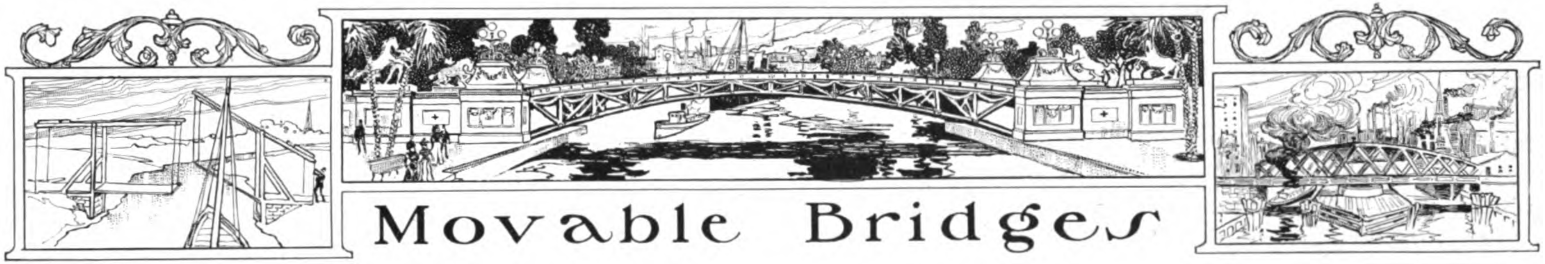
¶ He desires to express his appreciation of the many valuable suggestions and the assistance received from able, experienced and distinguished patrons, and also for the valuable services received from associates and collaborators in the structural, mechanical and artistic development of the Scherzer Rolling Lift Bridge.

¶ The author's conception of the possibilities of bridge construction has greatly enlarged from practical experience gained since the issue of the first edition ten years ago. His efforts in the future, as they have been in the past, will be concentrated to develop the Scherzer Rolling Lift Bridge to successfully meet any possible requirements in length of span, width of bridge, or artistic design.

Albert H. Scherzer

Chicago, July, 1908.

The Modern Type of Movable Bridge



Movable Bridges

"In all things, but proverbially so in mechanics, the supreme excellence is simplicity."—*James Watt.*

"The best engineer is not necessarily the one who will design and construct an elaborate bridge across a mighty river, but the one who will design and construct such a bridge so as to give the greatest amount of facility for transportation over it at the least possible expense." * * *

The Mediæval Pivot or Trunnion Bascule Bridge.

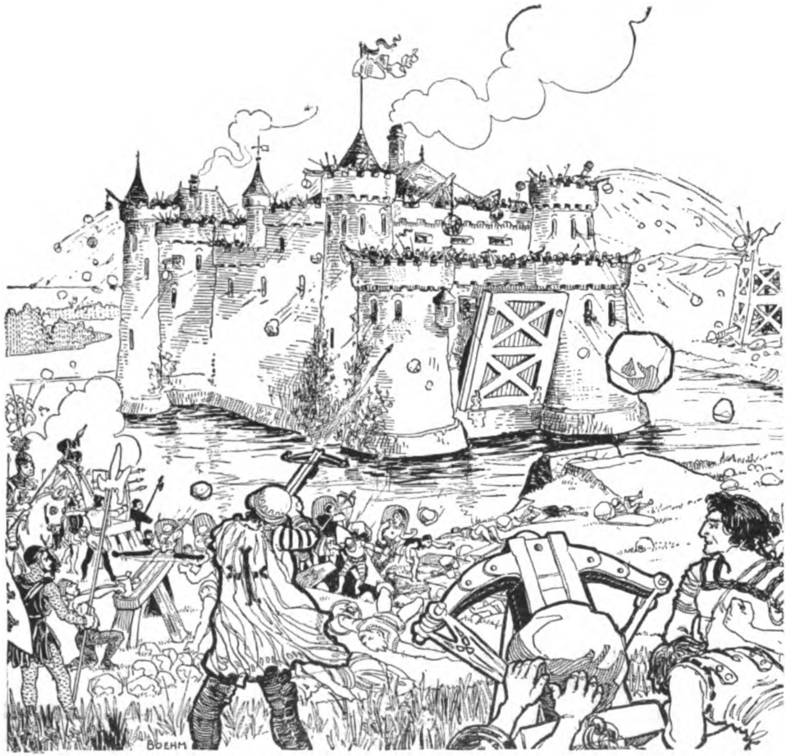
THE first movable bridges were used chiefly as bascules or draw bridges to span the moats surrounding castles or fortresses, and were of very short span. They were mainly built of wood, very little metal being used in their construction.

These bridges revolved around a hinge pivot or trunnion in a vertical direction, and were sometimes counter-balanced similar to a see-saw. They were very effective in the defense of castles and fortresses, but became obsolete upon the introduction of gunpowder and cannons.

With the advance of civilization, the interests of commerce and navigation called for a bridge to span navigable waters, that could be moved to allow the passage of vessels. The mediaeval pivot or trunnion bridge was early applied to this purpose, but very little progress was made in its development and improvement until the nineteenth century, when iron was generally substituted for wood in construction.

The Essential Requirements of a Movable Bridge Are:

1. The bridge must be absolutely safe for all traffic crossing it and for traffic using the navigable channel.
2. The bridge must cause the least possible delay to the traffic crossing it and to the traffic using the navigable channel.
3. The bridge should provide the widest possible navigable channel at a minimum cost.
4. Economy of first cost of the bridge, economy of operation and economy of maintenance.
5. Economy of space required for the site and operation of the bridge.
6. The bridge must not encroach on the adjacent dock space.
7. The bridge should provide one ample, unobstructed navigable channel in the middle of the waterway.
8. The main structural moving parts of the bridge should be few and simple.
9. The bridge should move with the least possible friction because of its comparatively great weight.
10. The operating machinery, locks and equipment of the bridge should be few and simple.
11. The bridge should be very rapid in operation.
12. When open, the bridge should form a barrier closing the highway.
13. The bridge should be as rigid as a fixed bridge, under the heaviest moving loads for both highway and railway traffic.
14. The bridge should have pleasing and artistic outlines.



The Mediaeval Bascule Bridge.

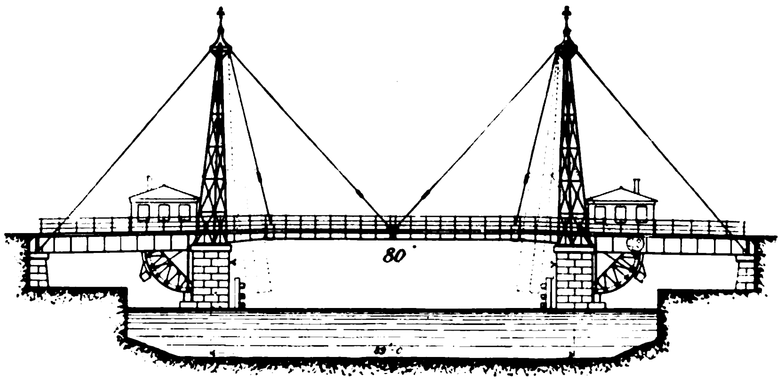
Only Three Types of Movable Bridges Have Been Extensively Used:

1. The Hinged Pivot or Trunnion Bascule Bridge.
2. The Swing Bridge.
3. The Scherzer Rolling Lift or Bascule Bridge.

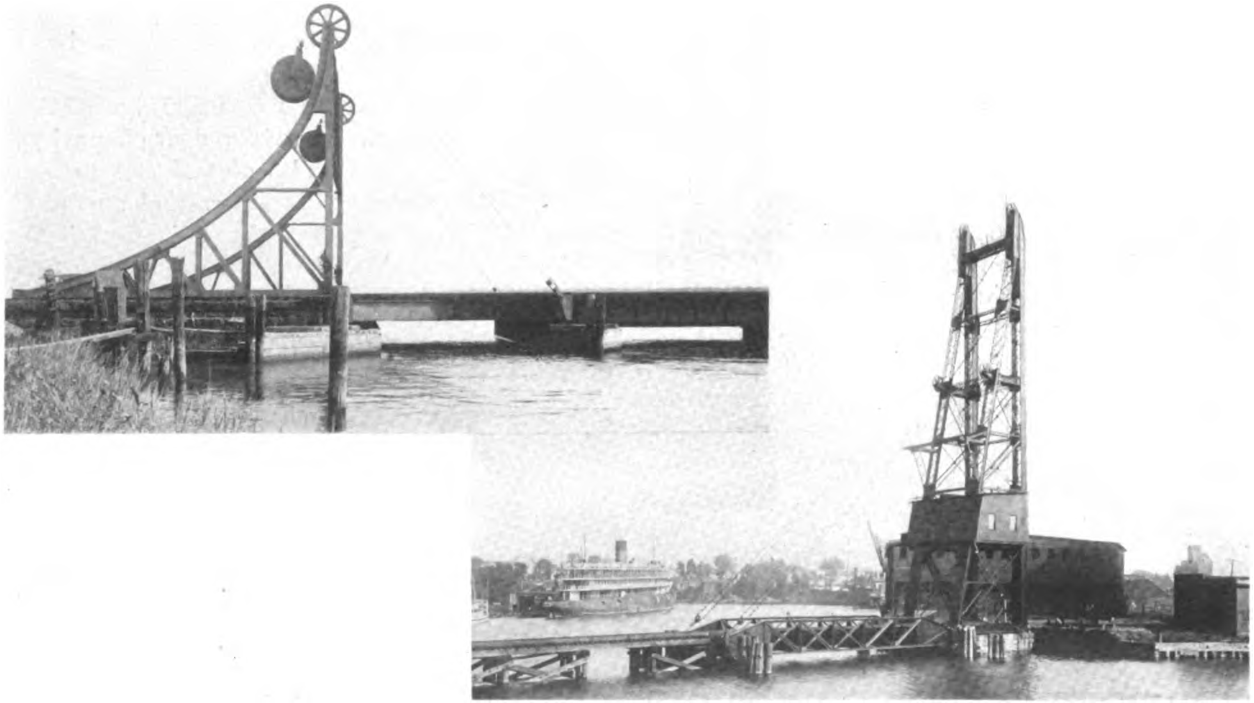
Small Hinged Pivot or Trunnion Bascule Bridges.

Between the years 1800 and 1869, a number of pivot bascule bridges were built, which had spans from 20 feet to 50 feet in length. In 1869 the Knipplesbro bascule bridge at Copenhagen, Denmark, was completed, being the largest bascule bridge ever constructed. It gave a clear channel 56 feet 8 inches wide, the total width of the bridge being 31 feet. It was composed of two movable leaves, and operated by hydraulic power.

In 1878 the Fijenoord bascule bridge at Rotterdam, Holland, was completed. It gave a clear channel 75 feet 6 inches wide, and had a total width of 34 feet 5 inches. It was also composed of two movable leaves and operated by hydraulic power. This bridge was, and remained until the construction of the Tower bridge at London, England, the largest pivot bascule bridge in Europe.

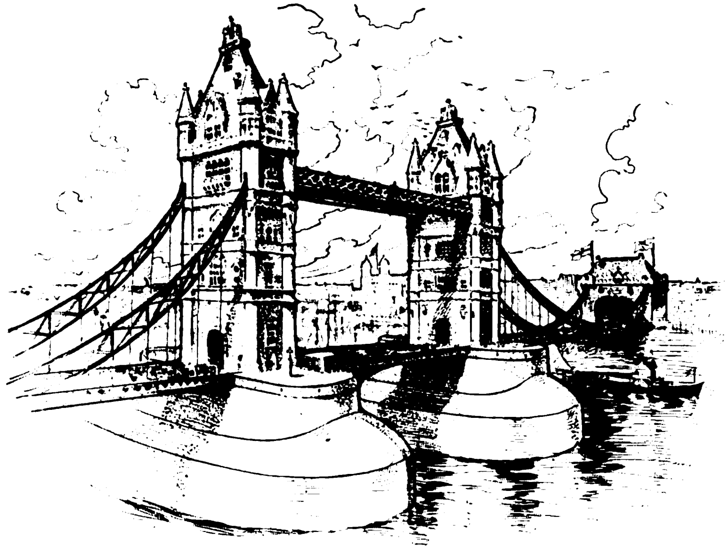


An Old Type of Trunnion Bascule Bridge



Types of Small Pivot Bascule Bridges

The Tower Bridge · London · A Large but Expensive Pivot Bascule Bridge



For more than half a century the most distinguished British engineers suggested various plans for accommodating the highway traffic across the Thames River, east of London Bridge, in the vicinity of the Tower of London. Plans were submitted for a high-level bridge, a tunnel or subway, a swing bridge and a bascule bridge.

Both the subway and the high-level bridge were objectionable on account of their great cost, being estimated at twice the cost of a bascule bridge. Both the subway and the high-level bridge were also objectionable, because of the steep grades which all traffic would have to climb perpetually in order to cross the river. Another serious objection was that the entrances to a subway or high-level bridge must be placed a great distance from the banks of the river, while a bascule bridge can have its entrances at the banks of the river, virtually without grades.

The eminent engineers of the Tower Bridge recognized the many objectionable features of the swing bridge, and in preference thereto proposed the adoption of the pivot bascule bridge, which was then the only other type of movable bridge available, even though the large span required increased the difficulties and cost of construction enormously.

After a very thorough consideration and hearing of all parties concerned, the authorities decided that the bascule bridge would be the most feasible and least expensive means to accommodate the enormous land and water traffic of London. The plans were begun in 1878, the construction started in 1885, and the bridge was completed in 1894.

The total cost of the Tower Bridge was more than $4,000,000, more than $500,000 being used for the artistic embellishment of the towers. In view of the fact that the bascule part of the Tower Bridge provides a waterway 200 feet in width, in contrast to the waterway of 75 feet 6 inches, provided in the Fijenoord bascule bridge, which represented the development of centuries, the engineers who so successfully designed and constructed the Tower Bridge deserve the highest praise.

The Tower Bridge had been under construction eight years and was nearing completion at the time of the invention of the Scherzer Rolling Lift Bridge. The movable or bascule part of the Tower Bridge was very expensive in construction, and is also comparatively slow and expensive in operation. It marks the culmination of the pivot bascule bridge.

Briefly stated the main advantages of the Scherzer Rolling Lift Bridge over the trunnion bascule bridge are as follows:

1. The Scherzer Rolling Lift Bridge has the shortest possible length of movable span to bridge any required opening because in opening the movable leaves move back and away from the channel. This great advantage is lost in the trunnion bascule bridge because the trunnions are fixed and do not permit the movable leaves to move back from the channel. The movable span must therefore be lengthened at greatly increased cost to provide the required clear channel.

2. The Scherzer Rolling Lift Bridge does not require a counterweight pit.

3. The Scherzer Rolling Lift Bridge has absolutely no sliding friction during operation. The large rollers on smooth, level tracks provide the most perfect known mechanical construction to reduce friction which in the Scherzer Rolling Lift Bridge is virtually nil, even in the largest and heaviest bridges.

4. The Scherzer Rolling Lift Bridge can be designed to provide by-passes for additional waterflow.

5. The Scherzer Rolling Lift Bridge is rigidly braced at all points according to the best practice.

6. The Scherzer Rolling Lift Bridge can be adapted in form to meet any possible requirements for a pleasing, graceful and artistic bridge and for single, double or multiple track bridges side by side with the minimum spacing of tracks.

7. The Scherzer Rolling Lift Bridge is not experimental and is the most economical in cost of construction and maintenance of all known bascule bridges. This is demonstrated by the fact that the longest, the widest, the most active and important bascule bridges constructed for railroad, electric railroad and highway traffic throughout the world during the past fifteen years are Scherzer Rolling Lift Bridges.

8. The Scherzer Rolling Lift Bridge has the counterweight firmly and rigidly attached to the trusses forming without additional cost the most substantial bracing possible. This is an especially great advantage and is in striking contrast to the hinged, pivoted and shifting counterweights of some types of trunnion bascule bridges.

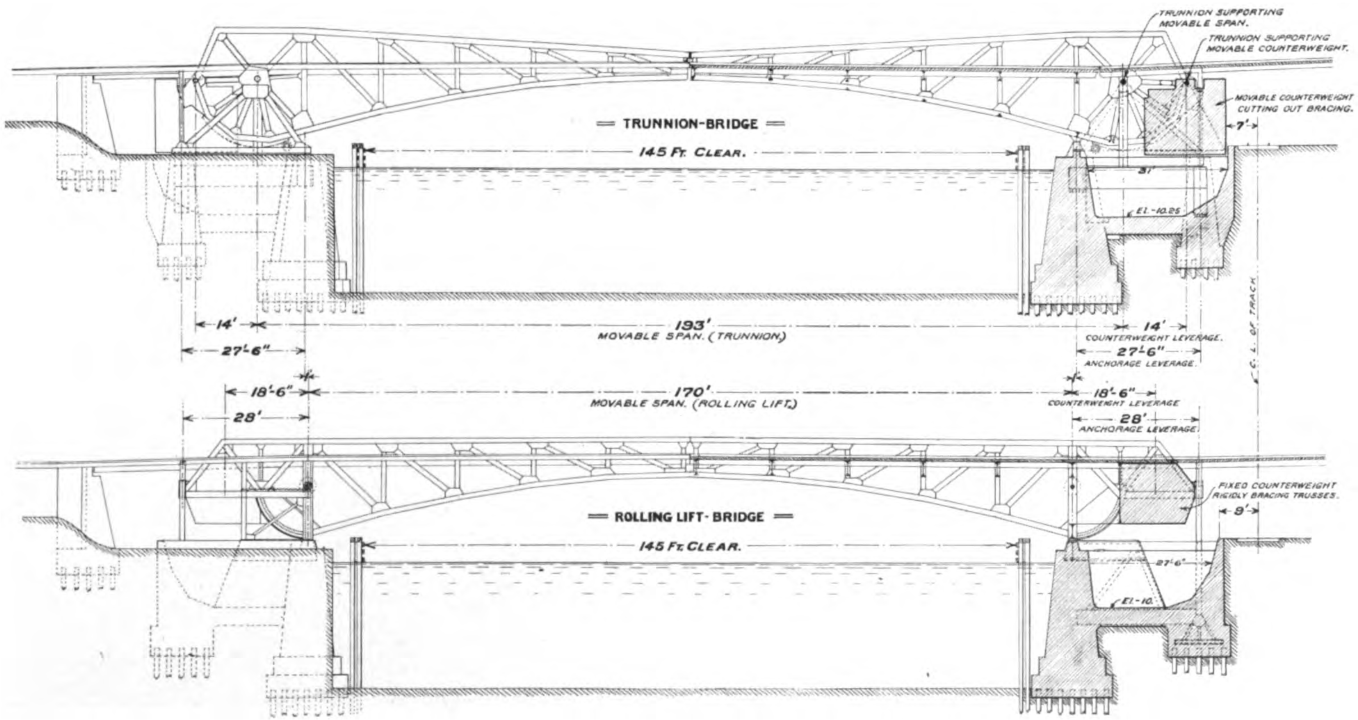
9. The Scherzer Rolling Lift Bridge provides the maximum lever arm and area for counterweight and therefore permits the use of the most economical material for this purpose, plain concrete being generally used for counterweight.

All the above advantages are secured because the Scherzer Rolling Lift Bridge does not revolve about a trunnion or pivot, but when opened, rolls away from the navigable channel on a perfectly smooth and level track.

The Scherzer Rolling Lift Bridge has been successfully used for the heaviest and most important railroad, electric railway and highway traffic and is not an experiment, even for the longest required spans. It has always given satisfaction to owners and the public.

Highway Scherzer Rolling Lift Bridge across Gowanus Canal, Brooklyn, New York.

Comparison of Trunnion and Rolling Lift Bridges

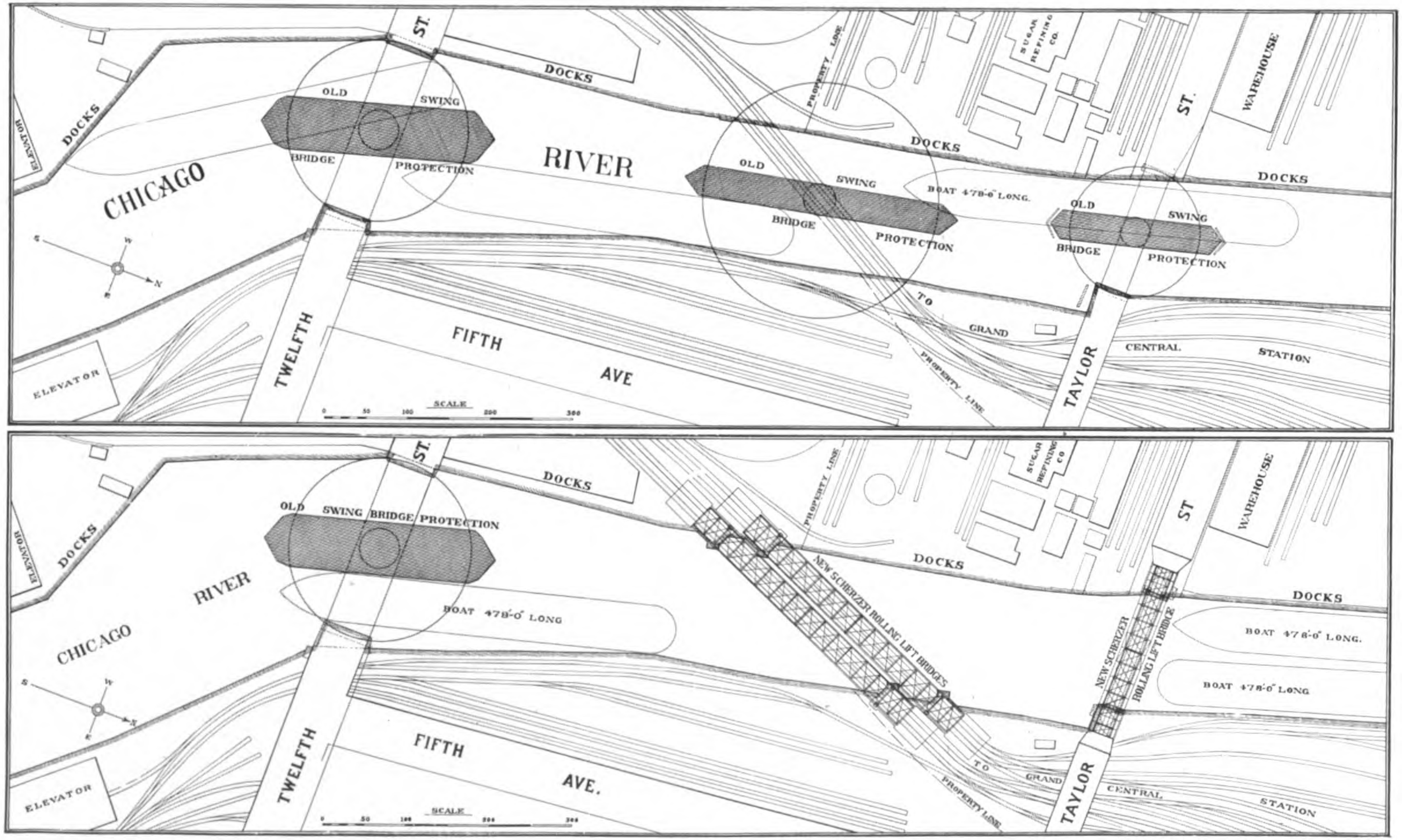


Comparison of Trunnion and Rolling Lift Bridges

	TRUNNION	ROLLING LIFT	GAIN BY USING ROLLING LIFT BRIDGE	
Movable Span - -	193′ 0″	170′ 0″	23′ 0″	11.9 Per Cent
Leverage of Counterweight	14′ 0″	18′ 6″	4′ 6″	32.0 "
Leverage of Anchorage -	27′ 6″	28′ 0″	0′ 6″	1.8 "
Amount of Steel - -	625 Tons	475 Tons	150 Tons	24.0 "
Amount of Counterweight	365 Cu. Yds.	200 Cu. Yds.	165 Cu. Yds.	45.0 "
Weight of Counterweight	170 Lbs. Per Cu. Ft.	140 Lbs. Per Cu. Ft.	30 Lbs. Per Cu. Ft.	17.6 "
Weight of Machinery -	169,500 Lbs.	75,000 Lbs.	94,500 Lbs.	56.0 "
Depth of Pit - - -	10.25′	10.00′	0.25′	2.4 "
Concrete in Substructure	2,600 Cu. Yds.	2,400 Cu. Yds.	200 Cu. Yds.	7.7 "
Friction - - -	Sliding	Rolling	Power and Durability	
Construction - - -	Complicated—many parts	Simple—One Part	Simplicity and Reliability	

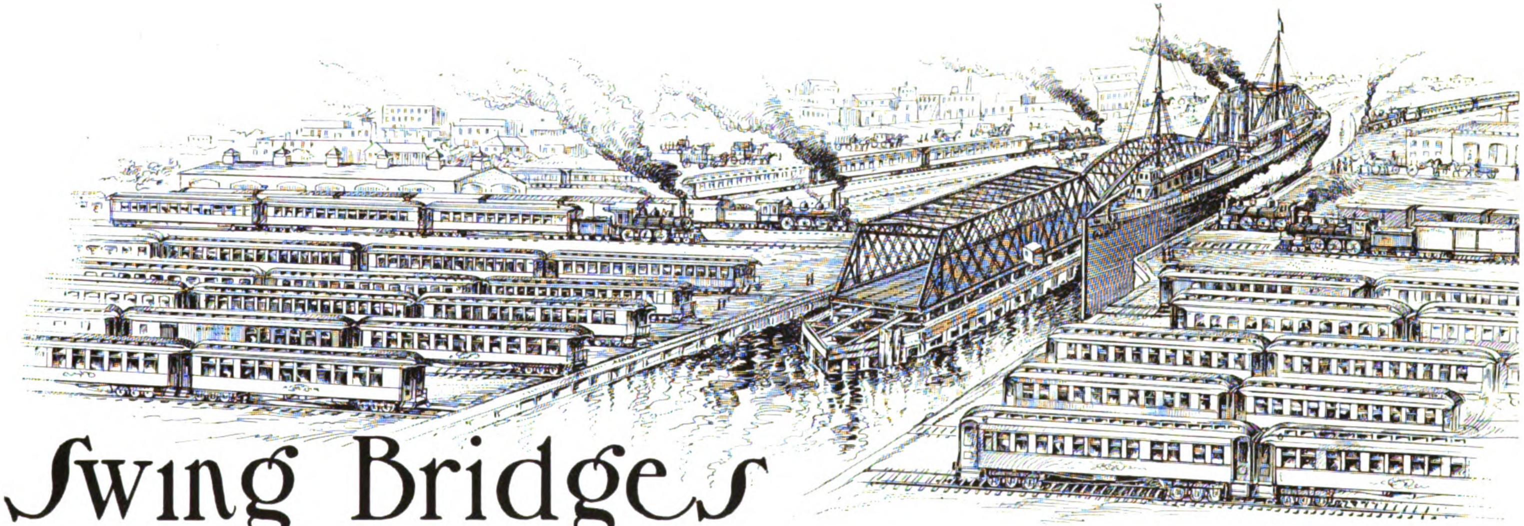
TRUNNION BRIDGE. Counterweight being suspended by trunnions has no value whatever as bracing and because of its shifting movement it cuts out essential bracing, impairing the rigidity of the bridge.

ROLLING LIFT BRIDGE. Counterweight being rigidly fixed to the movable structure, adds to the strength and rigidity of the bracing.



Comparative plats showing obstructions to navigation in the Chicago River caused by old center pier swing bridges and the improved channel provided by the use of Scherzer Rolling Lift Bridges

Swing Bridges



ALL TRAFFIC BLOCKADED BY A VESSEL JAMMED IN THE NARROW PASSAGE.

Considering the fact that the hinged pivot or trunnion bascule bridge was originally designed to span moats only, it adapted itself well to fulfill some of the essential requirements of a movable bridge crossing small navigable waterways. The piers were placed upon the sides of the channel, giving one unobstructed channel for navigation. It moved in a vertical direction within the limits of the highway and formed an effective bridge guard when open, preventing accidents.

The increasing size of vessels called for an ever increasing width of channel and consequent length of span in movable bridges. The cost and difficulties of construction of the hinged pivot or trunnion bascule bridge increased enormously as the span increased in length. These difficulties, owing to the increased span required, finally became so great that a new type of bridge came into use, namely the horizontal draw or swing bridge.

This type of bridge differed fundamentally from the bascule bridge in that the main supporting pier occupied the center or best part of the navigable channel, and divided the waterway into two narrow passages, instead of providing one wide adequate passage. It was therefore necessary to build a bridge large enough to span two waterways, even where only one channel for navigation was desired.

Some of the more objectionable features of the swing bridge are mentioned below:

SWING BRIDGES ARE FUNDAMENTALLY WRONG IN PRINCIPLE.

Center Pier and Protection Pier Obstruction to Navigation.

1. The center pier and protection pier required to protect the swing bridge when opened, form a serious obstruction to navigation. The obstruction, located virtually in the center of the main navigable channel, is considerably longer and wider than the bridge itself. Such an appropriation of the channel by a center pier and protection pier is objectionable even in wide waters, but it is especially objectionable where the navigable channel is limited in width, as it is in rivers flowing through cities such as Chicago, Milwaukee, Cleveland, Toledo, Buffalo, New York, Boston and other cities having large commerce by water. An obstruction in the form of a center pier and protection pier placed in the center of the navigable channel divides the waterway into two narrow channels and renders useless for navigation the center or most desirable part of the waterway. This feature of the swing bridge is especially objectionable in navigable canals, because the canal must be made wider to accommodate the obstruction, and in rivers two channels must be dredged and maintained instead of one adequate channel.

Vessels and Traffic Retarded.

2. Vessels being compelled to deviate from their course in order to pass around the center pier and protection pier obstruction, and the openings provided being narrow, the vessels are greatly retarded in their movements and the bridge must remain open a much longer time than if one wide, unobstructed center channel were provided.

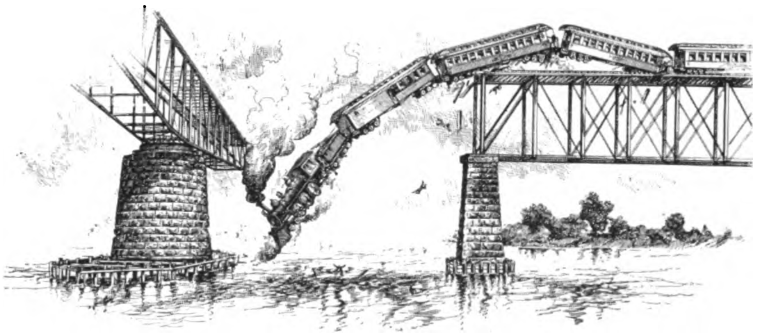
Dock Space Wasted.

3. As the swing bridge moves or revolves in a horizontal plane, much valuable dock space adjacent to the bridge is made useless for mooring vessels.

Valuable Land Useless.

4. Where the channel is very narrow, the center pier of the swing bridge must be placed upon the shore, the greater part of the bridge swings over land, and only one small open-

ing is available for navigation. This necessitates the building of a very large bridge to attain a very small proportionate result, as is illustrated by the swing bridges across the Chicago River at Adams and Jackson streets. The latter bridge has a length of 280 feet and gives only one channel for navigation of about 85 feet. The center pier rests entirely upon the shore, and the bridge swings over land worth many times the cost of the entire structure. These swing bridges must be removed and discarded to meet modern traffic requirements.



Disastrous Accidents.

5. Opening the swing bridge leaves a chasm in the roadway which has resulted in very serious accidents on railroad, electric railway and highway swing bridges. Nearly every swing bridge has trapped its victims during a fog or at night, a notable accident of this character occurring at the central viaduct at Cleveland where an electric car plunged over 100 feet into the river killing the conductor, motorman and all passengers, and very recently the accidents at Atlantic City and Norfolk. The necessity of lifting the rails before the bridge can be operated is a source of danger and accident on railroad and electric railway swing bridges. This impairs the stability of the track and the alignment and connection between the rails on the fixed and movable portions of the structure.

Swing Bridge Must be Narrow.

6. The swing bridge must be made as narrow as possible, so that it will not occupy too much of the navigable channel when the bridge is opened for the passage of vessels. For this reason swing bridges are usually much narrower than the streets which they connect.

Enormous Size and Weight of a Single Swing Railway Bridge.

7. Whenever a number of railroad tracks must be carried across a navigable channel at one place, a swing bridge becomes objectionable because of its enormous length, width and weight, and an accident to the operating machinery of

such a single swing bridge while it is opened will stop the entire railroad traffic until the necessary repairs are made.

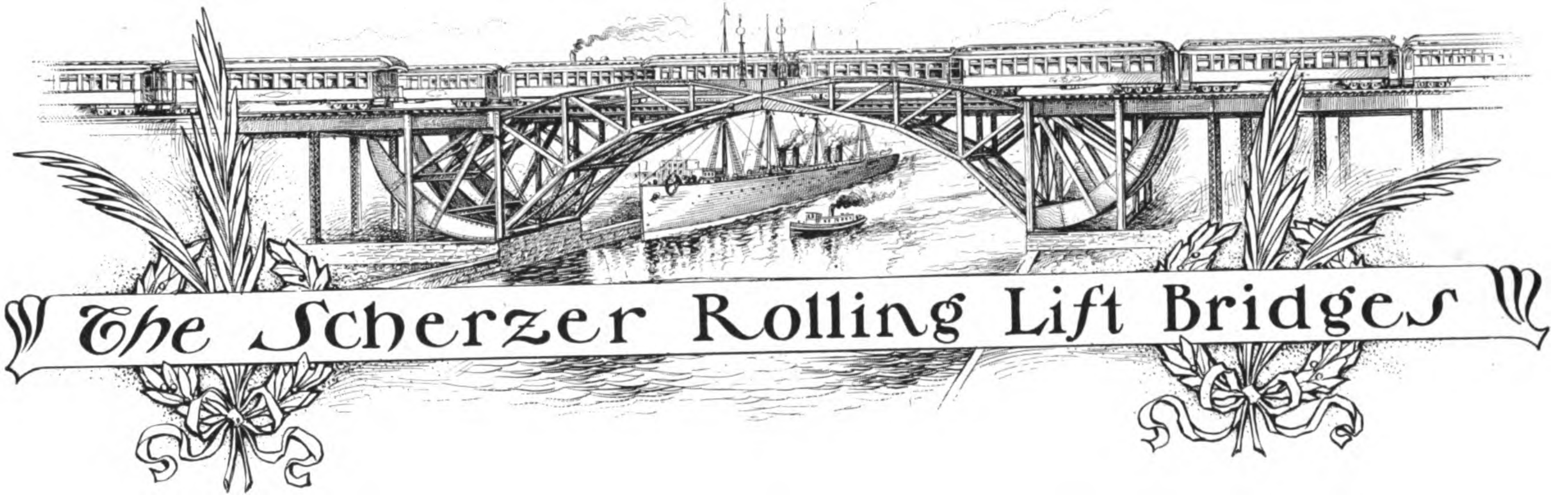
Erection Difficult.

8. As the swing bridge must usually be erected in the center of the channel, its erection presents some difficulties and frequently interferes with navigation and traffic. Where traffic must be maintained an expensive temporary bridge must be constructed.

Swing Bridge a Poor Asset.

9. Railroad traffic usually doubles within ten years, and at cities and terminals much more rapidly. If a single track swing bridge is built its usefulness is short lived as an increase of traffic requiring an additional track compels the discarding and removal of the existing swing bridge. If a double track swing bridge is then constructed to take its place increased traffic requiring a third track will soon compel the discarding and removal of the new double track swing bridge. This expensive process must be repeated for every growth in traffic requiring an additional track because swing bridges move or revolve in a horizontal plane and therefore a new swing bridge can not be constructed alongside of an existing swing bridge, as the two bridges would strike each other in revolving. This condition makes the swing bridge, which ought to be a permanent structure, a very poor and uncertain asset to any railroad company and soon becomes a liability because its removal is expensive and also disarranges and retards traffic.

Old type of obstructive center pier swing bridge in a congested location.



THE METROPOLITAN ELEVATED RAILROAD BRIDGE.

The most difficult problem that confronted the management and engineers of the Metropolitan West Side Elevated Railroad was the question of how they could carry the traffic of their four tracks across the Chicago River, so as to enter the business center of Chicago. Their right of way permitted a crossing between Jackson street and Van Buren street swing bridges, but these two bridges were so close together that it was impossible to build a third swing bridge between them.

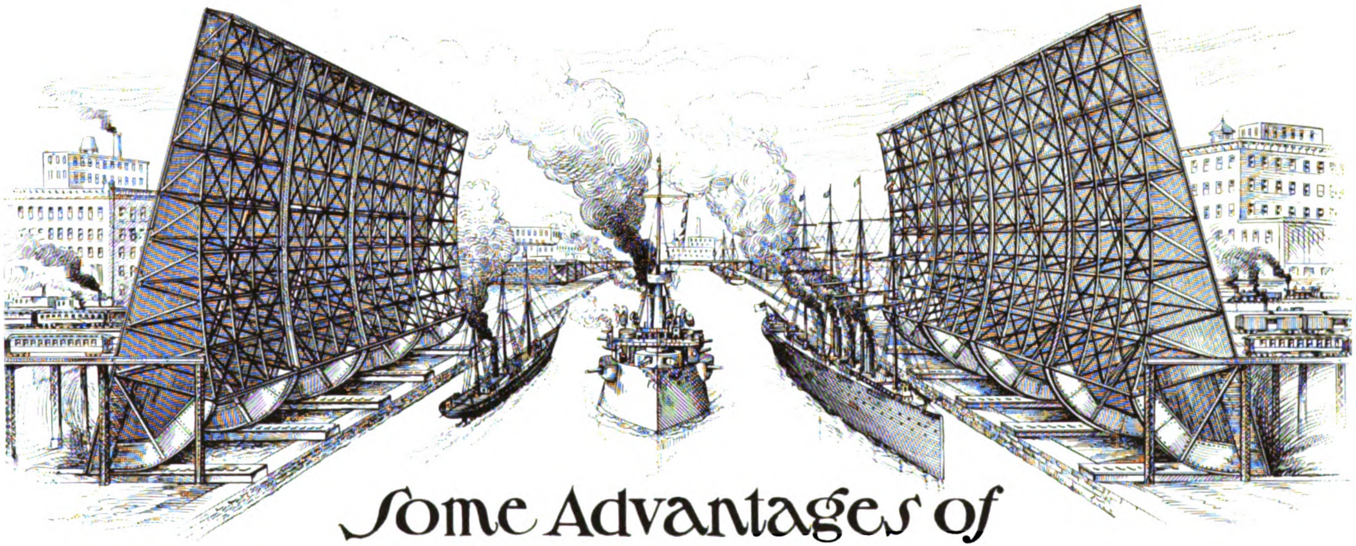
A number of bridge engineers were consulted as to the best type of bridge to meet the difficulties, and a number of new schemes were submitted, none of them, however, fulfilling the requirements. One of the ablest American bridge engineers submitted to the management a pivot bascule bridge design, similar to the Tower bascule bridge at London, which was then under construction, and it seemed to be the only feasible solution of the difficulties, and detailed plans were prepared for the construction of the bridge. In working out the detailed plans objectionable features became more apparent and William Scherzer, C. E., was consulted by the management of the Metropolitan Company in reference to overcoming some of these objectionable features and the execution of the design. After devoting a great deal of time and study to this problem, he became convinced that it was impossible to eliminate the objectionable features of the pivot or trunnion type of bascule bridge. As the elevated railroad was then rapidly nearing completion, the bridge problem became very critical, and induced William Scherzer to endeavor to solve the problem on entirely new lines, and, after very extensive studies, ultimately led to his invention of the type of bridge known as the Scherzer Rolling Lift Bridge. A design for a four-track rolling lift bridge was prepared by him and submitted, and after a careful investigation of its merits as compared with those of other types of bridges, it was decided by the management of the Metropolitan West Side Elevated Railroad Company to adopt this design, and William Scherzer was entrusted with the preparation of the detailed plans.

The Metropolitan Company then proposed to the City of Chicago that this type of bridge also be used at Van Buren street in place of the old swing bridge, which was inadequate. This proposition was accepted by the City of Chicago, and approved by the Secretary of War on November 16th, 1893. The plans for both of these bridges were completed in that year, shortly before the death of William Scherzer.

The Scherzer Rolling Lift Bridge fulfills every requirement essential to a movable bridge. Its introduction marked a new era in the progress of movable bridges. It eliminates the objectionable features of the hinged pivot or trunnion bascule bridge, the swing bridge and the direct lifting bridge. It spans navigable waters in the simplest, most efficient and least expensive manner. It has been in extensive use for a number of years and has never trapped or killed a single victim, nor as yet has any vessel succeeded in damaging the bridge. The bridge is especially adapted to avoid collisions, because of its great rapidity in opening and moving out of all danger. The efficiency of the Scherzer Rolling Lift Bridge in accommodating both the largest land and water traffic and its superiority over former types of movable bridges has been demonstrated beyond question by the many large bridges of the Scherzer type now in successful operation in Chicago, New York, Buffalo, Cleveland and Boston, and the further fact that it has been adopted, approved and used by the management and engineers of the largest and most progressive railroads in the United States and foreign countries, for the largest and most difficult movable railroad bridges ever built, and the further fact that the Scherzer bridge has been adopted and the Scherzer Company has completed plans for a number of large railroad and highway bridges now in the course of construction in various parts of the United States and England, Ireland, Holland, Russia, Egypt, India, Argentine Republic, Mexico, and other foreign countries. The other types of movable bridges heretofore used are rapidly being replaced by the Scherzer Rolling Lift Bridge.

An eminent authority has stated:

"The Scherzer type is the bridge of perfection; it is recognized by the engineering profession as the most perfect bascule bridge in existence; it is a monument to the inventor."



Some Advantages of Scherzer Rolling Lift Bridges

Piers on Shore; No Center Piers; Channel Unobstructed.

1. The movable parts of the Scherzer Rolling Lift Bridge are supported by piers placed upon the sides of the navigable channel, and no center pier support is necessary. The entire navigable channel is available, and is unobstructed for the passage of vessels. The span of the bridge may be made large enough to fulfill any requirements of navigation without impairing the simplicity, safety or efficiency of the bridge.

No Dock Space Wasted.

2. All dock space adjacent to the bridge is available for mooring vessels, as the bridge in opening or closing rolls or moves in a vertical direction.

Canal or Waterway Need Not be Widened.

3. When it is desired to bridge a navigable channel, river or canal, the bridge piers can be placed upon the shores. This leaves the entire width of the waterway unobstructed and available for navigation when the bridge is opened. The center pier and protection pier of a swing bridge, when placed in the center of a similar waterway obstruct the channel and would necessitate a widening of the canal or river to obtain two less efficient channels for the passage of vessels around the obstruction.

Roadway Closed. Accidents Impossible.

4. When opened for the passage of vessels, the Scherzer Rolling Lift Bridge acts as a barrier, closing the roadway, and thus absolutely preventing the many serious accidents common to swing bridges when opened.

Vessels Can Move Rapidly. Partial Opening Sufficient.

5. The large unobstructed opening in the direct line of the navigable channel, obtained by the use of a Scherzer Rolling Lift Bridge, enables vessels to pass the bridge very rapidly, and as a partial opening of the bridge will often be sufficient for the passage of vessels, the power expended and the time occupied in opening and closing the bridge are both reduced to a minimum. The large bridges of this type now in use are usually completely opened or closed in less than thirty seconds, and receive highway or railroad traffic in less than one minute from the time the bridge begins to close. A swing bridge could not be operated so rapidly and safely, nor could vessels pass so rapidly through the narrow openings provided by the swing bridge.

Bridge Can Be as Wide as Desired—Advantages of a Number of Bridges Side by Side.

6. Any desired number of contiguous railroad tracks may be carried across a navigable canal or river by the Scherzer Rolling Lift type of bridge, by constructing single or double track bridges and placing them side by side, to be coupled together when it is desired to operate them as one bridge; or each bridge may be equipped so as to operate singly. This method of arranging a number of bridges side by side absolutely insures a passage for railroad trains across the waterway at all times, as any accident to the operating machinery of one bridge would not interfere with the use of the remaining bridges in the group. Objection may justly be made to the enormous size, width and weight of a four, six or eight track railroad swing bridge, but no such objection can be made to the use of two, three or four independent double-track bridges of the Scherzer type, when the entire width of each bridge is only 30 feet, and each bridge is equipped so that it can be operated independently of the other bridges, and all of the bridges

are so arranged that they may be coupled together and operated as one bridge when desired. Increasing the number of bridges to be placed side by side to be operated as one bridge when they are arranged in this manner, does not decrease the safety, speed or facility of operation.

Erection Rapid and Economical. No Obstruction.

7. The construction and erection of the Scherzer Rolling Lift Bridge causes no obstruction whatever to navigation. The movable parts of the bridge are erected and completely equipped for operation on the piers at each side of the waterway, in the positions which they occupy when the bridge is open for navigation, and it is not necessary to close the bridge until it is entirely completed and ready for use. This method of erection upon the shores is also very economical and rapid. Both railroad, highway and vessel traffic can be maintained while the bridge is being erected in the upright position on its piers.

Long Span Bridges Absolutely Safe for the Heaviest Loads.

8. The Scherzer Rolling Lift Bridge insures the highest degree of safety in carrying the maximum loads for either highway or railway traffic, as the bridge is designed to act either as an arch or cantilever bridge, or a simple truss span, and, if desired, both the arch and cantilever features may be combined in one bridge. An arch or cantilever span, 200 feet, 300 feet or 500 feet in length is a comparatively limited structure, and cannot be objectionable because of its length.

See comparative diagram.

Double Deck Bridge. Roadway at Any Desired Height.

9. The Scherzer Rolling Lift Bridge may be designed either as a through or a deck bridge or as a double deck bridge. The roadway may be placed at any desired elevation above the surface of the water.

At Rest When Opened 45 Degrees. Movable Parts Cannot be Injured by Falling.

10. The Scherzer Rolling Lift Bridge may be counterweighted so that the center of gravity falls in the center of the rolling segment. In order to move the bridge it is then only necessary to overcome the resistance due to friction, which in the case of a large roller and a perfectly level track, is very small, very much smaller than with any other type of movable bridge, the swing bridge not excepted. To make the bridge more rapid in its operation and to secure the absolute safety of the movable parts, even in the case of an accident to the operating machinery, the movable leaves, or parts composing the bridge, are so counter-weighted that they are at rest when opened at an inclination of about 45 degrees, and not in the horizontal position which they occupy when closed. Thus the leaves forming the movable parts of the bridge will, as soon as

the locks are withdrawn, without the application of any power whatever, roll back and upward from the horizontal positions which they occupy when closed, and open a sufficient channel for the passage of vessels, the dead weight of the movable parts of the bridge in this manner assisting very materially in opening the bridge for navigation, and also in closing the bridge when it has been opened entirely. The principal advantage gained from this arrangement of the counter-weight, lies in the absolute safety of the movable parts of the bridge in case of a failure of any part of the operating machinery. No matter what positions the movable parts of the bridge occupy, should such an accident occur, the parts cannot fall and strike with violence; they can only roll downward to nearly the horizontal position which they occupy when closed, and then roll back again until they finally come to a position of rest at an angle of about 45 degrees. A failure of the operating machinery is very unlikely to occur, as it is very simple and strong.

One Leaf or Span for 300 Foot Channel, or Less.

11. The Scherzer Rolling Lift Bridge may be designed with only one movable leaf or span, when it is desired to cross a narrow waterway and obtain an unobstructed channel of 300 feet or less in width. Such a single span bridge would be more economical in construction and also more efficient than a swing bridge giving a like channel.

Economy in Construction.

12. That the Scherzer Rolling Lift Bridge is not expensive in construction has been repeatedly demonstrated by bids submitted for Scherzer Rolling Lift Bridges in competition with swing bridges and other types of movable bridges, including direct lifting and trunnion bascule bridges. This is also further demonstrated by the fact that more than one hundred Scherzer Rolling Lift Bridges have already been constructed or are now under construction superseding and replacing center pier swing bridges and trunnion bascule bridges in the United States and abroad.

Most Perfect Method to Overcome Friction.

13. The Scherzer Rolling Lift Bridge uses the most perfect and simplest known mechanical method to overcome friction, and friction is of no consequence in a Scherzer Rolling Lift Bridge, even for the longest and heaviest movable spans required. The Scherzer bridge moves by means of a large circular wheel, rocking upon a perfectly smooth and level track. In this respect it differs fundamentally from the pivot or trunnion bascule bridge, in which the friction on the pivots or trunnions increases enormously with every increase in length or weight of movable span.

Little Power Consumed.

14. The electric power consumed in operating a Scherzer

Rolling Lift Bridge is comparatively trifling, because the movable spans are perfectly counter-balanced and roll or rock virtually without friction in opening or closing. The movable spans of even the largest Scherzer Rolling Lift Bridges respond and acquire a momentum so rapidly that the current is usually turned into the motors for less than 20 seconds for a complete operation of opening and closing the bridge.

The double track Scherzer Rolling Lift Bridge constructed in 1903 for the Newburgh & South Shore Railway Company across the Cuyahoga River at Cleveland, Ohio, has a movable span of 160 feet. This bridge carries the heaviest modern railroad traffic, yet it requires an average of only 25 H.P. to operate in 30 seconds. The efficiency and economy of this bridge has already caused its duplication by a large number of railroad companies, among which are the following: Baltimore & Ohio Railroad; New York, Chicago & St. Louis Railway; New York, New Haven & Hartford Railroad; Norfolk & Western Railroad; Seaboard Air Line Railway; San Pedro, Los Angeles & Salt Lake Railroad; Duluth, Rainy Lake & Winnipeg and Canadian Northern Railways; Norfolk & Southern Railway; Buenos Ayres Great Southern Railway and the Government Railway at Port Soudan, Egypt.

The above results in economy correspond with the experience gained from the first Scherzer Rolling Lift Bridge constructed for the West Side Elevated Railroad at Chicago as shown by the letter from the general manager, Mr. W. E. Baker, on page 48, the six track Scherzer Rolling Lift Bridge at Boston for the New York, New Haven & Hartford Railroad Company and the many other bridges of the Scherzer type in operation in this country and abroad for many years.

Shortest Possible Movable Span for Any Required Waterway.

15. Because the Scherzer Rolling Lift Bridge in opening rolls backward and upward, it provides a maximum width of channel for navigation, with a minimum movable span. This great advantage is lost in the pivot or trunnion bascule bridge, as, in order to properly balance that type of bridge, the movable span must be more than 10 per cent longer than the movable span of a Scherzer Rolling Lift Bridge, and the increased movable span alone will increase the weight and cost of trusses, machinery and equipment more than 25 per cent over a Scherzer Rolling Lift Bridge.

One Man to Operate Bridge.

16. A single or double leaf Scherzer Rolling Lift Bridge can be operated successfully by one man from one side of the channel. The bridge can be operated by electricity, gasoline, steam, hydraulic, hand or other power.

Substructure May be Narrow.

17. The substructure may be designed narrow, to provide for a by-pass or to form the least obstruction possible and provide for a maximum water-flow.

Rails Firmly Fastened to Moving Structure.

18. The rails on the Scherzer Rolling Lift Bridge are firmly fastened to the movable structure. They do not have to be lifted before the bridge can be operated as is the case with swing bridges. This advantage insures the stability and perfect alignment of the track, making impossible accidents common to swing bridges where the rails are raised from the ties before the bridge can be operated.

Marked Features: Simplicity, Rigidity and Safety.

19. A marked feature of the Scherzer Rolling Lift Bridges now in use is the firmness and rigidity of the bridge under very heavy loads, both of railroad and highway traffic. The simplicity of the bridge structure, as compared with other movable bridges now in use, is at once apparent upon inspection of the bridge itself, or the views thereof herewith presented. The movable bridge span is composed only of the necessary material to bridge the chasm. The movable parts of the bridge roll in the most simple manner upon level tracks, which are firmly anchored to the masonry piers placed upon the banks of the waterway.

Bridge a Permanent Asset.

20. A Scherzer Rolling Lift Bridge is a permanent asset. A single track Scherzer Rolling Lift Bridge can be constructed and used continuously. As soon as traffic increases so as to require an additional track this can be readily and economically provided by building another single track Scherzer Rolling Lift Bridge alongside of the existing structure without delaying or interfering with traffic over the existing bridge. This process of adding single, double or multiple track bridges alongside of the existing bridge to accommodate growth in traffic from time to time can be continued to any desired extent. Four, six and eight track Scherzer Rolling Lift Bridges have already been constructed, composed of independent bridges placed side by side operated jointly or separately as desired. This great advantage of the Scherzer Rolling Lift Bridge is obtained because the bridge in operating moves entirely in a vertical plane and is lost in a swing bridge because it operates in a horizontal plane thus making it impossible to build any additional structures within the sweep of its radius of operation.

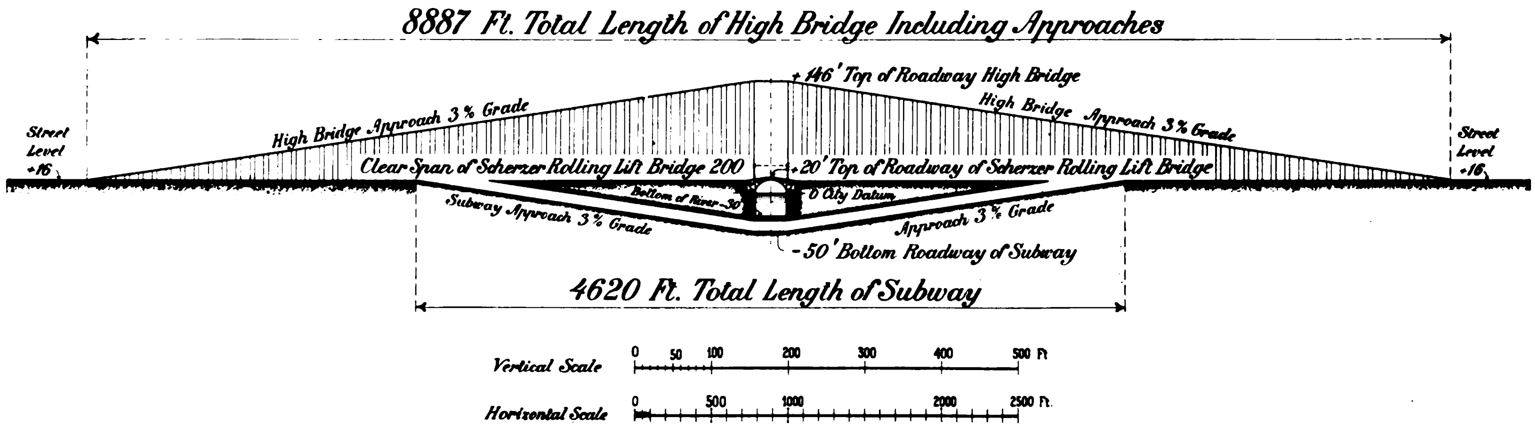
Trunnions, Ropes, Pulleys and Towers Unnecessary.

The objectionable hinged pivot or trunnion of the ancient bascule bridge, and the necessary towers, ropes, pulleys and shifting counter-weights required to operate some pivot bascule and lifting bridges, are entirely dispensed with. The counter-weight required in the Scherzer Rolling Lift Bridge is a part of the structure and is firmly fixed to it. The bridge forms an artistic and pleasing structure, and for simplicity, safety, rigidity, rapidity of operation, economy, efficiency and durability, it has no equal in use anywhere.

HOW DO YOU CROSS A RIVER?
Three Methods of Crossing a River Compared.

Comparative diagrams, showing the relative lengths of three methods of crossing a navigable channel, 200 feet wide and 30 feet deep. Comparison also applicable to a wider or a deeper channel.

1. SUBWAY. Total length, 4,620 feet.
2. HIGH-LEVEL BRIDGE. Total length, 8,887 feet.
3. SCHERZER ROLLING LIFT BRIDGE. Total length 307 feet.



RELATIVE COST OF THE ABOVE THREE METHODS OF CROSSING A NAVIGABLE CHANNEL.

1. Cost of a Subway 100 feet wide, at the rate of $20.00 per square foot of roadway and sidewalks, without ornamentation or allowance for land damages, $9,240,000, approximately.

2. Cost of a High-level Bridge, 100 feet wide, at the rate

of $5.00 per square foot of roadway and sidewalks, without ornamentation or allowance for land damages, $4,450,000, approximately.

3. Cost of a Scherzer Rolling Lift Bridge, complete, 100 feet wide, at the rate of $9.50 per square foot of roadway and sidewalks, without ornamentation, there being no land damages, $300,000, approximately.

All of the ornamentation of the Alexander III Bridge, Paris, which is acknowledged to be the most beautiful bridge in existence, cost $200,000. A similar ornamentation of a Scherzer Rolling Lift Bridge would not cost more, and would make the total cost of a Scherzer Rolling Lift Bridge, ornamented similar to the Alexander III Bridge at Paris, cost $500,000, approximately.

The cost of similar ornamentations for a subway or high-level bridge would be increased at least in proportion to the enormously increased lengths of these structures.

HOW DO YOU CROSS A RIVER?

Subways, Tunnels and High-Level Bridges to Cross Navigable Waterways Compared with a Scherzer Rolling Lift Bridge.

Intelligent engineering requires that all public as well as private improvements be planned on an economic basis to conserve energy and money.

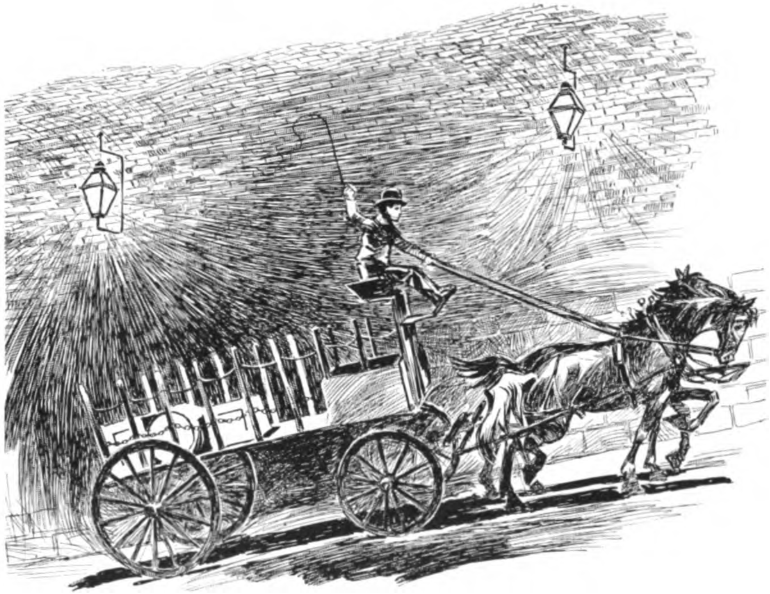
Probably the most exhaustive study and investigation regarding the relative merits of a subway, tunnel or high-level bridge for crossing a navigable waterway, as compared with a movable bridge, was made for the crossing of the Thames River at the site of the Tower Bridge, London, England, and resulted in favor of the movable bridge, even though the only feasible type of bridge then available was very expensive.

Briefly, the Main Objections to a Subway or Tunnel are:

1. Absence of natural light and air, and perpetual large expense to supply lighting and ventilation.

2. Subways and tunnels have only been constructed when other methods were impossible. The people dislike subways and tunnels, and do not voluntarily use them, because of the grades and the deficiency of natural light and fresh air. Subways and tunnels have always been limited in width and capacity on account of their excessive cost of construction and maintenance. The cost of a subway or tunnel to cross a navi-

gable channel 200 feet wide and 30 feet deep is not less than fifteen times as great as the cost of a Scherzer Rolling Lift



THE SUBWAY OR TUNNEL.

Bridge of the same width and capacity. The cost of maintaining and operating the bridge is less than the cost of lighting, ventilating and pumping the tunnel.

3. Modern vessels require a channel at least 30 feet deep. The floor of a subway would have to be about 66 feet below street level. Then to cross a river only 200 feet wide by means of a subway with a 3 per cent grade would require a tunnel 4,600 feet long, and all traffic would have to travel at least one mile to cross a river only 200 feet wide. At an average speed of four miles per hour, it would take fifteen minutes to cross the river through the subway. At the same speed, to cross the river on a Scherzer Rolling Lift Bridge would require only one minute. The occasional delay, if the bridge were opened for the passage of a vessel, would be comparatively trifling, as the average time for the opening of the bridge, passing of a vessel and closing of the bridge, is only two minutes. During the four winter months, there is usually no navigation and no delay from opening the bridge.

4. Pedestrians, cars and vehicles would have to perpetually expend enormous energy to climb out of the subway. The average travel during twenty-four hours across London Bridge, London, England, having a width of 50 feet, amounts to 22,000 vehicles and 110,000 pedestrians. To climb out of a subway 66 feet deep, the energy expended by this traffic would amount to more than 5,000 horse-power hours per day, or about 1,900,000 horse-power hours, net, per year, exclusive of all friction, radiation, evaporation, etc., which would also amount to at least as much more of wasted energy.

5. Should the subway or tunnel not be placed deep enough for the possible future requirements of navigation, as was unfortunately the case with three large and costly tunnels

constructed at Chicago, then the subway or tunnel would have to be lowered and reconstructed at very great expense, and

THE HIGH BRIDGE

during reconstruction the subway would have to be closed to all traffic for years. After the completion of the deepened subway, all the objectionable features would be increased because of the increased depth, and become prohibitive to the heavier traffic.

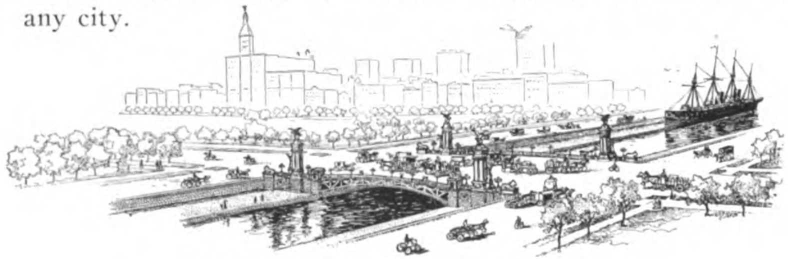
The High Bridge.

A fixed bridge would have to be at least 130 feet above street level to be high enough to allow the passage of masted vessels. It would have ample light and air, but all the objectionable features of the subway or tunnel in regard to long and steep grades and great cost of construction and maintenance would be intensified, because of the greater height and length. The Brooklyn Bridge at New York City alone has cost for construction more than twice as much as all of the movable bridges built in Chicago up to the present time.

All of the Above Objections to the Subway, Tunnel or High Bridge are Overcome by the Use of

THE SCHERZER ROLLING LIFT BRIDGE.

1. Light and air are abundant.
2. A wide and adequate bridge can be built for a small fraction of the cost of a narrow subway or tunnel. The cost of maintenance and operation of the bridge is also much less.
3. There is practically no grade for traffic to climb to reach the bridge, and no energy or time is wasted in climbing steep grades.
4. All traffic can reach the bridge from any point direct, without loss of time, and cross the river without taking a long and circuitous route.
5. Any possible future deepening of the navigable channel would not require the reconstruction of a Scherzer Rolling Lift Bridge, nor cause any delay to the traffic crossing the bridge.
6. The Scherzer Rolling Lift Bridge would also be a permanent, beautiful and monumental structure, an ornament to any city.



THE SCHERZER ROLLING LIFT BRIDGE

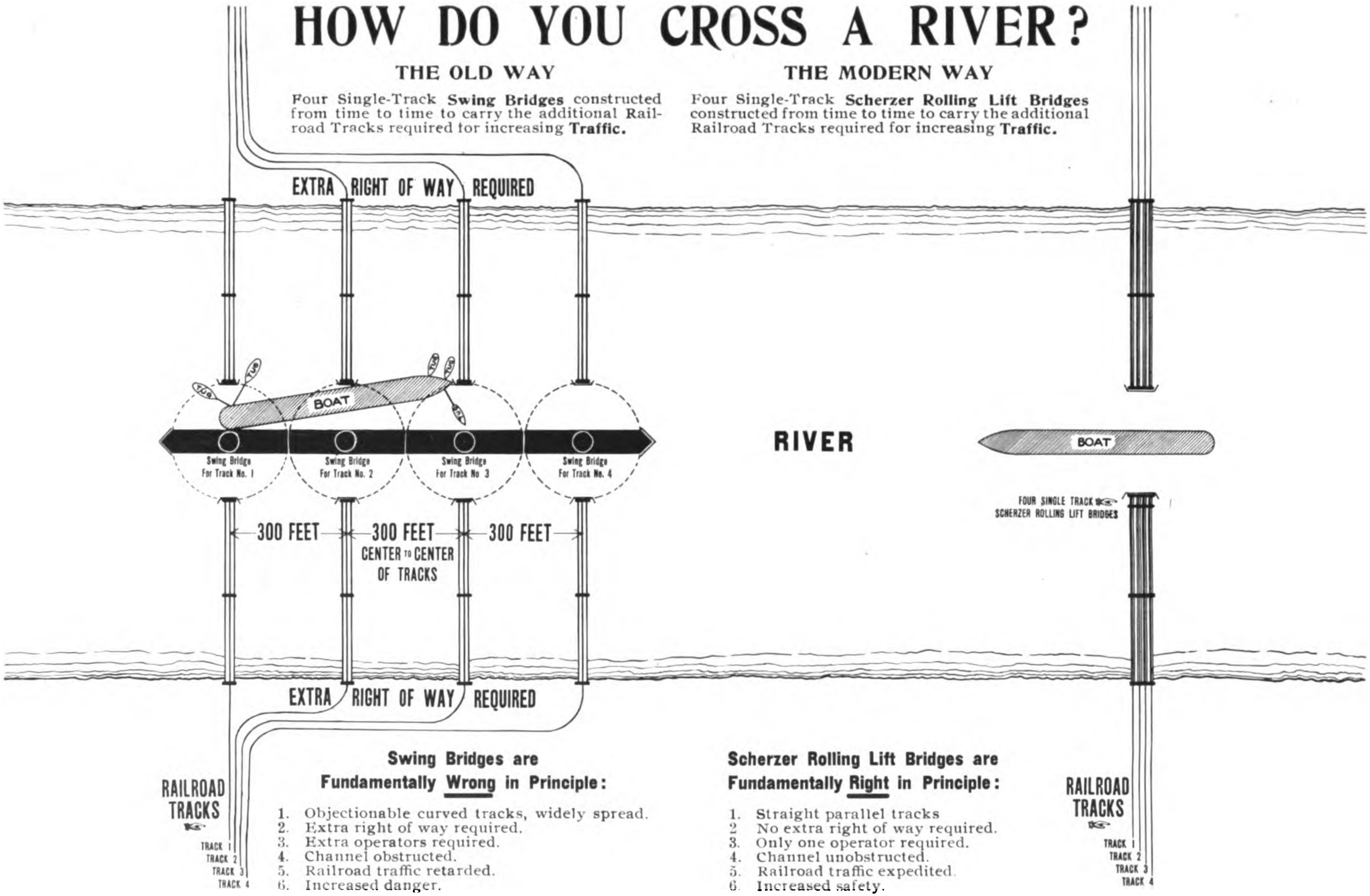
HOW DO YOU CROSS A RIVER?

THE OLD WAY

Four Single-Track **Swing Bridges** constructed from time to time to carry the additional Railroad Tracks required for increasing **Traffic.**

THE MODERN WAY

Four Single-Track **Scherzer Rolling Lift Bridges** constructed from time to time to carry the additional Railroad Tracks required for increasing **Traffic.**



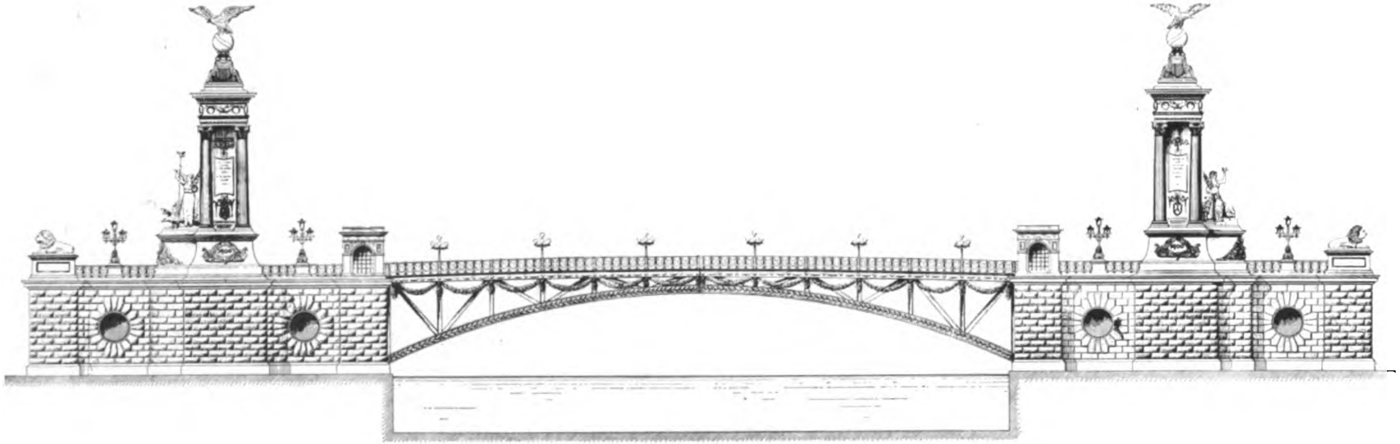
Swing Bridges are Fundamentally Wrong in Principle:

1. Objectionable curved tracks, widely spread.
2. Extra right of way required.
3. Extra operators required.
4. Channel obstructed.
5. Railroad traffic retarded.
6. Increased danger.

Scherzer Rolling Lift Bridges are Fundamentally Right in Principle:

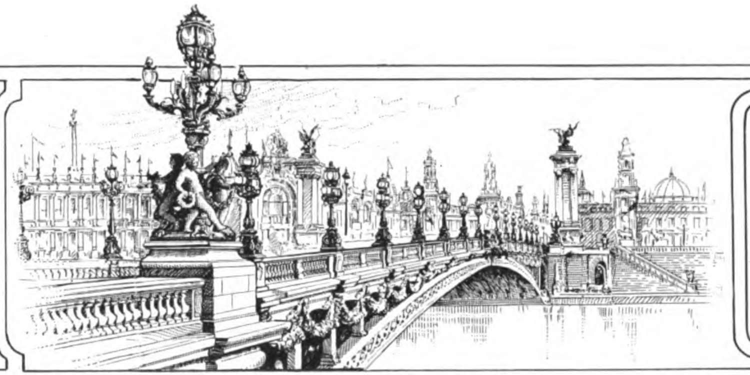
1. Straight parallel tracks
2. No extra right of way required.
3. Only one operator required.
4. Channel unobstructed.
5. Railroad traffic expedited.
6. Increased safety.

A Suggestion for an Artistic Scherzer Rolling Lift Bridge



Twentieth Century Memorial Bridge
Across the Chicago River Connecting the
North and South Side Boulevard Systems.

An Artistic Design *for a* Scherzer Rolling Lift Bridge



The main connecting link between the North and South Side boulevard systems of the City of Chicago is the Rush Street swing bridge. This structure is almost constantly crowded with heavy trucks and wagons, transporting merchandise, making the thoroughfare hazardous for lighter vehicles, carriages, automobiles, bicycles and pedestrians. A demand has arisen for an additional and more satisfactory connection between these boulevard systems, to be used exclusively for boulevard traffic. A tunnel has been proposed for this purpose, but as the depth of the river is to be at least thirty feet below datum, a tunnel or subway must necessarily have very long and steep approaches, and the cost has been variously estimated at from $6,000,000 to $10,000,000, for a subway wide enough to accommodate the traffic. A high level bridge has also been proposed, but would not be feasible for the reasons stated in the preceding article.

With a view of illustrating the artistic and monumental possibilities of a Scherzer Rolling Lift Bridge for such a crossing, a number of designs have been prepared, one of which is shown on page 34.

In the design illustrated, the rear ends of the moving spans, including the counter-weight and operating machinery, are inclosed and protected by monumental masonry. The clear channel provided for navigation is 200 feet wide when the bridge is open. The roadway is elevated about thirty-three feet above datum at the center of the bridge. There is sufficient head-room beneath the bridge for the passage of tugs and small craft, when the bridge is closed.

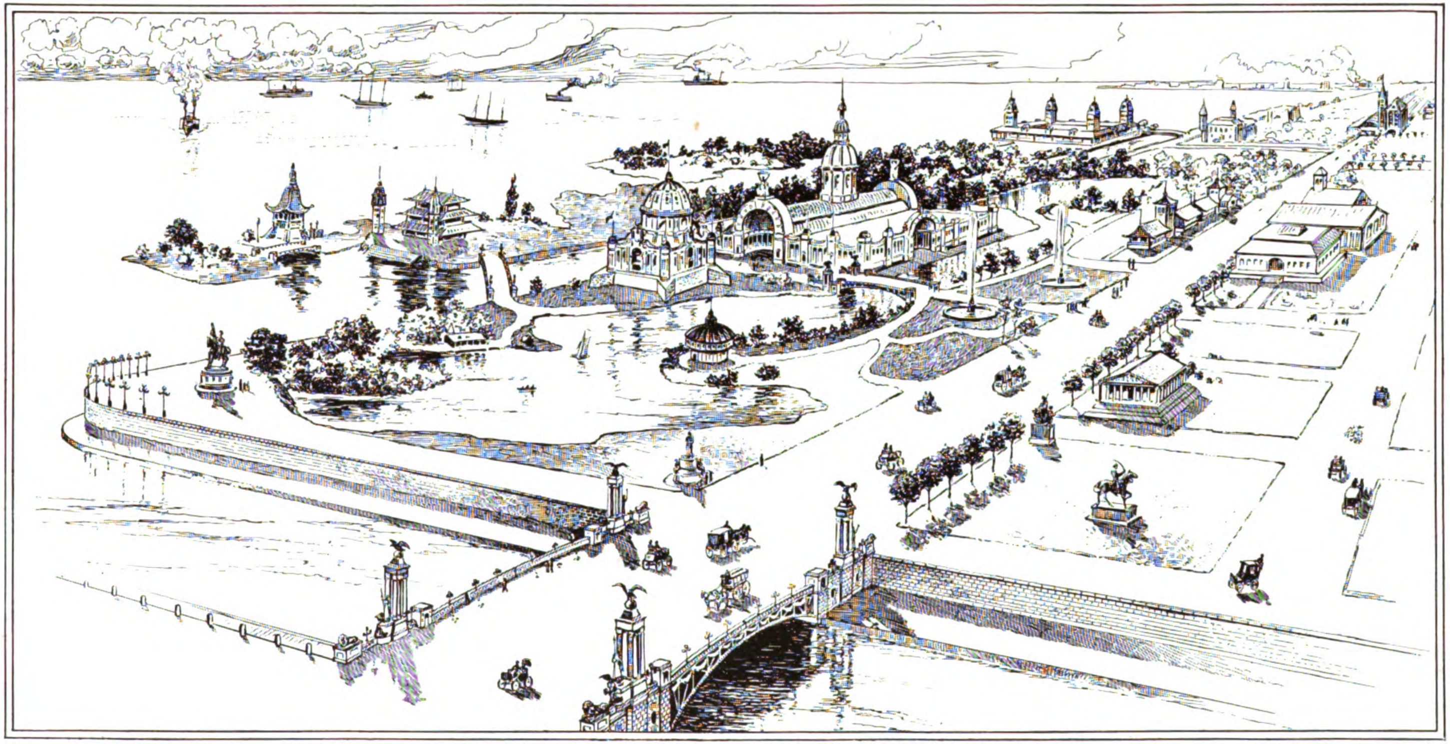
The monumental part of the design is not intended as a finality, but is merely a suggestion of the possibilities, and follows largely the monumental features of the far-famed Alexander III Bridge, recently constructed in Paris.

The design contemplates the construction of the bridge east of Rush Street. The most feasible plan for a connecting link between the boulevard systems would be to cover the tracks of the Illinois Central Railroad from 12th street to the crossing of the river at the bridge. The covering of the Illinois Central tracks by means of a viaduct, with buckle-plate floor, asphalt roadway and concrete sidewalks, will enable the ultimate creation of a grand Esplanade 300 feet in width, if desired, and readily accessible from every cross street. The covering of the Illinois Central tracks will make useful more than $10,000,000 worth of space now wasted and will forever dispose of the disagreeable tracks, smoke and noise which now rob the lake front of its principal attractions, will give an unobstructed view of the lake, will provide a proper environment and enable the early development of magnificent parks, with lagoons and grand canals, east of the railroad tracks, rivaling those of Venice, and be the ultimate site of magnificent, durable and permanent architectural triumphs, rivaling the grand but temporary achievements of the World's Fair.

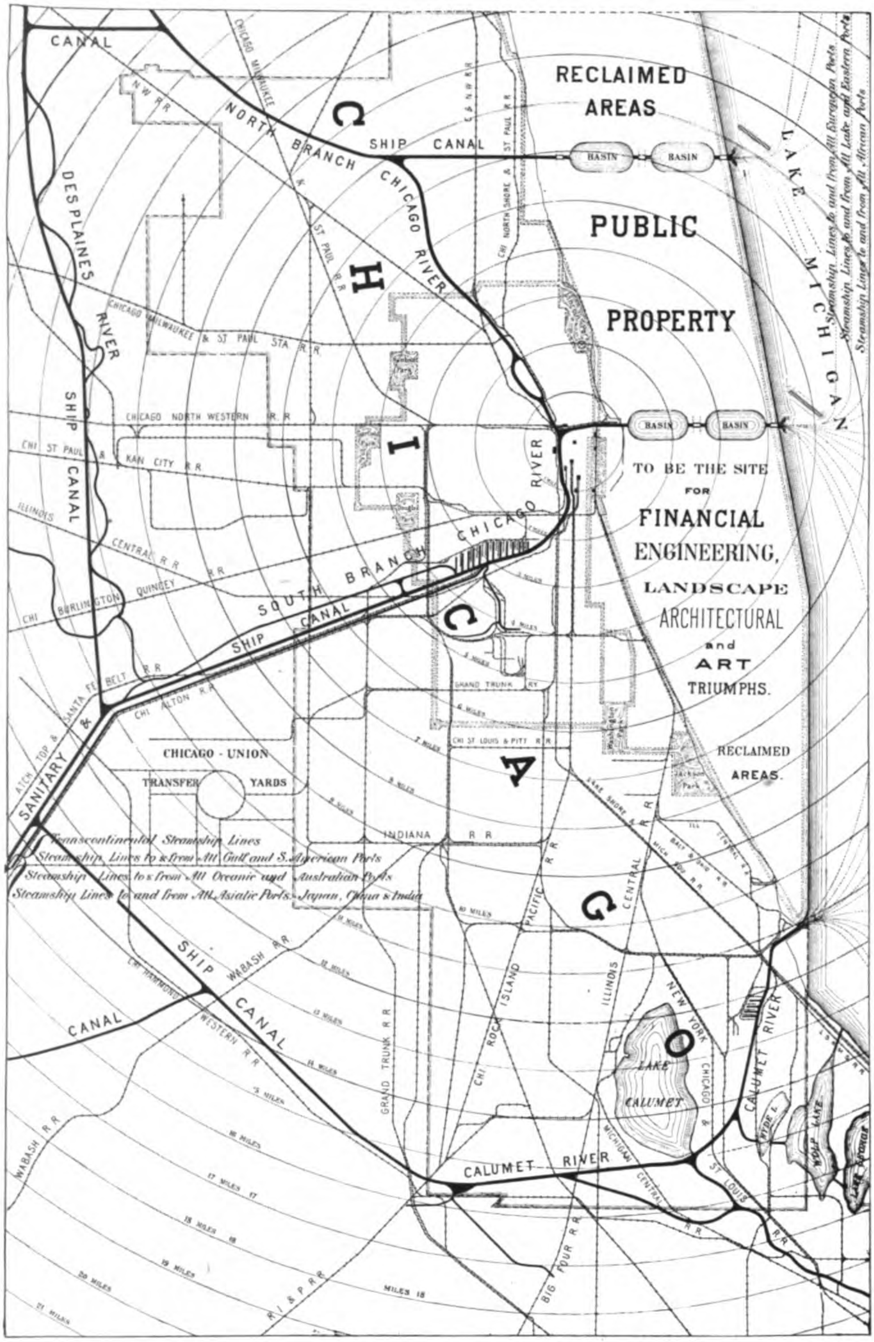
The able management of the Railroad Company will recognize the great necessity, desirability and value of this improvement to a metropolitan city like Chicago, and will undoubtedly co-operate for its early accomplishment as they have in the past in depressing their tracks and constructing the present monumental retaining walls, and viaducts across their tracks. A change of motive power to electricity will facilitate the ultimate covering of the entire length of tracks bordering upon the lake shore, and enable the extension of the Esplanade to Jackson Park.

Triumphal arches, great columns and statuary, with the necessary and appropriate environment of beautiful skies, parks and lagoons, it is evident would be impossible in a subway, and a tunnel, subway or high-level bridge would be of no benefit whatever in solving the present railroad nuisance.

The entire cost of an Esplanade 300 feet wide from 12th Street to the river, a bridge ample to accommodate both land and water traffic, and the necessary short approach on the north side of the river, can be built for less than one-half the cost of a tunnel or subway, and would leave several million dollars to be expended for permanent statuary, triumphal arches, columns and other appropriate monuments to embellish the Esplanade, and give to Chicago a boulevard only rivaled by the Champs d'Elysees, Paris.



Sketch suggesting a wide Esplanade, covering the Illinois Central Railroad tracks, with an artistic Scherzer Rolling Lift Bridge across the Chicago River, forming a connection between the North and South Side Boulevard Systems of the City of Chicago, and illustrating a limited reclamation of the submerged lands along the Lake Front of Chicago for Park purposes.



Map of MODERN CHICAGO showing

INTERNAL HARBOR SYSTEM,

giving Unrivaled Railroad and Water Transportation, Distribution and Manufacturing Facilities, also enabling the economical creation of Parks and Boulevards unrivaled in the World.

Chicago Harbor Improvements

THE INTERNAL HARBOR SYSTEM.

The Most Scientific, Economical and Perfect System for Water and Railroad Transportation and Distribution in the World.

The large lake vessels carrying the bulk of the commerce of the great lakes have been prevented from entering the harbor of Chicago, because the river is obstructed by swing bridges, whose center piers and pier protections absolutely block the passage of the modern lake carrier. The Sanitary District of Chicago is now required to maintain a flow of more than 300,000 cubic feet of water per minute through the Drainage and Ship Canal. This flow is supplied from Lake Michigan and must pass through the Chicago River into the Drainage and Ship Canal.

The highway swing bridge at Taylor Street and the railroad swing bridge at the Grand Central Station, between Taylor and 12th Streets, formed an obstruction to the passage of the required volume of water that could only be obviated by the removal of these bridges and the substitution therefor of bridges having their supporting piers on shore, or the construction of an extensive by-pass system under very valuable railroad and warehouse property. The Board of Trustees of the Sanitary District, after a very careful study and consideration of the problem, decided to remove the two swing bridges mentioned and construct two Scherzer Rolling Lift Bridges. Their decision was largely influenced by the fact that the report of the Chief Engineer showed a saving of $95,000 in favor of the Scherzer Rolling Lift Bridges as against the building of the by-pass, and the further fact that the building of the Scherzer Rolling Lift Bridges would remove all obstructions to the passage of vessels at this point, while the by-pass would be of no benefit whatever to navigation. The situation at these crossings is clearly shown on the plat, page 16, and illustrates the obstructive character of all swing bridges. In removing these two obstructions, the Sanitary District inaugurated a policy which contemplates the earliest possible removal of all the swing bridges obstructing the Chicago River and the substitution therefor of the most modern type of bridge.

In pursuance of this policy, it was decided to remove at once the swing bridges at State street, Dearborn street, Randolph street, Harrison street, 18th street, Main street and Canal street, and replace all of them with Scherzer Rolling Lift Bridges, the Scherzer Company furnishing the designs, plans, specifications, and consulting engineering services for this work. These and other contemplated improvements, when completed, will enable the largest lake vessels to go direct to and moor at the various manufacturing plants, docks, warehouses and railroad terminals located along the forty miles of river front on the Chicago River.

The serious delays to traffic across the river, caused by the old swing bridges, will be eliminated, as the new bridges to be provided will open and close rapidly, and the required openings will be much less frequent, on account of the increased size and decreased number of vessels passing through the bridges. The present small boats, with small cargoes and frequent trips, will be replaced by the large, modern, economical steel vessel, and the largest vessels will be enabled to move rapidly, because a wide and unobstructed channel will be provided in the middle of the river. The average cargo and total tonnage of the port of Chicago will increase enormously.

Upon the opening of the present Drainage and Ship Canal for navigation, more than fifty-six miles of additional dock frontage will be available and added to Chicago's already enormous harbor, and open a vast area of low-priced real estate for the location of new manufacturing plants, directly accessible to the largest vessels, and also located within the greatest and most perfect railroad distributing center in the world, thus enabling Chicago, not only to maintain its supremacy as the greatest marine port in the world, but will also make Chicago the richest, largest and most economical manufacturing, industrial and transportation center in the world.

Had this wise policy not been inaugurated, and were the Chicago River closed to navigation, and the docks built along the Lake Front of the City, forming an **Outer Harbor** far removed from the present manufacturing plants, warehouses and railroad terminals, which could not be removed to the Lake Front, owing to the limited area and enormous value of real estate adjacent to the Lake Front, it is self evident that the growth and progress of Chicago would have been seriously crippled, and commerce and manufacturing driven to more progressive cities, where the large modern vessel could go direct, by means of an **Internal Harbor System,** to the manufacturing plants, warehouses and railroad terminals, located on low-priced real estate.

Of supreme importance is the fact that the adopted policy will forever conserve the natural beauty of the Lake Front of Chicago, and enable the creation of beautiful parks, with islands, lagoons and sites for magnificent public institutions, reclaimed by a gradual filling of the submerged lands throughout the entire length of the city, if desired, to a width of one, two, three, four or more miles, as the population and needs of the city increase.

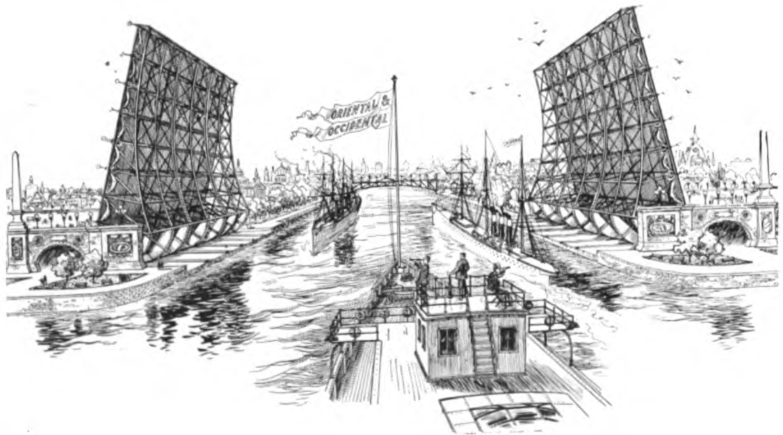
These great benefits can be obtained without expense to the taxpayers of the City of Chicago, as the cost of reclaiming the land is trifling compared to the value of the real estate created. The Lake Front of Chicago has a length of about 21 miles, measured from Evanston to the Calumet River. The water is very shallow near the shore, and gradually increases to a depth of only about 35 feet at a distance of four miles from the shore. Here the break-waters should be built to prepare the Chicago harbor for the large vessels which will soon seek entrance. The engineering problems involved in dredging, filling and reclaiming this land for a distance of four miles from the shore present no great difficulties, as much larger feats have been accomplished at Venice and throughout Holland during the Middle Ages.

Within the above area, 84 square miles, or 2,000,000,000 square feet of land can be created. If only one-half of this area is sold at the low average of $1.00 per square foot, more than $1,000,000,000 will be realized; and the remaining area will be fourteen times as great as all the present Chicago parks, both large and small, and of incalculable value. In Holland, many expensive, difficult and larger reclamations have been made for agricultural purposes only. The map accompanying this article suggests the future possibilities of Chicago.

Following upon the gigantic achievements of the municipal administrations and the progressive people of Chicago during her very brief existence, with the enormously increased resources of the present time, this undertaking is not too great for accomplishment and realization early in the twentieth century. If Chicago's natural beauty were not developed, its wealthy inhabitants would seek residence elsewhere, and its earnings would be drained by absentee landlords.

Chicago will take advantage of all her great opportunities, and by developing them on a large and comprehensive plan, attract the wealth, art, culture and refinement of the world, and will be not only the greatest manufacturing, industrial and transportation center, but also the most beautiful city in existence.

Other progressive cities have recognized the secret underlying Chicago's commercial success, and the fact that **The Internal Harbor System** is the most scientific, economical and perfect system for water and railroad transportation and distribution, and are as rapidly as possible following in her footsteps, and are developing **internal harbor facilities** to transport and distribute their commerce, without lighterage and other charges, by the most scientific, economical and perfect known system.



Sketch Illustrating an Entrance to Modern Chicago's Improved INTERNAL HARBOR SYSTEM.

The Scherzer Rolling Lift Bridge Company

General Offices: Monadnock Block, Chicago **Eastern Offices: 220 Broadway, New York**

Cable Address: "Scherzer Chicago"

Long Distance Telephones: Chicago, Harrison 874; New York, Cortlandt 4614

The Scherzer Rolling Lift Bridge Company succeeded to the business founded by William Scherzer, the inventor of the Scherzer Rolling Lift Bridge, and has always endeavored to maintain the original efficiency of the Scherzer Rolling Lift Bridge, and has, by gradual improvement and development, succeeded in simplifying the construction and operation of the bridge, greatly reducing, not only the first cost of construction, but the cost of maintenance and operation, as well.

The success of the Scherzer Rolling Lift Bridge in spanning wide navigable channels removes one of the difficulties and limitations heretofore encountered in ship canal construction and river and waterway improvements, as both the swing bridge and pivot or trunnion bascule bridge have been inadequate for these purposes. The illustration (page 47) shows an Arch Rolling Lift Bridge, a Cantilever Rolling Lift Bridge and a Rolling Lift Bridge acting as a simple Truss, each closed to receive traffic. In comparing these spans with the very large spans of the notable fixed bridges, also shown on the same scale, it is self-evident that, as a closed bridge to safely carry the heaviest loads, the Scherzer Rolling Lift Bridge may be greatly increased in length of span, without reaching the limits of safe construction. It is also self evident that, as a movable bridge, it has not yet reached the limits of its possibilities. No matter how long the span may be, sufficient substructure can be constructed and counter-weight and machinery can be provided to open or close the span. The counter-balancing and moving of a very long span Scherzer Rolling Lift Bridge is accomplished easily and with little power, because the bridge rolls on a smooth and level track virtually without friction.

The Scherzer Rolling Lift Bridge, when open, is more stable against wind pressure than the Eifel Tower or the Park Row Building, New York City, shown in the illustrations, because the bulk of the weight of the Scherzer Rolling Lift Bridge, when opened, is in the counter-weight boxes and segments, within or close to the foundations. Unlike these structures and other high buildings, it is uninhabited when open, and may be closed and placed out of all possible danger during a high wind or cyclone. It is also most rigidly braced.

The substructure involves no unusual difficulties; it can be proportioned with the same certainty as the superstructure for the stresses which it must carry. Larger stresses are safely carried by the substructures of the Forth Bridge and the Brooklyn Bridge than will probably ever have to be carried by the substructure of the longest span Scherzer Rolling Lift Bridge which is likely to be required in the future, but were a movable span required longer than either of the above, ample substructure could be provided.

The inventions and achievements of William Scherzer, and the developments and improvements made by his successors, have greatly increased the possibilities in movable bridge construction.

The Scherzer Rolling Lift Bridge is capable of great and economical expansion in length of span and width of bridge, and is adequate to meet any possible future demands.

To meet the growing demand for more artistic bridge structures, special attention is devoted by the Scherzer Rolling Lift Bridge Company to this feature, and the most experienced and talented architects are consulted. The outlines of the Scherzer Rolling Lift Bridge are more pleasing and artistic than those of any other type of movable bridge. The bottom chord of the Scherzer Rolling Lift Bridge may form a graceful arch, and the bridge may be a clear deck span.

The Scherzer Rolling Lift Bridge is well adapted to the most simple or the most elaborate artistic adornment, as shown by the various designs illustrated and the design on page 34. It may have the general outlines and be ornamented similar to the Alexander III Bridge at Paris, and in addition thereto be movable for the accommodation of navigation.

An arched deck span Scherzer Rolling Lift Bridge may be combined with arched deck fixed spans of steel or reinforced concrete construction, the entire bridge forming a pleasing, harmonious and artistic structure. Such a harmonious combination of fixed and movable spans is impossible where a swing bridge is used for the movable portion of the bridge nor can this result be obtained economically by any other form of bascule bridge.

Although the Scherzer Rolling Lift Bridge is protected by patents, it has been the policy of the inventor and founder, and always will be the policy of the Scherzer Rolling Lift Bridge Company, to make a reasonable charge for the right to construct a bridge under its patents. These charges are but a small proportion of the saving effected by the use of the

Scherzer Rolling Lift Bridge, compared with the cost of other types of movable bridges.

The Company is prepared to furnish, at any part of the world, consulting engineering services, designs, plans, specifications and supervision of construction of all classes of bridges, but makes a specialty of Scherzer Rolling Lift Bridges, and for these services makes the most reasonable charges consistent with the highest class of service which it always renders.

The Company is also prepared to take contracts for the complete manufacture, construction, erection and equipment of bridges.

The Scherzer Rolling Lift Bridges are all constructed under the designs, plans and specifications and consulting engineering supervision of the Scherzer Rolling Lift Bridge Company, having Chicago offices in the Monadnock Building, New York offices in the St. Paul Building and other offices in the principal cities throughout the world. A large corps of the most experienced and successful engineering specialists are constantly employed, assisting and co-operating with the principal consulting, government, railroad and municipal engineers throughout the world. The efficiency of the organization of the Company and its ability to successfully handle the various problems coming to it in this highly specialized branch of engineering practice is perhaps best shown in the extensive and successful record it has made in developing the design of the Scherzer Rolling Lift Bridge to efficiently and economically meet the requirements of widely varying conditions, more Scherzer Rolling Lift Bridges now being in operation or under construction in various parts of the world than all other types of bascule bridges combined—an unparalleled record.

The Company will be pleased to furnish to responsible parties, preliminary sketches and estimates of cost of proposed bridges, upon request, accompanied by data giving the following information:

1. Type of bridge, highway or railroad.
2. Location.
3. Name of River or Waterway.
4. Total length of structure including both movable span and fixed approach spans.
5. Least clear width of channel for navigation (required by the authorities) measured at right angles to the center line of navigable channel.
6. Angle of crossing measured between center line of navigable channel and center line of bridge.
7. Distance from high water to top of roadway or base of rail.
8. Minimum clear height permissible from high water to bottom of bridge when in the closed position.

9. (Highway bridge). Clear width of roadway between curbs.

10. (Highway bridge). Number and clear width of sidewalks.

11. (Railroad bridge) Number of tracks.

12. Proposed power for operation, hand, electric, gasoline or other means.

13. Loading and specifications to govern design.

14. Substrata conditions as shown by borings on both sides of the river at the bridge site.

(NOTE: It is very desirable when possible that this data be accompanied by a plat and profile of the bridge site.)

Active Agents of Modern Progress and Civilization.

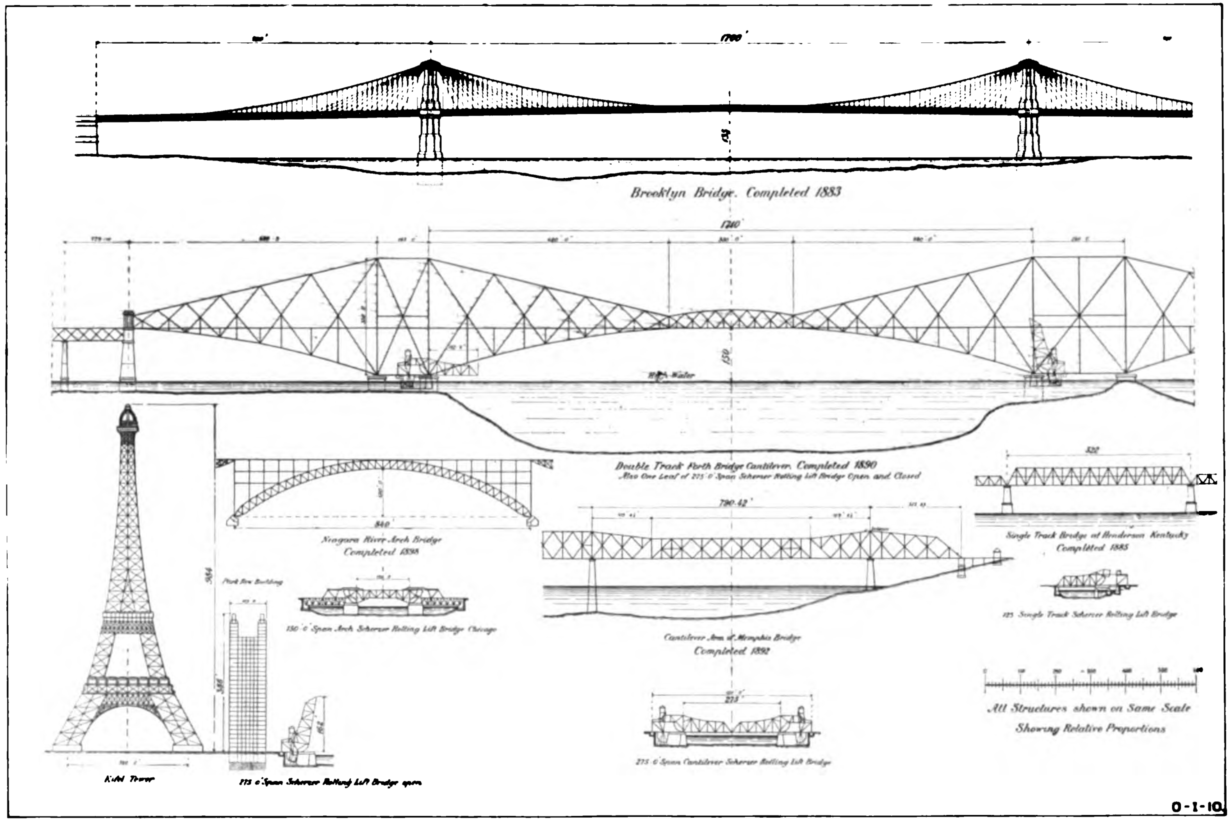


Diagram showing the relative proportions of Arch, Cantilever and Truss Scherzer Rolling Lift Bridges compared with the dimensions of existing large structures, demonstrating that the length of span of the Scherzer Rolling Lift Bridge can be greatly increased with perfect safety.

A FEW TESTIMONIALS REGARDING SCHERZER ROLLING LIFT BRIDGES IN SERVICE

Chicago, Illinois, July 12th, 1897.

Dear Sir:—Answering your request for information regarding the Scherzer Rolling Lift Bridge, used by this Company at the Chicago River, I have to say, that the four track railway bridge was completed some time before May 6th, 1895, at which date the road was opened and the bridge placed in active service, since which time it has operated continuously and has of itself caused no delays to trains, of which there are and have been, since shortly after the date of opening the road, about 1,200 trains daily crossing the bridge.

The cost of repairs—with the exception of two months, when the bridge did require some small repairs—is largely the wages of one man employed in oiling, cleaning, etc., around the bridge. The bridge may be said not to have required any repairs, except in the inter-locking machinery, and only then in the early days of operation, when it was not well understood.

The bridge requires, under our arrangement, two men's time to operate it, one on each side; but it can be operated by one man, on one side.

In regard to your question as to the cost of motor power, for operating the bridge, we do not make any charge for this item. It is too small to be considered. I should estimate that somewhere between five and ten dollars a month is the outside cost of power. It is evidently so small that we have not considered it worth while to go to the extent of measureing it definitely. The bridge is operated, as you know, by motor, using the current with which we operate the trains.

The bridge has proved rigid. It is rapid to open and shut, has never shown any signs of failure. It requires little power to move it and shows no evidence of a depreciation, and we are satisfied with it.

Yours truly,

(Signed) W. E. BAKER, General Manager,
Metropolitan West Side Elevated R. R.

Chicago, Illinois, Jan. 28th, 1907.

Gentlemen:—Complying with your inquiry, the following statement is made regarding the use and operation of our four-track Scherzer Rolling Lift Bridge over the South Branch of the Chicago River.

This bridge has been in daily operation since May, 1895, or for more than eleven and one-half years. All of the trains of the Metropolitan West Side Elevated Railway Company cross this bridge in entering or leaving the down town business district, the trains at the present time aggregating over 1,500 daily, and each consisting of from two to five cars. During the season of 1906 the bridge was open for the passage of shipping as many as 25 times during twenty-four hours.

The construction of the bridge and its operating mechanism have proven satisfactory and met all exigencies of this traffic. Repairs and maintenance, aside from that required by any exposed steel structure, have been very low in cost and do not appear to increase from year to year. There is no hesitation in saying that this bridge, forming an important link in our track system, has been satisfactory to all requirements.

Yours very truly,
(Signed) BENJ. H. GLOVER,
Supt. Motive Power & Way.

New Haven, Connecticut, Nov. 15th, 1901.

Dear Sir:—In response to your inquiry of the 14th inst., beg to say that this Company has a six-track steel Scherzer Rolling Lift Bridge over Fort Point Channel, Boston. This bridge has a clear span of 42 feet, is composed of three parallel double-track lifts and is opened in the neighborhood of sixteen times a day during the busy season. The lift span of this bridge is 114 feet in length on account of its acute angle.

This bridge has been in use about two years and we are very well satisfied with it, so much so that we have decided to build another one of the same type for our New York Division at Bridgeport over the Pequonnock River, taking the place of a swing bridge. This will be a four-track bridge, composed of two parallel double-track lifts, with a clear span of 80 feet.

These bridges are operated much quicker than the swinging type, our Fort Point Channel bridge being opened in about 37 seconds.

Yours truly,
(Signed) C. M. INGERSOLL, Chief Engineer,
New York, New Haven & Hartford R. R.

January 26th, 1907.

John N. Faithorn, President of the Chicago Terminal Transfer Railroad Company, writes under date of January 26th, 1907, as follows:

"In 1901 a Scherzer Rolling Lift Bridge was constructed for the Chicago Terminal Transfer Railroad Company across the South Branch of the Chicago River near Taylor Street and near the entrance to the Grand Central Station. This bridge is used by the Chicago Terminal Transfer Railroad Company, the Pere Marquette, the Chicago & Great Western and the Baltimore & Ohio Railroad Companies. This bridge has been in successful operation ever since its completion. Trains have never been delayed through any fault of the bridge during the entire period. The repairs upon the bridge have been slight and especially so considering the great size of the bridge.

(Signed) JOHN N. FAITHORN, President,
Chicago Terminal Transfer Railroad.

New Haven, Connecticut, October, 1905.

Dear Sir:—Your letter of October 18th, asking for information relative to Scherzer Rolling Lift Bridges has been referred to me. In answer to your first and second questions I may say that this Railroad Company has had a six-track railroad Scherzer Rolling Lift Bridge in operation since 1899 and the cost of repairs and maintenance has been very small. We also have a four-track bridge of the Scherzer type in operation at Bridgeport since 1902. Both of these bridges are operated by electricity much more rapidly than we could operate swing bridges, and the cost of operation is less than it is for swing bridges.

These bridges are so successful in operation that we are now building three more four-track railroad bridges of this type, one of which is nearly completed, and one double-track bridge of long span, and we have in immediate contemplation the building of three others.

In answer to your third question: The estimated cost of these bridges did not in any case over-run the railroad Company's revised estimate, except when there was an advance in the price of steel between the time the estimate was made and the bridge contracted for, which period in some cases was from six to nine months, giving ample opportunity for a change in price of material.

Answering your fourth question I may say that under many conditions the Scherzer bridge is superior to a swing bridge. This, however, can only be judged of in any particular instance by a full study of the local conditions and requirements.

Yours truly,

(Signed) W. H. MOORE, Engineer of Bridges,
New York, New Haven & Hartford R. R.

(Since this letter of October, 1905, we have received orders from the New York, New Haven & Hartford Railroad Company for three more double-track bridges, two more four-track bridges and two more six-track bridges.

Cincinnati, O., April 25th, 1901.

Dear Sir:—I have your letter of April 23rd, making inquiry about the Scherzer Rolling Lift Bridges which have been erected and are being erected on the line of the Cleveland, Cincinnati, Chicago & St. Louis Railway.

We installed one of these bridges a year ago at Cleveland, Ohio, and it has worked very satisfactorily ever since its installation. This is a single-track bridge with a clear opening between the protection piling of 110 feet.

We are now about to erect a second bridge of this type which is of the same length but built for two tracks, and is to be operated over the Cuyahoga River at Cleveland.

We have found the working of the bridge satisfactory in all respects, and the arrangement made with the Scherzer people for preparing plans and specifications for the bridge and supervising its erection has also been satisfactory.

Yours very truly,

(Signed) G. W. KITTREDGE, Chief Engineer,
Cleveland, Cincinnati, Chicago & St. Louis R. R.

(Mr. George W. Kittredge is now Chief Engineer of the New York Central & Hudson River Railroad. January 7th, 1907, he gave our Company an order for a double-track bridge of our type on the main line of the New York Central between New York and Albany. This bridge will eventually be a four-track structure.)

Chicago, Illinois, February 21st, 1902.

Gentlemen:—

The first swing bridge ever constructed over the Chicago River was at Dearborn Street in 1834, and from that time to the introduction and use of the Scherzer Rolling Lift Bridges in 1895, there have been no other successful movable bridges constructed in this city. Up to the time of the introduction of Scherzer Rolling Lift Bridges the large lake vessels, which now carry the bulk of the commerce of the Great Lakes, were prevented from entering the harbor of Chicago because of the obstructions to river navigation caused by several swing bridges whose center piers and pier protections blocked their passage, even with the assistance of the powerful tugs of the Chicago River.

One of the worst of these obstructive bridges was that carrying the tracks entering the Grand Central Station between Taylor and Twelfth Street, Chicago. At this point I once had a vessel stuck fast in the draw for several hours and it required the assistance of four tugs and two locomotives, with six-inch hawsers, to free her. This railroad swing bridge, together with the highway swing bridge at Taylor Street, has since been removed and Scherzer Rolling Lift Bridges substituted, giving a clear channel for navigation 120 feet wide, through which the largest lake carrier can easily and rapidly pass. My experience has been that since the substitution of Scherzer Rolling Lift Bridges for the obstructive center pier swing bridges tug bills for the average lake carrier have been reduced rather than increased. I have also found that the rolling lift bridges are much less liable to injury by passing vessels than the old-fashioned swing bridge, balanced as it is on an obstructive pier in the center of the channel. It is my opinion that THE SCHERZER ROLLING LIFT BRIDGE HAS SAVED TO THE CITY OF CHICAGO THE LARGE MARINE COMMERCE AND GREAT TONNAGE OF THE PORT OF CHICAGO, now ranked among the four largest ports of the world.

The swing bridge is objectionable to vessel interests in wide rivers as well as narrow rivers; these objections are obviated by the more modern Scherzer Rolling Lift Bridge.

(Signed) J. G. KEITH,
Member Executive Committee,
Lake Carriers' Association.

Chicago, February 21st, 1902.

Gentlemen:—I have read a letter dated the 21st inst., written by Capt. John G. Keith, a member of the Executive Committee of the Lake Carriers' Association.

I would state that the facts presented in Capt. Keith's letter are in accordance with my own experience with tug lines and vessel traffic on the Chicago River. I have on my desk at the present time a large bundle of damage claims for injuries to swing bridges, whereas there has never been any complaint or damage claim on account of any injury to a rolling lift bridge.

Respectfully yours,
(Signed) J. R. SINCLAIR, Local Manager,
Dunham Wrecking & Towing Company.

Manistee, Mich., March 31st, 1908.

The Scherzer Rolling Lift Bridge Co., Chicago, Illinois.

Gentlemen:—In reply to yours of 27, will say that the Scherzer Rolling Lift Bridge which your company constructed for this City in 1906 is proving entirely satisfactory in service. I consider it far superior in every respect to the swing bridge which we have in operation at Smith street and believe that the City will replace the swing bridge with a rolling lift bridge within a few years.

Yours very truly,
(Signed) GEO. B. PIKE,
City Engineer.

Jersey City, N. J., April 4th, 1908.

The Scherzer Rolling Lift Bridge Co.,
1616 Monadnock Block, Chicago, Ill.

Gentlemen:—Acknowledging your inquiry of the 2nd instant: The Scherzer Rolling Lift Spans constructed over the channel at Newark Bay to carry our double track structure have now been in use for several years and have been found very satisfactory in operation.

Yours truly,

(Signed) JOS. O. OSGOOD,

Chief Engineer Central Railroad Company of New Jersey.

Boston, April 7, 1908.

The Scherzer Rolling Lift Bridge Co.,
1616 Monadnock Block, Chicago, Ill.

Gentlemen:—In reply to your letter of April 3, 1908, I beg to say that the two Scherzer Bridges designed by you for Saugus and Malden Rivers, and which have been in operation since July, 1906, have been entirely satisfactory in every respect, and I earnestly approve of this type of bridge.

Very truly yours,

(Signed) JOHN R. RABLIN,

Engineer Metropolitan Park Commission.

City of Cleveland, Ohio, April 29, 1908.

The Scherzer Rolling Lift Bridge Co.,
1616 Monadnock Bldg., Chicago, Ill.

Gentlemen:—The Scherzer Rolling Lift Bridge built over the Cuyahoga River and known as Middle Seneca Street bridge was opened to the public in June, 1903. The bridge has proven satisfactory and no trouble has arisen in connection with the operation of the same.

Yours truly,

(Signed) ROBERT HOFFMANN,

Chief Engineer.

Saginaw, Michigan, May 28, '08.

Albert H. Scherzer, President,
Scherzer Rolling Lift Bridge Company,
Chicago, Illinois.

Dear Sir:—The Genesee Avenue bridge, crossing the Saginaw River in this city, the movable portion of which was constructed from your design, completed and opened to travel September 4, 1905, has worked satisfactorily without causing trouble or delay in its operation. It is considered one of the best bridges in this state. The sub-structure, which was built on a somewhat questionable sub-foundation, stands without showing any indication of cracking or excessive loading.

The bridge is satisfactory in every respect.

Yours truly,

(Signed) R. W. ROBERTS,

City Engineer.

A Partial List of Scherzer Rolling Lift Bridges in Operation or Under Construction in Various Parts of the World,

Including The Longest Span, The Widest, The Most Active and The Most Important Railroad, Electric Railway and Highway Movable Bridges ever built.

The best evidences of the merit of the Scherzer Rolling Lift Bridge and the satisfactory services rendered by The Scherzer Rolling Lift Bridge Company are the many repeated orders received by the Scherzer Company and the adoption and use of the Scherzer Rolling Lift Bridges by the leading railroad companies, governments, municipalities and eminent consulting engineers in the United States and foreign countries as shown by the following list:

United States.

RAILROAD:

New York, New Haven & Hartford Railroad:

Three Double Track Bridges across Fort Point Channel, Boston.

Two Double Track Bridges across Pequonnock River, Bridgeport, Connecticut.

Two Double Track Bridges across Myannus River, Cos Cob, Connecticut.

Two Double Track Bridges across Saugatuck River, Westport, Connecticut.

Two Double Track Bridges across Housatonic River, Naugatuck Junction, Connecticut.

One Double Track Bridge across Connecticut River, Lyme, Connecticut.

Two Double Track Bridges across Neponset River, Massachusetts.

Three Double Track Bridges across Bronx River, New York City.

Three Double Track Bridges across Eastchester Bay, New York City.

One Double Track Bridge across Seekonk River, Providence, Rhode Island.

One Double Track Bridge across Niantic River, Niantic, Connecticut.

Metropolitan West Side Elevated Railroad, Chicago:

Two Double Track Bridges across Chicago River, Chicago.

Pittsburgh, Cincinnati, Chicago & St. Louis Railway:

Two Double Track Bridges across Main Channel, Sanitary and Ship Canal, Chicago.

Chicago Terminal Transfer Railroad:

One Double Track Bridge across Main Channel, Sanitary and Ship Canal, Chicago.

One Double Track Bridge across Chicago River, Chicago.

Chicago Junction Railway:

One Double Track Bridge across Main Channel, Sanitary and Ship Canal, Chicago.

Cleveland, Cincinnati, Chicago & St. Louis Railway:

One Single Track Bridge across Cuyahoga River, Cleveland.

One Double Track Bridge across Cuyahoga River, Cleveland.

Central Railroad of New Jersey:

Two Double Track Bridges across Newark Bay, New Jersey.

Boston, Revere Beach & Lynn Railroad:

One Double Track Bridge across Crystal Cove, Massachusetts.

Newburgh & South Shore Railway:

One Double Track Bridge across Cuyahoga River, Cleveland.

Baltimore & Ohio Railroad:

One Double Track Bridge across Cuyahoga River, Cleve land.

One Single Track Bridge across Cuyahoga River, Cleveland.

New York, Chicago & St. Louis Railway:

One Double Track Bridge across Cuyahoga River, Cleveland.

Norfolk & Western Railway:

One Double Track Bridge across Elizabeth River, Norfolk, Virginia.

One Double Track Bridge across Elizabeth River, Gilmerton, Virginia.

Brooklyn Rapid Transit System:

Two Double Track Bridges across Coney Island Creek, New York City.

New York Central Railway:

One Double Track Bridge across Wappinger Creek, New Hamburg, New York.

Seaboard Air Line Railway:

One Single Track Bridge across Hillsboro Bay, Tampa, Florida.

Chicago, Lake Shore & Eastern Railway:

One Double Track Bridge across East Chicago Canal, Indiana Harbor, Indiana.

Duluth, Rainy Lake & Winnipeg Railway and Canadian Northern Railway:

One Single Track Bridge across Rainy River at Pither's Point, Minnesota.

Lake Shore & Michigan Southern Railway:

One Double Track Bridge across East Chicago Canal, Indiana Harbor, Indiana.

Norfolk & Southern Railway:

Two Single Track Bridges across Albemarle Sound, North Carolina.

San Pedro, Los Angeles & Salt Lake Railway:

One Single Track Bridge across San Gabriel River, Long Beach, California.

Buffalo Creek Railroad:

One Double Track Bridge across Ship Canal, Buffalo, N.Y.

HIGHWAY:

City of Chicago:

One Electric Railway and Highway Bridge across Chicago River at Van Buren Street.

One Electric Railway and Highway Bridge across Chicago River at North Halsted Street.

One Electric Railway and Highway Bridge across Chicago River at Taylor Street.

One Highway Bridge across Chicago River at Canal Street.

One Electric Railway and Highway Bridge across Chicago River at State Street.

One Highway Bridge across Chicago River at Loomis Street.

One Electric Railway and Highway Bridge across Chicago River at Main Street.

One Electric Railway and Highway Bridge across Chicago River at Randolph Street.

One Electric Railway and Highway Bridge across Chicago River at Eighteenth Street.

One Electric Railway and Highway Bridge across Chicago River at Harrison Street.

One Electric Railway and Highway Bridge across Chicago River at Twenty-second Street.

One Electric Railway and Highway Bridge across Chicago River at Dearborn Street.

City of Cleveland:

One Electric Railway and Highway Bridge across Cuyahoga River at Middle Seneca Street.

New York City:

One Electric Railway and Highway Bridge across Newtown Creek at Vernon Avenue.

One Electric Railway and Highway Bridge across Gowanus Canal at Hamilton Avenue.

One Electric Railway and Highway Bridge across Eastchester Bay at Pelham Bay Park.

One Highway Bridge across Gowanus Canal at Third Street.

One Electric Railway and Highway Bridge across Gowanus Canal at Ninth Street.

One Electric Railway and Highway Bridge across Flushing Creek, Flushing.

One Electric Railway and Highway Bridge across Gowanus Canal at Union Street.

City of Saginaw, Michigan:

One Electric Railway and Highway Bridge across Saginaw River at Genesee Avenue.

City of Buffalo, New York:

One Highway Bridge across City Ship Canal at South Michigan Street.

City of Marseilles:

One Highway Bridge across Canal at Main Street.

A Partial List of Scherzer Rolling Lift Bridges in Operation or Under Construction in Various Parts of the World—Cont'd

City of Boston:

One Highway Bridge across Malden River.

One Highway Bridge across Saugus River.

One Electric Railway and Highway Bridge across Charles River.

City of New Haven, Connecticut:

One Electric Railway and Highway Bridge across West River at Kimberly Avenue.

Pennsylvania Railroad:

One Electric Railway and Highway Bridge across Union Canal, Buffalo, N. Y.

Buffalo & Susquehanna Railroad:

One Electric Railway and Highway Bridge across Union Canal, Buffalo, N. Y.

City of Gloucester, Massachusetts:

One Electric Railway and Highway Bridge across Gloucester Canal at Western Avenue.

City of Manistee, Michigan:

One Electric Railway and Highway Bridge across Manistee River at Maple Street.

City of Peoria, Illinois:

One Highway Bridge across Illinois River at Bridge Street.

City of Fall River, Massachusetts:

One Highway Bridge across Taunton Great River.

City of Cambridge, Massachusetts:

One Electric Railway and Highway Bridge across Lechmere Canal at Commercial Avenue.

Lake Shore & Michigan Southern Railway:

One Highway Bridge across Swan Creek at Monroe Street, Toledo, Ohio.

Buffalo Creek Railroad:

One Highway Bridge across Ship Canal, Buffalo, N. Y.

England.

RAILROAD:

South Eastern & Chatham Railway:

One Railroad and Highway Bridge across Swale River, England.

Furness Railway Company:

Vickers Sons & Maxim, Ltd.
One Railroad and Highway Bridge at Barrow-in-Furness, England.

HIGHWAY:

Borough of Barrow-in-Furness:

One Electric Railway and Highway Bridge across Walney Channel.

Ireland.

RAILROAD:

Fishguard & Rosslare Railways and Harbours Company:

One Single Track Bridge across Suir River.

Wales.

RAILROAD AND HIGHWAY:

Messrs. Williams, Foster & Co. and Pascoe Grenfell & Sons, Ltd.:

One Railway and Highway Bridge across the River Tawe at Swansea, Wales.

Holland.

RAILROAD:

Dutch Railroad Company:

Three Single Track Bridges across Spaarne River.

HIGHWAY:

Ministry of Waterways:

Two Electric Railway and Highway Bridges across North Sea Canal at Velzen.

Russia.

HIGHWAY:

City of St. Petersburg:

One Electric Railway and Highway Bridge across Ekaterinhofka River.

Argentine Republic.

RAILROAD:

Buenos Aires Great Southern Railway:

Two Double Track Bridges across Riachuelo River, Buenos Aires, A. R.

India.

RAILROAD:

Burma Railways:

One Single Track Bridge across Ngawun River at Rangoon, India.

Egypt.

RAILROAD:

Egyptian Government:

One Double Track Bridge across the Harbor at Port Soudan.

HIGHWAY:

Egyptian Government:

One Highway Bridge across the Nile, Cairo.

Mexico.

RAILROAD:

Tehuantepec Railroad:

Two Single Track Bridges across the Harbor at Salina Cruz, Mexico.

Completed 1895

METROPOLITAN WEST SIDE
ELEVATED R. R. CO.

W. S. MENDEN, Chief Engineer

Four-Track

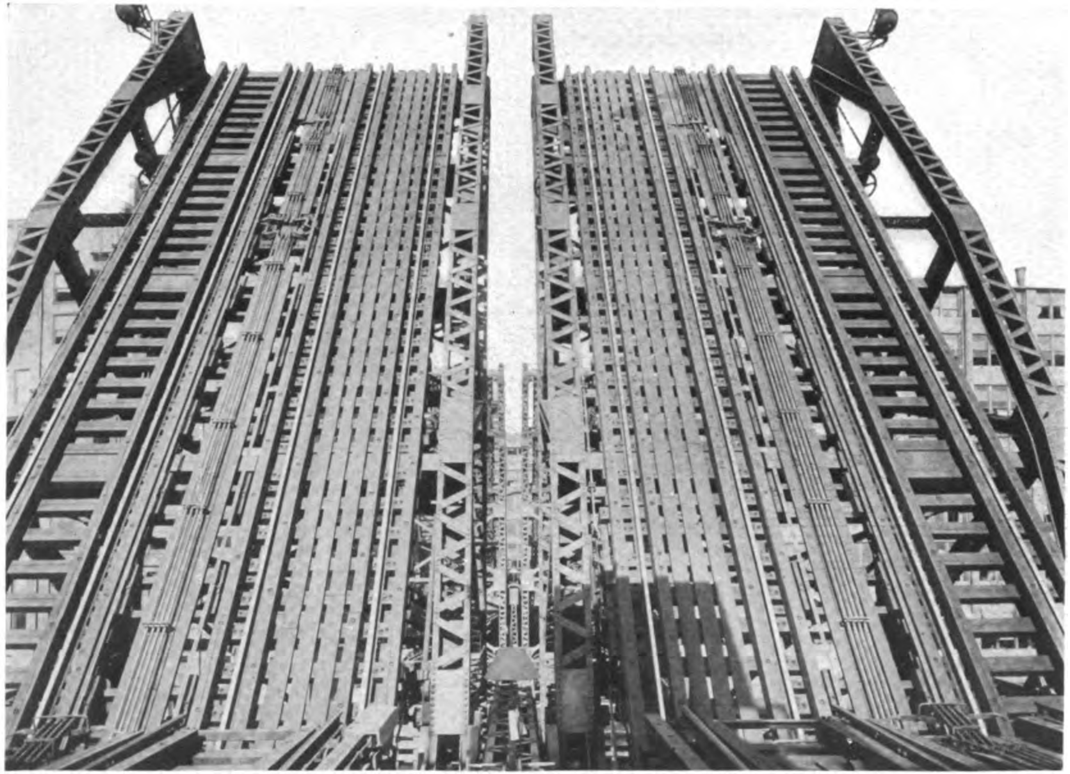
SCHERZER ROLLING LIFT BRIDGE

Across the South Branch of the Chicago River, Chicago,
For the Metropolitan West Side Elevated Railroad Company

In the closed position

THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 114 feet



Completed 1895

METROPOLITAN WEST SIDE
ELEVATED R. R. CO.

W. S. MENDEN, Chief Engineer

Four-Track

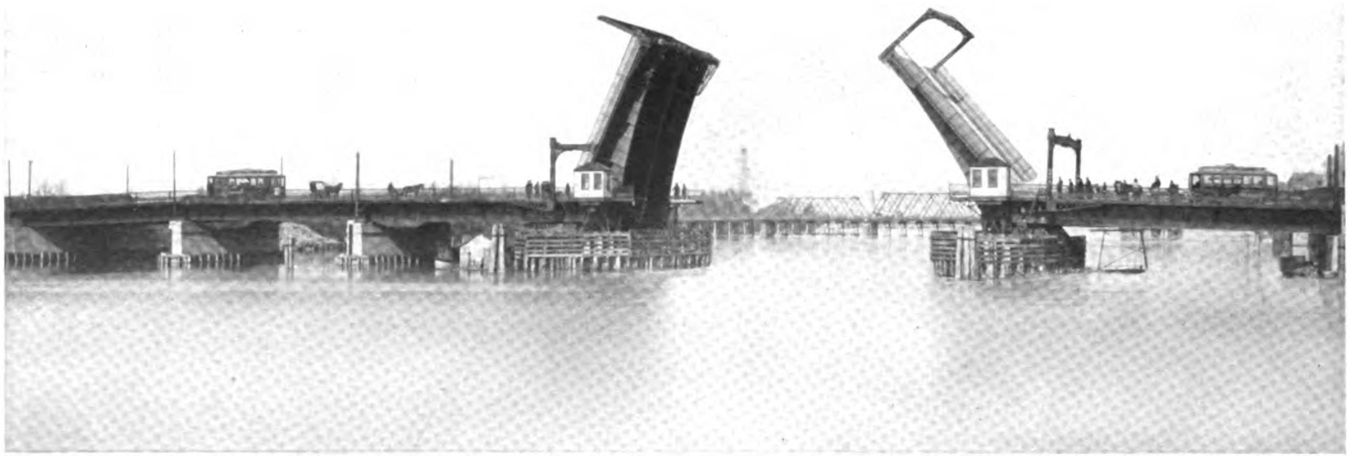
SCHERZER ROLLING LIFT BRIDGE

Across the South Branch of the Chicago River, Chicago,
For the Metropolitan West Side Elevated Railroad Company

View on line of tracks in a partly opened position showing tracks blocked against accidents

THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 114 feet



Completed 1905

CITY OF SAGINAW
R. W. ROBERTS, City Engineer

Highway and Electric Railway

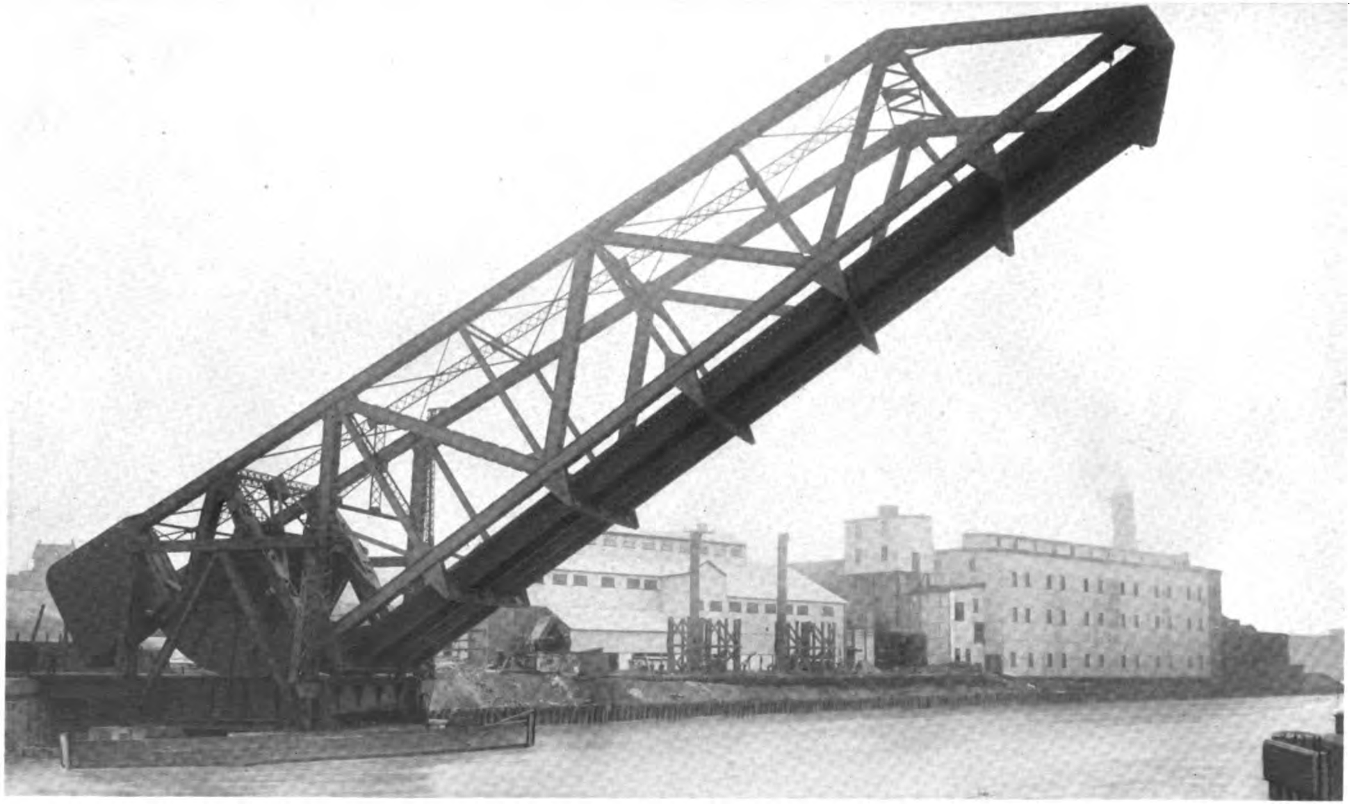
SCHERZER ROLLING LIFT BRIDGE

Across Saginaw River at Genesee Avenue, Saginaw, Michigan

In a partly opened position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 108 feet



Completed 1906

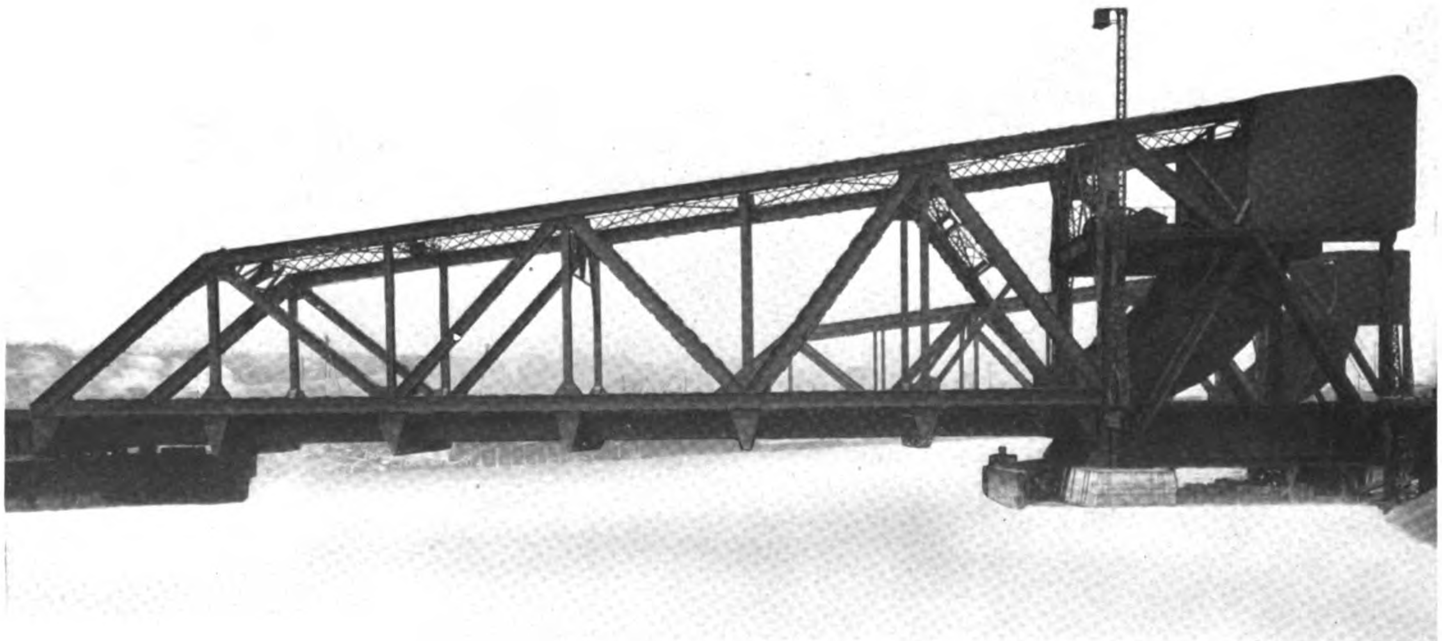
BALTIMORE & OHIO RAILROAD CO.
D. D. CAROTHERS, Chief Engineer
J. E. GREINER, Assistant Chief Engineer

Double-Track

SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the Baltimore & Ohio Railroad Company
In a partly opened position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 160 feet



Completed 1906

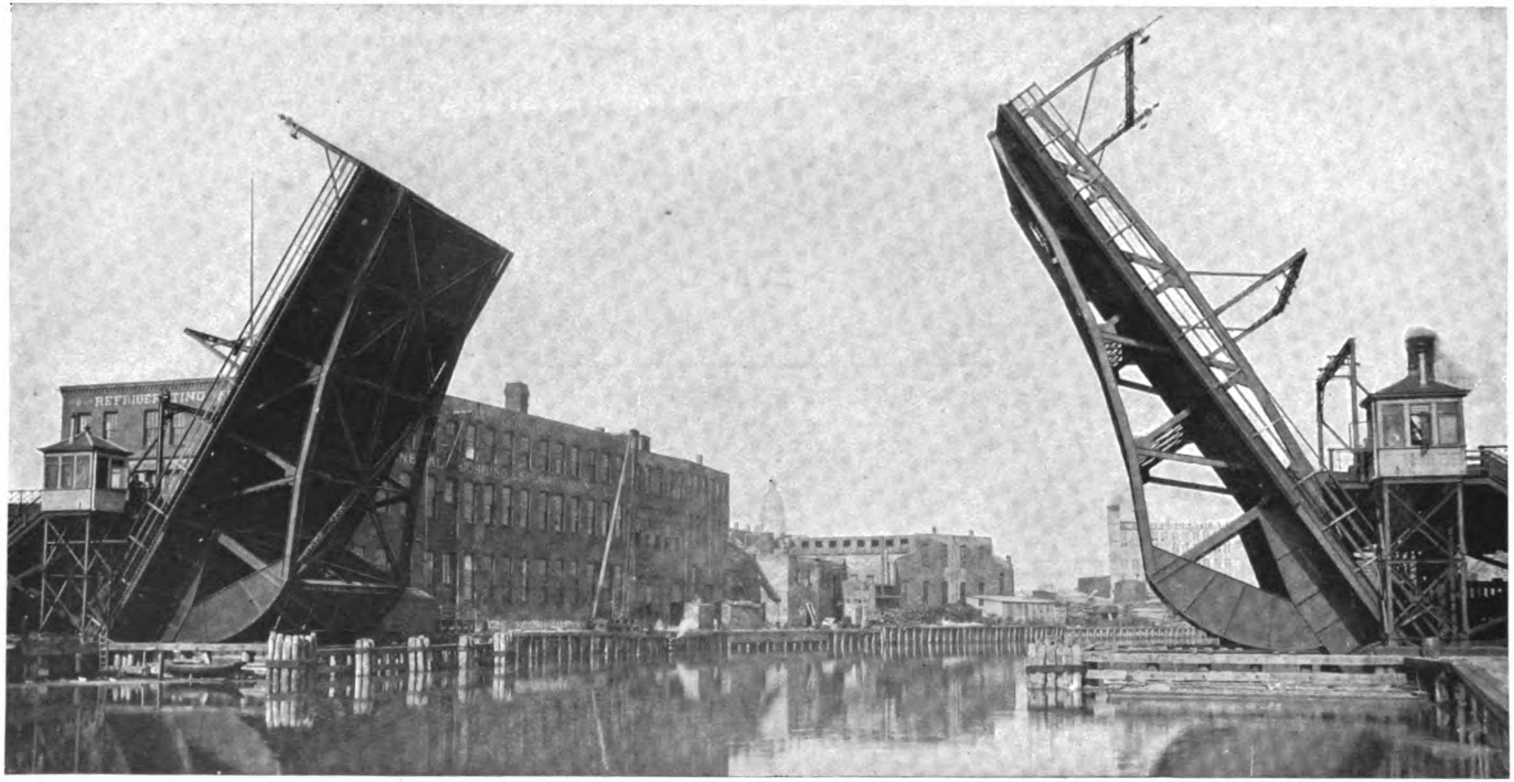
BALTIMORE & OHIO RAILROAD CO.
D. D. CAROTHERS, Chief Engineer
J. E. GREINER, Assistant Chief Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio, For the Baltimore & Ohio Railroad Company

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 160 feet



Completed 1897

CITY OF CHICAGO

L. B. JACKSON, City Engineer
W. M. HUGHES, Engineer

Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the North Branch of the Chicago River at North Halsted Street, Chicago

In a partly opened position

THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 127 feet

Completed 1897

CITY OF CHICAGO
L. B. JACKSON, City Engineer
W. M. HUGHES, Engineer

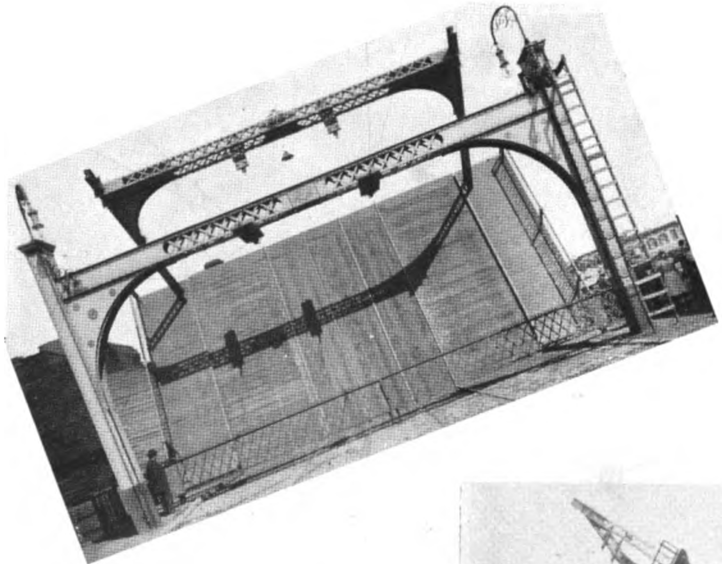
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the North Branch of the Chicago River at North Halsted Street, Chicago

In the closed position

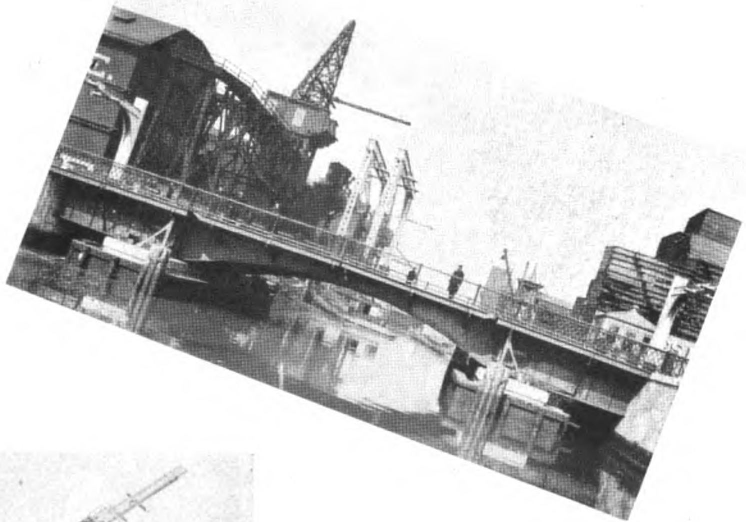
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 127 feet



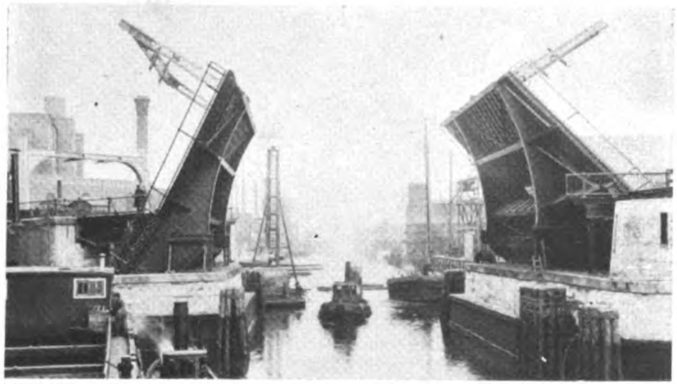
UNION STREET

Showing Roadway Blocked by Open Bridge



UNION STREET

Showing Bridge Closed for Highway Traffic



HAMILTON AVENUE

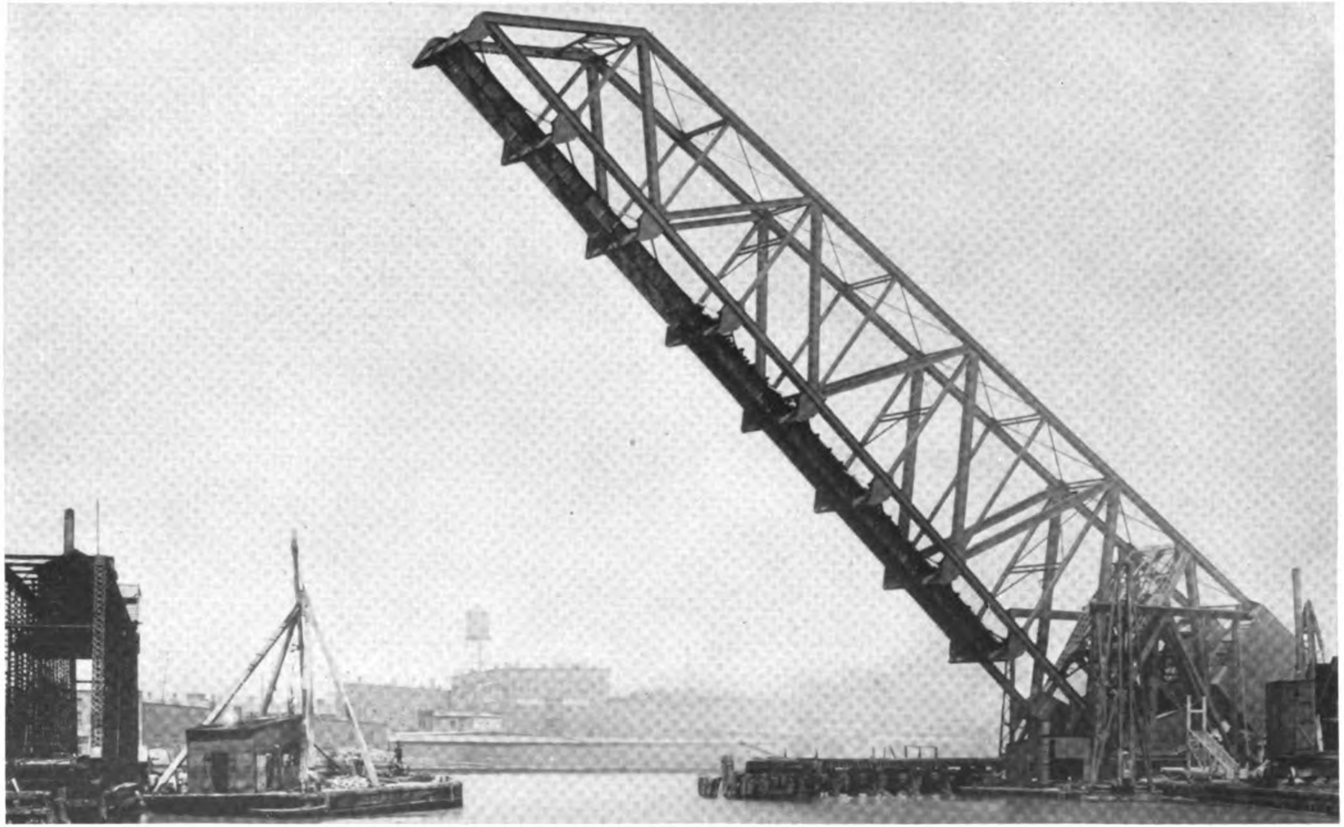
Showing Bridge Open for Navigation

Completed 1905

CITY OF NEW YORK
Honorable GUSTAV LINDENTHAL,
Commissioner of Bridges
J. S. LANGTHORN, Engineer in Charge

SCHERZER ROLLING LIFT BRIDGES ACROSS GOWANUS CANAL,
BROOKLYN, NEW YORK

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago



Completed 1907

BALTIMORE & OHIO RAILROAD CO.
D. D. CAROTHERS, Chief Engineer
J. E. GREINER, Assistant Chief Engineer

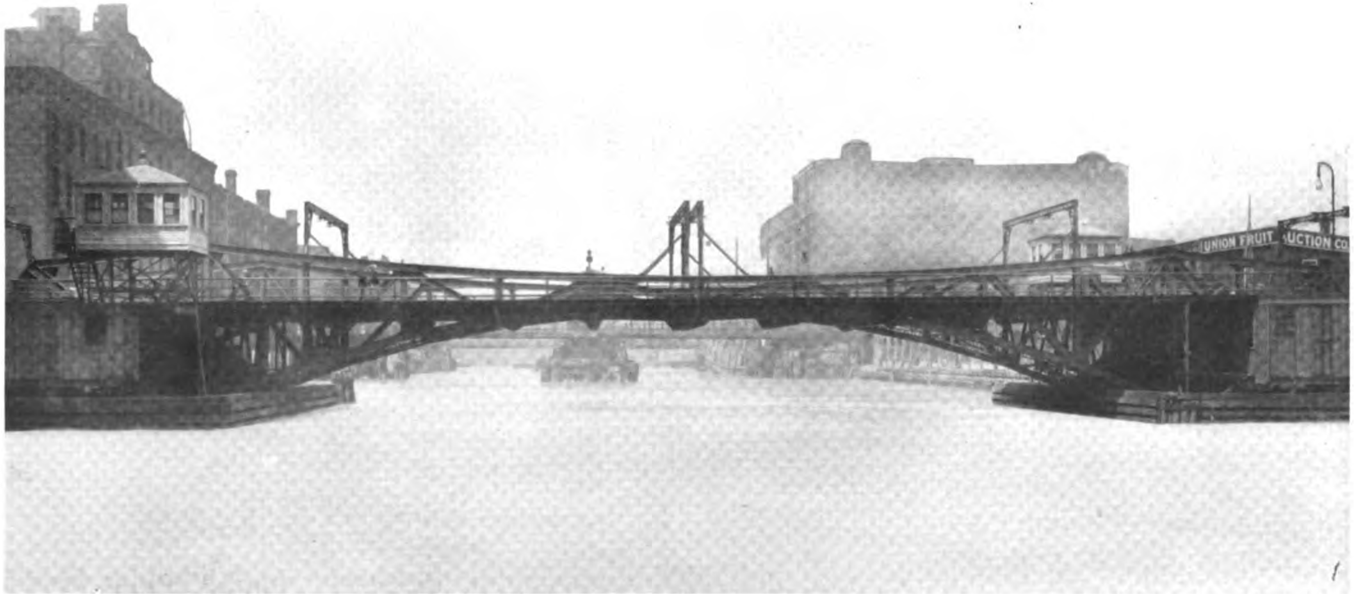
Single-Track

SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the Baltimore & Ohio Railroad Company

Side view showing method of erection in partly opened position without interfering with railroad traffic over the old bridge

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 230 feet



Completed 1903

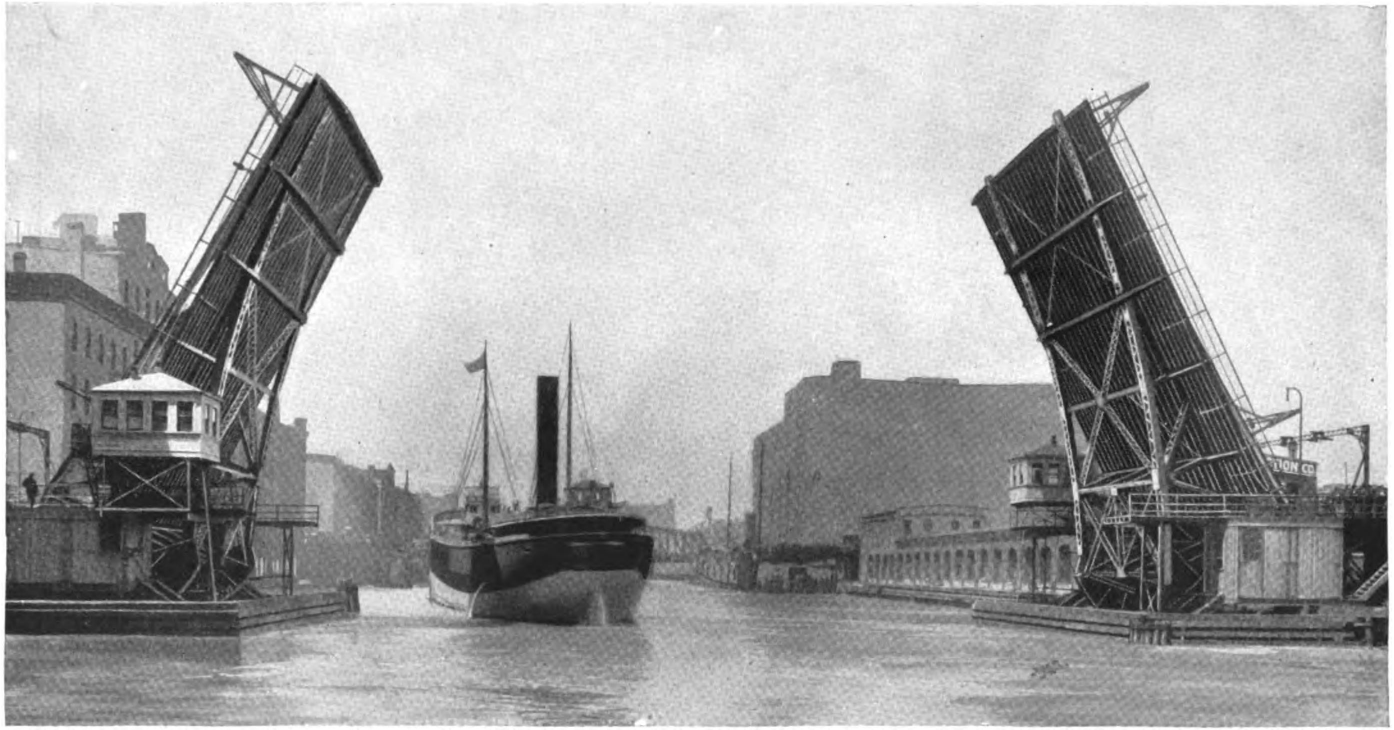
SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at State Street, Chicago,
For the Sanitary District of Chicago

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago.

Movable span, 161 feet 8 inches.



Completed 1903

THE SANITARY DISTRICT OF CHICAGO

ISHAM RANDOLPH, Chief Engineer
W. M. HUGHES, Engineer of Bridges

Highway and Electric Railway

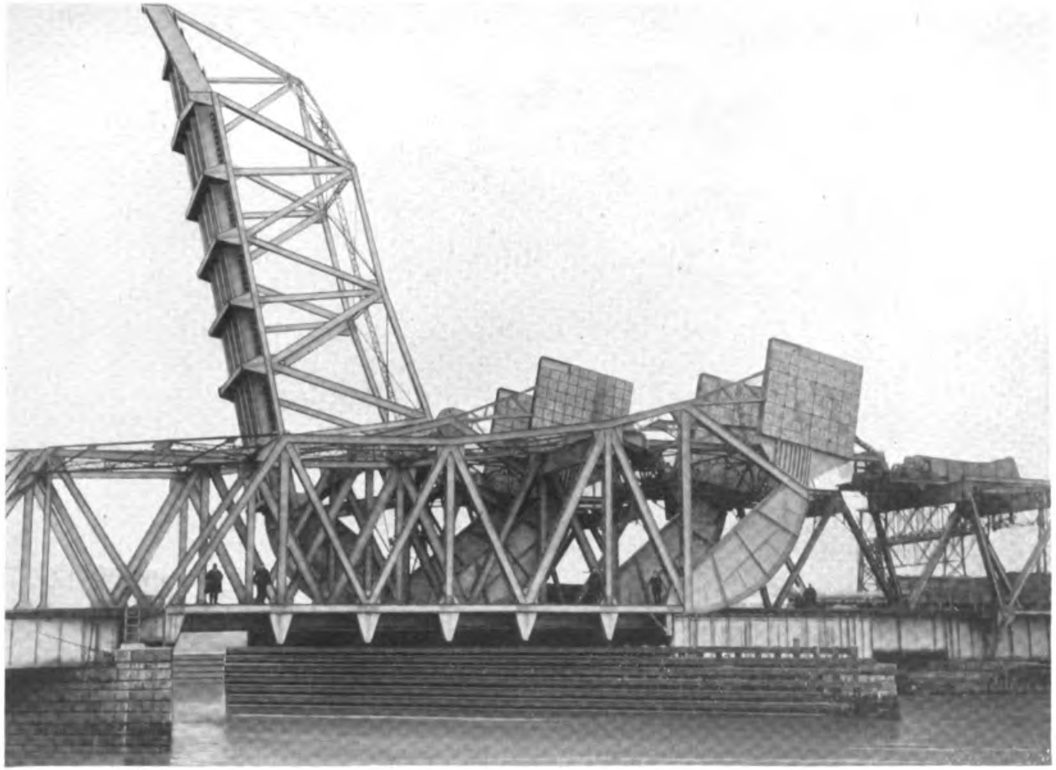
SCHERZER ROLLING LIFT BRIDGE

Across the Chicago River at State Street, Chicago, For the Sanitary District of Chicago

View showing bridge in the open position. This bridge is the first bascule bridge on the route of the Deep Waterway from the Great Lakes to the Gulf of Mexico and Panama Canal.

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 161 feet 8 inches



Completed 1899

N. Y., N. H. & H. R. R. CO.
F. S. CURTIS, Chief Engineer
W. H. MOORE, Engineer of Bridges

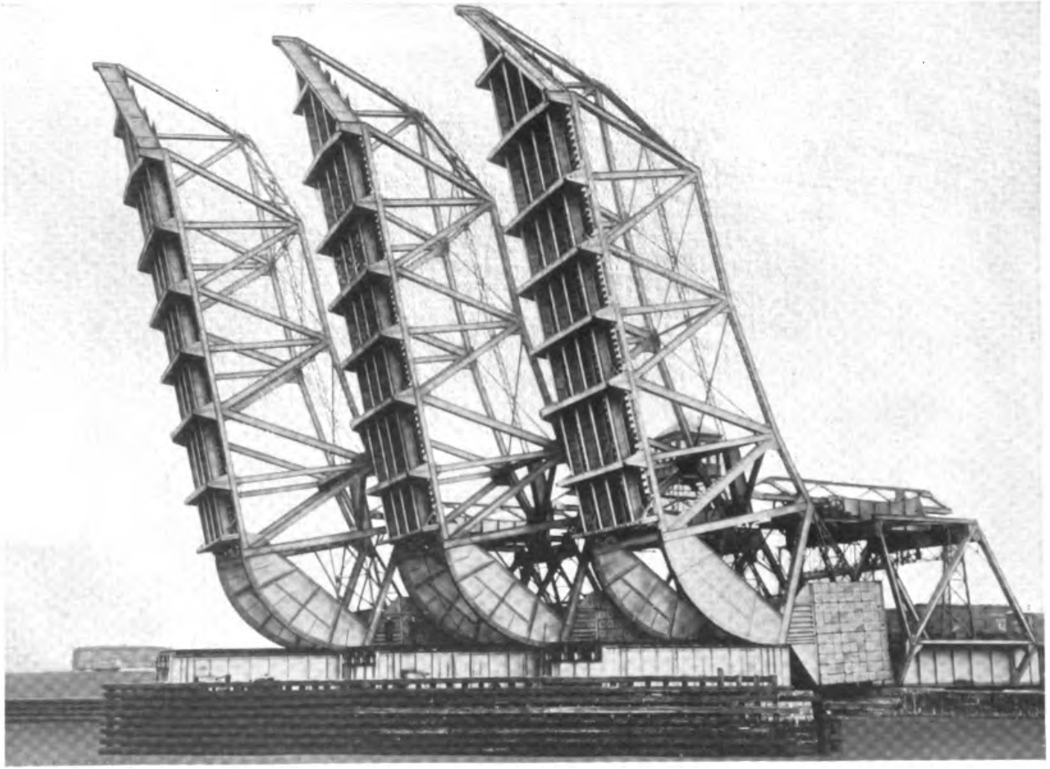
Six-Track

SCHERZER ROLLING LIFT BRIDGE
Across Fort Point Channel, Boston,
For the New York, New Haven & Hartford Railroad Company

Side view showing two spans closed and one span open

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 98 feet 9 inches



Completed 1899

N. Y., N. H. & H. R. R. CO.
F. S. CURTIS, Chief Engineer
W. H. MOORE, Engineer of Bridges

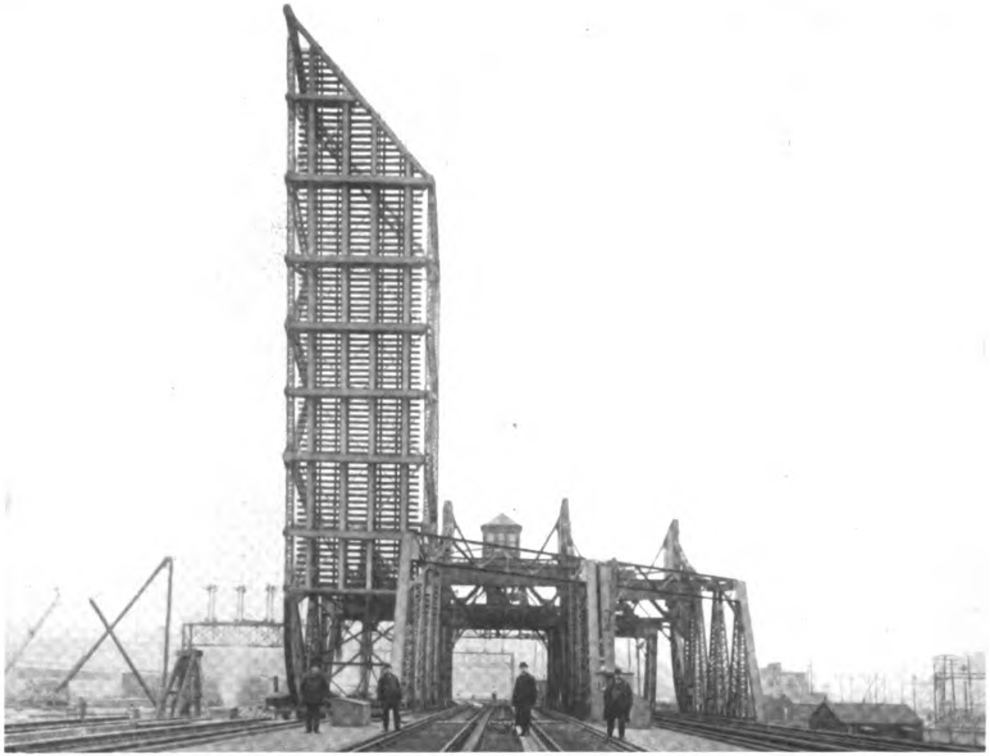
Six-Track

SCHERZER ROLLING LIFT BRIDGE
Across Fort Point Channel, Boston,
For the New York, New Haven & Hartford Railroad Company

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 98 feet 9 inches



Completed 1899

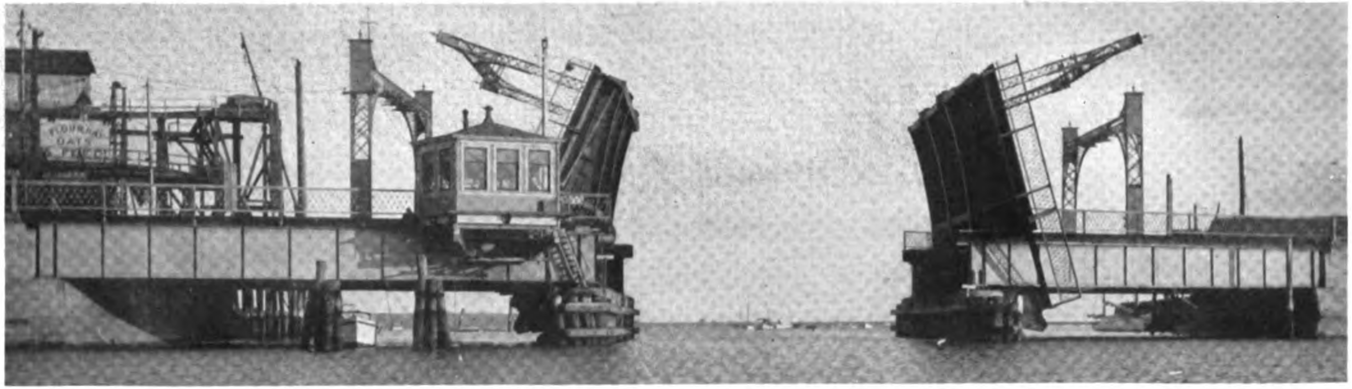
N. Y., N. H. & H. R. R. CO.
F. S. CURTIS, Chief Engineer
W. H. MOORE, Engineer of Bridges

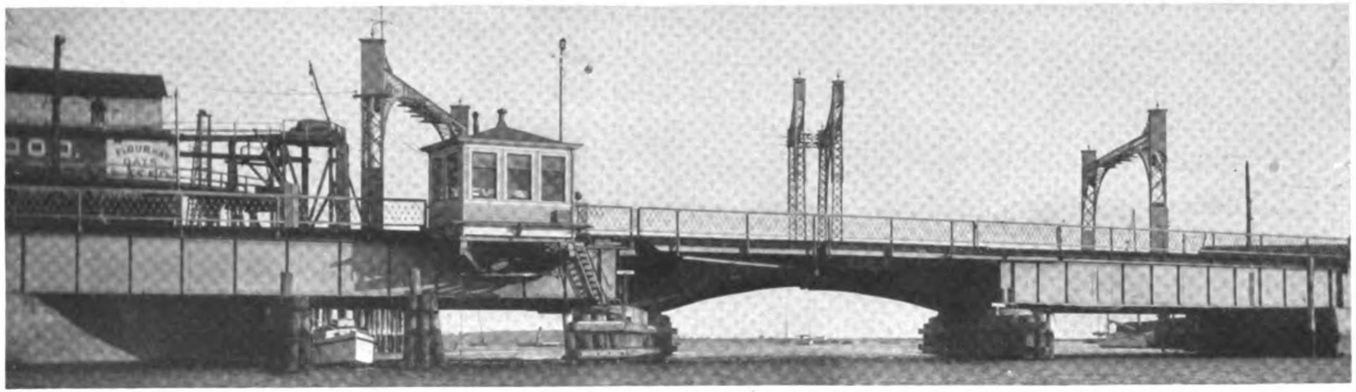
Six-Track
SCHERZER ROLLING LIFT BRIDGE
Across Fort Point Channel, Boston,
For the New York, New Haven & Hartford Railroad Company

View on line of tracks showing two spans closed and one span open

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 98 feet 9 inches





Completed 1907

CITY OF NEW HAVEN
CASSIUS W. KELLY, City Engineer

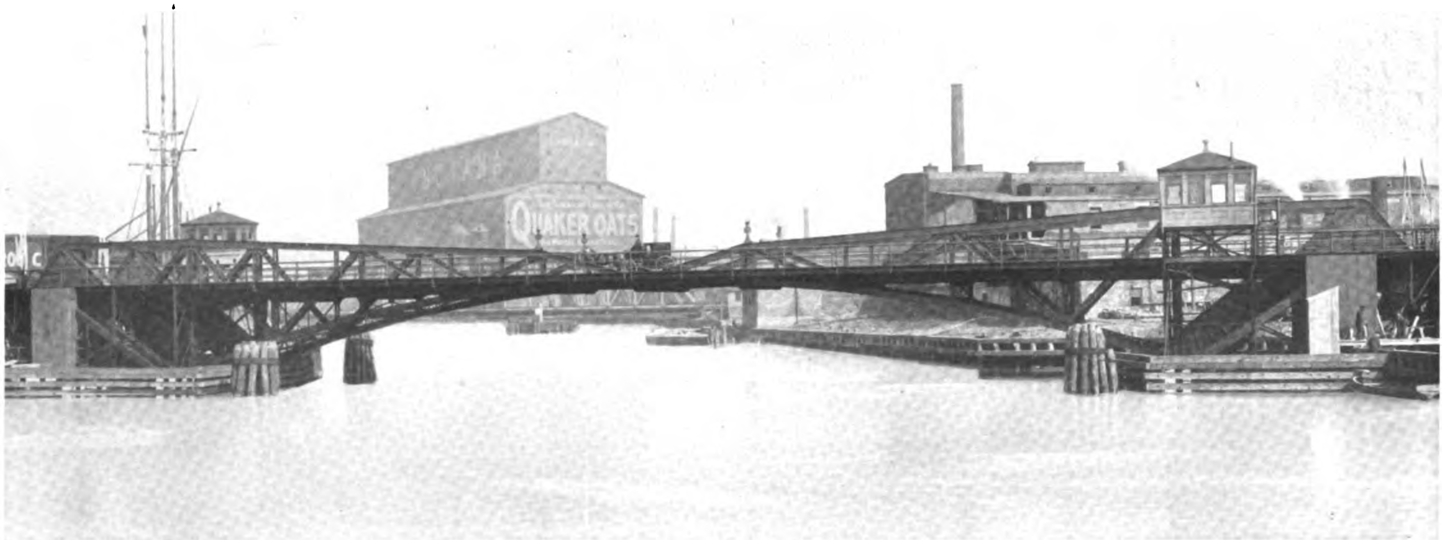
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across West River at
Kimberly Avenue, New Haven, Connecticut

In the open and closed positions

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 51 feet



Completed 1902

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Canal Street, Chicago,
For the Sanitary District of Chicago

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 188 feet

Completed 1902

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

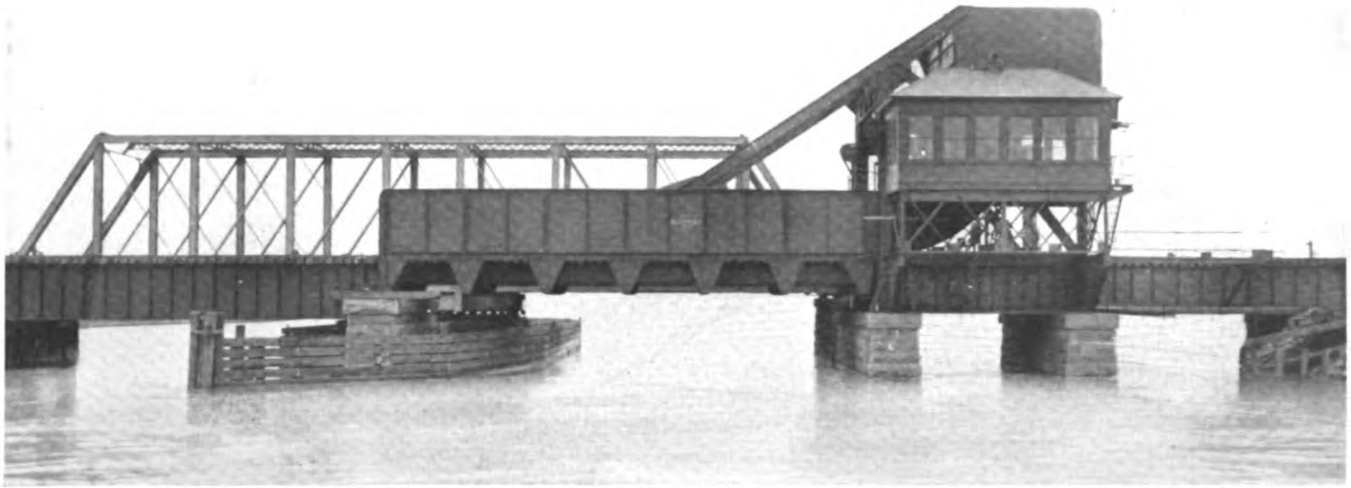
Highway

SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Canal Street, Chicago,
For the Sanitary District of Chicago

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 188 feet



Completed 1908

N. Y., N. H. & H. R. R. COMPANY
EDWARD GAGEL, Chief Engineer
W. H. MOORE, Engineer of Bridges

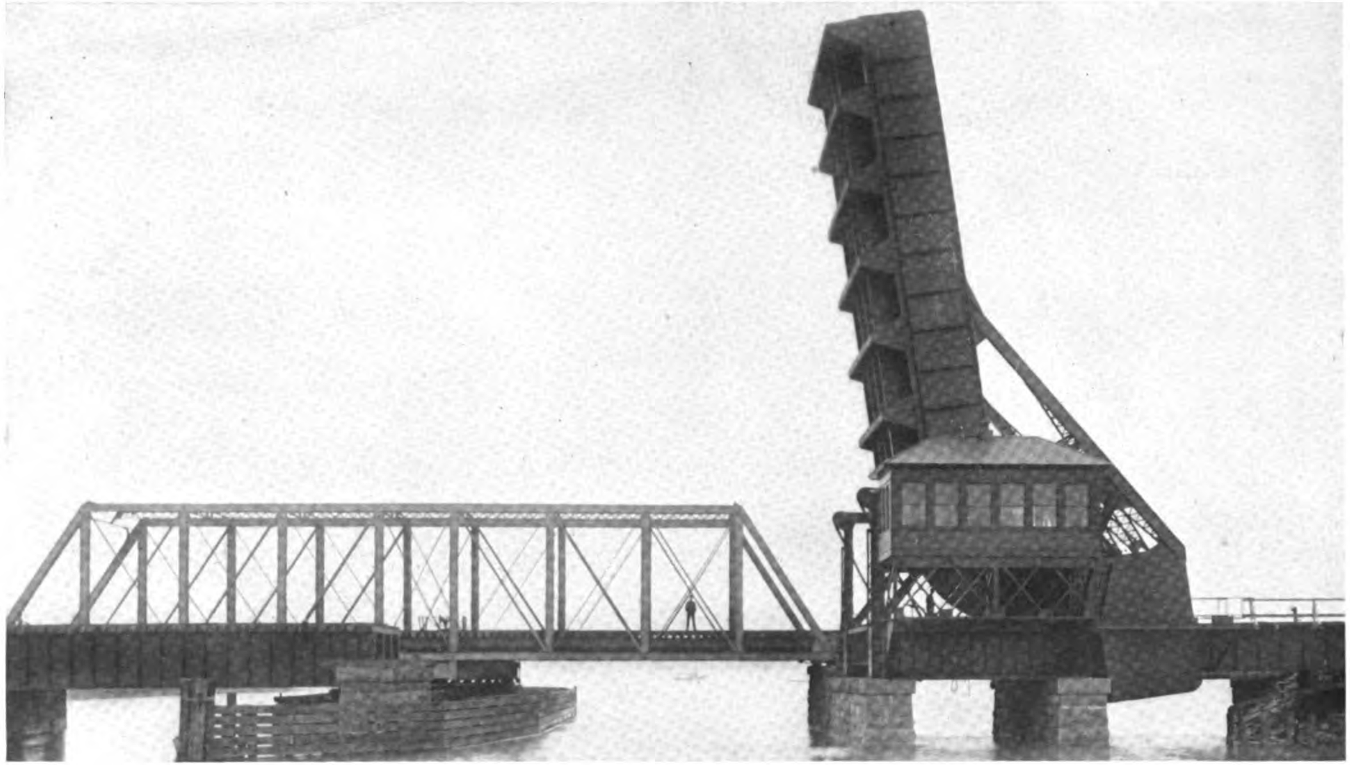
Double-Track

SCHERZER ROLLING LIFT BRIDGE
Across Niantic River at Niantic, Connecticut,
For the New York, New Haven & Hartford Railroad Company

View showing new bridge in closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 68 feet



Completed 1908

N. Y., N. H. & H. R. R. COMPANY
EDWARD GAGEL, Chief Engineer
W. H. MOORE, Engineer of Bridges

Double-Track

SCHERZER ROLLING LIFT BRIDGE
Across Niantic River at Niantic, Connecticut,
For the New York, New Haven & Hartford Railroad Company

View showing new bridge in the open position and the old swing bridge which the new structure replaced

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 68 feet

Completed 1905

CITY OF NEW YORK
Honorable JOHN L. SHEA,
Commissioner of Bridges
E. A. BYRNE, Engineer in Charge

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Newtown Creek at Vernon Avenue, New York City

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 172 feet

Completed 1905

CITY OF NEW YORK
Honorable JOHN L. SHEA,
Commissioner of Bridges
E. A. BYRNE, Engineer in Charge

Highway and Electric Railway

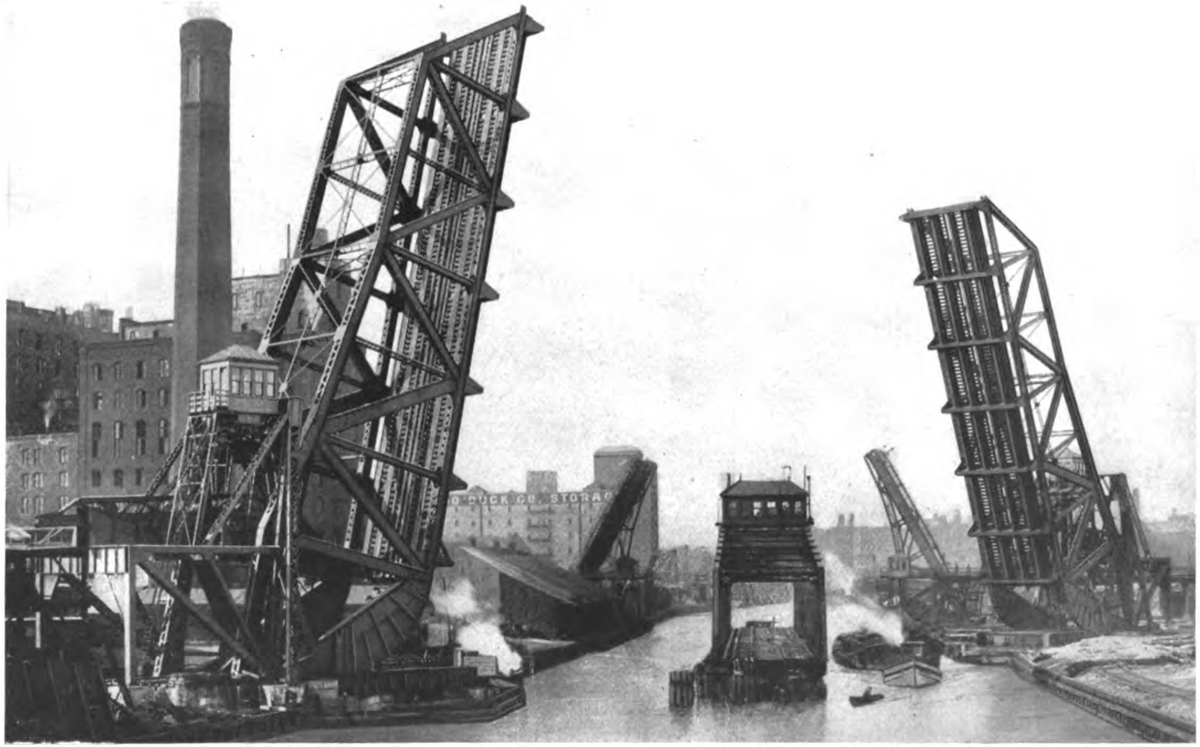
SCHERZER ROLLING LIFT BRIDGE

Across Newtown Creek at Vernon Avenue, New York City

In a partly opened position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 172 feet



Completed 1901

THE SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
W. M. HUGHES, Engineer of Bridges

CHICAGO TERMINAL TRANSFER R. R. COMPANY
F. E. PARADIS, Chief Engineer
RALPH MODJESKI, Consulting Engineer

Double-Track

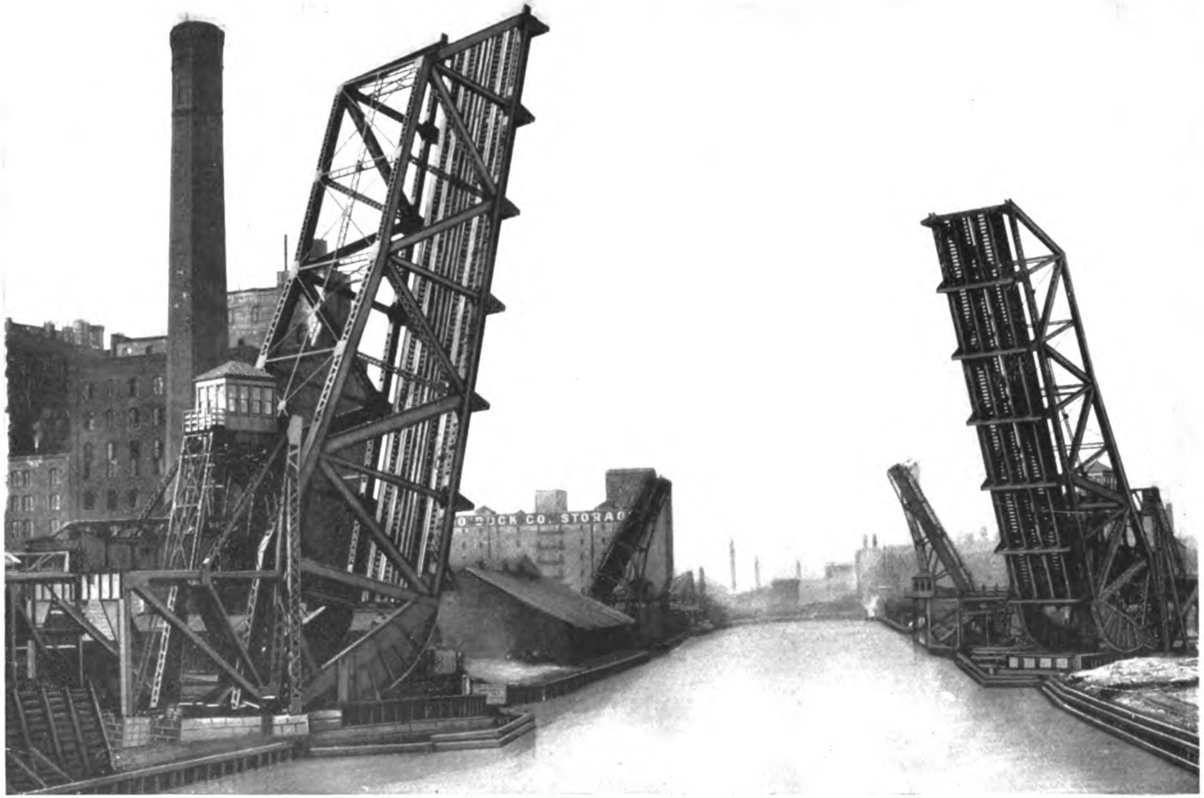
SCHERZER ROLLING LIFT BRIDGE
Across the South Branch of the Chicago River at the Grand Central Station, Chicago

Constructed by the Sanitary District of Chicago for the use of the Chicago Terminal Transfer Railroad and other railroads entering the Grand Central Station.

View before removal of old swing bridge showing obstructed channel

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 275 feet



Completed 1901

THE SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
W. M. HUGHES, Engineer of Bridges

CHICAGO TERMINAL TRANSFER R. R. COMPANY
F. E. PARADIS, Chief Engineer
RALPH MODJESKI, Consulting Engineer

Double-Track

SCHERZER ROLLING LIFT BRIDGE
Across the South Branch of the Chicago River at the Grand Central Station, Chicago

Constructed by the Sanitary District of Chicago for the use of the Chicago Terminal Transfer Railroad and other railroads entering the Grand Central Station.

In the open position

Designed by
THE SCHERZER ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 275 feet

Completed 1903

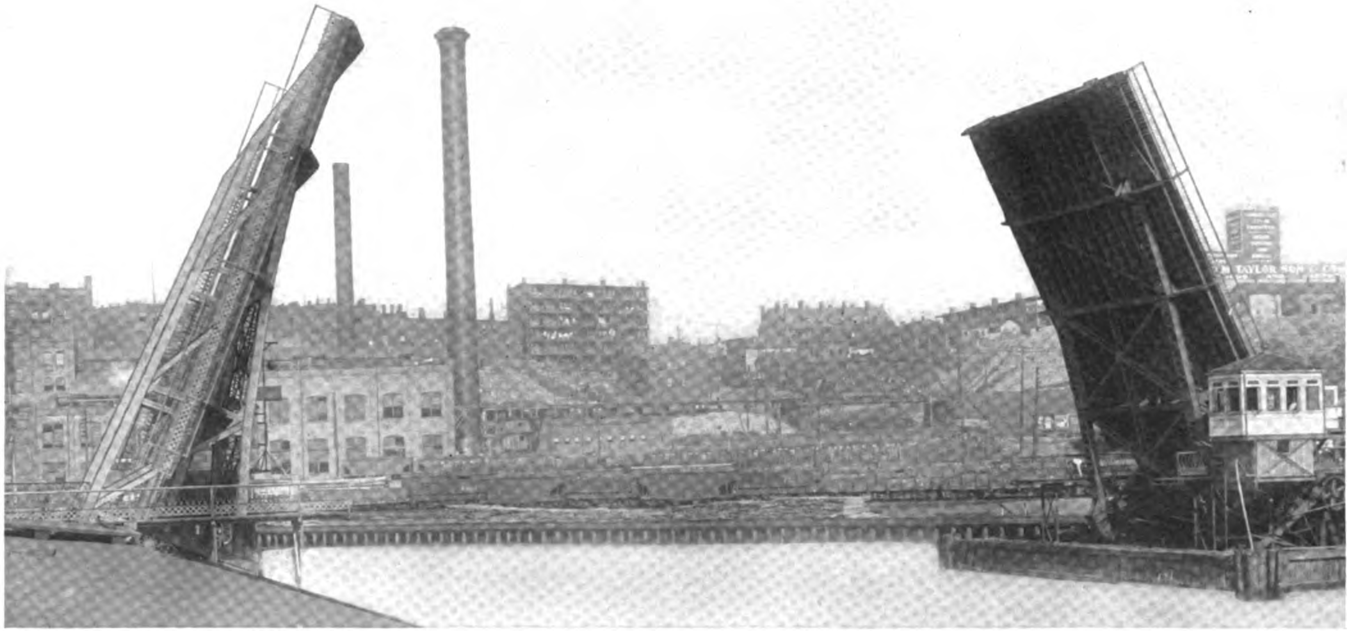
CITY OF CLEVELAND
WILLIAM J. CARTER, City Engineer
ROBERT HOFFMANN, Assistant City Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at
Middle Seneca Street, Cleveland, Ohio

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 138 feet



Completed 1903

CITY OF CLEVELAND
WILLIAM J. CARTER, City Engineer
ROBERT HOFFMANN, Assistant City Engineer

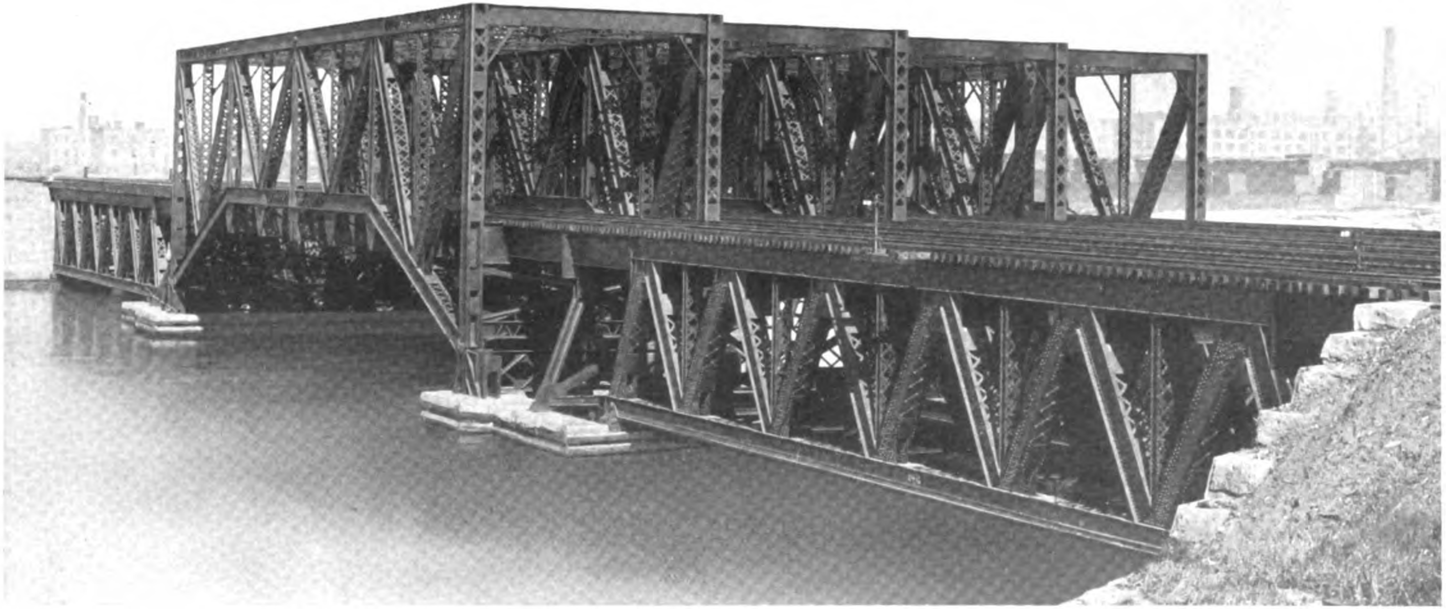
Highway

SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at
Middle Seneca Street, Cleveland, Ohio

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 138 feet



Completed 1901

THE SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
W. M. HUGHES, Engineer of Bridges
P., C., C. & ST. L. RY. CO.
THOS. H. JOHNSON, Chief Engineer
C. T. T. R. R. CO.
F. E. PARADIS, Chief Engineer
C. J. RY. CO.
J. B. COX, Chief Engineer
RALPH MODJESKI, Consulting Engineer for the Railroad Companies

Eight-Track

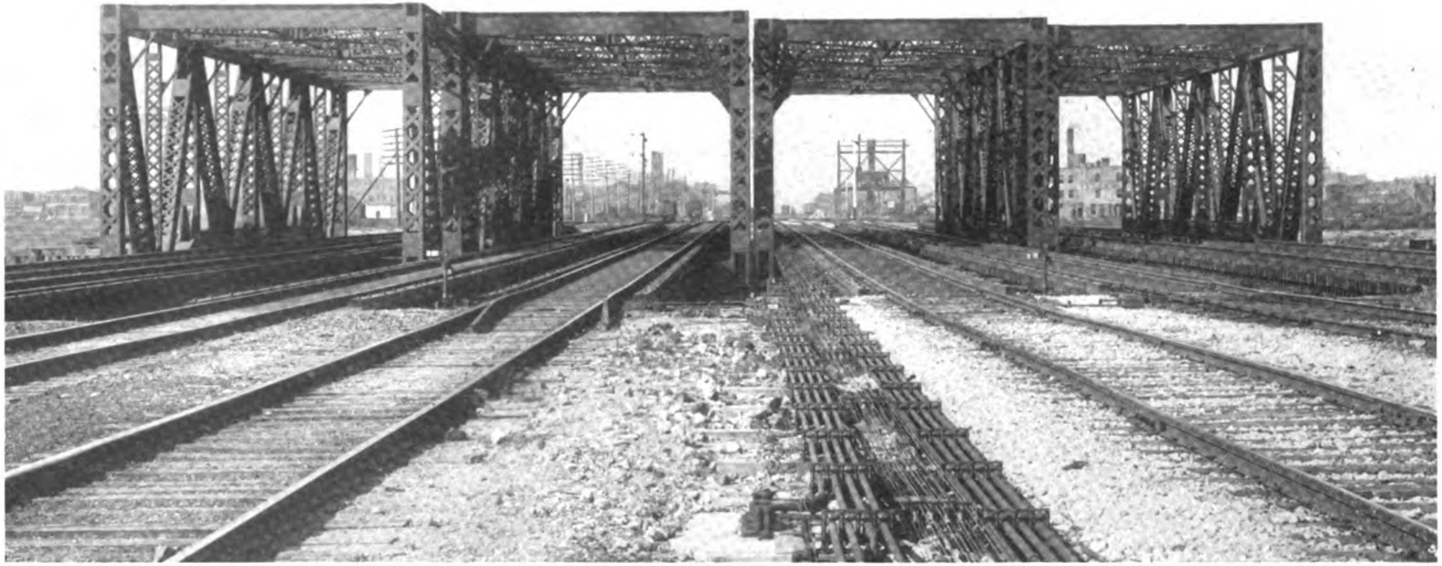
SCHERZER ROLLING LIFT BRIDGE

Across the Main Drainage and Ship Canal, Chicago, For the Sanitary District of Chicago

For the use of the Pittsburg, Cincinnati, Chicago & St. Louis Railway Company, the Chicago Terminal Transfer Railroad Company and the Chicago Junction Railway Company. View showing approach spans and fixed channel spans. Rolling segments and operating machinery are to be added when channel is opened to navigation

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 150 feet



Completed 1901

THE SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
W. M. HUGHES, Engineer of Bridges
P., C., C. & ST. L. RY. CO.
THOS. H. JOHNSON, Chief Engineer
C. T. T. R. R. CO.
F. E. PARADIS, Chief Engineer
C. J. RY. CO.
J. B. COX, Chief Engineer
RALPH MODJESKI, Consulting Engineer for the Railroad Companies

Eight-Track

SCHERZER ROLLING LIFT BRIDGE

Across the Main Drainage and Ship Canal, Chicago, For the Sanitary District of Chicago

For the use of the Pittsburg, Cincinnati, Chicago & St. Louis Railway Company, the Chicago Terminal Transfer Railroad Company and the Chicago Junction Railway Company. View on line of tracks showing four adjacent double-track bridges as fixed structures. This bridge crosses the channel at an angle of 68 degrees 21 minutes 40 seconds.

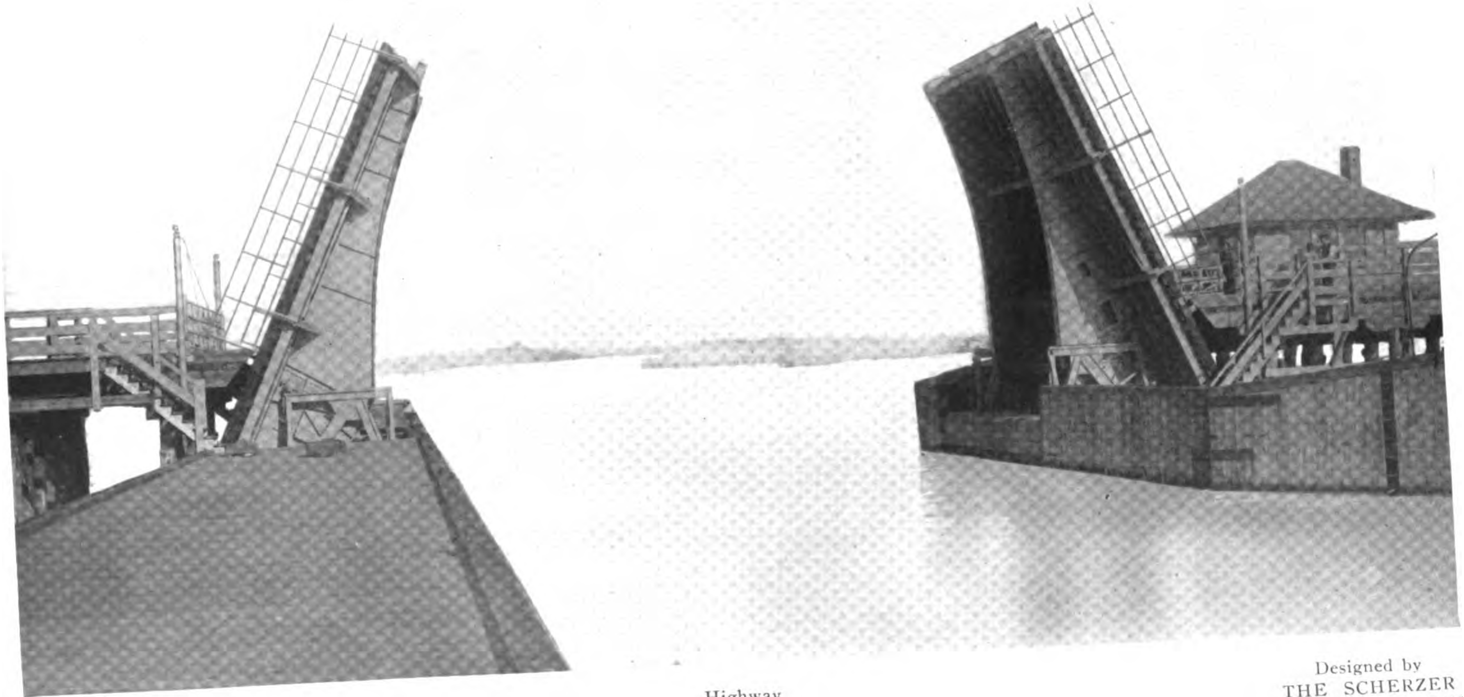
Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 150 feet

Completed 1906
METROPOLITAN PARK COMMISSION
J. R. RABLIN, Chief Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across Malden River
For the Metropolitan Park Commission, Boston, Massachusetts
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 56 feet



Completed 1906

METROPOLITAN PARK COMMISSION
J. R. RABLIN, Chief Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across Saugus River
For the Metropolitan Park Commission, Boston, Massachusetts

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 56 feet

Completed 1907

N. Y., N. H. & H. R. R. COMPANY
C. M. INGERSOLL, Chief Engineer
W. H. MOORE, Engineer of Bridges

Four-Track

SCHERZER ROLLING LIFT BRIDGE
Across Neponset River, Massachusetts,
For the New York, New Haven & Hartford Railroad Company

View on line of tracks showing one leaf in closed position and one leaf in open position.

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 62 feet 8 inches

Completed 1907

N. Y., N. H. & H. R. R. COMPANY
C. M. INGERSOLL, Chief Engineer
W. H. MOORE, Engineer of Bridges

Four-Track

SCHERZER ROLLING LIFT BRIDGE
Across Neponset River, Massachusetts,
For the New York, New Haven & Hartford Railroad Company

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 62 feet 8 inches

Completed 1901

THE SANITARY DISTRICT OF CHICAGO

ISHAM RANDOLPH, Chief Engineer

W. M. HUGHES, Engineer of Bridges

Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE

Across the Chicago River at Taylor Street, Chicago, For the Sanitary District of Chicago

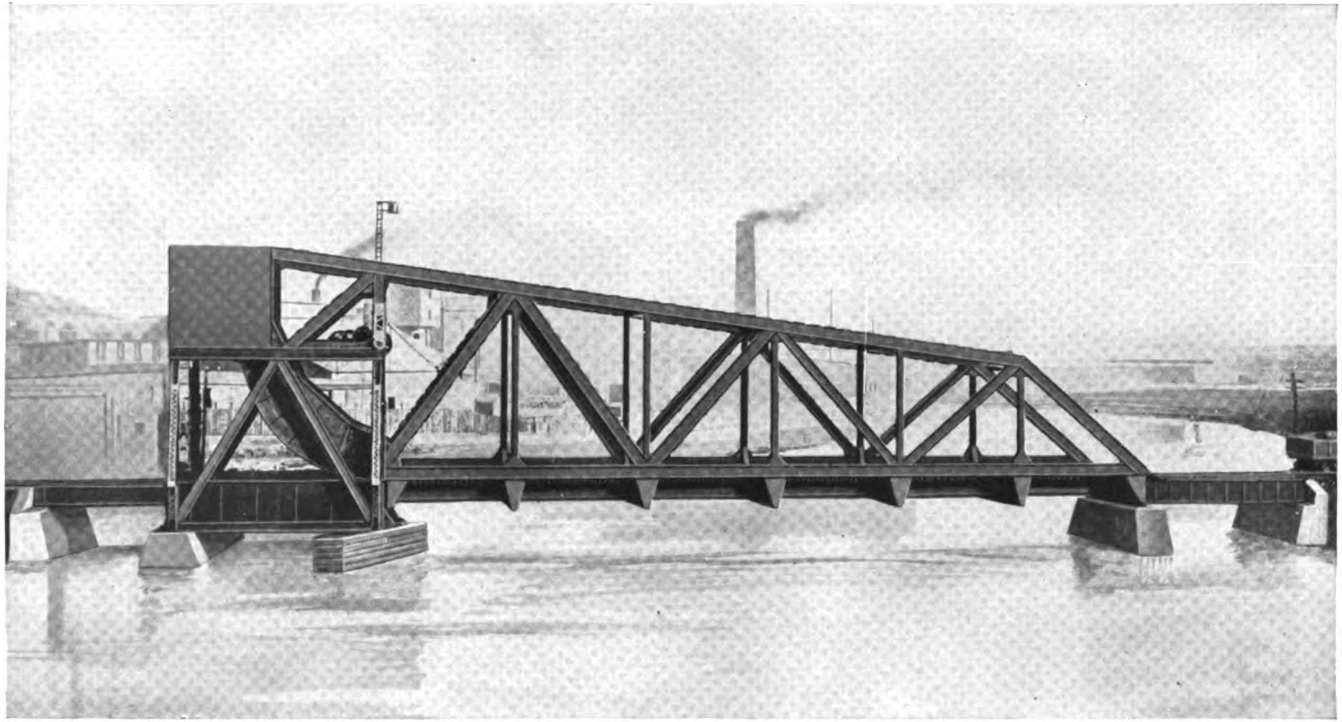
In the open position

Designed by

THE SCHERZER ROLLING LIFT BRIDGE CO.

Chicago

Movable span, 148 feet 7 inches



Completed 1904

NEWBURGH & SOUTH SHORE RAILWAY COMPANY
H. L. SCHULER, Chief Engineer.

Double-Track

SCHERZER ROLLING LIFT BRIDGE

Across the Cuyahoga River, Cleveland, Ohio,

For the Newburgh & South Shore Railway Company

In the Closed Position

Shortly after the completion of this bridge, similar bridges were ordered by the B. & O. R. R. Co., N. Y., C. & St. L. R. R. Co., N. Y., N. H. & H. R. R. Co., N. & W. R. R. Co., Seaboard Air Line R. R., N. & S. Ry. Co., Buenos Ayres Great Southern Ry. Co., Argentine Republic, the Government of Khartoom, Africa, and others.

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 160 feet

Completed 1904

NEWBURGH & SOUTH SHORE
RAILWAY COMPANY
H. L. SCHULER, Chief Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River, Cleveland, Ohio,
For the Newburgh & South Shore Railway Company
In a partly opened position for the passage of a small vessel

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 160 feet

Double-Track

SCHERZER ROLLING LIFT BRIDGE

Across the Cuyahoga River at Cleveland, Ohio,

For the Newburgh & South Shore Railway Company

View showing method of erection in the open position without false work by a movable platform and derrick attached to the top chords and raised at the completion of each panel length.

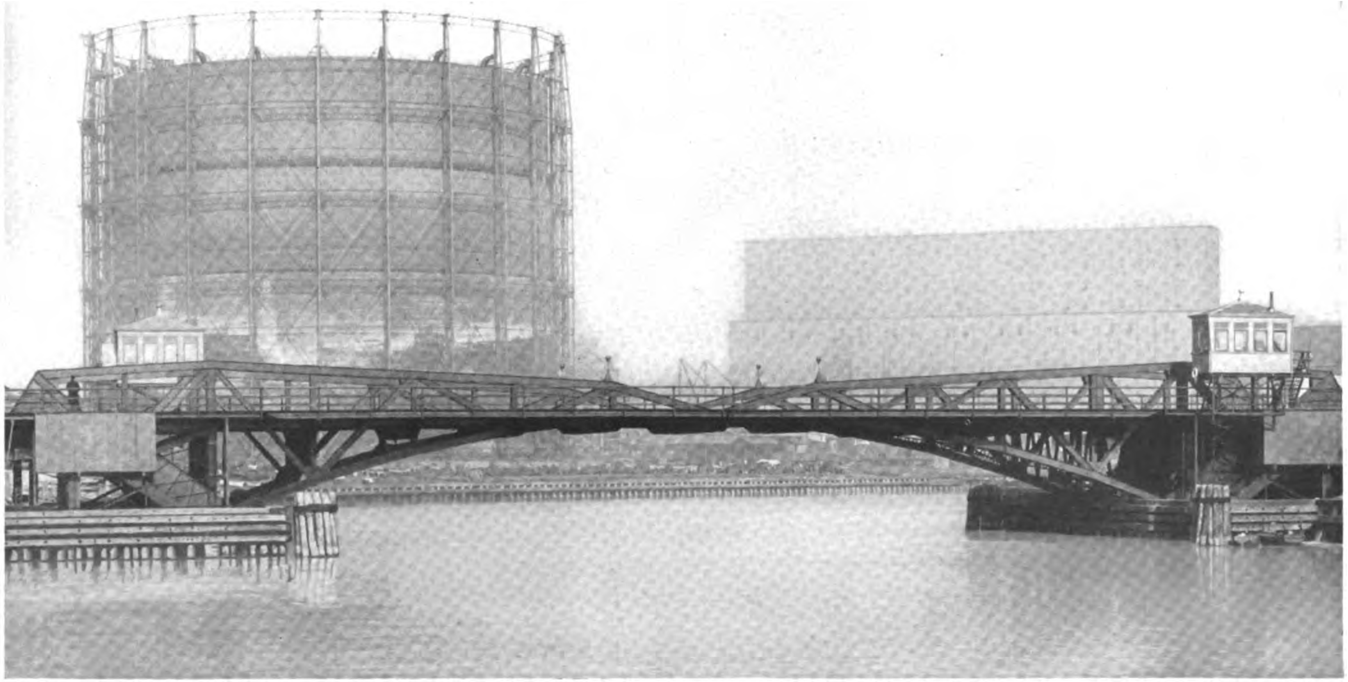
Completed 1904

NEWBURGH & SOUTH SHORE RAILWAY COMPANY

H. L. SCHULER, Chief Engineer

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 160 feet



Completed 1902

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

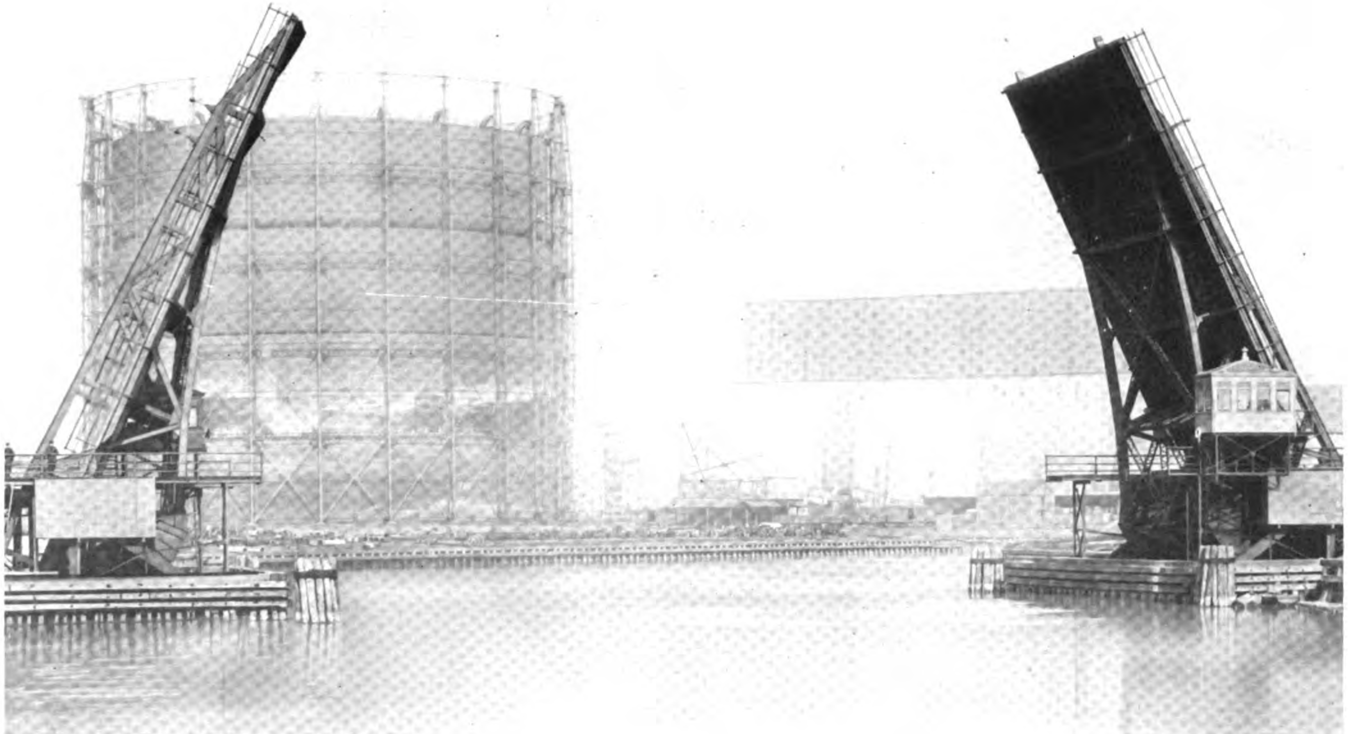
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Main Street, Chicago,
For the Sanitary District of Chicago

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

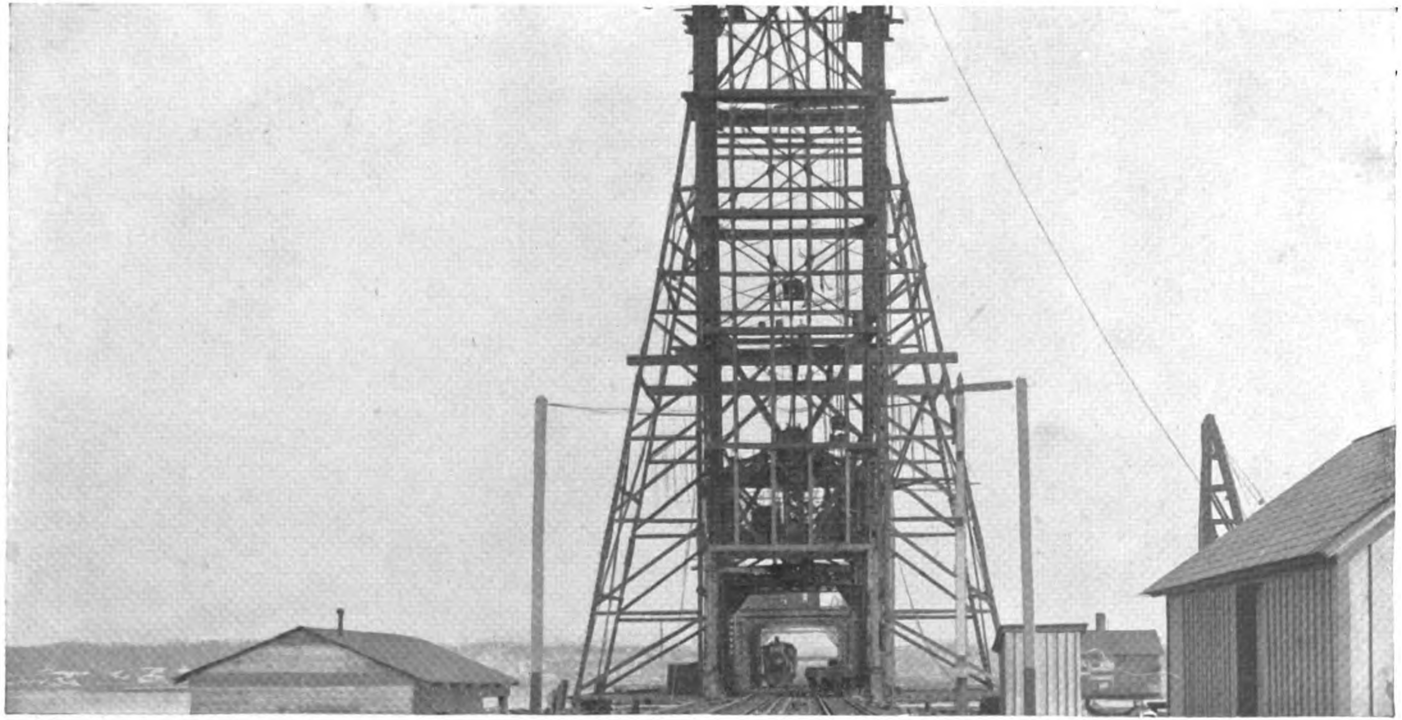
Movable span, 161 feet 8 inches



Completed 1902
SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Main Street, Chicago,
For the Sanitary District of Chicago
In the open position.

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 161 feet 8 inches



Completed 1903

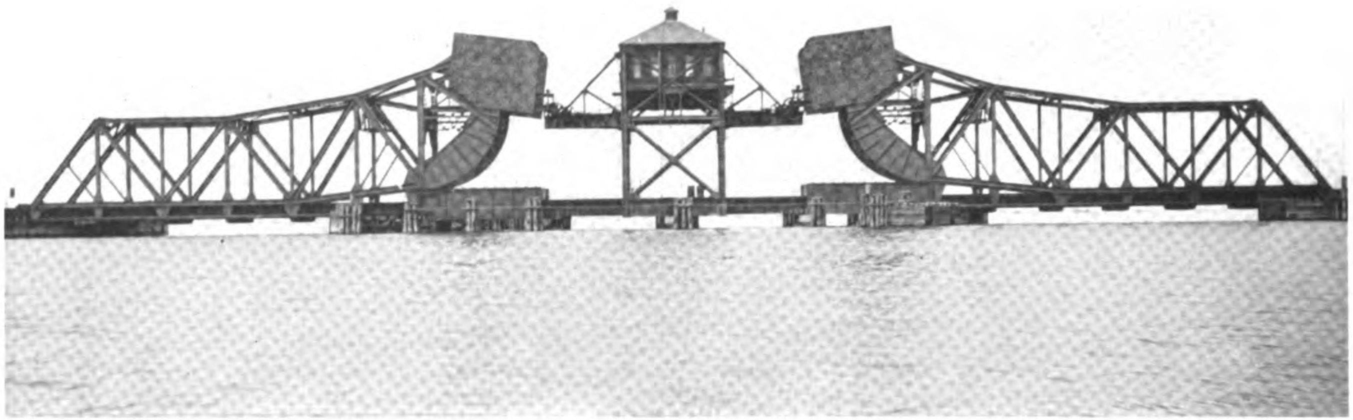
C. R. R. CO. OF N. J.
JOSEPH O. OSGOOD, Chief Engineer
A. L. BOWMAN, Bridge Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGES
Across Newark Bay, New Jersey,
For the Central Railroad Company of New Jersey

View on line of tracks during erection. These bridges were erected in the upright position without diverting or delaying railroad traffic and upon completion were operated to the closed position and immediately placed in service for railroad traffic.

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable spans, 120 feet



Completed 1903

C. R. R. CO. OF N. J.
JOSEPH O. OSGOOD, Chief Engineer
A. L. BOWMAN, Bridge Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGES
Across Newark Bay, New Jersey,
For the Central Railroad Company of New Jersey
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable spans, 120 feet

Completed 1906

CITY OF MANISTEE
WILLIAM WENTE, Mayor
GEORGE B. PIKE, City Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across the Manistee River at Maple Street, Manistee, Michigan
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO
Chicago

Movable span, 81 feet

Completed 1906

CITY OF MANISTEE
WILLIAM WENTE, Mayor
GEORGE B. PIKE, City Engineer

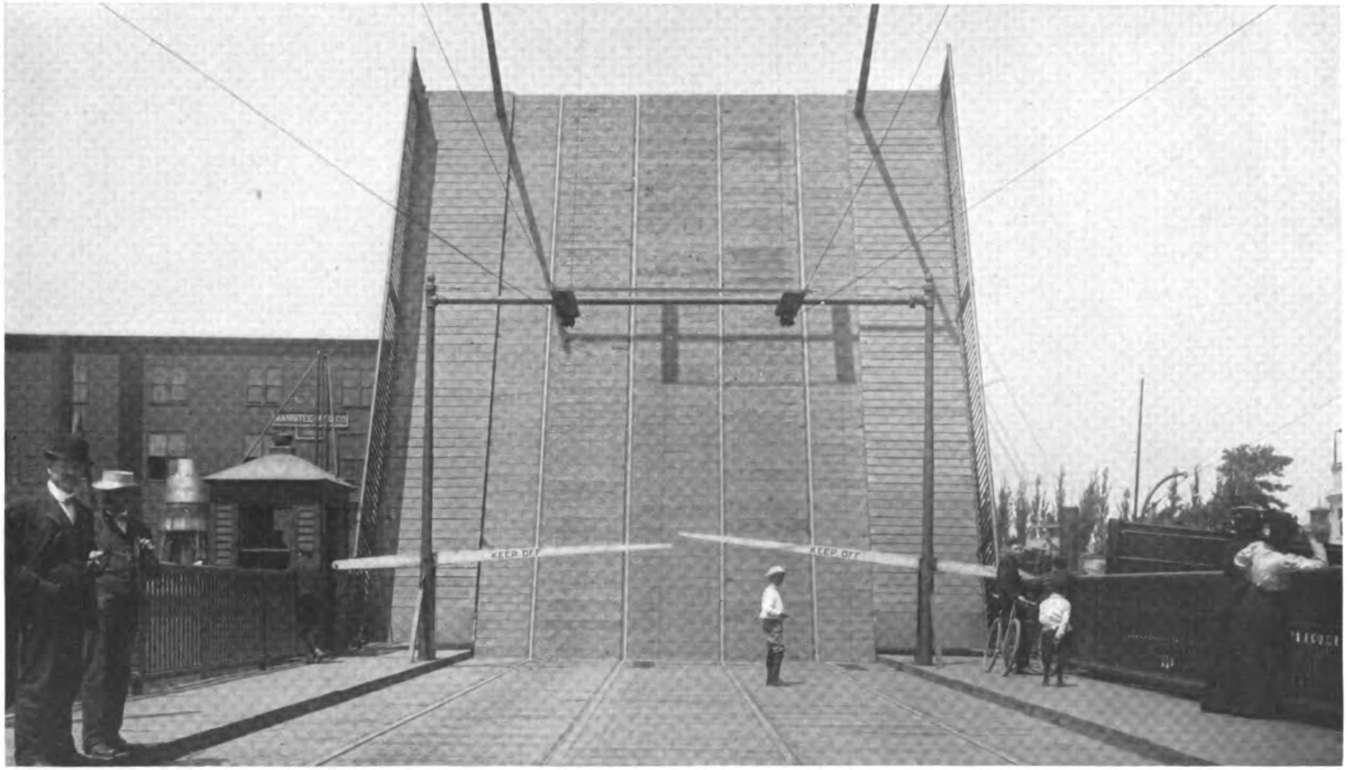
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the Manistee River at Maple Street, Manistee, Michigan

View showing bridge open for navigation

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 81 feet



Completed 1906

CITY OF MANISTEE

WILLIAM WENTE, Mayor

GEORGE B. PIKE, City Engineer

Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE

Across the Manistee River at Maple Street, Manistee, Michigan

View on line of roadway with bridge in the open position showing highway blocked against accidents

Designed by

THE SCHERZER

ROLLING LIFT BRIDGE CO.

Chicago

Movable span, 81 feet

Completed 1906

CITY OF MANISTEE

WILLIAM WENTE, Mayor

GEORGE B. PIKE, City Engineer

Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE

Across the Manistee River at Maple Street, Manistee, Michigan

View of roadway with bridge in the closed position

Designed by

THE SCHERZER

ROLLING LIFT BRIDGE CO.

Chicago.

Movable span, 81 feet

Completed 1907
N. Y., C. & ST. L. R. R. CO.
E. E. HART, Chief Engineer
A. J. HIMES, Bridge Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the New York, Chicago & St. Louis Railroad Company
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 160 feet

Completed 1907

N. Y., C. & ST. L. R. R. CO.
E. E. HART, Chief Engineer
A. J. HIMES, Bridge Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the New York, Chicago & St. Louis Railroad Company
In a partly opened position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 160 feet

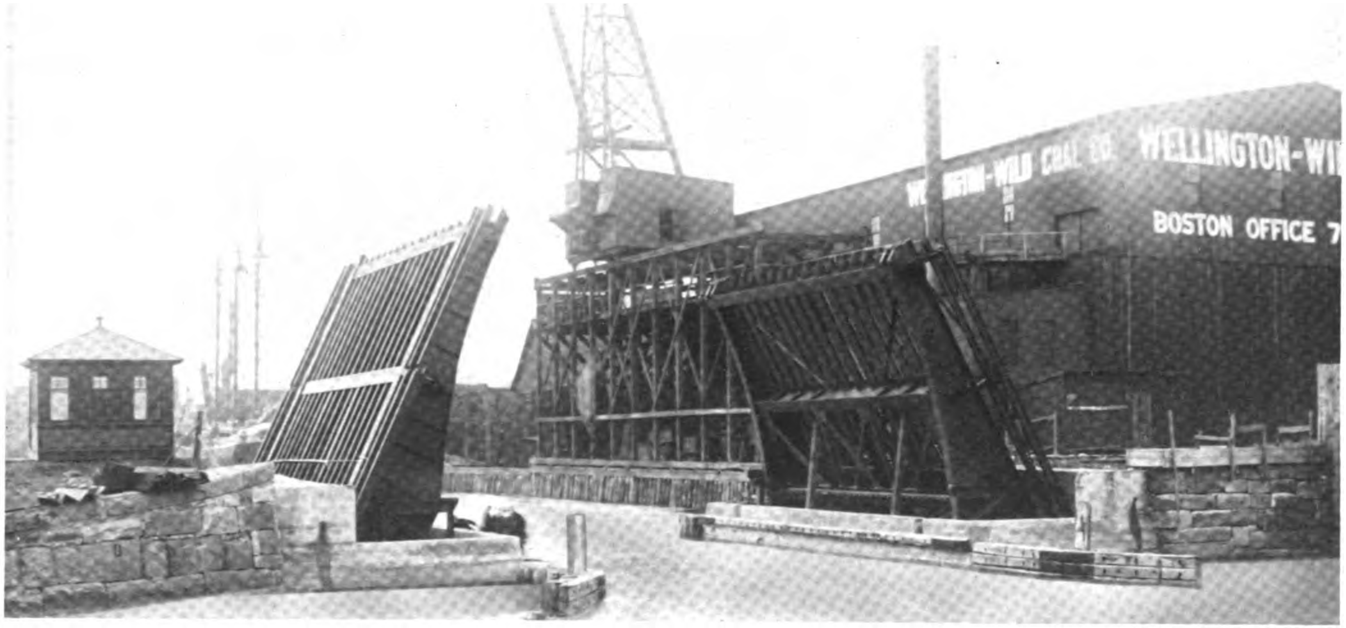
Completed 1907

N. Y., C. & ST. L. R. R. CO.
E. E. HART, Chief Engineer
A. J. HIMES, Bridge Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the New York, Chicago & St. Louis Railroad Company
View on line of tracks with bridge in closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 160 feet



Under construction 1908

CITY OF CAMBRIDGE

L. M. HASTINGS, City Engineer

Highway

SCHERZER ROLLING LIFT BRIDGE

Across Lechmere Canal at

Commercial Avenue, Cambridge, Massachusetts

View showing bridge during erection

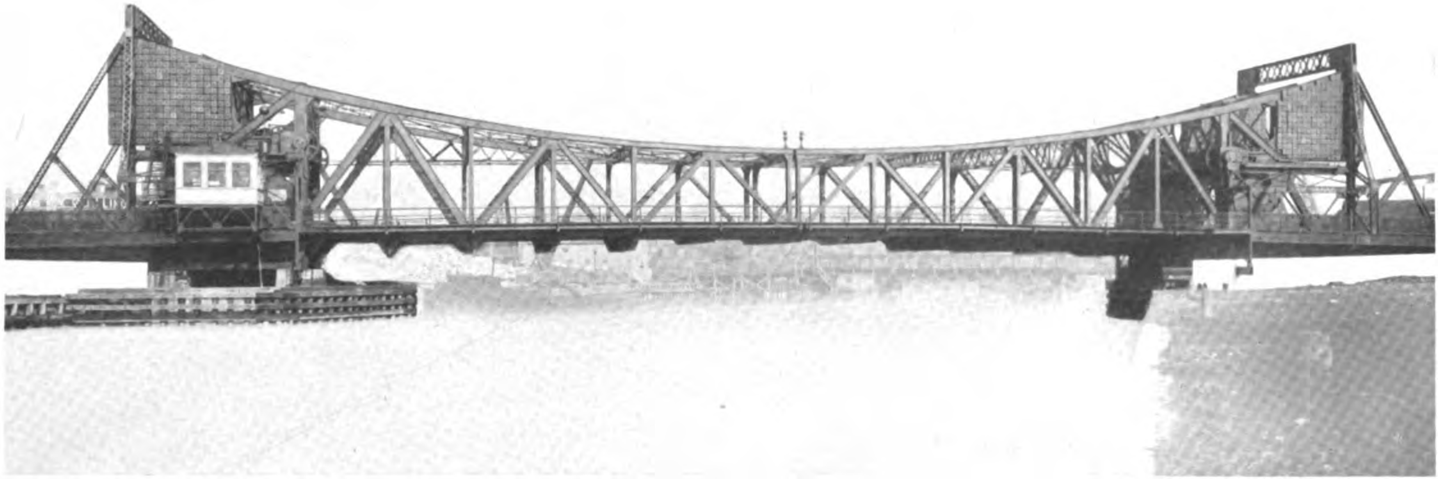
Designed by

THE SCHERZER

ROLLING LIFT BRIDGE CO.

Chicago

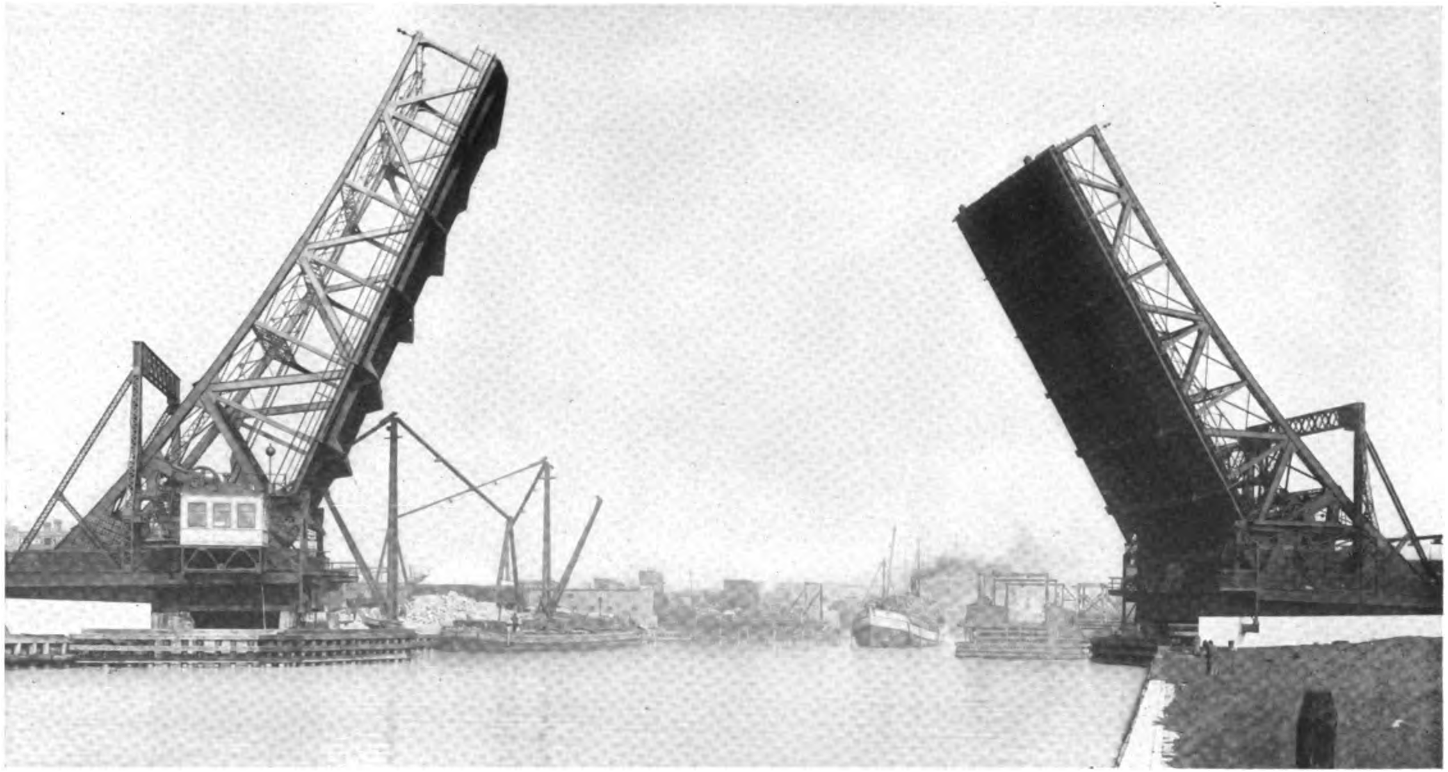
Movable span, 49 feet



Completed 1907
SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at 22nd Street, Chicago,
For the Sanitary District of Chicago
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 216 feet



Completed 1907

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

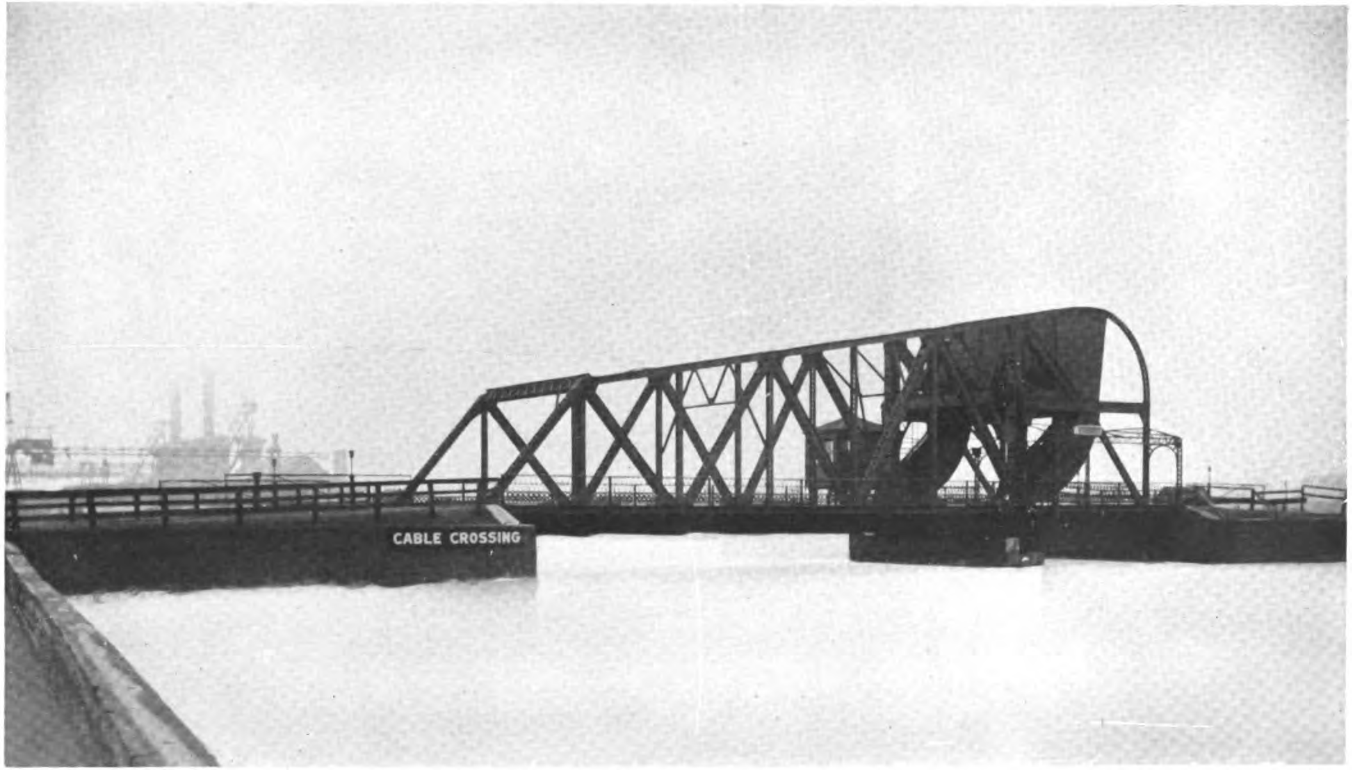
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at 22nd Street, Chicago,
For the Sanitary District of Chicago

In a partly opened position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 216 feet



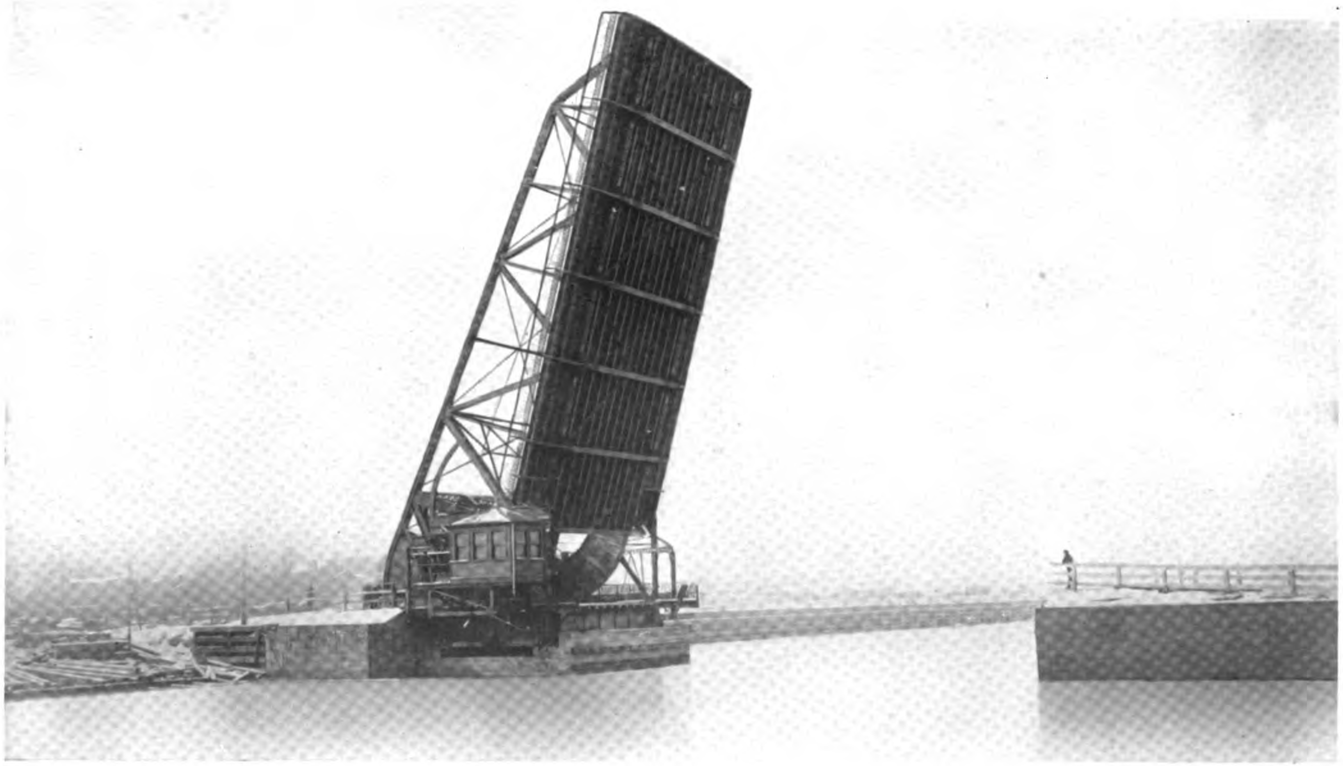
Completed 1907

PENNSYLVANIA RAILROAD COMPANY
C. P. MACARTHUR, Prin. Asst. Engineer
BUFFALO & SUSQUEHANNA RAILWAY CO.
GEORGE O. WAGNER, Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across Union Canal at
Hamburg Turnpike, Buffalo, New York
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 90 feet



Completed 1907

PENNSYLVANIA RAILROAD COMPANY
C. P. MACARTHUR, Prin. Asst. Engineer

BUFFALO & SUSQUEHANNA RAILWAY CO.
GEORGE O. WAGNER, Engineer

Highway

SCHERZER ROLLING LIFT BRIDGE
Across Union Canal at
Hamburg Turnpike, Buffalo, New York

In the open position.

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 90 feet

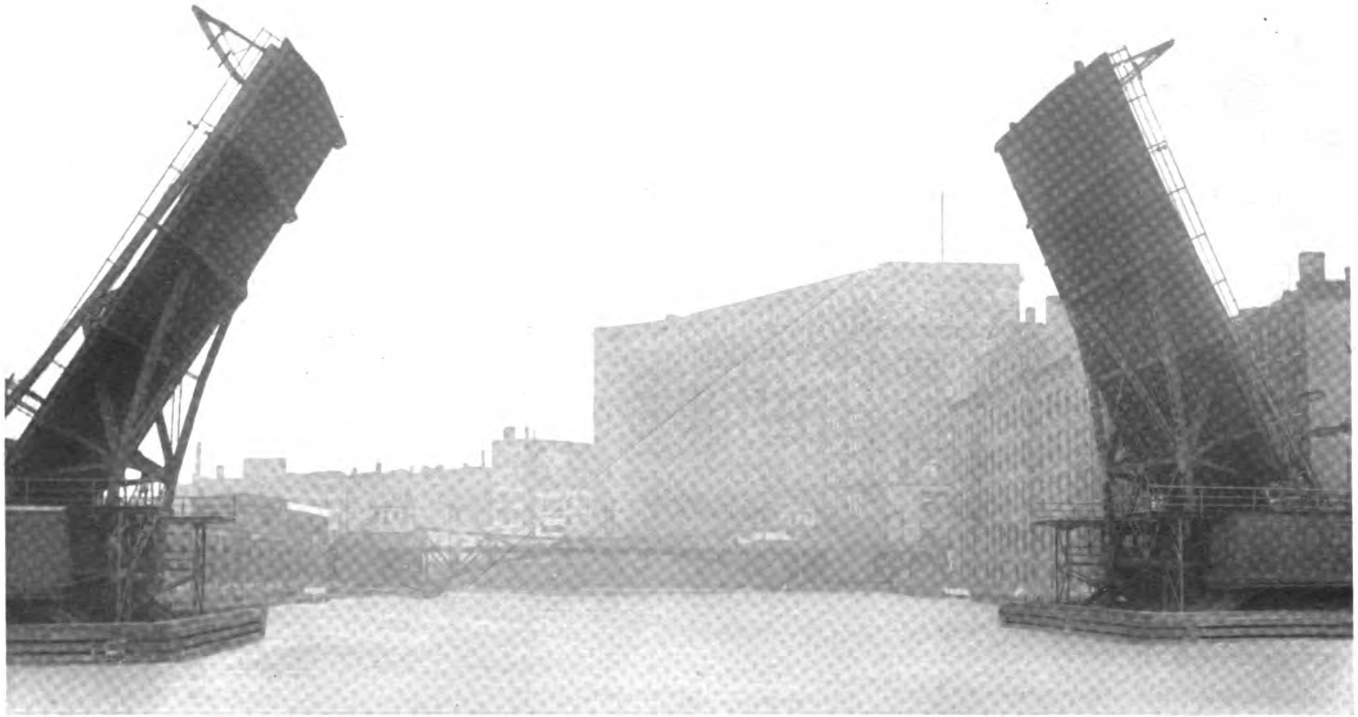
Completed 1907

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Dearborn Street, Chicago
For the Sanitary District of Chicago
In the closed position

THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 164 feet 6 inches



Completed 1907

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

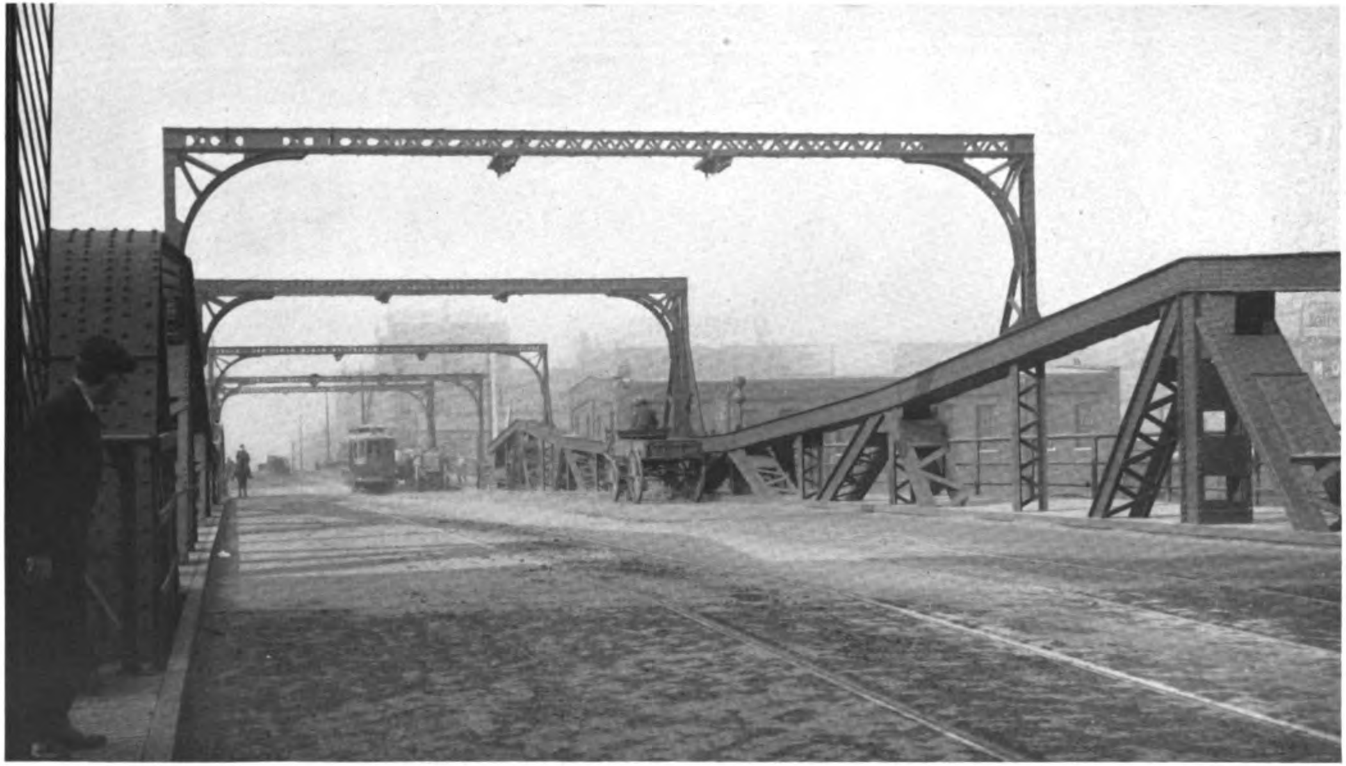
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Dearborn Street, Chicago,
For the Sanitary District of Chicago

In a partly opened position

THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 164 feet 6 inches



Completed 1907

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Dearborn Street, Chicago,
For the Sanitary District of Chicago

View showing roadway

THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 164 feet 6 inches

Completed 1903

B., R. B. & L. R. R. CO.
MELVIN O. ADAMS, President
G. M. TOMPSON, Chief Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across Crystal Cove, Boston, Massachusetts,
For the Boston, Revere Beach & Lynn Railroad Company
In the Closed Position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 35 feet 6 inches

Completed 1907

CITY OF GLOUCESTER
WINSLOW L. WEBBER, City Engineer
ESSEX COUNTY COMMISSIONERS
WALLACE BATES, Chairman

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Gloucester Canal at Western Avenue,
Gloucester, Massachusetts
View showing roadway

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 46 feet

Completed 1907

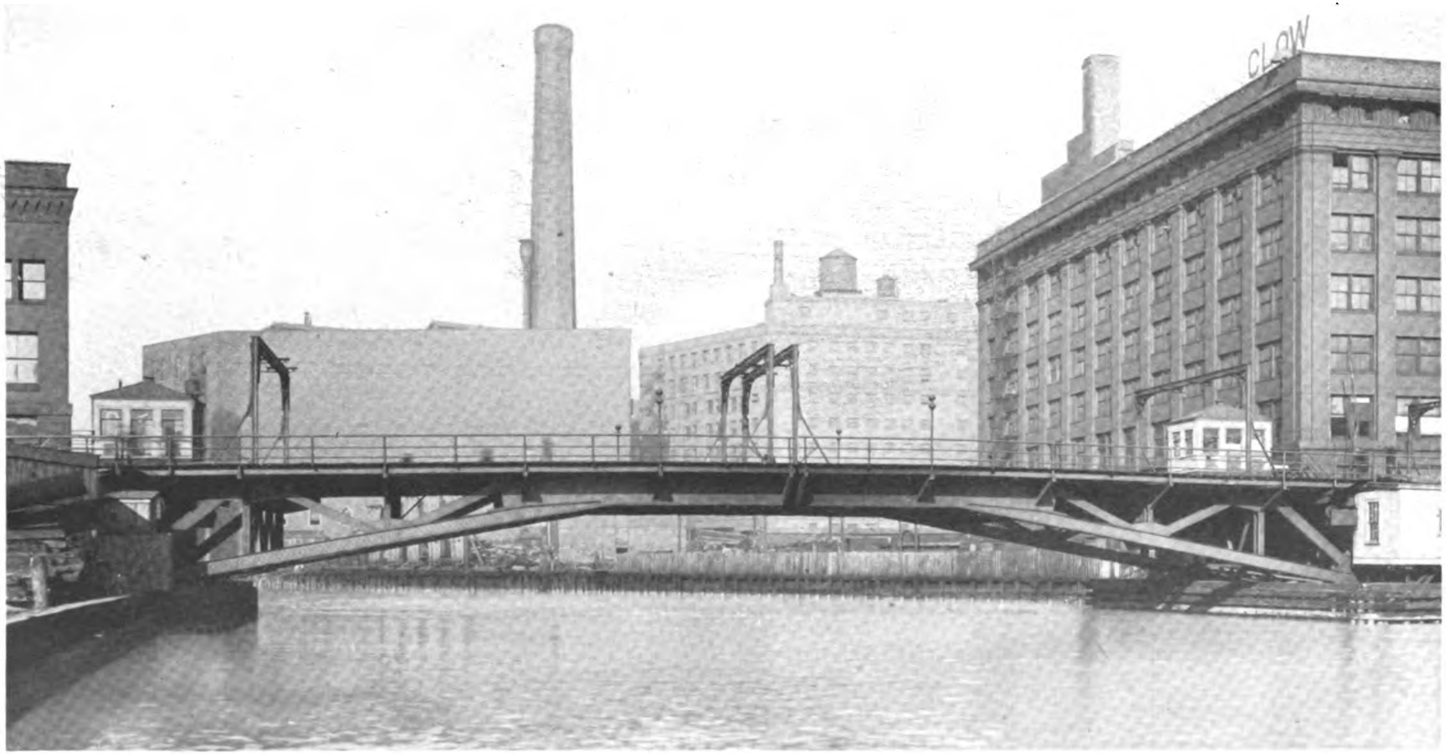
CITY OF GLOUCESTER
WINSLOW L. WEBBER, City Engineer
ESSEX COUNTY COMMISSIONERS
WALLACE BATES, Chairman

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Gloucester Canal at Western Avenue, Gloucester, Massachusetts

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 46 feet



Completed 1906

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

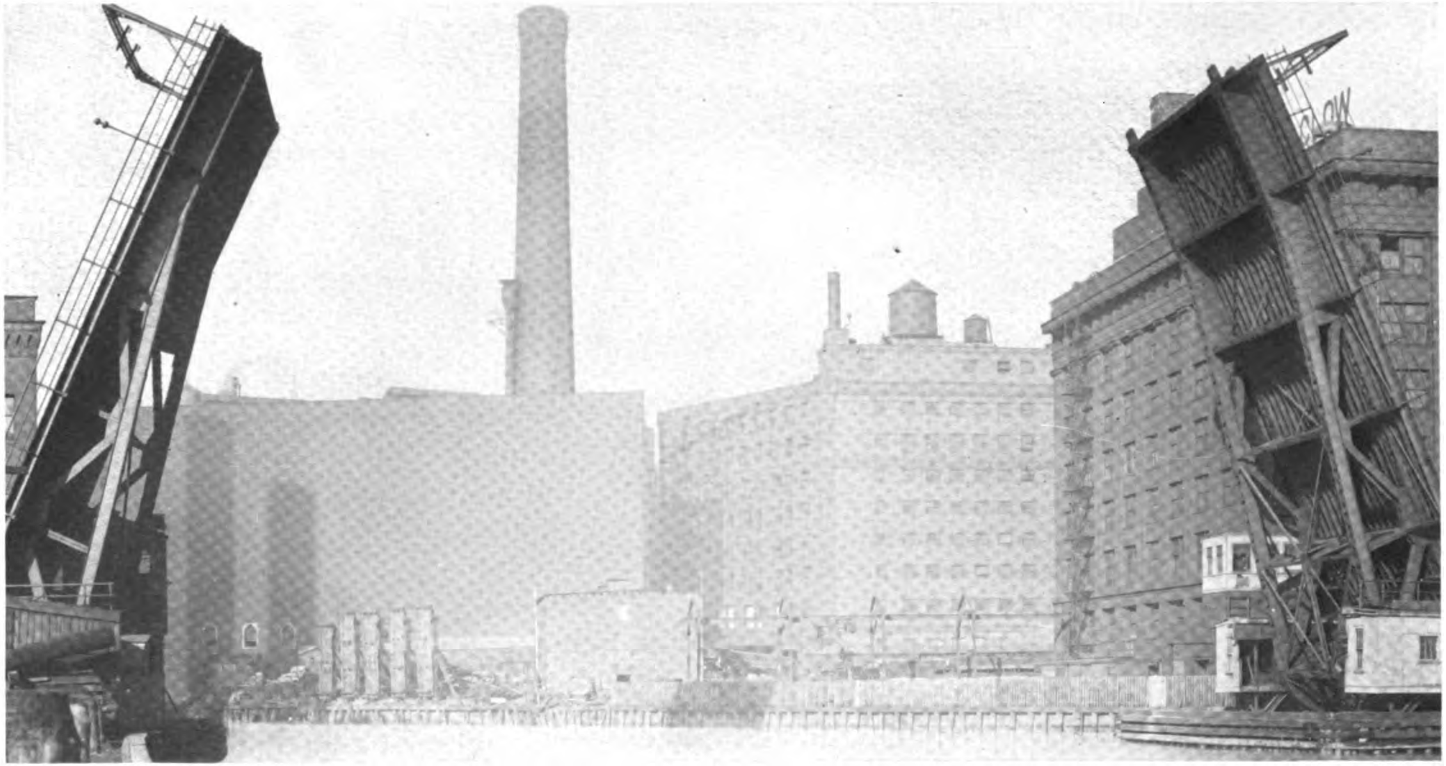
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at Harrison Street, Chicago,
For the Sanitary District of Chicago

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 182 feet



Completed 1906

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

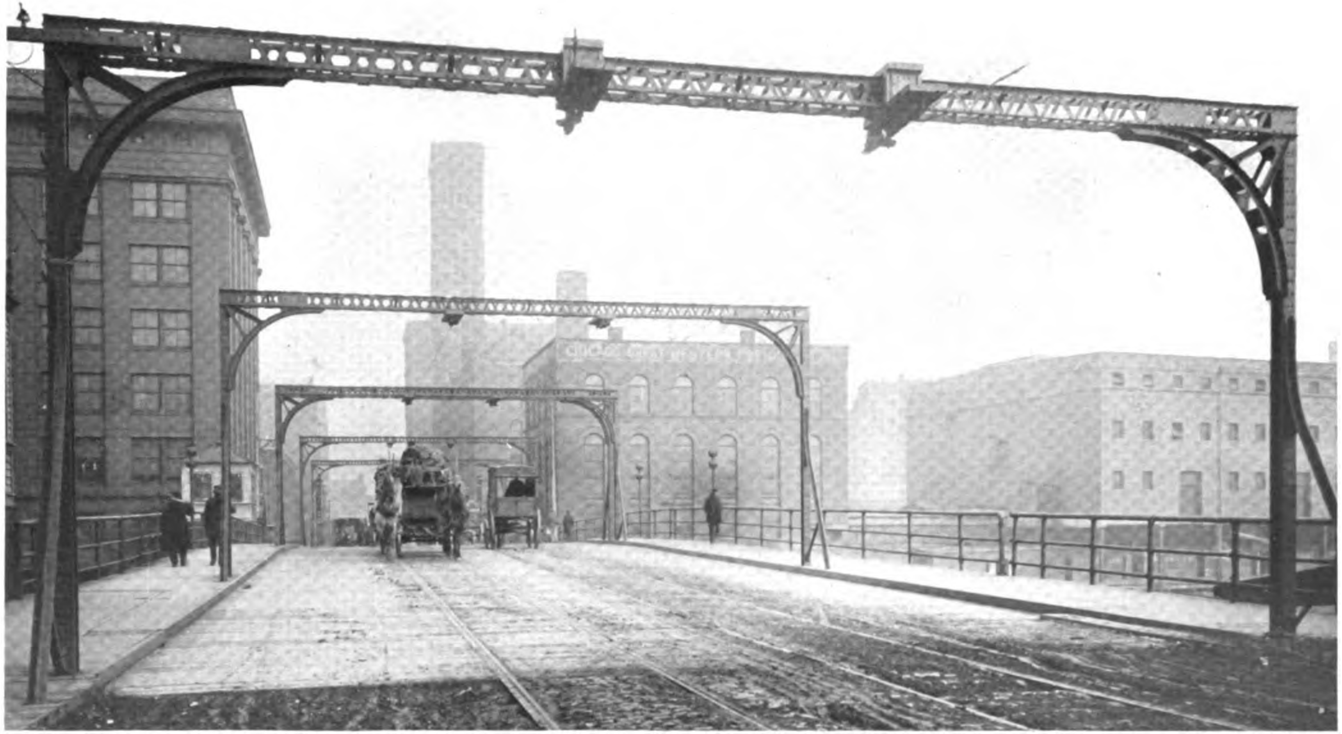
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at Harrison Street, Chicago,
For the Sanitary District of Chicago

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 182 feet



Completed 1906

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE

Across the Chicago River at Harrison Street, Chicago, For the Sanitary District of Chicago

View showing roadway

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 182 feet

Completed 1906

N. Y., N. H. & H. R. R. COMPANY

C. M. INGERSOLL, Chief Engineer

W. H. MOORE, Engineer of Bridges

Four-Track

SCHERZER ROLLING LIFT BRIDGE

Across Myannus River at Cos Cob, Connecticut,

For the New York, New Haven & Hartford Railroad Company

In the closed position

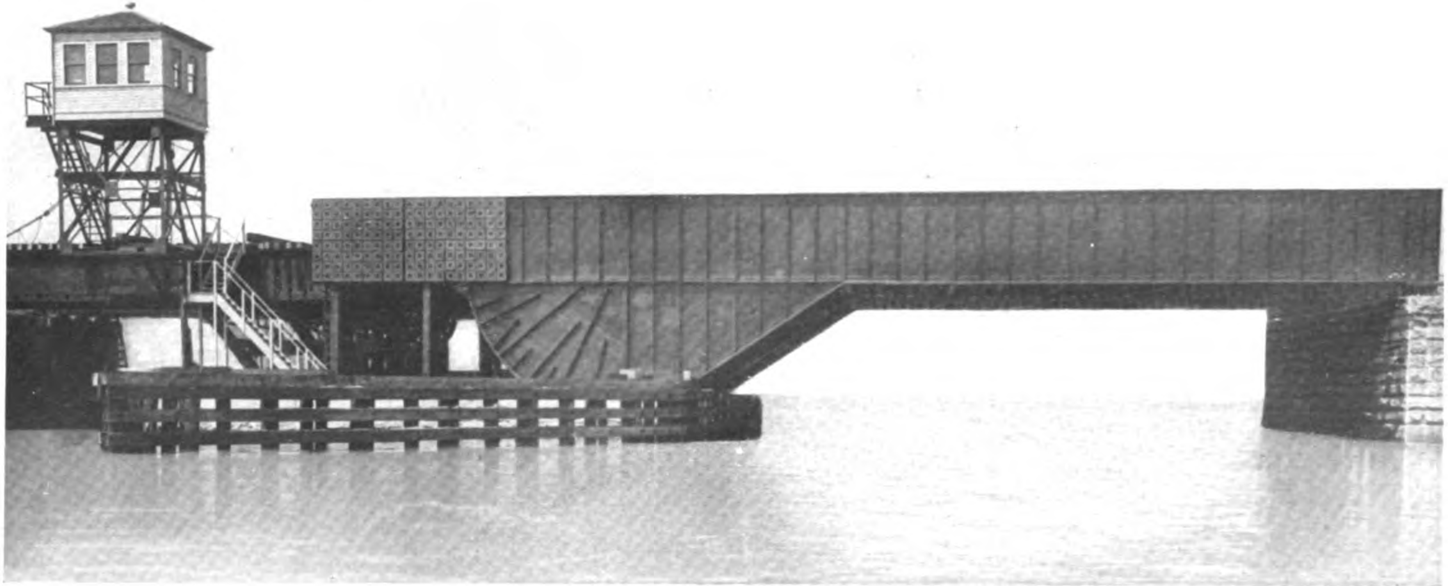
Designed by

THE SCHERZER

ROLLING LIFT BRIDGE CO.

Chicago

Movable span, 81 feet



Completed 1903

N. Y., N. H. & H. R. R. COMPANY
F. S. CURTIS, Chief Engineer
W. H. MOORE, Engineer of Bridges

Four-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Pequonnock River at
Bridgeport, Connecticut,
For the New York, New Haven & Hartford Railroad Company
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

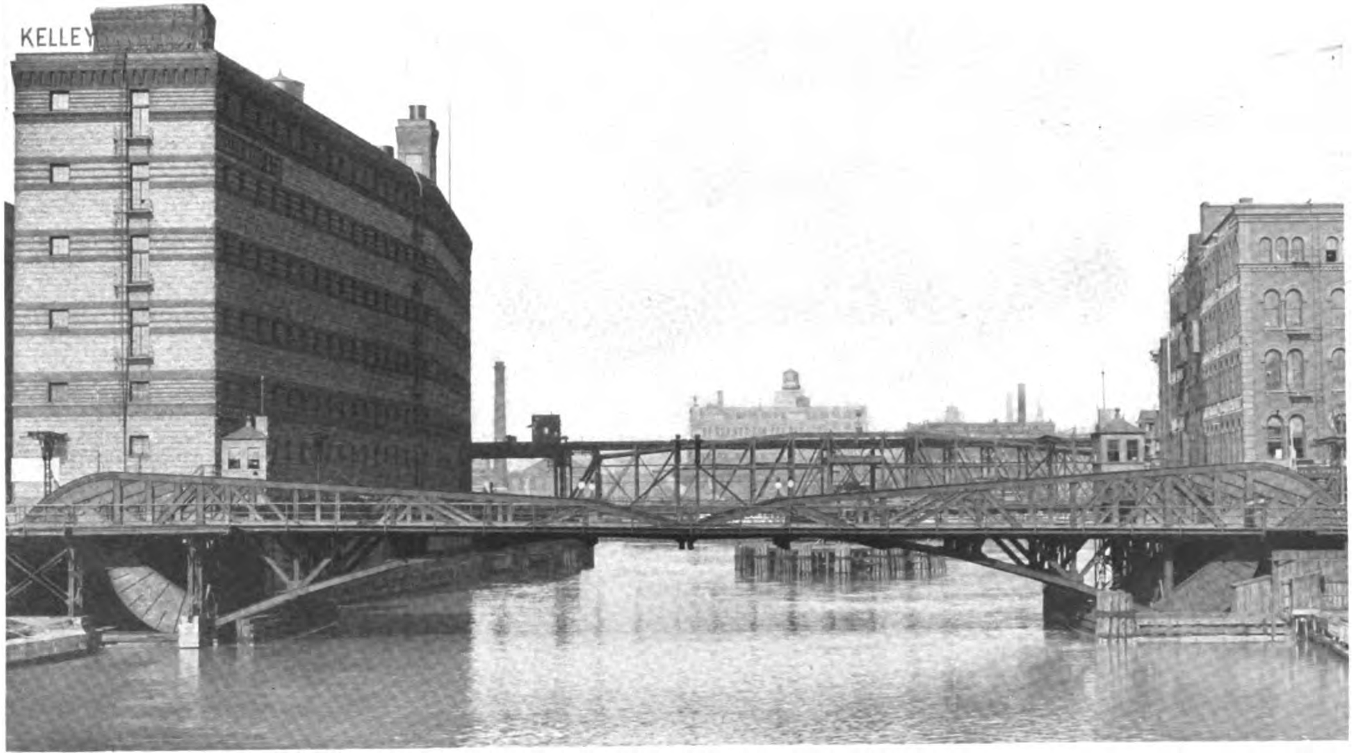
Movable span, 88 feet 1 inch

Completed 1906
CITY OF NEW YORK
Honorable G. LINDENTHAL, Commissioner of Bridges
O. F. NICHOLS, Chief Engineer
E. A. BYRNE, Engineer in Charge

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Flushing Creek at
Jackson Avenue, New York City
In the open and closed positions

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 71 feet 6 inches



Completed 1903
SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Randolph Street, Chicago, For the Sanitary District of Chicago
In the closed position

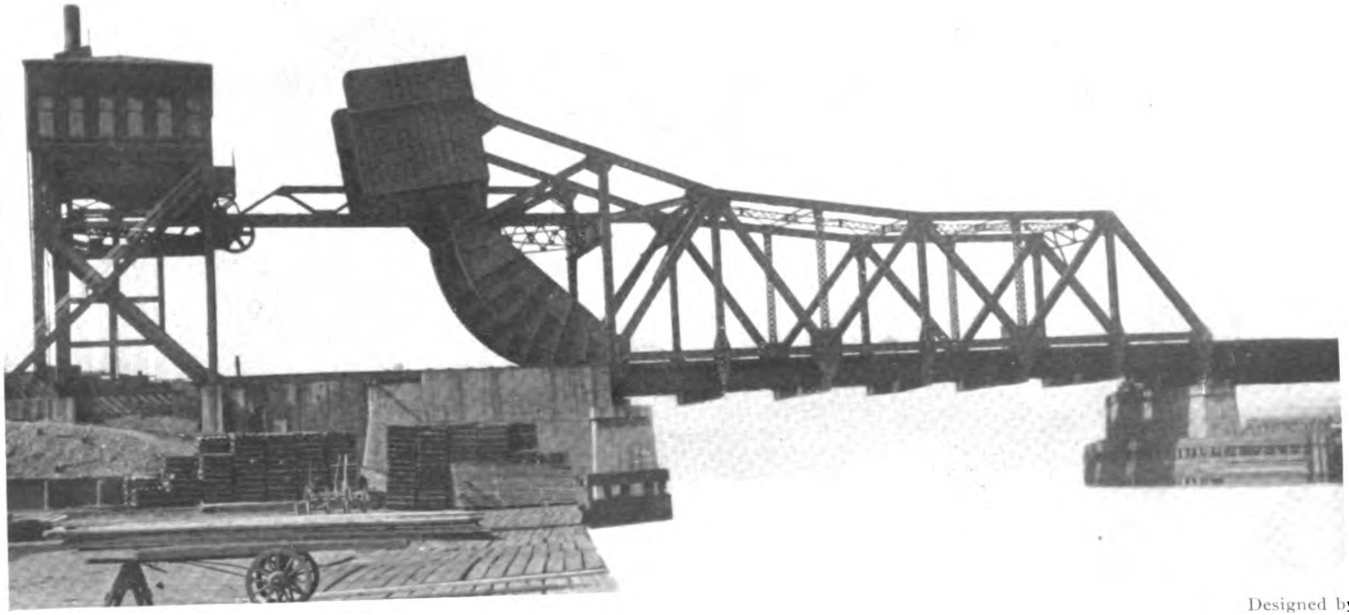
Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 169 feet 2 inches

Completed 1903

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway and Electric Railway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Randolph Street, Chicago,
For the Sanitary District of Chicago
Opened for navigation

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 169 feet 2 inches



Completed 1901

C., C., C. & ST. L. RY. CO.
GEORGE W. KITTREDGE, Chief Engineer
O. E. SELBY, Bridge Engineer

Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the Cleveland, Cincinnati, Chicago & St. Louis Railway Company
In the closed position

Designed by
THE SCHERZER ROLLING LIFT BRIDGE CO
Chicago

Movable span, 120 feet

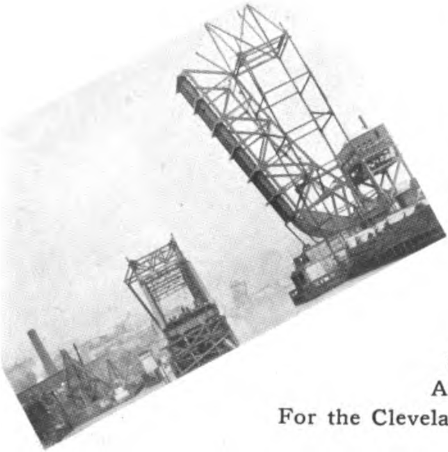
Completed 1901

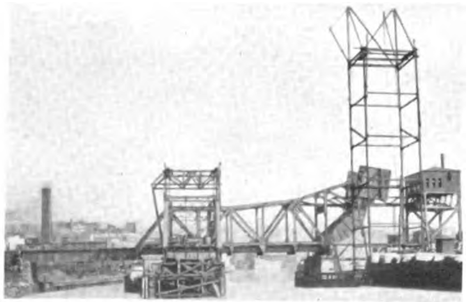
C., C., C. & ST. L. RY. CO.
GEORGE W. KITTREDGE, Chief Engineer
O. E. SELBY, Bridge Engineer

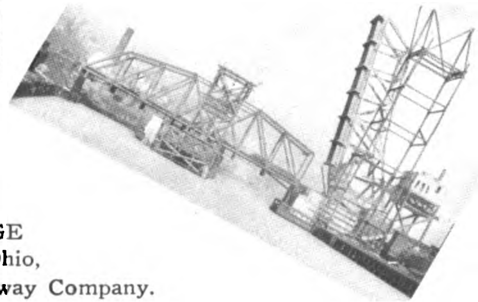
Double-Track
SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River at Cleveland, Ohio,
For the Cleveland, Cincinnati, Chicago & St. Louis
Railway Company
In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 120 feet







Double-Track

SCHERZER ROLLING LIFT BRIDGE

Across the Cuyahoga River, Cleveland, Ohio,

For the Cleveland, Cincinnati, Chicago & St. Louis Railway Company.

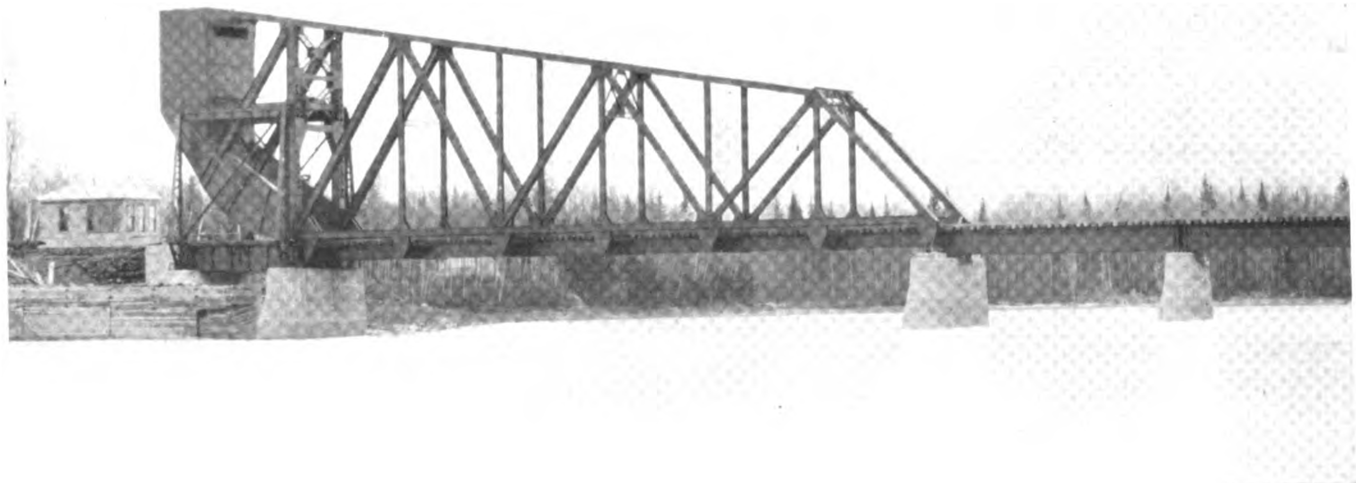
These views show the Scherzer Rolling Lift Bridge at the time of its completion. It also shows the obstructive center-pier swing bridge before its removal and replacement by the new Scherzer Rolling Lift Bridge.

The new bridge was erected in its upright position without diverting or delaying railroad traffic and upon completion was operated to its closed position and immediately placed in service for railroad traffic.

Completed 1901
THE C., C., C. & ST. L. RY. CO.
GEORGE W. KITTREDGE, Chief Engineer
O. E. SELBY, Bridge Engineer

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 120 feet



Completed 1908

DULUTH, RAINY LAKE & WINNIPEG RY.
H. T. HARE, Chief Engineer
CANADIAN NORTHERN RAILWAY
W. L. MACKENZIE, Bridge Engineer

Single-Track
SCHERZER ROLLING LIFT BRIDGE
Across Rainy River at Pither's Point, Minnesota, For the Duluth, Rainy Lake & Winnipeg and Canadian Northern Railways
In the closed position

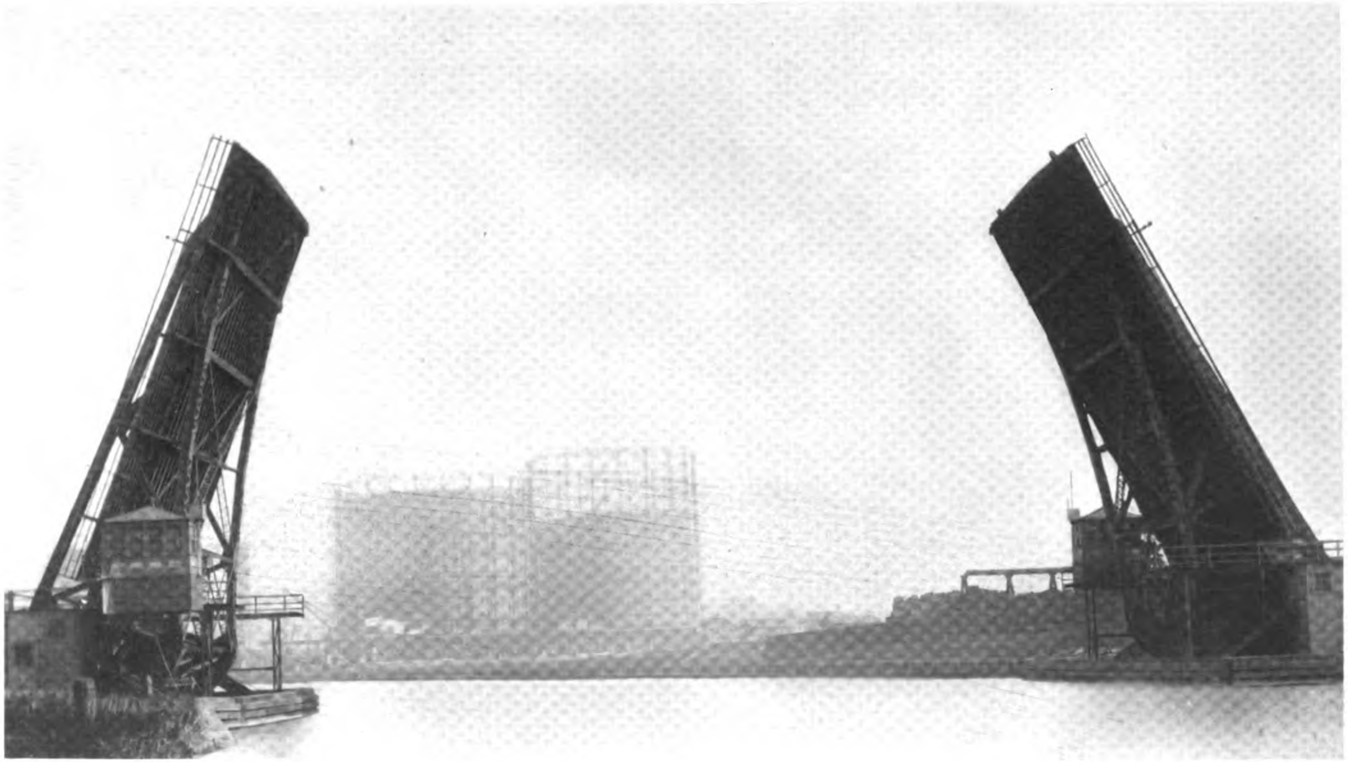
Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 134 feet

Completed 1904
SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Loomis Street, Chicago,
For the Sanitary District of Chicago
In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago
Movable span, 177 feet 6 inches



Completed 1904

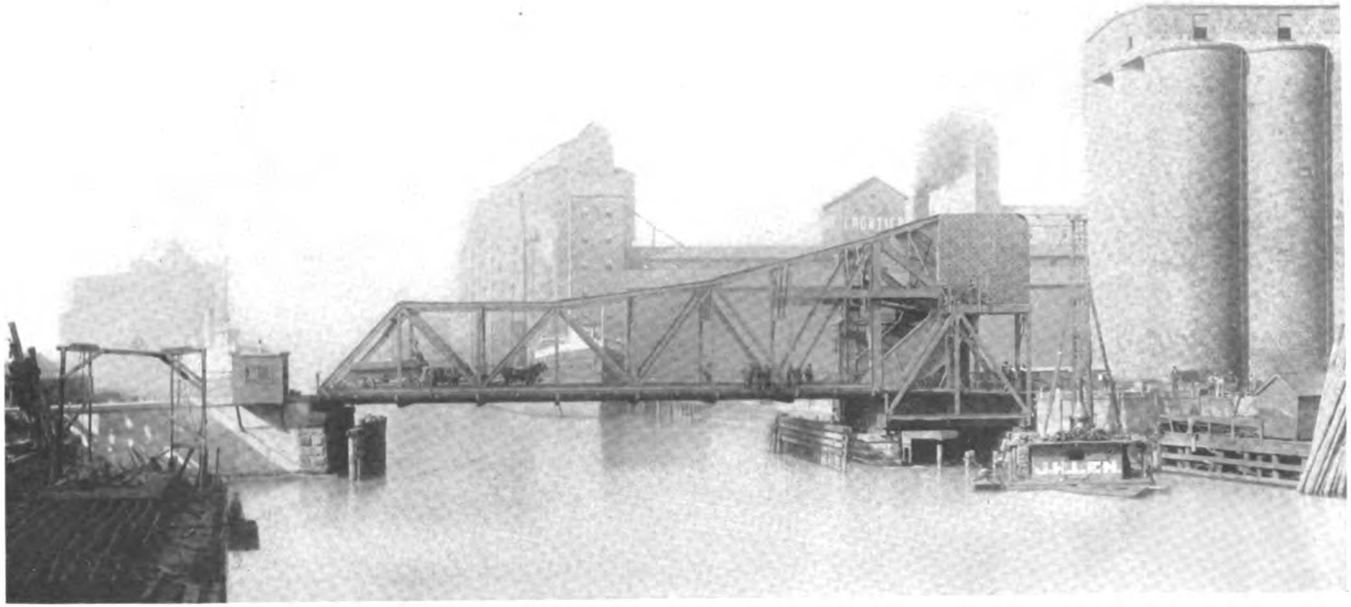
SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across Chicago River at Loomis Street, Chicago,
For the Sanitary District of Chicago

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 177 feet 6 inches



Completed 1904

CITY OF BUFFALO
FRANCIS G. WARD, Commissioner of Public Works
CHARLES M. MORSE, Chief Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across the City Ship Canal
at South Michigan Street, Buffalo, New York

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 110 feet

Completed 1904

CITY OF BUFFALO
FRANCIS G. WARD, Commissioner of Public Works
CHARLES M. MORSE, Chief Engineer

Highway
SCHERZER ROLLING LIFT BRIDGE
Across the City Ship Canal
at South Michigan Street, Buffalo, New York

In the open position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 110 feet

Completed 1905

N. Y., N. H. & H. R. R. COMPANY
C. M. INGERSOLL, Chief Engineer
W. H. MOORE, Engineer of Bridges

Four-Track
SCHERZER ROLLING LIFT BRIDGE
Across Saugatuck River at Westport, Connecticut,
For the New York, New Haven & Hartford Railroad Company

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

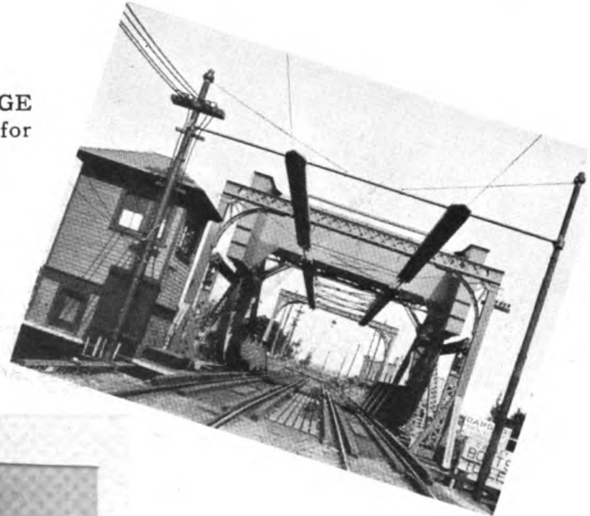
Movable span, 76 feet

Double-Track

SCHERZER ROLLING LIFT BRIDGE
Across Coney Island Creek, New York, for the Brooklyn Rapid Transit System

Completed 1907

In the Open Position

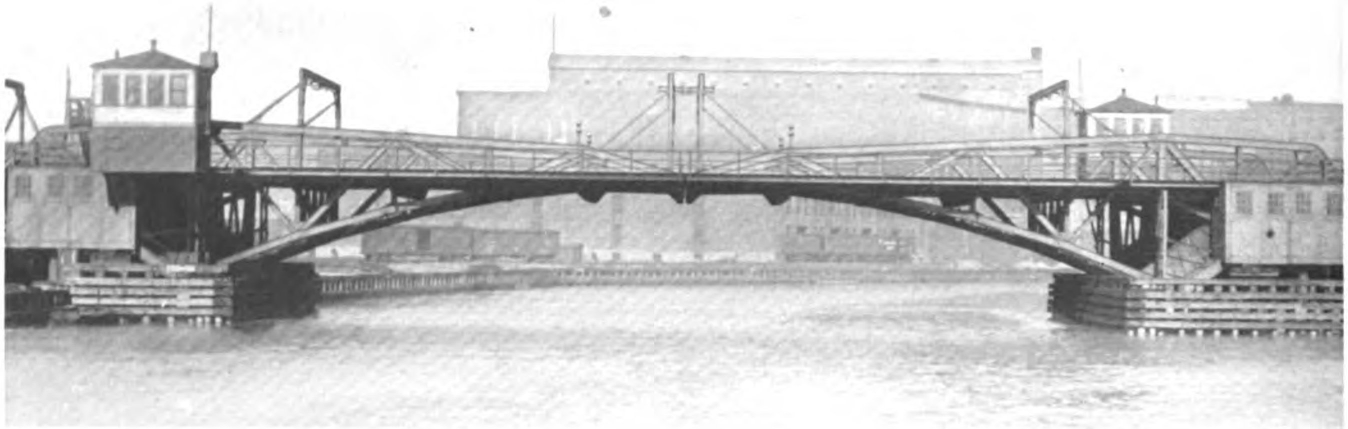


View on Line of Tracks

In the Closed Position

BROOKLYN RAPID TRANSIT SYSTEM
W. S. MENDEN, Chief Engineer

Designed by
THE SCHERZER ROLLING LIFT BRIDGE CO.
Chicago



Completed 1903

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

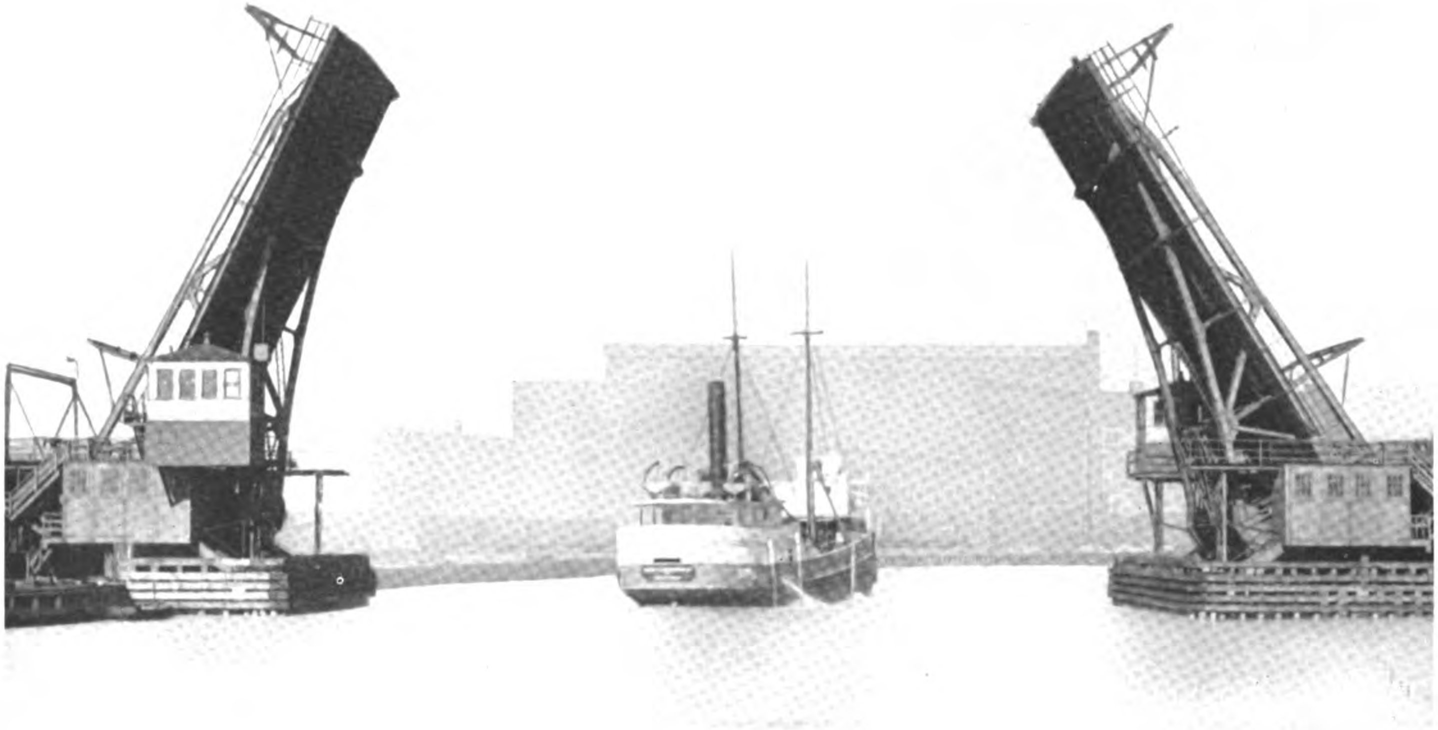
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at 18th Street, Chicago,
For the Sanitary District of Chicago

In the closed position

Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 161 feet 8 inches



Completed 1903

SANITARY DISTRICT OF CHICAGO
ISHAM RANDOLPH, Chief Engineer
C. R. DART, Bridge Engineer

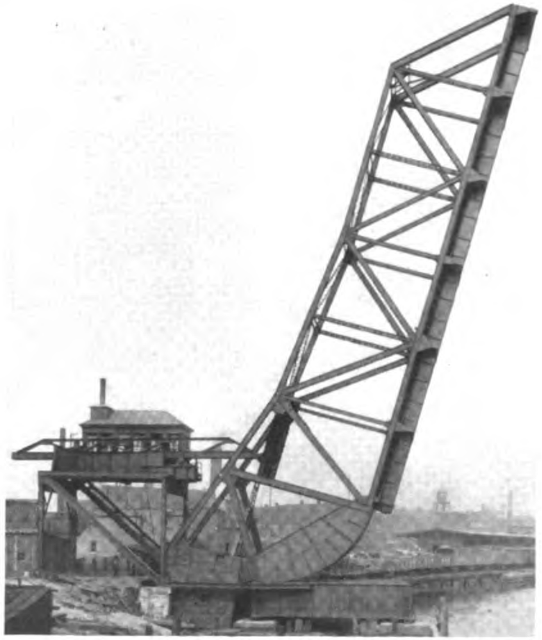
Highway and Electric Railway

SCHERZER ROLLING LIFT BRIDGE
Across the Chicago River at 18th Street, Chicago,
For the Sanitary District of Chicago

Opened for navigation

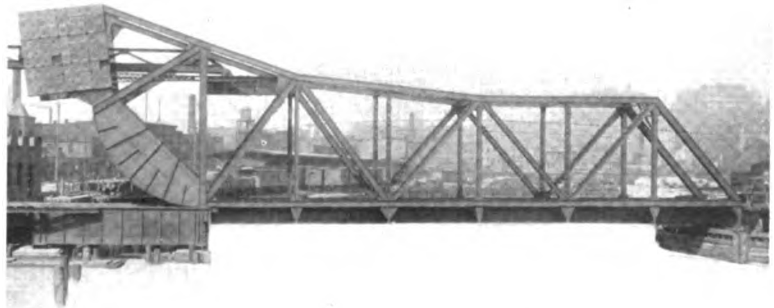
Designed by
THE SCHERZER
ROLLING LIFT BRIDGE CO.
Chicago

Movable span, 161 feet 8 inches



In the Open Position

C., C., C. & ST. L. R. R.
GEORGE W. KITTREDGE, Chief Engineer
O. E. SELBY, Bridge Engineer



In the Closed position

Single-Track

SCHERZER ROLLING LIFT BRIDGE
Across the Cuyahoga River, Cleveland, Ohio,
For the Cleveland, Cincinnati, Chicago & St. Louis R. R.

Completed 1901

Designed by
THE SCHERZER ROLLING LIFT BRIDGE CO.
Chicago