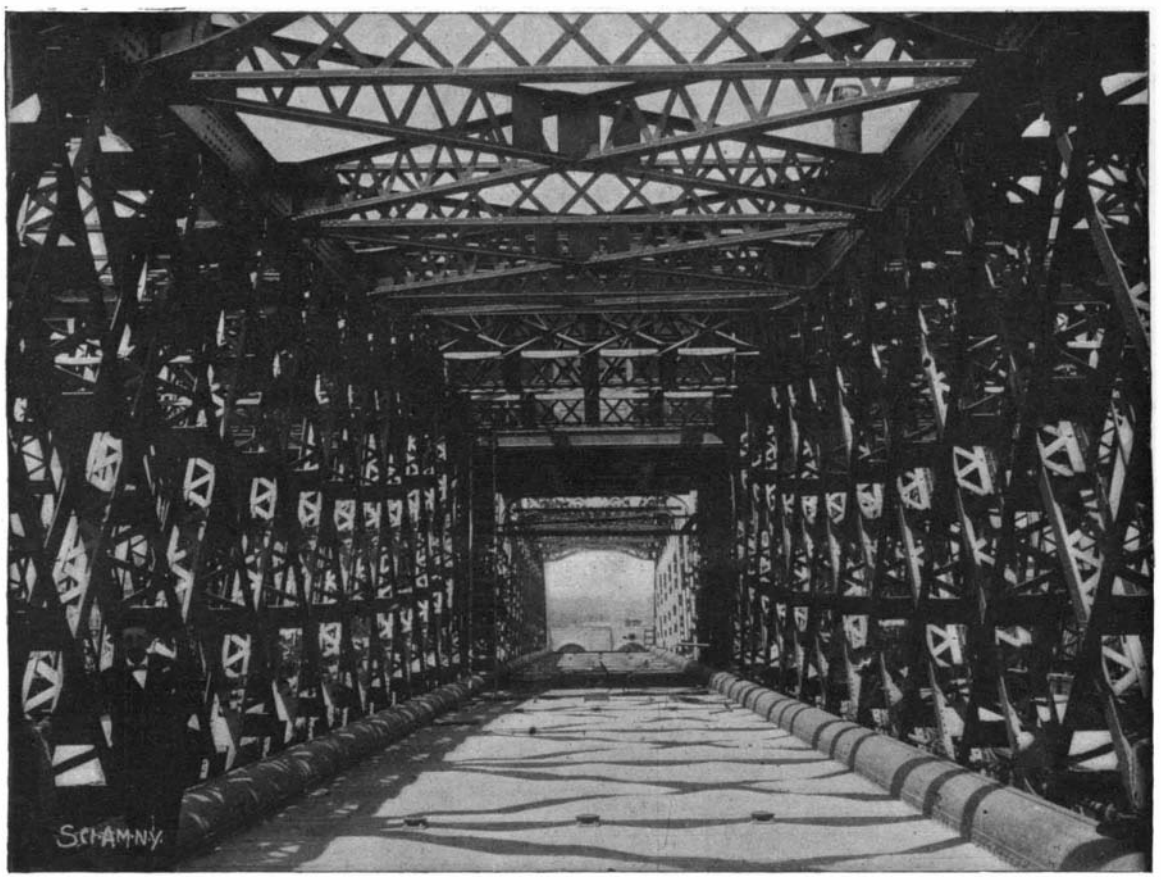
THIRD AVENUE DRAWBRIDGE ACROSS THE HARLEM RIVER, NEW YORK CITY.

The massive drawbridge which forms the subject of the accompanying engraving is the sixth structure of the kind that has been built in recent years across the Harlem River. Of these, the largest and most notable, which is owned by the New York Central and Hudson River Railroad Company, is 400 feet long and has the distinction of being the only large four-track drawbridge in existence. The Third Avenue drawbridge is 100 feet shorter; but its breadth is 86 feet, as against about 60 feet for the railroad bridge, and its total weight is about the same, namely, 2,500 tons.



VIEW LOOKING THROUGH ONE OF THE ROADWAYS.

Apart from its unusual proportions, the new structure is remarkable as showing the increasing tendency among American bridge engineers to adopt the riveted system of bridge construction in preference to the pin-connected for certain classes of work. The plate girder river spans at each end of the draw are also in line with the latest practice, which uses pin-connected construction only for the longer fixed spans of 250 feet and upward and riveted truss or plate girder work for shorter spans.

The drawspan consists of four lattice trusses which are spaced 21 feet center to center, and thus afford three separate ways, of which the outer two are roadways for vehicular traffic, and the center one carries a double track electric railway. Two footwalks, 9 feet wide, are carried on the outside of each of the trusses on cantilever brackets. The total width of the bridge over the outside railings of the sidewalks is 86 feet.

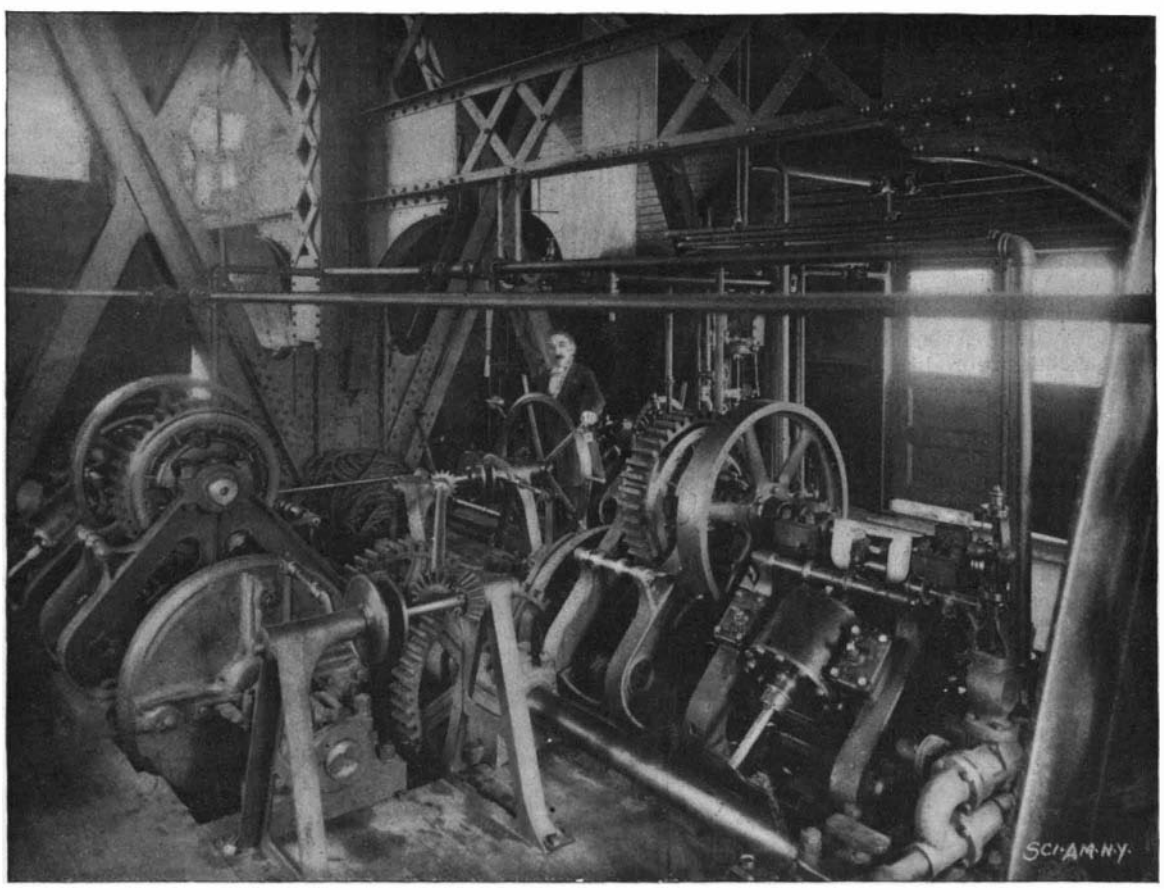
The top and bottom chords of all the trusses are of box section, the side plates being 20 inches deep and from ½ inch to 1 inch in thickness. The top chords are latticed, except on the curved ends and center, where they are closed by cover plates; the bottom chords have cover plates on the top and are latticed on the bottom. The wind bracing of the top chord system consists of small lattice girders 20 inches deep, and the bridge is further stiffened by lattice bracing between the web members.

The trusses are 38 feet deep at the center and 20 feet deep at the ends, and the engineer has introduced a novel and very pleasing feature by giving a curved outline to the top chord. It is possible, however, that the straight lines and angles which characterize the top chord of the familiar style of truss, such, for instance, as are seen in the distant bridge in the engraving, will be more satisfactory to some critics, who will urge that curved members are not theoretically adapted to meet the strains to which a truss bridge is subjected. The web members of the trusses are built up of 3½ by 6 inch and 3½ by 7 inch angle irons, whose thickness varies from ⅜ inch to ½ inch.

The floor of the bridge is carried upon 15 inch plate girders, which are spaced 4 feet 2 inches apart and are riveted directly to the bottom chords. Above the floor beams is laid a complete steel buckle-plate or trough floor, which is covered with concrete and asphalted.

The pivot pier rests upon an octagonal caisson built of yellow pine timbers, which was sunk by the pneumatic process to a solid foundation 50 feet below mean high water. The caisson is 78 feet in diameter and hollow, the center chamber being 30 feet in diameter. After it had been sunk to the required depth, it was filled with concrete to its full height. The masonry pier above the caisson is annular in shape, and tapers from 74 feet diameter at the base, where the wall is 19 feet thick, to 68 feet at the top, where the thickness of the wall is 11 feet. The wall is built with a concrete hearting and is faced with rock-faced ashlar masonry.

The total weight of the drawbridge is 2,500 tons, and it is carried by a massive plate steel drum, 60 feet in diameter, which turns upon a ring of eighty cast steel rollers, with 12 inches face and 24 inches diameter. The engines for turning the bridge are located in an engine house which is placed between the trusses and above the roadway at the center of the span. They consist of two 10 inch by 7 inch double cylinder inclined center crank oscillating engines, each separately coupled direct to a differential gear machine having a proportion of nineteen to one. The gear machines are fitted with fine hammered steel fulcrum pins, bronze rollers and bronze bushings, and operate directly by one set of spur gears, through a suitable size friction clutch on the horizontal turning shaft, which, at a speed of from zero to an average of eight to nine revolutions per minute, has sufficient grip to transmit the power of the engine. The outer ends of the horizontal shafting connect with the vertical turning shafting through powerful bevel gears. The two engines, with their differential gear machines, friction clutches and mechanism, are in duplicate design throughout, and are arranged so that each engine can run its own side independent of that of the other; both, however, being controlled in their movements of starting and stopping by one reverse valve and starting mechanism. The engines are arranged so that they can be readily coupled together, and when the whole duty of turning is to be done by one engine it is done through a set of compound gears which give the vertical shaft about one-half the speed given by the two engines. Under the same roof are housed two sixty horse power return tube boilers, which carry a working pressure of 100 pounds to the square inch. They are incased in asbestos, with an outer covering of Russia iron. In addition to furnishing steam for the main engines, these boilers run an engine and dynamo for the electric lighting of the bridge.



ENGINE ROOM OF DRAWSPAN.

Hydraulic rams are provided at each end of the span for raising the ends when the bridge is closed, and there are the customary devices for locking the draw and lifting the aprons and rail connections. All these operations are controlled by one man in the engine room, and may be simultaneously carried out in twelve seconds. It takes about two minutes to close the traffic gates, release the ends and swing the bridge to the full open position. Considering the great weight of the draw, this is remarkably rapid operation, and it is rendered necessary by the fact that between 5,000 and 6,000 vehicles will cross the bridge in the day and that the draw will have to be opened over sixty times daily for the passage of vessels. The machinery will act as follows: On the signal being given from the bridge, the gatemen will shut the gates of approach, and after travel is off the bridge, the others. Meantime the engineer withdraws the locking bolt and raises the supports and the hydraulic rams. The machinery at the same time raises the aprons which cover the gap left for expansion and contraction, and the electric car rails. When all is clear the draw is opened. Its speed is about three feet per second.

The river piers are built of granite masonry and vary in thickness from ten feet to six feet nine inches. At each end of the drawspan is a fixed plate girder deckspan 115 feet in length. It is made up of nine girders which are nine feet deep, and are spaced ten feet six inches, center to center. The top flanges carry a steel flooring of trough section, the troughs running transversely to the girders. This is filled with concrete and covered with sand, and above this is laid granite blocks on the roadways and stone flagging on the sidewalks.

The bridge was designed by Mr. Thomas Curtis Clarke, past President of the American Society of Civil Engineers, and was built by the Phœnix Bridge Company. The estimated cost of the finished structure is about $1,500,000, of which over half is absorbed by the cost of the approaches. The latter have been rendered necessary by the raising of the height of the bridge from six or seven feet to its present level of twenty-four feet above high water.

We are informed by Mr. Clarke that the present temporary bridge at the Third Avenue crossing of the Harlem River averages a traffic of five thousand vehicles daily. This is interrupted by the opening of the

draw above sixty times in twenty-four hours, and at each opening, of course, the traffic is blocked. The traffic is not as great as this on any of the Chicago moving bridges, and the vehicles crossing Brooklyn Bridge do not exceed 4,000 daily.

Excepting the Tower Bridge, of London, which averages 6,000 vehicles in twenty-four hours, interrupted by twenty openings, aggregating two and one-half hours' delay, no drawbridge has as great a traffic as the present temporary structure.

A Scientific View of Ghosts.

BY W. E. ORD, IN THE HUMANITARIAN.

The question whether spiritual beings ever become manifest to mankind must always be regarded as one of the deepest interest. Few people, perhaps, will readily admit an honest belief in ghosts, but there is, naturally, a disposition to consider eagerly all evidence bearing on their manifestation, and indeed it is probable that under the influence of the midnight hour, with the surroundings supposed to be favorable, all persons find little difficulty in appreciating the possibility of supernatural occurrences. We therefore find an ever recurring period of discussion of the subject, while an earnest endeavor is now being made to sift the large mass of evidence which is continually forthcoming, in order that any foundation of truth which exists may be discovered.

Secondhand evidence, however—usually the only evidence obtainable—has been brought into deserved contempt in this connection, and notwithstanding the most diligent and patient inquiry, it can scarcely be said to have settled any part of the question to the satisfaction of those whose opinion would be authoritative. To the love of a good story, savoring of the marvelous, to fear and illusion, to self-deception, exaggeration, and untruth, may be ascribed nine-tenths of the numerous accounts of supernatural occurrences which continually find a ready acceptance, while the failure to obtain trustworthy evidence by those who undertake an honest and scientific investigation would almost cause us to despair of human testimony altogether when it approaches this subject.

There is, however, another method of testing the validity of the belief in supernatural manifestations which it is surprising is not more often resorted to. We live in an age which has seen and is now seeing a progress in science unparalleled in human history. Every branch of knowledge has been opened and has had new light thrown upon it, and, as the result, we find that many of our older beliefs have had to give way altogether to newer and more rational views, while others have been greatly developed on a surer foundation. The belief in ghosts, originating in times of superstition, and involving certain assumptions with regard to nature and the human senses, can also be examined in the light of our later knowledge, and it may have to stand or fall by the result.

Instead, therefore, of considering the character of witnesses, the confirmation of circumstantial evidence, and the like, let us examine what the statement that a ghost has been seen or manifested can really mean in view of the scientific knowledge of the present day. Let us rather analyze the process of such a manifestation, and the ghostly nature, than question the veracity of the percipient or his sanity.

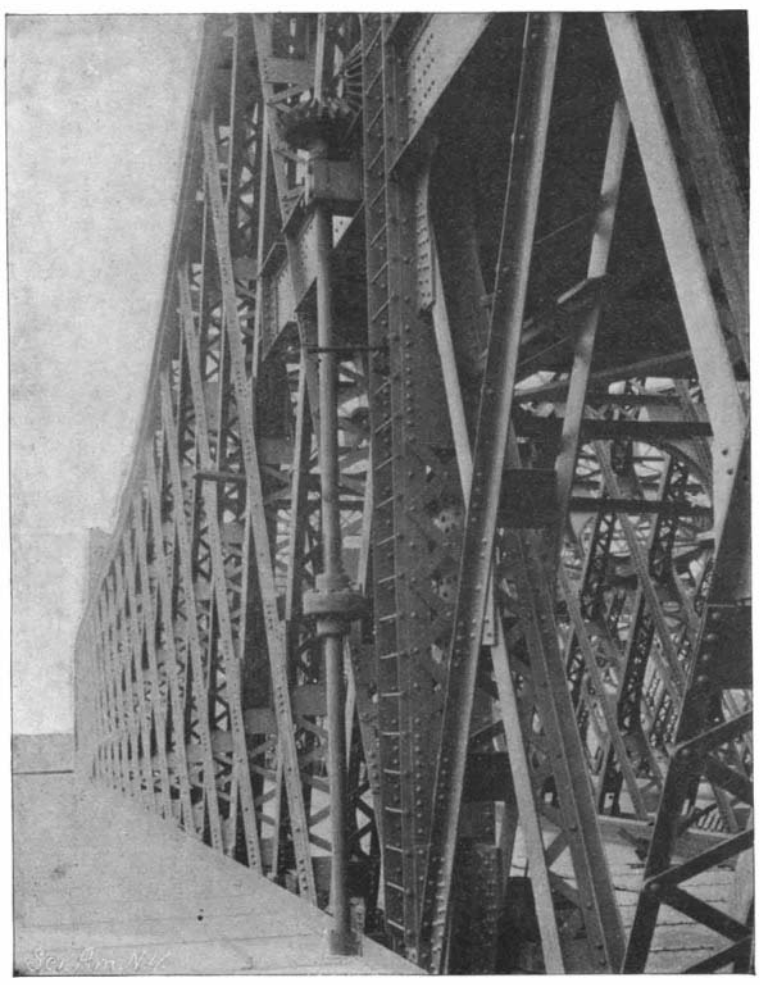
Modern science will first prove to us that ghosts—other than phantoms and hallucinations of the mind—can only become manifest to human beings by appearing in some material form. It is certain that nothing can be actually seen or heard except through the medium of the senses, and it would seem to be established that the senses can only respond to outside, or objective, influences in the form of energy acting through matter. Ghosts or spirits, therefore, if they appear to human beings, must for this purpose assume some material form. In order to be seen they must, when analyzed, exist in that form of matter and energy which acts upon the retina of the eye, and in order to be heard they must produce those vibrations of matter which cause the phenomena of sound.

On the other hand, the experiences of those who have seen ghosts would indicate that their material form is by no means substantial. They appear within closed doors without sound or warning, and vanish like the morning mists. Sometimes they affect one of the senses only; at others they are seen, heard, and felt, like ordinary human beings. Yet, in whatever way they are manifested, they must still appear in some material form, and it might be concluded that spiritual beings are able at certain times to give life, as it were, to some form of matter. When the ghost or spirit has accomplished its manifestation, it departs to its spiritual home, and the matter which it had touched into life and energy remains as before, unnoticeable by the ordinary human senses.

Another explanation of such appearances may, however, be suggested. The spiritual manifestation may not depend upon the will of the spirit, upon its power to materialize itself, but rather upon the state of the percipient's mind, and the abnormal development of his senses at the particular time. Spirit and matter are usually opposite terms, but we may nevertheless conceive the so-called spiritual world as in reality a material one analogous to our own. Recent science has shown that there is probably a world of energy and matter hidden from our ordinary senses, of which we can only conjecture from the suggestions obtained when the photographic plate records more than the human eye is ever capable of seeing, or the magnetic needle responds to an influence quite unfelt by our dull senses. Now it may be that it is in such a hidden world that ghosts have their existence—spirits finding a dwelling place in forms as much material as those of ordinary human beings, but of an essentially different, and perhaps more ethereal, character. Into their hidden world of peculiar and unknown energy mankind cannot usually enter, but at critical times in a man's life, corresponding to the fitful and occasional appearances of ghosts, his senses may be abnormally developed, so that—as with the photographic camera—he sees more than his eye is ordinarily capable of seing, and may become conscious by sight, or hearing, or touch, of that hidden world in which ghosts live, and move, and have their being. This view would explain much that, on any other ground, is antagonistic to belief in ghosts of any kind. Such difficulties as the perception of the apparition by only one person, or the appearance when the percipient is in an unusual state of mind or health, would be removed, and it must be admitted that the uncertain and fitful character of the visitations, and the failure to occur under any test conditions, would be quite in keeping with such an hypothesis. It must not be forgotten, however, that an abnormal state of mind might be the cause of the apparent manifestations.

In the much talked of appearances known as death wraiths there would also appear to be an abnormal development of some of the faculties. The apparition of a person who is dying in a distant land is seen by a very sympathetic friend, who is thereby impressed with a sense of his friend's danger or loss. In such cases there must be an influence which sets distance at defiance, and which acts in a manner for which the phenomena of electricity afford the only analogy. Between minds in deepest mutual sympathy there is much that would suggest an influence different from that which the ordinary senses are capable of conveying, but in the appearances of death wraiths the influence by material agency becomes incredible. It may easily be imagined that the electrical and other changes which are continually taking place in the brain, acting upon the surrounding medium, have an influence upon the minds of those with whom we are intimately associated, and ideas—which all have their physical counterpart in the brain—may, as in thought transference, be transmitted to those minds attuned, as it were, to receive them. Similarly, perhaps, in the case of death wraiths, the dying person, thinking of the friend, and yearning intensely to communicate some last message, may be supposed to exert his influence in a degree for which ordinary circumstances find no occasion, and may be able, at such a time, to produce in the mind of the friend at a distance a vivid sense of his presence. It is certain, however, that if this is so, science must make great progress before it can be understood how such communication takes place.

These explanations of ghostly phenomena are offered merely as suggestions, which might bring the occurrences into conformity with the ascertained laws of science. It is perhaps doubtful whether the ghostly visitors, who are usually shy with those desirous of becoming well acquainted with them, will not vanish altogether under the critical eye of science, and the belief in them, born perhaps of the unreasoning state of mind, may not bear any wholesome theory of their existence. There is, however, too strong and sincere a conviction in favor of such a belief for it to be dismissed offhand. In view of the weighty and prevalent opinion which can be cited in favor of the supernatural manifestations, serious inquiry is greatly to be desired, and some theory of the actual occurrences becomes essential. An endeavor to explain the phenomena scientifically may help to decide the validity of the belief in their existence, or else prevent that unhealthy state of mind which is too often its sole origin.



ONE OF THE OUTSIDE FOOTWALKS.

Venomous Fishes.

In many seas, especially those of the tropics, are found fish provided with a poison apparatus, which consists usually of a spine or spines more or less erectile in character, and connected with a poison gland. Prof. James D. Brunton gives an interesting account of two of these fishes, the Trachinis draco and Scorpæna scropha says Appleton's Popular Science Monthly. They are only poisonous as a serpent is poisonous—i. e., by wounding; their flesh is good and wholesome. Although the fish differ widely in appearance, yet the poison produces the same effect. The Trachinis draco is a handsome fish, not unlike a trout in general appearance. Upon each of its gill covers is situated the spine, connected with its poison gland through a duct formed by the combination of a groove in the spine and a very thin membrane, which covers the latter almost to its point. When the spine enters a resisting body, the membrane is pushed back, allowing the poisonous secretion free access to the wound. The gland is small, with nucleated colorless cells secreting a transparent fluid. The Scorpæna, on the other hand, is an unattractive looking fish, squat of body and having a large misshapen head. It may attain a large size, and is called by the French fishermen "le diable." The special organ in this fish is connected with the first three rays of the dorsal fin, the duct being formed as in Trachinis. There is also a spine on each gill cover connected with a poison gland. The effect of a wound from either of these fishes is quite a serious matter. At the moment of puncture only the sharp prick is felt. In a few minutes, however, the parts commence to burn and itch, and then become acutely painful. These pains increase in violence and extent. Then a feeling of suffocation is felt, and pain over the heart. From this time commence those cries of anguish which can always be recognized as caused by the acutest torture and fear. The cries are continuous, and beads of sweat stand on the brow. Flashes of light pass before the eyes, and the pulse is found to beat intermittently. Finally, delirium and convulsions supervene, which may pass on to collapse and death, or may, after lasting for many hours, gradually subside, leaving a malaise which is very difficult to get rid of. The point of puncture soon shows the results of intense irritation, and may eventually become gangrenous and necessitate amputation. The treatment is practically the same as that for a snake bite. The poison approaches that of the serpent in character, being alkaloidal, very quickly decomposed, and intensely rapid in action. It is secreted in large quantities at the spawning season, and is most active in the male fish. On coasts where these fish abound it frequently happens that bathers are poisoned by stepping on one of them, the Trachinii being especially fond of concealing themselves just under the sand in shallow water. It would be of interest to know whether Dr. Calmette's snake bite antitoxin is also efficient against the venom of these fishes.

AN electric omnibus, which goes four miles in half an hour, is now running in the London streets.

A Visit to the Buried Churches in Cornwall.*

A ramble of about two miles over the sandhills from Perranporth brings us to the site of the far-famed buried churches of Cornwall. They are not at all easy to find, and the first time I went alone in search of them, I lost my way completely. So the second time, resolved not to be beaten, we secured the help of the gallant "Capt. Tom," one of the oldest inhabitants of the district, formerly the manager of a mining company, a great traveler, and a very well informed, excellent man. Under his guidance and in his most enjoyable company, we were without much difficulty personally conducted to the veritable ruins. A rather toilsome climb was soon rewarded by a glorious view of the Atlantic and of the country spreading far and wide, and ere long we came upon the object of our search—a little stone building, so sunk in the sand as to easily escape notice. It is simplicity itself; and yet to all English Christians, especially to churchmen, it is fraught with the deepest interest, as being all that remains of a real British church built either in the fifth century, by Piranus, or in the sixth, over his grave, in memory of one of the earliest preachers of the Gospel in Cornwall. He is said to have been one of twelve bishops consecrated by St. Patrick and sent over by him, if not in company with the Apostle of Ireland, to evangelize the ignorant natives of that part of England. He was of noble birth, being descended from the Princes of Ossory. His father was Lugneus and his mother was called Liadem. His Irish name was Kieran or Claran; for in this instance, as in many cases, the Irish "K" became "C" in Cornish. After many years of successful labor in Ireland and Cornwall, he is said to have been beheaded as a witness for the faith he had preached. He is supposed to have fixed his humble dwelling in this retired spot by the sea, yet within sight of the amphitheater which would be the general resort of the scattered inhabitants. We know little more about his life or work; but we are told on good authority that, "worn out with old age and infirmity, he called his children in the spirit around him, and having exhorted them for the last time, he commanded his grave to be prepared, and, he having descended into it with calmness, his spirit departed."

Most probably this oratory was erected over his remains. In the course of time the sand, swept along by the northwest wind from the ocean, gradually covered it out of sight.

Taking advantage of a stream which then rolled down the neighboring valley to the sea, and served as a barrier to the advance of the sand, the Christians of the place built another small church about half a mile from the site of the first, which lasted for some centuries, until the rivulet was diverted by the opening of a mine, and the sand began to accumulate again, so that this second church had to be rebuilt on a larger scale in 1420. The same fate threatened it in turn, and in 1803 the building was taken down, and its tower, porch, pillars, arches, font and other principal parts of it, were removed to the present site, about two miles off, in the center of the parish, still known as the church of Perranzabuloe, a singular name derived from sabulum, the Latin word for sand, and signifying "Perran in the sand." An ancient obelisk, surmounted by a Greek cross, still marks the site of the second buried church.

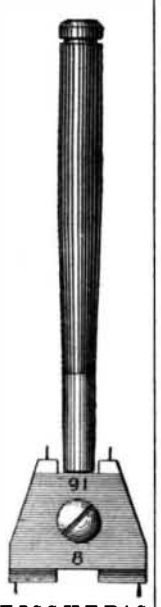
This most remarkable ruin of the first church was brought to light by Mr. Mitchell in 1835. The sand was carefully excavated, and then appeared the remains of the original building, much as they are now. These consist simply of an oblong framework of thick walls, of rough, unhewn stones, granite, porphyry, and slate, piled one upon another without mortar or cement; only sand and the china clay of the neighborhood being interspersed between the stones. When the ruin was first exposed to view, there was a low doorway with a stone moulding round it, which, contrary to either Norman or Saxon usage, was carried from the head of the arch down the sides, and the supports of the arch were perfectly plain, without capital or bases. This doorway fell to pieces within a fortnight after it had been excavated. Its principal fragments were laid up in the Truro Museum, while the rest was carried away by too curious visitors. There was also a window of the rudest form ever seen, measing just 18 inches by 12. The floor was of china clay and sand, and was distinctly divided into nave and chancel. Stone seats were there, attached to the east wall, and there is still a stone slab, probably the original communion table, under which were discovered three skeletons, one without a head, which may have been that of St. Piran, and one of the others, that of a woman, most likely his mother, who is said to have been buried with him. A head, corresponding to the headless skeleton, was afterward found on the south side of the church. All this singularly agrees with what had been long before recorded by Camden, and has been drawn by him from very ancient sources. It is interesting to add that there are indications close by of a very old burial ground, where thousands of human bones have been brought to view, many of which, now in a very comminuted state, still lie bleaching on the hillside, as in the valley of dry bones that Ezekiel saw in vision.

* Extract from "A Ramble in Cornwall," by the Rev. William Burnet, M.A., in the Fireside for March.

NEW CIRCLE DIVIDER.

Most draughtsmen have found by experience that dividing a circle into a large number of divisions is a tedious and often disappointing task, because the smallest error in setting the dividers to the distance calculated is multiplied on the circumference by the number of divisions.

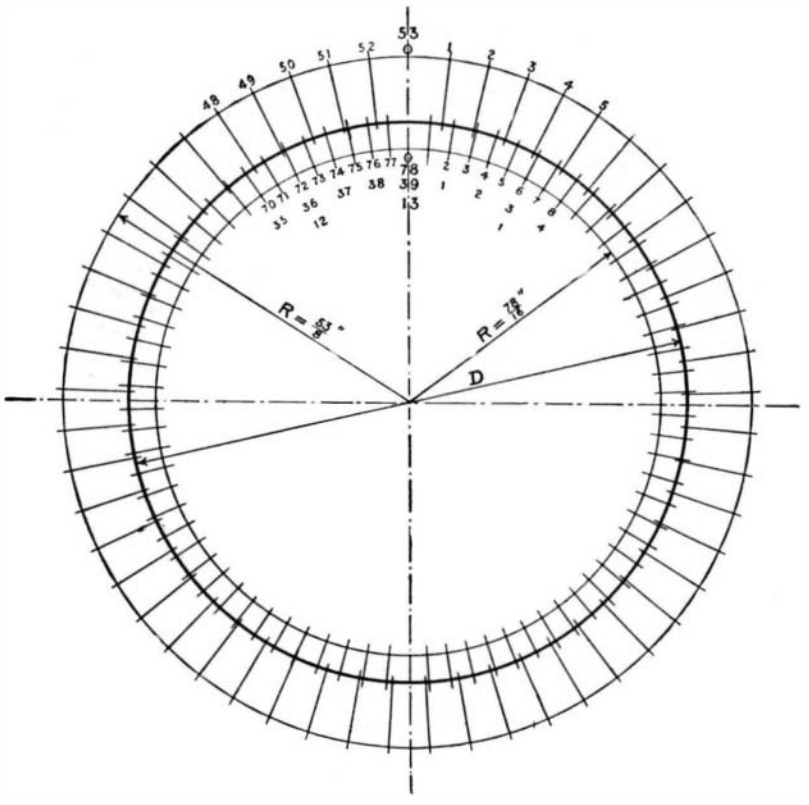
Several instruments have been devised for the purpose of dividing the circle, but they are either too high in price or too unhandy, and draughtsmen have generally preferred to calculate, use tables, or guess and take their chances.



FISCHER'S CIRCLE DIVIDER.

The simple instrument here illustrated dispenses with calculating tables and guesswork and is, at the same time, a handy and practically correct device. It consists of two pairs of fixed needle points, marked 8 and 16 respectively, which are reversible on a little handle. The points are so spaced that any circle of the proper radius will be correctly divided into the desired number of parts. It is only necessary to draw an auxiliary circle concentric with the circle to be divided and of a radius of so many eighths or sixteenths of an inch as there are parts desired. The pair of points marked "8" or "16" will divide this auxiliary circle into the desired number of divisions, which are then projected on the circle to be divided.

For instance, a circle is to be divided into 74 parts: draw a concentric circle of $\frac{74}{16}$ inches (equal $4\frac{10}{16}$ inches). On this circle the pair of points of the instrument marked "16" will make 74 equal divisions; or the points marked "8" would divide the same circle into 37 parts, because $\frac{74}{16}$ inches are equal to $\frac{37}{8}$ inches (equal $4\frac{5}{8}$ inches). This little instrument is very useful in designing gears, cams, chain wheels, conveyors, water wheels, etc. It is manufactured by Keuffel & Esser Company, No. 44 Ann Street, New York.



METHOD OF DIVIDING A CIRCLE.

Successful Kite Signaling.

On Monday, July 5, some very successful experiments in night signaling by means of colored lights sent aloft on kite strings were conducted by Lieut. Wise, U. S. A., and Mr. William A. Eddy, of Bayonne, N. J. Lieut. Wise was on Governor's Island, and Mr. Eddy was at the New Jersey Oval, in Bergen Point. Mr. Eddy was unable to lift his signal to the high altitude he desired, but he succeeded in raising the lights to a height of at least 500 feet. The signals were perceived by Lieut. Wise on Governor's Island, eight miles away. Mr. Eddy burned red and green lights at stated intervals, and so alternated them that they formed a code of signals. Lieut. Wise had no difficulty in locating and reading these signals. He replied with his own signals, which were not discovered by Mr. Eddy's assistants in time to permit the reading of the complete signal. The experiments were continued until almost midnight.

Ship Canal from the Baltic to the Black Sea.

Now that the Transsiberian Railway is far advanced toward completion, the Russian government is planning another great scheme which will outrival in political importance the Kiel Canal, says the New York Sun. It has always been considered by the Russian strategists as a source of great weakness that the naval forces of the empire should remain divided in such a way that one-half only, either the Baltic or the Black Sea fleet, could be available at one time. Between the north and the south there is no way for a naval concentration, communications being blockaded in the north by climatic and in the south by political obstructions.

There is a motto in maritime affairs that nothing can be improvised; everything has to be foreseen. It was with a clear understanding of this truth that the late Czar, Alexander III, gave instruction to his engineers to study the possibility of a maritime canal to connect the Baltic with the Black Sea; this canal to be constructed with dimensions sufficient for the transit of the largest war vessels. After a thorough study of the various possible roads, one has been selected as the most practical, running, as it does, entirely through Russian territory. On the plan selected there are no great difficulties of level to be overcome, although the European watershed summit has to be crossed, but this last takes place at one of its lowest points.

The proposed canal's entrance will be on the Gulf of Riga, at the mouth of the river Duna. It will follow the course of this river up to a point above Dunabourg. Then, leaving this valley, it reaches the Berezina River by a straight cut and passes through Babrouisk. This brings it into the Dnieper, and, following this natural declivity, it reaches the Black Sea, opening into a magnificent roadstead below the Kerson. The total length of this colossal waterway will be something like 1,600 kilometers (about 1,000 miles), and it will be excavated to a depth of 8½ meters (about 27 feet). This will allow the largest ironclads to navigate it freely from one end to the other. The estimated cost is put down at $500,000,000.

Its strategic importance does not need demonstration. By the selection of a course running at a safe distance from the frontier, it places back of the Russian forces stationed in Poland an unassailable base of operation. Fully protected already by a whole network of fortifications and railways, this canal is intended to act as a feeder for all the war material. As to the concentration of the whole Russian fleet in the Black Sea, this means an absolute control of Constantinople and the Straits.

But if this enterprise is of the utmost importance in a military point of view, it will also prove unquestionably very beneficial to the agricultural and industrial interests of the country. It places vast grain-producing regions in cheap communication with Odessa, the chief point of export, while the immense coal fields of southern Russia will come into easier connection with the industrial districts of Poland. There are reasons, too, to believe that new factories will develop along the canal on account of the cheapness of this new mode of transport. If this scheme has been adopted, there is no doubt that the Russian tenacity will bring it to success.

The Shoreditch Refuse Destructor Plant.

On June 28, Lord Kelvin opened the works established by the municipality at Shoreditch, England, which is designed to destroy the local refuse, generate electric light, and supply hot water to the public baths and laundries. Carts will convey the street, trade and household refuse to the works, where motor cars and electric hoists will distribute it to tipping platforms. Hence it will be shot by the aid of mechanical feeders into a dozen cells of the destructor. A forced draught is provided by motor-driven fans, some of which will exhaust an adjacent sewer and blow the gases therefrom into the furnace to help feed the flame. Steam generators and boilers will be used to drive the engines and dynamos and heat the water to be furnished to the baths and laundries. It is expected that 20,000 tons of refuse a year, which has formerly been carried out to sea at great expense, will be consumed annually in this plant. Lord Kelvin, in opening the works, described the project as an extremely happy union of scientific knowledge and mechanical skill, and said that it required remarkable courage in its application in this initial plant.

THE Rockefeller steamer Robert Fulton, 440 feet over all, is the largest steamer on the Great Lakes.

SCIENTIFIC AMERICAN

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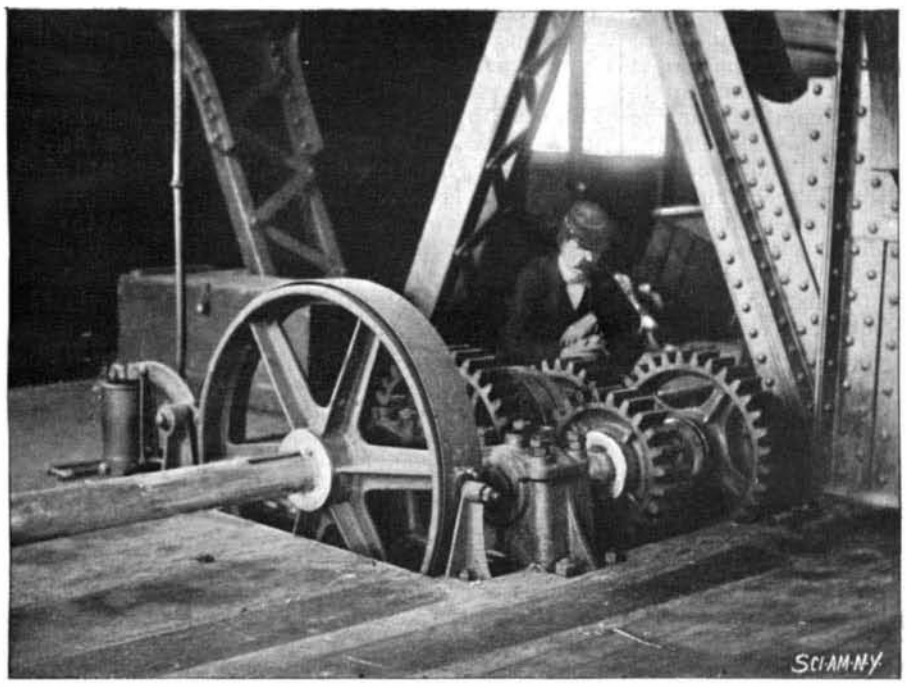
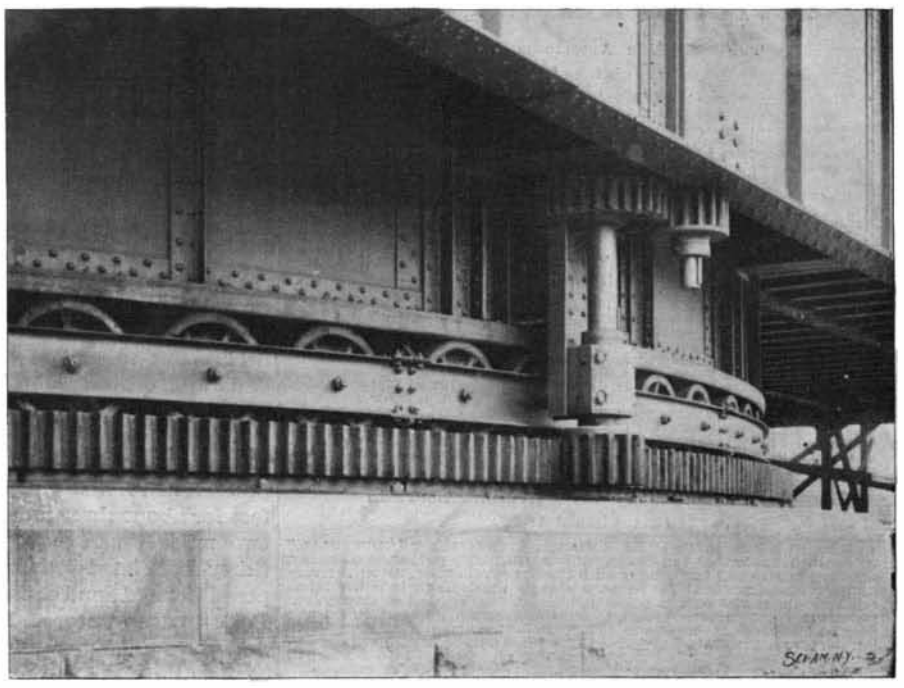
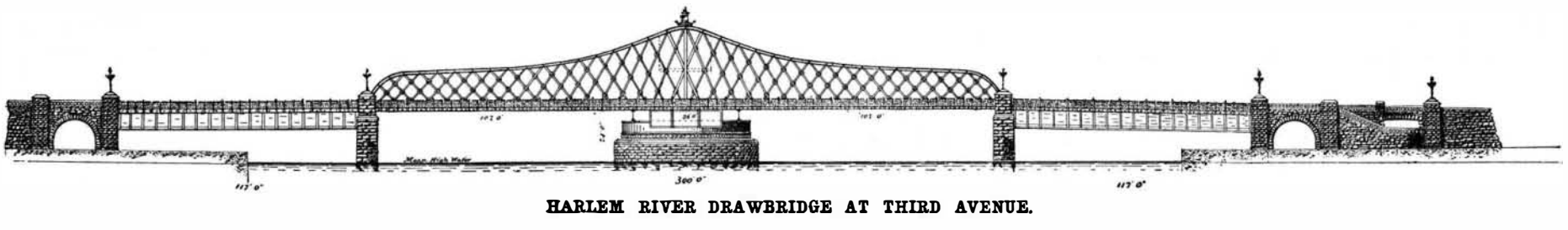


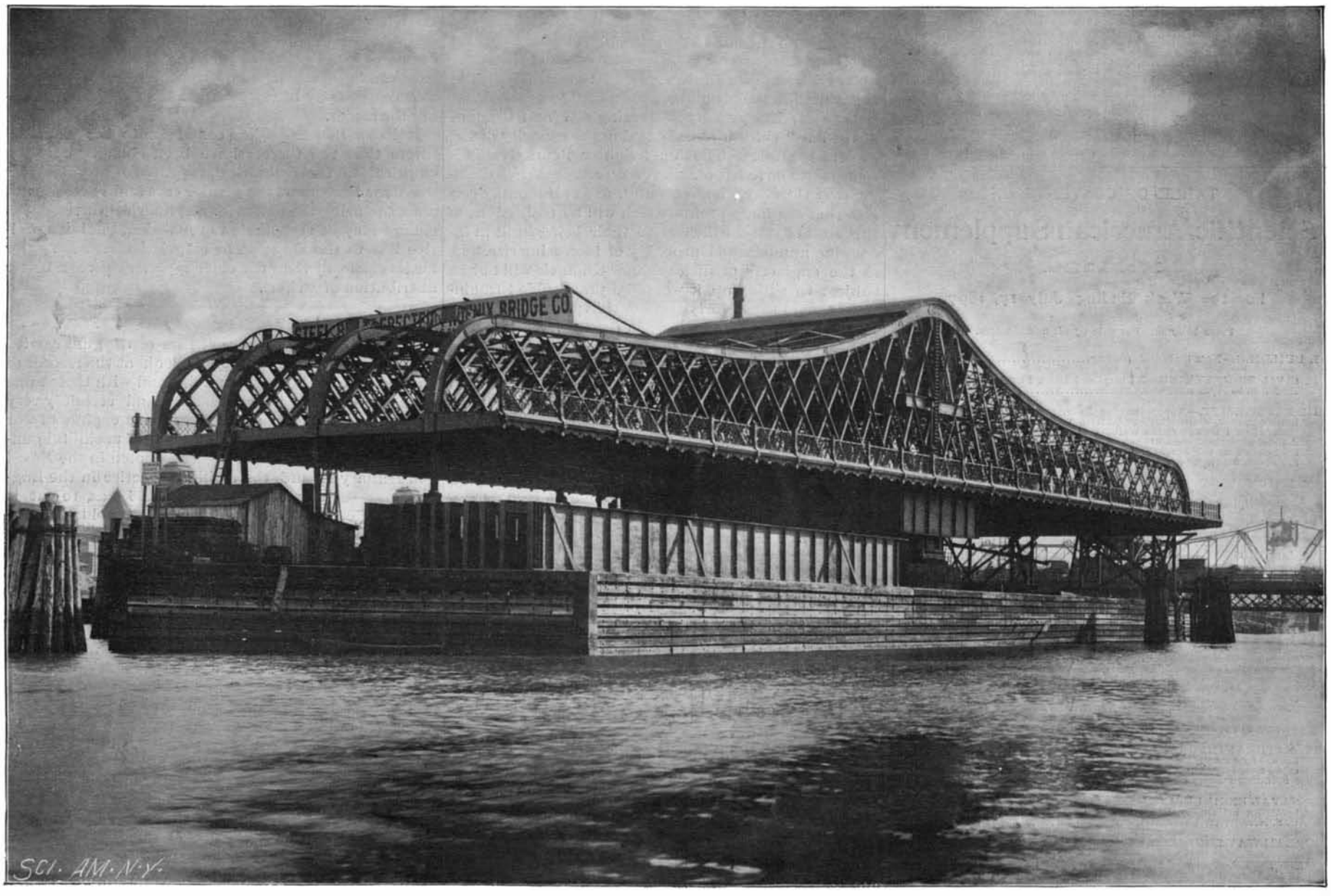
HYDRAULIC BRAKE FOR CHECKING DRAWSPAN.



DRUM AND TURNING GEAR OF DRAWSPAN.



HARLEM RIVER DRAWBRIDGE AT THIRD AVENUE.



THIRD AVENUE DRAWSPAN ACROSS THE HARLEM RIVER, NEW YORK.

Length, 300 feet; breadth, 86 feet; weight, 2,500 tons.—[See page 41.]