

SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class matter. Copyrighted, 1894, by Munn & Co.]

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. LXXI.—No. 2.
ESTABLISHED 1845.

NEW YORK, JULY 14, 1894.

\$3.00 A YEAR.
WEEKLY.

MOVING THE CENTRAL DRAW SPAN OF SEVENTH AVENUE BRIDGE.

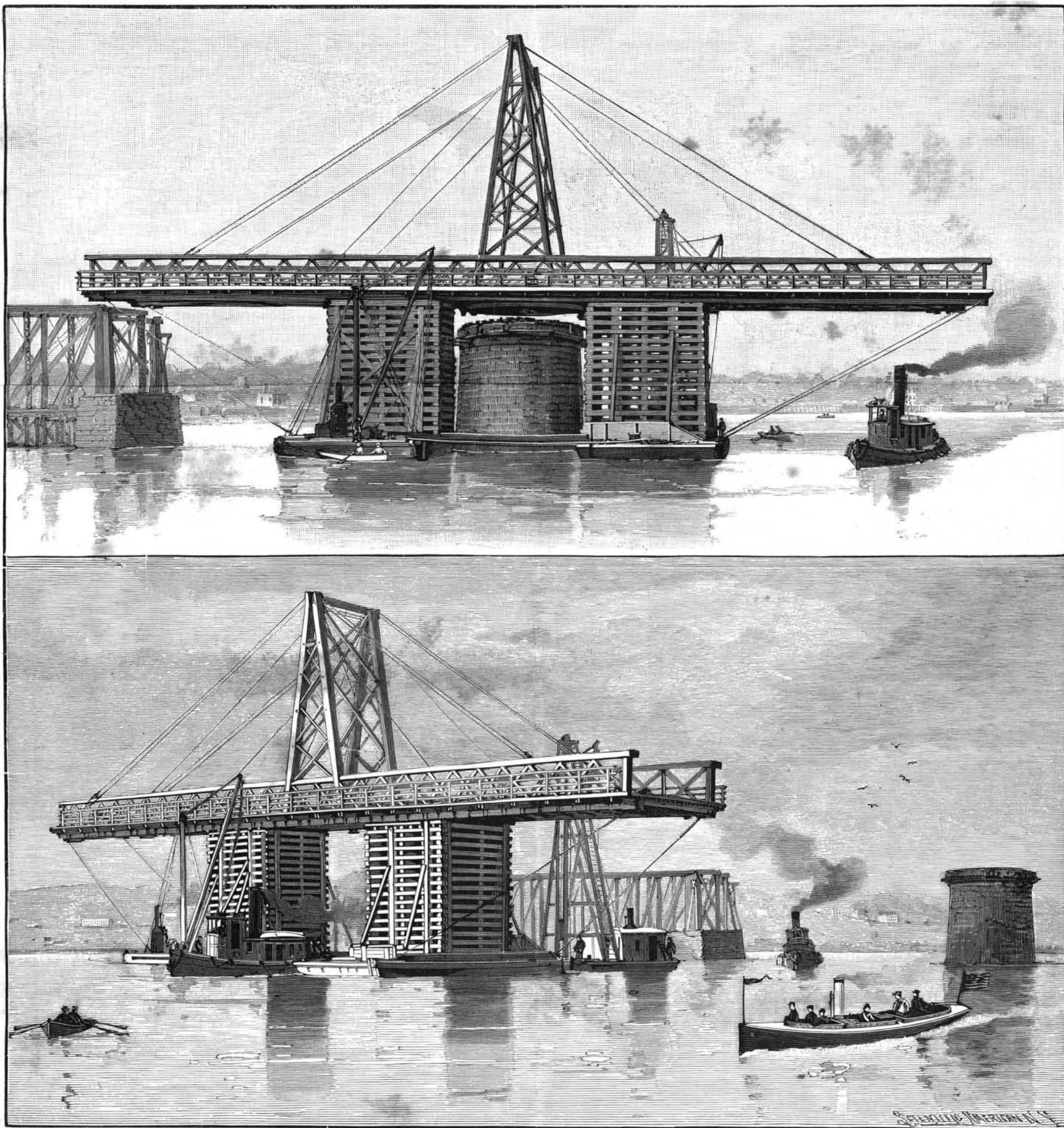
The work in process of execution in the city of New York upon the banks of the Harlem River, on the northern parts of the island, has involved some very extensive engineering operations, several of which have been described in our columns. The 155th Street viaduct, starting from the high ground on that street, near 9th Avenue, at about the commencement of the new Speedway, has its eastern terminus on the banks of the Harlem River, near 7th Avenue. Here the river

was formerly spanned by a wooden bridge with central swinging truss, the structure being known as McComb's Dam bridge. It was very familiar to the horsemen of the city, as being on the road to Jerome Park, a road much frequented by drivers of trotting horses, and a route lined with road houses, many of which were landmarks of years' standing.

In prosecuting the improvements in the neighborhood of the eastern end of the viaduct, the replacement of the old wooden bridge by a steel one was determined upon. The new bridge crosses the Harlem

River, and by a long steel viaduct across the flat ground, on the northern shore of the river, connects with Jerome Avenue, the road leading northward from its terminus and the one mentioned above. It became necessary to remove the old wooden bridge and to build some substitute therefor while the new one was in process of erection. We illustrate one of the steps in this work.

The temporary bridge lying to the east of the old site had to be a drawbridge, and the draw span of the old McComb's Dam bridge was decided on to supply



Lifting the span by means of the tides. The span in transit to its final position

MOVING THE DRAW SPAN OF THE SEVENTH AVENUE BRIDGE, NEW YORK CITY.

the draw span. This span was a wooden truss whose general construction is seen in our cuts. Its moving involved the lifting of it from its old central pier, its transfer to the site of the temporary bridge, followed by a lowering of about eight feet to conform to the grade of the rest of the bridge.

The fact that the Harlem River is a tidal stream was taken advantage of for the operations. Two seventy foot deck scows were moored, one on each side of the central pier. Two cross beams were provided for fastening the scows together, which beams were bolted to the deck. One was unbolted and drawn back as the scows were put in position, so as to make way for the central pier, which had to come between them while the free ends of the scows were temporarily secured by tackle.

Cribwork was now built up on the decks of the scows, Georgia pine timber twelve inches square in section being employed. As the tide fell the cribwork was carried up close under the bridge, and when the tide rose the scows rising with it lifted the truss bodily from the stone pier. Guy ropes were fastened to the ends of the truss and the scows were moved away with it, the cross timber being replaced as soon as there was room. The whole was then moved to the new position.

The span had now to be lowered about eight feet. The tides were utilized for this purpose. The scows brought the span over the site of the temporary center pier, which was built up with cribwork to approximately the level of the old pier. As the tide fell the truss rested on this. A few layers of blocking were removed from the top of the cribwork on the scows, so that as the tide rose the truss, while raised, was not lifted to its old level. Some of the timber was next removed from the pier, so that as the tide fell and the truss took its bearings on the pier it was lower than before. By repeating this process the draw span was eventually left in place and at the desired level.

The entire operation, executed by the firm of T. & A. Walsh, of this city, was carried out without any accident, and was completely successful.

Why Woman Ought Not to Work.

"The problem of woman from a bio-sociological point of view" is treated by Signor G. Ferrero in the current number of the *Monist*. "The essential condition of feminine existence," which he desires to analyze in his paper, is that which he names "the Law of Non-Labor." "As it is a natural law that the man must labor and struggle to live, so is it a natural law that the woman should neither labor nor struggle for her existence. Biology clearly shows us that the physiological prosperity of species depends on the division of labor between the sexes, for in exact ratio to this is the duration of life." Marriage, as found among the higher animals, is "a perfected form of the division of labor and mutual co-operation of the sexes." During hatching time the male bird does all the providing for his brooding mate. At other times her functions in seeking food are merely auxiliary. Similarly with lion and hyena. The fearful toil which falls to the savage woman the writer pronounces to be "merely a passing phase, a very dangerous aberration, produced by the excessive selfishness of man, which does not and cannot last long." He remarks that the races in which it is found "have remained in a savage state and have made scarcely any progress." In civilized nations female toil is not necessary for the production of the wealth needed for humanity. "Man alone could do this. Woman labor only tends to lower the marketable value of male labor; for, while woman is working in the factories, there are everywhere, and especially in Europe, crowds of men vainly seeking employment, to whom the cessation of work is an oft recurrent and terrible evil. This shows that, even from a sociological point of view, female labor is a pathological phenomenon.

"Statistics show us an increase of mortality among women and children in countries where industrial life has pressed mothers into its ranks. A perfect woman should be a *chef d'oeuvre* of grace and refinement, and to this end she must be exempt from toil. . . . The working woman grows ugly and loses her feminine characteristics. . . . Womanly grace and the love which men bear a beautiful woman have perhaps been the origin of paternal love and of all the other sweet and tender feelings of which the male is capable. Grace is the aesthetic side of weakness. Woman, more than man, enjoys all the benefits of civilization, which nevertheless have been in great part acquired by him alone. . . . Man labors and toils to-day, just as he did of old, and there is nothing abnormal in this fact, for it is his positive duty. What advantage, then, can be gained by participating in man's struggle for existence, when woman has only to wait until he places these benefits at her feet? I cannot understand why the question of woman suffrage should so excite public opinion. It is entirely profitless to her. . . . If her husband strains every nerve already to provide her with all the luxuries of life, he will certainly not be lax in defending those interests which are identical with those of his family."

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico, \$3 00
One copy, six months, for the U. S., Canada or Mexico, 1 50
One copy one year, to any foreign country belonging to Postal Union, 4 00
Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, for the U. S., Canada or Mexico. \$6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus, last page. (Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to one address in U. S., Canada or Mexico, on receipt of seven dollars. To foreign countries within Postal Union, eight dollars and fifty cents a year.)

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details, pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate building this work is invaluable. Has the largest circulation of any architectural publication in the world. Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, \$2.50 a year. To foreign Postal Union countries, \$3.00 a year. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, to one address, \$5.00 a year. To foreign Postal Union countries, \$6.50 a year. Combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN and SUPPLEMENT, \$9.00 a year. To foreign Postal Union countries, \$11.00 a year.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of *La America* is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. \$3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus. MUNN & CO., Publishers, 361 Broadway, New York.

The safest way to remit is by postal order, express money order, draft or bank check. Make all remittances payable to order of MUNN & CO. Readers are specially requested to notify the publishers in case of any failure, delay, or irregularity in receipt of papers.

NEW YORK, SATURDAY, JULY 14, 1894.

Contents.

Table listing various articles such as 'Am. Inst. of Homeopathy', 'Gas engines, economy of', 'Gold product of California', etc., with corresponding page numbers.

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 967.

For the Week Ending July 14, 1894.

Detailed table of contents for the supplement, listing articles like 'ASTRONOMY.—The Determination of Latitude and Longitude by Stellar Photography', 'BIOGRAPHY.—August Kunat', etc., with page numbers.

AGAIN A TORPEDO BOAT SINKS A WAR SHIP.

The value of torpedo boats was again illustrated during the recent Brazilian revolt. Among the vessels seized by the insurgents was the ironclad war ship Aquidaban. After her escape from the harbor of Rio she went to Santa Jatalina Bay, and here she was followed by the improvised fleet of the Brazilian government, consisting of the Nictheroy, one of the merchant steamers bought and armed in New York, and a few other boats of similar class, and a fast yacht formerly known as the Aurora, but supplied with torpedoes and newly christened Gustavo Sampaio. Three other small torpedo boats from Germany completed the attacking force. Having located the Aquidaban, the fleet approached in the dead of the night. A correspondent of the New York Herald says: The Sampaio ran up near the ironclad and received the fire of her small arms, but without serious damage. The Sampaio then discharged one torpedo, which missed the ship; then running up within a hundred feet of the ironclad, another torpedo was sent, which struck the great vessel on the port bow. The explosion was terrific. The bow of the big ship was lifted considerably, then with a quiver she settled down by the head in the water; but the ship did not sink. The crew of the Aquidaban, however, fled and made their escape in boats. The Brazilians boarded and took possession of the ship.

Her two forward compartments were found full of water up to the main deck. A topsail had been drawn over the hole in her bow by the crew; a diver was sent down to report on the damages. It was stated that a hole five meters by two meters existed between the first and second water tight divisions, that the steel framing and strapping were smashed, and the plates above the hole to the water line were badly cracked.

After two days' pumping work she was floated up high enough to allow her forefoot to rest in the mud. In this condition she will undergo temporary repairs to enable her to reach a dock at Rio. On her forecastle a 50-pounder Whitworth was mounted. Five Nordenfelt 1-pounders as a broadside battery were on her port side, together with a few 3-pounder Gardner field pieces of the same caliber and two Hotchkiss 3 pounder field guns on the starboard side. These, with her four 9-2-inch turret guns, comprised her armament.

Ammunition of all sorts and sizes was abundant, while cartridges for the small arms were not lacking. The hoist and shot cradles in the turrets were filled with projectiles, and fixed cartridges for the machine guns were in readiness to be served. The entire armament of the ship had been rendered worthless by the rebels. Breech bolts and blocks were missing, and the inside linings of the guns had been hacked with chisels, so that the guns are now utterly unfit for service.

The closing of the water tight doors must have prevented the entire hull being immersed, and the compartments exhibited their strength, having withstood the water pressure from two divisions. The after part of the ship was perfectly dry. The location of the guns on the Aquidaban was bad; that is to say, their position to efficiently meet attacks from torpedo boats was wrongly determined.

THE GREAT RAILROAD STRIKE.

The Inter-State Commerce Commission, organized by the Federal government for the purpose of studying railroad statistics, recently completed a report on the operations of the United States. It appears that there were 1,890 railroad corporations in the United States during the year ending June 30, 1893. They received in that period nearly a billion and a quarter of dollars. They carried 593,560,612 passengers over 14,229,101,084 miles and transported 745,119,482 tons of freight a distance of 93,588,111,833 miles. These operations were conducted on 176,461 miles of railroad. In round numbers 900,000 employes of all grades are supported by these roads, making one person in every ninety of the population of the United States. Accepting the stated capitalizations which the companies have reported, it appears that on an investment of \$10,500,000,000 less than one per cent of dividends were paid. It is calculated that out of every dollar that was received by the railroad companies, 75 cents went to their employes.

It is self-evident that the railroad industry of the United States is an enormous one. The vast body of men who operate it are a power for good or evil. Every citizen has his interest affected by them. Perhaps the investor in railroad securities is as little affected as any one by their actions, but the suburban residents all over the country have their very home life at the mercy of the train which transports them to and from their business, the dweller in the extreme East finds the price of his meat raised by a railroad strike hundreds of miles away in Chicago or other center, and the merchant in the delivery of his goods is greatly impeded in his business by any irregularity of the running of trains.

The papers of the entire country have been full of the accounts of a great strike now in progress. It is conducted ostensibly by an organization termed the American Railway Union. It started originally in consequence of an announcement made by the Pull-