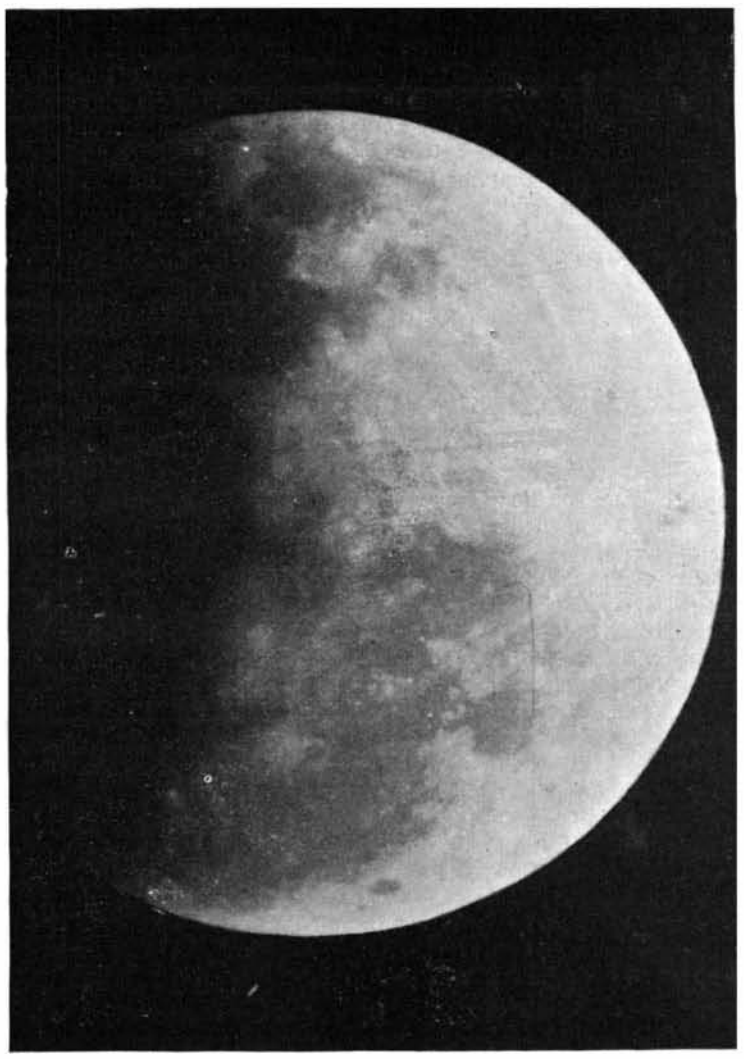
PHOTOGRAPH OF THE PARTIAL ECLIPSE OF THE MOON, SEPTEMBER 14, 1894.

The accompanying photograph of the partial eclipse of the moon on September 14 and 15, 1894, was made with the 10 inch equatorial refractor of this observatory, with photo connecting lens placed in front of the visual objective. The diameter of the moon's image in the principal focus is about one inch, which is enlarged by a positive photographically corrected enlarging lens to four and one-half inches. This enlarged image is taken direct in the telescope at the time of exposure.

The time of exposure for this negative was two seconds. The driving clock of the telescope was regulated to lunar rate, so that the moon's motion was accurately followed.

This photograph was made at the time of greatest obscuration, or half past eleven, and shows the diffused circular outline of the earth's shadow.

WILLIAM R. BROOKS.
Smith Observatory, Geneva, N. Y.



THE RECENT PARTIAL ECLIPSE OF THE MOON.

The Interstate Commerce Report.

The eighth annual report of the Interstate Commerce Commission, which recently appeared, deals with the year ending June 30, 1893. At that time there were 176,461 miles of steam railways in the United States open for traffic. This was an increase of 4,897 miles for the year. The total number of persons employed by the railways was 873,602, or about one in every seventy inhabitants of the United States. Notwithstanding the comparatively small mileage added during the year, 52,187 new employes were taken on during the same period. This increase may be attributed to the large number of additional men required for signaling purposes, for workers in freight yards and for porters in passenger stations. Since June, 1893, nearly one-third of the entire railway mileage of the United States has been in the hands of a receiver. The gross capitalization of the railways of this country was reported as $10,506,235,410, or at the rate of $63,421 per mile. These figures do not seem excessive when compared with the capitalization of the English railways. Some years ago it was estimated that the railways of England were capitalized at a rate of $185,000 a mile. A receivership on an English railway, especially for a trunk line, is not of frequent occurrence, so that we can safely assume that a part of the responsibility rests with our State laws, which fix rates too low to be profitable, and federal laws, which prohibit railways from making agreements among themselves to reduce unprofitable competition.

REPAIRING CHINESE WAR SHIPS.

In our issue of January 12 we described the great battle of the Yalu River, the most important naval engagement since the advent of iron and steel in shipbuilding. We now illustrate the repairs which were made to one of the vessels of the Chinese navy, which had been riddled with shot from Japanese war ships. After the retreat, the remnant of the Chinese fleet steamed away toward Port Arthur, the Woolwich of China, to make repairs. Port Arthur, where many of the vessels engaged in the Yalu battle were put in a seaworthy condition, was afterward taken by the Japanese.

The Chinese admiral opened the Yalu engagement on September 17, 1894, at a distance of about 7,000 yards. The firing at the outset was indifferent, but the Japanese gunners improved their aim as the distance began to lessen. The Chinese barbette ship Ting Yuen was the first to suffer any severe injury, a Japanese shell bursting in her battery. Two of the big guns of the battle ship Chen Yuen were disabled and she was left defenseless, except for her secondary battery. She had 120 shot holes in her sides when she steamed away. The Ching Yuen was soon riddled with shells. The Chao Yung ran ashore and became a target for the Japanese gunners until she was set on fire. The King Yuen was in a terrible plight. A shell burst through her deck and she slowly foundered. In the Chih Yuen nearly all the woodwork was burned away and there were 200 shot holes in her, mostly from machine guns, before she sank.

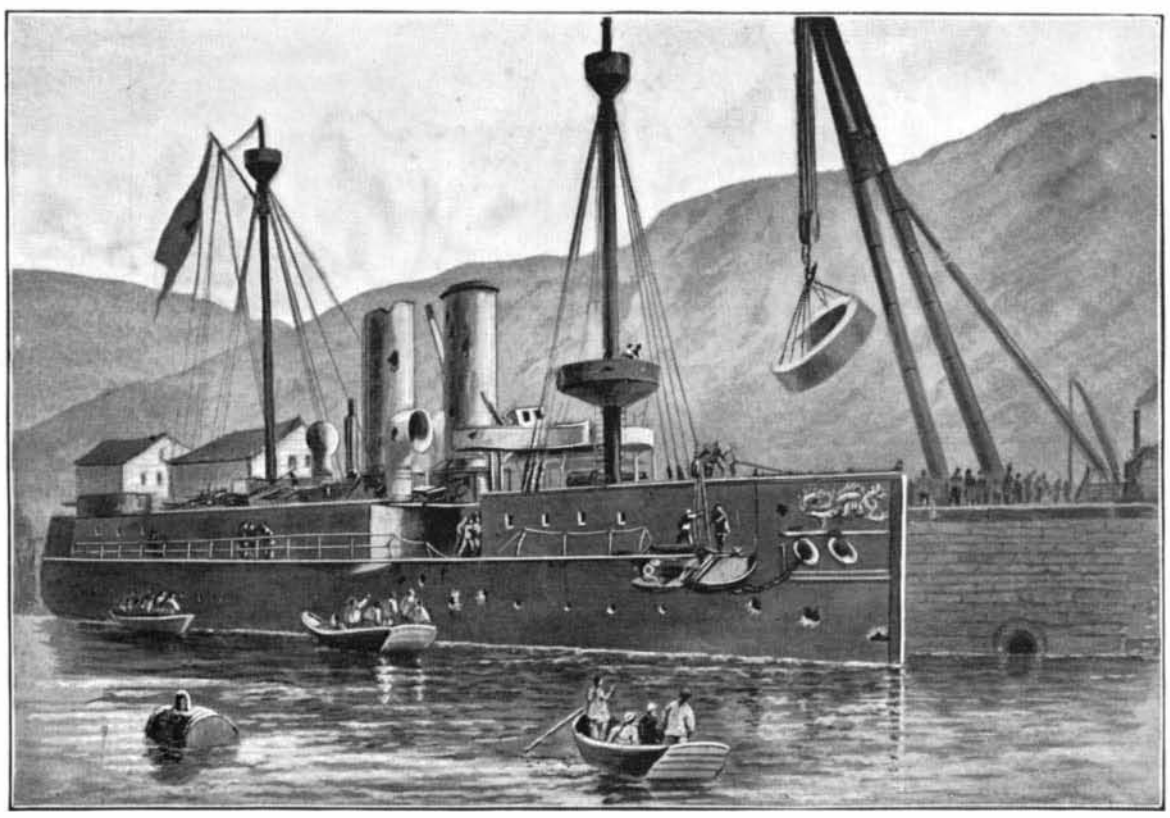
The Japanese cruiser Yoshino threw 3,750 pounds of projectiles a minute, able to pierce any but the thickest armor. The scene during the heat of the conflict was appalling. The fusillade swept away masts and funnels, shattered conning towers, pierced the gun shields and the hulls. Above the armored deck all was reduced to total wreckage. The battered ships with gaping sides were kept from foundering by the steam pumps, which were constantly at work. When dusk came, the vessels, listing badly, steamed slowly away. When the contending fleets separated, it is believed that they were both short of ammunition. The greater part of the damage inflicted to the Chinese vessels was done by shot, and not by ramming or torpedoes.

The details of the condition of the vessels during the conflict was terrible. Some of the foreign officers on the vessels of the contending fleets give sickening accounts of carnage. One of them expressed an opinion that if the European rulers could have seen the condition of the decks of the Chen Yuen, they would have forsworn war forever. A shell glanced from the steel deck of the Chen Yuen and went through her conning tower, shattering everything. A lieutenant was in the act of speaking to the engineer; he was blown to pieces and his head was left hanging on the speaking tubes. The woodwork in nearly all of the vessels was very much splintered and inflicted many painful wounds. In the first meeting of the Chinese and Japanese sea force, near Chemulpo, on July 12, the details are even more horrible. On the Yang-wei everything was a ruin. The funnel had been shot away to within four feet of the deck. As forced draught was used, the men rigged a jury stack of sheet iron and canvas supported by a derrick. A hose was kept playing constantly on this makeshift funnel to prevent it from taking fire or melting. Down in the boiler room naked coolies shoveled coal for dear life; gin was as free as water for them, and whenever a man lagged he was urged on with blows from a thick club made of rubber belting. The draught was so intense that a continuous sheet of flame poured from the funnel. The main deck was a lake of blood an inch thick. Floating in the deeper parts were fragments of bodies, and here and there a writhing human being whose tortures were not yet ended. Whenever a man was found hopelessly wounded, the surgeon gave him instant relief from his agony. He carried an atomizer filled with prussic acid, and when a man was found who was fatally injured, he sprayed the poison into the man's mouth and nostrils. The dying men craned their necks forward eagerly to escape the torture they suffered. The shattered remnants of humanity were thrown overboard and the vessel, with gaping sides, steamed to Shanghai.

Many nautical authorities are of the opinion that the work of the Japanese navy is the most successful since the time of Nelson. Captain Mahan thinks that nothing in the engagement will point to a remodeling of war ships, but it will certainly largely affect their equipment. The 66 ton guns of the Japanese fleet did good work, but it was not the large guns, which will send a 750 pound shot through the best armor made in Europe, but the rapid-firing guns which decided the battle by turning the decks into shambles and destroying gun mounts, stacks, fighting tops and conning towers, as well as riddling the hulls.

One battle cannot, of course, determine all the questions of naval construction, but the teaching of the battle of the Yalu seems indisputably in favor of swift cruisers armed with rapid-firing guns.

The conflict seems to have definitely decided that woodwork is out of place in war vessels. Baron von Sterneck de Ehrenstein, the chief official of the Austrian navy, says, in speaking of the Japanese cruisers being able to hold their own against the Chinese ironclads: "This fact has opened the eyes of the great powers, and induced them to give greater attention to the construction of cruisers in the future."



CHINESE WAR SHIP AFTER THE YALU ENGAGEMENT.

A Bridge of Concrete.

A concrete bridge having a clear span of 164 feet and 26 feet wide was recently constructed over the Danube at Munderkingen, in Austria. Stone is scarce and dear there, while good Portland cement is produced in large quantities. The centering was covered with oiled paper, on which the concrete was laid, consisting of 1 part cement, 2½ parts sand, and 5 broken stone, all thoroughly mixed. Blocks of this concrete have shown a resistance of 187 tons per square foot in seven days, 235 tons in twenty-eight days, and 308 tons in five months. The concrete was applied in layers 12 inches thick, starting at the abutments and working toward the crown, where it is 3¼ feet thick; midway to the crown it is 4½ feet thick. The time spent in laying the concrete was only nineteen days, and ten days after the centers were struck. The deflection proved less than 4½ inches.

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