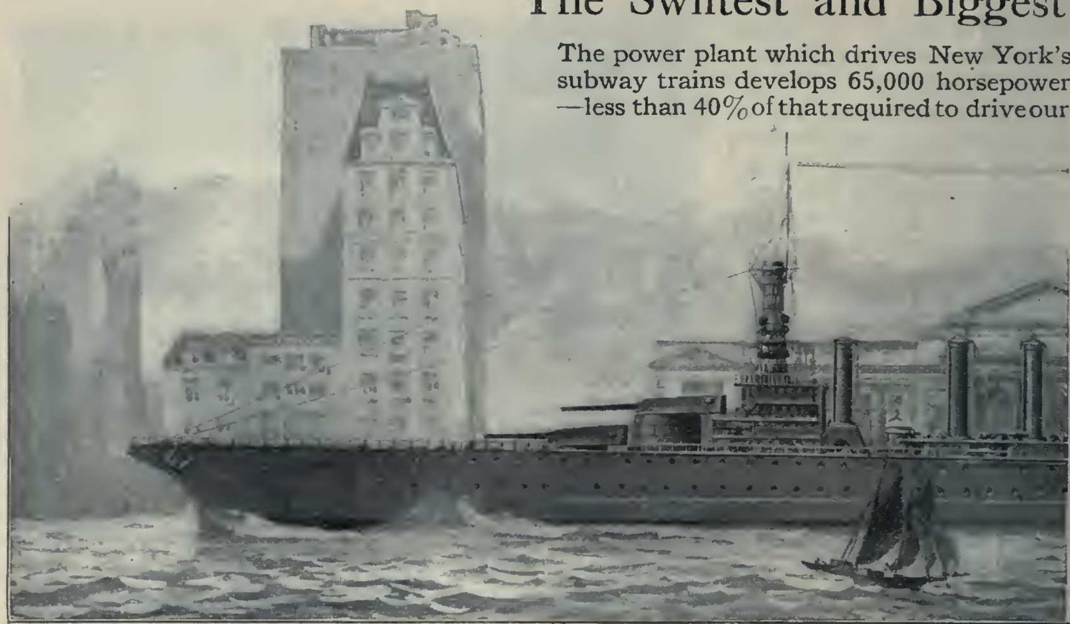
The Swiftest and Biggest

The power plant which drives New York's subway trains develops 65,000 horsepower —less than 40% of that required to drive our

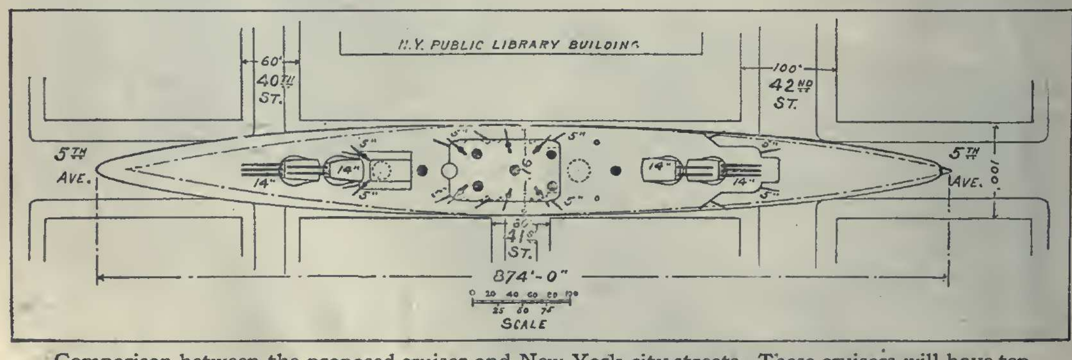


Our new battleships are the most daring ever proposed. They will have a length of 850 feet between perpendiculars and an over-all length of 874 feet. What that means is shown by the

A FEW months ago the United States Navy Department announced that it would build battle cruisers with a length of 850 feet and a speed of thirty-five knots—forty miles an hour. Only ship-builders and naval officers realized the full meaning of the Department's program. England is said to have completed battleships of about the same size but never have we attempted to build a fighting vessel so huge. The battles fought by the British and German fleets in the North Sea were object lessons. They showed that sea fights are won by speed and hitting power. And so the Navy Department determined to build the fastest battle-cruisers and to arm them with the most powerful guns.

What is a battle cruiser? It is a ship which is faster than a superdreadnought, but not so heavily armored. Battle cruisers were lost in the last North Sea battle largely because they had not the protection of a superdreadnought. But although they went down, they saved the day for England. They kept the German fleet in action, until the British Grand Fleet with its super-dreadnoughts could appear on the scene. And so we decide that battle cruisers we must have.

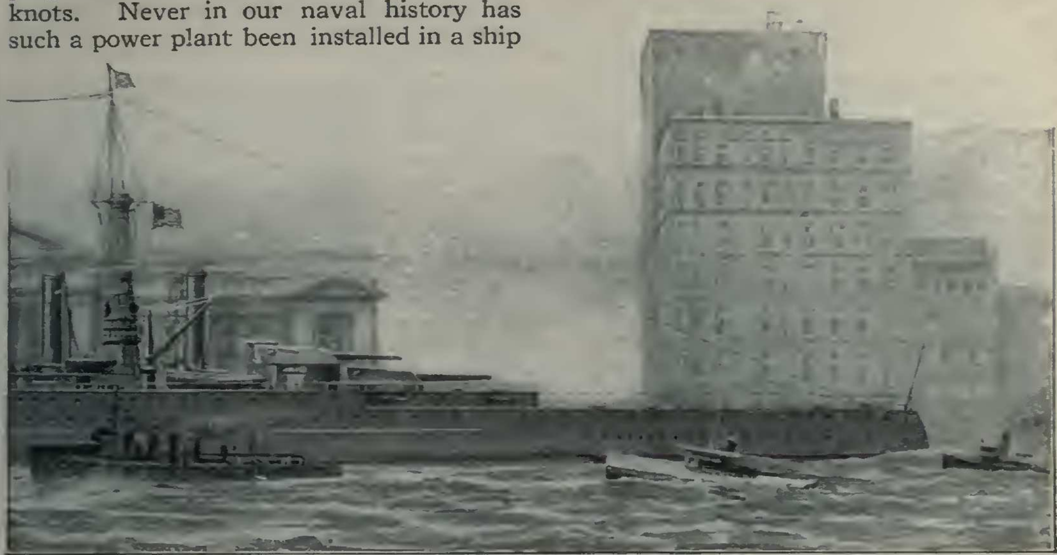
It is one thing to design a battle cruiser 850 feet long with a speed of thirty-five knots; quite another to build it. It would seem simple enough to magnify existing models and to put in bigger engines. That



Comparison between the proposed cruiser and New York city streets. These cruisers will have ten fourteen-inch, twenty five-inch and four three-inch anti-air-craft guns besides eight torpedo-tubes

Battle Cruisers in the World

proposed battle cruisers at a speed of 35 knots. Never in our naval history has such a power plant been installed in a ship



comparison with New York's Public Library and adjacent Fifth Avenue buildings in this picture. They will cost $16,500,000 each. It will take 180,000 horsepower to drive one at 35 knots

is not the way ships are built. The *Lusitania* made twenty-five knots with 70,000 horsepower. To make fifty knots, it might be supposed that it would be necessary merely to double the size of the engines. Battle cruiser building would be easy if that were all. Each additional knot is purchased at the expenditure of thousands of horsepower. Our naval engineers estimate that 180,000 horsepower will be required to develop thirty-five knots in one of the new battle cruisers. Never have marine engines of that power been built. As a result, American shipbuilding companies are loath to bid on the cruisers. The builders say that they will not bid except with the understanding that they will receive the cost of building plus ten percent. A similar plan of paying for ships was worked out in Germany when the giants *Imperator* and *Vaterland* were built. The Naval Appropriation Act of Aug. 29, 1916, permits this method of bidding. Our shipbuilders maintain that even on the ten-percent-plus-cost basis they will probably be losers because the Government will undoubtedly copy their successful models, and build ships in its own yards after the hard work has been done in private yards.

To develop a speed of thirty-five knots—forty miles—an hour, turbines must be employed. A steam turbine works on the windmill principle. Steam spurts against blades on a long shaft. The old-fashioned steam engine—"reciprocating engine" in engineers' language—is very tall. Its pistons work up and down in the cylinders, as everyone knows. Reciprocating engines take up much space, so much, in fact, that a ship like the *Lusitania*, which was driven by them, was practically all engines. The steam turbine requires very little head room and very little floor space, so that great economies can thus be effected. Moreover, oil will be used as fuel, which can be carried in the double bottom of the cruiser, thus further releasing space which would otherwise have to be taken up by coal bunkers. Moreover, steam turbines are lighter than reciprocating engines. They can be heavily overloaded, should emergency arise.

On the other hand, the use of steam turbines is not all plain sailing; for turbine engines, unlike reciprocating engines, are non-reversible and special means must be provided for backing. Furthermore, the most efficient speed of revolution of a boat's propeller is very much lower than the most efficient speed of the shaft of a turbine engine. Therefore it is not the most efficient proceeding to couple the turbine directly to the propeller-shaft. Gearing and a novel method of driving electrically with turbine engines will probably be employed on the new vessels.

The British battleship *Queen Elizabeth*, which took a prominent part in the Dardanelles campaign, has a rating of 60,000 horsepower and is a twenty-five-knot vessel. The British *Tiger* was designed for a speed of 28 knots with a rating of 100,000 horsepower. The German battleship *Goeben*, which made her famous dash for Turkey at the beginning of the war, is a twenty-eight-knot vessel of 70,000 horsepower, while among the later vessels the *Seydlitz* might be mentioned as a twenty-nine knot, 100,000 horsepower vessel. The *Vaterland*, most impressive of the German steamers now resting in New York harbor, has a horsepower rating of 65,000 and a speed of twenty-four knots.

The great Waterside station of the New York Edison Co., located on the East River, is reputed to be the largest steam plant in the world. Two buildings comprise this station. No. 1, the original station, has a total capacity of about 165,000 horsepower, which is considerably less than the power of one of the new battle cruisers. The two buildings of the Waterside plant develop about 288,000 horsepower, which is about 60 per cent more power than one of the new battle cruisers will develop.

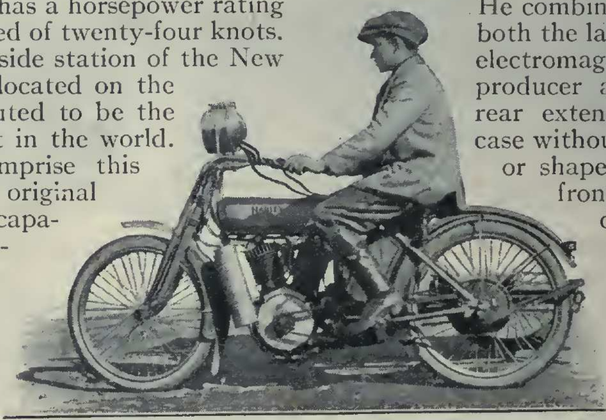
The great 59th Street plant of the Interborough Rapid Transit Co., which supplies power for the trains of New York's subway, develops only a little over 65,000 horsepower—less than forty per cent of that of the proposed battle cruiser.

In 1900 the total hydro-electric power developed in the United States was little more than enough to run one of the new battle cruisers, amounting to about 200,000 horsepower. To-day the total horsepower developed hydro-electrically in this country would run about ten of the battle cruisers.

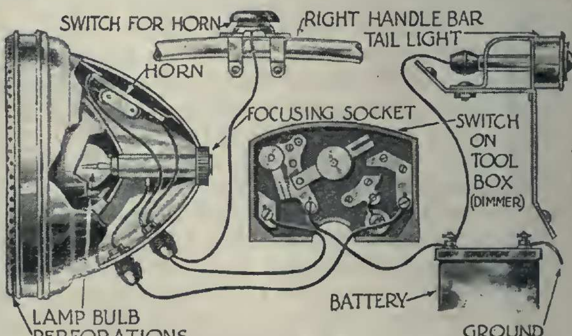
The greatest hydro-electric development of all, that at Niagara Falls, is perhaps the most impressive subject of all for comparative purposes. The mean flow of the Niagara River is about 222,000 cubic feet per second and the fall is 160 feet. The power houses planned for both American and Canadian sides of the Falls, including those in operation, are expected to utilize twenty-one and a half per cent of the mean flow of the river, utilizing a total of 650,000 horsepower. This vast amount of power would be insufficient to run even four of our new battle cruisers.

Turning Your Motorcycle Lamp into a Horn Without Changing Its Shape

A COMBINED lamp and horn which does not detract from the original lines of the motor vehicle has been invented by Nathaniel B. Wales, of Boston, Mass. He combines in a single unit both the lamp and horn. The electromagnets of the sound producer are mounted in a rear extension of the lamp case without changing its size or shape. Immediately in front of the sound producer is the electric light bulb. For a megaphone or sound chamber to intensify the volume of sound the inventor utilizes the hood, which frequently serves on gas lamps for the escape of heat. In other words, the wall adjacent to the parabolic reflector becomes the sound chamber. Obviously, it is not necessary to change the size of the lamp to do this. If this does not insure a sufficient volume of sound the circular front of the lens case may be utilized.



The motorcycle has many necessary accessories to carry so that a combination lamp and horn arrangement fastened to the handlebar saves valuable space



The sound-box of the horn is placed in the rear extension of the lamp case. The hood acts as a megaphone to intensify the volume of sound