

the position of this deck being adjusted by large gun metal nuts at the ends of the transverse girders supporting the deck which engage vertical screws hung on ball bearings from the top of supporting columns. The side columns are connected at their tops by transverse latticed girders; longitudinal bracing is provided between all columns, and exterior struts are carried out to the edge of the main deck, making the superstructure rigid in all directions. The load on these columns is distributed to the keel by special struts below the main deck. Three tracks 272 ft. long are provided on the movable deck, these being carried on latticed girder stringers under each rail. No adjustment in the elevation of the tracks on the landing piers will be necessary, the slight inequality due to the motion of the vessel under changing load being taken up by adjustable hinged gangways at each end of the car deck. These gangways are attached to the end of the movable deck by ball and socket joints and their outer ends are adjusted to the desired level by two lines of three-part cable attached to the top of a braced steel frame on the deck. The steel superstructure above the highest position of the car

the summer months. The vessel is strengthened throughout for heavy ice-breaking service. The car deck is raised and lowered by worm wheels driven from horizontal shafting which runs the length of the vessel on each side, the gearing being arranged to lift the deck fully loaded at a rate of one foot per minute through a distance of 18 ft. The engine operating this deck is of the four-cylinder high-pressure type, of massive design, driving a transverse shaft through double helical spur gears. This shaft drives the main line shafting through miter wheels at each end. The worms which drive the vertical screws carrying the car deck are of forged steel and the wheels of cast iron. The screws are driven through a loose forged steel sleeve and sliding key arrangement fitted into the box of the wheel. Steam will be supplied by two batteries of four single-ended return tube boilers, 12 ft. 4¼ in. in diameter and 9 ft. 6 in. long, having a total heating surface of about 10,400 sq. ft. and a grate area of about 350 sq. ft. An electric winch with two drums operated by a 41. hp. motor is located on the car deck for hauling cars on and off the boat. Two 25 hp. motors are provided for raising and lowering the gangways and two generators of 40 kw. and 20 kw., respectively, are installed for supplying the electric current for the operation of motors and for lighting. Two steam windlasses with slip drums are provided for mooring.



Looking Down One of the Tracks on the Movable Car Deck

deck supports a promenade around the vessel with a bridge platform forward from which all of the operations of steering and maneuvering are directed. The space below the main deck is occupied by the boilers, coal storage, engine rooms, accommodations for the crew, etc.

The vessel will be propelled by two sets of twin-screw triple-expansion surface-condensing engines with cylinders 23 in., 35 in. and 55 in. in diameter, having a 33-in. stroke. They are designed to run at 120 revolutions per minute with a steam pressure of 165 lb. A special feature of these engines is the shafting, which is made much stronger than usual to withstand the shock received when the propellers strike ice during the winter. The propellers themselves are of nickel steel and of an especially strong design. An ice-breaking propeller is provided in the forward end of the vessel, driven by a set of compound surface-condensing engines, the cylinders being 15 in. and 32 in. in diameter with a 21-in. stroke. This propeller, which is also of nickel steel, runs idly during

BEAM LIGHT SIGNALS ON THE PENNSYLVANIA

The new arrangement of electric lights (uncolored) to take the place of semaphores, as signals, on the Pennsylvania Railroad, between Philadelphia and Paoli, to be used both day and night, was described in the *Railway Age Gazette* of January 8, page 61. These signals have now been put in service over a distance of five miles, Overbrook to Bryn Mawr, and a photographic reproduction of one of the signal bridges, sent to us by the courtesy of the Philadelphia Public Ledger is given in the accompanying engraving. This is a four-track line and the observer sees the two signals for the two right-hand (west-bound) tracks. For the outer track the stop indication, protecting the train seen in



"Beam-Light" Signals at Rosemont, Pa.

the picture, consists of the four lights which are arranged in a horizontal line in the upper part of the hood or background. The next track is clear for three blocks in advance and the clear indication in the signal (at the left) consists of the four lights arranged in a vertical line.

On this electrified section the block sections are about 3,500 ft. long and "three-block information" is given. If the line is clear for only two blocks ahead, the clear signal is given by the lights in the lower part of the signal (corresponding to a second semaphore arm) indicating "proceed, prepare to pass next signal at medium speed."

The wires to be used for electric traction, seen in the engraving, are not yet in regular use. It is expected that electric motor cars will be put in service within a month or two.