The Harris County Houston Ship Channel Navigation District Fire Boat "Port Houston" will be at the Atlantic City Yacht Club pier from May 10th to 13th, inclusive, during the Thirtieth Annual Meeting of the National Fire Protection Association. It will feature the Marine Committee's program on May the twelfth.
Developing the Port of Houston

The possibilities of Port Houston as a port were realized by early settlers of Harris County, and sailing craft navigated the old channel of Buffalo Bayou in the latter eighteen-thirties. In a report written by a civil engineer named George Staley to General Sidney Sherman in 1846, it was recommended that a harbor be built on the waterway somewhere between Houston and Harrisburg and the channel be improved. From 1860 to 1875, the waterway was used by Commodore Charles Morgan for a line of sidewheel steamers operating between Morgan City, Louisiana, and Clinton, Texas. The latter point is now only a few miles from the turning basin of the Houston Ship Channel and is almost in the center of the ship channel industrial area.

The federal government began its improvement work in the interest of the Houston Ship Channel in 1872, by dredging a cut in Galveston Bay. Following the completion of this project further improvement work was authorized by both government and private interests until in 1899 a program of construction was approved which included the dredging of a 25-foot channel from the Gulf of Mexico to Houston. A series of delays to the completion of this improvement did not discourage the citizenship of Houston and Harris Counties who by this time were determined to see the fruition of their plans.

The work was finally completed in 1914, providing a ruling depth of 25 feet to the Houston Ship Channel. A few years later another dredging project was adopted, and completed in 1925, which provided a minimum channel depth of 30 feet. The cost of channel improvements was a little more than $13,000,000, contributed equally by the federal government and the citizens of Harris County. The latter through county and municipal expenditures created harbor and port facilities costing in excess of $7,000,000. These facilities include wharves and warehouses of the most modern construction and type, belt railway and switch trackage, grain elevator, handling devices, etc.

The affairs of the port are administered by a navigation commission the membership of which consists of representatives of the city and county and a chairman selected by both groups.

Immediately after the completion of the 25 foot project, business began to flow to the Port of Houston. A coastwise line operating between Houston and Philadelphia, was the first to make regular sailings. Oil refineries and other industrial enterprises followed the inauguration of water traffic and established themselves upon the banks of the ship channel. On account of the World War and Uncle Sam's later participation in it, a great portion of the shipping at Gulf ports was diverted to the North Atlantic and during the period from 1914 to 1919, the development of the infant port on the Houston Ship Channel was retarded but by no means stopped.

The development of Houston's port business has been as remarkable from the standpoint of results obtained, as its creation has been romantically interesting from the viewpoint of human achievement.

In November, 1919, the port made its first exportation, a cargo of cotton for Manchester, England. The following year therefore was the first full year of foreign trade. The total tonnage passing over the public wharves in 1920, amounted to 1,210,204 tons. For the year 1925 this total was increased to 9,118,582 tons, a gain of 653 percent. Statistics covering the port's traffic follow:

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
<th>Tonnage</th>
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<tbody>
<tr>
<td>1920</td>
<td>$82,301,162</td>
<td>1,210,204</td>
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<tr>
<td>1921</td>
<td>78,963,388</td>
<td>2,837,349</td>
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<tr>
<td>1922</td>
<td>144,272,900</td>
<td>3,365,635</td>
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<tr>
<td>1923</td>
<td>230,643,731</td>
<td>4,795,324</td>
</tr>
<tr>
<td>1924</td>
<td>314,356,508</td>
<td>7,094,294</td>
</tr>
<tr>
<td>1925</td>
<td>514,362,050</td>
<td>9,118,582</td>
</tr>
</tbody>
</table>

During the 1919-20 cotton season Houston exported 69,839 bales. At the close of the 1924-25 season it was found that the total exportation for a 12-month period had increased to 1,821,828 bales and Houston had attained the rank of second cotton port of America.

The Houston Chamber of Commerce on three occasions has demonstrated the adequacy of the port's facilities by chartering huge passenger liners.
and conducting parties of business men and members of their families on cruises to the West Indies, and other points of Latin-America with which Houston may logically establish trade relationships. The passenger lists of these cruises included the names of individuals residing in widely separated sections of the country and the publicity effort was as much for their benefit as for the shippers and other business men of the foreign countries visited.

The entrance to the Port of Houston is through a tidal channel extending from the Gulf of Mexico through jetties between Galveston Island and Bolivar Peninsula across Galveston Bay, a distance of 25 miles; thence up the San Jacinto River through low lying marshes and shallow bays to Lynchburg, a distance of nine miles; thence up the historic Buffalo Bayou passing the famous San Jacinto Battleground, now a state park, to the Turning Basin within the city limits of Houston, a further distance of 16 miles. The total distance from the harbor to the open Gulf is 50 miles.

In addition to Houston's publicly owned terminals, private industrial corporations have constructed facilities on the waterfront to take care of their shipping business. Particularly is this true of marine construction by oil refineries and cotton plants located on the ship channel. One cotton compress and warehouse has a waterfront facility for the storage of more than 100,000 bales of cotton in addition to a considerable capacity for the shipside movement of general merchandise. At the wharves of this plant five ocean-going vessels can be loaded at one time.

A story giving a general description of the Port of Houston would not be complete without mention of the great industrial development that has taken place on the banks of the Houston Ship Channel since the inauguration of water traffic. At the present time there are in that area 45 industries representing a capital investment of $110,000,000 and new construction underway will add $26,800,000 to this.

There are eight oil refineries operating on the waterway and other channel industries include chemical works, flour mill and elevator, cement plant, fertilizer works, molasses refinery, cotton compresses and warehouses, iron and steel working plants, the construction of which have been authorized, and coal and oil bunkering plants for the fueling of ships.
VIEWS OF "PORT HOUSTON" THE FIRST DIESEL ELECTRIC FIRE BOAT

(1) Wheel House—The pilot has direct control of the speed and direction of rotation of the propelling motors by operating the levers mounted on the pedestal on the port side. The recording meters indicate the power loads. (2) The "Port Houston" under modern speed. It has a beam of only 3 feet 7 inches which ensures a good supply of clean air for fighting fire. (3) Three pictures of the port Houston. (4) The distributing and pump motor panels are mounted on the port side of the engine room. (5) The "Port Houston" under modern speed. (6) A view of the main motor which is the largest in the ship. It is made of three separate motors which are combined together to light the fire. (7) The fire engine is entirely in view in this illustration. (8) The power set up is changed by merely turning the hand wheels to a point indicating "propulsion," "pump" or "off" position. The starboard deep sea water suction valve is illustrated at A. (9) View of the starboard. (10) The fire control is as illustrated at B. (11) The fire control is as illustrated at C. (12) The fire control is as illustrated at D. The fire control is as illustrated at E. (13) The fire control is as illustrated at F. (14) The fire control is as illustrated at G. (15) The fire control is as illustrated at H. (16) The fire control is as illustrated at I. (17) The fire control is as illustrated at J. (18) The fire control is as illustrated at K. (19) The fire control is as illustrated at L. (20) The fire control is as illustrated at M. (21) The fire control is as illustrated at N. (22) The fire control is as illustrated at O. (23) The fire control is as illustrated at P. (24) The fire control is as illustrated at Q. (25) The fire control is as illustrated at R. (26) The fire control is as illustrated at S. (27) The fire control is as illustrated at T. (28) The fire control is as illustrated at U. (29) The fire control is as illustrated at V. (30) The fire control is as illustrated at W. (31) The fire control is as illustrated at X. (32) The fire control is as illustrated at Y. (33) The fire control is as illustrated at Z. The fire control is as illustrated at AA. The fire control is as illustrated at BB. The fire control is as illustrated at CC. The fire control is as illustrated at DD. The fire control is as illustrated at EE. The fire control is as illustrated at FF. The fire control is as illustrated at GG. The fire control is as illustrated at HH. The fire control is as illustrated at II. The fire control is as illustrated at JJ. The fire control is as illustrated at KK. The fire control is as illustrated at LL. The fire control is as illustrated at MM. The fire control is as illustrated at NN. The fire control is as illustrated at OO. The fire control is as illustrated at PP. The fire control is as illustrated at QQ. The fire control is as illustrated at RR. The fire control is as illustrated at SS. The fire control is as illustrated at TT. The fire control is as illustrated at UU. The fire control is as illustrated atVV. The fire control is as illustrated at WW. The fire control is as illustrated at XX. The fire control is as illustrated at YY. The fire control is as illustrated at ZZ. The fire control is as illustrated at AAA. The fire control is as illustrated at BBB. The fire control is as illustrated at CCC. The fire control is as illustrated at DDD. The fire control is as illustrated at EEE. The fire control is as illustrated at FFF. The fire control is as illustrated at GGG. The fire control is as illustrated at HHH. The fire control is as illustrated at III. The fire control is as illustrated at JJJ. The fire control is as illustrated at KKK. The fire control is as illustrated at LLL. The fire control is as illustrated at MNN. The fire control is as illustrated at OOO. The fire control is as illustrated at PPP. The fire control is as illustrated at QQQ. The fire control is as illustrated at RRR. The fire control is as illustrated at SSS. The fire control is as illustrated at TTT. The fire control is as illustrated at UUU. The fire control is as illustrated at VVV. The fire control is as illustrated at WWV. The fire control is as illustrated at XXX. The fire control is as illustrated at YYY. The fire control is as illustrated at ZZZZ.
FIRE BOATS are floating power plants. The greater the power which can be placed in the hull, and the more effectively this power can be directed and used, the better the results.

And in few places does effectiveness mean as much in money and time saved as in fire fighting apparatus.

Fireboat characteristics are peculiar to this application, and require:
(a) Constant readiness for service.
(b) Extreme minimum time to get into action.
(c) High power for propulsion when going to fire or for towing burning vessels away from docks or other vessels.
(d) The best maneuvering qualities where quick, sure handling in dangerous places is imperative.
(e) Maximum power available for pumping.
(f) Power available for both pumping and propulsion simultaneously, as boat may be required to keep under way or to tow, with pumps going.
(g) Minimizing the greatest possible extent the expensive "stand-by" costs (fuel costs, crew costs, etc.) while waiting calls.

Diesel Electric drive is the best possible for such application. Better than any other form, it fulfills these requirements as follows:

(a) Readiness: Diesel generating units may be started on an instant notice. There is no fire to stoke, no steam pressure to build up. The power is always ready, waiting only the throw of the starting levers.

(b) Quick Action: Diesel Electric power is available in an instant, a throw of the engine starting levers, a turn of the set up handwheels and full power is ready—to drive the propeller or the fire pumps at full capacity, or both in combination. It is in action as quickly as a fire chief's motor car.

(c) High Power for Propulsion: The fire boat which must carry engines to drive the pumps as well as engines to drive the vessel is handicapped by the excess weight and space required, with a result that both engines must be smaller than the power could be if combined in one unit, available for either purpose. The Diesel Electric drive accomplishes the latter. The one power plant serves either the propulsion or the pump motors.

When going to a fire or towing vessels out into the stream, the full power in the vessel may be diverted to the propelling motor. Moreover, the speed and torque characteristics of an electric motor are such that either the most efficient towing or propelling speed may be used.

This means that the maximum power, applied in the most effective way, is available to drive the vessel.

(d) Maneuvering: Some of the characteristics of the Diesel Electric drive may be equaled by one or another of the other types, but none of them can approach it in the important characteristics of quick handling and maneuvering.

Two independent screws enable the vessel to spin about in its own length.

There are thirty graduated speeds, from zero to full, either ahead or astern on either motor, all obtained during a single throw of the control lever, and this control lever is placed in the pilot house, where the Captain can see the exact position and movement of vessel and move his controls accordingly. This vessel is more completely controlled, and in simpler fashion, than either a street car or a motor car.

(e) Maximum Power for Pumping: As for propulsion, the entire power of the engines may be utilized for the pumps. The power is transferred from propulsion motors to the pump motors by a quarter turn of the "set-up" hand wheels. And the same speed range, with consequent change in capacity, can be obtained with the pumping units.
This gives a tremendous reserve power above that normally required for pumping, or a change in capacity and pressures, effective under many different conditions.

(f) Flexibility of Power: A fire boat may need to move along a dock with nozzles in use, or tow a burning vessel into the stream and at the same time pump water against the fire. Electric drive provides the most flexible arrangements for such purposes.

In no other type of drive can all the power be made so easily available for so many purposes, and in such effective ways.

(g) Minimum “Stand-by” Losses: During a fire, operating cost of fire fighting equipment is a forgotten item. But during the long periods between fires, such equipment “eats its head off.” There is no return for the outlay necessary to keep the vessel ready for instant action.

This is particularly true of a steam vessel. The constant consumption of fuel necessary to keep steam up in the boiler is an important item in operating cost for which there is no return. In addition, there is the deterioration of the boiler, piping, etc., which is thus constantly in use.

With the Diesel Electric fire boat, all such costs are eliminated. The operating costs are practically zero until the fire call comes, and even at such time they are less than half of that of the steam equipment.

### The “Port Houston” Fire Boat

HE fire boat, “Port Houston,” the last word in fire fighting vessels, embodies all these advantages. This vessel was designed for the Harris County Houston Ship Channel Navigation District Commission by Cox and Stevens, Naval Architects. It was built by the Bethlehem Shipbuilding Co. The engines were furnished by the Winton Engine Co., and all electrical equipment for propulsion, pumping and principal auxiliaries, by the Westinghouse Electric and Manufacturing Company.

The vessel is 125', 10” overall in length, 27', 0” beam, and 8', 6” draft. It is steel throughout, and built to meet the requirements of the classification societies.

There is one main fire tower, two secondary fire towers and additional turrets on pilot house and forecastle fitted with heavy nozzles and hose connections at various positions along the rail, and at different heights, providing most effective and flexible combinations thru a total of 39 outlets.

The power equipment of the vessel consists of the following:

1—Main generating units, each consisting of:
   1—350 kw, 500 v, 425 rpm, d-c. main generator, with—
   1—25 kw, 125 v, direct connected exciter both driven by
   1—500 hp., 6 cylinder, 4 cycle Winton Engine.

2—Auxiliary Generating Unit, consisting of:
   2—250 kw, 270 v, 425 RPM generators.
   1—10 kw, 125 v, 720 RPM, belted exciter, all driven by—
   1—165 hp., 6 cylinder, 4 cycle, Winton Engine.

2—360 hp., 500 v, 265 RPM, propelling Motors.

2—410 hp., 500 v, 175 RPM, fire pump motors.

1—Complete switching and control equipment including:
   1—Two panel, dead front switchboard with safety “set-up” hand wheels, and engine room control stations for propulsion and fire pump motors.

1—Three panel auxiliary switchboard.

2—Pilot house control pedestals for propulsion motors.

All this electrical equipment was furnished by the Westinghouse Electric & Mfg. Co. All apparatus is designed particularly for marine service, and represents the latest advance in the art of applying electrical energy to shipboard service.

In operation at full propulsion power, each engine generator set supplies power to its corresponding propelling motor. The speed and direction of rotation of each motor is controlled by the Westinghouse variable voltage system of control. With this
system, by operating the double rheostat, the generator field or excitation current may be reduced to zero, reversed and then built up to full value in the opposite direction. This correspondingly reduces the voltage of the main generator circuit to zero, then reverses it and builds it up to full value in the opposite direction, without changing speed or direction of rotation of the generator itself. The motor, with constant field excitation, slows down to zero with the reduction in voltage of the main circuit driving it, reverses with the main circuit and then speeds up in the reverse direction.

Since only the small generator exciting current is handled, this operation is simple and requires little effort. Also the reversing rheostat may be located in the pilot house so that from his station there, by the simple operation of the rheostat pedestal levers, the Captain has complete control of his vessel.

When power is to be diverted to the main pumps, a quarter turn of the “set-up” hand wheels in the engine room makes the complete change. Automatic interlocks prevent any incorrect connections. The change over is quick and sure. The speed of the pump motors is then controlled by a variable voltage rheostat in the same manner as the propelling motors, except reversing is not required. This permits a wide range in the capacity and discharge head of the driven fire pumps.

The total capacity of the five main nozzles is 8,300 gallons per minute. The pumps are designed for two primary conditions—7,000 g.p.m. against a head of 150 pounds per sq. inch, or 3,500 g.p.m. against a head of 300 pounds per sq. inch.

With all power on the pumps, if it is desired to move the vessel, the double generator auxiliary unit comes into use, affording ample power for reduced speed, and the same flexible control for the propelling motors.

With the electrical system, duplicate units are available, and emergency interconnections, so that it would be practically impossible, by accident to any unit, to put the vessel out of commission. There is a flexibility and reliability here provided that is impossible with any other type of drive.

In addition to the main power units, a storage battery system supplies emergency and stand-by auxiliary power, the battery being charged through a motor generator set from shore power when the vessel is idle at dock, or from one of the exciters if in operation. This provides a very economical arrangement, as no power need be generated aboard ship during the long intervals of waiting.

In providing this equipment, the best experience of the Naval Architect, Shipbuilders, Engine Builders and Electric Manufacturer has been combined to make the most flexible and effective fire fighting machine ever produced. And in this vessel, the greatest advance over other types is in the results obtainable by the use of the convenient and flexible system of electric power.

The Harris County Houston Ship Channel Navigation District has provided the Port of Houston with the most effective, and at the same time, most economical type of craft to protect its waterfront.

Quick maneuvering is an outstanding feature of the Diesel Electric Drive, which is of vital importance in fighting fires.