

Booth - Sphex Club
3/2/62

SHIPBUILDING: A CREATIVE ART

It had been my intention to present a paper on seapower in the Civil War as next Friday happens to be the 100th anniversary of the monumental introduction of a new dimension in naval warfare -- the ironclad. The MONITOR encountered the MERRIMACK (more properly called the CSS VIRGINIA) on March 9, 1862 in what is known in U. S. Navy annals as "the Battle of Newport News." I shall proceed with the Newport News factor but in a radically different context. This I do in deference to my esteemed back-of-the-room critic, the Honorable E. M. Frost, because his paper a fortnight hence will delight and enlighten Civil War fans. Two Civil War papers in a row would be impolite and I acknowledge my colleague's seniority and, thus, more intimate knowledge of the period -- and I did not say "firsthand" knowledge. If my own lately revised topic is approached somewhat loosely, I hope you will join me in blaming it on Mr. Frost.

In presenting this somewhat "off-beat" paper to a group as discriminating and sophisticated in its tastes and interests as the Sphex Club, I do so because the subject has staggered my imagination like nothing I have ever encountered before, and that includes the Jules Verne books I read as a boy. Indeed, in investigating my current subject, I have convinced myself that Verne was a man of narrow vision. He might be pop-eyed if he could see some of the things that I have seen in probing the subject of this paper.

I have concluded, right or wrong, that in an area of some 225 acres along the James River waterfront of Warwick County, more history is being made than in all of the remaining 26 million acres of this Commonwealth put together. I am referring to the incomparable Newport News Shipbuilding and Dry Dock Company. May I interject here one note aside. The corporate title, Newport News Shipbuilding and Dry Dock Company, is long and repeated references to the full name would hardly contribute brevity to this paper. Consequently, subsequent references will be made to "the Shipyard," which is what the natives call it.

But call it what we may, what has been accomplished there over the past 75 years and the responsibilities it has accepted for the future security of our nation are awesome. We are usually inclined to think of the Shipyard in somewhat provincial terms because it is so close at hand, and a corporation, like a prophet, is often without honor in its own country. Virginia is not considered by Virginians as a locale of great industrial consequence and yet within our borders we have an organization whose ability and productivity have important implications for the security or survival of the entire free world. (A visitor to the Shipyard only last Saturday would have witnessed an event convincingly supporting this claim.)

But taking only the provincial view of the Shipyard, Virginians must acknowledge that its impact upon the industrial economy of our State is huge. As our largest integrated industry, the Shipyard is maintaining a daily payroll of \$400,000. It annually delivers over \$100 million in pay envelopes to more than 15,000 of the most dedicated, finely trained industrial employees in the world. It is spending more on the education of its employees each year than many of the colleges in Virginia. Its Apprentice School is a model for industries the world over.

No interloper labor union has ever been admitted to the bargaining tables of the Company but its wage policies and work conditions are not surpassed by any other shipbuilder in the world. In its 75-year history there has never been a work stoppage or a strike. Nor is there likely to be any shortage of work in the near future. On January 1 of this year the Shipyard had a backlog of orders amounting to \$480 million, twice the amount of its \$241 million billings for the year 1961. Its deliveries during 1961 included the largest ship in the world, an aircraft carrier; the largest oil tanker in the world; the largest and most modern ship tender; and one of the largest submarines in the world.

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If the word "great" and other lofty adjectives seem to crop up too abundantly in this paper, it is unavoidable. To be objective about my subject is to be superlative. You may challenge some of the claims I shall make, if you wish --for example, I shall say it is Virginia's most creative industry--but in rebuttal I shall only invite you to go--at your own expense, of course--to the lower Peninsula and see for yourself some of the wonders being created in that 225 acre plot of waterfront. It is an exciting and unforgettable experience, even for one, like myself, who doesn't know a slide rule from a pogo stick.

Few are the thrills equalling that of watching a monstrous complex of engineering design and technological genius glide gracefully and majestically into the waters of our own James River. I should not attempt to get poetic about a ship-launching but there is a romance about building and floating a ship which is found in no other industrial activity. To create an objet d'art like the magnificent UNITED STATES or an aircraft carrier like the FORRESTAL involves an artistry which sets shipbuilding apart from all other industrial undertakings.

The artists who shape these creations seem to agree with this proposal. Soon after the tragic shipbuilding holiday had been enforced by the Washington Disarmament Conference of 1921, in order to stay in business the Shipyard began to produce such improbable and unromantic items as water wheels for the electric power industry, traffic signal lights, wheel discs and railroad freight cars. Shipbuilding at Newport News was virtually at a standstill. Even luxury yachts ordered by multi-millionaires such as Alfred I. duPont and George F. Baker had to be contracted for at a loss to the builders as the Shipyard took desperate measures to keep the organization intact.

The late Homer L. Ferguson, then president of the Yard, was like a master sculptor turned to bricklaying in order to feed his children. Speaking at a New York meeting in 1923, Mr. Ferguson said, "I suppose it is fortunate we can do something else. We can build turbines and box cars; we can beat swords into plowshares and pruning hooks; but no man born to the fascinating art of creating ships can get enthusiastic about it." It was reported that tears filled his eyes and his voice broke as he asked, "Who could love a box car?"

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There is a granite monument standing at the center of the Shipyard on which is bolted a large bronze plaque with this inscription:

We shall build good ships here--
At a profit if we can,
At a loss if we must,
But always good ships.

Under this unbroken vow appears the name, Collis Potter Huntington.

Not only the granite and its inscription but the entire Shipyard and the hundreds of vessels which have come off her busy shipways to sail the seven seas in war and peace are monuments to the vision, the spirit and determination of Mr. Huntington.

You will recall that he was one of the Big Four of the West -- Huntington, Charles F. Crocker, Mark Hopkins and Leland Stanford -- a quartet of formidable tycoons who, it might be said, formed a partnership to integrate the West with the rest of the country.

Although it was the wisdom, guts and enterprise of men like Huntington and his partners who contributed so much of enduring value to the material progress of our country, they have never been accorded a place on Olympus by the textbook historian. It seems true of American history that those who developed this nation's unparalleled industrial and economic strength are generally obscured in our enthusiasm for politicians, military leaders and entertainers. We never heard of a ticker-tape parade for an industrialist.

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Upon completion of the Central Pacific Railway in 1869, Mr. Huntington envisioned a single transcontinental railway system. To this end he was instrumental in organizing the Southern Pacific Railway and acquired control of the unprofitable Chesapeake & Ohio to form the basis of an eastern extension. When the plan broke down, Mr. Huntington was left with his C. & O. and no profits coming in. While the connection of the line for through traffic westward from Richmond barely escaped the severe business depression of 1873, a proposed easterly extension to the York River was deferred until Mr. Huntington, with admirable vision, chose the mouth of the James at Newport News.¹ Until then the place had not even been able to sustain a country post office because of a lack of patronage. Even the carpetbaggers of the Reconstruction Period had passed it up.

Mr. Huntington stated in later years that he had first become fascinated by Hampton Roads as a boy of 16 on a visit there.

As he pressed the C. & O. trackage eastward to the harbor and constructed unloading piers at Newport News, shipping began to increase substantially.

¹Stolen from "Always Good Ships," Blewett, Newcomen Society, N. Y., 1960.

Already materially interested in the shipping industry, Mr. Huntington decided to establish his own shipbuilding and repair facility at the eastern terminus of his railroad in order to stimulate port activities and broaden outlets for his cheap coal. His personal connections with shipping enterprises suggested, too, that construction of steamers then being built on the Delaware River might be shifted to Hampton Roads. But fundamentally, there was a growing need for repair service for vessels plying to the C. & O. terminal, and the generally increasing size and draft of vessels visiting the harbor was creating demand for local dry dock and repair services.²

The Shipyard was incorporated in January of 1886 as the Chesapeake Dry Dock & Construction Company, and its present name was adopted four years later. Huntington proclaimed with pride that "it was my original intention to start a shipyard plant in the best location in the world, and I have succeeded in my purpose. It is right at the gateway to the seas on waters deep enough to accommodate the greatest vessels in the world. There is never any ice in winter, and it is never so cold but you can hammer metal out of doors."

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The origin and early history of the Shipyard were unique in two respects. Unlike most important industrial enterprises in existence today, the Shipyard did not have humble beginnings. It started big and got bigger almost immediately. Moreover, it was unique in the founder's initial indifference to profits, which he considered secondary to his oft-stated purpose of constructing the finest ships in the world--and the financial losses be damned.

The big beginning was evident in an 1891 letter to Mr. Huntington from C. B. Orcutt, whom Huntington had chosen as president. In answer to Mr. Huntington's plea for speed, Orcutt wrote: "You have given us a contract the like of which has never before been assigned either in this country or any other, namely, to put a first class shipbuilding establishment of great magnitude on virgin soil in a very short space of time, considering the size of the undertaking. All other shipyards have been the growth of years from simple beginnings, whereas here it has been necessary to handle at one time the layout and preparation of grounds, location, design and construction of buildings; selection, design and installation of the most modern machinery; all looking to future economical operation in competition with older shipyards."³

Its immediate impact upon the shipbuilding industry was acknowledged only three years after a charter was issued. With the docking of the naval monitor PURITAN, free of charge, at the dedication in 1889, the New York Times reported, "Newport News now has facilities for repairing the largest vessels afloat. . . what this section has needed for years. . . the formal opening marks a new era in industries for Virginia. It will also have an important bearing upon the shipbuilding interests of the country." That was a truly prophetic statement.

²Ibid.

³Collis Potter Huntington, Vol. II, Evans, 1954.

(Ibid., other quotations from Huntington correspondence, which follow.)

As Mr. Huntington continued to expand the Shipyard, he built the community right along in unison. He established the light and water company, put up the housing for his employees, started his own school system with the most competent teachers money could attract and opened the classrooms free to all the children of Shipyard employees. The yard was in business for a decade before Newport News became an incorporated city.

Meanwhile, the Shipyard was becoming a production triumph but a financial flop, and would have gone out of existence in a few years except for the unfaltering willingness of Mr. Huntington to sustain heavy loss upon loss without flinching. Somewhere ahead, he knew, the fiscal tide would turn. In the meantime he was happy to make shipbuilding history if not a profit.

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Some of the Huntington partnership's railroading successes became the subject of jealous criticism and even of Congressional inquisition. These tended to impugn the character of these enterprising gentlemen. It is an unfortunate fact that the truth seldom dispels the impression left by the big lie. In reading an account of the Congressional investigations, one concludes that McCarthyism was not a 20th Century innovation.

An examination of some of Mr. Huntington's personal correspondence during the early days of the Shipyard reveals the character of the man.

When it became apparent that the Shipyard would lose money in successfully bidding on three gunboats for the Navy in 1893, Mr. Huntington wrote to Mr. Orcutt, "Every ship we build must be first-class in quality in every respect whether we make or lose on her. We have got the best Shipyard in the world. What I want most of all is to have for it the reputation of building the best ships."

After the contract was awarded, he telegraphed Mr. Orcutt, "I want you to turn out as good or better ships of this class than have ever been built before for the Government. I had rather lose money on a first-class ship than to build one that did not give full satisfaction to our Government. I find there is more to be made in doing things this way, and there is a great satisfaction in doing work well. Moreover, it will set a good many men to work, and work is what they very much need. It would be humiliating to me to have anything turned out from our yard that was not first-class."

It developed that one of these gunboats, the NASHVILLE, was to become renowned for firing the first shot on our side in the Spanish-American war.

At the launching ceremonies Mr. Huntington wired Mr. Orcutt, "No better vessels of their kind have ever been built. You have been careful to follow my instructions that the excellence of workmanship with us always takes precedence over profit. I am particularly anxious for the sake of the old flag that the Newport News Shipyard shall turn out for this Nation splendid vessels of which our country may be proud."

The fact that Mr. Huntington had to dig into his own pockets, as he usually did, to cover losses running into many thousands of dollars on the gunboats seemed to be forgotten in his exuberance over the quality of the ships his yard was producing.

Finally, however, Mr. Huntington's patience began to run out. In 1896, he wrote "I suppose the day will sometime arrive when we shall get as much for building a ship as it cost us, but there is something fearfully wrong; in fact, so wrong that I am afraid to take any work until we have reached a point where we can get as much for building a ship as it costs us to build it."

But when the Navy soon thereafter announced plans for several new battleships, a capital class of advanced design which Newport News had never constructed before, Mr. Huntington's enthusiasm overcame his anxieties. He wanted to build those ships, which were to be the pride of the United States Fleet and the first ever to be wholly designed in America and built entirely of American materials.

To Mr. Orcutt again he wrote, "I am fearful you bid too low, but I will say to you now as I have always said, let there be no scrimping on the quality of the work. Make it first-class, whatever the price of the bid."

Newport News won the contract for the new KEARSAGE and the KENTUCKY, and shortly, a third, the ILLINOIS. These were the first of 14 Newport News battleships, the great dreadnaughts, to be built for the U. S. Navy for service with distinction in three wars. Some of them were to become world-famous for their exploits. Of the 16 capital ships of Theodore Roosevelt's globe circling Great White Fleet, seven slid down the shipways or floated out of the graving docks at Newport News. One of these ornate but powerful battleships, the MISSOURI, was inspected by Admiral Dewey on a visit to Newport News in 1903. Overwhelmed by the sight of her main batteries, the famed Admiral said that if he had had her at Manila Bay, he could have taken care of the whole Spanish fleet without further assistance.

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But Mr. Huntington's losses continued to pile up on top of already substantial capital expenditures for equipment, shipways, dry docks and the facilities that would permit the yard to undertake any kind of construction, no matter how large or how refined. In the middle of 1897 he wrote President Orcutt, "The deficit for some considerable time has been so great that I think very few men would have continued the work under the burden of the large current losses, but I have always had great faith in the Yard becoming a great success, and that belief is growing with me now. I propose to spend considerable more money and to make it a yard that everyone connected with it will be proud of."

At that time the Yard was costing Mr. Huntington some \$100,000 a month in excess of income from contracted jobs.

After writing a check for \$1,000,000 in February 1899 to complete the construction of six new shipways with trestles and cranes, Mr. Huntington was asked a month later for \$125,000 to enlarge the electric power plant. Upon sending his check he wrote, "There seems to be no end to the money I am called upon to pay for this Shipyard." His transmittals were not made without insistence upon learning all details in connection with the Shipyard affairs although his personal visits there from his home in New York were becoming less frequent.

On one occasion during that period he wrote the following letter in conveying his check to cover the cost of repairs to his workers' houses and expenses of the school: "I do not think any such item as \$4.00 for advertising the opening of the school should have been expended. It is a free school for the children of our people working in the Shipyard and they would all know when school commences. I have always been in the habit of looking as carefully after small expenses as large ones."

One of the heaviest losses was suffered in 1896 in the delivery of the passenger liner, LA GRANDE DUCHESSE. The cost of her construction was more than twice the contract price of \$550,000. Only a man of Mr. Huntington's perseverance, not to mention capital, would have withstood this loss, pyramided upon all the others, without giving up.

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On the 14th of August, 1900, the Hampton Roads area and the Shipyard were stunned by the news of the sudden death of Mr. Huntington at the age of 79. A month later Isaac Gates, Mr. Huntington's brother-in-law who had served as treasurer of the Shipyard and of other Huntington interests for many years, wrote to Mr. Orcutt: "We no longer have Mr. Huntington's bank account to fall back upon to help us out of tight places. The Yard must, from this time on, take care of itself."

To the day of his death, Mr. Huntington had never realized a penny's profit from the company in which he had greater pride than all of his other mighty ventures. In addition to his investments in the capitalization of the company, an indication of the amount advanced by him to cover contract losses or for plant improvements was recorded three years after his death when \$5,000,000 in bonds and \$6,000,000 in preferred stock of the company were issued in the settlement of his estate.

But if the Shipyard was suddenly bereft of Mr. Huntington's resources, in a remarkably short period of time, scarcely more than one decade, it had established a reputation for excellence and integrity unprecedented in the shipbuilding industry. This would be its indispensable asset in the painful search for fiscal stability.

Its earliest products had already set notable records for performance and its superiority had become well established with its largest potential customer--the United States government. Only two years after its first product had been created, Newport News ships began to establish the first of a long string of performance records. In 1893, soon after delivery of four fast freight steamers to the Morgan Steamship Line, in which Mr. Huntington also had an interest, the Marine Journal published this editorial: "The ink on the report of one of the magnificent new Morgan Line ships breaking the record hardly gets dry when another of those craft does a little better. The latest performance is that of EL CID whose feat on her maiden voyage elicited well deserved notices from the daily newspapers and caused no small comment at home and abroad. The Morgan fleet are probably incomparable for their speed and efficiency. It is a matter of common repute that EL CID was built more to keep the artisans at Newport News employed than for any real need the owners at the present time

have for her. If every multi-millionaire had done as Mr. Huntington--built a city and then kept his agent busy trying to keep the inhabitants busy--there would be less destitution abroad in the land today. This patriotic citizen and his associates who have furnished the money to construct these ships deserve the credit they have already earned of building the fastest freight ship in the world and one of the largest carriers under the American flag." (It wasn't speaking of aircraft carriers.)

Last summer I was standing on the launching platform of one of the Newport News shipways watching the traditional bottle of champagne smashed against the prow of the nuclear submarine JOHN MARSHALL. As the Navy band began playing Anchors Aweigh and the ship slid beautifully down her greased ways into the James River, for just a moment I wondered whether the ship might float or sink as it plunged into the water. I suppose the builders have sometimes thought of this, too, although not as seriously. But this embarrassment did actually come to the Newport News Shipyard people in 1896, when a launching turned into a sinking. The SOMMERS N. SMITH glided down her tracks, splashed into the water, capsized and sank. In fairness it should be said that this was no fault of the builder but of the launching crew. The small ship had slipped in her cradle, and gone into the river on beam ends, taking enough water through her open portholes to cause her to go to the bottom. It was raised in a few days, however, without serious damage.

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Although Mr. Huntington was a native of Connecticut and resided throughout his adult life either in New York or California, his enthusiasm for and devotion to the Commonwealth of Virginia were matched by few natives of the Old Dominion. At the 1892 christening of EL SUD, the first large Newport News steamship, Mr. Huntington was the speaker. He told his cheering audience that, "I hope to see you all here at the christening and launching of many ships at this port of Newport News as many ships will be built here. This will be the great entrepot of American commerce as it is at the very gateway to the sea with a wide and safe entrance and commodious harbor, and is in the center of the Atlantic coast-line of this great Republic. What is almost better than all is, it is in the State of Virginia. My interests in the Old Dominion have been very large for many years, and I owe it to the State to say that those interests have always received from her a wise and hearty encouragement and a fair treatment that an honest regard for individual rights and an intelligent understanding of the State's own best interest would prompt. I have for the old State a most affectionate regard, for I have made within her borders only friends. I believe that all who come within her domain will be equally well cared for. May the Commerce of this favored place go out even beyond the points from which others come, for however far the Missionary and Crusader may go, Commerce will always leave their uttermost limits behind and carry Civilization and its handmaid Religion far beyond them; for Commerce is King."

Three months later, June 1892, Mr. Huntington telegraphed congratulations to Mr. Orcutt on the launching of a sister ship of EL SUD, EL NORTE: "I have always believed in a great future for our commercial marine. I am much gratified, not only to see the South taking a strong step forward in this direction, but to be myself a factor in the progress--and I am especially glad that the good old State of Virginia has something to say about it."

Various monuments to Mr. Huntington and examples of his many beneficencies remain standing from Virginia to California. Among the most interesting, although obscure, ones are a couple of small unattractive tugboats, the DOROTHY and EL TORO. Launched as the first products of the Newport News Shipyard in 1891, both are still in service to this day, as if in testimony to Mr. Huntington's paramount emphasis upon quality.

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While the name of Huntington stands out foremost in any review of the Company's history, two other names are especially significant among the seven who have served as president during the 75-year span. When A. L. Hopkins was lost in the LUSITANIA sinking of 1915, he was succeeded by Homer L. Ferguson. To many Virginians, Mr. Ferguson was the premier Virginia industrialist of them all. He was "Mr. Shipbuilder" with a worldwide reputation. During his 32 years as president he guided the Shipyard through its darkest days, the post-World War I period, and ingeniously kept the company from going under at a time when shipbuilding in America was almost stopped. Surviving that bleak period, employment grew from less than 4,000 to an emergency peak of 31,000. If there had been any doubt of the Shipyard's strength at the beginning of Mr. Ferguson's regime, there was none when he retired in 1947.

The other name is that of the incumbent president and board chairman, William E. Blewett, Jr. As vice president and production manager of the yard during the critical World War II period, he had a major hand in raising the company to a level of productiveness which contributed enormously to the Allied victory. During that period, incidentally, two subsidiary companies were formed. The North Carolina Shipbuilding Company was established at the outbreak of war and became operational in record time. This was a tribute to the usefulness of the Newport News Apprentice School, which has provided through the years such an ample supply of skilled craftsmen that finding supervisory personnel ready to set up and operate the Carolina subsidiary was not difficult. Departmental skills existed in depth throughout the organization, and the transfer of several hundred qualified workers as a nucleus for the subsidiary operation was not damaging to the parent company. Peak employment of the Carolina branch at Wilmington reached 21,000 and a total of 243 ships were built there during the War at prices below any other shipyard in the country. It was closed at the end of the emergency.

Another subsidiary, the James River Shipbuilding Corporation was organized early in 1942 to build low draft naval vessels at Richmond but the Navy Department cancelled the operation before the first ship was produced.

Mr. Blewett's second great accomplishment was in leading the company with sensational success into the field of nuclear shipbuilding, and this introduces the most exciting part of our study.

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Near the beginning of this paper I made the bold declaration that present-day accomplishments of the Shipyard at Newport News have implications for the security of the entire free world. Let me explain.

Last Saturday the Shipyard launched its fifth nuclear-powered fleet ballistic missile, or FBM, submarine. The THOMAS JEFFERSON is one of the most complex engineering mechanisms ever designed by man. This ship, as long as the largest and newest destroyer at 425 feet and displacing 7,000 tons, is mammoth in size for an underseas craft. Inside her hull are packed away for instantaneous use 16 Polaris missiles with atomic warheads. This means that each of these submarines will carry a destructive force exceeding all the bombs dropped by all the nations in World War II -- and that includes the atom bombs dumped on Hiroshima and Nagasaki.

With almost unlimited cruising range and endurance limited only by the psychological and physiological factors affecting her crew, the THOMAS JEFFERSON and her sister ships are superbly mobile, and capable of evading detection. There is no need for surfacing and no snorkel need be raised from the depths to probe the atmosphere above. Electrolytic oxygen generators enable the submarine to manufacture her own oxygen from sea water, and the air inside is continuously scrubbed and purified. Indeed, that's better breathing than one finds in downtown Lynchburg.

Her two-stage Polaris missiles, carrying solid fuel propellants, can be fired one-a-minute while the ship cruises at depths of 400 to 600 feet. Once on its way, each missile is guided by an inertial guidance system independent of external commands or control. No countdowns are necessary and crews are trained to release a retaliatory attack moments after receiving the word by radio communication, which has been possible with submerged submarines for several years.

Polaris tests have proved that it has pinpoint accuracy at ranges up to 1,400 miles. Before the end of 1962, the range is expected to be extended to nearly 3,000 miles, which means that Russian targets will be within range from the middle of the Atlantic.

The Polaris is launched by an air ejection system which forces the missile from its launching tube and propels it from the water to a point above the surface. At that point the rocket motor ignites and sends the missile on its way.

Two positions must be known for success in missile launching: target and launcher. This puts great importance on navigation of the ship because the crew must know its exact location to the very moment of launching the missile. Just as it is unnecessary to surface the ship to get oxygen, or to communicate by radio, or to fire the missile, neither is it necessary to come to the surface to get a navigational fix of the ship's exact position. In other words, on a nuclear submarine the old sextant which has guided seafaring men for generations is now as obsolete as the crow's nest. It has been replaced on the new submarines by an inertial navigation system, a highly refined complex of gyroscopes and accelerometers which keeps track of ship movements in all directions, measures speed through the water, keeps an eye on true north on the compass, and thus gives a continuous report of the ship's exact position. Commodore Maury would be flabbergasted.

With this knowledge automatically provided, the Polaris can be headed toward its target with confidence. Inside the missile are extremely precise gyroscopes, accelerometers and its own electronic computer. This inertial

guidance system puts the Polaris on its course at the time of launch. Should it be moved off course by high winds or other effects, the guidance system automatically computes a correct new course to the target and heads the missile on it. It also maintains the stability of the missile, preventing pitching, yawing or rolling. At the precise instant required, the guidance system shuts off the rocket motors and triggers separation of the re-entry body from the missile, speeding the atomic warhead back from space and down through the earth's atmosphere from which it follows a ballistic trajectory to the target.

If Collis P. Huntington could see the THOMAS JEFFERSON in action, or the ROBERT E. LEE, the SAM HOUSTON, the JOHN MARSHALL, the SHARK, the JAMES MADISON, the JAMES MONROE or any of the four un-named FBM nuclear submarines now on the shipways at Newport News, he would be even more astounded than when he learned of the "extravagant" \$4.00 expenditure for advertising the opening of the 1895 school term.

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We can recall the day not very many years ago when a fellow could spend ninety days at a training station boning up on a little seamanship and navigation and call himself a sailor. A crew member on an FBM nuclear submarine, in addition to all the experience acquired in conventional vessels, must spend twelve months of special training in transistor theory, digital computing theory, Boolean logic, and electronic circuitry. If that doesn't discourage him, he must take a course in the functioning and maintenance of the entire weapons system--that is, the handling and firing of the Polaris missile.

If he is an officer he has probably had, in addition to his Naval Academy training and several years at sea, an intensive three-year course in nuclear physics and electronics at the University of California or M.I.T. That was the background of the relatively young captain of one of the nuclear submarines we interviewed in preparation for this paper.

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I know it seems I have strayed off course even if the Polaris missile does not. The point I was seeking to make is that the fantastic products coming off the shipways at Newport News may now be making the difference between war and peace. The skill and productivity of the old Shipyard are helping to save our skins.

Defense experts are in agreement that our Fleet Ballistic Submarines, nuclear powered and capable of continuous operation with an occasional interchange of crews, constitute today the most important restraining influence upon those who might otherwise attack the United States or provoke a war in some other part of the globe. Modern defense is based on maintaining deterrent power through creating and advertising weapons so fearful that only a nation gone insane would start a fight.

The construction of these amazing ships by the Shipyard at Newport News is all the more remarkable when one considers that no submarines had been produced there in more than 50 years. Back in 1904 the Yard contracted with Simon Lake, who pioneered in the design of early submersibles, for the construction

of five ships. These were the first successful submarines ever produced in this country. Lake was a speculator and his hopes of under-bidding a Netherlands shipbuilder and selling the ships to the United States Navy failed. He unloaded them on the Russians for use in their war against Japan. We hope they were the last Newport News submarines to fall into Russian hands.

But half a century later, when application of atomic energy to seapower seemed practical, the Shipyard established a subsidiary atomic test plant in the Idaho desert for a mock-up of the first shipborne atomic power plant. There was born a new era in Newport News shipbuilding history. The first nuclear submarine built at Newport News and delivered in September, 1960, was rated so high by the Navy that even Admiral Rickover was complimentary. New contracts followed, and there are now more submarines under construction at Newport News than at any other Yard in the country.

Shifting their long experience and talents to the nuclear field has, of course, brought about sweeping changes in Shipyard operations. Many fascinating new departments have had to be created--even a Department of Health Physics. Some of the routine procedures which now must be followed are downright eerie. Regular tests of the silt at the bottom of the James River must be made for radioactivity, workers in certain departments must wear radiation badges on their shirts and watch for color changes in a strip of harmless looking red paper, and one supposes that decontamination stations are as commonplace as men's washrooms. A 1962 visitor to the Shipyard becomes aware of a new urgency and a charged-up atmosphere as scintillating as the radioactivity in the exotic new fuel elements to which most of the change is related.

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The creative art of shipbuilding has brought forth its supreme achievement, its masterpiece, in one massive hunk of nuclear-age technology--the USS ENTERPRISE. In the art form it has no predecessor, certainly no peer. So much has been said and written already about this marvelous instrument of peace (or war) that one hardly knows where to begin or end. Moreover, one's dictionary lacks sufficient superlatives to describe this first nuclear-powered aircraft carrier which has already showered glory upon our Virginia Shipyard although she has been at sea for only three months.

Every element of this atomic-powered monster is the greatest or the largest. In her creation more than 16,000 drawings were necessary. The working blueprints end-to-end would have stretched from Lynchburg to Los Angeles. If she were left high and dry on Church Street her foremast would tower six stories above the Allied Arts Building. Her four-and-a-half acre flight deck could accommodate four football games being played end-to-end or 68 tennis matches. Her electric power plant would accommodate the energy needs of over half of the State of Virginia. Her air conditioning plant would cool every business establishment in Lynchburg. Her distilling plant would supply enough fresh water for the daily needs of all the homes in Rivermont. Her electrical cables would reach from Lynchburg to Boston. Her 60,000 tons of structural steel and 230 miles of pipe would fill 3,000 railroad cars making up a train stretching from here to 10 miles the other side of Appomattox.

For endurance and speed she will outdo anything afloat, and that includes another famous Newport News ship, the luxury liner UNITED STATES, which holds all the speed records for trans-Atlantic crossings, east and west. Her published speed from her recent sensational sea trials was "in excess of 40 miles per hour," but some reports suggest this may be a conservative figure.

The ENTERPRISE has been called the greatest concentration of electrical and electronic equipment ever assembled on shipboard or anywhere else. Her 625 miles of cable and more than a million electronic tubes, transistors and diodes were put together to meet the demands of modern warfare in which aircraft and missiles may attack a task force at speeds of thousands of miles an hour. Her tactical data system will solve a defense problem in only 20-millionths of a second. (The defense of the ship depends upon missiles rather than guns.)

For attack purposes she carries 100 jet aircraft, some capable of speeds above 1,600 miles per hour. Her largest bomber, weighing 78,000 pounds, may be catapulted at the rate of one each 15 seconds, reaching a speed of 160 miles an hour in a distance of 250 feet. Her four steam catapults are themselves an engineering marvel. In addition to all these wonders, she is equipped with four ladies' powder rooms, and even her own television station to entertain the crew with live broadcasts or films.

These facts and figures may seem either dreary or startling, depending upon one's point of view. The most impressive thing about the ENTERPRISE, however, is the way in which the production schedules for thousands of varied items had to be precisely coordinated so that each component could be manufactured in the Shipyard's shops and foundries and installed with a minimum of interruption. It is the skillful coordination and team-work between her various departments, perhaps more than any other single factor, that has enabled the Shipyard to undertake projects of such gigantic proportions as the construction of the ENTERPRISE, which was delivered to the Navy several months ahead of the contract completion date.

There are many other aspects of this fabulous ship which are worth examination and comment. I wish I had more time to soar aloft on mighty adjectives to describe this eighth wonder of the world.

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For one who really loves ships, a tour of the Shipyard can be a very nostalgic experience, for here is the birthplace of much that is exciting and glorious in recent American history.

One thinks of the old battleship WEST VIRGINIA whose precarious future hung in the balance after the disarmament treaty of 1921. If Mr. Ferguson had been 30 minutes later arriving at the White House in Washington to plead the WEST VIRGINIA'S case to President Harding, the Shipyard might have closed down: Raised from the mud of Pearl Harbor where it was sunk on December 7, 1941, the WEST VIRGINIA came back to make a brilliant record in later actions against the Japanese.

From Newport News came the famous aircraft carrier HORNET to carry Colonel Doolittle and his brave fliers on the 1942 mission to Tokyo and uplift America's low morale.....she was followed by many other deadly aircraft carriers of Admiral Halsey's famed Third Fleet.....the President Liners such as the HOOVER and COOLIDGE, which served admirably as troop transports until they were sunk by Japanese torpedoes.....the LEVIATHAN, taken from the Germans and rebuilt, causing Mr. Ferguson to say, "there had never been a job that so taxed our utmost resources, patience, and skill. We had to make not only the things themselves to conform to the original German pattern, and without the benefit of blueprints, but we had to create the materials and tools to work them with." When the Shipyard lost more than a million dollars on the job, Mr. Ferguson tendered his resignation. Fortunately, it was refused.....from these shipways also came the RANGER, America's first aircraft carrier.....and the most decorated ship in U. S. Naval history, the old carrier ENTERPRISE, which provided the backbone of the legendary South Pacific Force when the Japanese were pushing us back toward Australia.....the TEXAS, cited for superb fire support of the Normandy landings and now preserved as a permanent memorial in Houstonthe old "4-piper" World War I destroyers, some still in service after leasing to Great Britain for yeoman convoy duty in World War II.....the MORRO CASTLE, whose fiery death off the New Jersey coast was one of America's worst sea disasters.....the cruiser HOUSTON on China station at the outbreak of World War II and the first U. S. Naval ship to engage the enemy at sea in that conflict.....the AMERICA, which carried more of our troops to the battlefield in World War II than any other liner.....the AUGUSTA, flagship of the Atlantic Fleet in whose cramped quarters President Roosevelt and Mr. Churchill drew up the memorable Atlantic Charter Declaration.....the RANDOLPH, command ship of the task force assigned to pick up Astronaut John Glenn two weeks ago.....the 30 barges which made up the greater part of the special marine equipment required in building the Panama Canal.....the NASHVILLE of Spanish-American War fame, which we have already mentioned.....Teddy Roosevelt's Great White Fleetthe old battleship MISSISSIPPI, honored in both world wars.....the first YORKTOWN, heroine of the battle of Midway, and the second of the same name, renowned as "the Fighting Lady".....and so on--"always good ships."

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About three months ago the ENTERPRISE was being towed from her outfitting pier toward the Atlantic Ocean to begin her sea trials. These would be the critical tests of the most powerful atomic power plant ever built. As he gazed down from the sprawling flight deck of the big carrier, Mr. Blewett, the Shipyard president, spotted the ancient DOROTHY among the flotilla of dwarfs tugging and straining to get ENTERPRISE out into the channel. Here was the Alpha and Omega in rare combination -- the oldest and the youngest of a long line of Newport News aristocrats. Although not exactly addicted to maudlin sentimentality, Mr. Blewett began to think of what Mr. Huntington's reaction might have been if he had been aboard at that dramatic moment of Shipyard history. "He probably would have been thinking," said Mr. Blewett, "that both ships, the old tugboat and the giant carrier, had one characteristic in common -- the superb quality built into every Newport News ship."

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