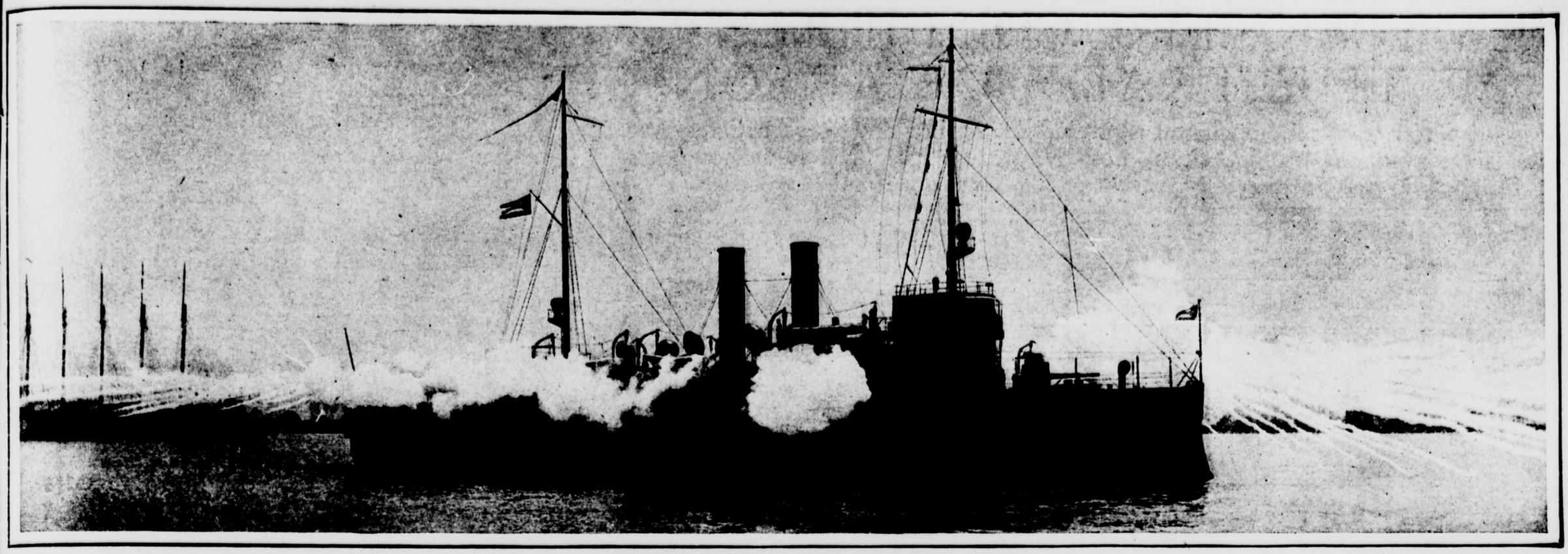


Cuban cruiser Cuba firing salute with brown powder.

Busy Inventors Plan Freak Ships to Meet Navy's Needs

Battleships With Pneumatic Stilts, Cast Iron Dreadnought and Perpetual Motion Submarine Among Their Ideas

YEARS ago the old side wheeler Talapoosa was shipping the last of her freight at Washington before starting on a leisurely jaunt to the Northern navy yards. Just before the cargo hatch cover was swung into place a couple of visitors strolled forward along the deck. To the likeliest of the sailors one of the pair, an elderly man, said:

"Say, mister, are we ready to start?"

And before he got his answer from the amused sailor he turned excitedly to his hesitating consort after a hasty look into the vessel's hold, and exclaimed: "Oh, see here, Maria; come look down in the cellar!"

Without any reflection upon the service it is to be recorded that that wondering visitor was then the honorable Secretary of the Navy. The naval branch of the national defence survived despite his steawardship. Therefore there is no cause to worry if one imaginative Congressman proposes to turn the dreadnoughts into seagoing commercial museums or another plans to save paint by plastering the sides of battleships with a protective coating of dazzling posters. Nor need there be anxiety because an active Secretary reformer has notions of bridging the social gulf in the navy.

At all times fertile minded men have done their best to help the navy as they saw its needs and the files of the Department are full of gratuitous suggestions for its betterment. In truth one of the bureaus used to keep a barrel for their reception and who knows but it still survives and may yet become a fountain of official wisdom? Something akin to this happened once before when a genius in the mountains of the sunny South failed to get the recognition he thought his due. That irate patriot notified his Congressman and the legislator indited a communication to the Secretary of the Navy—also from the land of cotton—and the delinquent bureau had more than one bad quarter of an hour in consequence.

The modern fighting ship requires a deal of careful nursing, though built of steel, and the dry dock has become a frequent cradle for doctoring. The trouble with dry docks is that the craft must seek them instead of having the dry dock meet the suffering ship half way at least. Now a helpful inventor has a remedy; he would turn every vessel into her own dry dock and he has even given sceptical naval constructors a sketch which shows clearly just how the thing can be done.

The hippopotamus sinks by contracting his body so as to reduce his displacement and he rises by reversing the process, that is, by swelling so that his body is bulkier and lighter than a corresponding volume of water. The genius in question proposes to accomplish the same end by projecting pneumatic cylinders outward from the bottom of the ship so that her increased displacement will cause the craft to rise even high enough to expose the whole of her under water body, thus enabling leaks to be repaired and barnacles and other retarding marine growths to be removed. To restore the vessel to her usual trim the pneumatic cylinders are withdrawn within the hull.

Theoretically this plan is deductive; and of course a genius is not expected to bother with the seemingly hampering fact that these cylinders would exclude motive engines, coal, ammunition. One should be content in being able thus to turn the craft into a magnified waterbug of steel capable of standing upon a goodly number of airtight legs. She wouldn't have to come to port when damaged, but could keep the sea persistently, to the dismay of the foe.

Any one that has lived within hearing distance of a modern shipyard knows the noisy, deafening rattle of the pneumatic riveter. A bright mind from the middle West proposes to do away with this clatter by casting the hull and the principal watertight divisions in one great piece. Apart from doing away with the weary weeks of ear splitting racket, much time would be saved and the strength of the craft immensely increased. This is not all, however, for the inventor would mould the external surface with markings like the scales of a fish and in this fashion, he assures the Navy Department, he would reduce friction and greatly promote speed.

Somehow this patriotic inventor has forgotten that the body of a fish is coated with a mucous substance which gives it its slippery nature. This little oversight might be fatal but for the peculiar paint which another creative mind has conceived. This mixture, besides giving to a vessel's bottom a surface as smooth and hard as glass, when applied thickly enough will, so it is declared, deflect cannon balls or armor piercing projectiles.

From the very beginning the shallow waters of some harbors have obliged constructors to design ships of lighter draught than foreign vessels of similar size. But for the happy idea of a genius out on the Mississippi the growth of dreadnoughts might well give concern in this particular. This gratuitous helper proposes that every battleship shall have an epidermis of empty air bags spread snugly against the craft's bottom and connected by valves and piping to a great reservoir of compressed air within the vessel.

Should the ship collide with another or strike a submerged obstruction producing leaks the shock of the blow would automatically open the valves and inflate the bags, thus holding the craft at the surface. On the other hand a ship wishing to navigate shallow waters could escape a deep draughted foe by simply inflating her bags. Strange as it may seem, the Navy Department has not taken kindly or seriously to this proposition.

The armor belt question has been threshed out in the halls of Congress and in the technical press, but the public cannot be certain that complete accord has yet been reached among the experts. Should this topic again become a lively subject of discussion the pigeonholes of the Navy Department have in their keeping a happy solution and it has the merit of economy.

The scheme offered by a thoughtful mind in the mountains of Tennessee is that the protective steel plating shall be tucked away in the dreadnought's hold until wanted and that it shall be only enough to cover one side of the craft. When an enemy looms upon the horizon the armor will be hoisted out and laid upon the side exposed to the approaching foe, while a great system of outriggers, serving as a counterbalance, will project from the sheltered flank. This proposal has the added advantage of making it possible to carry thicker armor than could be used if the steel were to cover both sides of the battle giant. As with many of these ingenious suggestions no reward is asked in this case, and this probably explains why the officials have not warmed up to it. It seems too good to be true to those sceptical experts.

Even while the Government is still seeking for a thoroughly satisfactory type of submarine from commercial builders, the Navy Department files contain a number of freely offered designs in which a speed of twenty-five knots an hour above or below the surface is unhesitatingly promised. One gifted mechanical seer intends to run his boat by compressed air. The engines are to exhaust into the boat and the excess oxygen over that required for the crew is to be recompressed by a system of air and vacuum pumps actuated by quicksilver.

The inventor declares that his craft can be run indefinitely. He does not say by what means the mercury is to keep the pumps going continually. It sounds like perpetual motion and the mere idea of such a thing naturally antagonizes the professional, cut and dried engineer.

The strategic advantage of fog induced artificially has not been dwelt upon by writers of naval text books—they are not uncommonly beclouded enough as they are written—and yet the subject deserves serious thought after one has read the proposed scheme offered by one student of atmospheric control. He offers to sell—mark you, this man means business and is mercenary—a contrivance which he has dubbed a fog raiser by which a ship can deliberately cloak herself within an obscuring mist, and by working the apparatus backward a natural fog can be scattered and the lurking enemy uncovered. Surely an appliance of this sort might have many uses and serve a number of admirable purposes when a legislative committee is bent upon overzealous investigating.

Another pioneer in this business of helping the navy to be in the van proposes to turn his ship into a great magnet capable of being made either positive or negative and able to exert its influence for miles around. In this manner the shot and shell of a foe are to be turned away from their intended target and swung back upon the craft that fired them.

The attacking ship, despite the full force of her driving engines, is by the same magnetic waves to be held at arm's length, or, if the magnetizer be in pursuit, the quarry will be dragged back, hampered or held until she is within reach of her pursuer's guns. Possibly this inventor is a bit ahead of the state of the art and while the officials of the Department are unresponsive, certainly he should find a kindred spirit in the late Baron Munchausen.

There are other promising plans in the pigeonholes of the naval archives that have not the drawback of complications or of being a half century or so too soon, and one of these is a triple keel arrangement guaranteed to produce great speed. As is well known it is the simple things that pay best in the field of invention and this fact probably explains why the author in this case has coupled commercialism with his proposal. He asks, however, for a bonus of but fifteen million dollars—a modest price if he makes good.

He assures the department that all that is necessary is to put three of his patented keels upon a vessel. This done she would scarcely stand still long enough to be finished. No more engines, no more fuel, but simply three ingenious, highly restive keels and the craft would have to be anchored, run ashore or chained to a dock to keep her from running away.

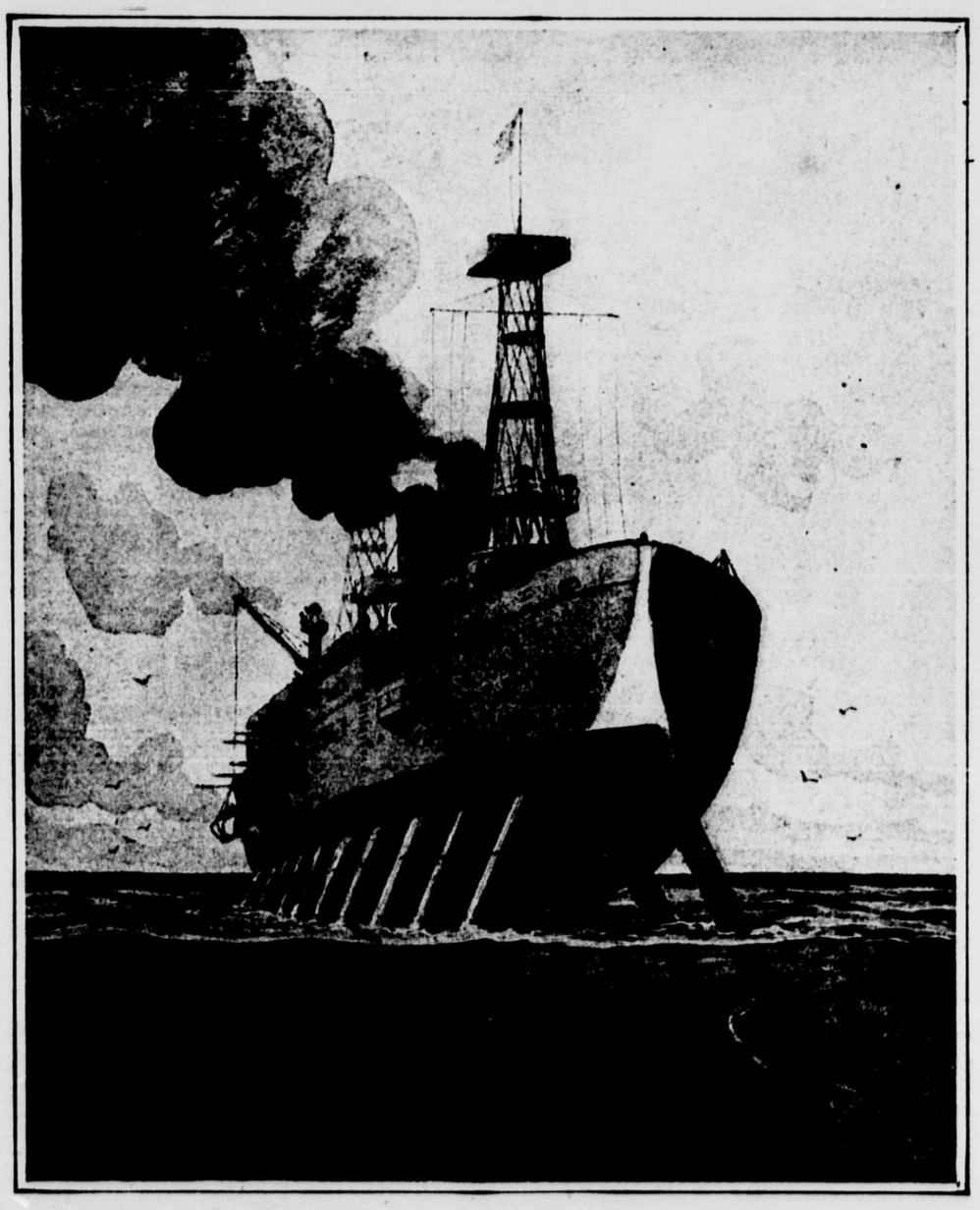
As Gen. Sherman expressed it, "War is hell," and a genius out in one of the Dakotas has carefully planned a ship to make it so. Broadly, the body of his vessel resembles the upper jaw of a great punching machine, and his proposition to the Government experts is couched in the following style:

"Could an unarmed vessel as outlined above (very heavy and swift) be used to upset an enemy's vessel? Mostly submarine, but rising above the surface and employing steam, compressed air, electricity and gunpowder as propelling power at the instant of attack? What's the matter with a five inch gun for defence made of gaspipe loaded with buckshot cartridges strung on a string of fuse and lighted at the muzzle?"

The records don't show that this profound thinker ever got even thanks for his patriotic effort. No wonder the downtrodden inventor turns and is heard from complainingly every now and then!

The dirigible airship is only a recent development of a project submitted to the naval authorities some years ago. The Fiend, for such her designer called her, was an aerial vessel capable of disposing offhand of a rival fleet of battleships. The inventor was so sure he was right that he would not disclose his secret until handsomely rewarded by the Government. He is probably still hugging his secret to his bosom.

But the designer of The Walloper is of a very different stripe. He has given the Department a sketch of his naval wonder, which among other things is to have a pair of great steel pectoral fins. These are to turn her in her own length, to halt her within a few yards when going full speed or to enable her to double on her track like a rabbit and thus dodge the best of a foe's gun pointers. But what would probably commend this ship to one of the Cabinet did he but know of her is the dovecote upon the single so-called military mast.



Every ship her own dry dock. Inventor's idea of battleship rising out of water on pneumatic stilts.

Our Navy Has Best Powder; So France Wants the Secret

Disasters on Battleships Have Caused French Naval Officers to Turn to United States for Assistance

THE powder experts of the United States navy have good reason to be proud over the fact that the French Government wants the formulas by which the smokeless powder used in the navy is prepared. This is indeed a tribute to their skill, because in a measure we are indebted to the French, having been influenced in the early days of the making of this powder by what the French chemists had already accomplished. There is another reason for felicitation: apparently foreign naval attaches have not been able to learn just how we make what is considered the best smokeless powder manufactured by any of the military powers.

Perhaps the general public does not know it, but the term "powder" is a misnomer so far as the propellant for cannon is concerned. It might more appropriately be called gun fuel, because it no longer resembles the powder of old, consisting in fact of cylindrical units which for rifles of the smaller calibres might be dubbed grains. But there is an even greater difference between the powder of old and the propellant of the present.

The black powder which was so long in use and the brown powder which later supplanted it were merely mechanical mixtures of varying proportions of sulpher, saltpetre and charcoal. Smokeless powder is a chemical product of a complex nature in which the constituents have undergone a complete transformation in their merging. By means of acids and other chemicals cotton is transformed into a substance of tremendous power, and the care with which this change is wrought in the powder factory makes all the difference between a safe and a dangerously unstable propellant. Experience in France in the last few years has laid emphasis upon this fact. As it stands to-day the officers and men of the French battle squadrons are distrustful of the powder in their magazines. This apprehension is well founded.

On the night of March 4, 1899, a French powder factory blew up, burying seventy men in its wreckage. That was the beginning of trouble. Eight years later, nearly to a day, on March 12, 1907, the battleship Jena, while in dry dock at Toulon was so badly damaged by an explosion aft that she was never repaired. The catastrophe exacted a toll of 118 lives. Unquestionably that disaster, like the preceding one, was due to decomposition of the navy powder B, in which sufficient heat was induced to cause spontaneous combustion. In August, 1908, six men were killed and eighteen hurt aboard the gunnery schoolship Couronne while at drill, the unstable powder being ignited by the heat of the practice weapon.

But the earlier accidents were far outstripped by the blowing up of the Liberte, which occurred on September 25, 1911, while she was lying in the midst of the vessels of the Second squadron in the roadstead of Toulon. The dead and injured aboard the Liberte and the neighboring ships numbered nearly 400. And if further proof of the hazardous character of powder B were needed this was supplied by a succession of less serious accidents or narrowly averted catastrophes which followed.

It is a fact that while all military powers to-day use a smokeless propellant for fighting purposes each of them has its own formulas, and the propellants are broadly divided into two groups, nitrocellulose powders and nitroglycerine powders. There is ample reason to believe that the United States leads the world in this matter, and pound for pound our so-called powder is more powerful than that of any of our rivals. This probably explains why France turns to us now.

Russia, France and the United States have fixed upon a pure nitrocellulose powder for naval and military use and in this they are opposed in practice to the other principal maritime powers. Propellants with a nitroglycerine base are said to be more stable and less affected by high temperatures than nitrocellulose powder, but they have one grave disadvantage—they wear out the gun bores more quickly because of the greater heat of conflagration. The life of the gun will be a vital element in the next great naval war and there is therefore a great advantage in using a powder that prolongs it. All the latest American battleships have refrigerated magazines, and automatic temperature taking and recording instruments make it possible to keep a continual check upon the condition of every powder storeroom. In addition to this frequent chemical tests guard against decomposition. By means of such precautions American ordnance experts declare that our smokeless powder will keep for a period of ten years. This is a good deal longer than it would ever remain aboard any of our modern dreadnoughts.

The process of making the powder is simple enough in theory. This is the day of commercial efficiency and the utilizing of scrap material, and Uncle Sam is no exception to the rule. At the smokeless powder factory at Indian Head, Md., it is generally the waste from cotton spinning mills that forms the base of the navy's fighting propellant; it is cheaper than raw cotton. Remnants of underwear are there transformed into a powerful explosive.

The stuff is first cleaned and dried. Then it is packed in airtight cans and shipped to the nitrating house. There it is soaked for a short while in a mixture of nitric acid and sulphuric acid and after being partly drained by mechanical wringers it is drenched with water to arrest the further attack of the acid, which otherwise might set it afire.

The powder maker having turned harmless cotton into an explosive by means of nitric acid then thanklessly does his utmost to get rid of every trace of the remaining acid clinging to the tattered textile. To accomplish this the acid bathed cotton is stewed for many hours in big cauldrons and then put in pulping mills for long periods, where it is further cleansed by means of alkali baths. Finally, acid free, it is drawn off in the form of a pasty slime or fluid pulp.

To get most of the water out of it it is run through presses from which it comes in flakes that feel like bits of damp crackers. To get the rest of the moisture out the pulp is packed in cylinders, topped with a quantity of alcohol, and when the plunger is applied the pressure and the alcohol drive before them the last of the water. Of course this leaves a percentage of the spirits in the pulp, but this aids in the next process.

To the crumbly mass ether is added and the material is kneaded in a machine the double of those used in steam bakeries. With this done the smokeless powder is chemically finished in the broad sense, but it is a long way off from the powder fit for the navy's rifles.

The next step is to form it into grains perforated with so many lengthwise, concentric passages. This is done by means of macaroni presses and dies, and the candylike plastic rods are then cut into units or grains of the required length; the size of the grains and their length differing for guns of varying calibres.

If the propellant when tested in a gun of the size for which it has been made proves to be perfect in all of its performances then it is given a lot number or index and is ready for issue, being packed in airtight cylindrical cases of metal. It is not again exposed to the air until taken out just before loading the guns in which it is to be fired.

Possibly you will wonder why some of the ether alcohol solvent is permitted to remain in the grains. Well, this modest percentage keeps the propellant from drying out or becoming crumbly and incidentally from growing too quick or active in its burning up. The ordnance man wants the grains to consume progressively as the shell is pushed forward with increasing speed toward the muzzle of the gun, and to burn otherwise would produce sudden and violently excessive pressures which might either burst the weapon or damage it. The solvent dampens or checks this hazardous procedure.

On the other hand, traces of nitric acid in imperfectly made powder will hasten decomposition of the grains and this will produce heat and spontaneous combustion after a while. Here is where the French have failed and because of our success they turn to us now.

Just the same, we have had our days of anxiety too. Not long after the first of our smokeless powder was issued to the service chemical tests were prescribed which were to be made from time to time by the proper officers on shipboard. Only a trained chemist could properly evaluate the results.

On the U. S. S. Olympia to the unpractised eye one examination caused alarm, and without more to do something like fifty thousand dollars worth of powder was promptly pitched into the sea. It was all a mistake and other tests and other means are now employed to warn the officers in charge of the magazines afloat. One of these is a color change which takes place in a chemical put in the propellant to give warning.

A sample of every lot of powder made at Indian Head or made by private manufacturers is kept in a surveillance magazine at the navy powder factory, and these samples are watched from day to day in addition. Any signs of deterioration are thus promptly detected and no time is lost in getting a cable message of instruction to the ship concerned. It is by this vigilance as well as because of the fine character of the navy's smokeless propellant that our record is so clean.

American naval officers and the chemists associated with them in the work of developing our powder have succeeded in doing a remarkable work. They have converted a violent explosive into a bridled propellant that will do just what they want it to do. This is the revolutionary difference between it and its ancient smoky rival.

The flame of smokeless powder has a temperature about twice that of the melting point of steel and this and the pressure of the gases pushing by the sides of the advancing projectile serve to eat away, like an oxyacetylene torch, the rifling within the bore of the gun. The weapon is thus first impaired in its accuracy of fire and then rendered unfit for service.

In this respect our powder is far better than the British propellant or that of the other nations using a nitroglycerine base.