

attack; hence the torpedo-boat is made small and swift.

The following comprises our torpedo flotilla, but many of these vessels are yet in process of construction:

Cushing,	Dahlgren,	Mackenzie,
Ericsson,	Farragut,	McKee,
Foote,	Craven,	Stringham,
Rodgers,	Davis,	Goldsborough
Winslow,	Fox,	Bailey,
Porter,	Morris,	Plunger,
Du Pont,	Talbot,	Stiletto,
Rowan,	Gwin.	

All are of thin steel except the Stiletto, which is of wood. The Plunger is a submarine torpedo-boat. The speed of these boats is from 23 to 30 knots per hour, excepting the Plunger, which only makes 8 under water. All, except the Stiletto and Plunger, carry from one to seven rapid-fire guns of small caliber, and are all armed with Whitehead torpedoes, except the Stiletto, which has Howell torpedoes.

Besides the vessels already described, there are on the navy list five iron cruising vessels, eleven wooden cruising vessels, six sailing ships, fourteen tugs, eight wooden steam vessels unfit for sea service and six wooden sailing vessels unfit for sea service. All of these vessels are in use for some particular or special service. The ships on the list which are unfit for sea service are large, and have been retained by the government for receiving ships—vessels which lie at the navy yards, and on board of which men are recruited and crews are organized for the regular sea-going ships of the navy. Of the serviceable vessels some are utilized as training ships for the young apprentices.

Just previous to the outbreak of the Spanish war we had on our navy list the names of 141 vessels.

MODERN CRUISERS We have since LATELY ACQUIRED. acquired and added the following:

New Orleans (formerly Brazilian cruiser Amazonas), protected cruiser; 3,437 tons displacement; coal capacity, 700 tons; speed 21 knots.

Albany (purchased from Brazil, but not yet completed), sister ship to the New Orleans.

Buffalo (formerly Brazilian cruiser Nictheroy), protected cruiser; 7,500 tons displacement; speed, 19 knots.

Topeka (formerly Peruvian cruiser Diogenes), 1,700 tons displacement; speed, 16 knots.

AUXILIARY CRUISERS. The Yankee, Dixie, Prairie, Yosemite, St. Paul, St. Louis, Yale and Harvard, are swift mail steamers which have had armament placed on them and are called auxiliary cruisers.

Besides these some eighty steamers, yachts and tugs, have been taken by the

government, and converted into gun-boats scouts, colliers, dispatch boats, supply vessels and transports.

MAIN BATTERIES. The guns constituting the main batteries of all vessels built or armed since the reconstruction of the navy was begun are steel breech-loading rifles. The calibers (diameters of the bores) thus far manufactured are 4-inch, 5-inch, 6-inch, 8-inch, 10-inch, 12-inch and 13-inch. Each gun is built up of a number of forged steel parts, the 4-inch and 5-inch being composed of a tube, jacket, and two chase hoops, and the larger guns having a third layer of jacket hoops and other chase hoops, in some cases extending to the muzzle. These parts are assembled with shrinkage. The machining and assembling of the forging is done at the navy gun factory at Washington.

The 4-inch breech-loading rifle, which is the smaller gun, weighs 3,400 lbs., and is a little less than fourteen feet in length. The weight of its projectile is 33 lbs., and the weight of powder charge is 13½ lbs. When fired the projectile leaves the gun with a velocity of 2,000 feet to the second, and after traveling a distance of 2,500 yards the velocity is decreased only to 1,246 feet to the second. The projectile, or shell, from this gun will perforate 7.2 inches of steel at the muzzle and 3.7 inches at a distance of 2,500 yards.

The 13-inch breech-loading rifle, which is the larger gun, weighs 136,000 lbs., and is 40 feet in length. The weight of the projectile is 1,100 lbs., and the weight of the powder charge is from 520 to 560 lbs. The projectile leaves the gun with a velocity of 2,100 feet to the second, and at a distance of 2,500 yards the velocity is 1,805 feet to the second. A shell from this gun will perforate at the muzzle 26.6 inches of steel, and at 2,500 yards 21.54 inches. The muzzle energy of the 13-inch projectile is 33,627 foot-tons.

Of these guns, some of the 6-inch and all of the lesser calibers are rapid-fire, that is, the projectiles and powder charges are in one, held together by a copper case similar to ordinary revolver ammunition. By this means the guns are loaded more rapidly.

Because of the great weight, the ammunition for the larger guns cannot be put up in this way. With these guns the powder charges are even put up and handled in sections.

For a 13-inch gun the length of fixed ammunition, if used, would be some eight feet, which would be unwieldy.

SECONDARY BATTERIES. The guns of the secondary batteries are all of small caliber—one, three and six pounders—and are of the Hotchkiss or Driggs-Schroeder patterns. All are rapid-fire. The ammunition is, of course, fixed—that is the projectile and

powder charge are in one case similar to the rapid-fire guns of the main battery.

The machine guns are of several patterns, including the Gatling, Colt, Hotchkiss, Maxim and Maxim-Nordenfeldt. A 1-pounder rapid-fire gun is now being manufactured which is automatic and discharges 240 shots to the minute.

SMALL ARMS. The small arms consist of the Lee straight pull magazine-rifle, calibre .236, and the Colt revolver, calibre .38.

The bullet used in the small-arm rifle and some of the machine guns is of hardened lead covered by a steel jacket plated with an alloy of copper and nickel. This bullet will penetrate ½ inch of steel boiler plate at 10 feet, and 5 feet of oak at 100 feet. Ordinary lead bullets are used in the revolver and other machine guns.

Knife-bayonets, about six inches in length, are provided for the rifle, and cutlasses are still in use.

PROJECTILES. The projectiles used with the main and secondary batteries are shell and shrapnel, the former being of two varieties, common and armor-piercing. Common shell are of cast steel, with a bursting charge of gun-powder within. Armor-piercing shell are of highly tempered steel, with specially hardened heads to prevent them from breaking up on contact with armor, and for a bursting charge contain some form of high explosive. The bursting charge within a shell is, upon impact, exploded by a percussion fuse. Shrapnel are shells filled with lead balls packed around a bursting charge. This bursting charge is ignited at the proper moment by a time fuse. The time fuse is adjusted so that the bursting charge breaks open the walls of the shell in front of the enemy, liberating the lead balls which with the pieces of broken steel, proceed onward in a cone of dispersion. Shrapnel may be effectively used against unarmored vessels or bodies of exposed troops.

TORPEDOES. Nearly all the torpedoes used in the navy are of the Whitehead type, and carry 150 pounds of wet gun cotton as the explosive. Torpedoes are fired from both ships and torpedo-boats. The torpedo is of steel, cigar shaped, pointed at both ends, and is driven through the water by two propellers at the rear end revolving in opposite directions, the shaft of one being a sleeve on the shaft of the other. The motive power is from within, and consists of a gas-engine driven by compressed air. A torpedo is started on its course toward an enemy by launching it from a tube. This is effected by exploding a small charge of powder in the rear end of the tube. Torpedoes may be used with effect within a distance of 800 yards, but after running about 300 or 400 yards they often diverge from their course. The torpedo runs for an enemy just