

be used, being entirely suitable, for the experimental 100,000 cartridges. Owing to the cannelluring and the method of manufacture of the projectile, the jacket requires no "soldering" to the lead—an important feature in connection with rapidity and economy of manufacture. The cartridge case requires the best of brass for manufacture and to be efficient for its work. The form of it depends upon its cubic capacity, which, to accommodate the powders experimented with, could not be reduced sufficiently to dispense with the bevel shape. It would appear, however, that about a minimum capacity has been given the case unless some better powder should be submitted. One experimenter appears confident of producing a powder that will require but a very small case. Should it be found necessary, as some appear to think, to return to "black powder," modified in some way from the heretofore ordinary use, the capacity of the case may have to be slightly increased, which can be readily done without embarrassing complications.

Early in the experiments brass primers, to prevent piercing by the firing pin and escape of gas, were thought to be necessary, but a reduction of the point of firing pin and in the amount of its projection beyond the face of the breech block show that copper works very satisfactorily, a "stronger" primer composition, however, was found to be required.

Only after the final selection of a powder can the niceties of the case and projectile be determined—only then can it be said that experimenting for the best form of projectile has begun.

II. The Rifle.—On account of the high pressures and the consequent sticking, from the form of and want of elasticity in the case, the Springfield system is suitable for powders giving great velocity. The "positive" cam makes it a perfectly safe one, but unless the form and elasticity of case can be made so as to give practically no resistance to extraction the difficulty of opening the breech may rule the Springfield system out for small-bore rifles. In bolt systems the mechanical construction provides for difficult extraction, though the opening of the breech may still be affected.

The even .30-calibre was chosen as being the smallest admissible, all things considered, not from any special principle involved, 7½ and 8 millimeters being generally the calibres adopted abroad.

It would appear from the experience of the National Armory that .30-rifle barrels can be made and rifled without any marked change in the methods used for the .45, but less rapidly, and consequently less economically. It also appears quite probable that resort will not have to be made to high grade steels for gun barrels, though high pressures must be provided for. Generally the outlook for the production of .30-calibre arm and ammunition without radical changes in methods and material and greatly increased cost is very favourable.

The projectile requiring rapid rotation for stability, one turn in 9-5 inches, has been given the rifling of three equal lands and grooves 0.005 inch deep. This combination gives in the small calibre the excellence attained in the .45 and possesses marked advantages for manufacture. The chamber, of course, has had to conform to the cartridge case, constructed as above set forth. The bore, rifling, and chamber established, the remainder of the arm, excepting a reduction of thickness of barrel for the Springfield rifle, is readily determined. With a barrel reduced to about what appears the required thickness and shape, a Springfield rifle has recently made the most perfect target of ten shots ever made at the armory at 1000 yards—every shot in the "bullseye" but one, which was just outside of it.

The indictment formulated by M. Greville Riache against the French Minister of Marine, Barbey, for having ordered quick firing guns for the French Navy from Messrs. Armstrong and Krupp, gave rise to a spirited debate in the French Chamber, May 27. It appears that the Minister never thought of supplying the French Navy with Krupp guns. He did, however, buy two Armstrong guns of 12 and 15 centimeters in order to test them against Canet guns of the same calibre, reserving the right to adapt for the French guns any improvements the English guns might possess, without further compensation.

The *Rousskii Invalid* gives some startling figures showing the sensible increase year by year in the rank and file of the Russian Army. In the year just ended, April 1st, 1891, the results of the new recruiting regulations were as follows:—The number of young men taken by the ballot was 878,011, of whom 47,728 were Jews. The number exempted from domestic circumstances was 420,757, thus giving 457,254 as amenable to military service. Deducting various categories not counted as available, and allowing for five years' service with the colours, this annual contingent will furnish not less than one million five hundred thousand men permanently enrolled on the peace establishment, and this total does not bear with any particular hardship upon the Russian population, which, exclusive of Finland, amounted in 1888 to 112,342,758 inhabitants, in which year were born 5,116,996 children, while the deaths were only 3,335,518, showing a gain of 1,781,478.

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