Cleaning Solutions

RIFLE ARMS AND THE MAN

NATIONAL RIFLE ASSOCIATION OF AMERICA

ORDNANCE OFFICERS FACE GIGANTIC TASK OF STORING MILITARY SMALL ARMS

THE TALE OF THE TAIL OF A BULLET
(Second Paper)

DEPTH CHARGE MOST EFFECTIVE ANTI-U-BOAT WEAPON

LITTLE LESSONS IN RELOADING
No. 10—Manipulating Velocity

EDITORIALS and
THE LATEST NEWS OF RIFLE, REVOLVER AND SHOTGUN; THE ARMY, NAVY AND THE NATIONAL GUARD

VOL. LXV, NO. 13

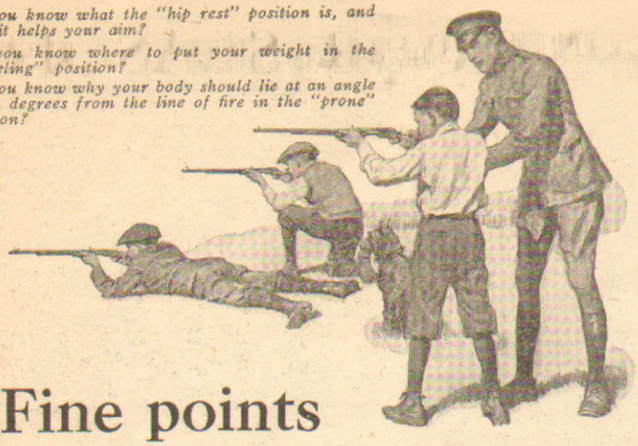
NRA

DECEMBER 21, 1918

Do you know what the "hip rest" position is, and how it helps your aim?

Do you know where to put your weight in the "kneeling" position?

Do you know why your body should lie at an angle of 45 degrees from the line of fire in the "prone" position?



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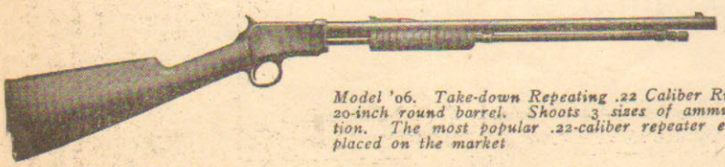

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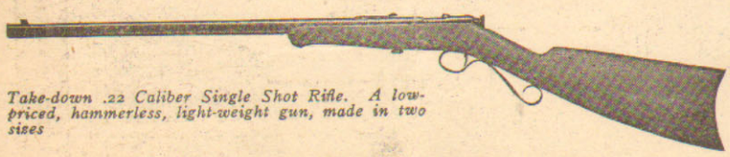

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ORDNANCE OFFICERS FACE GIGANTIC TASK OF STORING MILITARY SMALL ARMS

By STEPHEN TRASK

IN war's varied aftermath, the Ordnance Officer will play an important part. As in our preparation for war he was charged with the highly essential task of supplying arms and ammunition in unlimited quantity to our fighting forces, so now is he being called upon to reclaim the gigantic stores, gathering them in from the individuals to whom they were issued, and caring for them in such a way that even though they remain in storage for years on end, their usefulness will not become impaired.

The performance of this duty is not easy. There is no shortcut from the battlefield and the cantonment to the storehouse filled with greasy arms chests, that can be taken with any certainty that the ravages of rust and time have been rendered impotent. Wherefore of all the great army of men who have already begun the work of checking up, salvaging and storing the equipment of our millions of fighters, in anticipation of the coming of permanent peace, the Ordnance Officer, if he performs his duties as they should be performed, will have the most important task.

Many times in the history of the nation has it been necessary to demobilize wartime fighting forces. At the close of the Revolutionary War and the War of 1812, the problem of storing rifles was a negligible one, most of the men of the rank and file having privately owned the firearms with which they fought. And until the days of the War Between the States, there was little occasion for the government concerning itself as to whether firearms in storage would keep, so long as they had been wiped clean and treated to a coating of heavy grease. But that was in the Black Powder Days and black powder has never eaten its way into steel barrels in the fashion that modern powders do, nor was metal fouling in the Sixties the problem that it is now. So the matter of cleaning and testing, classifying and preparing for storage rifles in the various camps and cantonments today, is a much broader question than it has ever been before, in addition to the fact that never in the history of the world has any nation been confronted with the necessity of checking up so vast a supply of small arms.

Some idea of the complexity of the problem may be gained from the fact that although each rifle was new when issued and was carefully made to conform with the standards set for our military small arms, each has been for many months in the posession of a man whose knowledge of the care of a rifle at best can be classed as only elementary. Because of this ignorance many complications have arisen which cannot properly be charged to any knowing negligence on the part of the men but which must be remedied just the same, by the Ordnance Officer's and their assistants. For instance it is seldom that a comparitively new recruit, or even one who has been in the service for several months, will know anything concerning metal fouling, its cause and effects and the remedies to be applied to neutralize it. Again although a recruit should never "take down" his rifle, unless supervised by an experienced man it is a pretty sure bet that most of the soldiers have done so at one time or another and for various reasons, if nothing more than to examine the mechanism. And the assembling is pretty likely to have left more or less to be desired: adjustments have gotten disarranged, and while, theoretically the various standard parts of all rifles of the same model should be interchangeable this is not often so in practice. Parts on which small tolerances or allowance have been made are not usually interchangeable with similar parts on which the tolerances are greater. Therefore if in assembling his rifle, a man has picked up a part belonging to another soldier's rifle, there is apt to be too much play or too much friction.

All officers who are engaged in the work of checking up, classifying and storing the weapons turned in by our fighting men would do well to concern themselves deeply with making sure that the small arms returned are in the best possible condition before being sent to the storehouses. Each of them should bear in mind the fact that between the extremes of theoretical perfection in cleaning a rifle and that of practically doing nothing more than smearing on cosmoline, there is a wide difference.

A very good general rule to follow is one which has already been advocated in some branches of the Ordnance Department, but which might well be taken to heart and followed by every Ordnance Officer who is concerned in overseeing the work of collecting and storing the rifles.

Following out this program the Ordnance Officer in charge at each cantonment or camp should see that his assistants examine every rifle turned in and determine whether metal fouling is present in the bore. If so they should be given treatment to eradicate this evil. The rifles should then be thoroughly cleaned and tested for head-space with the proper gauges. The muzzle plugs should also be used. When this has been done and the rifles given a thorough cleaning, they may be classified in two groups: first, Serviceable Rifles (*a*) of High Efficiency, and in which is included rifles which pass all tests and (*b*) of Low Efficiency, in which category those which receive the .302 gauge but not the .304 would be placed; and second, Unserviceable which would include all rifles which receive the .304 guage and the .308 muzzle plug. After this the rifles should be heavily oiled in every part of the mechanism, and the barrel thoroughly coated with cosmic. The various classes of rifles could then be packed in boxes properly marked, and ready for storage.

In connection with the work which the ordnance officers must do, it may be mentioned that there is a

great deal of confusion upon the subject of what is meant by cleaning a rifle. Most reagents have been applied to the rifle simply because "it was a good thing to do," regardless of the immediate effect. The process has not been thought through to a finish from a scientific standpoint. Usually the subject is handled in the discussion of the different forms of fouling of the rifle. The first of these is described as powder fouling, and the ordinary man infers that the brownish colored residue found in the rifle after it has been fired is what is described and is a source of danger. While this powder looks badly in the rifle it is not a source of any great danger. It can be removed by the use of a dry patch almost completely. Of course, the rifle cannot be cleaned by this means because the real source of danger is still present, but if, after this residue is removed, the rifle is swabbed out by the use of a soda solution, which neutralizes the acid effects of the gases forced upon the surface of the rifle by the explosion, the greatest benefit will be noticed.

The acid is the cause of damage, and it is never removed by oil, but being often covered over by oil which is carelessly applied, results in the formation of a layer of rust beneath the oil, which the oil simply protects in its operation. It is usually recommended that this rust should be cleaned out by other efforts at cleaning made on successive days. *Oil will not remove acid; soda will.* It is believed that this is the most important part of the cleaning of the rifle. After the acid has been neutralized, then the introduction of an oiled patch in the rifle, in order to clean it by means of friction, is the best method of bringing it to a perfectly satisfactory condition. The rubbing it has received with oil cleans up the surface. Then it should be polished by rubbing again with a dry patch. This process will leave the surface of the rifle bright and clean so that it can be carefully inspected. If at this time any appearance of metal fouling is discovered, the rifle should be turned over to some one skilled in the use of the ammonia solution, or the tablet solution, as these should not be applied *except by a person expert in their use.* Great damage will result to the mechanism of the rifle if either of these solutions should accidentally reach working parts of the rifle.

After these processes have been completed, the rifle, if it is to be put away for a long period of time, should be heavily coated on the inside with a thick oil, such as cosmic, which should be warm before being poured into the rifle.

If it is intended to use the rifle the next day, a coat of light oil is all that is necessary, and several of these oils are on the market. It would be better to use one which has an alkaline present in it, which will continue the process of the elimination of acid while the rifle is in a quiescent state, a vegetable oil will not do. A good mixture can be prepared by using equal parts of amyl acetate, acetone, turpentine and sperm oil. Men coming in from the rifle range almost immediately force a patch saturated with some of these oil solutions through the rifle, rubbing it thoroughly, and think that they have cleaned the rifle, whereas, they have simply used the dirt which was present as a means of polishing the surface, instead of getting after the acid, which is the main source of danger to the rifle.

Many persons are alarmed when they see the blue reaction produced in the ammonia solution, after even a few shots have been fired. This is not metal fouling in any proper sense. It is only when the metal is present in patches which mechanically affect the flight of the bullet that it is dangerous and should be removed.

Here are some suggestions upon methods of cleaning which may be of value:

I. When the Rifle is in Daily Use.

Always clean the rifle once a day, as soon after use as possible.

1. Push a dry patch completely through the rifle from breech to muzzle to remove powder residue.

2. Soak a patch in soda solution and push through the barrel slowly, or put the solution in a can, put the muzzle in the solution and pump it up and down in the rifle slowly several times. This neutralizes the acid.

3. Dry out with a clean patch.

4. Scrub the barrel thoroughly with an oiled patch. Do this in sections of the barrel first and then push the patch straigh through the barrel.

5. Dry and polish with clean patches.

6. Examine:

   (*a*) If clean and bright, particularly when viewed from the muzzle, coat with thin oil. Sperm oil will do, but one containing acetone is better if available.

   (*b*) Once a week apply the swabbing solution, wash with water and dry before oiling.

   (*c*) If much metal fouling or metal patches are present, use Standard Solution, wash with water and dry carefully, then oil.

7. Remove all oil except from bearing parts of the bolt before shooting.

II. When Preparing the Rifle for Storage

1. Clean as above, but use the Standard Fouling Solution for half an hour, then wash thoroughly and dry—then oil.

2. Remove oil and examine for two or three successive days if possible.

3. Warm cosmoline.

4. Put cork in breech of rifle.

5. Pour in warm oil from muzzle.

6. Remove cork and allow barrel to drain.

7. Store without wrapping too closely.

Here are some directions for the preparation of sufficient metal fouling solution to clean one rifle barrel. This solution should always be *mixed as needed.* It *deteriorates on standing.* The tablets will keep for an indefinite length of time in a *bottle tightly corked. Four tablets* should be taken from the bottle labelled *ammonium persulphate* and *crushed,* so that they will dissolve more readily in water. The rifle barrel should be corked at the breech and be provided with a rubber tube 2 inches long placed over the muzzle. The crushed tablets should be placed in sufficient water to fill a rifle barrel. This quantity of water is about two spoonsful (Ordnance spoon model of 1917). *It can be measured by the mark on the side of an empty tablet bottle. One tablet* should then be taken from the bottle labelled *Caustic Soda,* and *crushed.* This powdered material should then be added to the above solution of ammonium persulphate. When the greater part of the solid material has dissolved it is ready to use. There may be a small quantity of floating material which will not dissolve completely: this may be disregarded.

The solution as prepared above should be used in exactly the same manner as the Standard metal fouling solution, which contained Aqua Ammonia. (See Description and rules for the management of the United States Rifle, Caliber .30 model 1917. Revision of May 7, 1918, page 45). In the case of badly fouled rifles, it may be necessary to have the solution in the barrel for a maximum of one hour to remove all the cupro-nickel. Two application of one-half hour each, when practicable are much more efficient than one treatment of one hour.

The following points should be carefully noted in the use of tablets for the preparation of the Standard metal fouling solution:

1. The bottles should be kept *tightly corked* to exclude moisture. This is especially necessary in the case of the Caustic Soda tablets because they take moisture from the air very rapidly.

2. Caustic Soda has a corrosive action on clothes and skin. Proper care must be taken in crushing this tablet to see that the material does not get on the skin and especially, that no particles fly into the eyes.

3. Ammonium Persulphate disintegrates cloth, paper or fiber very quickly and is very corrosive upon metals.

4. The Ordnance directions for the use of the metal fouling solution must be carefully followed. Under no circumstances should the solution be left in the rifle barrel over night, because appreciable corrosion of the steel will take place.

The swabbing solution is prepared by adding three (3) volumes of water to one (1) volume of the above Standard metal fouling solution.

The Tale of the Tail of a Bullet

By J. R. BEVIS

(Second Paper)

IN my first paper on "The Tale of the Tail of a Bullet," in ARMS AND THE MAN, November 9, 1918, Figures 1, 2, 3, 4, and 5 were deleted by the censor; Figure 6 was redrawn, substituting for the real tail and improvised one, and much of the material was rewritten. That was before the armistice.

The head of the bullet to the shoulder "BD," Figure 6, approaches very nearly the maximum efficiency. In this paper we will discuss the body and tail of the bullet, beginning with the shoulder "BD," Figure 6 and Figure 8. If we attach the head in Figure 6 and the tail in Figure 8, we have a bullet with a high degree of respectability.

That part of the bullet which comes in contact with the wall of the bore should end abruptly in order that as the bullet leaves the muzzle the bearing against the walls of the bore will cease at the same instant on all sides so that the bullet will not be deflected by the longer contact of any one point with the walls of the bore. If the bearing surface of the bullet terminates at "B′ D′," this shoulder should be made square with the longitudinal axis, and as true as it is possible to make it. The shoulder B′ b′ D′ d′ forms a gas check also and its depth should not vary greatly from the depth of the groove.

If the element of the surface of that head which offers the least resistance is a curve, then the element b′ m′, b′ p′, or b′ T, of the surface of the tail that would offer the least resistance to the lateral thrust could not be like that element of the surface of the head which offers the least resistance for the reason that the angle of incidence of thrust in the latter case is diametrically opposite to that in the former case. To state the general law, that shape of head which would offer the least resistance offers the greatest resistance if used in the structure of the tail. It needs, then, no further argument that the element of the surface of the tail should be a straight line as "b′ m".

In my preceding paper I gave the comparative ballistics of the 150-grain Springfield bullet, regular and boat-shaped, assuming no vacuum or rarefaction in the wake of the latter. I also stated that the body and tail of the bullet travel in a rarefaction which means that if the bullet be so constructed as to eliminate the vacuum in its wake there would still remain the retarding influence of the rarefaction.

Most every one of us has taken an empty cartridge shell and drawn out a part of the air with the mouth and had the shell adhere to the finger. The pressure on the outside of the shell being greater than the pressure therein, holds the finger and shell together with a force in direct ratio to the rarefaction in the shell.

In Figure 7, Issue November 9th, the rarefaction behind the stream line of the apex is evident, and the velocity of the inrushing air to fill the space in the immediate wake of the bullet is in inverse ratio to the degree of rarefaction, which varies with the altitude, with the velocity of the bullet, the shape of its head, etc.

If, however, this degree of rarefaction could be determined then the problem of evolving the tail of the bullet would not be difficult.

If the vacuum be represented by the cone "b′ Td′," Figure 8, then the surface of which the lines b′ T and b′ T are elements, theoretically separate the vacuum from the rarefaction. Such a condition cannot actually exist.

The angle "rb′ T" is called the critical angle of taper. Since the density of the air increases from the surface "b′ Td′" outward, for the sake of tolerance the efficient angle of taper must be less than the critical angle. For if it were not so, and the bullet's tail were constructed along the line "b′ T" and "d′ T" the purpose desired would be defeated. This fact is apparent.

It is not difficult to determine the rarefaction of air around the body and tail and then determine the value of the critical angle of taper, but it is difficult to determine the maximum value of the efficient angle of taper.

Of the several factors that enter into the calculation of "C," the ballistic coefficient, for the boat-tailed bullet, weight should be eliminated as much as possible. If it is desired to increase the weight of the bullet it may be done to a better advantage by increasing the length of the body BB′. To increase the weight of the bullet by increasing the length of the tail increases needlessly and disastrously the total length of the bullet. It is, therefore, evident that the tail should be as short as possible, and at the same time the angle of taper should be at its maximum. The fact is equally evident that if possible the tail should come to a point "P" to eliminate the opposing forces caused by a vacuum. If conditions will not permit the tail coming to a point, it should be as long as possible and have a flat base as "xy" or "vw" perpendicular to the longitudinal axis of the bullet.

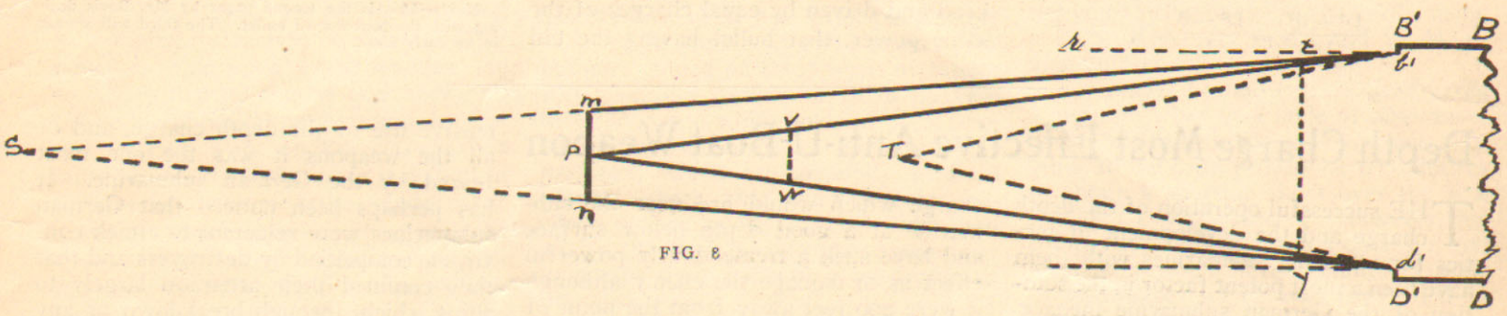

FIG. 8

The opposing forces of any base as "xy" or "vw" will be to the opposing forces of the base B′ D′ as the squares of their respective diameters: If the square of "vw" is one-fourth of "B′ D′" then the opposing force behind "vw" is ¼ as great behind B′ D′, and taking the Springfield bullet for illustration, the forces behind "vw" would equal one-fourth of 1.05 pounds or .26 pounds.

In my preceding paper I show that the resistance of 1.667 pounds acting for .2 of a second caused a retardation in the Springfield bullet of 501 f. s. If the base of the tail is "vw" as just discussed, the opposing forces of 1.05 pounds will be reduced by .79 pounds (1.05—.26) and the retardation for the same time will be $\frac{.79}{1.667}$ of 501 f. s. or approximately 237 f. s.

I have in mind a projectile used in our artillery, the tail of which is drawn in Figure 8, to scale as b′ xyd′, and the influence of this reduction in the base of this projectile increases its range materially.

In my article in "ARMS AND THE MAN," November 16th, I showed that the greater the value of the ballistic co-

efficient C' the greater the range of the bullet having the same muzzle of velocity. I give, herewith, the formula which I believe to be entirely new, for calculating the value of "C" of the boat-tailed bullet.

$$\frac{C = .0001428w}{c\ D^2} \times \left[1 + \left(\frac{D^2 - d^2}{D^2} \times \frac{2 \tan T}{\tan Tc}\right)\right]$$

in which w is the weight of the bullet in grains, c the co-efficient of shape, D the effective diameter of the bullet which equals the diameter of the lands plus the depth of one groove, d the diameter of the base, T the angle of taper, and Tc the critical angle of taper. The expression in the first parenthesis is the simple formula for "C." In the second term, when d becomes zero, or the tail a point.

$$\frac{D^2 - d^2}{D^2} = \frac{D^2 - 0}{2} = 1,$$

and if tan T equals tan Tc (the value of either I am not now at liberty to give) then

$$\frac{2 \tan T}{\tan Tc} - 1.$$

Assuming these values for illustration "C'" will equal (1+1) or two times "C". That is, the value of "C" for any bullet having any shaped head may be increased one hundred per cent by means of its tail. The 30—220 with its round nose may be made to have better ballistic properties than the 30—150 Springfield if the tail is made the proper shape. This fact is indisputable.

Of two bullets having the same shaped head and driven by equal charges of the same power, that bullet having the tail has many advantages over the other. First, on account of its greater value of "C" and its having a greater muzzle velocity due to less friction with the walls of the bore, and the greater density of loading it has considerably greater range for the same elevation of sights, and a flatter trajectory over all ranges. Second, for the same causes the boat tailed bullet has greater striking energy and greater striking velocity. Its center of gravity is nearer the head, by virtue of which there is every evidence of its superiority in accuracy.

In a future article, I hope to discuss the influence of the boat tail as applied to our popular bullets of common use.

NOTE—This is the second paper by Mr. Bevis dealing with the boat-shaped bullet. The third will appear in an early issue.

Depth Charge Most Effective Anti-U-Boat Weapon

THE successful operation of the depth charge and the development of tactics for attacking submarines with them have been a most potent factor in the solution of the German submarine menace. These charges are now being produced in quantities considerably in excess of the needs of our Navy and merchant fleet, and so tremendous is their destructive quality and so thoroughly has strategy for their use been developed, that it is a lucky submarine which could show itself or its periscope within view of a destroyer and survive the subsequent bombardment.

With the earlier development of the submarine its possibilities as a weapon of offense were vaguely conceived. Defense against submarines, however, was largely confined to the general doctrine of gun and torpedo. The Germans made such great strides in submarine development that the opportunity of catching a submarine on the surface and destroying him by gunfire became exceedingly scant. Because of his low freeboard he could detect the approach of a hostile vessel and submerge before that vessel sighted him. Through construction improvements and intensive training of personnel, the submarine could submerge even when caught napping before guns could be effectively trained upon him. Through a skillful use of the periscope a submarine could attack with little danger except from an occasional lucky shot or from ramming.

Some method of attack the submarine under water was necessary. Charges of explosives such as shells or bombs detonating by contact would injure a submarine if the U-boat were struck, but a moving submarine 100 feet below the surface is a difficult target to hit. There was desired, therefore, not so much a contact charge which would function on striking the submarine, as an explosive charge which would fire near the submarine at a good depth below surface and have such a tremendously powerful effect as to damage the enemy although it were 200 feet away from the point of detonation.

Prior to the entrance of the United States into the war the use of depth charges had begun, but had not been carried out to any marked extent abroad; yet the United States realized the necessity of being adequately armed with this new weapon against the submarine.

Our Navy undertook depth-charge development shortly after the opening of unrestricted warfare. The first design contained 50 pounds of explosive and was operated on a float-and-line principle. A float detached itself from the charge proper upon striking the water and remained on the surface while the charge sank and in sinking payed out rope attached to the float; when a predetermined length of rope had run out the charge exploded.

On the declaration of the war these charges were almost immediately available for issue to the vessels of the United States Navy. It was soon apparent, however, that with the construction of large and stronger submarines the 50 pounds of explosive was not sufficient, and immediately the development of larger charges was undertaken. The naval torpedo station at Newport developed a type of hydrostatically operated depth charge which subsequently was proven at least the equal of any other depth charge known to be in existence.

The depth charge has taken a place in the front rank of effective weapons of warfare alongside of the gun and torpedo, and it is destined to remain in that company as long as the submarine is employed as a weapon of war upon the seas. Our destroyers abroad made extensive use of the depth charge, and of all the weapons it was the one most feared by the German submarine. It has perhaps been noticed that German submarines were reluctant to attack convoys accompanied by destroyers and that they confined their attention largely to ships which, through breakdown or any other reason, fell out of line and dropped far behind the escorting destroyers.

Along with the development of the weapon itself tactics for its use have progressed from an occasional chance shot to a veritable bombardment. At first vessels carried one or two depth charges and dropped only one against the submarine. Gradually the number of depth charges carried has increased until now a destroyer will frequently carry more than a hundred.

The possible movements of a submarine after its discovery has been carefully studied and scientific curves have been determined enabling a swift attacking vessel to drop depth charges in the form of a barrage about the submarine, regardless of which direction the submarine turns after attack or how great her speed.

A new gun known as the "Y" gun has been designed and built especially for firing depth charges. All our destroyers and subchasers were equipped with this weapon. It is proving in service the equal of any material in use as depth-charge projectors and has increased the efficiency of depth-charge attack, as it enables depth charges to be thrown astern or on either side of the attacking vessel, thus widening the danger zone for an enemy submarine.

The Caldwell Range Rifleman advances this as a reason why some gobs grow dizzy:

Pretty girl (on firing line)—"Oh, and what are those squares with the black dots in the middle?"

Patient Jackie—"Those are the targets."

Pretty Girl—Oh, those are what everybody is shooting at huh? I thought they were some sort of dice game.

Errors Affecting Accuracy in the Small-Bore Rifle

By "CARTON"

In *The Rifleman*, London

PERHAPS a few of the reasons why the .22in. calibre rifle was not accepted so readily as it might have been as a very useful and economical weapon adapted for the training of recruits before the outbreak of the war was that there is no shock of recoil when firing and that practically no account need be taken of the effect of wind upon the bullet, or of light, temperature, condition and warmth of the barrel, not to mention barometric pressure, mirage, drift, jump, and personal equation which varies with each different firer. Admittedly, instruction on miniature rifle ranges is in no sense a final training, but no one will deny that it is a very useful and economical preparation for the real, serious work on the classification range, especially if the latter is distant or perhaps its accommodation inadequate.

We are concerning ourselves with the errors which affect accuracy in rifle shooting generally and at this stage have arrived at the "error of day." Unfortunately, perhaps, as regards training, the effect which the soldier has to contend with is very small because when firing his course of musketry in which the result of each of his shots is signalled his most distant range is limited to 400 yards where the position of each shot mark is only indicated approximately with a disc 12 inches in diameter. However, much could be written about the "error of day," but I propose in the space at my disposal to concentrate upon the effect of wind upon the long rifle cartridge bullet of the light calibre weapon which, although considered to be small up to the 100 yards range, is not so insignificant as to be entirely ignored by the club shot when shooting at 50 yards.

On outdoor club ranges, generally, very few devices are placed so that a firer may estimate the velocity and true direction of wind; these fore wind allowances are invariably a matter of guess work. Again, these ranges are generally sheltered, so that if flags were hoisted at a position—say adjacent the firing point or at the butts—while a variable wind was blowing they would not afford much assistance to the firer, which perhaps even then would be rather misleading.

So there are many methods adopted to counteract the force of wind on the bullet and estimate the necessary allowance to be made, one—a very elementary method—being to fire a "group" and then to bring the centre of the "group" to the centre of the bull's-eye. But as the wind is liable to shift, which it often does when firing a series of shots, the firer should learn to judge approximately before commencing his practice and so allow for it as correctly as he can, paying attention to possible variation as he proceeds. The ordinary outdoor club range is, however, a good school for the training of the would-be miniature rifle marksman because of the number of obstacles he has to contend with regarding the position of the site—safety and accessibility being the principal factors ensuring its popularity and success. Experience gained on these types of ranges will give him confidence when he ventures later into wider fields of open competition at our principal miniature rifle meetings, which are generally held on ranges where the wind sweeps unchecked by woods or cliff sides and where the flags enable the competitors to accept their indication as being of practical use.

The inconsistency of direction of the wind is invariably the greatest source of trouble. A right angle wind, *i. e.*, a wind blowing directly across the range, has a greater effect upon the bullet in its course than a wind blowing obliquely, say from 10, 8, 2, or 4 o'clock, and a very common change to be noticed is for a straight course wind to back or fill to one of the latter points—or, of course, the reverse—and one is more likely to be caught napping by this particular shift than by an increase or decrease in velocity.

However, the effect of these side winds up to 50 yards is very small. The firer at 25 yards, in fact, may treat it as being almost negligible; at 50 yards, if the wind is fairly strong and gusty, aiming at a point on the "bull" known as five or seven o'clock, occasionally when the gust warrants it, will assist him in securing all-in results; but at the 100 yards range—where the .22 calibre rifle and its bullet will provide ideal sport—a side wind, even an occasional zephyr, must receive attention, and due allowance made by altering the point of aim or adjusting the backsight in the orthodox manner or a serious drop in the scoring will result.

Mr. E. H. Robinson, the well-known expert and excellent authority on the subject, says, in his book "Rifle and Carton," that wind table constructing by experience is heartbreaking, but here is my table for what it is worth—

TABLE OF WIND ALLOWANCE FOR .22 RIFLES IN INCHES ON THE TARGET.

Wind blowing full across the range.

	100 yards.	200 yards.
Moderate	2 inches	6 inches
Fresh	4 inches	12 inches
Strong	5 inches	16 inches
Very strong. ...	7 inches	24 inches

It will be noticed that Mr. Robinson compiled his table in inches owing to the diversity of allowance given by backsight scales with varying sight bases, the data being gathered when firing .22 R. F. ammunition, having perhaps the highest muzzle velocity of any brand of that calibre yet manufactured, *i. e.*, "E. H. V." (Westphalian) and "H. P. S." (King's Norton), both being known to give the best results at 200 yards. I can thoroughly recommend the first column of figures in the table, having compared them with my own calculations, compiled from my score register of match shooting when firing over the 100 yards, using a B. S. A. No. 12 model and U. M. C. ammunition.

For ranges beyond two hundred yards I question whether a table of allowances could be framed which would act as a guide to the courageous shot who desires to obtain a sporting shoot over the 300, 400, or 500 yards ranges. However, for comparison with the given data for 100 and 200 yards, I have submitted a table of allowances which was forwarded to me for trial some few years back, when the oft-maligned black powder R. F. ammunition of government manufacture was being used on club miniature ranges. As imagination appears obviously to have entered into these calculations I cannot advise any of my readers to give them a trial; however, I append them for what they are worth.

Wind from points corresponding to figures on clock face

Range yards	6 or 12 deviation high or low	1, 5, 7, or 11 o'clock deviation left or right	2, 4, 8, or 10 o'clock deviation left or right	3 or 9 o'clock deviation left or right
300	6.00 in.	20.00 in.	36.60 in.	40.00 in.
400	10.00 in.	36.50 in.	5 ft. 6 in.	6 ft. 1 in.
500	15.71 in.	55.60 in.	8 ft. 4 in.	9 ft. 4 in.

I was informed that this wind table was based on a wind of 10 miles per hour strength, moving, therefore, at a rate of 14.6 feet per second, which we consider a pleasant breeze. For lesser or greater wind velocities the figures have to be varied proportionately. The direction of the wind is invariably classified by clock figures as if a clock lay flat before the rifleman, the "6 o'clock" at his feet, the "12 o'clock" in the direction of his target. A "12 or 6 o'clock" blows from rifleman to target, or vice versa, a "3 or 9 o'clock" blows at right angles to the line from the shooter to the paper.

Suppose, for example, we were at 400 yards, with a 10-mile breeze blowing

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ARMS AND THE MAN

1111 Woodward Building, Washington, D. C.

EVERY SATURDAY

Editor

BRIG. GEN. FRED H. PHILLIPS, Jr., Secretary N. R. A.

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KENDRICK SCOFIELD

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That the man shall serve his country in time of war is noble, brave and patriotic; but that a man shall properly prepare himself in time of peace to serve in war is all of these things and more. It is noble with a nobility which is real, not ideal. It is brave with a bravery which assumes in time of unemotional peace many burdens, among them that of bearing the lack of appreciation of those who do not consider military preparation or training necessary.

OUR MILITARY RIFLES SHOULD BE PRESERVED

IN the cantonments of the country, in the arsenals and at our Army bases abroad there are between three million and four million army rifles. This number includes Krags, Springfields and Models of 1917. Some of these rifles are still in their original coatings of cosmoline while others have been rendered unserviceable by rigorous use in the trenches. But between these two classes there are easily a million and perhaps two million weapons which will be turned in for storage now that hostilities have ceased.

What these rifles have cost the United States, it would be difficult to estimate. The days when military rifles of high workmanship standards could be produced for $12 and $15 have passed, and it is safe to assume that not one of the weapons made since the United States entered the world conflict represents an outlay of less than $25 with a probable average nearer $30. Therefore the 2,137,025 rifles, Model of 1917 alone, without considering either the Springfields or the Krags, it may be safely assumed cost the Government in the neighborhood of $64,000,000. In a war waged along the stupendous lines of the recent conflict, this is comparatively a small expenditure, but it is very much too large to justify any failure in preserving the rifles against deterioration.

When the matter of turning in the rifles at the different cantonments was taken up consequent to the signing of the armistice there was evidence that there existed among certain supply officers a belief that all that the only steps necessary to prepare rifles for storage was to see that the bore was wiped free of any traces of rust and to fill the bore and cover the rifle with cosmoline. This, as any man who is experienced in the ravages which disuse makes upon firearms knows, is not sufficient protection. The idea governing the ordnance officers at the different cantonments and abroad should be a conservation of this valuable army property, and not a mere slap-dash storage system. For instance every rifle turned in should be thoroughly examined for traces of metal fouling, and if the bore needs treatment, it should receive expert attention. "Ammonia Dope" is the one sure remedy for removing metal fouling; but in the hands of an inexperienced or ignorant man, it can do great damage to the working parts of the rifle, if permitted to come in contact with them.

It would be well if the Ordnance Department made use of the services of the Rifle Demonstrator Corps in connection with inspecting the rifles turned in and preparing them for storage. The officers who have been on duty in this branch of the Ordnance Department are skilled and practical. Under their supervision a corps of enlisted men could speedily be trained in the methods which will assure the preservation of our magnificent supply of rifles against any future need.

THE "STAY-AT-HOME" CHEVRON

IT is not strange that a well-grounded opposition to wearing the white or silver chevron, denoting service in the territorial confines of the United States during the world war, should be apparent in the attitude of both officers and men required to make this designation part of their official uniform.

No doubt the originators of the idea were moved only by a desire to express the appreciation of the nation for services rendered by the officers and men who never saw the firing line, but who, in most instances, have been responsible for the way in which our munitions production and cantonment training programs have been carried out. Unfortunately the wearing of the silver chevron by officers and the white chevron by enlisted men has had the opposite effect to that intended. Almost to a man those who failed to reach the firing line feel their misfortune keenly, and whether justifiably or not, they regard the silver and the white chevrons as needlessly calling attention to the fact that they were not members of the overseas forces.

In the first place, the new chevron is entirely unnecessary. If an officer or enlisted man has neither a gold chevron denoting six months' service abroad, or a blue chevron denoting less than that period of overseas service, it naturally follows that he was not overseas. In the second place to prescribe any distinctive uniform which tends to publically emphasize what most men regard as an unfortunate circumstance over which they had no control, being subject to orders, is not good policy to say the least.

PROMOTION IN THE ARMY

WHEN the armistice terms were signed, an order was hastily prepared cutting short the issuance of all commissions in the United States Army. This not only prevented the commissioning of any new officers, but curtailed all promotions abruptly. That the commissioning of any new officers should have been stopped was proper, but that officers who were slated for promotion should be prevented from attaining the rank to which they are entitled was unfortunate.

Senator Thomas has introduced a bill to remedy this condition. The legislation offered by him provides that all officers, non-commissioned officers and privates who had been recommended for promotion prior to or on the 11th day of November, 1918, shall be entitled to and shall be given commissions for the rank so recommended, in all respects as though hostilities with Germany had not been suspended.

The proposed legislation would if enacted result in righting the injustice which has been done to hundreds of members of the Army of the United States. The men who were slated for promotion at the time the signing of the armistice interfered had won their increased rank by meritorious service, and official recognition of what they have done should not now be withheld. It is even doubtful whether legislation is needed to accomplish this end. The situation seems to involve no more complicated a remedy than the rescinding of the original and hastily compiled order and the substitution of another providing that no commissions be granted to men not in the service on the day the armistice was signed, and providing for the promotion of such men as were entitled to recognition at the time hostilities ceased.

Little Lessons in Reloading

BY JOHN LYNN

No. 10—Manipulating Velocity

SPECIAL loads for rifles frequently are more desirable than regular loads, and the man who prepares his own ammunition should understand when and how he can vary bullet velocity from the standard of factory ammunition with profit. The labels on the powder cans may give the powder charges required (they likely will not give it in sufficient detail), but many other considerations enter.

The standard velocity with the regular bullet has the one great virtue of maintaining the striking point of the bullet where the sights are set. If the reloads are made up of the usual powder and bullet re-lining of sights is not required. The general feel and performance of the ammunition also is the same—recoil is identical, and killing powder is no different.

Higher velocities, however, often offer advantages which outweigh the change of elevation or windage in sighting that they usually make necessary. For instance, the .30-30 cartridge can be speeded up from about 2,000 feet to about 2,600 feet, with the result that the bullet has less fall, has a flatter trajectory, consequently can be sighted for a longer point blank range, requires less lead ahead of running game. The fast bullet also is less drifted by the wind, has longer range and more killing power. Other examples of increases in velocity possible are the .30-40 Krag, from 2,000 feet to fully 2,700 feet; the .30-1906, from 2,700 feet to nearly 3,000 feet. All the long list of hunting cartridges can be speeded up more or less. The only factory ammunition in which this speeding up is done is the "high velocity" .45-70, .38-55, .32-40, .38-40, .44-40, and two or three others, and in some ways the individual loading even these cartridges can improve on the factory product by using a less destructive powder giving the same results, using a bullet better suited to his particular purpose, or otherwise modifying the fixed stuff.

Lower velocity, on the other hand, sometimes is advisable. For instance, if a person wants to do a large amount of shooting at target with a fine rifle, it is worth while to consider the saving in wear on the barrel of light, cool burning low-speed loads. Low-velocity loads are safer in settled districts. In target shooting, they give about the same results at 200 to 300 yards in respect to fall and wind drift that the standard charges give at 500 to 1,000 yards, hence give valuable practice. They make less noise and give less recoil and may have ample power for the purpose used for. Finally, they cost less. Throughout big game hunting districts it is the practice among mang of the less well-to-do hunters to buy only three or four boxes of full power cartridges a year, and to use for all target shooting and on all small game cheap low-velocity ammunition they prepare themselves.

It is entirely practicable to send a bullet from a rifle at any speed desired, from about 800 feet up to the limit for the cartridge. Smokeless powder must be used, and in most cases a different kind is required for each two or three hundred-foot step up. Thus the powder correct to give 2,000 feet velocity in the .30-30 with the standard bullet (du Pont No. 18, 21 or Lightning) can not be used to give up the 2,600 feet maximum. No. 18 and possibly No. 16, is required for that. Again, Lightning, or No. 21, would give inferior accuracy in charges only sufficient to give 1,600 feet with gas check cast bullets. For this and lower velocities, down to light charges for shooting indoors a series of powders are required, ranging from No. 18 through Sharpshooter (possibly), No. 80 and one of the pistol powders. The bullet also can be manipulated. The highest velocities can be obtained only with the lighter standard bullets. In the .30-30 this is the standard 150-grain army bullet or the soft point of the same shape. For best killing power heavier bullets often are advisable, as for instance the 175-grain Newton copper-jacketed bullet in .30 caliber.

The change of sight required is small, but important. The changed striking point of the bullets may not be noticed in one or two shots, but may be ample to miss game at 100 yards. For the rough and ready individual who does not want to be bothered the standard ammunition is best; but for the man who is willing to take pains, the higher and lower velocities will raise the possibilities of any rifle. The most can be gotten out of a rifle only when special ammunition is used.

ERRORS AFFECTING ACCURACY

(*Continued from page 247*)

directly across the range, from 9 to 3 o'clock. According to the above table the bullet would be blown out of its course a distance of 6 ft. 1 in. Again, supposing we were shooting at 300 yards while a 6 o'clock breeze was blowing, the table informs us that the wind would accelerate the flight of the bullet to the extent that it would strike the target six inches higher, so that an allowance must be made for it in our scale of elevation.

However, this accelerating or retarding effect is regarded by some of our .22 calibre rifle experts as not being sufficient to be appreciable when shooting at 200 yards—the extreme range for accuracy—asserting that it is generally lost in some bigger elevation change that has to be made for light or atmospheric conditions.

Miniature rifle shooting on military ranges and club shooting differ considerably. In the former we endeavour to produce a good standard when firing at fairly large figures, whereas in the latter we are not satisfied until our targets register the highest possible number of points. But then there is a big difference in the sighting of rifles. The rifle used for military purposes has a sight fitted similar to that used on a Service rifle, while very few club members use any but the "peep" or the orthoptic sight, and when firing only at one distance, adjust it to the vertical and lateral zero for the range and use it year in and year out, aiming "dead on" each time. Now lateral adjustment is ready carried out on a military range, so that if there is a

rifle which throws left or right the firer is compelled to aim off, as though he were allowing for wind, to obtain figure hits. The club member who has been accustomed to treat his backsight to allow for his own peculiarities of sight and hold receives a set-back when called upon to use a military pattern rifle on a Service range. He knows that the backsight is not meant to be fixed even on a Service rifle and very often at the danger of raising the ire of the instructor moves the wind gauge screw with the object of obtaining zero laterally. However, the club shot soon recognises that his fine adjustment is of little use to him as a war shot and so amiably accepts the methods adopted.

One could discourse at great length upon the merits and demerits of various sights which are placed on the market for the rifleman's selection and describe the differences between them, but that would be an unpardonable digression at this moment. To obtain absolute accuracy in the first place we must fit a really good orthoptic sight of the "stem" pattern rigidly and upright, one capable of easy manipulation. The elevation scale of the orthoptic backsight is generally divided into divisions each one-twentieth of an inch; these divisions, usually about sixteen, can be sub-divided into fifths, each equalling one-hundredth of an inch, by means of a vernier scale.

Now before we can satisfactorily correct an error in shooting it is necessary that we should know the extent of that error and its cause. We have ascertained the "error of the day," and we are confident that we are holding well, but there remain two essential things to be observed before proceeding further. The first is: How to alter our elevation or windage a single degree without guess work; and the second, the effect this will have in changing the spot where the bullet hits the target. How often is an incorrect setting of sights or a very hazy knowledge of the vernier scale responsible for an indifferent score, even by men who have been club shooting for years? I know my readers will declare that there is not one but dozens of other causes that all militate against an ordinary club rifleman repeatedly "finding the bull" at the 50 and 100 yards ranges. But, nevertheless, I am convinced that the thoughtless twist of the screw has often spelt disaster, not only to the tyro, but to many of our clubmen who have never troubled to understand the reading of the scale.

In conclusion, it is my conviction that the proper place in which to gather a useful understanding of the purpose and intention of the windgauge and elevation scales is on the miniature range with a reliable orthoptic sighted rifle and a good spotting 'scope; then—and not until then—apply that learning to your efforts in open competition with the best talent of the rifle shooting world.

Navy Ordnance Produces Wide Variety of Weapons

THE production of various weapons ranging from gigantic, long-range, 16-inch, 50 calibre naval rifles, nearly 67 feet long, to a new type of automatic pistol which is being tried out, has engrossed the attention of the Ordnance Bureau, Navy Department during the past year, except when the ordnance experts were engaged in such tasks as supplying 100,000 submarine mines of a new type for the North Sea Barrage and perfecting mounts for the 14-inch naval rifles which so greatly aided the American forces in France.

The work accomplished by this branch of our fighting forces is made the subject of report by Rear Admiral Ralph Earle, chief of the Bureau.

While the procuring of sufficient supplies of standard material for the needs of the Navy has been the primary function of the bureau, Admiral Earle says a large amount of experimental development work has been carried on, leading to the perfection of established types of ordnance material and the development of new types to meet the varying conditions imposed by the present war. Among such new developments may be mentioned the adoption of a new high explosive for mines, trinitroxylol; the development of new types of smoke apparatus; the production of high velocity, long range star or illuminating shell; the development of numerous types of pyrotechnic recognition signals; important investigations in naval gas warfare, and development of a delayed-action fuse for anti-submarine shell.

Improvements in existing ordnance material include experimentation on increasing the range of torpedoes; tests of a number of types of fuses for armor-piercing and other projectiles; reduction of the flash of smokeless powder for night firing; and improvements in mine and depth charges. During the past year the bureau has proved the type 16-inch 50-caliber gun, which proved successful beyond expectation, and this gun promises to be an exceptionally splendid piece of ordnance. The production program of the 104 guns of this type required has now been started and it is anticipated that the guns will be ready to meet the building program. The type 8-inch bomb-throwing howitzer suitable for desroyers or larger vessels has been satisfactorily proved and is being delivered. The Y-gun, or depth charge thrower, developed by the General Ordnance Company, has been installed on all destroyers and has proved a most valuable weapon against submarines.

The bureau has been able to render some assistance to the Army in its operations on the western front by turning over for its use many guns of the following calibers: 14-inch, 12-inch, 10-inch, 8-inch, 7-inch, and 6-inch.

Vessels not of the Regular Navy of the types noted were armed between July 1, 1917, and July 1, 1918: Troop transports, N. O. T. S. vessels, merchant vessels (armed guards), tenders, special service, mine planters, mine sweepers, yachts for distant service; section patrol boats, submarine chasers, submarine chasers (French), (two 6-pounder guns each). In all a total of 937 vessels of these classes were armed.

A large number of mines, especially designed for use against submarines, have been manufactured, and have proven superior to any previous type for anti-submarine operations. In addition the Bureau of Ordnance has developed many new types of mines, especially suited for work in different seas, each type having a particular object. Mining as a science has changed and improved rapidly, and the manufacture of mines in this country for one day now is equal to that of a year before the war. Mines are produced as fast as they are required in planting. In order to do this the Navy developed an automatic mine loading plant, which, despite the difficulties adherent thereto, and the fact that there were none in existence from which to obtain ideas, has been a success. Our mining bases abroad are models and from overseas comes a comment of the vice admiral in command, which states that the organization of the shops is in accordance with the best principles of scientific management. "It is very impressive," Admiral Earle says, "to see the efficient manner in which the great number of mines are assembled and tested. The Service may well be proud of the manner in which the mining squadron is meeting every problem that confronts this large unit of the Navy overseas."

Due to the fact that it was necessary to arm destroyers, many of which were completed each month, and to arm not only our own merchant vessels but also ships belonging to England, France, Italy, Belgium and Russia, an unforseen demand for guns from three to five inches in caliber existed. This demand was approximately ten times the capacity existing at the beginning of the war. The bureau had to erect many new plants and develop the capacity of the few plants conversant with the manufacture of guns and gun forgings. The results obtained have been comparatively satisfactory.

Steps have been taken to modify mounts, both in service and under contract, in the following particulars: (*a*) Increased elevation to obtain greater range, (*b*) additional lubrication, (*c*)

quick-slewing devices, (*d*) spray shields and (*e*) foot-firing devices.

Four-inch 50-caliber wet mounts of the housing type have been developed and a type mount is nearly completed. Fixed type of 3-inch 50-caliber and 4-inch 50-caliber wet mounts also are being developed for possible use on submarines.

During the year the Naval Gun Factory has operated at maximum capacity. Its more important work and improvements may be summarized as follows: More than 260 guns were manufactured, many more were partially manufactured, and others were relined and rebuilt. These guns varied in size from the 16-inch 50-caliber to the small 3-inch boat gun and the 1-pounder. Without the gun factory the bureau would never have been able to arm and keep in satisfactory condition the vessels of the merchant marine.

One lesson the war has impressed upon seamen more deeply than ever is the importance of naval gunnery, that victory lies in accurate shooting with heavy shells with bursting charges. Victory does not lie, Admiral Earle says, in the long range or freak guns with light shells such as were used against Paris. To increase this accuracy of fire when steaming at various speeds and courses against moving targets there have been devised new and improved instruments, in the use of which the training of the personnel has gone forward rapidly. Range finders have been perfected and new types are in prospect. The efficiency of our gunnery, assisted by these new instruments, should find our ships in the next sea battle at least equal in gunnery to any enemy.

The most intimate liaison has been maintained with the Allied navies, and immense benefit has resulted from information of the experience gained and developments made in fire control-equipment by the Allied navies. From authentic reports received from abroad American fire-control systems and equipment appear to the equal of any used in foreign navies. Active development work is now in process, utilizing the creative ability of some of the best minds of the country, looking toward other important fire-control improvements, and in certain cases toward the simplification of manufacture without loss of efficiency.

An ample supply of Lewis machine guns is being provided for use in the naval service. Light and heavy type Browning guns are being provided for the Marine Corps. The Navy is depending upon the Army for Browning machine guns, rifles and pistols. A line-throwing gun of the shoulder type has been developed and will shortly be issued to the Service.

The installation of turret machinery on the battleship Mississippi was tested, and successfully fired with the ship listed seven and one-half degrees; the guns at fifteen degrees elevation gave the calculated range. Recoil mechanisms have been improved by the addition of expansion chambers and by replacing doubtful springs on the Texas, Oklahoma and Nevada. A simple modification for counter-recoil mechanisms has been developed and tested so that the bureau is in position to provide satisfactory mounts for firing at high angles. A pneumatic type of counter-recoil mechanism has been designed and will soon be tested and, if satisfactory, will be adopted for all ships mounting 16-inch 50-caliber guns.

In the last half of the year a railway mount carrying a 14-inch 50-caliber gun, capable of being fired up to forty-five degrees elevation, was designed, and five were completed prior to June 1—the first being successfully tested at Sandy Hook on April 30. Six locomotives and seventy cars, consisting of construction cars, berthing cars, fuel cars, workshop cars, etc., completely equipped were furnished by the bureau for the United States Naval Railway Battery No. 1.

The bureau has designed a tractor mount which carries a 7-inch 54-caliber gun of the type on vessels of the Louisiana class. Contracts have been awarded for the manufacture of such mounts, and for the 120-horsepower tractors necessary for hauling them, the bureau proceeding with the assembly of all material necessary for the operation of these guns.

The manufacture of armor and projectiles has proceeded in a satisfactory manner. Four new types of projectiles have been developed during the year. Contracts were awarded for projectiles necessary for all needs.

The increase in production of torpedoes has been great, and although the production has not yet reached a point to fully meet the needs of the Service, no actual shortage exists as yet.

The report in speaking of the work of the Special Board on Naval Ordnance says that the investigation of a proposed method of gun construction by which the initial tensions, secured in the present system of shrinkage, were to be replaced by initial tensions produced by expansion of tubes by very great interior hydraulic pressures, has been continued, and a 3-inch landing gun has been constructed by this process. The process, if successful, appears to be applicable to guns of considerable caliber, including the built-up guns, and the work so far has been sufficiently successful to warrant further constructional work along these lines.

The consideration of new sources of power for torpedo propulsion has been continued, but the two types on which the most experimental work has been done do not promise improvement over the present method of torpedo propulsion. Experiments in the use of motorite, a burning composition of about ninety per cent. nitroglycerine, caused the bursting of the containers. Since that time the inventor has been occupied in further experiments. Another method of furnishing power for torpedo propulsion, that by the use of a thermite boiler, at present appears impracticable, and the experimental work in its development does not promise successful results. The most promising lines of increasing the range and accuracy of the present torpedo appeared to lie along the lines being followed by officers of the bureau.

The activities of the board have included the consideration of almost every type of ordnance material, offensive and defensive, which are generally of a specific nature, tending to improve the efficiency of existing types. Much of this investigation work has been of service in the development, by the bureau, of superor types of ordnance material generally.

The bureau will soon be in possession

of ample proving-ground facilities, which will be utilized to the utmost in performing the experiments and tests desired for many years toward the improvement of both ordnance and gunnery.

The Navy's powder factory has been operated full time, but at less than usual capacity, due to a serious fire which practically destroyed the solvent recovery building No. 2 and its equipment on Nov. 19, 1917, this representing over one-half the solvent recovery capacity of the plant, and causing a reduced output for the remainder of the fiscal year. This house has been rebuilt on a better and, it is hoped, on a more fireproof plan, and is again in operation. The total fire loss for the fiscal year 1918 amounted to $101,-076.32.

The navy nitrate plant contracted for at Indian Head, Md., for which an expenditure of $9,150,000 was authorized, to be ready by December of 1919, will give a daily production of 180,000 pounds of ninety-six per cent. nitric acid. It is expected that this plant will furnish an ample and cheap supply of nitric acid for its powder, entirely independent of external or foreign supply.

INVESTIGATION OF ORDNANCE ASKED

Senator Poindexter is the author of a resolution which seeks to bring about an investigation of the Ordnance Department by the Senate Committee on Military Affairs. The resolution, according to the Senator was offered for the purpose of determining whether certain allegations made against this Department and the Quartermaster Department are justified.

That part of the resolution outlining the scope of the proposed inquiry reads:

"Resolved, That the Committee on Military Affairs shall proceed at once to investigate the Bureau of Ordnance and of the Quartermaster General of the War Department with particular reference to the manner in which funds appropriated by Congress for ordnance and supplies have been expended by those offices during the present war with Germany; and that said committee shall report to the Senate the number of 3-inch and other artillery shells, small-arms ammunition, rifles, automatic rifles, light and heavy machine guns, light and heavy field artillery, with the necessary carriages and other parts and appurtenances thereof, and the amount, kind, quality, cost and disposition of food, clothing, and other necessary supplies and equipment procured by the said Ordnance Office and the the office of the quartermaster general, respectively, and supplied during the said war to the military forces of the United States in France, and what portion of the same were procured in the United States and what portion in France."

In offering the resolution, the Senator read a newspaper statement which charged that:

"The total shipment of 3-inch shells of all kinds sent from the United States to France during the whole period we were in the war was about 3,000,000, and * * * this supply, under the intensive conditions prevailing, would hardly have met the requirements for a single month."

BRITISH SUBS SUNK MANY SHIPS

Forty-three enemy warships and 272 other crafts were sent to the bottom by British submarines during the world war, but in no instance was a merchantman struck without warning, and care was taken to insure the escape of merchant vessel crews. These facts have been made public by the British admiralty, in a report dealing with the activities of the English undersea boats.

The vessels destroyed by the British submarines included two battleships, two armored cruisers, two light cruisers, seven destroyers, five gunboats, twenty submarines, and five armed auxiliary vessels. In addition, three battleships and one light cruiser were torpedoed, but reached port badly damaged. One Zeppelin also got back to port badly damaged after having been attacked by a submarine.

Other enemy craft destroyed by British submarines were fourteen transports, six ammunition and supply ships, two store ships, fifty-three steamships, and 197 sailing ships.

The submarines also played an important part in convoy work. In the third year of the war one of the British submarine commanders carried out twenty-four cruises, totaling 22,000 miles, which probably constitutes a record for any submarine. In the first and second years of the war seven British submarine commanders carried out a total of 120 cruises, extending for 350 days, all of which were actually spent in the enemy theater. The Admiralty, thanking the merchantile marine and the fishing industry for their incomparable services during the war, says that without the loyal cooperation of the former with the navy and its indomitable courage the enemy's submarine campaign must inevitably have attained its object. The success achieved against the submarine, the Admiralty says, was also largely due to the interest taken by the owners in defensive equipment for ships. Moreover, the convoy system, which played so important a part in frustrating the enemy's designs and in securing a safe passage for the Army of the United States, necessitated practicing the new science of station keeping. The accuracy of this greatly depended upon the engineers' adaptability and skill. The Admiralty also says that aboard all ships, from the largest dreadnought to the smallest patrol boat, there were found officers and men of the merchantile navy combining with those of the Royal Navy in fighting the enemy and defeating his nefarious methods of warfare.

BOOK REVIEWS

The 1918 edition of "The ABC of Aviation Engines" has just appeared from the press of the Norman W. Henley Publishing Company, of New York. The book is the work of Capt. Victor W. Page, Sig. R. C., A. S., and follows his previous volume, "Aviation Engines," which has been used extensively as a text book in aviation schools. The book has been prepared with a view of providing a comprehensive manual couched, as far as possible, in non-technical terms, although it treats of the basic principles of airplane flight.

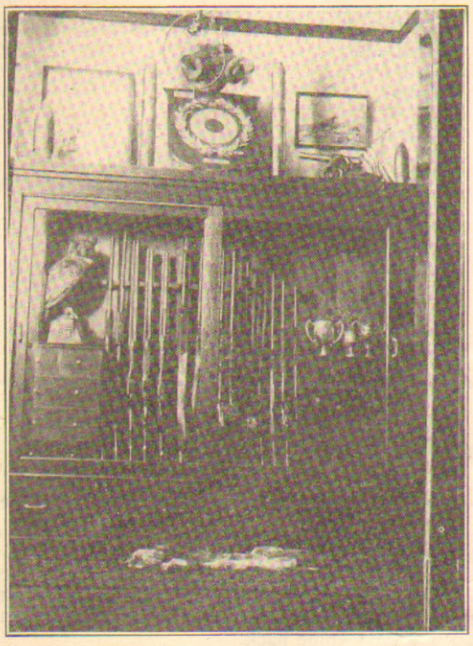
"Do's and Dont's for New Soldiers," although appearing very near to the time when demobilization is the order of the day, is a valuable little book by Major Harlow Brooks, M. R. C., dealing with the problem which every man who is called into the service must solve for himself—physically preparing himself for the work that he has to do and safeguarding himself against dangers other than those which he may expect to face on the battlefield. The book is chiefly devoted to a discussion of personal hygiene and disease prevention.

As modern warfare becomes more and more involved and intricate, the problem of couching all messages in language which cannot be misunderstood has been given increasing consideration. Several books have been written upon army paper-work, but the latest and perhaps the most complete contribution to the subject of military letters is "The English of Military Communications," by Major William A. Ganoe, a member of the instructing force of the United States Military Academy.

The course of lessons contained in the book has for its object the demonstration to the military man that rhetoric is no unimportant part of his profession, and that a study of English phraseology should be part of every officer's preparation in field regulations.

Statistics recently compiled show that nearly 24,000 persons in India were killed by snakes last year, and more than 2,000 by wild animals. Tigers caused 1,000 deaths, leopards 300, wolves and bears 280, and elephants and hyenas 80. Government rewards were paid in the course of the year for the destruction of 74,000 snakes, 1,200 tigers, 6,000 leopards, 2,000 bears, and 2,000 wolves.

From Club Room and Firing Line



Bunding's Gun Cabinet which contains high grade Pigeon and Trap Guns, Ross, Russian, Mauser, Mannlicher, Savage, Winchester, Remington and Mannlicher-Schoenaur Rifles and the .30 Springfield with which W. H. Spencer won the Military Individual Championship in 1916 at Jacksonville

Has Complete Outfit For Range or Hunt

T. E. BUNDING of St. Louis—those who know him best usually hail him as "Ted"—believes in every possible refinement in the way of excellent "shooting irons" when he sets out to burn powder, no matter whether the explosive is to be expended at game, at targets on the military range or over the traps, smashing the festive blue clay. And for 24 years Bunding has never lost an opportunity to add to his collections any worth while pistols, revolvers or rifles which came his way. In fact some of his friends are a bit disturbed over the possibility of Bunding never being satisfied until he has added a machine gun or two to his arsenal.

In Bunding's home there is a gun room which is a delight to most of his friends, who naturally are to be largely found in the ranks of the rifle and pistol enthusiasts. It is not the sort of gun-room that the collector of firearms so often produces—a helter skelter mass of obsolete weapons. But it is just the kind of place that one would expect a shooting enthusiast to have evolved, and there Bunding's collection, gotten together during his 25 year's experience in the shooting game is housed.

Bunding has won 42 medals with rifle, revolver, pistol and shotgun during his shooting career, and knows what a good weapon is. In his gun cabinets may be found some of the best examples of European and American gunsmithing. At present he is the owner of fifteen rifles, twelve pistols, seven revolvers and eight shotguns. Every one is in gun-crank condition.

During the National Matches of 1916 and 1918, Bunding became a familiar figure to civilian riflemen, having been a member of the Missouri team on both occasions, and having utilized most of his spare time about the range in "mixing in" and incidentally snapping what is one of the finest collections of contemporary American riflemen, both military and civilian, in existence. In addition Bunding has a wonderfully fine gallery of trapshooters for he is almost as much of an enthusiast with the scattergun as he is with the rifle and revolver.

Turkey Shoot Successful

Members of the Redlands, California, Rifle Club staged a match on November 24, as the result of which several of the boys carried off fine Thanksgiving turkeys.

The weather conditions were ideal, the only exception being a varying light on the 300-yard target. A moderate wind was blowing and the scores, taken as a whole, were among the best ever made on the range. The shoot resulted in a tie between Loge, Jones and Maccubbin and in the shoot off at the 500-yard range Jones won the turkey with a score of 47 out of a possible 50. All of the members shooting had some alibi for not winning the bird. Eimer, one of the clubs best shots, had an off day. Weaver, who was picked to win, got off with a bad start on the 500-yard range. The other members blamed the secretary of the club, who did the handicapping, for their downfall, although they could hardly hold him responsible for the shots placed in the "3" ring.

Taken all in all the match was a big success. Lieut. Herbert, new officer of the S. A. T. C. at the university, was a visitor to the range and shot a score at 300 yards. The following were the scores made, the match calling for 10 shots at 300, 500 and 600 yards, with handicaps.

Loge	137
Jones	137
Maccubbin	137
Wittwer	136
Rolfe	134
Dague	133
Eimer	130
Weaver	129
Johnson, W. B.	120

SHOOT OFF

Jones	47	.. ..	47
Maccubbin	45	.. ..	45
Loge	43	.. ..	43

Peekskill to Hold Matches

All winter shooting will continue to be the order of things on the Navy firing lines, and Peekskill, one of the most northern of the ranges is preparing for a series of matches in the near future.

Plans are under way for the staging of the rifle meet under the auspices of the Athletic Association. No definite date has been announced, but it will probably be before Christmas.

The meet will be open to every man on the Permanent Force in order to give every man an opportunity to get in on the prizes a system of classification is being worked out which will embrace three classes, A, B, and C.

Class A will consist of men whose record shows that they have qualified as Army and Navy experts as well as the 600- and 1,000-yard courses.

In Class B will be all the men who have qualified as Navy experts.

The remainder of the force will be assigned to Class C.

Every man on the range is expected to enter the meet, the list of classifications will be placed on the bulletin board before the commencement of the first match.

The meet will be conducted under the rules which governed the National Rifle Association Meet at Camp Perry, Ohio, during the past summer.

Prizes will be awarded to the highest scores in each classification. A gold medal to the winner, silver medals to the next two high, and bronze medals to the three having the next highest scores in each class.

The "Class A" competitors will shoot rapid fire at 200- and 300-yards, the first stage sitting from standing, the second stage prone from standing; time, 1 minute, and 1 minute and 10 seconds; and slow fire at 500 yards, 600 yards and 1,000 yards, 10 shots at each range, prone.

The "Class B" contestants will shoot the 60-shot Navy skirmish run.

The "Class C" contestants will shoot changing position fire, slow and rapid fire, at 300 yards.

Besides the above a bull's-eye match will be held, open to all, 500-yard range, 2 sighting shots, continue to fire until bull's-eye is missed.

The prize for the winner of this match is a handsome silver loving cup.

A force of nine men under Gunner's Mate Carl Carlson is engaged in keeping the smallarms equipment of the Peekskill range in good condition. The Peekskill armory is as well equipped as that of any navy range.

Carlson, who studied armory methods at the big Marine Corps Camp at Quantico, Va., was in charge of the Blue Jacket armory at Camp Perry during the recent National Matches.

Within the past few weeks the range has received 150 new Springfield or U. S. Model 1903 Rifles, these will replace the same number of old rifles which have been used here during the summer. The latter will be sent to a Naval Training Station to be used for drill purposes.

The armory equipment at the present time includes 230 U. S. Model 1917 rifles, 320 U. S. Model 1903, 18 Colt Automatic revolvers, cal. .45; 42 Colt revolvers, cal. .38; 6 Lewis machine guns; 4 Browning machine Rifles, and 4 Colt machine guns.

Fifty men can be accommodated at one time at the cleaning racks where ram-rods and oil are conveniently placed for their use. Each rifle is cleaned when it comes in from the firing line and inspected by one of the armorers before it is placed in the gun rack.

A force of nine men are kept busy going over the rifles, tightening guard screws, replacing broken parts and cutting cleaning patches.

A new rack 16 feet long, which holds 180 rifles has been built to replace the racks which were a part of the equipment of the armory when the Navy took over the range. The new rack is an improvement over the old style, as the rifles are so arranged that the front sight is protected from coming in contact with any part of the rack which would injure the sight.

Some of the Peekskill boys are visiting New York City at frequent intervals to instruct the members of the New York State Guard in indoor practice. This practice consists of aiming and sighting drills and trigger squeeze drills.

Mt. Pleasant Gets Ammunition

The ammunition shortage from which the Mt. Pleasant, South Carolina, Navy Range has been suffering for the past few weeks has been relieved by the arrival of a million rounds. Trucks loaded with it began arriving in the dim light of morning a few days ago and kept up their deliveries until well into the night. Pending the arrival of the big supply the range has been run on cartridges borrowed from Charleston.

Montreal Wins From Toronto

The first revolver match between Montreal and Toronto (postponed from November) was won by Montreal by 1,030 to 924. The match was 20 shots per man, indoors, at 20 yards. The second match of the series will be shot next week. The scores:

Montreal A. A. A.			
J. Boa	97	84	181
F. Dumfries	84	91	175
D. E. Saunders	86	87	173
E. G. Brewer	84	84	168
D. K. Young	84	83	167
A. M. Green	80	86	166
Total			1,030

Toronto R. C.			
A. Rutherford	85	86	171
J. P. White	79	84	164
C. E. Peterkin	75	74	149
R. Clarke	73	75	148
W. J. Medforth	73	73	146
T. A. Henderson	76	70	146
Total			924

T. G. Margetts.

"Bear Shoot" at Hartford

Twenty members of the Hartford, Conn., Rifle Club turned out to that organization's "Bear Shoot" held November 15. The bear used at the Hartford Club is a miniature bruin, this time from the brush of Paul Saling, one of the members, and each shot is labeled with the name of the marksman making it, each contestant firing once.

The club is planning a bear shoot a long range, outdoors.

Team shooting preceding the bear shoot was very close, a margin of 8 points to the winners being the largest. Following the target work the club enjoyed a fine supper served under the supervision of W. J. Hubaty, Julius Weiss, Shooting Master Charles Bodenstein, and Captain Leo Grcywacz, a quartet who provided a delightful surprise in unearthing from the recesses of the larder some old vintage which necessitated the appointment of a toastmaster and a season of impromptu speeches. Subjects covered a wide range in war and peace, and many of them dwelt on the promising future of this more than half-century-old shooting club.

Marines Lose to Civilians

It is not often that members of a civilian rifle club can best a bunch of "Leather Necks" on the rifle range, but this is what happened when a team of U. S. Marines and a team from the San Diego Rifle and Revolver Club met on the range at La Jolla December 1. The civilians hung up a total of 1,564 points out of a possible 1,800, while the Marines scored 1,545. The match called for 10 shots each slow fire, 600 yards, 500 yards, and 300 yards, and 10 shots each, rapid fire, at 200 yards, 300 yards, and 500 yards.

The Marines were headed by Captain Clark, who officiated as range officer. The match was shot off in record time. The full Marine course was shot over; no sighting shots were allowed. This course is considered the hardest expert course laid down in the Government manual. The contest was almost a tie; starting from 600 yards until the 300-yard range was reached. Here the civilians took the lead, which the Marines fought hard to cut down. However, the contest was not won until the last string of shots was fired.

The Marine outshot the civilians on the rapid-fire course by seven points, and the club members led in the slow-fire course by 26 points, leaving the club a lead of 19 points.

The Marines were equipped with the 1917 Model United States Government rifles, which are considered excellent at rapid fire, whereas the civilians were equipped with the 1903 Government Springfield, which has superior sights for slow firing work. Sergt. Pleasant of the Marines led the entire field with 276 points, while Charles Osborne led the club with 267 out of a possible 300 points. Carl Schroder of the club won a leg of the Dr. Chartres-Martin trophy by having the highest slow fire score, while Sergt. Pleasant of the Marines was a close second. The scores of the day were high considering the poor light conditions which prevailed on the mid ranges.

The United States Marine Corps holds the United States rifle championship, having won that distinction at Camp Perry, Ohio, last September, when they defeated all other branches of the United States Army and Navy, also civilian clubs.

Following are the scores made:

San Diego R. & R. Club	
Osborn	267
Hill	266
Bellon	265
Schroeder	264
Hall	262
Hubbs	240
Grand total	1,564

U. S. Marines	
Pleasant	276
Honey	258
McKaran	257
Hedden	256
Matheny	251
Berger	247
Grand total	1,545

SIGHTING SHOTS AND RICOCHETS

MARKSMANSHIP is spreading through all of the schools of the country, and before many months have passed it is likely that a majority of the high schools and preparatory schools of the nation, as well as the military schools and colleges, will have formed rifle clubs among the members of the student body. This is partly due to the efforts of the National Board and the office of the Director of Civilian Marksmanship to interest the educational institutions of the country in rifle practice as a sport, but it seems largely due to the fact that many educators who in times past looked upon marksmanship as an evidence of incipient militarism have completely changed their views on this point.

Among the many educational institutions where rifle clubs are in process of formation are the Syracuse, New York, High School; Tilton, New Hampshire, Seminary; the Pueblo, Colorado, Public High School; the Asheville, North Carolina, School; the Pawling, New York, School; the Lake Mills, Iowa, Public School; the Douglas, Arizona, Public Schools, and the Des Moines, Iowa, Public Schools.

The new .22-calibre Winchester muskets which are now being distributed to rifle clubs seem to be meeting with high approval. Most of the club members who have tried them out seem convinced that very accurate shooting is possible with these arms.

C. T. Patterson, secretary of the Ashtabula, Ohio, Rifle Club, is working to interest members of that organization in indoor qualification shooting on the N. R. A. Watch Fob Targets during the coming winter months. Commenting upon the personnel of the National Board for the Promotion of Rifle Practice, Patterson says: "I would like to shake hands with the Assistant Secretary of War for his selection of members on the reorganized National Board. These names all look good to the shooting fraternity."

Practically every member in good standing of the Empire City Rifle and Revolver Club, of New York, are either in the Army or Navy, and one of the club members, L. Cabasin, was killed at Chateau-Thierry. The president of the club, Lt. Ralph Eberlin, was severely wounded during the second battle of the Marne. During the absence of the active members, I. Richter, the secretary, has been personally defraying the expenses attendant upon keeping the club range available until the boys come back.

Three marksman and one sharpshooter qualifications have been reported by the Tamagua, Pa., Rifle Club. They are; sharpshooter, W. H. Diefenderfer, 202; marksmen, Arthur Merman, 173; Charles Hoffman, 161; John Schaeffer, 170. All qualifications were made over the small bore outdoor courses.

Shooting the 22 calibre outdoor course, the Altoona, Pa., Rifle Club has qualified eleven of its members according to the latest report of the Secretary. Those who qualified were: Experts: R. W. Francke, 242; Carl Hauser, 242; C. M. Kerns, 241; H. G. Olson, 231; S. T. McDowell, 231; C. C. Harris, 228; L. M. Nugent, 226; J. S. Davis, 224; C. M. Ritchie, 214. Sharpshooters: F. K. Fildes, 195; S. H. Owens, 194.

James I. Reynolds has qualified as an export rifleman in the modified Navy Course at the Peekskill, N. Y., Navy Rifle Range.

With a score of 222, George C. Wilkins, of the Manchester, New Hamphire, Rifle and Pistol Club, has qualified as an expert rifleman.

Shooting the small bore course, R. D. McCoy, of York, Pa., an annual member of the N. R. A. has qualified as an expert rifleman on a score of 233.

Report has been made by the Western Reserve Rifle Club of Cleveland, Ohio, of the qualification of eleven members, eight as marksmen, three as sharpshooters. They are: Sharpshooters; S. G. Steaves, 152; W. H. Sletzer, 173; Henry N. Walkden, 164; marksmen: Clarence E. Alger, 157; A. Christianson, 151; A. G. Knapp, 155; Lechner, 165; E. H. Stranahan, 153; S. G. Steaves, 164; W. H. Sletzer, 165; Henry N. Walkden, 156.

Firing the outdoor small bore course, F. E. Remington, on a score of 217 has qualified as an expert rifleman. He is a member of the Ridgewood, N. J., Rifle Club.

England has prohibited the feeding of grain to pheasants.

The States of Idaho and Washington and Alberta, Yukon, Northwest Territory and British Columbia permit goat hunting.

An effort is being made to interest State Game Commissions in making an intensive study of the game resources of each State with particular reference to the ratio between the kill and the game remaining in the covers.

Wisconsin has shortened the open season on deer.

California prohibits the sale of aigrettes, birds of paradise and goura or mumida.

J. V. O'Hara, of Vallejo, Cal., is responsible for a new invention of aid to duck hunters. It is a decoy that wiggles its tail and dives like a real duck. The "bird" is manipulated by means of a wire from the shore.

Wyoming is the only State that permits sheep hunting. Four Canadian provinces also permit sheep hunting.

The killing or capturing of migratory birds between sunset and a half hour before sunrise is prohibited under Federal regulations.

General H. C. Trexler has a herd of forty-seven bison on his Allentown (Pa.) reservation. The largest private herd numbers 700 and is owned by the Phillips Estate, Fort Pierre, S. D. The largest herd in the world numbers 2,291 and is at the Wainwright Buffalo Farm, Alberta, Pa.

Charles Sheldon has for some time past advocated that the big-game States should prohibit by law the sale of game trophies. We agree with him and believe that legislation to this effect should be generally enacted.

The Spokane (Wash.) City Council has revoked its order prohibiting trapshooting on Sundays at Glover Field, and every Sunday now the Spokane Gun Club entertains at the traps. The Sunday shooting was stopped last spring because of objection by a nearby church. This objection has been withdrawn.

Sixty-seven deer were killed on the two deer-hunting days in Vermont in November. Vermont is thought favorably of by sportsmen who desire good fishing and hunting, for nearly 2,000 licenses were issued this fall, nearly half of them being to non-residents.

Two expert and one sharpshooter qualifications have been reported by the Norwalk, Conn., Rifle Club. They are; experts; E. N. Dart, 225; B. J. Reynolds, 219; sharpshooter; F. H. Gaming, 209. Qualifications were over the small bore course.

Nine members of the Nevado, Iowa, National Rifle Club have qualified as marksmen. They are: R. L. Hollaway, 151; L. K. Wall, 160; C. E. McVay, 159; Sam White, 156; T. C. Tarman, 162; E. W. Scott, 159; C. Sarenson, 154; M. J. Cox, 153; G. Lounsberry, 154.

The Globe, Arizona, Rifle Club reports the qualification of sixteen marksmen. They are: Fred Barrett, 180; J. Bruce Wright, 179; Richard W. Mayne, 175; James A. Larson, 159; Wilbert G. McBride, 169; George Brunfield, 167; Ivan H. Barkdoll, 165; David L. Forrester, 163; Hylton H. Colley, 162; Walter P. Doolittle, 162; Al Weigbecker, 157; William J. Chappelle, 157; Charles E. Griswold, 155; Herbert Woodward, 151; Bert Fletcher, 151; Vlasco C. Murphy, 147.

Recent report from the Niagara Falls, New York, Rifle Club, shows the qualification of four members, one expert, one sharpshooter, and two marksmen. They are: experts, R. S. Tabor, 151; sharpshooter, Harry B. Hunter, 163; marksmen, Charles C. Williams, 174; Humphrey Nolan, 151. All qualifications were made under the N. R. A. courses.

Seven qualifications have been reported by the Manchester, New Hampshire, Rifle and Pistol Club, five experts and two sharpshooters. They are: experts, R. S. Lang, 226; A. J. Reed, 225; M. W. Gould, 218; S. P. Dogde, 214; O. M. Howlett, 214; sharpshooters, L. P. Schwarz, 202; S. J. Marsh, 196.

The Forest Service Rifle Club of the District of Columbia has qualified four expert riflemen. They are: Charles L. Smith, 223; L. H. Buchman, 222; R. V. Reynolds, 231; W. H. Shircliff, 214.

Roy P. Davis, of the St. Augustine, Florida, Rifle Club, has qualified as an expert rifleman on a score of 224.

R. F. Vast, of the Department of Agriculture Rifle Association of the District of Columbia has qualified as a marksman on a score of 141. Mr. Vast is a member of the Bureau of Markets Rifle Club.

When the annual Members' Match was shot by the Worcester, Mass., Piston and Rifle Club, Dr. W. L. Shipman was the winner on a score of 137. Sixteen members took part, the large calibre rifles being used.

On a score of 133 Frank E. Odell won the Members' Match, when the Mountain View, Calif., Rifle Club held that event some months ago, at which fifteen members shot.

With the day cloudy, and a twenty mile wind blowing, the Ventura County, Calif., Rifle Association shot the annual Members' Match several months ago. The event was won by Archis Ennis on a score of 134.

C. J. Foltz, on a score of 138 won the annual medal shoot of the Canton, Ohio, Rifle and Pistol Club, staged last September, fourteen members shooting.

The Saginaw, Mich., Rifle Club held its Members' Match last September when John C. Smith, Jr. won the medal on a score of 130. He was beaten by three points by Harry Chambers, but because Mr. Chambers was the medal winner for 1917, Mr. Smith carried off the trophy. Small bore rifles were used.

Shooting on the New York Guard State range, the Elmira, New York, Rifle and Revolver Club held the annual Member's Match last September. Twenty-two members shot, the medal going to Lt. W. K. Whitley who made a score of 128. He was closely followed by F. J. Jones and N. C. Wheeler, whose respective scores were 127 and 126.

A score of 129 won the Members' Match for C. E. Hoover when the Johnstown, Pa., Rifle Club shot that event the middle of September, fourteen members taking part.

The Members' Match of the Rye, New York, Rifle Club was shot over the club range on Nov. tenth, ten members being present. The event was won by E. Cave, on a score of 126.

Competing on the Boise Barracks Range, the Boise, Idaho, Military Rifle Club shot the Members' Match October 13, twelve members participating. Excellent weather conditions prevailed, the light being steady, with practically no wind. Roy E. Herrick, on a score of 140, was the winner.

The Bureau of Animal Industry Rifle Club, of the Department of Agriculture of the District of Columbia shot its annual medal match over the Congress Heights Rifle Range, with thirteen members firing. William White carried off the honors with a score of 118. A. C. Weimer and G. B. Taylor being tied for second place with 116 points each.

When the Brainerd, Minn., Rifle Club fired its Members' Match last September there were eleven members present, and P. O. Erickson won with a score of 122. R. W. Castle was second with a score of 121.

The high score for shooting at 1,000 yards on the Annapolis, Maryland, Navy Range, was hung up recently by F. R. Jacobs, a coach on the 600-yard range. Jacobs scored 98 out of 100. Jacobs ran 19 bull's-eyes and then fell out for a 3.

Machine Guns

P. T. Streit

In Rod and Gun in Canada

NEXT to the regular military infantry rifle and service pistols and revolvers, no weapon used in the great war is employed in such great numbers as the automatic machine gun. A short review of the history of these weapons may be of interest to some readers. The first models of this style of arm were called quick firers and were all hand operated by turning a crank or similar contrivance. They were constructed by placing a number of rifle barrels either side by side or in a circular form, so that one barrel could be loaded and fired successively. The first and probably the best known of these hand operated guns, was the American Galting, some of which were used in the Civil War, 1861 to 1865. The next gun of this type mentioned as used in war was the French Montigny "Mitrailleuse" and the Barvarian "Feldl" gun. Both of these guns were used in the Franco Prussian war of 1870 and 1871.

Later the Nordenfelt and the Gardner guns were introduced into some of the armies in a limited way. The Gatling gun was used by Russia in 1877 and by England in the Egyption campaign in 1882. France used several Gatling gun batteries in 1871.

These hand operated guns never proved much of a success, and not until 1883 do we hear of a real automatic gun, the invention of the American Engineer, Hiram Maxim, who was at that time residing in England.

Hiram Maxim spent a great deal of time and money in building and perfecting his model, and the result was sure gratifying to the inventor. His principle used is, to utilize the power of the explosion and let the recoil operate the gun, that is, eject and reload automatically.

Maxim's system was followed by different inventors of automatic guns ever since. On account of its certainty and reliability of functioning and the rapidity of its fire, the Maxim gun attracted universal attention among military experts of all nations, and the Maxim in its original or in a modified form, has been introduced into the service of nearly every army and navy in the world.

The ammunition used in the gun is always the same as that used in the infantry rifle of the respective army.

The Maxim gun has been steadily improved in many ways. Particularly in the matter of reducing weight. The so-called English Vickers represents the light model, although its mechanism is practically the same as that of the Maxim. The gun is often referred to as the Vickers-Maxim. This machine gun has a water jacket around the barrel for the purpose of cooling the barrel during rapid fire. As many as 400 to 500 shots per minute can be fired by the Vickers-Maxim.

The Austrian machine gun by the Archduke Salvator and Major Dormus was brought out and introduced into the Austrian Army about 1893. This gun was superceded in the Austrian service by the model 1902 Schwarzloze gun, the invention of the German Engineer, A. W. Schwarzloze.

The Schwarzloze gun also has a water jacket for cooling and is noted for the small number of constituent parts, and simple construction. There is but one spring used in the Schwarzloze.

The Bergmann machine gun is another gun of the Maxim type. It is recoil operated and has a water jacket. The Bergmann gun was never really accepted as the official gun of any government. The Maxim, Schwarzloze, and Bergmann guns use a woven belt containing 250 cartridges for loading purposes.

A gun much used by the Russians in 1914-1915, is the old model gas operated Colt-Browning machine gun. This Colt gun is operated by the gas of the explosion instead of the recoil.

The Colt gun is air cooled, a small pump like contrivance forces air through the barrel after each shot. The Colt gun also uses the web belt of 250 cartridges for loading.

The French army is using the Hotchkiss machine gun. This is another gas operated gun. The gun is worked by a portion of the gas escaping through an automatic valve working a piston in a tube underneath the barrel. The gun has no water jacket and is air cooled.

The Madson gun is another modern machine gun, and is used some by the English and the French armies. It is the invention of the Danish Engineer Schouboe. It would appear that the Benet Mercier machine gun is practically the same as the Madson. It is also known as the Rexer gun. The Madson gun is recoil operated and air cooled. It is really a machine rifle and weighs about 17½ pounds. It can easily be carried by one man. The Madson gun is loaded from special metal clips that fit into the top of the receiver.

One of the latest model machine guns now used in large numbers by the English, Belgian and Amercan armies in France is the Lewis machine gun. It is the invention of the American Army officer, Col. C. N. Lewis (retired). The gun has a new but very efficient and good cooling system. The magazine is also a new one, having a circular form, and the unloading and reloading can be done very easily and rapidly. The Lewis gun is manufactured in Birmingham, England, for the British and Belgian armies and in Utica, N. Y., by the Savage Arms Corporation for the U. S. Army. The Lewis gun is very popular in England.

In June, 1918, at a test by the British ordnace department, held to ascertain the merits of the different machine guns in use in the army and navy, as well as in the aerial service, since the general introduction of the Vickers-Maxim machine gun into the English branches of the service, the following guns were entered: The French light and heavy Hotchkiss guns, the Madson, the Lewis gun, and the French Berthier machine gun. The result of the test was:

1. Lewis gun; 2, Light Hotchkiss; 3, Madson; 4, Heavy Hotchkiss; 5, Berthier.

The committee reports that it is not justified in making a change and the Lewis machine gun will remain the light model gun used in the English service. The Vickers-Maxim will also be retained in the service.

Now we come to Uncle Sam's latest adopted models of the automatic machine guns. I refer to the heavy Browning water cooled machine gun of model 1918, weighing complete 34½ pounds, using a belt of 250 rounds for feeding, and the Browning machine rifle, model 1918, air cooled, weighing about 15 pounds.

This machine rifle is loaded with fixed clips holding 20 cartridges. In the government test held in May, 1917, as many as 39,500 shots were fired without a break. The machine rifle stood up at the government test equally well. Both guns were rated 100 per cent by the board conducting the test. These two Browning guns represent the best so far brought out in the machine gun and rifle line, and are the product of the untiring inventive genius and labor of the well-known inventor, John M. Browning, of Ogden, Utah, he of automatic pistol, rifle, and shotgun fame.

These two new guns are the result of years of experience in the building of all kinds of firearms by Mr. Browning, and are the first guns named after him. I will name a few of Mr. Browning's patents, which were all used and the pistols and guns covered by them manufactured in enormous numbers, and sold in every country on the globe.

The Fabrique Nationale Liege, Belgium automatic pistols, rifles and shotguns are all built after the Browning patents. The Winchester rikes of models 1886, 1890, 1892, 1894, 1895, 1906, the Winchester shotguns, model 1901 and the model 1897. The Stevens repeating shot-

gun is Brownings' patent. The Remington automatic rifles of calibre .25, .30, .32, and .35 calibre for rimless cartridges and the Remington automatic shotgun, are all manufactured after patents by John M. Browning.

All the Colt automatic pistols as well as .45 automatic, are the Browning patents.

All of the Browning firearms are known for their business like construction, certainty of functioning, strength and reliability.

I hope that the sportsmen of America will have a chance to use still newer guns, that are the production of the inventive genius of Mr. John M. Browning.

These clubs have been admitted to membership in the National Rifle Association:

CIVILIAN CLUBS

Massachusetts

Fairhaven Rifle Club, of Fairhaven, Mass.—Lewis F. Poor, secretary; Richard A. Terhune, president; Clarence F. Delano, vice-president; Asaph P. Foster, treasurer; Leroy B. Newton, executive officer. Membership, 52.

LIFE MEMBERS

E. C. Bartram, Logan, W. Va., bookkeeper.
Lieut. B. N. Richardson, U. S. Army, Davenport, Iowa.

The Old Miner

By BERTON BRALEY

I'm a bit too old for fightin', but when workin' on my shift,
As my noisy drill is bitin' at the ore seam in the drift,
I feel kind of like a soldier, and it seems this shakin' drill
Is a trusty young machine gun that is shootin' with a will;
And I sight along its piston like a gunner in the line,
And I guess it sort of thrills me when I run this drill of mine;
For it's makin' holes for powder that will shoot the copper free
To be used to make munitions for the cause of Liberty.

So I keep this drill a-throbbin' an' I listen to its song
Like a bunch of rapid-firers that is goin' mighty strong;
And I finds myself a-thinkin' "Here's a round or two for Fritz,
That'll cause him some discomfort in his innards when it hits."
And although I'm just a miner, rather gray and bent and lame,
I can feel I'm smashin' Boches by my labor, just the same,
As my drill is jumpin', thumpin' at the copper-bearin' rock
Which'll go to make munitions that'll give the Hun a shock.

I would like to shoot a Lewis or a Browning gun in France,
But I'm dim-eyed and rheumatic, and I'll never have the chance.
Yet I find some consolation when I fancy this machine
Is a snappy new machine gun that is drillin' Teutons clean;
I can think I'm right in battle as I hear its ringin' bark
And imagine every bullet that I'm sendin' hits the mark.
And although that's all a vision, and it goes and leaves me flat,
I can still feel like a soldier as the drill sings "Rat-a-tat!"
For I'm minin' the material that goes to feed the guns
With shells an' rifle cartridges to land among the Huns;
So I'll call myself a fighter while the air drills bark and drum,
For I'm helpin' send the Kaiser and his gang to Kingdom Come!

Engr. and Mining Journal.

"Who ordered the solid gold safety pins for distinguished service in the safety zone in Baltimore?"—inquires *The Bullet.*

WITH RIFLE AND GUN IN SOUTH AFRICA

BIG game is far to seek. The huge elephant, the ponderous hippo and rhino, the terrible lion, the savage buffalo, the graceful camelopard, the bigger species of buck—these constitute a large and costly order. But South Africa abounds in feathered game, of numerous varieties, from the ostrich to the quail, from the bustard to the snipe. All these are more or less accessible to the sportsman who visits comparatively civilized and inhabited regions; the majority more than less.

The domesticated and "cultivated" ostrich is, so to speak, an article of commerce. One no more thinks of shooting this valuable bird at the Cape than one does the farmyard goose or duck at home. But for the sportsman there are still wild ostriches left. They are to be found in portions of the Kalahari (the hunter's paradise), south of Lake 'Ngami, and in the hinterland of Damaraland and Namaqualand. In the wild state the birds are extremely shy and wary, and their flight, when at full speed, is more rapid than that of any mammal. But the ostriches, usually in small packs or large herds, run in wide circles, so that sportsmen on horseback can pretty readily cut them off and shoot them.

Passing the ostrich, as not every man's quarry, we come to the bustards. Of these there are a dozen varieties in South Africa. The best known are the paauw (the wild turkey of the sportsmen of the Old Colony) and the khoorhaan. The Stanley bustard is found in the Karoo, in Griqualand West, and in the Garden Colony. The kori bustard is the largest and noblest game-bird in existence. A fine specimen, in good condition, might weigh anything from 20 to 50 pounds. Usually encountered in pairs, this bird inhabits certain acacia-clad veld in the Karoo region; certain parts of the top end of Cape Colony, Natal, and the Orange River Colony; and particularly Damaland and Bechuanaland up to the Zambesi. Straight powder being used, the "Ghaum paauw" is an easy mark for the rifle, but, as the kori feed on open flats, it is not easily approached. The best way to get within range is to ride round it in ever-narrowing circles.

The black khoorhaan is very much smaller than the foregoing, being about the size of an English cock pheasant. The commonest, not only of the bustard family, but also of all the game birds in South Africa, it is to be met with practically everywhere, from the Cape to the Orange River. Other varieties of khoorhaan is, as its nature implies, in the Transvaal, foregoing, are found in the Karoo, and here and there in various parts of South Africa which are not too near town or too much cultivated. The habitat of the Vaal khoorhaan is, as is nature implies, in the Transvaal, but it is also found to the westward so far as Damaraland, but not to the northward so far as the Zambesi, where there is the black-bellied khoorhaan. This is a very graceful bird, somewhat suggestive of a peacock.

Pretty common throughout South Africa are at least three varieties of guinea-fowl—"Pintado"; "Tarantal" of the Dutch; the "Galeny" of British farmyards. The crowned or common wild guinea-fowl is still preserved in some parts of Cape Colony, Natal, and the Orange River Colony. It is plentiful upwards to the Zambesi. It is abundant in the vicinities of the rivers Botletle, Crocodile, Notwani, and Chobe. In various districts pot-hunters have woefully shrunk this bird by shooting into the brown when the birds are roosting, and by feasting on the livers and discarding the delicate flesh of the bodies of the slain guinea-fowl.

The more accessible and frequented parts of South Africa are fairly rich in Columbidæ—pigeons, doves, and turtles. There are Vinago, the common turtle, Peristera, and the "Cape pigeon," which is a sea-gull.

There are at least three other interesting species. There is the rock-dove, the origin of domestic varieties. There is the Cape turtle—a pretty bird, measuring only 6 inches, but looking large, owing to the great length of its tail. And there is the carunculated ground-pigeon (Geophilus carunculatus), which is a native of South Africa. It is a thick and round bird, about equal in size to the common turtle.

South African wildfowl include numerous varieties of geese, duck, teal, pochard, etc. There is also the dikkop, or thick-knee, which is higher and larger than the great snipe. There are at least three varieties of snipe—the black-quilled, the painted, and the great. The black-quilled is the common snipe of the country.

South Africa is a land of pleasing topsy-turveydom. There the giraffe is a camel (kameel); the hyena is a tiger (teegre voolf); the unclean-feeding hare is an ass (haas); the guinea-fowl is a peacock (paauw); and so on. Similarly, the Dutch term for all ground-roosting francolins and sand-grouse is partridge (patraise), and for tree-roosting francolins, pheasants (phaysaants).

The francolin, or Cape redwing, may be found all over South Africa. An allied species, also called the "redwing," inhabits the neighborhood of the Orange River, as its scientific name (Francolinus garipensis) implies. Many other francolins there are, including the Natal francolin, known as the "Namaqua pheasant." pheasant."

Quail, too, are generally distributed, including the common quail, which is more plentiful in the lower divisions of Cape Colony, the Transvaal, and Natal than farther north. Their annual arrival usually commences towards spring—about August—but depends largely upon the rainfall. In wet seasons they are to be encountered and flushed in countless numbers, particularly when good dogs are employed.—*"C," in "South Africa."*

WANTS AND FOR SALE

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