MAKING FINE GUNS FOR SPORTING PURPOSES.

The production of smooth-bored shotguns and grooved rifles for sporting purposes, now always after the breech-loading pattern, and very commonly double-barreled, has shown a steady improvement in the manufacture during several years past that is highly creditable to American ingenuity and mechanical skill. With the exception of the Prussian needle-gun, nearly every arm on the breech-loading system that was used for ten years after the commencement of our civil war, in 1860, was of American origin, something like five hundred patents having been issued during that period relative to this one department of gun making. The most of these were principally designed to meet the call for arms for military purposes, but they also contributed materially to the advancement of the art of making guns for the use of sportsmen, a branch of the manufacture in which the "Parker" gun has for many years stood in the first class. The "Parker" double-barreled shotgun has, indeed, become so well known, that not to be acquainted with its excellences is to argue that one has but little familiarity with firearms especially designed for sporting purposes.

Fig. 2.

In the accompanying illustrations, Fig. 1 represents the stock and breech action of a Parker gun, and shows a richness of ornamentation and fineness of finish that well accord with the high character of the gun in its serviceable qualities. Fig. 2 shows the manner in which the metal is worked up to form the gun barrel, to make the Damascus twist. Alternate rods of iron and steel are placed upon one another, and then forged and thoroughly welded together into a solid bar, which is afterward rolled into rods. The rod thus formed is raised to a bright red heat, and one end placed in a revolving chuck, while the other remains fixed, the turning of the chuck subjecting the rod to a severe twisting throughout its whole length, so that at last it acquires the appearance of a screw having a very fine thread. Three of these rods are then placed together, the twist of one being in a contrary direction to that of the other two, and they are welded together and rolled, making the strip which is wound around the mandrel, as shown in our illustration, the coil being welded till the spirals unite to form a hollow cylinder. The fine figures that appear in the finished barrel are the result of the skillfulness with which these several operations are performed, after which follows a process of hammering while the barrel is nearly cold, to further condense the metal, and the barrel is then ready to be bored, turned, and finished. About three-fourths of the material is cut away in the making, 16 pounds of iron being used in the first instance to make a pair of barrels which would weigh only 8 pounds when the welding is finished, and from three to four pounds after boring and grinding.

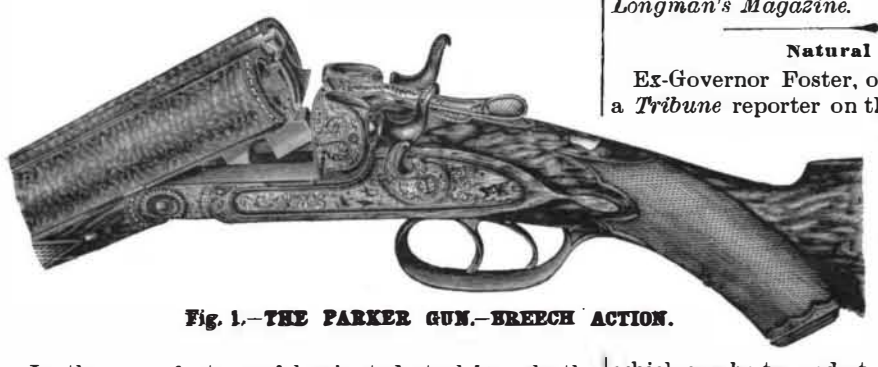


Fig. 1.—THE PARKER GUN.—BREECH ACTION.

In the manufacture of laminated steel barrels, the best quality of steel scrap is mixed with a small proportion of charcoal iron, heated in a furnace, puddled into a ball, well worked up under a forge hammer, drawn out under a tilt hammer into strips of the required length and thickness, and then treated as above described. Such barrels are much esteemed for hardness and closeness of grain, and show a different marking and appearance from those made by the Damascus twist.

It is only by such elaborate treatment of the metal that gun makers have succeeded in making guns so very light, and yet of such great strength and beauty. The most thorough testing is, of course, an important detail of the manufacture, and tests are made at various stages of the work, in order that imperfections may not pass into any part of the gun where they might afterward be covered up.

The factory of the Parker Brothers is at Meriden, Conn., but their principal salesroom is in New York city.

Cuttlefish.

Any one who has seen an octopus resting in its tank in an aquarium must have been struck by the puffing and blowing movements of the sack-like body, the nature of which excited Victor Hugo's imaginative powers in the "Toilers of the Sea." The octopus is seen to inspire and expire with great regularity. The soft body expands and contracts rhythmically enough to excite a natural comparison between its respiratory acts and our own. If we could dye the water so that our eye could follow the currents which the octopus inhales and exhales, we should perceive that at each inspiration the soft body expands, and water is drawn in two currents into the neck openings. These openings lead directly each into a gill chamber of the animal.

Here, inclosed in its own cavity, we find a plume-like gill. In its nature, this structure is simply a meshwork of blood vessels, and thus comes to resemble a lung in its essential features. Impure blood—that is, blood laden with the waste materials of the octopus-body, with the products of the vital wear and tear—is driven into the gill on one side. Subjected to the action of the oxygen gas contained in the water breathed in, the blood is purified. Its waste materials are given forth to the water, and it is passed onward out of the gill on its way to the heart for recirculation throughout the cuttlefish frame. Breathing in oxygen entangled in the water is, therefore, in the case of the cuttlefish an analogous act to that seen in higher animals, which inhale oxygen directly from the air.

The octopus, however, performs an expiratory act likewise. Placed below the head is a short tube, named in zoological parlance the "funnel." When cuttlefish inspiration has come to an end, expiration begins. The body contracts, and the water, which a moment before was drawn into the gill chambers by the neck openings, is expelled from the "funnel." The openings of entrance are guarded by valves. These close when expiration begins, and the water has no choice save to find a forcible exit by the tube just named. So far in octopus existence, it would seem as though there were no economy of power exhibited in the act of breathing. Muscular action expands the soft body, and muscular force contracts it.

There is exhibited here a plain difference between the octopus and the higher vertebrates. But the story of cuttlefish economy is not yet completed. A moment more, and your octopus, which sat crouched in the bottom of the tank, is seen to wing its way through the water. It skims like a living rocket through the clear medium in which it lives, as if impelled by some marvelous and invisible agency. The secret of this flight is the solution of cuttlefish economy and reserve force. So long as the resting mood prevails, the water used in breathing is ejected slowly, or at least without any marked display of force.

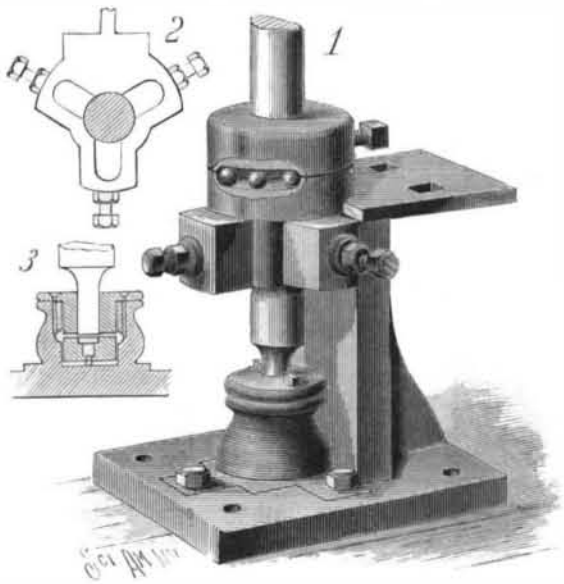
But when locomotion has to be subserved, and when the cuttlefish desires to swim, it propels itself through the water by aid of a veritable hydraulic engine. The effete water from the gills is ejected with force from the funnel, and by the reaction of this *jet d'eau* upon the surrounding medium the animal is enabled to execute its aquatic flights. Economy of a very rigid order is illustrated clearly enough in octopod existence. The otherwise useless "breath" of the animal becomes converted into a means of locomotion.—*Longman's Magazine.*

Natural Gas in Ohio.

Ex-Governor Foster, of Ohio, in an interview with a *Tribune* reporter on this subject, says that "natural gas fields have been discovered through the northern part of Ohio, and gas wells are in operation within nine miles of my town. I am pretty confident that I have found a field covering at least 200 square miles which is underlaid with natural gas reservoirs, which can be tapped at a depth of 1,100 to 1,300 feet. I have been engaged for some time in corraling this field. It would furnish a supply for Chicago by pipe lines, and not only that, but would make the country where it exists a great iron field. It is a curious fact that iron cannot be made except by a mixture of ores. Thus the ore of Lake Superior is united with ores of Pennsylvania and Ohio to make valuable iron. All are brought together where the fuel is cheapest. That has hitherto been in the coal fields. Natural gas has superseded coal at Pittsburg. It is a cheaper fuel and a better fuel than the world has ever known. If these fields are developed in Northern Ohio the iron business would become prominent in that locality."

ANTI-FRICTION BEARING.

The engraving represents a bearing designed for vertical shafts that revolve at a high rate of speed and are required to support considerable weight. Below a collar secured by set screws, the shaft passes through a pillow block and box, and terminates in a step (Fig. 3), which consists essentially of a hollow casting within which the shaft-guiding socket fits. The casting is so formed that there is an annular oil chamber about the socket, fed by proper oil ducts; about in line with the bottom of the shaft are two oil ducts, leading from the chamber to the interior of the socket. The step merely acts as a guide for the



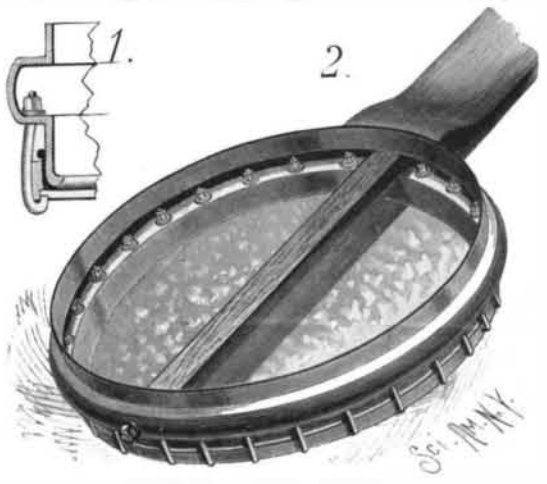
GALE'S ANTI-FRICTION BEARING.

lower end of the shaft, and not as a weight-supporting device, as the weight of the shaft and its load is taken up by a series of anti-friction balls that rest within a groove formed on the upper side of the pillow block, a corresponding groove being formed on the under side of the collar. The box to which the pillow block is bolted is provided with three or more converging slots (Fig. 2), in which are fitted adjustable blocks made of any of the well known anti-friction bearing metals. The adjusting devices of the box make it almost immaterial whether the weight carried by the shaft is equally distributed on all sides or not. The construction above described permits the shaft being revolved at high speed and of carrying quite a weight.

This invention has been patented by Mr. Morgan Gale, whose address is care of the San Sebastian Gold Mining Company, La Union, San Salvador, C. A.

BANJO FRAME.

The banjo frame herewith illustrated is so constructed that the head-holding hooks are prevented from tearing the clothes of the person playing the instrument. The frame is made of metal, and is provided with a hollow head forming an internal annular groove. In the annular shoulder thus formed by the top of the head are holes, through which are passed the lower screw-threaded ends of the clamps, the hooks of which engage the upper edge of the usual ring sur-



DOBSON'S BANJO FRAME.

rounding the frame. This construction is clearly shown in the sectional view, Fig. 1. The nuts are screwed on the ends of the clamps within the groove, and are turned by means of a key introduced through the open bottom of the frame. The head serves as a guard to prevent the clothes of the performer from coming in contact with the nuts or ends of the hooks.

This invention has been patented by Mrs. Minnie Dobson; further particulars can be had by addressing Dobson & Co., 234 West 37th Street, New York city.

SEVERAL kinds of quadrupeds in the London Zoo suffer from corns on their feet, due to the hard floors; and these produce boring ulcers which may extend clear through the foot. Hernia also occasionally afflicts the monkeys.