FURTHER OBSERVATIONS OF CAPT. VANAMBURGH.

My testimony at the trial was to the effect that No. 3 bullet was fired from the Sacco gun. In addition to comparing marks on said bullet with the marks on the rifling of said gun I showed that the set back in the Fraher Winchester shell was practically identical with the set backs on the three Winchester shells fired by me at Lowell. Since the trial I have examined with great care the Sacco gun under a microscope and have recorded certain of my observations in the shape of micro-photographs, or micrographs, which observations have shown the picture on the breech block of the gun and the peculiar markings of the firing pin. The breech block and firing pin have suffered no change from the condition in which they were at the time of the trial. I have also examined under a microscope and have photographed the primers and dents in primers of the said Lowell shells and the said Fraher shells, and have compared said shells in reference to markings with the breech block and firing pin of the Sacco gun. Every breech block of any gun is distinct and individual in its markings because of the methods of manufacture. The several stages of manufacture, of shop operations, require the use of milling cutters, files, scrapers and other devices which, in the case of cutters and scrapers, must be ground from time to time and new ones replacing those worn out. In the matter of files, they are discarded and new ones substituted when worn out. The different operations are performed on different machines and by different workmen, some right handed, others left handed, some more skilled and more

particular than others, all of which tends to create a condition on the finish of a metal surface, such as the face of a breech block, which condition is found to be peculiar to a given piece of work and chances of duplication are entirely remote. I have never seen two breech blocks which were identical in appearance when examined under the microscope, and they therefore could not register the same impressions.

In my opinion, and from my experience, the impressionmade by a particular breech block on the primer of a cartridge is as significant, and as much in the nature of a finger print impression, as are the marks made on a bullet from the rifling of a particular gun. In fact, the impressions on a primer surface, from the breech block, are of great assistance in identifying a particular gun, because there are more markings from which a comparison can be made. The cause of the impression on a primer surface of breech block marking is due to the fact that when the charge in the cartridge explodes a pressure is created by the gases from the explosion, which pressure is not relieved until the bullet issues from the muzzle of the barrel. That pressure in an automatic pistol of 32-calibre, must amount to at least a figure close to 14,000 pounds per square inch, and not below 11,000 per square inch; otherwise the pistol will not function automatically. Said pressure drives back the shell against the breech block, and the primer of said shell being of much thinner metal than the balance of the head of the cartridge, receives a distinct impression from the markings or corrugations of the breech block. In this case I have determined, in the instance of each of the said Lowell shells and the

said Fraher shell the position which those shells occupied in the gun at the time they were fired. This position was determined by locating the mark on each, which was registered by the extractor hook, and the position of that portion of the breech block which accomodates the ejector, thisportion of the breech block being in a constant position and making a definite and distinct mark on the head of the shell. By reason of thus determining the position that said shells occupied in the gun at the time of firing, it was possible to make accurate comparisons between the markings on the primers of said shells and the markings on the breech block of said Sacco gun.

The three Lowell Winchester shells were shells known to have been fired from the Sacco gun during the course of the trial, and therefore they can be used as known standards. The Fraher shell was a shell found on Pearl Street at South Braintree at the scene of the shooting. The marking or print of the breech block of the Sacco gun on the primers of the Lowell shells and the Fraher shell is identical. These markings are clearly shown on photographs taken by me at Bridgeport, the shells being magnified to about five diameters. The shells were photographed separately and are shown side by side in this affidavit, the Fraher shell being marked "One" and the Lowell shell being marked "Two".

Attention is invited to the direction followed by the breech block impressions and their similarity. The first point called to attention is in the Fraher shell at a point opposite the center of the interval between A and C on the cartridge and carried in to near the firing pin indentation. There will

be found two lines intersecting, forming an inverted "V"; directly across and on the opposite side of the firing pin indentation and touching the circumference of said indentation is a line extending upward to the boundary of the primer.

A similar mark on the Lowell shell is here pointed out. Slightly to the left of the mark referred to and at a point near where it intersects with the circumference of the firing pin indentation will be found two intersecting marks extending from the bottom boundary of the primer upward and meeting at a point, forming an inverted "V". A similar circumstance is pointed out on the Lowell shell. Around the rim of the firing pin indentation at a point at its very top will be found what in appearance is a little ball of metal extending out from the rim referred to. A similar ball is pointed out in the Lowell shell.

Attention is invited to the general appearance of the set back of metal forming the circumference of the firing pin indentation; that which forms the left half of the circle commencing at the top and extending around to a point directly under and on the bottom is more prominent, apparently raised above the general surface, than that portion of the circumference forming the right half of the circle.

The set back is a flowing back of the metal of the primer caused by the internal pressure at the moment of firing, and which, inserted on the thin metal of the primer cup, which primer cup is unsupported locally by vacancies in the breech block, will cause the primer metal to give way, to push outward, in other words, and on the fired case it will appear as rais-

ed above the general surface.

A special examination was made of the firing pin of the Sacco Colt automatic pistol. It was found to be a ball pointed firing pin of standard design of the Colts Patent Firearms Company. On its rounded surface was found a score extending partially around the circumference of the pin and at a distance back fromthe point of the firing pin of .0167 inches. The widest part of this score or cut on the metal of the firing pin was found to be .0047 inches. Further back from the firing pin point was found another score also running circumferentially, and its distance from the point of the firing pin was found to be .032 inches. The width of this second cut or score was found to be .005 inches at its widest point. Both scores or cuts referred to are somewhat irregular in their outline but very sharp or distinctive in appearance.

NOTE: Describe with gun in front of me relative position of cuts with reference to each other and position in reference to fixed objectives on the gun itself.

A careful examination under a compound microscope of the Lowell Winchester shell No. 1 discloses that there is a positive mark inside of the indentation made by the firing pin in the primer and at a point on the same side as the figure "32" on the head of the shell. Attention is also called to Lowell Winchester shell No. 2, which, on examination, discloses a positive or raised mark in the firing pin indentation of the primer at a point on the same side as the letter "R".

Attention is invited to Lowell Winchester shell No. 3, which shows a positive or raised mark in the firing pin indentation of the primer on the same side as the letter "C", in the

group of letters "A. C." which lie between "32" and "Co."

These Lowell Winchester shells, it will be remembered, are known standards obtained from an admitted shooting of the Sacco gun at Lowell.

A careful examination of the Fraher Winchester shell and comparison of it with those fired at Lowell discloses a raised mark in the firing pin indentation of the primer at a point opposite the interval between "A." and "C." on the cartridge head, said "A. C." being the group of letters between "32" and "Co." The raised mark to which attention is called in this Fraher shell is the same in appearance as the marks found on the three Lowell Winchester shells and occurs at the same depth and on the same side with reference to the position of the shell when fired, as in the three Winchester shells fired by me in the Lowell experiment at the time of the trial. Micro-photographs or micrographs havebeen taken under my personal supervision, showing the indentations in the primers caused by the firing pin in the Lowell Winchester shells and the Fraher shell . These four pictures are hereto annexed and marked 3, 4, 5 and 6, and show clearly and distinctly the ridge in the indentations caused by a corresponding depression or score in the firing pin. A micro-photograph or micrograph of the firing pin in the Sacco gun has been taken under my personal supervision, and a print of such photo is hereto annexed, marked 7, which photograph shows clearly and distinctly the scores or depressions in said firing pin above referred to. The score or depression in said firing pin above referred to which is more marked is the upper one shown in said photograph, which upper score or depression caused the pronounced ridge in the indentation of each shell as

shown by the annexed photograph . It is my opinion that the indentation and ridge in indentation in the primer of the Fraher shell was caused by a blow from the firing pin with the pronounced score or depression upon it of the Sacco gun.

Attention is invited to the micrograph of the firing pin. The picture was taken in a position to show two scores in the firing pin which were mentioned in preceding paragraphs, and measurements of which were given. I wish to point out that that score in the firing pin which is nearest the end or point of the firing pin is the only one which registers itself in the firing pin indentation on the primer. The second one, which was mentioned as measuring .032 inches from the point or end of the firing pin, is too far back to register itself on the primer, and therefore, while it is a pronounced score in the firing pin, it does not register itself in the primer metal, because of the comparative shallowness of the depth to which the firing pin penetrated.

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