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SIGNIFICANCE OF WAD AND CARD MARKS ON WOODEN TARGETS

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Wooden targets are very frequently involved in shooting cases in the form of doors, windows, furniture, etc. Investigations were, therefore, undertaken to determine whether cartridge components other than the shots such as wad, closing disc, under and over shot cards have any effect on such targets, and if so to what use the marks produced by these components can be put in crime scene reconstruction.

Firing was conducted on deal and teak wood targets; the former belonging to the soft variety of wood and the latter to hard variety. Deal wood targets were planed to a thickness of 1" and the teak wood to a thickness of $\frac{1}{2}$ ".

Figure 1 shows a typical pattern obtained by firing a shotgun from a distance of 15–20 feet on a target of deal wood. Figure 2 shows the mark B in Figure 1 at a magnified scale.

Analyzing the Figure 1, one finds two circular indentations at A and B and one puncture at C besides the shot marks. The puncture at C was definitely produced by the air cushion wad as this wad alone has the capability of penetration at this distance. This was confirmed by recovering the fired wad on the other side of the target.

The circular indentation at A could have been caused either by one of the cards or the closing

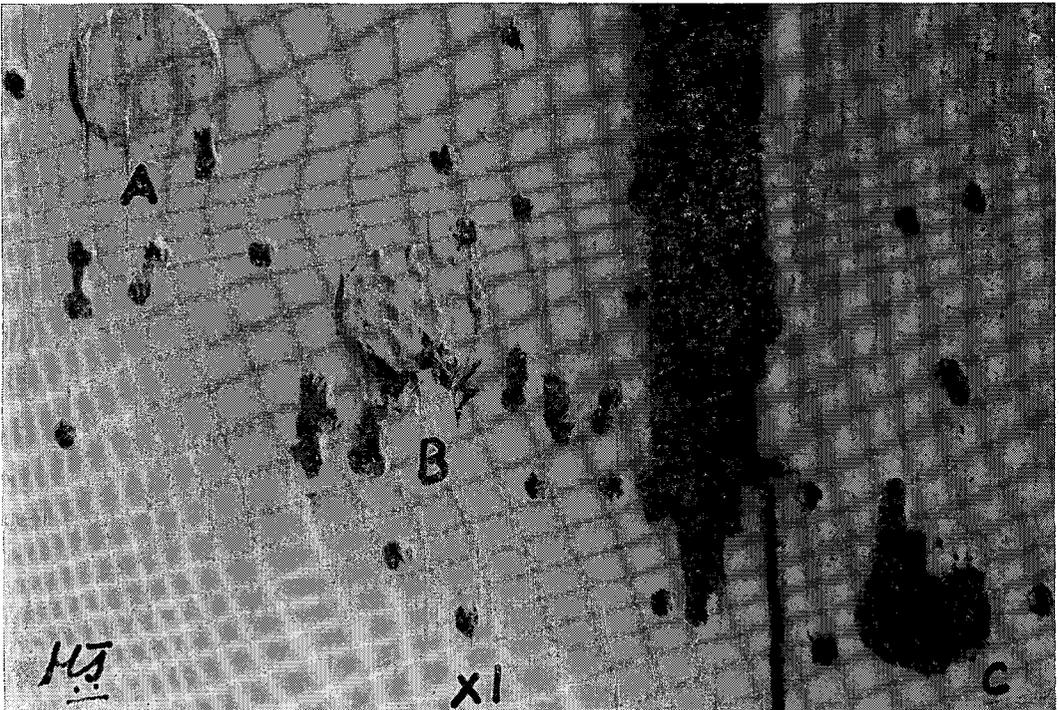


FIGURE 1
A typical pattern of wad and card marks from a firing distance of 15 to 20 feet.



FIGURE 2

A 3 diameter enlargement of the mark B shown in figure 1. Note the marks in relief corresponding to the marks in recess on the under shot card due to the lower most layer of shot.

disc. The possibility of the closing disc can be easily eliminated as it usually falls down within six feet and the range of firing in this case was 15-20 feet. Before assigning the indentation at A to one of the cards i.e. the over powder or the under shot card it will be advisable to consider the circular indentation at B. This indentation is most interesting since within it one finds numerous other details in relief as shown in Figure 2. These markings in relief must have been caused by similar markings in recess on the card responsible for producing this indentation. It is well known that the under shot card gets impressed by similar markings in recess due to the lowermost layer of the shot charge. If the cartridge is loaded with a single ball one gets a central mark in recess on the card corresponding to the ball. In case of LG shot one gets three marks in recess and so on and so forth. It is, therefore, certain that the indentation B was due to undershot card. The clarity with which shallow indentations on undershot card, which is made of cardboard, are reproduced on a material like wood is worth noting. It may be mentioned that if the shotgun is fired from the same distance i.e. 15-20 feet again, it is not necessary that these details will be reproduced although

the circular indentations may still be there. This is so because the flight of these cards from the muzzle to the target is not a stable one, and there is every likelihood of the undershot card striking the target with the opposite side forward. In some instances it may strike even sideways when no circular indentation will be produced. We can, therefore, assign the indentation at A to over powder card and that at B to undershot card.

Tests carried out on teak wood targets showed similar results. The indentations were quite distinct, but their depth was not so great as in the case of deal wood. The shallow indentations due to shots on the undershot cards were also reproduced although with comparatively lesser clarity. It is thus clear that components other than the shots of a shotgun cartridge can produce observable phenomenon on hard material like wood.

Once the card marks produced with the clarity shown in Figure 1 are observed, one can immediately infer about the bore of the gun used. Without the presence of wad and card marks it may not be possible to infer so unless one of these cards or wads are recovered at the scene of crime. In a case where one finds wads and cards of two different bores at the scene it may be difficult to say as to the bore of the weapon used since either of them may have been the component of the cartridge which was responsible for firing. In such cases the presence of wad and card marks will immediately decide the issue. In certain circumstances it may also be possible to say whether a muzzle loader or a shotgun was used.

The "Number" of shot used can usually be deduced if some of the shots are recovered either by referring to tables or by the simple rule formulated by the authors.¹ In the absence of shots one can refer to the markings on the closing disc or on the undershot card. Modern trend is towards using cartridges in which the closing disc is omitted. Further, it may not be possible in all cases to recover the above mentioned cards and disc, and even if recovered, it may not be possible to say definitely that these are the components of the cartridge used in the commission of crime. In such circumstances the indentation B will come to the rescue as it has faithfully reproduced the shot marks on the undershot card. It is in this respect that the mark B assumes significance.

¹ JAUHARI, M. AND SINHA, J. K., Relation Between Shot Number and Diameter of a Shotgun Pellet, JOURNAL IND. ACAD. FOR. SC. Vol. 1 No. 1 pp. 36-38, 1962.

When a shotgun is fired, the wad, cards, and the closing disc are all ejected from the muzzle of the gun with almost the same velocity as that of shot charge. However, these components cannot cover large distances on account of their light weight and poor ballistic shape. Wads travel to about 50 feet, cards to a lesser distance, and the closing disc least. Further, the ranges up to which they can produce indentations on wooden targets will depend upon the type of wood, assuming other things to be the same. These facts can help us in estimating the range of fire if marks of wad and cards are noticed on the target. All that one will have to do is to conduct test firing with the same gun, ammunition, and target as involved in crime.

The usual method of estimating range of firing in cases involving shotguns is to study the shot pattern. When the target is small and a sufficient portion of the pattern is not recorded, the estimation of range becomes difficult. If, however, wad or card marks are fortunately present the range may still be determined approximately as described above.

Efforts are also being made in this laboratory to correlate the range of firing with the distance

between the point of impact of the wad and the center of the shot charge.

From the above, one thing is obvious and that is the wad and card marks have definite significance for crime scene investigation and reconstruction. It is very essential that the investigating officers should also realize this and make every effort to search for these marks. It is not uncommon that a wooden door is the target of gunshot firing and the investigating officer instead of sending the whole door sends a cut portion of the door bearing the shot marks to the laboratory for examination and opinion. If the field investigator does not realize the importance of wad and card marks he may not include them in the portion sent to the laboratory and thus a useful piece evidence of may be lost.

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