

“The Trapezoid” By Andrew Keehan

Anyone who’s read a “how to roll a proper cartridge” article is familiar with the peculiar scrap of paper known as the trapezoid. This odd four-sided shape is the basis of every type of muzzle loading cartridge made by Federal armories in the Civil War period. But why the trapezoid? For one, it’s purely practical. Using a trapezoidal piece of paper, you can roll a tube with one heavy end and one light end. (fig. 1) The heavy end forms a good solid seating for the lead ball and the powder charge, while the light end provides an end flap that can easily be torn to release the contents. While this may seem an impressive bit of military engineering, it is far too simple an explanation to such a complex question.

There’s an even more practical reason for using trapezoid cartridge papers. By employing the trapezoid shape, you can maximize the number of cartridges that can be made from one sheet of paper. Thereby you also minimize the amount of paper used. This is accomplished by drawing two trapezoids with the diagonal ends together to form one long rectangle. This is a much more efficient use of paper than using rectangles of the desired length.(fig. 2) By using trapezoids, you can squeeze more cartridge tubes out of a single sheet of paper.

Fig. 1

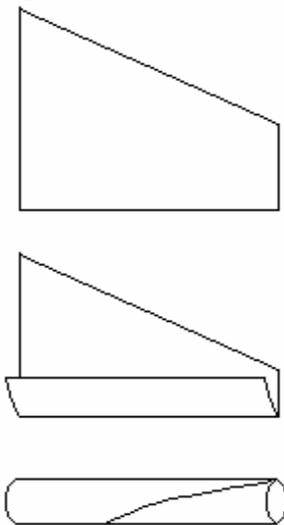
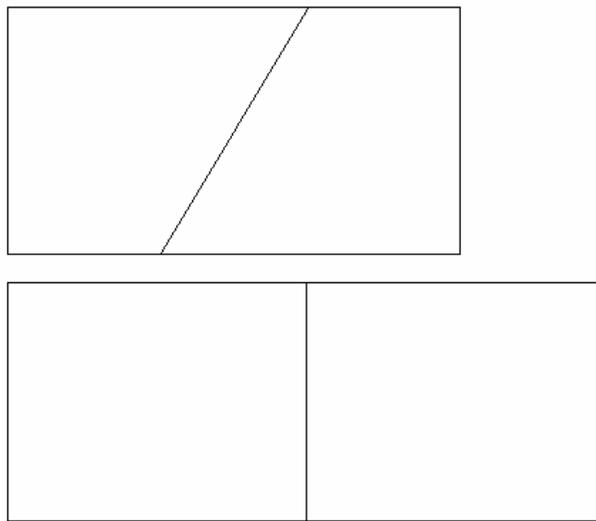


Fig. 2



In a further bit of practicality, all cartridge tubes for every caliber and load were cut from the same size sheet of paper. The Ordnance Manual specifies various dimensions of trapezoids for specific types of cartridges. It also specifies that only one size sheet of paper is to be used for all musket cartridge papers: 13” x 16½”. Because each different cartridge requires a different size trapezoid, the OD ordered sheets of paper of one size that would maximize the number of trapezoids that could be cut, regardless of the type of round. For example, a .69 round ball trapezoid is specified as 4 1/3” for the straight side, 5 ¼” for the long base, and 3” for the short base. You can cut 12 trapezoids of these dimensions from one sheet of paper by cutting six rectangles of 4 1/3” x 8 ¼” and dividing each into equal trapezoids. (fig. 3) You can cut 16 .58 expanding (minié) ball trapezoids on the same sheet of paper by drawing the rectangles on their sides. You can thusly cut 8 rectangles of 4 1/8” x 6 ½” and divide them equally as before. (fig. 4)

Fig. 3

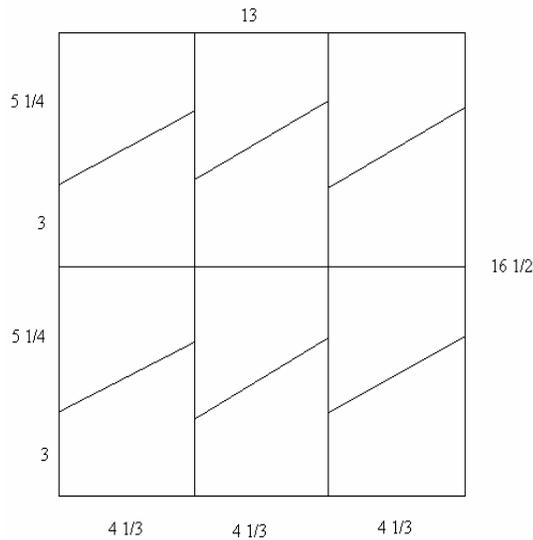
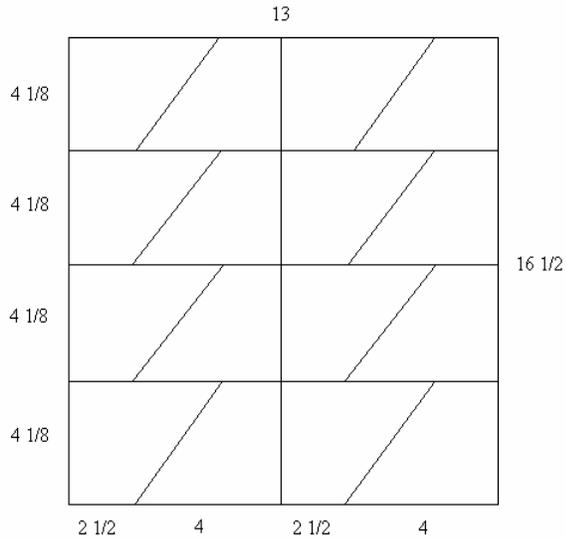


Fig. 4



The same sheet of paper will yield 12 tubes for .69 minié cartridges and 9 tubes for .69 buckshot cartridges with only small amounts of scraps left over.

All of this begs the question which came first, the sheets of paper or the trapezoids? While the odd dimensions of the trapezoids would seem to indicate they were measured as factors of the more evenly dimensioned paper sheets, the size of the full sheet of paper is actually much more flexible than the size of the finished tube. According to the manual, each type of cartridge has its own specific size projectile and measure of powder. A .69 round ball cartridge used a .65" round ball with 110 grains of powder, while a .58 elongated ball cartridge used a .5775" minié ball with 60 grains of powder, etc. It required different sizes of trapezoids to effectively cover each different type of projectile and charge. It was also necessary to keep different types of cartridges to a relatively standard length in order to avoid wide variation of the accompanying cartridge boxes. Bearing all this in mind, it seems likely the OD found a size of paper that would most efficiently meet its needs and mandated its cartridge paper sizes accordingly.

Source:

Laidley, T.T.S. The Ordnance Manual For the Use of Officers of the United States Army, Third Edition. J.B. Lippincott & Co., Pennsylvania. 1861. Ch. 10.

***Note* I have made some inferences regarding fractions of inches where the manual uses decimals. For example, I have changed 4.33 to 4 1/3 and 4.12 to 4 1/8.**