Nov. 10, 1931. J. F. McCUNE 1,831,537

PAPER SHELL FOR EXPLOSIVES

Filed Sept. 14, 1928

Fig. 2.

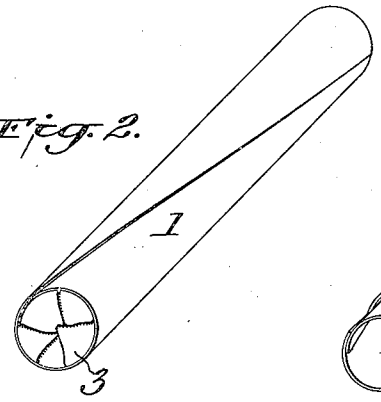


Fig. 1.

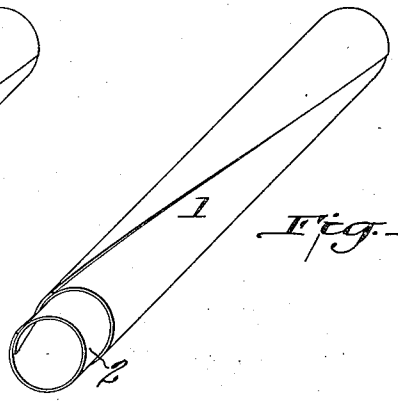


Fig. 3.

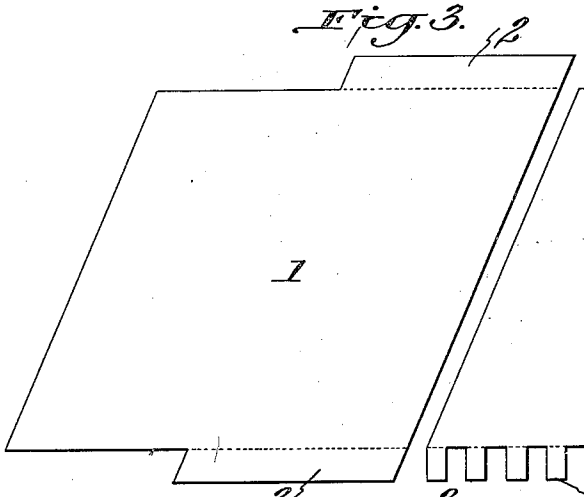


Fig. 4.

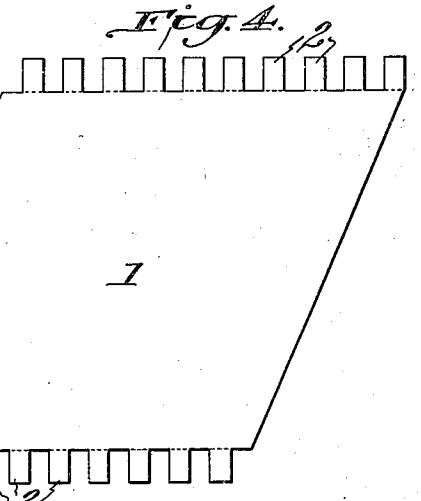
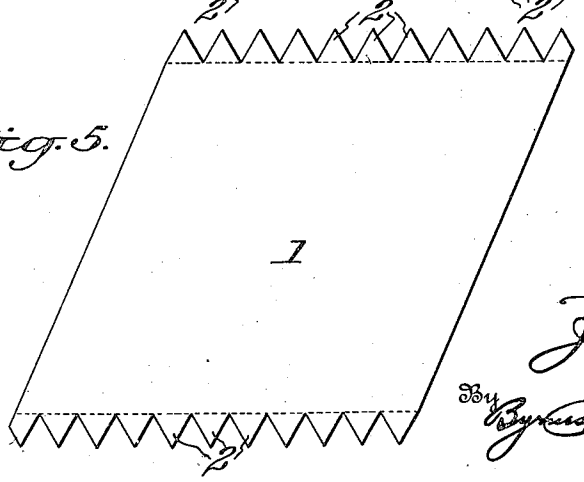


Fig. 5.



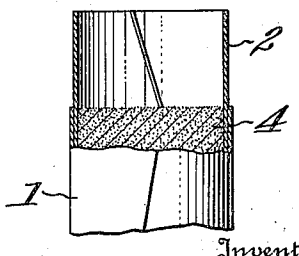


Fig. 6.

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UNITED STATES PATENT OFFICE

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PAPER SHELL FOR EXPLOSIVES

Application filed September 14, 1928. Serial No. 306,027.

This invention relates to paper shell for use with high explosives.

The ordinary paper shell is made by cutting a sheet of paper in the form of a parallelogram and rolling it into the form of a cylinder having approximately 2½ wraps. The same machine that cuts and rolls the paper also closes the lower end of the paper cylinder by folding the paper at the end of the cylinder toward the center to form what is called a "crimp". In this "crimp" the folds of paper necessarily overlap so that in places, particularly at the center, there are as many as ten layers of paper. The cylinder is then packed with explosive and the upper end is crimped on a machine which flutes the paper to the middle of the shell. Here again, the crimp is characterized by numerous layers of paper.

When shells of this character are packed end facing end in bore holes, it is found that the excessive amount of paper at the ends of the shells interferes with the propagation of the explosive way from one shell to the next, particularly in dynamites of low rate of detonation and furthermore introduces unnecessary carbonaceous material which is objectionable for several obvious reasons.

The object of the present invention is to produce a paper shell in which the amount of paper in the "crimps" at the ends of the shell is materially reduced and a method of making such shells.

The invention will be better understood when described in connection with the accompanying drawings in which

Fig. 1 is a view in perspective of a paper shell made from the sheet of paper shown in Fig. 3, showing one end before crimping;

Fig. 2 shows a finished shell made from the sheet of paper shown in Fig. 3 with the ends crimped;

Fig. 3, Fig. 4 and Fig. 5 show different modifications of the sheet of paper from which the shell is made; and

Fig. 6 is a sectional view of the top of a packed shell made from the paper shown in Fig. 3 before crimping.

In the drawings 1 indicates the sheet of paper from which the shells are made. Both short sides or ends of the sheet 1 are partially cut away leaving the portions 2 which form the crimp. The numeral 3 designates the crimped end of a shell and the explosive composition is indicated by the numeral 4.

A single strip of paper may be cut away from each end of the sheet 1, as shown in Fig. 3, or the ends of the sheet 1 may be serrated as illustrated in Figs. 4 and 5. The ends of the sheet may be cut away in other ways also so long as enough paper is left to form a crimp which will hold the explosive.

My preferred form of shell is made from a sheet of paper of the form shown in Fig. 3. A strip of paper of a width corresponding to the desired depth of the crimp, that is, the radius of the shell, is cut away from both short ends of the usual sheet of paper which has the form of a parallelogram. The length of the cut-out strip is such that the portion 2 left is sufficient for one turn of the shell or slightly more.

For example, in making a standard 1¼ by 8 inch shell I start with a sheet of paper having the form of a parallelogram whose sides are 9½ by 10 inches. A strip of paper ¾ inch deep and 4 to 4½ inches long is cut out from both short sides of the parallelogram. The paper is then rolled into a shell which is 1¼ inches in diameter. The body of this shell has two to three layers of paper whereas at the rims there is only one layer of paper over about two-thirds of the circumference and two layers over the remaining portion of the circumference. When the rims of this shell are crimped in the regular fashion, the ends of the shell will not have more than four to five layers of paper.

The decrease in the amount of paper in the ends of the cartridge is reflected in an improved propagation of the explosive wave through a loaded charge in a bore hole. This can easily be shown in gap tests in which the cartridges are tested when placed crimp end facing crimp end with a gap between. This test determines the maximum distance between shells that the explosive wave can travel.

This improvement in the gap test between the old type and my new cartridges is par-

ticularly noticeable in slow dynamites having a rate of detonation slower than 3,000 meters per second. In a gap test, in which cartridges loaded with dynamite of 2,100 meter/seconds rate of detonation were faced end to end, an improvement of from 60 to 70% was obtained with my new type shells over the old standard shells. On faster powders, as is well known, there is no difference in the gap test if the cartridges are loaded end facing end or by exposing freshly cut surfaces of the cartridge.

Due to the decrease in the amount of carbonaceous material in the ends of the shells made in accordance with this invention, I am able to increase the amount of carbonaceous material in the explosive composition with which the shells are charged and thus produce dynamites of lower density with the same total oxygen balance.

I claim:

1. A dynamite cartridge comprising dynamite enclosed in a substantially cylindrical paper shell made by rolling up into the form of a cylinder a sheet of paper made by cutting out a strip of paper along the ends of a sheet of paper of substantially quadrilateral shape, the width of said strip corresponding to the radius of the cylinder and its length being approximately one-half the width of the parallelogram, and crimping the ends of the said cylinder.

2. A dynamite cartridge comprising dynamite enclosed in a substantially cylindrical paper shell made by rolling up into a cylinder about 1¼ inches in diameter a sheet of paper made by cutting out a strip of paper approximately ¾ of an inch deep and 4 to 4½ inches long along the two opposite ends of a sheet of paper of quadrilateral shape, and crimping the ends of the said cylinder so as to enhance the propagation of the explosive wave through a multiplicity of the cartridges forming a loaded charge.

In testimony whereof, I affix my signature.

JOHN F. McCUNE.