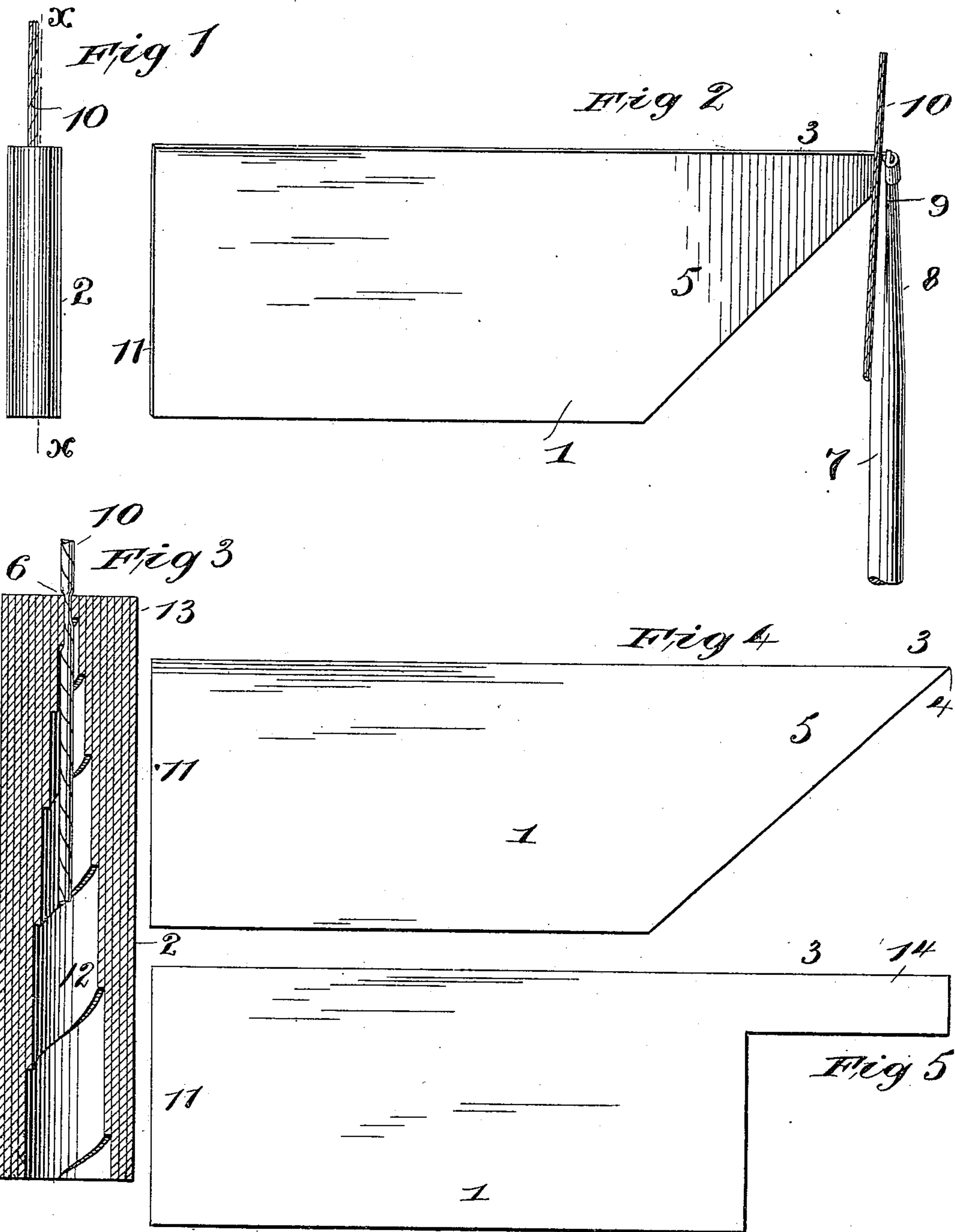


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Patented Mar. 20, 1900.

G. LISPENARD.
FIRE CRACKER BODY.
(Application filed Aug. 4, 1898.)

(No Model.)



WITNESSES
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GEORGE LISPENARD, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NORDLINGER-CHARLTON FIREWORKS COMPANY, OF SAME PLACE.

FIRE-CRACKER BODY.

SPECIFICATION forming part of Letters Patent No. 645,688, dated March 20, 1900.

Application filed August 4, 1898 Serial No. 687,731. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LISPENARD, a citizen of the United States, residing at New York, (Brooklyn,) county of Kings, and State of New York, have invented certain new and useful Improvements in the Construction of Fire-Cracker Bodies, of which the following is a specification.

My invention relates to the construction of tubes intended to form the casings or bodies for fire-crackers or other like detonating devices, the especial improvement hereinafter described relating more particularly to means for choking the bore of the tube in order to retain the stem and charge within the tube and offer sufficient resistance to the explosion of the contained combustible to the end that proper detonation of the same be had. In the prior practice of this particular art it has been customary to choke the bodies of fire-crackers for a like purpose in many ways. Among others a clay plug has been employed either at one or both ends of the body. Another form of choke has been effected by using a clay plug retained in place by partially constricting the body of the tube about the plug. Another form of choke has been effected by upsetting a number of the interior convolutions of paper or the like of which the body has been formed, this upsetting being formed in various ways. A still further form of choke has been made by forming a circumferential contraction in the body of the cracker, the body then being preferably made up of spirally-disposed strips forming superposed tubes. In all these prior methods of forming the choke either foreign material has been added to the body of the cracker in order to produce the choking effect or the choke has been formed by manipulation of the paper or other like material forming the shell after the same has been completed.

With my present invention I form the choke as an integral or component part of the body of the casing during the manufacture of the casing or shell. This I accomplish by providing a blank of sufficient size both in length and breadth to form the fire-cracker body, disposing the blank in convolute layers or folds, and reducing one end of the blank, so that the re-

duced end when being rolled upon a suitable mandrel will form a plug of gradually-decreasing thickness, the greatest diameter of the plug being located at the end of the body where the rolling of the tube commences.

My invention also consists in further details of improvement hereinafter described, and pointed out in the claims.

In the drawings accompanying this application, Figure 1 is a side elevation of a fire-cracker completed in accordance with my invention. Fig. 2 is a plan view of a paper blank conformed in the manner most suitable for carrying out my invention and a mandrel and stem diagrammatically illustrating the initial step of the preferred method of forming my improved tube. Fig. 3 is an enlarged sectional elevation on the line *xx*, Fig. 1, showing the tube completed in accordance with my present invention. Fig. 4 is a plan view of the preferred form of tube-blank, and Fig. 5 a like view of a modified form.

In carrying out my invention I employ a sheet of paper of any suitable kind or any other suitable material from which to make the cracker-body, providing the same can be rolled upon itself, the blank being preferably of a width equal to that of the length of the finished cracker. By reference to Fig. 2 it will be noted that such a blank 1 is of a width approximating the length of the body 2 of the completed fire-cracker. (Shown in Fig. 1.) One end 3 of the blank is reduced in diameter, starting from a point, as 4, Fig. 4, and cutting the same on a line diverging to the other side, thus forming a horn 5 at the end of the blank. The object of this reduced portion or horn is to create plug shown at 6 in Fig. 3.

To carry out my invention by mechanical means, which I prefer, I preferably employ a mandrel 7, such as illustrated in Fig. 2, which consists of a rod 7, round for a portion of its length and tapering down to a moderately-fine point at one end 8, the tapered point being provided with a wedge-shaped split or slot 9, adapted to receive the extreme point 3 of the horn 5 of the blank. In rolling the tube the point of the horn is inserted in the slot, and in order to firmly secure the dis-

charging stem or fuse 10 in place it is laid against the point of the mandrel on one side, as indicated in Fig. 2. The mandrel is then turned to wind the blank upon the same, the gradual winding of the blank upon the mandrel disposing the same in convolute folds, the interior diameter of which gradually becomes larger as it approaches the rear end 11 of the blank, as clearly illustrated in Fig. 3, the initial convolution of the blank firmly gripping the stem, as shown in Fig. 3, the continuation of the rotation of the mandrel while the blank is held against it under pressure firmly and tightly disposing the folds one over the other, so as to almost completely close the end of the bore 12, formed on the mandrel at end 13 of the tube. It is intended that the incline on the end of the mandrel shall be of such an extent that when the incline or horn of the blank has reached its limit the body or preferably parallel-sided portion of the blank shall begin to fold over upon the round or parallel-sided portion 7 of the mandrel, so that the tube will be continued to be tightly disposed about the mandrel at all points. I do not intend to limit myself to this method of making the body, as it is apparent that other means can be employed.

Another form of blank which can be to a certain extent advantageously employed is that shown in Fig. 5, in which the blank of suitable diameter in length is provided with a parallel-sided plug-forming tongue 14, which tongue can be either integral with the blank or secured to it.

The choke formed in accordance with my invention has great resisting power, as it is apparent that any attempt to move the convolutions forming the choke outwardly by means of a force exerted on the interior of the bore will only tend to contract the convolutions at that end by spirally disposing them and still further reducing their diameter.

The paper is rolled under considerable tension, so that the various folds continue to exert considerable pressure upon themselves and extreme pressure upon the innermost convolutions forming the plug, the end of the blank being pasted down, so as to properly secure it in position.

It is desired that only enough of the stem 10 be left within the bore 12 to properly ignite the charge within the bore.

As will be noted, I have provided means for choking but one end of the body of the fire-cracker. I have not at the present time devised means for producing the choke at both ends of the body in the same manner; yet, however, I do not limit myself to a choke formed in the above-stated way at one end of the cracker only, as the same may be produced at both ends without departing from the spirit of my invention.

After the formation of the body as above described the explosive charge may be poured

into the bore thus formed, and which is of greater dimensions than that of a body of like length and number of folds, and choked in any of the previously-recited ways. The back end of the body can be choked in any one of the ways now in use or by other preferred means, and should means be employed which involve the upsetting or disturbing of some of the interior convolutions of the material by displacing them and forcing them inwardly the pressure created upon the front end choked in accordance with my invention will further compact the convolutions at that end about themselves and strengthen the choke, means being at the same time provided to avoid injuring or disturbing the stem.

Besides greatly economizing in the cost of labor incidental to the manufacture of fire-crackers my present invention decreases the cost of paper employed, as there is no waste resulting from the cutting of the blanks, especially that form shown in Figs. 2 and 4.

Having described my invention, I claim—

1. A fire-cracker body or shell comprising a band of paper folded upon itself to form a tubular bore, the concentric folds of which at one end completely close the bore except for the stem which is incased within such folds, substantially as described.

2. A fire-cracker body or shell comprising a band or strip of paper, having opposed parallel sides and one end of gradually-increasing breadth and disposed in convolute concentric folds upon itself to form a plug, the folds of the balance of the blank being likewise disposed and inclosing the said plug, substantially as described.

3. A fire-cracker body or shell comprising a blank of paper or the like, having a horn of gradually-increasing breadth at one end, the blank being disposed in convolute folds upon itself, the horn forming a plug of gradually-decreasing breadth at one end of the body, substantially as described.

4. A fire-cracker body or tube comprising a series of convolute folds of material, a plug closing the bore of the tube at one end formed by a concentric continuation of said folds, and a stem extending longitudinally into the bore and held therein, one or more of the convolutions forming the plug, substantially as described.

5. A blank for making fire-cracker bodies, comprising a sheet of paper or the like having opposed parallel sides and a pointed extension or horn at one end extending from one edge to the opposite parallel edge, substantially as described.

6. A blank for making fire-cracker bodies, comprising a rectangular sheet of paper, or the like, having a horn converging to a point, forming an acute angle at one edge of the sheet, substantially as described.

7. A fire-cracker body or tube, having a

bore, and a plug at one end formed of the material of the body, and by concentrically superposing the material at that end to increase its thickness, substantially as described.

5 8. A body for a fire-cracker or the like composed of a strip or band having parallel sides and a narrow extension at one end folded upon itself to form a bore that gradually in-

creases from one substantially-closed end toward the other, substantially as described.

Signed at the city, county, and State of New York this 3d day of August, 1898.

GEORGE LISPENARD.

Witnesses:

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