No. 639,605. Patented Dec. 19, 1899.

L. NORDLINGER.

FIREWORKS BODY OR THE LIKE.

(Application filed Feb. 18, 1899.)

(No Model.)

Fig. 1.

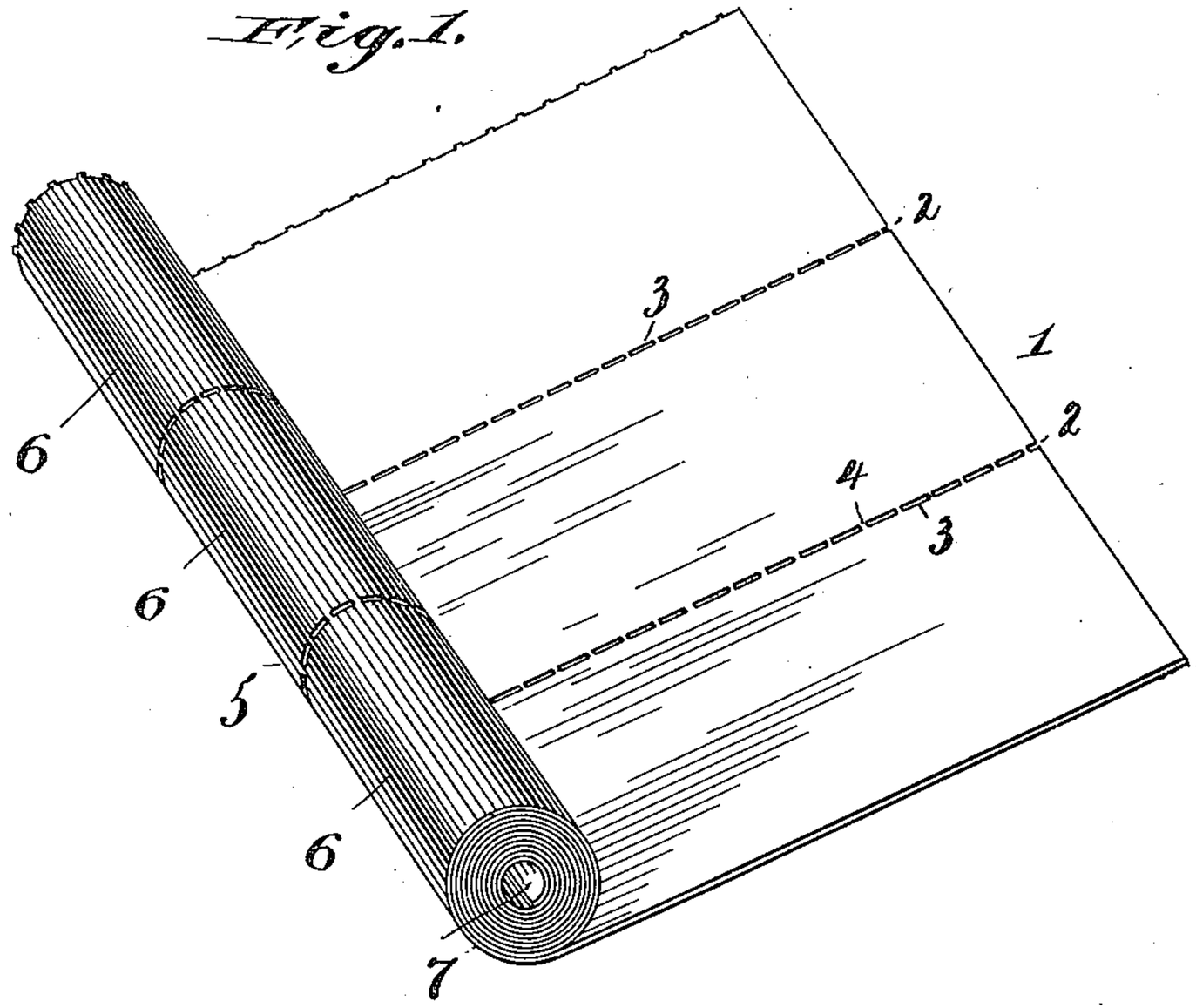


Fig. 2.

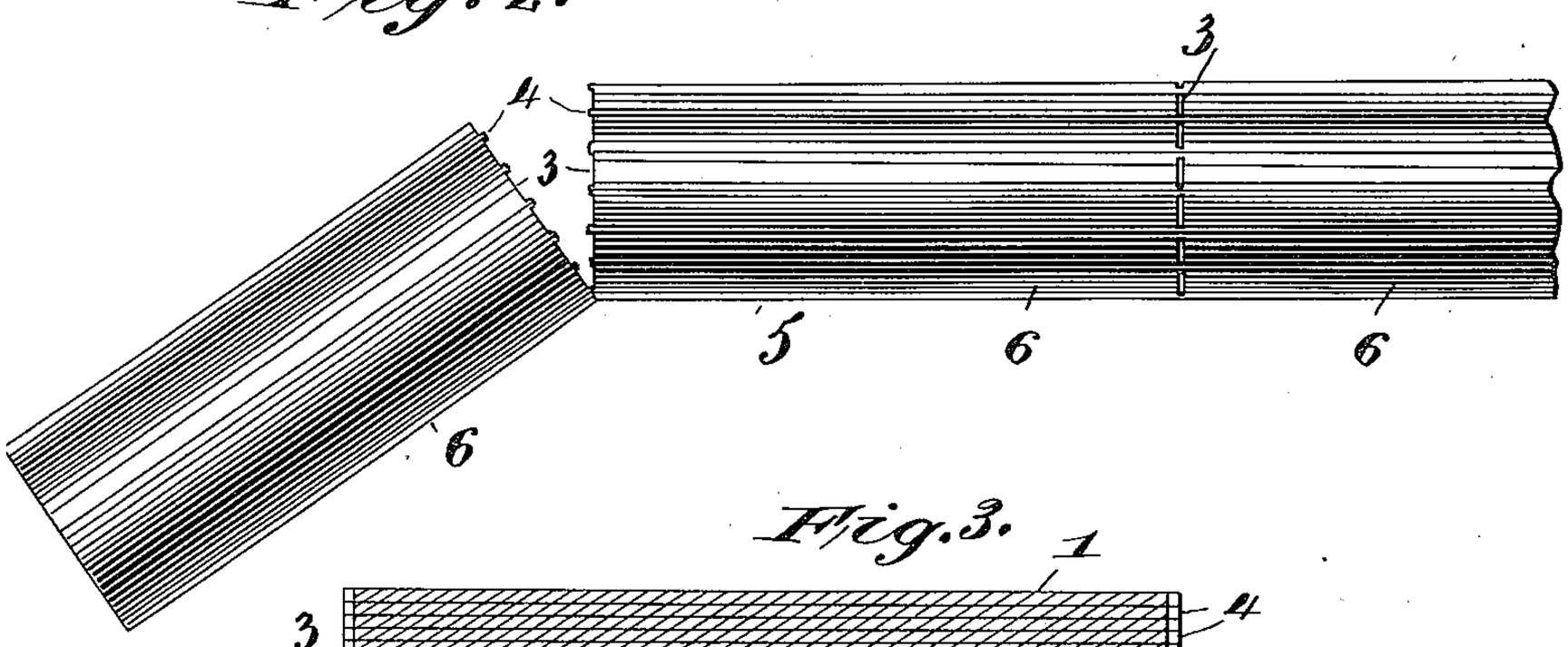
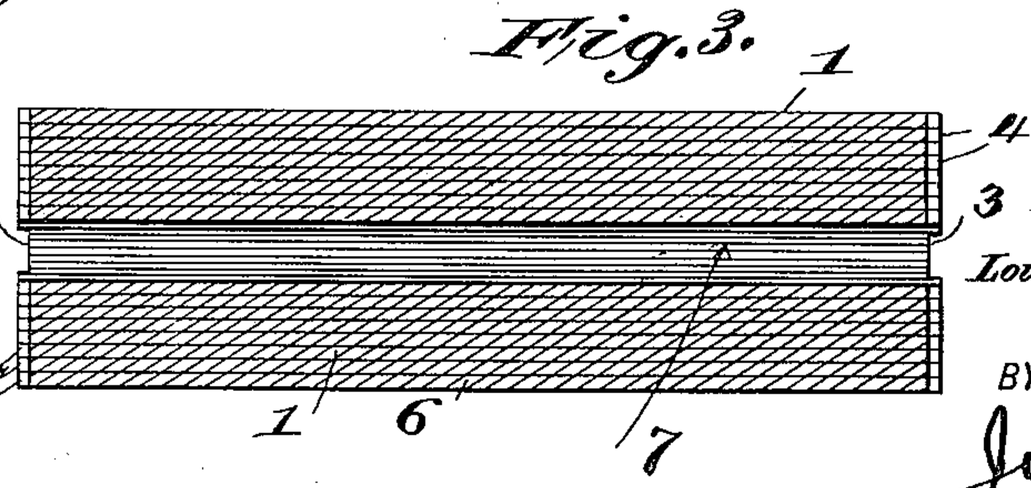


Fig. 3.



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LOUIS NORDLINGER, OF NEW YORK, N. Y., ASSIGNOR TO THE NORDLINGER-CHARLTON FIRE WORKS COMPANY, OF SAME PLACE.

FIREWORKS-BODY OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 639,605, dated December 19, 1899.

Application filed February 18, 1899. Serial No. 705,976. (No model.)

To all whom it may concern:

Be it known that I, LOUIS NORDLINGER, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Fireworks-Bodies or the Like, of which the following is a specification.

My invention has relation to the construction of bodies or tubes for fire-crackers and other pyrotechnical devices, although the same may be employed in the manufacture of paper or other like tubes for general or specific use.

In the manufacture of fire-cracker bodies and other fireworks it has been customary to cut a strip of paper of the desired length and to roll it upon itself or otherwise dispose the strip of paper in spiral or convolute form, leaving a central bore or opening, the successive folds of the paper being either glued upon each other or otherwise secured together.

Another manner of making tubes for special or general use has been to utilize a band or strip of paper or a plurality of bands or strips and form the tube continuously or of a length longer than the ultimate tube and to sever the continuous or otherwise formed tube into tubes of different and shorter length by severing them from the main tube by a knife or other cutting instrumentality after the tube has been completely formed.

The latter-stated manner of forming tubes is not desirable in the manufacture of tubes for fire-crackers for the reason that in the latter art the body is necessarily very thick, comparatively, and is usually of pulpy or spongy paper, and the bore is comparatively of very small diameter relative to the general thickness of the body.

To form tubes for fire-crackers by severing the same from a continuously or otherwise formed tube by a knife or other suitable cutting instrument after the tube is formed is attendant with considerable difficulty, not only because of its requiring a special tool or machine for this purpose and the difficulty of keeping the knives sharpened, but it is not economical unless the tube is formed continuously, and this nas been found to be very difficult of accomplishment unless employed in connection with strips or bands of paper spirally disposed about each other, and when dealing with soft or pulpy paper—such as Chinese paper, usually employed in the manufacture of fire-crackers and the like—the difficulties which would be attendant upon severing the completed bodies from the tube would be very great.

My invention therefore has to do with the manufacture of bodies for fire-crackers or the like wherein either the soft or pulpy paper or a comparatively hard paper can be used and where the body is made of considerable thickness and of a much greater thickness than the bore.

In practicing my invention I take a strip of paper (or other fabric) of a width sufficient to make the desired number of fire-cracker bodies of the desired length, which should be imperforate, except as hereinafter described, and mount the same upon a suitable tool or mandrel and dispose the paper about itself in spiral or convolute folds, rolling it in the direction of its length, and simultaneously from the initial point of the spiral disposition of the paper I score, upset, or perforate the same at points determining the end or length of the complete body, the scoring, upsetting, or perforation of the paper forming a line of weakened or partly broken or separated paper which when the body is completely formed will be transversely of the body and diametrically in actual or substantial alinement, so that sections of the tube so completed can be broken off with very little pressure, leaving a completed body ready for loading and final treatment with a slightly-jagged edge.

My invention therefore resides in the article substantially as hereinafter described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a perspective view of a partly-formed tube made in accordance with my invention, showing a plurality of bodies being formed of one strip of paper; Fig. 2, a side elevation of the completed tube, enlarged,

and showing a body being broken away from the tube; and Fig. 3, a longitudinal sectional elevation, enlarged, of a completed body formed in accordance with my invention.

Similar numerals of reference indicate corresponding parts throughout the several views.

In practicing my invention I take a strip of paper or other suitable fabric 1 of a width suitable for the purpose of producing the desired number of completed bodies and of a proper length (the word "length" meaning the dimensions of the sheet or strip of paper in the direction of the rolling) and proceed to spirally dispose the said sheet or strip upon itself. I employ for this purpose a mandrel; but any mechanism suitable for this purpose can be employed, it being essential to leave a longitudinal bore both in the tube and in the completed body.

I employ in conjunction with the mandrel or other means for supporting the tube during the rolling process a scoring or perforating device consisting of one or more instrumentalities and so organized that at the initial step in the disposition of the paper to form the tube the same will at predetermined points transversely of the line of fold produce a line 2 of perforations, scoring, upsetting, or separation of the paper in parallel lines, (where two or more separations are made running in the direction of the length of the paper.)

In the form in which my invention has been embodied I have weakened the paper along the line of its ultimate separation by removing therefrom small rectangular sections 3, leaving connecting-tongues 4 between the separations, the connecting-tongues being preferably narrower than the length of the openings formed in the paper, so that when the tube 5 is completed, as shown in Fig. 2, not only will the line of separations lie transversely and be in diametrical alinement, (although overlapping each other, owing to the increasing diameter of the tube as it is being rolled,) but will leave a connecting tissue between each successive body—that is, in the lines of separation of less resistance than the sum of the perforations. In other words, when the tube is completed the sum of the area of the connecting-tongues is so proportioned to the sum of the area of the perforations that the resistance to ultimate separation of one section 6 from the other will be as little as can be obtained consistent with sufficient strength for supporting the sections in operative relationship to each other during the process of rolling, the result of such disposition of the material being that when the tube 5 is completed the sections 6 can be readily broken off or separated by hand, as indicated in Fig. 2, leaving a completed fire-cracker body of the desired length, thickness, and diameter of bore 7. It is apparent that this construction renders it possible to employ paper (although any other suitable material can be utilized) of varying densities, tough, spongy, or any structural characteristic, and that the necessity of forming a continuous tube in order to produce the sections of shorter length, as before stated, is absolutely avoided.

Any desired means can be employed for preventing the paper from unrolling, such as gluing, pasting, &c.

I do not intend to limit myself to weakening the paper by a line composed of a series of perforations of any specific form, as it is apparent that instead of being rectangular they may be circular or otherwise disposed, and, further, the weakening of the paper along the line or lines of separation may be brought about by scoring or otherwise disturbing or weakening the fiber of the paper, as I consider myself to be the first to have formed a tube of spirally-disposed or convolute folds of paper or other desired fabric and which is imperforate in the final body between its ends, and to weaken the tube thus formed at predetermined points transversely of the length of the tube, so as to allow of the ultimate separation of the paper at that point, the weakening being substantially continuous or coextensive with the diameter of the tube or the length of the sheet or strip of paper or fabric employed.

In Fig. 1 it will be noticed that one edge of the paper has not been scored, perforated, or weakened, while the other edge has.

My invention is thus illustrated for the reason that in practicing it one or both of the longitudinal edges of the paper will remain untouched and for the further reason that it is considered the illustration of the formation of three sections will suffice for a full and clear description of my invention.

Of course it must be understood that where the word "imperforate" is used herein it should be taken to mean that the strip or band forming the final firework-body should be without such holes, perforations, or the like as would unfit it for use as a firework-body.

Having deseribed my invention, I claim—

1. An article of manufacture of the class described consisting of a tube for a fireworks-body comprising a strip or band of fabric disposed upon itself in convolute folds the final one of which is secured, the strip or band being perforated on a line running in the direction of the length of the fabric, the perforations being in substantial diametrical alinement, the fabric of the band or strip between the perforations being imperforate, substantially as described.

2. An article of manufacture of the class described consisting of a tube for a fireworks-body comprising a strip or band spirally disposed upon itself to provide a central bore and an outer body, the outer end of the strip being secured thereon, the tube being weakened in

the direction of the length of the fabric by the removal of portions thereof which forms a line of perforations with connecting-tongues, said perforations being of greater area longitudinally than laterally and of greater area than the connecting-tongues, the perforations and tongues lying in the same transverse plane and being in diametric alinement, the fabric between the perforations being imperforate, substantially as described.

Signed at the city, county, and State of New York this 16th day of February, 1899.

LOUIS NORDLINGER.

Witnesses:

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SERENA B. KUHN.