

No. 675,102.

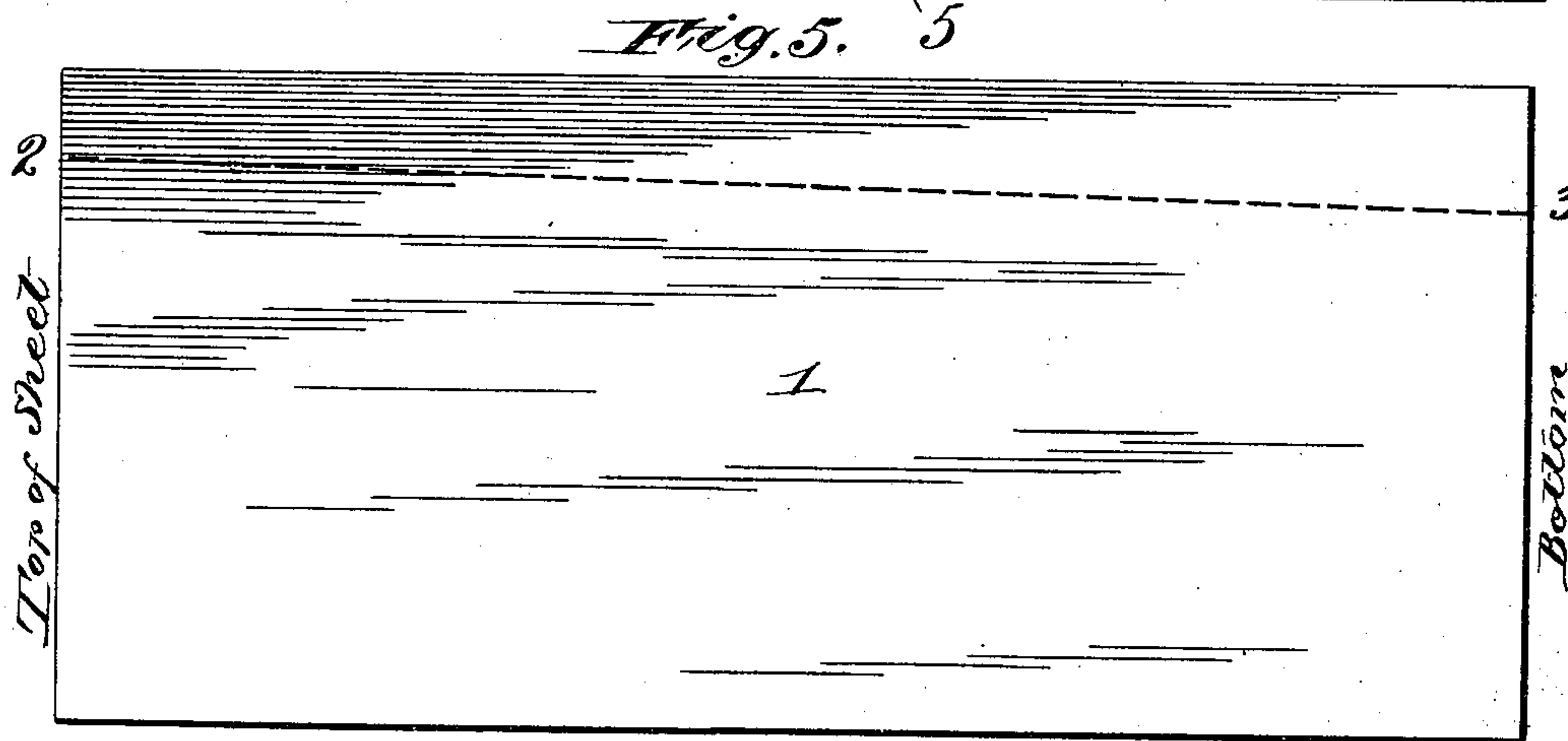
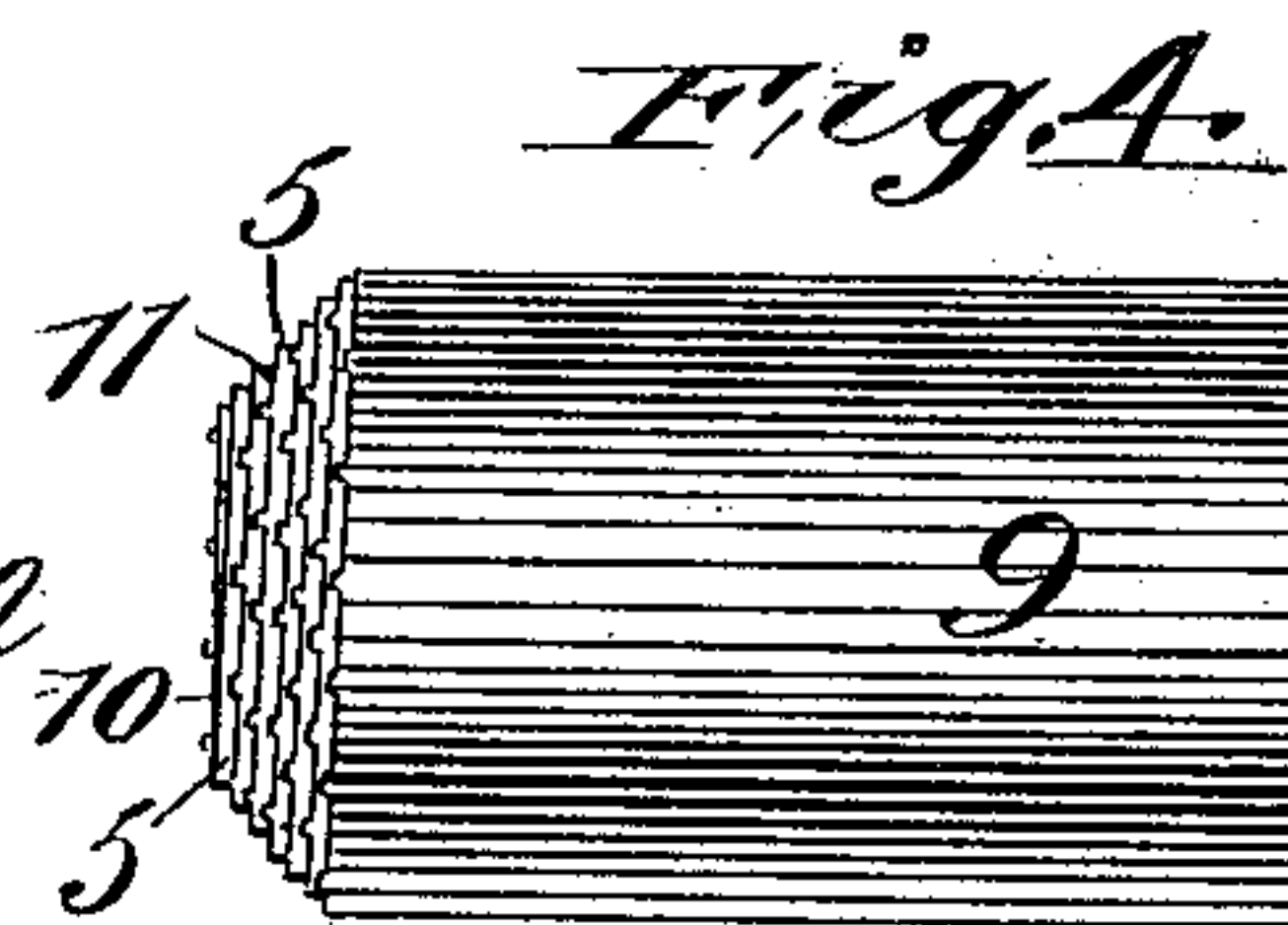
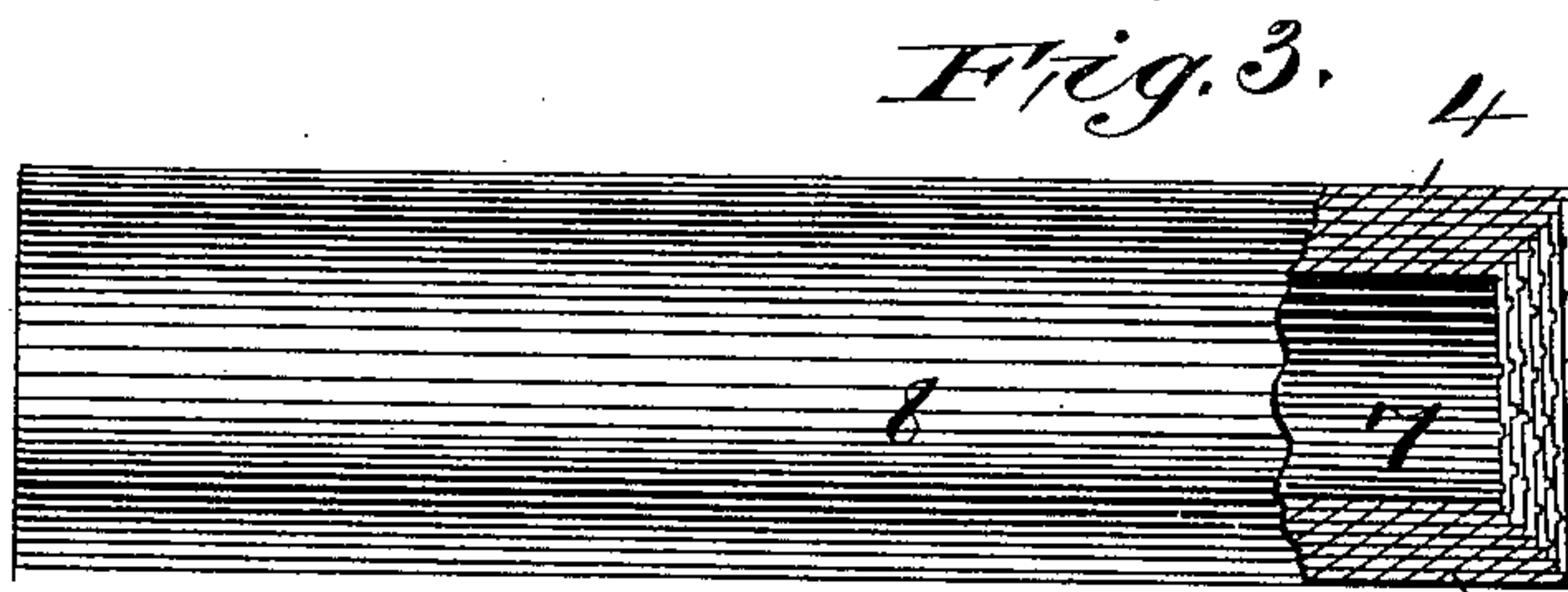
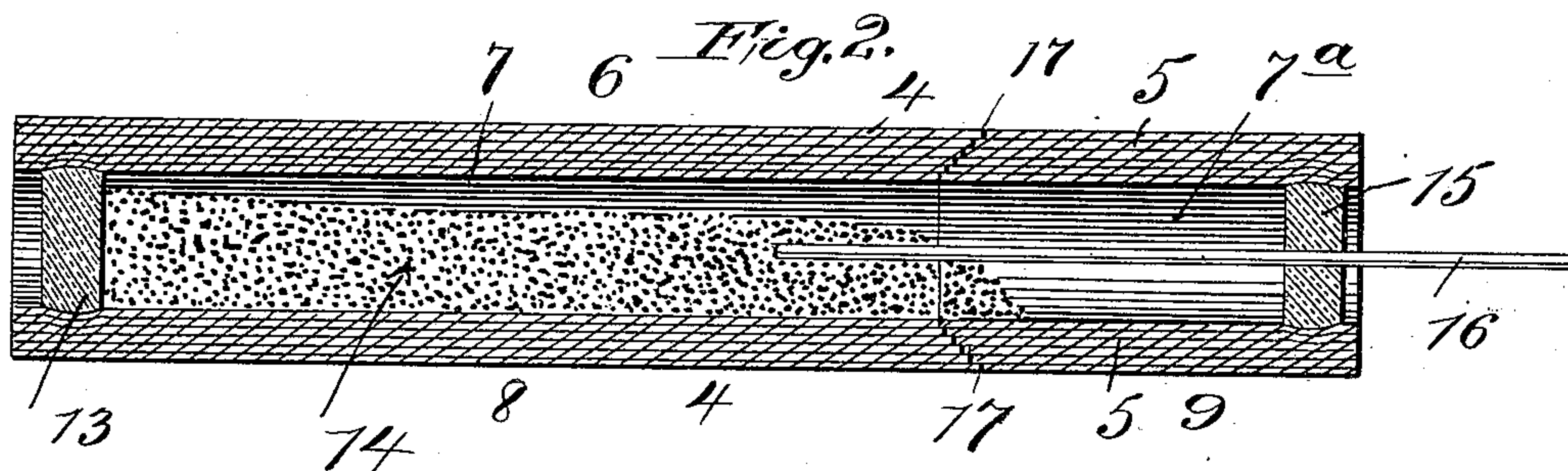
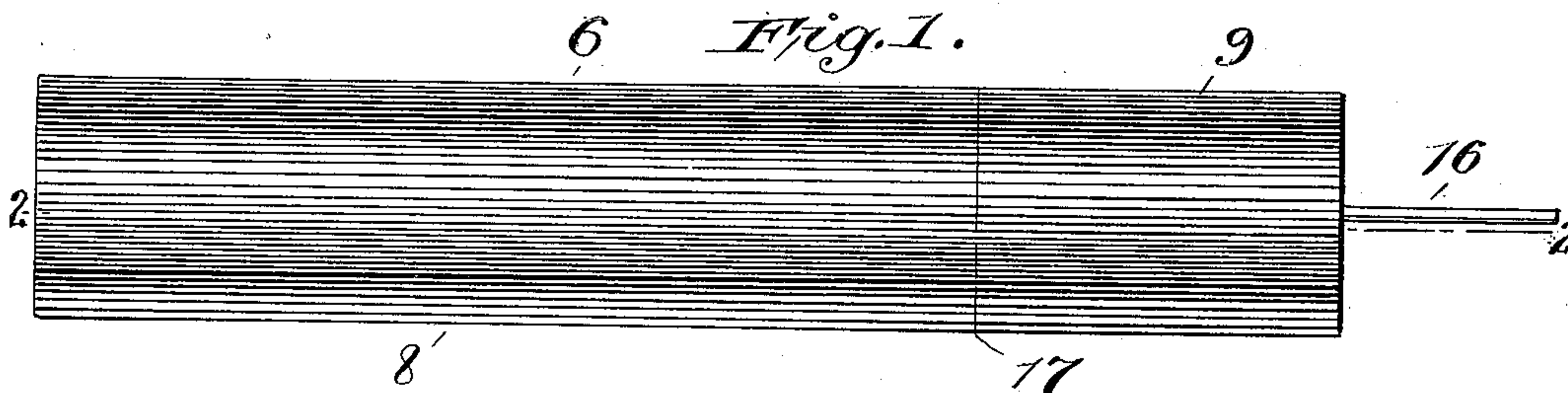
Patented May 28, 1901.

L. NORDLINGER.

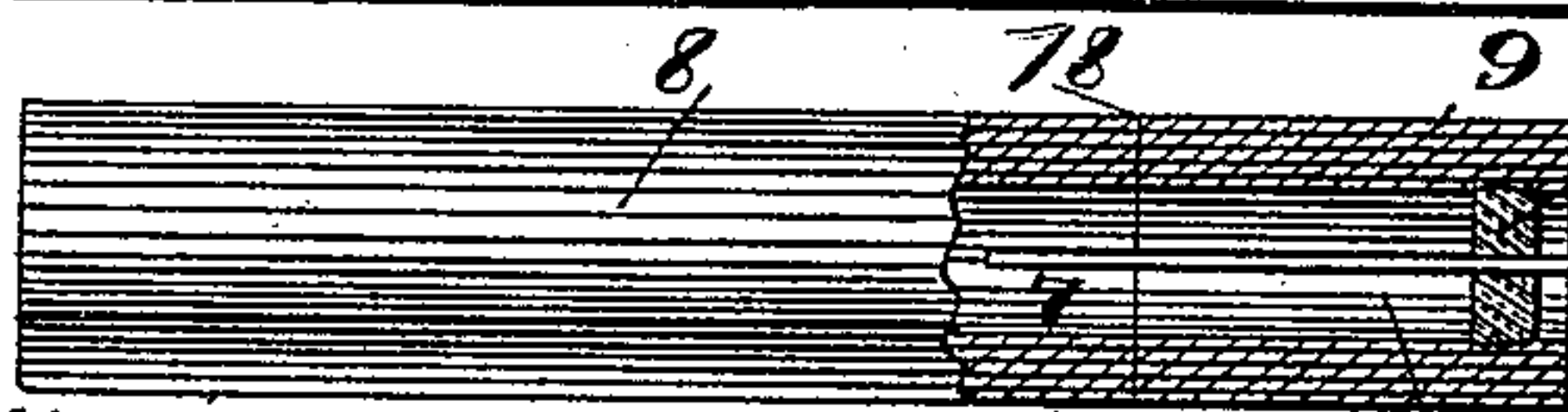
FIREWORKS AND PROCESS OF MAKING SAME.

(Application filed Dec. 20, 1899.)

(No Model.)



Attest:
C. W. Benjamin
Chas. S. Husley



6 Fig. 6. 7a

Inventor,
Louis Nordlinger,

by Joseph L. Levy
att'y

UNITED STATES PATENT OFFICE.

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

FIREWORKS AND PROCESS OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 675,102, dated May 28, 1901.

Application filed December 20, 1899. Serial No. 740,991. (No model.)

To all whom it may concern:

Be it known that I, LOUIS NORDLINGER, a citizen of the United States, residing at the city of New York, borough of Manhattan, county and State of New York, (with post-office address at 935 Madison avenue, in said city,) have invented certain new and useful Improvements in Fireworks and Processes of Making the Same, of which the following is a specification.

My invention relates generally to the improvements in firework construction and in the mode of making the same, and specifically to fire-crackers, the object of which is to cheapen the cost of manufacture, while at the same time producing a more effective detonating device.

The invention consists in the article and the process of making the same, as hereinafter described, and further pointed out in the claims.

In the accompanying drawings, illustrating an embodiment of my invention, Figure 1 is a side elevation of a fire-cracker made in accordance with my invention, and Fig. 2 a longitudinal sectional elevation of the same. Figs. 3 and 4 respectively represent the detached sections, Fig. 3 being partly in section. Fig. 5 diagrammatically represents the method of making the specific body illustrated in Figs. 1 to 4; and Fig. 6 is a side elevation, partly in section, of attached sections of a fire-cracker body of a modified form.

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

My present improvements relate more particularly to the construction of fire-cracker bodies used with high-power explosives, although the same can be advantageously employed in the usual fire-cracker construction.

In the art of making fire-crackers, especially where a high-power explosive, such as dynamite composition or the like, has been employed, serious consequences have resulted from premature explosions, the tendency to which results mainly from the methods of manufacture employed, especially that part wherein the plugging or the choking of the tube occurs. To avoid the expense incidental to the employment of cork for choking the tube, in which additional thickness of body-paper has to be used to prevent the cork

being forcibly ejected when the body is exploded, wads of compressed paper have been resorted to, and in choking the tube with these wads, which often have been impregnated with glue or the like, it has happened that friction-sparks have been generated and the charge exploded, it being necessary to choke one end after the charge has been inserted. With my improvements this danger is avoided. Clay plugs or plugs made from the body of the tube can be used in the usual way to choke the ends and comparatively less thickness of paper employed than heretofore.

One of the methods of practicing my invention and producing my improved body will now be described.

I take a sheet of paper or other fabric 1 of which it is desired to construct the body and of the proper dimensions and produce thereon by any well-known device and in the rolling direction thereof a line of weakness 2 3, as by scoring, perforation, &c., which may be disposed so as to cause said line to lie in diametric alinement, as in my patent, or, as preferred, (for reasons hereinafter stated,) the line is caused to extend diagonally across the sheet, as shown in Fig. 5. This sheet is then rolled upon itself to form the convolute folds or spirals 4 5 to form the body 6, having the bore 7^a, (during which rolling the scoring or perforating is done,) the edges of the paper being secured down in any suitable way. The tube thus formed is thus divided into sections 8 9 (of which any suitable number can be used) ready to be separated from the main body or tube. By exerting a torsional or twisting pressure on the body the tube is separated into the sections 8 9 on the line of weakness 2 3, the section 9 then presenting a projecting nose 10, formed by the gradually-projecting spirals of paper, the inclined surface of which is stepped, as at 11, which stepping is formed by the gradually-increasing projection of the successive convolutions and influenced by the diagonal disposition of the scoring or perforating lines 2 3. This separation of the tube into sections produces in the opposing end of the section 8 a stepped recess 12, formed in the same way and by the same act, the nose and recess 10 12 forming

an interlocking joint. The sections 8 9 are then ready for independent choking, charging, and fusing, all of which may be done by the same operator or by different persons, while as independent sections a plug 13, of clay or other desired material, is forced into the bore 7 of the section 8 to choke its end opposite the recess 12 and a charge of explosive material 14 placed in the bore, as indicated in Fig. 2, and the section 9 is likewise provided with a plug 15 and igniting-fuse 16. The sections are now ready to be joined together to form the completed fire-cracker properly charged, fused, and choked, and it will be noted that this condition has been brought about without subjecting the charge to the influence of accidental or premature discharge.

To secure the sections together, the nose 10 is dipped into some adhesive substance 17, such as glue, preferably, or the same may be otherwise applied so as to cause the same to cover its stepped surface, whereupon it is inserted by a screwing action into the stepped recess, the stepping of the surfaces of the recess and nose producing an interlocking joint, which with the increase of surface produced by the spiral extension of the tube convolutions for the deposition of the adhesive substance forms a firm point, which actual detonation has demonstrated is as strong if not stronger than the tube in other parts. The tube may then be finished by rolling an outer covering thereon in the well-known way or as desired.

It is clear that the nose and recess can be formed upon either section of the tube, and it is also clear that instead of forming the tube in this way from a blank or sheet of paper just wide enough to make a single body in length a sheet of paper of sufficient width to make several finished tubes can be employed, the division into complete tube-sections being had in accordance with my before-described patent, in which the weakening is diametrically alined. It is also apparent that instead of utilizing the diagonally-disposed line of scoring or perforation 2 3 the sheet can be weakened as per my patent or the tubes severed in any other known way—that is to say, my invention can be utilized by merely cutting a tube into sections of the desired length and then securing the substantially flat faces of the two sections together, as indicated at 18 in Fig. 6, the sections having been choked, charged, and fused, as previously described in connection with sections 8 and 9.

I prefer that the section carrying the fuse should be the shortest, so as to allow the other section to be provided with the charge, which is not packed tightly therein, but it is free to move about, so that when the two sections are secured together the bores 7 and 7^a will become alined, allowing the fuse 16 to enter into or project into close proximity to the charge 14, thus causing the effective assem-

blage of the parts to be readily accomplished. It is not essential that the fuse be brought into physical contact with the charge, as a sputtering fuse may be employed to ignite the charge 14 in the well-known way. It is also obvious that the plug 13 may also be provided with a fuse and that instead of employing but two sections, as 8 and 9, in the construction of the fire-cracker it may be constructed of any number of desired sections; but I prefer the herein-described method of construction, as it produces with the smallest number of parts and great economy in labor and cost of material the sections each provided with component parts of the complete fire-cracker, each one requiring only attachment together and subsequent finishing, as before described, if desired, to at once produce a complete fire-cracker or firework, and this without subjecting the charge of the operator to the danger of inadvertent explosion.

Having described my invention, I claim—

1. The art of making fireworks, which consists in forming a hollow tube, dividing said tube into sections, choking the outer end of each of the sections, charging one section, fusing the other section, and uniting the two sections together, with their bores alining, substantially and for the purposes herein set forth.

2. The art of making fire-cracker or firework bodies, which consists in spirally disposing a sheet of fabric upon itself, to form a tube having a bore, and weakening the fabric of said tube on a line diagonal to the direction of rolling, severing said tube on said line of weakness into separate sections, choking the outer end of each of the sections, charging one of the sections, and fusing the other of the sections, and firmly uniting the severed surfaces of the sections together, with the respective bore of the sections alining, substantially and for the purposes herein set forth.

3. As an article of manufacture, a firework, comprising several sections, one section having a plugged end and a charge as component elements, another and opposing section having a plugged and fused end as component elements, both sections being firmly united transversely between said plugged or choked ends by added means, the bores of said sections alining, substantially as described.

4. As an article of manufacture, a firework or fire-cracker, comprising several sections, one end section having a choked end and a contained charge, the other end section having choked end and a fuse, the opposing inner ends of said sections having an interlocking projection and recess, which are firmly united together to aline the bores of said sections and complete the firework, substantially as described.

5. A firework-body, comprising the sections 8 and 9, section 9 having a coned projection comprising a plurality of stepped and

ragged surfaces, and the section 8 having a likewise-constructed recess to receive said nose or projection, substantially as described.

5 6. A firework-body, comprising sections formed of spirally-disposed layers of fabric, and a bore, the fabric projecting from one section spirally, and decrementally to form a projecting nose, and a similarly-formed recess in the opposing end of the other section, 10 the nose and recess being adapted to be secured together, to complete the tube, substantially as described.

7. A tube for a firework-body, having a

shell and a bore, an annular projection from 15 the shell, forming a gradually-diminishing nose having a stepped and ragged surface, the shell of the other section having a like and inwardly-extending stepped recess of gradually-diminishing diameter, and adapted to receive the stepped nose of the other section, 20 substantially as described.

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

LOUIS NORDLINGER.

Witnesses:

CHARLES G. HENSLEY,
HERBERT F. DURBUR.