(No Model.) 3 Sheets—Sheet 1.

D. APPEL.

ART OF MANUFACTURING PAPER BAGS.

No. 551,611. Patented Dec. 17, 1895.

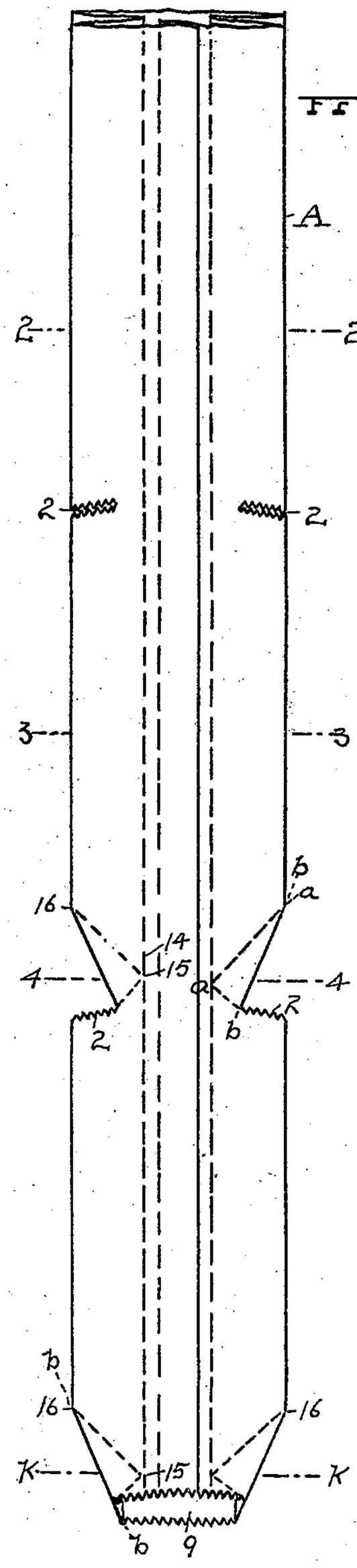

Fig. 1.

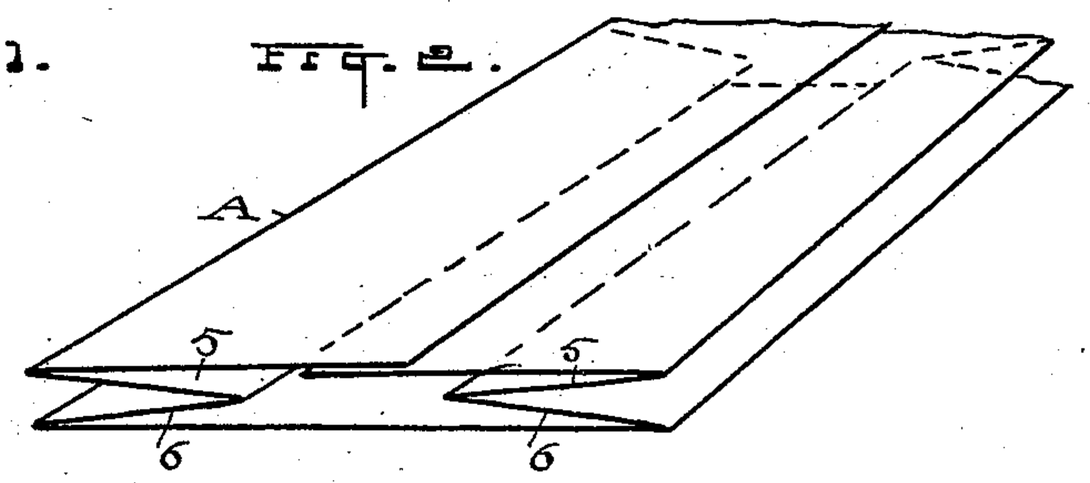

Fig. 2.

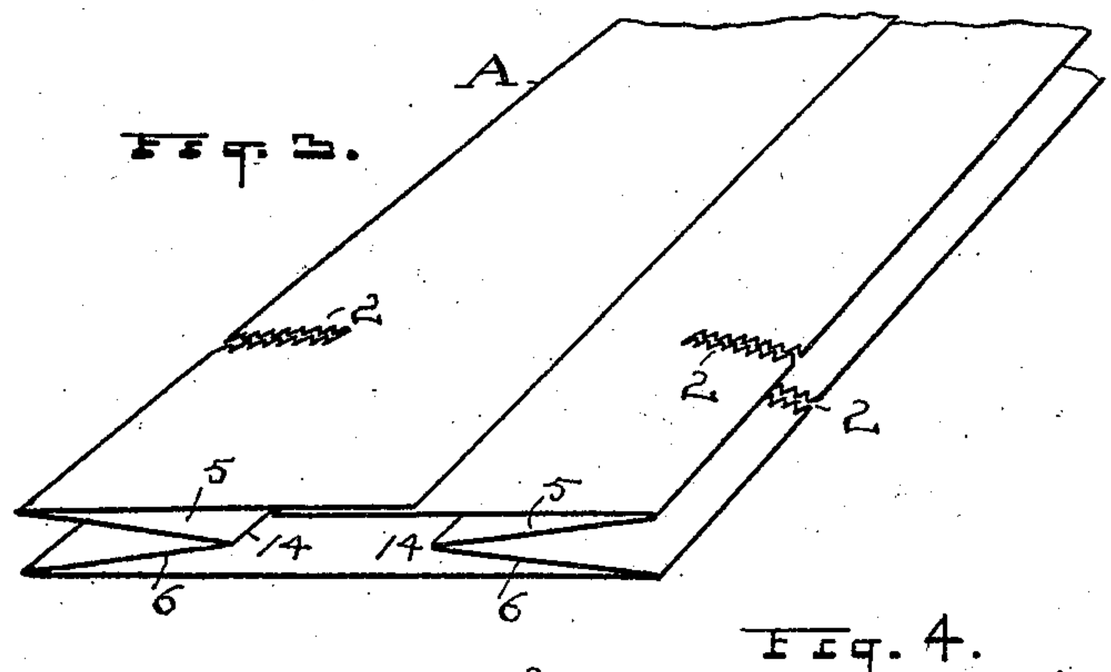

Fig. 3.

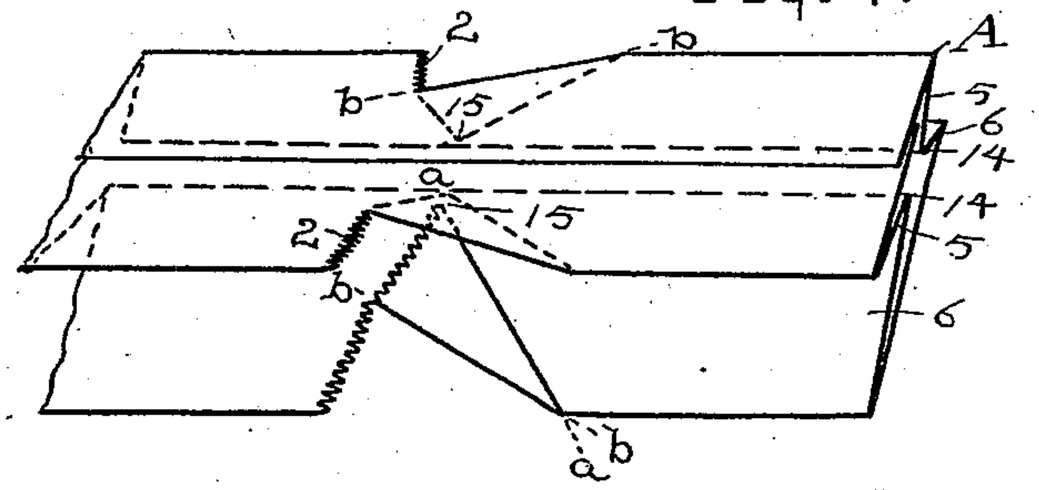

Fig. 4.

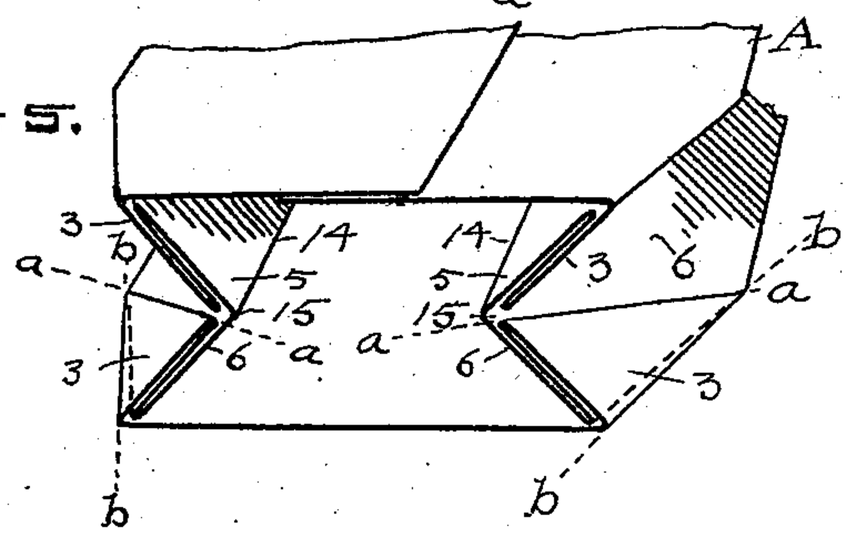

Fig. 5.

ATTEST.

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BY H T Fisher ATTY.

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D. APPEL.

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No. 551,611. Patented Dec. 17, 1895.

Fig. 6.

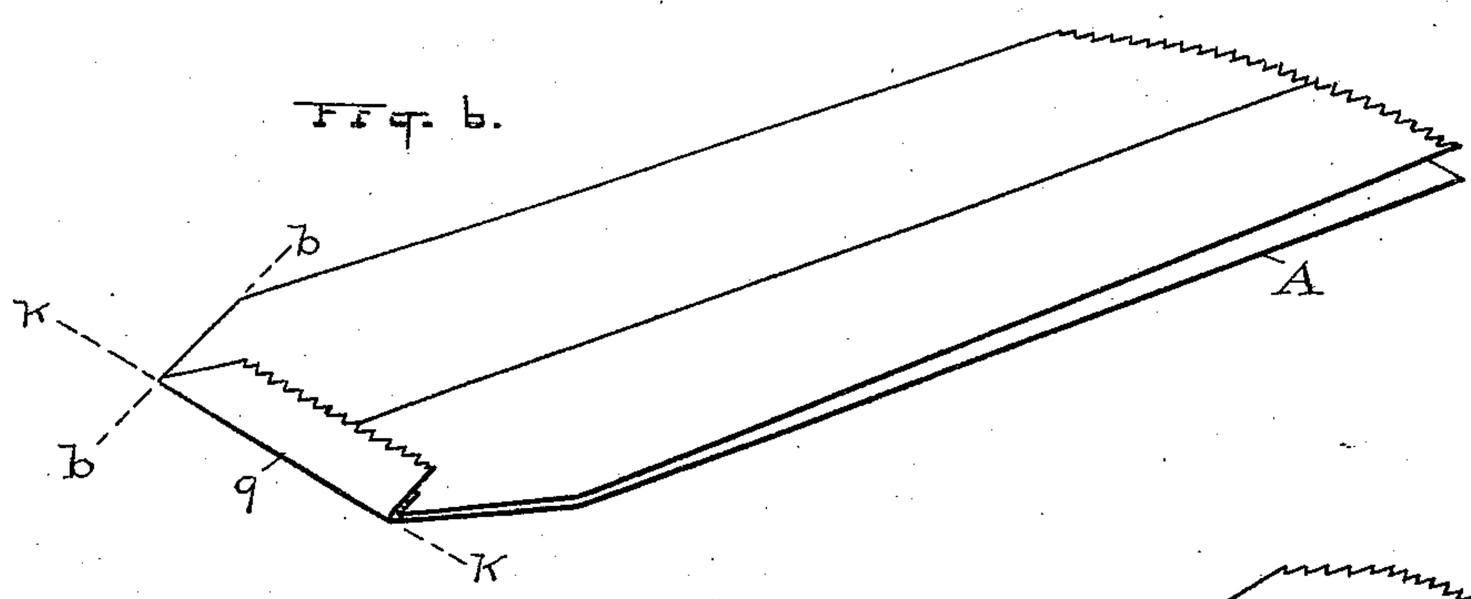


Fig. 7.

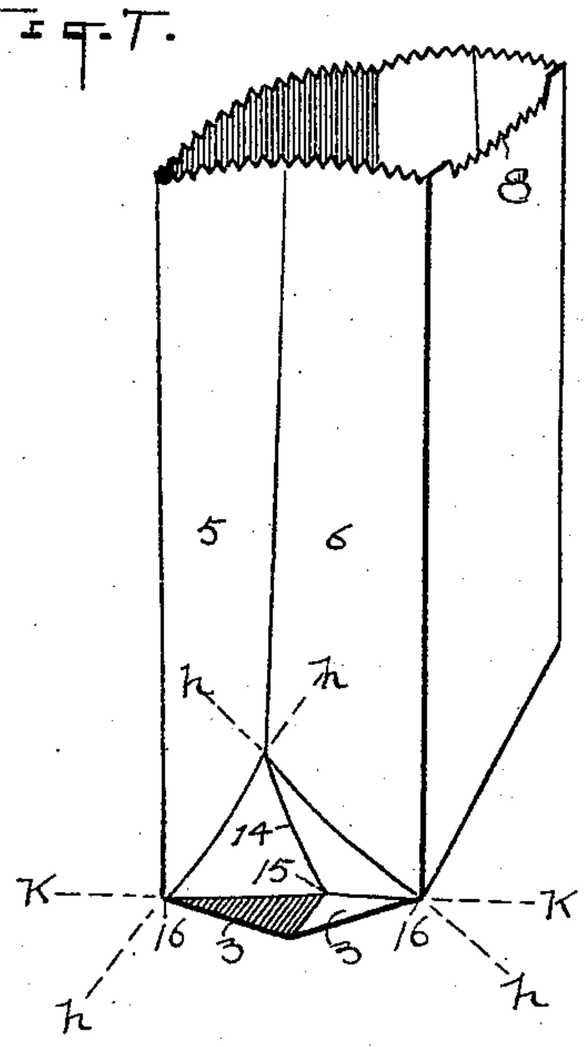


Fig. 8.

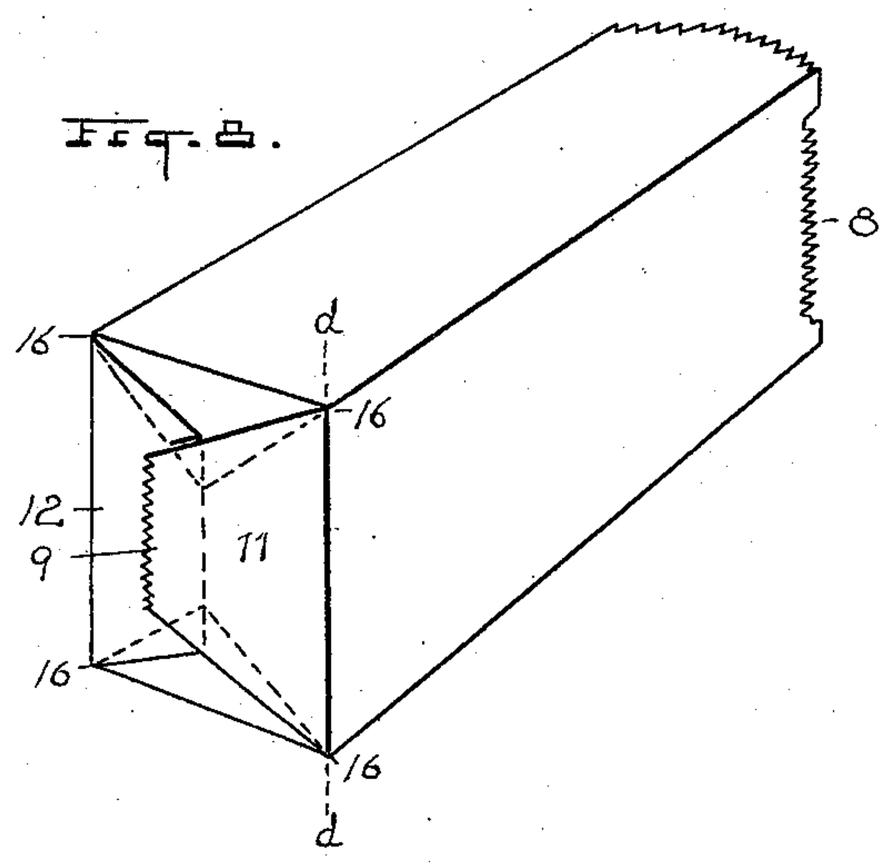
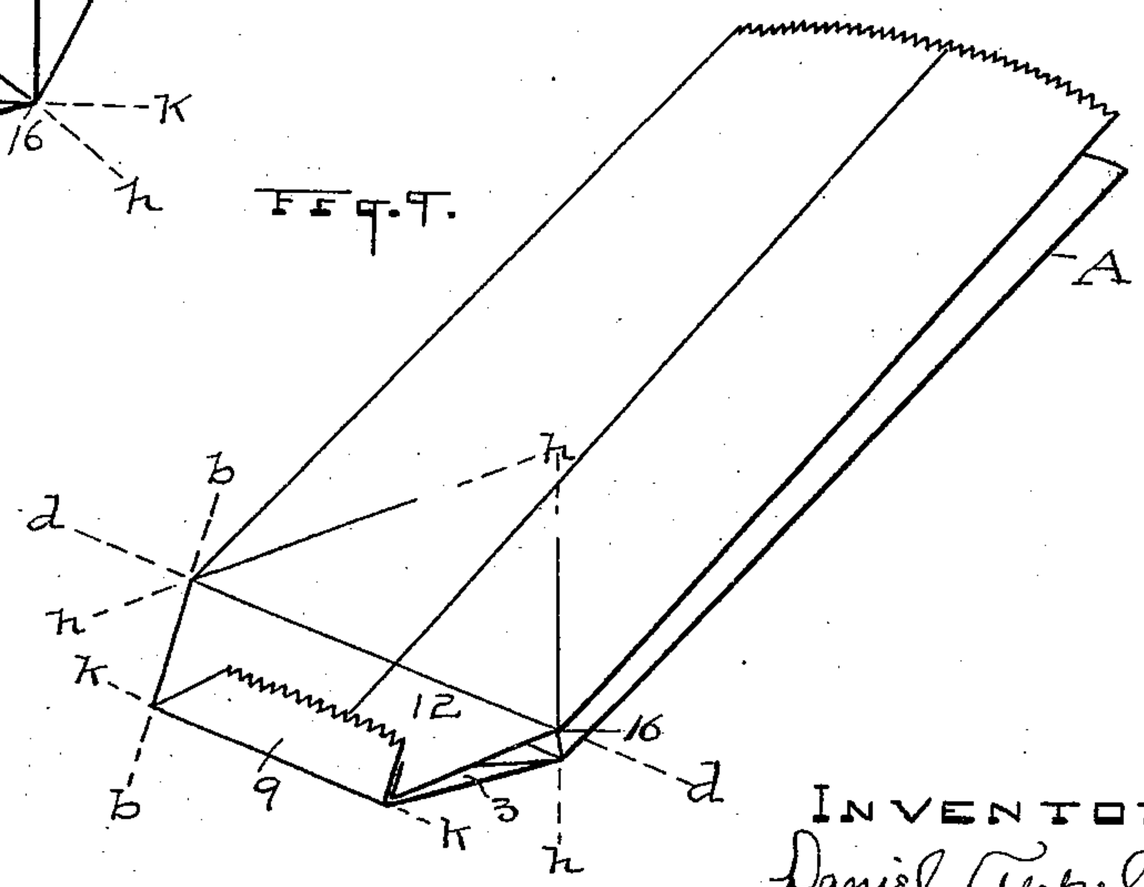


Fig. 9.



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(No Model.) 3 Sheets—Sheet 3.

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ART OF MANUFACTURING PAPER BAGS.

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Fig. 10.

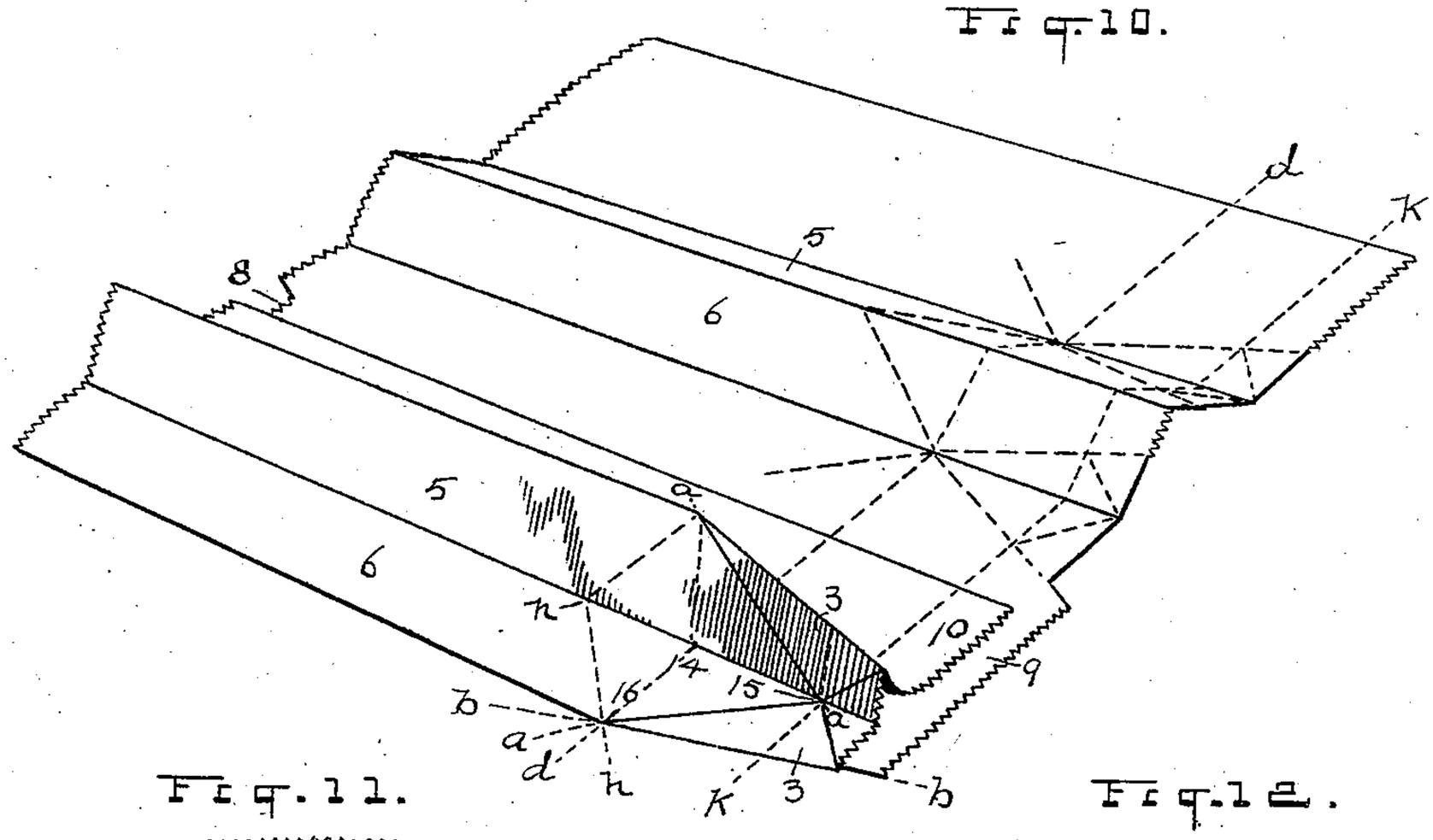


Fig. 11.

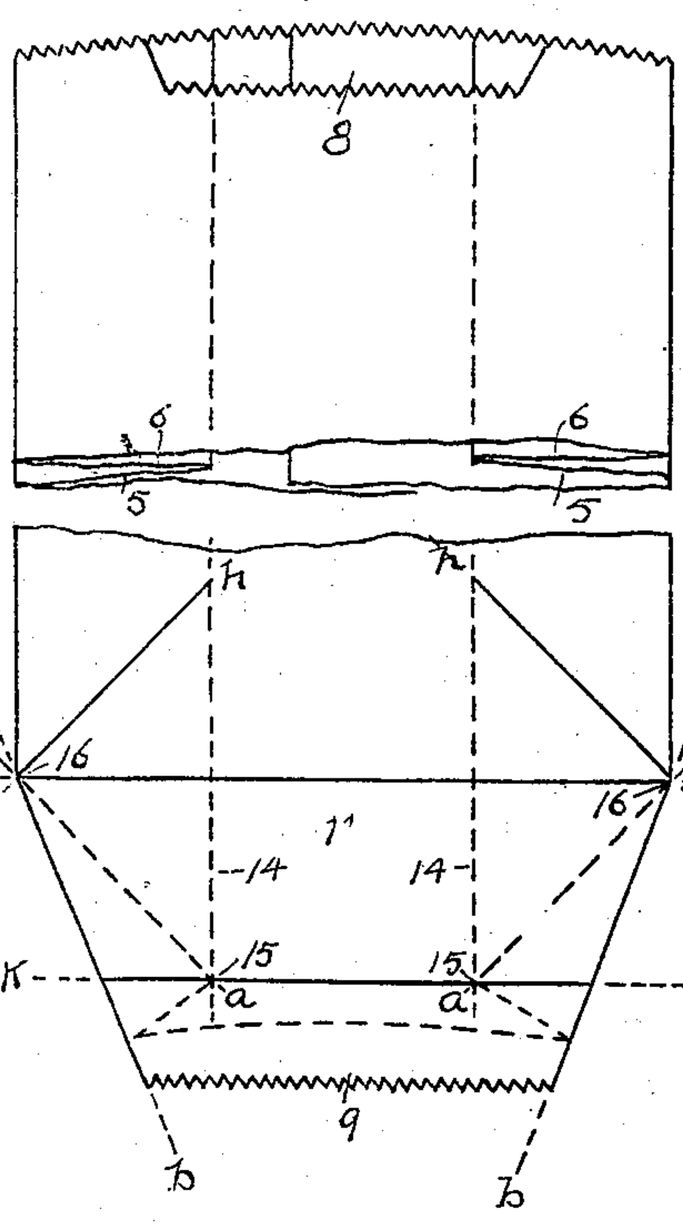
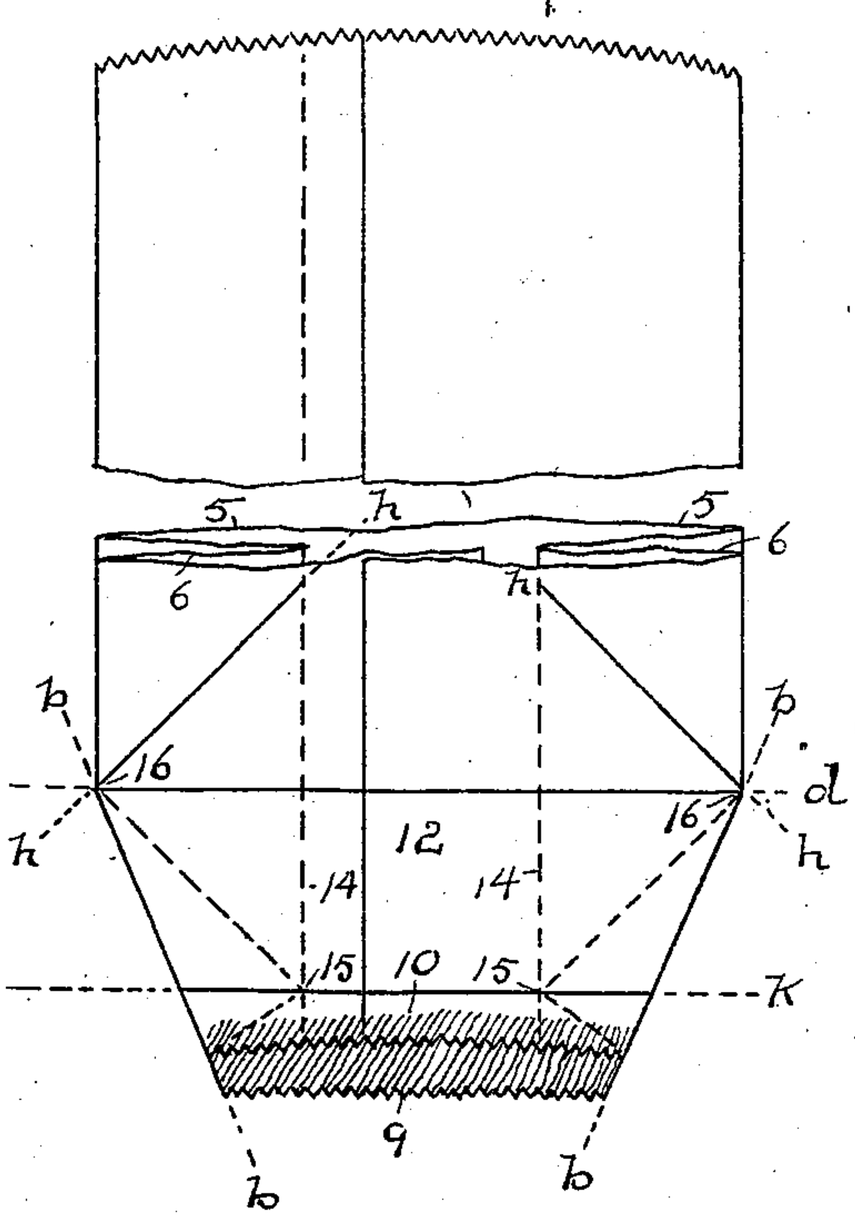


Fig. 12.



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UNITED STATES PATENT OFFICE.

DANIEL APPEL, OF CLEVELAND, OHIO.

ART OF MANUFACTURING PAPER BAGS.

SPECIFICATION forming part of Letters Patent No. 551,611, dated December 17, 1895.

Application filed July 22, 1895. Serial No. 556,705. (No model.)

To all whom it may concern:

Be it known that I, DANIEL APPEL, a citizen of the United States, residing in Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in the Art of Manufacturing Paper Bags; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the art of manufacturing paper bags; and the object of the invention is to provide a self-opening satchel-bottom bag, or, in other words, a bag which is so fashioned that it requires no help whatever after being opened automatically by a dip of air to give it shape and to spread on natural and predetermined lines when being filled. The bottom of the bag may, therefore, be said to be self-forming, and in this respect differs essentially from all paper bags which require the hand to be thrust in and the bottom of the bag manipulated into shape before filling can begin.

The invention, therefore, consists in the method or process of making paper bags and in the bag itself as an article of manufacture, substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a view of a section of the usual plicated paper tube from which the bagsare successively formed and in which one of the overlapping edges or seams along its middle is already provided with paste. In this view are also illustrated certain steps in the manufacture of the bag, as hereinafter fully described. Figs. 2 and 3 are enlarged cross-sections of the tube, taken on lines 2 2 and 3 3, respectively, Fig. 1, and disclosing more clearly the form of the tube out of which the completed bag is wrought. In Fig. 3 are shown the two incisions across the edges of the tube, which determine the length of the bag-blank and are initial to the folding of the bottom. Fig. 4 is a perspective view of a section of the tube corresponding substantially to Fig. 3, but a step further toward completion, because the corners of the bottom are folded in and the tube is ready to be severed on the line of the incisions, as also seen at 4 4, Fig. 1. Fig. 5 is a perspective view of the bottom of the bag folded in at its corners, as in Fig. 4, and in condition substantially as seen at the bottom of Fig. 1. Fig. 6 is a perspective view of an uncreased bag finished and collapsed and ready for use. Fig. 7 shows the bag in Fig. 6 distended as when opened by a dip of air for use but not wholly spread at the bottom, and Fig. 8 shows the same bag fully open at all points. Fig. 9 is a view of a finished bag, as in Fig. 6, but creased on certain lines, as hereinafter described. Fig. 10 is a perspective view of an unfolded bag-blank, and Figs. 11 and 12 are views of the same blank partly folded.

I have not shown any special machinery or appliances which may be employed as aids in accomplishing the different steps of manufacture, because, as will at once be obvious to any person practiced in this art, there might be a great many different means employed to work out each step in the process and all yield practically the same result. Neither do the means which may be employed constitute the present invention, but are reserved for another and separate application. Assuming, then, that we are now working from stock in the form of tube A, furnished to hand in continuous feed, the first step in my process is to form the lateral incisions 2, which, besides their special purpose, also determine the length of the bag-blank and come at the top of one bag and at the bottom of another. The next step in the process is to fold the corners 3 of the bottom portion of the bag inward, so that the inner edge *a a* of the fold will assume an angle of substantially forty-five degrees to the edge or side of the bag. This leaves the outer or folding edge *b b* at one-half the angle of the edge *a a*, or, say, twenty-two and one-half degrees. These infolded corners 3 are each tucked or folded back flat against the corresponding plies 5 and 6, respectively, and they remain in this position in the finished bag. The next step in the process is to sever the blanks substantially on the line of the incisions 2, but with such deviation as will now appear and as seen in Figs. 11 and 12. Thus Fig. 11 shows one edge of the bag and Fig. 12 the other of the preferred style of bag. In this latter figure the line of severance has left a recess, or what

is known as a "thumb-hole," 8 in the edge extending in this instance about two-thirds across the center of the bag, but it may be shorter. The stock removed from thumb-hole 8 remains on the other severed part, and is indicated by lip 9 at the bottom of the bag, Figs. 10, 11, and 12. This leaves the blank in the advanced state of completion seen in Figs. 11 and 12, and the next step is to apply paste along the edges 9 and 10 of the leading and rearmost sections 11 and 12 respectively of the bottom and then fold and lap back both sections and the infolded corners 3 between them on the cross-line *k k*, Figs. 11 and 12. This brings in the lower part of corners 3 and makes the bag eight plies deep at the ends of the fold on line *k k*, and hence exceedingly firm at that point.

The bag is now complete, and if it be made from continuous tube A the steps of manufacture may be briefly enumerated as follows: First, make the incisions 2; second, fold the corners 3 back into the side plies; third, sever the stock to form the bag-blank; fourth, paste the bottom lap; fifth and last step, fold the pasted lap back on the rear or short section of the bottom, as described.

The foregoing description implies that the bags are made from a continuous tube. If the blanks are worked up separately the steps in the manufacture are really limited to the folding in of the corners 3 and the pasting and back-folding of the bottom, a very simple and direct process. In either case all of the steps follow each other in rapid succession, and each is so simple and easily accomplished that complete bags can be turned out at a very rapid rate indeed.

Now, having mentioned the essential steps of manufacture, I may call attention to certain others of minor and subordinate character and yet of material advantage—such, for example, as the creasing of the bag on the line *d d*, Fig. 9, so as to define the bottom edge of the bag at each side and facilitate its spreading thereon when the bag is opened. The line or lines *d d* intersect the folding-line *b b* of the corners 3 at the initial point 16 of their fold, and are the natural lines on which the sides and edges of the bag terminate and the bottom begins. Hence to crease the bag at this point causes the bottom to take on the substantially square form seen in Fig. 7 when opened, and overcomes the necessity of hand manipulation. However, when this is done the stock is naturally held back in the plies at the bottom, forming a recess or depression of nearly diamond shape, as indicated in Fig. 7 and defined by inclined lines *h h* and base-line *d d*, and the bag remains this way until the material filled into the bag straightens it out. I have found that the bag is liable to open with these catches at its bottom whether the bag has been previously creased or not on lines *h h*. In order, therefore, that the opening of the bag at this point shall be symmetrical and regular I choose to crease it up both sides on lines *h h*. These creases also serve the important office of braces on the sides of the flutes to keep the mouth of the bag open in a rectangular shape when being filled, as hereinafter described.

Another valuable though subordinate feature of construction is found in the inclined incision 2, from which the corners 3 are folded. The line of overlapping fold at the middle of the bottom coincident with the inner line 14 of the flutes is indicated by *k k*. It will be seen also that the upper point 15 of the corner folds 3 comes directly on this line. Now if the incisions 2 were made directly inward instead of inclined the points 15 would be thrown that much higher up and would not enter the line of fold at *k k*, as shown. Of course the bottom would automatically take shape on the predetermined lines even with the point 15 raised somewhat from the transverse line *k k*, but not so certainly or satisfactorily.

The purpose and importance of the corner fold 3 will now appear. First, by reason of their thickness and angle of fold they are noticeably stiff and arbitrary, and hence give certain definiteness of outline to the bottom of the bag and induce or produce other lines upon which the bottom unfolds and spreads to the desired shape. Thus following the line *a a* of the corner fold 3 it will be seen that as the bag is filled and distended the inner side plies 5 and 6 are forced to bend and fold flat down over the diagonal edges *a a* of the turned-in corners 3 at an angle of about forty-five degrees to the bottom and side of the bag, which is also the angle of the edge *a a*, and the paper bends or folds over these edges very much as it would over an instrument or stiff insertion which might be introduced to produce the same effect. Indeed a like effect might be obtained by temporarily inserting an instrument or by pasting in an insertion of paper or other material in lieu of the said corner fold 3.

Another material advantage of the corner folds 3 is the definite fixing of the corners 16 of the bottom of the bag. These corners are arbitrarily fixed by the folds 3, and by reason of their stiffness contribute to the spreading of the bottom over its unfolded portions to the flat satchel-bottom form shown and described.

The points of the corner folds 3 may be pasted down, but this is not necessary, and the said folds might be produced by a double instead of a single fold, the object in any case being to get stiff edges on line *a a*, over which to bend the side plies 5 and 6 of the bag. The corner folds 3 are therefore of the first importance in giving shape, character, and strength to the bottom of the bag and in determining its unfolding on strictly rectangular outlines.

It should be understood in connection with the diagonal creases *h h* at the sides of the bag that these creases are not necessarily

confined to the special form of square-bottom bag shown and described in this case, but they may be used with other square-bottom bags having plicated sides and serve the same purpose as in this instance—viz., of giving a symmetrical formation to the bottom of the bag and as braces to keep the mouth of the bag open after it has been opened by a dip of air. This latter function is of special importance, because thereby the mouth of the bag is kept in a distended condition and filling of the bag may be at once begun and continued without interruption. It will be understood that by merely creasing the paper the fiber is not broken and weakened, as it would be if the paper were folded flat on these lines and then opened. In that case the line of fold would be a line of weakness rather than of strength, and instead of serving as a brace to the stock there and upward toward the mouth of the bag it would become a broken line on which there would be a constant tendency to collapse and refold as before. Hence care should be taken in making the creases *h h* so as not to really break the fiber. If this be done the creases will serve as strengthening-ribs there and above, while below they will facilitate the spreading of the bag on natural lines to the square-bottom form.

What I claim is—

1. The method herein described of making paper bags from plicated stock, consisting in flat folding the bottom corners of the plies back across the plies about half the depth of the plies on a diagonal line of about twenty-two and one-half degrees, so as to bring the said folds wholly to the bottom of the bag; then cross folding the bottom of the blank on a line traversing said back folded corners and securing the lap of the bottom with paste, substantially as described.

2. The herein described improvement in the art of manufacturing satchel-bottom paper bags, which consists in first folding the four bottom corners of the plicated sides of the blank so as to bring the lower point of the line of the fold about half way across the ply, making the line of fold about twenty-two and one-half degrees to the edge of the plies, and then completing the bag by cross folding and pasting the lap of the bottom back on the body, substantially as described.

3. The method of making bags from a continuous plicated tube, consisting in first forming incisions in the edges of the tube about half the depth of the plies and then folding the corners of the plies inward from these incisions on a line of fold about twenty-two and one-half degrees to the side edge of the plies, then severing the stock substantially on the line of the said incisions and finishing the bag by folding the bottom on a cross line traversing the said folded in corners and adhering the lip so turned back with paste, subtantially as described.

4. The bag having plicated sides and the lower portion of each ply folded back against the ply on a line running from about midway the depth of the ply at its bottom transverse edge to the edge of the ply above at an angle of about twenty-two and one-half degrees to the side edge of the ply, and having its bottom folded transversely substantially as described, whereby a bag is produced in which the folds of the ply come always wholly into the bottom of the bag and the opening of the bag preparatory to filling is facilitated, substantially as described.

5. The bag described having plicated sides and the corners at its bottom folded between the plies at an angle of about twenty-two and one-half degrees to the said sides and said corners secured to prevent unfolding, whereby the adjacent stock of the plies is caused to bend over the inner edges of the said corners when the bag is opened, substantially as described.

6. In paper bags, a bag having side plies and a stiffening portion for each ply at its bottom at an angle of about forty-five degrees to the side of the bag, and forming a stiff edge over which the corresponding part of the ply is bent and lapped to form the square of the bag, substantially as described.

7. The bag described having the bottom corners of its plicated sides folded between the plies and subtantially to the depth thereof, and the lap of the bottom folded back on the body substantially on a line with the points of the said folded in corners and pasted to the body, substantially as described.

8. The bag described having plicated sides, the lower corners of said sides turned in substantially the depth of the plies and the bottom lap of the bag folded back and pasted on a line intersecting the points of the said inturned corners, and the diagonal creases *h. h.* on the sides of the back at right angles to inner edges of said inturned corners, substantially as described.

Witness my hand to the foregoing specification of this 20th day of July, 1895.

DANIEL APPEL.

Witnesses:
H. T. FISHER,
R. B. MOSER.