5 Sheets—Sheet 1.

F. E. PORTER.

Paper-Bag Machine.

No. 205,133. Patented June 18, 1878.

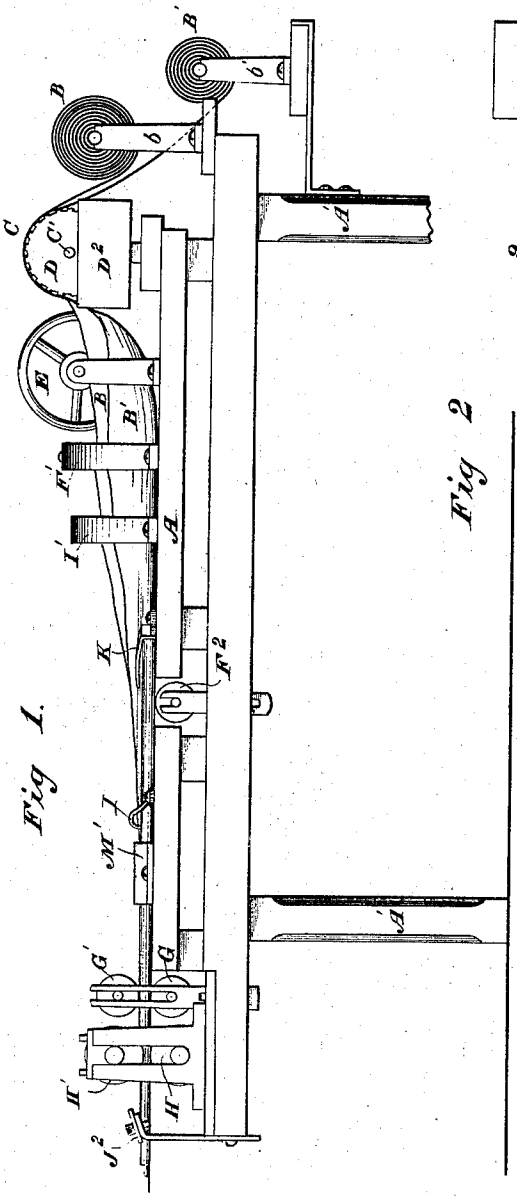


Fig 1.

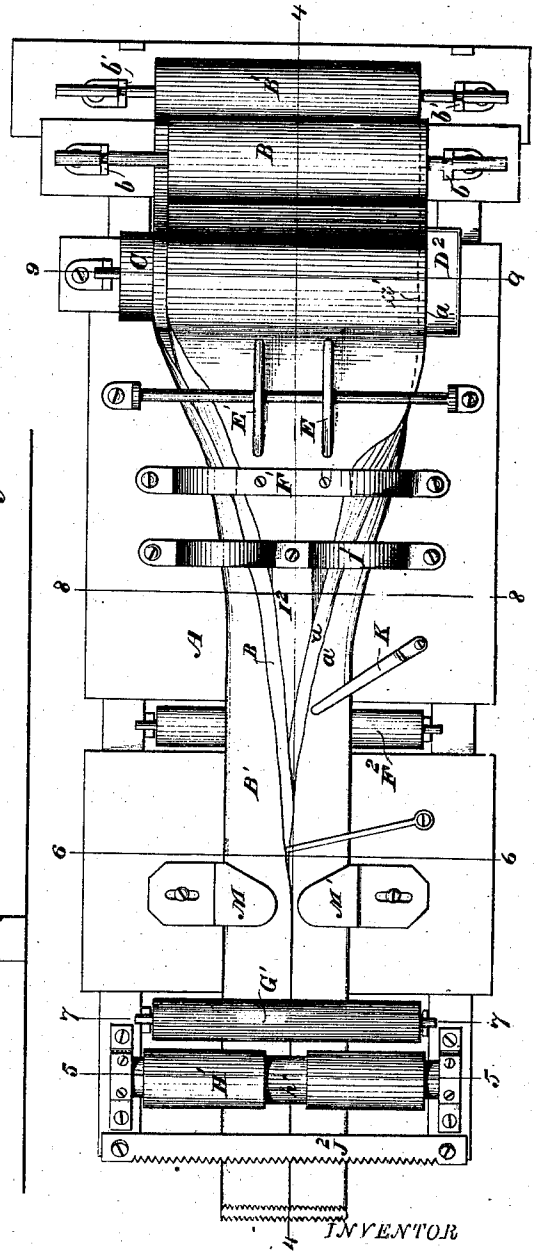


Fig 2

WITNESSES

Wm A Skinkle

Roberdeau Buchanan.

INVENTOR

Frederick E Porter

By his Attorneys

Baldwin, Hopkins & Peyton.

5 Sheets—Sheet 2.

F. E. PORTER.

Paper-Bag Machine.

No. 205,133. **Patented June 18, 1878.**

Fig 8.

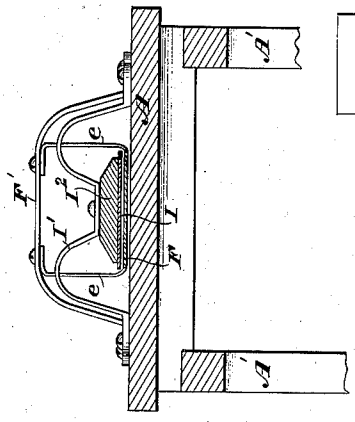


Fig 9

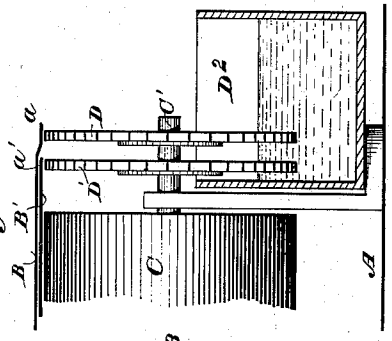


Fig 7

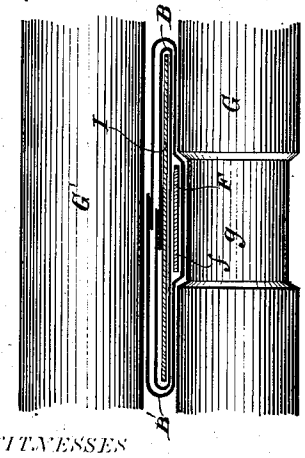
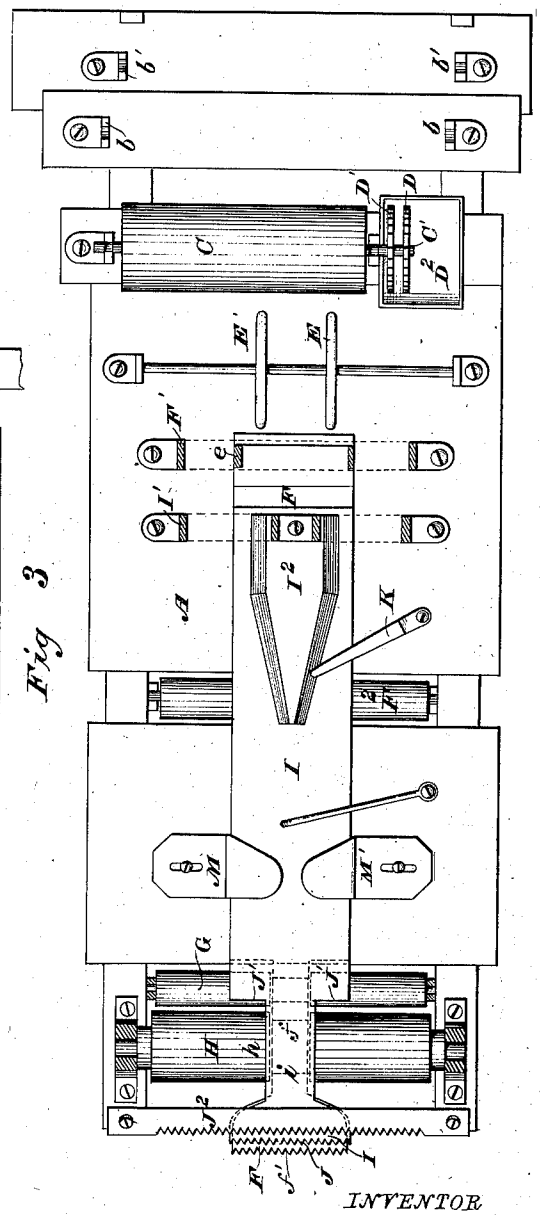


Fig 3



WITNESSES

Wm A. Stinkle.

Roberdeau Buchanan.

INVENTOR

Frederick E Porter

By his Attorneys

Baldwin, Hopkins & Peyton.

5 Sheets—Sheet 3.

F. E. PORTER.
Paper-Bag Machine.

No. 205,133. **Patented June 18, 1878.**

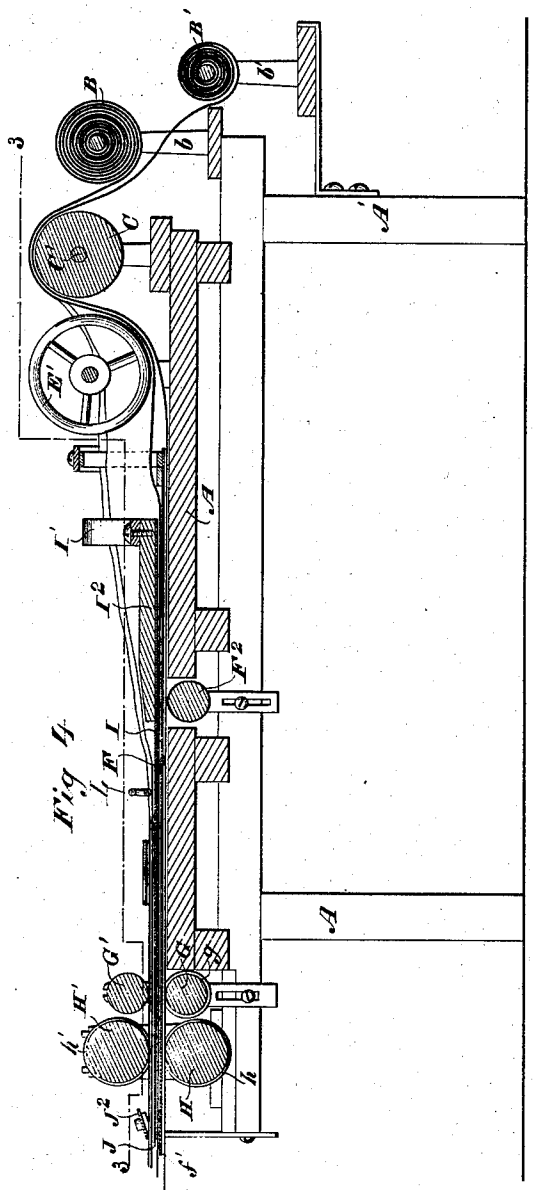


Fig 4.

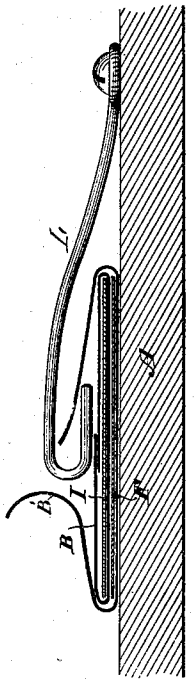


Fig 6

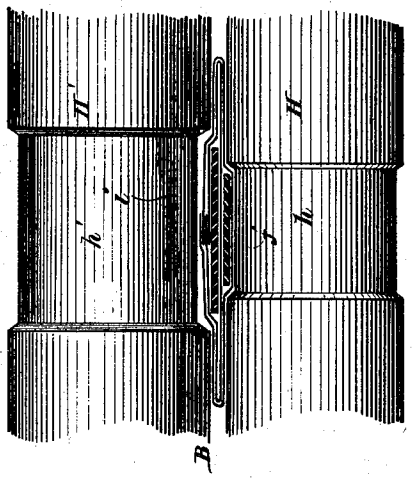


Fig 5.

WITNESSES

Wm A Skinkle

Roberdeau Buchanan.

INVENTOR

Frederick E Porter

By his Attorneys

Baldwin, Hopkins & Peyton

5 Sheets—Sheet 4.

F. E. PORTER.

Paper-Bag Machine.

No. 205,133. Patented June 18, 1878.

Fig 11.

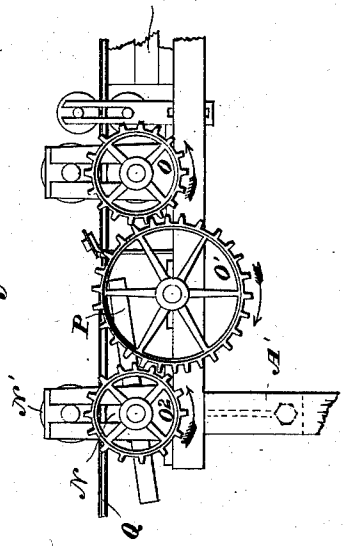


Fig 10

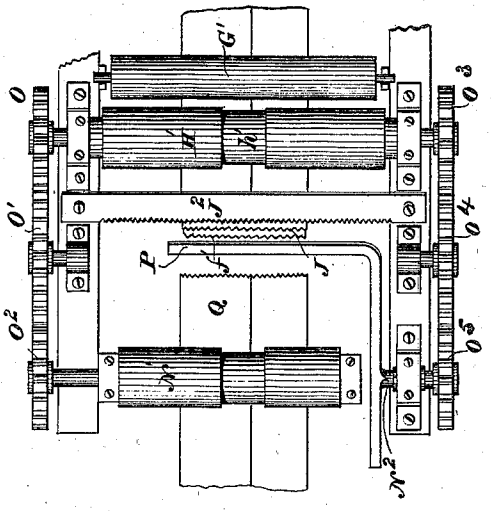


Fig 12.

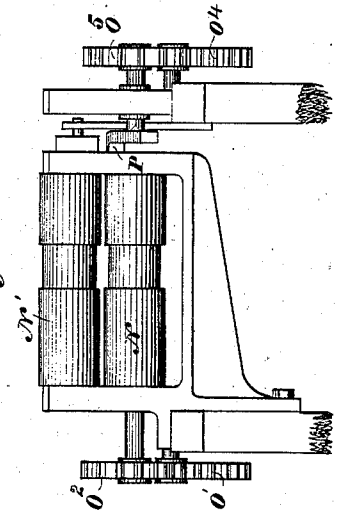


Fig 13.

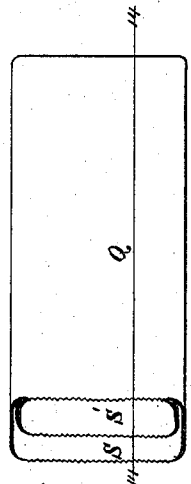


Fig 14

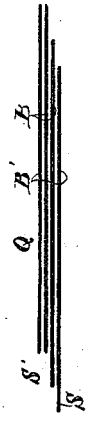


Fig 15.

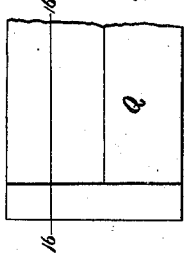


Fig 16.



WITNESSES

Wm A Skinkle

Geo W Breck

INVENTOR

Frederick E Porter

By his Attorneys

Baldwin, Hopkins & Peyton

5 Sheets—Sheet 5.

F. E. PORTER.

Paper-Bag Machine.

No. 205,133. Patented June 18, 1878.

Fig 17

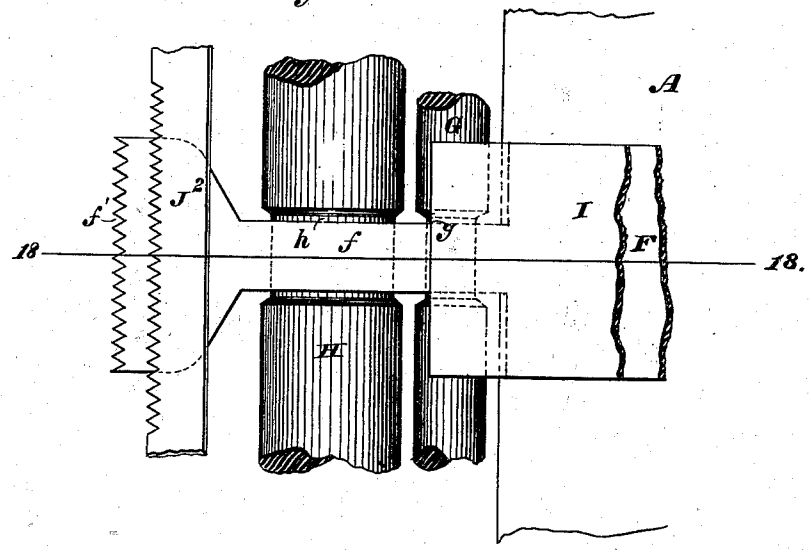


Fig 18.

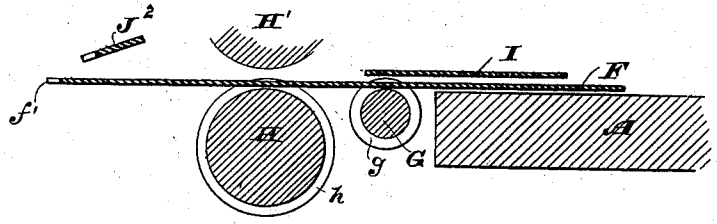


Fig 20. *Fig 19*



WITNESSES

Wm A Skinkle

Geo. W. Breck

INVENTOR

Frederick E Porter.

By his Attorneys

Goldwin, Hopkins & Peyton

UNITED STATES PATENT OFFICE.

FREDERICK E. PORTER, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF HIS RIGHT TO RODNEY B. SMITH, OF SAME PLACE.

IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. 205,188, dated June 18, 1878; application filed April 16, 1878.

To all whom it may concern:

Be it known that I, FREDERICK E. PORTER, of Baltimore city, in the State of Maryland, have invented certain new and useful Improvements in the Art of and Apparatus for Manufacturing Paper Tubes and Paper Bags, of which the following is a specification:

My object mainly is to produce automatically duplex bags—that is to say, bags made from two separate papers, one of which forms the outside and the other the lining. In some instances the lining may be of the same quality and color of paper as the outside; but usually the bags are made with their insides or linings of a white or suitably-colored paper, which, when the bags are used, will show off their contents to advantage, and an outer paper of stronger, cheaper, and coarser material, either bleached or unbleached.

Heretofore it has been a common custom with druggists and others to line bags by hand with a paper of a color best suited to expose the substances to be placed in them to advantage, and also to use for such lining chemically-prepared papers to resist the action of certain drugs, &c. The making of such bags by hand is slow and expensive, whether the lining is composed of separately-made complete bags or of sheets of paper folded and pasted in place.

By my improvements I automatically and simultaneously form two tubes, one within the other, from two sheets or webs of paper taken from their respective rolls. The duplex tube thus formed is severed into lengths suitable for the bags. The manner of severing the two tubes is such as to facilitate the application of paste to the bottoms, so as securely to hold the linings and outsides together when folded to form the bottoms.

My invention further consists in certain novel organizations of parts, and in combinations of devices for carrying out my improvements.

The subject-matter claimed will hereinafter specifically be designated.

In the accompanying drawings, which show so much only of suitable apparatus as is necessary to illustrate my invention, I have shown all my improvements, or means for carrying out my improvements, as embodied in the best form now known to me. Obviously, however, some of the improvements may be used without the others, or in an organization of mechanism differing in some respects from that therein shown and hereinafter specifically described.

I have not deemed it necessary to show or describe mechanism for applying paste to the ends of the tubes and for forming the bag-bottoms. Any of the suitable and well-known machines adapted to the purpose may be employed, or the bottom pasting and folding may be done by hand.

Figure 1 is a side elevation; Fig. 2, a plan or top view; Fig. 3, a view similar to Fig. 2, except that the paper is removed and parts are shown in section on the line 3 3 of Fig. 4; Fig. 4, a longitudinal vertical section on the line 4 4 of Fig. 2; Fig. 5, a view, in elevation, on an enlarged scale, of the drawing and former-supporting rolls, with the formers in section in the plane of the line 5 5 of Fig. 2; Fig. 6, a view, in elevation, on an enlarged scale, with parts in transverse section on the line 6 6 of Fig. 2, showing the pressing or folding finger, which causes the overlapping edge of the inner strip of paper to adhere to the opposite pasted edge to form the inner lining-tube; Fig. 7, a view on an enlarged scale, partly in elevation and partly in section, in the plane of the line 7 7 of Fig. 2, showing the seam-pressing rolls, formers, and complete tubes; Fig. 8, a view, partly in elevation and partly in section, on the line 8 8 of Fig. 2, showing the relative arrangement and manner of supporting the two formers at their inner ends, where the paper is first acted upon by them; Fig. 9, an enlarged-view, partly in section, on the line 9 9 of Fig. 2, showing the roll over which the two sheets of paper pass to the former and the pasting devices. Fig. 10 is a plan view of a portion of the delivery end of the machine, especially designed to show the devices for severing the bag-blanks from the tube and discharging them; Fig. 11, a side elevation, and Fig. 12 an end view, of the same. Figs. 13, 14, 15, and 16 are views, somewhat exaggerated or magnified, of the duplex tubular bag-blanks and the complete bag. Fig. 13 is a plan of the blank as deliv-

ered from the machine; Fig. 14, a longitudinal section therethrough on the line 14 14 of Fig. 13; Fig. 15, a plan of the bag, and Fig. 16 a section on the line 16 16 of Fig. 15, on an enlarged scale. Fig. 17 is a plan or top view, with parts broken away, of a portion of the machine, of somewhat modified construction. Fig. 18 is a section on the line 18 18 of Fig. 17; and Figs. 19 and 20 are, respectively, longitudinal sections of portions of a tubular blank and a bag somewhat modified.

A suitable supporting frame-bed or table, A, is mounted on legs A′ or otherwise, as desired. At the front end of the frame two rollers carry rolls B B′ of paper, composed of long webs or sheets of the proper width for the bags to be made. The two sheets are preferably of corresponding width; but the inner one may be narrower than the outer one. Suitable springs to keep the requisite tension upon the rolls to prevent too free unwinding of the paper are employed, as usual. The rolls are supported in standards *b b′*, the roll B in this instance being above and in advance of the roll B′. The paper rolls are so arranged relatively to each other, or the paper so wound upon the rollers, as to cause the edge *a* of the paper as drawn from the top roll B to overlap the edge *a′* of the paper supplied from the bottom roll B′, as seen in Figs. 2 and 9. The upper roll B supplies the lining-paper, or that from which the inner tube is formed, and the roll B′ supplies the paper for the outer tube. It is obvious that the two sheets might be rolled up together upon a single shaft or roll in such manner as to be supplied therefrom with one edge of one sheet projecting beyond the corresponding edge of the other sheet; or the two rolls might be suitably located otherwise than shown by the drawings.

The two sheets of paper are simultaneously drawn, as will hereinafter be described, from the rolls, and pass in contact with each other, except at the edges, (see Figs. 2 and 9,) over a supporting and guiding roller, C, fast upon a shaft, C′, turning freely in suitable bearings in uprights on the frame A. As the paper passes over this roller the under surface of the edges *a* and *a′* of the two sheets are simultaneously pasted by suitable paste-applying devices, which cause the paste to adhere in parallel lines upon the paper at or near the edges. The paste is shown by the drawings as applied by the two revolving wheels D D¹, fast on the shaft C′, and taking up the paste from a reservoir, D². These wheels are properly arranged so as not to apply the paste in such manner as to cause the two sheets to adhere, and they are preferably made of a diameter slightly exceeding that of the roller C, so as to bear with sufficient force on the sheets of paper under tension to insure a proper application of the paste. By making the paste-wheels project slightly above the roller C they strain the paper somewhat at the edges, and travel for a short portion of their revolution in contact with the paper, thus rendering a failure to uniformly apply the lines of paste to the two sheets hardly possible.

The two sheets next are acted upon by the wheels (or it may be a roller) E E′, beneath which they pass downwardly from the roller C. These wheels press upon the sheets while they are under tension, and depress their central portions, and create a tendency of the edges of the sheets to curl or bend upward, as is well understood, preparatory to the passage of the paper to a former or tubing devices.

I have adapted two formers to the simultaneous and continuous forming of two tubes, the one tube within the other, and the two separate and wholly unconnected with each other, except by mere frictional contact of their contiguous surfaces. Obviously paste might readily be so applied to one or both sheets of paper as to cause them to adhere together, so as to have the inner tube or lining and the outer tube secured together; but I prefer to have them wholly unconnected, and to unite the properly-severed sections of the finished tubes together afterward, at the bag-bottoms only, by applying paste to the double tubular blanks and folding over the bottoms, as will hereinafter be explained.

The outside former, or the one around which the outer tube is formed, is composed of a plate or mandrel, F, suspended at its inner end from an arched support or bridge, F¹, secured to the frame or table A. The former is supported from the bridge by a bent rod or pendent centrally-open bracket, *e*. Near its outer or free end the plate is cut away to form a narrow part or neck, *f*, which rests over or in annular grooves or recesses *g h*, formed respectively in the bottom roller G of a pair of supporting and pressing rollers, and in the corresponding roller H of a pair of supporting and drawing rollers. At its outer end the former plate widens out to the width of its main part again, and is serrated or formed with teeth, so as to terminate in a transversely-arranged row of teeth, *f′*. Intermediate its ends the former-plate is supported by a roller, F², (or it may be several rollers, according to the length of the plate,) which roller raises the bottom surface of the plate above the table a distance sufficient to prevent frictional contact between the paper and table. Were the paper drawn along with its under side in contact with the table A, the frictional contact between rough-surfaced paper and the table would sometimes wrinkle, and, again, tear, the paper. The lining-former, or device for tubing the sheet drawn from the roll B, is shorter than the bottom former F, and consists of a plate or mandrel, I, of a width preferably about corresponding with that of the bottom former, though it may be of a less width, suspended at its inner end from a supporting-bracket or peculiarly-curved overhanging frame, I¹, a little in advance of the bridge or support F¹. This bracket, it should be observed, is secured at its ends to the frame or

table A, and projects from each end upward, and then inward and downward, being fastened at its center to a forming-block, I^2, on the top of the plate I. A space is left between the top and bottom plates or formers F I amply sufficient to allow the paper for forming the lining-tube to pass between them. The top former-plate I has a serrated end, J, and a neck, *i*, similar to the corresponding parts of the bottom former, except that the serrated end of the bottom former projects slightly beyond the end of the top former, for a purpose hereinafter to be explained, and that the neck *i* is shorter and wider than the neck *f* of the bottom former. (See dotted lines, Fig. 3.) By continuing the broad portion of the plate I to or slightly beyond the vertical plane of the longitudinal center of the roller G, this plate is supported at its shoulder J^1 by the roller, and held at the proper distance above the lower former to accommodate the paper between them, (see Figs. 3 and 7,) while the neck *i* comes opposite the annular groove *h'* in the drawing-roller H', which is wider than the groove *h* in the roller H, and prevents the paper being clamped upon the plate by the pressure of the rollers H H', while insuring a proper bite or pressure of the draw-rolls upon the paper at each side of the former-necks, as will readily be understood by an inspection of the drawings.

A stationary serrated plate or fixed cutter, J^2, crosses above the formers, so as to lie upon or close to and slightly above the upper surface of the outer tube. This knife or cutter is secured at its ends to the opposite sides of the frame, and is preferably inclined so as to depress its toothed edge, which edge is about as far from the toothed end J of the upper former as this toothed end is from the corresponding outer end *f'* of the bottom former. The object of this construction and relative arrangement will hereinafter be explained.

A pressing-finger, K, for acting on the paper to aid in forming the tube and to counteract the tendency of the paper to curl up or wrinkle at its pasted edge, is secured by an adjustable pivot or screw to the table, and bears at its inner end upon the outer paper quite near its pasted edge. A curved-hook-ended pressing and folding finger or rod, L, crosses above the pasted edge of the outer sheet, and acts upon the overlapping edge of the lining-paper to press it down upon the pasted edge.

Plates M M, adjustably secured to the table on each side of the formers, overlap them, and press the tubes up to the edges of the former, and cause them to maintain their shape.

These tube pressing or forming plates give the proper shape to the tubes, and aid also in pressing down the pasted seams preparatory to the action of the pressing-rolls G G'.

The double tube, after passing beyond the ends of the formers, is acted upon by supplementary or bag-blank drawing and feeding rollers N N^1, driven from the driving-shaft or lower draw-roller H, by gearing O O^1 O^2, connecting the driving-roller with the lower roller N. In this way the end of the tube is nipped between and carried forward by the rollers N N^1, and held under tension during the operation of a tube-deflecting rod or striker, P, fast on a shaft, N^2, in line with the shaft of the roller N, and revolved by gearing O^3 O^4 O^5, so as to strike the tube from below and quickly press it upward against the ends of the formers, as well as against the knife J^2, to separate the bag-blanks Q therefrom at regular intervals. Any suitable means may be employed to guide the end of the tube to the rollers N N^1 to insure the proper operation of the mechanism.

The pressing-rollers, tube-drawing rollers, and supplementary or blank-drawing rollers are preferably self-adjusting relatively to each other, to suit variations in the thickness of the tube.

In operation the two sheets of paper have, of course, to be fed along by hand, and properly adjusted upon the machine as far as the drawing-rolls H H', the lower one of which is a driving-roll, to which power is applied in any suitable way. The outside paper B' passes beneath the bottom former, while the lining-paper B passes between the two formers, being first led through the open pendent frame or suspending-bracket of the bridge F^1, between its sides or arms *e*. The outer paper passes outside or around this suspending-bracket. At proper intervals, according to the length of blanks desired, as the two sheets are thus tubed one within the other by the continuous operation of the mechanism, the striker P is thrown up, and severs from the double tube a duplex bag-blank, with exposed end portions or edges of both the inner and the outer tube, so that paste may be applied to the inside of the lip or edge S of the outer tube and to the inside of the lip or edge S' of the inner tube. These exposed edges or lips extend the full width of the blank, so as to secure a proper adhesion of the pasted end to the body of the blank when folded over to form the bottom. The severing is done on three lines, or by three simultaneous cuts at short distances apart. The cut caused by the sudden upward deflection and strain of the paper against the cutter J^2 severs the top sides of the two tubes substantially in the same line. In practice, owing to the rapid movement of the paper through the machine, there is a very slight projection of the lining-tube beyond the outer tube at the upper cut; but it is not material, especially when three cuts are made, that it should so project. The intermediate cut produced by the pressure of the paper upward against the cutting end J of the former I severs the under side of the lining-tube and forms the lip S', while the cut by the end *f'* of the bottom former severs the lower side of the inclosing-tube. As severed, the duplex tubular blanks may pass directly to a suitable

bottom pasting and folding machine, or the work may be done by hand.

As before stated, my improvements are particularly designed for the manufacture of bags for the use of druggists. The bags are most generally lined with white or with blue paper, chemically treated, so that the colors will not be affected by alkalies, &c. My improvements are, however, applicable to the manufacture of bags from two sheets of paper of any desired colors, or of different qualities and thickness, or of similar quality and color, each sheet being of, say, half the weight of the paper usually employed to make single bags. One of the sheets may be bleached and the other unbleached. By using two sheets of paper together, making up a duplex tubular blank of the same weight as a single blank as ordinarily made, I produce a stronger and a more secure bag, for it is obvious that, should there be a weak place in the one blank, it would be protected by the other, and, as the blanks or double bags are connected only at their bottoms, any injury to the one does not necessarily weaken the other. The paper of each blank or bag is free to stretch and conform to the proper shape independently of the other.

Obviously one of the webs or sheets may be of linen, muslin, or any suitable fabric, so as to form duplex blanks, with one tube only (either the outer or the inner one) of paper. The blanks may be cut on a single line in some cases, when they are to be used as tubes or casings only—as, for instance, for file-wrappers or covers for papers, &c. When so severed the serrated end of the bottom former may terminate flush with, or in the vertical plane of, the cutting-edge of the stationary knife J^2, or the formers may both terminate short of this knife, and the cutting be done wholly by pressing the tubes against the knife. In some instances, especially where duplex tubes are to be severed into blanks by a single cut, so that their ends will terminate on the same line, or practically flush with each other, I may use a single former, and carry out my invention so far as relates to my improvement in the art of automatically forming double tubes by simultaneously and continuously drawing along two separate sheets, independently pasting their edges while the sheets are on the way to the former, and forming two flattened tubes with parallel straight seams at a single operation, preparatory to severing into blanks.

The bottom one of the two formers may be made quite narrow throughout, except at its serrated end, thus facilitating the formation of the two tubes of such width that one will practically fill up the other, the outside width of the inner tube about corresponding with the inside width of the outer tube; and, when so made, the outer or cutting end of the lower former may be slightly narrower than the corresponding end of the upper former, so as not to spread the outer tube to an injurious extent, while yet insuring the cutting sufficiently near to the edges to render certain a proper separation of the blank from the tube by the strain on the paper.

In Figs. 17 and 18 the top former I terminates at the pressing-rollers G G', the neck *i* and cutting end J being dispensed with. In this manner the pushing-feed of the end of the tube beyond the rollers H H' is facilitated, as friction, which would be created on the bottom side of the inner tube, between the formers, were the top former extended, is avoided. In this modified organization of mechanism the blanks are severed on two cuts, as at Fig. 19, and the bag-bottoms are formed by folding, as shown by Fig. 20. When properly pasted and doubled over, the two tubes are securely held together by the pasted lip and the fold.

Instead of the single supporting-roller C or its equivalent, with the two paste-wheels, as before described, it is obvious that a second roller, with a paste-wheel and reservoir might be mounted over the first, and the papers pass separately over these rollers to be pasted.

A single former, such as the bottom one shown in Figs. 17 and 18, in connection with the pasting and folding mechanism, the knife J^2 and striker P, may obviously be employed without the top former to produce the duplex blanks. Each duplex blank so formed would be severed by one cut at top—that is, it would be cut at the end through both the outer and inner upper sides of the tube on the same line, while the bottom cut would be through the lower side of both the outer and inner tube on a single line in advance of the upper cut, thus forming two corresponding lips or projecting ends, one on the inner and the other on the outer tube.

By cutting off or folding in the lip of the inner tube, a blank corresponding at its bottom or folding end with that shown either in Fig. 14 or Fig. 19 would be produced to be made into a bag, as in Fig. 16 or Fig. 20, and this without departing from an important part of my invention, which consists in continuously and simultaneously drawing along two separate sheets, applying paste to their edges, forming the flat tubes one within the other, and pressing down the parallel longitudinal seams, and then severing the tubes by different cuts on parallel lines.

I claim as of my own invention—

1. As an improvement in the art of manufacturing tubes for paper bags, &c., by machinery, the hereinbefore-described method of simultaneously and continuously forming two flattened tubes with parallel-pasted seams, the one within the other, from two separate sheets or webs of paper, preparatory to severing into short lengths or duplex blanks.

2. As an improvement in the art of manufacturing paper bags by machinery which simultaneously forms two unconnected tubes, the one within the other, from two sheets or webs of paper, the hereinbefore-described

method of simultaneously drawing the two papers along, applying paste to one edge of each sheet, forming the tubes and pressing down the pasted seams preparatory to severing blanks from the duplex tube connected with the sheets or webs from which it is continuously formed.

3. As an improvement in the art of manufacturing paper tubes for bags, &c., the hereinbefore-described method of simultaneously and continuously forming two flattened parallel-seamed tubes, the one within the other, and subsequently severing the tubes at intervals to form blanks.

4. As an improvement in the art of manufacturing paper bags by machinery, the hereinbefore-described method of simultaneously forming two tubes, the one within the other, and, after so forming them, severing the tubes at intervals to form duplex bag-blanks having exposed end projections or lips on the outer tubes, or on both the outer and inner tubes, to receive the paste for securing the bottoms.

5. As an improvement in the art of manufacturing paper bags, the hereinbefore-described method of uniting two tubular blanks, the one within the other, which consists in cutting the ends of the tubes (previously formed from long webs or uncut sheets) on parallel lines, to form exposed projecting lips on the inner and outer tubes, or on the outer tubes alone, applying paste to said lips, and folding them upon the body of the blank.

6. The hereinbefore-described duplex bag-blank, the same consisting of an inner and an outer tube made up of a uniform number of thicknesses of paper throughout, except at the longitudinal laps or seams, and having no transverse laps or seams, and terminating at the end in exposed parallel projections or lips on the inner and outer tubes, the cuts producing such lips extending the width of the tubes only.

7. The peculiar lined or duplex bag hereinbefore described, the same consisting of independent inner and outer tubes united together at the bottom by pasting and folding and unconnected elsewhere, the said bag being made up from a blank of a uniform number of thicknesses of paper throughout, except at the longitudinal laps or seams, and having no other laps or seams whatever, except those produced by the pasting down of the lips formed by cuts extending the width of the tubular blank only.

8. The combination, substantially as hereinbefore set forth, of mechanism for supplying two sheets of paper and applying paste to the edges thereof, said mechanism being and operating substantially as described, and two formers to which the sheets of paper pass, along which they are drawn, and upon which they are simultaneously formed into an inner and an outer tube.

9. The combination of a former, F, having a neck, *f*, the supporting arch or bridge, the annularly-grooved pressing-roller, and the annularly-grooved drawing-roller, substantially as set forth.

10. The combination, substantially as hereinbefore set forth, of the top former and the bottom former, projecting beyond the top former and having a serrated end.

11. The combination of a bottom former, the supporting arch or bridge, its suspending centrally-open bracket, a top former, and its supporting-bracket, these members being constructed and operating substantially as hereinbefore set forth.

12. The combination, substantially as hereinbefore set forth, of the paper-supplying rollers, the paste-wheels, the paste-reservoir, the depressing-wheels, the formers, and their supports, whereby the edges of the paper are pasted on the way to the formers and the two sheets properly presented to the formers to be formed into a double tube as drawn along them from the supplying-rollers.

13. The combination, substantially as herebefore set forth, of a roller, G, having an annular groove, the bottom former having a neck adapted to enter said groove, and the top former supported on said roller and held above the bottom former.

14. The combination of the two formers, having necks *f i*, the annularly-grooved roller G, the groove of which receives the neck *f* of the bottom former, and upon which roller the shoulder of the top former is supported, substantially as hereinbefore set forth.

15. The combination, substantially as hereinbefore set forth, of two formers having necks *f i* of different widths, and the drawing-rollers having annular grooves of different widths to receive the necks of the formers, whereby the clamping of the paper between the formers, or between them and the rollers, is avoided, and the bite of the rollers upon the paper at the sides of the former-necks is insured.

16. The combination, substantially as hereinbefore set forth, of two formers, arranged one above the other and terminating in serrated ends, with the end of the bottom former projecting slightly beyond that of the top former, and the stationary cutter above and at a slight distance back from the end of the top former, whereby the blanks may be severed on three lines.

17. The combination, substantially as hereinbefore set forth, of two formers having serrated ends, the one projecting beyond the other, mechanism, essentially such as described, for supplying two sheets of paper to the formers, drawing them along the formers, and simultaneously forming them into two tubes, one within the other, the cutter above the former, beyond which cutter the serrated ends of the formers project, and a striker to deflect the paper upward and sever the duplex blanks on different lines, whereby lips for pasting are formed upon both the inner and outer tubes of the blank, as set forth

18. The combination, substantially as hereinbefore set forth, of two formers upon which two tubes are simultaneously formed, one within the other, and the pressing-finger K, acting upon the paper near its pasted edge, for the purpose specified.

19. The combination, substantially as hereinbefore set forth, of the two formers and the curved hook-ended pressing-finger crossing the pasted edge of the outer tube, and acting upon the inner tube, for the purpose specified.

In testimony whereof I have hereunto subscribed my name.

FREDERICK E. PORTER.

Witnesses:
P. E. CHAPPELL,
GOVER WICKS.