

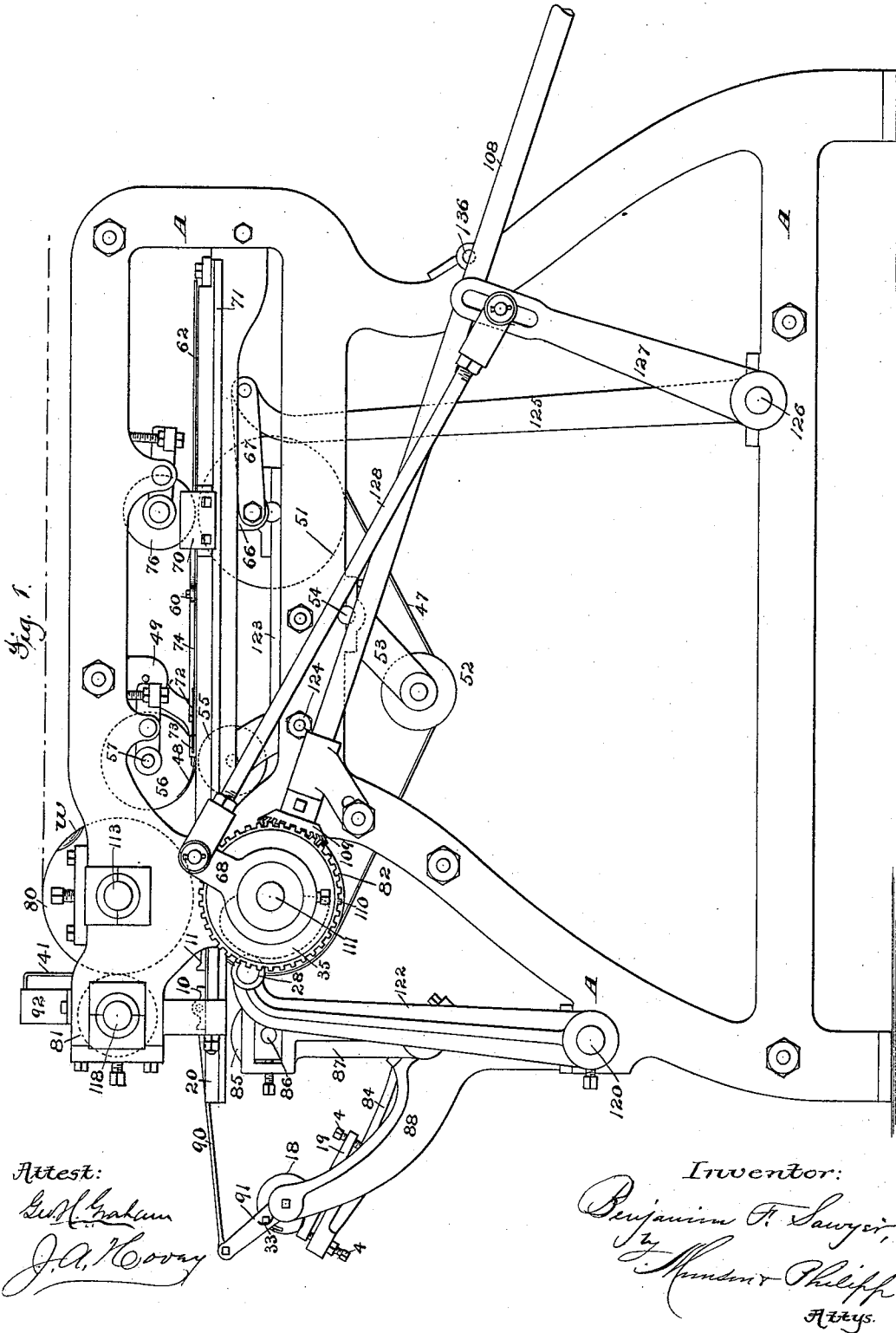
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10 Sheets—Sheet 1.

B. F. SAWYER.
PAPER BAG MACHINE.

No. 326,592.

Patented Sept. 22, 1885.



Attest:

Geo. H. Graham
J. A. Hooy

Inventor:

Inventor:
Benjamin F. Sawyer,
by *Wm. H. Phillips*
Attys.

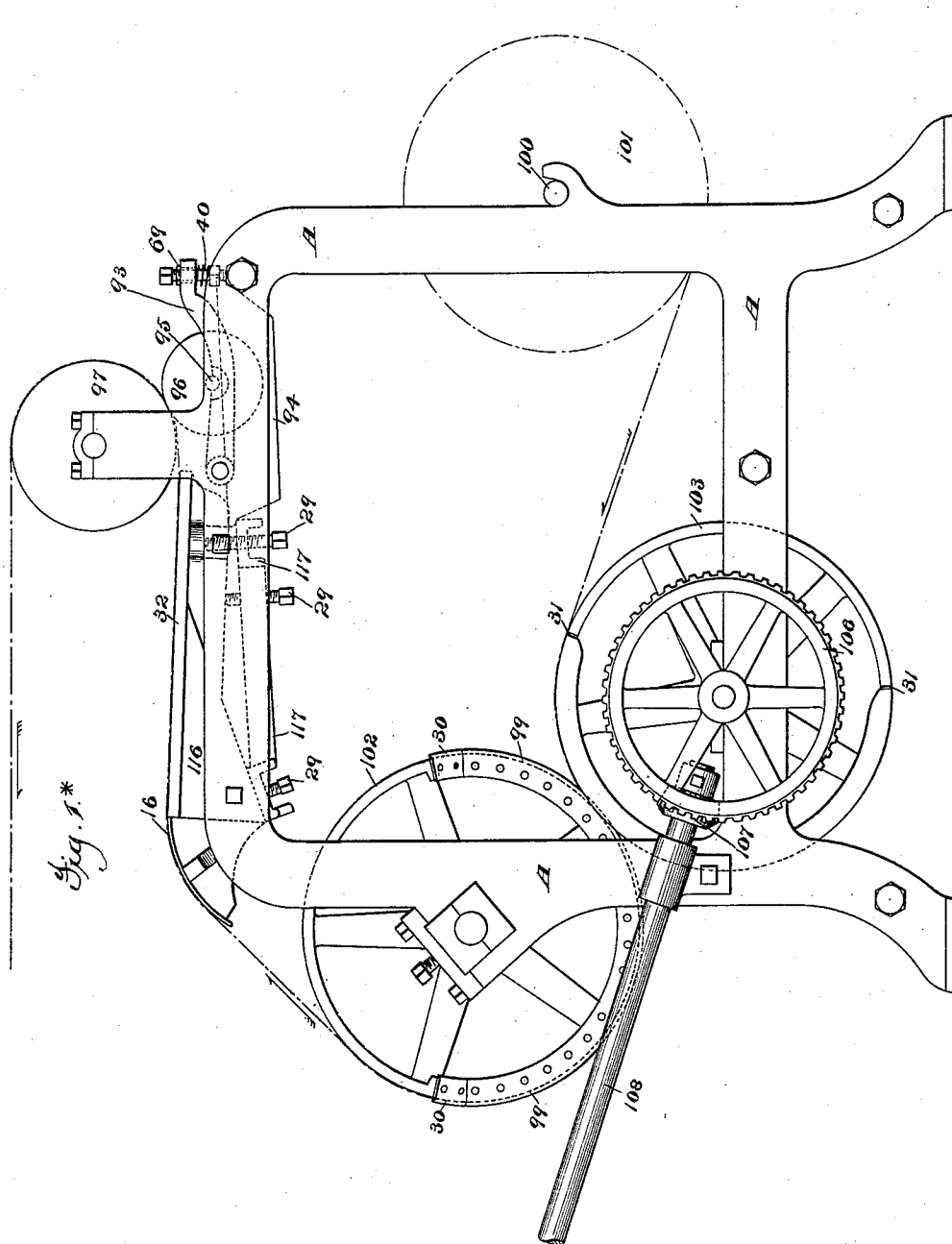
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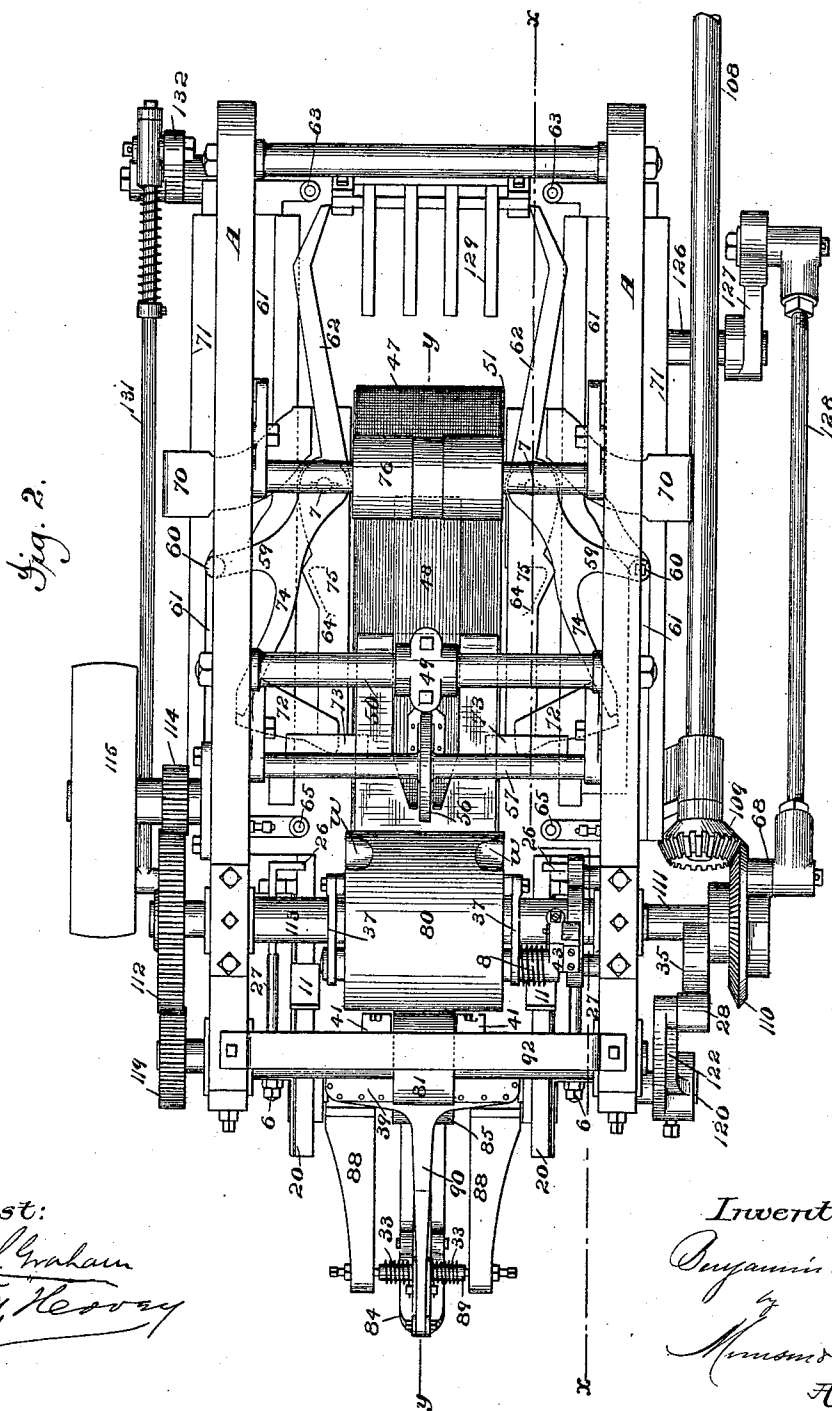
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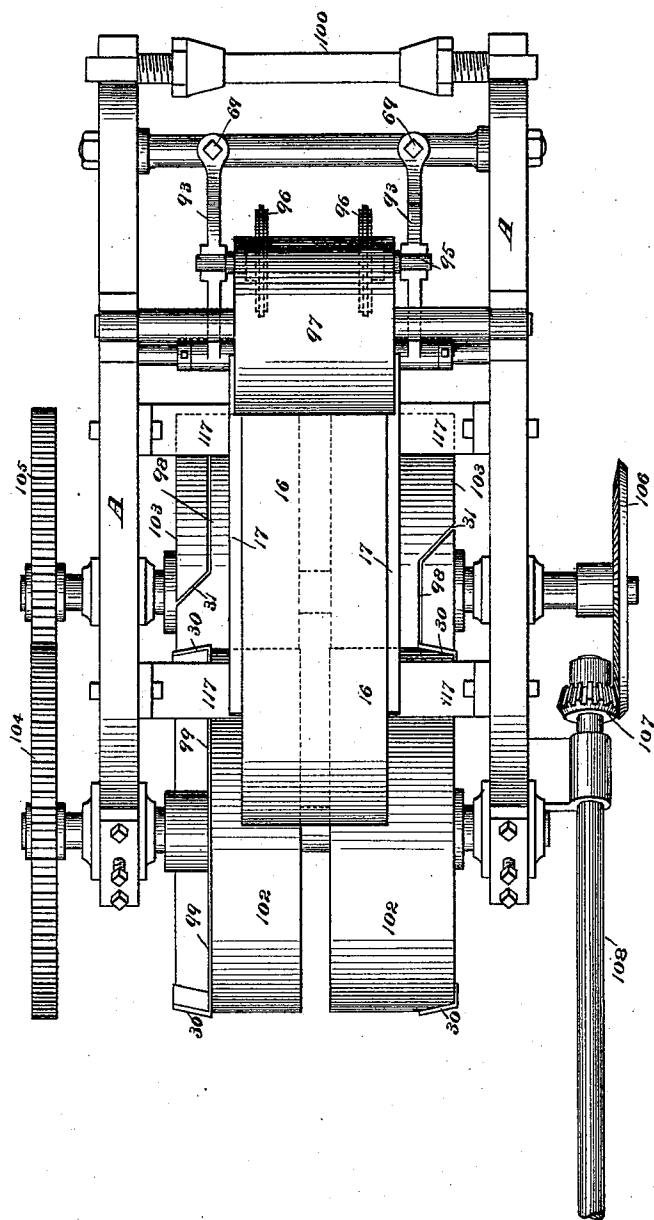
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Fig. 2.*



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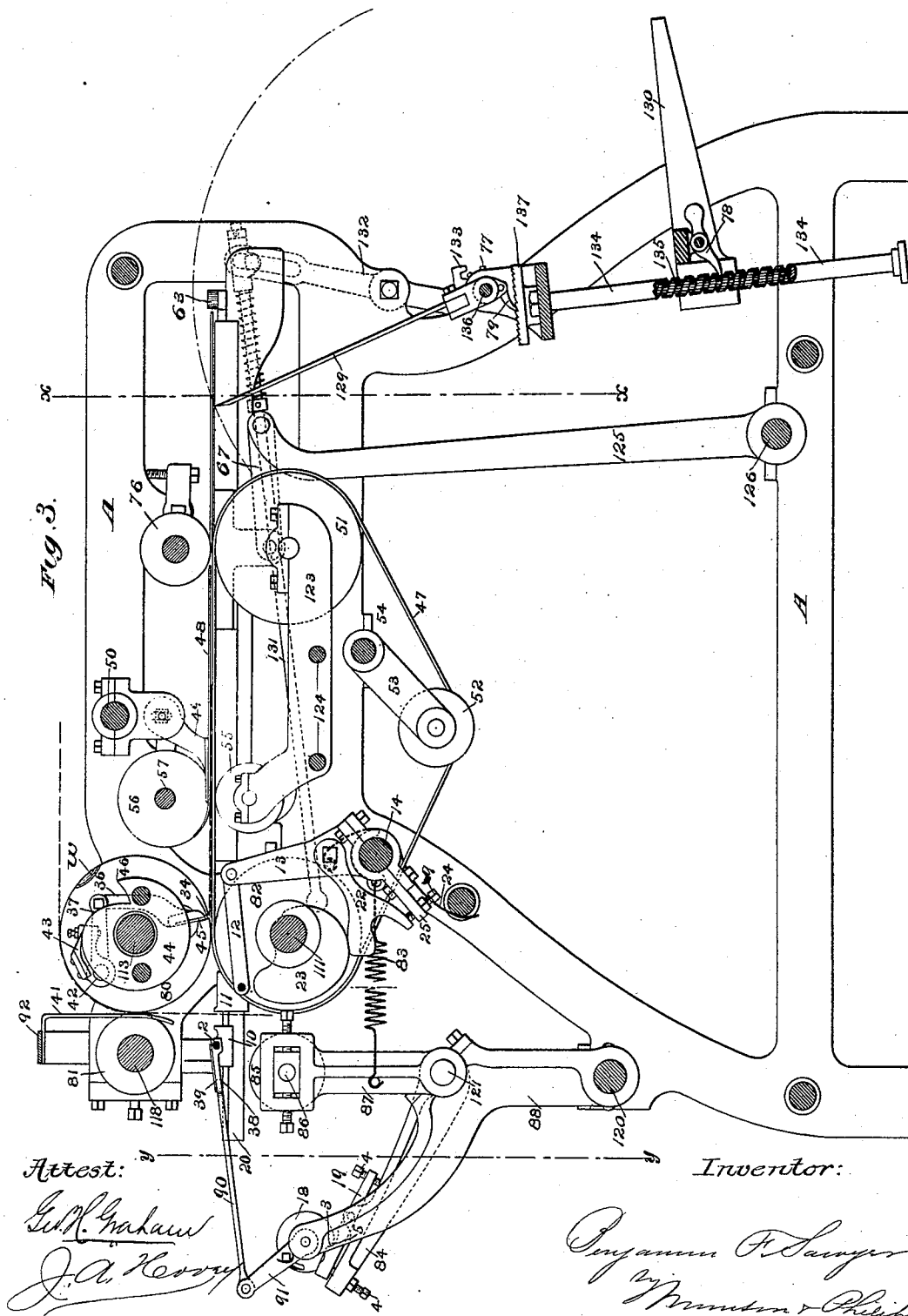
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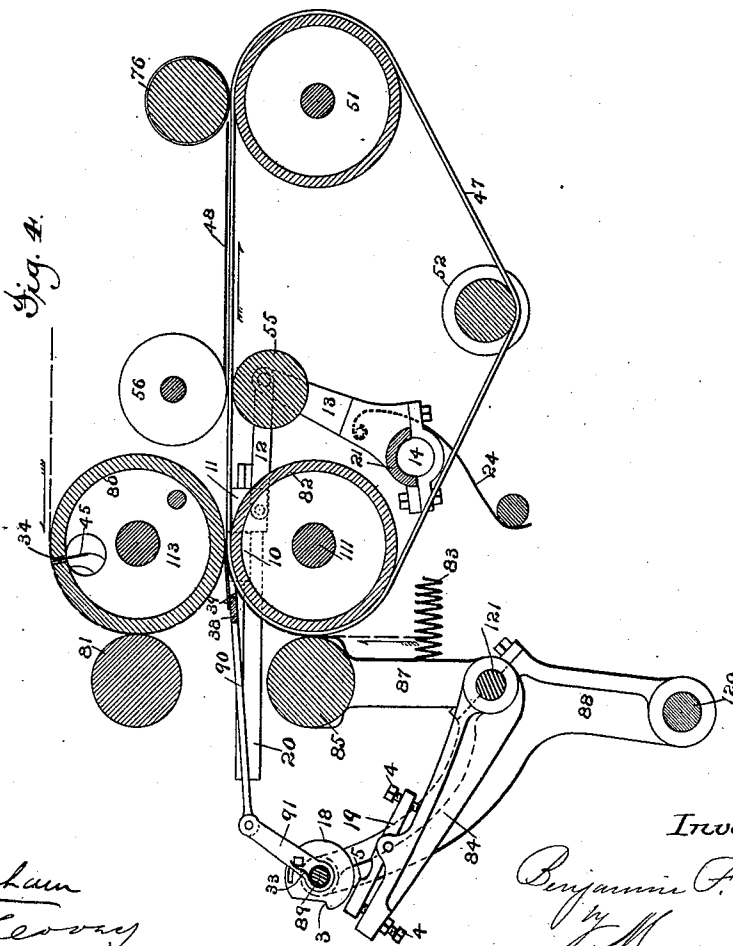
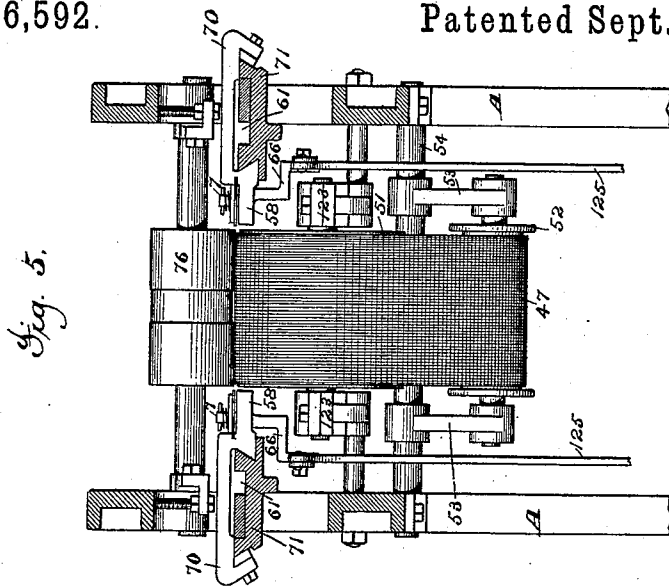
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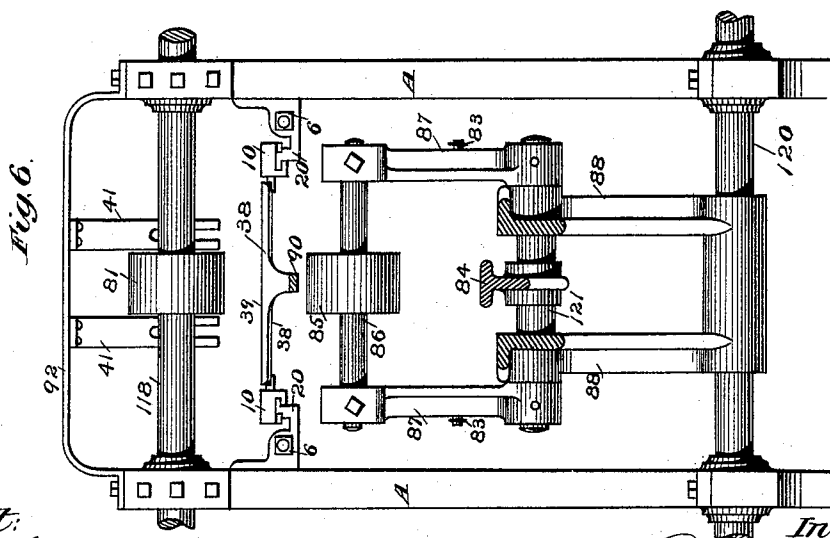
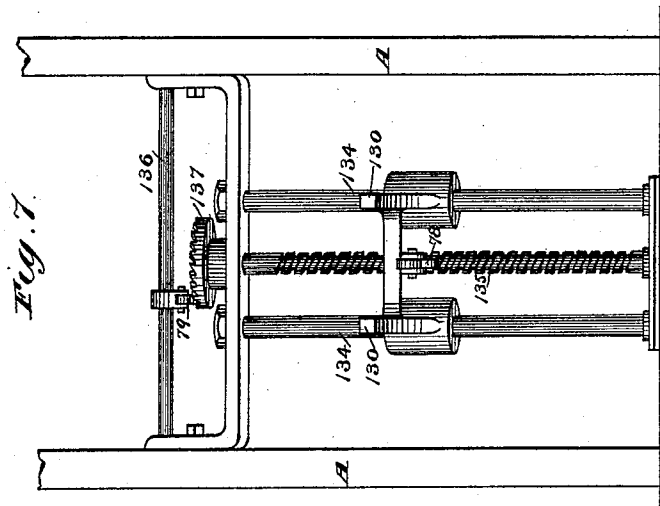
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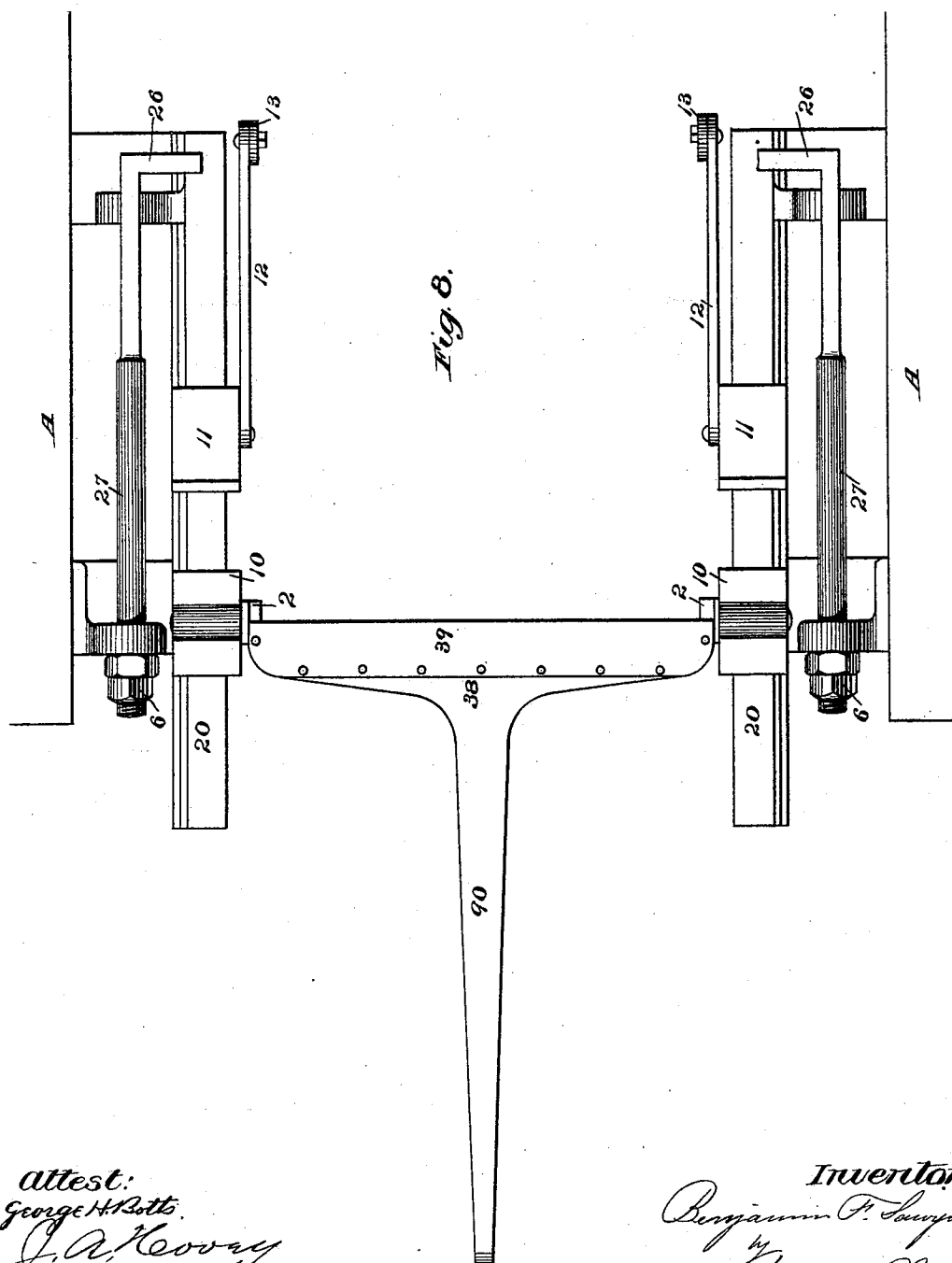
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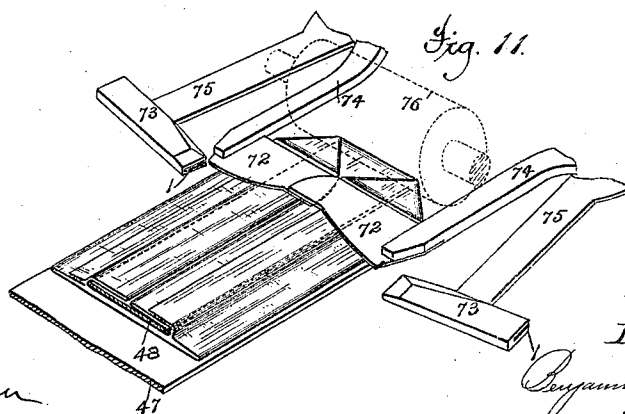
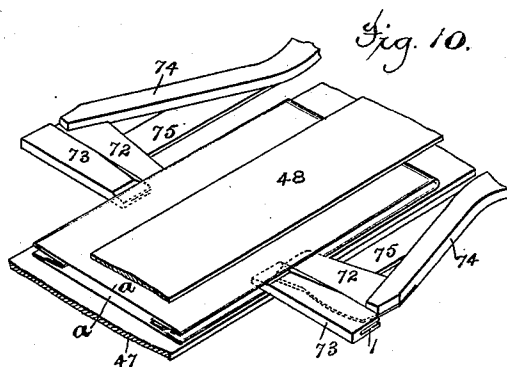
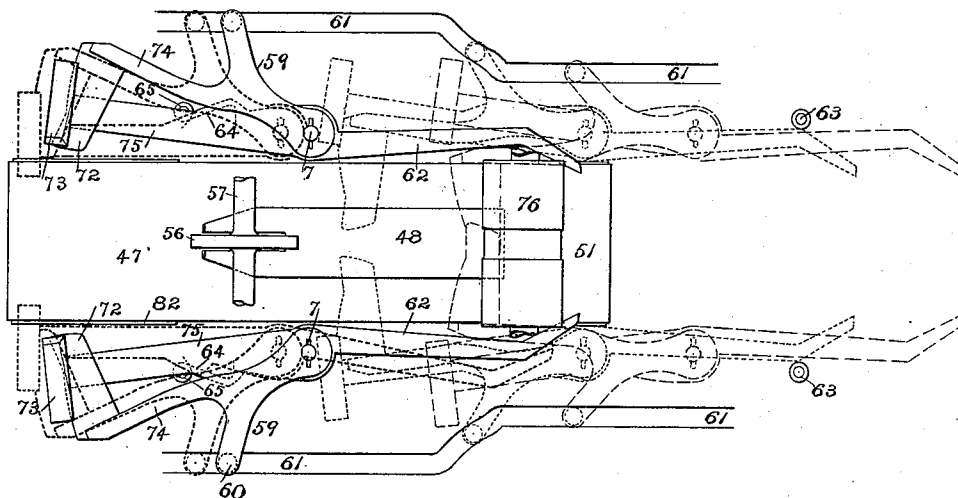
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Fig. 9



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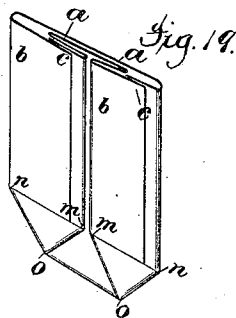
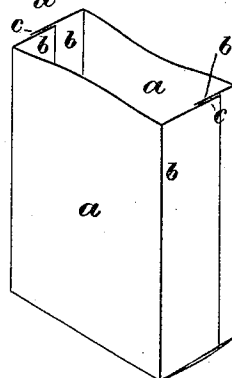
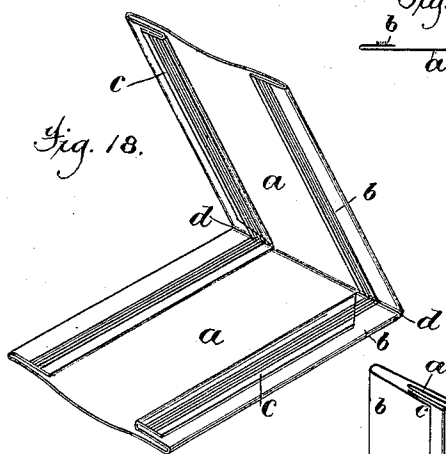
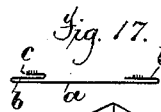
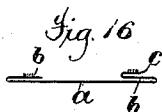
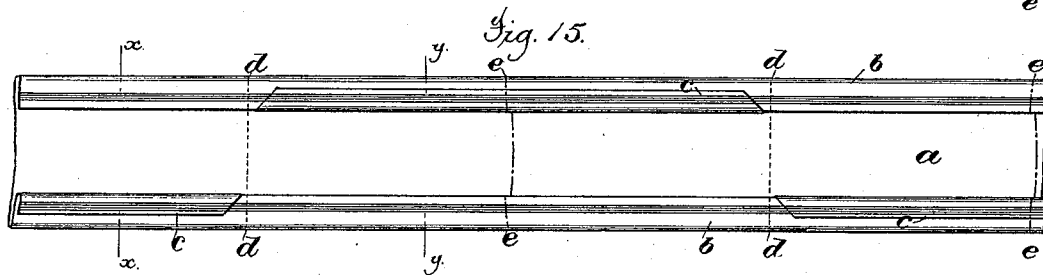
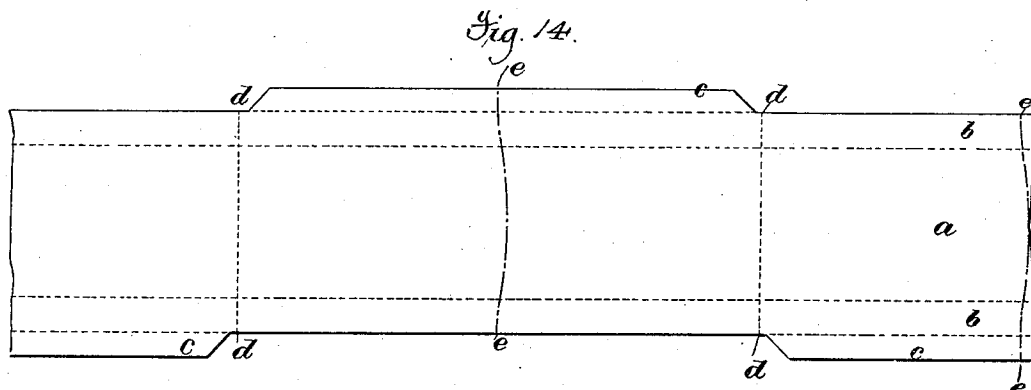
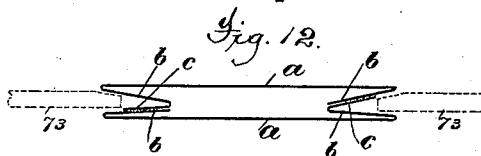
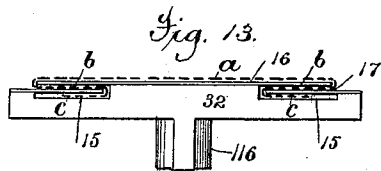
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UNITED STATES PATENT OFFICE.

BENJAMIN F. SAWYER, OF OXANNA, ALABAMA, ASSIGNOR TO THE UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 326,592, dated September 22, 1885.

Application filed October 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. SAWYER, a citizen of the United States, residing in the city of Oxanna, county of Calhoun, and State of Alabama, have invented certain new and useful Improvements in Paper-Bag Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to a mechanism which is designed and adapted for the manufacture of what are known as "seamless-bottom bel-
lows-sided paper bags," it being the object of the invention to provide a mechanism for this
15 purpose by which all of the operations of cutting, pasting, and folding which are necessary to convert a continuous strip or web of paper into bags of this character can be automatic-
ally performed in a rapid and reliable manner, and by which, also, the completed bag will be
20 folded to such form that when filled it will assume a square and symmetrical form without the aid of hand creasing or folding.

To these ends the invention consists in the
25 several mechanisms, singly and in various combinations, which enter into and make up the organization by which this result is accomplished, all of which will be hereinafter fully explained and particularly pointed out.

30 In a practical embodiment of the present invention the continuous sheet or web of paper which is to be converted into bags is, as it is unwound from the roll, led between a pair of cylinders, one of which is provided at or
35 near each end with a circumferentially-arranged cutting-blade which extends around one-half of the circumference of the cylinder. These blades are located upon opposite sides
40 of the cylinder and are provided at their ends with wing portions, which extend diagonally outward, so that as the cylinders revolve narrow sections will be removed from the opposite
edges of the web alternately. The companion cylinder is provided with cutting-
45 grooves, which are arranged to co-operate with the blades just mentioned in the usual manner. After passing from these cutting-cylinders the web is led through a folding apparatus, by which it receives four longitudinal
50 folds. These four folds are made by first

edges of the web upon lines which correspond with the side edges of the completed bag, and then turning outward and folding down the portions which are left projecting by the removal of the narrow sections before referred to. The incomplete tube thus formed is then bent around a roll which serves to set the folds just made and prevent the plies from unfolding, and at the same time or subsequently it passes in contact with suitable pasting apparatus, by which lines of paste are applied to the edges of the web in such position as to form the side seams of the bag when the cross-fold for the bottom is made, after which it is drawn between a pair of feeding-rolls and projected in front of a pair of folding and cutting cylinders. When a sufficient length of the tube to form one-half of a bag-length has been projected past the bite of these folding-cylinders, it is folded transversely into the bite of these cylinders by an ordinary folding-blade, thus forming the fold for the bottom of the bag, and bringing the sides together so that they will be united by the lines of paste already applied as they pass between the cylinders. As the bag is fed forward by the folding-cylinders, a cutting-blade mounted in one of said cylinders is projected outward so as to sever the bag from the tube in time to allow the freshly-cut end to be again projected forward in front of the cylinders. As the completed bag leaves the cutting-cylinders, it is acted upon by side-folding mechanisms, which operates to form two inwardly-extending V-shaped folds in its bottom corners, which serve, when the bag is filled, to cause it to assume a square and symmetrical form without being opened out or creased by hand. After being thus folded the completed bags pass to a fly or other piling mechanism, by which they are delivered from the machine and laid upon a table ready for bundling.

The details in the construction and operation of the organization thus briefly outlined will now be described and explained in connection with the accompanying drawings, in which—

Figures 1 and 1* are a side elevation of a mechanism embodying the present invention. Figs. 2 and 2* are a plan view of the same. Fig. 3 is a vertical sectional elevation of that

portion of the mechanism shown in Figs 1 and 2, the same being taken upon the line *xx* of Fig. 2. Fig. 4 is a diagrammatic section taken upon the line *yy* of Fig. 2. Fig. 5 is a cross-section upon the line *xx* of Fig. 3. Fig. 6 is a similar view taken upon the line *yy* of the same figure. Fig. 7 is a partial end elevation looking from the right of the same figure. Fig. 8 is a plan view of the ways upon which the transverse folding-blade reciprocates. Fig. 9 is a diagrammatic plan view showing the movements of the side-folders for forming the V-shaped folds in the bottom corners of the bag. Fig. 10 is a perspective view showing the position of the side-folders just before the V-folds are made. Fig. 11 is a similar view showing the position of these folders just after the folds are completed. Fig. 12 is a cross-section upon an enlarged scale, showing the manner in which the side-folders are entered into the bellows-folds of the side of the bag. Fig. 13 is an enlarged end view of the folder which imparts the longitudinal folds to the web. Fig. 14 is a plan view of the web after it has had the sections removed from its sides by the first cutting-cylinders. Fig. 15 is a like view of the web after it has been folded longitudinally and has received the lines of paste. Fig. 16 is a cross-sectional view of the web, taken upon the line *xx* of Fig. 15. Fig. 17 is a like view taken upon the line *yy* of the same figure. Fig. 18 is a perspective view of a section of the web of suitable length to form one bag, the same being shown as partially folded upon the line forming the bottom of the bag, for the purpose of illustrating the manner in which the edges of the web are united to form the side seams of the bag. Fig. 19 is a perspective view of the completed bag after the V-shaped folds have been formed in its bottom corners, and Fig. 20 is a perspective view of the bag, showing the same as it will appear after being filled.

Referring to said drawings, it is to be understood that A represents a frame-work of suitable form and construction to support the various parts of the mechanism in proper working relation to each other. At its right hand or rear end this frame-work is provided with bearings, in which is mounted a spindle, 100, which supports the roll of paper 101, which is to be converted into bags. The spindle 100, or the roll 101, will be provided with any suitable form of tension apparatus (not shown) by which the web will be kept at the proper tension as it enters the machine.

From the roll 101 the web is led between a pair of cutting-cylinders, 102 103. The cylinder 102 is provided at its opposite ends with a pair of circumferentially-arranged cutting-blades, 99, which are located diametrically opposite each other upon the cylinder, each extending around one-half of its circumference. These blades are provided at their ends with wings or extensions 30, which extend obliquely outward to the ends of the cylinder, as shown in Figs. 1* and 2*. The cylinder

103 is provided with cutting-grooves 98 31, which are arranged to co-operate with the blades 99 30 in the usual manner. These cylinders are of such length that as the web passes between them, as shown in Fig. 1*, the said blades will operate to remove a narrow section or strip from its opposite sides alternately, so that as it leaves the cylinder it will be reduced to the form shown in Fig. 14. The cylinders 102 103 will preferably be made in two parts, as shown in Fig. 2*, each of which parts is capable of being moved longitudinally upon the shaft, so that the blades 99 30 can be adjusted to different distances from each other to vary the width of the bag produced. The shafts of these cylinders are provided with engaging-gears 104 105, by which they are caused to revolve in unison, the two cylinders being driven by a bevel-gear, 106, which is mounted upon the shaft of the cylinder 103, and engages with a pinion, 107, upon one end of a longitudinal shaft, 108, the opposite end of which is provided with a pinion, 109, which engages with a bevel-gear, 110, mounted upon one end of a transverse shaft, 111, the opposite end of which is provided with a gear (not shown) which engages with a gear, 112, mounted upon a second transverse shaft, 113, and which engages with a gear, 114, mounted upon the shaft of the main driving-pulley 115.

As the web emerges from between the cylinders 102 103, after having been cut to the form shown in Fig. 14, it is turned upward partially around the cylinder 102, and thence passes rearward through a longitudinal folder or former 116, which is mounted upon a support, 117, extending between the side frames of the machine, as shown in Figs. 1* and 2*. This folder 116 is secured to the support 117 by means of suitable set screws, as 29, in such manner that it is capable of a slight vertical adjustment, and in such manner also that it can be removed and a wider or narrower folder substituted, when it is desired to change the width of the bag produced.

The folder 116 consists, as best shown in Fig. 13, of a flat plate or body, 32, of somewhat greater width than the width of the completed bag, which is provided, near each edge, with a longitudinal recess or groove, 15. The body 32 is somewhat thicker at its middle than at its edges, and is provided on its top with a thin plate, 16, which is of a width just equal to the width of the completed bag, and is arranged so that its edges extend outward over the recesses 15. The body 32 is also provided at its edges with narrow plates 17, which extend inward beneath the edges of the plate 16, terminating near the inner sides of the recesses 15. In passing through this folder the central portion, *a*, of the web is drawn forward over the plate 16, as shown in Figs. 1* and 13, the side portions, *b*, being turned inward beneath the edges of the plate 16 and the projecting portions *c* turned outward beneath the edges of the plates 17, as shown in Fig. 13, so that as the web emerges from the

folder it will be folded four times longitudinally and reduced to the form shown in Figs. 15, 16, and 17.

As the longitudinally-folded web, or, as it may now be called, the "incomplete tube," emerges from the folder 116, it passes upward around a roll, 97, as shown in Fig. 1*, and thence forward to the final cutting and folding mechanism, as shown in Fig. 1. As the web passes around the roll 97, the portions *b c* receive continuous lines of paste, as indicated in Figs. 15, 16, and 17, from the pasting-disks 96, which are secured to a shaft, 95, and receive paste from a fountain, 94, in the usual manner. The shaft 95, to which the disks 96 are secured, is supported upon a pair of arms, 93, which are provided with springs, as 40, which serve to press the arms upward, so as to hold the disks 96 against the roll 97 with a yielding pressure. This is a feature of considerable importance, because, as will be observed, the number of thicknesses of paper which pass between the pasting-disks and the roll 97 is not always the same, there being sometimes two thicknesses and sometimes three. This variation in the thickness of the paper makes it necessary, in order that the disks may properly apply the paste, that they should be capable of accommodating themselves to this variation so as to always exert the same degree of pressure against the roll. The arms 93 are also provided with adjusting-screws, as 69, by which the tension of the springs 40 may be regulated as occasion may require. The disks 96 are made capable of adjustment upon the shaft 95, so that they may be made to operate in connection with webs of different widths.

After the lines of paste have been applied in the manner just described, the web is led forward over a cylinder, 80, which is mounted upon the shaft 113, and thence downward between said cylinder and a companion roll, 81, which is mounted upon a transverse shaft, 118, and is driven in unison with the cylinder 80 by means of a gear, 119, which engages with the gear 112. The roll 81 is, as will be observed, of such length that it only comes into contact with the central portion, *a*, of the web, and does not therefore interfere with the lines of paste applied to the side portions, *b* and *c*. In order to hold the side portions in position, however, and to prevent them from becoming unfolded while the web is passing between the roll 81 and the cylinder 80, there are provided a pair of vertical guides, 41, which are suspended from a bracket, 92, extending between the side frames of the machine, and lie in close proximity to the cylinder 80 upon each side of the roll 81, as shown in Figs. 2 and 3. To prevent the guides 41 from becoming smeared with paste, they are bifurcated at their lower ends, as shown in Figs. 2 and 6, so as to straddle the lines of paste and bear upon the web only at each side of said lines. These guides will also be made capable of lateral adjustment upon the bracket 92.

As the end of the folded and pasted web passes downward from between the roll 81 and cylinder 80, it passes in front of a pair of folding-cylinders, composed of the cylinder 80, just referred to, and a companion cylinder, 82, located directly beneath it and mounted upon the shaft 111. When the web or incomplete tube has been thus advanced so far as to bring the line *d d* (see Figs. 14, 15, and 18) in front of the bite of said cylinders, a folding-blade, 39, will be operated so as to fold the web upon said line into the bite of said cylinders, thus bringing the pasted parts *b c* together, so as to unite said parts and form the side seams of the bag.

The folding-blade 39 is constructed and operated as follows: The blade itself consists of a flat sheet of metal, which is secured to a yoke-shaped back, 38, the opposite arms of which are provided with trunnions 2, which rest in heads 10, which are arranged to slide freely back and forth upon ways 20, supported upon brackets extending inward from the side frames of the machine, as shown in Figs. 6 and 8. The back 38 is provided with a forwardly-extending arm, 90, the outer end of which is connected to one end of an arm, 91, the opposite end of which is loosely mounted upon a shaft, 89, which is rigidly mounted in a pair of arms, 88, extending from a rock-shaft, 120, journaled in the side frames of the machine, as shown in Figs. 1, 3, and 6. The shaft 89 is provided with one or more springs, 33, which are secured to said shaft and to the arm 91, as shown in Figs. 1, 2, and 3, in such manner that they have a constant tendency to rock the arm 91 inward, so as to throw the blade 39 into the bite of the cylinders 80 82. The shaft 89 is also provided with a disk, 18, which is loosely mounted upon the shaft, but is rigidly secured to the arm 91, and is provided upon one side with a notch or recess, 3, as best shown in Fig. 4, the purpose of which will be hereinafter explained. The arms 88 are provided at a distance above the shaft 120 with bearings, in which is mounted a rock-shaft, 121, from which extend a pair of rigid arms, 87, which terminate about opposite the axis of the cylinder 82, and in the upper end of which is mounted a shaft, 86, which carries a roll, 85, of about the same size and length as the roll 81. The shaft 121 is also provided at its middle with a third rigid arm, 84, which extends outward beneath the disk 18 and is provided upon its upper side with a pivoted bar, 19, the opposite ends of which are acted upon by adjusting-screws 4 in such manner that its position with relation to the arm 84 can be slightly varied, as best shown in Fig. 4. The bar 19 is provided upon its upper side with a projection, 5, which is of suitable form to engage with the notch 3 of the disk 18 under certain conditions, which will be hereinafter explained. The shaft 120 extends at one end beyond the side frame of the machine and is provided with an arm, 122, the upper end of which is provided with

a bowl, 28, which rests upon the periphery of a cam, 35, mounted upon the shaft 111, as shown in Figs. 1 and 2. The arms 87 are provided with one or more springs, 83, the tendency of which is to rock the shaft 121 so as to raise the arm 84 and hold the bar 19 in contact with the disk 18, and thus, through the arms 88, rock the shaft 120, so as to hold the bowl 28 in contact with the cam 35, as also shown in Figs. 1 and 2.

Just in front of the heads 10 the ways 20 are provided with a second pair of sliding heads, 11, (see Fig. 8,) which are pivotally connected by means of a pair of links, 12, with a pair of rock-arms, 13, which are mounted upon studs 14, projecting from the side frames, and are rigidly connected with each other by a web, 21, as best shown in Fig. 4. One of the arms 13 is provided with an arm, 22, the end of which rests upon the periphery of a cam, 23, which is also mounted upon the shaft 111, as shown in Fig. 3. The arm 22 is kept in constant contact with the cam 23 by means of one or more springs, 24, arranged in any convenient manner, as, for example, as shown in Figs. 3 and 4.

In order to properly regulate the forward movement of the arms 13 the web 21 is provided with an arm, 25, which extends forward beneath the arm 22, and is provided with an adjusting-screw, 9, by which the position of the arm 22 can be varied so as to determine the forward position of the arms 13 and heads 11. The rearward movement of the arms 13 and heads 11 is determined by means of a pair of stops, 26, the position of which can be varied by means of the rods 27 and nuts 6, as best shown in Fig. 8.

The operation of the mechanism just described is as follows: The various parts are so timed with relation to each other that while the end of the web is being projected in front of the cylinders 80 82, the blade 39 and the roll 85 will be held in the position shown in Figs. 1 and 3. As soon, however, as the line *d d* of the the pasted and folded web arrives opposite the bite of the cylinders, the cam 35 will have arrived in such position as to permit the arms 122, 88, and 87 to be drawn inward by the spring 83 so as to carry the roll 85 into contact with the cylinder 82, and cause it to press and hold the end of the web against said cylinder, as shown in Fig. 4. The cam 35 is so shaped, however, that after the roll 85 has come into contact with and been arrested by the cylinder 82, it will permit the arm 122 to be carried inward a short distance farther, thereby causing the spring 83 to rock the shaft 121 slightly, so as to move the arm 84 and bar 19 downward sufficiently to disengage the projection 5 from the recess 3 of the disk 18, and thus allow the springs 33 to rock the arm 91 and throw the blade 39 into the bite of the cylinders 80 82, and effect the folding upon the line *d d*, as also shown in Fig. 4. Just before the folding takes place, however, the cam 23 will arrive in such position as to

permit the springs 24 to rock the arms 13 to the position shown in Fig. 4, thereby carrying the heads 11 to the front of the bite of the cylinders 80 82, and out of the way of the heads 10. After the fold of the web has been well entered into the bite of the cylinders 80 82, the cam 23 will arrive in position to rock the arms 13 forward, so as to carry the heads 11 into contact with the heads 10 and force the blade 39 back to its normal position; and at the same time that this takes place the cam 35 will arrive in position to rock the arms 122, 88, and 87 back to their normal positions, thereby raising the arm 84 and bringing the bar 19 into contact with the disk 18, so that the projection 5 will enter the recess 3 and hold the blade in its retracted position until it is again released, as just described.

The cylinder 80 is provided with a severing-blade, 45, which is adapted to move in and out through a longitudinal opening, 34, in the cylinder, it being for this purpose provided with a pair of arms, 36, which are pivotally secured to a pair of arms, 37, extending from a rock-shaft, 42, which is journaled in the heads of the cylinder and provided at one end with an arm, 43, which rests upon the periphery of a stationary cam, 44, as shown in Figs. 2 and 3. The shaft 42 is provided with a spring, 8, the tendency of which is to throw the blade outward through the opening 34, when permitted by the cam 44 to do so. The blade and its auxiliaries just mentioned are so arranged that after the web has been folded into the bite of the cylinders, as just described, and just after the line *e e* of the web has passed the bite of the roll 81 and cylinder 80, the arm 43 will pass over the point 46 of the cam 44, so that the spring 8 will be permitted to rock the shaft 42 and project the blade 45 quickly outward through the opening 34 and beyond the periphery of the cylinder, the web at this time being held between the cylinders 80 82, and the roll 81 and cylinder 80 will be stretched tightly over the surface of the latter, so that as the blade 45 is thus projected outward it will sever the web upon the line *e e*, leaving the forward free end to be carried onward between the cylinders 80 82, and the rear free end to pass downward in front of said cylinders to be folded at the proper time, in the manner already described.

As the now completed bag emerges from between the cylinders 80 82, it is carried forward between a traveling apron, 47, and a stationary guide-plate, 48. The plate 48 is attached to a bracket, 49, depending from a rod, 50, mounted in the side frames, while the apron 47 passes around the cylinder 82, and a similar cylinder, 51, located a suitable distance in advance thereof, and having its shaft journaled in a supplemental frame, 123, supported upon cross-rods 124, and returns beneath a stretching-roll, 52, the shaft of which is journaled in arms 53, extending downward from a cross-shaft, 54, all as shown in Figs. 1, 3, and 4. To insure the advancement of the

bag between the apron 47 and plate 48, a roll, 55, the shaft of which is mounted in the frame 123, is located beneath the apron at a suitable distance in advance of the cylinders 80 82, and directly above this roll there is provided a revolving disk, 56, which is mounted upon a cross-shaft, 57, and arranged to extend through a slot in the plate 48, so as to press the bag against the apron and the roll 55, and thus secure its positive advancement. While the bag is being advanced between the apron 47 and plate 48, it is subjected to the action of the side-folders, before referred to, by which the V-shaped folds are formed in its bottom corners, which cause it to assume a rectangular form as soon as filled. These folders and their operation will now be described. These folders are carried upon a pair of heads, 70, which are arranged to reciprocate upon ways 71, formed upon the side frames of the machine, as best shown in Fig. 5, and consist of the folders proper, 72, and the guides or guards 73, as best shown in Figs. 2, 9, 10, and 11. The folders 72 consist of thin plates, and are secured to the ends of a pair of arms, 74, which are pivoted upon studs 7, rising from projections 58, extending inward from the heads 70, as best shown in Figs. 2 and 5, while the guides or guards 73, which consist of thicker plates, which are beveled at their inner ends, and provided with recesses I, (see Figs. 10 and 11,) are secured to the ends of a pair of arms, 75, which are also pivoted upon the studs 7, beneath the arms 74, as best shown in Figs. 2 and 5. The arms 74, which carry the folders 72, are provided with outwardly-projecting arms 59, the ends of which are provided with studs or bowls 60, which enter cam-grooves 61, formed in the ways 71, (see Figs. 2, 5, and 9,) while the arms 75, which carry the guides or guards 73, are provided with forwardly-extending arms 62, the ends of which incline inward, so as to be acted upon by the stationary studs 63, and also upon their under sides with cam projections 64, (see Figs. 2 and 9,) which are so arranged to be acted upon by the stationary studs 65. The heads 70, upon which the arms 74 75 are pivoted, are provided with downwardly-extending arms 66, which are connected by links 67 with a pair of arms, 125, which extend upward from a rock-shaft, 126, the end of which is provided with an arm, 127, which is connected by a rod, 128, with a crank, 68, secured to the shaft 111 outside of the gear 110.

The operation of this part of the mechanism is as follows: Just before the folding-blade 39 is moved inward to fold the web into the bite of the cylinders 80 82, as already described, the crank 68, through the rod 128, arms 127 125, and links 67, commences to move the heads 70, carrying the side-folders and their guards rearward from the position shown by broken lines in Fig. 9, and this movement continues until just before said parts arrive at the position shown by the light dotted lines in said figure, at which time the studs 60 of the arms

59 will enter the outwardly-inclined portions of the cams 61, thereby throwing the folders 72 outward, after which these parts will continue their rearward movement until they arrive at the position shown by the full lines in said figure, which will bring the folders and their guards just to the rear of the bite of the cylinders 80 82. While the folders and their guards are being moved rearward, as just described, the blade 39 will be moved forward to fold the web into the bite of the cylinders 80 82, as already described, so that by the time the folders and guards arrive in this position the bottom fold of the bag will have been entered into the bite of the cylinders and the folding-blade withdrawn. Just after the folding-blade has been withdrawn and just as the side-folders and guards are completing their rearward movement, the cam-projections 64 will come into engagement with the studs 65, so as to throw the guards 73 inward to the position shown by the heavy dotted lines in Fig. 9. This will cause the ends of said guards to enter between the parts *b b* of the web just in the rear of the bite of the cylinders 80 82, as indicated in Fig. 12. As soon as this takes place, the crank 68 will commence to move the heads 70 in the opposite direction, thereby carrying the guards 73 forward between the cylinders 80 82, (the ends of one or both of the cylinders being slightly cut away, as shown at *w*, to permit of this,) and with their ends in the bellows sides of the bag, as shown in Fig. 10. It will be observed that during this movement the guards 73 do not enter sufficiently far into the bellows sides of the bag to come between the parts *b c*, thereby permitting these parts to be pressed together and united by the lines of paste as they pass between the cylinders. By reason of the relative lengths of the arms 125 and 127 the forward movement of the heads 70 will be considerably faster than that of the bag, so that by the time the studs 60 have arrived in position to enter the inclined portions of the cam-grooves 61, the guards 73 will have moved forward to a point near the bottom of the bag. As the heads 70 continue their forward movement, the studs 60 of the arms 59 will enter and pass along the inclined portions of the cam-grooves 61, thereby moving the folders 72 inward to the position shown by the broken lines in Fig. 9. As the folders are thus moved inward, they will enter the recesses I in the guards 73, and be thus guided into the bellows sides of the bag, as shown in Fig. 10. As soon as the folders have been entered into the bellows sides of the bag, the inclined ends of the arms 62 will come into contact with the studs 63, and the guards 73 will be again moved outward to their normal position. As the folders 72 continue to be moved inward, as just stated, they will enter between the parts *b c* and turn the upper folds of the bellows sides of the bag over onto the top of the plate 48, as shown in Fig. 11, and thereby form the two V-shaped folds *m n o* in its bot-

tom corners, as shown in Figs. 11 and 19, which folds will cause the bag to assume a rectangular and symmetrical form when filled, as shown in Fig. 20. After the sides of the completed bag have been thus folded over onto the body, and as the bag leaves the plate 48 it passes between the cylinder 51 and a pressing-roll, 76, mounted directly above said cylinder, by which the various folds are fully broken down and set.

As the bags emerge from between the cylinder 51 and roll 76, they pass onto a fly, 129, by which they are piled upon a table, 130, to be removed by an attendant. The fly 129 is operated in the usual manner through a rod, 131, which is connected to a crank-pin projecting from the face of the gear upon the shaft 111, which engages with the gear 112, and to one end of a pivotal lever, 132, the opposite end of which is provided with a segmental gear, 133, (see Fig. 3,) which engages with a gear, 77, mounted upon the end of the shaft 136 of the fly.

The piling-table 130 is mounted so as to be capable of vertical adjustment upon a pair of rods, 134, and is provided with a pawl, 78, which engages with a threaded rod, 135, as shown in Figs. 3 and 7, the upper end of which is provided with a ratchet-wheel, 137, which is engaged by a pawl, 79, mounted in a short arm or projection extending from the shaft 136, as best shown in Fig. 3. From this arrangement it results that each time the fly 129 is operated the shaft 135 is caused to make a partial revolution, thereby causing the table 130 to be gradually lowered as the pile of bags upon it increases in height. When the table has been thus lowered to the limit of its downward movement, and the pile of bags has been removed by the attendant, the table can be readily raised to its uppermost position, the pawl 78 simply sliding idly over the threads of the rod 135.

Having thus described my invention, what I claim is—

1. The combination, with the cutting-cylinders 102 103, provided with blades which are arranged to remove narrow sections from portions of the opposite sides of the web, of the folder 116, constructed and arranged to impart four longitudinal folds to the web, substantially as described.

2. The combination, with the cutting-cylinders 102 103, provided with blades which are arranged to remove narrow sections from the opposite sides of the web alternately, of the folder 116, constructed and arranged to impart four longitudinal folds to the web, substantially as described.

3. The combination, with the cutting-cylinders 102 103, provided with blades which are arranged to remove narrow sections from portions of the opposite sides of the web, of the folder 116, constructed and arranged to impart four longitudinal folds to the web, and a pasting mechanism arranged to apply lines

of paste to the edges of the web, substantially as described.

4. The combination, with the folding-cylinders 80 82 and the feeding-roll 81, of the vibrating roll 85, and a folding-blade for folding the web into the bite of said cylinders, substantially as described.

5. The combination, with the cylinder 80, carrying the blade 45, of the companion cylinder 82 and the feeding-roll 81, and means for projecting said blade suddenly outward beyond the periphery of its cylinder, so as to sever the passing web at a point between the roll 81 and the cylinder 82, all substantially as described.

6. The combination, with the cylinder 80, carrying the blade 45, of the companion cylinder 82 and feeding-roll 81, a blade for folding the web into the bite of said cylinders, and means for projecting the blade 45 suddenly outward beyond the periphery of its cylinder to sever the web, all substantially as described.

7. The combination, with the cylinder 80, carrying the blade 45, of the companion cylinder 82, feeding-roll 81, and vibrating roll 85, a blade for folding the web into the bite of said cylinders, and means for projecting the blade 45 suddenly outward beyond the periphery of its cylinder to sever the web, all substantially as described.

8. The combination, with the folding-cylinders 80 82, of the feeding-roll 81, and the vibrating roll 85, the spring-controlled blade 39, and means for holding and releasing said blade, all substantially as described.

9. The combination, with the reciprocating blade 39, connected to the rock-arm 91, of the disk 18, and spring or springs 33, and the rock-arm 84, by which said disk is held and released, substantially as described.

10. The combination, with the reciprocating blade 39, connected to the rock-arm 91, of the disk 18, and spring or springs 33, the rock-arm 84, by which said disk is held and released, and the reciprocating heads 11, by which said blade 39 is retracted, substantially as described.

11. The combination, with the folding-cylinders 80 82, of the laterally-vibrating guides 73, arranged to enter the bellows folds in the sides of the bag in the rear of said cylinders and then pass forward with the bag, substantially as described.

12. The combination, with the laterally-vibrating guides 73, arranged to enter the bellows folds at the sides of the bag and move forward with the bag, of the laterally-vibrating folders 72, arranged to co-operate therewith to fold inward one side of the bellows portion of each side of the bag, substantially as described.

13. The combination, with the apron 47 and the plate 48, between which the bag is advanced, of the laterally-vibrating guides 73 and co-operating folders 72, arranged to ad-

vance with the bag as they operate to fold inward one side of the bellows portion of each side of the bag, substantially as described.

14. The combination, with means for supporting and advancing the bag, of the laterally-vibrating guides 73 and co-operating folders 72, arranged to advance with the bag as they operate to fold inward one side of the bellows portion of each side of the bag, and the pressing-roll 76, substantially as described.

15. The combination, with the fly 129 and piling-table 130, of the screw-rod 135 and the pawl and ratchet 79 137, substantially as described.

16. The combination, with the fly 129 and piling-table 130, of the screw-rod 135, pawl and ratchet 79 137, and the pawl 78, substantially as described.

17. The combination, with the cutting mechanism arranged to remove the narrow portions from the opposite sides of the web, of folding mechanism arranged to impart four longitudinal folds to the web, pasting mechanism arranged to apply lines of paste to the edges of the folded web, folding mechanism arranged

to fold the web transversely upon the line which forms the bag-bottom, and cutting mechanism arranged to sever the bag from the web, all substantially as described.

18. The combination, with the cutting mechanism arranged to remove the narrow portions from the opposite sides of the web, of folding mechanism arranged to impart four longitudinal folds to the web, pasting mechanism arranged to apply lines of paste to the edges of the folded web, folding mechanism arranged to fold the web transversely upon the line which forms the bag-bottom, cutting mechanism arranged to sever the bag from the web, and side-folding mechanism arranged to fold over onto the body one side of the bellows portion of each side of the bag, all substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

BENJAMIN F. SAWYER.

Witnesses:

J. D. ROBERTS,

A. L. SAWYER.