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C. B. STILWELL.

PAPER BAG MACHINE.

No. 255,204. Patented Mar. 21, 1882.

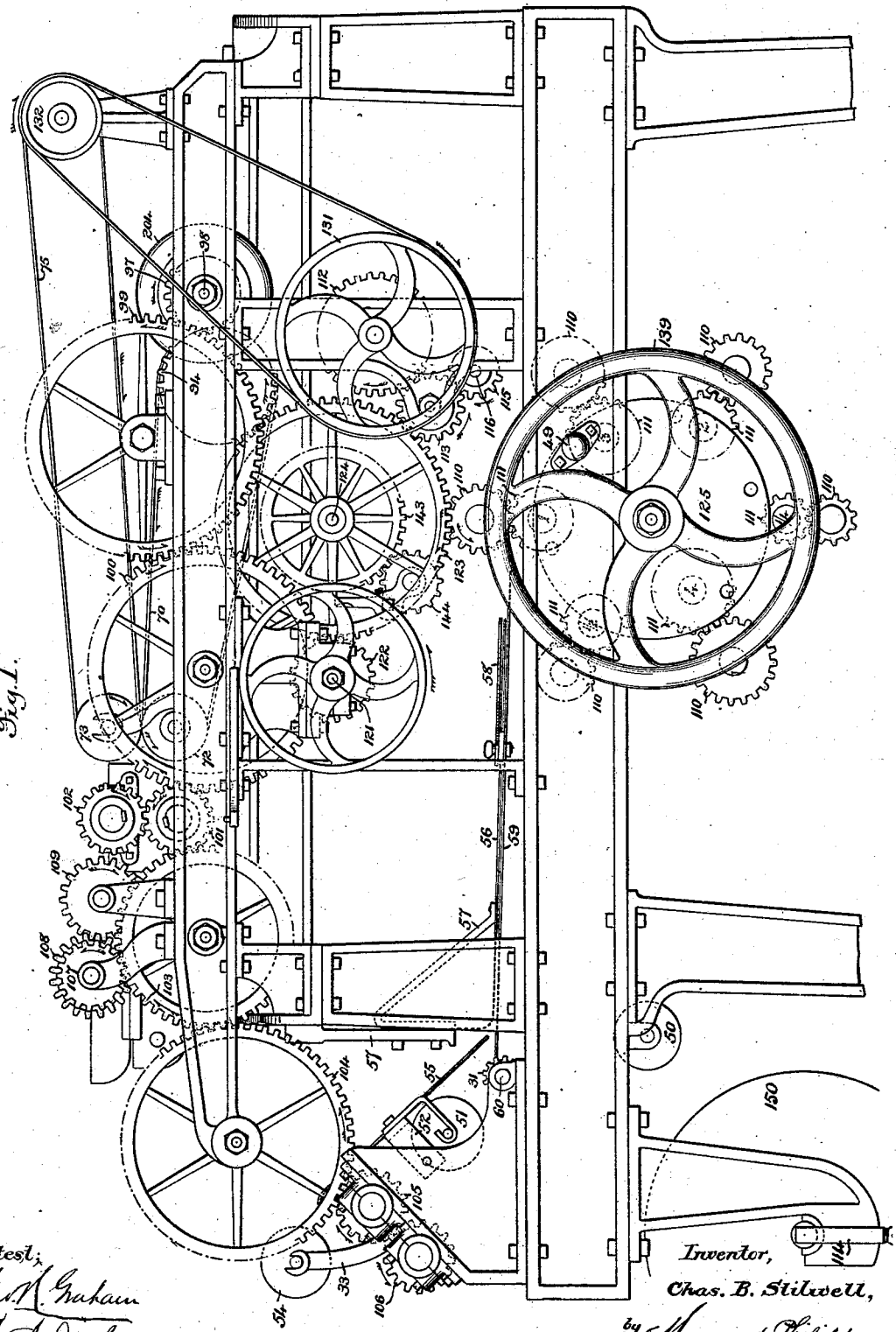


Fig. 1.

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(No Model.) 7 Sheets—Sheet 2.

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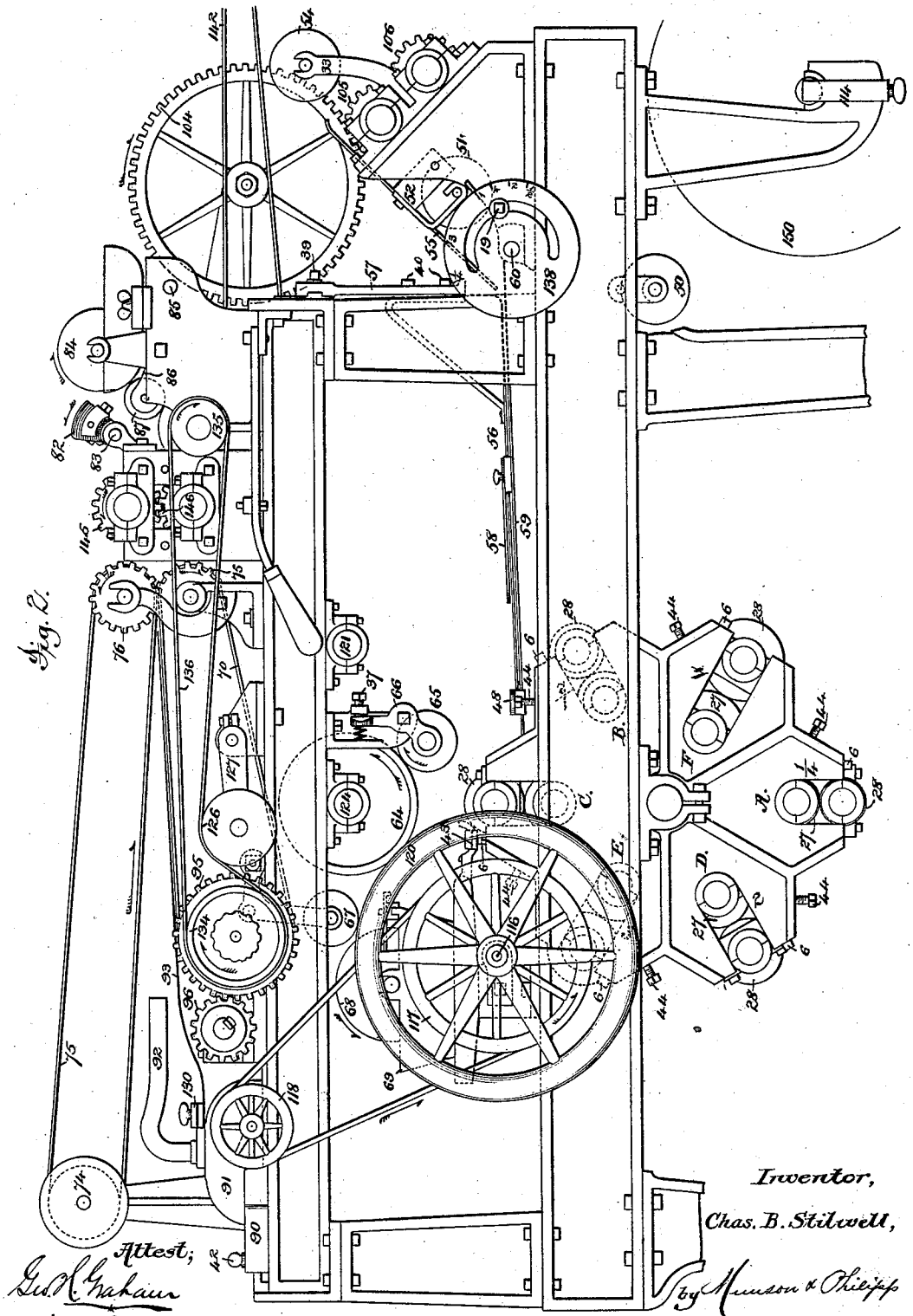


Fig. 2.

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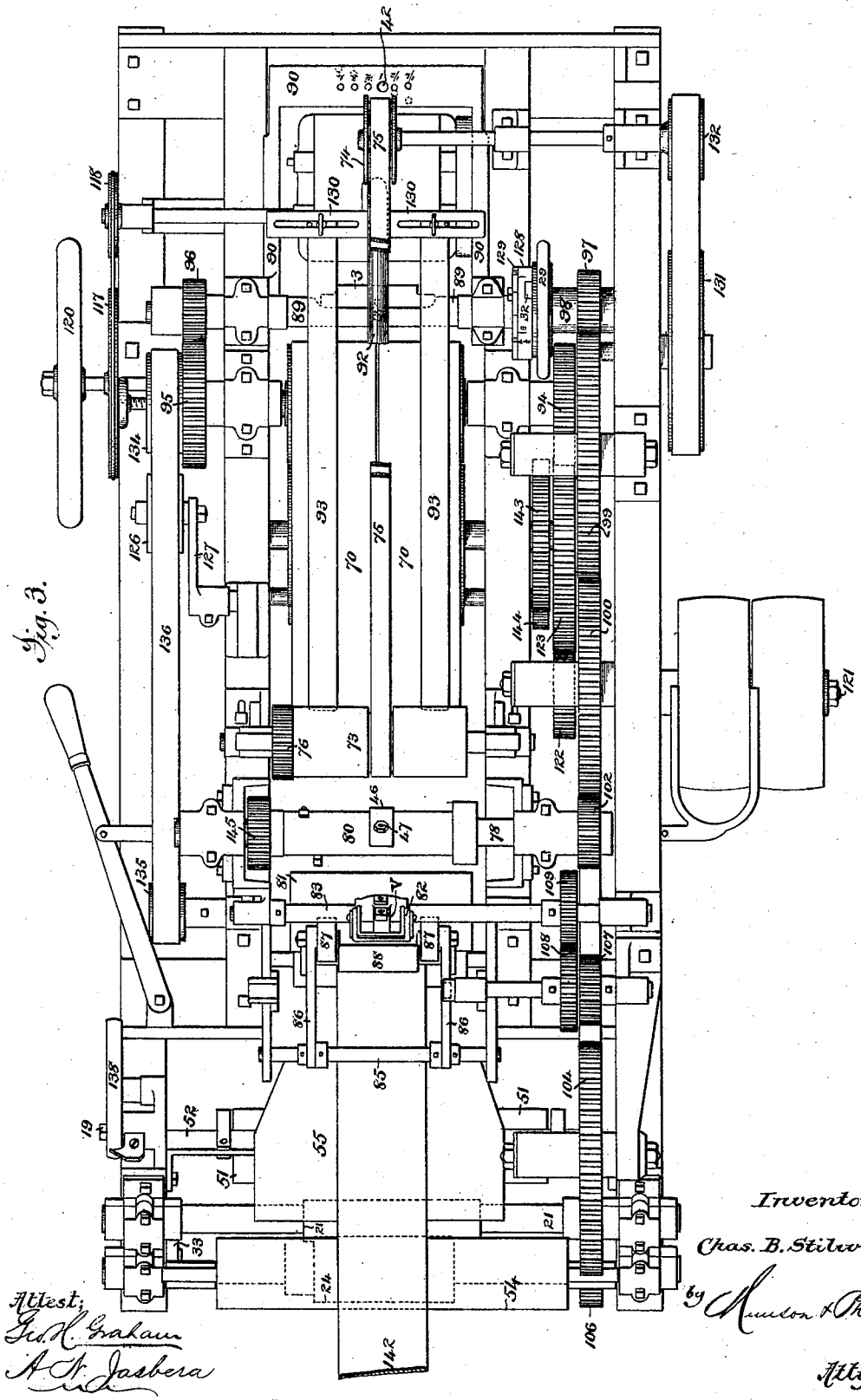


Fig. 3.

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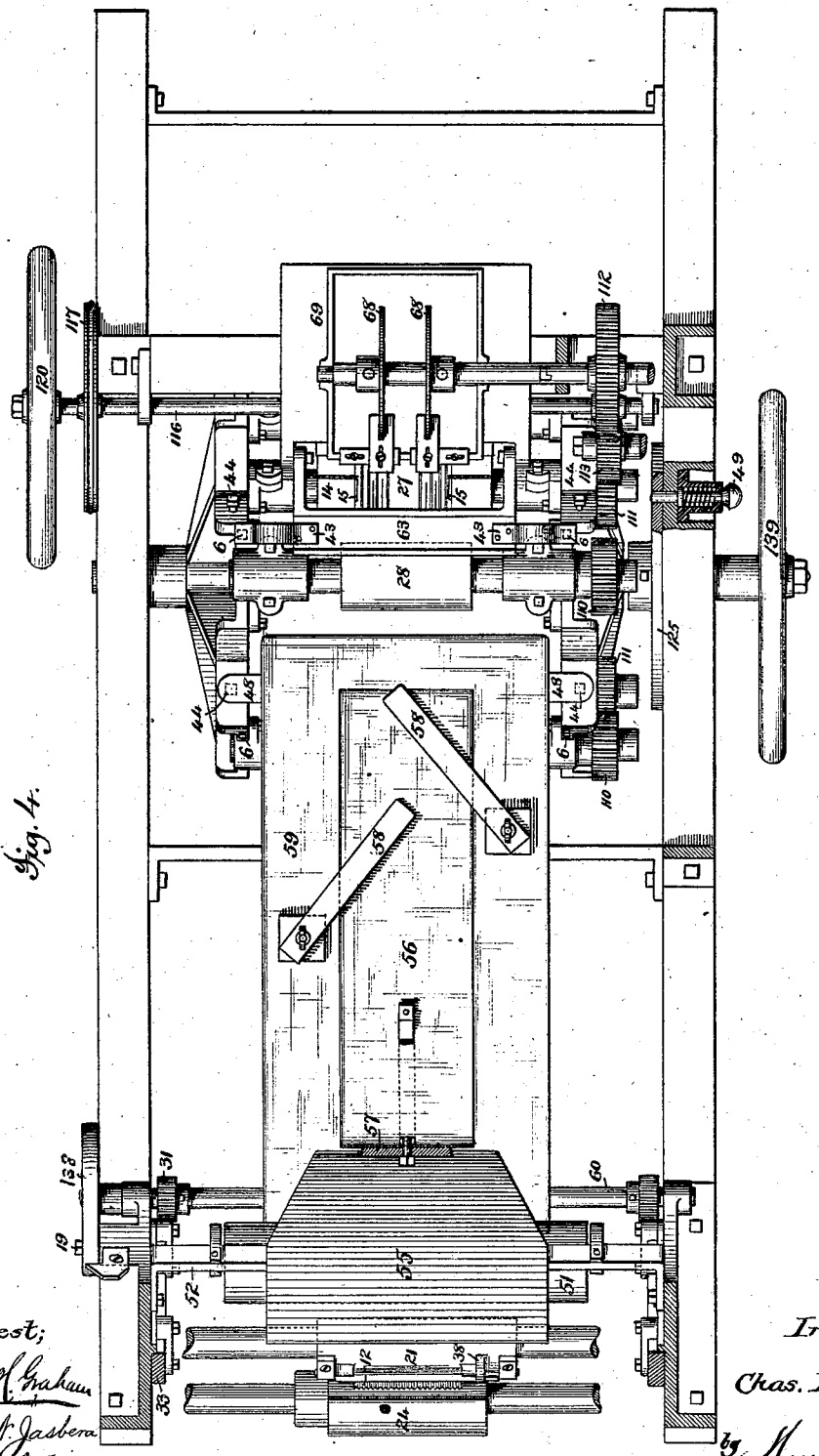


Fig. 4.

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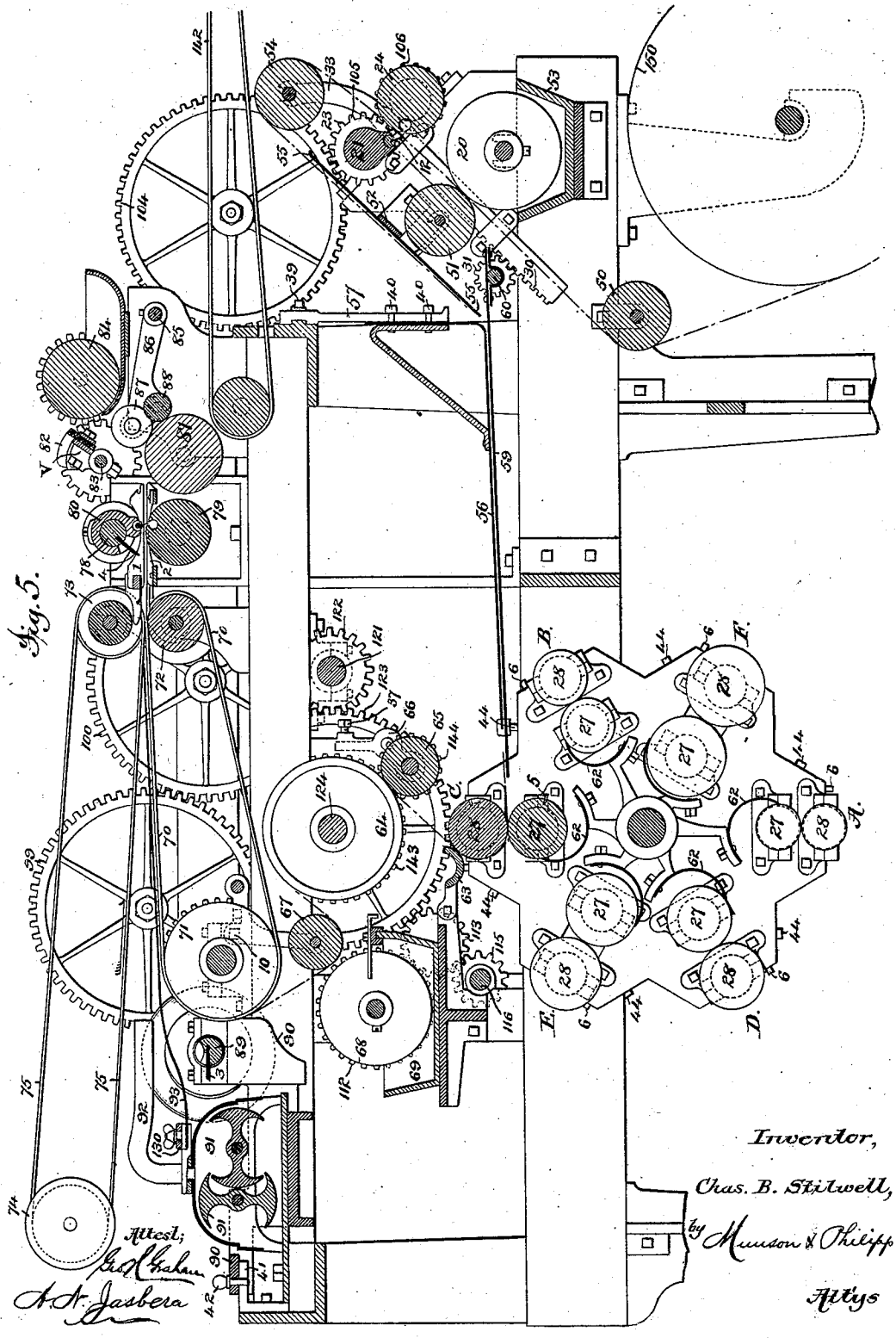


Fig. 5.

Witnesses;
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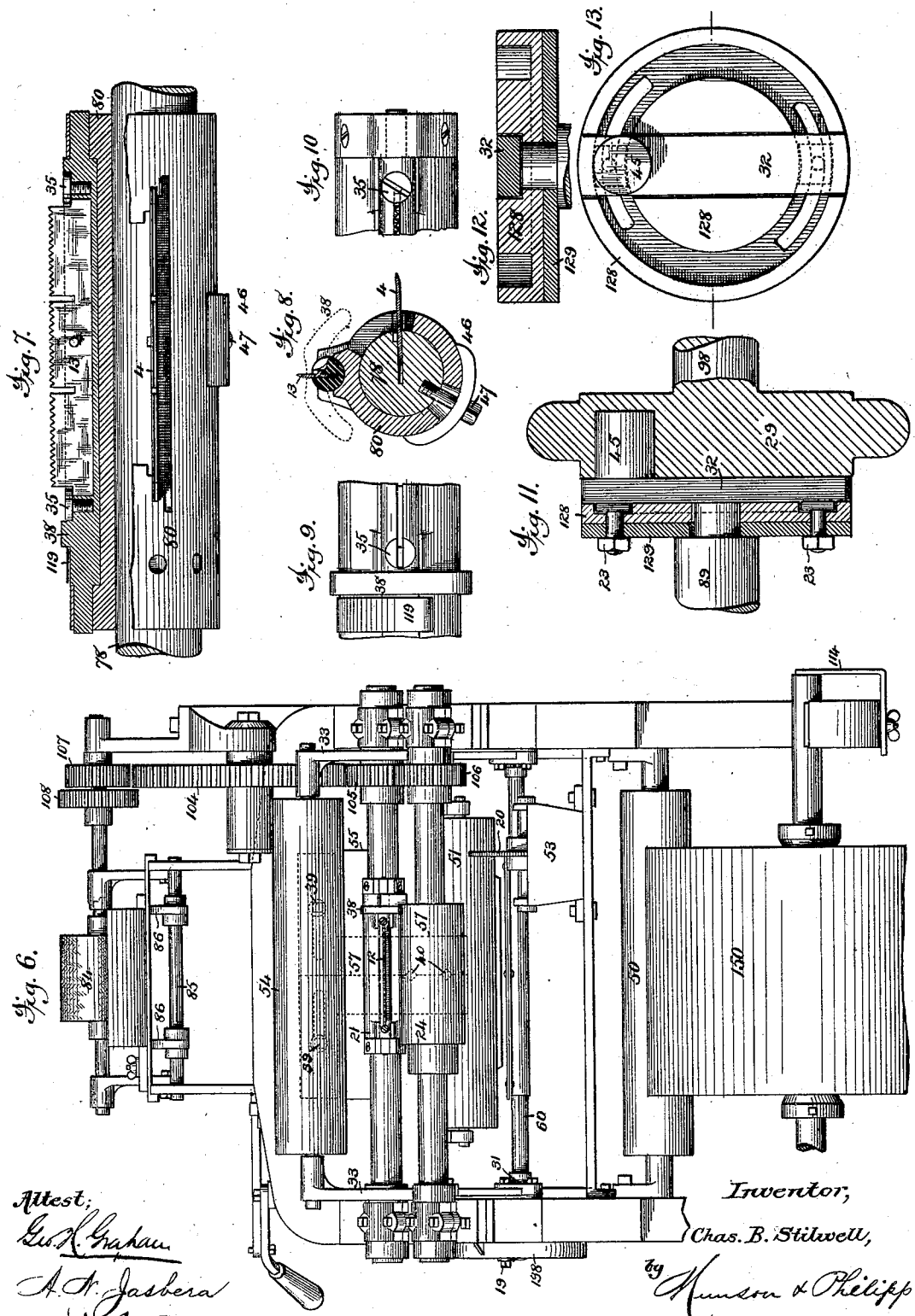
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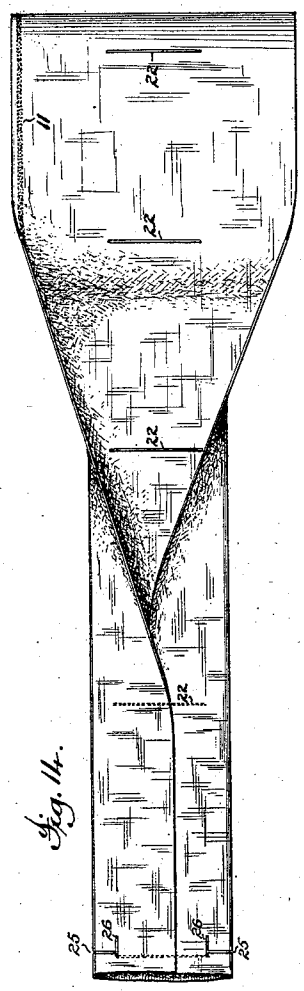
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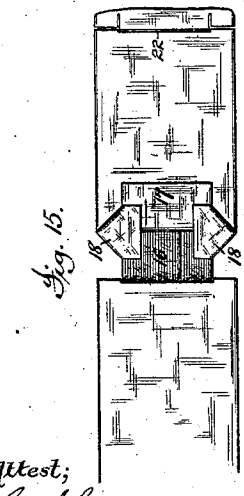
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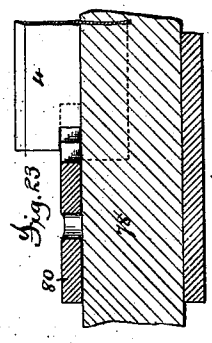
C. B. STILWELL.

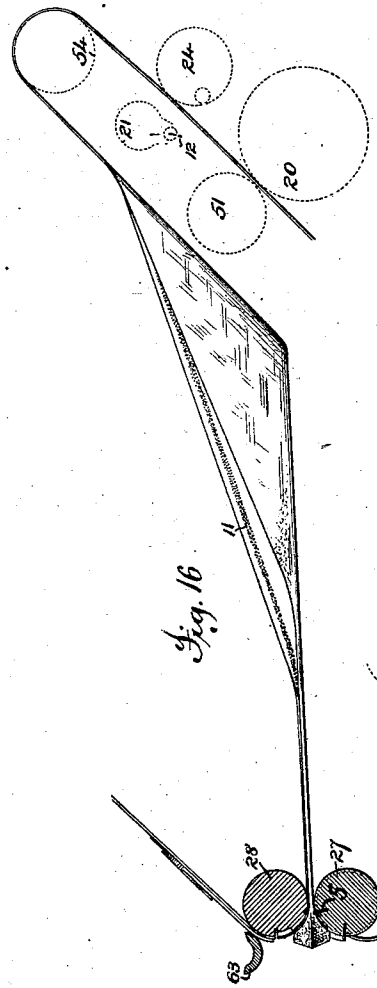
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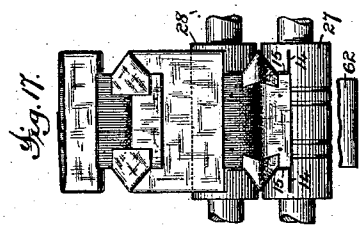
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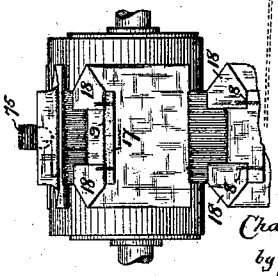


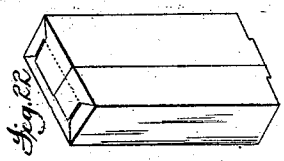


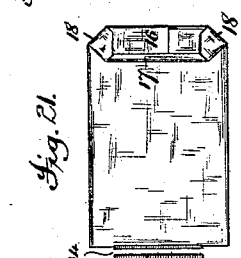




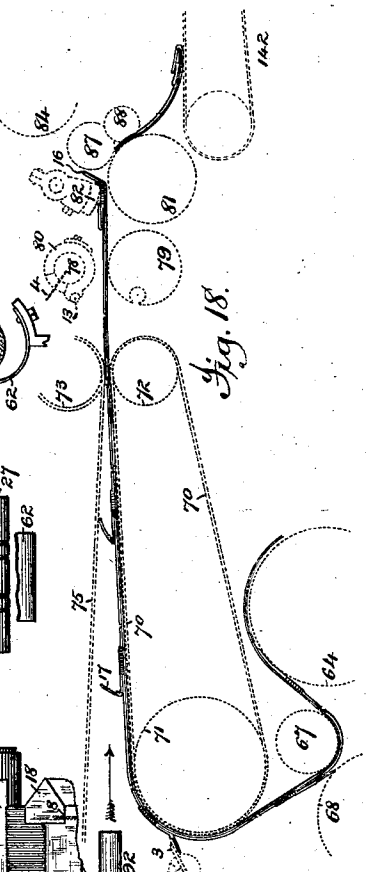












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UNITED STATES PATENT OFFICE.

CHARLES B. STILWELL, OF WATERTOWN, N. Y., ASSIGNOR TO THE UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PA.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 255,204, dated March 21, 1882.

Application filed October 21, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. STILWELL, a citizen of the United States, residing in the city of Watertown, county of Jefferson, and State of New York, 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.

The improvements embodied herein, while in part capable of use in ordinary bag-machines, relate more particularly to that class of bag-machines which automatically operate to produce satchel-bottomed paper bags, and especially to such improved machines as include mechanisms operating upon the principle and substantially as is set forth in the Patent No. 165,381, granted July 6, 1875, reissued July 30, 1878, No. 8,357, and Patent No. 203,638, granted July 30, 1878. The art of making satchel-bottomed paper bags as improved and perfected by the inventions forming the subjects-matter of the aforesaid patents includes the conversion of a long web of paper into a tube provided with such cuts, partially severing it transversely, as enable mouth-distending and fold-laying apparatuses to spread and lay portions of said tube a bag's length apart into the requisite preliminary diamond shape suited to the formation of a satchel-bottom, said bag-lengths remaining connected together by a strip, and thus fed continuously through the machine and accurately conveyed to the action of pasting, creasing, folding, and cutting devices, whereby the bottom laps are prepared and folded to complete the bag-bottom and each bag is severed from the tube and delivered from the machine.

The present improvements relate to means whereby one machine has its various mechanisms constructed and organized so as to capacitate them to produce various sizes of satchel-bottomed bags; and said improvements embrace various combinations involving one or more of the following mechanisms: a carrying-frame in which are mounted two or more sets of opening feeding-rollers, each set adapted to the formation of a different size of bag and capable of adjustment into co-operative relation to the other mechanisms; a primary cutting and intermediate cutting and slitting mechanisms operating to prepare the tube for the action of the opening feeding-rollers; an adjustable breaker co-operating with said rollers; adjustable pasting-disks for applying paste to the first bottom flap; an interchangeable creaser for defining the fold of the said flap; an adjustable means for sustaining the outwardly-moving bag-lengths and a faster-traveling belt or air-blast for laying or bending said flap into position to be pressed onto the bag-bottom; a last bottom-flap creaser and final cutter, relatively adjustable; an adjustable final flap-pasting device; adjustable wheels for holding the bottom folds while the last flap is engaged by an interchangeable laying-roller; an adjustable moving frame carrying the primary creaser and interchangeable gearing, whereby the motion of the feeding-rollers in action is properly transmitted to the other mechanisms, and so as to produce correct coaction in forming various sizes of bags; and a take-up device for determining the extent of material stretched from the primary cutting mechanism to the opening feeding-rollers, whereby the exact relation of the positions of the material separately acted upon by the various mechanisms is fixed.

The improvements also include the construction of some of the appliances, all of which is set forth with particularity in the specification, and finally pointed out and defined in the claims.

Figures 1 and 2 represent right and left hand side elevations of the machine. Fig. 3 is a top or plan view, showing particularly the upper range of mechanisms. Fig. 4 is a sectional plan view, showing the lower range of mechanisms. Fig. 5 is a longitudinal sectional elevation as seen from the left-hand side of the machine. Fig. 6 is an end elevation as seen from the feeding end of the machine. Fig. 7 is an elevation, partly in section, of the last cutting and creasing cylinder. Fig. 8 is a transverse section of the same. Figs. 9 and 10 are plan views of opposite ends of said cylinder, showing more particularly the mode of securing the cutting-blade. Figs. 11, 12, and 13 are views of a crank-pin connection between two trains of gear-wheels. Figs. 14 and 15 are up-

per and under plan views of the material in various stages of its conversion into tubular bag-blanks. Fig. 16 is a skeleton view, illustrating the forming of the primary central cut formed in the web, the conversion of the latter into a tube, the side slitting, mouth distending, and diamond folding of the bottom. Fig. 17 is an end view of the devices accomplishing the diamond folding, the breaker being removed. Fig. 18 illustrates the transverse pasting, the first creaser as operating to fold the first flap, and second creasing and transverse severing, also the second pasting and final folding, of which Fig. 19 is an end elevation. Fig. 20 illustrates the tubular blank with the first flap folded and the last pasting operation effected upon its surface. Fig. 21 illustrates the finished bag, and Fig. 22 the same when opened into a square or rectangular form. Fig. 23 is a detail showing the construction of the end of blade 4.

To aid a ready understanding of the mechanisms, their general functions will be first pointed out in connection with their operation upon the web of paper in converting the same into bags, and then their structure, particular characteristics, and specific operation will be explained in detail.

The web of paper from a roll, 150, held in suitable bearings at the lower front end of the machine, is led, while distended widthwise, over the tension-roller 50, and carried between a yielding pressing-roller, 51, and a pasting-disk, 20, from which it receives a line of paste, 11, along on one edge. From thence it passes through the first cutting mechanism, whereby the first partial severance of the web is performed, the cut being made in the transverse center to form the slit 22, as in Fig. 14. It is bent around a take-up roller, 54, and thence descends over an inclined guard, 55, and the plate or table 59, and passes beneath the tube-former 56, around which latter it is doubled to form a tube by having its sides lapped centrally, so that the pasted edge of one side is laid over or upon the opposite side, arms 58 serving to guide its edges into proper relation, so that the pasted edge of the upper ply will be pressed and united to the lower ply in passing between the feeding and opening rollers 27 28, and complete the formation of the tube. These feeding and opening rollers 27 28 are provided with short serrated cutters 14, that make the short transverse cuts 25 through the tube inwardly from its side edges, and with short slitting-knives 15, which make the short longitudinal slits 26, that intersect both the cuts 25 and the central transverse slit 22, and the roller 27 may carry a creasing-blade, 5, that co-operates with a slot in the roller 28 in creasing the tube upon a transverse line at the center of the bag-bottom, to enable the diamond fold to be more readily and perfectly spread. This creasing-blade may, however, be omitted and the mechanism remain entirely operative. These rollers are also provided with mouth-distending devices, whereby the slit and cut tube may have its opposite sides distended to spread the diamond folds 18 and lay its rearward flap 17. This tube, with partially-formed bottom connected by its forward flaps, 16, is then carried upward between a pressing-roller, 65, and the carrying-cylinder 64, under a guiding-roller, 67, and onto an endless traveling apron, 70. In passing the roller 67 the rearward bottom flap, 17, and diamond folds 18 receive short longitudinal lines of paste 8, and in passing over the apron-guiding cylinder 71 said rearward bottom flap, 17, is creased transversely on the line 9 by the creaser-blade 3, which causes said bottom flap, 17, to stand upward, as in Fig. 18. As the tube is carried onward upon the apron 70 these bottom flaps, 17, are engaged by a faster-moving belt, 75, that lays them forward and downward onto the diamond folds 18, and in a position to be pressed flat as the tube passes between the pressing-rollers 72 73. Beyond these pressing-rollers the third or final cutting mechanism comes into operation, whereby the cut 34 (see Fig. 20) is made, which severs blank from blank. The forward flap, 16, now free, is creased transversely by the creaser-blade 4, so as to incline slightly upward. As the bag-bottom passes over the supporting-roller 81 the revolving paster 82 comes into operation and lays upon it the line of paste 7. As the tube moves onward its leading end is controlled by the wheels 87, under which the outer portions of the diamond folds 18 pass, and its upwardly-projecting flap 17, meeting the roller 88, is forced rearwardly upon the tube to complete the bag-bottom, (see Fig. 21,) thus finishing the bag, which may be delivered in any manner, as by a belt, 142, and which bag may be opened to have the form shown in Fig. 22, all of which operations are analogous to those described in the aforesaid patents.

The shaft carrying the paper roll 150 may be adjusted laterally by slotted adjustable arms 114, applied to its ends.

The tension-roller 50 is hung in pendulous arms, and the yielding pressing-roller 51 is hung in curved arms depending from a cross-bar, 52, so that it may rise and fall to properly hold the edge of the passing web onto the pasting-disk 20, that turns frictionally in a paste-vat, 53.

The web-take-up roller 54 is mounted in adjustable inclined arms 33, the lower end of each of which is provided with a rack, 30, that engages a pinion, 31, on a cross-shaft, 60. (See Fig. 5.) These arms 33 slide in bearings and may be moved by rotating the shaft 60 through the hand-wheel 138, so as to raise or lower said roller, and thus adjust it in proper position for the production of any sized bag. To facilitate this adjustment, an indicating device may be employed, and some fastening—as the slotted wheel 138 and the clamp-screw 19—will be required to hold the roller fixedly in its adjusted

position. The inclined guard 55 is a plate supported by a cross-bar, 52, so as to bridge the space between the roller 54 and the tube-former 56.

The plate or table 59 is secured to the shaft 60 by straps, which embrace it and form a hinge that permits its forward end to be raised and lowered. As the tube-former 56 must be of a width equal to that of the bag-tube it is to aid in forming, it is made removable by being secured to a bracket, 57, that depends from the cross-frame. This bracket 57 is made in two parts, (see Fig. 6,) each of which is secured to the cross-frame by a bolt, 39, passing through a slot in the hanger, the tube-former being secured to the hanger by means of bolts 40, embraced in sockets gained into the opposite meeting edges of the two heads of said bracket.

All the cutting mechanisms are mainly constructed in substantially the same manner, their differences consisting in the disposition of the blades for the accomplishment of the peculiar cuts required to be made, and in peculiar constructions, more fully hereinafter set forth. The general characteristics of the cutting mechanisms are a roller or carrier, as 24 28 79, provided with a proper-shaped cutting slot or slots for coaction with the cutters and knives, which are mounted in a roller or carrier, as 21 27 78.

The carrier 21 of the first cutting mechanism is a shaft provided with a projecting seat, in which a socket is formed as a bearing for the shaft of the primary serrated cutting-blade 12, (see Fig. 6,) which blade co-operates with a cutting-slot formed in the carrier or roller 24, and is given a slight oscillating movement by means of a cam, 38, fast to its shaft, in like manner as is described in said Patent No. 206,638.

The third cutting apparatus (see Figs. 5 and 7 to 10) consists of a roller or carrier, 79, provided with a cutting-slot, and of a sleeve, 80, mounted on an arbor, 78, and provided with a projecting seat, in which a socket is formed as a bearing for the shaft of a serrated cutting-blade, 13, which shaft is provided with a cam, 38, that rolls in contact with the periphery of the roller or carrier 79, and thus oscillates the blade, a retracting-spring, 119, rocking the blade backward to its normal position. The arbor 78, which supports the cutting-blade 13 of this mechanism, also carries the final creaser-blade, and as the last cut and crease must vary in their distances of separation with each different size of bag made, the carrier proper of said cutting-blade or the sleeve 80 is made to turn adjustably upon the arbor 78, so that the relation of the creasing-blade 4, that is fixedly held in a slot or socket in the arbor 78, with respect to cutting-blade 13 may be varied and determined by turning the sleeve 80 upon the arbor 78 until the proper relative adjustment is reached, which is secured by a curved clamp, 46, held to duty by a screw, 47, tapped into the arbor 78.

The second cutting mechanism consists of short serrated longitudinal cutters 14 and short slitting-knives 15, set in sockets in the roller 27, which cutters and knives coact with suitably-shaped cutting-slots in the roller 28. Though these cutters and slitters are here represented as seated in stationary positions, they may be mounted to oscillate as in said Patent No. 206,638.

In order that the proper-sized rollers 27 28 and the cutters and slitting-knives they carry may be provided for the production of the various sizes of bags, a suitable number of sets, as A B C D E F, of such rollers 27 28, appropriate to the different number of sizes of bags which the machine is to produce, are journaled in a carrying-frame that is capable of rotary adjustment to bring the proper set of such rollers into co-operative relation with the other mechanisms. These interchangeable sets or pairs of rollers 27 28 might of course be separately removable and adjustable in the framework; but in order to promote the ready readjustment of the machine for the various-sized bags, the rotary structure of carrying-frame here shown is of great utility. Each roller 27 is provided with pins to impale the rearward flap 17 of each bag, and with stripping-fingers 62 to disengage the flap from the pins at the proper time, as is described in said last-named patent. When this roller-carrying frame is adjusted to bring a new set of rollers, 27 28, in place, it is secured in proper position by means of a head-plate, 125, perforated with adjusting-holes, that are engaged by a spring-seated pin, 49; and in order that the table 59 may sustain a proper relative position with respect to the different pairs of rollers 27 28, to which it is to direct the partially-formed tube, the roller-carrying frame is provided at the front of each set of rollers with studs 44, upon which a cross-bar, 48, attached to the inner end of the table rests in appropriate adjustment.

The curved breaker 63, which stands in such close relation to the plane of travel of the material as to act to prevent distortion of the distended but uncreased diamond folds 18, and thus secures the retention of their shape until it is finally completed by being pressed flat, is made capable of proper co-operation with all the varying sized rollers 28 by being pivoted so as to rest in operative position by gravity; and in order to secure its proper depression with respect to said rollers it is provided with arms 43 at each end, which rest upon properly-related studs 6, projecting from the heads of the roller-carrying frame in rear of each roller 28.

The pressing-roller 65, which coacts with the carrying-cylinder 64, is hung in swinging arms 66, pivoted to brackets, the free members of which have a spring interposed between them and the shoulder of said bracket, their throw being limited by means of regulating-screws 37. The cylinder 64 runs loosely upon the shaft 124, and is driven frictionally by the

paper. The roller 65 is actuated by a pinion, 141, that is engaged by the wheel 143, fast on the shaft 124, the latter being rotated by the wheel 123, that gears with the main driving-pinion 122.

The shaft of the guiding-roller 67 is journaled in hangers which may be secured in fixed positions determining the adjustment of the rollers with respect to the periphery of the pasting-disks 68. Any common means may be used to accomplish this adjustment, as the mere tightening of their pivotal screws 10, the purpose being to guide the tube out of contact with the pasting-disks 68, but in such near relation to the periphery of said pasting-disks as to permit the rearward flap 17 to spring outward into contact therewith and receive the lines of paste 8 while the body of the tube is held out of such contact, as in Fig. 18. These pasting-disks 68 turn in a paste-vat, 69, and are provided with doctors or scrapers in the usual manner, and each is independently adjustable to suit its position with respect to each size of bag produced.

The creaser-blade 3 is mounted in a socket in a shaft, 89, that is journaled in bearings carried by an adjustable frame, 90. This frame 90 slides in ways provided on the side frames, and may be adjusted to and from the cylinder 71 (by which the apron 70, which runs over it, is driven) and secured in a given adjustment by means of a pin, 42, which enters through one of a set of holes bored parallel with the edge of the cross-bar of said frame 90, and an appropriate one of a set of holes located diagonally in the end frame, 41.

The creaser 3 is made interchangeable, so that one of appropriate length and width may be mounted in the socket of the shaft 89 to suit the size of bag which the machine is adjusted to make, a longer blade being required as the size of the bag is increased, for the reason that as the width of the bag, and consequently the size of its bottom, changes with the dimensions of each bag, it is manifest that the larger the bag is made an appropriate increase in the dimensions of its diamond folds will result, and a longer creaser be necessitated to compass it, and as an increase in the size of the bag adds to its length and causes the distance between the bottom of one bag and that of the next adjacent bag to be increased in like manner, it is necessary to change its time of operation upon the material to coincide with that of the feeding opening-rollers that determine the length of the bag; and as this must be accomplished by change-gearing which correspond in size with those upon the feeding-rollers in operation, it is manifest that the greater the length of bag produced by the feeding opening-rollers the larger the gear that drives the creaser will be, and consequently the width of the creaser must be increased to bring its edge into operative position.

It is also apparent that as the feed of the material is maintained at a uniform rate, no matter what size of bag is being produced, through the driving-pinion 122, intermediate 123, and the gears 110 111, with which each set of feeding opening-rollers 27 28 is provided, as well as through the traveling apron 70, driven by the gear 94, which meshes with the intermediate 123, the cutting, creasing, and last pasting mechanisms, which act during each revolution of their carriers, must make turn for turn with the feeding-rollers and have a uniform surface-speed therewith while operating upon the material. To transmit the motion of the driving-shaft 121 to these mechanisms and regulate their speed with respect to that of the feeding opening-rollers 27 28, the gear 96, which is driven from the shaft of gear-wheel 94 by a gear-wheel, 95, is made exchangeable with others of different sizes for increasing or diminishing the rotation of the creaser-shaft 89 to correspond with that of the feeding opening-rollers; and to avoid the necessity of changing the gears driving the cutting, creasing, or final pasting devices to correspond in size and yet impart to said devices the necessary coacting speed of operation relative to that of the feeding opening-rollers, the motion of the creaser-shaft 89 is transmitted to the train of wheels 97 99 100, thence to the wheels 101 102, and through 103 104 to wheels 105 106, and through 103 to 107, and through 108 to 109 by means of an automatically-adjustable crank-pin, 45.

The transmitting-gear 97, of uniform size with the gears 101 and 105, which must make turn for turn with it, is mounted upon a short stud, 98, that carries at its inner end a head, 29, in which is provided the bearing for the crank-pin 45. This crank-pin projects from a bar, 32, that slides in a diametrical groove cut in a plate, 128, that is secured to the shaft 89. For purposes of adjustment this plate 128 is supported so as to turn upon the shaft 89, and so as to be fixedly secured to a disk, 129, fast to said shaft, against the face of which disk it may be rigidly clamped by bolts 23, held in holes in the disk, and having their heads resting in a circular groove in the face of the plate 128.

Whenever the driving-pinion 96 is changed for one of another size it is apparent that the bar 32 will slide in its groove until the center of the pin 45 will coincide at one point in its revolution with the pitch-line of said pinion, and that in consequence the motion transmitted through said crank-pin at this one point in its revolution will coincide with that derived from the feeding-rollers, the gears of which are equal in size to the pinion 96, although the shaft 89 is put out of alignment with the stud 98 by the movement of the frame 90. That the timely relation or position of action of said creaser with respect to the cutting and final creasing devices may be accurately and speedily insured, proper adjustment is secured by loosening the bolts 23 and turning the head 29, and with it the plate 128, until the pinion 97 has carried the final cutting and final creasing and

pasting devices into correct relative position with respect to that of the creaser 3, whereupon the bolts 23 are tightened to secure the adjusted position of the crank-pin, which adjustment is readily ascertainable by means of the graduations upon the periphery of the plate 128 and the disk 129; but it being evident that in their operation the first cutting device and the last creaser must act upon the material at the instant when the center of the crank-pin 45 coincides in its revolution with the pitch-line of the gear 96, in order that said cutting device and creaser may engage with the paper while they are moving at a uniform rate of speed with the travel of the paper, it therefore follows that in order to secure the timely operation of the first cutter upon the material the roll 54 must be adjusted by sliding its bearing-arms so as to carry it toward or from the first cutting device, (as may be required,) thereby increasing or diminishing the extent of paper stretched between the first cutting device and the operative position of the cutters 14 on the opening-rolls 28—that is to say, that as the relative distance between the first cutter and opening-rollers is always the same, and in forming any sized bag the first cuts must be intersected by those of the knives 15, it is requisite that the length of paper stretched between said devices must be exactly that of one or more bag-lengths, no matter what the size of each bag is, and this variation suited to several sizes of bags is readily accomplished by the web-take-up roller 54, which may have substituted for it many equivalently-operating devices. This change-gearing determining the relative movements of the mechanisms during the various adjustments of which the machine is capable permits the pasting devices to turn in stationary bearings.

As the plane of travel of the paper with respect to the periphery of the pasting-disks 68, the alignment of whose carrying-shaft is not changed, must be varied at times in order to secure the proper pasting of various sizes of bag-bottoms, the rearward flaps of which will be short or long according to the dimensions of the bag being made, and as the extent of paper stretched from the feeding-rollers 27 28 to the final creasing and cutting mechanisms must always remain the same, or equal to the length of one or more bag-blanks, it is requisite that the guide-roller 67 shall be hung to swing, in being adjusted, in bearings so related to the centers of the cylinders 64 and 71 as to admit of its movement in adjustment to and from the periphery of the pasting-disks 68 without slacking or straining the material, and thus disturbing the register of the preliminary cuts and creases with respect to the final creases, cuts, and folds.

The shanks of the interchangeable creaser-blades 3 are all made of one length, so as to be secured in the same socket with convenience, the operating edges of each being extended to suitable proportions.

The shank of the creaser-blade 4 is fixed in its socket in the carrier, and the sleeve 80, which carries the cutting-blade 13, is recessed (see Fig. 7) to allow its circular adjustment without disturbing said creaser, the sleeve being provided with indices determining the proper adjustment of the cutting-blade 13 relative to the creaser with which it is to co-operate in finishing the bag-bottom, said indices being accurately determined to suit each size of bag.

In order to secure the correct co-operative relation of the creaser and its creasing-slot no matter to what extent the cutter is moved with relation to the creaser, the sleeve 80 has fast to it a pinion, 145, that meshes with a pinion, 146, that is fast to the carrier 79, which latter is loose on its shaft; and that when adjusted the mechanisms may be properly rotated, the wheel 101 is fast on the carrier 79, and wheel 102 is fast on the arbor 78.

All the cutters are secured in their seats provided in the shafts which cause their oscillation in a similar manner, and the description of the cutting-blade 13 will suffice for all. Its shank is made of a length to suit the seat, and the cutting-edge is given proper proportions adapted to the cut it is required to make.

As means of fastening, screws 35, having slots for the passage of the cutter-shank through their heads, are provided, the flare of which screw-heads will, when properly turned, bear upon a shoulder at each end of the cutter-shank.

The final pasting apparatus is secured to an arm, V, fast upon the shaft 83, and consists of a pad, 82, formed by a straight member having wings projecting at right angles thereto, the general bearing-surface being curved to adapt it to have surface contact with the paste-roll 84, that turns in the paste-vat, and to properly bear upon the bag-bottom in applying the paste-lines thereto. The wings or side members of this paster might be arranged to slide laterally on the shaft, and thus adjust to suit various sizes of bags, which arrangement avoids the necessity of removing said paster and exchanging it for another.

The guiding-wheels 87 are mounted in pivoted arms 86, to run frictionally by bearing onto the roller 81, which arms also support the roller 88, which is similarly driven. These wheels are adjustable laterally on their supporting-shaft 85, and the roller 88 is made interchangeable with others to suit different sizes of bags. Motion is communicated to the roller 81 by means of a band-wheel, 135, and a band, 136, from a band-wheel, 134, on the shaft of the cylinder 71. A tightening-pulley, 126, adjustable by a movable arm, 127, supported by a bracket, serves to regulate the tension of the belt.

The traveling apron 70, preferably made of rubber, which forms a creasing-cushion, and is of a width in excess of the largest bag to be produced upon the machine, is stretched from

the cylinder 71 to the pressing-roller 72, and guides or carries the unsevered blanks to the pressing-rollers 72 73, which are geared together to run in unison by means of wheels 75 76.

A belt, 75, preferably arranged centrally over the apron 70, is stretched from a pulley, 74, and over a recessed portion of the roller 73, and it is caused to run slightly faster than the paper through motion derived from the band-wheel 131, transmitted by a belt to a band-wheel, 132, on the shaft of the pulley 74. It operates to lay the flaps 17 forward and downward onto the bag-bottom; and in order that it may effectually perform this function it is arranged so as to run in traveling over the material at an angle to the plane of travel of the material. The improved action of this arrangement is that it gradually approaches and bears upon the outwardly-moving bag-length, whence results a sure contact and constantly-increasing pressure upon said flap, which causes the same to be so bent forward and downward that the flap is laid onto and held upon the bag-bottom as it enters between the rollers 72 73, and thus has its relation to the bottom accurately secured before the great pressure of the rollers is applied to it. Its inclined position renders it unnecessary that any adjustment of it, either in position or speed of travel, shall be made for the production of any sized bag. Although this belt is of great utility in performing the function of laying the projecting rearward flaps 17 forward and downward upon the bag-bottom, it has been found in practice that these flaps 17 will not always stand forward far enough after the creasing operation is performed to be properly caught by this belt when carried onward far enough to be engaged by it, in which case a defective bag will be produced. This faulty operation is overcome and its action rendered a positive one, independent of the quality or state of the paper, by means of an air-blast which insures the proper forward inclination of these creased bottom flaps to secure their engagement by the belt, which air-blast is directed over the apron 70, so as to strike the flaps as they rise over the cylinder 71 and bear them forward so as to be properly impinged upon by the belt 75, and by it pressed downward to enter between the pressing-rollers 72 73. This blast is produced by rotary fans 91, of ordinary construction, and directed by one or more pipes, 92, the fans being geared together and driven by a band-wheel, 117, through a belt moving over a band-wheel, 118.

Any form of apparatus for producing the air-blast may be adopted, and this blast, either with or without a cowl or deflector near the roller 73, may be used without the belt 75 to bend forward and so far incline the flap 17 downward as to secure its proper entry between the rollers 72 73. During this forward bending of the flaps 17, either by the belt or by the air-blast, or both, it is manifest that the rearward portion of the diamond folds will, if left free in passing from the cylinder 71 to the rollers 72 73, be lifted up, and thus distort the bottom and destroy the bag. To prevent this guide-bars 93 are arranged to lie over each edge of the bag-blanks, to rest over or bear lightly on the blanks between their bottom flaps and outer edges. These bars are adjustably held by a slotted cross-plate, 130, by means of thumb-screws, and may thus be positioned to suit the size of the bag being made.

For the guide-bars 93 narrow belts might be substituted or properly-directed blasts of air supplant either.

The belt 75 might have substituted for it such a number of currents of air as are necessary to perform the same function, these currents being so directed as to impinge upon the flaps 17 at different points of their progression or movement onward to the rollers 72 73, and thus gradually bend them forward and lay them downward to be properly entered into the nip of said rollers, the guides 93 or any of their substitutes being used to properly hold the diamond fold.

For the purpose of securing the correct passage of the free end of the bag-blank emerging from the rollers 72 73 onward to the final cutting and creasing devices, and thence to the final pasting and folding devices, narrow conductors 1 and 2, arranged above and below the plane of travel of the material, are made to span the necessary portion of space between those devices, and the last severing-knife and creaser are slotted to admit their passage by the conductors 1. The pasting-disks 68 are mounted upon a shaft jointed to admit its removal without disturbing its toothed driving-wheel 112 when cleansing is to be done, which shaft is rotated by the intermediate 113.

As shown herein, the mechanisms are adjusted to make bags of a capacity, say, equal to one pound, which is determined by the size of the set C of feeding and opening rollers 27 28. If, now, it is desired to adjust the mechanisms for the production of a bag of greater size—say equal to that of the circumference of the set F of the feeding and opening rollers 27 28—the following adjustments are made: The breaker 63 is raised, the tube-former corresponding with the set C of feeding opening rolls is removed, the inner end of the table 59 is raised, and the polygonal roller-carrying frame is rotated by means of the hand-wheel 139 until the gear-wheel 110 of the set F of rollers 27 28 properly meshes with the driving-wheel 123. The table 59 is then lowered to rest upon the studs 44, and a tube-former, 56, of appropriate width, is secured in place, and the breaker is dropped into position. The frame 90 is then released from its pin 42, entered to hold it, and drawn rearward, and its gear 96 exchanged for one of a size corresponding with that of 110 of set F of the rolls 27 28, and the creaser 3 is replaced by one of suitable length and width. The frame 90 is then moved forward until the gear 96 properly meshes with the

wheel 95 to bring the creaser 3 in relative position to the cutters of the opening-rolls, the slide of the crank-pin 45 moving to suit this adjustment, and the pin 42 is entered in the proper holes. The head 24 is then rotated, and through it the gear 97 and the train of wheels to which it imparts motion, to adjust into proper relative position the first cutting device, the last cutter and creaser with respect to the creaser 3 and opening-rolls, the indices on the plate 128 and disk 129 rendering this speedy of accomplishment. The sleeve 80 is then rotated to bring its cutter into the proper distance from the creaser 4, and secured there by the clamping-screw 47. The first cutting-blade is exchanged for one of proper length. The guide-rolls 87 are then adjusted laterally and a roller, 88, of proper length mounted between them. The guide-bars 93 are laterally adjusted. The take-up roller 54 is then adjusted into proper position to make the distance intervening between the first cutter and the opening-rolls equal to an even number of exact bag-lengths of the new size to be made, as indicated by the graduations on the hand-wheel 138. The pasting-disks 68 are laterally adjusted and a suitably-shaped pasting-pad, 82, placed in position. The paper is then introduced and the mechanisms moved through the hand-wheel 120 until the paper is engaged by the feeding-rollers 72 73, and the machine set in motion. This hand-wheel 120 is on a shaft, 116, carrying a pinion, 115, that engages the toothed wheel 113, that gears with the wheel 123.

What is claimed is—

1. In a machine for making paper bags, a carrying-frame supporting two or more interchangeable sets of mechanisms which operate in forming the bag-bottom, said frame being arranged to rotate in moving a set of said mechanisms into operative position, all substantially as described.

2. The combination, with interchangeable opening feeding-rollers having cutters and slitters, and an interchangeable creaser, as 3, of a primary cutting mechanism and an adjustable final cutting and creasing mechanism, all substantially as described.

3. The combination, with interchangeable opening feeding-rollers having cutters and slitters, and an interchangeable creaser, as 3, of a primary cutting mechanism, an adjustable final cutting and creasing mechanism, and an adjustable take-up roll, substantially as described.

4. The combination, with interchangeable opening feeding-rollers, an interchangeable creaser, as 3, a primary cutting mechanism, and an adjustable final cutting and creasing mechanism, of connecting-gearing driving the same, a movable frame carrying the shaft of creaser 3, an interchangeable gear, 96, and an adjusting crank-pin, as 45, coupling the shaft 89 to the stud of pinion 97, substantially as described.

5. The combination of the adjustable take-up roller with the cutting and creasing mechanisms, whereby the extent of paper stretched between two operating mechanisms is governed and a perfect register of the portion operated upon by one mechanism is secured with respect to the operation of the succeeding mechanism or mechanisms, all substantially as described.

6. The combination, with the opening feeding-rollers and means providing for interchanging one set for another of different size, and with cutting and creasing mechanisms and interchangeable gearing causing their movements to coincide with that of the said rollers, of the adjustable take-up roller controlling the extent of paper stretched between two operating mechanisms, whereby the concerted coaction of the various mechanisms is accomplished in the production of the bag-bottom by operations successively performed upon it, all substantially as described.

7. The combination, with interchangeable opening feeding-rollers, of the breaker constructed to be adjusted into different positions suited to the operation of forming different sizes of bags, all substantially as described.

8. The combination, with interchangeable opening feeding-rollers, cutting and creasing mechanisms, and an adjustable final pasting device, of means for changing their rotative movements to provide concerted action during the formation of a number of different sizes of bags, all substantially as described.

9. The combination, with a creasing-cushion and an adjustable frame carrying a creaser-blade co-operating with said cushion, of interchangeable opening feeding-rollers, substantially as described.

10. The combination, with a machine for making paper bags, of an air apparatus supplying one or more currents of air directed so as to impinge upon the free flap of the bag-bottom and turn it forward, substantially as described.

11. The combination, with means for feeding onward bag-lengths having rearward-projecting bottom flaps that require folding forward in forming the bottom, of a creaser, as 3, operating to define the line of folding, and one or more conductors, as 92, emitting an air-current to impinge upon and bend or fold said flap, all substantially as described.

12. In a machine for making paper bags, the combination, with guides operating to sustain the outer edges of the bag-bottom in place, of a belt the operating-surface of which is arranged to travel at greater speed and with increasing proximity to the surface of and in the same direction as the onwardly-fed material, said belt thus operating to engage with and gradually fold or lay each rearward bottom flap onto the partially-formed bag-bottom as the same passes beneath it, substantially as described.

13. The combination, with means for feeding

onward bag-lengths having projecting bottom flaps that require to be folded in forming the bag-bottom, of guides operating to control the sides of the bag-bottom, and one or more conductors emitting an air-current to impinge upon and bend, lay, or fold said flap, all substantially as described.

14. The combination, with means for feeding onward bag-lengths having projecting flaps that require folding in forming the bag-bottom, of a creaser, as 3, operating to define the line of folding, guides operating to control the sides of the bag-bottom, and one or more conductors, as 92, emitting an air-current to impinge upon and lay, bend, or fold said flap, all substantially as described.

15. The combination, with means for feeding onward bag-lengths having rearward bottom flaps that require to be folded, of the inclined belt, as 75, and one or more conductors, as 92, emitting an air-current, the conjoint action of which secures the perfect laying or folding of such rearward bottom flap into proper position to be secured onto the bag-bottom, all substantially as described.

16. The combination, with means for feeding onward bag-lengths having rearward bottom flaps that require to be folded, of a creaser, as 3, operating to define the line of folding, an inclined belt, as 75, and one or more conductors, as 92, emitting an air-current, all substantially as described.

17. In a machine for making satchel-bottomed paper bags, the combination, with a guiding-roller, over which is carried the tube having its body partially severed to form bottom flaps, of one or more disks automatically supplied with paste, by the conjoint action of which each bottom flap is carried into contact with the periphery of the pasting disk or disks and pasted by the simple spring of the paper while the body of the tube or bag-blank is held out of such contact, all substantially as described.

18. The combination, with pasting-disks revolving upon fixed bearings, and with two fixed guides for conducting the material past said pasting-disks, of an adjustable guide hung in such relation to said fixed guides that it may be adjusted to guide the material more or less distant from the pasting-disks without increasing or diminishing the length of the path of travel, and thus distend or slack the material, all substantially as described.

19. The combination, with interchangeable opening feeding-rollers and devices they carry for forming bag-bottoms having rearward bottom flaps, of a guide and the laterally-adjustable pasting-disks 68, substantially as described.

20. The combination, with severing mechanism, of mechanism for creasing the front point of the diamond preparatory to folding, said mechanisms being adjustable with relation to each other, so as to operate upon bags of varying sizes, all substantially as described.

21. A combined creasing and cutting mechanism consisting of an arbor provided with a creaser-holding socket, upon which is mounted a sleeve that supports the cutting-blade, said sleeve being arranged to turn upon the arbor to adjust the relation of its cutter to the creaser, and provided with means, substantially as described, for securing its adjusted relation.

22. The combination, with the primary cutting mechanism and interchangeable opening feeding-rollers, of final creasing and cutting mechanisms the blades whereof are relatively adjustable, all substantially as described.

23. The combination, with the adjustable creaser-blade 4, operating to define the line of folding of the last bottom flap, of laterally-adjustable wheels 87 and interchangeable roller 88, which mechanisms are adapted to form the last bottom flap of various sizes of bags, substantially as described.

24. The combination, with the creaser-blade 4, of the wheels 87 and roller 88, the same constituting the mechanism for folding the last bottom flap, substantially as described.

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

Witnesses: CHAS. B. STILWELL.
FRANK L. BAKER,
JNO. L. BAKER.