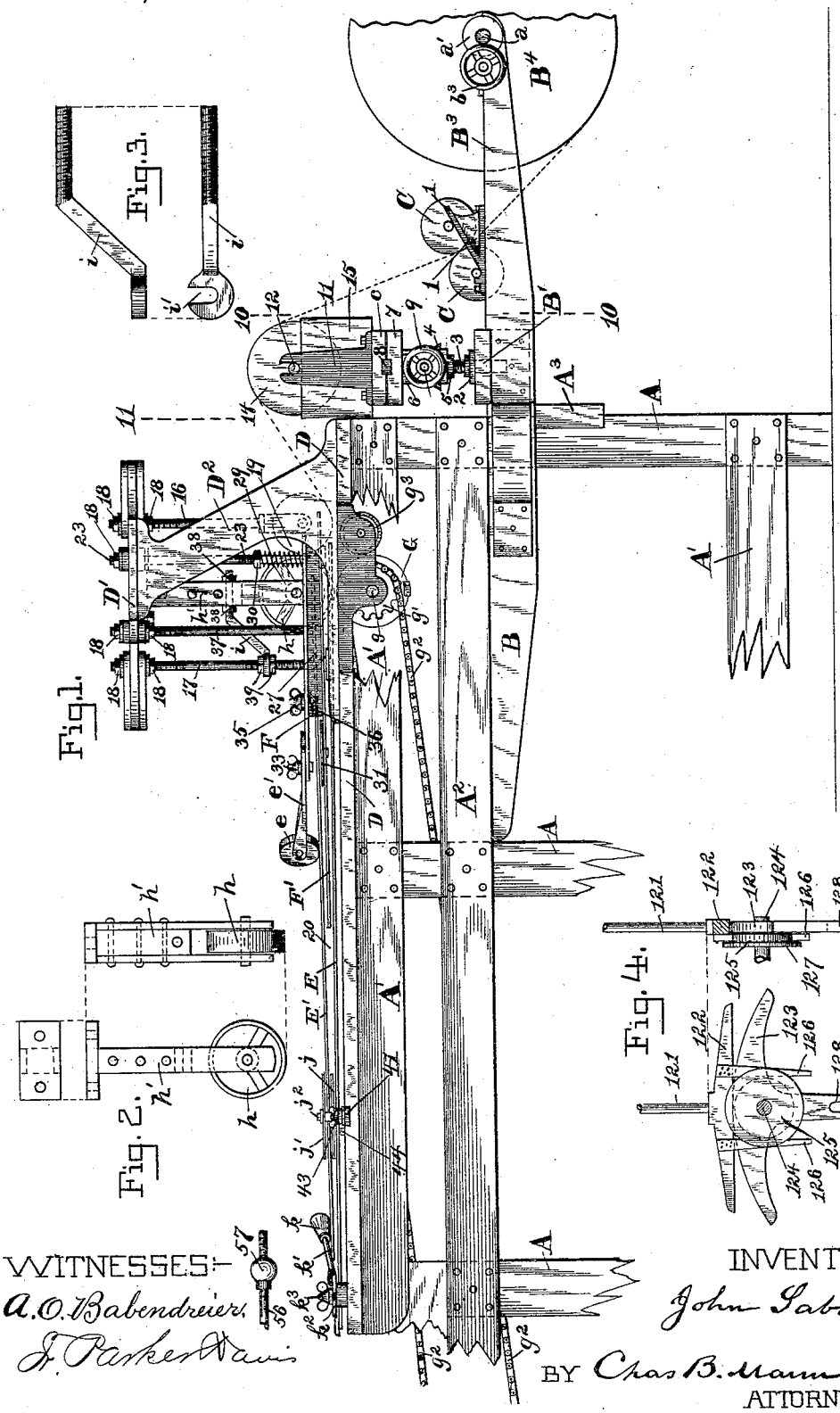
(No Model.) 6 Sheets—Sheet 1.

J. SABOLD.

PAPER BAG MACHINE.

No. 493,524. Patented Mar. 14, 1893.



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PAPER BAG MACHINE.

No. 493,524. Patented Mar. 14, 1893.

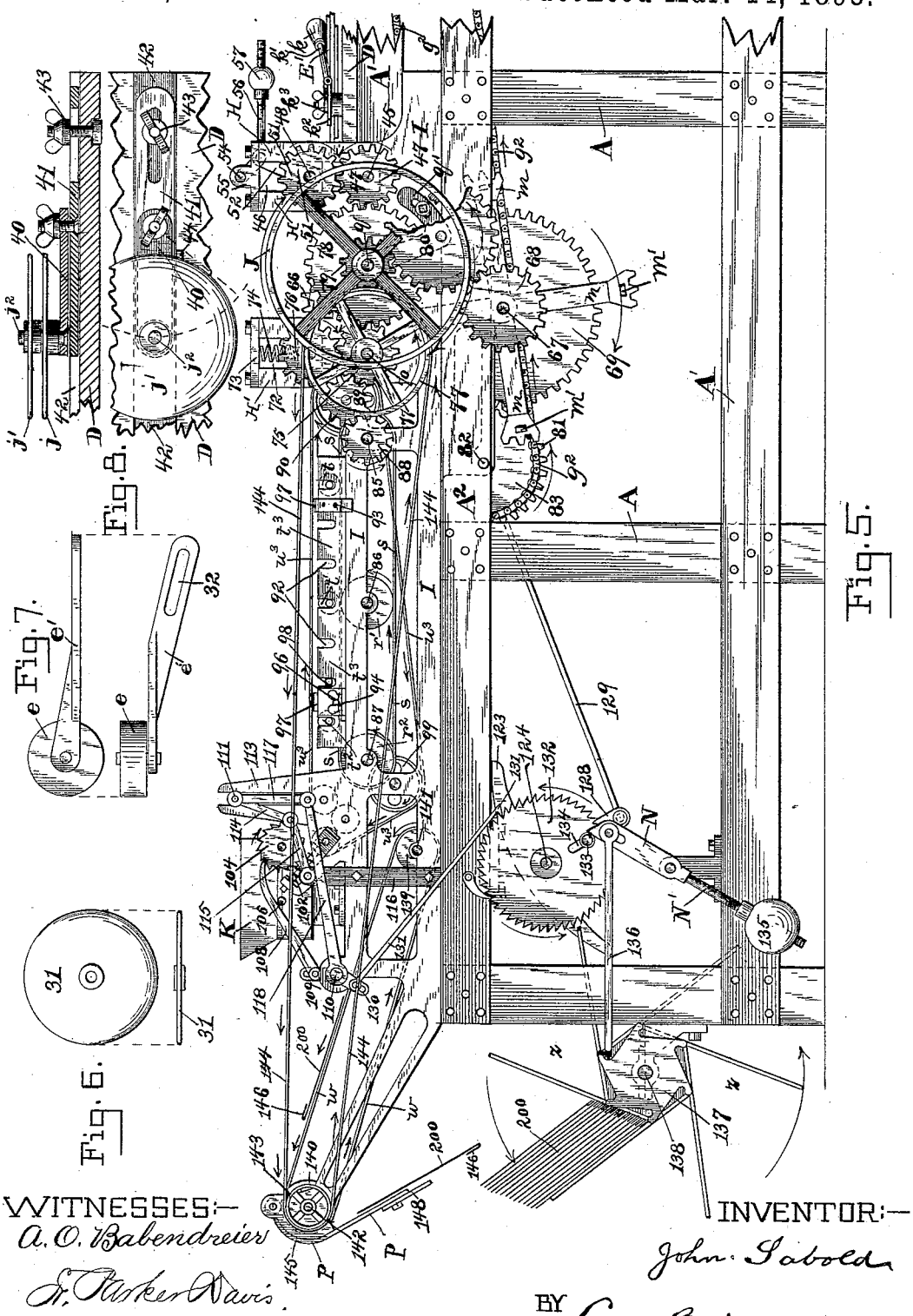

Fig. 5.

Fig. 8.

Fig. 7.

Fig. 6.

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PAPER BAG MACHINE.

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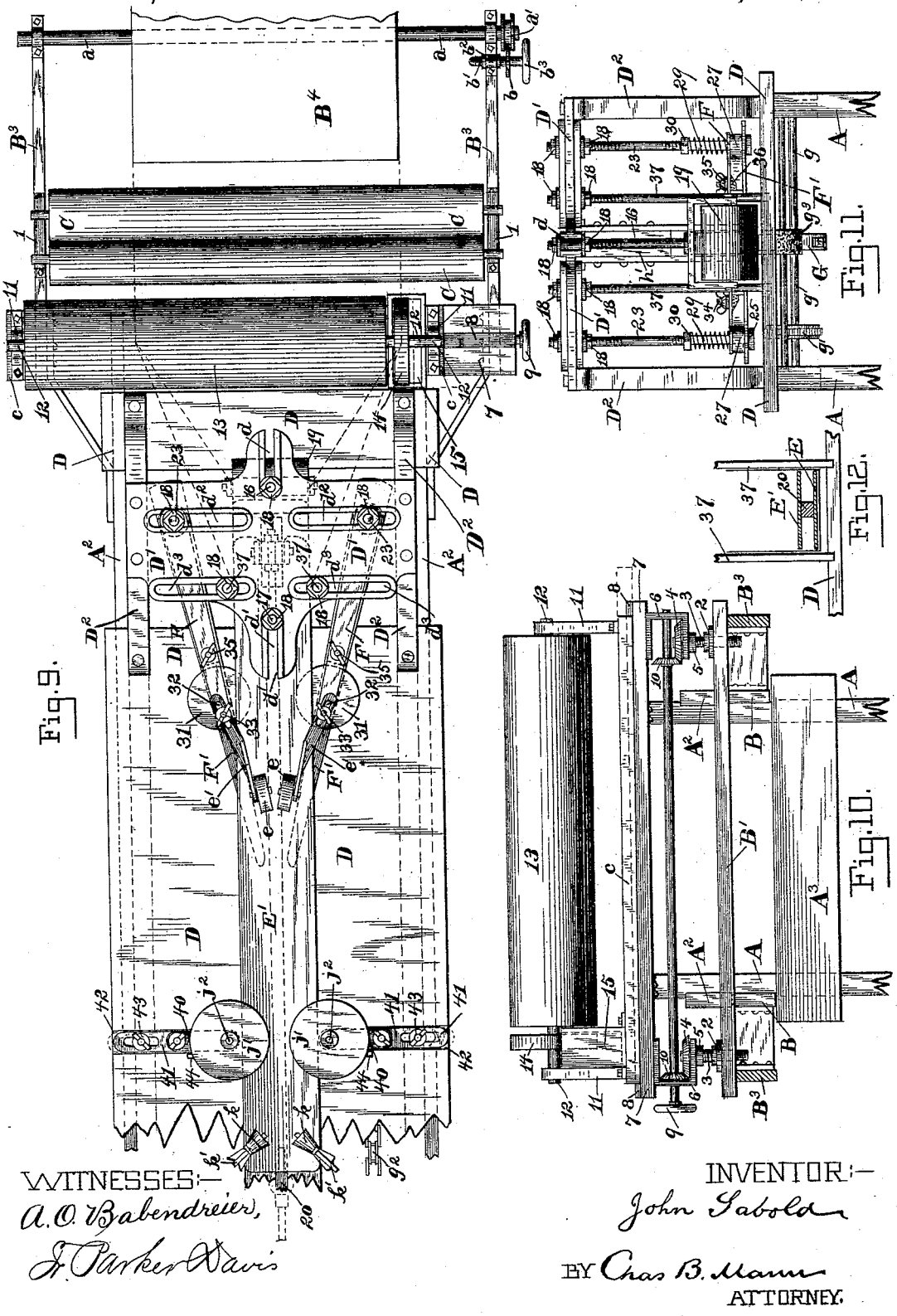

Fig. 9.

Fig. 11.

Fig. 12.

Fig. 10.

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PAPER BAG MACHINE.

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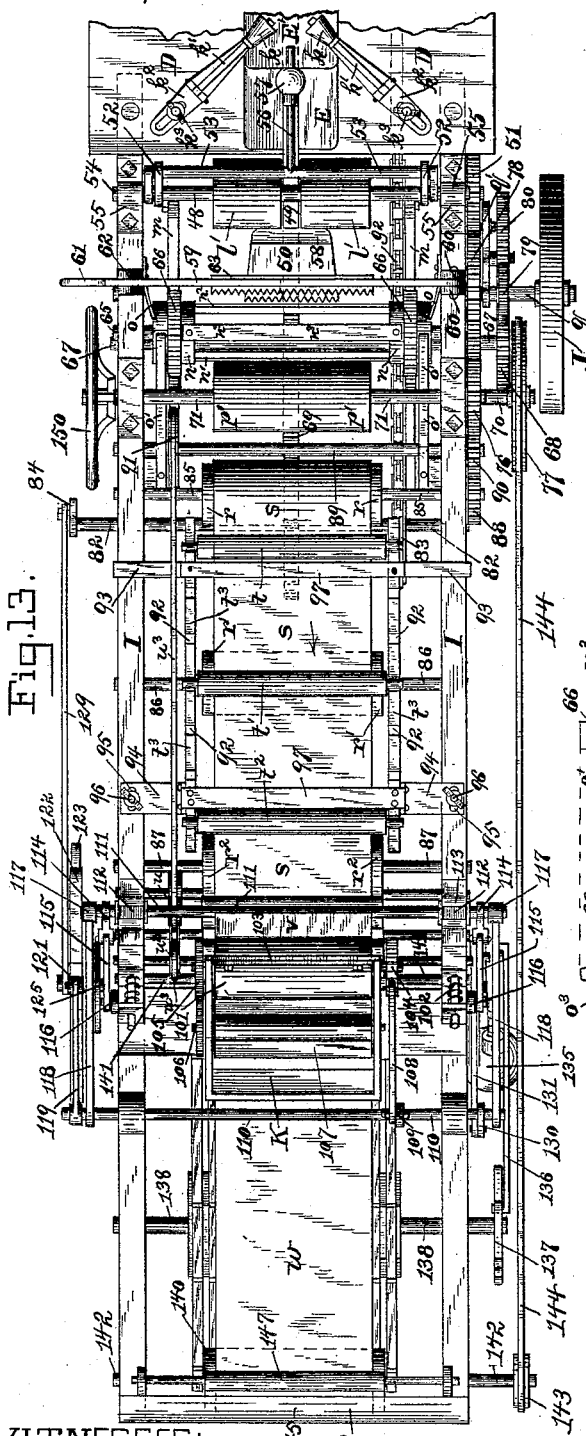

Fig. 13.

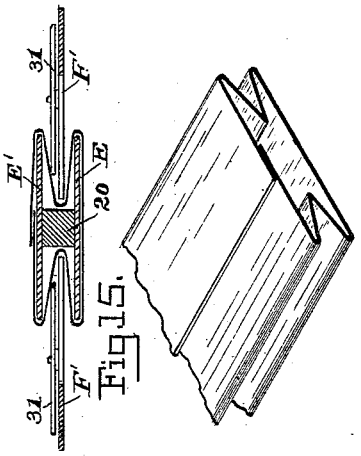

Fig. 15.

Fig. 15.

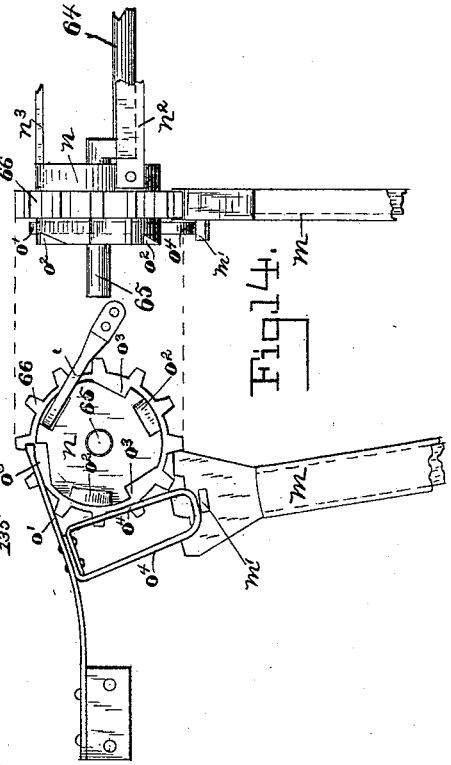

Fig. 14.

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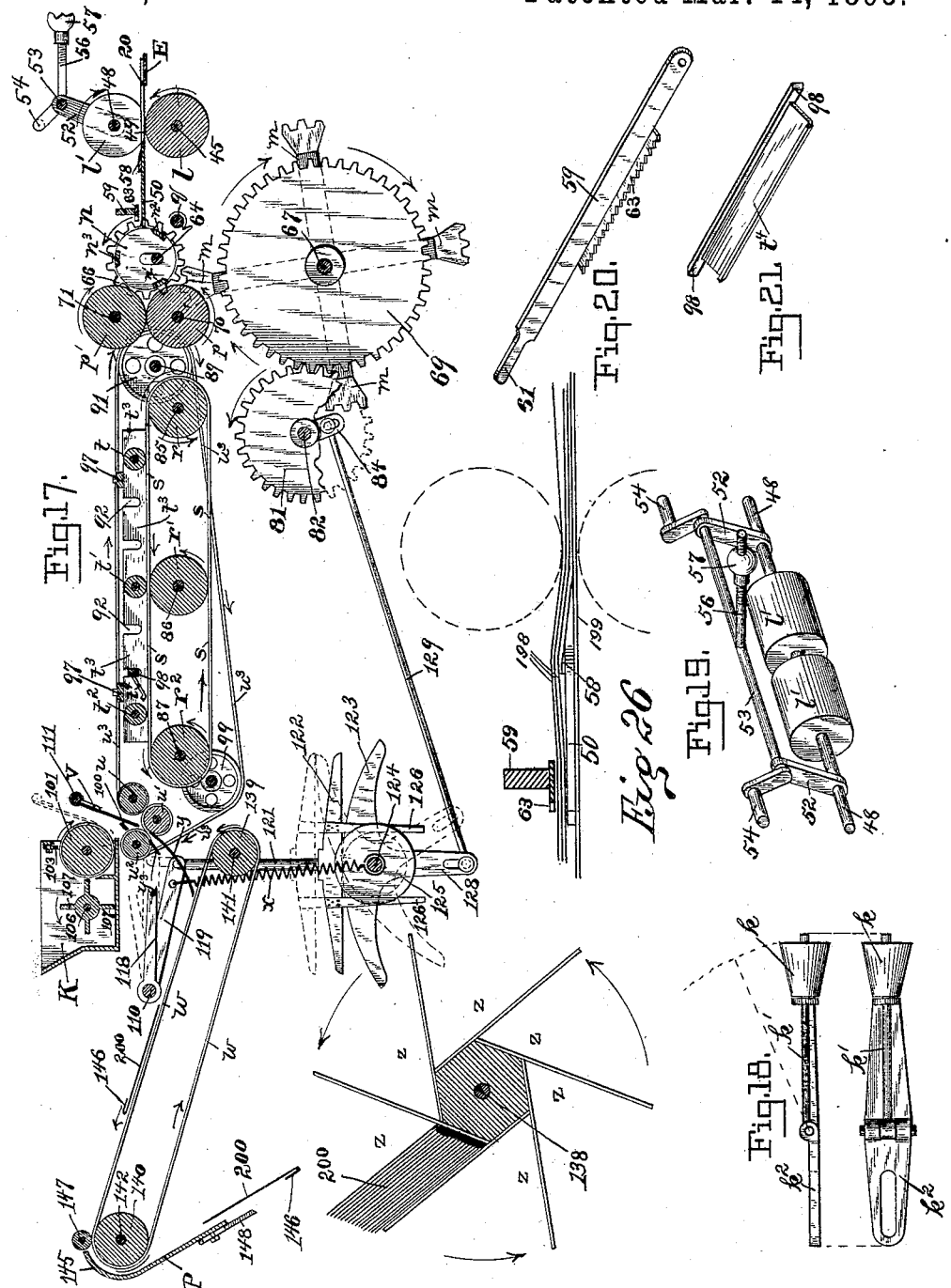

Fig. 17.

Fig. 20.

Fig. 21.

Fig. 26.

Fig. 19.

Fig. 18.

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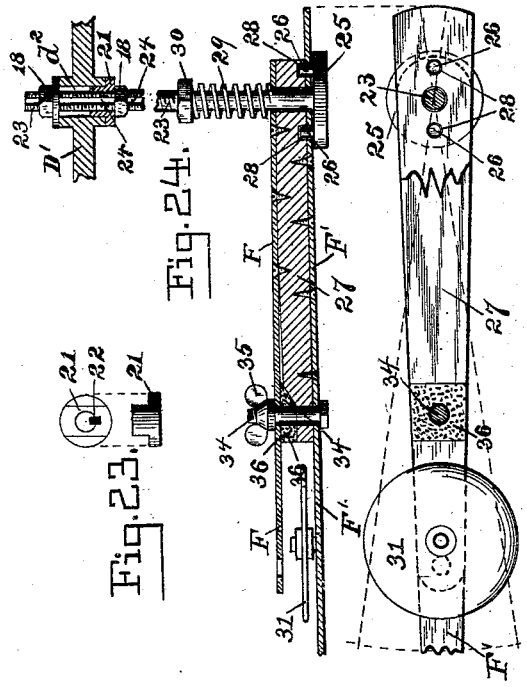


Fig. 24.

Fig. 23.

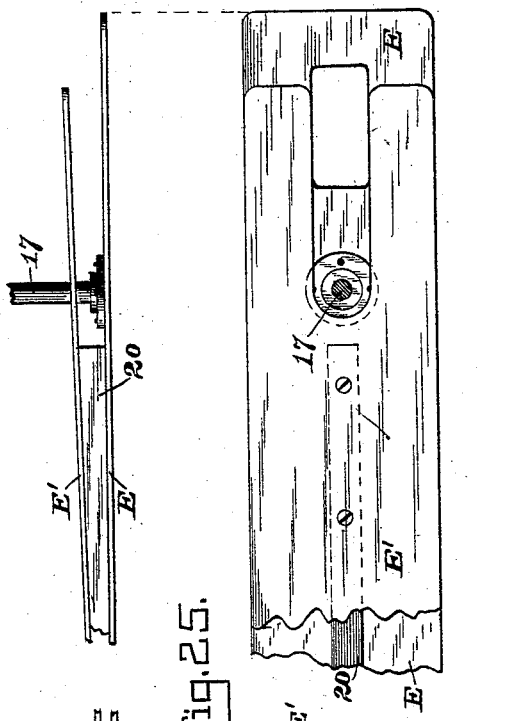


Fig. 25.

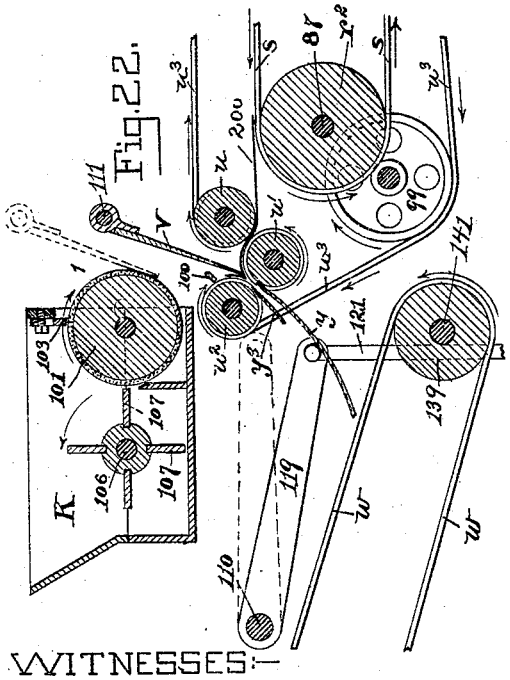
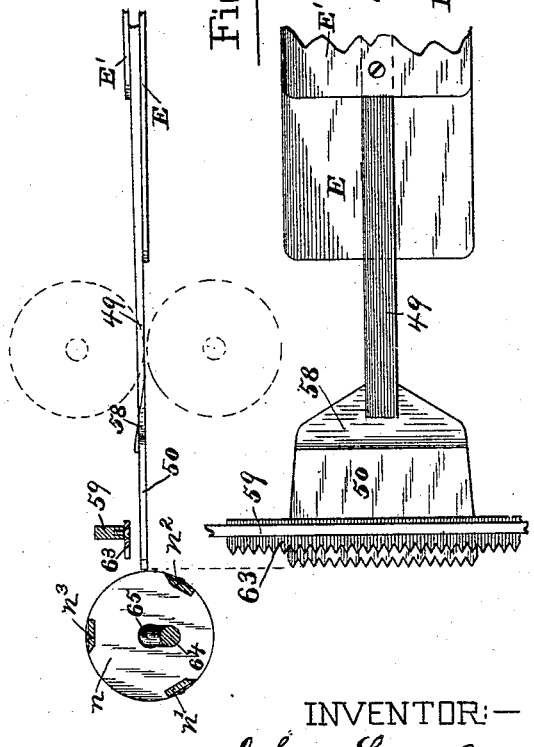


Fig. 22.



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UNITED STATES PATENT OFFICE.

JOHN SABOLD, OF BOYERTOWN, PENNSYLVANIA.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 493,524, dated March 14, 1893.

Application filed February 27, 1892. Serial No. 422,973. (No model.)

To all whom it may concern:

Be it known that I, JOHN SABOLD, a citizen of the United States, residing at Boyertown, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

This invention relates to paper bag-making machines of that class in which the paper is taken from a roll and first formed into a tube, then cut into proper lengths suitable for the size of bag desired to be made, after which the cut lengths have one end folded and pasted to form the bottom of the bag, and then passed to the counter.

The object of the invention is to simplify the mechanism in this class of machines and to also admit of making any size of bags desired on the same machine or on one machine.

In the accompanying drawings illustrating the invention,—Figures 1 and 5 together show a side view of the machine,—each figure showing one half. Fig. 2 shows three views of the hanger for supporting the revoluble wheel which backs the type-wheel. Fig. 3 shows two views of the brace connecting the type-backing wheel-hanger and the former-plate supporting-rod. Fig. 4 shows two views of the device for raising and lowering the paste-knife and bag-counter; Fig. 6, two views of the first creasing disk; Fig. 7, two views of the first drawing and lapping rollers, *e*; Fig. 8, two views of the mounting of the second creasing disks, *j*, *j'*. Figs. 9 and 13 together show a plan or top view of the machine; Fig. 10, a section of the machine on the line 10—10 of Fig. 1, a portion of the standards having been broken off; Fig. 11, a section of the machine on the line 11—11 of Fig. 1, a portion of the standards having been broken off. Fig. 12 shows a section of the former plate and the two rods 37, for elevating the sides of the paper at right angles to the bottom surface of the lower former plate. Fig. 14 shows two views of one of the disks which carry the cutter blades and one of the arms which impart motion thereto; Fig. 15, a cross-section of the upper and lower former and the central creasing-plate showing the bag-tube being formed. Fig. 16 shows a section of the formed bag-tube before it reaches the breaker blades. Fig. 17 shows a section view of the rear end of the machine—the same end and part being shown in side elevation in Fig. 5. Fig. 18 shows two detail views of the mounting of the hinged conical drawing rollers, *k*. Fig. 19 shows a detail perspective view of the first upper feed-roller and its adjustable weight; Fig. 20, a detail perspective view of the saw-toothed breaker blade attached to its supporting bar; Fig. 21 a detail perspective view of the shield for keeping the paper-bag close to the first carrier belt; Fig. 22, an enlarged detail view of the bottom pasting device. Fig. 23 shows two views of the movable collar, 21, which prevents the rod, 23, from turning. Fig. 24 shows two detail views of one end of the plates which are pivotally mounted on the rod, 23. Fig. 25 shows two views of the upper and lower former plates connected together. Fig. 26, is a detail longitudinal section illustrating the operation of the separator-device.

The letter, A, designates the standards of the frame of the machine; A', the upper and lower side rails which connect the said standards, A, of the machine; A^2, the intermediate connecting side rail, and A^3, a cross-bar (see Figs. 1 and 10) below said intermediate rails, A^2, at front end of the machine, which connects the standard, A, on one side of the machine with that on the other. This cross-bar, A^3, projects beyond each side of the machine and with the intermediate rails, A^2, form supporting slide-ways for slides B, which are connected at their front ends by a cross-bar, B'; the said slides, B, are longitudinally movable between the intermediate rails, A^2, and the cross-bar, A^3. Extending outward from the machine and fastened to the ends of the cross-bar, B', which project beyond the said slides, B, are paper-roll supporting arms, B^3, between which the paper-roll, B^4, is supported on a shaft, *a*, whose journals are on said arms. The paper-roll shaft, *a*, has on one end a grooved pulley, *a'*, in the groove of which turns a disk, *b*, mounted on a screw-threaded shaft, *b'*, working in a nut, b^2, or bearing rigidly mounted on the arm. This screw-threaded shaft, *b'*, has a hand-wheel, b^3, by turning which the paper-roll shaft, *a*, and the paper thereon can be moved crosswise of the machine to adjust it.

The tension rollers, C, extend across the

paper-roll arms from one side to the other and their supporting journals rest on inclined slides, 1, on the said arms.

On the cross-bar, B′, are two lifting jacks—one near each end,—these jacks are composed of a base-plate, 2, internally screw-threaded, a lifting screw, 3, provided at its upper end with a miter-gear wheel, 4. These lifting jacks are for supporting and vertically adjusting the side-pasting wheel and the adjacent roller. Fixed on the lifting screw, 3, between the base-plate and miter-wheel is a collar, 5, which supports a bracket, 6, attached to a cross-bar, 7, having on its upper surface a longitudinal guide-rail 8, hereinafter referred to. A cross-shaft below the cross-bar 7, has on one end a hand-wheel, 9, and is journaled in the two brackets, 6, referred to, and on the shaft between the said two brackets are miter-pinions, 10, which respectively intermesh with the miter-wheels, 4, of the lifting screws. On the cross-bar, 7, is a laterally-movable carriage, *c*, which travels on the guide-rail 8, and has two standards, 11, supporting the paste-roll shaft, 12, carrying the paper-supporting roller, 13, and side paste-wheel, 14, revoluble in a paste-box, 15. It will now be understood that the paper-roll, B^4, has an endwise adjustment and that together with the side paste-applying mechanism can be moved either toward or away from the front end of the machine by virtue of the slides, B; the paper-supporting roller and side paste-wheel, however, have a vertical adjustment independent of the paper-roll, B^4, and the tension rollers, C, which will enable the parts to be adjusted so as to produce the proper tension on any width of paper, and thereby avoid breaking the paper.

Above the table-top, D, is a top plate, D′, supported on two standards, D^2, on opposite sides of the machine. In the said top plate are two central slots, *d*, *d*′, extending longitudinally of the machine through which slots pass depending rods, 16, 17, which are screw-threaded at their upper ends and each provided with two lock-nuts, 18, one above and the other below the top-plate, D′, whereby the rods are held in place and also vertically adjusted. The first of these rods, 16, has its lower end bifurcated to receive a loose roller 19, whose face is equal to the width of the finished bag to be made. The other one, 17, of said two rods has its lower end fastened to the lower one of two former-plates, E, E′, (see Figs. 1 and 25) which extends lengthwise of the machine a little above the table-top, D, from a point near the bottom of the loose roller, 19, to the first pair of feed-rollers, *l*, *l*′. These two former-plates, E, E′, are fastened one above and the other below a central longitudinal rib or strip, 20. The top-plate, D′, also has four lateral slots, d^2, d^3, arranged in two pairs, one pair in front of the other, and one of the slots of each pair is on one side and the other on the opposite side of the longitudinal central line of the machine. A movable collar 21, has flat sides and is laterally adjustable in each one of the first pair of slots, d^2, see Figs. 23 and 24, through each collar passes a vertical rod, 23, having at its upper end a spline groove, 24, to engage a key, 22, in the collar which prevents the rod from turning; the said rods, 23, are screw-threaded at their upper ends and like the rods, 16, 17, referred to are vertically-adjustable and also held in place by lock-nuts, 18. On the lower end of each of the said rods, 23, is fastened a horizontal disk, 25, having two upward-projecting pins, 26, located diametrically opposite each other.

Two plates, F, F′, are attached to a block, 27, which separates them and extends a portion of their length, these plates and block are pivotally mounted at one end on the rod, 23, above the said disk, 25. Two holes, 28, in the lower plate, which forms a central creasing plate, register with the pins, 26, on the disk, 25, when the creasing plate is pointing acutely to the central longitudinal line of the machine, as seen in Fig. 9. A spiral-spring, 29, on each rod, 23, presses the said plates down upon the disk and thereby retains the pins, 26, in engagement with the holes in the creasing plate, F′. The pins, 26, and holes, 28, automatically stop and hold the pivoted plates. A nut, 30, is on the rod and acts on the spiral spring, 29, and, by virtue of its vertical adjustment determines the tension of the spring upon the plates. The free end of the lower plate, F′, extends between the upper and lower former-plates, E, E′ (shown in broken lines in Fig. 9.) On this creasing-plate is mounted the first creasing-disk, 31, revolving in a horizontal plane, whose rim extends between the top and bottom former-plates and starts the central or bellows-crease. Each of the two upper plates, F, carry a drawing and lapping roller, *e*, for acting on the edges of the paper which overlap to form the tube. These rollers turn in a vertical plane which is oblique to the longitudinal central line. Each roller is mounted on an arm, *e*′, which is adjustable on the said upper plate, F, by means of a slot, 32, through which passes a thumb-screw, 33, to clamp it against the plate, F, which is made of spring material for purposes hereinafter referred to. A bolt, 34, passes through the two plates, F, F′, and the separating block, 27, and has a thumb-nut, 35. The end of the separating block, 27, is cut away at the top and a piece of rubber, 36, inserted. It will now be seen that by turning the thumb-nut, 35, the tension of the first drawing roller, *e*, upon the paper can be increased or diminished.

In each of the slots, d^3, in the top-plate, D, is a depending rod, 37, which like the other rods is provided with lock-nuts, 18. These two rods, 37, extend down below the lower former-plate, one being on one side and the other on the opposite side thereof, and their object is to bring the sides of the paper, after its passage under the loose roller, 19, to a vertical position ready to be acted upon by the

first central creasing-disk, 31, and then by the drawing and lapping rollers, *e*.

The type-roller, G, is centrally mounted on a cross-shaft, *g*; a sprocket-wheel, *g'*, driven by a chain, g^2, imparts a revoluble motion to the said cross-shaft and type-wheel. A revoluble ink-supplying roller, g^3, supplies ink to the face of the type-wheel, above which is a revoluble backing wheel, *h*, rigidly supported by a hanger, *h'*, attached to the top plate, D'. A brace, *i*, has one end attached to the hanger, *h'*, by a pair of nuts, 38, so as to allow it to be loosened; the other end of the brace has a slot, *i'*, open at one side to receive the rod, 17, and two lock-nuts, 39, on the rod clamp the said slotted end. It will now be seen that by loosening both pairs of lock-nuts, 38, and 39, the brace, *i*, can be disengaged from the rod to allow the same to be adjusted either up or down, as desired, after which the brace is again thrown into position and the lock-nuts adjusted and tightened.

The paper tube passes from the first creasing-disks, 31, and the first drawing rollers, *e*, to the second creasing-disks, *j*, *j'*, four in number, arranged in upper and lower pairs, the upper and lower disk on each being supported on the same pin, j^2. This pin, j^2, is fastened to one end of a narrow arm, 40, whose other end is pivotally attached to a horizontal plate, 41, laterally adjustable in a slide-way, 42, in the table-top D; a thumb-screw, 43, passing through a slot in said plate, 41, and into the table-top allows for its adjustment either toward or away from the central line of the machine for different sizes of bags. The upper pair of the creasing disks, *j'*, last referred to have position above and close to the upper former-plate, E', while the lower pair are located between the two former-plates, E, E', and serve to finally crease the central fold of the bag-tube. The object of mounting the above disks on the pivoted arm is to admit of their being thrown out or away from the former-plates while "threading" the machine without disturbing their adjustment. A stop, 44, on the table-top, D, prevents the plate from going too far when the disks are brought back to their original position.

A pair of drawing rollers, *k*, conical in shape, are located on the top and near the free end of the upper former-plate, E', which is somewhat shorter than the lower former-plate, E; these two conical drawing rollers, *k*, serve to give a final draw to the paper over the edge of the top former-plate, E', and each conical roller is loosely mounted on the free end of a shaft, *k'*, hinged to a plate k^2, horizontally adjustable on the table-top by means of a slot therein and a thumb-screw, k^3, passing therethrough. The object of hinging the shaft is to allow for raising the roller out of the way when "threading" the machine and yet not disturb its adjustment. After passing from this last pair of drawing rollers, *k*, the bag-tube goes between the first pair of feed-rollers, *l*, *l'*, one above the other; the lower one of these feed-rollers, *l*, is mounted on a cross-shaft, 45, journaled in sliding blocks traveling in vertical slideways, 46, in two standards, H, of two main side-frames I, on top of the table and one at each side thereof. On one end of the shaft just referred to is a pinion wheel, 47, for driving it. The upper roller, *l'*, strictly speaking, comprises two short rollers independently adjustable on the same cross-shaft, 48, so as to provide a space between them for the passage of the narrow neck, 49, connecting the tongue-plate, 50, with the lower former-plate, E. The cross-shaft, 48, like the cross-shaft of the lower feed-roller is journaled in sliding blocks in the said slideways, 46, of the standards, H, of the side-frames, I, and on one end has a pinion wheel, 51, to engage with the one on the cross-shaft, 47, of the lower feed-roller, *l*. These pinion wheels are located on the outside of the standards, H, (see Figs. 5 and 13.) Two links, 52, loosely connect the shaft, 48, with a shaft, 53, having crank-ends, 54, journaled in the caps, 55, of the side standards H. An arm, 56, is fixed to the crank-shaft, 53, and is screw-threaded and carries an adjustable weight, 57. This arrangement and adjustment of the weight serves to increase or diminish the tension of the upper feed-roller, *l'*, upon the lower one, *l*, and also the upper feed-roller can be easily raised when it is desired to "thread" the machine. The bag-tube passes from these first feed-rollers, *l*, *l'*, to the tongue plate, 50, which is joined to the neck, 49, and has a saw-toothed or serrated edge; this tongue plate where it is joined to the neck has an upward-inclined separator, 58, which presents a knife-edge to the bag-tube as it leaves the first feed-rollers and causes the upper side of the bag-tube and the layers composing the inward folds, to ride up over it, as illustrated in Fig. 26, thus separating all the upper folds or layers of paper from the bottom one. The object of providing this separator is to insure that the three upper layers, 198, of paper shall be against the breaker-edge (hereinafter described) which is set back of the serrated edge of the tongue-plate, and hence be broken off shorter than the bottom layer of paper, 199, whereby said bottom layer may be folded over the upper layers in the further operation of the machine to close the bottom of the bag. A cross-bar, 59, (see Figs. 13, 17, and 20) is located above and near the front end of the tongue plate, 50; this cross-bar is pivoted at one end between standards, 60, on the frame, I, at one side of the machine, and the other end has a handle, 61, resting between standards, 62, similar to those just mentioned, but is held by its own weight and the friction against the sides of the standards. A blade, 63, having a serrated edge is fixed on the under side of this cross-bar and all the upper layers of the paper tube (the bottom one only excepted) are cut or broken thereon, as it is between this blade and the tongue-plate that

the said upper layers of the paper tube pass. The bar, 59, and the blade 63 can be raised at will.

A fixed shaft, 64, 65, extends cross-wise of the machine and is supported by the side frames, I; a portion, 64, of this shaft between its extremities, 65, is bent down below the two extremities (see Figs. 14 and 17) to allow the bag-tube to pass over it; two breaker heads, n, are mounted on the extremities, 65, of this shaft. Three breaker blades, n', n^2, n^3, are attached to the heads and extend cross-wise of the machine and are located apart equidistant. By so locating the breaker blades one may always be above and the others below the center of the breaker-heads. Twelve gear teeth, 66, are on the perimeter of each breaker-head and are successively engaged by teeth on radial arms, m, (see Figs. 5, 14 and 17) in the present instance four in number, which are fixed to and arranged equidistant about a change-wheel shaft 67; these arms give the breaker-heads and blades an intermittent motion of one third a revolution at a time. By this arrangement the paper bag-tube in its passage from the first pair of feed-rollers, l, l', passes above two of the blades, n', n^2, and the downwardly-bent portion, 64, of the breaker-head shaft, and below the third breaker blade, n^3.

Two pairs of spring stop-pawls, o, o' (see Fig. 14) prevent the breaker-heads from turning either way. The first pair, o, of these pawls are of ordinary construction one having its end fixed to the inside of one of the frames, I, and the other its end to the inside of the other frame, and their free ends successively engage three notches, o^2, on the outer face of each breaker-head. These two spring pawls, o, prevent the breaker-heads from turning backward. Each one of the other pair, o', of the pawls is also fastened to the inside of the frames, I, and their free ends engage successively three ratchet teeth, o^3, on the periphery of the breaker-heads (see Fig. 14) and prevent the breaker-heads from turning forward until the proper time. Each one of this second pair of spring pawls has a pendent arm, o^4, which contacts with and is raised by a lug, m', on each radial arm, m, as they advance to engage the teeth, 66, of the breaker-heads, and by raising the said pendent arms, o^4, the last-named spring-pawls, o', are disengaged from the ratchet-teeth and allow the breaker-heads to turn forward.

The change-wheel shaft, 67, has on one end a change-wheel, 68, and between the two sets of radial arms, four arms in each set, is a gear-wheel, 69. By the revolution of the shaft, 67, the bag-tube is cut into lengths by the alternate action of the breaker blades; these bag-lengths are then drawn forward between the second pair of feed-rollers, p, p', on the shafts, 70, and 71, journaled in sliding boxes in vertical slideways, 72, on side standards, H'. A cap, 73, is fastened on the top of each of the standards, H', last mentioned and a spiral-spring, 74, is between the cap and the sliding journal-box of the top-feed-roller, and serves to put a tension on the feed-roller. A pinion-wheel, 75, and 76, respectively, is placed on each of the shafts, 70, 71, of these second feed-rollers p, p'. On the same end of the lower shaft, 70, however, is a belt-pulley, 77, hereinafter referred to, and on the other end is a hand-wheel, 150, for moving the respective parts while "threading" the machine.

The main driving-pulley, J, of the machine is mounted on a cross-shaft, q, equidistant between the shafts 45 and 70, and below the tongue-plate, 50. A large gear-wheel, 78, on this driving shaft, q, intermeshes with the pinions, 47 and 75, on the lower feed-roller shafts, 45, and 70, and imparts motion to them. A small gear-wheel, 79, is on the driving shaft, q, and a swinging arm, q', has one end loose on the driving-shaft between the said small gear-wheel, 79, and the large wheel, 78, and carries an idle-wheel, 80, which intermeshes with said small gear-wheel, and transfers motion therefrom to the change-wheel, 67, on the shaft, 68; and, the gear wheel, 69, on this shaft imparts motion to a gear-wheel, 81, on a sprocket-wheel shaft, 82. The sprocket-wheel, 83, on this shaft is connected with and drives the sprocket-wheel, g', on the type-wheel shaft, g, by a chain, g^2, and thereby imparts motion to the type-wheel. A slotted crank-arm, 84, hereinafter referred to is mounted on the sprocket-wheel shaft.

Several belt-carrying rollers, r, r', r^2, (in the present instance three, though more may be used) are respectively mounted on cross-shafts, 85, 86, 87, which are in line with the two lower feed-roller shafts and the main driving shaft of the machine. An endless carrier-belt, s, travels over these rollers in the direction shown by the arrows in Figs. 5, 13, 17 and 22. A pinion-wheel, 88, is on one end of the shaft, 85, of the first one, r, of the said belt-carrying rollers. A supplemental cross-shaft, 89, has a pinion wheel, 90, on one end which intermeshes with the pinion wheel 75, on the lower feed-roller shaft 70; this pinion-wheel, 90, also intermeshes with the pinion, 88, on the first belt-carrying roller shaft, 85, and thereby imparts motion to the endless carrier-belt, s, which passes over the rollers, r, r', r^2, as heretofore mentioned, and at a greater velocity than that of the last feed-rollers. A belt-pulley, 91, hereinafter referred to, is also mounted on the said supplemental cross-shaft, 89, and toward the end opposite the one carrying the pinion-wheel, 90. As the lengths of the paper bag-tube leave the last pair of feed-rollers they pass onto the endless belt and are carried along thereby and under one or more loose rollers, t, t', t^2, three in the present instance, which keep the bag-lengths against the belt and cause the bag to be fed up to the stop, 100. These loose rollers, t, t', t^2, are respectively journaled in a series of vertical slots, 92, in the sides, t^3, of a frame longitudinally adjustable on the main side-

frames, I, heretofore referred to, and rest loosely on the endless carrier-belt. This frame which is narrower than the main frame of the machine is above and between the said side-frames, I, and this movable frame is supported by four laterally-projecting arms, 93, 94, two on each side, which are attached to the ends of the sides, t^3; these four arms, 93, 94, rest upon the side frames, I, and are mounted thereon; a slot, 95, however, in the last two of the arms, 94, through which a thumb-screw, 96, passes into the frame, limits the longitudinal movement of the said movable frame, and also holds it in place on the main side-frames, I. Two cross-pieces, 97, one at each end, connect the sides, t^3, of the movable frame.

When making the longer sizes of bags it is important that the loose rollers shall not continue to propel the bag-lengths after the forward or bottom-end of the bag has reached the stop, 100, for if thus propelled the bag would buckle or double-up before the knife, V, comes down on and presses it between the rollers, u', u^2. For the long bags, therefore, I remove one or more of the loose rollers nearest the bottom paste-rollers, u, u', u^2, and substitute a deflector, t^4, see Figs. 17 and 21, having square supporting-ends 98, which rest in the slots, 92, of the sides, t^3, and by reason of the square ends is so held that its downward-pointing edge does not contact with the endless belt, but is above it and has position close to it, and it serves to keep the free end of the bag-lengths from flying up and yet without putting any pressure on them or causing them to be propelled, as the rollers do.

The bag-lengths upon leaving the endless carrier, s, pass between a series of three rollers, u, u', u^2, driven by a belt, u^3, which connects them with the belt-bulley, 91, previously referred to, on the supplemental shaft, 89. These three rollers have a greater velocity than the endless belt; the bag passes between the first two rollers, u, u', without being gripped thereby, but after the bottom end has had paste applied and folded the bag is pressed by the last two rollers, u', u^2. The under stretch of the carrier belt, u^3, has the forward movement and passes from the belt-pulley 91, to and under an idle-wheel, 99, then over the top of a pulley on the shaft of, the third roller, u^2, of the series, thence down and under a pulley on the shaft of the second roller, u', thence up again and over a pulley on the shaft of the first roller, u, and then passes back to and over the said belt-pulley, 91. It will be seen that by this arrangement the first and third rollers, u, u^2, revolve in one direction and the second one, u', in the opposite direction, and this second roller co-acts with the last roller, u^2, in the operation of forming the bottom of the bag. When the end of the bag-length strikes the stop, 100, the bottom paste-knife, v, which has been previously supplied with paste from an elevated paste-roller, 101, descends and applies paste to the end of the bag-length and at the same time makes a V-fold therein, and presses the same down between the second and third rollers, u', u^2. The bag is then propelled by them to a delivery carrier-belt w. A tension-spring, 102, acts upon the journal box of the shaft of the third roller, u^2, and has a tendency to force the roller, u^2, against the second roller, u', of the series.

The paste-supply-roller, 101, has an intermittent revoluble motion in an elevated receptacle or box, K, on the top of the machine; this box has an adjustable guard or scraper, 103, above the paste-roller, 101, to scrape therefrom any surplus paste. The paste supply roller, 101 is mounted on a shaft, on one end of which is a ratchet-wheel, 104, and on the other end a pinion wheel, 105, both of which are outside of the paste-box. The pinion-wheel just mentioned imparts motion to a similar pinion wheel on an agitator shaft, 106, on which is mounted within the box a. revoluble agitator having four radial arms or blades, 107. The ratchet-wheel 104, is intermittently rotated by a pawl, 108, connected to a slotted arm 109, on a rock-shaft, 110, back and below the paste box and extends cross-wise the machine. The paste-knife, v, extends cross-wise of the machine and is mounted on a shaft, 111, journaled in boxes, 112, movable in vertical slideways, 113, in side standards of the machine. Two links, 114, on the outside of the machine have one end fixed rigidly to the paste-knife shaft, 111, and the other end of each of said links is loosely connected with one end of a second link, 115, whose other end is pivoted to a standard 116, on the side of the machine. By the operation of these links the paste-knife in its descent is swung away from the paste-roller to avoid the stop, 100. Two additional links, 117, each have one end loosely mounted on the ends of the paste-knife shaft 111, outside of the links, 114, and the other end loosely connected with the free end of an arm, 118, fixed on the rock-shaft, 110. A third arm, 119, of the rock-shaft, 110, has its free end loosely connected with the upper end of a vertical rod, 121, which is connected at its lower end to a shoe, 122; this shoe is moved up and down by a rocking cam, 123, mounted loosely on a fixed shaft, 124, extending cross-wise of the machine. A spiral spring, x, has one end attached to the third rock-shaft arm, 119, and its other end to the fixed shaft, 124, and tends to keep the shoe always against the cam so that the paste-knife will act promptly in response to the up-and-down movement of the shoe. A flanged guide-roller, 125, which is loose on the shaft, 124, has its tread in proximity to the cam, and serves as a guide for two depending arms, 126, attached to the inner side of the shoe; the said arms, 126, extending down between the wheel-flange, 127, and the said cam, 123, on either side of the tread. The slotted arm, 128, of the cam which extends below the shaft, 124, and on which the

cam oscillates, is connected by a rod, 129, with the slotted crank-arm, 84, previously referred to, which latter is mounted on one end of the sprocket wheel shaft, 82. Thus it will be seen that in each revolution of the sprocket-wheel shaft the rock-shaft arm, 119, will be raised and lowered twice and consequently the paste-knife will be raised and lowered twice, or in other words will form the bottoms of two successive bags; and as the sprocket-wheel shaft revolves twice as fast as the change-wheel shaft, 67, one revolution of which cuts, four bag-lengths, the said bag-lengths will be properly folded and pasted at the bottom because the paste-knife makes as many up-and-down strokes as the number of bag-lengths cut by the action of the four radial arms on the shaft, 67. A second slotted arm, 130, is fixed on the rock-shaft, 110, and pivotally connected with said arm is a ratchet-pawl, 131, which successively engages each tooth of a counting ratchet-wheel, 132, having fifty teeth. The pawl 131 drawing on the ratchet-wheel causes it to revolve. This ratchet-wheel is loosely mounted on the fixed shaft, 124, referred to, and on the end thereof opposite that on which the rocking-cam 123. is mounted.

A pin, 133, projects from the side of the ratchet-wheel and is adjustable in a radial slot, 134, therein. A lever, N, is fulcrumed at the side of the machine below the ratchet-wheel; the lower arm N′, of the lever is screw-threaded and carries a weight, 135, which is adjustable thereon; this weight serves to move the lever in one direction. The end of the upper arm, N, has position in the path of the pin, 133, and thereby is engaged once in every revolution of the ratchet-wheel, 132, or in other words the lever-arm, N, is moved one way at every complete revolution of the ratchet-wheel and after the knife-blade, *v*, descends fifty times. To this upper lever-arm N is loosely attached one end of a push-pawl, 136, which engages successively six equally-disposed teeth of a disk, 137, fixed on a shaft, 138, hereinafter referred to.

As before stated the bag, after it is pasted at the bottom, passes to the delivery carrier-belt, *w*, over a shield or apron, *y*. The apron, *y*, and guide-shield, y^3, below the third roller, w^3, of the series prevents the bags from sticking to the said second and third rollers. The delivery carrier-belt, *w*, passes over two rollers, 139, 140, in an upward-inclined direction: said rollers are mounted on cross-shafts, 141, 142. A pulley, 143, is mounted on one end of the elevated roller shaft, 142, and is connected by a belt, 144, with the belt pulley, 77, on the end of lower shaft, 70, of the second pair of feed-rollers. And by the revolution of this pulley, 77, motion is imparted to the said delivery carrier-belt, *w*. A delivery chute, P, has position adjoining the upper roller, 140; its upper end is curved, at 145, to conform to the curve of the roller, and from said curve it extends downward and its lower position inclines backward toward the bag-counting receptacle. A small loose roller, 147, is journaled above the elevated roller, 140, and rests upon the carrier-belt for the purpose of aiding the carrier-belt to propel the bags to the said curved part of the delivery chute, by which latter the bags are directed into one of six pockets, *z*, of the bag-counter, which pockets are arranged around the cross-shaft, 138, having on one end the toothed disk, 137, before named. By this arrangement (see Figs. 5 and 17) of delivery carrier-belt, *w*, roller, 140, curved and also back-ward-inclined chute, P, loose roller, 147, and pockets, *z*, the finished bags, 200, pass with their bottom-end fore-most and with the fold, 146, at the bottom uppermost, over the roller 140, and then down the chute; thus the position of the said bottom-fold of each bag is reversed, that is, it is changed from the upper to the lower side, and as the bags drop one at a time into the pocket, *z*, the bottom-fold, 146, of the bag which drops comes in contact with the plain side of the bag that lies in the said pocket. Thus the end of each bag as it drops comes in contact with the bottom of the pocket, and the fifty bags to be accumulated in each pocket will be stacked therein evenly. An extensible end, 148, is fixed to the chute, P. It will also be seen that for every bag pasted at the bottom, or in other words delivered into the pockets, *z*, the counting ratchet-wheel, 132, moves one space, and that when fifty bags have been deposited in one of the pockets the next succeeding pocket is brought into position by the action of the pin, 133, on the lever, N, and the push-pawl, 136, on the ratchet-disk, 137. Thus provision is made for counting the bags in stacks each containing fifty which stacks are then removed by hand and bundled.

In adjusting the machine for different sized bags the loose roller, 19, is removed and another substituted of the proper face width; for the former-plates, E, E′, are substituted others of suitable size, and the creasing plates and drawing rollers are adjusted toward or away from the central longitudinal line of the machine.

For printing, cutting and bottom-pasting bags of another length a different change-wheel, 68, is to be substituted on the shaft, 67, but the relation between the type-wheel, radial arms, the bottom-pasting apparatus, and the counting-mechanism is not altered. For making the longest bags, however, the change-wheel shaft, 67, is provided with only two diametrical opposite arms, *m*, to a set, instead of four; this necessitates the substitution of a gear on the change-wheel shaft, 67, in place of the one 69, which shall be of equal size and intermesh with a gear-wheel on the sprocket-wheel shaft, 82, in the place of the gear-wheel, 81. By this change the relative movement of the type-wheel, breaker-blades, and bottom-pasting mechanism will remain the same; and in view of two arms, *m*, now

being used instead of four, for each revolution of the change-wheel shaft, only two bag-lengths will be cut instead of four. Under these circumstances the same set of change-wheels that were used for the various shorter lengths of bags may now be again used for the various longer bags, because the relative increase in the length of the different sized bags is the same.

The "threading" and operation of the machine is as follows:—A roll of paper is placed on the paper-roll shaft, *a*, and is adjusted centrally by turning the hand-wheel, b^3; the end of the paper strip is then drawn between the rollers, C, and over the side pasting-wheel 14, and paper-supporting roll, 13, then down under the loose roller, 19, and bottom former-plate, E, and the size printed thereon by the type-wheel; the side edges of the paper are then turned up so as to come between the depending rods, 37; and it will be observed that the up-turn will begin where the paper leaves the supporting roller, 13, and will increase therefrom to the rods, 37, where the paper extends vertically at each side as seen in Fig. 12; an oblique crease extends at each side from the point where the paper leaves the roller 13, to the loose roller, 19, as indicated by broken lines in Fig. 9. This first up-turn of the paper must be gradual and if the width of the paper is such that there is not great enough distance between the supporting roller, 13, and the loose roller, 19, and rods, 37, to prevent breaking of the paper in making the up-turn, then the distance may be increased by drawing out the slides, B, and the up-bend thereby made more gradual. Furthermore if the downward angle on which the paper leaves the roller 13, is so great as to cause the paper to break, this angle can be lessened by lowering the said roller through the means provided for the purpose and explained heretofore. The paper after passing the rods 37 is then drawn between the first creasing disks, 31, on the creasing plate, F′, and the former-plates, E, E′, the said creasing plate, F′, and the plate, F, above it, having been turned outward on their pivot, 23, and said upper plate carrying with it the first drawing-and-lapping roller, *e* and the lower plate carrying with it the creasing disk 31. The edges of the paper, when it gets to this point, are lapped so as to bring underneath that side edge of the paper to which paste has been applied. The plates, F, F′, are then turned back into their proper position where the disks 31, and the ends of the plates, F′, fold the paper in between the two former-plates, E, E′, as illustrated in Fig. 15, and the roller, *e*, draws and holds the paper down upon the top-plate E′; the said plates F, F′ are held by the pins, 26, on the disk, 25; the creasing-plates, F′, creasing disks, 31, and drawing-and-lapping rollers, *e*, all being connected, they may be thrown out and in on the pivots, 23, together, without disturbing their adjustment with relation to each other; the paper strip is now in shape of a tube and is drawn along to the upper and lower creasing-disks, *j*, *j*′, previously thrown out of engagement, and under the hinged drawing-rollers, *k*, to the first feed-rollers, *l*, *l*′, and started between them, which is done by raising the top-rollers by means of the weight-arm, 56; the pair of creasing-disks, *j*, *j*′, are again thrown in proper position with respect to the former plates. Up to the first feed-rollers, *l*, *l*′, the machine must be "threaded," or the paper strip placed in position, by hand, and from thence onward the operation is automatic. Upon leaving the first feed-rollers the bag-tube passes to the tongue-plate, 50, and is cut into lengths by the breaker-blades, and the tube, now being in bag-length, is drawn by the second feed-rollers and the bag-lengths are successively deposited on the endless carrier and conveyed to the bottom-pasting apparatus which completes the bags and at the same time counts them; they are then deposited onto the delivery carrier which passes them to the delivery chute from which they pass already counted into the receiving pockets, *z*.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the machine-frame; a paper-roll shaft; and arms attached to the said frame and longitudinally movable thereon for supporting the said paper-roll shaft.

2. The combination of the machine-frame; a paper-roll shaft; supports for said shaft which are movable with respect to the said frame; and a roller 13 and paste-wheel 14 mounted on said movable supports.

3. The combination of the machine-frame; a paper-roll shaft; supports for said shaft which are movable with respect to the said frame; a roller 13 and paste-wheel 14 mounted on said movable supports; and means for vertically-adjusting the said roller and paste-wheel.

4. The combination of a laterally-adjustable carriage, *c*; a roller 13 and a paste-wheel 14 both mounted thereon; and a lifting jack for raising and lowering the said carriage.

5. The combination with the frame of the machine, of the top-plate, D′, elevated above the said frame and provided with two laterally-extending slots, d^3; a roller 19 suspended from said top-plate; a former-plate, E, suspended from said top-plate; two guide-rods 37 one at each side of the former-plate and adjustable in said laterally-extending slots.

6. The combination of the two former-plates, E, E′; two creasing-disks 31 revolving in a horizontal plane and their rims arranged to extend between the said two former-plates; two drawing-and-lapping rollers, *e*, revolving in a vertical plane above the top former-plate; and plates pivoted at one end and carrying both the said creasing-disks and the drawing-rollers.

7. The combination of the two former-plates, E, E′; two creasing disks, 31, revolving in a

horizontal plane and their rims arranged to extend between the said two former-plates; two drawing-and-lapping rollers, *e*, revolving in a vertical plane above the top-former-plate; and plates pivoted at one end and carrying both the said creasing-disks and the drawing-rollers, said plates having ends arranged to extend between the two former-plates, for the purpose described.

8. The combination of the top-plate, D′, having two laterally-extending slots, d^2; a rod, 23, secured and adjustable in each of said slots and depending therefrom and having at its lower end a disk 25 which is provided with an upward-projecting pin 26; a creasing-plate, F′, pivotally attached to each of said rods and provided with a hole 28 which registers with the said upward-projecting pin.

9. The combination of the former-plates; two plates, F, F′, both attached to a block 27 which separates them; a drawing-and lapping-roller, *e*, carried on the upper one, F, of said plates; a rubber-spring 36 under the said upper plate, F; and a thumb-screw 35 co-acting with the said rubber-spring to increase or diminish the tension of the said drawing-roller upon the upper former-plate.

10. The combination of the former plates, E, E′; a horizontal plate 41 laterally-adjustable on the table; an arm 40 pivotally attached to the said horizontal plate and provided with an upward-projecting pin; and two creasing-disks, *j*, *j*′, both revoluble on the said upward-projecting pin.

11. The combination of the former-plates, E, E′; conical drawing-rollers, *k*, to rest on the upper former-plate; and bearings for said rollers hinged to move in a vertical plane.

12. The combination of the lower feed-roller, *l*, mounted on a shaft 45; an upper feed-roller, *l*′, mounted on a shaft 48; a shaft 53 having journaled crank-ends and provided with an arm 56; links 52 loosely connecting the shaft of the upper roller and the said crank-shaft; and a weight 57 adjustable on the said arm.

13. The combination of the former-plates; a creaser device co-acting with the former-plates to produce the inward-fold of the bag-tube; a tongue-plate 50 on the edge of which the bag-tube is cut or broken; a narrow neck 49 connecting the former-plate and tongue-plate; feed-rollers, *l*, *l*′, located between the former-plates and tongue-plate; and an upward-inclined separator 58 at the point where the tongue-plate joins the neck for the purpose described.

14. The combination of a tongue-plate having a serrated edge; and a breaker having a plural number of blades all of which at all times extend in a direction parallel with the edge of said tongue-plate and which revolve with an intermittent motion.

15. The combination of a tongue-plate having a serrated edge; a breaker having a plural number of blades all of which are at all times in a direction parallel with the edge of said tongue-plate; a fixed shaft; and two heads, *n*, loosely revoluble on said shaft and to which the said blades are attached.

16. A breaker for paper-bag machines having in combination a shaft; two heads on the said shaft; and a plural number of breaker-blades attached to said two heads parallel with each other and located apart equi-distant.

17. A breaker for paper-bag machines having in combination a shaft; two heads on the said shaft; a plural number of breaker-blades attached to said two heads parallel with each other and located apart equi-distant; and means to impart an intermittent rotary motion to said two heads.

18. A breaker for paper-bag machines having in combination a shaft; two heads on the said shaft each provided on its perimeter with teeth; a plural number of blades attached to said heads parallel with each other; and means co-acting with the teeth on said heads to impart intermittent rotary motion thereto.

19. A breaker for paper-bag machines having in combination a shaft; two heads on the said shaft each provided in its perimeter with teeth; a plural number of blades attached to said heads parallel with each other; a stop-pawl acting on the breaker-heads to normally prevent them from turning; and an actuating arm, *m*, which engages the teeth on said head to impart intermittent rotary motion thereto.

20. The combination of the main side-frames of the machine; the bag-length carrier, *s*; a frame longitudinally-adjustable on the said main-frame and provided with a series of vertical slots, g^3; and rollers, *t*, *t*′, t^2, loosely journaled in said slots and resting upon the said bag-length carrier.

21. The combination of the three rollers, *u*, *u*′, u^2, driven by a single belt; a paste-roller 101; a vertical slideway 113; a shaft 111 movable in said slideway; a paste and folding-knife, *v*, attached to said shaft; a rock-shaft 110; an arm 118 fixed on said rock-shaft; a link 117 connecting the said arm with the said paste-knife shaft to impart movement to the latter; and two link-arms, 114, 115, pivoted together and one fixed rigidly to the paste-knife shaft and the other pivoted to a fixed standard to swing the paste-knife.

22. The combination of a paste and folding knife; a rock-shaft 110; mechanism connecting the said knife and rock-shaft; an arm 119 fixed on said rock-shaft; a vertical rod 121 connected with said arm and provided at its lower end with a shoe 122; a rocking-cam 123 in contact with said shoe to impart up-and-down movement to the shoe and rod; and means to actuate said cam.

23. In a paper-bag machine the combination with mechanism for actuating the paste and folding knife, of a vertical rod 121 provided at its lower end with a shoe 122 having two

depending arms 126; a fixed shaft 124; a cam 123 rocking on said shaft; a flanged roller 125 loose on said fixed shaft and between said two depending arms.

24. In a paper-bag machine, the combination of a rotary bag-receptacle having a number of pockets and a ratchet-disk; a counting ratchet-wheel having a projection; suitable intermittently-operating mechanism for actuating the said wheel; a lever having an end in the path of the projection on the ratchet-wheel and weighted at the opposite end; and a push-pawl connected with said lever and engaging the ratchet-disk on the bag-receptacle.

25. In a paper-bag machine the combination of a paper-roll shaft; tension-rollers, C, having their journals resting on inclined slides; a paper-supporting roller, 13, and paste-wheel 14 both on one shaft; and means for vertically-adjusting the said paper-supporting roller and paste-wheel.

26. In a paper-bag machine, the combination of the creasing plates, F′, and the plates, F, above them and which are connected with them and pivoted by one end to swing in a horizontal plane; creasing disks, 31, revolving in a horizontal plane; adjustable drawing-and-lapping rollers, *e*, revolving in a vertical plane all mounted on said pivoted plates; and devices for automatically stopping and holding the said pivoted plates when in the normal or operative position.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN SABOLD.

Witnesses:
I. F. YOST,
L. P. G. FEGLEY.