(No Model.) 3 Sheets—Sheet 1.

H. E. SMYSER.

PACKAGE MAKING AND FILLING MACHINERY.

No. 544,697. Patented Aug. 20, 1895.

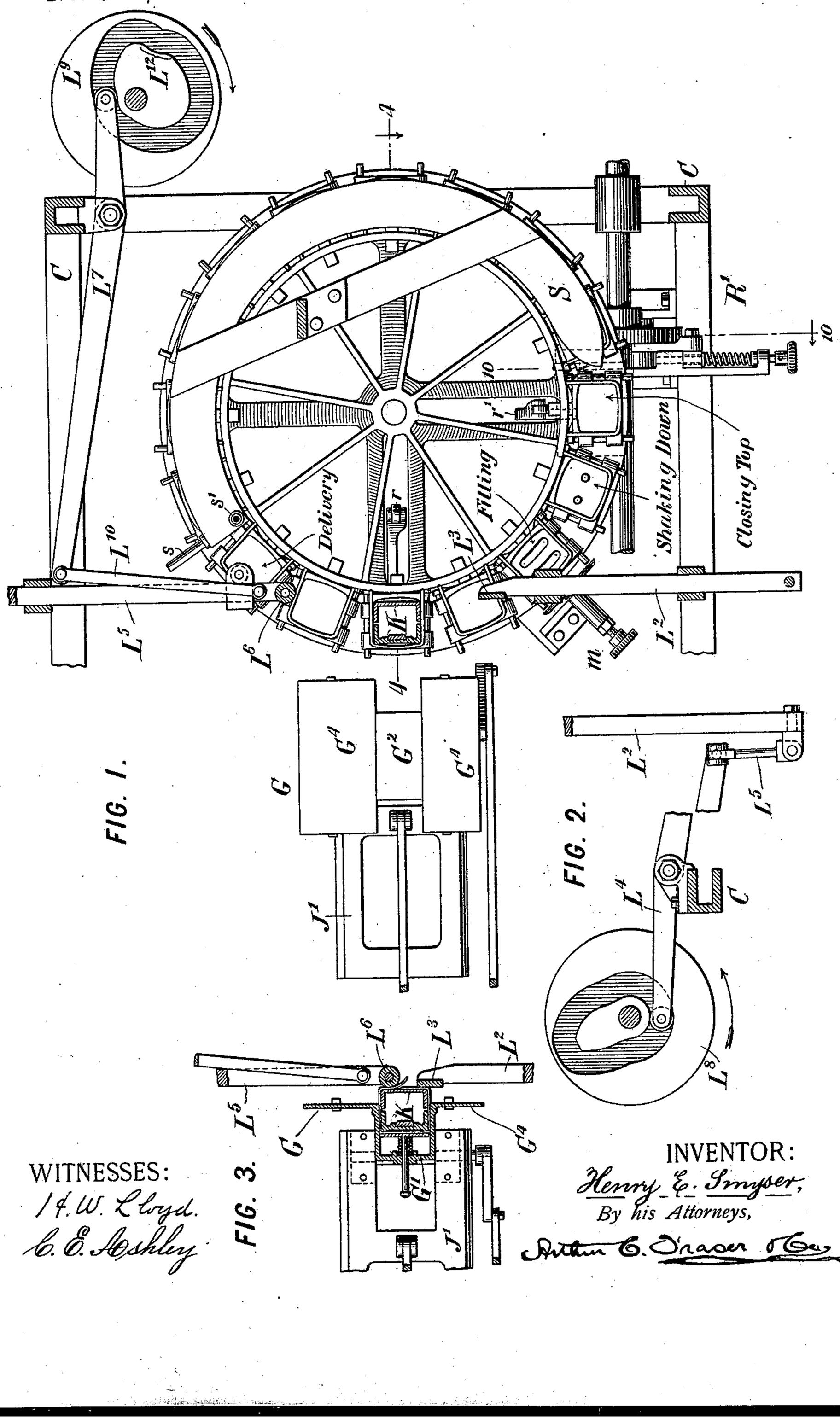

FIG. 1.

FIG. 2.

FIG. 3.

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(No Model.) 3 Sheets—Sheet 2.

H. E. SMYSER.

PACKAGE MAKING AND FILLING MACHINERY.

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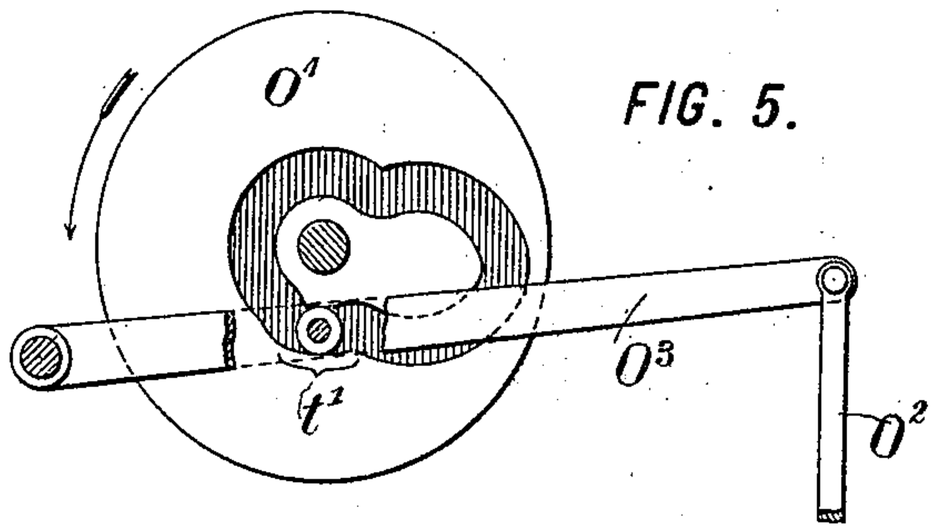


FIG. 5.

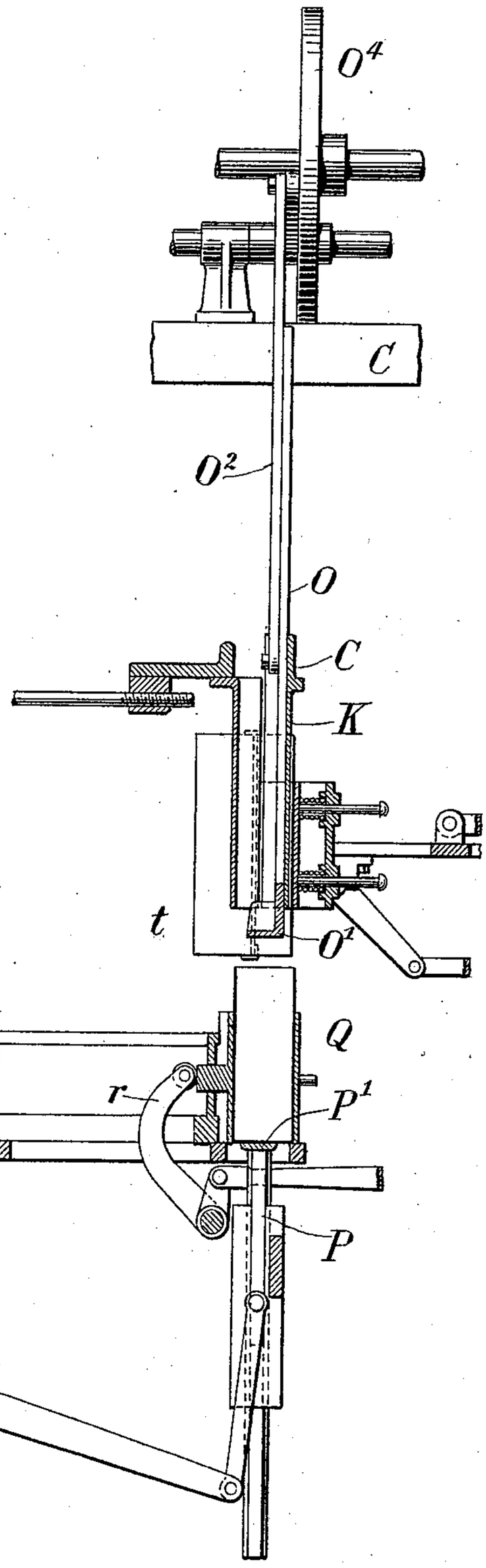
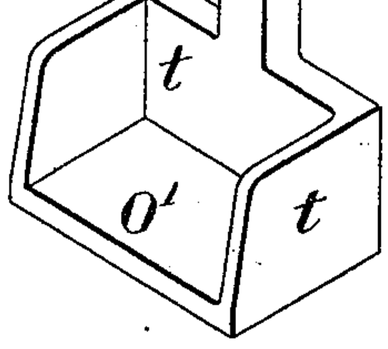


FIG. 4.

FIG. 6.



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(No Model.) 3 Sheets—Sheet 3.

H. E. SMYSER.

PACKAGE MAKING AND FILLING MACHINERY.

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FIG. 8.

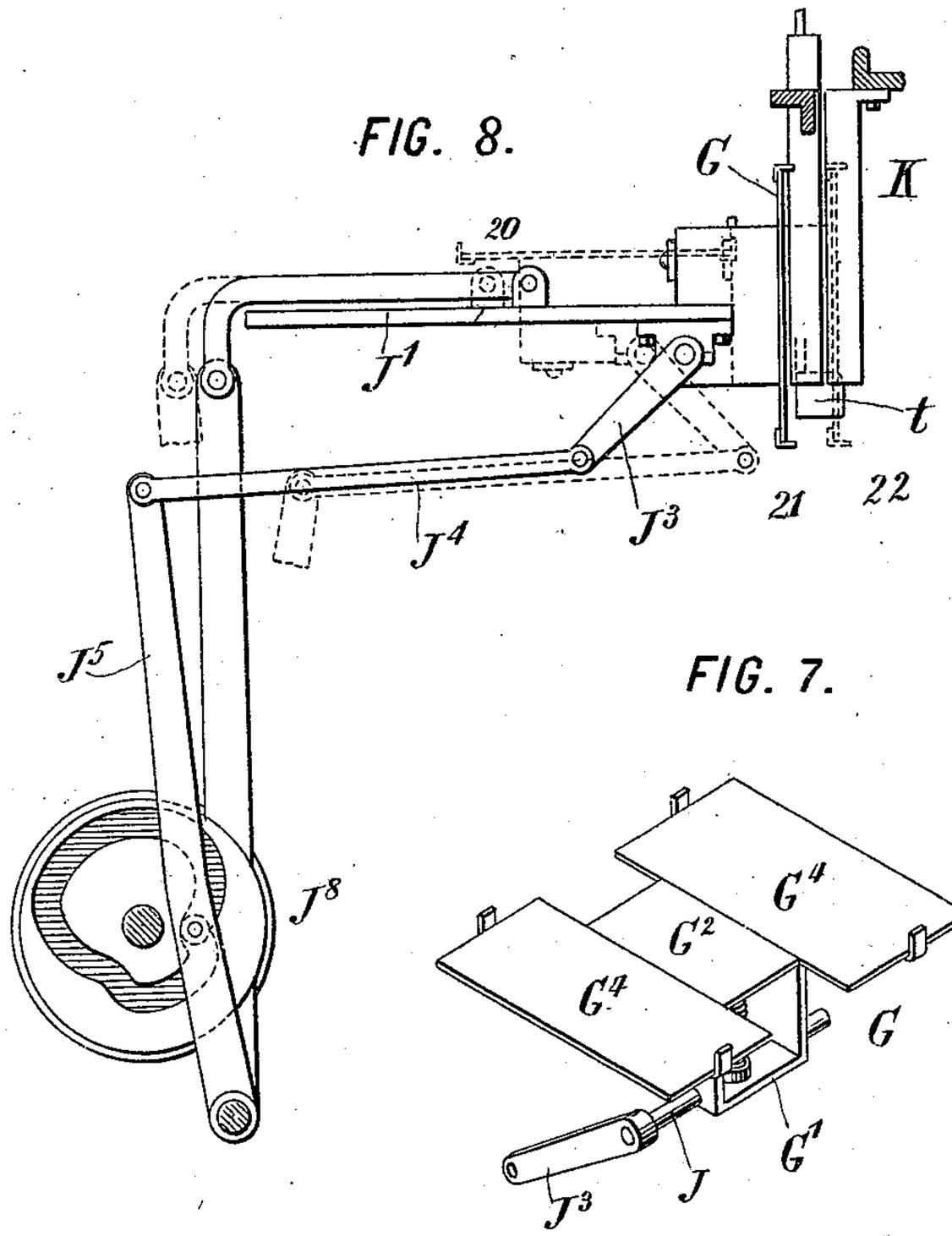


FIG. 8a

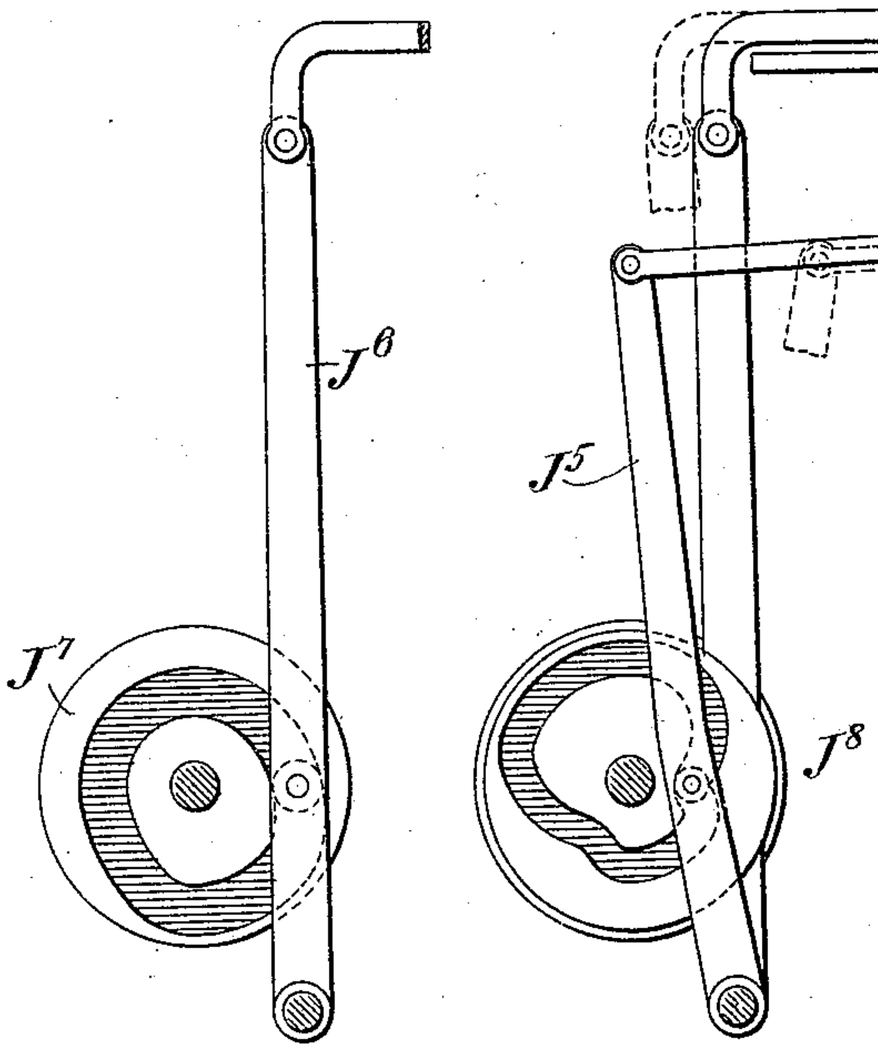


FIG. 7.

FIG. 10.

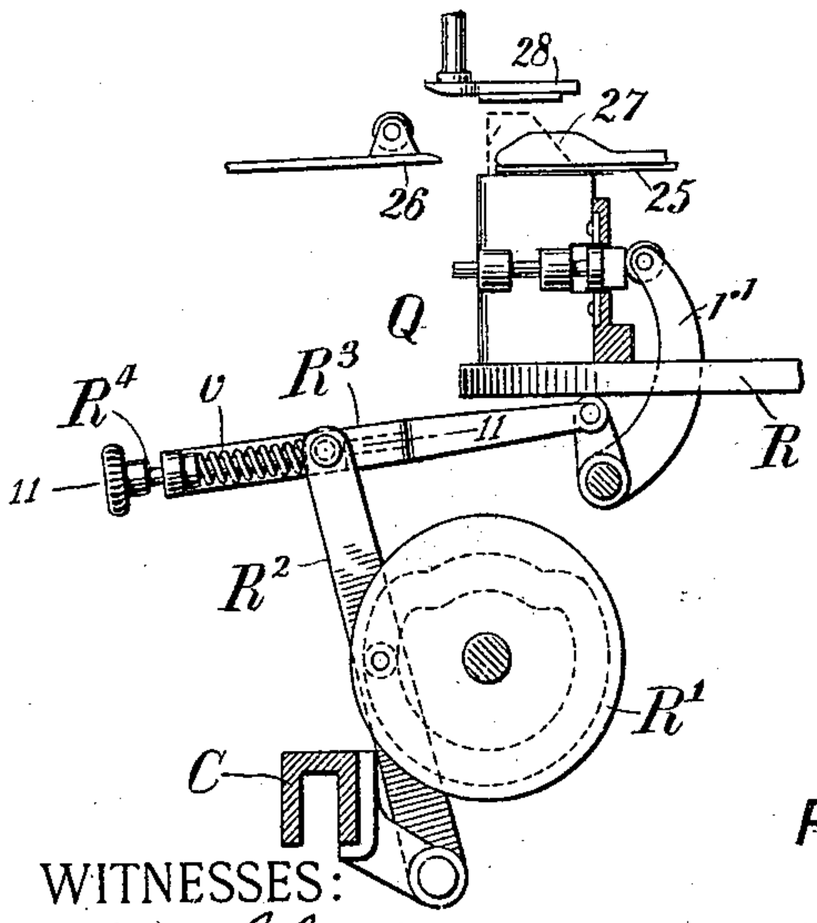


FIG. 9.

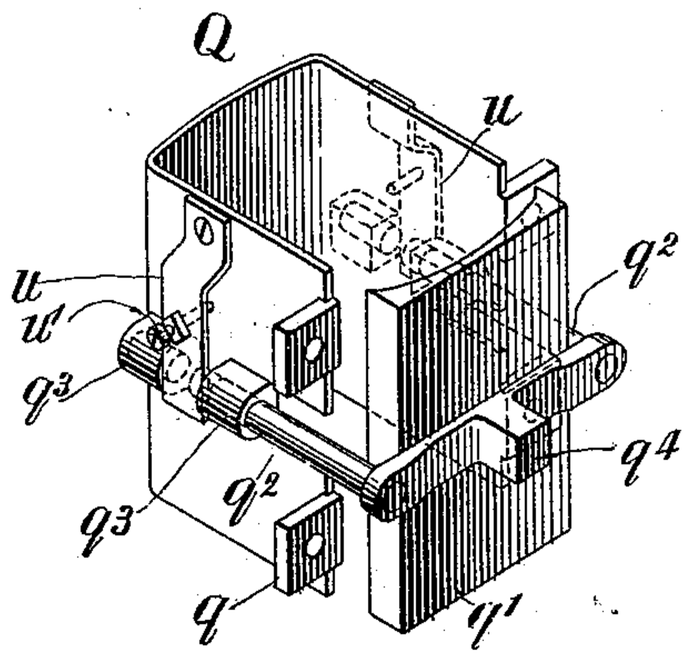
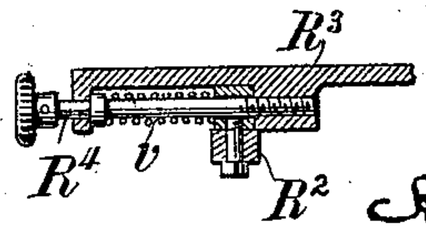


FIG. 11.



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UNITED STATES PATENT OFFICE.

HENRY E. SMYSER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO ARBUCKLE BROTHERS, OF NEW YORK, N. Y.

PACKAGE MAKING AND FILLING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 544,697, dated August 20, 1895.

Application filed September 8, 1893. Serial No. 485,109. (No model.)

To all whom it may concern:

Be it known that I, HENRY E. SMYSER, a citizen of the United States, residing in Philadelphia, (Germantown,) in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Package Making and Filling Machinery, of which the following is a specification.

This invention relates to automatic machinery for making a paper bag, and also for filling it and closing its top, whereby a completed package of any desired commodity is made and delivered.

The machine to which my present improvements particularly relate is that shown in my Letters Patent No. 449,275, granted March 31, 1891, together with the developments thereof embodied in my patents, the one dated October 3, 1893, No. 505,857, and the other dated October 3, 1893, No. 505,888.

My present invention provides certain improvements designed to perfect the details of the said machine and overcome certain defects in the operation thereof, as will be fully hereinafter set forth.

In the accompanying drawings I have shown only those parts of the complete machine which are necessary to an understanding of the construction and operation of the improvements provided by my present invention.

For an understanding of the operation of the complete machine and the particular construction of those features not herein fully shown and described I would refer those interested to my several Letters Patent and applications above mentioned.

To enable my present invention to be understood, it will be sufficient to explain that in my said packaging-machine successive sheets of paper are taken from a pile by means of paste-applying carriers, the sheets being deposited one after another upon a tilting table or matrix, which table, after each pasted sheet is laid upon it, tilts from a horizontal to a vertical position and advances against an upright former or hollow rectangular tube, around three sides of which it wraps the sheet, whereupon the portions of paper projecting beyond the fourth side of the former are folded in against it by two folders acting successively, the paste serving to unite the two edges of paper to form a rectangular tube of paper inclosing the former and projecting somewhat beneath it. Thereupon (while the tilting table or matrix moves back to receive the next sheet) the bottom of the bag is formed by successively-acting folders, which fold in the lower portion of the tube, paste being applied by pasters for cementing the two bottom flaps that are last folded. A plunger then rises from beneath against the bottom of the bag and squeezes it flat against an upper plunger, which stands at the bottom of the former and constitutes the temporary bottom thereof. The two plungers then simultaneously descend, holding the bag-bottom clamped between them and drawing the bag down off from the former and plunging it into a pocket, which stands directly beneath the former. This pocket is one of an extended series of pockets arranged in a circle and moved around step by step, their open bottoms sliding over a horizontal table. Each pocket is provided with a movable portion, by means of which it can be contracted to grasp the paper bag. As soon as the bag is plunged down into the pocket, or soon before it fully enters the pocket, the pocket is thus contracted, so as to grasp and frictionally hold the bag, whereupon the upper plunger reascends, retiring again within the former. The grasping of the bag by the pocket prevents the possibility of its being lifted by the ascent of this plunger in case any paste should have touched the plunger. After the plunger has passed up out of the bag the pocket moves forward to bring the next pocket directly beneath the former. The open-mouthed bag is then filled with the required quantity of whatever material is to be packed, which is deposited in it through a chute. The pocket is then opened or expanded to release its grasp upon the package, whereupon the latter is lifted and dropped within the pocket, in order to shake down or compact the mass of material. Subsequently the pocket moves to the position where the top of the package is closed. In this position folders act to turn in the upper part of the bag, folding it down flat upon the mass of material, paste being applied to the flaps last

turned down to cement them in place. Thereafter the continued movements of the pocket carry the closed package beneath a heated plate or steam-table, by which the paste applied to the top of the package is dried. Finally the completed and dried package is lifted out of the pocket by a plunger and transferrred to a delivery-belt, which carries it out of the machine.

Figure 1 of the accompanying drawings is a horizontal section showing in plan the series of pockets and their accessories, showing the former and folders in section, and showing the tilting table or matrix in plan. Fig. 2 is a fragmentary elevation showing the mechanism for operating the first folder. Fig. 3 is a fragmentary section on the same plane as Fig. 1, cut through the former, folders, and tilting matrix and showing the parts in the act of folding the paper tube around the former. Fig. 4 is a vertical section cut longitudinally of the machine through the former and two diametrically-opposite pockets in the plane of the line 4 4 in Fig. 1, looking in the direction of the arrow on that line. Fig. 5 is a fragmentary elevation of the upper part of Fig. 4. Fig. 6 is a perspective view of the upper plunger, which works within the former. Fig. 7 is a perspective view of the tilting matrix or table. Fig. 8 is a side elevation of the matrix and former and the parts accessory thereto. Fig. 8ª is a similar elevation of the cam and lever, not clearly shown in Fig. 8. Fig. 9 is a perspective view of one of the pockets. Fig. 10 is a vertical transverse section on the line 10 10 in Fig. 1. Fig. 11 is a sectional view on line 11 11 in Fig. 10.

In designating the parts that are common to my former machine I shall use, as far as possible, the same letters and figures of reference as in my said application, Serial No. 380,470.

C indicates the fixed frame of the machine. G is the tilting matrix or table. K is the former or mold around which the tube is made. Q Q are the pockets. R is the table over which the pockets slide, and O′ P′ are the upper and lower plungers which transfer the bag downward from the former into the pocket.

The tilting matrix G has wings G^4 G^4, connected together through a trough-shaped body G′, to which is fixed a pivotal shaft J, which is hung in bearings on a slide J′, Fig. 8, which slide extends longitudinally of the machine, as shown in Figs. 1 and 3, being reciprocated in suitable slideways (not shown) by means of a cam J^7, Fig. 8ª, acting through a lever J^6 and a link. The matrix is tilted by means of an arm J^3, fixed to the shaft J and connected by a link J^4 and lever J^5 to a cam J^8, Fig. 8. The matrix has a spring-mounted plate G^2 between the wings G^4 and normally standing flush with them, as shown in Fig. 7. The sheet of paper, having paste applied in the proper places, is deposited on the matrix while the latter stands horizontally, as shown in Figs. 1 and 7, its position being that shown in dotted lines at 20 in Fig. 8. The matrix then tilts to a vertical position, during which movement the slide J′ moves forward until the matrix reaches the position shown in full lines at 21 in Fig. 8, whereupon, its tilting movement being completed and the movement of the slide continuing, the matrix still standing vertically moves against the former K, so that the middle of the sheet of paper is clamped against the former by the plate G^2, while the sides of the sheet are folded against the opposite sides of the former by the action of the wings G^4 as the matrix advances to its extreme position. (Shown in dotted line at 22, Fig. 8.) The position of the parts, with the sheet of paper thus wrapped around three sides of the former, is shown in Fig. 4.

Two folders—the one a plate or blade L^3 and the other a roller L^6—advance from their retracted positions. (Shown in Fig. 1.) The folder L^3, being in advance, turns down one projecting edge or flap of the paper against the back of the former, and the roller L^6, immediately following it, turns in the other edge or flap in the manner shown in Fig. 3 and lays its pasted edge against the first flap, the roller then rolling over the pasted seam in order to insure that the paste shall unite the two flaps. The folding-blade L^3 is carried on a slide L^2 and driven from a cam L^8, Fig. 2, through a lever L^4 and link L^5. The roller L^6 is carried on a slide L^5, Fig. 1, and driven from a cam L^9 through a lever L^7 and link L^{10}.

The bottom-folders for closing the bottom of the bag are not shown, since they are not affected by my present improvements. So far as my present invention is concerned, any known device may be applied for folding in the bottom of the bag. During this operation the bottom end of the former K is closed by the plunger O′, which then stands with its bottom surface flush with the lower end of the former. This plunger O′ is mounted on a vertical slide O, working through the former K, and is operated from a cam O^4, Figs. 4 and 5, through a lever O^3 and link O^2.

The bottom plunger p' is mounted on a vertical slide P, sliding in ways beneath the table R, (see Fig. 4,) and is operated from a cam P^4 through a lever P^3 P^2 and link.

The pockets Q, one of which is shown in detail in Fig. 9, are attached by ears q to the rim of a wheel Q′, Fig. 4, which rotates intermittently to carry the pockets around over the table R. The back wall q' of each pocket is movable in order to expand or contract the pocket. This wall is guided by means of pins q^2 q^2, projecting horizontally forward parallel to each other and sliding in holes bored through lugs q^3 q^3, formed on the sides of the pocket. The pins project so far beyond the front of the pocket that they may be struck by a pusher in order to push back the wall q' to expand the pocket, while to contract the pocket

a projection q^4 on the back wall is struck by a roller or lever-arm, thereby sliding the back wall farther into the pocket. The lever r (shown in Fig. 4) operates to contract the pocket to grasp the bag when the latter is first plunged into it, and subsequently, when the bag reaches the position for closing its top, as shown in Fig. 10, another lever r' acts against the back wall to again contract the pocket to firmly grasp the package while its top is being closed. This latter lever is operated from a cam R′ through a lever R^2 and connecting bar or link R^3.

Referring to Fig. 1, the bag is plunged into the pocket directly beneath the former K. The pocket then moves twice to bring the bag to the position marked "filling," in which position the weighed or measured charge of material is dropped into it from a chute, (not shown,) after which the next movement brings it to the position marked "shaking down," where the bag is lifted and dropped to shake down its contents, and the next following movement brings it to the position marked "closing top," where the folders operate upon the bag to fold in and close the top of the package. In the filling position the pocket is opened to release the bag by means of a plunger m, which moves inwardly and presses in the projecting pins q^2. In the "closing-top" position the pocket is again contracted by the operation of the lever r' and cam R′, already referred to. The folders for closing the top of the bag are indicated in Fig. 10, 25 being the first folding-blade, 26 the opposite one, 27 the folders for the side wings or flaps, and 28 the presser-plate, none of which parts relate to my present invention, and consequently require no description further than to say that they fold in and seal the top of the package. The next movement of the pocket carries the completed package beneath the heated plate or steam-table S, Fig. 1, which receives steam from a pipe s'. On emerging from the farther end of this table the pocket reaches the position marked "delivery," where the pocket is first expanded, and a plunger then operates to lift out the completed package, leaving the pocket empty and ready for receiving another empty bag.

The description thus far given is of the machine as it was constructed prior to the improvements constituting my present invention, and is designed solely to enable these improvements to be fully and correctly understood.

I will now proceed to describe my present improvements.

As constructed prior to my present invention, the folding-roller L^6 simply rolled onto the pasted seam and back. It was found that under some circumstances this seam would not unite, and upon the retreat of the roller the outer flap of paper would curl up, somewhat in the manner shown in Fig. 3, or at any rate, by failing to be securely cemented to the pasted flap, the bag would be spoiled. To overcome this defect, my present invention provides that the roller L^6 shall roll repeatedly back and forth over the pasted seam in order to roll it thoroughly down and securely unite it to the pasted flap. To this end, in the construction shown, the roller L^6, after first laying down the seam, rolls back over it and then returns, rolling over it again, and finally rolls back and recedes from the seam. These movements are imparted to it by the portion of the cam L^9, marked L^{12} in Fig. 1.

In the operation of my said machine as constructed prior to my present invention it would sometimes occur that the action of the matrix G in folding the paper around the former K would be imperfect, in that by reason of the former not extending down as far as the bottom edge of the paper the portion of the paper projecting beneath the bottom of the former, and being hence unsupported thereby, would occasionally fail to be formed properly into a tube, but would buckle or bend under the former, with the result that the paper beneath the former would not be properly presented to the folders for closing the bottom of the bag. Consequently these folders would sometimes tear the paper, or at other times would fold in the bottom unsymmetrically, so that the pasted spots would not come in the proper places, thereby leaving the bag-bottom weak. To remedy this defective folding of the paper around the former, my present invention provides a temporary downward continuation of the former during the instant that the paper is being folded around it. This downward continuation is shown best in Fig. 8, where it is lettered t. It is constructed preferably as an attachment to or part of the plunger O′ by providing it with walls in the manner shown in Fig. 6. It is these walls which constitute the downward continuation of the former, the walls t being made just small enough to slide within the former, so that they extend out as nearly as possible into line with the sides of the former, around which the paper is first folded. To accomplish the desired result it is necessary not only to provide the plunger O′ with these walls t, but also to impart to the plunger such movement as shall cause it to dwell in the position shown in Figs. 4 and 8 during the moment while the paper is being folded by the matrix around the former. To this end the cam O^4, which drives the plunger O′, is formed, as shown in Fig. 5, with a portion t', by means of which the necessary dwell is imparted to the plunger. It results from this construction that the plunger O′ after moving down with the plunger P′ to carry the bag into the pocket Q rises then to the position shown in Fig. 4, and on reaching that position it stops and dwells there while the matrix is folding the next sheet of paper around the former and until the matrix has completed the wrapping of the paper around three sides of the former—that

is, until the matrix has reached the position shown in Fig. 3—whereupon the portion t' of the cam ceases to act upon the roller of the lever O^3, and the succeeding portion of the cam completes the lifting movement of the plunger, carrying it up into the position where it forms a temporary bottom for the former, which position it retains during the folding in of the bag-bottom. The construction of the plunger, with the walls t constituting a downward continuation of the former, as described, serves in practice to entirely prevent the improper folding in of the paper beneath the former and insures in this respect the making of a perfect bag. It is not essential that the walls t, constituting this downward continuation, shall be constructed as a part of the plunger O′, as they might be independent thereof; but it is preferable and most convenient to form them on the plunger, as thereby the one cam with its dwell t' serves for imparting the necessary movements to the plunger as well as for retaining the walls t in position while they are required to form a downward continuation of the former and to lift them up into the former to get them out of the way preparatory to folding up the bottom of the bag.

A further feature of my present invention consists of an improvement applied to the expanding and contracting pocket Q. This pocket, after being expanded or contracted, should be capable of retaining its expanded or contracted condition until it is again acted upon, for which purpose previously reliance was placed upon the friction with which the back wall q' moved due to the weight of this wall and the friction of the pins q^2 in the lugs q^3. The amount of friction thus provided, however, was not capable of adjustment and was not uniform for the different pockets, as it depended somewhat upon the exact nicety of fit and the exact smoothness of surface at the bearings between the pins and lugs. To enable any required amount of friction to be imparted, and to enable the friction to be adjusted at will to bring the several pockets into uniformity in this respect, my present invention provides for applying a tension device or friction-brake to the pockets. This friction-brake is preferably of the simple construction shown in Fig. 9, where it consists of a spring-plate or leaf-spring u, fastened to the side of the pocket, with its frictional portion bearing against the side of one of the pins q^2, and with an adjusting-screw u', bearing against the side of the pocket for adjusting the exact amount of friction by means of varying the tension with which the spring u bears against the pin. I prefer to provide the springs u on both sides of each pocket, as shown; but it might suffice to apply the same on only one side. The exact construction of this spring-brake or friction device might be varied somewhat, as will be apparent.

A further improvement relates to the means for closing or contracting the pocket to grasp the bag and hold it firmly while the operation of closing the top of the package is being performed, as shown in Fig. 10. It should be understood that the exact size or diameter of the bags or packages necessarily varies from time to time by reason of the character of material being packed, which at times will be more or at times less dense, an adjustment to provide for such differences being necessarily provided when a given weight of material is being packed, in order that the capacity or cubic contents of the package may vary to allow for the variations in volume or density of the material. Consequently, when the package becomes larger an adjustment of the extent of movement of the lever r' must be made in proportion to the altered size of the package, and to this end I have heretofore provided an adjusting-screw R^4 for varying the relation of the lever R^2 and link R^3, and thereby varying the throw of the lever r', and in consequence the extent of contraction of the pocket upon the bag. This adjustment answers the purpose well; but, in addition, it has been found desirable to provide for making the pocket to some extent self-adjusting, in order that it may adapt itself to minute differences in bulk of successive packages. It is also desirable that the pocket shall embrace the successive packages with a certain uniform degree of firmness. To these ends my present invention introduces an improved construction, whereby the pocket-contracting lever or other part r' is seated against a spring, through which spring the movement for contracting the pocket is transmitted, in order that the contractile thrust exerted shall possess a yielding tendency sufficient both to limit the extent of compression of the package and to render the contractile effort of the pocket self-adjusting to adapt it to packages of slightly-varying bulk. I prefer to introduce the spring between the lever R^2 and link R^3 by coiling it around the screw R^4, as shown at v in Fig. 10. The spring might, however, be otherwise introduced. It will be understood as to this feature that my present invention is not limited to the precise mechanism consisting of the lever r', link R^3, lever R^2, and cam R′, since any mechanical device whatever by which at the proper moment a thrust is imparted to the movable wall of the pocket for contracting the pocket to grasp the bag might be substituted for this mechanism, a spring or yielding cushion equivalent to the spring v being interposed in any such substituted mechanism so as to constitute an intermediary through which the thrust is transmitted.

I claim as my invention the following-defined novel features, substantially as hereinbefore specified, namely:

1. In a bag forming mechanism, a former, and a matrix for wrapping a sheet of paper around three sides of the former preparatory to its formation into a tube, the former being

sufficiently shorter than the sheet of paper to leave sufficient of the paper tube projecting beneath it to be folded in to form the bottom of the bag, combined with a movable wall constituting a temporary downward continuation of the former during the instant that the paper is being folded around the former, and means for displacing it preparatory to the folding in of the bottom.

2. The combination with a former K and matrix G, of a vertically movable wall *t* adapted to slide up within the former, and mechanism for moving it adapted to hold it projected beneath the former during the time that the matrix is folding a sheet around the former, and subsequently to lift it within the former.

3. The combination with a former K and matrix G, and plunger O′ working within the former, of a wall *t* applied to said plunger, and a cam O^4 for operating the plunger, formed with a dwell *t′* for causing the plunger to rest beneath the former during the instant that the paper is being folded by the matrix around the former.

4. In a packaging machine, the combination with one of a series of pockets having a movable wall *q′* guided by sliding pins q^2, of a tension device consisting of a spring *u* applied to said pocket and pressing against such pin, and means for adjusting the tension of said spring.

5. In a packaging machine, the combination with a package-holding pocket having a movable wall, of a device for contracting the pocket consisting of a movable part moving to push in said wall, and a spring interposed between said parts and said movable wall and through which the thrust is communicated in order that the pocket in contracting upon the package shall embrace it yieldingly and thereby adapt itself to variations in the bulk of the packages.

6. In a packaging machine, the combination with a pocket having a movable wall, of a device for contracting the pocket consisting of a lever *r′*, link R^3, lever R^2 and cam R′, and a spring *v* interposed between the lever R^2 and lever *r′*, and through which spring the thrust is transmitted from the former to the latter, whereby the contractile thrust exerted by the latter lever against the pocket is rendered yielding.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY E. SMYSER.

Witnesses:
FRED WHITE,
GEORGE H. FRASER.