

No. 815,858.

PATENTED MAR. 20, 1906.

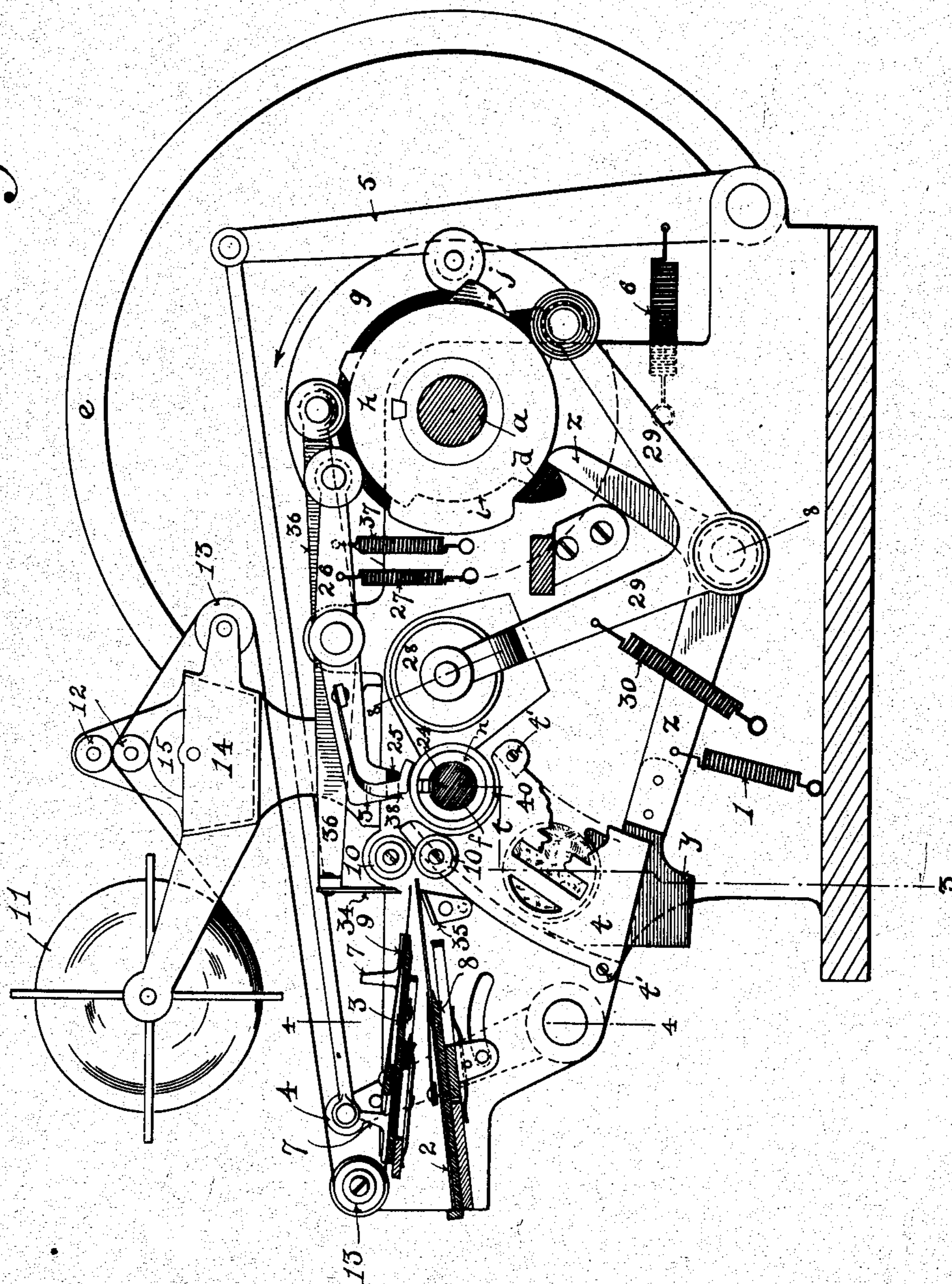
A. OESTERREICH.

PROCESS FOR THE MANUFACTURE OF PAPER BOXES.

APPLICATION FILED MAY 28, 1904.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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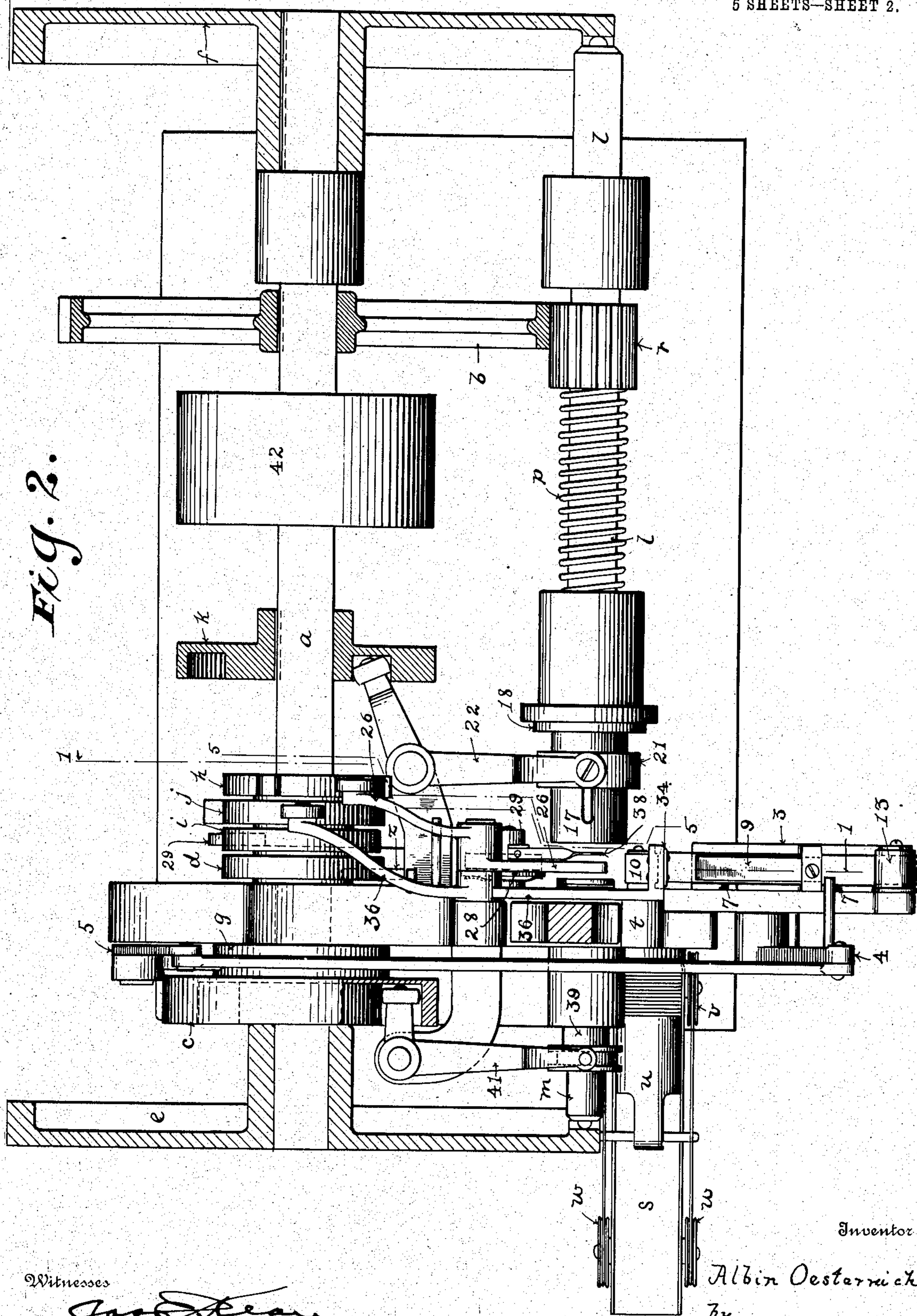
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# PROCESS FOR THE MANUFACTURE OF PAPER BOXES.

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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

Fig. 3.

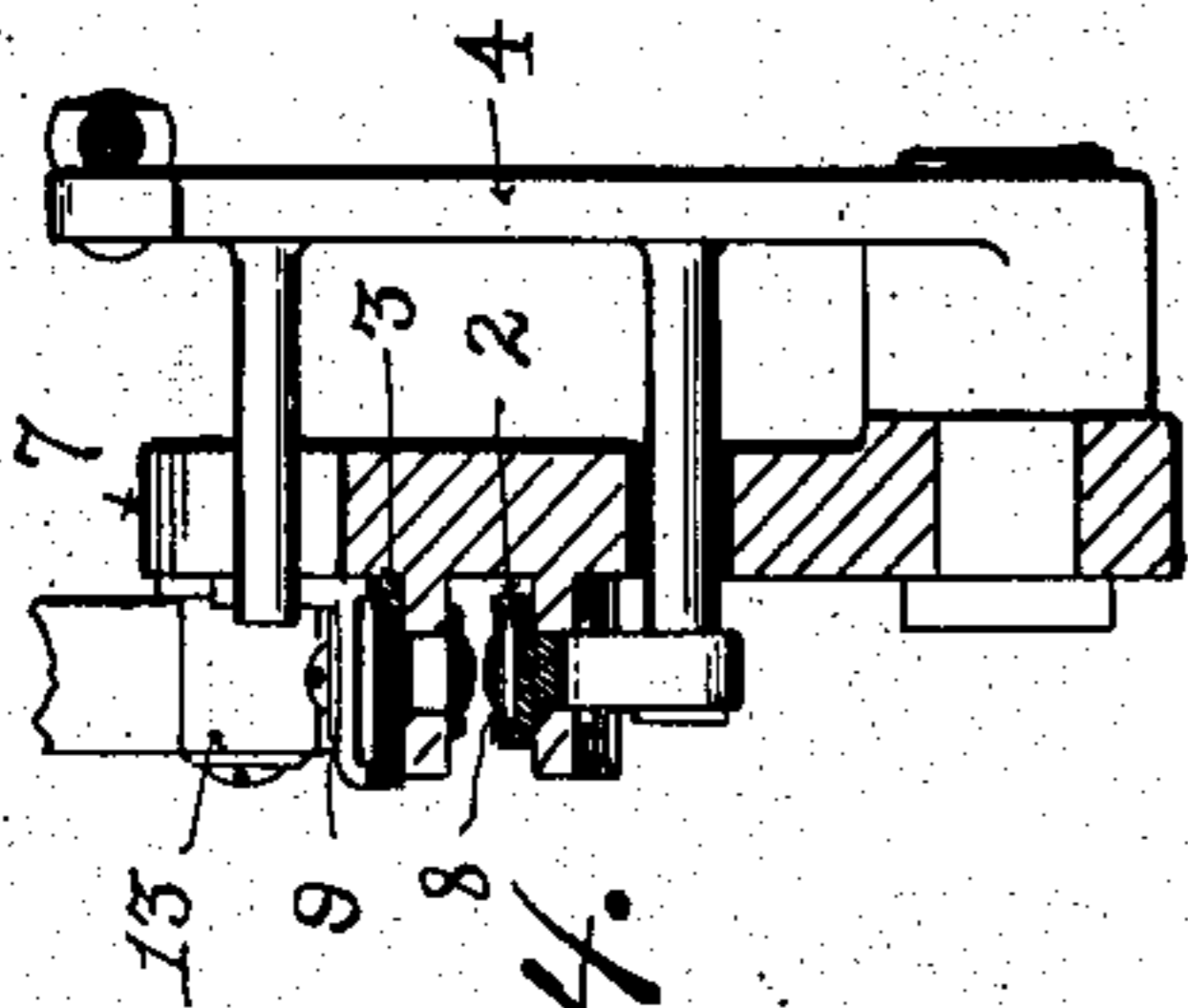
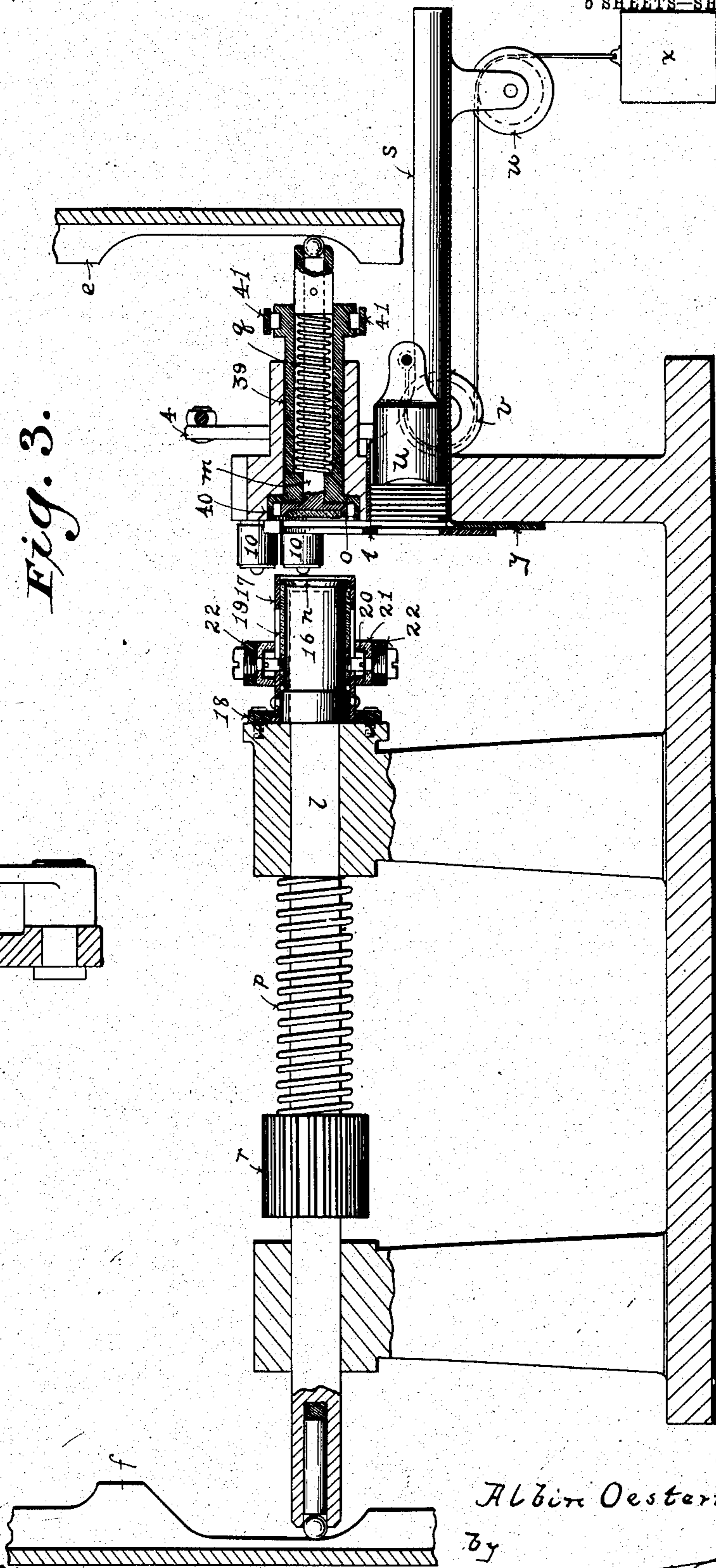


Fig. 4.



Witnesses

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5 SHEETS—SHEET 4.

Fig. 8.

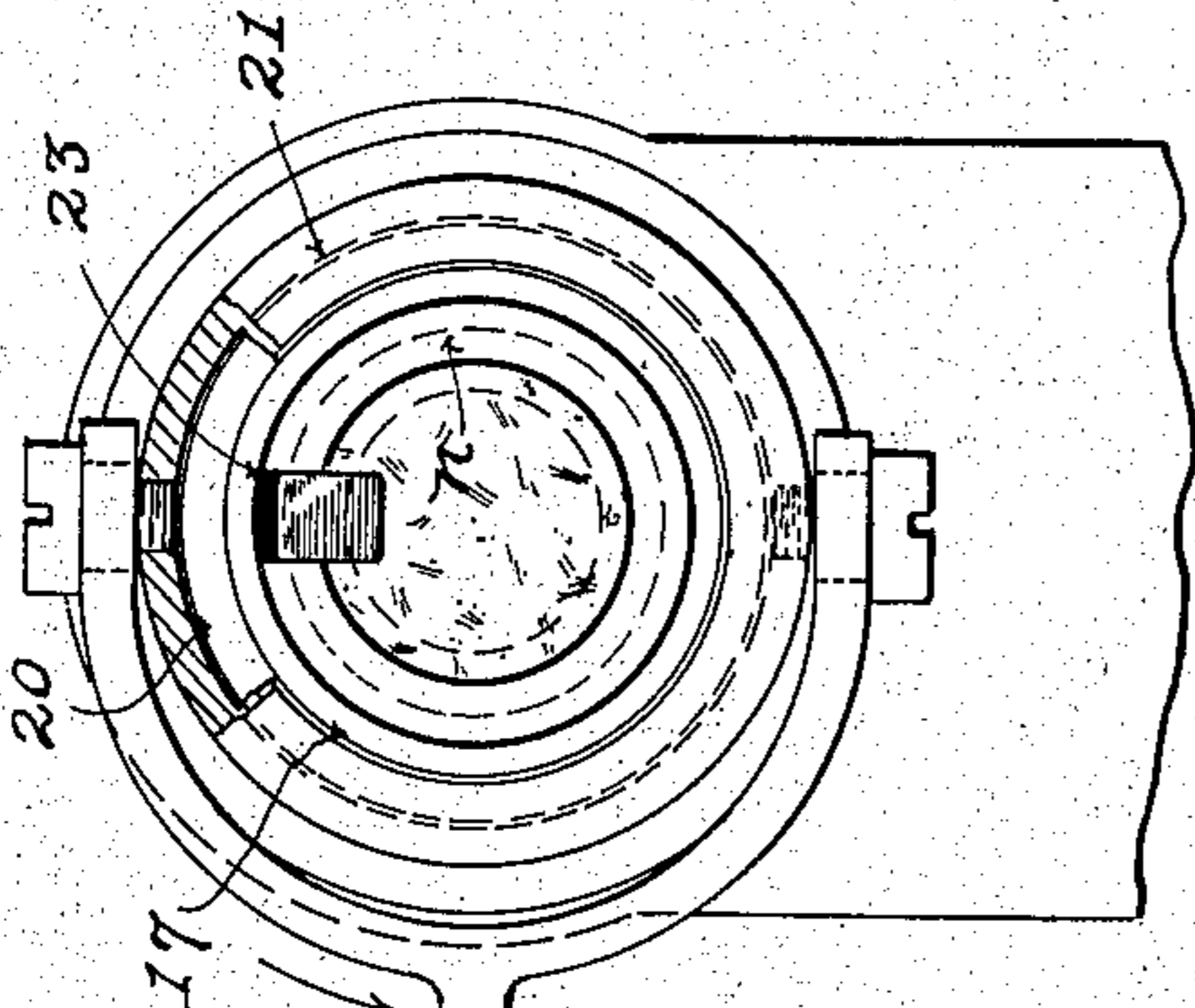
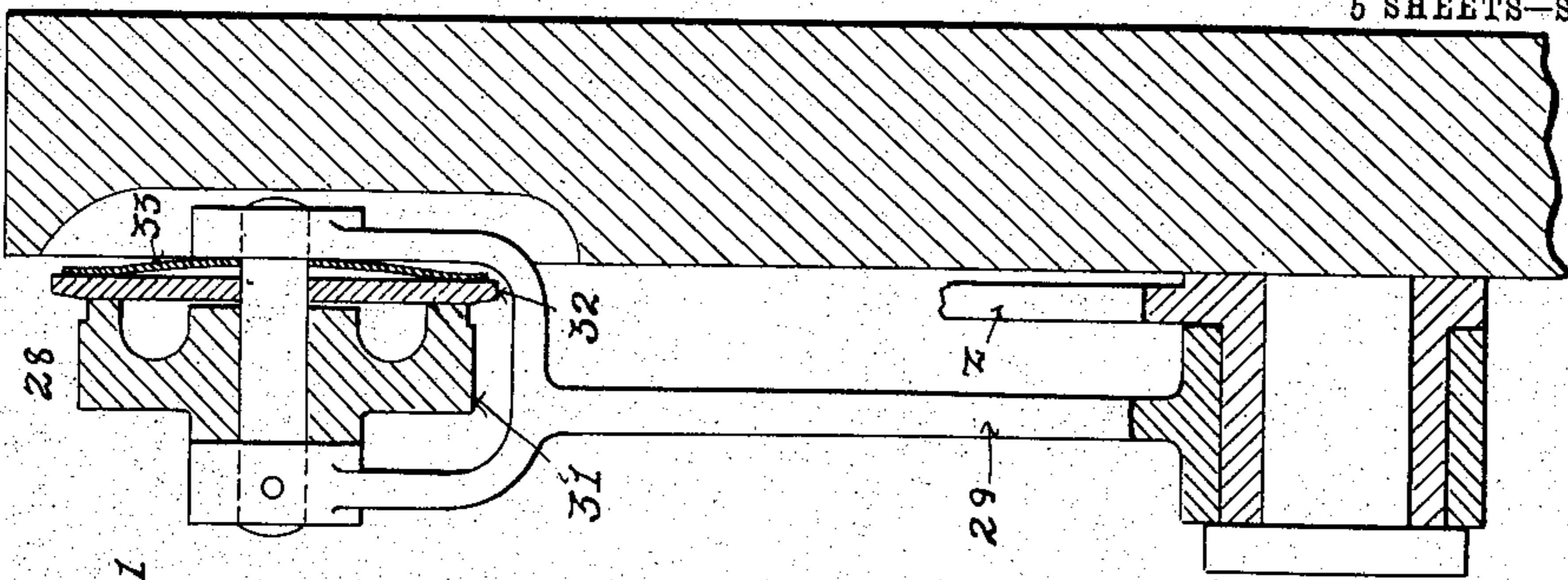


Fig. 5.

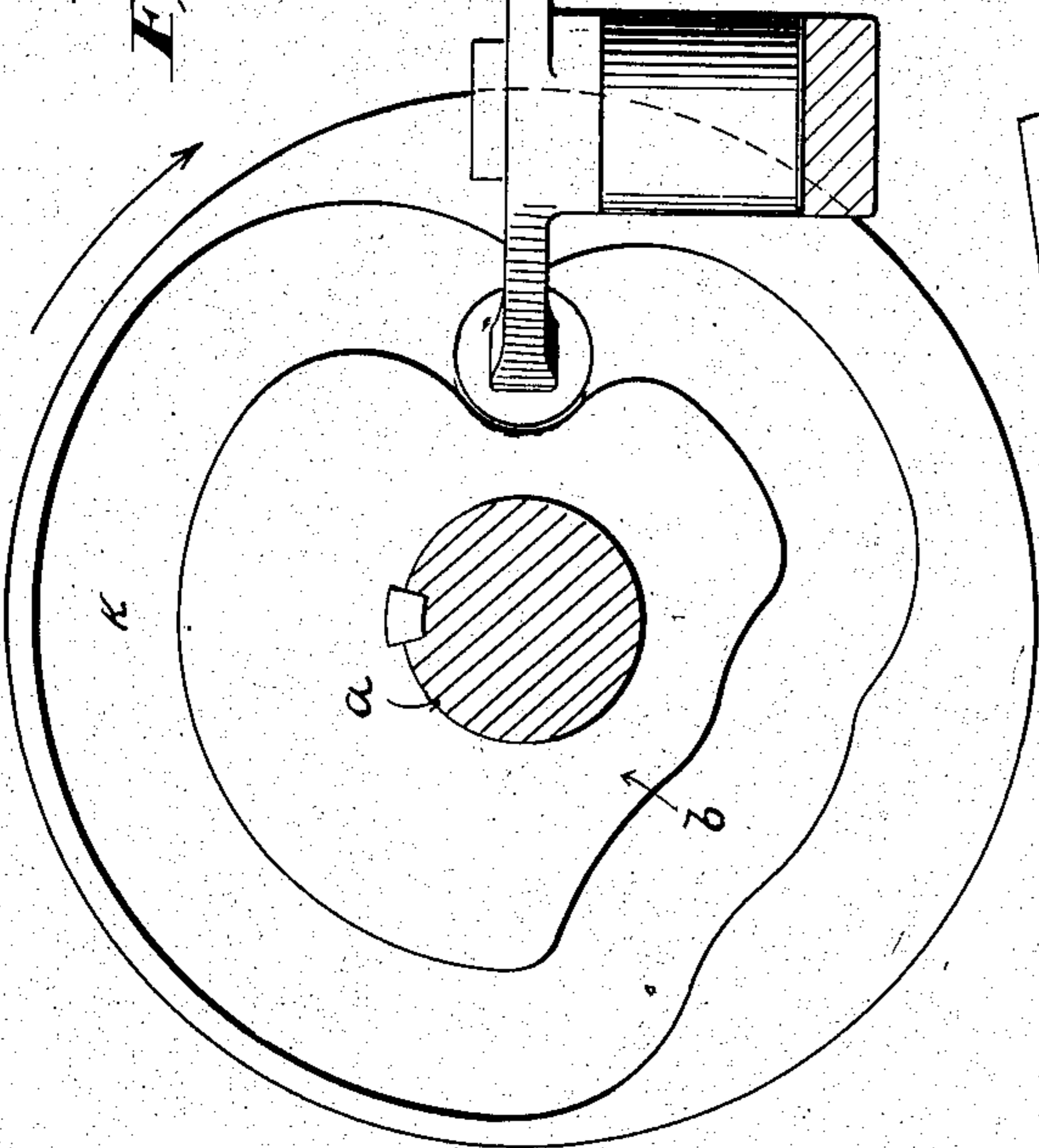
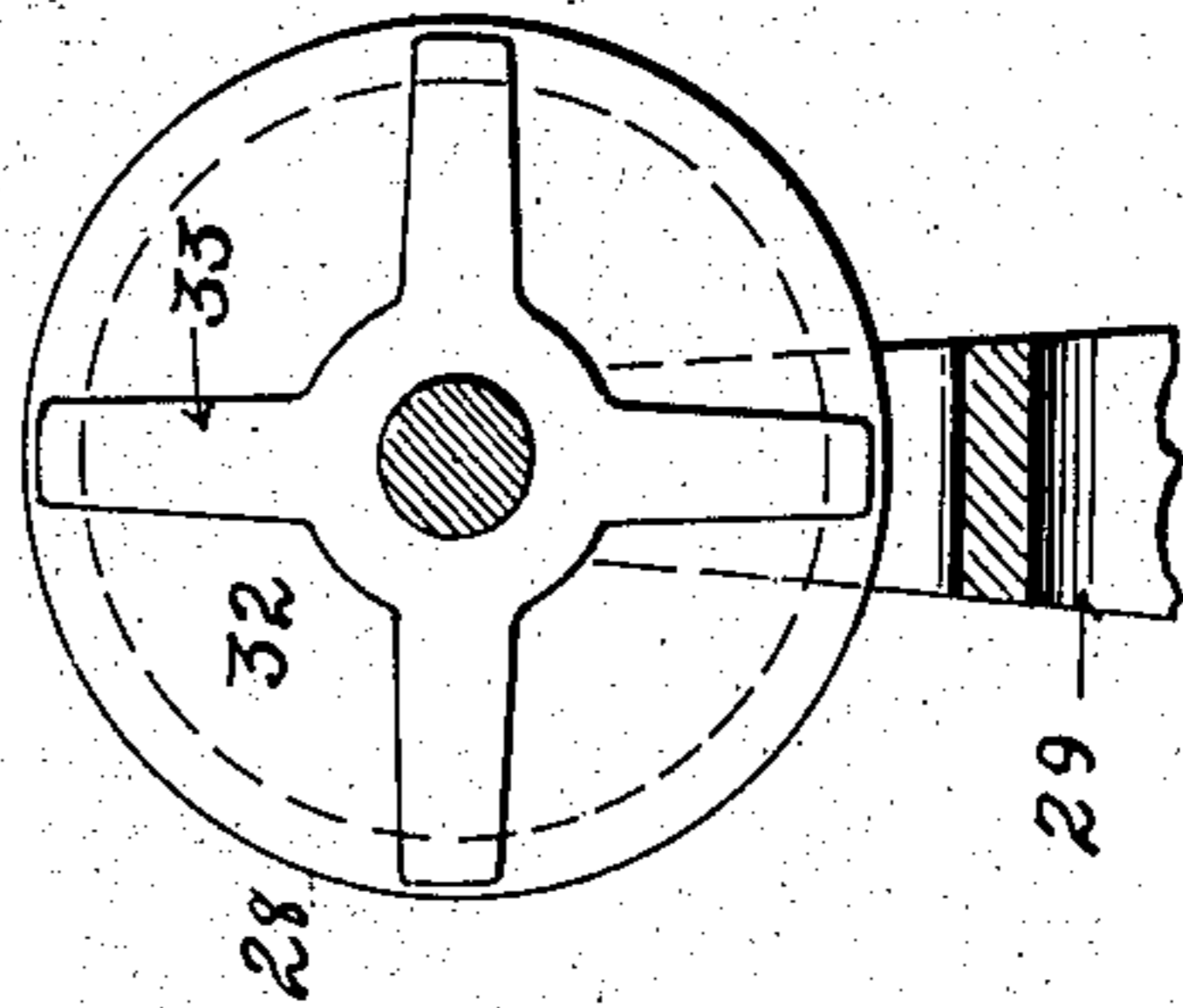


Fig. 6.

Fig. 7.



Witnesses

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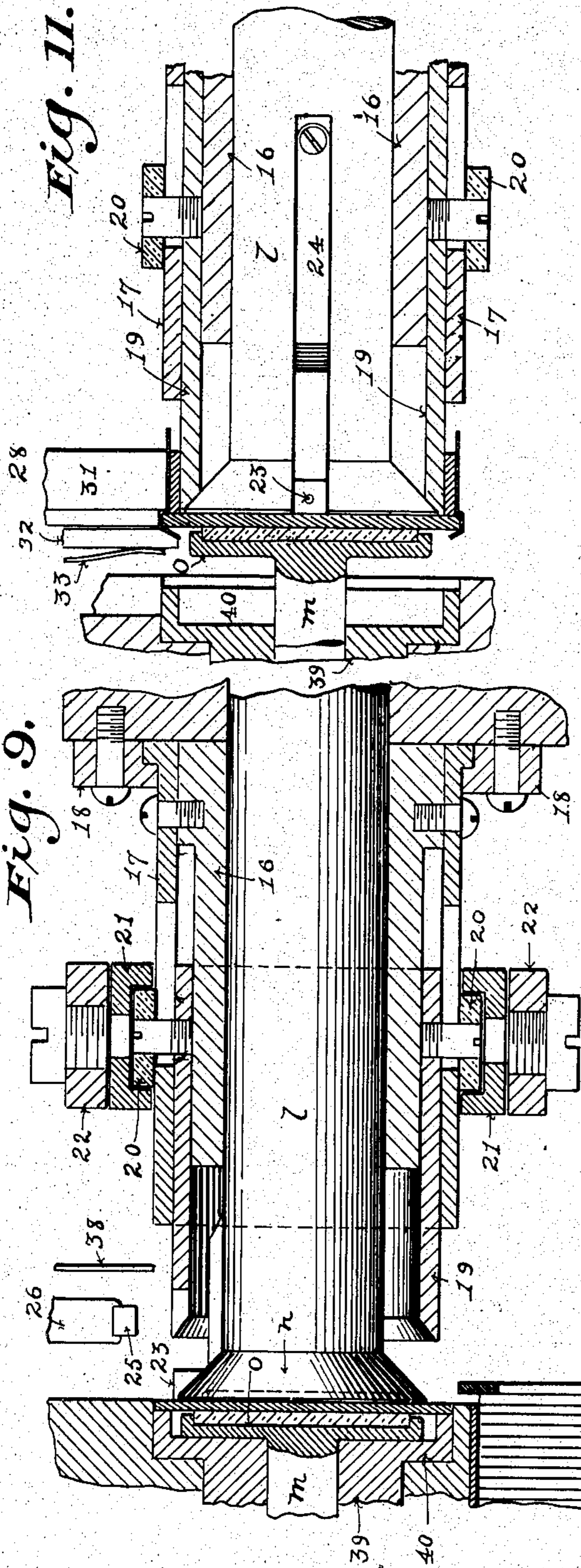
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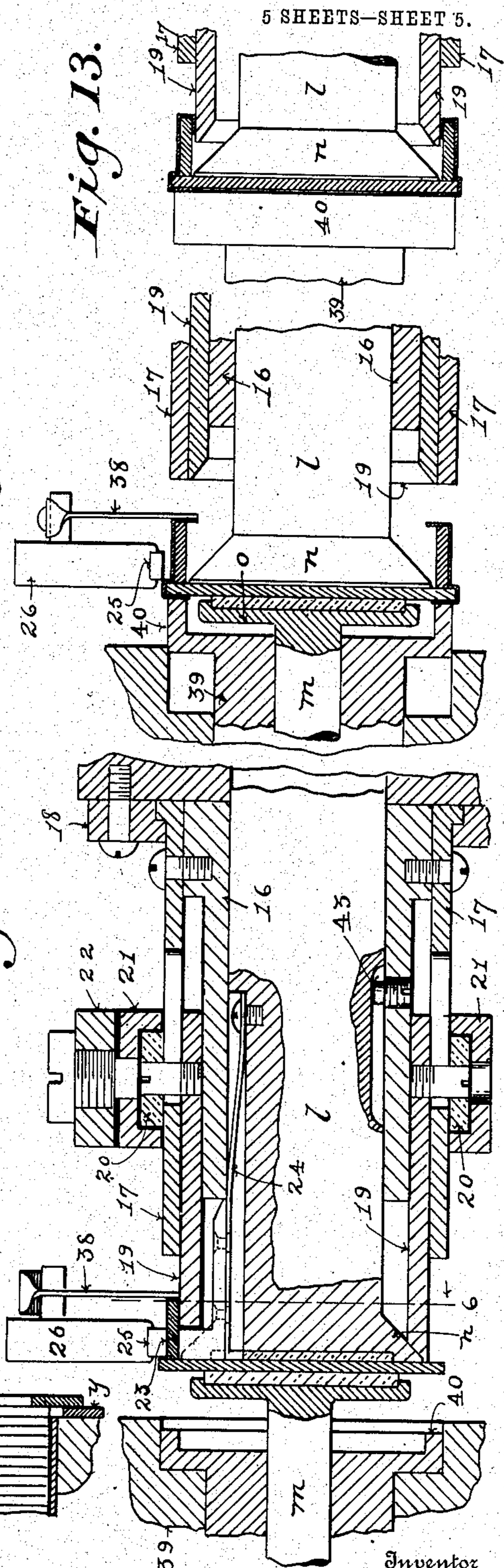
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APPLICATION FILED MAY 28, 1904.



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# UNITED STATES PATENT OFFICE.

ALBIN OESTERREICH, OF HANOVER, GERMANY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FRED N. BURT, OF BUFFALO, NEW YORK.

## PROCESS FOR THE MANUFACTURE OF PAPER BOXES.

No. 815,858.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed May 28, 1904. Serial No. 210,288.

*To all whom it may concern:*

Be it known that I, ALBIN OESTERREICH, a subject of the German Emperor, and a resident of Hanover, Germany, have invented certain new and useful Improvements in Processes for the Manufacture of Paper Boxes, of which the following is a specification.

My invention relates to processes for the manufacture of paper boxes, and more particularly to paper boxes which are cylindrically or polygonally formed.

The main object of my invention is to provide a new and useful process for the manufacture of paper boxes and box-covers with the bodies or sides and the bottoms or tops attached thereto, said bodies being so formed as to be true sections of cylinders or sections of polygons, as the case may be, and exact predetermined cross-sections.

My process consists of a particular and novel method of winding or coiling the box sides or bodies, together with a paper covering, over a rotary body-former, which acts as a fixed mandrel, and folding over the paper covering over the edge of the box-body and then folding said paper covering in upon the inner surface of the box-body over said rotary body-former, thereby forming a true cylindrical or polygonal section, and securing the same when so formed by the infold of the paper covering.

The significance of my invention will be the better understood and the necessity of the construction employed and herein shown will be made clear by a brief reference to existing methods and machines and the difficulties encountered in the manufacture of boxes of this kind.

The covers of cylindrical or polygonal boxes of this class must be held frictionally—that is to say, the outer cylindrical or polygonal body must fit snugly over the inner cylindrical or polygonal body and the fit must be so exact that the cover may be readily removed or replaced and at the same time held frictionally against falling off. This is a difficult attainment. Two strips of fiber material coiled or pasted for cover may or may not fit. If covered by covering-strips, further deviation will follow. In short, by former methods a large percentage, often as high as twenty per cent. of the output, are misfits and the fitting up must be done by hand with large attendant expense. This difficulty

can be met only by making the box-body and putting on the covering over a rotary body-former, which performs the function of a mandrel, and then folding over and securing down the edge of the covering and over the same body-former rendering the cylindrical section or the polygonal section true and of the correct diameter and fixing the same. Nor will it answer the purpose to remove the box-bodies from the mandrel over which they are formed and then over a second cylinder or mandrel attempt to make them true cylinders and all having the same diameter. This truing and gaging to a predetermined diameter must both be performed while the paste is fresh and immediately preceding the folding in and securing of the paper covering upon the inner surface of the box-body. In other words, the rotary body-former acts also as a gage, and the infolding and gumming down of the paper covering and the reëntering of the mandrel constitute means for fixing the box-body to gage, and the gaging and fixing to gage must be done substantially simultaneously.

I will now describe the method of carrying out my process by reference to the drawings herewith, in which like characters of reference indicate corresponding parts, and in which—

Figure 1 is a vertical cross-section on the line 1 1 of Fig. 2 of the machine embodying my invention. Fig. 2 is a view of the same, partly in plane and partly in horizontal section. Fig. 3 is a vertical longitudinal section on the line 3 3 of Fig. 1. Fig. 4 is a section on the line 4 4 of Fig. 1 of mechanism for feeding pasteboard and paper blanks or strips for box-bodies or sides to the machine. Fig. 5 is an enlarged section on the line 5 5 of Fig. 2. Fig. 6 is a section on the line 6 6 of Fig. 10 of the body-former, showing means for holding the advance end of a pasteboard blank or strip thereto. Fig. 7 is a side elevation as viewed from the right with reference to Fig. 8 of a wheel for pressing the covering-strip against the pasteboard body and turning it over the edge of an adjoining bottom piece. Fig. 8 is a section on the line 8 8 of Fig. 1 of the presser and forming-wheel shown in Fig. 7 and of associated parts; and Figs. 9, 10, 11, 12, and 13 are enlarged longitudinal sections of the bottom-clamping and body-forming heads and associated parts in different posi-

tions for performing the reverse operations required to make the boxes.

Referring to Figs. 1, 2, and 3, *a* is the main shaft of the machine, provided with a gear *b* and cams *c*, *d*, *e*, *f*, *g*, *h*, *i*, *j*, and *k*. *l* *m* are rotary and longitudinally-movable shafts arranged in line with each other and parallel with the shaft *a* and provided at their inner ends with clamping-heads *n* and *o* and at their outer ends with roller-bearings, which are held by springs *p* and *q* in engagement with the cams *e* and *f*, respectively. The shaft *l* is provided with a wide-faced pinion *r*, which meshes with the gear *b*. *s* is a receptacle for bottom-blanks arranged parallel with the shaft *m* and terminating at its inner end in a guideway *t* for conducting the bottom-blanks one at a time between the clamping-heads *n* and *o*. This guideway *t* is adjustably secured to the frame of the machine by set-screws *t'* *t'* and when screwed down flat against the frame will hold the blanks in a position so that only a very thin single blank will be carried up by the follower *y*. When it is desired to adapt the machine to blanks of greater thickness, the screws *t'* *t'* are loosened up and a bushing of paper or cardboard or metal bushings of predetermined thickness are inserted between the frame and the guideway *t*. In this manner the mechanism may be adjusted to blanks of any desired thickness. *u* is a follower connected by cords passing over pulleys *v* and *w* with a weight *x*, by which the bottom-blanks are fed forwardly in the holders as they are removed one at a time from its inner end. *y* is a pusher carried by one end of a lever *z* and adapted to move back and forth past the inner end of the holder *s* through the guideway *t*. The opposite end of the lever *z* is held by a spring 1 in the path of a projection on the periphery of the cam *d*. Two reciprocating slides 2 and 3 for feeding pasteboard strips or blanks and the paper covering-strip for the top or sides for boxes are operated by lateral pins on a vibrating arm 4, which is connected by a rod with the arm 5, having a roller held by a spring 6 in engagement with the cam *g*. The slide 2 is connected directly by a lug on its under side with a pin on the arm 4 nearest its fulcrum. The slide 3 is provided on its upper side with lugs 7 in the path of the other pin on said arm 4, so that during the initial movement of the slide 2 forward the slide 3 will remain at rest. These slides are grooved or flanged lengthwise on their upper sides and provided with springs 8 and 9 to hold the pasteboard and paper blanks or strips in place thereon and carrying them forward therewith between the guide-rollers 10 when the slides are advanced, said springs permitting the withdrawal of the slides when the body-blanks are caught and held upon the forming-sleeve 19, as hereinafter explained. The body

blanks or strips are previously cut to the required length and supplied by hand one at a time to the slide 2, or by slight modification of the feeding mechanism they may be cut to length as they are fed to the machine from a continuous strip wound on a reel. 11 is a reel on which is wound the paper covering-strip and from which it passes between rollers 12 and around guide-rollers 13 to the slide 3. The lower roller 12 is supplied with paste from a box 14 by a roller 15.

Referring to Figs. 9 and 10 in connection with Figs. 2 and 3, the shaft *l* passes at its inner end loosely through a sleeve 16, formed at one end with an external collar, to which is secured a sleeve 17. The sleeve 16 is made to turn with the shaft *l* by a pin or key 43, secured in said sleeve and engaging a longitudinal groove in said shaft, as shown in Fig. 10, or by other suitable means. The sleeve 17 is longitudinally slotted on opposite sides and is formed at its outer end with an external flange fitting into a flanged ring 18, by which it is revolvably connected with the adjacent bearing of the shaft *l*. In the annular space between the two sleeves 16 and 17 is loosely fitted an axially-movable sleeve 19, which serves as a form or mandrel for making the body or sides of the boxes. It is connected by screws or pins passing through the slots in the sleeve 17, with a ring 20 loosely fitting in an internally-grooved ring 21, thus permitting the sleeves 16, 17, and 18, with the ring 20, to turn with the shaft *l*, while the ring 21 does not turn. The ring 21 is pivotally connected with one end of a bell-cranked lever 22, the opposite end of which is provided with a roller engaging with a groove in the face of cam *k*, as shown in Figs. 2 and 5. For holding the advance ends of the pasteboard strips or blanks on the body-forming sleeve 19 while it makes a revolution and wraps the strip or blank around it the clamping-head *n* is provided with an inwardly-yielding point 23. This point is carried by a block which is loosely fitted in a recess in the head *n* and a notch in the end of the sleeve 19 and is mounted, as shown in Figs. 10 and 11, on the free end of a spring 24, attached to the shaft *l* in a longitudinal recess therein. 25 is an elastic presser-foot made of rubber or other suitable material carried in one end of a lever 26, the opposite end of which is provided with a roller held by a spring 27 in engagement with the cam *h*. The presser-foot 25 stands over the inner end of the sleeve 19 when the latter is in position for winding the pasteboard strip or blank thereon. 28 is a presser-wheel carried by one end of an angular lever 29, the opposite end of which is provided with a roller held by a spring 30 in engagement with the cam *i*. The wheel 28, as shown in Fig. 8, is composed of two parts 31 and 32. The part 31 has a plain smooth face with a groove or recess in one side to re-

ceive the projecting edge of a bottom-blank, as shown in Fig. 11. The part 32 is slightly beveled on the side next to the part 31 and extends beyond its periphery. It is yieldingly held against the part 31 by a spring 33 (shown in Fig. 7) to allow for variations in the thickness of the bottom-blanks and to feed the paper covering-strips by which the bottoms are attached to the bodies of the boxes. 34 is a movable knife working with a stationary knife 35 and carried at one end of a lever 36, the opposite end of which is provided with a roller held by a spring 37 in engagement with the cam *j*. These knives are located between the slide 3 and the guide-rollers 10 for cutting off the paper covering-strip at the proper point. The lever 26 is provided with a twisted angular spring 38 for turning the paper covering-strip inwardly over the edge of the pasteboard body, as shown in Fig. 12. 39 is a sleeve fitted upon and turning with the shaft *m*, which is movable endwise therein. It is internally recessed, as shown in Fig. 3, to receive the spring *q* and is provided at its inner end with a flanged head 40 for pressing the inturned edge of the paper covering-strip against the bottom, as shown in Fig. 12. The head 40 is recessed to receive the clamping-head *o*, as shown in Fig. 9. At its outer end a sleeve 39 is formed to travel with a grooved collar engaged by the forked end of a bell-cranked lever 41, the opposite end of which is provided with a roller engaging a groove in the face of the cam *c*.

The clamping-heads *n* and *o* are recessed to receive elastic pads in their opposing faces, as shown in Fig. 10, to more effectively hold the bottom or end blanks between them.

In the machine herein described and shown for carrying out my process the gear and pinion *b* and *r* are so proportioned that the shaft *l* with the clamping-heads *n* and *o* and the forming-sleeve 19 will make six revolutions to one revolution of the main shaft *a*; but this proportion may be varied according to the number and order of the operations which the machine is designed to perform.

Having thus pointed out the principal parts of the mechanism for carrying out my process, I will now describe the process by reference to the machine, indicating the steps as they are accomplished from time to time.

The bottom-receptacle *s* being supplied with bottom or end blanks and the follower *u* being placed against the outer end of the series, the slide 2 being supplied with a body-blank cut to the required length and the covering-strip being wound on the reel 11, passed between the rollers 12 and around the rollers 13, and its end tucked underneath the spring 9 of the slide 3 and the box 14 being supplied with paste, when the machine is started by power applied to the pulley 42 on the shaft *a* the pusher *y* is swung upward by the

cam *d* and carries a single bottom or end blank from the inner end of the receptacle *s* through the guideway *t* into place between the clamping-heads *n* and *o*. The head *n* is then thrust inward by cam *f* into position to clamp said blank between it and the opposing head *o*, as shown at Fig. 9. Both the clamping-heads, with the blank held between them, are thereupon moved back together by cam *e* to the forming-sleeve 19, as shown in Fig. 10. Simultaneously with or immediately following the last-mentioned operation the slides 2 and 3 are moved forward by the cam *g*, carrying the inner ends of a body-blank and the covering-strip between the guide-rollers 10, the body-blank moving in advance of the covering-strip, the covering-strip being supplied with paste on its lower side is stuck to the upper side of the body-blank as it passes between said rollers. The advance end of the body-blank passes between the sleeve 19 and the foot 25 and is momentarily pressed down upon the point 23, as shown in Figs. 6 and 10, by the engagement of the shorter projection on cam *h* with the roller on lever 26. The spring 38, the lower end of which strikes the sleeve 19, yields upwardly to permit the depression of the foot 25 in the foregoing operation. The body-blank, with the covering-strip pasted thereto, being caught and held by the point 23, is wrapped around the sleeve 19 by the rotation of the shaft *l*. At the same time the roller on lever 29 dropping into a depression on the cam *i* permits the spring 30 to carry the wheel 28 toward the sleeve 19, holding said blank and the covering-strip with a yielding pressure against said sleeve and turning one edge of the covering-strip inwardly over the edge of the bottom or end blank by a single operation and substantially coincidently with the winding on of the covering-strip, as shown in Fig. 11. The knife 34 is depressed at the proper time by the cam *j* to cut off the covering-strip to a length sufficient to extend a little more than once around the box and to lap upon itself, and the presser-wheel 28 is held against the forming-sleeve 19 while the latter makes a little over a complete revolution, so as to firmly press and stick the lapped end of the covering-strip in place. The forming-sleeve 19 is thereupon withdrawn from the head *o* by the cam *k*, and the spring 38 is depressed by the longer projection on the cam *h*, as shown in Fig. 12, while the clamping heads make another complete revolution, thereby turning the edge of the covering-strip inwardly over the edge of the body-blank at the open end of the box. In this manner the first step in my process has been completed—namely, an end-blank has been placed in position and a body-blank wound onto a mandrel and at the same time butted up against the inner face of the end-blank, so that the box-body is a true cylinder

or polygon, with a perfectly squared end closely abutted against the face of the end-blank. In addition to this the covering-strip has been turned inwardly over the periphery of the end-blank and has also been

turned inwardly over the outer end of the box-body.

While I am describing my process in making box-bodies and connecting them directly with end-blanks in the process, it will be evident that my process may be employed with equal facility and advantage in the formation of necks for boxes, which are the cylindrical or polygonal open end portions inserted within the body of the box-body proper to form the internal flange over which the cover of the box fits.

Immediately following the foregoing operation the sleeve 19 is moved back by the cam *k* toward the head *o* to turn the covering-strip inside of the box, as shown in Fig. 13. This constitutes the second step in my process. It is upon the sleeve 19, acting as a mandrel, that the box-body has been formed. This sleeve has been withdrawn and the paper covering turned inwardly, as shown in Fig. 13. The mandrel 19 now advances within the box-body to the position shown in Fig. 10, carrying the inwardly-turned edges of the covering in upon the inner surface of the box and thoroughly pressing and gluing them down therein. Coincidentally with the last two preceding operations the head 40 is thrust inwardly by the cam *c*, pressing the other intumed edge of the covering-strip against and sticking it to the bottom of the box, as shown in Figs. 12 and 13. By the coincident performance of these two operations of securing down the two overlapping edges of the covering-strip the cylindrical or polygonal body of the box has been rendered stable and fixed by the engagement of the covering-strip with the outer surface and the inner surface of the cylinder, and this has been done while the box-body has been held to a true cylindrical or polygonal position. It cannot thereafter be distorted by twisting spirally into a cone-section, as could be done if the body were released from the holder and not formed by the reentry of the mandrel. It is this step in my process and conducted in this manner which renders the box-bodies true sections, so that a perfect fit is always insured, a condition which has been heretofore attained with indifferent success. The cams *e* and *f* now permit the springs *p* and *q* to separate the clamping-heads *n* and *o*, and the head 40 is withdrawn by the cam *c* to its original position, as shown in Figs. 9 and 10, and the sleeve 19 is withdrawn by the cam *k* to the position in which it is shown in Fig. 12, thereby releasing the finished box, which is stripped from the sleeve 19 by the sleeve 17 and allowed to drop from the machine.

The foregoing operation being repeated, as

explained, a complete box or cover is made to each revolution of the main shaft *a*. By varying the shape of the clamping-heads *n* and *o*, the forming-sleeve 19, the presser-wheel 28, and the head 40 the process may be adapted to produce polygonal boxes having any desired number of plain sides with rounded corners without change in principle or mode of operation.

Having thus described my process and mechanism necessary to carrying out the same, without limiting myself to the specific mechanism herein shown and described, what I claim is—

1. The herein-described process for making cylindrical paper-box bodies, comprising the winding up of a body-blank, winding an adhesive covering-strip of greater width than said body-blank onto the same, turning by a single operation one edge of said covering-strip over one edge of said blank, turning by a single operation the other edge of said covering-strip over the other edge of said body-blank, forcing the last-named edge of said covering-strip within and pasting it on said body-blank, then truing said body-blank with the covering-strip attached thereto to a predetermined gage while the gum on said covering-strip is green and the parts are in a yielding condition.

2. The herein-described process for making cylindrical paper-box bodies, comprising the winding up of a body-blank, winding an adhesive covering-strip of greater width than said body-blank onto the same, turning by a single operation one edge of said covering-strip over one edge of said blank, turning by a single operation the other edge of said covering-strip over the other edge of said blank, forcing the last-named edge of said covering-strips within and pasting it on said body-blank, then truing said body-blank with the covering-strip attached thereto to a predetermined gage while the gum on said covering-strip is green and the parts are in a yielding condition, and fixing said body to gage by the inturn of said covering-strip and gluing or gumming the same to the inner surface of said body-blank.

3. The herein-described process for making cylindrical paper boxes, comprising the winding up of a body-blank with one edge thereof abutting against the surface of an end-blank, simultaneously winding on an adhesive covering-strip of greater width than the said body-blank plus the thickness of the end-blank, turning by a single operation one edge of said covering-strip over the end-blank and securing the same to the outer surface of said end-blank, turning by a single operation the other edge of said covering-strip over the open end of said body, forcing the last-named edge of said covering-strips within and pasting it on said body-blank, then truing said body with the covering-strip in place on said

body to a predetermined gage while the gum on said covering-strip is green and the parts are in a yielding condition.

4. The herein-described process for making cylindrical paper boxes, comprising the winding up of a body-blank with one edge thereof abutting against the surface of an end-blank, simultaneously winding on an adhesive covering-strip of greater width than the said body-blank plus the thickness of the end-blank, turning by a single operation one edge of said covering-strip over the end-blank and securing the same to the outer surface of said end-blank, turning by a single operation the other edge of said covering-strip over the open end of said body, forcing the last-named edge of said covering-strip within and pasting it on said body-blank, then truing said body with the covering-strip in place on said body to a predetermined gage while the gum on said covering-strip is green and the parts are in a yielding condition, and fixing said body to gage by the inturn of said covering-strip and gluing or gumming the same to the inner surface of said body.

5. The herein-described process for making cylindrical paper-box bodies, comprising the winding up of a body-blank over a mandrel and simultaneously winding upon said body-blank an adhesive covering-strip of greater width than said blank, removing the said blank with said covering-strip wound thereon from said mandrel, turning by a single operation the edge of said covering-strip over the edge of said body-blank, and then replac-

ing said box-body on said mandrel to bring the same to gage and at the same time turning in and securing said inturned edge on the inner surface of said body-blank to fix the said box-body to the gage determined by said mandrel.

6. The herein-described process for making cylindrical paper boxes, comprising the winding up of a body-blank over a mandrel with one edge thereof abutting against the face of an end-blank, simultaneously winding upon said body-blank an adhesive covering-strip of greater width than said body-blank plus the thickness of said end-blank, turning by a single operation the edge of said covering-strip over the face of said end-blank and securing the same thereto, removing said blank thus secured at one end to said end-piece from said mandrel, turning by a single operation the edge of said covering-strip over the open end of said body-blank, and then replacing the box-body on said mandrel to bring the same to gage while the gum on said covering-strip is green and the parts are in a yielding condition, and at the same time turning in and securing said inturned edge to the inner surface of said body-blank to fix the said box-body to the gage determined by said mandrel.

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

ALBIN OESTERREICH.

Witnesses:

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R. LUDER.