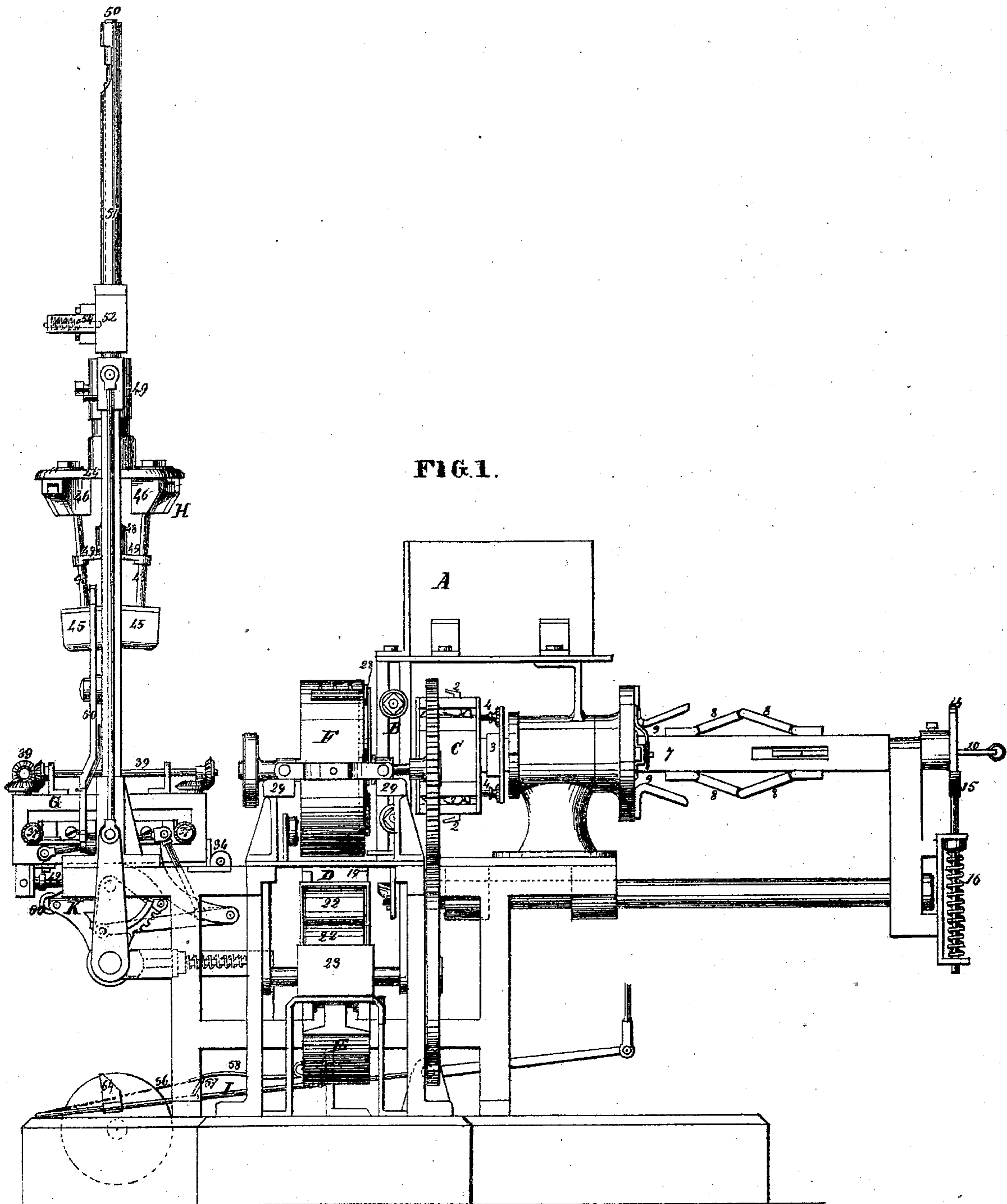


H. R. HEYL.
Improvement in Paper Box Machines.
No. 120,436. Patented Oct. 31, 1871.



WITNESSES.
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H. R. HEYL.
 Improvement in Paper Box Machines.
 No. 120,436.

6 Sheets--Sheet 2.

Patented Oct. 31, 1871.

FIG. 19.

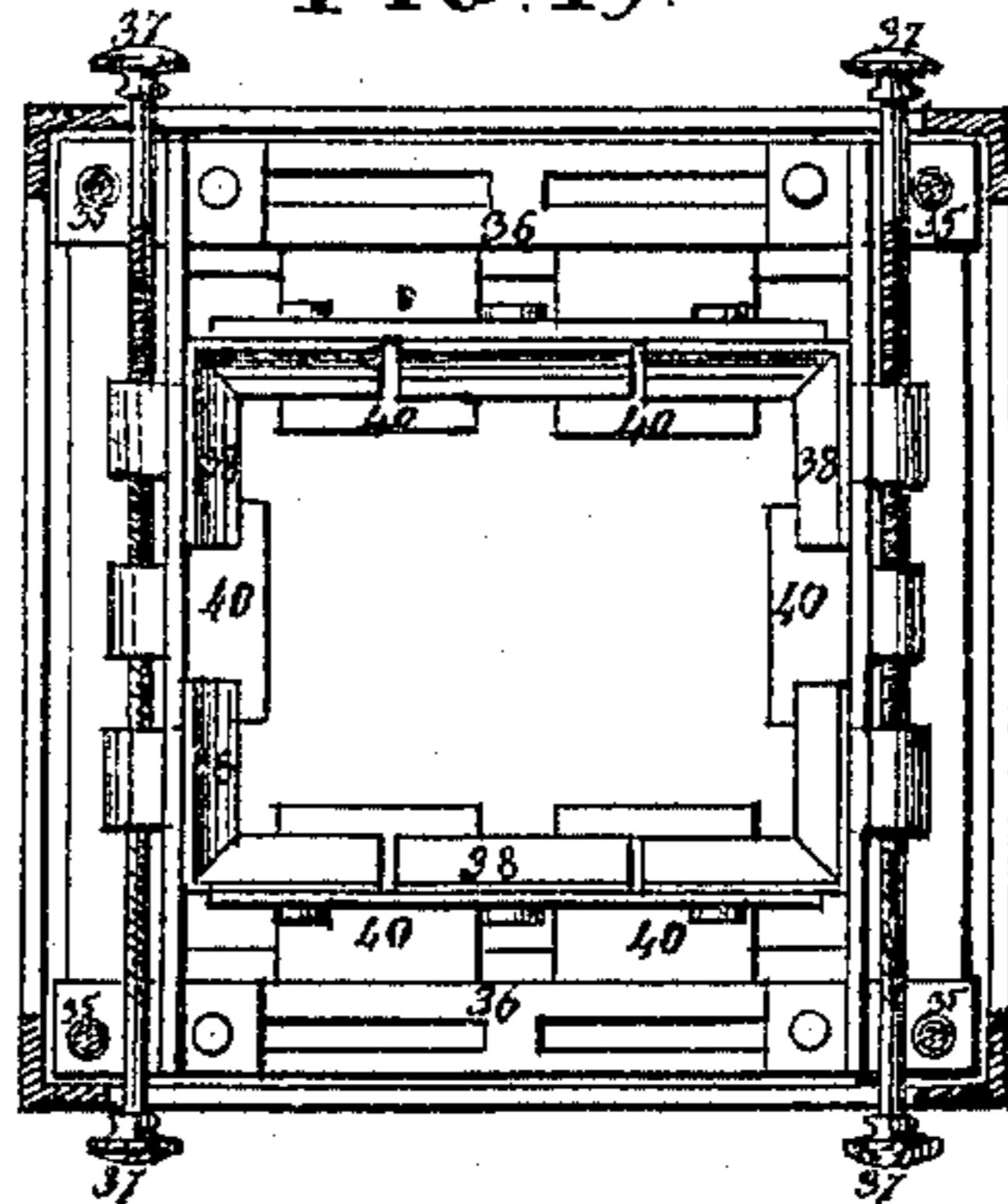


FIG. 18.

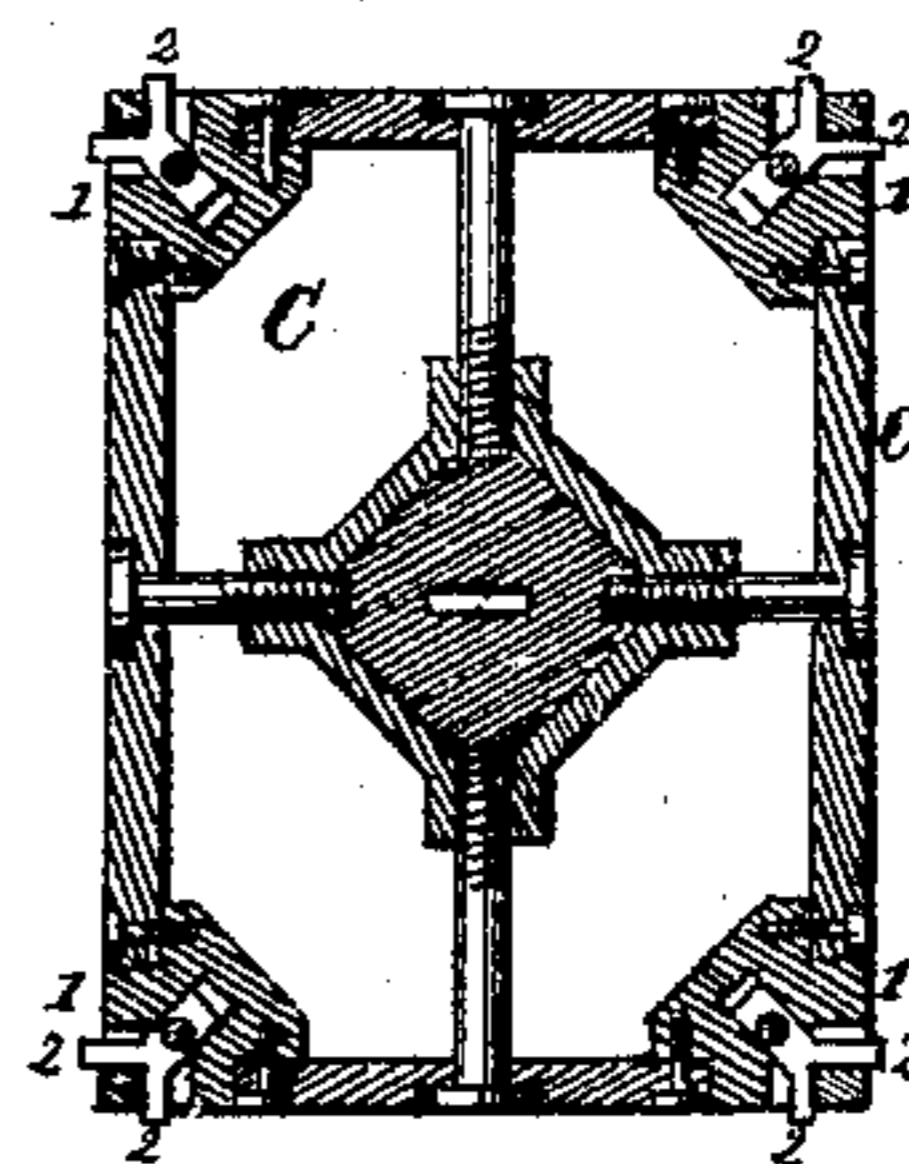
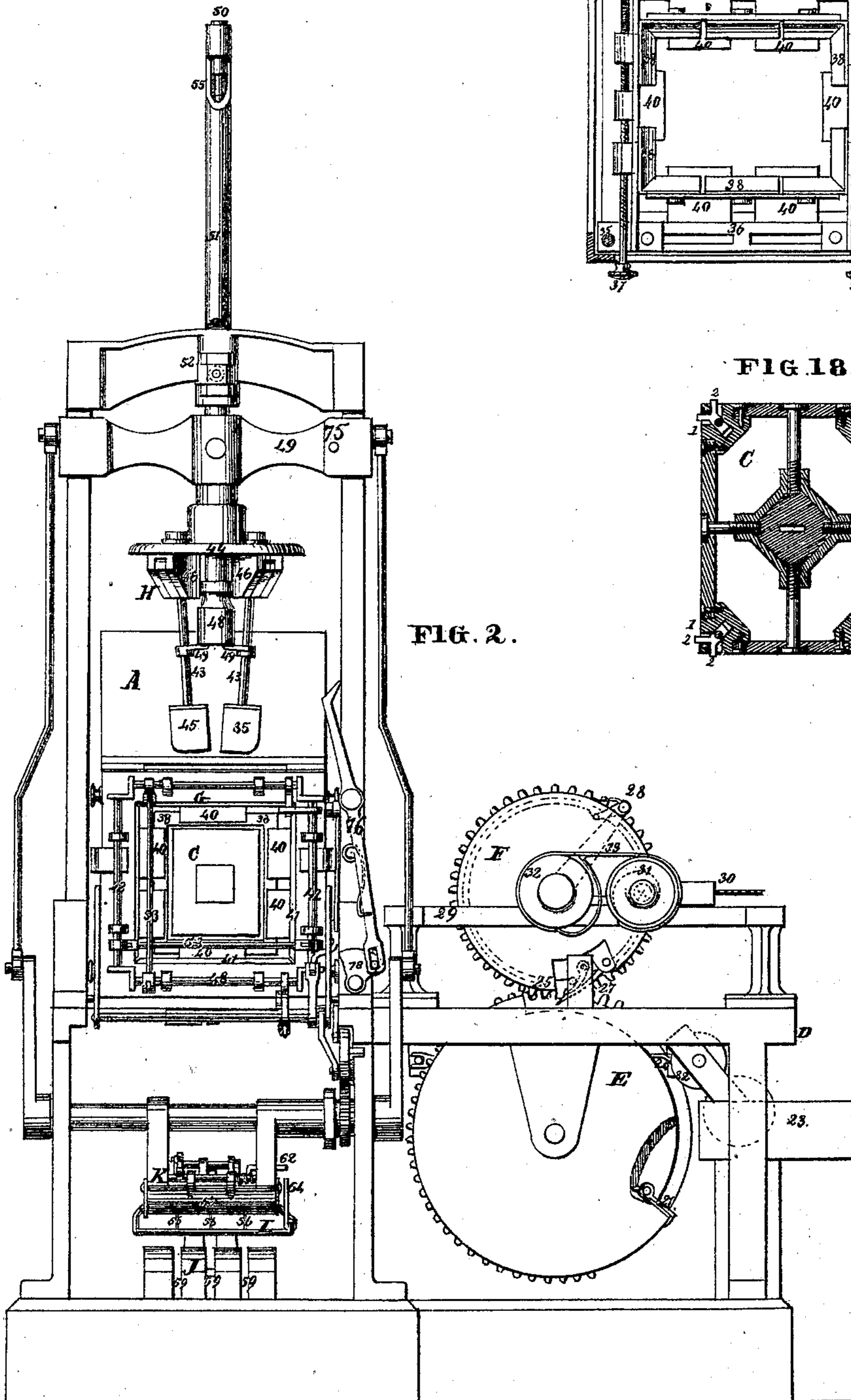


FIG. 2.



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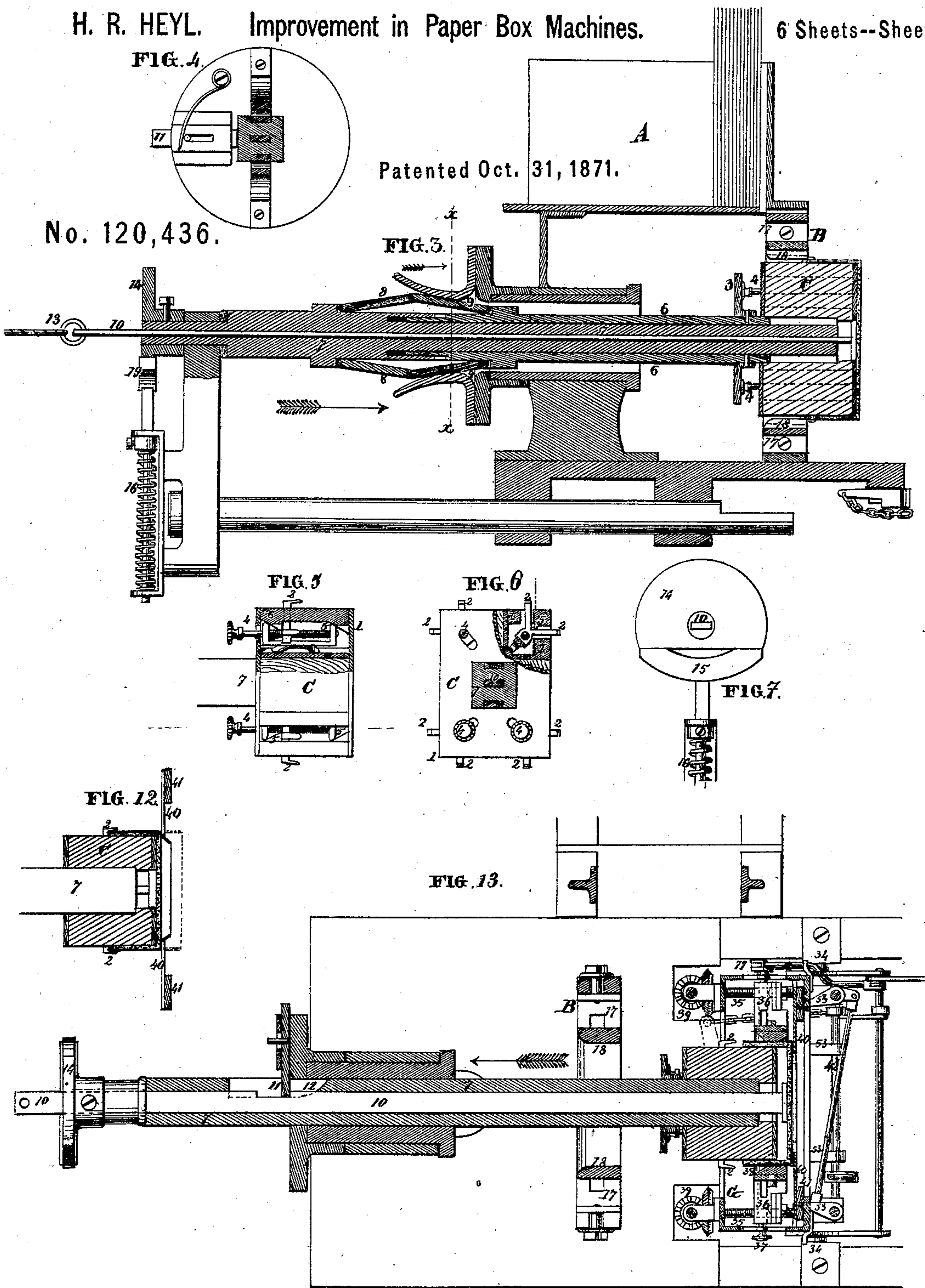
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H. R. HEYL. Improvement in Paper Box Machines.

6 Sheets--Sheet 3.

FIG. 4.
No. 120,436.

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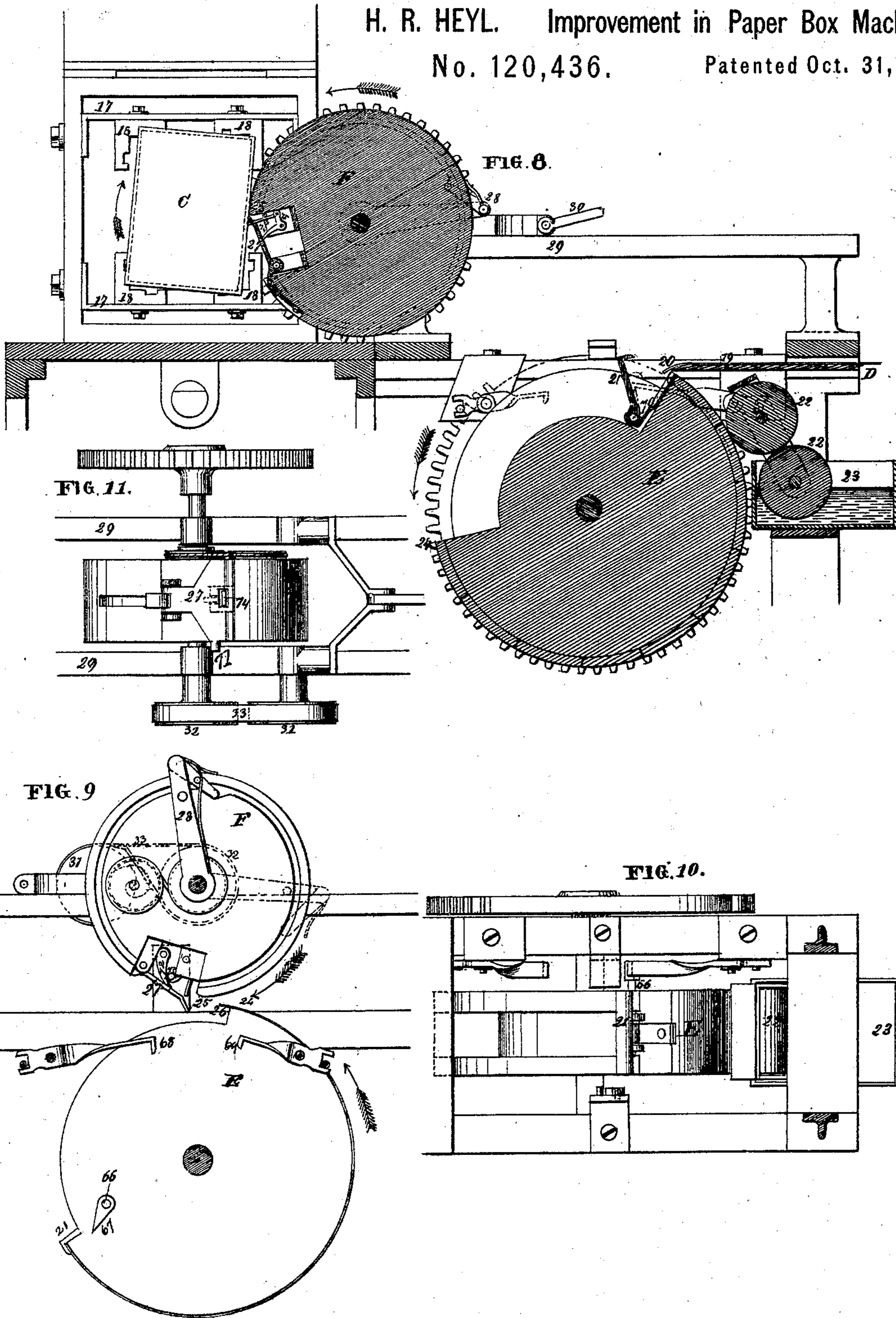
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H. R. HEYL. Improvement in Paper Box Machines.

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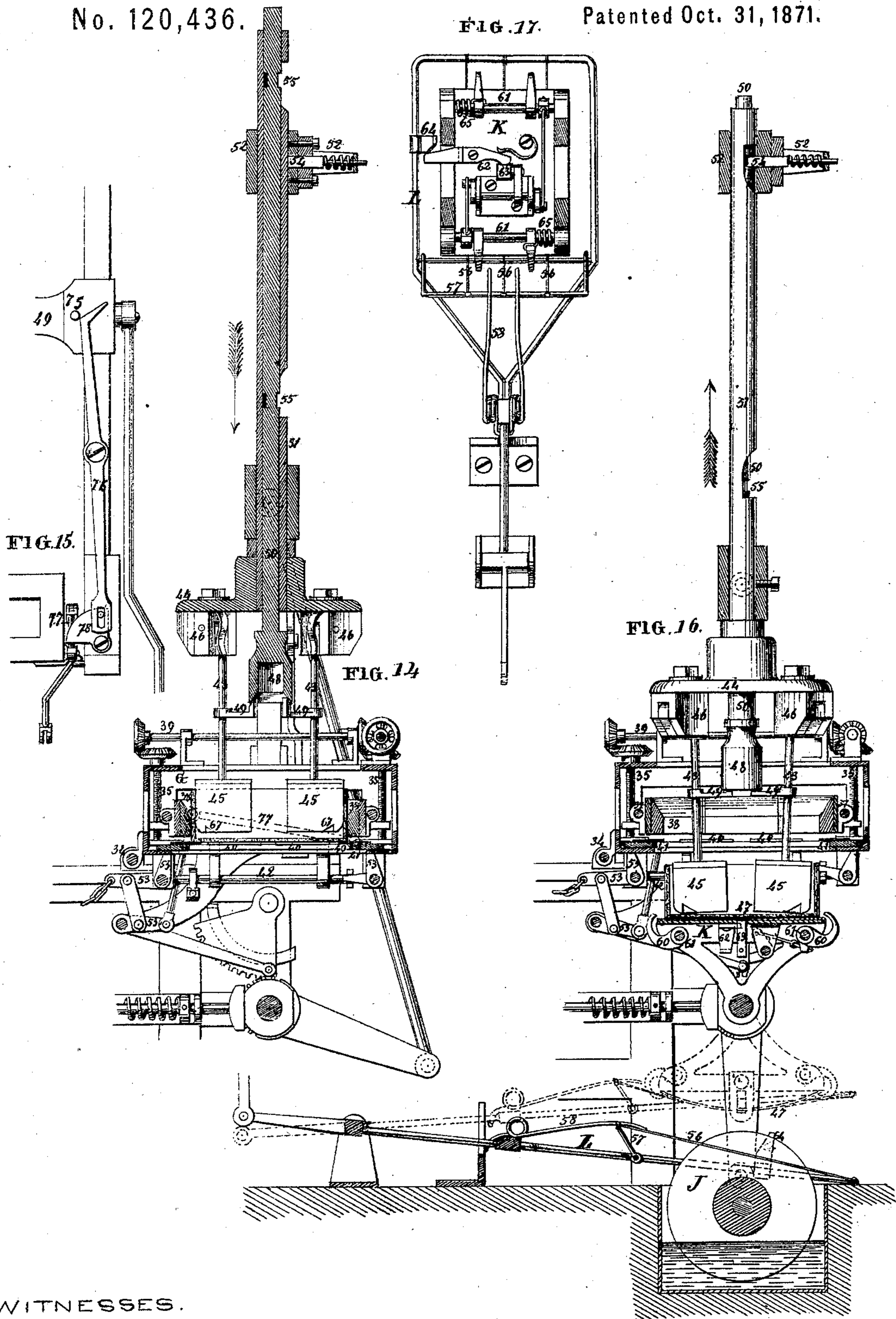
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No. 120,436.

FIG. 17.

Patented Oct. 31, 1871.



WITNESSES.

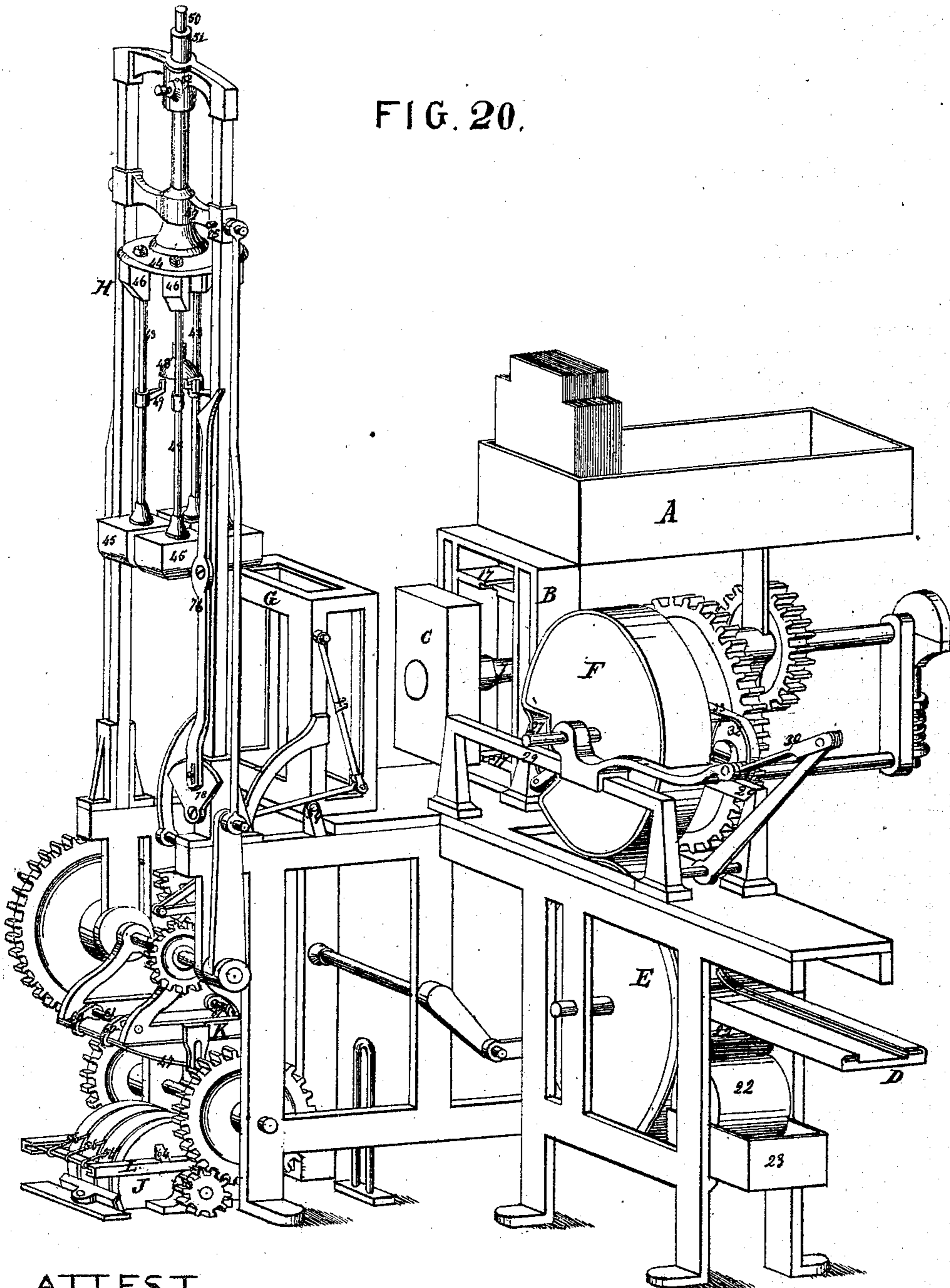
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FIG. 20.



ATTEST.
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Atty.

UNITED STATES PATENT OFFICE.

HENRY R. HEYL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO C. S. PATTERSON; AND SAID HEYL AND PATTERSON ASSIGN THEIR RIGHT TO AMERICAN PAPER-BOX MACHINE COMPANY, OF SAME PLACE.

IMPROVEMENT IN PAPER-BOX MACHINES.

Specification forming part of Letters Patent No. 120,436, dated October 31, 1871.

To all whom it may concern:

Be it known that I, HENRY R. HEYL, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Machine for Manufacturing Paper Boxes; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawing, in which—

Figure 1 is a side view of the machine. Fig. 2 is a front view thereof. Fig. 3 is a vertical section of the crimping-plunger, hereinafter described, together with mechanism for controlling its movements, and of the box in which the pasteboard blanks are contained. Fig. 4 is a vertical section at *x x*, Fig. 3. Figs. 5 and 6 are, respectively, a side and a rear elevation, partly in section, of the crimping-plunger, hereinafter described. Fig. 7 is an elevation of a device employed to retain the said plunger in its normal position when at rest. Fig. 8 is a vertical section, looking front, of the devices employed for pasting and applying the wrappers. Fig. 9 is a rear elevation of the same parts in another position. Fig. 10 is a plan of a portion thereof. Fig. 11 is a plan of another part of the same. Fig. 12 is a horizontal section of the crimping-plunger with the box in position, showing leaves in the act of folding the edges of the wrapper around the bottom. Fig. 13 is a horizontal section of said plunger and its accessories, showing the plunger in position within the folding-frame and the latter in its first or upright position, the turning of the projecting edges of the wrapper being completed. Fig. 14 is a vertical section of the vertical plunger, hereinafter described, and the folding-frame before referred to, the latter being in its second or horizontal position, and a box within it being pressed by the plunger. Fig. 15 is an elevation of a lever-and-cam movement employed to retract the leaves beneath the folding-frame when the box is to be pressed through the frame. Fig. 16 is a vertical section in same plane as Fig. 14, showing the box pressed through the folding-frame and in the act of receiving its label, and the vertical plunger receding from within it. Fig. 17 is a plan of the mechanism employed for pasting and applying the labels, the

label platform being shown in horizontal section in the portion represented by dotted lines in Fig. 16. Fig. 18 is a transverse section of the crimping-plunger under a modified form. Fig. 19 is a transverse section of the folding-frame. Fig. 20 is a perspective view, illustrating the relative positions of the principal parts of the machine.

To enable others to understand the principles of the machine and the mode of operating it, I will first give a general description of the process of making a box upon the machine, and then describe in detail the various novel parts.

The object of the machine is to produce from pasteboard and paper properly cut or prepared a paper-box complete.

The pieces of pasteboard from which the boxes are to be made are placed directly over the machine in the box A, so that they can be dropped one by one at each revolution of the machine, directly behind the crimping-frame or former B and in front of the reciprocating plunger C. Fig. 1 shows the position of the parts at this period. The plunger then moves forward, pressing the pasteboard through the opening in the former B, which, being barely large enough to admit of its passage, bends the pasteboard close to the plunger, where it is held by a set of nippers attached to the plunger. Fig. 3 shows the plunger in the act of forcing the pasteboard through the former. The plunger then stops its forward movement a short distance in front of the former B to receive the covering-paper. A strip of paper of sufficient length to go entirely around the box is inserted at the extreme right of the machine at D, Figs. 2 and 8, and is caught by and carried around the pasting-wheel E, which, in its return motion, transfers the paper to the pressing-wheel F, pasted side out; from this wheel it is again transferred to the sides of the box by a forward movement of the pressing-wheel (until it rests against the box) and a revolution of plunger C. Fig. 8 shows the pasting-wheel in the act of seizing the paper strip. Fig. 9, taken from the opposite direction, shows the paper strip on the pasting-wheel about to be transferred to the pressing-wheel. The box with the covering-paper around it is then carried forward by the plunger into the folding-frame G, when the cover-paper is lapped around

against the bottom of the box by a set of leaves or folders which move inward across the bottom as the box is pressed upon them. This operation is illustrated in Figs. 12 and 13, the latter figure showing the plunger about to be withdrawn from the box. The plunger then returns to its first position, leaving the box in the folding-frame G, which then rocks over into a horizontal position directly under the vertical plunger H. The next operation is to fold the upper edge of the cover-paper over the top and down into the inside of the box. This is done by the inward and downward motion of the square-grooved feet of the vertical plunger H as they pass down into the box, as shown in Fig. 14. The label or square piece of paper for the bottom of the box is pasted by being laid upon the paste-roller, from which position it is thrown, pasted side out, up against the platform K by the lifting-rack L, as illustrated by dotted lines in Fig. 16. Small nippers or fingers attached to the platform K grasp the label at either end and hold it against the platform, while the latter turns upward and brings the label immediately under the box. The box is then pushed down through the folding-frame G upon the label that lies under it, as shown in Fig. 16, and the label is made to adhere to the box by a firm pressure of the vertical plunger. This completes the operation, and the vertical plunger returns to its original position, leaving the finished box upon the platform K, which in proper time again turns down and casts the box out at the end of the machine.

Having thus described the general movements and effects of the machine, I shall now explain the mechanism of each important part, viz.: Fig. 3 represents a longitudinal section of the reciprocating plunger C and its connections. The plunger-head C is made up of movable sections, as shown in Fig. 18, so that it can be altered in shape and size when necessary. The corner sections 1 1 1 1, Figs. 5 and 6, contain the nippers 2 2 that hold the pasteboard to its place upon plunger while the covering-paper is being pasted around it. In order to grasp the pasteboard the nippers are moved inward and downward, all at once, by the action of the plate 3, Fig. 3, against the bars 4 and the inclined planes 5 5, Fig. 5. These nippers may be shifted to any position in their grooves by turning the screw-bar 4, upon which they are set. The plate 3, Fig. 3, gets its motion through the slide bars 6 6, which run in grooves in the plunger-shaft 7 and are attached to the jointed pusher-arms 8 8. In passing through the bearing 9 these pusher-arms are pressed down close to the shaft, which has the effect of pushing the plate 3 forward against the nipper-bars 4, thereby forcing all of the nippers down upon the edge of the pasteboard at once, and as the pusher-arms pass out of the bearing at the other end the nippers are released to allow the box to be pushed off from the plunger. The pushing of the box off from the plunger is effected by the pusher-rod 10 running through the center of the plunger-shaft. This rod is forced out beyond the face of the plunger C, as the plunger commences to return, by being held

at the back end by a latch, 11, Fig. 13, and after the box is fairly off the plunger the latch is lifted by the inclined plane 12 and the pusher-rod is drawn back into its place by the action of an elastic cord, 13, Fig. 3, or a spring of any proper form. During the time that the plunger C is not in rotation it is kept in proper position by means of the cam 14, Figs. 3 and 7, and the T-brace 15, which bears up continually against the flat side of the cam by the force of the spiral spring 16. The crimping-frame or former B, Fig. 3, and also shown in outline in Fig. 8, is made up of the adjustable cross-bars 17 17 and the corner sections 18 18 18 18, set within a square frame, so that the opening through which the plunger C passes can be altered to any required size. Fig. 8 represents that part of the machine which pastes the covering-paper and transfers it to the box upon the plunger C. The strip of paper, of proper length and width, is inserted at D, and passing through the guide 19 until it reaches the point 20 it is caught by the nipper 21 upon the pasting-wheel E, and as the pasting-wheel moves forward the paper is drawn with it and laid around upon the pasted face of the wheel, the paste having been supplied by the rollers 22, which carry it from the paste-pan 23. The periphery of the wheel E is formed by the insertion of sections that can be removed, so that the surface can be shortened to correspond with the length of the strip of paper that is to be pasted. The movement of the pasting-wheel E is simultaneous with the reciprocating motion of the plunger-shaft 7. The pressing-wheel F, when directly over the pasting-wheel E, as shown in Fig. 9, is in gear with it and must turn in the opposite direction, so that the two points, 24 on the wheel E and 25 on the wheel F, must meet at 26; here the nipper 27, on wheel F, grasps the latter end of the strip of paper that projects over the face of the wheel E at 24, and as both wheels make a reverse revolution the paper is transferred to the upper wheel F pasted side out. The latter end of the strip of paper is secured to this wheel by a set of fingers attached to the arm 28. The pressing-wheel F then slides forward upon the bars 29 by the action of the connecting-rod and lever 30, and is immediately released from connection with the pasting-wheel E; it then rights itself into proper position by means of the spring-barrel 31 and pulley 32, Figs. 9 and 11, which are connected by a belt, 33, both ends of which are passed over the spring-barrel and pull in the same direction, and thereby always bringing the point 25 on wheel F horizontal to its axis, so that as the wheel is pressed forward against the plunger C the end of the strip of paper will attach itself to the box. In this position, with the wheel F pressing against it, the plunger C makes a revolution and the paper is pasted entirely around the box. To adapt the nipper 21 of the pasting-wheel to catch and release the end of the paper strip at the proper moment it is hung upon a pivot, 66, adapted to be turned in each direction alternately by an arm, 67, striking against tappets 68 69, or by other means. The heel of the nipper is formed

with two flat surfaces, adapting it to be held in either its open or closed position by a spring, 70. When the wheel reaches the proper position to catch the paper the nipper is shut down by the arms 67 coming in contact with the tappet 68; and when the paper has been transferred to the pressing-wheel the arm 67, striking the tappet 69, throws up the nipper to the position shown in Fig. 8, which position it retains until it has to catch a new strip. The spring-clip 27, by which the pasted strip of paper is drawn from the paste-wheel E and around the pressing-wheel F, may be opened as follows: a lug, 71, Fig. 11, projecting from the said clip, is carried against a pivoted cam or tappet, 72, Fig. 9, which rests against a pin, 73, so that when the clip 27 approaches the projecting end of the paper strip at 26 the said clip will be elevated and, again escaping from the tappet, will seize the end of the paper. The wheel is then turned in the opposite direction, as indicated by the arrow in Fig. 9. The pivoted tappet will yield without raising the clip. When the first end of the paper strip is pressed against the side of the box it is instantly released from the wheel F by a pin, 74, striking against the box and pressing inward against a bell-crank lever, 75, so as to throw the long arm of the latter outward against the clip 27 and elevate it from the paper. Fig. 19 represents the folding-frame G, into which the box next passes, for the purpose of having the covering-paper folded around upon the bottom and down the inside of the box. The said frame is also shown in position in Figs. 13, 14, and 16. This part of the machine is a light rectangular frame which rocks, upon pivots 34 34, into a horizontal or vertical position, as required. Inside of this frame, and supported at the four corners upon the screws 35 35, is a pair of cross-bars, 36 36, by means of which, in connection with the long screws 37, the sectional casing 38 38 38 can be adjusted to the proper size and shape to receive the box from the plunger C. The screws 35 35 35 35, being connected with each other across the top of the frame by a line of shafts and gears, 39 39 39 39, can be turned together for the purpose of raising or lowering the casing 38 38 to adapt it to the depth of the box that is to be made. The upper edges of the casings 38 38 are beveled inward for the purpose of directing the box as it is pushed into the opening, and for other reasons that will be explained in connection with the vertical plunger. In the bottom of the folding-frame is a series of leaves or folders, 40 40 40 40, that are made to slide inward across the bottom of the box for the purpose of folding the lower projecting edge of the covering-paper to its place. These leaves are flat pieces of metal set upon four sliding plates, 41 41 41 41, which are worked simultaneously by the connecting-shafts and levers 42, Figs. 13, 14, and 15. Leaves of different lengths and widths are substituted at any time, as the difference in the size of the box may require. The vertical plunger is composed of a set of arms, 43, equal in number to the angles of the box, which are arranged upon a face-plate, 44, so that the several feet 45 45 form a block of the size and shape

of the inside of the box. These arms are all hinged at the top upon the pivots 46 46 and are kept expanded by a spring at the joint of each. The feet are made of wooden or metallic blocks with grooves cut in the bottom around and near the outer edge. When the folding-frame just described has rocked or swung over directly under the vertical plunger the plunger descends and the feet 45 45, striking the beveled edges of the casing 38 38 38 38 in the folding-frame, glide down into the box, pressing firmly against its sides. As the feet are entering the box the upper edge of the covering-paper is caught in the grooves 67 and is bent down into and against the inside of the box, the outward pressure of the feet setting it firmly to its place. At the moment that the vertical plunger has reached the bottom of the box the folding-leaves 40 40 recede, allowing the box to be pushed down through the folding-frame upon the platform K, Fig. 16. When the folding-frame G is rocked over into a horizontal position the leaves 40 are in their inward or contracted position. As the plunger descends a pin, 75, upon the cross-head 49 strikes the toe of the lever 76, which is pivoted to one of the standards of the frame. This action of the lever rocks the sector 78 and brings one of its radial edges down upon the lever 77, which communicates motion to the other levers by which the levers 53 are actuated. Here it is necessary for the plunger-feet to contract sufficiently to allow them to draw out of the box and return upward, leaving the box upon the platform K. This contraction is effected by means of the socket 48, which is pressed down over the hooks 49 attached to the standards 43. This socket gets its motion through the stem 50, which passes up through the plunger-shaft 51. Upon the cross-brace 52 is set a spring-bolt, 54. This bolt is allowed to pass, through a notch in the plunger-shaft 51, into a slot in the socket-stem 55, and by this means the socket is held stationary while the plunger moves upward, until the end of the notch in the shaft has reached the roller in the bolt, which causes the bolt to lift out of the slot in the socket-stem. The bolt is allowed to act upon the socket again when the plunger begins to descend, thereby lifting the socket from the hooks and allowing the feet to expand again. Fig. 16 represents the paste-roller J, platform K, and lifting-rack L, which prepare the label for the bottom of the box. The rack L is a frame having a set of wires or cords stretched across it from end to end for the purpose of lifting the label from the paste-roller J. This rack is lifted by a cam on the central counter-shaft beneath the table. These wires 56 are attached at one end to a movable cross-bar, 57, and are kept stretched by the spring 58, so that they can conform to the curved face of the platform K as they are pressed up against it. The paste-roller J, upon which the label is laid after the roller has made a revolution and become coated with paste, is provided with deep grooves 59 59 59 59, through which the wires 56 56 56 can pass, and in this position lie under the label, so that, as the rack is lifted up, the paper will

lie on top of the wires. When the label is pressed up against the face 47 of the platform K the nippers 60 60 are released and spring around, clasp- ing the label at either end and securing it to the platform. The operation of the nippers 60 for grasping and releasing the label is effected by the devices shown in Figs. 16 and 17. The shaft 61 at either end of the platform K, upon which the nippers are fixed, are connected by levers and rods to a central rock-shaft, which has also a connection by a lever with a sliding bar or post, the upper end of which rests against the under side of the curved metallic face 47. When this curved face is pressed down flat the post is also pushed down, thereby giving a revolution to the levers and rods that draw the nippers 60 back from contact with the curved face 47. When the post 63 is entirely down the click 62 springs into a notch in the post 63 and holds the nippers 60 back in the open position until the platform K turns face downward, and the trigger 64 upon the side of the lifting-rack L comes up in contact with the other end of the click 62 and pushes it back, thereby freeing the post, which allows the nippers 60 to return to the closed position by the power of the spiral springs 65. This position of the parts is indicated by dotted lines in Fig. 16. Half a revolution of the platform K then brings the label on top and directly under the box and vertical plunger. As the box is then pressed down upon the label the curved face 47, which is made of sheet metal, flattens down upon the solid base and the nippers turn out and lock in the position shown. The object in having the curved face 47 is to gradually expel the air from between the box and label, to avoid blisters.

Mechanism for automatically producing the movements of the plunger C, pressing-cylinder F, and rocking frame G will be described in a subsequent application; but the described movement of these and other parts may be produced by any adequate means. The special features of invention claimed in this application do not depend on the specific mechanism, automatic or otherwise, for actuating the various parts with proper relation to each other.

The following is what I claim as new:

1. The plunger C, constructed with corner sections 1 1, two or more in number, and with nippers 2 2, operating substantially as and for the purpose set forth.
2. The combination of the plate 3 and slide-bars 4 6 8 for operating the nippers 2, substantially as described.
3. The pasting-wheel E, having an adjustable periphery made up of sections and provided with a nipper, 21, substantially as described and for the purpose set forth.

4. The pressing-wheel or roller F, operating substantially as described, to take the wrapper or covering-paper from the pasting device and apply it to the body or sides of the box.

5. The combination, operating as shown and described, of a pasting-wheel, a reciprocating pressing device which takes the covering-paper or wrapper therefrom and applies it to the box, and a support for the said box.

6. The combination of the double belt 33 and pulleys 31 32, operating substantially as described, in connection with a suitable spring to restore the parts to their normal or central position when moved in either direction.

7. The receiving or folding-frame G, adjustable in dimensions, and supported adjustably by screws 35, which are connected so as to move simultaneously, substantially as described.

8. The expanding plunger H, provided with grooved and beveled feet attached to pivoted arms, and operating to catch the upper edges of the wrapper and carry them down within the box, in the manner explained.

9. The combination, operating as shown and described, of an expanding - and - contracting plunger with the beveled frame or receptacle for the box.

10. The combination of the arms 43, expanded by suitable springs, and the contracting devices consisting of the socket 48, hooks 49, and spring-bolt 54, operating in connection with the hollow plunger-shaft 51, substantially as described.

11. The paste-roller J, having two or more grooves, 59, in combination with a lifting-rack, adapted to operate substantially as described and for the purpose set forth.

12. The lifting-rack L, with the cross-wires 56 56, the movable cross-bar 57, and the tension-spring 58, substantially as described and for the purpose set forth.

13. The platform K with its flexible curved face 47 and the nippers 60 60, substantially as described and for the purpose set forth.

14. The combination, operating substantially as herein described, of two reciprocating plungers and a receiving or folding-frame capable of being rocked or turned to receive said plungers in succession.

15. The combination, operating as shown and described, of the reciprocating plunger with the vibrating platform and automatic pasting and lifting devices for applying the label.

HENRY R. HEYL.

Witnesses:

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(109)