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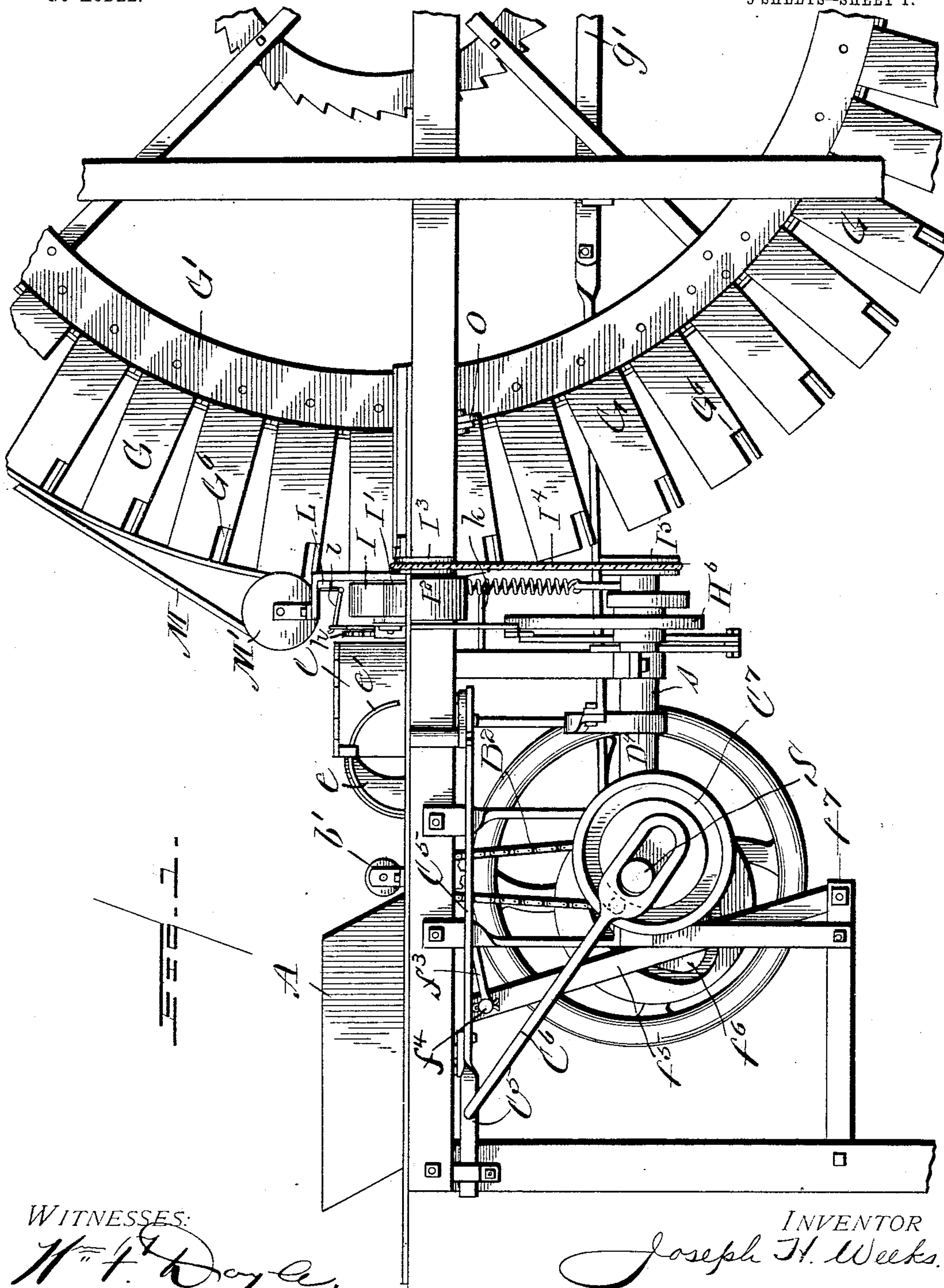
PATENTED FEB. 9, 1904.

J. H. WEEKS.
CARTON MACHINE.

APPLICATION FILED MAY 18, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

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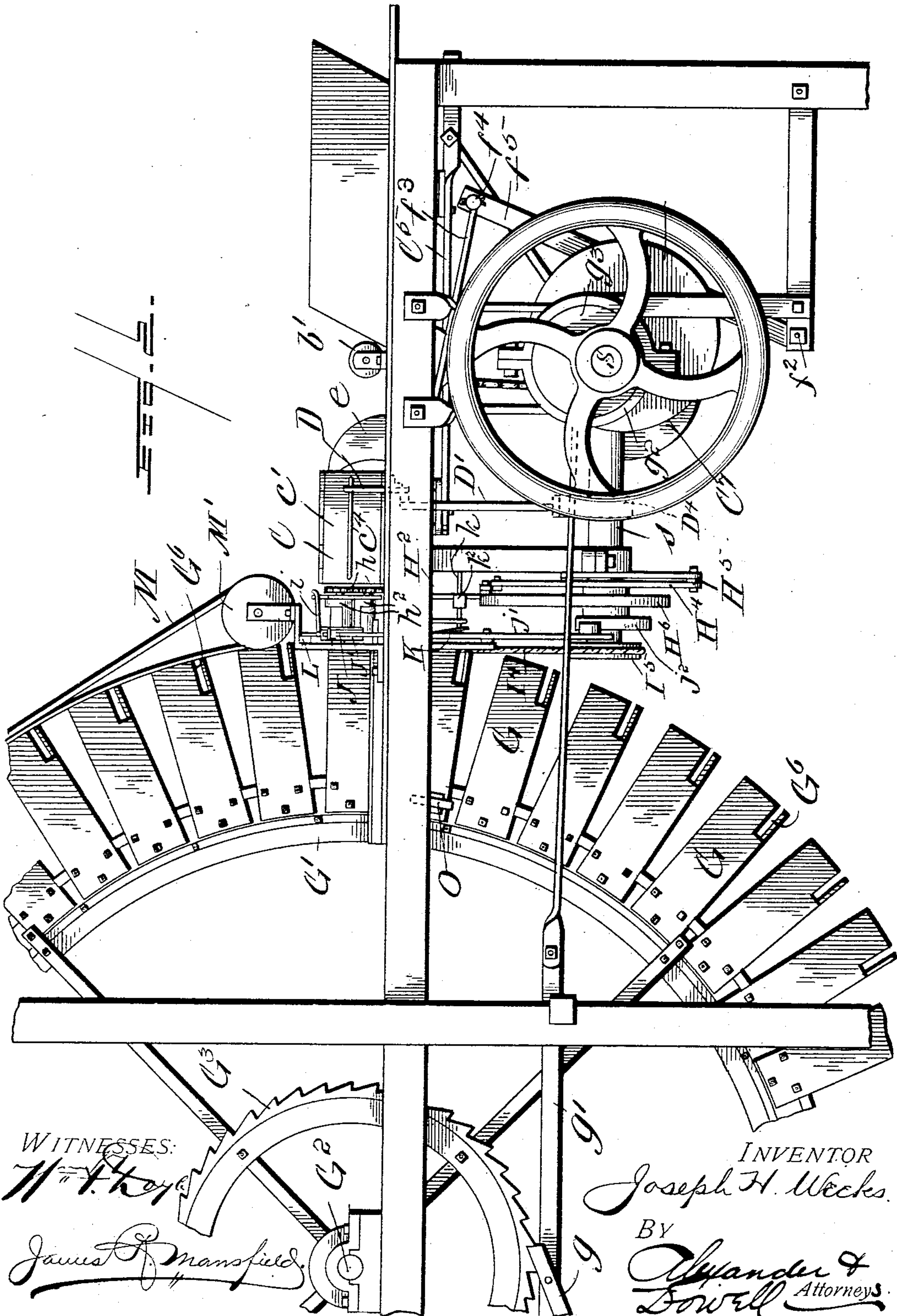
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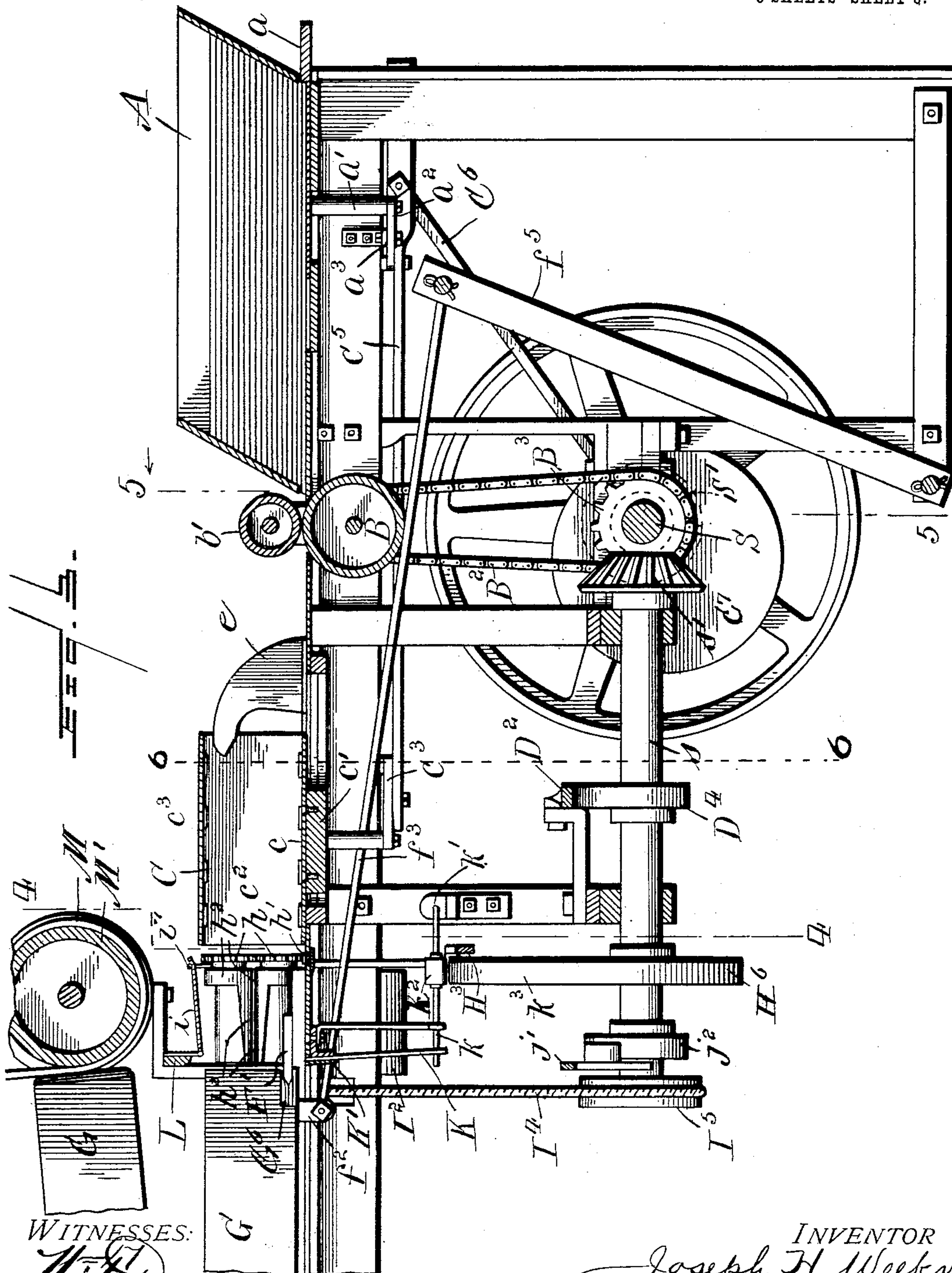
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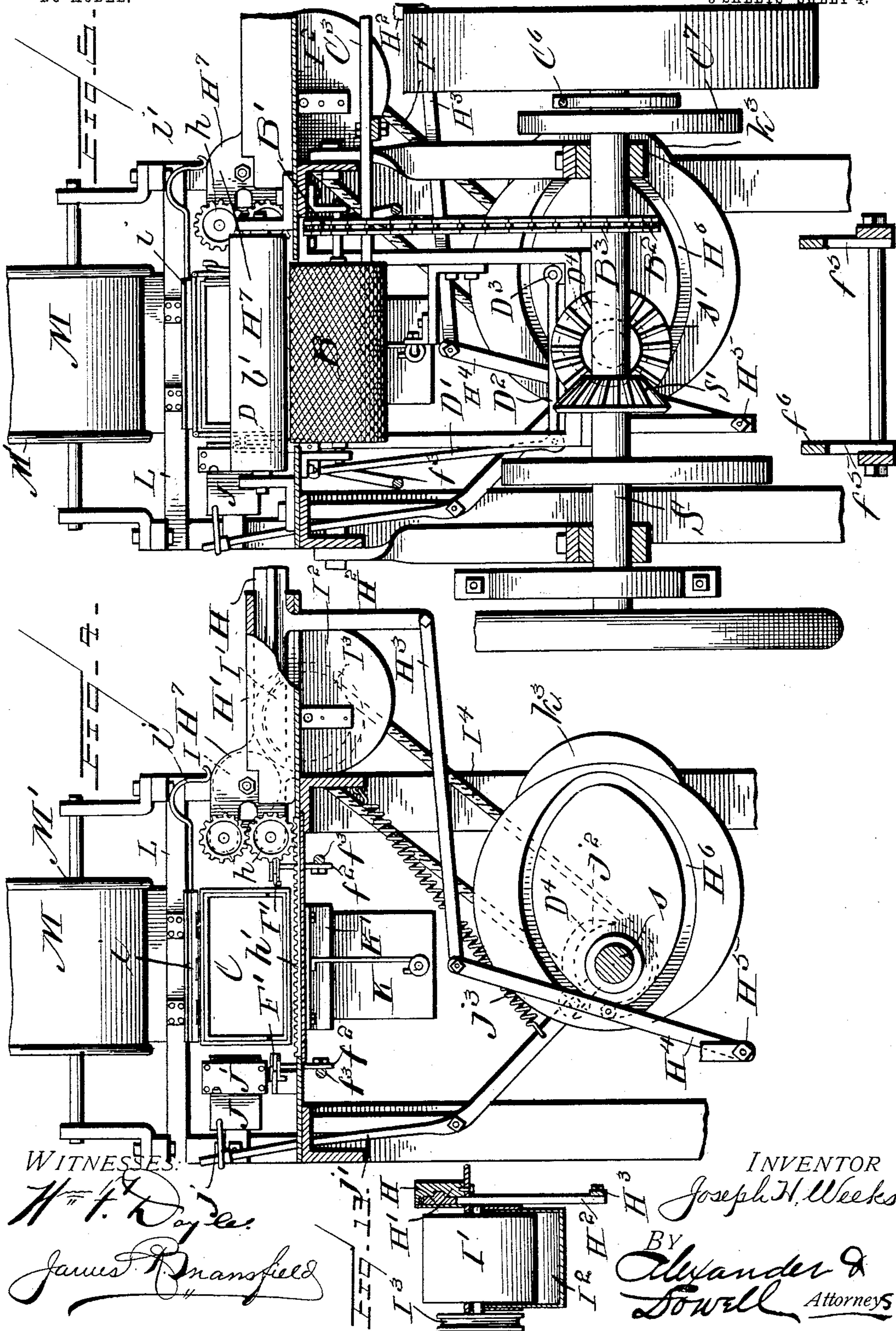
Attorney's

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5 SHEETS—SHEET 4.



No. 751,823.

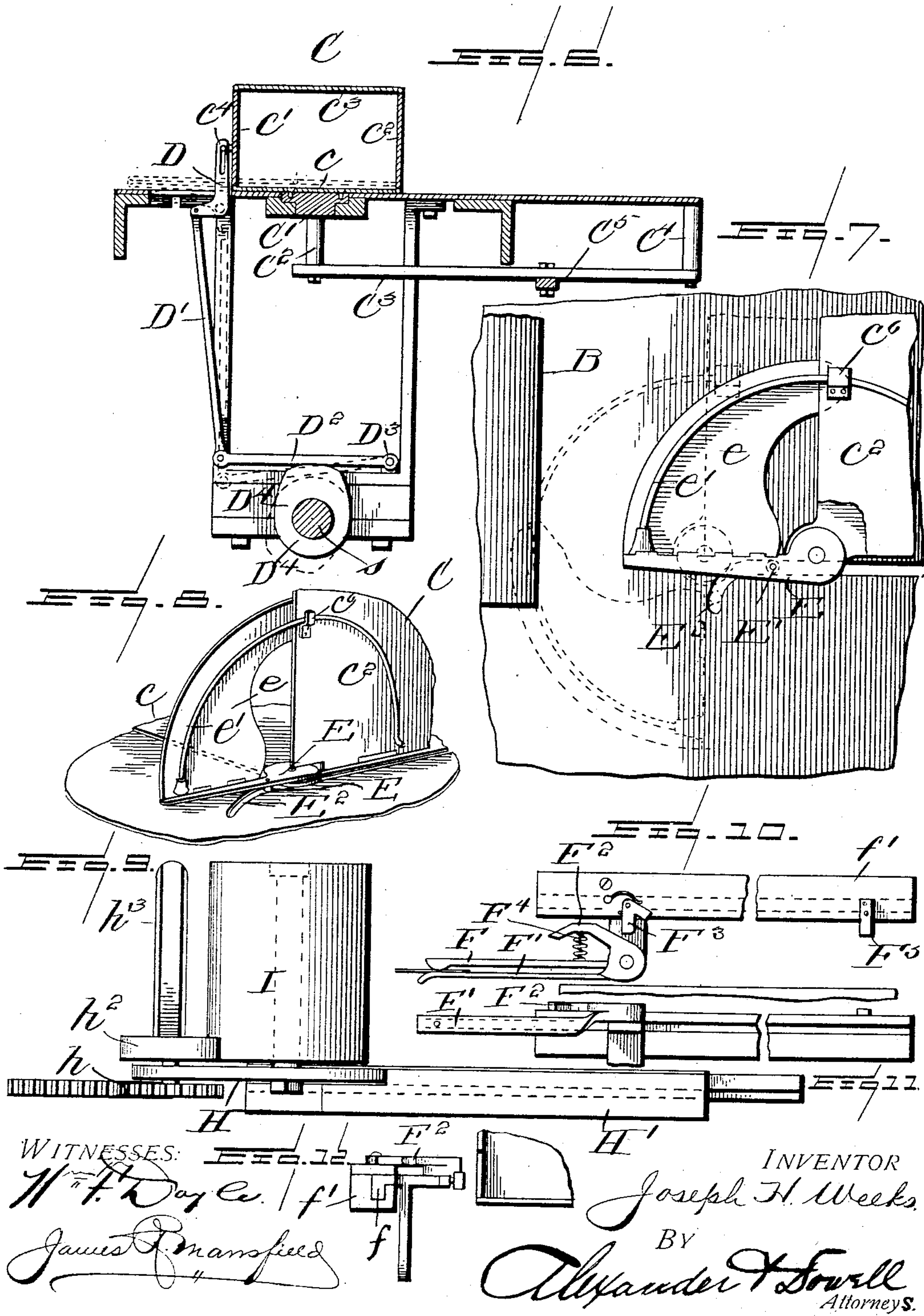
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.5 SHEETS—SHEET 5.



UNITED STATES PATENT OFFICE.

JOSEPH H. WEEKS, OF BATTLECREEK, MICHIGAN.

CARTON-MACHINE.

SPECIFICATION forming part of Letters Patent No. 751,823, dated February 9, 1904.

Application filed May 18, 1903. Serial No. 157,637. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH H. WEEKS, of Battlecreek, in the county of Calhoun and State of Michigan, have invented certain new and useful Improvements in Carton-Machines; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improved machine for closing the bottoms of shucks or carton-tubes; and its object is to provide a machine which will automatically take a carton tube or shuck from a pile, expand it, place it on a suitable former, paste and fold the bottom flaps thereof, and remove the formed carton out of the way for subsequent filling.

The machine comprises novel mechanism for expanding the carton tubes or shucks, novel mechanism for placing the expanded cartons on the formers or holders, and novel mechanism for pasting and folding the bottom end flaps of the carton on the holder. These several mechanisms will be hereinafter clearly explained; but I would remark that the specific forms and constructions of parts shown in the drawings may be varied without departing from the substance of the invention.

The features and combinations of parts for which protection is desired are summarized in the claims following the detailed description of the mechanism illustrated in said drawings, in which—

Figure 1 is a side elevation, partly in section, of the essential parts of the machine, the blank form-wheel being partly broken away. Fig. 2 is a similar view of the opposite side of the mechanism. Fig. 3 is an enlarged longitudinal vertical section through the principal parts of the machine. Fig. 4 is a transverse section on line 4 4, Fig. 3; Fig. 5, a transverse section on line 5 5, Fig. 3. Fig. 6 is a detail section on line 6 6, Fig. 3. Fig. 7 is an enlarged detail view of part of the carton-tube-opening devices, and Fig. 8 is a detail perspective view of parts shown in Fig. 7. Figs. 9, 10, 11, and 12 are detail views of the "gripper mechanism" for placing the carton-

tubes on the forms. Fig. 13 is a detail view of the pasting mechanism.

The operative parts of the machine are supported upon a suitable framework the construction of which is immaterial. At the outer end of this frame is the feed-box A, in which the shucks or folded carton-tubes with unsealed open end flaps are placed. The tubes are fed from the bottom of the pile one at a time by means of a reciprocating ejector and feed-rolls B b' (the latter journaled in suitable bearings transversely of the frame) and adjacent to the inner end of box A, so as to catch the end of a shuck moved outward by the ejector and feed the shuck into the expander. The ejector *a* is operated at the proper times in any suitable manner. As shown, it has a depending finger *a'* connected to one end of an oscillating lever *a''*, pivoted on the frame at *a'''*, and operatively connected at its other end to a reciprocatory rod C⁵, hereinafter referred to. The feed-roll B is shown as having a sprocket B' on its shaft driven by a chain B² from a sprocket B³ on the main shaft S of the machine. Rolls B b', as stated, feed the shuck into the expander C, which, as shown, is collapsible, but when expanded is of about the shape and size of the carton. As shown, the expander is four sided, its lower plate *c* being fast to a reciprocating slide C', guided in suitable ways on the frame and movable toward and from the rolls *b* B. The side plates *c'* *c''* of the expander are hinged to the side edges of plate *c*, and the top plate *c'''* of the expander is hinged to the sides *c'* *c''*, so that the expander can collapse sidewise, falling over upon the slide C', as indicated in dotted lines in Fig. 6. The slide C' is reciprocated by a vibrating lever C³, pivoted at C⁴ to a fixed point on the frame and to a finger C², depending from slide C', said lever being connected to the inner end of rod C⁵, which extends forward and is connected to lever *a''*. Rod C⁵ is reciprocated by means of a pitman C⁶, which is yoked over shaft S and provided with a pin-engaging cam C⁷ on said shaft, which at the proper times causes the reciprocation of the shuck-ejector *a* and the expander also. The expander is

opened and collapsed at proper times by means of a bell-crank lever D, pivoted on a fixed part of the frame at one side of and below the plate *c*. The lower arm of said lever extends beside
 5 plate *c'* and is engaged by a rod *c⁴*, secured to the outer face, extending longitudinally of side *c'* of the expander, the lever being slotted for the passage and play of the rod *c⁴*. (See Fig. 6.) The shorter arm of lever D is connected
 10 by a link D' to the free end of a vibrating lever D², pivoted at D³ to a fixed part of the frame and oscillated by a cam D⁴ on a counter-shaft *s*, suitably journaled on the frame and driven by bevel-gears S' *s'* from shaft S. (See
 15 Fig. 5.) When the cam raises lever D², lever D is rocked to the position shown in full lines, Fig. 6, opening the expander and holding it open, though not interfering with the reciprocation thereof, and when the cam D⁴ permits lever D to drop the expander collapses,
 20 as indicated in dotted lines, Fig. 6, in which position it is moved forward toward the rolls *b* B to receive an incoming shuck or carton.

To one forward corner of the bottom plate
 25 *c* of the expander C is pivoted an arm E, which can swing in the plane of said plate, and to said arm is hinged an opener-blade *e*, the hinge of the blade to the arm coming exactly in line with the hinge of parts *c* *c²* before and when
 30 the expander opens. (See Fig. 7.) The opener *e* is preferably curved, as shown, so that it can be swung back out of the way of an incoming carton as the expander moves toward rolls *b* B, and then as the expander retreats the opener
 35 will move back, and its point will enter between the bottom end flaps of the carton-tube and insure the opening thereof by and with the expander as the latter is opened out. The opener *e* is moved in and out of position by
 40 means of a pin E' on arm E, which engages a guide-groove E² in the top of frame, the forward end of said groove being curved, as indicated in Figs. 7 and 8, so as to swing the arm E outward as it moves toward the rolls
 45 B *b* and swing it inward as it moves away from such rolls. To the heel of opener *e* is attached a curved wire *e'*, which extends through a guide and retainer *c⁶* on the outer side of plate *c²*, while the toe of the opener passes to the
 50 inside of said plate. This wire *e'* guides the opener and causes it to keep in a plane parallel with plate *c²* and to rise and fall therewith as the expander opens or collapses. As the flat carton tube or shuck emerges from rolls
 55 *b* B it enters the collapsed expander C, (which has been advanced into position to receive it, with opener *e* thrown back in the position indicated in dotted line, Fig. 7.) Then as the expander recedes, carrying the carton with it,
 60 opener *e* slips in between the rear end flaps of the carton, and when the expander opens up opener *e* insures and compels the folded carton to open up within the expander. The opener

e prevents the carton sticking or bending within the opener, and I consider it very useful. 65
 The opener *e* and wire *e'* also serve as a catch to compel the carton to move backward with the expander into position to be removed onto the forms or holders. The opened carton is
 70 removed from the expander at the proper time by means of opposite pairs of grippers F F', (see Figs. 4 and 10,) which are mounted on slides *f*, moving in guides *f'* on the frame at opposite sides of and in line with the path of
 75 movement of the expander C, the gripper-slides being reciprocated by means of rods *f³*, pivoted to lugs *f²* on slides *f* and (at *f⁴*) to the upper part of a bail-shaped lever *f⁵*, which is pivoted at *f⁷* on a fixed part of the frame and is vibrated at proper times by a cam *f⁶*
 80 on shaft S, as indicated in the drawings. By this means the grippers are moved forward at the proper time to meet the incoming expanded carton brought back by expander C, the grippers being opened at the proper point (to receive the inner side flaps of the expanded carton) by means of trips F³, (see Fig. 10,) which
 85 engage fingers F² on the inner grippers F' and cause them to open as the grippers move outward past the trips F³, after passing which
 90 the grippers are closed upon the carton-flaps by the springs F⁴ and remain closed during the backward stroke of the grippers, holding the carton and drawing it from the expander until the grippers have moved so far rearward that fingers F² strike fixed trips F⁵,
 95 Fig. 10, which cause the grippers to release the carton and remain disengaged therefrom until it is moved out of the way by the rotation of wheel G. The trip F³ is pivoted
 100 so as to cause fingers F' to open only on the outward movement of the grippers, yielding when the grippers move back and letting them pass unaffected on their return strokes. The grippers pull the cartons from the expander
 105 onto forms or holders, and I preferably employ an endless series of forms G, mounted radially on the rim of a form-wheel G', supported on a shaft G² and moved step by step,
 110 so as to successively present forms in position to receive a carton from the expander, support it during the bottom pasting and folding operations, and then remove it out of the way, while an empty form comes into place. As shown, wheel G' is given a step-by-step
 115 movement for this purpose by means of a ratchet-wheel G³ on shaft G², engaged by a pawl *g* on a reciprocating rod *g'*, connected to an eccentric-strap *g²* on an eccentric *g³* fast to shaft S. (See Fig. 2.) The wheel G rotates in
 120 a plane corresponding with the line of movement of the grippers and expander, and at each movement of the wheel one of the formers G is brought in line with the expander and between the opposite sets of grippers F F'. (See
 125 Figs. 3 and 4.) Preferably the formers G

are hollow, so that the cartons after their bottoms are sealed may be filled (by suitable mechanism not shown) before they are removed from the wheel. The formers may also be cut away or notched on their sides near their outer ends, as shown at G^6 , to accommodate the opening movement of grippers F' , which are preferably opened just before the cartons stop their rearward movement with the expander. When the grippers pull a carton upon a form, its rearmost flaps project beyond the outer end thereof in position for folding (all parts being properly proportioned or adjusted according to the size of carton being handled) and are folded and pasted by means of mechanism located beside the path of the carton and operating between the expander and formers after the grippers have pulled the carton onto the form and while the expander is moving back toward the feed-box.

The pasting and folding mechanism is as follows: A horizontally-reciprocating slide H is mounted in a guide-bracket H' at the right-hand side of the machine, said slide being movable transversely of the path of the carton and reciprocated at proper times by means of a link H^3 , connecting an arm H^2 on the slide with the upper end of a lever H^4 , pivoted at H^5 on a fixed part of the frame and having a wrist-pin engaging a race-cam H^6 on shaft s . (See Fig. 4.) On the inner end of slide H are journaled two vertically-disposed intermeshing pinions h h , one above the other, the lower one meshing with a fixed rack-bar h' , extending across the machine below the path of the carton. To the rear faces of said pinions are attached disk-pasters h^2 , provided with axially-extending segments or wing-pasters h^3 , Fig. 9. These pasters are adapted to receive paste from a roll I , mounted on slide H in axial alinement with the pasters and which takes paste from a drum I' in a paste-well I^2 , attached to the machine, as shown. The paste-drum may be rotated by pulley I^3 and belt I^4 from a pulley I^5 on shaft s . (See Fig. 3.) As slide H reciprocates the pasters h^2 h^3 are caused to rotate by the gearing, and in their inward movement the wing-pasters h h^3 first strike the adjacent side flap of a carton on the form, folding said flap inward, and the disk-pasters apply lines of paste to the inner end edges of the top and bottom flaps, while the wing-pasters apply paste to the inner side edges of said top and bottom flaps. Above the path of the pasters is a plate i , which may be hinged at rear to a suitable part of the framing and is provided with a projecting finger i' , which rests upon the upper edge of slide H , and as said slide moves inward the finger runs onto a cam part H^7 , by which the finger i' is lowered, permitting plate i to drop upon the upper flap and hold it down against the upper pasters, which properly apply paste thereto.

Upon the return of the pasters part H^7 causes finger i' to raise plate i out of the way and uphold it until the next pasting operation. Preferably as soon as the pasters have folded the right side flap the opposite left side flap is folded in by means of the blade J , which is supported in a suitable guide J' and is operated by means of a link j , connected to the upper end of an oscillating lever j' , the lower end of which engages a cam j^2 on shaft s , being held thereagainst and retracted after operation by the spring j^3 . (See Fig. 4.) After the pasters move back the lower flap is folded by means of the tucker-blade, which is guided in a slotted plate K' and is operated at the proper time by means of a lever k , pivoted at k' to a fixed part of the frame and having a roller k^2 , which is engaged at the proper time by a cam k^3 on the periphery of cam H^6 . (See Figs. 4 and 5.)

The broad construction of the pasting mechanism I have covered in a companion application, Serial No. 627, to which I refer for a more full explanation of the essential features and mode of operating the rotary disk and wing pasters. The lower flap is folded over the two side flaps, being first properly pasted on its edges and end, and then the wheel G is given a partial rotation, causing the partly-sealed carton on the holder or form to rise with the form, which moves upward past a folder-bar L , attached to the frame just above the path of the folding mechanism and so close to the form that as it ascends the last upper projecting flap of the carton will be folded down by said bar as the form, with the carton thereon, moves upward therepast, the last flap being folded and pressed down in place during this movement of the former. After passing bar L the forms bring the cartons beneath or against the inner run of an endless belt M , which runs over pulleys M' , arranged at suitable point adjacent to the periphery of the wheel G so that the inner run of the belt will lie against the outer ends of the formers and will hold the folded cartons thereon for any desired extent of revolution of the wheel G . Guide-rollers O O may be attached to the frame at opposite sides of the wheel G' in position to hold and guide the forms into true alinement with the expander and grippers at the point of transfer of the cartons from the expander to the forms.

Operation: The operation of the machine has been already explained in describing the several parts thereof; but I will briefly recapitulate. The carton tubes or shucks are placed in box A , from which they are removed singly by ejector a and fed by rolls b B into the expander C , which at the time is in a collapsed condition, and adjacent to the rolls, with the opener e in the position shown in dotted lines, Fig. 7. The expander then starts inward and

opener *e* slips in between the flaps of the carton, and then the expander C is opened up, as indicated in Fig. 6, opening up the carton in corresponding form, the end flaps thereof projecting at the ends of the expander. As the expander finishes its backward movement the grippers F F' catch the inner end flaps of the carton and withdraw it from the expander onto one of the holders or forms G on wheel G', leaving the rearmost end flaps projecting beyond the end of the form, and the expander moves back and collapses in position for reception of another carton-tube. Meanwhile the pasters h^2 h^3 are moved past the end of the form by slide H and connections and in so doing apply paste to the upper and lower flaps and fold one side flap, the other side flap being folded by the tucker-blade J, the plate *i* holding the top flap down in position to properly receive paste. As soon as the pasters are retracted the bottom flap is closed by tucker-blade K, and then the wheel G is moved so as to raise the form and carton out of the way, and in this movement the top and last flap is folded by passing the stationary bar L, and the flaps are held down by the retaining-belt M until the cartons reach the point of discharge. This movement of wheel G brings another form into position to receive the next carton to be sealed, which has been meanwhile taken from the box, opened up, and brought forward by the expander in the manner specified.

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

1. A hollow prismatic collapsible expander adapted to receive the carton-tube within it in a collapsed state and then expand to open the cartons by external pressure thereon, substantially as described.

2. In combination with mechanism for feeding carton tubes or shucks, a hollow prismatic reciprocating collapsible expander adapted to receive the carton-tube in a collapsed state and then expand thereby opening the contained carton by external pressure thereon, substantially as described.

3. In combination means for feeding flat carton tubes or shucks, mechanism for folding the end flaps of a carton, and a hollow prismatic collapsible expander adapted to receive the carton-tubes within it and then expand thereby opening the cartons by external pressure thereon, and deliver them when opened to the folding mechanism, substantially as described.

4. In combination, mechanism for feeding flat carton-tubes, mechanism for folding and pasting the end flaps of a carton, a reciprocating collapsible prismatic expander adapted to receive the flat carton-tubes, open them up, and means for taking the cartons from the

expander and delivering them while opened to the folding and pasting mechanism, substantially as described.

5. In combination, mechanism for feeding flat carton tubes or shucks, a form or holder for expanded cartons, a hollow prismatic collapsible expander adapted to receive carton-tubes from the feeder, open them up by external pressure thereon, and means for taking the cartons from the expander and delivering them to the forms, substantially as described.

6. In combination, mechanism for feeding flat carton tubes or shucks, a form or holder, for expanded cartons, mechanism for pasting and folding the flaps of a carton on the form or holder, a movable prismatic expander adapted to receive carton-tubes from the feeder and open them up and means for taking the cartons from the expander and delivering them to the form, substantially as described.

7. In combination, mechanism for feeding carton tubes or shucks, a collapsible hollow prismatic carton-expander having hinged sides adapted when collapsed to receive cartons from the feeder and then expand and open the cartons, a movable form or holder, mechanism for transferring the open carton from the expander to the form, and mechanism for closing the projecting flaps of the carton on the form, substantially as described.

8. In combination, mechanism for feeding carton tubes or shucks, a hollow prismatic collapsible carton-expander having hinged sides, adapted while collapsed to receive cartons from the feeder and open them up and to transfer them from the feeding to the folding mechanism, a movable form or holder, mechanism for transferring the open carton from the expander to the form, and pasting and folding mechanism for sealing the projecting flaps of the carton on the form, substantially as described.

9. In combination, means for feeding carton-tubes, a form, a reciprocating prismatic carton-expander adapted to carry cartons from the feeder to the form, mechanism adapted to remove expanded cartons from the expander to the form and place them thereon, and mechanism for closing the end flaps of the carton while on the form, substantially as described.

10. In combination, means for feeding carton-tubes, a form, a reciprocating prismatic collapsible carton-expander, having hinged sides and adapted to carry cartons from the feeding mechanism to the form, gripper mechanism adapted to draw expanded cartons from the expander onto the form, and mechanism for pasting and folding the projecting end flaps of the carton while on the form, substantially as described.

11. In combination, means for feeding car-

ton-tubes, a form, a collapsible prismatic expander adapted while in a collapsed state to receive cartons from the feeder and then expand to open the carton, and carry them to the form, mechanism for removing cartons from the expander and placing them upon the form, and mechanism for closing the projecting end flaps of cartons while on the form.

12. In combination, means for feeding carton-tubes, a reciprocating collapsible prismatic expander having hinged sides and adapted while collapsed to receive cartons from the feeder and then expand and open the cartons, a movable form, gripper mechanism for removing cartons from the expander and placing them upon the form, and mechanism for pasting and folding the projecting end flaps of cartons while on the form.

13. In combination, a hollow expansible carton-expander, and an opener adapted to enter the carton in the expander before the latter expands and assist it in opening the carton, substantially as described.

14. In combination, a reciprocating collapsible carton-expander, an opener connected thereto adapted to enter the carton within the expander and assist it in opening the carton, substantially as described.

15. In combination, a reciprocating carton-expander, a movable opener operating therewith adapted to move out of the way as the expander advances, and to move between the carton-flaps in the expander as the latter retreats, and assist the expander in opening the carton.

16. In combination, a reciprocating collapsible carton-expander, a movable opener pivoted to the expander and adapted to move out of the way as the expander advances, and to move between the carton-flaps as the expander retreats, and assist in opening the carton.

17. In combination, a reciprocating expander, a bar hinged thereto, an opener hinged to said bar, means for vibrating said bar as the expander reciprocates, and a connection between the opener and expander, substantially as described.

18. In combination, the collapsible reciprocating expander, the bar hinged to the inner end thereof, the opener hinged to said bar, the pin and guide-slot for operating said bar, as the expander reciprocates, and the connecting-wire between the opener and expander, substantially as described.

19. In combination, carton-tube-feeding mechanisms, a reciprocating expander, and a vibrating opener beside and moving with the expander, substantially as described.

20. In combination, carton-tube-feeding mechanisms, a reciprocating collapsible carton-expander, and a vibrating opener connected to and moving with the expander, substantially as described.

21. In combination, a collapsible expander, having its top, bottom and sides, hinged together, and adapted to collapse sidewise, a slide and connections for reciprocating said expander, a lever having a sliding connection with the one side of the box, and means for rocking said lever, substantially as described.

22. In combination, a collapsible expander having top, bottom and side pieces hinged together, at the corners, a slide and connections for reciprocating said expander, a rod on one side of the expander, a stationarily-located bell-crank lever having a sliding connection with the rod, and means for rocking said lever, substantially as described.

23. In a carton-machine; means for feeding carton-blanks, a series of forms adapted to successively receive expanded cartons, a reciprocating prismatic expander adapted to take cartons from the feeder and carry them to the forms, a reciprocating gripper mechanism adapted to take the expanded cartons from the expander and place them on the forms, and means for opening and closing said grippers at the proper times, substantially as described.

24. In a carton-machine, the combination of means for feeding carton-blanks, a series of forms, a reciprocating collapsible prismatic expander for opening up the blanks and transferring them from the feeder to the forms, reciprocating grippers adapted to take the expanded cartons from the expander and place them on the forms and mechanism for pasting and folding the projecting end flaps of the cartons while on the forms.

25. In a carton-machine, the combination of mechanism for feeding carton-blanks, a collapsible carton-expander, a carton-form, mechanism adapted to take a carton from the expander and place it on the form, a transversely-movable set of pasters adapted to apply paste to the carton-flaps, and a movable plate for holding the upper flap in position for pasting, substantially as described.

26. In a carton-machine, the combination of mechanism for feeding carton-blanks, a reciprocating collapsible carton-expander, an endless rotary series of carton-forms, gripper mechanism adapted to take cartons from the expander and place them on the forms, a transversely-movable set of pasters adapted to apply paste to the carton-flaps, a movable plate for folding the upper flap in position for pasting, and stationary movable devices for folding the flaps, substantially as described.

27. In combination, means for feeding flat carton blanks or shucks, a reciprocating carton-expander, a wheel carrying a series of carton forms or holders on its periphery, a reciprocating gripper mechanism adapted to take cartons from the expander and place them on the forms, mechanism for closing the project-

ing end flaps of the cartons on the forms, and an endless belt extending around part of the peripheral series of forms on the wheel, substantially as described.

- 5 28. In combination, means for feeding flat carton blanks or shucks, a reciprocating collapsible carton-expander, an opener connected to and moving with the expander, a wheel carrying a series of radially-disposed forms on
10 its periphery, means for moving the wheel intermittently, a reciprocating gripper mechanism adapted to take cartons from the expander and place them on the forms, mechanism for

pasting and folding the projecting end flaps of the cartons on the forms, and an endless 15 belt extending around part of the peripheral series of forms on the wheel, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two 20 witnesses.

JOSEPH H. WEEKS.

In presence of—

JAMES R. MANSFIELD,
C. EDWARD DUFFEY.