(No Model.) 3 Sheets—Sheet 1.

W. H. KLINE.

PAPER BAG MACHINE.

No. 458,559. Patented Sept. 1, 1891.

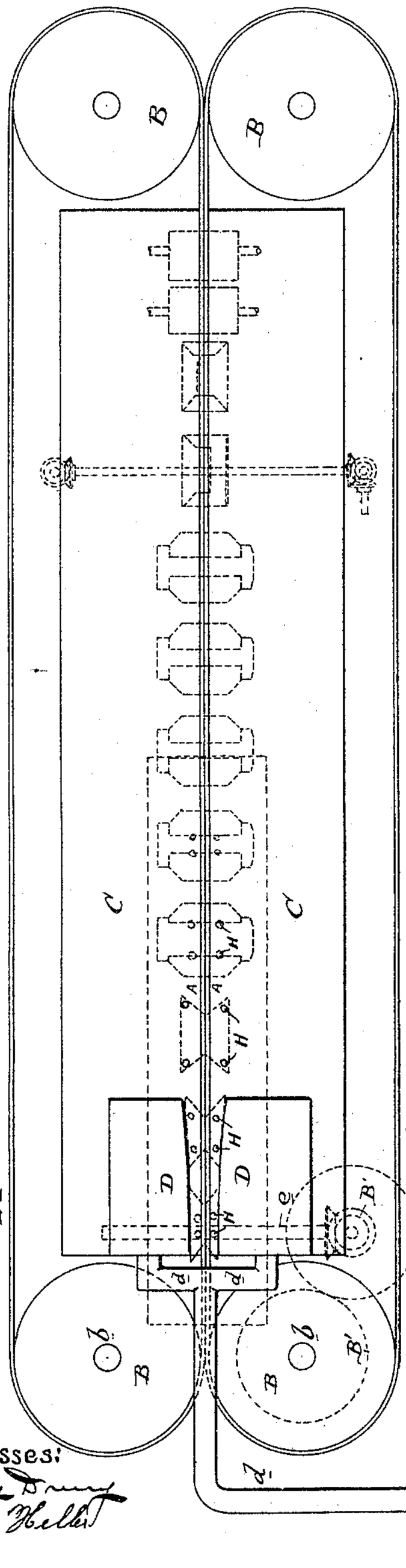

FIG. 1

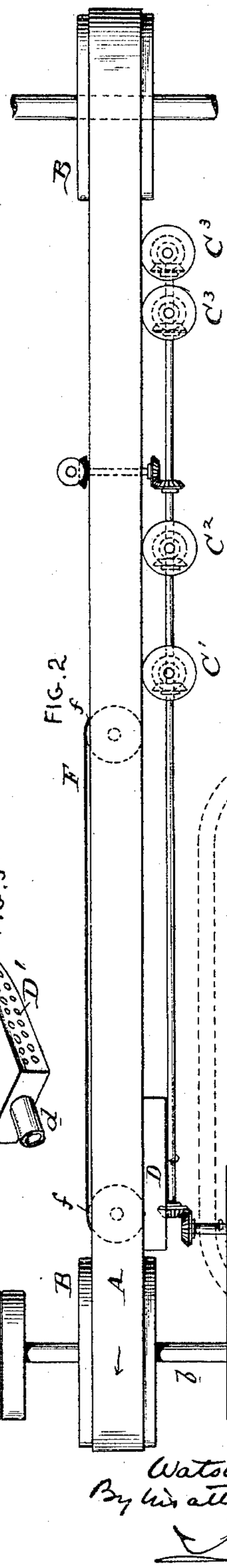

FIG. 2

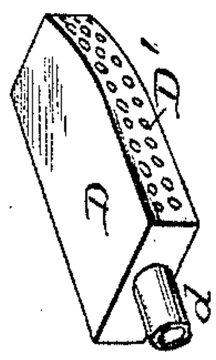

FIG. 3

Witnesses:
Henry Drury
Jesse Hollist

Inventor:
Watson H. Cline
By his atty
W. H. Kline Jr.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

3 Sheets—Sheet 2.

W. H. KLINE.

PAPER BAG MACHINE.

No. 458,559. Patented Sept. 1, 1891.

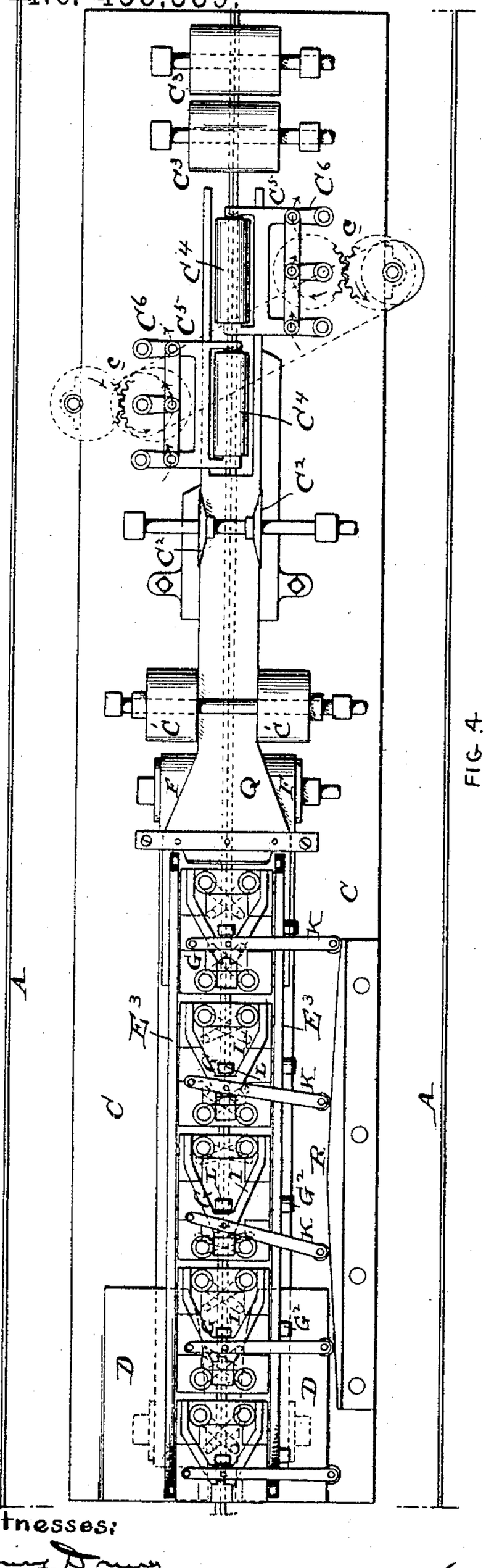

FIG. 4.

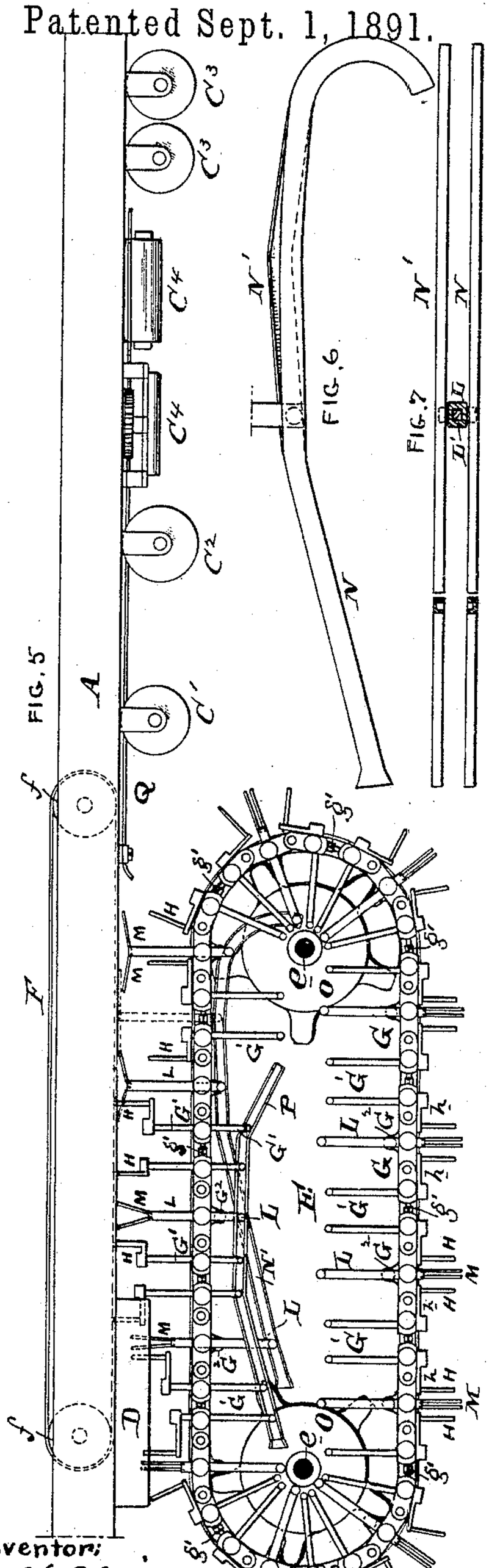

FIG. 5.

FIG. 6.

FIG. 7.

Witnesses:
Henry Dewey
Jesse Heller

Inventor:
Watson H. Cline
By his atty
Thos. Dewey & Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

W. H. KLINE.

PAPER BAG MACHINE.

No. 458,559. Patented Sept. 1, 1891.

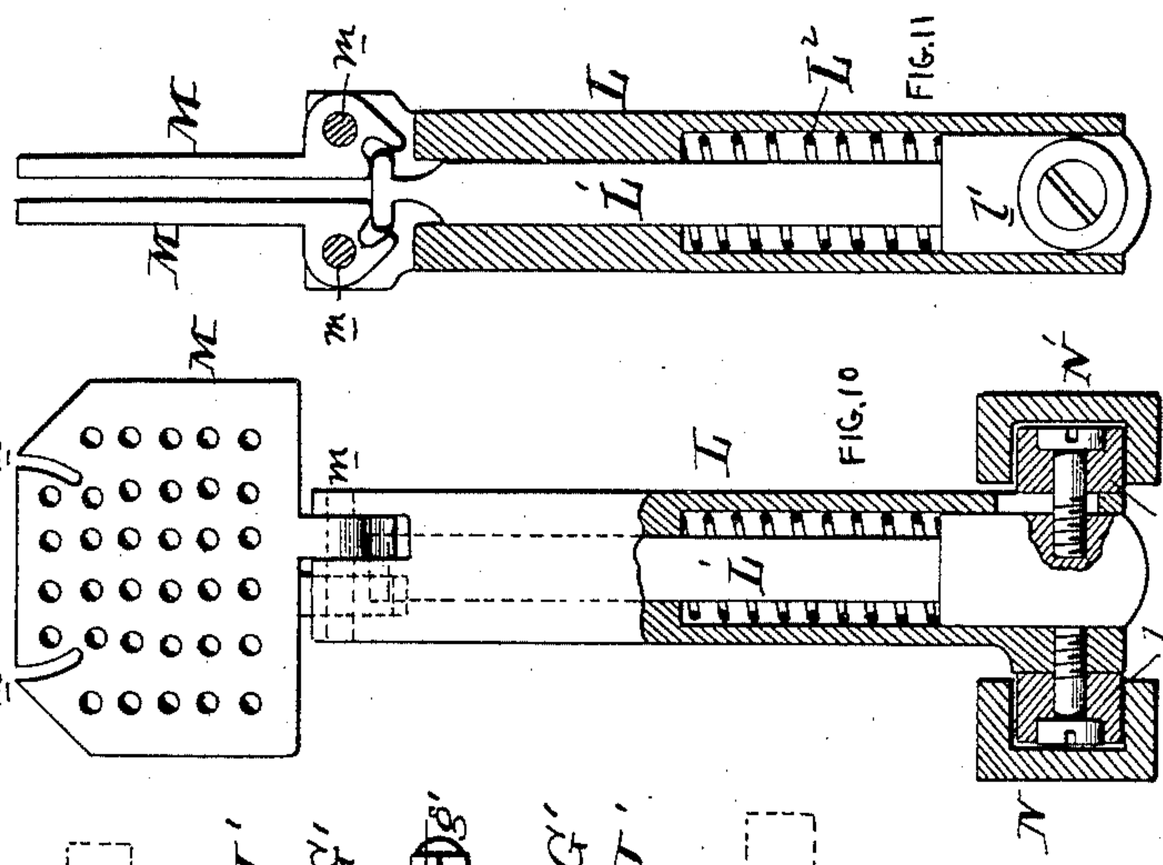

FIG. 11

FIG. 10

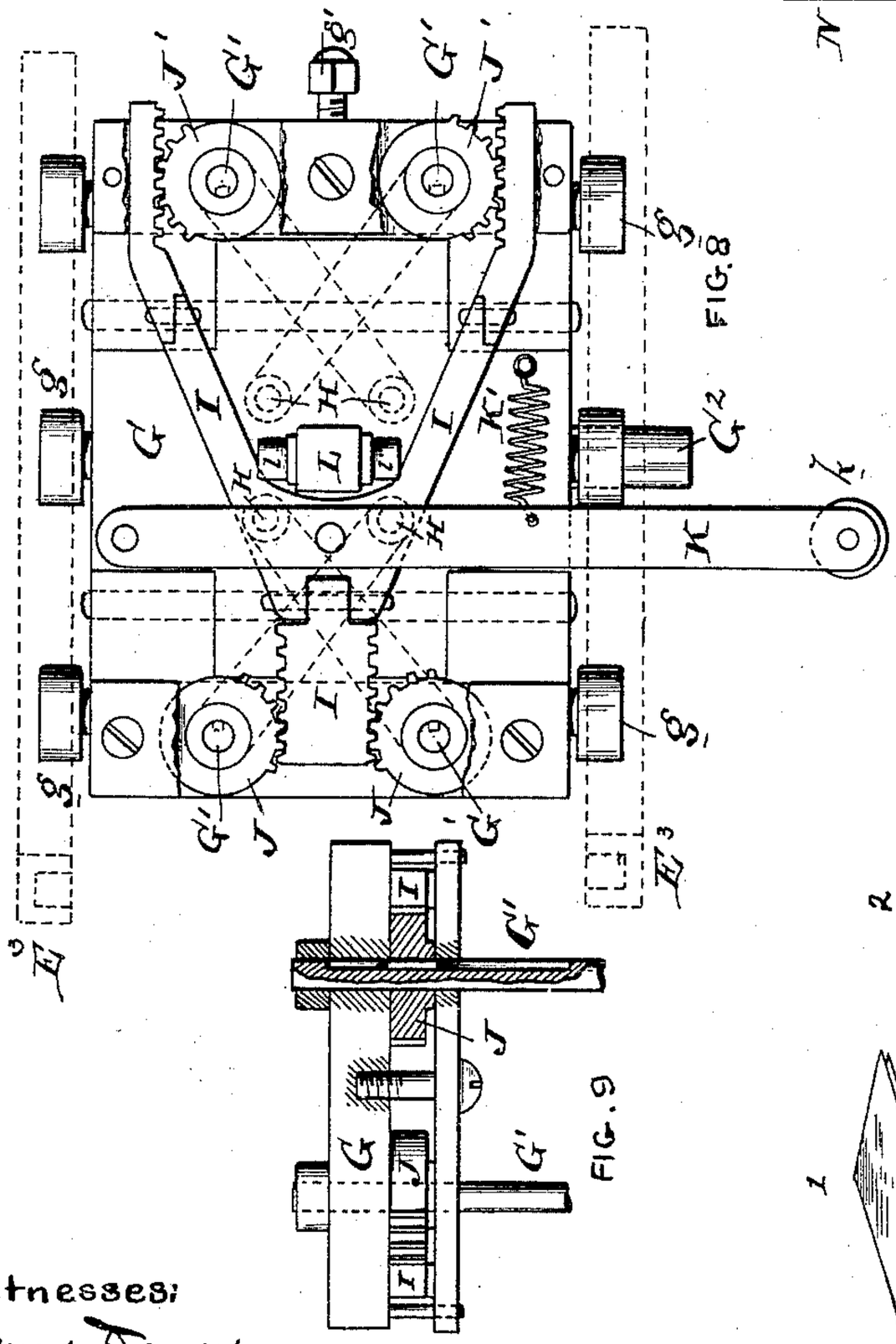

FIG. 8

FIG. 9

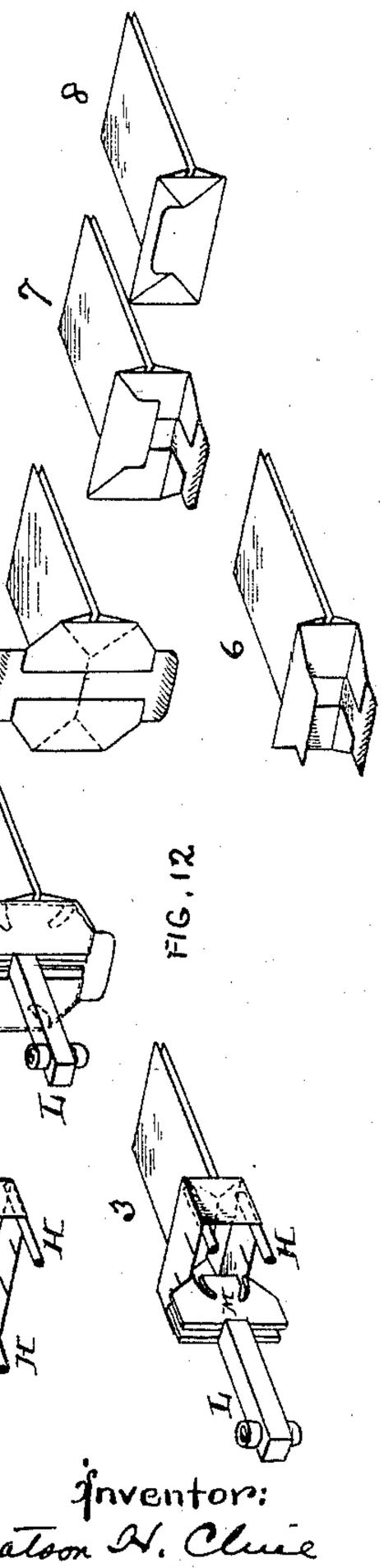

FIG. 12

Witnesses:
Henry Drury
Jesse Heller

Inventor:
Watson H. Cline
By his atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WATSON H. CLINE, OF CAMDEN, NEW JERSEY, ASSIGNOR OF ONE-HALF TO JAMES E. HAYS, OF SAME PLACE.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 458,559, dated September 1, 1891.

Application filed September 17, 1890. Serial No. 365,288. (No model.)

To all whom it may concern:

Be it known that I, WATSON H. CLINE, of the city and county of Camden, and State of New Jersey, have invented an Improvement in Paper-Bag Machines, of which the following is a specification.

My invention has reference to paper-bag machines; and it consists of certain improvements which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

My improvements have particular reference to apparatus for manufacturing satchel-bottoms upon bellows side-fold tubes, whereby the formation of the bag may be had in a continuous manner and while the bag-tube is in motion passing through the machine.

In carrying out my invention I employ suction for the purpose of opening the tube for permitting the entrance of the bottom-forming mechanism. The tube after leaving the tube-forming mechanism is received between the two endless aprons or bands, from which one end of the tube projects. The tube is conveyed between suction-boxes, through which air-currents are formed and by which the sides of the paper tube are drawn apart, forming an entrance at one end of the tube. As soon as the tube is opened in this manner fingers are projected into the interior thereof and then caused to move away from each other until they reach points corresponding to the four corners of the bottom. While in the custody of these fingers a pair of hinged plates or blades are thrust down into the mouth of the tube and by suitable devices caused to lie flat upon it to positively fold the free edges of the paper tube into a condition for subsequent proper folding and pasting of the bottom. Immediately after creasing the paper into the proper shape for the bottom these plates and the fingers are removed automatically, and then by pasting, creasing, and folding devices the satchel-bottom is completed upon the bellows side-fold tube.

In the operation of my improvements the aforesaid fingers and plates are connected to a series of carriages, which are caused to travel with a speed equal to that of the conveying-bands, by which the tubes are held and caused to travel through the machine. While the said carriages and their operating-fingers and blades or plates are being conveyed in contact with the tubes the said parts are automatically manipulated by suitable cam devices, which cause them to perform their operations at predetermined moments and with proper relation one with respect to the other.

In the drawings, Figure 1 is a front elevation of my improved machine with the device for shaping the bottom removed. Fig. 2 is a plan view of same, showing the driving mechanism for the device for forming the bottom. Fig. 3 is a perspective view of one of the suction-boxes for opening the tube. Fig. 4 is a front elevation of my improved machine with each end cut away and a portion of the bottom-forming mechanism removed. Fig. 5 is a plan view of same, showing the bottom-forming mechanism in position. Fig. 6 is a plan view of the cams for operating the forming blades or plates. Fig. 7 is an elevation of same. Fig. 8 is a front elevation of one of the carriages for carrying the forming plates and fingers. Fig. 9 is an end view of same with part in section. Fig. 10 is an elevation of the forming plate or blades and operating mechanism therefor, with part in section. Fig. 11 is an end view of same, also with part in section; and Fig. 12 illustrates a series of tubes in the process of formation, and shows the several operations in the formation of the bottom.

A A are two endless bands passing about the pulleys B, arranged at each end of the machine. These pulleys may be driven in any suitable manner, so that the two endless bands are caused to travel in contact for a portion of their length.

C is the frame of the machine arranged between the bands and wheels B. To this frame C are secured the two boxes D, arranged adjacent to the feeding ends of the bands and formed substantially as illustrated in Fig. 3—that is to say, having the opposing faces made with perforations D′. These boxes connect with an exhaust-pipe *d*, leading to an exhauster D^2. By the operation of the ex-

hauster air is drawn through the apertures D′, causing the faces of the bellows side-fold tube to be drawn apart upon passing between the said boxes D.

E represents mechanism for forming the bottom of the bag prior to its being folded down and pasted, and this mechanism is arranged in front of the boxes D and the frame C, adjacent to the boxes.

F are two endless bands which travel upon each side of the feeding-bands A and are guided over rollers *f*. These bands are caused to travel by means of suitable gearing, or otherwise, so as to move with a speed equal to that of the feeding-bands A. The object of these bands F is to receive the folded paper forming the bottom and convey it along with the tube, which is in the custody of the bands A, and at the same speed so handle it that the paper shall not be dragged out of shape. The bottom of the bag is folded into the shape shown at 5 in Fig. 12 by the time it reaches the plate Q, and the tube is then conveyed by the bands A under the plate Q and receive paste from the paste-applying rollers C′. As it continues its travel it passes under the creasing-disks C^2, which crease the bottom on the lines on which it is to fold. After being creased it passes under a roller C^4, which is given a vertical and lateral motion by means of a frame C^5, holding the roller and connected to rotary cranks C^6, said cranks being rotated by means of gearing *c*. The gearing *c* is made eccentric, so that the movement of the roller C^4 is not uniform as to velocity, but is greatest while acting upon the paper tube and slowest in returning to be in a position to act upon the next tube. The motion of this roller C^4 is designed to push over the creased flap, and then roll it down, at the same time traveling with the moving bag-tube. A similar roller and mechanism is arranged immediately after the first-mentioned roller, and is designed to roll down the opposite pasted flap. The action of these two rollers upon the bag is illustrated in Nos. 7 and 8 of Fig. 12. No. 6 illustrates the creased paper tube before reaching the rollers C^4, and after being actuated upon by the creasing-disks C^2. After the bottom is formed, as in No. 8 of Fig. 12, it passes under the pressure-roller C^3, and is then completed.

The mechanism E for forming the bottom of the bag is clearly shown in Sheets 2 and 3. It consists of a series of carriages G, arranged end to end and guided in suitable guides E^3, Figs. 4 and 8. Each of the carriages G is preferably formed of three parts hinged together, as is clearly shown in Figs. 5 and 8, for the purpose of more readily turning the curves. The carriages are held at a given distance apart by means of screws *g′*, attached to the carriages, and the heads of which are caused to rest against the next succeeding carriage. Each of the carriages is provided with a pin or projection G^2, which is acted upon by the teeth of the propelling-wheels O, which propelling-wheels are secured upon shafts *e*, geared together by sprocket-wheels E′ and chain E^2. These shafts *e* are driven by gearing B′ from the main shaft *b* of the pulleys or wheels B, (see Figs. 1 and 2,) whereby the speed of the carriages G is in exact accordance with the speed of the bands A and F. The guide-rails E^3 are grooved and receive guide-rollers *g*, which are secured to the carriages, as shown in Fig. 8. In the central portion of the carriage there is a sliding frame L, projecting toward the bands A, and to the free end of this frame L and pivoted at *m* are two forming blades or plates M, Figs. 10 and 11. These forming-plates are rotated upon their bearings by means of a reciprocating shaft L′, which is guided within the frame L and is normally acted upon by a spring L^2, carried in the frame L, for the purpose of bringing the two blades M parallel, as shown in Fig. 11, in which position they are ready for entrance into the opened bag-tube. The rear end of the frame L is provided with a wheel *l*, which works in a camway N, and likewise the rear end of the shaft L is provided with a wheel *l′*, which works in a grooved camway N′. These camways are shown in Figs. 5, 6, and 7 and are designed to move the blades toward the bands A until within the open tube, and then while holding the frame L operate the shaft L′ to cause the said blades M to rotate about their bearings *m* and open out flat into the position indicated at 4, Fig. 12.

Upon the end pieces of the carriages G are journaled the reciprocating and rotating rods G′, carrying at their free ends the cranks H, which are formed with long fingers adapted to enter the bottom of the tube when opened by the suction-boxes and by proper manipulation bring the tube to the shape shown at 2 in Fig. 12, and while so held permit the blades M to be forced into the open end of the tube, as indicated by numbers 3 and 4 of Fig. 12. The rotary reciprocating shafts G′ pass through pinions J, carried upon the carriages, (see Figs. 8 and 9,) and these pinions J are rotated in opposite directions, so that the two adjacent shafts G′, or those upon one end of the carriage, are rotated in opposite directions. The pinions J at one end of the carriage are connected on adjacent sides to a rack I by suitable teeth, and this rack is made jointed and is provided with teeth at the other end operating upon the outer or opposite sides of the corresponding pinions J′ of the other two reciprocating and rotating shafts G′. It will thus be seen that each of the carriages G is provided with four shafts G′ and four cranks H. The rack I is reciprocated upon the carriage G by means of the lever-arm K, pivoted at one end to the middle portion of the carriage G and provided at the other end with a roller *k*, which works upon a cam R, secured to the frame C of the

machine, and on the side adjacent to the bands A, Fig. 4. As the carriages travel adjacent to the bands A, the cam R causes the lever-arm K to move against the action of a spring K′ and induces a reciprocation of the rack I. This action causes the cranks H to move farther apart, and thereby open the end of the bag-tube into the shape shown at 2 in Fig. 12. As it is necessary for the cranks H to enter the tube, provision is made for their longitudinal reciprocation through the pinions J and J′, which provision consists of a camway P, Fig. 5, which acts upon the shafts G′ to thrust them forward to project the cranks H into the open tube while in the custody of the suction-boxes D. After being projected into the open end of the tube the said shafts are held against reciprocation while they are rotated in the manner above specified to cause the bag-tube to be opened into a condition to receive the forming-plates M. After the bag has been shaped in the manner above described the curved ends of the camways N and N′ causes the plate M to be withdrawn from the tube, and the rear oblique end of the camway P causes the cranks or fingers H to be withdrawn from the tube, and these parts pass around with the carriages into a position to act upon successive tubes. The cranks and crank-fingers H, during the entrance of the forming-plates M, are moved and are received through curved slots *m′*, Fig. 10, into blades M, and while the blades M are entering into a final position within the tube the crank-fingers are withdrawn. Subsequently the blades M are withdrawn and the tube folded in the condition at 5 in Fig. 12 passes on to the pasting-rolls, and then to the creasing and folding mechanism. The various rotating and moving parts are mechanically connected together or with proper power machinery of any suitable construction, whereby their movements and speeds have a given relation with the surface speed of all the parts, and so far as their movement in the direction of the travel of the tube is concerned said movements are equal to the speed of travel of the bands A.

It is quite evident that the details of construction might be more or less modified without in the least departing from the principles of my invention. Hence I do not limit myself to the details herein set out.

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

1. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, suction-boxes between which the end of the paper tube passes to open the same, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, and power mechanism for operating the forming-fingers during the travel of the carriages.

2. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, suction-boxes between which the end of the paper tube passes to open the same, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, power mechanism for operating the forming-fingers during the travel of the carriages, consisting of cam devices for reciprocating the forming-fingers to and from the conveying devices, and cam devices for rotating or rocking said forming-fingers.

3. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, suction-boxes between which the end of the paper tube passes to open the same, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, power mechanism for operating the forming-fingers during the travel of the carriages, forming blades or plates for entering the open end of the tube, a reciprocating frame, to which the forming-plates are loosely connected, carried by the carriages, a reciprocating rod or shaft for moving said plates about their axes to and from each other, and cam mechanism for actuating said reciprocating frame and shaft during the travel of the carriages.

4. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, and power mechanism for operating the forming-fingers during the travel of the carriages.

5. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, power mechanism for operating the forming-fingers during the travel of the carriages, consisting of cam devices for reciprocating the forming-fin-

gers to and from the conveying devices, and cam devices for rotating or rocking said forming-fingers.

6. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, power mechanism for operating the forming-fingers during the travel of the carriages, and an endless apron traveling under folded bottoms and acting as the support for the paper arranged at right angles to the body of the tube.

7. In a paper-bag machine, the combination of conveying devices for conveying a tube of paper, a series of carriages forming an endless train, each provided with forming-fingers for entering the open end of the tube and spreading it into shape to be folded, guides for said carriages, power mechanism for causing the carriages and conveying devices to travel at the same speeds, power mechanism for operating the forming-fingers during the travel of the carriages, consisting of cam devices for reciprocating the forming-fingers to and from the conveying devices, and cam devices for rotating or rocking said forming-fingers, and an endless apron traveling under folded bottoms and acting as the support for the paper at right angles to the body of the tube.

8. In a paper-bag machine, the combination of endless conveyers for conveying tubes of paper with a series of carriages traveling adjacent to the ends of the tubes, mechanical devices, substantially as set out, carried by said carriages for entering the tube and folding the end thereof mechanically, power mechanism for operating said carriages at a speed equal to that of the endless conveyers, pasting devices for applying paste to the diamond folds of the tube, and folding devices for folding the diamond folds over one upon the other to complete the bottom of the bag.

9. In a paper-bag machine, the combination of endless conveyers for conveying tubes of paper, means in the path of the paper tube for opening its end during its travel with the conveyer, with a series of carriages traveling adjacent to the ends of the tubes, mechanical devices, substantially as set out, carried by said carriages for entering the open tube and folding the tube to form the bottom mechanically, power mechanism for operating said carriages at a speed equal to that of the endless conveyers, pasting devices for applying paste to the diamond folds of the tube, and folding devices for folding the diamond folds over one upon the other to complete the bottom of the bag.

10. In a paper-bag machine, the combination of a conveyer for a tube, a traveling carriage arranged to travel substantially parallel to said conveyer, four crank-fingers carried by said carriage and adapted to be reciprocated to and from the conveyer and moved toward or from each other to shape the bottom of the tube into a rectangular box, and power mechanism to move said conveyer and carriage and operate the forming-fingers.

11. The combination, in a paper-bag machine, of a conveyer for a tube, a traveling carriage arranged to travel substantially parallel to said conveyer, four crank-fingers carried by said carriage and adapted to be reciprocated to and from the conveyer and moved toward or from each other to shape the bottom of the tube into a rectangular box, forming plates or blades arranged between the forming crank-fingers and adapted to spread out as they are moved toward the conveyers, also carried by the carriage, and power mechanism to move said conveyer and carriage and operate the forming-fingers and forming plates or blades.

12. The combination, in a paper-bag machine, of a conveyer for a tube, a traveling carriage arranged to travel substantially parallel to said conveyer, four crank-fingers carried by said carriage and adapted to be reciprocated to and from the conveyer and moved toward or from each other to shape the bottom of the tube into a rectangular box, power mechanism to move the carriage and conveyer at equal speeds, and stationary cams for reciprocating said forming-fingers and imparting to them a lateral movement.

13. The combination, in a paper-bag machine, of a conveyer for a tube, a traveling carriage arranged to travel substantially parallel to said conveyer, four crank-fingers carried by said carriage and adapted to be reciprocated to and from the conveyer and moved toward or from each other to shape the bottom of the tube into a rectangular box, forming blades or plates arranged between the forming crank-fingers and adapted to spread out as they are moved toward the conveyers, also carried by the carriage, and stationary cams for reciprocating the forming blades or plates to or from the conveyer, and also open or close the same with reference to each other.

14. In a paper-bag machine, the combination of bottom-forming mechanism for forming and pasting a diamond fold, a conveyer for conveying the folded tube, mechanism for folding over the diamond fold, consisting of a surface or part movable transversely to the line of travel of the tube and also longitudinally therewith, and power mechanism for imparting to the folded surface a simultaneous transverse and longitudinal motion.

15. In a paper-bag machine, the combination of bottom-forming mechanism for forming and pasting a diamond fold, a conveyer

for conveying the folded tube, mechanism for folding over the diamond fold, consisting of a surface or part movable transversely to the line of travel of the tube and also longitudinally therewith, power mechanism for imparting to the folding surface a simultaneous transverse and longitudinal motion, and eccentric gearing for operating said power mechanism, whereby the motion of the folding surface with the travel of the tube is at a greater speed than its return for meeting the next tube.

In testimony of which invention I have hereunto set my hand.

WATSON H. CLINE.

Witnesses:
ERNEST HOWARD HUNTER,
A. J. DUNN.