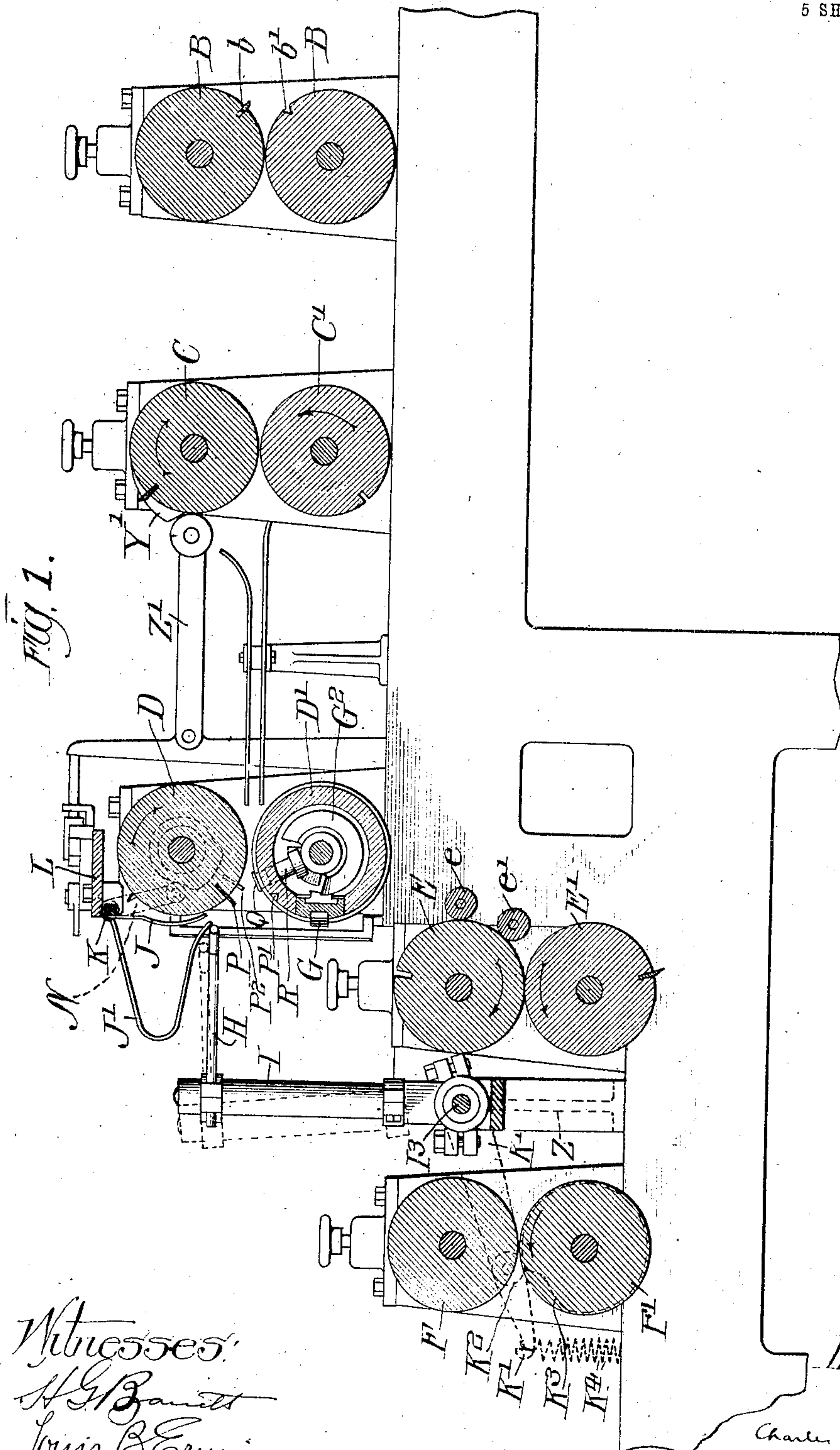


C. S. JACKSON.
PAPER BAG MACHINE.
APPLICATION FILED JULY 1, 1907.

983,825.

Patented Feb. 7, 1911.

5 SHEETS—SHEET 1.



Witnesses:
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Inventor:
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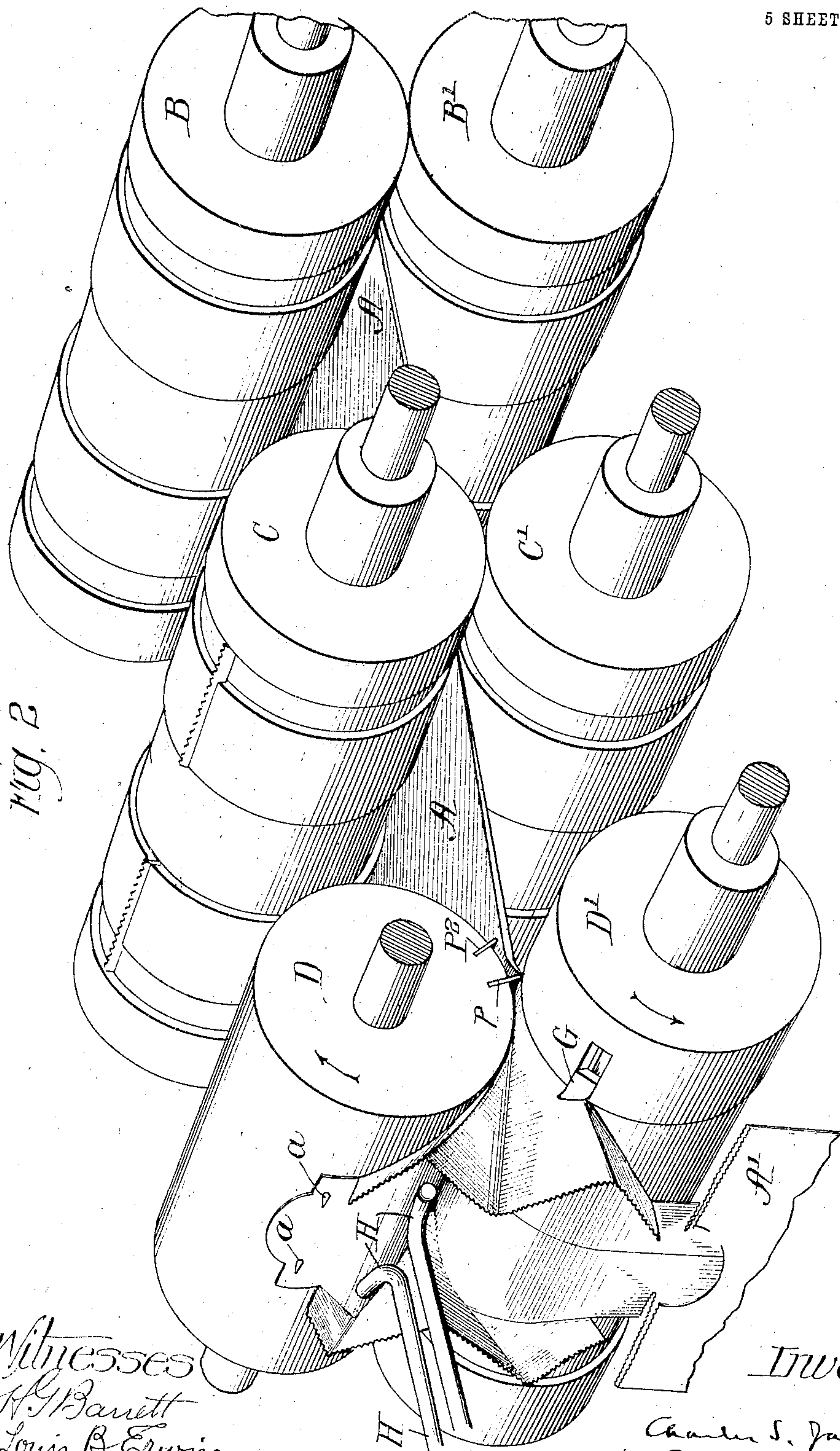


Fig. 2

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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.



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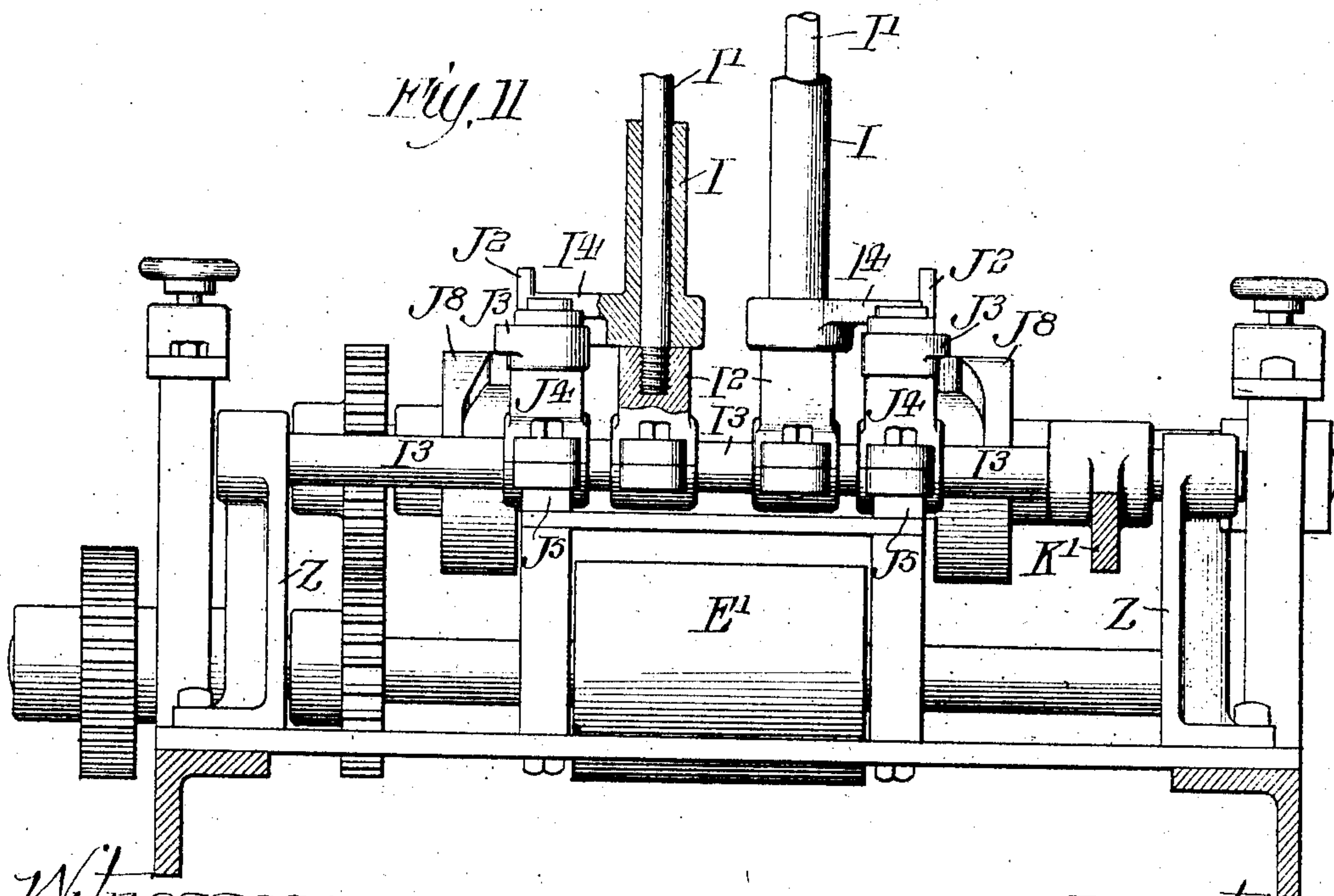
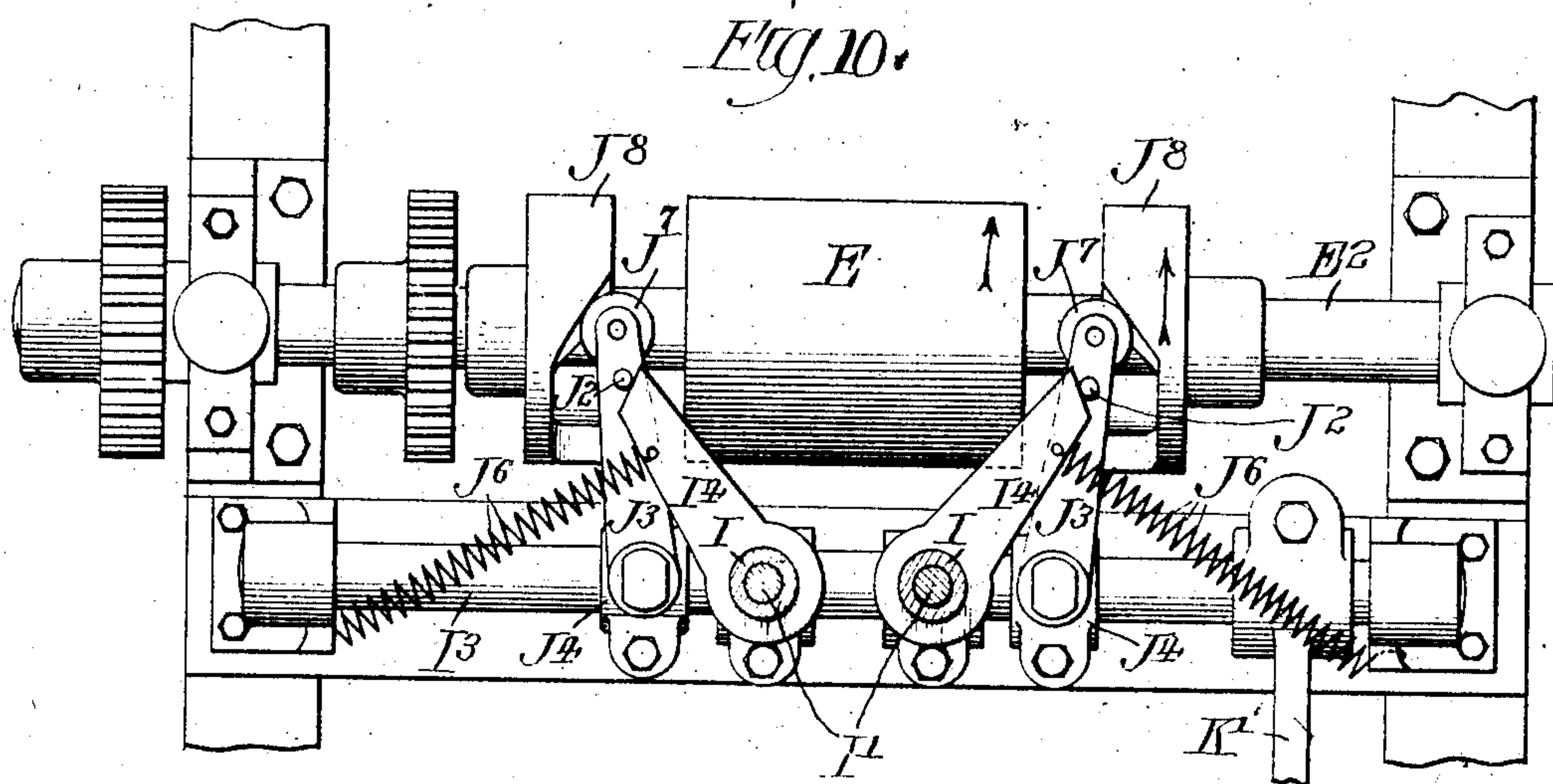
Inventor:
Charles L. Jones
in witness whereof
his atty.

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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

983,825.

Specification of Letters Patent.

Patented Feb. 7, 1911.

Application filed July 1, 1907. Serial No. 381,629.

To all whom it may concern:

Be it known that I, CHARLES S. JACKSON, a citizen of the United States, residing at Franklin, in the county of Warren and State of Ohio, have invented a certain new and useful Improvement in Paper-Bag Machines, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to machines for forming what are known as square satchel-bottomed bags, sometimes called self-opening square or S. O. S. bags; and it has for its object the simplification and improvement of the mechanism employed in such machines for forming the diamond-fold upon the bag blanks in the operation of forming the bottoms of the bags.

In the practical embodiment which I have made of my invention I have applied it to paper bag machines constructed under and in substantial accordance with Letters Patent of the United States No. 736,673 granted August 18, 1903, to Phineas L. Bartholomew, and I have so illustrated it in the accompanying drawings; but my improvement is applicable to other paper bag machines of the class referred to.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of a portion of a paper bag machine embodying my invention; Fig. 2 an outline or diagrammatic view, in perspective, of the three upper pairs of rolls shown in Fig. 1, the left hand pair being the diamond-forming rolls; Figs. 3, 4, 5 and 6 perspective views of said diamond-forming rolls and their cooperating devices, showing them in the positions which they successively occupy in the formation of the diamond fold upon the bottom of the bag blank; Fig. 7 a top plan view of the lower diamond-forming roll; Fig. 8 a longitudinal sectional view of said roll, exposing the parts within it; Fig. 9 a cross section of said roll upon the dotted line 9—9 of Fig. 8; Fig. 10 a detail view, in horizontal plan and section, of some of the parts cooperating with the diamond-forming rolls; and Fig. 11 a front elevation of the parts shown in Fig. 10.

The same letters of reference are employed to indicate corresponding parts in the several views.

The bellows-folded tube A, Fig. 2, from which the bags are formed, is folded and pasted by the usual or any suitable mechanism at the right of the portion of the machine shown in Figs. 1 and 2, and fed forward between the pairs of rolls there shown. The two rear or right-hand pairs of rolls B B¹ and C C¹ are feed rolls, serving to advance the bag to the diamond-forming rolls D D¹, and they are also provided with cutters and cooperating recesses by means of which (in connection with cutting rolls at the right or in rear of them, but not shown) the bag tube is cut transversely into separate bag blanks, the successive blanks being entirely separated from each other with the exception of a narrow connecting tang, as shown in Fig. 2, where the rear end of one blank A¹ is shown connected by such tang to the front end of the succeeding blank upon which the diamond fold is being formed.

The upper diamond-forming roll D is provided near its middle with a pair of projecting points or pins *a a* which are adapted to puncture the middle portion of the end of the upper ply of the bag tube A, as the latter passes between the rolls D D¹, and to carry such upper ply of the bag tube forward and upward around the face of the roll D, as shown in Figs. 2 and 3. The middle portion of the lower ply of the bag tube is carried forward and downward over the face of the lower roll D¹ by its connection with the preceding bag blank A¹, which latter is drawn forward and downward, from the diamond forming rolls, by the feed rolls E e E¹ e¹, Fig. 1, whence the bag blanks pass on forward between the rolls F F¹. The roll E¹ is provided midway of its length with a short cutting blade which cooperates with a recess in the roll E to sever the connecting tangs of the bag blanks as the latter pass between the rolls, and thus to finally and completely separate the bags.

The carrying of the upper ply of the bag blank upward and forward around the roll D and the carrying of the lower ply of the blank forward and downward around the roll D¹, in the manner and by the means explained, serves to open out the mouth of the bag blank, preparatory to the forming of the diamond fold thereon, as shown in Fig. 2. The roll D¹ is provided with a pair

of side grippers G G, one of which is shown in Fig. 2 and both of which are shown in Figs. 7 and 8, which grippers enter between the bellows folds of the bag blank as the latter passes between the rolls D D¹ and grip the lower ply of the blank to the face of the roll D¹, as shown in Fig. 2. These grippers serve to define the lower corner folds of the diamond fold, and to carry such corners forward and downward as the roll D¹ turns. The upper corner folds of the diamond fold are formed by a pair of arms H H having outwardly bent rear ends, as shown in Fig. 2, and those forward ends are secured to vertical rock shafts I I, Figs. 1, 3, 4, 5, 6, 10 and 11, mounted and operated in the manner hereafter described. At the proper point in the opening out of the mouth of the bag blank the rear ends of these arms H H are swung outward and upward and their laterally bent ends engage the opposite sides of the upper ply of the bag blank at points corresponding to the engagement of the grippers G G with the opposite sides of the lower ply of the blank, and the two instrumentalities cooperate to straighten out the bellows folds of the opposite sides of the blank and to form and define the upper and lower corners of the diamond fold.

For the purpose of disengaging the upper ply of the blank from the pins *a a* of the upper roll D I provide a curved plate J, Figs. 1, 3, 4, 5 and 6, secured to and depending from a rock shaft K suitably mounted in bearings upon the under side of the cross rod L of the framework of the machine. A coiled spring M connected to an arm N secured to and depending from the right hand end of the rock shaft K tends to turn the latter in a direction to yieldingly press the lower end of the curved plate J against the forward face of the roll D. The plate J is of such width as to permit it to pass between the two pins *a a* upon the roll D, and as said pins carry the upper ply of the bag blank upward and forward on the face of said roll, the lower end of the plate J will pass between said pins and behind the bag blank, as shown in Fig. 3, and disengage the blank from the pins. For the purpose of supporting the upper ply of the blank, after such disengagement of it from the pins *a a*, I provide a second curved plate J¹, secured at its upper rear end to the rock shaft K, and bowed outwardly at its middle, away from the plate J, and having its lower end bent inwardly toward the lower end of the finger J, so that when the bag blank is disengaged from the pins *a a* upon the roll D it will be caught and supported by the lower rearwardly bent end of the plate J, as shown in Figs. 4 and 5.

The roll D is provided with a creasing blade P extending its full length and co-

operating with a corresponding groove P¹ in the roll D¹, Figs. 1 and 7, to form the main transverse crease of the bag blank, along which the upper ply of the blank is folded upward against the body of the blank as the diamond fold is completed; and for the purpose of swinging the lower end of the plate J forward, away from the roll D, so as to permit the passage of the creasing blade P behind it, as the latter moves from the position of Fig. 5 to that of Fig. 6, I provide a cam O upon the spindle of the roll D, which cam cooperates with an anti-friction roller carried by the lower end of the arm N to swing the latter and the lower end of the plate J forward at the proper time to permit the creasing blade P to pass behind the plate J, Figs. 1, 3, 4, 5 and 6.

The lower roll D¹ is longer than the upper roll D, and its middle portion, corresponding in length to the upper roll D and to the width of the bag blank, is of the same diameter as the upper roll D, while its end portions are of slightly larger diameter, as clearly shown in Figs. 7 and 8. The bag blank passes between the two rolls in the circumferential recess thus formed in the lower roll and is not gripped by the bodies of the roll.

In rear of the longitudinal line of the groove P¹ the roll D¹ is provided with a pair of reciprocating plates or fingers Q Q, Figs. 1, 7 and 8. These plates or fingers are secured at their outer ends to the ends of arms or posts R R, which latter are fastened at their inner ends to sleeves or hubs S S loosely mounted upon the spindle T of the roll D¹ and projecting radially outward from said sleeves or hubs through diagonal cam slots U U in the shell of the roll D¹, and the roll turns upon it, and the spindle has fast upon it, immediately within the ends of the roll, a pair of cams V V. Coiled springs W W surrounding the spindle T bear against the inner ends of the sleeves or hubs S S and press the latter outwardly, causing anti-friction rollers X X upon the arms R R to bear against the faces of the cams V V. The arms R R are also surrounded, between the rollers X X and the fingers Q Q carried by their outer ends, with anti-friction sleeves R¹ R¹ which play in the slots U U in the shell of the roll and relieve the friction which would otherwise occur between the arms R R and the walls of said slots.

Inasmuch as the arms R R which carry the fingers Q Q project outwardly through the cam slots in the shell of the roll D¹, they are carried around with said roll in the revolutions of the latter, their hubs S S turning upon the fixed spindle T; and, inasmuch as the cams V V are in fixed position, when the anti-friction rollers X X of

the arms R R contact with the faces of the cams V V, during the forward revolution of the roll D¹, the hubs S S which carry the arms R R will be forced inward along the spindle T, toward the middle of the roll D¹, with the result that the fingers Q Q will be moved diagonally inward and forward from the position of the solid lines in Fig. 7 to the position of the dotted lines. The adjustment and coöperation of the parts are such that after the main transverse crease has been formed in the bag blank by the creasing blade P carried by the upper roll D and the groove P¹ in the lower roll D¹, and as the fingers Q Q are brought to position diametrically between the axes of the rolls D D¹, the rollers X X carried by the arms R R will contact with the cams V V, and the fingers Q Q will be forced inward and forward upon the face of the roll D¹ from the position of the solid lines in Fig. 7 to that of the dotted lines in said figure, as the rollers X X ride over the faces of the cams V V. Inasmuch as the end portions of the roll D¹ are of larger diameter than its middle portion, and inasmuch as the bag blank travels in the circumferential recess of such reduced middle portion, the fingers Q Q, at their inward and forward movement from the position of the solid lines in Fig. 7 to that of the dotted lines, pass over or above both plies of the bag blank, and while serving to hold the latter to the roll D¹ in the forward and downward movement of the fingers, leave it in loosely collapsed condition, instead of gripping it tightly to the roll. I provide the opposite ends of the roll D with two short blades P², in rear of the creasing blade P, which serve to hold the bag blank down to the roll D¹ at the initial inward movement of the fingers Q Q, and thereby insure the passage of the latter over the top of both plies of the blank.

The fingers Q Q are moved gradually inward and forward over the top of the bag blank, by the action of the cams V V and the revolution of the roll, as the fingers are carried forward from the diametrical line of the two rolls to approximately the horizontal plane of the axis of the lower roll, by which time, or shortly before reaching such position, they have been moved inward and forward to their limit of movement, and the lower forward edges of the fingers reach a position approximately coincident with the rear edge of the groove P¹ in the roll D¹ (dotted lines Fig. 7) and engage the bag blank at the line of its main transverse crease. Shortly after the fingers Q Q have reached this position, and thus engaged the bag blank, the rollers X X clear the rear ends of the cams V V and the springs W W thereupon throw the fingers Q Q outward and backward to normal position again.

The movement of the fingers Q, Q is sub-

stantially contemporaneous with the opening of the mouth of the bag and the fingers do not reach their limit position until the bag mouth is fully opened or substantially so. Their first engagement with the bag is at a point more remote from its mouth than that which the fingers occupy when the opening operation is being completed. Therefore the bag may be very readily spread apart at the earlier stages of the opening movement and the fingers reach their ultimate position by a sliding or smoothing movement over the surface of the bag which lays it perfectly flat without creases.

The kicker-arms H H, by which the upper corners of the diamond fold are defined and formed, are operated by the means more particularly illustrated in Figs. 1, 10 and 11. The arms are secured at their front ends in hubs clamped upon the upper ends of the vertical rock shafts I I heretofore referred to. These shafts I I are hollow or tubular and fit and turn upon rods or posts I¹ I¹ which are secured at their lower ends in hubs I² I² fast upon a rock shaft I³ journaled at its opposite ends in brackets Z upon the framework at opposite sides of the machine, Fig. 11. Projecting rearwardly and outwardly from the lower ends of the tubular shafts I I, and in the present instance formed integral therewith, Figs. 10 and 11, is a pair of arms I⁴ provided with beveled or inclined rear ends which bear against pins J² J² carried by and projecting upwardly from a pair of arms J³ J³ which are pivoted at their forward ends to a pair of hubs J⁴ J⁴ loosely surrounding the rock shaft I³ and bolted in fixed position to the framework of the machine at J⁵ J⁵, Fig. 11. Springs J⁶ J⁶, connected to the arms I⁴ I⁴ near their rear ends, exert an outward pull upon said arms and maintain their beveled rear ends in engagement with the pins J² J² of the arms J³ J³. The latter carry at their rear ends a pair of anti-friction rollers J⁷ J⁷ which bear against the inner faces of a pair of cams J⁸ J⁸ fast upon the spindle E² of the roll E, each cam having a recess formed in it with an abrupt rear wall and an inclined front wall, as shown in Fig. 10. Under this construction and arrangement of the parts, when the cams J⁸ turn forward from the position shown in Fig. 10 the rear ends of the arms J³ J³ will be permitted to swing outward, and the springs J⁶ J⁶ will swing the rear ends of the arms I⁴ I⁴ outward with them, thereby rocking the tubular shafts I I and swinging outward the rear ends of the kicker-arms H H carried by the upper ends of said shafts. When the abrupt rear walls in the recesses of the cams J⁸ J⁸ contact with the rollers J⁷ J⁷ the parts will be quickly swung inward again to normal position.

As before stated, the hubs I² I², which

carry the vertical rods $I^1 I^1$ and tubular rock shafts $I I$ and kicker-arms $H H$, are secured upon the horizontal rock shaft I^3 . Secured to this rock shaft near its right hand end, Figs. 10 and 11, is the rear end of a forwardly projecting arm K^1 which carries upon its side, near its forward end, an anti-friction roller K^2 , which travels upon the periphery of a cam K^3 fast upon the end of the roll F^1 or upon the spindle thereof, as indicated by the dotted lines in Fig. 1. A spring K^4 connected to the front end of the arm K^1 exerts a downward pull upon the latter and maintains the roller K^2 in engagement with the cam K^3 . The adjustment of the parts is such that as the cams $J^8 J^8$ move forward from the position shown in Fig. 10 (thereby permitting the kicker-arms $H H$ to be swung outward by the action of the springs $J^6 J^6$) the depression in the cam K^3 , Fig. 1, is carried under the roller K^2 , with the result that the spring K^4 draws the front end of the arm K^1 downward, thereby rocking the shaft I^3 and swinging the rock shafts K and kicker-arms $H H$ forward and upward to the position indicated by the dotted lines in Fig. 1. The rear ends of the kicker-arms $H H$ are thus given a simultaneous outward and upward and forward movement, conducive to their best action upon the upper ply of the bag blank in the formation of the upper corner folds therein.

Under the above described construction and arrangement of the parts, as the lower ply of the bag blank is carried downward and forward upon the face of the lower roll D^1 by the side grippers $G G$ the coöperation of the curved plate or finger J^1 and the kicker-arms $H H$ with the upper ply of the blank, and the action of the fingers $Q Q$ upon the body or both plies of the blank in rear of its main transverse crease, causes the blank to assume the successive positions and shapes indicated in Figs. 4, 5 and 6. At this point in the operation the diamond fold has been formed upon the end of the bag blank and the latter has been brought to an approximately flat or vertical position, whereupon the usual wing folders or presser plates are swung inward and press the flattened diamond fold against the face of the lower roll D^1 as the bag blank is drawn on downward by the rolls $F e^1 E^1$, Fig. 1. The wing folders $Y Y$ are operated by a cam Y^1 carried by the roll C , and connections Z^1 therefrom shown in said figure but not necessary to be described, inasmuch as such wing folders are common in machines of this character. The final folding and pasting of the bottoms of the bags, after they have passed the rolls $E E^1$, may be accomplished by the usual or any suitable means and forms no part of my present invention.

The fingers $Q Q$, operating in the manner

described, are, I believe, an entirely novel feature in machines of this character, and their employment enables me to dispense with the cumbersome reciprocating tucker plates with which some machines of this character have before been provided, and also with any side grippers upon the upper roll D , such, for instance, as were necessary and employed in the machine of the Bartholomew patent heretofore referred to.

I provide the roll B , Fig. 1, with two short creasing blades b at its opposite ends, and the roll B^1 with two coincident grooves b^1 , for the purpose of creasing the bag blank at the lines of its opposite bottom folds. These creases serve to break the paper along the lines between the lower corner folds of the bag bottom, formed by the side grippers $G G$, and the upper corner folds, formed by the kicker-arms $H H$, and facilitate the opening out of the bottom of the bag blank into the diamond fold by these instrumentalities.

The particular construction of the side grippers $G G$ of the lower roll D^1 forms no part of my present invention, and they may be of any suitable construction, such, for instance, as that illustrated and described in the Bartholomew patent. As shown in Fig. 8, they consist in the present instance of reciprocating jaws $G G$ carried by blocks $G^1 G^1$ and playing and guided in slots in the shell of the roll, Fig. 7. The blocks $G^1 G^1$ are fast upon rods $G^6 G^6$, whose inner ends have secured to them blocks $G^5 G^5$ which carry anti-friction rollers $G^4 G^4$ which coöperate with a double faced cam G^2 carried by a hub G^3 fast upon the spindle T of the roll. The blocks $G^5 G^5$ and $G^7 G^7$ are provided with flanges which fit under guide strips $G^8 G^8$, Fig. 9, and serve to guide the parts in their inward and outward movements longitudinally of the roll. Spring-pressed rods G^1 bearing against the jaws $G G$ press the latter inward and coöperate with the cams $G^2 G^2$ in giving the jaws $G G$ their inward and outward movements.

The gripping jaws of the grippers $G G$ coöperate with the gripping jaws or fingers $G^9 G^9$, which latter are provided with beveled ends adapted to contact with the beveled inner edges of the grippers $G G$ when the latter are forced inward by their springs, to thereby force the free ends of the jaws or fingers $G^9 G^9$ outward into contact with the inner faces of the gripping jaws of the grippers $G G$ to grip the lower plies of the bellows folded blank between them, in very much the same manner as the corresponding parts operate in the machine of the Bartholomew patent before mentioned. The adjustment and coöperation of the parts are such that the grippers $G G$ are forced inward, toward the middle of the roll, to grip the lower plies of the bag blank, when the

grippers are approximately at the top of the roll D^1 in the forward revolution of the latter, and they continue to grip the lower plies of the blank to said roll until the latter has turned forward approximately a quarter of a revolution, to the position shown in Fig. 1, at which point the cams $G^2 G^2$ force the grippers $G G$ outward and maintain them in outward position until, in the further revolution of the roll D^1 , they are again brought to approximately the top of the roll.

Having thus fully described my invention, I claim:

1. In a paper bag machine of the character described, the combination, with the lower diamond-forming roll mounted to turn upon a fixed spindle, of a pair of arms loosely mounted at their inner ends upon said spindle within the roll and projecting outward through cam slots or openings in the shell of the roll, plates or fingers secured to the outer ends of said arms and projecting inwardly toward the middle line of the roll, a pair of cams secured upon the fixed spindle within the roll and operating in the revolution of the latter to force said arms inward toward the middle of the roll, and springs operating to yieldingly maintain said arms in and return them to their outer positions.

2. In a paper bag machine of the character described, the combination, with the lower diamond-forming roll mounted to turn upon a relatively fixed spindle, of a pair of arms loosely mounted at their inner ends upon said spindle within the roll and projecting outward through cam slots in the shell of the roll, said slots extending forwardly and inwardly toward the middle line of said roll, plates or fingers secured to the outer end of said arms and projecting inwardly toward the middle of the roll, a pair of cams secured to the fixed spindle within the roll and cooperating with said arms, and springs operating to press said arms in a direction opposite to that in which they are moved by engagement with the cams.

3. In a paper bag machine of the character described, the combination with the lower diamond-forming-roll, of a pair of plates or fingers carried by said roll, each plate or finger having a working edge substantially parallel to the axis of the roll, means for advancing said plates or fingers bodily on the face of the roll while preserving the direction of the working edge with respect to the axis of the roll whereby the fingers will first engage the blank and then carry forward the line of engagement.

4. In a paper bag machine of the character described, the combination with the lower diamond-forming-roll, of a pair of plates or fingers carried by said roll, means for advancing them bodily forward and inward to first engage the blank and then

carry forward the line of engagement while preserving the direction of the working edge of each finger.

5. In a paper bag machine of the character described, the combination with the lower diamond-forming-roll, of a pair of plates or fingers carried thereby, means for advancing said plates or fingers in a direction inclined to the edge of the roll, while preserving the direction of the working edge thereof.

6. In a paper bag machine of the character described, the combination, with the lower diamond-forming roll D^1 mounted upon the fixed spindle T , the sleeves or hubs $S S$ loosely mounted upon said spindle within the roll, the arms $R R$ carried by said sleeves and projecting outward through the diagonal slots $U U$ in the shell of the roll, the fingers $Q Q$ secured to the outer ends of the arms $R R$, the cams $V V$ secured to the spindle T within the roll and cooperating with the arms $R R$, and the springs $W W$ cooperating with the sleeves $S S$ in opposition to the cams $V V$.

7. In a paper bag machine of the character described, the combination, with the upper diamond-forming roll D provided with the creasing blade P , and the lower diamond-forming roll D^1 provided with the groove P^1 cooperating with the blade P to form the main transverse crease in the bag blank, of the plates or fingers $Q Q$ carried by the roll D^1 in rear of the groove P^1 , and means for moving said fingers inward and forward upon the face of said roll to approximately the rear line of said groove for the purpose of engaging said fingers with the bag blank in rear of the main transverse crease therein during the formation of the diamond fold.

8. In a paper bag machine of the character described, the combination, with the diamond-forming rolls and their gripping devices, of the rock shafts $I I$, the spring-operated arms $I^4 I^4$ projecting from said shafts $I I$, the arms $J^3 J^3$ provided with the pins $J^2 J^2$ engaging the arms $I^4 I^4$ and carrying the anti-friction rollers $J^7 J^7$, the cams $J^8 J^8$ cooperating with said rollers, and the kicker-arms $H H$ carried by the upper ends of the rock shafts $I I$.

9. In a paper bag machine of the character described, the combination, with the diamond-forming rolls and their gripping devices, of the rock shaft I^3 and means for rocking it, the vertical rock shafts $I I$ mounted at their lower ends upon the rock shaft I^3 and carrying the rearwardly extending kicker-arms $H H$ at their upper ends, the spring operated arms $I^4 I^4$ projecting from the rock shafts $I I$, the arms $J^3 J^3$ provided with the pins $J^2 J^2$ engaging the arms $I^4 I^4$ and carrying the anti-friction rollers $J^7 J^7$, and the cams $J^8 J^8$ cooperating with the rollers $J^7 J^7$.

10. In a paper bag machine of the character described, the combination of the rock shaft I³ and means for rocking it, the vertical posts I¹ I¹ secured at their lower ends to said rock shaft I³, the tubular rock shafts I I mounted upon the posts I¹ I¹, the arms I⁴ I⁴ projecting from the rock shafts I I, the springs J⁶ J⁶ connected to the arms I⁴ I⁴, the arms J³ J³ having the pins J² J² engaging the arms I⁴ I⁴ and carrying the rollers J⁷ J⁷, the cams J⁸ J⁸ coöperating with the rollers J⁷ J⁷, and the kicker-arms H H carried by the upper ends of the rock shafts I I.

11. In a paper bag machine of the character described, the combination, with the upper diamond-forming roll D and its pins a a and creaser blade P, of the rock shaft K, the depending finger J carried by said rock shaft, and the cam O and connections for operating the rock shaft K to swing the lower end of the finger J forward out of the path of the creaser blade P.

12. In a paper bag machine of the character described, the combination, with the upper diamond-forming roll D and its pins a a and creaser blade P, of the rock shaft K, the depending finger J and the outwardly bowed plate or finger J¹ carried by said rock shaft, and the cam O and connections for operating the rock shaft to swing the lower ends of said fingers forward to carry the finger J out of the path of the creaser P.

13. In a paper bag machine of the character described, the combination with devices for opening out the mouth of the bag blank and forming the diamond fold therein including diamond forming rolls, and fingers bodily forwardly slidable over the periphery of the lower diamond forming roll to hold said bag blank in place, of means for creasing the opposite sides of the bag blank on the lines which connect the upper and lower corners of the opposite sides of

the diamond fold, to facilitate the formation of the latter.

14. In a paper bag machine of the character described, the combination with devices for opening out the mouth of the bag blank and forming the diamond fold therein including diamond forming rolls and holding fingers Q, Q bodily slidable forwardly on the lower of said diamond forming rolls, and means for advancing the fingers, of a pair of rolls, as B, B¹ provided with a creasing blade b and coöperating groove b¹ operating to crease the bag blank on the lines which connect the upper and lower corners of the opposite sides of the diamond fold, to facilitate the formation of the latter.

15. In a paper bag machine of the character described, the combination with the lower diamond forming roll, of a pair of plates or fingers carried by said roll and slidably mounted in inclined grooves therein, and means for moving said plates or fingers inward and forward over the face of said roll, and engaging them with the bag blank in rear of the main transverse crease therein, during the formation of the diamond fold, substantially as described.

16. In a paper bag machine of the character described, the combination, with the lower diamond forming roll, of a pair of plates or fingers carried by said roll and slidably mounted therein, and cams arranged inside of said roll, and operating, in the revolution of the roll, to bodily advance said plates or fingers inward and forward over the face of the roll for the purpose of engaging said plates or fingers with the bag blank in rear of the main transverse crease therein, during the formation of the diamond fold, substantially as described.

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