(Model.)

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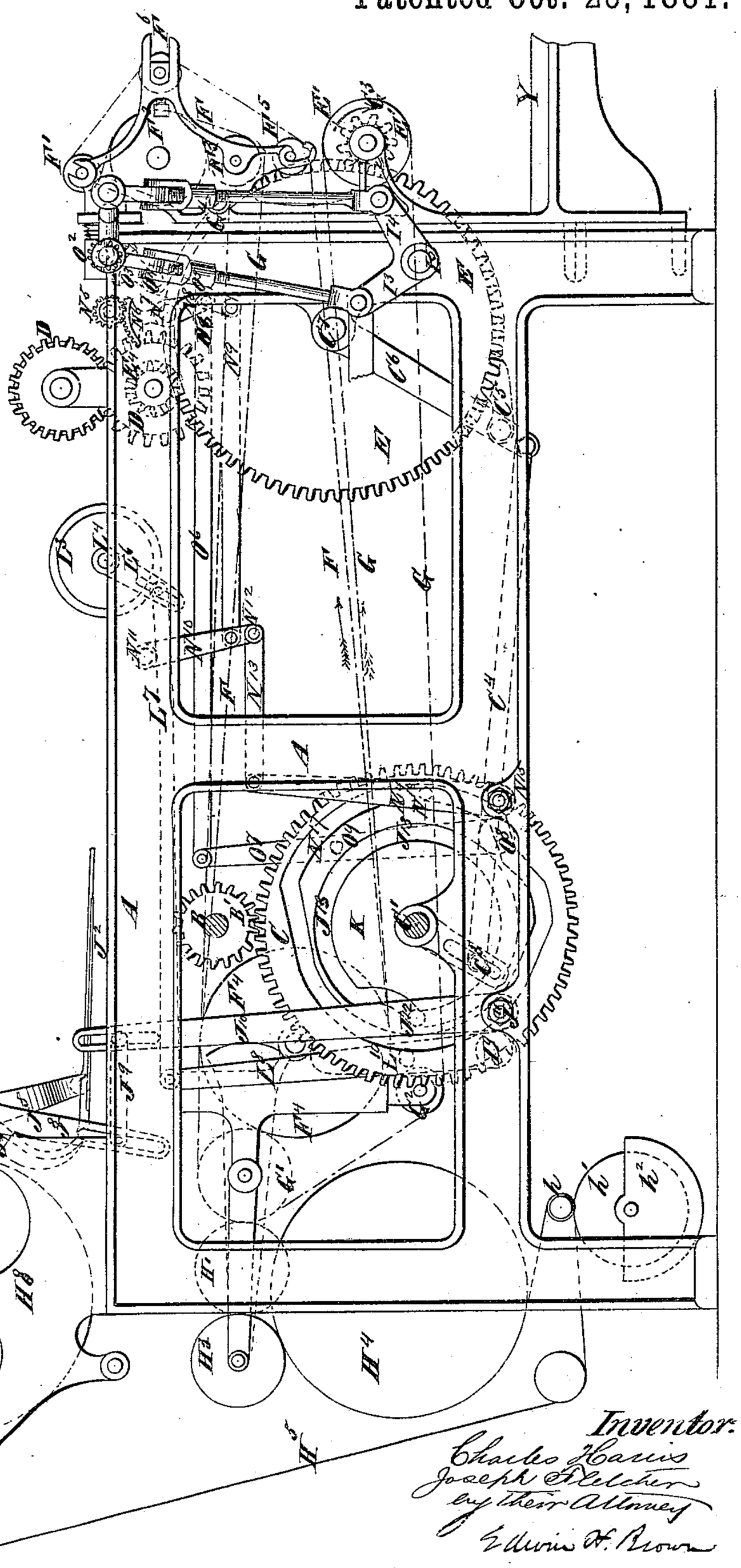
C. HARRIS & J. FLETCHER.

PAPER BAG MACHINE.

No. 248,739. Patented Oct. 25, 1881.



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PAPER BAG MACHINE.

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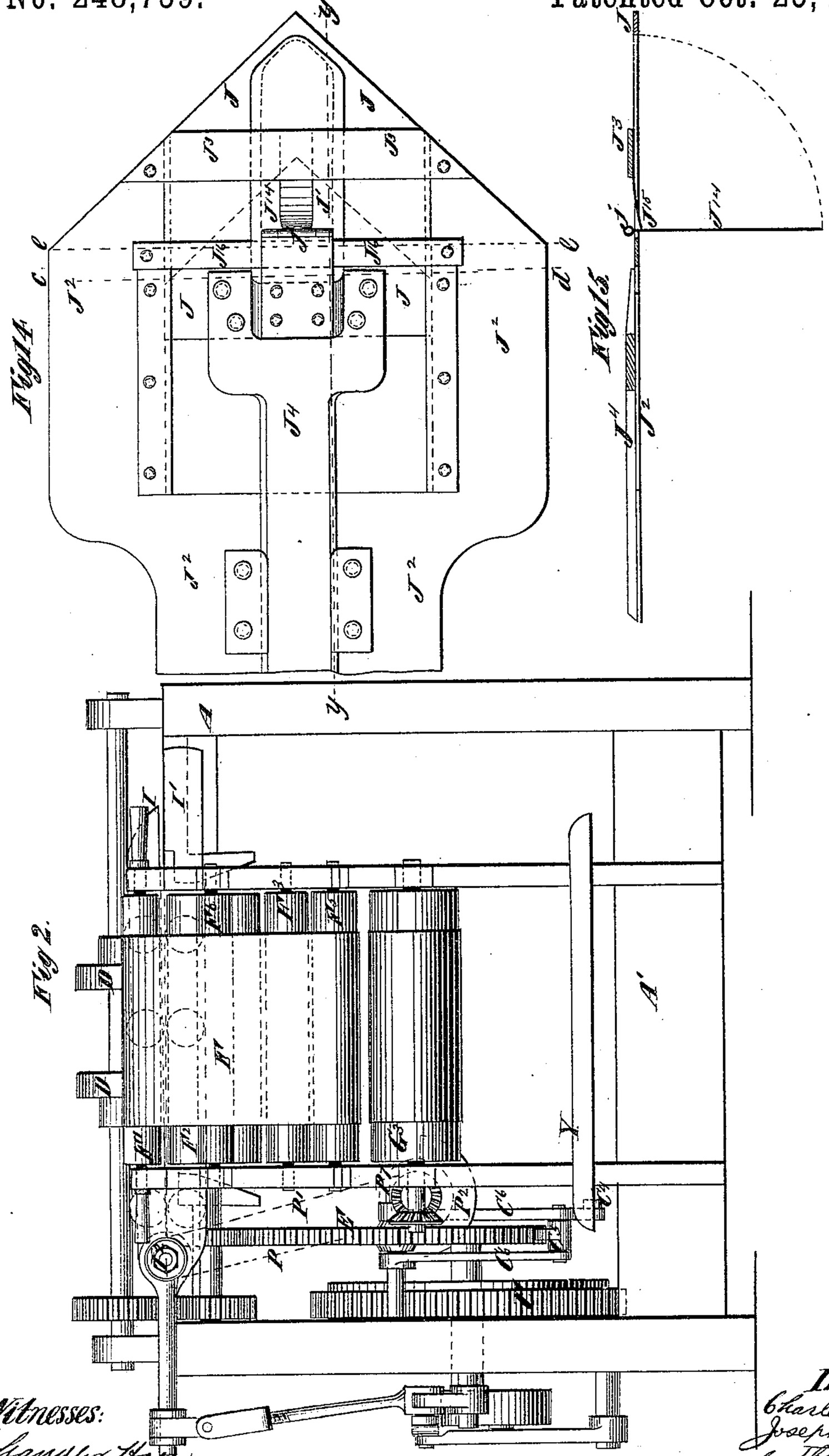

Fig. 2.

Fig. 3.

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(Model.)

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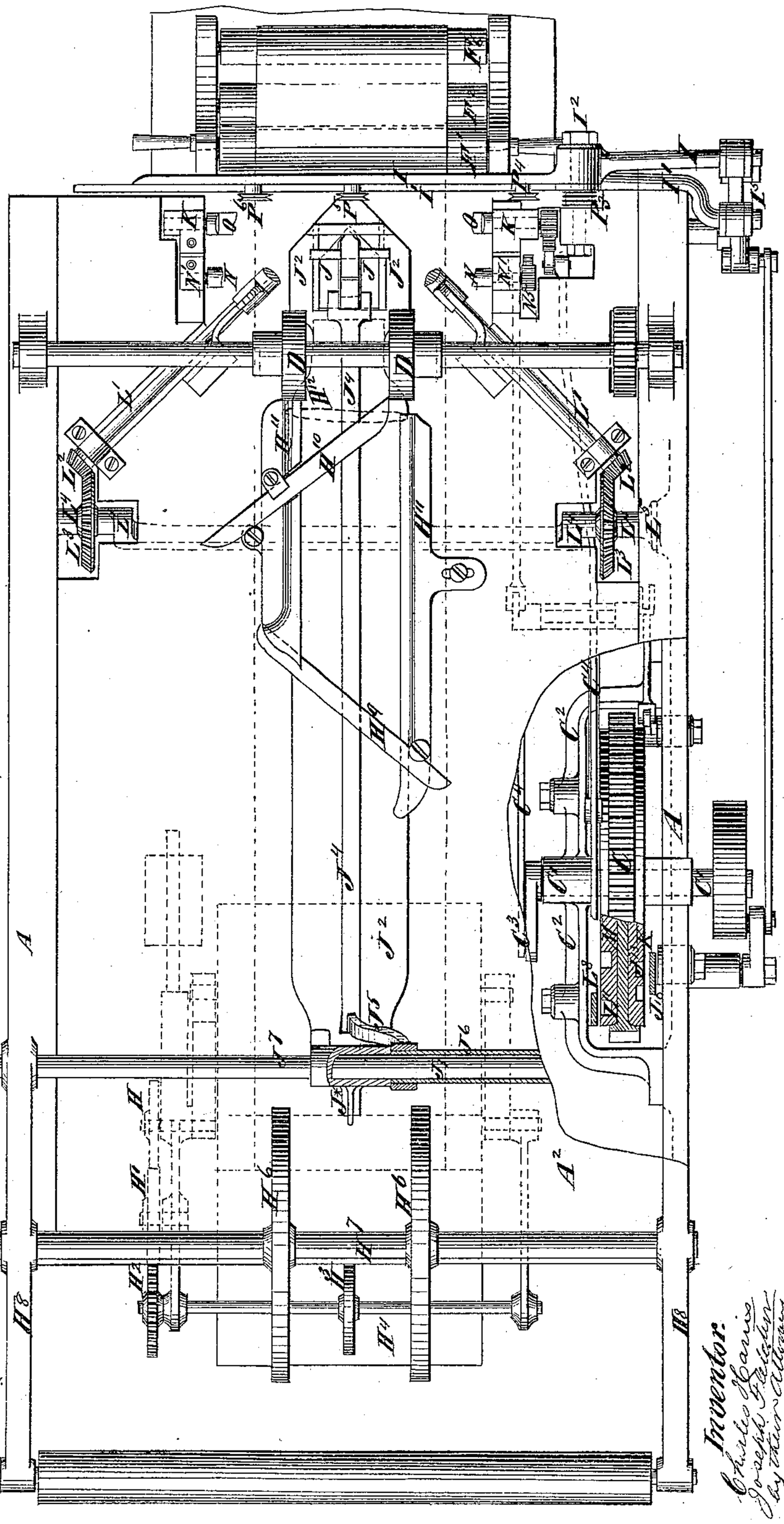

Fig. 3.

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(Model.) 5 Sheets—Sheet 4.

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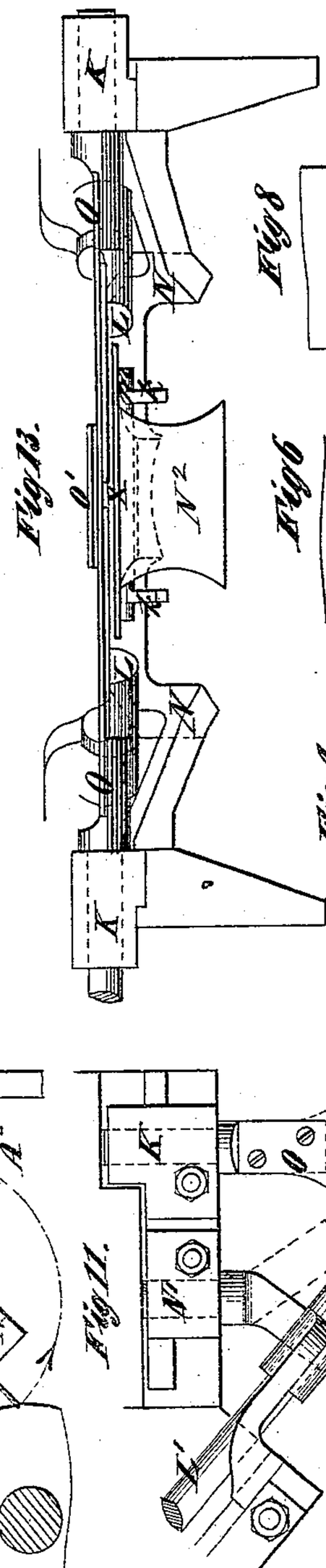

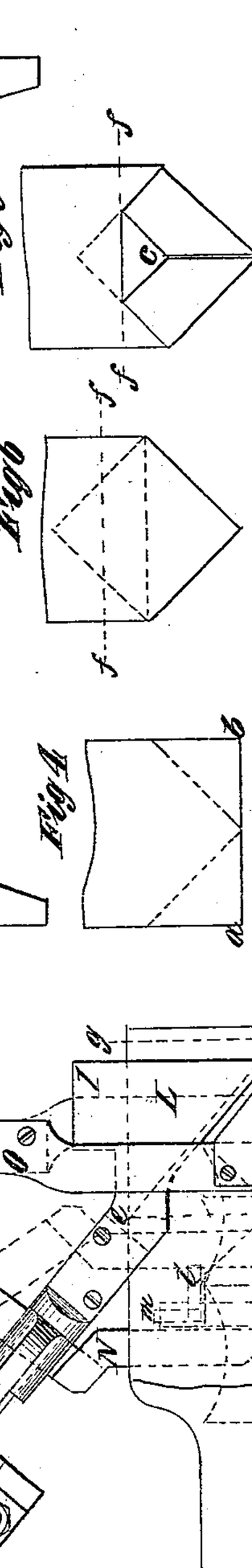

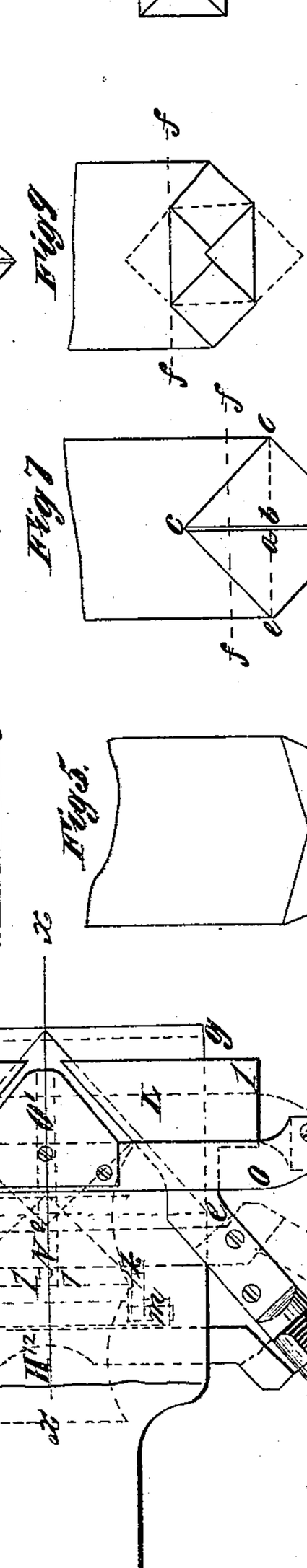

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(Model.) 5 Sheets—Sheet 5.

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PAPER BAG MACHINE.

No. 248,739. Patented Oct. 25, 1881.

Fig 18.

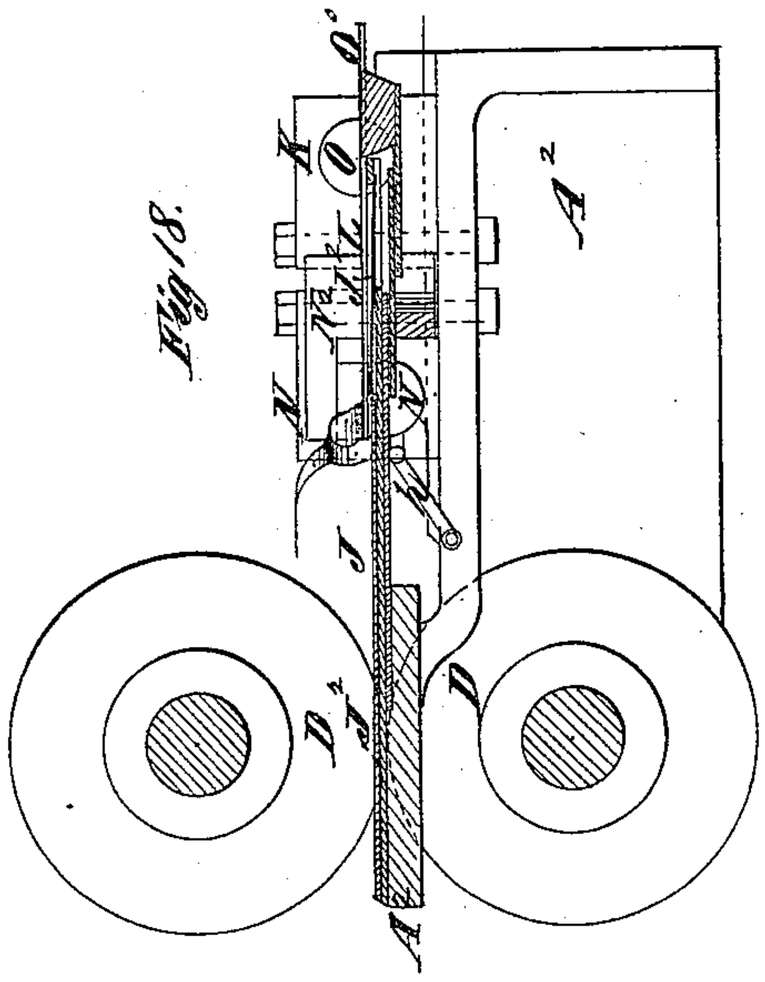


Fig 16.

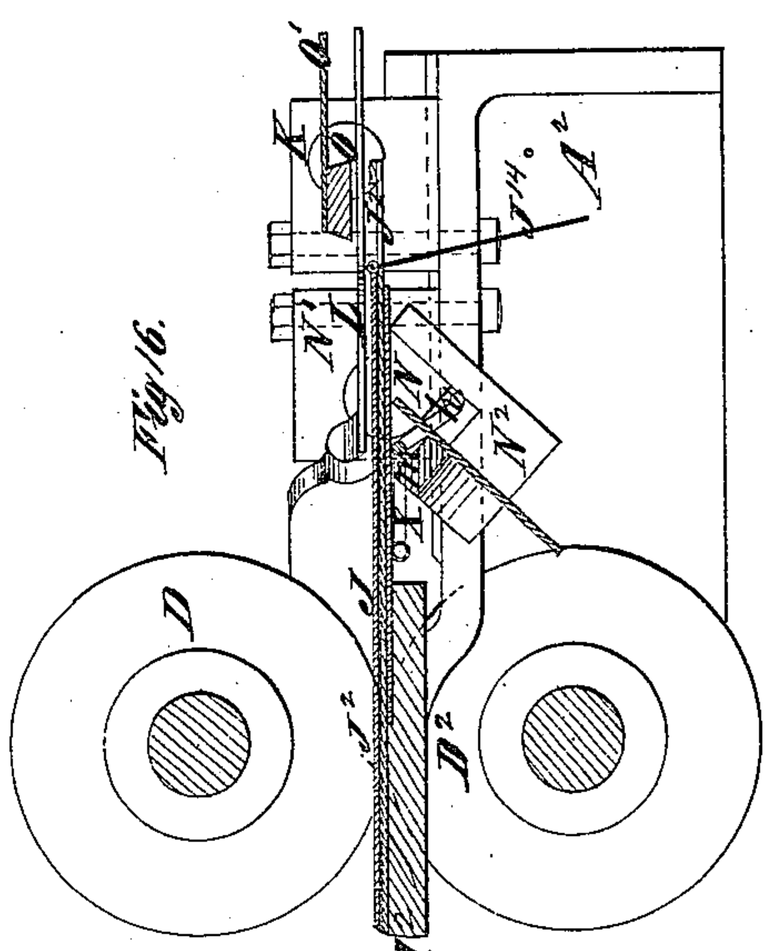
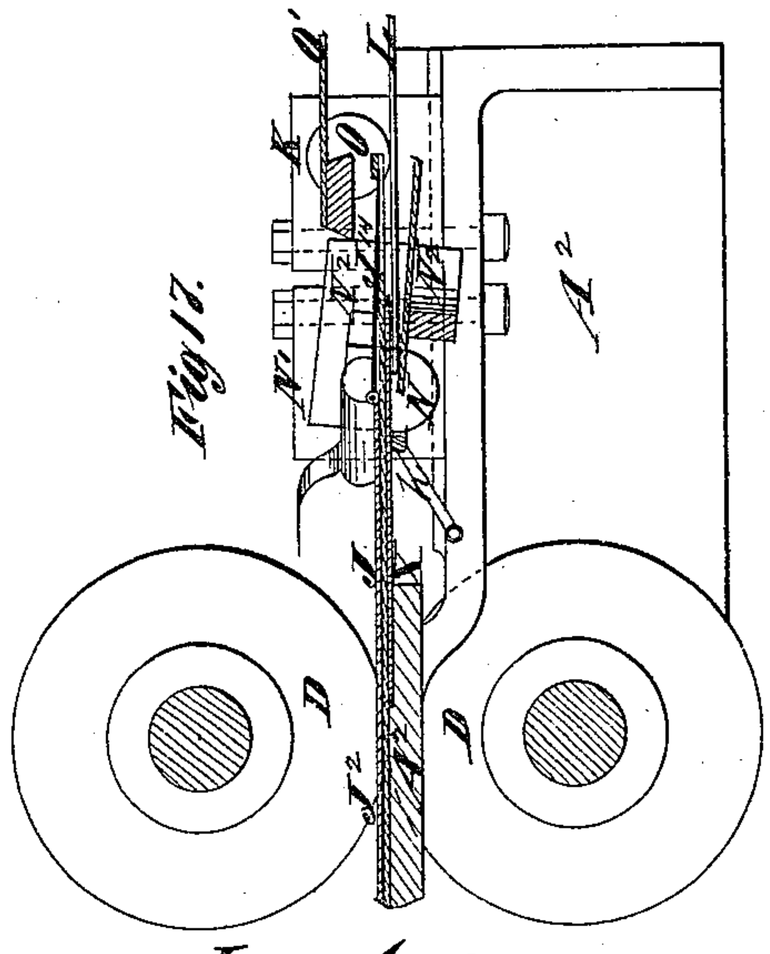


Fig 17.



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UNITED STATES PATENT OFFICE.

CHARLES HARRIS AND JOSEPH FLETCHER, OF MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 248,739, dated October 25, 1881.

Application filed September 19, 1881. (Model.) Patented in England March 14, 1877.

To all whom it may concern:

Be it known that we, CHARLES HARRIS and JOSEPH FLETCHER, both of Manchester, county of Lancaster, England, have invented certain new and useful Improvements in Paper-Bag-Making Machinery, of which the following is a specification.

Our present invention is the same as that for which British Letters Patent numbered 1,014 were granted to us March 14, 1877.

Our invention relates to machines for making square or rectangular paper bags, commonly known as "satchel-bottomed" bags, from a continuous roll of paper; and the object of our invention is to provide a machine comprising mechanism for forming paper drawn from a continuous roll into a tube, for feeding such tube forward through the machine, shears for cutting such tube to proper lengths to form bags, and folding mechanism and pasting mechanism for forming and securing the bottom of the bag.

To this end our invention consists in various details of construction and combinations of parts, hereinafter described.

In the accompanying drawings, Figure 1 represents a side elevation of a machine embodying our invention, certain parts being removed the better to illustrate our invention. Fig. 2 is an end elevation of such machine. Fig. 3 is a plan thereof, certain parts being removed the better to illustrate our invention. Figs. 4, 5, 6, 7, 8, 9, and 10 are detail views, illustrating bags in different stages of their manufacture. Fig. 11 is a detail plan of the folding mechanism upon an enlarged scale; Fig. 12, a section on line *x x*, Fig. 11; Fig. 13, a front view of certain portions of the folding mechanism; Fig. 14, a plan view, upon an enlarged scale, of certain of the mechanism for forming the bottom of the bag. Fig. 15 is a vertical section on line *y y*, Fig. 14; and Figs. 16, 17, and 18 are longitudinal sections upon the line *x x*, Fig. 11, showing the folding mechanism in different positions.

Similar letters of reference designate corresponding parts in all the figures.

In all the views, A A are the cast-iron sides of the frame-work of the machine, bolted together by the cross-piece A′, and supporting the table A^2.

B is a driving-shaft, to which a continuous revolving motion is imparted, either by a strap or toothed gearing, or such shaft may be turned by hand by means of a winch-handle, or in any other convenient manner. This driving-shaft carries a spur-pinion, B′, gearing into the spur-wheel C, securely keyed upon a spindle, C′, revolving in bearings, one of which is formed in the cast-iron frame-work A, and the other on the bracket C^2, bolted to such frame-work, as illustrated. The outer extremity of this spindle C′ carries a tappet or cam-groove for actuating the hinged knives, hereinafter described; and upon the inner extremity of the same spindle is mounted an adjustable crank-pin, C^3, to which a rod, C^4, is connected, (seen dotted in Fig. 1,) this rod being connected at its outer end to a short arm projecting from a pawl, C^5, mounted at the extremity of the loose arms C^6, radiating from the shaft C^7. An intermittent motion is communicated to the shaft C^7 by the pawl C^5, taking into the teeth of the spur-wheel E, (keyed upon such shaft,) and causing it to turn a part of a revolution, proportioned to the throw of the crank-pin C^3, as the rod C^4 is pushed in the direction of the arrow by the action of the crank-pin C^3, and to remain stationary when such rod and pawl are drawn in the opposite direction. The spur-wheel E gears with a pinion, E^4, which communicates revolving motion to a pair of drawing-rollers, D, and the same intermittent motion is also communicated by the same spur-wheel, E, through the spur-pinion E′, to a pair of endless blanklets or aprons, (seen dotted in Fig. 1, and in partial outline in Figs. 2 and 3,) one of such blankets being marked F, and following the direction of the arrows over and around the rollers F^5, F^6, F′, F^2, F^3, and F^4, and the other blanket (marked G) following the direction of the dotted arrows over and around the rollers G^3, G^2, G′, G^4, F^2, and F^3, and back around F^4 to G^3. The shaft of the blanket-roller G′ carries upon its outer extremity a spur-wheel, H, (shown in dotted out-

line in Fig. 3,) which gears through a pair of idle spur-wheels, H′ and H², with a friction-wheel, H³, hung in an oscillating frame, which rests in frictional contact with the roll of paper H⁴, and so assists unwinding of such roll of paper in exactly the same surface-speed as the periphery of the drawing-rollers D. The sheet of paper indicated by the line in Figs. 1 and 2, and marked H⁵, first passes round the stretching-rollers *h*, and in doing so one of its edges on the under side comes in contact with the periphery of the paste-wheel *h*′, revolving in the paste-box *h*², and thus receives a longitudinal streak of paste at the required distance from the edge. The sheet of paper H⁵ travels beneath a pair of creasing-wheels, H⁶, which are adjusted a sufficient distance apart upon the shaft H⁷, turning in bearings in the brackets H⁸, to crease the sheet of paper longitudinally, and of the requisite width of the bags in process of manufacture. This creasing action prepares the sheet of paper H⁵ for being folded with one edge overlapping the other, which is performed by then passing the central portion (or part between the creases) under the stationary former J², affixed by the arm J* to the rod J⁷, while the side with the unpasted edge passes beneath the left-hand folder, H⁹, (seen in Fig. 3,) and is so folded down, and the side with the pasted edge is folded, overlapping the other edge by the right-hand folder, H¹⁰, (seen in Fig. 3,) the extreme or outermost longitudinal edges of such folded paper being guided beneath the guide-edges H¹¹. (Seen in Fig. 3.) The paper tube thus formed, and indicated by the letter H¹² in Figs. 3 and 11, is drawn forward intermittently by the drawing-rollers D, (which serve also by their pressure to finish the edges of such paper tube,) and is cut off to the desired length by the blades I and I′ of the shears, which are mounted upon the fixed stud I², and are connected to separate arms (marked I³ and I⁴, respectively) of the bell-crank lever I⁵, which is actuated by the tappet or cam-groove hereinbefore mentioned.

We will now proceed to describe the mechanism employed for forming the bottom of the bag.

J is a pointed plate, (hereinafter called the "spear,") mounted in a cavity, J′, formed in the stationary former J², so as to be capable of a forward motion, and to project beyond the front edge, J³, of the former immediately after the blades I and I′ of the shears diverge or retire after performing their cutting-off operation. This is effected by connecting such spear by means of a flat bar, J⁴, passing through the inside of the paper tube (a small piece of which paper tube H¹² is seen broken off in Fig. 11) to a cranked bar, J⁵, branching from the sleeve J⁶, mounted upon the rod J⁷. This sleeve J⁶, in its turn, is caused to make the necessary fraction of a revolution to give the motion required to the spear J by its arm J⁸, being connected by a link, J⁹, to a lever, J¹⁰, mounted upon the stud J¹¹, affixed to the frame-work A, and which lever is provided on its inner side with a friction bowl or roller, J¹², taking into a cam-groove, J¹³, formed in a plate, K, (seen in Figs. 1, 3,) affixed on the outside of the spur-wheel C and revolving therewith.

Beneath the former J², and projecting from the front edge of the table A², as seen more clearly in Fig. 12, is a plate, X, between which and the gage-plate J² the under portion of the paper tube passes. The front edge of this plate terminates in a line, *e e*, Fig. 11, drawn through the side angles of the gage-plate, and which line corresponds with the line indicated by the same letters in all the diagrams. The spear J, when in its foremost position, as indicated in Fig. 14, completes the point of the former J², and serves to support the upper side of the mouth of the paper tube during the action of the folding mechanism, while at the same time the lower side of such paper tube, projecting beyond the front edge of the plate X, is pressed down and caused to gape, as seen in perspective in diagram in Fig. 5, by means of a hinged tongue, J¹⁴, which, being hinged at *j* in a cavity formed in such spear, and by coming in contact with a projection, J¹⁵, upon the stationary former J², has thus been compelled to turn down, as seen in Fig. 15, as the spear J has advanced to its foremost position. (Seen in Fig. 14.) The front of the paper tube is thus prepared and slightly bent over the diagonal point or extremity of the gage-plate and spear, as seen in diagram, Fig. 5, to insure the proper action of the diagonal folders, which now come into play, (seen best in Fig. 11, and broken off in Fig. 3,) and which are mounted at the extremity of the diagonal shafts L′, with their under surfaces above the top surface of the paper tube, and have a half-revolution imparted to them at the proper instant, for the purpose of folding under the corners of the paper tube (marked *a* and *b* in diagram, Fig. 4) to the position indicated by the same letters in diagram, Fig. 7, and which completes what may be termed the "first-folding operation."

It will be understood that the use of the hinged tongue J¹⁴ is to cause the mouth of the tube to gape as it is turned down, and that its use is necessary to the success of the diagonal-folders.

That portion of the lower side of the paper tube which projects beyond the front edge of the plate X has thus, by the action of the diagonal folders L, been turned back and round the front edge of the plate X, and now lies up close against the under surface of such plate, where it forms a corresponding half of a square to that formed by the upper side of the paper tube, which remains still supported by the former.

Diagram Fig. 6 shows the paper tube as it appears on the upper side, and Fig. 7 as it appears on the under side upon completion of this first-folding operation.

Each of the diagonal shafts L′ is geared by

means of a bevel-pinion, L^2, with a bevel-wheel, L^3, mounted upon the cranked shaft L^4. This shaft L^4 is mounted in bearings L^5, affixed to the frame-work A, and is caused to partially revolve by being provided with an arm, L^6, connected by a rod, L^7, to a lever, L^8, working upon a fixed stud, L^9, inside the bracket C^2, and which lever is provided with a friction bowl or roller, L^{10}, taking into a suitable cam-groove, L^{11}, formed in a metallic plate, M, affixed on the inside of and revolving with the spur-wheel C. The necessary half-revolution to the diagonal folders is thus simultaneously imparted to them by such cam-groove.

It should be here remarked that the spear J commences to retire at the same instant as the diagonal-folders have performed half their motion, and that such spear has assumed the position seen in Fig. 3 by the time such folders have finished their half-revolution. In drawing back the spear the hinged tongue J^{14} becomes raised to the horizontal position by having to pass over the bar J^{16}, affixed across the former J^2 for this purpose.

The figures 1, marked at the several angles of the diagonal-folders L, and which also appear upon the same parts indicated by the dotted lines in Fig. 11, will readily enable the position of such folders to be traced when they have completed their half-revolution, and from which it will be seen that the side edges of such folders are turned back at right angles to their former position—viz., up to the line *f f*, which corresponds with the line indicated by the same letters in diagrams Figs. 6, 7, 8, and 9, and shown clearly in Fig. 17—where they for the present remain stationary.

The second-folding operation now commences, and consists in bending back and folding under the back point of the square marked *c* in diagram Fig. 7 to the position indicated by the same letter in diagram Fig. 8, and this is performed by a back folder consisting of a cranked bar, N, (of peculiar shape, as illustrated, in order to avoid coming in contact with the diagonal-folders,) mounted in bearings N′, and carrying at its center a plate, N^2, which, as it sweeps round, first creases the back point of the square marked *c*, over the sides of the diagonal-folders and across the line *f f*, and then returns sufficiently out of the way to allow the diagonal-folders to make their return movement, (the reason of this only partial return movement will appear hereinafter,) and as soon as they are out of the way such back-folder again sweeps round and completes the folding under of the back point, *c*, of the square to the position indicated in diagram Fig. 8 and in Fig. 18, and thus completes the second portion of the folding operation.

The final-folding operation consists in folding under the front portion of the square marked *d* in diagram Fig. 8, and this is effected by means of a front-folder consisting of a bar, O, mounted in bearings K, carrying at its center a plate, O′, which, as it sweeps round in the opposite direction to that of the back-folder, folds under the front portion of the square marked *d*, slightly overlapping the back portion, as indicated by the dotted lines in Fig. 11, and also in Fig. 18 and in diagram Fig. 9. Motion is communicated to the back-folder by its cranked bar N, having a pinion, N^5, at one extremity, gearing with a toothed segment, N^6, mounted upon a fixed stud, N^7, and provided with an arm, N^8, to which is connected a rod, N^9, having its outer extremity jointed to an arm, N^{10}, depending from a rocking shaft, N^{11}, (seen dotted in Fig. 3,) and which, in its turn, is connected by another arm, N^{12}, and by a link, N^{13}, to a lever, N^{14}, working upon a stud, N^{15}, affixed to the frame-work A. This lever N^{14} is provided with a friction bowl or roller, N^{16}, taking into a suitable cam-groove, N^{17}, formed in the plate K, hereinbefore mentioned. Motion is also communicated to the front-folder in a similar manner by its bar O, having a pinion, O^2, at one extremity gearing with a toothed segment, O^3, mounted upon a fixed stud, O^4, and provided with an arm, O^5, to which is connected a rod, O^6, having its other extremity jointed to a lever, O^7, working upon a stud, O^8, affixed to the bracket C^2, this lever O^7 being provided with a friction-bowl, O^9, taking into a suitable cam-groove formed in the plate M, hereinbefore mentioned.

The necessary pasting of the parts which require to adhere together is effected by the action of a pair of endless pasting-cords, P and P′, which pass through a trough, P^2, containing paste, and thence over the pulleys P^3 upon the stud I^2, and round their respective pulleys P^4, P^5, and P^6, mounted upon the back side of each of the blades of the shears, intermittent motion being communicated to these pasting-cords by the bevel wheels P^7, gearing with the shaft of the blanket-roller G^3. It will thus be readily apparent that immediately after the blades I and I′ have performed their cutting-off operation the pasting-cords carried by such blades are brought in contact with the upper and lower sides of the extremity of the paper tube H^{12}, (seen projecting in Fig. 11,) and thus lay a streak of paste thereon at the required distance from and parallel with the newly cut-off edge of such paper tube, and as indicated by the dotted line *g g* in Fig. 11.

We will now proceed to describe the action of the machine: The hinged knives having come together and cut off a bag and pasted the necessary length of paper tube, as just described, then rise up to make way for the folding mechanism, and at the same time the spear J is advanced to its foremost position, as seen in Figs. 11 and 14, and the mouth of the paper tube caused to gape, as hereinbefore described. The cam-groove operating on the lever L^8 is now timed to give a half-revolution to the diagonal-folders, which assume the dotted position seen in Fig. 11, and the cam-groove operating the lever J^{10}, in its turn, has meanwhile withdrawn the spear, as seen in Fig. 3. The first-folding operation, in forming the bottom of the bag, is now completed. While the diagonal-folders re-

main in this last-named position, the first action in the second-folding operation commences—viz., the folding back of the point of the square marked *c* in Fig. 7 to the position seen in diagram Fig. 8. This is effected by the cam-groove operating the lever N^{14}, causing the back-folder plate N^2 to make a complete throw, as indicated by the dotted arc in Fig. 12. The back-folding-plate N^2 now retires for an instant to make way for the return movement of the diagonal-folders L; but it will be obvious that in the absence of some special means of supporting the paper tube while no longer held by either the diagonal-folders or the back-folder, the same might partially fall; and to prevent this we provide a pair of spring-fingers, *k* and *l*, mounted upon the pivots *m* on the under side of the plate X. By the pull of a spring or weight in the direction of the arrow (see Fig. 12) these fingers always tend to move upward into contact with the under plate, X, to the position seen dotted in Fig. 12; but when the back-folder N has fully returned it comes in contact with, and, overcoming the pull of the spring or weight, so draws down such fingers into the position seen in Fig. 12. It will thus be obvious that as the back-folder makes its first movement, the spring or weight being relieved, the fingers go up with it and support the under side of the bag in course of formation. As the diagonal-folders are returning the back-folding plate N^2 only retires sufficiently far to allow them to pass, the fingers *k* and *l* in the meantime remaining in the dotted position seen in Fig. 12 to support the bottom of the bag. The next sweep round of the back-folder then perfects the folding under of the back point of the square marked *c*, and completes the second-folding operation. The back-folding plate N^2 now remains up in contact with the paper, in order that its front edge may serve as a support around which the front point of the square marked *d* in the diagrams is bent by the action of the front-folding plate O′, which now comes into play. The bottom of the bag being thus completed, the front-folder now resumes its first position, and the drawing-rollers D, commencing to revolve, cause the bag to be advanced through the now open shears, and to be received between the traveling blankets F G, at which instant the back-folder retires, and the knives then immediately close and cut off such bag to the desired length. The cut-off bag then continues to travel between the blankets, and thus, while carried by such blankets around the blanket-rollers, is pressed together to insure the proper adhesion of the pasted parts, and is finally ejected from such blankets onto the table Y. Fig. 10 shows the bottom of a bag when finally opened out.

From the foregoing it will be apparent that the various movements of the folding mechanism are all imparted by the cam-plates K and M, affixed to and revolving with the spur-wheel C, and the position of these grooves should be timed so as to enable the several operations to be performed in their proper order.

In conclusion, we would remark that this machine is adjustable in all necessary parts, so as to be capable of manufacturing various sizes of bags.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a machine for making paper bags from a continuous roll of paper, the combination of mechanism for forming the sheet of paper into a continuous tube, mechanism for feeding said tube through the machine, shears for cutting the same into proper lengths to form bags, pulleys attached to one of the blades of said shears, and a cord or belt carrying paste or other adhesive substance passing over said pulleys, so that when the tube is cut off by the shears the required parts will be covered with paste or other adhesive substance by the said cord or belt passing over them, all substantially as specified.

2. In a machine for making paper bags from a continuous sheet of paper, the combination of mechanism for forming the sheet of paper into a continuous tube, mechanism for feeding said tube through the machine, shears for cutting said tube into lengths to form bags, composed of two blades pivoted to a fixed center, and having arms extending from the ends opposite their cutting-edges, a bell-crank lever, rods connecting said bell-crank lever with the arms of said shear-blades, and a cam for imparting to said bell-crank lever an oscillating motion, whereby, when the tube is moved forward between the blades by the feeding mechanism, the said blades are operated to cut off the tube, all substantially as specified.

3. In a machine for making paper bags from a continuous roll of paper, the combination of mechanism for forming the sheet of paper into a continuous tube, mechanism for feeding said tube through the machine, shears for cutting said tube into lengths to form bags, folders secured to oscillating shafts extending transversely to said tube, pinions mounted on said shafts, toothed sectors or segments engaging with said pinions, a cam, and levers and rods for imparting motion from said cam to said sectors or segments, all substantially as specified.

4. In a machine for making paper bags from a continuous roll of paper, the combination of mechanism for forming the sheet of paper into a continuous tube, mechanism for feeding said tube through the machine, shears for cutting said tube into lengths to form bags, diagonal-folders mounted on shafts extending at an angle to said tube, gear-wheels mounted on said shafts, an oscillating shaft extending transversely to said tube and carrying gear-wheels engaging with the first said gear-wheels, a cam, and levers and rods for transmitting motion from said cam to said transverse shaft, all substantially as specified.

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