(No Model.)

4 Sheets—Sheet 1.

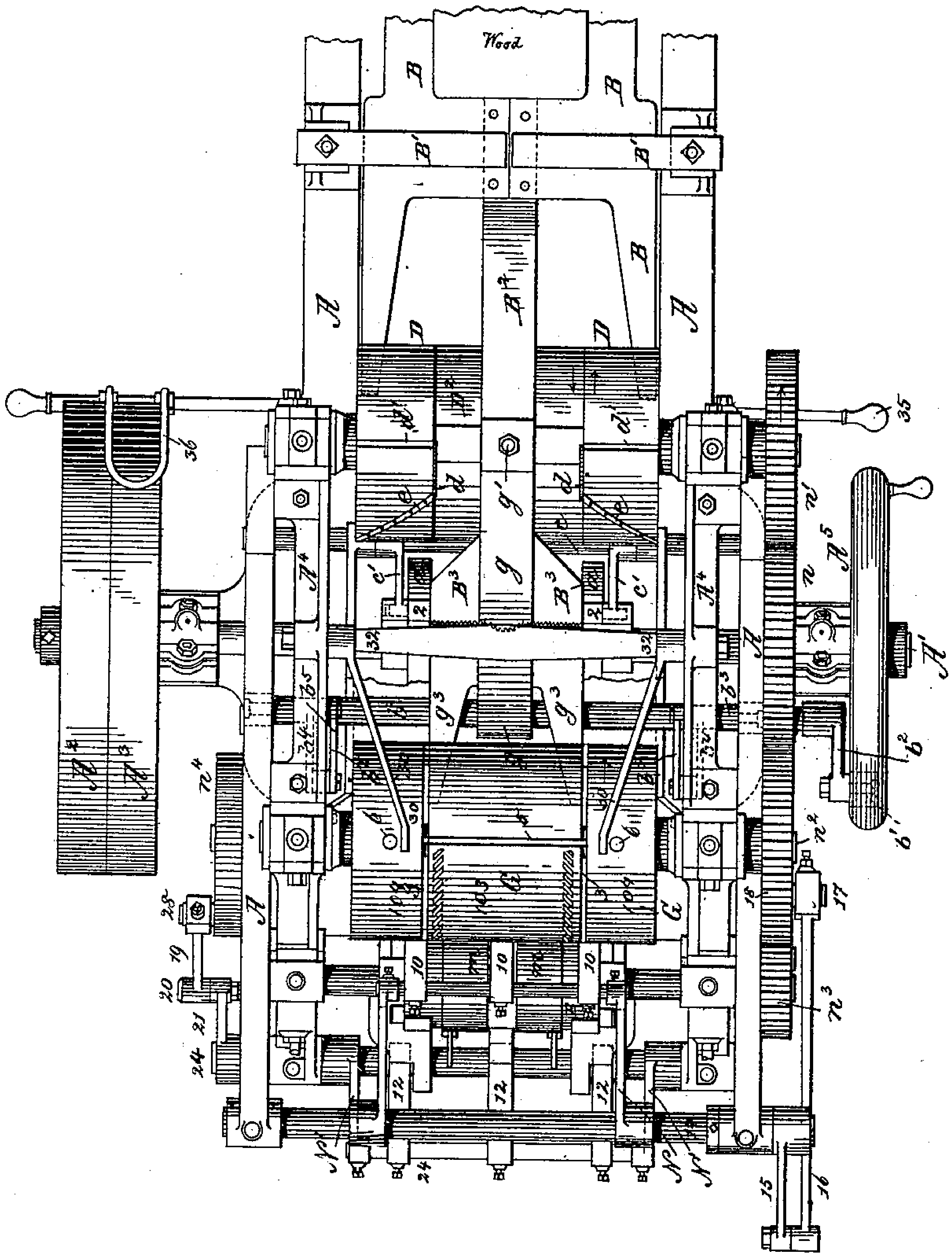
D. APPEL.

PAPER BAG MACHINE.

No. 332,631.

Patented Dec. 15, 1885.

Fig:1.



Witnesses.

Arthur Lipperlen.

John F. C. Prinkert

Inventor.

Daniel Appel.

by Crosby Gregory attys

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.)

4 Sheets—Sheet 2.

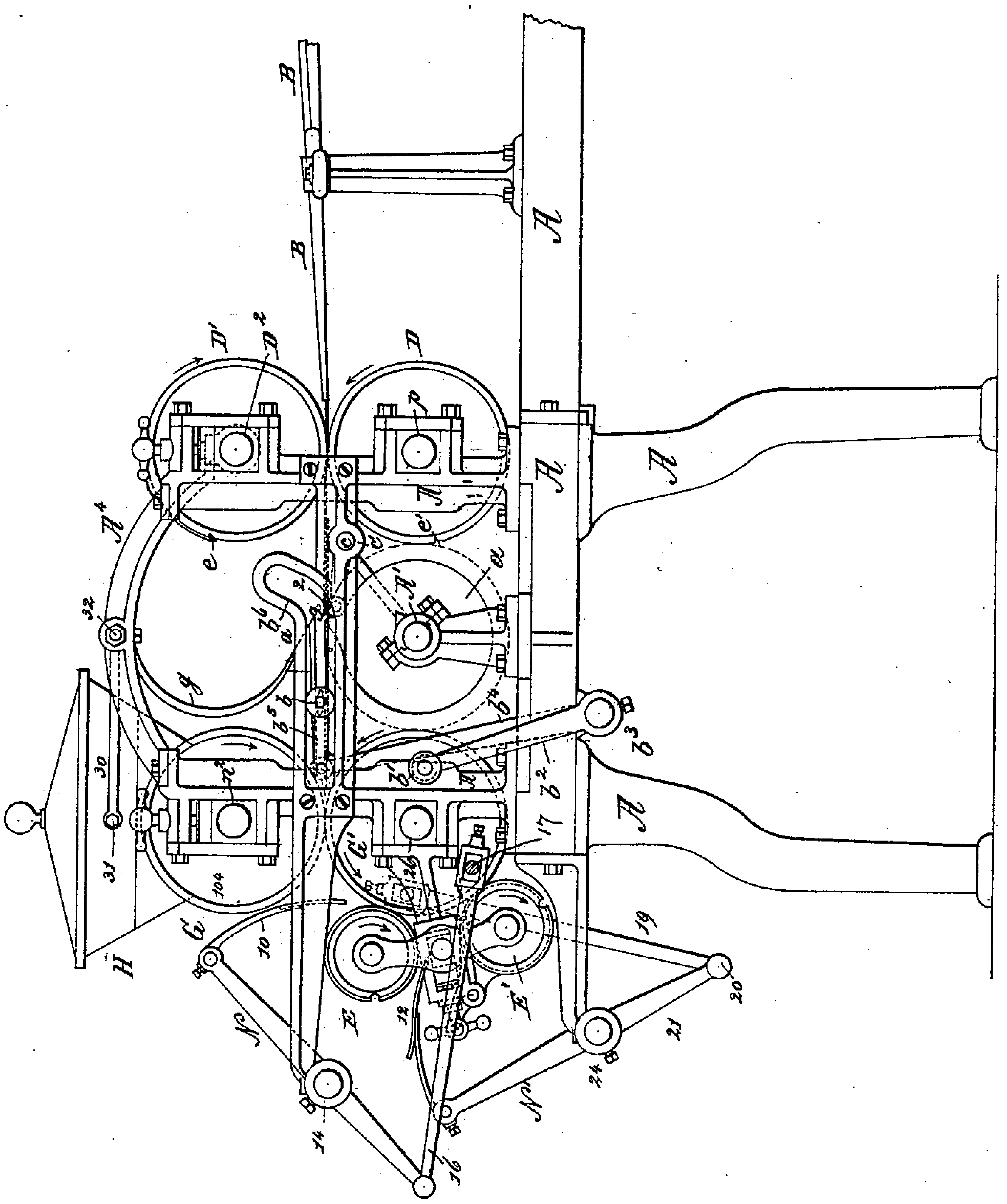
D. APPEL.

PAPER BAG MACHINE.

No. 332,631.

Patented Dec. 15, 1885.

Fig: 2.



Witnesses.

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N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.)

4 Sheets—Sheet 3.

D. APPEL.

PAPER BAG MACHINE.

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Fig:3.

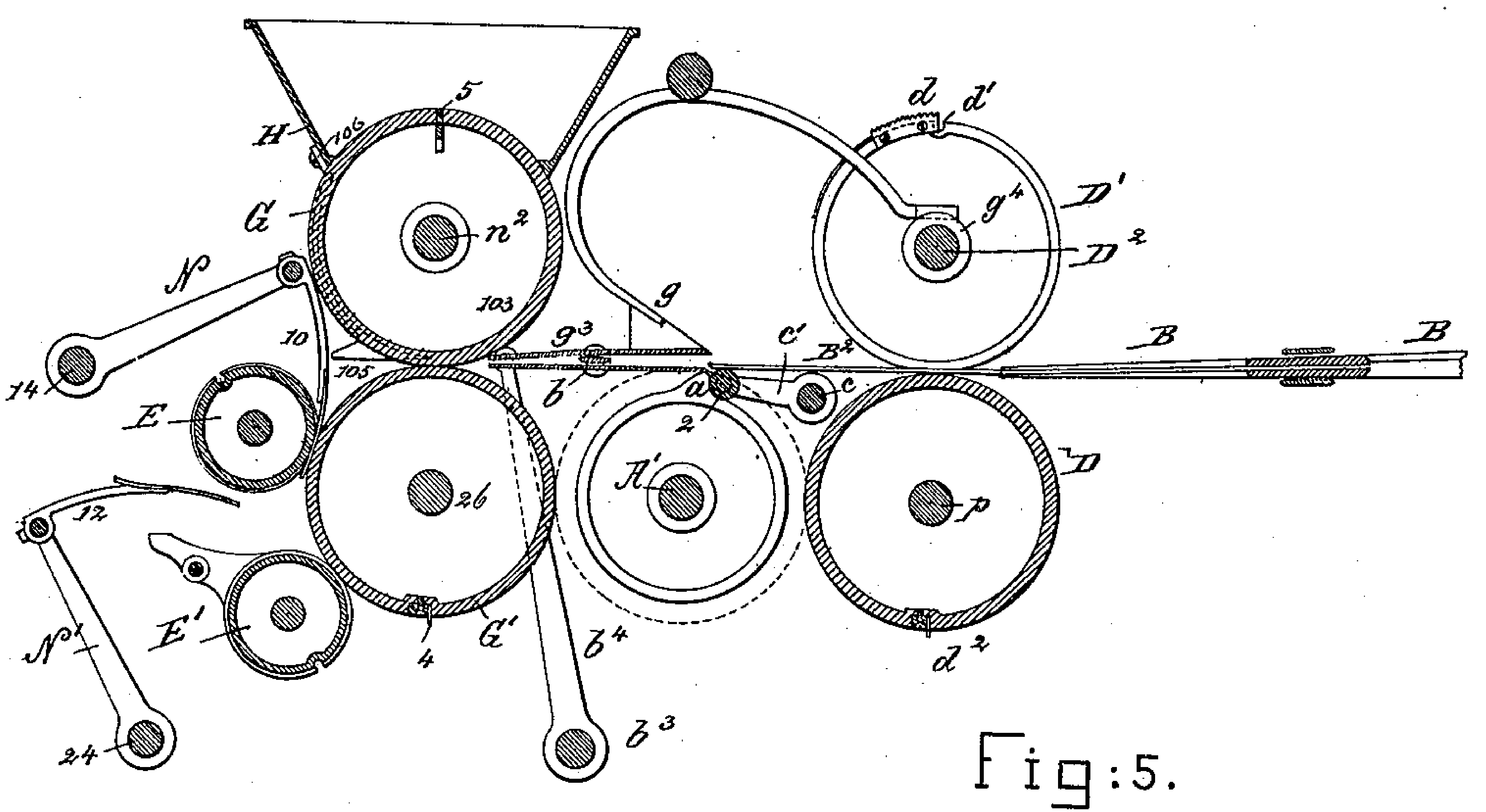


Fig:4.

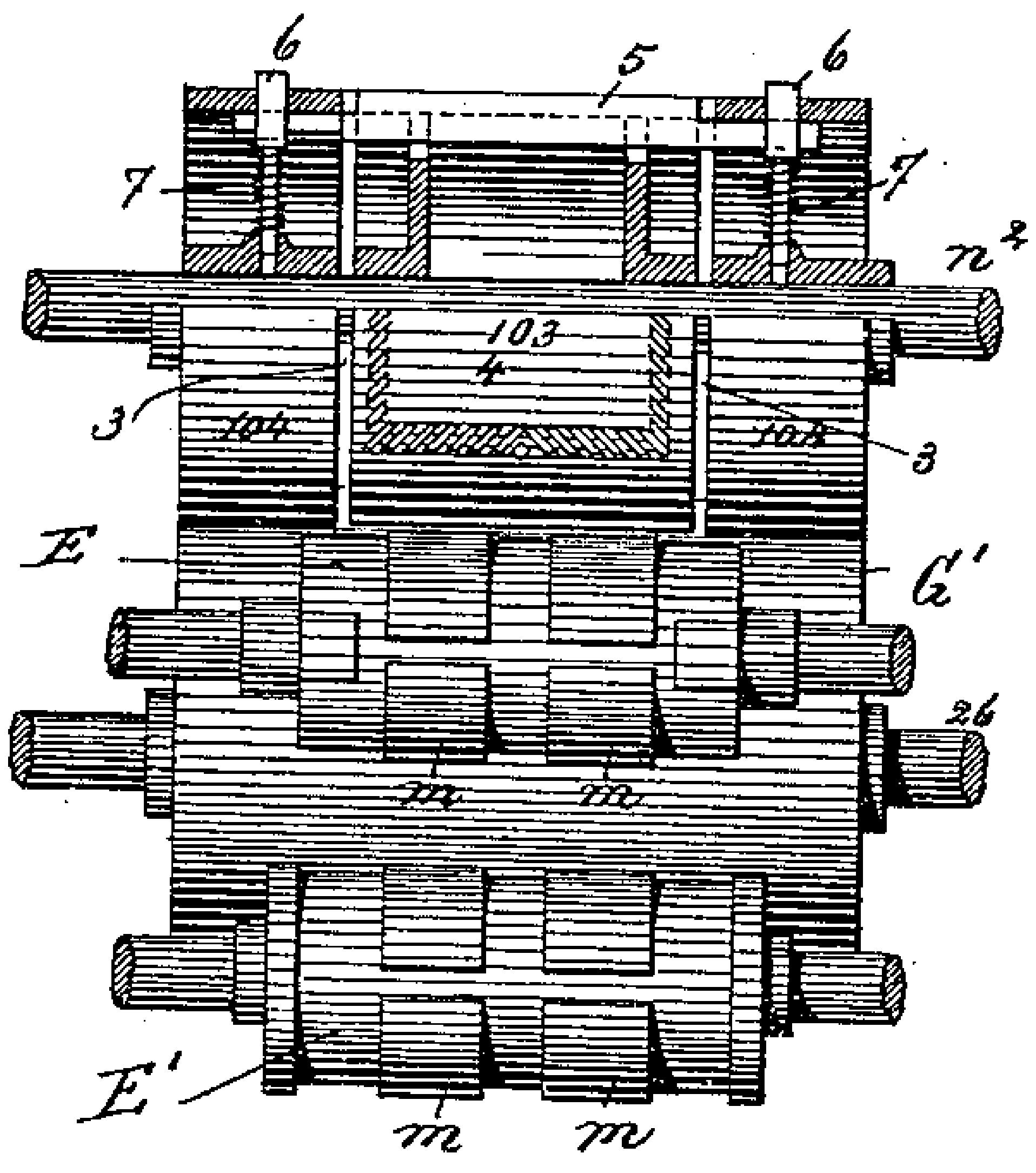


Fig:5.

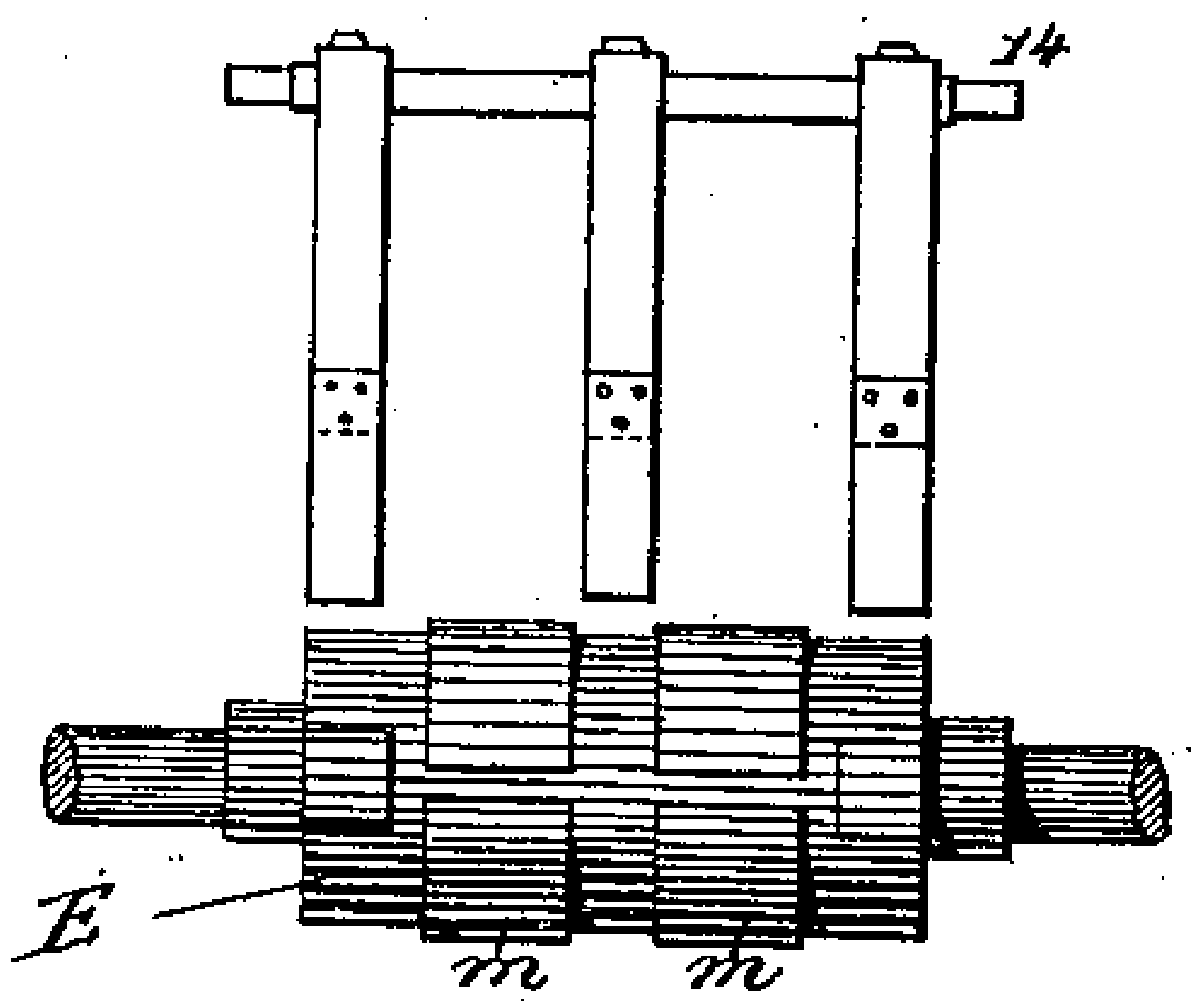


Fig:5^a

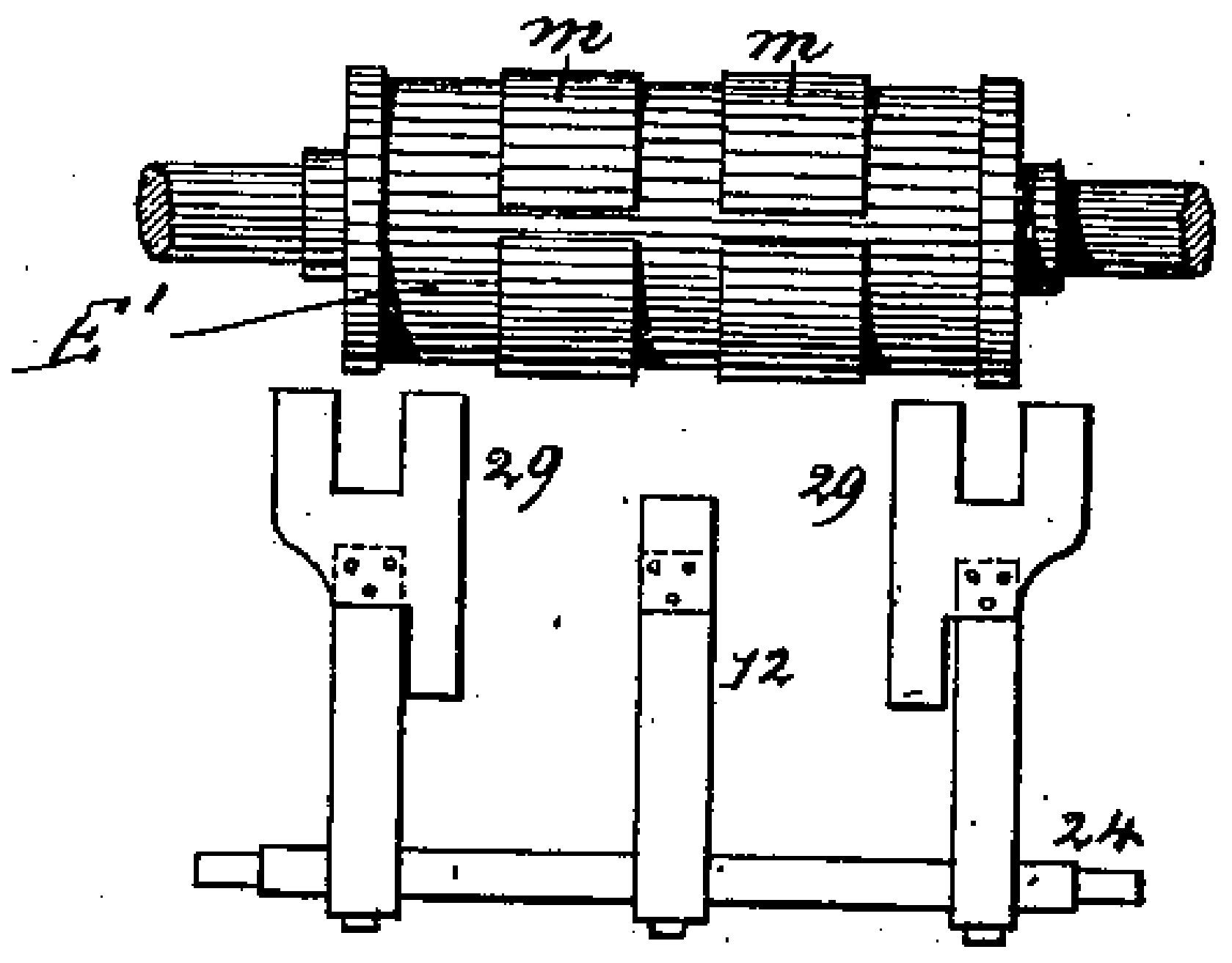


Fig:6.

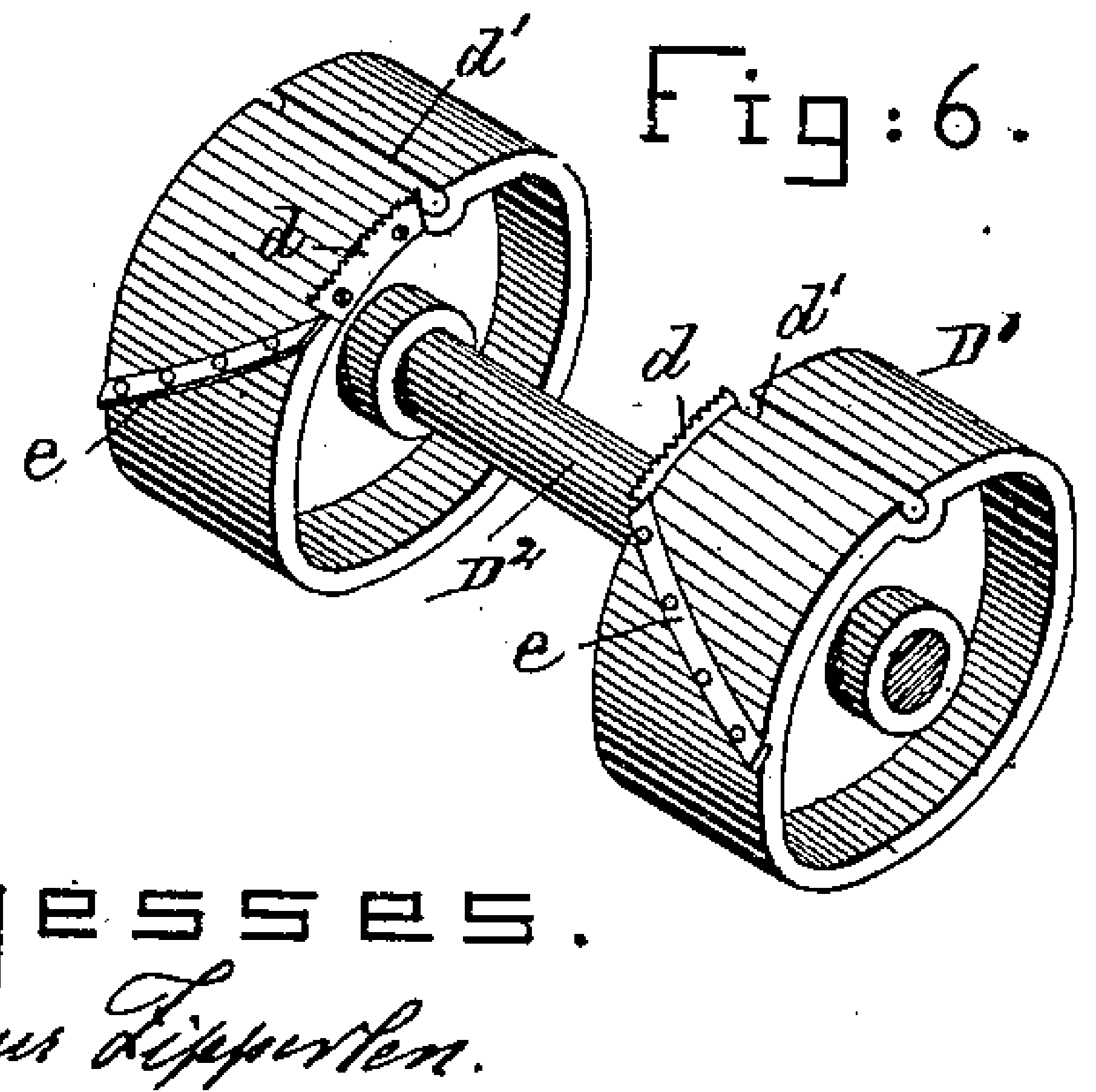


Fig:7.

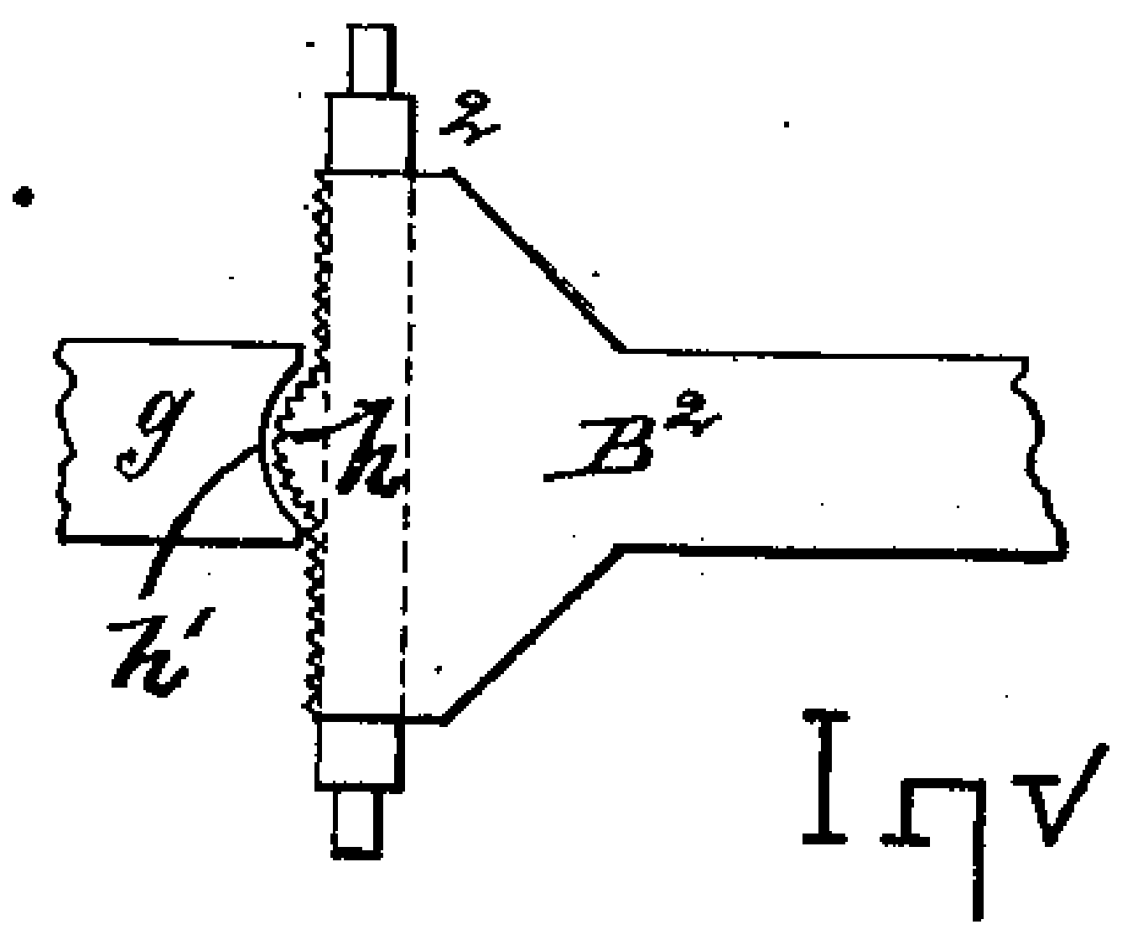
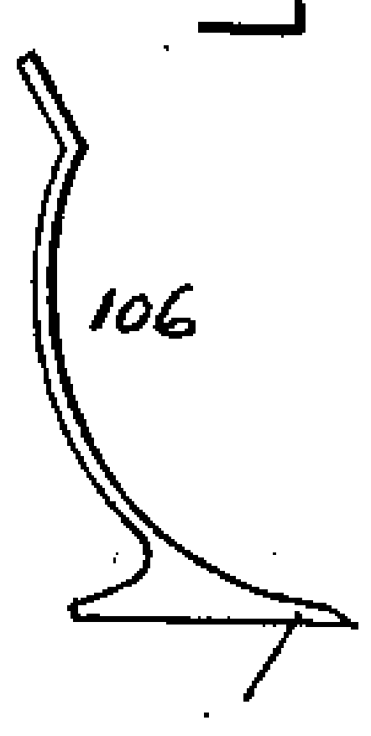


Fig:8.



Witnesses.

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(No Model.)

4 Sheets—Sheet 4.

D. APPEL.

PAPER BAG MACHINE.

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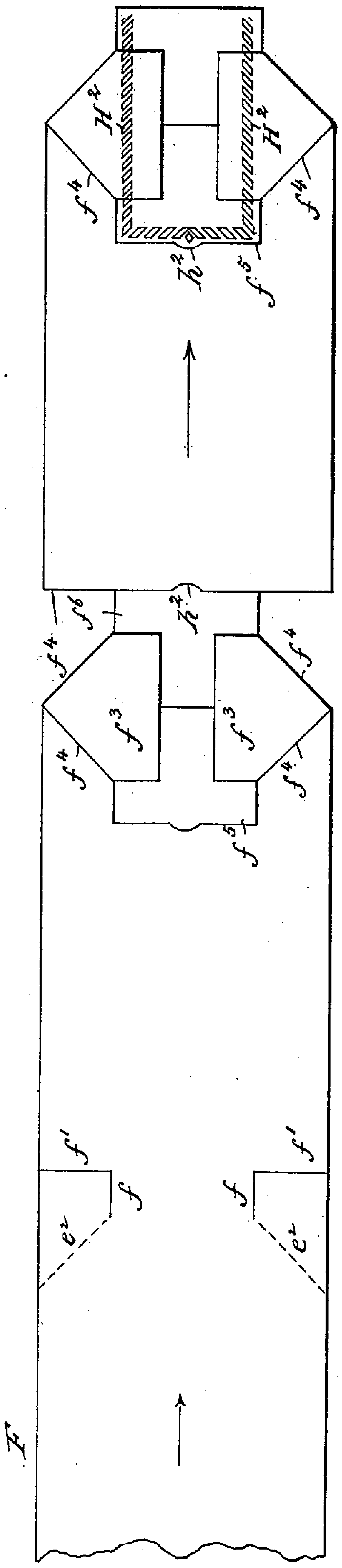

Fig: 9.

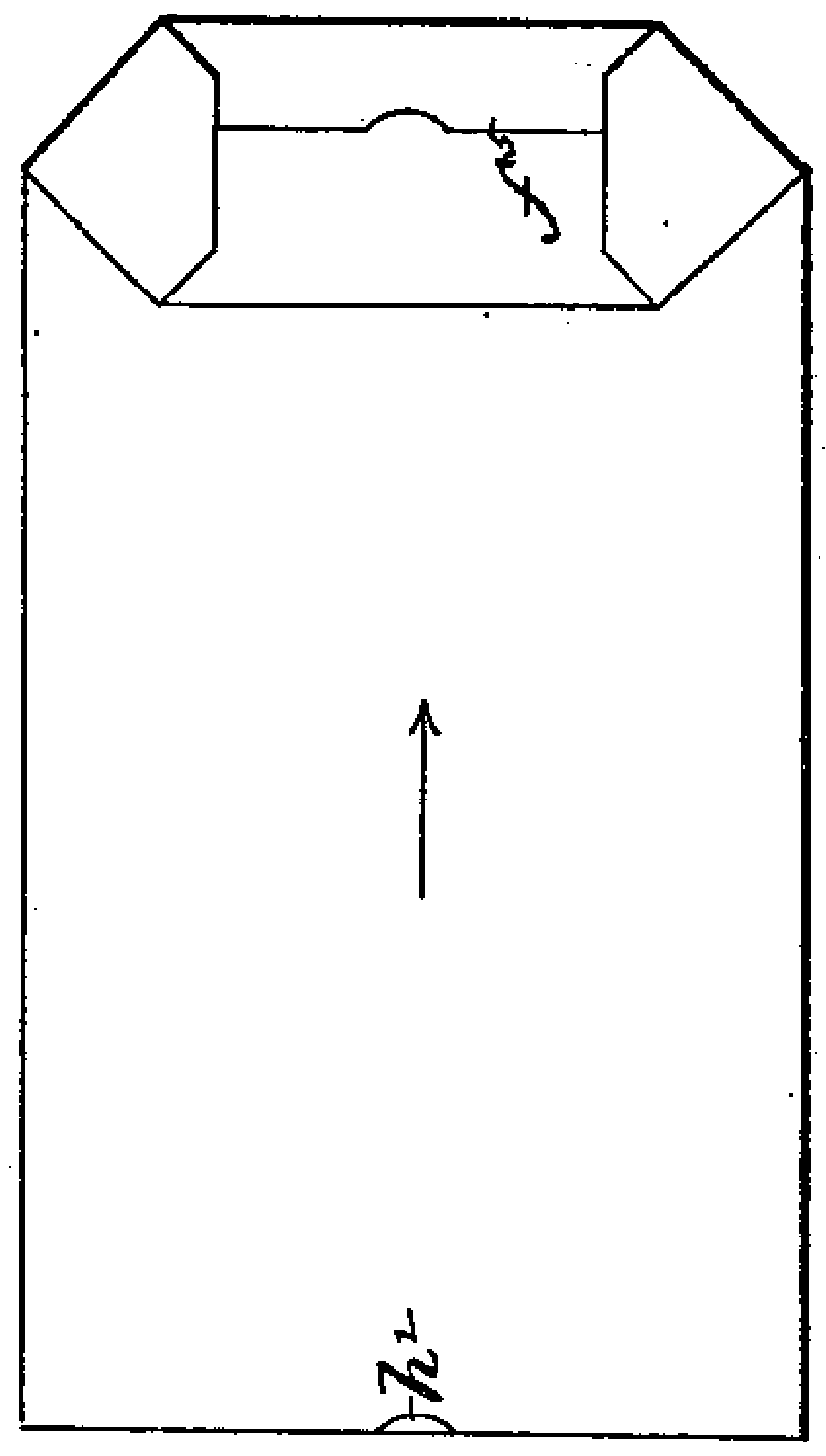

Fig: 12.

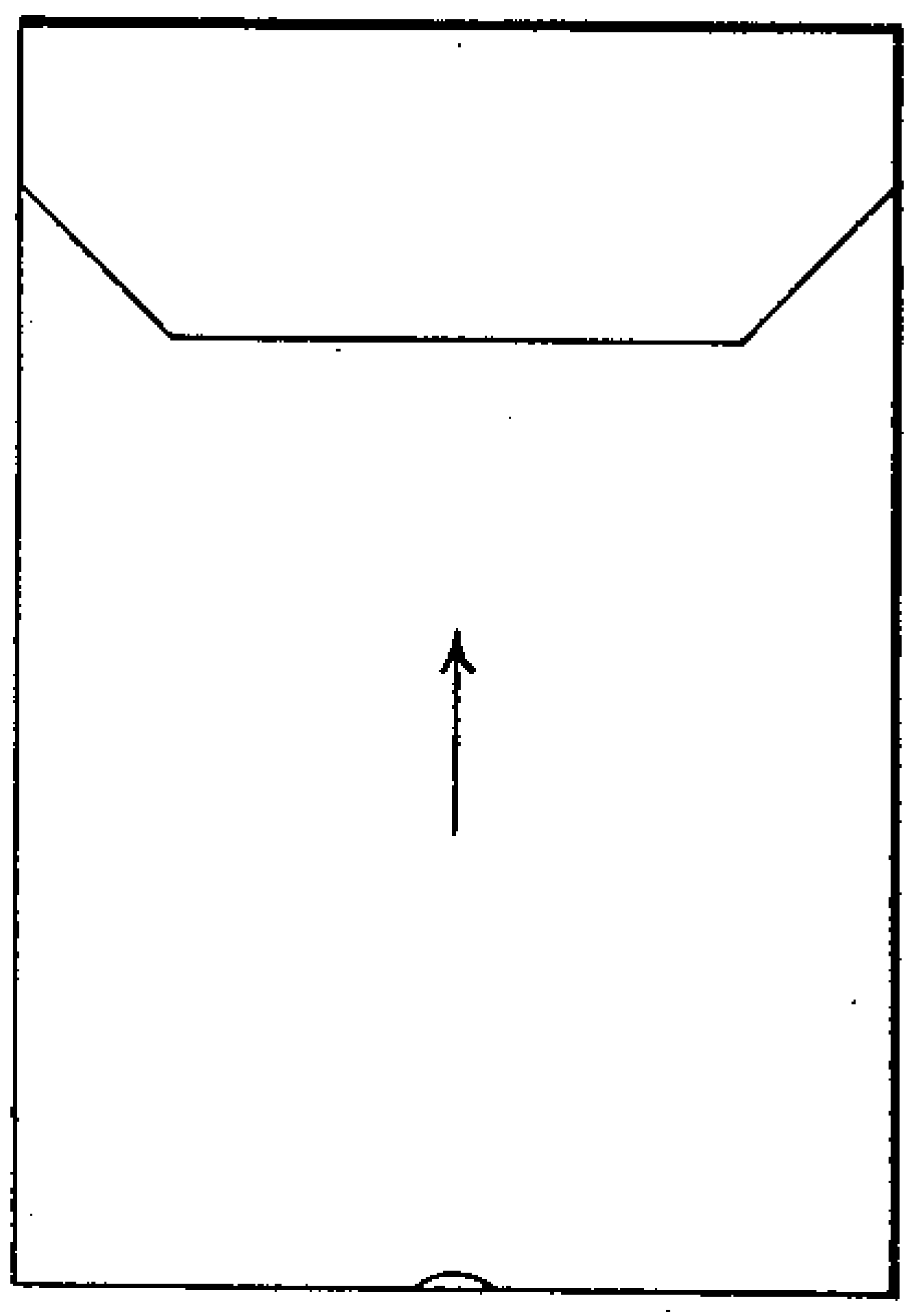

Fig: 11.

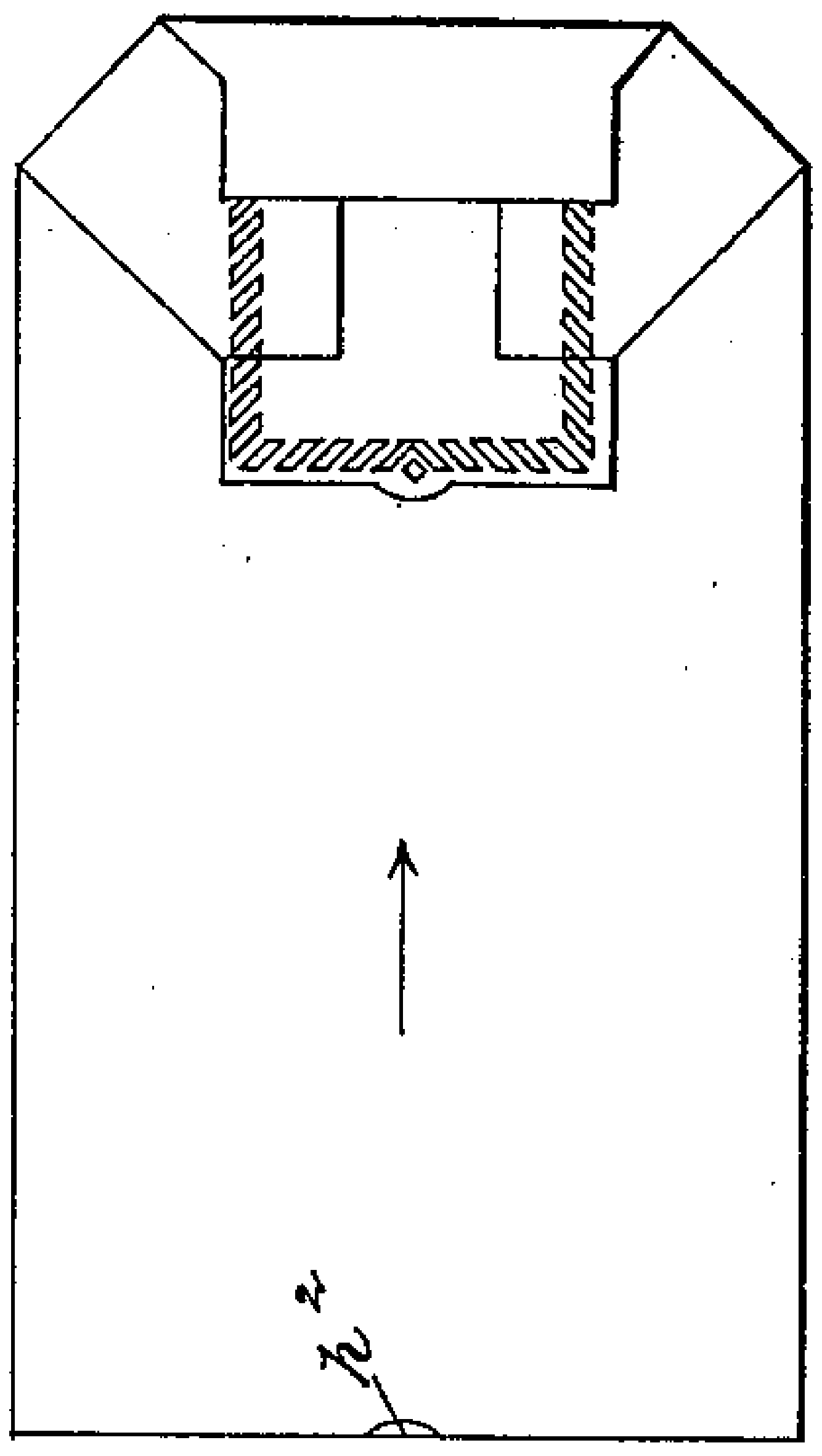

Fig: 10.

Witnesses.

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UNITED STATES PATENT OFFICE.

DANIEL APPEL, OF CLEVELAND, OHIO, ASSIGNOR TO THE EASTERN PAPER BAG COMPANY, OF HARTFORD, CONNECTICUT.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,631, dated December 15, 1885.

Application filed August 18, 1884. Serial No. 140,841. (No model.)

To all whom it may concern:

Be it known that I, DANIEL APPEL, of Cleveland, county of Cuyahoga, State of Ohio, have invented an Improvement in Paper-Bag Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The machine herein described is especially applicable for the manufacture of paper flour-sacks.

In this my invention some of the mechanical parts—such as the opener, the plate-folder, and the three rolls with which the tucking-blades co-operate in the folding of the bag—are substantially as in other machines heretofore made; but herein the different parts of the mechanism are constructed and arranged in special manner, as will be described, to simplify the construction of the machine, as well as its cost, and to enable the machine to produce large bags or flour-sacks rapidly, even though the paper is very heavy. The feeding-rollers are provided with cutters, to slit the tube longitudinally for a short distance through both plies, and from one end of each of the slots so made outward to the edges of the tube, and the said feeding-rollers also serve to carry creasing-blades, which, by their operation upon the upper and lower sides of the tube, the blades passing each other, serve to crease or crimp both plies of the tube in the line in which the paper composing the tube will be bent in the formation of the diagonal folds of the bottom of the bag. Permitting the edges of the creasing-blades to pass each other at such distance as to crease both plies of the tube, but not cut it, serves to soften the paper so that thereafter it may be easily and truly bent in the line of the crease, it bending as freely in one direction as in the other, thus greatly facilitating the formation of the diagonal folds in thick or heavy paper. The tube, having been slitted and creased, is in its forward movement lifted opposite the point where it was slitted transversely from its edge inward for a short distance, so that the upper ply of the tube is cut through in line with the two short transverse cuts referred to, the cutting-member being the serrated end of a spring-tongue extended from the delivery end of the former, over which the paper is folded for the production of the tube, the said tongue being within the tube. The tongue is lifted, as described, by a roller acted upon by a cam, and besides cutting the upper ply transversely between the two short transverse cuts first referred to serves to open the tube, lifting its upper ply above the end of the nose, so that in the further forward movement of the tube the upper ply so lifted is caught upon the usual nose, which latter, in engagement with the upper ply and entering the tube, causes the upper ply to be detained and laid back for the proper formation of the diamond fold. The serrated end of the tongue referred to is herein shown as shaped to form a curved lip to facilitate opening the bag when the same is to be used, and to aid in the formation of the lip the nose is concaved to conform in shape with the convexed extension of the tongue. The upper ply of the tube, lifted and turned back by the nose, is acted upon by a plate-folder which has a reciprocating movement and passes under the nose, substantially as in the Knight patent, No. 220,925, thus completing the diamond fold. The diamond fold having been completed, a pair of rollers immediately behind the nose receive the leading end of the diamond fold between them, thus aiding in the forward movement of the tube. The upper roll of the pair of rolls applies paste to the diamond fold, and the portion of the lower fly of the tube yet uncut is severed, leaving the end of the tube with the diamond fold made therein and pasted free to be cross-folded by the joint action of three rollers and two tucking-blades, substantially as described in my Patent No. 252,412, the said blades and rollers being, however, somewhat differently constructed, as will be described.

The particular features in which my invention consists will be hereinafter more fully described, and pointed out in the claims at the end of this specification.

Figure 1 is a plan view of a sufficient portion of a paper-bag-forming machine to illustrate my invention, the paste-box and folder-blade being omitted; Fig. 2, a side elevation thereof, the plate-folder cam and the gears shown in Fig. 1 being omitted; Fig. 3, a longitudinal vertical section of Fig. 1, the framework being, however, omitted. Fig. 4 is a detail, looking at the delivery end of the machine, the said figure showing the rolls which are operative in the cross-folding, and the upper roller which is employed to apply the paste, the said roller being partially in section to illustrate the parts within it. Figs. 5 and 5^a are details of the two cross-folding rollers and the tucking-blades which co-operate with them. Fig. 6 is a detail of one of the feeding, slitting, and creasing rolls. Fig. 7 is a plan view showing the tongue, the roller under it, and the end of the nose; Fig. 8, a detail showing the stripper. Fig. 9 shows the tube slitted, creased, diamond folded, and pasted. Fig. 10 shows the severed bag-blank once cross-folded. Fig. 11 shows the same as having been cross-folded a second time; and Fig. 12 shows the bag, the so-called "blindfold" being opened out.

The frame-work A, of suitable shape to contain the working parts, has a main shaft, A', which is provided with suitable belt-pulleys, A^2 A^3, two like cams, a, and outside the frame the said shaft has attached to it (see Fig. 1) the plate-folder cam A^5, provided with a handle, thus enabling the said cam and the shaft A' to be turned by hand. The cam A^5 actuates the plate-folder b, which in practice is substantially the same as the plate-folder described in the Knight patent, No. 220,925, to which reference may be had. The cam A^5 receives the roll b' of the arm b^2 of the rock-shaft b^3, the latter having attached to it two like arms, b^4, which by links b^5 are connected with the end journals of the said plate-folder, the said journals in practice being provided with suitable rollers, which are made to travel in the curved guides b^6.

The former B and its guides B' B', employed for the formation of the tube to be subsequently made into bags, are of usual construction. This former at its inner end is provided with a tongue, B^2, made preferably of spring-steel, which at its delivery end is widened, as shown at B^3, serrated, and slightly upturned, the said tongue serving at the proper time, as will be described, to sever a part of the upper ply of the tube. Extending across the frame is a shaft, c, having two arms, c' c', which serve as bearings for the ends of a roller, 2, which is extended from one to the other of the said arms immediately below the end of the tongue B^2, the said roll being acted upon near each end by means of the two like cams a on the main shaft, the roller 2, when lifted, acting to raise the end of the tongue and cause its upturned teeth to penetrate, pass through, and sever that part of the upper ply of the tube which is acted upon by it. The lower ply of the tube rests between the roller 2 and the tongue when the latter is lifted, and, owing to the roller, the tube, which is in motion, is in no way retarded, nor is its under ply broken through. The lower feed-roll, D, is composed of a single cylinder; but the upper feed-roll, D', is composed of two short cylinders attached to a suitable shaft, so as to leave between them a space sufficient for the passage of the tongue B^2. The cylinders of the upper feed-roller, D', have attached to them the two slitting-knives d d and two of the creasing-blades e e, and the said cylinders also have transverse slits d', to receive the transverse edge-cutting knives d^2, attached to the lower feed-roller, D.

The knives d act to cut two short longitudinal slits, f, through both plies of the tube F. (See Fig. 9.) The knives d^2 act to cut through both plies from the edge of the said tube, forming the two edge-cuts f' f', and the diagonally-placed creasing-blades e, attached to the cylinder of the upper feed-roller, D', co-operating with notches e', made in the lower feed-roller, D, act to crease both plies of the tube in the direction of the dotted lines e^2, Fig. 9, or diagonally backward from the rear end of the slits f to the edges of the tube. Instead of providing the roller D with notches, as described, it may be provided with blades like those marked e on the upper roller, D'. The creasing blades and notches or equivalents are so located upon the two feeding-rollers as to pass one below the other, while the paper of both plies of the tube is between them, the edges of the said blades and the edges left after making the said notches being so located with relation to each other that in the rotation of the rollers both plies of the paper will be crimped or softened, so that the paper may thereafter be readily bent in either direction in the line of the creases e^2, such creases being in the line in which the paper tube will subsequently be bent to form the diagonal sides of the diamond fold. The width of the toothed end B^3 of the tongue B^2 is equal to the distance between the inner ends of the slits f', and as the roll 2, before described, acts to lift the end of the tongue, the latter, besides cutting that part of the upper ply of the tube between the inner ends of the slits f' f', also acts to open the tube or lift the upper ply above the level of the point of the nose g, so that the latter—the movement of the tube being continuous—catches under against and holds back the upper ply of the tube, and the plate-folder b, at such time elevated, is quickly thrown downward upon the upper ply and carried forward under the nose, thus completing the diamond fold, (represented in Fig. 9 at f^3,) the creases e^2 e^2 made by the blades e e' defining the diagonal folds f^4 f^4, and insuring the easy and ready formation of the same in the proper direction, such short preliminary creasing materially facilitating the manufacture of flour-sacks and heavy bags for other purposes made from thick paper. Part of the upper ply of the tube is left as a lap, f^5, to appear outside the bottom of the bag. As herein shown, the end of the tongue is provided with a circular or curved projection, h, which, as the tongue is lifted, as before described, co-operates with a concaved part, h', of the nose to form a recess, h^2, which is useful in opening the mouth of the bag when the same is to be used. The nose g is made as a curved bar, the upper end of which is attached by bolt g' to a sleeve, g^4, placed on the shaft D^2 of the upper feed-roller, D'. The under side of the nose g is made as a flat plate, g^3, which is bifurcated, as shown in Fig. 1, its forked rear end being entered between the rollers G G' almost to their centers, thus keeping the diamond fold down in proper place. The rollers G G' receive between them the leading end of the diamond fold and aid in carrying the tube through the machine. The upper roller, G, is composed of a central cylinder, 103, and two other shorter cylinders, 104, one at each side thereof, all the cylinders being attached to a common shaft, n^2, but so as to leave annular spaces 3 3 between the cylinders 104 and the central cylinder, 103. The central cylinder is what is usually called the "brass" cylinder, it having applied to it the usual scored parts to take paste from the paste-box H and apply it to the diamond-folded part of the bag-blank, as at H^2. The cylinder 103 forms the bottom for the paste-box, the latter, concaved to fit the roller closely, having the lower portion of its sides shaped to enter the annular grooves 3 3. The cylinders 104 are of varying radius, those parts of the said cylinders which are in line with the parts of the brass cylinder that apply the paste to the diamond fold being of least radius, but of the same radius as the central or brass cylinder, to thus enable the latter to apply paste to the diamond fold; but the other parts of the said cylinders 104 are of sufficiently greater diameter than the central cylinder as to leave an open space between the central cylinder and the body of the bag as the latter (the diamond-folded part having been pasted) is fed between the rollers G and G'.

To prevent the bag-blank from clinging to the upper roller, G, I have provided each of said annular grooves 3 3 with a stripper, 105, (shown only in Figs. 3 and 8,) the said strippers being narrow feet pointed to enter the grooves 3, and, as herein shown, the said feet form parts of legs 106, which at top are attached to the rear side of the paste-box. The cylinder G' is provided with a knife, 4, which acts in the rotation of the rollers G G' to sever the connecting part f^6 of the lower ply of the tube preparatory to cross-folding the same. The knife must enter a groove or recess of the upper roller, G; but as the said roller rotates in the paste-box, it is obvious that a simple slot cannot be used without detriment, for the same would fill with paste at each rotation of the upper roller, G, and the said paste would be discharged upon the bag to its detriment, and would also prevent the proper operation of the said blade. To obviate this difficulty, the longitudinal groove in the cylinder G, opposite the blade 4, is provided with a filling-bar, 5, the ends of which are extended through slots in spring-supported pins 6, the springs 7 normally keeping the outer edge of the filling-bar out flush with the periphery of the roller G, but in the rotation of the said roller, together with the roller G', their movement being in unison by proper gearing between them, the projecting ends of the pins 6 meet the roller G' just before the blade 4 arrives in position opposite the filling-bar 5, and the said pins, being pushed in against their springs 7, act to retract the filling-bar, leaving at the periphery of the roller G a suitable slot for the entrance of the blade 4 to cut off the part f^6 of the lower ply of the tube. The roller G' acts as one of the three rollers employed in the formation of the first and second cross-folds, the other rollers being marked E E'. These two rollers differ from those described in my United States Patent No. 252,412, in that they are grooved and cut away circumferentially (see Figs. 4 and 5) to leave projection m m opposite to each other, to come in contact with the paper to bite the same against the under roller, G', the cut-away portions of the rollers E E' coming opposite the lines of paste, and the fingers of the tucking-blades carried by the arms N N'.

In my patent referred to the tucking-blades were in one piece, and descended only to the bite of the rolls; but in practice with thick heavy paper I have found it very desirable to push the paper farther between the rolls, to insure the catching of the paper. To do this I have made the blades as separate fingers, and have cut away the rolls, as described, to enable the entrance of the fingers between them beyond the bite of the rolls employed for cross-folding. Each roller E E' has a longitudinal groove to receive the blade 4 of the roller G'. All the rollers will be made hollow to thus make them lighter.

The tucking-blade to form the first cross-fold is composed of fingers 10, attached to arms N, of a rock-shaft, 14, having an arm, 15, connected by link 16 with a crank-pin, 17, of a toothed gear fast on the shaft 26 of the roller G', the said gear being of the same size as the toothed gear 18 on the shaft n^2 of the roller G. The shaft 26, at its opposite end, has a crank-pin, 28, which by link 19 and pin 20 is connected with the arm 21 of the rock-shaft 24, to which is attached the arms N', which carry the tucking-blade that acts to form the second cross or blind fold.

The tucking-blade for the formation of the second cross-fold is composed of a short finger, 12, and two longer fingers having bifurcated ends 29, the outermost portions of which assist in the formation of the blind fold, while the innermost portions act as do the fingers 10 when making the first cross-fold, and also prevent the first cross-fold from opening while the second cross-fold is being made. The central finger, 12, is made sufficiently short to avoid disturbing the pasted longitudinal seam of the bag.

The arms 30, which hold the paste-box H

in place by bolts 31 therein, are extended from a cross-rod, 32, held fast in the arch-pieces A^4 of the frame-work.

The belt-shipper 36 has its handle 35 extended to the opposite side of the machine.

In Fig. 1 I have shown the toothed gear *n* on the main shaft A′. This gear in practice engages a toothed gear on the shaft *p* of the roller D, and also a toothed gear on the shaft 26 of roller G^2.

Shaft D^2 in practice has a gear, *n*′, which is engaged with a like-sized gear on the shaft *p*, and the gear 18 on the shaft n^2 of the roller G is of the same size as and is driven by the gear on the shaft 26 of roller G^2. The gear carried by the shaft 26 engages toothed gears on the shafts of and rotates the rollers E E′.

I have not herein considered it necessary to illustrate all the gears, as they tend to complicate the drawings.

In the machine herein described I have aimed to employ the fewest possible number of parts to accomplish the work to be done, and the said parts have been brought into the most compact arrangement possible.

I employ but six rollers or cylinders, and by them, under the arrangement devised by me, I feed the tube before the bag is cut off and the bag after it is cut off, and by knives and blades on the rolls I slit and cut the tube transversely past the diamond fold, the said rolls aiding in cross-folding the bag.

I claim—

1. In a paper-bag machine, the feeding-rollers D D′, provided with the knives *d* d^2, to slit the tube longitudinally and cut it transversely from the slits to the edges of the tube, and provided, respectively, with the diagonally-placed crimping-blades, and notches or equivalents to pass each other and crimp the tube from the ends of the slits outward toward the edges of the tube, substantially as described.

2. The two main feeding-rollers and the slitting-knives *d*, and knives d^2, connected therewith to cut the tube transversely, combined with the former, arranged in front of the said rolls, and with the tongue extended between and back of the said rolls, substantially as described.

3. The spring-tongue located within the paper tube, combined with the roller 2 and with means, substantially as described, to operate the roller and lift the tongue and to sever the upper ply of the tube, as set forth.

4. The former, the feed-rollers provided with the knives *d* d^2, and the tongue extended between the feed-rollers, and having a widened upturned end, combined with means, substantially as described, to lift the end of the tongue and cause it to effect the cutting of the upper ply of the tube between the short transverse edge cuts *f f*′, substantially as set forth.

5. The roller G′, provided with the knife 4, combined with the roller G, provided with the closing-bar, and means, substantially as described, to move it radially and open a space for the said knife when it is to act to sever the central part of the under ply of the tube, substantially as set forth.

6. The nose *g*, provided with the recess *h*′, combined with the tongue provided with a projection, *h*, and a roller and actuating-cam therefor to operate said tongue to cut a lip for the mouth of the bag, substantially as described.

7. The rollers G′ and E, combined with the tucking-blade composed of the short finger 12 and the bifurcated fingers 29, to operate substantially as described.

8. The former, the feeding-rolls provided with the knives *d* d^2, the tongue extended between them, means, substantially as described, to lift the said tongue to cut the upper ply of the tube and lift it above the nose, and the nose *g*, combined with the rollers G G′, carrying the pasting device and the knife 4, to operate substantially as described.

9. The former, the feeding-rolls provided with the knives *d* d^2, the tongue extended between them, means, substantially as described, to lift the said tongue to cut the upper ply of the tube and lift it above the nose, and the nose *g*, combined with the rollers G G′, carrying the pasting device and knife 4, and with the rollers E E′, and two tucking-blades, all arranged to operate substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL APPEL.

Witnesses:
A. G. CARPENTER,
F. G. McDOWELL.