No. 715,360. Patented Dec. 9, 1902.

C. E. DULIN.

PAPER BAG MACHINE.

Application filed Nov. 6, 1901.

(No Model.) 5 Sheets—Sheet 1.

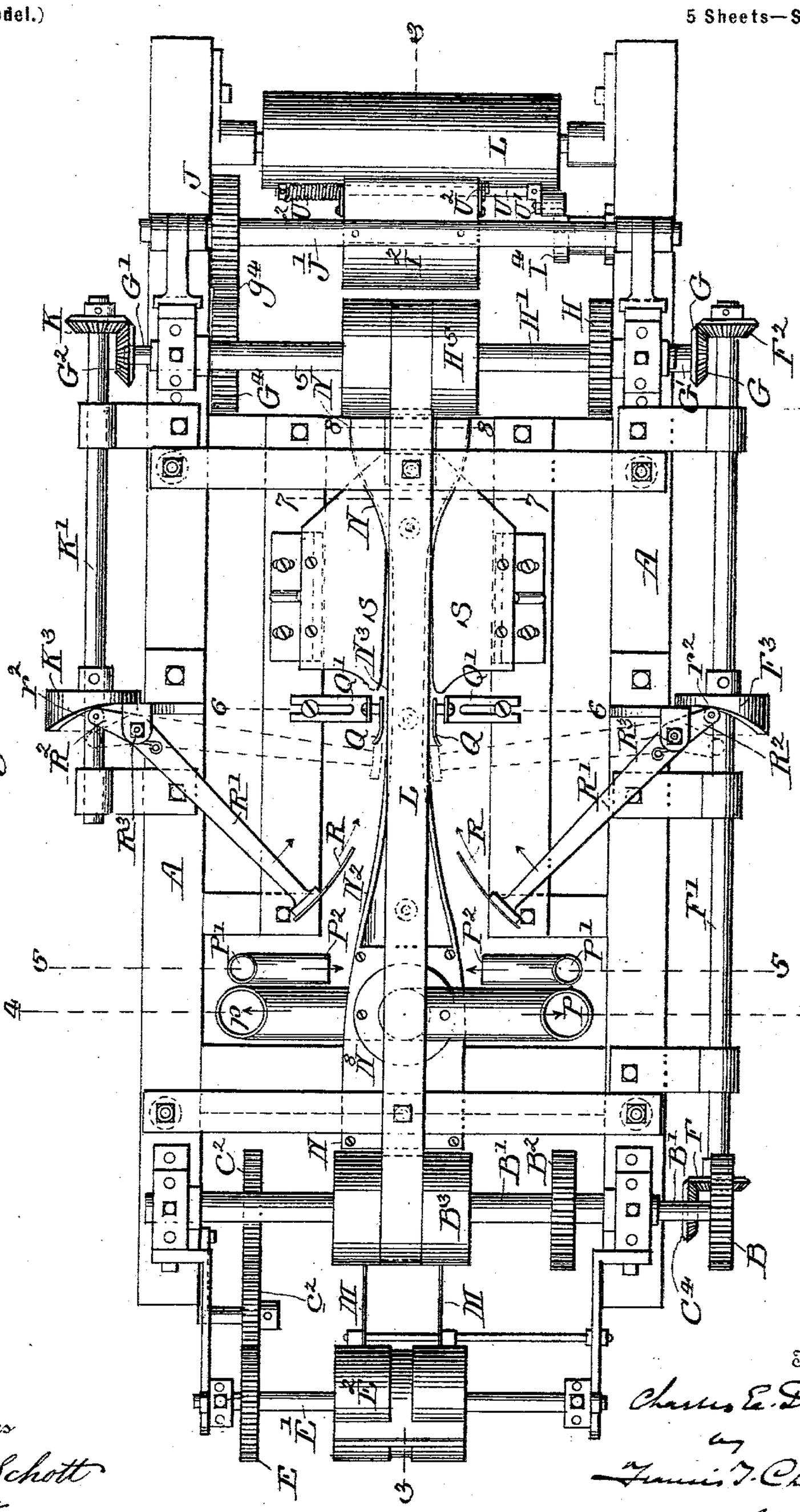

Fig. 1.

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(Application filed Nov. 6, 1901.)

(No Model.) 5 Sheets—Sheet 2.

Fig. 2.

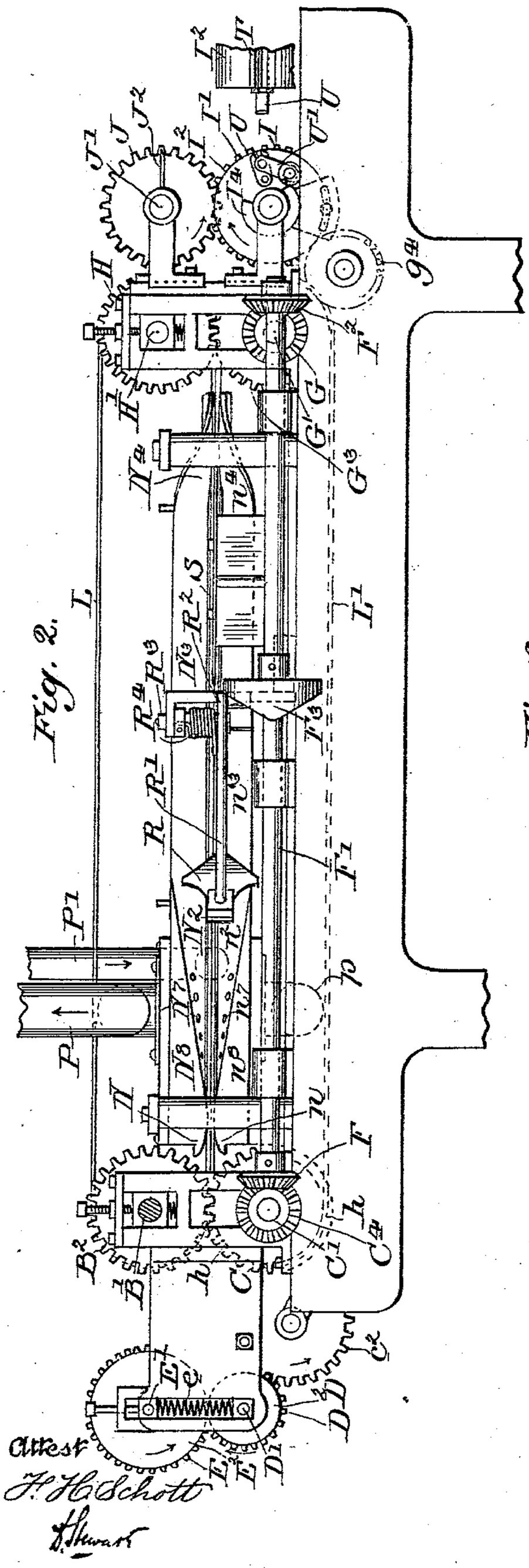

Fig. 3.

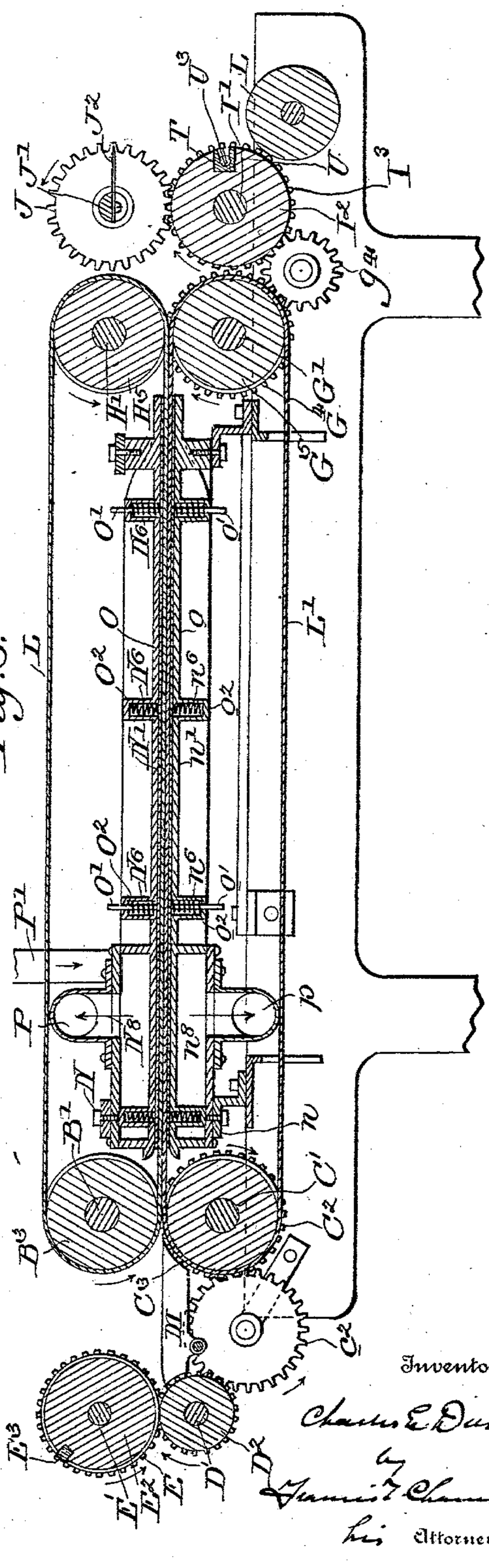

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Fig. 4.

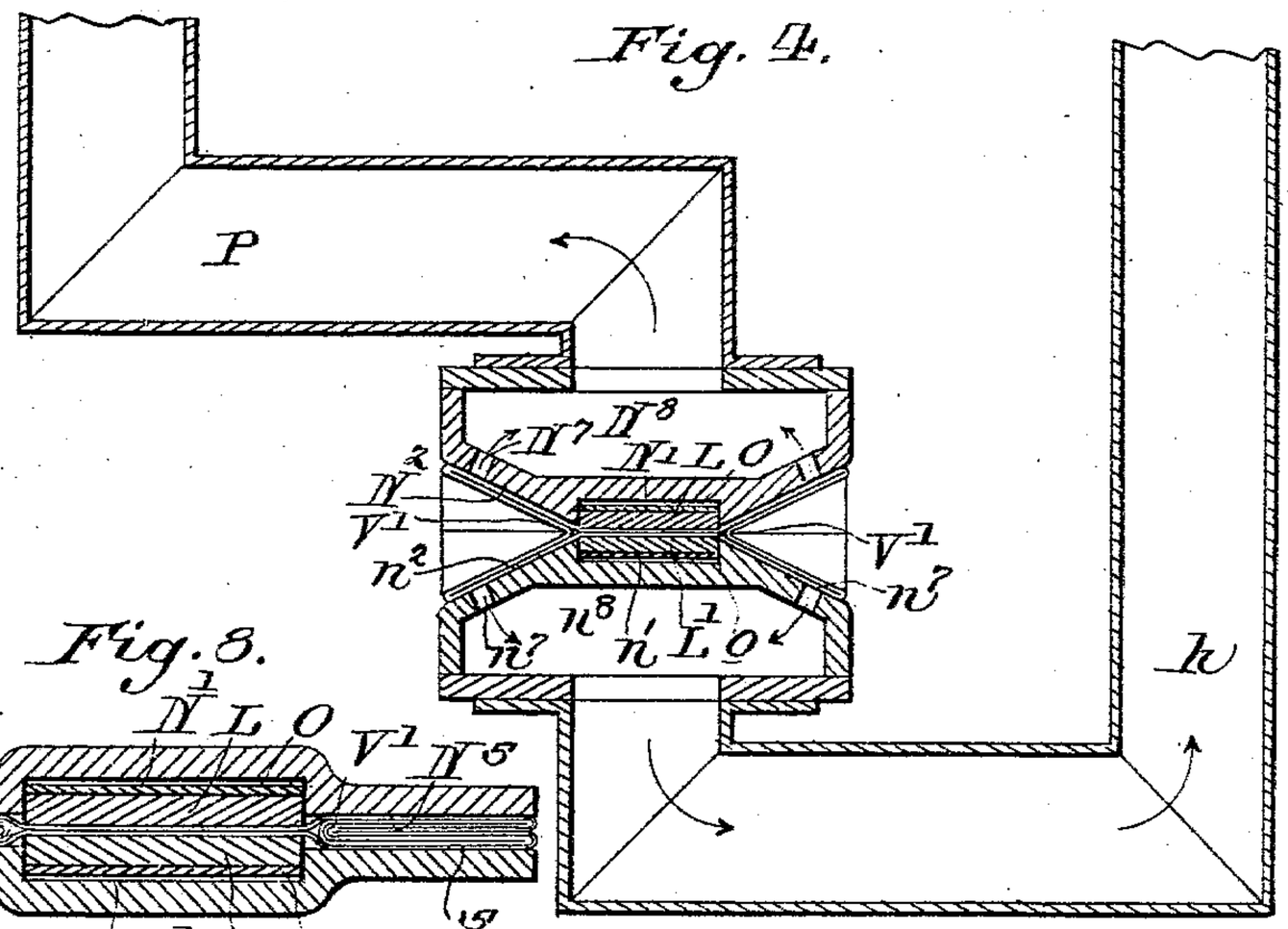


Fig. 8.

Fig. 5.

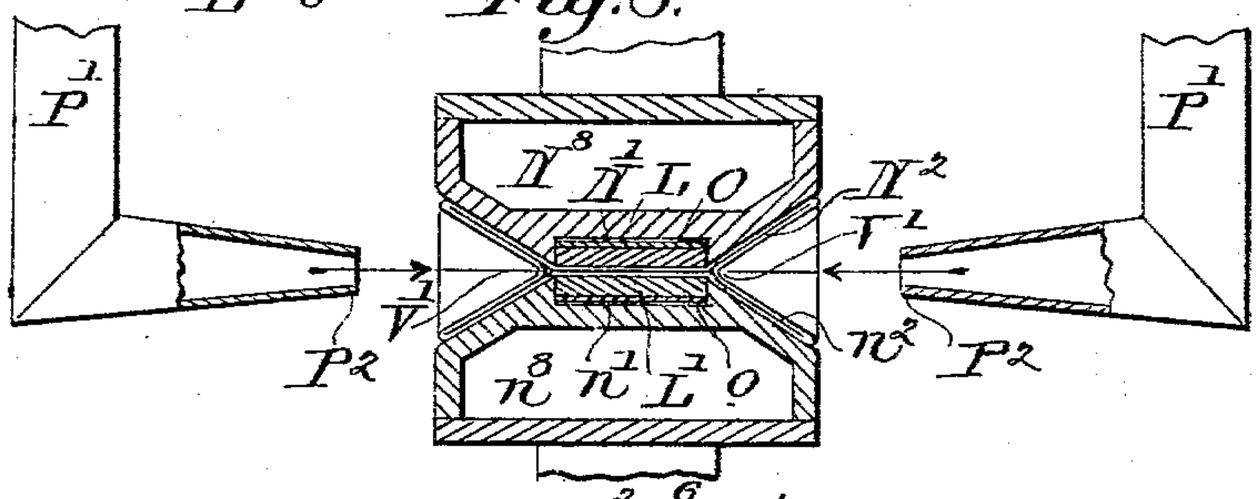


Fig. 6.

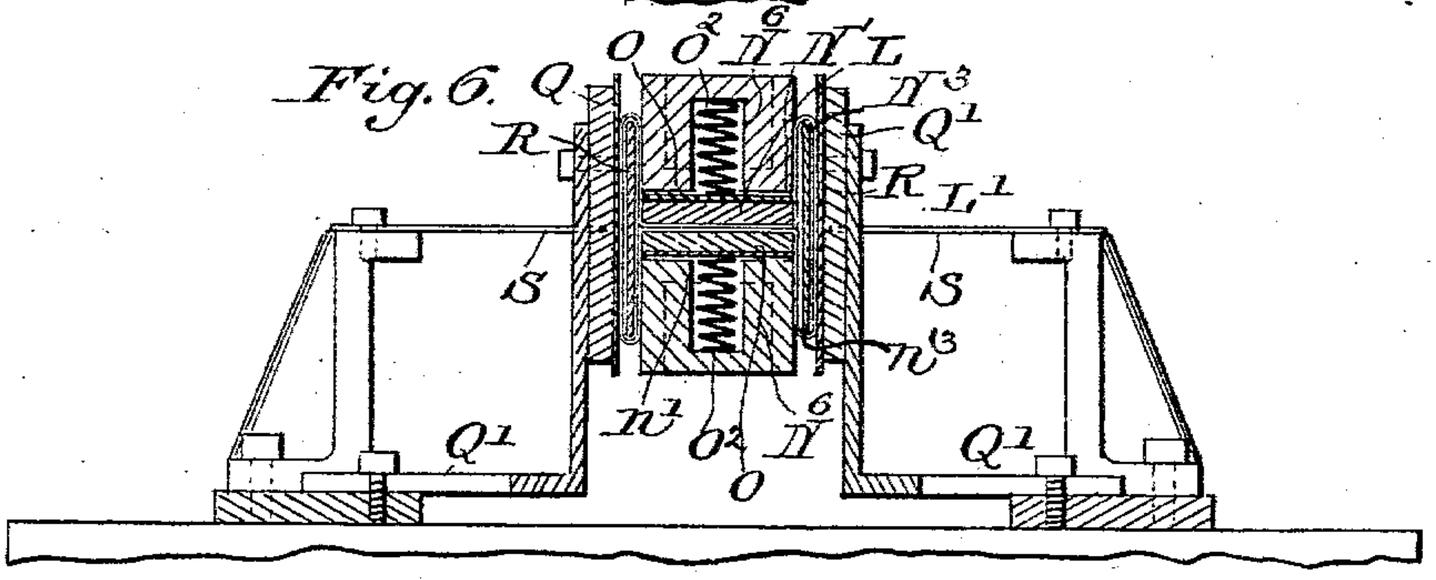
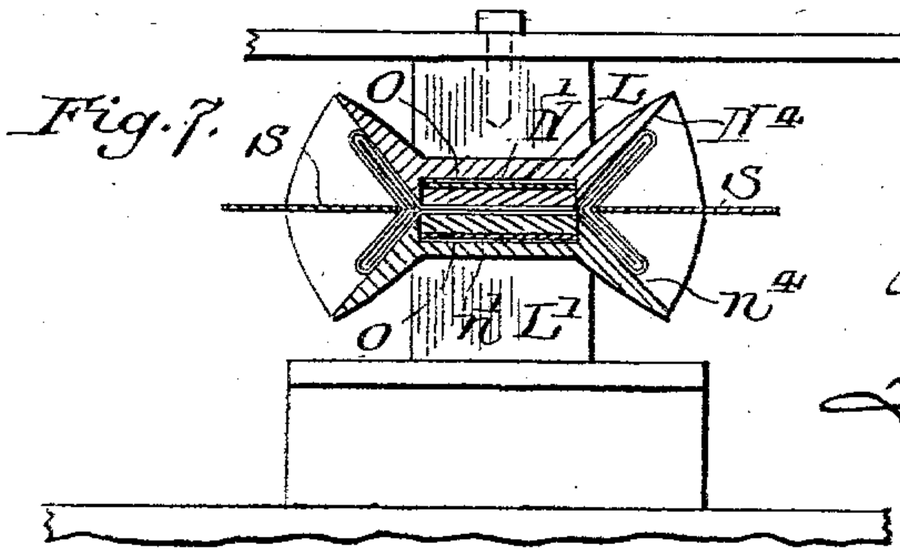


Fig. 7.



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PAPER BAG MACHINE.

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(No Model.) 5 Sheets—Sheet 4.

Fig. 12.

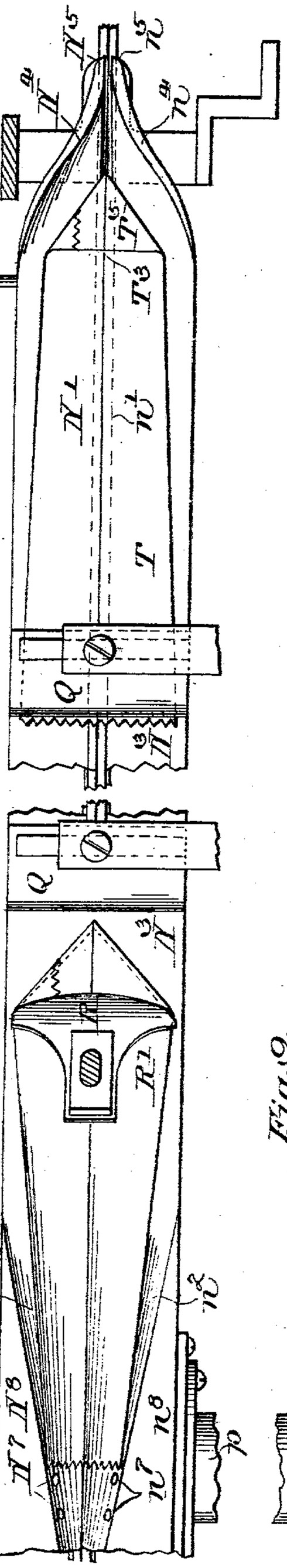

Fig. 13.

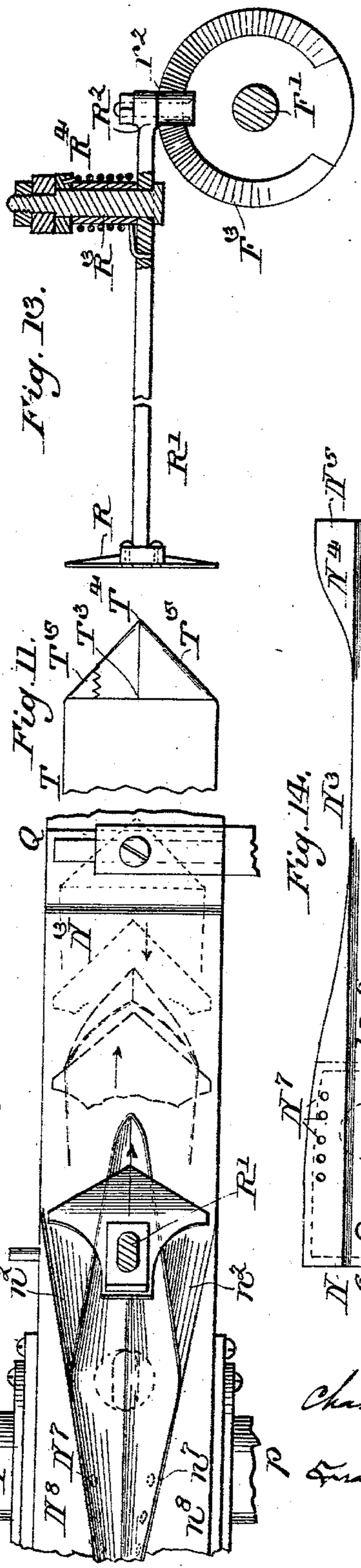

Fig. 11.

Fig. 14.

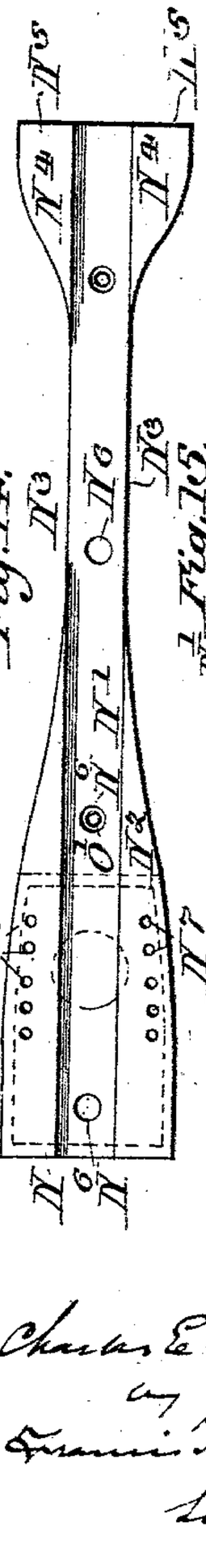

Fig. 15.

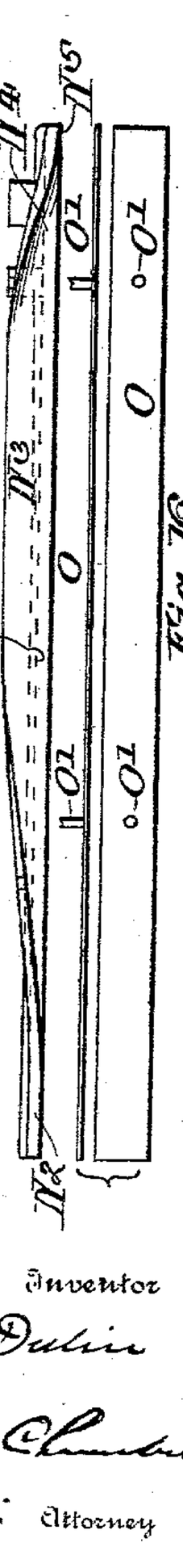

Fig. 16.

Fig. 10.

Fig. 9.

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No. 715,360. Patented Dec. 9, 1902.

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PAPER BAG MACHINE.

(Application filed Nov. 6, 1901.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 17.

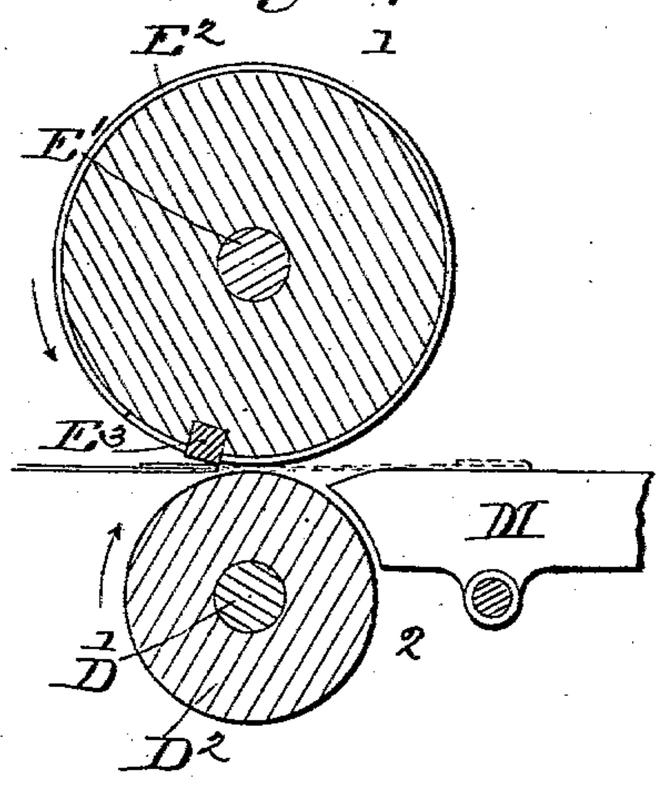


Fig. 18.

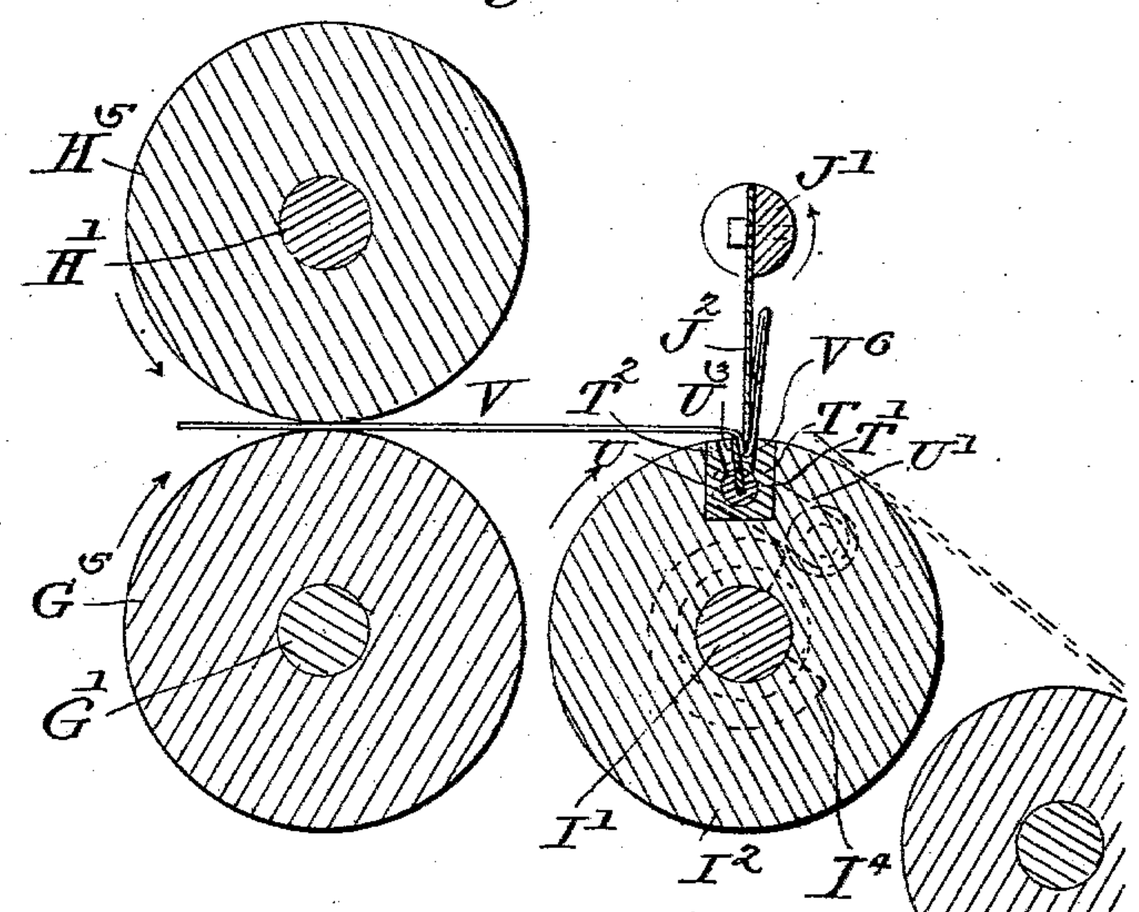


Fig. 19.

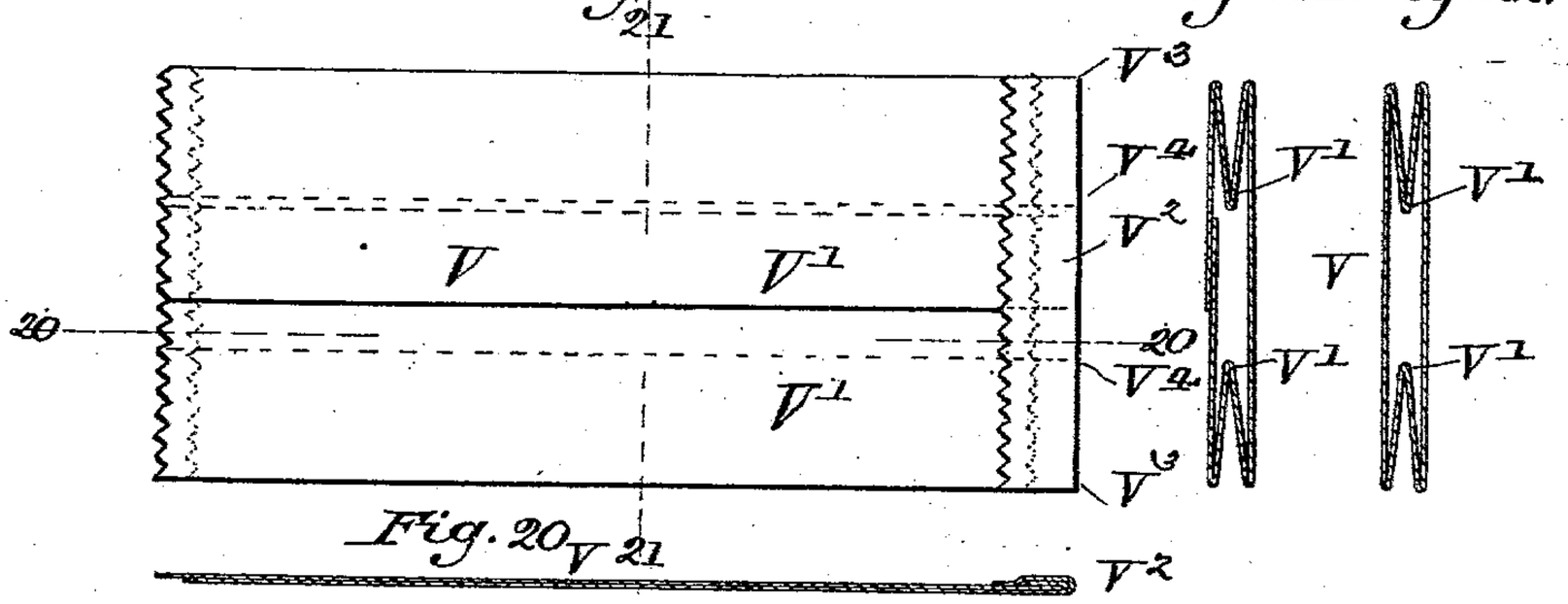
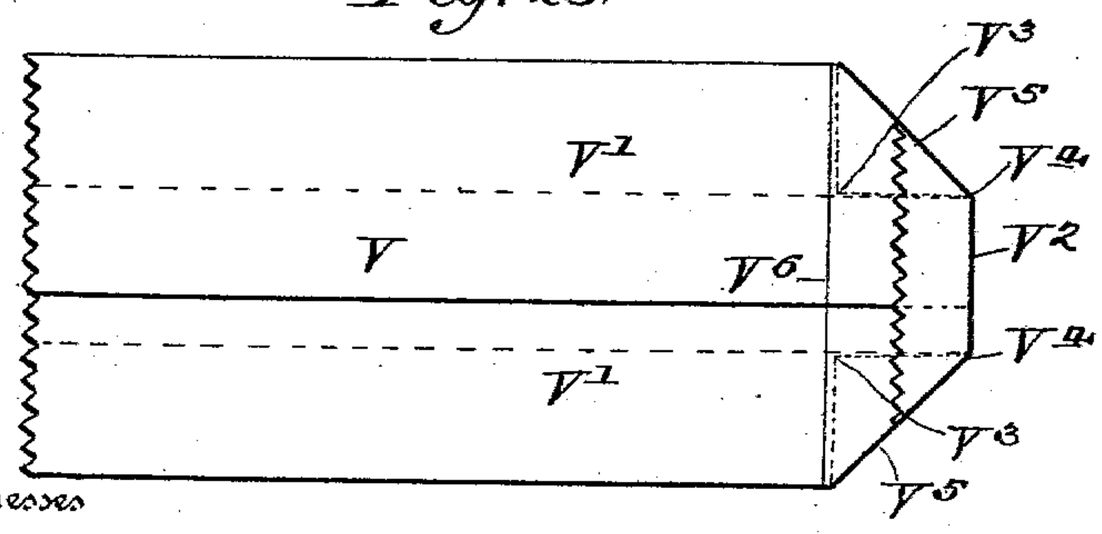


Fig. 21. Fig. 22.

Fig. 23.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES E. DULIN, OF SANDYHILL, NEW YORK, ASSIGNOR TO UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 715,360, dated December 9, 1902.

Application filed November 6, 1901. Serial No. 81,294. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. DULIN, a citizen of the United States of America, residing in Sandyhill, in Washington county, State of New York, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to machinery for tucking in the corners of bellows-folded paper bags, this corner-tucking being for the purpose of facilitating the opening of such paper bags into square form.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which—

Figure 1 is a plan view of my machine; Fig. 2, a side elevation with the driving gear-wheel removed; Fig. 3, a central sectional elevation taken on the line 3 3 of Fig. 1; Fig. 4, a cross-section through the formers and suction-boxes, taken as on the line 4 4 of Fig. 1; Fig. 5, a cross-section through the formers and blast-pipes, taken as on the line 5 5 of Fig. 1; Fig. 6, a cross-section through the formers and coacting mechanism, taken on the line 6 6 of Fig. 1; Fig. 7, a cross-section through the formers and folding-plates, taken on the line 7 7 of Fig. 1; Fig. 8, a cross-section through the rear end of the formers, taken on the line 8 8 of Fig. 1. Fig. 9 is a side view of the formers and reciprocating tucking-blades, illustrating particularly the action of the tucking-blade upon the bag. Fig. 10 is a similar view showing the blade in a more advanced position. Fig. 11 is a side view of the end of the bag at the time when the tucker-blade has completed its operation upon it; Fig. 12, a side elevation of the rear of the formers, showing how they act to re-form the bellows fold. Fig. 13 is a side elevation of the tucker and tucker-lever and actuating-cam with the pivot of the lever shown in section. Fig. 14 is a bottom view of the upper former; Fig. 15, a side elevation thereof, Fig. 16 showing also a side elevation of the presser-plate and plan view of the same. Fig. 17 is a cross-sectional view of the feed-rolls by means of which the bags are fed to my machine; Fig. 18, a cross-sectional view of the rolls at the end of the machine, showing particularly the way in which the bags are creased transversely in the final operation. Fig. 19 is a plan view of the bag prior to its passage through the machine. Fig. 20 is an edge view or side elevation of the bag; Fig. 21, a cross-sectional view on the line 21 21 of Fig. 19, Fig. 22 being a similar view with the omission of the lap and corresponding with the sections of the bag shown in the figures illustrating the machine, and Fig. 23 is a plan view of the completed bag.

A indicates the frame of the machine; B, the driving gear-wheel, through which power is communicated to the main shaft, (indicated at B′.) The shaft B has secured to it the belt-drum (indicated at B^3) and a gear-wheel B^2, by which motion is communicated to the gear-wheel C on the lower shaft C′, which shaft has secured to it the belt-drum C^3 and also a gear-wheel C^2, which through an intermediate wheel c^2 drives a gear-wheel D, secured to the shaft D′, on which in turn is secured the lower feed-roll D^2. The gear-wheel D′ engages and drives the gear E of the upper shaft E′, to which is secured the upper feed-roll E^2, said feed-roll being preferably grooved, as indicated, and having a projecting cross-bar, (indicated at E^3.) To the end of the shaft C′ is secured a bevel-gear C^4, which engages and drives a bevel-gear F on a longitudinal shaft F′, having another gear-wheel F^2 at its rear end by which it communicates motion to the gear G, secured to the shaft G′. The shaft F′ has also secured to it a cam, (indicated at F^3.) The shaft G′ has secured to it the lower belt-drum G^5 and on the end opposite to that to which is secured the gear G a second bevel-gear G^2, communicating motion through a bevel-gear K to a shaft K′, having secured to it in turn a cam K^3, corresponding to the cam F^3. Through a gear-wheel G^3, also secured to the shaft G′, motion is communicated to the gear-wheel H, secured on the shaft H′ and to which is secured the upper rear belt-drum H^5. Another gear-wheel G^4, secured on the shaft G′, drives, through the intermediate wheel g^4, the gear-

wheel I, secured to the shaft I′, which shaft has secured to it the creasing-roller I^2 and the second gear-wheel, (indicated at I^3,) by which motion is communicated to the gear-wheel J on the upper shaft J′, to which shaft in turn is secured the creasing-blade J^2. I^4 is a cam secured around but not to the shaft I′.

L and L′ are carrier-belts, the upper one extending over the rolls B^3 and H^5 and the lower one extending over the rolls C^3 and G^5.

M M are guides situated between the feed-rolls E^2 D^2 and the belt-drums B^3 C^3.

N and n are the formers, having substantially similar oppositely-turned faces and formed with central grooves (indicated at N′ n') of the breadth of the belts L L′, which breadth is the same as that of the central portion of the bags to be treated—that is, the portion lying between the bellows-folded sides. At their front ends the formers are preferably formed with slightly-opened lips, as best shown in Fig. 2, and with their sides flaring gradually backward, as indicated at N^2 n^2, until they merge into parallel vertical portions, (indicated at N^3 n^3,) these vertical portions of the sides again merging into curved portions N^4 n^4, which at or about the points indicated at N^5 n^5 the extreme rear end of the formers extend horizontally, lying in parallel planes.

N^6 n^6 are perforations formed through the portions N′ n' of the formers for purposes to be hereinafter described. The faces of the front curved portions of the formers are connected by means of perforations N^7 with suction-boxes, (indicated at N^8 n^8,) P and p indicating the air suction-pipes leading to a suction-fan. (Not shown.)

O and o are thin metallic presser-plates fitted in the central grooves N′ n' of the formers and having, as shown, vertically-extending posts O′ o', which extend through one or more of the perforations N^6. The plates are pressed together by the action of springs (indicated at O^2 o^2) working through the openings N^6 n^6 and suitably held in the formers, as is well shown, for instance, in Fig. 6.

P′ and P′ are blast-pipes connected with a blast-fan (not shown) and having their nozzles P^2 P^2 directed into the opening between the diverging front sides of the formers, as is indicated in Fig. 5.

It will be observed that the belts L L′ work through the grooves N′ n' between the plates O o, which act to press the faces of the belts together.

Q Q are presser-plates situated parallel to and in close proximity to the vertical side walls N^3 n^3 of the formers. These presser-plates are secured, as shown, to adjustable standards, (indicated at Q′.)

R R are tucker-blades secured on the long ends R′ of pivoted levers R′ R^2, R^3 indicating the pivot and r^2 cam-rolls secured on the arm R^2 and resting against the cams K^3 and F^3, R^4 R^4 indicating springs which hold the cam-rolls in contact with the cams. The position of the levers and the construction of the cam are such that the tucker-blades R are given oscillatory movement, which carries their triangular points into the partially-opened bellows folds of the bags near the bottom of the bags, the tuckers moving forward and acting to distend the corners until they pass between the presser-plates Q and the vertical sides N^3 of the formers, after which the tuckers are withdrawn in position to act upon the succeeding bag.

S S are folding-plates extending from the plane sides N^3 n^3 of the formers between the converging sides N^4 n^4, as is well shown in Fig. 1.

Returning to the creasing device at the end of the machine the creasing-roll I^2 is formed with a longitudinal cavity, in which is set the creasing-block T, having formed in it a cavity T^2 and a bearing at the base of the cavity, (indicated at T′.) In this bearing is situated the longitudinal shaft U, having secured to it the lever-arm U′, which by means of a cam-roller rests in contact with the cam I^4, a spring U^2 holding the roller in contact with the cam.

U^3 is a creasing-blade secured to the shaft U and extending up into the creasing-cavity T^2.

V, Figs. 19 and 20, indicates the completed bag as it is fed to the machine, V′ V′ indicating the bellows folds, V^2 the cross-folded bottom, V^3 V^3 the outer corners of the folded bag, and V^4 V^4 the points or corners where the bellows fold V′ intersects the bottom of the bag.

In Fig. 23 the bag is represented in the condition in which it leaves the machine, the corners V^3 being folded inward into contact with the bellows fold V′ and the new folds (indicated at V^5) formed. Also by preference a cross-fold V^6 is formed across the bag.

In operation the blanks are fed to the machine through the feed-rolls E^2 D^2, the cross-bar E^3 enabling the feeding operative to bring the abutted end of each bag against this cross-bar, so that it will be fed to the machine in exact relationship with the movement of the different mechanical parts, or of course any other feeding device having the same function may be employed. Passing across the guides M the bag is passed between the drums B^3 C^3 into the bite of the belts L L′, which carry it between the formers N n. As the bags pass between the front diverging sides of the formers their bellows folds are sucked out, as indicated in Fig. 4, this action being facilitated and increased by the action of the blast-nozzles P^2, acting also to press the bellows folds of the bags out against the gradually-diverging sides of the formers, so that when the bag approaches the vertical walls U^3 of the formers its sides will be sufficiently distended to enable the triangular tuckers R when they sweep forward to pass between the distended folds, gradually increasing their distention, as indicated in Figs.

9 and 10, until they pass between the pressing-plates Q, the action of which is to press back the corners of the bag to the form indicated in Fig. 11. The tucker-blades are retracted after they have pressed the corners of the blank beneath the presser-plates and the bag moving forward passes between the folder-plates S S and between the converging sides N^4 n^4 of the folders, which press the bellows folds back to the original position over the folder-plates S, as is indicated in Fig. 7, the bags passing from the rear ends of the formers with their corners tucked in, as indicated in Fig. 23, but otherwise in the same condition in which they are fed to the formers. The refolded bags are passed from between the drums H^5 G^5 over the top of the creaser-roll I^2, and, as is shown in Fig. 18, the creasing-blade J^2 presses the paper of the bag down into the cavity T^2, formed in the block T, set across the face of the roll I^2 and between the wall of said cavity and the pinching-plate U^3, which, by means of its shaft U and lever-arm U′, is actuated at the proper time by the cam I^4. This forms the transverse crease V^6, (shown in Fig. 23,) said crease facilitating the opening of the bag on proper lines.

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

1. In a machine for tucking in the corners of a bellows-folded bag, formers N, *n* having their sides curved from substantially horizontal to substantially vertical positions and again to substantially horizontal positions and their front curved sides perforated and connected to suction-boxes, in combination with blast-pipes P^2 P^2 directed between the front curved ends of said formers, means for feeding bellows-folded blanks between the formers, means for pressing down the corners of the bag on the vertical sides of the formers and tuckers over which the sides of the bag are folded by the rear curved portions of the formers.

2. In a machine for tucking in the corners of a bellows-folded bag, formers N, *n*, having their sides curved from substantially horizontal to substantially vertical positions and again to substantially horizontal and their front curved sides perforated and connected to suction-boxes, in combination with blast-pipes P^2 P^2 directed between the front curved ends of said formers, means for feeding bellows-folded blanks between the formers, means for pressing down the corners of the bag on the vertical sides of the formers, tuckers over which the sides of the bag are folded by the rear curved portions of the formers, and a creaser acting to crease the bag transversely after it has passed from between the formers.

3. In a machine for tucking in the corners of a bellows-folded bag, formers N *n*, having their sides curved from substantially horizontal to substantially vertical positions and again to substantially horizontal, means for feeding bellows-folded bags between said formers, means acting on the sides of the bags to open their tucks as they pass between the front curved sides of the formers, reciprocating tucker-blades R R acting to engage the partially-opened tucks at their bottom corners and move forward with the bag over the vertical sides of the formers, tucker-plates Q Q secured close to the vertical sides of the formers and between which and the formers the ends of the tucker-blades R R pass at the end of the forward sweep, and tucker-plates extending from near the plates Q between the rear curved sides of the formers over which the bellows folds are refolded.

4. In a machine for tucking in the corners of a bellows-folded bag, formers N, *n* having their sides curved from substantially horizontal to substantially vertical positions and again to substantially horizontal and their front curved sides perforated and connected to suction-boxes, in combination with blast-pipes P^2 P^2 directed between the front curved ends of said formers, means for feeding bellows-folded blanks between the formers, reciprocating tucker-blades R R acting to engage the partially-opened tucks at their bottom corners and move forward with the bag over the vertical sides of the formers, tucker-plates Q Q secured close to the vertical sides of the formers and between which and the formers the ends of the tucker-blades R R pass at the end of their forward sweep, and tucker-plates extending from near the plates Q between the rear curved sides of the formers over which the bellows folds are refolded.

5. In a machine for tucking in the corners of a bellows-folded bag, the combination of the curved formers N, *n*, having central grooves N′, *n*′, of presser-plates O, *o*, situated in said grooves and pressed together by springs and belts L L′ moving in the grooves N′ *n*′ and pressed together by said plates O *o*.

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