

No. 616,605.

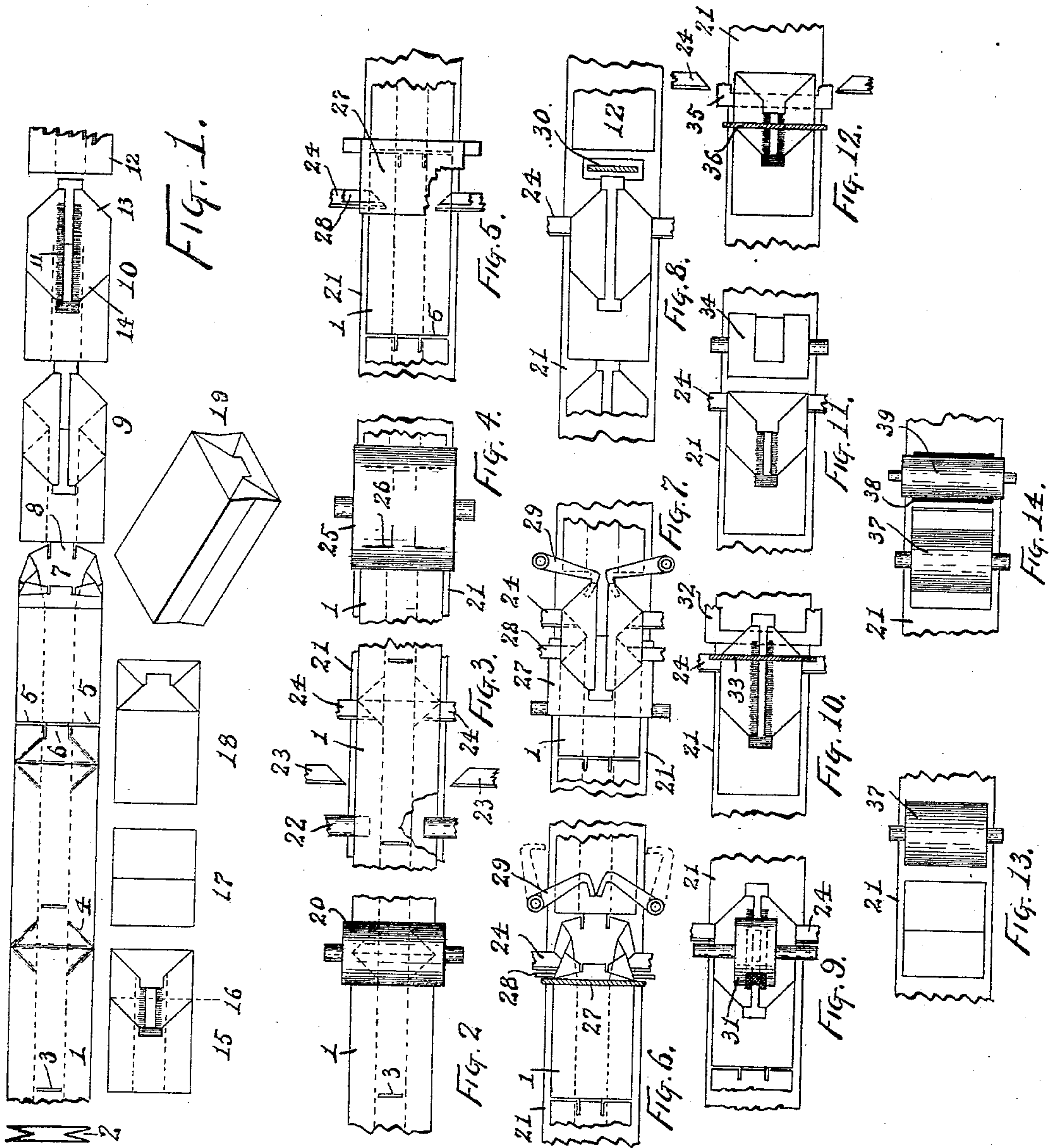
Patented Dec. 27, 1898.

C. V. CRIST.
PAPER BAG MACHINE.

(Application filed Nov. 26, 1897.)

(No Model.)

6 Sheets—Sheet I.



Witnesses:
E. R. Shipley.
M. S. Belden.

Charles V. Crist Inventor
by James W. See Attorney

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6 Sheets—Sheet 2.

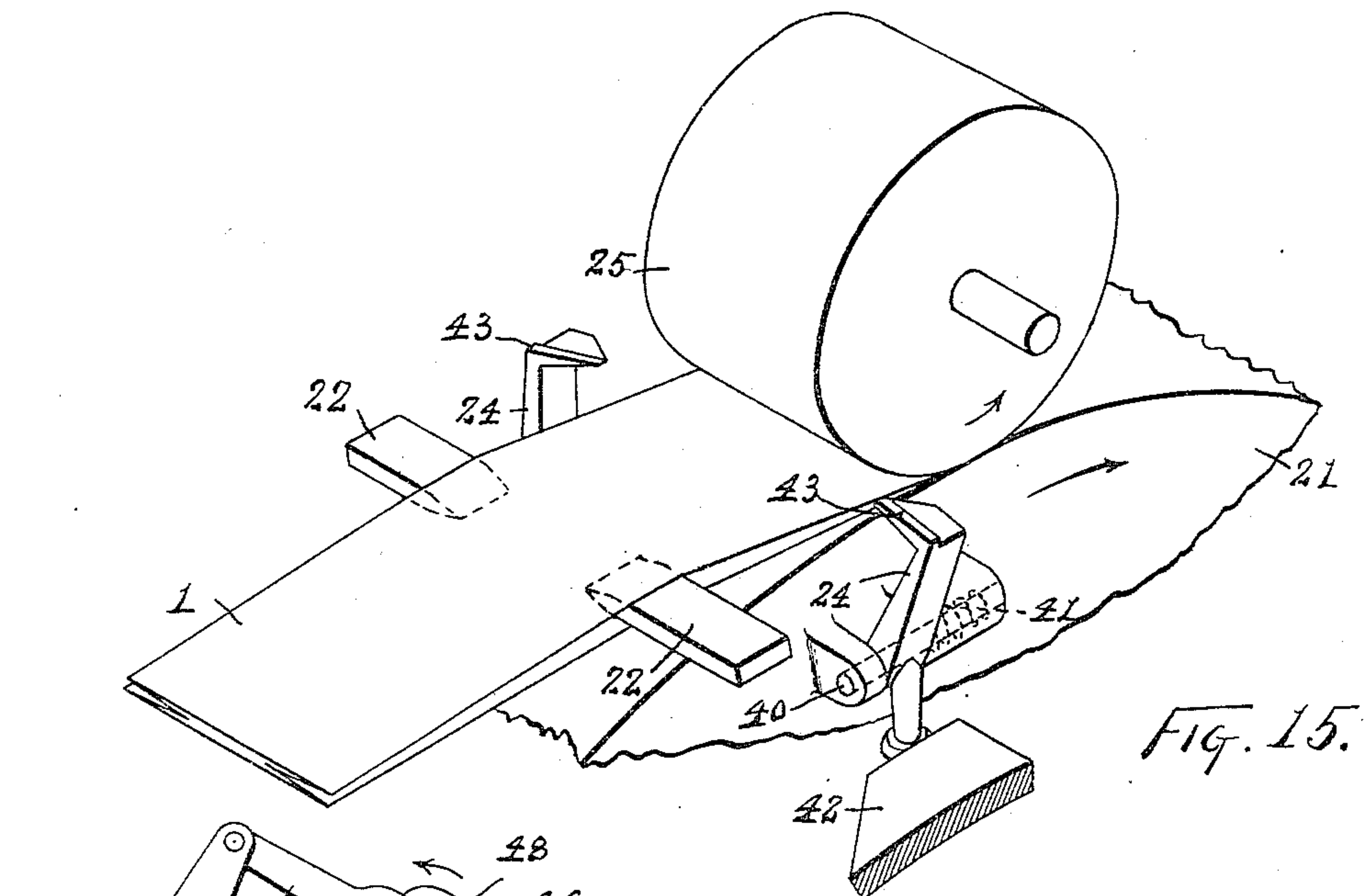


Fig. 15.

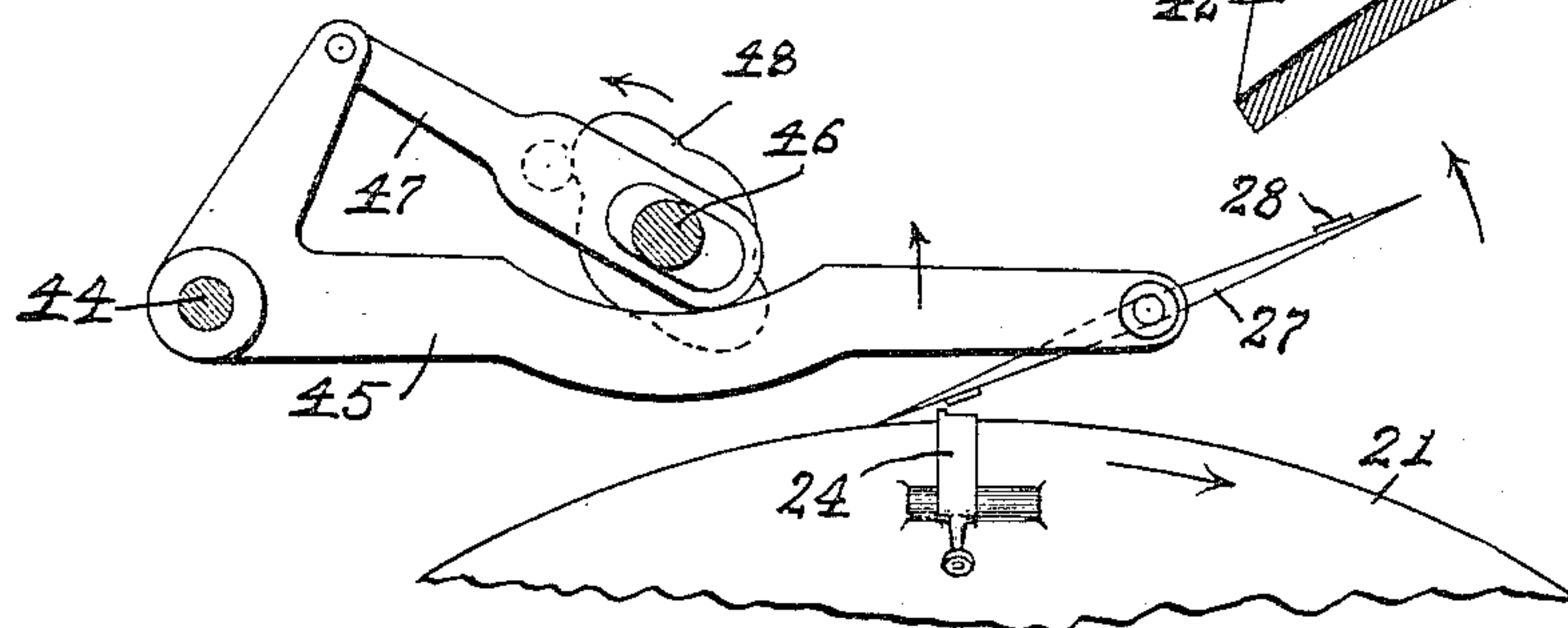


Fig. 16.

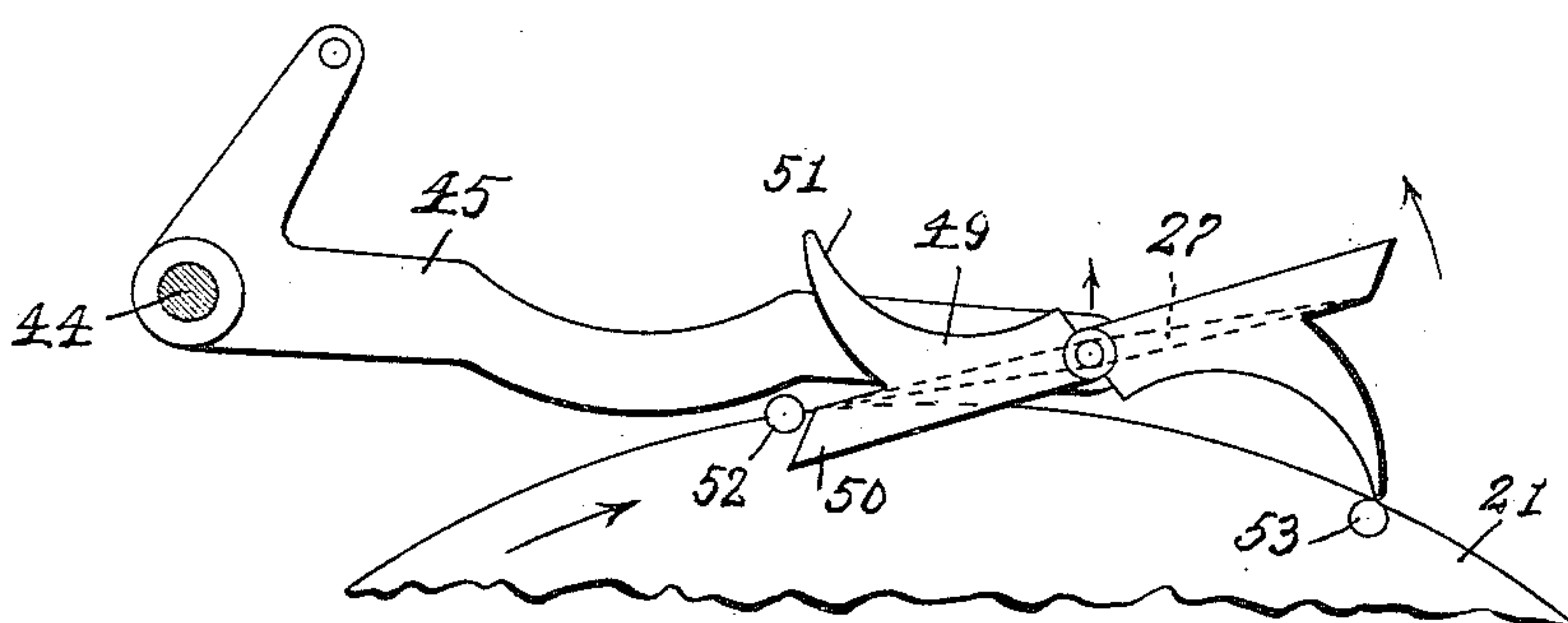


Fig. 17. Charles V. Crist Inventor
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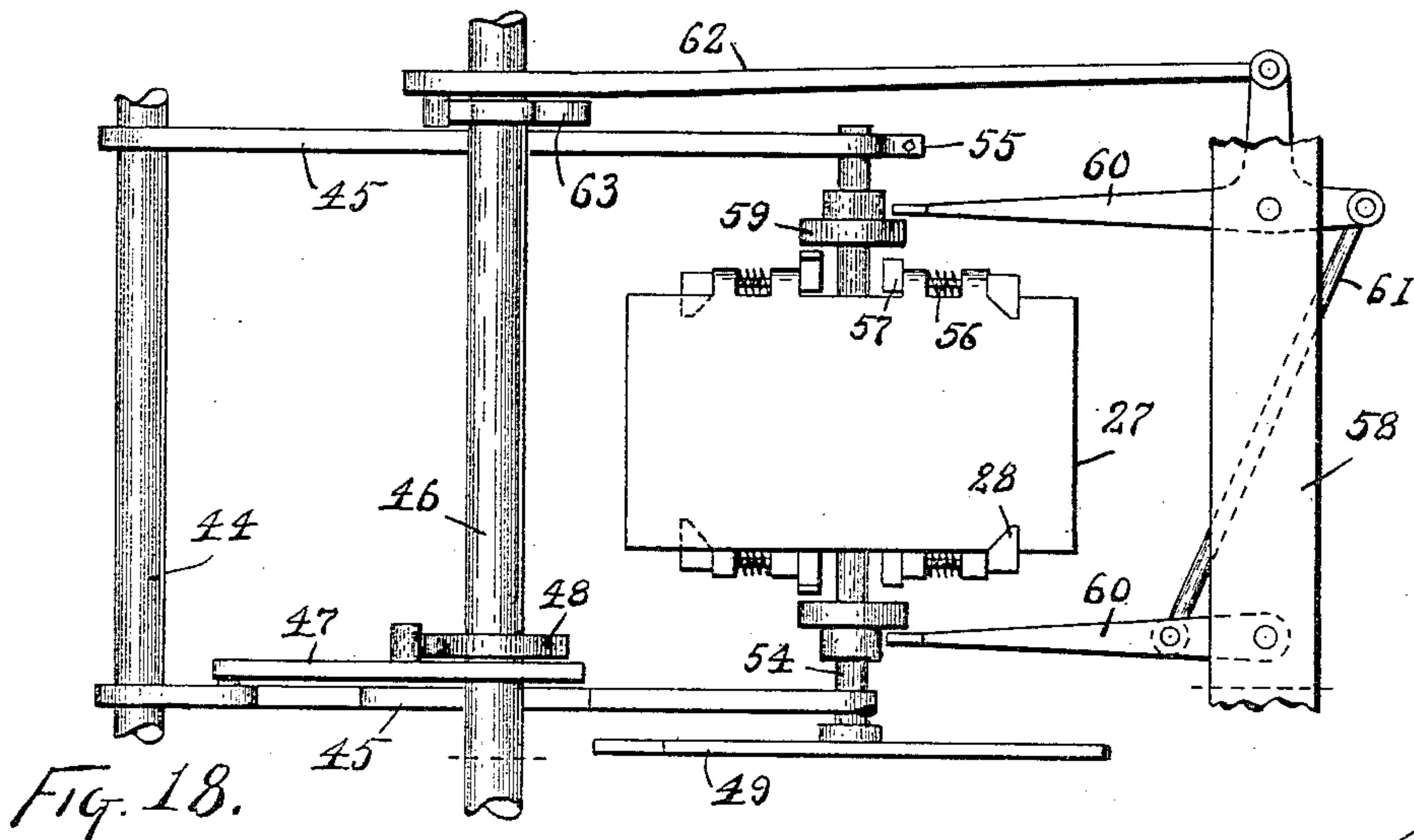


Fig. 18.

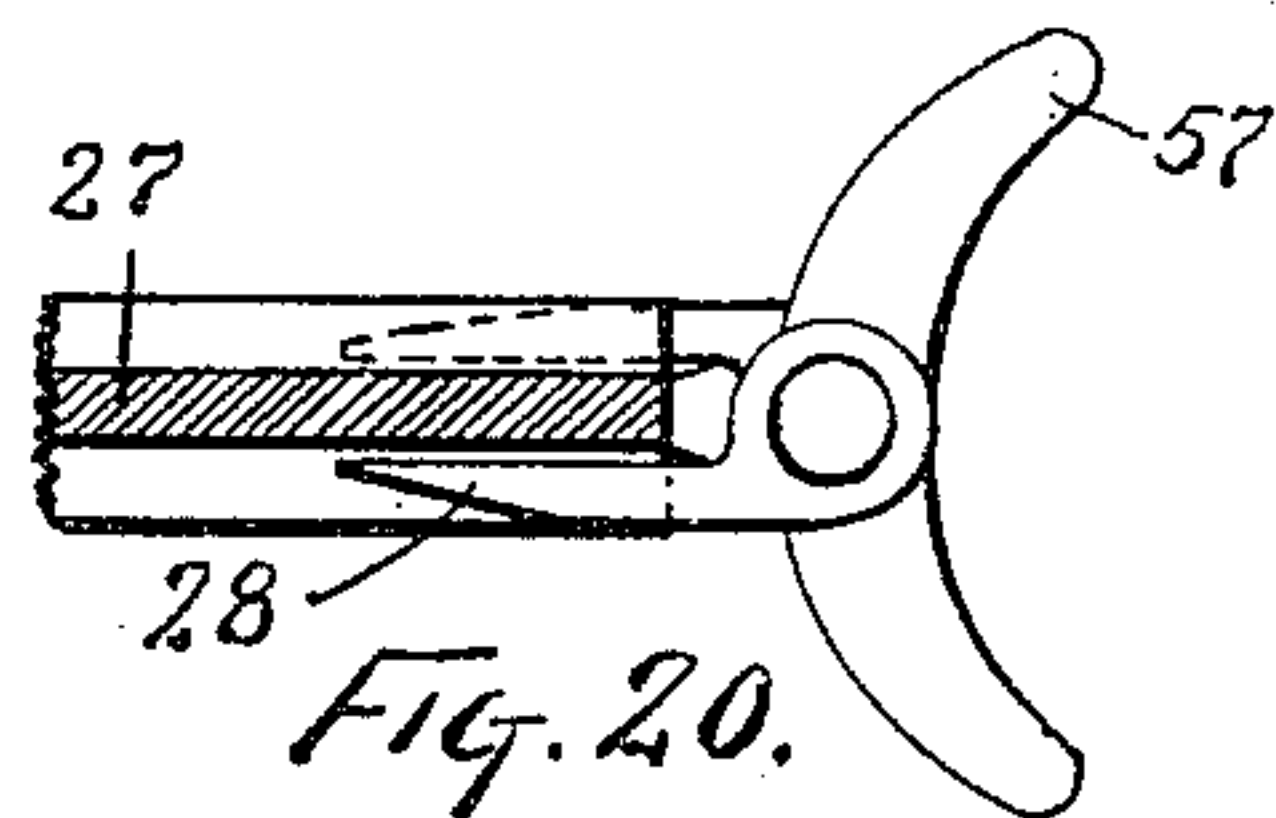


Fig. 20.

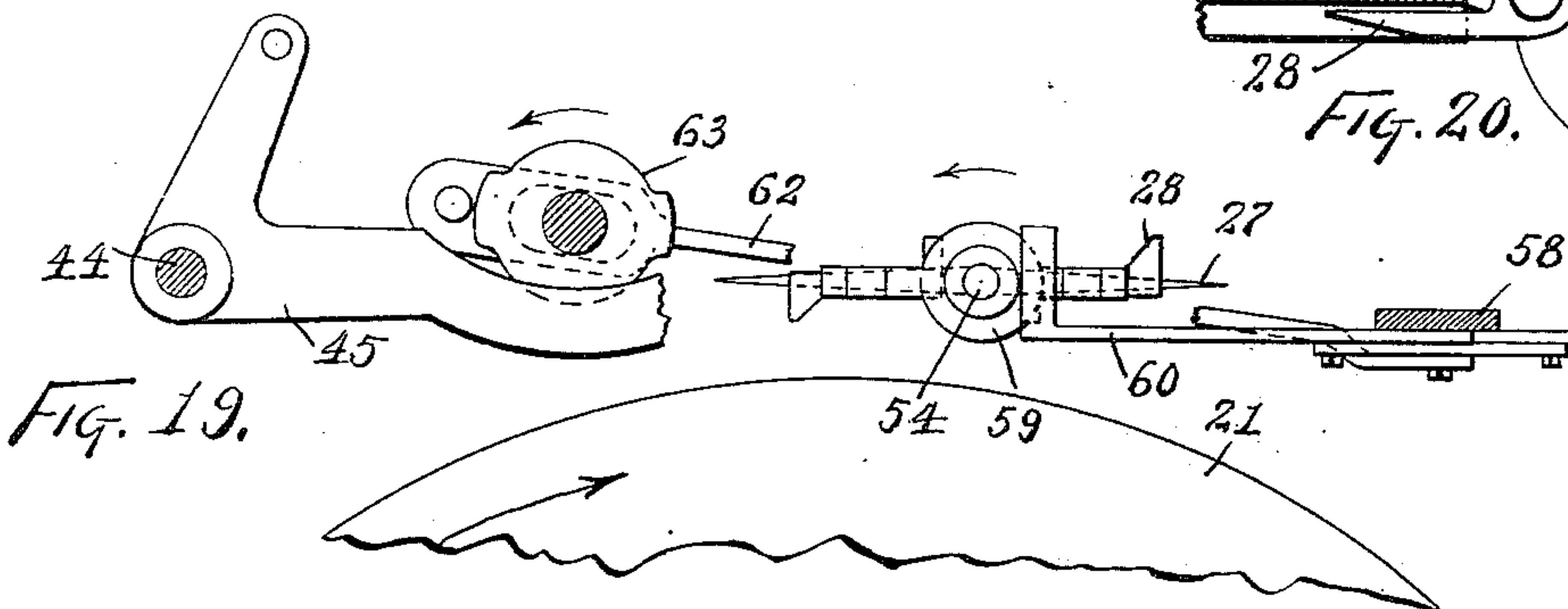


Fig. 19.

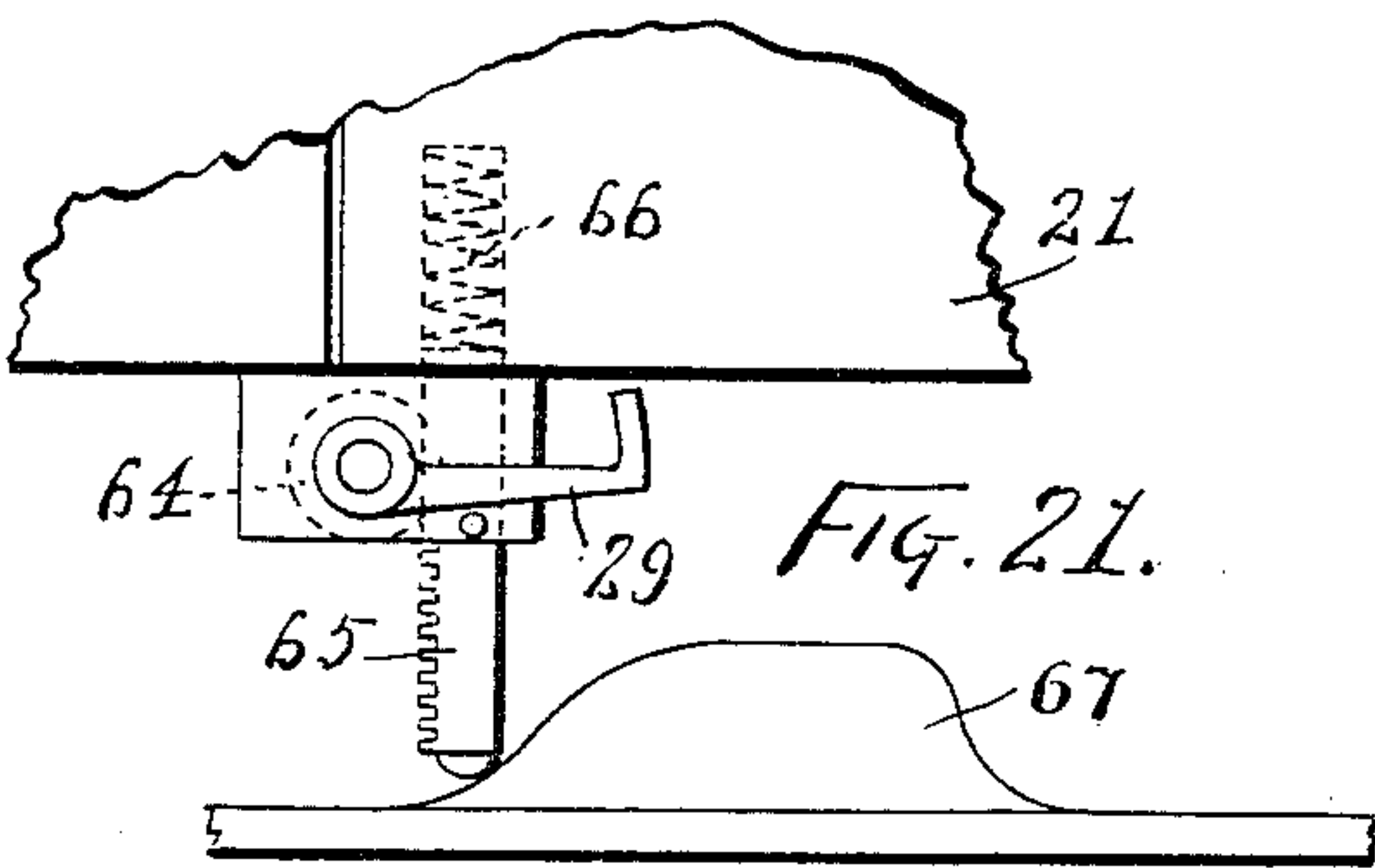


Fig. 21.

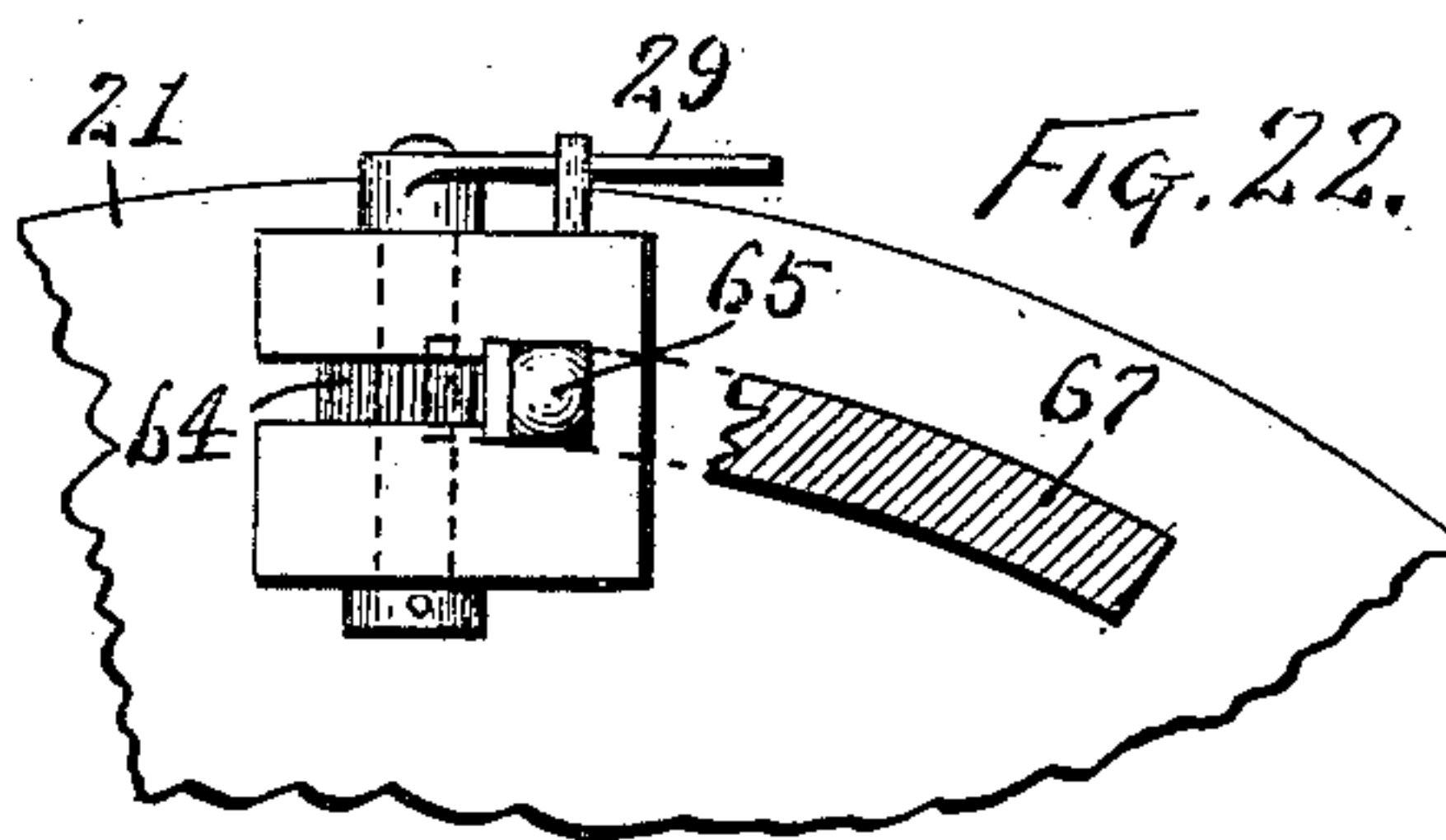


Fig. 22.

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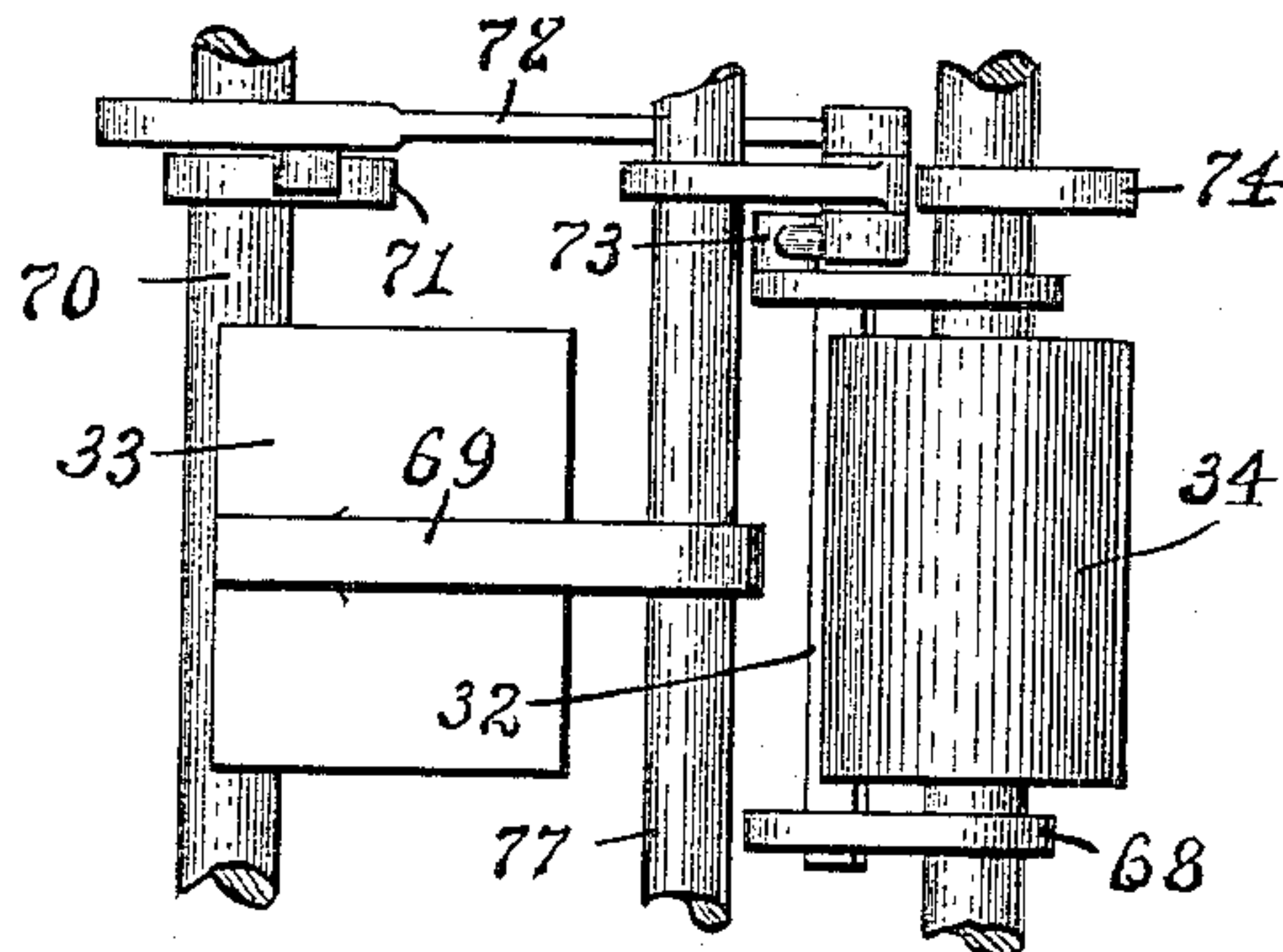
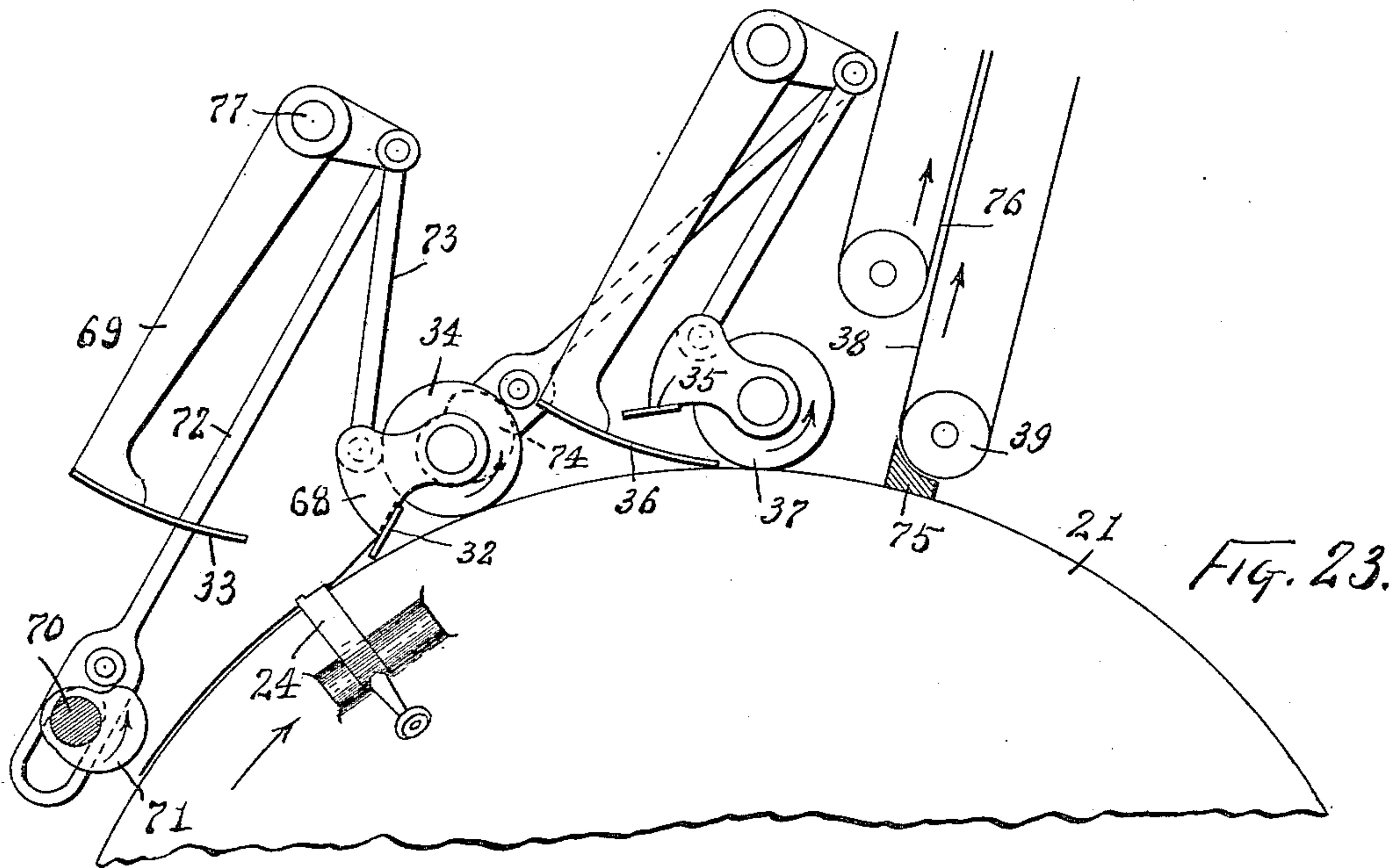


Fig. 24.

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6 Sheets—Sheet 5.

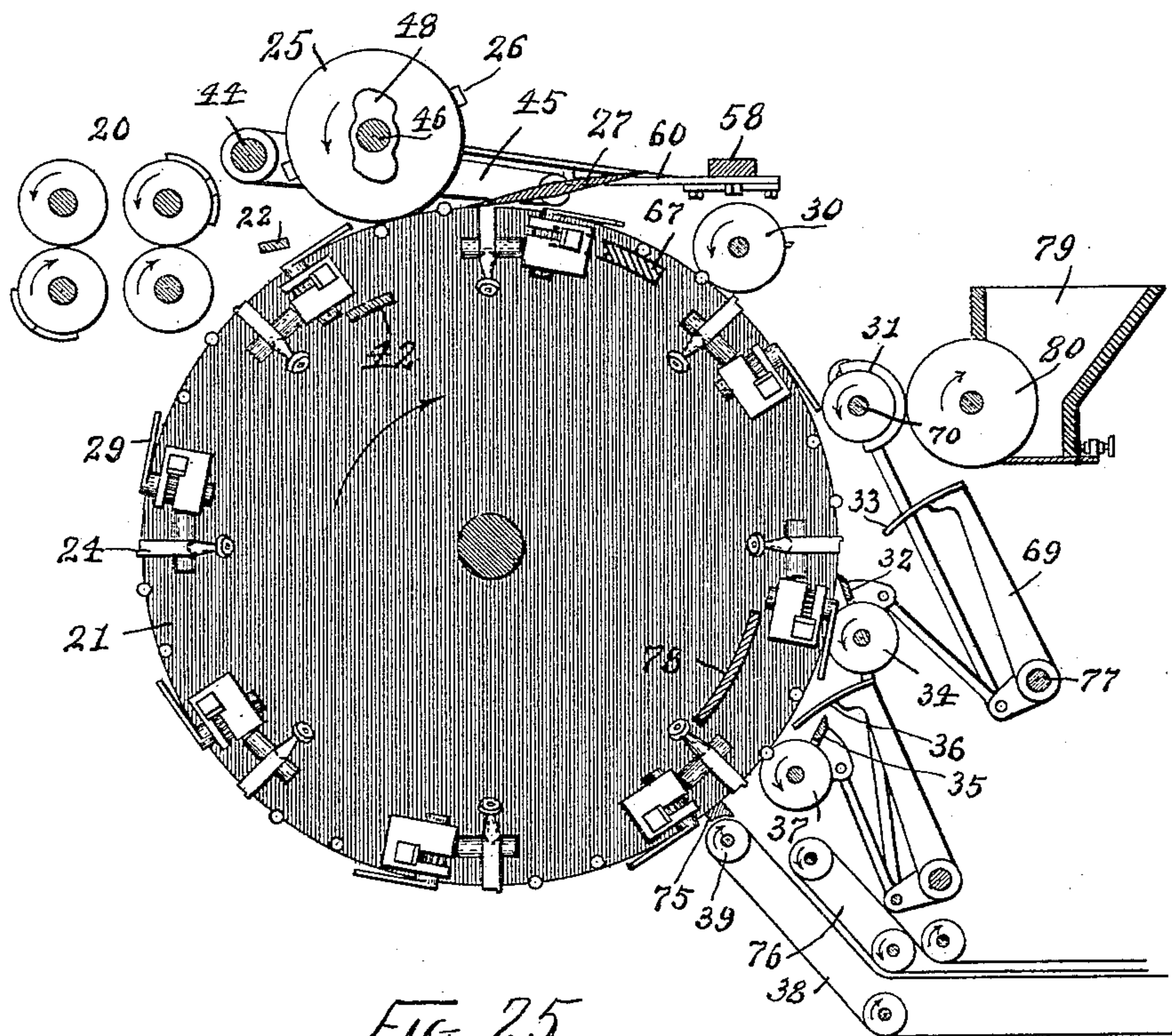


Fig. 25.

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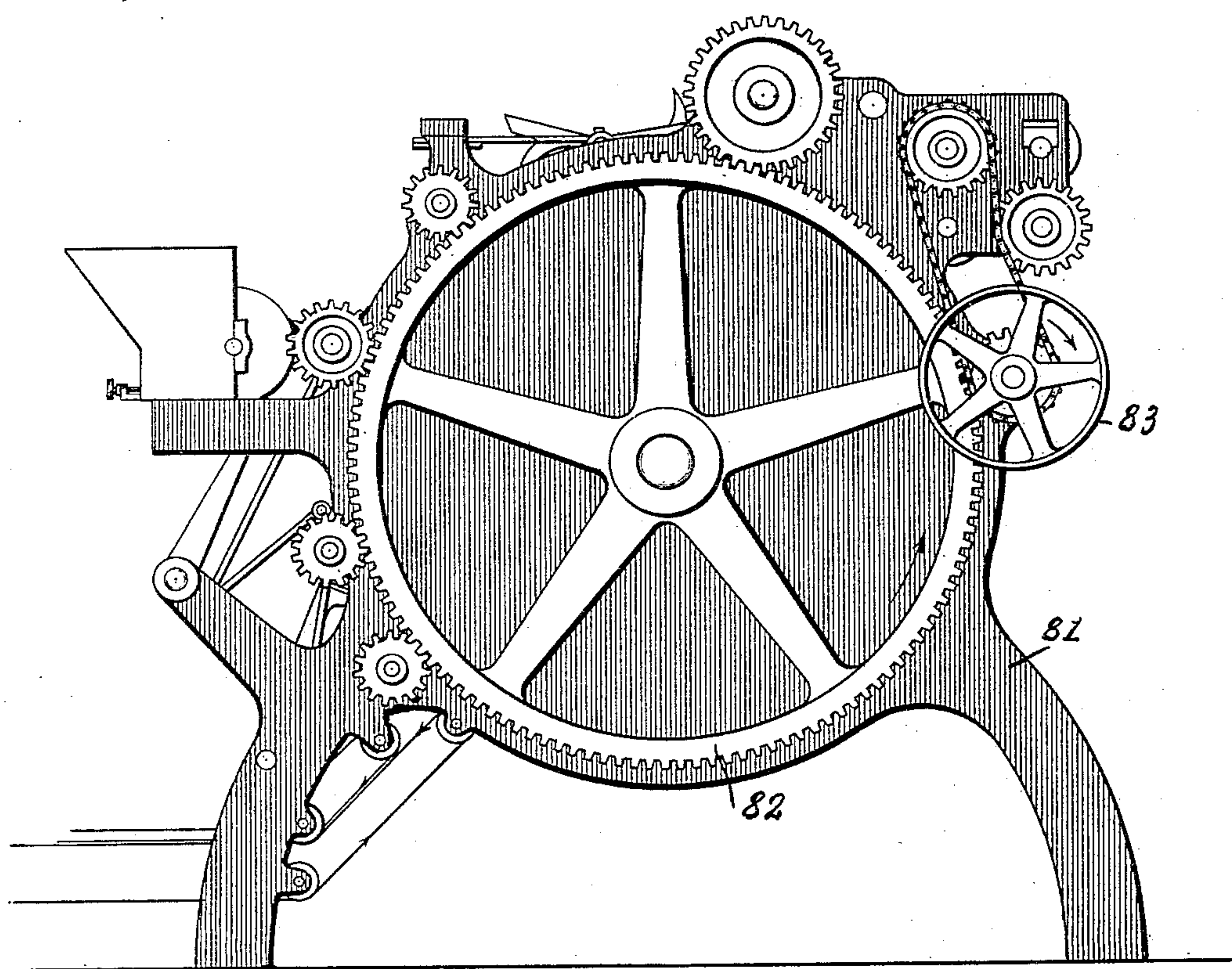


FIG. 26.

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UNITED STATES PATENT OFFICE.

CHARLES V. CRIST, OF MIDDLETOWN, OHIO, ASSIGNOR TO THE TYTUS-GARDNER PAPER AND MANUFACTURING COMPANY, OF SAME PLACE.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 616,605, dated December 27, 1898.

Application filed November 26, 1897. Serial No. 659,735. (No model.)

To all whom it may concern:

Be it known that I, CHARLES V. CRIST, of Middletown, Butler county, Ohio, have invented certain new and useful Improvements in Paper-Bag Machines, (Case A,) of which the following is a specification.

This invention pertains to improvements in paper-bag machines of that class which receive a bellows-fold tube of paper and form the same into square-bottom paper bags, and the improvements will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a collective diagram illustrating the program of effects to be produced by the machine from the reception of the tube to the completion of the bags; Figs. 2 to 14, inclusive, elementary diagrams illustrating the individual instruments for the performance of the several steps in the program of effects; Figs. 15 to 24, inclusive, detailed views of the devices immediately connected with and operating the several individual instruments; Fig. 25, a side view of the machine so far as its operative parts are concerned, and Fig. 26 a rear elevation of the machine.

The drawings have been designed to illustrate, first, the individual effects to be produced regardless of instrumentalities; second, the instruments involved in the several steps regardless of the device for operating the instruments; third, the devices for operating the individual instruments, and, fourth, the machine, involving the instruments, their operating devices, and mechanism connecting and actuating the devices.

The program of effects, Fig. 1.—A bellows-fold paper tube 1 of cross-section, as at 2, has cross-slits 3 through the upper ply only of the tube, these slits being centrally disposed and extending but part way across the tube, the distance between the slits corresponding with the length of tube-stock required for a bag. Such slitted tube is then to have formed in it the creases 4 for the bottom foldings. Elbow cuts 5 are then to be made through all the plies of the tube, the cross-cuts extending in outward prolongation of slits 3, while

the short cuts project therefrom toward the creasing, thus forming a loose tail 6 on the upper ply of the tube, the lower ply having a corresponding tail, but cut free only at its sides. The end of the bag is then to be opened up, as at 7, leaving lower tail 8 still uncut from the bag ahead of it. This opening operation is to be continued till the upper tail lies clear back on the tube, as at 9, thus forming the diamond. The bag having been gotten into the form indicated at 9 is ready to receive its paste; but before the paste is applied to it the bag just ahead of it is to be severed from it. 10 indicates the same bag after the bag 12 ahead of it has been severed from it and after its paste 11 has been applied. At 10 we thus have the bag still attached to the tube behind, the diamond folded, and having the prow flap 13 and trailing flap 14, both flap-tails being loose and ready for the flap-folding operation; but as the flap-folding operations are performed on the forward bag, which bag has been severed from the one being pasted, we may disregard the tube and consider only the advanced severed bag. The prow flap is then to be lifted and folded back on the diamond, as at 15. The end of the bag thus treated is then to be lifted and folded clear back on line 16 and pressed down on the trailing flap, leaving the bag, as at 17, a completely-bottomed bag. The completed bottom is then to be unfolded back on line 16, such unfolding having no effect on the bottom closure, but putting the bag in flat long condition, as at 18. At 19 the bag is seen opened out as in use.

Creasing instrument, Fig. 2.—The creasing is done by the ordinary creasing-rolls 20 of the common art, the tube passing between a soft roll and an opposing roll carrying creasing-blades which creases from one side of the tube, a second pair of similar rolls reversely arranged repeating the creasing, but from the other side of the tube.

Carrying instrument, Fig. 3.—The tube lies on a carrying-surface 21, having a continuous motion to the right. In practice this carrying-surface is the periphery of a cylinder. At the point where the tube approaches

the cylinder the bellows folds are held open by stationary spreaders 22. On and moving with the cylinder are cylinder-grippers 23, capable of moving into and out of the bellows folds and of clamping the lower bellows-folds to the surface of the cylinder. These grippers enter the bellows folds held open by spreaders 22 and clamp the lower folds to the cylinder, the grippers then taking the position indicated at 24, the forward edges of the grippers corresponding with angular fold-lines for the bag, which will correspond with creases in the tube. The numeral 23 having been applied to the grippers when open, the numeral 24 will hereinafter be employed. We now have the advancing cylinder with the lower bellows folds clamped tightly to it and certain folding-lines defined by creasing and by the forward edges of the grippers.

Elbow-cutting instruments, Fig. 4.—The elbow cuts 5 of Fig. 1 may be produced by a draw-roll 25, bearing the elbow-cutters 26, cooperating with suitable counter-grooves in the surface of the cylinder. This roll keeps tension on the tube gripped to the cylinder and produces the elbow cuts. The roll illustrated bears two sets of elbow-cutters 26 and is therefore to make a half-revolution for each bag, the circumference of this roll equaling twice the length of stock for one bag.

Diamond-folding instruments, Figs. 5, 6, and 7, (see Fig. 5.)—The cylinder carries the tube under a fly-plate 27, which is trunnioned at its forward edge. The tube passes under the plate, and when the cross-folding line 16 of Fig. 1 comes to the rear edge of the plate said plate edge descends upon the tube, grippers 28 at the side edges of the fly-plate at the same time gripping the upper plies of the bellows fold directly opposite cylinder-grippers 24. In this condition the tube has the lower plies of the bellows folds firmly gripped to the cylinder by grippers 24, the upper plies of the bellows folds firmly gripped to the under surface of the fly-plate by grippers 28, and the rear edge of the fly-plate resting across the tube on the folding-line. The rear edge of the fly-plate is now to advance with the cylinder and tube, the trunnions of the plate meanwhile rising, so that the rear edge of the plate may follow the cylinder and pass under the trunnions, the plate thus turning over till its edge is forward and the trailing flap of the bag folded back, at which time the fly-plate grippers 28 let go, and the cylinder carries the bag forward for other operations. In Fig. 5 the fly-plate 27 is in position to begin its folding on the flap. In Fig. 6 the plate 27 is shown in its vertical position, the bottom of the bag being at that time about half-way opened. This opening operation imposes some strain on the tail which connects the bag with the bag in advance, and with some kinds of stock there may be danger of tearing at the tail. This may be guarded against by guard-fingers 29,

swinging in over the tail. These fingers are carried by the cylinder and are normally outward, as seen in dotted lines in Fig. 6, where the solid lines show these guard-fingers in the act of going into operative position. In Fig. 7 the fly-plate 27 is seen with its edge in advance, having completed its work upon the bag. At this stage fly-plate grippers 28 are to be released, so that the cylinder may carry the bag forward away from the fly-plate, and at this stage guard-fingers 29 may be withdrawn. The result of the steps now under consideration is that the bag has been put into the form indicated at 9 of Fig. 1 and is ready to have the bag ahead of it severed from its lower tail.

Cutting instrument, Fig. 8.—Cutter 30, which may be an ordinary cutting-roll, cooperating with the cylinder, now severs the lower tail, thus leaving the bag under consideration free from the bag 12 ahead of it, thus leaving the bag under consideration with its diamond folded and both flap-tails free, the bag being clamped to the cylinder by grippers 24 and being still connected with the bag behind it.

Pasting instrument, Fig. 9.—The bag now under consideration—the one still attached to the tube at its rear—goes under paste-roll 31, which applies the paste to the bottom of the bag, during or immediately after which time the cutter previously referred to will sever this pasted bag from the tube, leaving the severed and pasted bag gripped to the cylinder.

Prow-flap folder, Figs. 10 and 11, (see Fig. 10.)—As the cylinder carries the bag forward the prow flap meets and slides over a folding-blade 32, and at proper time the edge of the tuck-blade 33 descends upon the bag upon the cross-folding line for the prow flap. Blade 32 has a rising motion away from the cylinder and blade 33 has a tucking motion under blade 32, the result being that as the bag goes forward its prow flap is lifted and folded back upon the bottom of the bag, as indicated in Fig. 11, where 34 is a press-roll, under which the cylinder will carry the bag to have its prow flap pressed home, the roll being recessed, as indicated, so as to clear the paste on the balance of the bag-bottom.

Trailing-flap holder, Figs. 12 and 13, (see Fig. 12.)—Cylinder-grippers 24 are now released, the bag being assumed as being held to the cylinder by press-roll 34 of Fig. 11. As the end of the bag is carried forward by the cylinder it passes over a folding-blade 35, and a tucking-blade 36 descends at the cross-folding line for the trailing flap. The two blades operate the same as those which folded the prow flap, the result being that the bottom of the bag is folded back upon the trailing flap, as seen in Fig. 13, where the bag is ready to pass under a press-roll 37.

Unfolder, Fig. 14.—As the cylinder carries the advancing end of the bag out from under roll 37 the rear edge of the bottom springs up

and finally the bottom comes against endless carrier 38, running on roll 39, which carrier takes the bag from the cylinder and flattens it out into the condition seen at 18, Fig. 1, and takes it to the drier.

Devices.

Cylinder-grippers, Fig. 15.—The cylinder-grippers 24 are mounted on pivots 40, carried by the cylinder, springs 41 urging the grippers to active position. The upper inturned thin fingers of the grippers snap inwardly and downwardly upon the lower plies of the bellows folds, which are held open by the stationary spreaders 22, along which the tube 1 is drawn by the cylinder and by roll 25. The grippers pass under spreaders 22 and are opened by stationary cams 42 and snap into the bellows folds and clamp the tube tightly down to the cylinder. The inturned fingers of grippers 24 are thin, but they are provided with rest-ledges 43, which elevate the upper plies of the bellows fold, thus leaving room for the entrance of the fly-plate grippers, these ledges being also useful in giving a good start to the bottom-opening operation.

Fly-plate lift, Fig. 16.—The fly-plate 27 is in practice made double, with trunnions at its center, one edge acting on alternate bags and the other edge on intermediate bags, the plate thus requiring but half a turn for each bag. In Fig. 16 the lower edge of the fly-plate is in pressing position on the tube assumed as being on the cylinder, and that edge of the fly-plate must now advance with the cylinder-surface, during which advance the axis of the fly-plate must rise and then descend again. The shaft of the fly-plate is carried in arms 45, rocking on shaft 44, and its rising-and-falling motion is controlled by cam 48 on shaft 46, acting through link 47, cam 48 being double and its shaft making a half-revolution per bag.

Fly-plate rotator, Fig. 17.—Arms 49 are fast on the fly-plate shaft and are acted on by pins 52 and 53, projecting from the side of the cylinder. Arms 49 are each double, having straight arms 50 and curved arms 51. Pin 53, acting on a curved arm, causes the rear edge of the fly-plate to quickly descend upon the tube at the proper time, and pin 52, acting on straight arm 50, enforces the rotation of the plate, so that its active edge accompanies the cylinder-surface. One of the fly-plate shaft-bearings in arms 45 is split and provided with a clamp-screw 55, Fig. 18, to furnish an adjustable friction-brake for the fly-plate to steady its motion and avoid evils due to inertia at high speed.

Fly-plate grippers, Figs. 18, 19, and 20.—The fly-plate grippers 28 are on spindles journaled in ears on the edges of the fly-plate, springs 56 urging the grippers to active position. The gripper-spindles have outwardly-projecting arms 57 near the fly-plate shaft 54, and flanges 59 slide on the shaft against these arms. To a fixed frame-bar 58

are pivoted the arms 60, whose inner ends may engage flanges 59, link 61 connecting the two arms 60, so that they move inwardly in unison. Double cam 63 on shaft 46 operates arms 60 through link 62. As the rear edge of the fly-plate descends upon the tube arms 60 cause the grippers to open for an instant, after which they snap into the bellows folds opposite the cylinder-grippers, the points of the fly-plate grippers entering the bellows folds as opened by the ledges 43 on the cylinder-grippers, Fig. 15. The fly-plate thus turns to have its rear edge meet the proper folding-line on the tube. Its grippers snap into the bellows folds and clamp the upper plies thereof firmly to the under surface of the plate. The plate is forced to turn, so that its rear edge accompanies the folding-line. The fly-plate shaft is forced to rise and fall to suit the position of the active edge of the fly-plate. The fly-plate folds back the upper plies of the tube to form the trailing flap, and cam 63 opens the fly-plate grippers at the completion of its folding work, so that the bag may leave the fly-plate and pass onward. It is to be observed that the fly-plate grippers are self-contained and mounted on the fly-plate and are self-closing by the action of their springs, the extraneous mechanism requiring only to open the grippers at proper time. The result of this construction is that when the grippers have closed upon the fold the fly-plate may continue its folding motion independent of any connection with mechanism for actuating the grippers, or, in other words, the fly-plate may cut loose from gripper-actuating mechanism as soon as it shall have gotten proper grip upon the folds.

Guard-fingers, Figs. 21 and 22.—The guard-fingers 29 are on spindles mounted radially at the sides of the cylinder. The spindles have pinions 64 engaged by rack-plungers 65, pressed outwardly by spring 66, the springs thus holding the guard-fingers out to idle position. At proper time the ends of racks 65 are engaged by stationary cams 67, which throw the guard-fingers to active position and quickly permit them to return to idle position.

Prow-flap folder, Figs. 23 and 24.—The advancing prow flap passes onto folding-blade 32, which is carried in rocker 68, and the blade is lifted by the action of cam 71 on shaft 70, acting through links 72 and 73. When blade 32 has lifted the flap somewhat, then tucker-blade 33, carried by arm 69, descends upon the flap and tucks it under blade 32 as blade 32 rises and finally tucks it under press-roll 34, which presses the flap home, the two blades then returning to normal position ready to act upon the next bag.

Trailing-flap folder, Fig. 23.—This folder is like the prow-flap folder and hardly needs description. Its blades 35 and 36 operate on the bag end after it passes from under roll 34, tucker 36 tucking the fold under blade 35

and under press-roll 37, blades 35 and 37 being operated by cam 74 on the shaft of press-roll 34.

The unfolder, Fig. 23.—As the completely-bottomed bag passes from under press-roll 37 its advancing end is arrested by stop 35, and the rear edge of the bottom springs up as soon as freed from roll 37, the bottom flying up against rapidly-moving endless carrier 38 and passing on between that carrier and the second carrier 76, whereby the unfolded bag may be carried onto the drier in flat form and proper side up for convenient subsequent drying, packing, &c.

The machine, Figs. 25 and 26, (see Fig. 25.)—The cylinder 21 is shown as of dimensions suited for eight lengths of bag-stock and provided with eight sets of cylinder-grippers and guard-fingers and pins for rotating the fly-plate. The tube comes from the left through creasing-rolls 20, passes fold-spreaders 22, is gripped to the cylinder by the cylinder-grippers, temporarily opened by cam 42, is drawn under draw-roll 25, whose cutters 26 do the cross-cutting, goes then to the fly-plate 27, which opens up the tube and forms the diamond, passes then under cutter 30, which severs the bag about the time paste-roll 31 has applied the paste. The pasted bag goes then to the prow-flap folder and has that fold pressed by roll 34. The appropriate cylinder-grips are then released by cam 78. The bag then goes to the trailing-flap folder, and the fold is pressed by roll 37, after which the bag goes to the endless carriers and away from the machine in flat unfolded condition. Draw-roll 25 serves as a draw-roll and serves as the cross-cutter, and its shaft carries the cams which raise and lower the fly-plate and open the fly-plate grippers. The shaft of paste-roll 31 carries the cam which operates the prow-flap folder and the paste-roll is supplied from fountain 79 and feed-roll 80. Turning to Fig. 26, the cylinder is carried in housings 81, its shaft carrying the master-gear 82, geared to the various rolls, power being applied to the machine by belt on pulley 83.

It is to be particularly observed that the operation of bottoming the bag is performed without the active agency of any device penetrating the interior of the bag. It is true that guard-fingers 29 enter the bag for an instant during the bottom-opening operation, but these guard-fingers are not active agents in the opening operation, the office of the guard-fingers being merely to prevent the possible tearing of the paper by the active agents, and it is only in connection with the weaker kinds of paper that these guard-fingers are needed at all.

I claim as my invention—

1. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a bellows-folded paper tube, a trunnioned fly-plate having its outer free edge adapted to travel for an interval with said carrier, and self-closing

spring-grippers mounted on and moving with the side edges of said fly-plate adapted to enter the bellows fold of the tube and clamp the upper plies thereof tightly against the surface of the plate.

2. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a bellows-folded paper tube, grippers on the carrier adapted to enter and open the bellows fold of the tube and clamp the lower plies thereof tightly to the carrier, and a trunnioned fly-plate having its outer free edge adapted to travel for an interval with the carrier, and self-closing spring-grippers mounted on and moving with the side edges of said plate adapted to enter the bellows folds of the tube as opened by the first-mentioned grippers and to clamp the upper plies of said fold tightly to the plate.

3. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a bellows-folded paper tube, grippers on the carrier adapted to move inwardly and downwardly and clamp the lower plies of the bellows fold tightly to the carrier, ledges upon said grippers adapted to elevate the upper plies of the bellows folds, a trunnioned fly-plate arranged to have its free outer edge move for an interval with the carrier, and self-closing spring-grippers mounted on the side edges of said fly-plate and adapted to engage the upper plies of the bellows fold of the tube over the first-mentioned grippers and in advance of said ledges and to clamp the upper plies of the bellows fold tightly to the plate.

4. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a bellows-fold paper tube, grippers mounted on said carrier and adapted to clamp the lower plies of the bellows fold tightly to the carrier, mechanism adapted to grasp the upper ply of the tube and fold the same back upon the tube-body while the lower plies are clamped to the carrier, and guard-fingers mounted on the carrier and adapted to swing inwardly over the lower ply of the tube as the upper ply is being folded back.

5. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a bellows-fold paper tube, a cutter cooperating with said carrier and adapted to partially sever said tube by cross-cuts defining the tube into sections united by tails at the lower ply of the tube, grippers mounted on the carrier and adapted to clamp the lower plies of the tube-sections to the carrier, a draw-roll cooperating with the carrier and grippers to draw said sectional tube forward, and bottom-opening devices adapted to engage the upper ply of the forward end of the tube-sections while said tube-sections are connected by said lower tails.

6. In a paper-bag machine, the combina-

tion, substantially as set forth, with a carrier adapted to advance a diamond-folded tube-section, a pasting device, a press-roll 34, a folding-blade 32 having a lifting motion and adapted to engage under the prow flap of the diamond fold before the same reaches said press-roll, and a tucker-blade 33 adapted for motion toward said carrier and under said folding-blade and toward said press-roll.

7. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a diamond-folded tube-section, a pasting device, a press-roll 34 coöperating with said carrier and adapted to press the flap after folding, and a folding-blade 32 disposed across said carrier to the rear of said press-roll and adapted for movement from the carrier and arranged to engage under the flap of the tube-section advanced by the carrier and lift the flap from the carrier before it reaches the press-roll.

8. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance a diamond-folded tube-section, a pasting device, a folding-blade 32 disposed across the carrier and adapted to engage under the prow flap of the diamond fold and lift the same from the carrier, a press-roll 34 disposed across the carrier

and adapted to press said prow flap backward and downward against the carrier, a folding-blade 35 disposed across said carrier in advance of said press-roll and adapted to engage under the folded end of the tube-section and lift the same from the carrier, and a press-roll 37 disposed across the carrier in advance of said last-mentioned folding-blade and adapted to press the folded bottom of the tube-section backwardly and downwardly against the carrier.

9. In a paper-bag machine, the combination, substantially as set forth, of a carrier adapted to receive and advance diamond-folded tube-sections, a folding device for folding the prow flap of the diamond fold backward and downward, a second folding device adapted to fold the advancing end of the tube-section backwardly and downwardly upon the trailing flap of the diamond fold, and an endless carrier device disposed in advance of said second folding device and adapted to arrest the advance of said tube-section with the carrier and to carry said section away from the surface of the carrier.

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