

March 7, 1944.

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2,343,439

BAG FILLING MACHINE

Filed June 27, 1942

3 Sheets-Sheet 1

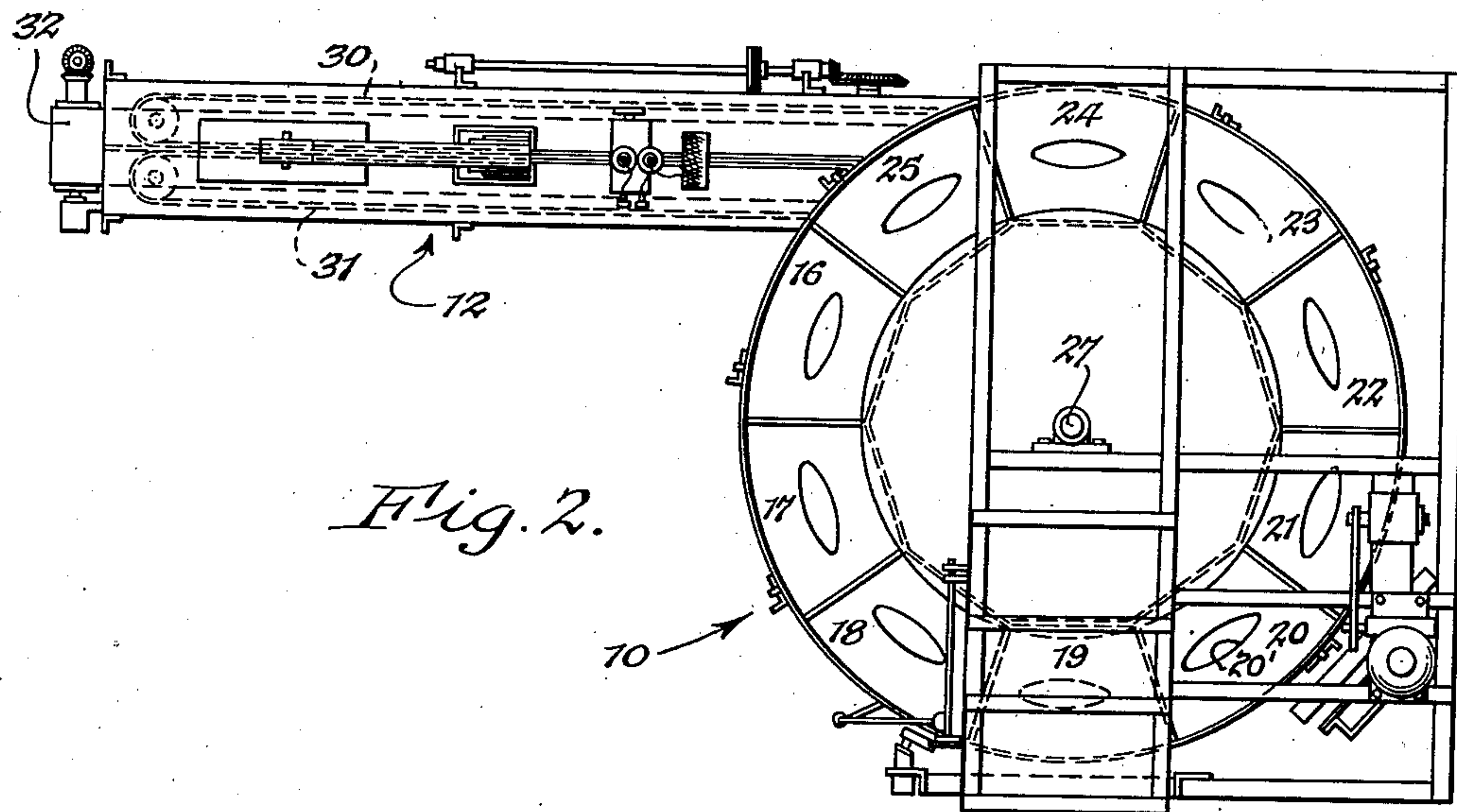


Fig. 2.

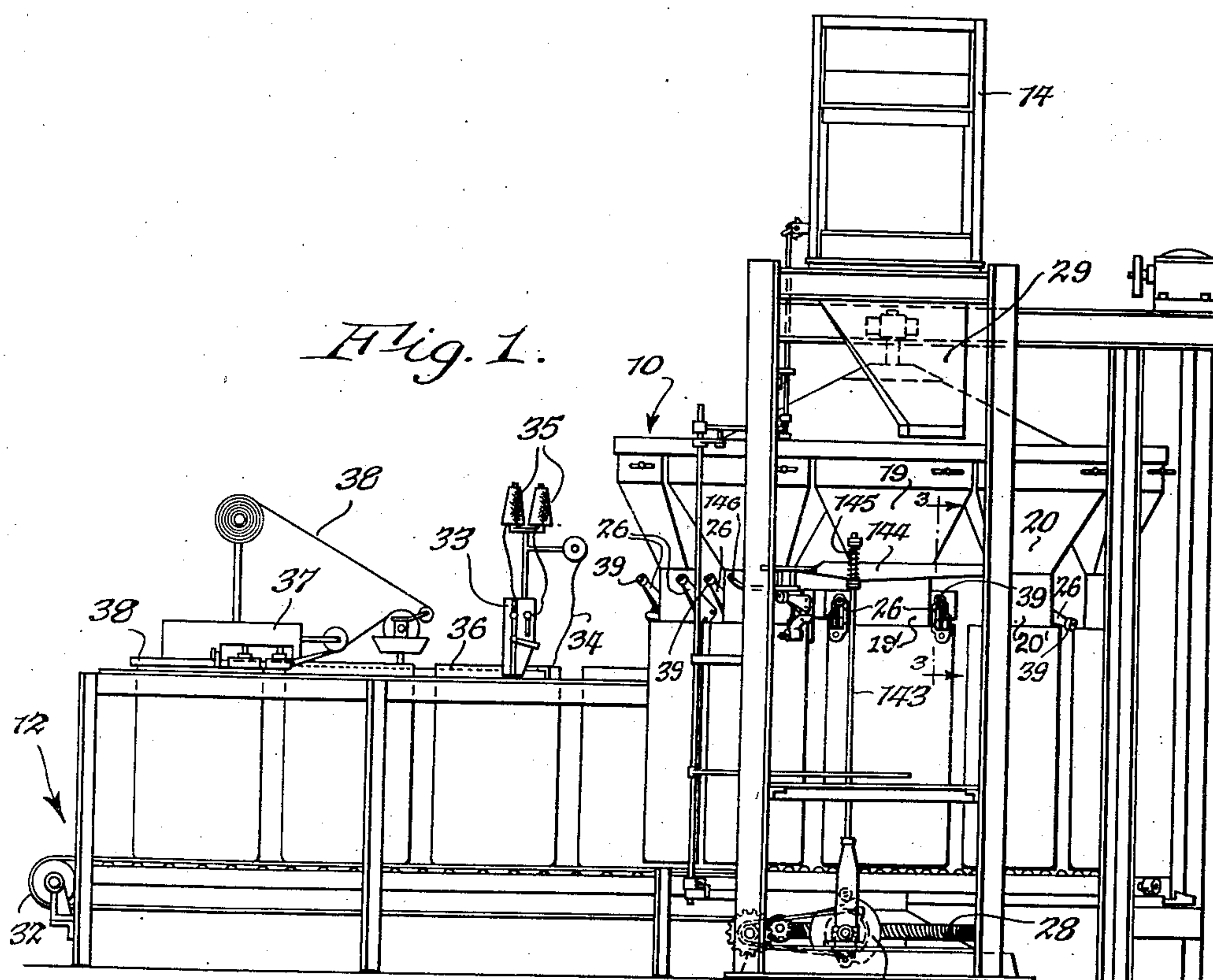


Fig. 1.

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3 Sheets-Sheet 2

Fig. 3.

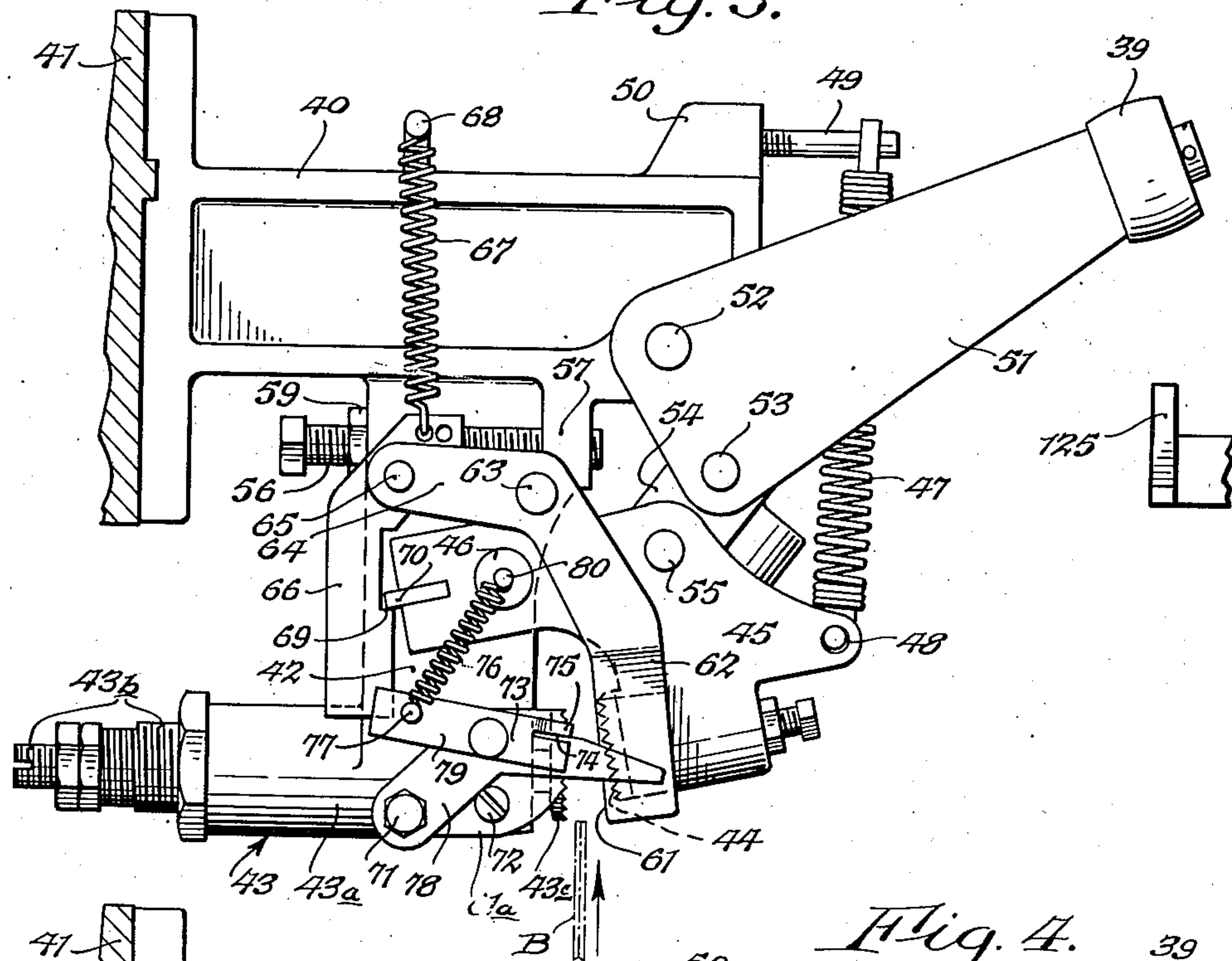
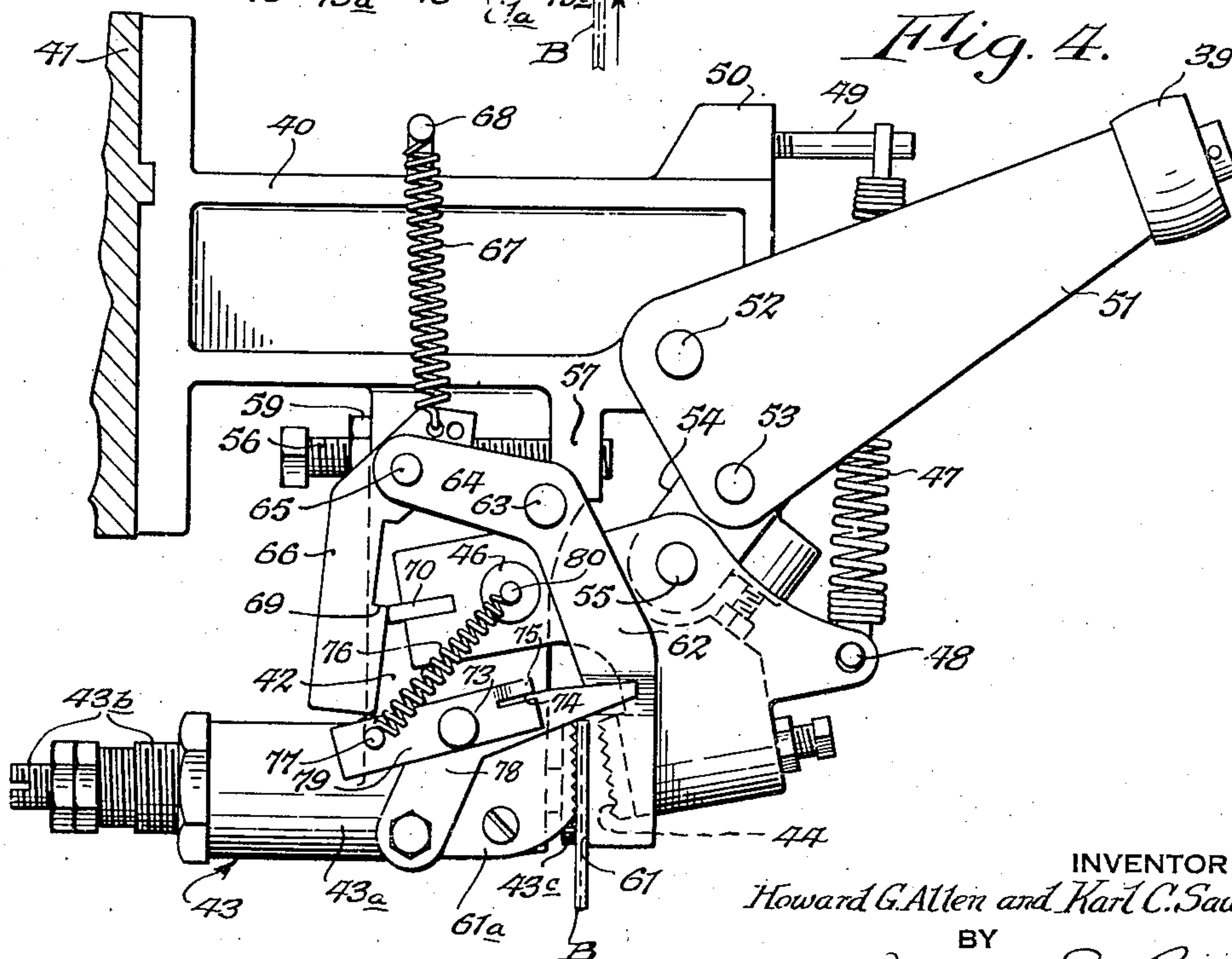


Fig. 4.



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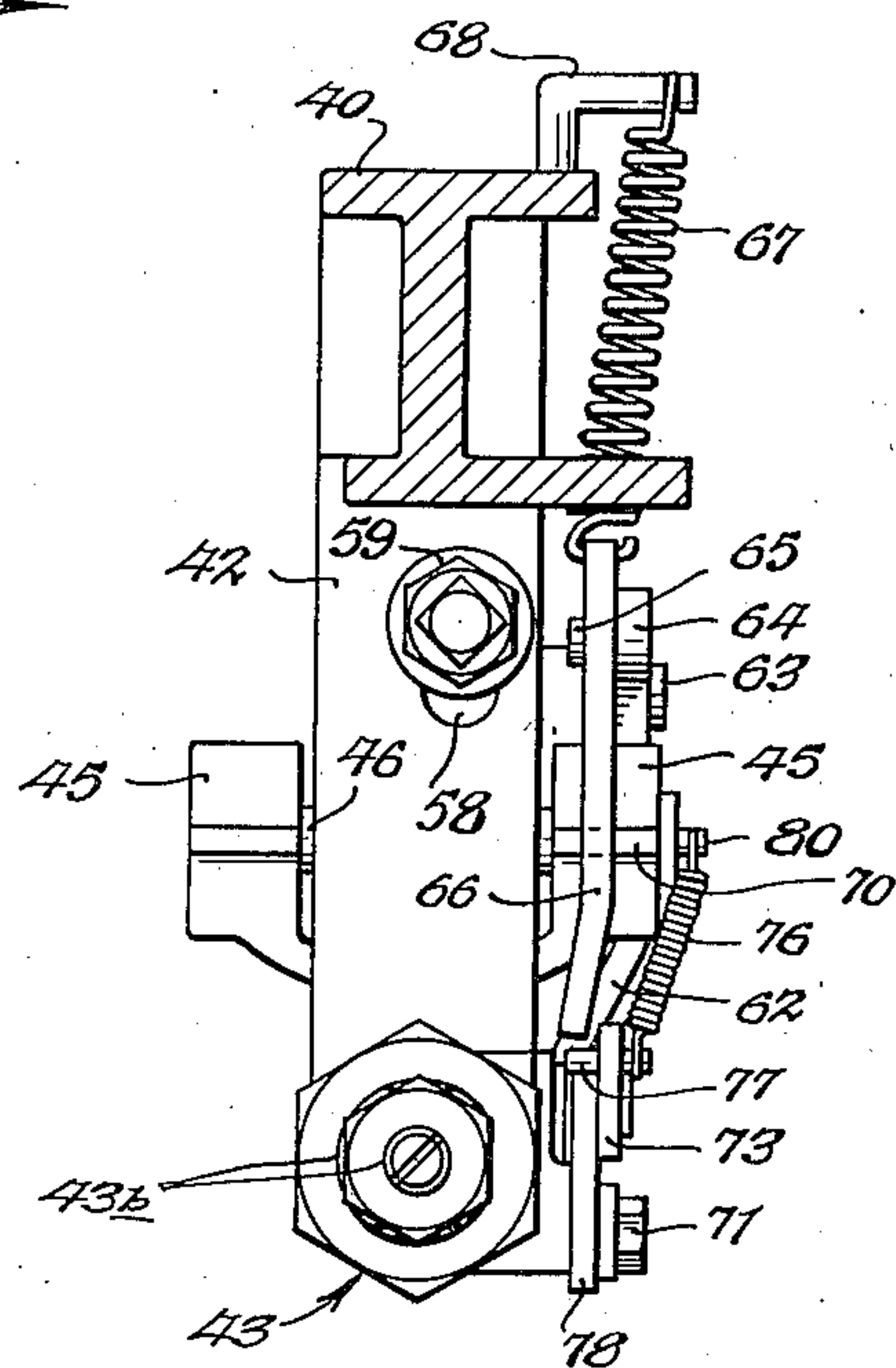
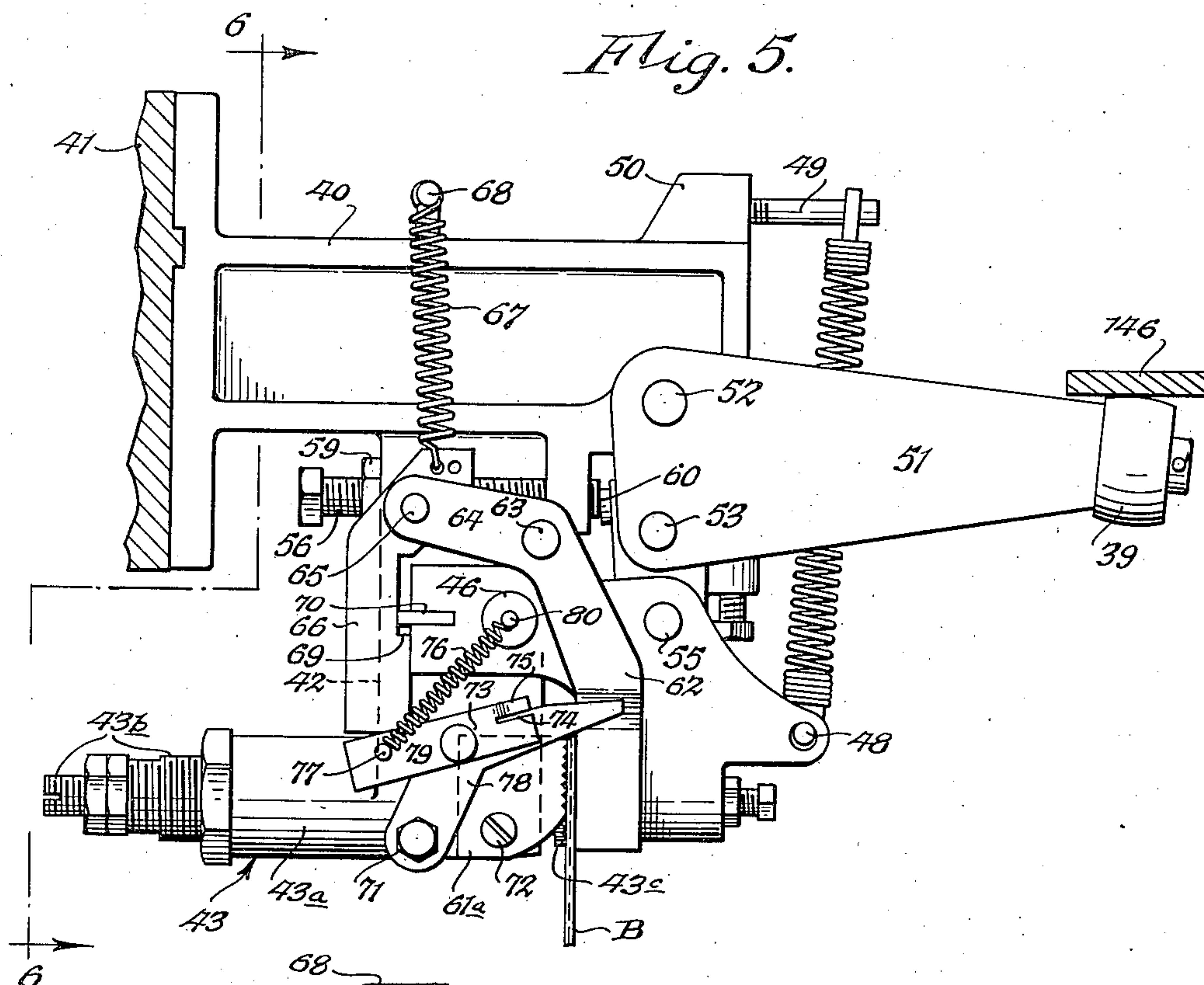
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3 Sheets-Sheet 3



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2,343,439

BAG FILLING MACHINE

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Application June 27, 1942, Serial No. 448,712

8 Claims. (Cl. 226—59)

This invention relates to new and useful improvements in article grippers and particularly seeks to provide novel grippers for use in connection with bag filling or other types of machinery in which a flexible container to be filled is held by grippers and moved through one or more operating stations.

This invention is particularly adapted to be employed in connection with bag filling machines of the type disclosed in U. S. Letters Patent 2,054,279, granted September 15, 1936, to H. F. Briggs, and which include a rotary turret having a plurality of circumferentially disposed filling spouts with each of which is associated a pair of spaced gripping devices comprising main grippers adapted to securely hold the top corner portions of bags while they are filled and temporary grippers capable only of holding an empty bag. Normally, an operator applies individual bags to the respective spouts while the main grippers are maintained in an open position, and the bags thus applied are temporarily held solely by the temporary grippers. Rotation of the turret brings elements of the main grippers into operative contact with gripper closing devices whereupon the main grippers are brought into secure clamping position with respect to the bag. Heretofore, the temporary grippers usually have comprised elements yieldably maintained in contact by springs and between which portions of the bags were forced by the operator.

Difficulty has been encountered in frequent instances because it is necessary for the springs associated with the temporary grippers to exert sufficient force to hold the empty bag in definite position while, at the same time, the springs must be sufficiently light to permit the operator to rapidly insert the bag mouth into the grippers and into an accurate position therein. As pointed out above, the turret is a constantly rotating structure and it is necessary for an operator to position upwards of 18 bags per minute when the machine is operating at its normal speed. A compromise has necessarily been effected in the selection of spring tension and, in certain instances, the bags are not gripped with sufficient firmness and, in other instances, the grippers have caused undue difficulty in proper insertion and positioning of the bag. Inaccuracy in positioning of the bag, whether it be caused by failure of the grippers to securely hold the bag or by inaccurate positioning by the operator, frequently results in improper filling of the bag and in

improper closing thereof in the later stages of its handling.

Therefore, an object of this invention is to provide novel gripping devices for bag filling machines or the like including main clamping grippers and temporary grippers which are normally open when the main grippers are open and which are closeable upon the insertion of a bag between the jaws thereof to temporarily hold the same in position until the main grippers have been moved into the bag clamping position.

Another object of this invention is to provide a device of the character stated in which insertion of a bag between the jaws of the temporary grippers effects the tripping of the temporary gripper linkage mechanisms to cause the jaws of the temporary grippers to close upon the bag.

Another object of this invention is to provide a device of the character stated in which the jaws of the temporary grippers are opened simultaneously with the opening of the jaws of the main grippers with which they are associated.

Another object of this invention is to provide a device of the character stated in which the jaws of the temporary grippers are opened simultaneously with the opening of the jaws of the main grippers with which they are associated and in which the jaws of the temporary grippers are retained in opened position by suitable linkage mechanisms which are adapted to be tripped by the bag as the same is inserted into proper position whereupon the temporary grippers are caused to close upon the bag.

Another object of this invention is to provide a device of the character stated which is simple in design, rugged in construction and economical to manufacture.

With these and other objects in view, the nature of which will become more apparent, the invention will be more fully understood by reference to the drawings, the accompanying detailed description, and the appended claims.

In the drawings:

Fig. 1 is an elevational view of a bag filling and closing machine in connection with which grippers constructed in accordance with this invention may be employed;

Fig. 2 is a top plan view thereof;

Fig. 3 is an enlarged sectional view of a gripper assembly in its open position, the section being taken along the line 3—3 of Fig. 1;

Fig. 4 is a view similar to Fig. 3 and which shows the temporary gripper jaws in the closed position;

Fig. 5 is a view generally similar to Figs. 3 and 4 but shows both the temporary and main gripper jaws in the closed position; and

Fig. 6 is a vertical section taken along lines 6-6 of Fig. 5.

Referring now to the drawings in which similar characters of reference indicate the same parts throughout the several views and in which in certain instances reference characters are identical with those reference characters indicating similar parts in U. S. Letters Patent 2,054,279, aforesaid, there is shown a bag filling and closing machine of the type to which our invention is particularly adapted. The machine comprises a rotary turret filling structure indicated generally at 10 and a bag closing structure indicated generally at 12. The rotary filling turret includes a battery of weighing scales 14 which are adapted to deliver predetermined charges of material to a series of bag filling hoppers numbered 16 to 25 inclusive. Each of these hoppers terminates in a bag filling spout (19', 20' for example) which may be generally ovular in cross section and of such dimensions as to permit the positioning of a bag mouth thereover. Each of the bag filling spouts has associated therewith a pair of gripper units, one unit of each pair being disposed at each side of the respective spout. These gripper units are indicated generally at 26 and the invention in the present case relates to specific improvements in these gripper elements.

In general, the gripper units are located in such position as to engage with the corners of a bag mouth positioned over the appropriate filling spout and provisions are made for adjustment of the grippers toward and from one another in order to accommodate bags of different widths within the capacity of the machine. If so desired, one or both of these gripper units may be mounted for producing a movement of separation therebetween for the purpose of drawing the bag mouth tautly into engagement with the filling spout. Details of the adjustment and mounting means form no part of the present invention and are fully disclosed in Patent 2,054,279 aforesaid.

The rotary turret 10 is arranged for rotation about a vertical shaft 27 mounted in suitable thrust bearings and driven for rotation by any desired form of means which may comprise a worm wheel 28 connected to a suitable source of power. Ordinarily, the turret 10 is driven for constant rotation and bags are serially positioned upon the filling spouts associated with the hoppers 16 to 25. The bags progress around the turret and pass the filling position which is occupied by the hopper 19 in Figs. 1 and 2. In this position, the particular hopper involved is located beneath the discharge chute 29 of the scale battery 14. It will be understood that a measured quantity of bag filling material is discharged through the chute 29 into the hopper. The filling material gravitates from the hopper through the associated bag filling spout as these elements and the bag connected thereto progressively rotate through the positions occupied by the hoppers 20 to 24 in Figs. 1 and 2.

After the bags have been filled, they are transferred from the rotary turret 10 to the closing devices 12 wherein the bag mouth is closed. In a preferred form of machine, the

gripper units 26 are carried by pivotally mounted supports which move the bag bodily downwardly out of engagement with its associated filling spout prior to transfer thereof to the closing devices. The gripper units may be arranged for a further movement of separation just prior to transfer whereby to draw the bag mouth into a flatly closed position admirably suited for transfer into the conveying devices of the closing unit. This latter structure forms no part of the present invention and is fully described in Patent 2,054,279 aforesaid.

As shown in Figs. 1 and 2, the closing devices include a pair of conveyor chains 30, 31 between which the collapsed bag mouth is progressively introduced. The grip exerted between these chains retains the mouth in its flatly closed position and suitable driving means are provided for moving the conveyor chains 30, 31 to progress the bag through the various operating stations of the closing device. The main weight of the bag and its contents may be borne by a suitable conveyor 32 which is driven at the same speed as the conveyor chains 30, 31. The speed of the conveyers 30, 31 and 32 may be so chosen with regard to the speed of rotation of the turret 10 as to provide for maximum efficiency from the standpoint of operating capacity although it is obvious that at the time of transfer of the bag from the turret to the grip of the chains 30, 31 the linear speed of the conveyor chains must be equal to the linear speed of the bag upon the turret. This latter circumstance occurs because one of the gripper units 26 which is in engagement with the leading edge of the bag mouth is released immediately that the leading edge comes within the grip of the chains 30, 31 while the gripper unit 26 which is in engagement with the rear edge of the bag mouth remains in such engagement until the rear edge of the bag has progressed substantially into the grip of chains 30, 31.

The closing devices may comprise a sewing head 33 which is adapted to apply a reinforcing cord 34 and sewing thread 35 in the form of a bag closure stitch such as that disclosed in Patent 1,913,825. The sewing head 33 forms a line of stitches 36 which serves to secure the walls of the bag mouth together. The stitched bag then progresses to a tape applying device 37 which applies and adhesively secures a tape 38 over the bag mouth and the line of stitches 36 formed therein. If so desired, suitable automatically operable severing means may be provided within the tape applying unit 37 for cutting the stitches and tape which extend continuously from bag to bag.

The above brief description of the general character of the machine has been made for the purpose of better understanding of the present invention and reference is again made to Patent 2,054,279 for details omitted herein.

As shown in Fig. 1, each of the gripping devices 26 is provided with a roller 39 positioned at the outer end of a lever which will be more fully described hereinafter. Upon rotation of the turret, the respective rollers 39 of the gripping devices are brought into positions wherein they are acted upon by other elements of the machine to close and open the gripping devices. One of these actuating elements comprises a shoe 146 carried by a lever 144 pivotally mounted upon the machine frame. A link 143 connects through a give-way spring 145 with the lever 144 in order that vertical motions imparted to the link 143 may be

translated into rocking motions of the lever 144 and shoe 146. At its lower end, the link 143 is connected with cam mechanism including a cam 126 which is driven for rotation by suitable mechanism including the worm wheel 28. The relationship of the cam mechanism to the rotation of the turret and positioning of the gripping devices 26 thereon is such that the shoe 146 is brought downwardly into contact with each of the rollers 39 as they are successively brought therebeneath. The downward movement thus imparted to the rollers 39 serves to close the gripping devices 26. All of the above mechanism is described in complete detail in Patent 2,054,279 and certain of the reference numerals used herein correspond to the reference numerals used in said patent.

Upon continued rotation of the turret, the bags are filled and the filled bags are finally brought to a position in which it is necessary to open the grippers to permit transfer of the filled bag to the conveyer chains 30, 31. As shown in the Patent 2,054,279, the mechanism for opening the grippers may comprise a stationary cam positioned at a suitable point adjacent the intersection of the path of the bags with the conveyer chains 30, 31. This particular cam is shown in the present application in Fig. 3 and bears the reference numeral 125 corresponding to the reference numeral used in said Patent 2,054,279. The cam 125 is provided with an upwardly inclined surface arranged for contact with the rollers 39 successively presented thereto. This upwardly inclined surface initiates upward movement of the rollers 39 and the levers upon which they are carried and it is this upward movement which serves to open the gripping devices 26. It will be understood that the cam 125 is supported on the main frame of the machine and reference is here made to Patent 2,054,279 for detailed disclosure of such support.

Referring now to Fig. 3, there is shown a bracket 40 secured to a rotary portion 41 of the turret. It will be understood that a bracket 40 is provided for each of the gripping devices 26 and that they are suitably positioned around the turret to support the gripping devices in pairs respectively associated with each of the filling spouts. The bracket 40 is provided with a downwardly extending web 42 upon the lower end of which is supported a fixed clamping jaw generally indicated at 43. The jaw 43 comprises a boss 43a formed in the web 42 within which is mounted a series of telescopically threaded members 43b one of which terminates in a head 43c provided with a serrated working face. The head 43c is the actual gripping element of the jaw 43 and it may be adjusted fore and aft of the boss 43a by means of the threaded members 43b.

The movable jaw 44 of the main gripper is carried on a lever 45 pivoted on a shaft 46 carried by the web 42. By referring to Fig. 6, it will be understood that the lever 45 is bifurcated and embraces the web 42 and that the pivot shaft 46 extends through the arms of the lever 45 and through the web 42.

The lever 45 is urged to rotate in a counterclockwise direction by a tension spring 47, one end of which is connected thereto in a perforation 48 and the other end of which is supported upon a stud 49 secured to an ear 50 formed upon the bracket 40. The action of spring 47 is therefore to urge the jaw 44 away from the fixed jaw 43 whereby to maintain the main bag gripper in open position.

The lever 45 is adapted to be moved in a clockwise direction to bring the jaw 44 into gripping engagement with the jaw 43 and to be maintained in this latter position by the mechanism now to be described. A bifurcated lever 51 is arranged to straddle the spring 47 and is pivoted upon the ends of a shaft 52 extending through the bracket 40. It is the lever 51 upon whose outer end the roller 39 is rotatably supported. Adjacent its pivoted end, the lever 51 is relatively wide and it has pivoted thereto on a shaft 53 a link 54 which is, in turn, pivoted at 55 to the lever 45. The wide portion of the lever 51 thus actually defines, along the line extending between the pivots 52 and 53, one link of a toggle whose other link is the link 54. Clockwise rotation of the lever 51 will serve to straighten the toggle thus defined and to move the lever 45 in a clockwise direction to close the main bag gripper.

The clockwise movement of the lever 45 and the straightening of the toggle is resisted by the spring 47 until such time as the toggle lies in its dead-center position. It will be understood that further clockwise movement of the actuating lever 51 will carry the toggle beyond its dead-center position and that the spring 47 will thereafter tend to cause further clockwise movement of the lever 51. In the present mechanism, advantage is taken of this well known characteristic of toggle linkage whereby the spring 47 maintains the main gripping jaws in bag gripping position. To this end, a screw 56 is threaded into a suitable lug 57 formed upon the bracket 40 and is loosely received in a slot 58 formed in the web 42. A lock nut 59 is threaded upon the screw 56 and it will be understood that the lock nut 59 may be drawn down upon the web 42 in order to secure the screw 56 in its adjusted position. The free end of the screw 56 may thus be adjustably related with one of the members of the toggle in order to determine the final position of the toggle when the main gripper is closed. As shown particularly in Fig. 5, the link 54 of the toggle has formed thereon an abutment 60 located upon an extension of the link 54 beyond its pivot 53. The position of screw 56 is preferably so selected that the toggle will be permitted to go slightly beyond its dead-center position wherein the spring 47 will maintain the gripping jaws 44, 43 in operative relation.

The temporary gripper comprises a movable jaw 61 and a fixed jaw 61a secured to the fixed jaw 43. The fixed jaw 61a may be formed as a plate presenting an edge for contact with the movable jaw 61 and it is preferred to serrate the surface of the working face or edge as illustrated in the drawings. The jaw 61 may be provided with any suitable working face although satisfactory results are obtained with the working face smooth as illustrated in the drawings. The movable jaw 61 is formed on a bell crank lever 62 pivoted intermediate its ends upon a suitable stud 63 supported by the web 42. The shorter arm 64 of the bell crank lever 62 carries a stud 65 upon which is pivotally supported a latch 66. The latch 66 has extensions on either side of the pivot stud 65, the upper extension being perforated to receive one end of a tension spring 67 whose other end is supported upon a hook 68 secured to the bracket 40.

The spring 67 tends to rotate the latch 66 in a counterclockwise direction about its pivot 65 and also serves to rotate the bell crank lever 62 in a clockwise direction whereby to urge the movable

temporary gripping jaw 61 into engagement with the stationary jaw 61a. The other extension of the latch 66 has a shoulder 69 formed on the bearing face thereof and the shoulder 69 is arranged for selective engagement with a pallet 70 formed on the lever 45. As shown in Fig. 3, the movable jaw 61 is held in open position against the tension of spring 67 by the interengagement of the shoulder 69 and the pallet 70. Inasmuch as the spring 67 tends to urge the latch 66 in a counterclockwise direction, the shoulder 69 will be maintained in engagement with the pallet 70 and the latch 66 must be moved in a clockwise direction against the force of spring 67 in order to release the parts for closure of the temporary gripping jaw 61.

In order that the temporary gripping jaw 61 may be released for closure thereof under the impulse of spring 67, there is provided a trigger 78 pivoted at 71 upon the supporting structure for the fixed jaw 43. The trigger 78 extends into the path of a bag which is to be inserted between the open gripping jaws in such position that the act of inserting a bag will raise the trigger or, stated otherwise, will cause the trigger to rotate in a counterclockwise direction about its pivot 71. The trigger 78 is freely pivoted at 71 and normally rests against a stop screw 72 secured to the stationary gripping jaw 43.

The trigger 78 has pivoted thereon a latch trip lever 73, one arm of which is slit at 74 to form a tang 75 which is bent over the upper portion of the trigger 78. The lever 73 may thus rotate in a counterclockwise direction independently of the trigger 78 but clockwise rotation thereof is limited by contact between the tang 75 and the trigger 78. The lever 73 is urged to rotate in a clockwise direction by a spring 76 tensioned between a stud 77 on the other arm 79 and a stud 80 formed upon the pivot shaft 46. The action of spring 76 is thus to bear downwardly upon the trigger 78 through the action of the tang 75.

The other arm 79 of the lever 73 extends toward the lower end of the latch 66 and the stud 77 which extends through the arm 79 (see Fig. 6) is thus positioned for contact with the lower end of the latch 66 upon upward or counterclockwise movement of the trigger 78.

The operation of the novel gripping device herein described will now be set forth. As pointed out above, Fig. 3 illustrates the gripping device in a position in which the main gripping jaws 43, 44 are open and in which the temporary gripping jaws 61, 61a are open. This position is assumed after rotation of the turret has brought the roller 39 on the actuating lever 51 into contact with the opening cam 125 and the parts are in position for reception of a bag when the gripper reaches the bag positioning station. As shown in Fig. 3, the collapsed mouth of a bag B is moved upwardly into the space between the open gripper jaws. The upper edge of the bag mouth will strike the trigger 78 and further upward movement of the bag will raise the trigger causing the stud 77 on the latch trip lever 73 to strike the lower end of the latch 66. Continued upward movement of the trigger 78 will result in clockwise rotation of the latch 66 against the tension of spring 67 and will serve to withdraw the shoulder 69 from beneath the pallet 70. When this occurs, the spring 67 will contract and draw the latch 66 upwardly with its bearing face resting against the end of pallet 70. The upward movement of latch 66 is accompanied by a clockwise rotation of the bell crank lever 62 which is

effective to bring the jaw 61 formed thereon toward contact with the fixed jaw 61a. The bag mouth B will thus be gripped between the jaws 61, 61a by the tension of the spring 67. It will be understood that the spring 67 may be of such strength as is necessary to securely hold the empty bag in proper position and it will be further understood that the closing of the temporary grippers does not occur until the bag has been placed in an appropriate position within the grippers. The operator is thus relieved of any necessity for shifting the bag after it becomes gripped between the jaws 61, 61a and the operator is assured that the bag is properly positioned and that it will remain thus properly positioned immediately that the temporary grippers are closed.

In Fig. 4, there is illustrated the position of the parts when the temporary grippers are closed as described above. It will be observed that the stud 77 on latch trip lever 73 has passed beyond and beneath the end of latch 66, thus leaving the latch 66 free to return to its initial position upon movement of the pallet 70 into the notch above the shoulder 69.

Further rotation of the turret will bring the roller 39 beneath the shoe 146 and downward movement of the shoe in the manner described above will rock actuating lever 51 in a clockwise direction whereby to bring the movable main bag gripper jaw 44 into contact with the bag B for securely holding the bag in position during filling. The movement of the jaw 44 is effected by clockwise rotation of the lever 45 and, as an incident to this clockwise rotation, the pallet 70 moves upwardly past the shoulder 69 on latch 66 permitting the latch 66 to rotate in a counterclockwise direction to position the shoulder 69 beneath the pallet 70. The latter position of parts is illustrated in Fig. 5.

Continued rotation of the turret will carry the firmly gripped bags through the filling stations and will finally bring the roller 39 into contact with the fixed cam 125 (Fig. 3). Upon such contact, the lever 51 is moved in a counterclockwise direction for a sufficient distance to bring the toggle 52, 53, 54 through its dead-center position after which the spring 47 is free to rock the lever 45 in a counterclockwise direction to open the gripping device. The counterclockwise rotation of lever 45 moves the jaw 44 of the main gripper away from the bag and also engages the pallet 70 with the shoulder 69 of the latch 66. This latter engagement causes a downward movement of the latch 66 and a counterclockwise rotation of the bell crank lever 62 against the tension of spring 67 whereby to move the jaw 61 of the temporary gripper away from the jaw 61a. The bag B will thereupon be removed from the gripping device and the trigger 78 will rotate in a clockwise direction under the influence of spring 76. In the course of this latter movement, the stud 77 will pass by the lower end of latch 66 as permitted by the pivotal mounting of the latch trip lever 73 upon the trigger 78. The parts will thereupon assume the positions illustrated in Fig. 3 wherein the gripping device is ready for the insertion of another bag.

The above detailed description has been made in order to comply with the patent statutes. It will be apparent that the gripping device herein disclosed fulfills the objects of the invention and it will be understood that certain modifications in detail may be made by those skilled in the art. The description is therefore to be taken in

an illustrative rather than in a limiting sense and it is applicants' intention that their invention shall be limited only by the scope of the appended claims.

We claim:

1. A bag filling machine comprising a bag filling spout, main bag grippers for holding a bag in filling position relative to said spout during filling of said bag, means for closing said main grippers, temporary bag grippers for holding an empty bag in proper filling position prior to closing of said main grippers, means responsive to movement of an empty bag into predetermined position relative to said temporary grippers for closing said temporary grippers, and means for opening said main and temporary grippers.

2. A bag filling machine comprising a filling spout, temporary bag grippers, means responsive to the positioning of an empty bag in filling position relative to said spout for closing said temporary grippers to hold said bag in said position, main bag grippers, means operative subsequently to closing of said temporary grippers for closing said main bag grippers to hold said bag in said position during filling thereof, and means operative after said bag has been filled for simultaneously opening said main and temporary grippers.

3. A bag filling machine comprising a filling spout, a temporary bag gripper, yieldable means responsive to the positioning of an empty bag in filling position relative to said spout for closing said temporary gripper to hold said bag in said position, a main bag gripper, means operative subsequently to closing of said temporary gripper for closing said main bag gripper to hold said bag in said position during filling thereof, and means operative after said bag has been filled for opening said main and temporary grippers.

4. A bag filling machine comprising a filling spout, a temporary bag gripper, means yieldably urging said temporary gripper toward closed position, means for holding said temporary gripper in open position, means responsive to the positioning of an empty bag in filling position relative to said spout for disabling said holding means whereby to permit said temporary gripper to be closed by said yieldable means to hold said bag in said position, a main bag gripper, means operative subsequently to closing of said temporary gripper for closing said main gripper to hold said bag in said position during filling thereof, and means operative after said bag has been filled for opening said main and temporary grippers and for restoring said holding device into operative condition for holding said temporary gripper in open position.

5. A bag filling machine comprising a bag filling spout, a temporary bag gripper; means yieldably urging said temporary gripper to closed position; a latching device for holding said temporary gripper in open position, said latching device including a latch-actuating lever positioned in the path of insertion of an empty bag into said open

temporary gripper whereby insertion of an empty bag into predetermined position in said open temporary gripper will release said latching device to permit closing of said temporary gripper by said yieldable means; a main bag gripper; means for closing said main bag gripper to hold said bag during filling thereof; and means operative after filling of said bag for opening said main bag gripper and simultaneously opening and latching said temporary gripper.

6. A bag filling machine comprising a filling spout, a temporary bag gripper; a main bag gripper; means yieldably urging said temporary gripper to closed position; a latching device for interconnecting said temporary gripper and said main gripper, said latching device including a latch pivotally connected with said temporary gripper, a pallet connected with said main gripper, said latch being engageable with said pallet whereby movement of said main gripper in one direction is transmitted to said temporary gripper, and a latch-actuating lever positioned in the path of insertion of a bag into said temporary gripper whereby insertion of a bag into predetermined position in said open temporary gripper will release said latching device to permit closing of said temporary gripper by said yieldable means; means for closing said main gripper to hold said bag during filling thereof; and means operative after filling of said bag for opening said main gripper, said last-named means being effective to move said main gripper in the direction in which movement is transmitted to said temporary gripper whereby to open said temporary gripper simultaneously with the opening of said main gripper.

7. Article supporting means comprising a main gripper, a temporary gripper, a latching device interconnecting said main and temporary grippers for simultaneous opening movement, latch release mechanism responsive to movement of an article into predetermined position within said article supporting device for releasing said latching device to permit closing of said temporary gripper independently of said main gripper, and means for closing said main gripper.

8. An article supporting device comprising a main gripper, a temporary gripper, a spring urging said temporary gripper to closed position, a spring superior to said first-named spring urging said main gripper to open position, a latching device connecting said temporary gripper with said main gripper whereby opening of said main gripper causes opening of said temporary gripper, latch release mechanism responsive to movement of an article into predetermined position in said article supporting device for releasing said latching device to permit closing of said temporary gripper by its spring, and means for closing said main gripper and for reconnecting said latching device whereby opening of said main gripper will cause opening of said temporary gripper.

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