

April 22, 1941.

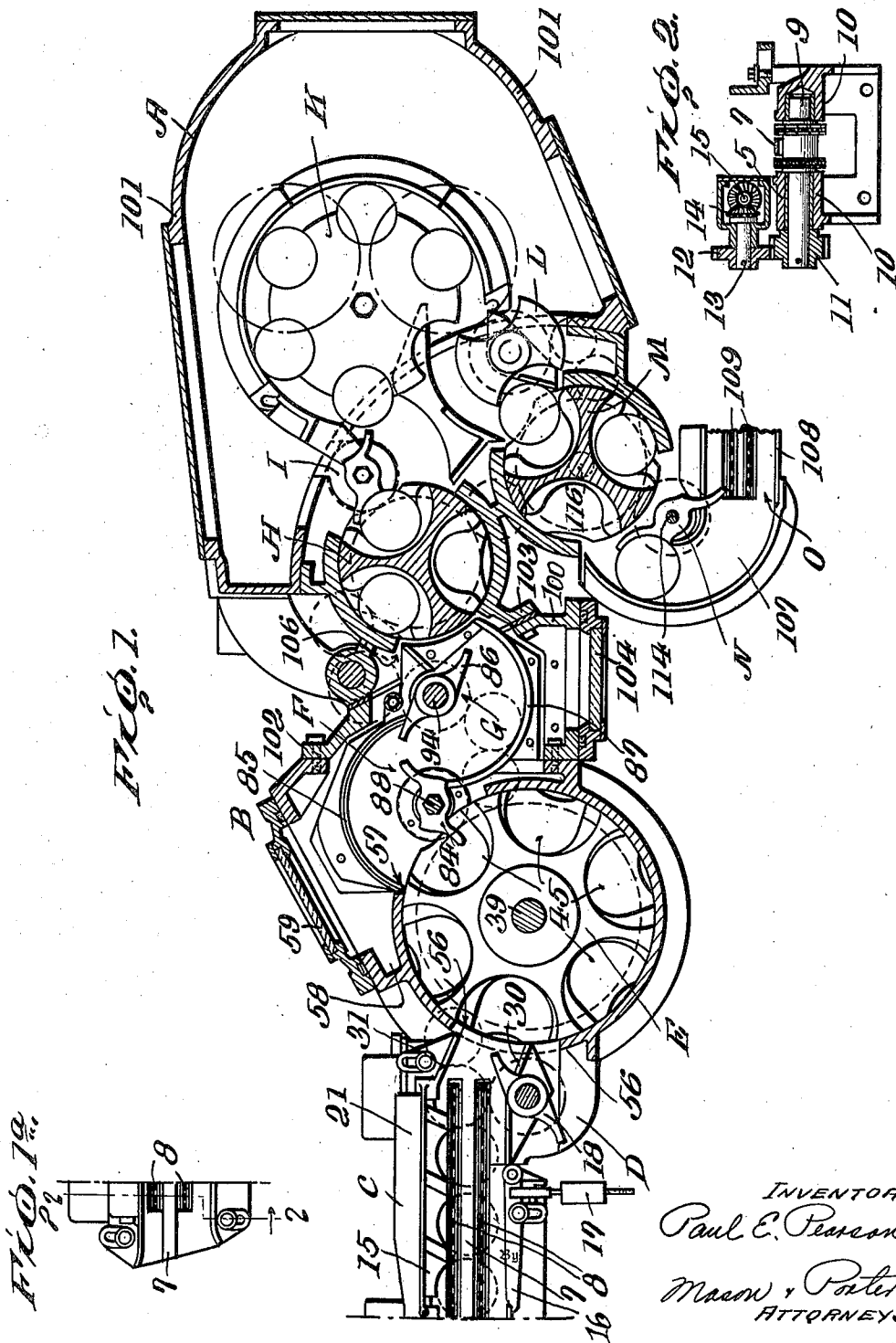
P. E. PEARSON

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APPARATUS FOR PACKAGING PRODUCTS IN A VACUUM

Filed March 24, 1939

9 Sheets-Sheet 1



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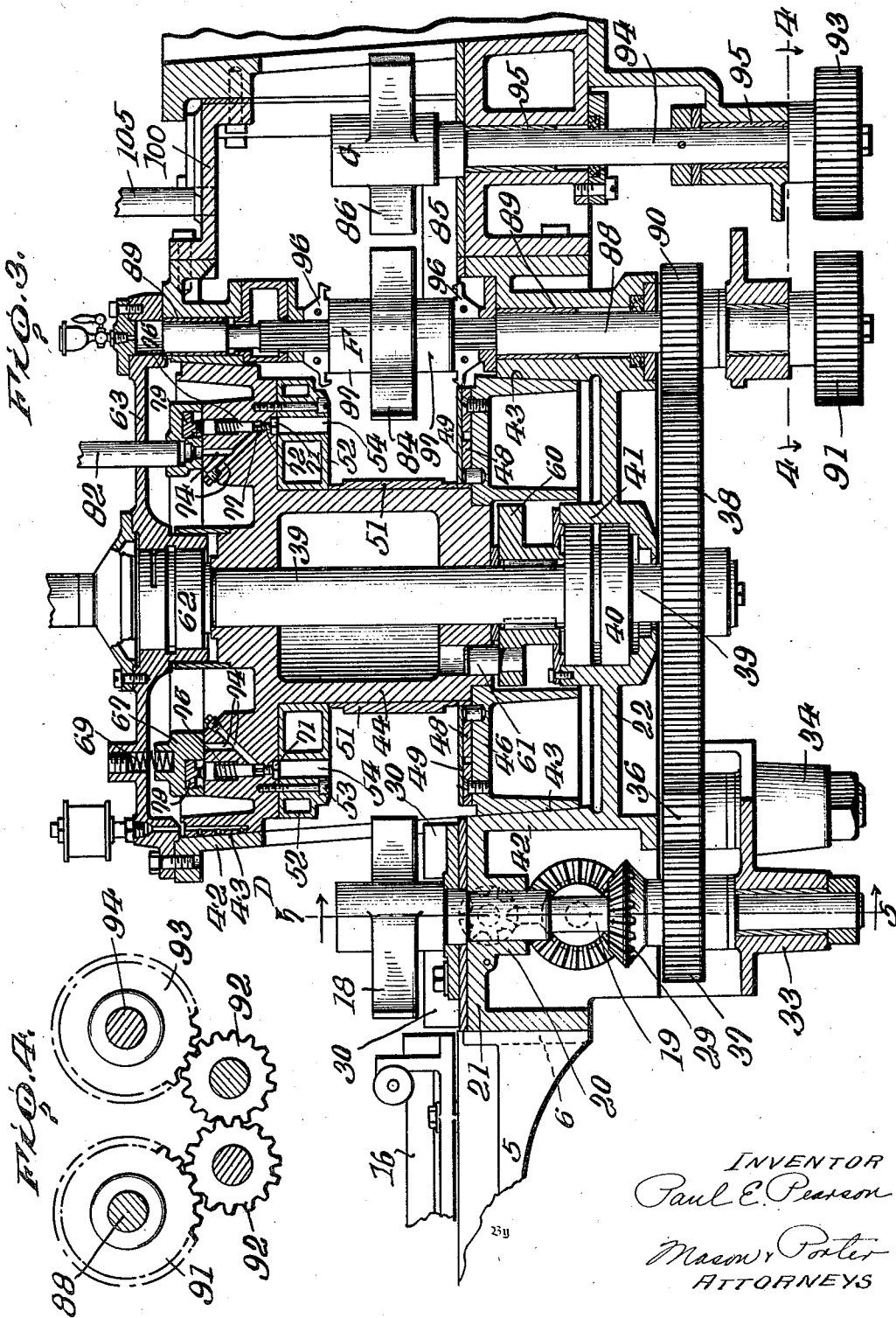
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APPARATUS FOR PACKAGING PRODUCTS IN A VACUUM

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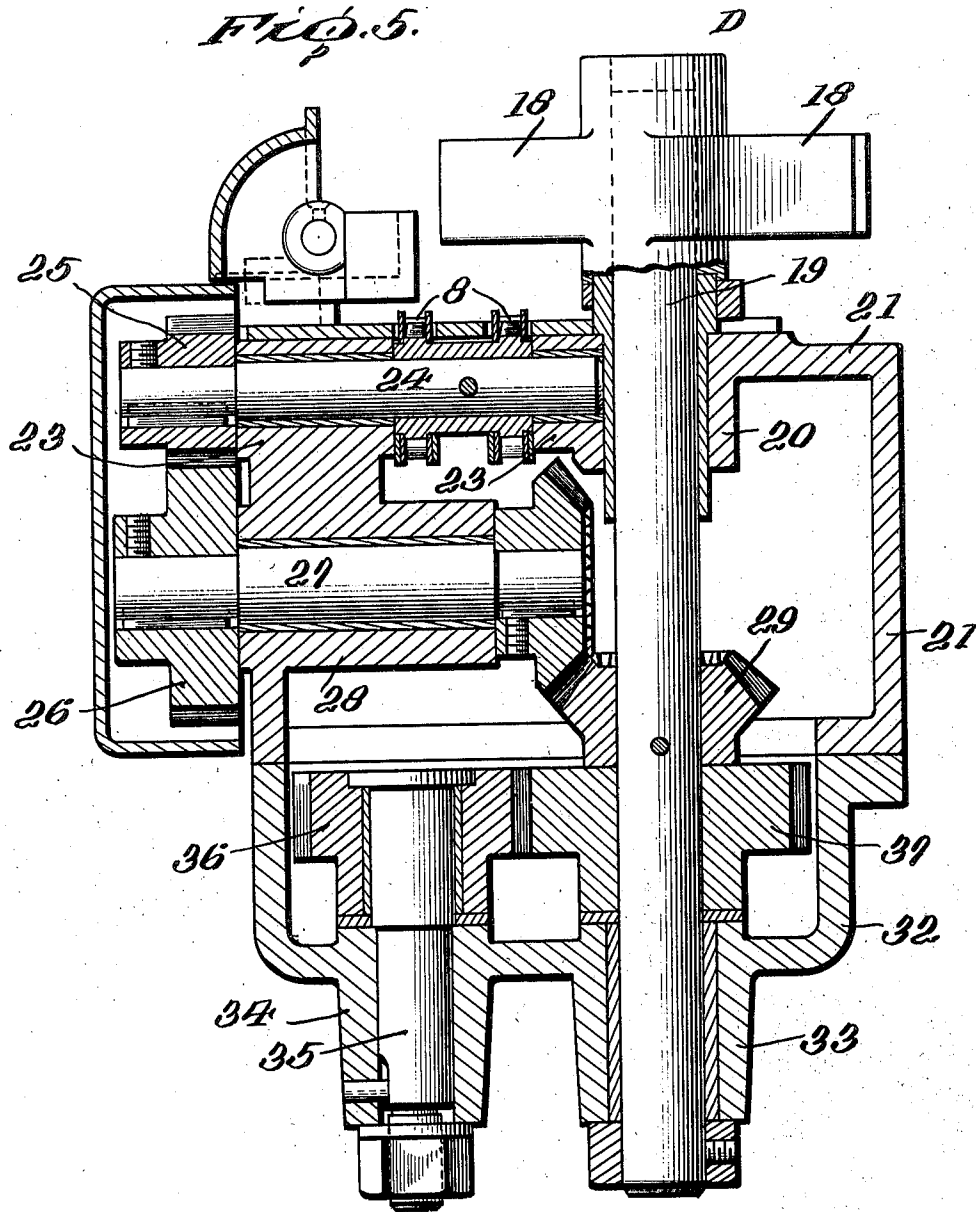
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9 Sheets-Sheet 3



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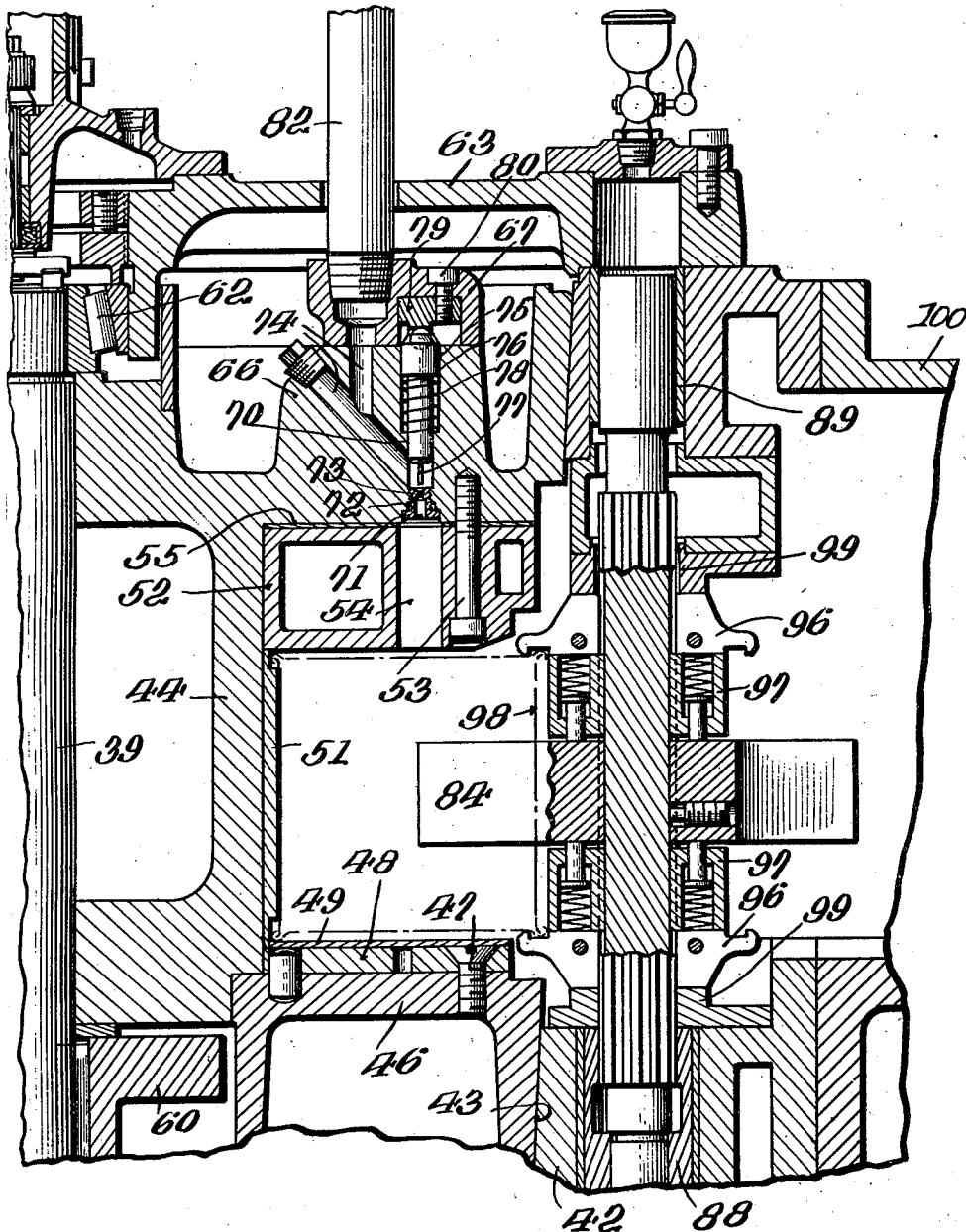


Fig. 6.

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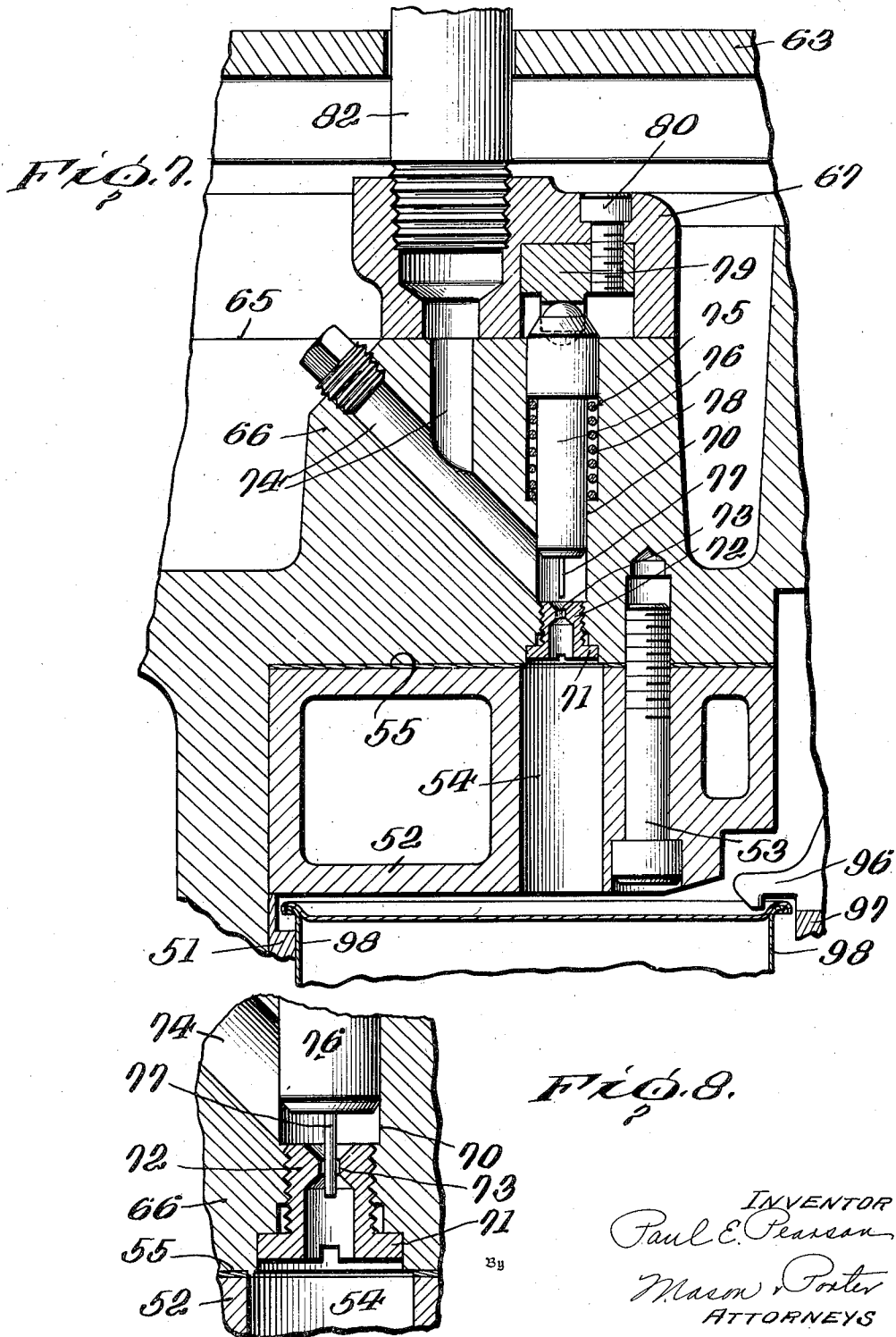
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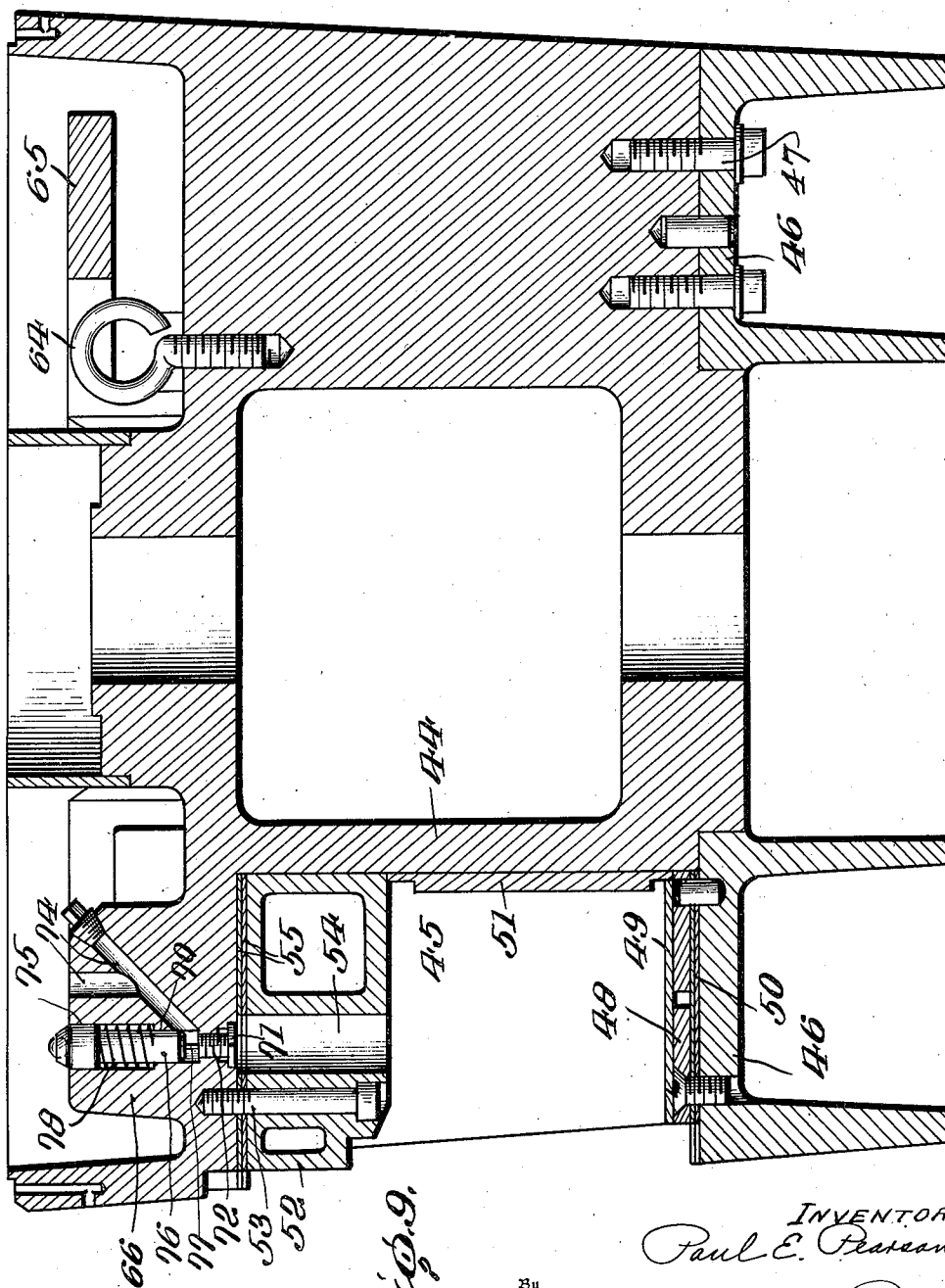


Fig. 9.

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FIG. 10.

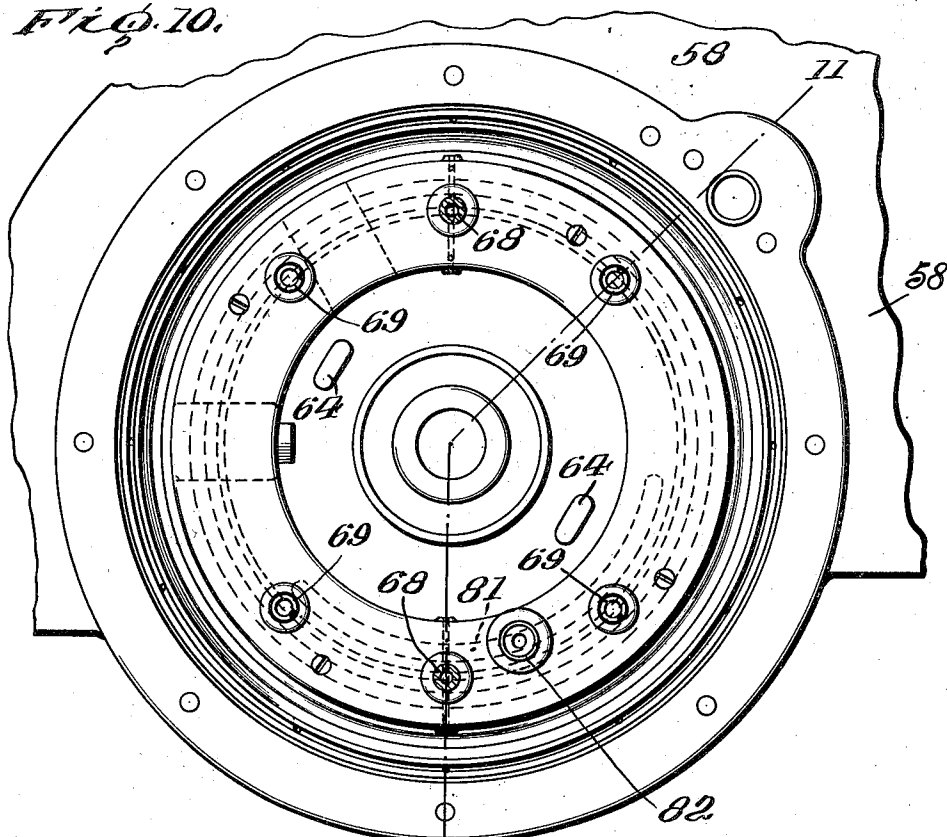
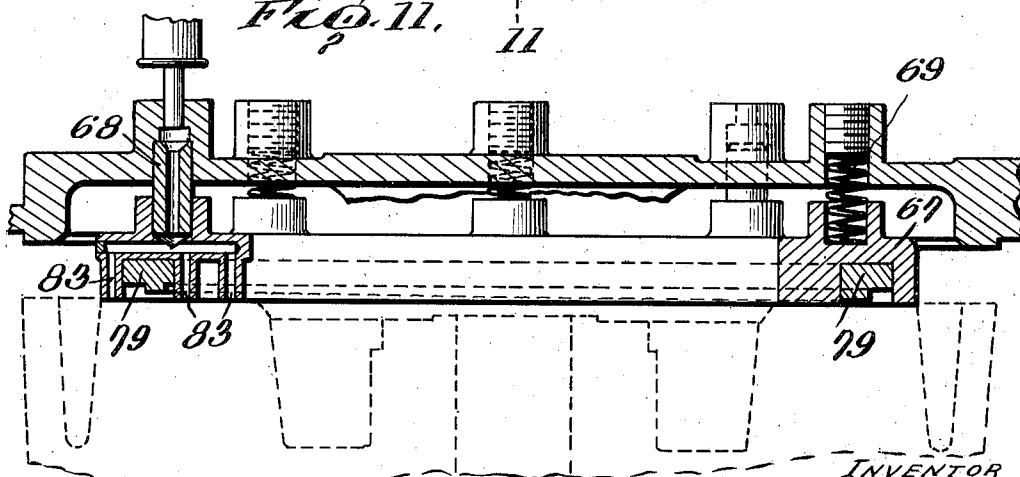


FIG. 11.



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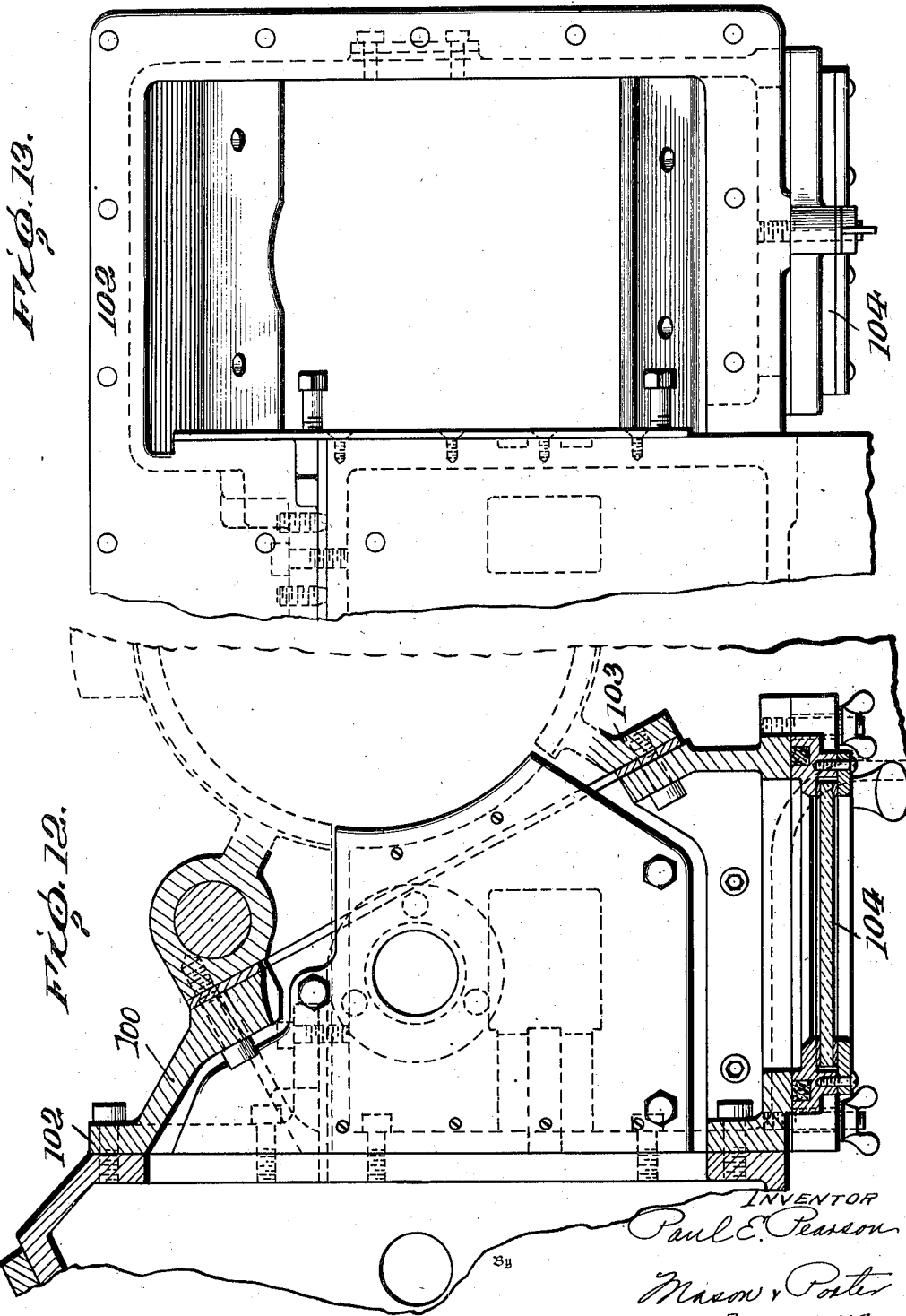
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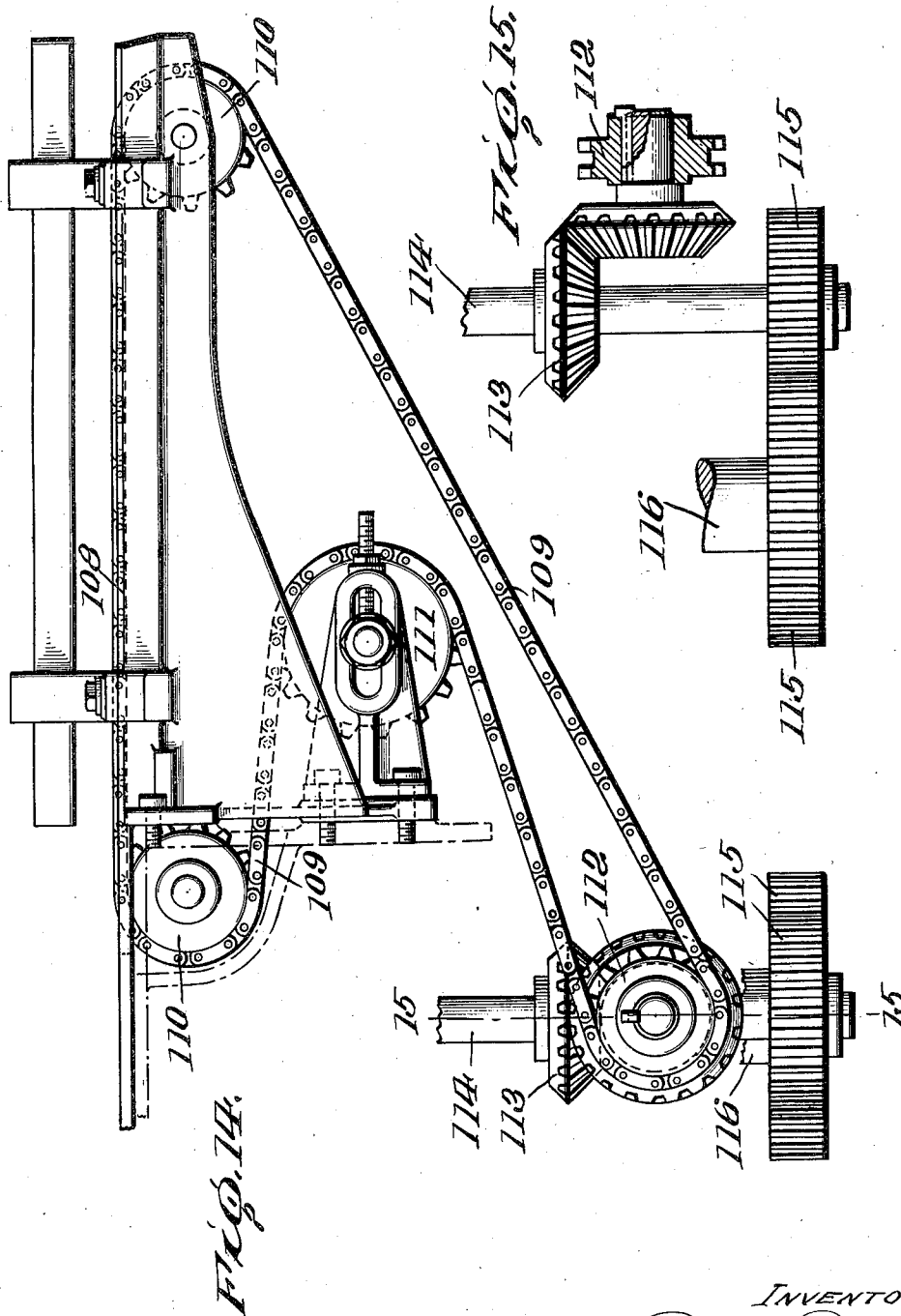
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UNITED STATES PATENT OFFICE

2,239,115

APPARATUS FOR PACKAGING PRODUCTS IN
A VACUUM

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Application March 24, 1939, Serial No. 264,047

11 Claims. (Cl. 226—82)

The invention relates to certain new and useful improvements in methods of an apparatus for vacuum-packing food products, particularly those of a powdery nature.

In the packaging of products of a powdery nature, considerable difficulty has been experienced in attempting to draw a vacuum in the containers prior to the sealing thereof because in rapidly drawing the vacuum, air entrapped in the powdered contents of the containers rapidly expands and rushes out of the containers, and some of the powdery substance becomes entrained in said air and is carried out into the space surrounding the containers, resulting in loss of said substance and the dusting and clogging of mechanisms or parts contained in said space. Very often the containers being vacuumized have covers loosely applied thereon and which are subsequently secured in place while in the vacuum chamber. It will be obvious that in such cases, any powdered material which lodges between the covers and the containers during the drawing of the vacuum will seriously hamper the efficient sealing of the containers. It is to the remedying of these objectionable conditions that the present invention is addressed.

An object of the present invention is to provide a novel method of packaging powdered material which includes the step of slowly drawing a low vacuum in the containers over an extended interval of time so as to attain the desired evacuated condition in said containers without entraining powdered substance in, and drawing it out of the containers with, the evacuated air.

Another object of the invention is to provide a novel method including the step of evacuating the containers in the manner stated and in which the evacuated containers are sealed promptly after the evacuation thereof and without intervention of any communication with air at atmospheric pressure.

Another object of the invention is to provide a method of evacuating and sealing containers in the manner stated and in which the containers are subjected to another and heavier vacuum pull just prior to being sealed.

Another object of the invention is to provide novel apparatus for practicing the above mentioned method.

Another object of the invention is to provide a novel container vacuumizing apparatus including a slowly moving pocketed carrier having a vacuumizing port equipment movable with each pocket and means effective to draw a uniform low vacuum through all said ports whereby con-

tainers within the pockets will be evacuated slowly and without drawing out powdered substance therefrom.

Another object of the invention is to provide an apparatus of the character mentioned in which the port equipments are very small and are formed in removable and replaceable plugs so that the sizes of portings used can be varied at will.

Another object of the invention is to provide an apparatus of the character mentioned in which is included novel means for preventing clogging of the evacuating ports or orifices.

Another object of the invention is to provide a novel apparatus for very slowly evacuating containers so as to avoid drawing out of powdered substance from said containers, which apparatus can be applied as an attachment to a standard form of vacuumizing and closing machine in which the containers are subjected to another and heavier vacuum pull.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more fully understood by following the detailed description, the appended claims and the several views illustrated in the accompanying drawings.

In the drawings:

Figures 1 and 1^A together comprise a horizontal section taken through a vacuumizing and closing machine or apparatus embodying the invention.

Figure 2 is a fragmentary vertical cross section taken on the line 2—2 of Figure 1^A.

Figure 3 is a central vertical section taken through the turret or valve in which the containers are slowly vacuumized.

Figure 4 is a fragmentary horizontal section taken on the line 4—4 on Figure 3.

Figure 5 is a fragmentary vertical cross section taken on the line 5—5 on Figure 3.

Figure 6 is a fragmentary vertical cross section illustrating one vacuumizing pocket of the valve at the position at which the containers are extracted or discharged therefrom.

Figure 7 is an enlarged fragmentary section illustrating one of the individual pocket vacuumizing porting equipments.

Figure 8 is an enlarged fragmentary section illustrating the manner in which the vacuumizing orifices are prevented from clogging.

Figure 9 is an enlarged detail vertical cross section of the turret or valve in which the containers are slowly vacuumized.

Figure 10 is a plan view of the rotary valve or

turret and the casing therefor with the cover removed.

Figure 11 is a fragmentary vertical cross section taken on the line 11—11 of Figure 10 and illustrating the relation of the spring pressed ring and the casing cover by which it is held against rotation.

Figures 12 and 13 illustrate the adapter casing member in horizontal section and in front elevation respectively.

Figure 14 is a fragmentary side elevation illustrating the mechanism for feeding off the vacuumized and closed containers.

Figure 15 is a detail vertical cross section taken on the line 15—15 on Figure 14.

The apparatus herein disclosed as an example of embodiment of the mechanical features of the invention, and which is adapted for practicing the method steps of the invention, includes a suitable standard form of vacuumizing and closing machine generally designated A and which preferably is of the type disclosed in detail in U. S. Letters Patent 1,933,462, issued to Nelson Troyer and Paul E. Pearson, on October 31, 1933, and an attachment, generally designated B, which is designed for slowly vacuumizing containers filled with powdered material.

One of the common methods of vacuumizing containers having powdered material therein consists in loosely attaching covers to the containers, then placing the containers in a vacuum chamber and drawing air from the containers through the loose connections between the covers and the container bodies. It has been found that the air rushing at great velocity out of the containers through the small orifices or spaces left between the loosely folded metal parts later to be formed into a double seam seal carries with it some of the powder from the containers into the surrounding vacuum chamber, and some of the powder entrained with the outwardly rushing air remains between the proximate container body and cover portions and seriously hampers efficient sealing of the containers. The present invention overcomes these difficulties in a manner later to be explained.

The whole combination of apparatus herein disclosed includes the standard vacuumizing machine structure A and the attachment B aforesaid and the individual equipments hereinafter briefly mentioned. The loosely covered containers are fed into the apparatus by a feed-in equipment C, and a rotary transfer element D transfers the containers from the equipment C into individual receiving pockets formed in the turret or valve member E in which the containers are slowly vacuumized in a manner avoiding drawing off of powdered material therefrom. After the containers have been slowly vacuumized, they are transferred through the medium of an extractor member F and a transfer member G into receiving pockets of a rotary feed-in valve H forming a part of the standard machine A. From the valve H the containers are extracted by a rotary element I and transferred to the closing turret K from which they are delivered by an extractor L which transfers them to the receiving pockets of a rotary discharge valve M. The vacuumized and closed containers are extracted from the discharge valve M by a rotary member N and are transferred to the feed-off equipment O by which they are delivered from the apparatus.

The feed-in equipment C includes a bracket 5 having a mounting flange 6 by which it is at-

tached to the machine frame, and a feed floor 7 which is longitudinally grooved to receive the feed chains 8. The feed chains pass over driven sprockets mounted on a shaft 9 which is rotatable in suitable bearings 10 formed in the pocket and has a gear 11 fixed thereon. The gear 11 meshes with a driving gear 12 affixed to a shaft 13 which is miter-gear coupled as at 14 with a timing screw 15 opposed by a spaced yieldable wall 16 yieldably pressed toward the screw in the well known manner by a counterweight equipment 17. See Figures 1, 1^A and 2.

The chains 8 and the timing screw 15 feed the containers in suitably timed relation so as to be engaged by the individual, oppositely projecting arms 18 of the transfer member D and each can be fed into one of the receiving pockets of the vacuumizing valve or turret H. It will be observed by reference to Figure 5 of the drawings, that the transfer member D is secured to the upper end of a shaft 19 which is vertically rotatable in a bearing 20 formed in the forward extension 21 of a frame 22 comprising a portion of the attachment B. The extension also includes bearings 23 for a horizontally disposed shaft 24 which carries a sprocket member over which the chains 8 are trained. The shaft 24 has a gear 25 affixed thereto to which rotation is imparted by a driver gear 26 mounted on a shaft 27 having bearing as at 28 in the extension 21, said shaft 26 being driven by a miter-gear couple 29 from the shaft 19.

A container guide 30 is fixed to the extension beneath the transfer member D and cooperates with a deflector or guide 31 likewise secured upon said extension in the manner best illustrated in Figures 1 and 3 of the drawings. The guide elements 30 and 31 are mounted in position for receiving individual containers between them and guiding said containers one by one into the receiving pockets of the vacuumizing valve or turret E.

A housing attachment 32 depends from the extension 21 and provides a lower bearing 33 for the shaft 19, and vertically disposed bearings or supports 34 for a pair of stub shafts 35. The stub shafts 35 support intermeshing idler gears 36 one of which meshes with a driven gear 37 secured upon the shaft 19 for imparting rotation to said shaft, and the other of which meshes with a large spur gear 38 and has rotation imparted thereto by said spur gear. See Figures 3 and 5 of the drawings.

The large spur gear 38 is fixed to the lower end of a vertically disposed shaft 39 having rotary bearing as at 40 in a well 41 formed in the attachment frame 22. It will be obvious by reference to Figures 1 and 3 of the drawings that the well 41 is surrounded by a concentrically disposed turret or valve casing 42 which extends upwardly from the base framing 22 and includes a vertically flared bore 43 for snugly and rotatably receiving the rotary turret or valve member 44 forming a part of the slow vacuumizing member hereinafter generally designated E.

The vacuumizing turret or valve 44 is equipped with a plurality (six being shown) of individual peripheral pockets 45 each of a size for receiving and forming a confining space about an individual container. The unit E, rotatable with the shaft 39, includes the main body or rotor 44 and a base ring 46 which is removably secured as at 47 to the bottom of said rotor and forms floors for the pockets 45 formed in said rotor. Each pocket floor is equipped with a filler plate

48 and a wear plate 49, and any desirable shim equipment 50 may be interposed above the base ring if desired in the manner best illustrated in Figure 9 of the drawings. Each pocket also includes a wall abutment member 51 and a skeletonized ceiling insert 52 which is removably secured to the rotor 44 as at 53 and has an opening or clearance 54 formed therethrough for a purpose later to be explained. It is to be understood that the ceiling inserts 52 are selectively applied in accordance with the size of containers being vacuumized and closed, and suitable shim equipments 55 may also be inserted between the ceiling pieces and the rotor in the manner illustrated in Figures 6 and 9 of the drawings.

The guide members 30 and 31 guide the in-feeding containers through a casing opening 56 into the rotor pockets, and after the containers have been slowly vacuumized in said pockets they are discharged from the rotor pockets through an outlet or discharge opening 57 in the casing into an extension 58 of the casing which is provided with a glass window equipped door 59 through which access can be had into said casing extension, see Figure 1.

The turret shaft 39 has a driving ring 60 keyed thereto and which includes a driving lug 61 engaged in a receiving socket in the rotor 44 so that the rotation of the shaft 39 will be imparted to the rotor 44. The upper end of the shaft 39 has rotative bearing as at 62 in a cover 63 which is removably secured to the upper end of the casing 42 in the manner best illustrated in Figures 3 and 6 of the drawings.

It will be observed by reference to Figures 3, 6, 7, 9 and 11 of the drawings that the rotor 44, 46 includes a pair of lift rings 64 which project upwardly from the rotor and may be employed to facilitate lifting of the rotor out of the casing 42 in which it has rotative bearing as at 43. The rotor includes a skeletonized ring bearing shelf 65 having a solid portion 66 overlying each pocket 45 and an upper machined face or surface presented for engagement with a valve or control ring 67 held against rotation by socket and pin connections 68 with the cover 63, see Figures 10 and 11. The ring 67 is yieldably pressed against the rotor shelf 65 by springs 69 which are socketed in the cover.

Each solid portion 66 of the rotor has a vertical bore 70 formed therein and positioned for registry with the opening 54 through the particular underlying ceiling piece 52. At the lower end of each bore 70 a plug 71 is removably mounted as at 72 and each plug includes a very small vacuumizing port or orifice 73 which affords communication between the interior of the respective pocket 45 and the upper face of the rotor shelf 65 through the particular ceiling opening 54, the bore 70 and suitable lateral boring 74. It will be obvious that the plugs 71 can be mounted and removed through the clearance openings 54.

Each bore 70 is counterbored as at 75 and supports a reciprocable, shouldered plunger 76 from which an orifice cleaning pin 77 depends. A compression spring 78 is coiled about each plunger 76 between the shoulder thereof and the shoulder formed by the particular counterbore, said springs serving to normally urge the plungers upwardly to the position illustrated in Figure 7 of the drawings in which the respective orifice clearing pins 77 are clear of the orifices 73. Each plunger preferably includes an anti-friction ball at its upper end, and the springs 78 hold the plungers against a cam track

79 secured as at 80 in a receiving recess in the ring 67. As the rotor rotates relatively to the ring 67, the cam track will force the plunger 76 downwardly at intervals to cause the pins 77 to enter, clear and assure against clogging of the small orifices 73, see Figure 8.

It will be observed by reference to Figures 10 and 11 of the drawings that the ring 67 includes a long concentric vacuumizing groove 81 in its under face extending more than 120° around the ring and in which a low vacuum is drawn through a communicating pipe line 82 having connection with a vacuum pump or any other source of negative pressure (not shown). It will be obvious that as the rotor 44 is slowly rotated the individual pockets 45, closed by the casing wall 42, will have a low vacuum slowly and gradually drawn therein through the individual orifice and duct equipment 54, 73, 70, 74 peculiar to and movable with the respective pockets. The individual plugs 71 are removable and replaceable and selective plugs having varied sizes of orifices 73 can be used. It will be readily understood that the size of the orifices determines the speed at which the vacuum is pulled in the pockets 45, and it is the purpose of the invention to draw this vacuum very slowly and over an extended interval of time so that the desired vacuumization of the containers in the pockets can be effected without drawing any powdered material from the containers and into the seam structures later to be double-seam-sealed.

It will be noted by reference to Figure 11 that the ring holding studs or pins 68 are hollow and that the ring 67 includes duct equipment 83 through which lubricant can be directed through the pin structures to the opposing surfaces of the ring 67 and the shelf 65.

As each pocket 45 of the turret or valve rotor 44 and the container which has been slowly vacuumized therein during movement of the rotor comes into registry with the discharge opening 57, the container is engaged by one of the oppositely directed arms 84 of the rotary extractor member generally designated F and moved out of the pocket. The arms swing the extracted containers in an arcuate path guided by a guide member 85, and these containers which have been pre-vacuumized are thus transferred into the zone of influence of the rotary transfer member generally designated G so that the oppositely directed arms of this transfer member can individually engage them and swing them in a continuing but reversely directed arcuate path guided by the guide member 87, see Figure 1.

The extractor member F is fixed to a vertically disposed shaft 88 rotatable in bearings 89 provided therefor in the casing extension 58, and at its lower end this shaft carries a driver gear 90 which meshes with the large spur gear 38 secured on the turret shaft 39 and a driven gear 91 to which rotation is imparted through two intermeshing idler gears 92 best shown in Figure 4 of the drawings and to which rotation is imparted by a driver gear 93 secured upon the lower end of a shaft 94 rotatably supported in bearings 95 and carrying the transfer member G.

The transfer member G has its counterpart in the standard form of vacuumizing and closing machine disclosed in the Troyer and Pearson Patent 1,933,462, hereinbefore referred to, and since the various elements H, I, K, L, M, and N of that machine, herein generally designated A, and the drive connections by which movement is imparted to these elements, are shown and de-

scribed in detail in the patent referred to, further detailed description of these parts herein is thought to be unnecessary. It is deemed sufficient to state that the driven gear 93 hereinbefore referred to corresponds with the gear 76 illustrated in Figure 3 of the patent referred to, and rotation may be imparted to this gear in the manner illustrated and described in that patent or in any other suitable manner.

In order to assure proper extraction of the containers from the rotor pockets 45 after they have been slowly vacuumized therein, the extractor F includes upper and lower diametrically opposed gripper fingers 96 which are normally separated by spring equipments 97 and are forced together to grip a container indicated at 98 in Figure 6, in proper timed relation with the rotor movement, by stationary cams 99. These gripper finger equipments of this type are shown and described in detail in Figures 8, 8^a, 8^b, and 9 of the Troyer Patent 1,983,252, issued December 4, 1934, and further detailed description of these equipments herein is thought to be unnecessary.

The shaft 94 is rotatably supported in an adapter housing 100 which is interposed between the turret valve casing extension 58 and the casing 101 of the machine A and secured as at 102 to the former and as at 103 to the latter of said casings. The adapter housing includes a glass window equipped door 104 through which access may be had to the interior of the adapter housing. The chamber provided by the casing extension 58 and the adapter housing 100 is air tight, and the pre-vacuumized containers moving through these casing portions are protected from communication with air at atmospheric pressure. It will be understood, of course, that the rotary valve members H and M permit ingress and egress of containers into and from the casing 101 of the vacuumizing and closing machine and yet prevent direct air communication into and from said casing.

It is preferred that the chambering within the casing extension 58 and the adapter housing 100 be maintained at a negative pressure, and for this purpose a vacuumizing tube or pipe line 105 may be connected to the adapter housing and with an evacuating pump or any other suitable source of negative pressure (not shown). By this means also, any powder which might be suspended in the air within the adapter housing is likely to be drawn off so that when the containers enter the standard vacuumizing and closing machine A through the entrance opening 106 they will pass into the high vacuum maintained in the casing 101 free of any powdery halo and can there be closed without danger of powdered material being drawn out of the containers or into the seam structures being double-seam-sealed in the well known manner.

The discharging or feed off equipment O includes a receiving floor 107 over which the containers are moved by the rotary element N, and a take-off floor 108 over which the containers are moved by a chain 109 passing over an idler sprocket 110, a second sprocket 111, and a driver sprocket 112. The driver sprocket may be driven in any approved manner, or it may be driven by a miter-gear couple from the shaft 114 on which the rotary element N is mounted and which is in turn driven by a spur gear couple 115 from the shaft 116 on which the rotary valve member M is mounted, as illustrated in detail in Figures 14 75

and 15 herein and as in Figures 3 and 4 of the Patent 1,933,462 hereinbefore referred to.

The principal step in the method involved in this invention comprises the slow and continuous pre-vacuumizing of the loosely covered containers as they move along in the turret or carrier 44. The vacuumizing function is accomplished through the small plug orifices 73 and proceeds slowly over an extended interval of time so as to attain the desired evacuated condition in the containers without drawing powdered material out of the containers. As has been hereinbefore described the pre-vacuumized containers are moved from the rotor 44 into the casing 101 through a passageway closed off from communication with air at atmospheric pressure and preferably maintained at a negative pressure, and within the casing 101 a high vacuum is drawn in the containers and they are closed or double-seam-sealed without relieving said vacuum.

It is of course to be understood that the details of structure and arrangement of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:

1. In apparatus of the character described, a closure casing having container receiving and discharging opening equipment, a slowly moving container carrier rotatable in contact with said casing having powdered material bearing container confining chambers formed peripherally therein and a restricted vacuum value determining orifice formed directly therein movable with and communicating with each chamber, and means effective through and controlled by said orifices for slowly and steadily subjecting said chambers to a definite low vacuum predetermined by the size of said orifices whereby containers bearing powdered material may be vacuumized without withdrawing powdered material therefrom.

2. In apparatus of the character described, a slowly moving container carrier having container confining chambers therein and a restricted orifice communicating with each chamber and all movable with said carrier, means effective during travel of said container and through said orifices for slowly and steadily subjecting said chambers to a definite low vacuum whereby containers bearing powdered material may be vacuumized without withdrawing powdered material therefrom, and means effective at intervals during movement of said carrier for clearing and preventing clogging of said orifices.

3. In apparatus of the character described, a closure casing having container receiving and discharging opening equipment, a container carrier slowly rotatable in contact with said casing and having powdered material bearing container receiving and confining pockets formed peripherally therein, said carrier having a restricted vacuum value determining orifice movable with and communicating into each pocket, a stationary control ring directly engaged by said carrier and having a long grooveway for simultaneously communicating with a plurality of the traveling orifices and which has provision for communication with a source of negative pressure whereby said pockets and containers therein will be successively and slowly vacuumized in a definite low degree predetermined by the size of said orifices and without drawing powdered material from said containers.

4. The improvements in apparatus defined in

claim 3, further characterized in that each orifice is formed in a selective removable plug, and there is provided means projectible into and withdrawable from each orifice to prevent clogging thereof.

5. An apparatus as defined in claim 3, in which there is provided a removable cover for said casing, and means mutually engaging said cover and said ring for holding the ring against rotation and for yieldably pressing the ring against the carrier.

6. An apparatus as defined in claim 3, in which there is provided a spring retracted plunger associated with each orifice and reciprocally supported in said ring, and a cam track carried by said ring and effective at intervals to project said plungers into the orifices to assure against clogging thereof.

7. An apparatus as defined in claim 3, in which each said orifice is formed in a selective removable plug, and in which each pocket includes a selective removable floor and ceiling equipment, each ceiling equipment including a clearance through which the respective plug can be mounted or removed.

8. An apparatus as defined in claim 3, in which there is provided a removable cover for said casing, socketed bosses projecting in opposed alignment from the cover and ring respectively, and studs engaged in said sockets and holding said ring against movement, said studs and cover and ring having lubricating duct equipments through which a lubricant can be directed to the opposed faces of the ring and carrier.

9. In apparatus of the character described, a housing having a high vacuum drawn therein, means in said housing for receiving and sealing containers having powdered material therein, means including an air sealing rotary feed-in or receiving valve for feeding containers to said

sealing means, means including an air sealing rotary discharging or feed-out valve for feeding containers from said sealing means, a closure casing having container receiving and discharging opening equipment, a container carrier slowly rotatable in said casing and having powdered material bearing container receiving and confining pockets therein, said carrier having a restricted vacuum value determining orifice movable with and communicating into each pocket, a control ring rotatably engaged by said carrier and having a long grooveway for simultaneously communicating with a plurality of the travelling orifices and which has provision for communication with a source of negative pressure whereby said pockets and containers therein will be successively and slowly vacuumized in a definite low degree predetermined by the size of said orifices and without drawing powdered material from said containers, means for feeding containers through the casing opening into said carrier pockets, and means for feeding containers from the casing discharge opening and to the receiving valve.

10. The apparatus defined in claim 9 in which there is included an individually removable adapter casing secured between the closure casing and the housing for enclosing the travelling containers from communication with air at atmospheric pressure.

11. The apparatus defined in claim 9 in which there is included an individually removable adapter casing secured between the closure casing and the housing for enclosing the travelling containers from communication with air at atmospheric pressure, and also means whereby the interior of said adapter casing can be connected with a source of negative pressure.

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