

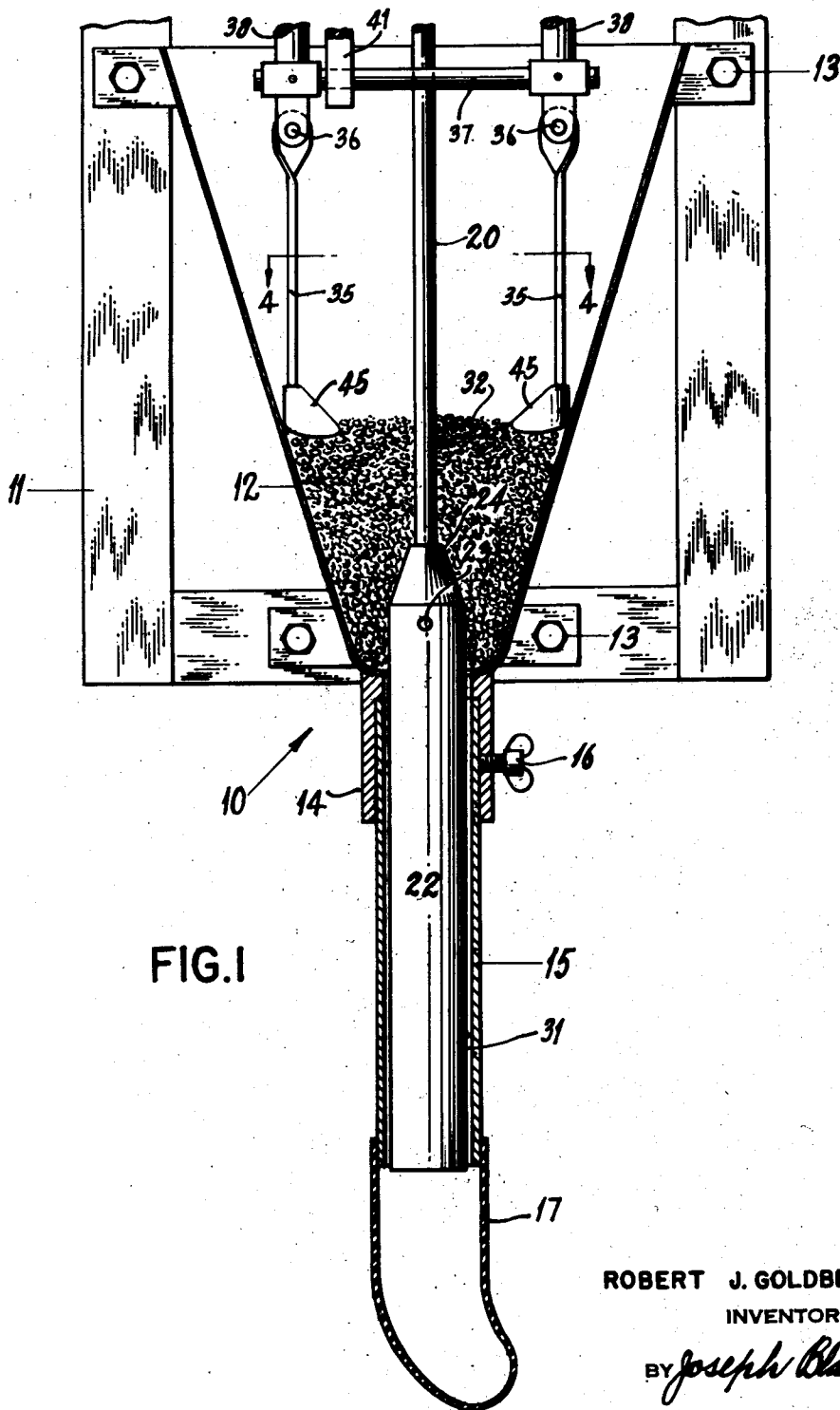
May 19, 1953

R. J. GOLDBERG
FILLING MACHINE HAVING VERTICALLY RECIPROCABLE
TAMPING ARMS AND PLUNGER

2,639,072

Filed Oct. 1, 1948

3 Sheets-Sheet 1



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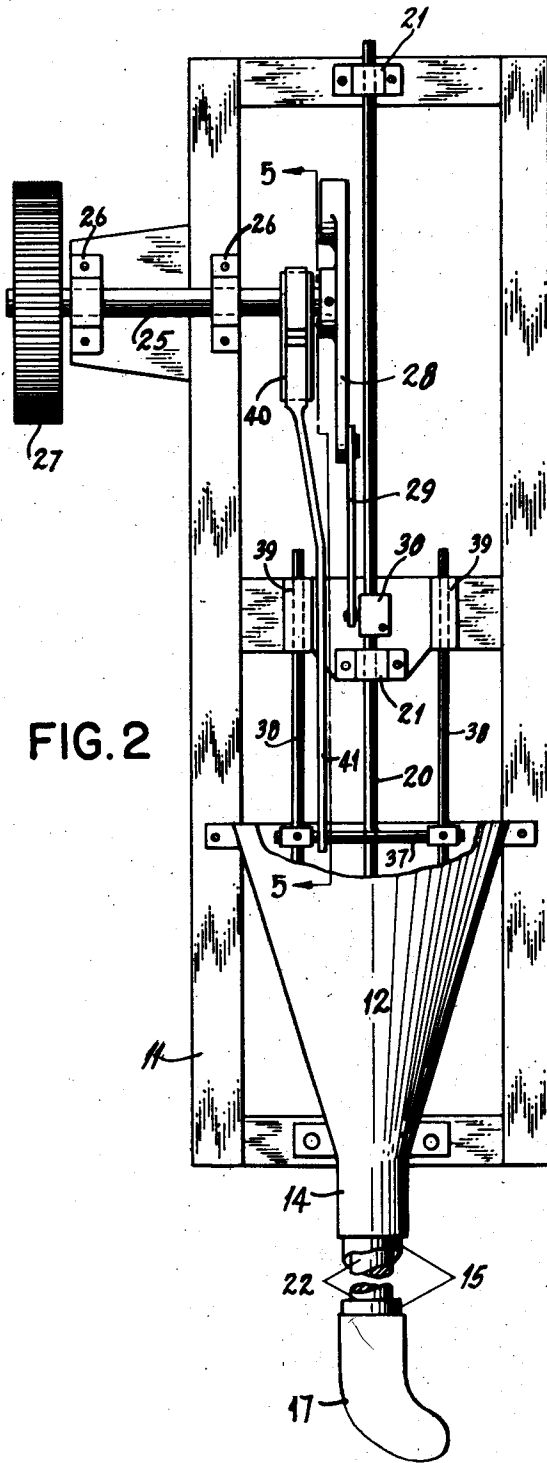


FIG. 2

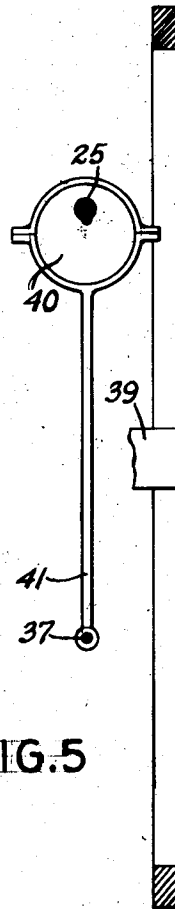


FIG. 5

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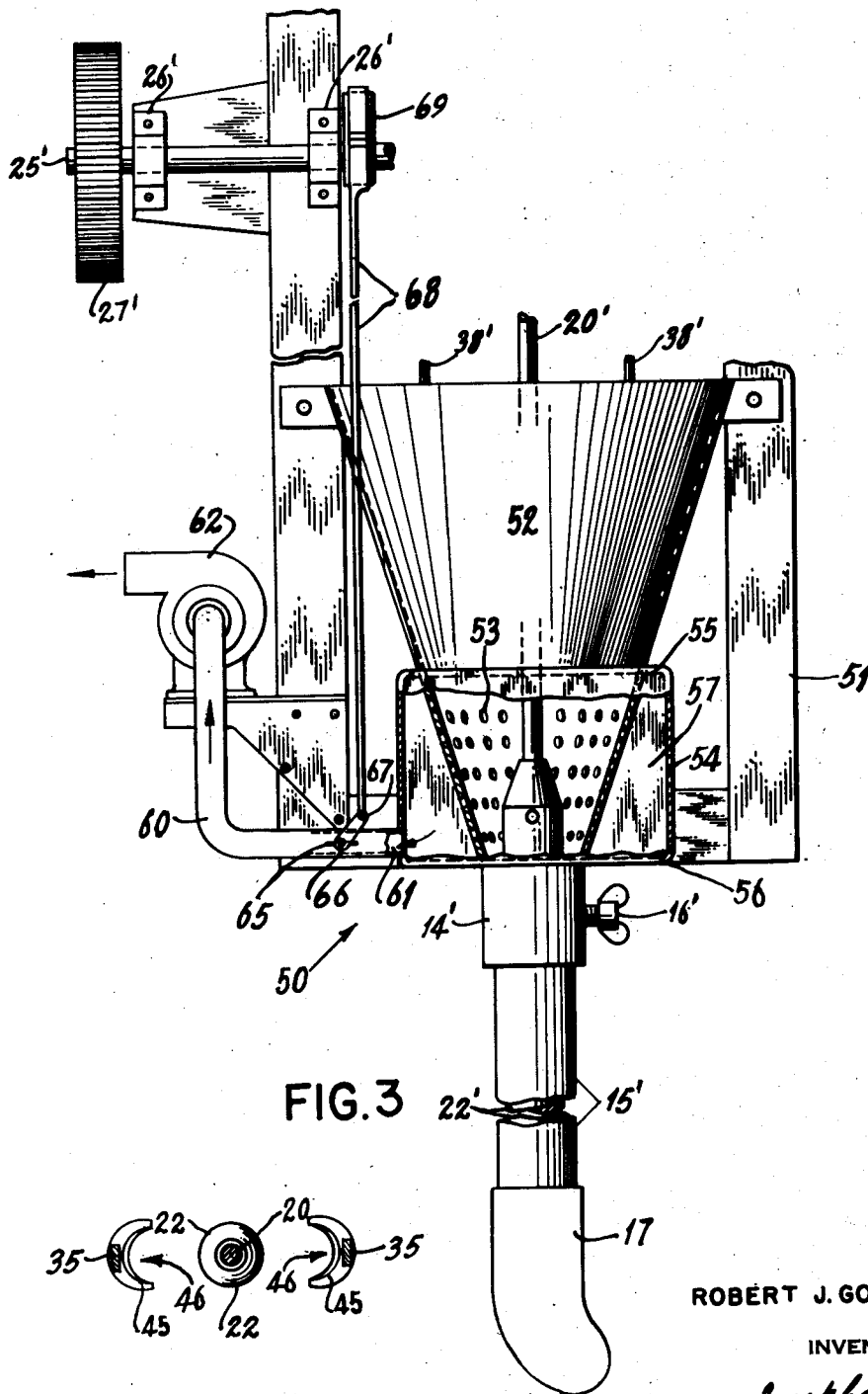
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FILLING MACHINE HAVING VERTICALLY RECIPROCABLE TAMPING ARMS AND PLUNGER

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2 Claims. (Cl. 226—19)

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This invention relates to a machine for filling small containers with rubber particles or like non-fluent material.

An object of this invention is to provide a conical hopper having a central nozzle for receiving a large supply of the rubber particles and to provide an elongated vertically movable plunger and two vertically and laterally movable tamping or pusher arms for pushing and collecting the filling material over the nozzle to permit the plunger to pack the collected material into a container secured to the lower end of the nozzle.

Another object of this invention is to provide a funnel shaped conical hopper having inwardly tapering walls and to pivotally mount the tamping or pusher arms so that as the arms are moved downwardly in the hopper, the tapering hopper walls cause the arms to simultaneously move laterally toward the nozzle.

Another object of this invention is to hang the tamping arms from a single horizontal cross-bar and to cause the arms to move vertically in unitary relation and an equal distance.

In practice it is found that downward movement of the plunger through the nozzle causes a void or empty space above the nozzle on the return stroke. This is due to the fact that rubber is a non-fluent material. The tamping arms push the particles of filling material toward the nozzle and fill the void before the plunger starts its downward stroke.

With the above and other objects in view, the invention will be hereinafter more particularly described, and the combination and arrangement of parts will be shown in the accompanying drawings and pointed out in the claims which form part of this specification.

Reference will now be had to the drawings, wherein like numerals of reference designate corresponding parts throughout the several views, in which:

Figure 1 is a central cross-sectional view of a fragmentary portion of the filling machine, showing tamping and packing mechanism movably mounted in a conical hopper.

Figure 2 is a front elevation of the entire filling machine.

Figure 3 is a front elevation of modified filling mechanism showing the lower portion of the hopper perforated and circumscribed by an inclosure and under air suction.

Figure 4 is an enlarged cross-sectional view taken as on line 4—4 in Figure 1, with the tamping arms shown in close relation with the plunger.

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Figure 5 is a cross-sectional view taken on line 5—5 in Figure 2, showing an eccentric and pitman, the remainder parts being omitted.

In the illustrated embodiment of the invention, the numeral 10 indicates a filling machine comprising a housing 11, having a conical hopper 12 fixed thereto by bolts 13.

The hopper 12 has a nozzle 14 at its lower end. A nozzle extension 15 is mounted in the nozzle 14 and held by means of a thumb screw 16. A container 17 is suitably secured to the nozzle extension 15. The container 17 may be an arm or a leg of a doll.

An elongated plunger rod 20 is mounted in bearings 21 fixed to the housing 11. A plunger 22 is secured to the plunger rod 20 by a pin 23 and is of slightly smaller diameter than the internal diameter of the nozzle 15. The upper end portion of the plunger 22 tapers upwardly and is reduced in diameter to substantially that of the plunger rod 20, as indicated by the numeral 24.

The drive mechanism for the plunger rod 20 and the plunger 22 consists of a shaft 25 mounted in bearings 26 suitably supported at the upper elevation of the housing 11. A gear 27 fixed to the shaft 25 and driven in any suitable manner from a power source causes rotation of the shaft 25.

Secured to the inner end of the shaft 25 is a counterbalanced crank arm 28 having one end of a link 29 pivotally connected thereto. The other end of the link 29 is pivotally connected to a head member 30 which is fixed to the plunger rod 20.

Rotation of the shaft 25 causes reciprocation of the plunger rod 20 and reciprocation of the plunger 22 into and out of the nozzle extension 15. It is to be noted that an annular clearance space 31 is provided around the plunger 22 and between the outer periphery of the plunger and the inner periphery of the nozzle extension 15 to facilitate the passage of the plunger through the nozzle extension without undue jamming action.

The material 32 to be fed into the container 17 is non-fluent and a void is formed above the nozzle on the return stroke of the plunger. For this purpose I provide tamping arms or pusher arms 35 which are pivotally mounted on pins 36 in a horizontal cross-head 37. The arms 35 are positioned diametrically of the conical hopper 12.

The cross-head 37 is guided for vertical reciprocating motion by guide rods 38 slidable in bearings 39. An eccentric 40 mounted on the shaft

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25 carries a pitman 41 having its lower end in operative engagement with the cross-head 37.

Rotation of the shaft 25 causes joint vertical reciprocation of the arms 35. The lower end portions of the arms are guided by the inclined walls of the hopper 12 for movement toward the axis of the nozzle and serve to collect and feed the material 32 to the nozzle. The tamping arms 35 consolidate the filling material. This consolidation permits its discharge into a container through a small diameter pipe or nozzle extension 15 by the plunger 22.

The arms 35 have semi-circular lower portions 45, each of which is shaped like a crescent with a concave inner face 46. The concavity 46 permits each lower portion 45 to closely approach the plunger 22 and feed the material 32 to the plunger 22.

The modified filling mechanism, identified by the numeral 50, comprises a housing 51 having a conical hopper 52 suitably fixed thereto. The hopper 52 has a nozzle 14¹. A nozzle extension 15¹ is mounted in the nozzle 14¹ and held by thumb screw 16¹. A container 17 is suitably secured to the nozzle extension 15¹, the same as shown in Figure 1.

The modified filling mechanism 50 also comprises a plunger rod 20¹ and a plunger 22¹ driven by a gear 27¹ and a shaft 25¹ mounted in bearings 26¹, the same as shown in Figure 2.

The modified filling mechanism 50 also comprises a cross-head and feeding arms guided by rods 38¹ and driven by a crank arm and by an eccentric (not shown), the same as shown in Figure 2.

The hopper 52 has apertures 53 all around its lower portion while the upper portion of the hopper is intact. A cylindrical jacket 54 having a larger inner diameter than the outer diameter of the apertured lower portion of the hopper 52 is mounted in circumscribing relation with the hopper. The jacket 54 has upper and lower flanges 55, 56 in suitably contacting relation with the hopper 52.

A chamber 57 of annular cross-section is formed between the jacket 54 and the hopper 52. A tube 60 has one end mounted in an aperture 61 in the jacket 54. The other end of the tube 60 is connected with the suction or inlet of an exhaust fan 52, well known in the art.

A butterfly or disk valve 65 is mounted on a pin 66, passing diametrically through the valve 65 and through the tube 60. The valve 65 is actuated by an arm 67, secured to the pin 66. The free end of the arm 67 is pivotally connected to the lower end of a pitman 63 driven by an eccentric 69 on the shaft 25¹.

Motion is intermittently and automatically communicated to the butterfly valve 65 by the pitman 63 and timed so that the valve is moved into position to close the suction tube 60, to permit a quantity of filling material to be fed into a container frictionally held on the nozzle extension 15¹.

The plunger 22¹ is then raised, thereby cutting off the flow of filling material from the hopper 52. The pitman 63 simultaneously swings the butterfly valve 65 into position to open the suction tube 60. The suction causes the air in the perforated portion of the hopper to be withdrawn therefrom before the plunger is lowered.

This causes a suction on the filling material which gives it an initial compacting and so when the pusher arms come down they compact the material still further and hold it in place during

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the downward feeding movement of the plunger through the nozzle.

Operation

The filling material is placed in the conical hopper having a long tubular nozzle extension at its lower end. A small container such as a hand or foot of a doll is attached to the lower end portion of the nozzle extension.

The filling material is forced into the container by the vertically reciprocable plunger which is carried down within the nozzle with its lower end slightly below the nozzle extension.

In the disclosure shown, two pusher arms are positioned diametrically of the hopper and are movable vertically and laterally in the hopper in contacting relation with the sides of the hopper. The arms follow the sloping sides of the hopper towards the nozzle. The lower ends of the pusher arms are of semi-circular form adapted to partly circumscribe the plunger.

The plunger and pusher arms move simultaneously in the same direction for a short time. The plunger is moved through a large distance while the pusher arms are moved through a small distance.

Each stroke of the plunger forces a wad of the material into the container, about three to fifteen reciprocations of the plunger fills a container, depending upon the size of the container.

It is to be noted that by non-fluent materials, I mean to include cotton, kapok, wool, latex foam rubber, etc.

It is to be particularly noted that the action of the mechanism is arranged so that the pusher or tamping arms 35 first feed the filling material down toward the opening in the bottom of the hopper and hold the material in compacted form under pressure and that the plunger 22 then comes down and pushes the already compacted material into and through the nozzle extension. This filling machine thus exerts a two-step feeding action, first feeding the material toward the opening in the bottom of the hopper so as to compact the material, and second, feeding the material through the hopper and through the nozzle and into a container in timed relation.

The pusher arms 35 have already been returned to their starting position and when the plunger is likewise returned to its starting position, the cycle is repeated.

It is to be noted that I may extend the hopper so as to circumscribe a portion of the nozzle extension (not shown). This will augment the suction area and increase the quantity of material that the plunger can push through the nozzle.

In accordance with the patent statutes I have described and illustrated the preferred embodiment of my invention, but it will be understood that various changes and modifications can be made therein without departing from the spirit of the invention as defined by the appended claims.

I claim:

1. In a two-step feeding machine for filling containers with particles of non-fluent material, a housing, an upright conical and perforated hopper fixed to said housing and having a tubular nozzle at its lower end, a plunger reciprocally mounted on said housing for up and down movement in said hopper and through said nozzle, a cross-head slidably mounted on said housing, two tamping arms pivotally mounted on said cross-head and reciprocally mounted for up and down movements, said arms being in diametrically contacting relation with the inclined walls

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of said hopper and guided by said walls for simultaneous movement to said nozzle, the lower end portions of said arms facing said nozzle being semi-circular and adapted for movement toward the axis of said nozzle for collecting and feeding said filling material to said nozzle, to permit said plunger in its downward movement to pack said collected material into said container, a drive shaft mounted transversely of said housing and having an eccentric thereon, a connecting rod mounted on said eccentric at one end and being connected to said cross-head at the other end, a crank fixed at one end of said shaft, a link pivotally secured to said crank at one end and being pivotally connected to said plunger at the other end, said plunger and said tamping arms being independently driven from said drive shaft in timed relation, whereby the tamping arms first feed the filling material toward the opening in the bottom of the hopper and hold the material in compacted form and the plunger then comes down and pushes the already compacted material into and through said nozzle, and air suction means communicating with said perforated hopper for removing the air from said filling material for creating an air stream in said hopper facilitating the downward movement of said material.

2. In a two-step feeding machine for filling containers with particles of non-fluent material, a housing, an upright conical hopper fixed to said housing and having a tubular nozzle at its lower end, a plunger reciprocally mounted on said housing for up and down movement in said hopper and through said nozzle, a cross-head slidably mounted on said housing, two tamping arms pivotally mounted on said cross-head and reciprocally mounted for up and down movements,

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said arms being in diametrically contacting relation with the inclined walls of said hopper and guided by said walls for simultaneous movement to said nozzle, the lower end portions of said arms facing said nozzle and being semi-circular and adapted for movement toward the axis of said nozzle for collecting and feeding said filling material to said nozzle, to permit said plunger in its downward movement to pack said collected material into said container, a drive shaft mounted transversely of said housing and having an eccentric thereon, a connecting rod mounted on said eccentric at one end and being connected to said cross-head at the other end, a crank fixed at one end of said shaft, a link pivotally secured to said crank at one end and being pivotally connected to said plunger at the other end, said plunger and said tamping arms being independently driven from said drive shaft in timed relation, whereby the tamping arms first feed the filling material toward the opening in the bottom of the hopper and hold the material in compacted form and the plunger then comes down and pushes the already compacted material into and through said nozzle.

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