

Jan. 31, 1956

R. P. MOORE

2,732,987

CAPSULE CLEANING AND INSPECTING MACHINE

Filed Feb. 8, 1951

5 Sheets-Sheet 1

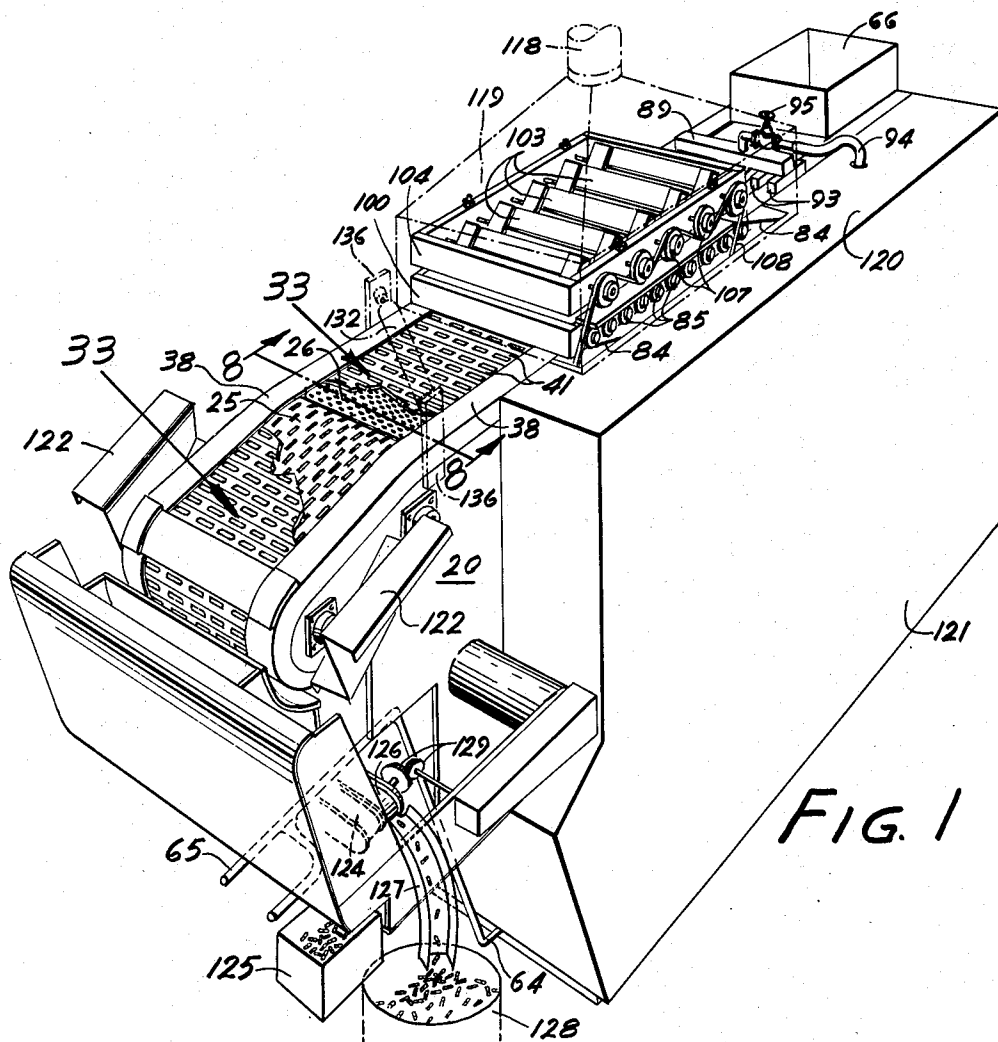


FIG. 1

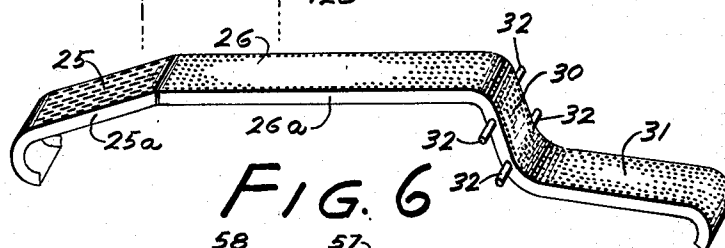


FIG. 6

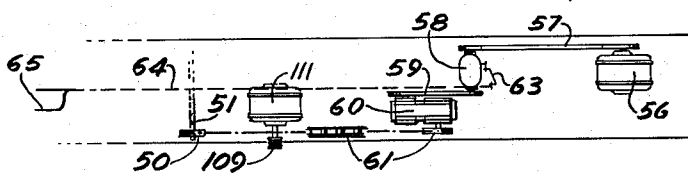


FIG. 7

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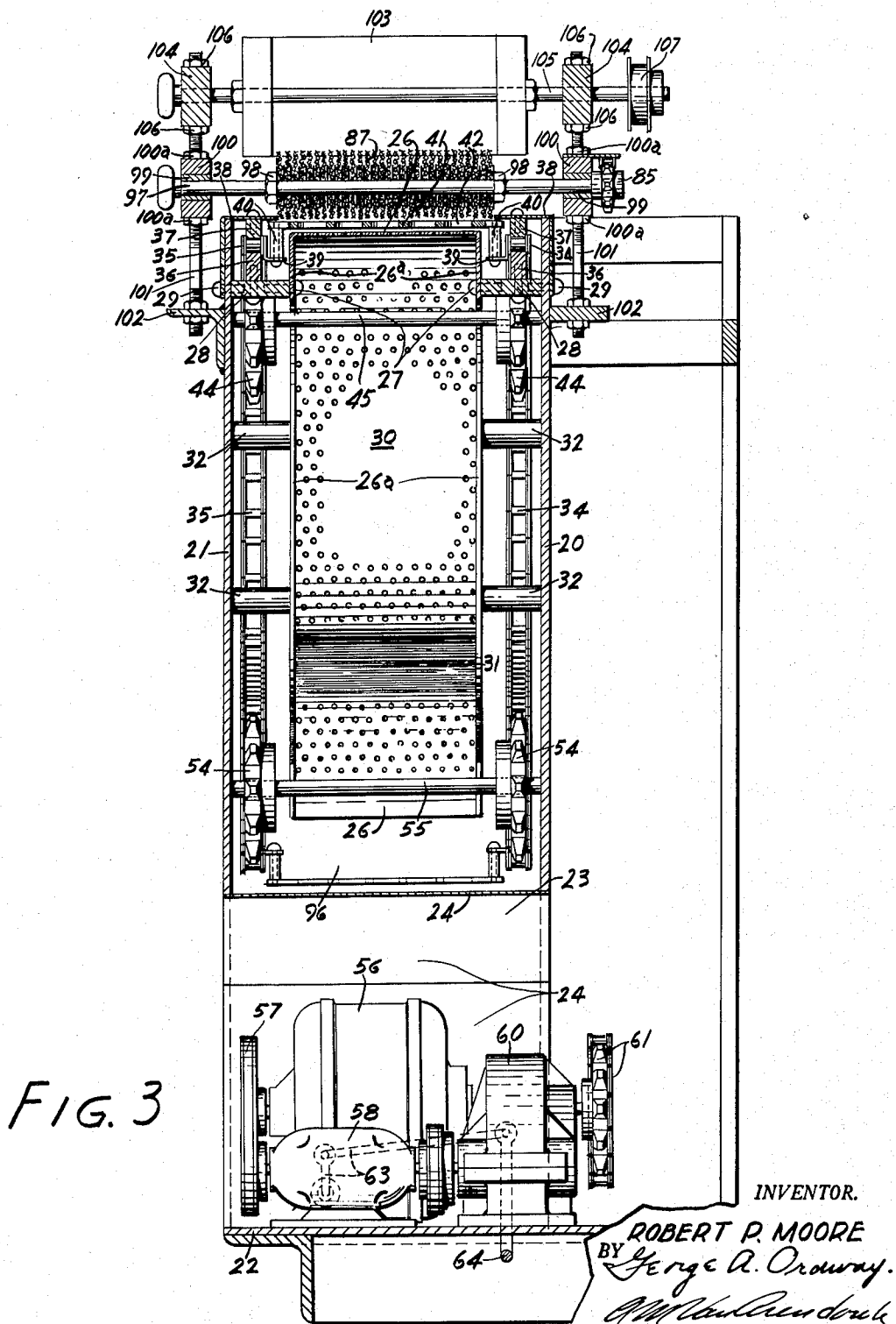
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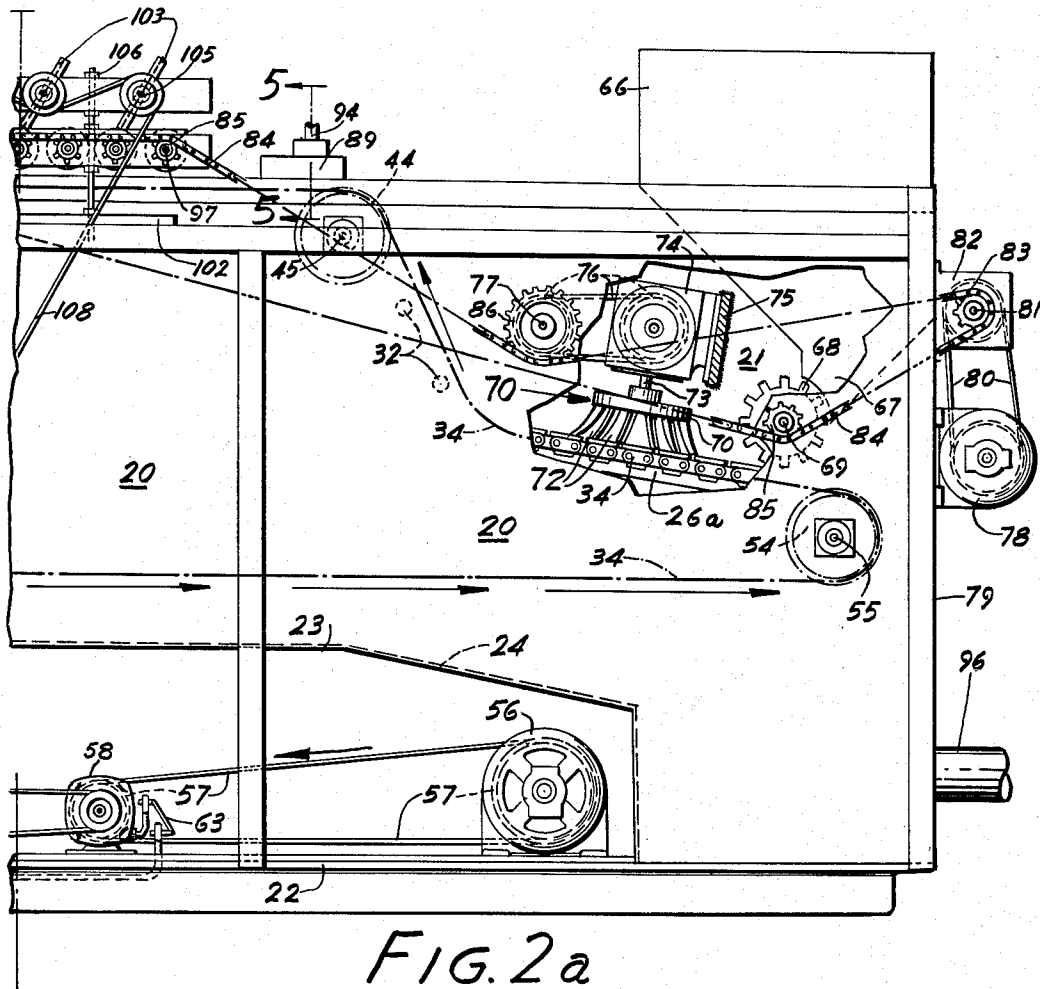


FIG. 2a

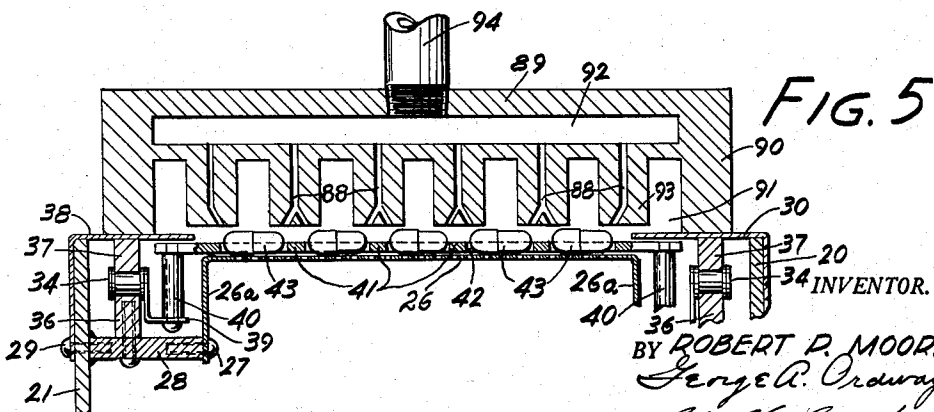


FIG. 5

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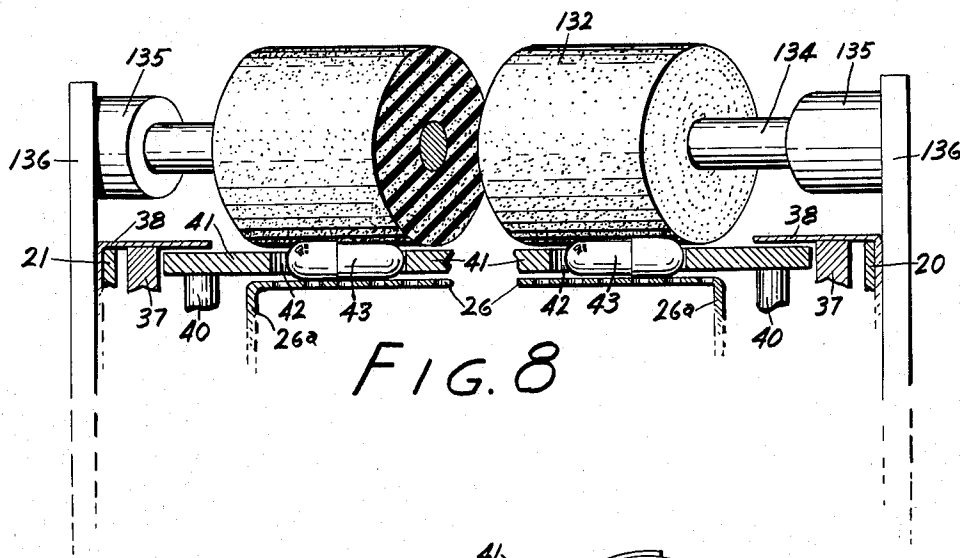


FIG. 8

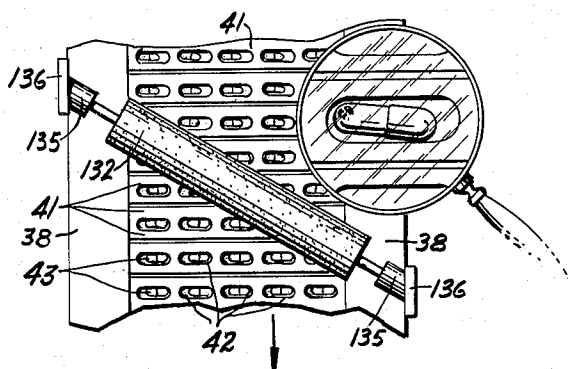


FIG. 9

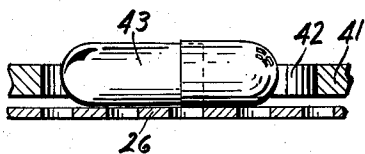


FIG. 10

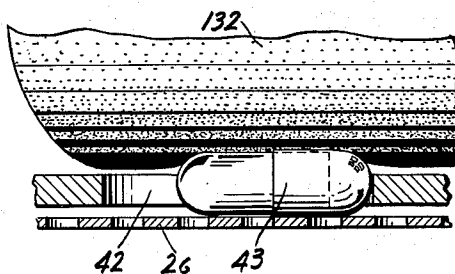


FIG. 11

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2,732,987

CAPSULE CLEANING AND INSPECTING MACHINE

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Application February 8, 1951, Serial No. 210,049

5 Claims. (Cl. 226—41)

This invention relates to a machine for handling capsules and more particularly to a machine for cleaning and polishing capsules and presenting them in an orderly array for inspection preparatory to their being packaged for sale to the trade.

Various powdered medicaments such as are encapsulated by the pharmaceutical industry tend, during the capsule filling operations, to adhere to and form a powdery coating over the outer surfaces of their containing capsules. This coating is not only unsightly and undesirable in appearance but is further objectionable in that it defeats certain fundamental purposes of encapsulation, namely the prevention of the medicament from being tasted during oral administration and the containing of the medicament in precisely the proper dose amount. It therefore, has been the custom in the drug industry to wipe loose powder from and polish all such powder-filled capsules before packaging them for distribution. Heretofore, the cleaning and polishing operations have been performed manually, by depositing a quantity of the capsules at random between layers or folds of a sheet of cheesecloth or the like, and rolling the capsules between such folds with a reciprocating or circular manipulation to remove these powder particles. This method of cleaning has been found to be quite costly and time consuming, especially, when dealing with a mass production volume of capsules. Such hand methods, in addition to requiring the employment of numerous operators, are not altogether satisfactory because frequently portions of the surfaces of a substantial number of the capsules escape any contact with the wiping cloth and thus fail to be cleaned. This is probably partially due to the disorganized and random manner in which capsules are handled under such methods. Moreover, as the wiping cloths rather quickly become saturated with the particular powder medicament encapsulated, frequent changing and laundering of the cloths is necessary and this also increases the expense of the operations. Following the cleaning, the capsules are usually brought to an inspecting machine where the capsules are passed, continuously, in a randomly formed single layer, under the eyes of inspectors who remove those capsules failing below the established standards, including capsules the exteriors of which are not substantially completely free of any trace of the powdered medicament.

It is an object of the present invention to provide a machine for orienting and presenting large quantities of capsules in continuous, orderly, discrete, single-layer array into association with a thorough and positively acting cleaning means and forthwith, following such cleaning operations, to a visual inspection station.

Another object of the invention is to provide a machine of the above character in which each capsule is rotated during its traverse of the various sections of the machine so that all portions of the capsule surfaces are presented to the cleaning and polishing actions of each of the units provided for this purpose and, similarly, all

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portions of the capsules are presented to view and the inspection operations thereby facilitated.

A further object is to provide in a machine of the above character, mechanism adapted to insure that the capsule caps are fully joined upon their respective capsule bodies following the cleaning and polishing operations.

A still further object is to provide a machine in which the speed of transportation of the capsules through the machine is responsively and conveniently under the control of the operator at all times so that if a group of capsules below inspection standard is encountered, the machine may be slowed down to a speed appropriate to the purposes of manually culling all of the unsatisfactory capsules.

Other objects, features, innovations, elements, and combinations of the invention will be discernible from the following description which is to be taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of the capsule cleaning, polishing and inspecting machine,

Figures 2-2a, taken together, constitute a right side elevation of the machine, certain parts being broken away for clearness of illustration,

Figure 3 is a sectional elevation taken along the line 3—3 of Figure 2,

Figure 4 is a detailed perspective in enlarged scale, of one unit of the cleaning and polishing section of the machine,

Figure 5 is a detailed sectional elevation in enlarged scale, taken along the line 5—5 of Figure 2a and showing particularly an air pressure operated, pre-cleaning station,

Figure 6 is a detailed perspective in reduced scale, showing a foraminous plate or bed upon which the capsules are supported during their traverse of the various cleaning and inspection stations,

Figure 7, is a diagrammatic view of the main machine drive and the speed control therefor,

Figure 8 is a detailed front elevation in enlarged scale, taken substantially along the line 8—8 of Figure 1 and shows certain mechanism which may be used on the machine to insure that the capsule caps are in fully joined position on their respective capsule bodies following the cleaning and polishing operations,

Figure 9 is a detailed top plan view of the mechanism shown in Figure 8, and

Figures 10 and 11 are detailed, diagrammatic views in enlarged scale, showing the manner in which the mechanism shown in Figures 8 and 9 operates to insure that the capsule caps are fully joined upon the capsule bodies.

The machine frame includes two spaced, parallel, vertically disposed, substantially rectangularly shaped side plates 20 and 21 (Figs. 2, 2a and 3) welded or otherwise suitably secured at the lower edges of their fore and aft ends to a base 22. Intermediate their ends, the lower edges of the plates are recessed as at 23 (Figs. 2 and 2a) from their lower edges to provide clearance for and ready access to certain machine driving mechanism mounted on base 22 and hereinafter to be described. A formed plate 24 extends transversely between plates 20 and 21 and completely covers the opening therebetween formed by the recesses 23.

A capsule-supporting, bed-plate of foraminous stock and comprised of a forward section 25 and a rear section 26 (Figs. 1 and 6) is affixed between plates 20 and 21 adjacent their upper edges, as shown in Figs. 3 and 4 by screws 27 passing through depending flanges 25a and 26a of plates 25 and 26, respectively, and threaded into oppositely disposed, inwardly projecting spacing bars 28,

fixed by screws 29 to plates 20 and 21. Forward section 25 is disposed between the plates at an angle on the order of 15° and, its foraminations are preferably elongate slots arranged in alternate, staggered row formation and extending longitudinally of the machine. The rear section 26 has simple circular foraminations and, as clearly shown in Fig. 6, has a major body portion of its surface extending in a horizontal plane which merges into an angularly disposed portion indicated at 30. The angle of the portion 30 may lie within a range from 23–27° but is preferably formed at 25°.

The lower end of angular portion 30 merges in a smooth curve into a slightly angularly disposed rear portion 31, the angle of which as mounted in the machine is approximately 9° to the horizontal. Short cylindrical supporting and spacing studs 32 (see also Fig. 3) are secured between the flanges 26a and the inner surfaces of side walls 20 and 21 to insure the rigid support of the angular portion 30 in proper position in the machine frame.

For purposes of clarity in illustration, the capsule supporting bedplate sections 25 and 26, just described, are omitted in Figs. 2 and 2a, except for an indication of the support studs 32 in dotted lines and a partial showing (in Fig. 2a through a broken portion of wall 20) of flange 26a formed on the rear capsule supporting section 26. These bed-plate sections 25 and 26 underlie in close spaced relation the upper stretch of a conveyor, generally indicated at 33. Conveyor 33 comprises a pair of spaced, parallel, endless roller chains 34 and 35, each of which is guided for travel between lower guides 36 (Fig. 3) and upper guides 37. Lower guides 36 are rigidly mounted on the upper surfaces of bars 28 whereas the upper guides 37 are dependently supported from angle strips 38 secured to sides 20 and 21. The clearance between the lower surfaces of guides 37 and the upper surfaces of guides 36 is such as to permit free and easy travel of the chains 34 and 35, guidedly therebetween. The path of the upper stretch of the conveyor 33 through the machine, follows the general profile configuration of the capsule supporting bed-plate sections 25 and 26, guides 36 and 37 being angularly disposed at appropriate portions thereof to effect this conformation.

Inwardly projecting lugs 39 (Figs. 3, 4, and 5) affixed to each link of chains 34 and 35 carry upstanding pins 40 to the upper ends of which are attached the opposite ends of horizontally disposed, relatively narrow, thin, elongate, strips 41. Strips 41 span transversely across, in slightly spaced relation above, the upper surfaces of the capsule-supporting bed-plates 25 and 26, between roller chains 34 and 35. Each strip 41 is provided with a series of uniform, longitudinally extending, aligned and spaced, elongate slots 42. Each slot 42 is of such length and width as to receive a capsule 43 (with the latter laying in horizontal position) freely and with ample clearance, the length, however, being somewhat greater than the width clearance for reasons hereinafter appearing. The spacing between the upper surfaces of bed-plates 25 and 26 and the under surfaces of strips 41 is such that when a capsule 43 is positioned within a slot 42 the mean longitudinal center line of the capsule will lie substantially in the plane of the mean longitudinal center line of the strip 41 as clearly shown in Fig. 10. The roller chains 34 and 35 together with the slotted strips 41 constitute conveyor 33. Chains 34 and 35 are mounted as shown in Figs. 2 and 2a over a series of spaced pairs of idler sprockets which are arranged as follows:

Two pairs of idler sprockets such as 44 supported upon shafts 45 journaled for rotation in plates 20–21 engage the upper stretch of chains 34 and 35. Chains 34 and 35, at the forward end of the machine, pass around a pair of sprockets such as 46 affixed to shaft 47 which is similarly journaled for rotation in side plates 20–21. From here, the chains pass for a short distance toward the rear of the machine over a pair of sprockets such as 48 fixed to an idler shaft 49 similarly journaled in the machine side plates. The chains, together with their

strips 41 then pass downwardly around a pair of drive sprockets such as 50 fixed to a shaft 51 journaled for rotation in side plates 20 and 21. From drive sprockets 50 the chains and their spanning strips 41 pass upwardly over a pair of relatively large idler sprockets such as 52 fixed on a shaft 53. From idler sprockets 52 the lower stretch of the conveyor passes for a considerable distance rearwardly and around a pair of idler sprockets such as 54 (see also Fig. 3) fixed upon a shaft 55 located adjacent the rear end of the machine and journaled for rotation in side plates 20–21. From sprockets 54 the conveyor passes forwardly and upwardly through an angle of approximately 9° corresponding to the portion 31 of the capsule-supporting bed-plate 26, thence upwardly at an angle of approximately 25° over that portion 30 of bed-plate 26 to the first pair of idler sprockets 44, thence horizontally over the horizontal portion of bed-plate 26 to the second pair of such sprockets 44, located at the forward end of the machine.

An electric motor 56 (Figs. 2, 2a, 3 and 7) is connected by belt and pulley connections 57 with a variable speed control unit 58. Unit 58 is connected by belt and pulley connections 59 to a gear reducer 60 which, in turn, is connected by chain and sprocket connections 61 with a sprocket 62 fixed on shaft 51. Through the train of connections just described, upon operation of motor 56, shaft 51 and drive sprocket 50 are driven continuously in rotation in a counter-clockwise direction as viewed in Fig. 2, to advance conveyor 33 as directed by guides 36 and 37 around the various idler sprockets 52, 54, 44–44, 46 and 48.

It will be understood, of course, that corresponding portions of the guides 36 and 37 are mounted in correct angular position along the inner surfaces of side walls 20–21 to maintain the conveyor in correct angular position and spaced relation from the angular portions 30 and 31 of bed plate 26 during the travel of the conveyor from the lowermost idler sprockets 54 to idler sprockets 44.

The speed of travel of the conveyor is conveniently and responsively under the control of the operator by means of a linkage 63 (Figs. 2, 2a, 3 and 7) connected with the variable speed control 58 and a rod 64 associated with such linkage and extending forwardly of the machine. Rod 64 terminates at the forward end thereof with a yoke 65 adapted to embrace the knee or leg of the operator. By shifting yoke 65 and rod 64 to the left or to the right, the variable speed control 58 is actuated to increase or decrease the speed of advance of the conveyor to suit the requirements of the operator.

Capsules 43 to be cleaned are contained within and fed from a hopper 66 (Figs. 1 and 2a) mounted above the upper stretch of the conveyor at the rear end of the machine. The lower end of the hopper 66 (Fig. 2a) is provided with a tapering throat 67 from which the capsules are fed by gravity to a fluted drum 68 which extends transversely across the upper stretch of the conveyor and is mounted upon a horizontally disposed shaft 69 journaled for rotation in side walls 20–21 and arranged to be driven in rotation in a manner later to be described. The capsules generally assume a horizontal position immediately as they fall from the grooves of drum 68 onto the strips 41 of the conveyor and, in ascending the gradual slope of approximately 9°, more or less scatter themselves thereover and deposit themselves by gravity into the elongated slots 42. In ascending the 25° incline of the portion 30 of bed-plate 26, such capsules as have not registered themselves within slots 42 roll by gravity down the slope of the inclined portion 30 and ultimately find themselves contained within one of the vacant slots 42.

If desired, to assist in the distribution and registration of the capsules within the slots, there may be provided a rotating distributing means generally indicated at 70 in Fig. 2a. This distributing means comprises a disk 71

having depending, pliant fins 72 of rubber or other suitable resilient material the lower ends of which lightly contact the upper surfaces of strips 41. This distributing means or brush assembly is affixed to a shaft 73 of a gear box 74 mounted on a cross bar 75 suitably secured between side walls 20—21. The gearing (not shown) of gear box 74 is arranged to be driven through belt and pulley connections 76 by a shaft 77 journaled for rotation in side walls 20—21. The means for driving shafts 69 and 77 comprises a motor 78 mounted on the rear wall 79 of the machine frame. Motor 78 is connected by belt and pulley connections 80, to drive a shaft 81 journaled in a bracket 82 secured on the rear wall 79 of the machine frame. Shaft 81 has affixed thereon a sprocket 83. An endless roller chain 84 passing around sprocket 83 engages a sprocket 85 affixed on shaft 69 and also engages a sprocket 86 affixed on shaft 77. Chain 84 also passes over and engages a series of sprockets 85 fixed on shafts 97 of a series of cleaning or buffing rollers 87 later to be described. Suffice it now to say that when motor 78 is operating, drum 63 is continuously driven in rotation to feed capsules 43 from hopper 66 onto the upper stretch of conveyor 33 and the rotating distributing means 70 is continuously driven in rotation to aid in effecting complete distribution of capsules 43 over the surfaces of strips 41 and thereby expedite the entry of the capsules into the confines of the slots 42.

It has been found in practice that an extremely good distribution and location of the capsules within slots 42 is obtained simply by permitting them to fall from the grooves of drum 63 and ride up the slight incline of 9° and thence up the steeper incline of 25°. For the most part, the capsules find themselves located within one slot or another during such movement. However, for such slight few as may not find themselves in a slot 42, the distributor 70 through the light brushing contact of fins 72 substantially assures the location of each and every capsule deposited upon the conveyor by drum 68.

As strips 41 advance over bed-plates 25 and 26 there is a sufficient frictional engagement between the outer surfaces of the capsules and the upper surfaces of the foraminated bed-plates 25 and 26 to cause the capsules to be continuously rotated about their axes as they are pushed along the bed-plates by the strips. This is an important feature in that it causes all surfaces of the capsules to be presented to the cleaning and buffing action of the various cleaning units of the machine now to be described.

As the conveyor reaches the top of incline 30 of bed-plate 26 (Fig. 2a) and commences its horizontal travel, the entire surfaces of the capsules are presented first to a series of air jets 83 (Fig. 5) formed in an air cleaning unit 89 extending transversely across and mounted upon the top of the machine, in slightly spaced relation above the upper surfaces of capsules 43.

The air cleaning unit 89 comprises a block 90 chambered as at 91 and 92 to provide a series of nozzles 93 in which the jets 83 are formed. Each of the jets communicates with the common chamber 92 which is connected by a pipe and hose connection 94 to a source of compressed air (not shown), a manually operated control valve 95 (Fig. 1) being interposed in the air supply line to regulate the flow of air. It will be noted from Fig. 5 that the lower ends of nozzles 93 lie in close proximity to the capsule surfaces. Hence, the rushing currents of air flowing through jets 83 preliminarily clean the capsule surfaces by blowing the particles of dust therefrom and through the foraminations of bed plate 26 into the interior of the enclosure formed by side walls 20—21, cover 24, and rear wall 79.

The dust particles are withdrawn from the enclosure through a duct 96 (Fig. 2a) provided at the rear end of the machine, the duct being connected with a suitable air exhaust system (not shown).

Following the passage of the capsules beneath the air

jet cleaning unit 89, they pass under the series of wiping or buffing rollers 87 (Figs. 2, 3 and 4). Each roller 87 is comprised of a multitude of disks of cotton, canvas or other suitable textile material mounted on shafts 97 and held in tightly compressed relation thereon by nuts 98. The opposite ends of shafts 97 are journaled for rotation in bearings 99 provided in a rectangular frame 100. Referring to Fig. 3 it is seen that frame 100 is supported for vertical adjustment on oppositely disposed, upright, threaded studs 101 affixed to outwardly projecting brackets 102 secured on side plates 20—21. Frame 100 is preferably adjusted by nuts 100a in such spaced relation from rollers 87 that the peripheries of the latter engage the surfaces of the capsules with a light, but positive wiping contact as the capsules pass thereunder.

The right end of each shaft 97 passes through its bearing in frame 100 and has fixed thereon a sprocket 85 which sprockets, as before stated, are collectively engaged by chain 84 whereby shafts 97 and their rollers 87 are continuously driven in rotation in a counter-clockwise direction as viewed in Figs. 2—2a. As the capsules are engaged by rollers 87, the capsules are positively rotated about their axes in a direction opposite to their direction of rotation as they are advanced by conveyor 33 over bed plate 26, so that the entire surface of each capsule is presented to the wiping and buffing action of each roller 87 as the capsule passes thereunder. Hence all traces of powder are removed from the capsules, the surfaces of the rollers yielding sufficiently to insure a wiping action upon the opposed rounded ends of the capsules as well as upon the intermediate body portions.

In order to maintain the rollers 87 free of the dust or powder material wiped from the capsules, there is provided a series of blades or beaters 103, there being one blade for each pair of rollers 87. Blades 103 extend transversely across a frame 104 similar to and mounted above frame 100 upon studs 101. The blades are fixed upon horizontally disposed shafts 105 journaled for rotation at their opposite ends in frame 104, which latter is adjusted vertically upon the studs, by nuts 106 so as to bring the edges of the blades into a brushing or beating engagement with the peripheries of rollers 87. The right end of each shaft 105 extends beyond the outer wall of frame 104 and has affixed thereto a pulley 107. A belt 108 passing alternately over and under pulleys 107 and also around one groove of a double pulley 109 affixed to a shaft 110 of an electric motor 111 drives the blades continuously in rotation in alternately opposite directions. A tension pulley 112 adjustable along a rod 113 mounted on side plate 20 maintains proper tension upon belt 108. A belt 114 passing around the other groove of double pulley 109 and also around a series of pulleys 115 affixed to shafts 116, simultaneously drives these shafts in rotation. A series of wiping or buffing rollers indicated in dotted lines at 117 and corresponding to the buffer rollers 87 are arranged to engage the inwardly facing sides of strips 41 to wipe any loose powder therefrom as the conveyor 33 traverses the forward, lower, interior portion of the enclosure formed by side walls 20—21, base 22, and rear wall 79. Such powder-dust as is cast about the atmosphere of this enclosure is, of course, withdrawn with the air stream passing from the enclosure through duct 96. The powder beaten or agitated from rollers 87 by blades 103 is carried away through a duct 118 (Fig. 1) provided at the upper, funneled end of a rectangularly shaped housing 119, duct 118 being connected to a suitable air exhaust system (not shown). Housing 119 seats flush upon the upper surfaces of the top 120 of a cabinet 121 containing all of the belt and pulley connections just described, and completely encases all of the blades 103 and rollers 87.

Following the cleaning operations, the capsules are advanced by conveyor 33 down the 15° incline at the forward end of the machine where they may be readily and conveniently inspected by the operator. It has been found

in practice that by providing the bed plate 25 with elongate foraminations extending longitudinally thereof as shown in Fig. 1, the operator is subjected to less eye strain than when these foraminations are circular as in bed plate 26. By shifting the knee or leg control 65 to the left or right as before stated, the speed of conveyor 33 may be raised or lowered at the will of the operator. Hence, if a particular portion of a run of capsules presents an undesirably large number of unsatisfactory capsules, the machine may be slowed down to a speed that will permit the operator sufficient time to insure of the removal of all capsules not meeting the required standard. Inclined chutes 122 affixed on the opposite sides of the forward end of the machine have their forward lower ends lying in vertical alignment with a transversely disposed conveyor belt 124 positioned over a receptacle 125 for receiving imperfect or inferior or rejected capsules. In operation, the operator simply removes those capsules which are unsatisfactory, using either the right or left hand or both, and drops them into the nearest chute 132 whereupon they slide down the latter and fall upon conveyor 124 which carries them to receptacle 125. Those cleaned capsules which pass inspection continue on their course as the strips 41 travel around and under sprockets 46 and, as the strips invert upon reaching the lower portion of the turn, the capsules fall upon a conveyor 126 similar and extending parallel to conveyor 124. Conveyor 126 carries the cleaned and inspected capsules to a chute 127 down which they slide into a suitable receptacle 128.

Conveyors 124 and 126 are of the conventional belt type and are driven continuously by suitable bevel gearing 129 connected as by means of chain and sprockets 130 to a sprocket 131 affixed on the driven shaft 49 as shown in Fig. 2.

Since the caps of the capsules are held on their respective capsule bodies by frictional engagement only, handling of the capsules in their promiscuous state, such as pouring them from a supply container into hopper 66 and distributing them into the slots 42, may tend to cause some of the caps to become partially disjoined from their respective bodies as shown in Fig. 10.

The present machine is provided with mechanism for insuring that all of the caps are fully joined on their respective capsule bodies following the cleaning and polishing operations and preparatory to their advancement over bed-plate 25 for inspection. This mechanism comprises a roller 132 (Figs. 8 and 9) of semi-soft, sponge rubber or similar resilient material fixed upon a horizontally disposed shaft 134. Shaft 134 and roller 132 are mounted obliquely across the forward end of bed-plate 26 by journaling the opposite ends of shaft 134 for free rotation in angularly disposed bearings 135 provided on upright supports 136 affixed in offset relation, as shown in Figs. 1 and 9, to side plates 20 and 21. The spacing between the periphery of roller 132 and the upper surface of bed-plate 26 is slightly less than the mean diameter of the capsules. Hence, as the capsules are advanced by strips 41 into the plane of roller 132, they are yieldingly but frictionally engaged by the roller. As the capsules advance under the roller, their frictional engagement with the roller imparts rotation thereto in a direction opposite to that in which the capsules are rotated about their own axes. This opposite rotation of the obliquely disposed roller, by virtue of the frictional engagement of the capsule caps and bodies, biases the capsules bodily, longitudinally of slots 42 until one end of the capsule (either the cap or body end, as the case may be) abuts one end of that slot 42 in which the capsule is contained, as illustrated in Fig. 11. Following such abutment, the body or cap is moved under the influence of the roller into fully joined position with respect to its associated cap or body.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

What is claimed is:

1. In a machine of the class described, a conveyor for carrying capsules, said conveyor comprising a pair of stationarily mounted bed-plate sections of foraminous material, the foraminations being circular in one section and longitudinally elongate in the other, an endless series of relatively narrow strips closely spaced together and extending transversely across and in slightly spaced relation above the upper surfaces of said bed-plate sections, each strip of said series being provided with a plurality of elongate, longitudinally extending slots each of which is adapted to contain but a single horizontally disposed capsule, means for continuously moving said strips over said bed-plate sections, a hopper containing a supply of capsules, means for feeding capsules from said hopper in generally horizontal position onto said strips, said bed-plate sections and strips being angularly disposed from the horizontal at portions thereof to expedite and assist in effecting the deposition of the capsules into a contained relation within said slots.

2. In a machine of the class described, means for conveying capsules discretely in horizontal position and in multiple rows over a predetermined path, means for effecting axial rotation of the capsules during their traverse of such path, cleaning rollers driven in rotation and extending transversely across said path, said rollers being adapted to frictionally bear against the surface of said capsules and remove powderdust therefrom as the capsules travel along said path, rotating blades associated with said cleaning rollers and adapted to remove dust therefrom by agitation, a housing enclosing said conveying means, cleaning rollers, and blades, and an air exhaust duct connected with said housing for carrying off dust removed from said capsules and rollers.

3. In a machine of the class described, means for moving large quantities of capsules in discrete, aligned, horizontally disposed, single layer, array over a predetermined path and for simultaneously imparting axial rotation thereto during such movement along said path, a series of positively driven cleaning rollers associated with said capsule moving means and adapted to engage and clean the surfaces of said capsules as they come into association therewith during their movement along said path, and a resilient roller mounted for free rotation at an angle oblique to the longitudinal axes of the capsules as they travel along said path whereby, as the capsules come into association with said freely rotatable roller, rotative movement is imparted thereto, and the capsules, including their component parts, are bodily biased longitudinally an extent sufficient to insure that the capsules are fully joined.

4. In a machine of the class described, means for conveying capsules discretely oriented one from another in spaced, horizontal position and in multiple rows over a predetermined path; means for cleaning and polishing said capsules as they traverse certain portions of said path; said conveying means including stationary, foraminous, capsule-supporting bedplates and movable capsule-carrying strips arranged to travel in spaced relation over said bedplates; each of said strips extending transversely across said bedplates and having a series of longitudinally disposed, elongate slots for receiving, containing and moving the capsules over the bedplates; the foraminations in at least a portion of said bedplate construction being elongate in a direction substantially at right angles to the direction of the capsule-receiving slots whereby inspection of the cleaned and polished capsules is facilitated and the eye strain normally attending such inspection is materially reduced.

5. In a machine of the class described, means for moving large quantities of capsules in discrete, aligned, horizontally disposed, single layer, array over a predetermined path and for simultaneously imparting axial rotation thereto during such movement along said path; said moving means including strips having a plurality of longitudinally disposed, elongate slots for discretely containing

with end clearance single capsules therewithin; a series of positively driven cleaning rollers associated with said capsule moving means and adapted to engage and clean the surfaces of said capsules as they come into association therewith during their movement along said path, and a resilient roller mounted for free rotation at an angle oblique to the longitudinal axes of the capsules as they travel along said path whereby, as the capsules come into association with said freely rotatable roller, rotative movement is imparted thereto, and the capsules, including their component parts, are bodily biased longitudinally an extent sufficient to insure their abutting against one end of their respective containing slots and their being ultimately forced into a fully joined condition before leaving said roller.

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